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Vol. 2

Ductile Fracture Toughness of Modified A 302 Grade B Plate Materials

Data Records

Prepared by
D. E. McCabe, E. T. Manneschmidt, R. L. Swain

Oak Ridge National Laboratory

MASTER

Prepared for
U.S. Nuclear Regulatory Commission

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MASTER

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Abstract

The objective of this work was to develop ductile fracture toughness data in the form of J-R curves for modified A 302 grade B plate materials typical of those used in fabricating reactor pressure vessels. A previous experimental study at Materials Engineering Associates (MEA) on one particular heat of A 302 grade B plate showed decreasing J-R curves with increased specimen thickness. This characteristic has not been observed in numerous tests made on the more recent production materials of A 533 grade B and A 508 class 2 pressure vessel steels. It was unknown if the departure from norm for the MEA material was a generic characteristic for all heats of A 302 grade B steels or just unique to that one particular plate.

Seven heats of modified A 302 grade B steel and one heat of vintage A 533 grade B steel were provided to this project by the General Electric Company of San Jose, California. All plates were tested for chemical content, tensile properties, Charpy transition temperature curves, drop-weight nil-ductility transition (NDT) temperature, and J-R curves. Tensile tests were made in the three principal orientations and at four temperatures, ranging from room temperature to 550°F (288°C). Charpy V-notch transition temperature curves were obtained in longitudinal, transverse, and short transverse orientations. J-R curves were made using four specimen sizes (1/2T, 1T, 2T, and 4T). The fracture mechanics-based evaluation method covered three test orientations and three test temperatures [180, 400, and 550°F (82, 204, and 288°C)]. However, the coverage of these variables was contingent upon the amount of material provided. Drop-weight NDT temperature was determined for the T-L orientation only.

None of the seven heats of modified A 302 grade B showed size effects of any consequence on the J-R curve behavior. Crack orientation effects were present, but none were severe enough to be reported as atypical. A test temperature increase from 180 to 550°F (82 to 288°C) produced the usual loss in J-R curve fracture toughness. Generic J-R curves and mathematical curve fits to the same were generated to represent each heat of material.

Volume 1 deals with evaluation of data and discussion of technical findings. This volume (Volume 2) is a compilation of all data developed.

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Ductile Fracture Toughness of Modified A 302 Grade B Plate Materials, Data Records*

D. E. McCabe, E. T. Manneschmidt,
and R. L. Swain

1. Introduction

This volume is a compilation of all data generated in the project. The purpose is to put on record the text matrix, material identification, sampling plans, specimen designs used, and all of the data obtained. There are seven heats of modified A 302 grade B pieces, identified as Z1 through Z7.
Z1 and Z2 are from the same heat of steel, but are separately received pieces. There is also one piece of vintage A 533 grade B, identified as Z8. The objective of this work was to obtain upper-shelf fracture toughness characterization in the form of J-R curves. Of interest were specimen size effects, anisotropy of fracture properties (orientation effect on J-R curve), and test temperature effects. Three test temperatures selected were 180, 400, and 550°F (82, 204, and 288°C). Test orientations for compact specimens were transverse (T-L), longitudinal (L-T), and short transverse (L-S).

The materials were provided to the project by General Electric Corp., San Jose, California. The materials are archival, retained from operating reactors for future reference. The long storage time has led to some problems with heat and rolling direction identification, so the heat numbers reported here should be used with some caution.

Appendix A contains the specimen sampling plan. Note that the code/specimen number combinations are repeated on each specimen size or specimen type. This means that the specimen size or type is relied upon as an unwritten code [see Figure A1(a) through (d)].

Appendix B contains the baseline material characterization information on chemistries, tensile test records, Charpy V-notch transition curves, and drop-weight nil-ductility (NDT) data. Each plate was sampled for chemistries. The three tensile test directions were longitudinal (L), transverse (T), and short transverse (S). The three Charpy specimen orientations were longitudinal (L-T), transverse (T-L), and short transverse (L-S). Figures B1 through B4 show the tensile, Charpy, and drop-weight NDT specimens, respectively..

Appendix C contains photomicrographs of end pieces cut from broken Charpy specimens. Figure C1 shows the orientations of these specimens. The main purpose of this sampling was to metallographically identify the principal rolling direction in each piece. These pictures are included here for typical microstructural evaluation only.

Appendix D presents all J-R curves generated in this project. The compact specimen and test matrix for 1/2TC(T), 1TC(T), and 2TC(T) specimens are described in Figures D1 through D3 and Tables D1 through D3, respectively. Figure D4 shows the dimension of the 4TC(t) specimens. All information relevant to each J-R curve is presented in the leading pages.

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Appendix A

Sampling Plans for Plates Z1 through Z8
(Pieces supplied to this Project are Marked ORNL)

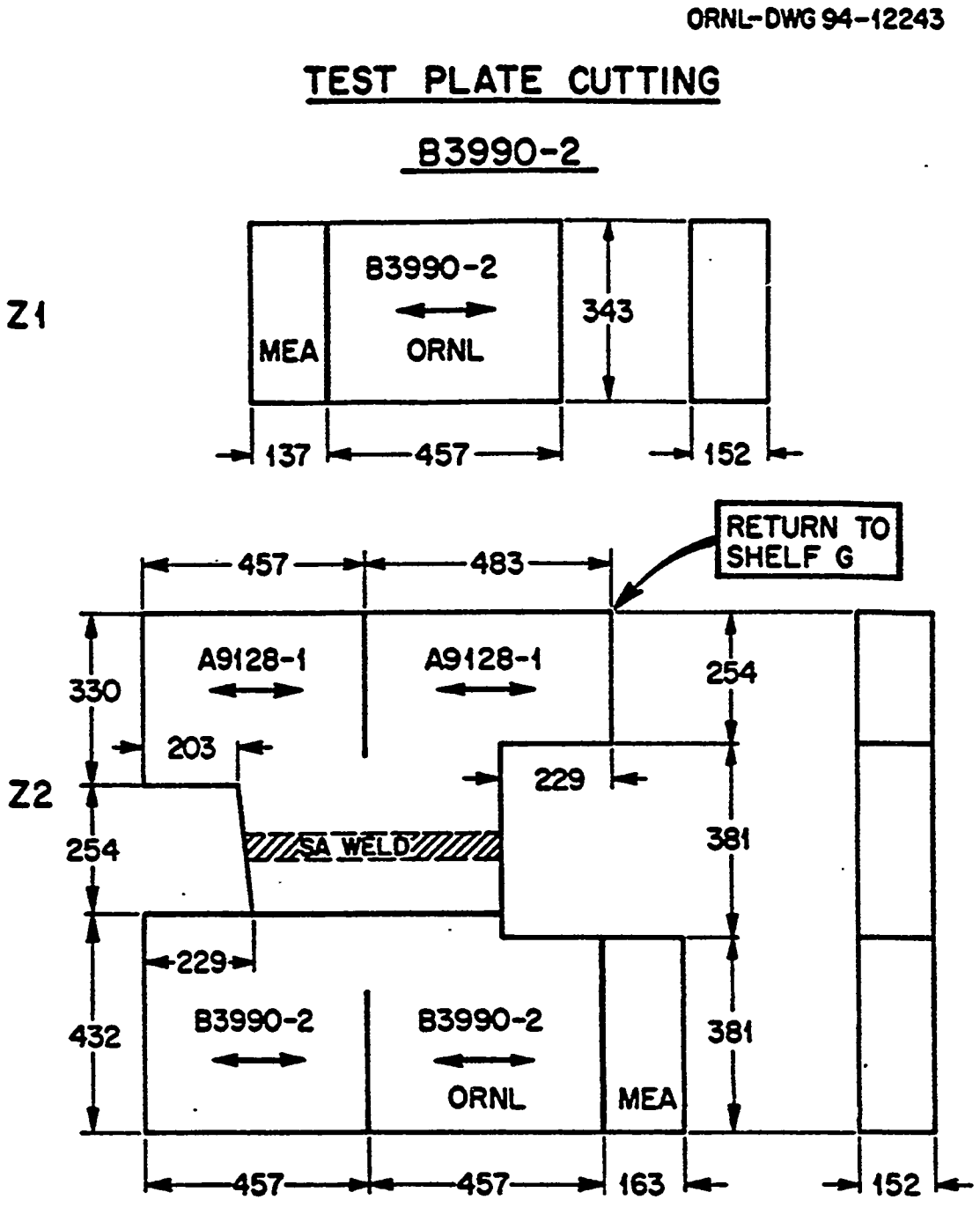
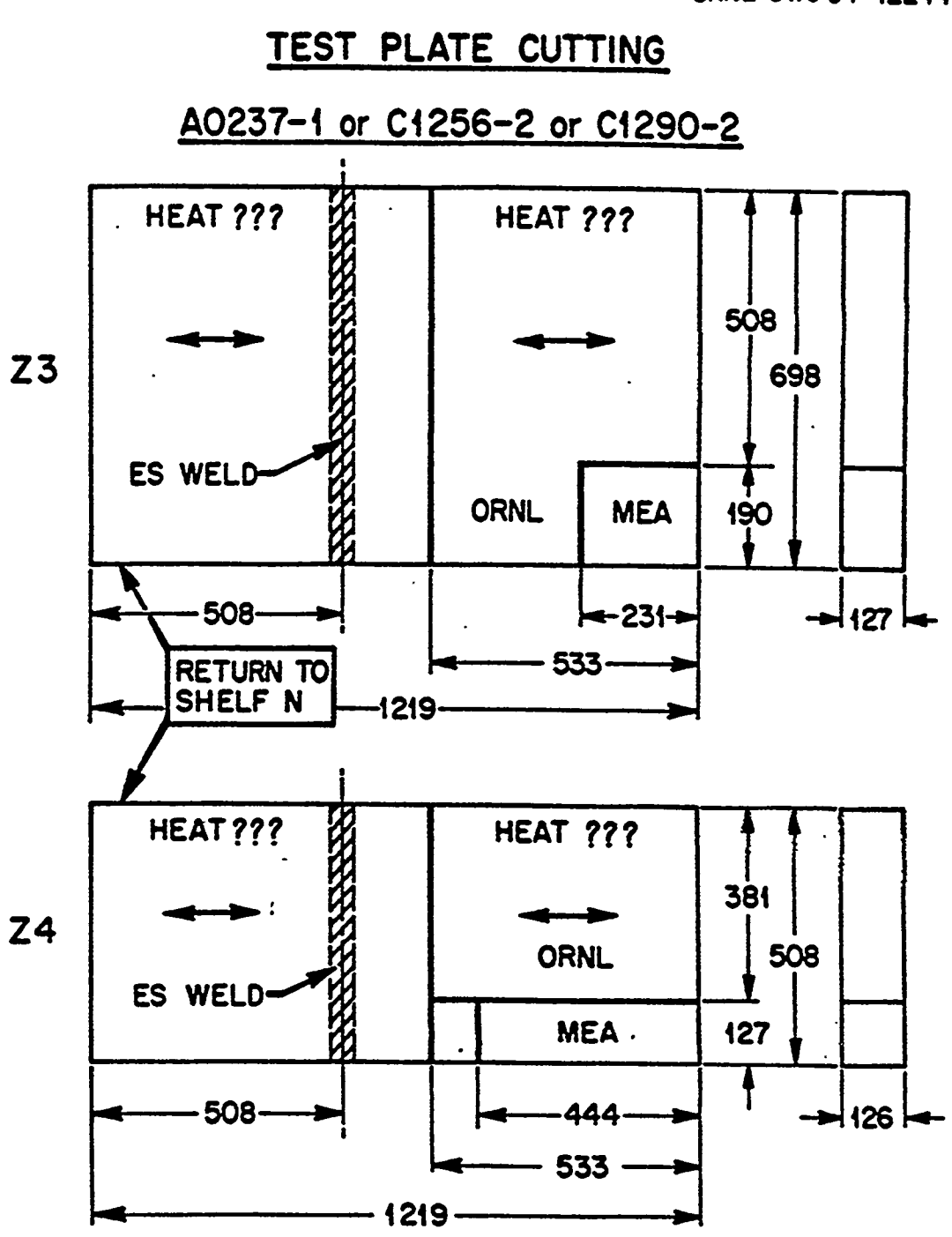


Figure A1. General Electric-supplied plates of modified A 302 grade B steel. (a) Codes Z1 and Z2. (b) Codes Z3 and Z4. (c) Codes Z5 and Z6. (d) Codes Z7 and Z8.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL EDGES ASSUMED BURNED

(b)

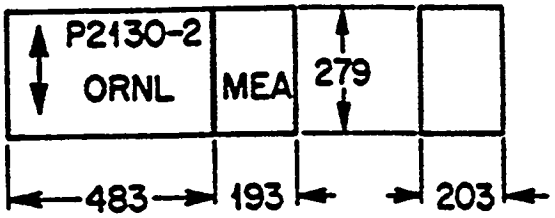
Figure A1. (continued)

ORNL-DWG 94-12245

TEST PLATE CUTTING

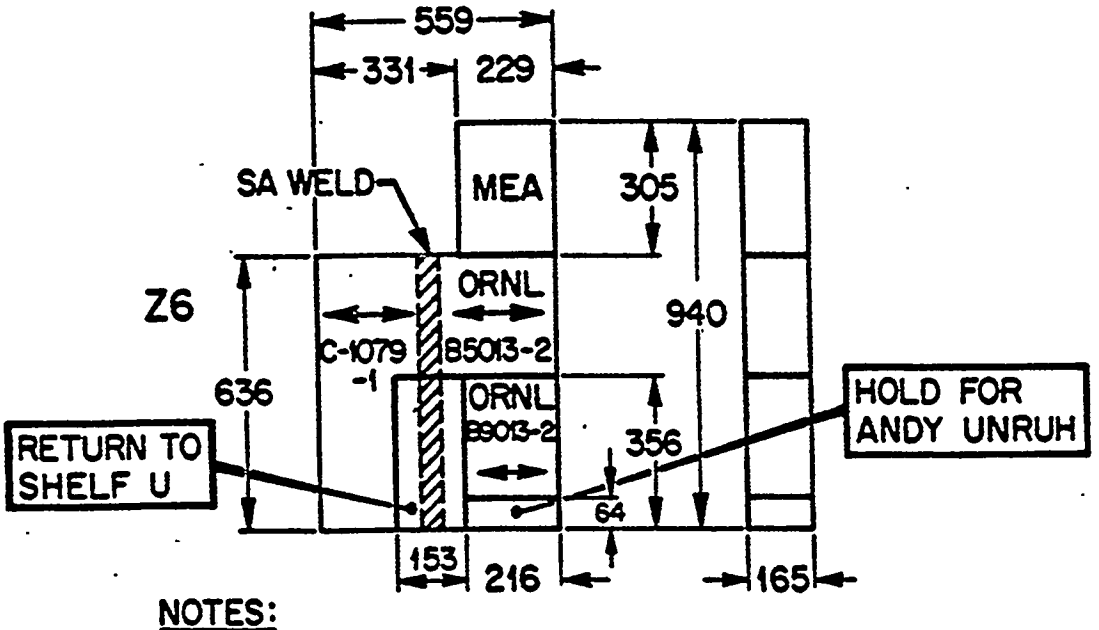
P2130-2

Z5



C1079-1 and B5013-2

Z6



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS
2. EDGES ARE BURN CUT WITH LONG EDGES STAMPED AS QUENCHED EDGES

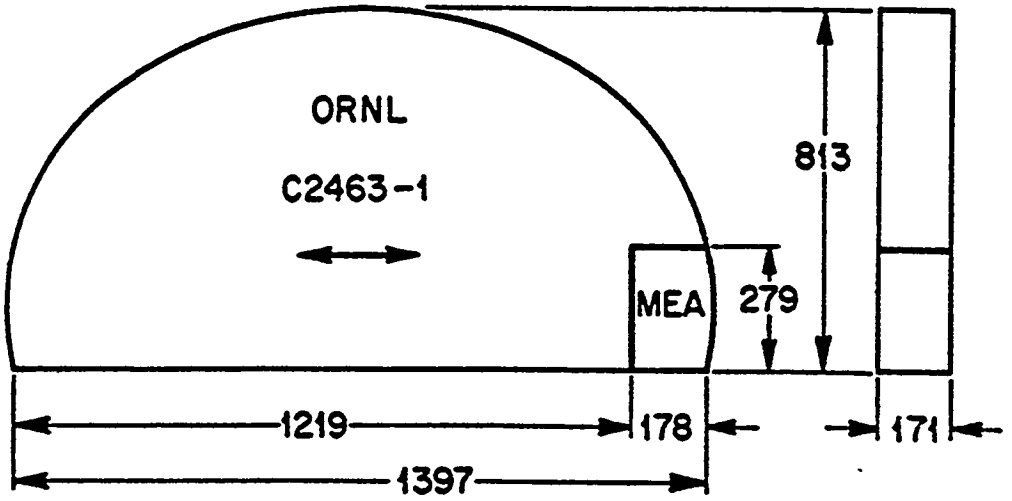
(c)

Figure A1. (continued)

TEST PLATE CUTTING

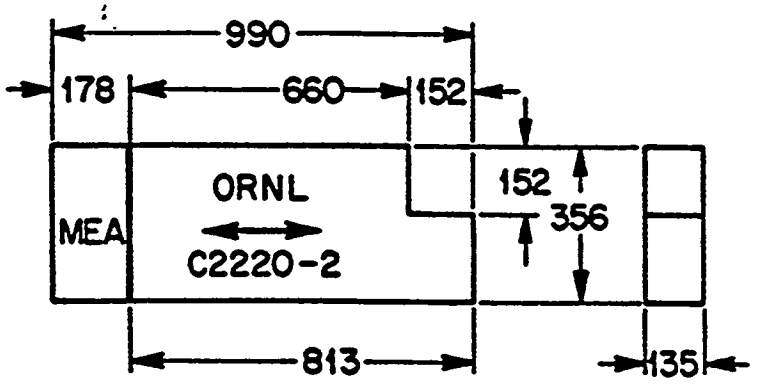
C2463-1

Z7



C2220-2

Z8



NOTES:

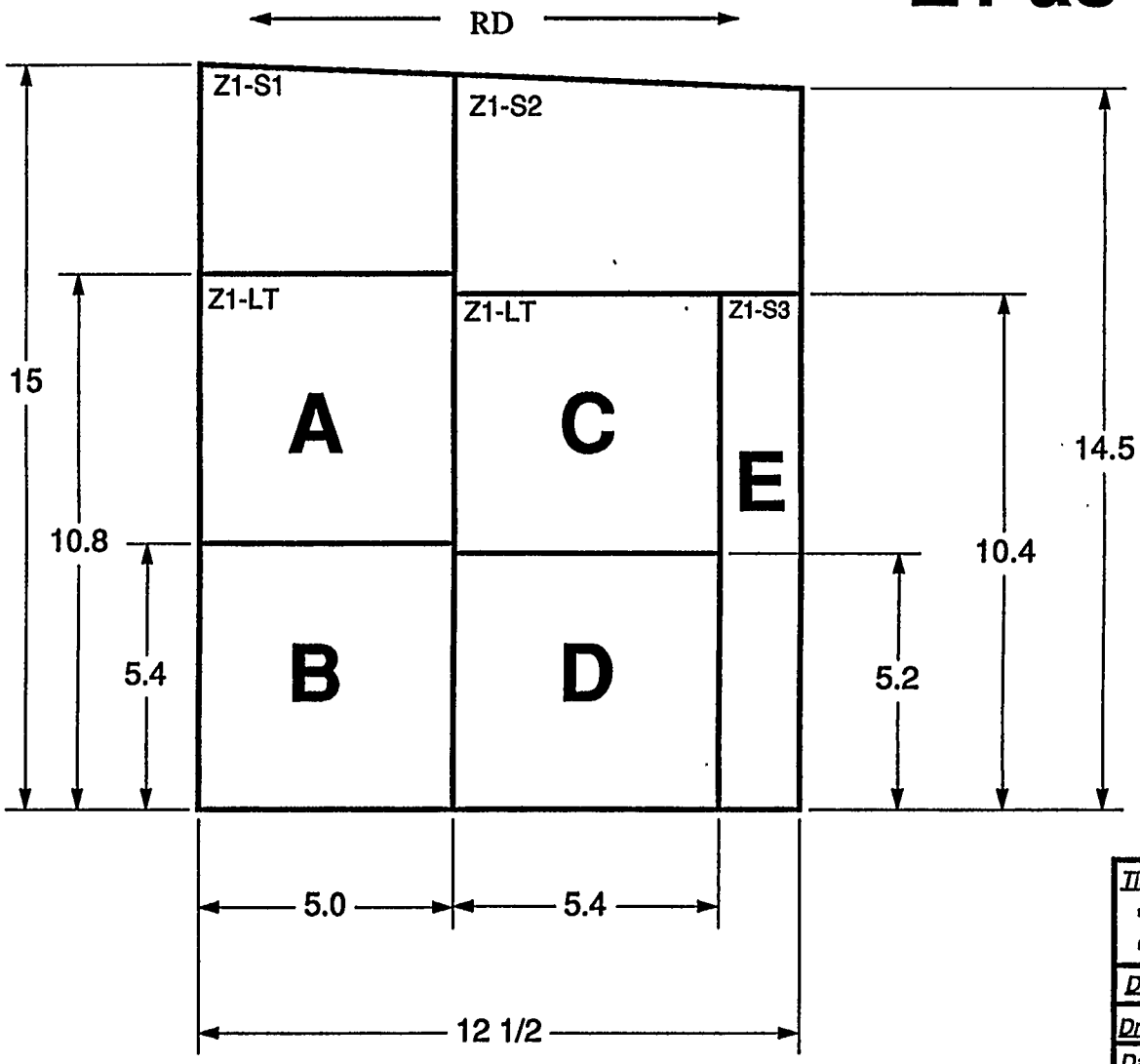
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. ALL EDGES ASSUMED BURNED

(d)

Figure A1. (continued)

Block	Contents of Z1 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A		4	1			
B			1		32	16
C			1			
D			1			
E					10	8
TOTAL	0	4	4	0	42	24

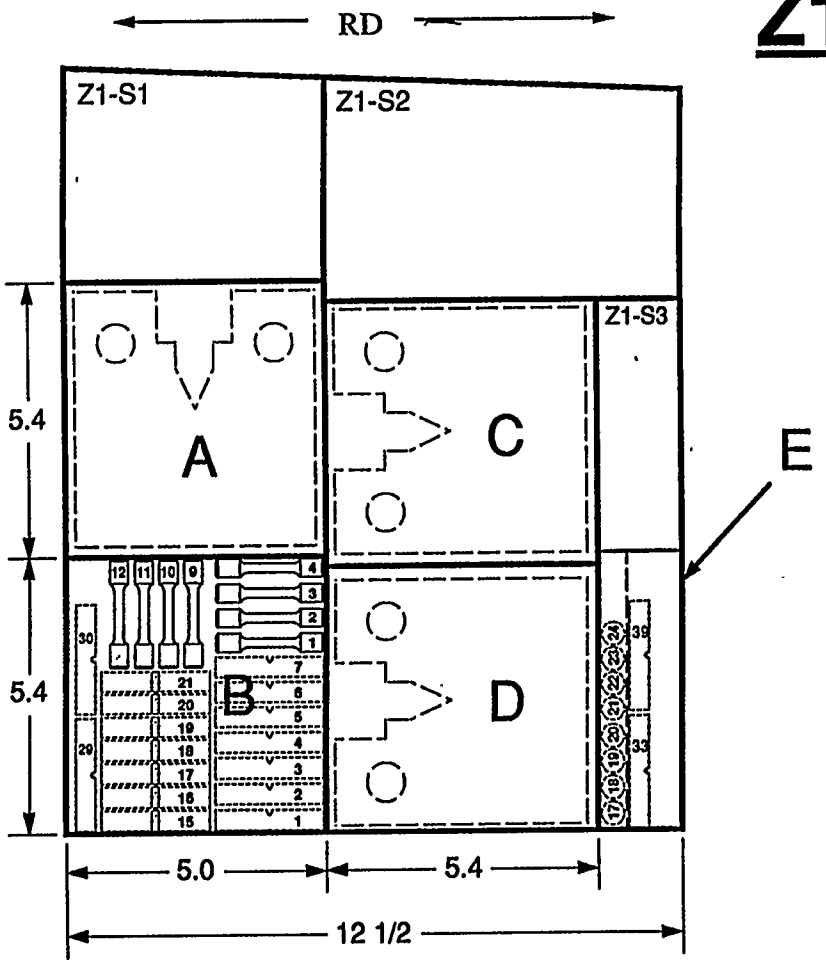
Z1 as Received

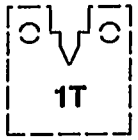


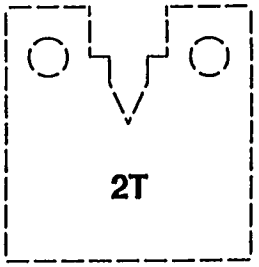
ornl
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Title:	Z1 as Received
Drawing Number:	FMG-L 019 r.0
Drawn:	E.T. Manneschmidt
Date:	July 9, 1993
QAS Approved:	

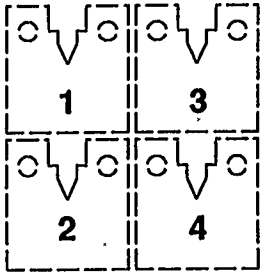
Z1





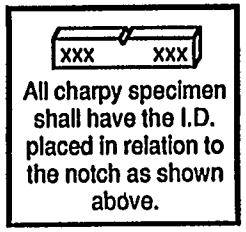


All specimen I.D.s from block "Z1" shall start Z1 folowed by the number shown on the drawing.



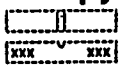
Orientation and I.D.s of 1Ts under the 2T (showing) in "**A**"

The 2T in Section "B" is in the same orientation as the 2T in Section "A".

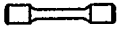


All charpy specimen shall have the I.D. placed in relation to the notch as shown above.

Charpy



Tensile

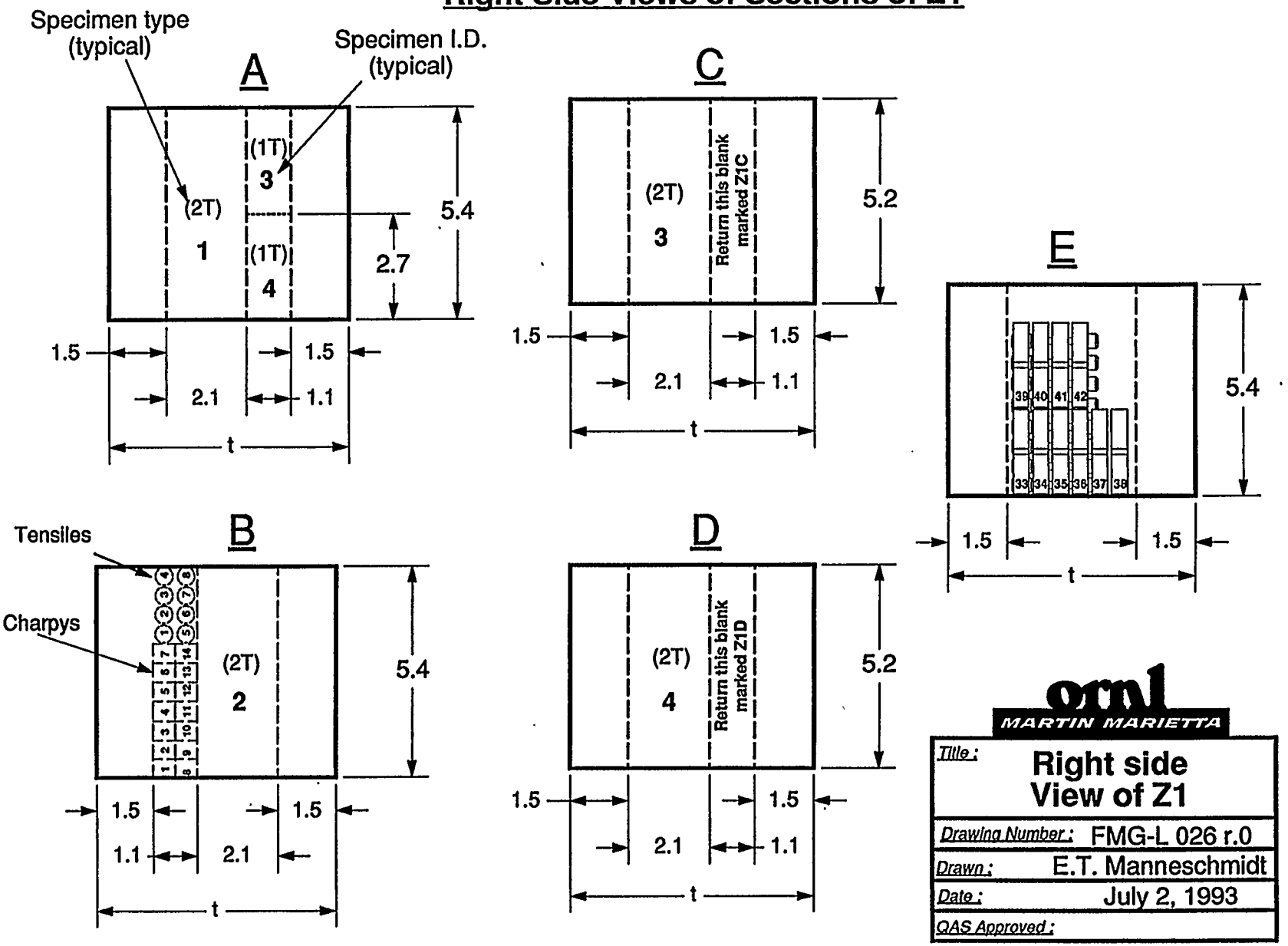


I.D. on each end.

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Title:	**Top View of Z1**
Drawing Number:	FMG-L 009 r.0
Drawn:	E.T. Manneschmidt
Date:	July 2, 1993
QAS Approved:	

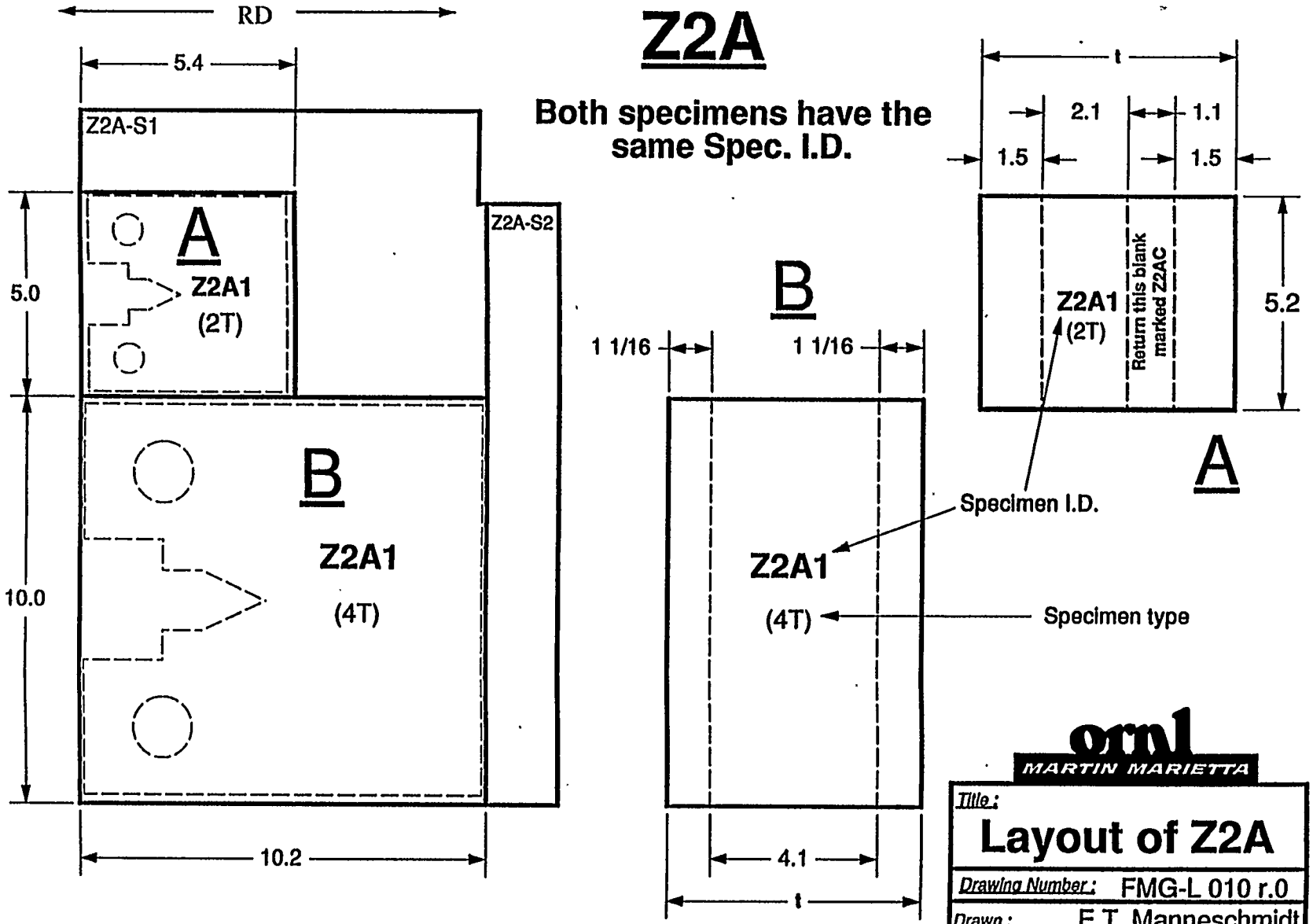
Right Side Views of Sections of Z1



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Drawing Number:	FMG-L 026 r.0
Drawn:	E.T. Manneschmidt
Date:	July 2, 1993
QAS Approved:	

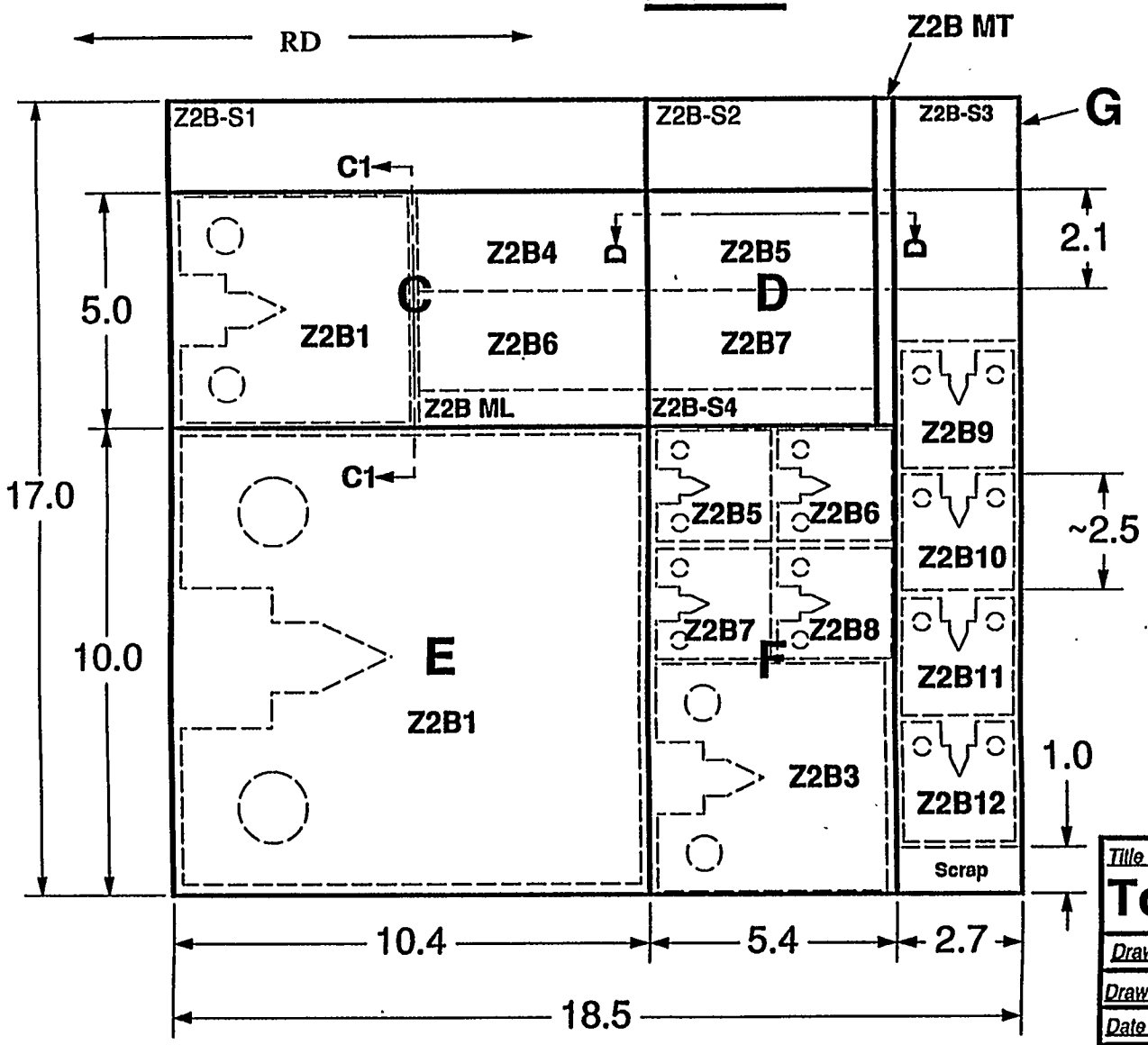
Block	Contents of Z2 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A			1			
B				1		
C		4	3			
D			2			
E				1		
F	16	4	2			
G		8				
TOTAL	16	16	8	2	0	0

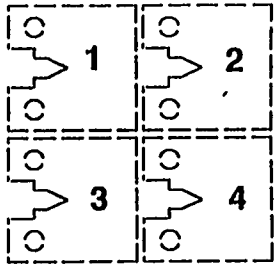


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Title:	**Layout of Z2A**
Drawing Number:	FMG-L 010 r.0
Drawn:	E.T. Manneschmidt
Date:	July 7, 1993
QAS Approved:	

Z2B





Orientation and I.D.s of 1Ts under Z2B1 (2T) in "C".

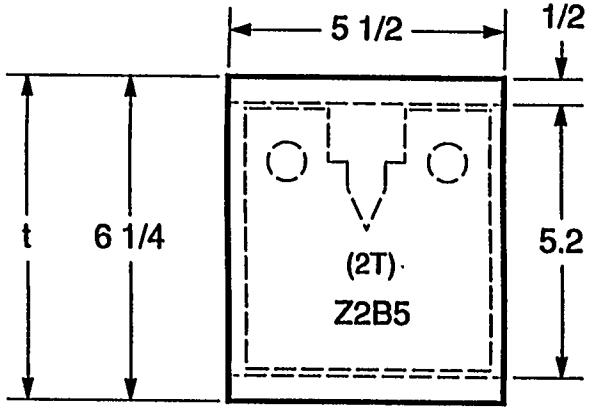
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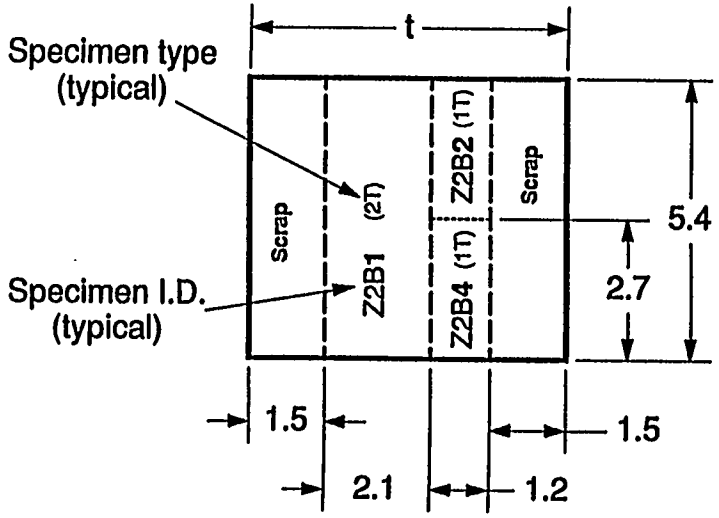
Title:	**Top View of Z2B**
Drawing Number:	FMG-L 011 r.0
Drawn:	E.T. Manneschmidt
Date:	July 7, 1993
QAS Approved:	

Z2B Blocks C, D, & E

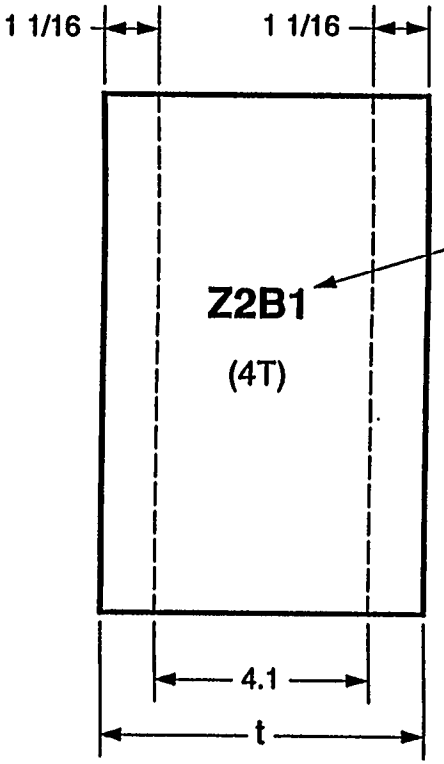
(for use in specimen I.D. and orientation)

Section D - D





Section C1 - C1

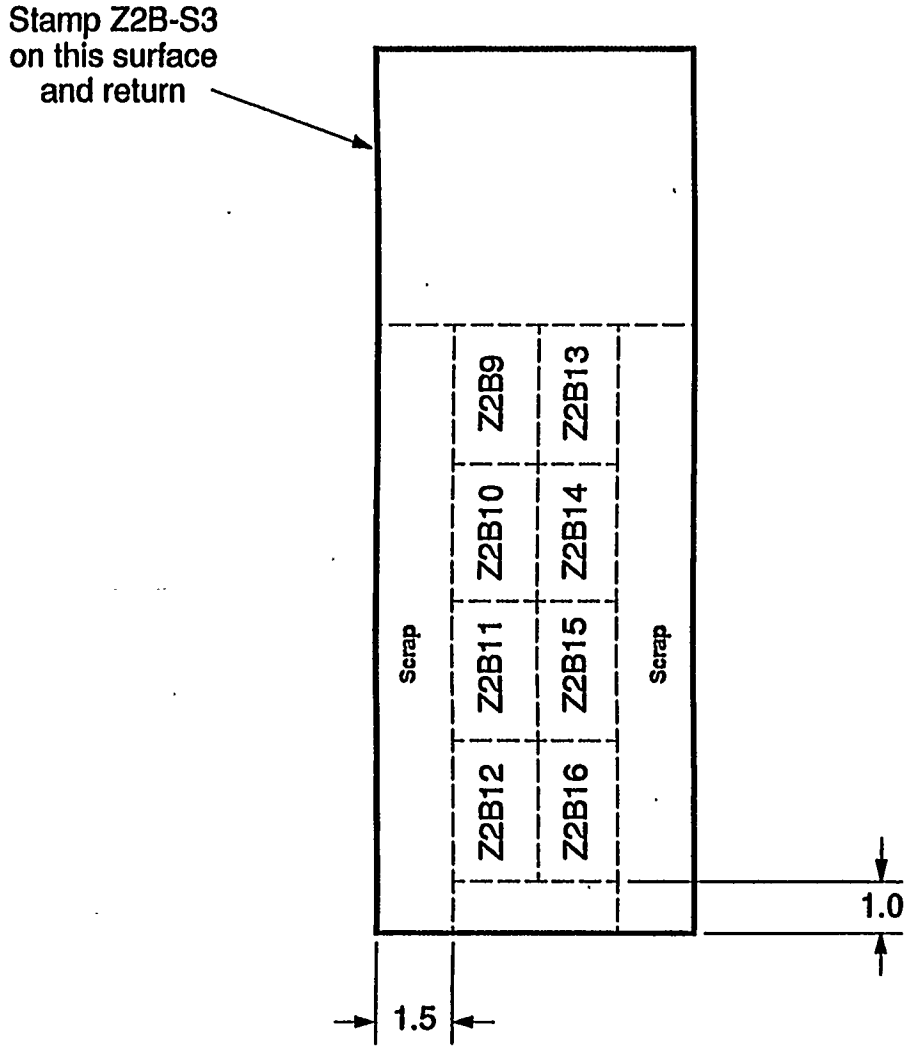


E (right side view)

ornl
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Title: Views of Blocks C, D, and E (Z2B)	
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Drawn:	E.T. Manneschmidt
Date:	July 7, 1993
QAS Approved:	

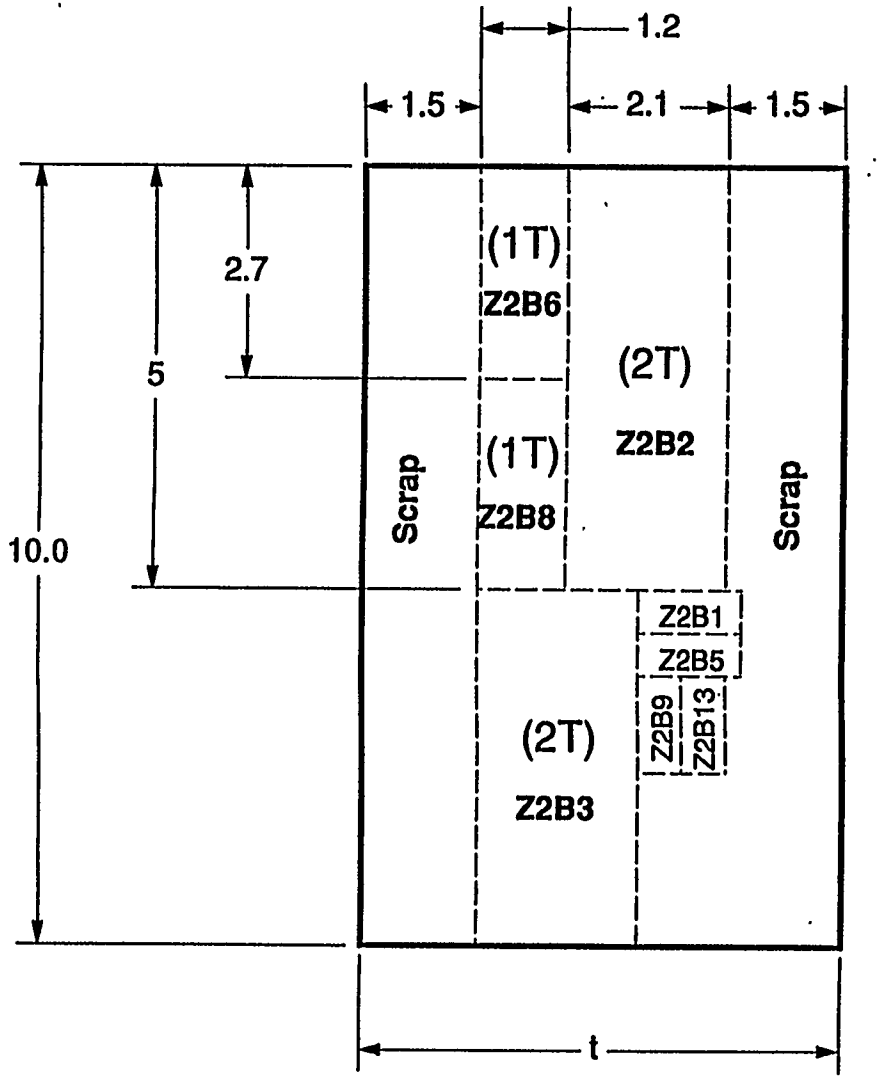
Right Side View Block G



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Title:	Right Side View of Block G (Z2B)
Drawing Number:	FMG-L 013 r.0
Drawn:	E.T. Manneschmidt
Date:	July 8, 1993
QAS Approved:	

Right Side View Block F

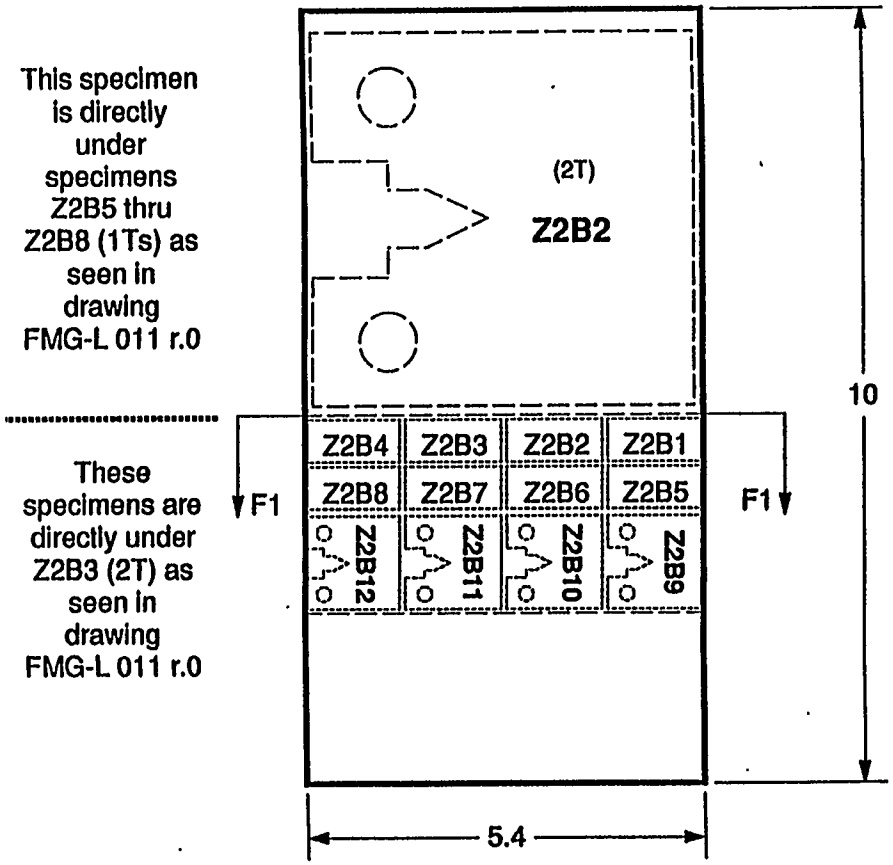


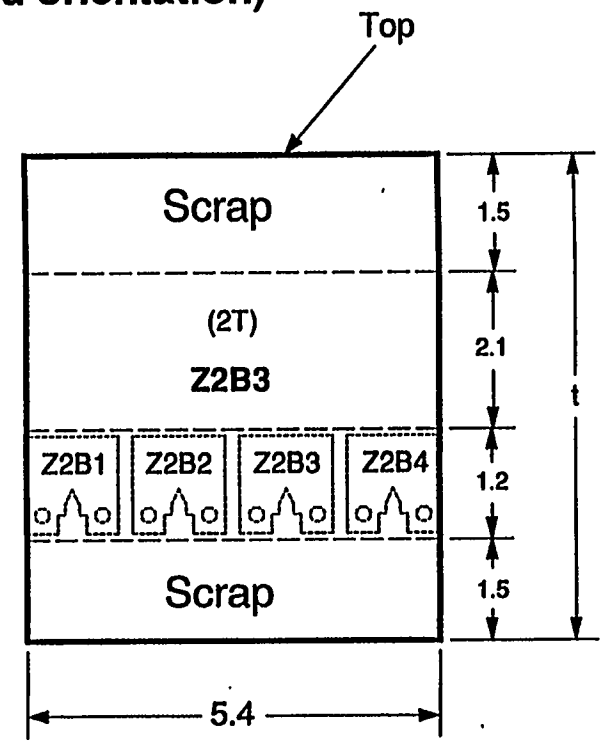
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Title:	Right side View of Block F (Z2B)
Drawing Number:	FMG-L 014 r.0
Drawn:	E.T. Manneschmidt
Date:	July 7, 1993
QAS Approved:	

Block F

(for use in specimen I.D. and orientation)





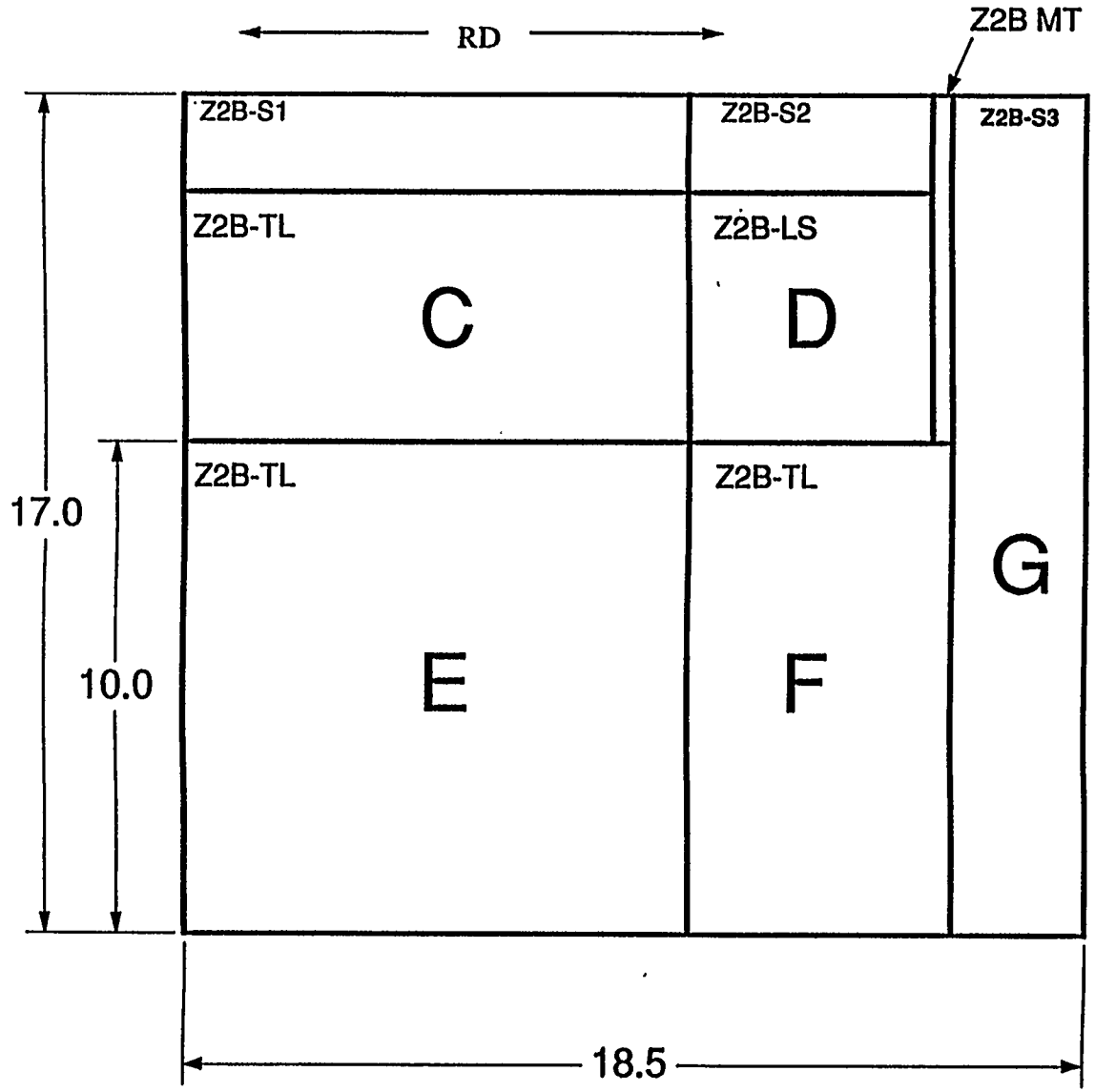
Section F1 - F1

Second level specimens in Block F

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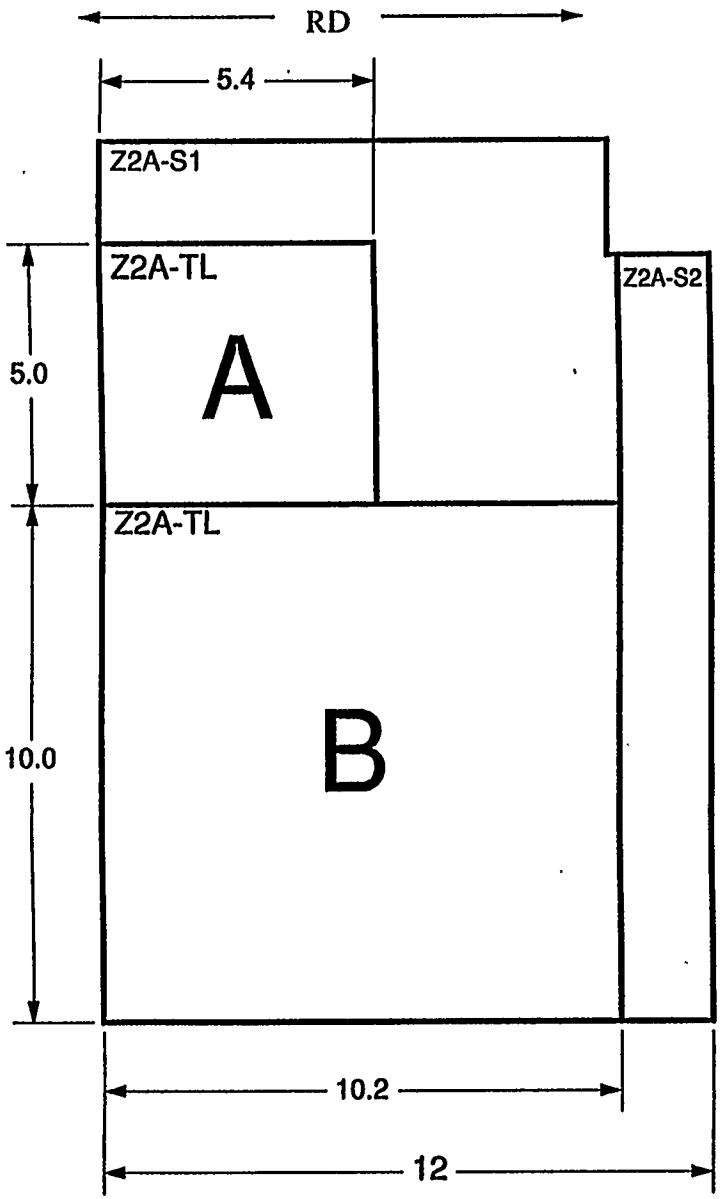
Title:	**Block F (Z2B)**
Drawing Number:	FMG-L 015 r.0
Drawn:	E.T. Manneschmidt
Date:	July 8, 1993
QAS Approved:	

Z2B as Received



ornl
MARTIN MARIETTA

Title:	Z2B as Received
Drawing Number:	FMG-L 017 r.0
Drawn:	E.T. Manneschmidt
Date:	July 9, 1993
QAS Approved:	

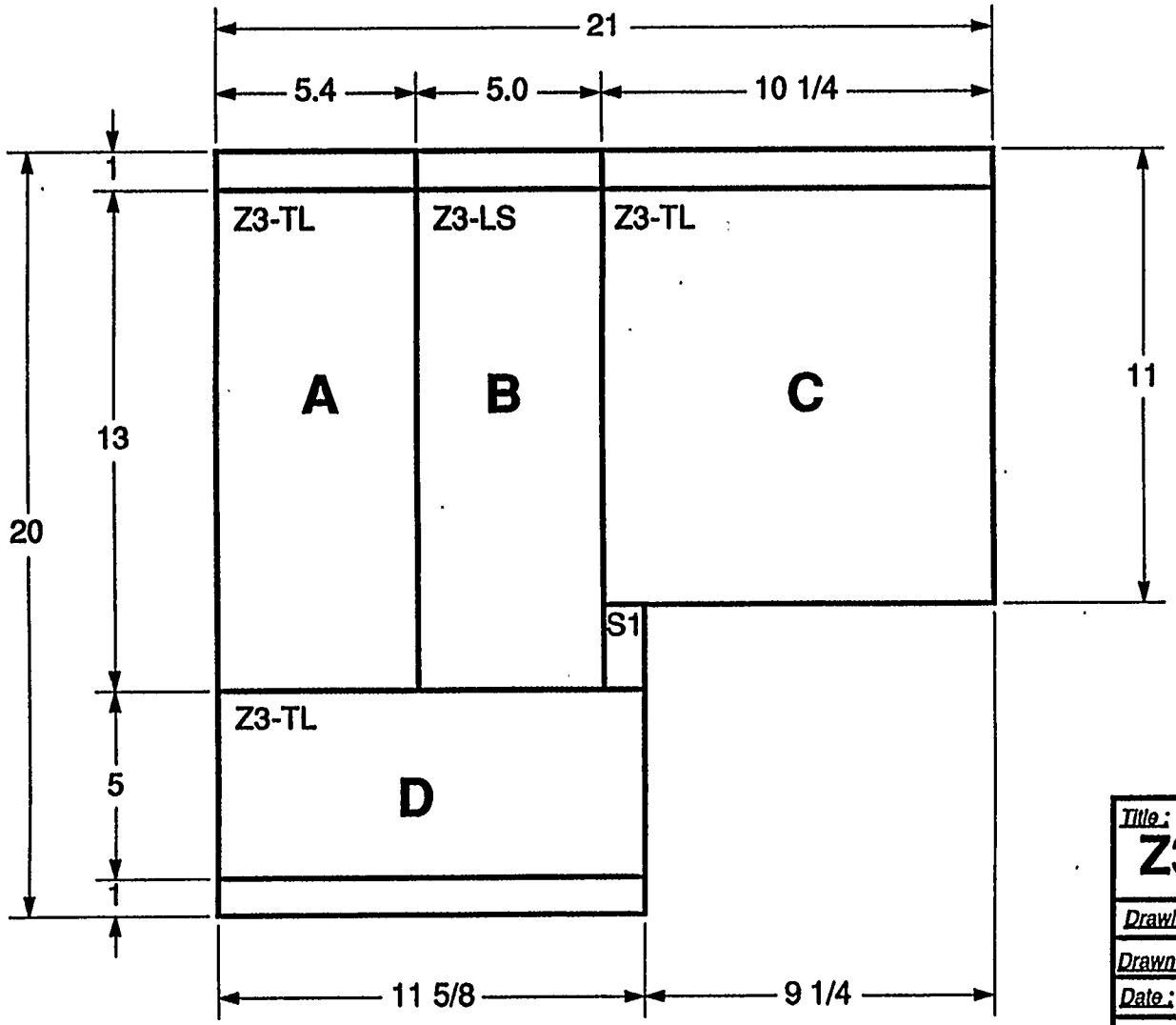


Z2A as Received

MARTIN MARIETTA	
Title:	Z2A as Received
Drawing Number:	FMG-L 018 r.0
Drawn:	E.T. Manneschmidt
Date:	July 7, 1993
QAS Approved:	

Block	Contents of Z3 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A	16	2	2		2	
B			4		42	24
C				1		
D		6	2			
TOTAL	16	8	8	1	44	24

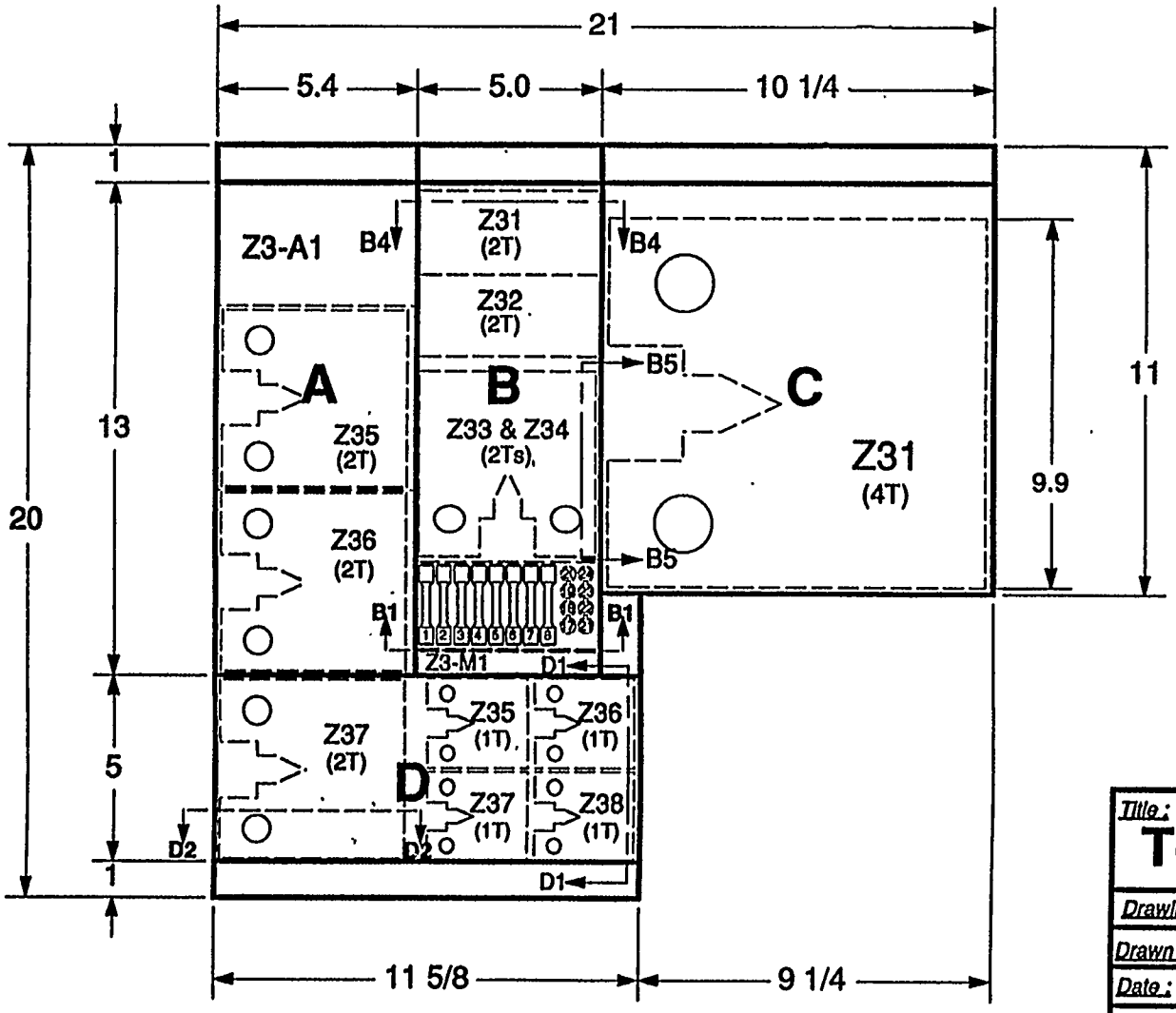
Z3 as Received



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MARTIN MARIETTA

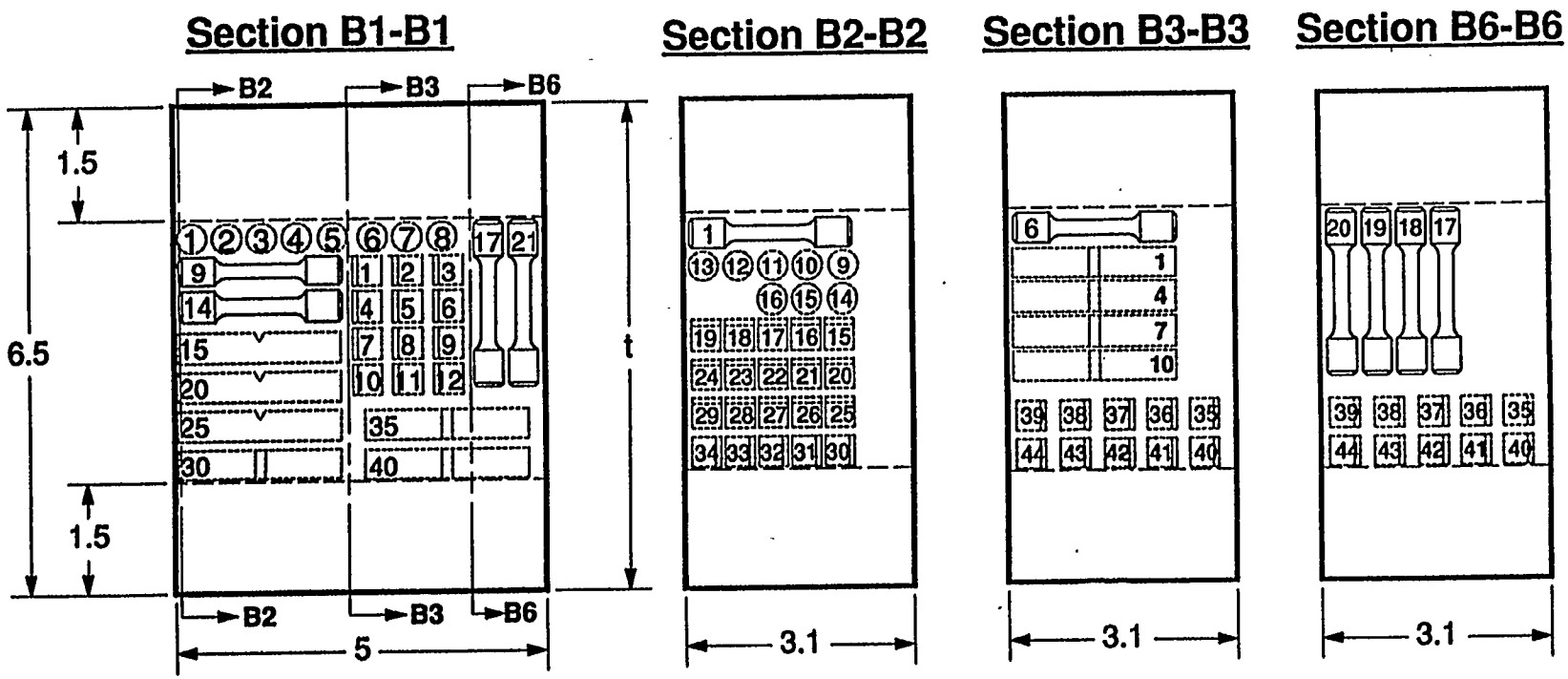
Title:	Z3 as Received
Drawing Number:	FMG-L 027 r.0
Drawn:	E.T. Manneschmidt
Date:	July 16, 1993
QAS Approved:	

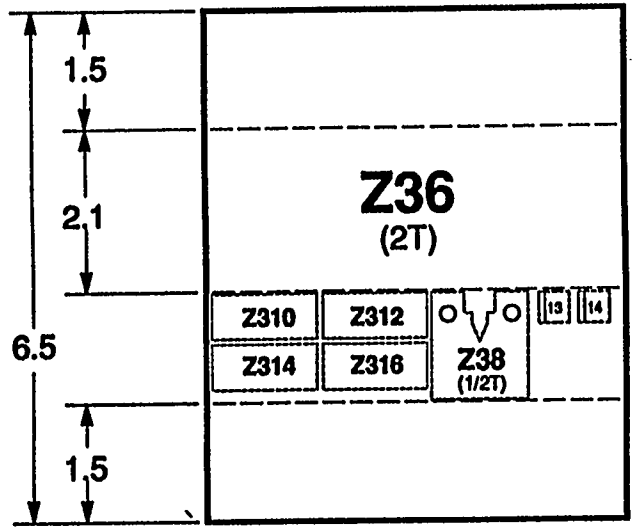
Top View of Z3



ORNL MARTIN MARIETTA

Title:	Top View of Z3
Drawing Number:	FMG-L 033 r.0
Drawn:	E.T. Manneschmidt
Date:	July 19, 1993
QAS Approved:	



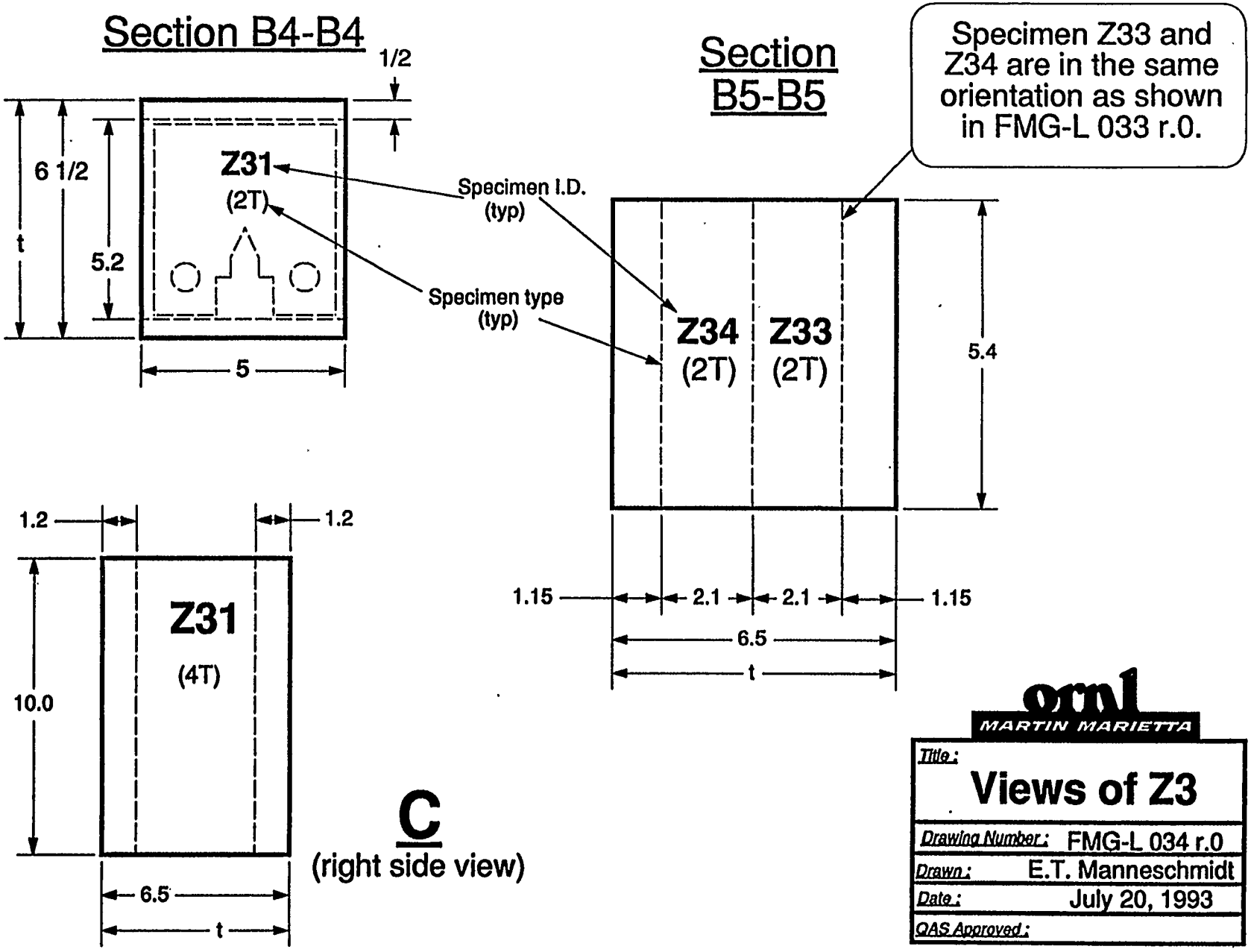


Block A

View from the bottom of Drawing FMG-L 033 r.0 (See FMG-L 037 r.0)

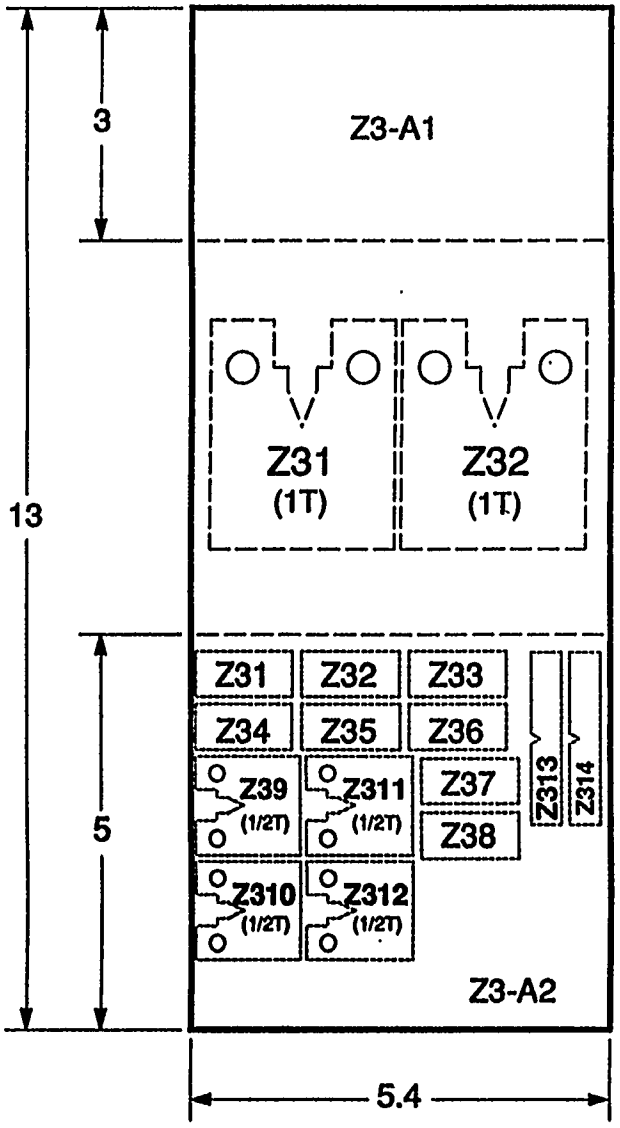
MARTIN MARIETTA

Title:	**Views of Z3**
Drawing Number:	FMG-L 035 r.0
Drawn:	E.T. Manneschmidt
Date:	July 20, 1993
QAS Approved:	


Section B4-B4
1/2
6 1/2
t
5.2
Z31
(2T)
5
Specimen I.D.
(typ)
Specimen type
(typ)
Section
B5-B5
Specimen Z33 and
Z34 are in the same
orientation as shown
in FMG-L 033 r.0.
Z34
(2T)
Z33
(2T)
5.4
1.15
2.1
2.1
1.15
6.5
t
1.2
1.2
Z31
(4T)
10.0
6.5
t
C
(right side view)
ornl
MARTIN MARIETTA
Title:
Views of Z3
Drawing Number: FMG-L 034 r.0
Drawn: E.T. Manneschmidt
Date: July 20, 1993
QAS Approved:

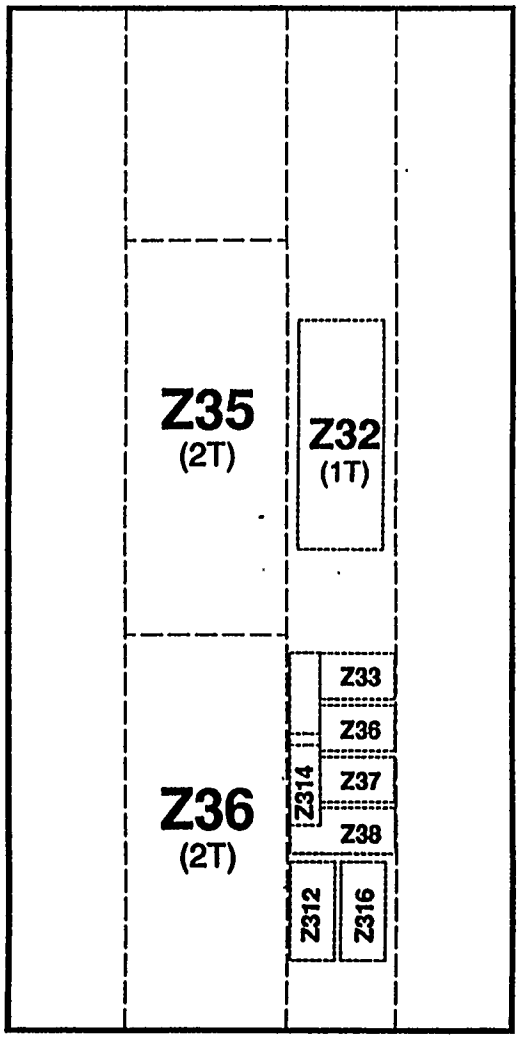
Block A

Layer of specimens under the ones shown in top view in FMG-L 035 r.0.



Block A

Right side view

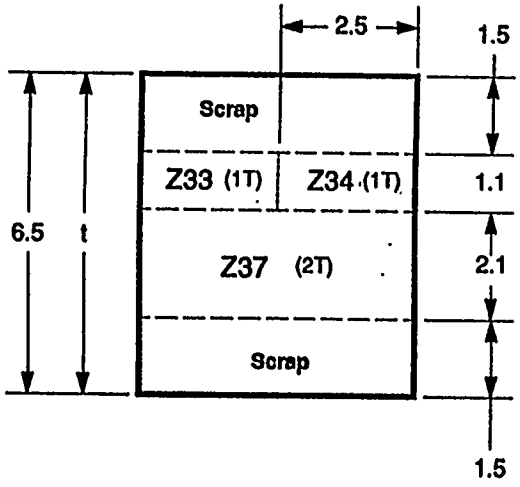


MARTIN MARIETTA

Title: **Views of Z3**

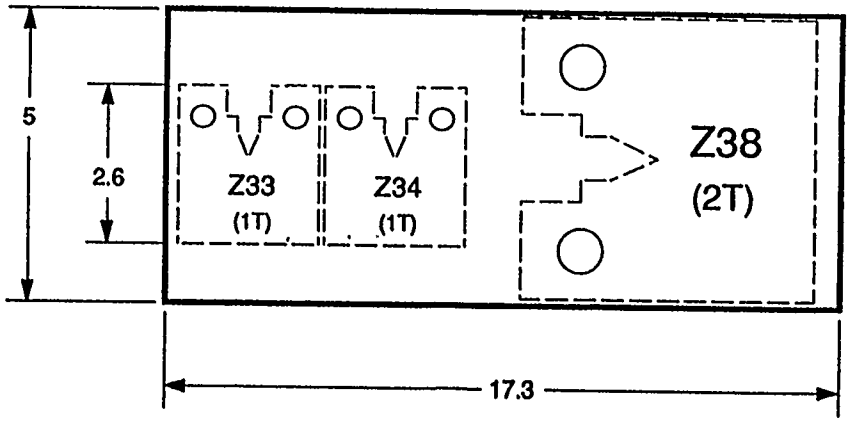
Drawing Number:	FMG-L 037 r.0
Drawn:	E.T. Manneschmidt
Date:	July 21, 1993
QAS Approved:	

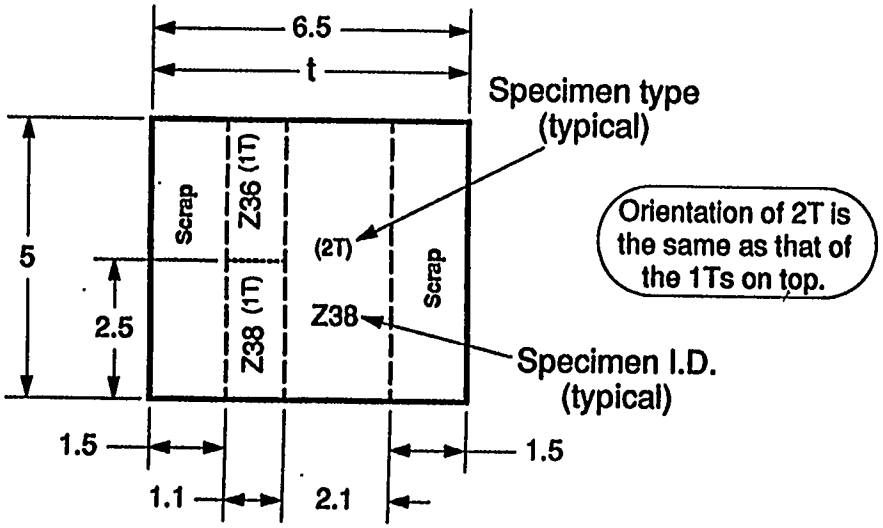
Section D2-D2



Block D

Layer of specimens under the ones shown in top view in FMG-L 035 r.0.





Orientation of 2T is the same as that of the 1Ts on top.

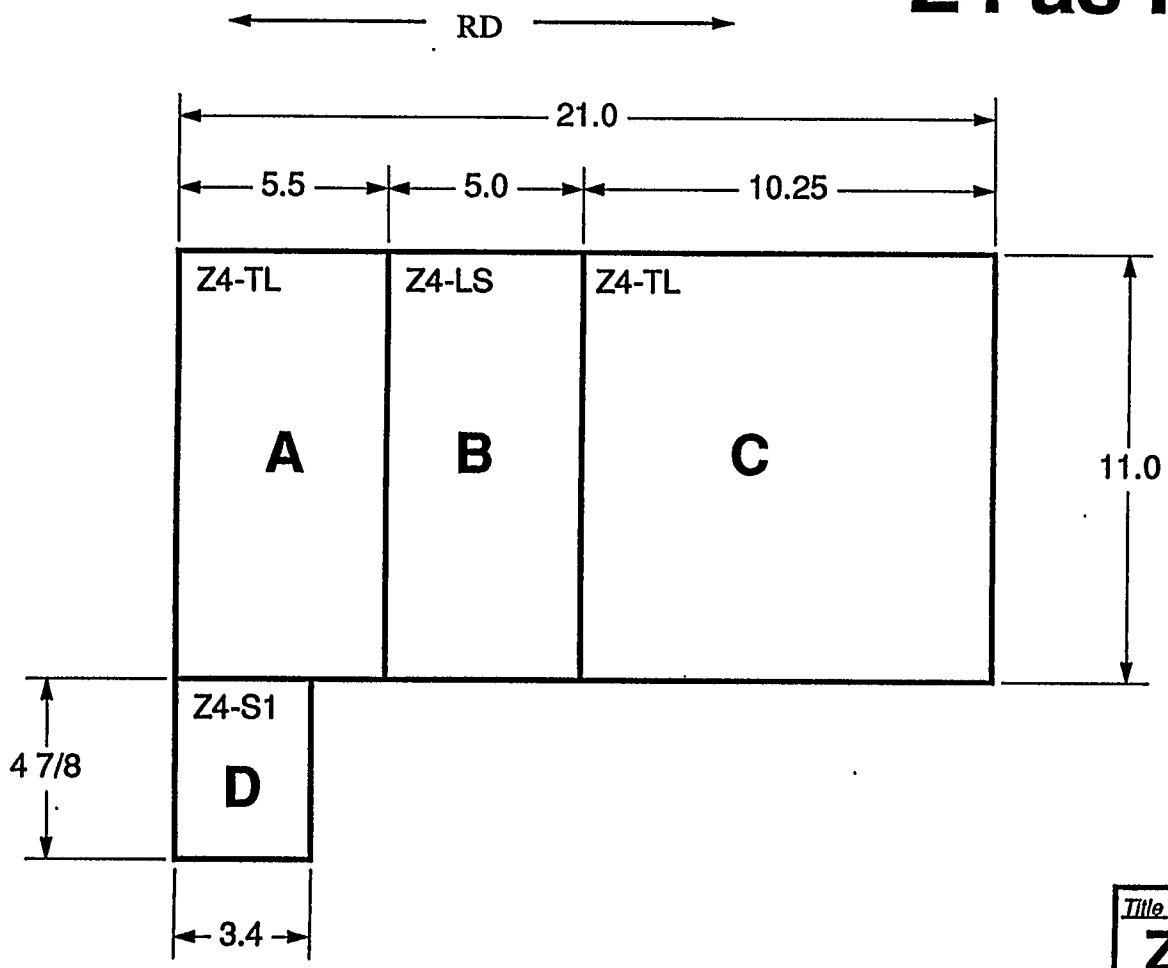
Section D1-D1

ornl MARTIN MARIETTA

Title:	**Views of Z3**
Drawing Number:	FMG-L 036 r.0
Drawn:	E.T. Manneschmidt
Date:	July 20, 1993
QAS Approved:	

Block	Contents of Z4 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A			4			
B	12		4			11
C				1		
D	4				30	13
TOTAL	16	0	8	1	30	24

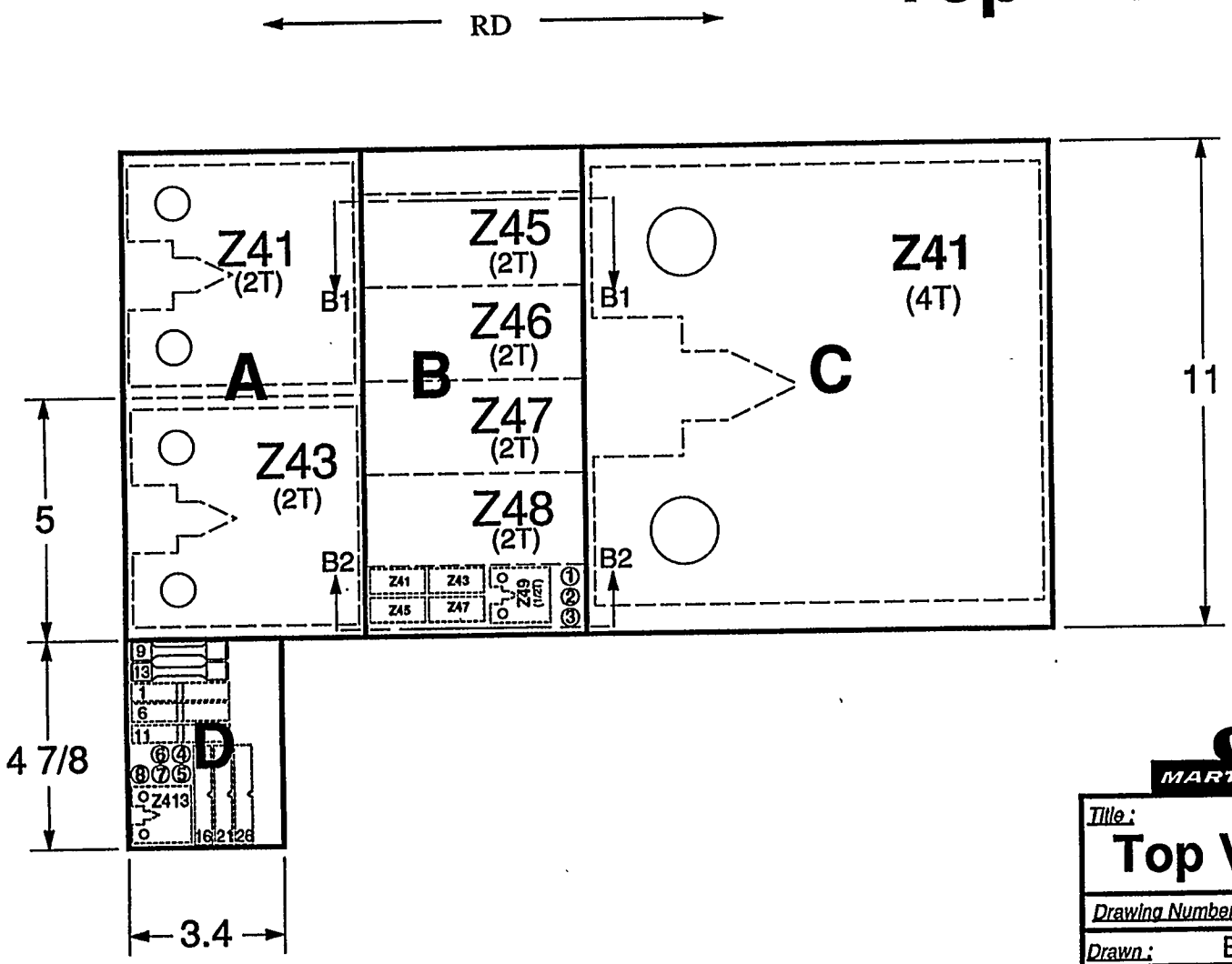
Z4 as Received



ornl MARTIN MARIETTA

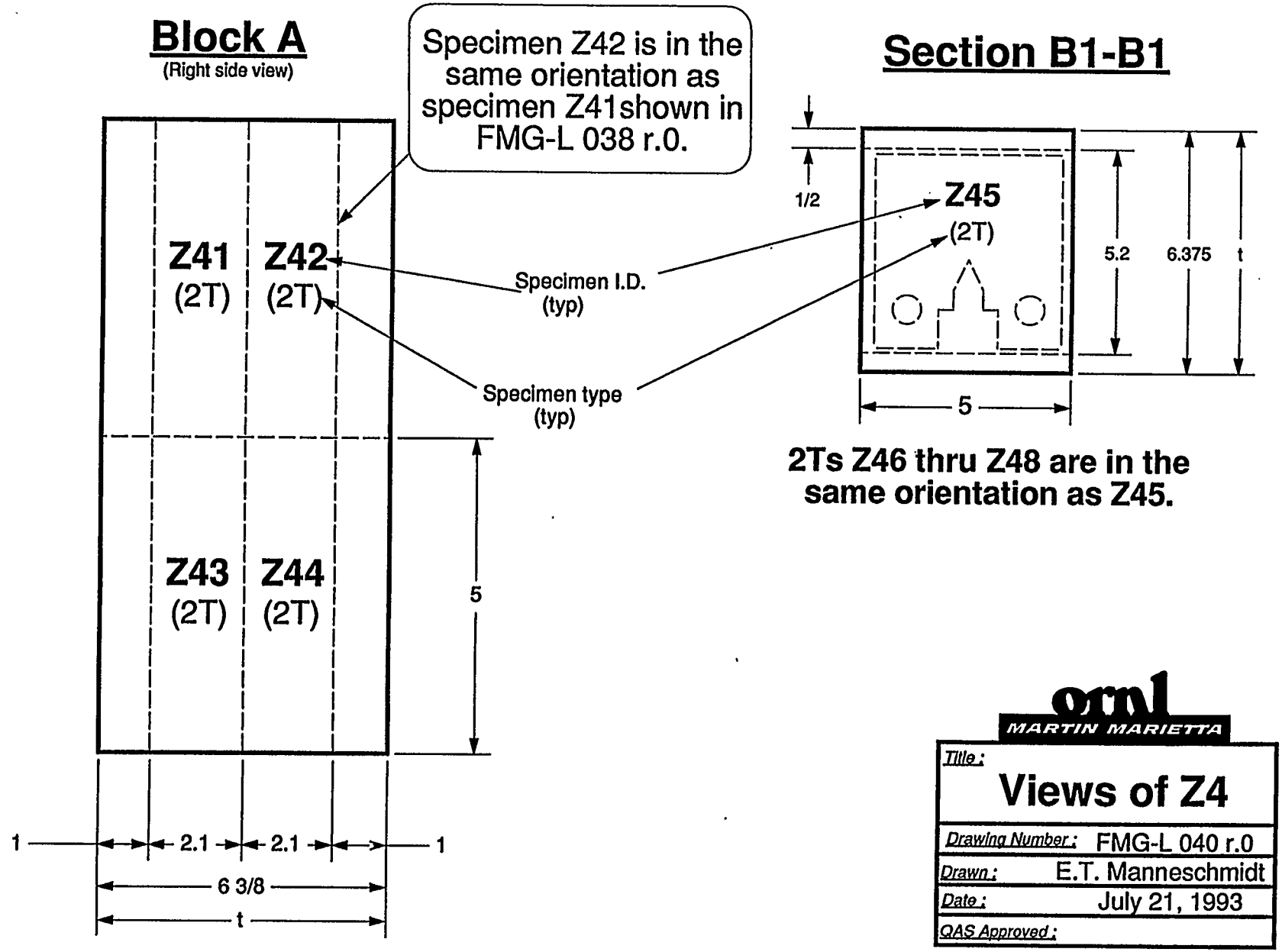
Title:	Z4 as Received
Drawing Number:	FMG-L 028 r.0
Drawn:	E.T. Manneschmidt
Date:	July 16, 1993
QAS Approved:	

Top View of Z4



ornl
MARTIN MARIETTA

Title: Top View of Z4	
Drawing Number:	FMG-L 038 r.0
Drawn:	E.T. Manneschmidt
Date:	July 21, 1993
QAS Approved:	

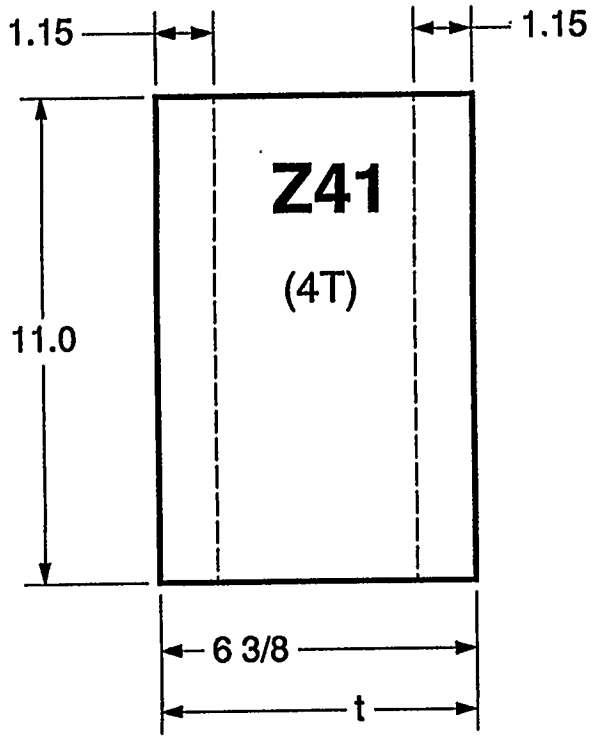


ornl MARTIN MARIETTA

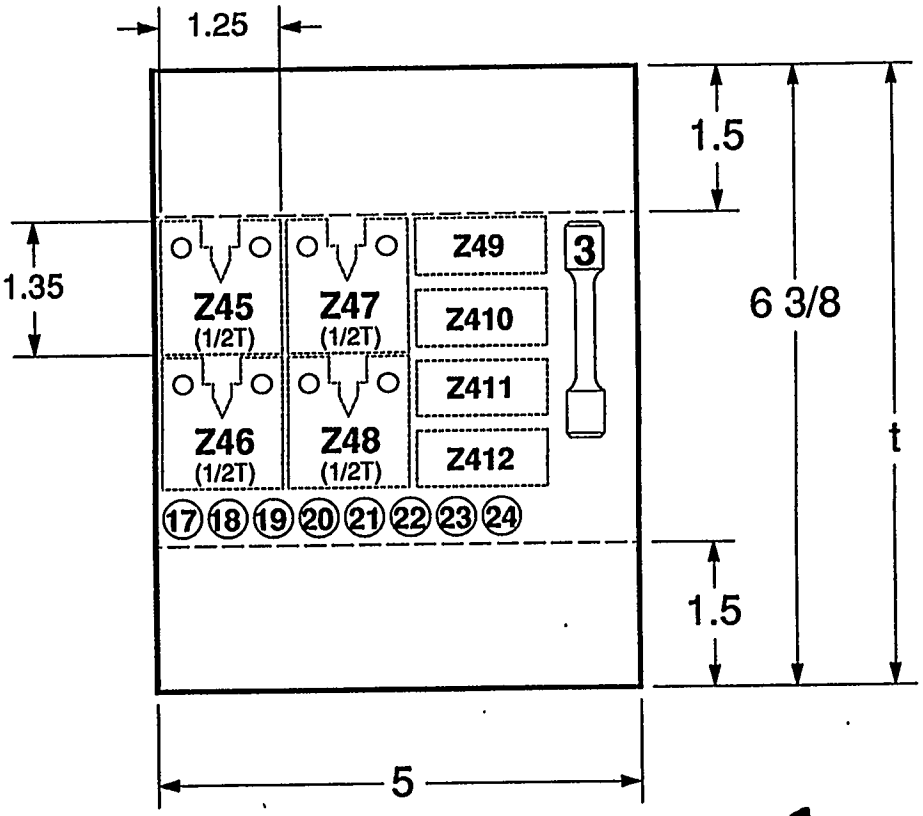
Title:	Views of Z4
Drawing Number:	FMG-L 040 r.0
Drawn:	E.T. Manneschmidt
Date:	July 21, 1993
QAS Approved:	

C

(right side view)



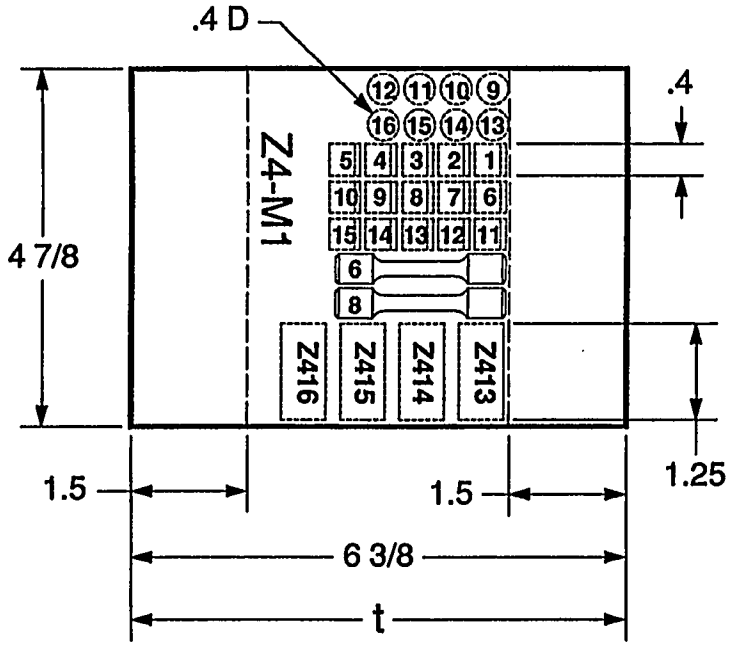
Section B2-B2



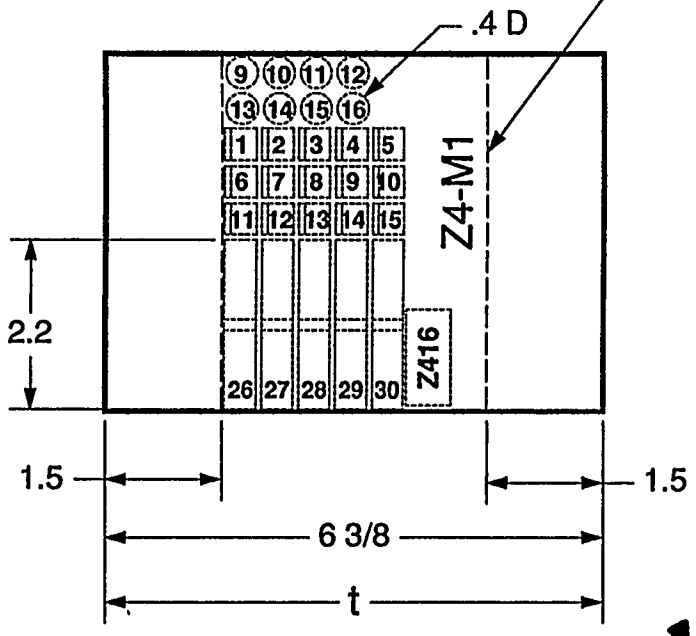
MARTIN MARIETTA

Title:	Views of Z4
Drawing Number:	FMG-L 039 r.0
Drawn:	E.T. Manneschmidt
Date:	July 21, 1993
QAS Approved:	

Block D
(Left side view)



Block D
(Right side view)



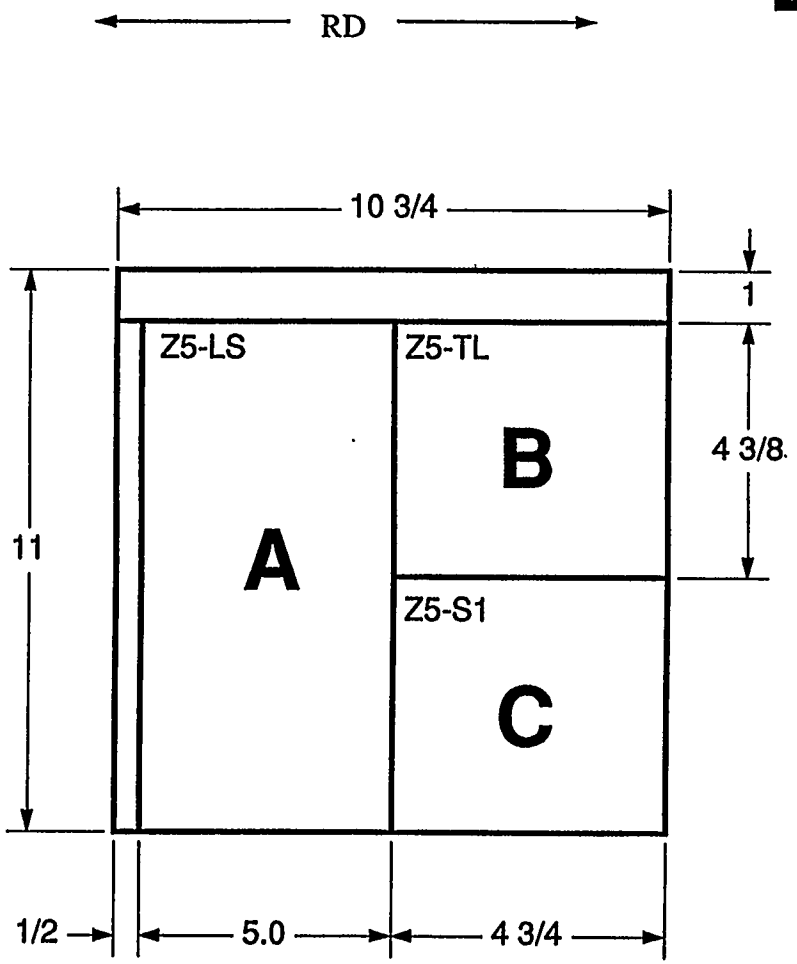
ornl
MARTIN MARIETTA

Title:	**Views of Z4**
Drawing Number:	FMG-L 041 r.0
Drawn:	E.T. Manneschmidt
Date:	July 21, 1993
QAS Approved:	

Contents of Z5

Block	Contents of Z5 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A	16		4		12	8
B		2	2		18	
C		2	2		10	8
TOTAL	16	4	8	0	40	16

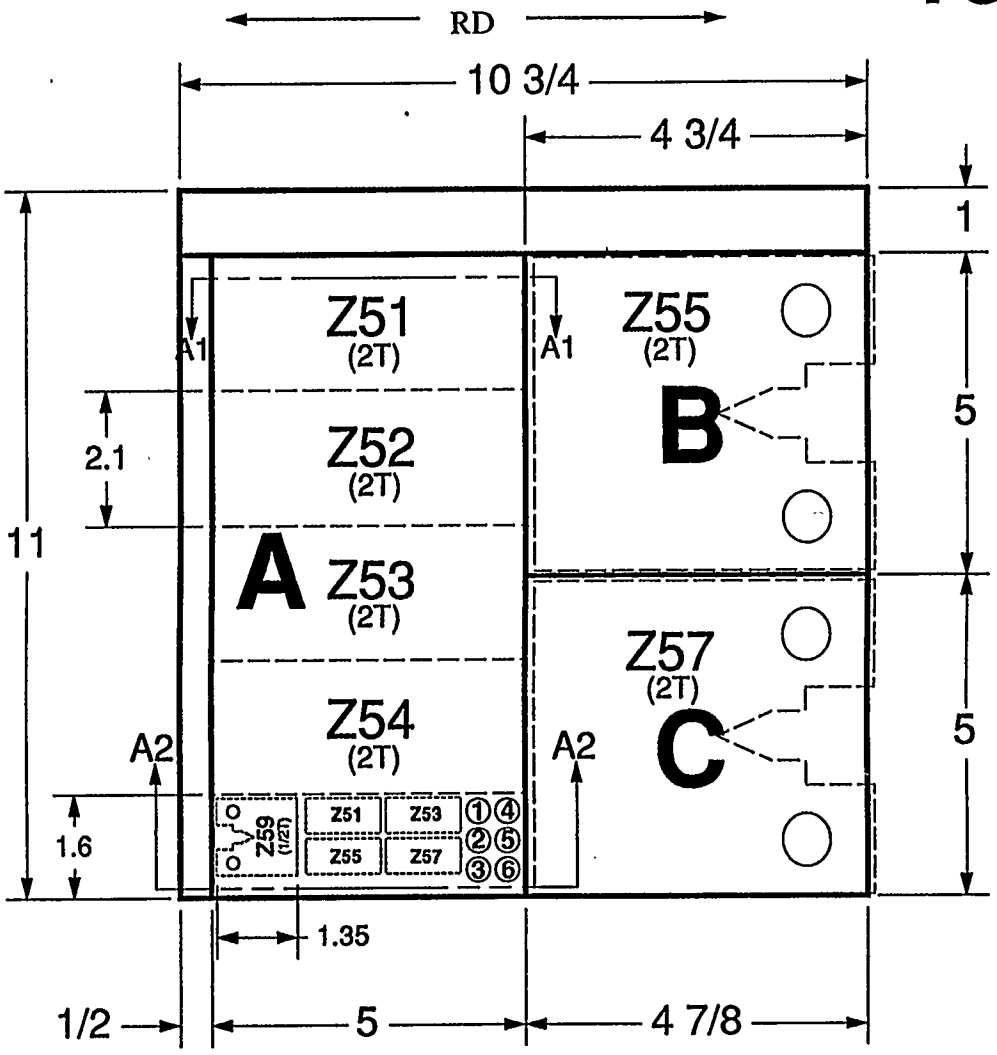
Z5 as Received



MARTIN MARIETTA

Title:	Z5 as Received
Drawing Number:	FMG-L 029 r.0
Drawn:	E.T. Manneschmidt
Date:	July 16, 1993
QAS Approved:	

Top View of Z5



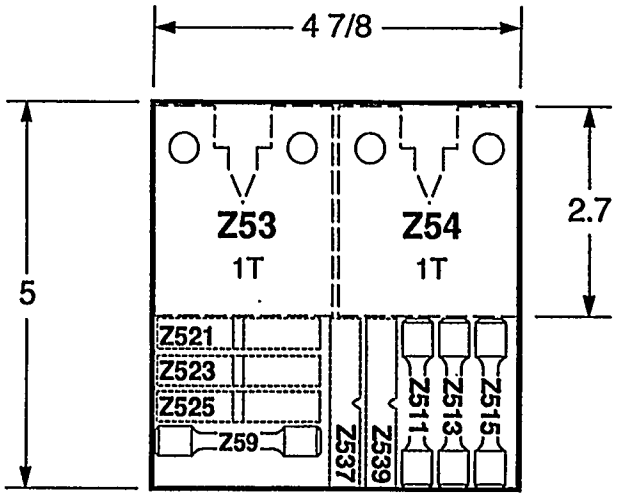
Blocks "B" an "C" are short for the full length dimension of the standard 2T specimen. Reference all dimensions except for overall length from the back (left) edge as shown.

Plate is 8" thick

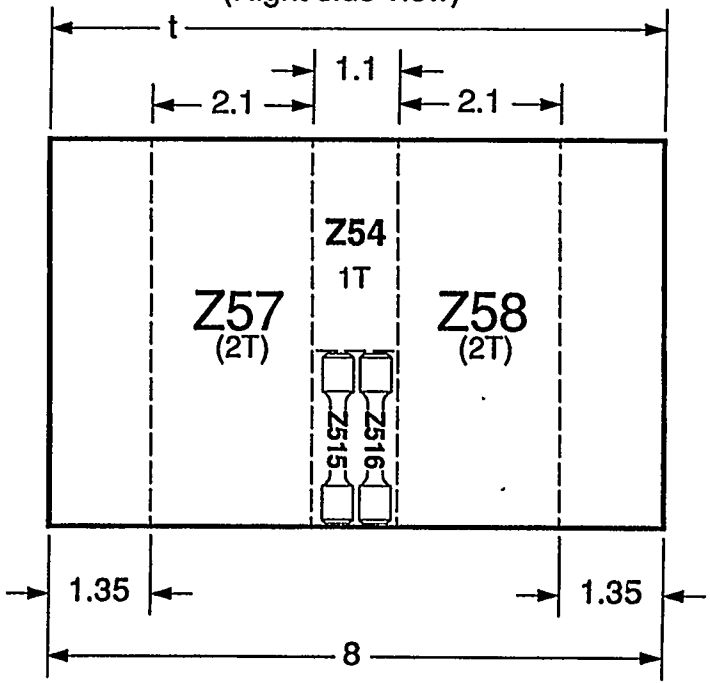
MARTIN MARIETTA

Title: Top View of Z5	
Drawing Number:	FMG-L 042 r.0
Drawn:	E.T. Manneschmidt
Date:	July 23, 1993
QAS Approved:	

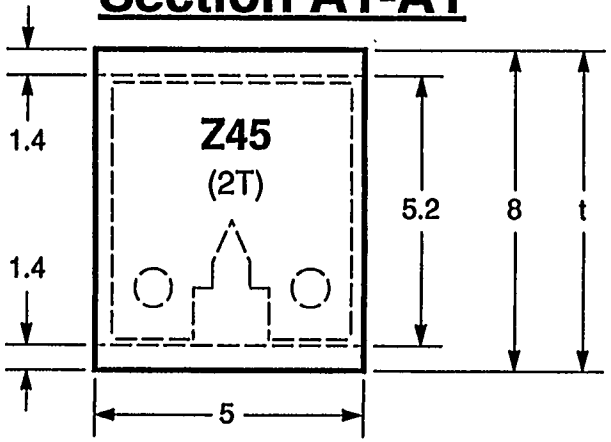
Block C
(Second layer)



Block C
(Right side view)



Section A1-A1

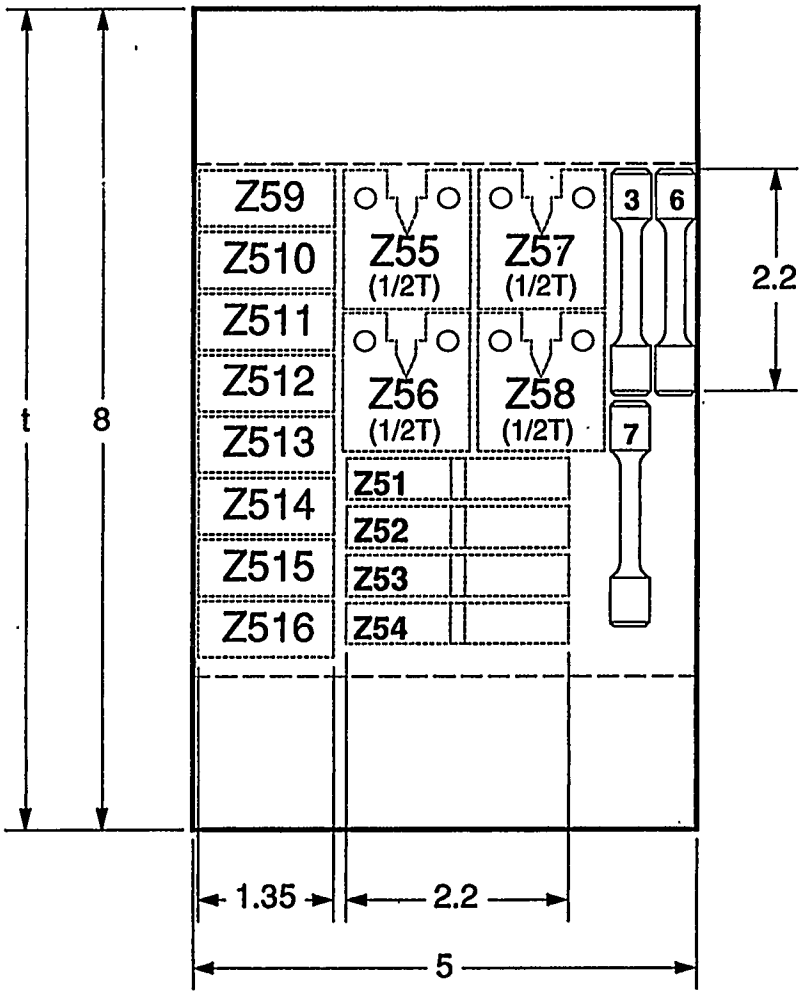


2Ts Z51 thru Z54 are in the same orientation as Z51.

ornl
MARTIN MARIETTA

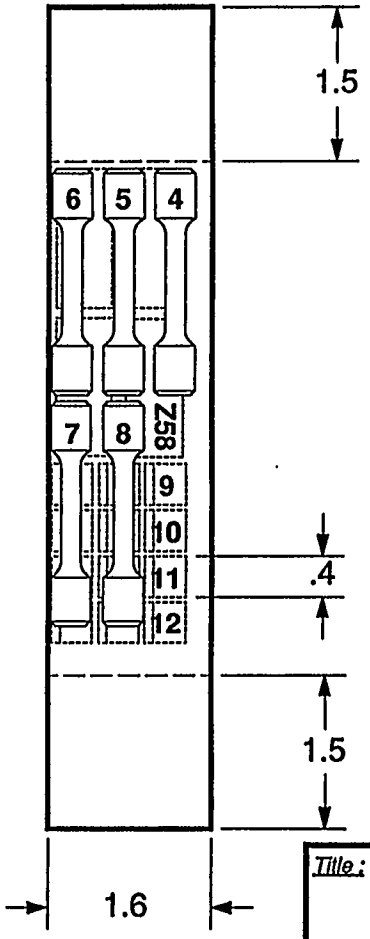
Title:	**Views of Z5**
Drawing Number:	FMG-L 043 r.0
Drawn:	E.T. Manneschmidt
Date:	July 23, 1993
QAS Approved:	

Section A2-A2



Section A2-A2

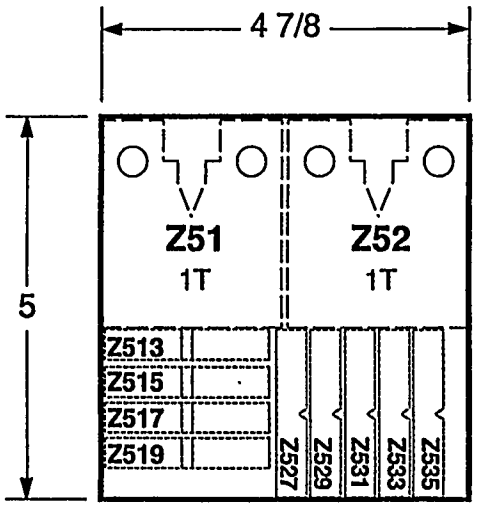
(right side view)



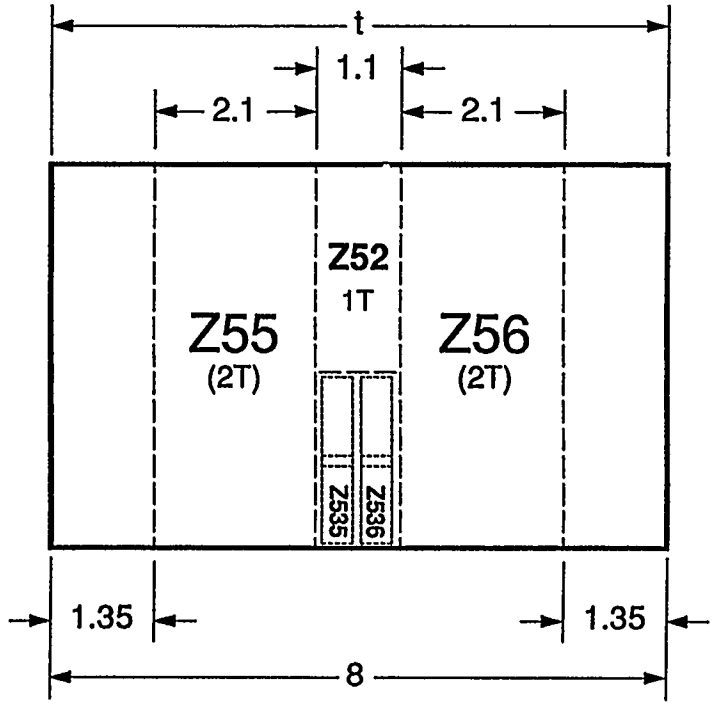
MARTIN MARIETTA

Title:	**Views of Z5**
Drawing Number:	FMG-L 044 r.0
Drawn:	E.T. Manneschmidt
Date:	July 23, 1993
QAS Approved:	

Block B
(Second layer)



Block B
(Right side view)

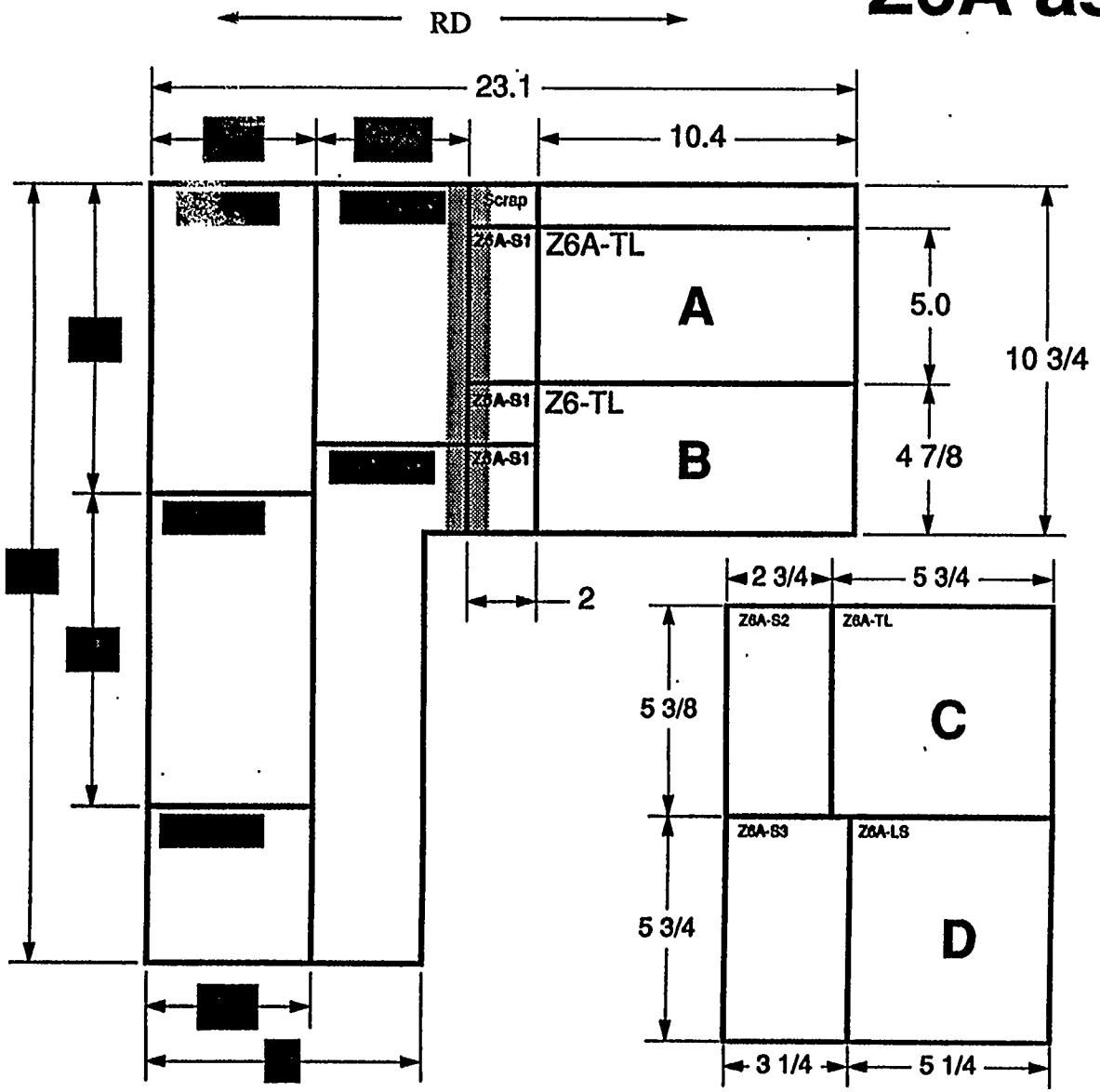


ornl
MARTIN MARIETTA

Title:	**Views of Z5**
Drawing Number:	FMG-L 045 r.0
Drawn:	E.T. Manneschmidt
Date:	July 23, 1993
QAS Approved:	

Block	Contents of Z6A Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A		4	2		45	16
B	16		3			8
C		4	1			
D			2			
TOTAL	16	8	8	0	45	24

Z6A as Received



Weld

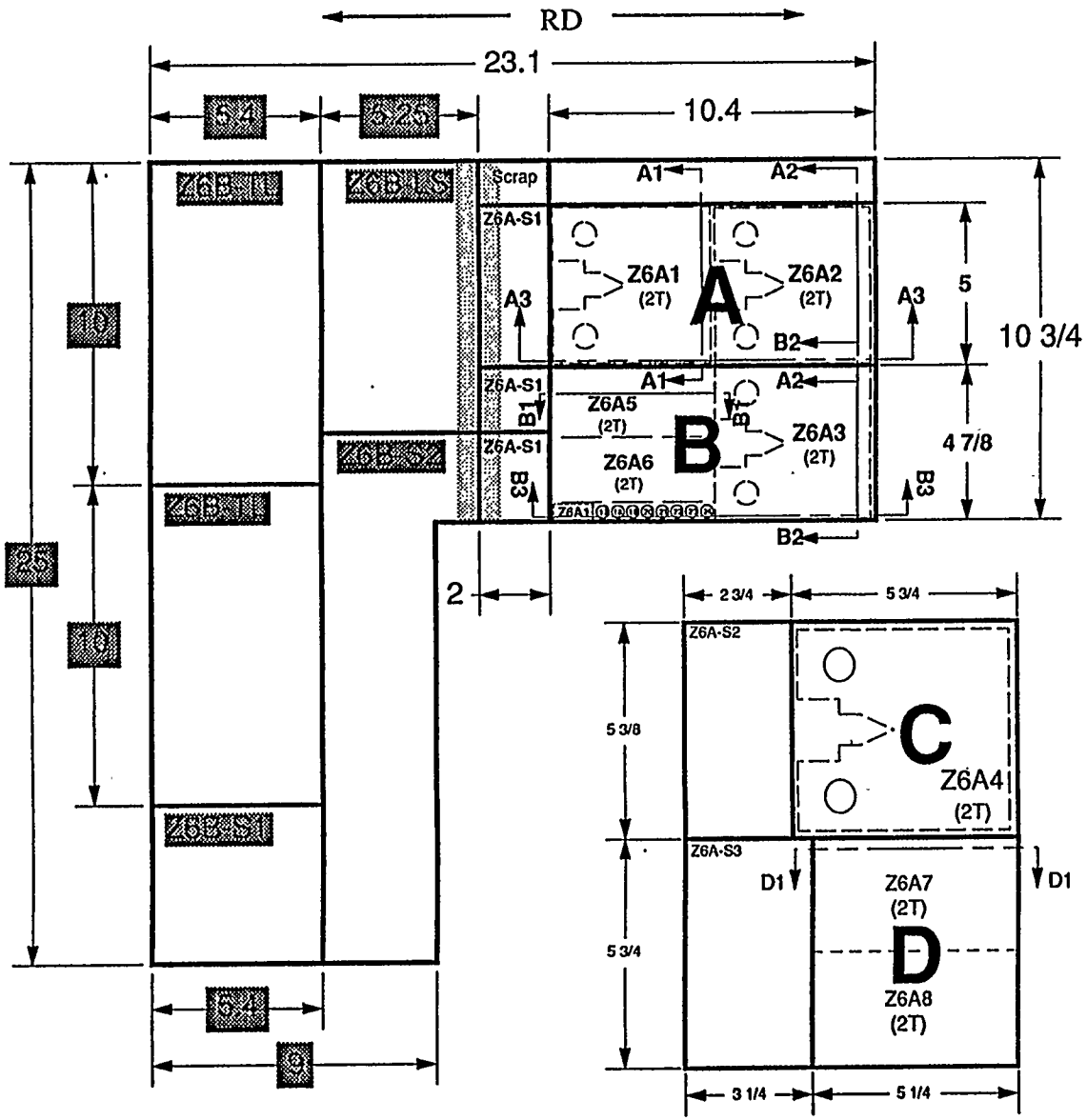
Disregard

Pre-sawn blocks
A, B, C, & D.

ornl
MARTIN MARIETTA

Title:	Z6A as Received
Drawing Number:	FMG-L 030 r.0
Drawn:	E.T. Manneschmidt
Date:	July 16, 1993
QAS Approved:	

Top view of Z6A



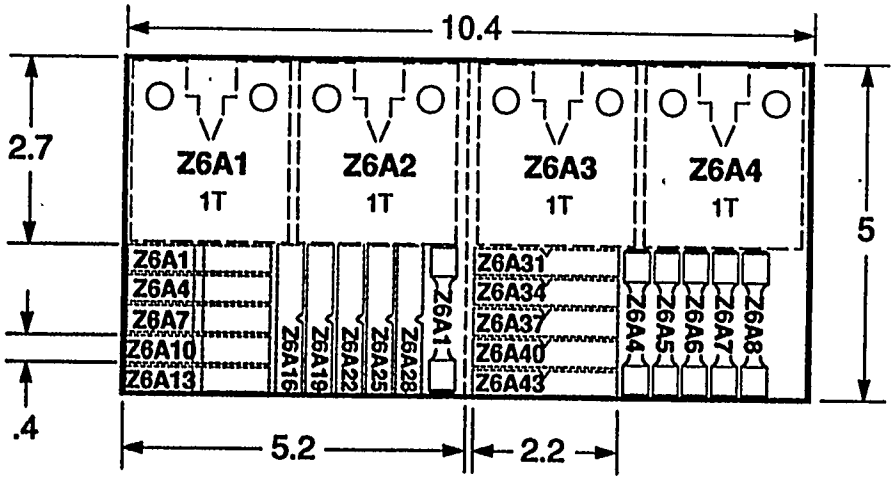
Weld

Disregard

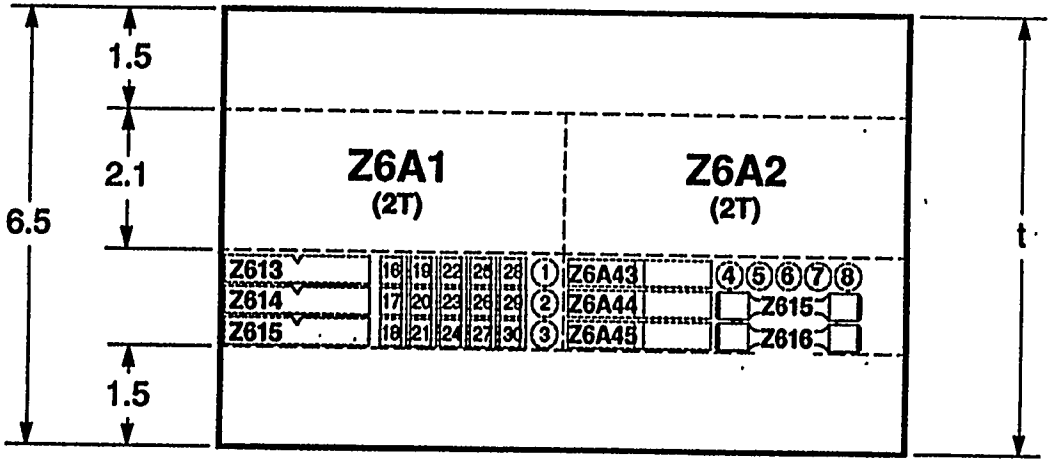
ornl MARTIN MARIETTA

Title:	Top view of Z6A
Drawing Number:	FMG-L 048 r.1
Drawn:	E.T. Manneschmidt
Date:	July 26, 1993
QAS Approved:	

Block A
(top view, second layer)



(see drawing FMG-L 050 r.0 for more details)

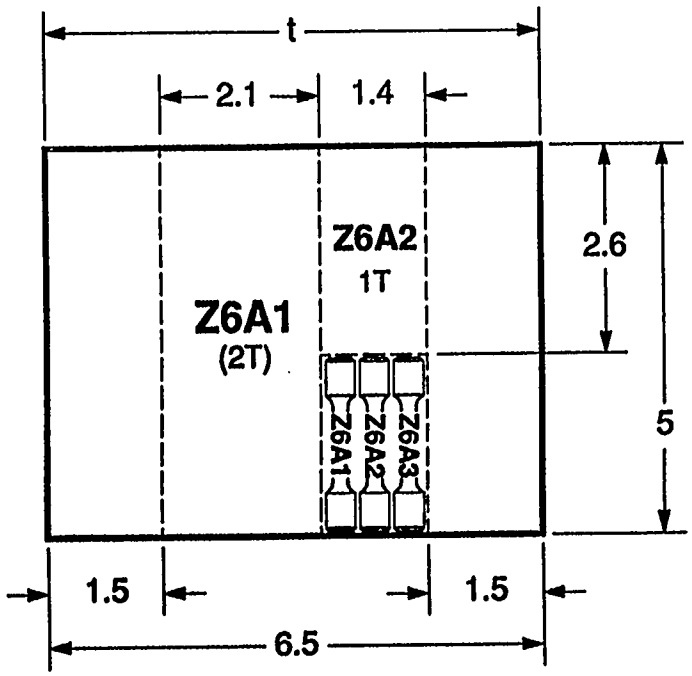


Section A3-A3

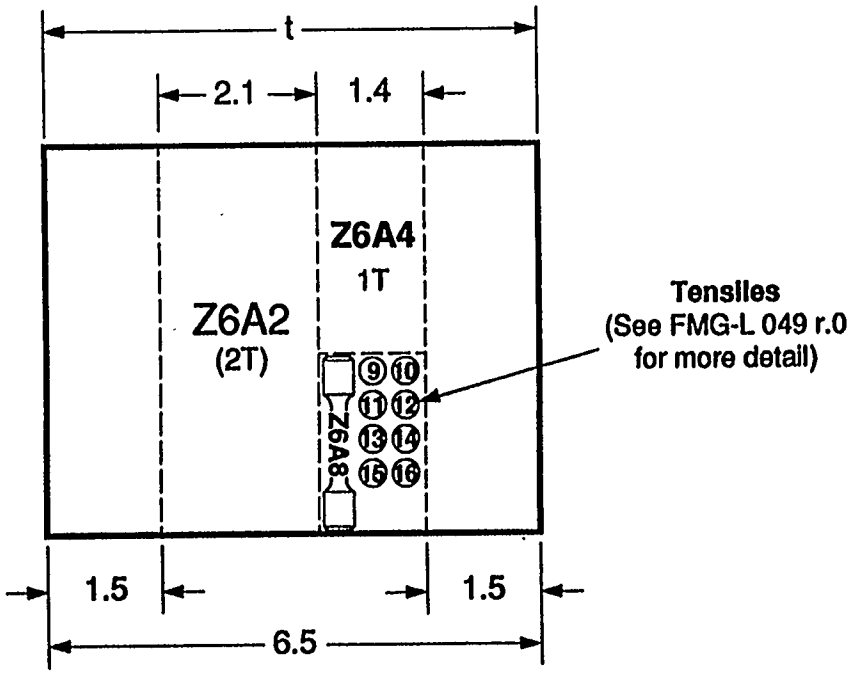
ornl MARTIN MARIETTA

Title:	**Views of Z6A**
Drawing Number:	FMG-L 049 r.0
Drawn:	E.T. Manneschmidt
Date:	July 26, 1993
QAS Approved:	

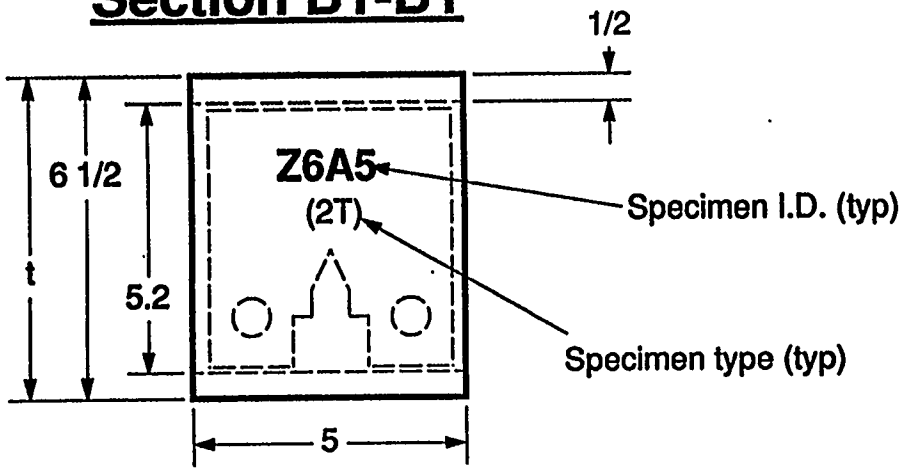
Section A1-A1



Section A2-A2

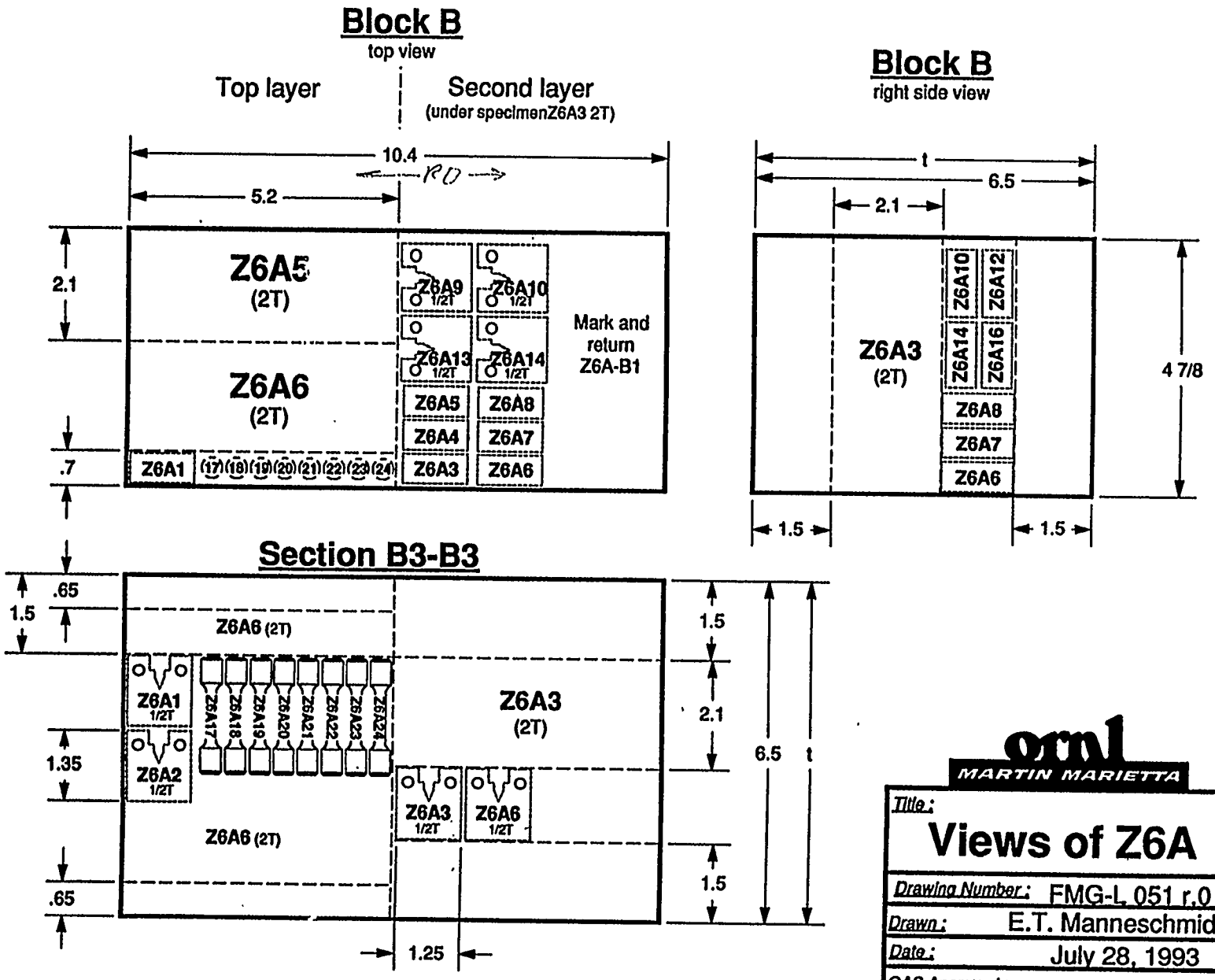


Section B1-B1



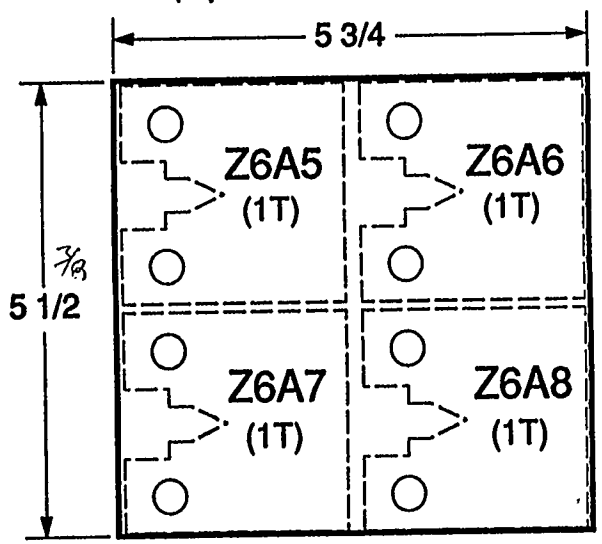
ornl MARTIN MARIETTA

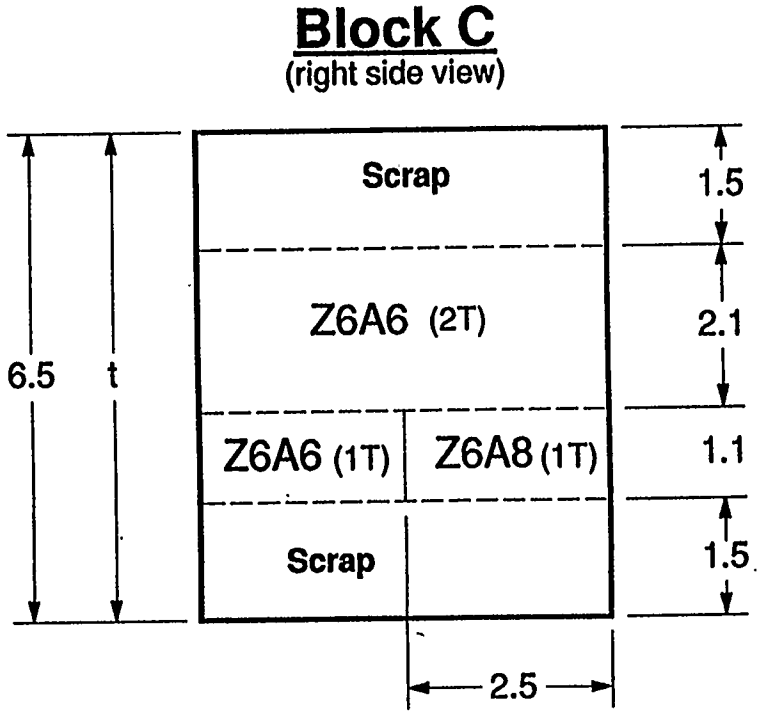
Title:	**Views of Z6A**
Drawing Number:	FMG-L 050 r.0
Drawn:	E.T. Manneschmidt
Date:	July 27, 1993
QAS Approved:	

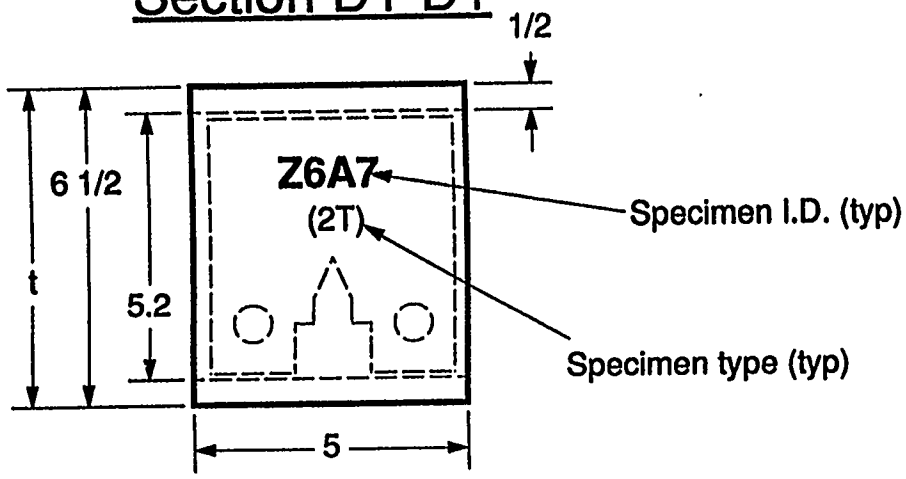


MARTIN MARIETTA

Title:	**Views of Z6A**
Drawing Number:	FMG-L 051 r.0
Drawn:	E.T. Manneschmidt
Date:	July 28, 1993
QAS Approved:	





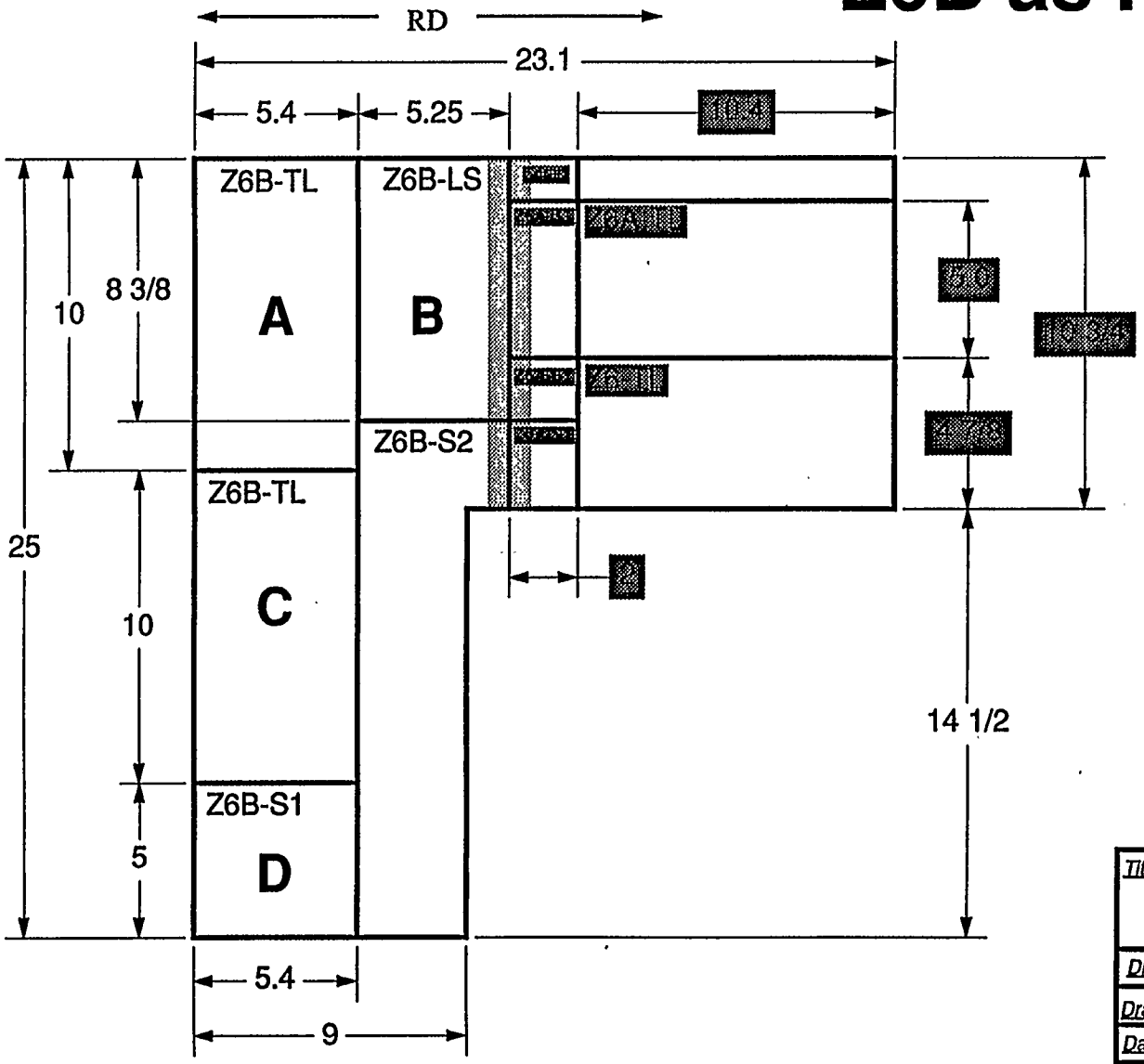


ornl
MARTIN MARIETTA

Title:	**Views of Z6A**
Drawing Number:	FMG-L 047 r.0
Drawn:	E.T. Manneschmidt
Date:	July 26, 1993
QAS Approved:	

Block	Contents of Z6B Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A		4	2		45	16
B	2		2			8
C	14	4	2			
D			2			
TOTAL	16	8	8	0	45	24

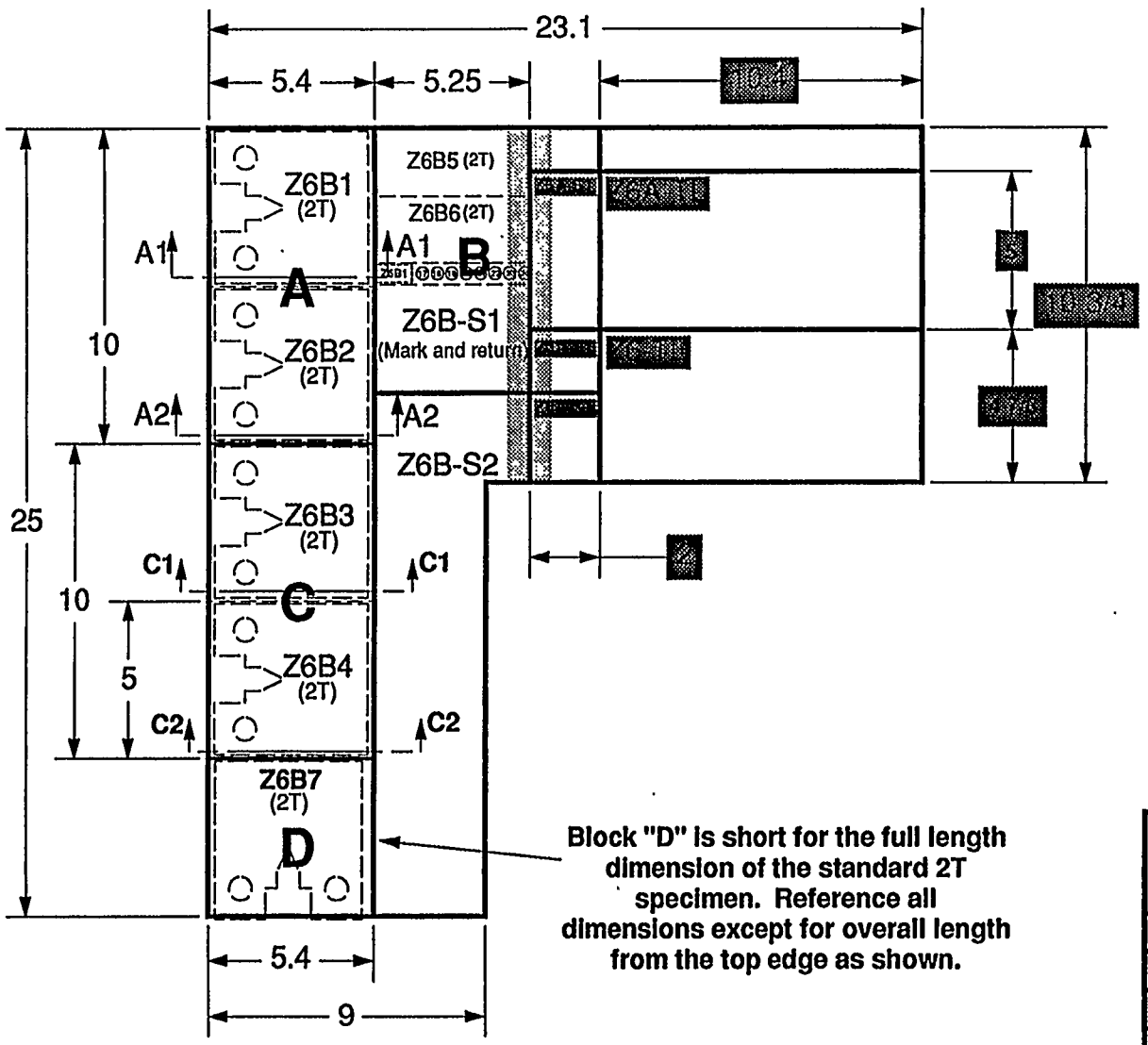
Z6B as Received



MARTIN MARIETTA

Title:	Z6B as Received
Drawing Number:	FMG-L 052 r.0
Drawn:	E.T. Manneschmidt
Date:	July 28, 1993
QAS Approved:	

Top view of Z6B



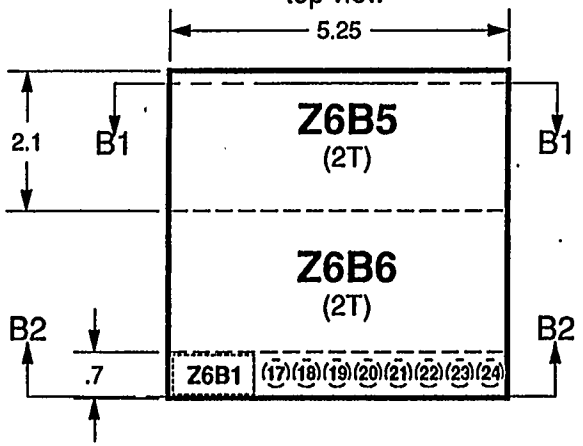
Block "D" is short for the full length dimension of the standard 2T specimen. Reference all dimensions except for overall length from the top edge as shown.

ornl MARTIN MARIETTA

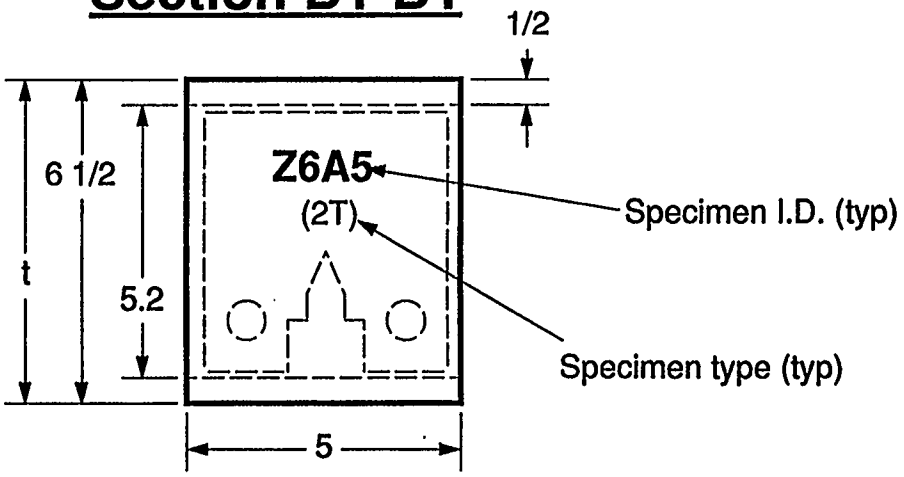
Title:	Top view of Z6B
Drawing Number:	FMG-L 053 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

Block B

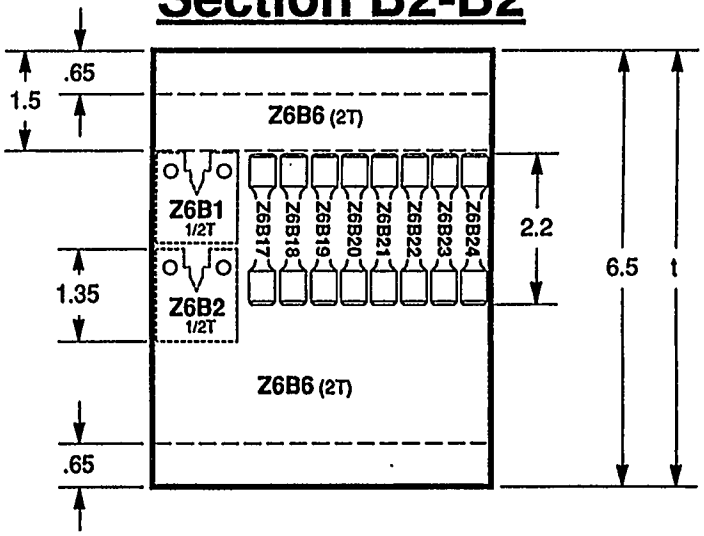
top view



Section B1-B1

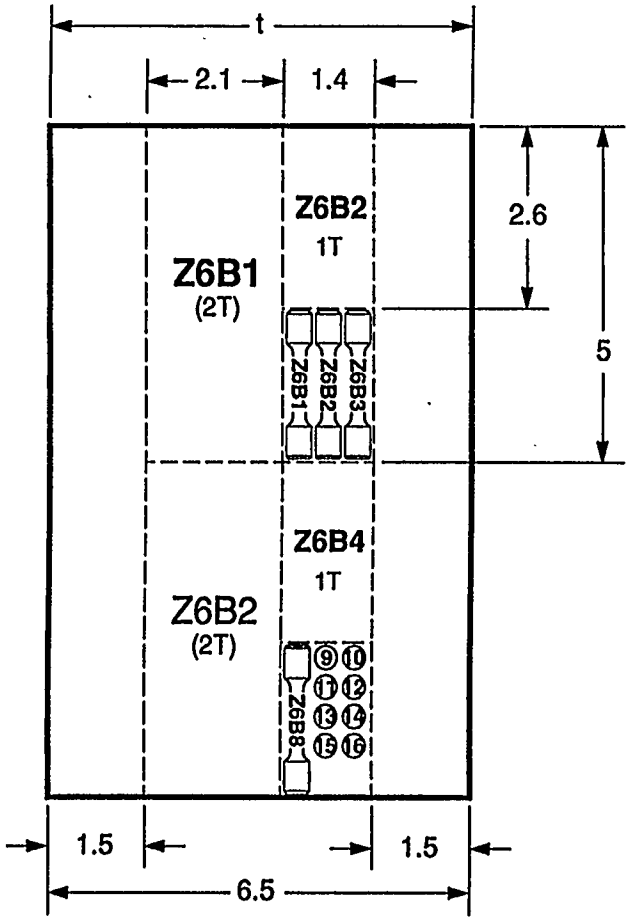


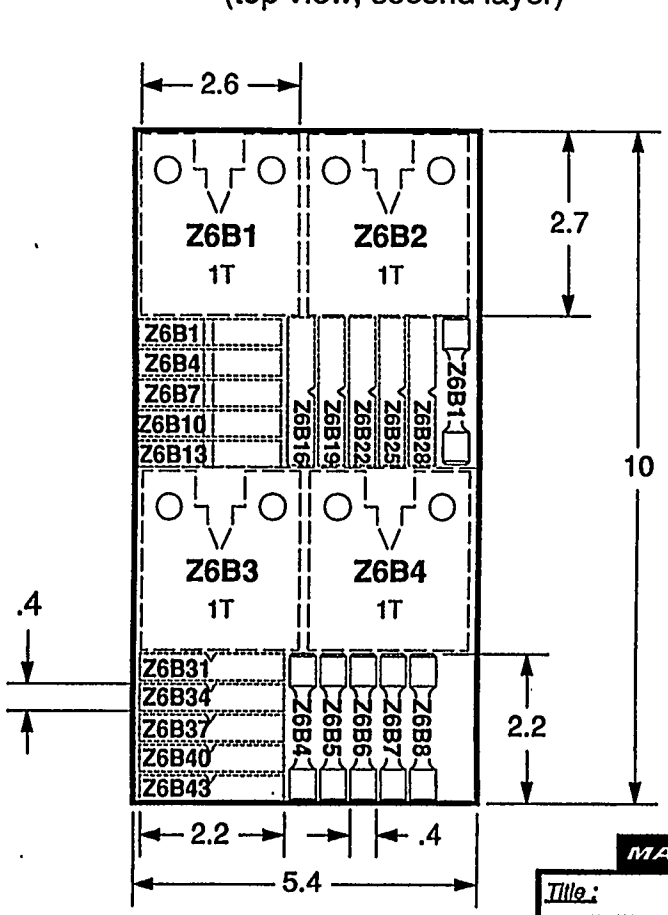
Section B2-B2



MARTIN MARIETTA

Title: Views of Z6B	
Drawing Number:	FMG-L 054 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

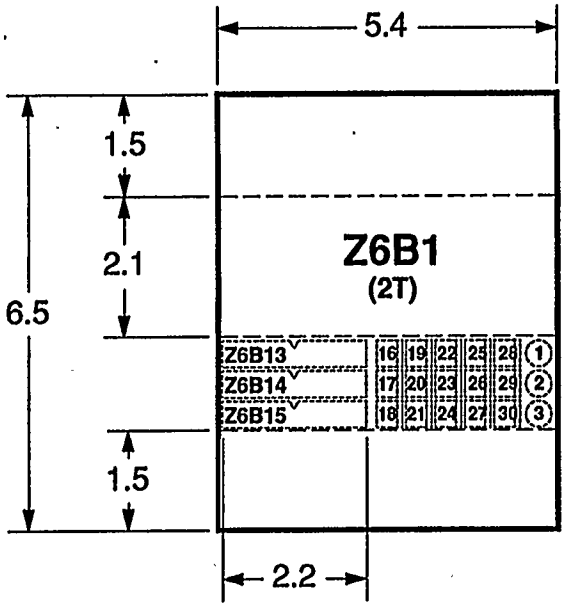




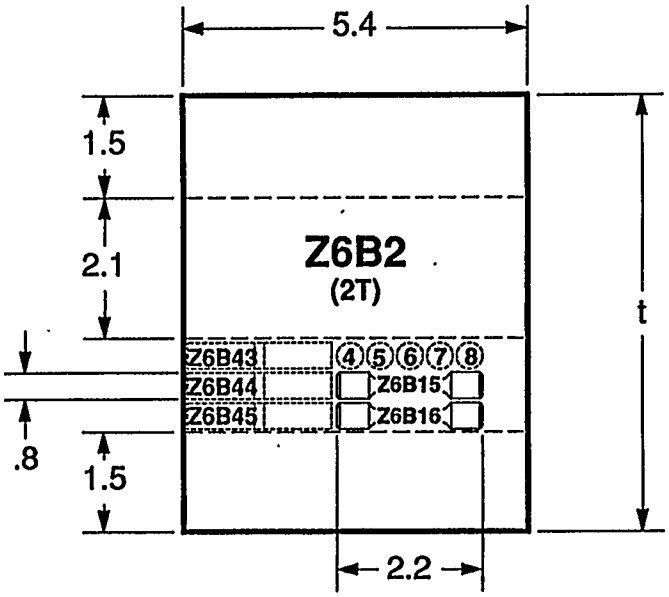
ornl
MARTIN MARIETTA

Title:	**Views of Z6B**
Drawing Number:	FMG-L 055 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

Section A1-A1



Section A2-A2

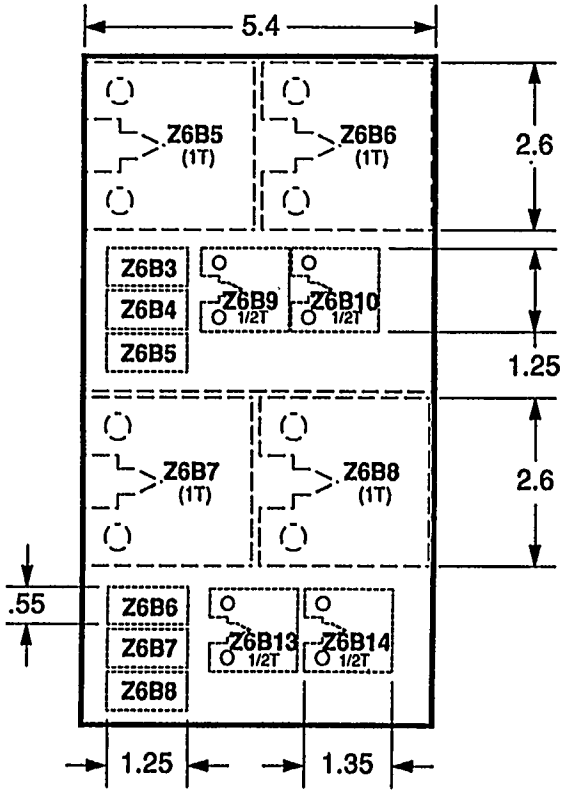


ornl
MARTIN MARIETTA

Title:	**Views of Z6B**
Drawing Number:	FMG-L 046 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

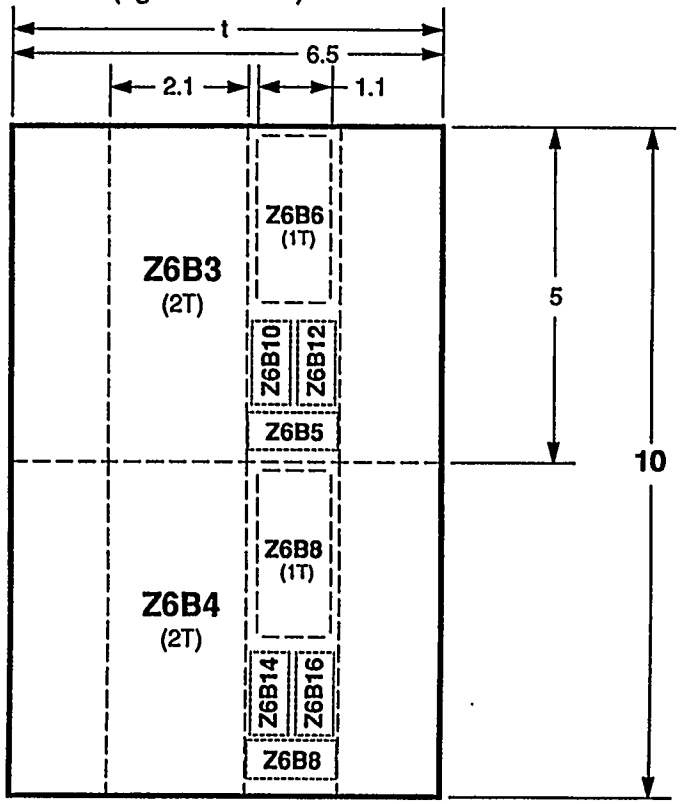
Block C

(second layer, under specimens shown in top view,FMG-L 053 R.0)



Block C

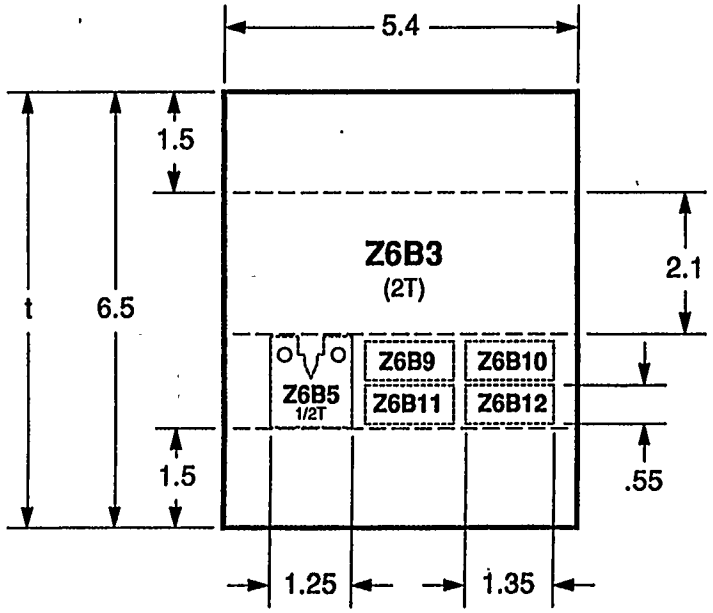
(right side view)



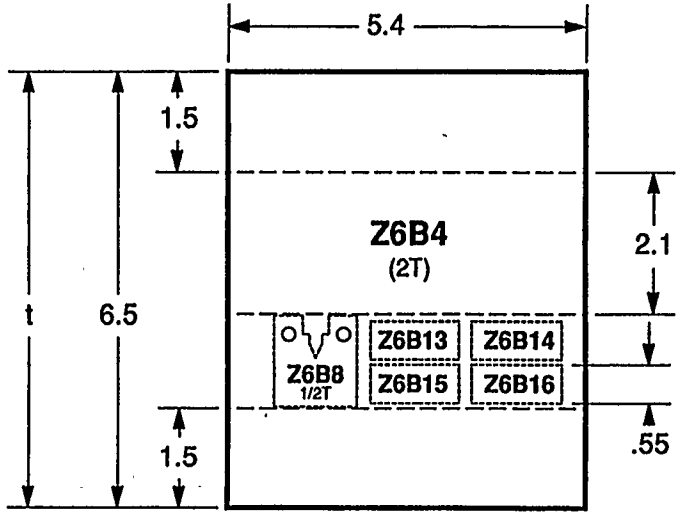
MARTIN MARIETTA

Title:	**Views of Z6B**
Drawing Number:	FMG-L 031 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

Section C1-C1



Section C2-C2

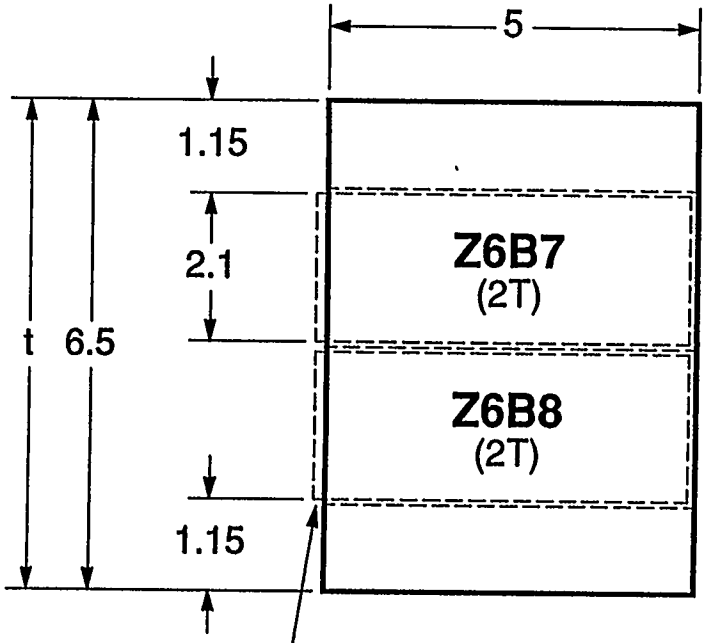


ornl
MARTIN MARIETTA

Title:	**Views of Z6B**
Drawing Number:	FMG-L 057 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

Block D

(right side view)



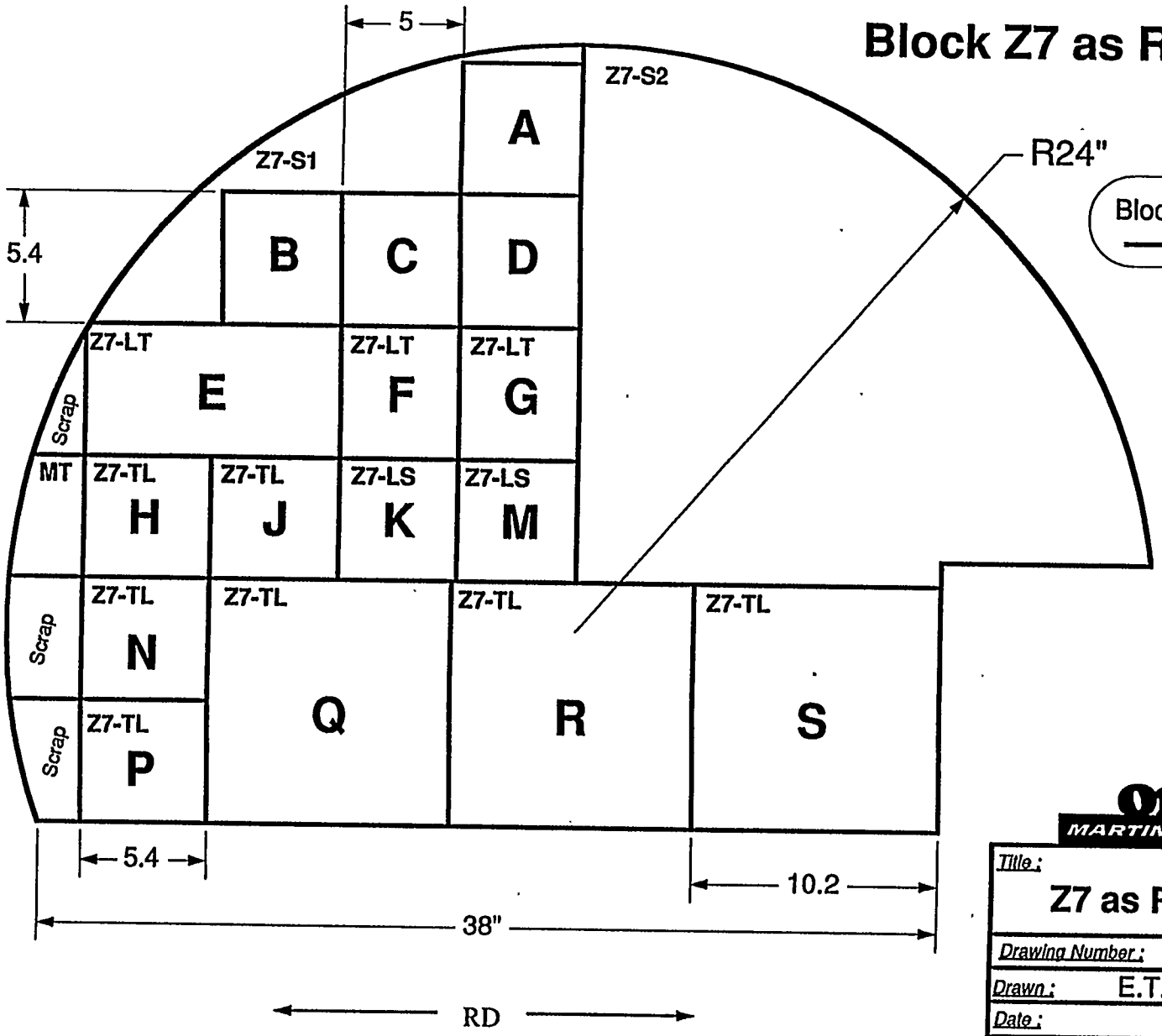
Specimen are oversized as shown above and on FMG-L 053 r.0.
Fabricate specimen as shown in FMG-L 053 r.0 with the notch end sticking out.

ornl
MARTIN MARIETTA

Title:	**Views of Z6B**
Drawing Number:	FMG-L 056 r.0
Drawn:	E.T. Manneschmidt
Date:	August 5, 1993
QAS Approved:	

Block	Contents of Z7 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A			1			
B			1			
C			1			
D			1			
E			2			
F		4	1			
G		4	1			
H	8		1		15	16
J			1		21	
K			2		4	8
M	8		2		2	
N		4	1			
P		6	0			
Q				1		
R				1		
S				1		
TOTAL	16	18	15	3	42	24

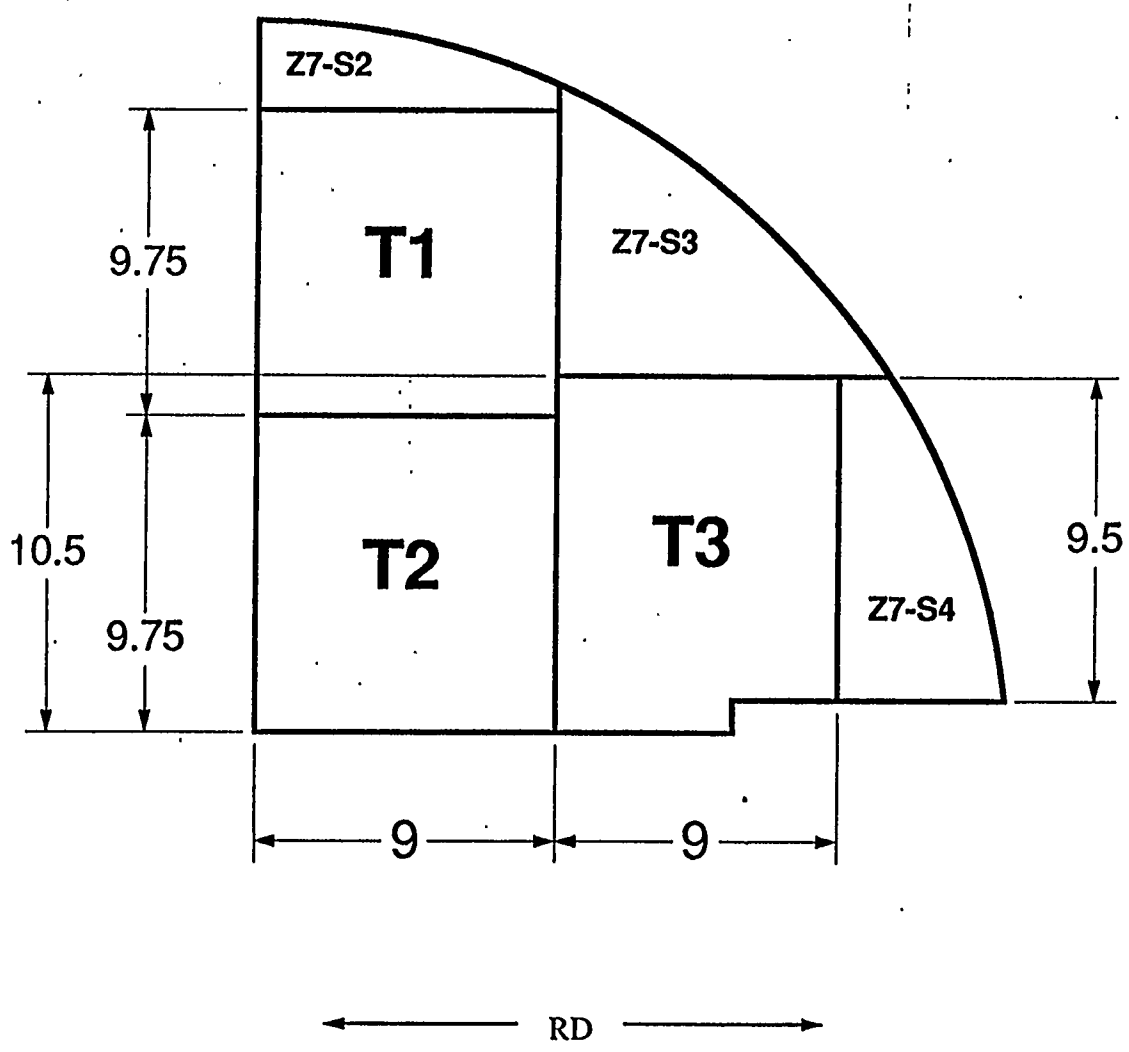
Block Z7 as Received



ornl
MARTIN MARIETTA

Title:	Z7 as Received
Drawing Number:	FMG-L 016 r.0
Drawn:	E.T. Manneschmidt
Date:	July 9,1993
QAS Approved:	

Remainder Block Z7 as Received

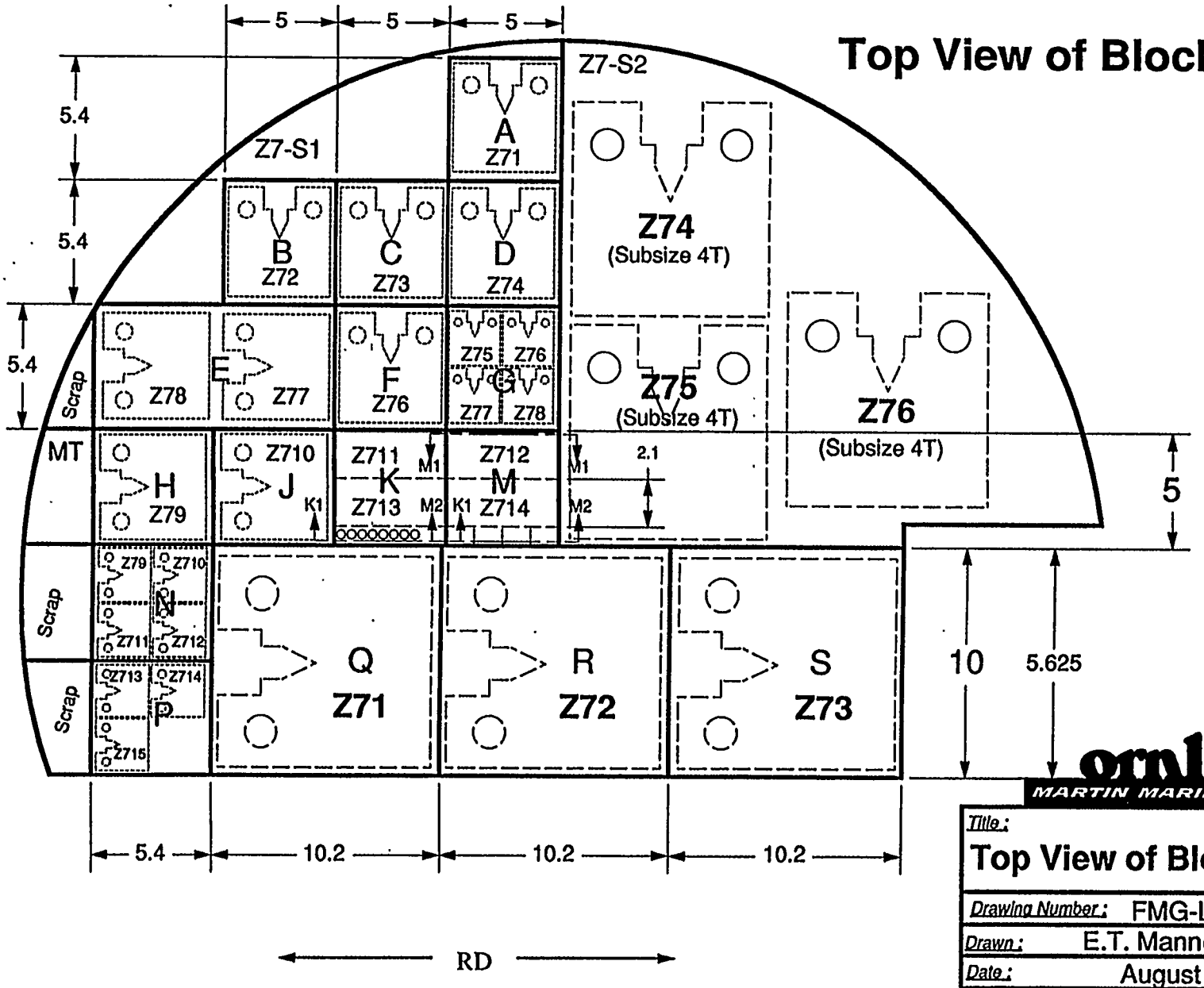


Blocks already cut

ornl
MARTIN MARIETTA

Title:	Remainder of Z7 as Received
Drawing Number:	FMG-L 051 r.0
Drawn:	E.T. Manneschmidt
Date:	August 12,1993
QAS Approved:	

Top View of Block Z7

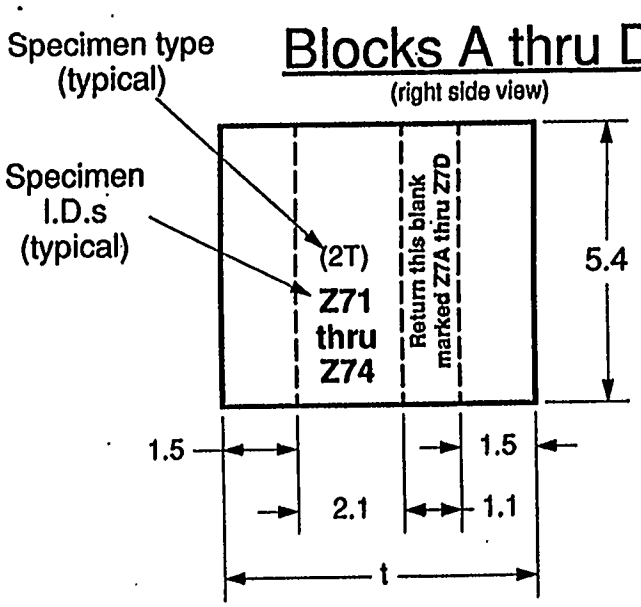


ornl
MARTIN MARIETTA

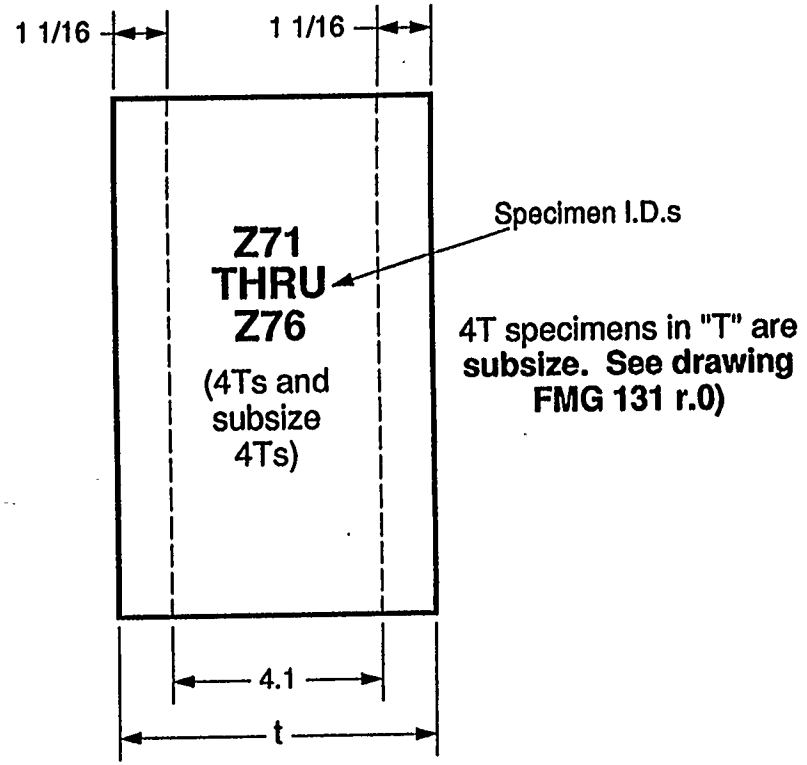
Title:	Top View of Block Z7
Drawing Number:	FMG-L 020 r.1
Drawn:	E.T. Manneschmidt
Date:	August 10,1993
QAS Approved:	

Blocks A thru D

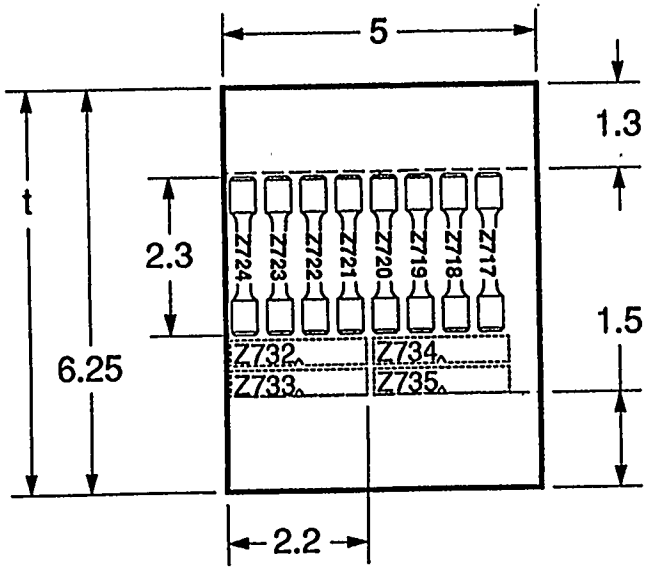
(right side view)



Q, R, S, & T



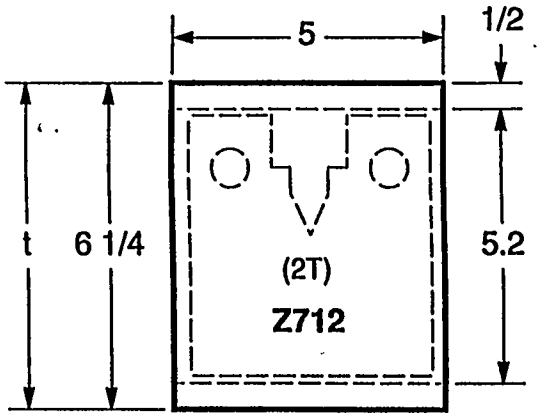
Section K1 - K1



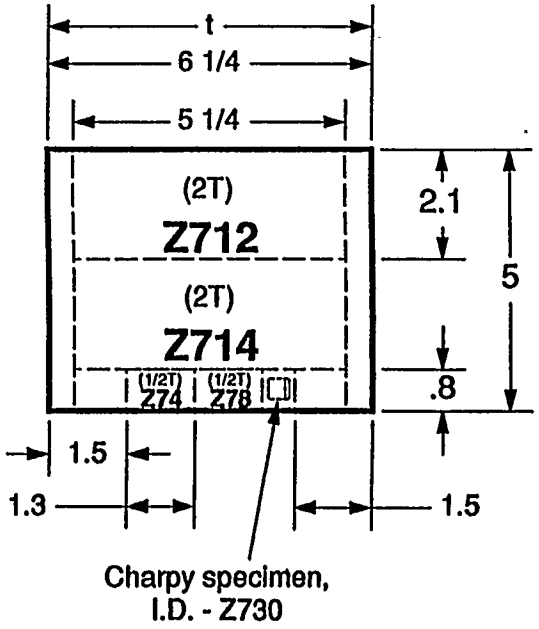
ornl MARTIN MARIETTA

Title:	Views of Blocks in Z7
Drawing Number:	FMG-L 021 r.1
Drawn:	E.T. Manneschmidt
Date:	August 10,1993
QAS Approved:	

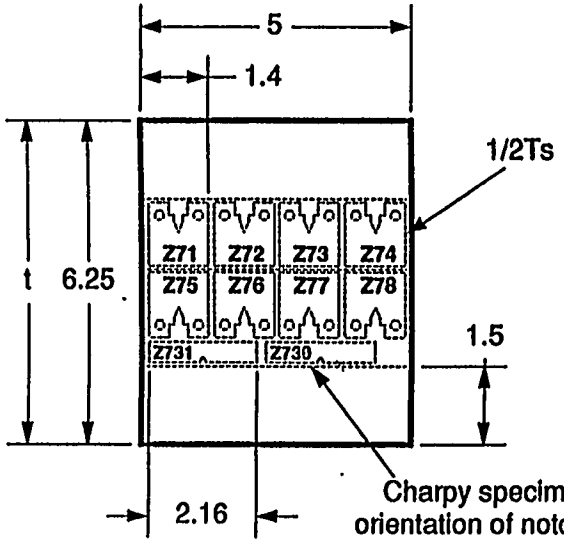
Section M1 - M1

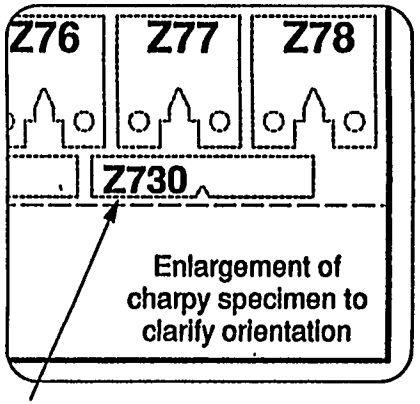


M (right side view)



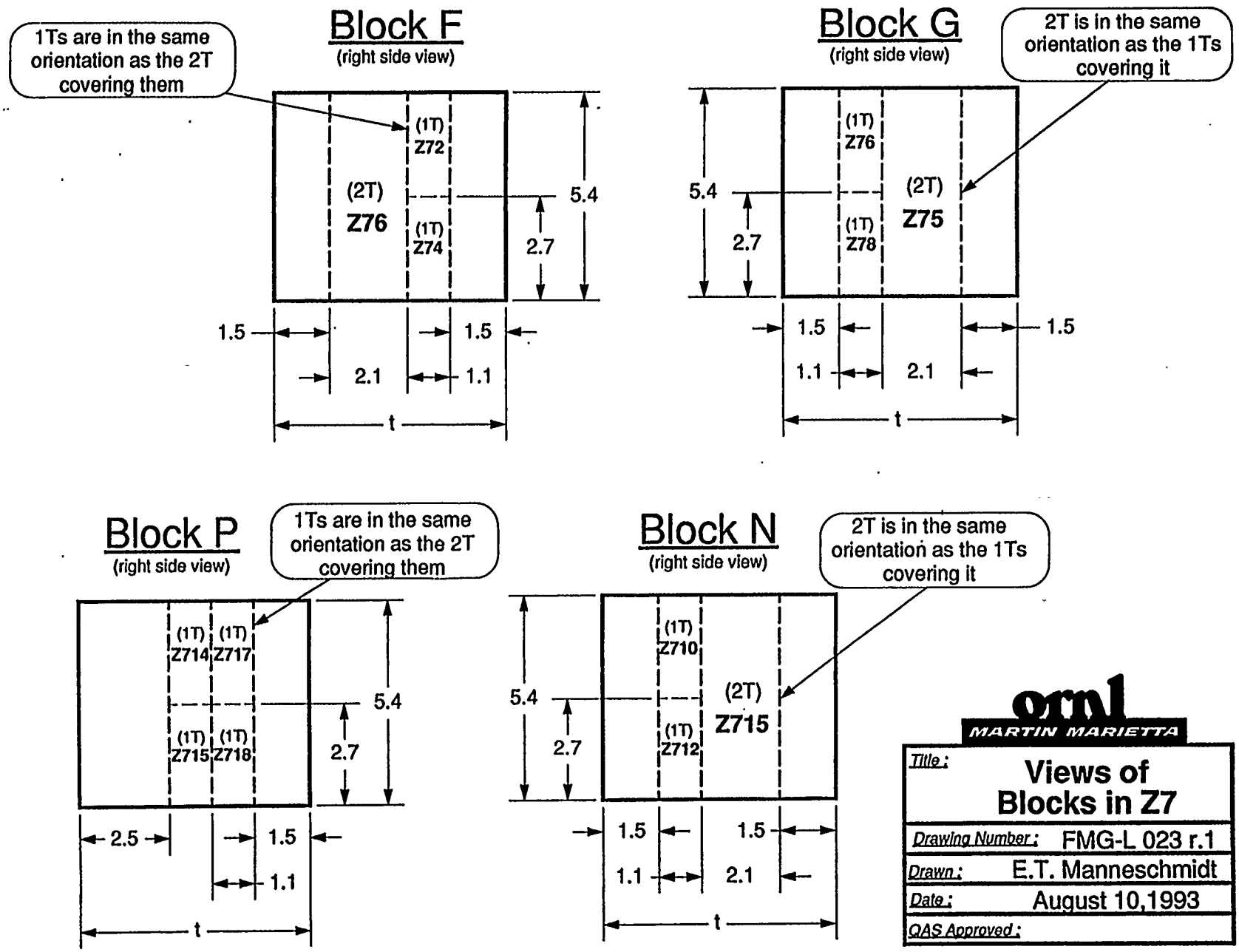
Section M2 - M2





ornl
MARTIN MARIETTA

Title:	Views of Blocks in Z7
Drawing Number:	FMG-L 022 r.0
Drawn:	E.T. Manneschmidt
Date:	July 12,1993
QAS Approved:	

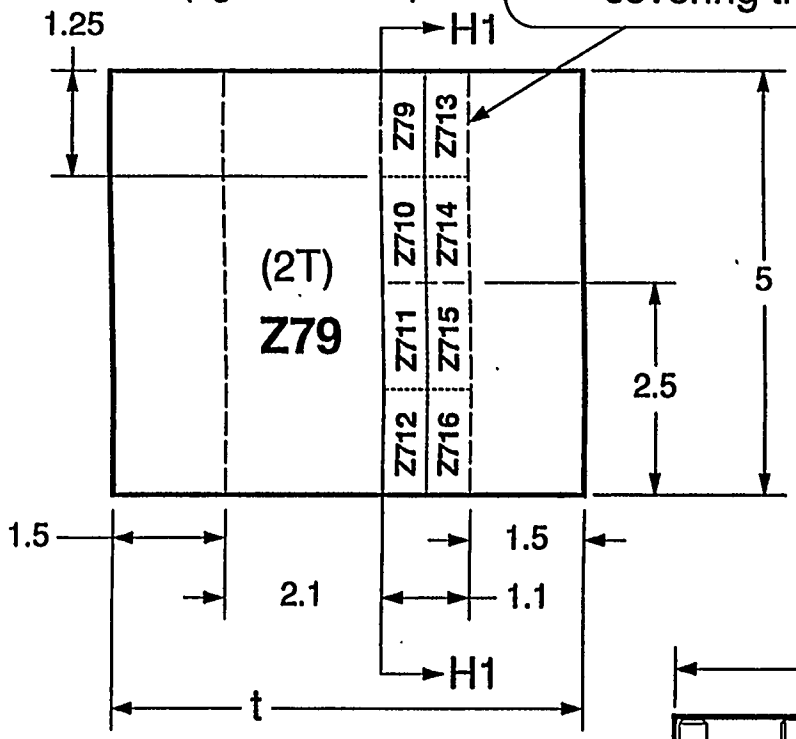


ornl
MARTIN MARIETTA

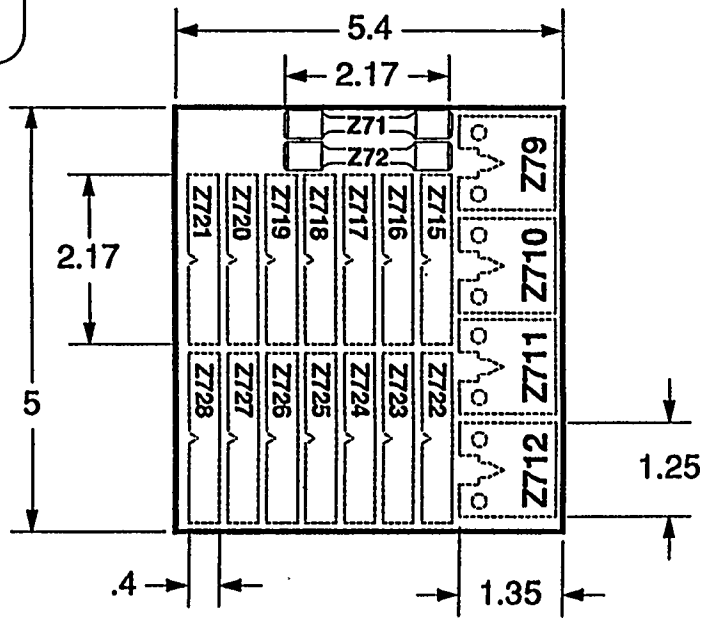
Title:	Views of Blocks in Z7
Drawing Number:	FMG-L 023 r.1
Drawn:	E.T. Manneschmidt
Date:	August 10,1993
QAS Approved:	

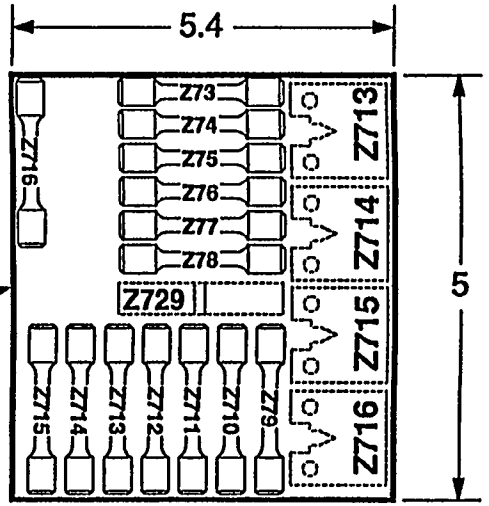
Block H

(right side view)



Section H1 - H1



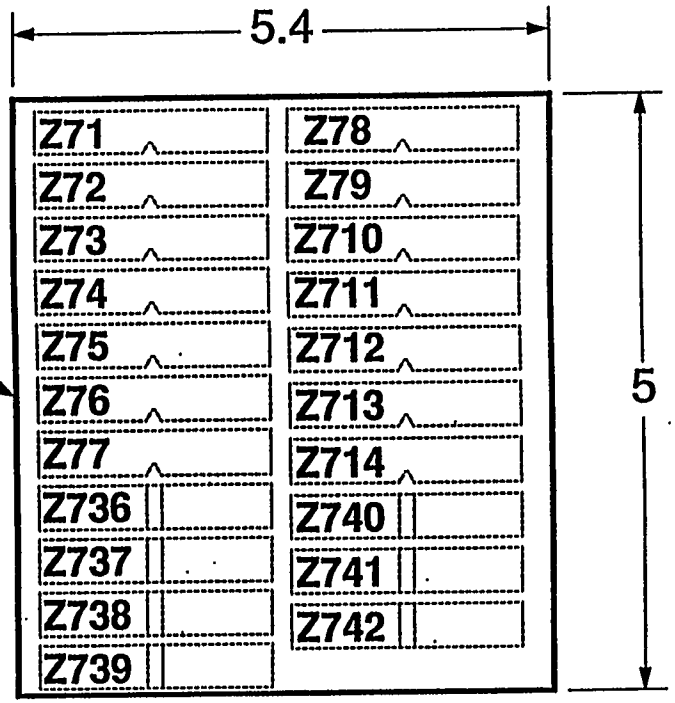


These specimens are found directly behind the specimens shown in **Section H1 - H1.**

ornl MARTIN MARIETTA

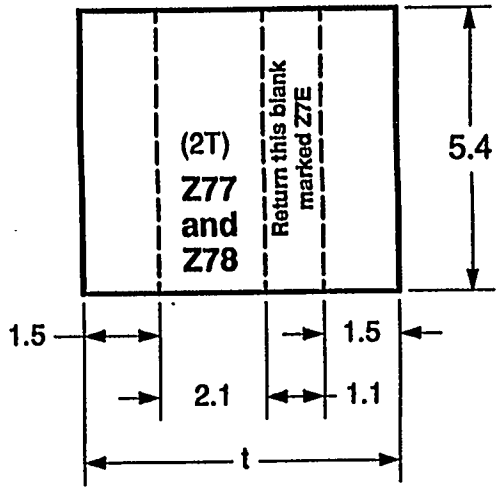
Title:	**Views of Blocks in Z7**
Drawing Number:	FMG-L 024 r.0
Drawn:	E.T. Manneschmidt
Date:	July 12,1993
QAS Approved:	

These charpy specimens are found directly below the 2T specimen shown in **BLOCK J.**



Block E

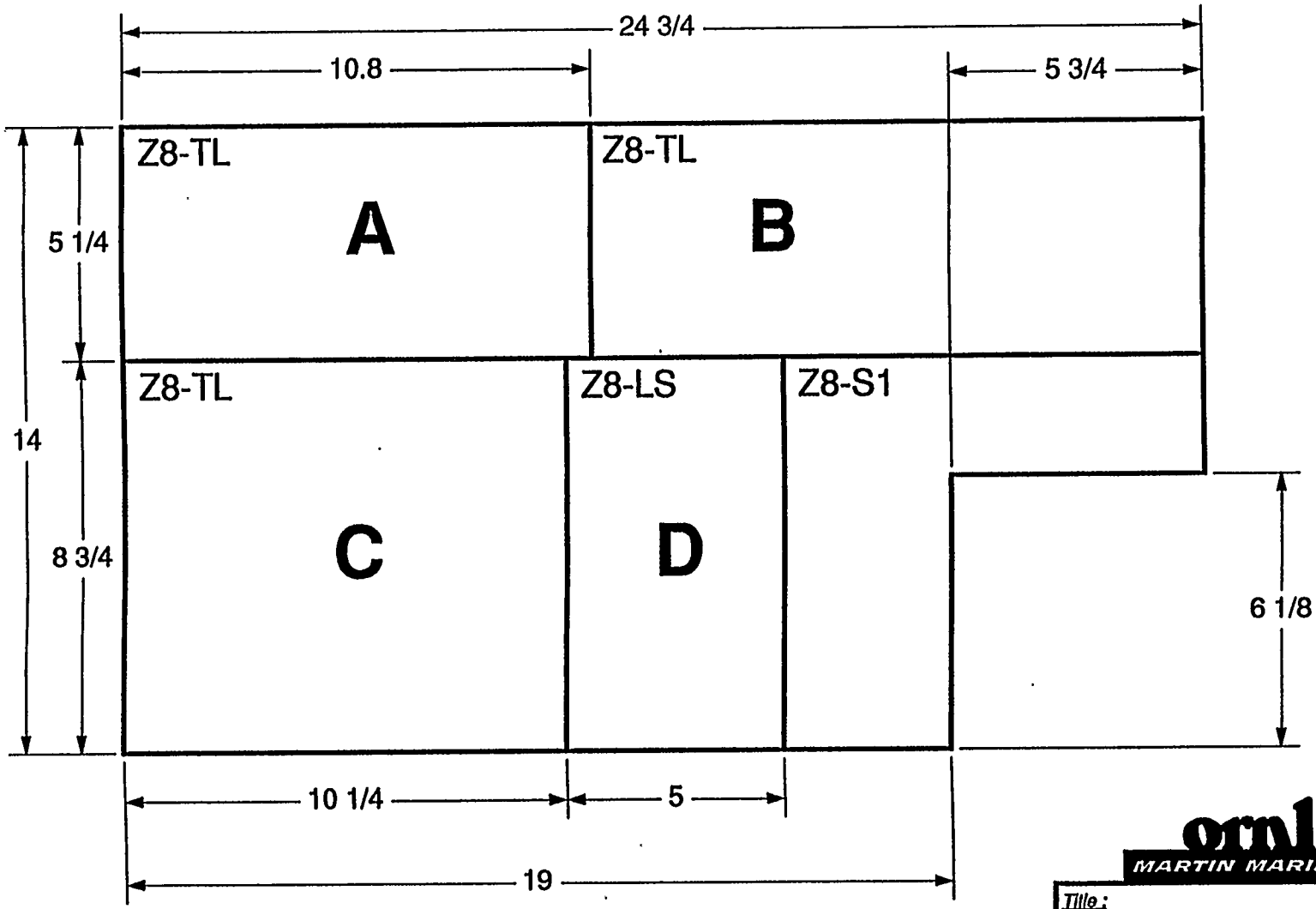
(right side view)



ORNL MARTIN MARIETTA

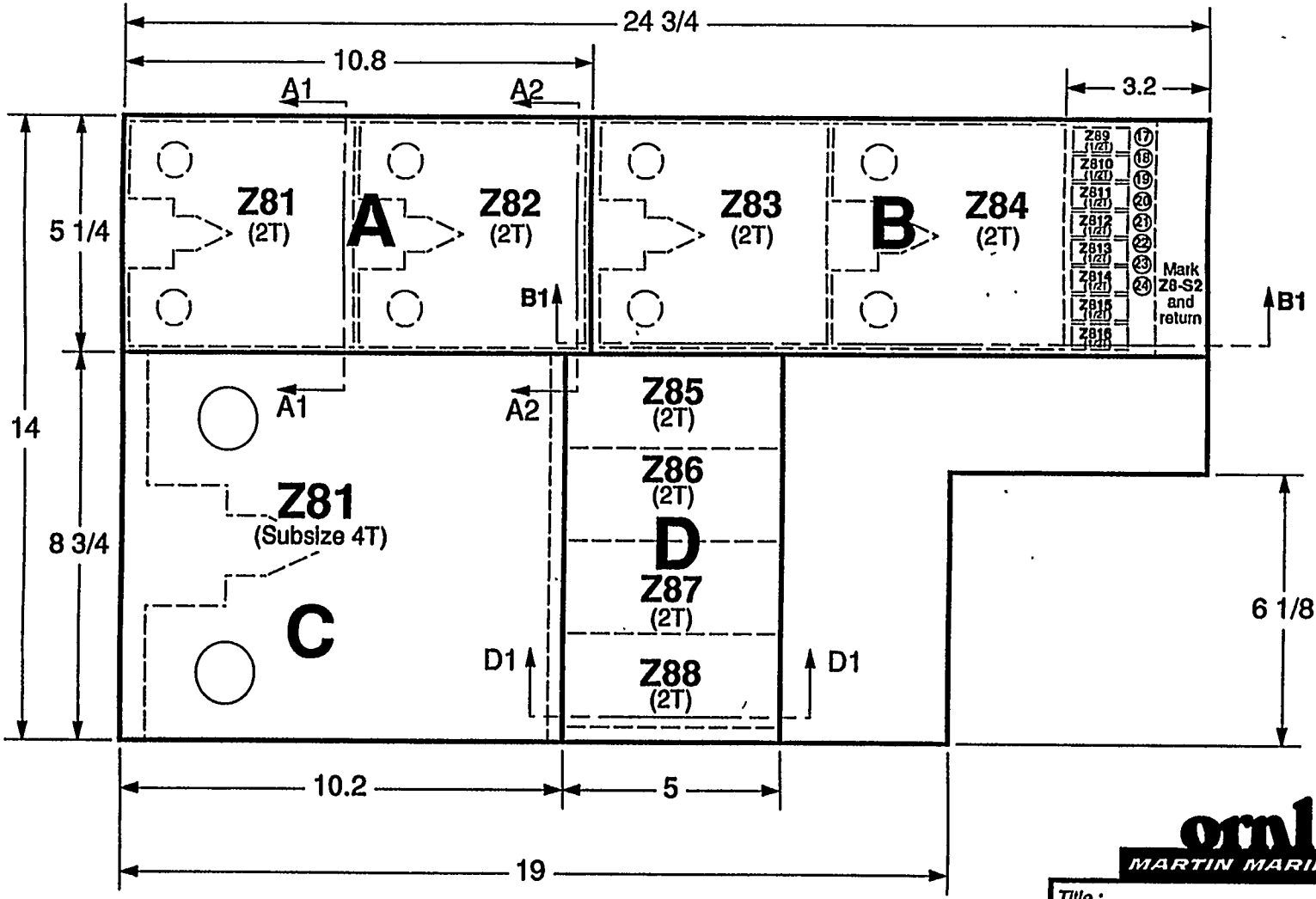
Title:	Views of Blocks in Z7
Drawing Number:	FMG-L 025 r.0
Drawn:	E.T. Manneschmidt
Date:	July 13,1993
QAS Approved:	

Block	Contents of Z8 Blocks					
Letter I.D.	1/2Ts	1Ts	2Ts	4Ts	Charpys	Tensiles
A			2		42	6
B	16		2			18
C				1		
D			4			
TOTAL	16	0	8	1	42	24



Z8 as Received

ORNL MARTIN MARIETTA	
Title:	Z8 as Received
Drawing Number:	FMG-L 032 r.0
Drawn:	E.T. Manneschmidt
Date:	July 19, 1993
QAS Approved:	



Top View of Z8

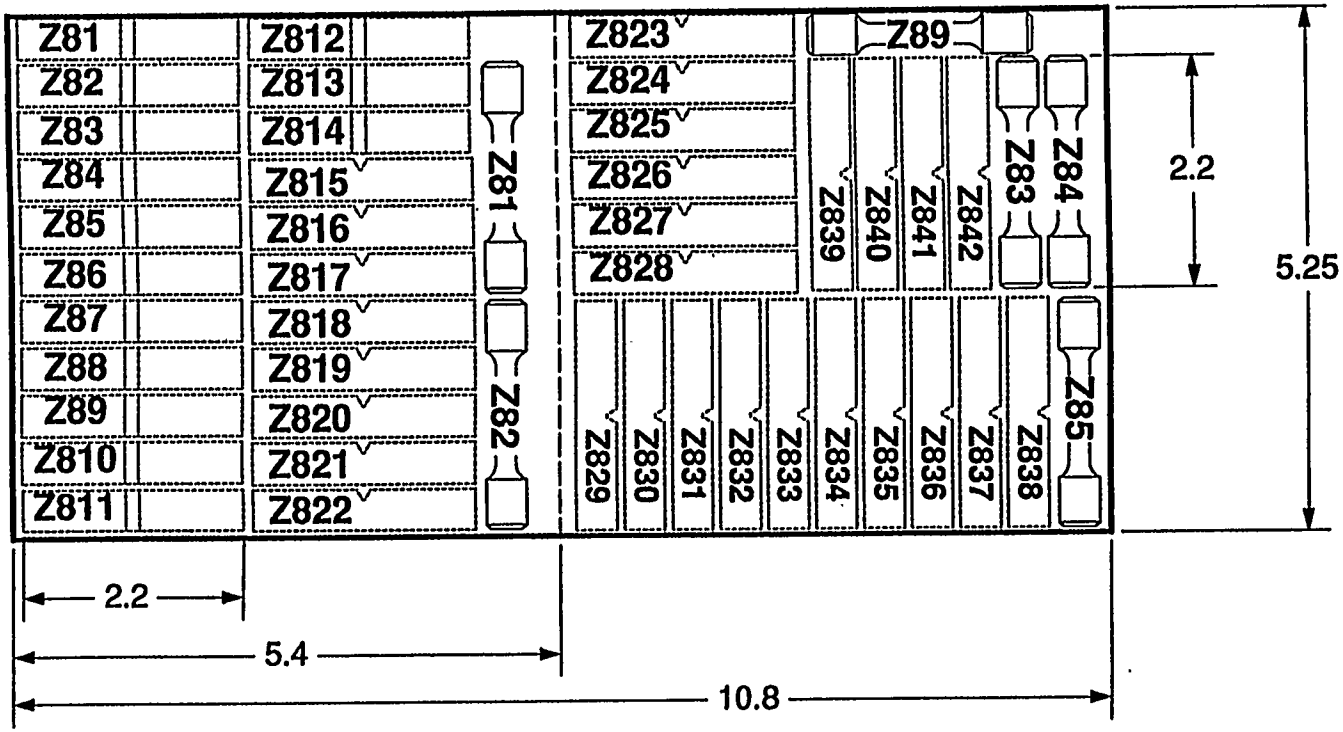
Title:	Top View of Z8
Drawing Number:	FMG-L 064 r.0
Drawn:	E.T. Manneschmidt
Date:	July 19, 1993
QAS Approved:	

ORNL MARTIN MARIETTA

Block A

(top view, second layer)

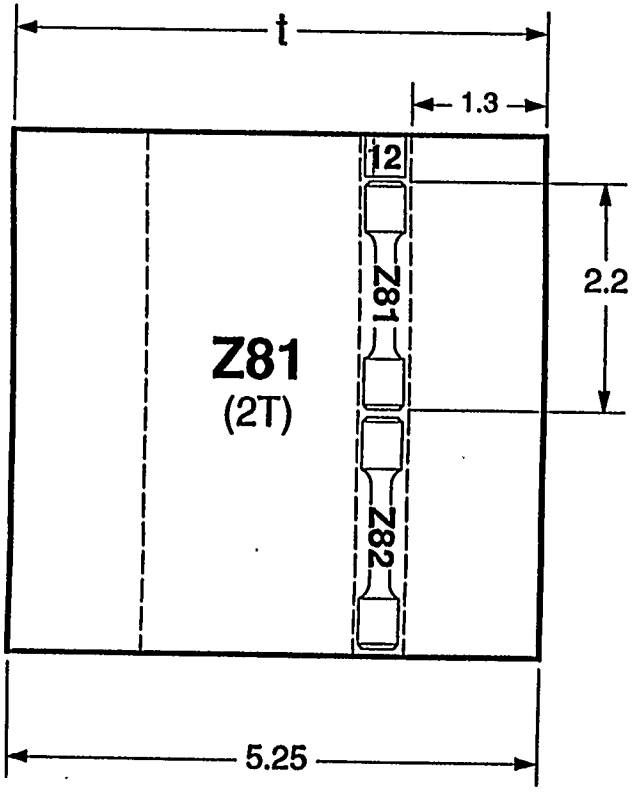
(see drawing FMG-L 050 r.0 for more details)



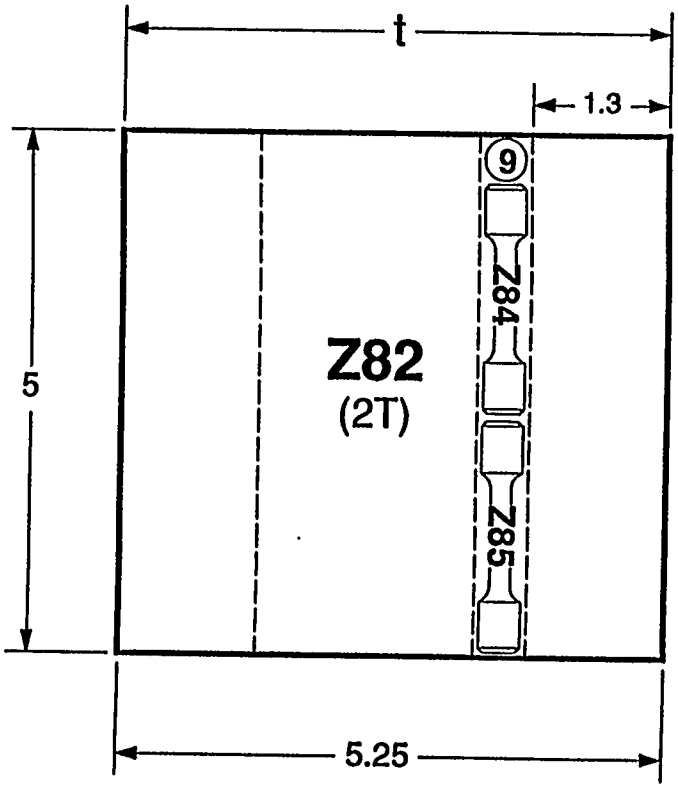
ornl MARTIN MARIETTA

Title:	**Top View of Z8**
Drawing Number:	FMG-L 058 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	

Section A1-A1



Section A2-A2



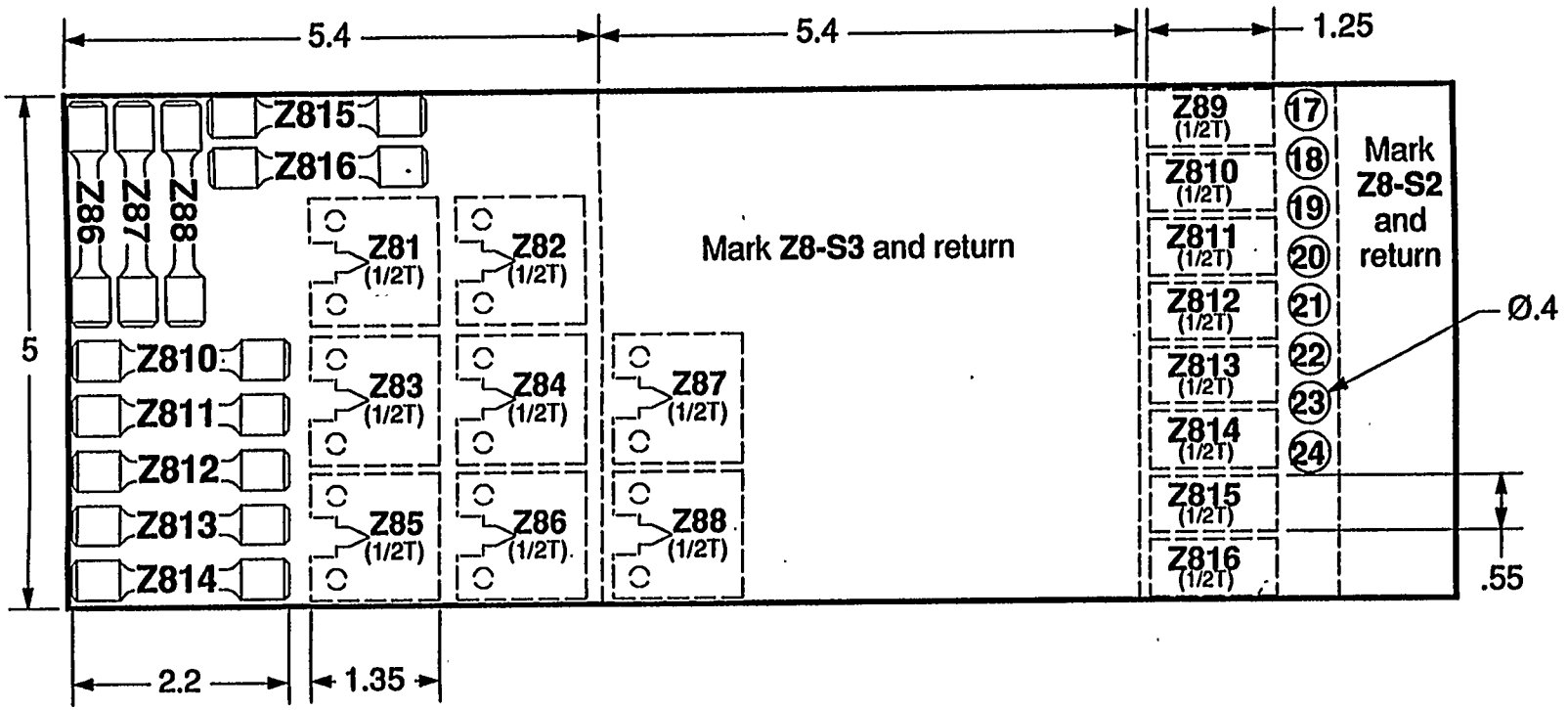
ornl
MARTIN MARIETTA

Title:	**Top View of Z8**
Drawing Number:	FMG-L 059 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	

Block B

(top view, second layer)

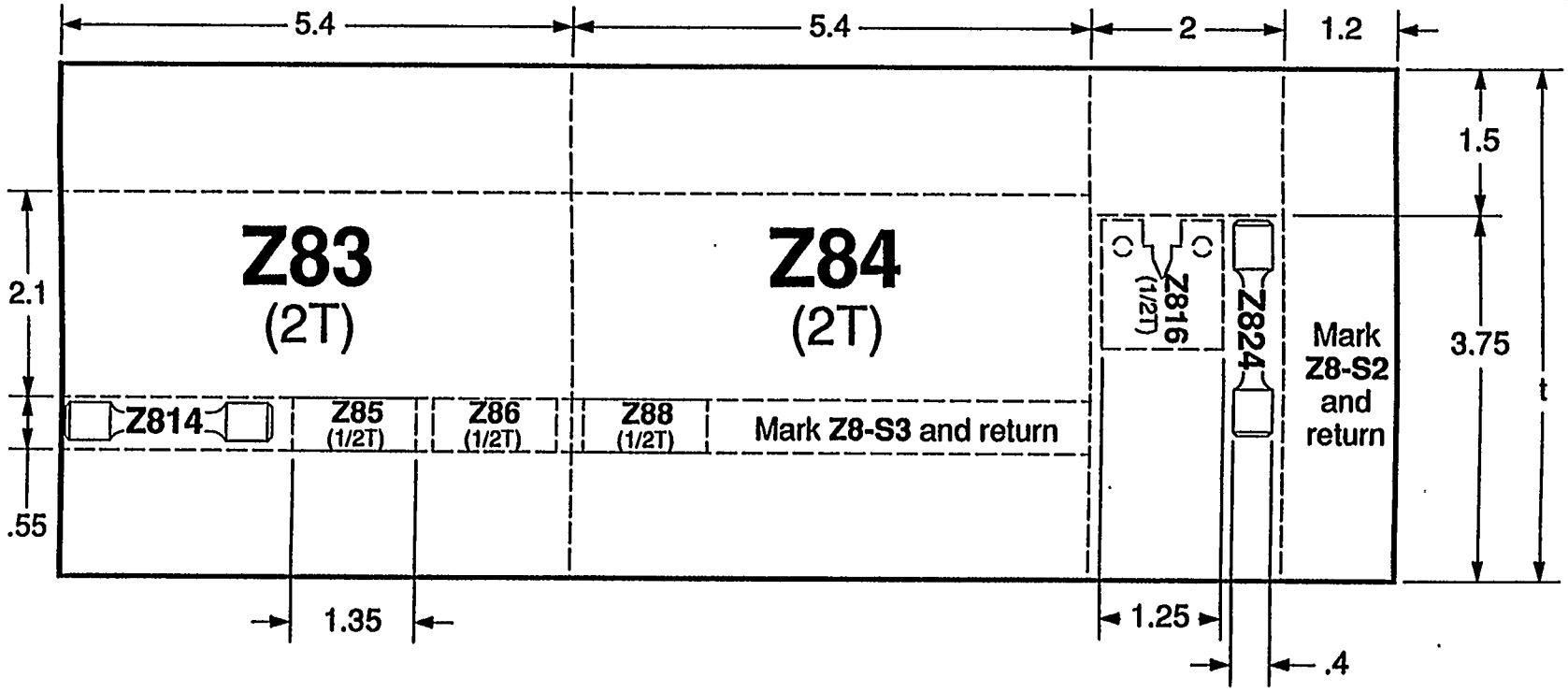
(see drawing FMG-L 061 r.0 for more details)



MARTIN MARIETTA

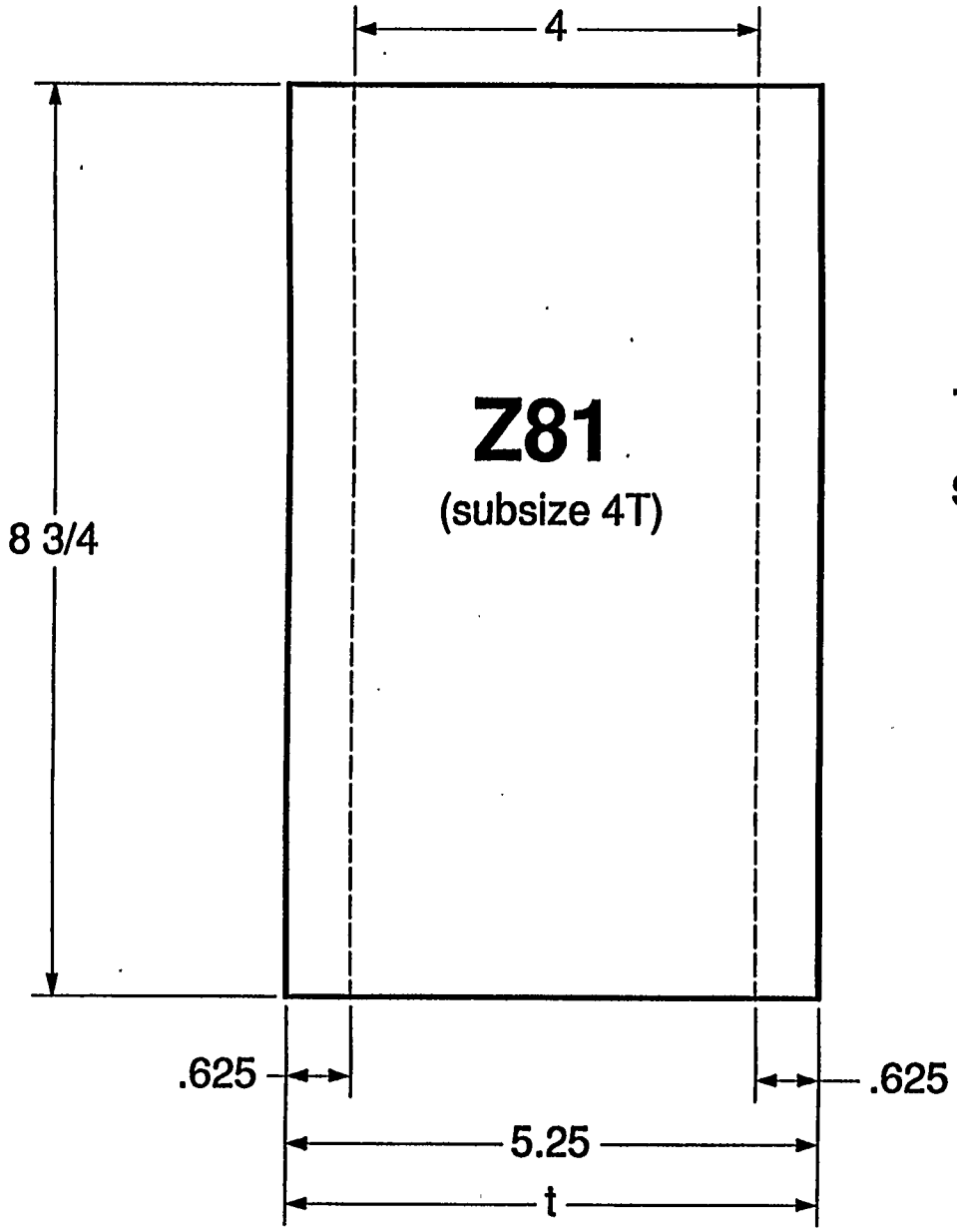
Title:	View of Z8
Drawing Number:	FMG-L 060 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	

Section B1-B1



ornl
MARTIN MARIETTA

Title:	View of Z8
Drawing Number:	FMG-L 061 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	



Block C

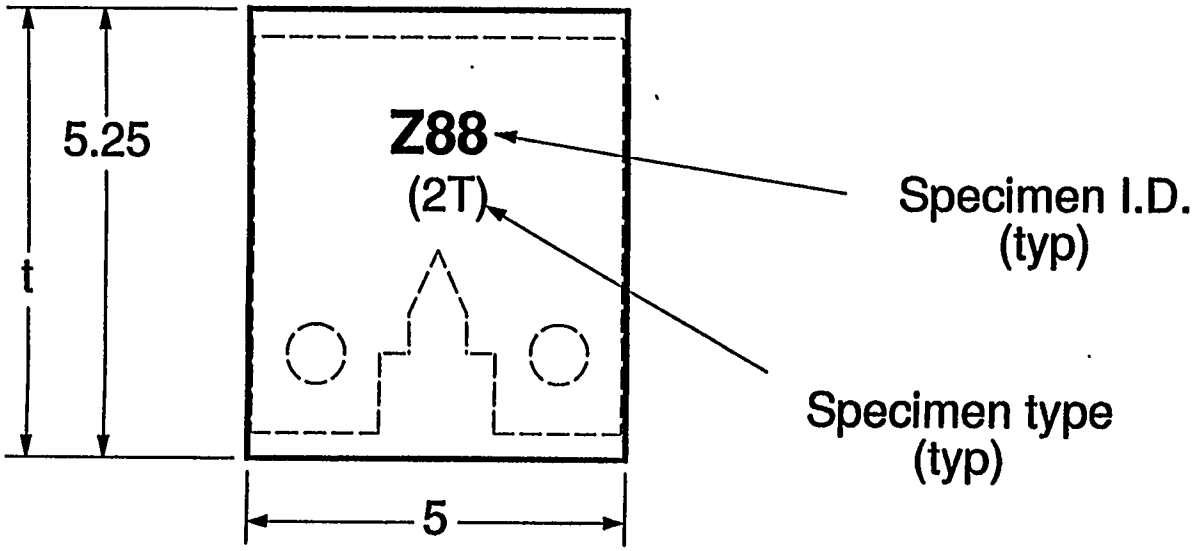
(right side view)

This is not a standzrd 4T specimen. See drawing FMG 131 r.0 (subsize 4T) for details of machining.

ornl MARTIN MARIETTA

Title:	**View of Z8**
Drawing Number:	FMG-L 062 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	

Section D1-D1



ornl
MARTIN MARIETTA

Title:	View of Z8
Drawing Number:	FMG-L 063 r.0
Drawn:	E.T. Manneschmidt
Date:	August 6, 1993
QAS Approved:	

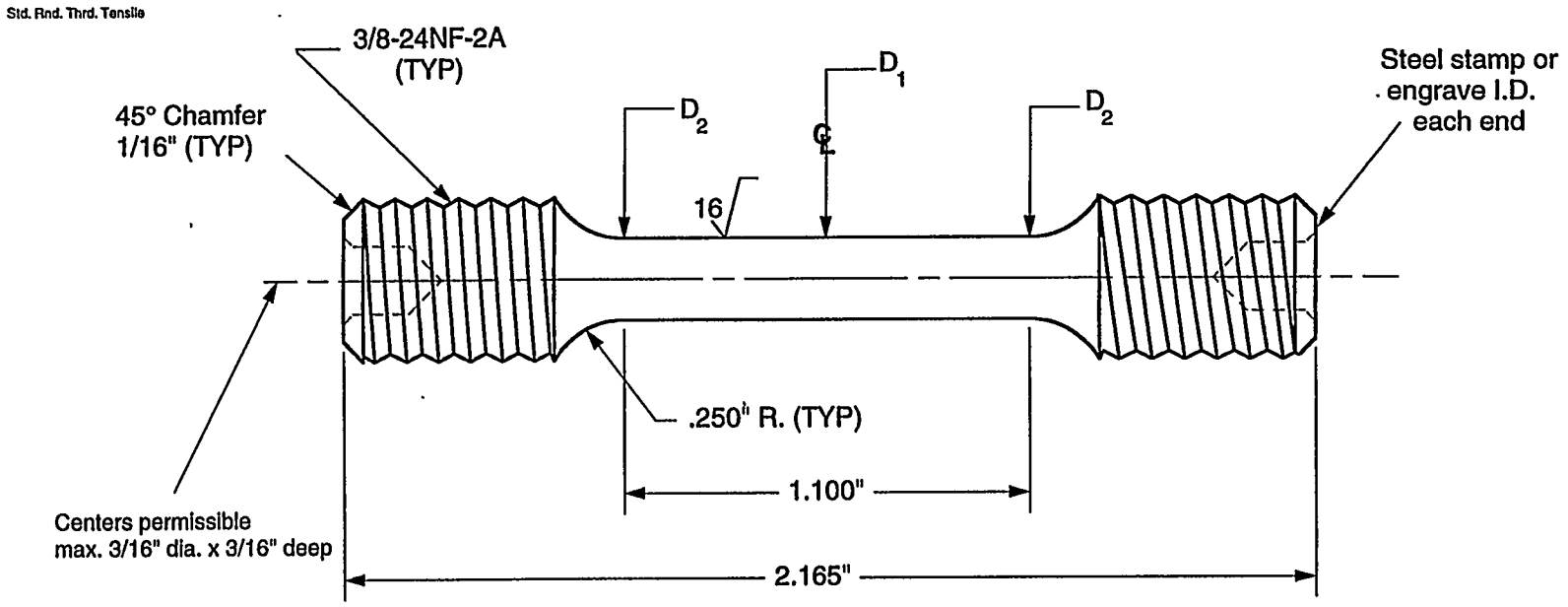
Appendix B

Chemistries, Tensile Properties, Charpy V-Notch Transition Curves, RT_{NDT}, and Drop-Weight NDT

Table B1. Modified A 302 grade B test materials, heat code, and chemistries

Plate code	Heat	Composition (wt %)												
		C	Mn	P	S	Si	Ni	Cr	Mo	V	Nb	Co	Cu	Al
Z1, Z2	B3990-2	0.18	1.35	0.007	0.011	0.23	0.47	0.11	0.44	0.003	0.004	0.011	0.17	0.03
Z3	A0237-1[a]	0.24	1.47	0.008	0.014	0.25	0.52	0.11	0.50	0.002	0.003	0.011	0.11	0.026
Z4	C1290-2[a]	0.22	1.42	0.006	0.013	0.24	0.50	0.11	0.48	0.002	0.003	0.011	0.10	0.027
Z5	P2130-2	0.17	1.16	0.013	0.016	0.17	0.60	0.10	0.50	0.002	0.004	0.012	0.16	0.012
Z6A	C1079-1	0.17	1.35	0.006	0.013	0.23	0.49	0.10	0.45	0.002	0.003	0.012	0.18	0.028
Z6B	B5013-2	0.22	1.39	0.009	0.023	0.20	0.51	0.15	0.48	0.002	0.003	0.017	0.21	0.035
Z7	C2463-1	0.26	1.47	0.008	0.014	0.15	0.53	0.09	0.52	0.002	0.003	0.011	0.16	0.017
Z8	C2220-2	0.27	1.49	0.006	0.015	0.23	0.68	0.12	0.45	0.002	0.003	0.012	0.16	0.016

[a]There was some uncertainty in heat identifications. Values were determined by ABB-Combustion Engineering.



D_1 = 0.250" ± .001 DIA

D_2 = From 0.0010" to 0.0015" greater than D_1

Tolerances
X.XXX = ±0.005
X.XX = ±0.01
All surfaces should be parallel and perpendicular as appropriate within 0.002". All dimensions in inches.

NOTES:

1. No Grinding. Material must not be ground at any time during the fabrication of specimens.
2. All diameters must be concentric within 0.0010" TIR.
3. Reduced diameter D1 must be within 1/4" of gage length center line. All radius must blend without undercuts or steps.
4. Threads must be turned concentric to centerline within 0.001" TIR.
5. Specimen gage length to have uniform slope from max. dia. D2 to min. dia.
6. D1 max uniform slope not to exceed 0.002" change in dia. per 1" of change in length.

ornl
MARTIN MARIETTA

Title:	Std. Rnd. Threaded Tensile
Drawing Number:	FMG 129 r.1
Drawn:	E.T. Manneschmidt
Date:	August 31, 1993
QAS Approved:	

Figure B1. Standard round threaded tensile specimen.

Table B2. Tensile properties for seven heats of modified A 302 grade B (Z1–Z7) and one vintage heat of A 533 grade B (Z8)

Plate code	Test temperature (°F)	Yield strength[a] (ksi)			Ultimate Strength[a] (ksi)			Elongation (%)		
		T	L	S_T	T	L	S_T	T	L	S_T
Z1	75	65.2	64.0	64.2	84.5	84.7	80.1	25.5	25.0	13.5
	180	62.4	64.2	58.1	80.7	80.8	79.0	22.5	23.0	17, 7[b]
	400	57.0	58.8	57.7	79.3	79.7	72.2	21.0	21.5	15, 8[b]
	550	60.3	60.1	58.9	84.8	84.0	57.0	24.5	24.0	8
Z3	75	67.9	67.8	67.0	89.7	90.0	89.3	23.0	27.5	16.5
	180	64.8	64.4	64.0	85.2	85.2	84.7	21.5	23.5	15.0
	400	59.8	59.5	52.9	84.9	84.2	80.5	20.5	23.0	11.0
	550	61.7	61.0	62.2	88.2	89.0	88.3	25.0	25.5	15.0
Z4	75	67.8	68.1	66.5	89.2	89.8	88.2	25.0	24.5	21.5
	180	63.8	64.4	63.5	83.9	84.7	83.6	22.5	23.5	20.5
	400	60.3	[c]	[c]	83.3	[c]	[c]	22.0	[c]	[c]
	550	61.2	61.0	60.4	88.0	87.9	87.1	24.0	26.0	20.0
Z5	75	58.1		55.2	78.1		72.0	24.5		17.5
	180	55.6		52.8	74.4		68.6	22.4		13.5
	400	53.8		49.0	75.8		68.5	21.5		13.0
	550	54.2		49.6	79.8		74.1	23.4		11.5
Z6A	75	61.8	63.7	57.6	81.0	82.4	62.5	28.5	28.0	7.5
	180	57.9	59.1	58.4	70.8	77.0	61.5	16.0	25.0	4.5
	400	55.0	55.6	55.7	76.2	75.8	74.9	21.0	23.5	12.5
	550	55.8	57.7	57.5	81.2	84.0	76.8	21.5	22.0	12.0
Z6B	75	64.9	68.8	62.6	86.3	89.1	77.9	24.5	28.0	9.5
	180	64.5	63.2	61.0	83.6	82.3	78.0	20.5	24.0	11.0
	400	59.3	59.8	57.5	83.7	83.4	69.0	20.5	22.5	4.5
	550	60.7	61.5	60.7	86.2	87.2	64.7	21.5	24.0	5.0
Z7	75	68.5	69.1	68.2	91.7	92.5	92.2	24.5	23.5	17.5
	180	65.5	66.7	66.7	86.7	87.7	87.7	22.5	23.5	17.0
	400	60.1	60.3	61.4	85.6	86.0	86.2	21.5	22.5	13.0
	550	62.3	63.6	62.3	90.0	91.3	90.6	23.4	26.0	11.5
Z8	75	61.9	63.1	61.6	88.2	88.9	87.2	23.5	26.0	17.5
	180	59.8	59.2	58.4	83.4	82.5	81.5	22.5	24.0	17.0
	400	56.7	54.7	55.8	82.7	80.2	80.0	21.0	23.0	14.5
	550	58.0	57.4	54.6	88.2	87.2	84.6	22.5	26.5	11.5

[a]MPa = (ksi) × 6.894.
[b]Unaveraged values.
[c]Omitted because of questionable results.

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z1 A302-B (T-Orientation)

Date			2/8/94	3/23/94	3/3/94	2/24/94	2/9/94	3/23/94	3/4/94	2/25/94
Specimen I.D.			Z19	Z110	Z111	Z112	Z113	Z114	Z115	Z116
Specimen Type			Round	threaded						
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2530	.2520	.2530	.2525	.2530	.2525	.2525	.2520
	Center	do	.2510	.2510	.2505	.2505	.2510	.2510	.2510	.2510
	Right		.2530	.2515	.2530	.2525	.2530	.2535	.2520	.2530
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1655	2.1655	2.1670	2.1670	2.1650	2.1660	2.1660	2.1640
	Final	Lf								
	Gage	GL	1.0670	1.0730	1.0670	1.0750	1.0740	1.0625	1.0590	1.0735
LOAD (lbs)	0.2% offset	P.2%	3305	3120	2955	3020	3225	3085	2880	2930
	Upper Yield	σ	3435	3280	2875	-	3375	3170	2880	-
	Lower Yield	σ	3240	3110	2850	-	3210	3070	2785	-
	Ultimate	σ	4240	4015	3960	4210	4150	3975	3875	4165
	Fracture	σ	2670	2740	2765	2965	2725	2660	2770	3680
Stress (Ksi) (MPa)	0.2% offset	P.2%	66.8	63.1	60.0	61.3	65.2	62.3	58.2	59.2
	Upper Yield	σ	69.4	66.3	58.3	-	68.2	64.1	58.2	-
	Lower Yield	σ	65.5	62.9	57.8	-	64.9	62.0	56.3	-
	Ultimate	σ	85.7	81.1	80.4	85.4	83.9	80.3	78.3	84.2
	Fracture	σ	54.0	55.4	56.1	60.2	55.1	53.8	56.0	74.4
Elongations (inches)	Luders	ee	.008	.008	.035	-	.009	.009	.026	-
	To Max. Load	eu	.118	.101	.093	.120	.121	.107	.104	.123
	To Fracture	ef	.269	.232	.224	.251	.277	.240	.218	.276
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	2%	-
	Uniform	eu	11%	9%	9%	11%	11%	10%	10%	11%
	Total	ef	25%	22%	21%	23%	26%	23%	21%	26%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z1 A302-B (S-Orientation)

Date			2/9/94	3/24/94	3/7/94	2/23/94	2/9/94	3/24/94	3/7/94	2/23/94
Specimen I.D.			Z117	Z118	Z119	Z120	Z121	Z122	Z123	Z124
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2530	.2520	.2520	.2530	.2525	.2530	.2520	.2525
	Center	do	.2510	.2510	.2505	.2510	.2510	.2505	.2510	.2510
	Right		.2525	.2530	.2520	.2530	.2530	.2525	.2530	.2530
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1660	2.1655	2.1635	2.1660	2.1640	2.1640	2.1655	2.1665
	Final	Lf								
	Gage	GL	1.0810	1.0680	1.0570	1.0710	1.0570	1.0630	1.0610	1.0700
LOADS (lbs)	0.2% offset	P.2%	3190	3050	2825	2910	3230	2690	2875	2925
	Upper Yield	σ	3250	3230	2820	-	3280	2910	-	-
	Lower Yield	σ	3185	3050	2780	-	3170	2690	-	-
	Ultimate	σ	4080	3915	3765	3930	3850	2775	3365	3800
	Fracture	σ	0	1425	0	2475	1475	0	0	3170
Stress (Ksi) (MPa)	0.2% offset	P.2%	64.5	61.6	57.3	58.8	65.3	54.6	58.1	59.1
	Upper Yield	σ	65.7	65.3	57.2	-	66.3	59.0	-	-
	Lower Yield	σ	64.4	61.6	56.4	-	64.1	54.6	-	-
	Ultimate	σ	82.5	79.1	76.4	79.4	77.8	56.3	68.0	76.8
	Fracture	σ	0.0	28.8	0.0	50.0	29.8	0.0	0.0	64.1
Elongations (inches)	Luders	ee	.008	.008	.038	-	.011	.007	.022	-
	To Max. Load	eu	.101	.109	.083	.070	.065	.007	.026	.055
	To Fracture	ef	.188	.183	.154	.097	.108	.076	.090	.072
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	4%	-	1%	1%	2%	-
	Uniform	eu	9%	10%	8%	7%	6%	1%	2%	5%
	Total	ef	17%	17%	15%	9%	10%	7%	8%	7%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z1 A302-B (L-Orientation)

Date			2/8/94	3/21/94	3/2/94	2/22/94	2/8/94	3/22/94	3/3/94	2/22/94
Specimen I.D.			Z11	Z12	Z13	Z14	Z15	Z16	Z17	Z18
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2530	.2520	.2530	.2530	.2530	.2520	.2525	.2530
	Center	do	.2510	.2500	.2510	.2510	.2500	.2510	.2500	.2510
	Right		.2530	.2530	.2535	.2535	.2540	.2530	.2515	.2530
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1630	2.1625	2.1640	2.1610	2.1630	2.1660	2.1640	2.1640
	Final	Lf								
	Gage	GL	1.0740	1.0770	1.0700	1.0750	1.0630	1.0690	1.0540	1.0780
LOADS (lbs)	0.2% offset	P.2%	3260	3130	2950	3025	3170	3045	2850	2925
	Upper Yield	σ	3360	3125	-	-	3310	3070	-	-
	Lower Yield	σ	3250	3115	-	-	3110	3035	-	-
	Ultimate	σ	4225	4020	3975	4210	4125	3940	3885	4100
	Fracture	σ	2625	2500	2710	2675	2650	2525	.2580	2575
Stress (Ksi) (MPa)	0.2% offset	P.2%	65.9	63.8	59.6	61.1	64.6	61.5	58.1	59.1
	Upper Yield	σ	67.9	63.7	-	-	67.4	62.0	-	-
	Lower Yield	σ	65.7	63.5	-	-	63.4	61.3	-	-
	Ultimate	σ	85.4	81.9	80.3	85.1	84.0	79.6	79.1	82.9
	Fracture	σ	53.1	50.9	54.8	54.1	54.0	51.0	52.6	52.0
Elongations (inches)	Luders	ee	.010	.008	.038	-	.010	.007	.040	-
	To Max. Load	eu	.116	.105	.094	.117	.115	.108	.102	.113
	To Fracture	ef	.268	.247	.228	.262	.264	.249	.236	.260
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	4%	-	1%	1%	4%	-
	Uniform	eu	11%	10%	9%	11%	11%	10%	10%	10%
	Total	ef	25%	23%	21%	24%	25%	23%	22%	24%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z3 A302-B (T-Orientation)

Date			2/7/94	3/24/94	3/9/94	2/18/94	2/7/94	3/25/94	3/9/94	2/19/94
Specimen I.D.			Z31	Z32	Z33	Z34	Z35	Z36	Z37	Z38
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2525	.2520	.2530	.2520	.2525	.2515	.2520	.2520
	Center	do	.2510	.2510	.2510	.2510	.2510	.2510	.2505	.2500
	Right		.2535	.2520	.2520	.2520	.2520	.2515	.2520	.2515
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1665	2.1660	2.1670	2.1660	2.1675	2.1670	2.1660	2.1655
	Final	Lf								
	Gage	GL	1.0700	1.0960	1.1070	1.1050	1.0985	1.0950	1.1010	1.1020
LOAD (lbs)	0.2% offset	P.2%	3375	3240	3000	3050	3375	3230	2915	3030
	Upper Yield	σ	3575	3240	-	-	3605	3240	-	-
	Lower Yield	σ	3355	3200	-	-	3360	3210	-	-
	Ultimate	σ	4440	4215	4165	4370	4440	4215	4080	4325
	Fracture	σ	3175	2505	2995	3015	3025	2675	2900	2860
Stress (Ksi) (MPa)	0.2% offset	P.2%	68.2	65.5	60.6	61.6	68.2	65.3	59.1	61.7
	Upper Yield	σ	72.3	65.5	-	-	72.9	65.5	-	-
	Lower Yield	σ	67.8	64.7	-	-	67.9	64.9	-	-
	Ultimate	σ	89.7	85.2	84.2	88.3	89.7	85.2	82.8	88.1
	Fracture	σ	64.2	50.6	60.5	60.9	61.1	54.1	58.8	58.3
Elongations (inches)	Luders	ee	.009	.008	.029	-	.010	.008	.037	-
	To Max. Load	eu	.112	.104	.101	.123	.115	.118	.104	.120
	To Fracture	ef	.250	.206	.226	.275	.255	.262	.232	.274
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	3%	-
	Uniform	eu	10%	9%	9%	11%	10%	11%	9%	11%
	Total	ef	23%	19%	20%	25%	23%	24%	21%	25%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z3 A302-B (S-Orientation)

Date			2/7/94	3/28/94	3/10/94	2/25/94	2/7/94	3/28/94	3/10/94	3/1/94
Specimen I.D.			Z317	Z318	Z319	Z320	Z321	Z322	Z323	Z324
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2530	.2520	.2525	.2495	.2520	.2500	.2515	.2520
	Center	do	.2510	.2500	.2510	.2490	.2505	.2495	.2495	.2500
	Right		.2530	.2520	.2530	.2505	.2520	.2510	.2515	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1675	2.1650	2.1670	2.1660	2.1670	2.1680	2.1660	2.1665
	Final	Lf								
	Gage	GL	1.0740	1.0590	1.0760	1.0580	1.0670	1.0750	1.0635	1.0750
LOAD (lbs)	0.2% offset	P.2%	3300	3145	2950	3025	3325	3135	2265	3060
	Upper Yield	σ	3340	3360	-	-	3475	3300	-	-
	Lower Yield	σ	3310	3145	-	-	3310	3125	-	-
	Ultimate	σ	4415	4170	3830	4300	4410	4130	4090	4315
	Fracture	σ	3350	3175	1740	3570	3200	3125	3360	3625
Stress (Ksi) (MPa)	0.2% offset	P.2%	66.7	64.1	59.6	62.1	67.5	64.1	46.3	62.3
	Upper Yield	σ	67.5	68.4	-	-	70.5	67.5	-	-
	Lower Yield	σ	66.9	64.1	-	-	67.2	63.9	-	-
	Ultimate	σ	89.2	85.0	77.4	88.3	89.5	84.5	83.7	87.9
	Fracture	σ	67.7	64.7	35.2	73.3	64.9	63.9	68.7	73.8
Elongations (inches)	Luders	ee	.002	.004	.020	-	.004	.004	.014	-
	To Max. Load	eu	.088	.082	.043	.093	.095	.083	.071	.096
	To Fracture	ef	.184	.167	.094	.158	.172	.151	.130	.160
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	0%	0%	2%	-	0%	0%	1%	-
	Uniform	eu	8%	8%	4%	9%	9%	8%	7%	9%
	Total	ef	17%	16%	9%	15%	16%	14%	12%	15%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z3 A302-B (L-Orientation)

Date			2/8/94	3/25/94	3/8/94	2/21/94	2/8/94	3/25/94	3/8/94	2/21/94
Specimen I.D.			Z39	Z310	Z311	Z312	Z313	Z314	Z315	Z316
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2535	.2510	.2525	.2500	.2520	.2520	.2520	.2530
	Center	do	.2510	.2500	.2510	.2485	.2500	.2510	.2510	.2510
	Right		.2525	.2515	.2525	.2480	.2510	.2520	.2520	.2530
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1850	2.1610	2.1665	2.1640	2.1650	2.1655	2.1650	2.1655
	Final	Lf								
	Gage	GL	1.0950	1.0725	1.0700	1.0580	1.0700	1.0670	1.0580	1.0680
LOADS (lbs)	0.2% offset	P.2%	3365	3180	2910	2950	3340	3200	2980	3030
	Upper Yield	σ	3575	3200	-	-	3540	3240	2995	-
	Lower Yield	σ	3360	3160	-	-	3325	3190	2970	-
	Ultimate	σ	4450	4180	4115	4275	4420	4220	4215	4455
	Fracture	σ	2675	2590	2740	2610	2665	2625	2825	2975
Stress (Ksi) (MPa)	0.2% offset	P.2%	68.0	64.8	58.8	60.8	68.0	64.7	60.2	61.2
	Upper Yield	σ	72.3	65.2	-	-	72.1	65.5	60.5	-
	Lower Yield	σ	67.9	64.4	-	-	67.7	64.5	60.0	-
	Ultimate	σ	89.9	85.2	83.2	88.1	90.0	85.3	85.2	90.0
	Fracture	σ	54.1	52.8	55.4	53.8	54.3	53.1	57.1	60.1
Elongations (inches)	Luders	ee	.008	.008	.031	-	.008	.009	.022	-
	To Max. Load	eu	.126	.106	.110	.121	.124	.108	.111	.120
	To Fracture	ef	.292	.249	.245	.271	.302	.254	.246	.262
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	2%	-
	Uniform	eu	12%	10%	10%	11%	12%	10%	10%	11%
	Total	ef	27%	23%	23%	26%	28%	24%	23%	25%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z4 A302-B (T-Orientation)

Date			2/9/94	3/30/94	3/14/94	3/11/94	2/9/94	3/31/94		3/11/94
Specimen I.D.			Z41-17	Z41-18	Z41-19	Z41-20	Z41-21	Z41-22	Z41-23	Z41-24
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2525	.2525	.2530	.2530	.2525	.2500	.2520	.2525
	Center	do	.2505	.2510	.2510	.2510	.2505	.2490	.2500	.2510
	Right		.2540	.2520	.2530	.2540	.2530	.2500	.2530	.2530
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1675	2.1670	2.1685	2.1630	2.1650	2.1650	2.1660	2.1650
	Final	Lf								
	Gage	GL	1.0660	1.0705	1.0700	1.0790	1.0550	1.0870	1.0850	1.0810
LOAD (lbs)	0.2% offset	P.2%	3315	3150	2985	3040	3390	3165		3020
	Upper Yield	σ	3340	3150	-	-	3615	3225		-
	Lower Yield	σ	3290	3130	-	-	3390	3125		-
	Ultimate	σ	4380	4150	4120	4355	4410	4085		4355
	Fracture	σ	2880	2720	2785	2620	2870	2670		2925
Stress (Ksi) (MPa)	0.2% offset	P.2%	67.3	63.7	60.3	61.4	68.8	65.0		61.0
	Upper Yield	σ	67.8	63.7	-	-	73.4	66.2		-
	Lower Yield	σ	66.8	63.3	-	-	68.8	64.2		-
	Ultimate	σ	88.9	83.9	83.3	88.0	89.5	83.9		88.0
	Fracture	σ	58.4	55.0	56.3	52.9	58.2	54.8		59.1
Elongations (inches)	Luders	ee	.007	.009	.021	-	.009	.009		-
	To Max. Load	eu	.113	.102	.098	.114	.115	.108		.118
	To Fracture	ef	.265	.238	.231	.270	.267	.249		.250
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	2%	-	1%	1%		-
	Uniform	eu	11%	10%	9%	11%	11%	10%		11%
	Total	ef	25%	22%	22%	25%	25%	23%		23%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z4 A302-B (S-Orientation)

Date			2/9/94	3/29/94		3/15/94	2/9/94	3/29/94		3/16/94
Specimen I.D.			Z41-1	Z41-2	Z41-3	Z41-4	Z41-5	Z41-6	Z41-7	Z41-8
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2525	.2520	.2520	.2530	.2520	.2530	.2520	.2530
	Center	do	.2500	.2500	.2500	.2510	.2506	.2505	.2505	.2510
	Right		.2525	.2525	.2520	.2530	.2515	.2530	.2520	.2540
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1675	2.1650	2.1655	2.1650	2.1640	2.1655	2.1645	2.1650
	Final	Lf								
	Gage	GL	1.0725	1.0770	1.0730	1.0680	1.0750	1.0810	1.0770	1.0700
L O A D S (lbs)	0.2% offset	P.2%	3250	3115		2990	3325	3190		2995
	Upper Yield	σ	3425	3140		-	3450	3190		-
	Lower Yield	σ	3235	3090		-	3313	3165		-
	Ultimate	σ	4330	4100		4300	4350	4125		4325
	Fracture	σ	3675	2875		3575	3100	3010		3280
Stress (Ksi) (MPa)	0.2% offset	P.2%	66.2	63.5		60.4	67.4	64.7		60.5
	Upper Yield	σ	69.8	64.0		-	69.9	64.7		-
	Lower Yield	σ	65.9	62.9		-	67.2	64.2		-
	Ultimate	σ	88.2	83.5		86.9	88.2	83.7		87.4
	Fracture	σ	74.9	58.6		72.3	62.9	61.1		66.3
Elongations (inches)	Luders	ee	.008	.007		-	.009	.007		-
	To Max. Load	eu	.110	.109		.121	.117	.101		.121
	To Fracture	ef	.202	.221		.206	.255	.220		.220
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%		-	1%	1%		-
	Uniform	eu	10%	10%		11%	11%	9%		11%
	Total	ef	19%	21%		19%	24%	20%		21%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z4 A302-B (L-Orientation)

Date			2/9/94	3/29/94		3/14/94	2/9/94	3/29/94		3/15/94
Specimen I.D.			Z41-9	Z41-10	Z41-11	Z41-12	Z41-13	Z41-14	Z41-15	Z41-16
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2535	.2510	.2520	.2530	.2540	.2530	.2525	.2520
	Center	do	.2510	.2500	.2500	.2510	.2515	.2515	.2510	.2500
	Right		.2540	.2520	.2525	.2530	.2525	.2535	.2515	.2510
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1645	2.1650	2.1670	2.1640	2.1640	2.1645	2.1630	2.1660
	Final	Lf								
	Gage	GL	1.0770	1.0800	1.0820	1.0780	1.0790	1.0850	1.0850	1.0770
LOADS (lbs)	0.2% offset	P.2%	3380	3165		3015	3410	3225		3000
	Upper Yield	σ	3575	3180		-	3665	3375		-
	Lower Yield	σ	3362	3155		-	3400	3200		-
	Ultimate	σ	4450	4150		4355	4460	4220		4310
	Fracture	σ	2750	2610		2665	2750	2685		2650
Stress (Ksi) (MPa)	0.2% offset	P.2%	68.3	64.5		60.9	68.6	64.9		61.1
	Upper Yield	σ	72.3	64.8		-	73.8	67.9		-
	Lower Yield	σ	67.9	64.3		-	68.4	64.4		-
	Ultimate	σ	89.9	84.5		88.0	89.8	84.9		87.8
	Fracture	σ	55.6	53.2		53.9	55.4	54.0		54.0
Elongations (inches)	Luders	ee	.010	.006		-	.009	.007		-
	To Max. Load	eu	.105	.103		.122	.111	.107		.125
	To Fracture	ef	.263	.252		.275	.269	.256		.279
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%		-	1%	1%		-
	Uniform	eu	10%	10%		11%	10%	10%		12%
	Total	ef	24%	23%		26%	25%	24%		26%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z5 A302-B (T-Orientation)

Date			2/8/94	4/4/94	3/15/94	4/20/94	2/8/94	4/5/94	3/15/94	4/20/94
Specimen I.D.			Z59	Z510	Z511	Z512	Z513	Z514	Z515	Z516
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2525	.2530	.2515	.2510	.2490	.2515	.2520	.2515
	Center	do	.2510	.2515	.2500	.2500	.2480	.2505	.2505	.2500
	Right		.2525	.2525	.2515	.2525	.2490	.2515	.2515	.2515
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1660	2.1675	2.1680	2.1670	2.1670	2.1680	2.1690	2.1670
	Final	Lf								
	Gage	GL	1.0690	1.0700	1.0910	1.0725	1.0740	1.0770	1.0740	1.0770
LOADS (lbs)	0.2% offset	P.2%	2790	2715	2615	2595	2925	2830	2705	2725
	Upper Yield	σ	2965	2730	2615	-	3100	2880	2720	-
	Lower Yield	σ	2780	2690	2590	-	2900	2820	2705	-
	Ultimate	σ	3805	3660	3685	3875	3830	3705	3770	3965
	Fracture	σ	2375	2375	2720	2750	2600	2560	2940	2775
Stress (Ksi) (MPa)	0.2% offset	P.2%	56.4	54.7	53.3	52.9	60.6	57.4	54.9	55.5
	Upper Yield	σ	59.9	55.0	53.3	-	64.2	58.4	55.2	-
	Lower Yield	σ	56.2	54.1	52.8	-	60.0	57.2	54.9	-
	Ultimate	σ	76.9	73.7	75.1	78.9	79.3	75.2	76.5	80.8
	Fracture	σ	48.0	47.8	55.4	56.0	53.8	51.9	59.7	56.5
Elongations (inches)	Luders	ee	.014	.011	.035	-	.012	.011	.038	-
	To Max. Load	eu	.140	.122	.114	.139	.131	.126	.118	.136
	To Fracture	ef	.300	.272	.245	.288	.266	.259	.226	.282
	Total (Lf-Lo)	efm								

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6A A302-B (T-Orientation)

Date			2/7/94	4/5/94	3/16/94	2/28/94	2/7/94	4/5/94	3/16/94	3/1/94
Specimen I.D.			Z6A1	Z6A2	Z6A3	Z6A4	Z6A5	Z6A6	Z6A7	Z6A8
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2520	.2510	.2515	.2515	.2510	.2515	.2500	.2520
	Center	do	.2510	.2500	.2510	.2505	.2505	.2505	.2490	.2510
	Right		.2520	.2510	.2515	.2520	.2515	.2510	.2500	.2520
Neck	A									

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6A A302-B (S-Orientation)

Date			2/7/94	4/5/94	3/11/94	4/20/94	2/7/94	4/5/94	3/16/94	4/20/94
Specimen I.D.			Z6A9	Z6A10	Z6A11	Z6A12	Z6A13	Z6A14	Z6A15	Z6A16
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2510	.2510	.2510	.2505	.2510	.2510	.2500	.2515
	Center	do	.2500	.2510	.2500	.2500	.2500	.2500	.2495	.2510
	Right		.2510	.2520	.2510	.2510	.2510	.2510	.2510	.2515
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1680	2.1680	2.1675	2.1675	2.1670	2.1675	2.1680	2.1685
	Final	Lf								
	Gage	GL	1.0955	1.0815	1.1000	1.0880	1.0975	1.1020	1.1060	1.0960
L O A D S (lbs)	0.2% offset	P.2%	2725	2840	2760	2820	2930	2930	2700	2855
	Upper Yield	σ	2975	2975	-	-	3070	2970	2730	-
	Lower Yield	σ	2720	2840	-	-	2930	2915	2700	-
	Ultimate	σ	2775	2850	3695	3985	3360	3215	3645	3580
	Fracture	σ	0	320	2625	2270	0	2175	2340	920
Stress (Ksi) (MPa)	0.2% offset	P.2%	55.5	57.4	56.2	57.4	59.7	59.7	55.2	57.7
	Upper Yield	σ	60.6	60.1	-	-	62.5	60.5	55.8	-
	Lower Yield	σ	55.4	57.4	-	-	59.7	59.4	55.2	-
	Ultimate	σ	56.5	57.6	75.3	81.2	68.4	65.5	74.6	72.4
	Fracture	σ	0.0	6.5	53.5	46.2	0.0	44.3	47.9	18.6
Elongations (inches)	Luders	ee	.002	-	.052	-	.002	.008	.059	-
	To Max. Load	eu	.018	.004	.086	.115	.041	.032	.080	.040
	To Fracture	ef	.082	.045	.140	.183	.091	.060	.129	.076
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	0%	-	5%	-	0%	1%	5%	-
	Uniform	eu	2%	0%	8%	11%	4%	3%	7%	4%
	Total	ef	7%	4%	13%	17%	8%	5%	12%	7%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6A A302-B (L-Orientation)

Date			2/7/94	4/6/94	3/16/94	4/21/94	2/7/94	4/6/94	3/16/94	4/21/94
Specimen I.D.			Z6A17	Z6A18	Z6A19	Z6A20	Z6A21	Z6A22	Z6A23	Z6A24
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2510	.2510	.2515	.2515	.2500	.2510	.2510	.2515
	Center	do	.2500	.2500	.2510	.2505	.2495	.2500	.2505	.2500
	Right		.2515	.2510	.2520	.2515	.2510	.2515	.2515	.2510
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1665	2.1680	2.1675	2.1675	2.1675	2.1670	2.1680	2.1680
	Final	Lf								
	Gage	GL	1.1005	1.0820	1.0950	1.0605	1.0945	1.0800	1.0765	1.0780
LOADS (lbs)	0.2% offset	P.2%	3165	2915	2725	2720	3005	2900	2780	2960
	Upper Yield	σ	3375	2945	2730	-	3185	3070	2825	-
	Lower Yield	σ	3140	2900	2725	-	3005	2900	2770	-
	Ultimate	σ	4135	3785	3780	3950	3940	3780	3705	4320
	Fracture	σ	2470	2395	2515	2725	2335	2290	2615	2980
Stress (Ksi) (MPa)	0.2% offset	P.2%	64.5	59.4	55.1	55.2	61.5	59.1	56.4	60.3
	Upper Yield	σ	68.8	60.0	55.2	-	65.1	62.5	57.3	-
	Lower Yield	σ	64.0	59.1	55.1	-	61.5	59.1	56.2	-
	Ultimate	σ	84.2	77.1	76.4	80.1	80.6	77.0	75.2	88.0
	Fracture	σ	50.3	48.8	50.8	55.3	47.8	46.7	53.1	60.7
Elongations (inches)	Luders	ee	.010	.009	.048	-	.010	.009	.037	-
	To Max. Load	eu	.132	.115	.118	.130	.128	.117	.119	.121
	To Fracture	ef	.303	.266	.263	.215	.302	.266	.244	.255
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	4%	-	1%	1%	3%	-
	Uniform	eu	12%	11%	11%	12%	12%	11%	11%	11%
	Total	ef	28%	25%	24%	20%	28%	25%	23%	24%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6B A302-B (T-Orientation)

Date			2/10/94	4/7/94	3/17/94	4/22/94	2/10/94	4/7/94	3/17/94	4/22/94
Specimen I.D.			Z6B1	Z6B2	Z6B3	Z6B4	Z6B5	Z6B6	Z6B7	Z6B8
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2520	.2515	.2520	.2520	.2515	.2520	.2520	.2520
	Center	do	.2510	.2510	.2510	.2510	.2510	.2510	.2510	.2510
	Right		.2520	.2520	.2520	.2520	.2520	.2520	.2520	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1750	2.1750	2.1750	2.1760	2.1760	2.1760	2.1760	2.1770
	Final	Lf								
	Gage	GL	1.0500	1.0690	1.0690	1.0600	1.0630	1.0640	1.0520	1.0670
LOADS (lbs)	0.2% offset	P.2%	3265	3260	2960	2975	3260	3120	2910	3040
	Upper Yield	σ	3265	-	-	-	3260	3120	-	-
	Lower Yield	σ	3240	-	-	-	3180	3100	-	-
	Ultimate	σ	4270	4235	4160	4230	4265	4040	4030	4305
	Fracture	σ	3060	2970	3180	3215	2970	2760	2985	3375
Stress (Ksi) (MPa)	0.2% offset	P.2%	66.0	65.9	59.8	60.1	65.9	63.1	58.8	61.4
	Upper Yield	σ	66.0	-	-	-	65.9	63.1	-	-
	Lower Yield	σ	65.5	-	-	-	64.3	62.7	-	-
	Ultimate	σ	86.3	85.6	84.1	85.5	86.2	81.6	81.4	87.0
	Fracture	σ	61.8	60.0	64.3	65.0	60.0	55.8	60.3	68.2
Elongations (inches)	Luders	ee	.007	.006	.030	-	.006	.005	.030	-
	To Max. Load	eu	.121	.100	.098	.119	.119	.109	.108	.124
	To Fracture	ef	.265	.218	.210	.222	.257	.221	.222	.230
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	0%	3%	-
	Uniform	eu	12%	9%	9%	11%	11%	10%	10%	12%
	Total	ef	25%	20%	20%	21%	24%	21%	21%	22%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6B A302-B (S-Orientation)

Date			2/10/94	2/11/94	3/18/94	2/17/94	2/10/94	2/11/94	3/18/94	2/17/94
Specimen I.D.			Z6B17	Z6B18	Z6B19	Z6B20	Z6B21	Z6B22	Z6B23	Z6B24
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2515	.2520	.2520	.2520	.2520	.2515	.2515	.2515
	Center	do	.2510	.2510	.2510	.2510	.2510	.2505	.2505	.2510
	Right		.2520	.2520	.2520	.2520	.2520	.2515	.2515	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1720	2.1710	2.1715	2.1720	2.1720	2.1725	2.1720	2.1700
	Final	Lf								
	Gage	GL	1.0500	1.0650	1.0640	1.0590	1.0680	1.0640	1.0500	1.0500
LOAD (lbs)	0.2% offset	P.2%	3140	3020	2840	2440	3100	2980	2845	2930
	Upper Yield	σ	3190	3070	-	-	3160	3040	-	-
	Lower Yield	σ	3100	3000	-	-	3095	2960	-	-
	Ultimate	σ	4025	3830	3655	3115	3680	3885	3165	3285
	Fracture	σ	1775	3300	3115	0	925	3350	2980	0
Stress (Ksi) (MPa)	0.2% offset	P.2%	63.5	61.0	57.4	49.3	62.7	60.5	57.7	59.2
	Upper Yield	σ	64.5	62.0	-	-	63.9	61.7	-	-
	Lower Yield	σ	62.7	60.6	-	-	62.5	60.1	-	-
	Ultimate	σ	81.3	77.4	73.9	63.0	74.4	78.8	64.2	66.4
	Fracture	σ	35.9	66.7	63.0	0.0	18.7	68.0	60.5	0.0
Elongations (inches)	Luders	ee	.007	.008	.028	-	.009	.006	.016	-
	To Max. Load	eu	.088	.086	.055	.014	.042	.082	.016	.012
	To Fracture	ef	.123	.122	.071	.052	.076	.114	.023	.057
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	2%	-
	Uniform	eu	8%	8%	5%	1%	4%	8%	2%	1%
	Total	ef	12%	11%	7%	5%	7%	11%	2%	5%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z6B A302-B (L-Orientation)

Date			2/10/94	4/7/94	3/17/94	2/16/94	2/10/94	4/7/94	3/18/94	2/16/94
Specimen I.D.			Z6B9	Z6B10	Z6B11	Z6B12	Z6B13	Z6B14	Z6B15	Z6B16
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2520	.2515	.2520	.2520	.2520	.2520	.2520	.2520
	Center	do	.2520	.2510	.2510	.2510	.2510	.2510	.2510	.2510
	Right		.2520	.2520	.2520	.2520	.2520	.2520	.2520	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1630	2.1640	2.1640	2.1660	2.1655	2.1660	2.1665	2.1675
	Final	Lf								
	Gage	GL	1.0640	1.0600	1.0600	1.0660	1.0520	1.0450	1.0470	1.0640
LOADS (lbs)	0.2% offset	P.2%	3440	3120	2990	3080	3375	3130	2935	3015
	Upper Yield	σ	3500	-	-	-	3380	-	-	-
	Lower Yield	σ	3400	-	-	-	3310	-	-	-
	Ultimate	σ	4430	4060	4145	4350	4425	4080	4110	4280
	Fracture	σ	2725	2560	2780	3075	2675	2415	2700	2915
Stress (Ksi) (MPa)	0.2% offset	P.2%	69.0	63.1	60.4	62.2	68.2	63.3	59.3	60.9
	Upper Yield	σ	70.2	-	-	-	68.3	-	-	-
	Lower Yield	σ	68.2	-	-	-	66.9	-	-	-
	Ultimate	σ	88.8	82.1	83.8	87.9	89.4	82.5	83.1	86.5
	Fracture	σ	54.6	51.7	56.2	62.1	54.1	48.8	54.6	58.9
Elongations (inches)	Luders	ee	.010	.007	.029	-	.008	.006	.026	-
	To Max. Load	eu	.114	.106	.101	.123	.114	.106	.101	.123
	To Fracture	ef	.321	.254	.233	.249	.276	.254	.237	.267
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	2%	-
	Uniform	eu	11%	10%	10%	12%	11%	10%	10%	12%
	Total	ef	30%	24%	22%	23%	26%	24%	23%	25%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z7 A302-B (T-Orientation)

Date			2/7/94	4/8/94	3/22/94	4/22/94	2/7/94	4/11/94	3/22/94	4/25/94
Specimen I.D.			Z79	Z710	Z711	Z712	Z713	Z714	Z715	Z716
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2520	.2515	.2520	.2520	.2515	.2510	.2515	.2515
	Center	do	.2510	.2505	.2505	.2510	.2505	.2500	.2505	.2500
	Right		.2510	.2520	.2510	.2515	.2520	.2515	.2515	.2515
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1650	2.1660	2.1660	2.1645	2.1645	2.1650	2.1650	2.1650
	Final	Lf								
	Gage	GL	1.0880	1.0990	1.0650	1.0910	1.0980	1.0650	1.0890	1.0850
LOADS (lbs)	0.2% offset	P.2%	3390	3240	2955	3105	3410	3225	2965	3040
	Upper Yield	σ	3450	3255	-	-	3475	3315	-	-
	Lower Yield	σ	3375	3220	-	-	3390	3225	-	-
	Ultimate	σ	4540	4295	4230	4375	4515	4235	4210	4500
	Fracture	σ	3215	2830	3240	3060	3160	2825	3080	3290
Stress (Ksi) (MPa)	0.2% offset	P.2%	68.5	65.7	60.0	62.8	69.2	65.7	60.2	61.9
	Upper Yield	σ	69.7	66.0	-	-	70.5	67.5	-	-
	Lower Yield	σ	68.2	65.3	-	-	68.8	65.7	-	-
	Ultimate	σ	91.8	87.1	85.8	88.4	91.6	86.3	85.4	91.7
	Fracture	σ	65.0	57.4	65.7	61.8	64.1	57.6	62.5	67.0
Elongations (inches)	Luders	ee	.006	.006	.027	-	.008	.007	.023	-
	To Max. Load	eu	.116	.109	.108	.110	.120	.106	.111	.128
	To Fracture	ef	.265	.249	.223	.247	.271	.234	.237	.258
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	3%	-	1%	1%	2%	-
	Uniform	eu	11%	10%	10%	10%	11%	10%	10%	12%
	Total	ef	24%	23%	21%	23%	25%	22%	22%	24%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z7 A302-B (S-Orientation)

Date			2/7/94	4/12/94	3/22/94	3/14/94	2/7/94	4/12/94	3/22/94	3/14/94
Specimen I.D.			Z717	Z718	Z719	Z720	Z721	Z722	Z723	Z724
Specimen Type			Round	threaded						
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2510	.2510	.2510	.2510	.2510	.2520	.2520	.2510
	Center	do	.2500	.2500	.2495	.2500	.2495	.2510	.2510	.2500
	Right		.2510	.2510	.2510	.2510	.2510	.2520	.2520	.2510
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1670	2.1665	2.1660	2.1665	2.1670	2.1670	2.1670	2.1670
	Final	Lf								
	Gage	GL	1.0800	1.0840	1.0985	1.0925	1.0835	1.0770	1.0760	1.0940
LOADS (lbs)	0.2% offset	P.2%	3410	3190	3025	3050	3415	2745	3020	3075
	Upper Yield	σ	3480	-	-	-	3440	2750	-	-
	Lower Yield	σ	3365	-	-	-	3320	2740	-	-
	Ultimate	σ	4520	4260	4255	4400	4515	4320	4230	4490
	Fracture	σ	3370	3470	3340	3620	3900	2125	2680	4270
Stress (Ksi) (MPa)	0.2% offset	P.2%	69.5	65.0	61.9	62.1	69.8	55.5	61.0	62.6
	Upper Yield	σ	70.9	-	-	-	70.4	55.6	-	-
	Lower Yield	σ	68.6	-	-	-	67.9	55.4	-	-
	Ultimate	σ	92.1	86.8	87.0	89.6	92.3	87.3	85.5	91.5
	Fracture	σ	68.7	70.7	68.3	73.7	79.8	42.9	54.2	87.0
Elongations (inches)	Luders	ee	.007	.007	.026	-	.005	.007	.024	-
	To Max. Load	eu	.114	.104	.104	.106	.112	.107	.096	.118
	To Fracture	ef	.190	.193	.152	.119	.181	.171	.131	.130
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	2%	-	0%	1%	2%	-
	Uniform	eu	11%	10%	9%	10%	10%	10%	9%	11%
	Total	ef	18%	18%	14%	11%	17%	16%	12%	12%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z7 A302-B (L-Orientation)

Date			2/7/94	4/8/94	3/21/94	4/22/94	2/7/94	4/8/94	3/21/94	4/22/94
Specimen I.D.			Z71	Z72	Z73	Z74	Z75	Z76	Z77	Z78
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2520	.2515	.2520	.2515	.2515	.2515	.2510	.2515
	Center	do	.2505	.2505	.2510	.2505	.2505	.2505	.2500	.2505
	Right		.2520	.2520	.2515	.2515	.2520	.2510	.2510	.2515
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1650	2.1645	2.1660	2.1660	2.1670	2.1640	2.1640	2.1630
	Final	Lf								
	Gage	GL	1.0870	1.0770	1.0825	1.0910	1.0890	1.0820	1.0950	1.0775
LOAD (lbs)	0.2% offset	P.2%	3500	3295	2965	3155	3420	3275	2985	3115
	Upper Yield	σ	3430	-	-	-	3490	3290	-	-
	Lower Yield	σ	3430	-	-	-	3380	3250	-	-
	Ultimate	σ	4595	4380	4220	4490	4525	4265	4255	4515
	Fracture	σ	3250	2810	2860	2955	2970	2775	2865	2930
Stress (Ksi) (MPa)	0.2% offset	P.2%	71.0	66.9	59.9	64.0	69.4	66.5	60.8	63.2
	Upper Yield	σ	69.6	-	-	-	70.8	66.8	-	-
	Lower Yield	σ	69.6	-	-	-	68.6	65.9	-	-
	Ultimate	σ	93.2	88.9	85.3	91.1	91.8	86.5	86.7	91.6
	Fracture	σ	65.9	57.0	57.8	60.0	60.3	56.3	58.4	59.5
Elongations (inches)	Luders	ee	.007	.007	.027	-	.008	.009	.023	-
	To Max. Load	eu	.112	.104	.107	.125	.118	.109	.106	.132
	To Fracture	ef	.242	.245	.247	.274	.273	.257	.243	.290
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	1%	1%	2%	-	1%	1%	2%	-
	Uniform	eu	10%	10%	10%	11%	11%	10%	10%	12%
	Total	ef	22%	23%	23%	25%	25%	24%	22%	27%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z8 A302-B (T-Orientation)

Date			2/4/94	4/13/94	3/23/94	3/2/94	2/4/94	4/13/94	3/23/94	3/2/94
Specimen I.D.			Z81	Z82	Z83	Z84	Z85	Z86	Z87	Z88
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2515	.2520	.2520	.2515	.2515	.2505	.2510	.2520
	Center	do	.2500	.2505	.2510	.2505	.2510	.2500	.2505	.2500
	Right		.2515	.2515	.2520	.2515	.2515	.2520	.2510	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1670	2.1670	2.1650	2.1680	2.1655	2.1640	2.1680	2.1670
	Final	Lf								
	Gage	GL	1.0910	1.0945	1.0975	1.0970	1.0950	1.0935	1.0880	1.1060
LOADS (lbs)	0.2% offset	P.2%	3140	2965	2815	2870	3065	2915	2785	2835
	Upper Yield	σ	3140	-	-	-	3125	-	-	-
	Lower Yield	σ	3100	-	-	-	3065	-	-	-
	Ultimate	σ	4400	4120	4100	4340	4300	4085	4065	4330
	Fracture	σ	3125	2925	2925	3325	3130	2725	3050	3080
Stress (Ksi) (MPa)	0.2% offset	P.2%	64.0	60.2	56.9	58.2	61.9	59.4	56.5	57.8
	Upper Yield	σ	64.0	-	-	-	63.2	-	-	-
	Lower Yield	σ	63.2	-	-	-	61.9	-	-	-
	Ultimate	σ	89.6	83.6	82.9	88.1	86.9	83.2	82.5	88.2
	Fracture	σ	63.7	59.3	59.1	67.5	63.3	55.5	61.9	62.7
Elongations (inches)	Luders	ee	.004	.002	.025	-	.006	.003	.029	-
	To Max. Load	eu	.118	.103	.111	.135	.129	.116	.114	.125
	To Fracture	ef	.253	.229	.241	.236	.267	.257	.222	.252
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	0%	0%	2%	-	1%	0%	3%	-
	Uniform	eu	11%	9%	10%	12%	12%	11%	10%	11%
	Total	ef	23%	21%	22%	22%	24%	24%	20%	23%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z8 A302-B (S-Orientation)

Date			2/4/94	4/18/94	3/24/94	3/4/94	2/4/94	4/18/94	3/24/94	3/4/94
Specimen I.D.			Z817	Z818	Z819	Z820	Z821	Z822	Z823	Z824
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2515	.2520	.2520	.2520	.2525	.2530	.2520	.2515
	Center	do	.2500	.2510	.2510	.2505	.2510	.2515	.2505	.2510
	Right		.2520	.2520	.2520	.2520	.2525	.2530	.2520	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1665	2.1675	2.1675	2.1660	2.1680	2.1690	2.1675	2.1615
	Final	Lf								
	Gage	GL	1.0905	1.0970	1.0890	1.0935	1.0950	1.0970	1.0960	1.1010
LOAD (lbs)	0.2% offset	P.2%	3035	2915	2750	2565	3060	2920	2765	2830
	Upper Yield	σ	3035	2890	-	-	3075	2935	-	-
	Lower Yield	σ	3025	2885	-	-	3050	2900	-	-
	Ultimate	σ	4300	4045	3995	4150	4300	4040	3915	4230
	Fracture	σ	3700	3125	1215	3665	3455	0	2140	3580
Stress (Ksi) (MPa)	0.2% offset	P.2%	61.8	58.9	55.6	52.0	61.8	58.8	56.1	57.2
	Upper Yield	σ	61.8	58.4	-	-	62.1	59.1	-	-
	Lower Yield	σ	61.6	58.3	-	-	61.6	58.4	-	-
	Ultimate	σ	87.6	81.7	80.7	84.2	86.9	81.3	79.4	85.5
	Fracture	σ	75.4	63.2	24.6	74.4	69.8	0.0	43.4	72.4
Elongations (inches)	Luders	ee	.004	.001	.029	-	.004	.004	.025	-
	To Max. Load	eu	.118	.113	.102	.073	.122	.104	.105	.109
	To Fracture	ef	.143	.203	.145	.084	.240	.166	.176	.169
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	0%	0%	3%	-	0%	0%	2%	-
	Uniform	eu	11%	10%	9%	7%	11%	9%	10%	10%
	Total	ef	13%	19%	13%	8%	22%	15%	16%	15%
	Total (Lf-Lo)/GL	efm								

Remarks -

Tensile Test Data Sheet

Program HSST 0450 **Operator** John Henry

Material Z8 A302-B (L-Orientation)

Date			2/4/94	4/14/94	3/23/94	2/3/94	2/4/94	4/14/94	3/25/94	2/3/94
Specimen I.D.			Z89	Z810	Z811	Z812	Z813	Z814	Z815	Z816
Specimen Type			Round threaded							
Machine			Instron (EM-01)							
Full Scale Load (lbs)			5000	5000	5000	5000	5000	5000	5000	5000
X-Head Speed (in/min)			0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Chart Speed (cm/min)			2	2	2	2	2	2	2	2
Temperature (°F)		T	RT	180	400	550	RT	180	400	550
Gage Diameters (inches)	Left		.2525	.2520	.2520	.2520	.2520	.2530	.2520	.2520
	Center	do	.2510	.2510	.2505	.2510	.2505	.2510	.2510	.2510
	Right		.2520	.2525	.2515	.2520	.2520	.2530	.2520	.2520
Neck Diameters (inches)	A									
	B									
	Average	df								
Reduction of Area (%)										
Overall Lengths (inches) meas.	Initial	Lo	2.1665	2.1675	2.1620	2.1660	2.1670	2.1675	2.1690	2.1650
	Final	Lf								
	Gage	GL	1.1035	1.0935	1.0940	1.0715	1.0900	1.0960	1.0980	1.0980
LOADS (lbs)	0.2% offset	P.2%	3150	2925	2760	2835	3090	2930	2600	2850
	Upper Yield	σ	3175	-	-	-	3125	-	-	-
	Lower Yield	σ	3150	-	-	-	3080	-	-	-
	Ultimate	σ	4430	4075	4010	4310	4350	4085	3915	4320
	Fracture	σ	2850	2525	2665	2925	2675	2530	2515	2870
Stress (Ksi) (MPa)	0.2% offset	P.2%	63.7	59.1	56.0	57.3	62.7	59.2	52.5	57.6
	Upper Yield	σ	64.2	-	-	-	63.4	-	-	-
	Lower Yield	σ	63.7	-	-	-	62.5	-	-	-
	Ultimate	σ	89.5	82.4	81.4	87.1	88.3	82.6	79.1	87.3
	Fracture	σ	57.6	51.0	54.1	59.1	54.3	51.1	50.8	58.0
Elongations (inches)	Luders	ee	.003	.004	.030	-	.002	.001	.024	-
	To Max. Load	eu	.120	.118	.113	.134	.113	.108	.117	.140
	To Fracture	ef	.299	.265	.249	.278	.272	.259	.258	.292
	Total (Lf-Lo)	efm								
Elongations (%)	Luders	ee	0%	0%	3%	-	0%	0%	2%	-
	Uniform	eu	11%	11%	10%	13%	10%	10%	11%	13%
	Total	ef	27%	24%	23%	26%	25%	24%	23%	27%
	Total (Lf-Lo)/GL	efm								

Remarks -

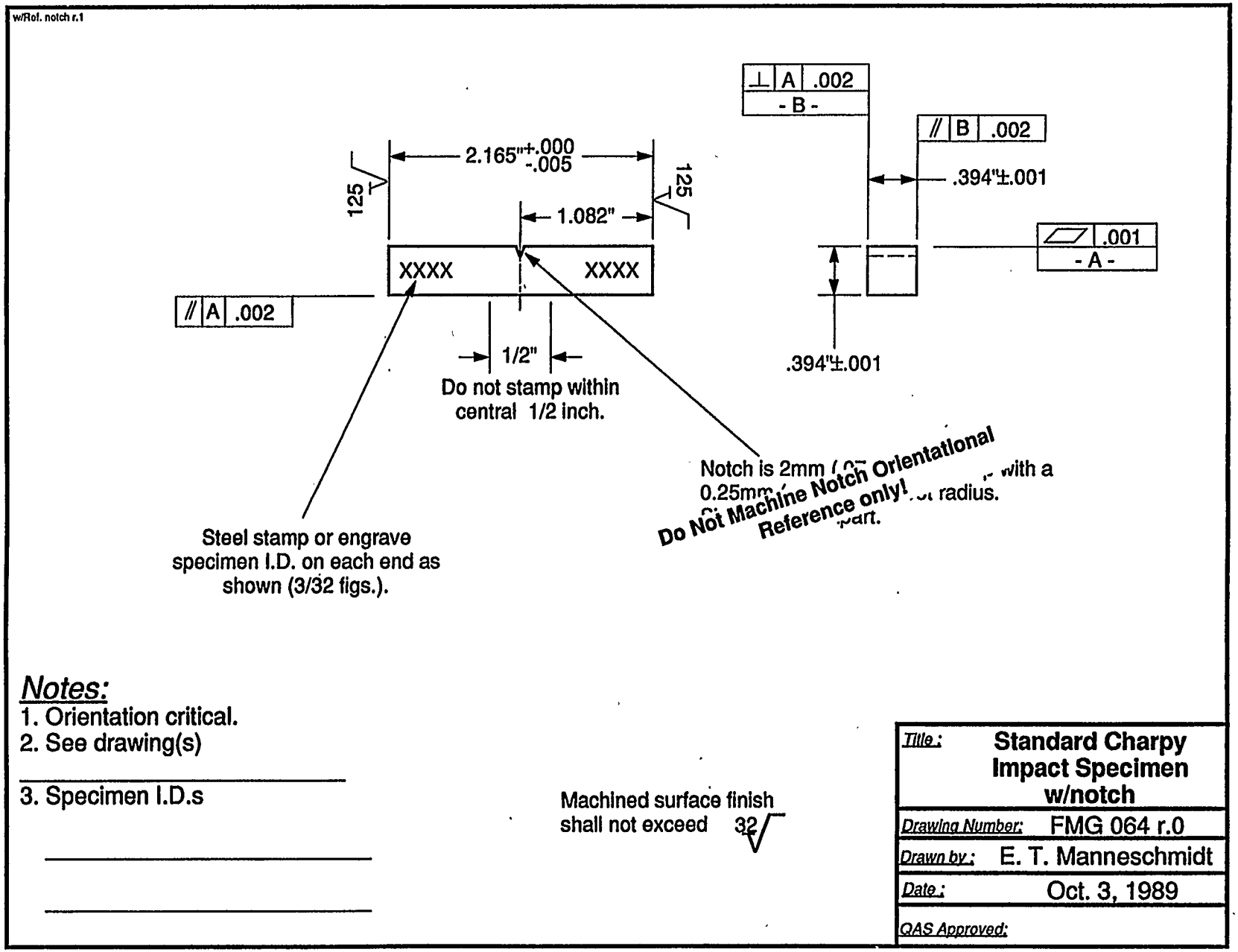


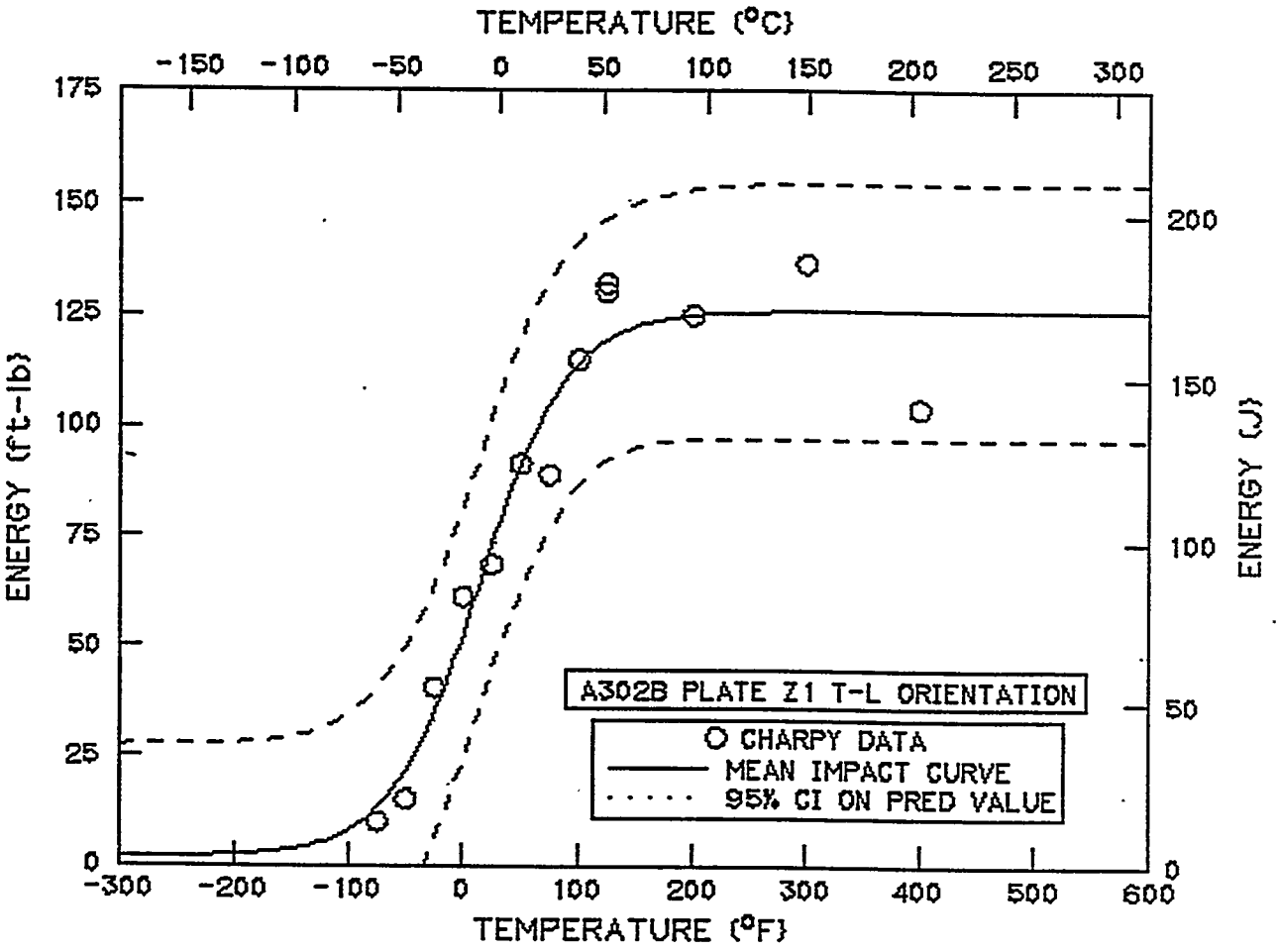
Figure B2. Standard Charpy V-notch specimen.

Table B3. Charpy V-notch values for material transition temperature and upper-shelf evaluation

Plate code	Orientation	Temperature, °F (°C)						RT_{NDT}		Upper-shelf energy	
		30 ft-lb		50 ft-lb		50% shear		(°F)	(°C)	(ft-lb)	(J)
Z1, Z2	T-L	–33	(–36)	–4	(–20)	25	(–4)	–5	–20	126	173
	L-T	–45	(–43)	–20	(–29)	10	(–12)			160	219
	L-S	–19	(–28)	8	(–13)	30	(–1)			171	234
Z3	T-L	0	(–18)	33	(0)	35	(2)	–15	–26	85	116
	L-T	–37	(–38)	–9	(–23)	25	(–4)			129	177
	L-S	–16	(–27)	21	(–6)	55	(13)			127	174
Z4	T-L	–38	(–39)	11	(–12)	30	(–1)	–15	–26	111	152
	L-S	–56	(–49)	–17	(–27)	35	(2)			130	178
Z5	T-L	–19	(–28)	18	(–8)	20	(–7)	–30	–34	95	130
	L-T	–30	(–34)	–2	(–19)	25	(–4)			153	209
	L-S	–59	(–50)	–41	(–40)	–10	(–23)			171	234
Z6A	T-L	–17	(–27)	11	(–12)	40	(4.4)	–30	–34	113	155
	L-T	–28	(–33)	–2	(–19)	25	(–4)			129	177
	L-S	–41	(–40)	–10	(–23)	35	(2)			130	178
Z6B	T-L	11	(–12)	60	(16)	40	(4.4)	13	–10	64	88
	L-T	–33	(–36)	–1	(–18)	5	(–15)			117	160
	L-S	–32	(–36)	–5	(–20)	10	(–12)			114	156
Z7	T-L	–21	(–29)	19	(–7)	5	(–15)	–15	–26	96	131
	L-T	–45	(–43)	–12	(–24)	10	(–12)			126	173
	L-S	–50	(–46)	–20	(–29)	0	(–18)			120	164
Z8	T-L	27	(–3)	72	(22)	30	(–1)	24	–4.4	96	131
	L-T	25	(–4)	48	(9)	65	(18)			134	184
	L-S	–5	(–20)	29	(–2)	55	(13)			154	211

Plate Z1
Modified A302 Grade B
Heat B 3990-2

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 13.9 (DEG F),-10 (DEG C)
  TRANSITION ZONE WIDTH: 153.3 (F DEG),85.2 (C DEG)
  UPPER SHELF ENERGY: 125.9 (FT-LB),170.7 (J)



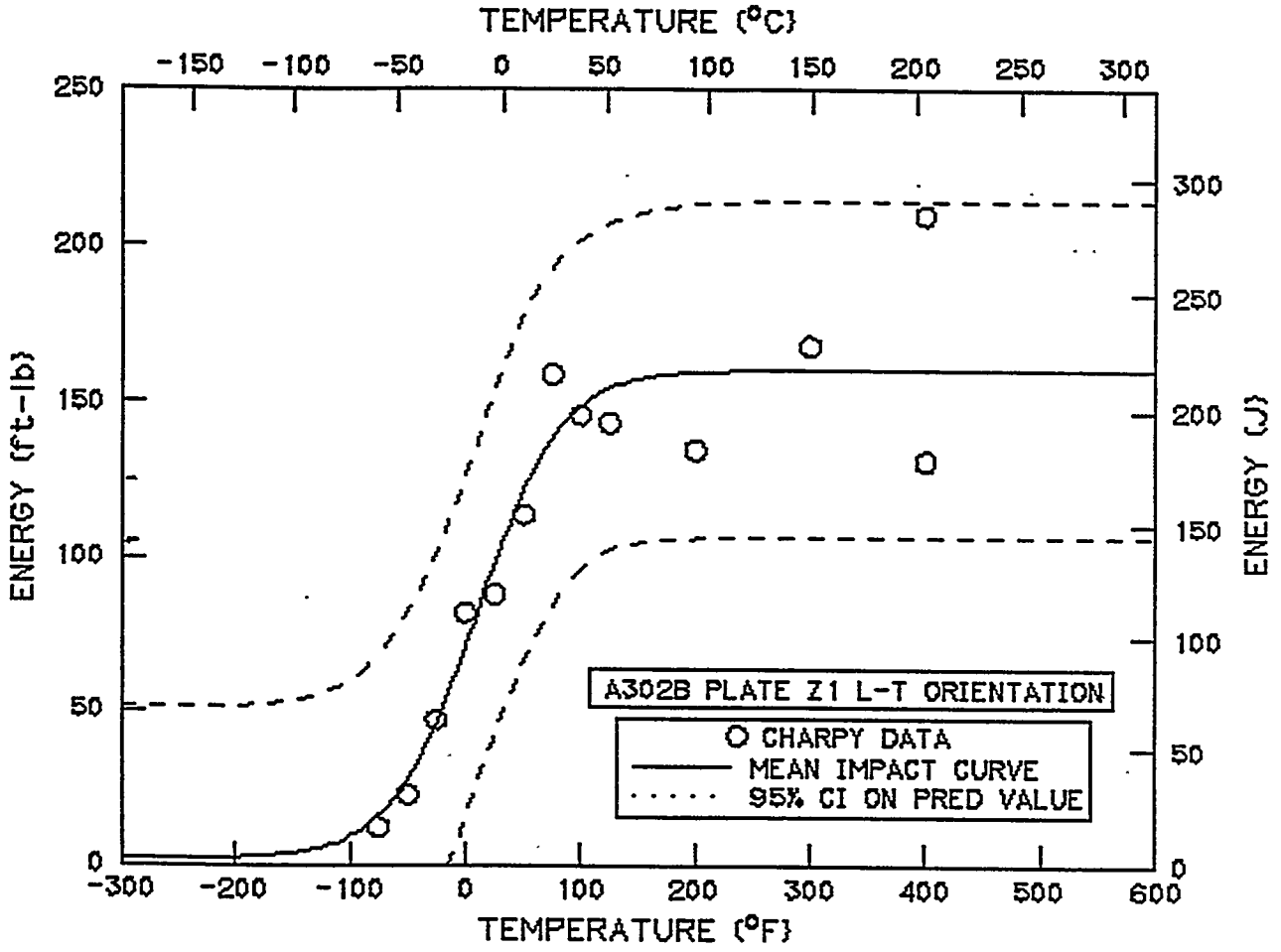
UPPER SHELF ENERGY: 125.9 (FT-LB),170.7 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 97.2 TO 154.6 (FT-LB),131.8 TO 209.6 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-33.2 (DEG F),-36.2 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-137.8 TO 7.2 (DEG F),-94.4 TO -13.8 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-3.6 (DEG F),-19.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-50.4 TO 32.6 (DEG F),-45.8 TO 0.3 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_TL

SET NAME: A302B_1_TL
REMARK: HSST A302B EVALUATION OF PLATE Z1 - ORIENTATION T-L

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z135	-75	-59.4	9.9	13.4	0.007	0.178	0
2	Z134	-50	-45.6	15	20.3	0.013	0.33	5
3	Z133	-25	-31.7	40.5	54.9	0.032	0.813	20
4	Z132	0	-17.8	61.2	83	0.048	1.219	30
5	Z131	25	-3.9	68.6	93	0.053	1.346	45
6	Z130	50	10	91.4	123.9	0.063	1.6	70
7	Z129	75	23.9	89	120.7	0.063	1.6	75
8	Z136	100	37.8	115	155.9	0.074	1.88	75
9	Z137	125	51.7	130.1	176.4	0.086	2.184	100
10	Z140	125	51.7	132	179	0.084	2.134	100
11	Z139	200	93.3	125	169.5	0.083	2.108	100
12	Z141	300	148.9	136.6	185.2	0.084	2.134	100
13	Z138	400	204.4	104	141	0.0689	1.75	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_LT
Y VARIABLE: ENERGY
TANH REGRESSION DIVERGING
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 9.6 (DEG F),-12.5 (DEG C)
  TRANSITION ZONE WIDTH: 142.5 (F DEG),79.2 (C DEG)
  UPPER SHELF ENERGY: 160.4 (FT-LB),217.5 (J)



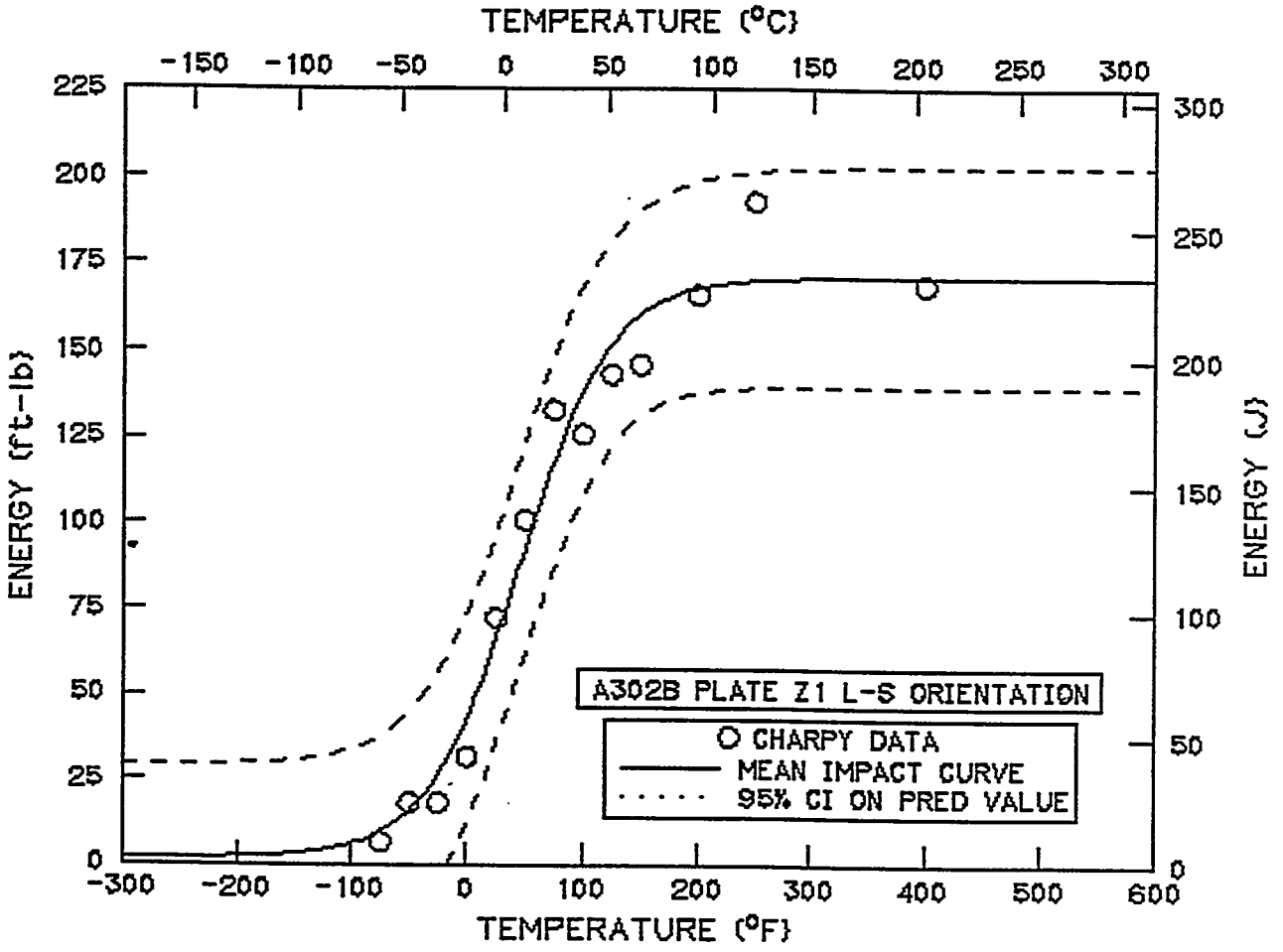
UPPER SHELF ENERGY: 160.4 (FT-LB),217.5 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 106.4 TO 214.5 (FT-LB),144.3 TO 290.8 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-45.3 (DEG F),-42.9 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 13.3 (DEG F),UNDEFINED TO -10.4 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-20.1 (DEG F),-29 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 32.6 (DEG F),UNDEFINED TO 0.3 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_LT

SET NAME: A302B_1_LT
REMARK: HSST A302B EVALUATION OF PLATE Z1 - ORIENTATION L-T

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z17	-75	-59.4	12	16.3	0.022	0.559	0
2	Z16	-50	-45.6	22.5	30.5	0.028	0.711	5
3	Z15	-25	-31.7	46.9	63.6	0.047	1.194	20
4	Z14	0	-17.8	82	111.2	0.067	1.702	40
5	Z13	25	-3.9	88	119.3	0.07	1.778	60
6	Z12	50	10	114	154.6	0.076	1.93	75
7	Z11	75	23.9	159	215.6	0.085	2.159	100
8	Z18	100	37.8	146	197.9	0.093	2.362	100
9	Z19	125	51.7	143.5	194.6	0.095	2.413	100
10	Z113	200	93.3	134.9	182.9	0.09	2.286	100
11	Z110	300	148.9	168	227.8	0.074	1.88	100
12	Z111	400	204.4	210	284.7	0.075	1.905	100
13	Z112	400	204.4	131.5	178.3	0.097	2.464	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 44.4 (DEG F),6.9 (DEG C)
  TRANSITION ZONE WIDTH: 156.4 (F DEG),86.9 (C DEG)
  UPPER SHELF ENERGY: 171.1 (FT-LB),232 (J)



UPPER SHELF ENERGY: 171.1 (FT-LB),232 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 139.6 TO 202.6 (FT-LB),189.3 TO 274.7 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-18.9 (DEG F),-28.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-171.6 TO 19.6 (DEG F),-113.1 TO -6.9 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 8.2 (DEG F),-13.2 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-38.2 TO 38.8 (DEG F),-39 TO 3.8 (DEG C)
REMARK: NONE

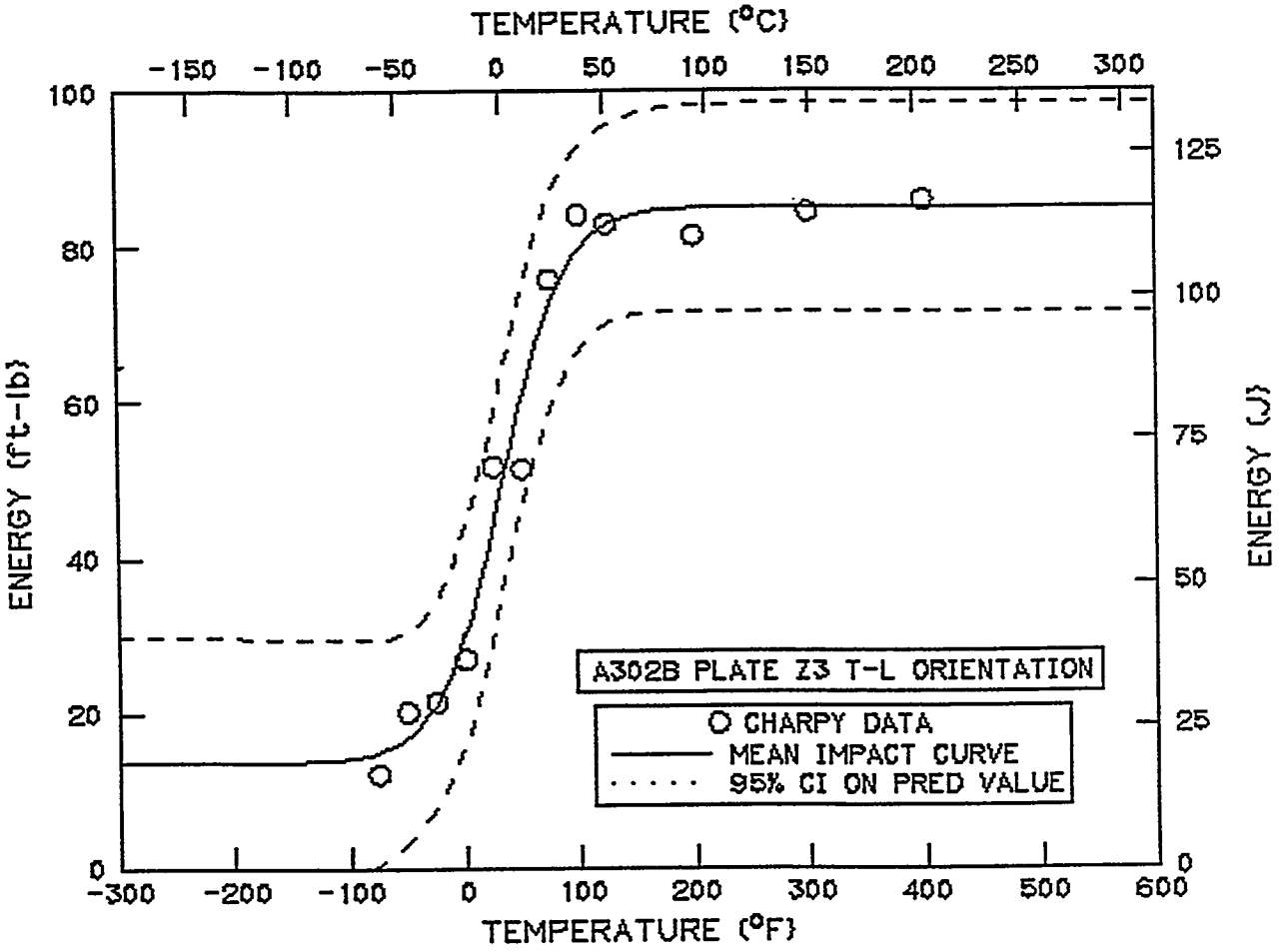
SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_1_LS

SET NAME: A302B_1_LS
REMARK: HSST A302B EVALUATION OF PLATE Z1 - ORIENTATION L-S

NMBR	IDENT	TEMPERATURE (DEG F)	TEMPERATURE (DEG C)	ENERGY (FT-LB)	ENERGY (J)	EXPANSION (IN)	EXPANSION (MM)	SHEAR (PERCENT)
1	Z121	-75	-59.4	6.6	8.9	0.005	0.127	0
2	Z120	-50	-45.6	18	24.4	0.016	0.406	0
3	Z119	-25	-31.7	18	24.4	0.015	0.381	5
4	Z118	0	-17.8	31.6	42.8	0.026	0.66	15
5	Z117	25	-3.9	72.2	97.9	0.055	1.397	50
6	Z116	50	10	101	136.9	0.069	1.753	65
7	Z115	75	23.9	133	180.3	0.09	2.286	85
8	Z122	100	37.8	126	170.8	0.088	2.235	80
9	Z123	125	51.7	143.2	194.2	0.082	2.083	100
10	Z124	150	65.6	146	197.9	0.089	2.261	100
11	Z127	200	93.3	166	225.1	0.087	2.21	100
12	Z125	250	121.1	192.7	261.3	0.076	1.93	100
13	Z126	400	204.4	169	229.1	0.072	1.829	100

Plate Z3
Modified A302 Grade B
Heat A 0237-1

DATA SOURCE: ANALYSIS SET
ANALYSIS SET:- A302B_3_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY: 13.7 (FT-LB),18.5 (J)
  MID-TRANSITION TEMPERATURE: 32.4 (DEG F),0.2 (DEG C)
  TRANSITION ZONE WIDTH: 108.1 (F DEG),60 (C DEG)
  UPPER SHELF ENERGY: 85.1 (FT-LB),115.4 (J)



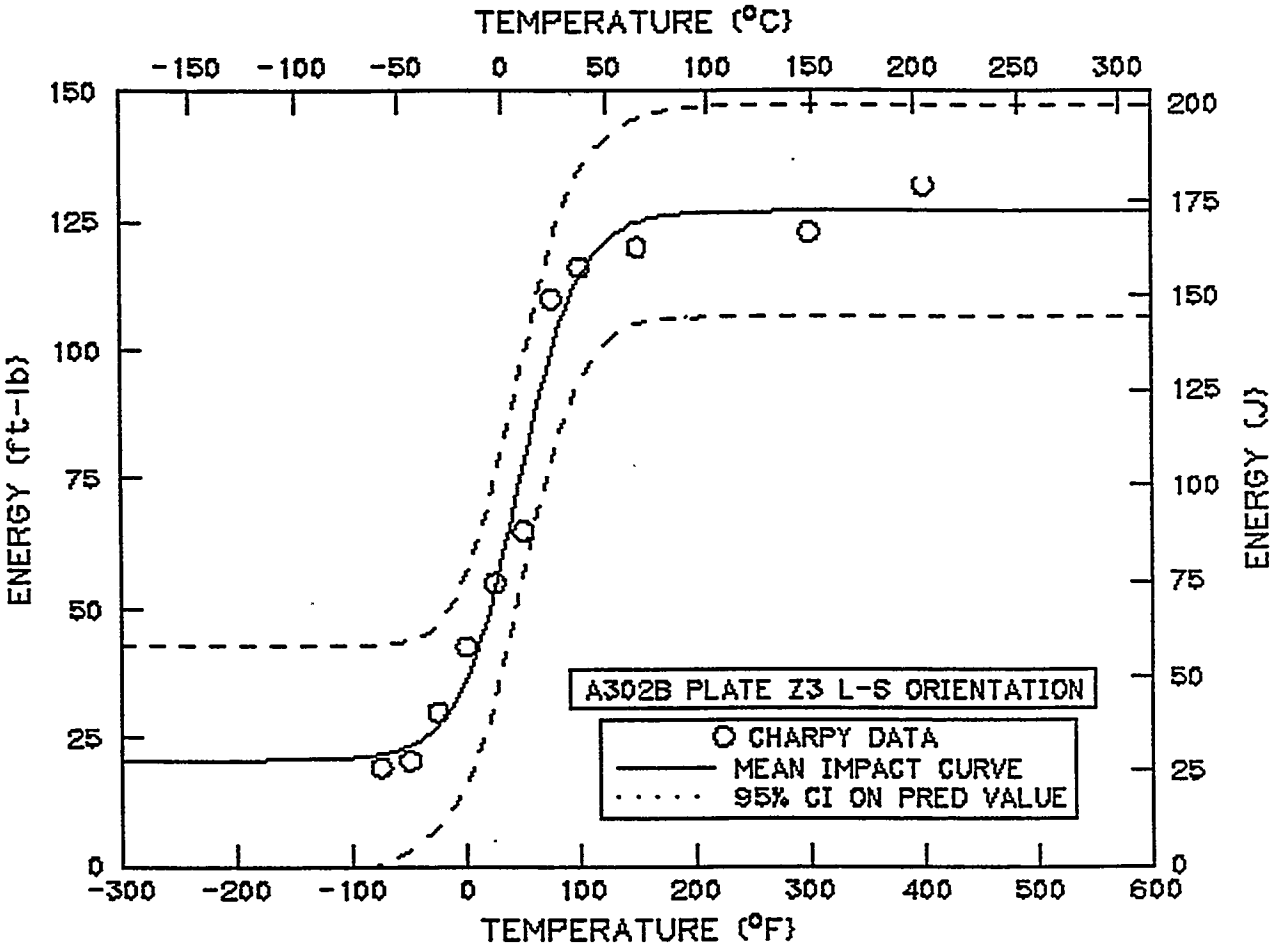
UPPER SHELF ENERGY: 85.1 (FT-LB),115.4 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 71.8 TO 98.4 (FT-LB),97.4 TO 133.5 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-0.5 (DEG F),-18 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-58.4 TO 24.2 (DEG F),-50.2 TO -4.3 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 33.3 (DEG F),0.7 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 10.7 TO 55.8 (DEG F),-11.8 TO 13.2 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_3_TL

SET NAME: A302B_3_TL
REMARK: HSST A302B EVALUATION OF PLATE Z3 - ORIENTATION T-L

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z306	-75	-59.4	12.2	16.5	0.009	0.229	0
2	Z305	-50	-45.6	20.2	27.4	0.019	0.483	10
3	Z304	-25	-31.7	21.5	29.2	0.02	0.508	15
4	Z303	0	-17.8	27	36.6	0.026	0.66	20
5	Z302	25	-3.9	51.8	70.2	0.045	1.143	45
6	Z307	50	10	51.5	69.8	0.046	1.168	65
7	Z301	75	23.9	75.9	102.9	0.061	1.549	80
8	Z310	100	37.8	84.2	114.2	0.067	1.702	100
9	Z308	125	51.7	83	112.5	0.067	1.702	100
10	Z309	200	93.3	81.5	110.5	0.068	1.727	100
11	Z311	300	148.9	84.5	114.6	0.072	1.829	100
12	Z312	400	204.4	86	116.6	0.067	1.702	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_3_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY: 20.7 (FT-LB),28 (J)
  MID-TRANSITION TEMPERATURE: 46.4 (DEG F),8 (DEG C)
  TRANSITION ZONE WIDTH: 106.5 (F DEG),59.2 (C DEG)
  UPPER SHELF ENERGY: 127 (FT-LB),172.2 (J)



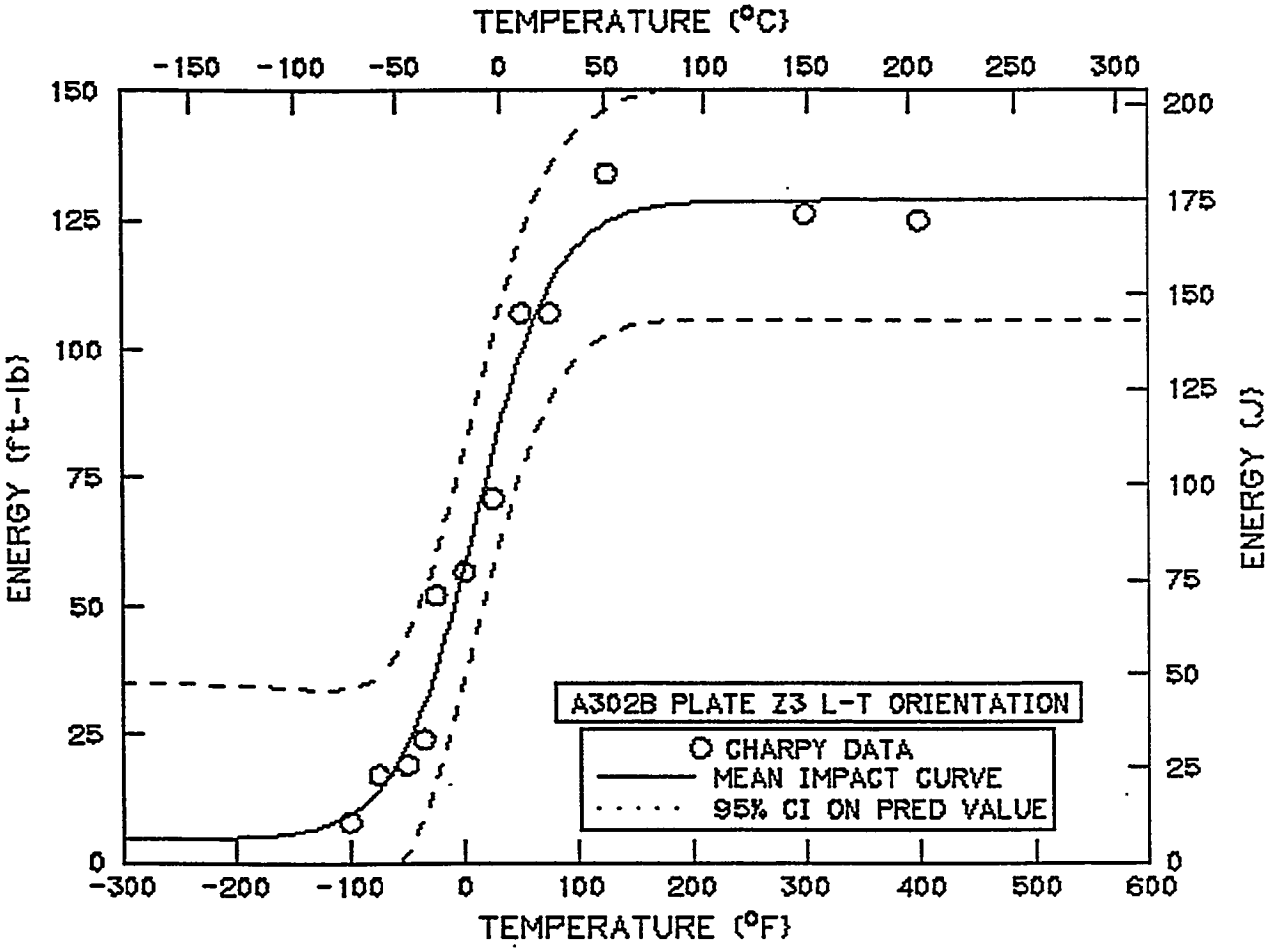
UPPER SHELF ENERGY: 127 (FT-LB),172.2 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 106.4 TO 147.6 (FT-LB),144.3 TO 200.1 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-15.9 (DEG F),-26.6 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 22.2 (DEG F),UNDEFINED TO -5.4 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 20.7 (DEG F),-6.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-14.9 TO 43.4 (DEG F),-26.1 TO 6.3 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_3_LS

SET NAME: A302B_3_LS
REMARK: HSST A302B EVALUATION OF PLATE Z3 - ORIENTATION L-S

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z321	-75	-59.4	19.2	26	0.021	0.533	0
2	Z320	-50	-45.6	20.5	27.8	0.022	0.559	5
3	Z319	-25	-31.7	30	40.7	0.03	0.762	25
4	Z318	0	-17.8	42.7	57.9	0.036	0.914	25
5	Z317	25	-3.9	54.9	74.4	0.043	1.092	35
6	Z316	50	10	64.9	88	0.05	1.27	40
7	Z315	75	23.9	110	149.1	0.077	1.956	85
8	Z322	100	37.8	116.2	157.5	0.085	2.159	100
9	Z324	150	65.6	120	162.7	0.082	2.083	100
10	Z323	300	148.9	123	166.8	0.084	2.134	100
11	Z325	400	204.4	132	179	0.084	2.134	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_3_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY: 4.5 (FT-LB),6 (J)
  MID-TRANSITION TEMPERATURE: 9.9 (DEG F),-12.3 (DEG C)
  TRANSITION ZONE WIDTH: 138.5 (F DEG),76.9 (C DEG)
  UPPER SHELF ENERGY: 128.9 (FT-LB),174.7 (J)



UPPER SHELF ENERGY: 128.9 (FT-LB),174.7 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 105.8 TO 151.9 (FT-LB),143.4 TO 206 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-36.9 (DEG F),-38.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO -6.3 (DEG F),UNDEFINED TO -21.3 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-9.1 (DEG F),-22.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-39.8 TO 16.2 (DEG F),-39.9 TO -8.8 (DEG C)
REMARK: HSST A302B EVALUATION OF PLATE Z3 - ORIENTATION L-T

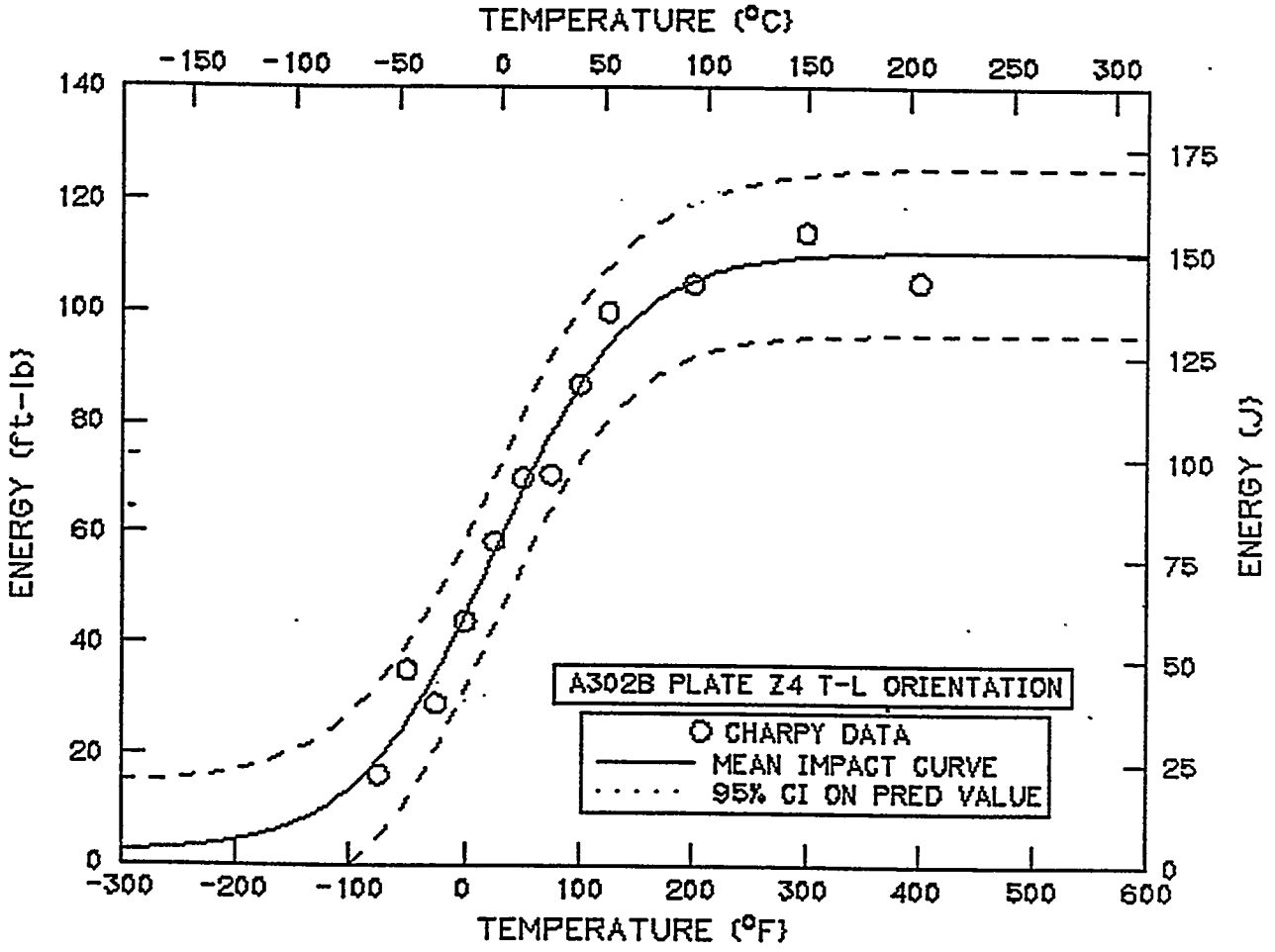
SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_3_LT

SET NAME: A302B_3_LT
REMARK: HSST A302B EVALUATION OF PLATE Z3 - ORIENTATION L-T

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z337	-100	-73.3	8	10.8	0.008	0.203	0
2	Z335	-75	-59.4	17	23	0.014	0.356	0
3	Z334	-50	-45.6	19	25.8	0.016	0.406	5
4	Z336	-35	-37.2	24	32.5	0.021	0.533	5
5	Z333	-25	-31.7	52.2	70.8	0.04	1.016	20
6	Z332	0	-17.8	56.8	77	0.045	1.143	20
7	Z331	25	-3.9	71	96.3	0.059	1.499	45
8	Z338	50	10	107	145.1	0.075	1.905	75
9	Z330	75	23.9	107	145.1	0.072	1.829	80
10	Z339	125	51.7	134	181.7	0.089	2.261	100
11	Z340	300	148.9	126.2	171.1	0.084	2.134	100
12	Z341	400	204.4	125	169.5	0.084	2.134	100

Plate Z4
Modified A302 Grade B
Heat C 1290-2

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302_4_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 24.9 (DEG F),-3.9 (DEG C)
  TRANSITION ZONE WIDTH: 236.3 (F DEG),131.3 (C DEG)
  UPPER SHELF ENERGY: 110.9 (FT-LB),150.4 (J)



UPPER SHELF ENERGY: 110.9 (FT-LB),150.4 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 96 TO 125.9 (FT-LB),130.1 TO 170.7 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-37.8 (DEG F),-38.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-87 TO -3.4 (DEG F),-66.1 TO -19.7 (DEG C)
TEMPERATURE [5 (FT-LB),6.8 (J) ENERGY]:-185.6 (DEG F),-120.9 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO -75.3 (DEG F),UNDEFINED TO -59.6 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 10.8 (DEG F),-11.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-21.3 TO 40.5 (DEG F),-29.6 TO 4.7 (DEG C)
REMARK: NONE

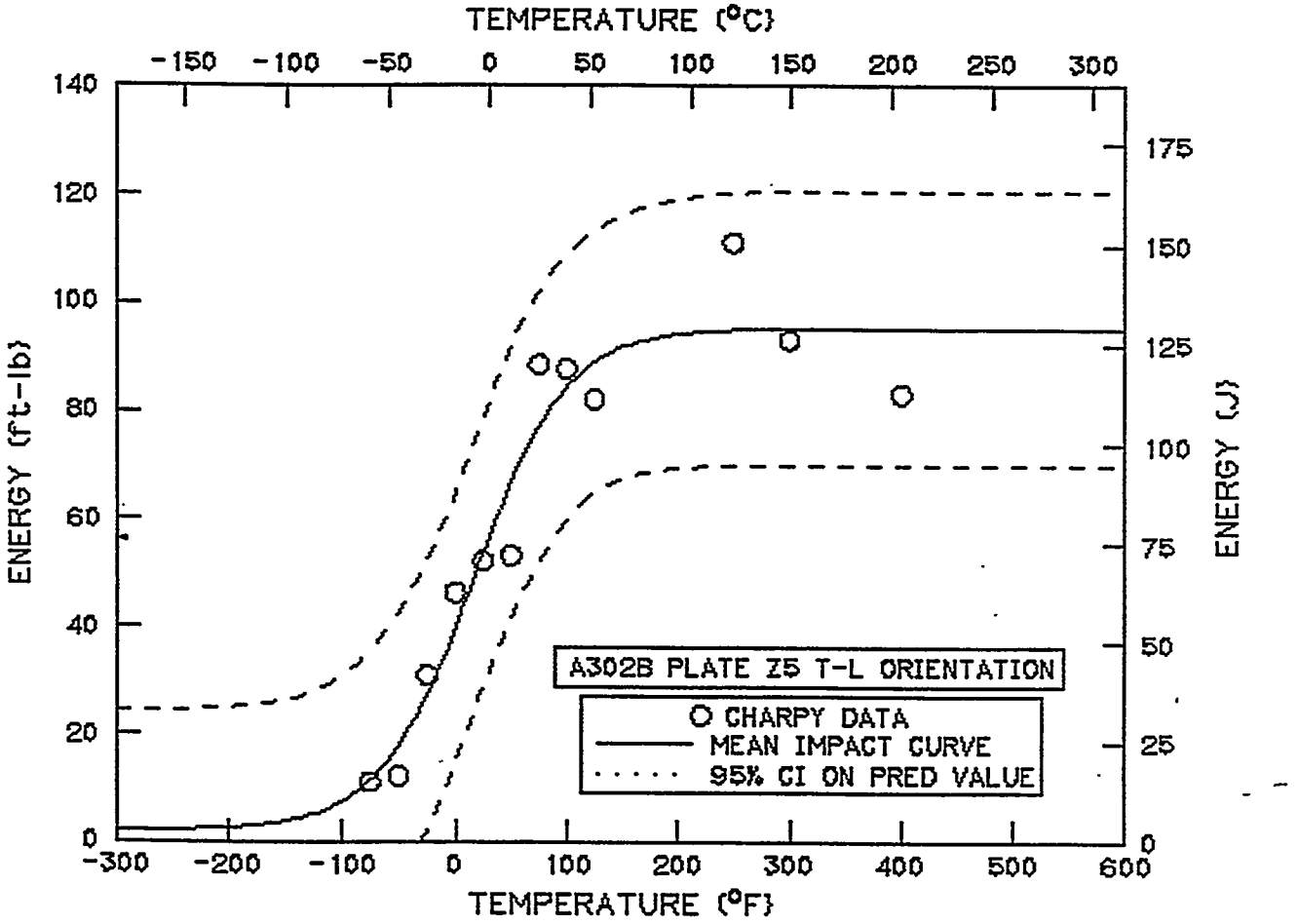
SOURCE: ANALYSIS SET
ANALYSIS SET: 302_4_LS

SET NAME: 302_4_LS
REMARK: HSST - A302B EVALUATION, PLATE Z4 L-S ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z413	-100	-73.3	8.5	11.5	0.01	0.254	0
2	Z47	-75	-59.4	29.5	40	0.025	0.635	5
3	Z46	-50	-45.6	35	47.5	0.036	0.914	5
4	Z45	-25	-31.7	46	62.4	0.037	0.94	25
5	Z44	0	-17.8	62	84.1	0.052	1.321	40
6	Z43	25	-3.9	78.7	106.7	0.058	1.473	50
7	Z42	50	10	71.4	96.8	0.059	1.499	45
8	Z41	75	23.9	110	149.1	0.075	1.905	75
9	Z48	100	37.8	112.6	152.7	0.077	1.956	80
10	Z49	125	51.7	129.4	175.4	0.087	2.21	100
11	Z412	200	93.3	129	174.9	0.085	2.159	100
12	Z411	300	148.9	129.8	176	0.085	2.159	100
13	Z410	400	204.4	123	166.8	0.084	2.134	100

Plate Z5
Modified A302 Grade B
Heat P 2130-2

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 16 (DEG F),-8.9 (DEG C)
  TRANSITION ZONE WIDTH: 166.1 (F DEG),92.3 (C DEG)
  UPPER SHELF ENERGY: 95.2 (FT-LB),129.1 (J)



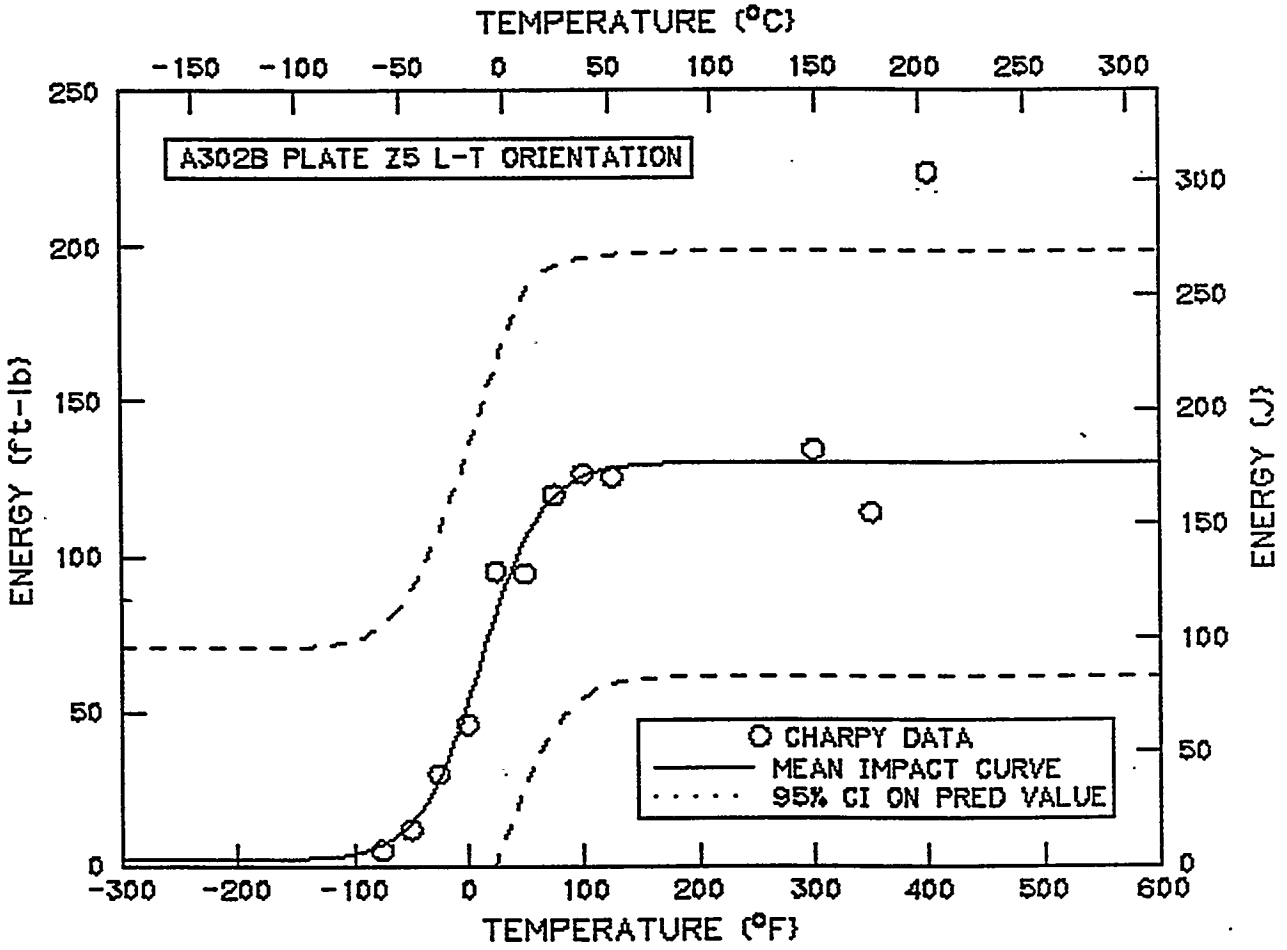
UPPER SHELF ENERGY: 95.2 (FT-LB),129.1 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 69.8 TO 120.7 (FT-LB),94.6 TO 163.6 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-19.1 (DEG F),-28.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-105.6 TO 27.4 (DEG F),-76.4 TO -2.6 (DEG C)
TEMPERATURE [5 (FT-LB),6.8 (J) ENERGY]:-125.3 (DEG F),-87.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO -18.6 (DEG F),UNDEFINED TO -28.1 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 18.5 (DEG F),-7.5 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-31.1 TO 69.6 (DEG F),-35 TO 20.9 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_TL

SET NAME: A302B_5_TL
REMARK: HSST A302B EVALUATION OF PLATE Z5 - ORIENTATION T-L

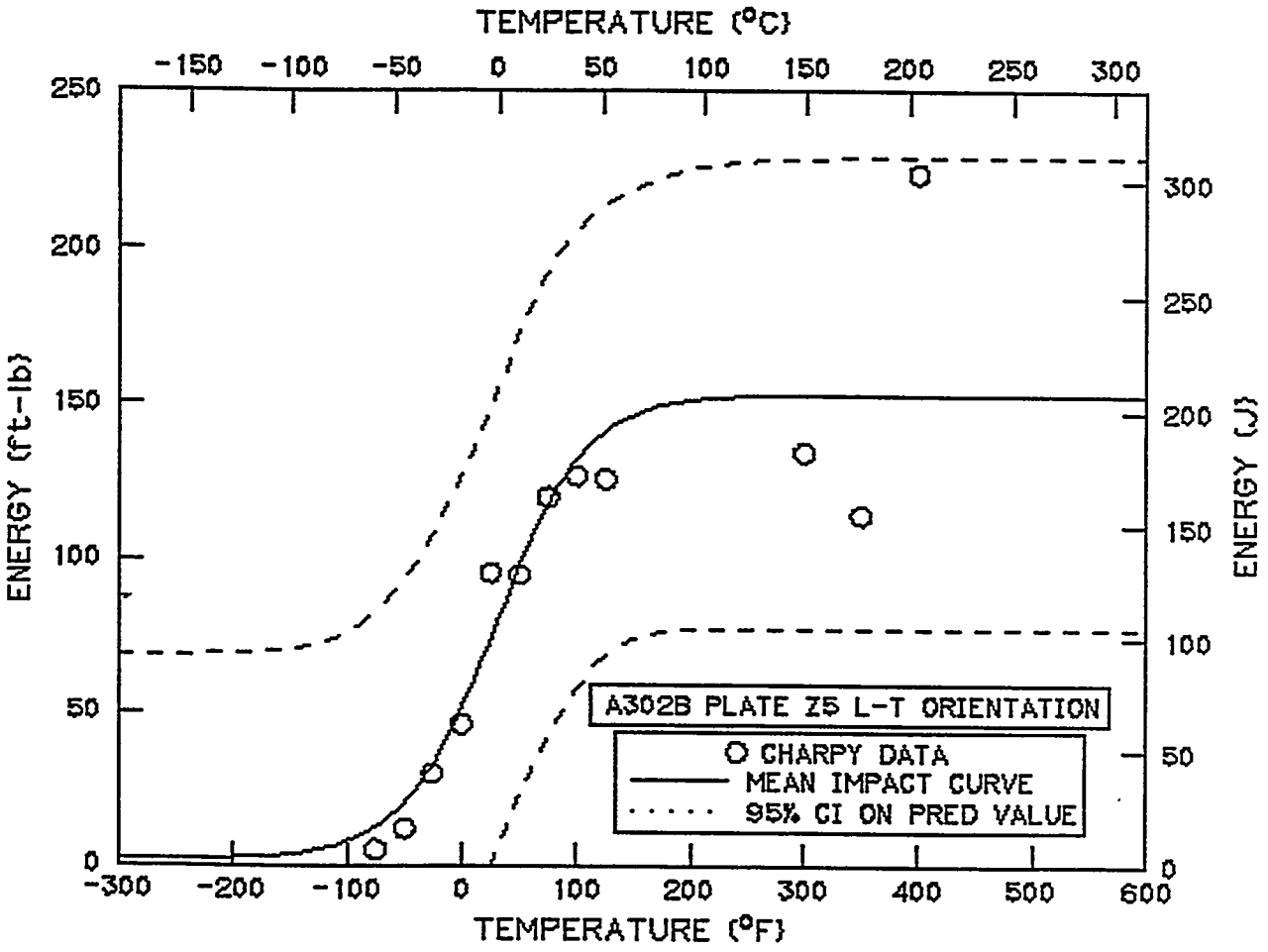
NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z527	-75	-59.4	11	14.9	0.01	0.254	5
2	Z528	-50	-45.6	12.1	16.4	0.014	0.356	10
3	Z529	-25	-31.7	30.9	41.9	0.033	0.838	35
4	Z530	0	-17.8	46.3	62.8	0.043	1.092	40
5	Z531	25	-3.9	52.2	70.8	0.048	1.219	60
6	Z532	50	10	53.2	72.1	0.049	1.245	55
7	Z533	75	23.9	88.5	120	0.069	1.753	85
8	Z534	100	37.8	87.7	118.9	0.066	1.676	100
9	Z536	125	51.7	82	111.2	0.065	1.651	100
10	Z537	250	121.1	111	150.5	0.07	1.778	100
11	Z538	300	148.9	93.1	126.2	0.07	1.778	100
12	Z535	400	204.4	83	112.5	0.07	1.778	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 11.5 (DEG F),-11.4 (DEG C)
  TRANSITION ZONE WIDTH: 106.7 (F DEG),59.3 (C DEG)
  UPPER SHELF ENERGY [HELD FIXED]: 130 (FT-LB),176.3 (J)



UPPER SHELF ENERGY: 130 (FT-LB),176.3 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 61.4 TO 198.6 (FT-LB),83.3 TO 269.2 (J)
REMARK: NONE

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 28.4 (DEG F),-2 (DEG C)
  TRANSITION ZONE WIDTH: 157.8 (F DEG),87.7 (C DEG)
  UPPER SHELF ENERGY: 153 (FT-LB),207.5 (J)



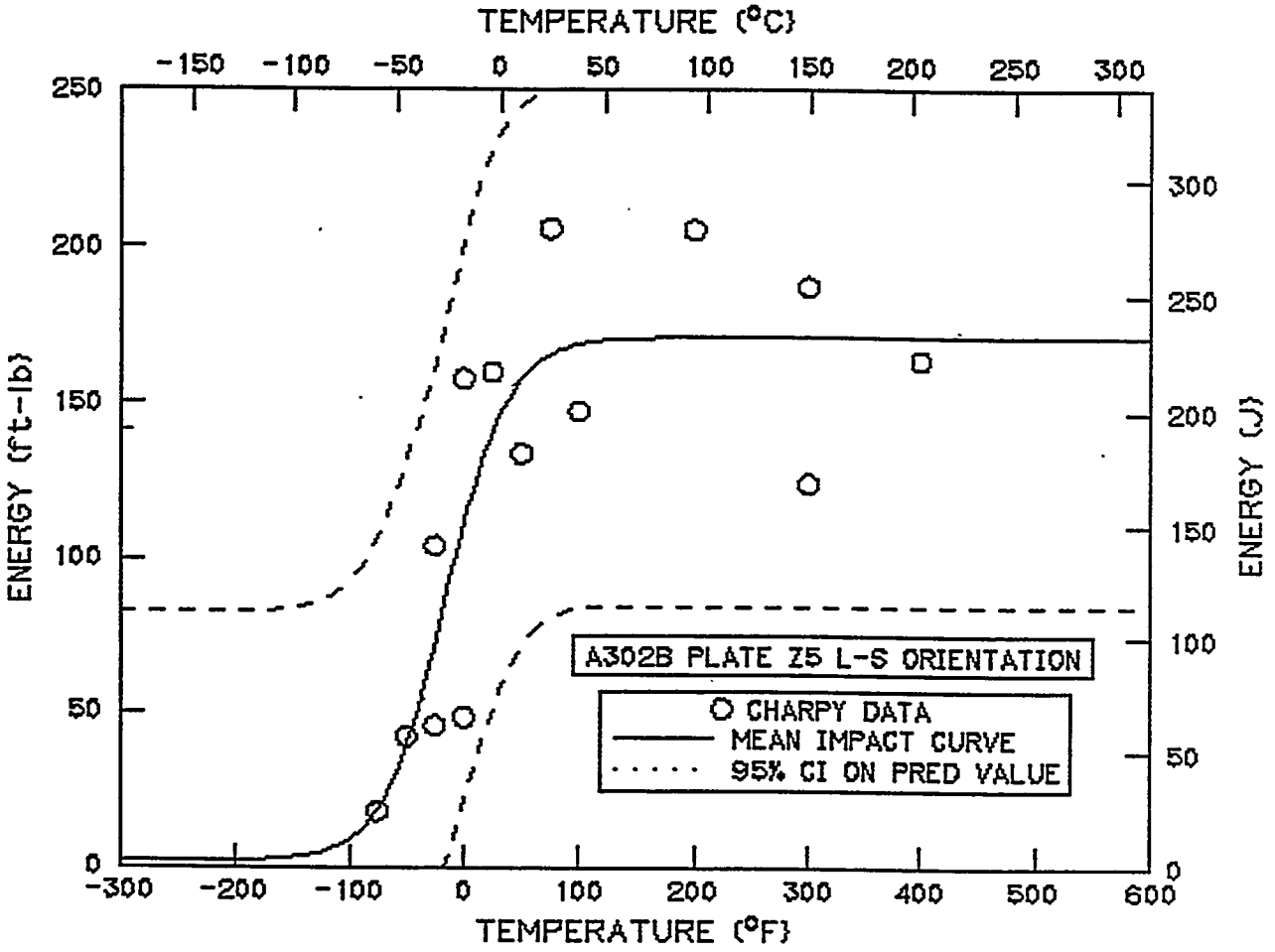
UPPER SHELF ENERGY: 153 (FT-LB),207.5 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 77.1 TO 229 (FT-LB),104.5 TO 310.5 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-30 (DEG F),-34.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 59.2 (DEG F),UNDEFINED TO 15.1 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-1.7 (DEG F),-18.7 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 86.6 (DEG F),UNDEFINED TO 30.3 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_LT

SET NAME: A302B_5_LT
REMARK: HSST A302B EVALUATION OF PLATE Z5 - ORIENTATION L-T

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z507	-75	-59.4	5	6.8	0.006	0.152	0
2	Z506	-50	-45.6	11.8	16	0.013	0.33	5
3	Z505	-25	-31.7	29.8	40.4	0.031	0.787	10
4	Z504	0	-17.8	46	62.4	0.04	1.016	30
5	Z503	25	-3.9	95.3	129.2	0.066	1.676	60
6	Z502	50	10	94.6	128.3	0.067	1.702	50
7	Z501	75	23.9	119.6	162.2	0.074	1.88	85
8	Z508	100	37.8	126.5	171.5	0.083	2.108	100
9	Z509	125	51.7	125.5	170.2	0.079	2.007	100
10	Z511	300	148.9	134.1	181.8	0.075	1.905	100
11	Z512	350	176.7	114	154.6	0.068	1.727	100
12	Z510	400	204.4	224	303.7	0.074	1.88	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE:-15.9 (DEG F),-26.6 (DEG C)
  TRANSITION ZONE WIDTH: 106.8 (F DEG),59.4 (C DEG)
  UPPER SHELF ENERGY: 171.2 (FT-LB),232.2 (J)



UPPER SHELF ENERGY: 171.2 (FT-LB),232.2 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 84.2 TO 258.3 (FT-LB),114.1 TO 350.2 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-59.1 (DEG F),-50.6 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 6.9 (DEG F),UNDEFINED TO -14 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-40.7 (DEG F),-40.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 24.3 (DEG F),UNDEFINED TO -4.3 (DEG C)
REMARK: NONE

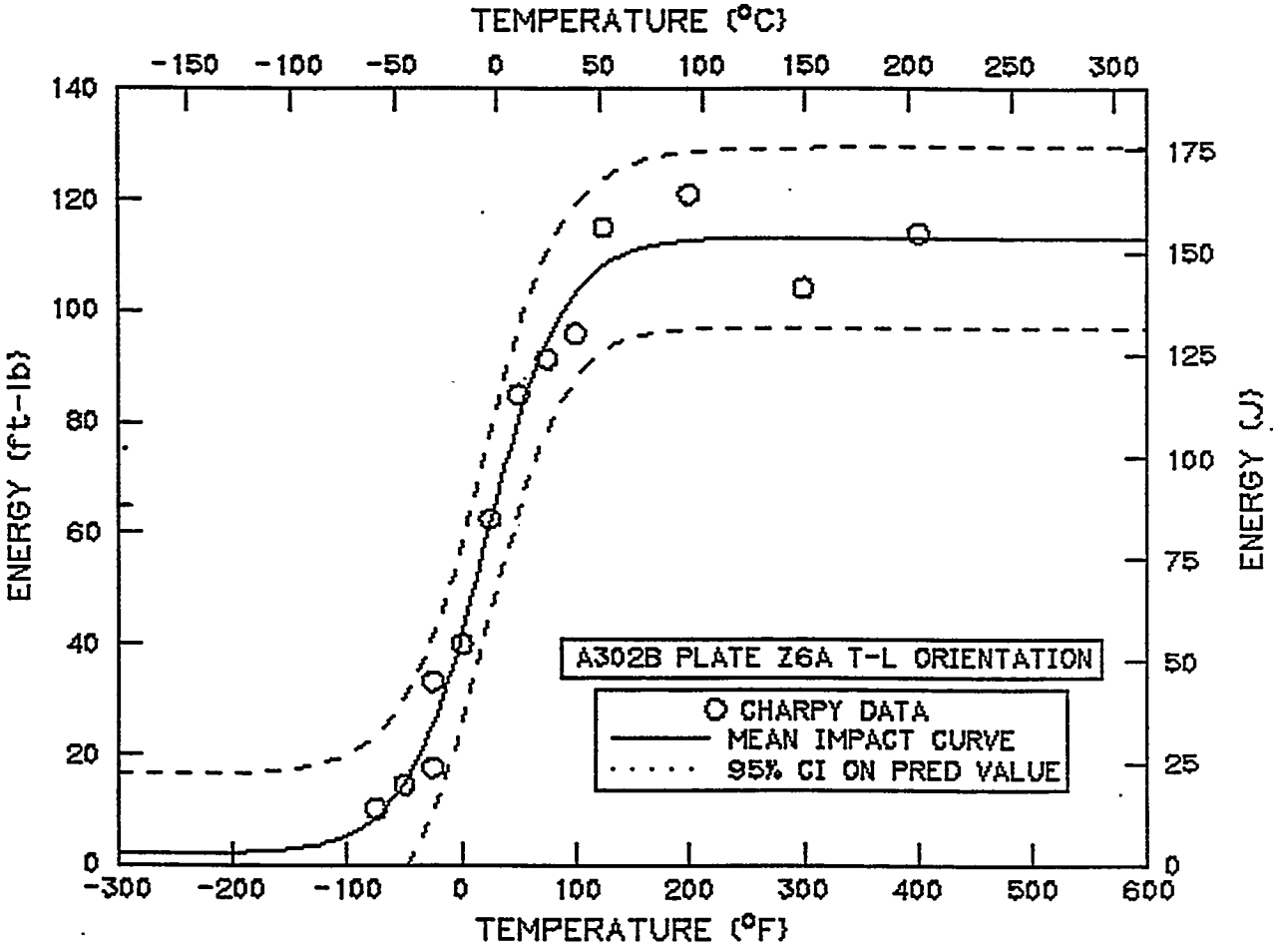
SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_5_LS

SET NAME: A302B_5_LS
REMARK: HSST A302B EVALUATION OF PLATE Z5 - ORIENTATION L-S

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z513	-75	-59.4	18	24.4	0.017	0.432	5
2	Z514	-50	-45.6	42.1	57.1	0.037	0.94	15
3	Z515	-25	-31.7	45.5	61.7	0.043	1.092	30
4	Z523	-25	-31.7	104	141	0.077	1.956	45
5	Z516	0	-17.8	48.3	65.5	0.043	1.092	40
6	Z521	0	-17.8	157.9	214.1	0.098	2.489	85
7	Z517	25	-3.9	160.1	217.1	0.075	1.905	100
8	Z518	50	10	134	181.7	0.072	1.829	100
9	Z519	75	23.9	206	279.3	0.092	2.337	100
10	Z520	100	37.8	147.6	200.1	0.083	2.108	100
11	Z525	200	93.3	205.5	278.6	0.097	2.464	100
12	Z524	300	148.9	124.4	168.7	0.088	2.235	100
13	Z526	300	148.9	187.5	254.2	0.097	2.464	100
14	Z522	400	204.4	164	222.4	0.1	2.54	100

Plate Z6A
Modified A302 Grade B
Heat C 1079-1

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_6ATL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 20.1 (DEG F),-6.6 (DEG C)
  TRANSITION ZONE WIDTH: 137.3 (F DEG),76.2 (C DEG)
  UPPER SHELF ENERGY: 113.2 (FT-LB),153.5 (J)



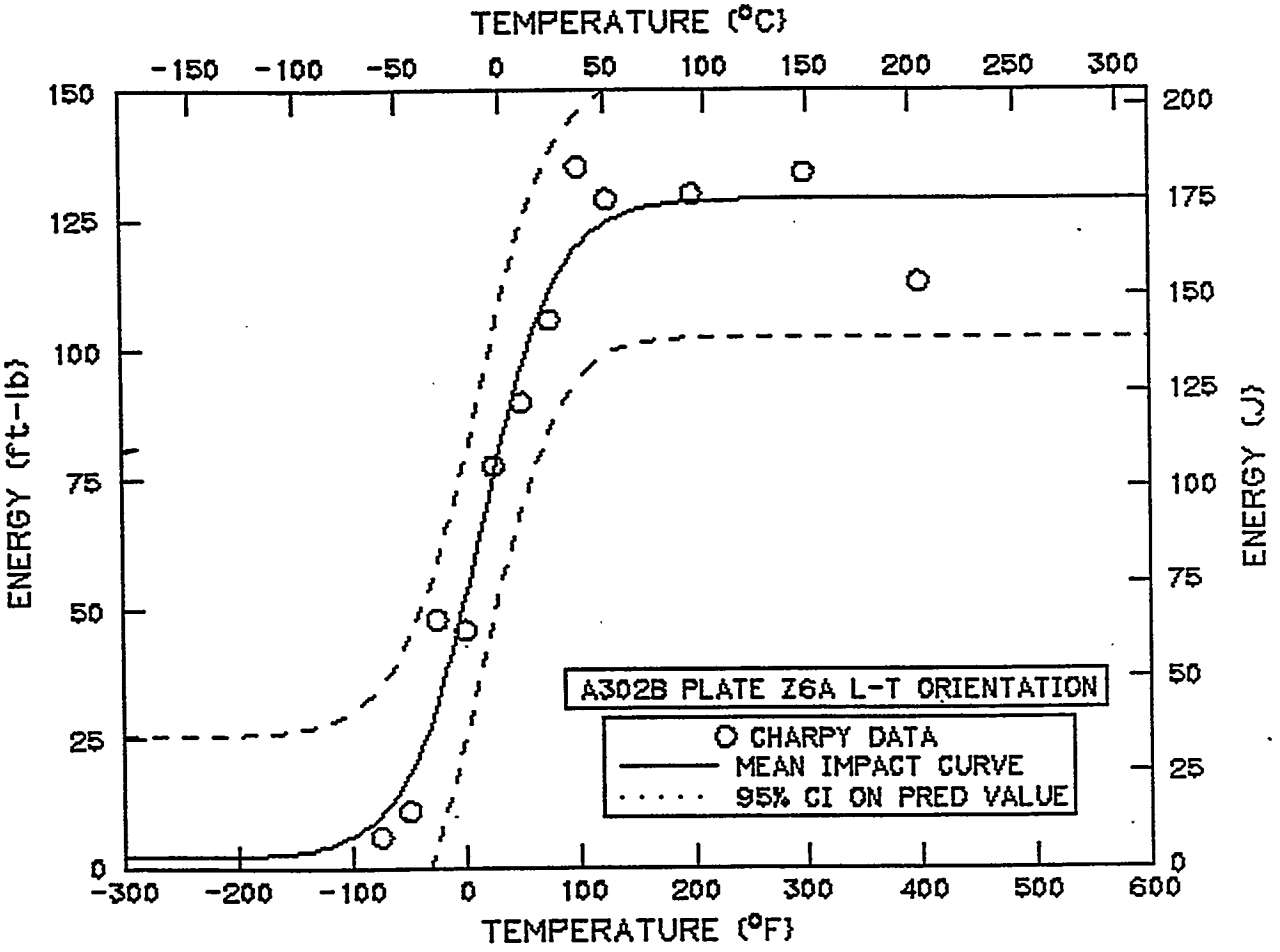
UPPER SHELF ENERGY: 113.2 (FT-LB),153.5 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 97 TO 129.5 (FT-LB),131.5 TO 175.5 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-17.3 (DEG F),-27.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-50.9 TO 5.5 (DEG F),-46 TO -14.7 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 10.6 (DEG F),-11.9 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-11 TO 30.9 (DEG F),-23.9 TO -0.6 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_6ATL

SET NAME: A302B_6ATL
REMARK: HSST A302B EVALUATION OF PLATE Z6A - ORIENTATION T-L

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z6A22	-75	-59.4	10	13.6	0.008	0.203	0
2	Z6A21	-50	-45.6	14.4	19.5	0.015	0.381	5
3	Z6A20	-25	-31.7	17.5	23.7	0.018	0.457	10
4	Z6A23	-25	-31.7	33.2	45	0.03	0.762	15
5	Z6A19	0	-17.8	40	54.2	0.036	0.914	20
6	Z6A18	25	-3.9	62.5	84.7	0.052	1.321	35
7	Z6A17	50	10	84.9	115.1	0.066	1.676	60
8	Z6A16	75	23.9	91.3	123.8	0.065	1.651	70
9	Z6A24	100	37.8	95.9	130	0.073	1.854	100
10	Z6A25	125	51.7	115	155.9	0.078	1.981	100
11	Z6A26	200	93.3	121	164.1	0.074	1.88	100
12	Z6A27	300	148.9	104.1	141.1	0.071	1.803	100
13	Z6A28	400	204.4	114	154.6	0.073	1.854	100

ANALYSIS SET: A302B_6ALT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 14 (DEG F),-10 (DEG C)
  TRANSITION ZONE WIDTH: 132.9 (F DEG),73.8 (C DEG)
  UPPER SHELF ENERGY: 129 (FT-LB),174.9 (J)



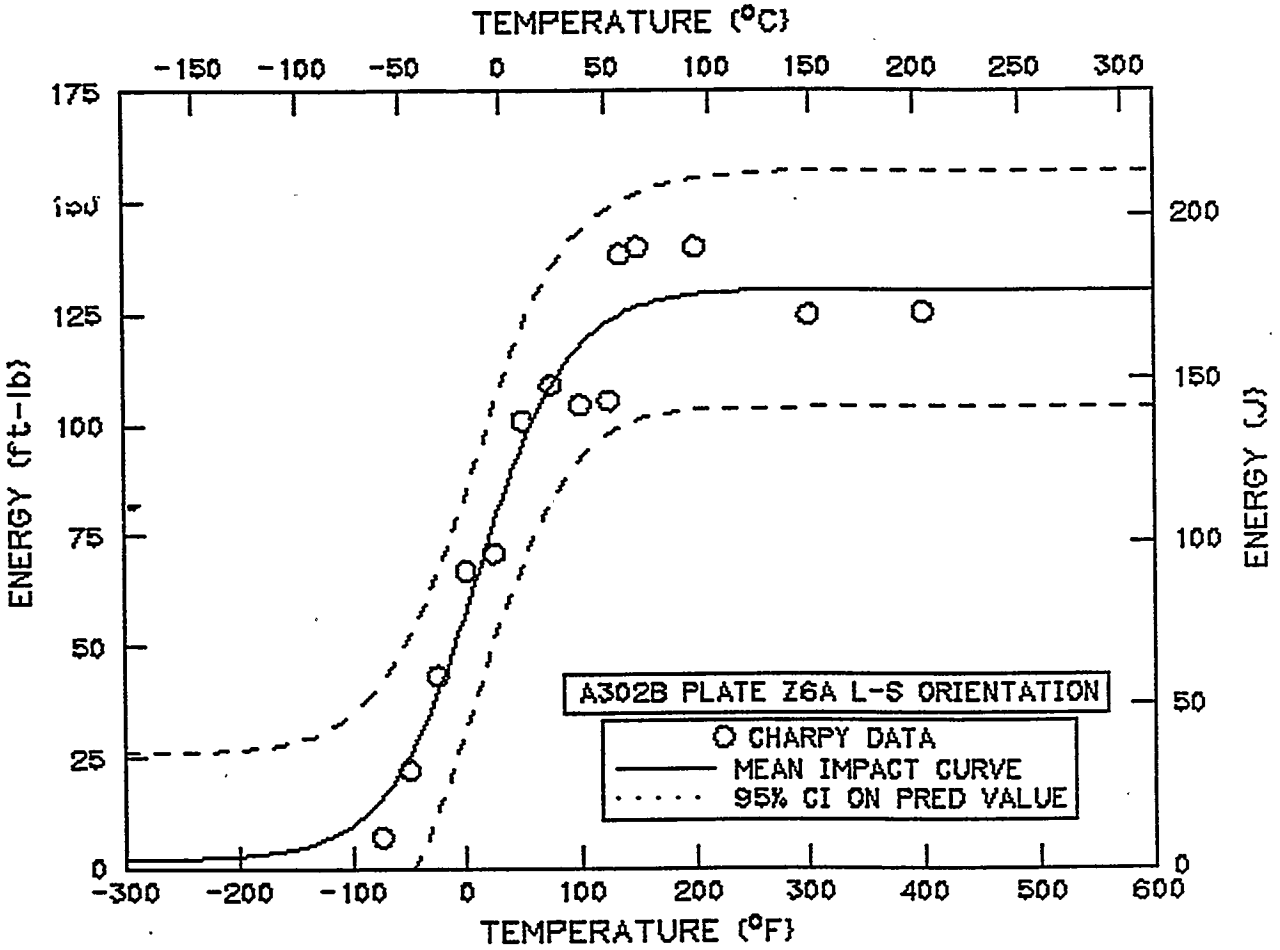
UPPER SHELF ENERGY: 129 (FT-LB),174.9 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 102.4 TO 155.5 (FT-LB),138.8 TO 210.9 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-27.9 (DEG F),-33.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-101.3 TO 4.9 (DEG F),-74.1 TO -15 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-2.5 (DEG F),-19.2 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-39.5 TO 26.3 (DEG F),-39.7 TO -3.2 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_6ALT

SET NAME: A302B_6ALT
REMARK: HSST A302B EVALUATION OF PLATE Z6A - ORIENTATION L-T

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z6A31	-75	-59.4	6	8.1	0.006	0.152	0
2	Z6A32	-50	-45.6	11	14.9	0.013	0.33	10
3	Z6A37	-25	-31.7	48.1	65.2	0.04	1.016	20
4	Z6A33	0	-17.8	46	62.4	0.039	0.991	20
5	Z6A34	25	-3.9	77.8	105.5	0.06	1.524	45
6	Z6A35	50	10	90	122	0.072	1.829	60
7	Z6A36	75	23.9	105.9	143.6	0.075	1.905	75
8	Z6A38	100	37.8	135.2	183.3	0.088	2.235	100
9	Z6A39	125	51.7	128.9	174.8	0.089	2.261	100
10	Z6A40	200	93.3	129.9	176.1	0.078	1.981	100
11	Z6A41	300	148.9	134	181.7	0.088	2.235	100
12	Z6A42	400	204.4	113	153.2	0.072	1.829	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_6ALS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 10.5 (DEG F),-12 (DEG C)
  TRANSITION ZONE WIDTH: 161.2 (F DEG),89.5 (C DEG)
  UPPER SHELF ENERGY: 130.5 (FT-LB),177 (J)



UPPER SHELF ENERGY: 130.5 (FT-LB),177 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 103.9 TO 157.2 (FT-LB),140.9 TO 213.1 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-41 (DEG F),-40.6 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-132.1 TO -1.6 (DEG F),-91.2 TO -18.7 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-10.4 (DEG F),-23.6 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-55.1 TO 23.8 (DEG F),-48.4 TO -4.6 (DEG C)
REMARK: NONE

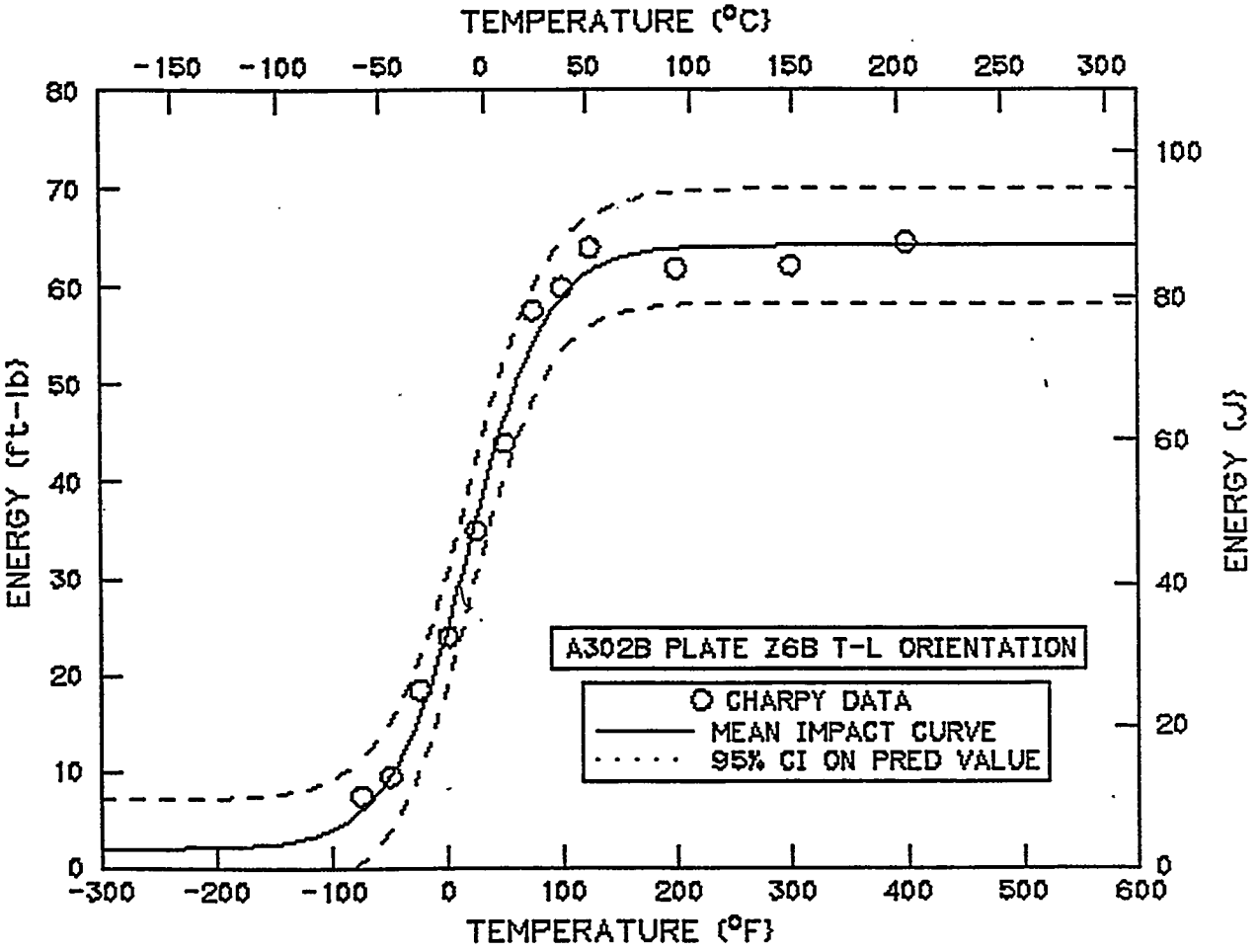
SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_6ALS

SET NAME: A302B_6ALS
REMARK: HSST A302B EVALUATION OF PLATE Z6A - ORIENTATION L-S

NMBR	IDENT	TEMPERATURE (DEG F)	TEMPERATURE (DEG C)	ENERGY (FT-LB)	ENERGY (J)	EXPANSION (IN)	EXPANSION (MM)	SHEAR (PERCENT)
1	Z6A7	-75	-59.4	7	9.5	0.006	0.152	0
2	Z6A6	-50	-45.6	22	29.8	0.017	0.432	5
3	Z6A5	-25	-31.7	43.3	58.7	0.036	0.914	20
4	Z6A4	0	-17.8	67	90.8	0.053	1.346	45
5	Z6A3	25	-3.9	71	96.3	0.056	1.422	35
6	Z6A2	50	10	101	136.9	0.078	1.981	75
7	Z6A1	75	23.9	109	147.8	0.075	1.905	70
8	Z6A8	100	37.8	104.5	141.7	0.08	2.032	90
9	Z6A9	125	51.7	105.5	143	0.08	2.032	95
10	Z6A14	135	57.2	138.4	187.6	0.104	2.642	100
11	Z6A13	150	65.6	140	189.8	0.081	2.057	100
12	Z6A10	200	93.3	140	189.8	0.083	2.108	100
13	Z6A11	300	148.9	124.8	169.2	0.075	1.905	100
14	Z6A12	400	204.4	125.5	170.2	0.07	1.778	100

Plate Z6B
Modified A302 Grade B
Heat B 5013-2

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302_6B_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 17.9 (DEG F),-7.8 (DEG C)
  TRANSITION ZONE WIDTH: 137.9 (F DEG),76.6 (C DEG)
  UPPER SHELF ENERGY: 64.2 (FT-LB),87.1 (J)



UPPER SHELF ENERGY: 64.2 (FT-LB),87.1 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 58.4 TO 70.1 (FT-LB),79.2 TO 95 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]: 10.9 (DEG F),-11.7 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-2.6 TO 23.9 (DEG F),-19.2 TO -4.5 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 59.8 (DEG F),15.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 43.3 TO 81.3 (DEG F),6.3 TO 27.4 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302_6B_TL

SET NAME: A302_6B_TL
REMARK: HSST A302B EVALUATION OF PLATE Z6B - ORIENTATION T-L

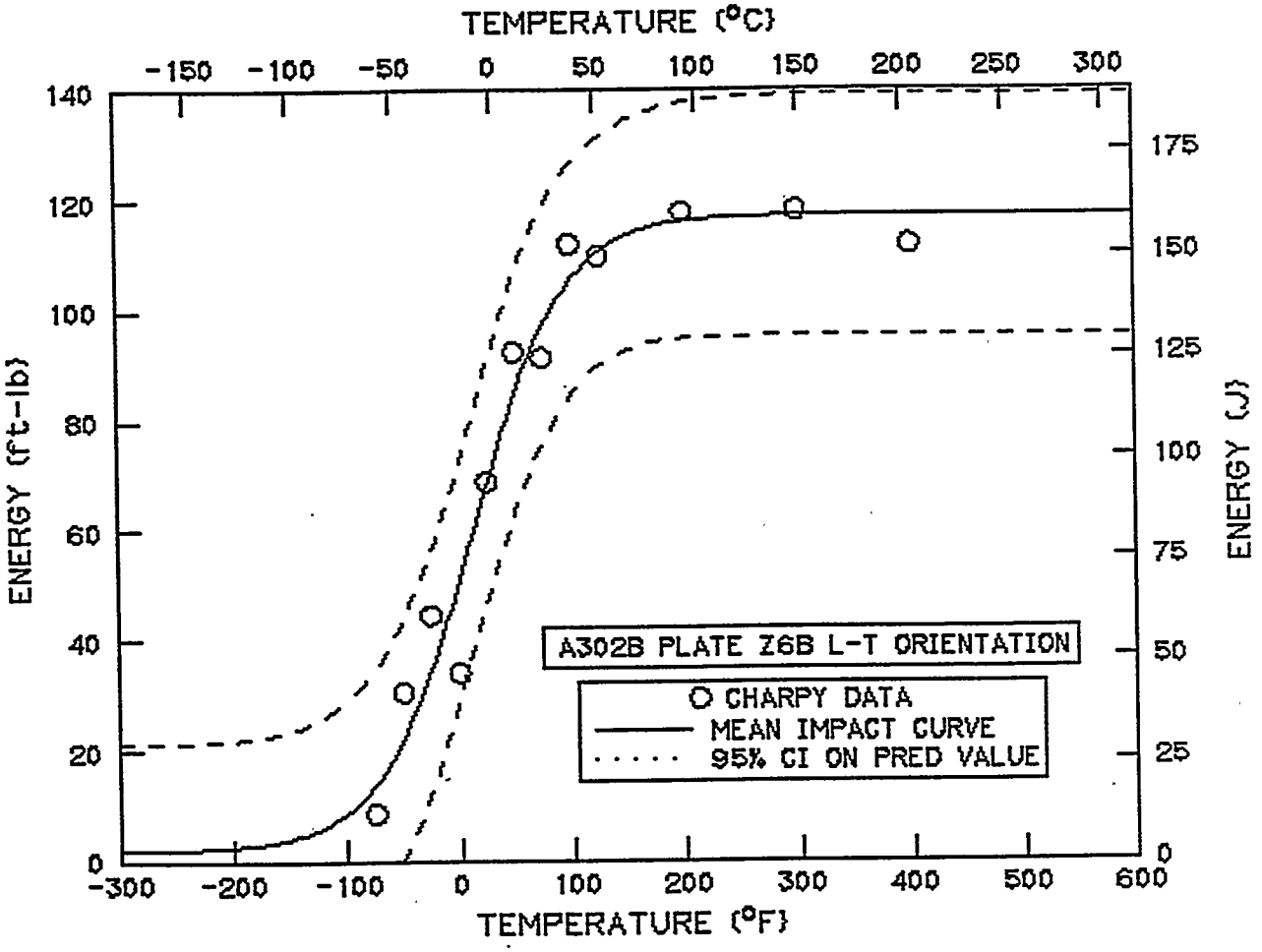
NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z6B16	-75	-59.4	7.5	10.2	0.008	0.203	0
2	Z6B17	-50	-45.6	9.5	12.9	0.009	0.229	5
3	Z6B18	-25	-31.7	18.5	25.1	0.016	0.406	10
4	Z6B19	0	-17.8	24	32.5	0.026	0.66	20
5	Z6B20	25	-3.9	35	47.5	0.034	0.864	30
6	Z6B21	50	10	44	59.7	0.037	0.94	45
7	Z6B22	75	23.9	57.7	78.2	0.051	1.295	80
8	Z6B23	100	37.8	60	81.3	0.052	1.321	90
9	Z6B24	125	51.7	64	86.8	0.051	1.372	100
10	Z6B27	200	93.3	61.9	83.9	0.054	1.372	100
11	Z6B26	300	148.9	62.2	84.3	0.057	1.448	100
12	Z6B25	400	204.4	64.6	87.6	0.062	1.575	100

Instrumented Charpy Impact Test Sheet

PROJECT: HSST A302B Evaluation ENGINEER: Don McCabe TECHNICIAN: E. T. Manneschmidt
MATERIAL: Plate Z6B SITE: North Lab TUP #: 6293 DATE: 10/ /1993 DISK #: CVN 176 & 177

SPECIMEN IDENTIFICATION	TEST TEMP. °F	DIAL ENERGY ft-lb	LATERAL EXPAN (mils)	FRACT. APP. % SHEAR	MAT. ORIENT.	REMARKS
Z6B 1	75	103.2	59	90	LS	
2	50	95.7	62	80	LS	
3	25	66.0	50	50	LS	
4	0	59.1	45	25	LS	
5	–25	31.3	25	15	LS	
6	–50	26.0	20	15	LS	
7	–75	9.1	8	5	LS	
8	100	116.8	80	100	LS	
9	125	103.0	72	100	LS	
10	400	103.0	70	100	LS	
11	300	118.0	75	100	LS	
12	200	128.0	75	100	LS	
13	400	106.2	67	100	LS	
14					LS	
15					LS	
16	–75	7.5	8	0	TL	
17	–50	9.5	9	5	TL	
18	–25	18.5	16	10	TL	
19	0	24.0	26	20	TL	
20	25	35.0	34	30	TL	
21	50	44.0	37	45	TL	
22	75	57.7	51	80	TL	
23	100	60.0	52	90	TL	
24	125	64.0	54	100	TL	
25	400	64.6	62	100	TL	
26	300	62.2	57	100	TL	
27	200	61.9	54	100	TL	
28					TL	
29					TL	
30					TL	

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302_6B_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 12.4 (DEG F),-10.9 (DEG C)
  TRANSITION ZONE WIDTH: 160.8 (F DEG),89.3 (C DEG)
  UPPER SHELF ENERGY: 117.4 (FT-LB),159.1 (J)



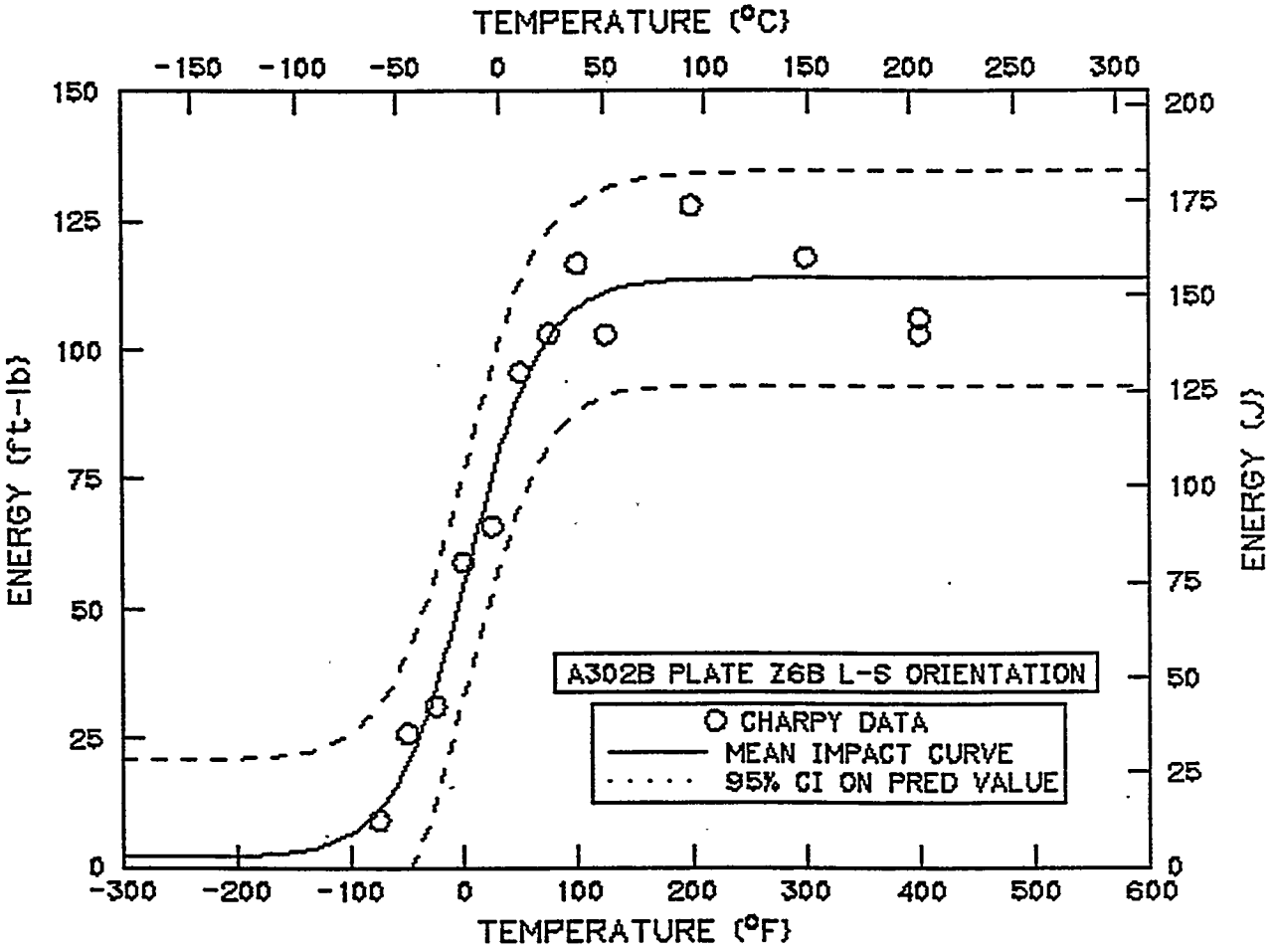
UPPER SHELF ENERGY: 117.4 (FT-LB),159.1 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 95.4 TO 139.3 (FT-LB),129.4 TO 188.8 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-33.4 (DEG F),-36.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-94 TO 0.9 (DEG F),-70 TO -17.3 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-1.2 (DEG F),-18.5 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-37 TO 29.3 (DEG F),-38.3 TO -1.5 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SET: A302_6B_LT

SET NAME: A302_6B_LT
REMARK: HSST A302B EVALUATION OF PLATE Z6B - ORIENTATION L-T

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z6B37	-75	-59.4	8.6	11.7	0.006	0.152	0
2	Z6B36	-50	-45.6	30.5	41.4	0.023	0.584	15
3	Z6B35	-25	-31.7	44.6	60.5	0.035	0.889	25
4	Z6B34	0	-17.8	34	46.1	0.029	0.737	20
5	Z6B33	25	-3.9	69	93.6	0.051	1.295	60
6	Z6B32	50	10	92.5	125.4	0.067	1.702	75
7	Z6B31	75	23.9	91.5	124.1	0.068	1.727	95
8	Z6B38	100	37.8	112.2	152.1	0.074	1.88	95
9	Z6B39	125	51.7	110	149.1	0.075	1.905	100
10	Z6B42	200	93.3	118	160	0.078	1.981	100
11	Z6B41	300	148.9	118.2	160.3	0.076	1.93	100
12	Z6B40	400	204.4	112	151.9	0.067	1.702	100

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: 302_6B_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 4.1 (DEG F),-15.5 (DEG C)
  TRANSITION ZONE WIDTH: 131.4 (F DEG),73 (C DEG)
  UPPER SHELF ENERGY: 113.9 (FT-LB),154.4 (J)



UPPER SHELF ENERGY: 113.9 (FT-LB),154.4 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 93.3 TO 134.6 (FT-LB),126.4 TO 182.5 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-31.9 (DEG F),-35.5 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-80.9 TO -3.5 (DEG F),-62.7 TO -19.7 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-5.3 (DEG F),-20.7 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-34.9 TO 20.6 (DEG F),-37.2 TO -6.3 (DEG C)
REMARK: NONE

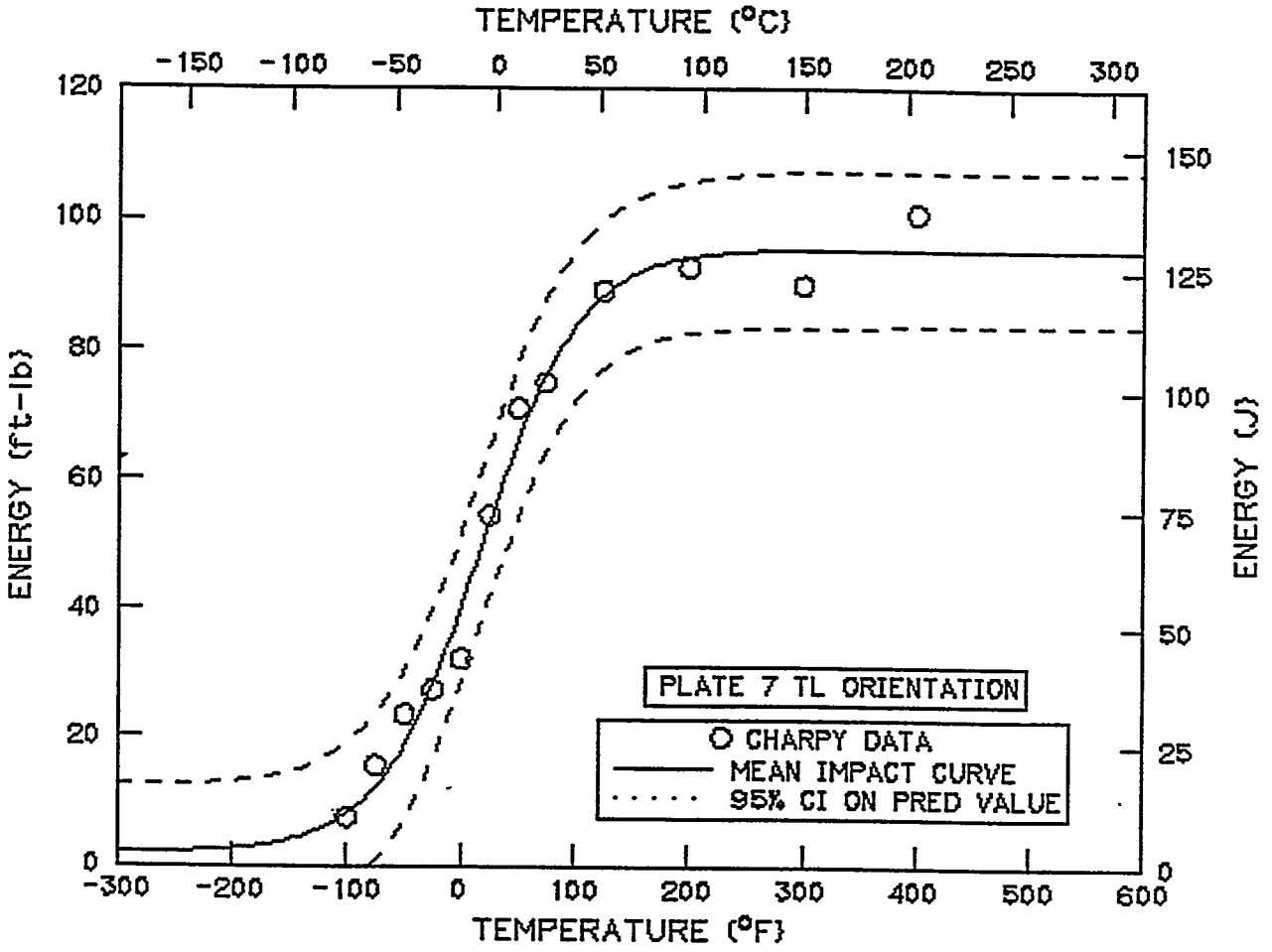
SOURCE: ANALYSIS SET
ANALYSIS SET: 302_6B_LS

SET NAME: 302_6B_LS
REMARK: HSST A302B EVALUATION OF PLATE Z6B - ORIENTATION L-S

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z6B7	-75	-59.4	9.1	12.3	0.008	0.203	5
2	Z6B6	-50	-45.6	26	35.3	0.02	0.508	15
3	Z6B5	-25	-31.7	31.3	42.4	0.025	0.635	15
4	Z6B4	0	-17.8	59.1	80.1	0.045	1.143	25
5	Z6B3	25	-3.9	66	89.5	0.05	1.27	50
6	Z6B2	50	10	95.7	129.8	0.062	1.575	80
7	Z6B1	75	23.9	103.2	139.9	0.059	1.499	90
8	Z6B8	100	37.8	116.8	158.4	0.08	2.032	100
9	Z6B9	125	51.7	103	139.6	0.072	1.829	100
10	Z6B12	200	93.3	128	173.5	0.075	1.905	100
11	Z6B11	300	148.9	118	160	0.075	1.905	100
12	Z6B10	400	204.4	103	139.6	0.07	1.778	100
13	Z6B13	400	204.4	106.2	144	0.067	1.702	100

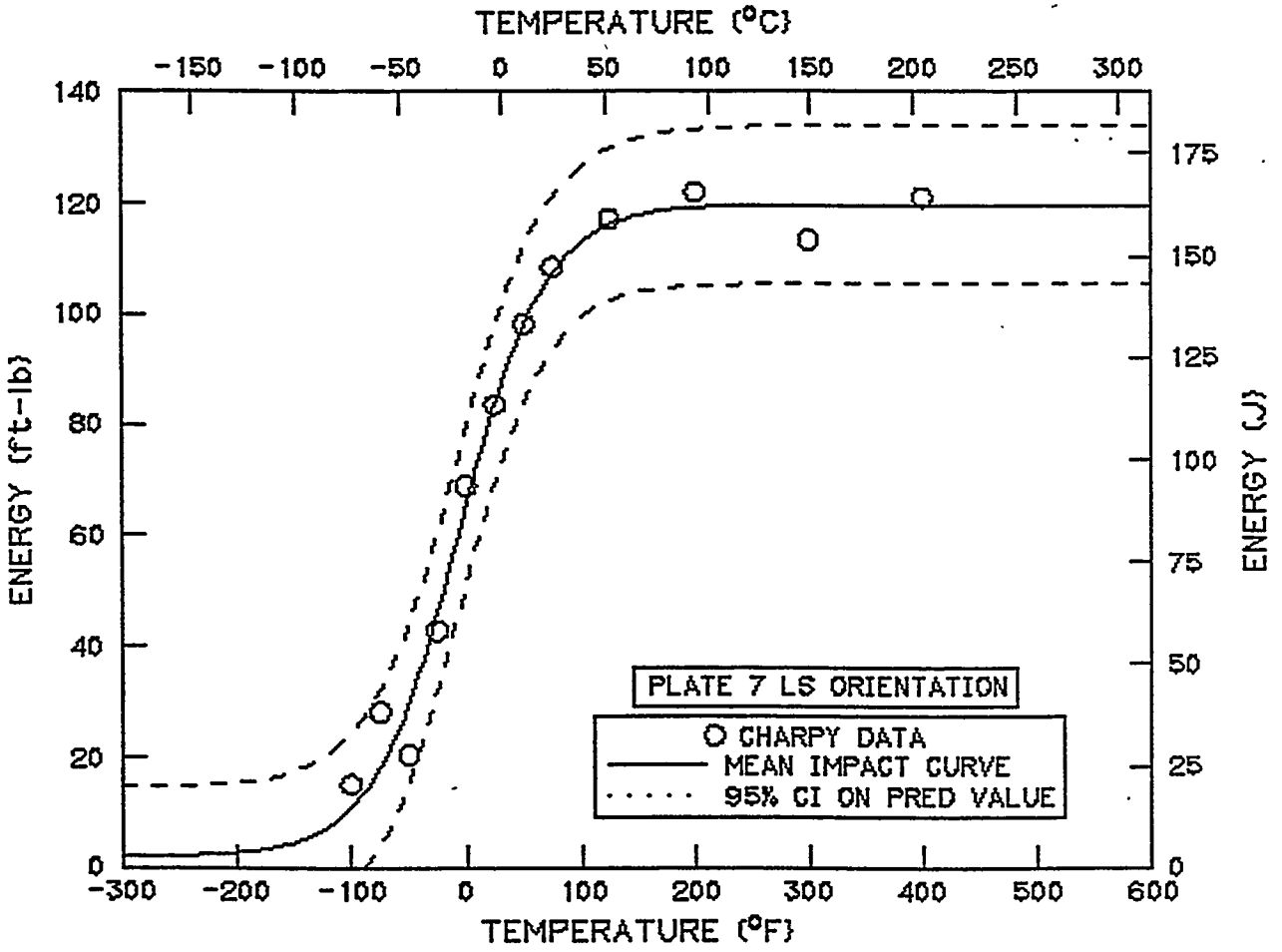
Plate Z7
Modified A302 Grade B
Heat C 2463-1

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_7_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 16.3 (DEG F),-8.7 (DEG C)
  TRANSITION ZONE WIDTH: 175.1 (F DEG),97.3 (C DEG)
  UPPER SHELF ENERGY: 95.6 (FT-LB),129.6 (J)



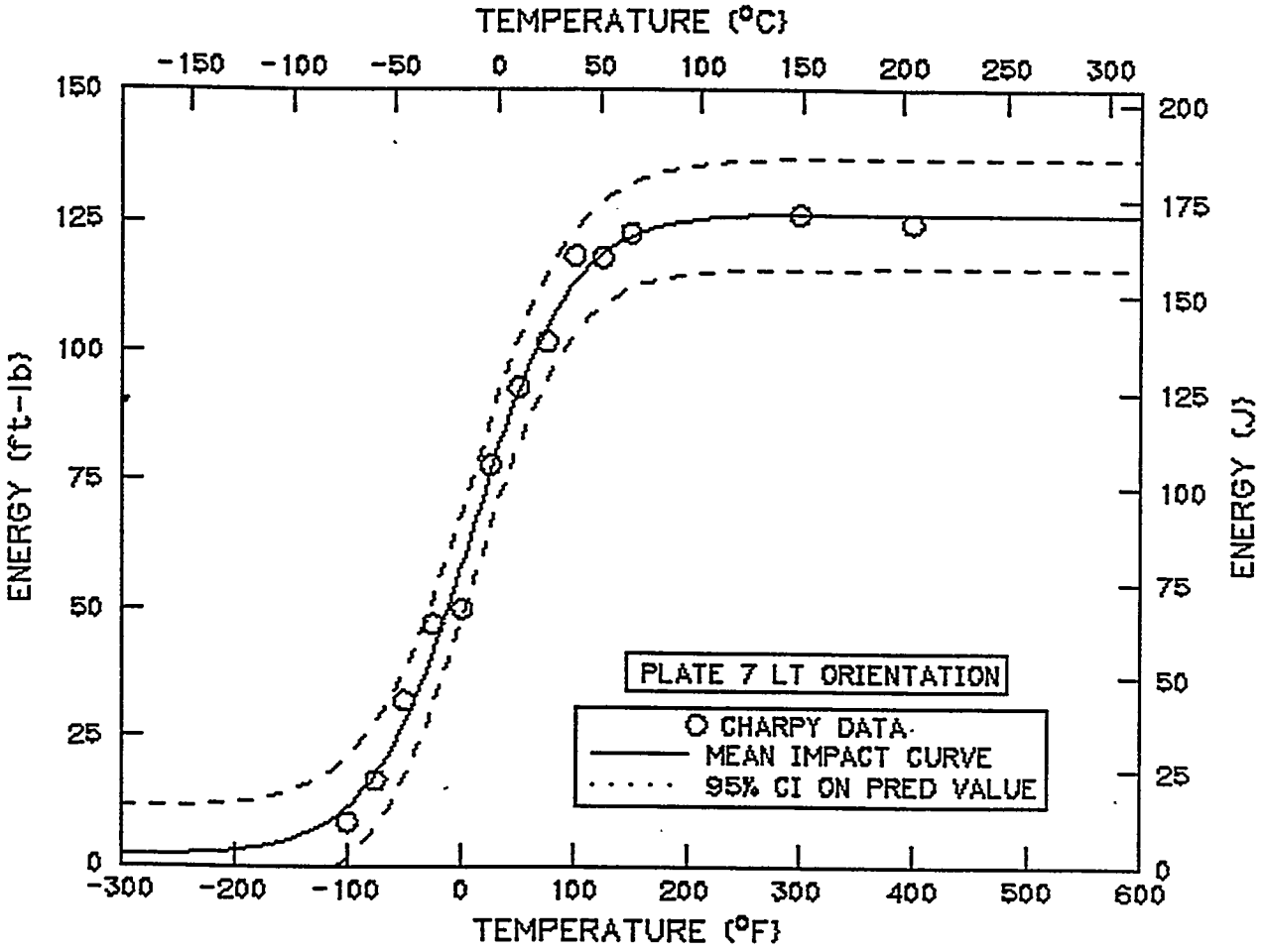
UPPER SHELF ENERGY: 95.6 (FT-LB),129.6 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 83.6 TO 107.5 (FT-LB),113.4 TO 145.8 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-20.9 (DEG F),-29.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-51.3 TO 2.6 (DEG F),-46.3 TO -16.3 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 18.6 (DEG F),-7.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-3.3 TO 41.3 (DEG F),-19.6 TO 5.2 (DEG C)
REMARK: NONE

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_7_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE:-5.8 (DEG F),-21 (DEG C)
  TRANSITION ZONE WIDTH: 150.5 (F DEG),83.6 (C DEG)
  UPPER SHELF ENERGY: 119.7 (FT-LB),162.3 (J)



UPPER SHELF ENERGY: 119.7 (FT-LB),162.3 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 105.5 TO 134 (FT-LB),143 TO 181.6 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-49.6 (DEG F),-45.3 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-80.9 TO -27.6 (DEG F),-62.7 TO -33.1 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-19.9 (DEG F),-28.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-40.3 TO -1.5 (DEG F),-40.2 TO -18.6 (DEG C)
REMARK: NONE

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_7_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 8 (DEG F),-13.3 (DEG C)
  TRANSITION ZONE WIDTH: 172.9 (F DEG),96 (C DEG)
  UPPER SHELF ENERGY: 126.4 (FT-LB),171.4 (J)



UPPER SHELF ENERGY: 126.4 (FT-LB),171.4 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 115.8 TO 137.1 (FT-LB),156.9 TO 185.9 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-45.4 (DEG F),-43 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-69.4 TO -27 (DEG F),-56.3 TO -32.8 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]:-12.1 (DEG F),-24.5 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-28.1 TO 2.5 (DEG F),-33.4 TO -16.4 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SETS: A302B_7_LT,A302B_7_TL AND A302B_7_LS

SET NAME: A302B_7_LT
REMARK: HSST A302B EVAL. PLATE Z7 SPECIMENS IN LT ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z7_5	-100	-73.3	8.5	11.5	0.005	0.127	0
2	Z7_8	-75	-59.4	16.5	22.4	0.011	0.279	0
3	Z7_4	-50	-45.6	32	43.4	0.024	0.61	10
4	Z7_6	-25	-31.7	47	63.7	0.034	0.864	20
5	Z7_3	0	-17.8	50	67.8	0.038	0.965	30
6	Z7_7	25	-3.9	78	105.8	0.058	1.473	65
7	Z7_9	50	10	93	126.1	0.069	1.753	75
8	Z7_1	75	23.9	101.8	138	0.073	1.854	85
9	Z7_10	100	37.8	118.3	160.3	0.08	2.032	100
10	Z7_11	125	51.7	117.9	159.9	0.079	2.007	100
11	Z7_2	150	65.6	122.6	166.2	0.081	2.057	100
12	Z7_12	300	148.9	126.2	171.1	0.082	2.083	100
13	Z7_13	400	204.4	124.6	168.9	0.081	2.057	100

SET NAME: A302B_7_TL
REMARK: HSST A302B EVAL. PLATE Z7 SPECIMENS IN TL ORIENTATION

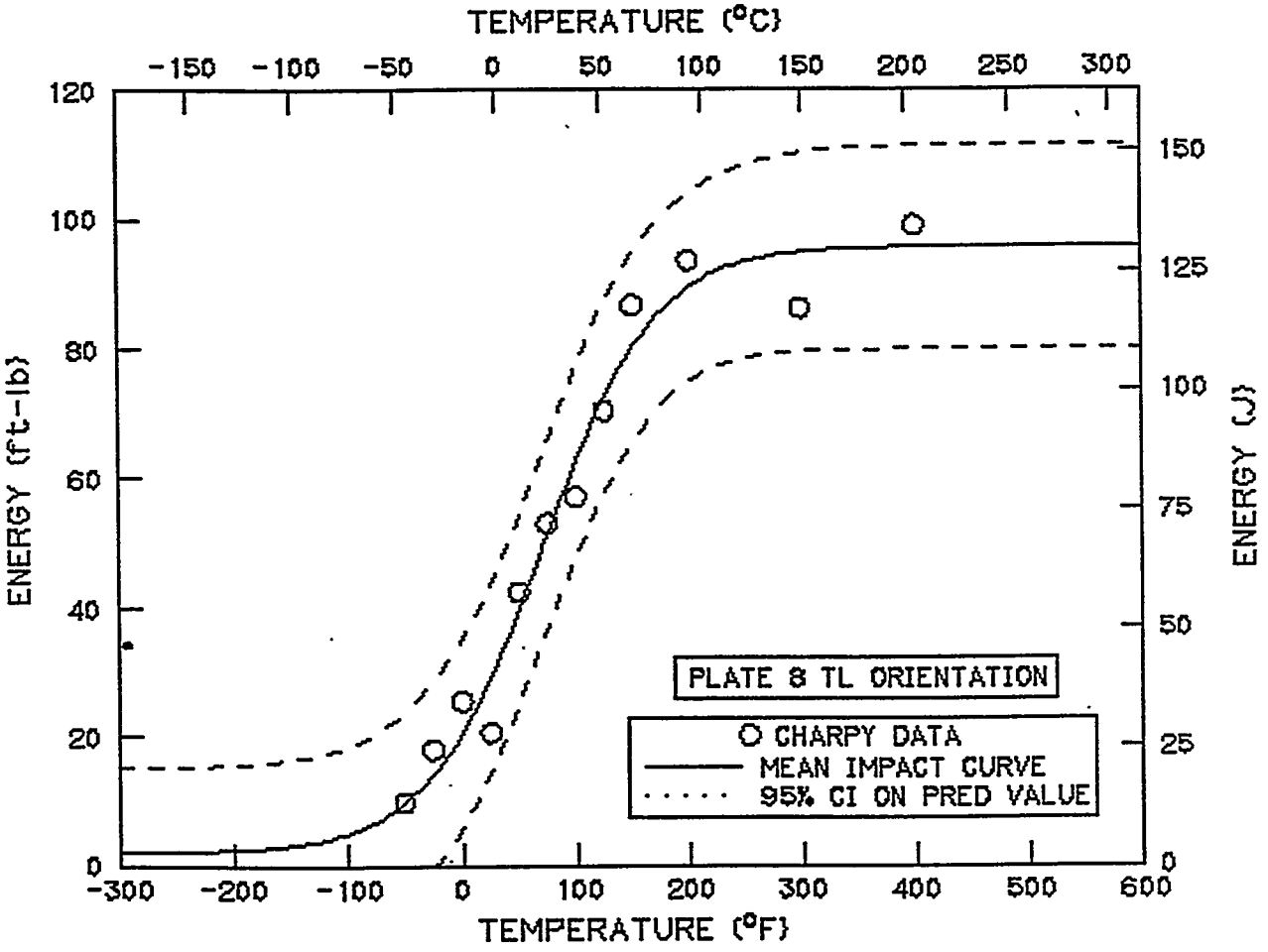
NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z7_18	-100	-73.3	7.5	10.2	0.004	0.102	0
2	Z7_19	-75	-59.4	15.5	21	0.011	0.279	0
3	Z7_17	-50	-45.6	23.4	31.7	0.018	0.457	10
4	Z7_20	-25	-31.7	27.2	36.9	0.023	0.584	20
5	Z7_16	0	-17.8	32	43.4	0.028	0.711	25
6	Z7_21	25	-3.9	54.6	74	0.043	1.092	50
7	Z7_22	50	10	71	96.3	0.056	1.422	70
8	Z7_15	75	23.9	75	101.7	0.056	1.422	75
9	Z7_23	125	51.7	89.1	120.8	0.074	1.88	100
10	Z7_25	200	93.3	92.7	125.7	0.072	1.829	100
11	Z7_24	300	148.9	90	122	0.068	1.727	100
12	Z7_26	400	204.4	101	136.9	0.074	1.88	100

SET NAME: A302B_7_LS
REMARK: HSST A302B EVAL. PLATE Z7 SPECIMENS IN LS ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z7_34	-100	-73.3	15	20.3	0.009	0.229	0
2	Z7_33	-75	-59.4	28.2	38.2	0.02	0.508	0
3	Z7_32	-50	-45.6	20.4	27.7	0.015	0.381	5
4	Z7_31	-25	-31.7	42.8	58	0.032	0.813	20
5	Z7_35	0	-17.8	68.9	93.4	0.051	1.295	45
6	Z7_30	25	-3.9	83.5	113.2	0.058	1.473	65
7	Z7_36	50	10	98.2	133.1	0.067	1.702	75
8	Z7_29	75	23.9	108.5	147.1	0.071	1.803	85
9	Z7_37	125	51.7	117.2	158.9	0.076	1.93	100
10	Z7_39	200	93.3	122	165.4	0.085	2.159	100
11	Z7_38	300	148.9	113.5	153.9	0.083	2.108	100
12	Z7_40	400	204.4	121.1	164.2	0.077	1.956	100

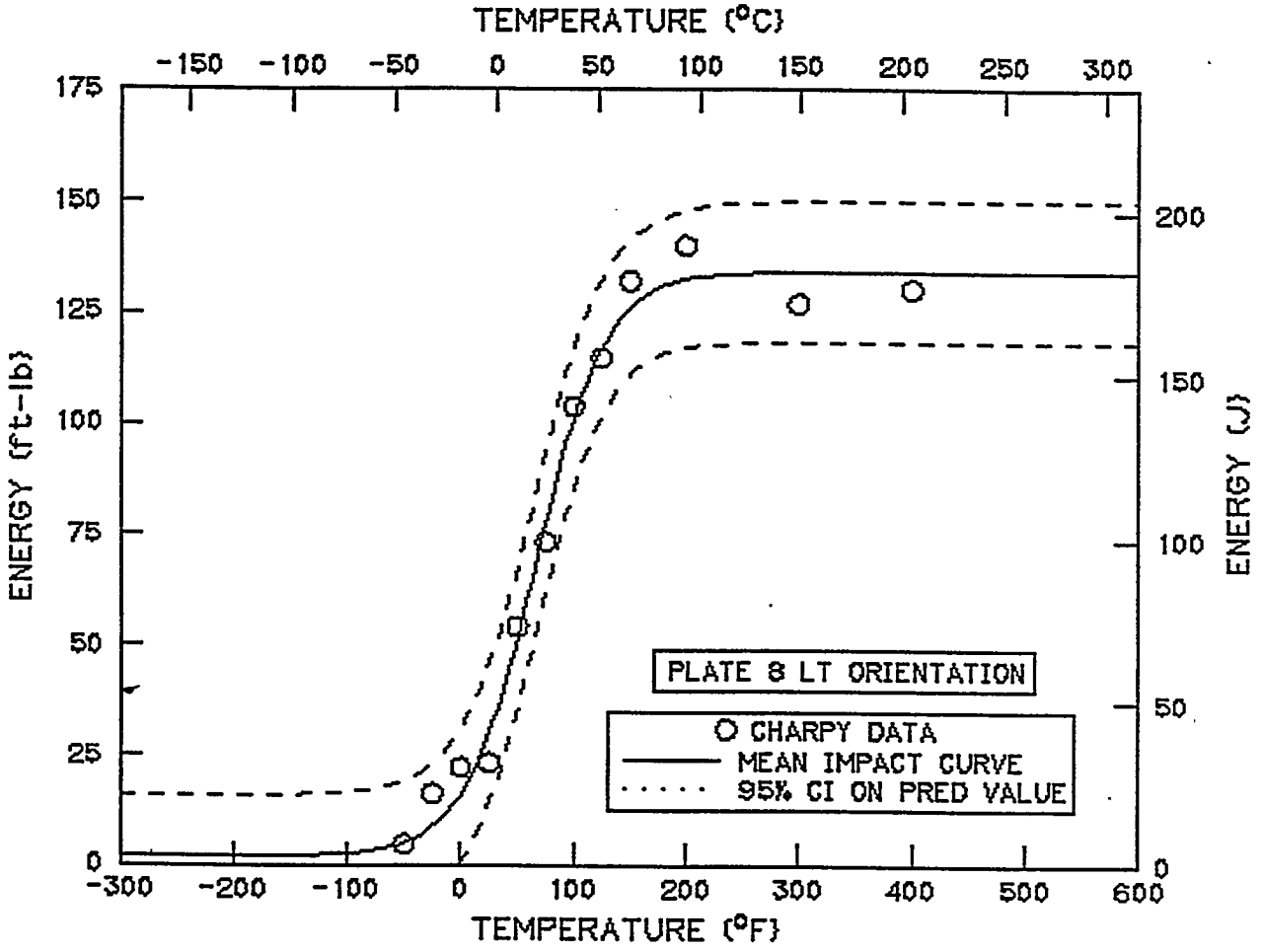
Plate Z8
Modified A533 Grade B
Heat C 2220-2

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_8_TL
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 69.9 (DEG F),21 (DEG C)
  TRANSITION ZONE WIDTH: 198.9 (F DEG),110.5 (C DEG)
  UPPER SHELF ENERGY: 95.8 (FT-LB),129.8 (J)



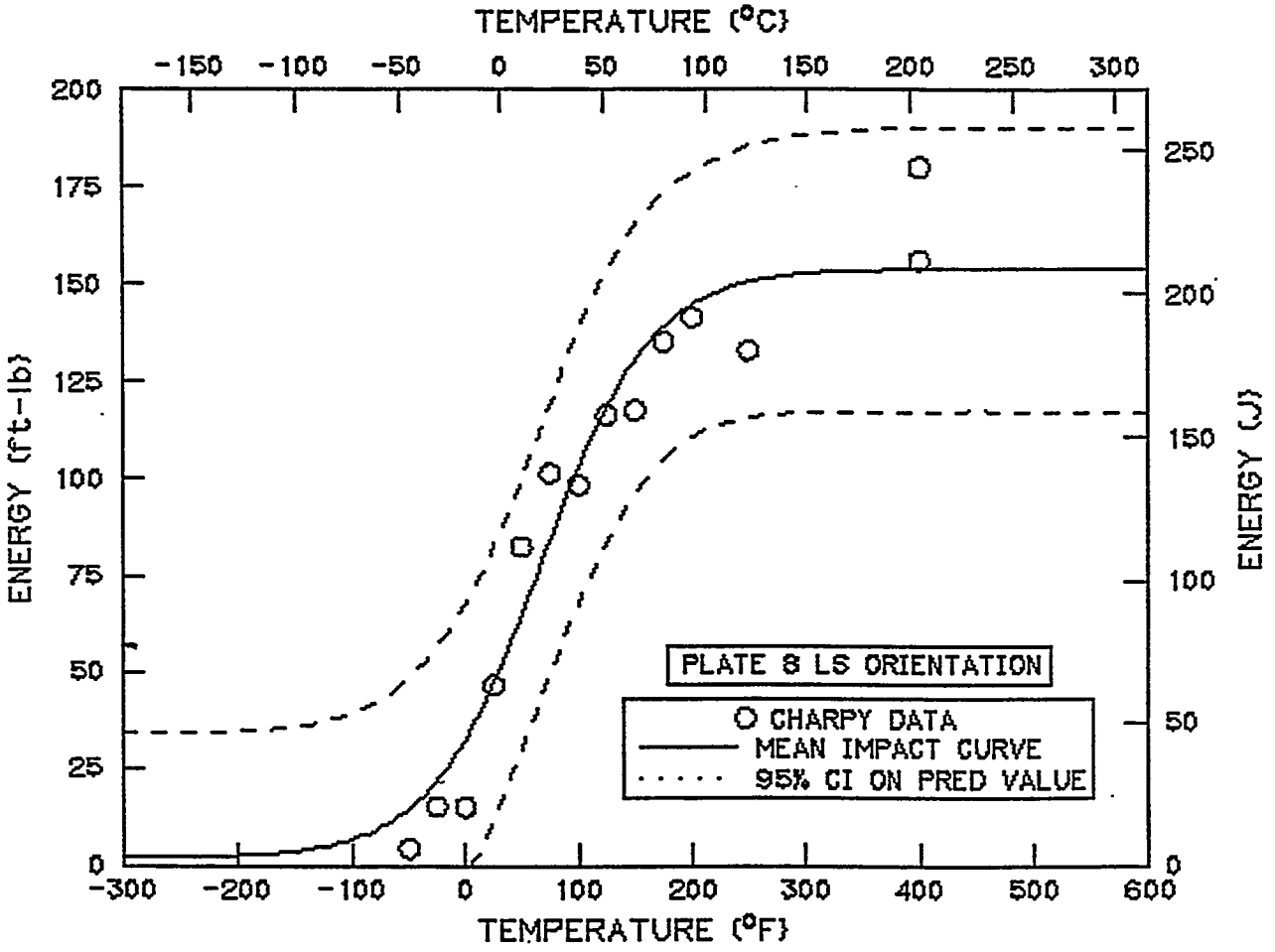
UPPER SHELF ENERGY: 95.8 (FT-LB),129.8 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 79.9 TO 111.6 (FT-LB),108.3 TO 151.4 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]: 27.4 (DEG F),-2.6 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-18.6 TO 60.4 (DEG F),-28.1 TO 15.8 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 72.2 (DEG F),22.4 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 40.7 TO 104.9 (DEG F),4.8 TO 40.5 (DEG C)
REMARK: NONE

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_8_LT
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 65.9 (DEG F),18.8 (DEG C)
  TRANSITION ZONE WIDTH: 123.6 (F DEG),68.7 (C DEG)
  UPPER SHELF ENERGY: 134.2 (FT-LB),181.9 (J)



UPPER SHELF ENERGY: 134.2 (FT-LB),181.9 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 118.4 TO 150 (FT-LB),160.5 TO 203.4 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]: 25.2 (DEG F),-3.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-3 TO 44.2 (DEG F),-19.4 TO 6.8 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 48.5 (DEG F),9.2 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 30.6 TO 63.7 (DEG F),-0.8 TO 17.6 (DEG C)
REMARK: NONE

DATA SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_8_LS
Y VARIABLE: ENERGY
CONFIDENCE INTERVAL: PREDICTED VALUE
MODEL PARAMETERS
  LOWER SHELF ENERGY [HELD FIXED]: 2 (FT-LB),2.7 (J)
  MID-TRANSITION TEMPERATURE: 66.8 (DEG F),19.4 (DEG C)
  TRANSITION ZONE WIDTH: 194.2 (F DEG),107.9 (C DEG)
  UPPER SHELF ENERGY: 154 (FT-LB),208.8 (J)



UPPER SHELF ENERGY: 154 (FT-LB),208.8 (J)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: 117.5 TO 190.5 (FT-LB),159.3 TO 258.3 (J)
TEMPERATURE [30 (FT-LB),40.7 (J) ENERGY]:-5.4 (DEG F),-20.8 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT: UNDEFINED TO 50 (DEG F),UNDEFINED TO 10 (DEG C)
TEMPERATURE [50 (FT-LB),67.8 (J) ENERGY]: 29.3 (DEG F),-1.5 (DEG C)
  CONFIDENCE INTERVAL ON PREDICTED VALUE
    95 PERCENT:-44.1 TO 75.8 (DEG F),-42.3 TO 24.4 (DEG C)
REMARK: NONE

SOURCE: ANALYSIS SET
ANALYSIS SETS: A302B_8_LS AND A302B_8_LT

SET NAME: A302B_8_LS
REMARK: HSST A302B EVAL. PLATE Z8 SPECIMENS IN LS ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z8_6	-50	-45.6	4.4	6	0.003	0.076	0
2	Z8_5	-25	-31.7	15.1	20.5	0.013	0.33	5
3	Z8_4	0	-17.8	15	20.3	0.014	0.356	15
4	Z8_3	25	-3.9	46.4	62.9	0.038	0.965	30
5	Z8_2	50	10	82.5	111.9	0.06	1.524	60
6	Z8_1	75	23.9	101.5	137.6	0.069	1.753	75
7	Z8_9	100	37.8	98.5	133.5	0.065	1.651	70
8	Z8_7	125	51.7	116.5	158	0.081	2.057	85
9	Z8_8	150	65.6	117.7	159.6	0.071	1.803	90
10	Z8_10	175	79.4	135.2	183.3	0.083	2.108	100
11	Z8_11	200	93.3	141.6	192	0.085	2.159	100
12	Z8_12	250	121.1	133	180.3	0.085	2.159	100
13	Z8_13	400	204.4	156.1	211.6	0.079	2.007	100
14	Z8_14	400	204.4	180.1	244.2	0.087	2.21	100

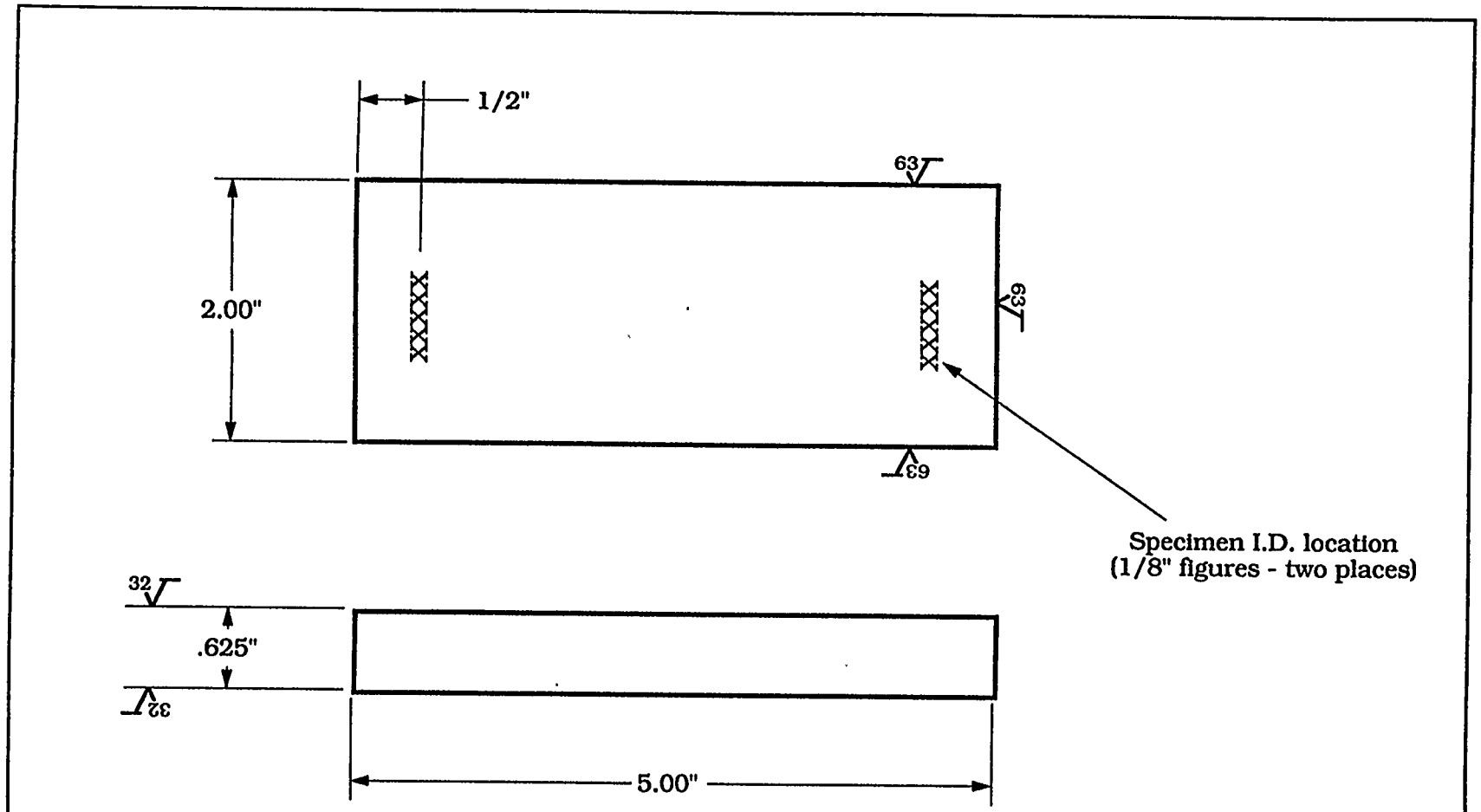
SET NAME: A302B_8_LT
REMARK: HSST A302B EVAL. PLATE Z8 SPECIMENS IN LT ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z8_20	-50	-45.6	4.6	6.2	0.003	0.076	5
2	Z8_19	-25	-31.7	16	21.7	0.013	0.33	5
3	Z8_18	0	-17.8	22	29.8	0.018	0.457	10
4	Z8_17	25	-3.9	23.1	31.3	0.022	0.559	20
5	Z8_16	50	10	54.2	73.5	0.041	1.041	40
6	Z8_15	75	23.9	73.4	99.5	0.051	1.295	50
7	Z8_21	100	37.8	103.9	140.9	0.074	1.88	70
8	Z8_26	125	51.7	114.8	155.6	0.076	1.93	85
9	Z8_22	150	65.6	132.1	179.1	0.083	2.108	90
10	Z8_23	200	93.3	140	189.8	0.081	2.057	100
11	Z8_24	300	148.9	127	172.2	0.081	2.057	100
12	Z8_25	400	204.4	130.3	176.7	0.082	2.083	100

SOURCE: ANALYSIS SET
ANALYSIS SET: A302B_8_TL

SET NAME: A302B_8_TL
REMARK: HSST A302B EVAL. PLATE Z8 SPECIMENS IN TL ORIENTATION

NMBR	IDENT	TEMPERATURE (DEG F)	(DEG C)	ENERGY (FT-LB)	(J)	EXPANSION (IN)	(MM)	SHEAR (PERCENT)
1	Z8_34	-50	-45.6	9.8	13.3	0.008	0.203	5
2	Z8_33	-25	-31.7	18	24.4	0.015	0.381	5
3	Z8_32	0	-17.8	25.4	34.4	0.024	0.61	10
4	Z8_31	25	-3.9	20.6	27.9	0.021	0.533	15
5	Z8_30	50	10	42.4	57.5	0.038	0.965	35
6	Z8_29	75	23.9	53	71.9	0.044	1.118	40
7	Z8_39	100	37.8	57.1	77.4	0.049	1.245	65
8	Z8_40	125	51.7	70.4	95.4	0.054	1.372	85
9	Z8_35	150	65.6	86.7	117.5	0.065	1.651	90
10	Z8_36	200	93.3	93.6	126.9	0.069	1.753	100
11	Z8_37	300	148.9	86.2	116.9	0.068	1.727	100
12	Z8_38	400	204.4	99	134.2	0.069	1.753	100



Notes:

1. Orientation critical.
2. See drawing(s)

_____

3. Specimen I.D.s

_____

_____

_____

Tolerances :

xx ± 0.010"

xxx ± 0.005"

Title :	Drop Weight Specimen Blank
Drawing Number :	FMG 009 r.0
File name :	Drop Wt. Blank
Drawn by :	E. T. Manneschmidt
Date :	Oct. 10, 1989
QAS Approved:	

Figure B3. Type P3 drop-weight specimen.

Table B4. Reference temperature determinations

Plate code	NDT temperature		Charpy properties at NDT + 60°F, T-L orientation				RT_{NDT}	
			Energy		Lateral expansion			
	(°F)	(°C)	(ft-lb)	(J)	(in.)	(mm)	(°F)	(°C)
Z1, Z2	–5	–20	93	127	0.063	1.6	–5	–20
Z3	–15	–26	60	82	0.046	1.2	–15	–26
Z4	–15	–26	64	88	0.058	1.5	–15	–26
Z5	–30	–34	56	77	0.048	1.2	–30	–34
Z6A	–30	–34	65	89	0.052	1.3	–30	–34
Z6B	–30	–34	38	52	0.034	0.9	13[a]	–10
Z7	–15	–26	64	88	0.056	1.4	–15	–26
Z8	–20	–29	33	45	0.038	1.0	24[a]	–4

[a]Determined from Charpy V-notch 50-ft-lb (lower-bound) temperature – 60°F.

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z2 Mod. A302- B Steel DATE: 7/1/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z2A1-10	-4°F (-20°C)	√	
Z2A1-07	5°F (-15°C)		√
Z2A1-02	5°F (-15°C)		√

T_{NDT} = -4 °F (-20 °C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span. in. (mm)	Deflection Stop. in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-tear performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z3 Mod. A302- B Steel DATE: 7/6/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z31-01	-4°F (-20°C)		√
Z31-05	-13°F (-25°C)		√
Z31-08	-22°F (-30°C)	√	
Z31-10	-13°F (-25°C)	√	
Z31-03	-4°F (-20°C)		√

T_{NDT} = -13 °F (-25 °C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-break performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z4 Mod. A302- B Steel DATE: 7/7/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z41-06	-4°F (-20°C)		√
Z41-08	-13°F (-25°C)		√
Z41-04	-22°F (-30°C)	√	
Z41-09	-13°F (-25°C)	√	
Z41-07	-4°F (-20°C)		√

T_{NDT} = -13 °F (-25 °C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-break performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z5 Mod. A302- B Steel DATE: 9/1/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z5A1	-4°F (-20°C)		√
Z5A2	-13°F (-25°C)		√
Z5A3	-22°F (-30°C)		√
Z5A4	-31°F (-35°C)	√	
Z5A5	-22°F (-30°C)		√

T_{NDT} = -31 °F (-35 ° C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span. in. (mm)	Deflection Stop. in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-test performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z6A Mod. A302- B Steel DATE: 9/1/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z6A1	-13°F (-25°C)		√
Z6A2	-22°F (-30°C)		√
Z6A3	-31°F (-35°C)		√
Z6A4	-40°F (-40°C)	√	
Z6A5	-31°F (-35°C)	√	
Z6A6	-22°F (-30°C)		√

T_{NDT} = -31 °F (-35 ° C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-break performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z6B Mod. A302- B Steel DATE: 9/1/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z6B1	-13°F (-25°C)		√
Z6B2	-22°F (-30°C)		√
Z6B3	-31°F (-35°C)	√	
Z6B5	-22°F (-30°C)		√

T_{NDT} = -31 °F (-35 ° C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-break performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z7 Mod. A302- B Steel DATE: 7/7/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z72-05	-4°F (-20°C)		√
Z72-01	-13°F (-25°C)		√
Z72-08	-22°F (-30°C)	√	
Z72-10	-13°F (-25°C)	√	
Z72-02	-4°F (-20°C)		√

T_{NDT} = -13 °F (-25 ° C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-tost performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

DROP WEIGHT TEST DATA SHEET

PROJECT: HSST MATERIAL: Z8 Mod. A533- B Steel DATE: 7/8/94 ORIENTATION: T-L

ENGINEER: D. E. McCabe TECHNICIAN: J. J. Henry SPECIMEN TYPE: P3 DEPTH: NA

CHARPY-V DATA (If avail.)

T_{CV} @ 50 ft-lb(67.8 J) _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F (33°C) _____ (°F) (°C)

T_{CV} @ 35 mil L.E. _____ (°F) (°C)

$T^*_{NDT} = T_{CV}$ - 60°F _____ (°F) (°C)

INITIAL TEST (lowest T^*_{NDT}) _____ (°F) (°C)

HAMMER HEIGHT

Specimen Size

σ .2%@ T_{NDT} _____ (ksi) (MPa)

Drop Weight Energy (E) (from Table 1) 250 (ft-lb) (J)

Hammer Weight (Wh) 173.1 (lb) (Kg)

Hammer Height (Ex12/Wh) 17 1/2 in

TEST DATA (see Table 2)

SPECIMEN NUMBER	TEST TEMPERATURE °F (°C)	TEST RESULTS	
		BREAK	NO-BREAK
Z81-03	-4°F (-20°C)		√
Z81-06	-13°F (-25°C)		√
Z81-09	-22°F (-30°C)	√	
Z81-01	-13°F (-25°C)		√

T_{NDT} = -22 °F (-30 °C)

FROM ASTM SPEC. E 208

TABLE 1 Standard Drop-Weight Test Conditions

Type of Specimen	Specimen Size, in. (mm)	Span, in. (mm)	Deflection Stop, in. (mm)	Yield Strength Level, ksi (MPa)	Drop-Weight Energy for Given Yeild Strength Level* ft-lbf	J
P-1	1 by 3 1/2 by 14 (25.4 by 89 by 356)	12.0 (305)	0.3 (7.6)	30 to 50 (210 to 340)	600	800
				50 to 70 (340 to 480)	800	1100
				70 to 90 (480 to 620)	1000	1350
				90 to 110 (620 to 760)	1200	1650
P-2	3/4 by 2 by 5 (19 by 51 by 127)	4.0 (102)	0.06 (1.5)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550
P-3	5/8 by 2 by 5 (15.9 by 51 by 127)	4.0 (102)	0.075 (1.9)	30 to 60 (210 to 410)	250	350
				60 to 90 (410 to 620)	300	400
				90 to 120 (620 to 830)	350	450
				120 to 150 (830 to 1030)	400	550

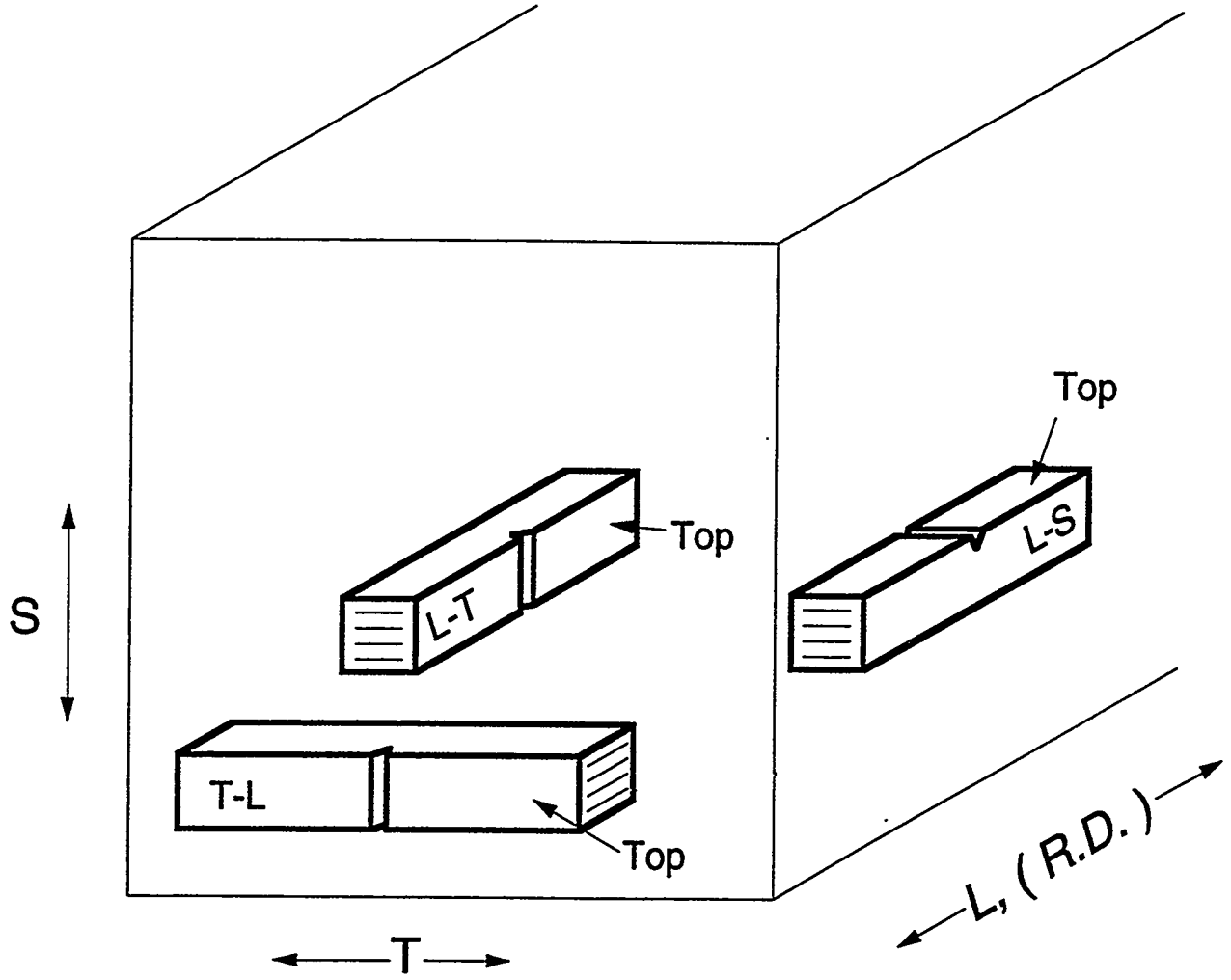
* Initial tests of a given strength level steel shall be conducted with the drop-weight energy stated in this column. In the event that insufficient deflection is developed (no-break performance) an increased drop-weight energy shall be employed for other specimens of the given steel.

TABLE 2 Suggested Sequence of Drop-Weight Test Temperatures

Specimen Condition After Test at Temperature T_n	Suggested Test Temperature for Succeeding Test
No crack in weld notch	No-Test performance (see 13.2.3 and 13.3)
Weld crack extending less than 1/16 in. (1.6 mm) into specimen surface	T_n - 60°F T_n - 30°C
Weld crack extending 1/2 to 1/4 in. (3.2 to 6.4 mm) into specimen surface	T_n - 40°F T_n - 20°C
Weld crack extending approximately 1/2 the distance between specimen edge and toe of crack-starter weld bead	T_n - 20°F T_n - 10°C
Weld crack extending to within 1/4 in. (6.4 mm) of specimen edge	T_n - 10°F T_n - 5°C
Specimen "Breaks" (see 13.2.1)	T_n + 40°F T_n + 20°C
	Continue testing as described in 11.1 and 11.2

Appendix C

Microstructure as Evaluated from Cross Section of Charpy Specimens



Expected Sulfide Stringer Directions from cross-rolled plate

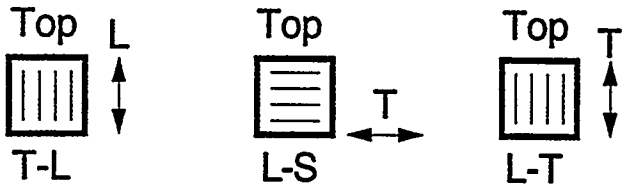
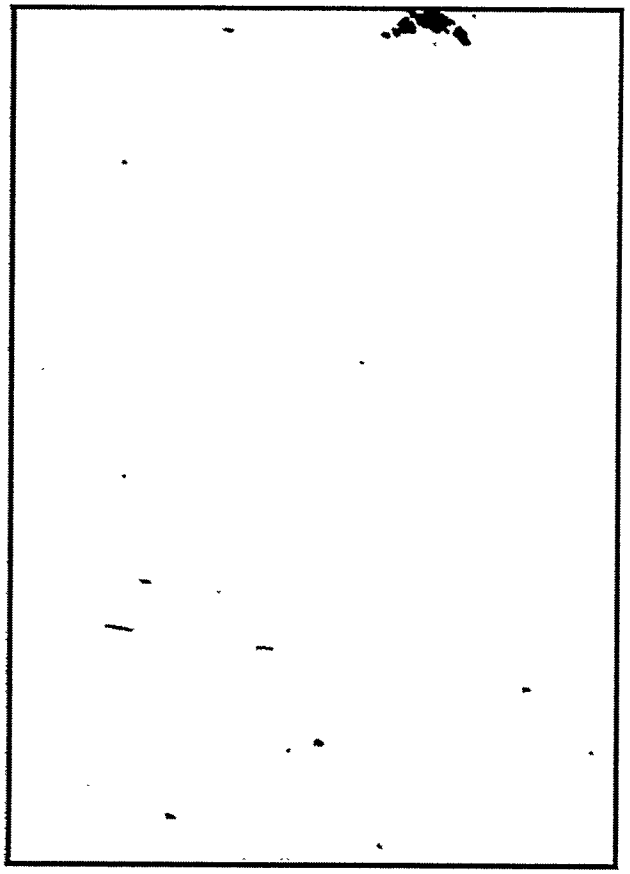
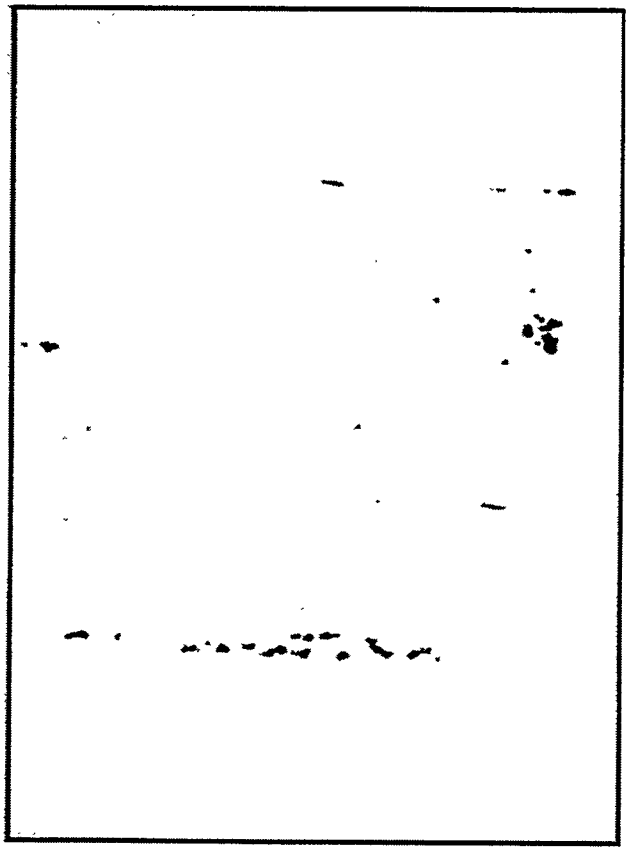


Figure C1. Charpy specimen orientations.

Material Code Z1:
Inclusions and Sulfide Stringers

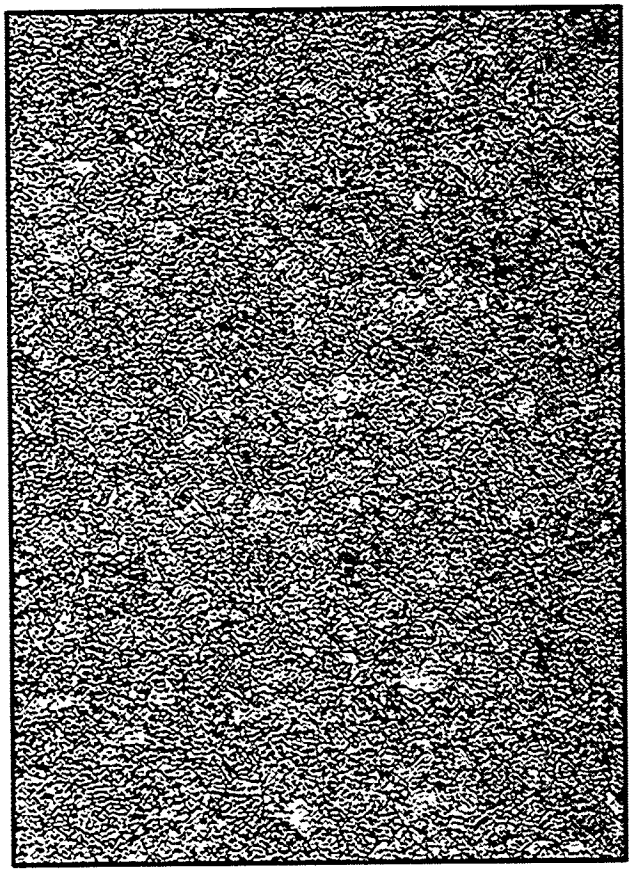


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z1-35

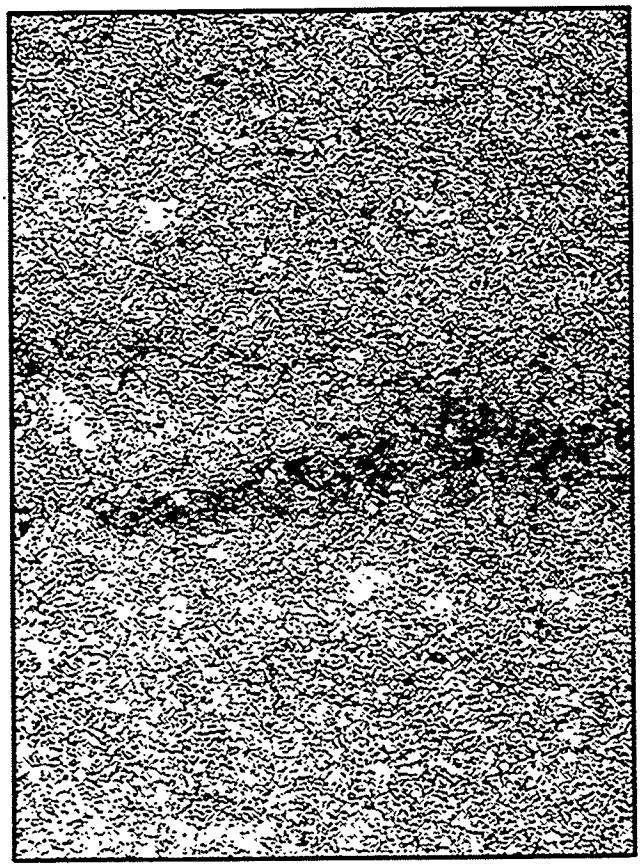


Transverse to RD
100×, Polished Only
Spec. Code: Z1-7

Material Code Z1:
Polished and Etched, 2% Nital
Moderate Banding in Transverse Direction

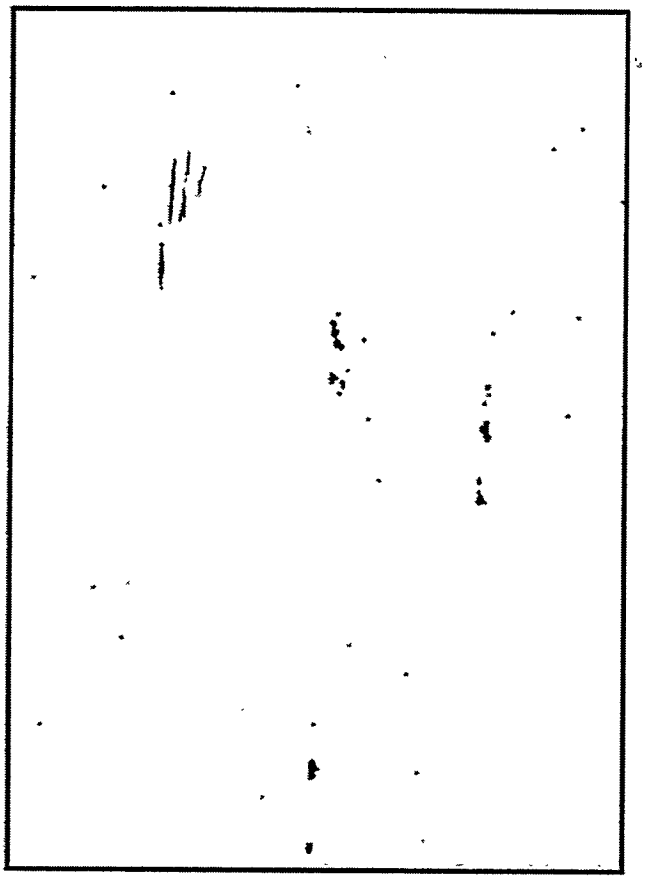


Longitudinal Rolling Direction →
100×, 2% Nital Etch
Spec. Code: Z1-35

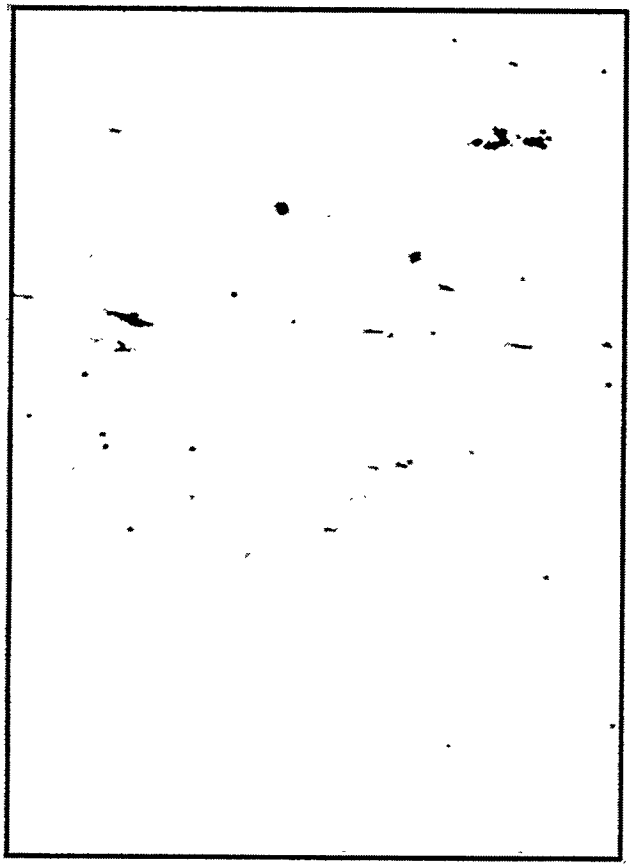


Transverse to RD
100×, 2% Nital Etch
Spec. Code: Z1-7

Material Code Z3:
Inclusions and Sulfide Stringers
Obvious Specimen Orientation Error, Charpy Spec. Z36

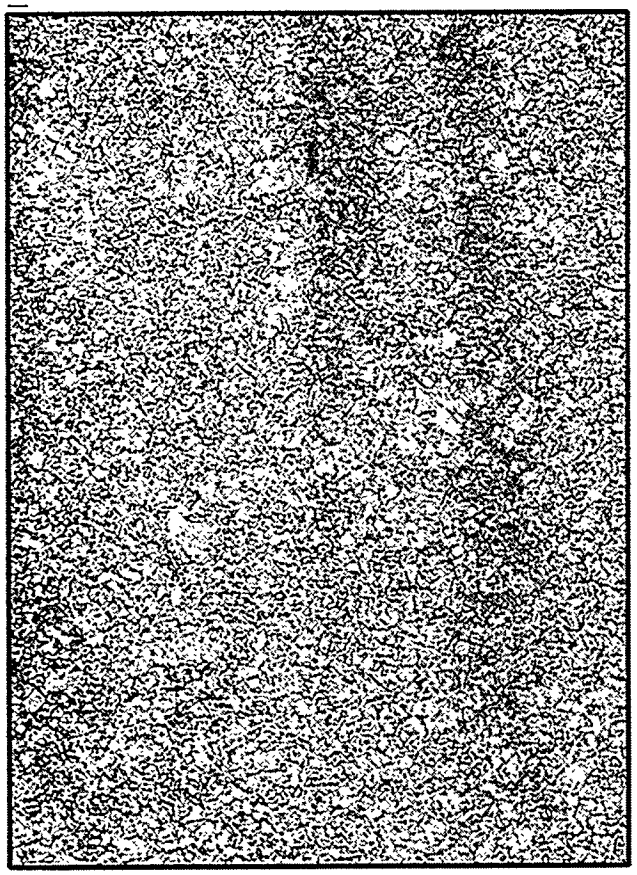


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z3-6

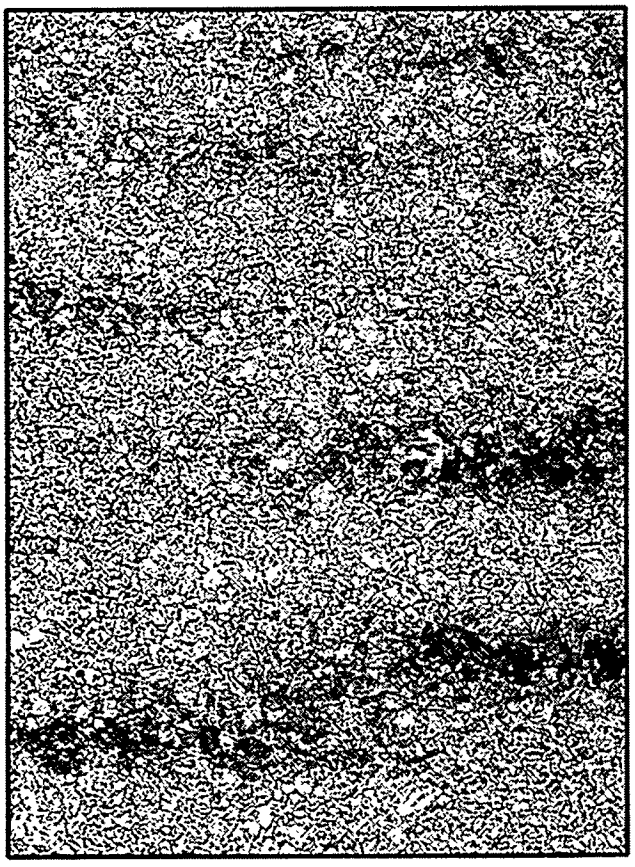


Transverse to RD
100×, Polished Only
Spec. Code: Z3-37

Material Code Z3:
Polished and Etched 2% Nital
Obvious Specimen Orientation Error, Charpy Spec. Z36

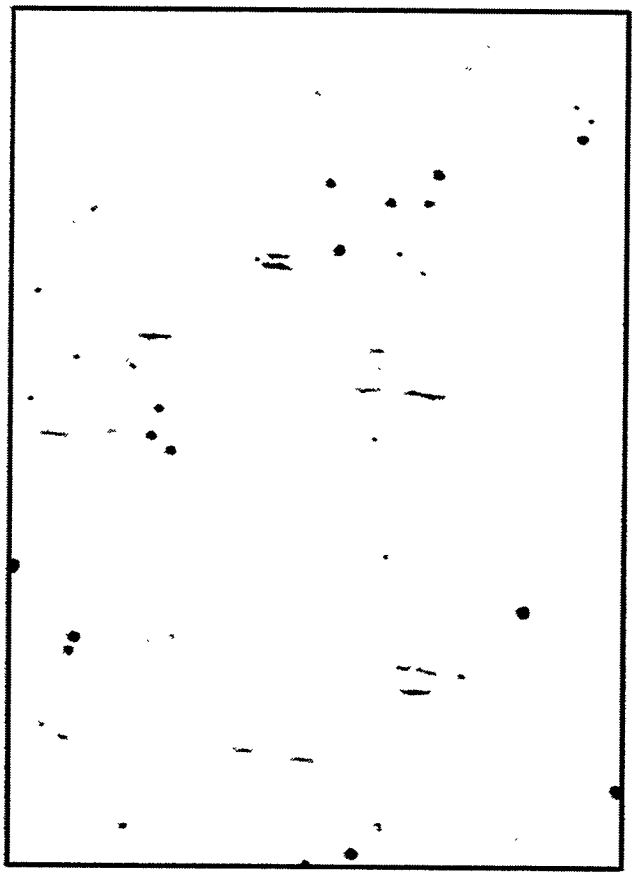


Longitudinal Rolling Direction →
100×, 2% Nital Etch
Spec. Code: Z3-6

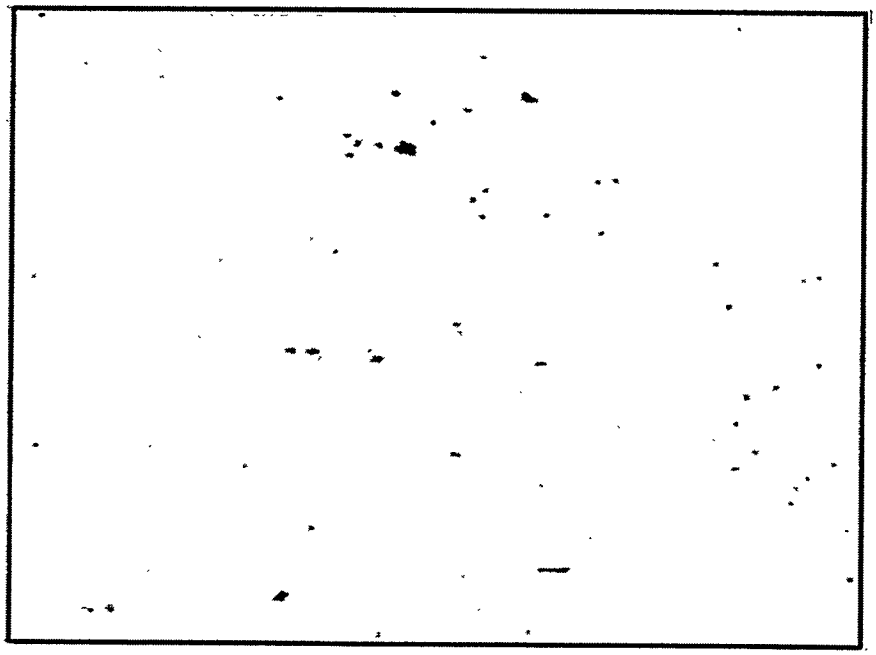


Transverse to RD
100×', 2% Nital Etch
Spec. Code: Z3-37

Material Code Z4:
Inclusions and Sulfide Stringers

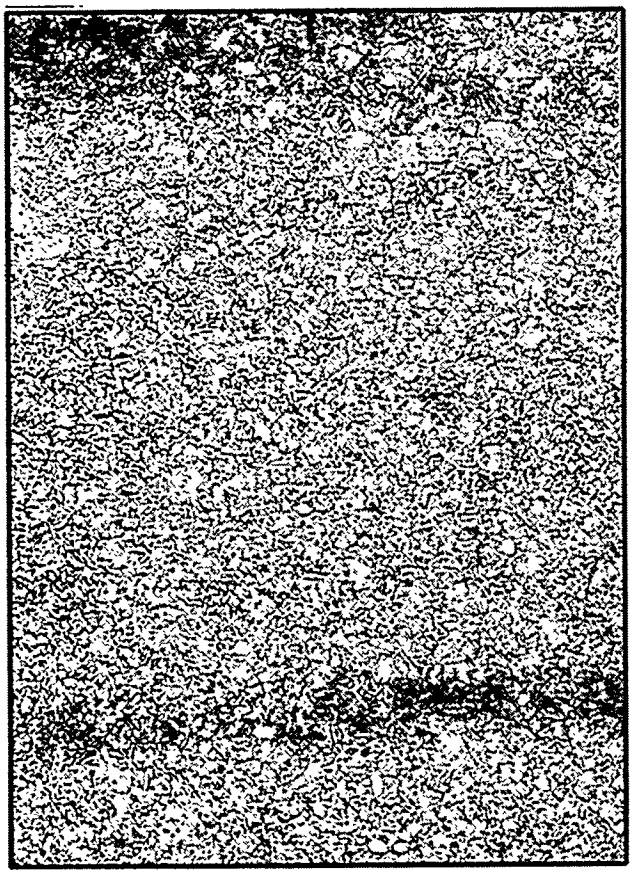


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z4-16

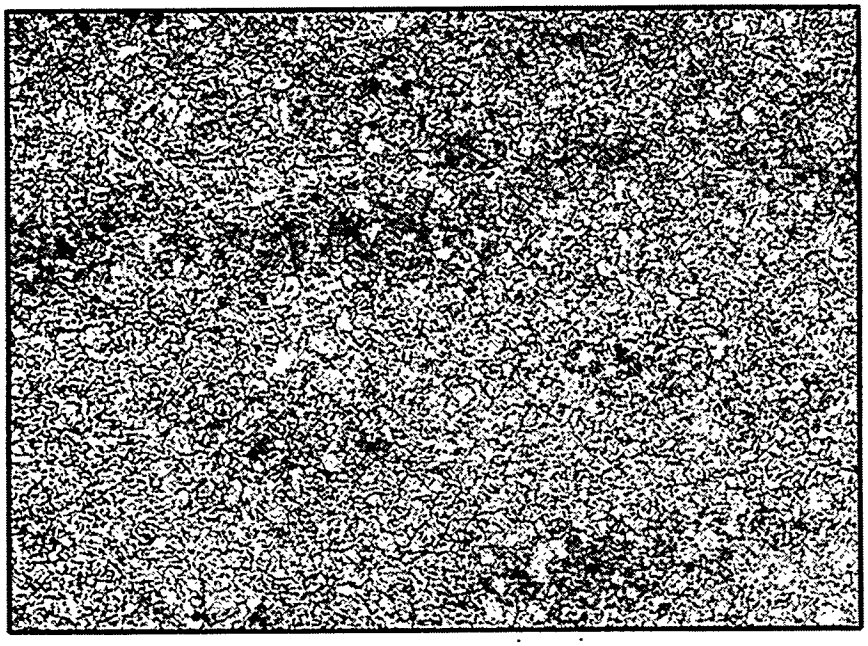


Transverse to RD
100×, Polished Only
Spec. Code: Z4-13

Material Code Z4:
Polished and Etched 2% Nital



Longitudinal Rolling Direction →
100×, 2% Nital Etch
Spec. Code: Z4-16

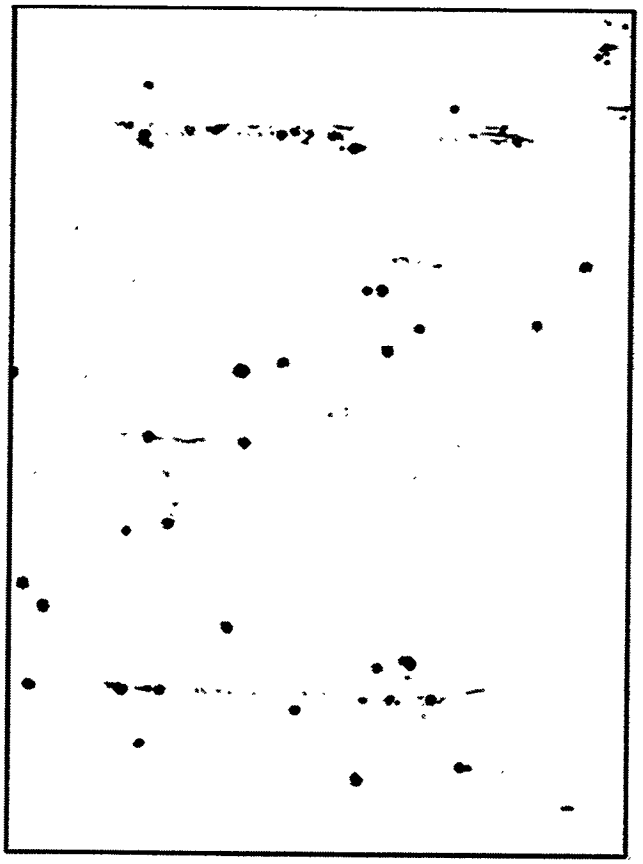


Transverse to RD
100×, 2% Nital Etch
Spec. Code: Z4-13

Material Code Z5:
Inclusions and Sulfide Stringers

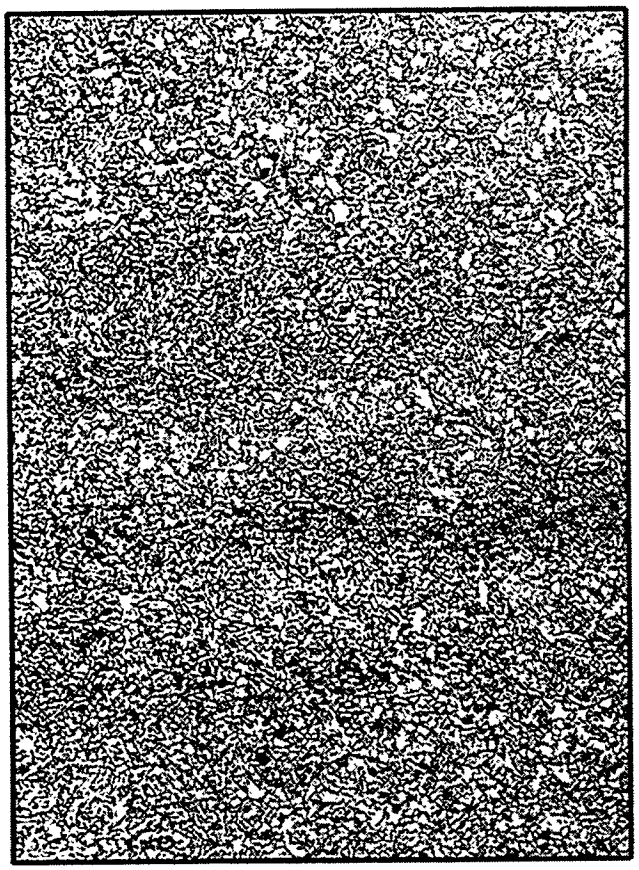


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z5-27



Transverse to RD
100×, Polished Only
Spec. Code: Z5-7

Material Code Z5:
Polished and Etched, 2% Nital



Longitudinal Rolling Direction →
100×, 2% Nital Etch
Spec. Code: Z5-27

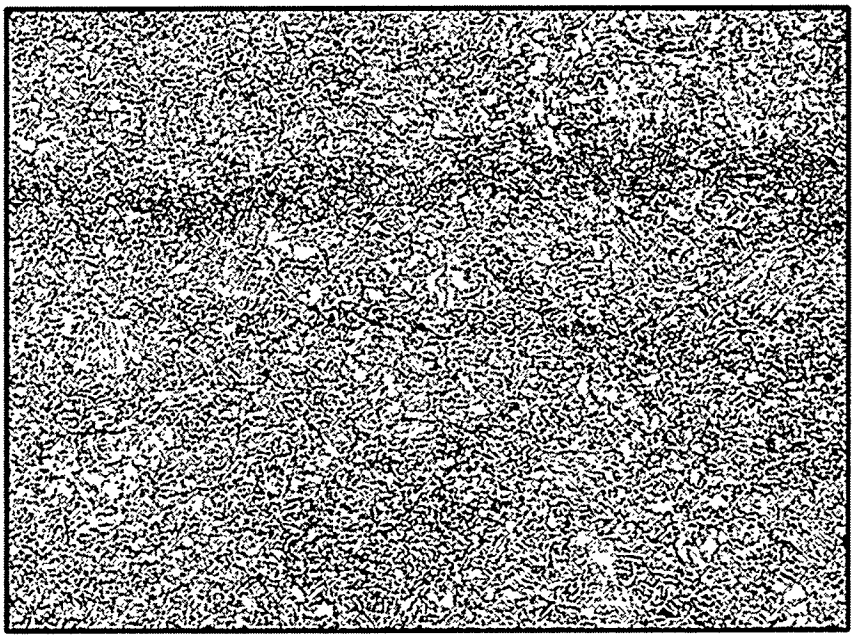


Transverse to RD
100×, 2% Nital Etch
Spec. Code: Z5-7

Material Code Z6A:
Inclusions and Sulfide Stringers, Top
Polished and Etched, 2% Nital, Bottom

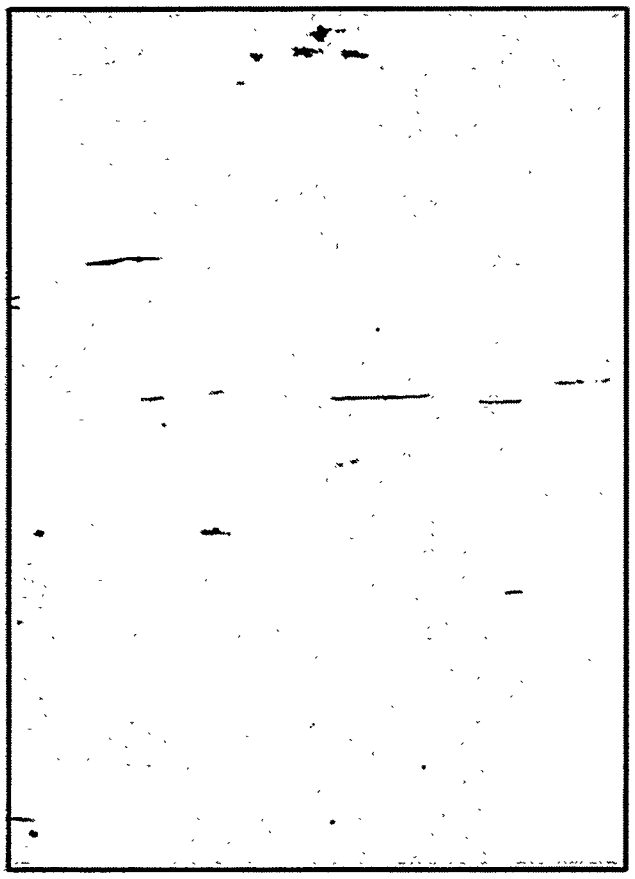


Transverse to RD
100×, Polished Only
Spec. Code: Z6A-7

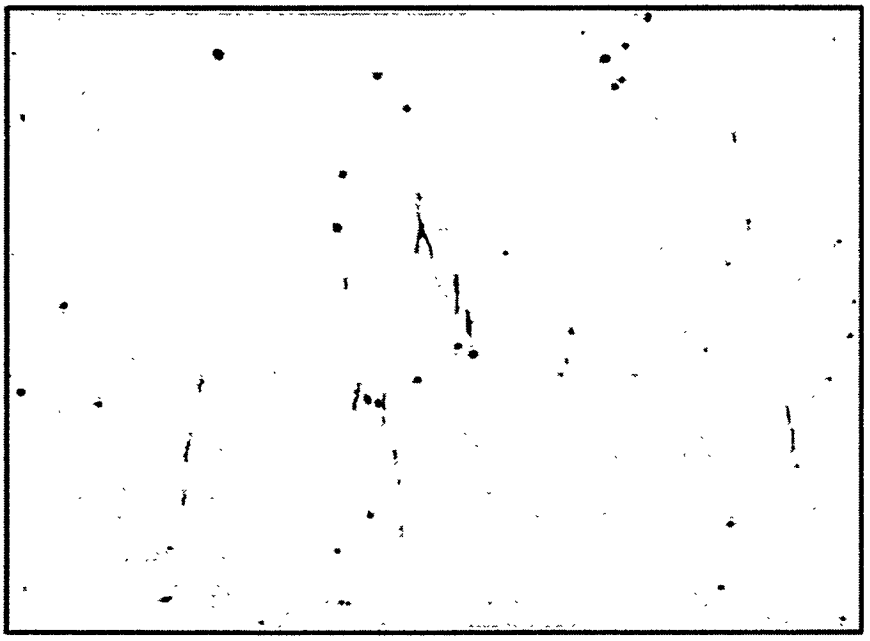


Transverse to RD
100×, 2% Nital Etch
Spec. Code: Z6A-7

Material Code Z6B:
Inclusions and Sulfide Stringers
Note Orientation Error

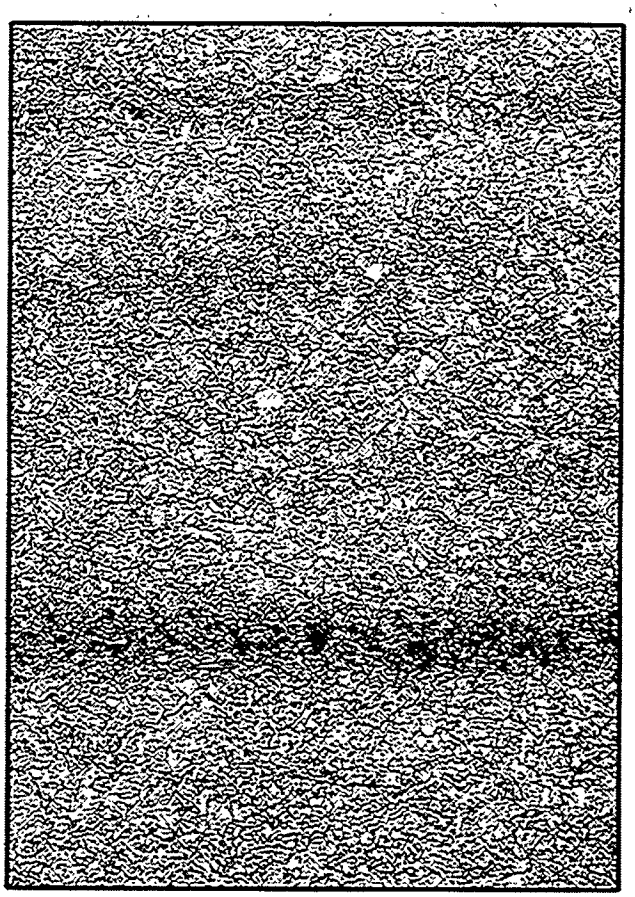


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z6B-16

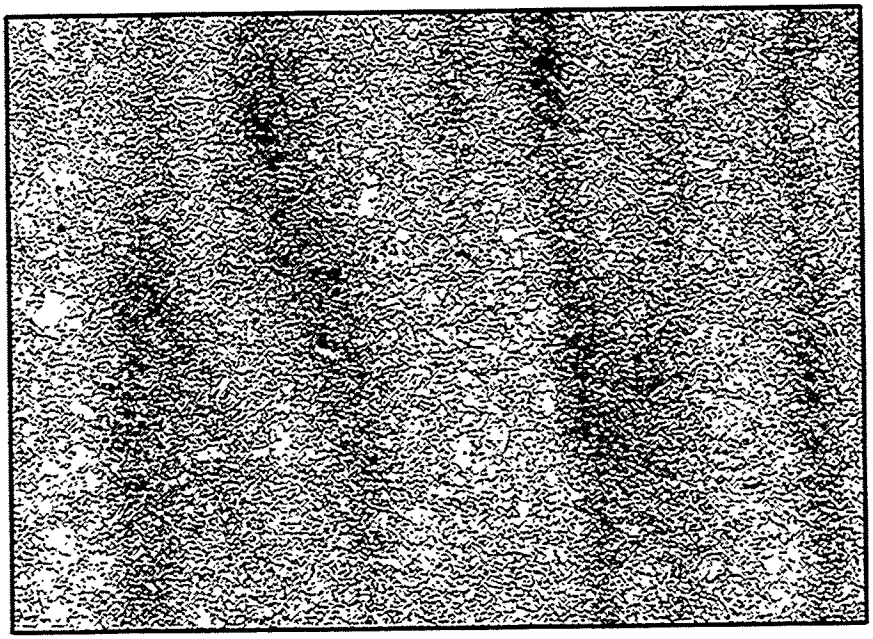


Transverse to RD
100×, Polished Only
Spec. Code: Z6B-7

Material Code Z6B:
Polished and Etched 2% Nital
Note Orientation Error

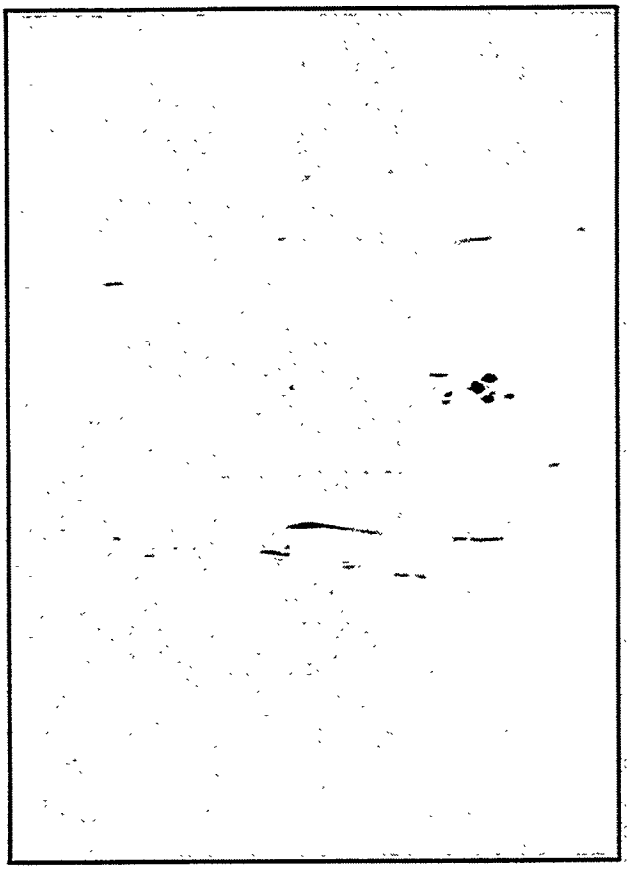


Longitudinal Rolling Direction →
100×, Polished and Etched
Spec. Code: Z6B-16



Transverse to RD
100×, Polished and Etched
Spec. Code: Z6B-7

Material Code Z7:
Inclusions and Sulfide Stringers

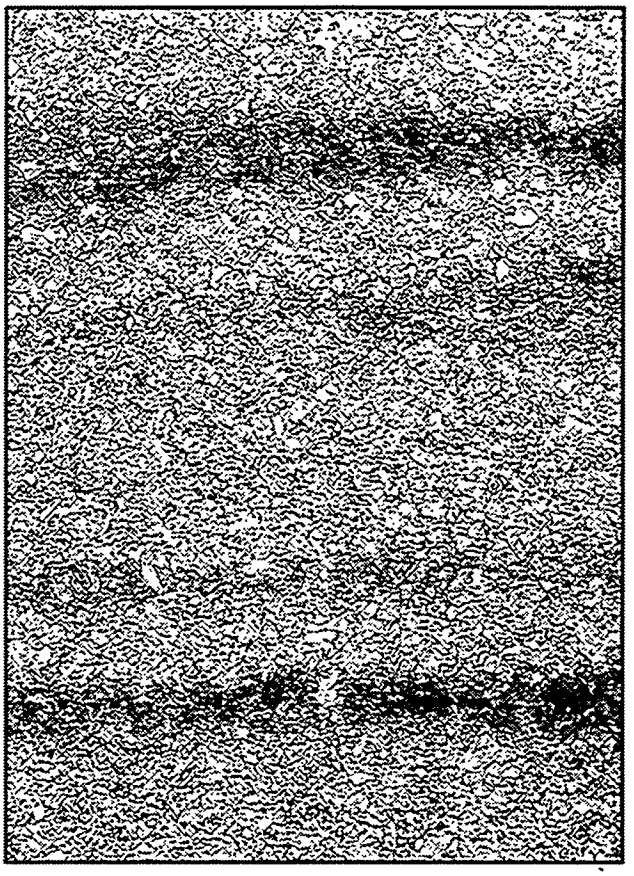


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z7-18

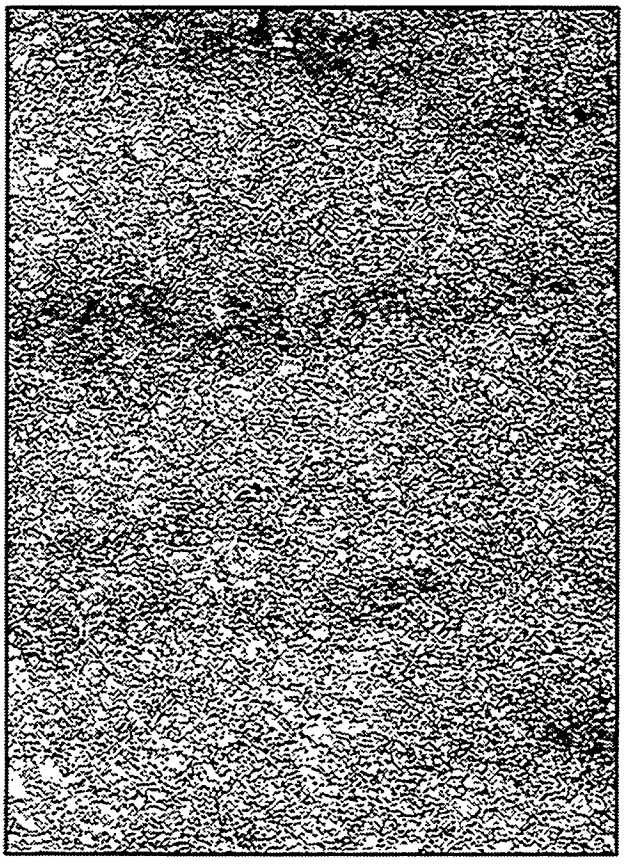


Transverse to RD
100×, Polished Only
Spec. Code: Z7-5

Material Code Z7:
Polished and Etched, 2% Nital
Banding in Longitudinal and Transverse Directions

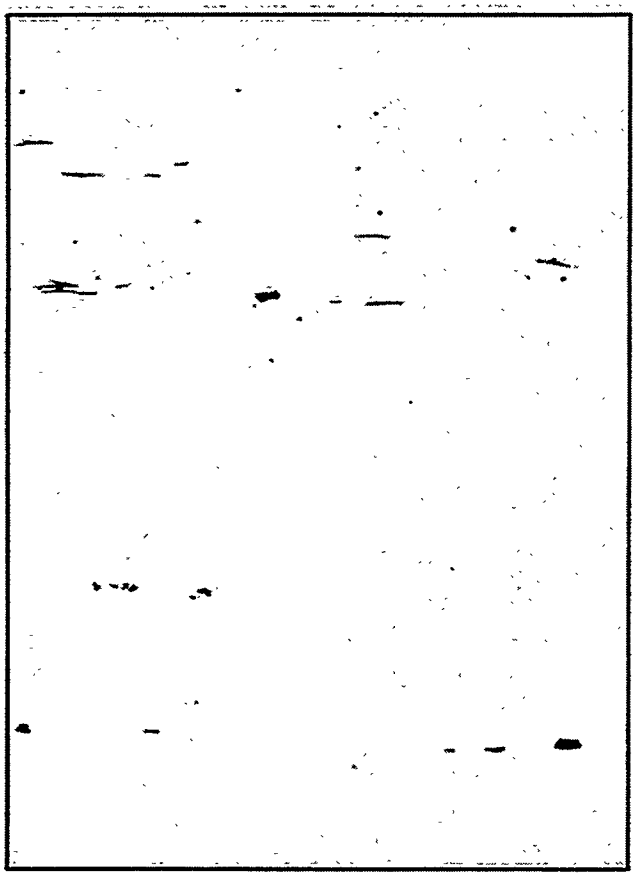


Longitudinal Rolling Direction →
100×, 2% Nital Etch
Spec. Code: Z7-18

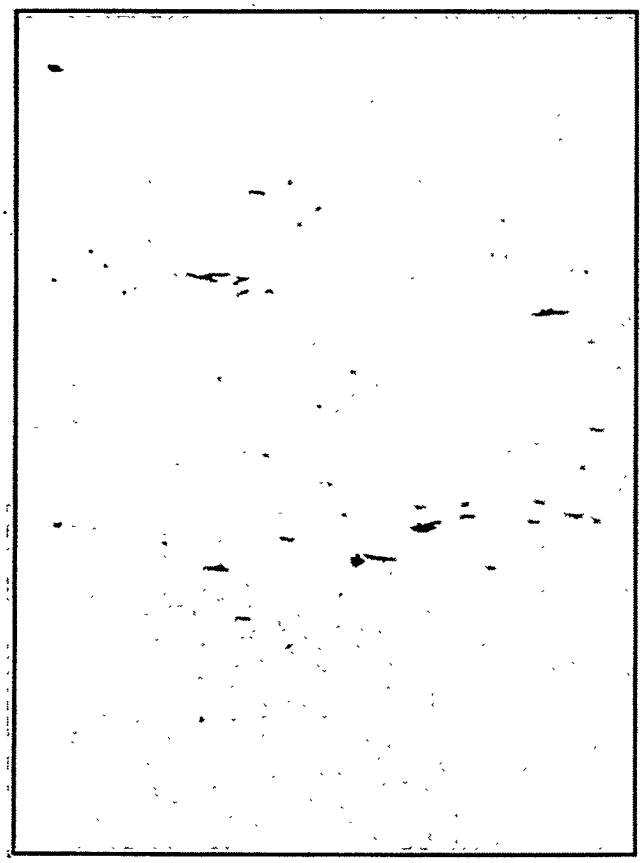


Transverse to RD
100×, 2% Nital Etch
Spec. Code: Z7-5

Material Code Z8:
Inclusions and Sulfide Stringers

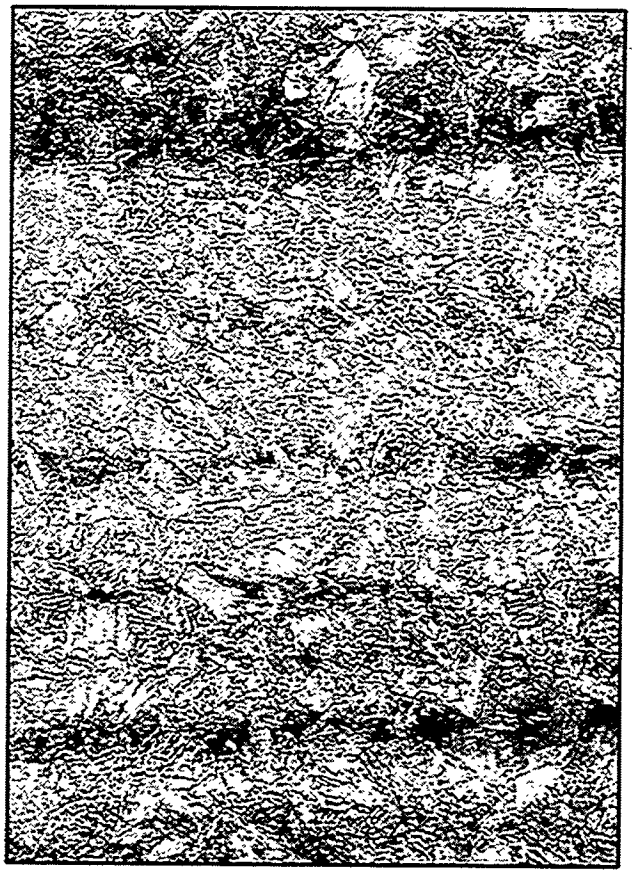


Longitudinal Rolling Direction →
100×, Polished Only
Spec. Code: Z8-34

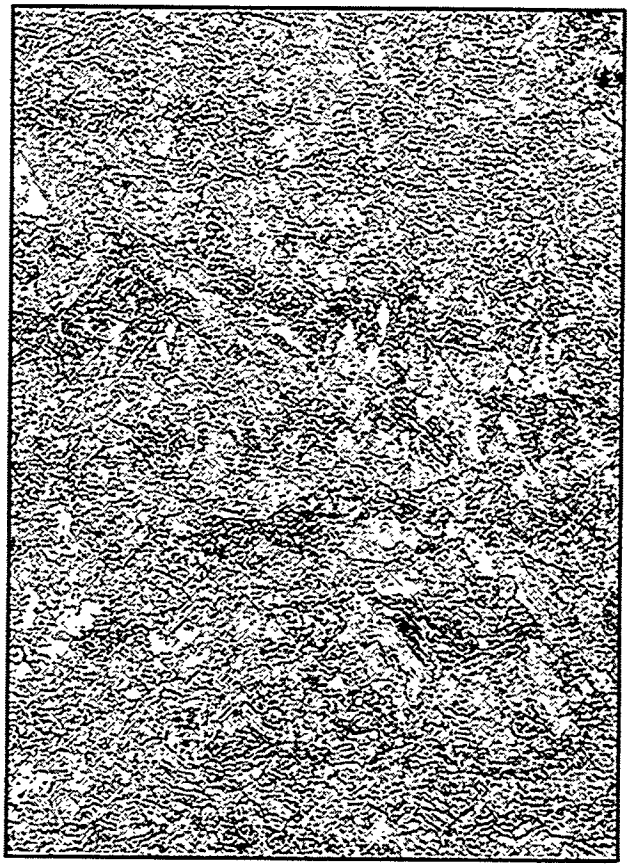


Transverse to RD
100×, Polished Only
Spec. Code: Z8-20

Material Code Z8:
Polished and 2% Nital Etched
Severe Banding in Rolling Direction



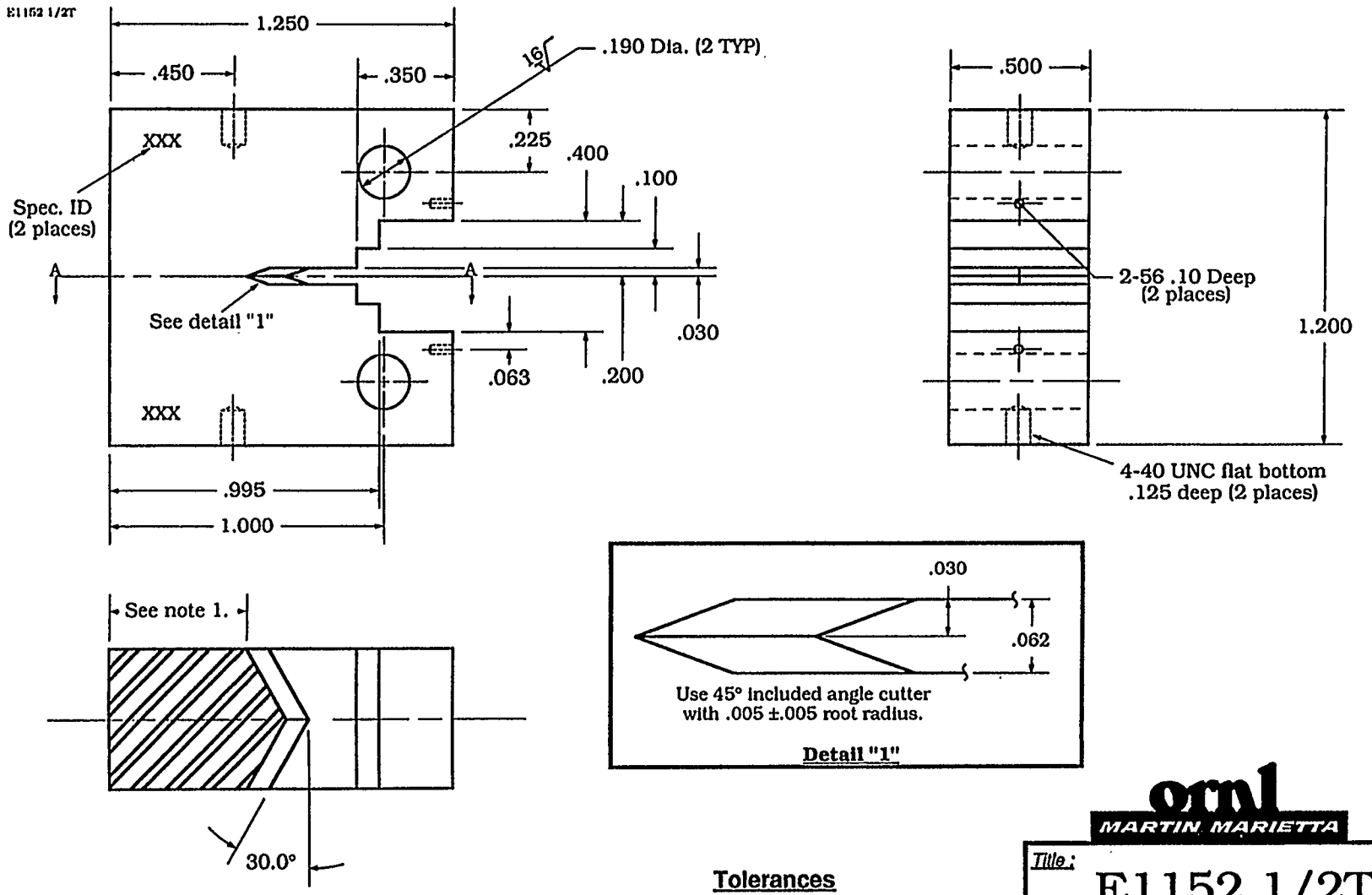
Longitudinal Rolling Direction →
100×, Polished and Etched
Spec. Code: Z8-34



Transverse to RD
100×, Polished and Etched
Spec. Code: Z8-20

Appendix D

J-R Curves Determined Using Compliance Methods (Deformation Theory J, ASTM Standard 1152-87)



Notes:

1. Ligament depth = 0.425 .
2. This specimen designed for use with knife blades 0.400 x 0.010 to be supplied and attached by ORNL.
3. Specimen IDs are as follows:

_____

_____

Tolerances

X.XXX = ±0.005

X.XX = ±0.01

All surfaces should be parallel and perpendicular as appropriate within 0.005". All dimensions in inches. Surface finishes 32√ or better.

ornl MARTIN MARIETTA

Title:	E1152 1/2T
Drawing Number:	FMG 127 r.1
Drawn:	E.T. Manneschmidt
Date:	July 1, 1993
QAS Approved:	

Figure D1. 1/2TC(T) compact specimen.

Table D1. Test matrix of 1/2TC(T) specimens

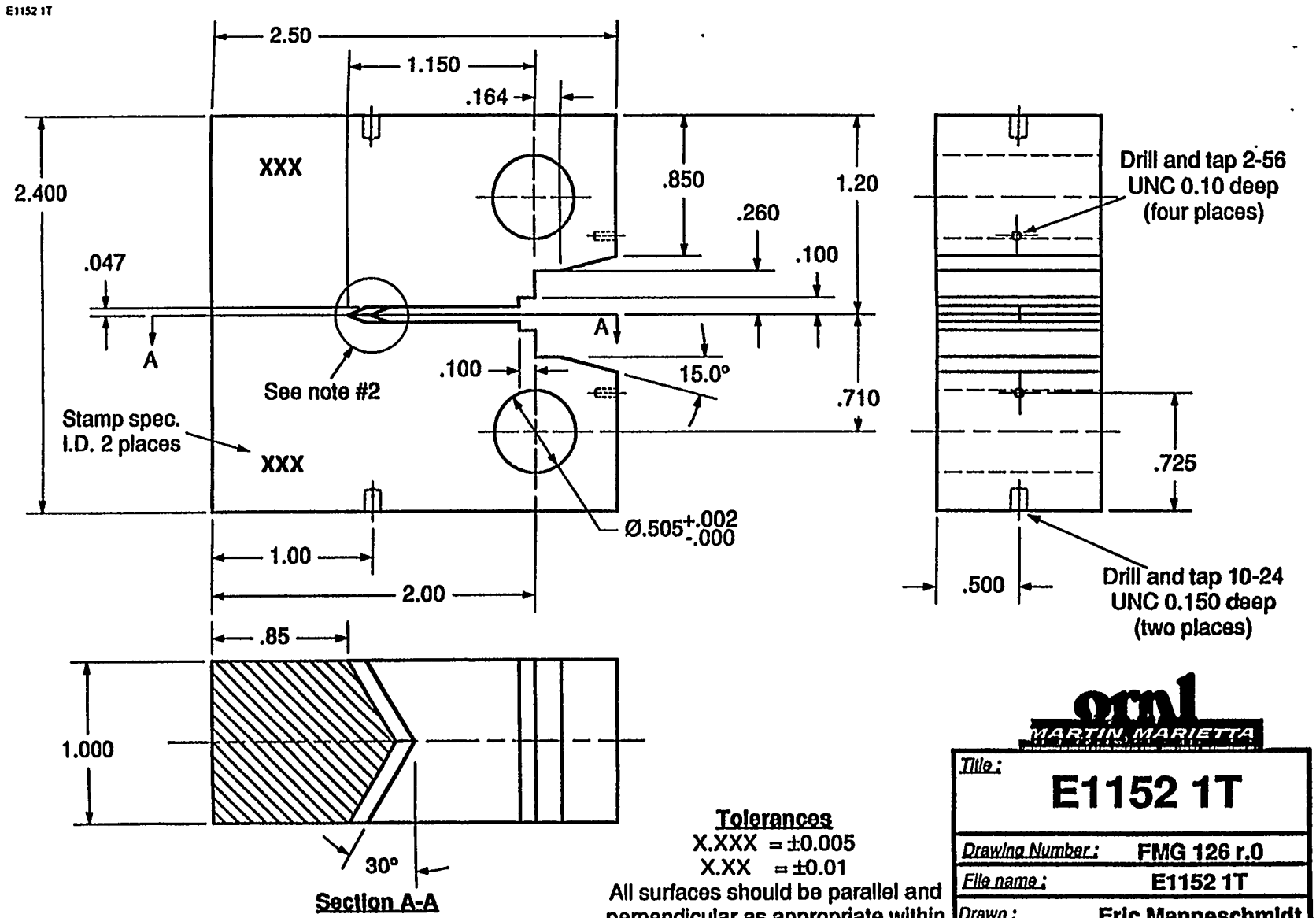
A302-B TESTS, 1/2T COMPACT SPECIMENS

Code	Orientation T-L	Temp °F	Tested Codes	Orientation L-S	Temp °F	Tested Codes	Orientation L-T	Temp °F	Tested Codes
Z2	9-16	180	Z2B10	1-8	180	Z2B1		180	
		180	Z2B9		180	Z2B2		180	
		400	Z2B12		400	Z2B3		400	
		400	Z2B11		400	Z2B4		400	
		550	Z2B13		550	Z2B5		550	
		550	Z2B14		550	Z2B6		550	
Z3	9-16	180	Z310	1-8	180	Z32		180	
		180	Z314		180	Z34		180	
		400	Z311		400	Z31		400	
		400	Z313		400	Z35		400	
		550	Z39		550	Z33		550	
		550	Z312		550	Z38		550	
Z4	9-16	180	Z49	1-8	180	Z41		180	
		180	Z410		180	Z44		180	
		400	Z413		400	Z42		400	
		400	Z416		400	Z48		400	
		550	Z412		550	Z43		550	
		550	Z414		550	Z47		550	
Z5	9-16	180	Z59	1-8	180	Z51		180	
		180	Z510		180	Z57		180	
		400	Z511		400	Z52		400	
		400	Z514		400	Z56		400	
		550	Z512		550	Z54		550	
		550	Z513		550	Z58		550	
Z6A	9-16	180	Z6A11	1-8	180	Z6A3		180	
		180	Z6A13		180	Z6A4		180	
		400	Z6A12		400	Z6A2		400	
		400	Z6A16		400	Z6A8		400	
		550	Z6A10		550	Z6A6		550	
		550	Z6A15		550	Z6A7		550	

Table D1. (Continued)

A302-B TESTS, 1/2T COMPACT SPECIMENS

Code	Orientation T-L	Temp °F	Tested Codes	Orientation L-S	Temp °F	Tested Codes	Orientation L-T	Temp °F	Tested Codes
Z6B	9-16	180	Z6B9	1-8	180	Z6B7		180	
		180	Z6B10		180	Z6B8		180	
		400	Z6B11		400	Z6B5		400	
		400	Z6B12		400	Z6B6		400	
		550	Z6B14		550	Z6B1		550	
		550	Z6B16		550	Z6B3		550	
Z7	9-16	180	Z710	1-8	180	Z72		180	
		180	Z79		180	Z71		180	
		400	Z711		400	Z75		400	
		400	Z712		400	Z73		400	
		550	Z713		550	Z77		550	
		550	Z714		550	Z78		550	
Z8	1-8	180	Z83	9-16	180	Z813		180	
		180	Z85		180	Z816		180	
		400	Z84		400	Z811		400	
		400	Z87		400	Z814		400	
		550	Z81		550	Z89		550	
		550	Z88		550	Z810		550	



Tolerances
X.XXX = ±0.005
X.XX = ±0.01
All surfaces should be parallel and perpendicular as appropriate within 0.005". All dimensions in inches. Surface finishes $\sqrt{32}$ or better.

Notes:
1. Break all edges.
2. Use 45° included angle cutter with radius of .003 or less.

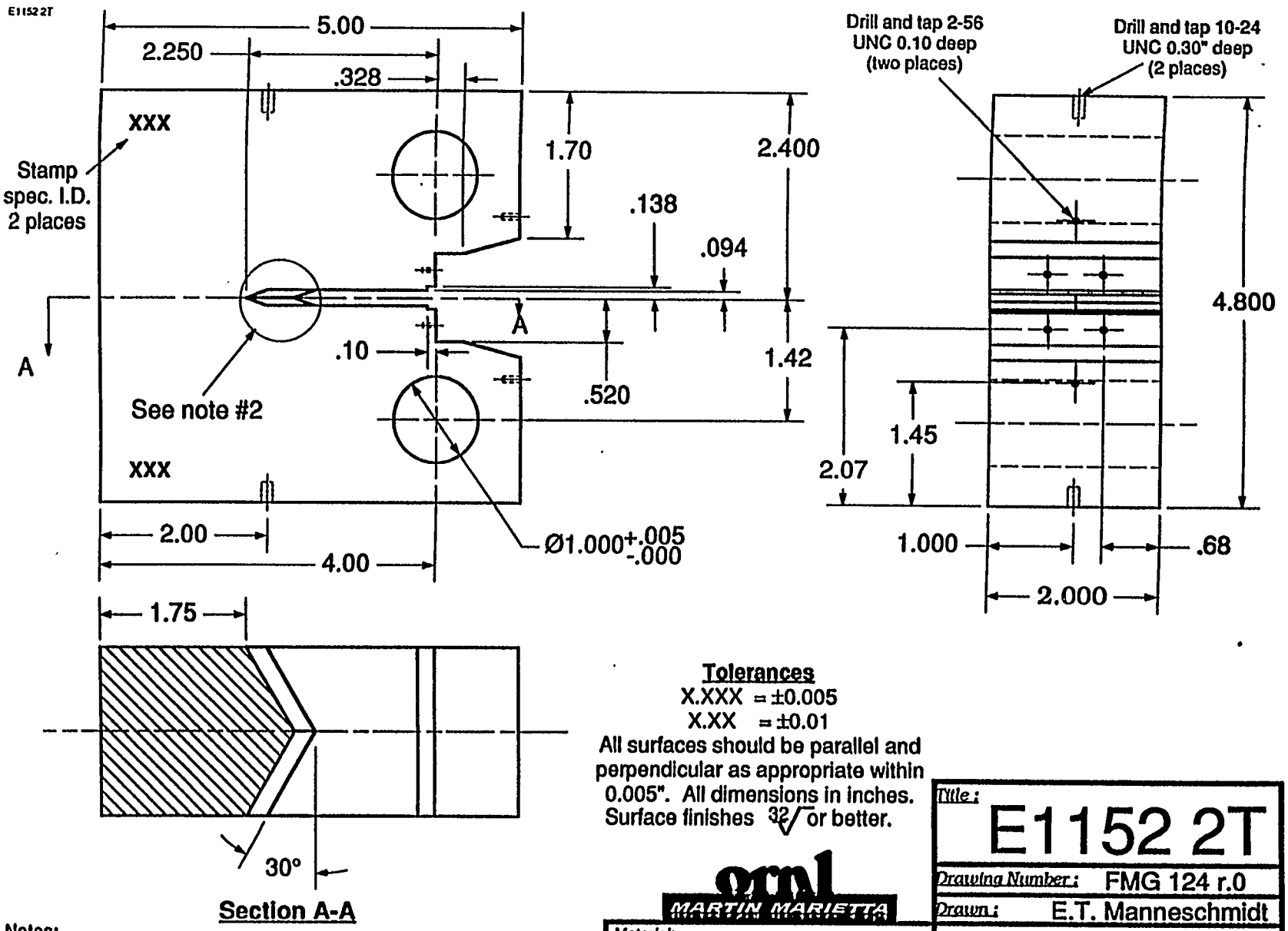
Title:	**E1152 1T**
Drawing Number:	FMG 126 r.0
File name:	E1152 1T
Drawn:	Eric Manneschmidt
Date:	June 30, 1993
QAS Approved:	

Figure D2. 1TC(T) compact specimens.

Table D2. Test matrix of 1TC(T) specimens

A302-B TESTS, 1T COMPACT SPECIMENS

Code	Orientation T-L	Temp °F	Tested Codes	Orientation L-S	Temp °F	Tested Codes	Orientation L-T	Temp °F	Tested Codes
Z2	B1-B8	180	Z2B2				B9-B16	180	Z2B14
		180	Z2B5					180	Z2B16
		400	Z2B03					400	Z2B09
		400	Z2B4					400	Z2B11
		550	Z2B6					550	Z2B10
		550	Z2B7					550	Z2B12
Z3	5-8	180	235				1-4	180	Z32
		180	237					180	Z34
		550	238					550	Z31
								550	Z33
Z5							1-4	180	Z501
								180	Z502
								550	Z503
								550	Z504
Z6A	5-8	180	Z6A7				1-4	180	Z6A1
		180	Z6A8					180	Z6A4
		550	Z6A5					550	Z6A3
		550	Z6A6					550	Z6A2
Z6B	5-8	180	Z6B5				1-4	180	Z6B4
		180	Z6B8					180	Z6B1
		550	Z6B6					550	Z6B2
		550	Z6B7					550	Z6B3
Z7	9-16	180	Z79				1-8	180	Z78
		180	Z711					180	Z72
		400	Z714					400	Z74
		400	Z712					400	Z73
		550	Z710					550	Z71
		550	Z715					550	Z77



Tolerances
X.XXX = ±0.005
X.XX = ±0.01
All surfaces should be parallel and perpendicular as appropriate within 0.005". All dimensions in inches. Surface finishes $\sqrt{32}$ or better.

ornl MARTIN MARIETTA

Material: A302 B Steel	Title: E1152 2T
	Drawing Number: FMG 124 r.0
	Drawn: E.T. Manneschmidt
	Date: June 29, 1993
	QAS Approved:

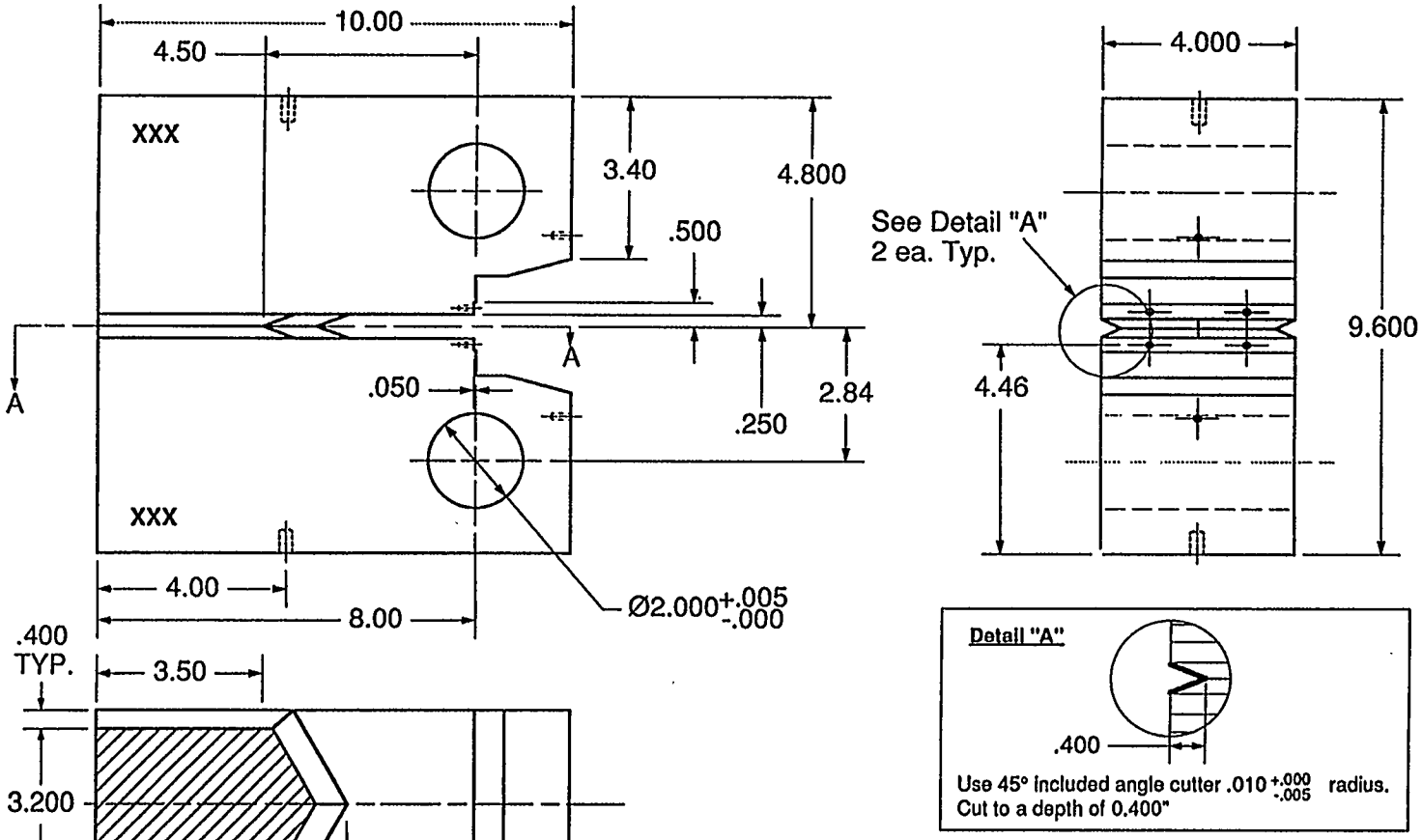
Notes:
1. Break all edges.
2. Use 45° included angle cutter with radius of .003 or less.

Figure D3. 2TC(T) compact specimens.

Table D3. Test matrix of 2TC(T) specimens

A302-B TESTS, 2T COMPACT SPECIMENS

Code	Orientation T-L	Temp °F	Tested Codes	Orientation L-S	Temp °F	Tested Codes	Orientation L-T	Temp °F	Tested Codes
Z1	3-4	550	Z13 CL				1-2	550	Z11
		550	Z14 CL					550	Z12
Z2A	A1	180	Z2A1 CL		180	Z2B7			
Z2B	B1-B3	180	Z2B1 CL	B4-B7	180	Z2B4			
		400	Z2B2 CL		400	Z2B5			
		400	Z2B3 CL		400	Z2B6			
Z3	5-8	180	Z36 CL				3-4		
		180	Z37 CL	1-2	180	Z32		180	Z33
		550	Z38 CL		550	Z31		550	Z34
		550	Z35 CL						
Z4	1-4	180	Z43 CL	5-8	180	Z45			
		180	Z41 CL		180	Z47			
		550	Z44 CL		550	Z46			
		550	Z42 CL		550	Z48			
Z5	5-8	180	Z55 D-CL	1-4	180	Z51			
		180	Z58 CL		180	Z53			
		550	Z57 D-CL		180	Z54			
		550	Z56 CL		550	Z52			
Z6A	1-4	180	Z6A4	5-8	180	Z6A5			
		180	Z6A1 CL		180	Z6A6			
		550	Z6A2 CL		550	Z6A7			
		550	MISSING		550	Z6A8			
Z6B	1-4	180	Z6B2 CL						
		180	Z6B4 CL	5-6	180	Z6B5	7-8	180	Z6B7
		550	Z6B3 CL		550	Z6B6		550	Z6B8
		550	Z6B1 CL						
Z7	7-10	180	Z77 CL	11-14	180	Z711	1-6	180	Z71
	15	180	Z78 CL		180	Z712		180	Z72
		400	Z79 CL		550	Z713		400	Z73
		550	Z710 CL		550	Z714		400	Z76
		550	Z715 CL					550	Z75
								400	Z74
Z8	1-4	180	Z83 CL	5-8	180	Z86			
		180	Z82 CL		180	Z87			
		550	Z81		550	Z88			
		550	Z84 CL		550	Z85			



Notes:

1. Center each notch on existing 30° chevron notch.

Tolerances

X.XXX = ±0.005
X.XX = ±0.01
All surfaces should be parallel and perpendicular as appropriate within 0.002". All dimensions in inches.

Material: A302 B Low Alloy Steel

Title:	Sidegrooving of J Type 4T Compact Specimen
Drawing Number:	4T45010SG
File name:	4T Sidegrooving
Drawn:	J. J. Henry
Date:	October 26, 1993
Upgrade date:	

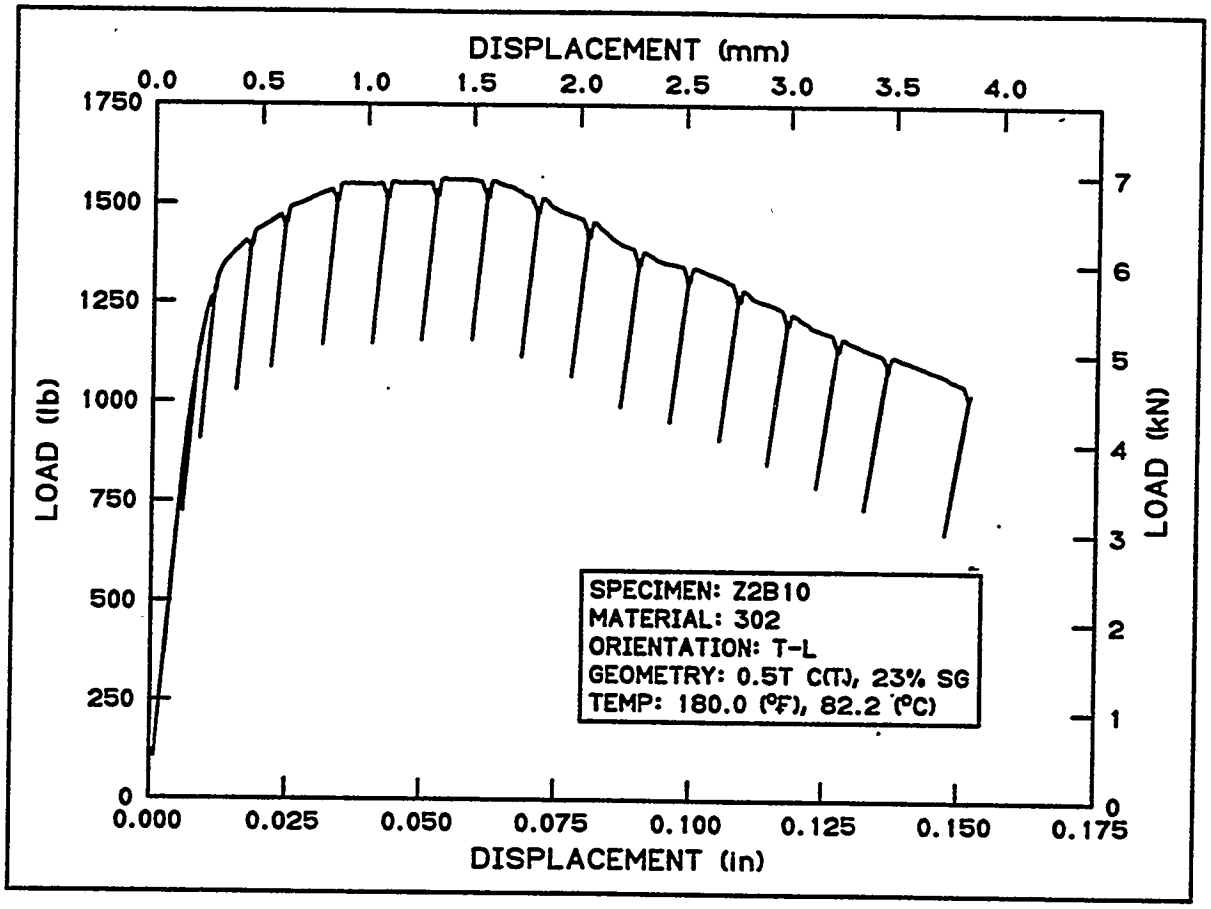
ornl MARTIN MARIETTA

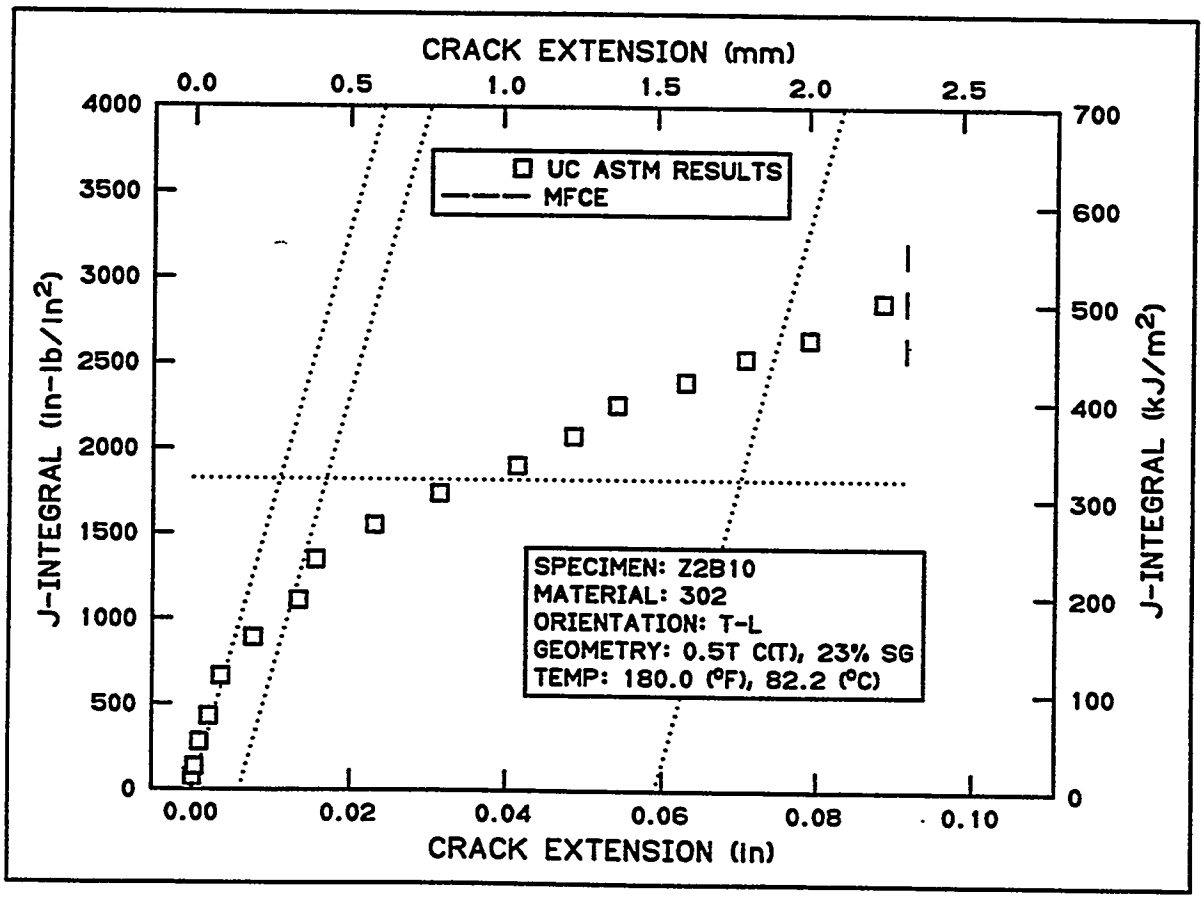
Figure D4. 4TC(T) compact specimens.

SPECIMEN
  IDENTIFICATION: Z2B10
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 23 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6684 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1041	0.0075	0.0000	73.5
2	1256	0.0106	0.0003	135.8
3	1404	0.0168	0.0009	280.0
4	1470	0.0232	0.0021	429.8
5	1534	0.0326	0.0036	665.2
6	1550	0.0420	0.0076	892.5
7	1552	0.0512	0.0134	1112.1
8	1557	0.0604	0.0156	1351.9
9	1518	0.0698	0.0230	1556.0
10	1462	0.0793	0.0314	1744.4
11	1387	0.0887	0.0414	1907.4
12	1343	0.0980	0.0485	2081.2
13	1301	0.1073	0.0541	2263.8
14	1234	0.1168	0.0629	2400.1
15	1173	0.1262	0.0706	2535.5
16	1121	0.1356	0.0789	2649.2
17	1046	0.1506	0.0884	2867.0

  WIDTH: 1.0001 (IN),25.403 (MM)
  THICKNESS: 0.5004 (IN),12.710 (MM)
  SIDE GROOVE RATIO: 23.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2496 (IN),6.340 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8952 (IN),22.738 (MM)
    DISTANCE 2: 0.9086 (IN),23.078 (MM)
    DISTANCE 3: 0.9154 (IN),23.251 (MM)
    DISTANCE 4: 0.9149 (IN),23.238 (MM)
    DISTANCE 5: 0.9234 (IN),23.454 (MM)
    DISTANCE 6: 0.9238 (IN),23.465 (MM)
    DISTANCE 7: 0.9248 (IN),23.490 (MM)
    DISTANCE 8: 0.9248 (IN),23.490 (MM)
    DISTANCE 9: 0.9206 (IN),23.383 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0104 (IN),25.664 (MM)
    DISTANCE 2: 1.0144 (IN),25.766 (MM)
    DISTANCE 3: 1.0140 (IN),25.756 (MM)
    DISTANCE 4: 1.0043 (IN),25.509 (MM)
    DISTANCE 5: 0.9839 (IN),24.991 (MM)
    DISTANCE 6: 1.0080 (IN),25.603 (MM)
    DISTANCE 7: 1.0078 (IN),25.598 (MM)
    DISTANCE 8: 1.0254 (IN),26.045 (MM)
    DISTANCE 9: 1.0230 (IN),25.984 (MM)

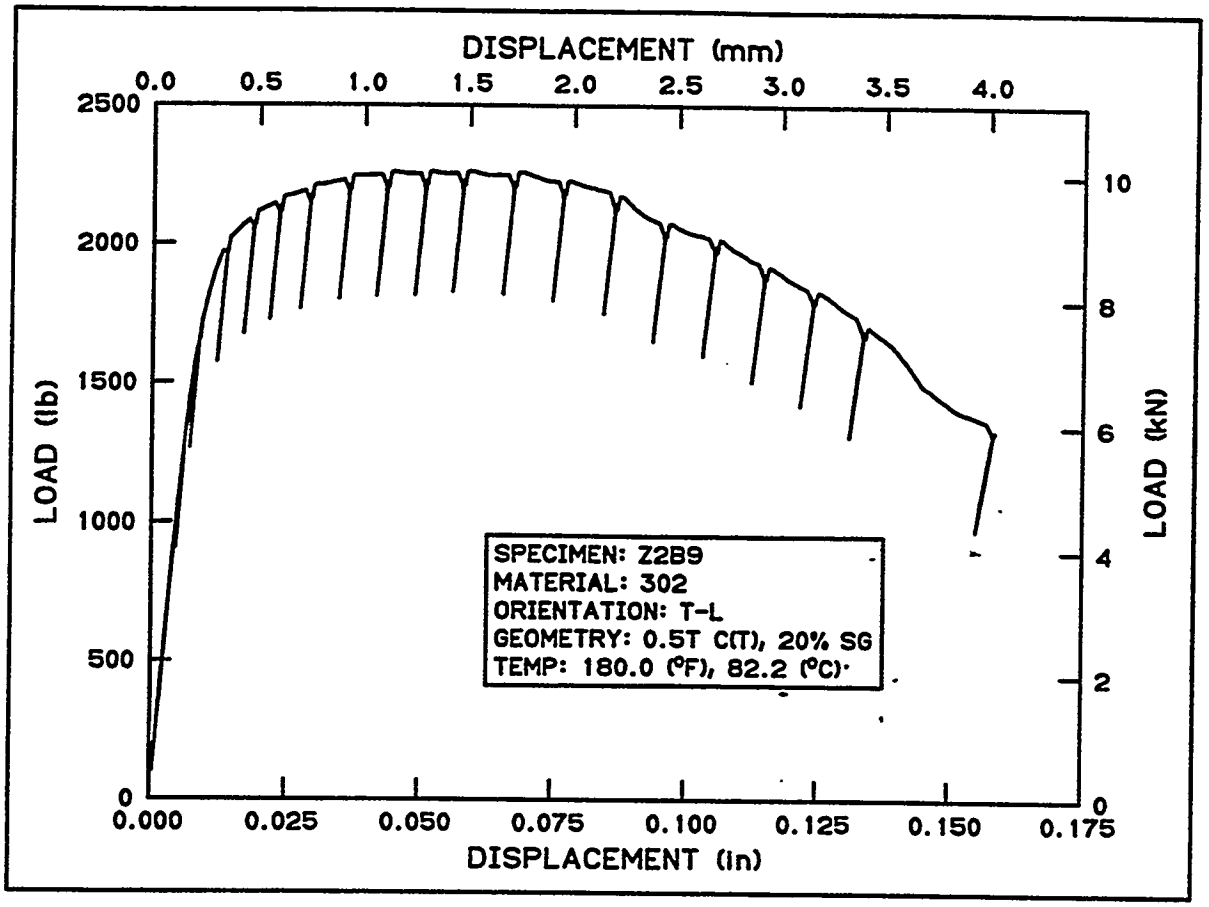

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
7
6
5
4
3
2
1
0
SPECIMEN: Z2B10
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 23% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

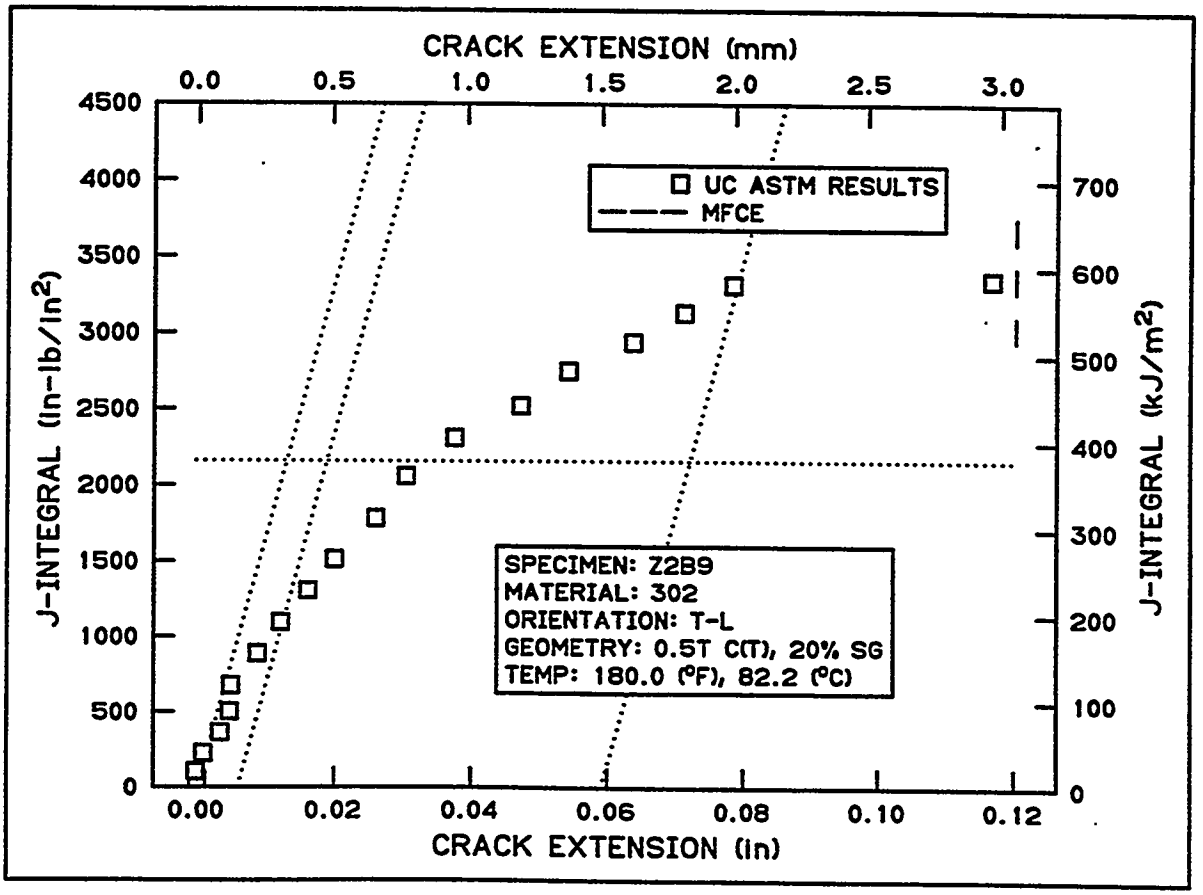

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
UC ASTM RESULTS
MFCE
SPECIMEN: Z2B10
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 23% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B9
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6073 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1244	0.0059	0.0000	53.9
2	1618	0.0083	-0.0002	104.7
3	1970	0.0129	0.0009	227.6
4	2084	0.0177	0.0033	364.5
5	2144	0.0225	0.0047	502.8
6	2191	0.0282	0.0049	676.2
7	2230	0.0355	0.0088	888.1
8	2249	0.0425	0.0122	1096.3
9	2253	0.0496	0.0162	1307.5
10	2255	0.0566	0.0200	1515.1
11	2250	0.0661	0.0261	1783.9
12	2225	0.0757	0.0305	2062.0
13	2187	0.0852	0.0376	2315.4
14	2079	0.0946	0.0472	2526.3
15	2025	0.1039	0.0543	2753.9
16	1931	0.1135	0.0636	2944.1
17	1840	0.1228	0.0712	3136.1
18	1740	0.1323	0.0784	3320.4
19	1368	0.1569	0.1167	3352.6

  WIDTH: 1.0001 (IN),25.403 (MM)
  THICKNESS: 0.5004 (IN),12.710 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2502 (IN),6.355 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8446 (IN),21.453 (MM)
    DISTANCE 2: 0.8534 (IN),21.676 (MM)
    DISTANCE 3: 0.8550 (IN),21.717 (MM)
    DISTANCE 4: 0.8620 (IN),21.895 (MM)
    DISTANCE 5: 0.8624 (IN),21.905 (MM)
    DISTANCE 6: 0.8619 (IN),21.892 (MM)
    DISTANCE 7: 0.8622 (IN),21.900 (MM)
    DISTANCE 8: 0.8567 (IN),21.760 (MM)
    DISTANCE 9: 0.8480 (IN),21.539 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9806 (IN),24.907 (MM)
    DISTANCE 2: 0.9765 (IN),24.803 (MM)
    DISTANCE 3: 0.9810 (IN),24.917 (MM)
    DISTANCE 4: 0.9989 (IN),25.372 (MM)
    DISTANCE 5: 0.9742 (IN),24.745 (MM)
    DISTANCE 6: 0.9720 (IN),24.689 (MM)
    DISTANCE 7: 0.9663 (IN),24.544 (MM)
    DISTANCE 8: 0.9759 (IN),24.788 (MM)
    DISTANCE 9: 0.9738 (IN),24.735 (MM)

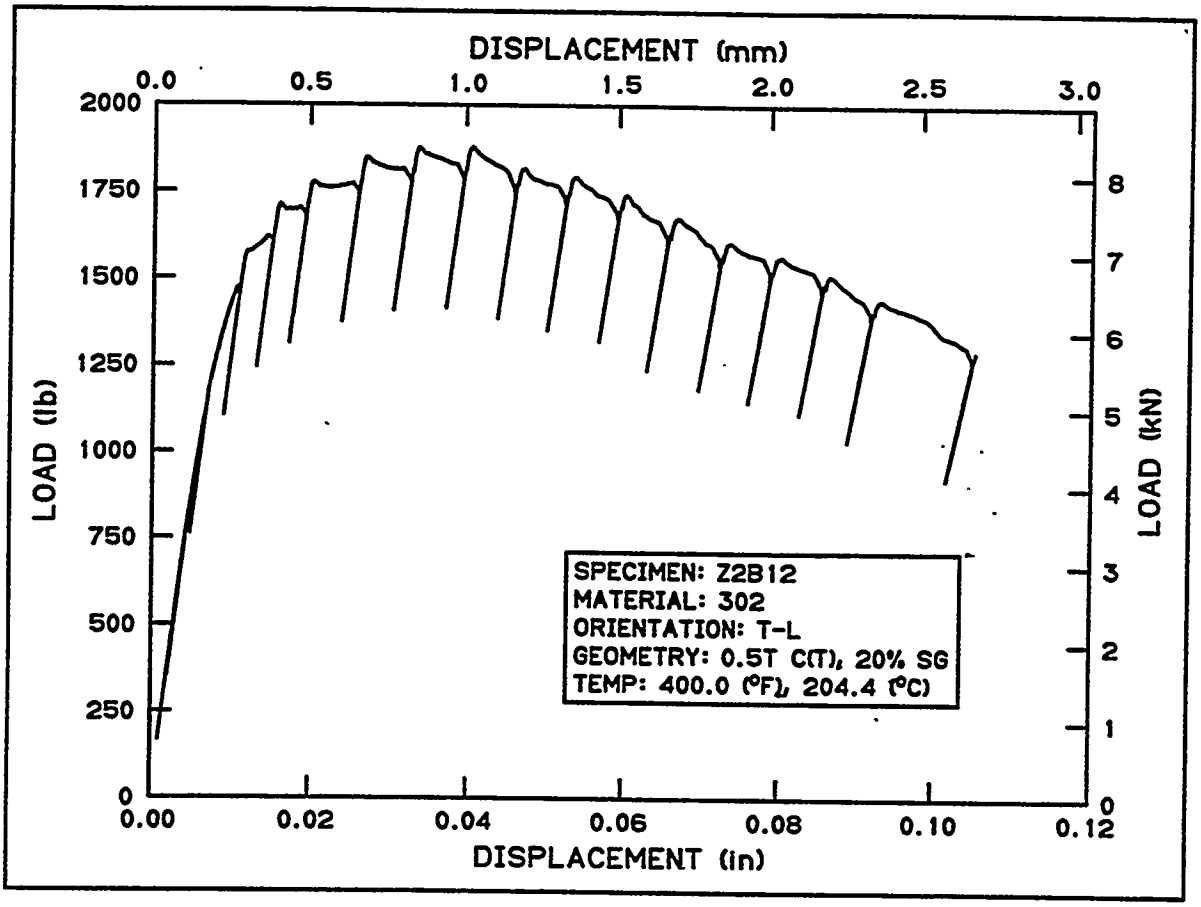

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2500
2000
1500
1000
500
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z2B9
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

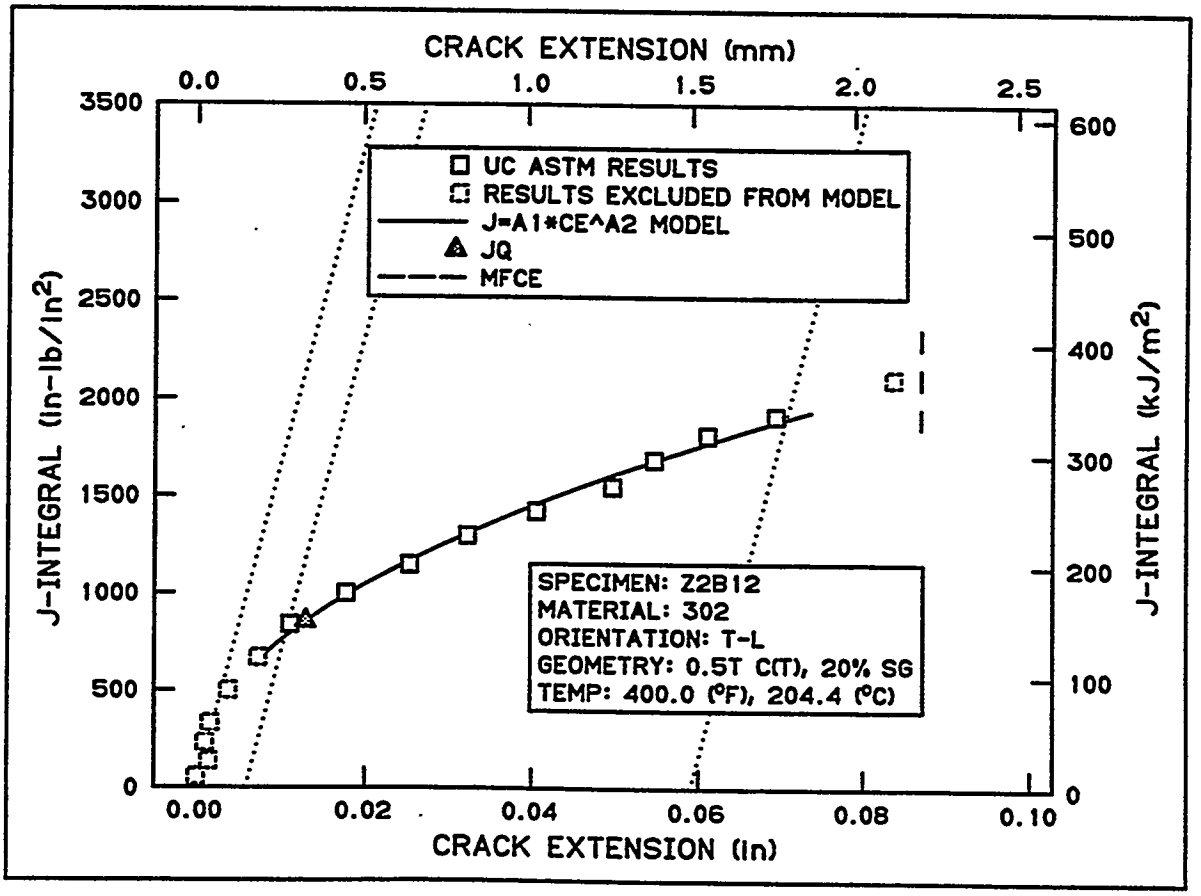

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
MFCE
SPECIMEN: Z2B9
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B12
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6390 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1086	0.0064	0.0000	56.5
2	1470	0.0105	0.0015	136.0
3	1620	0.0144	0.0010	231.1
4	1702	0.0185	0.0017	333.0
5	1773	0.0250	0.0038	500.5
6	1814	0.0315	0.0074	668.9
7	1828	0.0382	0.0112	840.7
8	1805	0.0448	0.0178	1001.6
9	1765	0.0513	0.0253	1150.2
10	1728	0.0578	0.0321	1300.8
11	1666	0.0642	0.0405	1427.0
12	1598	0.0711	0.0497	1551.9
13	1562	0.0777	0.0547	1689.5
14	1523	0.0841	0.0610	1815.6
15	1441	0.0907	0.0693	1915.6
16	1309	0.1040	0.0836	2108.6

  WIDTH: 1.0008 (IN),25.420 (MM)
  THICKNESS: 0.5003 (IN),12.708 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2458 (IN),6.243 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8726 (IN),22.164 (MM)
    DISTANCE 2: 0.8830 (IN),22.428 (MM)
    DISTANCE 3: 0.8868 (IN),22.525 (MM)
    DISTANCE 4: 0.8903 (IN),22.614 (MM)
    DISTANCE 5: 0.8890 (IN),22.581 (MM)
    DISTANCE 6: 0.8886 (IN),22.570 (MM)
    DISTANCE 7: 0.8874 (IN),22.540 (MM)
    DISTANCE 8: 0.8813 (IN),22.385 (MM)
    DISTANCE 9: 0.8710 (IN),22.123 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9724 (IN),24.699 (MM)
    DISTANCE 2: 0.9864 (IN),25.055 (MM)
    DISTANCE 3: 0.9768 (IN),24.811 (MM)
    DISTANCE 4: 0.9678 (IN),24.582 (MM)
    DISTANCE 5: 0.9680 (IN),24.587 (MM)
    DISTANCE 6: 0.9647 (IN),24.503 (MM)
    DISTANCE 7: 0.9595 (IN),24.371 (MM)
    DISTANCE 8: 0.9794 (IN),24.877 (MM)
    DISTANCE 9: 0.9707 (IN),24.656 (MM)

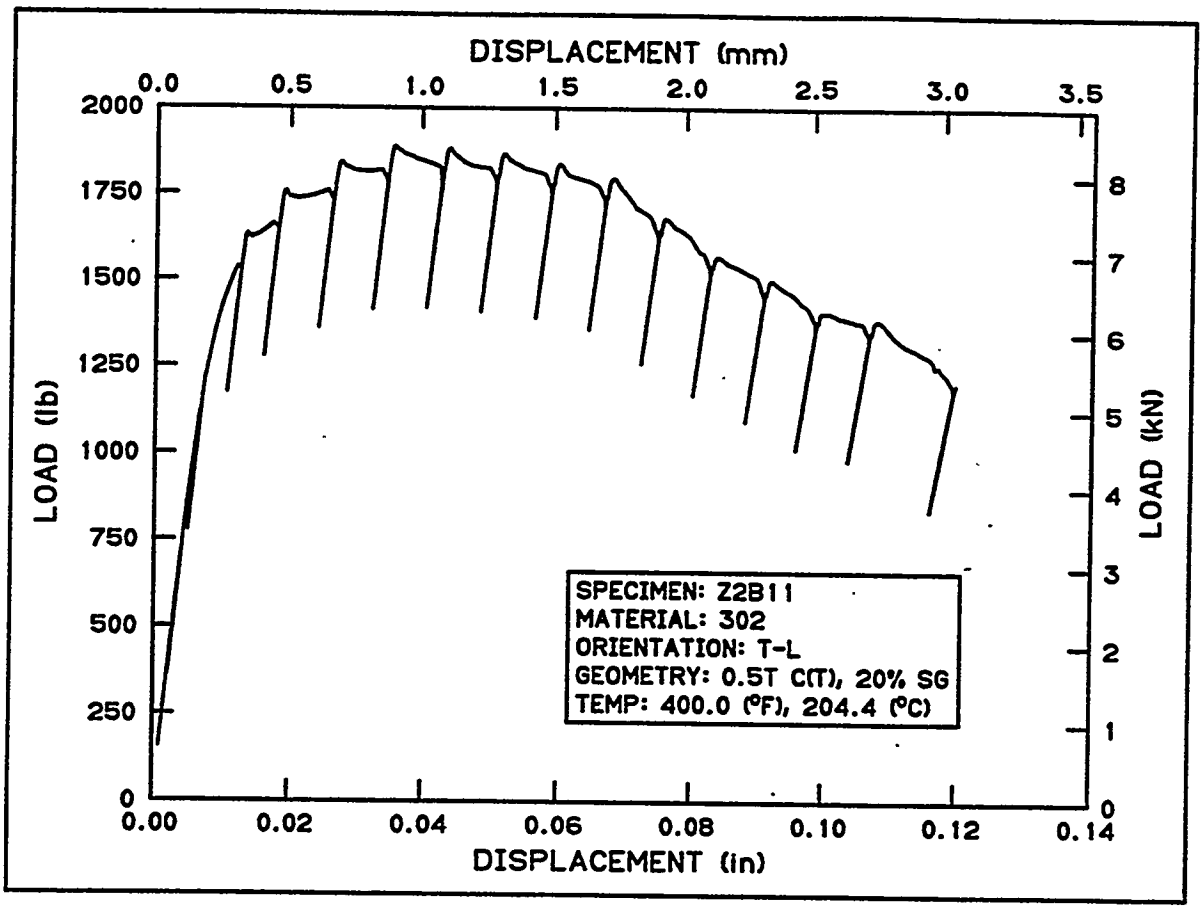

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z2B12
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

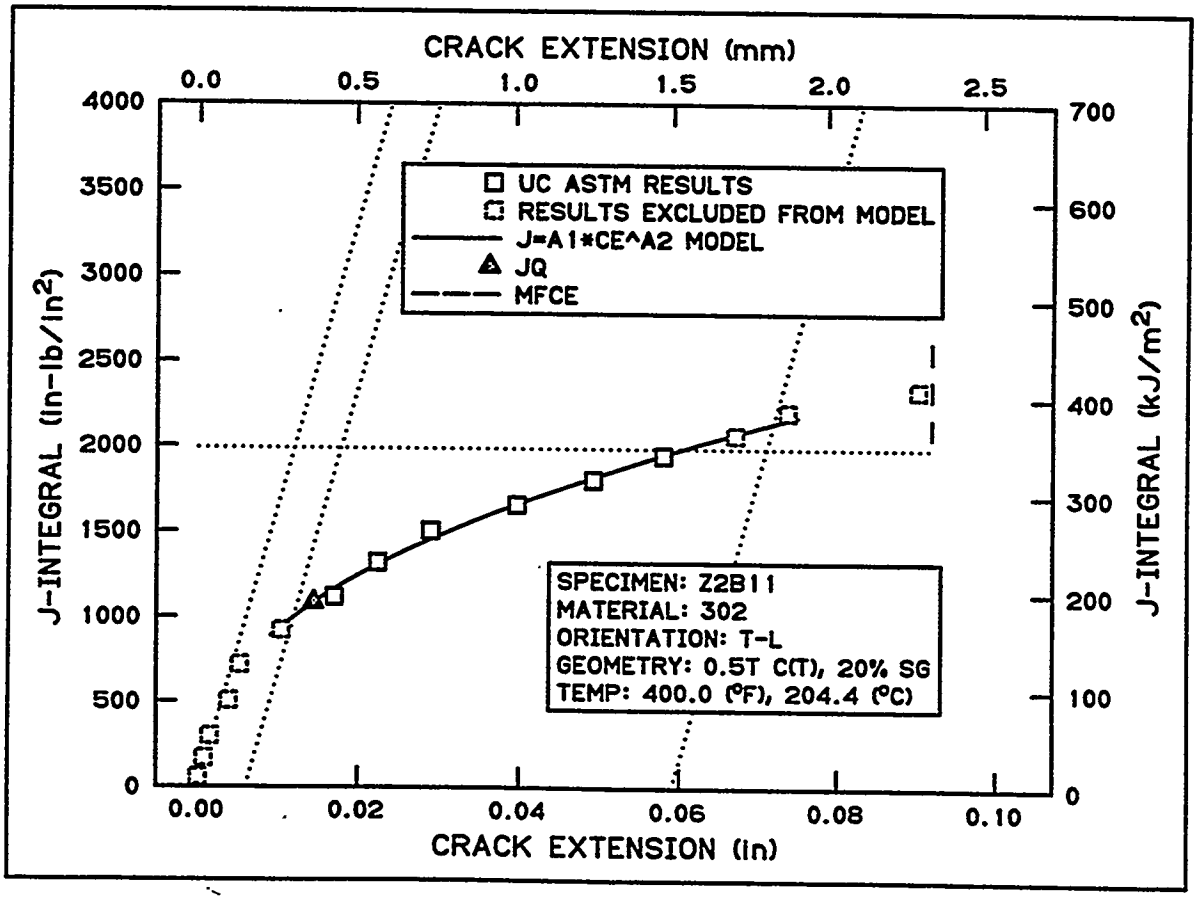

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B12
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
  IDENTIFICATION: Z2B11
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6394 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1098	0.0065	0.0000	58.9
2	1537	0.0120	0.0007	170.6
3	1663	0.0172	0.0015	300.1
4	1758	0.0254	0.0038	507.6
5	1818	0.0334	0.0052	720.0
6	1833	0.0413	0.0103	923.7
7	1823	0.0494	0.0170	1120.4
8	1806	0.0576	0.0225	1322.1
9	1773	0.0655	0.0290	1508.8
10	1684	0.0734	0.0397	1661.3
11	1578	0.0816	0.0491	1807.1
12	1509	0.0897	0.0579	1948.7
13	1421	0.0975	0.0670	2069.1
14	1378	0.1057	0.0737	2205.1
15	1224	0.1185	0.0902	2334.1

  WIDTH: 1.0010 (IN),25.425 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2490 (IN),6.325 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8812 (IN),22.382 (MM)
    DISTANCE 2: 0.8886 (IN),22.570 (MM)
    DISTANCE 3: 0.8924 (IN),22.667 (MM)
    DISTANCE 4: 0.8934 (IN),22.692 (MM)
    DISTANCE 5: 0.8928 (IN),22.677 (MM)
    DISTANCE 6: 0.8906 (IN),22.621 (MM)
    DISTANCE 7: 0.8864 (IN),22.515 (MM)
    DISTANCE 8: 0.8840 (IN),22.454 (MM)
    DISTANCE 9: 0.8770 (IN),22.276 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9824 (IN),24.953 (MM)
    DISTANCE 2: 0.9388 (IN),23.846 (MM)
    DISTANCE 3: 0.9728 (IN),24.709 (MM)
    DISTANCE 4: 0.9853 (IN),25.027 (MM)
    DISTANCE 5: 0.9990 (IN),25.375 (MM)
    DISTANCE 6: 0.9955 (IN),25.286 (MM)
    DISTANCE 7: 0.9858 (IN),25.039 (MM)
    DISTANCE 8: 0.9884 (IN),25.105 (MM)
    DISTANCE 9: 0.9721 (IN),24.691 (MM)

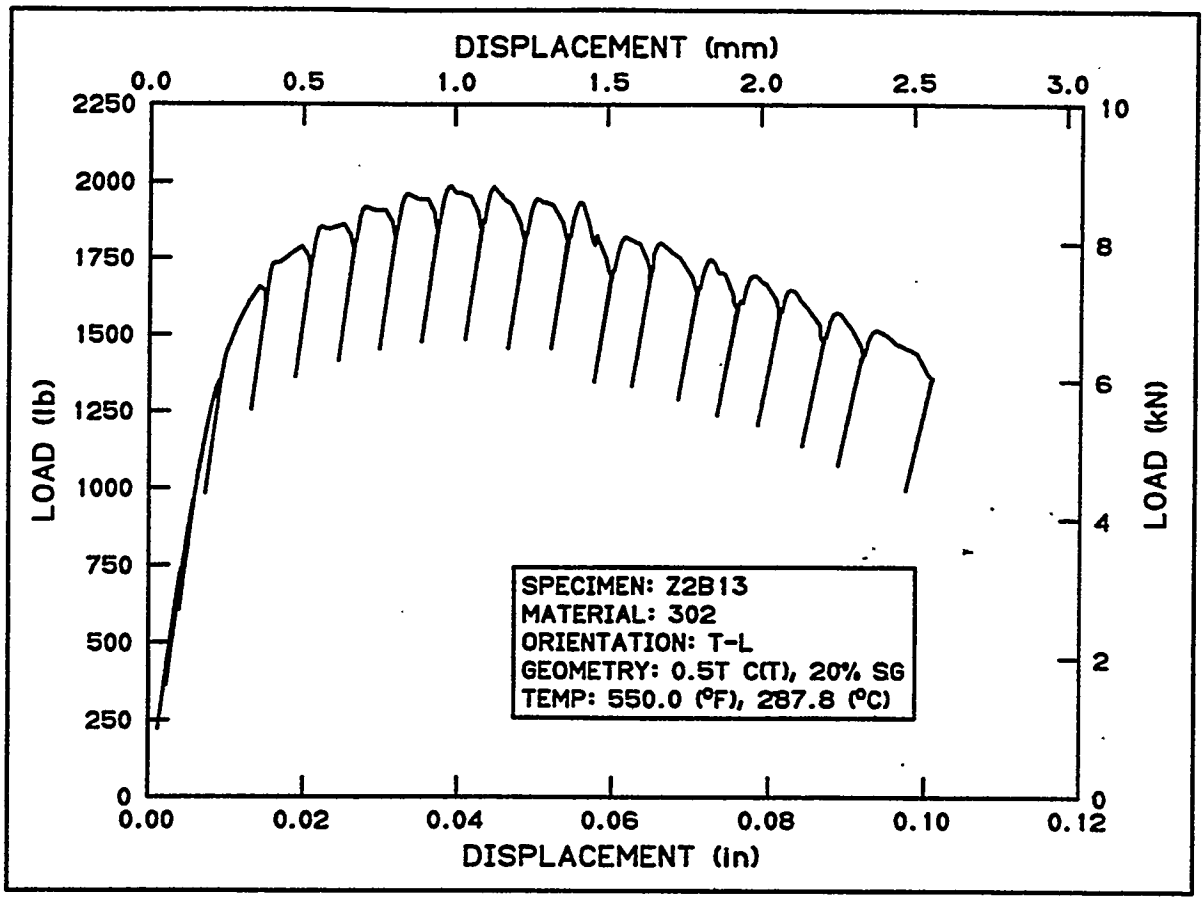

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z2B11
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

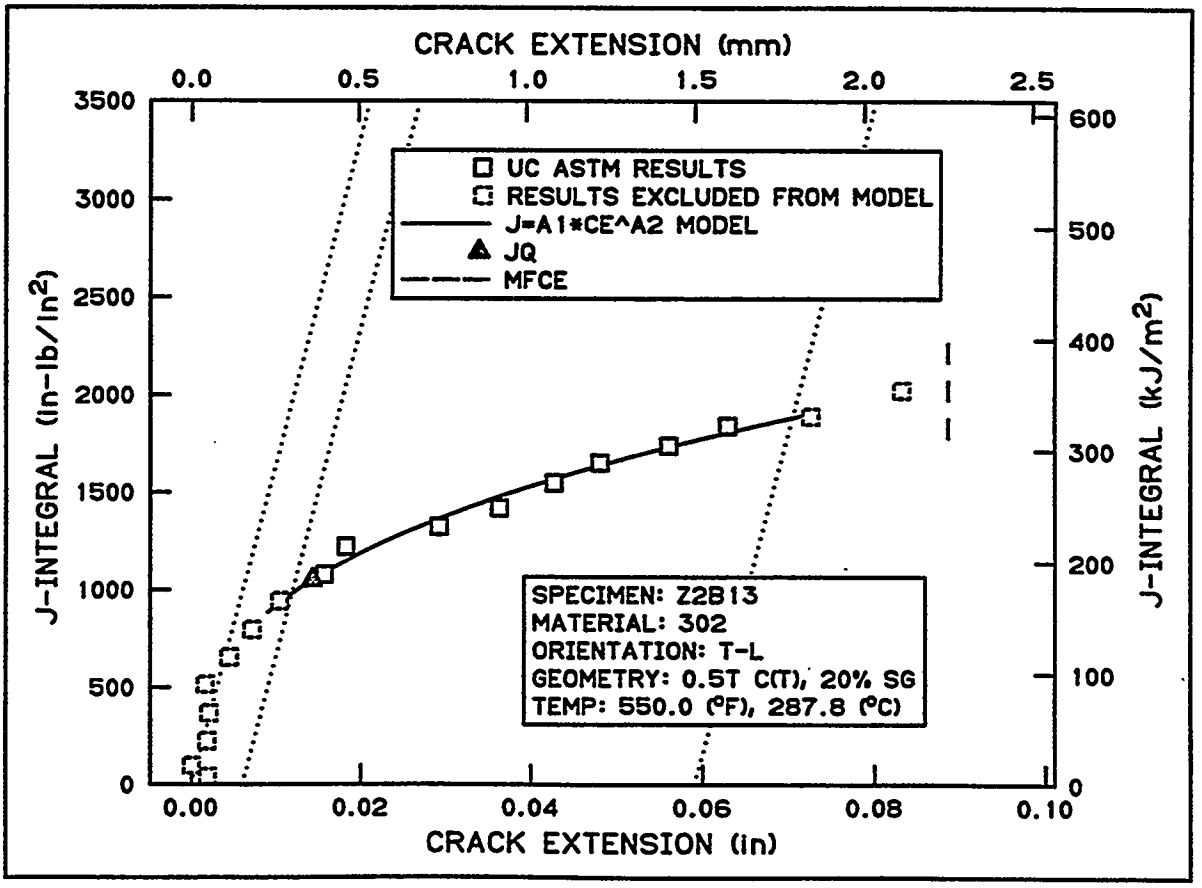

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B11
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B13
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6351 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	930	0.0055	0.0019	41.5
2	1328	0.0086	0.0000	99.2
3	1656	0.0141	0.0018	225.4
4	1788	0.0195	0.0021	368.5
5	1861	0.0251	0.0017	515.8
6	1908	0.0304	0.0044	655.2
7	1943	0.0359	0.0071	797.3
8	1951	0.0415	0.0103	943.5
9	1926	0.0467	0.0156	1079.7
10	1924	0.0520	0.0182	1222.9
11	1824	0.0578	0.0292	1325.9
12	1798	0.0633	0.0363	1422.2
13	1751	0.0684	0.0427	1549.0
14	1696	0.0742	0.0481	1651.7
15	1667	0.0794	0.0561	1739.5
16	1586	0.0849	0.0629	1841.3
17	1519	0.0905	0.0725	1889.3
18	1440	0.0989	0.0832	2024.3

  WIDTH: 1.0052 (IN),25.532 (MM)
  THICKNESS: 0.5003 (IN),12.708 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2446 (IN),6.213 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8630 (IN),21.920 (MM)
    DISTANCE 2: 0.8706 (IN),22.113 (MM)
    DISTANCE 3: 0.8778 (IN),22.296 (MM)
    DISTANCE 4: 0.8823 (IN),22.410 (MM)
    DISTANCE 5: 0.8846 (IN),22.469 (MM)
    DISTANCE 6: 0.8853 (IN),22.487 (MM)
    DISTANCE 7: 0.8858 (IN),22.499 (MM)
    DISTANCE 8: 0.8820 (IN),22.403 (MM)
    DISTANCE 9: 0.8752 (IN),22.230 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9712 (IN),24.668 (MM)
    DISTANCE 2: 0.9665 (IN),24.549 (MM)
    DISTANCE 3: 0.9558 (IN),24.277 (MM)
    DISTANCE 4: 0.9676 (IN),24.577 (MM)
    DISTANCE 5: 0.9708 (IN),24.658 (MM)
    DISTANCE 6: 0.9656 (IN),24.526 (MM)
    DISTANCE 7: 0.9728 (IN),24.709 (MM)
    DISTANCE 8: 0.9728 (IN),24.709 (MM)
    DISTANCE 9: 0.9780 (IN),24.841 (MM)

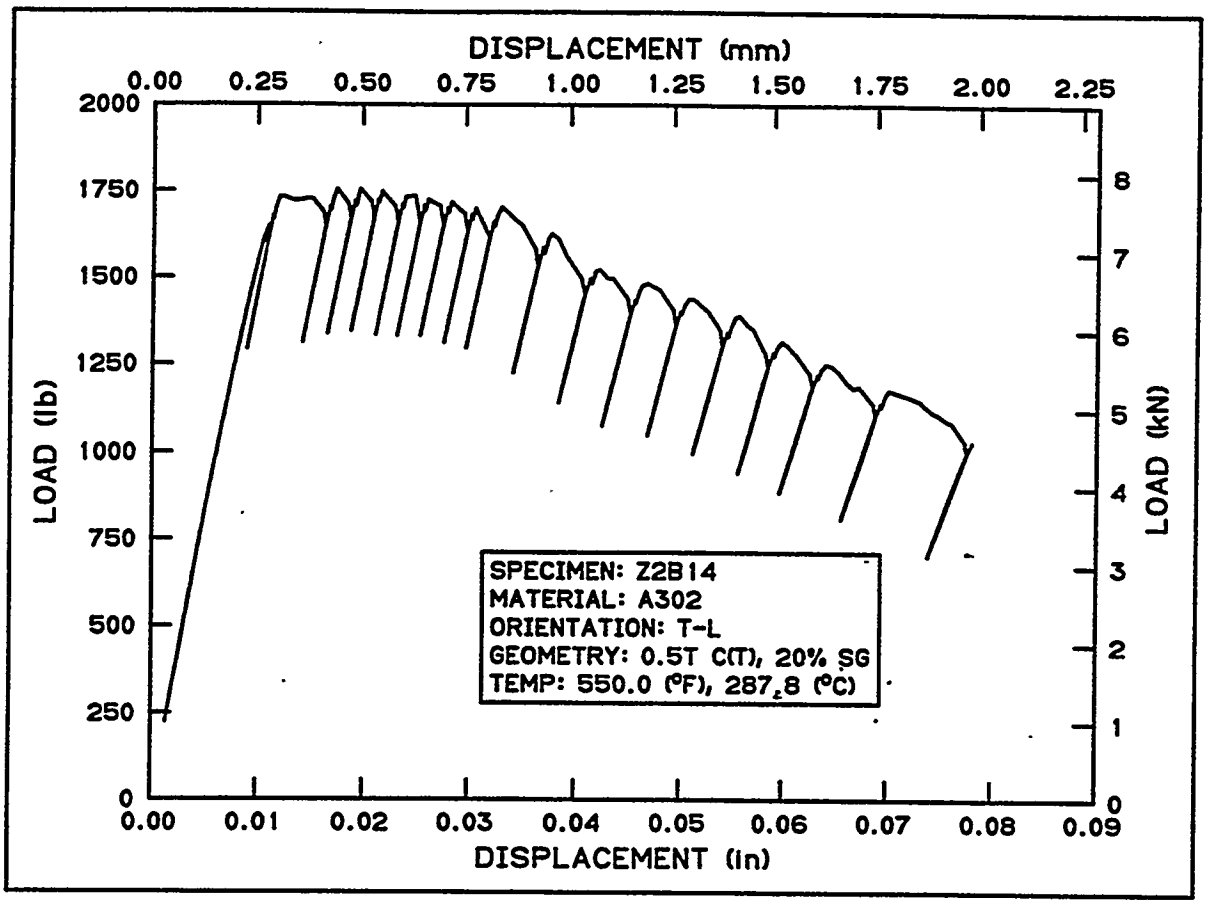

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z2B13
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

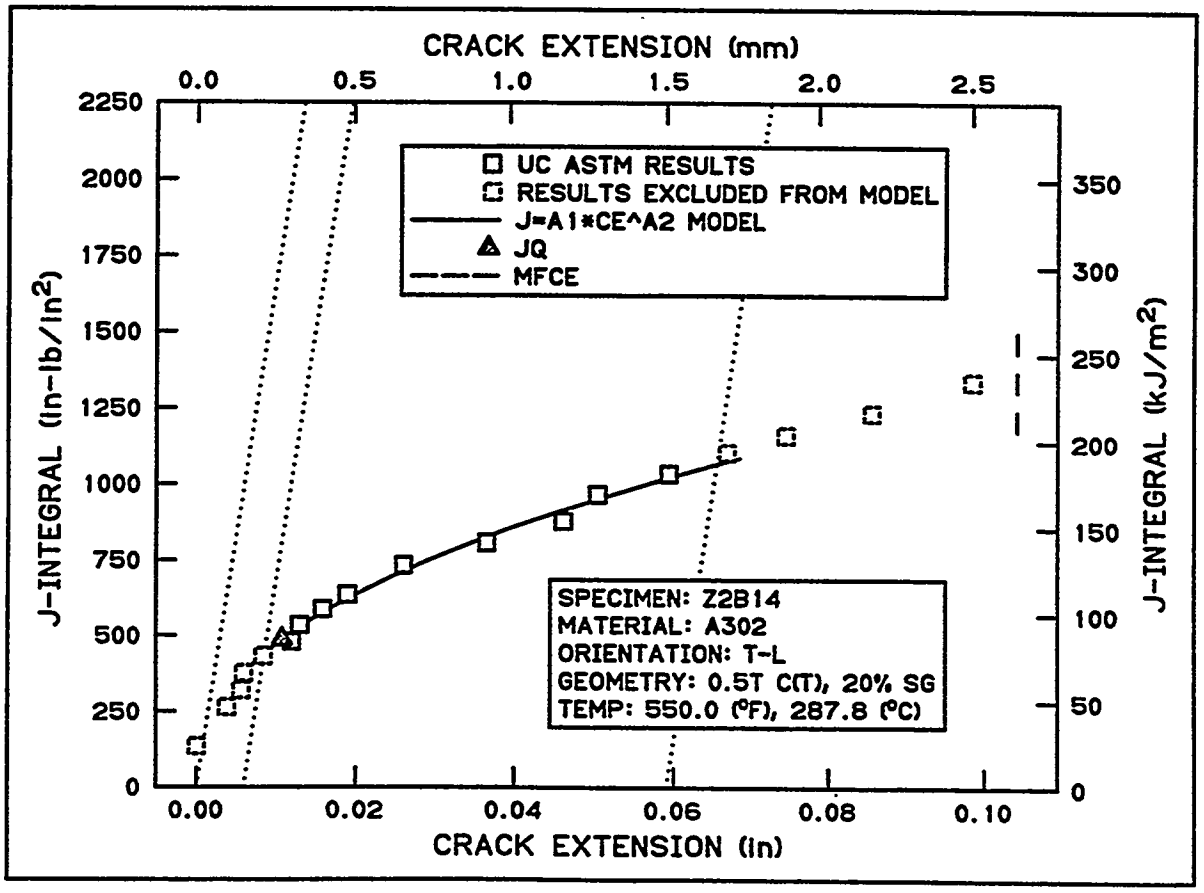

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B13
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z2B14
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6390 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1609	0.0104	0.0000	135.7
2	1725	0.0151	0.0038	265.3
3	1755	0.0173	0.0056	321.9
4	1754	0.0195	0.0060	377.2
5	1748	0.0215	0.0085	433.4
6	1732	0.0238	0.0120	481.1
7	1724	0.0260	0.0131	536.3
8	1717	0.0282	0.0159	589.3
9	1700	0.0305	0.0190	636.8
10	1651	0.0349	0.0260	734.8
11	1558	0.0391	0.0365	809.3
12	1498	0.0434	0.0460	880.4
13	1466	0.0479	0.0503	968.4
14	1404	0.0525	0.0594	1035.4
15	1352	0.0569	0.0668	1105.7
16	1280	0.0611	0.0746	1162.8
17	1189	0.0672	0.0855	1235.9
18	1087	0.0762	0.0984	1340.0

  WIDTH: 0.9984 (IN),25.359 (MM)
  THICKNESS: 0.5003 (IN),12.708 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2508 (IN),6.370 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8814 (IN),22.388 (MM)
    DISTANCE 2: 0.8884 (IN),22.565 (MM)
    DISTANCE 3: 0.8922 (IN),22.662 (MM)
    DISTANCE 4: 0.8938 (IN),22.703 (MM)
    DISTANCE 5: 0.8934 (IN),22.692 (MM)
    DISTANCE 6: 0.8925 (IN),22.670 (MM)
    DISTANCE 7: 0.8920 (IN),22.657 (MM)
    DISTANCE 8: 0.8870 (IN),22.530 (MM)
    DISTANCE 9: 0.8770 (IN),22.276 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0028 (IN),25.471 (MM)
    DISTANCE 2: 1.0022 (IN),25.456 (MM)
    DISTANCE 3: 1.0047 (IN),25.519 (MM)
    DISTANCE 4: 1.0058 (IN),25.547 (MM)
    DISTANCE 5: 1.0040 (IN),25.502 (MM)
    DISTANCE 6: 0.9824 (IN),24.953 (MM)
    DISTANCE 7: 0.9845 (IN),25.006 (MM)
    DISTANCE 8: 0.9786 (IN),24.856 (MM)
    DISTANCE 9: 0.9758 (IN),24.785 (MM)

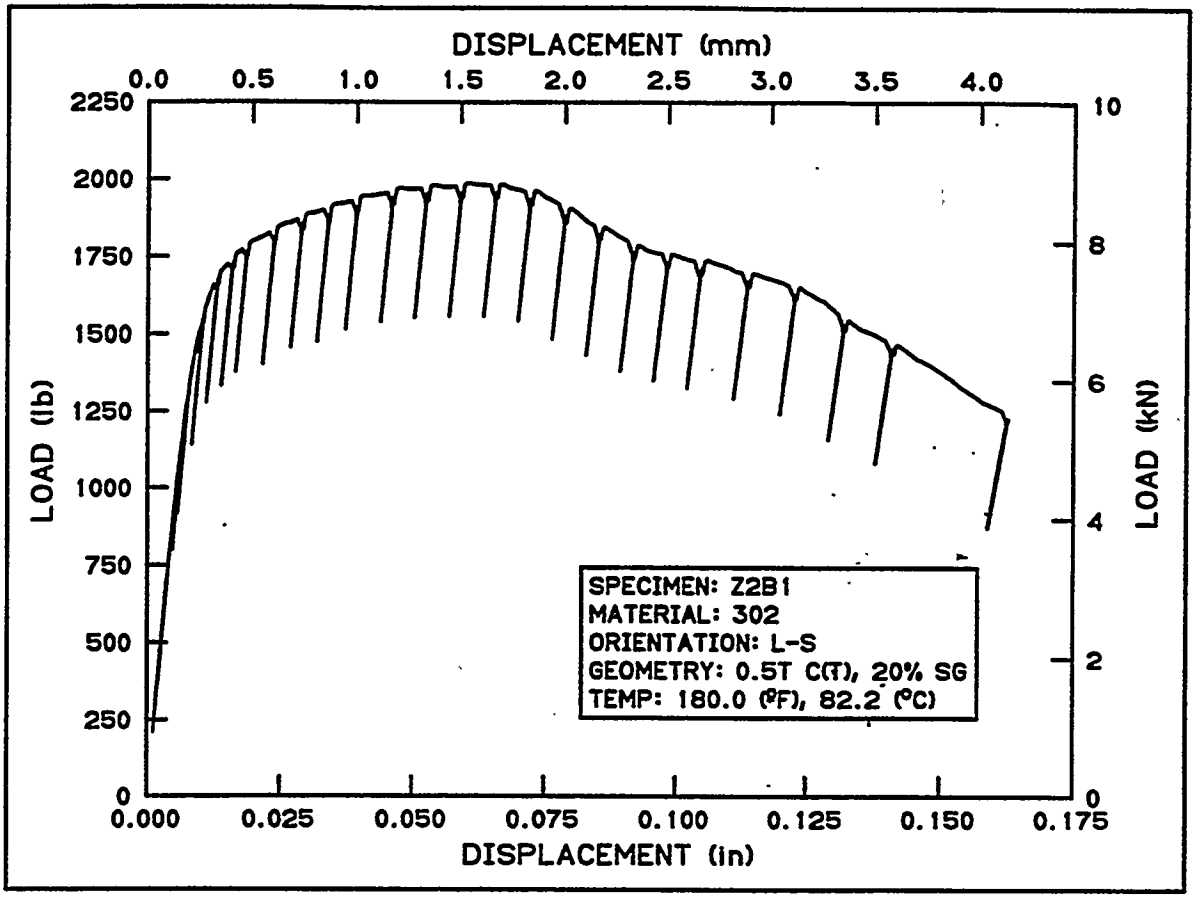

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
2000 1750 1500 1250 1000 750 500 250 0
LOAD (lb)
8 7 6 5 4 3 2 1 0
LOAD (kN)
SPECIMEN: Z2B14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
DISPLACEMENT (in)

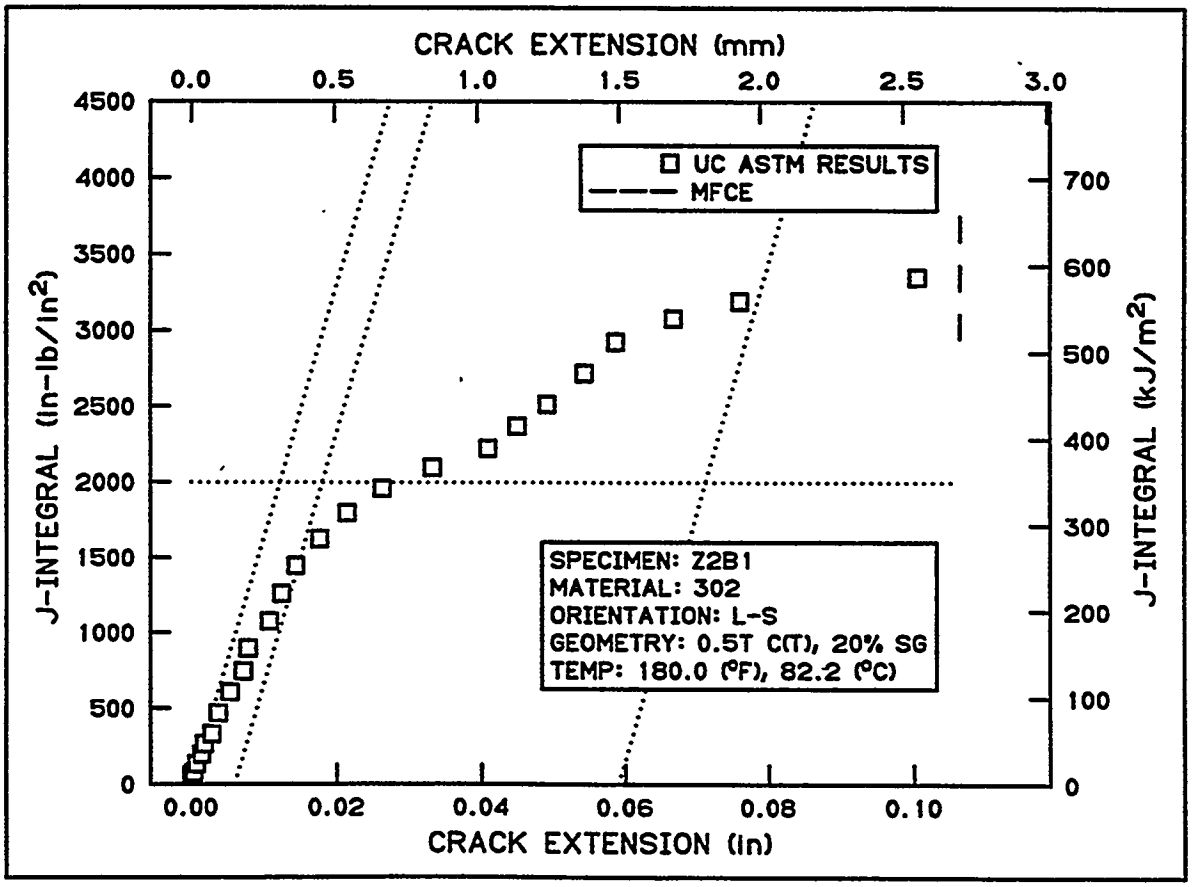

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
2250 2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (in-lb/in²)
350 300 250 200 150 100 50 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B1
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6371 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1128	0.0063	0.0000	58.6
2	1255	0.0073	0.0003	75.3
3	1514	0.0099	0.0007	132.3
4	1658	0.0125	0.0014	196.9
5	1725	0.0151	0.0018	265.9
6	1771	0.0177	0.0028	332.3
7	1826	0.0227	0.0037	468.4
8	1869	0.0280	0.0053	608.3
9	1901	0.0331	0.0071	745.2
10	1928	0.0384	0.0078	895.2
11	1955	0.0450	0.0107	1076.0
12	1969	0.0514	0.0123	1260.8
13	1976	0.0580	0.0143	1445.8
14	1980	0.0646	0.0177	1623.9
15	1960	0.0710	0.0215	1796.6
16	1921	0.0775	0.0262	1958.2
17	1853	0.0841	0.0332	2096.5
18	1800	0.0907	0.0409	2222.3
19	1760	0.0971	0.0450	2370.2
20	1736	0.1034	0.0491	2514.8
21	1701	0.1124	0.0543	2719.7
22	1659	0.1215	0.0586	2925.4
23	1568	0.1308	0.0666	3079.8
24	1482	0.1396	0.0760	3192.3
25	1255	0.1615	0.1004	3350.0

  WIDTH: 1.0004 (IN),25.410 (MM)
  THICKNESS: 0.5002 (IN),12.705 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2494 (IN),6.335 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8724 (IN),22.159 (MM)
    DISTANCE 2: 0.8838 (IN),22.449 (MM)
    DISTANCE 3: 0.8856 (IN),22.494 (MM)
    DISTANCE 4: 0.8907 (IN),22.624 (MM)
    DISTANCE 5: 0.8894 (IN),22.591 (MM)
    DISTANCE 6: 0.8935 (IN),22.695 (MM)
    DISTANCE 7: 0.8879 (IN),22.553 (MM)
    DISTANCE 8: 0.8863 (IN),22.512 (MM)
    DISTANCE 9: 0.8772 (IN),22.281 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9707 (IN),24.656 (MM)
    DISTANCE 2: 0.9876 (IN),25.085 (MM)
    DISTANCE 3: 1.0034 (IN),25.486 (MM)
    DISTANCE 4: 0.9987 (IN),25.367 (MM)
    DISTANCE 5: 0.9920 (IN),25.197 (MM)
    DISTANCE 6: 0.9943 (IN),25.255 (MM)
    DISTANCE 7: 0.9994 (IN),25.385 (MM)
    DISTANCE 8: 0.9908 (IN),25.166 (MM)
    DISTANCE 9: 0.9811 (IN),24.920 (MM)

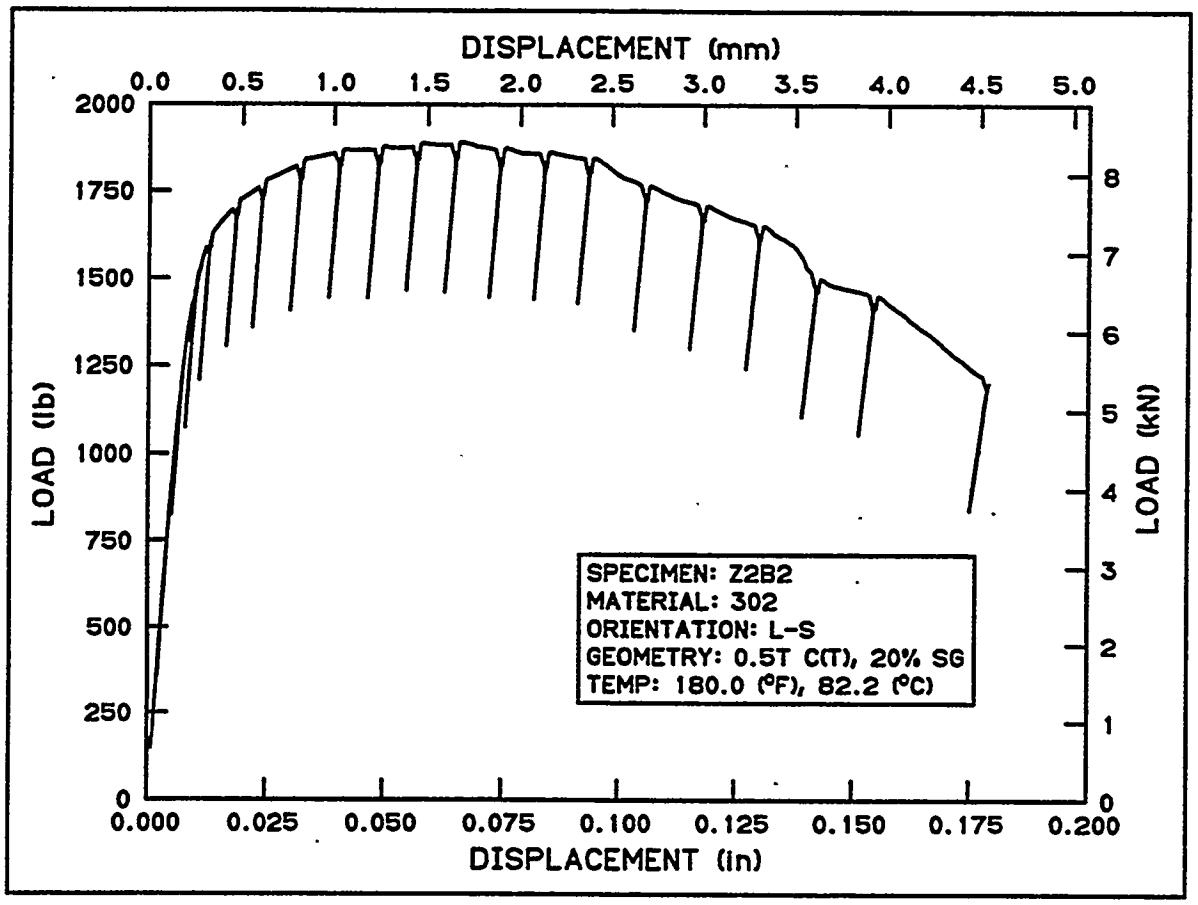

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
10
8
6
4
2
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)
SPECIMEN: Z2B1
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

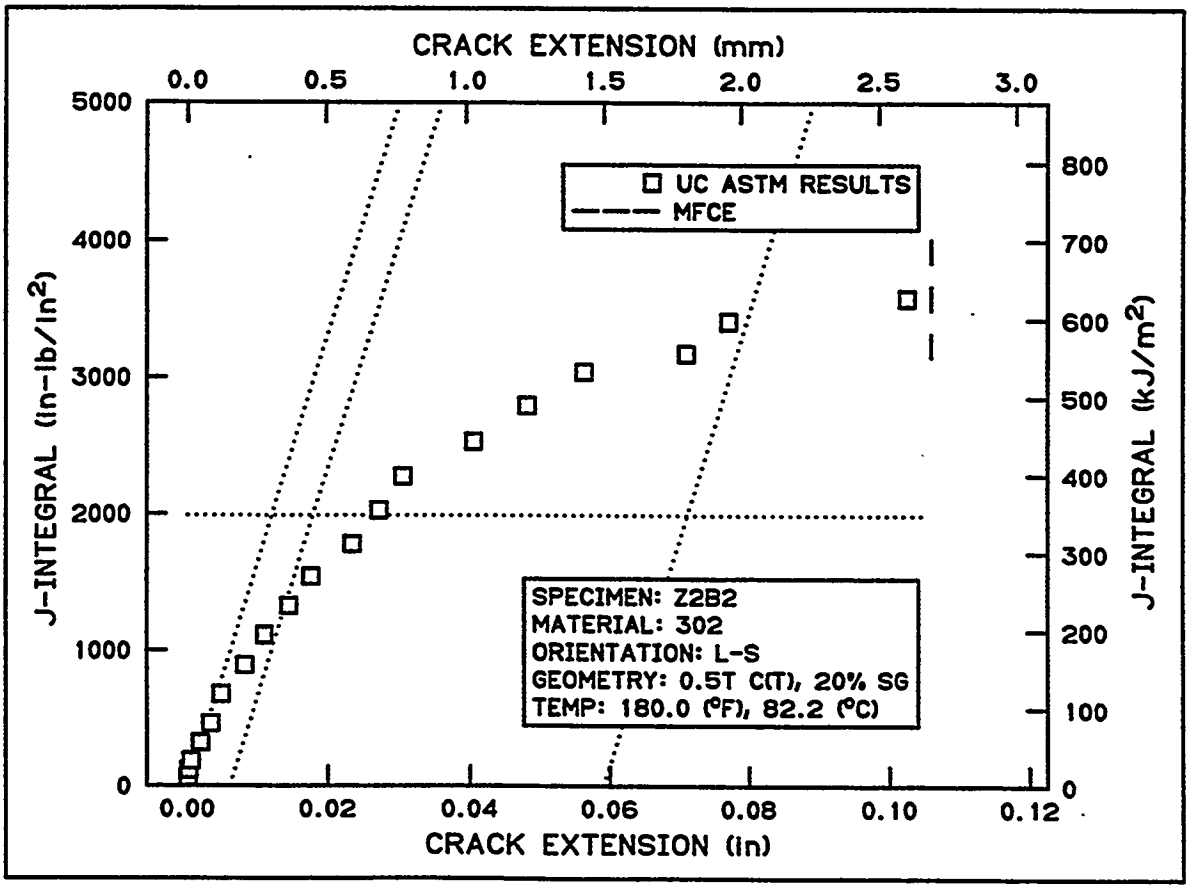

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
J-INTEGRAL (in-lb/in²)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
MFCE
SPECIMEN: Z2B1
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z2B2
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6382 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1134	0.0065	0.0000	62.5
2	1423	0.0092	0.0001	116.3
3	1588	0.0121	0.0005	183.5
4	1696	0.0175	0.0018	318.6
5	1758	0.0230	0.0032	459.7
6	1821	0.0313	0.0047	675.9
7	1858	0.0394	0.0080	891.0
8	1869	0.0477	0.0109	1110.4
9	1877	0.0557	0.0145	1323.4
10	1884	0.0638	0.0176	1540.8
11	1869	0.0733	0.0234	1778.2
12	1858	0.0827	0.0271	2026.2
13	1843	0.0924	0.0305	2276.3
14	1769	0.1045	0.0405	2531.7
15	1714	0.1167	0.0481	2795.4
16	1655	0.1289	0.0563	3040.7
17	1520	0.1411	0.0709	3176.5
18	1455	0.1533	0.0770	3410.0
19	1224	0.1776	0.1025	3581.3

  WIDTH: 0.9997 (IN),25.392 (MM)
  THICKNESS: 0.5003 (IN),12.708 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2501 (IN),6.353 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8756 (IN),22.240 (MM)
    DISTANCE 2: 0.8865 (IN),22.517 (MM)
    DISTANCE 3: 0.8896 (IN),22.596 (MM)
    DISTANCE 4: 0.8923 (IN),22.664 (MM)
    DISTANCE 5: 0.8924 (IN),22.667 (MM)
    DISTANCE 6: 0.8906 (IN),22.621 (MM)
    DISTANCE 7: 0.8914 (IN),22.642 (MM)
    DISTANCE 8: 0.8872 (IN),22.535 (MM)
    DISTANCE 9: 0.8776 (IN),22.291 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9756 (IN),24.780 (MM)
    DISTANCE 2: 1.0006 (IN),25.415 (MM)
    DISTANCE 3: 0.9900 (IN),25.146 (MM)
    DISTANCE 4: 0.9915 (IN),25.184 (MM)
    DISTANCE 5: 1.0027 (IN),25.469 (MM)
    DISTANCE 6: 0.9894 (IN),25.131 (MM)
    DISTANCE 7: 1.0022 (IN),25.456 (MM)
    DISTANCE 8: 0.9970 (IN),25.324 (MM)
    DISTANCE 9: 0.9854 (IN),25.029 (MM)


DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
2000 1750 1500 1250 1000 750 500 250 0
LOAD (lb)
8 7 6 5 4 3 2 1 0
LOAD (kN)
SPECIMEN: Z2B2
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

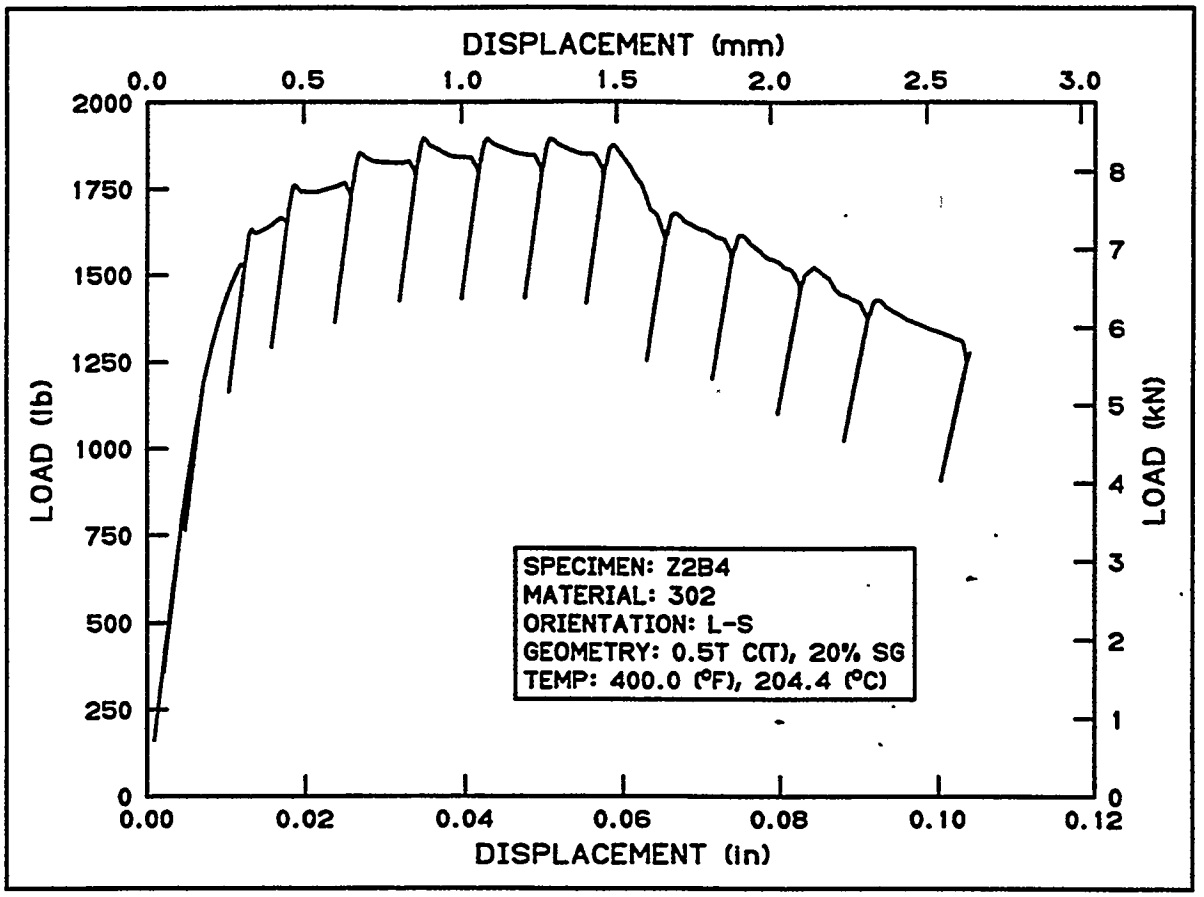

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
MFCE
SPECIMEN: Z2B2
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

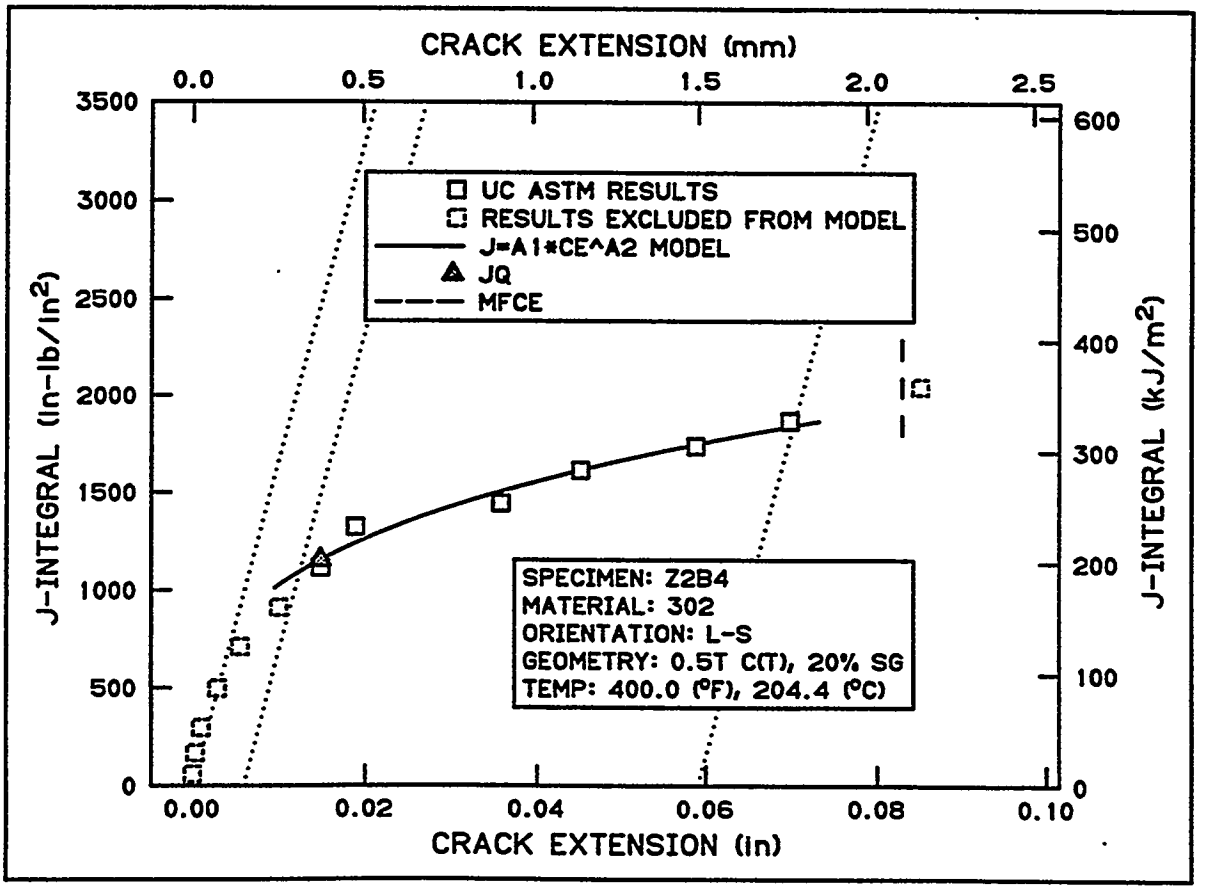
SPECIMEN
  IDENTIFICATION: Z2B3
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6395 (IN)
TEST

SPECIMEN
  IDENTIFICATION: Z2B4
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6411 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1088	0.0064	0.0000	58.4
2	1530	0.0117	0.0003	167.3
3	1665	0.0169	0.0010	296.6
4	1766	0.0248	0.0029	496.1
5	1827	0.0328	0.0055	708.3
6	1839	0.0406	0.0101	911.5
7	1845	0.0486	0.0149	1115.9
8	1843	0.0564	0.0189	1323.8
9	1673	0.0643	0.0358	1446.4
10	1602	0.0729	0.0451	1615.2
11	1510	0.0815	0.0588	1741.7
12	1420	0.0900	0.0698	1871.6
13	1307	0.1031	0.0850	2045.8

WIDTH: 1.0006 (IN),25.415 (MM)
THICKNESS: 0.5003 (IN),12.708 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2492 (IN),6.330 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
  DISTANCE 1: 0.8770 (IN),22.276 (MM)
  DISTANCE 2: 0.8860 (IN),22.504 (MM)
  DISTANCE 3: 0.8918 (IN),22.652 (MM)
  DISTANCE 4: 0.8944 (IN),22.718 (MM)
  DISTANCE 5: 0.8959 (IN),22.756 (MM)
  DISTANCE 6: 0.8942 (IN),22.713 (MM)
  DISTANCE 7: 0.8924 (IN),22.667 (MM)
  DISTANCE 8: 0.8886 (IN),22.570 (MM)
  DISTANCE 9: 0.8818 (IN),22.398 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
  DISTANCE 1: 0.9648 (IN),24.506 (MM)
  DISTANCE 2: 0.9753 (IN),24.773 (MM)
  DISTANCE 3: 0.9774 (IN),24.826 (MM)
  DISTANCE 4: 0.9526 (IN),24.196 (MM)
  DISTANCE 5: 0.9664 (IN),24.547 (MM)
  DISTANCE 6: 0.9744 (IN),24.750 (MM)
  DISTANCE 7: 0.9846 (IN),25.009 (MM)
  DISTANCE 8: 0.9838 (IN),24.989 (MM)
  DISTANCE 9: 0.9774 (IN),24.826 (MM)

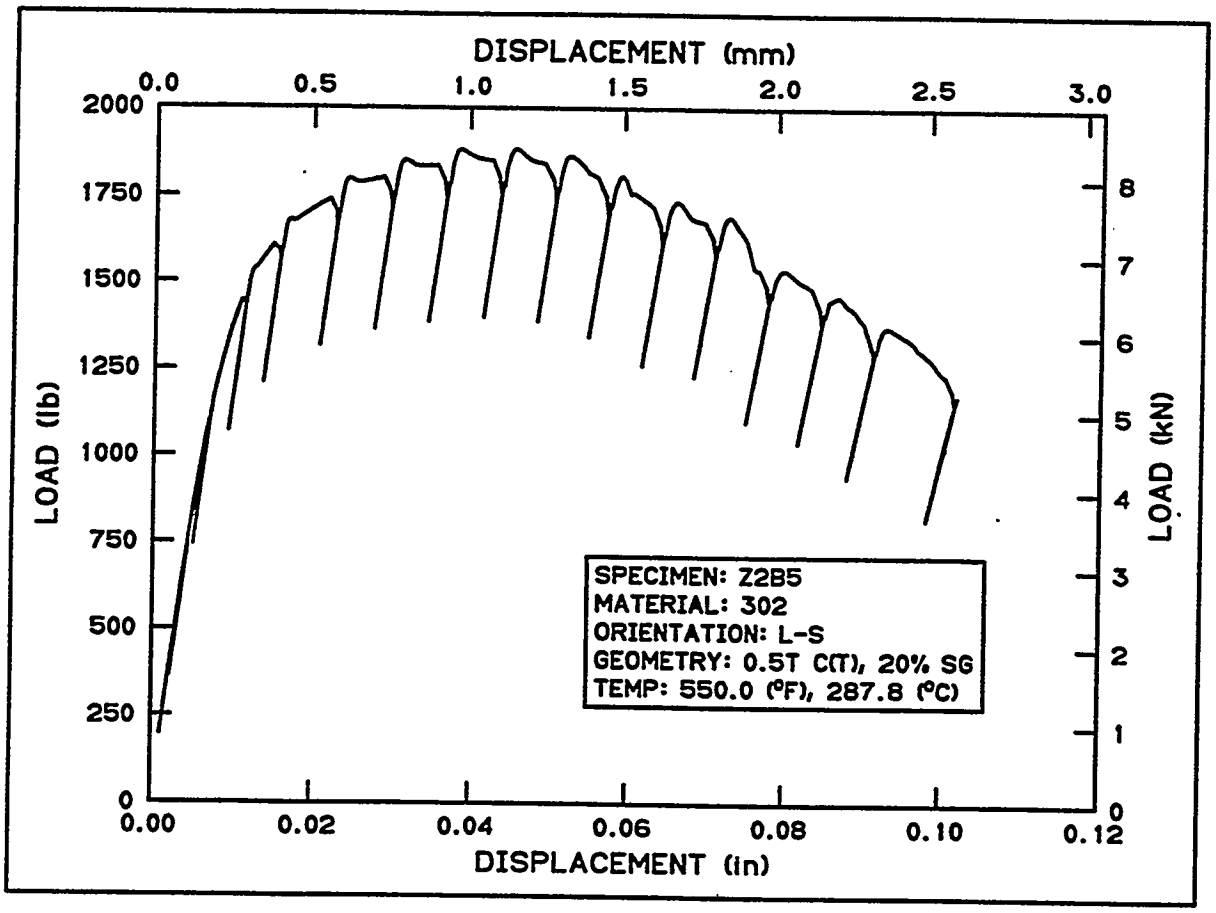

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
SPECIMEN: Z2B4
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

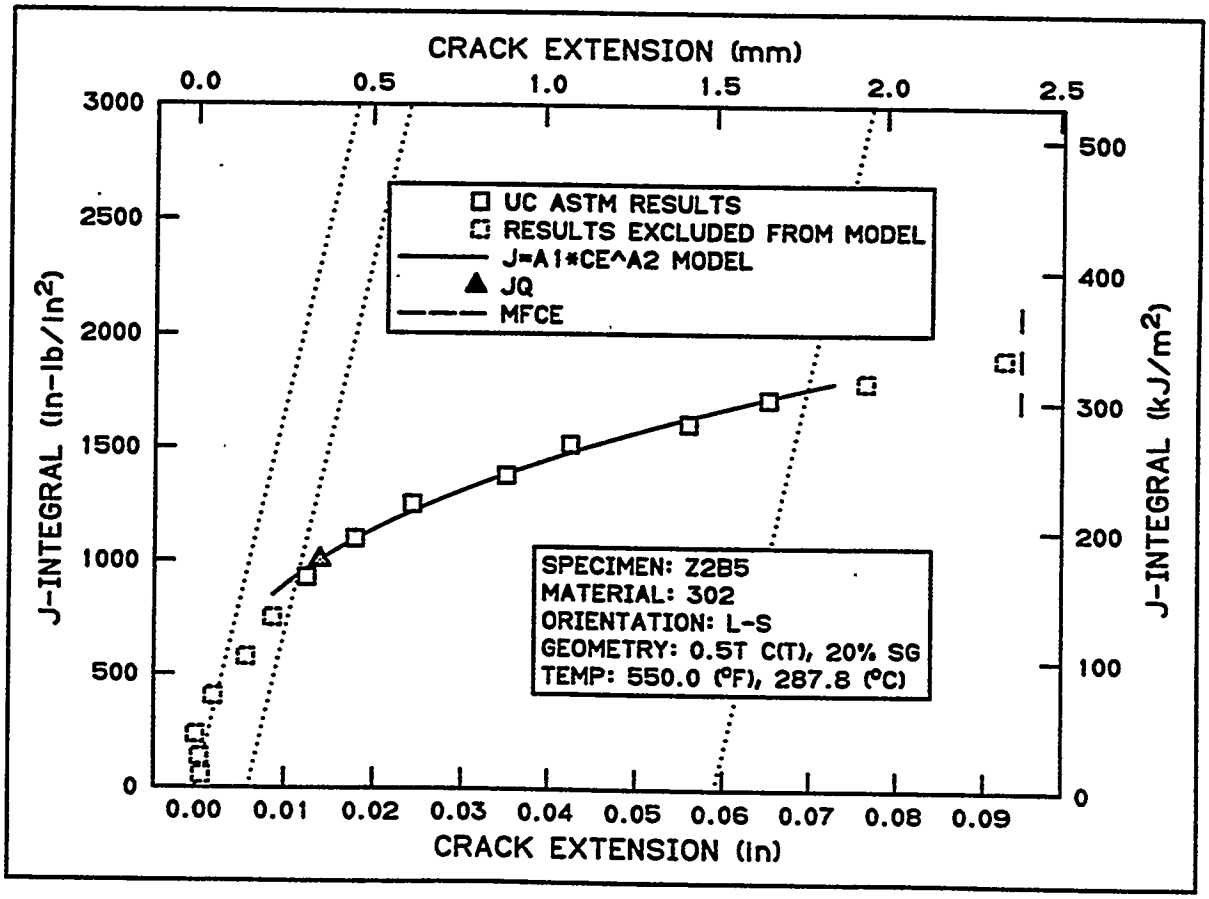

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
600
500
400
300
200
100
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B4
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B5
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6412 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1065	0.0066	0.0006	57.4
2	1444	0.0108	0.0005	137.8
3	1606	0.0148	0.0000	235.0
4	1739	0.0218	0.0020	404.8
5	1802	0.0285	0.0056	576.3
6	1836	0.0352	0.0086	751.4
7	1852	0.0423	0.0125	929.8
8	1842	0.0490	0.0179	1099.9
9	1802	0.0558	0.0244	1253.9
10	1718	0.0628	0.0351	1382.8
11	1675	0.0694	0.0425	1520.7
12	1531	0.0765	0.0560	1611.3
13	1484	0.0832	0.0652	1719.7
14	1387	0.0899	0.0764	1795.4
15	1233	0.1004	0.0922	1902.4

  WIDTH: 1.0009 (IN),25.423 (MM)
  THICKNESS: 0.5001 (IN),12.703 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2488 (IN),6.320 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8778 (IN),22.296 (MM)
    DISTANCE 2: 0.8834 (IN),22.438 (MM)
    DISTANCE 3: 0.8850 (IN),22.479 (MM)
    DISTANCE 4: 0.8909 (IN),22.629 (MM)
    DISTANCE 5: 0.8962 (IN),22.763 (MM)
    DISTANCE 6: 0.8988 (IN),22.830 (MM)
    DISTANCE 7: 0.8921 (IN),22.659 (MM)
    DISTANCE 8: 0.8935 (IN),22.695 (MM)
    DISTANCE 9: 0.8821 (IN),22.405 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9808 (IN),24.912 (MM)
    DISTANCE 2: 0.9812 (IN),24.922 (MM)
    DISTANCE 3: 0.9945 (IN),25.260 (MM)
    DISTANCE 4: 0.9824 (IN),24.953 (MM)
    DISTANCE 5: 0.9731 (IN),24.717 (MM)
    DISTANCE 6: 0.9866 (IN),25.060 (MM)
    DISTANCE 7: 0.9830 (IN),24.968 (MM)
    DISTANCE 8: 0.9852 (IN),25.024 (MM)
    DISTANCE 9: 0.9919 (IN),25.194 (MM)

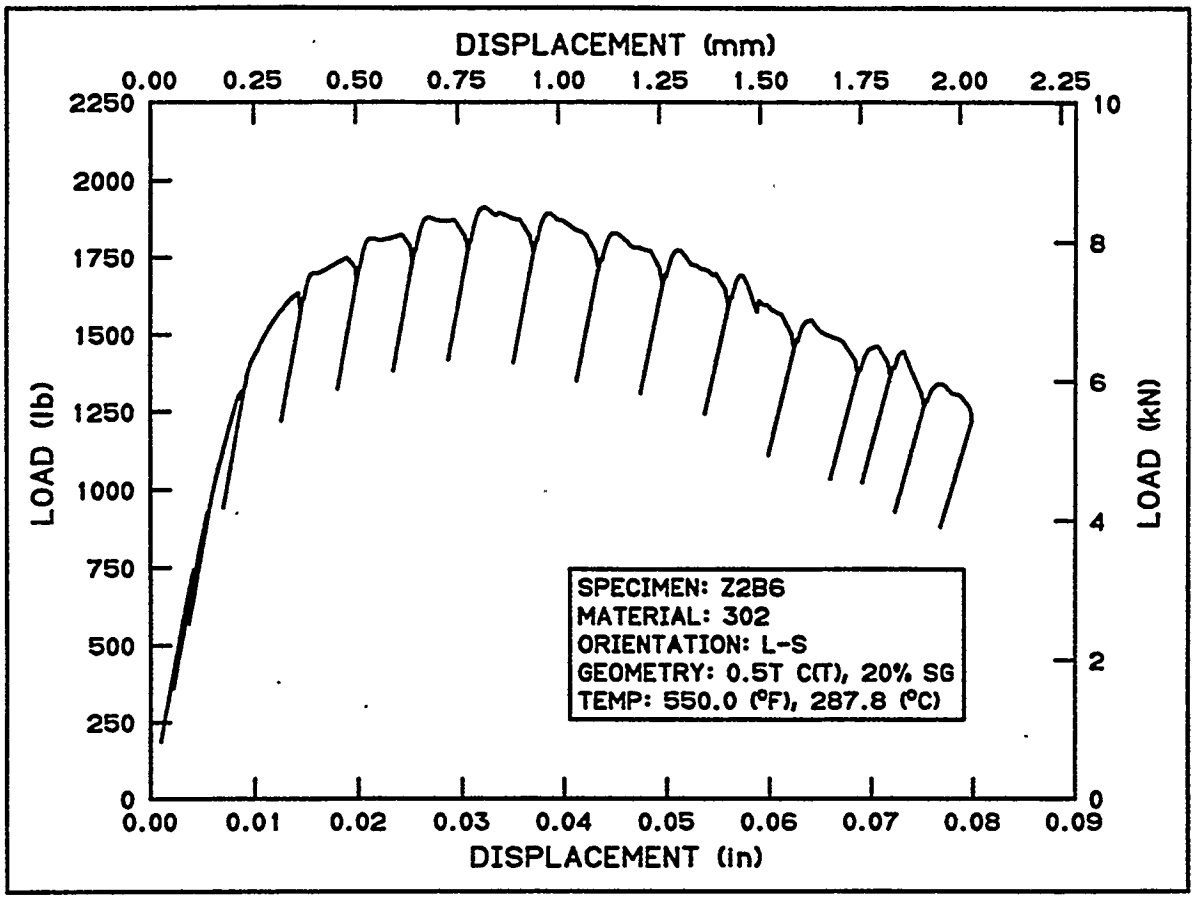

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z2B5
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

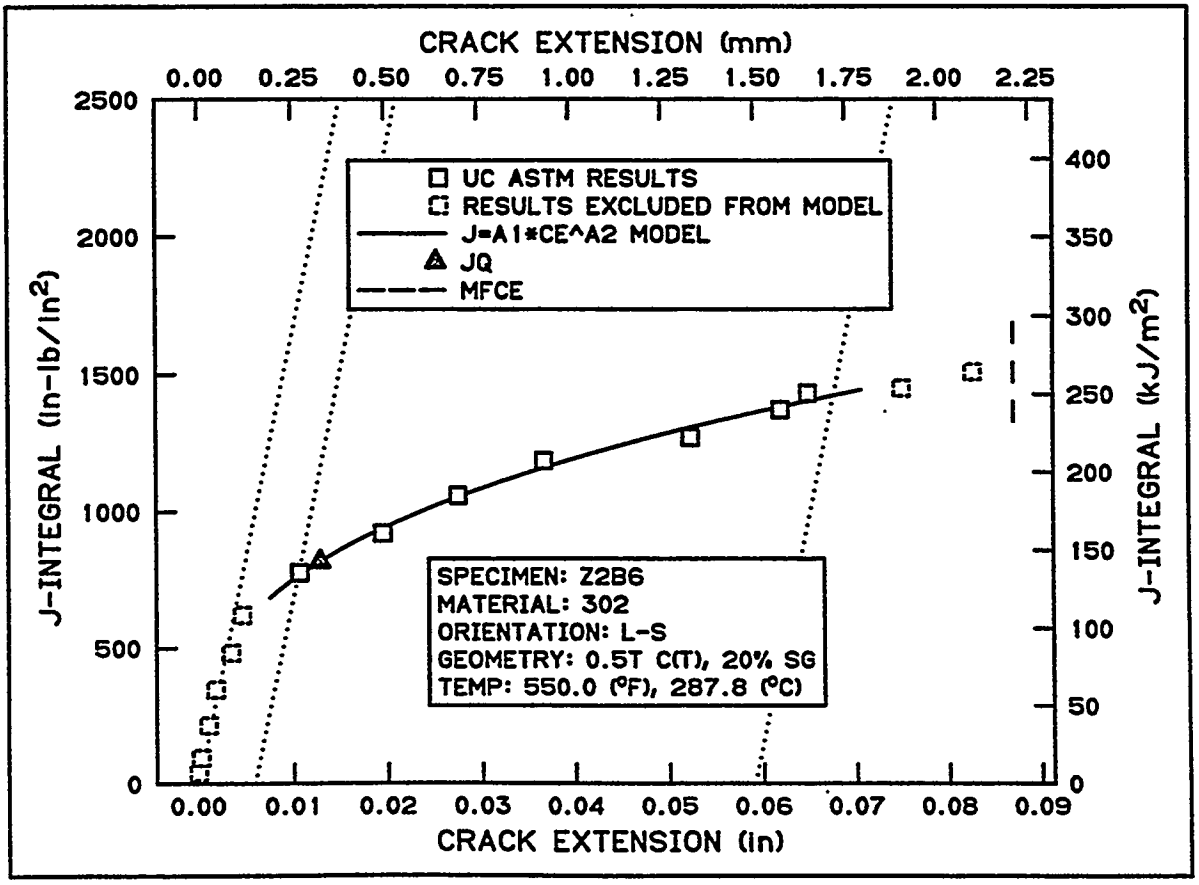

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B5
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B6
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6328 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	903	0.0053	0.0000	40.3
2	1299	0.0084	0.0003	95.1
3	1620	0.0136	0.0010	214.5
4	1749	0.0189	0.0018	346.5
5	1824	0.0241	0.0035	481.6
6	1872	0.0293	0.0046	621.2
7	1872	0.0356	0.0107	776.9
8	1826	0.0421	0.0195	920.4
9	1771	0.0484	0.0275	1057.8
10	1696	0.0547	0.0367	1185.4
11	1567	0.0612	0.0523	1269.9
12	1477	0.0673	0.0619	1371.3
13	1462	0.0707	0.0649	1431.7
14	1400	0.0737	0.0749	1449.4
15	1302	0.0788	0.0826	1508.6

  WIDTH: 1.0002 (IN),25.405 (MM)
  THICKNESS: 0.5001 (IN),12.703 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2493 (IN),6.332 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8630 (IN),21.920 (MM)
    DISTANCE 2: 0.8725 (IN),22.162 (MM)
    DISTANCE 3: 0.8798 (IN),22.347 (MM)
    DISTANCE 4: 0.8828 (IN),22.423 (MM)
    DISTANCE 5: 0.8864 (IN),22.515 (MM)
    DISTANCE 6: 0.8884 (IN),22.565 (MM)
    DISTANCE 7: 0.8896 (IN),22.596 (MM)
    DISTANCE 8: 0.8866 (IN),22.520 (MM)
    DISTANCE 9: 0.8780 (IN),22.301 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9494 (IN),24.115 (MM)
    DISTANCE 2: 0.9518 (IN),24.176 (MM)
    DISTANCE 3: 0.9584 (IN),24.343 (MM)
    DISTANCE 4: 0.9671 (IN),24.564 (MM)
    DISTANCE 5: 0.9972 (IN),25.329 (MM)
    DISTANCE 6: 0.9778 (IN),24.836 (MM)
    DISTANCE 7: 0.9651 (IN),24.514 (MM)
    DISTANCE 8: 0.9734 (IN),24.724 (MM)
    DISTANCE 9: 0.9732 (IN),24.719 (MM)

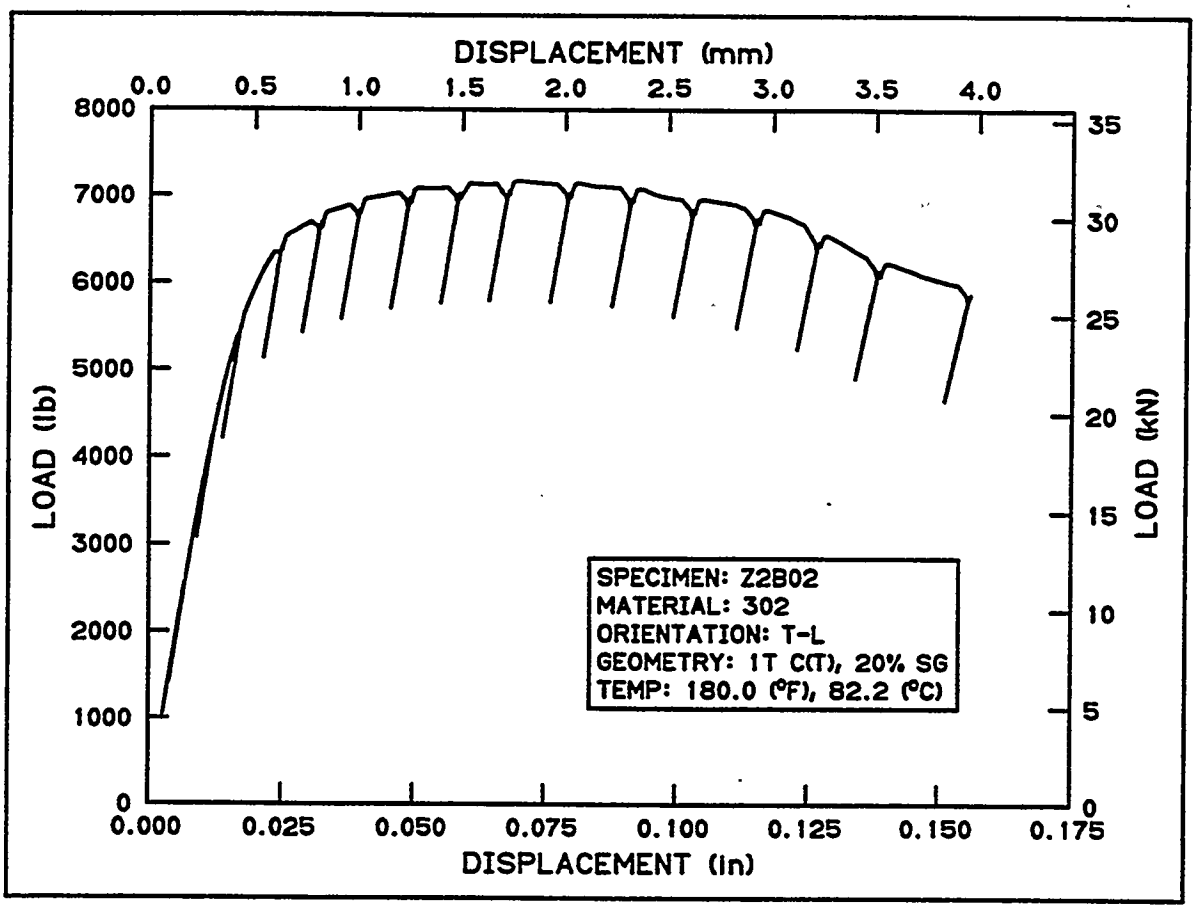

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (lb)
10 8 6 4 2 0
LOAD (kN)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
DISPLACEMENT (in)
SPECIMEN: Z2B6
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

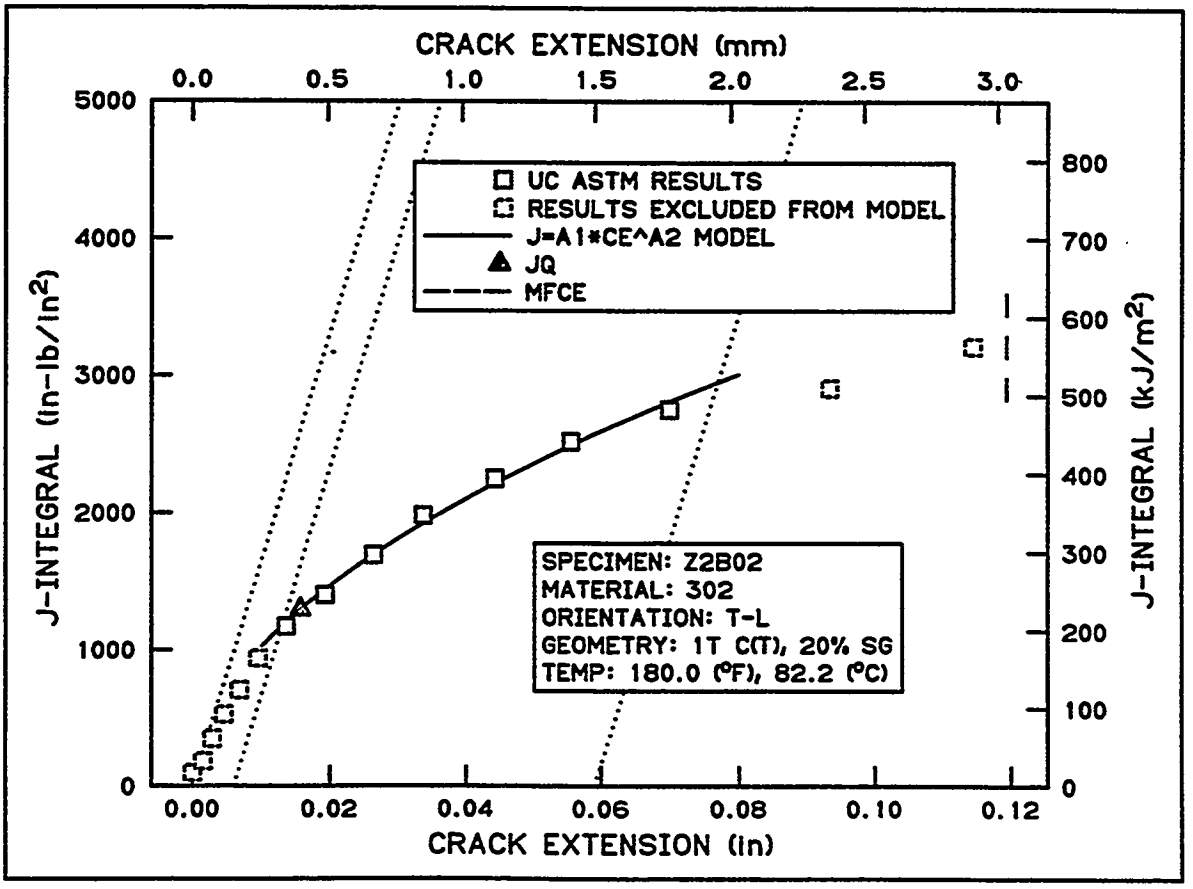

CRACK EXTENSION (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
2500 2000 1500 1000 500 0
J-INTEGRAL (in-lb/in²)
400 350 300 250 200 150 100 50 0
J-INTEGRAL (kJ/m²)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B6
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z2B02
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2623 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4148	0.0116	0.0000	96.9
2	5368	0.0164	0.0015	183.6
3	6339	0.0233	0.0029	347.7
4	6695	0.0303	0.0045	524.4
5	6887	0.0376	0.0068	703.9
6	7036	0.0469	0.0095	938.7
7	7097	0.0561	0.0136	1175.0
8	7142	0.0655	0.0193	1405.8
9	7139	0.0772	0.0264	1695.6
10	7096	0.0891	0.0337	1984.7
11	6965	0.1007	0.0443	2252.1
12	6871	0.1126	0.0555	2519.4
13	6678	0.1240	0.0699	2752.2
14	6295	0.1359	0.0934	2909.7
15	5980	0.1535	0.1145	3214.0

  WIDTH: 2.0010 (IN),50.825 (MM)
  THICKNESS: 1.0037 (IN),25.494 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4991 (IN),12.677 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7383 (IN),44.153 (MM)
    DISTANCE 2: 1.7530 (IN),44.526 (MM)
    DISTANCE 3: 1.7608 (IN),44.724 (MM)
    DISTANCE 4: 1.7658 (IN),44.851 (MM)
    DISTANCE 5: 1.7681 (IN),44.910 (MM)
    DISTANCE 6: 1.7692 (IN),44.938 (MM)
    DISTANCE 7: 1.7688 (IN),44.928 (MM)
    DISTANCE 8: 1.7620 (IN),44.755 (MM)
    DISTANCE 9: 1.7481 (IN),44.402 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8945 (IN),48.120 (MM)
    DISTANCE 2: 1.8842 (IN),47.859 (MM)
    DISTANCE 3: 1.8346 (IN),46.599 (MM)
    DISTANCE 4: 1.9060 (IN),48.412 (MM)
    DISTANCE 5: 1.8543 (IN),47.099 (MM)
    DISTANCE 6: 1.8954 (IN),48.143 (MM)
    DISTANCE 7: 1.9117 (IN),48.557 (MM)
    DISTANCE 8: 1.8682 (IN),47.452 (MM)
    DISTANCE 9: 1.8884 (IN),47.965 (MM)

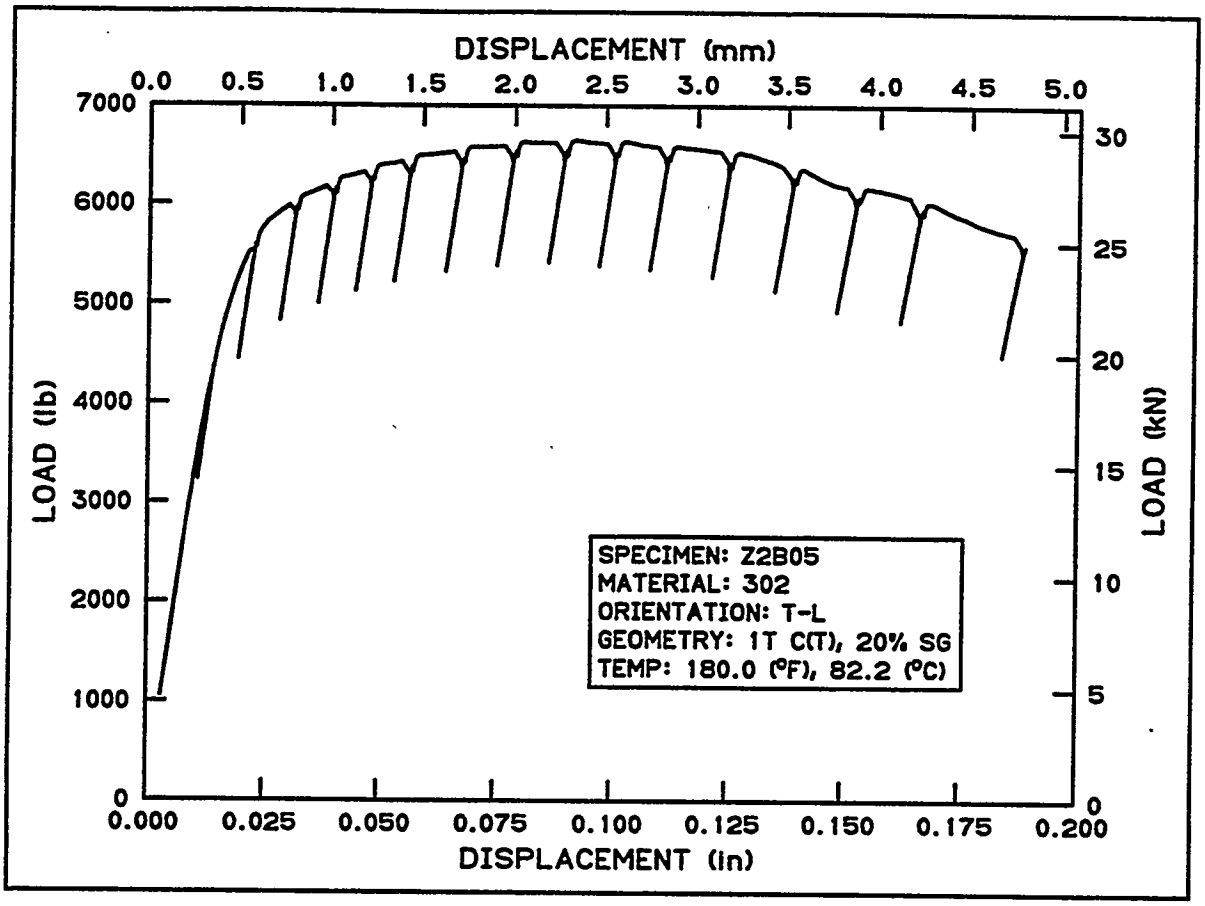

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
35
30
25
20
15
10
5
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)
SPECIMEN: Z2B02
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

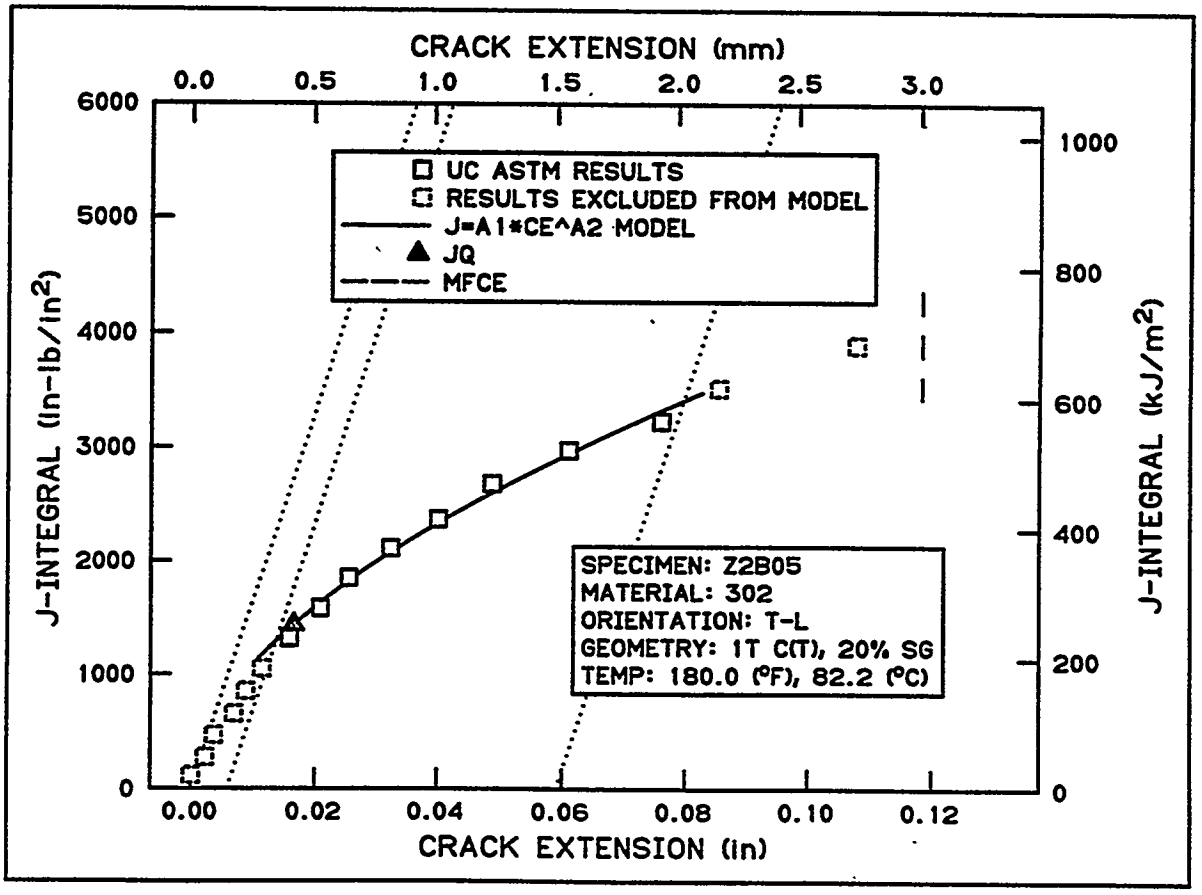

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
J-INTEGRAL (in-lb/in²)
5000
4000
3000
2000
1000
0
J-INTEGRAL (kJ/m²)
800
700
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B02
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z2B05
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.3030 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4147	0.0131	0.0000	115.0
2	5523	0.0215	0.0023	275.2
3	5980	0.0298	0.0037	468.2
4	6173	0.0380	0.0070	659.1
5	6319	0.0463	0.0089	855.4
6	6426	0.0544	0.0115	1053.5
7	6530	0.0656	0.0159	1321.6
8	6588	0.0765	0.0209	1586.7
9	6618	0.0873	0.0257	1855.5
10	6613	0.0986	0.0324	2117.4
11	6578	0.1096	0.0402	2374.2
12	6534	0.1231	0.0488	2685.9
13	6384	0.1367	0.0610	2978.3
14	6182	0.1504	0.0761	3236.1
15	6077	0.1639	0.0855	3522.4
16	5711	0.1862	0.1079	3901.7

  WIDTH: 2.0006 (IN),50.815 (MM)
  THICKNESS: 1.0031 (IN),25.479 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4992 (IN),12.680 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7774 (IN),45.146 (MM)
    DISTANCE 2: 1.8012 (IN),45.750 (MM)
    DISTANCE 3: 1.8095 (IN),45.961 (MM)
    DISTANCE 4: 1.8152 (IN),46.106 (MM)
    DISTANCE 5: 1.8131 (IN),46.053 (MM)
    DISTANCE 6: 1.8119 (IN),46.022 (MM)
    DISTANCE 7: 1.8046 (IN),45.837 (MM)
    DISTANCE 8: 1.7918 (IN),45.512 (MM)
    DISTANCE 9: 1.7634 (IN),44.790 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9277 (IN),48.964 (MM)
    DISTANCE 2: 1.9104 (IN),48.524 (MM)
    DISTANCE 3: 1.8968 (IN),48.179 (MM)
    DISTANCE 4: 1.9200 (IN),48.768 (MM)
    DISTANCE 5: 1.9080 (IN),48.463 (MM)
    DISTANCE 6: 1.9260 (IN),48.920 (MM)
    DISTANCE 7: 1.9244 (IN),48.880 (MM)
    DISTANCE 8: 1.9314 (IN),49.058 (MM)
    DISTANCE 9: 1.9680 (IN),49.987 (MM)

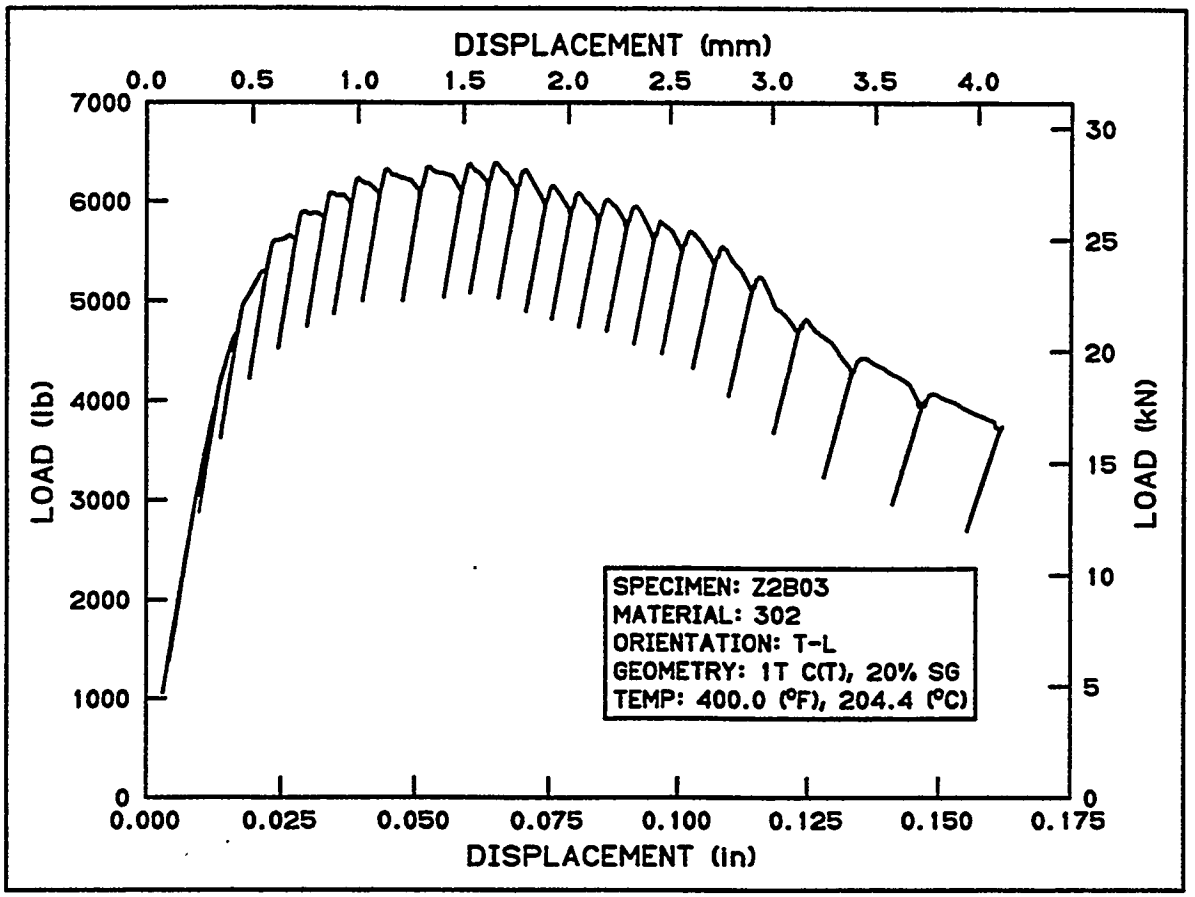

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
30 25 20 15 10 5 0
SPECIMEN: Z2B05
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

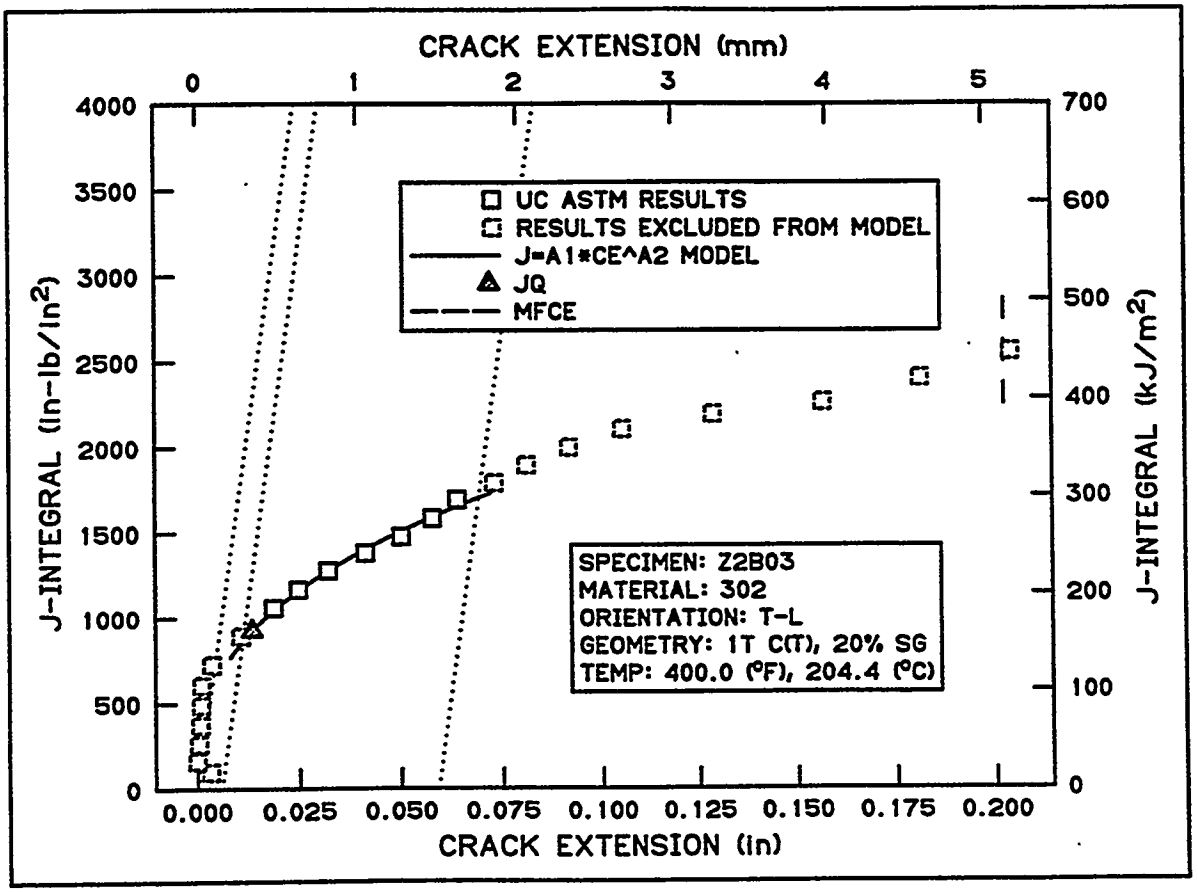

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B05
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B03
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.3016 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3830	0.0124	0.0032	98.0
2	4618	0.0162	0.0000	163.5
3	5289	0.0213	0.0004	262.4
4	5661	0.0265	0.0008	372.9
5	5887	0.0316	0.0010	488.5
6	6061	0.0367	0.0011	604.1
7	6176	0.0415	0.0036	724.5
8	6218	0.0491	0.0108	892.3
9	6258	0.0569	0.0187	1060.8
10	6299	0.0618	0.0248	1168.0
11	6289	0.0670	0.0321	1279.8
12	6224	0.0716	0.0413	1384.0
13	6071	0.0770	0.0501	1477.8
14	5978	0.0825	0.0578	1583.2
15	5943	0.0878	0.0640	1691.3
16	5904	0.0924	0.0730	1787.7
17	5704	0.0988	0.0810	1890.9
18	5587	0.1045	0.0917	1995.6
19	5312	0.1120	0.1052	2103.6
20	4852	0.1207	0.1286	2192.5
21	4433	0.1315	0.1565	2263.1
22	4160	0.1444	0.1810	2401.3
23	3819	0.1593	0.2038	2553.7

  WIDTH: 2.0058 (IN),50.947 (MM)
  THICKNESS: 1.0033 (IN),25.484 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4990 (IN),12.675 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7580 (IN),44.653 (MM)
    DISTANCE 2: 1.7869 (IN),45.387 (MM)
    DISTANCE 3: 1.8016 (IN),45.761 (MM)
    DISTANCE 4: 1.8125 (IN),46.037 (MM)
    DISTANCE 5: 1.8160 (IN),46.126 (MM)
    DISTANCE 6: 1.8162 (IN),46.131 (MM)
    DISTANCE 7: 1.8110 (IN),45.999 (MM)
    DISTANCE 8: 1.7974 (IN),45.654 (MM)
    DISTANCE 9: 1.7688 (IN),44.928 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9938 (IN),50.643 (MM)
    DISTANCE 2: 2.0046 (IN),50.917 (MM)
    DISTANCE 3: 2.0130 (IN),51.130 (MM)
    DISTANCE 4: 1.9832 (IN),50.373 (MM)
    DISTANCE 5: 1.9946 (IN),50.663 (MM)
    DISTANCE 6: 2.0124 (IN),51.115 (MM)
    DISTANCE 7: 2.0060 (IN),50.952 (MM)
    DISTANCE 8: 2.0026 (IN),50.866 (MM)
    DISTANCE 9: 2.0168 (IN),51.227 (MM)

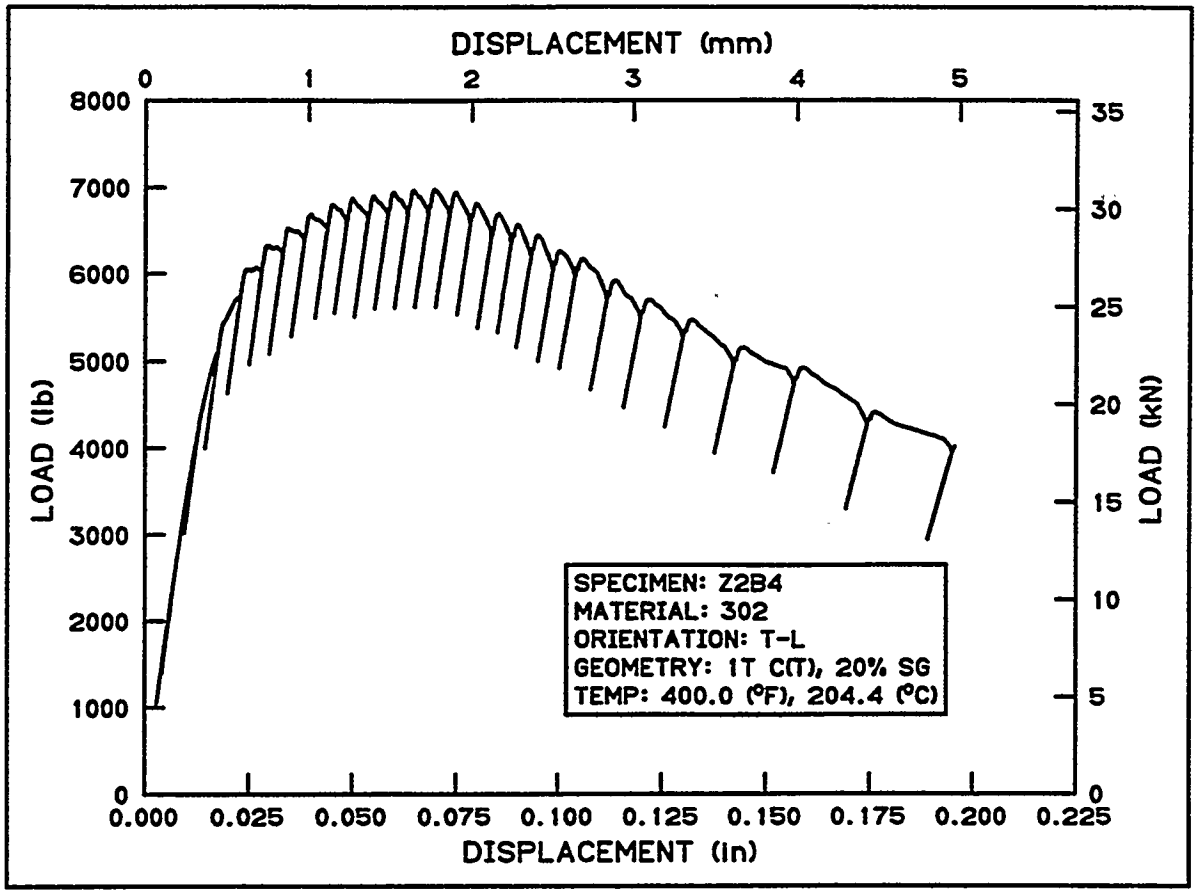

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z2B03
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

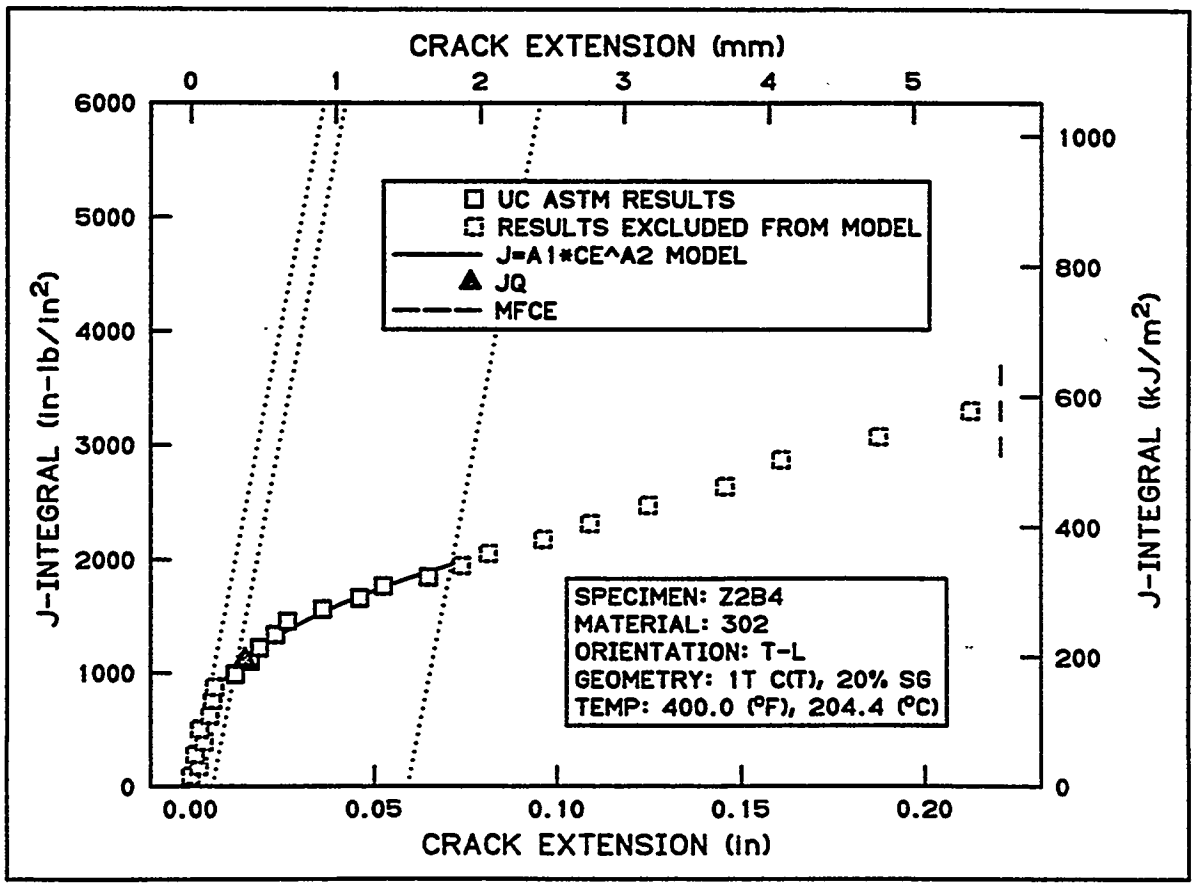

CRACK EXTENSION (mm)
0
1
2
3
4
5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B03
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B4
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2740 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3971	0.0120	0.0000	92.3
2	5055	0.0170	0.0022	173.3
3	5685	0.0216	0.0011	279.2
4	6069	0.0268	0.0035	390.1
5	6304	0.0318	0.0024	503.2
6	6487	0.0368	0.0051	623.2
7	6616	0.0419	0.0059	758.8
8	6736	0.0469	0.0064	875.0
9	6779	0.0515	0.0120	987.8
10	6819	0.0566	0.0160	1103.3
11	6852	0.0616	0.0186	1221.2
12	6884	0.0663	0.0230	1337.1
13	6898	0.0712	0.0263	1458.0
14	6835	0.0761	0.0358	1563.8
15	6711	0.0813	0.0460	1663.1
16	6628	0.0864	0.0524	1770.2
17	6541	0.0907	0.0647	1848.9
18	6395	0.0959	0.0735	1949.3
19	6189	0.1021	0.0809	2055.3
20	5999	0.1094	0.0961	2177.3
21	5714	0.1176	0.1089	2314.3
22	5460	0.1280	0.1247	2474.3
23	5156	0.1400	0.1455	2638.3
24	4907	0.1549	0.1608	2871.3
25	4496	0.1720	0.1872	3075.4
26	4094	0.1931	0.2125	3302.7

  WIDTH: 2.0011 (IN),50.828 (MM)
  THICKNESS: 1.0032 (IN),25.481 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4998 (IN),12.695 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7531 (IN),44.529 (MM)
    DISTANCE 2: 1.7714 (IN),44.994 (MM)
    DISTANCE 3: 1.7786 (IN),45.176 (MM)
    DISTANCE 4: 1.7758 (IN),45.105 (MM)
    DISTANCE 5: 1.7747 (IN),45.077 (MM)
    DISTANCE 6: 1.7748 (IN),45.080 (MM)
    DISTANCE 7: 1.7780 (IN),45.161 (MM)
    DISTANCE 8: 1.7779 (IN),45.159 (MM)
    DISTANCE 9: 1.7650 (IN),44.831 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0340 (IN),51.664 (MM)
    DISTANCE 2: 1.9990 (IN),50.775 (MM)
    DISTANCE 3: 1.9864 (IN),50.455 (MM)
    DISTANCE 4: 2.0034 (IN),50.886 (MM)
    DISTANCE 5: 1.9914 (IN),50.582 (MM)
    DISTANCE 6: 2.0035 (IN),50.889 (MM)
    DISTANCE 7: 1.9870 (IN),50.470 (MM)
    DISTANCE 8: 1.9860 (IN),50.444 (MM)
    DISTANCE 9: 1.9655 (IN),49.924 (MM)

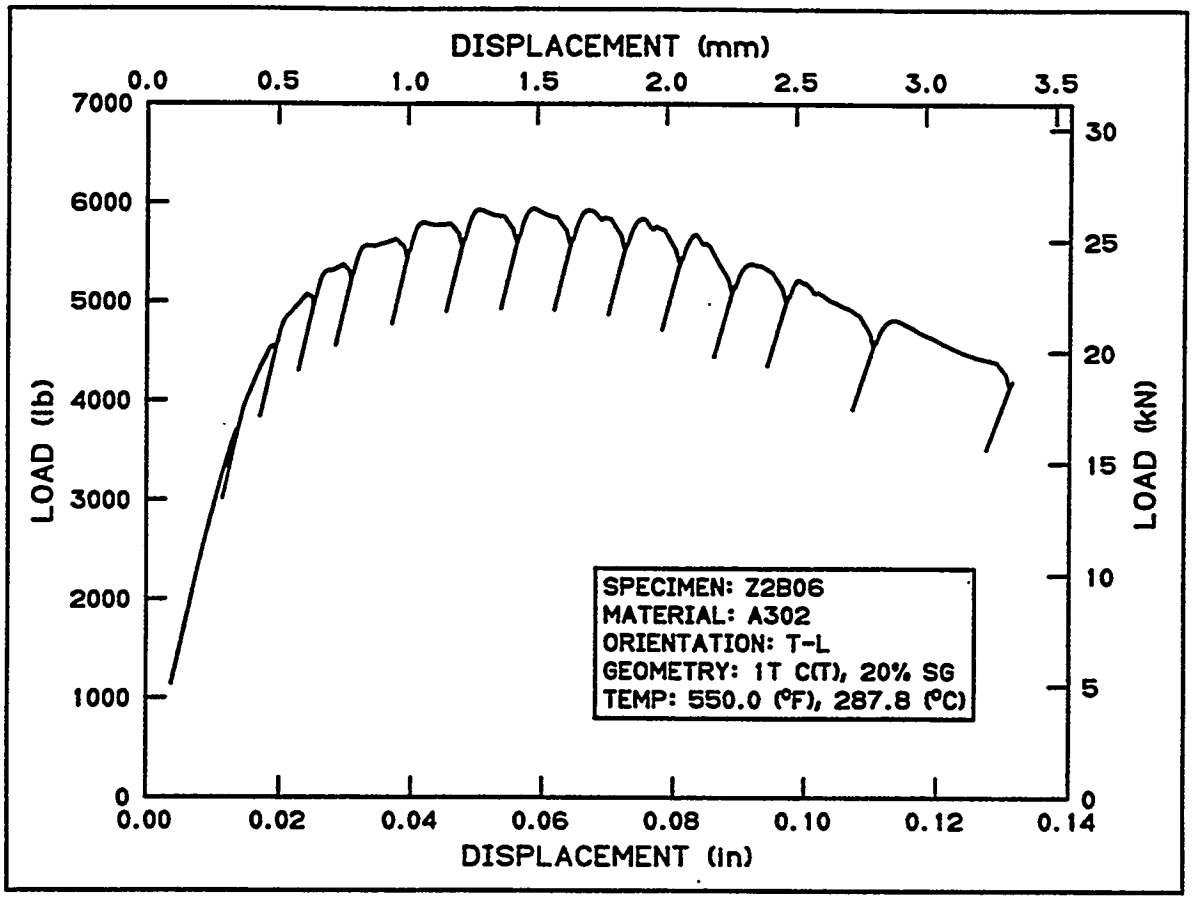

DISPLACEMENT (mm)
0
1
2
3
4
5
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z2B4
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

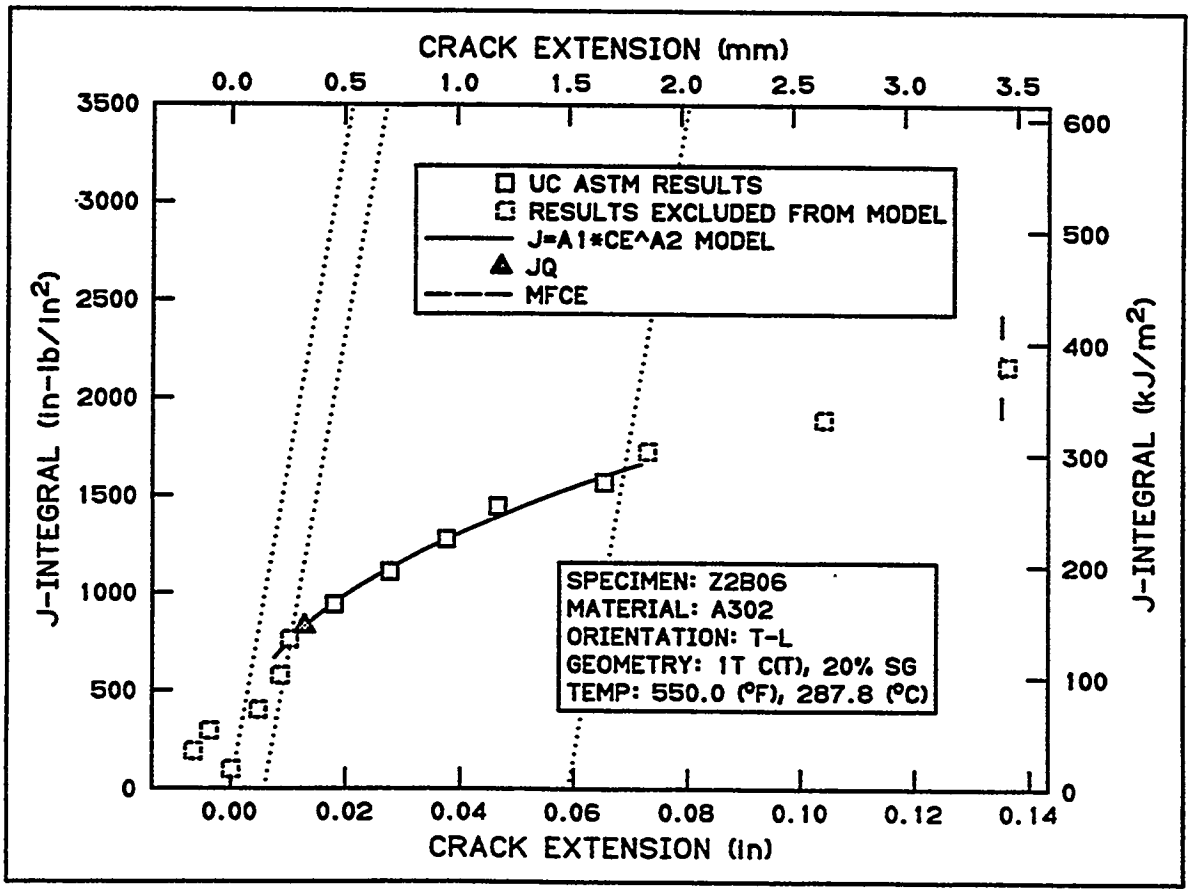

CRACK EXTENSION (mm)
0
1
2
3
4
5
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B4
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B06
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.3308 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3650	0.0132	0.0001	97.4
2	4531	0.0186	-0.0064	189.1
3	5070	0.0241	-0.0037	293.8
4	5373	0.0295	0.0048	401.8
5	5632	0.0375	0.0086	579.1
6	5787	0.0459	0.0103	763.8
7	5862	0.0540	0.0180	940.9
8	5852	0.0621	0.0276	1110.2
9	5839	0.0703	0.0376	1279.7
10	5723	0.0785	0.0465	1448.5
11	5386	0.0867	0.0653	1569.5
12	5296	0.0949	0.0730	1728.0
13	4863	0.1082	0.1040	1891.5
14	4394	0.1289	0.1361	2168.2

  WIDTH: 2.0020 (IN),50.851 (MM)
  THICKNESS: 1.0032 (IN),25.481 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4984 (IN),12.659 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7877 (IN),45.408 (MM)
    DISTANCE 2: 1.8134 (IN),46.060 (MM)
    DISTANCE 3: 1.8276 (IN),46.421 (MM)
    DISTANCE 4: 1.8378 (IN),46.680 (MM)
    DISTANCE 5: 1.8450 (IN),46.863 (MM)
    DISTANCE 6: 1.8426 (IN),46.802 (MM)
    DISTANCE 7: 1.8386 (IN),46.700 (MM)
    DISTANCE 8: 1.8298 (IN),46.477 (MM)
    DISTANCE 9: 1.8091 (IN),45.951 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0274 (IN),51.496 (MM)
    DISTANCE 2: 1.9700 (IN),50.038 (MM)
    DISTANCE 3: 1.9624 (IN),49.845 (MM)
    DISTANCE 4: 1.9776 (IN),50.231 (MM)
    DISTANCE 5: 1.9572 (IN),49.713 (MM)
    DISTANCE 6: 1.9637 (IN),49.878 (MM)
    DISTANCE 7: 1.9594 (IN),49.769 (MM)
    DISTANCE 8: 1.9635 (IN),49.873 (MM)
    DISTANCE 9: 1.8926 (IN),48.072 (MM)

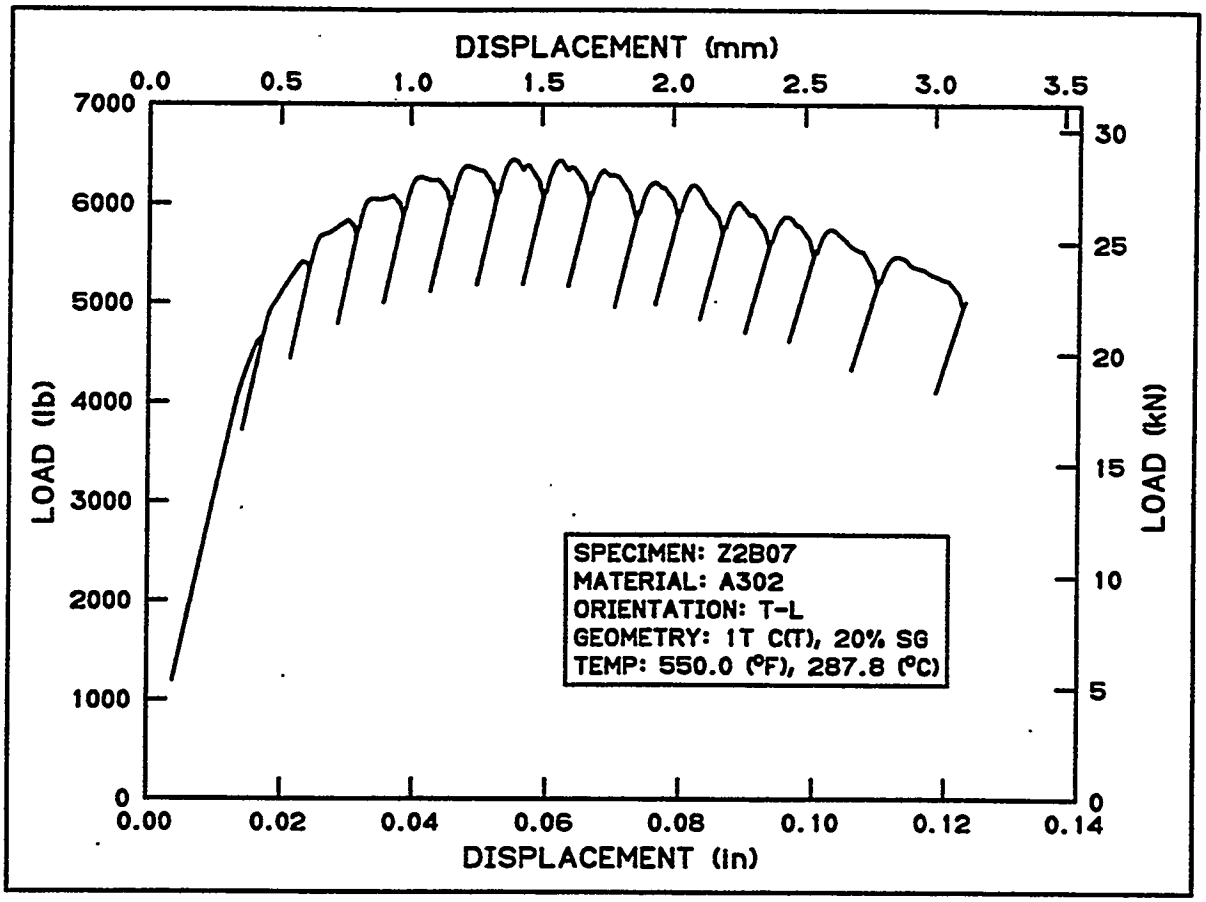

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z2B06
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

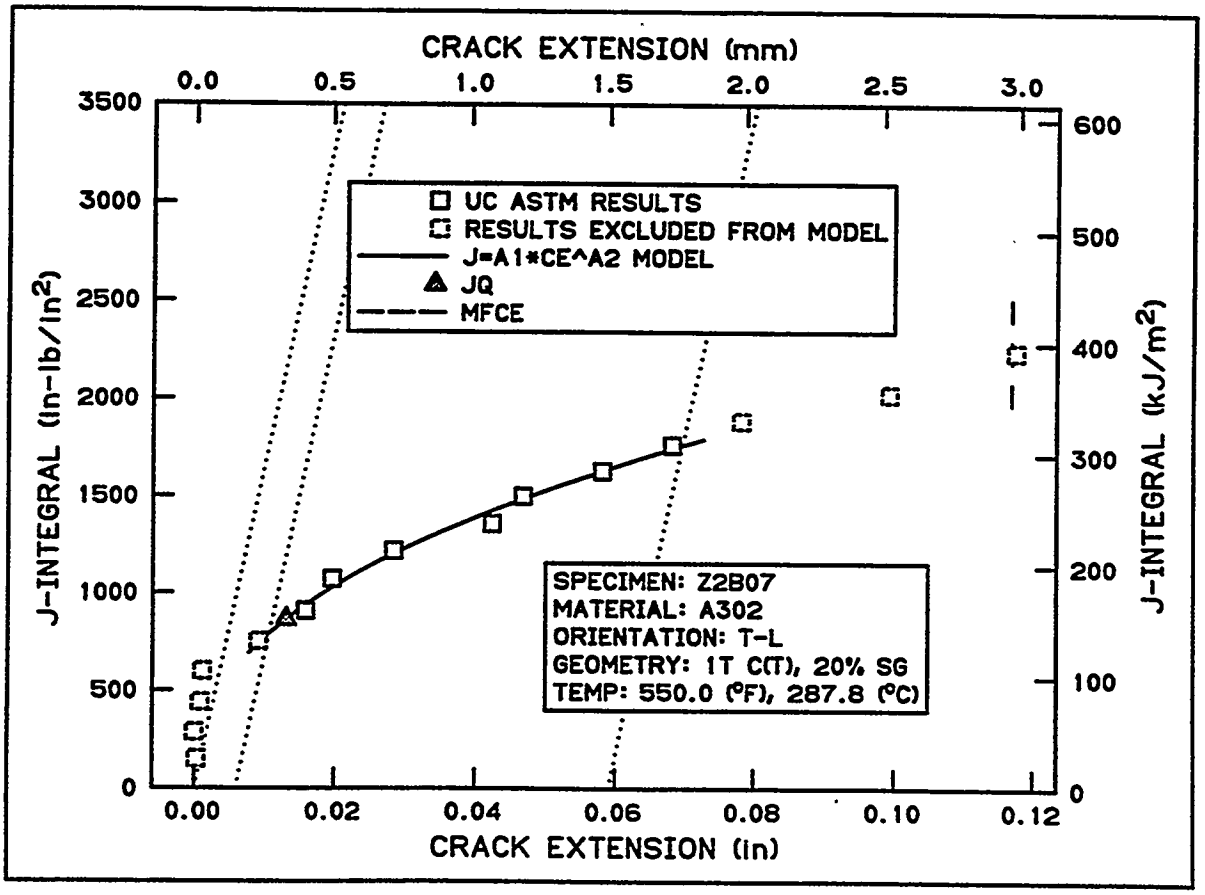

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B06
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z2B07
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.3143 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4603	0.0162	0.0003	151.2
2	5414	0.0230	0.0000	287.9
3	5837	0.0299	0.0008	441.1
4	6083	0.0367	0.0011	599.8
5	6241	0.0435	0.0091	752.2
6	6330	0.0502	0.0159	907.5
7	6380	0.0572	0.0197	1073.0
8	6361	0.0638	0.0286	1219.9
9	6270	0.0706	0.0424	1360.2
10	6169	0.0774	0.0469	1500.8
11	5991	0.0841	0.0581	1629.2
12	5899	0.0909	0.0682	1762.7
13	5786	0.0977	0.0781	1886.1
14	5529	0.1072	0.0993	2024.8
15	5234	0.1203	0.1175	2243.4

WIDTH: 2.0020 (IN),50.851 (MM)
THICKNESS: 1.0030 (IN),25.476 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4988 (IN),12.670 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7780 (IN),45.161 (MM)
DISTANCE 2: 1.7942 (IN),45.573 (MM)
DISTANCE 3: 1.8074 (IN),45.908 (MM)
DISTANCE 4: 1.8149 (IN),46.098 (MM)
DISTANCE 5: 1.8216 (IN),46.269 (MM)
DISTANCE 6: 1.8242 (IN),46.335 (MM)
DISTANCE 7: 1.8258 (IN),46.375 (MM)
DISTANCE 8: 1.8224 (IN),46.289 (MM)
DISTANCE 9: 1.8101 (IN),45.977 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9745 (IN),50.152 (MM)
DISTANCE 2: 1.9412 (IN),49.306 (MM)
DISTANCE 3: 1.9245 (IN),48.882 (MM)
DISTANCE 4: 1.9052 (IN),48.392 (MM)
DISTANCE 5: 1.9238 (IN),48.865 (MM)
DISTANCE 6: 1.9171 (IN),48.694 (MM)
DISTANCE 7: 1.9252 (IN),48.900 (MM)
DISTANCE 8: 1.9315 (IN),49.060 (MM)
DISTANCE 9: 1.9684 (IN),49.997 (MM)

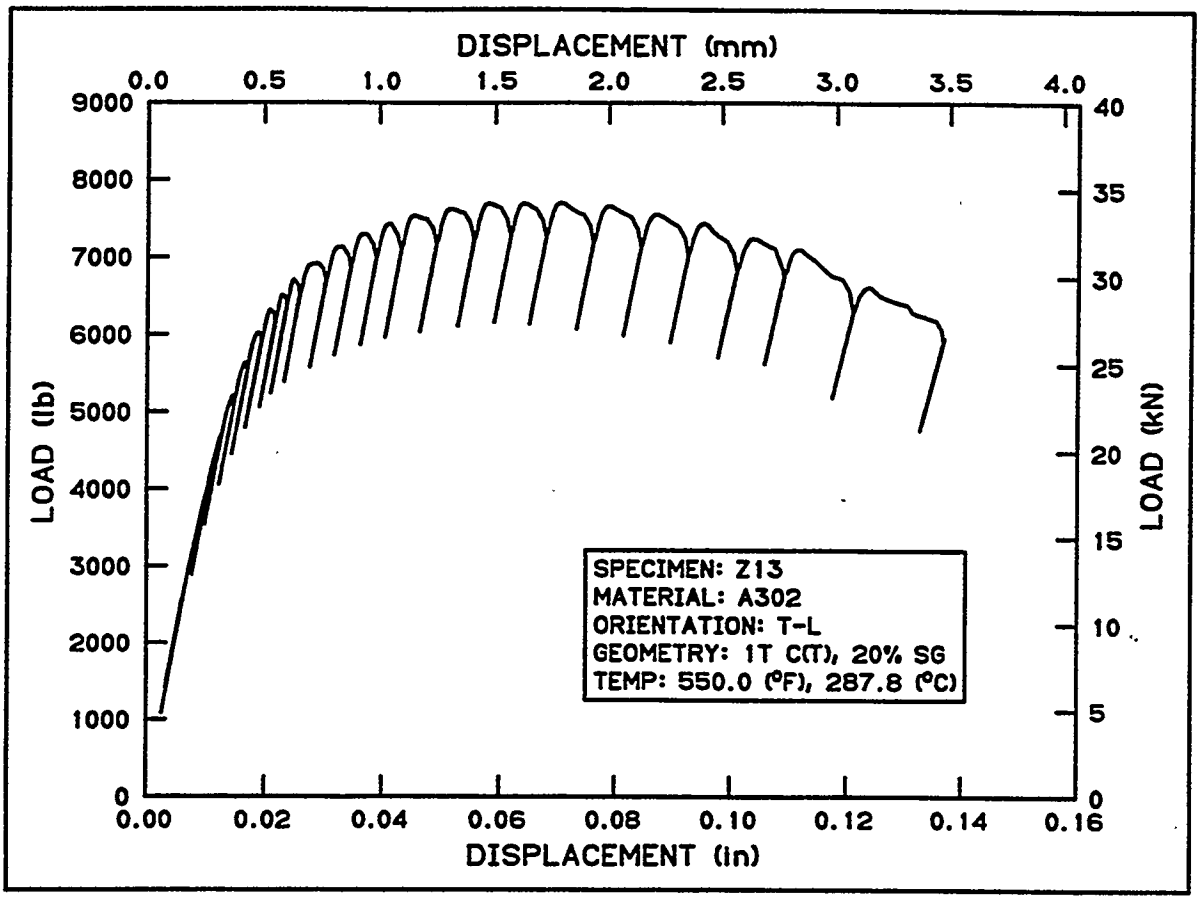

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z2B07
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

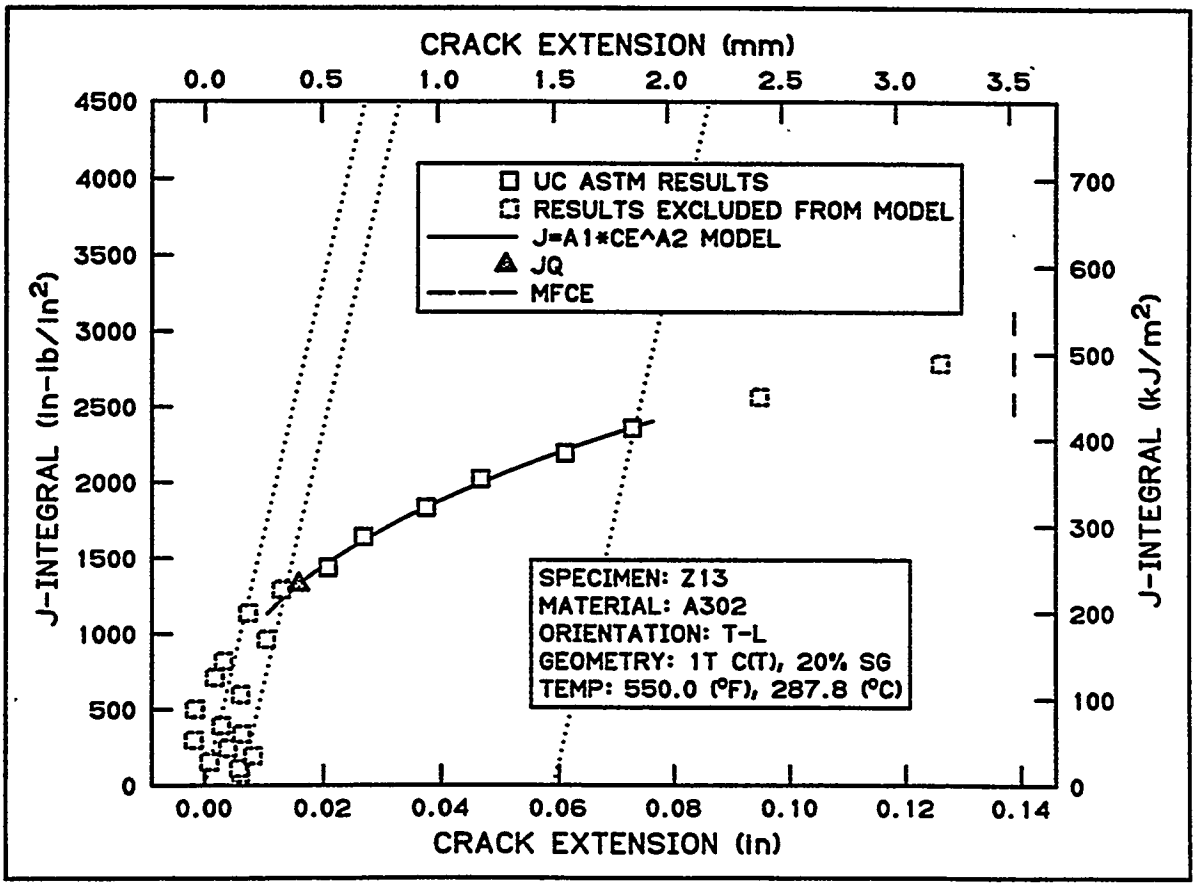

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B07
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z13
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2486 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3955	0.0101	0.0060	77.7
2	4660	0.0123	0.0057	111.3
3	5192	0.0143	0.0008	153.1
4	5631	0.0165	0.0081	193.7
5	6018	0.0186	0.0038	243.0
6	6315	0.0207	-0.0018	298.0
7	6505	0.0227	0.0062	338.3
8	6708	0.0248	0.0028	393.8
9	6921	0.0289	-0.0016	503.3
10	7133	0.0331	0.0060	599.0
11	7287	0.0372	0.0017	713.2
12	7420	0.0413	0.0031	821.8
13	7476	0.0474	0.0103	966.3
14	7558	0.0538	0.0073	1140.4
15	7632	0.0600	0.0129	1295.7
16	7613	0.0661	0.0208	1440.3
17	7545	0.0743	0.0268	1644.3
18	7513	0.0826	0.0375	1836.1
19	7399	0.0908	0.0467	2025.0
20	7209	0.0993	0.0611	2193.1
21	7121	0.1074	0.0728	2360.7
22	6716	0.1192	0.0948	2567.5
23	6193	0.1354	0.1259	2792.4

WIDTH: 2.0006 (IN),50.815 (MM)
THICKNESS: 1.0038 (IN),25.497 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5016 (IN),12.741 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7327 (IN),44.011 (MM)
DISTANCE 2: 1.7456 (IN),44.338 (MM)
DISTANCE 3: 1.7536 (IN),44.541 (MM)
DISTANCE 4: 1.7559 (IN),44.600 (MM)
DISTANCE 5: 1.7584 (IN),44.663 (MM)
DISTANCE 6: 1.7571 (IN),44.630 (MM)
DISTANCE 7: 1.7477 (IN),44.392 (MM)
DISTANCE 8: 1.7481 (IN),44.402 (MM)
DISTANCE 9: 1.7374 (IN),44.130 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9356 (IN),49.164 (MM)
DISTANCE 2: 1.8941 (IN),48.110 (MM)
DISTANCE 3: 1.8850 (IN),47.879 (MM)
DISTANCE 4: 1.8695 (IN),47.485 (MM)
DISTANCE 5: 1.8611 (IN),47.272 (MM)
DISTANCE 6: 1.8923 (IN),48.064 (MM)
DISTANCE 7: 1.8912 (IN),48.036 (MM)
DISTANCE 8: 1.9048 (IN),48.382 (MM)
DISTANCE 9: 1.8924 (IN),48.067 (MM)

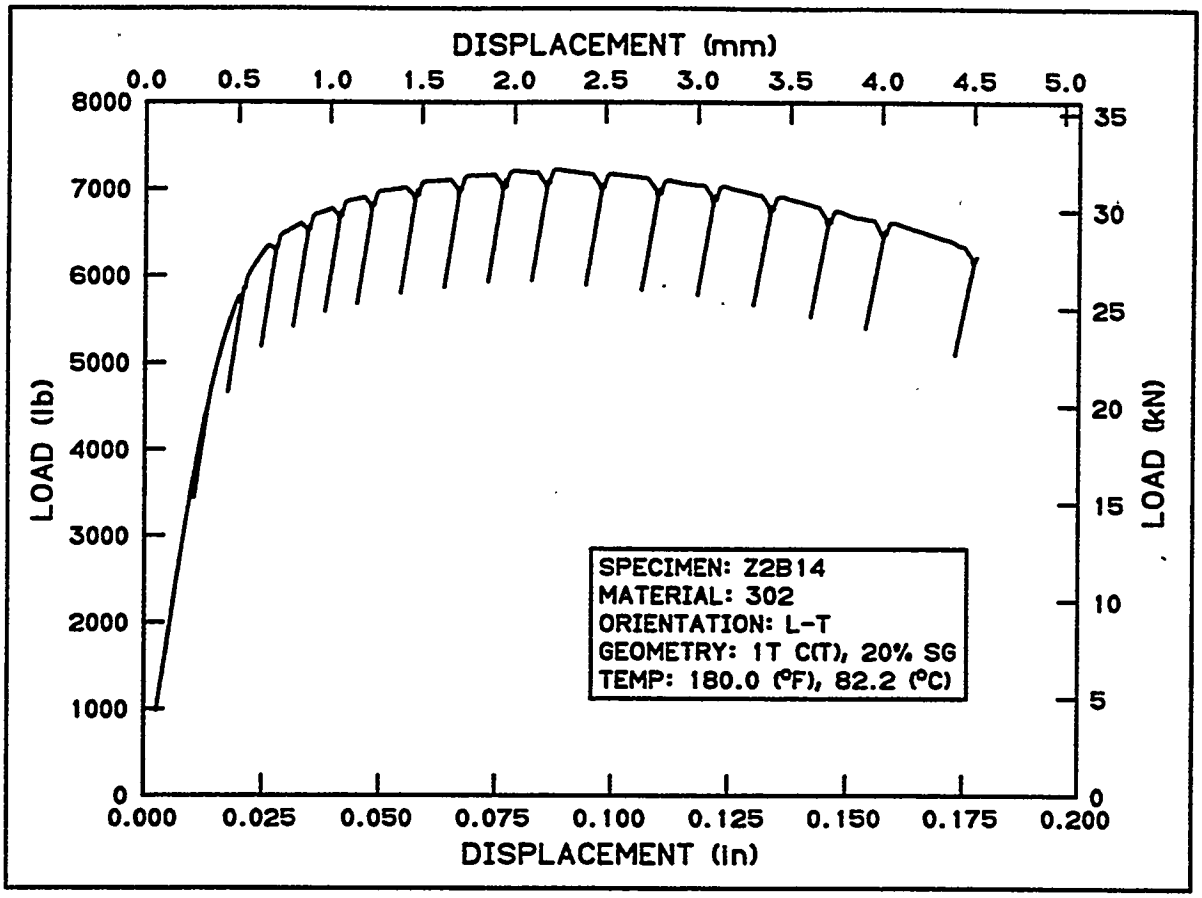

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
40
35
30
25
20
15
10
5
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)
SPECIMEN: Z13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

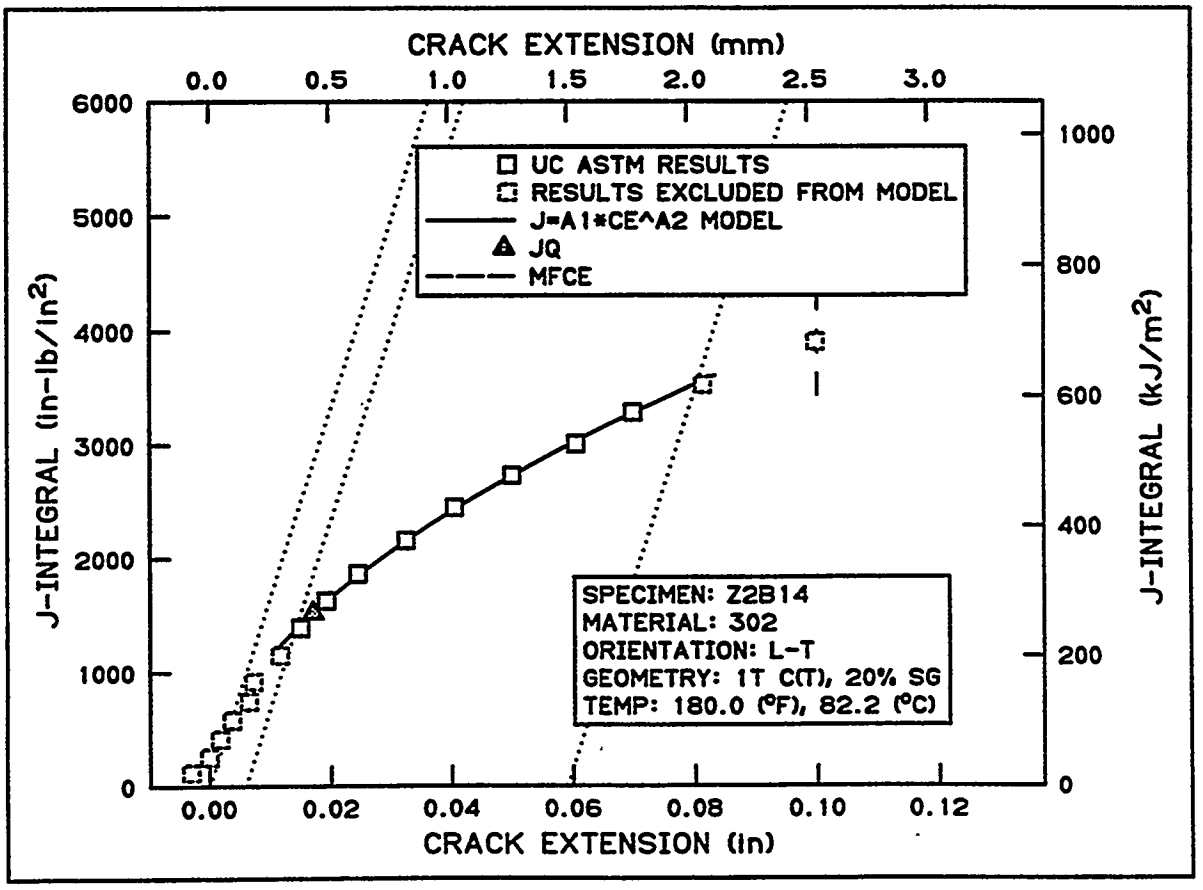

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
J-INTEGRAL (in-lb/in²)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z2B14
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2825 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4432	0.0130	-0.0029	117.8
2	5748	0.0198	0.0000	254.6
3	6347	0.0262	0.0018	413.1
4	6598	0.0331	0.0037	578.1
5	6769	0.0397	0.0065	742.4
6	6901	0.0466	0.0073	916.1
7	7017	0.0555	0.0116	1150.0
8	7106	0.0652	0.0150	1392.2
9	7165	0.0745	0.0193	1629.2
10	7189	0.0838	0.0245	1868.1
11	7169	0.0956	0.0324	2160.2
12	7121	0.1074	0.0405	2451.6
13	7039	0.1195	0.0499	2733.3
14	6927	0.1317	0.0605	3005.6
15	6791	0.1438	0.0699	3281.2
16	6638	0.1558	0.0814	3525.7
17	6336	0.1751	0.0998	3902.8

  WIDTH: 2.0040 (IN),50.902 (MM)
  THICKNESS: 1.0052 (IN),25.532 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4998 (IN),12.695 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7680 (IN),44.907 (MM)
    DISTANCE 2: 1.7812 (IN),45.242 (MM)
    DISTANCE 3: 1.7860 (IN),45.364 (MM)
    DISTANCE 4: 1.7892 (IN),45.446 (MM)
    DISTANCE 5: 1.7881 (IN),45.418 (MM)
    DISTANCE 6: 1.7889 (IN),45.438 (MM)
    DISTANCE 7: 1.7846 (IN),45.329 (MM)
    DISTANCE 8: 1.7766 (IN),45.126 (MM)
    DISTANCE 9: 1.7596 (IN),44.694 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9154 (IN),48.651 (MM)
    DISTANCE 2: 1.8436 (IN),46.827 (MM)
    DISTANCE 3: 1.8754 (IN),47.635 (MM)
    DISTANCE 4: 1.8810 (IN),47.777 (MM)
    DISTANCE 5: 1.8744 (IN),47.610 (MM)
    DISTANCE 6: 1.8742 (IN),47.605 (MM)
    DISTANCE 7: 1.9126 (IN),48.580 (MM)
    DISTANCE 8: 1.8909 (IN),48.029 (MM)
    DISTANCE 9: 1.8970 (IN),48.184 (MM)

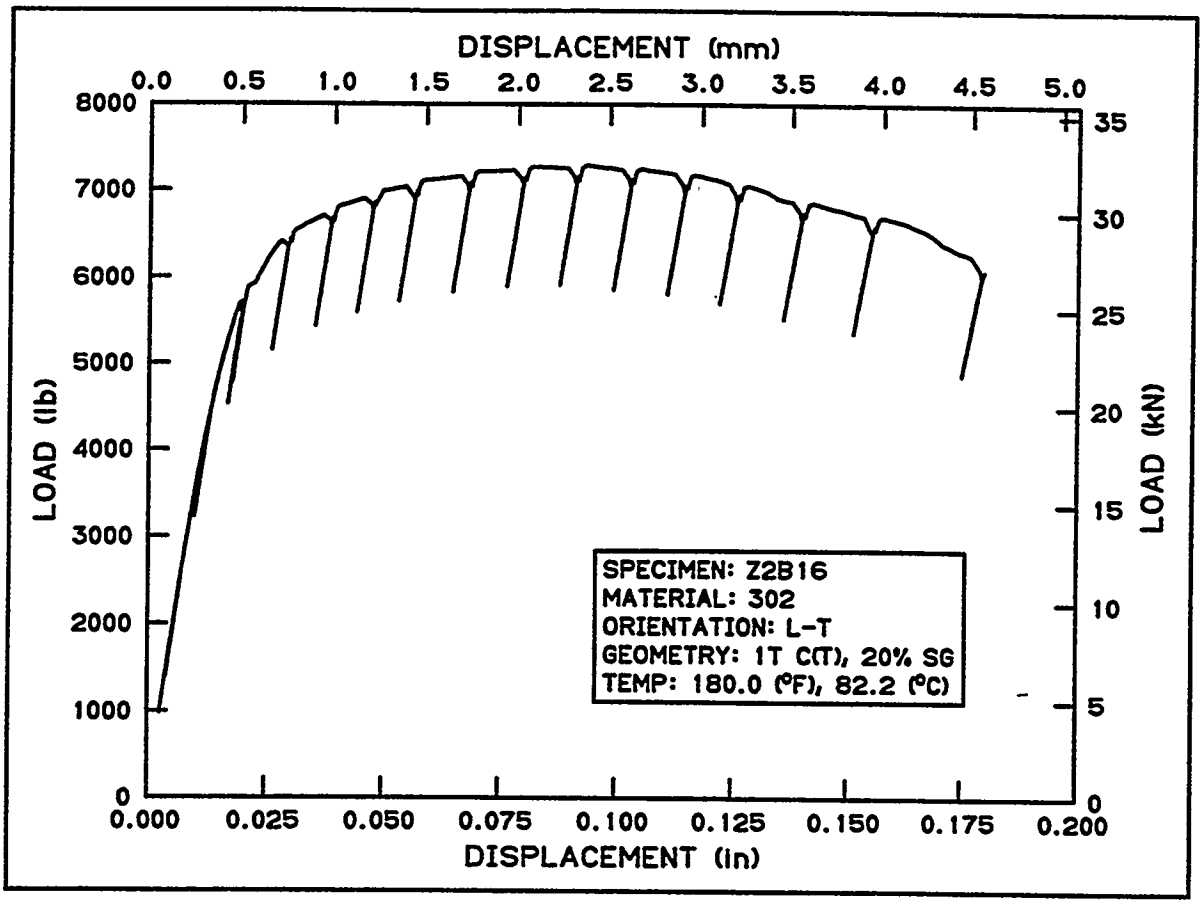

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
35 30 25 20 15 10 5 0
LOAD (kN)
SPECIMEN: Z2B14
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

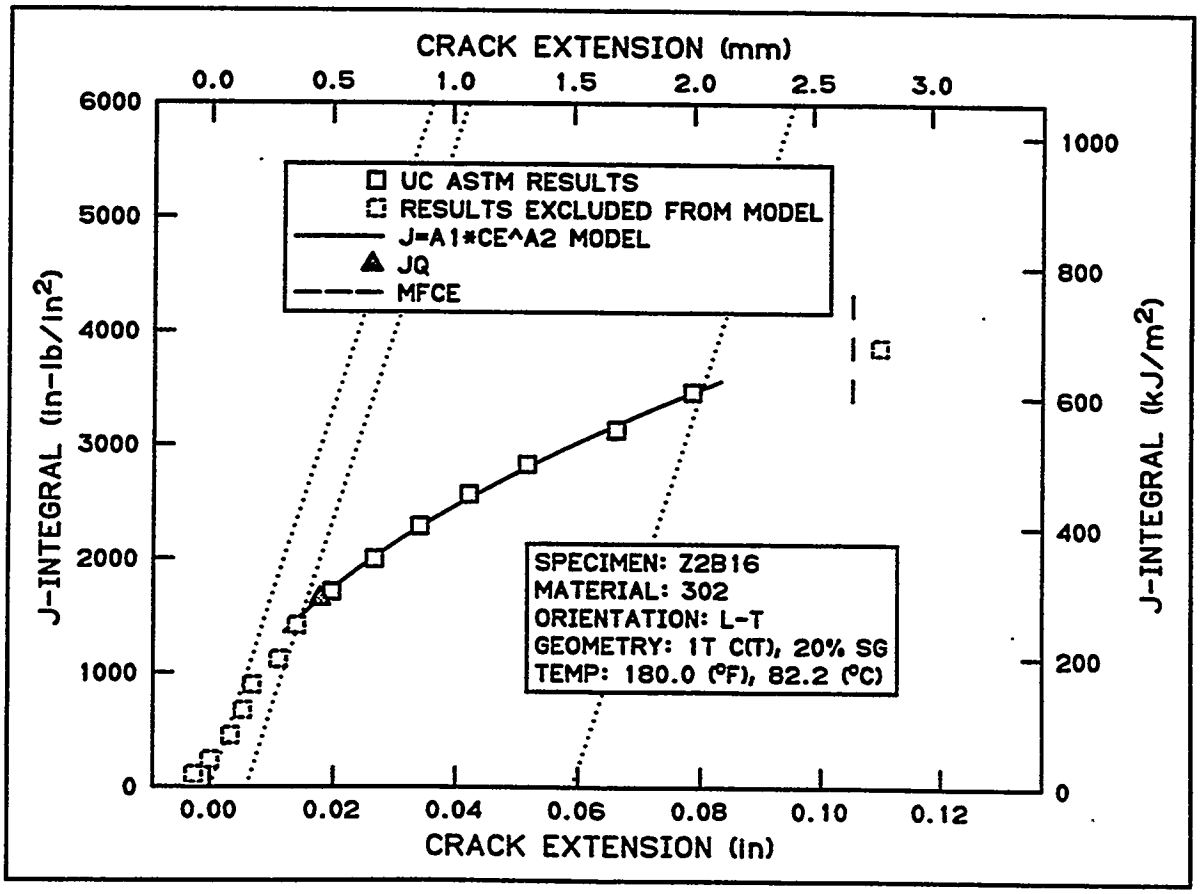

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B14
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B16
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2793 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4275	0.0125	-0.0026	110.5
2	5681	0.0191	0.0000	239.6
3	6406	0.0281	0.0033	453.1
4	6701	0.0369	0.0053	673.9
5	6895	0.0457	0.0068	896.1
6	7036	0.0546	0.0112	1120.4
7	7162	0.0664	0.0141	1420.6
8	7234	0.0776	0.0198	1714.9
9	7257	0.0894	0.0267	2002.1
10	7239	0.1009	0.0341	2291.8
11	7193	0.1123	0.0422	2571.6
12	7076	0.1239	0.0516	2835.0
13	6875	0.1378	0.0661	3135.5
14	6709	0.1532	0.0786	3467.0
15	6255	0.1767	0.1096	3866.4

  WIDTH: 2.0055 (IN),50.940 (MM)
  THICKNESS: 1.0052 (IN),25.532 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4999 (IN),12.697 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7453 (IN),44.331 (MM)
    DISTANCE 2: 1.7698 (IN),44.953 (MM)
    DISTANCE 3: 1.7787 (IN),45.179 (MM)
    DISTANCE 4: 1.7828 (IN),45.283 (MM)
    DISTANCE 5: 1.7867 (IN),45.382 (MM)
    DISTANCE 6: 1.7870 (IN),45.390 (MM)
    DISTANCE 7: 1.7882 (IN),45.420 (MM)
    DISTANCE 8: 1.7846 (IN),45.329 (MM)
    DISTANCE 9: 1.7668 (IN),44.877 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8752 (IN),47.630 (MM)
    DISTANCE 2: 1.8808 (IN),47.772 (MM)
    DISTANCE 3: 1.8884 (IN),47.965 (MM)
    DISTANCE 4: 1.8936 (IN),48.097 (MM)
    DISTANCE 5: 1.8686 (IN),47.462 (MM)
    DISTANCE 6: 1.8702 (IN),47.503 (MM)
    DISTANCE 7: 1.8808 (IN),47.772 (MM)
    DISTANCE 8: 1.8987 (IN),48.227 (MM)
    DISTANCE 9: 1.9118 (IN),48.560 (MM)

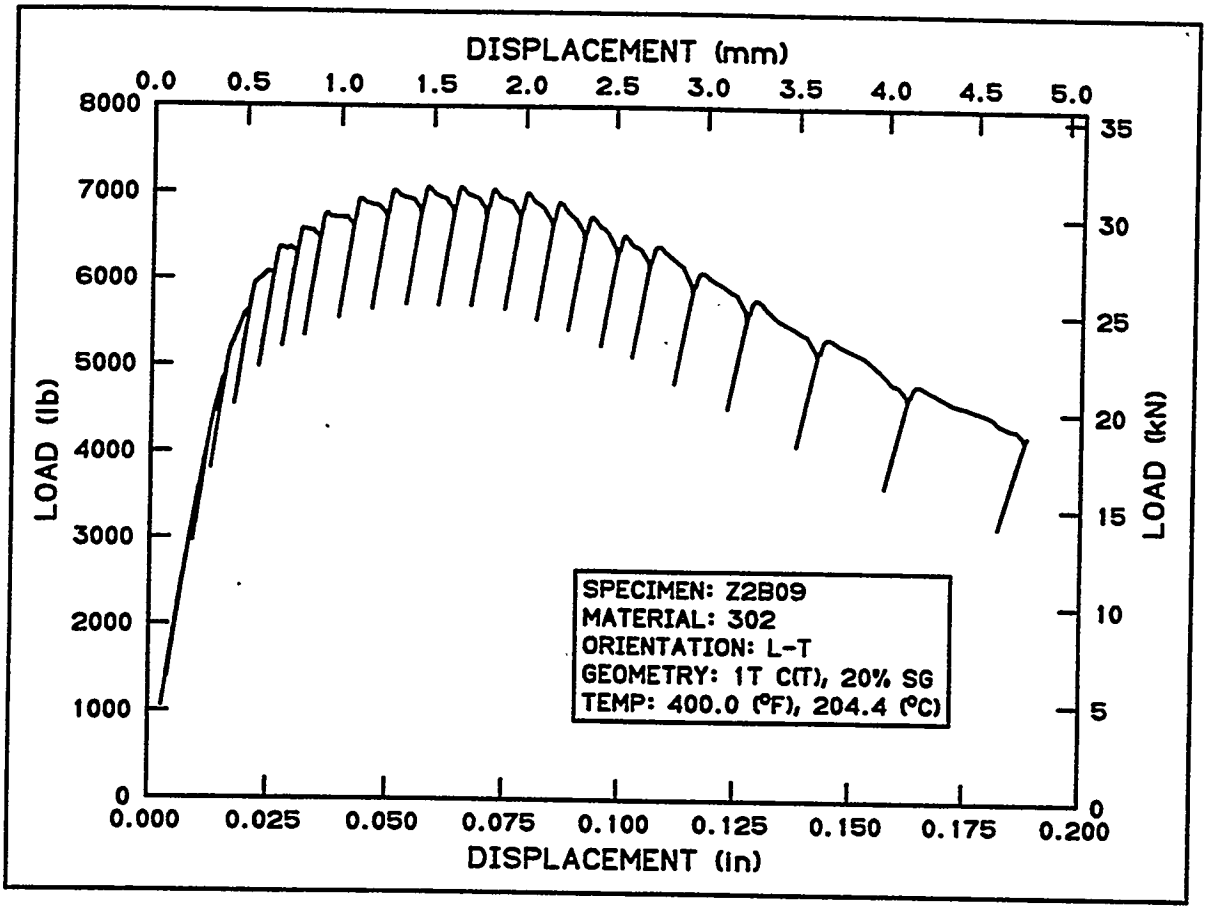

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
35 30 25 20 15 10 5 0
SPECIMEN: Z2B16
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

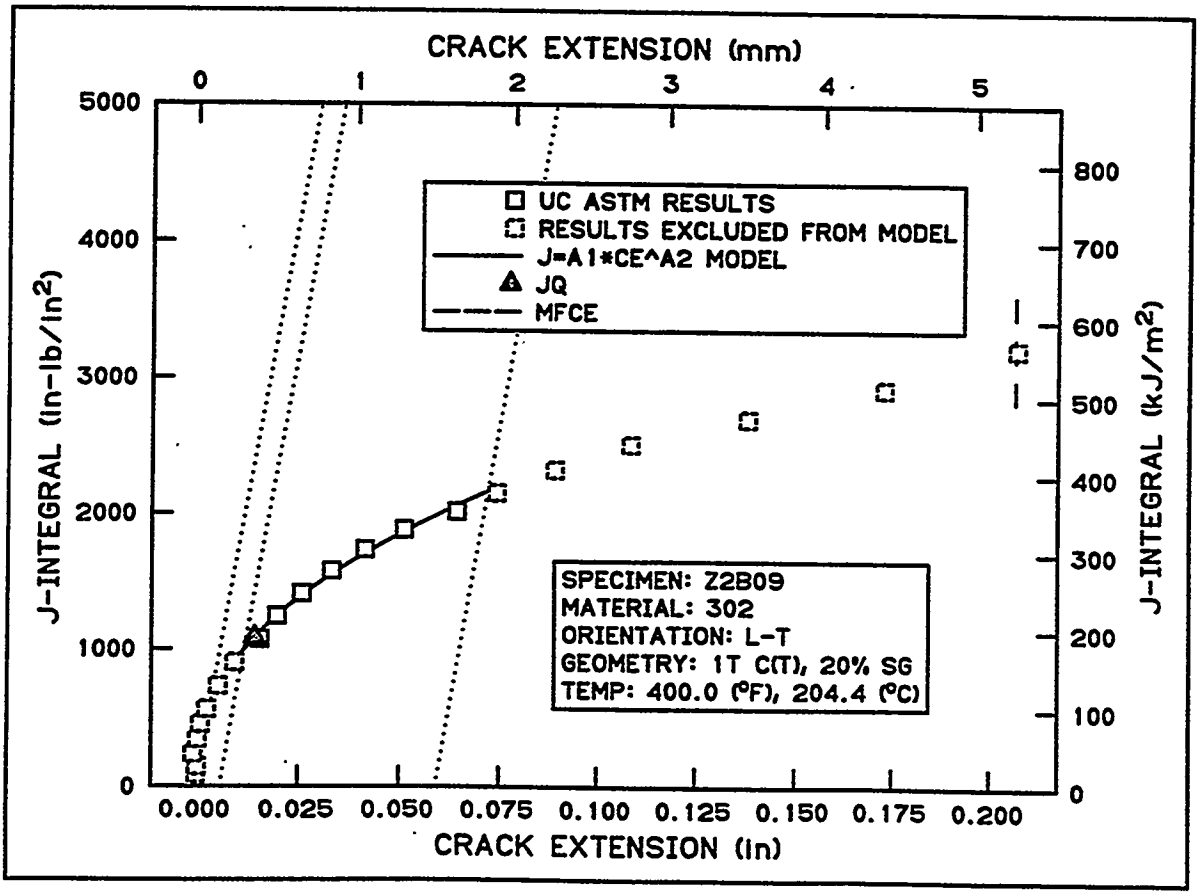

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B16
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B09
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2747 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3923	0.0114	0.0000	86.8
2	4824	0.0151	0.0002	145.3
3	5595	0.0196	-0.0007	238.1
4	6079	0.0242	0.0004	344.9
5	6360	0.0290	0.0012	453.2
6	6558	0.0335	0.0027	561.7
7	6719	0.0406	0.0055	731.9
8	6853	0.0474	0.0096	903.8
9	6927	0.0547	0.0157	1075.5
10	6937	0.0616	0.0200	1245.5
11	6944	0.0686	0.0260	1412.1
12	6903	0.0759	0.0333	1580.1
13	6833	0.0827	0.0415	1737.9
14	6710	0.0897	0.0511	1884.8
15	6544	0.0968	0.0643	2018.4
16	6363	0.1039	0.0743	2154.3
17	6164	0.1131	0.0892	2322.9
18	5828	0.1248	0.1085	2509.8
19	5364	0.1398	0.1380	2699.5
20	4794	0.1602	0.1729	2923.2
21	4312	0.1858	0.2068	3222.0

  WIDTH: 2.0042 (IN),50.907 (MM)
  THICKNESS: 1.0052 (IN),25.532 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5007 (IN),12.718 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7368 (IN),44.115 (MM)
    DISTANCE 2: 1.7636 (IN),44.795 (MM)
    DISTANCE 3: 1.7758 (IN),45.105 (MM)
    DISTANCE 4: 1.7824 (IN),45.273 (MM)
    DISTANCE 5: 1.7889 (IN),45.438 (MM)
    DISTANCE 6: 1.7878 (IN),45.410 (MM)
    DISTANCE 7: 1.7869 (IN),45.387 (MM)
    DISTANCE 8: 1.7760 (IN),45.110 (MM)
    DISTANCE 9: 1.7472 (IN),44.379 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0132 (IN),51.135 (MM)
    DISTANCE 2: 1.9791 (IN),50.269 (MM)
    DISTANCE 3: 1.9756 (IN),50.180 (MM)
    DISTANCE 4: 1.9602 (IN),49.789 (MM)
    DISTANCE 5: 1.9832 (IN),50.373 (MM)
    DISTANCE 6: 1.9531 (IN),49.609 (MM)
    DISTANCE 7: 1.9826 (IN),50.358 (MM)
    DISTANCE 8: 1.9936 (IN),50.637 (MM)
    DISTANCE 9: 2.0396 (IN),51.806 (MM)

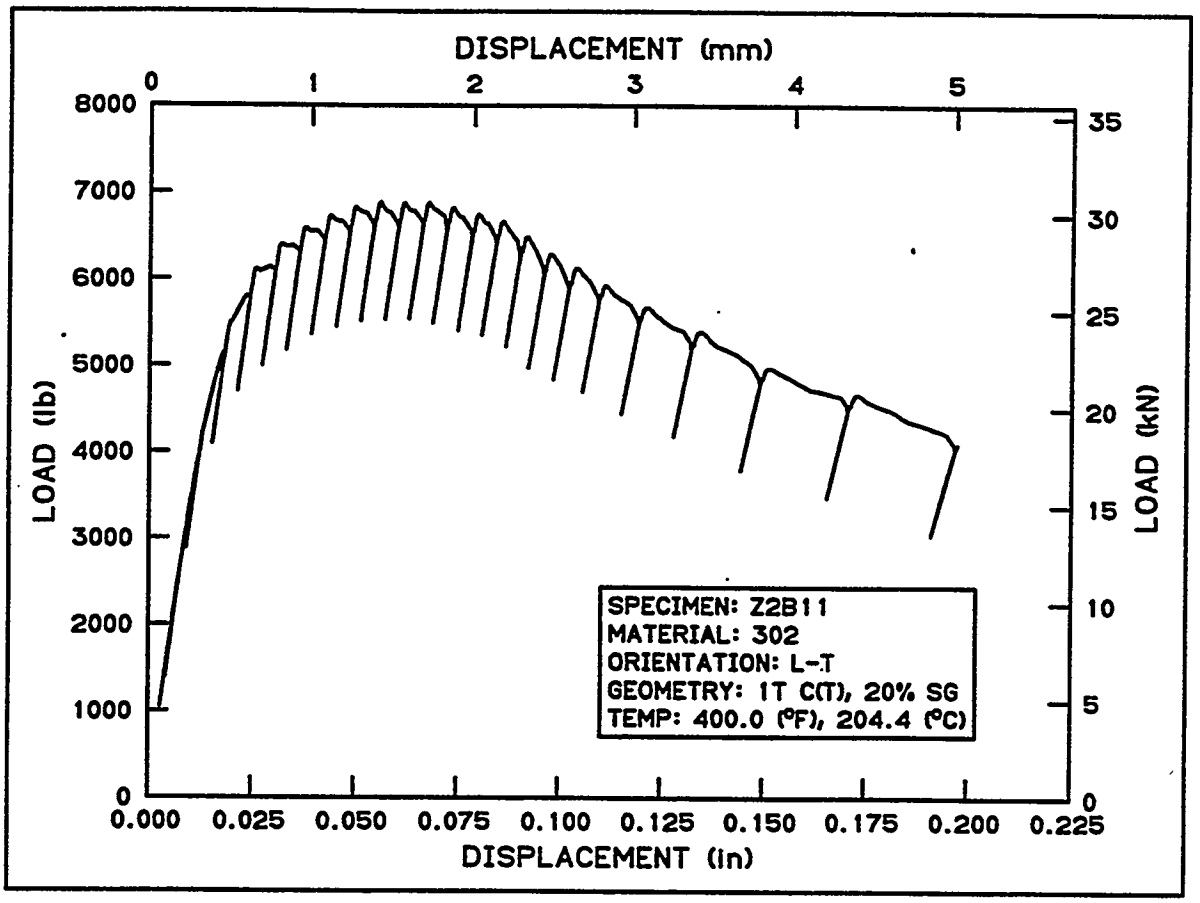

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
35 30 25 20 15 10 5 0
SPECIMEN: Z2B09
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

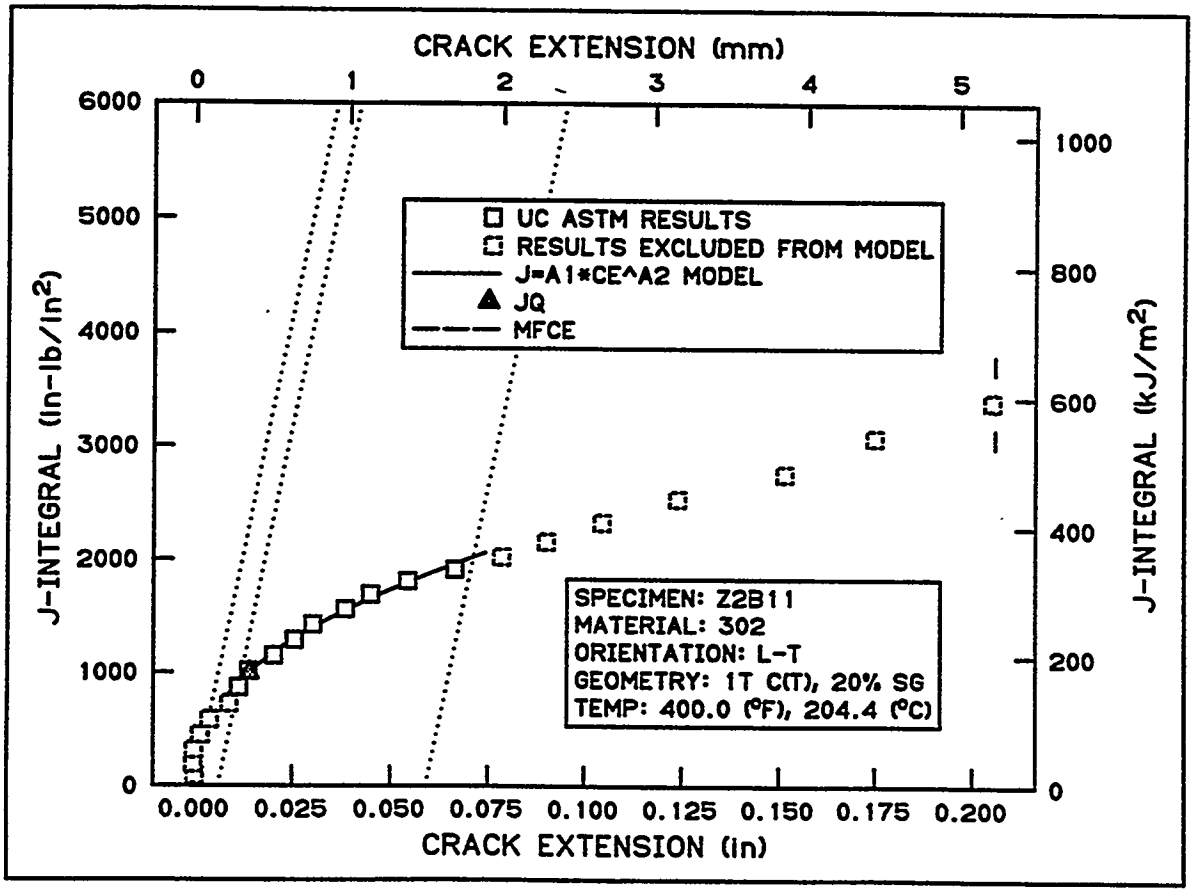

CRACK EXTENSION (mm)
0 1 2 3 4 5
J-INTEGRAL (in-lb/in²)
5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
800 700 600 500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B09
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B11
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2875 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3849	0.0116	0.0000	87.9
2	5108	0.0175	-0.0003	191.1
3	5798	0.0233	-0.0001	314.8
4	6139	0.0292	0.0014	450.0
5	6380	0.0347	0.0037	584.3
6	6548	0.0408	0.0087	724.8
7	6658	0.0467	0.0112	868.2
8	6754	0.0526	0.0138	1013.8
9	6758	0.0583	0.0203	1150.0
10	6784	0.0640	0.0256	1289.1
11	6768	0.0701	0.0303	1427.1
12	6691	0.0762	0.0385	1564.6
13	6637	0.0821	0.0449	1697.0
14	6539	0.0877	0.0544	1816.8
15	6328	0.0939	0.0665	1918.6
16	6154	0.1000	0.0785	2027.1
17	5956	0.1076	0.0901	2158.6
18	5696	0.1173	0.1046	2327.4
19	5400	0.1304	0.1240	2534.7
20	5001	0.1471	0.1515	2755.9
21	4641	0.1690	0.1749	3075.9
22	4209	0.1948	0.2051	3395.5

  WIDTH: 2.0047 (IN),50.919 (MM)
  THICKNESS: 1.0050 (IN),25.527 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.4996 (IN),12.690 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7581 (IN),44.656 (MM)
    DISTANCE 2: 1.7816 (IN),45.253 (MM)
    DISTANCE 3: 1.7923 (IN),45.524 (MM)
    DISTANCE 4: 1.7978 (IN),45.664 (MM)
    DISTANCE 5: 1.7993 (IN),45.702 (MM)
    DISTANCE 6: 1.7948 (IN),45.588 (MM)
    DISTANCE 7: 1.7926 (IN),45.532 (MM)
    DISTANCE 8: 1.7804 (IN),45.222 (MM)
    DISTANCE 9: 1.7575 (IN),44.641 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0336 (IN),51.653 (MM)
    DISTANCE 2: 2.0110 (IN),51.079 (MM)
    DISTANCE 3: 1.9998 (IN),50.795 (MM)
    DISTANCE 4: 1.9824 (IN),50.353 (MM)
    DISTANCE 5: 2.0035 (IN),50.889 (MM)
    DISTANCE 6: 1.9590 (IN),49.759 (MM)
    DISTANCE 7: 1.9852 (IN),50.424 (MM)
    DISTANCE 8: 1.9798 (IN),50.287 (MM)
    DISTANCE 9: 2.0100 (IN),51.054 (MM)

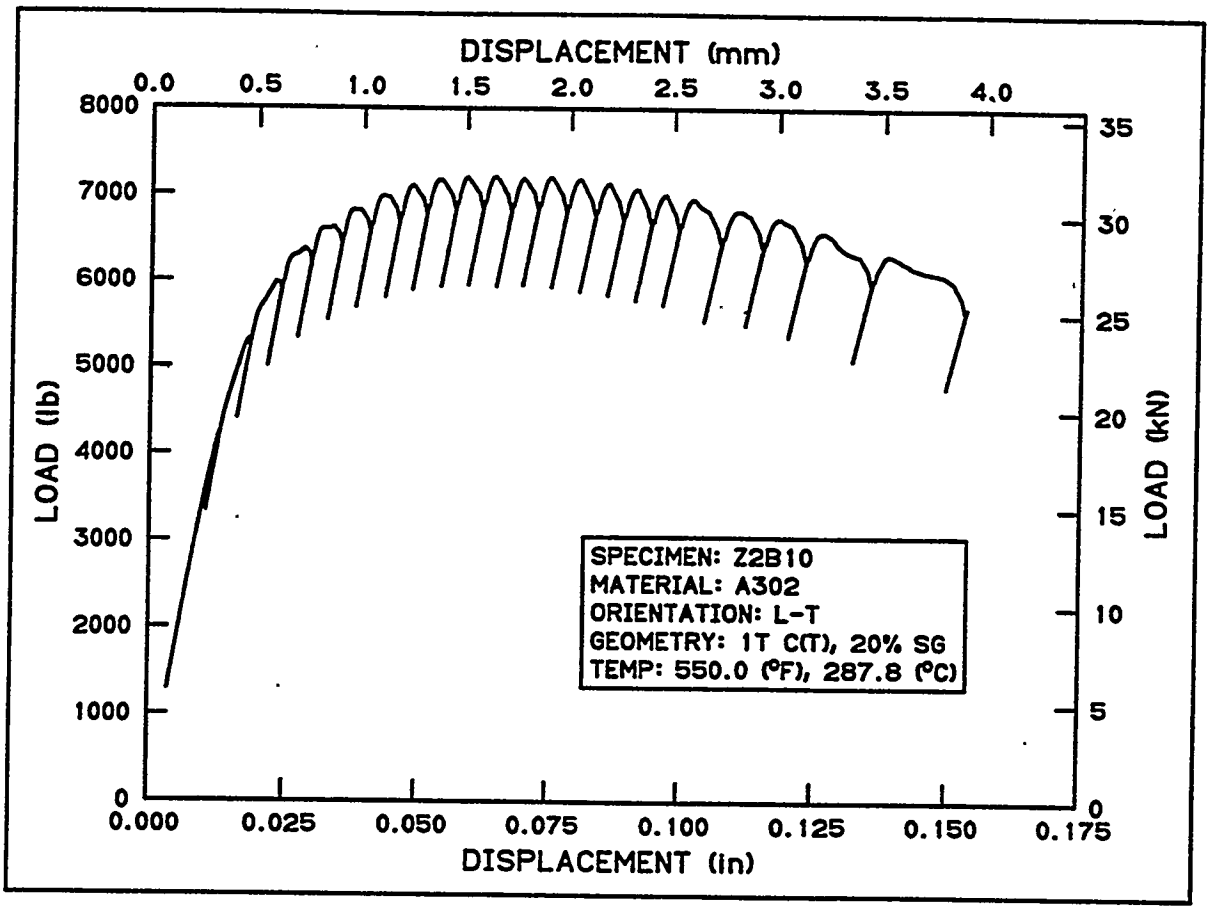

DISPLACEMENT (mm)
0
1
2
3
4
5
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z2B11
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

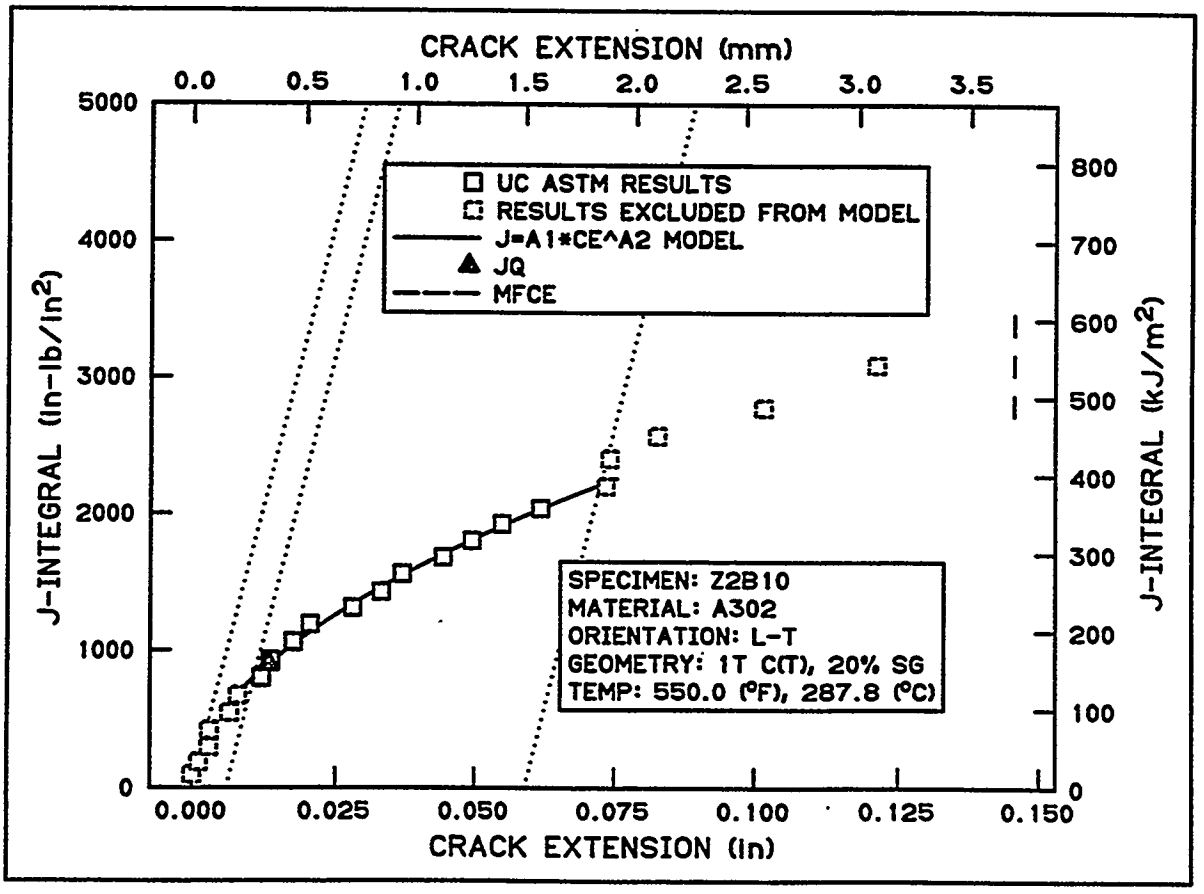

CRACK EXTENSION (mm)
0
1
2
3
4
5
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B11
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B10
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2687 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4190	0.0126	0.0000	95.2
2	5296	0.0178	0.0012	185.6
3	5975	0.0231	0.0029	296.0
4	6365	0.0283	0.0030	417.6
5	6622	0.0337	0.0065	545.1
6	6811	0.0389	0.0080	672.4
7	6965	0.0443	0.0120	802.6
8	7040	0.0495	0.0137	930.3
9	7123	0.0548	0.0176	1063.2
10	7142	0.0599	0.0205	1191.9
11	7168	0.0652	0.0281	1314.1
12	7144	0.0705	0.0332	1432.2
13	7164	0.0756	0.0369	1563.7
14	7169	0.0808	0.0443	1684.0
15	7123	0.0862	0.0495	1806.0
16	7065	0.0915	0.0549	1927.7
17	7005	0.0969	0.0618	2041.5
18	6824	0.1049	0.0734	2204.0
19	6770	0.1127	0.0741	2404.6
20	6655	0.1206	0.0826	2570.2
21	6301	0.1332	0.1016	2777.5
22	5996	0.1507	0.1212	3095.9

  WIDTH: 2.0050 (IN),50.927 (MM)
  THICKNESS: 1.0050 (IN),25.527 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7532 (IN),44.531 (MM)
    DISTANCE 2: 1.7681 (IN),44.910 (MM)
    DISTANCE 3: 1.7770 (IN),45.136 (MM)
    DISTANCE 4: 1.7781 (IN),45.164 (MM)
    DISTANCE 5: 1.7809 (IN),45.235 (MM)
    DISTANCE 6: 1.7780 (IN),45.161 (MM)
    DISTANCE 7: 1.7713 (IN),44.991 (MM)
    DISTANCE 8: 1.7588 (IN),44.674 (MM)
    DISTANCE 9: 1.7402 (IN),44.201 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9330 (IN),49.098 (MM)
    DISTANCE 2: 1.9208 (IN),48.788 (MM)
    DISTANCE 3: 1.8747 (IN),47.617 (MM)
    DISTANCE 4: 1.9135 (IN),48.603 (MM)
    DISTANCE 5: 1.9104 (IN),48.524 (MM)
    DISTANCE 6: 1.9199 (IN),48.765 (MM)
    DISTANCE 7: 1.9142 (IN),48.621 (MM)
    DISTANCE 8: 1.9276 (IN),48.961 (MM)
    DISTANCE 9: 1.9532 (IN),49.611 (MM)

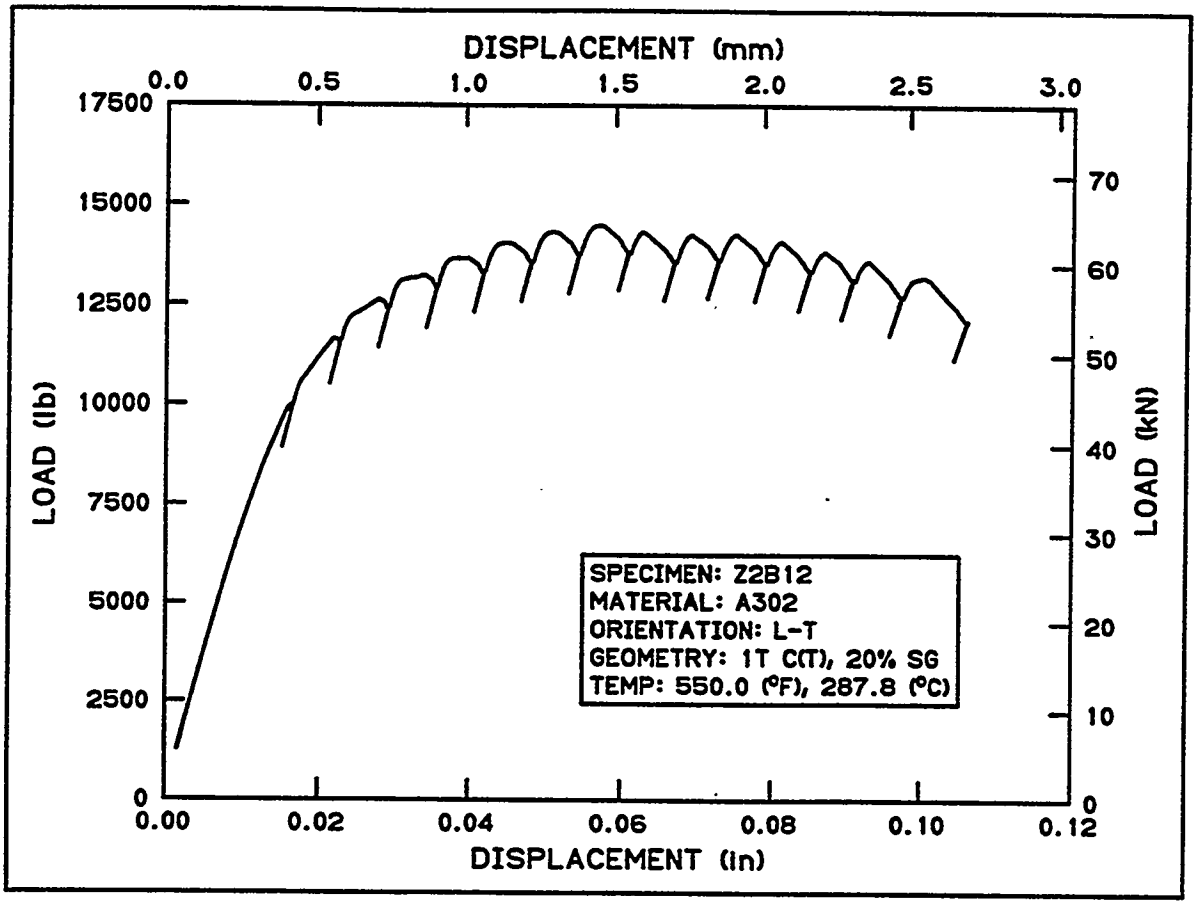

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
35
30
25
20
15
10
5
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)
SPECIMEN: Z2B10
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

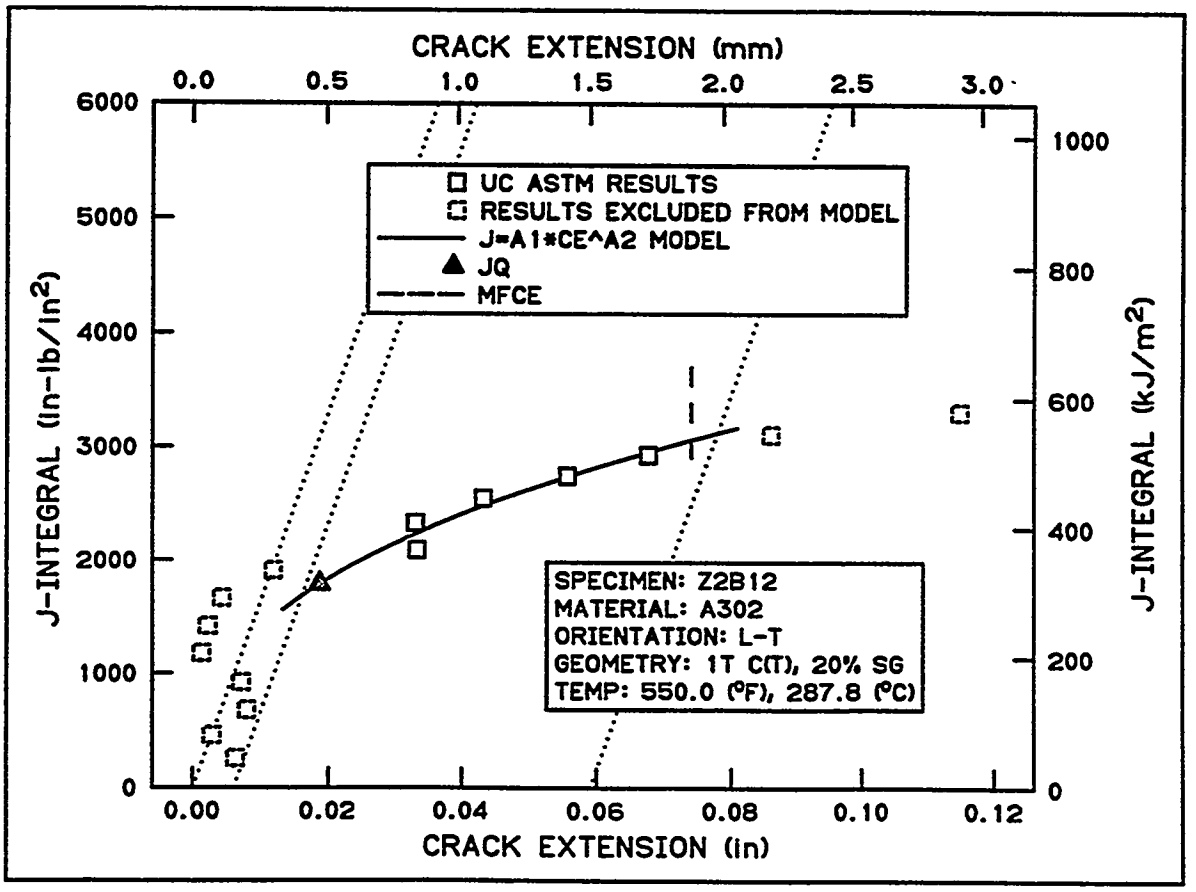

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
J-INTEGRAL (in-lb/in²)
5000
4000
3000
2000
1000
0
J-INTEGRAL (kJ/m²)
800
700
600
500
400
300
200
100
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B10
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z2B12
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.0505 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	9911	0.0159	0.0062	258.2
2	11641	0.0218	0.0028	459.9
3	12631	0.0278	0.0079	681.6
4	13232	0.0338	0.0070	922.9
5	13654	0.0398	0.0013	1179.4
6	14022	0.0456	0.0022	1420.7
7	14305	0.0516	0.0042	1668.5
8	14470	0.0576	0.0118	1911.7
9	14247	0.0634	0.0332	2095.2
10	14256	0.0692	0.0330	2332.2
11	14267	0.0751	0.0433	2552.0
12	14096	0.0812	0.0557	2749.0
13	13842	0.0870	0.0677	2934.4
14	13602	0.0929	0.0861	3112.4
15	13123	0.1012	0.1149	3309.6

  WIDTH: 2.0037 (IN),50.894 (MM)
  THICKNESS: 1.0050 (IN),25.527 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5002 (IN),12.705 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.6072 (IN),40.823 (MM)
    DISTANCE 2: 1.5716 (IN),39.919 (MM)
    DISTANCE 3: 1.5016 (IN),38.141 (MM)
    DISTANCE 4: 1.5362 (IN),39.019 (MM)
    DISTANCE 5: 1.5712 (IN),39.908 (MM)
    DISTANCE 6: 1.5454 (IN),39.253 (MM)
    DISTANCE 7: 1.5052 (IN),38.232 (MM)
    DISTANCE 8: 1.5687 (IN),39.845 (MM)
    DISTANCE 9: 1.6037 (IN),40.734 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.6766 (IN),42.586 (MM)
    DISTANCE 2: 1.6282 (IN),41.356 (MM)
    DISTANCE 3: 1.6056 (IN),40.782 (MM)
    DISTANCE 4: 1.6182 (IN),41.102 (MM)
    DISTANCE 5: 1.6315 (IN),41.440 (MM)
    DISTANCE 6: 1.6215 (IN),41.186 (MM)
    DISTANCE 7: 1.6060 (IN),40.792 (MM)
    DISTANCE 8: 1.6168 (IN),41.067 (MM)
    DISTANCE 9: 1.6646 (IN),42.281 (MM)

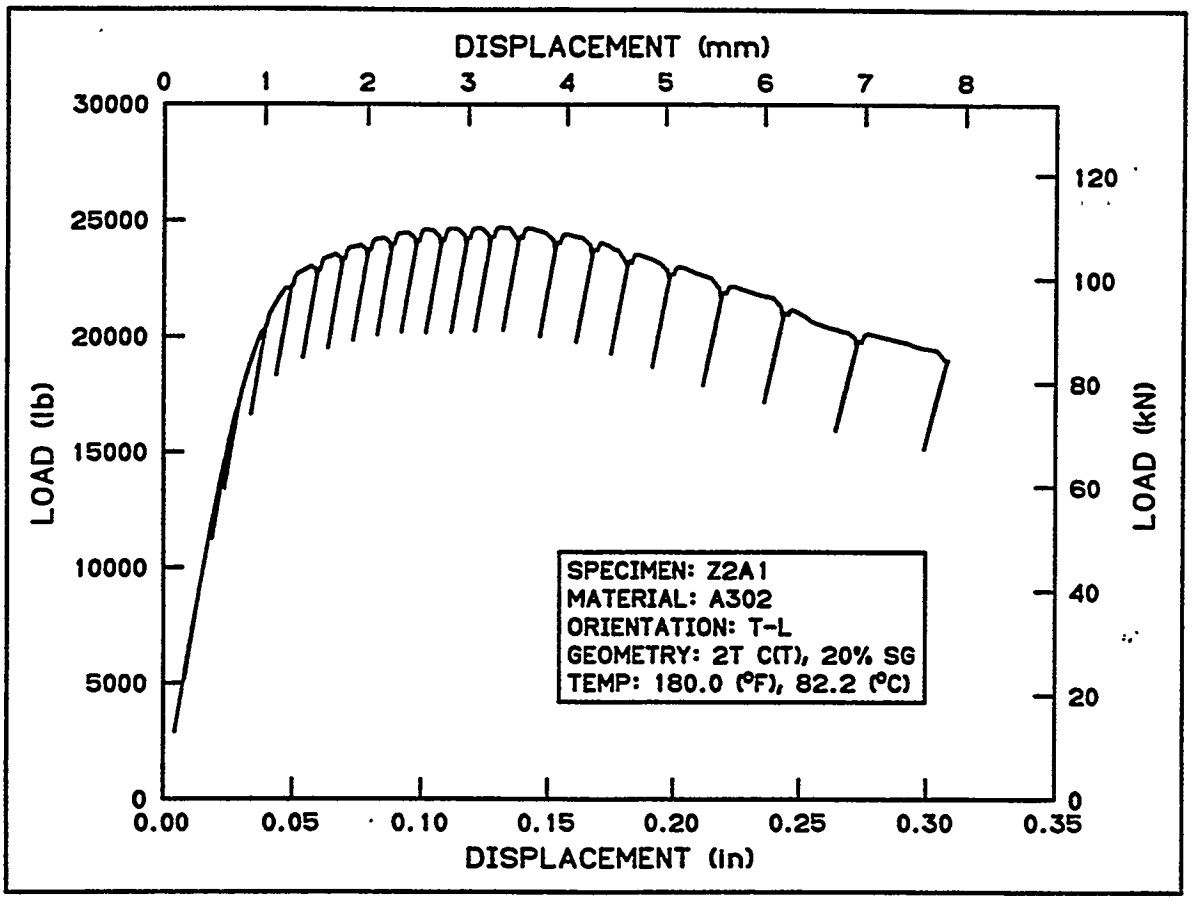

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
17500
15000
12500
10000
7500
5000
2500
0
LOAD (lb)
70
60
50
40
30
20
10
0
LOAD (kN)
SPECIMEN: Z2B12
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

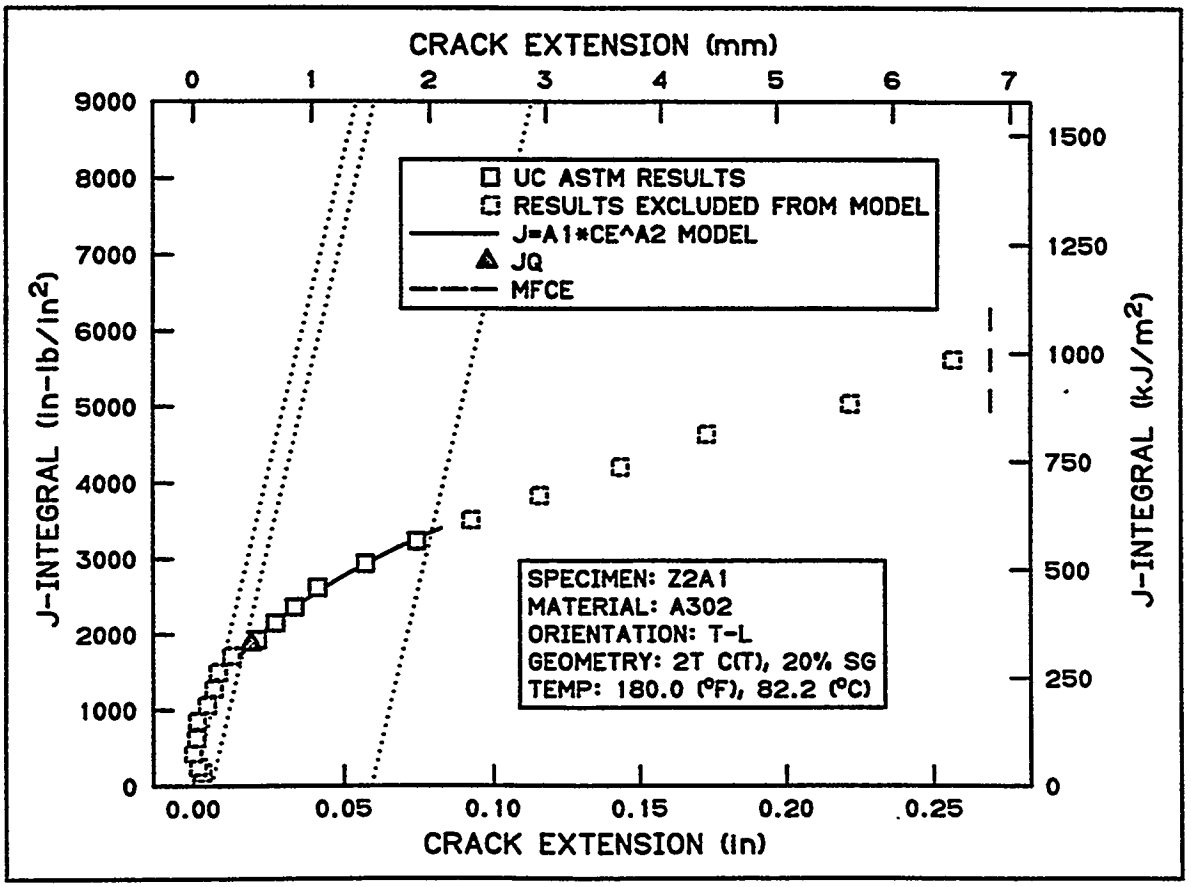

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B12
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z2A1
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.6197 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14383	0.0234	0.0030	172.7
2	16703	0.0282	0.0016	246.8
3	20146	0.0379	0.0000	427.7
4	22074	0.0473	0.0011	629.4
5	23011	0.0570	0.0013	851.7
6	23524	0.0664	0.0046	1063.7
7	23926	0.0760	0.0069	1283.6
8	24237	0.0853	0.0084	1501.5
9	24473	0.0948	0.0128	1719.8
10	24579	0.1044	0.0214	1933.9
11	24621	0.1140	0.0274	2157.9
12	24649	0.1235	0.0337	2370.6
13	24672	0.1346	0.0413	2624.5
14	24448	0.1491	0.0571	2939.6
15	24249	0.1634	0.0743	3236.8
16	23717	0.1774	0.0924	3513.1
17	23176	0.1944	0.1158	3834.9
18	22524	0.2149	0.1432	4210.8
19	21672	0.2395	0.1730	4639.6
20	20202	0.2689	0.2216	5042.4
21	19415	0.3041	0.2563	5625.3

WIDTH: 4.0043 (IN),101.710 (MM)
THICKNESS: 2.0008 (IN),50.820 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0004 (IN),25.410 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.5352 (IN),89.794 (MM)
DISTANCE 2: 3.5910 (IN),91.211 (MM)
DISTANCE 3: 3.6219 (IN),91.996 (MM)
DISTANCE 4: 3.6430 (IN),92.532 (MM)
DISTANCE 5: 3.6522 (IN),92.766 (MM)
DISTANCE 6: 3.6506 (IN),92.725 (MM)
DISTANCE 7: 3.6392 (IN),92.436 (MM)
DISTANCE 8: 3.6132 (IN),91.775 (MM)
DISTANCE 9: 3.5634 (IN),90.510 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.9674 (IN),100.770 (MM)
DISTANCE 2: 3.8665 (IN),98.209 (MM)
DISTANCE 3: 3.8490 (IN),97.765 (MM)
DISTANCE 4: 3.8837 (IN),98.646 (MM)
DISTANCE 5: 3.8814 (IN),98.588 (MM)
DISTANCE 6: 3.8965 (IN),98.971 (MM)
DISTANCE 7: 3.8867 (IN),98.722 (MM)
DISTANCE 8: 3.8840 (IN),98.654 (MM)
DISTANCE 9: 3.9598 (IN),100.580 (MM)

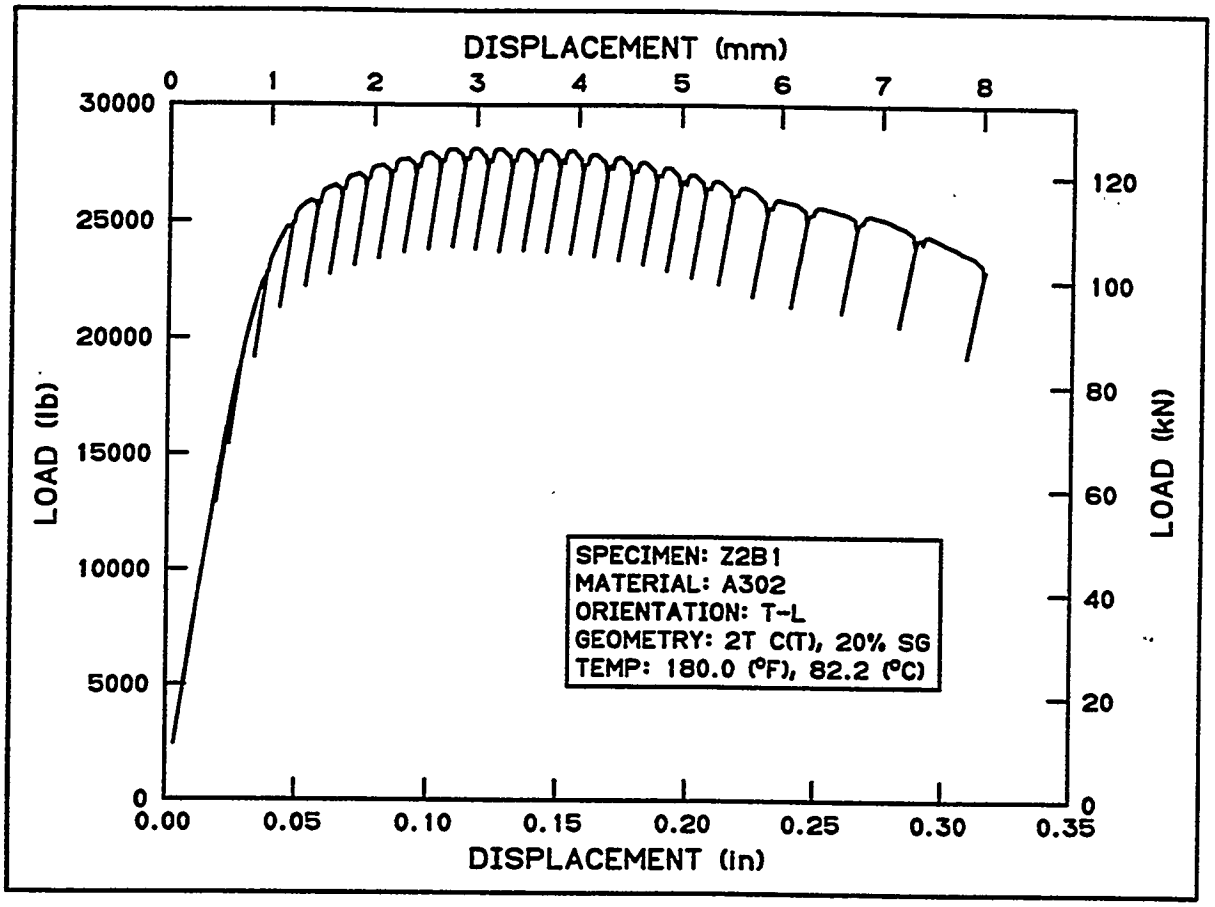

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
8
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
DISPLACEMENT (in)

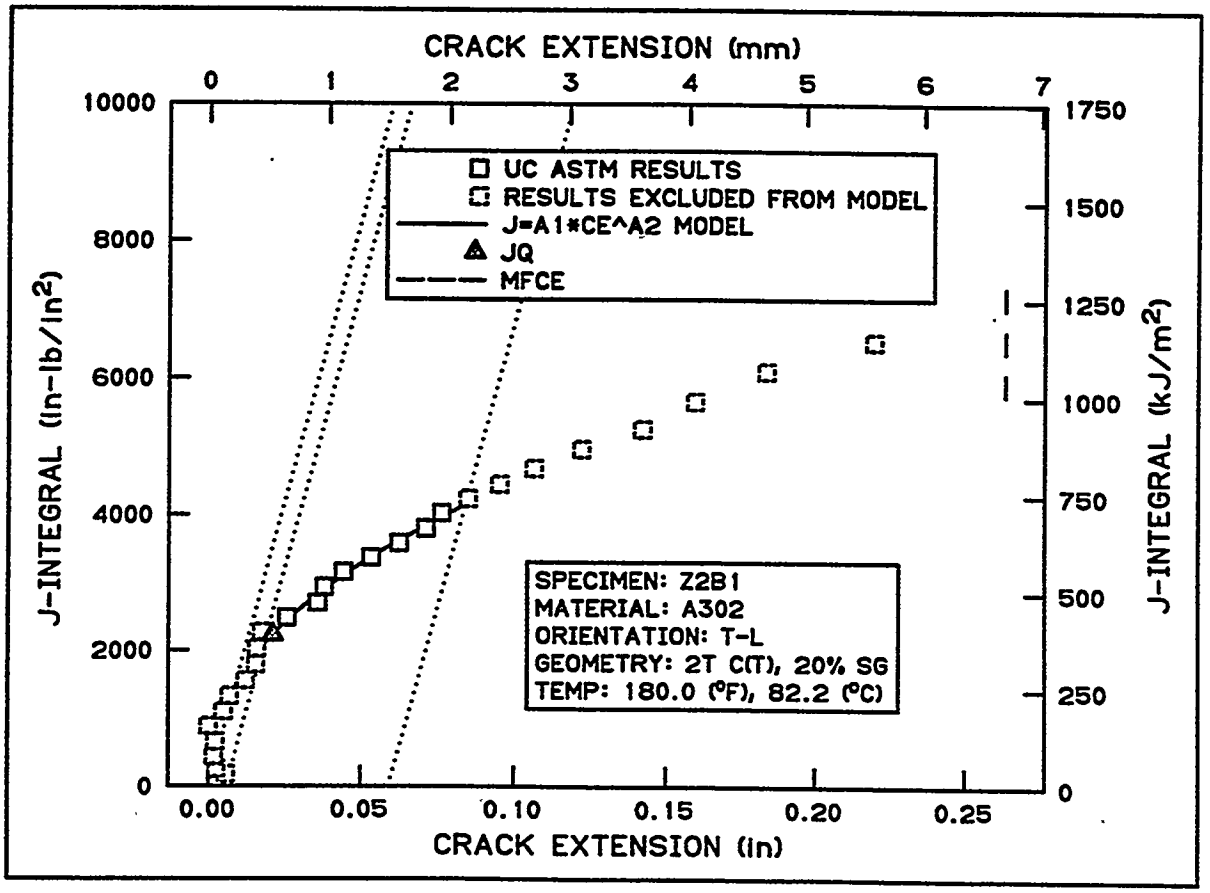

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B1
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5408 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15815	0.0225	0.0057	176.7
2	18481	0.0271	0.0026	254.0
3	22383	0.0363	0.0018	436.9
4	24729	0.0455	0.0023	650.8
5	25889	0.0543	0.0000	877.9
6	26555	0.0637	0.0050	1098.5
7	27029	0.0729	0.0069	1325.4
8	27395	0.0820	0.0122	1554.7
9	27694	0.0915	0.0156	1791.7
10	27936	0.1003	0.0160	2030.2
11	28093	0.1098	0.0175	2271.8
12	28106	0.1188	0.0260	2484.9
13	28103	0.1277	0.0359	2702.1
14	28072	0.1368	0.0381	2938.0
15	28048	0.1462	0.0443	3160.5
16	28017	0.1556	0.0534	3374.8
17	27862	0.1645	0.0624	3591.7
18	27739	0.1742	0.0711	3807.8
19	27510	0.1834	0.0763	4035.2
20	27290	0.1929	0.0849	4245.3
21	27002	0.2022	0.0953	4457.5
22	26705	0.2127	0.1065	4689.4
23	26297	0.2262	0.1223	4967.0
24	25811	0.2419	0.1423	5257.5
25	25394	0.2609	0.1596	5666.3
26	24790	0.2840	0.1838	6107.4
27	23539	0.3115	0.2198	6546.1

  WIDTH: 4.0014 (IN),101.640 (MM)
  THICKNESS: 2.0003 (IN),50.808 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9946 (IN),25.263 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4799 (IN),88.389 (MM)
    DISTANCE 2: 3.5195 (IN),89.395 (MM)
    DISTANCE 3: 3.5406 (IN),89.931 (MM)
    DISTANCE 4: 3.5543 (IN),90.279 (MM)
    DISTANCE 5: 3.5582 (IN),90.378 (MM)
    DISTANCE 6: 3.5569 (IN),90.345 (MM)
    DISTANCE 7: 3.5449 (IN),90.040 (MM)
    DISTANCE 8: 3.5250 (IN),89.535 (MM)
    DISTANCE 9: 3.4874 (IN),88.580 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8853 (IN),98.687 (MM)
    DISTANCE 2: 3.8778 (IN),98.496 (MM)
    DISTANCE 3: 3.7558 (IN),95.397 (MM)
    DISTANCE 4: 3.7936 (IN),96.357 (MM)
    DISTANCE 5: 3.7710 (IN),95.783 (MM)
    DISTANCE 6: 3.7626 (IN),95.570 (MM)
    DISTANCE 7: 3.7847 (IN),96.131 (MM)
    DISTANCE 8: 3.7944 (IN),96.378 (MM)
    DISTANCE 9: 3.8174 (IN),96.962 (MM)

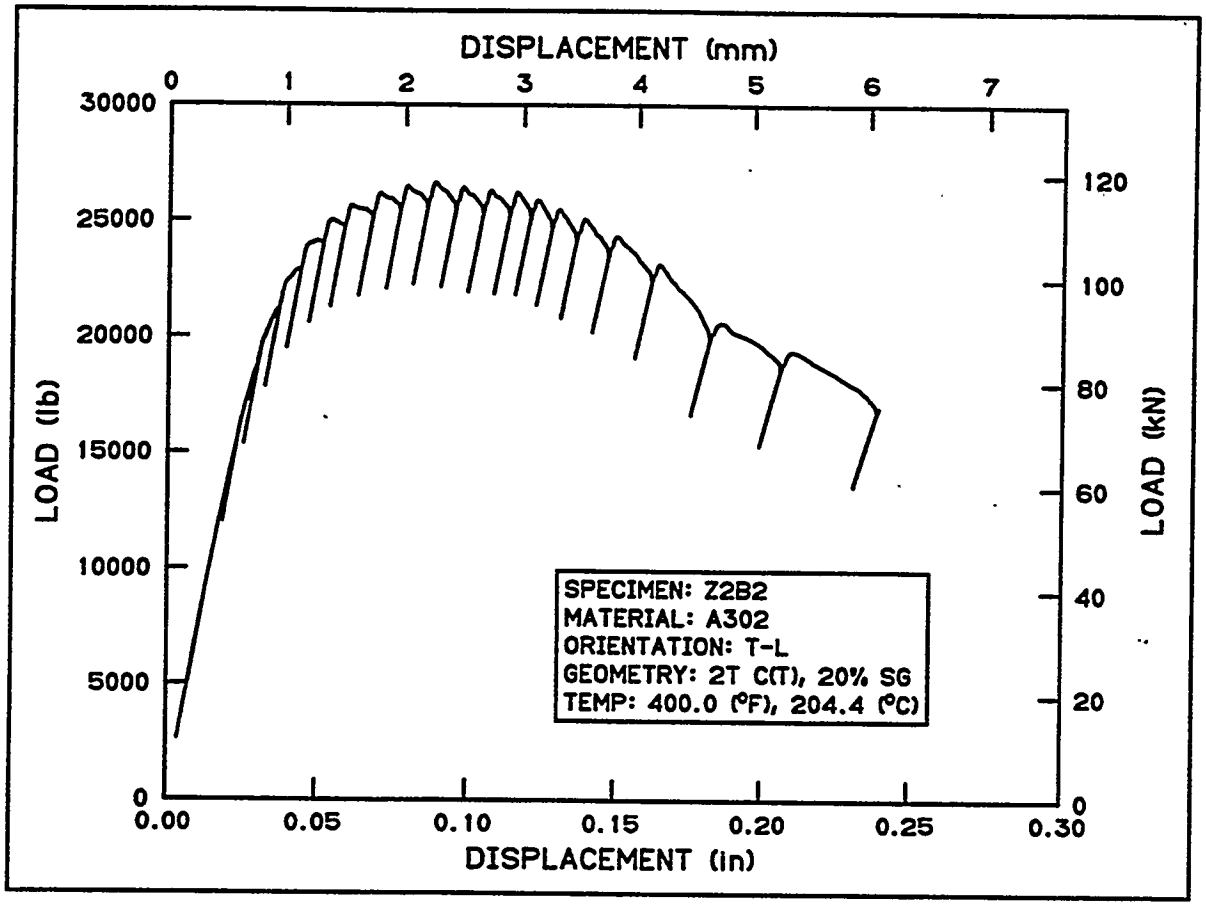

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)

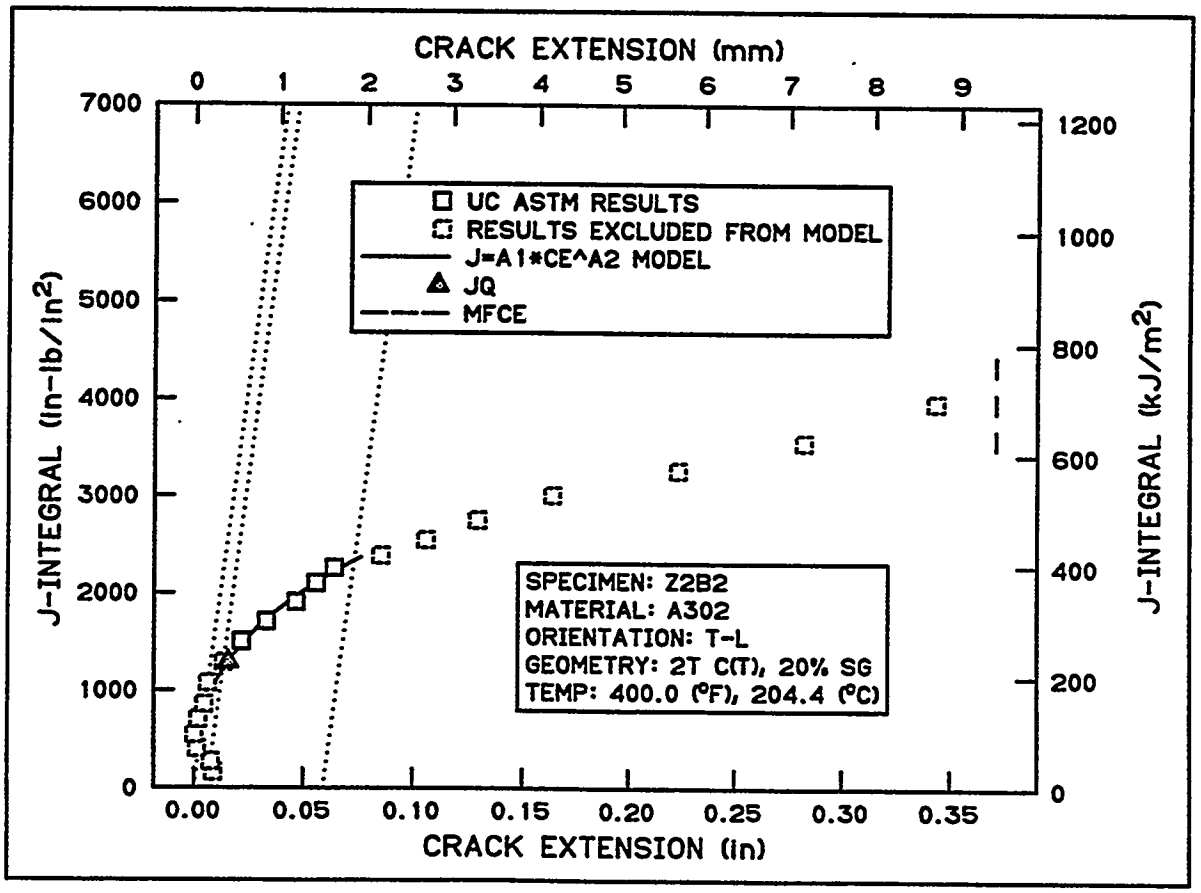

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B2
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5454 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14969	0.0222	0.0088	163.0
2	18376	0.0289	0.0076	271.1
3	21036	0.0359	0.0013	404.0
4	22854	0.0425	0.0000	547.3
5	24145	0.0494	0.0018	705.4
6	24955	0.0559	0.0046	860.2
7	25508	0.0654	0.0063	1076.5
8	25957	0.0741	0.0135	1288.2
9	26184	0.0834	0.0218	1501.5
10	26269	0.0923	0.0334	1709.8
11	26094	0.1013	0.0468	1909.3
12	25998	0.1101	0.0559	2105.5
13	26104	0.1169	0.0640	2262.2
14	25779	0.1237	0.0852	2391.0
15	25160	0.1324	0.1060	2552.0
16	24368	0.1440	0.1294	2757.2
17	23191	0.1590	0.1640	3011.0
18	21178	0.1782	0.2235	3266.0
19	19244	0.2032	0.2823	3558.5
20	17505	0.2354	0.3435	3970.9

  WIDTH: 4.0000 (IN),101.600 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9994 (IN),25.385 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4880 (IN),88.595 (MM)
    DISTANCE 2: 3.5250 (IN),89.535 (MM)
    DISTANCE 3: 3.5485 (IN),90.132 (MM)
    DISTANCE 4: 3.5609 (IN),90.447 (MM)
    DISTANCE 5: 3.5649 (IN),90.548 (MM)
    DISTANCE 6: 3.5668 (IN),90.597 (MM)
    DISTANCE 7: 3.5547 (IN),90.289 (MM)
    DISTANCE 8: 3.5375 (IN),89.852 (MM)
    DISTANCE 9: 3.5114 (IN),89.190 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9199 (IN),99.565 (MM)
    DISTANCE 2: 3.9114 (IN),99.350 (MM)
    DISTANCE 3: 3.8873 (IN),98.737 (MM)
    DISTANCE 4: 3.9138 (IN),99.411 (MM)
    DISTANCE 5: 3.9098 (IN),99.309 (MM)
    DISTANCE 6: 3.9052 (IN),99.192 (MM)
    DISTANCE 7: 3.8774 (IN),98.486 (MM)
    DISTANCE 8: 3.9708 (IN),100.860 (MM)
    DISTANCE 9: 3.9686 (IN),100.800 (MM)

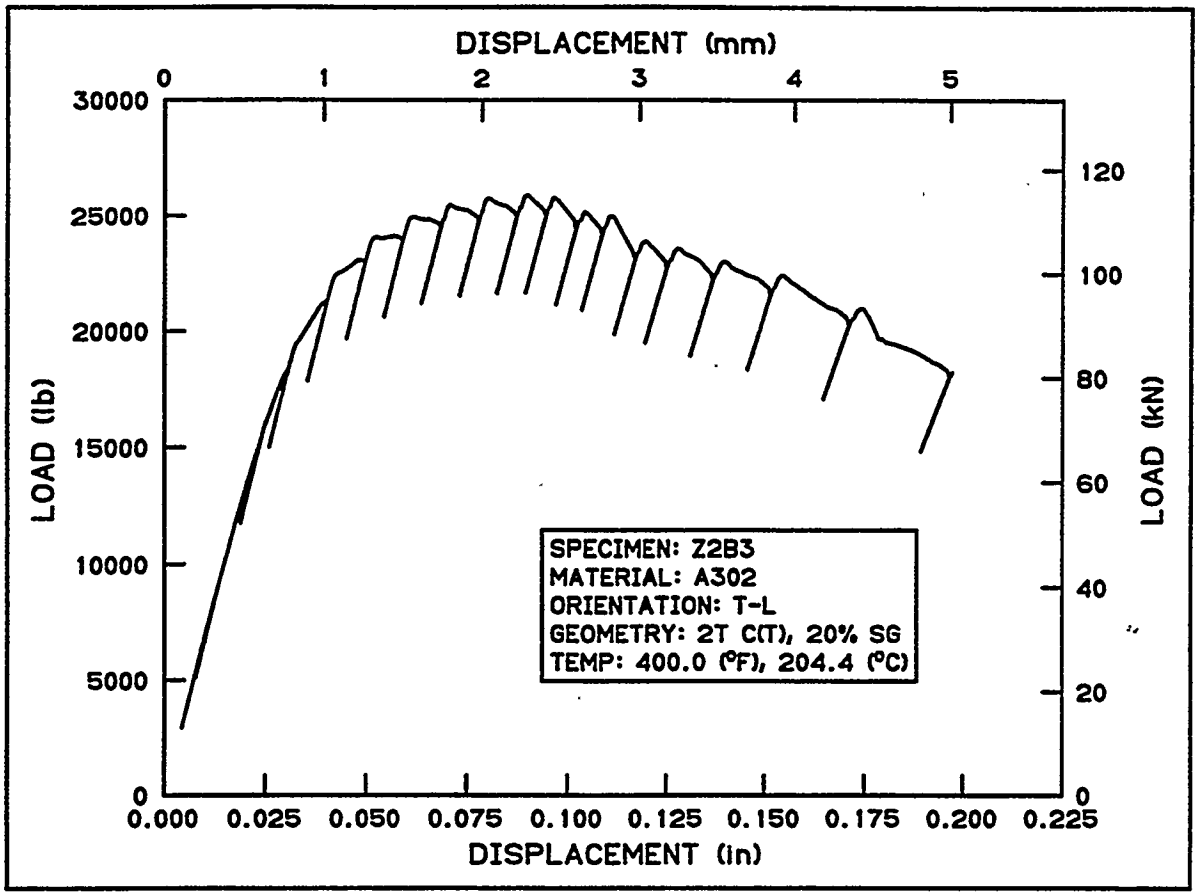

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

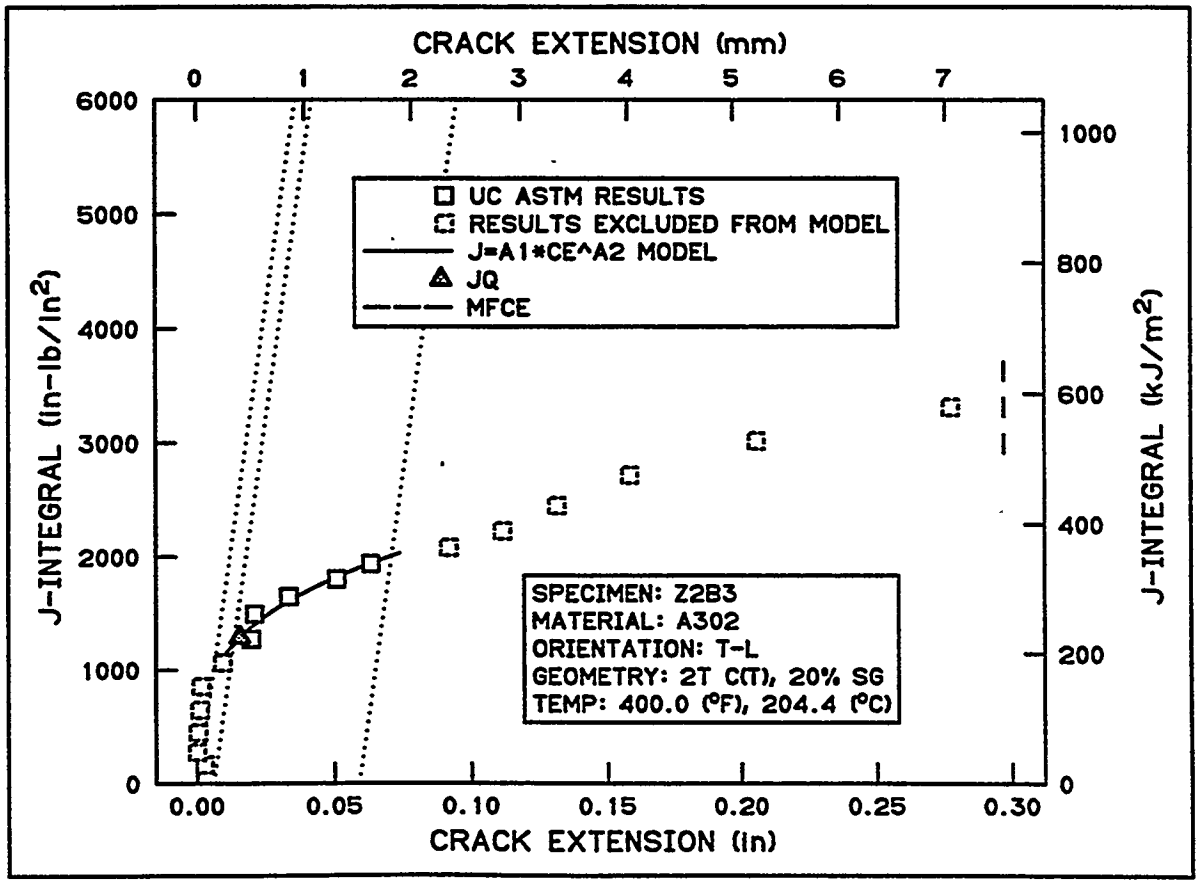

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
8
9
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B3
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5714 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14677	0.0227	0.0027	163.0
2	18082	0.0296	0.0000	273.0
3	21114	0.0387	0.0004	445.8
4	23071	0.0479	0.0010	644.6
5	24130	0.0570	0.0016	853.4
6	24845	0.0659	0.0093	1062.8
7	25253	0.0750	0.0197	1269.7
8	25443	0.0846	0.0210	1492.3
9	25747	0.0909	0.0336	1646.5
10	25445	0.0986	0.0509	1801.4
11	25047	0.1052	0.0635	1936.0
12	24446	0.1131	0.0919	2079.7
13	23566	0.1218	0.1114	2226.4
14	23057	0.1333	0.1313	2448.6
15	22271	0.1483	0.1583	2718.3
16	20922	0.1680	0.2057	3015.8
17	18579	0.1938	0.2775	3309.2

  WIDTH: 4.0039 (IN),101.700 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9963 (IN),25.306 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5095 (IN),89.141 (MM)
    DISTANCE 2: 3.5610 (IN),90.449 (MM)
    DISTANCE 3: 3.5876 (IN),91.125 (MM)
    DISTANCE 4: 3.5991 (IN),91.417 (MM)
    DISTANCE 5: 3.6002 (IN),91.445 (MM)
    DISTANCE 6: 3.5900 (IN),91.186 (MM)
    DISTANCE 7: 3.5686 (IN),90.642 (MM)
    DISTANCE 8: 3.5382 (IN),89.870 (MM)
    DISTANCE 9: 3.4846 (IN),88.509 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8800 (IN),98.552 (MM)
    DISTANCE 2: 3.8658 (IN),98.191 (MM)
    DISTANCE 3: 3.8568 (IN),97.963 (MM)
    DISTANCE 4: 3.8588 (IN),98.014 (MM)
    DISTANCE 5: 3.8738 (IN),98.395 (MM)
    DISTANCE 6: 3.8838 (IN),98.649 (MM)
    DISTANCE 7: 3.8457 (IN),97.681 (MM)
    DISTANCE 8: 3.8421 (IN),97.589 (MM)
    DISTANCE 9: 3.9042 (IN),99.167 (MM)

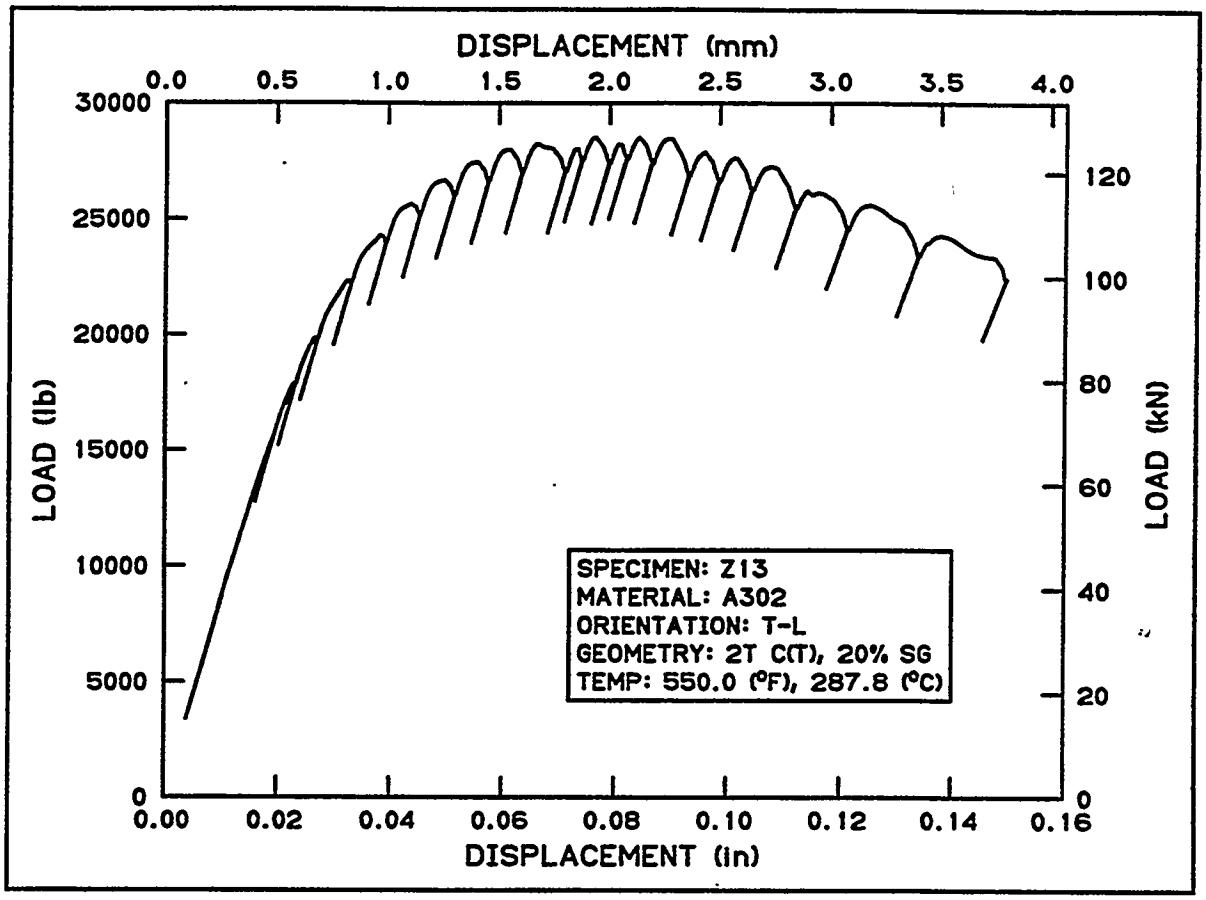

DISPLACEMENT (mm)
0
1
2
3
4
5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B3
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

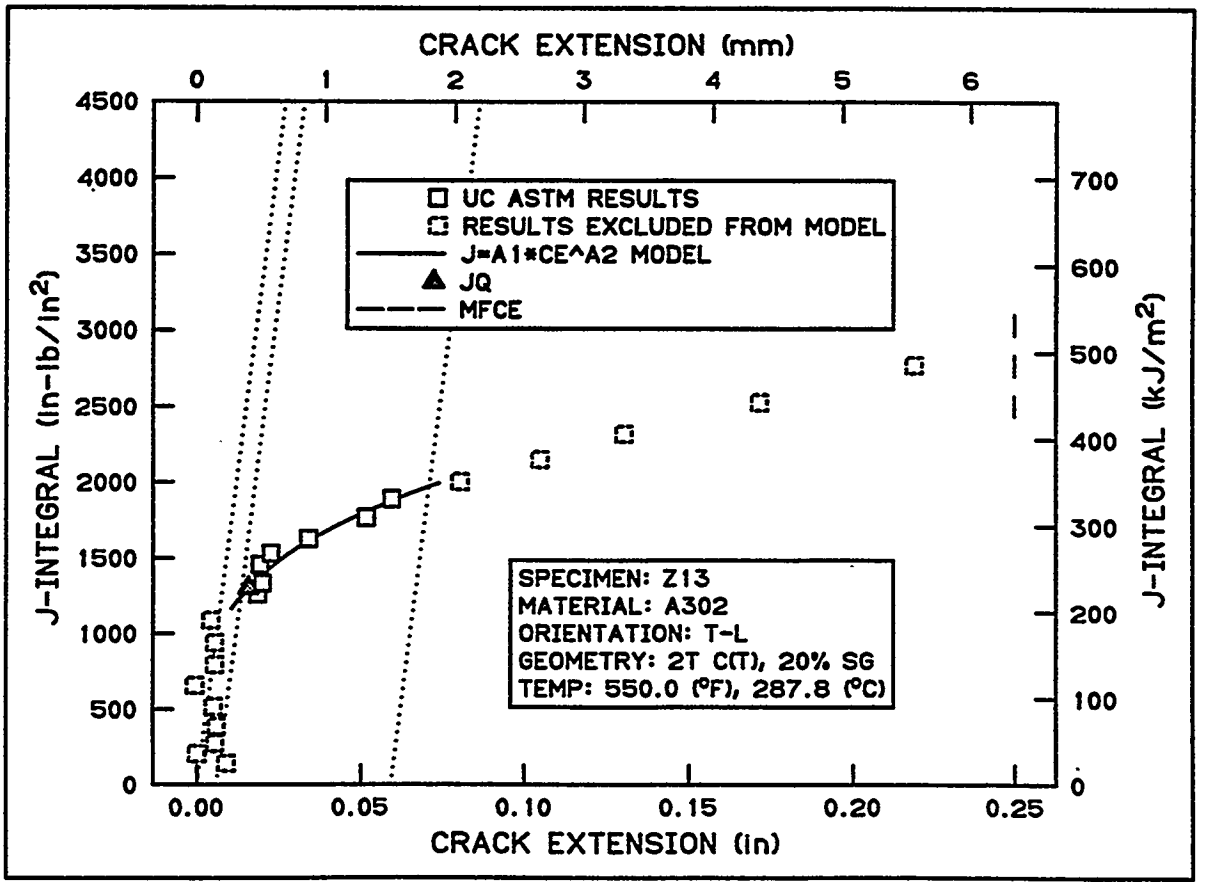

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B3
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z13
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4893 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15223	0.0186	0.0089	142.2
2	17732	0.0225	0.0000	206.0
3	19801	0.0264	0.0054	273.6
4	22335	0.0322	0.0059	387.4
5	24300	0.0379	0.0051	516.1
6	25651	0.0435	-0.0006	656.5
7	26670	0.0495	0.0054	793.9
8	27441	0.0553	0.0055	938.4
9	27972	0.0611	0.0043	1088.6
10	28028	0.0686	0.0187	1262.4
11	27993	0.0726	0.0201	1336.6
12	28531	0.0763	0.0194	1458.3
13	28213	0.0802	0.0228	1532.2
14	28517	0.0840	0.0344	1631.0
15	28428	0.0899	0.0517	1771.1
16	27881	0.0957	0.0594	1892.4
17	27600	0.1015	0.0803	2005.3
18	27170	0.1087	0.1047	2151.2
19	25839	0.1186	0.1303	2318.6
20	24804	0.1311	0.1717	2527.1
21	23351	0.1475	0.2188	2771.0

  WIDTH: 3.9970 (IN),101.520 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0026 (IN),25.466 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4818 (IN),88.438 (MM)
    DISTANCE 2: 3.4976 (IN),88.839 (MM)
    DISTANCE 3: 3.5062 (IN),89.057 (MM)
    DISTANCE 4: 3.5022 (IN),88.956 (MM)
    DISTANCE 5: 3.4996 (IN),88.890 (MM)
    DISTANCE 6: 3.4986 (IN),88.864 (MM)
    DISTANCE 7: 3.4890 (IN),88.621 (MM)
    DISTANCE 8: 3.4691 (IN),88.115 (MM)
    DISTANCE 9: 3.4638 (IN),87.981 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7238 (IN),94.585 (MM)
    DISTANCE 2: 3.6684 (IN),93.177 (MM)
    DISTANCE 3: 3.7283 (IN),94.699 (MM)
    DISTANCE 4: 3.7424 (IN),95.057 (MM)
    DISTANCE 5: 3.7228 (IN),94.559 (MM)
    DISTANCE 6: 3.7516 (IN),95.291 (MM)
    DISTANCE 7: 3.7590 (IN),95.479 (MM)
    DISTANCE 8: 3.7944 (IN),96.378 (MM)
    DISTANCE 9: 3.8100 (IN),96.774 (MM)

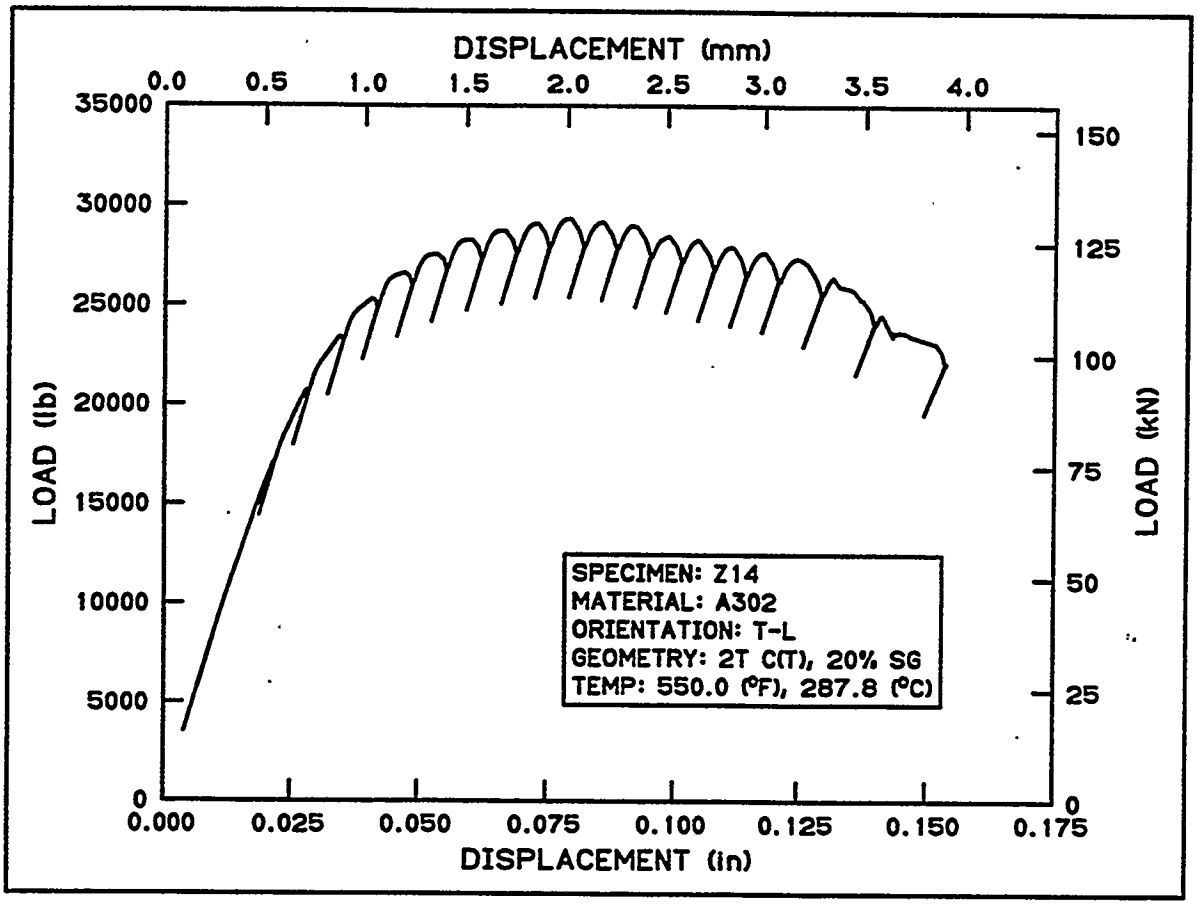

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

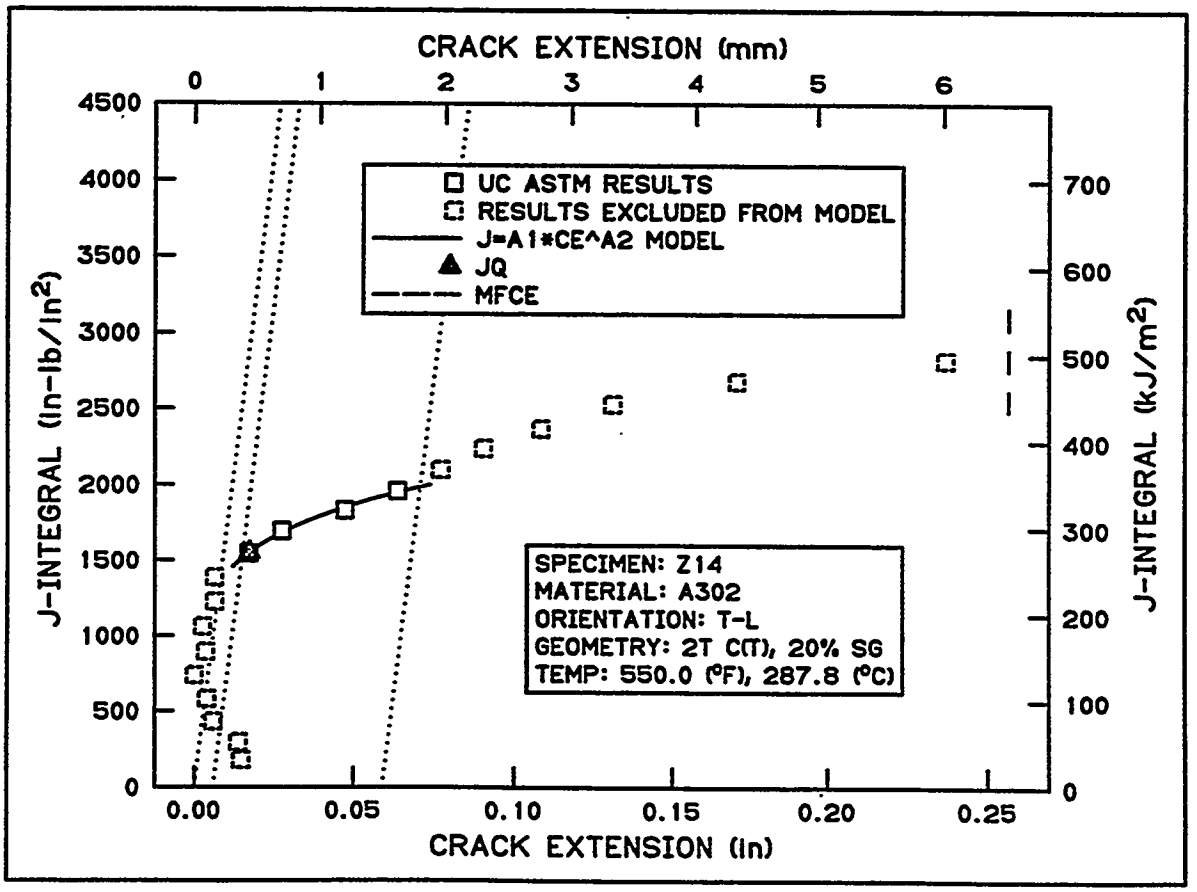

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z14
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4763 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16999	0.0213	0.0146	180.0
2	20677	0.0278	0.0137	295.9
3	23382	0.0342	0.0059	433.0
4	25310	0.0407	0.0040	582.3
5	26612	0.0470	0.0000	739.7
6	27545	0.0534	0.0037	895.1
7	28269	0.0601	0.0027	1062.9
8	28713	0.0667	0.0065	1227.8
9	29080	0.0730	0.0064	1389.1
10	29304	0.0795	0.0171	1546.5
11	29149	0.0859	0.0274	1696.0
12	28929	0.0924	0.0473	1834.7
13	28453	0.0988	0.0639	1963.0
14	28251	0.1048	0.0772	2102.5
15	27913	0.1117	0.0906	2242.0
16	27643	0.1182	0.1085	2370.4
17	27077	0.1266	0.1311	2531.2
18	25292	0.1373	0.1709	2683.1
19	23152	0.1515	0.2369	2825.9

WIDTH: 3.9993 (IN),101.580 (MM)
THICKNESS: 2.0050 (IN),50.927 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0015 (IN),25.438 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4506 (IN),87.645 (MM)
DISTANCE 2: 3.4742 (IN),88.245 (MM)
DISTANCE 3: 3.4850 (IN),88.519 (MM)
DISTANCE 4: 3.4902 (IN),88.651 (MM)
DISTANCE 5: 3.4928 (IN),88.717 (MM)
DISTANCE 6: 3.4907 (IN),88.664 (MM)
DISTANCE 7: 3.4806 (IN),88.407 (MM)
DISTANCE 8: 3.4579 (IN),87.831 (MM)
DISTANCE 9: 3.4519 (IN),87.678 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7242 (IN),94.595 (MM)
DISTANCE 2: 3.6955 (IN),93.866 (MM)
DISTANCE 3: 3.7217 (IN),94.531 (MM)
DISTANCE 4: 3.7191 (IN),94.465 (MM)
DISTANCE 5: 3.7422 (IN),95.052 (MM)
DISTANCE 6: 3.7767 (IN),95.928 (MM)
DISTANCE 7: 3.7226 (IN),94.554 (MM)
DISTANCE 8: 3.7525 (IN),95.313 (MM)
DISTANCE 9: 3.7640 (IN),95.606 (MM)

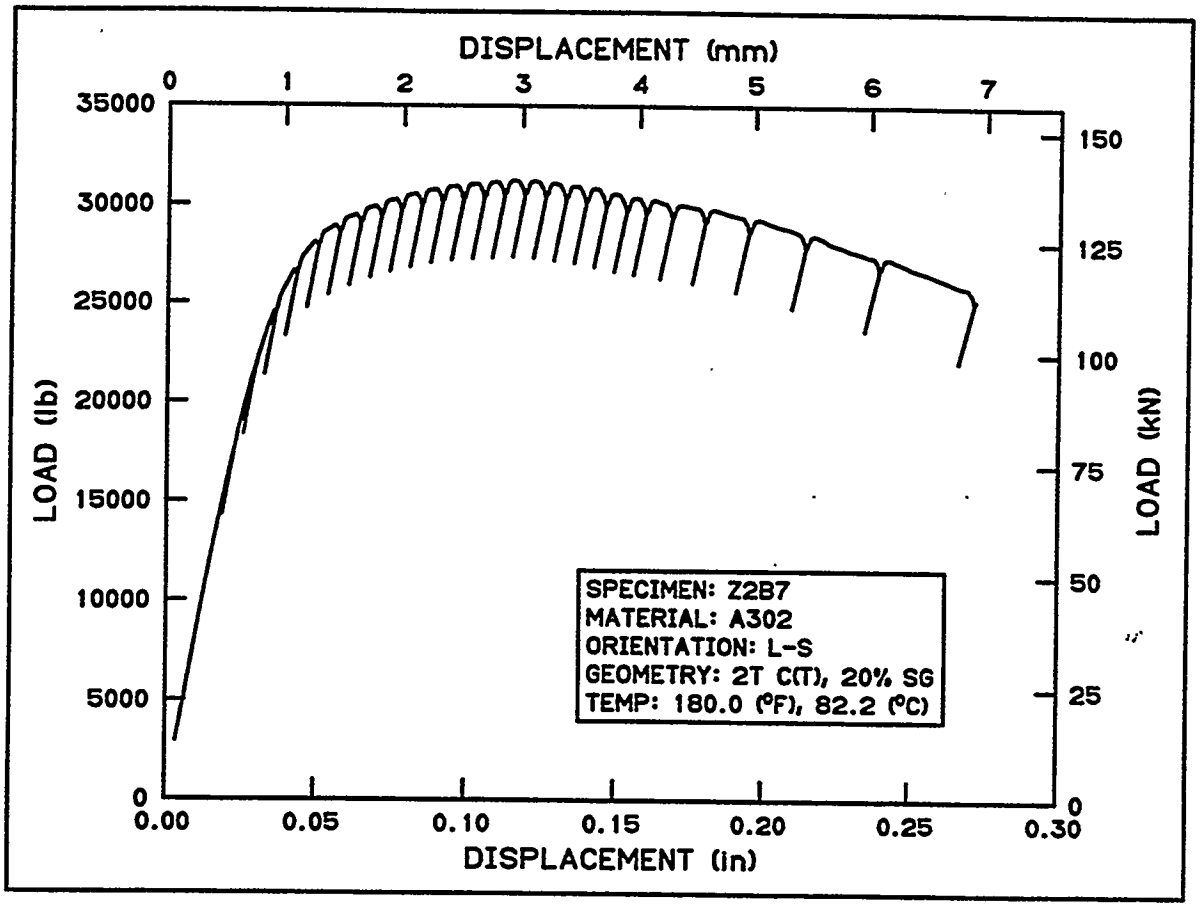

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

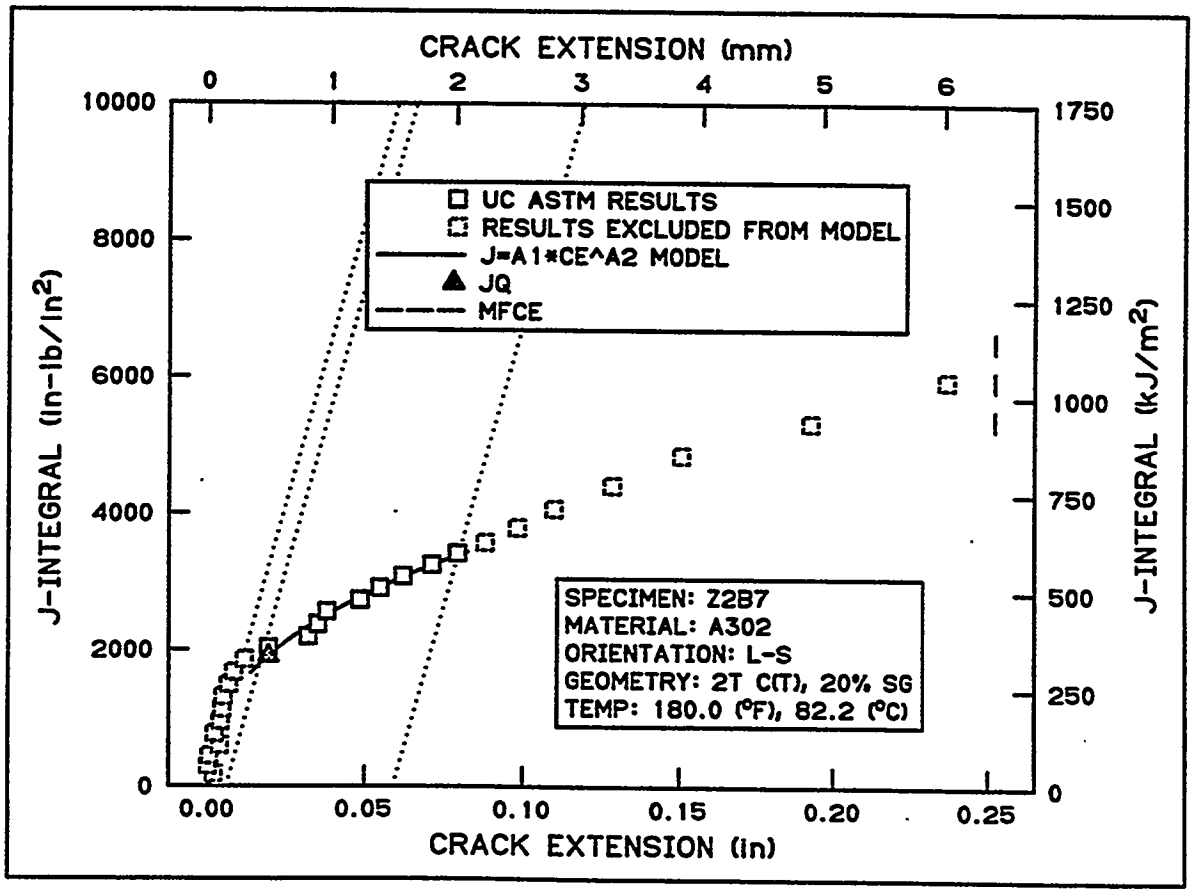

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B7
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4880 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17157	0.0219	0.0018	180.3
2	21318	0.0287	0.0000	299.5
3	24491	0.0356	0.0005	444.2
4	26602	0.0422	0.0038	601.1
5	28084	0.0491	0.0022	773.4
6	28939	0.0559	0.0041	953.6
7	29501	0.0627	0.0046	1133.1
8	29938	0.0692	0.0050	1313.2
9	30278	0.0761	0.0067	1492.6
10	30563	0.0829	0.0083	1673.5
11	30772	0.0897	0.0117	1854.4
12	30933	0.0965	0.0194	2029.8
13	31051	0.1034	0.0321	2199.5
14	31152	0.1100	0.0352	2381.5
15	31212	0.1167	0.0380	2566.5
16	31146	0.1236	0.0485	2735.5
17	31027	0.1304	0.0547	2913.8
18	30911	0.1372	0.0621	3086.7
19	30801	0.1439	0.0713	3253.8
20	30512	0.1508	0.0793	3422.6
21	30337	0.1575	0.0880	3581.0
22	30085	0.1665	0.0983	3797.6
23	29875	0.1778	0.1097	4072.8
24	29402	0.1928	0.1284	4419.3
25	28567	0.2121	0.1506	4859.8
26	27380	0.2372	0.1927	5332.8
27	25826	0.2693	0.2368	5955.2

  WIDTH: 4.0027 (IN),101.670 (MM)
  THICKNESS: 2.0012 (IN),50.830 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9970 (IN),25.324 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4634 (IN),87.970 (MM)
    DISTANCE 2: 3.4878 (IN),88.590 (MM)
    DISTANCE 3: 3.5002 (IN),88.905 (MM)
    DISTANCE 4: 3.4962 (IN),88.803 (MM)
    DISTANCE 5: 3.4947 (IN),88.765 (MM)
    DISTANCE 6: 3.4898 (IN),88.641 (MM)
    DISTANCE 7: 3.4831 (IN),88.471 (MM)
    DISTANCE 8: 3.4704 (IN),88.148 (MM)
    DISTANCE 9: 3.4520 (IN),87.681 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8253 (IN),97.163 (MM)
    DISTANCE 2: 3.8112 (IN),96.804 (MM)
    DISTANCE 3: 3.7496 (IN),95.240 (MM)
    DISTANCE 4: 3.7210 (IN),94.513 (MM)
    DISTANCE 5: 3.7002 (IN),93.985 (MM)
    DISTANCE 6: 3.7548 (IN),95.372 (MM)
    DISTANCE 7: 3.7046 (IN),94.097 (MM)
    DISTANCE 8: 3.6920 (IN),93.777 (MM)
    DISTANCE 9: 3.7033 (IN),94.064 (MM)

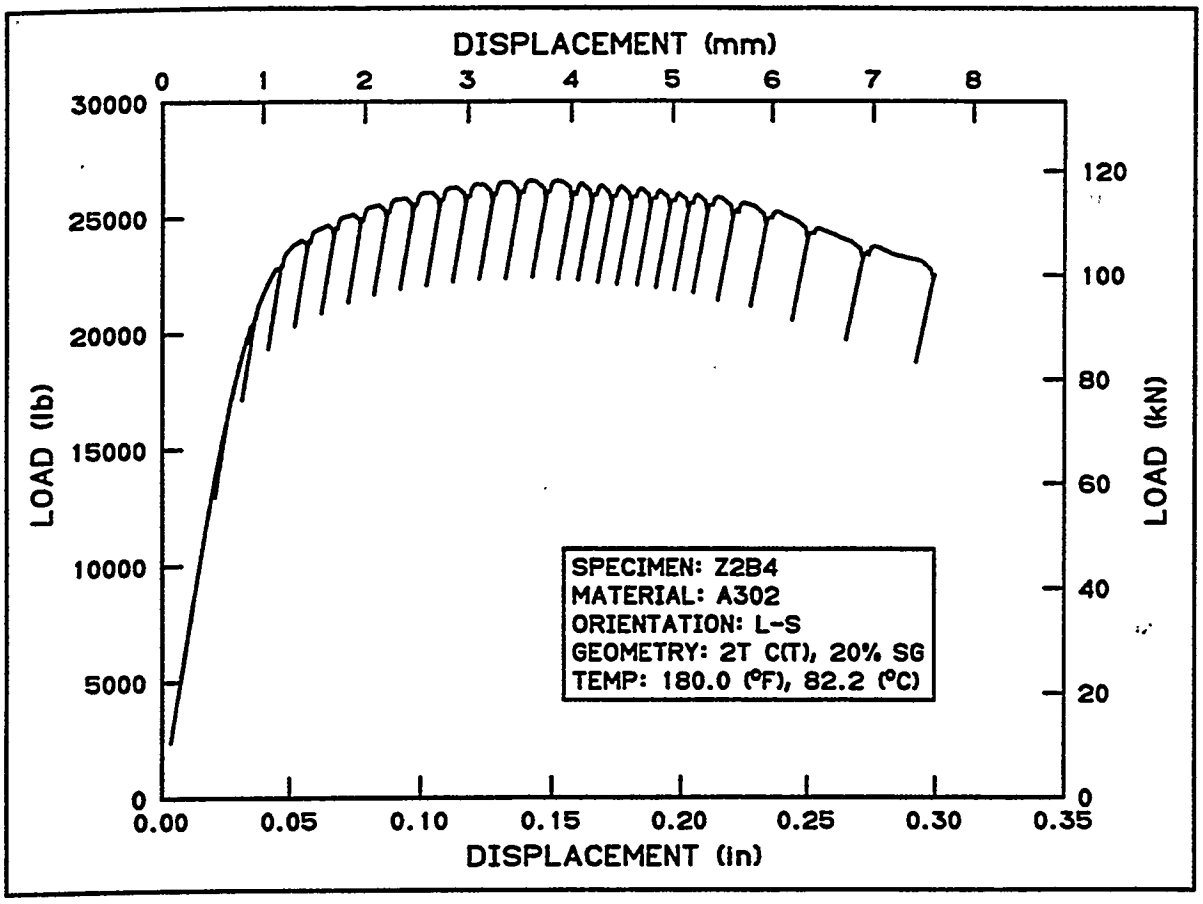

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z2B7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

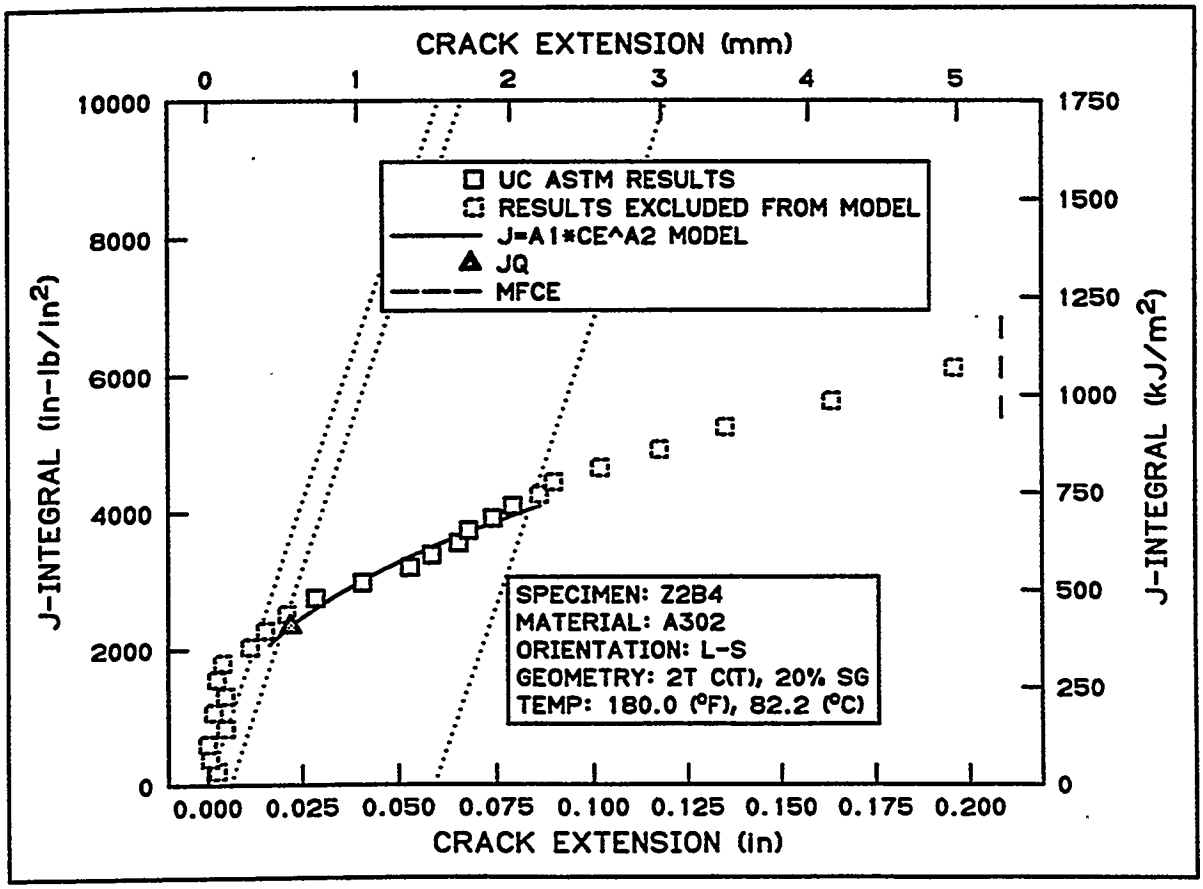

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B4
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5954 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15867	0.0245	0.0025	199.4
2	20272	0.0346	0.0006	383.4
3	22771	0.0444	0.0000	598.9
4	24030	0.0544	0.0047	829.9
5	24684	0.0644	0.0016	1069.3
6	25145	0.0741	0.0047	1306.1
7	25529	0.0842	0.0024	1553.1
8	25829	0.0944	0.0040	1795.6
9	26074	0.1043	0.0112	2031.9
10	26278	0.1140	0.0153	2273.7
11	26404	0.1242	0.0211	2515.3
12	26496	0.1341	0.0285	2752.1
13	26537	0.1438	0.0406	2979.1
14	26519	0.1541	0.0529	3200.8
15	26446	0.1615	0.0585	3379.8
16	26350	0.1691	0.0654	3552.1
17	26305	0.1767	0.0680	3737.5
18	26229	0.1843	0.0742	3915.6
19	26127	0.1915	0.0793	4093.5
20	26008	0.1992	0.0862	4257.0
21	25943	0.2069	0.0898	4441.7
22	25815	0.2163	0.1019	4646.6
23	25458	0.2295	0.1175	4909.2
24	24856	0.2458	0.1353	5240.4
25	23943	0.2670	0.1636	5624.1
26	23050	0.2950	0.1960	6113.4

  WIDTH: 4.0012 (IN),101.630 (MM)
  THICKNESS: 2.0008 (IN),50.820 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9980 (IN),25.349 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5280 (IN),89.611 (MM)
    DISTANCE 2: 3.5710 (IN),90.703 (MM)
    DISTANCE 3: 3.5908 (IN),91.206 (MM)
    DISTANCE 4: 3.6086 (IN),91.658 (MM)
    DISTANCE 5: 3.6114 (IN),91.730 (MM)
    DISTANCE 6: 3.6137 (IN),91.788 (MM)
    DISTANCE 7: 3.6056 (IN),91.582 (MM)
    DISTANCE 8: 3.5972 (IN),91.369 (MM)
    DISTANCE 9: 3.5700 (IN),90.678 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8394 (IN),97.521 (MM)
    DISTANCE 2: 3.7552 (IN),95.382 (MM)
    DISTANCE 3: 3.8067 (IN),96.690 (MM)
    DISTANCE 4: 3.7985 (IN),96.482 (MM)
    DISTANCE 5: 3.8244 (IN),97.140 (MM)
    DISTANCE 6: 3.7814 (IN),96.048 (MM)
    DISTANCE 7: 3.8211 (IN),97.056 (MM)
    DISTANCE 8: 3.8152 (IN),96.906 (MM)
    DISTANCE 9: 3.7850 (IN),96.139 (MM)

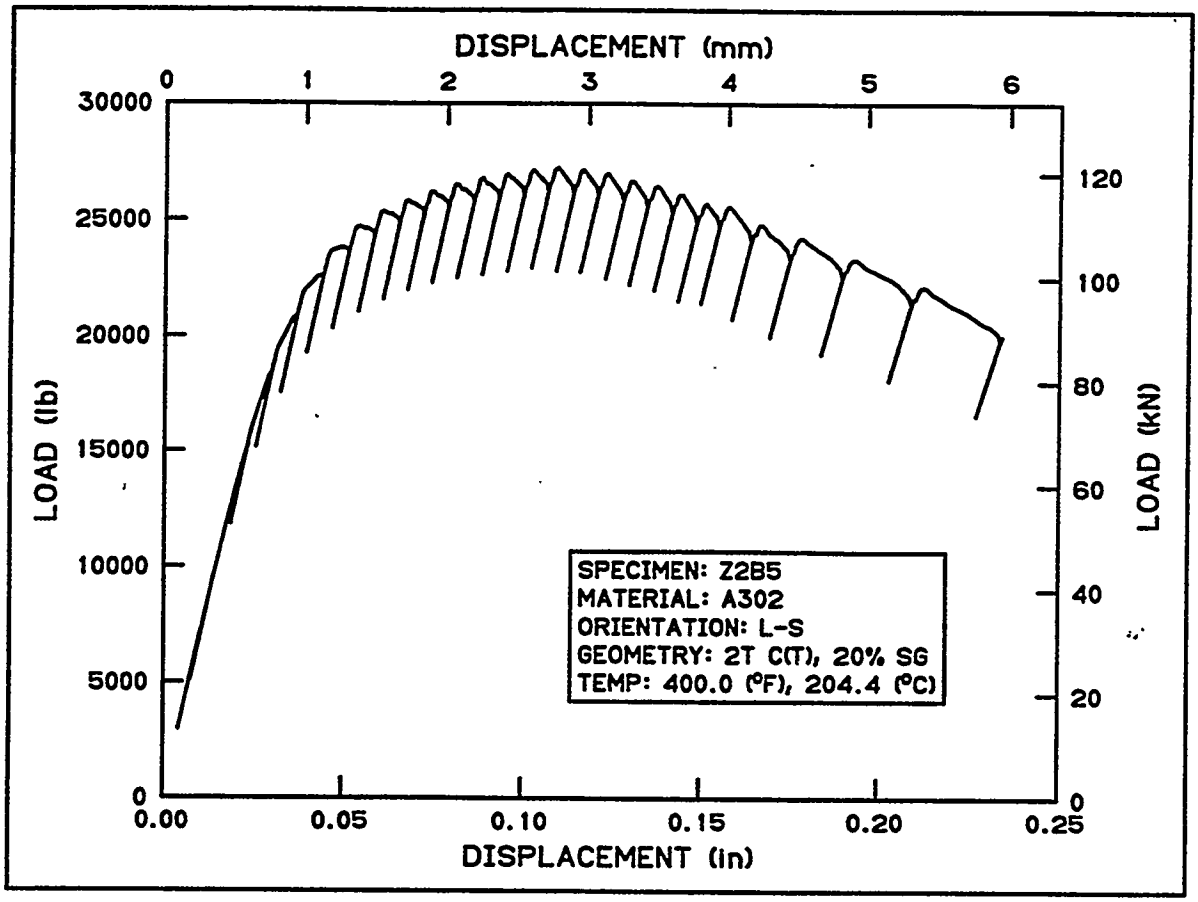

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B4
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)

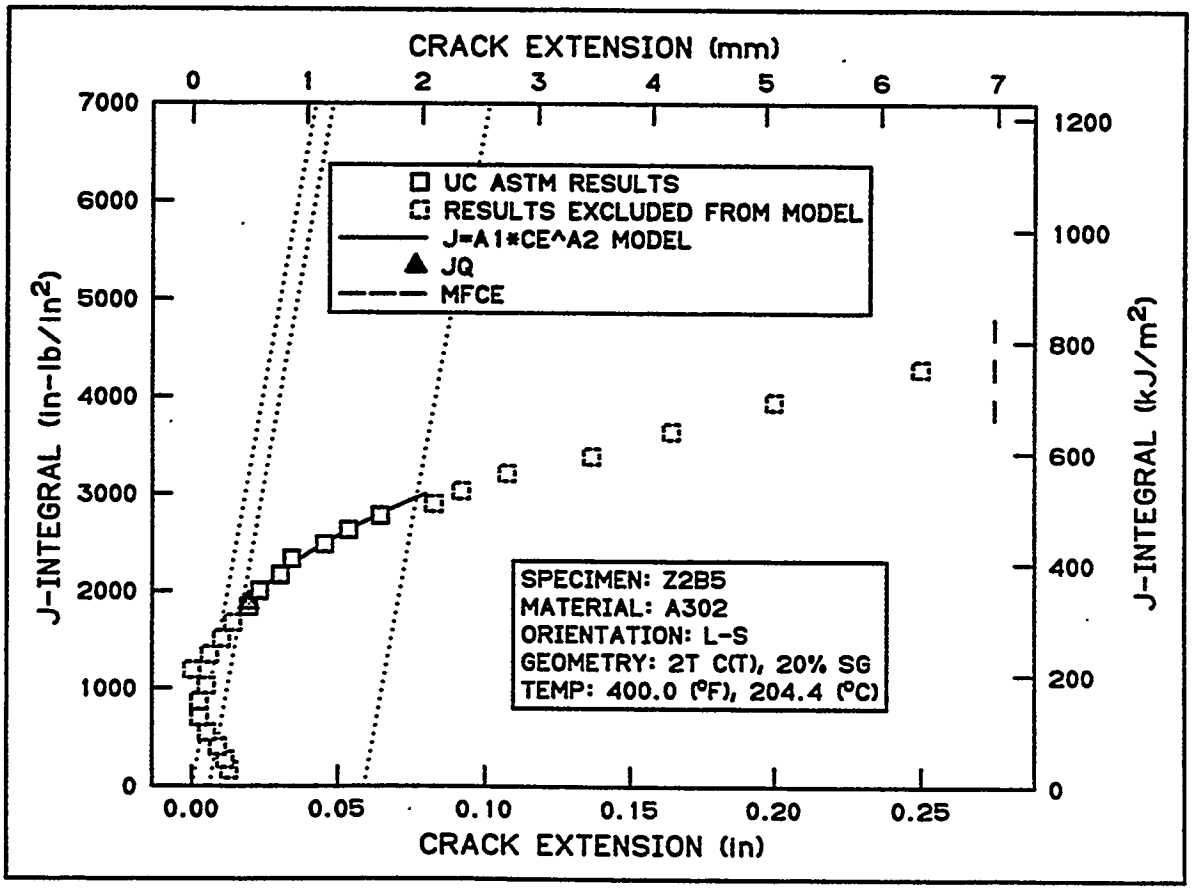

CRACK EXTENSION (mm)
0 1 2 3 4 5
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B4
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z2B5
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.5570 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14630	0.0221	0.0125	162.6
2	18791	0.0290	0.0112	270.7
3	20724	0.0358	0.0087	399.9
4	22571	0.0427	0.0050	547.6
5	23829	0.0494	0.0025	703.6
6	24640	0.0564	0.0024	866.2
7	25265	0.0632	0.0049	1025.2
8	25707	0.0696	0.0000	1192.5
9	26026	0.0767	0.0059	1346.6
10	26308	0.0834	0.0101	1508.8
11	26532	0.0903	0.0138	1674.6
12	26731	0.0972	0.0193	1839.0
13	26922	0.1039	0.0230	2003.4
14	27081	0.1103	0.0303	2165.8
15	27090	0.1170	0.0342	2329.9
16	26781	0.1243	0.0455	2483.4
17	26586	0.1310	0.0536	2631.5
18	26386	0.1380	0.0644	2780.7
19	26092	0.1443	0.0827	2902.1
20	25717	0.1511	0.0919	3035.9
21	25145	0.1604	0.1075	3216.3
22	24154	0.1718	0.1366	3390.3
23	23398	0.1866	0.1639	3644.7
24	22200	0.2055	0.1998	3950.9
25	20437	0.2306	0.2497	4288.2

WIDTH: 4.0025 (IN),101.660 (MM)
THICKNESS: 2.0010 (IN),50.825 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9978 (IN),25.344 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4962 (IN),88.803 (MM)
DISTANCE 2: 3.5370 (IN),89.840 (MM)
DISTANCE 3: 3.5619 (IN),90.472 (MM)
DISTANCE 4: 3.5762 (IN),90.835 (MM)
DISTANCE 5: 3.5817 (IN),90.975 (MM)
DISTANCE 6: 3.5788 (IN),90.902 (MM)
DISTANCE 7: 3.5679 (IN),90.625 (MM)
DISTANCE 8: 3.5402 (IN),89.921 (MM)
DISTANCE 9: 3.4924 (IN),88.707 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.8701 (IN),98.301 (MM)
DISTANCE 2: 3.7565 (IN),95.415 (MM)
DISTANCE 3: 3.8142 (IN),96.881 (MM)
DISTANCE 4: 3.8614 (IN),98.080 (MM)
DISTANCE 5: 3.8250 (IN),97.155 (MM)
DISTANCE 6: 3.8190 (IN),97.003 (MM)
DISTANCE 7: 3.8513 (IN),97.823 (MM)
DISTANCE 8: 3.8149 (IN),96.898 (MM)
DISTANCE 9: 3.9119 (IN),99.362 (MM)

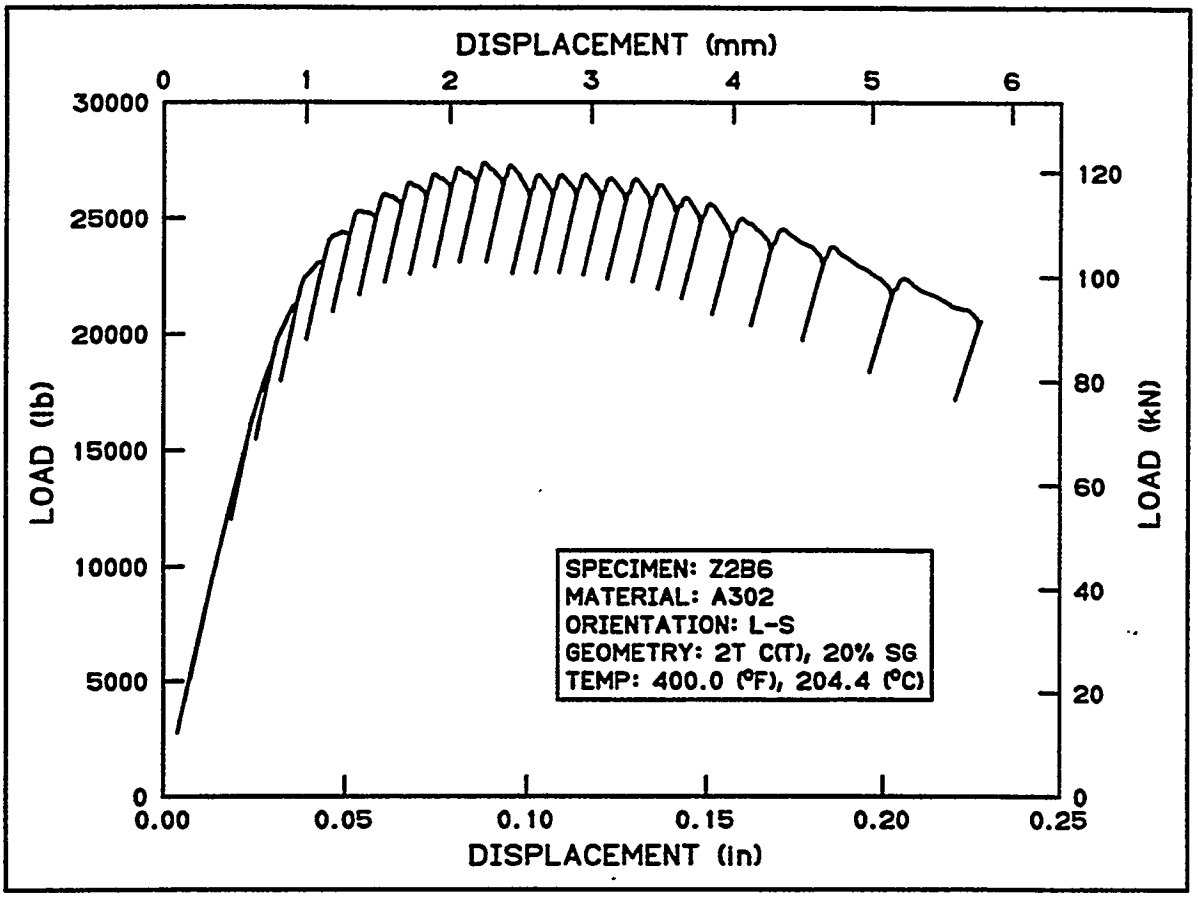

DISPLACEMENT (mm)
0
1
2
3
4
5
6
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

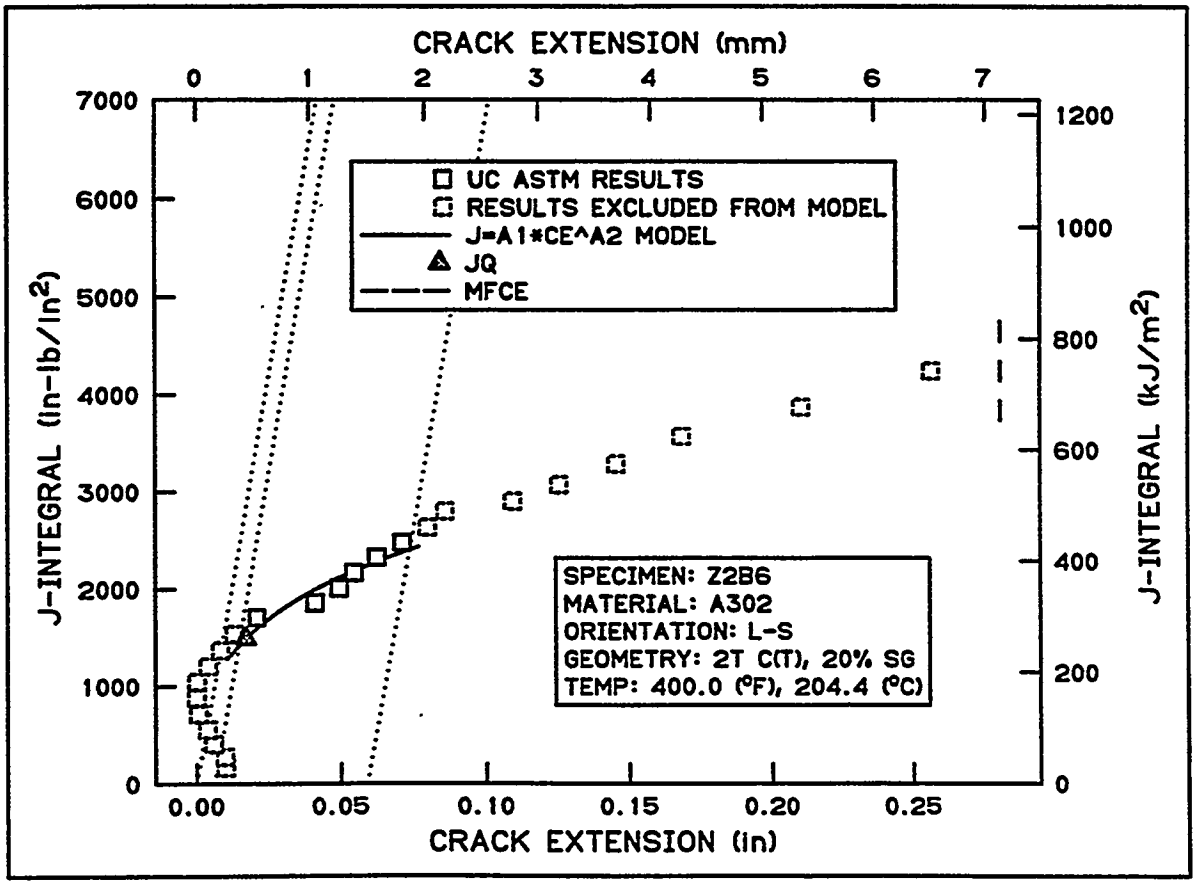

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z2B6
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.5515 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14994	0.0222	0.0097	164.7
2	18475	0.0288	0.0095	273.7
3	21122	0.0356	0.0057	405.5
4	23068	0.0425	0.0037	553.0
5	24407	0.0491	0.0007	712.5
6	25259	0.0562	0.0000	879.4
7	25925	0.0630	0.0001	1043.8
8	26377	0.0696	0.0039	1204.8
9	26702	0.0764	0.0080	1367.8
10	26952	0.0834	0.0127	1535.6
11	27064	0.0904	0.0208	1706.7
12	26912	0.0974	0.0412	1858.3
13	26675	0.1042	0.0494	2006.7
14	26645	0.1109	0.0545	2165.1
15	26705	0.1173	0.0624	2324.0
16	26574	0.1243	0.0710	2475.9
17	26574	0.1311	0.0796	2633.3
18	26358	0.1378	0.0858	2796.7
19	25841	0.1447	0.1092	2899.4
20	25195	0.1534	0.1255	3068.9
21	24434	0.1651	0.1454	3282.2
22	23765	0.1798	0.1682	3563.9
23	22404	0.1993	0.2104	3865.7
24	21051	0.2243	0.2565	4239.8

WIDTH: 3.9983 (IN),101.560 (MM)
THICKNESS: 2.0023 (IN),50.858 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0013 (IN),25.433 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.5050 (IN),89.027 (MM)
DISTANCE 2: 3.5438 (IN),90.013 (MM)
DISTANCE 3: 3.5656 (IN),90.566 (MM)
DISTANCE 4: 3.5770 (IN),90.856 (MM)
DISTANCE 5: 3.5828 (IN),91.003 (MM)
DISTANCE 6: 3.5741 (IN),90.782 (MM)
DISTANCE 7: 3.5566 (IN),90.338 (MM)
DISTANCE 8: 3.5299 (IN),89.659 (MM)
DISTANCE 9: 3.4801 (IN),88.395 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.9491 (IN),100.310 (MM)
DISTANCE 2: 3.8750 (IN),98.425 (MM)
DISTANCE 3: 3.8456 (IN),97.678 (MM)
DISTANCE 4: 3.8128 (IN),96.845 (MM)
DISTANCE 5: 3.8148 (IN),96.896 (MM)
DISTANCE 6: 3.8258 (IN),97.175 (MM)
DISTANCE 7: 3.7992 (IN),96.500 (MM)
DISTANCE 8: 3.7944 (IN),96.378 (MM)
DISTANCE 9: 3.8551 (IN),97.920 (MM)

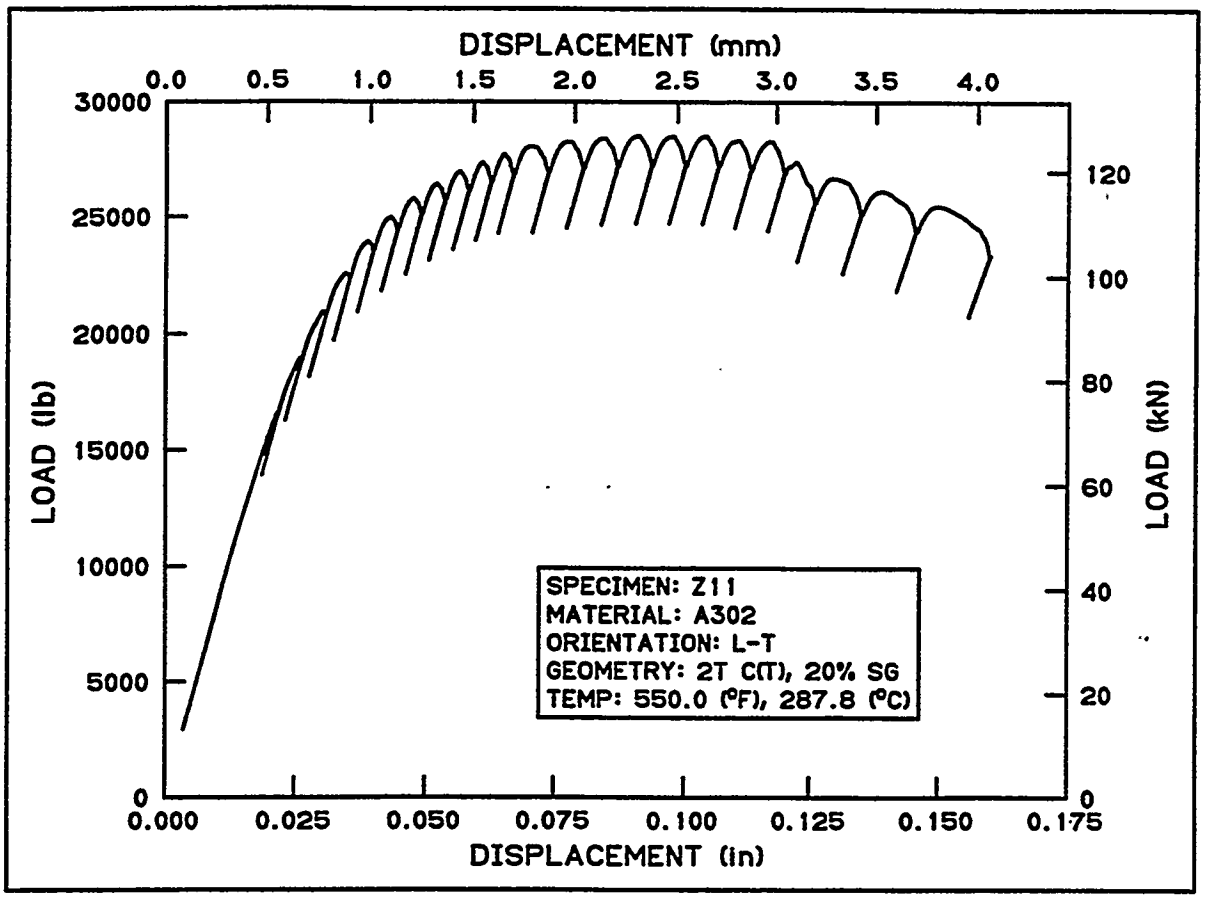

DISPLACEMENT (mm)
0
1
2
3
4
5
6
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z2B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

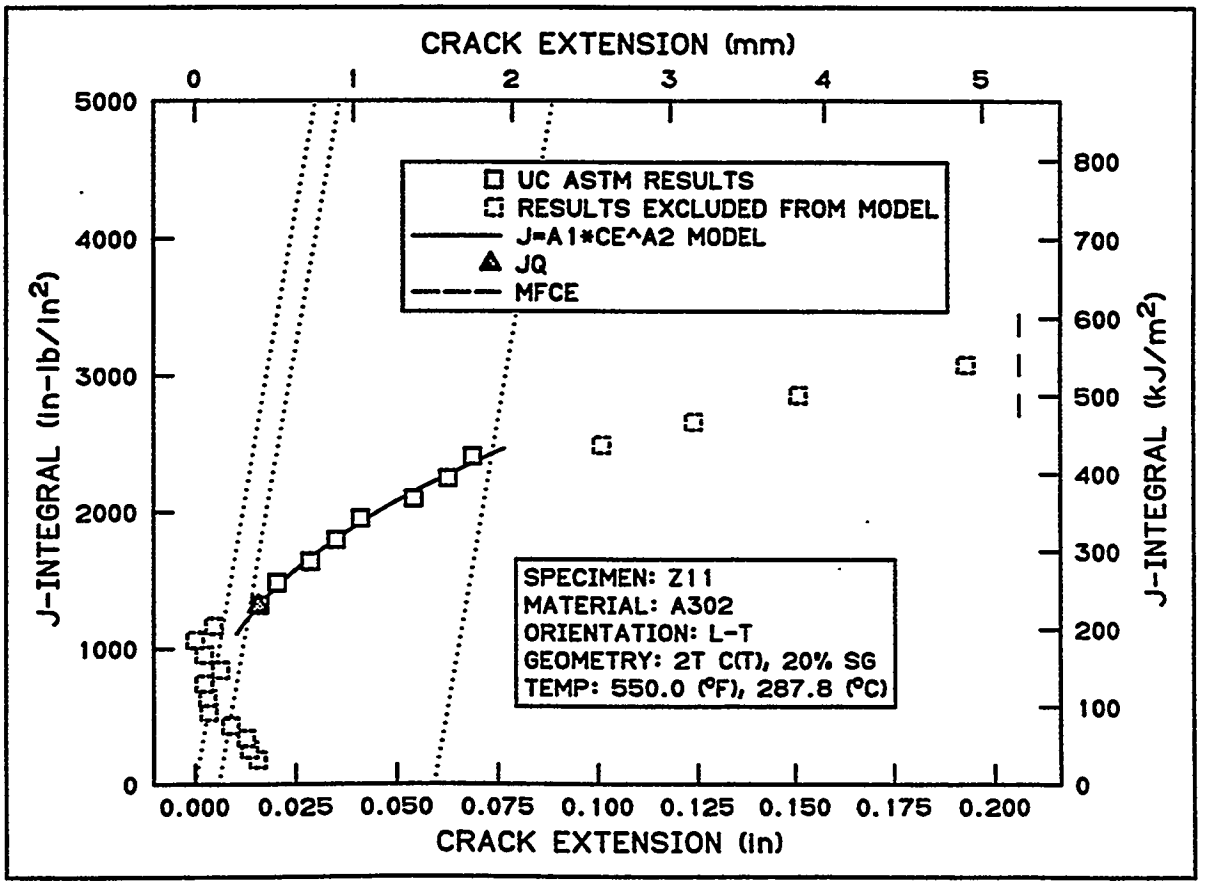

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z11
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5092 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16464	0.0214	0.0156	180.5
2	18917	0.0258	0.0136	255.7
3	20933	0.0301	0.0127	340.0
4	22579	0.0345	0.0089	432.8
5	23939	0.0389	0.0034	534.2
6	24997	0.0432	0.0031	636.7
7	25811	0.0477	0.0023	742.3
8	26439	0.0519	0.0063	843.3
9	26985	0.0564	0.0023	955.7
10	27364	0.0607	0.0000	1063.2
11	27726	0.0651	0.0047	1167.0
12	27982	0.0715	0.0162	1322.9
13	28230	0.0782	0.0205	1485.4
14	28403	0.0846	0.0286	1639.9
15	28498	0.0911	0.0349	1799.2
16	28487	0.0978	0.0411	1956.2
17	28511	0.1042	0.0542	2100.8
18	28303	0.1108	0.0626	2251.2
19	28278	0.1173	0.0686	2411.1
20	26538	0.1241	0.1009	2492.4
21	26486	0.1325	0.1239	2663.6
22	25551	0.1436	0.1509	2858.3
23	24487	0.1578	0.1928	3083.5

  WIDTH: 3.9986 (IN),101.560 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0014 (IN),25.436 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5048 (IN),89.022 (MM)
    DISTANCE 2: 3.5228 (IN),89.479 (MM)
    DISTANCE 3: 3.5280 (IN),89.611 (MM)
    DISTANCE 4: 3.5288 (IN),89.632 (MM)
    DISTANCE 5: 3.5234 (IN),89.494 (MM)
    DISTANCE 6: 3.5150 (IN),89.281 (MM)
    DISTANCE 7: 3.5020 (IN),88.951 (MM)
    DISTANCE 8: 3.4770 (IN),88.316 (MM)
    DISTANCE 9: 3.4708 (IN),88.158 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7132 (IN),94.315 (MM)
    DISTANCE 2: 3.6310 (IN),92.227 (MM)
    DISTANCE 3: 3.6788 (IN),93.442 (MM)
    DISTANCE 4: 3.7323 (IN),94.800 (MM)
    DISTANCE 5: 3.7320 (IN),94.793 (MM)
    DISTANCE 6: 3.7436 (IN),95.087 (MM)
    DISTANCE 7: 3.7307 (IN),94.760 (MM)
    DISTANCE 8: 3.7449 (IN),95.120 (MM)
    DISTANCE 9: 3.7672 (IN),95.687 (MM)

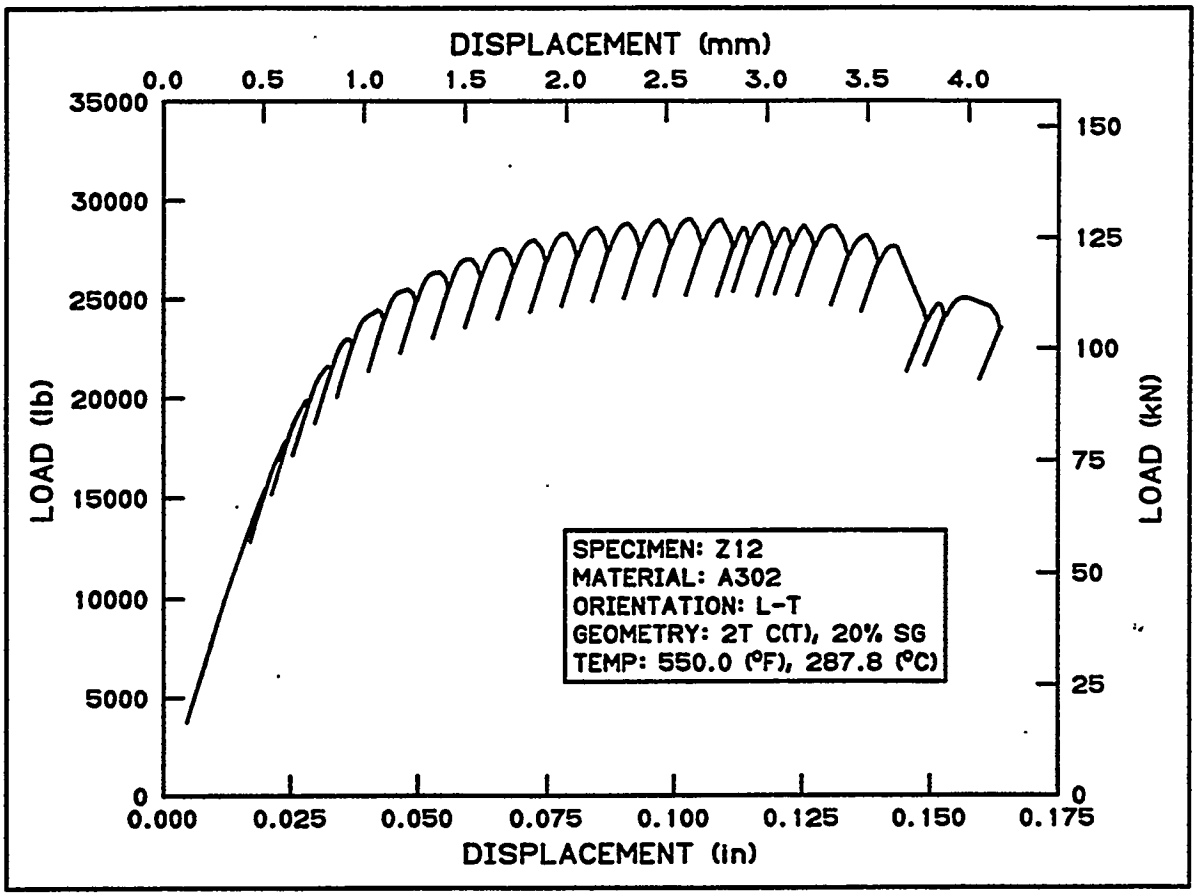

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
30000 25000 20000 15000 10000 5000 0
LOAD (lb)
120 100 80 60 40 20 0
LOAD (kN)
SPECIMEN: Z11
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

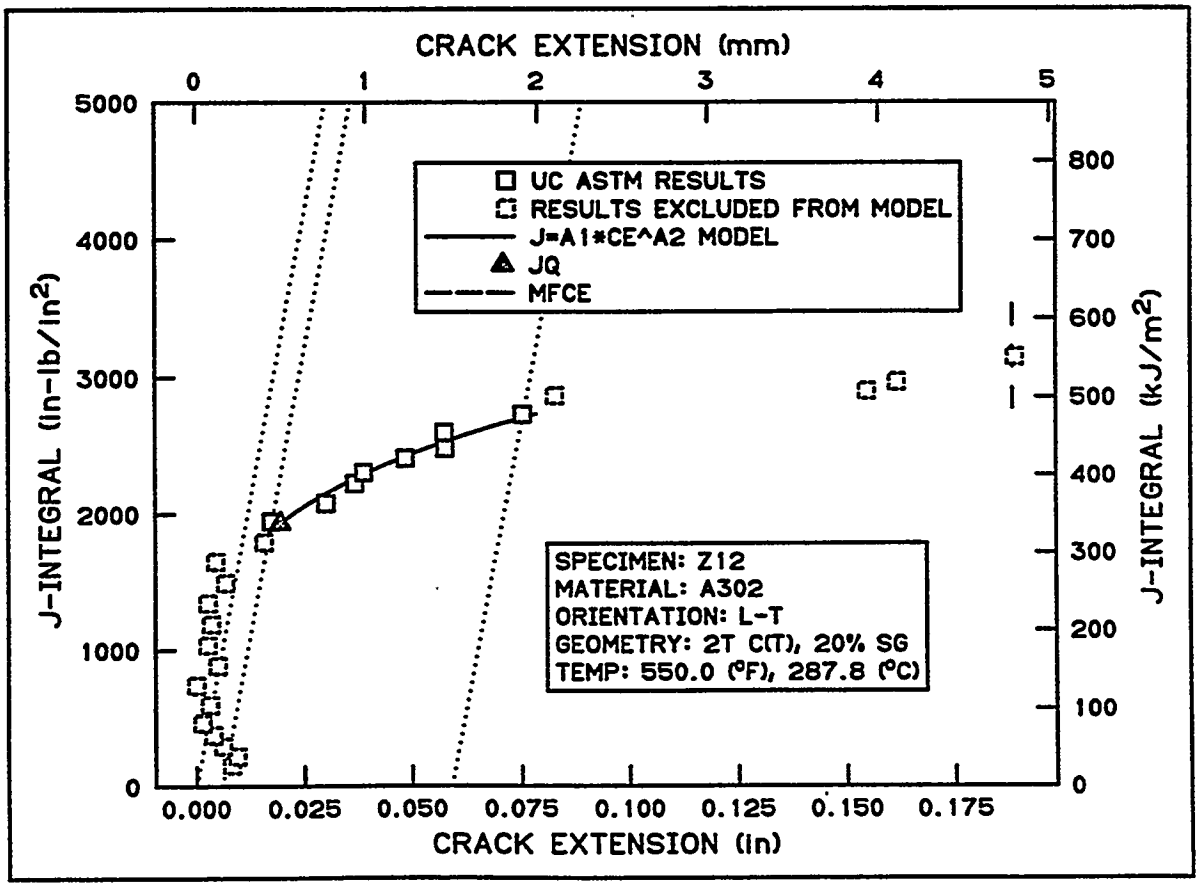

CRACK EXTENSION (mm)
0 1 2 3 4 5
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z11
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z12
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5112 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15328	0.0198	0.0082	154.5
2	17743	0.0239	0.0094	219.3
3	19810	0.0279	0.0062	293.5
4	21569	0.0321	0.0039	376.2
5	22950	0.0360	0.0014	464.0
6	24418	0.0421	0.0032	598.3
7	25477	0.0480	0.0000	741.4
8	26346	0.0543	0.0050	884.7
9	27000	0.0604	0.0027	1035.5
10	27520	0.0666	0.0035	1188.1
11	27967	0.0725	0.0027	1342.2
12	28312	0.0788	0.0068	1491.4
13	28593	0.0849	0.0045	1648.8
14	28814	0.0910	0.0158	1792.2
15	28977	0.0970	0.0175	1945.1
16	29033	0.1031	0.0300	2080.2
17	29000	0.1091	0.0368	2225.6
18	28575	0.1133	0.0389	2306.2
19	28850	0.1173	0.0486	2411.1
20	28537	0.1214	0.0577	2483.6
21	28718	0.1254	0.0575	2599.5
22	28664	0.1315	0.0753	2730.7
23	28210	0.1376	0.0827	2867.3
24	27598	0.1436	0.1547	2899.4
25	24728	0.1515	0.1617	2965.4
26	24612	0.1616	0.1888	3147.5

  WIDTH: 3.9993 (IN),101.580 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0018 (IN),25.446 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4887 (IN),88.613 (MM)
    DISTANCE 2: 3.5145 (IN),89.268 (MM)
    DISTANCE 3: 3.5230 (IN),89.484 (MM)
    DISTANCE 4: 3.5280 (IN),89.611 (MM)
    DISTANCE 5: 3.5261 (IN),89.563 (MM)
    DISTANCE 6: 3.5230 (IN),89.484 (MM)
    DISTANCE 7: 3.5120 (IN),89.205 (MM)
    DISTANCE 8: 3.4914 (IN),88.682 (MM)
    DISTANCE 9: 3.4832 (IN),88.473 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6904 (IN),93.736 (MM)
    DISTANCE 2: 3.6392 (IN),92.436 (MM)
    DISTANCE 3: 3.6962 (IN),93.883 (MM)
    DISTANCE 4: 3.6996 (IN),93.970 (MM)
    DISTANCE 5: 3.7223 (IN),94.546 (MM)
    DISTANCE 6: 3.7394 (IN),94.981 (MM)
    DISTANCE 7: 3.7070 (IN),94.158 (MM)
    DISTANCE 8: 3.7132 (IN),94.315 (MM)
    DISTANCE 9: 3.6946 (IN),93.843 (MM)

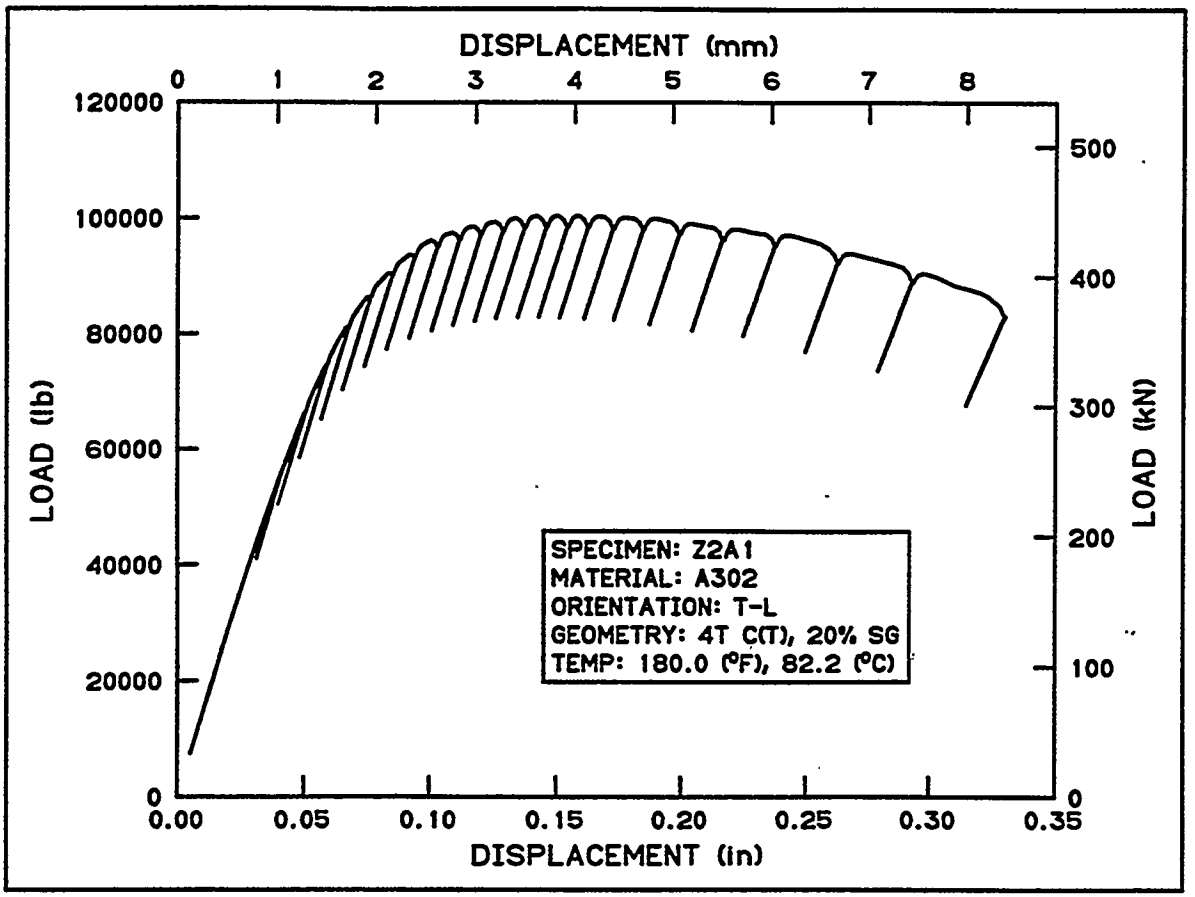

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
35000
30000
25000
20000
15000
10000
5000
0
150
125
100
75
50
25
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z12
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

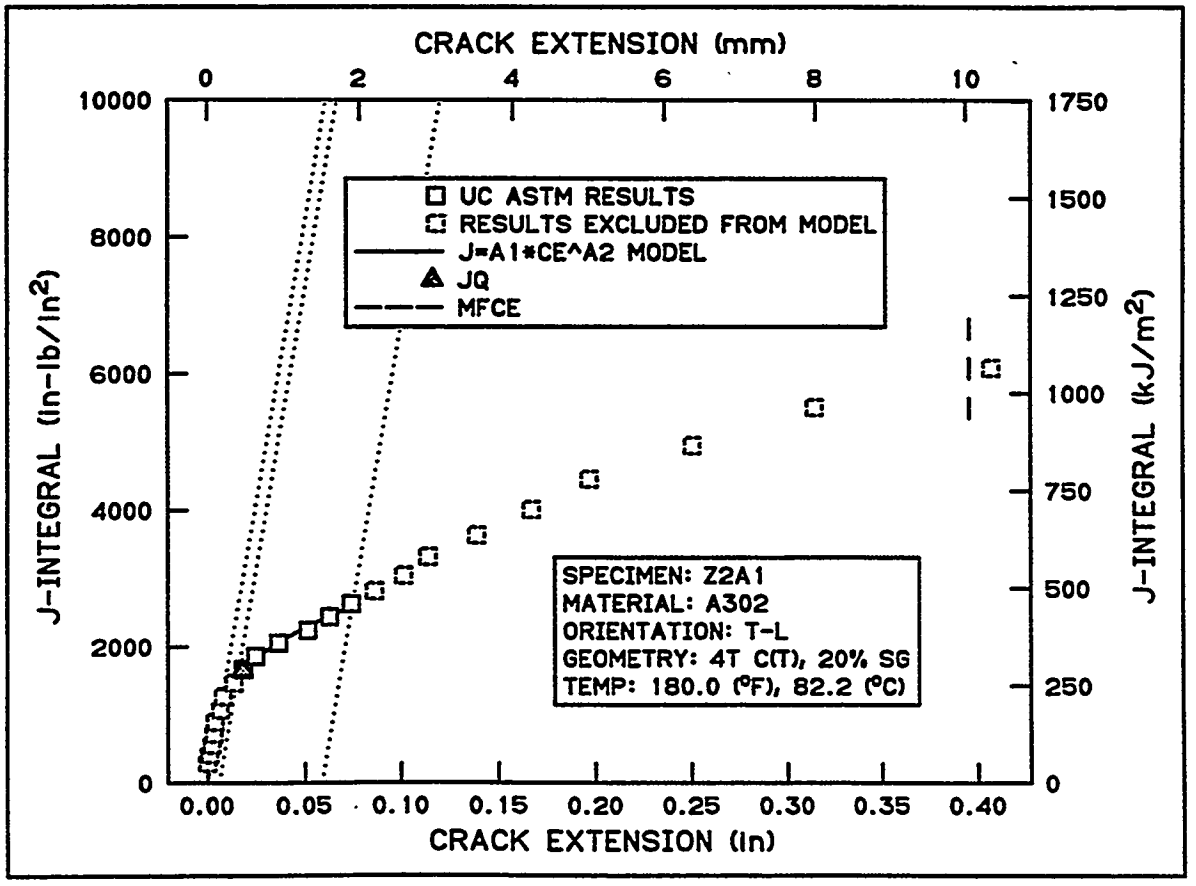

CRACK EXTENSION (mm)
0
1
2
3
4
5
5000
4000
3000
2000
1000
0
800
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z12
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z2A1
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 5.1531 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	56492	0.0415	0.0000	292.5
2	65898	0.0499	0.0009	416.3
3	74115	0.0583	0.0022	558.6
4	80946	0.0668	0.0033	720.2
5	86300	0.0752	0.0039	893.3
6	90480	0.0835	0.0066	1073.7
7	93749	0.0919	0.0082	1264.9
8	96204	0.1004	0.0136	1465.6
9	97492	0.1090	0.0187	1663.9
10	98584	0.1173	0.0248	1858.7
11	99382	0.1258	0.0366	2054.2
12	99999	0.1342	0.0517	2241.5
13	100391	0.1425	0.0631	2437.9
14	100436	0.1507	0.0744	2627.4
15	100459	0.1592	0.0864	2817.9
16	100218	0.1693	0.1013	3043.5
17	99954	0.1813	0.1138	3318.6
18	99367	0.1959	0.1388	3632.8
19	98350	0.2133	0.1667	4006.9
20	97243	0.2339	0.1968	4452.7
21	94848	0.2589	0.2505	4946.4
22	91587	0.2892	0.3144	5499.8
23	86564	0.3229	0.4068	6078.6

WIDTH: 7.9800 (IN),202.690 (MM)
THICKNESS: 4.0000 (IN),101.600 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 7.0000 (IN),177.800 (MM)
DISTANCE 2: 7.1200 (IN),180.850 (MM)
DISTANCE 3: 7.1800 (IN),182.370 (MM)
DISTANCE 4: 7.2200 (IN),183.390 (MM)
DISTANCE 5: 7.2300 (IN),183.640 (MM)
DISTANCE 6: 7.2200 (IN),183.390 (MM)
DISTANCE 7: 7.1900 (IN),182.630 (MM)
DISTANCE 8: 7.1300 (IN),181.100 (MM)
DISTANCE 9: 7.0300 (IN),178.560 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 7.7100 (IN),195.830 (MM)
DISTANCE 2: 7.5304 (IN),191.270 (MM)
DISTANCE 3: 7.5731 (IN),192.360 (MM)
DISTANCE 4: 7.4621 (IN),189.540 (MM)
DISTANCE 5: 7.5116 (IN),190.790 (MM)
DISTANCE 6: 7.6208 (IN),193.570 (MM)
DISTANCE 7: 7.5080 (IN),190.700 (MM)
DISTANCE 8: 7.5994 (IN),193.020 (MM)
DISTANCE 9: 7.6183 (IN),193.500 (MM)

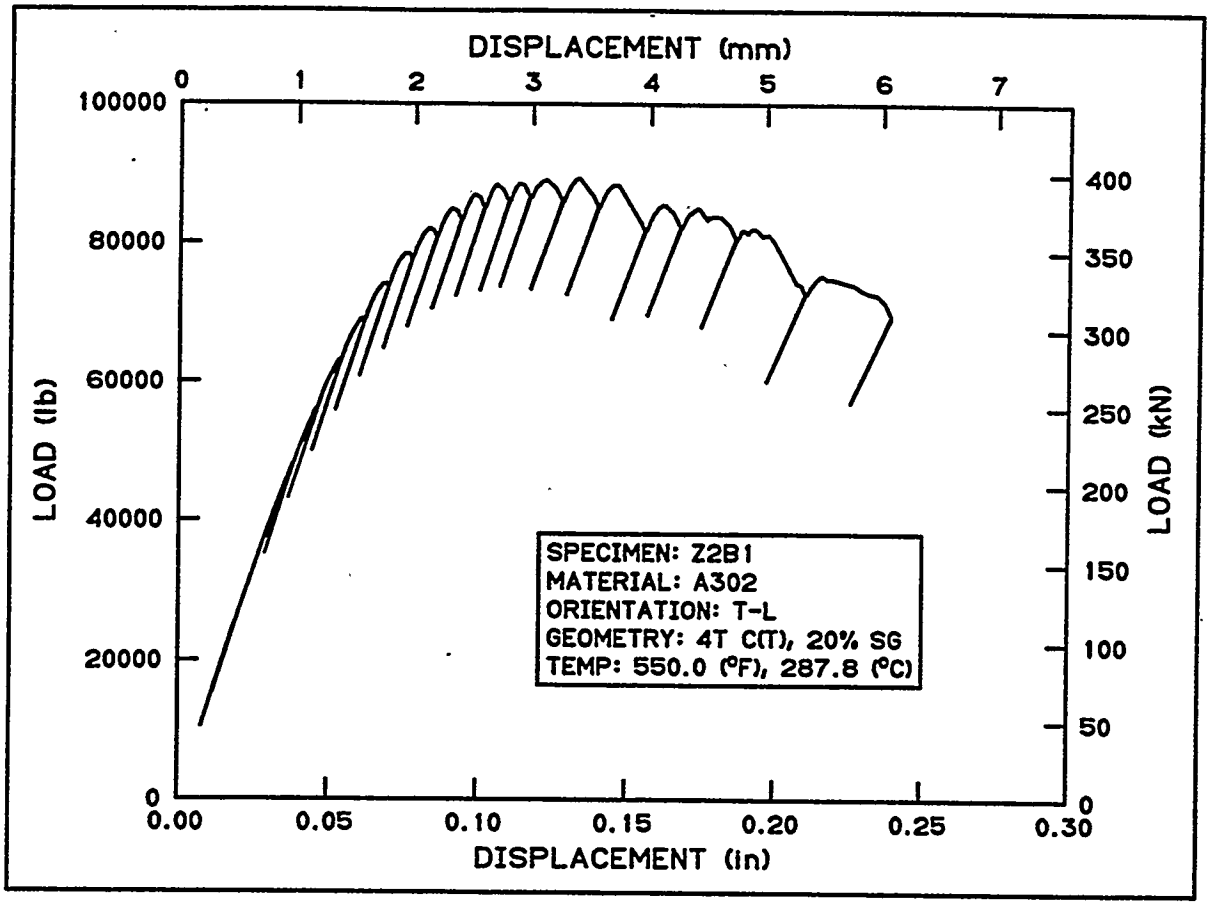

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
8
120000
100000
80000
60000
40000
20000
0
LOAD (lb)
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z2A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
DISPLACEMENT (in)

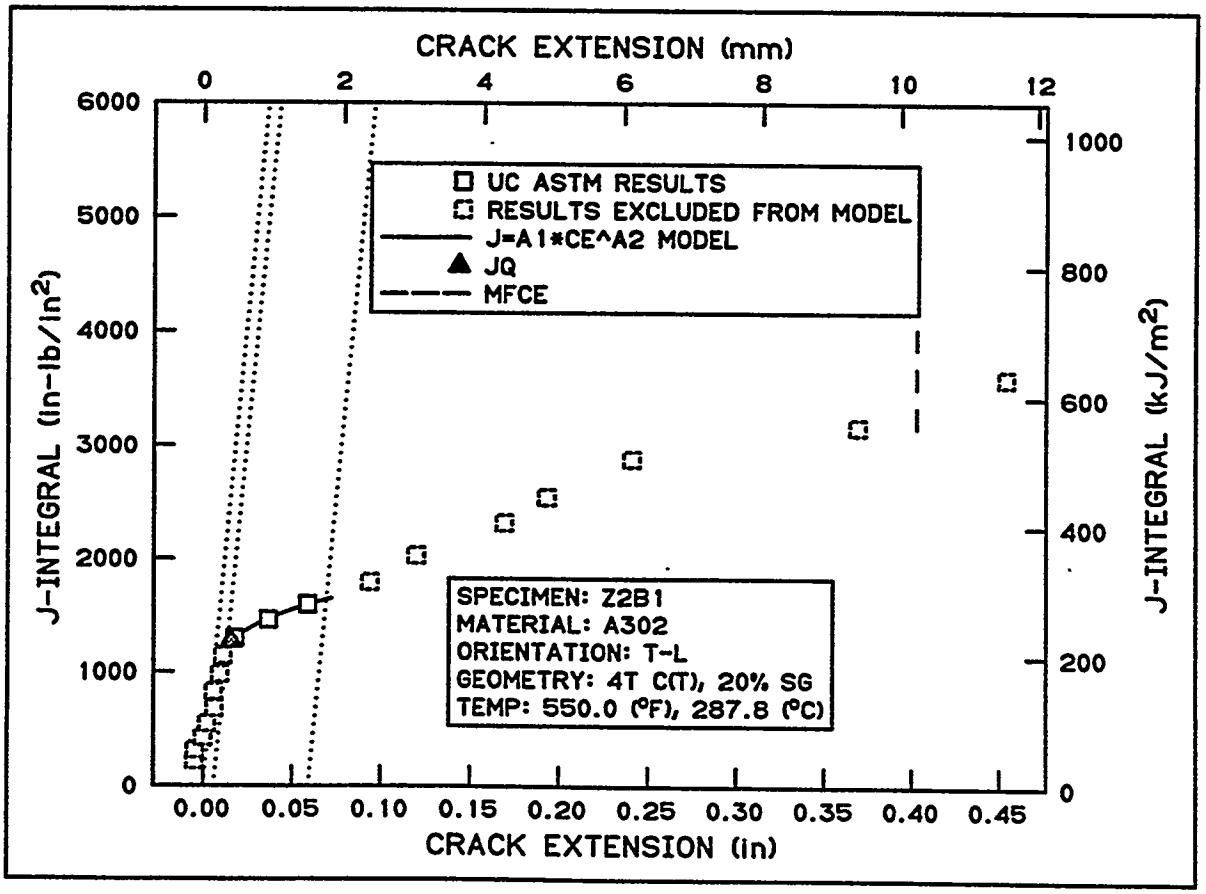

CRACK EXTENSION (mm)
0
2
4
6
8
10
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z2B1
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 5.2081 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	47535	0.0375	-0.0048	220.8
2	55659	0.0452	-0.0046	315.8
3	62654	0.0526	0.0000	425.4
4	68871	0.0604	0.0023	548.6
5	73989	0.0679	0.0062	683.1
6	78428	0.0755	0.0059	829.5
7	82084	0.0832	0.0094	982.2
8	84933	0.0908	0.0111	1143.1
9	86952	0.0983	0.0179	1299.8
10	88392	0.1060	0.0367	1463.7
11	88543	0.1136	0.0588	1597.9
12	89048	0.1226	0.0938	1796.8
13	89266	0.1336	0.1199	2034.2
14	88271	0.1468	0.1695	2319.0
15	85460	0.1624	0.1931	2545.2
16	83734	0.1814	0.2408	2883.4
17	74283	0.2071	0.3688	3168.8
18	72595	0.2344	0.4541	3597.5

  WIDTH: 7.9800 (IN),202.690 (MM)
  THICKNESS: 4.0000 (IN),101.600 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0200 (IN),51.308 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.0000 (IN),177.800 (MM)
    DISTANCE 2: 7.1500 (IN),181.610 (MM)
    DISTANCE 3: 7.2300 (IN),183.640 (MM)
    DISTANCE 4: 7.3000 (IN),185.420 (MM)
    DISTANCE 5: 7.3300 (IN),186.180 (MM)
    DISTANCE 6: 7.3200 (IN),185.930 (MM)
    DISTANCE 7: 7.2700 (IN),184.660 (MM)
    DISTANCE 8: 7.1900 (IN),182.630 (MM)
    DISTANCE 9: 7.0700 (IN),179.580 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.7748 (IN),197.480 (MM)
    DISTANCE 2: 7.6680 (IN),194.770 (MM)
    DISTANCE 3: 7.5476 (IN),191.710 (MM)
    DISTANCE 4: 7.5698 (IN),192.270 (MM)
    DISTANCE 5: 7.6465 (IN),194.220 (MM)
    DISTANCE 6: 7.5909 (IN),192.810 (MM)
    DISTANCE 7: 7.5734 (IN),192.360 (MM)
    DISTANCE 8: 7.6620 (IN),194.610 (MM)
    DISTANCE 9: 7.8061 (IN),198.270 (MM)

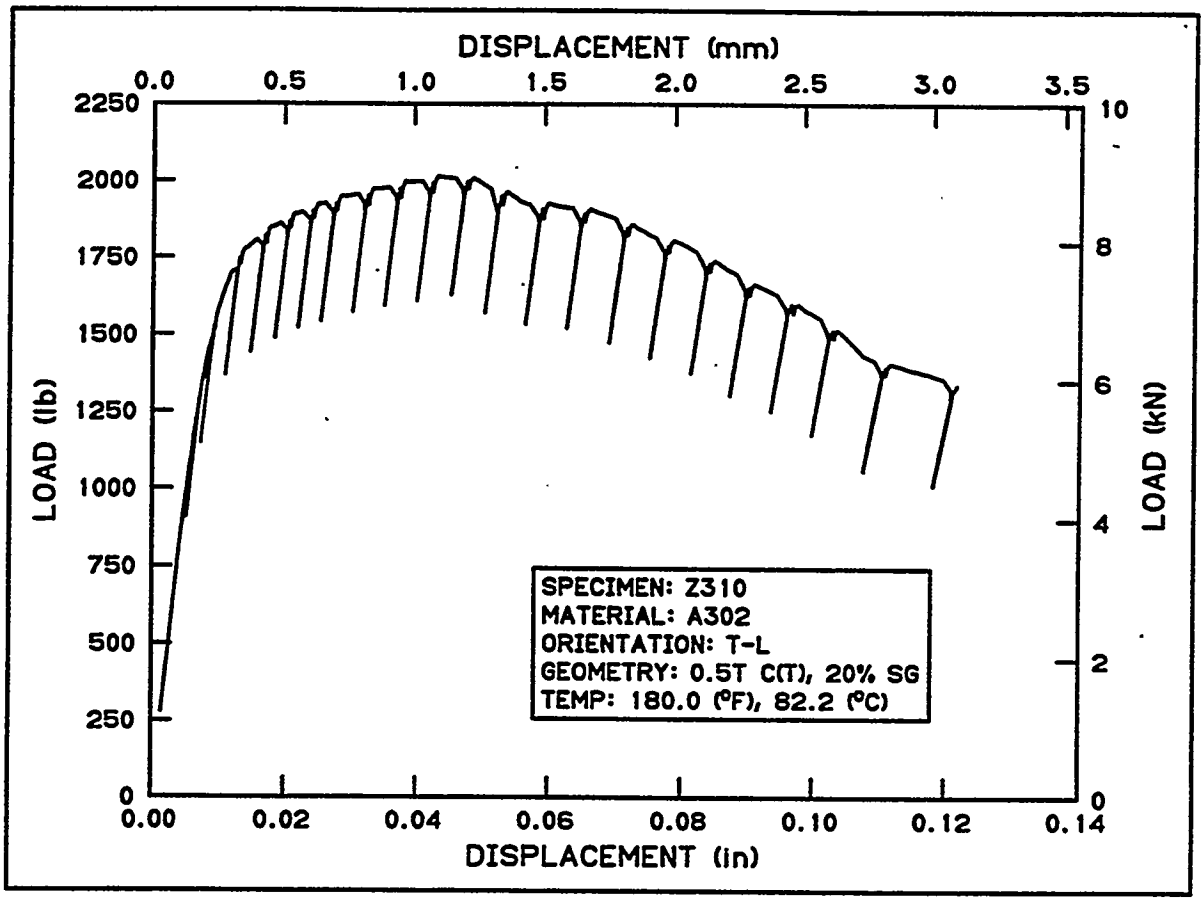

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
100000
80000
60000
40000
20000
0
LOAD (lb)
400
350
300
250
200
150
100
50
0
LOAD (kN)
SPECIMEN: Z2B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

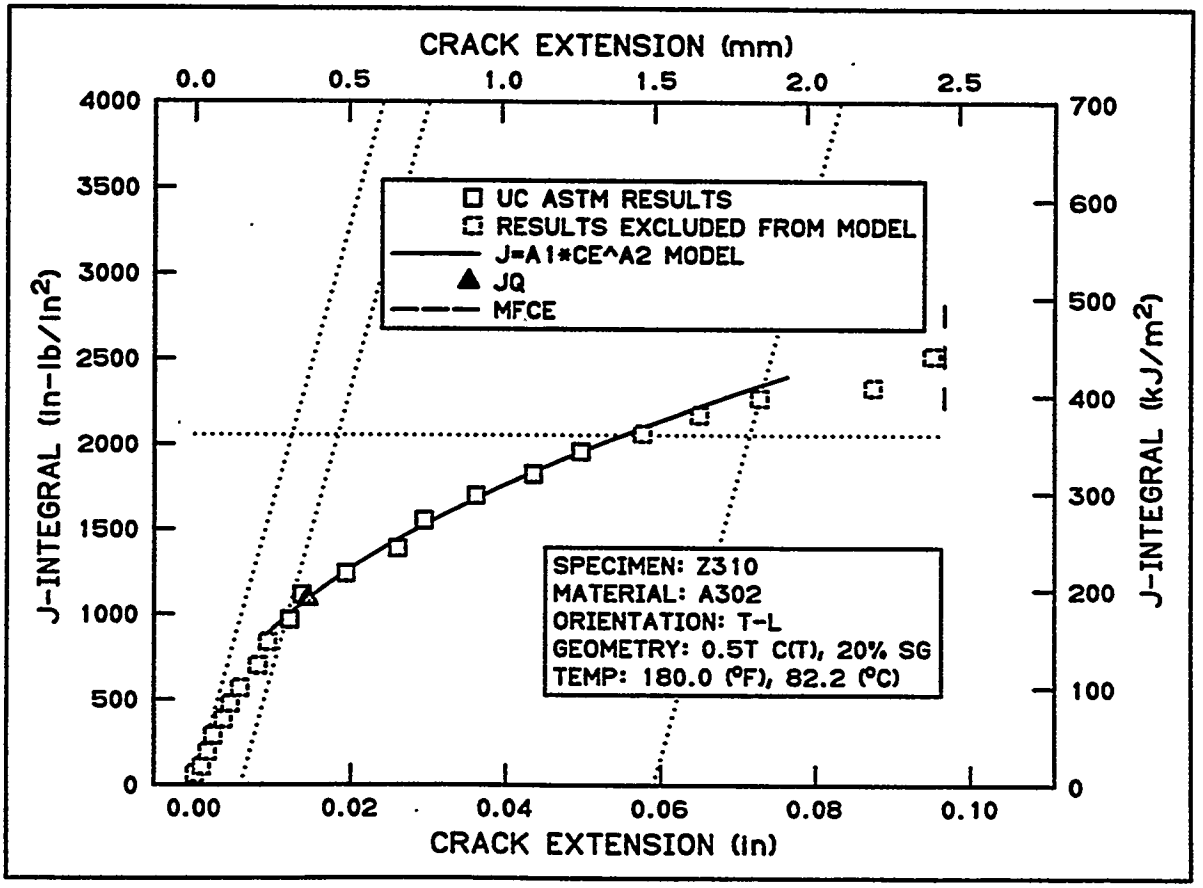

CRACK EXTENSION (mm)
0
2
4
6
8
10
12
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z2B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z310
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6301 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1194	0.0065	0.0000	64.9
2	1447	0.0085	0.0009	107.8
3	1702	0.0120	0.0017	193.5
4	1806	0.0156	0.0024	289.6
5	1861	0.0191	0.0037	382.9
6	1898	0.0224	0.0046	475.7
7	1927	0.0259	0.0058	568.9
8	1955	0.0308	0.0081	699.4
9	1977	0.0357	0.0094	836.0
10	1998	0.0406	0.0121	969.0
11	2008	0.0456	0.0137	1115.1
12	1973	0.0509	0.0194	1240.8
13	1924	0.0568	0.0261	1389.8
14	1912	0.0634	0.0295	1554.8
15	1878	0.0698	0.0361	1700.9
16	1814	0.0759	0.0436	1827.0
17	1769	0.0820	0.0497	1959.1
18	1696	0.0883	0.0576	2064.8
19	1631	0.0943	0.0649	2173.3
20	1554	0.1010	0.0727	2271.9
21	1419	0.1092	0.0875	2333.0
22	1356	0.1197	0.0951	2520.1

WIDTH: 1.0041 (IN),25.504 (MM)
THICKNESS: 0.5008 (IN),12.720 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2474 (IN),6.284 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8542 (IN),21.697 (MM)
DISTANCE 2: 0.8682 (IN),22.052 (MM)
DISTANCE 3: 0.8743 (IN),22.207 (MM)
DISTANCE 4: 0.8778 (IN),22.296 (MM)
DISTANCE 5: 0.8820 (IN),22.403 (MM)
DISTANCE 6: 0.8858 (IN),22.499 (MM)
DISTANCE 7: 0.8860 (IN),22.504 (MM)
DISTANCE 8: 0.8818 (IN),22.398 (MM)
DISTANCE 9: 0.8740 (IN),22.200 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9406 (IN),23.891 (MM)
DISTANCE 2: 0.9631 (IN),24.463 (MM)
DISTANCE 3: 0.9720 (IN),24.689 (MM)
DISTANCE 4: 0.9774 (IN),24.826 (MM)
DISTANCE 5: 0.9850 (IN),25.019 (MM)
DISTANCE 6: 0.9810 (IN),24.917 (MM)
DISTANCE 7: 0.9836 (IN),24.983 (MM)
DISTANCE 8: 0.9823 (IN),24.950 (MM)
DISTANCE 9: 0.9557 (IN),24.275 (MM)

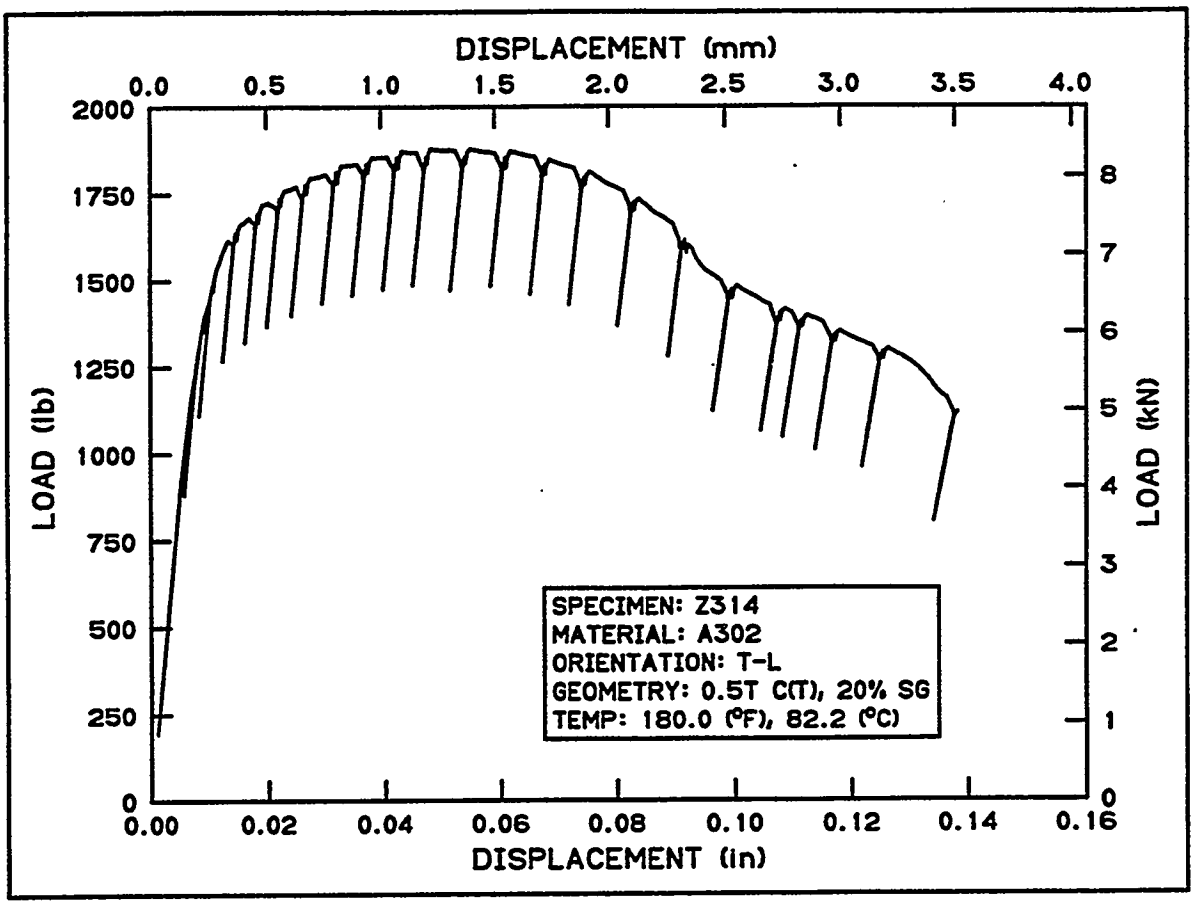

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z310
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

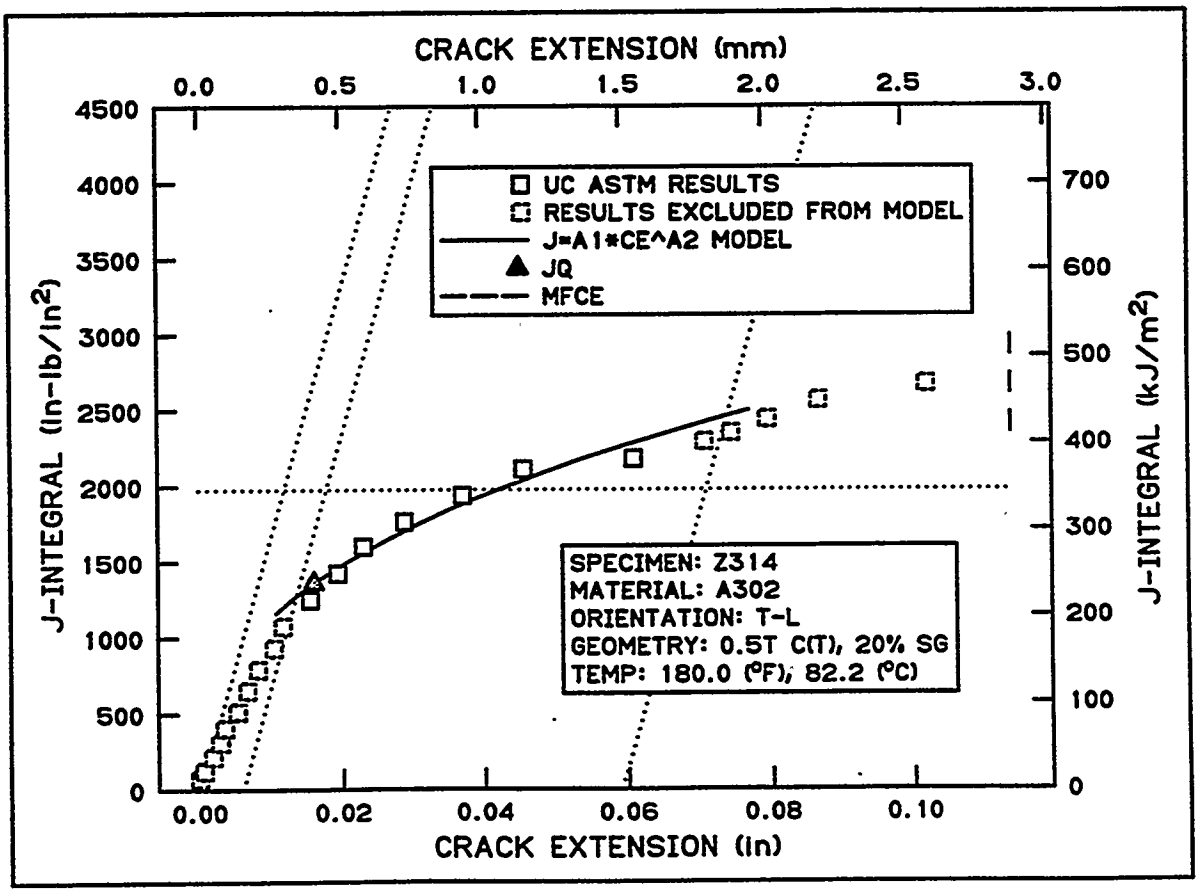

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z310
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z314
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6435 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1183	0.0072	0.0000	73.5
2	1400	0.0093	0.0006	123.3
3	1615	0.0131	0.0018	214.5
4	1681	0.0167	0.0028	307.9
5	1721	0.0204	0.0034	405.3
6	1770	0.0249	0.0052	514.3
7	1806	0.0299	0.0066	652.6
8	1836	0.0353	0.0081	791.3
9	1857	0.0405	0.0104	930.5
10	1868	0.0457	0.0117	1073.7
11	1875	0.0525	0.0155	1248.1
12	1867	0.0592	0.0194	1422.3
13	1856	0.0661	0.0229	1600.6
14	1823	0.0730	0.0287	1762.4
15	1758	0.0812	0.0371	1935.4
16	1663	0.0896	0.0454	2106.5
17	1499	0.0977	0.0609	2175.7
18	1429	0.1060	0.0707	2289.5
19	1406	0.1098	0.0744	2347.4
20	1377	0.1151	0.0794	2438.3
21	1309	0.1237	0.0866	2563.1
22	1159	0.1365	0.1018	2669.6

WIDTH: 1.0024 (IN),25.461 (MM)
THICKNESS: 0.5011 (IN),12.728 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2462 (IN),6.254 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8758 (IN),22.245 (MM)
DISTANCE 2: 0.8838 (IN),22.449 (MM)
DISTANCE 3: 0.8886 (IN),22.570 (MM)
DISTANCE 4: 0.8938 (IN),22.703 (MM)
DISTANCE 5: 0.8948 (IN),22.728 (MM)
DISTANCE 6: 0.8952 (IN),22.738 (MM)
DISTANCE 7: 0.8930 (IN),22.682 (MM)
DISTANCE 8: 0.8899 (IN),22.603 (MM)
DISTANCE 9: 0.8816 (IN),22.393 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9952 (IN),25.278 (MM)
DISTANCE 2: 1.0178 (IN),25.852 (MM)
DISTANCE 3: 1.0223 (IN),25.966 (MM)
DISTANCE 4: 1.0010 (IN),25.425 (MM)
DISTANCE 5: 0.9948 (IN),25.268 (MM)
DISTANCE 6: 0.9990 (IN),25.375 (MM)
DISTANCE 7: 0.9971 (IN),25.326 (MM)
DISTANCE 8: 1.0024 (IN),25.461 (MM)
DISTANCE 9: 0.9862 (IN),25.049 (MM)

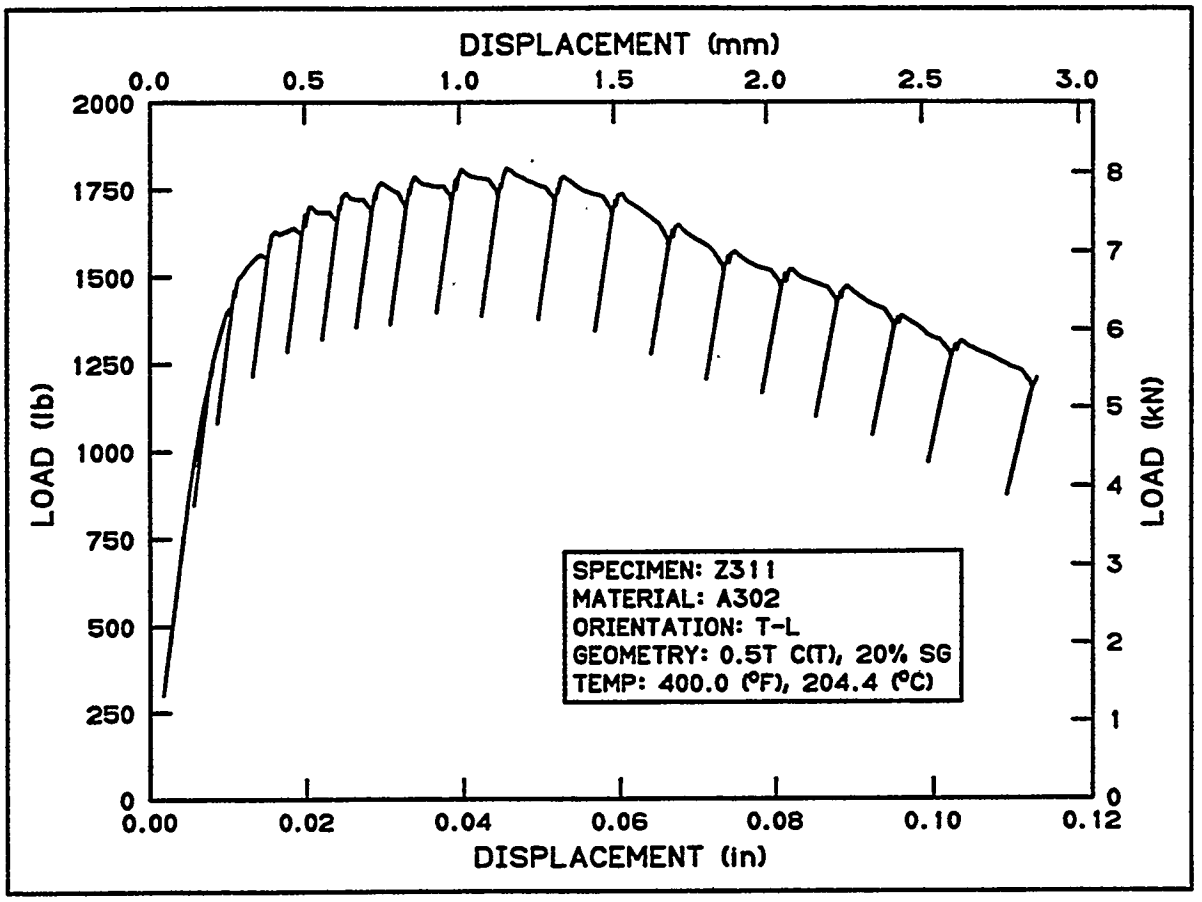

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z314
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

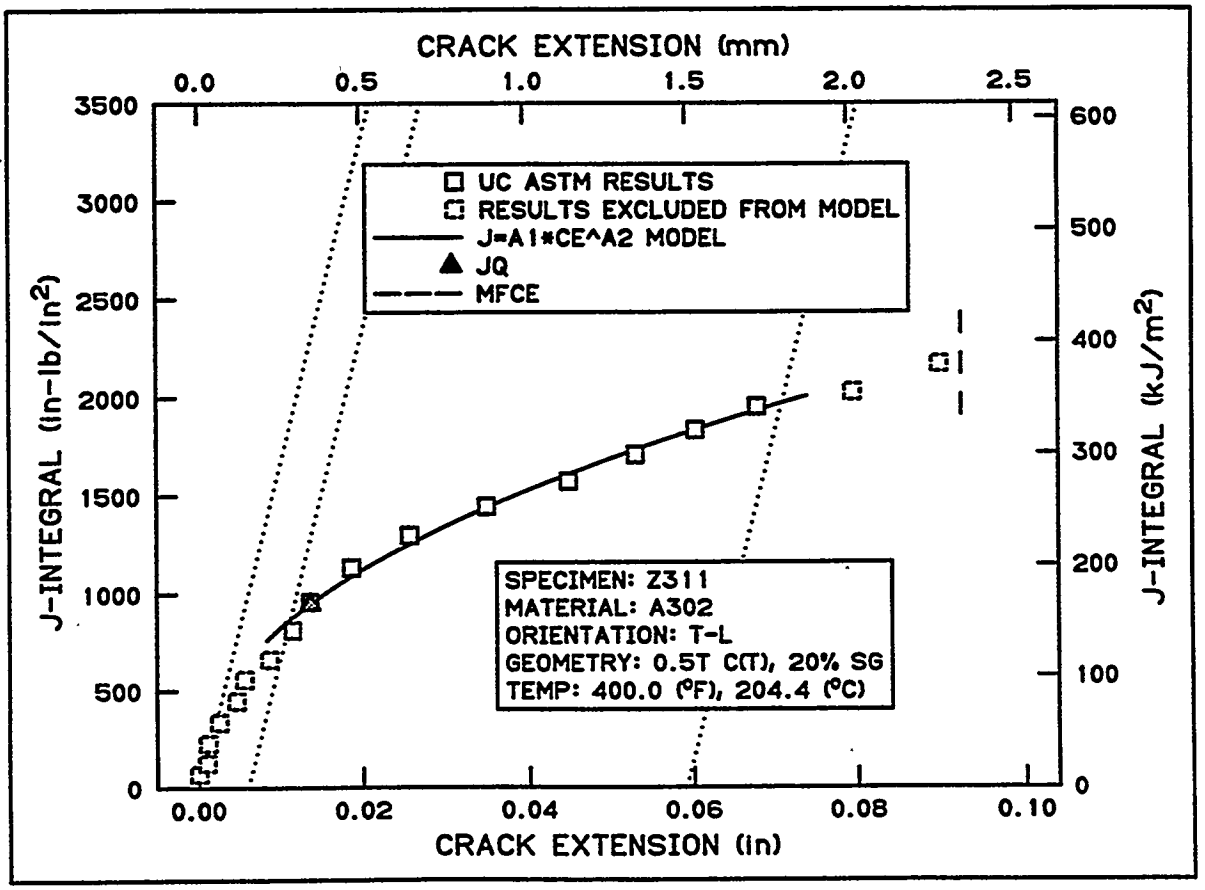

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z314
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z311
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6418 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1132	0.0068	0.0000	69.8
2	1398	0.0097	0.0010	127.3
3	1564	0.0139	0.0011	228.8
4	1639	0.0183	0.0024	337.1
5	1685	0.0229	0.0046	446.0
6	1722	0.0272	0.0055	556.0
7	1742	0.0315	0.0086	660.5
8	1760	0.0374	0.0114	811.0
9	1780	0.0431	0.0136	957.5
10	1756	0.0504	0.0187	1133.4
11	1730	0.0577	0.0256	1298.8
12	1652	0.0649	0.0349	1444.3
13	1573	0.0720	0.0448	1571.1
14	1520	0.0794	0.0530	1706.4
15	1472	0.0866	0.0603	1832.7
16	1408	0.0938	0.0679	1951.7
17	1320	0.1008	0.0794	2026.7
18	1229	0.1111	0.0898	2167.7

WIDTH: 1.0017 (IN),25.443 (MM)
THICKNESS: 0.5008 (IN),12.720 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2474 (IN),6.284 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8738 (IN),22.195 (MM)
DISTANCE 2: 0.8858 (IN),22.499 (MM)
DISTANCE 3: 0.8915 (IN),22.644 (MM)
DISTANCE 4: 0.8940 (IN),22.708 (MM)
DISTANCE 5: 0.8946 (IN),22.723 (MM)
DISTANCE 6: 0.8941 (IN),22.710 (MM)
DISTANCE 7: 0.8908 (IN),22.626 (MM)
DISTANCE 8: 0.8864 (IN),22.515 (MM)
DISTANCE 9: 0.8786 (IN),22.316 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9642 (IN),24.491 (MM)
DISTANCE 2: 0.9712 (IN),24.668 (MM)
DISTANCE 3: 0.9800 (IN),24.892 (MM)
DISTANCE 4: 0.9968 (IN),25.319 (MM)
DISTANCE 5: 0.9870 (IN),25.070 (MM)
DISTANCE 6: 0.9666 (IN),24.552 (MM)
DISTANCE 7: 0.9802 (IN),24.897 (MM)
DISTANCE 8: 0.9959 (IN),25.296 (MM)
DISTANCE 9: 0.9854 (IN),25.029 (MM)

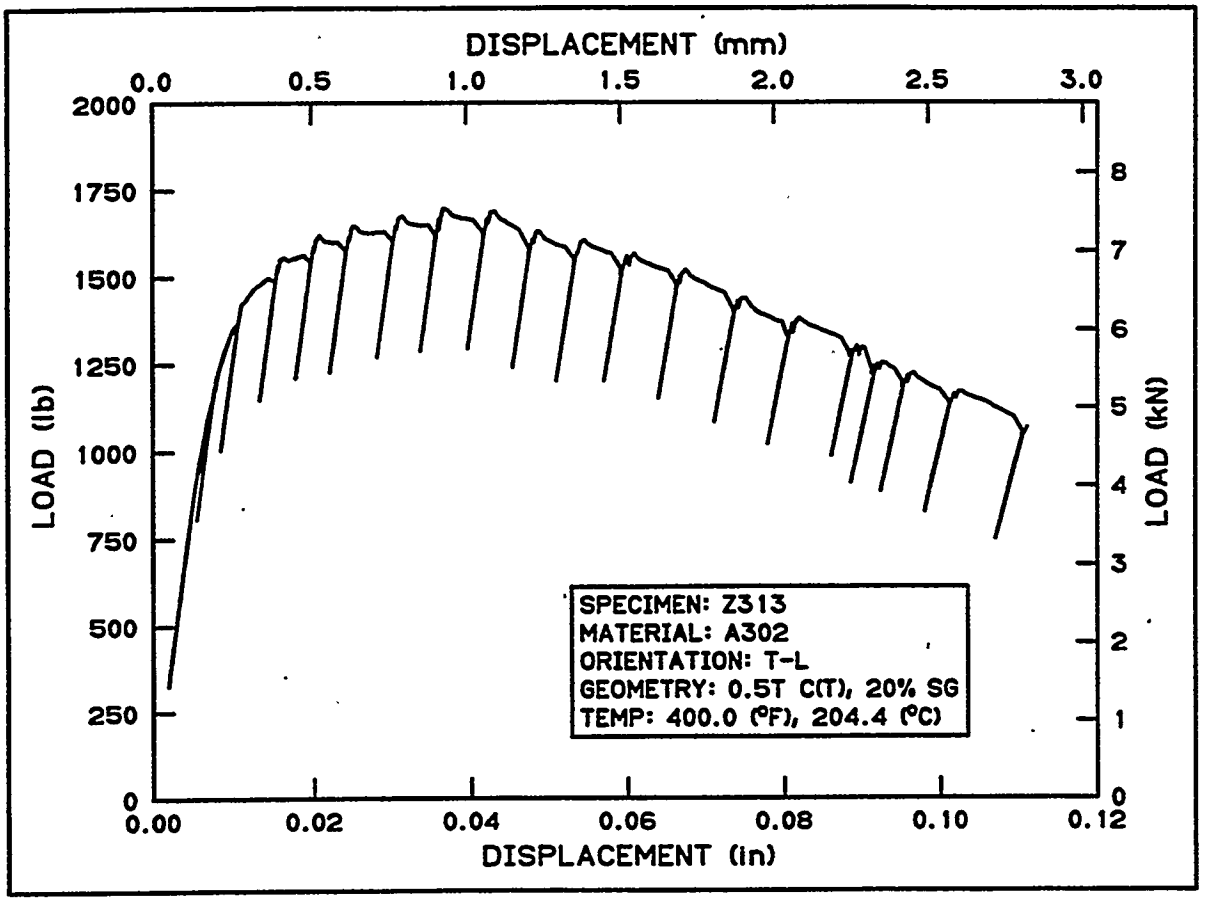

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z311
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

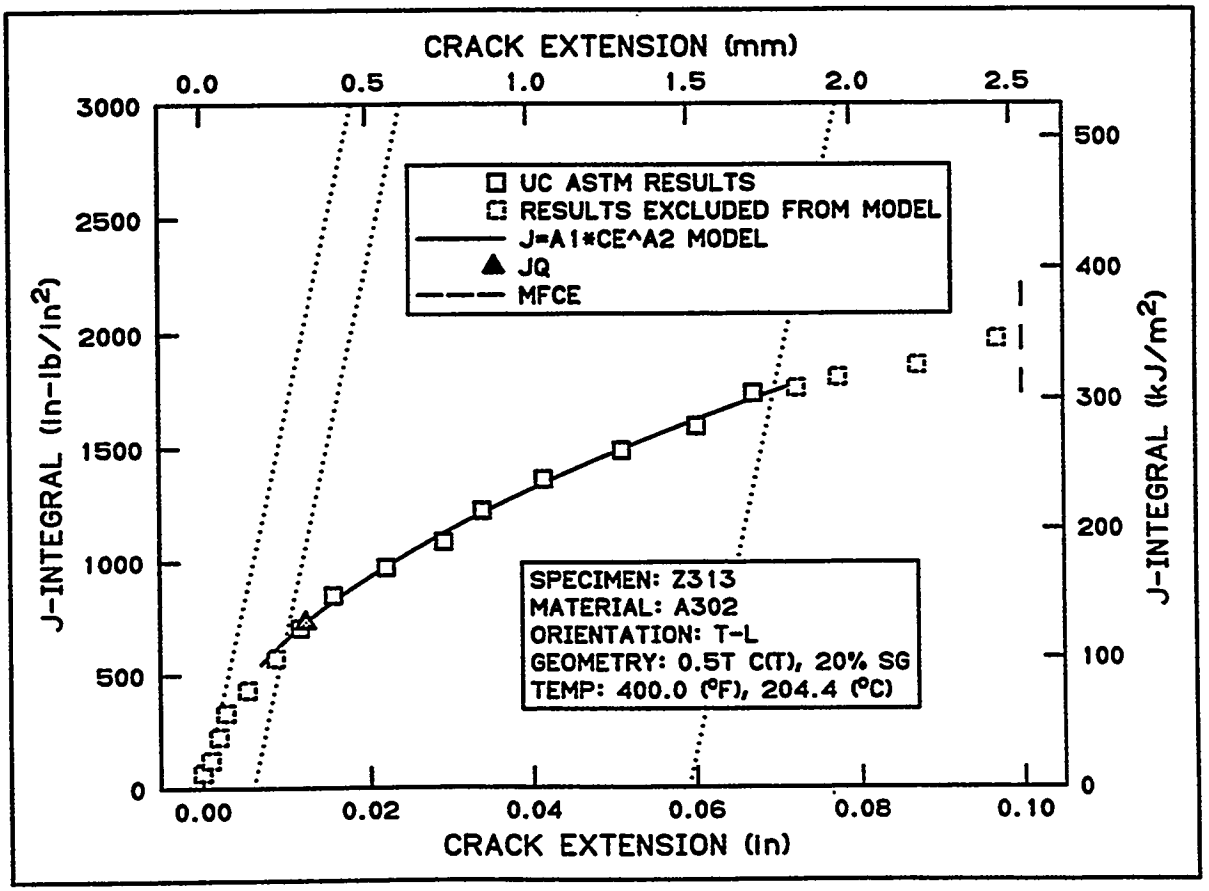

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z311
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z313
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6465 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1089	0.0068	0.0000	66.9
2	1347	0.0098	0.0009	121.8
3	1497	0.0142	0.0019	225.4
4	1562	0.0187	0.0027	330.1
5	1599	0.0230	0.0053	431.7
6	1630	0.0289	0.0086	570.4
7	1649	0.0346	0.0116	703.4
8	1663	0.0403	0.0157	849.0
9	1633	0.0461	0.0220	973.1
10	1584	0.0521	0.0291	1087.8
11	1566	0.0580	0.0338	1223.7
12	1517	0.0652	0.0413	1360.8
13	1455	0.0724	0.0509	1485.7
14	1370	0.0798	0.0602	1593.1
15	1322	0.0872	0.0671	1736.1
16	1293	0.0902	0.0723	1759.7
17	1233	0.0940	0.0773	1806.7
18	1174	0.0999	0.0870	1859.9
19	1097	0.1094	0.0969	1974.7

WIDTH: 1.0020 (IN),25.451 (MM)
THICKNESS: 0.5010 (IN),12.725 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2470 (IN),6.274 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8884 (IN),22.565 (MM)
DISTANCE 2: 0.8952 (IN),22.738 (MM)
DISTANCE 3: 0.9003 (IN),22.868 (MM)
DISTANCE 4: 0.8996 (IN),22.850 (MM)
DISTANCE 5: 0.8989 (IN),22.832 (MM)
DISTANCE 6: 0.8966 (IN),22.774 (MM)
DISTANCE 7: 0.8916 (IN),22.647 (MM)
DISTANCE 8: 0.8848 (IN),22.474 (MM)
DISTANCE 9: 0.8741 (IN),22.202 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9818 (IN),24.938 (MM)
DISTANCE 2: 1.0048 (IN),25.522 (MM)
DISTANCE 3: 0.9868 (IN),25.065 (MM)
DISTANCE 4: 0.9927 (IN),25.215 (MM)
DISTANCE 5: 0.9901 (IN),25.149 (MM)
DISTANCE 6: 0.9962 (IN),25.303 (MM)
DISTANCE 7: 1.0059 (IN),25.550 (MM)
DISTANCE 8: 0.9880 (IN),25.095 (MM)
DISTANCE 9: 0.9832 (IN),24.973 (MM)

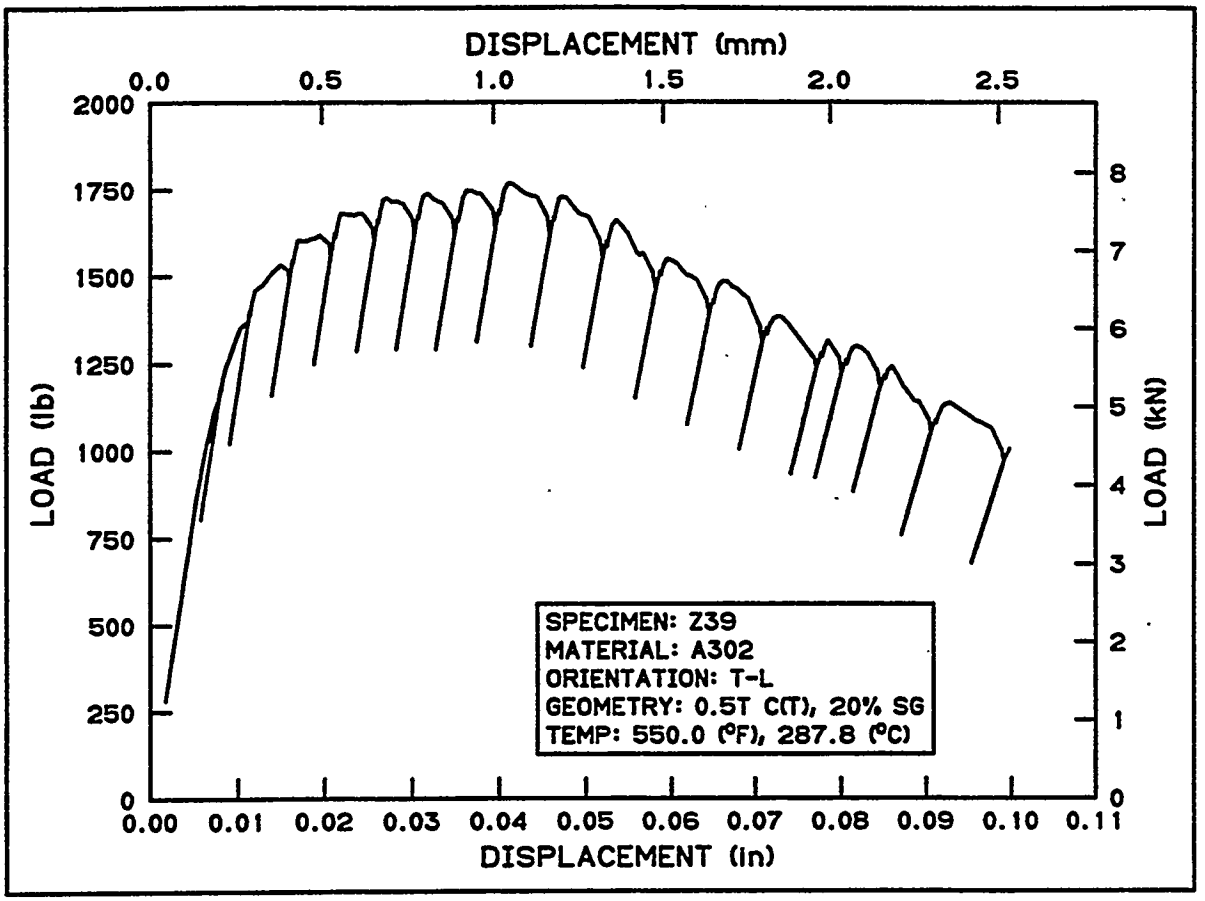

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z313
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

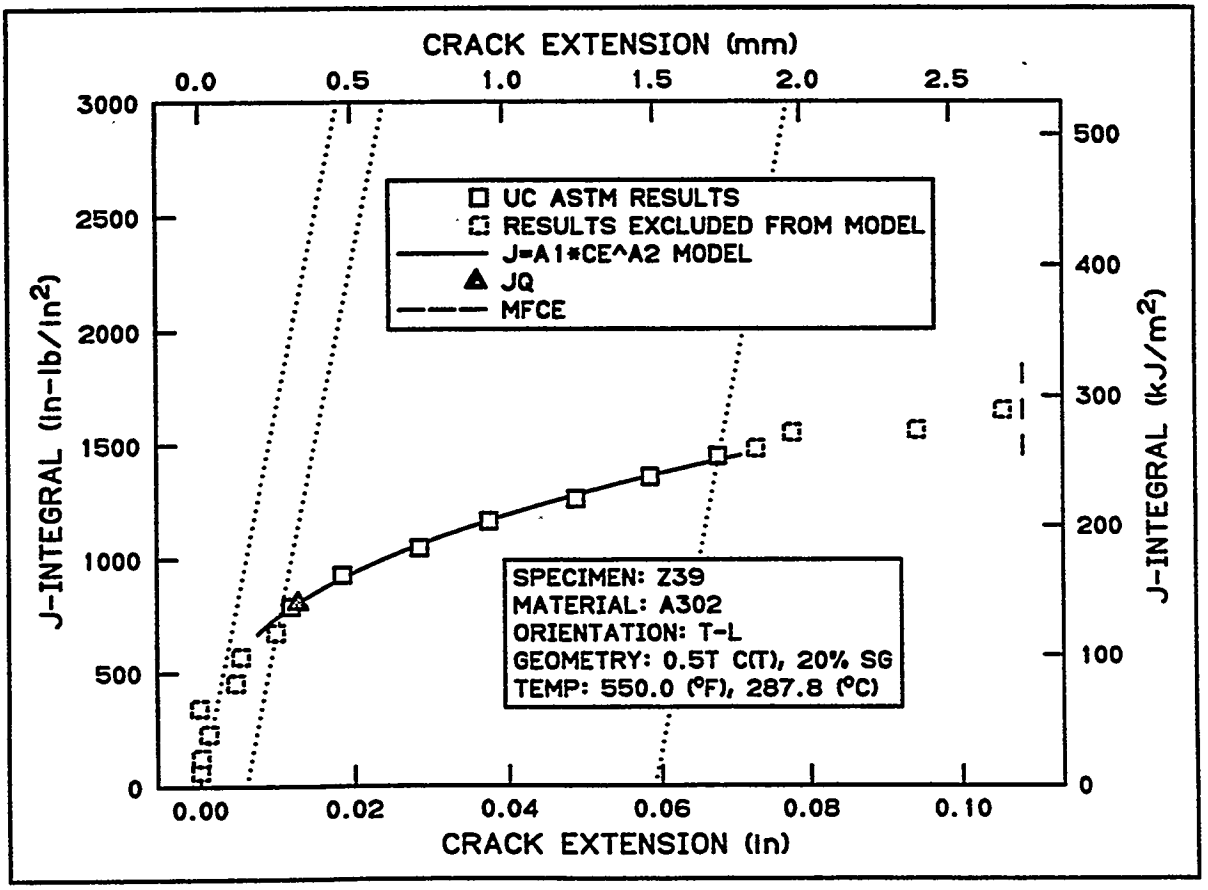

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z313
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z39
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6484 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1106	0.0073	0.0000	64.8
2	1350	0.0103	0.0001	124.6
3	1533	0.0149	0.0011	229.5
4	1619	0.0194	-0.0001	343.1
5	1678	0.0244	0.0046	453.9
6	1710	0.0289	0.0053	568.8
7	1710	0.0335	0.0099	673.8
8	1737	0.0379	0.0119	788.3
9	1726	0.0444	0.0185	928.4
10	1669	0.0504	0.0284	1047.0
11	1564	0.0568	0.0375	1164.1
12	1488	0.0630	0.0488	1260.4
13	1435	0.0692	0.0586	1357.3
14	1366	0.0738	0.0677	1448.5
15	1314	0.0785	0.0728	1482.6
16	1278	0.0831	0.0776	1552.2
17	1139	0.0892	0.0940	1562.2
18	1064	0.0977	0.1054	1650.5

WIDTH: 1.0032 (IN),25.481 (MM)
THICKNESS: 0.5008 (IN),12.720 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2472 (IN),6.279 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8868 (IN),22.525 (MM)
DISTANCE 2: 0.8958 (IN),22.753 (MM)
DISTANCE 3: 0.8986 (IN),22.824 (MM)
DISTANCE 4: 0.9004 (IN),22.870 (MM)
DISTANCE 5: 0.9010 (IN),22.885 (MM)
DISTANCE 6: 0.9002 (IN),22.865 (MM)
DISTANCE 7: 0.8948 (IN),22.728 (MM)
DISTANCE 8: 0.8899 (IN),22.603 (MM)
DISTANCE 9: 0.8811 (IN),22.380 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9987 (IN),25.367 (MM)
DISTANCE 2: 1.0068 (IN),25.573 (MM)
DISTANCE 3: 0.9951 (IN),25.276 (MM)
DISTANCE 4: 0.9916 (IN),25.187 (MM)
DISTANCE 5: 1.0077 (IN),25.596 (MM)
DISTANCE 6: 1.0058 (IN),25.547 (MM)
DISTANCE 7: 1.0144 (IN),25.766 (MM)
DISTANCE 8: 1.0057 (IN),25.545 (MM)
DISTANCE 9: 1.0052 (IN),25.532 (MM)

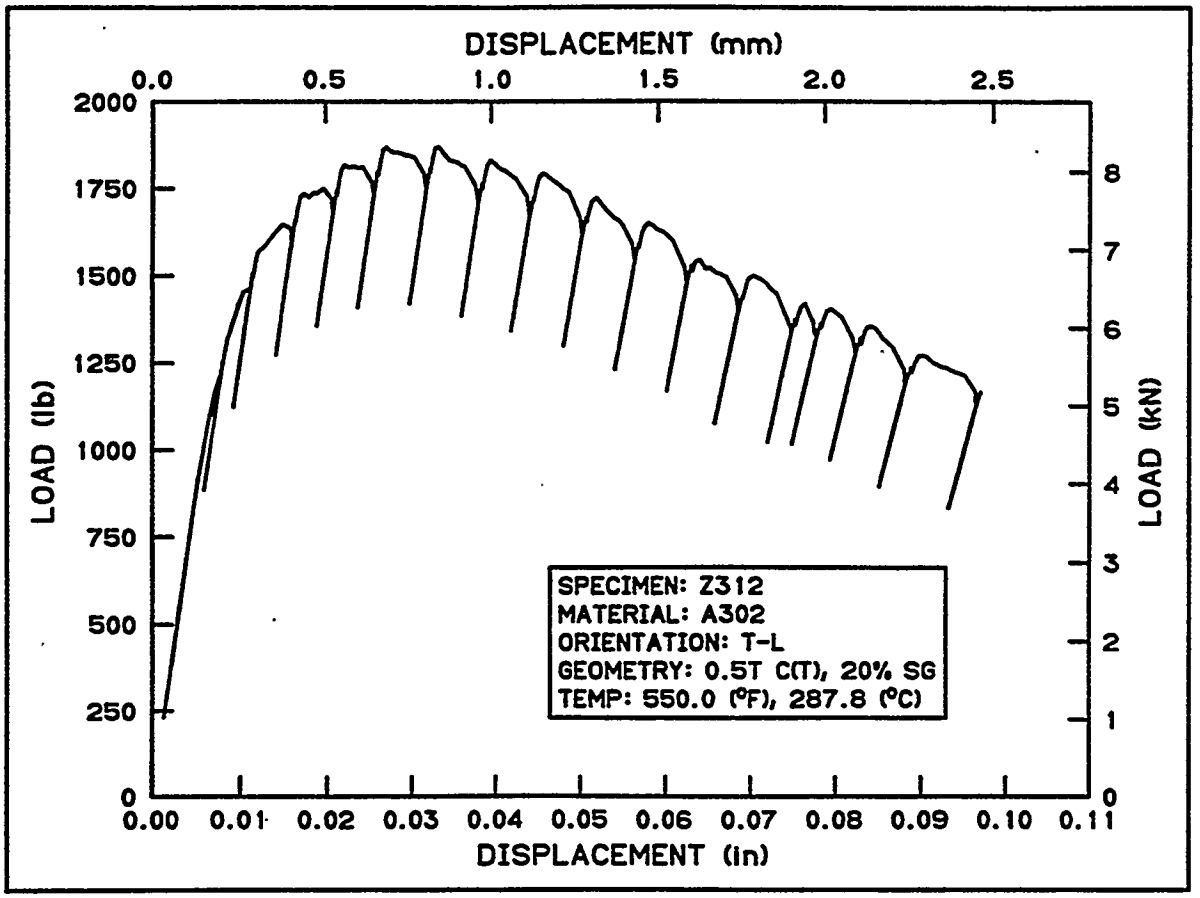

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
SPECIMEN: Z39
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

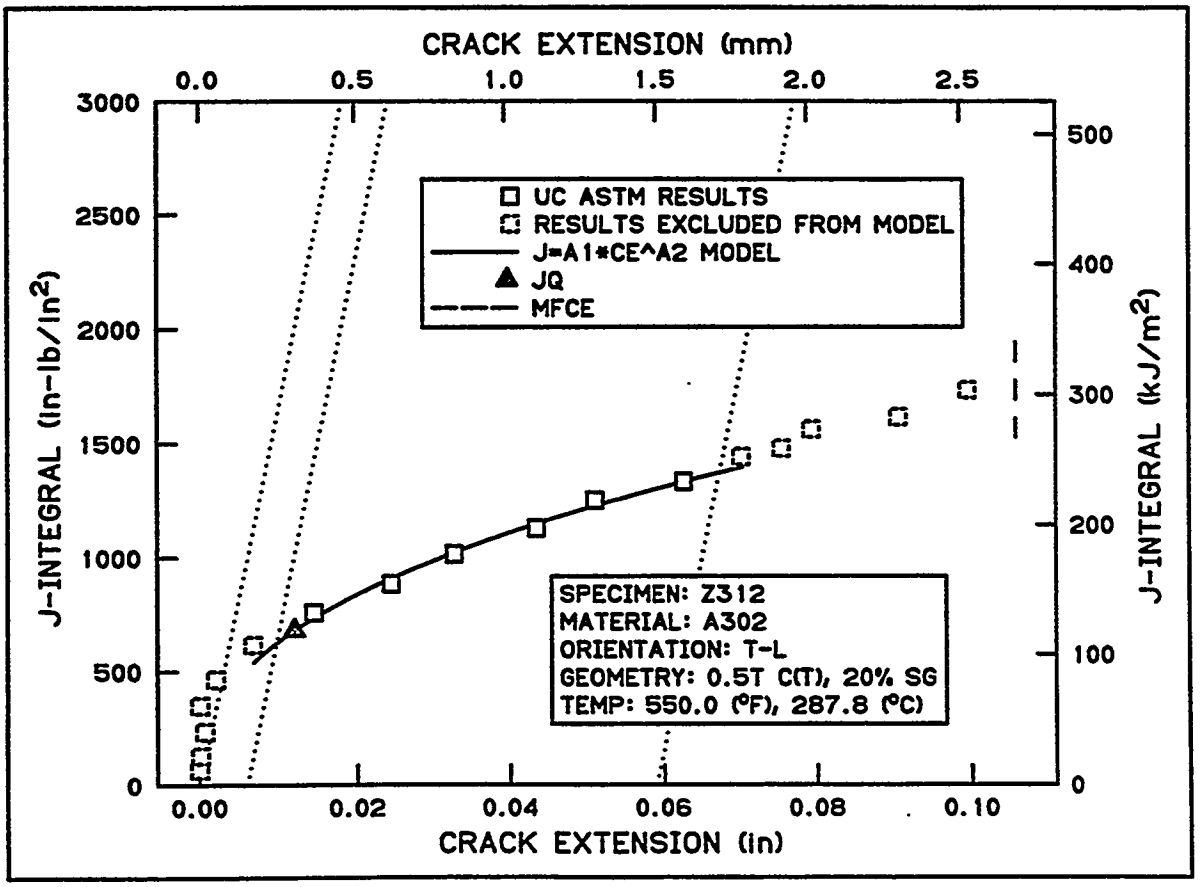

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
500
400
300
200
100
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z39
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z312
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6327 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1164	0.0071	0.0000	65.4
2	1452	0.0103	0.0001	127.5
3	1647	0.0148	0.0007	234.2
4	1749	0.0195	0.0001	348.3
5	1812	0.0241	0.0020	464.4
6	1841	0.0301	0.0067	615.4
7	1813	0.0362	0.0145	757.5
8	1777	0.0423	0.0244	884.0
9	1740	0.0485	0.0327	1015.8
10	1643	0.0549	0.0435	1127.3
11	1600	0.0609	0.0511	1249.3
12	1498	0.0671	0.0627	1331.9
13	1450	0.0731	0.0701	1440.3
14	1420	0.0764	0.0754	1477.2
15	1382	0.0807	0.0793	1560.8
16	1295	0.0867	0.0905	1615.2
17	1212	0.0951	0.0995	1733.0

  WIDTH: 1.0022 (IN),25.456 (MM)
  THICKNESS: 0.5014 (IN),12.736 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2476 (IN),6.289 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8612 (IN),21.874 (MM)
    DISTANCE 2: 0.8735 (IN),22.187 (MM)
    DISTANCE 3: 0.8798 (IN),22.347 (MM)
    DISTANCE 4: 0.8830 (IN),22.428 (MM)
    DISTANCE 5: 0.8858 (IN),22.499 (MM)
    DISTANCE 6: 0.8866 (IN),22.520 (MM)
    DISTANCE 7: 0.8851 (IN),22.482 (MM)
    DISTANCE 8: 0.8818 (IN),22.398 (MM)
    DISTANCE 9: 0.8716 (IN),22.139 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9910 (IN),25.171 (MM)
    DISTANCE 2: 0.9896 (IN),25.136 (MM)
    DISTANCE 3: 0.9872 (IN),25.075 (MM)
    DISTANCE 4: 0.9820 (IN),24.943 (MM)
    DISTANCE 5: 0.9900 (IN),25.146 (MM)
    DISTANCE 6: 0.9760 (IN),24.790 (MM)
    DISTANCE 7: 0.9879 (IN),25.093 (MM)
    DISTANCE 8: 0.9852 (IN),25.024 (MM)
    DISTANCE 9: 0.9904 (IN),25.156 (MM)

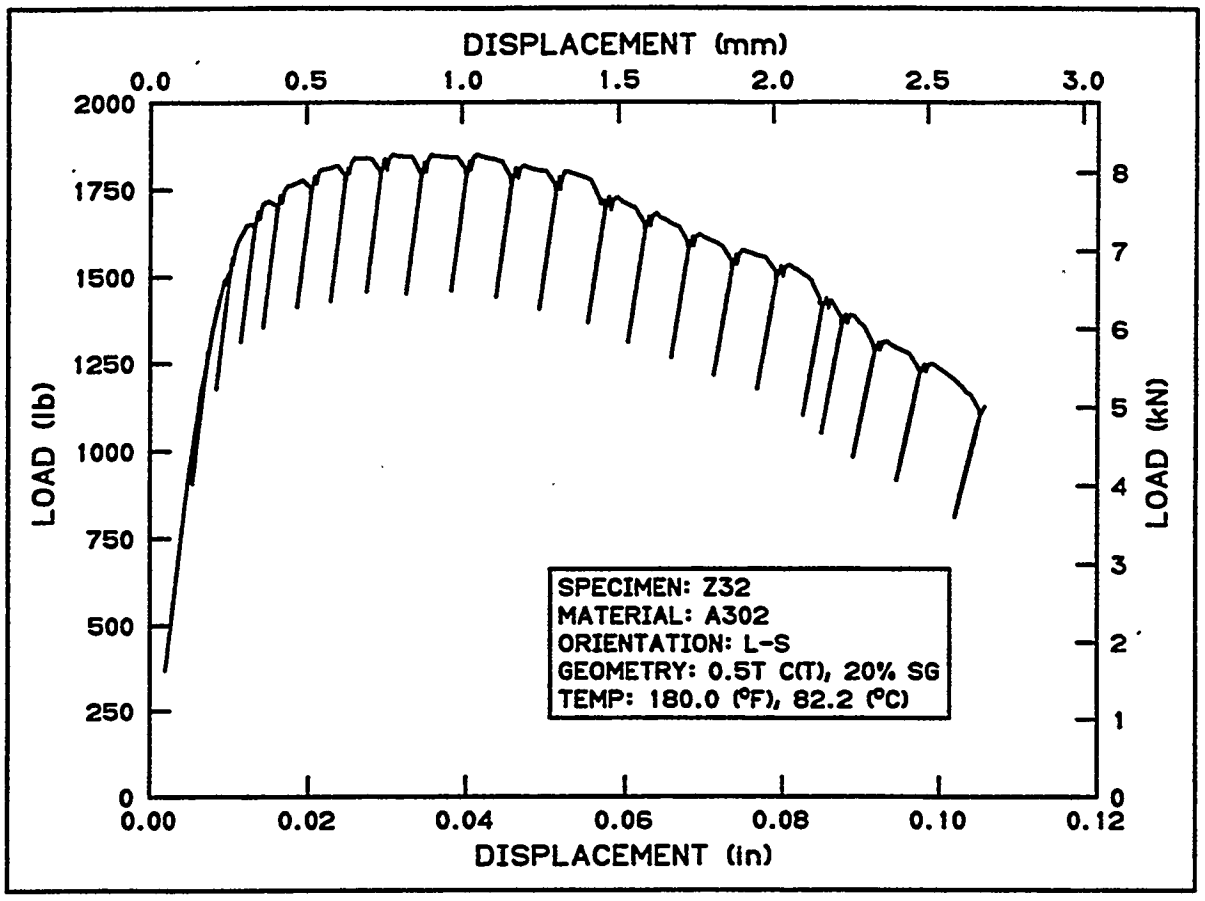

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
SPECIMEN: Z312
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

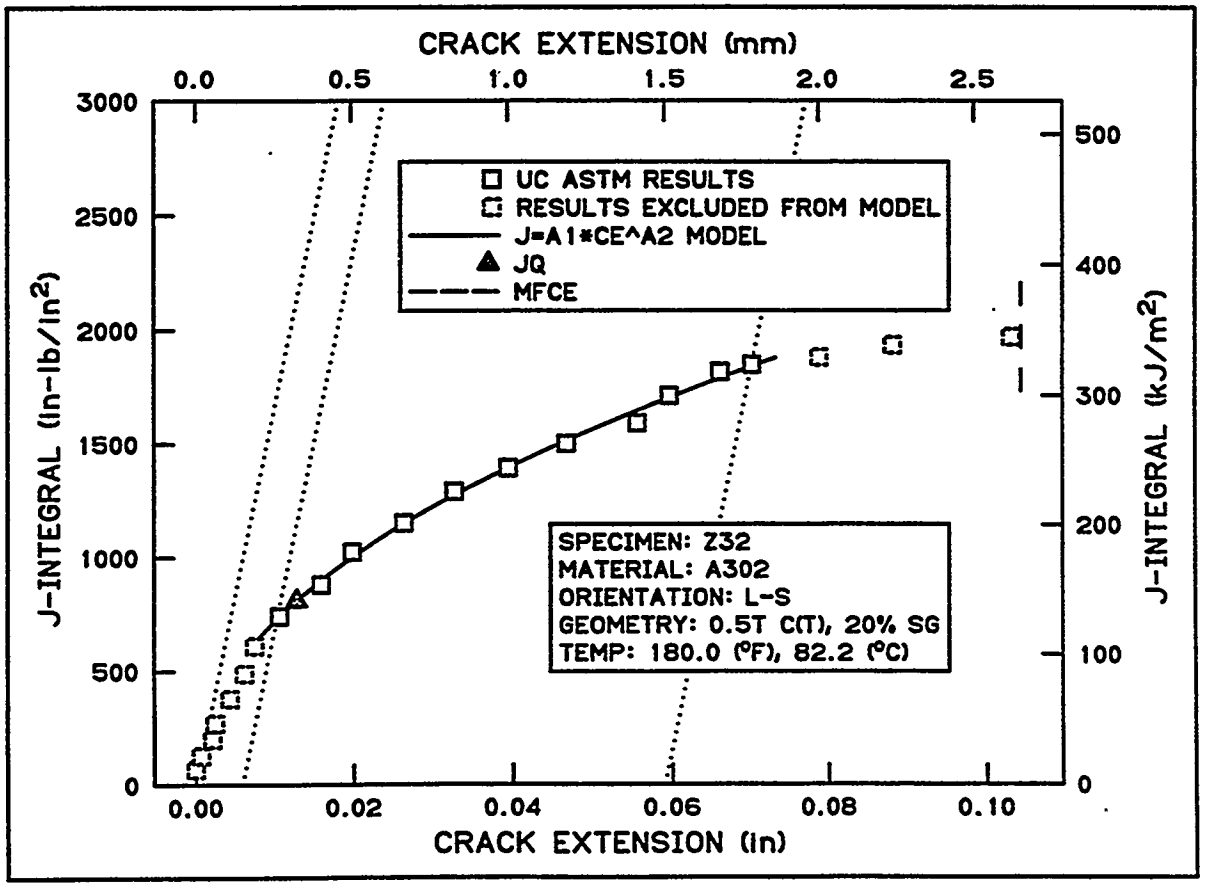

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
500
400
300
200
100
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z312
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z32
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6364 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1185	0.0066	0.0000	66.5
2	1486	0.0094	0.0007	127.1
3	1649	0.0122	0.0021	199.7
4	1718	0.0149	0.0024	269.2
5	1778	0.0192	0.0043	378.1
6	1819	0.0236	0.0062	487.8
7	1840	0.0279	0.0075	609.7
8	1845	0.0332	0.0106	741.1
9	1843	0.0388	0.0158	879.4
10	1830	0.0444	0.0198	1023.3
11	1803	0.0500	0.0264	1151.4
12	1775	0.0556	0.0327	1290.9
13	1699	0.0612	0.0394	1393.9
14	1644	0.0668	0.0468	1500.8
15	1586	0.0723	0.0556	1591.4
16	1556	0.0777	0.0597	1711.4
17	1491	0.0836	0.0661	1816.6
18	1431	0.0862	0.0702	1847.9
19	1354	0.0905	0.0788	1879.8
20	1278	0.0961	0.0882	1933.4
21	1161	0.1039	0.1031	1969.8

WIDTH: 1.0018 (IN),25.446 (MM)
THICKNESS: 0.5011 (IN),12.728 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2478 (IN),6.294 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8677 (IN),22.040 (MM)
DISTANCE 2: 0.8792 (IN),22.332 (MM)
DISTANCE 3: 0.8866 (IN),22.520 (MM)
DISTANCE 4: 0.8896 (IN),22.596 (MM)
DISTANCE 5: 0.8920 (IN),22.657 (MM)
DISTANCE 6: 0.8906 (IN),22.621 (MM)
DISTANCE 7: 0.8873 (IN),22.537 (MM)
DISTANCE 8: 0.8798 (IN),22.347 (MM)
DISTANCE 9: 0.8688 (IN),22.068 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9776 (IN),24.831 (MM)
DISTANCE 2: 0.9790 (IN),24.867 (MM)
DISTANCE 3: 0.9819 (IN),24.940 (MM)
DISTANCE 4: 0.9899 (IN),25.143 (MM)
DISTANCE 5: 0.9816 (IN),24.933 (MM)
DISTANCE 6: 0.9804 (IN),24.902 (MM)
DISTANCE 7: 1.0037 (IN),25.494 (MM)
DISTANCE 8: 1.0041 (IN),25.504 (MM)
DISTANCE 9: 0.9970 (IN),25.324 (MM)

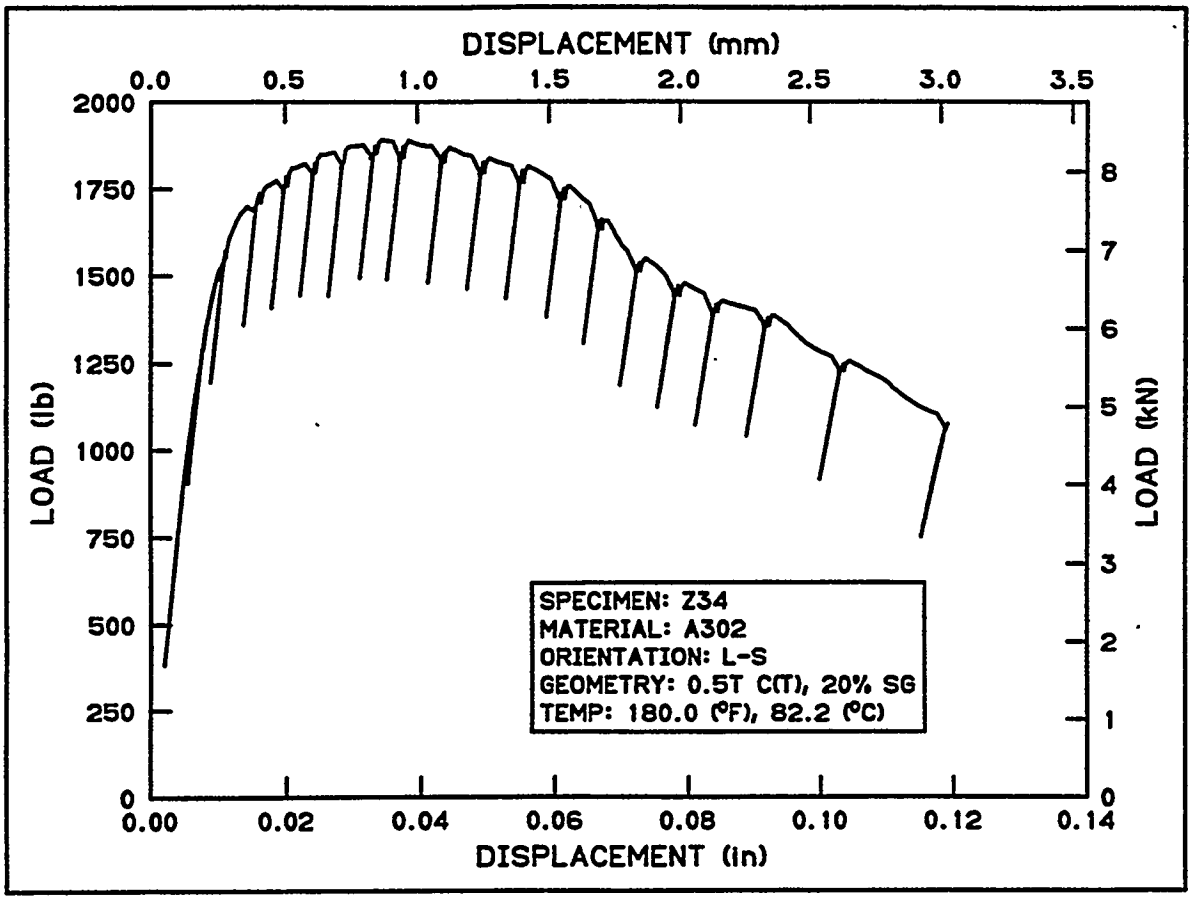

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z32
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

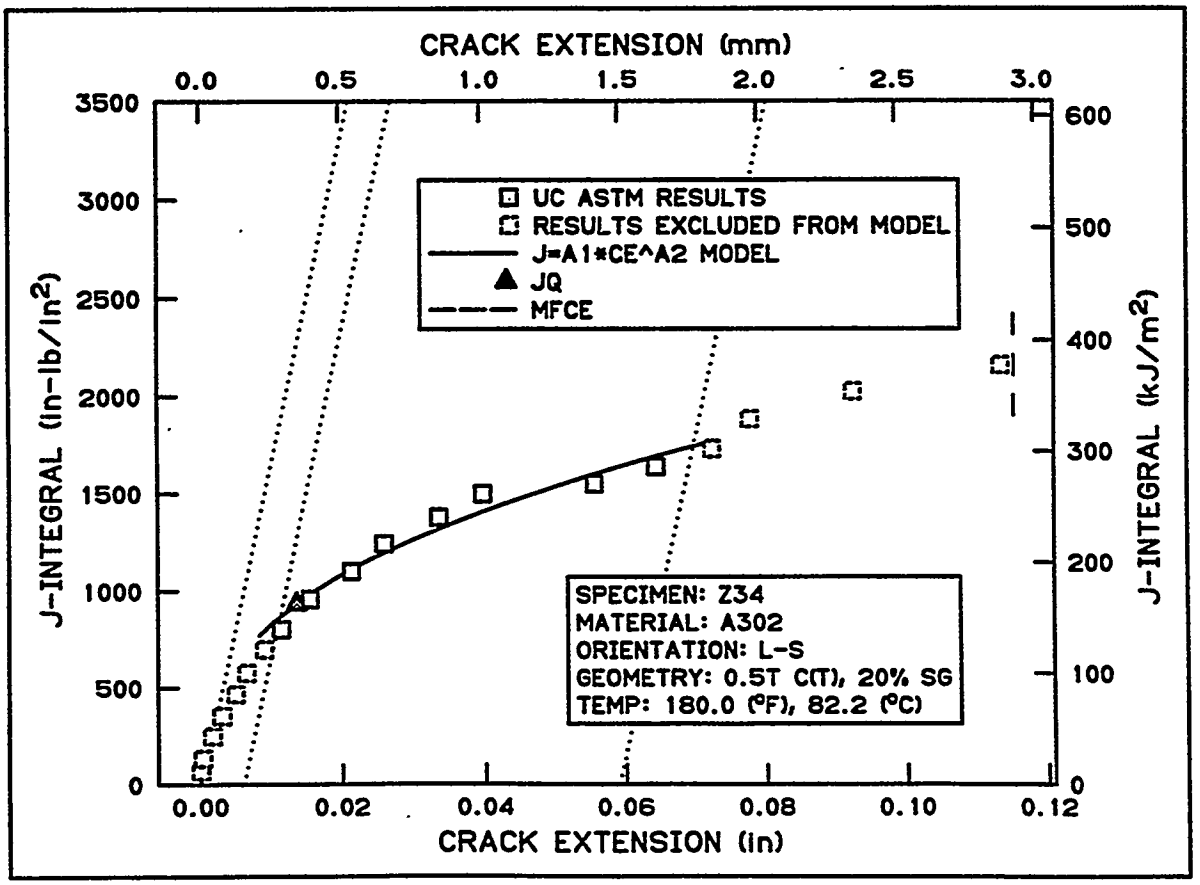

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z32
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z34
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6371 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1198	0.0068	0.0000	66.4
2	1513	0.0098	0.0003	132.2
3	1700	0.0140	0.0016	247.8
4	1773	0.0183	0.0029	352.6
5	1820	0.0228	0.0048	465.3
6	1854	0.0272	0.0064	575.8
7	1877	0.0314	0.0089	698.1
8	1885	0.0358	0.0113	801.7
9	1872	0.0415	0.0154	956.1
10	1843	0.0474	0.0214	1097.8
11	1815	0.0533	0.0259	1240.8
12	1780	0.0593	0.0335	1377.3
13	1708	0.0652	0.0397	1497.4
14	1574	0.0708	0.0556	1548.1
15	1499	0.0766	0.0643	1636.3
16	1448	0.0824	0.0722	1726.3
17	1402	0.0901	0.0777	1880.7
18	1268	0.1017	0.0924	2022.2
19	1102	0.1175	0.1133	2158.7

WIDTH: 1.0031 (IN),25.479 (MM)
THICKNESS: 0.5012 (IN),12.730 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2466 (IN),6.264 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8616 (IN),21.885 (MM)
DISTANCE 2: 0.8720 (IN),22.149 (MM)
DISTANCE 3: 0.8802 (IN),22.357 (MM)
DISTANCE 4: 0.8852 (IN),22.484 (MM)
DISTANCE 5: 0.8899 (IN),22.603 (MM)
DISTANCE 6: 0.8904 (IN),22.616 (MM)
DISTANCE 7: 0.8906 (IN),22.621 (MM)
DISTANCE 8: 0.8895 (IN),22.593 (MM)
DISTANCE 9: 0.8816 (IN),22.393 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9796 (IN),24.882 (MM)
DISTANCE 2: 0.9940 (IN),25.248 (MM)
DISTANCE 3: 1.0048 (IN),25.522 (MM)
DISTANCE 4: 1.0044 (IN),25.512 (MM)
DISTANCE 5: 0.9950 (IN),25.273 (MM)
DISTANCE 6: 0.9980 (IN),25.349 (MM)
DISTANCE 7: 0.9970 (IN),25.324 (MM)
DISTANCE 8: 1.0142 (IN),25.761 (MM)
DISTANCE 9: 0.9864 (IN),25.055 (MM)

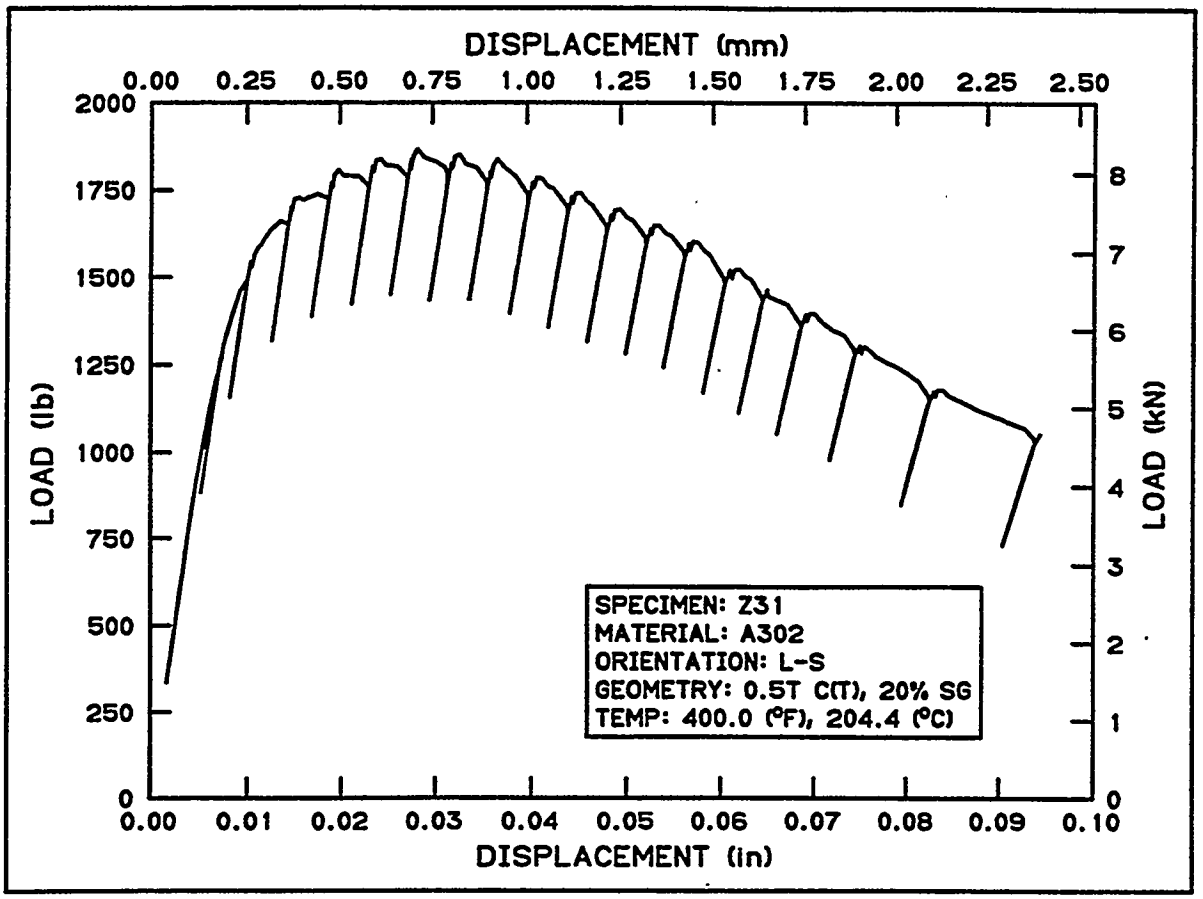

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z34
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

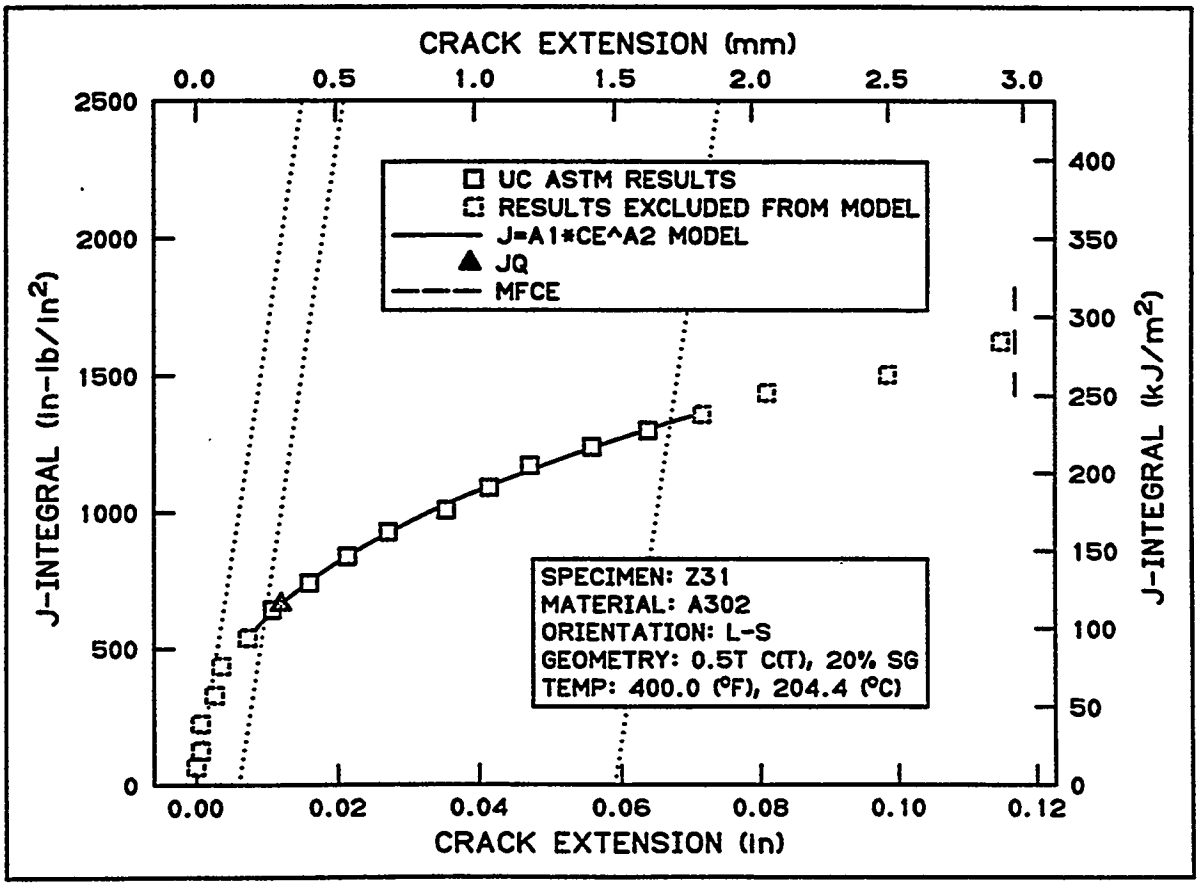

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z34
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z31
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6321 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1177	0.0065	0.0000	66.4
2	1462	0.0092	0.0006	124.6
3	1662	0.0134	0.0006	225.1
4	1739	0.0173	0.0026	328.7
5	1789	0.0217	0.0035	435.5
6	1817	0.0258	0.0071	538.7
7	1831	0.0299	0.0106	642.6
8	1813	0.0342	0.0160	740.2
9	1788	0.0382	0.0213	838.2
10	1754	0.0422	0.0271	927.8
11	1705	0.0463	0.0354	1006.6
12	1665	0.0505	0.0414	1089.3
13	1618	0.0546	0.0471	1170.4
14	1564	0.0587	0.0559	1237.9
15	1494	0.0632	0.0638	1298.4
16	1421	0.0671	0.0715	1356.9
17	1336	0.0731	0.0809	1437.0
18	1203	0.0812	0.0983	1503.2
19	1068	0.0927	0.1148	1624.9

  WIDTH: 1.0046 (IN),25.517 (MM)
  THICKNESS: 0.5013 (IN),12.733 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2449 (IN),6.221 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8602 (IN),21.849 (MM)
    DISTANCE 2: 0.8739 (IN),22.197 (MM)
    DISTANCE 3: 0.8806 (IN),22.367 (MM)
    DISTANCE 4: 0.8828 (IN),22.423 (MM)
    DISTANCE 5: 0.8840 (IN),22.454 (MM)
    DISTANCE 6: 0.8824 (IN),22.413 (MM)
    DISTANCE 7: 0.8786 (IN),22.316 (MM)
    DISTANCE 8: 0.8727 (IN),22.167 (MM)
    DISTANCE 9: 0.8614 (IN),21.880 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9931 (IN),25.225 (MM)
    DISTANCE 2: 1.0026 (IN),25.466 (MM)
    DISTANCE 3: 1.0099 (IN),25.651 (MM)
    DISTANCE 4: 1.0002 (IN),25.405 (MM)
    DISTANCE 5: 0.9999 (IN),25.397 (MM)
    DISTANCE 6: 0.9915 (IN),25.184 (MM)
    DISTANCE 7: 0.9814 (IN),24.928 (MM)
    DISTANCE 8: 0.9790 (IN),24.867 (MM)
    DISTANCE 9: 0.9790 (IN),24.867 (MM)

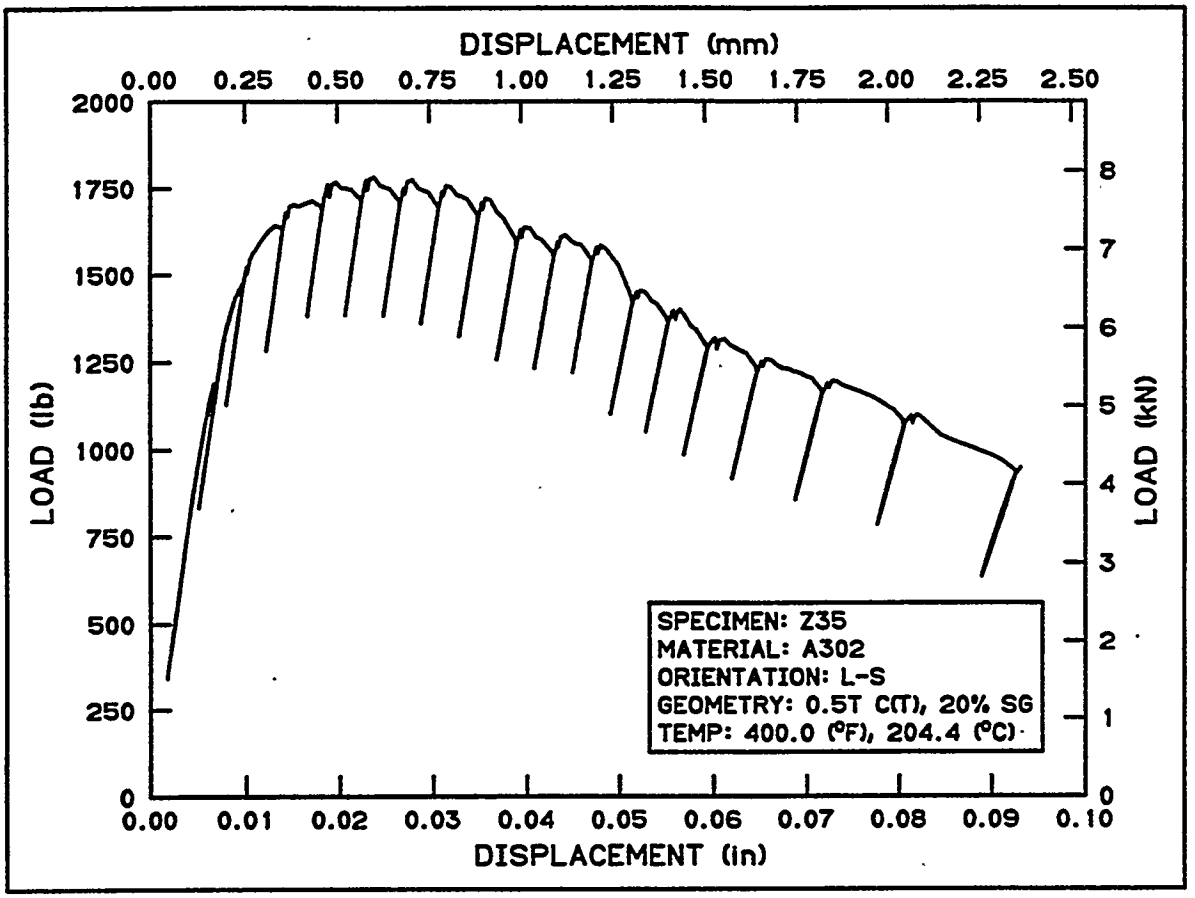

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

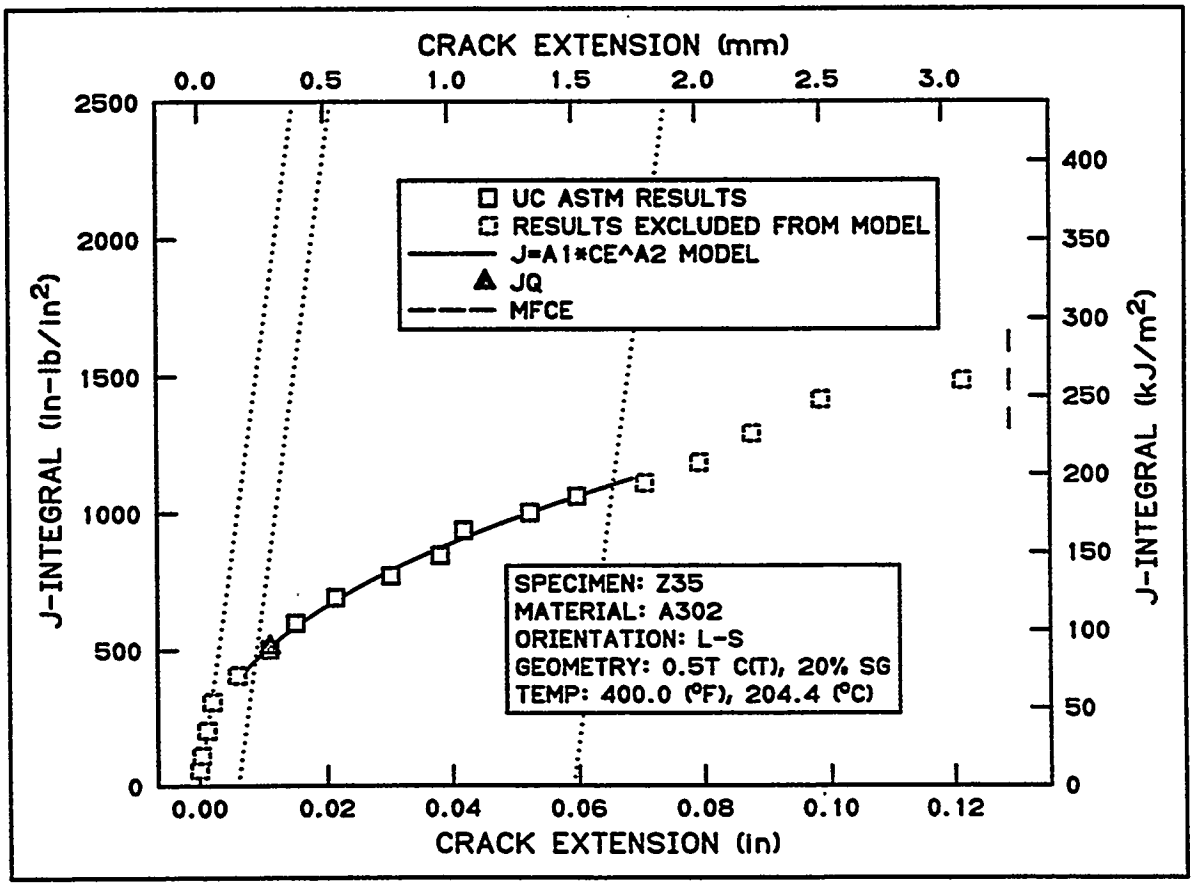

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z35
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6293 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1140	0.0063	0.0000	58.4
2	1434	0.0089	0.0003	110.6
3	1641	0.0131	0.0012	203.3
4	1714	0.0170	0.0020	308.4
5	1746	0.0212	0.0059	407.1
6	1748	0.0253	0.0109	503.5
7	1738	0.0294	0.0151	599.1
8	1718	0.0336	0.0214	692.7
9	1662	0.0375	0.0302	771.6
10	1601	0.0415	0.0381	845.8
11	1586	0.0458	0.0419	937.5
12	1528	0.0499	0.0523	1001.6
13	1415	0.0540	0.0598	1060.8
14	1342	0.0582	0.0706	1109.1
15	1275	0.0635	0.0792	1184.1
16	1202	0.0706	0.0875	1291.2
17	1112	0.0795	0.0985	1416.0
18	966	0.0912	0.1213	1485.7

WIDTH: 1.0022 (IN),25.456 (MM)
THICKNESS: 0.5011 (IN),12.728 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2474 (IN),6.284 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8588 (IN),21.814 (MM)
DISTANCE 2: 0.8713 (IN),22.131 (MM)
DISTANCE 3: 0.8754 (IN),22.235 (MM)
DISTANCE 4: 0.8800 (IN),22.352 (MM)
DISTANCE 5: 0.8766 (IN),22.266 (MM)
DISTANCE 6: 0.8810 (IN),22.377 (MM)
DISTANCE 7: 0.8834 (IN),22.438 (MM)
DISTANCE 8: 0.8808 (IN),22.372 (MM)
DISTANCE 9: 0.8706 (IN),22.113 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9861 (IN),25.047 (MM)
DISTANCE 2: 0.9916 (IN),25.187 (MM)
DISTANCE 3: 1.0060 (IN),25.552 (MM)
DISTANCE 4: 0.9877 (IN),25.088 (MM)
DISTANCE 5: 0.9974 (IN),25.334 (MM)
DISTANCE 6: 1.0062 (IN),25.557 (MM)
DISTANCE 7: 1.0208 (IN),25.928 (MM)
DISTANCE 8: 1.0312 (IN),26.192 (MM)
DISTANCE 9: 1.0194 (IN),25.893 (MM)

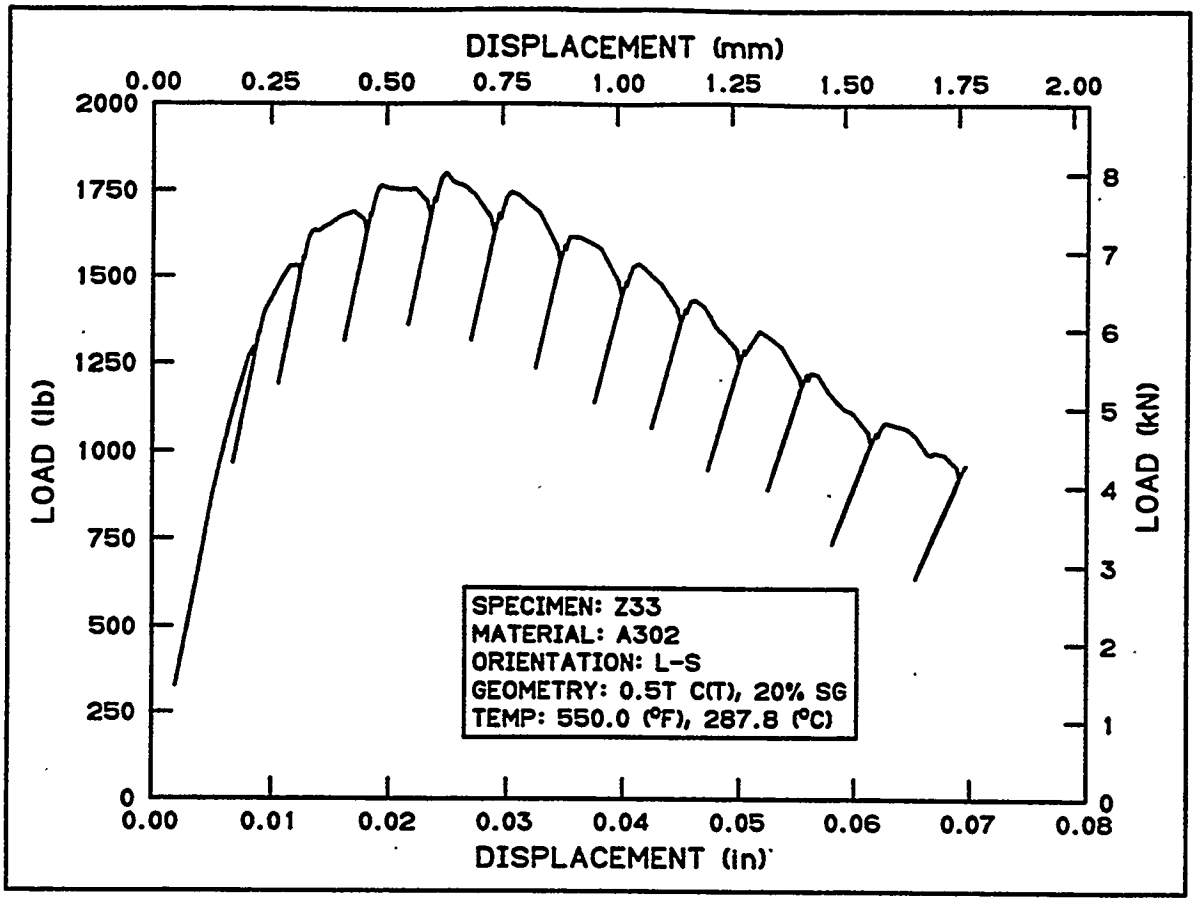

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)
SPECIMEN: Z35
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

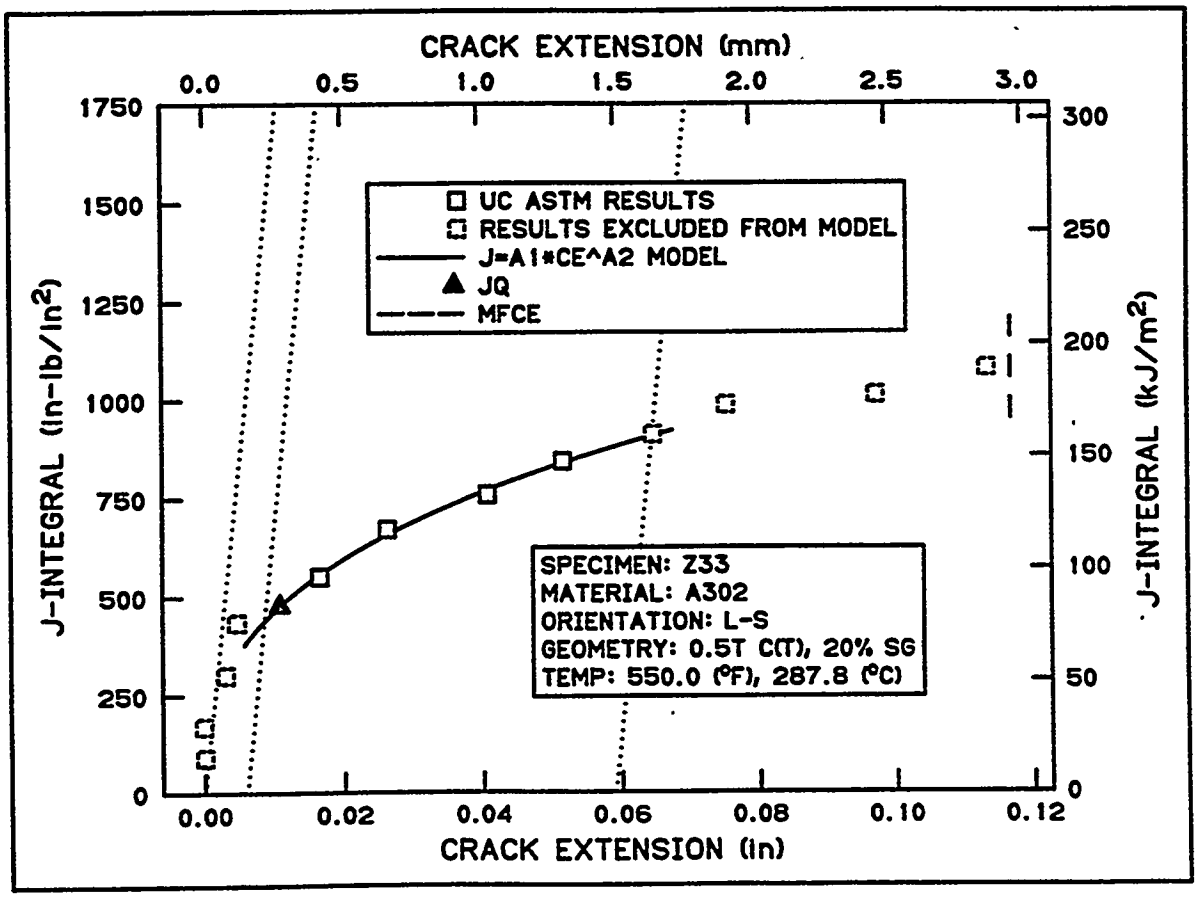

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z35
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
IDENTIFICATION: Z33
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6385 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1270	0.0081	0.0000	90.7
2	1532	0.0115	-0.0001	170.7
3	1688	0.0169	0.0030	301.3
4	1754	0.0221	0.0046	434.9
5	1739	0.0272	0.0165	551.2
6	1686	0.0327	0.0262	670.5
7	1583	0.0380	0.0407	757.8
8	1480	0.0432	0.0517	842.3
9	1343	0.0484	0.0646	911.1
10	1299	0.0536	0.0752	987.0
11	1111	0.0599	0.0970	1011.2
12	995	0.0677	0.1133	1079.5

WIDTH: 1.0024 (IN),25.461 (MM)
THICKNESS: 0.5009 (IN),12.723 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2459 (IN),6.246 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8618 (IN),21.890 (MM)
DISTANCE 2: 0.8762 (IN),22.255 (MM)
DISTANCE 3: 0.8893 (IN),22.588 (MM)
DISTANCE 4: 0.8908 (IN),22.626 (MM)
DISTANCE 5: 0.8894 (IN),22.591 (MM)
DISTANCE 6: 0.8942 (IN),22.713 (MM)
DISTANCE 7: 0.8906 (IN),22.621 (MM)
DISTANCE 8: 0.8810 (IN),22.377 (MM)
DISTANCE 9: 0.8660 (IN),21.996 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9966 (IN),25.314 (MM)
DISTANCE 2: 1.0027 (IN),25.469 (MM)
DISTANCE 3: 1.0166 (IN),25.822 (MM)
DISTANCE 4: 0.9946 (IN),25.263 (MM)
DISTANCE 5: 0.9870 (IN),25.070 (MM)
DISTANCE 6: 0.9924 (IN),25.207 (MM)
DISTANCE 7: 1.0090 (IN),25.629 (MM)
DISTANCE 8: 1.0020 (IN),25.451 (MM)
DISTANCE 9: 1.0126 (IN),25.720 (MM)

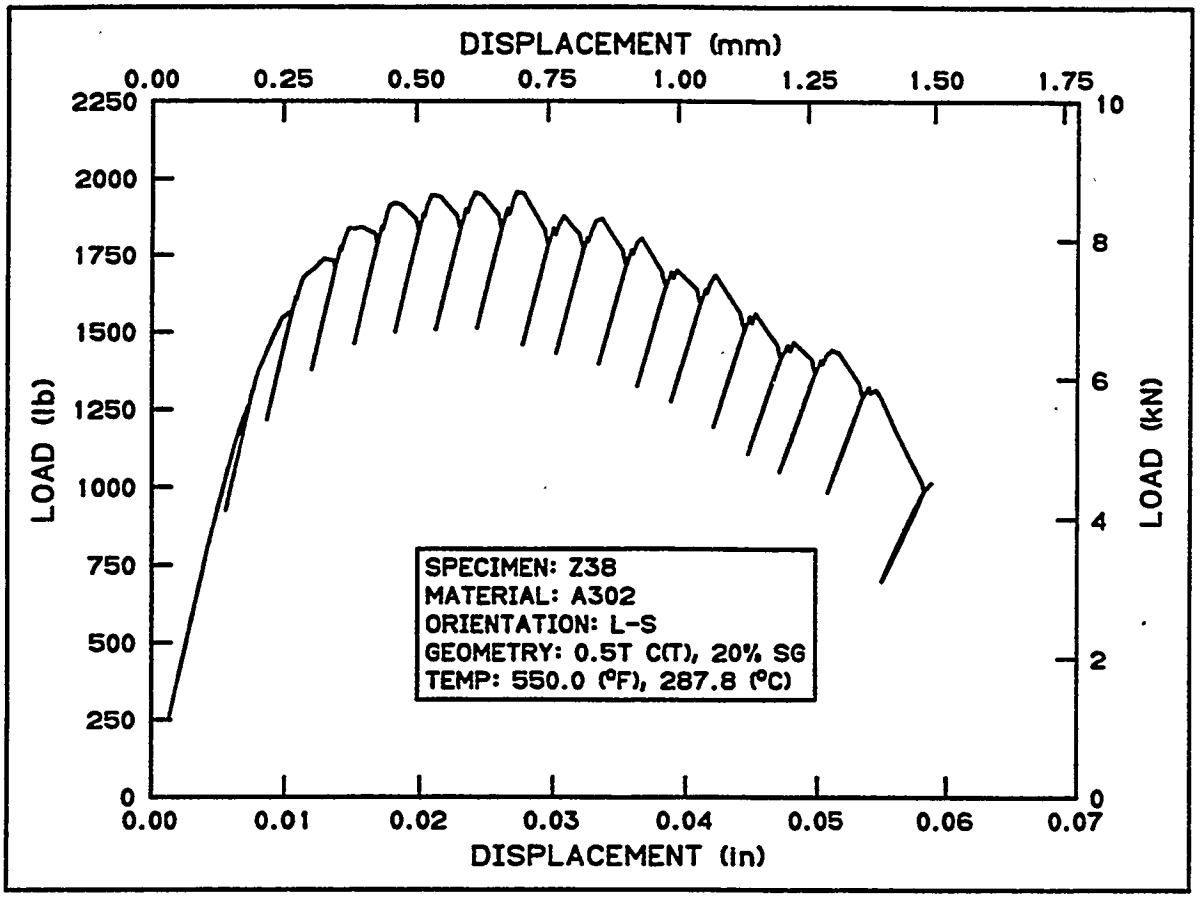

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
2000 1750 1500 1250 1000 750 500 250 0
LOAD (lb)
8 7 6 5 4 3 2 1 0
LOAD (kN)
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08
DISPLACEMENT (in)

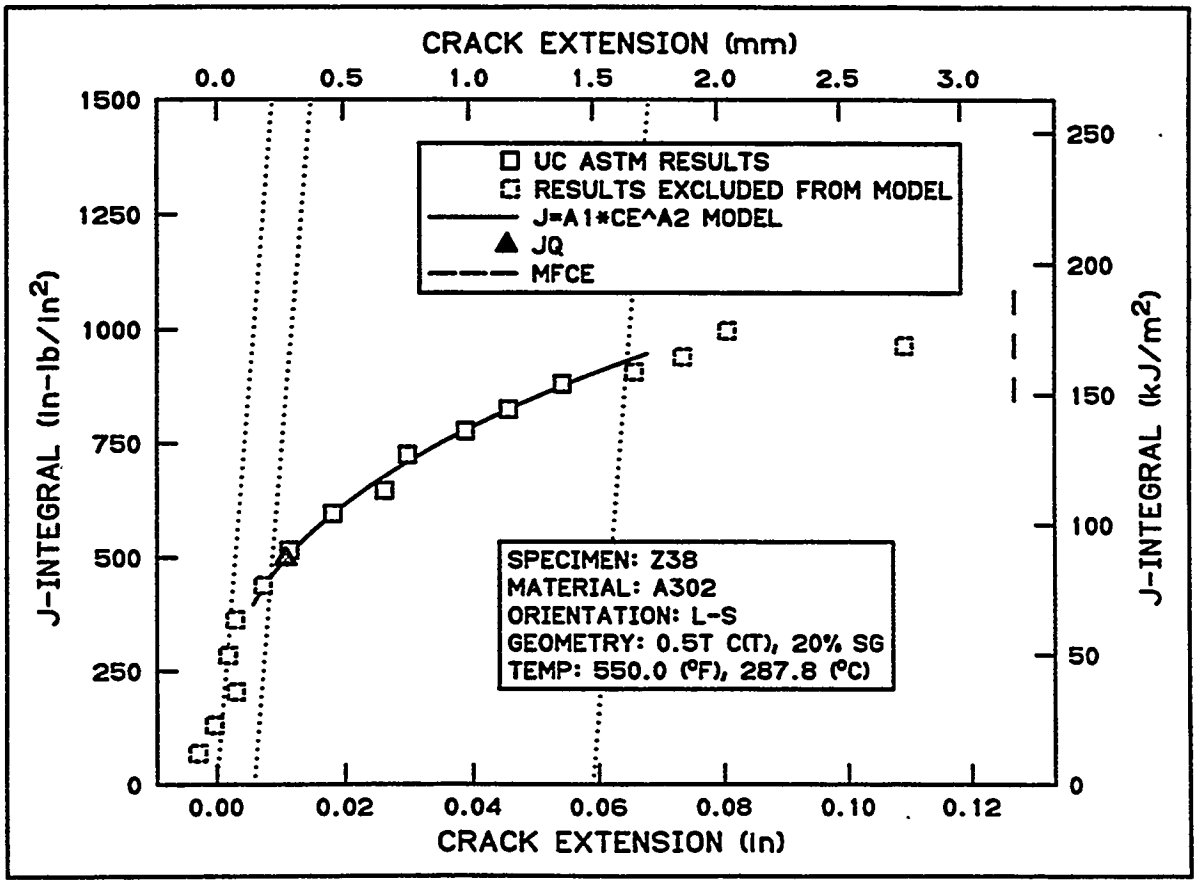

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (in-lb/in²)
300 250 200 150 100 50 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z38
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6195 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1207	0.0068	-0.0029	68.9
2	1544	0.0098	-0.0004	130.3
3	1737	0.0128	0.0030	204.2
4	1842	0.0156	0.0018	284.8
5	1913	0.0186	0.0029	364.0
6	1938	0.0215	0.0074	439.3
7	1946	0.0246	0.0114	515.9
8	1951	0.0277	0.0181	596.2
9	1877	0.0308	0.0262	647.2
10	1869	0.0337	0.0298	725.4
11	1805	0.0366	0.0389	777.5
12	1701	0.0393	0.0456	824.5
13	1685	0.0422	0.0543	879.9
14	1559	0.0452	0.0656	906.4
15	1468	0.0481	0.0733	939.5
16	1434	0.0516	0.0805	997.2
17	1187	0.0560	0.1092	964.6

  WIDTH: 1.0022 (IN),25.456 (MM)
  THICKNESS: 0.5007 (IN),12.718 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2470 (IN),6.274 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8599 (IN),21.841 (MM)
    DISTANCE 2: 0.8664 (IN),22.007 (MM)
    DISTANCE 3: 0.8702 (IN),22.103 (MM)
    DISTANCE 4: 0.8710 (IN),22.123 (MM)
    DISTANCE 5: 0.8688 (IN),22.068 (MM)
    DISTANCE 6: 0.8678 (IN),22.042 (MM)
    DISTANCE 7: 0.8658 (IN),21.991 (MM)
    DISTANCE 8: 0.8634 (IN),21.930 (MM)
    DISTANCE 9: 0.8578 (IN),21.788 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9865 (IN),25.057 (MM)
    DISTANCE 2: 0.9913 (IN),25.179 (MM)
    DISTANCE 3: 1.0049 (IN),25.524 (MM)
    DISTANCE 4: 1.0111 (IN),25.682 (MM)
    DISTANCE 5: 1.0111 (IN),25.682 (MM)
    DISTANCE 6: 0.9912 (IN),25.176 (MM)
    DISTANCE 7: 0.9742 (IN),24.745 (MM)
    DISTANCE 8: 0.9792 (IN),24.872 (MM)
    DISTANCE 9: 0.9810 (IN),24.917 (MM)

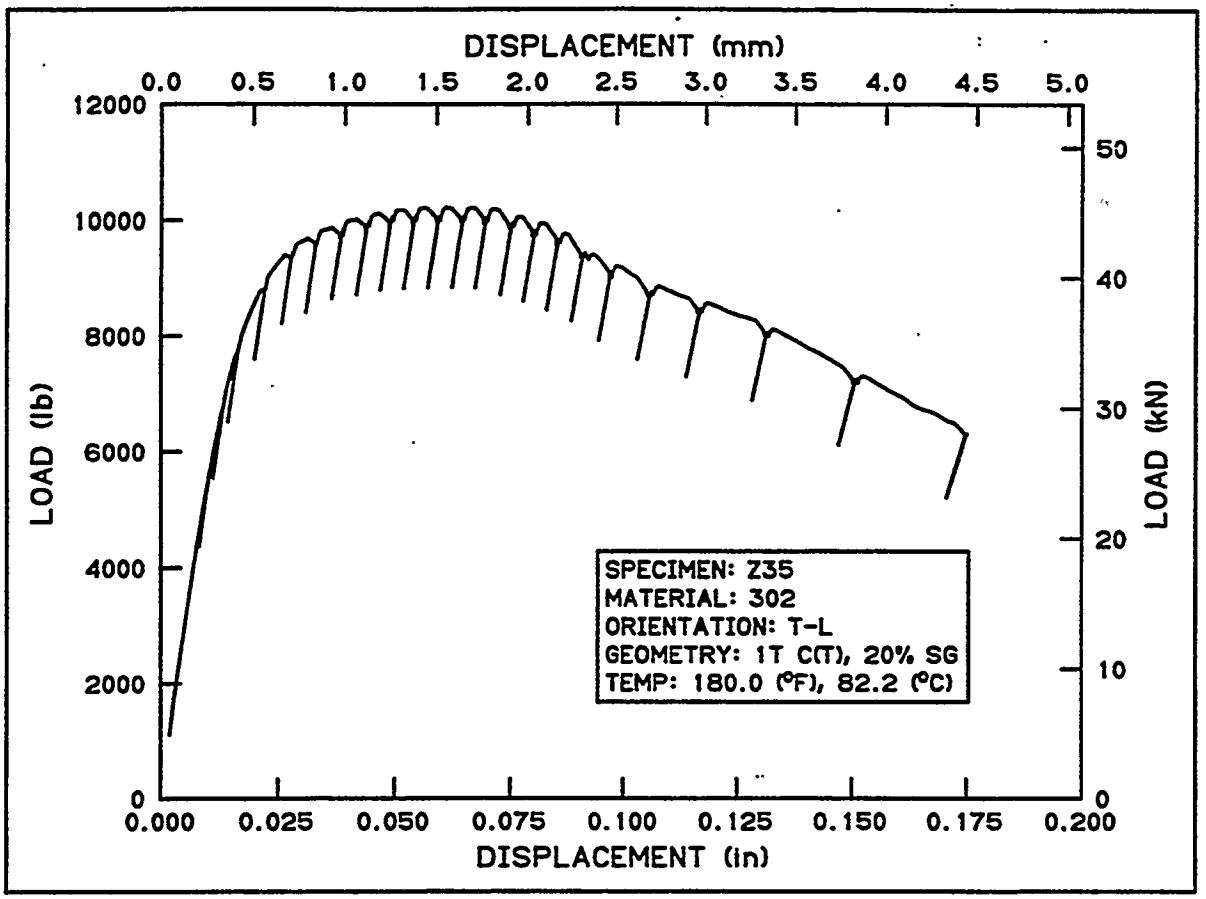

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
DISPLACEMENT (in)

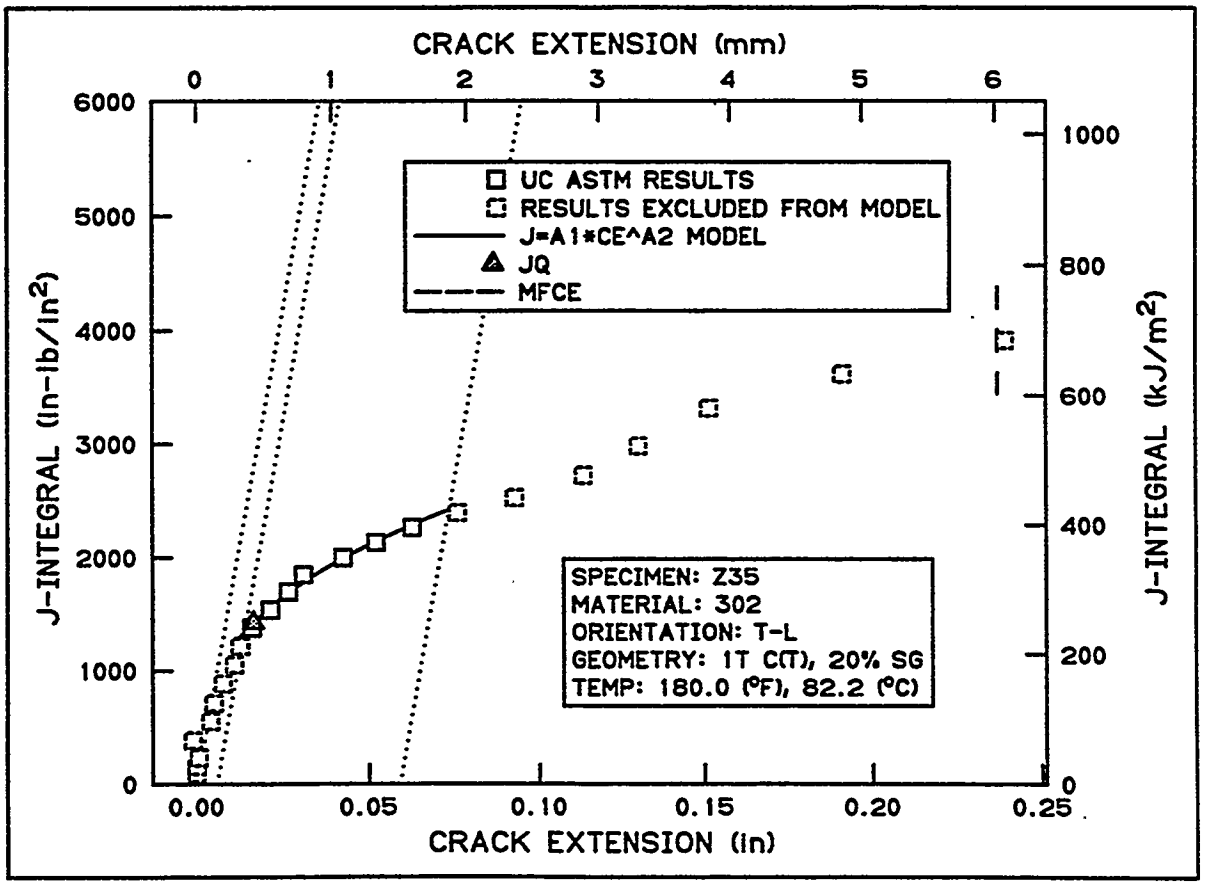

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z35
MATERIAL CODE: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.1506 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	5348	0.0098	0.0000	95.9
2	6567	0.0128	-0.0001	157.0
3	7645	0.0160	0.0006	232.8
4	8769	0.0212	-0.0011	383.5
5	9392	0.0264	0.0040	551.2
6	9684	0.0313	0.0051	711.9
7	9868	0.0366	0.0077	885.1
8	10008	0.0418	0.0111	1050.9
9	10106	0.0468	0.0127	1214.4
10	10164	0.0521	0.0161	1377.4
11	10199	0.0571	0.0214	1537.6
12	10203	0.0622	0.0266	1696.4
13	10196	0.0674	0.0311	1850.3
14	10162	0.0725	0.0426	1999.9
15	10037	0.0777	0.0521	2133.6
16	9920	0.0828	0.0628	2266.0
17	9745	0.0877	0.0760	2396.1
18	9356	0.0941	0.0928	2526.9
19	9009	0.1030	0.1133	2721.9
20	8645	0.1145	0.1302	2979.6
21	8262	0.1291	0.1514	3313.7
22	7479	0.1478	0.1911	3616.2
23	6485	0.1726	0.2392	3911.3

WIDTH: 1.9972 (IN),50.729 (MM)
THICKNESS: 1.0002 (IN),25.405 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5019 (IN),12.748 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.6036 (IN),40.731 (MM)
DISTANCE 2: 1.6274 (IN),41.336 (MM)
DISTANCE 3: 1.6694 (IN),42.403 (MM)
DISTANCE 4: 1.7022 (IN),43.236 (MM)
DISTANCE 5: 1.7122 (IN),43.490 (MM)
DISTANCE 6: 1.6979 (IN),43.127 (MM)
DISTANCE 7: 1.6607 (IN),42.182 (MM)
DISTANCE 8: 1.5528 (IN),39.441 (MM)
DISTANCE 9: 1.5918 (IN),40.432 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.8751 (IN),47.628 (MM)
DISTANCE 2: 1.8660 (IN),47.396 (MM)
DISTANCE 3: 1.8682 (IN),47.452 (MM)
DISTANCE 4: 1.8804 (IN),47.762 (MM)
DISTANCE 5: 1.8950 (IN),48.133 (MM)
DISTANCE 6: 1.8916 (IN),48.047 (MM)
DISTANCE 7: 1.8960 (IN),48.158 (MM)
DISTANCE 8: 1.9160 (IN),48.666 (MM)
DISTANCE 9: 1.9315 (IN),49.060 (MM)

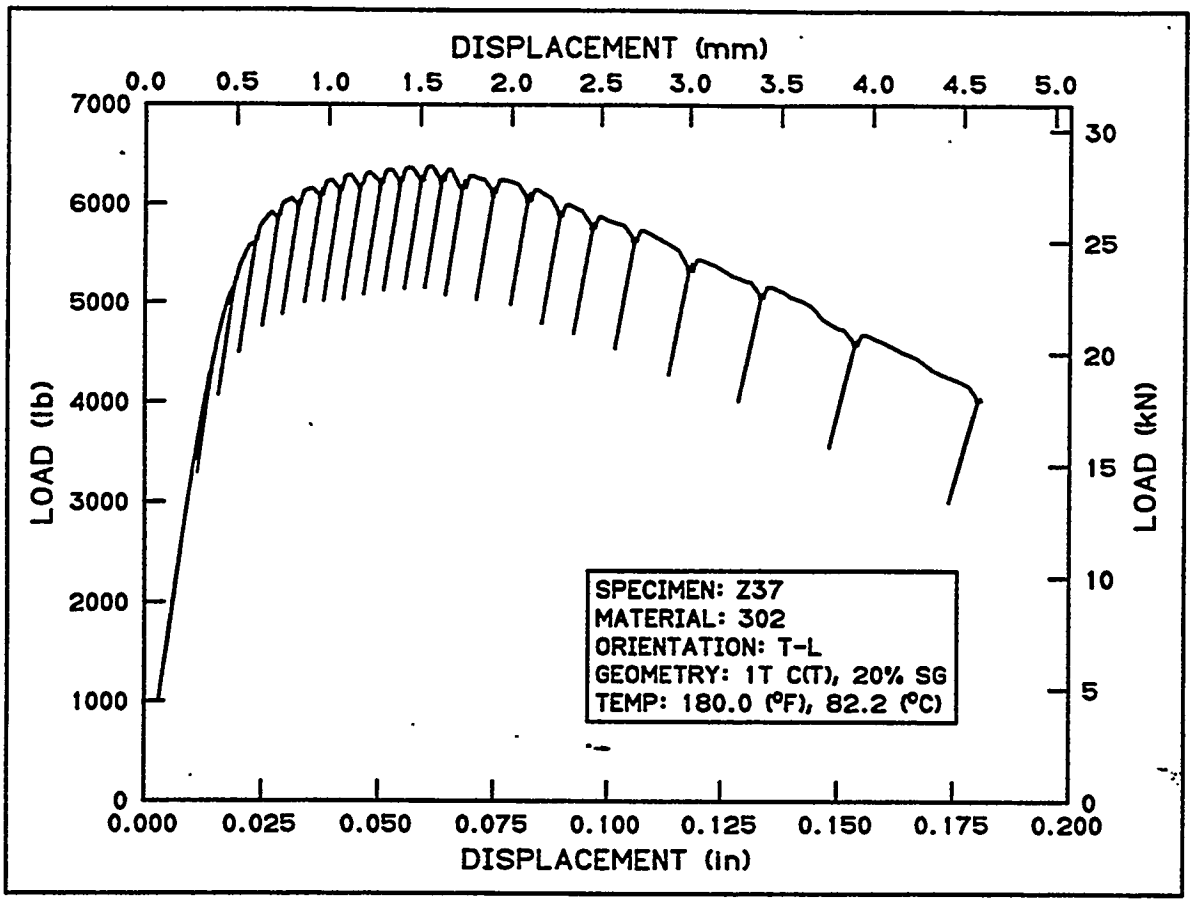

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
12000
10000
8000
6000
4000
2000
0
LOAD (lb)
50
40
30
20
10
0
LOAD (kN)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)
SPECIMEN: Z35
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

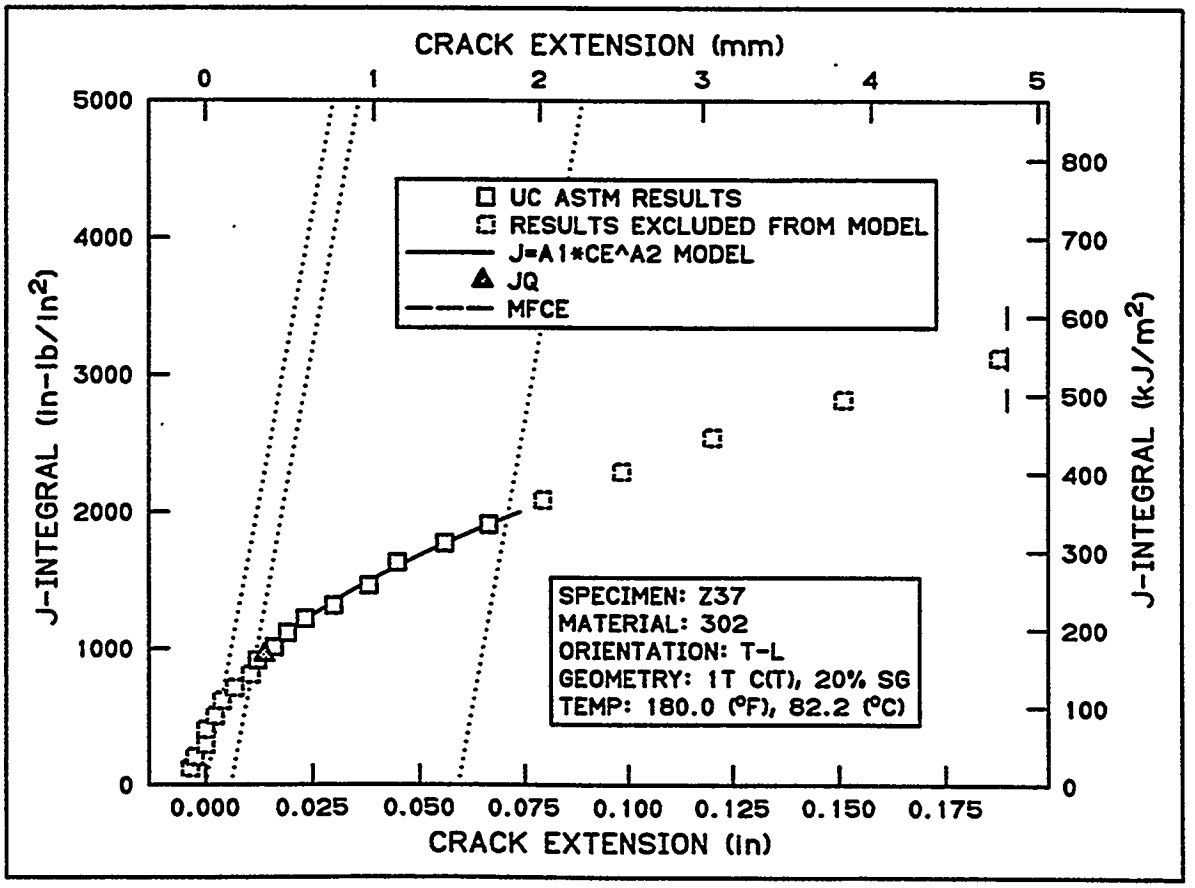

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
SPECIMEN: Z35
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
IDENTIFICATION: Z37
MATERIAL CODE: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.3100 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4240	0.0138	-0.0036	122.6
2	5082	0.0182	-0.0025	205.8
3	5572	0.0222	0.0000	295.5
4	5910	0.0269	0.0000	404.9
5	6048	0.0312	0.0023	505.8
6	6154	0.0357	0.0038	616.5
7	6239	0.0399	0.0068	712.7
8	6290	0.0440	0.0105	810.6
9	6313	0.0482	0.0121	914.6
10	6339	0.0529	0.0160	1012.2
11	6363	0.0571	0.0191	1118.8
12	6375	0.0615	0.0233	1221.2
13	6346	0.0655	0.0300	1317.7
14	6246	0.0728	0.0381	1466.9
15	6199	0.0801	0.0448	1636.3
16	6061	0.0874	0.0560	1776.1
17	5934	0.0942	0.0665	1913.2
18	5785	0.1035	0.0794	2089.1
19	5534	0.1155	0.0984	2295.7
20	5209	0.1312	0.1202	2546.7
21	4729	0.1513	0.1510	2819.7
22	4171	0.1782	0.1876	3126.1

WIDTH: 1.9970 (IN),50.724 (MM)
THICKNESS: 1.0003 (IN),25.408 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5028 (IN),12.771 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7617 (IN),44.747 (MM)
DISTANCE 2: 1.7959 (IN),45.616 (MM)
DISTANCE 3: 1.8194 (IN),46.213 (MM)
DISTANCE 4: 1.8300 (IN),46.482 (MM)
DISTANCE 5: 1.8375 (IN),46.672 (MM)
DISTANCE 6: 1.8298 (IN),46.477 (MM)
DISTANCE 7: 1.8226 (IN),46.294 (MM)
DISTANCE 8: 1.8015 (IN),45.758 (MM)
DISTANCE 9: 1.7702 (IN),44.963 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 2.0338 (IN),51.659 (MM)
DISTANCE 2: 2.0484 (IN),52.029 (MM)
DISTANCE 3: 2.0221 (IN),51.361 (MM)
DISTANCE 4: 2.0107 (IN),51.072 (MM)
DISTANCE 5: 1.9738 (IN),50.135 (MM)
DISTANCE 6: 1.9913 (IN),50.579 (MM)
DISTANCE 7: 1.9752 (IN),50.170 (MM)
DISTANCE 8: 1.9890 (IN),50.521 (MM)
DISTANCE 9: 1.9828 (IN),50.363 (MM)

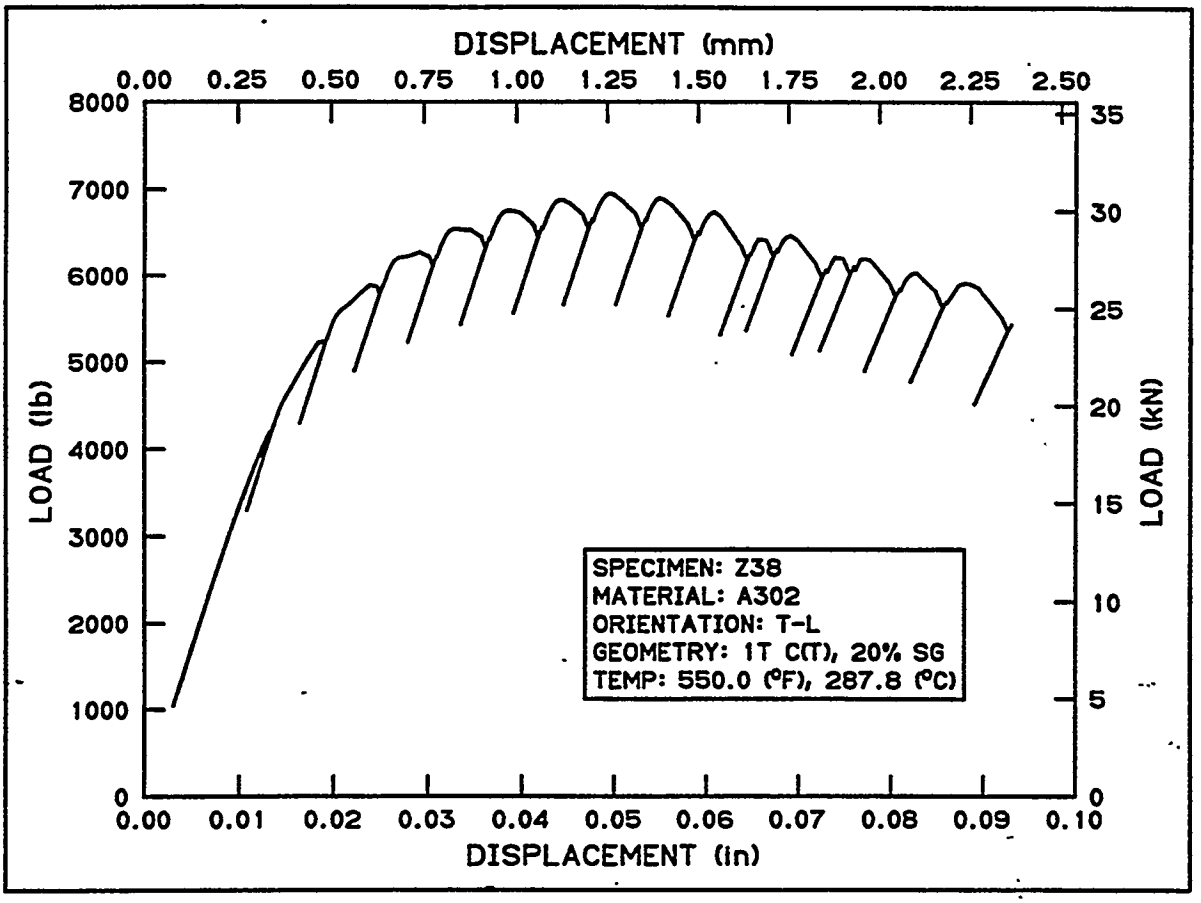

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
30 25 20 15 10 5 0
LOAD (kN)
SPECIMEN: Z37
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

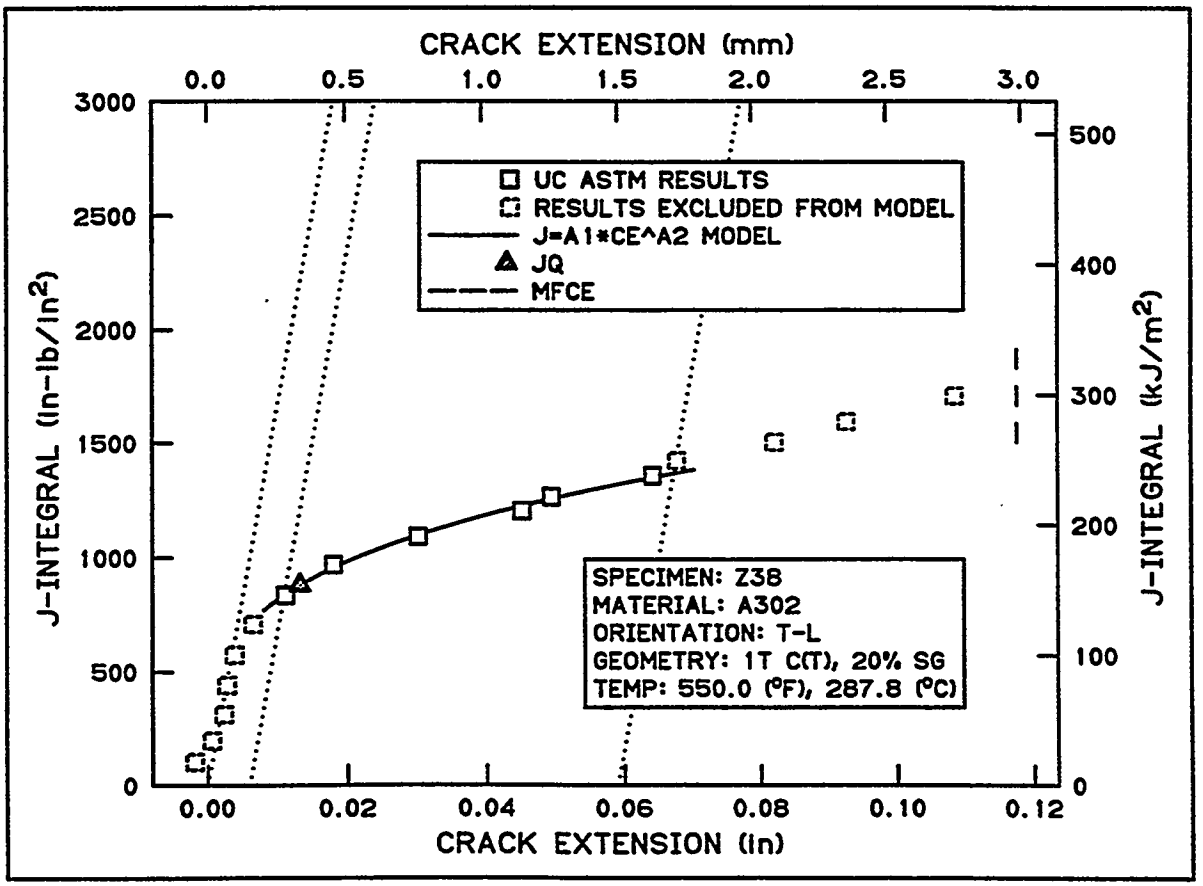

CRACK EXTENSION (mm)
0 1 2 3 4 5
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z37
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z38
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2839 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4120	0.0129	-0.0019	102.6
2	5214	0.0183	0.0006	197.0
3	5887	0.0238	0.0023	313.8
4	6271	0.0290	0.0028	441.1
5	6529	0.0345	0.0038	573.5
6	6721	0.0398	0.0064	706.8
7	6834	0.0451	0.0111	834.8
8	6871	0.0507	0.0180	968.6
9	6809	0.0562	0.0301	1091.9
10	6683	0.0615	0.0451	1203.0
11	6419	0.0656	0.0494	1264.1
12	6417	0.0698	0.0642	1356.2
13	6210	0.0739	0.0677	1420.8
14	6181	0.0777	0.0820	1502.0
15	6032	0.0828	0.0925	1593.5
16	5860	0.0894	0.1084	1708.7

  WIDTH: 1.9972 (IN),50.729 (MM)
  THICKNESS: 1.0002 (IN),25.405 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5019 (IN),12.748 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7370 (IN),44.120 (MM)
    DISTANCE 2: 1.7654 (IN),44.841 (MM)
    DISTANCE 3: 1.7889 (IN),45.438 (MM)
    DISTANCE 4: 1.8004 (IN),45.730 (MM)
    DISTANCE 5: 1.8080 (IN),45.923 (MM)
    DISTANCE 6: 1.8015 (IN),45.758 (MM)
    DISTANCE 7: 1.7896 (IN),45.456 (MM)
    DISTANCE 8: 1.7792 (IN),45.192 (MM)
    DISTANCE 9: 1.7698 (IN),44.953 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9199 (IN),48.765 (MM)
    DISTANCE 2: 1.8894 (IN),47.991 (MM)
    DISTANCE 3: 1.8838 (IN),47.849 (MM)
    DISTANCE 4: 1.8881 (IN),47.958 (MM)
    DISTANCE 5: 1.9035 (IN),48.349 (MM)
    DISTANCE 6: 1.8964 (IN),48.169 (MM)
    DISTANCE 7: 1.8988 (IN),48.230 (MM)
    DISTANCE 8: 1.9334 (IN),49.108 (MM)
    DISTANCE 9: 1.9466 (IN),49.444 (MM)

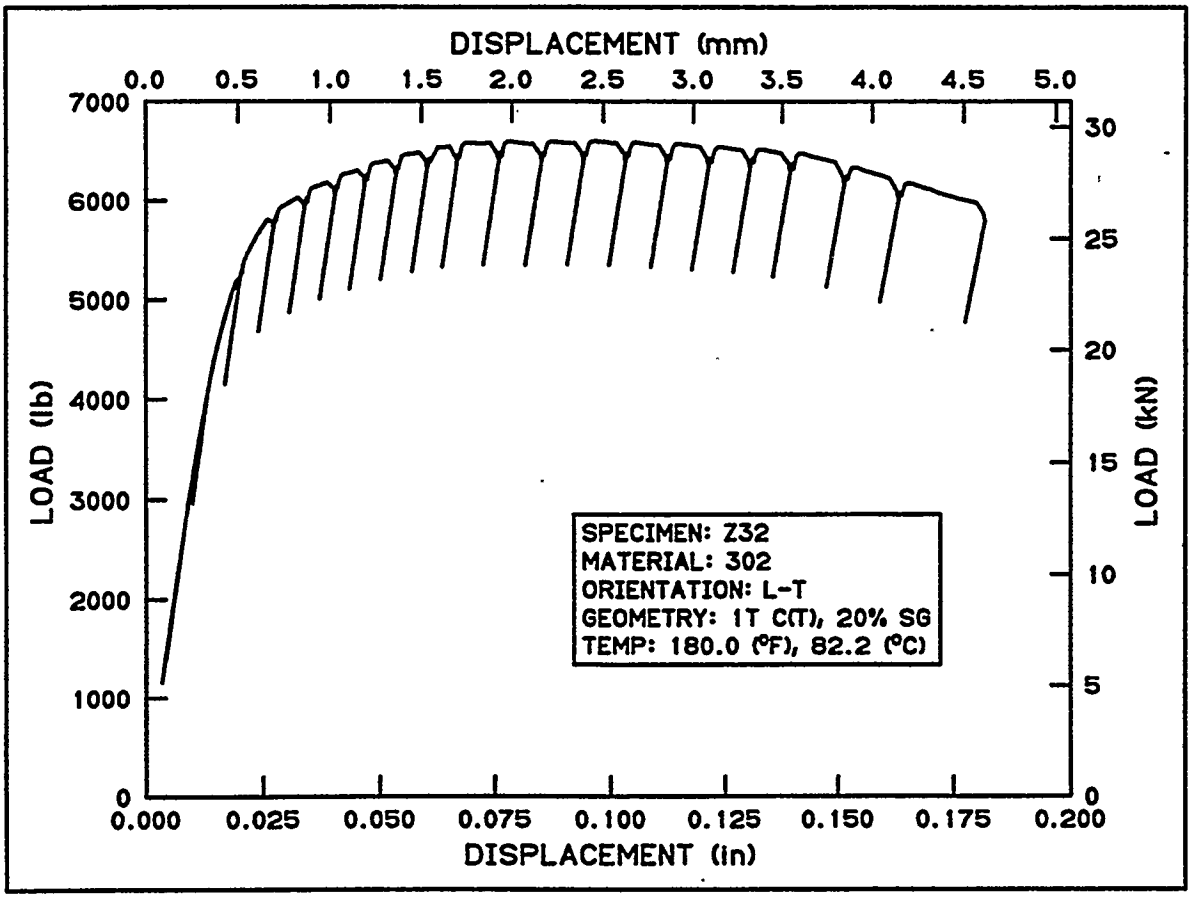

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
35 30 25 20 15 10 5 0
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

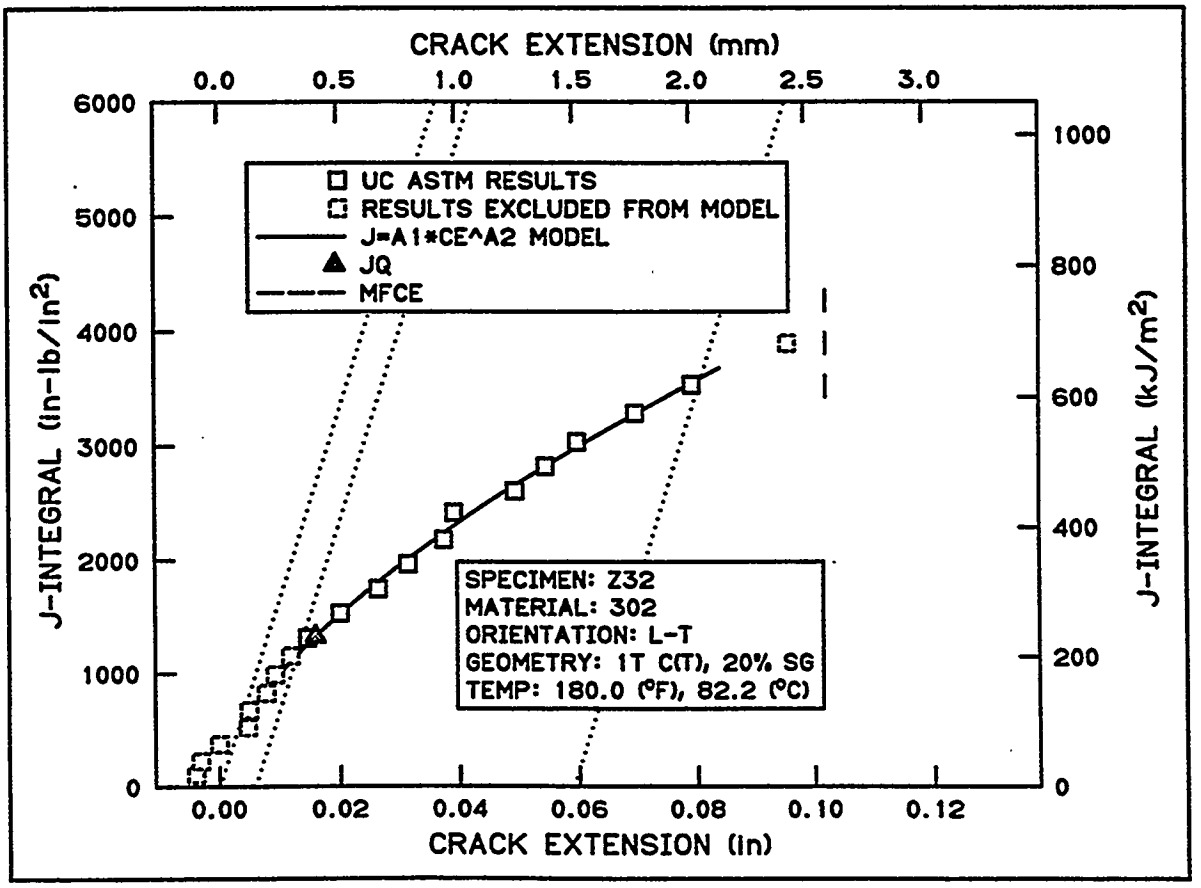

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z32
MATERIAL CODE: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.3118 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3912	0.0126	-0.0038	102.8
2	5188	0.0193	-0.0030	223.5
3	5805	0.0260	0.0000	374.0
4	6031	0.0324	0.0047	521.8
5	6182	0.0387	0.0049	676.0
6	6305	0.0453	0.0078	827.3
7	6403	0.0517	0.0092	989.3
8	6486	0.0586	0.0118	1153.0
9	6551	0.0651	0.0146	1312.3
10	6588	0.0740	0.0200	1532.5
11	6576	0.0831	0.0264	1747.6
12	6583	0.0922	0.0313	1966.7
13	6583	0.1012	0.0373	2182.2
14	6561	0.1105	0.0391	2415.7
15	6548	0.1195	0.0494	2606.2
16	6517	0.1287	0.0544	2822.3
17	6486	0.1374	0.0597	3033.3
18	6392	0.1493	0.0695	3287.4
19	6228	0.1611	0.0791	3532.8
20	5985	0.1799	0.0955	3892.7

WIDTH: 2.0028 (IN),50.871 (MM)
THICKNESS: 1.0001 (IN),25.403 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5018 (IN),12.746 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7624 (IN),44.765 (MM)
DISTANCE 2: 1.7982 (IN),45.674 (MM)
DISTANCE 3: 1.8205 (IN),46.241 (MM)
DISTANCE 4: 1.8304 (IN),46.492 (MM)
DISTANCE 5: 1.8318 (IN),46.528 (MM)
DISTANCE 6: 1.8284 (IN),46.441 (MM)
DISTANCE 7: 1.8230 (IN),46.304 (MM)
DISTANCE 8: 1.8042 (IN),45.827 (MM)
DISTANCE 9: 1.7817 (IN),45.255 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9536 (IN),49.621 (MM)
DISTANCE 2: 1.9263 (IN),48.928 (MM)
DISTANCE 3: 1.9006 (IN),48.275 (MM)
DISTANCE 4: 1.9083 (IN),48.471 (MM)
DISTANCE 5: 1.9188 (IN),48.738 (MM)
DISTANCE 6: 1.9126 (IN),48.580 (MM)
DISTANCE 7: 1.9124 (IN),48.575 (MM)
DISTANCE 8: 1.9024 (IN),48.321 (MM)
DISTANCE 9: 1.9316 (IN),49.063 (MM)

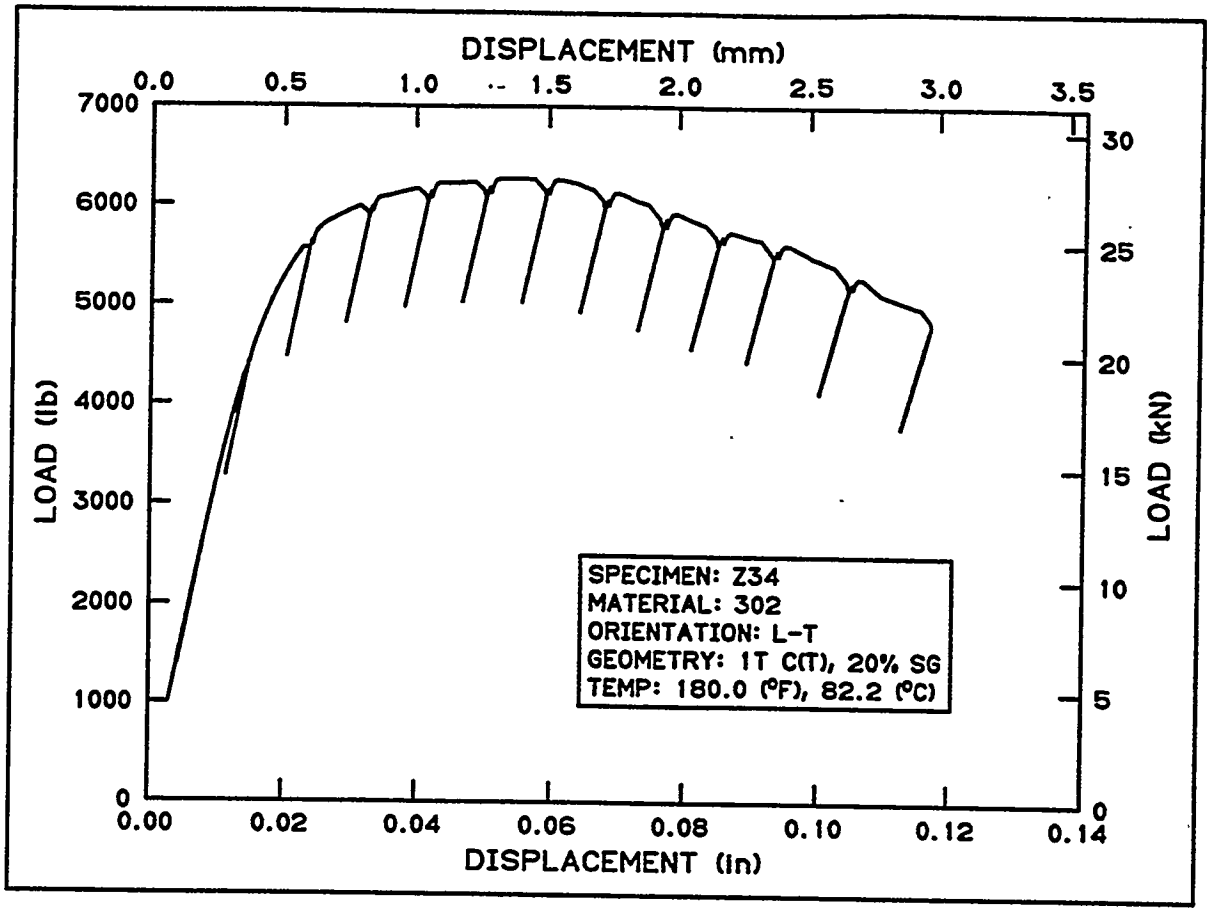

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
30 25 20 15 10 5 0
LOAD (kN)
SPECIMEN: Z32
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

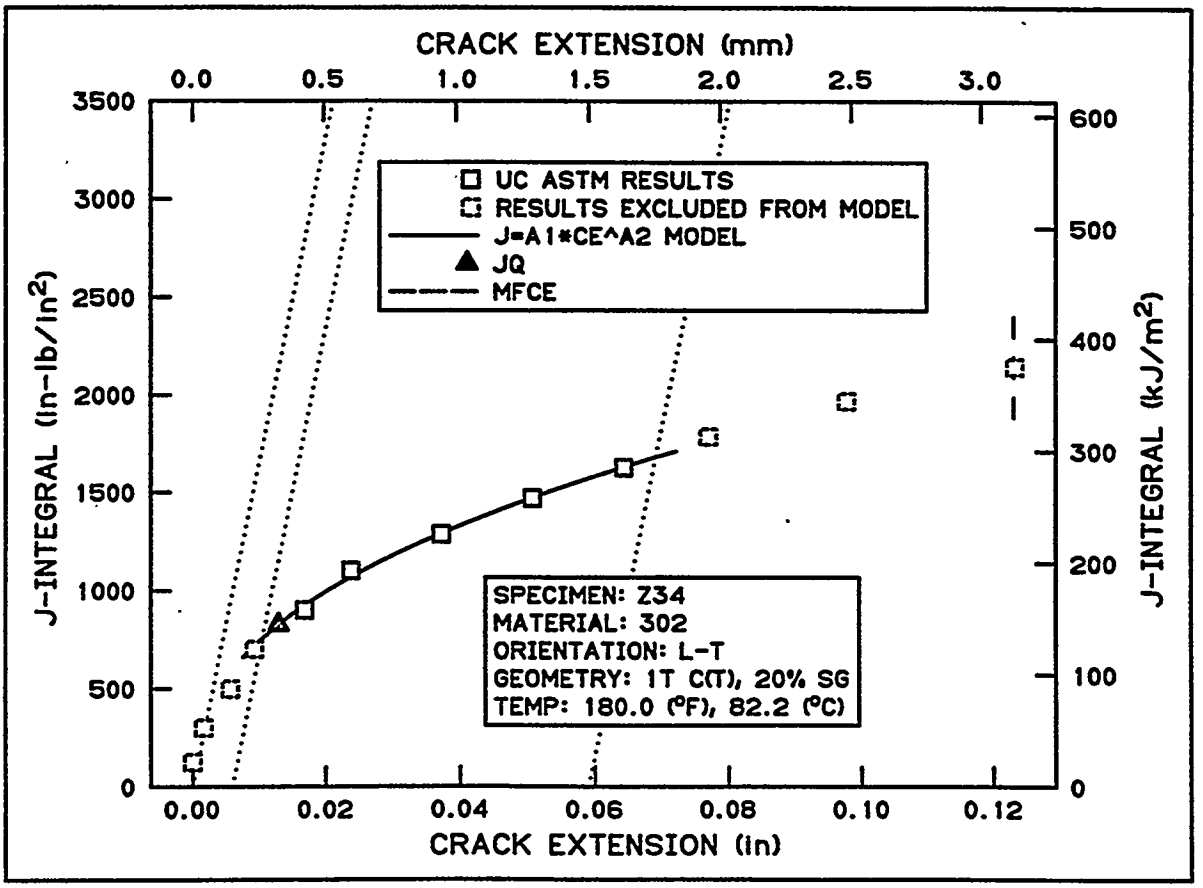

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z32
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z34
MATERIAL CODE: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.3104 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4262	0.0138	0.0000	125.2
2	5563	0.0225	0.0016	299.5
3	5985	0.0311	0.0056	498.0
4	6167	0.0396	0.0093	700.7
5	6234	0.0482	0.0168	899.6
6	6265	0.0570	0.0238	1102.8
7	6161	0.0657	0.0372	1289.6
8	6009	0.0742	0.0507	1471.4
9	5806	0.0828	0.0644	1627.4
10	5660	0.0911	0.0770	1785.8
11	5396	0.1021	0.0977	1968.4
12	4981	0.1153	0.1232	2144.2

WIDTH: 1.9977 (IN),50.742 (MM)
THICKNESS: 1.0003 (IN),25.408 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5007 (IN),12.718 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7596 (IN),44.694 (MM)
DISTANCE 2: 1.8032 (IN),45.801 (MM)
DISTANCE 3: 1.8167 (IN),46.144 (MM)
DISTANCE 4: 1.8290 (IN),46.457 (MM)
DISTANCE 5: 1.8300 (IN),46.482 (MM)
DISTANCE 6: 1.8284 (IN),46.441 (MM)
DISTANCE 7: 1.8222 (IN),46.284 (MM)
DISTANCE 8: 1.7970 (IN),45.644 (MM)
DISTANCE 9: 1.7648 (IN),44.826 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9108 (IN),48.534 (MM)
DISTANCE 2: 1.9676 (IN),49.977 (MM)
DISTANCE 3: 1.9180 (IN),48.717 (MM)
DISTANCE 4: 1.9252 (IN),48.900 (MM)
DISTANCE 5: 1.9289 (IN),48.994 (MM)
DISTANCE 6: 1.9213 (IN),48.801 (MM)
DISTANCE 7: 1.9354 (IN),49.159 (MM)
DISTANCE 8: 1.9402 (IN),49.281 (MM)
DISTANCE 9: 1.9618 (IN),49.830 (MM)

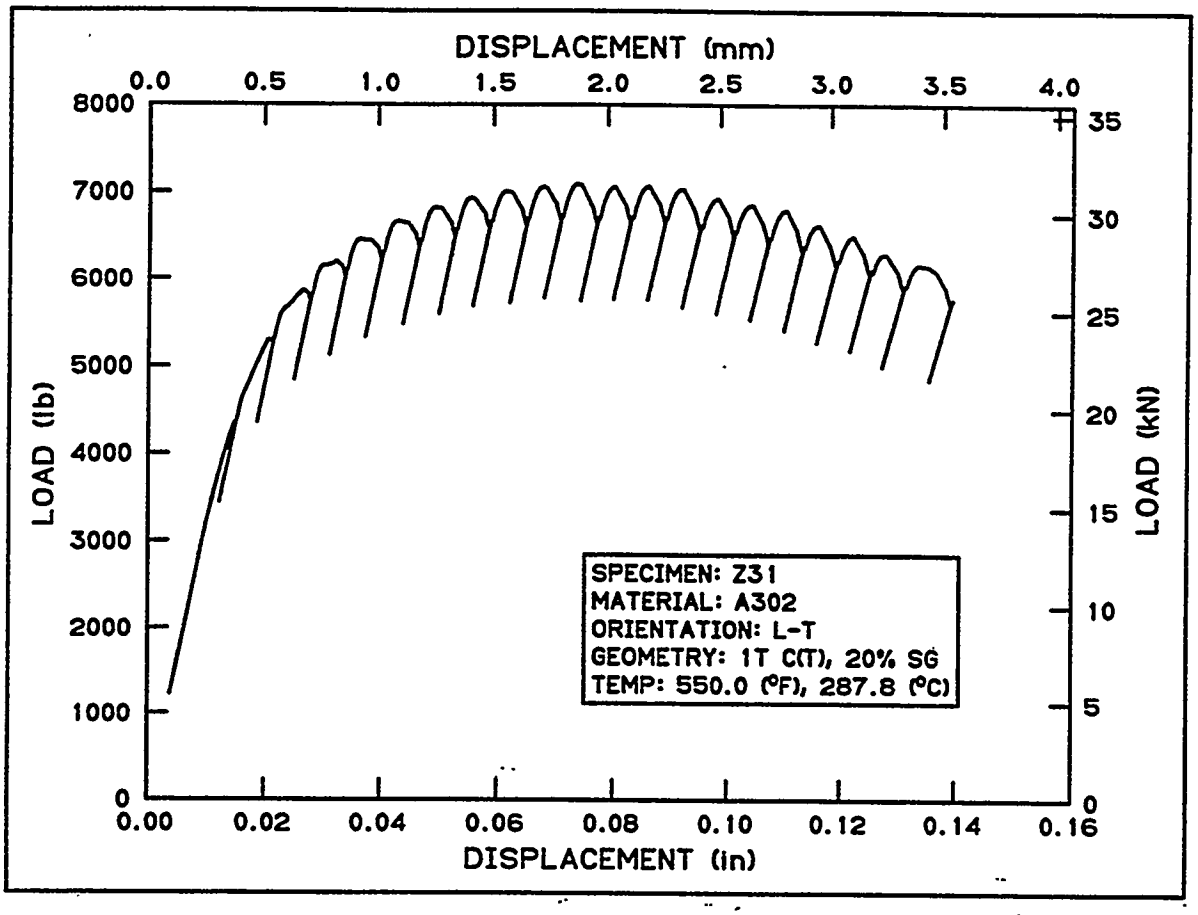

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z34
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

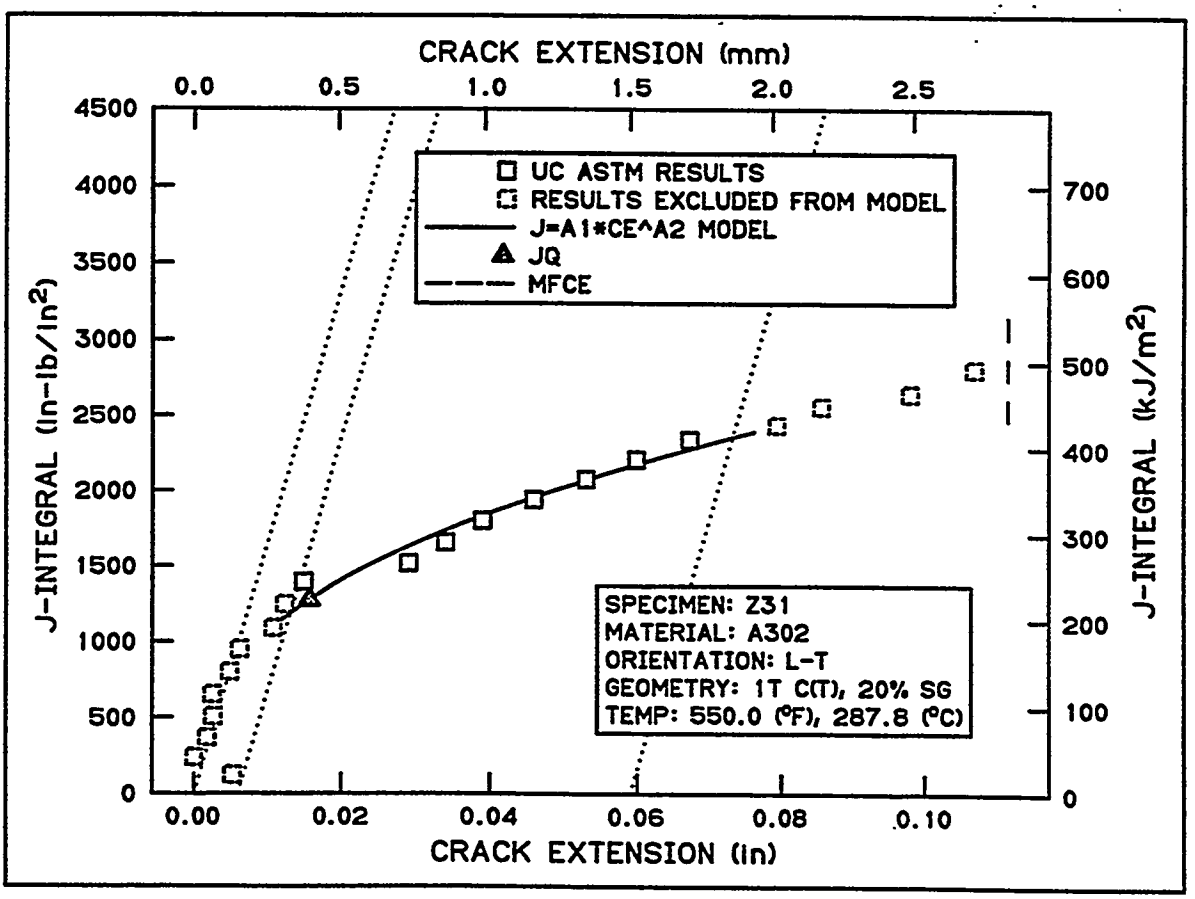

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z34
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z31
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2925 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4302	0.0144	0.0052	123.4
2	5296	0.0204	0.0000	238.6
3	5866	0.0264	0.0018	369.3
4	6201	0.0323	0.0026	507.7
5	6440	0.0382	0.0025	652.6
6	6637	0.0444	0.0048	802.7
7	6805	0.0502	0.0061	953.4
8	6900	0.0561	0.0107	1093.7
9	6985	0.0622	0.0123	1250.9
10	7031	0.0682	0.0148	1398.8
11	7078	0.0741	0.0290	1523.0
12	7053	0.0801	0.0341	1662.7
13	7064	0.0859	0.0390	1805.9
14	7026	0.0920	0.0459	1945.5
15	6920	0.0982	0.0530	2078.9
16	6848	0.1042	0.0599	2211.1
17	6791	0.1101	0.0673	2341.8
18	6611	0.1161	0.0794	2440.4
19	6497	0.1220	0.0857	2564.1
20	6291	0.1278	0.0980	2648.6
21	6090	0.1365	0.1068	2812.6

WIDTH: 1.9993 (IN),50.782 (MM)
THICKNESS: 1.0005 (IN),25.413 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7602 (IN),44.709 (MM)
DISTANCE 2: 1.7848 (IN),45.334 (MM)
DISTANCE 3: 1.8024 (IN),45.781 (MM)
DISTANCE 4: 1.8111 (IN),46.002 (MM)
DISTANCE 5: 1.8122 (IN),46.030 (MM)
DISTANCE 6: 1.8078 (IN),45.918 (MM)
DISTANCE 7: 1.7954 (IN),45.603 (MM)
DISTANCE 8: 1.7735 (IN),45.047 (MM)
DISTANCE 9: 1.7642 (IN),44.811 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9338 (IN),49.119 (MM)
DISTANCE 2: 1.8983 (IN),48.217 (MM)
DISTANCE 3: 1.8983 (IN),48.217 (MM)
DISTANCE 4: 1.9075 (IN),48.450 (MM)
DISTANCE 5: 1.9098 (IN),48.509 (MM)
DISTANCE 6: 1.8977 (IN),48.202 (MM)
DISTANCE 7: 1.9098 (IN),48.509 (MM)
DISTANCE 8: 1.8861 (IN),47.907 (MM)
DISTANCE 9: 1.9306 (IN),49.037 (MM)

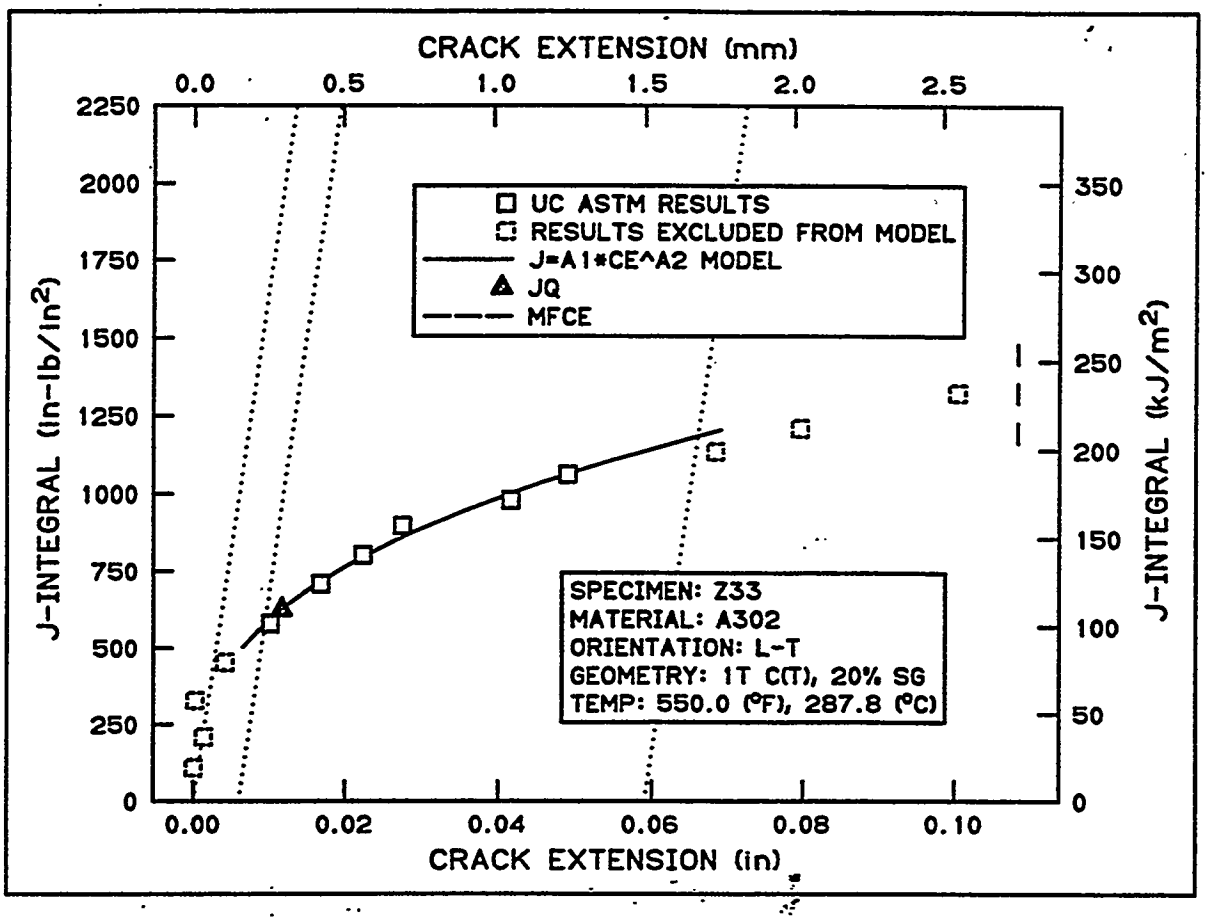

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

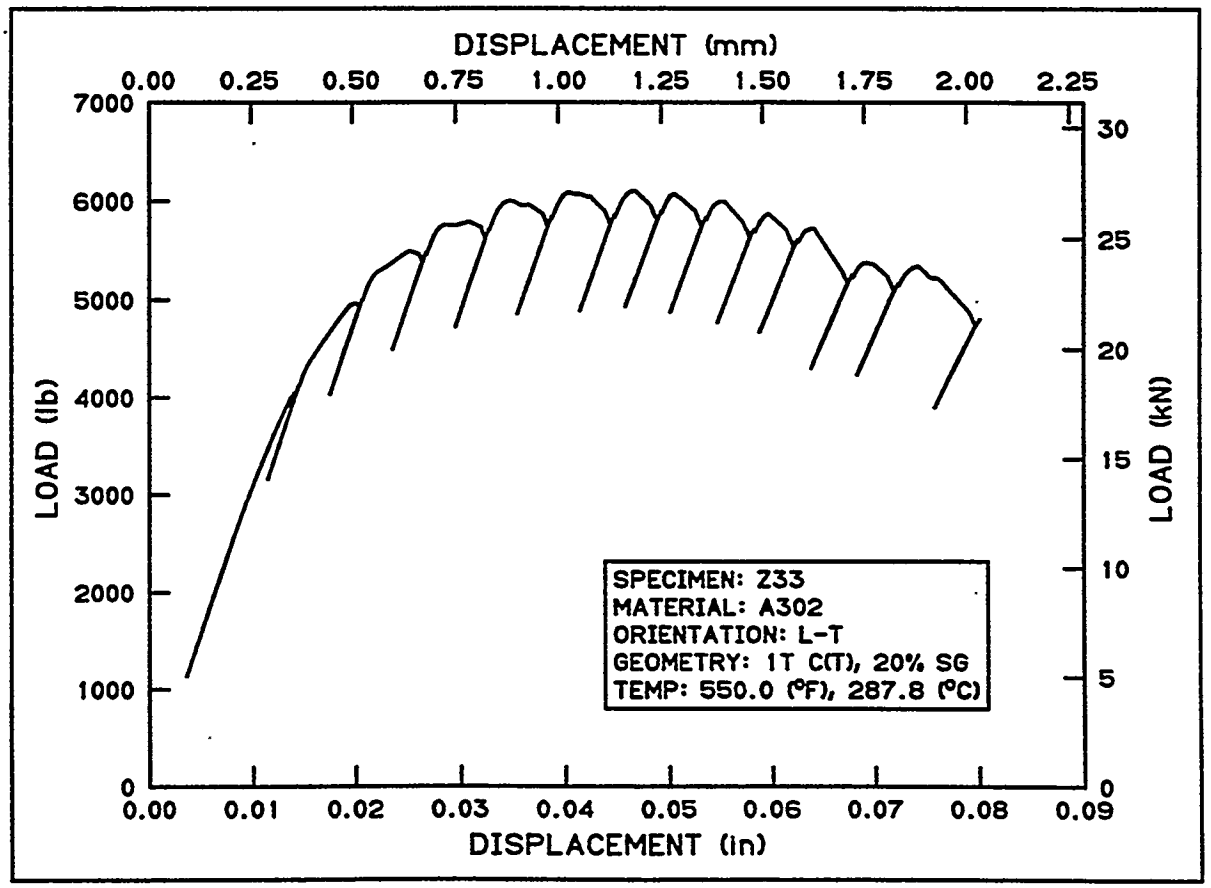

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z33
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.3036 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3981	0.0137	0.0000	107.9
2	4953	0.0195	0.0014	208.6
3	5499	0.0252	0.0002	329.0
4	5791	0.0309	0.0041	453.4
5	5963	0.0366	0.0101	579.9
6	6046	0.0424	0.0168	707.8
7	6102	0.0468	0.0224	802.0
8	6025	0.0512	0.0276	896.1
9	5998	0.0555	0.0416	978.3
10	5874	0.0596	0.0490	1060.4
11	5724	0.0641	0.0685	1135.7
12	5364	0.0699	0.0796	1209.3
13	5074	0.0774	0.1003	1323.6

  WIDTH: 1.9962 (IN),50.703 (MM)
  THICKNESS: 1.0005 (IN),25.413 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5024 (IN),12.761 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7548 (IN),44.572 (MM)
    DISTANCE 2: 1.7712 (IN),44.988 (MM)
    DISTANCE 3: 1.7940 (IN),45.568 (MM)
    DISTANCE 4: 1.8208 (IN),46.248 (MM)
    DISTANCE 5: 1.8256 (IN),46.370 (MM)
    DISTANCE 6: 1.8304 (IN),46.492 (MM)
    DISTANCE 7: 1.8260 (IN),46.380 (MM)
    DISTANCE 8: 1.8110 (IN),45.999 (MM)
    DISTANCE 9: 1.7826 (IN),45.278 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9062 (IN),48.417 (MM)
    DISTANCE 2: 1.9198 (IN),48.763 (MM)
    DISTANCE 3: 1.8986 (IN),48.224 (MM)
    DISTANCE 4: 1.9018 (IN),48.306 (MM)
    DISTANCE 5: 1.9336 (IN),49.113 (MM)
    DISTANCE 6: 1.9116 (IN),48.555 (MM)
    DISTANCE 7: 1.9090 (IN),48.489 (MM)
    DISTANCE 8: 1.9213 (IN),48.801 (MM)
    DISTANCE 9: 1.9296 (IN),49.012 (MM)

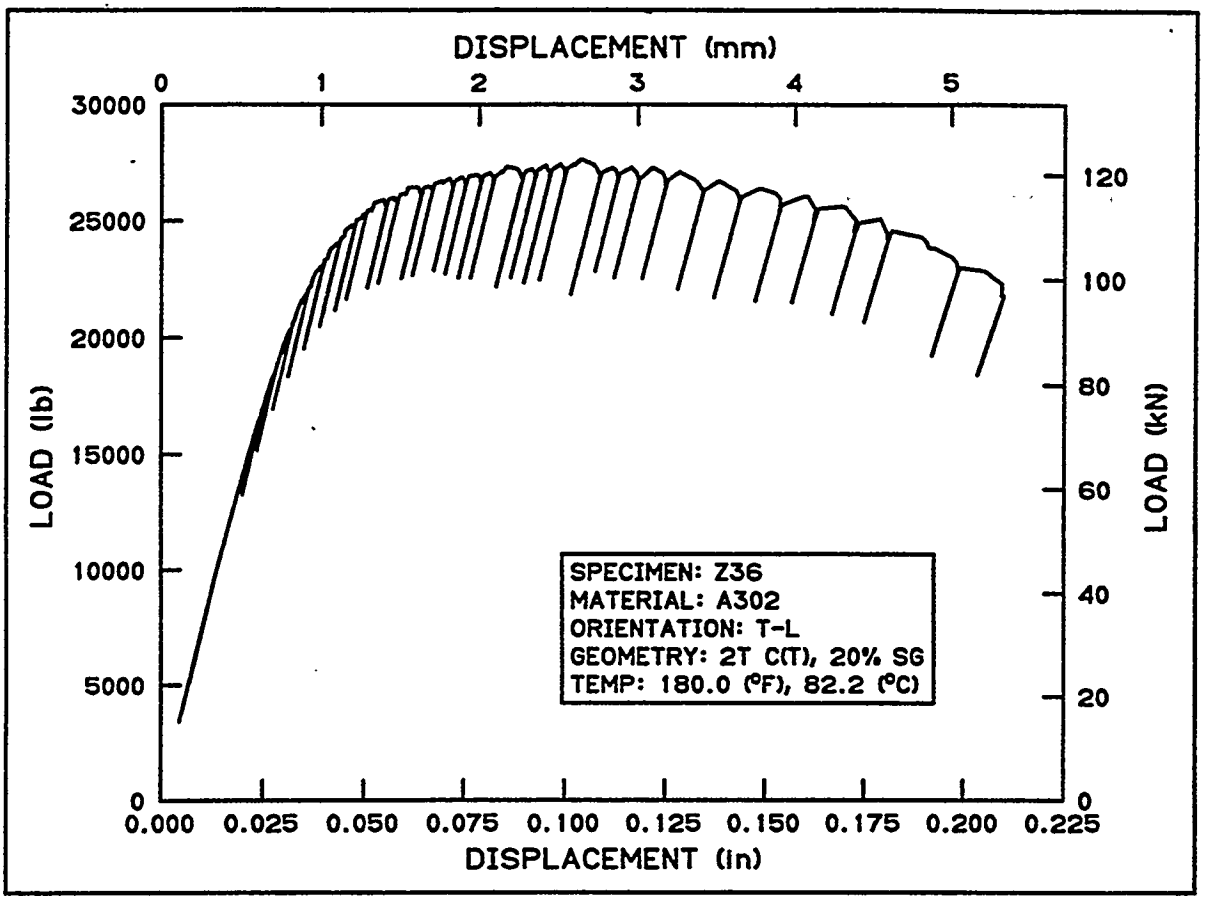

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
2250
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

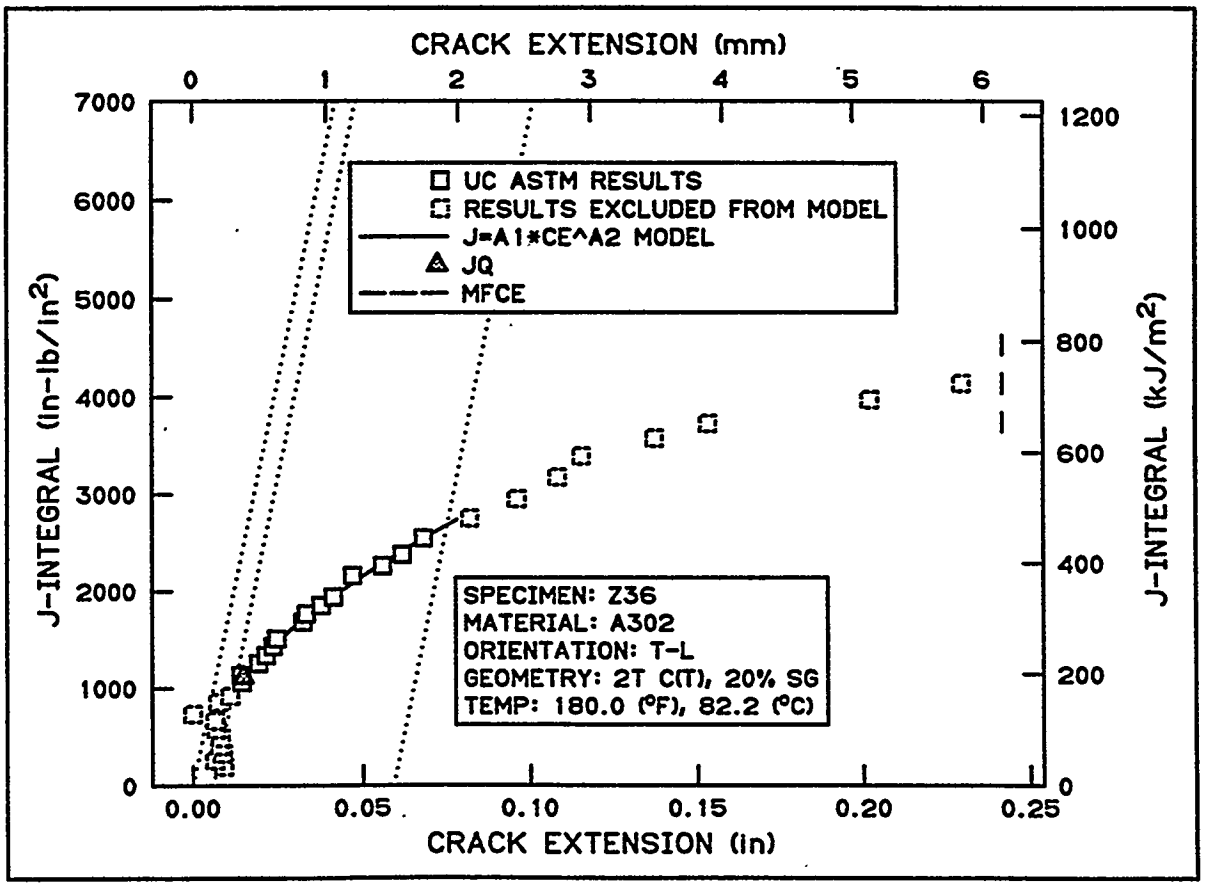

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
2.25
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
DISPLACEMENT (in)

SPECIMEN
IDENTIFICATION: Z36
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.5704 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16172	0.0236	0.0090	197.4
2	18216	0.0272	0.0064	258.7
3	20012	0.0308	0.0086	328.8
4	21539	0.0345	0.0078	407.0
5	22788	0.0380	0.0080	489.2
6	23759	0.0416	0.0068	576.1
7	24603	0.0454	0.0065	664.9
8	25086	0.0490	0.0000	733.6
9	25770	0.0524	0.0074	855.2
10	25876	0.0574	0.0108	920.0
11	26452	0.0610	0.0143	1062.0
12	26467	0.0660	0.0141	1131.8
13	26669	0.0695	0.0192	1256.9
14	26867	0.0744	0.0214	1339.2
15	26958	0.0780	0.0234	1431.8
16	26951	0.0818	0.0246	1510.5
17	27332	0.0855	0.0324	1684.1
18	27201	0.0918	0.0333	1764.3
19	27177	0.0956	0.0377	1852.5
20	27296	0.0994	0.0413	1940.8
21	27642	0.1041	0.0470	2159.6
22	27258	0.1118	0.0559	2259.0
23	27243	0.1167	0.0618	2376.8
24	27263	0.1221	0.0681	2545.6
25	26809	0.1320	0.0821	2750.5
26	26693	0.1385	0.0961	2949.0
27	26382	0.1491	0.1081	3173.0
28	26043	0.1607	0.1153	3390.4
29	25582	0.1701	0.1371	3573.1
30	24374	0.1806	0.1532	3723.8
31	23859	0.1926	0.2020	3970.2
32	22633	0.2070	0.2296	4138.2

WIDTH: 4.0086 (IN),101.820 (MM)
THICKNESS: 2.0010 (IN),50.825 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9700 (IN),24.638 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4633 (IN),87.968 (MM)
DISTANCE 2: 3.5210 (IN),89.433 (MM)
DISTANCE 3: 3.5530 (IN),90.246 (MM)
DISTANCE 4: 3.5650 (IN),90.551 (MM)
DISTANCE 5: 3.5661 (IN),90.579 (MM)
DISTANCE 6: 3.5546 (IN),90.287 (MM)
DISTANCE 7: 3.5430 (IN),89.992 (MM)
DISTANCE 8: 3.5522 (IN),90.226 (MM)
DISTANCE 9: 3.4736 (IN),88.229 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7569 (IN),95.425 (MM)
DISTANCE 2: 3.7786 (IN),95.976 (MM)
DISTANCE 3: 3.7880 (IN),96.215 (MM)
DISTANCE 4: 3.8077 (IN),96.716 (MM)
DISTANCE 5: 3.7798 (IN),96.007 (MM)
DISTANCE 6: 3.7839 (IN),96.111 (MM)
DISTANCE 7: 3.7915 (IN),96.304 (MM)
DISTANCE 8: 3.7766 (IN),95.926 (MM)
DISTANCE 9: 3.7464 (IN),95.159 (MM)

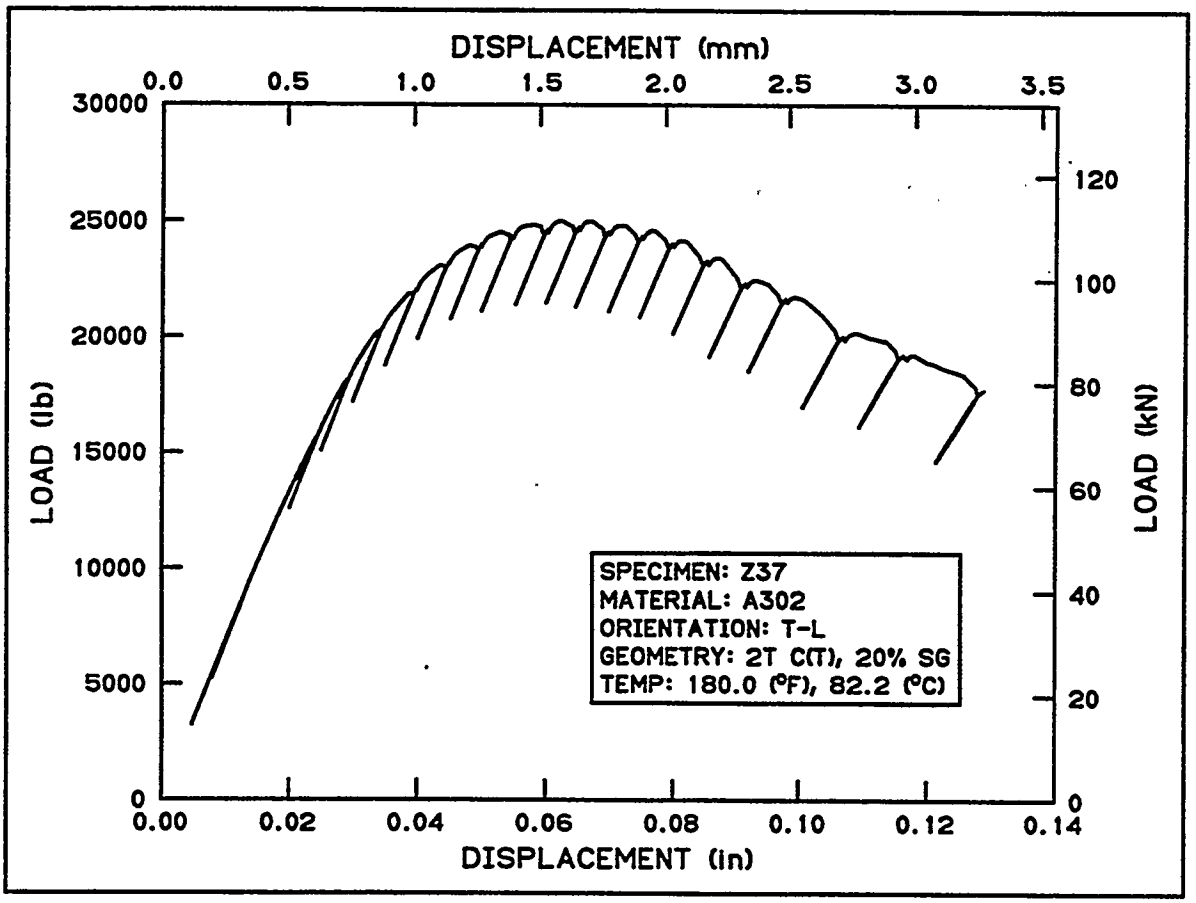

DISPLACEMENT (mm)
0
1
2
3
4
5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z36
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

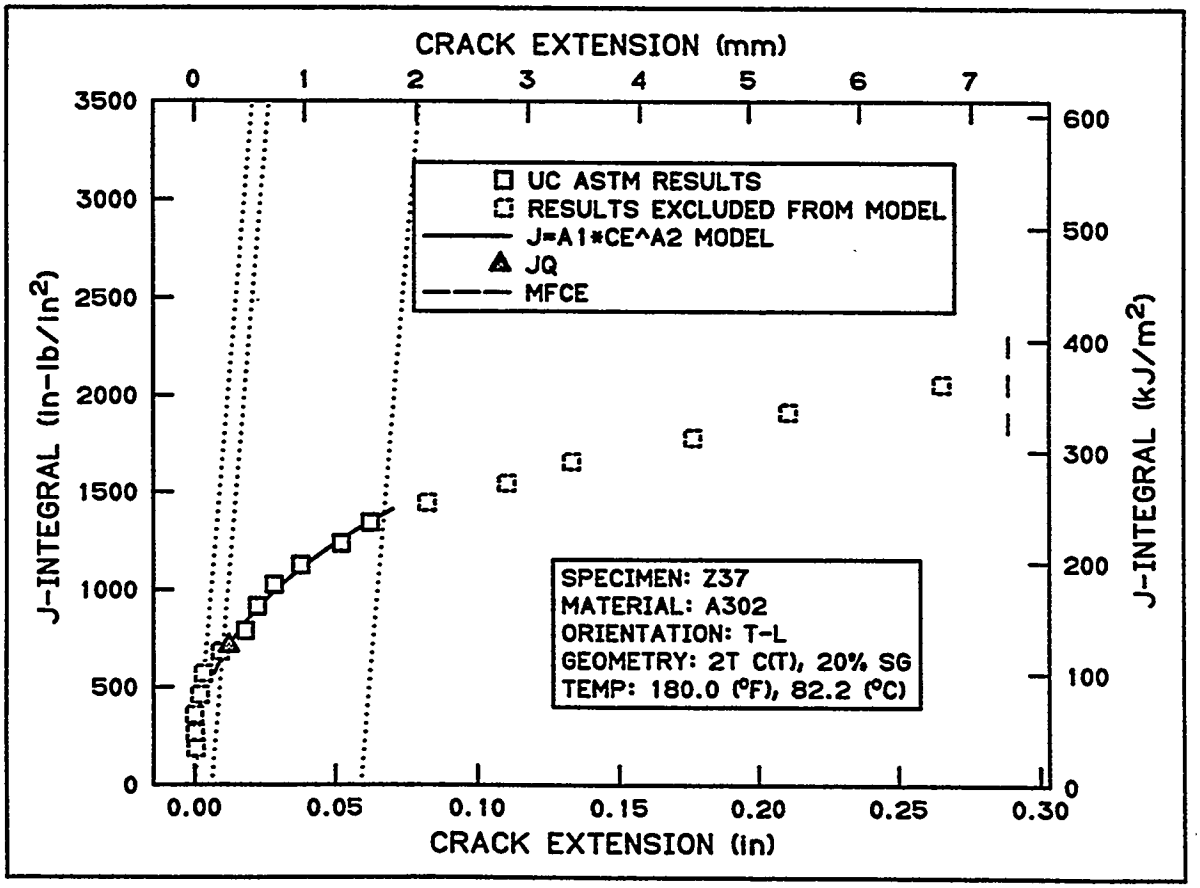

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z36
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z37
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6023 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15516	0.0239	0.0005	187.8
2	17980	0.0287	0.0002	268.0
3	20129	0.0336	0.0000	359.7
4	21821	0.0385	0.0019	461.7
5	23077	0.0433	0.0031	569.0
6	23955	0.0481	0.0092	682.4
7	24553	0.0528	0.0181	789.6
8	24850	0.0579	0.0225	915.3
9	25008	0.0625	0.0285	1026.6
10	24990	0.0672	0.0379	1128.4
11	24803	0.0724	0.0522	1239.2
12	24606	0.0771	0.0626	1345.3
13	24116	0.0822	0.0824	1448.9
14	23393	0.0876	0.1104	1548.3
15	22307	0.0950	0.1332	1660.2
16	20967	0.1036	0.1764	1783.7
17	19837	0.1136	0.2109	1915.7
18	18381	0.1257	0.2652	2059.3

  WIDTH: 4.0018 (IN),101.650 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9956 (IN),25.288 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5020 (IN),88.951 (MM)
    DISTANCE 2: 3.5630 (IN),90.500 (MM)
    DISTANCE 3: 3.6036 (IN),91.531 (MM)
    DISTANCE 4: 3.6156 (IN),91.836 (MM)
    DISTANCE 5: 3.6428 (IN),92.527 (MM)
    DISTANCE 6: 3.6302 (IN),92.207 (MM)
    DISTANCE 7: 3.6172 (IN),91.877 (MM)
    DISTANCE 8: 3.5886 (IN),91.150 (MM)
    DISTANCE 9: 3.5423 (IN),89.974 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9087 (IN),99.281 (MM)
    DISTANCE 2: 3.9352 (IN),99.954 (MM)
    DISTANCE 3: 3.9465 (IN),100.240 (MM)
    DISTANCE 4: 3.9047 (IN),99.179 (MM)
    DISTANCE 5: 3.8766 (IN),98.466 (MM)
    DISTANCE 6: 3.8709 (IN),98.321 (MM)
    DISTANCE 7: 3.8216 (IN),97.069 (MM)
    DISTANCE 8: 3.8391 (IN),97.513 (MM)
    DISTANCE 9: 3.8878 (IN),98.750 (MM)

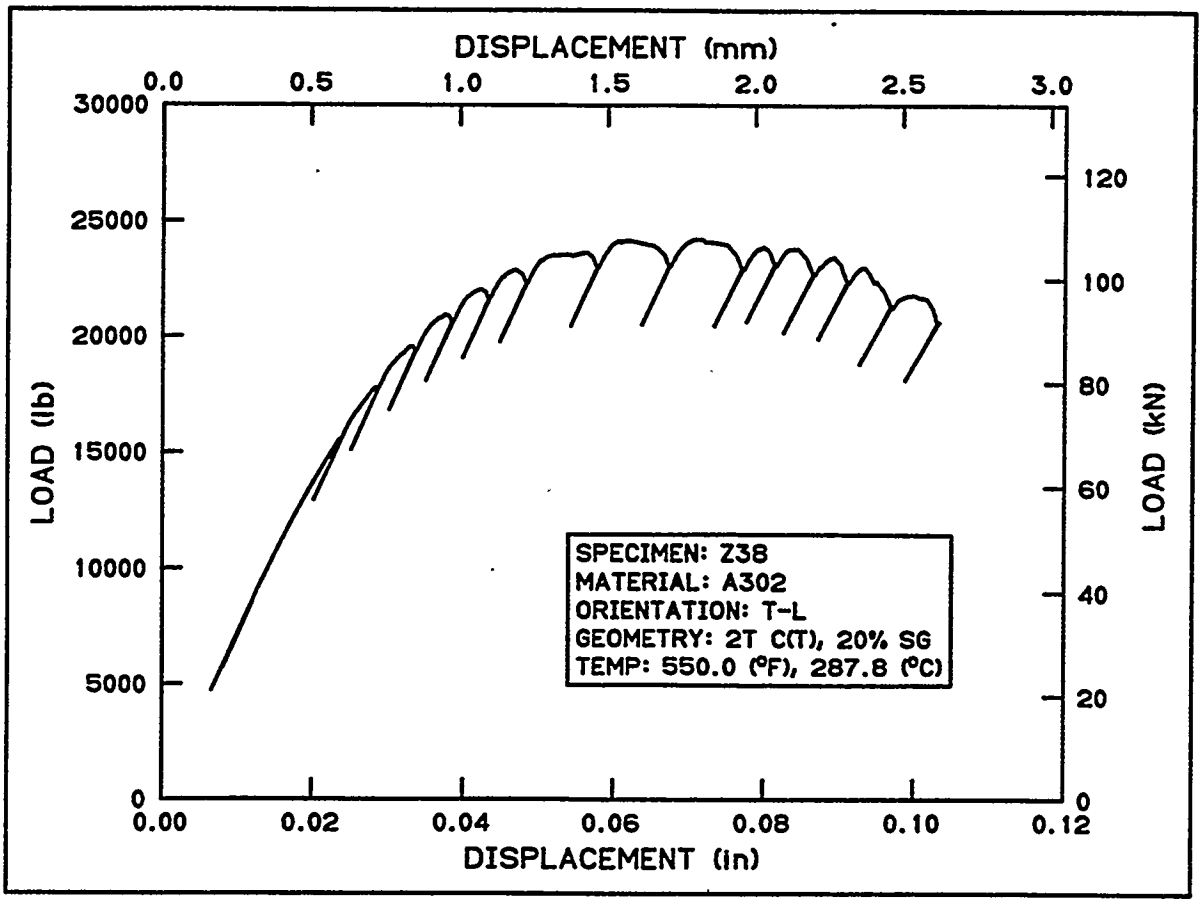

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z37
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

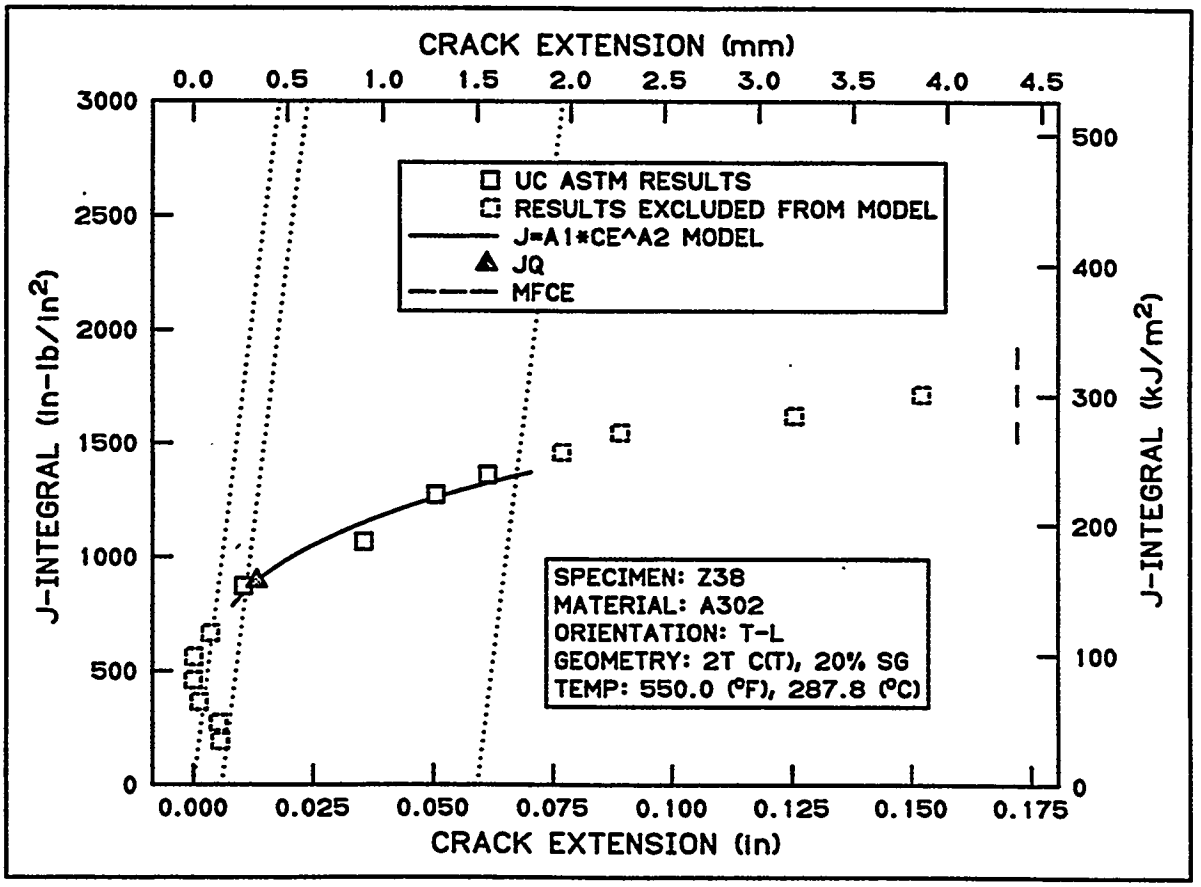

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z37
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z38
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6076 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15501	0.0234	0.0056	193.1
2	17735	0.0281	0.0053	272.6
3	19545	0.0328	0.0012	364.8
4	20918	0.0375	0.0000	460.9
5	22040	0.0422	0.0001	561.8
6	22888	0.0468	0.0035	665.7
7	23645	0.0564	0.0105	873.1
8	23851	0.0656	0.0354	1068.3
9	23952	0.0750	0.0505	1274.4
10	23878	0.0798	0.0613	1362.0
11	23785	0.0844	0.0768	1460.0
12	23432	0.0892	0.0891	1548.1
13	22401	0.0948	0.1254	1622.8
14	21616	0.1017	0.1521	1717.9

  WIDTH: 4.0050 (IN),101.730 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9926 (IN),25.212 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5590 (IN),90.399 (MM)
    DISTANCE 2: 3.6086 (IN),91.658 (MM)
    DISTANCE 3: 3.6346 (IN),92.319 (MM)
    DISTANCE 4: 3.6444 (IN),92.568 (MM)
    DISTANCE 5: 3.6406 (IN),92.471 (MM)
    DISTANCE 6: 3.6250 (IN),92.075 (MM)
    DISTANCE 7: 3.5897 (IN),91.178 (MM)
    DISTANCE 8: 3.5266 (IN),89.576 (MM)
    DISTANCE 9: 3.5047 (IN),89.019 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8140 (IN),96.876 (MM)
    DISTANCE 2: 3.7806 (IN),96.027 (MM)
    DISTANCE 3: 3.7824 (IN),96.073 (MM)
    DISTANCE 4: 3.7966 (IN),96.434 (MM)
    DISTANCE 5: 3.7616 (IN),95.545 (MM)
    DISTANCE 6: 3.7721 (IN),95.811 (MM)
    DISTANCE 7: 3.7502 (IN),95.255 (MM)
    DISTANCE 8: 3.7538 (IN),95.347 (MM)
    DISTANCE 9: 3.7464 (IN),95.159 (MM)

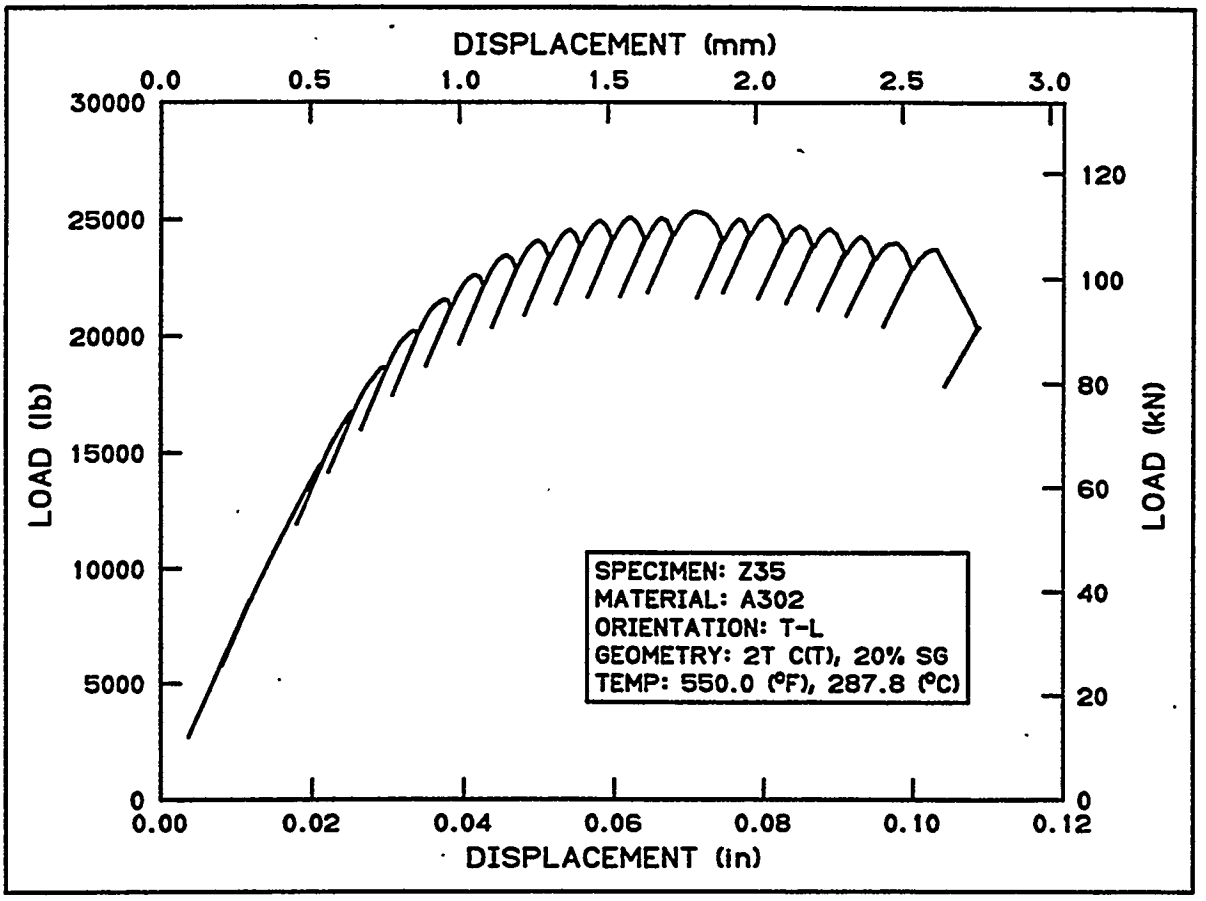

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

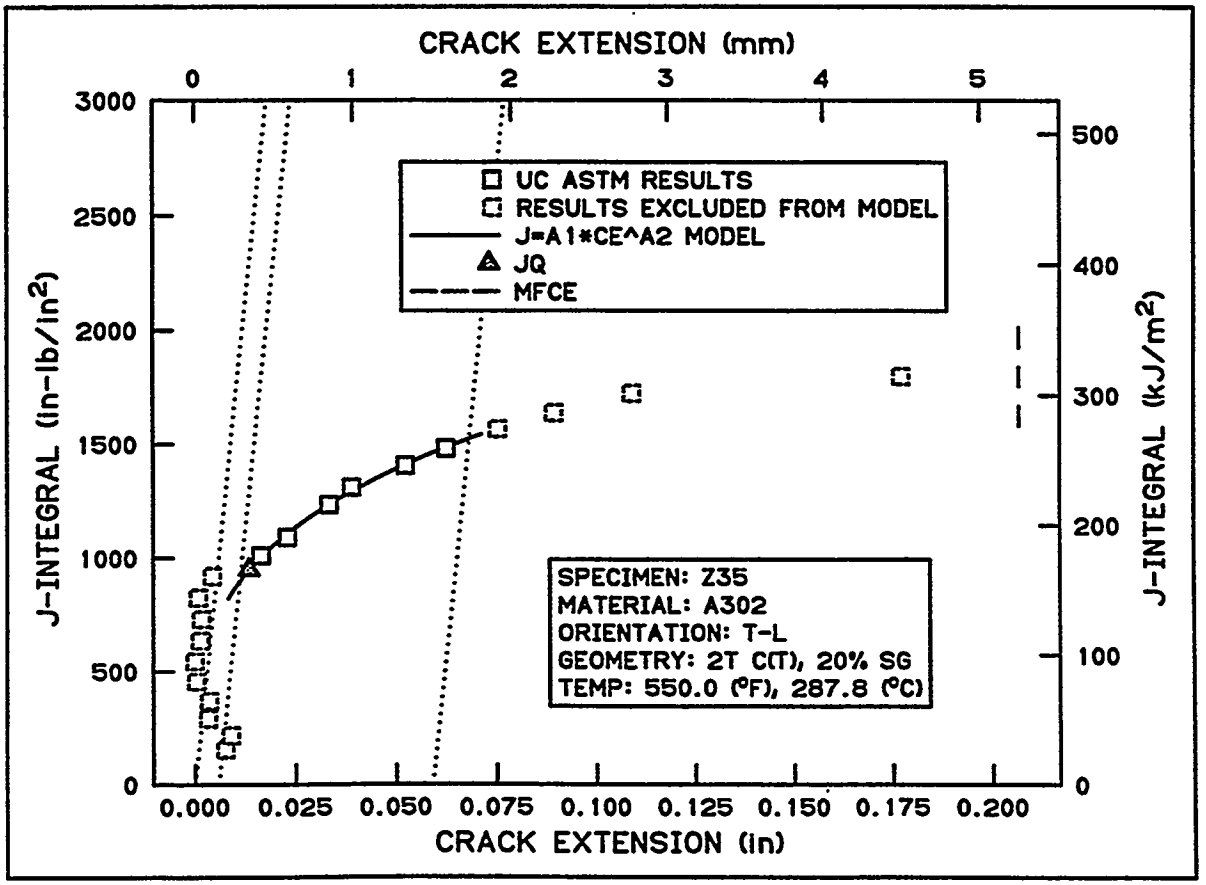

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z38
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z35
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5677 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14395	0.0209	0.0076	154.2
2	16645	0.0249	0.0090	216.4
3	18612	0.0291	0.0033	290.5
4	20178	0.0332	0.0036	367.3
5	21542	0.0374	0.0004	454.9
6	22611	0.0414	0.0000	544.3
7	23438	0.0456	0.0013	636.1
8	24061	0.0498	0.0016	731.3
9	24543	0.0539	0.0009	825.4
10	24948	0.0580	0.0044	919.8
11	25096	0.0621	0.0165	1010.3
12	25067	0.0662	0.0230	1090.7
13	25180	0.0724	0.0333	1234.3
14	25019	0.0765	0.0390	1311.3
15	25194	0.0805	0.0524	1406.1
16	24731	0.0847	0.0625	1481.7
17	24612	0.0888	0.0753	1566.0
18	24275	0.0929	0.0894	1636.5
19	23981	0.0979	0.1091	1722.4
20	22969	0.1044	0.1771	1796.5

  WIDTH: 4.0074 (IN),101.790 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9806 (IN),24.907 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5006 (IN),88.915 (MM)
    DISTANCE 2: 3.5422 (IN),89.972 (MM)
    DISTANCE 3: 3.5699 (IN),90.675 (MM)
    DISTANCE 4: 3.5852 (IN),91.064 (MM)
    DISTANCE 5: 3.5872 (IN),91.115 (MM)
    DISTANCE 6: 3.5736 (IN),90.769 (MM)
    DISTANCE 7: 3.5476 (IN),90.109 (MM)
    DISTANCE 8: 3.4924 (IN),88.707 (MM)
    DISTANCE 9: 3.4762 (IN),88.295 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7896 (IN),96.256 (MM)
    DISTANCE 2: 3.7464 (IN),95.159 (MM)
    DISTANCE 3: 3.7580 (IN),95.453 (MM)
    DISTANCE 4: 3.7728 (IN),95.829 (MM)
    DISTANCE 5: 3.7498 (IN),95.245 (MM)
    DISTANCE 6: 3.7404 (IN),95.006 (MM)
    DISTANCE 7: 3.7454 (IN),95.133 (MM)
    DISTANCE 8: 3.7516 (IN),95.291 (MM)
    DISTANCE 9: 3.7604 (IN),95.514 (MM)

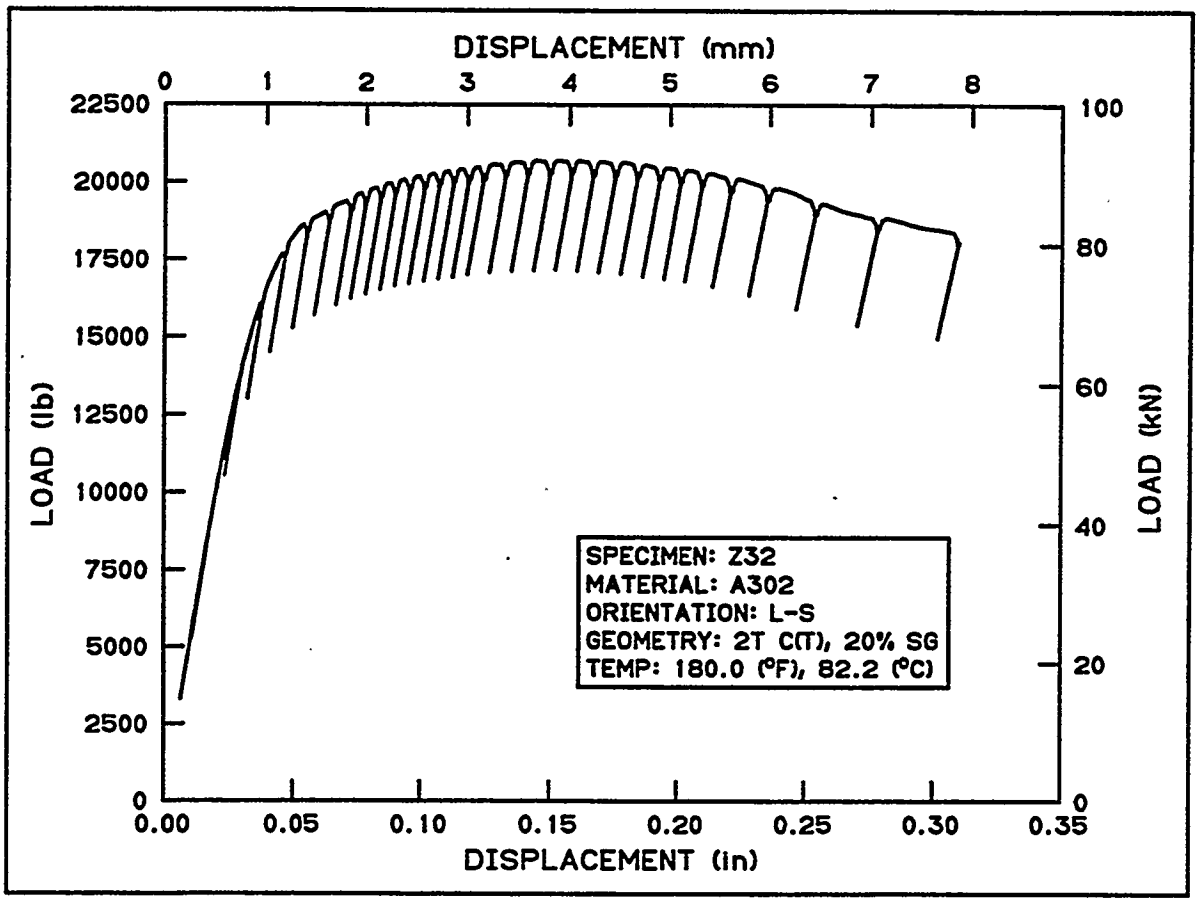

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z35
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

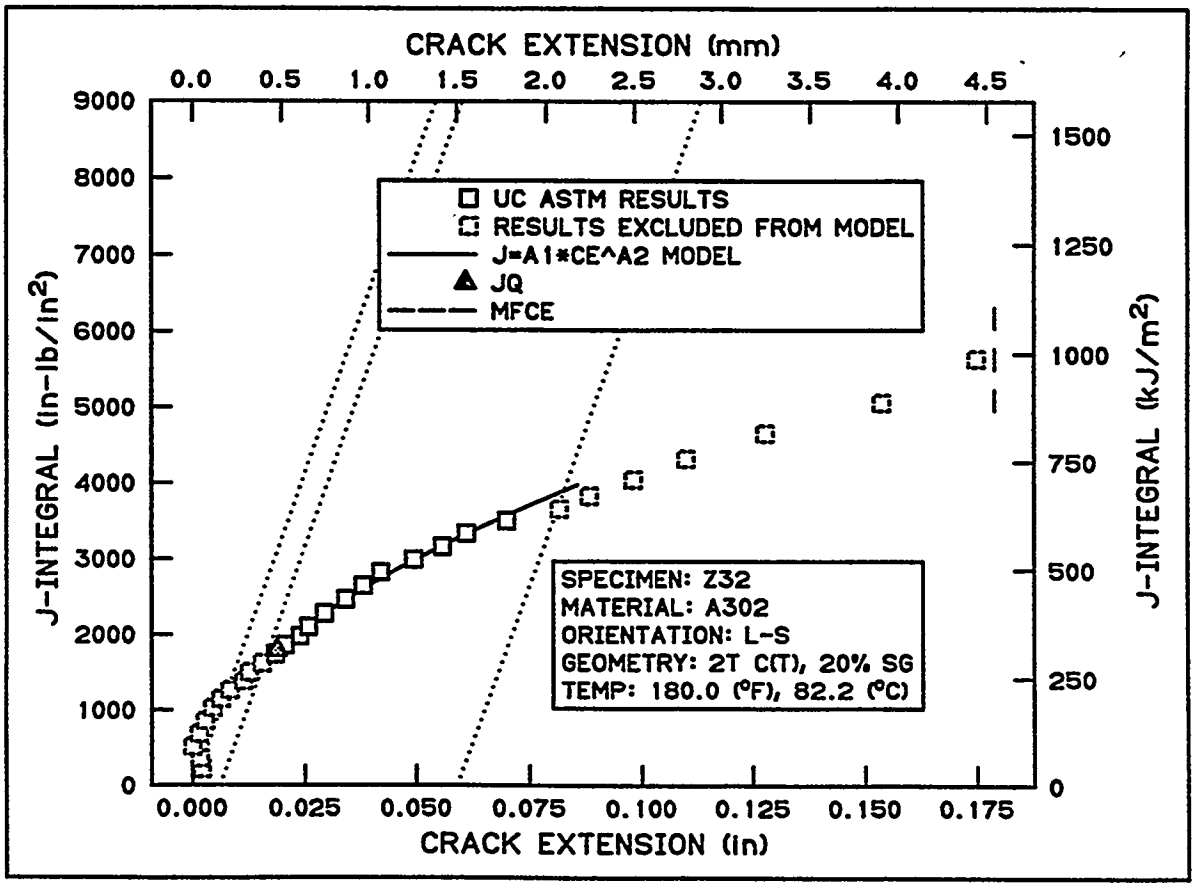

CRACK EXTENSION (mm)
0
1
2
3
4
5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z35
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z32
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.7688 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13466	0.0283	0.0020	216.3
2	16043	0.0368	0.0016	354.6
3	17656	0.0453	0.0000	511.9
4	18622	0.0539	0.0014	683.8
5	19019	0.0625	0.0028	856.9
6	19366	0.0708	0.0044	1030.6
7	19616	0.0767	0.0062	1148.8
8	19799	0.0826	0.0082	1270.0
9	19948	0.0882	0.0112	1387.3
10	20069	0.0937	0.0125	1507.4
11	20170	0.0993	0.0154	1624.9
12	20266	0.1050	0.0183	1744.6
13	20339	0.1108	0.0205	1863.4
14	20414	0.1163	0.0239	1982.4
15	20479	0.1222	0.0258	2103.9
16	20569	0.1305	0.0294	2283.6
17	20626	0.1393	0.0342	2464.0
18	20656	0.1479	0.0381	2646.6
19	20665	0.1564	0.0420	2827.8
20	20637	0.1649	0.0495	2997.0
21	20611	0.1733	0.0558	3170.0
22	20583	0.1818	0.0611	3345.8
23	20482	0.1906	0.0700	3512.4
24	20412	0.1990	0.0816	3663.0
25	20327	0.2075	0.0883	3832.5
26	20128	0.2187	0.0981	4048.9
27	19875	0.2329	0.1100	4322.3
28	19409	0.2518	0.1277	4659.2
29	18864	0.2758	0.1537	5063.1
30	18403	0.3077	0.1748	5643.7

  WIDTH: 4.0082 (IN),101.810 (MM)
  THICKNESS: 2.0008 (IN),50.820 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9729 (IN),24.712 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6727 (IN),93.287 (MM)
    DISTANCE 2: 3.7128 (IN),94.305 (MM)
    DISTANCE 3: 3.7412 (IN),95.026 (MM)
    DISTANCE 4: 3.7579 (IN),95.451 (MM)
    DISTANCE 5: 3.7654 (IN),95.641 (MM)
    DISTANCE 6: 3.7658 (IN),95.651 (MM)
    DISTANCE 7: 3.7598 (IN),95.499 (MM)
    DISTANCE 8: 3.7414 (IN),95.032 (MM)
    DISTANCE 9: 3.7058 (IN),94.127 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9522 (IN),100.390 (MM)
    DISTANCE 2: 3.9323 (IN),99.880 (MM)
    DISTANCE 3: 3.8977 (IN),99.002 (MM)
    DISTANCE 4: 3.9095 (IN),99.301 (MM)
    DISTANCE 5: 3.9011 (IN),99.088 (MM)
    DISTANCE 6: 3.9247 (IN),99.687 (MM)
    DISTANCE 7: 3.9134 (IN),99.400 (MM)
    DISTANCE 8: 3.9309 (IN),99.845 (MM)
    DISTANCE 9: 3.9578 (IN),100.530 (MM)

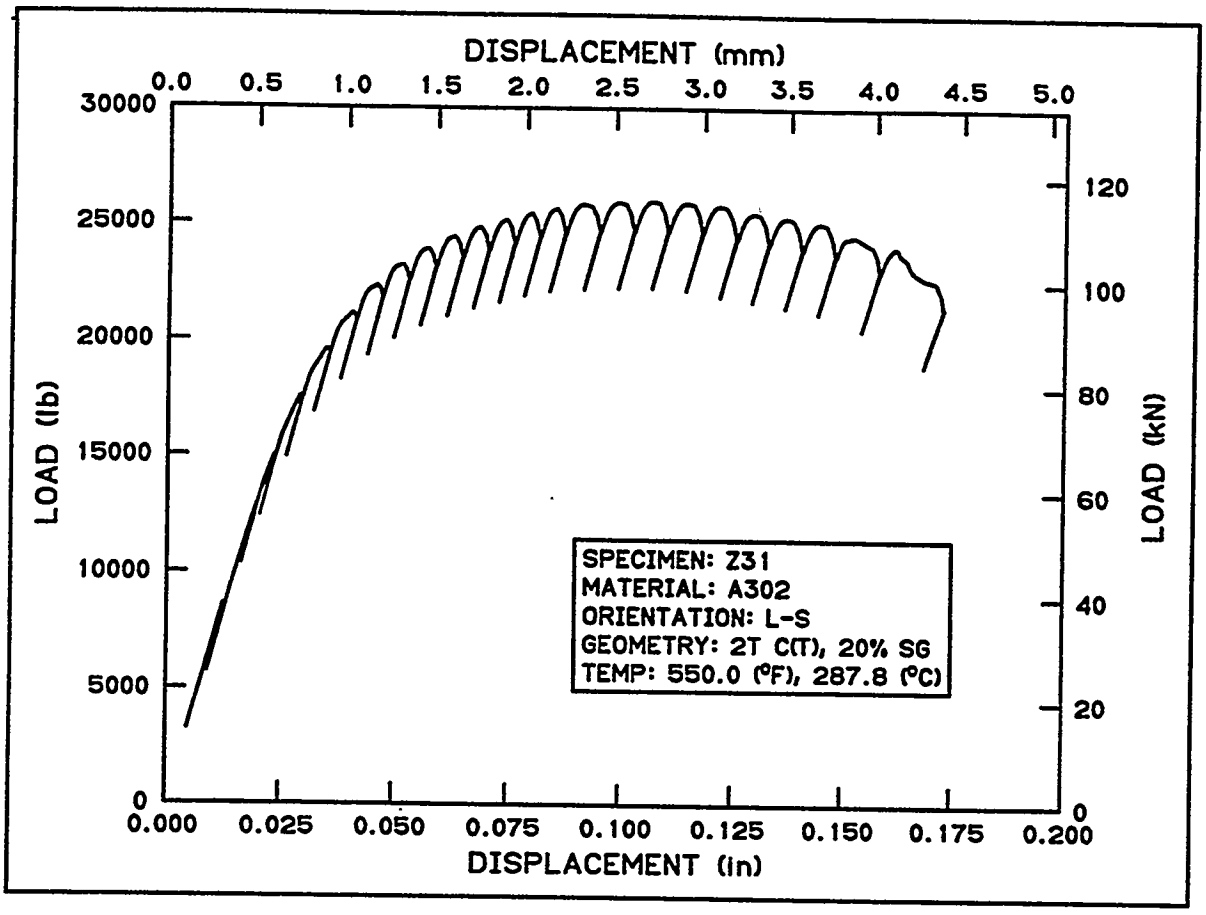

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
22500 20000 17500 15000 12500 10000 7500 5000 2500 0
LOAD (lb)
100 80 60 40 20 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z32
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

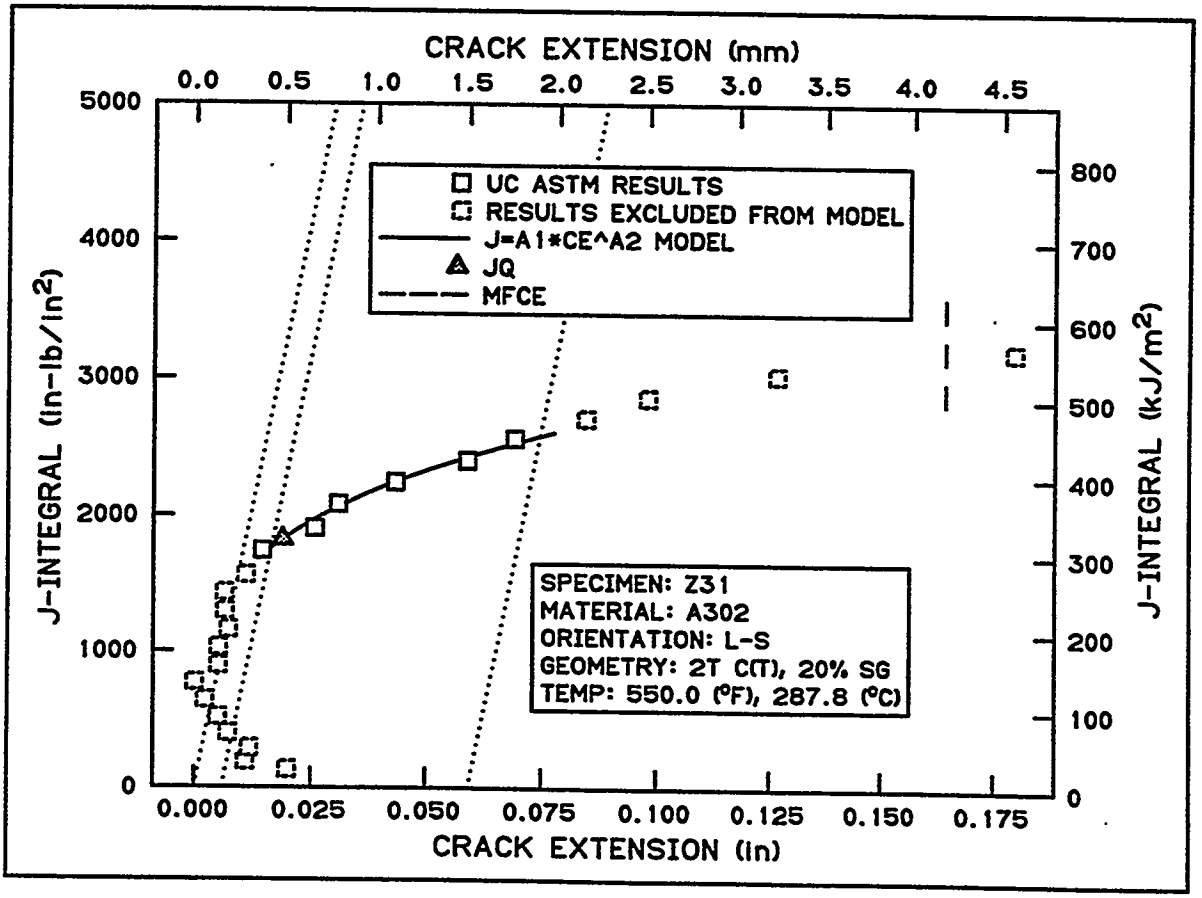

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z32
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z31
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6122 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	12840	0.0196	0.0199	133.5
2	14936	0.0233	0.0109	191.1
3	17557	0.0290	0.0118	286.5
4	19592	0.0346	0.0072	397.0
5	21146	0.0403	0.0050	514.5
6	22303	0.0458	0.0022	640.6
7	23183	0.0516	0.0000	770.1
8	23875	0.0572	0.0051	896.2
9	24391	0.0630	0.0051	1030.6
10	24819	0.0685	0.0072	1162.2
11	25128	0.0743	0.0065	1298.3
12	25434	0.0799	0.0064	1434.0
13	25639	0.0855	0.0110	1564.5
14	25741	0.0931	0.0146	1743.4
15	25844	0.1007	0.0258	1910.8
16	25904	0.1082	0.0309	2088.1
17	25832	0.1158	0.0434	2250.7
18	25694	0.1232	0.0588	2407.7
19	25384	0.1308	0.0691	2566.6
20	25162	0.1384	0.0846	2714.1
21	24957	0.1459	0.0981	2865.1
22	24049	0.1565	0.1266	3031.2
23	22510	0.1711	0.1796	3211.4

  WIDTH: 4.0075 (IN),101.790 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9815 (IN),24.930 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4478 (IN),87.574 (MM)
    DISTANCE 2: 3.5184 (IN),89.367 (MM)
    DISTANCE 3: 3.5729 (IN),90.752 (MM)
    DISTANCE 4: 3.6128 (IN),91.765 (MM)
    DISTANCE 5: 3.6360 (IN),92.354 (MM)
    DISTANCE 6: 3.6444 (IN),92.568 (MM)
    DISTANCE 7: 3.6377 (IN),92.398 (MM)
    DISTANCE 8: 3.6075 (IN),91.631 (MM)
    DISTANCE 9: 3.5925 (IN),91.249 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6924 (IN),93.787 (MM)
    DISTANCE 2: 3.6878 (IN),93.670 (MM)
    DISTANCE 3: 3.7619 (IN),95.552 (MM)
    DISTANCE 4: 3.7651 (IN),95.634 (MM)
    DISTANCE 5: 3.7526 (IN),95.316 (MM)
    DISTANCE 6: 3.7796 (IN),96.002 (MM)
    DISTANCE 7: 3.7738 (IN),95.855 (MM)
    DISTANCE 8: 3.8022 (IN),96.576 (MM)
    DISTANCE 9: 3.7923 (IN),96.324 (MM)

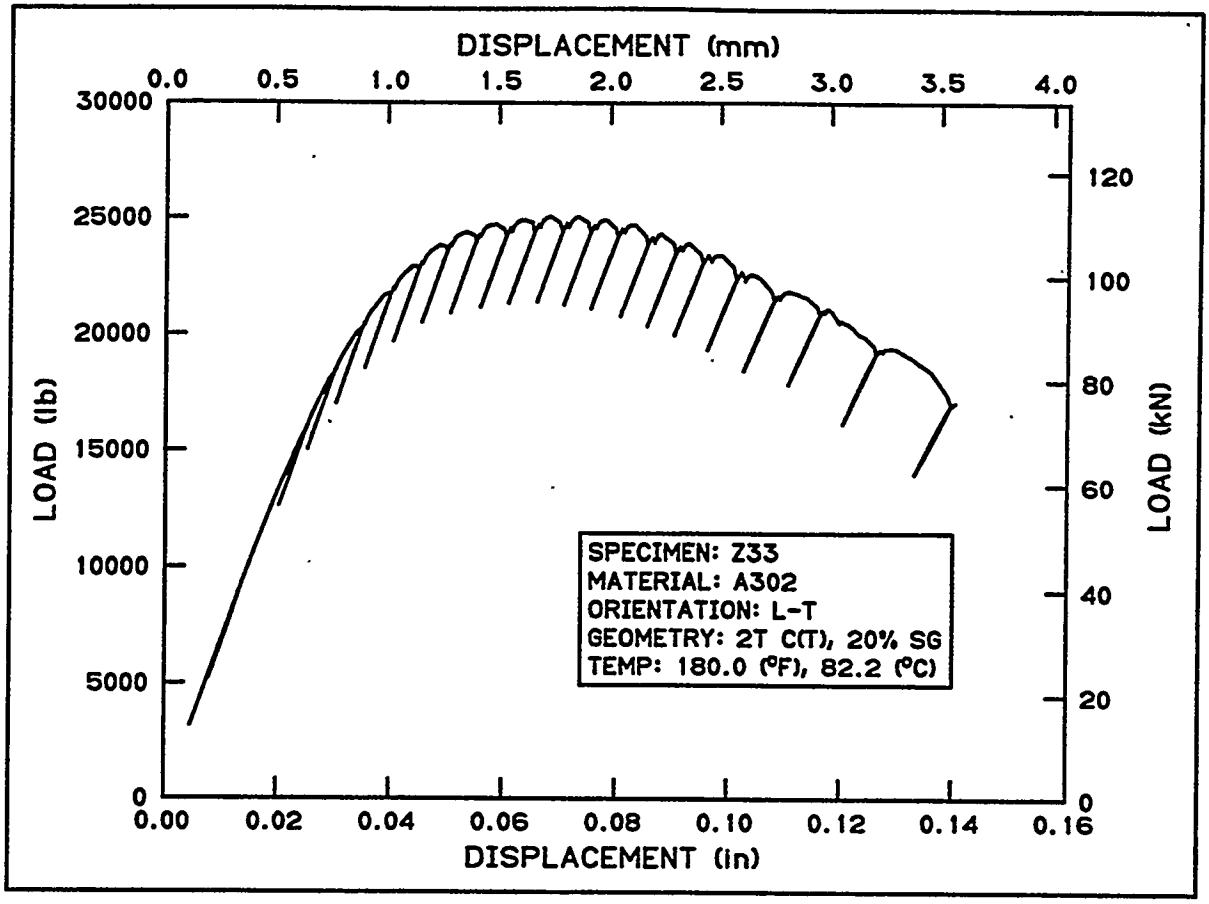

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
30000 25000 20000 15000 10000 5000 0
LOAD (lb)
120 100 80 60 40 20 0
LOAD (kN)
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

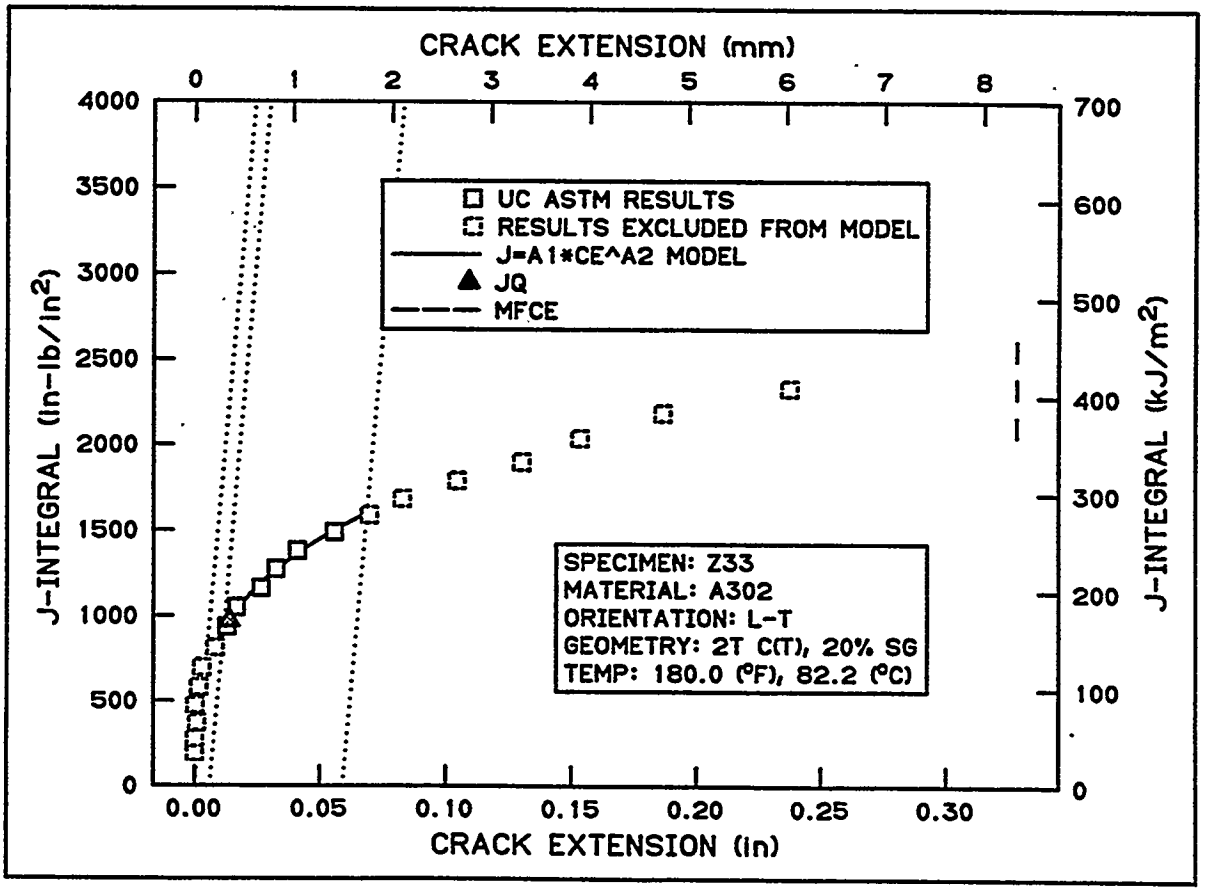

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z33
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6037 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15504	0.0242	0.0000	195.5
2	18034	0.0292	0.0000	277.9
3	20058	0.0340	0.0008	371.7
4	21657	0.0389	0.0002	474.6
5	22907	0.0438	0.0016	582.4
6	23821	0.0486	0.0028	697.0
7	24390	0.0534	0.0080	811.9
8	24729	0.0586	0.0127	935.2
9	24921	0.0635	0.0166	1050.5
10	25047	0.0683	0.0266	1162.3
11	25064	0.0731	0.0326	1274.3
12	24927	0.0781	0.0411	1382.2
13	24708	0.0832	0.0558	1490.7
14	24335	0.0877	0.0698	1590.1
15	23919	0.0928	0.0827	1686.5
16	23389	0.0988	0.1045	1792.4
17	22401	0.1057	0.1301	1900.4
18	21595	0.1139	0.1533	2038.5
19	19869	0.1243	0.1865	2187.4
20	18394	0.1360	0.2375	2333.8

  WIDTH: 3.9928 (IN),101.420 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9948 (IN),25.268 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5035 (IN),88.989 (MM)
    DISTANCE 2: 3.5750 (IN),90.805 (MM)
    DISTANCE 3: 3.6040 (IN),91.542 (MM)
    DISTANCE 4: 3.6276 (IN),92.141 (MM)
    DISTANCE 5: 3.6356 (IN),92.344 (MM)
    DISTANCE 6: 3.6326 (IN),92.268 (MM)
    DISTANCE 7: 3.6176 (IN),91.887 (MM)
    DISTANCE 8: 3.5828 (IN),91.003 (MM)
    DISTANCE 9: 3.5223 (IN),89.466 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9532 (IN),100.410 (MM)
    DISTANCE 2: 4.0463 (IN),102.780 (MM)
    DISTANCE 3: 3.9496 (IN),100.320 (MM)
    DISTANCE 4: 3.8948 (IN),98.928 (MM)
    DISTANCE 5: 3.8580 (IN),97.993 (MM)
    DISTANCE 6: 3.8728 (IN),98.369 (MM)
    DISTANCE 7: 3.8900 (IN),98.806 (MM)
    DISTANCE 8: 3.9582 (IN),100.540 (MM)
    DISTANCE 9: 3.9282 (IN),99.776 (MM)

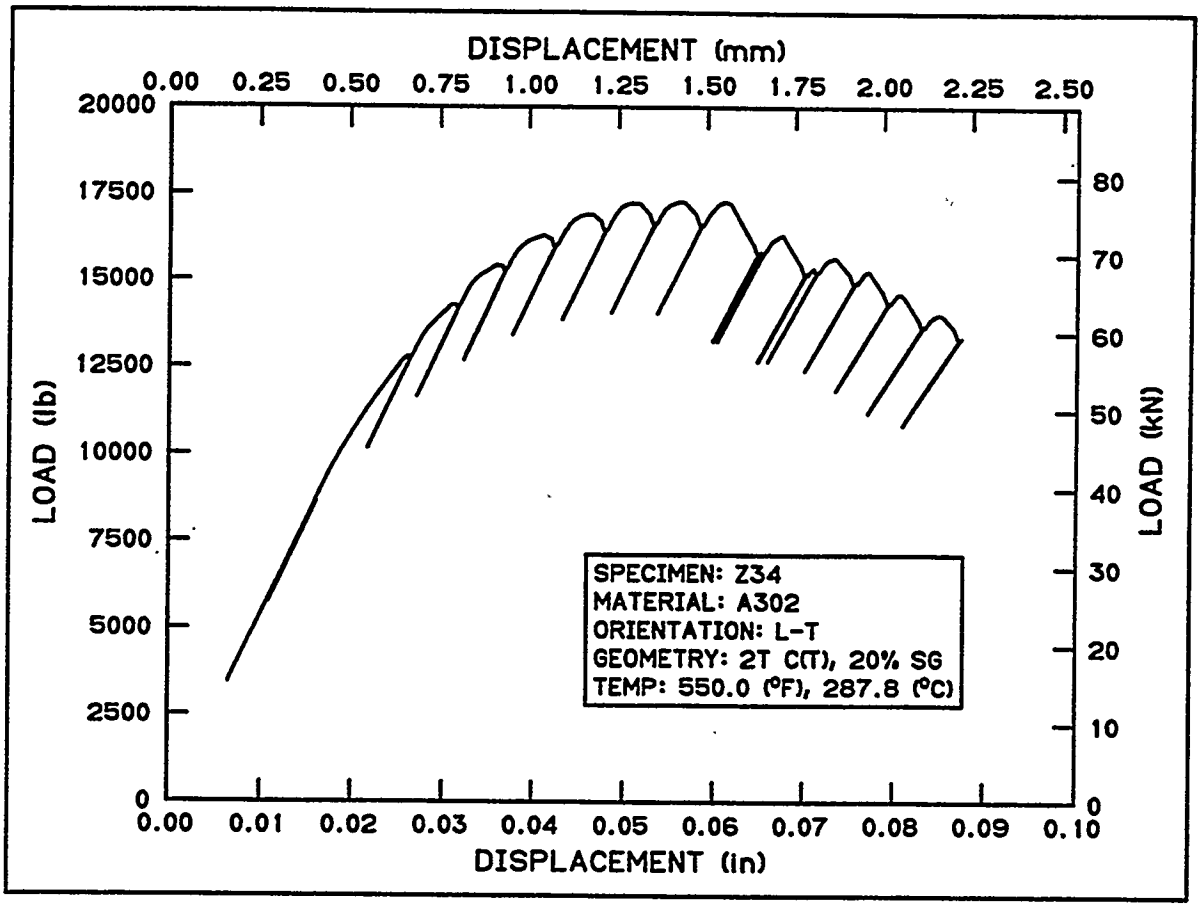

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
30000 25000 20000 15000 10000 5000 0
LOAD (lb)
120 100 80 60 40 20 0
LOAD (kN)
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
DISPLACEMENT (in)

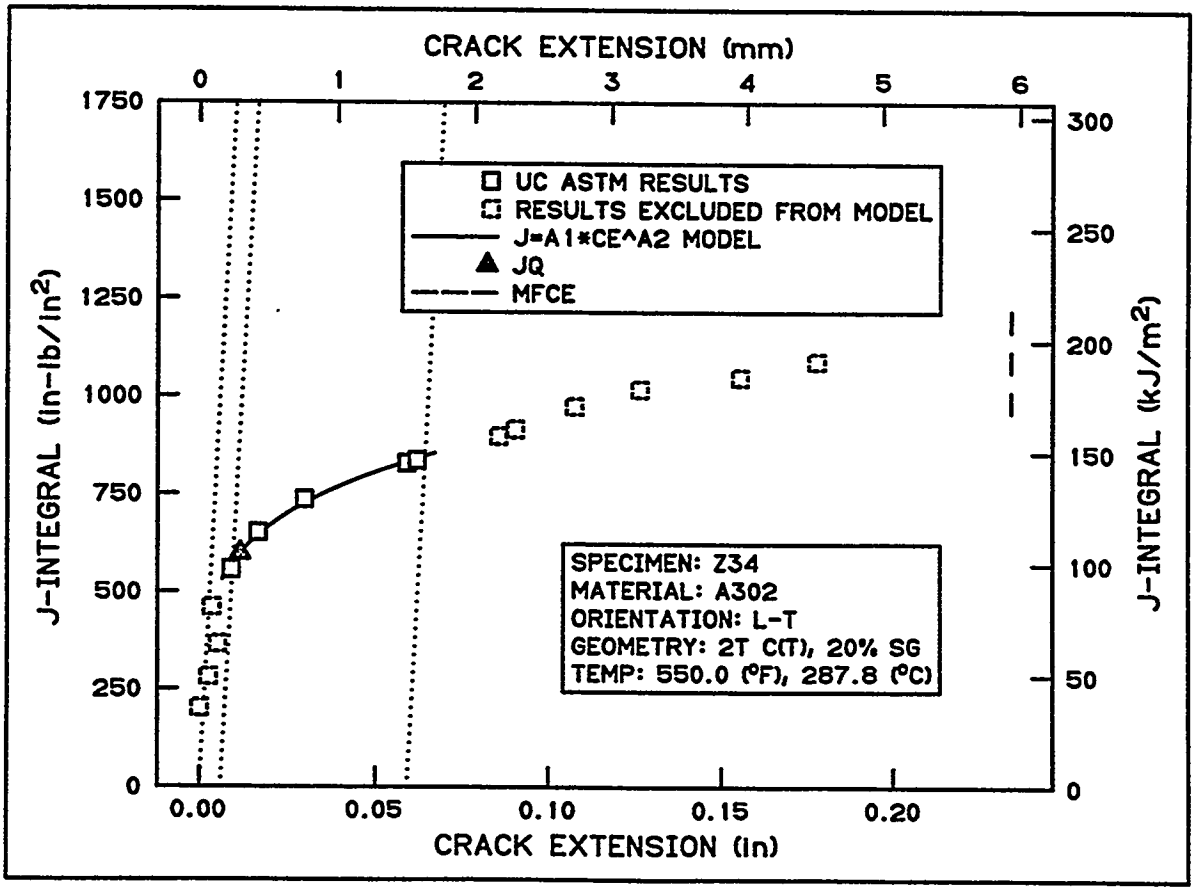

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8
4000 3500 3000 2500 2000 1500 1000 500 0
J-INTEGRAL (in-lb/in²)
700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z33
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z34
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.7770 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	12686	0.0255	0.0000	202.2
2	14258	0.0307	0.0025	281.7
3	15423	0.0358	0.0051	366.3
4	16296	0.0410	0.0034	460.8
5	16908	0.0463	0.0089	556.4
6	17224	0.0516	0.0167	651.5
7	17241	0.0566	0.0300	737.3
8	17221	0.0617	0.0590	829.5
9	15776	0.0650	0.0619	837.3
10	16308	0.0675	0.0857	898.3
11	15254	0.0705	0.0905	915.7
12	15655	0.0735	0.1074	973.6
13	15248	0.0772	0.1264	1017.9
14	14510	0.0811	0.1555	1048.2
15	13988	0.0854	0.1778	1090.0

  WIDTH: 4.0068 (IN),101.770 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9926 (IN),25.212 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6837 (IN),93.566 (MM)
    DISTANCE 2: 3.7054 (IN),94.117 (MM)
    DISTANCE 3: 3.7342 (IN),94.849 (MM)
    DISTANCE 4: 3.7608 (IN),95.524 (MM)
    DISTANCE 5: 3.7639 (IN),95.603 (MM)
    DISTANCE 6: 3.7894 (IN),96.251 (MM)
    DISTANCE 7: 3.8046 (IN),96.637 (MM)
    DISTANCE 8: 3.8356 (IN),97.424 (MM)
    DISTANCE 9: 3.8428 (IN),97.607 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9618 (IN),100.630 (MM)
    DISTANCE 2: 3.8798 (IN),98.547 (MM)
    DISTANCE 3: 3.9158 (IN),99.461 (MM)
    DISTANCE 4: 3.9476 (IN),100.270 (MM)
    DISTANCE 5: 3.9699 (IN),100.840 (MM)
    DISTANCE 6: 3.9874 (IN),101.280 (MM)
    DISTANCE 7: 4.0726 (IN),103.440 (MM)
    DISTANCE 8: 4.1750 (IN),106.050 (MM)
    DISTANCE 9: 4.1972 (IN),106.610 (MM)

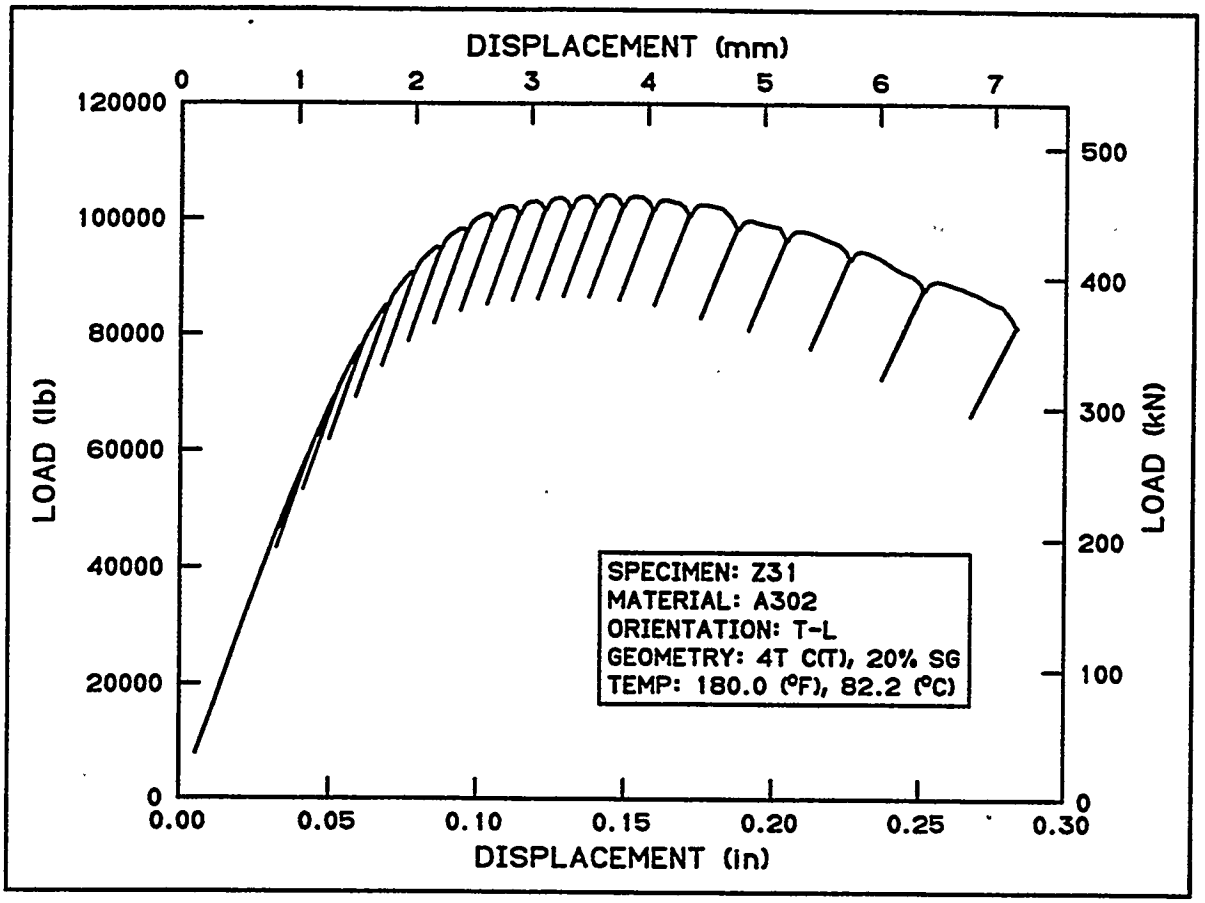

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
20000 17500 15000 12500 10000 7500 5000 2500 0
LOAD (kN)
80 70 60 50 40 30 20 10 0
SPECIMEN: Z34
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

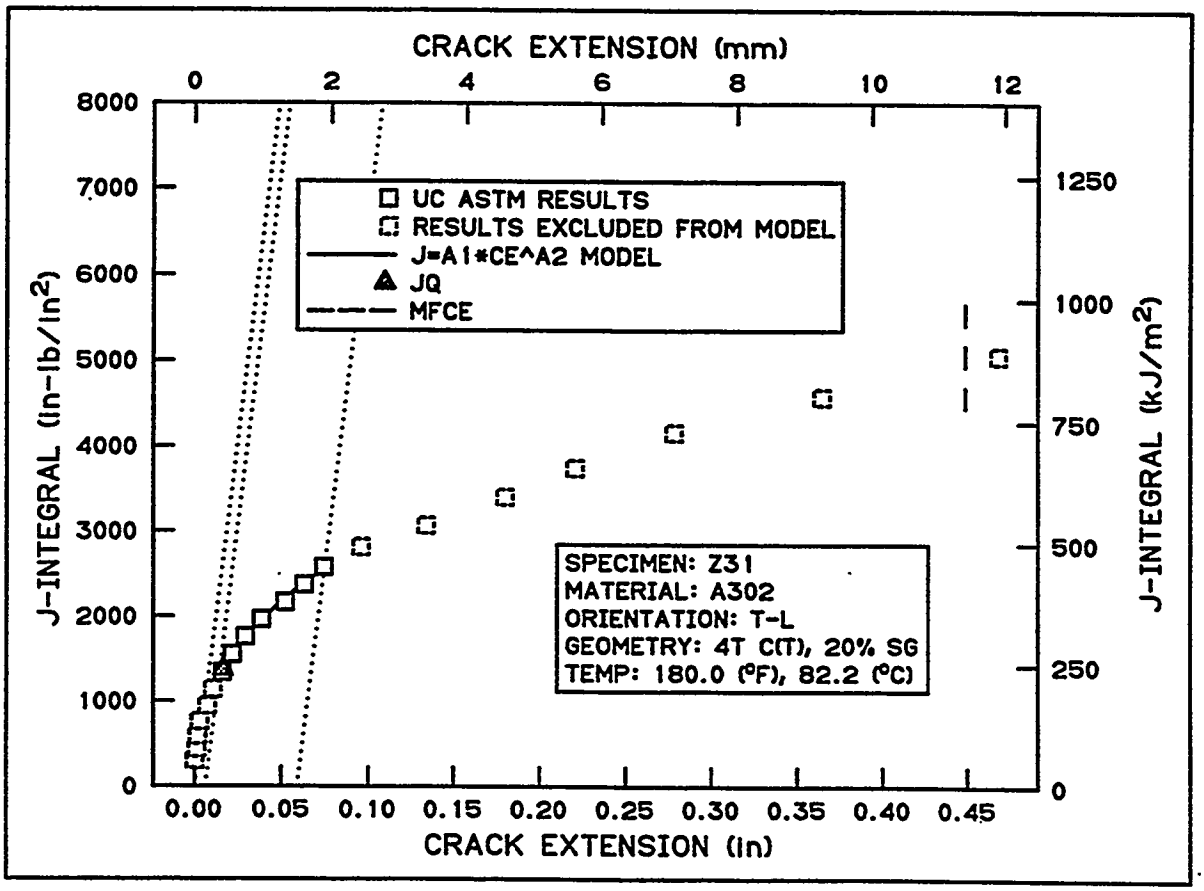

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
J-INTEGRAL (in-lb/in²)
1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z34
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.05 0.10 0.15 0.20
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z31
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 5.1531 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	58864	0.0425	0.0001	308.3
2	68843	0.0511	0.0013	440.8
3	77632	0.0597	0.0018	593.2
4	84854	0.0683	0.0029	762.8
5	90510	0.0768	0.0073	944.8
6	95051	0.0856	0.0105	1141.8
7	98320	0.0940	0.0159	1341.4
8	100881	0.1026	0.0217	1550.6
9	102236	0.1112	0.0293	1760.7
10	103087	0.1196	0.0387	1966.8
11	103622	0.1284	0.0523	2169.5
12	103961	0.1370	0.0632	2373.4
13	104149	0.1456	0.0744	2580.5
14	103855	0.1557	0.0958	2814.8
15	102839	0.1682	0.1340	3069.5
16	101935	0.1828	0.1797	3403.3
17	98787	0.2007	0.2206	3743.7
18	95654	0.2222	0.2782	4161.2
19	90239	0.2475	0.3643	4579.3
20	85088	0.2784	0.4684	5060.0

  WIDTH: 8.0000 (IN),203.200 (MM)
  THICKNESS: 4.0000 (IN),101.600 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0000 (IN),50.800 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.0200 (IN),178.310 (MM)
    DISTANCE 2: 7.1400 (IN),181.360 (MM)
    DISTANCE 3: 7.1800 (IN),182.370 (MM)
    DISTANCE 4: 7.2000 (IN),182.880 (MM)
    DISTANCE 5: 7.2000 (IN),182.880 (MM)
    DISTANCE 6: 7.2000 (IN),182.880 (MM)
    DISTANCE 7: 7.1700 (IN),182.120 (MM)
    DISTANCE 8: 7.1100 (IN),180.590 (MM)
    DISTANCE 9: 7.0300 (IN),178.560 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.7280 (IN),196.290 (MM)
    DISTANCE 2: 7.5630 (IN),192.100 (MM)
    DISTANCE 3: 7.5846 (IN),192.650 (MM)
    DISTANCE 4: 7.5763 (IN),192.440 (MM)
    DISTANCE 5: 7.5308 (IN),191.280 (MM)
    DISTANCE 6: 7.5932 (IN),192.870 (MM)
    DISTANCE 7: 7.6022 (IN),193.100 (MM)
    DISTANCE 8: 7.6573 (IN),194.500 (MM)
    DISTANCE 9: 7.6830 (IN),195.150 (MM)

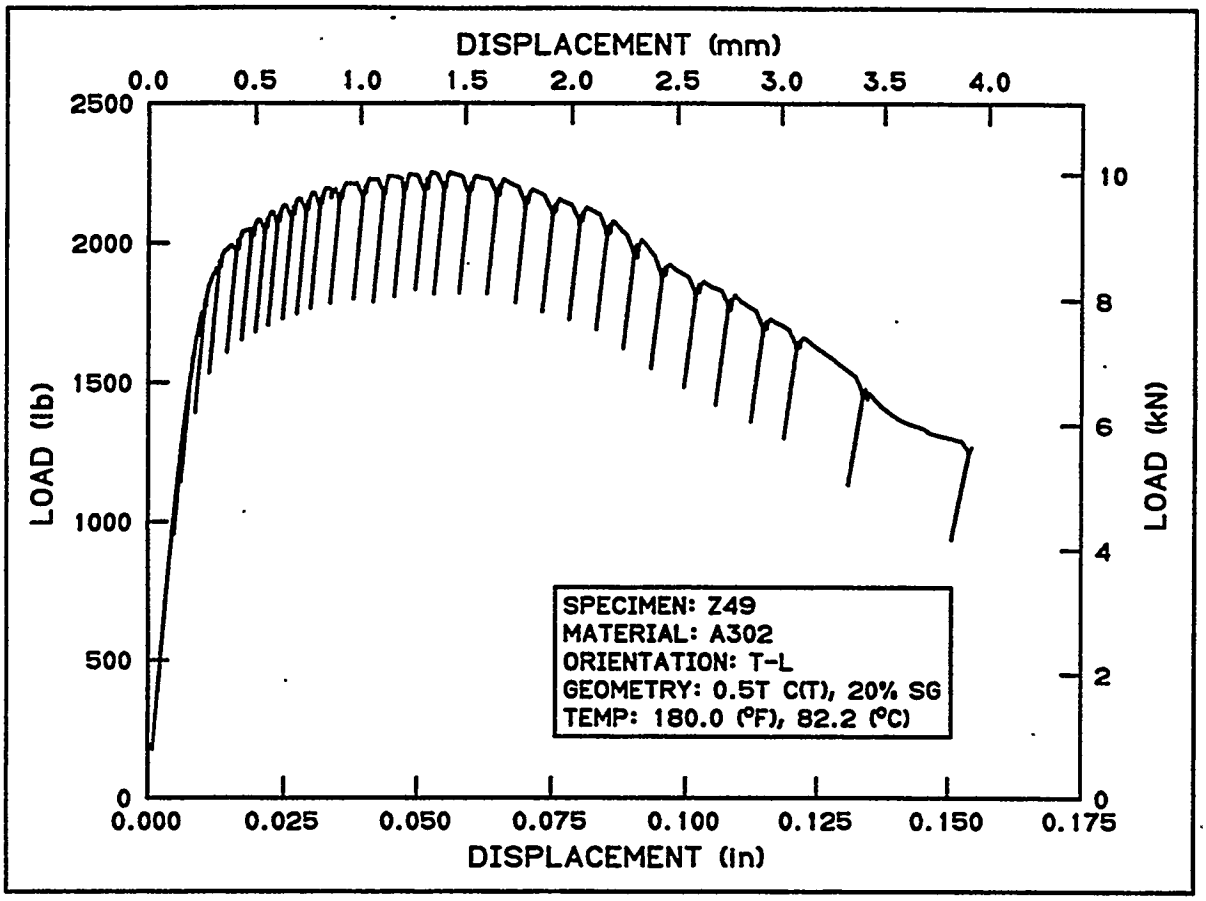

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
120000
100000
80000
60000
40000
20000
0
500
400
300
200
100
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

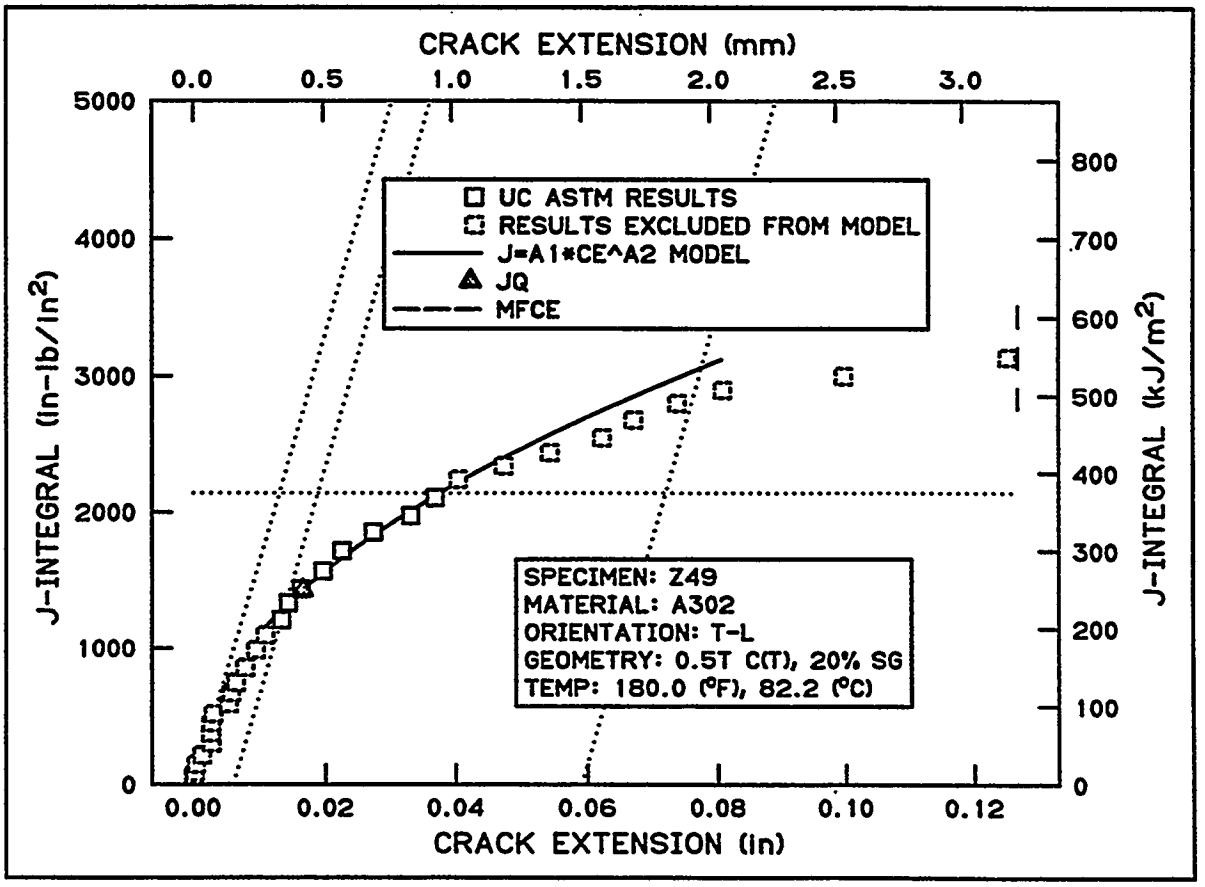

CRACK EXTENSION (mm)
0
2
4
6
8
10
12
8000
7000
6000
5000
4000
3000
2000
1000
0
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z31
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z49
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6108 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1263	0.0062	0.0000	61.6
2	1466	0.0074	0.0002	86.3
3	1753	0.0100	0.0004	146.2
4	1909	0.0126	0.0013	213.8
5	1992	0.0153	0.0027	300.5
6	2043	0.0177	0.0026	374.9
7	2081	0.0204	0.0027	447.8
8	2108	0.0230	0.0030	514.2
9	2132	0.0253	0.0053	589.6
10	2156	0.0280	0.0057	669.3
11	2176	0.0307	0.0063	745.7
12	2192	0.0346	0.0077	855.2
13	2213	0.0386	0.0093	985.3
14	2228	0.0425	0.0108	1095.7
15	2237	0.0462	0.0132	1207.6
16	2243	0.0500	0.0143	1330.4
17	2248	0.0536	0.0163	1432.6
18	2239	0.0584	0.0196	1566.2
19	2226	0.0636	0.0225	1714.1
20	2201	0.0688	0.0273	1852.0
21	2169	0.0736	0.0331	1973.2
22	2136	0.0786	0.0368	2106.4
23	2102	0.0839	0.0404	2238.8
24	2027	0.0890	0.0473	2338.3
25	1954	0.0941	0.0543	2434.4
26	1878	0.1004	0.0622	2544.6
27	1830	0.1067	0.0670	2677.3
28	1758	0.1133	0.0737	2799.7
29	1689	0.1195	0.0807	2897.4
30	1521	0.1324	0.0997	2998.5
31	1290	0.1525	0.1251	3133.9

WIDTH: 0.9996 (IN),25.390 (MM)
THICKNESS: 0.5000 (IN),12.700 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2500 (IN),6.350 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8475 (IN),21.527 (MM)
DISTANCE 2: 0.8536 (IN),21.681 (MM)
DISTANCE 3: 0.8582 (IN),21.798 (MM)
DISTANCE 4: 0.8639 (IN),21.943 (MM)
DISTANCE 5: 0.8651 (IN),21.974 (MM)
DISTANCE 6: 0.8662 (IN),22.001 (MM)
DISTANCE 7: 0.8657 (IN),21.989 (MM)
DISTANCE 8: 0.8623 (IN),21.902 (MM)
DISTANCE 9: 0.8546 (IN),21.707 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9862 (IN),25.049 (MM)
DISTANCE 2: 0.9898 (IN),25.141 (MM)
DISTANCE 3: 0.9902 (IN),25.151 (MM)
DISTANCE 4: 0.9906 (IN),25.161 (MM)
DISTANCE 5: 0.9956 (IN),25.288 (MM)
DISTANCE 6: 0.9994 (IN),25.385 (MM)
DISTANCE 7: 0.9789 (IN),24.864 (MM)
DISTANCE 8: 0.9808 (IN),24.912 (MM)
DISTANCE 9: 0.9614 (IN),24.420 (MM)

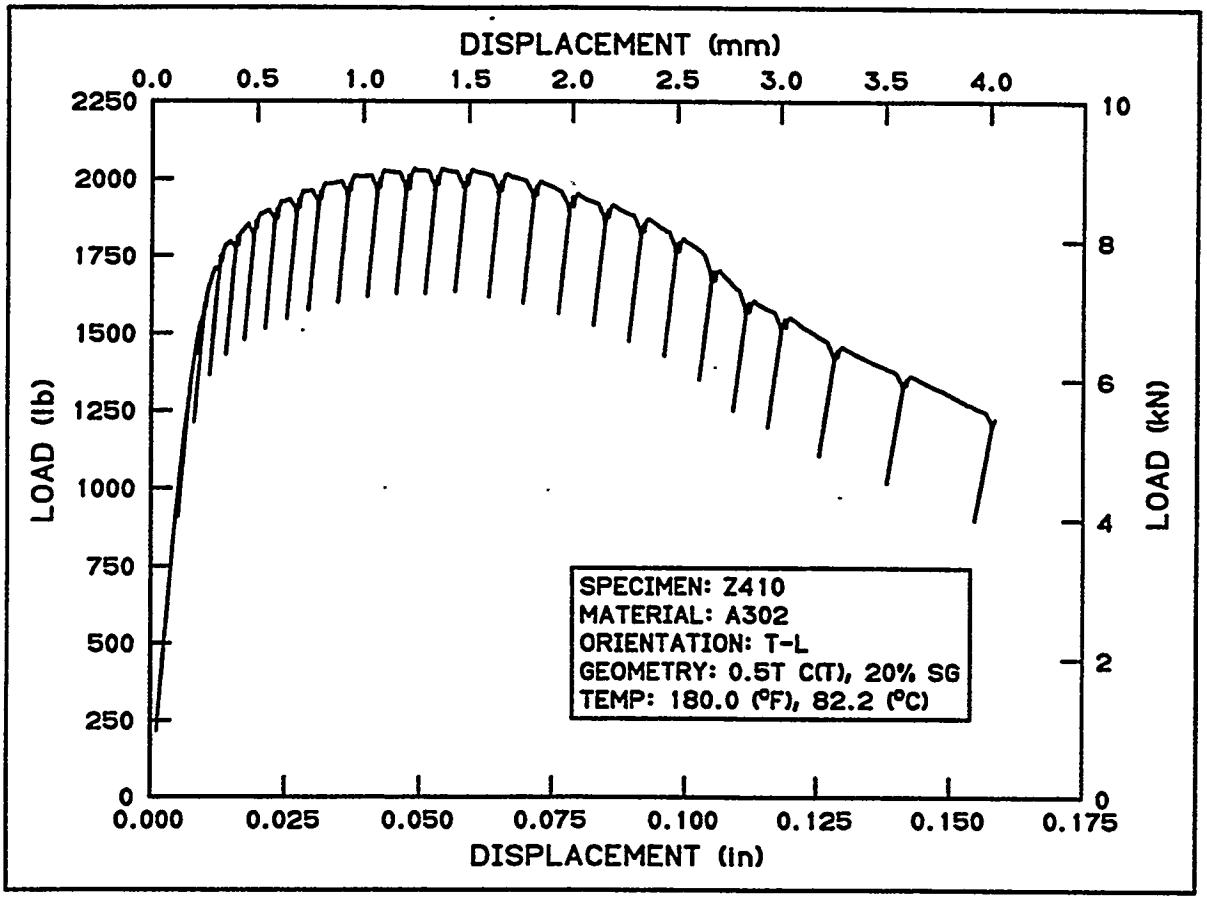

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2500
2000
1500
1000
500
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z49
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

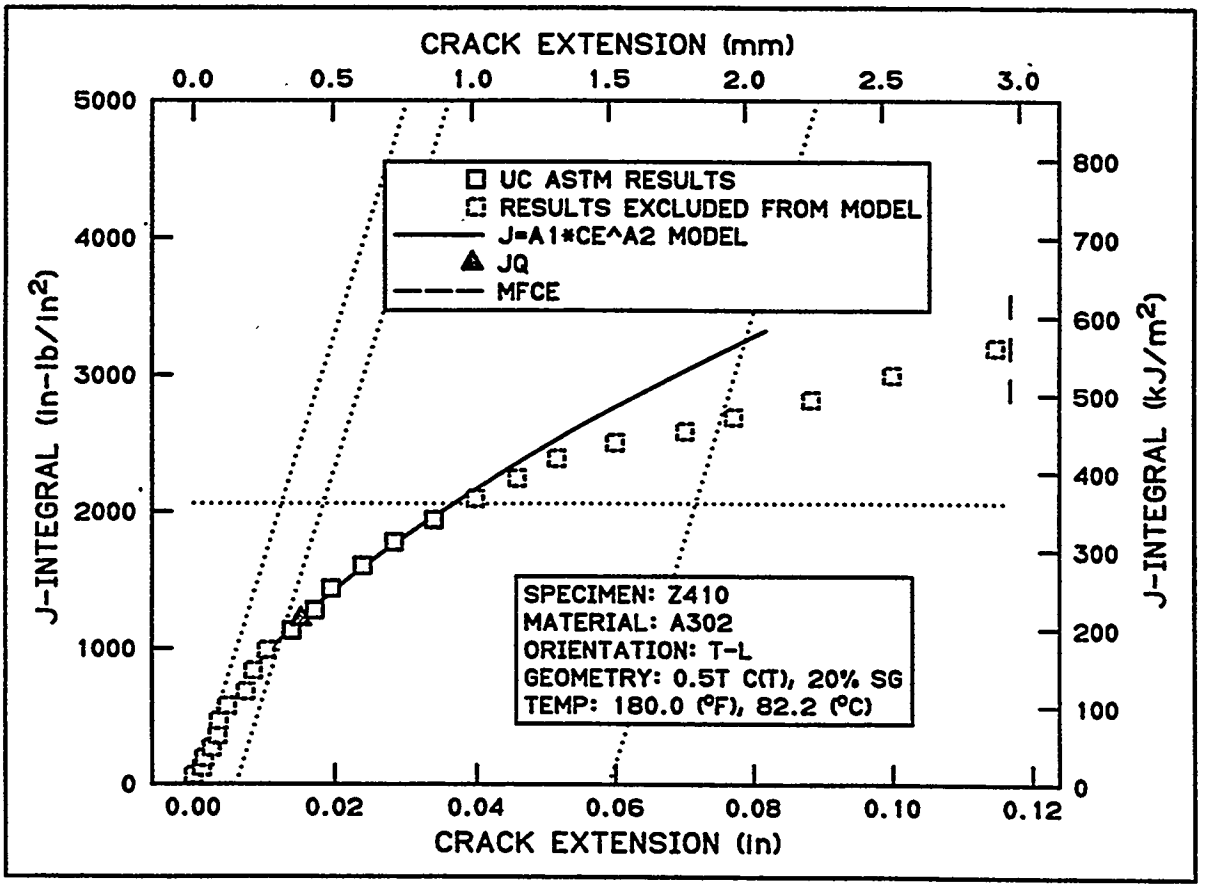

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z49
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z410
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6250 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1190	0.0063	0.0000	64.9
2	1528	0.0091	0.0012	124.5
3	1708	0.0118	0.0015	193.3
4	1796	0.0145	0.0025	268.8
5	1852	0.0179	0.0033	359.1
6	1897	0.0218	0.0035	464.8
7	1933	0.0257	0.0047	575.1
8	1961	0.0298	0.0073	682.6
9	1991	0.0353	0.0084	835.3
10	2011	0.0408	0.0103	988.3
11	2020	0.0461	0.0139	1132.5
12	2023	0.0515	0.0171	1279.5
13	2022	0.0567	0.0195	1436.6
14	2010	0.0634	0.0239	1603.2
15	1995	0.0698	0.0283	1776.0
16	1958	0.0765	0.0339	1941.2
17	1919	0.0835	0.0398	2096.7
18	1880	0.0901	0.0459	2245.0
19	1827	0.0968	0.0516	2389.7
20	1753	0.1035	0.0600	2504.7
21	1640	0.1101	0.0699	2584.6
22	1570	0.1170	0.0770	2690.3
23	1476	0.1268	0.0883	2820.0
24	1374	0.1398	0.0999	3002.9
25	1248	0.1567	0.1147	3203.2

  WIDTH: 0.9997 (IN),25.392 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2498 (IN),6.345 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8506 (IN),21.605 (MM)
    DISTANCE 2: 0.8644 (IN),21.956 (MM)
    DISTANCE 3: 0.8735 (IN),22.187 (MM)
    DISTANCE 4: 0.8829 (IN),22.426 (MM)
    DISTANCE 5: 0.8837 (IN),22.446 (MM)
    DISTANCE 6: 0.8850 (IN),22.479 (MM)
    DISTANCE 7: 0.8802 (IN),22.357 (MM)
    DISTANCE 8: 0.8719 (IN),22.146 (MM)
    DISTANCE 9: 0.8627 (IN),21.913 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9942 (IN),25.253 (MM)
    DISTANCE 2: 0.9958 (IN),25.293 (MM)
    DISTANCE 3: 0.9848 (IN),25.014 (MM)
    DISTANCE 4: 0.9904 (IN),25.156 (MM)
    DISTANCE 5: 0.9884 (IN),25.105 (MM)
    DISTANCE 6: 0.9858 (IN),25.039 (MM)
    DISTANCE 7: 0.9938 (IN),25.243 (MM)
    DISTANCE 8: 1.0018 (IN),25.446 (MM)
    DISTANCE 9: 0.9896 (IN),25.136 (MM)

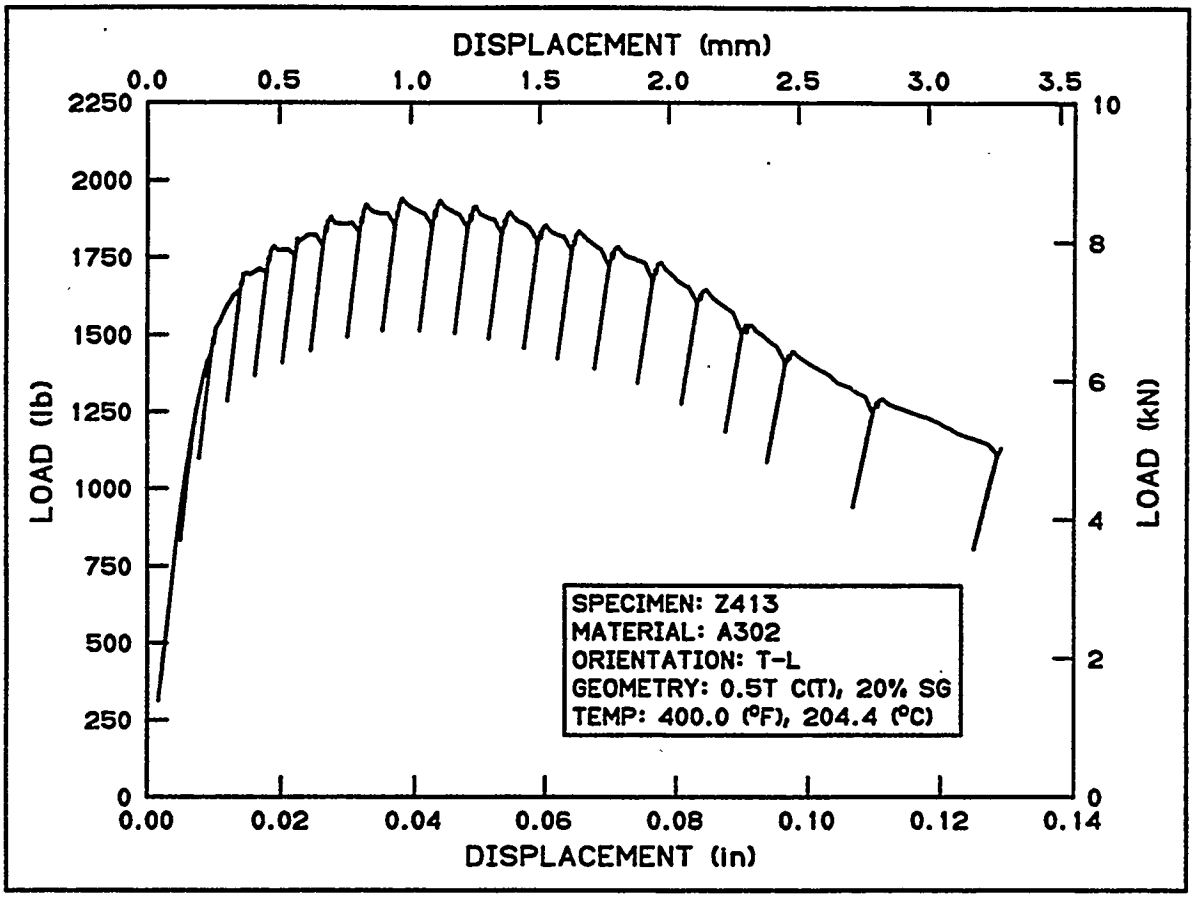

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z410
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

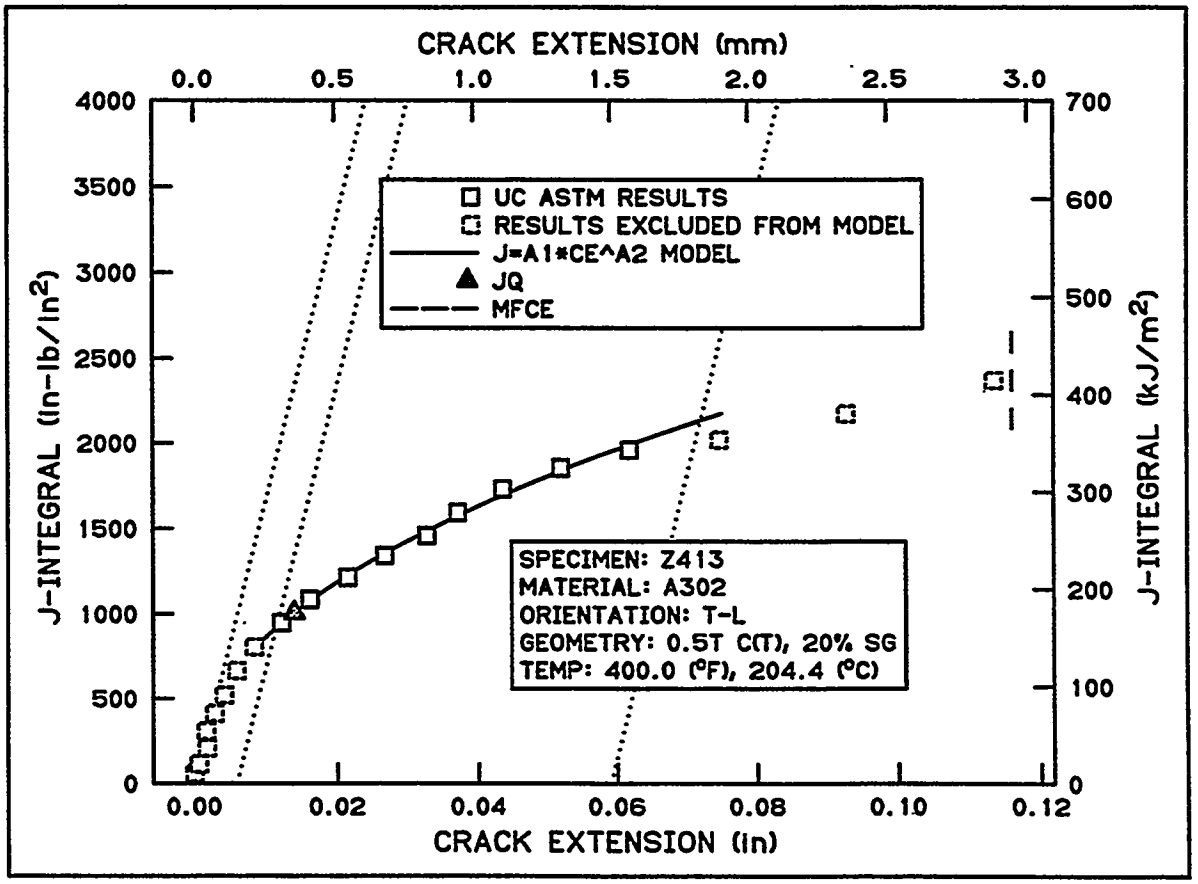

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z410
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z413
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6290 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1115	0.0063	0.0000	60.5
2	1413	0.0090	0.0006	113.9
3	1626	0.0129	0.0017	208.6
4	1713	0.0168	0.0016	308.6
5	1776	0.0210	0.0028	412.8
6	1823	0.0251	0.0042	520.7
7	1863	0.0305	0.0059	664.5
8	1893	0.0359	0.0084	805.2
9	1894	0.0414	0.0122	948.1
10	1890	0.0467	0.0161	1084.6
11	1873	0.0521	0.0215	1211.8
12	1848	0.0575	0.0267	1341.6
13	1817	0.0628	0.0327	1458.1
14	1775	0.0685	0.0370	1592.2
15	1732	0.0752	0.0436	1731.9
16	1656	0.0817	0.0520	1854.9
17	1570	0.0886	0.0618	1959.4
18	1463	0.0952	0.0746	2018.5
19	1298	0.1087	0.0927	2171.2
20	1144	0.1271	0.1135	2369.5

WIDTH: 1.0001 (IN),25.403 (MM)
THICKNESS: 0.5001 (IN),12.703 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2500 (IN),6.350 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8704 (IN),22.108 (MM)
DISTANCE 2: 0.8772 (IN),22.281 (MM)
DISTANCE 3: 0.8812 (IN),22.382 (MM)
DISTANCE 4: 0.8826 (IN),22.418 (MM)
DISTANCE 5: 0.8836 (IN),22.443 (MM)
DISTANCE 6: 0.8826 (IN),22.418 (MM)
DISTANCE 7: 0.8794 (IN),22.337 (MM)
DISTANCE 8: 0.8758 (IN),22.245 (MM)
DISTANCE 9: 0.8682 (IN),22.052 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9973 (IN),25.331 (MM)
DISTANCE 2: 1.0056 (IN),25.542 (MM)
DISTANCE 3: 0.9986 (IN),25.364 (MM)
DISTANCE 4: 0.9984 (IN),25.359 (MM)
DISTANCE 5: 0.9954 (IN),25.283 (MM)
DISTANCE 6: 0.9962 (IN),25.303 (MM)
DISTANCE 7: 0.9868 (IN),25.065 (MM)
DISTANCE 8: 0.9952 (IN),25.278 (MM)
DISTANCE 9: 0.9696 (IN),24.628 (MM)

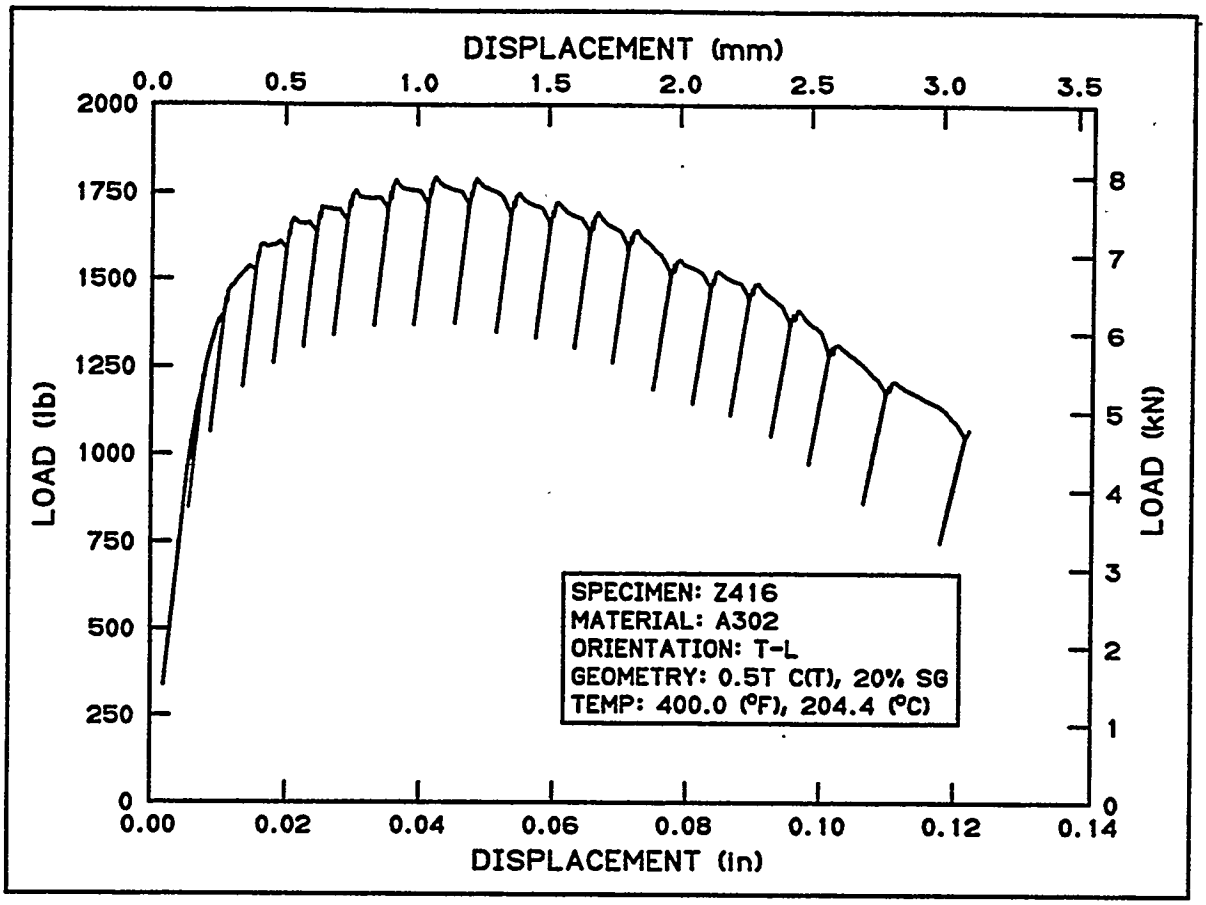

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z413
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

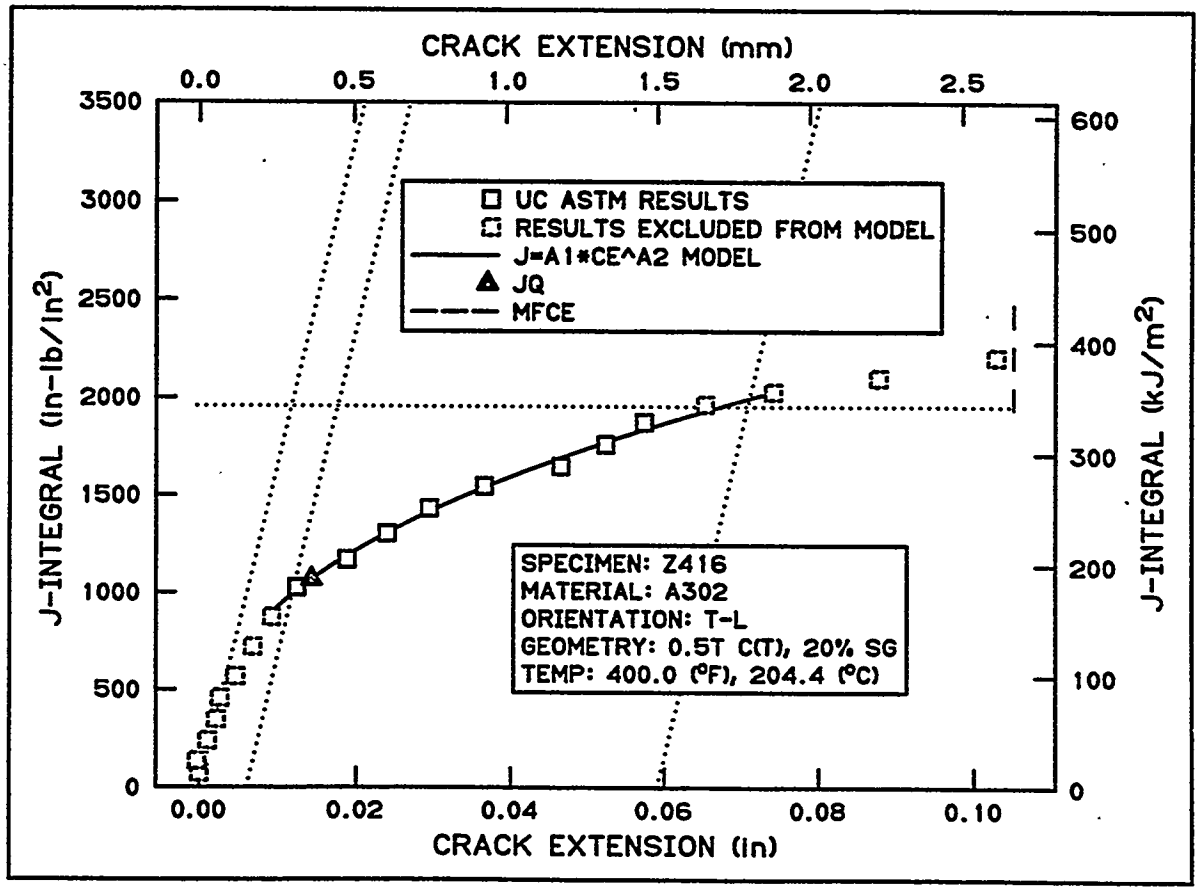

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z413
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z416
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6441 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1141	0.0070	0.0000	72.6
2	1380	0.0099	-0.0003	135.0
3	1536	0.0144	0.0011	238.0
4	1609	0.0189	0.0022	347.4
5	1663	0.0233	0.0026	457.7
6	1702	0.0277	0.0046	568.9
7	1734	0.0338	0.0068	721.9
8	1753	0.0398	0.0092	875.2
9	1753	0.0460	0.0125	1026.8
10	1738	0.0522	0.0189	1170.7
11	1705	0.0580	0.0240	1305.3
12	1676	0.0640	0.0295	1434.4
13	1637	0.0699	0.0366	1548.8
14	1572	0.0759	0.0465	1650.0
15	1517	0.0821	0.0524	1762.1
16	1487	0.0879	0.0574	1876.2
17	1423	0.0941	0.0652	1967.8
18	1348	0.1000	0.0741	2032.4
19	1217	0.1085	0.0877	2104.2
20	1093	0.1202	0.1028	2210.7

  WIDTH: 1.0000 (IN),25.400 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2496 (IN),6.340 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8844 (IN),22.464 (MM)
    DISTANCE 2: 0.8969 (IN),22.781 (MM)
    DISTANCE 3: 0.8988 (IN),22.830 (MM)
    DISTANCE 4: 0.9008 (IN),22.880 (MM)
    DISTANCE 5: 0.8989 (IN),22.832 (MM)
    DISTANCE 6: 0.8982 (IN),22.814 (MM)
    DISTANCE 7: 0.8934 (IN),22.692 (MM)
    DISTANCE 8: 0.8852 (IN),22.484 (MM)
    DISTANCE 9: 0.8710 (IN),22.123 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9831 (IN),24.971 (MM)
    DISTANCE 2: 1.0086 (IN),25.618 (MM)
    DISTANCE 3: 0.9960 (IN),25.298 (MM)
    DISTANCE 4: 0.9976 (IN),25.339 (MM)
    DISTANCE 5: 0.9978 (IN),25.344 (MM)
    DISTANCE 6: 0.9930 (IN),25.222 (MM)
    DISTANCE 7: 1.0040 (IN),25.502 (MM)
    DISTANCE 8: 1.0034 (IN),25.486 (MM)
    DISTANCE 9: 0.9952 (IN),25.278 (MM)

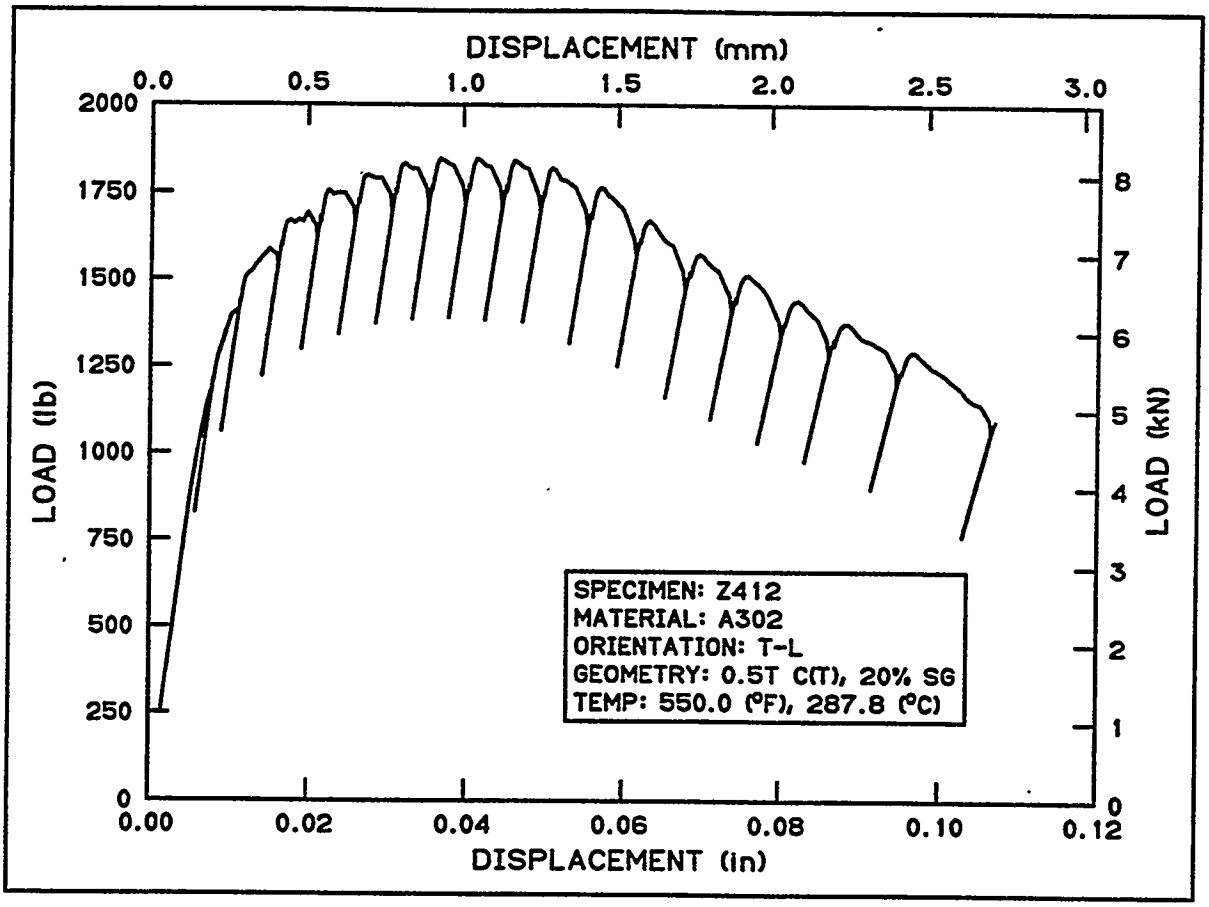

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z416
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

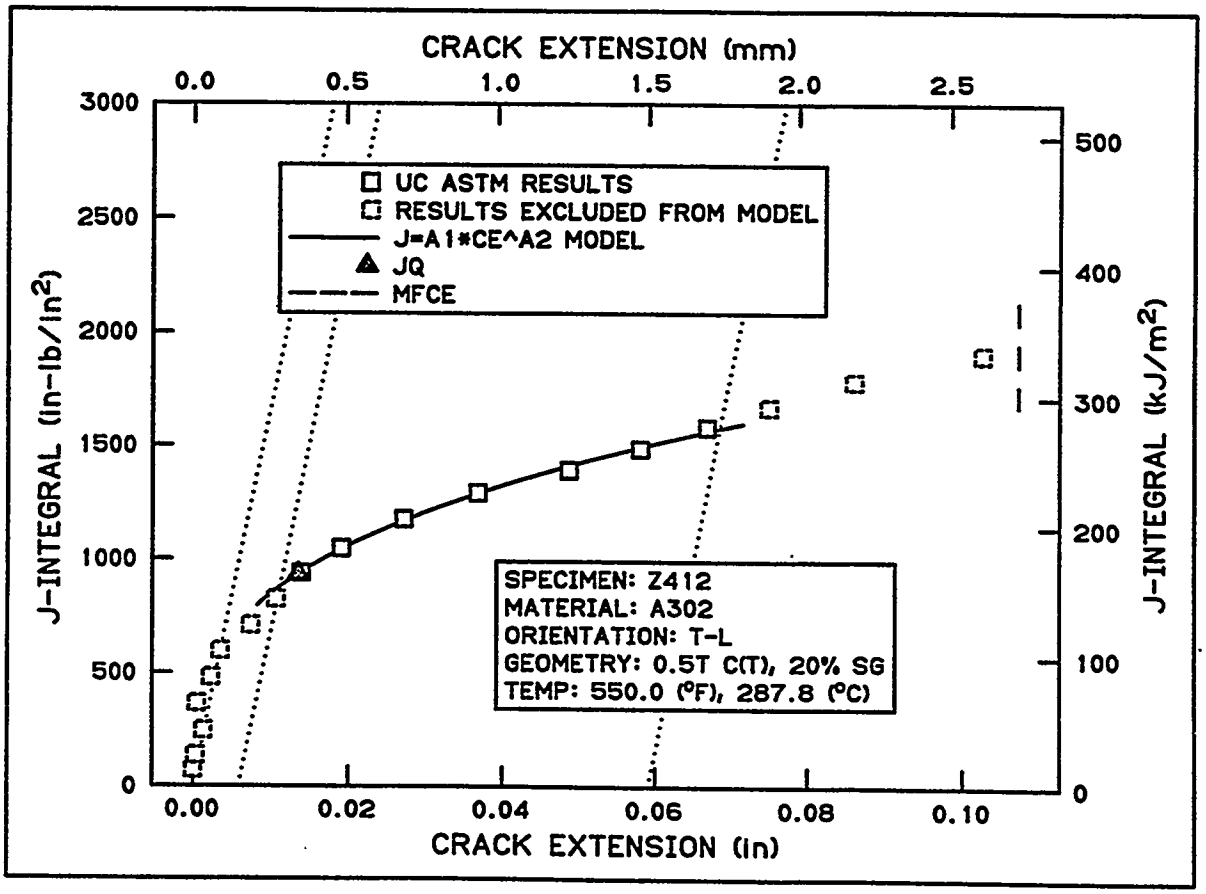

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z416
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z412
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6389 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1142	0.0073	0.0000	73.2
2	1396	0.0103	0.0003	136.3
3	1586	0.0149	0.0013	246.8
4	1691	0.0197	0.0005	365.1
5	1747	0.0244	0.0023	481.2
6	1791	0.0289	0.0036	598.0
7	1818	0.0335	0.0074	710.9
8	1826	0.0381	0.0106	824.9
9	1824	0.0428	0.0139	939.1
10	1817	0.0475	0.0191	1048.7
11	1766	0.0535	0.0271	1177.2
12	1700	0.0598	0.0368	1294.3
13	1599	0.0661	0.0486	1392.1
14	1528	0.0720	0.0580	1486.5
15	1455	0.0783	0.0668	1582.5
16	1389	0.0845	0.0750	1670.9
17	1299	0.0931	0.0859	1786.3
18	1142	0.1052	0.1026	1905.8

WIDTH: 1.0000 (IN),25.400 (MM)
THICKNESS: 0.5000 (IN),12.700 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2503 (IN),6.358 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8708 (IN),22.118 (MM)
DISTANCE 2: 0.8815 (IN),22.390 (MM)
DISTANCE 3: 0.8906 (IN),22.621 (MM)
DISTANCE 4: 0.8954 (IN),22.743 (MM)
DISTANCE 5: 0.8962 (IN),22.763 (MM)
DISTANCE 6: 0.8964 (IN),22.769 (MM)
DISTANCE 7: 0.8922 (IN),22.662 (MM)
DISTANCE 8: 0.8866 (IN),22.520 (MM)
DISTANCE 9: 0.8792 (IN),22.332 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9966 (IN),25.314 (MM)
DISTANCE 2: 1.0033 (IN),25.484 (MM)
DISTANCE 3: 1.0032 (IN),25.481 (MM)
DISTANCE 4: 1.0006 (IN),25.415 (MM)
DISTANCE 5: 1.0048 (IN),25.522 (MM)
DISTANCE 6: 0.9988 (IN),25.370 (MM)
DISTANCE 7: 0.9882 (IN),25.100 (MM)
DISTANCE 8: 0.9792 (IN),24.872 (MM)
DISTANCE 9: 0.9911 (IN),25.174 (MM)

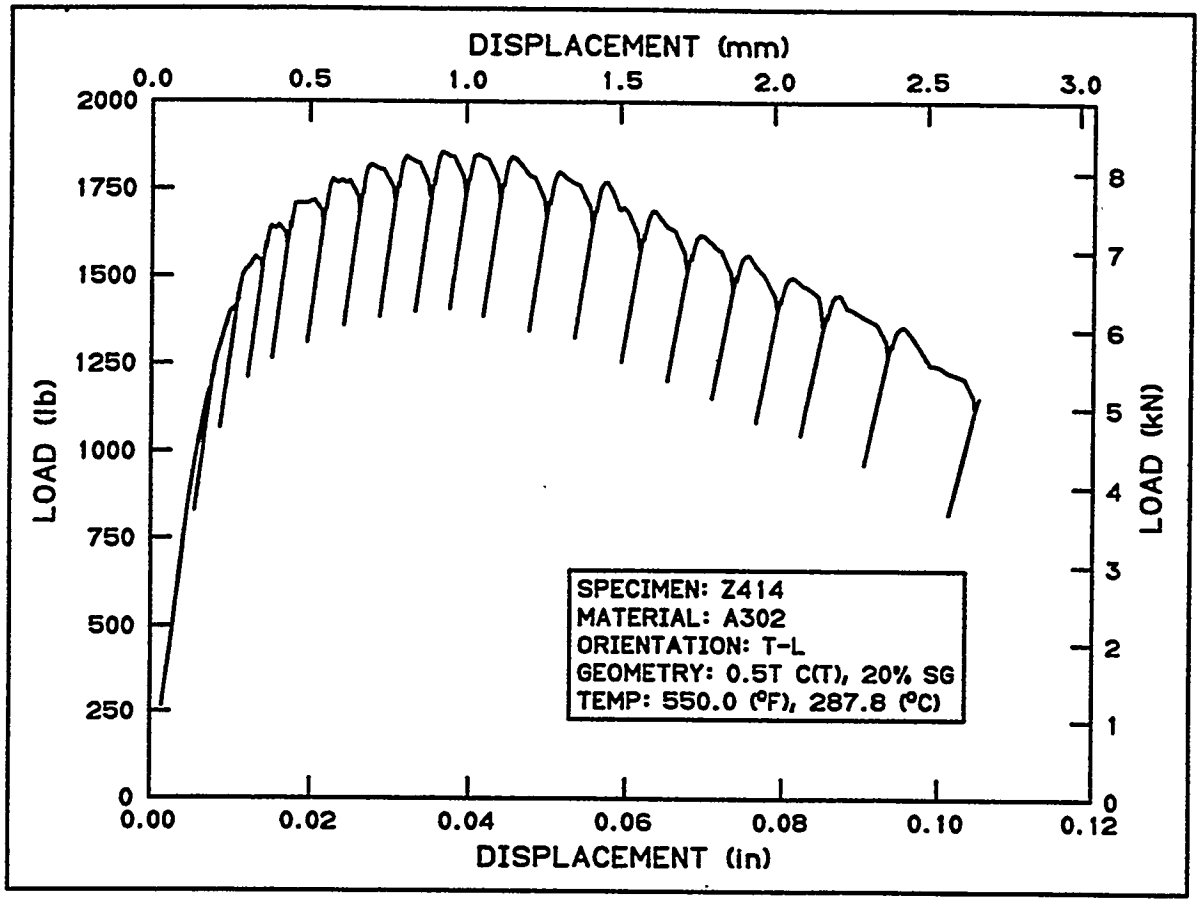

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z412
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

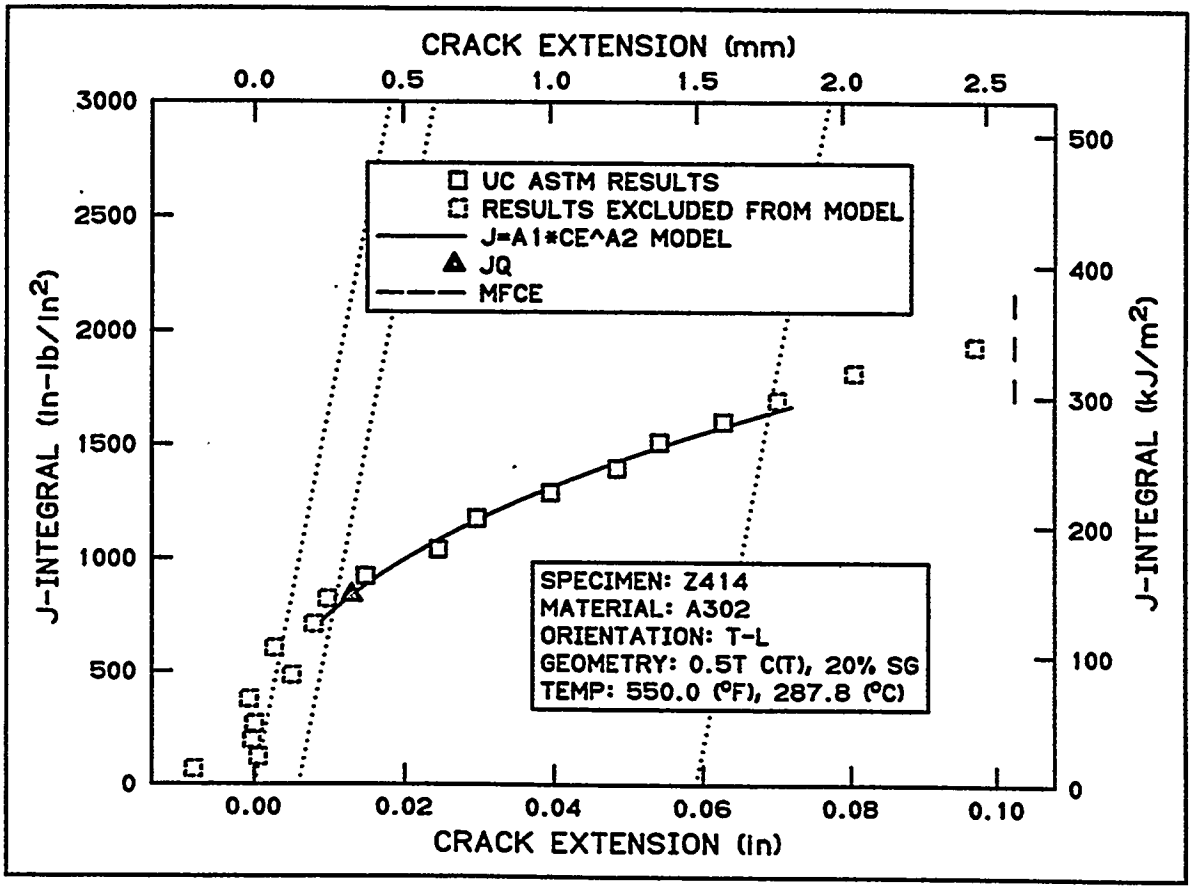

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z412
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z414
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6361 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1137	0.0069	-0.0079	68.3
2	1398	0.0098	0.0005	122.9
3	1554	0.0128	-0.0003	197.6
4	1644	0.0158	0.0000	269.3
5	1716	0.0202	-0.0007	377.9
6	1772	0.0246	0.0050	483.9
7	1804	0.0289	0.0027	604.0
8	1823	0.0335	0.0079	710.0
9	1841	0.0379	0.0097	822.1
10	1833	0.0422	0.0148	922.8
11	1780	0.0482	0.0244	1042.9
12	1760	0.0538	0.0296	1177.6
13	1685	0.0600	0.0395	1290.9
14	1630	0.0660	0.0485	1398.2
15	1574	0.0719	0.0542	1512.6
16	1504	0.0774	0.0627	1603.2
17	1462	0.0835	0.0701	1697.4
18	1366	0.0919	0.0803	1818.9
19	1208	0.1033	0.0969	1934.9

  WIDTH: 0.9993 (IN),25.382 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2504 (IN),6.360 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8728 (IN),22.169 (MM)
    DISTANCE 2: 0.8824 (IN),22.413 (MM)
    DISTANCE 3: 0.8881 (IN),22.558 (MM)
    DISTANCE 4: 0.8927 (IN),22.675 (MM)
    DISTANCE 5: 0.8942 (IN),22.713 (MM)
    DISTANCE 6: 0.8930 (IN),22.682 (MM)
    DISTANCE 7: 0.8886 (IN),22.570 (MM)
    DISTANCE 8: 0.8807 (IN),22.370 (MM)
    DISTANCE 9: 0.8722 (IN),22.154 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9960 (IN),25.298 (MM)
    DISTANCE 2: 0.9930 (IN),25.222 (MM)
    DISTANCE 3: 0.9968 (IN),25.319 (MM)
    DISTANCE 4: 0.9877 (IN),25.088 (MM)
    DISTANCE 5: 0.9854 (IN),25.029 (MM)
    DISTANCE 6: 0.9840 (IN),24.994 (MM)
    DISTANCE 7: 0.9878 (IN),25.090 (MM)
    DISTANCE 8: 0.9890 (IN),25.121 (MM)
    DISTANCE 9: 0.9788 (IN),24.862 (MM)

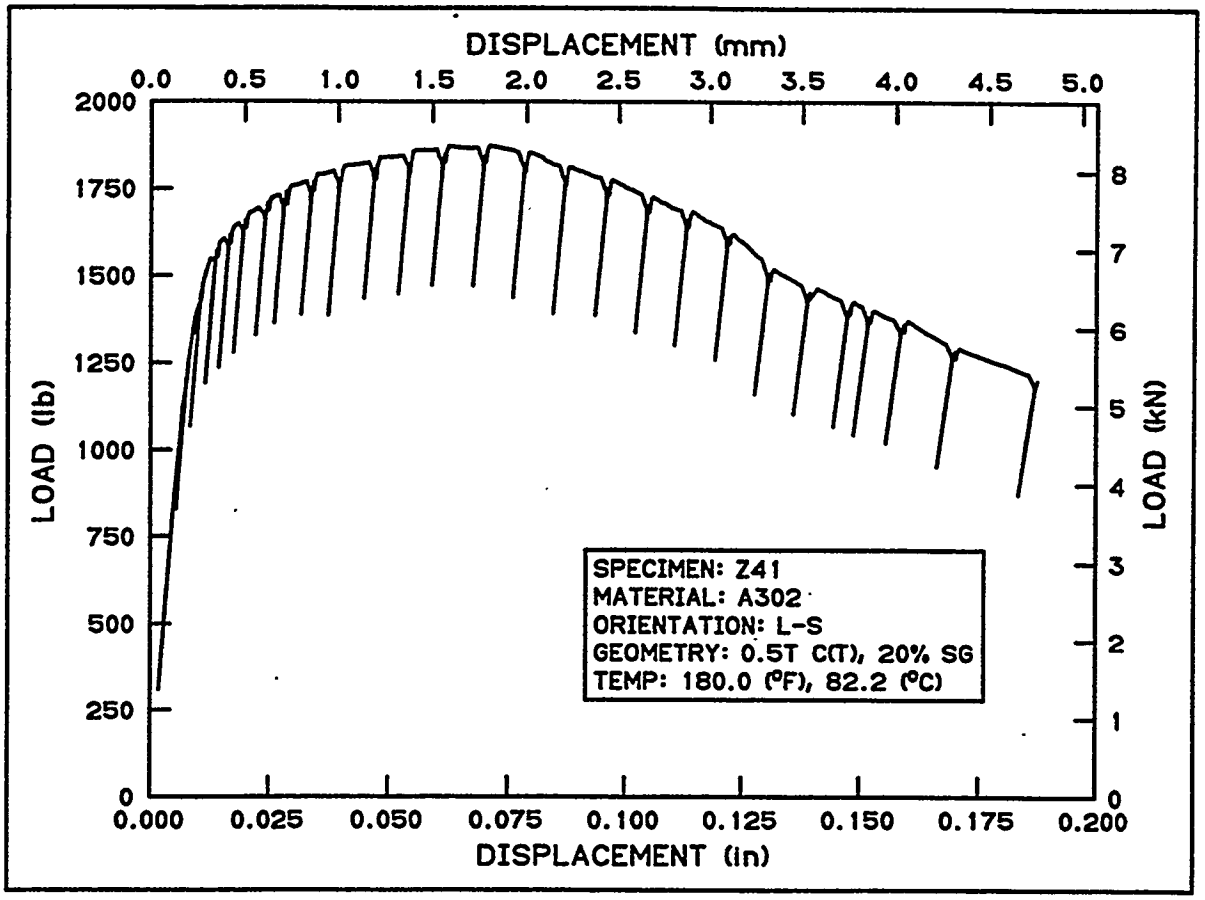

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z414
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

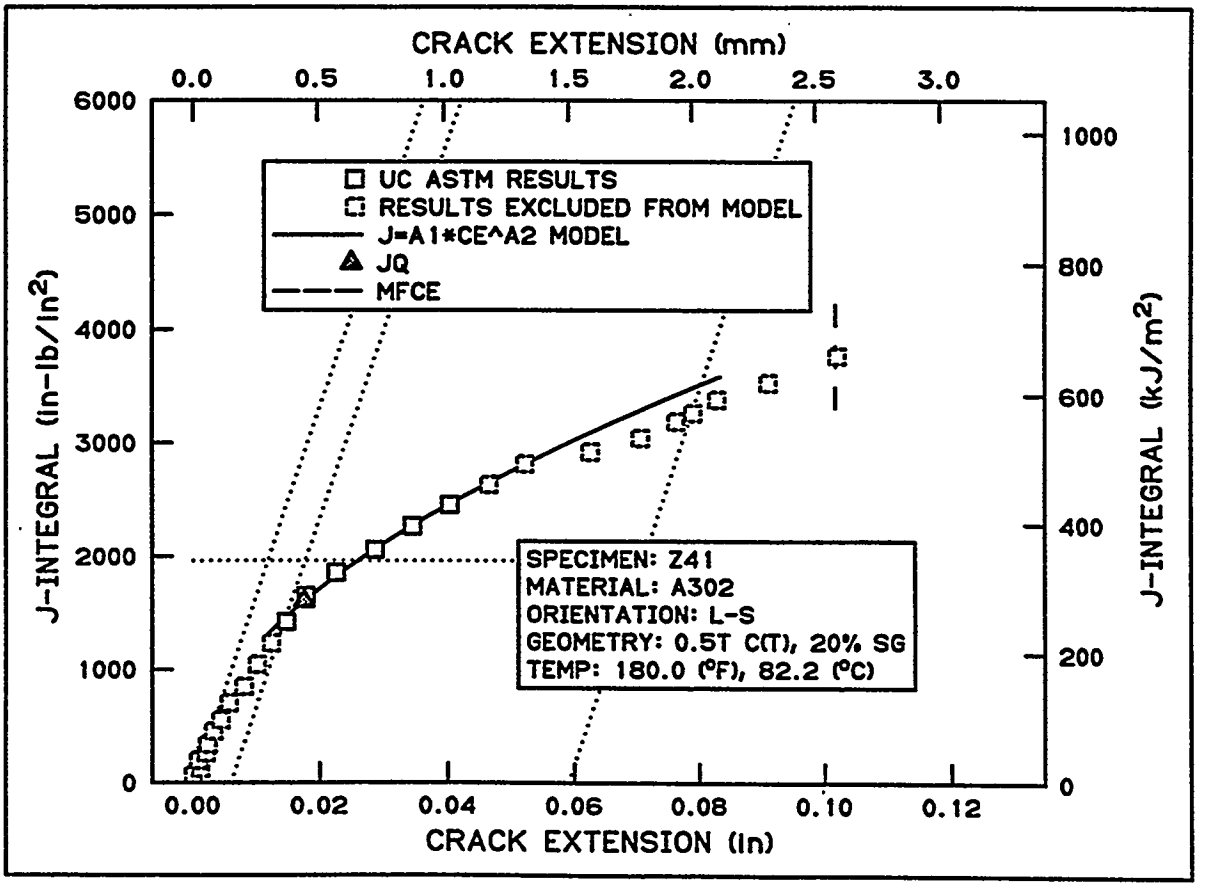

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z414
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z41
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6452 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1124	0.0068	0.0000	66.8
2	1393	0.0095	0.0011	124.?
3	1547	0.0124	0.0008	196.6
4	1606	0.0153	0.0020	261.9
5	1650	0.0183	0.0023	338.5
6	1695	0.0225	0.0032	455.8
7	1731	0.0270	0.0044	555.7
8	1770	0.0328	0.0057	705.5
9	1800	0.0383	0.0080	848.7
10	1825	0.0457	0.0102	1044.7
11	1845	0.0528	0.0124	1233.4
12	1863	0.0598	0.0148	1421.4
13	1867	0.0684	0.0179	1650.6
14	1855	0.0769	0.0226	1857.5
15	1814	0.0858	0.0286	2060.8
16	1781	0.0945	0.0345	2268.5
17	1733	0.1032	0.0403	2456.9
18	1687	0.1117	0.0465	2635.3
19	1637	0.1205	0.0521	2816.2
20	1549	0.1290	0.0626	2923.8
21	1474	0.1375	0.0705	3046.1
22	1430	0.1460	0.0763	3191.1
23	1413	0.1504	0.0790	3265.0
24	1377	0.1570	0.0828	3384.2
25	1307	0.1680	0.0911	3531.5
26	1219	0.1854	0.1020	3768.5

  WIDTH: 1.0022 (IN),25.456 (MM)
  THICKNESS: 0.5001 (IN),12.703 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2504 (IN),6.360 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8836 (IN),22.443 (MM)
    DISTANCE 2: 0.8959 (IN),22.756 (MM)
    DISTANCE 3: 0.8996 (IN),22.850 (MM)
    DISTANCE 4: 0.8991 (IN),22.837 (MM)
    DISTANCE 5: 0.9004 (IN),22.870 (MM)
    DISTANCE 6: 0.8986 (IN),22.824 (MM)
    DISTANCE 7: 0.8975 (IN),22.797 (MM)
    DISTANCE 8: 0.8919 (IN),22.654 (MM)
    DISTANCE 9: 0.8802 (IN),22.357 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9970 (IN),25.324 (MM)
    DISTANCE 2: 1.0050 (IN),25.527 (MM)
    DISTANCE 3: 0.9880 (IN),25.095 (MM)
    DISTANCE 4: 0.9988 (IN),25.370 (MM)
    DISTANCE 5: 0.9976 (IN),25.339 (MM)
    DISTANCE 6: 0.9922 (IN),25.202 (MM)
    DISTANCE 7: 0.9964 (IN),25.309 (MM)
    DISTANCE 8: 1.0004 (IN),25.410 (MM)
    DISTANCE 9: 1.0035 (IN),25.489 (MM)

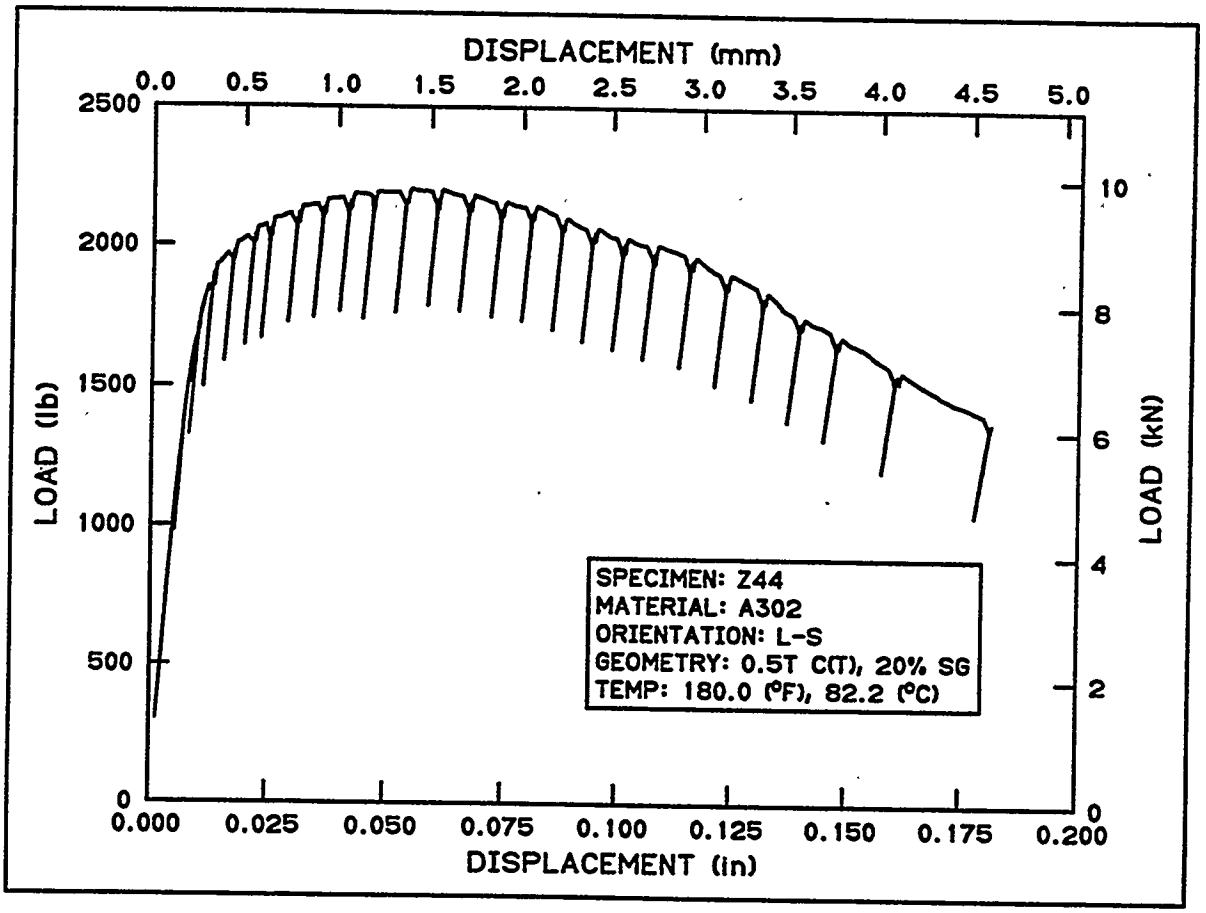

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

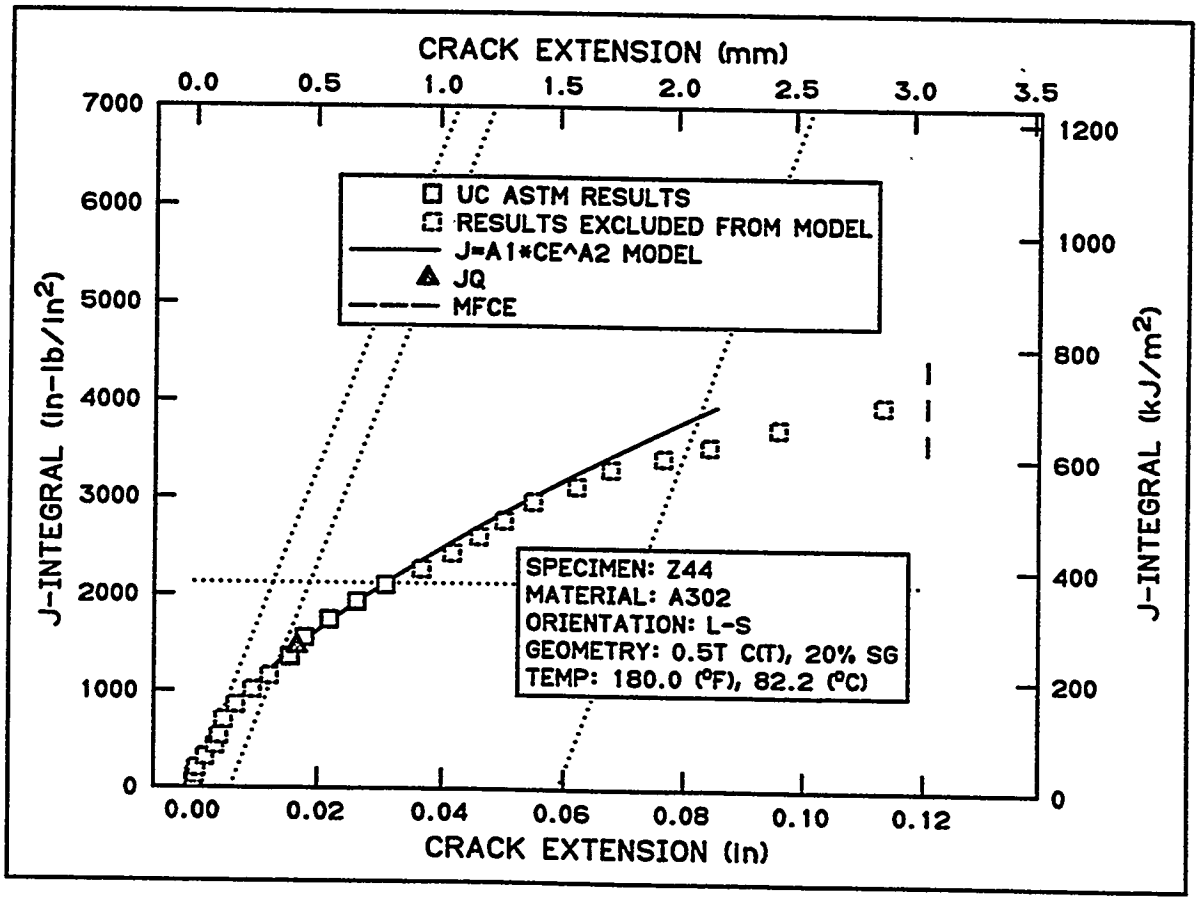

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z44
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6128 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1284	0.0064	0.0000	66.0
2	1649	0.0092	0.0002	129.0
3	1851	0.0120	0.0004	203.3
4	1968	0.0161	0.0018	318.4
5	2029	0.0201	0.0035	438.6
6	2073	0.0241	0.0041	539.3
7	2114	0.0293	0.0048	704.9
8	2147	0.0349	0.0068	859.7
9	2170	0.0403	0.0095	1018.1
10	2184	0.0455	0.0123	1162.0
11	2192	0.0522	0.0156	1355.7
12	2194	0.0591	0.0179	1557.4
13	2180	0.0657	0.0219	1745.3
14	2156	0.0726	0.0263	1932.5
15	2139	0.0792	0.0309	2108.3
16	2111	0.0859	0.0366	2273.8
17	2064	0.0925	0.0416	2439.5
18	2033	0.0993	0.0459	2607.9
19	2006	0.1057	0.0500	2772.2
20	1974	0.1139	0.0548	2969.9
21	1908	0.1219	0.0621	3127.4
22	1862	0.1300	0.0677	3304.6
23	1767	0.1381	0.0765	3423.8
24	1708	0.1460	0.0842	3544.8
25	1583	0.1591	0.0958	3732.3
26	1411	0.1796	0.1132	3974.0

  WIDTH: 0.9998 (IN),25.395 (MM)
  THICKNESS: 0.5001 (IN),12.703 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2501 (IN),6.353 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8456 (IN),21.478 (MM)
    DISTANCE 2: 0.8520 (IN),21.641 (MM)
    DISTANCE 3: 0.8544 (IN),21.702 (MM)
    DISTANCE 4: 0.8620 (IN),21.895 (MM)
    DISTANCE 5: 0.8662 (IN),22.001 (MM)
    DISTANCE 6: 0.8686 (IN),22.062 (MM)
    DISTANCE 7: 0.8708 (IN),22.118 (MM)
    DISTANCE 8: 0.8716 (IN),22.139 (MM)
    DISTANCE 9: 0.8696 (IN),22.088 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9723 (IN),24.696 (MM)
    DISTANCE 2: 0.9776 (IN),24.831 (MM)
    DISTANCE 3: 0.9830 (IN),24.968 (MM)
    DISTANCE 4: 0.9800 (IN),24.892 (MM)
    DISTANCE 5: 0.9808 (IN),24.912 (MM)
    DISTANCE 6: 0.9768 (IN),24.811 (MM)
    DISTANCE 7: 0.9902 (IN),25.151 (MM)
    DISTANCE 8: 0.9984 (IN),25.359 (MM)
    DISTANCE 9: 0.9886 (IN),25.110 (MM)

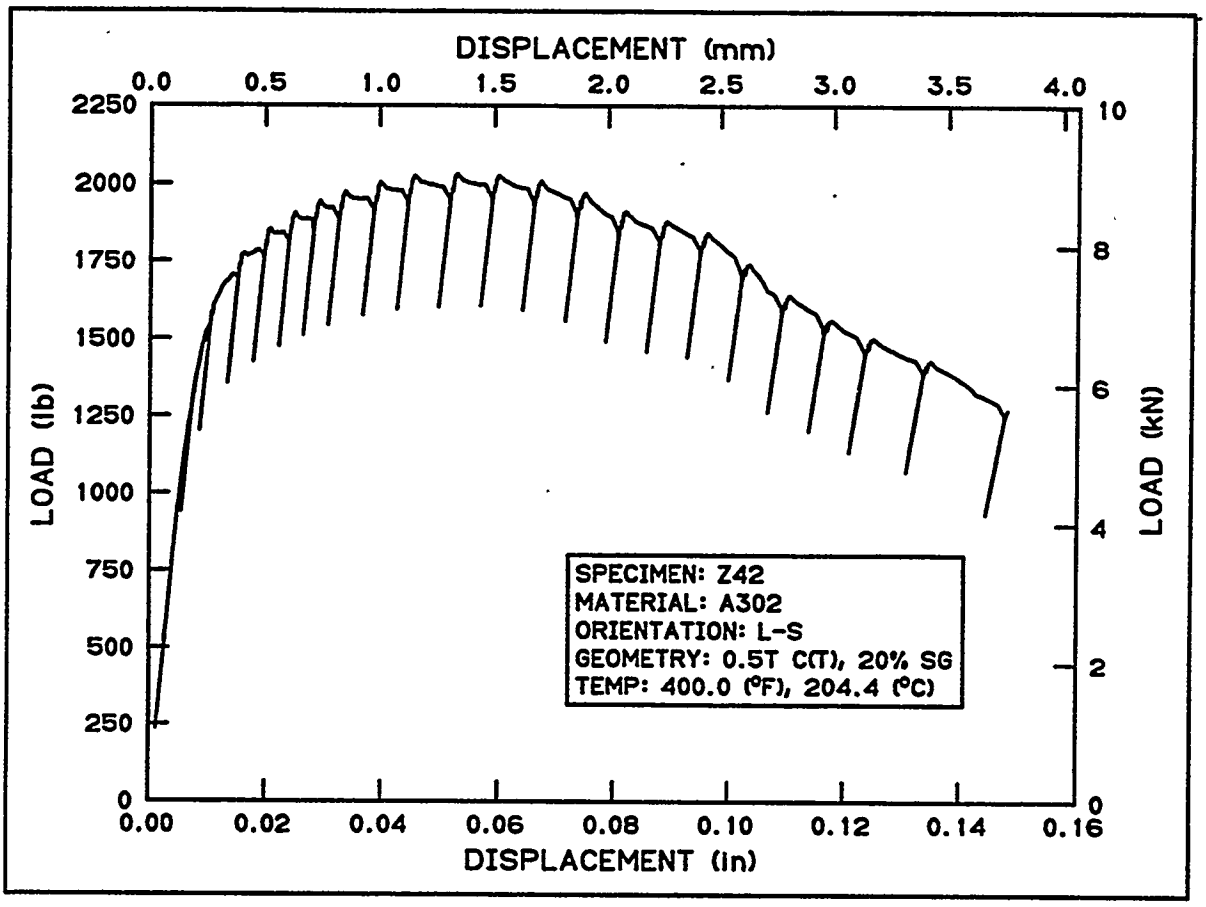

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
2500
2000
1500
1000
500
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z44
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

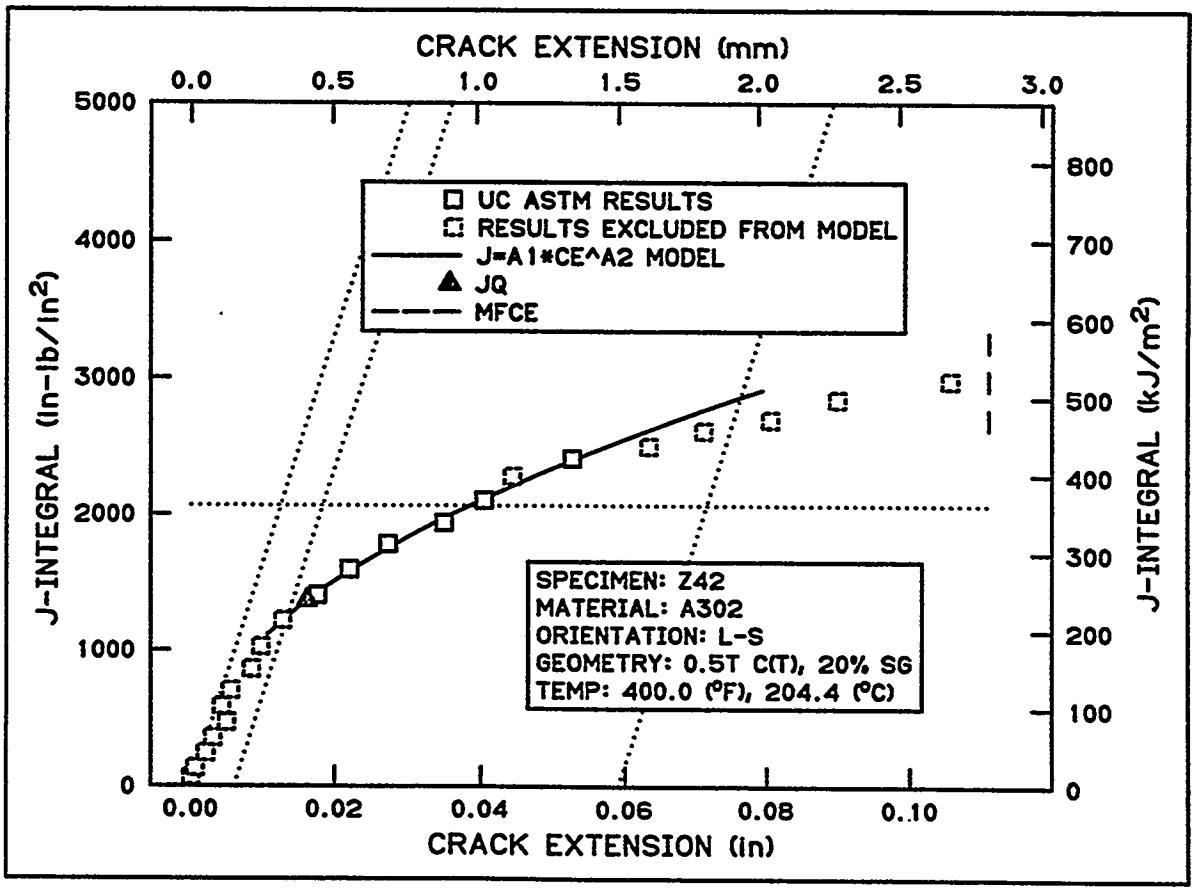

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z44
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z42
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6242 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1219	0.0067	0.0000	71.3
2	1522	0.0097	0.0005	134.4
3	1705	0.0142	0.0020	245.5
4	1787	0.0186	0.0030	358.3
5	1843	0.0228	0.0049	470.5
6	1886	0.0271	0.0042	588.9
7	1921	0.0315	0.0054	704.6
8	1952	0.0373	0.0083	861.1
9	1978	0.0432	0.0096	1025.3
10	1988	0.0502	0.0127	1220.4
11	1995	0.0575	0.0176	1407.1
12	1983	0.0647	0.0220	1597.1
13	1949	0.0721	0.0272	1782.5
14	1893	0.0793	0.0349	1938.5
15	1858	0.0863	0.0404	2104.2
16	1830	0.0935	0.0443	2279.6
17	1765	0.1008	0.0526	2409.9
18	1644	0.1078	0.0633	2499.0
19	1581	0.1151	0.0711	2612.3
20	1507	0.1221	0.0805	2694.5
21	1433	0.1322	0.0898	2842.7
22	1291	0.1463	0.1055	2980.5

  WIDTH: 0.9997 (IN),25.392 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2509 (IN),6.373 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8642 (IN),21.951 (MM)
    DISTANCE 2: 0.8702 (IN),22.103 (MM)
    DISTANCE 3: 0.8768 (IN),22.271 (MM)
    DISTANCE 4: 0.8792 (IN),22.332 (MM)
    DISTANCE 5: 0.8796 (IN),22.342 (MM)
    DISTANCE 6: 0.8795 (IN),22.339 (MM)
    DISTANCE 7: 0.8792 (IN),22.332 (MM)
    DISTANCE 8: 0.8718 (IN),22.144 (MM)
    DISTANCE 9: 0.8654 (IN),21.981 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9822 (IN),24.948 (MM)
    DISTANCE 2: 1.0033 (IN),25.484 (MM)
    DISTANCE 3: 0.9856 (IN),25.034 (MM)
    DISTANCE 4: 0.9874 (IN),25.080 (MM)
    DISTANCE 5: 0.9790 (IN),24.867 (MM)
    DISTANCE 6: 0.9960 (IN),25.298 (MM)
    DISTANCE 7: 0.9798 (IN),24.887 (MM)
    DISTANCE 8: 0.9804 (IN),24.902 (MM)
    DISTANCE 9: 0.9686 (IN),24.602 (MM)

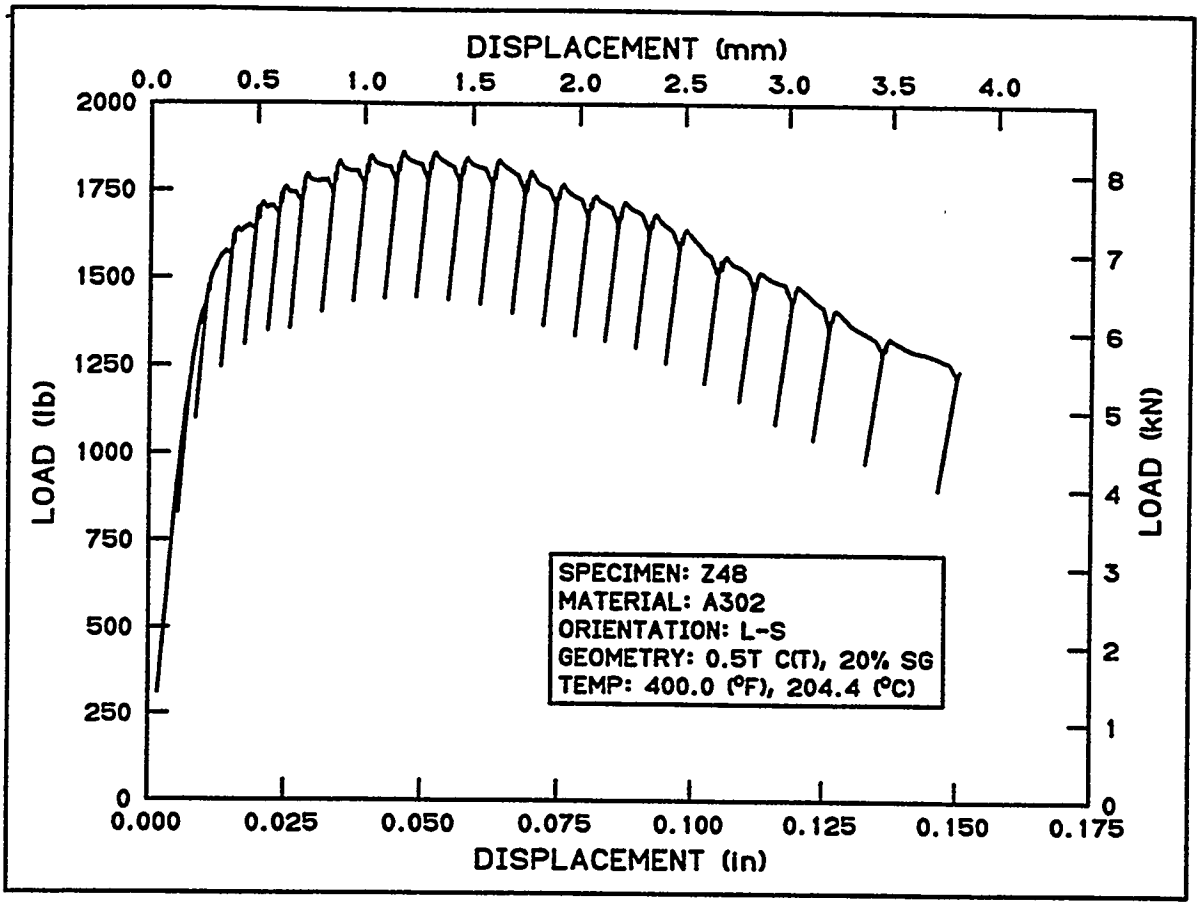

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z42
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

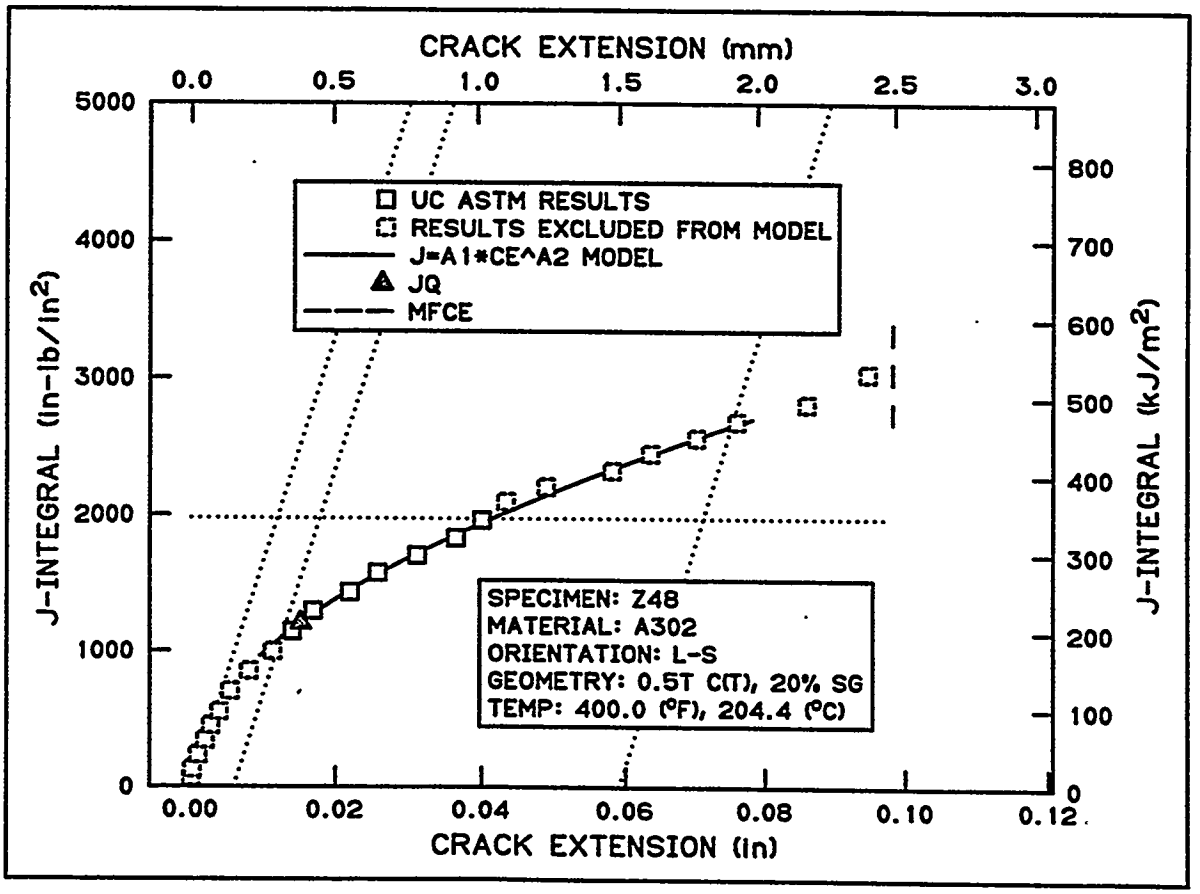

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
800
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z42
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z48
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6398 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1130	0.0067	0.0000	67.8
2	1398	0.0095	0.0002	129.4
3	1577	0.0138	0.0009	234.4
4	1651	0.0181	0.0019	340.6
5	1705	0.0224	0.0027	447.4
6	1745	0.0266	0.0039	550.5
7	1780	0.0325	0.0054	702.6
8	1804	0.0381	0.0080	850.6
9	1817	0.0440	0.0113	997.5
10	1824	0.0497	0.0140	1146.1
11	1817	0.0555	0.0169	1296.6
12	1812	0.0613	0.0220	1434.1
13	1795	0.0672	0.0258	1578.4
14	1752	0.0731	0.0311	1707.0
15	1725	0.0790	0.0364	1836.2
16	1703	0.0846	0.0400	1965.8
17	1684	0.0903	0.0433	2098.7
18	1638	0.0959	0.0489	2207.1
19	1566	0.1033	0.0580	2324.7
20	1517	0.1104	0.0634	2449.9
21	1483	0.1174	0.0700	2563.6
22	1418	0.1248	0.0758	2684.5
23	1328	0.1347	0.0859	2813.3
24	1262	0.1485	0.0946	3036.9

WIDTH: 0.9992 (IN),25.380 (MM)
THICKNESS: 0.5001 (IN),12.703 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2502 (IN),6.355 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8841 (IN),22.456 (MM)
DISTANCE 2: 0.8890 (IN),22.581 (MM)
DISTANCE 3: 0.8929 (IN),22.680 (MM)
DISTANCE 4: 0.8944 (IN),22.718 (MM)
DISTANCE 5: 0.8958 (IN),22.753 (MM)
DISTANCE 6: 0.8912 (IN),22.636 (MM)
DISTANCE 7: 0.8902 (IN),22.611 (MM)
DISTANCE 8: 0.8864 (IN),22.515 (MM)
DISTANCE 9: 0.8762 (IN),22.255 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9867 (IN),25.062 (MM)
DISTANCE 2: 0.9938 (IN),25.243 (MM)
DISTANCE 3: 0.9902 (IN),25.151 (MM)
DISTANCE 4: 0.9811 (IN),24.920 (MM)
DISTANCE 5: 0.9778 (IN),24.836 (MM)
DISTANCE 6: 0.9864 (IN),25.055 (MM)
DISTANCE 7: 0.9898 (IN),25.141 (MM)
DISTANCE 8: 0.9967 (IN),25.316 (MM)
DISTANCE 9: 0.9915 (IN),25.184 (MM)

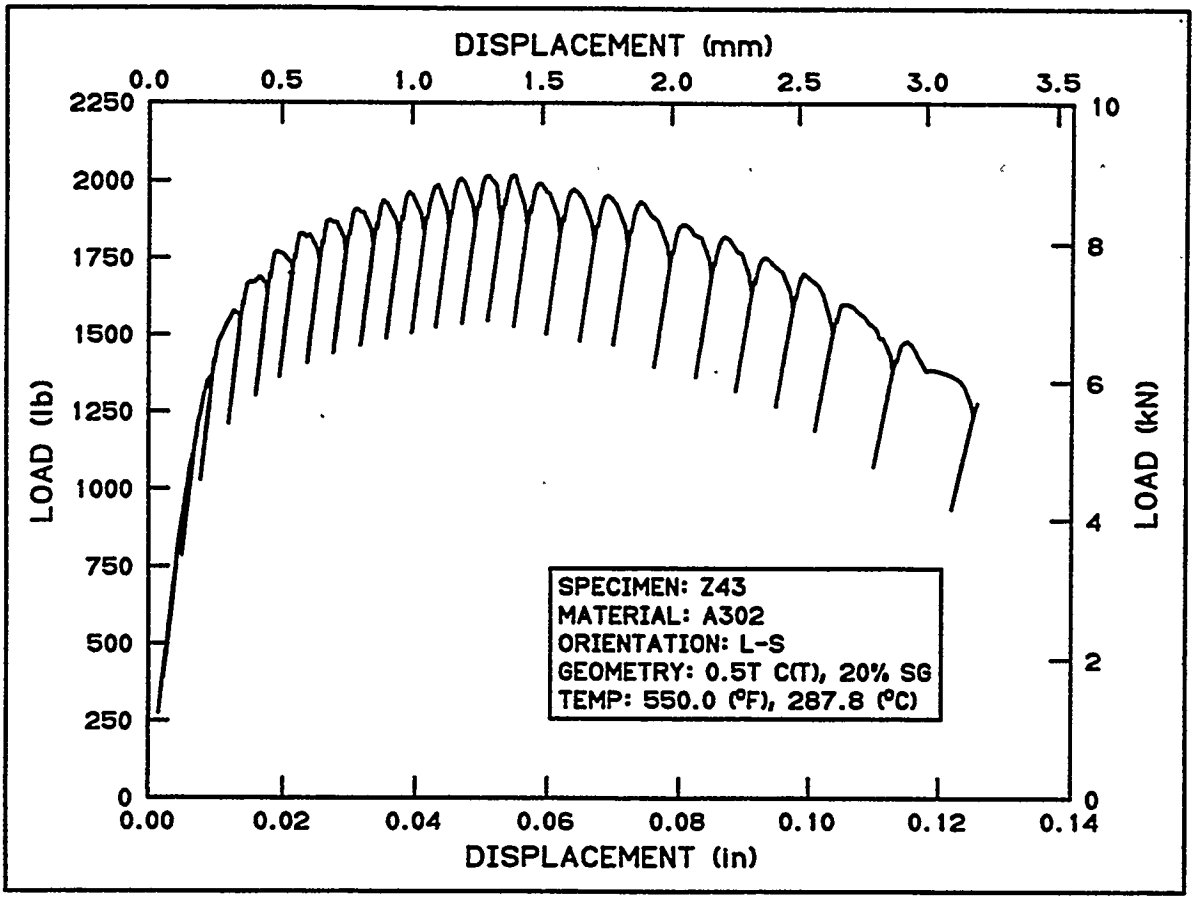

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z48
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

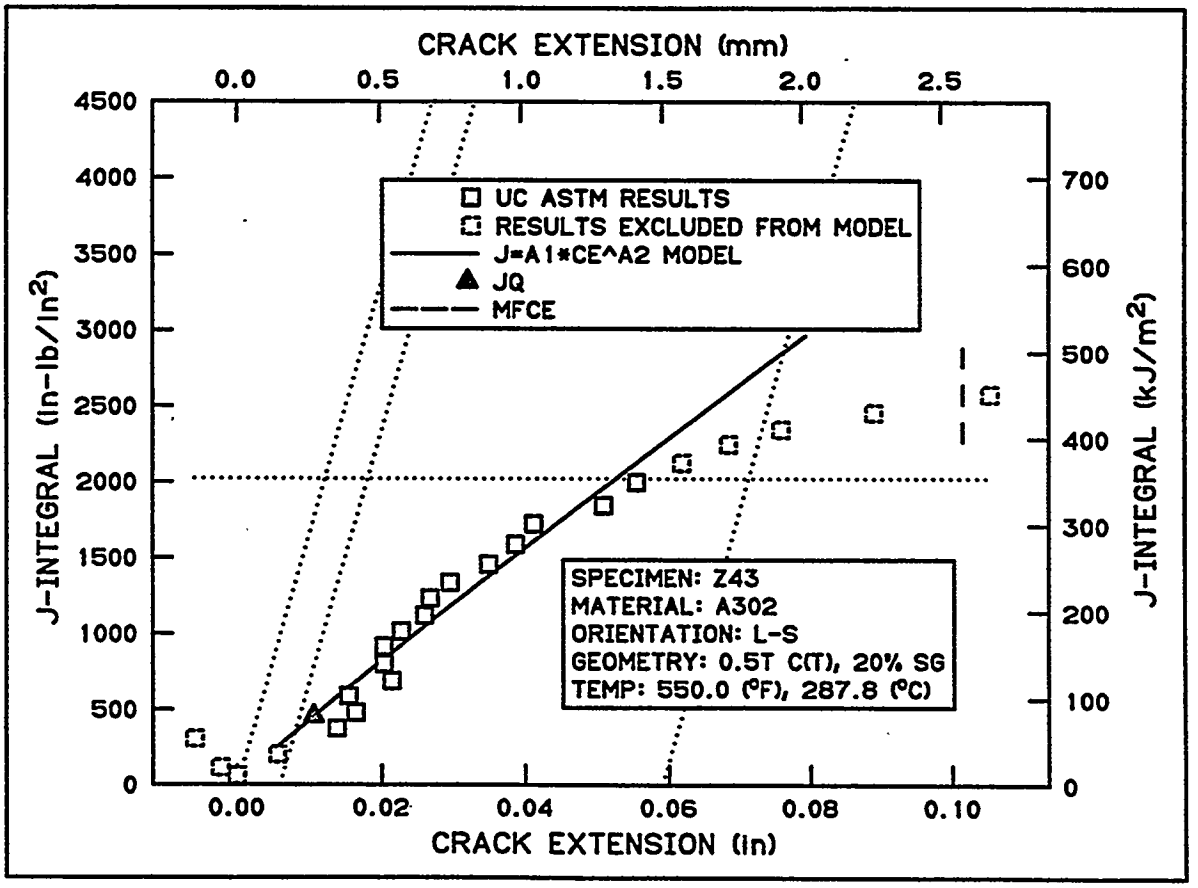

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z48
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z43
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6322 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1071	0.0062	0.0000	61.2
2	1345	0.0087	-0.0022	113.8
3	1575	0.0126	0.0056	200.2
4	1687	0.0163	-0.0057	305.0
5	1762	0.0200	0.0138	375.2
6	1822	0.0240	0.0164	482.3
7	1866	0.0280	0.0155	592.1
8	1898	0.0320	0.0214	692.0
9	1927	0.0356	0.0203	805.2
10	1955	0.0394	0.0203	917.6
11	1986	0.0434	0.0227	1016.9
12	1996	0.0473	0.0260	1122.3
13	2014	0.0511	0.0268	1234.8
14	2015	0.0550	0.0296	1338.8
15	1959	0.0602	0.0349	1458.7
16	1943	0.0652	0.0386	1590.8
17	1925	0.0703	0.0412	1725.7
18	1870	0.0767	0.0508	1846.0
19	1816	0.0832	0.0555	1998.2
20	1764	0.0896	0.0618	2126.0
21	1706	0.0959	0.0684	2248.1
22	1635	0.1021	0.0759	2345.9
23	1491	0.1113	0.0889	2457.4
24	1332	0.1238	0.1052	2577.0

WIDTH: 1.0000 (IN),25.400 (MM)
THICKNESS: 0.5000 (IN),12.700 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2506 (IN),6.365 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8760 (IN),22.250 (MM)
DISTANCE 2: 0.8804 (IN),22.362 (MM)
DISTANCE 3: 0.8842 (IN),22.459 (MM)
DISTANCE 4: 0.8868 (IN),22.525 (MM)
DISTANCE 5: 0.8872 (IN),22.535 (MM)
DISTANCE 6: 0.8858 (IN),22.499 (MM)
DISTANCE 7: 0.8836 (IN),22.443 (MM)
DISTANCE 8: 0.8794 (IN),22.337 (MM)
DISTANCE 9: 0.8742 (IN),22.205 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9931 (IN),25.225 (MM)
DISTANCE 2: 0.9750 (IN),24.765 (MM)
DISTANCE 3: 0.9859 (IN),25.042 (MM)
DISTANCE 4: 0.9894 (IN),25.131 (MM)
DISTANCE 5: 0.9849 (IN),25.016 (MM)
DISTANCE 6: 0.9874 (IN),25.080 (MM)
DISTANCE 7: 0.9809 (IN),24.915 (MM)
DISTANCE 8: 0.9854 (IN),25.029 (MM)
DISTANCE 9: 0.9776 (IN),24.831 (MM)

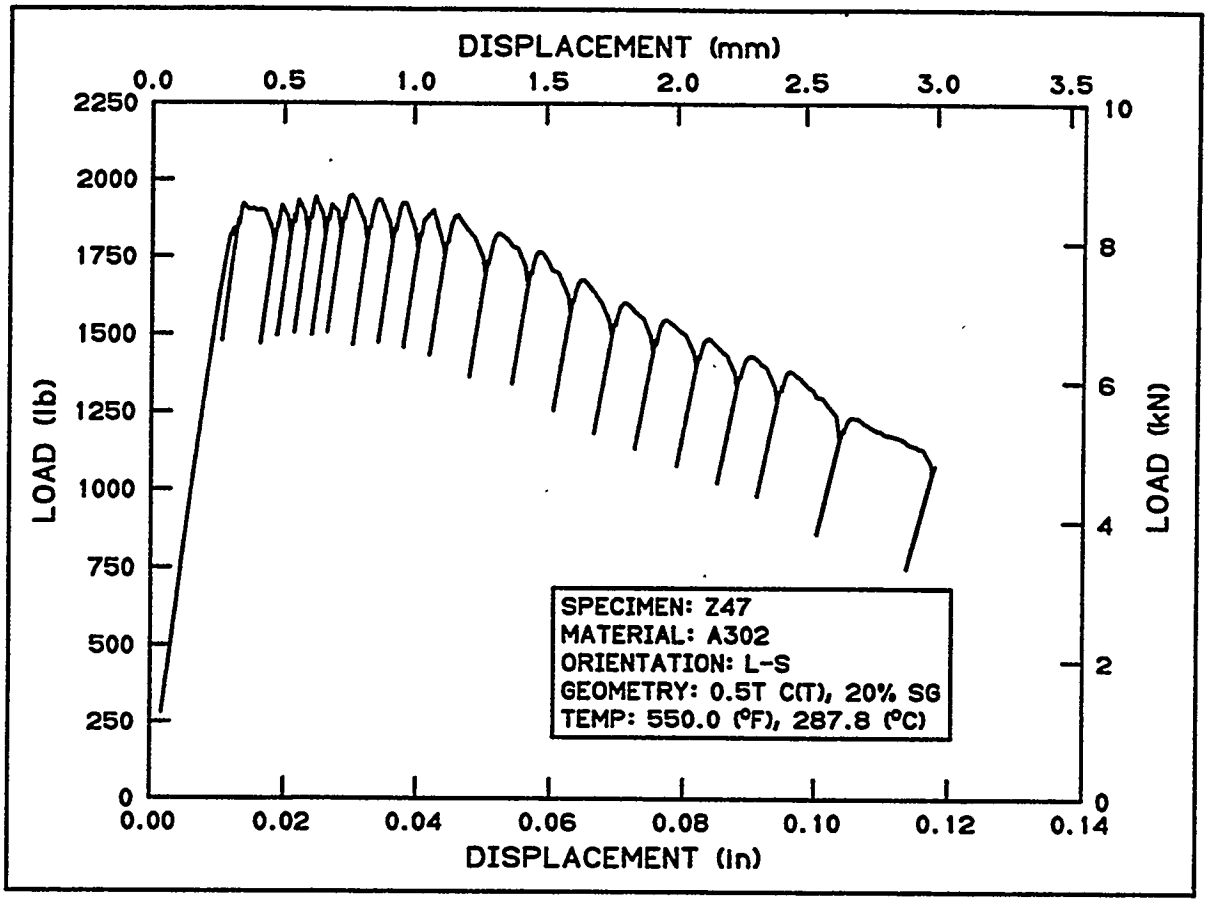

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z43
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

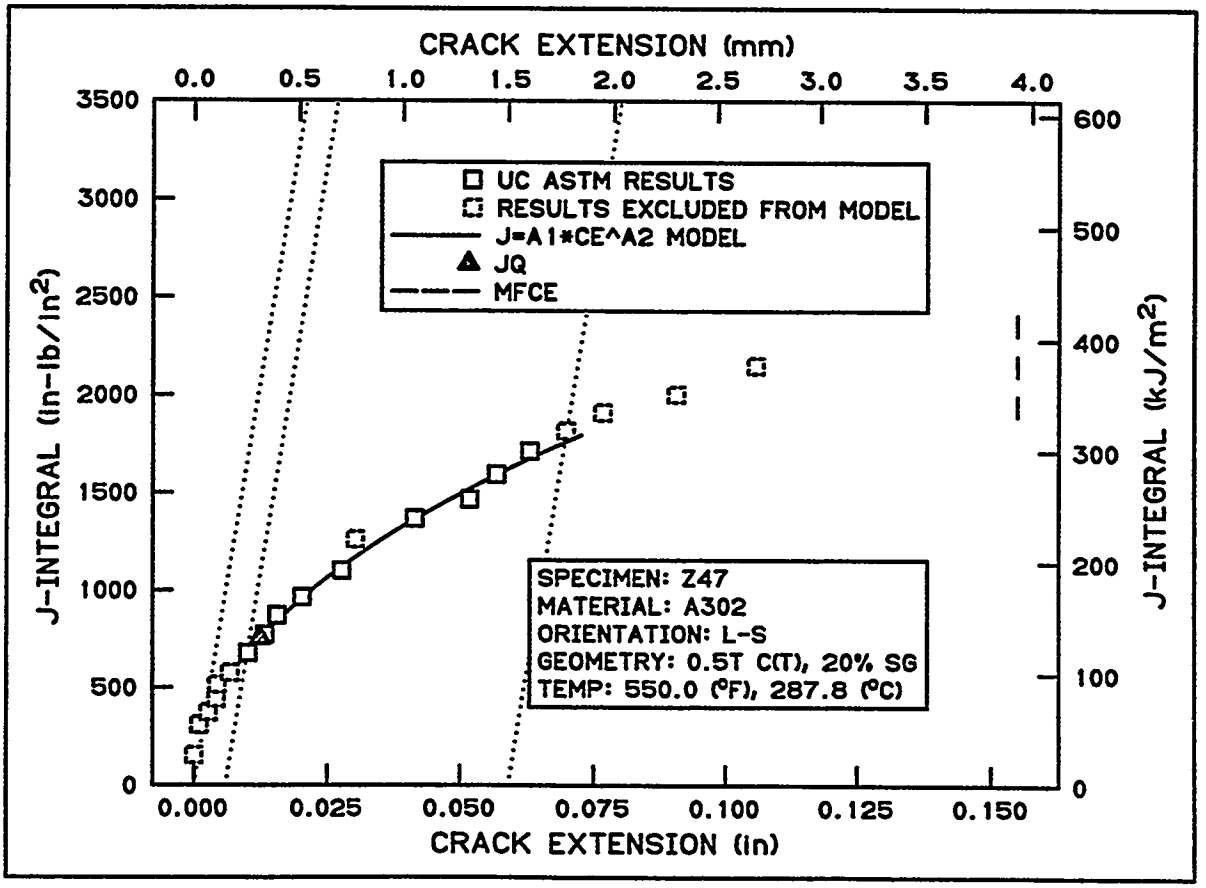

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z43
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z47
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6331 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1818	0.0117	0.0000	153.7
2	1899	0.0168	0.0010	308.9
3	1917	0.0194	0.0027	372.9
4	1933	0.0219	0.0043	440.6
5	1944	0.0245	0.0044	515.1
6	1918	0.0269	0.0068	575.4
7	1932	0.0307	0.0102	677.5
8	1935	0.0344	0.0133	773.3
9	1922	0.0383	0.0156	872.5
10	1902	0.0423	0.0203	965.5
11	1816	0.0484	0.0278	1101.7
12	1779	0.0549	0.0304	1262.4
13	1696	0.0611	0.0416	1369.3
14	1601	0.0674	0.0518	1469.4
15	1553	0.0737	0.0568	1596.5
16	1498	0.0802	0.0631	1715.6
17	1435	0.0864	0.0699	1818.0
18	1395	0.0925	0.0767	1912.2
19	1271	0.1019	0.0906	2006.1
20	1133	0.1161	0.1059	2155.0

  WIDTH: 0.9989 (IN),25.372 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2504 (IN),6.360 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8633 (IN),21.928 (MM)
    DISTANCE 2: 0.8734 (IN),22.184 (MM)
    DISTANCE 3: 0.8804 (IN),22.362 (MM)
    DISTANCE 4: 0.8860 (IN),22.504 (MM)
    DISTANCE 5: 0.8886 (IN),22.570 (MM)
    DISTANCE 6: 0.8909 (IN),22.629 (MM)
    DISTANCE 7: 0.8905 (IN),22.619 (MM)
    DISTANCE 8: 0.8866 (IN),22.520 (MM)
    DISTANCE 9: 0.8792 (IN),22.332 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0336 (IN),26.253 (MM)
    DISTANCE 2: 1.0374 (IN),26.350 (MM)
    DISTANCE 3: 1.0358 (IN),26.309 (MM)
    DISTANCE 4: 1.0344 (IN),26.274 (MM)
    DISTANCE 5: 1.0332 (IN),26.243 (MM)
    DISTANCE 6: 1.0307 (IN),26.180 (MM)
    DISTANCE 7: 1.0364 (IN),26.325 (MM)
    DISTANCE 8: 1.0516 (IN),26.711 (MM)
    DISTANCE 9: 1.0602 (IN),26.929 (MM)

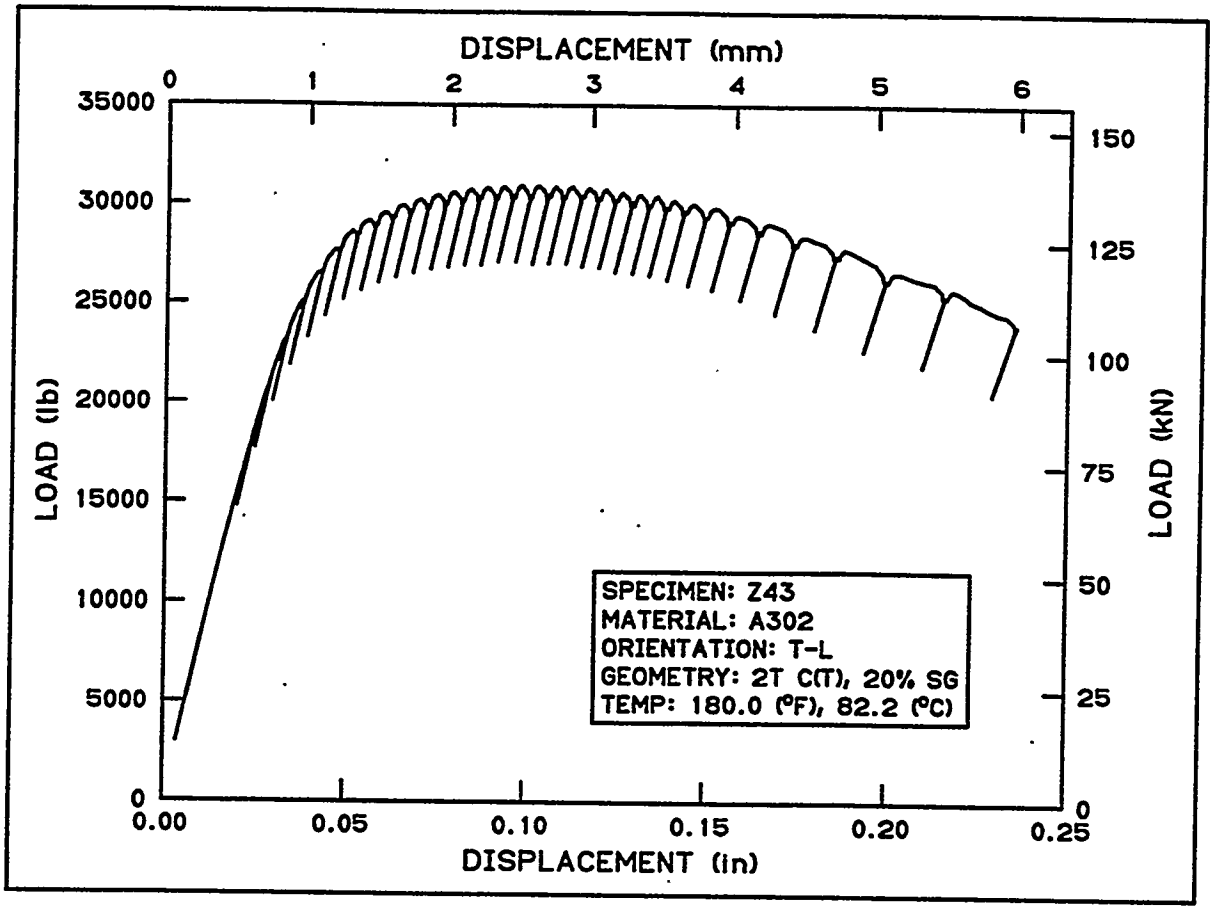

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z47
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

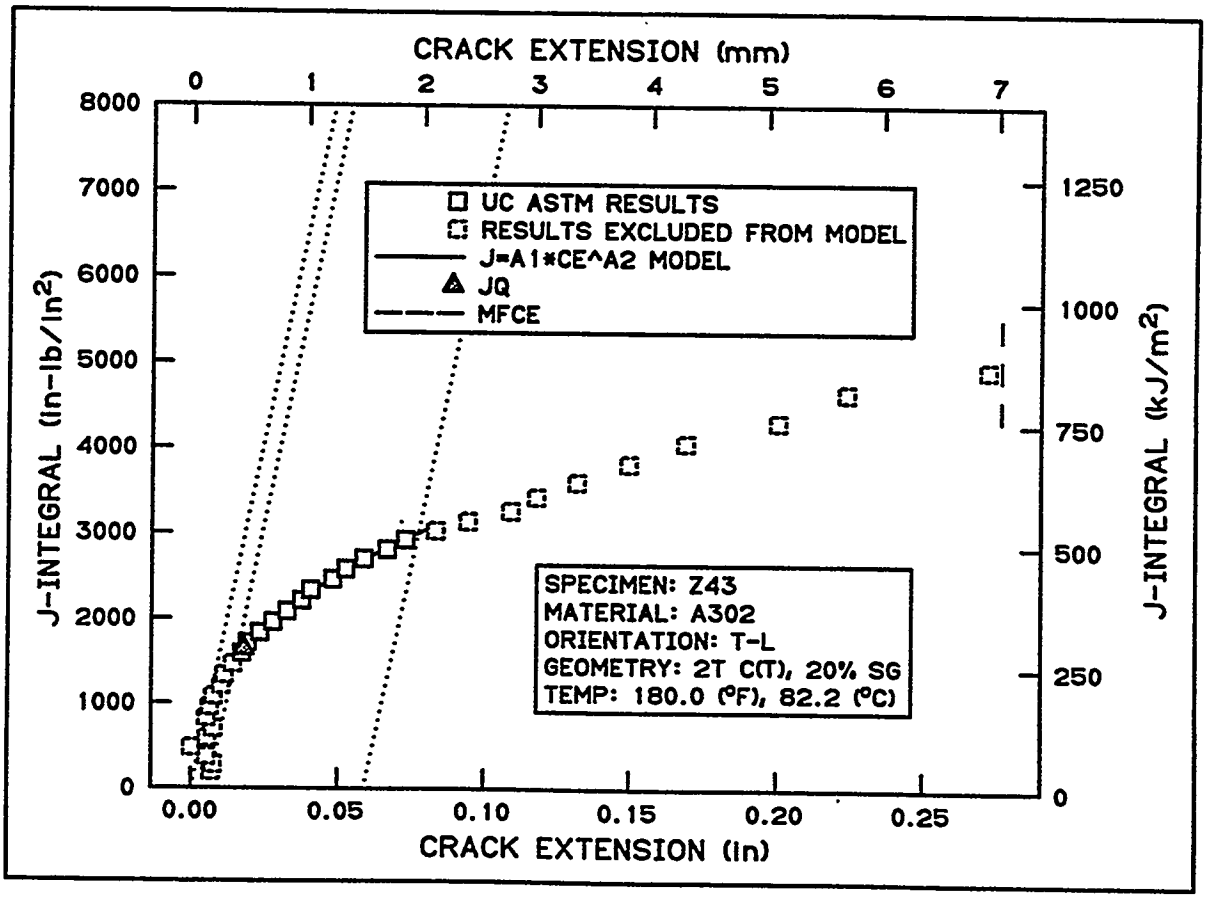

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
3500
3000
2500
2000
1500
1000
500
0
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z47
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z43
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4928 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17746	0.0232	0.0067	195.2
2	20637	0.0279	0.0073	278.5
3	23048	0.0325	0.0051	374.0
4	25006	0.0371	0.0000	480.8
5	26495	0.0417	0.0054	589.1
6	27672	0.0463	0.0074	705.6
7	28600	0.0512	0.0051	830.8
8	29137	0.0559	0.0063	958.2
9	29528	0.0604	0.0075	1083.3
10	29905	0.0652	0.0101	1209.2
11	30191	0.0700	0.0112	1337.0
12	30424	0.0748	0.0140	1466.7
13	30569	0.0793	0.0172	1592.3
14	30724	0.0840	0.0190	1717.9
15	30807	0.0887	0.0232	1839.8
16	30858	0.0933	0.0278	1965.0
17	30920	0.0982	0.0327	2094.8
18	30906	0.1030	0.0376	2220.7
19	30869	0.1077	0.0407	2341.8
20	30867	0.1125	0.0482	2467.0
21	30801	0.1171	0.0527	2586.3
22	30732	0.1217	0.0588	2705.8
23	30587	0.1262	0.0667	2814.9
24	30477	0.1312	0.0729	2931.6
25	30384	0.1359	0.0831	3038.8
26	30180	0.1406	0.0942	3146.9
27	29971	0.1463	0.1090	3267.0
28	29725	0.1530	0.1179	3428.1
29	29228	0.1608	0.1320	3605.1
30	28746	0.1708	0.1496	3820.1
31	28043	0.1823	0.1690	4064.2
32	27050	0.1962	0.2004	4311.4
33	26083	0.2126	0.2238	4646.7
34	24500	0.2328	0.2723	4927.9

  WIDTH: 3.9970 (IN),101.520 (MM)
  THICKNESS: 2.0035 (IN),50.889 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0004 (IN),25.410 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4842 (IN),88.499 (MM)
    DISTANCE 2: 3.4989 (IN),88.872 (MM)
    DISTANCE 3: 3.5022 (IN),88.956 (MM)
    DISTANCE 4: 3.5028 (IN),88.971 (MM)
    DISTANCE 5: 3.5005 (IN),88.913 (MM)
    DISTANCE 6: 3.4961 (IN),88.801 (MM)
    DISTANCE 7: 3.4887 (IN),88.613 (MM)
    DISTANCE 8: 3.4822 (IN),88.448 (MM)
    DISTANCE 9: 3.4638 (IN),87.981 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8124 (IN),96.835 (MM)
    DISTANCE 2: 3.7740 (IN),95.860 (MM)
    DISTANCE 3: 3.7643 (IN),95.613 (MM)
    DISTANCE 4: 3.7775 (IN),95.949 (MM)
    DISTANCE 5: 3.7622 (IN),95.560 (MM)
    DISTANCE 6: 3.7783 (IN),95.969 (MM)
    DISTANCE 7: 3.7480 (IN),95.199 (MM)
    DISTANCE 8: 3.7570 (IN),95.428 (MM)
    DISTANCE 9: 3.7828 (IN),96.083 (MM)

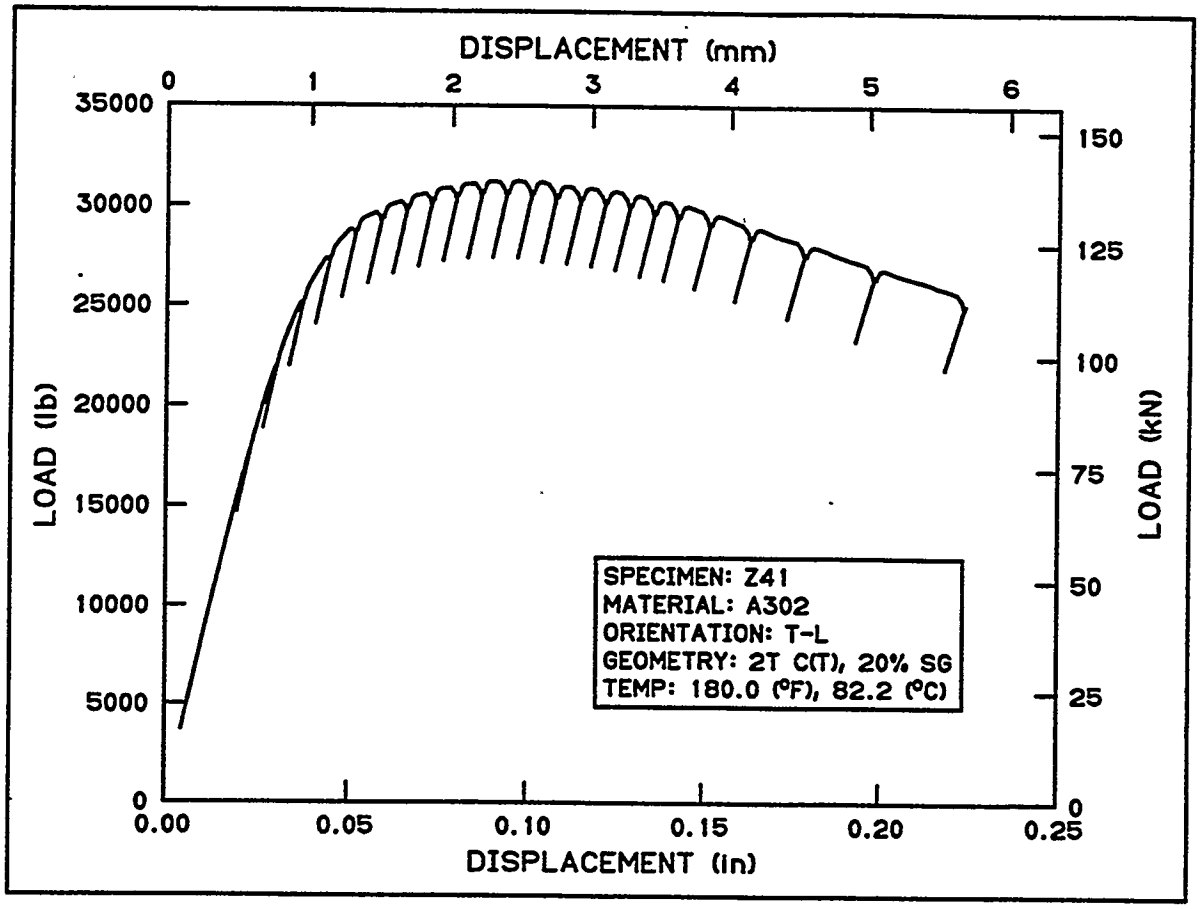

DISPLACEMENT (mm)
0
1
2
3
4
5
6
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z43
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

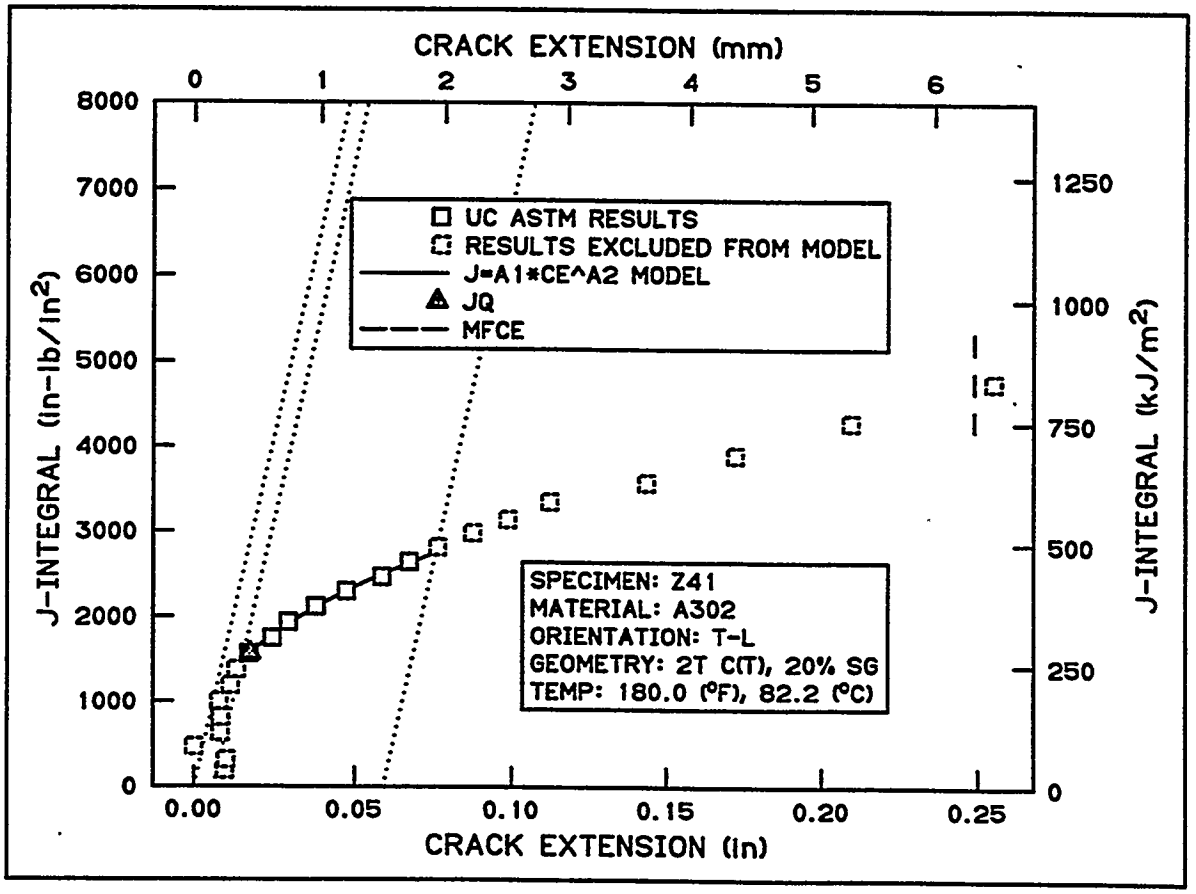

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z43
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z41
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4846 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17507	0.0225	0.0094	190.6
2	21840	0.0295	0.0098	316.0
3	25055	0.0364	0.0000	470.6
4	27338	0.0434	0.0081	635.0
5	28820	0.0502	0.0082	816.8
6	29650	0.0573	0.0078	1006.9
7	30200	0.0642	0.0113	1192.0
8	30598	0.0710	0.0131	1378.6
9	30917	0.0780	0.0171	1566.2
10	31119	0.0849	0.0243	1749.3
11	31193	0.0919	0.0293	1939.7
12	31214	0.0989	0.0377	2122.6
13	31104	0.1056	0.0474	2299.7
14	30941	0.1125	0.0586	2470.1
15	30842	0.1194	0.0672	2645.7
16	30664	0.1265	0.0763	2818.3
17	30423	0.1333	0.0874	2986.1
18	30170	0.1403	0.0987	3146.6
19	29768	0.1493	0.1123	3358.3
20	29115	0.1608	0.1434	3581.1
21	28275	0.1762	0.1721	3901.7
22	27096	0.1959	0.2093	4290.0
23	25678	0.2215	0.2550	4767.3

  WIDTH: 3.9981 (IN),101.550 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9999 (IN),25.397 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4672 (IN),88.067 (MM)
    DISTANCE 2: 3.4855 (IN),88.532 (MM)
    DISTANCE 3: 3.4904 (IN),88.656 (MM)
    DISTANCE 4: 3.4911 (IN),88.674 (MM)
    DISTANCE 5: 3.4908 (IN),88.666 (MM)
    DISTANCE 6: 3.4884 (IN),88.605 (MM)
    DISTANCE 7: 3.4838 (IN),88.489 (MM)
    DISTANCE 8: 3.4796 (IN),88.382 (MM)
    DISTANCE 9: 3.4658 (IN),88.031 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7888 (IN),96.236 (MM)
    DISTANCE 2: 3.7226 (IN),94.554 (MM)
    DISTANCE 3: 3.7230 (IN),94.564 (MM)
    DISTANCE 4: 3.7288 (IN),94.712 (MM)
    DISTANCE 5: 3.7377 (IN),94.938 (MM)
    DISTANCE 6: 3.7170 (IN),94.412 (MM)
    DISTANCE 7: 3.7210 (IN),94.513 (MM)
    DISTANCE 8: 3.7247 (IN),94.607 (MM)
    DISTANCE 9: 3.7942 (IN),96.373 (MM)

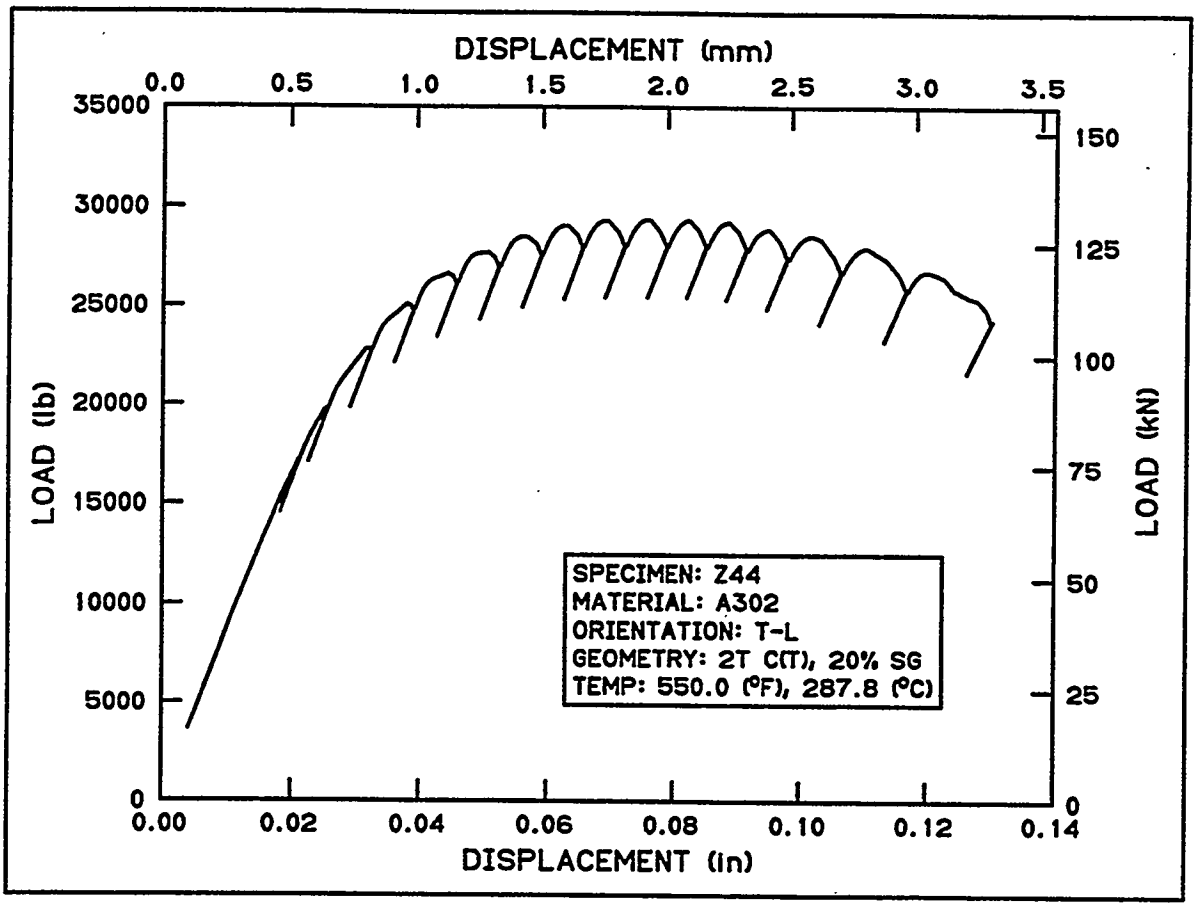

DISPLACEMENT (mm)
0
1
2
3
4
5
6
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

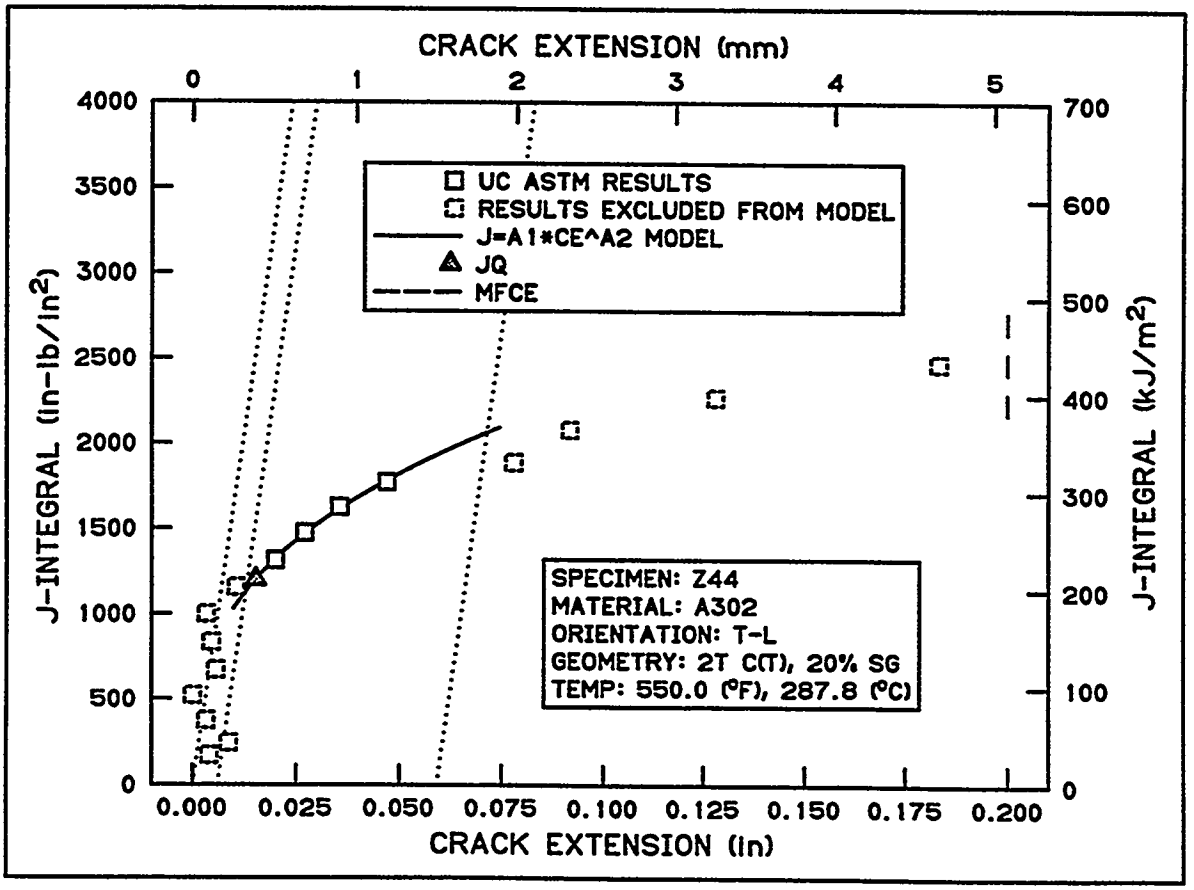

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z44
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4797 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17067	0.0209	0.0040	173.0
2	19703	0.0250	0.0086	245.9
3	22808	0.0314	0.0032	376.1
4	25072	0.0378	0.0000	522.3
5	26636	0.0442	0.0056	673.6
6	27687	0.0505	0.0045	835.2
7	28481	0.0566	0.0033	1000.9
8	29028	0.0630	0.0105	1158.5
9	29289	0.0694	0.0200	1315.4
10	29322	0.0760	0.0271	1476.8
11	29316	0.0823	0.0354	1628.1
12	29238	0.0886	0.0469	1775.2
13	28849	0.0949	0.0780	1890.4
14	28297	0.1032	0.0918	2081.8
15	27238	0.1138	0.1281	2271.7
16	25331	0.1278	0.1832	2473.5

  WIDTH: 3.9965 (IN),101.510 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0019 (IN),25.448 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4529 (IN),87.704 (MM)
    DISTANCE 2: 3.4774 (IN),88.326 (MM)
    DISTANCE 3: 3.4876 (IN),88.585 (MM)
    DISTANCE 4: 3.4904 (IN),88.656 (MM)
    DISTANCE 5: 3.4924 (IN),88.707 (MM)
    DISTANCE 6: 3.4910 (IN),88.671 (MM)
    DISTANCE 7: 3.4857 (IN),88.537 (MM)
    DISTANCE 8: 3.4699 (IN),88.135 (MM)
    DISTANCE 9: 3.4642 (IN),87.991 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7541 (IN),95.354 (MM)
    DISTANCE 2: 3.7040 (IN),94.082 (MM)
    DISTANCE 3: 3.6839 (IN),93.571 (MM)
    DISTANCE 4: 3.6778 (IN),93.416 (MM)
    DISTANCE 5: 3.6761 (IN),93.373 (MM)
    DISTANCE 6: 3.6389 (IN),92.428 (MM)
    DISTANCE 7: 3.6372 (IN),92.385 (MM)
    DISTANCE 8: 3.7014 (IN),94.016 (MM)
    DISTANCE 9: 3.7121 (IN),94.287 (MM)

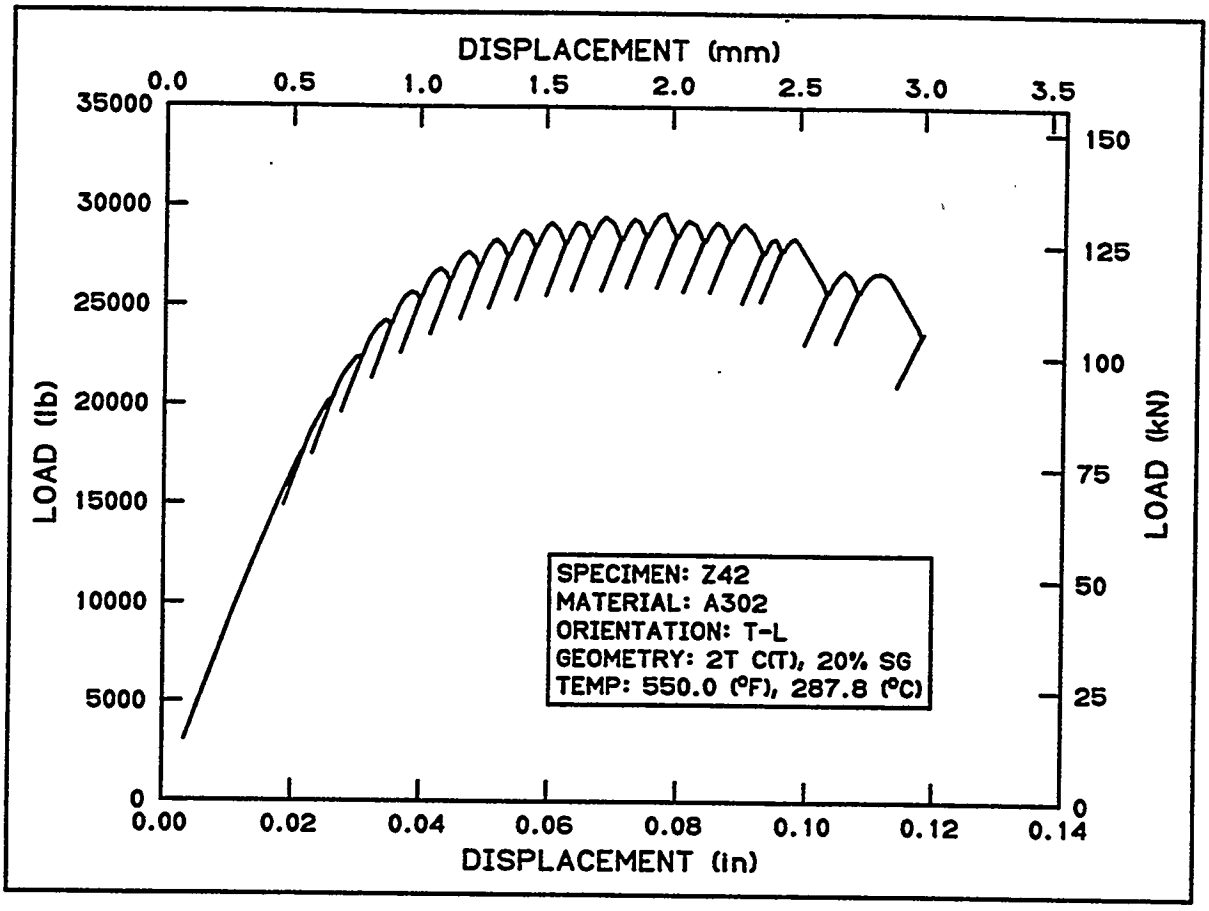

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z44
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

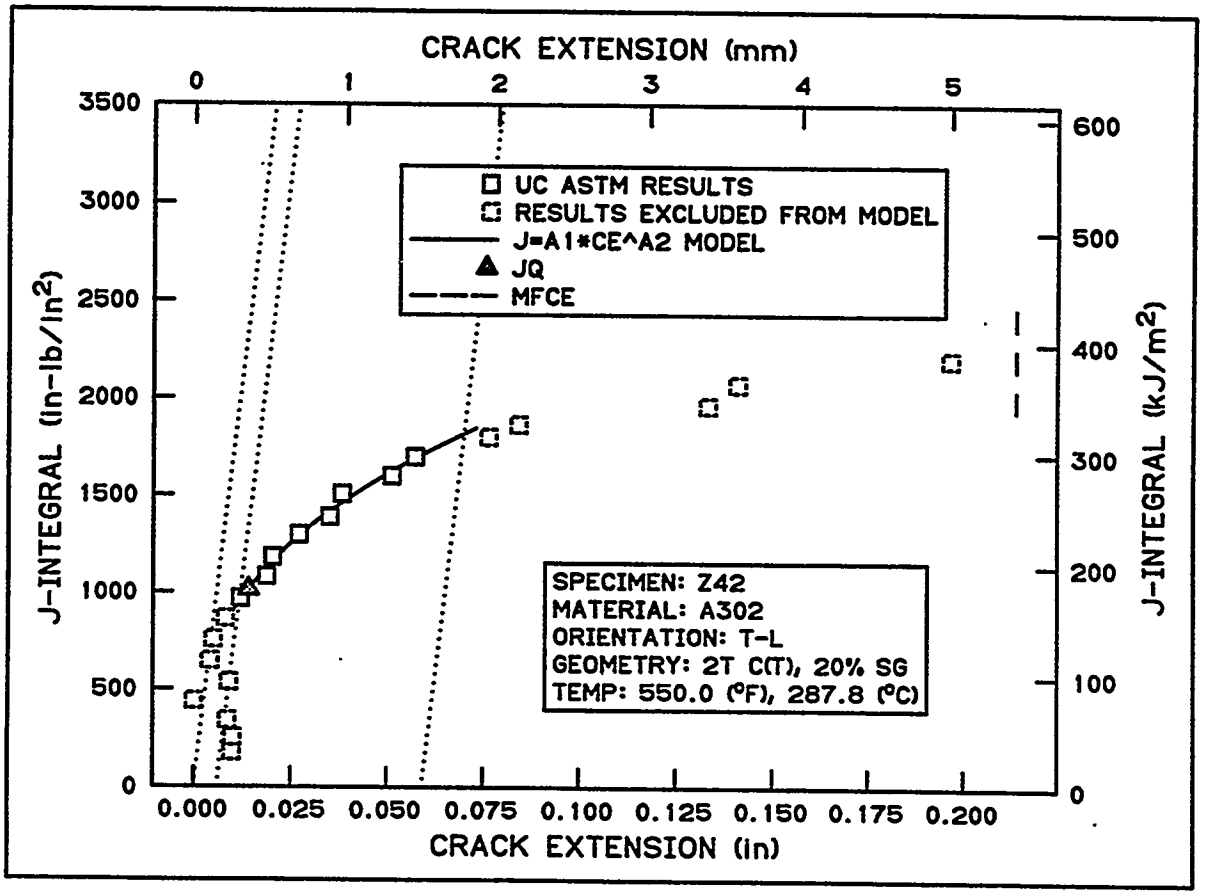

CRACK EXTENSION (mm)
0
1
2
3
4
5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z44
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z42
  MATERIAL CODE: A302
  ORIENTATION:. T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4753 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17459	0.0211	0.0098	178.8
2	20092	0.0253	0.0099	254.9
3	22362	0.0297	0.0086	341.8
4	24189	0.0341	0.0000	440.7
5	25634	0.0382	0.0090	537.9
6	26796	0.0426	0.0042	647.0
7	27657	0.0470	0.0050	757.7
8	28317	0.0514	0.0082	866.6
9	28771	0.0557	0.0120	970.9
10	29165	0.0600	0.0187	1084.0
11	29194	0.0642	0.0203	1185.0
12	29465	0.0685	0.0272	1298.4
13	29364	0.0729	0.0352	1390.2
14	29594	0.0771	0.0384	1509.3
15	29292	0.0813	0.0512	1601.1
16	29212	0.0857	0.0572	1700.4
17	29152	0.0899	0.0764	1802.9
18	28343	0.0942	0.0842	1867.3
19	28237	0.0983	0.1332	1963.1
20	26796	0.1056	0.1409	2072.5
21	26341	0.1130	0.1966	2202.7

  WIDTH: 3.9967 (IN),101.520 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0016 (IN),25.441 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4603 (IN),87.892 (MM)
    DISTANCE 2: 3.4795 (IN),88.379 (MM)
    DISTANCE 3: 3.4854 (IN),88.529 (MM)
    DISTANCE 4: 3.4879 (IN),88.593 (MM)
    DISTANCE 5: 3.4879 (IN),88.593 (MM)
    DISTANCE 6: 3.4843 (IN),88.501 (MM)
    DISTANCE 7: 3.4756 (IN),88.280 (MM)
    DISTANCE 8: 3.4580 (IN),87.833 (MM)
    DISTANCE 9: 3.4530 (IN),87.706 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7958 (IN),96.413 (MM)
    DISTANCE 2: 3.7022 (IN),94.036 (MM)
    DISTANCE 3: 3.6744 (IN),93.330 (MM)
    DISTANCE 4: 3.6826 (IN),93.538 (MM)
    DISTANCE 5: 3.6768 (IN),93.391 (MM)
    DISTANCE 6: 3.6648 (IN),93.086 (MM)
    DISTANCE 7: 3.6454 (IN),92.593 (MM)
    DISTANCE 8: 3.7168 (IN),94.407 (MM)
    DISTANCE 9: 3.7260 (IN),94.640 (MM)

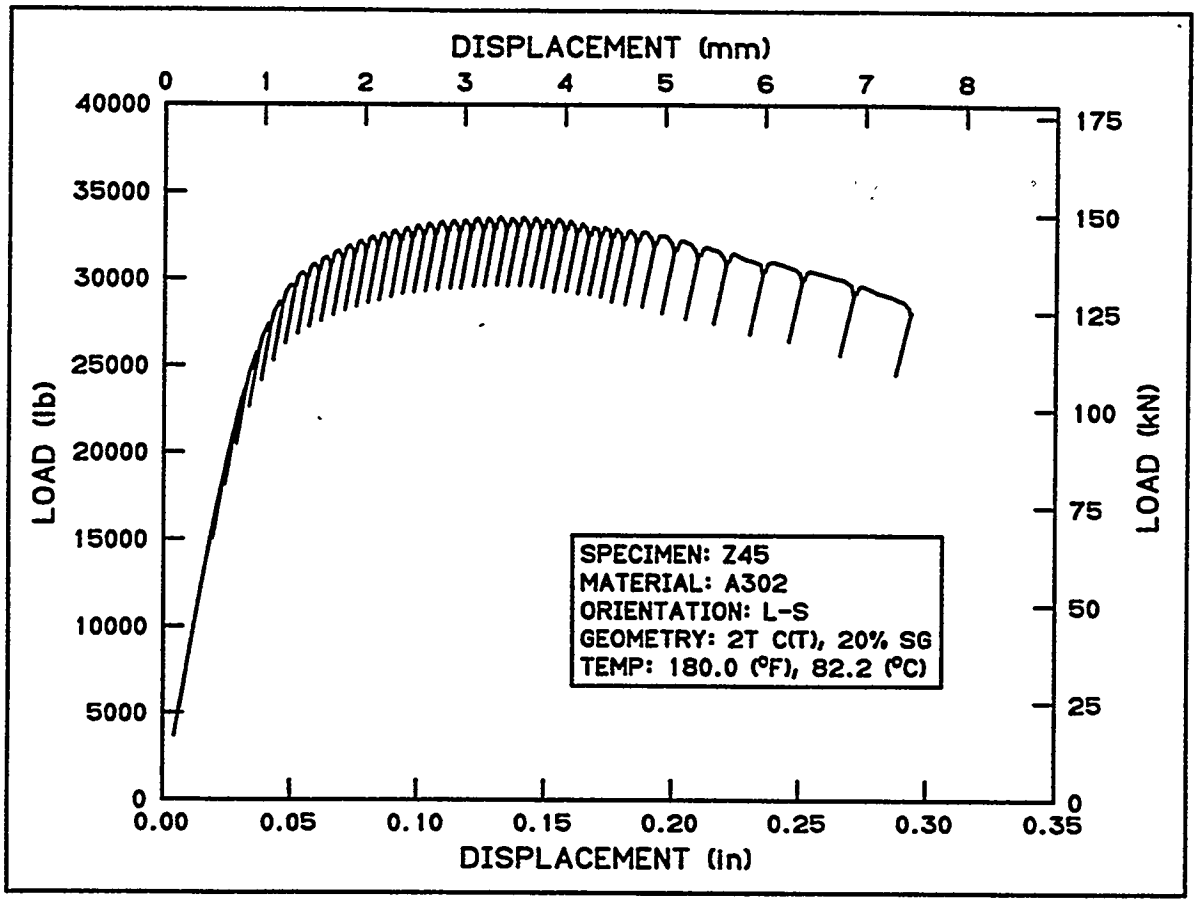

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z42
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

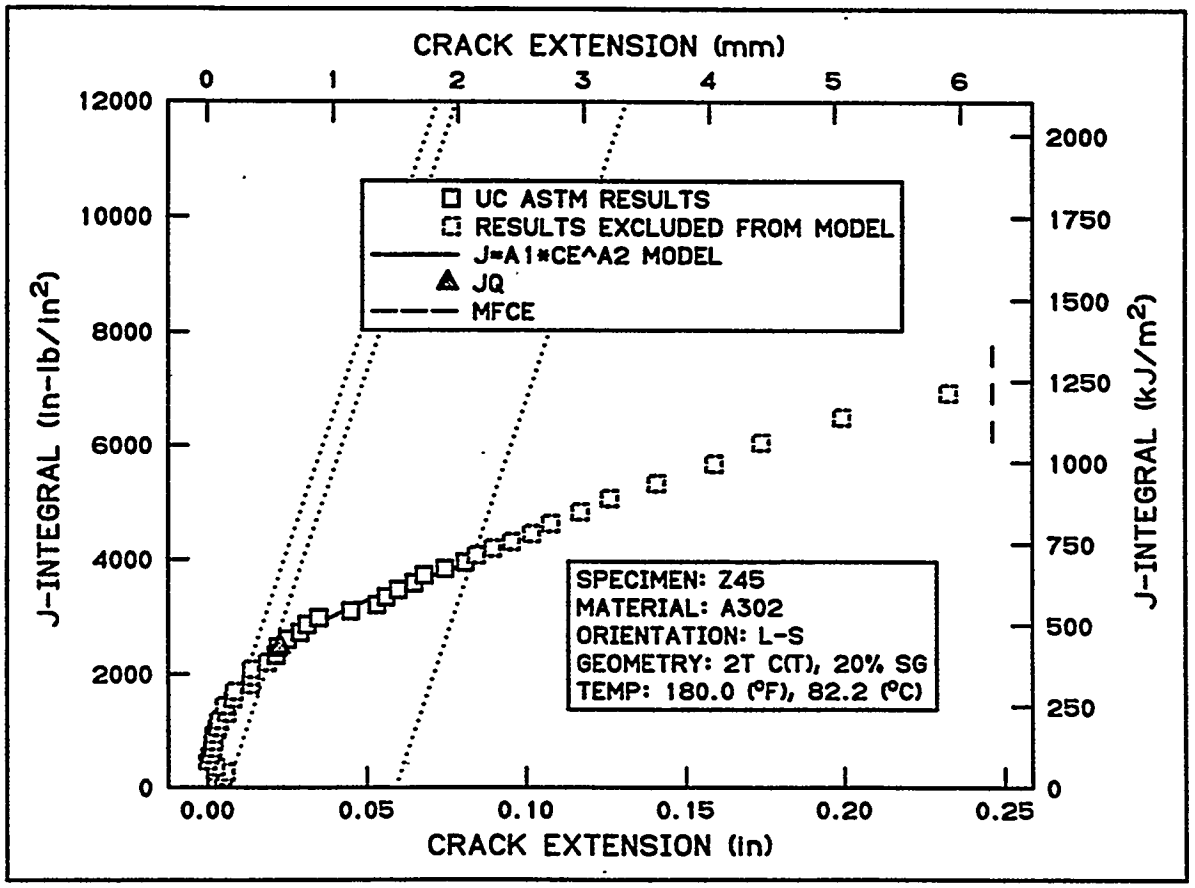

CRACK EXTENSION (mm)
0
1
2
3
4
5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z42
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z45
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4593 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17987	0.0226	0.0048	186.4
2	20979	0.0271	0.0056	267.6
3	23538	0.0315	0.0024	357.0
4	25725	0.0363	0.0000	463.4
5	27400	0.0409	0.0007	574.8
6	28647	0.0453	0.0015	687.7
7	29628	0.0498	0.0017	809.5
8	30340	0.0545	0.0020	937.3
9	30839	0.0590	0.0030	1058.9
10	31239	0.0635	0.0036	1182.1
11	31593	0.0682	0.0060	1311.1
12	31897	0.0726	0.0053	1439.9
13	32149	0.0772	0.0079	1563.8
14	32399	0.0817	0.0083	1693.5
15	32586	0.0862	0.0134	1812.2
16	32768	0.0907	0.0137	1948.8
17	32919	0.0955	0.0137	2084.8
18	33053	0.0998	0.0188	2204.6
19	33172	0.1043	0.0216	2331.2
20	33273	0.1092	0.0223	2468.8
21	33339	0.1139	0.0251	2605.9
22	33363	0.1183	0.0291	2722.0
23	33471	0.1231	0.0312	2864.2
24	33479	0.1275	0.0349	2982.9
25	33544	0.1322	0.0449	3103.7
26	33468	0.1366	0.0531	3209.7
27	33532	0.1413	0.0561	3346.6
28	33505	0.1459	0.0599	3473.2
29	33410	0.1504	0.0649	3590.5
30	33444	0.1550	0.0681	3726.7
31	33318	0.1595	0.0746	3841.4
32	33161	0.1642	0.0808	3959.1
33	32965	0.1686	0.0843	4083.4
34	32947	0.1731	0.0895	4202.8
35	32852	0.1777	0.0954	4318.2
36	32776	0.1832	0.1017	4457.9
37	32699	0.1895	0.1077	4637.1
38	32435	0.1975	0.1168	4837.9
39	32016	0.2069	0.1260	5075.6
40	31608	0.2180	0.1408	5338.4
41	31049	0.2319	0.1589	5679.8
42	30576	0.2483	0.1740	6052.7
43	29941	0.2674	0.1992	6499.8
44	28700	0.2909	0.2326	6929.2

WIDTH: 3.9972 (IN),101.530 (MM)
THICKNESS: 2.0037 (IN),50.894 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0023 (IN),25.458 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4295 (IN),87.109 (MM)
DISTANCE 2: 3.4445 (IN),87.490 (MM)
DISTANCE 3: 3.4538 (IN),87.727 (MM)
DISTANCE 4: 3.4628 (IN),87.955 (MM)
DISTANCE 5: 3.4684 (IN),88.097 (MM)
DISTANCE 6: 3.4730 (IN),88.214 (MM)
DISTANCE 7: 3.4744 (IN),88.250 (MM)
DISTANCE 8: 3.4732 (IN),88.219 (MM)
DISTANCE 9: 3.4563 (IN),87.790 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7243 (IN),94.597 (MM)
DISTANCE 2: 3.6690 (IN),93.193 (MM)
DISTANCE 3: 3.7116 (IN),94.275 (MM)
DISTANCE 4: 3.7064 (IN),94.143 (MM)
DISTANCE 5: 3.7296 (IN),94.732 (MM)
DISTANCE 6: 3.7120 (IN),94.285 (MM)
DISTANCE 7: 3.7056 (IN),94.122 (MM)
DISTANCE 8: 3.6840 (IN),93.574 (MM)
DISTANCE 9: 3.7640 (IN),95.606 (MM)

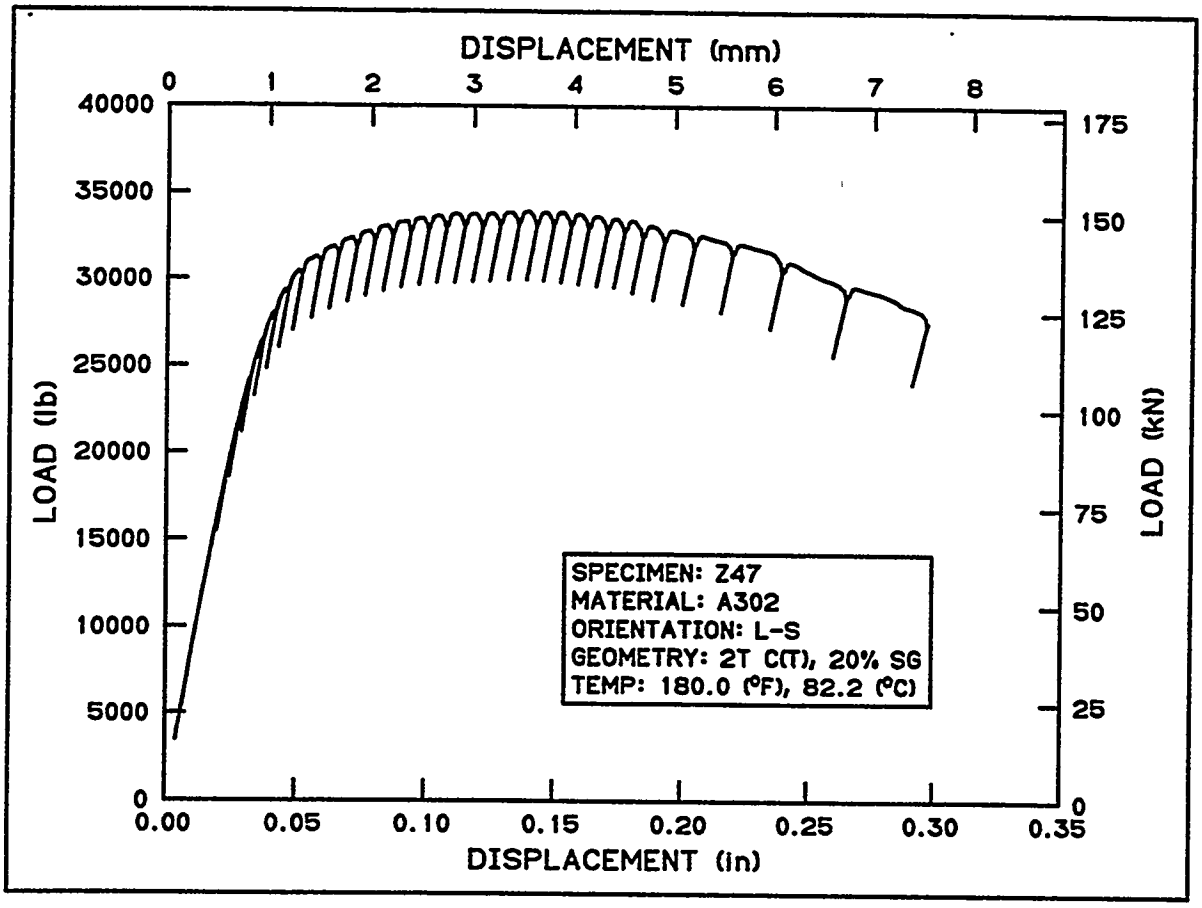

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
8
40000
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
175
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z45
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
DISPLACEMENT (in)

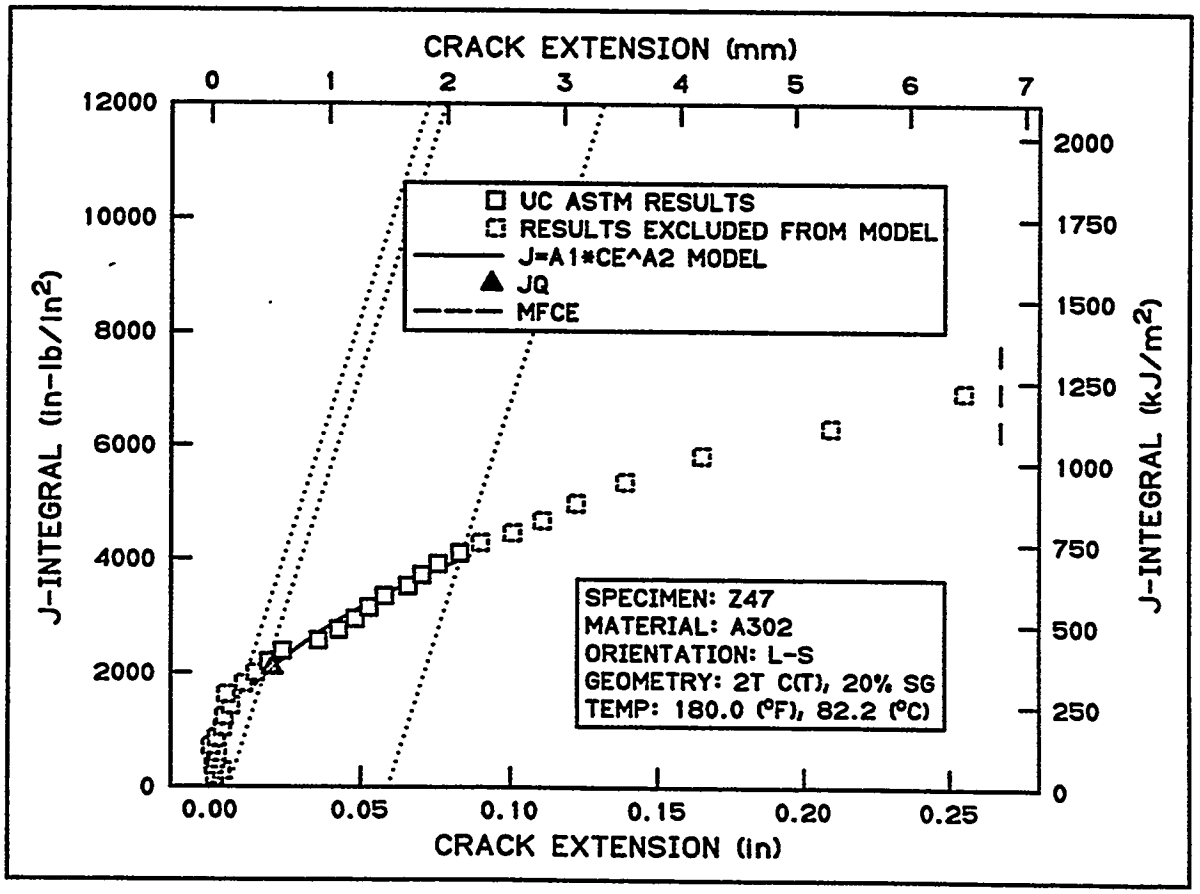

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
12000
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z45
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z47
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4508 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18347	0.0225	0.0013	192.2
2	21510	0.0272	0.0037	274.1
3	24164	0.0318	0.0010	368.9
4	26332	0.0363	0.0016	473.7
5	27984	0.0407	0.0021	586.2
6	29320	0.0453	0.0000	706.6
7	30465	0.0506	0.0018	845.6
8	31310	0.0574	0.0038	1035.5
9	31902	0.0642	0.0044	1226.7
10	32379	0.0712	0.0066	1420.4
11	32753	0.0780	0.0050	1618.7
12	33065	0.0848	0.0110	1810.3
13	33306	0.0917	0.0149	2003.7
14	33490	0.0986	0.0193	2196.9
15	33640	0.1055	0.0239	2391.6
16	33737	0.1124	0.0359	2576.2
17	33740	0.1193	0.0426	2766.5
18	33785	0.1261	0.0482	2955.7
19	33845	0.1331	0.0527	3158.8
20	33886	0.1399	0.0578	3357.0
21	33839	0.1468	0.0656	3535.5
22	33836	0.1533	0.0703	3731.0
23	33729	0.1605	0.0757	3923.7
24	33587	0.1676	0.0831	4116.9
25	33476	0.1743	0.0899	4297.6
26	33331	0.1811	0.1005	4475.4
27	32958	0.1900	0.1105	4691.0
28	32631	0.2017	0.1222	4993.6
29	32191	0.2166	0.1388	5371.2
30	31513	0.2362	0.1647	5835.1
31	29757	0.2615	0.2089	6322.3
32	28191	0.2946	0.2547	6954.5

  WIDTH: 3.9975 (IN),101.540 (MM)
  THICKNESS: 2.0039 (IN),50.899 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0015 (IN),25.438 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4199 (IN),86.865 (MM)
    DISTANCE 2: 3.4436 (IN),87.467 (MM)
    DISTANCE 3: 3.4542 (IN),87.737 (MM)
    DISTANCE 4: 3.4561 (IN),87.785 (MM)
    DISTANCE 5: 3.4562 (IN),87.787 (MM)
    DISTANCE 6: 3.4605 (IN),87.897 (MM)
    DISTANCE 7: 3.4592 (IN),87.864 (MM)
    DISTANCE 8: 3.4571 (IN),87.810 (MM)
    DISTANCE 9: 3.4427 (IN),87.445 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7472 (IN),95.179 (MM)
    DISTANCE 2: 3.6928 (IN),93.797 (MM)
    DISTANCE 3: 3.7058 (IN),94.127 (MM)
    DISTANCE 4: 3.7230 (IN),94.564 (MM)
    DISTANCE 5: 3.7210 (IN),94.513 (MM)
    DISTANCE 6: 3.7116 (IN),94.275 (MM)
    DISTANCE 7: 3.7340 (IN),94.844 (MM)
    DISTANCE 8: 3.7224 (IN),94.549 (MM)
    DISTANCE 9: 3.7394 (IN),94.981 (MM)

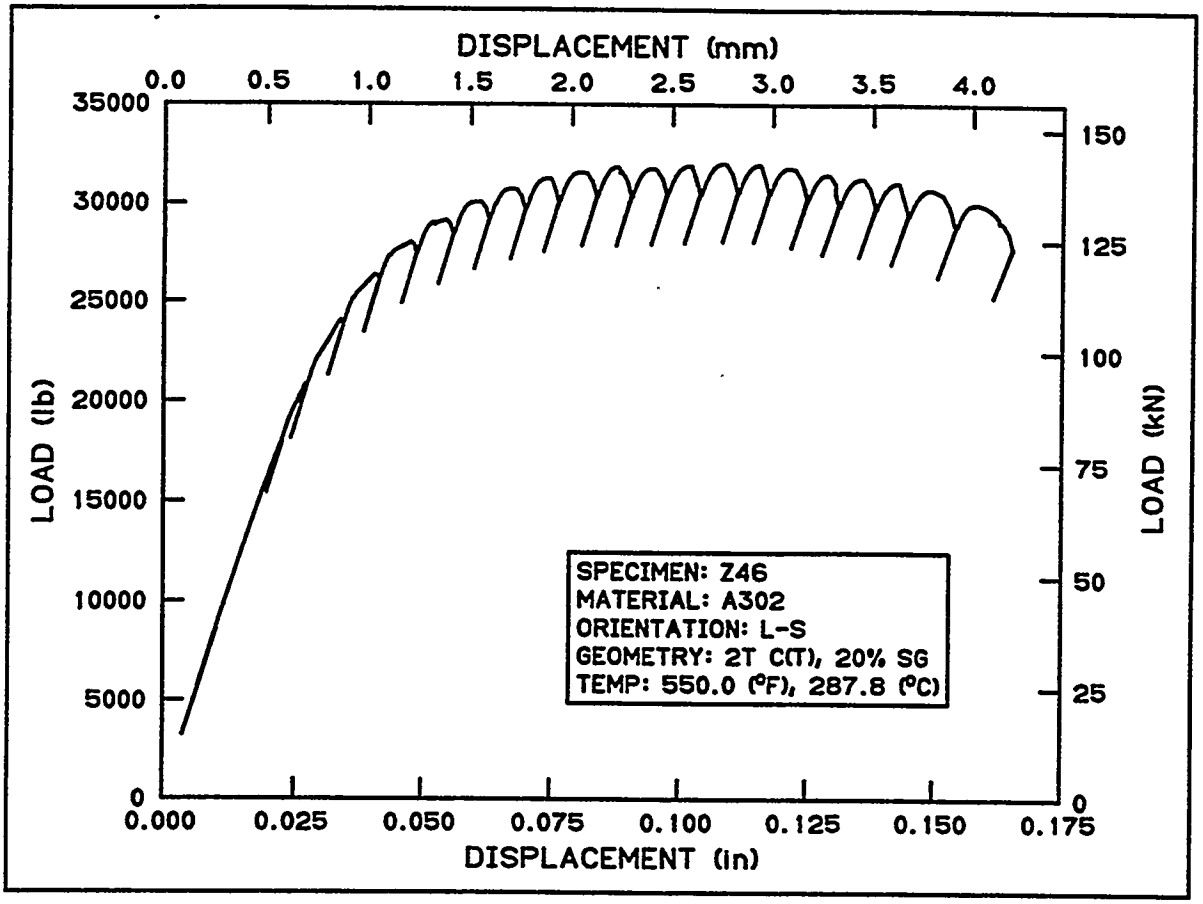

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
8
40000
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
175
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z47
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
DISPLACEMENT (in)

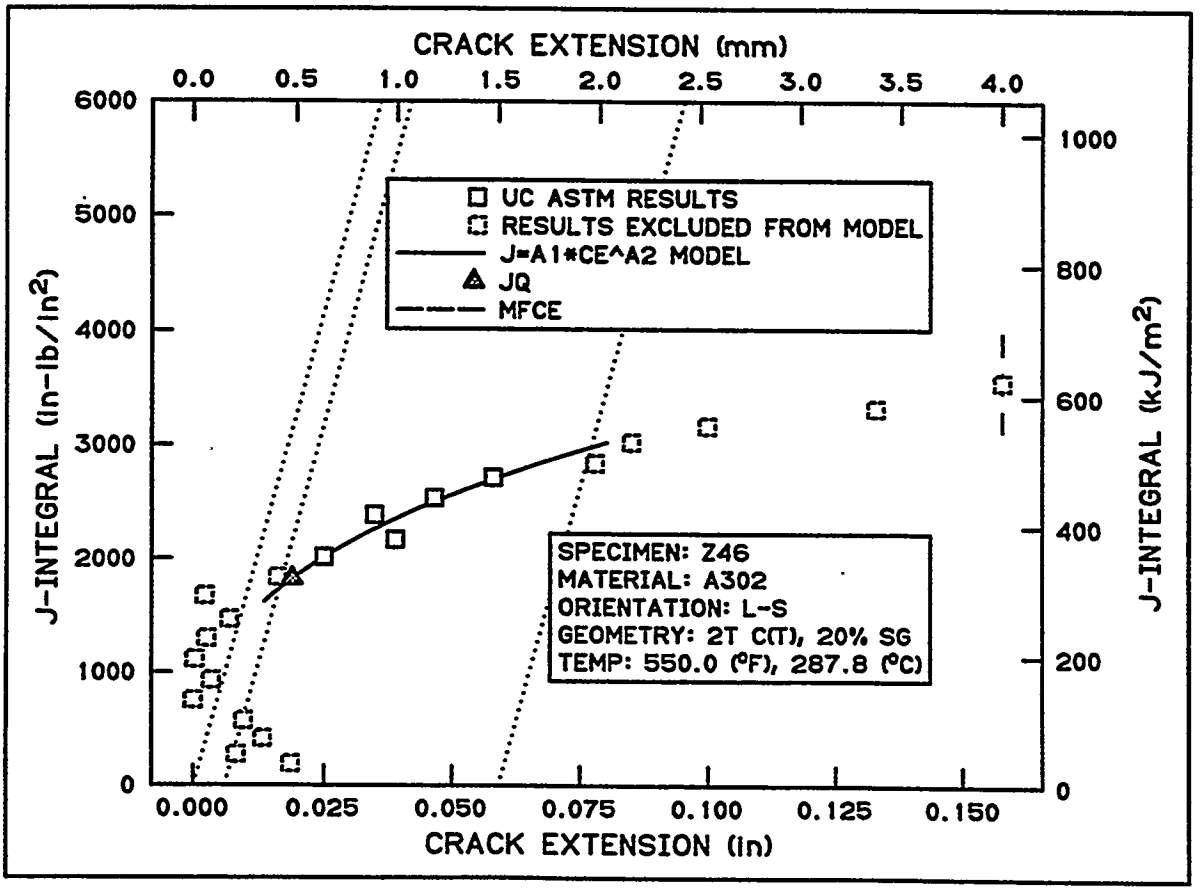

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
12000
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z47
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z46
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4697 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17940	0.0224	0.0185	191.6
2	20789	0.0269	0.0081	275.5
3	24059	0.0338	0.0131	416.6
4	26374	0.0405	0.0095	575.8
5	28031	0.0475	0.0000	755.3
6	29156	0.0543	0.0034	931.1
7	30073	0.0611	0.0003	1114.1
8	30704	0.0680	0.0025	1298.5
9	31238	0.0747	0.0068	1467.1
10	31532	0.0816	0.0022	1674.0
11	31628	0.0884	0.0161	1839.2
12	31719	0.0953	0.0251	2016.6
13	31900	0.1020	0.0390	2169.8
14	32013	0.1089	0.0350	2385.4
15	31969	0.1156	0.0466	2535.4
16	31738	0.1225	0.0581	2718.4
17	31423	0.1293	0.0778	2841.4
18	31242	0.1360	0.0850	3027.1
19	31031	0.1429	0.0998	3167.4
20	30483	0.1515	0.1329	3325.8
21	29012	0.1632	0.1576	3555.8

  WIDTH: 3.9969 (IN),101.520 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0019 (IN),25.448 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4577 (IN),87.826 (MM)
    DISTANCE 2: 3.4722 (IN),88.194 (MM)
    DISTANCE 3: 3.4768 (IN),88.311 (MM)
    DISTANCE 4: 3.4792 (IN),88.372 (MM)
    DISTANCE 5: 3.4779 (IN),88.339 (MM)
    DISTANCE 6: 3.4786 (IN),88.356 (MM)
    DISTANCE 7: 3.4741 (IN),88.242 (MM)
    DISTANCE 8: 3.4592 (IN),87.864 (MM)
    DISTANCE 9: 3.4518 (IN),87.676 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6472 (IN),92.639 (MM)
    DISTANCE 2: 3.6216 (IN),91.989 (MM)
    DISTANCE 3: 3.6162 (IN),91.851 (MM)
    DISTANCE 4: 3.6314 (IN),92.238 (MM)
    DISTANCE 5: 3.6248 (IN),92.070 (MM)
    DISTANCE 6: 3.6266 (IN),92.116 (MM)
    DISTANCE 7: 3.6158 (IN),91.841 (MM)
    DISTANCE 8: 3.6460 (IN),92.608 (MM)
    DISTANCE 9: 3.6540 (IN),92.812 (MM)

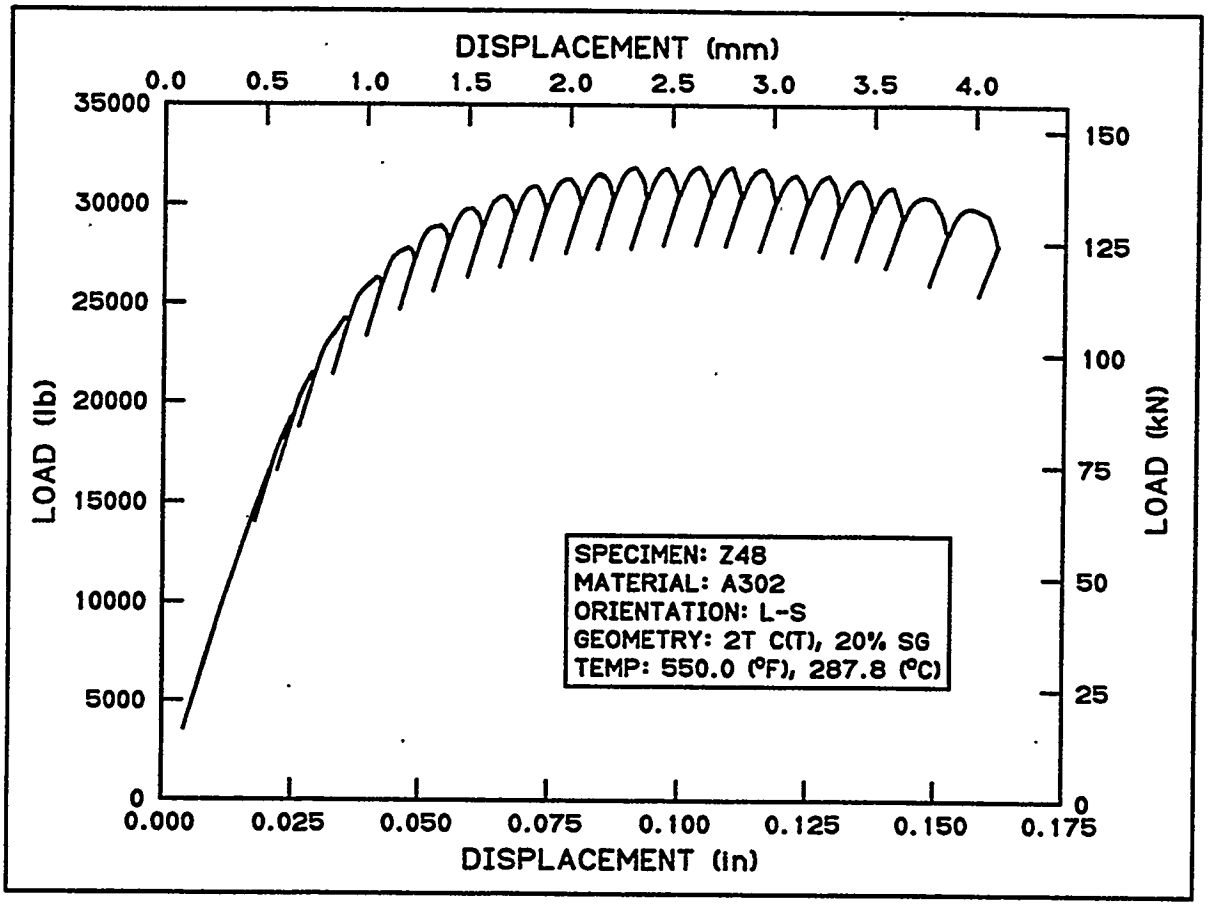

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z46
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

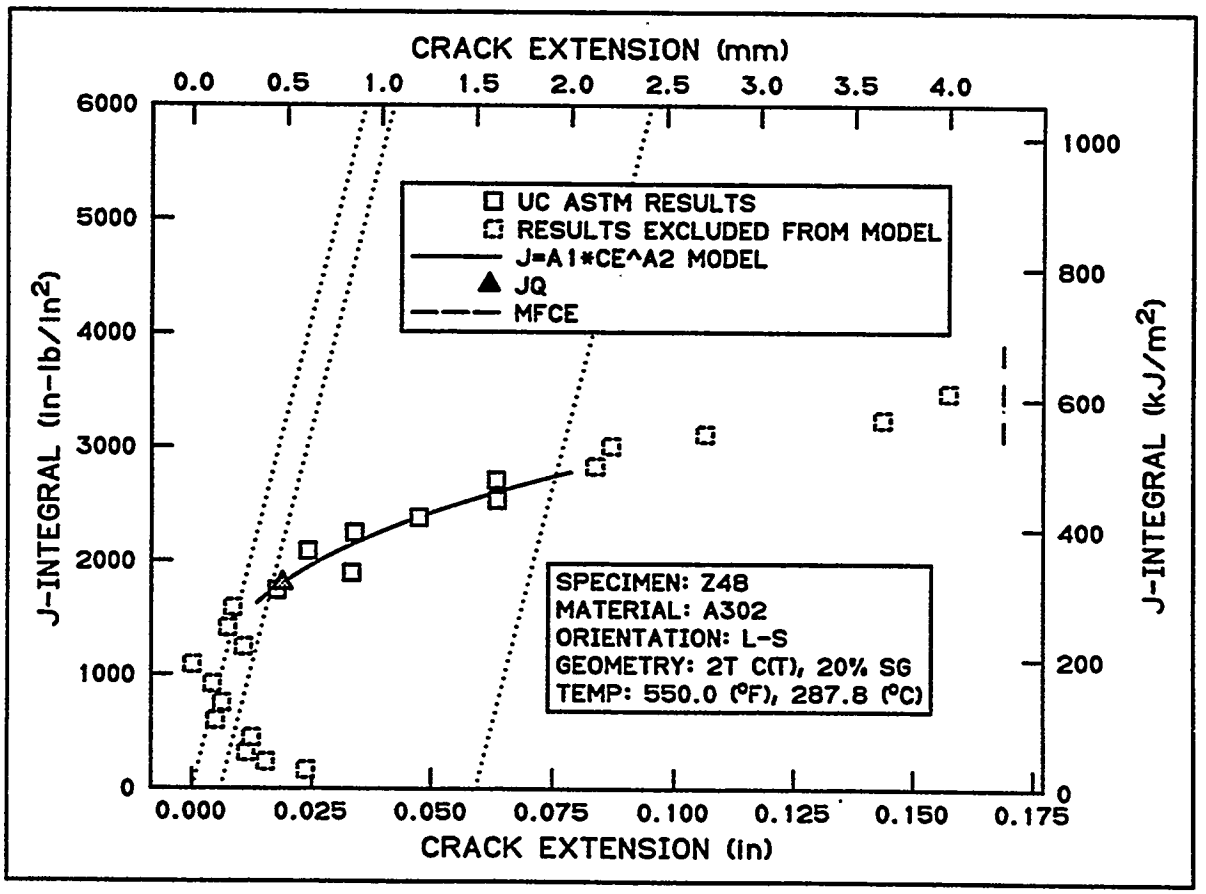

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z46
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z48
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4735 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16495	0.0205	0.0237	165.5
2	19173	0.0246	0.0153	237.2
3	21479	0.0288	0.0113	317.4
4	24213	0.0350	0.0123	449.7
5	26284	0.0412	0.0048	600.4
6	27803	0.0474	0.0062	756.1
7	28909	0.0537	0.0042	919.9
8	29774	0.0599	0.0000	1090.5
9	30415	0.0662	0.0107	1245.3
10	30882	0.0724	0.0074	1413.9
11	31277	0.0788	0.0084	1591.8
12	31490	0.0850	0.0177	1745.9
13	31836	0.0913	0.0333	1898.7
14	31815	0.0975	0.0241	2090.6
15	31894	0.1038	0.0338	2251.7
16	31872	0.1101	0.0474	2385.0
17	31768	0.1164	0.0635	2538.9
18	31488	0.1226	0.0633	2714.4
19	31459	0.1289	0.0836	2836.3
20	31227	0.1352	0.0869	3012.9
21	30840	0.1414	0.1064	3121.2
22	30254	0.1493	0.1435	3249.6
23	29467	0.1599	0.1573	3484.4

  WIDTH: 3.9992 (IN),101.580 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0003 (IN),25.408 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4556 (IN),87.772 (MM)
    DISTANCE 2: 3.4734 (IN),88.224 (MM)
    DISTANCE 3: 3.4825 (IN),88.455 (MM)
    DISTANCE 4: 3.4846 (IN),88.509 (MM)
    DISTANCE 5: 3.4850 (IN),88.519 (MM)
    DISTANCE 6: 3.4826 (IN),88.458 (MM)
    DISTANCE 7: 3.4751 (IN),88.268 (MM)
    DISTANCE 8: 3.4566 (IN),87.798 (MM)
    DISTANCE 9: 3.4462 (IN),87.533 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6606 (IN),92.979 (MM)
    DISTANCE 2: 3.6402 (IN),92.461 (MM)
    DISTANCE 3: 3.6372 (IN),92.385 (MM)
    DISTANCE 4: 3.6500 (IN),92.710 (MM)
    DISTANCE 5: 3.6520 (IN),92.761 (MM)
    DISTANCE 6: 3.6410 (IN),92.481 (MM)
    DISTANCE 7: 3.6333 (IN),92.286 (MM)
    DISTANCE 8: 3.6353 (IN),92.337 (MM)
    DISTANCE 9: 3.6424 (IN),92.517 (MM)

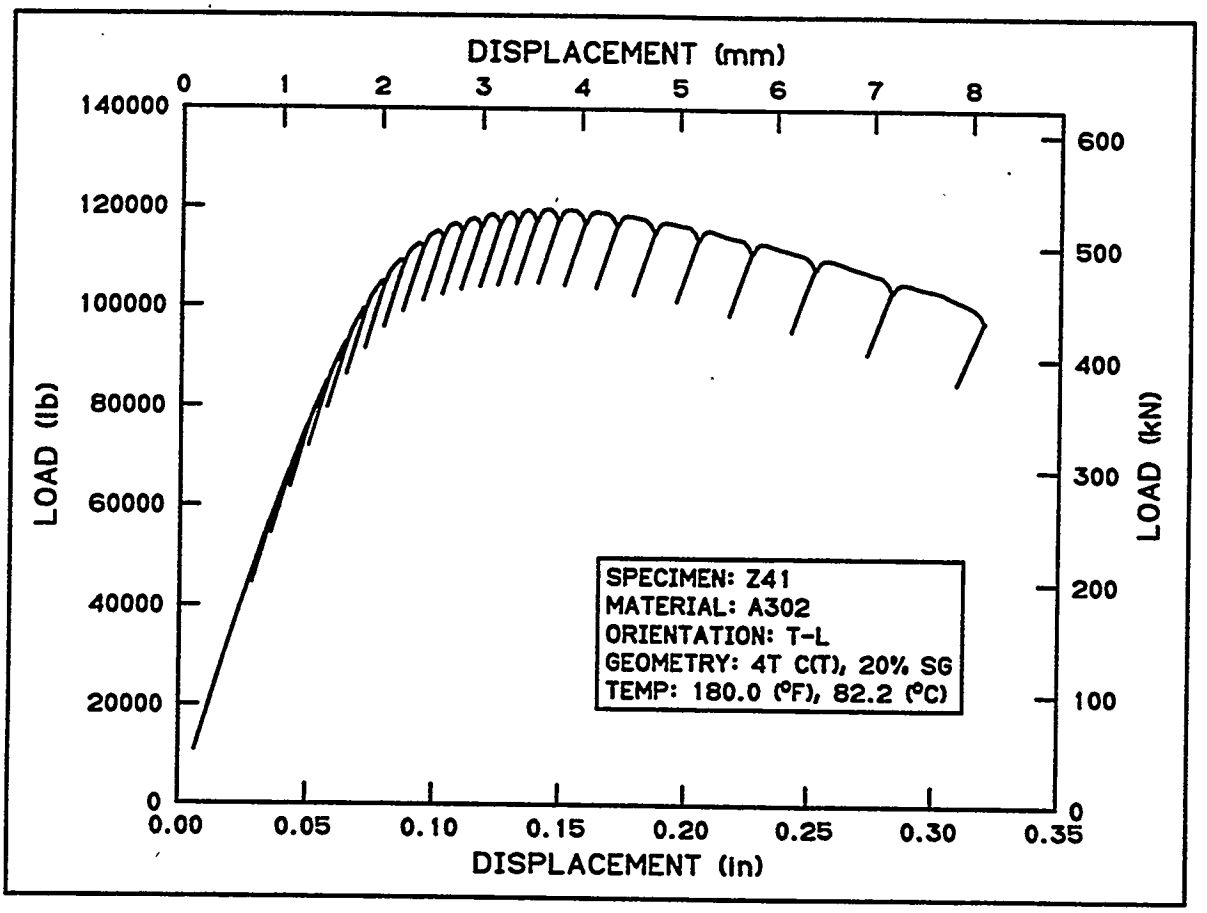

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
LOAD (lb)
35000 30000 25000 20000 15000 10000 5000 0
LOAD (kN)
150 125 100 75 50 25 0
SPECIMEN: Z48
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

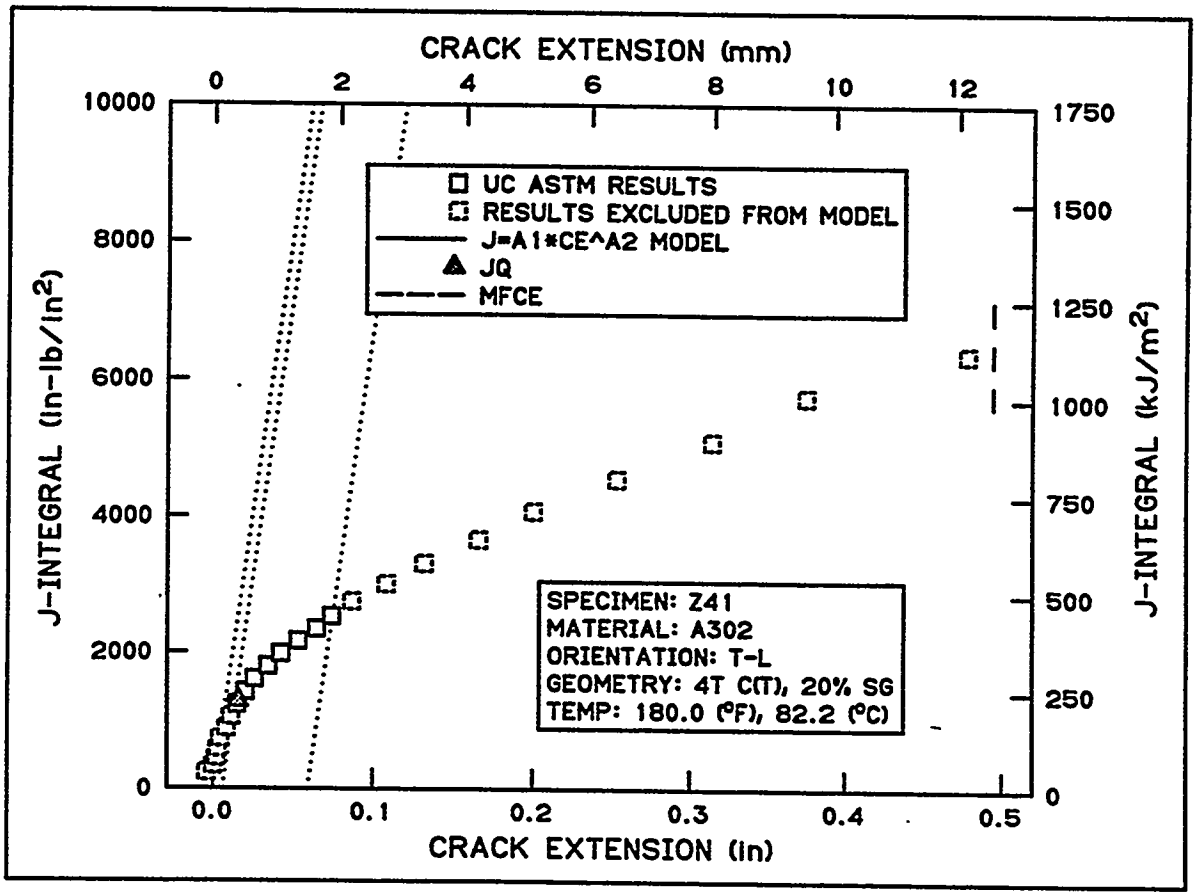

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z48
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z41
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 4.9363 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	56929	0.0355	-0.0041	239.7
2	67005	0.0428	0.0000	340.9
3	76111	0.0499	0.0019	458.0
4	84809	0.0572	0.0028	589.6
5	92626	0.0645	0.0044	735.9
6	99382	0.0716	0.0083	893.0
7	104940	0.0788	0.0111	1062.3
8	109331	0.0860	0.0149	1237.8
9	112697	0.0932	0.0202	1420.0
10	115273	0.1005	0.0259	1613.3
11	116794	0.1077	0.0342	1801.1
12	117856	0.1149	0.0421	1985.3
13	118654	0.1219	0.0529	2171.2
14	119076	0.1293	0.0644	2350.0
15	119528	0.1364	0.0739	2536.2
16	119701	0.1450	0.0866	2755.3
17	119400	0.1554	0.1083	3009.2
18	118827	0.1680	0.1317	3313.8
19	117720	0.1829	0.1655	3666.9
20	116237	0.2008	0.2001	4081.1
21	113616	0.2225	0.2526	4556.2
22	110513	0.2479	0.3140	5099.9
23	106363	0.2788	0.3751	5754.5
24	100030	0.3160	0.4780	6381.7

  WIDTH: 8.0300 (IN),203.960 (MM)
  THICKNESS: 4.0000 (IN),101.600 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0000 (IN),50.800 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 6.9200 (IN),175.770 (MM)
    DISTANCE 2: 6.9200 (IN),175.770 (MM)
    DISTANCE 3: 6.9500 (IN),176.530 (MM)
    DISTANCE 4: 6.9400 (IN),176.280 (MM)
    DISTANCE 5: 6.9400 (IN),176.280 (MM)
    DISTANCE 6: 6.9500 (IN),176.530 (MM)
    DISTANCE 7: 6.9400 (IN),176.280 (MM)
    DISTANCE 8: 6.9300 (IN),176.020 (MM)
    DISTANCE 9: 6.9200 (IN),175.770 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.5722 (IN),192.330 (MM)
    DISTANCE 2: 7.4444 (IN),189.090 (MM)
    DISTANCE 3: 7.3960 (IN),187.860 (MM)
    DISTANCE 4: 7.3916 (IN),187.750 (MM)
    DISTANCE 5: 7.3816 (IN),187.490 (MM)
    DISTANCE 6: 7.3546 (IN),186.810 (MM)
    DISTANCE 7: 7.4112 (IN),188.240 (MM)
    DISTANCE 8: 7.4694 (IN),189.720 (MM)
    DISTANCE 9: 7.6194 (IN),193.530 (MM)

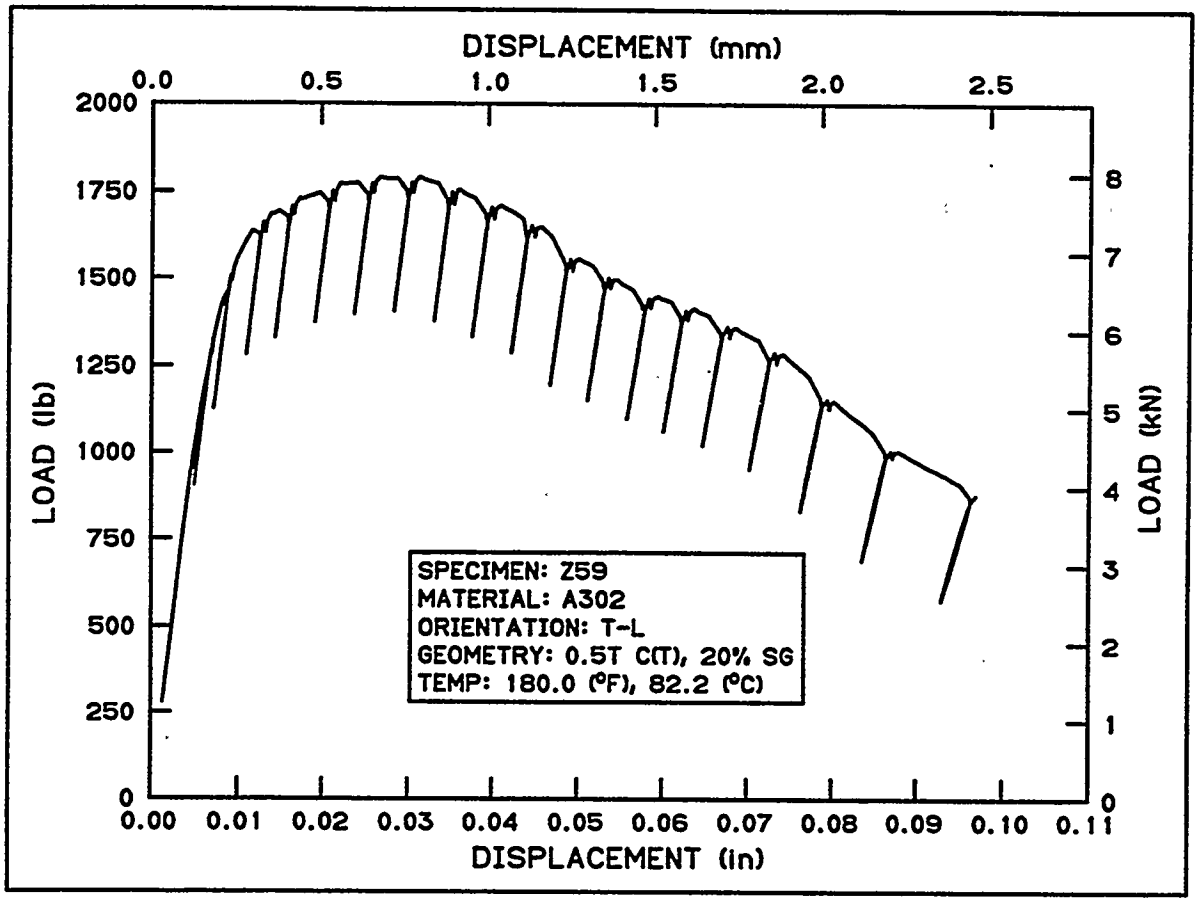

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
140000
120000
100000
80000
60000
40000
20000
0
LOAD (lb)
600
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)

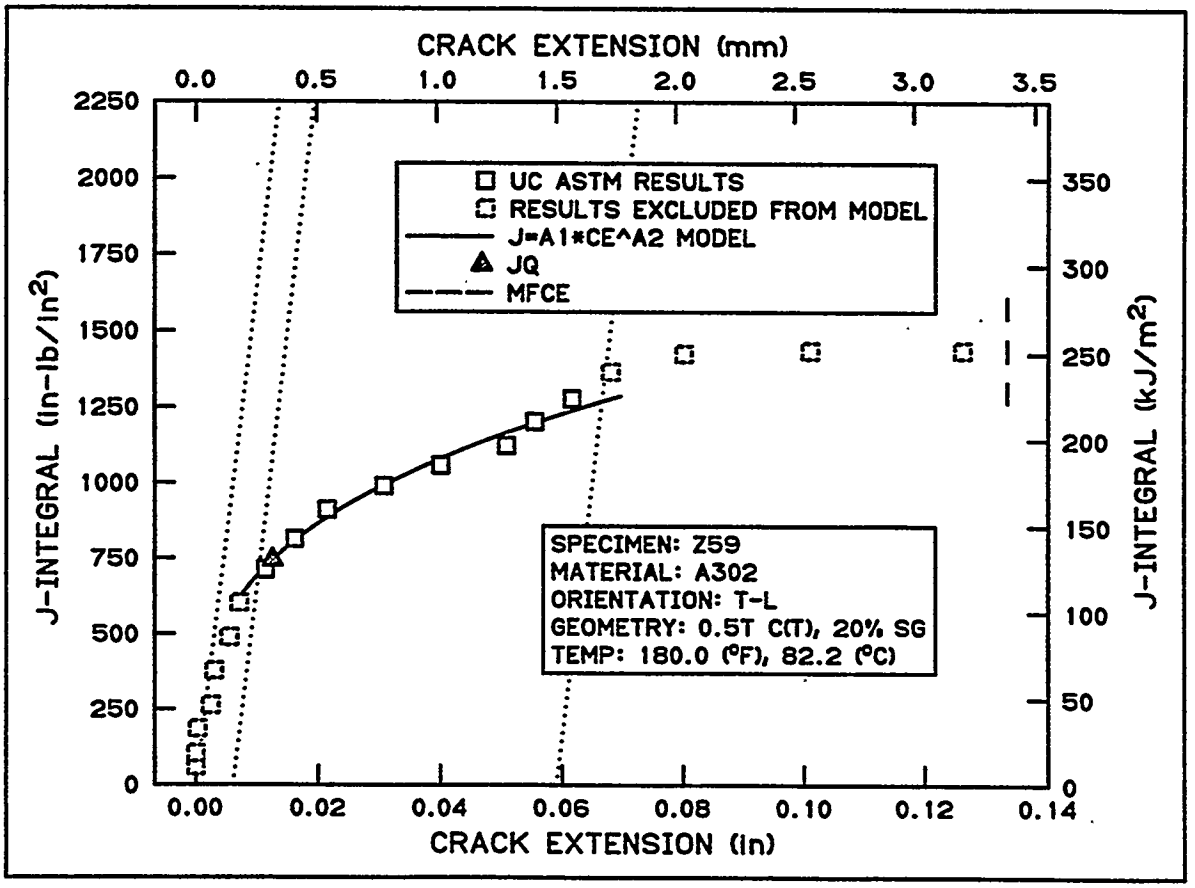

CRACK EXTENSION (mm)
0 2 4 6 8 10 12
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z41
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.0 0.1 0.2 0.3 0.4 0.5
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z59
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6150 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1183	0.0061	0.0000	60.7
2	1436	0.0082	0.0000	104.2
3	1636	0.0115	0.0003	185.9
4	1694	0.0147	0.0024	263.7
5	1746	0.0195	0.0030	378.9
6	1774	0.0240	0.0054	489.5
7	1787	0.0286	0.0070	603.7
8	1774	0.0334	0.0112	714.0
9	1733	0.0378	0.0161	814.7
10	1688	0.0425	0.0215	911.5
11	1619	0.0468	0.0307	990.3
12	1536	0.0517	0.0401	1059.3
13	1468	0.0564	0.0510	1123.4
14	1433	0.0610	0.0555	1202.8
15	1394	0.0654	0.0617	1278.5
16	1325	0.0712	0.0681	1368.2
17	1220	0.0773	0.0802	1427.1
18	1057	0.0848	0.1010	1437.6
19	911	0.0950	0.1261	1439.1

  WIDTH: 0.9986 (IN),25.364 (MM)
  THICKNESS: 0.4993 (IN),12.682 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2510 (IN),6.375 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8497 (IN),21.582 (MM)
    DISTANCE 2: 0.8582 (IN),21.798 (MM)
    DISTANCE 3: 0.8636 (IN),21.935 (MM)
    DISTANCE 4: 0.8670 (IN),22.022 (MM)
    DISTANCE 5: 0.8709 (IN),22.121 (MM)
    DISTANCE 6: 0.8740 (IN),22.200 (MM)
    DISTANCE 7: 0.8735 (IN),22.187 (MM)
    DISTANCE 8: 0.8663 (IN),22.004 (MM)
    DISTANCE 9: 0.8598 (IN),21.839 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9790 (IN),24.867 (MM)
    DISTANCE 2: 0.9683 (IN),24.595 (MM)
    DISTANCE 3: 0.9914 (IN),25.182 (MM)
    DISTANCE 4: 0.9999 (IN),25.397 (MM)
    DISTANCE 5: 1.0158 (IN),25.801 (MM)
    DISTANCE 6: 1.0138 (IN),25.751 (MM)
    DISTANCE 7: 1.0225 (IN),25.972 (MM)
    DISTANCE 8: 0.9920 (IN),25.197 (MM)
    DISTANCE 9: 1.0036 (IN),25.491 (MM)

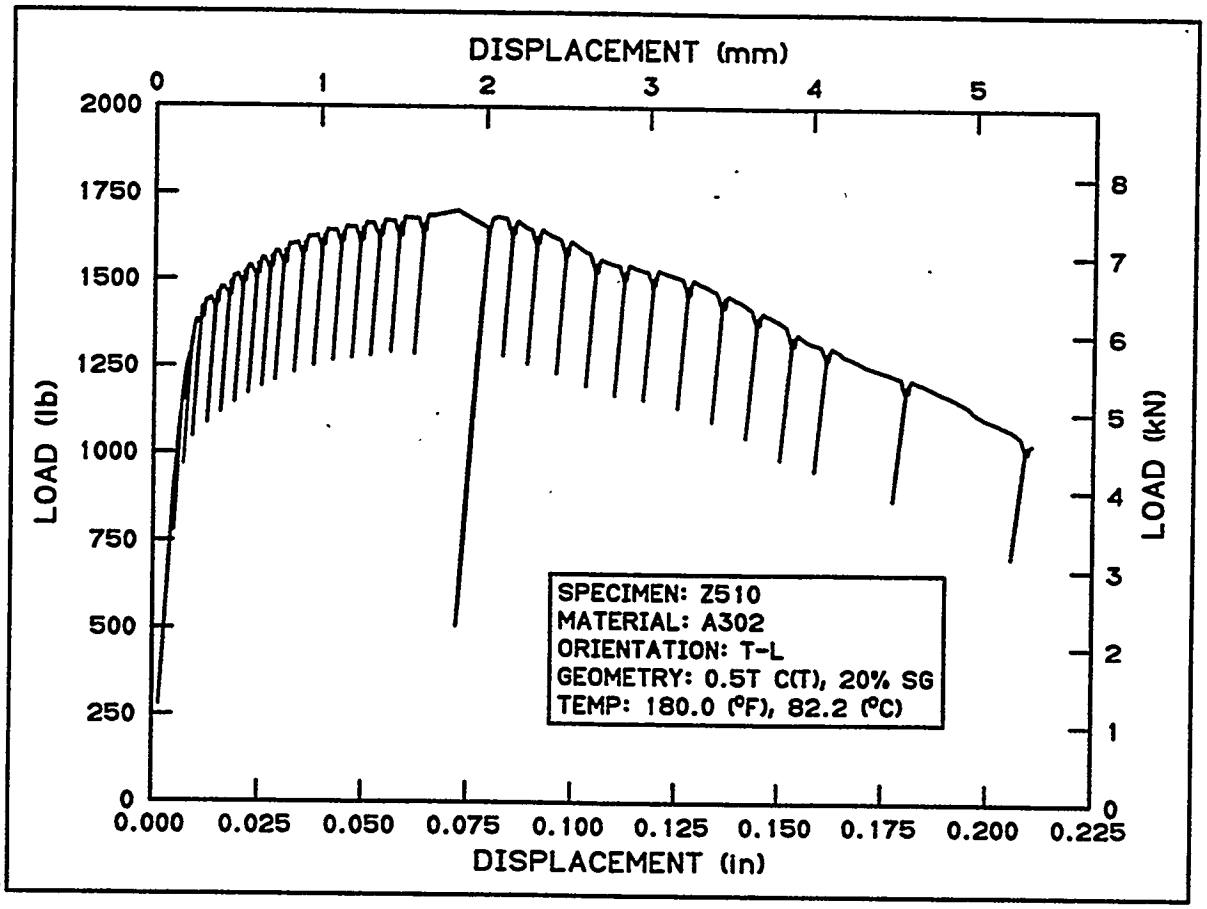

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z59
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

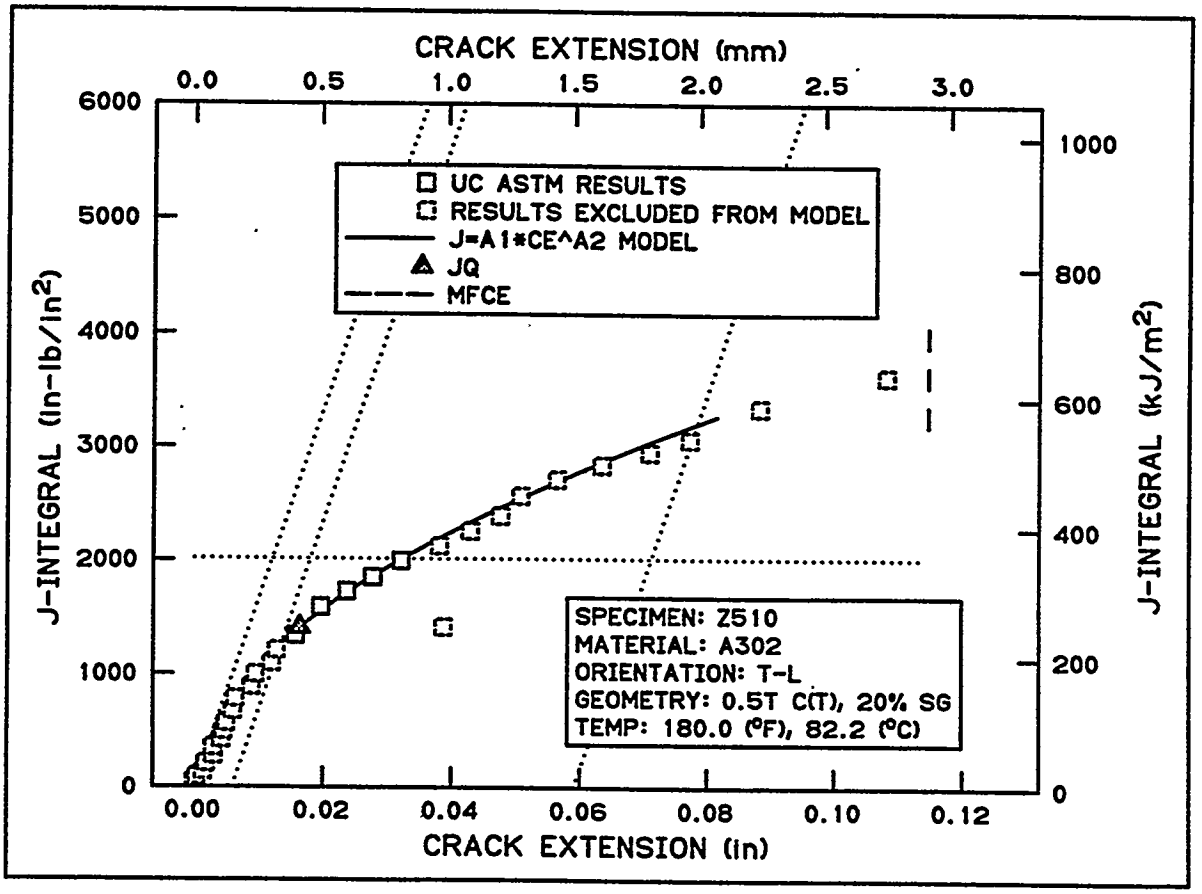

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z59
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z510
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6320 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1075	0.0060	0.0000	57.6
2	1260	0.0079	0.0005	95.9
3	1381	0.0100	0.0014	140.2
4	1445	0.0132	0.0018	211.4
5	1478	0.0161	0.0030	279.3
6	1513	0.0197	0.0029	351.1
7	1537	0.0226	0.0042	422.0
8	1561	0.0259	0.0045	495.0
9	1582	0.0291	0.0049	568.0
10	1607	0.0339	0.0060	673.4
11	1629	0.0385	0.0063	781.9
12	1645	0.0431	0.0089	888.2
13	1654	0.0478	0.0095	998.4
14	1664	0.0519	0.0120	1098.6
15	1672	0.0569	0.0128	1212.5
16	1680	0.0626	0.0157	1343.3
17	1702	0.0721	0.0387	1416.9
18	1428	0.0779	0.0197	1591.5
19	1679	0.0836	0.0238	1728.3
20	1648	0.0896	0.0278	1852.1
21	1618	0.0966	0.0322	1997.7
22	1579	0.1037	0.0381	2129.3
23	1543	0.1108	0.0429	2261.6
24	1528	0.1177	0.0475	2395.1
25	1506	0.1261	0.0507	2570.9
26	1469	0.1343	0.0563	2716.1
27	1419	0.1429	0.0633	2841.8
28	1370	0.1513	0.0709	2951.2
29	1313	0.1597	0.0772	3065.1
30	1224	0.1789	0.0883	3346.6
31	1057	0.2076	0.1082	3625.2

  WIDTH: 0.9986 (IN),25.364 (MM)
  THICKNESS: 0.4995 (IN),12.687 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2510 (IN),6.375 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8679 (IN),22.045 (MM)
    DISTANCE 2: 0.8784 (IN),22.311 (MM)
    DISTANCE 3: 0.8863 (IN),22.512 (MM)
    DISTANCE 4: 0.8844 (IN),22.464 (MM)
    DISTANCE 5: 0.8887 (IN),22.573 (MM)
    DISTANCE 6: 0.8880 (IN),22.555 (MM)
    DISTANCE 7: 0.8855 (IN),22.492 (MM)
    DISTANCE 8: 0.8830 (IN),22.428 (MM)
    DISTANCE 9: 0.8710 (IN),22.123 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9843 (IN),25.001 (MM)
    DISTANCE 2: 1.0052 (IN),25.532 (MM)
    DISTANCE 3: 0.9978 (IN),25.344 (MM)
    DISTANCE 4: 0.9926 (IN),25.212 (MM)
    DISTANCE 5: 0.9754 (IN),24.775 (MM)
    DISTANCE 6: 1.0110 (IN),25.679 (MM)
    DISTANCE 7: 1.0088 (IN),25.624 (MM)
    DISTANCE 8: 1.0014 (IN),25.436 (MM)
    DISTANCE 9: 0.9932 (IN),25.227 (MM)

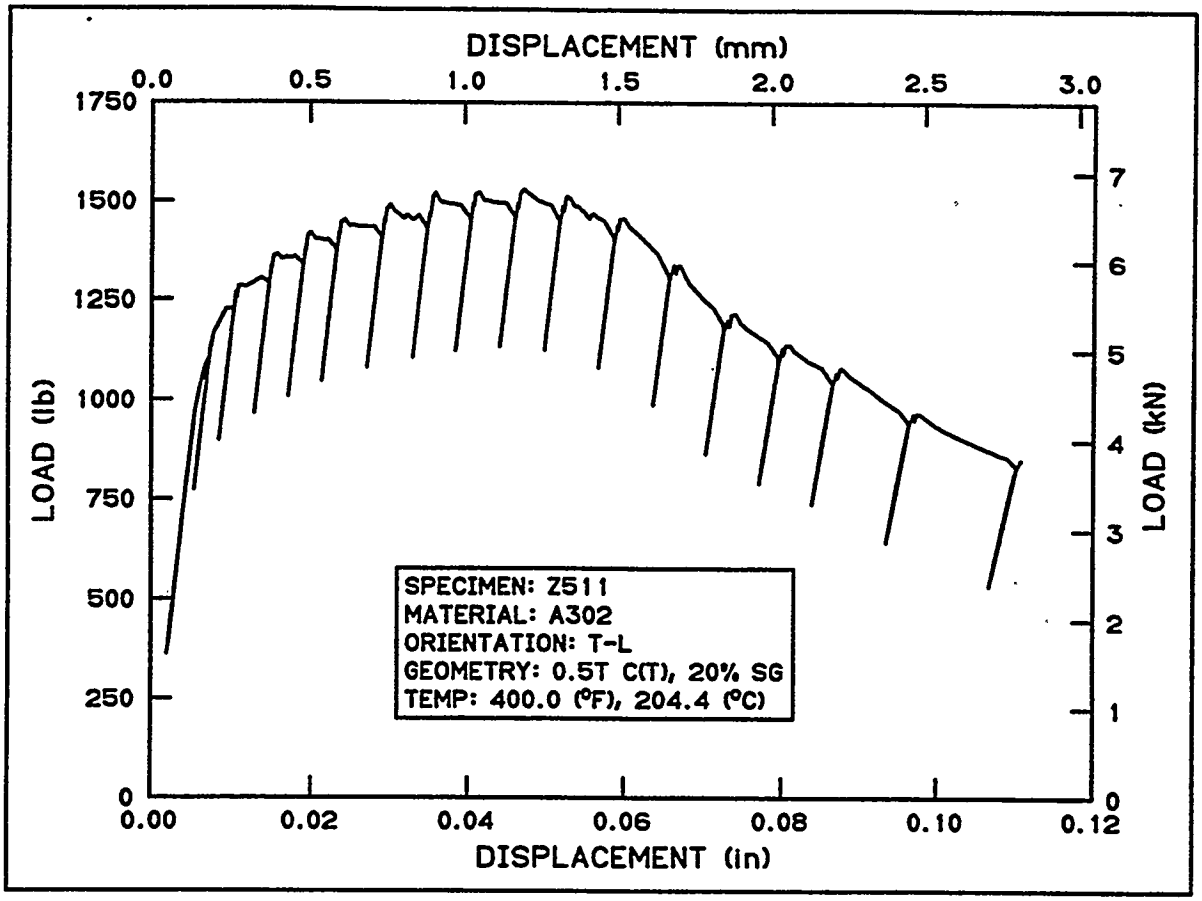

DISPLACEMENT (mm)
0
1
2
3
4
5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z510
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

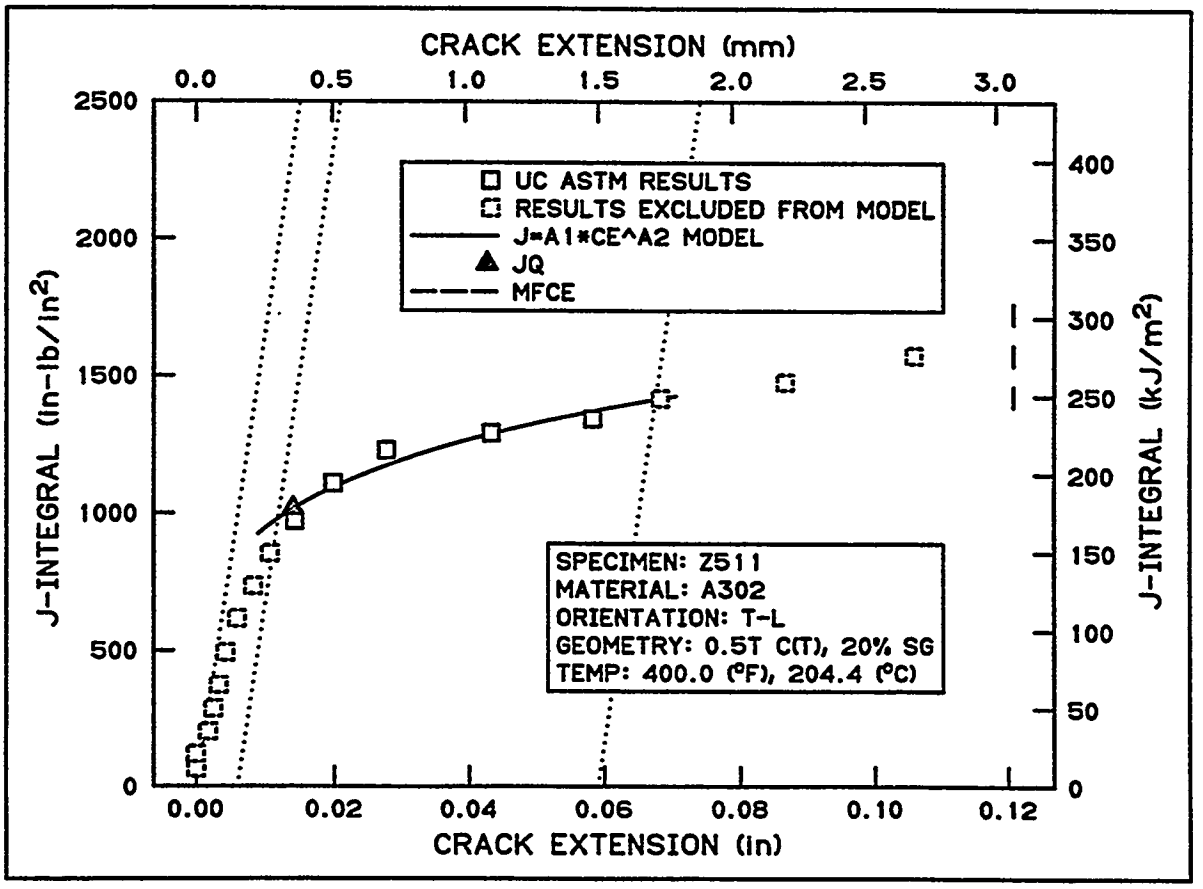

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z510
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z511
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6390 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1076	0.0065	0.0000	65.2
2	1227	0.0092	0.0000	118.9
3	1304	0.0136	0.0017	201.6
4	1359	0.0178	0.0025	285.9
5	1402	0.0219	0.0032	372.5
6	1435	0.0277	0.0042	492.8
7	1465	0.0335	0.0059	617.1
8	1490	0.0389	0.0082	734.7
9	1495	0.0447	0.0106	854.5
10	1491	0.0504	0.0142	972.7
11	1450	0.0573	0.0198	1109.1
12	1366	0.0641	0.0276	1227.6
13	1230	0.0713	0.0432	1290.9
14	1143	0.0782	0.0583	1343.7
15	1082	0.0851	0.0682	1418.0
16	976	0.0950	0.0866	1477.3
17	858	0.1090	0.1058	1576.6

  WIDTH: 0.9990 (IN),25.375 (MM)
  THICKNESS: 0.4993 (IN),12.682 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2501 (IN),6.353 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8770 (IN),22.276 (MM)
    DISTANCE 2: 0.8890 (IN),22.581 (MM)
    DISTANCE 3: 0.8942 (IN),22.713 (MM)
    DISTANCE 4: 0.8944 (IN),22.718 (MM)
    DISTANCE 5: 0.8942 (IN),22.713 (MM)
    DISTANCE 6: 0.8910 (IN),22.631 (MM)
    DISTANCE 7: 0.8908 (IN),22.626 (MM)
    DISTANCE 8: 0.8848 (IN),22.474 (MM)
    DISTANCE 9: 0.8718 (IN),22.144 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9924 (IN),25.207 (MM)
    DISTANCE 2: 1.0066 (IN),25.568 (MM)
    DISTANCE 3: 1.0179 (IN),25.855 (MM)
    DISTANCE 4: 1.0180 (IN),25.857 (MM)
    DISTANCE 5: 1.0148 (IN),25.776 (MM)
    DISTANCE 6: 1.0046 (IN),25.517 (MM)
    DISTANCE 7: 1.0138 (IN),25.751 (MM)
    DISTANCE 8: 1.0111 (IN),25.682 (MM)
    DISTANCE 9: 0.9915 (IN),25.184 (MM)

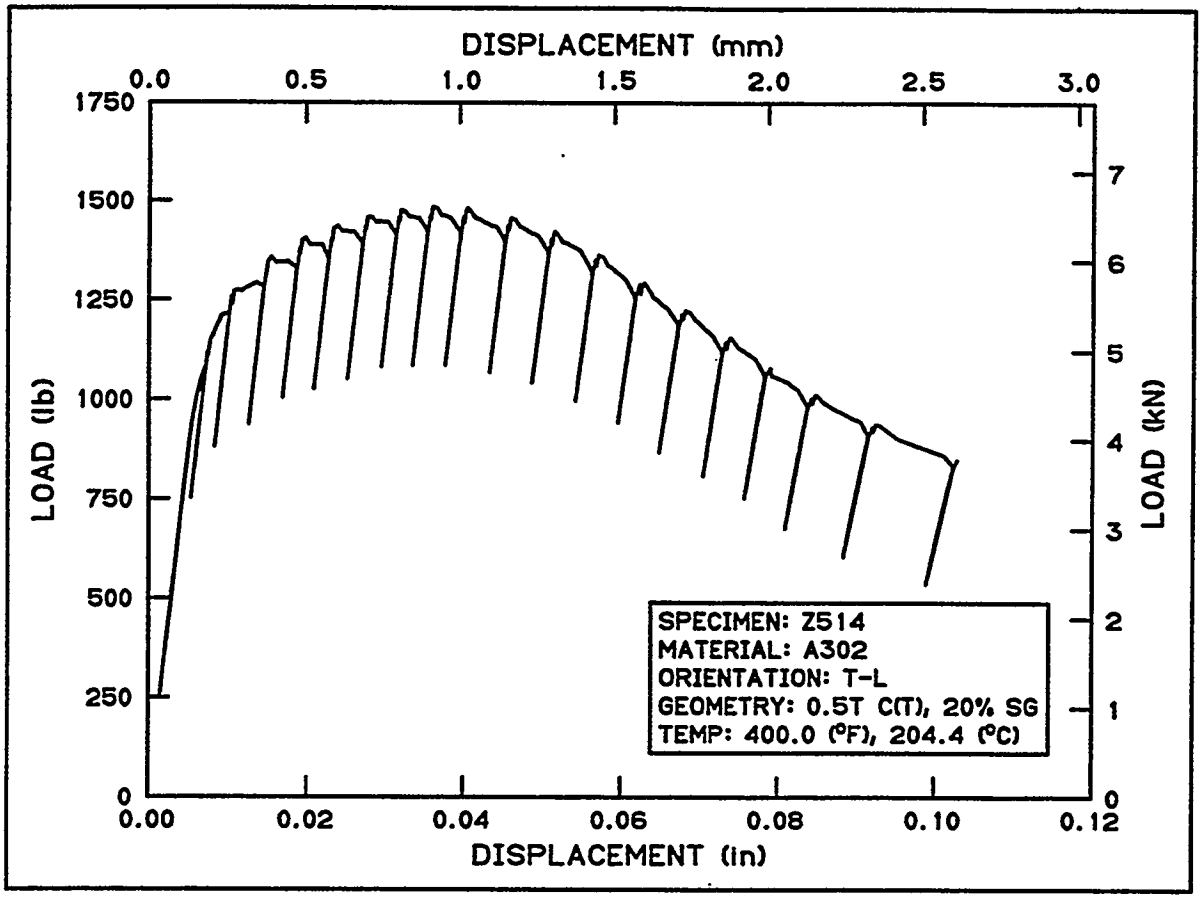

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z511
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

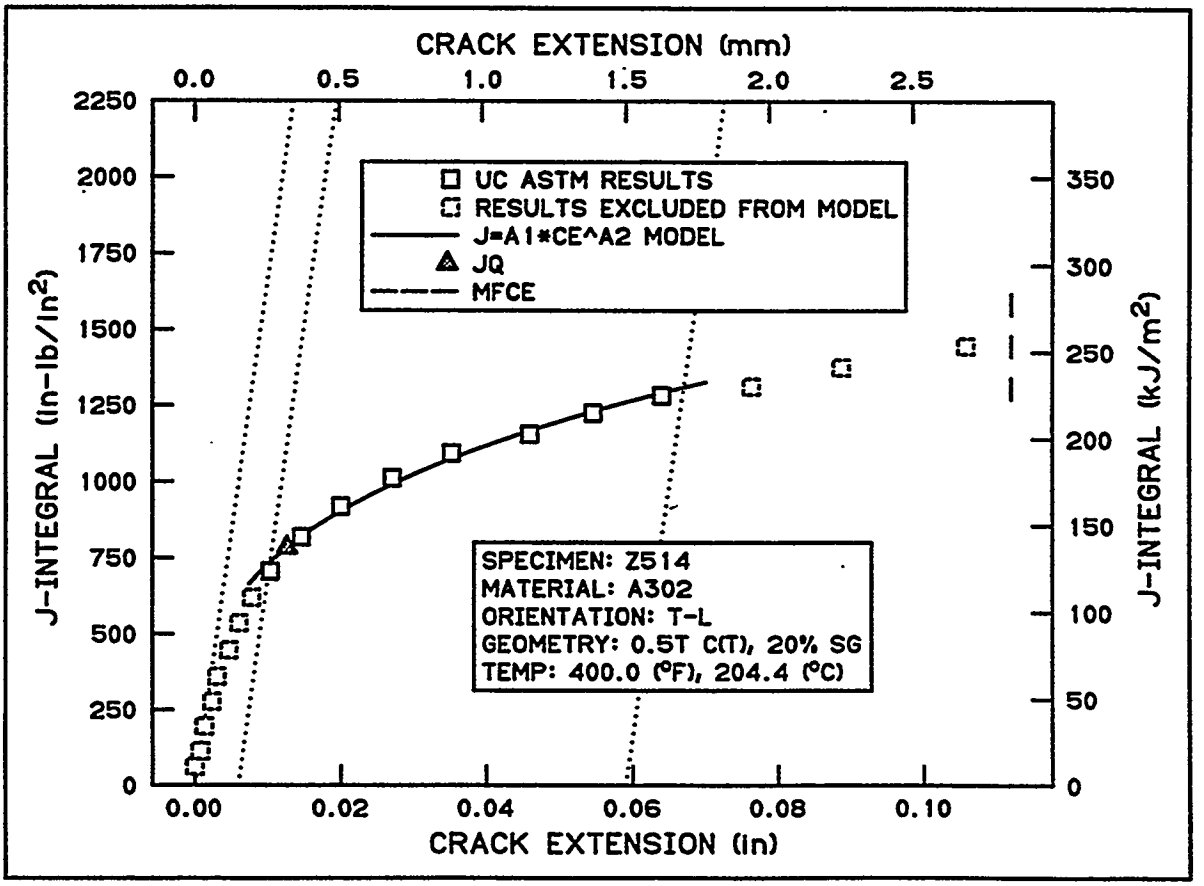

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
400
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z511
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z514
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6362 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1046	0.0064	0.0000	62.2
2	1210	0.0090	0.0007	113.5
3	1293	0.0134	0.0013	195.4
4	1347	0.0174	0.0023	276.8
5	1389	0.0218	0.0030	359.6
6	1420	0.0258	0.0046	446.3
7	1445	0.0301	0.0060	536.0
8	1456	0.0341	0.0078	620.2
9	1455	0.0382	0.0103	707.1
10	1434	0.0440	0.0146	818.4
11	1411	0.0494	0.0200	919.3
12	1374	0.0547	0.0270	1012.6
13	1301	0.0606	0.0353	1094.9
14	1230	0.0657	0.0460	1156.9
15	1162	0.0716	0.0546	1226.6
16	1103	0.0771	0.0640	1283.8
17	1024	0.0825	0.0763	1314.1
18	945	0.0905	0.0887	1375.9
19	860	0.1012	0.1058	1446.9

WIDTH: 0.9978 (IN),25.344 (MM)
THICKNESS: 0.4993 (IN),12.682 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2516 (IN),6.391 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8676 (IN),22.037 (MM)
DISTANCE 2: 0.8801 (IN),22.355 (MM)
DISTANCE 3: 0.8870 (IN),22.530 (MM)
DISTANCE 4: 0.8924 (IN),22.667 (MM)
DISTANCE 5: 0.8953 (IN),22.741 (MM)
DISTANCE 6: 0.8937 (IN),22.700 (MM)
DISTANCE 7: 0.8920 (IN),22.657 (MM)
DISTANCE 8: 0.8884 (IN),22.565 (MM)
DISTANCE 9: 0.8794 (IN),22.337 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9920 (IN),25.197 (MM)
DISTANCE 2: 1.0065 (IN),25.565 (MM)
DISTANCE 3: 0.9936 (IN),25.237 (MM)
DISTANCE 4: 0.9970 (IN),25.324 (MM)
DISTANCE 5: 0.9992 (IN),25.380 (MM)
DISTANCE 6: 0.9987 (IN),25.367 (MM)
DISTANCE 7: 1.0009 (IN),25.423 (MM)
DISTANCE 8: 1.0156 (IN),25.796 (MM)
DISTANCE 9: 0.9813 (IN),24.925 (MM)

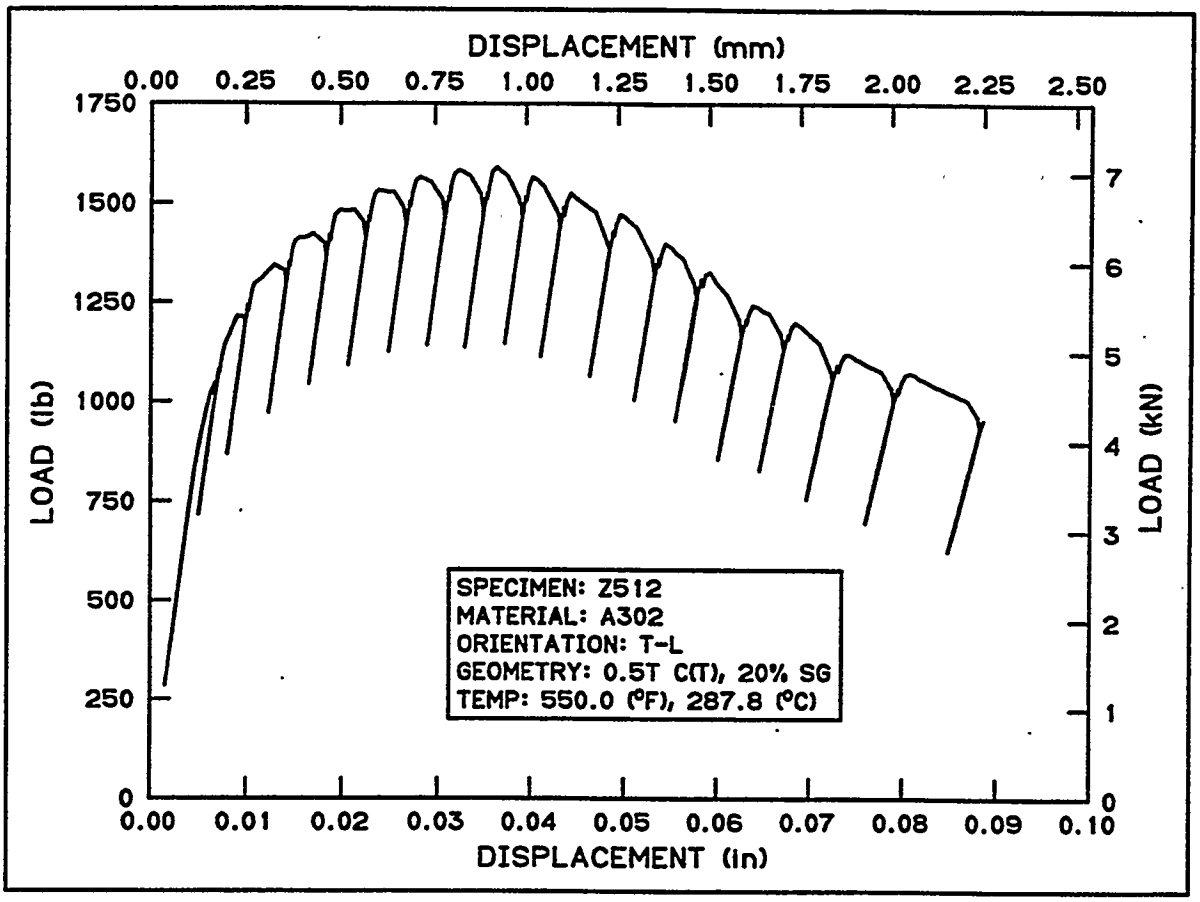

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z514
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

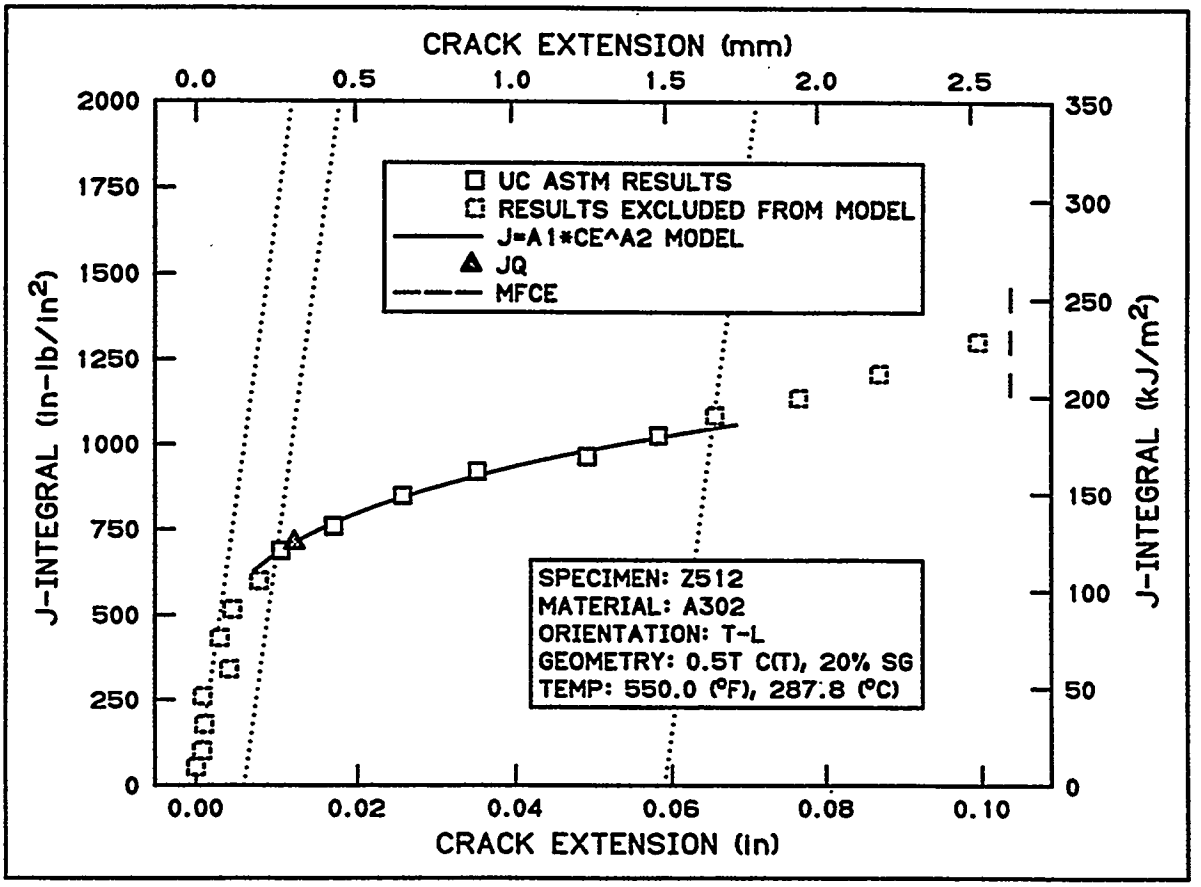

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
2250
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z514
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z512
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6341 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1021	0.0063	0.0000	53.9
2	1215	0.0090	0.0008	100.9
3	1344	0.0128	0.0010	178.5
4	1424	0.0168	0.0008	260.8
5	1484	0.0211	0.0041	340.8
6	1528	0.0252	0.0029	432.1
7	1552	0.0291	0.0045	516.9
8	1568	0.0333	0.0078	599.4
9	1569	0.0373	0.0105	687.9
10	1542	0.0413	0.0170	759.9
11	1477	0.0468	0.0256	849.8
12	1440	0.0512	0.0350	921.5
13	1362	0.0562	0.0492	965.1
14	1269	0.0610	0.0583	1027.6
15	1223	0.0656	0.0656	1086.5
16	1149	0.0710	0.0765	1137.9
17	1077	0.0776	0.0868	1209.2
18	1005	0.0869	0.0994	1304.5

  WIDTH: 1.0055 (IN),25.540 (MM)
  THICKNESS: 0.4991 (IN),12.677 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2437 (IN),6.190 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8547 (IN),21.709 (MM)
    DISTANCE 2: 0.8682 (IN),22.052 (MM)
    DISTANCE 3: 0.8765 (IN),22.263 (MM)
    DISTANCE 4: 0.8808 (IN),22.372 (MM)
    DISTANCE 5: 0.8816 (IN),22.393 (MM)
    DISTANCE 6: 0.8852 (IN),22.484 (MM)
    DISTANCE 7: 0.8850 (IN),22.479 (MM)
    DISTANCE 8: 0.8838 (IN),22.449 (MM)
    DISTANCE 9: 0.8682 (IN),22.052 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9668 (IN),24.557 (MM)
    DISTANCE 2: 0.9790 (IN),24.867 (MM)
    DISTANCE 3: 0.9918 (IN),25.192 (MM)
    DISTANCE 4: 0.9826 (IN),24.958 (MM)
    DISTANCE 5: 0.9606 (IN),24.399 (MM)
    DISTANCE 6: 0.9906 (IN),25.161 (MM)
    DISTANCE 7: 0.9908 (IN),25.166 (MM)
    DISTANCE 8: 0.9832 (IN),24.973 (MM)
    DISTANCE 9: 0.9782 (IN),24.846 (MM)

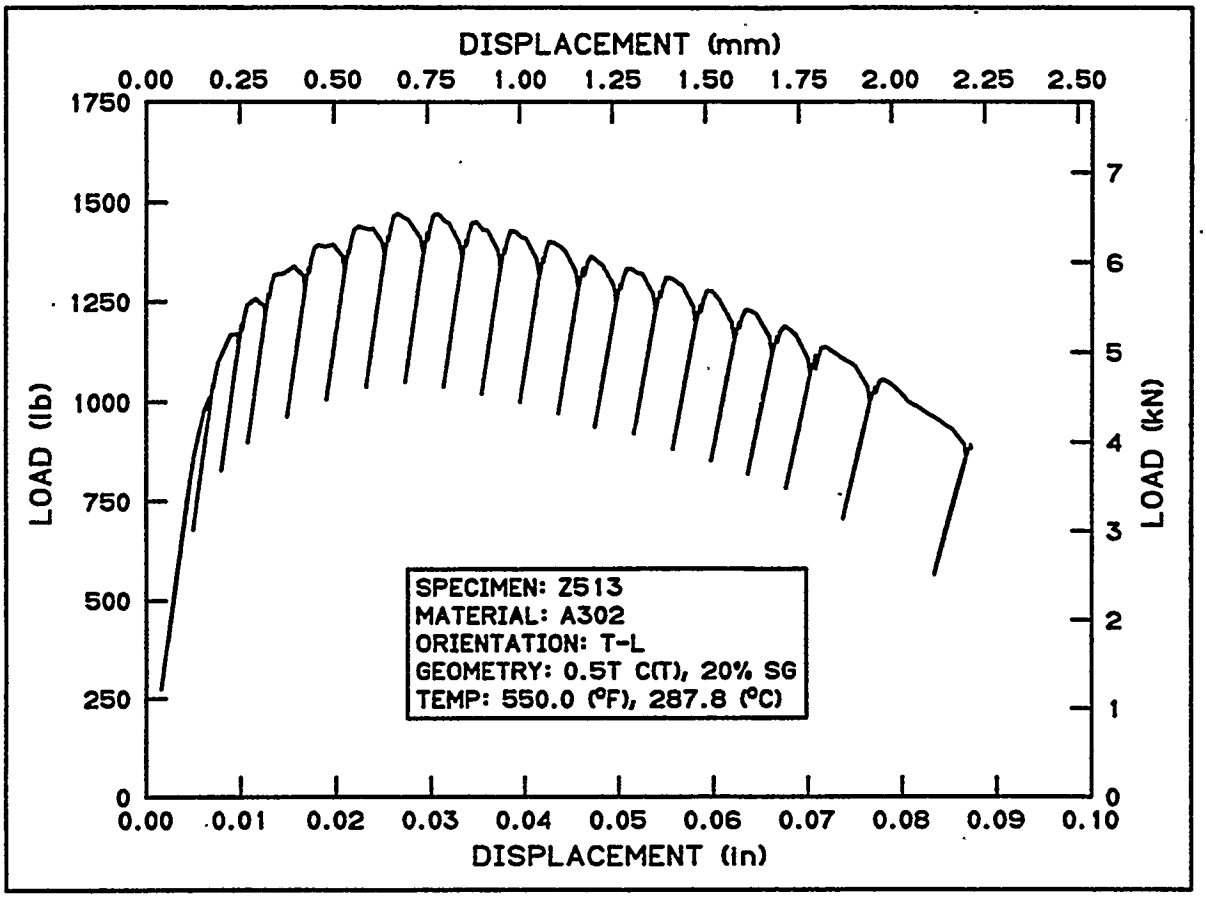

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
1750 1500 1250 1000 750 500 250 0
LOAD (kN)
7 6 5 4 3 2 1 0
SPECIMEN: Z512
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

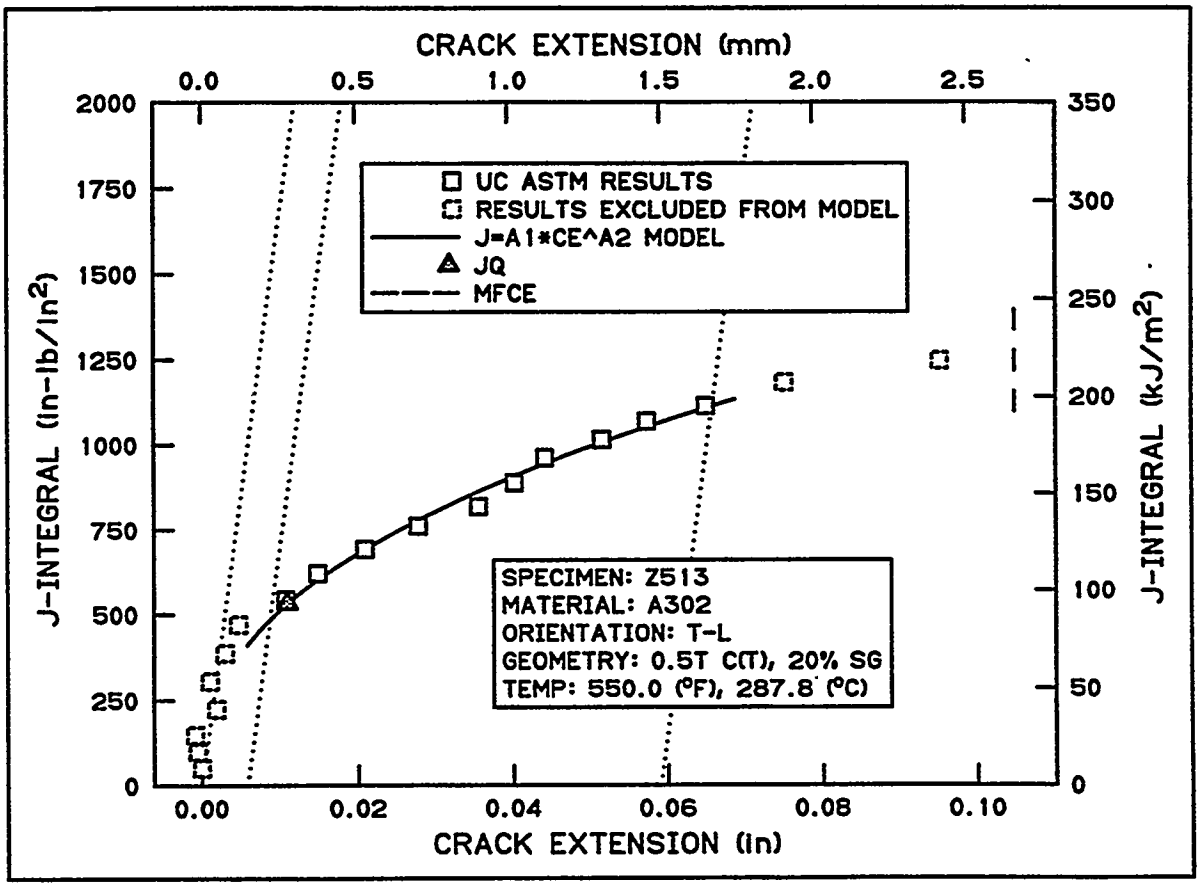

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z512
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z513
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6372 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	979	0.0061	0.0000	50.8
2	1168	0.0090	-0.0005	98.3
3	1257	0.0116	-0.0009	148.1
4	1339	0.0156	0.0019	223.8
5	1395	0.0196	0.0011	305.4
6	1435	0.0238	0.0030	387.1
7	1457	0.0275	0.0048	470.8
8	1448	0.0319	0.0109	544.5
9	1430	0.0360	0.0149	621.9
10	1409	0.0401	0.0209	693.8
11	1378	0.0443	0.0277	762.1
12	1340	0.0483	0.0355	819.3
13	1319	0.0525	0.0402	889.4
14	1290	0.0567	0.0442	961.8
15	1258	0.0605	0.0516	1014.7
16	1218	0.0646	0.0574	1068.8
17	1166	0.0687	0.0650	1114.0
18	1089	0.0750	0.0751	1183.7
19	933	0.0852	0.0952	1247.9

  WIDTH: 0.9998 (IN),25.395 (MM)
  THICKNESS: 0.4993 (IN),12.682 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2493 (IN),6.332 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8694 (IN),22.083 (MM)
    DISTANCE 2: 0.8789 (IN),22.324 (MM)
    DISTANCE 3: 0.8870 (IN),22.530 (MM)
    DISTANCE 4: 0.8912 (IN),22.636 (MM)
    DISTANCE 5: 0.8934 (IN),22.692 (MM)
    DISTANCE 6: 0.8923 (IN),22.664 (MM)
    DISTANCE 7: 0.8899 (IN),22.603 (MM)
    DISTANCE 8: 0.8853 (IN),22.487 (MM)
    DISTANCE 9: 0.8782 (IN),22.306 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9836 (IN),24.983 (MM)
    DISTANCE 2: 0.9921 (IN),25.199 (MM)
    DISTANCE 3: 1.0091 (IN),25.631 (MM)
    DISTANCE 4: 1.0130 (IN),25.730 (MM)
    DISTANCE 5: 1.0102 (IN),25.659 (MM)
    DISTANCE 6: 0.9986 (IN),25.364 (MM)
    DISTANCE 7: 0.9634 (IN),24.470 (MM)
    DISTANCE 8: 0.9740 (IN),24.740 (MM)
    DISTANCE 9: 0.9557 (IN),24.275 (MM)

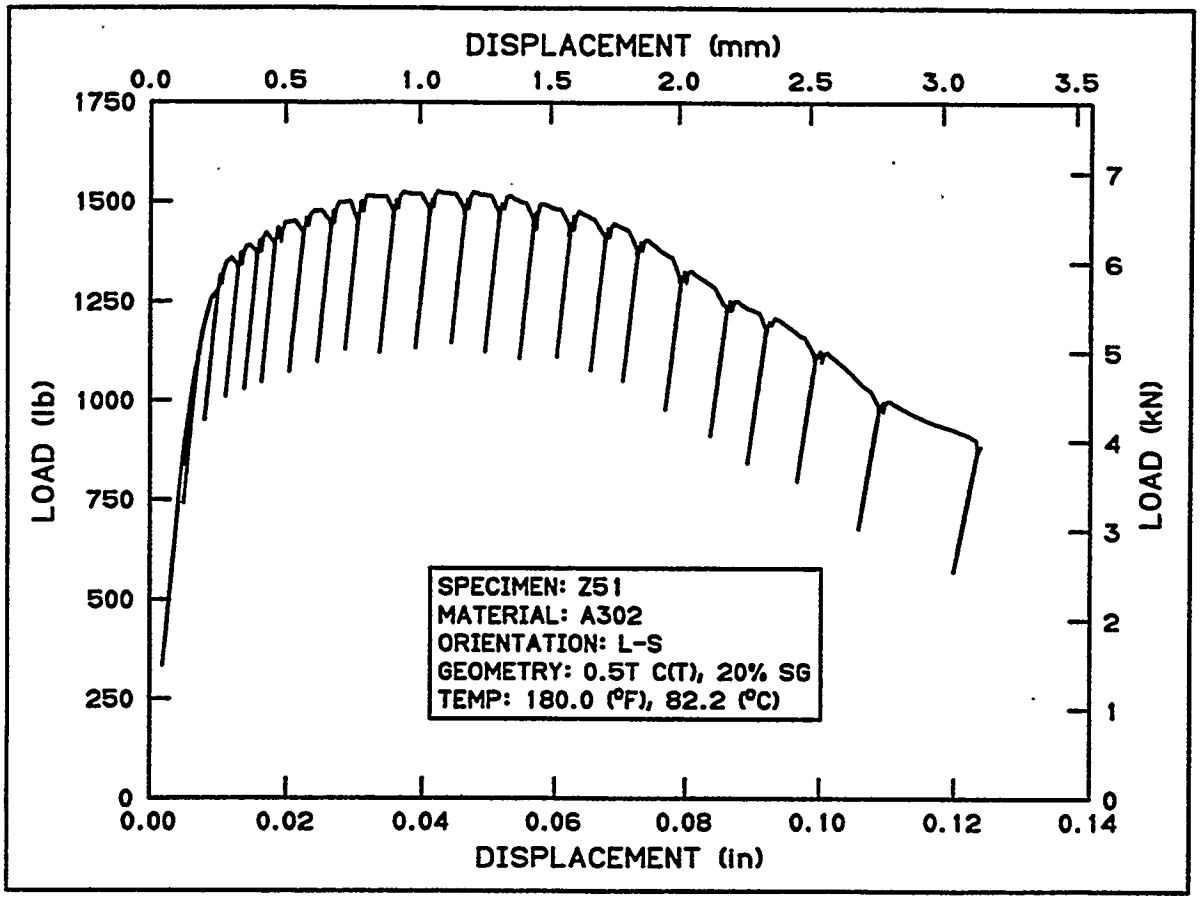

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
1750 1500 1250 1000 750 500 250 0
LOAD (kN)
7 6 5 4 3 2 1 0
SPECIMEN: Z513
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

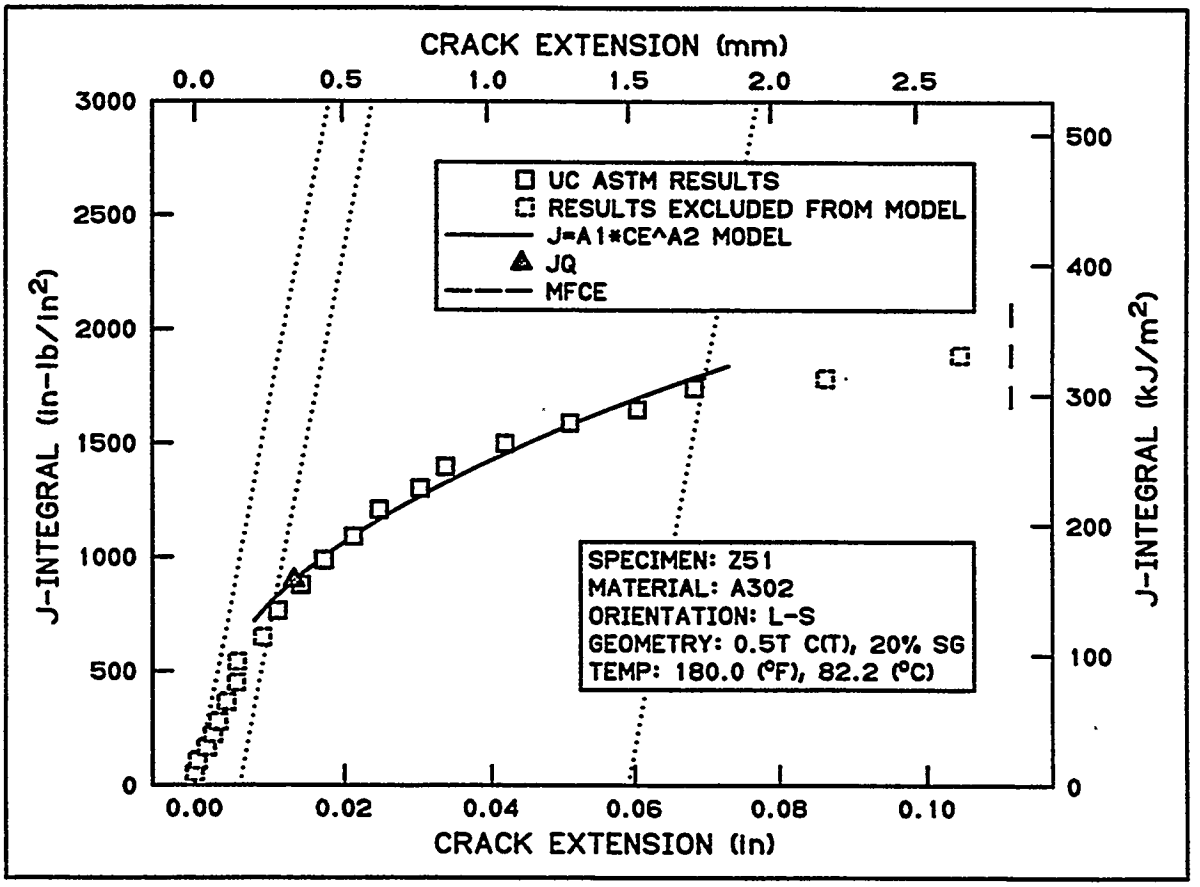

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z513
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z51
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6420 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1052	0.0063	0.0000	54.9
2	1261	0.0089	0.0004	108.7
3	1360	0.0117	0.0016	166.5
4	1392	0.0143	0.0024	224.5
5	1423	0.0168	0.0030	278.9
6	1452	0.0211	0.0042	364.9
7	1479	0.0248	0.0055	450.6
8	1500	0.0291	0.0056	541.4
9	1513	0.0345	0.0091	651.2
10	1520	0.0396	0.0112	765.8
11	1520	0.0447	0.0142	879.2
12	1515	0.0501	0.0172	986.8
13	1496	0.0554	0.0212	1090.4
14	1480	0.0607	0.0247	1208.6
15	1456	0.0659	0.0302	1302.9
16	1429	0.0711	0.0337	1398.8
17	1361	0.0778	0.0419	1499.1
18	1286	0.0842	0.0510	1590.1
19	1222	0.0910	0.0604	1649.4
20	1160	0.0977	0.0683	1745.0
21	1024	0.1076	0.0862	1785.7
22	912	0.1222	0.1044	1888.2

  WIDTH: 1.0005 (IN),25.413 (MM)
  THICKNESS: 0.4994 (IN),12.685 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2491 (IN),6.327 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8777 (IN),22.294 (MM)
    DISTANCE 2: 0.8880 (IN),22.555 (MM)
    DISTANCE 3: 0.8950 (IN),22.733 (MM)
    DISTANCE 4: 0.8932 (IN),22.687 (MM)
    DISTANCE 5: 0.8940 (IN),22.708 (MM)
    DISTANCE 6: 0.8960 (IN),22.758 (MM)
    DISTANCE 7: 0.8941 (IN),22.710 (MM)
    DISTANCE 8: 0.8888 (IN),22.576 (MM)
    DISTANCE 9: 0.8824 (IN),22.413 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9776 (IN),24.831 (MM)
    DISTANCE 2: 1.0165 (IN),25.819 (MM)
    DISTANCE 3: 1.0051 (IN),25.530 (MM)
    DISTANCE 4: 0.9990 (IN),25.375 (MM)
    DISTANCE 5: 1.0050 (IN),25.527 (MM)
    DISTANCE 6: 1.0080 (IN),25.603 (MM)
    DISTANCE 7: 1.0107 (IN),25.672 (MM)
    DISTANCE 8: 1.0012 (IN),25.430 (MM)
    DISTANCE 9: 0.9706 (IN),24.653 (MM)

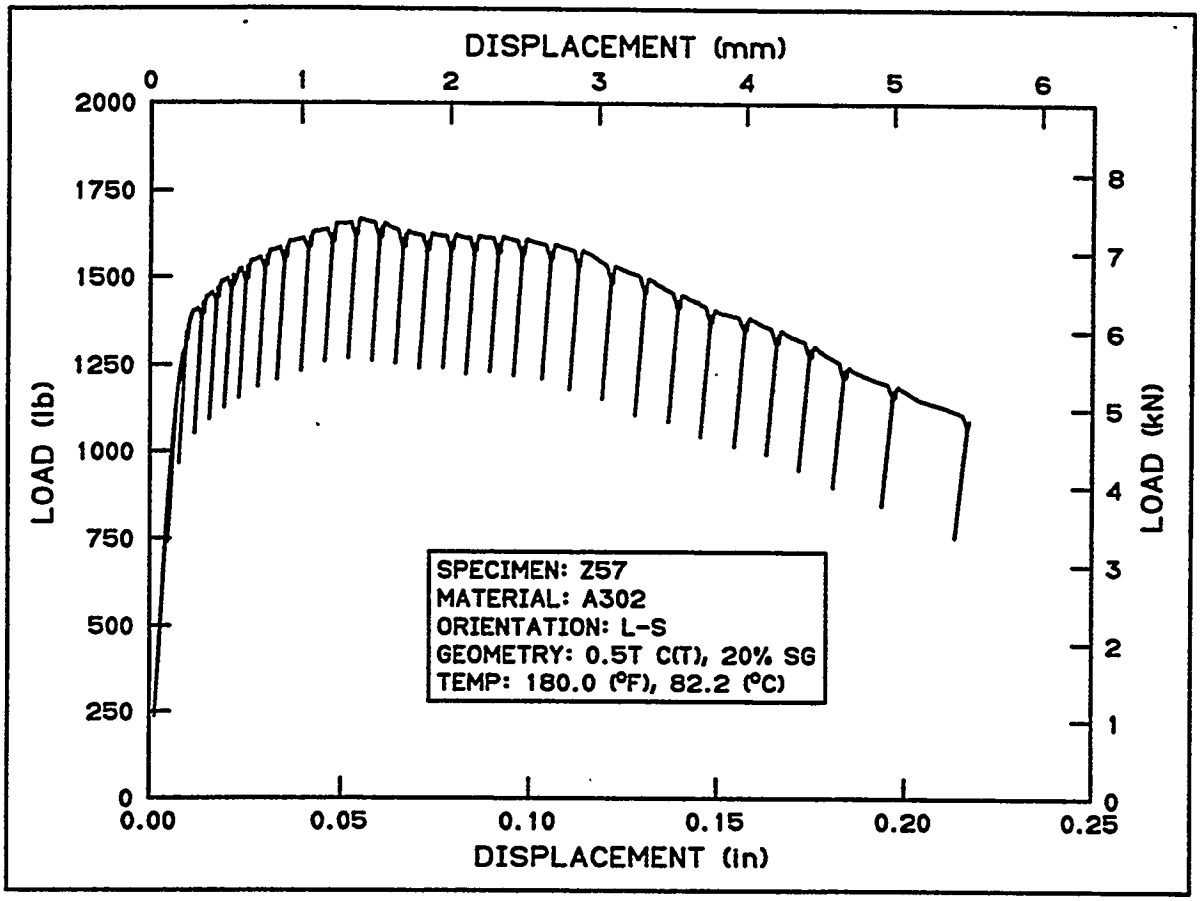

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z51
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

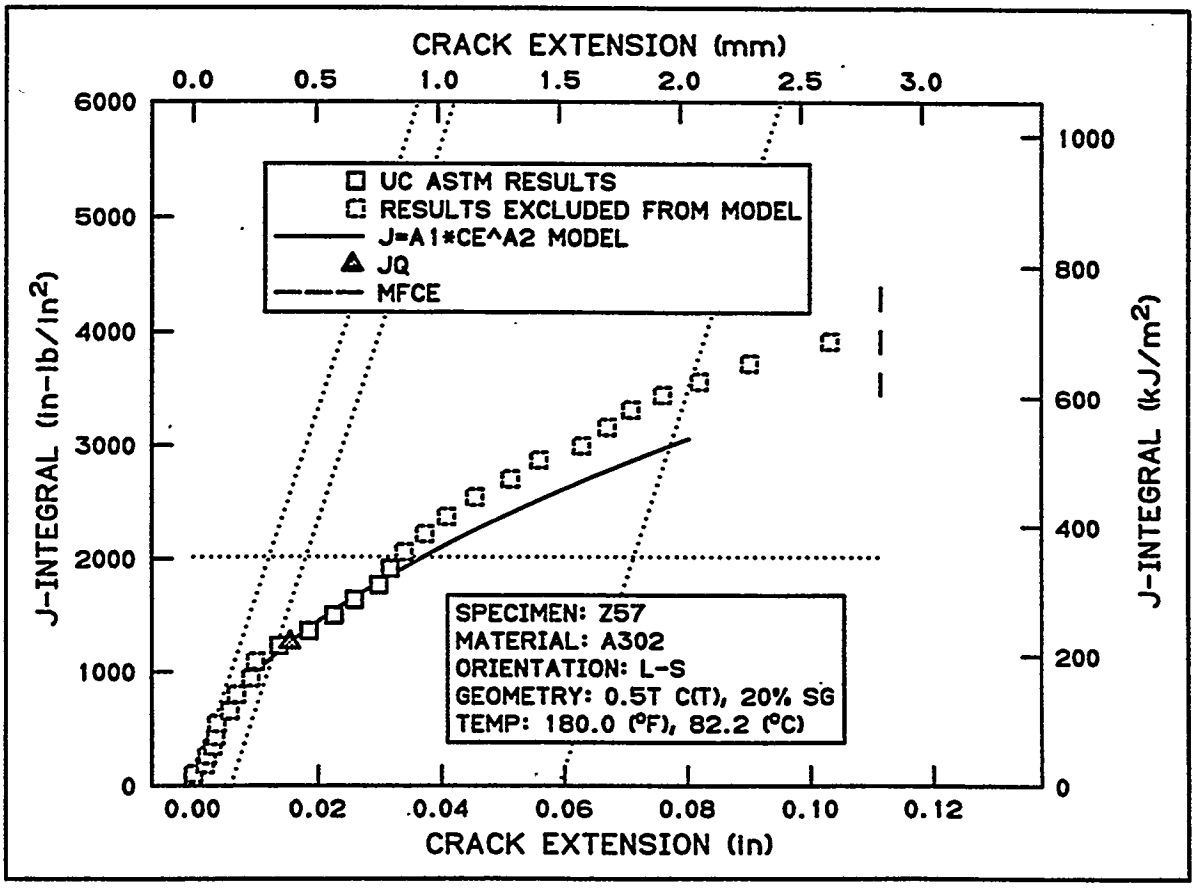

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z51
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z57
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6330 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1033	0.0059	0.0000	55.3
2	1277	0.0084	0.0001	103.8
3	1411	0.0122	0.0019	184.7
4	1456	0.0159	0.0022	264.5
5	1496	0.0199	0.0031	347.8
6	1524	0.0235	0.0036	431.5
7	1557	0.0286	0.0038	545.1
8	1585	0.0337	0.0058	657.6
9	1613	0.0398	0.0069	801.9
10	1639	0.0461	0.0092	945.1
11	1658	0.0523	0.0100	1091.8
12	1658	0.0586	0.0137	1232.4
13	1636	0.0648	0.0185	1362.1
14	1620	0.0713	0.0225	1499.4
15	1619	0.0776	0.0258	1637.2
16	1614	0.0840	0.0298	1770.1
17	1613	0.0902	0.0316	1915.7
18	1605	0.0966	0.0339	2058.6
19	1594	0.1040	0.0372	2219.6
20	1577	0.1115	0.0408	2371.6
21	1536	0.1202	0.0455	2543.7
22	1503	0.1292	0.0512	2703.1
23	1457	0.1379	0.0558	2869.6
24	1416	0.1468	0.0627	2996.4
25	1387	0.1555	0.0669	3160.3
26	1356	0.1641	0.0708	3313.2
27	1317	0.1731	0.0759	3444.2
28	1258	0.1823	0.0819	3562.4
29	1195	0.1952	0.0901	3723.3
30	1108	0.2152	0.1032	3919.8

WIDTH: 0.9995 (IN),25.387 (MM)
THICKNESS: 0.4998 (IN),12.695 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2503 (IN),6.358 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8602 (IN),21.849 (MM)
DISTANCE 2: 0.8722 (IN),22.154 (MM)
DISTANCE 3: 0.8786 (IN),22.316 (MM)
DISTANCE 4: 0.8840 (IN),22.454 (MM)
DISTANCE 5: 0.8906 (IN),22.621 (MM)
DISTANCE 6: 0.8915 (IN),22.644 (MM)
DISTANCE 7: 0.8912 (IN),22.636 (MM)
DISTANCE 8: 0.8890 (IN),22.581 (MM)
DISTANCE 9: 0.8790 (IN),22.327 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9768 (IN),24.811 (MM)
DISTANCE 2: 0.9962 (IN),25.303 (MM)
DISTANCE 3: 0.9952 (IN),25.278 (MM)
DISTANCE 4: 0.9914 (IN),25.182 (MM)
DISTANCE 5: 1.0007 (IN),25.418 (MM)
DISTANCE 6: 1.0098 (IN),25.649 (MM)
DISTANCE 7: 1.0042 (IN),25.507 (MM)
DISTANCE 8: 0.9890 (IN),25.121 (MM)
DISTANCE 9: 0.9657 (IN),24.529 (MM)

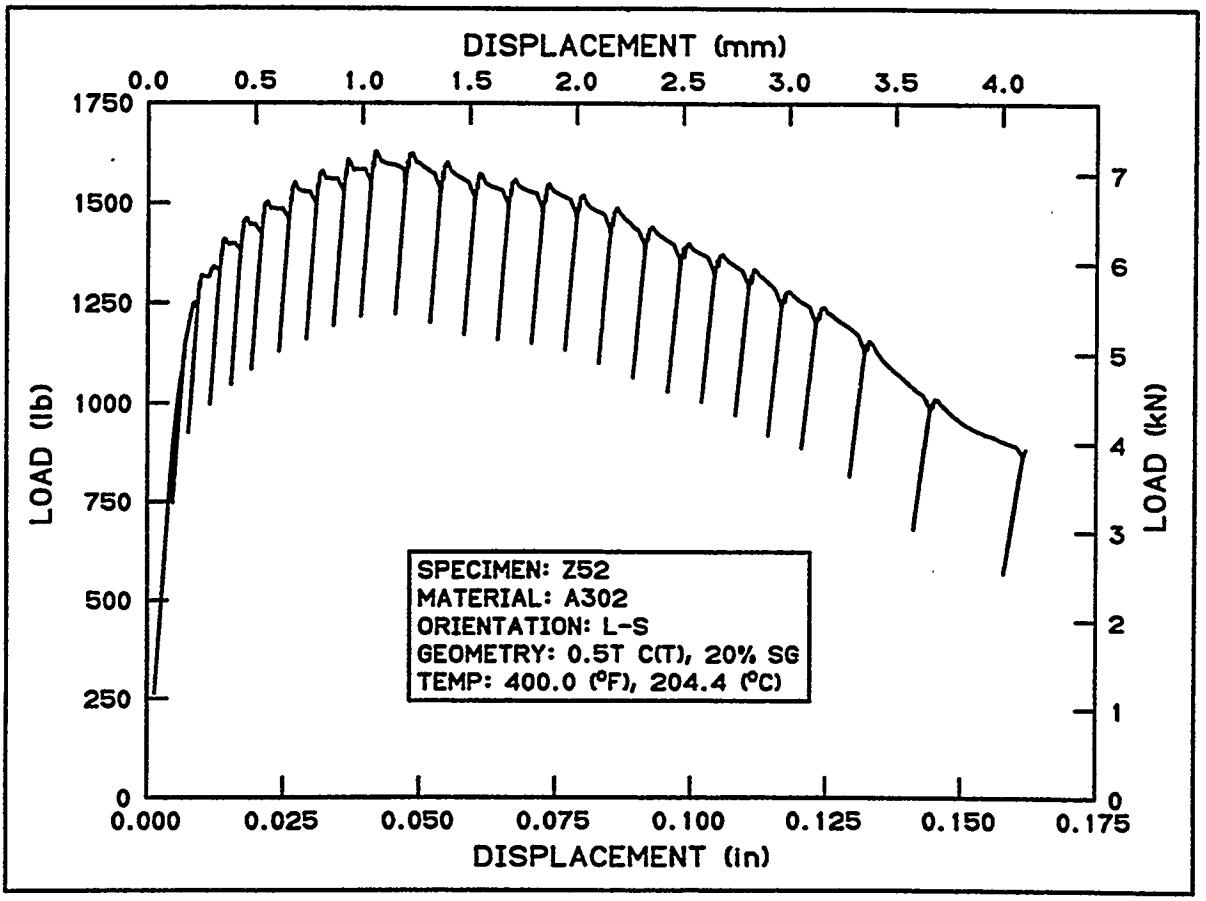

DISPLACEMENT (mm)
0
1
2
3
4
5
6
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z57
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

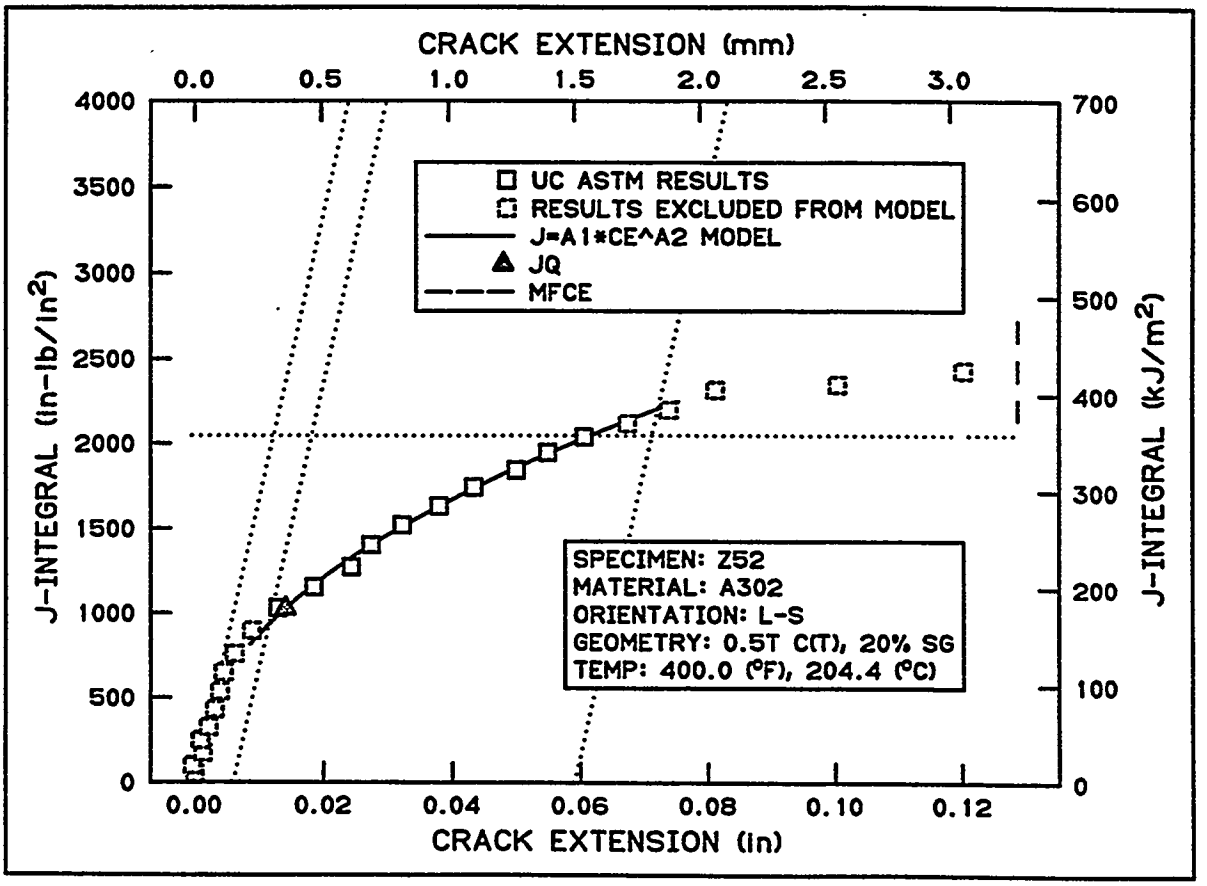

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z57
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z52
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6274 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1047	0.0059	0.0000	51.6
2	1249	0.0085	-0.0004	99.5
3	1340	0.0121	0.0012	173.4
4	1399	0.0158	0.0009	248.7
5	1446	0.0197	0.0022	325.1
6	1486	0.0246	0.0031	430.4
7	1528	0.0296	0.0039	538.3
8	1561	0.0347	0.0045	650.1
9	1583	0.0398	0.0062	759.5
10	1592	0.0459	0.0089	898.3
11	1573	0.0524	0.0130	1031.8
12	1550	0.0587	0.0185	1155.8
13	1530	0.0650	0.0244	1273.7
14	1523	0.0713	0.0274	1403.7
15	1507	0.0775	0.0322	1521.9
16	1471	0.0839	0.0379	1633.5
17	1431	0.0903	0.0434	1745.4
18	1396	0.0967	0.0500	1843.9
19	1364	0.1029	0.0549	1946.9
20	1330	0.1092	0.0606	2039.0
21	1283	0.1154	0.0675	2118.2
22	1240	0.1219	0.0739	2197.8
23	1170	0.1308	0.0811	2316.3
24	1019	0.1431	0.1004	2348.9
25	893	0.1601	0.1202	2430.0

WIDTH: 0.9996 (IN),25.390 (MM)
THICKNESS: 0.4996 (IN),12.690 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2511 (IN),6.378 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8664 (IN),22.007 (MM)
DISTANCE 2: 0.8761 (IN),22.253 (MM)
DISTANCE 3: 0.8824 (IN),22.413 (MM)
DISTANCE 4: 0.8836 (IN),22.443 (MM)
DISTANCE 5: 0.8848 (IN),22.474 (MM)
DISTANCE 6: 0.8818 (IN),22.398 (MM)
DISTANCE 7: 0.8809 (IN),22.375 (MM)
DISTANCE 8: 0.8729 (IN),22.172 (MM)
DISTANCE 9: 0.8640 (IN),21.946 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9988 (IN),25.370 (MM)
DISTANCE 2: 1.0206 (IN),25.923 (MM)
DISTANCE 3: 1.0330 (IN),26.238 (MM)
DISTANCE 4: 1.0108 (IN),25.674 (MM)
DISTANCE 5: 0.9902 (IN),25.151 (MM)
DISTANCE 6: 1.0151 (IN),25.784 (MM)
DISTANCE 7: 0.9985 (IN),25.362 (MM)
DISTANCE 8: 1.0008 (IN),25.420 (MM)
DISTANCE 9: 0.9776 (IN),24.831 (MM)

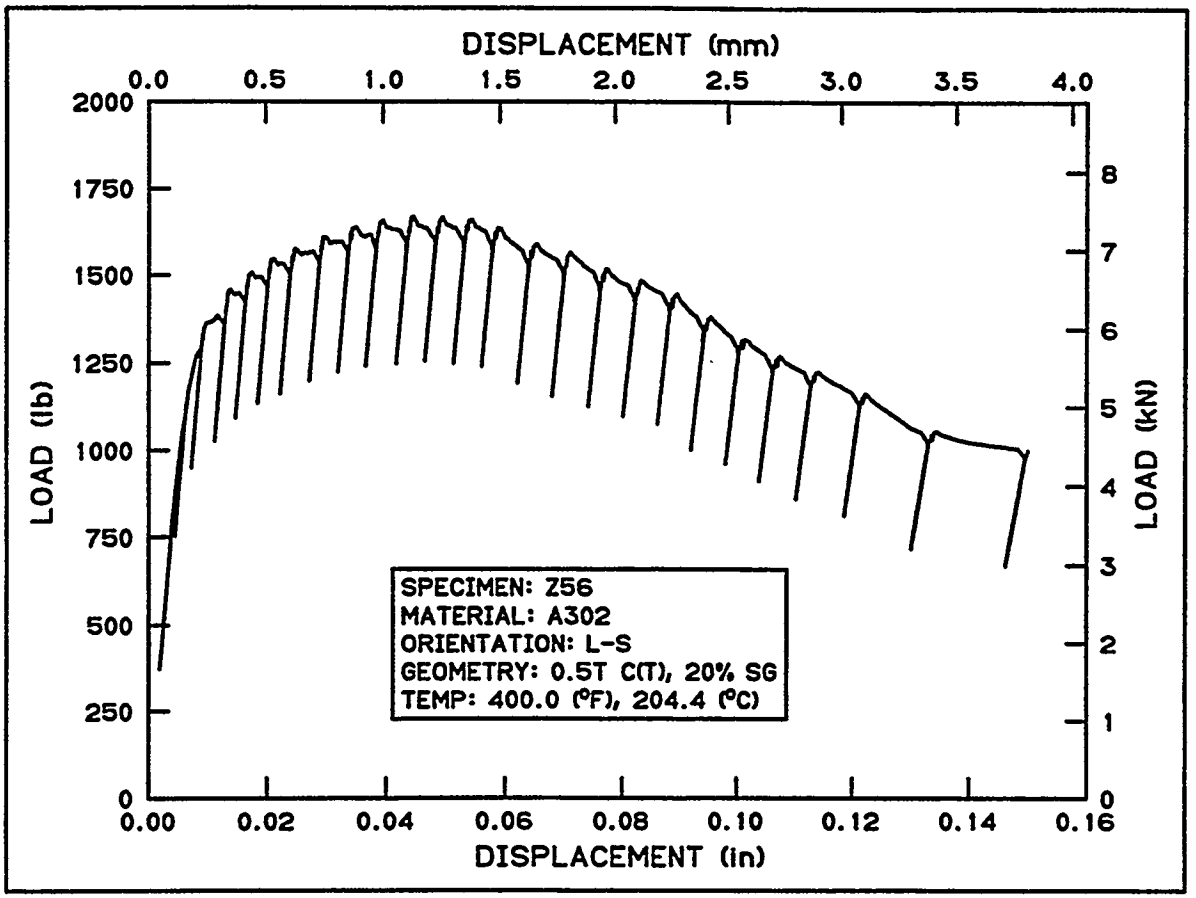

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z52
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

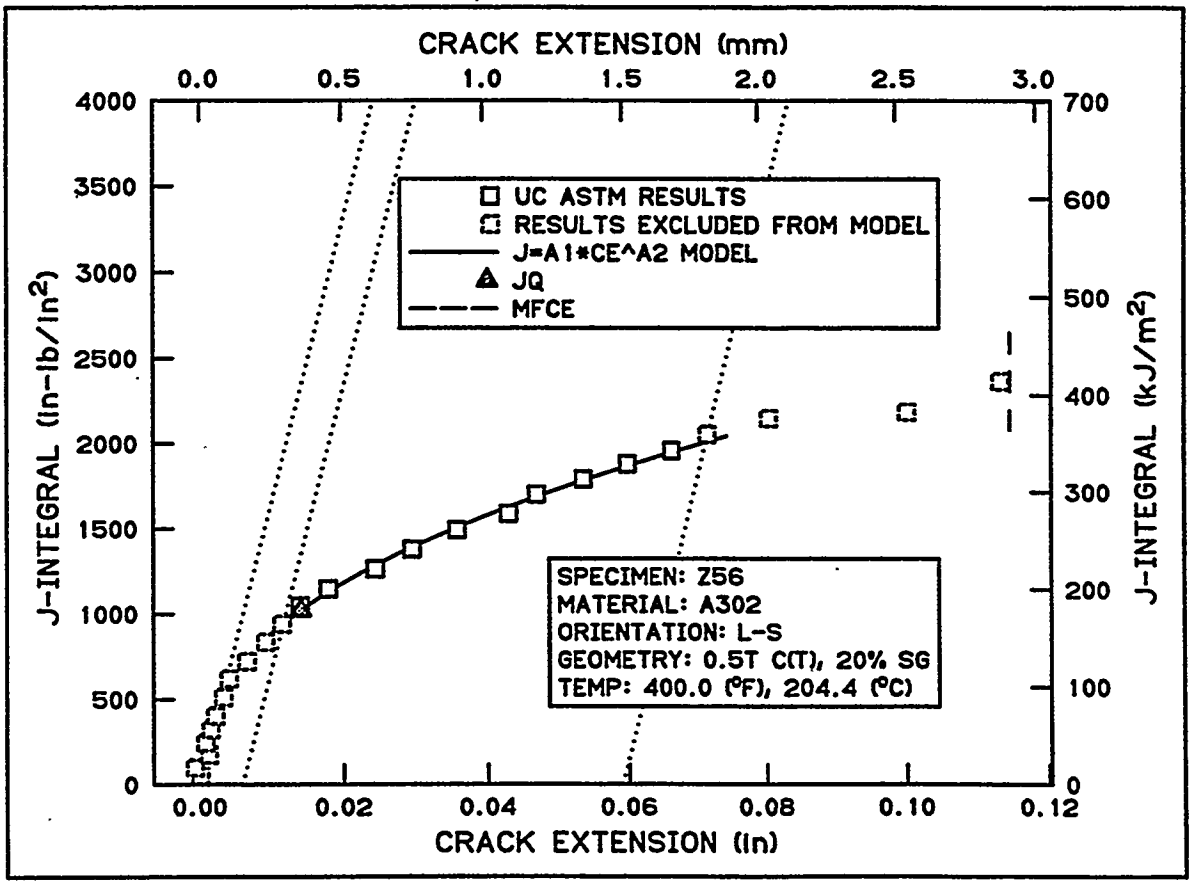

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z52
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z56
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6267 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1036	0.0056	0.0000	49.8
2	1274	0.0082	-0.0007	97.5
3	1384	0.0107	0.0012	173.1
4	1449	0.0153	0.0008	245.0
5	1494	0.0190	0.0015	322.4
6	1531	0.0228	0.0022	403.4
7	1567	0.0277	0.0033	511.4
8	1596	0.0326	0.0041	619.6
9	1614	0.0375	0.0066	721.4
10	1628	0.0422	0.0092	834.6
11	1634	0.0468	0.0114	941.0
12	1635	0.0516	0.0140	1047.1
13	1626	0.0566	0.0179	1146.8
14	1571	0.0628	0.0244	1263.5
15	1544	0.0687	0.0295	1379.2
16	1508	0.0751	0.0357	1492.6
17	1471	0.0810	0.0429	1588.5
18	1447	0.0869	0.0469	1702.0
19	1385	0.0929	0.0535	1790.2
20	1327	0.0990	0.0598	1879.3
21	1274	0.1049	0.0662	1958.5
22	1223	0.1117	0.0714	2052.8
23	1165	0.1199	0.0803	2147.6
24	1054	0.1318	0.1000	2185.3
25	1007	0.1482	0.1132	2365.0

WIDTH: 1.0012 (IN),25.430 (MM)
THICKNESS: 0.4992 (IN),12.680 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2477 (IN),6.292 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8562 (IN),21.747 (MM)
DISTANCE 2: 0.8637 (IN),21.938 (MM)
DISTANCE 3: 0.8733 (IN),22.182 (MM)
DISTANCE 4: 0.8779 (IN),22.299 (MM)
DISTANCE 5: 0.8791 (IN),22.329 (MM)
DISTANCE 6: 0.8817 (IN),22.395 (MM)
DISTANCE 7: 0.8843 (IN),22.461 (MM)
DISTANCE 8: 0.8760 (IN),22.250 (MM)
DISTANCE 9: 0.8623 (IN),21.902 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9938 (IN),25.243 (MM)
DISTANCE 2: 0.9922 (IN),25.202 (MM)
DISTANCE 3: 0.9858 (IN),25.039 (MM)
DISTANCE 4: 0.9678 (IN),24.582 (MM)
DISTANCE 5: 0.9812 (IN),24.922 (MM)
DISTANCE 6: 1.0016 (IN),25.441 (MM)
DISTANCE 7: 0.9940 (IN),25.248 (MM)
DISTANCE 8: 0.9961 (IN),25.301 (MM)
DISTANCE 9: 0.9919 (IN),25.194 (MM)

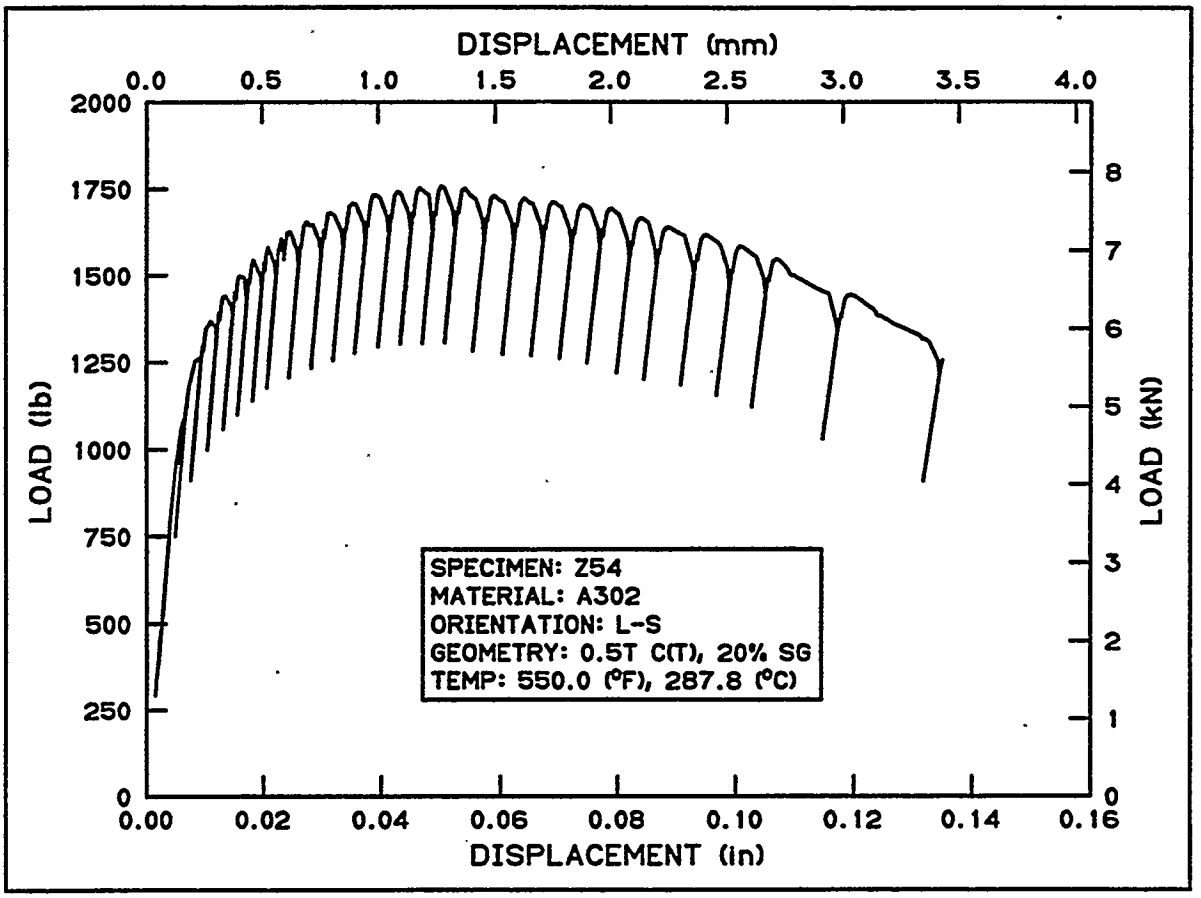

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
2000 1750 1500 1250 1000 750 500 250 0
LOAD (lb)
8 7 6 5 4 3 2 1 0
LOAD (kN)
SPECIMEN: Z56
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
DISPLACEMENT (in)

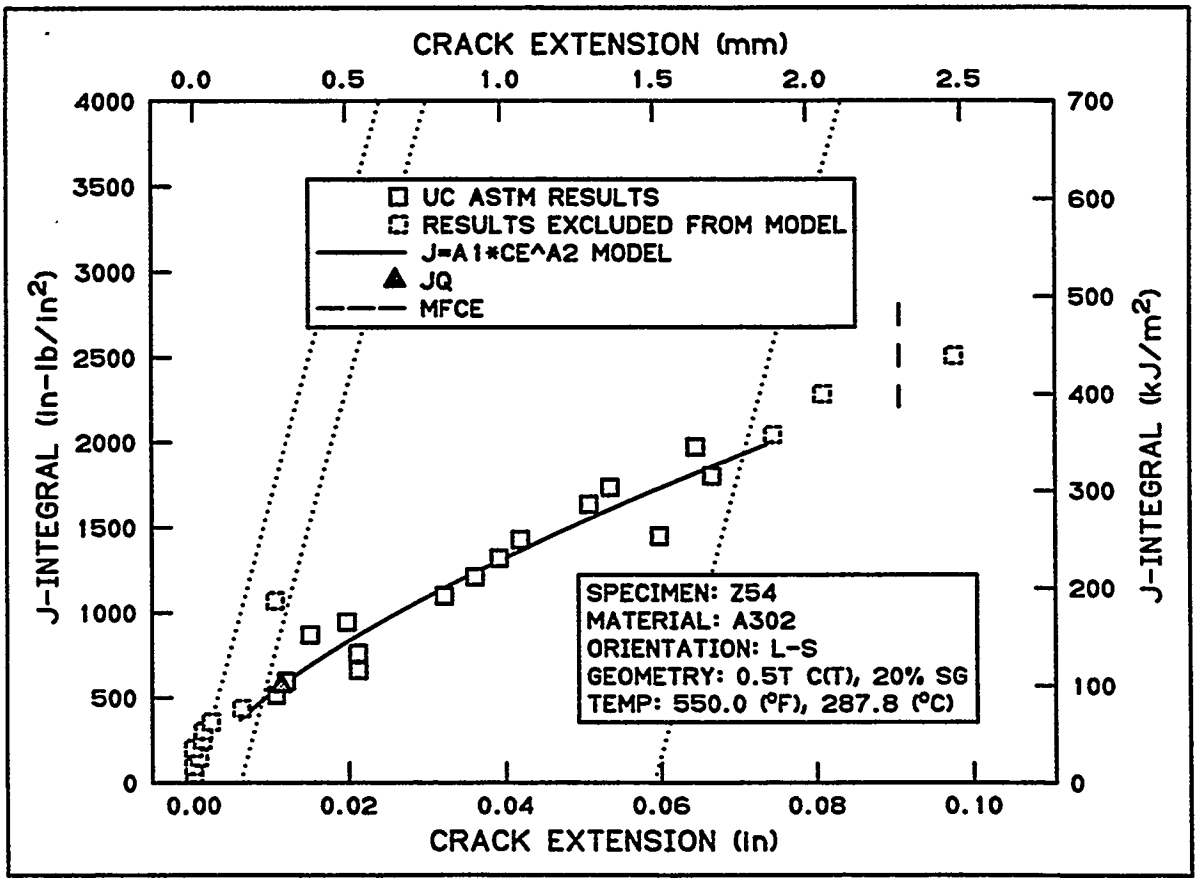

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
4000 3500 3000 2500 2000 1500 1000 500 0
J-INTEGRAL (in-lb/in²)
700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z56
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z54
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6171 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1056	0.0059	0.0000	52.9
2	1255	0.0083	-0.0001	97.2
3	1366	0.0109	0.0006	148.5
4	1441	0.0134	-0.0001	201.8
5	1498	0.0158	0.0010	250.3
6	1543	0.0182	0.0012	304.5
7	1581	0.0208	0.0022	357.4
8	1625	0.0247	0.0061	437.1
9	1646	0.0285	0.0107	515.9
10	1675	0.0321	0.0120	598.8
11	1707	0.0356	0.0212	664.2
12	1725	0.0397	0.0212	762.2
13	1737	0.0432	0.0151	871.0
14	1745	0.0470	0.0198	946.4
15	1752	0.0506	0.0105	1071.3
16	1721	0.0558	0.0322	1099.6
17	1710	0.0606	0.0361	1210.0
18	1706	0.0655	0.0392	1319.6
19	1696	0.0704	0.0419	1428.9
20	1691	0.0754	0.0598	1449.7
21	1674	0.0803	0.0508	1634.8
22	1650	0.0853	0.0535	1734.9
23	1614	0.0914	0.0665	1801.3
24	1584	0.0974	0.0645	1971.6
25	1553	0.1036	0.0745	2044.7
26	1447	0.1158	0.0808	2285.4
27	1307	0.1328	0.0976	2509.9

WIDTH: 0.9980 (IN),25.349 (MM)
THICKNESS: 0.4990 (IN),12.675 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2505 (IN),6.363 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8572 (IN),21.773 (MM)
DISTANCE 2: 0.8628 (IN),21.915 (MM)
DISTANCE 3: 0.8712 (IN),22.128 (MM)
DISTANCE 4: 0.8745 (IN),22.212 (MM)
DISTANCE 5: 0.8733 (IN),22.182 (MM)
DISTANCE 6: 0.8710 (IN),22.123 (MM)
DISTANCE 7: 0.8684 (IN),22.057 (MM)
DISTANCE 8: 0.8628 (IN),21.915 (MM)
DISTANCE 9: 0.8569 (IN),21.765 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9976 (IN),25.339 (MM)
DISTANCE 2: 0.9811 (IN),24.920 (MM)
DISTANCE 3: 0.9623 (IN),24.442 (MM)
DISTANCE 4: 0.9451 (IN),24.006 (MM)
DISTANCE 5: 0.9466 (IN),24.044 (MM)
DISTANCE 6: 0.9401 (IN),23.879 (MM)
DISTANCE 7: 0.9623 (IN),24.442 (MM)
DISTANCE 8: 0.9524 (IN),24.191 (MM)
DISTANCE 9: 0.9538 (IN),24.227 (MM)

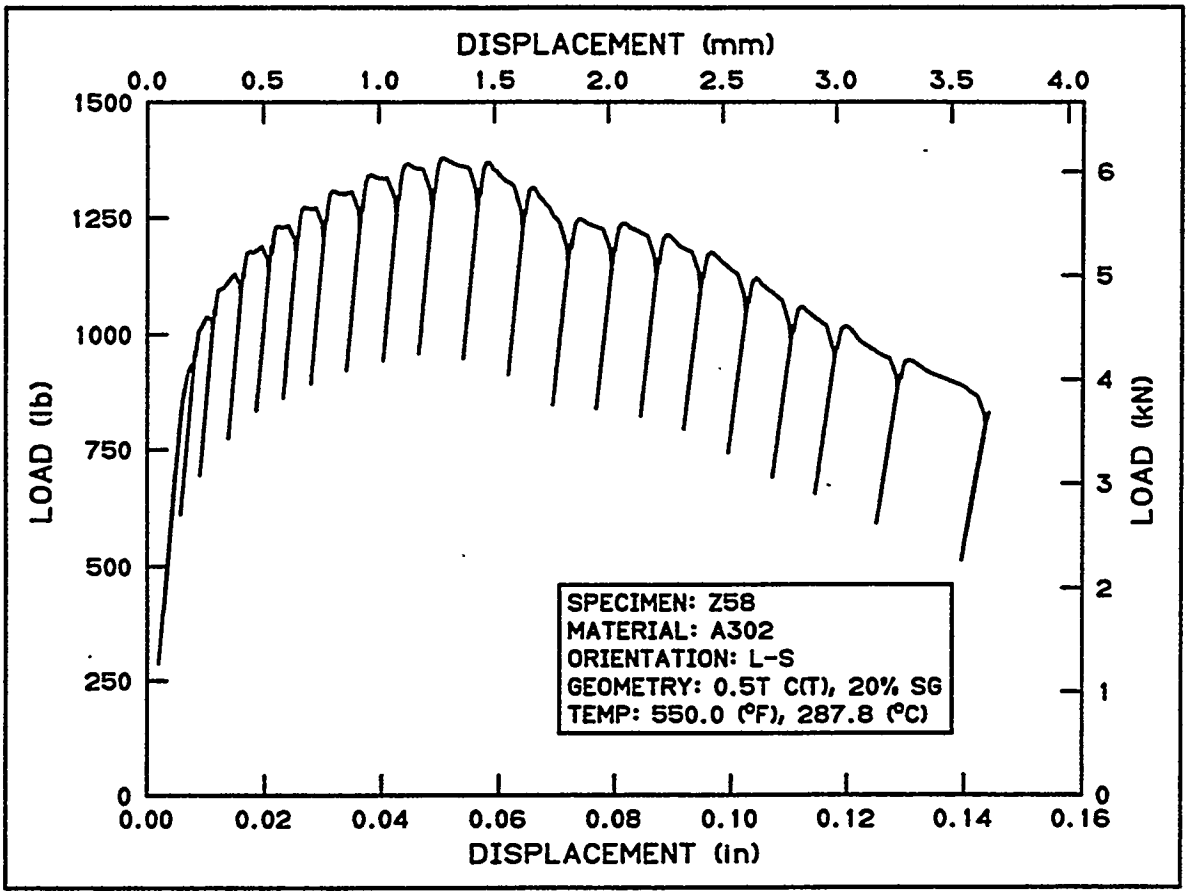

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z54
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

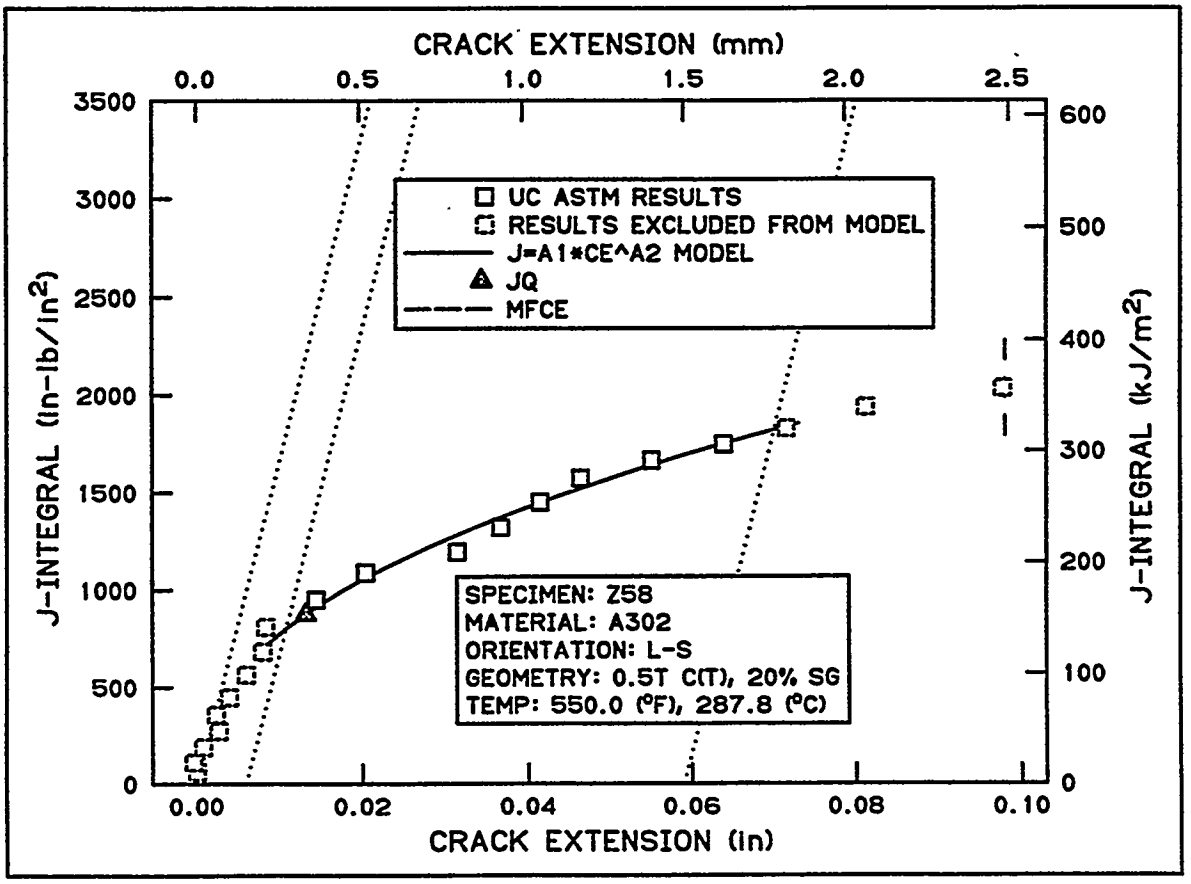

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z54
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z58
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6632 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	922	0.0071	0.0000	60.6
2	1036	0.0100	-0.0004	110.8
3	1128	0.0148	0.0008	190.3
4	1188	0.0194	0.0026	273.3
5	1233	0.0239	0.0023	358.7
6	1272	0.0287	0.0039	448.6
7	1305	0.0349	0.0060	565.2
8	1335	0.0407	0.0079	685.4
9	1355	0.0470	0.0083	811.7
10	1356	0.0548	0.0145	951.1
11	1317	0.0625	0.0204	1089.3
12	1239	0.0703	0.0314	1196.3
13	1225	0.0778	0.0367	1321.9
14	1210	0.0856	0.0415	1451.2
15	1175	0.0932	0.0464	1572.6
16	1127	0.1010	0.0551	1663.7
17	1069	0.1088	0.0639	1746.4
18	1017	0.1164	0.0715	1827.8
19	947	0.1271	0.0812	1938.8
20	863	0.1422	0.0978	2036.2

WIDTH: 1.0020 (IN),25.451 (MM)
THICKNESS: 0.4995 (IN),12.687 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2473 (IN),6.281 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8982 (IN),22.814 (MM)
DISTANCE 2: 0.9052 (IN),22.992 (MM)
DISTANCE 3: 0.9126 (IN),23.180 (MM)
DISTANCE 4: 0.9132 (IN),23.195 (MM)
DISTANCE 5: 0.9158 (IN),23.261 (MM)
DISTANCE 6: 0.9145 (IN),23.228 (MM)
DISTANCE 7: 0.9120 (IN),23.165 (MM)
DISTANCE 8: 0.9112 (IN),23.144 (MM)
DISTANCE 9: 0.9005 (IN),22.873 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.0125 (IN),25.718 (MM)
DISTANCE 2: 1.0176 (IN),25.847 (MM)
DISTANCE 3: 1.0091 (IN),25.631 (MM)
DISTANCE 4: 0.9968 (IN),25.319 (MM)
DISTANCE 5: 1.0042 (IN),25.507 (MM)
DISTANCE 6: 0.9992 (IN),25.380 (MM)
DISTANCE 7: 1.0200 (IN),25.908 (MM)
DISTANCE 8: 1.0040 (IN),25.502 (MM)
DISTANCE 9: 1.0220 (IN),25.959 (MM)

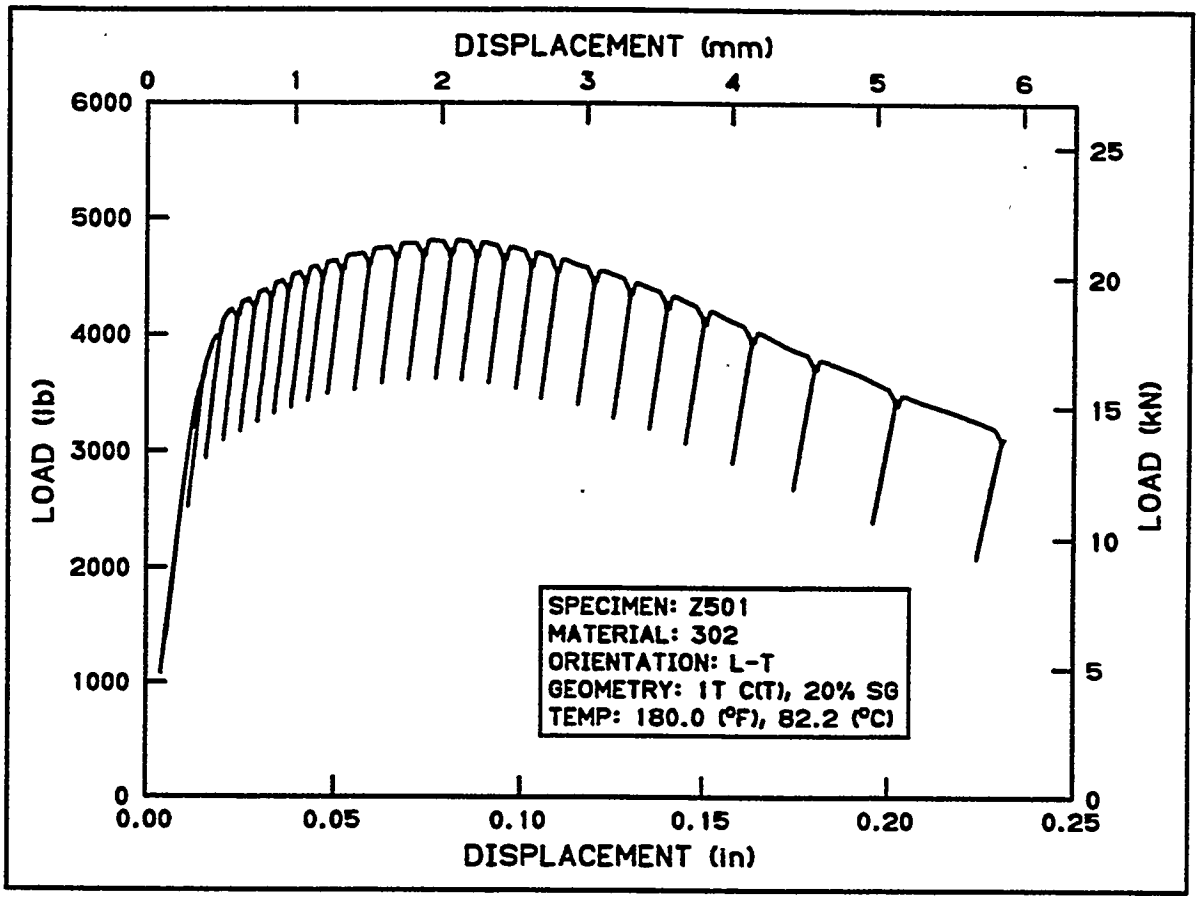

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
1500
1250
1000
750
500
250
0
LOAD (lb)
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z58
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

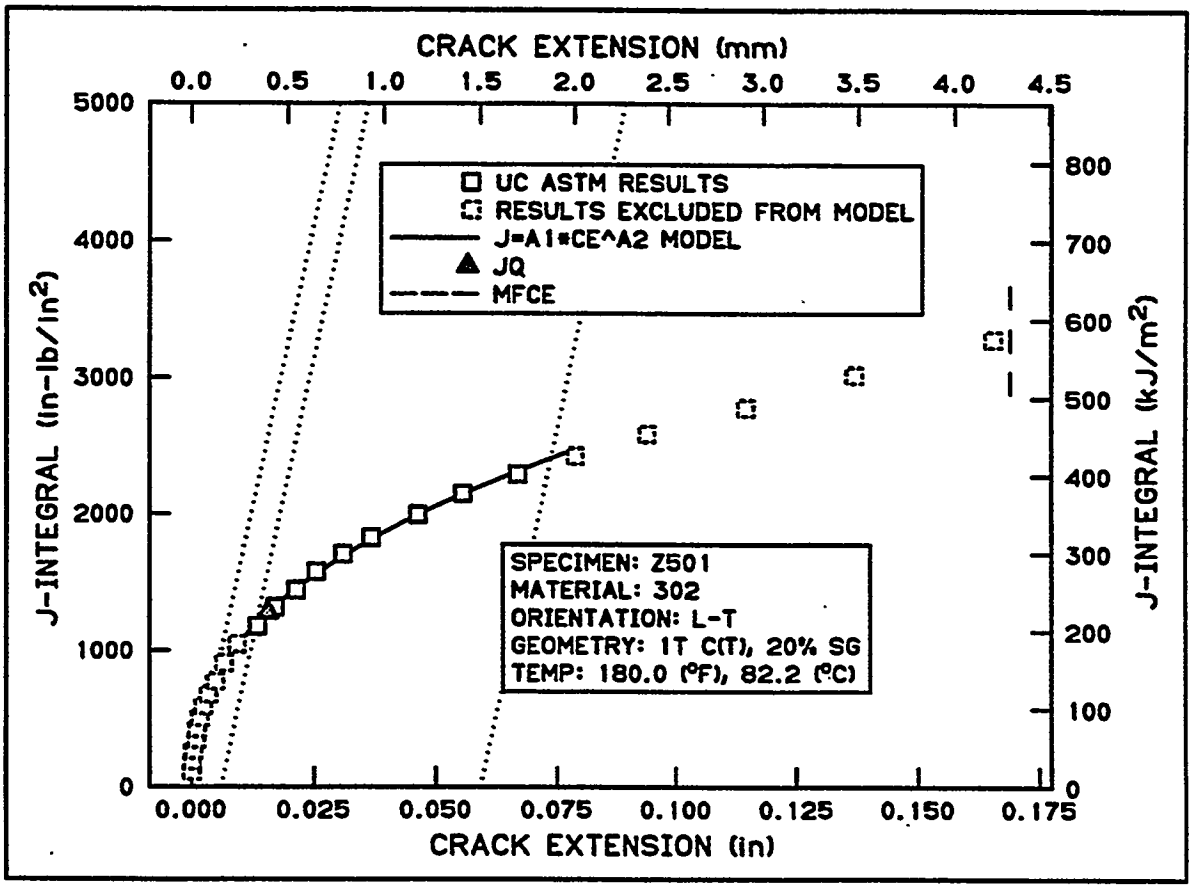

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z58
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z501
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.3547 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3498	0.0137	0.0000	112.9
2	3968	0.0181	0.0001	185.9
3	4212	0.0225	0.0003	264.8
4	4300	0.0271	0.0009	344.7
5	4384	0.0316	0.0010	424.7
6	4462	0.0361	0.0017	507.8
7	4532	0.0407	0.0024	591.0
8	4590	0.0452	0.0035	675.3
9	4644	0.0503	0.0048	772.5
10	4706	0.0577	0.0066	908.8
11	4756	0.0649	0.0093	1046.9
12	4790	0.0718	0.0134	1179.6
13	4805	0.0791	0.0170	1318.0
14	4803	0.0860	0.0214	1445.5
15	4777	0.0935	0.0255	1579.8
16	4730	0.1009	0.0309	1709.2
17	4681	0.1080	0.0367	1828.8
18	4585	0.1182	0.0463	1996.4
19	4491	0.1281	0.0555	2152.6
20	4376	0.1381	0.0667	2295.7
21	4253	0.1480	0.0788	2429.5
22	4070	0.1612	0.0939	2592.0
23	3825	0.1782	0.1145	2782.3
24	3543	0.2001	0.1370	3022.0
25	3192	0.2289	0.1655	3284.0

  WIDTH: 1.9966 (IN),50.714 (MM)
  THICKNESS: 1.0004 (IN),25.410 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5035 (IN),12.789 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8390 (IN),46.711 (MM)
    DISTANCE 2: 1.8657 (IN),47.389 (MM)
    DISTANCE 3: 1.8794 (IN),47.737 (MM)
    DISTANCE 4: 1.8786 (IN),47.716 (MM)
    DISTANCE 5: 1.8761 (IN),47.653 (MM)
    DISTANCE 6: 1.8664 (IN),47.407 (MM)
    DISTANCE 7: 1.8516 (IN),47.031 (MM)
    DISTANCE 8: 1.8302 (IN),46.487 (MM)
    DISTANCE 9: 1.7966 (IN),45.634 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0655 (IN),52.464 (MM)
    DISTANCE 2: 2.0351 (IN),51.692 (MM)
    DISTANCE 3: 2.0071 (IN),50.980 (MM)
    DISTANCE 4: 2.0135 (IN),51.143 (MM)
    DISTANCE 5: 2.0350 (IN),51.689 (MM)
    DISTANCE 6: 1.9910 (IN),50.571 (MM)
    DISTANCE 7: 2.0470 (IN),51.994 (MM)
    DISTANCE 8: 2.0479 (IN),52.017 (MM)
    DISTANCE 9: 2.0165 (IN),51.219 (MM)

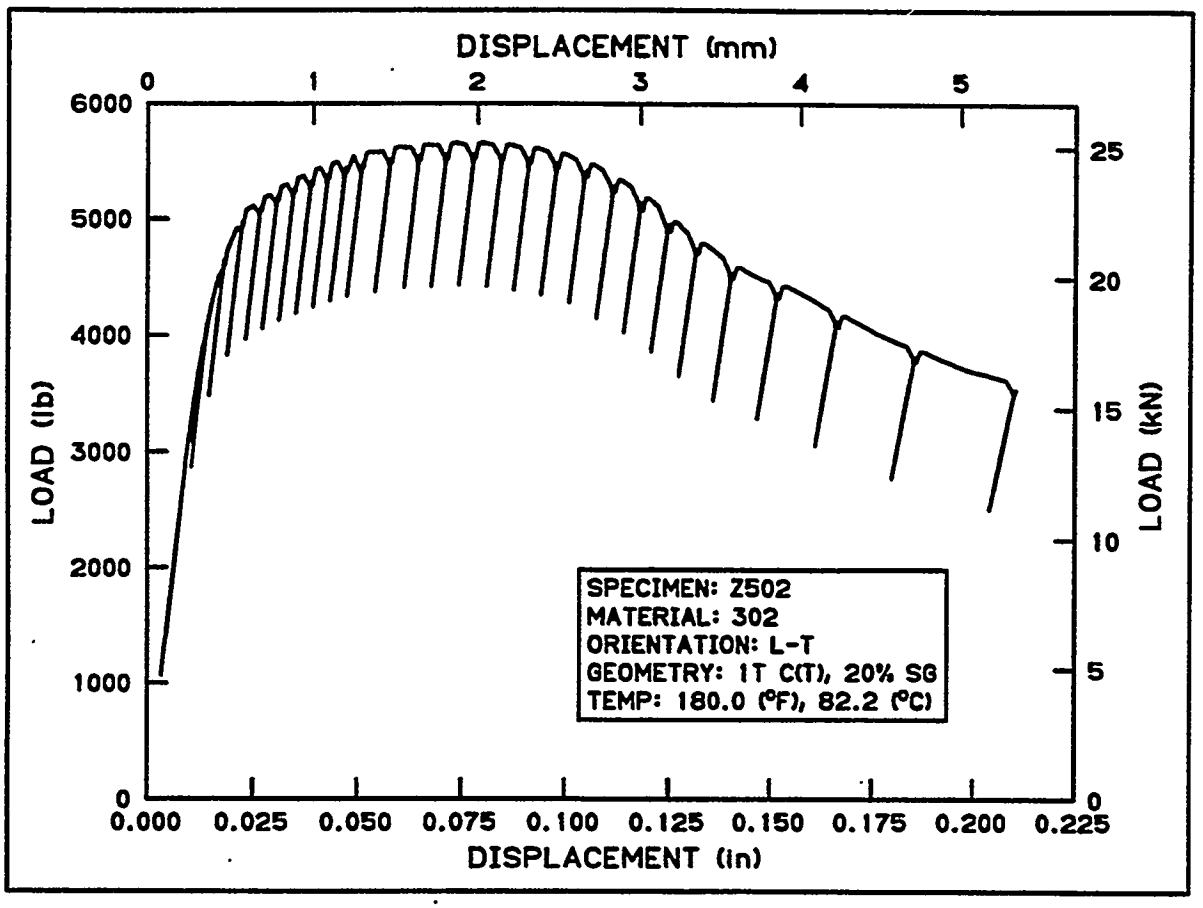

DISPLACEMENT (mm)
0
1
2
3
4
5
6
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
25
20
15
10
5
0
LOAD (kN)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)
SPECIMEN: Z501
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

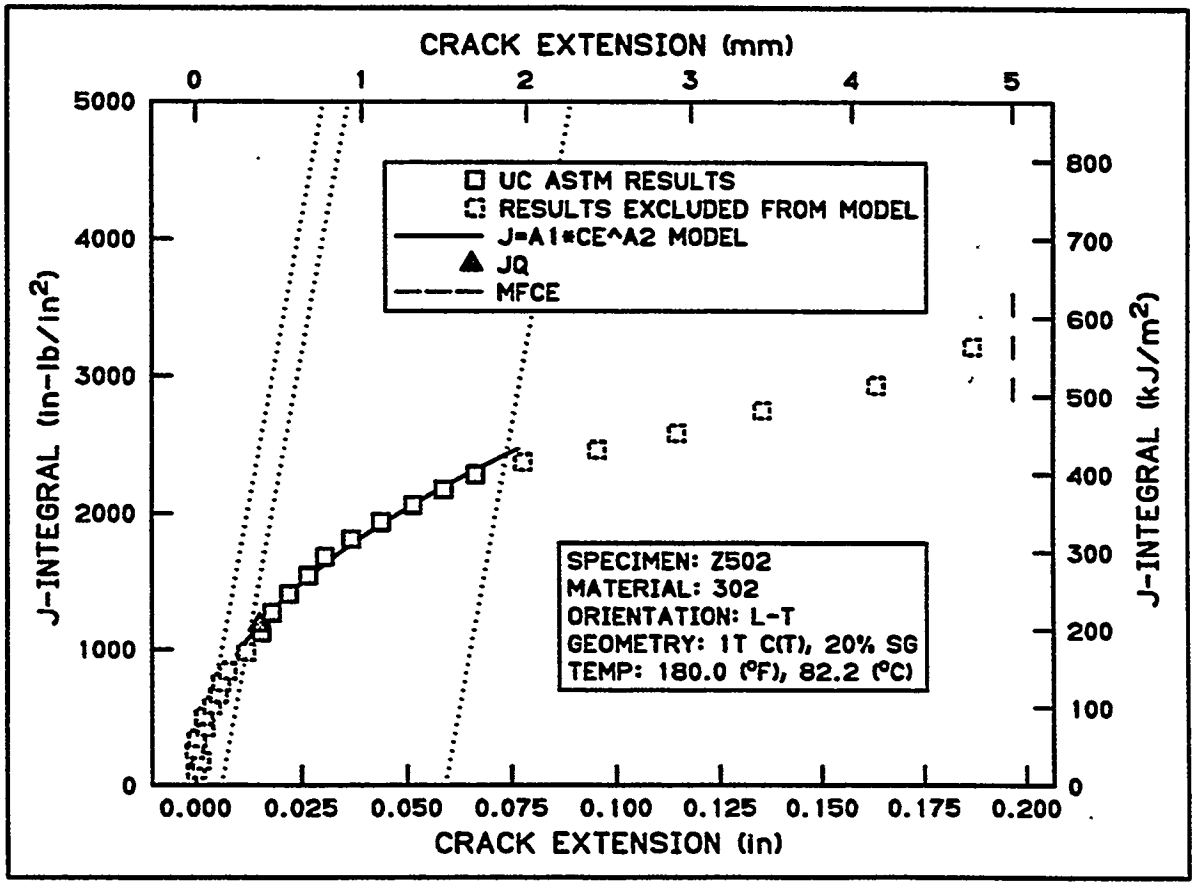

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z501
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
IDENTIFICATION: Z502
MATERIAL CODE: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.3135 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3853	0.0129	0.0000	109.0
2	4507	0.0168	0.0011	177.3
3	4917	0.0210	-0.0003	258.0
4	5110	0.0248	0.0002	343.4
5	5206	0.0288	0.0022	423.0
6	5297	0.0329	0.0019	505.1
7	5370	0.0369	0.0038	587.6
8	5435	0.0410	0.0052	671.0
9	5490	0.0450	0.0059	758.5
10	5538	0.0489	0.0074	841.8
11	5581	0.0557	0.0118	981.0
12	5616	0.0626	0.0155	1125.7
13	5634	0.0693	0.0180	1267.7
14	5643	0.0757	0.0221	1406.3
15	5641	0.0823	0.0266	1544.2
16	5618	0.0891	0.0306	1681.7
17	5578	0.0959	0.0368	1810.9
18	5511	0.1026	0.0438	1937.6
19	5421	0.1090	0.0515	2059.2
20	5281	0.1159	0.0588	2173.6
21	5109	0.1224	0.0664	2283.4
22	4885	0.1295	0.0778	2372.8
23	4671	0.1383	0.0954	2462.0
24	4462	0.1497	0.1144	2583.7
25	4227	0.1643	0.1354	2747.9
26	3916	0.1835	0.1633	2933.2
27	3618	0.2081	0.1868	3218.5

WIDTH: 1.9974 (IN),50.734 (MM)
THICKNESS: 1.0003 (IN),25.408 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5020 (IN),12.751 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7516 (IN),44.491 (MM)
DISTANCE 2: 1.7978 (IN),45.664 (MM)
DISTANCE 3: 1.8256 (IN),46.370 (MM)
DISTANCE 4: 1.8366 (IN),46.650 (MM)
DISTANCE 5: 1.8428 (IN),46.807 (MM)
DISTANCE 6: 1.8390 (IN),46.711 (MM)
DISTANCE 7: 1.8255 (IN),46.368 (MM)
DISTANCE 8: 1.8024 (IN),45.781 (MM)
DISTANCE 9: 1.7574 (IN),44.638 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9730 (IN),50.114 (MM)
DISTANCE 2: 1.9900 (IN),50.546 (MM)
DISTANCE 3: 1.9960 (IN),50.698 (MM)
DISTANCE 4: 1.9824 (IN),50.353 (MM)
DISTANCE 5: 2.0350 (IN),51.689 (MM)
DISTANCE 6: 2.0224 (IN),51.369 (MM)
DISTANCE 7: 2.0240 (IN),51.410 (MM)
DISTANCE 8: 2.0513 (IN),52.103 (MM)
DISTANCE 9: 2.0224 (IN),51.369 (MM)

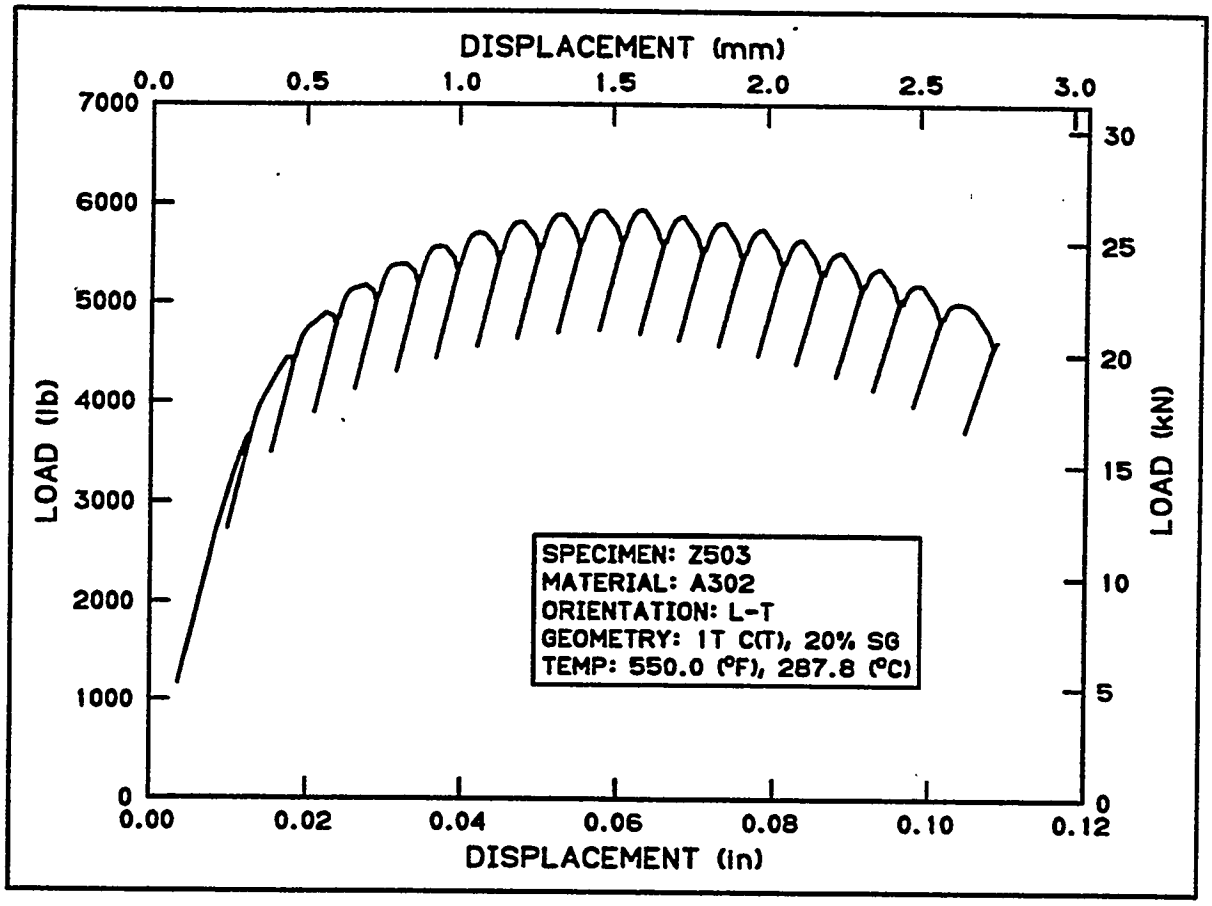

DISPLACEMENT (mm)
0
1
2
3
4
5
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z502
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

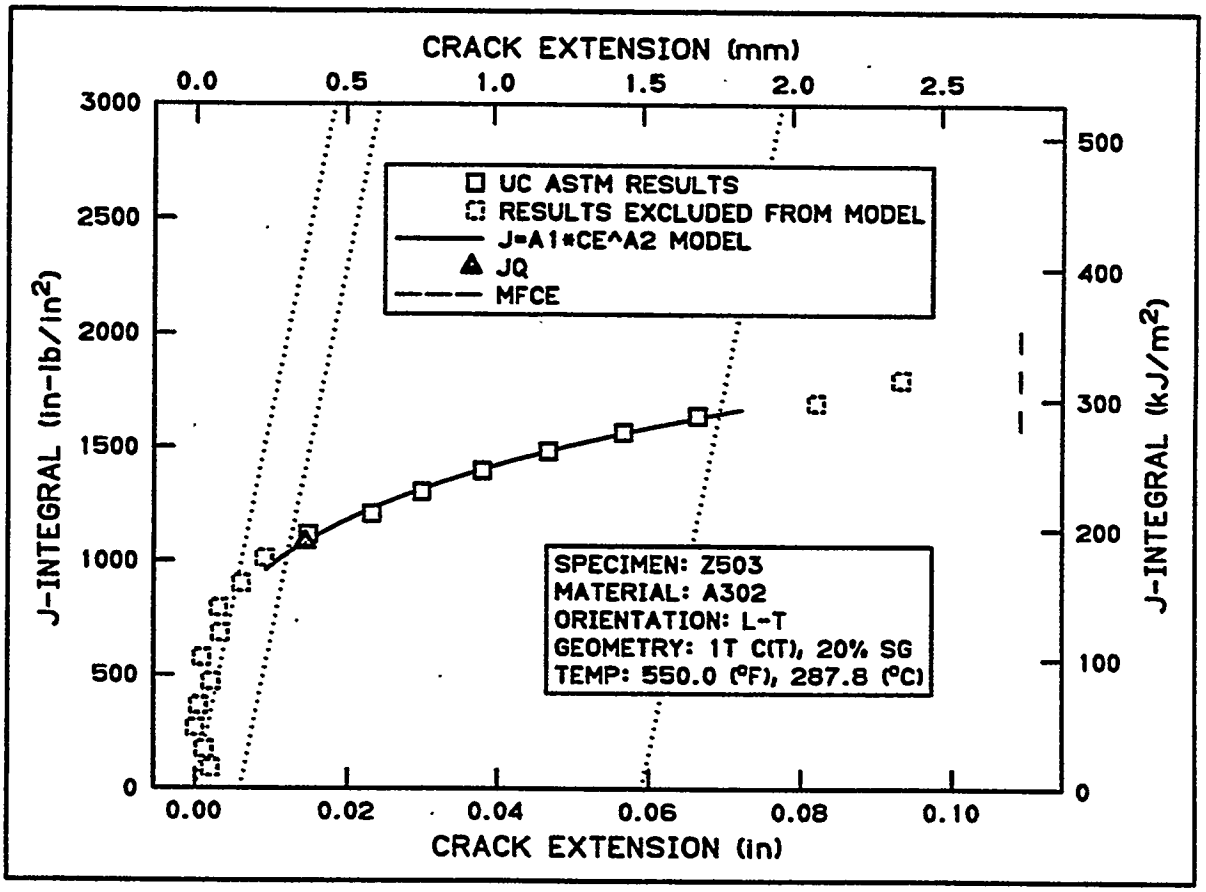

CRACK EXTENSION (mm)
0
1
2
3
4
5
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z502
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z503
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2973 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3618	0.0122	0.0020	89.7
2	4439	0.0173	0.0011	172.3
3	4895	0.0222	0.0000	267.4
4	5174	0.0273	0.0005	364.6
5	5388	0.0325	0.0021	469.9
6	5559	0.0376	0.0008	576.4
7	5691	0.0428	0.0033	685.0
8	5809	0.0478	0.0031	795.8
9	5883	0.0529	0.0060	902.8
10	5924	0.0581	0.0091	1013.7
11	5933	0.0631	0.0148	1116.9
12	5873	0.0681	0.0232	1208.1
13	5801	0.0734	0.0299	1305.1
14	5740	0.0784	0.0380	1399.3
15	5642	0.0834	0.0467	1484.5
16	5512	0.0885	0.0566	1567.4
17	5349	0.0935	0.0662	1640.8
18	5180	0.0989	0.0819	1698.5
19	4926	0.1058	0.0931	1800.9

THICKNESS: 1.0004 (IN),25.410 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5024 (IN),12.761 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7706 (IN),44.973 (MM)
DISTANCE 2: 1.8001 (IN),45.723 (MM)
DISTANCE 3: 1.8184 (IN),46.187 (MM)
DISTANCE 4: 1.8246 (IN),46.345 (MM)
DISTANCE 5: 1.8223 (IN),46.286 (MM)
DISTANCE 6: 1.8106 (IN),45.989 (MM)
DISTANCE 7: 1.7944 (IN),45.578 (MM)
DISTANCE 8: 1.7735 (IN),45.047 (MM)
DISTANCE 9: 1.7366 (IN),44.110 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9186 (IN),48.732 (MM)
DISTANCE 2: 1.9022 (IN),48.316 (MM)
DISTANCE 3: 1.8846 (IN),47.869 (MM)
DISTANCE 4: 1.8964 (IN),48.169 (MM)
DISTANCE 5: 1.9394 (IN),49.261 (MM)
DISTANCE 6: 1.9052 (IN),48.392 (MM)
DISTANCE 7: 1.9052 (IN),48.392 (MM)
DISTANCE 8: 1.9104 (IN),48.524 (MM)
DISTANCE 9: 1.9334 (IN),49.108 (MM)

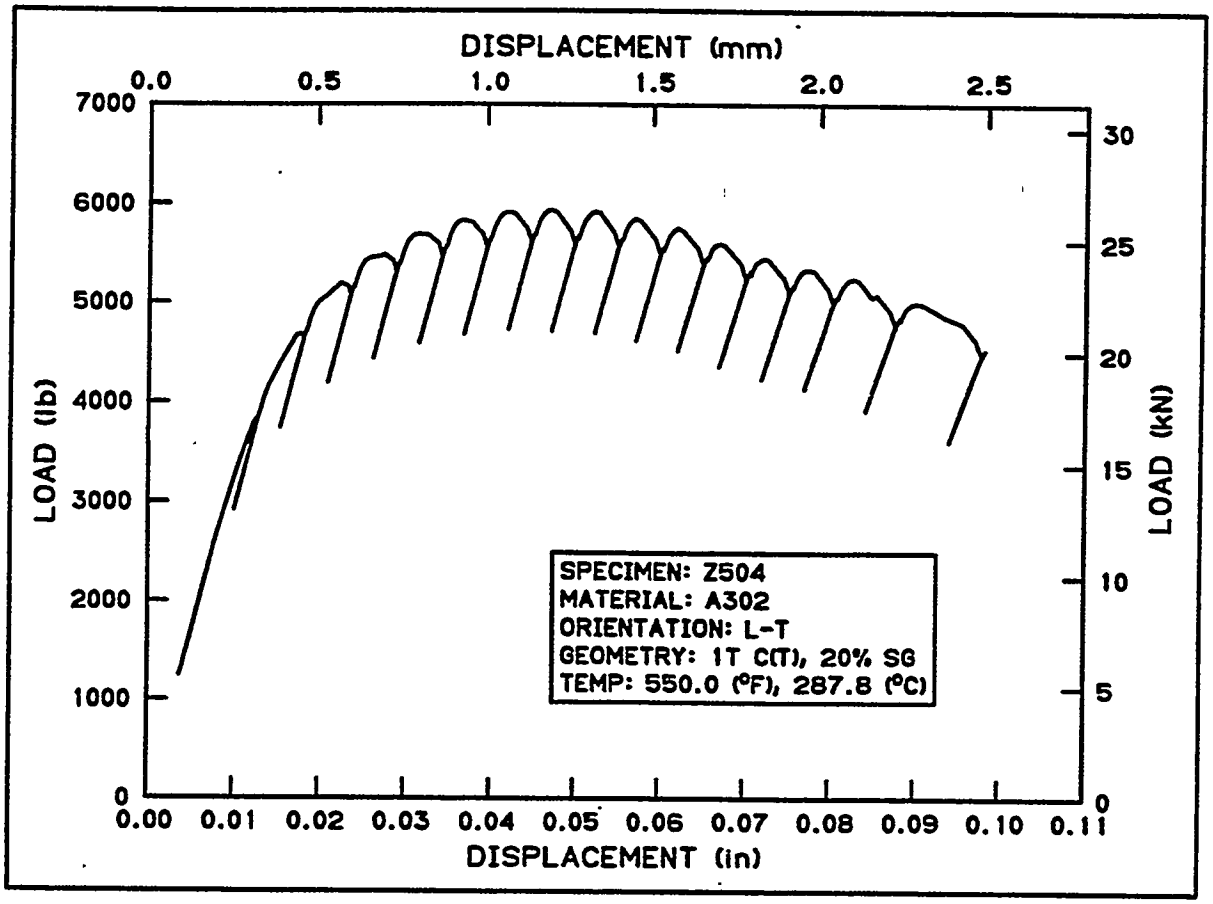

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z503
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

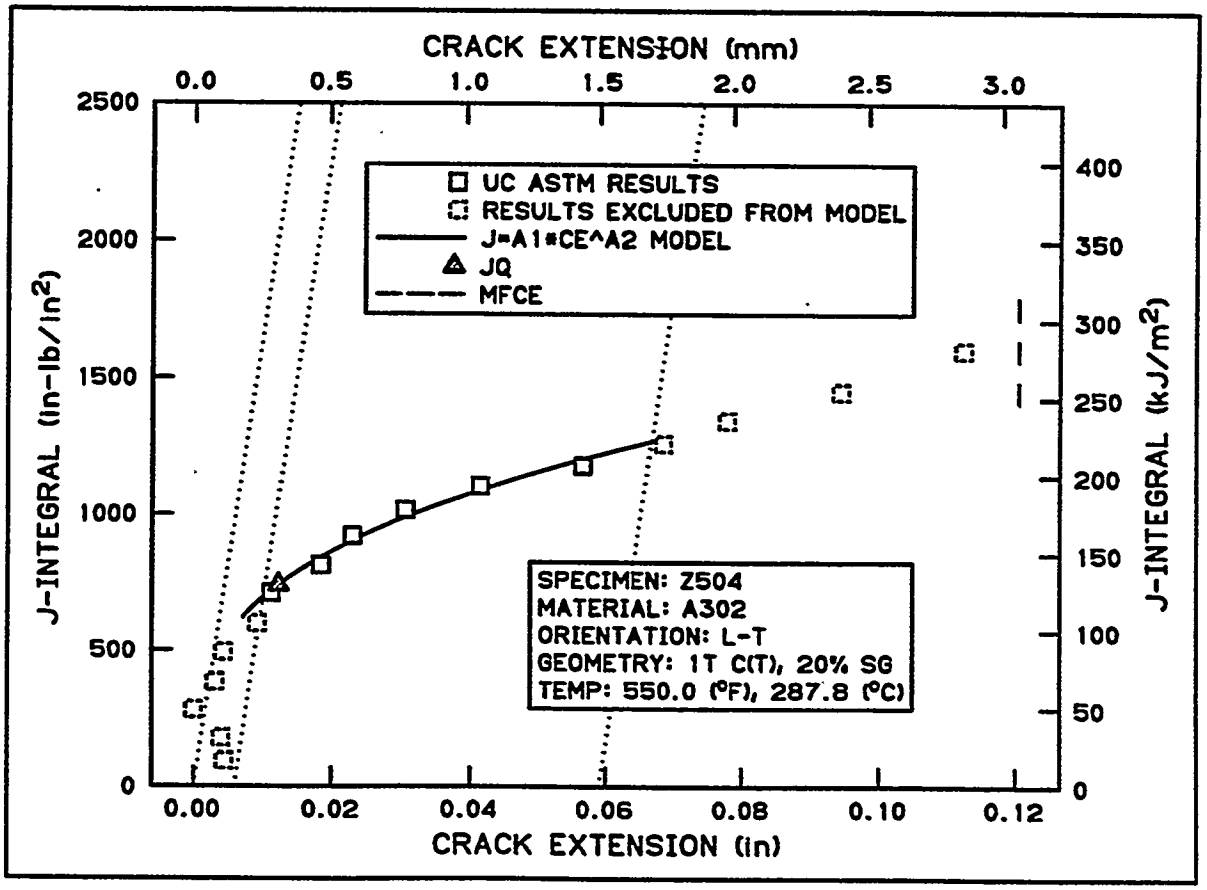

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z503
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z504
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2896 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3772	0.0123	0.0044	93.5
2	4669	0.0173	0.0040	178.1
3	5196	0.0224	0.0000	280.6
4	5484	0.0274	0.0031	383.3
5	5685	0.0324	0.0043	492.5
6	5814	0.0375	0.0092	598.8
7	5902	0.0427	0.0113	710.7
8	5917	0.0477	0.0185	813.8
9	5915	0.0527	0.0230	921.0
10	5832	0.0576	0.0307	1016.4
11	5728	0.0627	0.0415	1105.5
12	5573	0.0676	0.0566	1179.7
13	5435	0.0727	0.0685	1261.1
14	5326	0.0781	0.0778	1346.1
15	5085	0.0853	0.0945	1451.8
16	4796	0.0955	0.1125	1604.9

  WIDTH: 1.9970 (IN),50.724 (MM)
  THICKNESS: 1.0001 (IN),25.403 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5020 (IN),12.751 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7416 (IN),44.237 (MM)
    DISTANCE 2: 1.7800 (IN),45.212 (MM)
    DISTANCE 3: 1.8026 (IN),45.786 (MM)
    DISTANCE 4: 1.8134 (IN),46.060 (MM)
    DISTANCE 5: 1.8146 (IN),46.091 (MM)
    DISTANCE 6: 1.8102 (IN),45.979 (MM)
    DISTANCE 7: 1.7974 (IN),45.654 (MM)
    DISTANCE 8: 1.7768 (IN),45.131 (MM)
    DISTANCE 9: 1.7338 (IN),44.039 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9235 (IN),48.857 (MM)
    DISTANCE 2: 1.9445 (IN),49.390 (MM)
    DISTANCE 3: 1.9076 (IN),48.453 (MM)
    DISTANCE 4: 1.8829 (IN),47.826 (MM)
    DISTANCE 5: 1.9064 (IN),48.423 (MM)
    DISTANCE 6: 1.9155 (IN),48.654 (MM)
    DISTANCE 7: 1.9080 (IN),48.463 (MM)
    DISTANCE 8: 1.9158 (IN),48.661 (MM)
    DISTANCE 9: 1.9082 (IN),48.468 (MM)

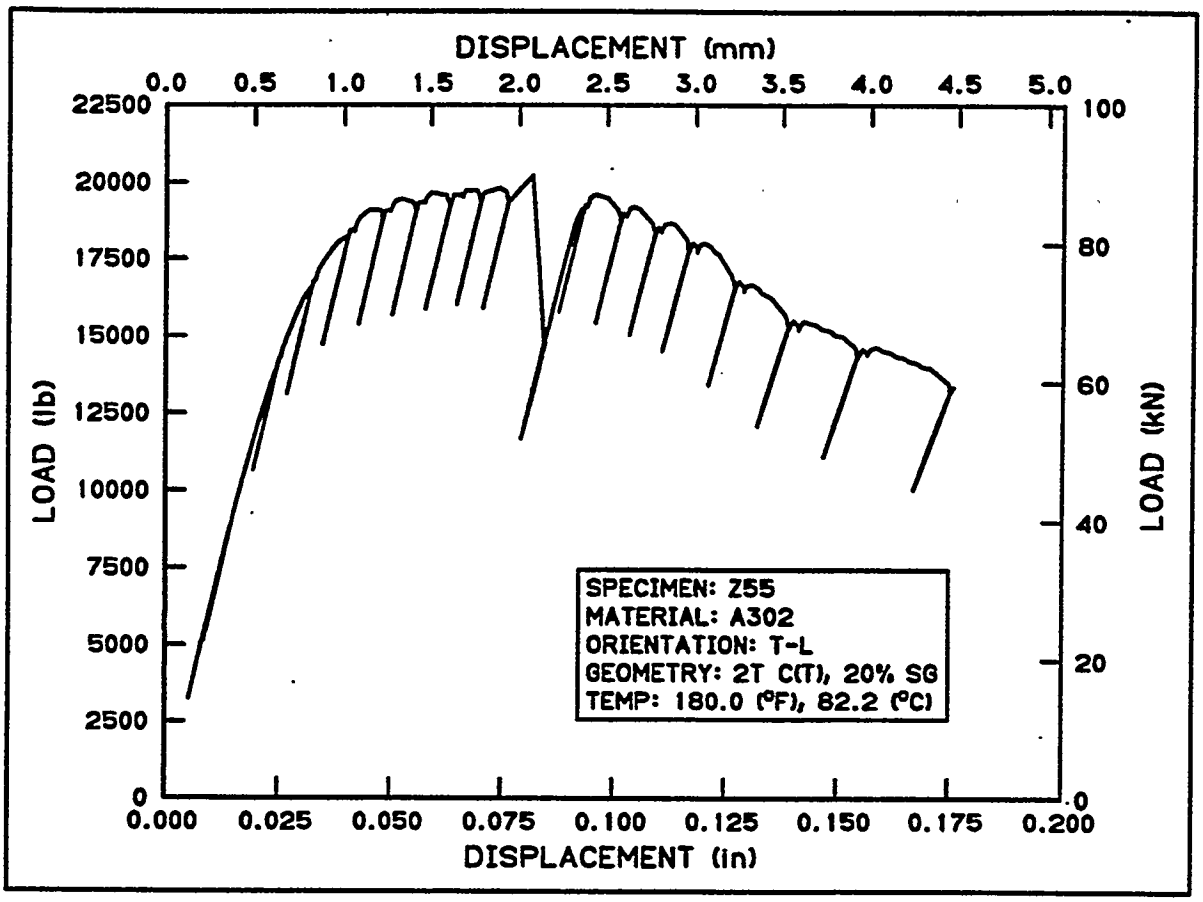

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z504
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

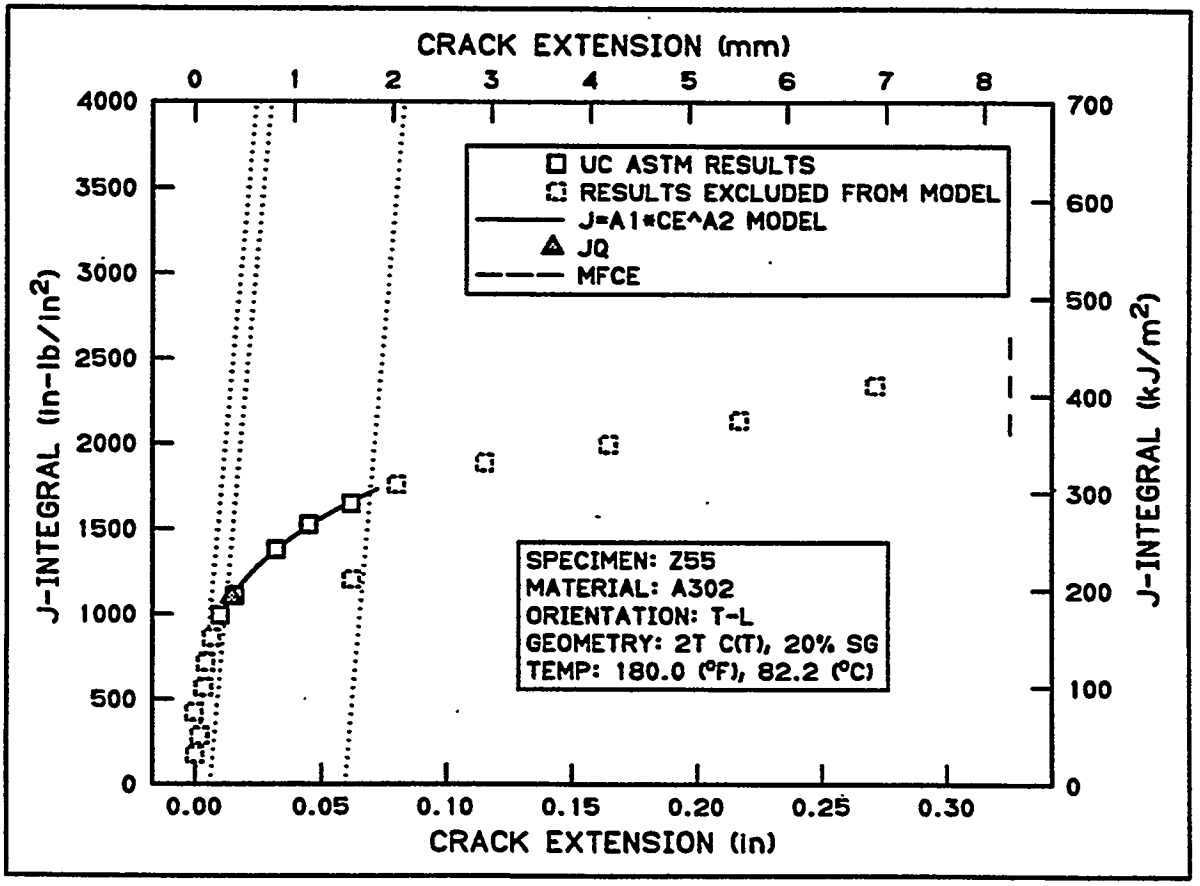

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
400
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z504
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z55
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6531 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13521	0.0234	0.0000	173.6
2	16258	0.0307	0.0019	285.6
3	18054	0.0381	-0.0003	422.9
4	19103	0.0453	0.0034	568.4
5	19439	0.0525	0.0043	714.4
6	19649	0.0594	0.0066	859.5
7	19723	0.0667	0.0099	992.0
8	19772	0.0747	0.0157	1108.1
9	14598	0.0844	0.0618	1203.9
10	18805	0.0915	0.0321	1379.3
11	19476	0.0985	0.0451	1526.3
12	19119	0.1056	0.0616	1648.8
13	18602	0.1136	0.0801	1760.5
14	17655	0.1234	0.1154	1892.0
15	16210	0.1354	0.1646	1998.2
16	14978	0.1512	0.2172	2140.1
17	13850	0.1717	0.2713	2345.7

  WIDTH: 4.0022 (IN),101.660 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.7820 (IN),19.863 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.3463 (IN),84.996 (MM)
    DISTANCE 2: 3.4009 (IN),86.383 (MM)
    DISTANCE 3: 3.4403 (IN),87.384 (MM)
    DISTANCE 4: 3.4564 (IN),87.793 (MM)
    DISTANCE 5: 3.4705 (IN),88.151 (MM)
    DISTANCE 6: 3.4644 (IN),87.996 (MM)
    DISTANCE 7: 3.4494 (IN),87.615 (MM)
    DISTANCE 8: 3.4280 (IN),87.071 (MM)
    DISTANCE 9: 3.3962 (IN),86.263 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6408 (IN),92.476 (MM)
    DISTANCE 2: 3.6764 (IN),93.381 (MM)
    DISTANCE 3: 3.7194 (IN),94.473 (MM)
    DISTANCE 4: 3.7445 (IN),95.110 (MM)
    DISTANCE 5: 3.7636 (IN),95.595 (MM)
    DISTANCE 6: 3.7530 (IN),95.326 (MM)
    DISTANCE 7: 3.8128 (IN),96.845 (MM)
    DISTANCE 8: 3.8803 (IN),98.560 (MM)
    DISTANCE 9: 3.8240 (IN),97.130 (MM)

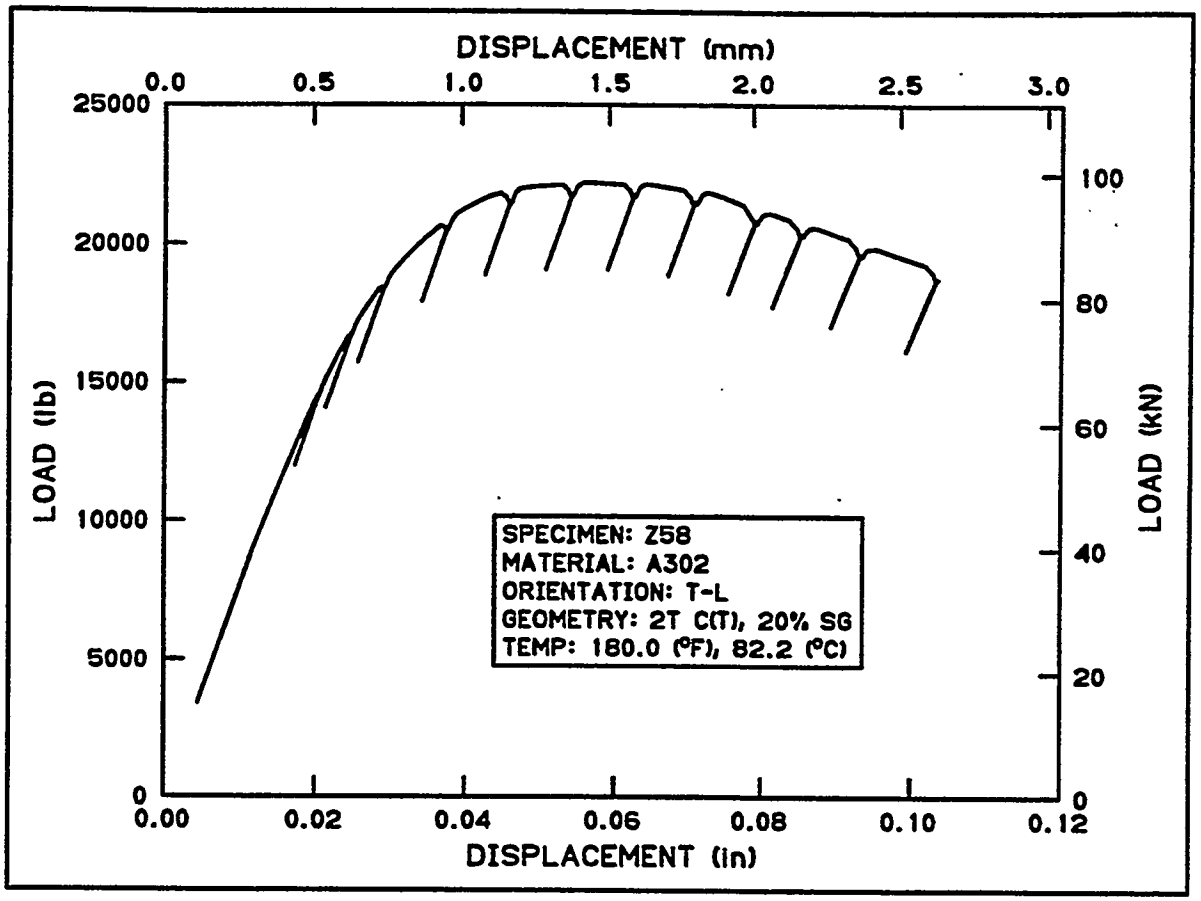

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
22500 20000 17500 15000 12500 10000 7500 5000 2500 0
100 80 60 40 20 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z55
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

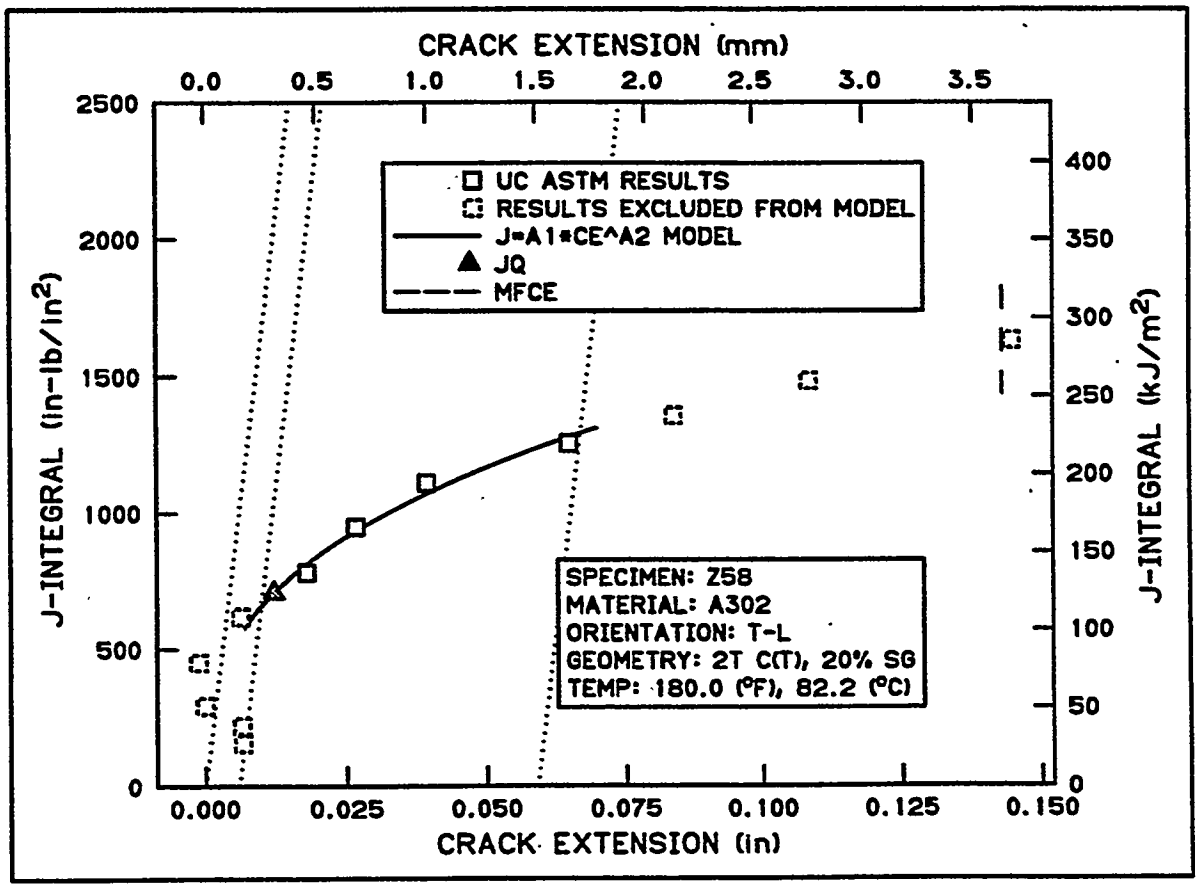

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8
4000 3500 3000 2500 2000 1500 1000 500 0
700 600 500 400 300 200 100 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z55
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z58
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5696 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14470	0.0202	0.0066	155.6
2	16647	0.0243	0.0064	219.3
3	18377	0.0284	0.0000	293.0
4	20653	0.0365	-0.0011	451.3
5	21806	0.0447	0.0063	618.3
6	22104	0.0529	0.0181	781.5
7	22116	0.0611	0.0267	948.8
8	21936	0.0692	0.0394	1109.7
9	21396	0.0774	0.0649	1254.4
10	20897	0.0835	0.0839	1355.3
11	20201	0.0914	0.1084	1482.4
12	19253	0.1019	0.1448	1630.1

  WIDTH: 3.9991 (IN),101.580 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.8388 (IN),21.306 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.3438 (IN),84.933 (MM)
    DISTANCE 2: 3.3987 (IN),86.327 (MM)
    DISTANCE 3: 3.4382 (IN),87.330 (MM)
    DISTANCE 4: 3.4564 (IN),87.793 (MM)
    DISTANCE 5: 3.4530 (IN),87.706 (MM)
    DISTANCE 6: 3.4374 (IN),87.310 (MM)
    DISTANCE 7: 3.4081 (IN),86.566 (MM)
    DISTANCE 8: 3.3492 (IN),85.070 (MM)
    DISTANCE 9: 3.3090 (IN),84.049 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6454 (IN),92.593 (MM)
    DISTANCE 2: 3.6581 (IN),92.916 (MM)
    DISTANCE 3: 3.6237 (IN),92.042 (MM)
    DISTANCE 4: 3.5791 (IN),90.909 (MM)
    DISTANCE 5: 3.5643 (IN),90.533 (MM)
    DISTANCE 6: 3.5481 (IN),90.122 (MM)
    DISTANCE 7: 3.4838 (IN),88.489 (MM)
    DISTANCE 8: 3.4478 (IN),87.574 (MM)
    DISTANCE 9: 3.3688 (IN),85.568 (MM)

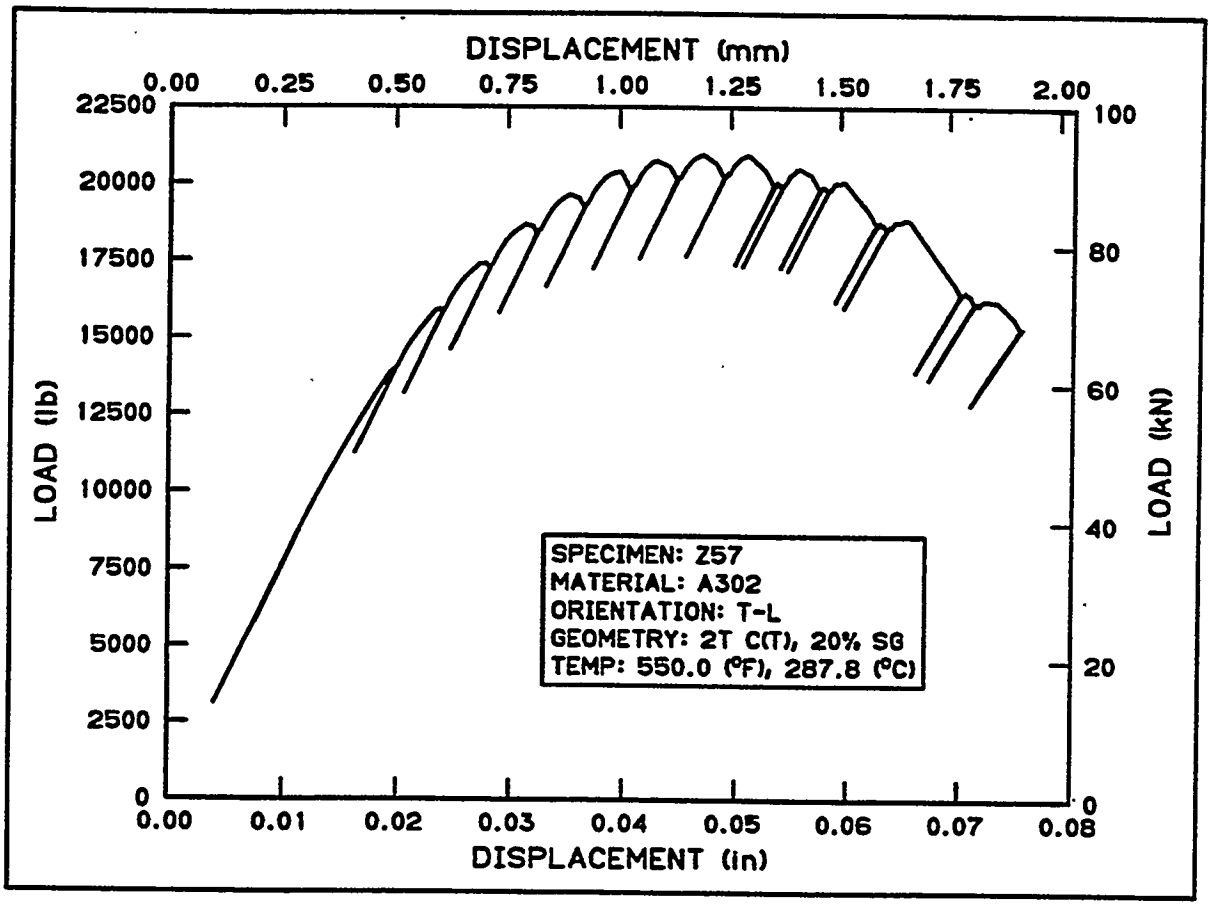

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
25000
20000
15000
10000
5000
0
LOAD (lb)
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z58
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

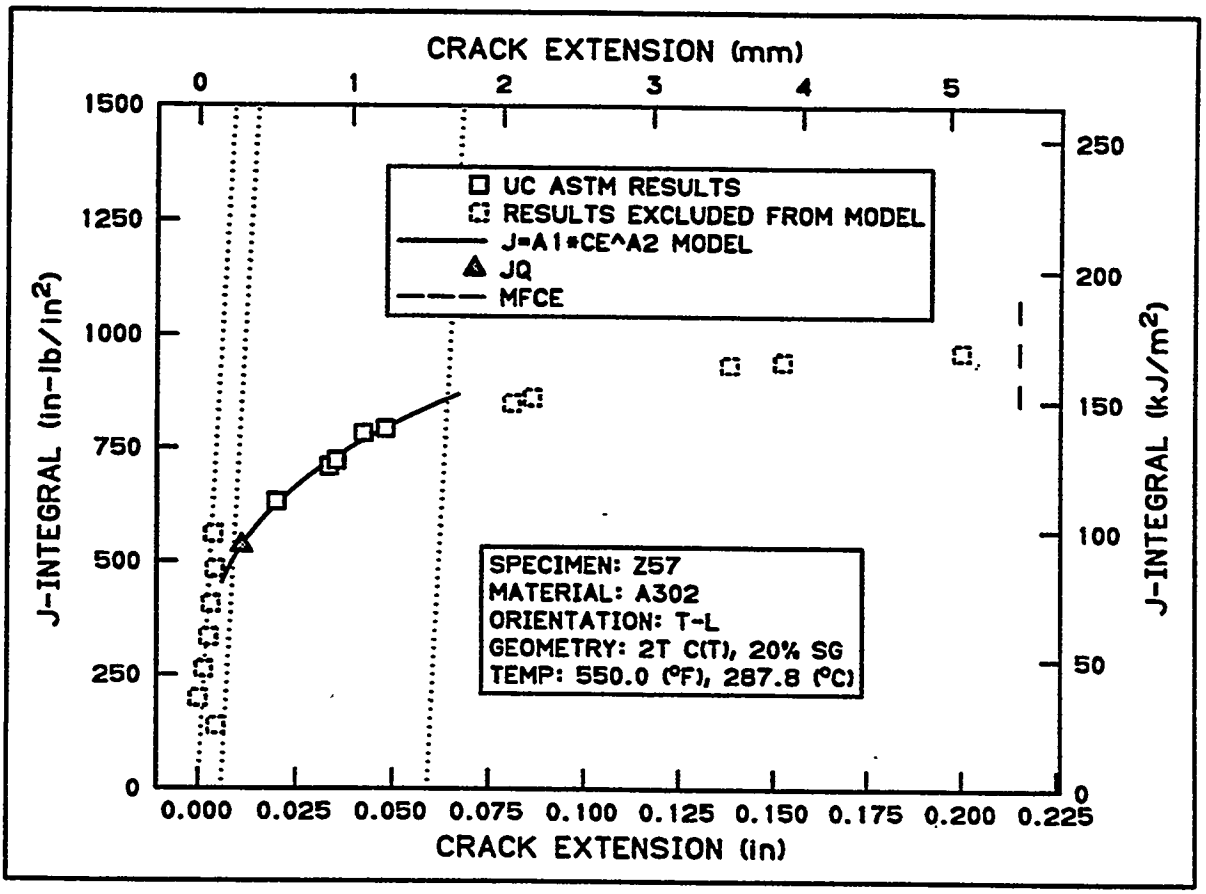

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
400
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z58
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z57
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5597 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13777	0.0191	0.0046	137.9
2	15849	0.0232	0.0000	198.2
3	17379	0.0270	0.0014	262.7
4	18669	0.0311	0.0027	333.5
5	19649	0.0350	0.0033	407.0
6	20354	0.0389	0.0043	483.4
7	20763	0.0426	0.0039	561.3
8	20966	0.0468	0.0200	632.9
9	20950	0.0508	0.0336	710.1
10	19955	0.0535	0.0355	723.1
11	20505	0.0554	0.0425	783.3
12	19871	0.0575	0.0481	793.6
13	20095	0.0594	0.0811	851.2
14	18685	0.0628	0.0865	863.7
15	18825	0.0653	0.1382	935.9
16	16425	0.0706	0.1522	943.7
17	16189	0.0733	0.1998	965.6

  WIDTH: 3.9987 (IN),101.570 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.8634 (IN),21.930 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.3677 (IN),85.540 (MM)
    DISTANCE 2: 3.4235 (IN),86.957 (MM)
    DISTANCE 3: 3.4490 (IN),87.605 (MM)
    DISTANCE 4: 3.4613 (IN),87.917 (MM)
    DISTANCE 5: 3.4584 (IN),87.843 (MM)
    DISTANCE 6: 3.4366 (IN),87.290 (MM)
    DISTANCE 7: 3.4217 (IN),86.911 (MM)
    DISTANCE 8: 3.3575 (IN),85.280 (MM)
    DISTANCE 9: 3.3860 (IN),86.004 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4752 (IN),88.270 (MM)
    DISTANCE 2: 3.5736 (IN),90.769 (MM)
    DISTANCE 3: 3.6257 (IN),92.093 (MM)
    DISTANCE 4: 3.6337 (IN),92.296 (MM)
    DISTANCE 5: 3.6901 (IN),93.729 (MM)
    DISTANCE 6: 3.7089 (IN),94.206 (MM)
    DISTANCE 7: 3.7136 (IN),94.325 (MM)
    DISTANCE 8: 3.6092 (IN),91.674 (MM)
    DISTANCE 9: 3.6274 (IN),92.136 (MM)

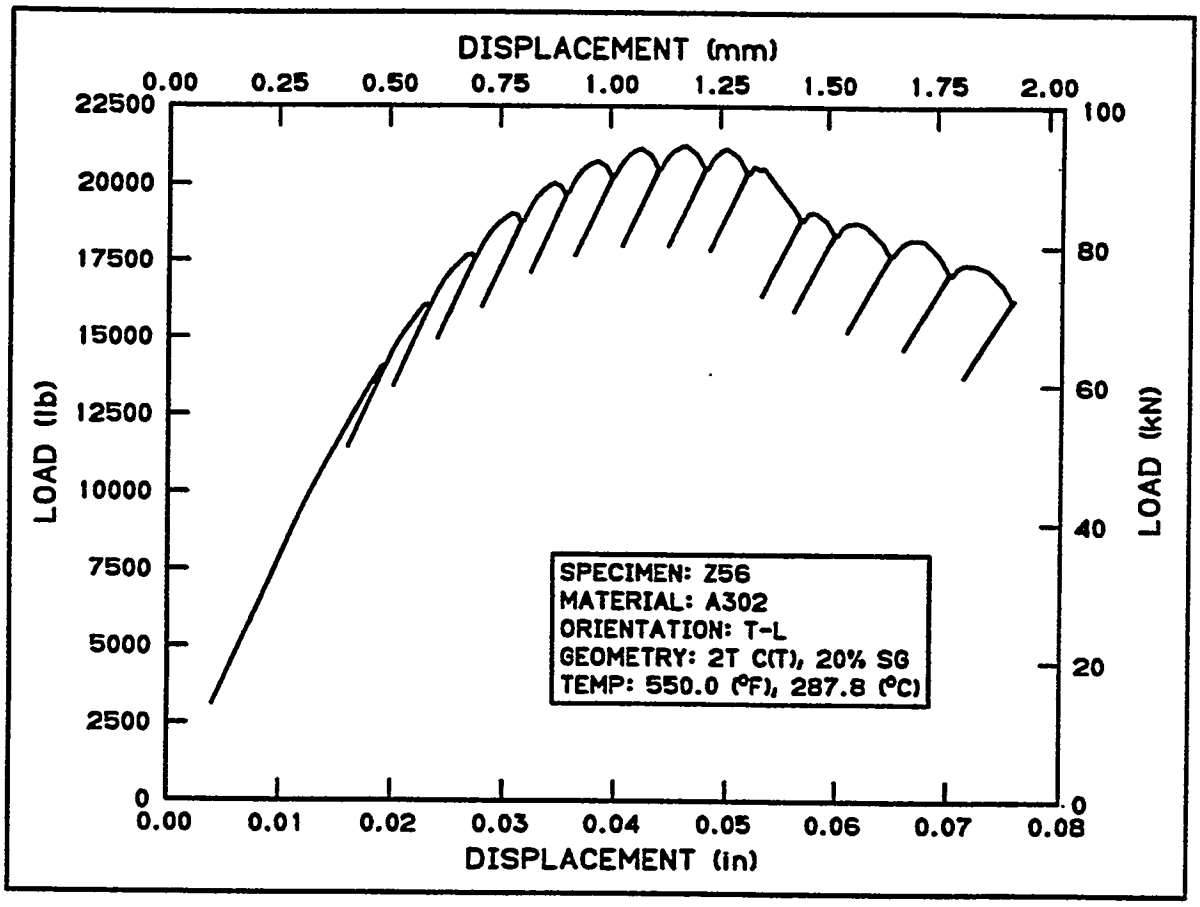

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
22500
20000
17500
15000
12500
10000
7500
5000
2500
0
100
80
60
40
20
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z57
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
DISPLACEMENT (in)

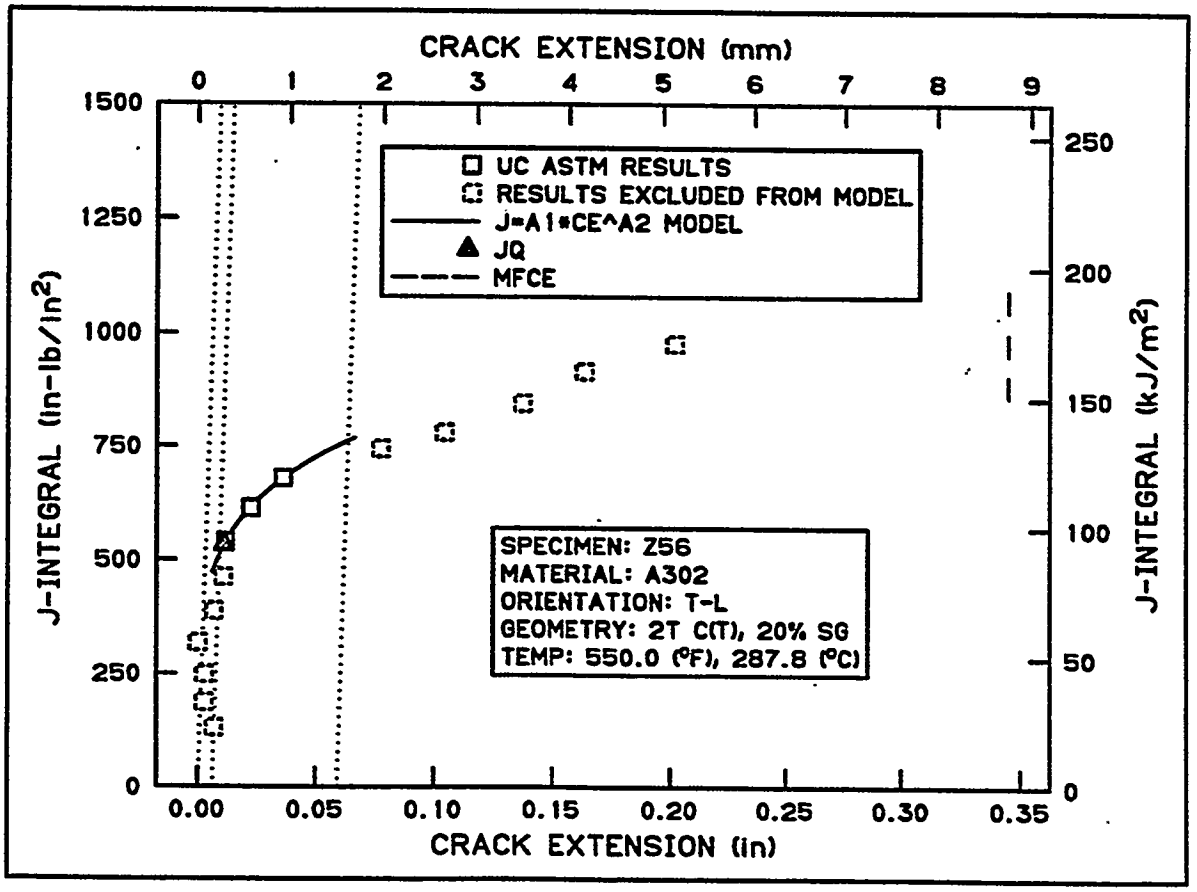

CRACK EXTENSION (mm)
0
1
2
3
4
5
1500
1250
1000
750
500
250
0
250
200
150
100
50
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z57
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z56
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5263 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13970	0.0189	0.0067	130.3
2	16030	0.0228	0.0027	186.5
3	17678	0.0266	0.0027	248.3
4	19028	0.0306	0.0000	318.5
5	20027	0.0344	0.0067	388.5
6	20725	0.0383	0.0107	462.5
7	21131	0.0421	0.0117	540.2
8	21232	0.0461	0.0224	614.3
9	21132	0.0498	0.0363	680.3
10	20490	0.0533	0.0775	744.8
11	19073	0.0580	0.1046	781.3
12	18654	0.0626	0.1374	846.9
13	18174	0.0678	0.1639	916.8
14	17226	0.0735	0.2019	978.1

  WIDTH: 3.9976 (IN),101.540 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.7737 (IN),19.652 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.2588 (IN),82.774 (MM)
    DISTANCE 2: 3.2996 (IN),83.810 (MM)
    DISTANCE 3: 3.3298 (IN),84.577 (MM)
    DISTANCE 4: 3.3408 (IN),84.856 (MM)
    DISTANCE 5: 3.3333 (IN),84.666 (MM)
    DISTANCE 6: 3.3193 (IN),84.310 (MM)
    DISTANCE 7: 3.2926 (IN),83.632 (MM)
    DISTANCE 8: 3.2436 (IN),82.387 (MM)
    DISTANCE 9: 3.2238 (IN),81.885 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7152 (IN),94.366 (MM)
    DISTANCE 2: 3.7318 (IN),94.788 (MM)
    DISTANCE 3: 3.7149 (IN),94.358 (MM)
    DISTANCE 4: 3.7085 (IN),94.196 (MM)
    DISTANCE 5: 3.6274 (IN),92.136 (MM)
    DISTANCE 6: 3.6568 (IN),92.883 (MM)
    DISTANCE 7: 3.5396 (IN),89.906 (MM)
    DISTANCE 8: 3.5606 (IN),90.439 (MM)
    DISTANCE 9: 3.5246 (IN),89.525 (MM)

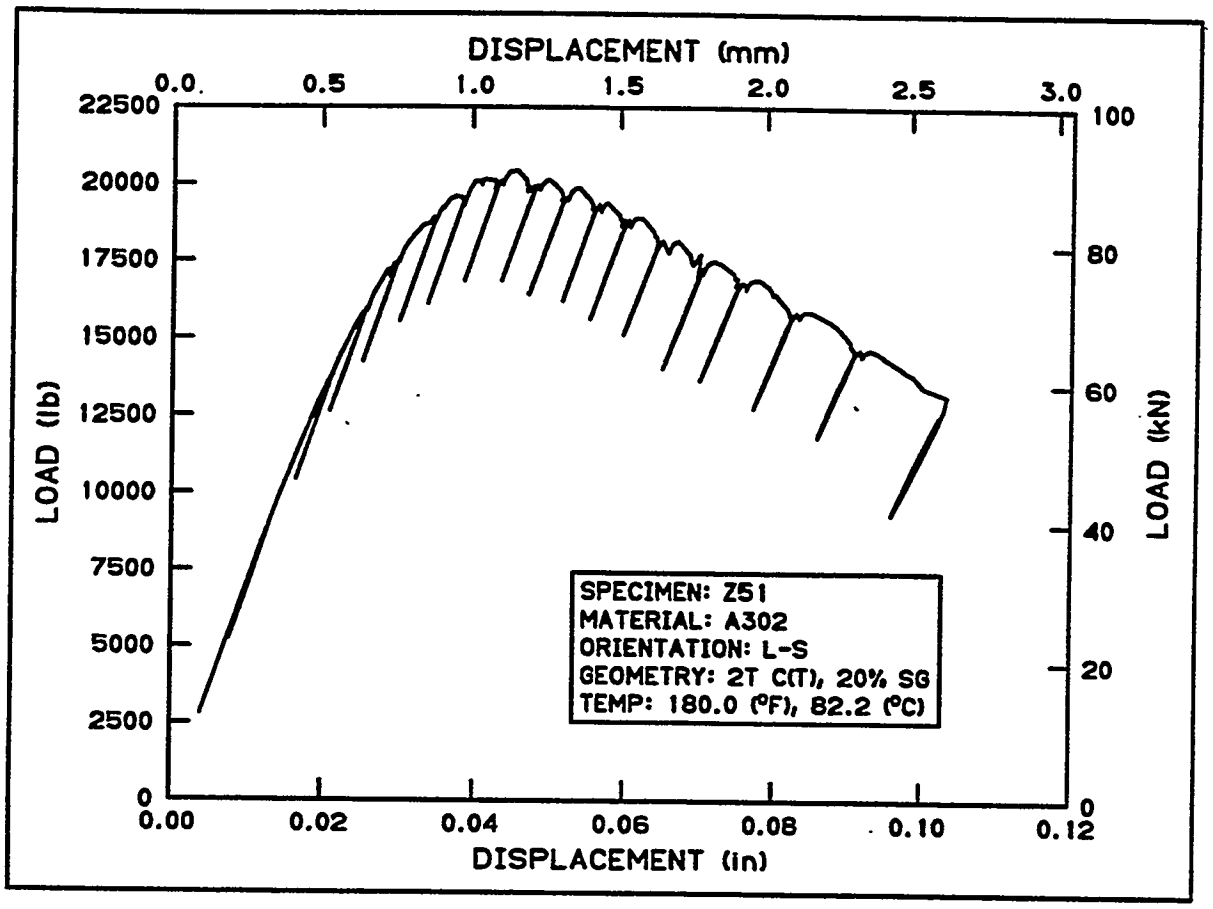

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00
LOAD (lb)
22500 20000 17500 15000 12500 10000 7500 5000 2500 0
LOAD (kN)
100 80 60 40 20 0
SPECIMEN: Z56
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08
DISPLACEMENT (in)

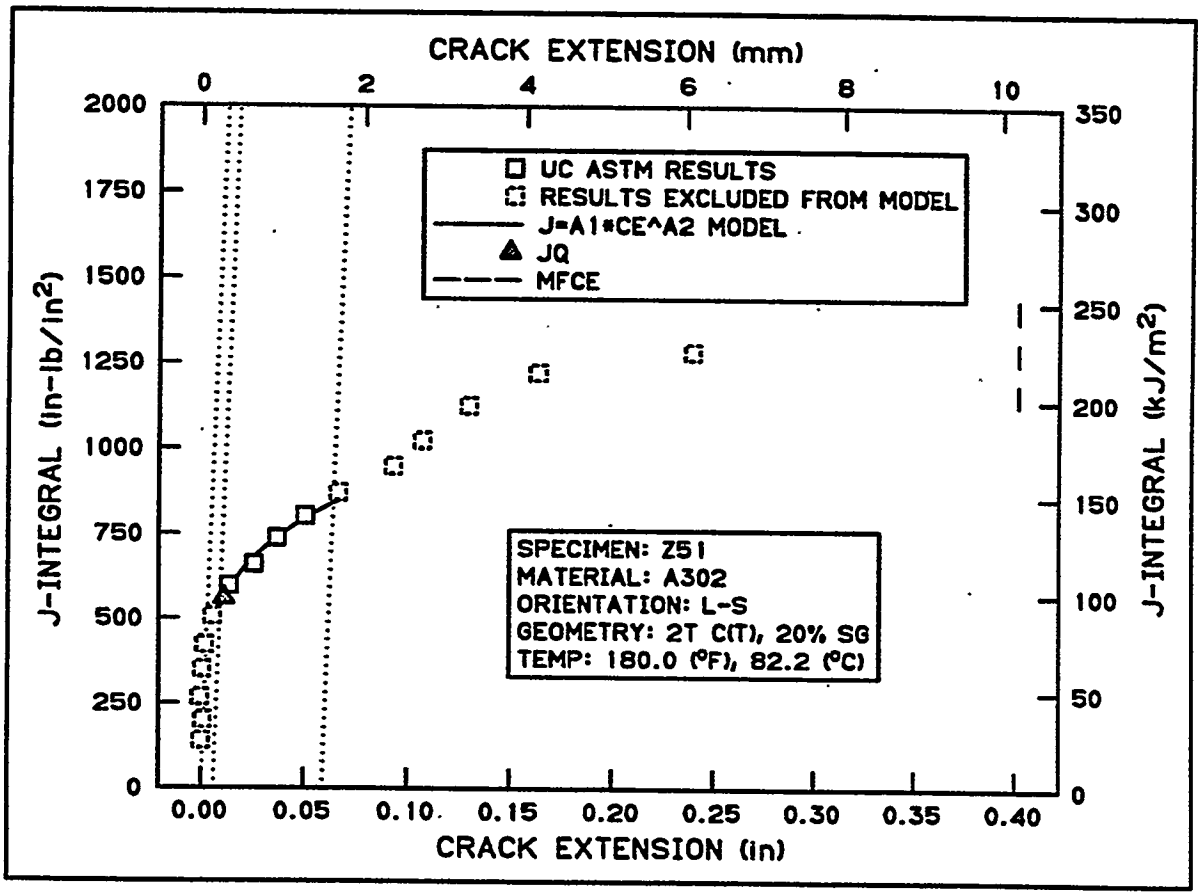

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8 9
J-INTEGRAL (in-lb/in²)
1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z56
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z51
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5968 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13559	0.0206	0.0000	140.4
2	15701	0.0247	0.0008	201.4
3	17349	0.0290	-0.0006	267.9
4	18662	0.0329	0.0005	350.6
5	19607	0.0370	0.0017	423.6
6	20165	0.0410	0.0055	508.3
7	20427	0.0453	0.0137	598.0
8	20146	0.0494	0.0258	661.1
9	19885	0.0534	0.0370	738.5
10	19403	0.0574	0.0506	803.7
11	18924	0.0619	0.0666	872.5
12	18162	0.0668	0.0929	949.6
13	17454	0.0725	0.1071	1025.0
14	16475	0.0799	0.1297	1127.0
15	15410	0.0883	0.1632	1223.5
16	13826	0.0987	0.2393	1285.3

  WIDTH: 4.0022 (IN),101.660 (MM)
  THICKNESS: 2.0005 (IN),50.813 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0012 (IN),25.430 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5425 (IN),89.980 (MM)
    DISTANCE 2: 3.5972 (IN),91.369 (MM)
    DISTANCE 3: 3.6332 (IN),92.283 (MM)
    DISTANCE 4: 3.6323 (IN),92.260 (MM)
    DISTANCE 5: 3.6196 (IN),91.938 (MM)
    DISTANCE 6: 3.6110 (IN),91.719 (MM)
    DISTANCE 7: 3.6058 (IN),91.587 (MM)
    DISTANCE 8: 3.5568 (IN),90.343 (MM)
    DISTANCE 9: 3.5132 (IN),89.235 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9300 (IN),99.822 (MM)
    DISTANCE 2: 4.0078 (IN),101.800 (MM)
    DISTANCE 3: 4.3110 (IN),109.500 (MM)
    DISTANCE 4: 4.0018 (IN),101.650 (MM)
    DISTANCE 5: 3.9280 (IN),99.771 (MM)
    DISTANCE 6: 3.9509 (IN),100.350 (MM)
    DISTANCE 7: 3.9743 (IN),100.950 (MM)
    DISTANCE 8: 3.9494 (IN),100.310 (MM)
    DISTANCE 9: 3.8174 (IN),96.962 (MM)

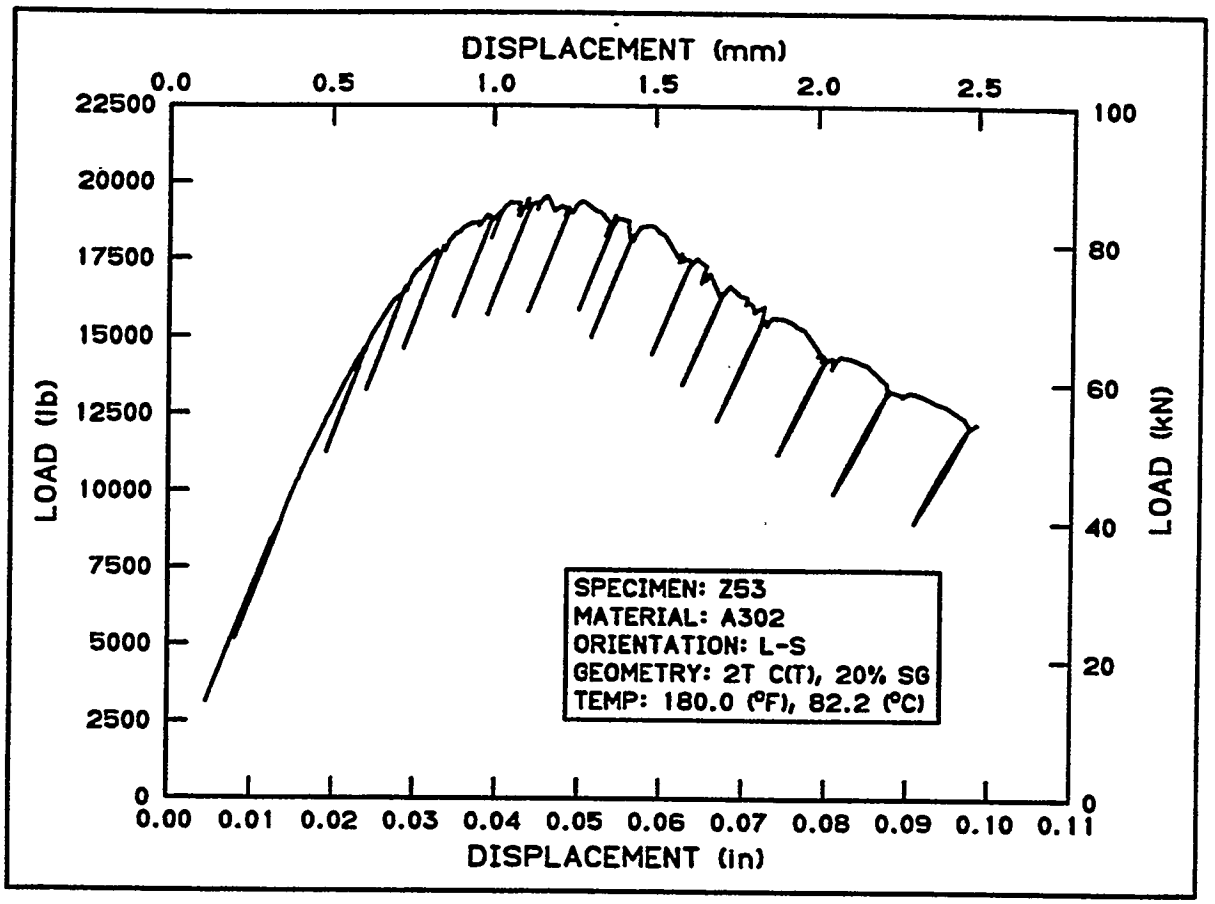

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
22500
20000
17500
15000
12500
10000
7500
5000
2500
0
LOAD (lb)
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z51
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

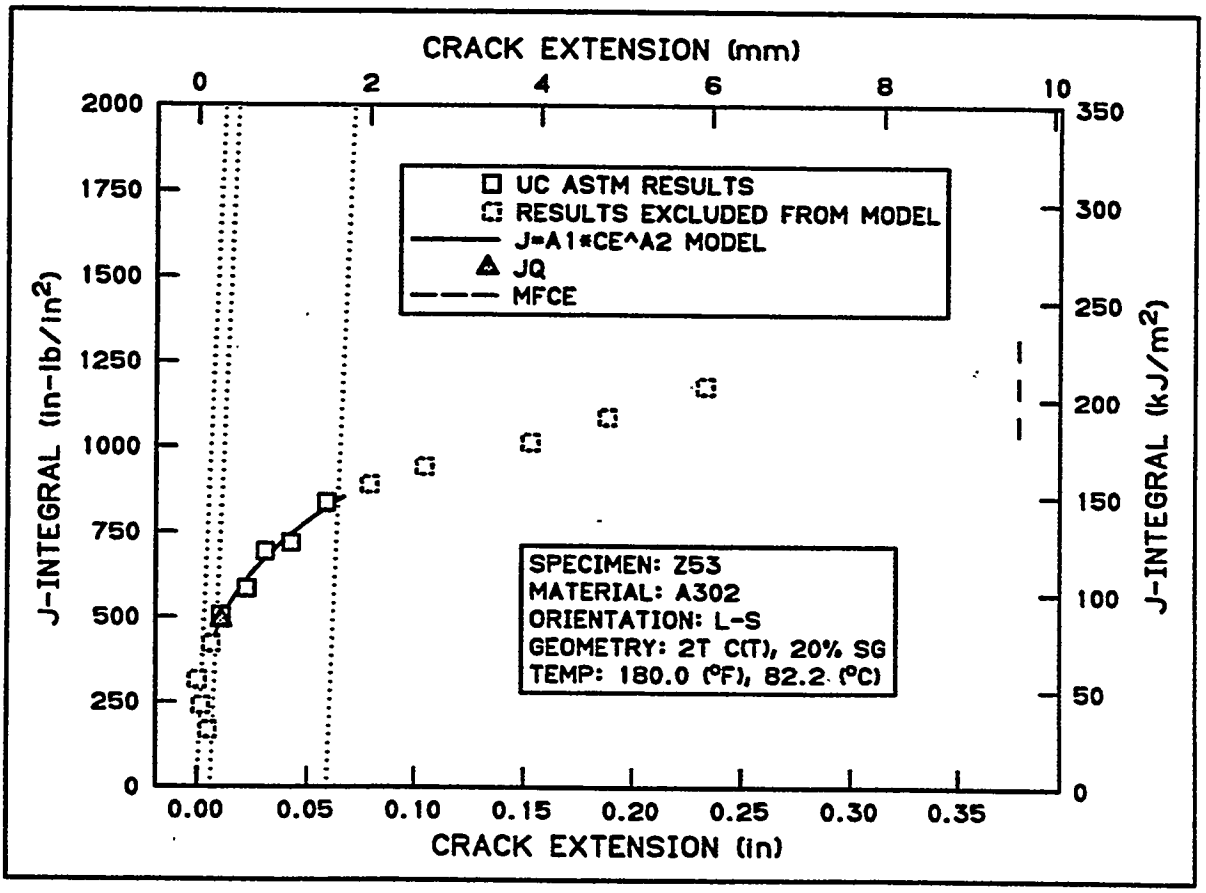

CRACK EXTENSION (mm)
0
2
4
6
8
10
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z51
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z53
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6035 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14255	0.0229	0.0048	167.9
2	16150	0.0274	0.0018	240.0
3	17579	0.0318	0.0000	315.1
4	18649	0.0367	0.0063	422.0
5	19331	0.0414	0.0108	504.9
6	19527	0.0459	0.0224	584.4
7	19349	0.0504	0.0308	693.2
8	18637	0.0558	0.0425	718.7
9	18278	0.0603	0.0590	837.0
10	16820	0.0649	0.0788	890.0
11	16114	0.0703	0.1044	943.2
12	15231	0.0773	0.1529	1013.8
13	14101	0.0849	0.1883	1088.9
14	12774	0.0946	0.2333	1180.0

  WIDTH: 3.9995 (IN),101.590 (MM)
  THICKNESS: 2.0007 (IN),50.818 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0017 (IN),25.443 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5318 (IN),89.708 (MM)
    DISTANCE 2: 3.5854 (IN),91.069 (MM)
    DISTANCE 3: 3.6286 (IN),92.166 (MM)
    DISTANCE 4: 3.6400 (IN),92.456 (MM)
    DISTANCE 5: 3.6384 (IN),92.415 (MM)
    DISTANCE 6: 3.6256 (IN),92.090 (MM)
    DISTANCE 7: 3.6030 (IN),91.516 (MM)
    DISTANCE 8: 3.5856 (IN),91.074 (MM)
    DISTANCE 9: 3.5376 (IN),89.855 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 4.0076 (IN),101.790 (MM)
    DISTANCE 2: 4.0117 (IN),101.900 (MM)
    DISTANCE 3: 3.9858 (IN),101.240 (MM)
    DISTANCE 4: 3.9708 (IN),100.860 (MM)
    DISTANCE 5: 3.9417 (IN),100.120 (MM)
    DISTANCE 6: 4.0044 (IN),101.710 (MM)
    DISTANCE 7: 3.9341 (IN),99.926 (MM)
    DISTANCE 8: 4.0380 (IN),102.570 (MM)
    DISTANCE 9: 3.9445 (IN),100.190 (MM)

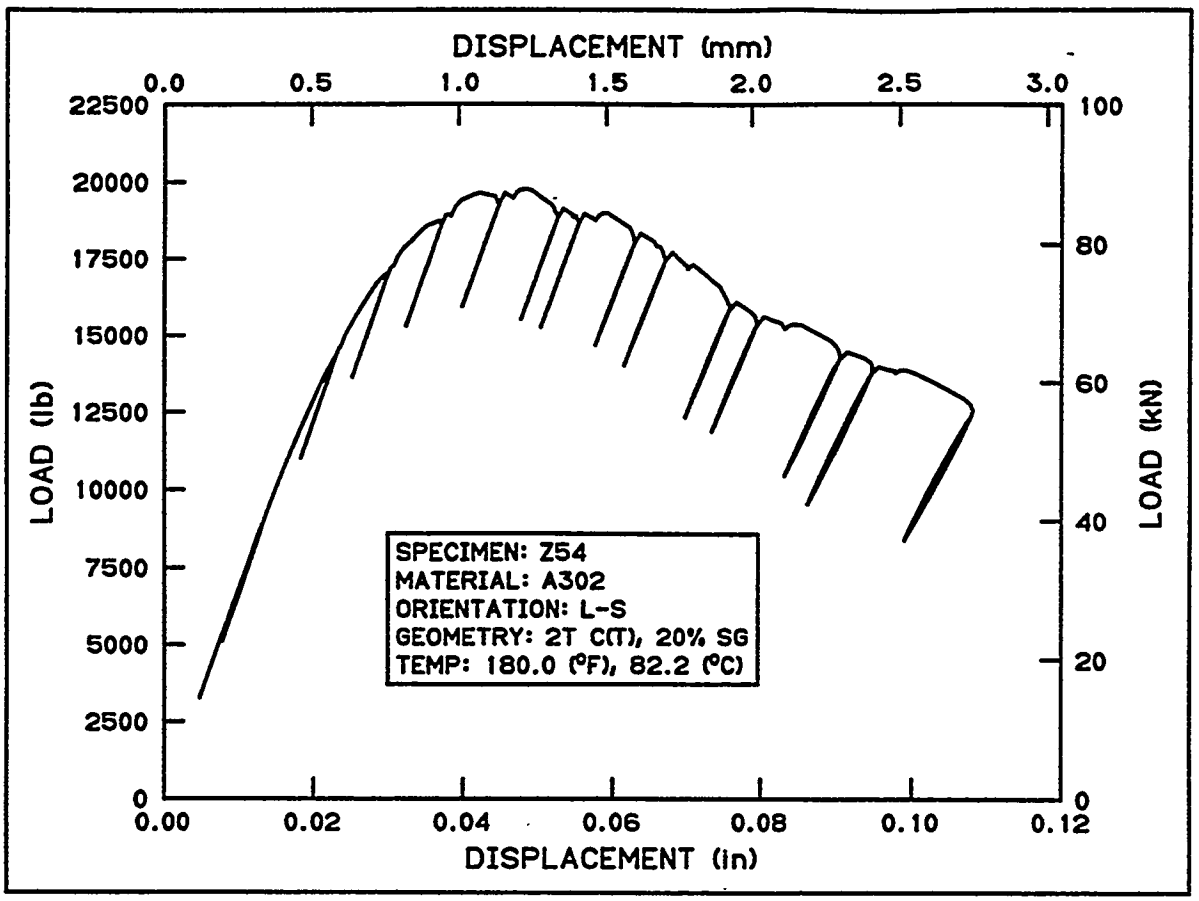

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
22500
20000
17500
15000
12500
10000
7500
5000
2500
0
LOAD (lb)
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z53
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

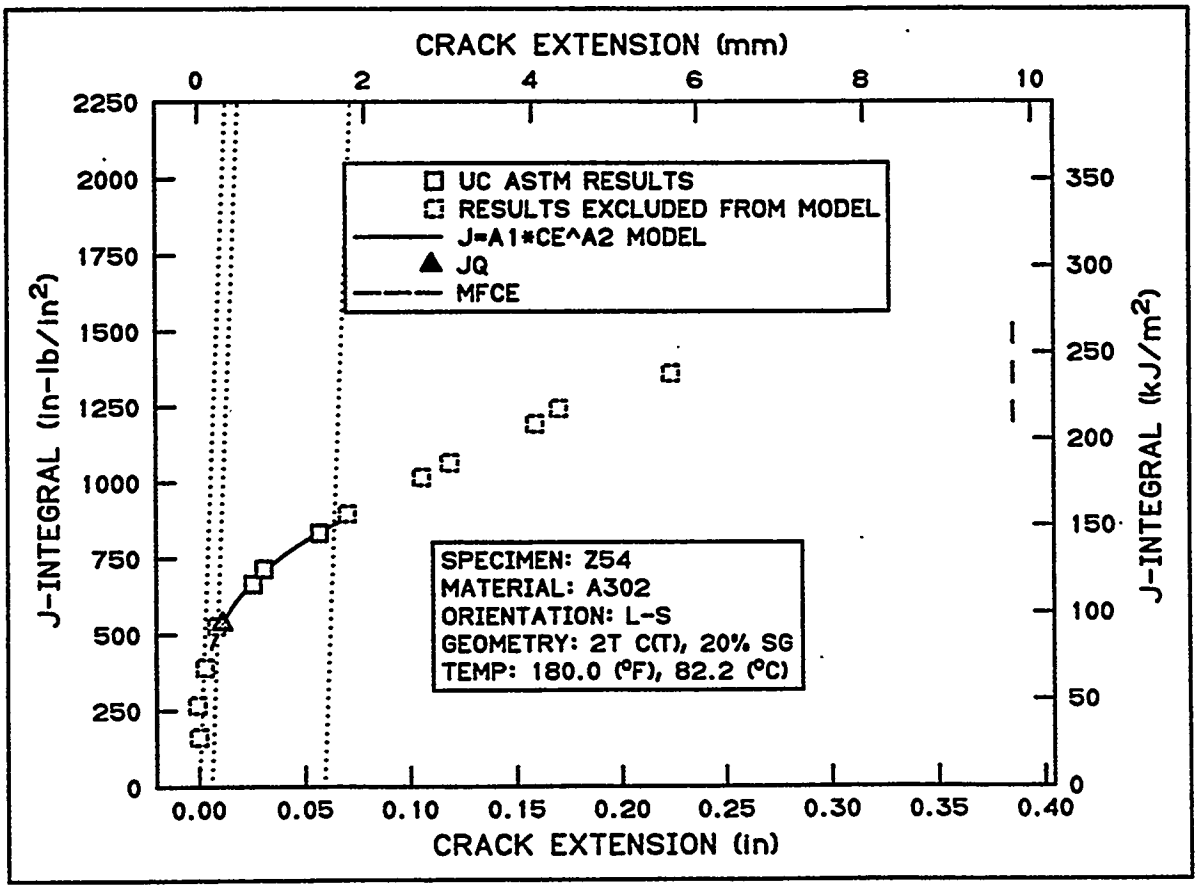

CRACK EXTENSION (mm)
0
2
4
6
8
10
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z53
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z54
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.6020 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13833	0.0218	0.0000	162.2
2	16728	0.0286	-0.0008	266.6
3	18576	0.0352	0.0030	390.1
4	19644	0.0422	0.0084	527.4
5	19718	0.0490	0.0257	665.8
6	18838	0.0546	0.0308	714.8
7	18969	0.0592	0.0571	832.9
8	17899	0.0658	0.0702	896.1
9	17295	0.0709	0.1055	1015.7
10	15716	0.0789	0.1187	1063.4
11	15350	0.0855	0.1590	1191.5
12	14235	0.0940	0.1703	1241.6
13	13460	0.1034	0.2236	1359.1

  WIDTH: 4.0000 (IN),101.600 (MM)
  THICKNESS: 2.0008 (IN),50.820 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0021 (IN),25.453 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5707 (IN),90.696 (MM)
    DISTANCE 2: 3.5933 (IN),91.270 (MM)
    DISTANCE 3: 3.6243 (IN),92.057 (MM)
    DISTANCE 4: 3.6560 (IN),92.862 (MM)
    DISTANCE 5: 3.6481 (IN),92.662 (MM)
    DISTANCE 6: 3.6021 (IN),91.493 (MM)
    DISTANCE 7: 3.5968 (IN),91.359 (MM)
    DISTANCE 8: 3.5740 (IN),90.780 (MM)
    DISTANCE 9: 3.5064 (IN),89.063 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 4.0351 (IN),102.490 (MM)
    DISTANCE 2: 4.0498 (IN),102.860 (MM)
    DISTANCE 3: 3.9687 (IN),100.800 (MM)
    DISTANCE 4: 3.9912 (IN),101.380 (MM)
    DISTANCE 5: 3.9788 (IN),101.060 (MM)
    DISTANCE 6: 3.9776 (IN),101.030 (MM)
    DISTANCE 7: 3.9402 (IN),100.080 (MM)
    DISTANCE 8: 3.9592 (IN),100.560 (MM)
    DISTANCE 9: 4.0605 (IN),103.140 (MM)

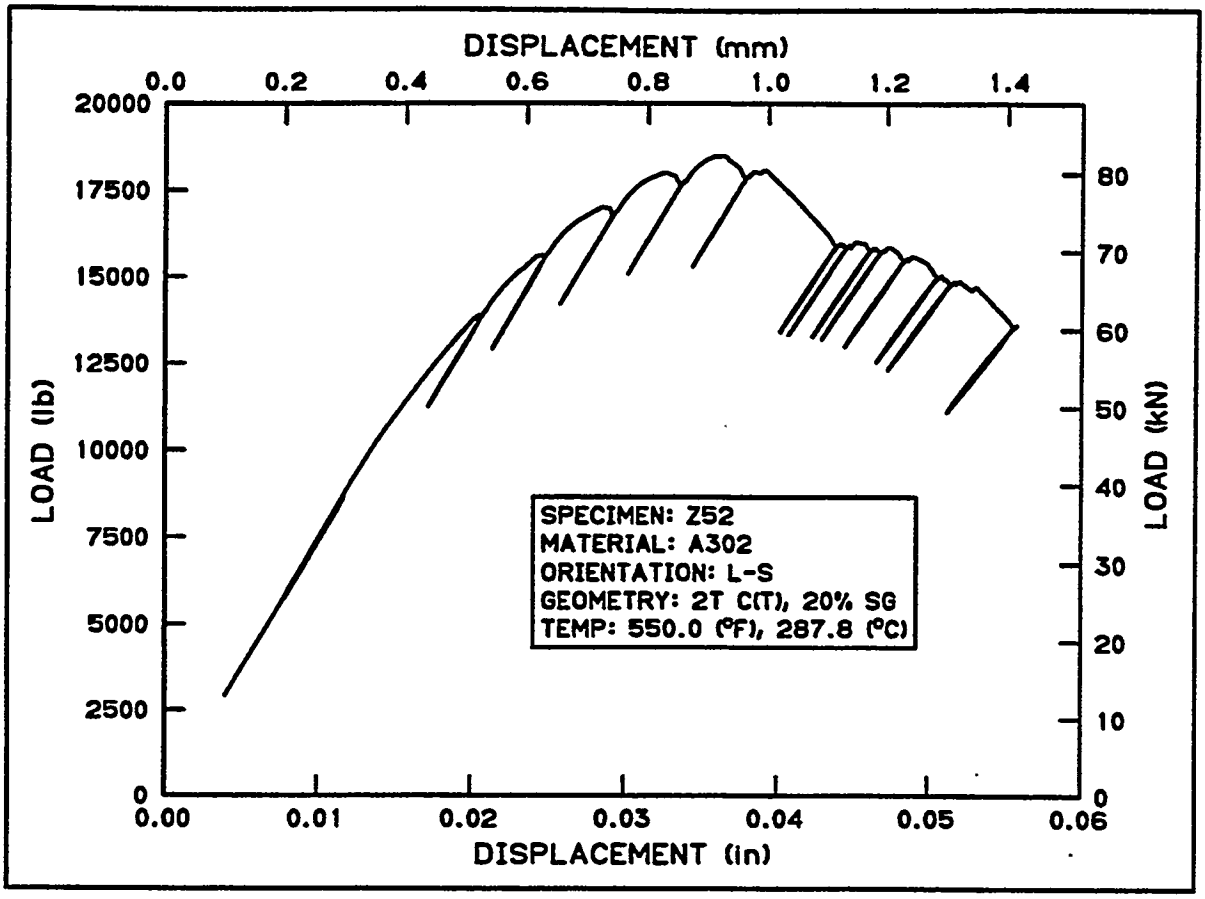

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
22500
20000
17500
15000
12500
10000
7500
5000
2500
0
100
80
60
40
20
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z54
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

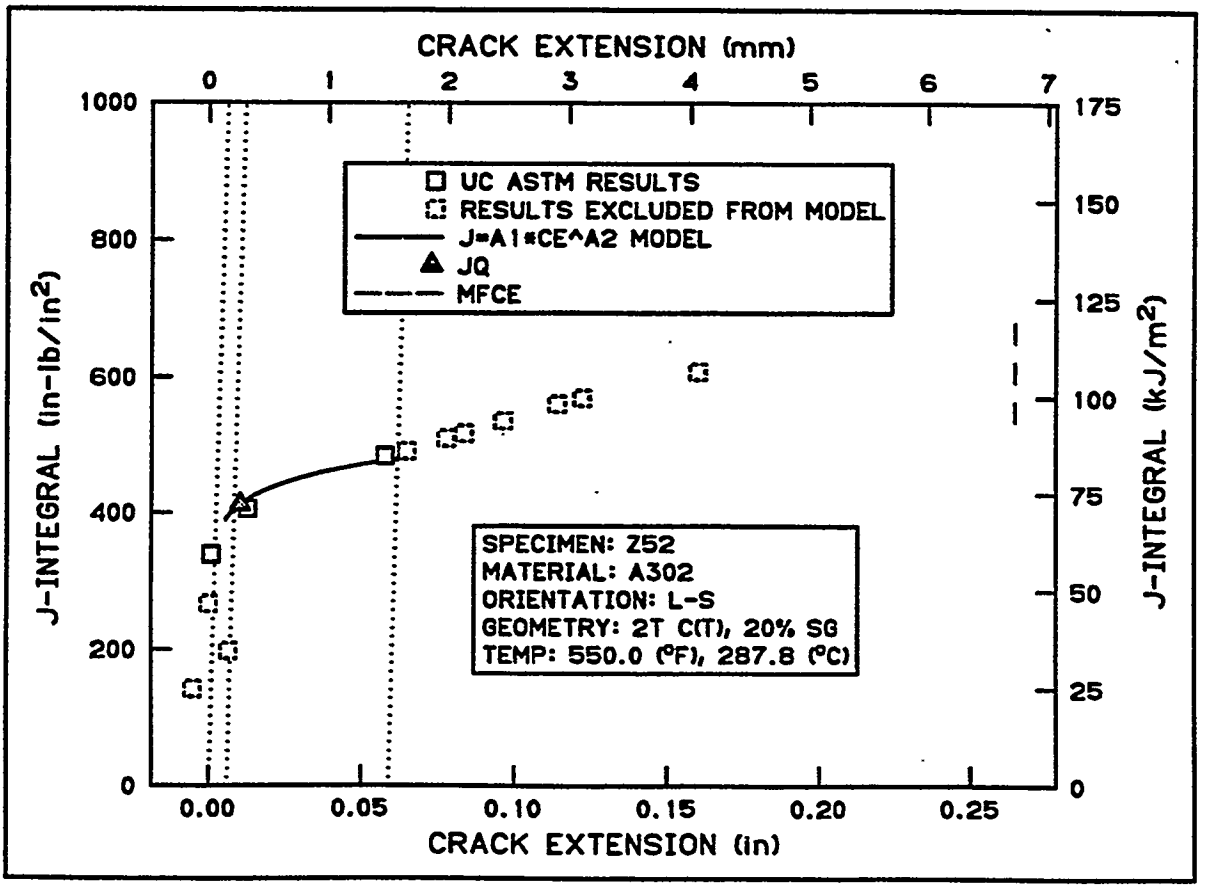

CRACK EXTENSION (mm)
0
2
4
6
8
10
2250
2000
1750
1500
1250
1000
750
500
250
0
350
300
250
200
150
100
50
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z54
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z52
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5622 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13768	0.0201	-0.0053	142.4
2	15583	0.0243	0.0065	197.9
3	17002	0.0285	0.0000	267.4
4	18000	0.0326	0.0009	338.9
5	18406	0.0367	0.0128	406.5
6	17206	0.0412	0.0580	484.9
7	15922	0.0442	0.0649	491.8
8	16032	0.0452	0.0779	510.5
9	15818	0.0464	0.0836	518.0
10	15869	0.0475	0.0964	536.5
11	15592	0.0491	0.1141	561.0
12	14951	0.0510	0.1222	569.8
13	14722	0.0531	0.1599	608.7

  WIDTH: 3.9930 (IN),101.420 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0000 (IN),25.400 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5034 (IN),88.986 (MM)
    DISTANCE 2: 3.5432 (IN),89.997 (MM)
    DISTANCE 3: 3.5709 (IN),90.701 (MM)
    DISTANCE 4: 3.5901 (IN),91.189 (MM)
    DISTANCE 5: 3.6008 (IN),91.460 (MM)
    DISTANCE 6: 3.5876 (IN),91.125 (MM)
    DISTANCE 7: 3.5690 (IN),90.653 (MM)
    DISTANCE 8: 3.5316 (IN),89.703 (MM)
    DISTANCE 9: 3.5058 (IN),89.047 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7750 (IN),95.885 (MM)
    DISTANCE 2: 3.8357 (IN),97.427 (MM)
    DISTANCE 3: 3.7750 (IN),95.885 (MM)
    DISTANCE 4: 3.8357 (IN),97.427 (MM)
    DISTANCE 5: 3.8623 (IN),98.102 (MM)
    DISTANCE 6: 3.8520 (IN),97.841 (MM)
    DISTANCE 7: 3.8200 (IN),97.028 (MM)
    DISTANCE 8: 3.8272 (IN),97.211 (MM)
    DISTANCE 9: 3.8386 (IN),97.500 (MM)

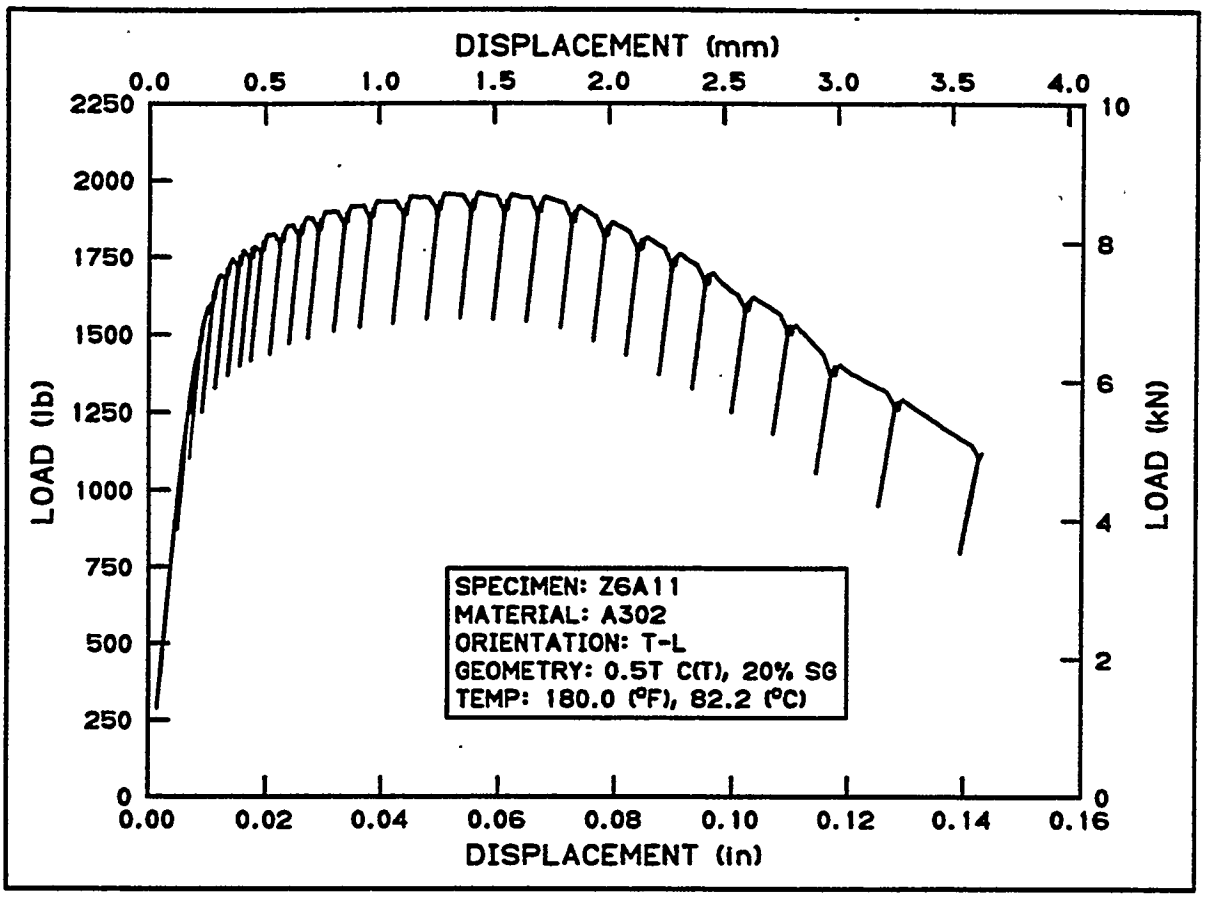

DISPLACEMENT (mm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
20000
17500
15000
12500
10000
7500
5000
2500
0
LOAD (lb)
80
70
60
50
40
30
20
10
0
LOAD (kN)
SPECIMEN: Z52
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
DISPLACEMENT (in)

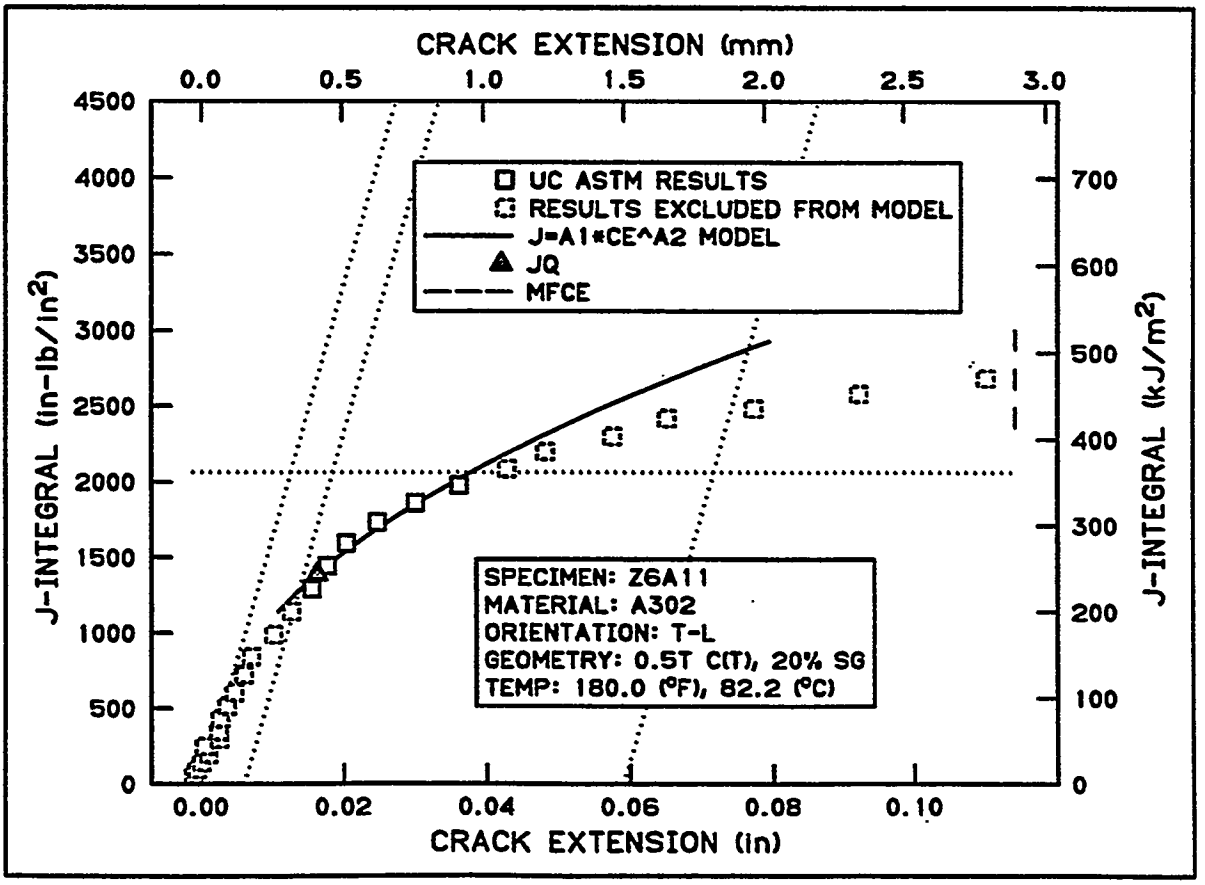

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
175
150
125
100
75
50
25
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z52
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A11
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6198 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1158	0.0061	-0.0012	57.0
2	1414	0.0080	-0.0007	95.4
3	1586	0.0101	0.0000	142.6
4	1689	0.0121	0.0010	195.1
5	1742	0.0141	0.0004	248.0
6	1770	0.0160	0.0025	296.7
7	1783	0.0179	0.0024	344.6
8	1826	0.0212	0.0026	429.5
9	1853	0.0245	0.0036	515.1
10	1877	0.0278	0.0046	602.4
11	1897	0.0322	0.0059	720.9
12	1916	0.0367	0.0069	840.4
13	1930	0.0422	0.0101	987.9
14	1944	0.0478	0.0126	1140.7
15	1951	0.0537	0.0155	1290.2
16	1948	0.0595	0.0177	1443.5
17	1941	0.0653	0.0204	1592.9
18	1925	0.0710	0.0247	1733.9
19	1881	0.0765	0.0300	1861.8
20	1833	0.0822	0.0360	1978.7
21	1779	0.0882	0.0428	2086.4
22	1725	0.0938	0.0481	2199.6
23	1631	0.1008	0.0575	2300.8
24	1567	0.1080	0.0650	2419.4
25	1436	0.1156	0.0772	2483.3
26	1314	0.1267	0.0921	2582.0
27	1146	0.1412	0.1099	2685.8

WIDTH: 0.9950 (IN),25.273 (MM)
THICKNESS: 0.4995 (IN),12.687 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2466 (IN),6.264 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8509 (IN),21.613 (MM)
DISTANCE 2: 0.8622 (IN),21.900 (MM)
DISTANCE 3: 0.8680 (IN),22.047 (MM)
DISTANCE 4: 0.8702 (IN),22.103 (MM)
DISTANCE 5: 0.8702 (IN),22.103 (MM)
DISTANCE 6: 0.8716 (IN),22.139 (MM)
DISTANCE 7: 0.8696 (IN),22.088 (MM)
DISTANCE 8: 0.8654 (IN),21.981 (MM)
DISTANCE 9: 0.8572 (IN),21.773 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9584 (IN),24.343 (MM)
DISTANCE 2: 0.9858 (IN),25.039 (MM)
DISTANCE 3: 0.9718 (IN),24.684 (MM)
DISTANCE 4: 0.9778 (IN),24.836 (MM)
DISTANCE 5: 0.9946 (IN),25.263 (MM)
DISTANCE 6: 0.9946 (IN),25.263 (MM)
DISTANCE 7: 0.9740 (IN),24.740 (MM)
DISTANCE 8: 0.9836 (IN),24.983 (MM)
DISTANCE 9: 0.9640 (IN),24.486 (MM)

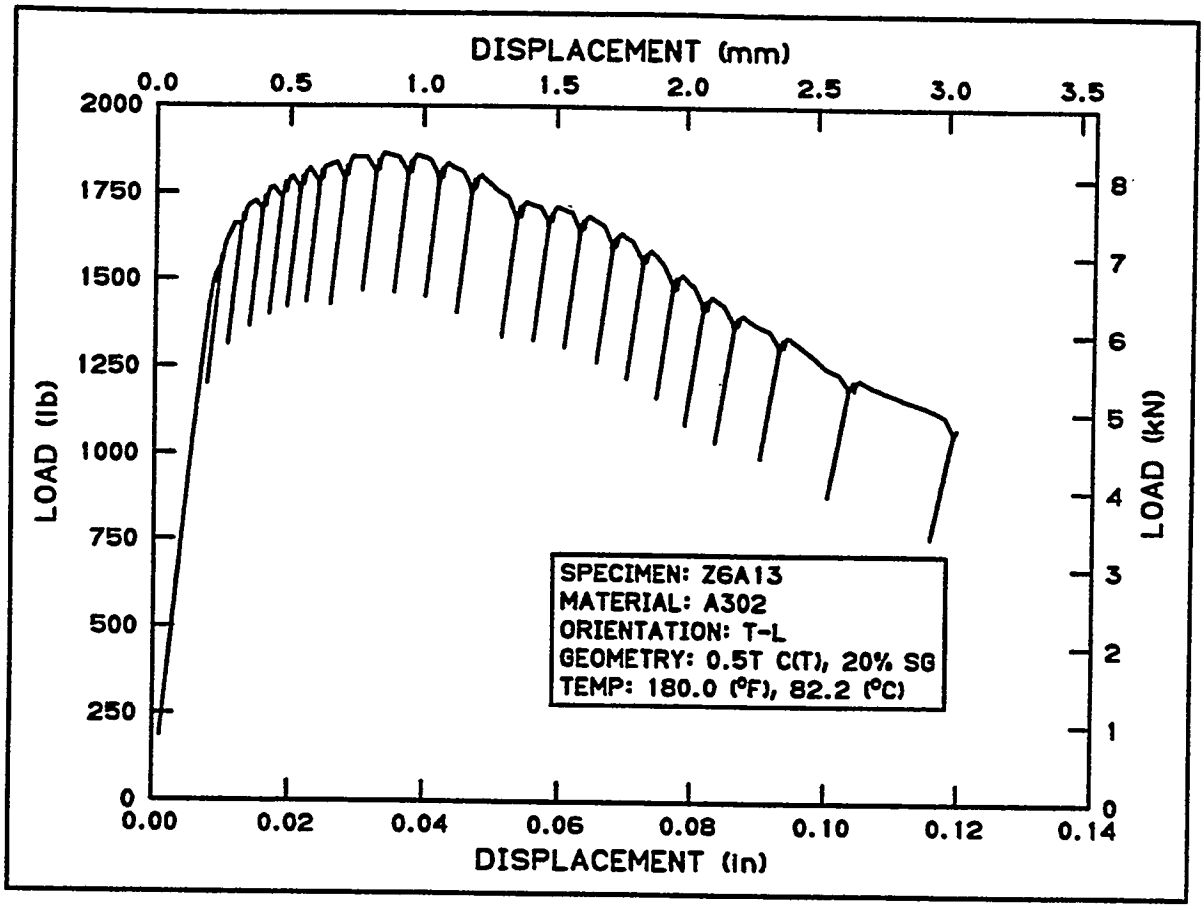

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6A11
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

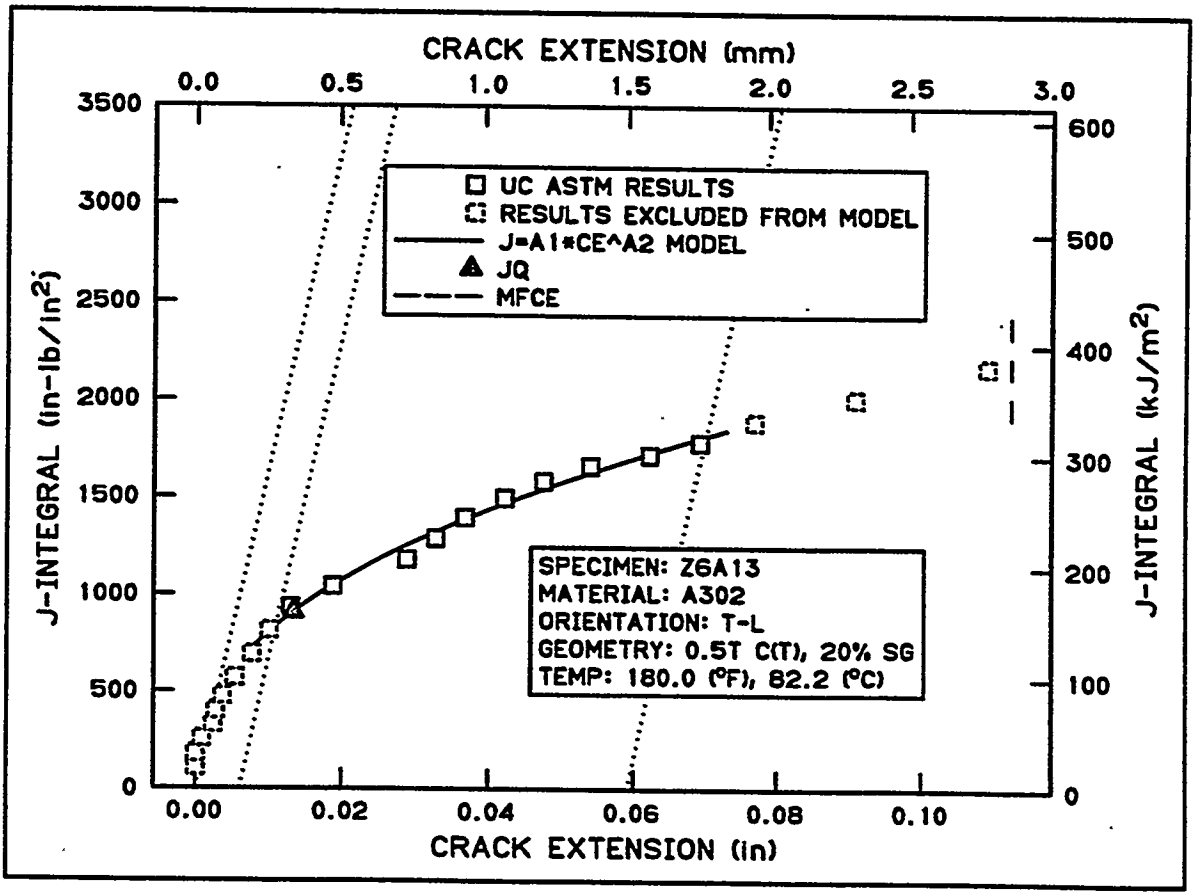

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4500
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A11
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A13
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6374 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1514	0.0087	0.0000	109.9
2	1660	0.0115	0.0000	180.8
3	1725	0.0145	0.0009	258.2
4	1765	0.0172	0.0024	332.4
5	1796	0.0199	0.0028	401.8
6	1820	0.0226	0.0037	476.7
7	1838	0.0266	0.0053	571.6
8	1853	0.0310	0.0076	692.7
9	1854	0.0357	0.0100	815.5
10	1844	0.0405	0.0130	934.1
11	1812	0.0452	0.0188	1044.5
12	1739	0.0519	0.0289	1181.8
13	1711	0.0567	0.0329	1289.5
14	1696	0.0614	0.0368	1396.0
15	1658	0.0662	0.0422	1495.3
16	1615	0.0705	0.0475	1583.5
17	1552	0.0752	0.0540	1661.9
18	1483	0.0801	0.0622	1718.3
19	1432	0.0844	0.0693	1782.1
20	1357	0.0914	0.0769	1889.3
21	1235	0.1018	0.0907	2010.4
22	1114	0.1179	0.1091	2175.5

WIDTH: 1.0018 (IN),25.446 (MM)
THICKNESS: 0.4998 (IN),12.695 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2397 (IN),6.088 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8624 (IN),21.905 (MM)
DISTANCE 2: 0.8740 (IN),22.200 (MM)
DISTANCE 3: 0.8802 (IN),22.357 (MM)
DISTANCE 4: 0.8811 (IN),22.380 (MM)
DISTANCE 5: 0.8820 (IN),22.403 (MM)
DISTANCE 6: 0.8810 (IN),22.377 (MM)
DISTANCE 7: 0.8793 (IN),22.334 (MM)
DISTANCE 8: 0.8745 (IN),22.212 (MM)
DISTANCE 9: 0.8664 (IN),22.007 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9554 (IN),24.267 (MM)
DISTANCE 2: 0.9888 (IN),25.116 (MM)
DISTANCE 3: 0.9912 (IN),25.176 (MM)
DISTANCE 4: 0.9888 (IN),25.116 (MM)
DISTANCE 5: 0.9710 (IN),24.663 (MM)
DISTANCE 6: 1.0018 (IN),25.446 (MM)
DISTANCE 7: 0.9998 (IN),25.395 (MM)
DISTANCE 8: 1.0130 (IN),25.730 (MM)
DISTANCE 9: 0.9686 (IN),24.602 (MM)

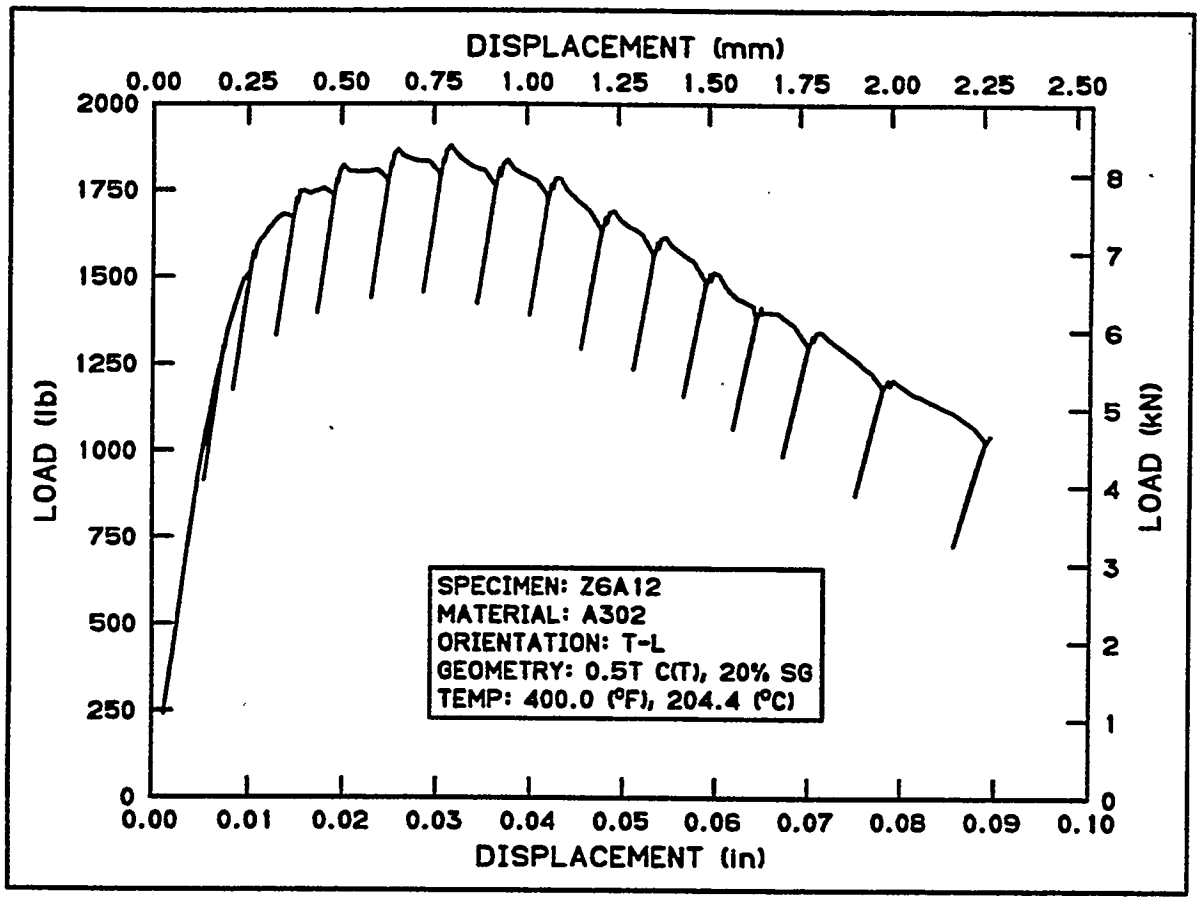

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)
SPECIMEN: Z6A13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

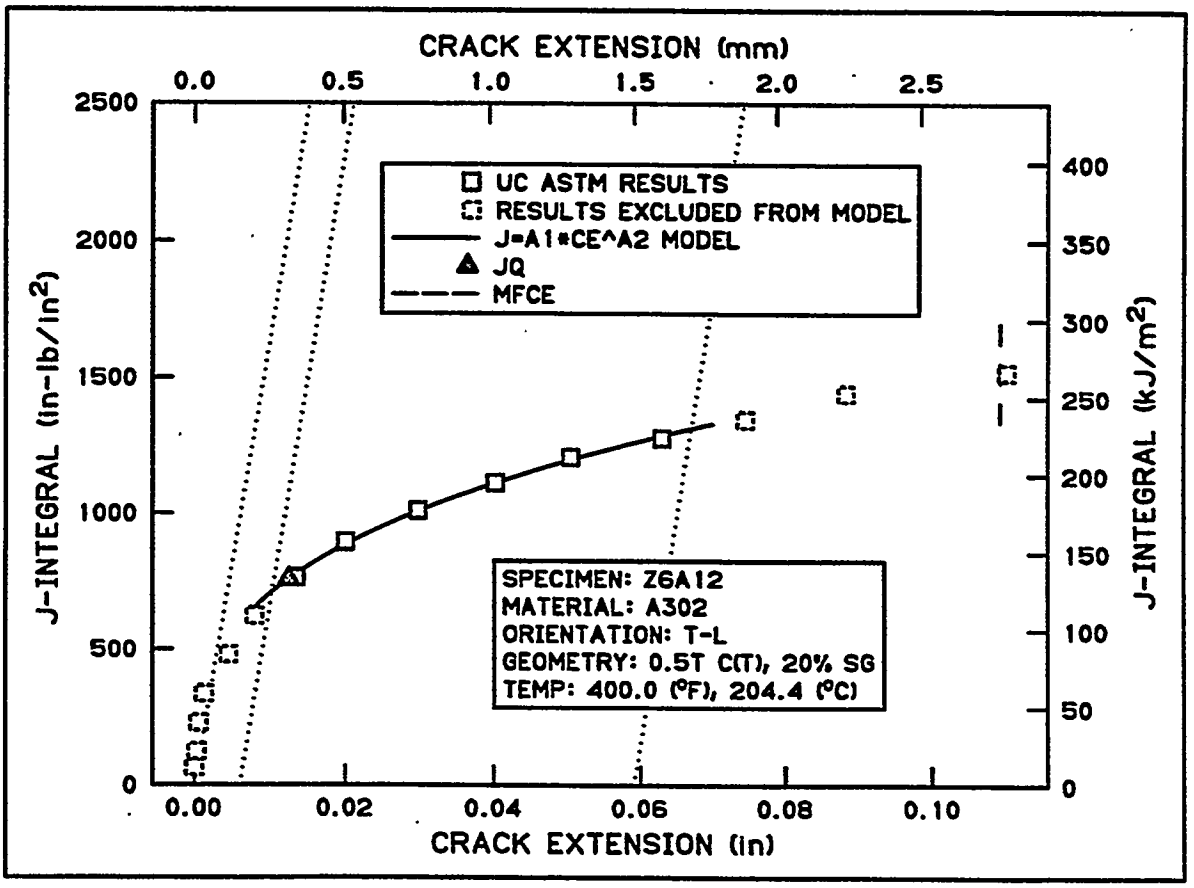

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A13
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
IDENTIFICATION: Z6A12
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6243 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1201	0.0066	0.0000	64.5
2	1491	0.0094	0.0003	123.7
3	1681	0.0136	0.0006	228.5
4	1756	0.0178	0.0013	336.2
5	1809	0.0235	0.0045	480.2
6	1834	0.0291	0.0079	623.8
7	1808	0.0349	0.0134	765.0
8	1778	0.0405	0.0201	895.7
9	1692	0.0462	0.0298	1011.2
10	1623	0.0518	0.0402	1112.2
11	1547	0.0575	0.0506	1206.7
12	1433	0.0630	0.0630	1277.3
13	1362	0.0684	0.0745	1346.6
14	1227	0.0767	0.0882	1443.4
15	1071	0.0877	0.1100	1521.6

WIDTH: 0.9940 (IN),25.248 (MM)
THICKNESS: 0.4995 (IN),12.687 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2482 (IN),6.304 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8606 (IN),21.859 (MM)
DISTANCE 2: 0.8703 (IN),22.106 (MM)
DISTANCE 3: 0.8748 (IN),22.220 (MM)
DISTANCE 4: 0.8764 (IN),22.261 (MM)
DISTANCE 5: 0.8780 (IN),22.301 (MM)
DISTANCE 6: 0.8784 (IN),22.311 (MM)
DISTANCE 7: 0.8734 (IN),22.184 (MM)
DISTANCE 8: 0.8682 (IN),22.052 (MM)
DISTANCE 9: 0.8610 (IN),21.869 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9944 (IN),25.258 (MM)
DISTANCE 2: 0.9976 (IN),25.339 (MM)
DISTANCE 3: 0.9954 (IN),25.283 (MM)
DISTANCE 4: 0.9802 (IN),24.897 (MM)
DISTANCE 5: 0.9822 (IN),24.948 (MM)
DISTANCE 6: 0.9710 (IN),24.663 (MM)
DISTANCE 7: 0.9752 (IN),24.770 (MM)
DISTANCE 8: 0.9848 (IN),25.014 (MM)
DISTANCE 9: 0.9387 (IN),23.843 (MM)

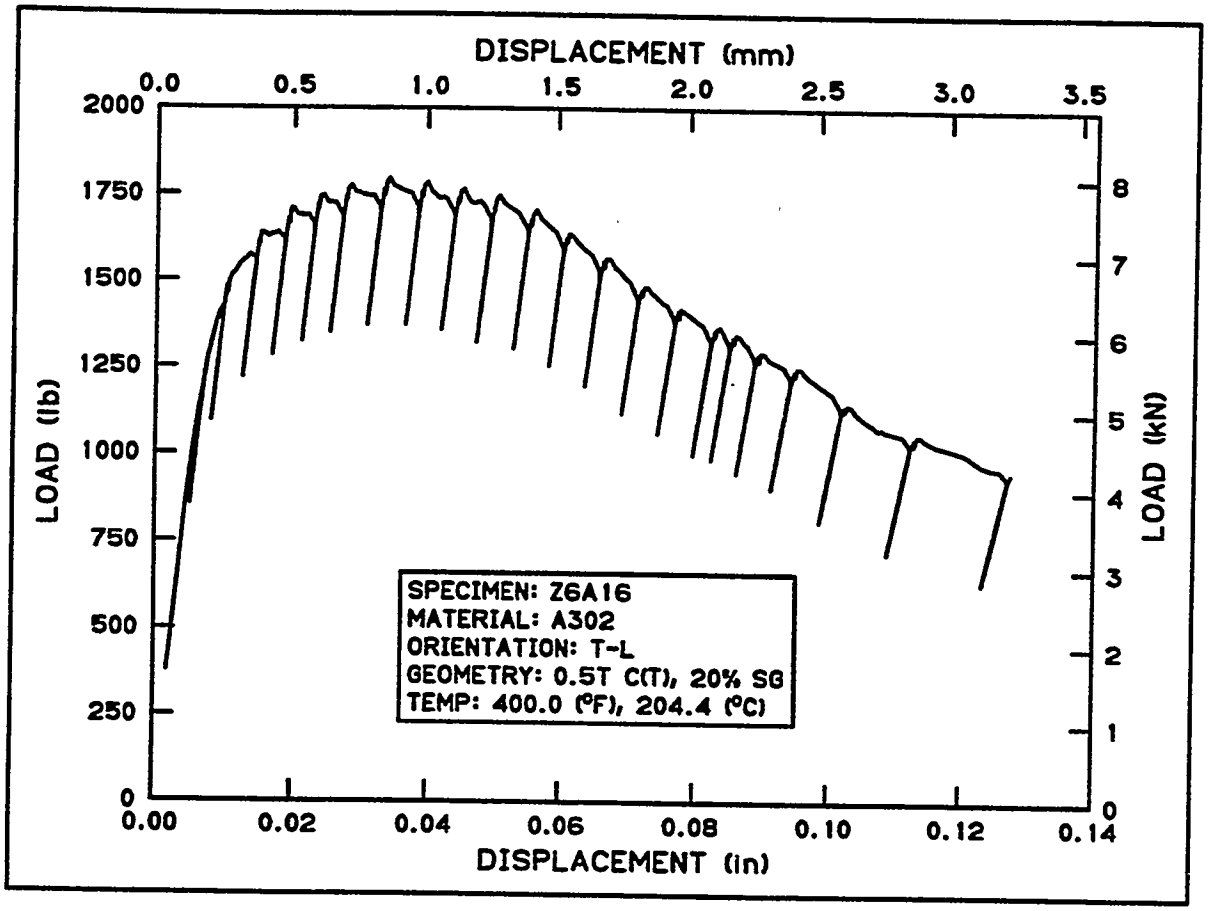

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z6A12
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

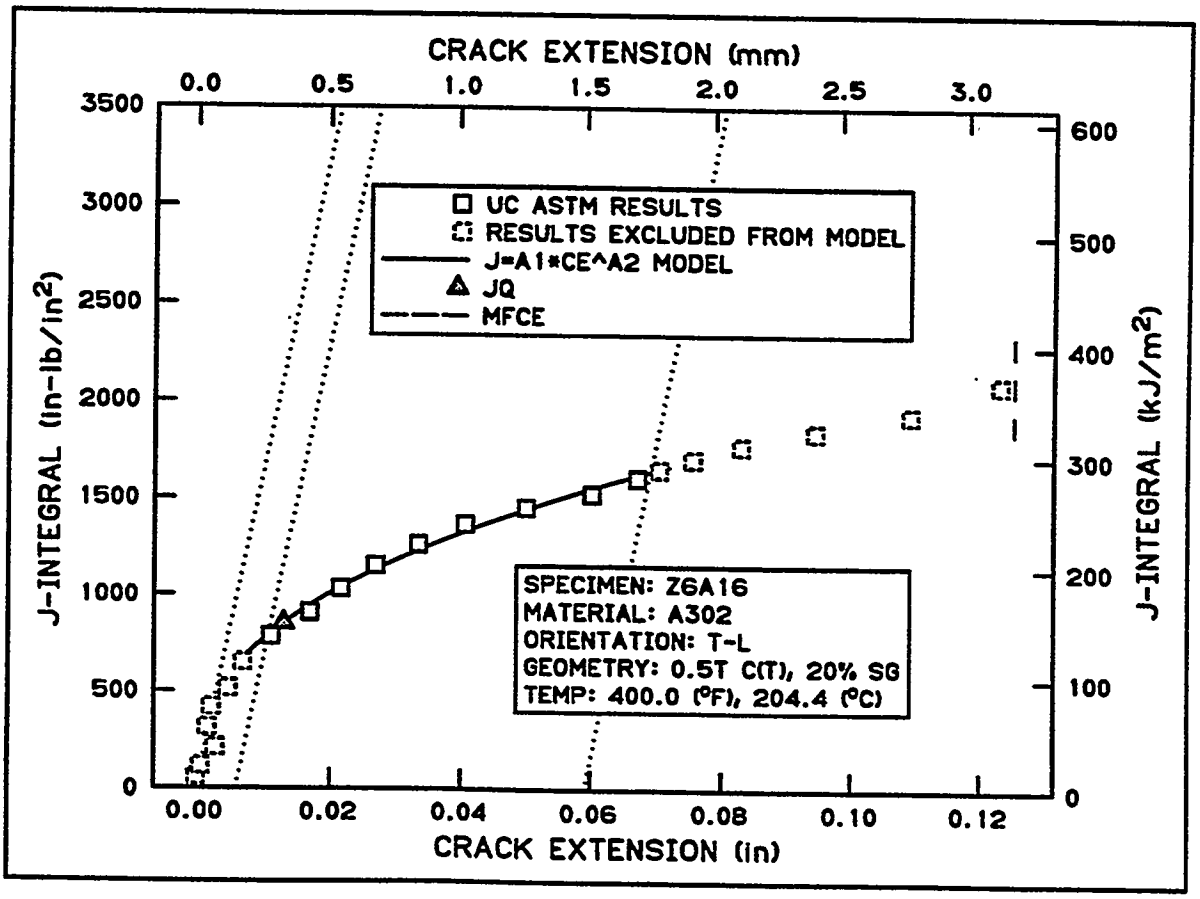

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A12
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A16
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6306 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1145	0.0064	0.0000	61.2
2	1406	0.0092	0.0007	116.8
3	1573	0.0135	0.0029	214.3
4	1639	0.0175	0.0017	314.8
5	1689	0.0218	0.0023	418.7
6	1723	0.0258	0.0047	517.2
7	1745	0.0313	0.0070	651.8
8	1751	0.0370	0.0111	787.3
9	1736	0.0423	0.0170	910.3
10	1723	0.0477	0.0216	1034.6
11	1697	0.0531	0.0268	1156.3
12	1643	0.0588	0.0334	1266.1
13	1575	0.0643	0.0405	1369.6
14	1499	0.0699	0.0499	1455.6
15	1433	0.0754	0.0601	1525.5
16	1377	0.0808	0.0671	1608.2
17	1369	0.0834	0.0704	1652.1
18	1318	0.0876	0.0755	1705.1
19	1257	0.0930	0.0829	1773.0
20	1178	0.1003	0.0944	1845.9
21	1058	0.1111	0.1092	1932.9
22	964	0.1257	0.1231	2092.0

WIDTH: 0.9988 (IN),25.370 (MM)
THICKNESS: 0.4996 (IN),12.690 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2430 (IN),6.172 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8634 (IN),21.930 (MM)
DISTANCE 2: 0.8740 (IN),22.200 (MM)
DISTANCE 3: 0.8772 (IN),22.281 (MM)
DISTANCE 4: 0.8784 (IN),22.311 (MM)
DISTANCE 5: 0.8808 (IN),22.372 (MM)
DISTANCE 6: 0.8789 (IN),22.324 (MM)
DISTANCE 7: 0.8730 (IN),22.174 (MM)
DISTANCE 8: 0.8656 (IN),21.986 (MM)
DISTANCE 9: 0.8586 (IN),21.808 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9878 (IN),25.090 (MM)
DISTANCE 2: 1.0090 (IN),25.629 (MM)
DISTANCE 3: 1.0048 (IN),25.522 (MM)
DISTANCE 4: 1.0074 (IN),25.588 (MM)
DISTANCE 5: 0.9955 (IN),25.286 (MM)
DISTANCE 6: 0.9880 (IN),25.095 (MM)
DISTANCE 7: 0.9910 (IN),25.171 (MM)
DISTANCE 8: 1.0028 (IN),25.471 (MM)
DISTANCE 9: 0.9976 (IN),25.339 (MM)

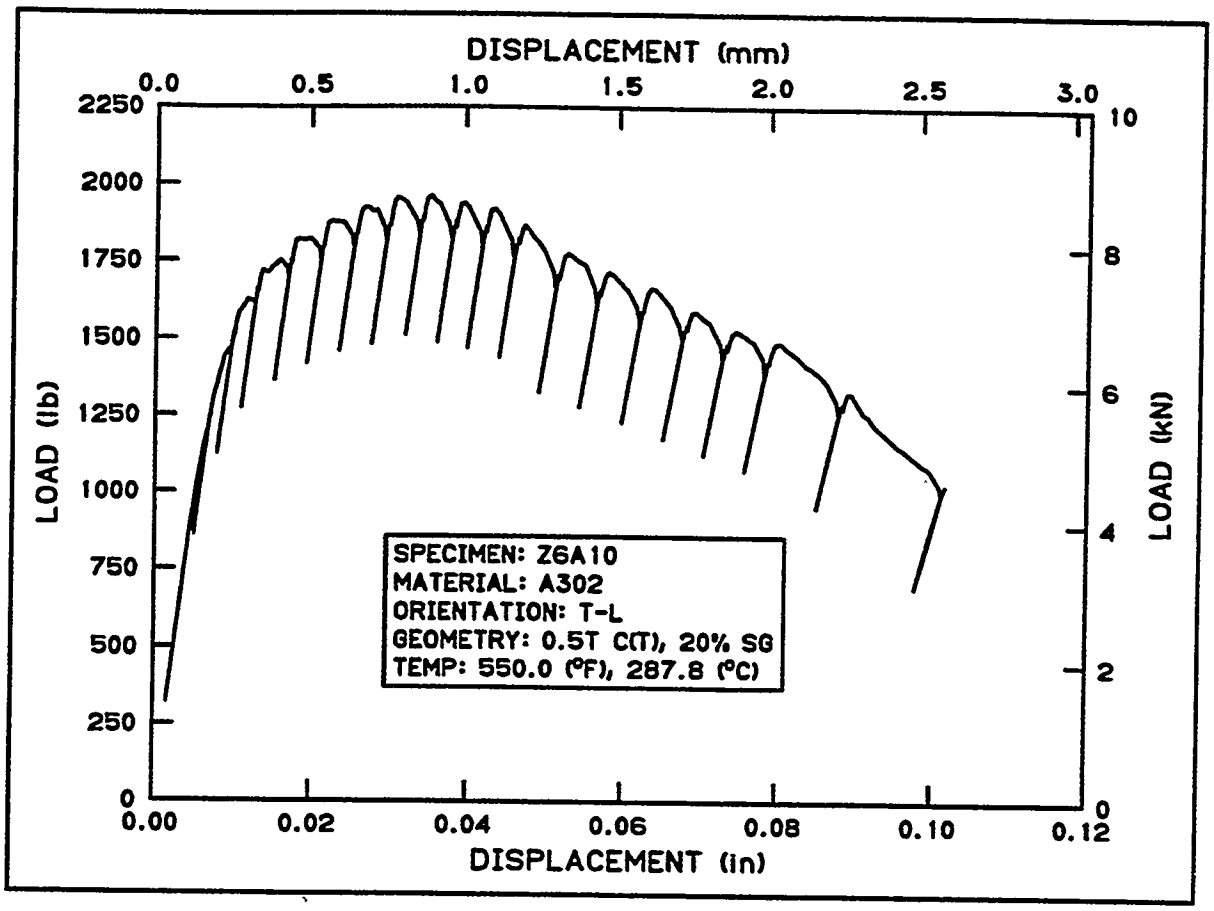

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z6A16
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

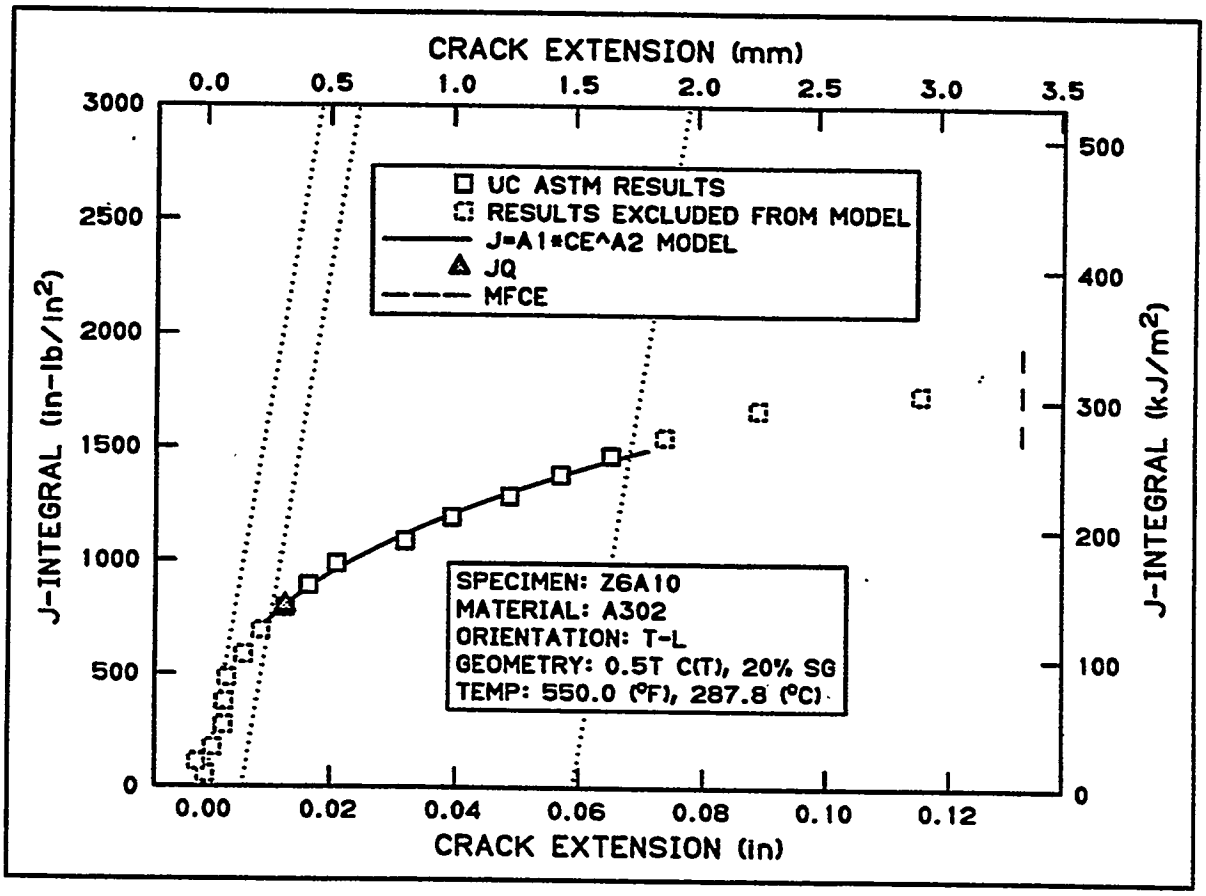

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A16
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A10
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6137 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1155	0.0063	0.0000	56.2
2	1443	0.0089	-0.0014	110.1
3	1623	0.0116	0.0012	173.5
4	1751	0.0157	0.0029	273.1
5	1822	0.0197	0.0031	376.4
6	1874	0.0238	0.0035	482.9
7	1914	0.0280	0.0062	585.0
8	1939	0.0317	0.0089	693.3
9	1933	0.0361	0.0128	795.7
10	1921	0.0398	0.0165	892.4
11	1900	0.0438	0.0210	989.1
12	1786	0.0495	0.0318	1088.9
13	1736	0.0549	0.0394	1192.8
14	1659	0.0603	0.0487	1286.8
15	1608	0.0657	0.0569	1382.0
16	1556	0.0709	0.0650	1466.8
17	1495	0.0767	0.0736	1548.3
18	1363	0.0863	0.0887	1670.6
19	1081	0.0996	0.1151	1739.1

WIDTH: 0.9915 (IN),25.184 (MM)
THICKNESS: 0.4995 (IN),12.687 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2504 (IN),6.360 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8452 (IN),21.468 (MM)
DISTANCE 2: 0.8556 (IN),21.732 (MM)
DISTANCE 3: 0.8624 (IN),21.905 (MM)
DISTANCE 4: 0.8660 (IN),21.996 (MM)
DISTANCE 5: 0.8688 (IN),22.068 (MM)
DISTANCE 6: 0.8717 (IN),22.141 (MM)
DISTANCE 7: 0.8714 (IN),22.134 (MM)
DISTANCE 8: 0.8654 (IN),21.981 (MM)
DISTANCE 9: 0.8582 (IN),21.798 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9724 (IN),24.699 (MM)
DISTANCE 2: 0.9885 (IN),25.108 (MM)
DISTANCE 3: 0.9862 (IN),25.049 (MM)
DISTANCE 4: 0.9946 (IN),25.263 (MM)
DISTANCE 5: 0.9776 (IN),24.831 (MM)
DISTANCE 6: 0.9906 (IN),25.161 (MM)
DISTANCE 7: 1.0013 (IN),25.433 (MM)
DISTANCE 8: 1.0342 (IN),26.269 (MM)
DISTANCE 9: 1.0124 (IN),25.715 (MM)

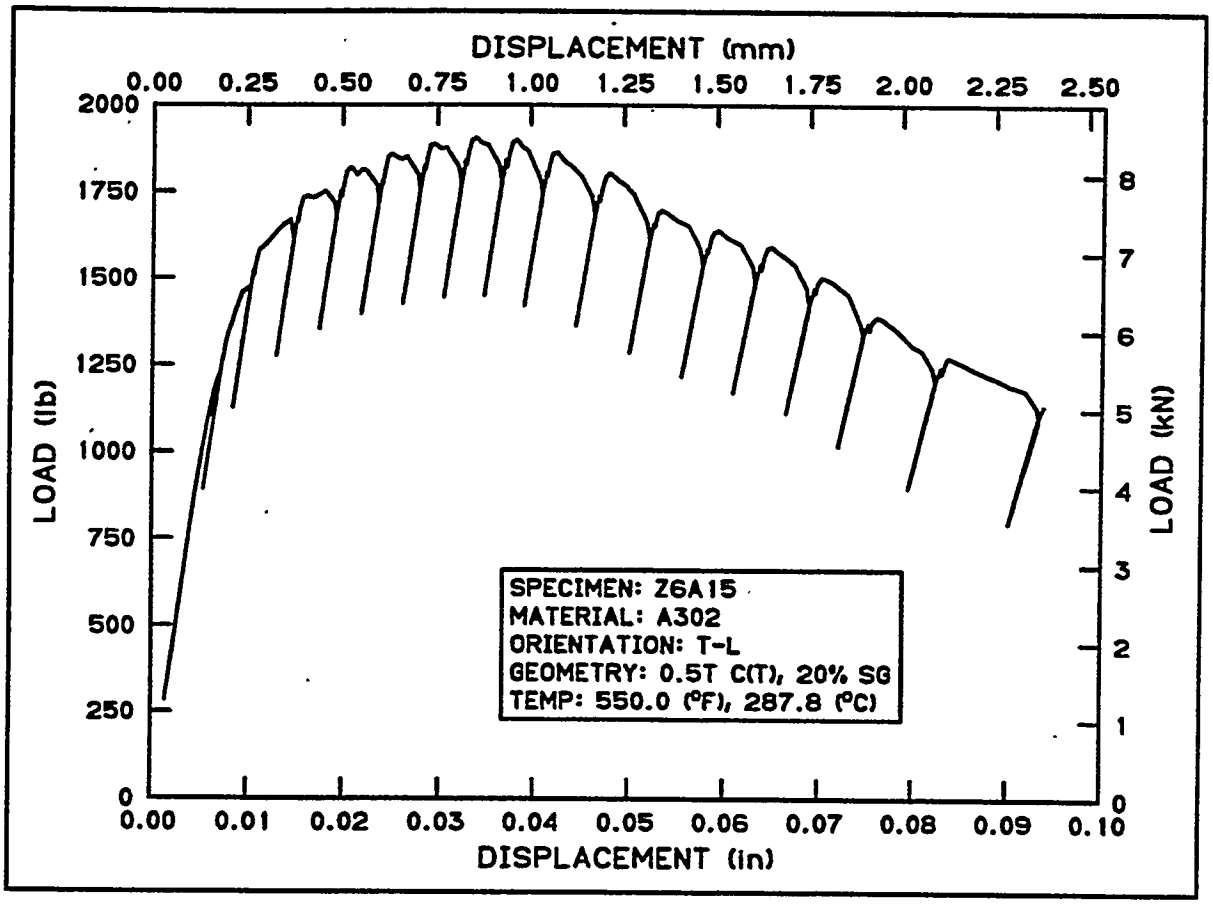

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z6A10
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

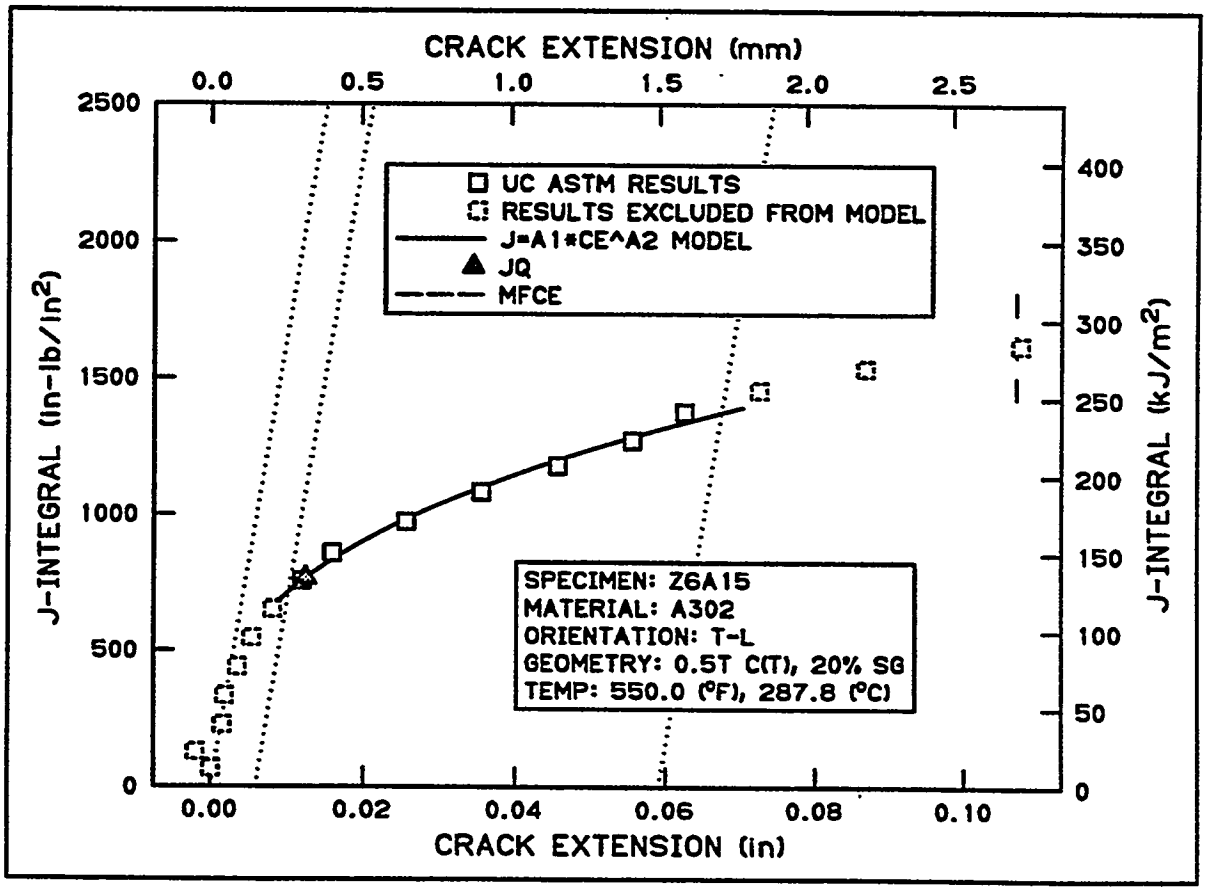

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A10
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A15
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6230 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1189	0.0066	0.0000	67.7
2	1458	0.0094	-0.0020	128.4
3	1653	0.0136	0.0015	227.2
4	1751	0.0180	0.0018	334.1
5	1812	0.0221	0.0035	440.4
6	1851	0.0263	0.0054	547.8
7	1877	0.0305	0.0082	653.7
8	1885	0.0348	0.0120	756.9
9	1867	0.0391	0.0160	859.7
10	1796	0.0447	0.0256	973.9
11	1746	0.0502	0.0355	1084.2
12	1653	0.0560	0.0457	1180.5
13	1599	0.0616	0.0556	1271.9
14	1541	0.0673	0.0625	1376.6
15	1456	0.0730	0.0725	1456.5
16	1294	0.0809	0.0867	1538.0
17	1180	0.0919	0.1075	1623.2

  WIDTH: 0.9999 (IN),25.397 (MM)
  THICKNESS: 0.4996 (IN),12.690 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2416 (IN),6.137 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8499 (IN),21.587 (MM)
    DISTANCE 2: 0.8592 (IN),21.824 (MM)
    DISTANCE 3: 0.8637 (IN),21.938 (MM)
    DISTANCE 4: 0.8670 (IN),22.022 (MM)
    DISTANCE 5: 0.8690 (IN),22.073 (MM)
    DISTANCE 6: 0.8690 (IN),22.073 (MM)
    DISTANCE 7: 0.8684 (IN),22.057 (MM)
    DISTANCE 8: 0.8658 (IN),21.991 (MM)
    DISTANCE 9: 0.8590 (IN),21.819 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9672 (IN),24.567 (MM)
    DISTANCE 2: 0.9824 (IN),24.953 (MM)
    DISTANCE 3: 0.9752 (IN),24.770 (MM)
    DISTANCE 4: 0.9752 (IN),24.770 (MM)
    DISTANCE 5: 0.9576 (IN),24.323 (MM)
    DISTANCE 6: 0.9744 (IN),24.750 (MM)
    DISTANCE 7: 0.9528 (IN),24.201 (MM)
    DISTANCE 8: 0.9835 (IN),24.981 (MM)
    DISTANCE 9: 0.9740 (IN),24.740 (MM)

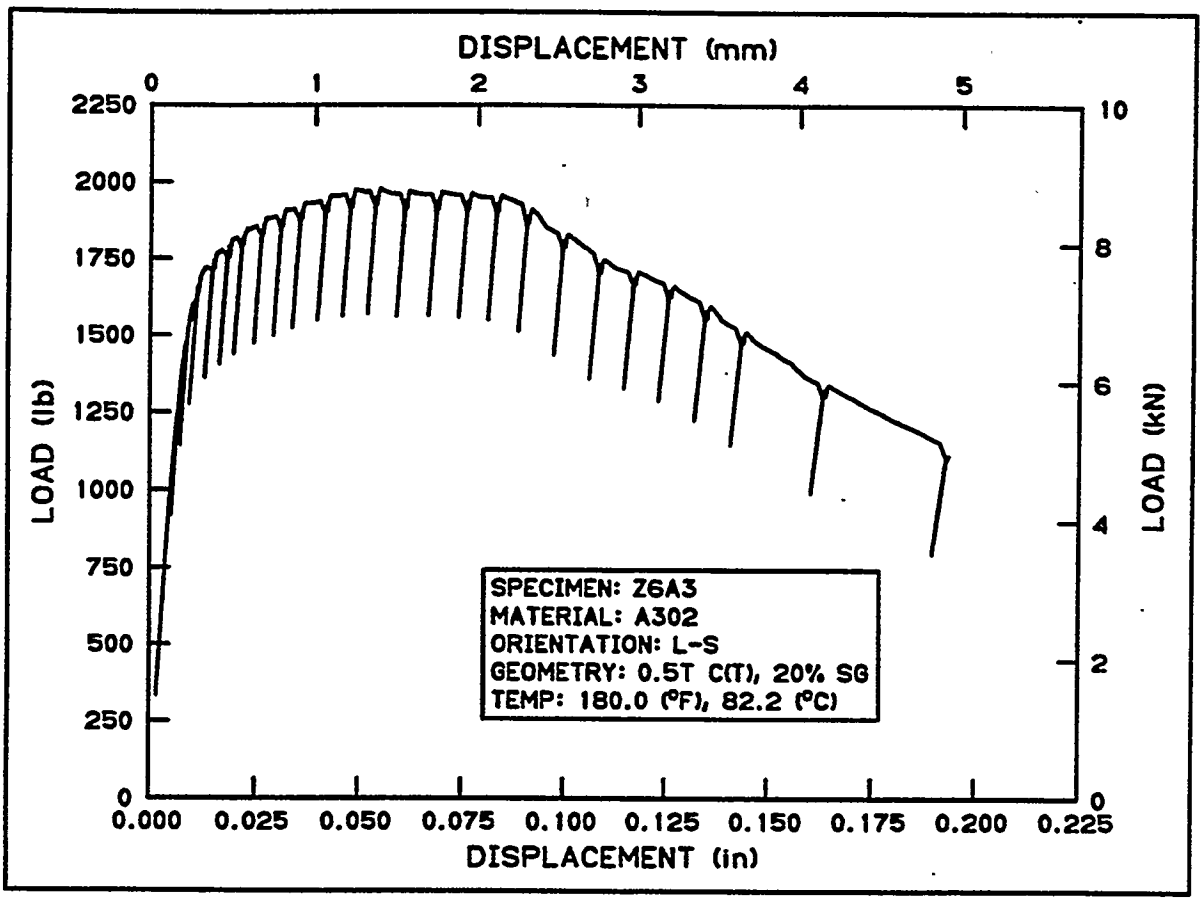

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z6A15
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

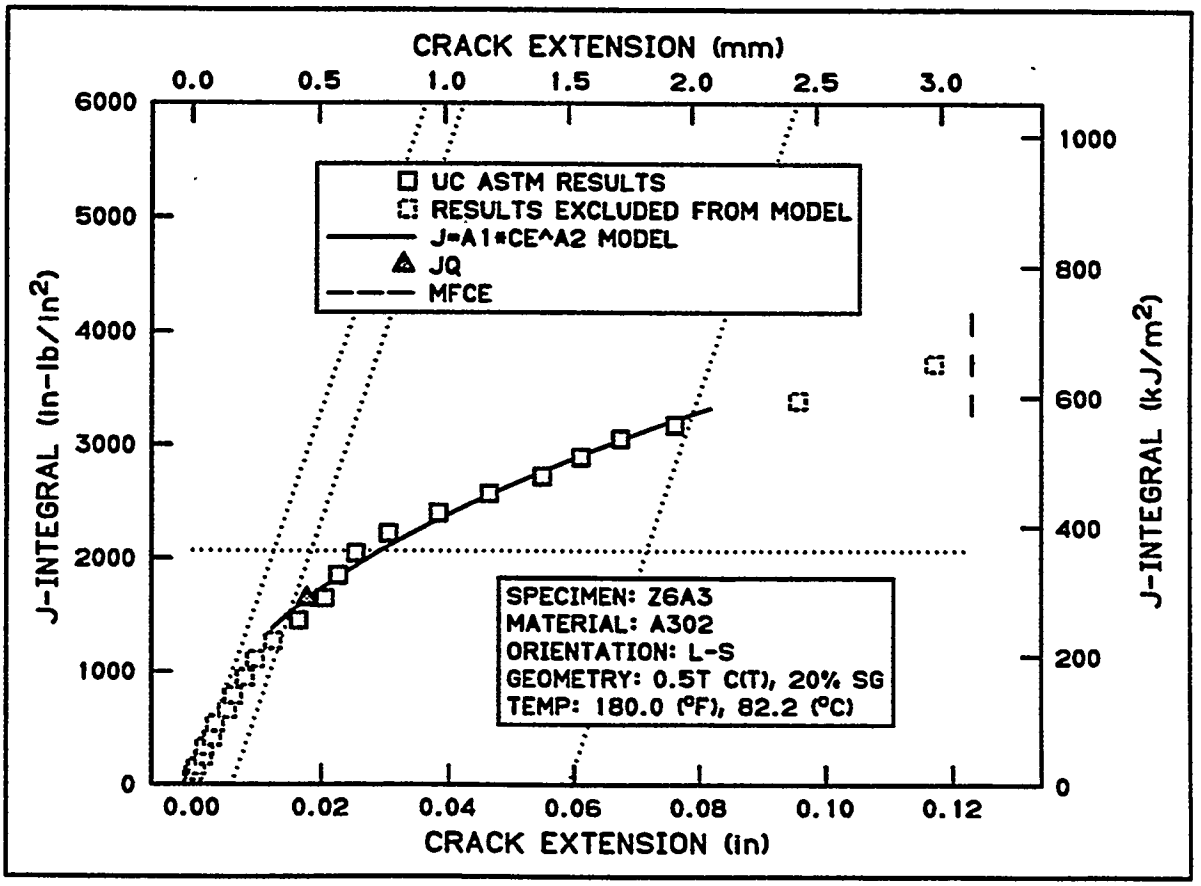

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A15
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A3
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6226 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1196	0.0063	0.0000	65.0
2	1449	0.0083	0.0002	108.0
3	1598	0.0102	0.0006	157.1
4	1720	0.0134	0.0017	243.3
5	1777	0.0168	0.0019	329.9
6	1818	0.0204	0.0030	413.2
7	1856	0.0249	0.0035	536.9
8	1888	0.0298	0.0053	661.7
9	1912	0.0342	0.0062	786.7
10	1936	0.0404	0.0080	948.2
11	1958	0.0464	0.0096	1110.9
12	1967	0.0524	0.0124	1272.6
13	1960	0.0598	0.0165	1455.5
14	1959	0.0673	0.0205	1653.6
15	1958	0.0744	0.0227	1854.4
16	1949	0.0819	0.0255	2046.6
17	1927	0.0893	0.0306	2221.3
18	1834	0.0980	0.0384	2403.7
19	1768	0.1069	0.0465	2574.5
20	1706	0.1156	0.0549	2725.2
21	1670	0.1242	0.0611	2894.2
22	1609	0.1330	0.0675	3055.8
23	1526	0.1418	0.0762	3176.9
24	1349	0.1619	0.0957	3392.4
25	1156	0.1916	0.1171	3720.2

WIDTH: 0.9988 (IN),25.370 (MM)
THICKNESS: 0.5000 (IN),12.700 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2426 (IN),6.162 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8670 (IN),22.022 (MM)
DISTANCE 2: 0.8693 (IN),22.080 (MM)
DISTANCE 3: 0.8724 (IN),22.159 (MM)
DISTANCE 4: 0.8720 (IN),22.149 (MM)
DISTANCE 5: 0.8710 (IN),22.123 (MM)
DISTANCE 6: 0.8638 (IN),21.941 (MM)
DISTANCE 7: 0.8570 (IN),21.768 (MM)
DISTANCE 8: 0.8568 (IN),21.763 (MM)
DISTANCE 9: 0.8520 (IN),21.641 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9602 (IN),24.389 (MM)
DISTANCE 2: 0.9948 (IN),25.268 (MM)
DISTANCE 3: 0.9794 (IN),24.877 (MM)
DISTANCE 4: 0.9853 (IN),25.027 (MM)
DISTANCE 5: 0.9866 (IN),25.060 (MM)
DISTANCE 6: 0.9901 (IN),25.149 (MM)
DISTANCE 7: 0.9874 (IN),25.080 (MM)
DISTANCE 8: 1.0126 (IN),25.720 (MM)
DISTANCE 9: 0.9780 (IN),24.841 (MM)

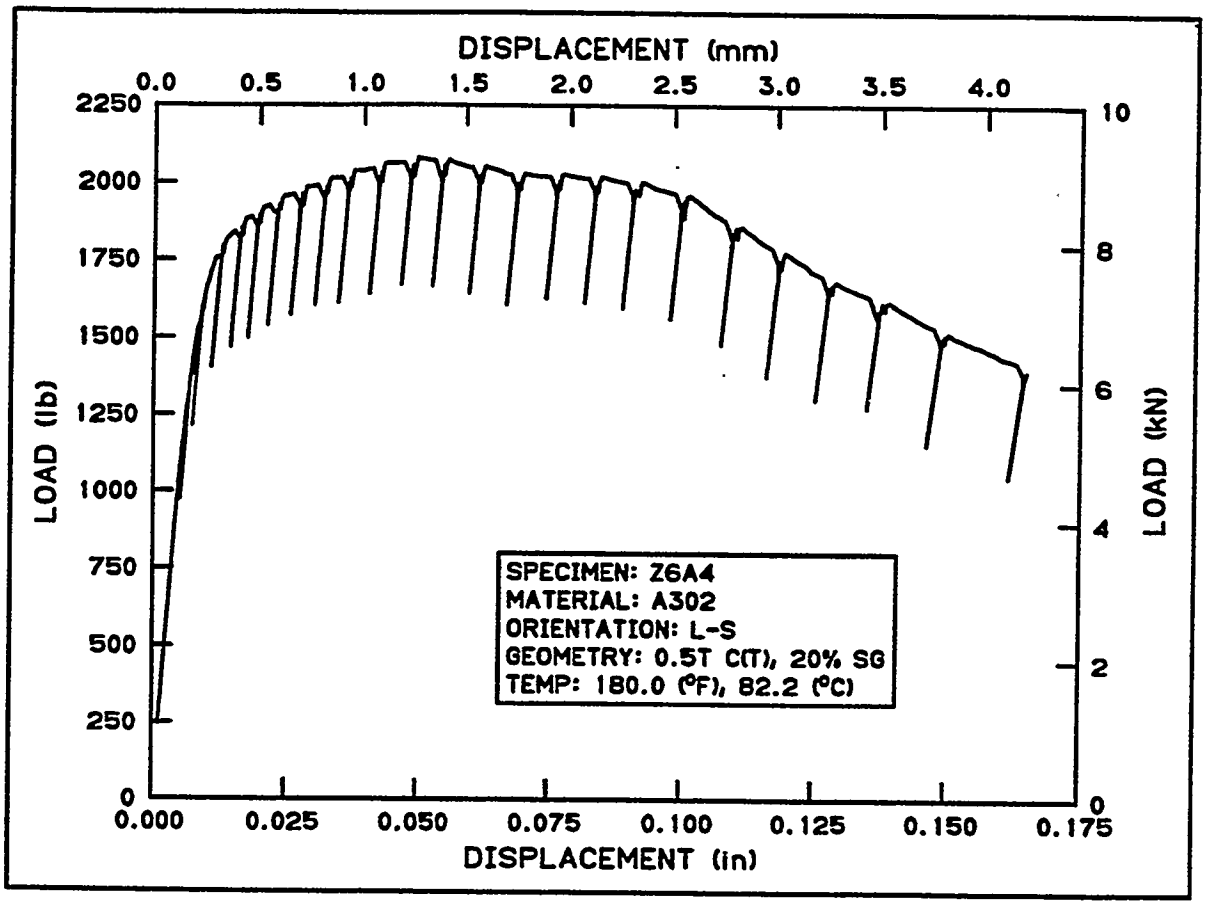

DISPLACEMENT (mm)
0
1
2
3
4
5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6A3
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

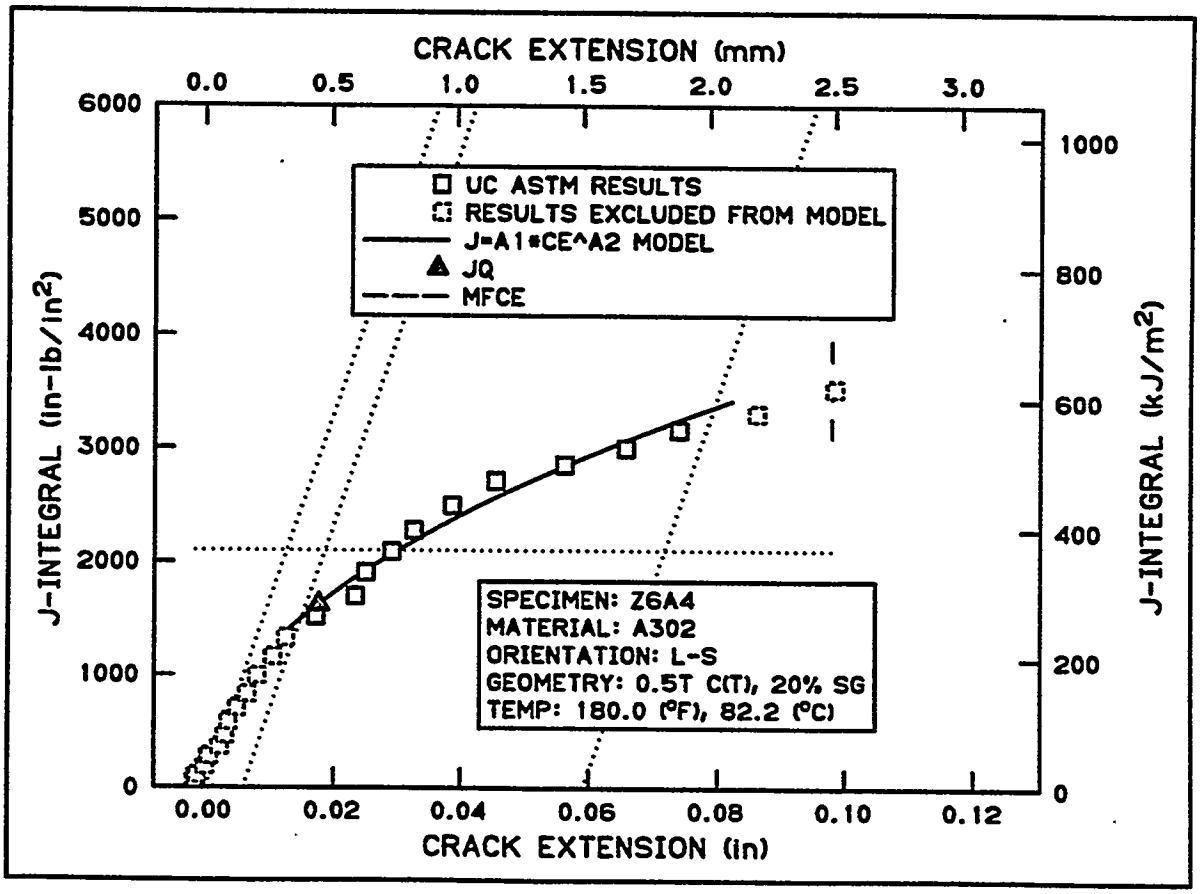

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
6000
5000
4000
3000
2000
1000
0
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A3
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A4
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6132 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1265	0.0062	-0.0016	65.9
2	1525	0.0082	-0.0012	110.2
3	1757	0.0115	0.0000	192.7
4	1840	0.0148	0.0006	282.4
5	1888	0.0180	0.0023	367.1
6	1924	0.0214	0.0031	467.7
7	1961	0.0261	0.0036	586.9
8	1989	0.0305	0.0050	708.4
9	2016	0.0352	0.0066	831.7
10	2043	0.0411	0.0082	997.6
11	2064	0.0470	0.0107	1165.0
12	2068	0.0530	0.0126	1333.8
13	2049	0.0601	0.0173	1521.7
14	2026	0.0675	0.0234	1699.4
15	2019	0.0748	0.0251	1907.7
16	2014	0.0821	0.0292	2094.8
17	2000	0.0894	0.0326	2282.8
18	1965	0.0986	0.0387	2499.8
19	1879	0.1080	0.0456	2717.1
20	1789	0.1171	0.0562	2855.4
21	1699	0.1264	0.0658	3002.7
22	1630	0.1354	0.0741	3166.0
23	1533	0.1476	0.0863	3311.3
24	1420	0.1632	0.0984	3530.8

WIDTH: 0.9960 (IN),25.298 (MM)
THICKNESS: 0.4997 (IN),12.692 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2454 (IN),6.233 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8522 (IN),21.646 (MM)
DISTANCE 2: 0.8588 (IN),21.814 (MM)
DISTANCE 3: 0.8631 (IN),21.923 (MM)
DISTANCE 4: 0.8672 (IN),22.027 (MM)
DISTANCE 5: 0.8618 (IN),21.890 (MM)
DISTANCE 6: 0.8623 (IN),21.902 (MM)
DISTANCE 7: 0.8559 (IN),21.740 (MM)
DISTANCE 8: 0.8506 (IN),21.605 (MM)
DISTANCE 9: 0.8458 (IN),21.483 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9658 (IN),24.531 (MM)
DISTANCE 2: 0.9616 (IN),24.425 (MM)
DISTANCE 3: 0.9532 (IN),24.211 (MM)
DISTANCE 4: 0.9766 (IN),24.806 (MM)
DISTANCE 5: 0.9627 (IN),24.453 (MM)
DISTANCE 6: 0.9666 (IN),24.552 (MM)
DISTANCE 7: 0.9436 (IN),23.967 (MM)
DISTANCE 8: 0.9346 (IN),23.739 (MM)
DISTANCE 9: 0.9416 (IN),23.917 (MM)

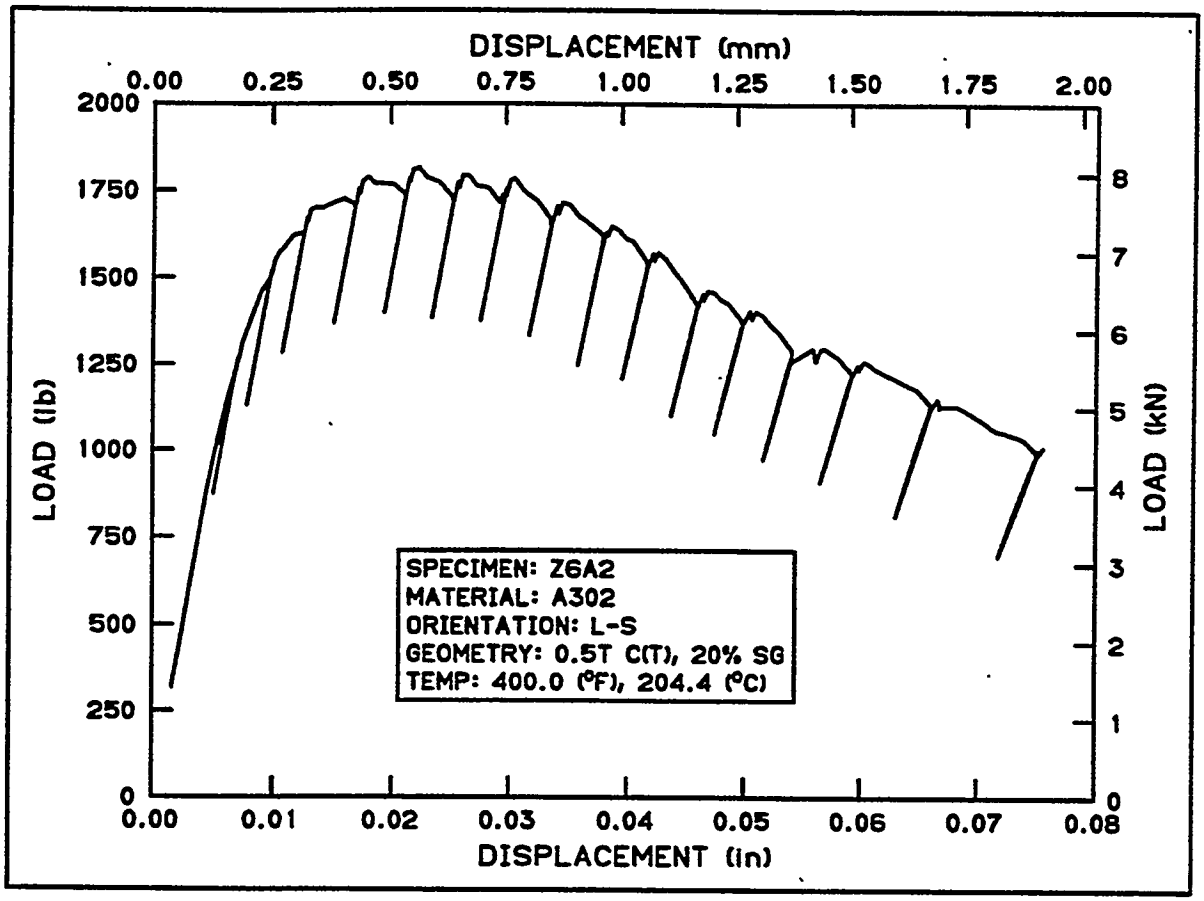

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

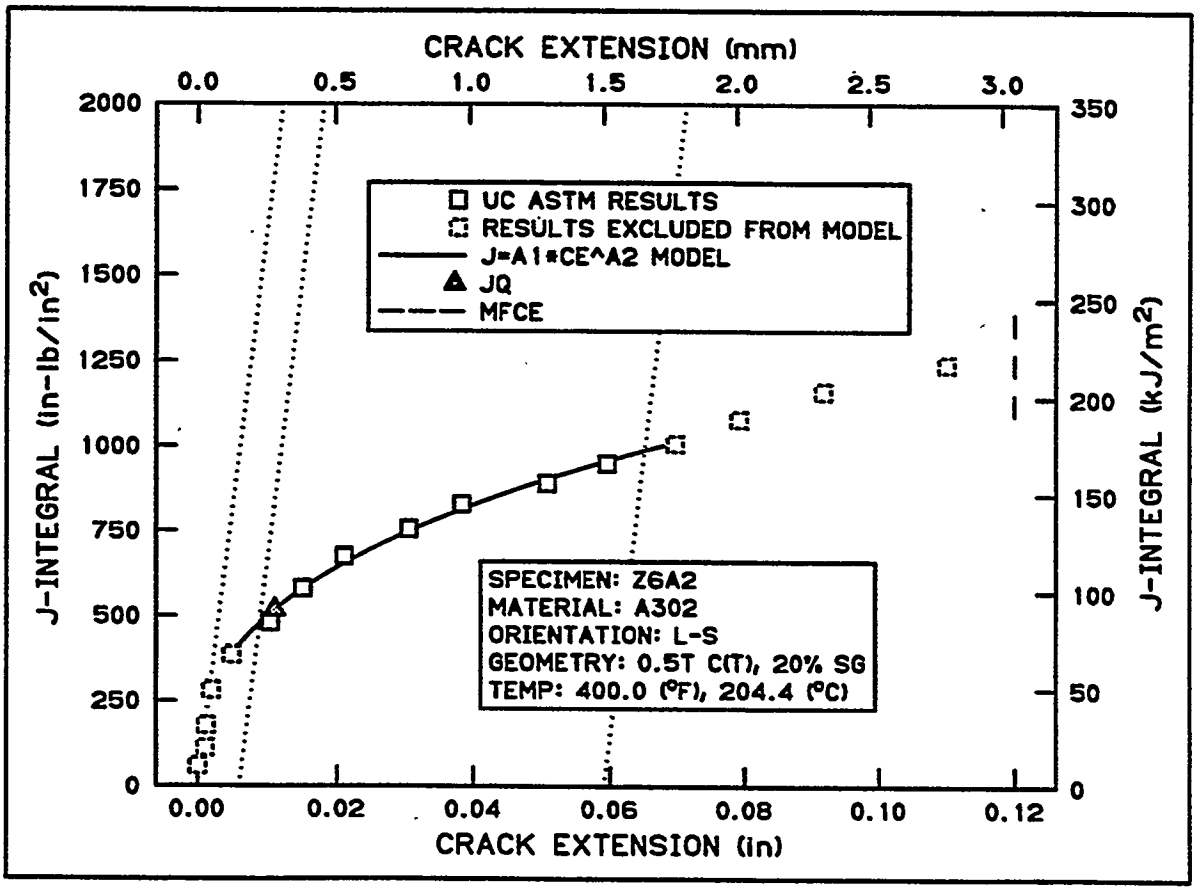

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A2
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6275 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1158	0.0063	0.0000	59.6
2	1461	0.0090	0.0011	112.2
3	1622	0.0116	0.0012	177.8
4	1725	0.0158	0.0020	282.3
5	1767	0.0199	0.0049	385.9
6	1773	0.0239	0.0104	482.2
7	1756	0.0281	0.0151	581.6
8	1721	0.0322	0.0210	676.3
9	1664	0.0363	0.0305	757.2
10	1606	0.0403	0.0383	829.7
11	1490	0.0446	0.0508	889.9
12	1427	0.0485	0.0596	948.4
13	1345	0.0528	0.0696	1006.6
14	1269	0.0580	0.0791	1078.3
15	1178	0.0648	0.0917	1160.5
16	1035	0.0738	0.1100	1240.7

  WIDTH: 1.0004 (IN),25.410 (MM)
  THICKNESS: 0.4996 (IN),12.690 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2414 (IN),6.132 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8500 (IN),21.590 (MM)
    DISTANCE 2: 0.8624 (IN),21.905 (MM)
    DISTANCE 3: 0.8693 (IN),22.080 (MM)
    DISTANCE 4: 0.8721 (IN),22.151 (MM)
    DISTANCE 5: 0.8725 (IN),22.162 (MM)
    DISTANCE 6: 0.8744 (IN),22.210 (MM)
    DISTANCE 7: 0.8732 (IN),22.179 (MM)
    DISTANCE 8: 0.8708 (IN),22.118 (MM)
    DISTANCE 9: 0.8630 (IN),21.920 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9748 (IN),24.760 (MM)
    DISTANCE 2: 0.9824 (IN),24.953 (MM)
    DISTANCE 3: 1.0046 (IN),25.517 (MM)
    DISTANCE 4: 0.9992 (IN),25.380 (MM)
    DISTANCE 5: 0.9710 (IN),24.663 (MM)
    DISTANCE 6: 0.9807 (IN),24.910 (MM)
    DISTANCE 7: 0.9916 (IN),25.187 (MM)
    DISTANCE 8: 0.9978 (IN),25.344 (MM)
    DISTANCE 9: 0.9925 (IN),25.210 (MM)

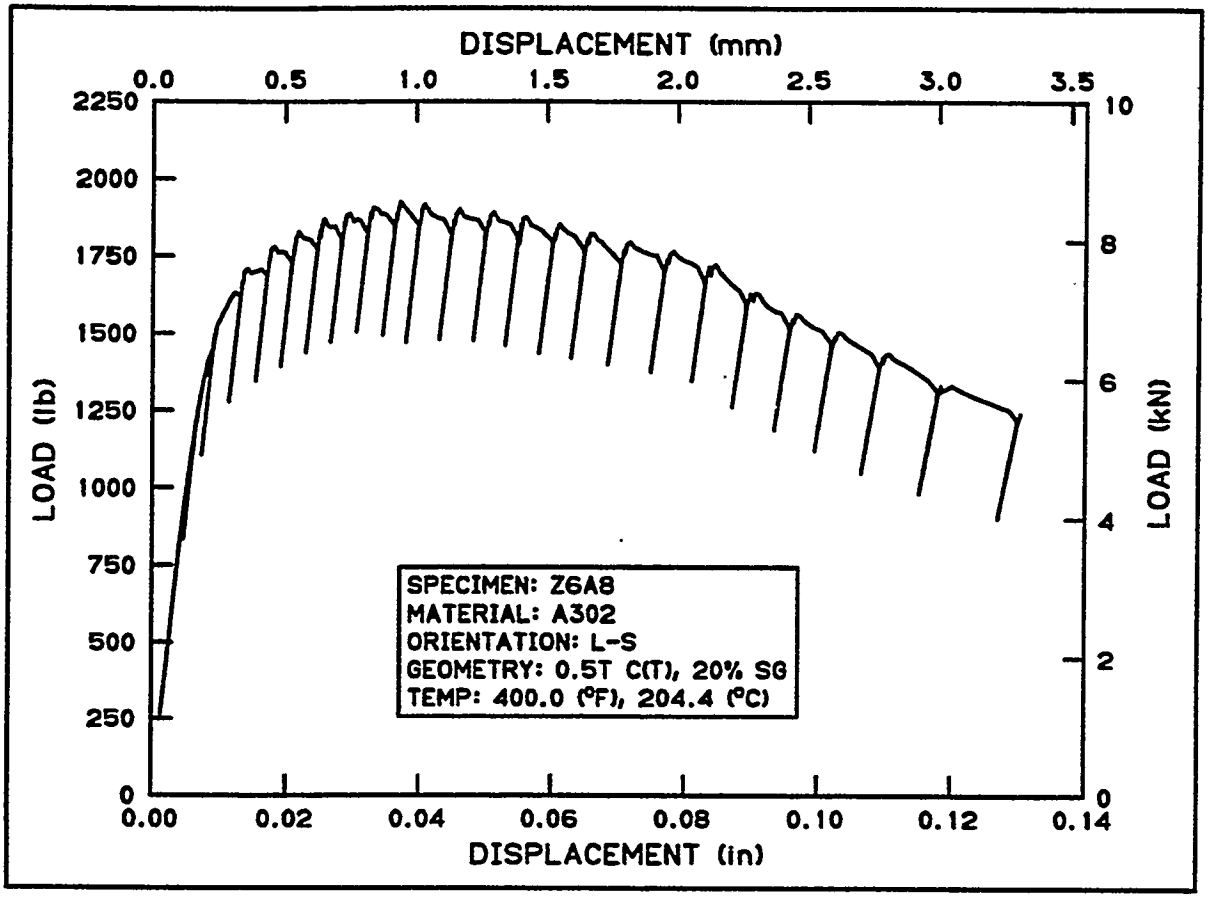

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
DISPLACEMENT (in)

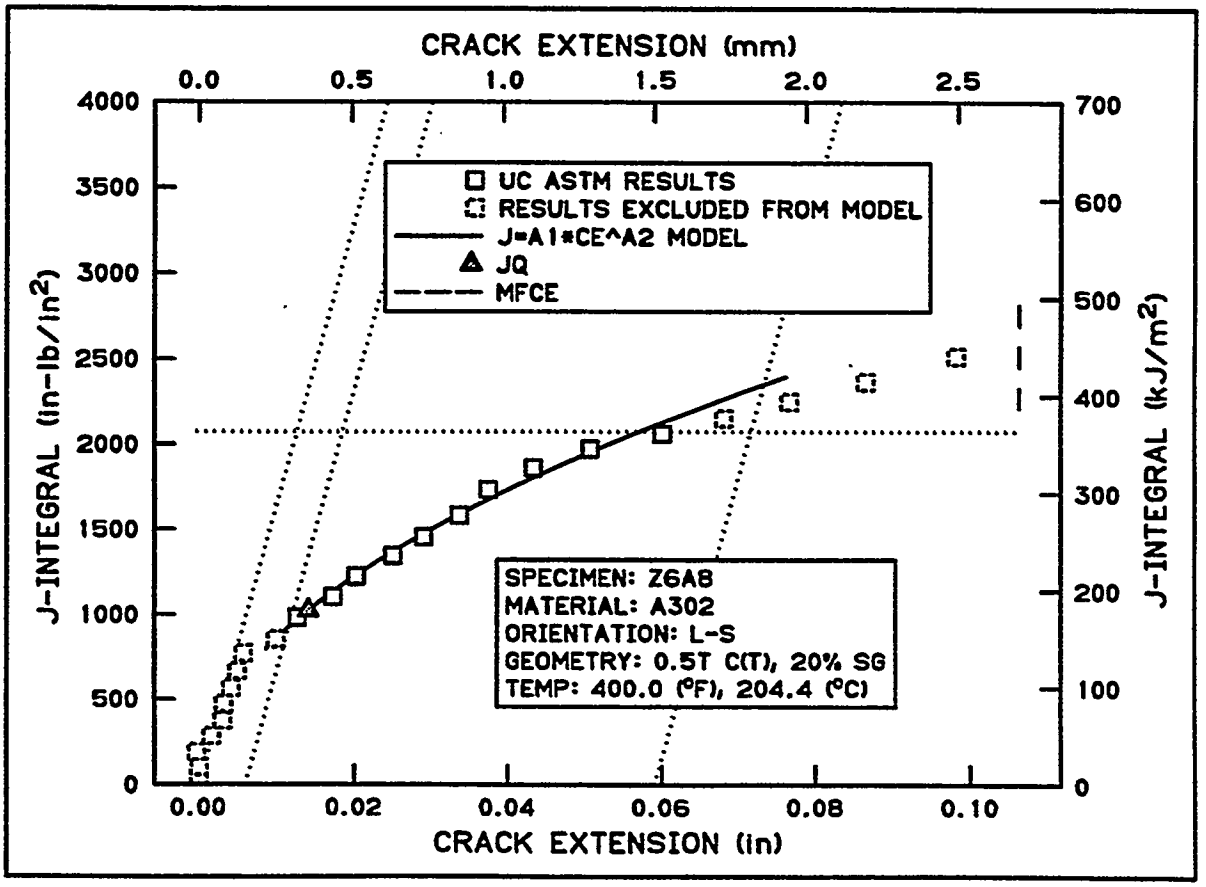

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
J-INTEGRAL (in-lb/in²)
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
350
300
250
200
150
100
50
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A8
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6208 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1123	0.0059	0.0000	52.3
2	1417	0.0084	0.0000	102.1
3	1629	0.0121	-0.0003	191.4
4	1705	0.0160	0.0016	284.6
5	1760	0.0196	0.0030	376.4
6	1803	0.0233	0.0032	473.1
7	1843	0.0271	0.0041	568.0
8	1865	0.0309	0.0049	669.6
9	1886	0.0346	0.0057	774.0
10	1893	0.0382	0.0099	856.7
11	1866	0.0435	0.0126	984.7
12	1864	0.0486	0.0173	1105.7
13	1853	0.0534	0.0203	1225.8
14	1832	0.0583	0.0250	1345.7
15	1811	0.0633	0.0291	1457.3
16	1795	0.0673	0.0337	1584.2
17	1751	0.0756	0.0375	1735.4
18	1715	0.0817	0.0434	1862.6
19	1638	0.0881	0.0508	1973.3
20	1564	0.0945	0.0601	2063.7
21	1508	0.1005	0.0681	2151.9
22	1432	0.1079	0.0766	2251.6
23	1348	0.1165	0.0864	2367.0
24	1252	0.1286	0.0982	2516.6

  WIDTH: 0.9982 (IN),25.354 (MM)
  THICKNESS: 0.4993 (IN),12.682 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2437 (IN),6.190 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8557 (IN),21.735 (MM)
    DISTANCE 2: 0.8622 (IN),21.900 (MM)
    DISTANCE 3: 0.8710 (IN),22.123 (MM)
    DISTANCE 4: 0.8690 (IN),22.073 (MM)
    DISTANCE 5: 0.8720 (IN),22.149 (MM)
    DISTANCE 6: 0.8682 (IN),22.052 (MM)
    DISTANCE 7: 0.8634 (IN),21.930 (MM)
    DISTANCE 8: 0.8581 (IN),21.796 (MM)
    DISTANCE 9: 0.8478 (IN),21.534 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9517 (IN),24.173 (MM)
    DISTANCE 2: 0.9510 (IN),24.155 (MM)
    DISTANCE 3: 0.9624 (IN),24.445 (MM)
    DISTANCE 4: 0.9742 (IN),24.745 (MM)
    DISTANCE 5: 0.9836 (IN),24.983 (MM)
    DISTANCE 6: 0.9954 (IN),25.283 (MM)
    DISTANCE 7: 0.9842 (IN),24.999 (MM)
    DISTANCE 8: 0.9714 (IN),24.674 (MM)
    DISTANCE 9: 0.9360 (IN),23.774 (MM)

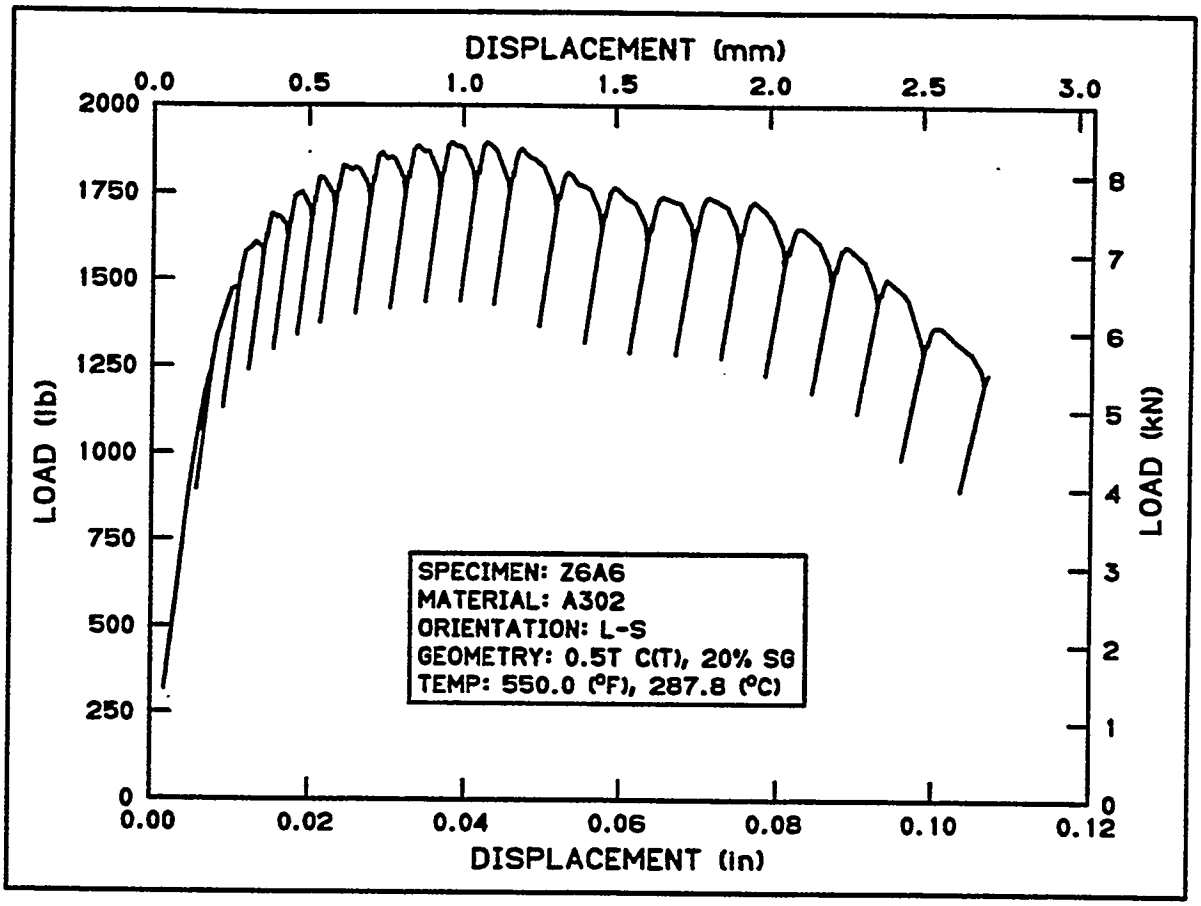

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

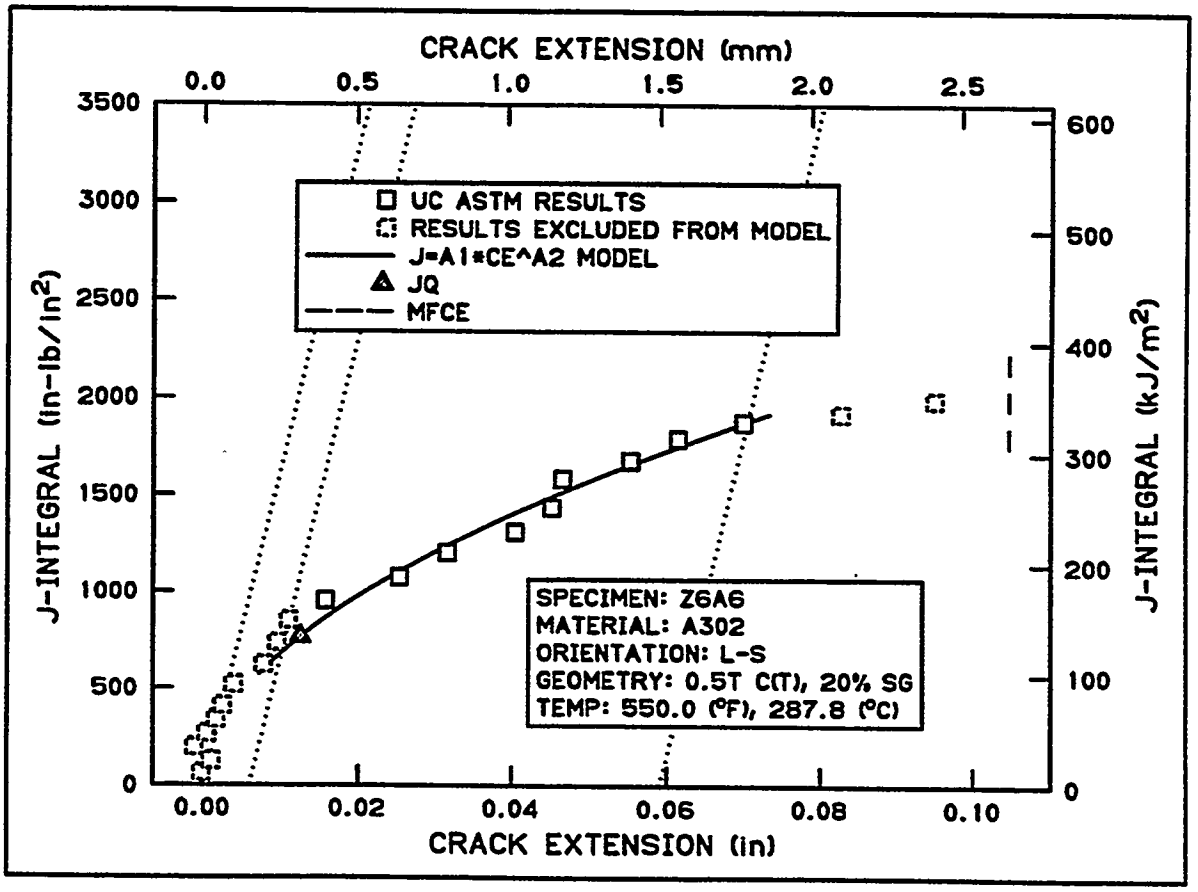

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A6
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6254 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1181	0.0068	-0.0002	64.2
2	1471	0.0100	0.0010	126.1
3	1607	0.0129	-0.0011	197.1
4	1681	0.0159	0.0005	267.3
5	1750	0.0188	0.0016	339.2
6	1790	0.0216	0.0025	411.3
7	1816	0.0261	0.0039	520.6
8	1845	0.0306	0.0077	626.3
9	1867	0.0350	0.0095	739.3
10	1874	0.0395	0.0109	854.7
11	1872	0.0437	0.0158	956.5
12	1824	0.0498	0.0253	1077.3
13	1759	0.0558	0.0316	1205.0
14	1718	0.0616	0.0404	1312.1
15	1718	0.0674	0.0451	1439.5
16	1708	0.0733	0.0465	1585.2
17	1667	0.0791	0.0554	1679.2
18	1606	0.0852	0.0614	1793.0
19	1553	0.0910	0.0700	1876.1
20	1443	0.0967	0.0826	1920.5
21	1290	0.1049	0.0950	1991.5

WIDTH: 1.0008 (IN),25.420 (MM)
THICKNESS: 0.4998 (IN),12.695 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2408 (IN),6.116 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8566 (IN),21.758 (MM)
DISTANCE 2: 0.8627 (IN),21.913 (MM)
DISTANCE 3: 0.8682 (IN),22.052 (MM)
DISTANCE 4: 0.8708 (IN),22.118 (MM)
DISTANCE 5: 0.8702 (IN),22.103 (MM)
DISTANCE 6: 0.8705 (IN),22.111 (MM)
DISTANCE 7: 0.8681 (IN),22.050 (MM)
DISTANCE 8: 0.8624 (IN),21.905 (MM)
DISTANCE 9: 0.8560 (IN),21.742 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9728 (IN),24.709 (MM)
DISTANCE 2: 0.9682 (IN),24.592 (MM)
DISTANCE 3: 0.9656 (IN),24.526 (MM)
DISTANCE 4: 0.9860 (IN),25.044 (MM)
DISTANCE 5: 0.9757 (IN),24.783 (MM)
DISTANCE 6: 0.9778 (IN),24.836 (MM)
DISTANCE 7: 0.9642 (IN),24.491 (MM)
DISTANCE 8: 0.9642 (IN),24.491 (MM)
DISTANCE 9: 0.9564 (IN),24.293 (MM)

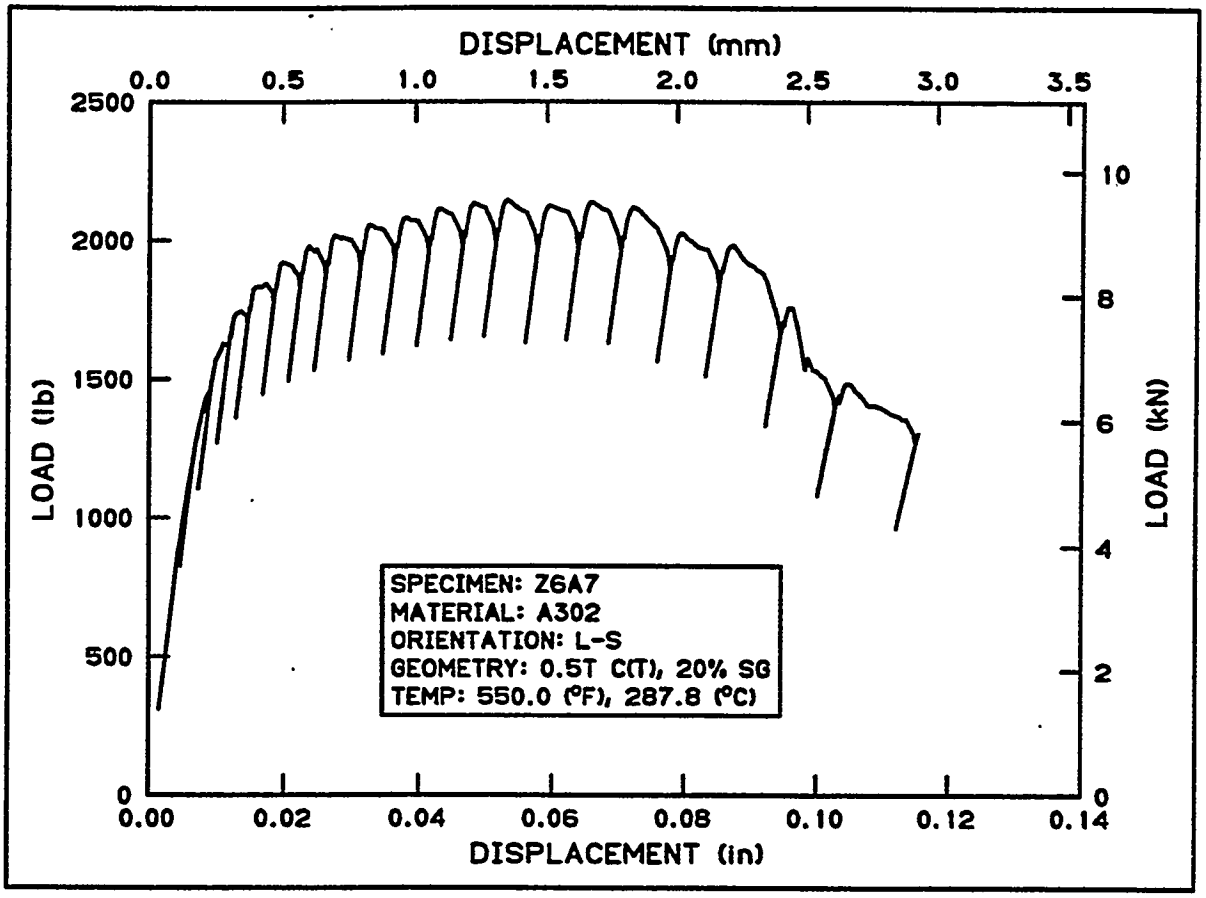

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

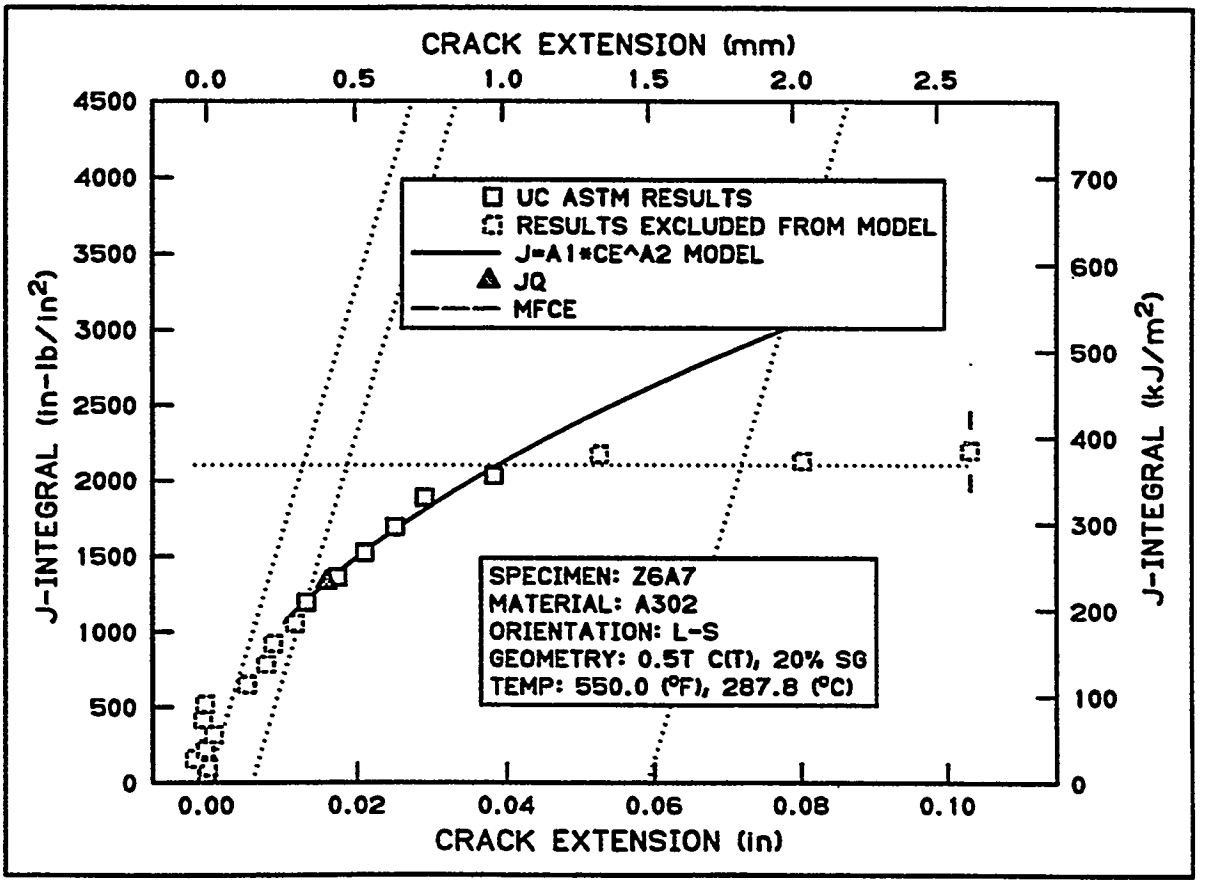

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
600
500
400
300
200
100
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A7
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6111 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1121	0.0059	0.0000	50.4
2	1427	0.0084	0.0002	98.4
3	1625	0.0109	-0.0016	157.1
4	1744	0.0135	-0.0001	220.1
5	1843	0.0172	0.0010	316.2
6	1911	0.0208	-0.0005	417.8
7	1968	0.0247	-0.0002	518.8
8	2000	0.0298	0.0053	647.4
9	2037	0.0347	0.0078	781.7
10	2067	0.0398	0.0088	921.0
11	2095	0.0447	0.0117	1056.7
12	2117	0.0498	0.0132	1196.8
13	2099	0.0560	0.0174	1362.4
14	2101	0.0622	0.0210	1525.5
15	2103	0.0684	0.0250	1692.8
16	2042	0.0757	0.0289	1887.9
17	1966	0.0834	0.0382	2033.7
18	1855	0.0922	0.0525	2174.5
19	1502	0.1011	0.0801	2129.8
20	1353	0.1135	0.1030	2198.2

WIDTH: 0.9938 (IN),25.243 (MM)
THICKNESS: 0.4993 (IN),12.682 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2474 (IN),6.284 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8624 (IN),21.905 (MM)
DISTANCE 2: 0.8720 (IN),22.149 (MM)
DISTANCE 3: 0.8749 (IN),22.222 (MM)
DISTANCE 4: 0.8766 (IN),22.266 (MM)
DISTANCE 5: 0.8726 (IN),22.164 (MM)
DISTANCE 6: 0.8647 (IN),21.963 (MM)
DISTANCE 7: 0.8276 (IN),21.021 (MM)
DISTANCE 8: 0.8240 (IN),20.930 (MM)
DISTANCE 9: 0.8492 (IN),21.570 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9762 (IN),24.795 (MM)
DISTANCE 2: 0.9784 (IN),24.851 (MM)
DISTANCE 3: 0.9616 (IN),24.425 (MM)
DISTANCE 4: 0.9665 (IN),24.549 (MM)
DISTANCE 5: 0.9746 (IN),24.755 (MM)
DISTANCE 6: 0.9681 (IN),24.590 (MM)
DISTANCE 7: 0.9496 (IN),24.120 (MM)
DISTANCE 8: 0.9371 (IN),23.802 (MM)
DISTANCE 9: 0.9384 (IN),23.835 (MM)

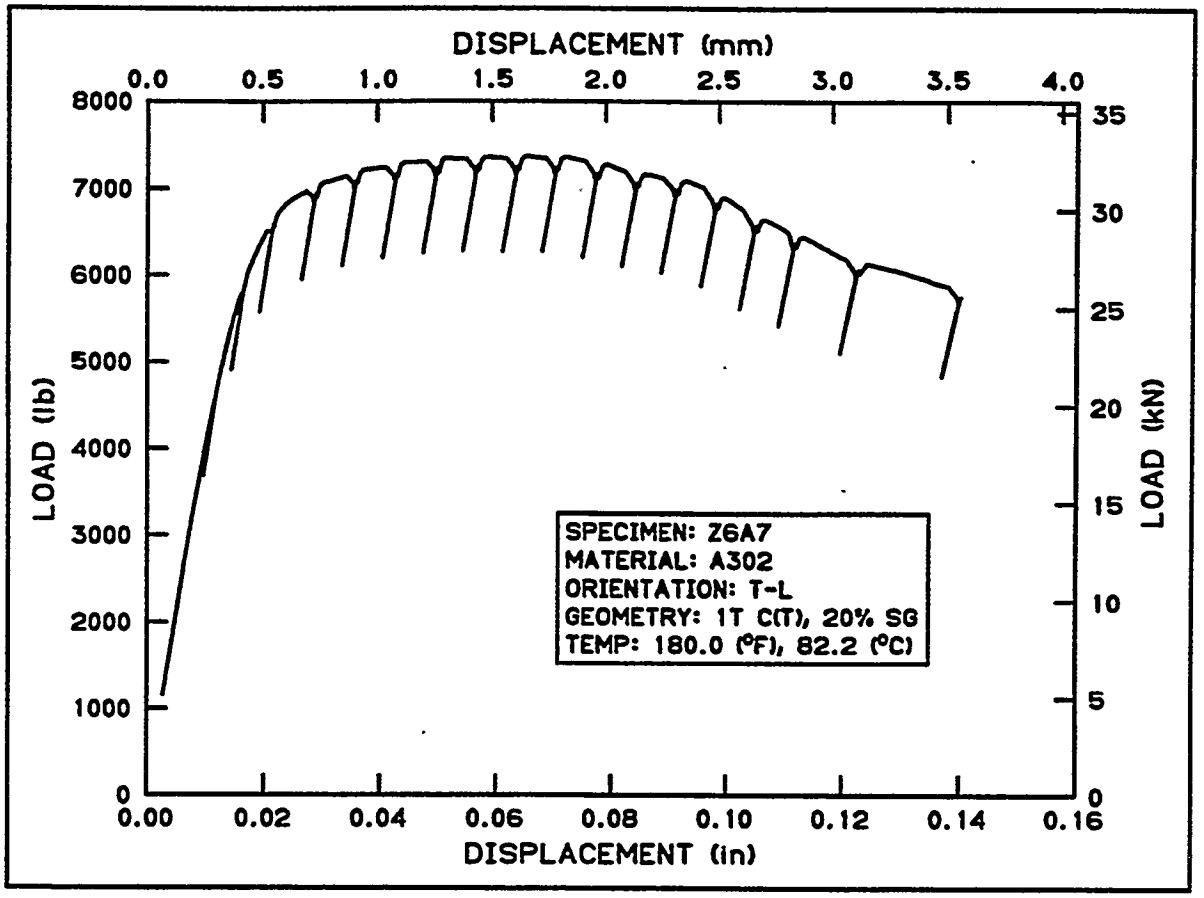

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2500
2000
1500
1000
500
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

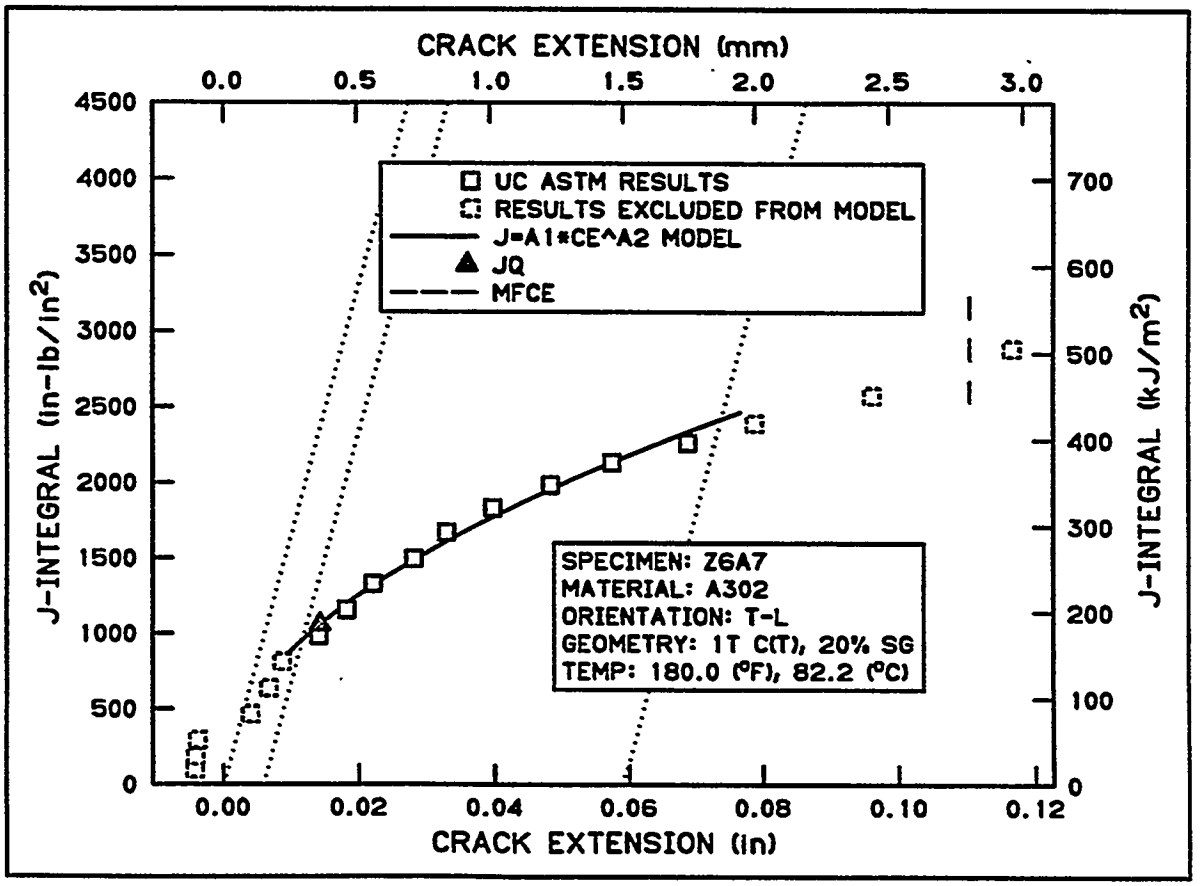

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A7
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2413 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4494	0.0112	-0.0042	97.7
2	5757	0.0158	-0.0041	186.6
3	6506	0.0204	-0.0038	294.4
4	6961	0.0272	0.0040	465.0
5	7138	0.0341	0.0067	637.7
6	7240	0.0408	0.0087	813.0
7	7303	0.0477	0.0142	984.6
8	7336	0.0546	0.0182	1158.3
9	7343	0.0615	0.0222	1331.2
10	7345	0.0683	0.0281	1498.2
11	7306	0.0753	0.0329	1673.3
12	7188	0.0822	0.0397	1832.4
13	7113	0.0888	0.0483	1984.5
14	7007	0.0957	0.0574	2134.3
15	6753	0.1026	0.0688	2264.5
16	6539	0.1094	0.0787	2392.4
17	6184	0.1205	0.0961	2575.9
18	5876	0.1379	0.1165	2885.4

  WIDTH: 1.9991 (IN),50.777 (MM)
  THICKNESS: 1.0010 (IN),25.425 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5016 (IN),12.741 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7197 (IN),43.680 (MM)
    DISTANCE 2: 1.7314 (IN),43.978 (MM)
    DISTANCE 3: 1.7314 (IN),43.978 (MM)
    DISTANCE 4: 1.7339 (IN),44.041 (MM)
    DISTANCE 5: 1.7326 (IN),44.008 (MM)
    DISTANCE 6: 1.7334 (IN),44.028 (MM)
    DISTANCE 7: 1.8318 (IN),46.528 (MM)
    DISTANCE 8: 1.7292 (IN),43.922 (MM)
    DISTANCE 9: 1.7185 (IN),43.650 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8338 (IN),46.579 (MM)
    DISTANCE 2: 1.8114 (IN),46.010 (MM)
    DISTANCE 3: 1.8523 (IN),47.048 (MM)
    DISTANCE 4: 1.8822 (IN),47.808 (MM)
    DISTANCE 5: 1.8772 (IN),47.681 (MM)
    DISTANCE 6: 1.8884 (IN),47.965 (MM)
    DISTANCE 7: 1.8459 (IN),46.886 (MM)
    DISTANCE 8: 1.8290 (IN),46.457 (MM)
    DISTANCE 9: 1.8439 (IN),46.835 (MM)

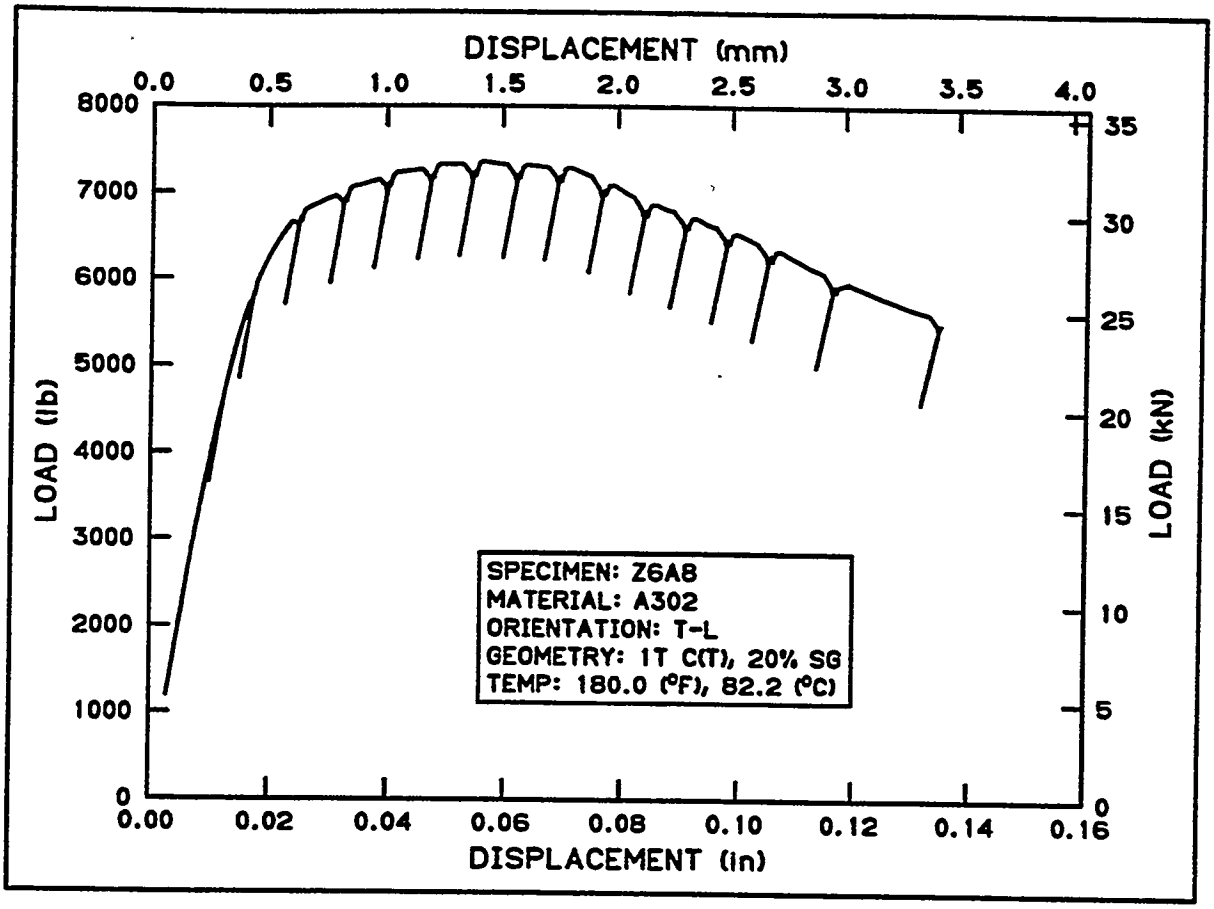

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
35
30
25
20
15
10
5
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

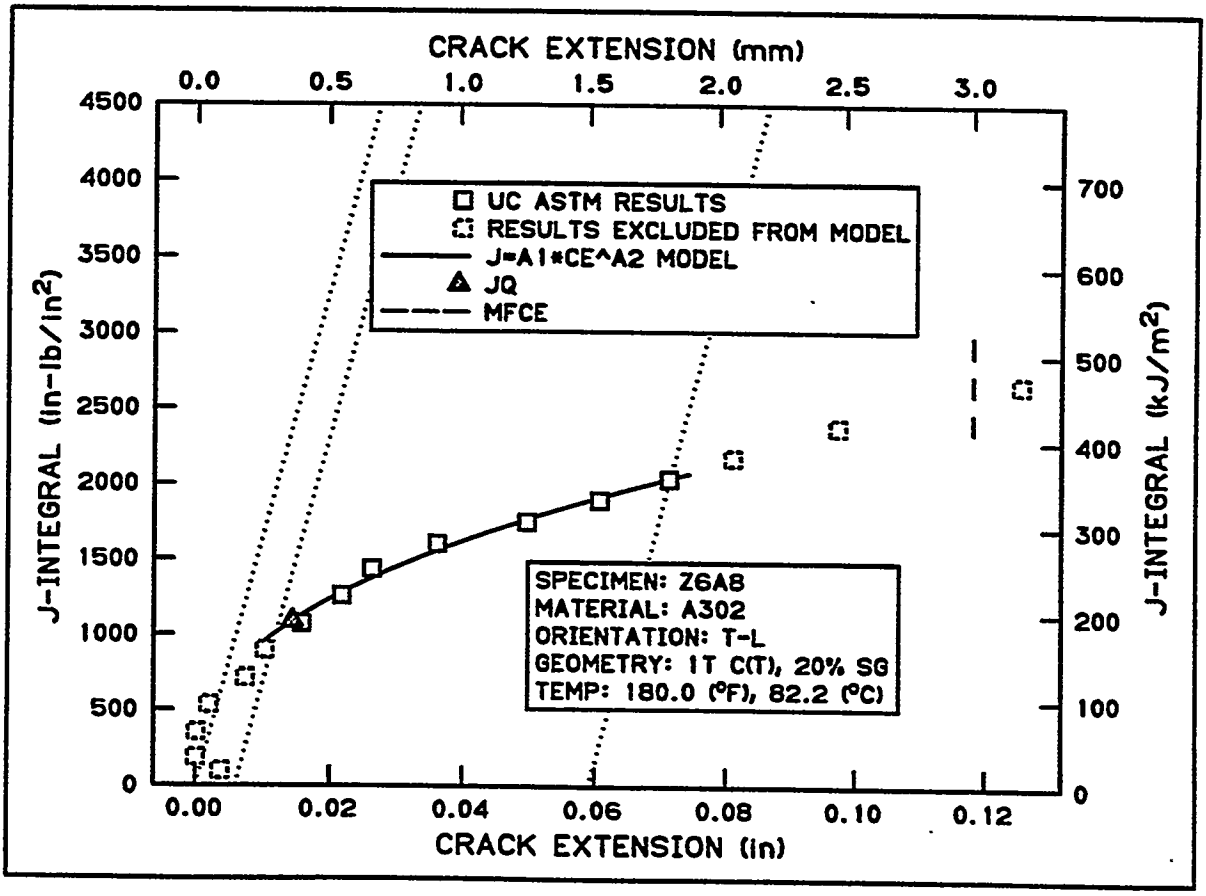

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
J-INTEGRAL (in-lb/in²)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z6A8
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2389 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4443	0.0116	0.0037	98.2
2	5702	0.0164	0.0000	189.1
3	6658	0.0235	0.0001	356.6
4	6960	0.0308	0.0020	536.3
5	7152	0.0380	0.0075	714.8
6	7267	0.0453	0.0104	900.4
7	7326	0.0524	0.0158	1077.7
8	7321	0.0598	0.0218	1261.2
9	7295	0.0669	0.0263	1438.7
10	7193	0.0743	0.0361	1608.6
11	6956	0.0816	0.0496	1753.3
12	6786	0.0885	0.0607	1896.9
13	6606	0.0957	0.0713	2038.0
14	6424	0.1028	0.0810	2178.9
15	6077	0.1145	0.0973	2382.0
16	5611	0.1328	0.1255	2665.4

  WIDTH: 1.9982 (IN),50.754 (MM)
  THICKNESS: 1.0010 (IN),25.425 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5024 (IN),12.761 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7209 (IN),43.711 (MM)
    DISTANCE 2: 1.7380 (IN),44.145 (MM)
    DISTANCE 3: 1.7408 (IN),44.216 (MM)
    DISTANCE 4: 1.7456 (IN),44.338 (MM)
    DISTANCE 5: 1.7458 (IN),44.343 (MM)
    DISTANCE 6: 1.7490 (IN),44.425 (MM)
    DISTANCE 7: 1.7461 (IN),44.351 (MM)
    DISTANCE 8: 1.7400 (IN),44.196 (MM)
    DISTANCE 9: 1.7296 (IN),43.932 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8649 (IN),47.368 (MM)
    DISTANCE 2: 1.8860 (IN),47.904 (MM)
    DISTANCE 3: 1.8381 (IN),46.688 (MM)
    DISTANCE 4: 1.8548 (IN),47.112 (MM)
    DISTANCE 5: 1.9022 (IN),48.316 (MM)
    DISTANCE 6: 1.8758 (IN),47.645 (MM)
    DISTANCE 7: 1.8680 (IN),47.447 (MM)
    DISTANCE 8: 1.7987 (IN),45.687 (MM)
    DISTANCE 9: 1.8394 (IN),46.721 (MM)

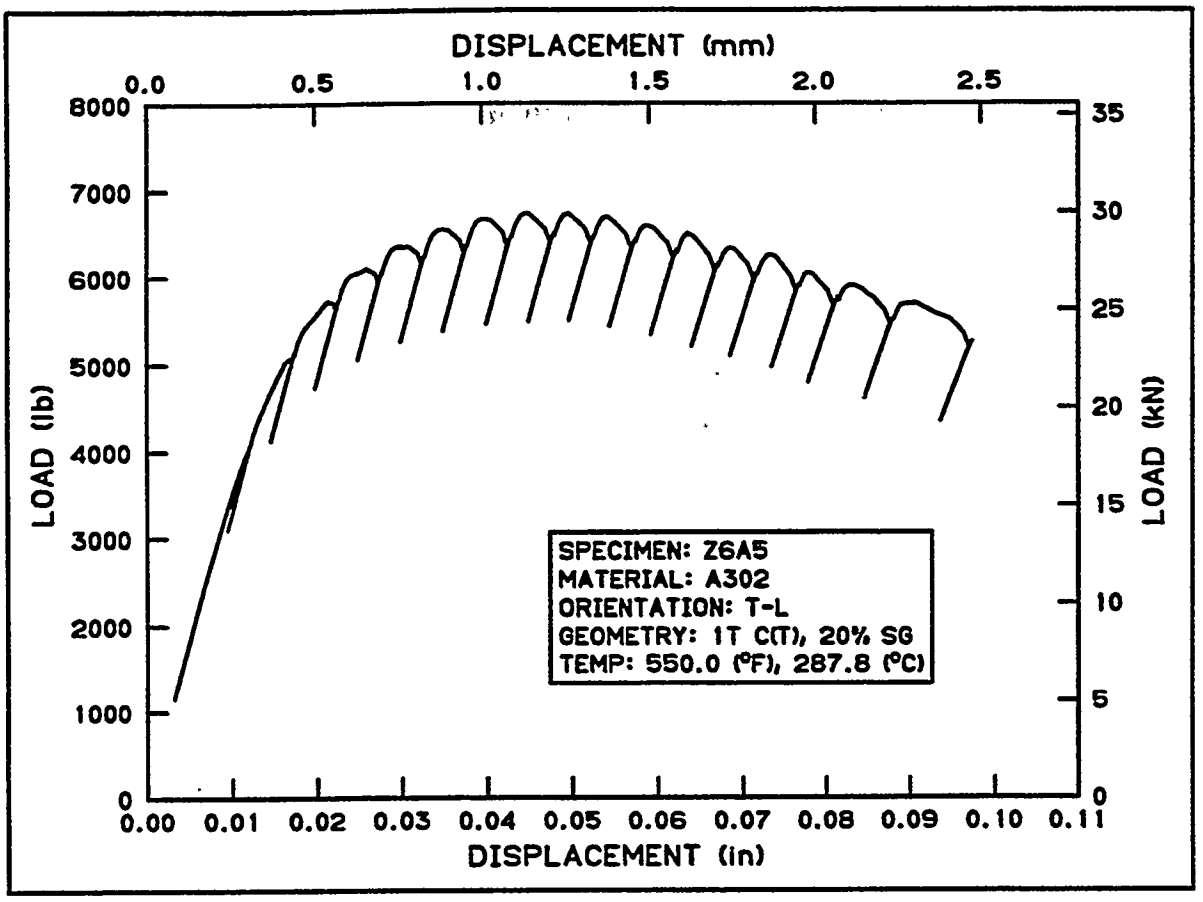

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

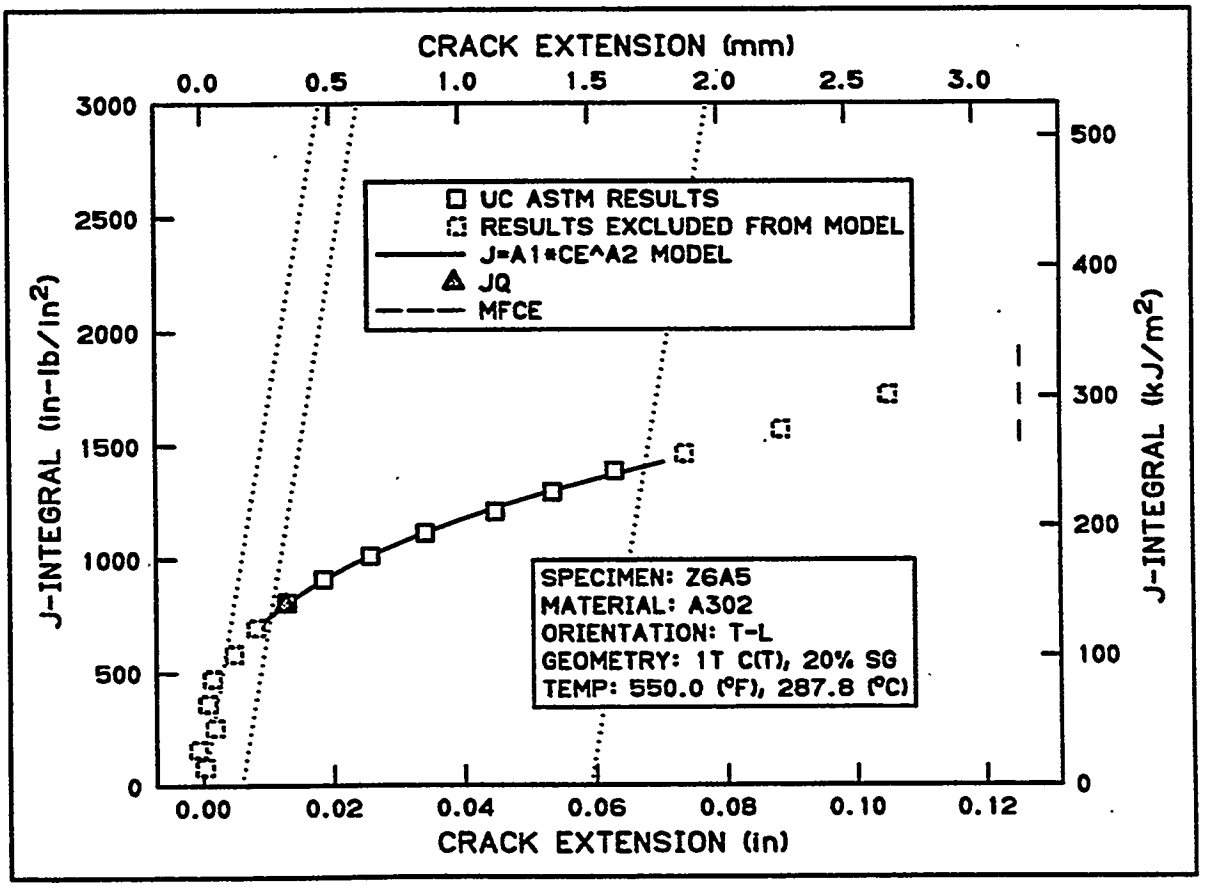

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A5
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2565 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	3909	0.0114	0.0003	80.6
2	5030	0.0164	-0.0007	159.7
3	5712	0.0212	0.0018	256.0
4	6088	0.0259	0.0008	362.6
5	6350	0.0308	0.0015	472.3
6	6537	0.0354	0.0048	581.6
7	6648	0.0405	0.0082	696.5
8	6681	0.0455	0.0129	808.9
9	6676	0.0502	0.0185	911.9
10	6621	0.0550	0.0258	1013.6
11	6557	0.0595	0.0341	1114.2
12	6451	0.0643	0.0448	1205.9
13	6318	0.0691	0.0536	1292.7
14	6228	0.0741	0.0630	1386.7
15	6027	0.0785	0.0736	1461.1
16	5770	0.0856	0.0884	1569.6
17	5519	0.0948	0.1050	1721.5

WIDTH: 2.0019 (IN),50.848 (MM)
THICKNESS: 1.0010 (IN),25.425 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5010 (IN),12.725 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7410 (IN),44.221 (MM)
DISTANCE 2: 1.7561 (IN),44.605 (MM)
DISTANCE 3: 1.7601 (IN),44.707 (MM)
DISTANCE 4: 1.7629 (IN),44.778 (MM)
DISTANCE 5: 1.7630 (IN),44.780 (MM)
DISTANCE 6: 1.7620 (IN),44.755 (MM)
DISTANCE 7: 1.7604 (IN),44.714 (MM)
DISTANCE 8: 1.7536 (IN),44.541 (MM)
DISTANCE 9: 1.7420 (IN),44.247 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.8938 (IN),48.103 (MM)
DISTANCE 2: 1.8899 (IN),48.003 (MM)
DISTANCE 3: 1.9030 (IN),48.336 (MM)
DISTANCE 4: 1.8761 (IN),47.653 (MM)
DISTANCE 5: 1.9044 (IN),48.372 (MM)
DISTANCE 6: 1.8950 (IN),48.133 (MM)
DISTANCE 7: 1.8386 (IN),46.700 (MM)
DISTANCE 8: 1.8678 (IN),47.442 (MM)
DISTANCE 9: 1.8796 (IN),47.742 (MM)

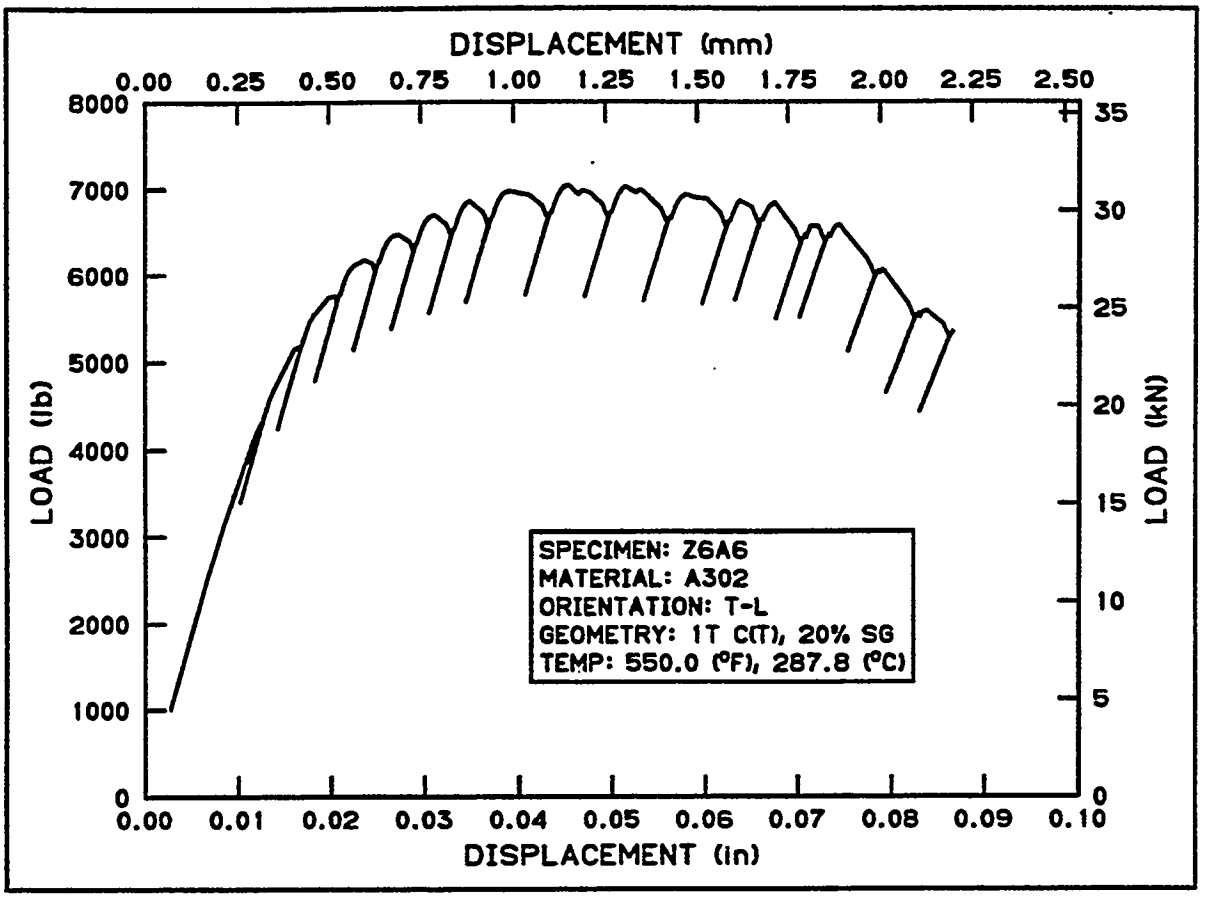

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6A5
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

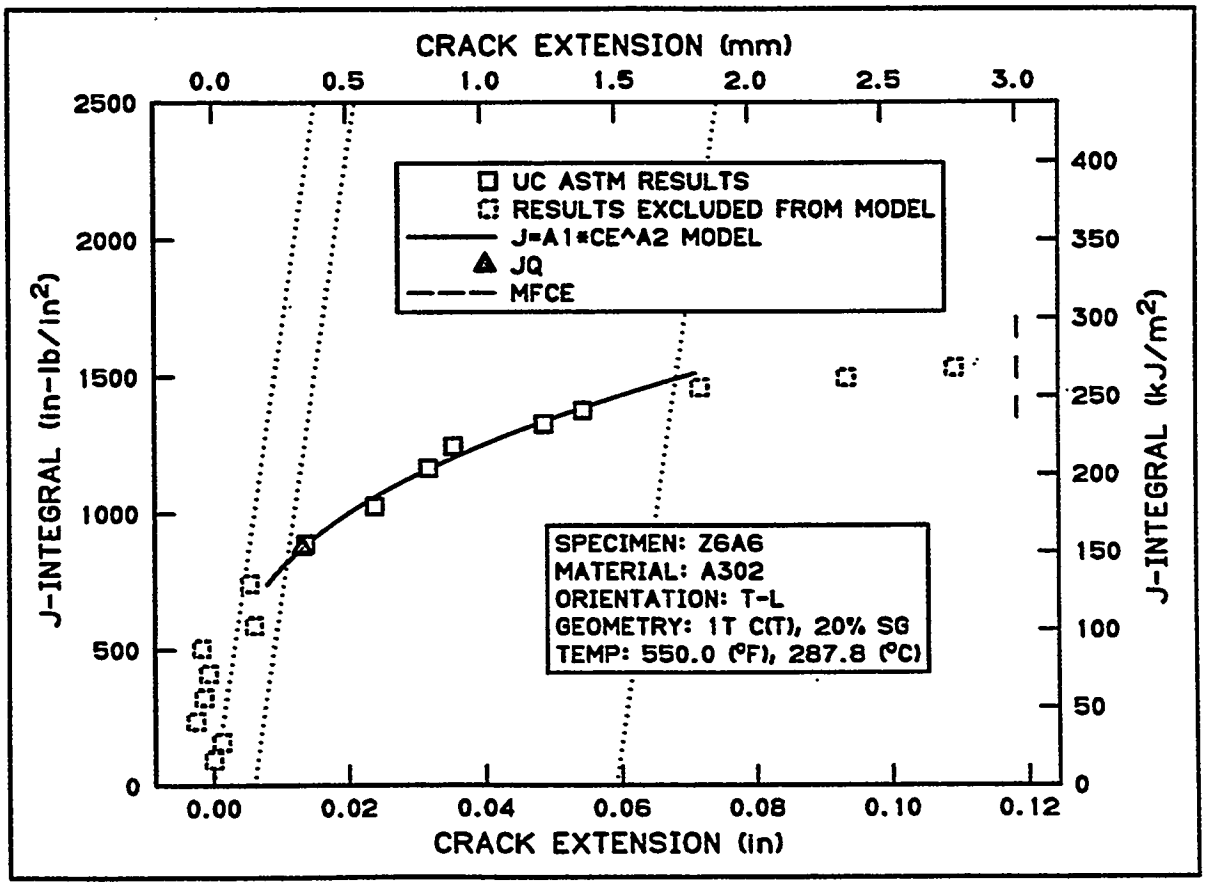

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A5
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A6
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2509 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4230	0.0121	0.0000	93.7
2	5145	0.0160	0.0012	158.7
3	5745	0.0197	-0.0026	236.4
4	6178	0.0236	-0.0014	322.5
5	6474	0.0272	-0.0007	410.9
6	6696	0.0311	-0.0017	503.8
7	6856	0.0347	0.0060	588.2
8	6928	0.0410	0.0054	742.1
9	6957	0.0476	0.0137	887.7
10	6919	0.0538	0.0239	1026.5
11	6889	0.0601	0.0317	1166.7
12	6860	0.0637	0.0354	1246.3
13	6835	0.0675	0.0485	1326.9
14	6564	0.0714	0.0543	1375.2
15	6415	0.0757	0.0716	1459.1
16	6066	0.0791	0.0933	1495.5
17	5583	0.0839	0.1093	1530.9

  WIDTH: 2.0018 (IN),50.846 (MM)
  THICKNESS: 1.0010 (IN),25.425 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5013 (IN),12.733 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7319 (IN),43.990 (MM)
    DISTANCE 2: 1.7440 (IN),44.298 (MM)
    DISTANCE 3: 1.7502 (IN),44.455 (MM)
    DISTANCE 4: 1.7548 (IN),44.572 (MM)
    DISTANCE 5: 1.7574 (IN),44.638 (MM)
    DISTANCE 6: 1.7601 (IN),44.707 (MM)
    DISTANCE 7: 1.7588 (IN),44.674 (MM)
    DISTANCE 8: 1.7541 (IN),44.554 (MM)
    DISTANCE 9: 1.7449 (IN),44.320 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9057 (IN),48.405 (MM)
    DISTANCE 2: 1.8628 (IN),47.315 (MM)
    DISTANCE 3: 1.8730 (IN),47.574 (MM)
    DISTANCE 4: 1.8750 (IN),47.625 (MM)
    DISTANCE 5: 1.8024 (IN),45.781 (MM)
    DISTANCE 6: 1.8710 (IN),47.523 (MM)
    DISTANCE 7: 1.8903 (IN),48.014 (MM)
    DISTANCE 8: 1.8930 (IN),48.082 (MM)
    DISTANCE 9: 1.8889 (IN),47.978 (MM)

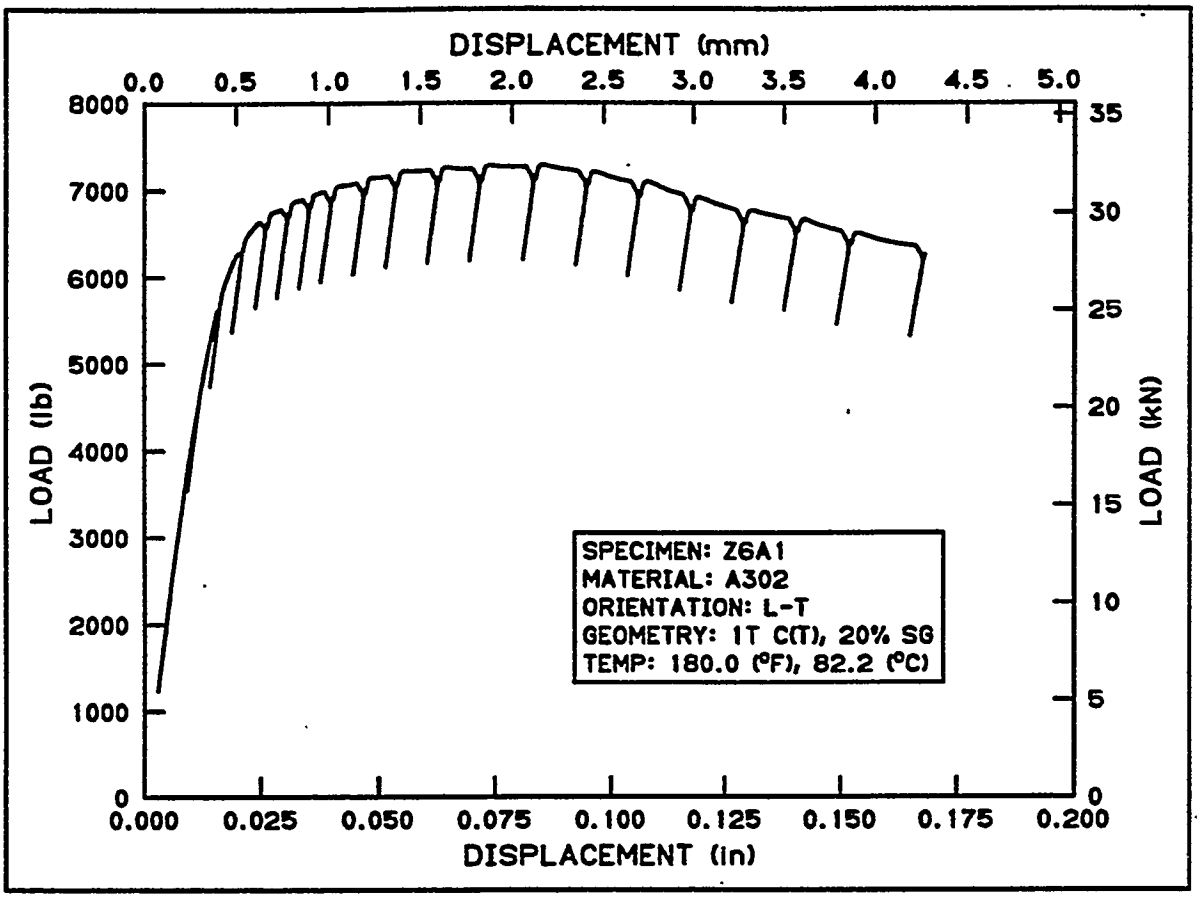

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
35 30 25 20 15 10 5 0
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

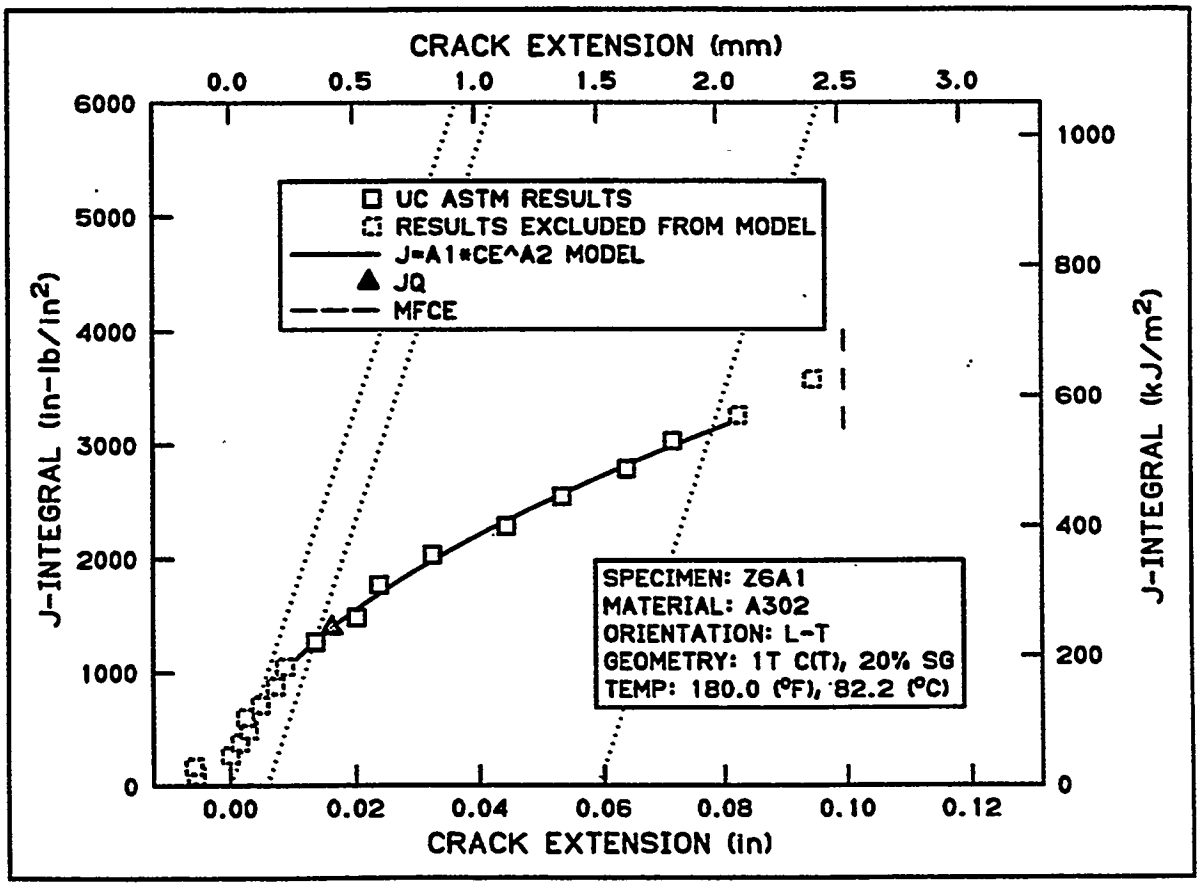

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A1
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2347 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4336	0.0110	-0.0055	87.5
2	5590	0.0156	-0.0058	170.3
3	6262	0.0201	0.0000	268.6
4	6632	0.0248	0.0016	381.7
5	6776	0.0292	0.0030	489.8
6	6891	0.0339	0.0025	601.1
7	6978	0.0385	0.0049	711.9
8	7077	0.0453	0.0073	877.2
9	7158	0.0521	0.0088	1047.6
10	7228	0.0612	0.0137	1268.5
11	7243	0.0702	0.0202	1485.4
12	7265	0.0816	0.0238	1771.8
13	7214	0.0928	0.0324	2037.4
14	7092	0.1044	0.0443	2288.0
15	6935	0.1159	0.0533	2546.0
16	6771	0.1274	0.0639	2786.2
17	6667	0.1387	0.0716	3031.5
18	6526	0.1501	0.0823	3257.0
19	6356	0.1661	0.0944	3575.7

  WIDTH: 2.0004 (IN),50.810 (MM)
  THICKNESS: 1.0007 (IN),25.418 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5007 (IN),12.718 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7190 (IN),43.663 (MM)
    DISTANCE 2: 1.7305 (IN),43.955 (MM)
    DISTANCE 3: 1.7311 (IN),43.970 (MM)
    DISTANCE 4: 1.7346 (IN),44.059 (MM)
    DISTANCE 5: 1.7422 (IN),44.252 (MM)
    DISTANCE 6: 1.7390 (IN),44.171 (MM)
    DISTANCE 7: 1.7434 (IN),44.282 (MM)
    DISTANCE 8: 1.7394 (IN),44.181 (MM)
    DISTANCE 9: 1.7271 (IN),43.868 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9282 (IN),48.976 (MM)
    DISTANCE 2: 1.8557 (IN),47.135 (MM)
    DISTANCE 3: 1.7826 (IN),45.278 (MM)
    DISTANCE 4: 1.7918 (IN),45.512 (MM)
    DISTANCE 5: 1.8412 (IN),46.766 (MM)
    DISTANCE 6: 1.8548 (IN),47.112 (MM)
    DISTANCE 7: 1.8372 (IN),46.665 (MM)
    DISTANCE 8: 1.8248 (IN),46.350 (MM)
    DISTANCE 9: 1.8538 (IN),47.087 (MM)

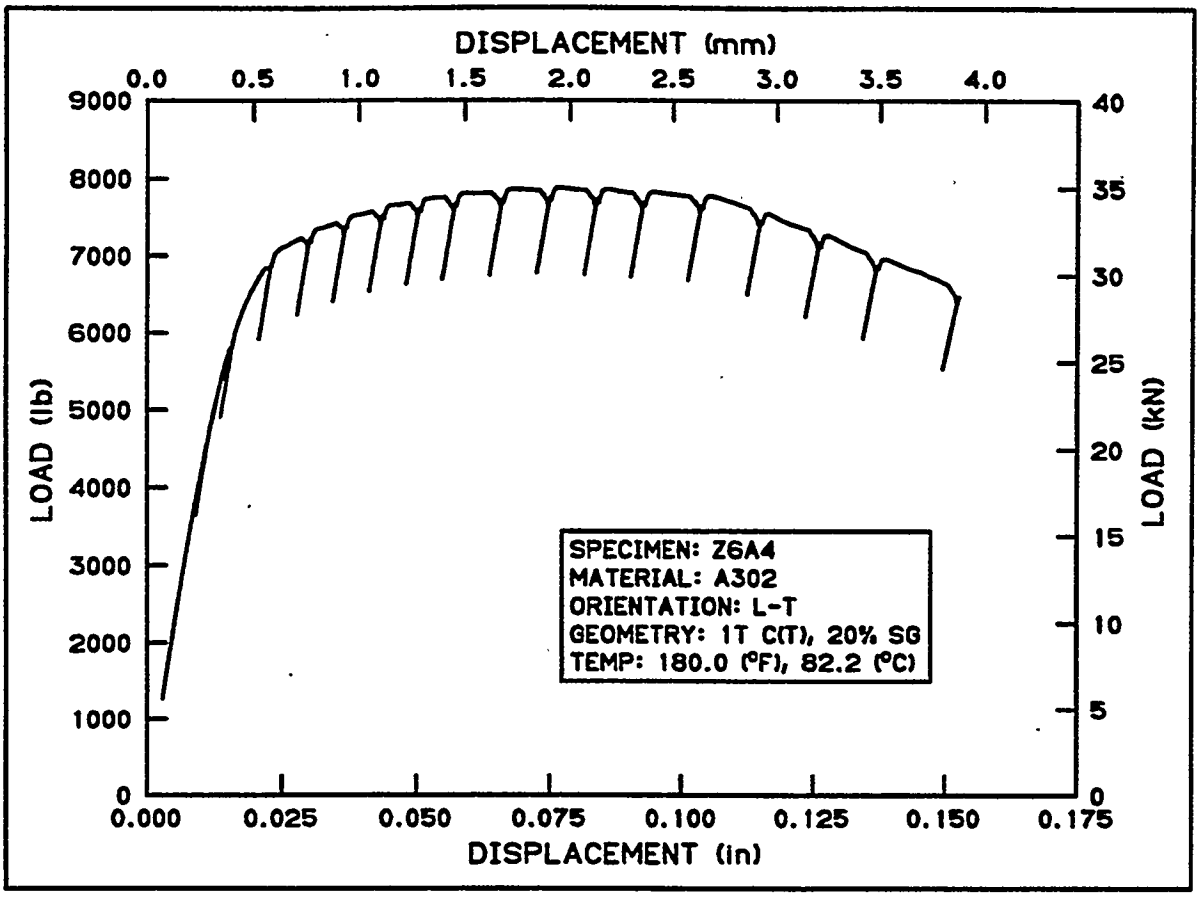

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
35 30 25 20 15 10 5 0
LOAD (kN)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)
SPECIMEN: Z6A1
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

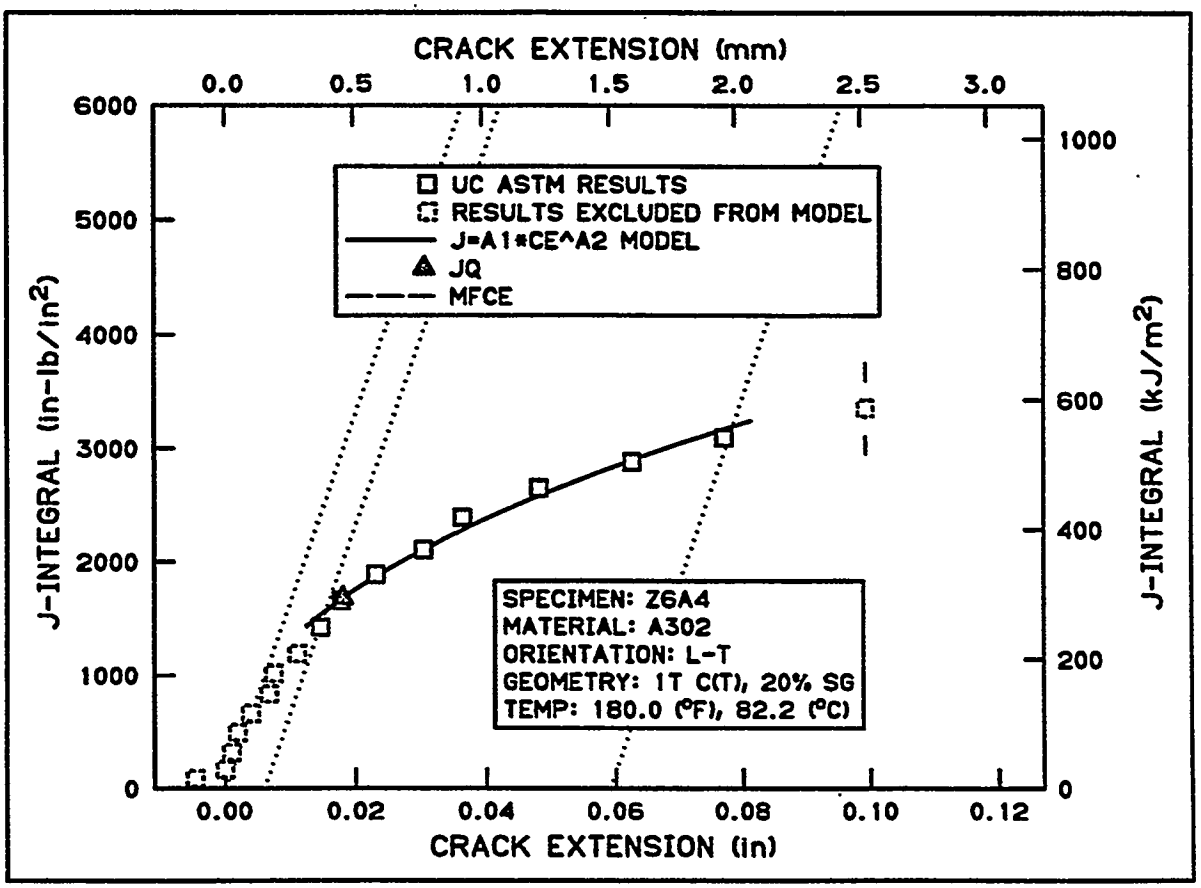

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A1
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z6A4
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2231 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4446	0.0108	-0.0045	86.5
2	5761	0.0152	0.0000	166.1
3	6838	0.0218	0.0010	319.7
4	7223	0.0286	0.0019	494.5
5	7417	0.0351	0.0039	663.3
6	7570	0.0418	0.0067	834.8
7	7681	0.0486	0.0074	1015.5
8	7756	0.0553	0.0111	1189.9
9	7817	0.0640	0.0146	1423.2
10	7847	0.0730	0.0178	1659.5
11	7846	0.0817	0.0231	1888.2
12	7811	0.0906	0.0303	2108.3
13	7771	0.1014	0.0363	2390.7
14	7616	0.1129	0.0482	2650.0
15	7338	0.1240	0.0627	2880.8
16	7042	0.1350	0.0771	3095.5
17	6632	0.1505	0.0993	3355.5

  WIDTH: 1.9993 (IN),50.782 (MM)
  THICKNESS: 1.0008 (IN),25.420 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5020 (IN),12.751 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.6994 (IN),43.165 (MM)
    DISTANCE 2: 1.7203 (IN),43.696 (MM)
    DISTANCE 3: 1.7250 (IN),43.815 (MM)
    DISTANCE 4: 1.7258 (IN),43.835 (MM)
    DISTANCE 5: 1.7257 (IN),43.833 (MM)
    DISTANCE 6: 1.7304 (IN),43.952 (MM)
    DISTANCE 7: 1.7324 (IN),44.003 (MM)
    DISTANCE 8: 1.7308 (IN),43.962 (MM)
    DISTANCE 9: 1.7206 (IN),43.703 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7864 (IN),45.375 (MM)
    DISTANCE 2: 1.7811 (IN),45.240 (MM)
    DISTANCE 3: 1.8044 (IN),45.832 (MM)
    DISTANCE 4: 1.8525 (IN),47.054 (MM)
    DISTANCE 5: 1.8424 (IN),46.797 (MM)
    DISTANCE 6: 1.8402 (IN),46.741 (MM)
    DISTANCE 7: 1.8388 (IN),46.706 (MM)
    DISTANCE 8: 1.8222 (IN),46.284 (MM)
    DISTANCE 9: 1.8396 (IN),46.726 (MM)

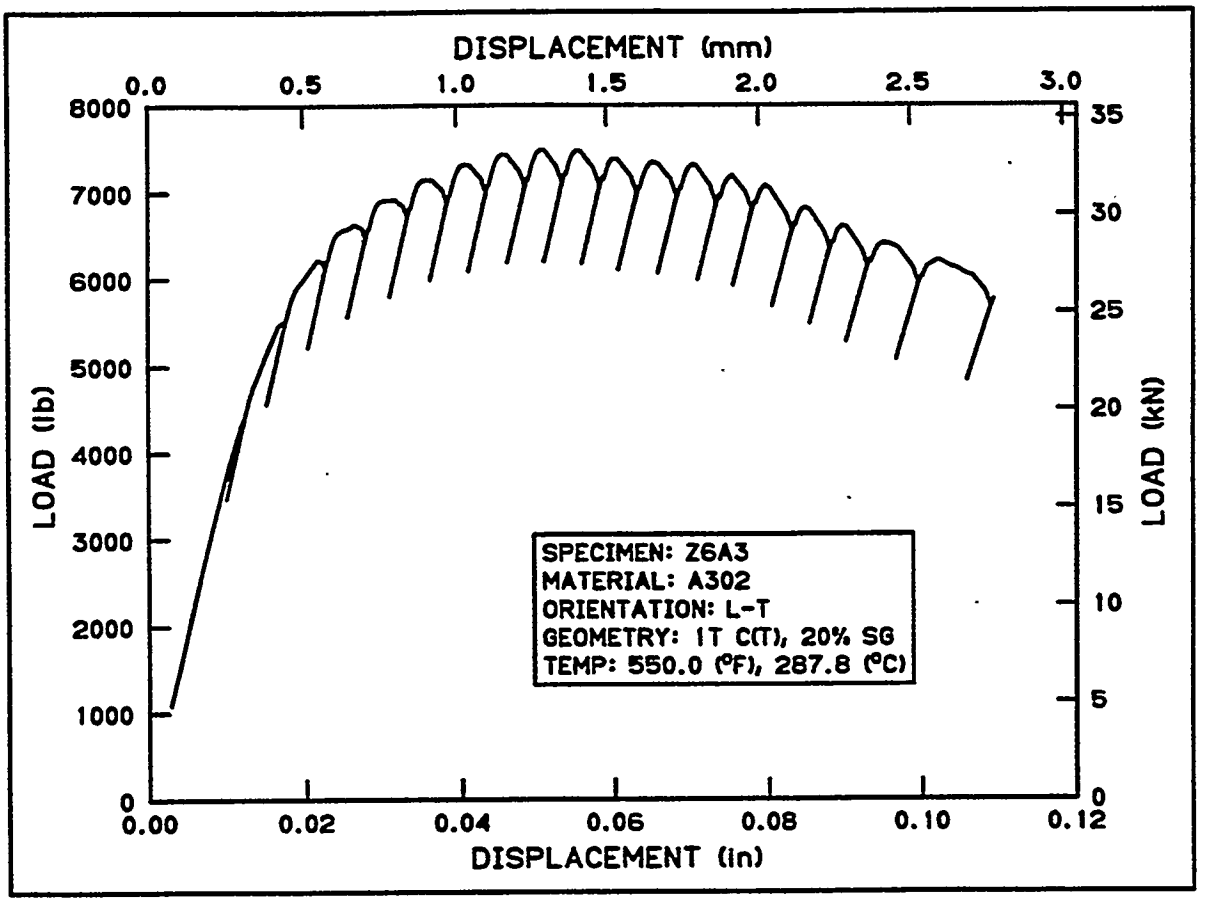

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
LOAD (lb)
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
40 35 30 25 20 15 10 5 0
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

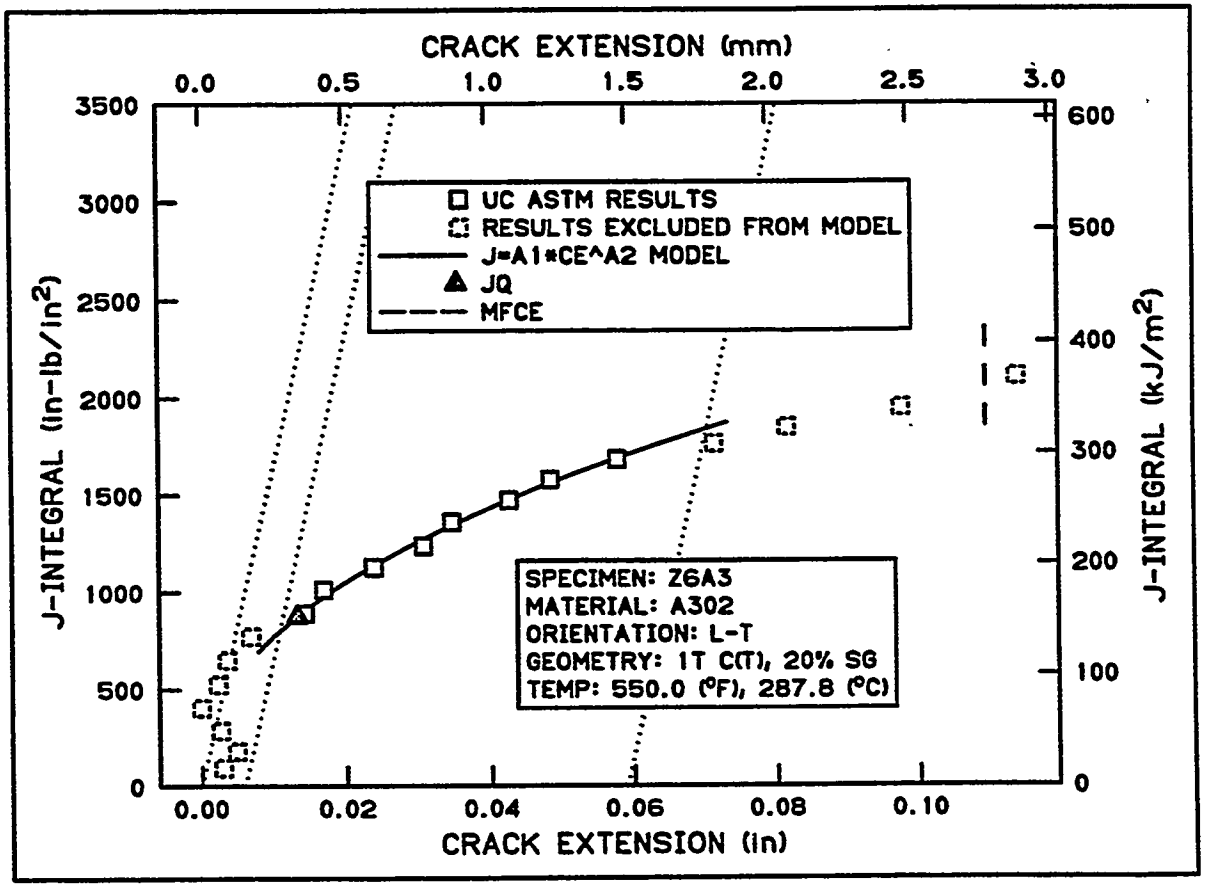

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z6A3
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2316 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4313	0.0118	0.0030	93.2
2	5476	0.0167	0.0049	178.2
3	6210	0.0216	0.0026	286.6
4	6625	0.0264	0.0000	403.0
5	6919	0.0315	0.0024	524.1
6	7140	0.0364	0.0036	648.8
7	7311	0.0411	0.0069	770.2
8	7427	0.0461	0.0142	888.8
9	7486	0.0509	0.0168	1010.0
10	7471	0.0557	0.0237	1125.0
11	7372	0.0605	0.0306	1234.5
12	7315	0.0658	0.0346	1358.0
13	7305	0.0706	0.0426	1469.3
14	7188	0.0754	0.0485	1575.2
15	7043	0.0803	0.0579	1680.4
16	6797	0.0854	0.0713	1761.2
17	6592	0.0903	0.0816	1846.7
18	6344	0.0970	0.0976	1946.4
19	6031	0.1066	0.1137	2104.6

  WIDTH: 1.9978 (IN),50.744 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5024 (IN),12.761 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7270 (IN),43.866 (MM)
    DISTANCE 2: 1.7372 (IN),44.125 (MM)
    DISTANCE 3: 1.7394 (IN),44.181 (MM)
    DISTANCE 4: 1.7388 (IN),44.166 (MM)
    DISTANCE 5: 1.7378 (IN),44.140 (MM)
    DISTANCE 6: 1.7352 (IN),44.074 (MM)
    DISTANCE 7: 1.7326 (IN),44.008 (MM)
    DISTANCE 8: 1.7290 (IN),43.917 (MM)
    DISTANCE 9: 1.7174 (IN),43.622 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8355 (IN),46.622 (MM)
    DISTANCE 2: 1.8409 (IN),46.759 (MM)
    DISTANCE 3: 1.8649 (IN),47.368 (MM)
    DISTANCE 4: 1.8685 (IN),47.460 (MM)
    DISTANCE 5: 1.8221 (IN),46.281 (MM)
    DISTANCE 6: 1.7794 (IN),45.197 (MM)
    DISTANCE 7: 1.8128 (IN),46.045 (MM)
    DISTANCE 8: 1.8885 (IN),47.968 (MM)
    DISTANCE 9: 1.9044 (IN),48.372 (MM)

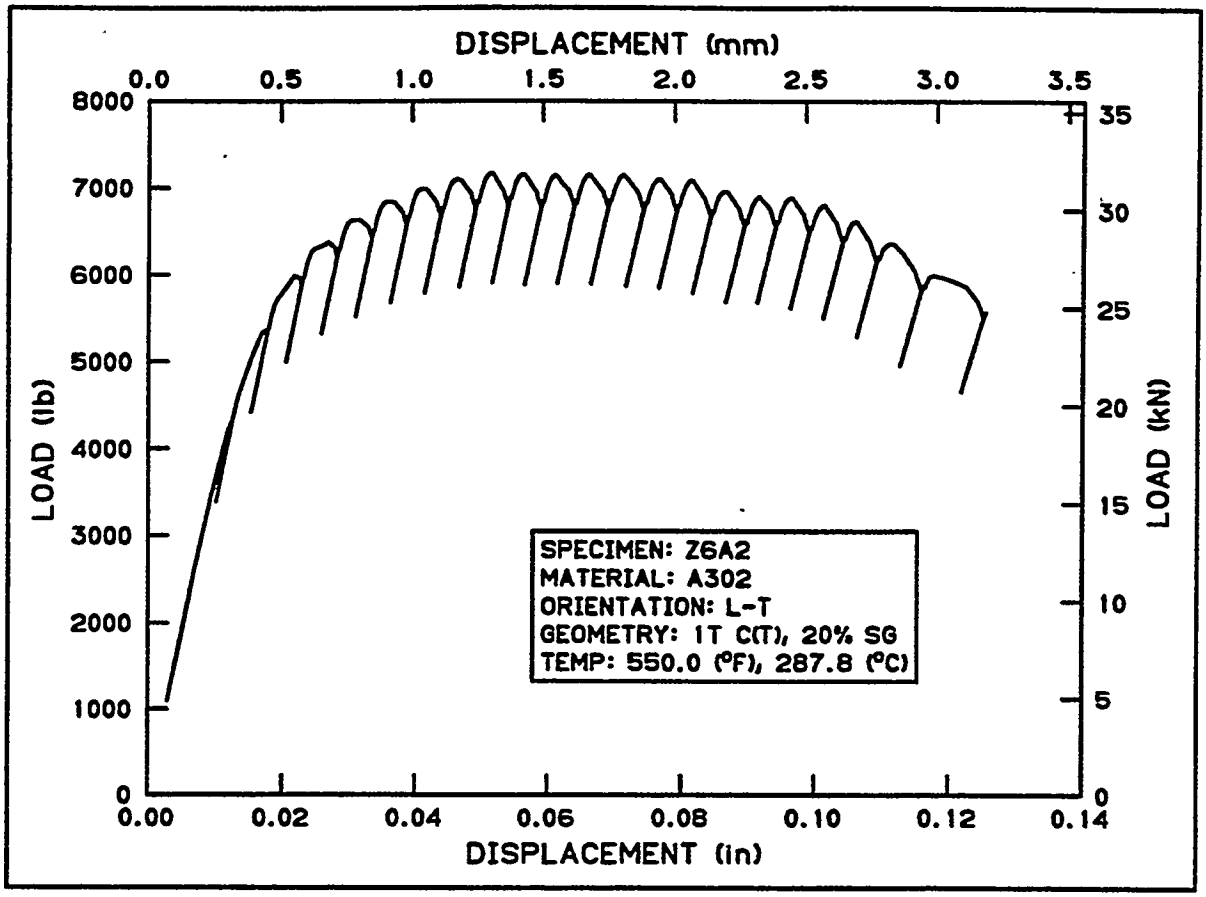

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6A3
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

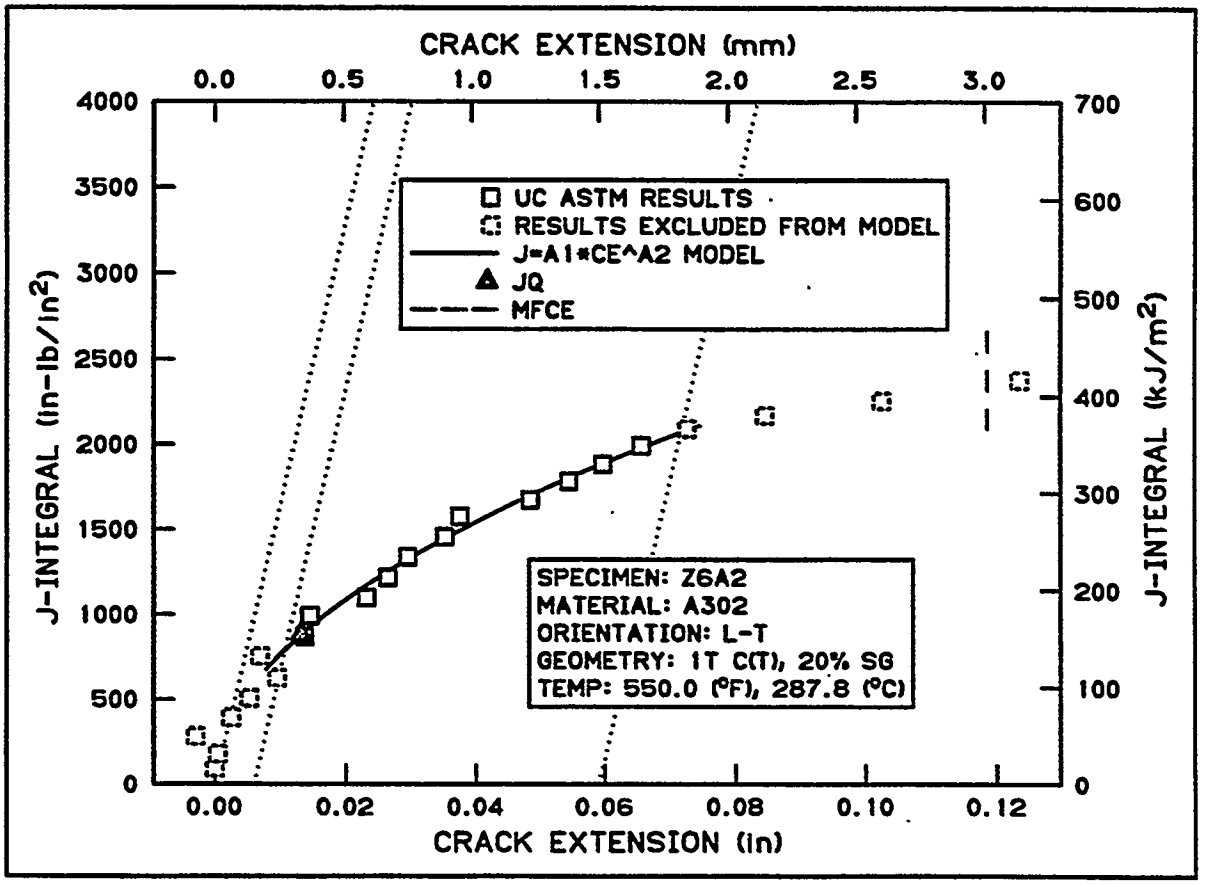

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A3
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A2
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2429 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4219	0.0119	0.0000	92.0
2	5328	0.0169	0.0004	177.4
3	5985	0.0217	-0.0029	282.3
4	6369	0.0267	0.0025	391.9
5	6627	0.0315	0.0052	506.4
6	6832	0.0367	0.0095	625.0
7	6980	0.0415	0.0068	752.4
8	7088	0.0467	0.0137	869.4
9	7155	0.0516	0.0145	991.8
10	7141	0.0564	0.0232	1099.4
11	7073	0.0617	0.0265	1216.9
12	7098	0.0666	0.0296	1338.2
13	7094	0.0718	0.0352	1457.1
14	7094	0.0767	0.0375	1576.8
15	7083	0.0814	0.0485	1673.6
16	6955	0.0866	0.0545	1782.4
17	6898	0.0913	0.0597	1884.2
18	6884	0.0963	0.0656	1991.8
19	6798	0.1013	0.0726	2093.0
20	6614	0.1061	0.0845	2171.8
21	6259	0.1129	0.1024	2257.2
22	5871	0.1225	0.1234	2379.0

WIDTH: 2.0000 (IN),50.800 (MM)
THICKNESS: 1.0010 (IN),25.425 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7238 (IN),43.785 (MM)
DISTANCE 2: 1.7376 (IN),44.135 (MM)
DISTANCE 3: 1.7414 (IN),44.232 (MM)
DISTANCE 4: 1.7466 (IN),44.364 (MM)
DISTANCE 5: 1.7496 (IN),44.440 (MM)
DISTANCE 6: 1.7519 (IN),44.498 (MM)
DISTANCE 7: 1.7498 (IN),44.445 (MM)
DISTANCE 8: 1.7458 (IN),44.343 (MM)
DISTANCE 9: 1.7368 (IN),44.115 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.8914 (IN),48.042 (MM)
DISTANCE 2: 1.8842 (IN),47.859 (MM)
DISTANCE 3: 1.8278 (IN),46.426 (MM)
DISTANCE 4: 1.8407 (IN),46.754 (MM)
DISTANCE 5: 1.8486 (IN),46.954 (MM)
DISTANCE 6: 1.8754 (IN),47.635 (MM)
DISTANCE 7: 1.8761 (IN),47.653 (MM)
DISTANCE 8: 1.8636 (IN),47.335 (MM)
DISTANCE 9: 1.8775 (IN),47.689 (MM)

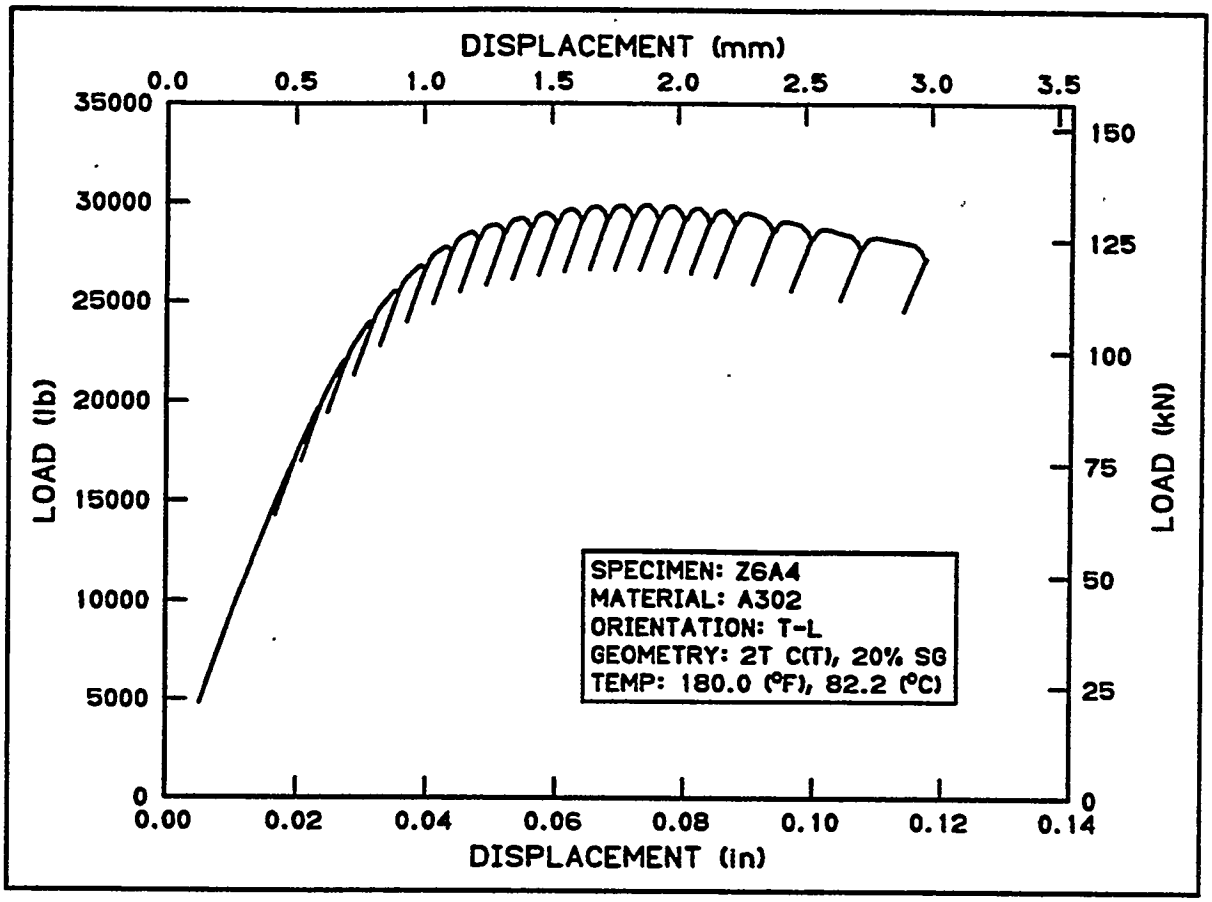

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

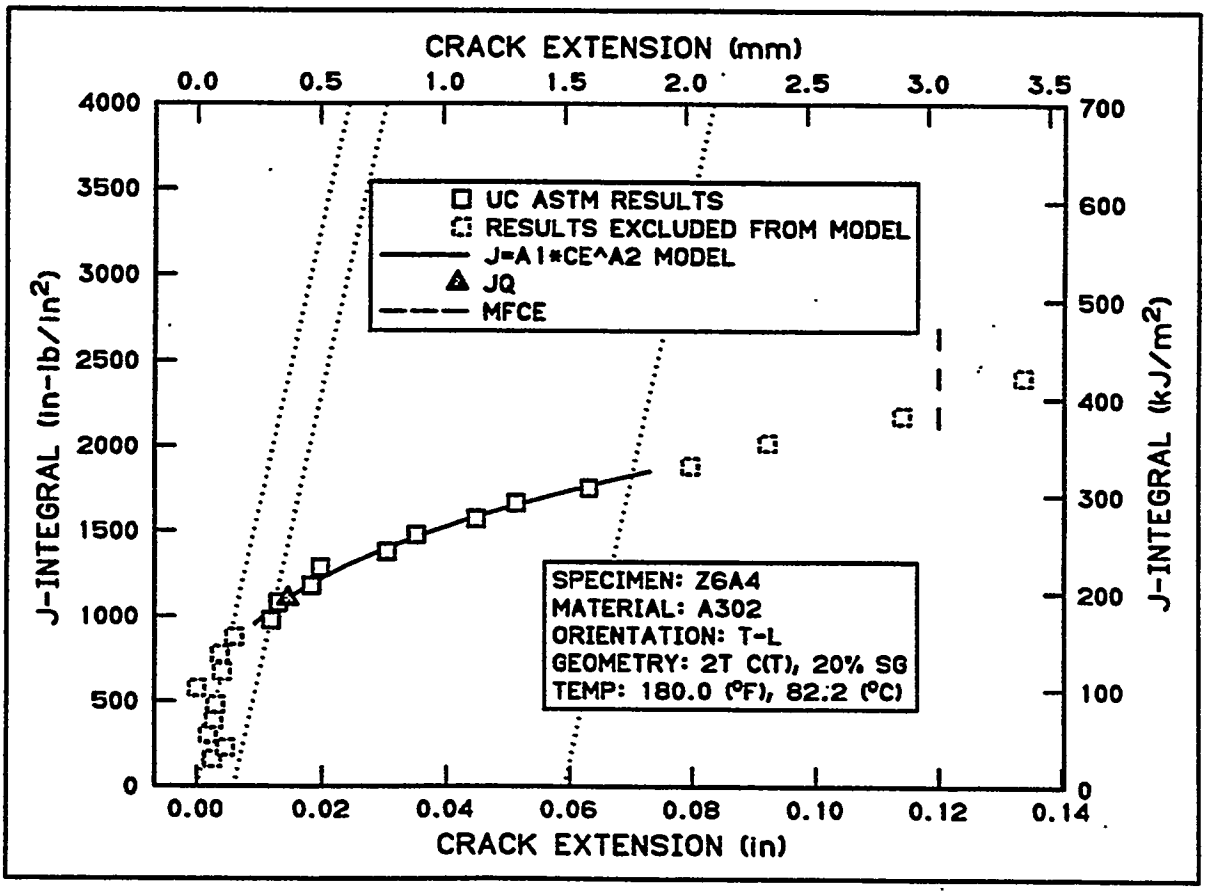

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A4
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4584 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16722	0.0191	0.0025	160.3
2	19510	0.0231	0.0046	227.2
3	21972	0.0270	0.0018	305.5
4	23931	0.0309	0.0027	389.2
5	25505	0.0348	0.0030	479.0
6	26789	0.0388	0.0000	577.8
7	27741	0.0427	0.0040	674.4
8	28481	0.0467	0.0037	778.4
9	28870	0.0506	0.0060	879.5
10	29199	0.0546	0.0119	979.5
11	29446	0.0585	0.0131	1082.3
12	29651	0.0624	0.0184	1181.3
13	29786	0.0665	0.0198	1286.8
14	29835	0.0703	0.0304	1379.6
15	29863	0.0743	0.0352	1478.7
16	29797	0.0783	0.0448	1573.5
17	29710	0.0822	0.0512	1668.1
18	29603	0.0860	0.0631	1755.1
19	29292	0.0919	0.0796	1884.9
20	28906	0.0977	0.0921	2020.9
21	28361	0.1055	0.1139	2182.4
22	27896	0.1155	0.1336	2407.9

  WIDTH: 3.9983 (IN),101.560 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9992 (IN),25.380 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4455 (IN),87.516 (MM)
    DISTANCE 2: 3.4616 (IN),87.925 (MM)
    DISTANCE 3: 3.4668 (IN),88.057 (MM)
    DISTANCE 4: 3.4634 (IN),87.970 (MM)
    DISTANCE 5: 3.4586 (IN),87.848 (MM)
    DISTANCE 6: 3.4614 (IN),87.920 (MM)
    DISTANCE 7: 3.4569 (IN),87.805 (MM)
    DISTANCE 8: 3.4491 (IN),87.607 (MM)
    DISTANCE 9: 3.4404 (IN),87.386 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5754 (IN),90.815 (MM)
    DISTANCE 2: 3.5742 (IN),90.785 (MM)
    DISTANCE 3: 3.5742 (IN),90.785 (MM)
    DISTANCE 4: 3.5482 (IN),90.124 (MM)
    DISTANCE 5: 3.5700 (IN),90.678 (MM)
    DISTANCE 6: 3.5786 (IN),90.896 (MM)
    DISTANCE 7: 3.5772 (IN),90.861 (MM)
    DISTANCE 8: 3.6004 (IN),91.450 (MM)
    DISTANCE 9: 3.6193 (IN),91.930 (MM)

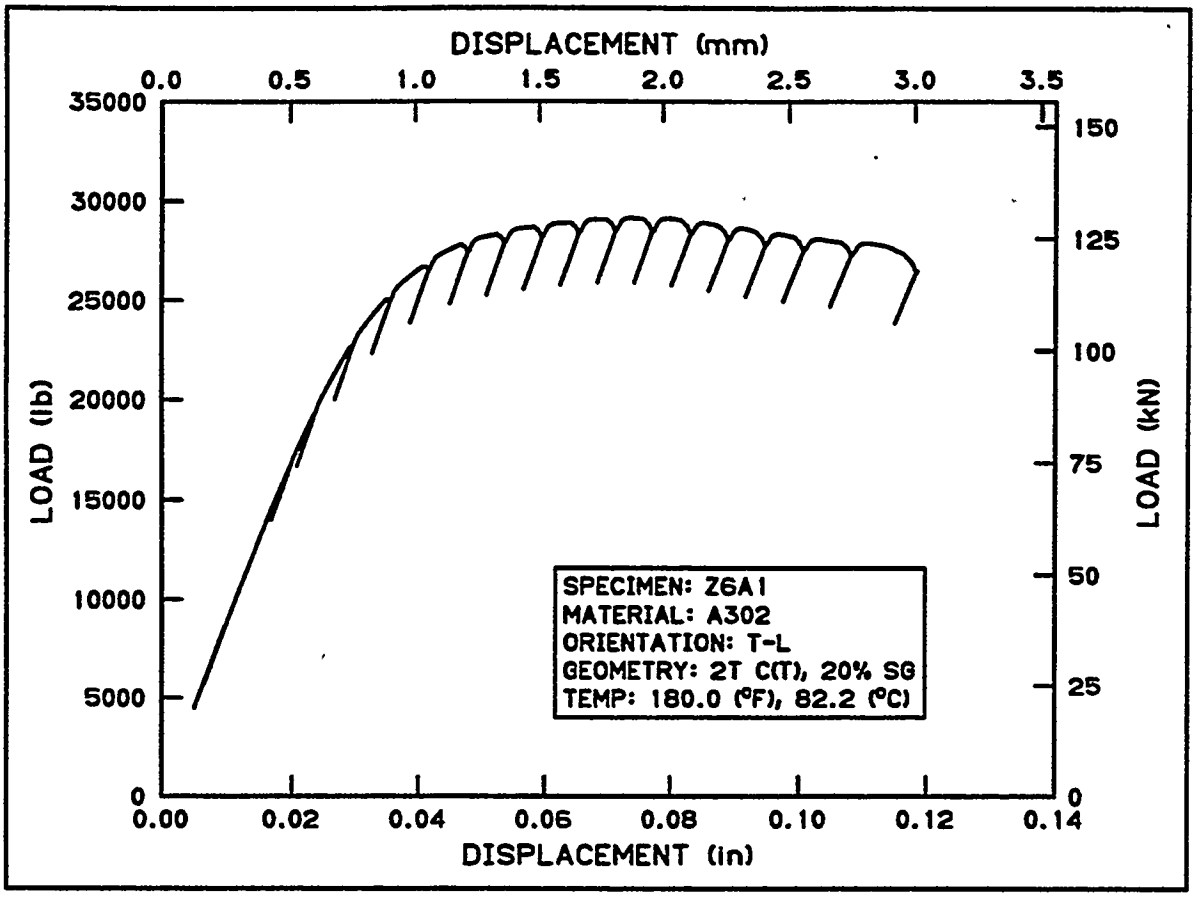

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

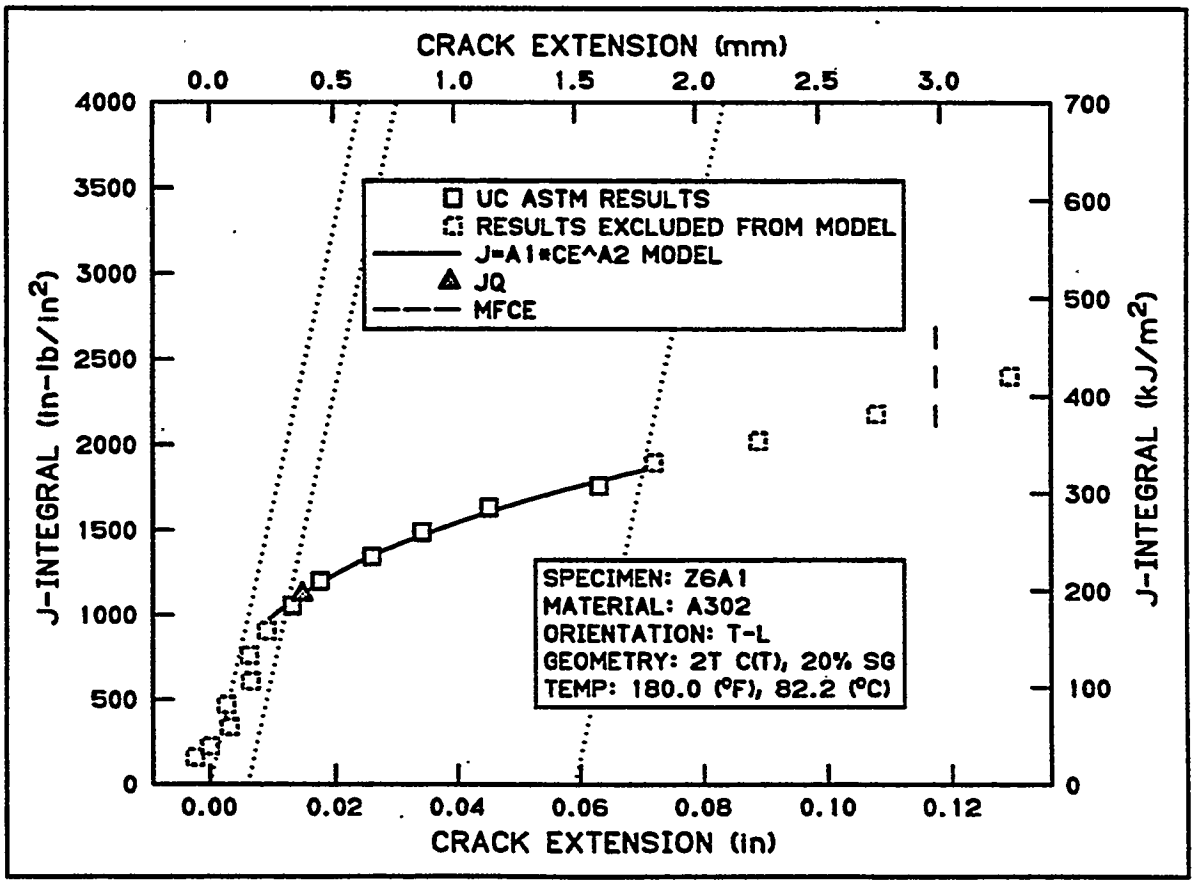

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A4
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A1
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4739 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16466	0.0194	-0.0023	159.2
2	19179	0.0233	0.0000	224.5
3	22603	0.0291	0.0031	339.5
4	25033	0.0349	0.0026	471.1
5	26691	0.0407	0.0064	610.1
6	27809	0.0466	0.0062	762.6
7	28312	0.0523	0.0090	908.2
8	28674	0.0582	0.0131	1055.9
9	28899	0.0640	0.0176	1201.7
10	29054	0.0697	0.0261	1345.0
11	29080	0.0756	0.0342	1489.6
12	29028	0.0816	0.0451	1632.5
13	28760	0.0872	0.0631	1757.8
14	28463	0.0931	0.0721	1894.7
15	28193	0.0991	0.0888	2021.9
16	27893	0.1066	0.1078	2180.5
17	27352	0.1163	0.1293	2400.5

WIDTH: 3.9967 (IN),101.520 (MM)
THICKNESS: 2.0000 (IN),50.800 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0008 (IN),25.420 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4481 (IN),87.582 (MM)
DISTANCE 2: 3.4694 (IN),88.123 (MM)
DISTANCE 3: 3.4774 (IN),88.326 (MM)
DISTANCE 4: 3.4824 (IN),88.453 (MM)
DISTANCE 5: 3.4835 (IN),88.481 (MM)
DISTANCE 6: 3.4821 (IN),88.445 (MM)
DISTANCE 7: 3.4792 (IN),88.372 (MM)
DISTANCE 8: 3.4672 (IN),88.067 (MM)
DISTANCE 9: 3.4640 (IN),87.986 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.5538 (IN),90.267 (MM)
DISTANCE 2: 3.5078 (IN),89.098 (MM)
DISTANCE 3: 3.5433 (IN),90.000 (MM)
DISTANCE 4: 3.5643 (IN),90.533 (MM)
DISTANCE 5: 3.5584 (IN),90.383 (MM)
DISTANCE 6: 3.5802 (IN),90.937 (MM)
DISTANCE 7: 3.6556 (IN),92.852 (MM)
DISTANCE 8: 3.6981 (IN),93.932 (MM)
DISTANCE 9: 3.7044 (IN),94.092 (MM)

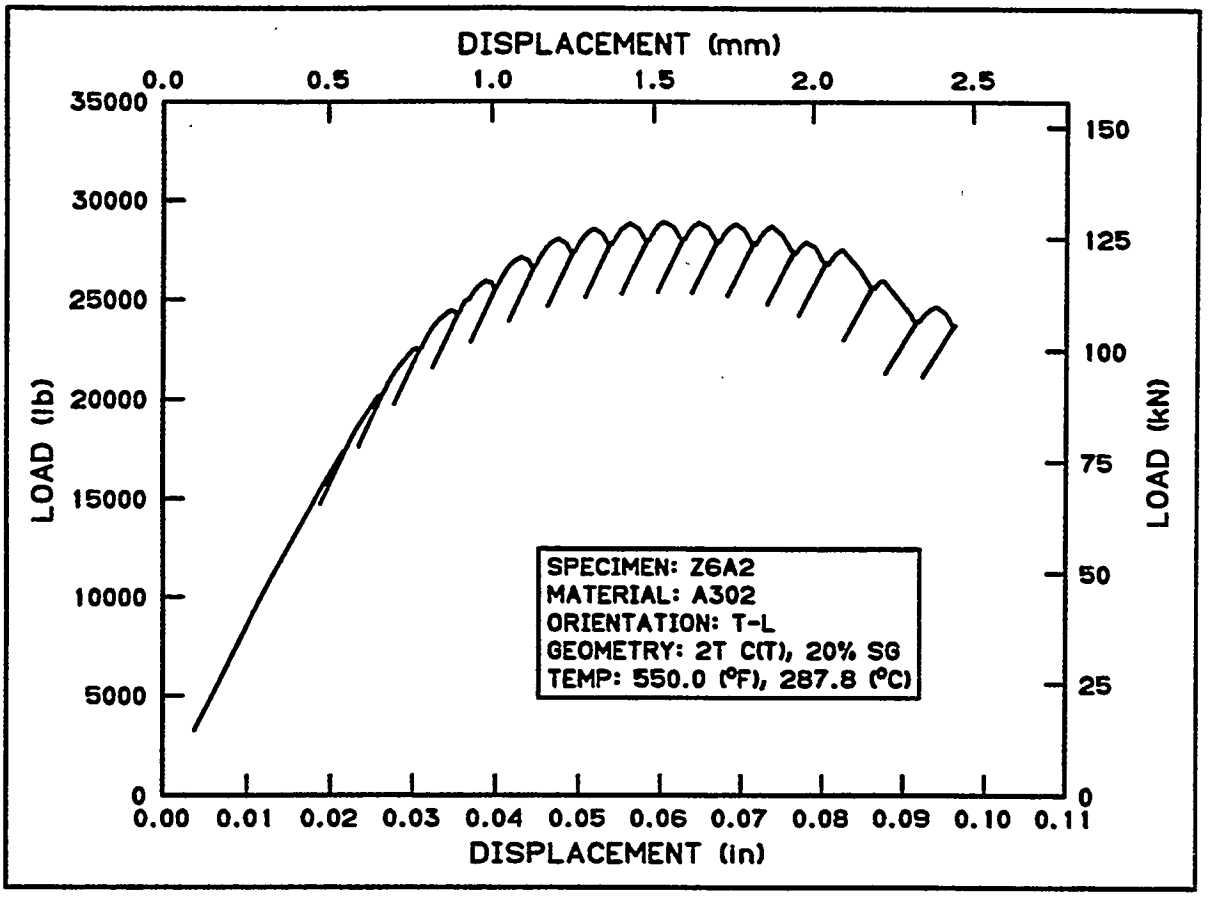

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

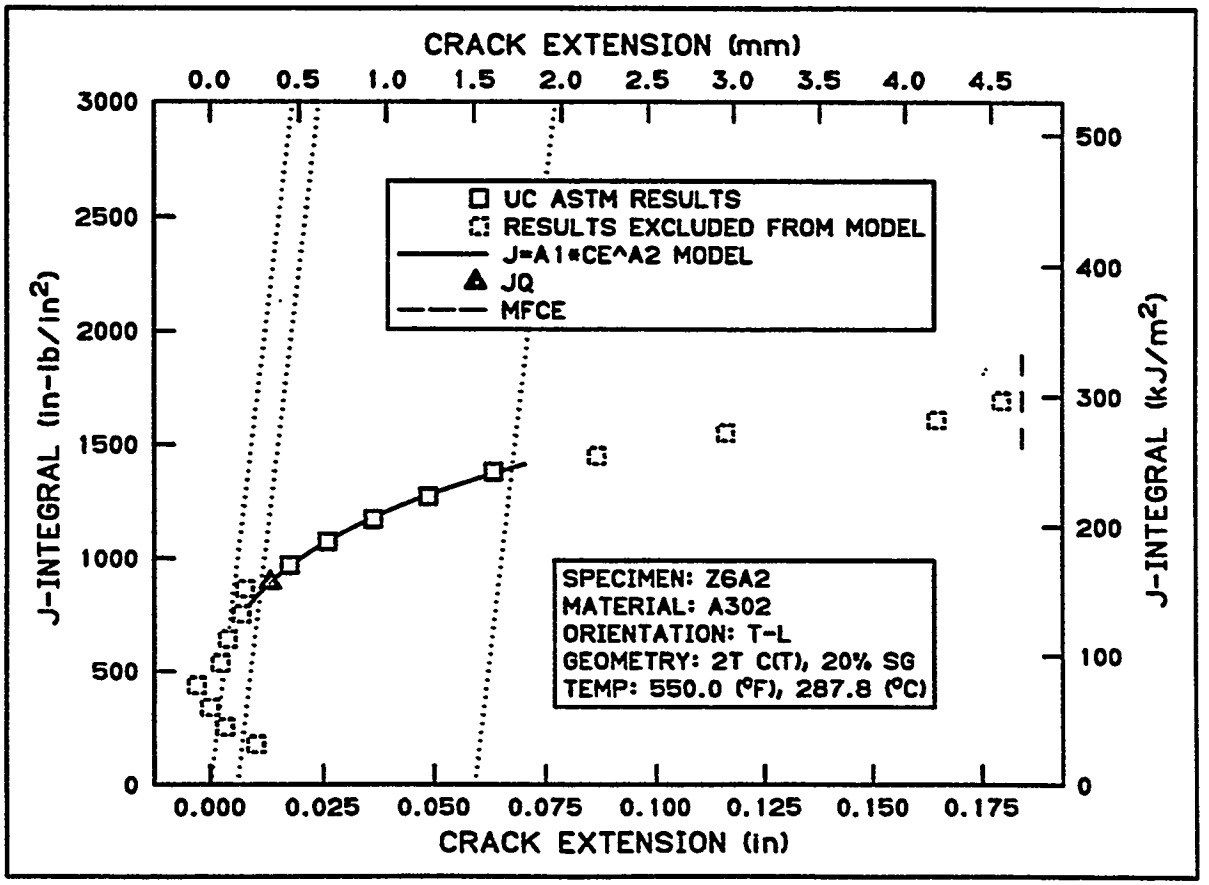

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A2
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4635 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17226	0.0213	0.0100	177.3
2	20092	0.0257	0.0032	253.9
3	22471	0.0300	0.0000	340.6
4	24413	0.0343	-0.0030	437.5
5	25910	0.0387	0.0023	536.6
6	27107	0.0430	0.0039	642.6
7	28026	0.0474	0.0069	754.1
8	28537	0.0518	0.0077	866.1
9	28816	0.0562	0.0176	970.7
10	28897	0.0604	0.0260	1075.0
11	28835	0.0647	0.0365	1173.4
12	28792	0.0693	0.0488	1274.3
13	28691	0.0737	0.0634	1382.4
14	27884	0.0779	0.0866	1452.1
15	27505	0.0825	0.1162	1552.7
16	25969	0.0875	0.1647	1609.2
17	24677	0.0940	0.1795	1694.7

WIDTH: 3.9972 (IN),101.530 (MM)
THICKNESS: 2.0060 (IN),50.952 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9986 (IN),25.364 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4458 (IN),87.523 (MM)
DISTANCE 2: 3.4683 (IN),88.095 (MM)
DISTANCE 3: 3.4714 (IN),88.174 (MM)
DISTANCE 4: 3.4708 (IN),88.158 (MM)
DISTANCE 5: 3.4666 (IN),88.052 (MM)
DISTANCE 6: 3.4656 (IN),88.026 (MM)
DISTANCE 7: 3.4626 (IN),87.950 (MM)
DISTANCE 8: 3.4481 (IN),87.582 (MM)
DISTANCE 9: 3.4414 (IN),87.412 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.8460 (IN),97.688 (MM)
DISTANCE 2: 3.7210 (IN),94.513 (MM)
DISTANCE 3: 3.6817 (IN),93.515 (MM)
DISTANCE 4: 3.6649 (IN),93.088 (MM)
DISTANCE 5: 3.6030 (IN),91.516 (MM)
DISTANCE 6: 3.6012 (IN),91.470 (MM)
DISTANCE 7: 3.5956 (IN),91.328 (MM)
DISTANCE 8: 3.5902 (IN),91.191 (MM)
DISTANCE 9: 3.5802 (IN),90.937 (MM)


DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

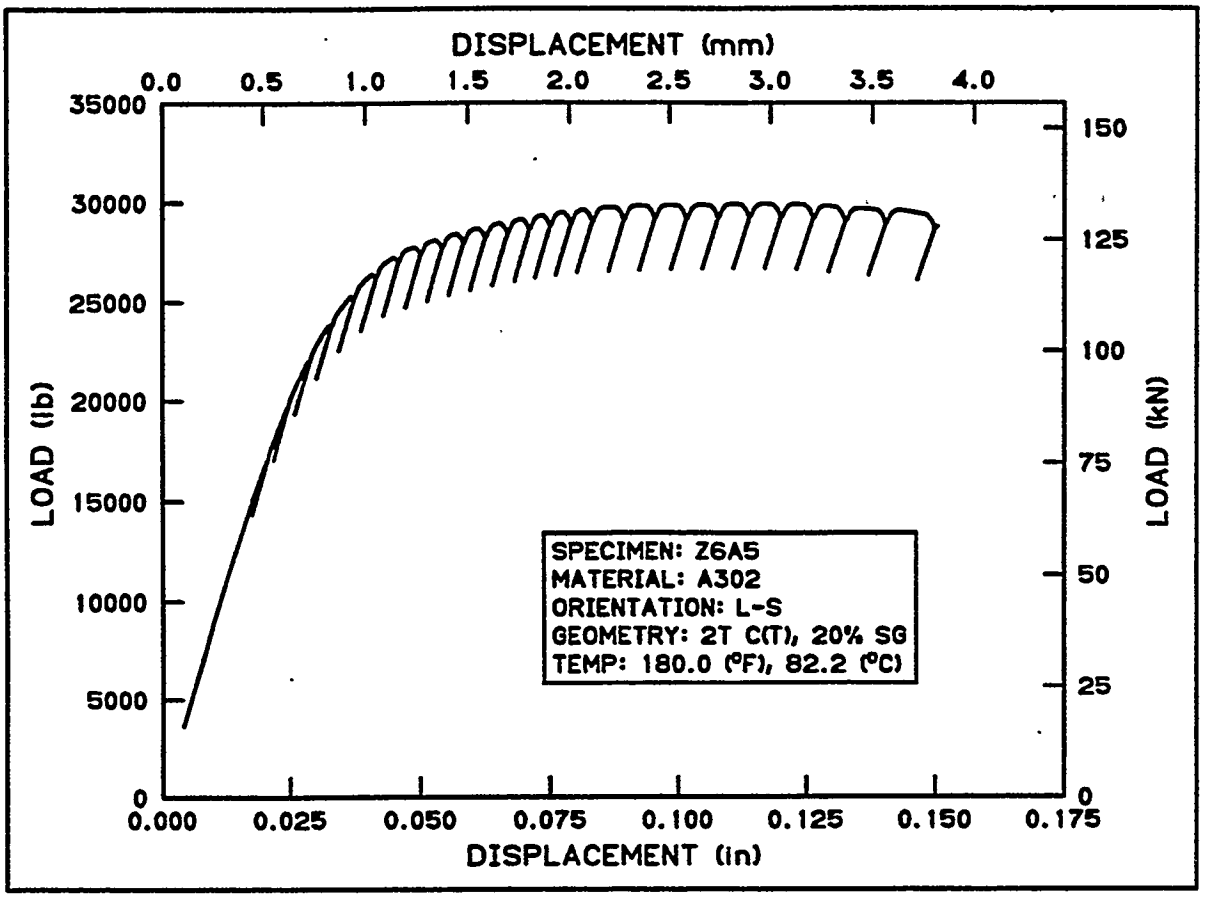

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

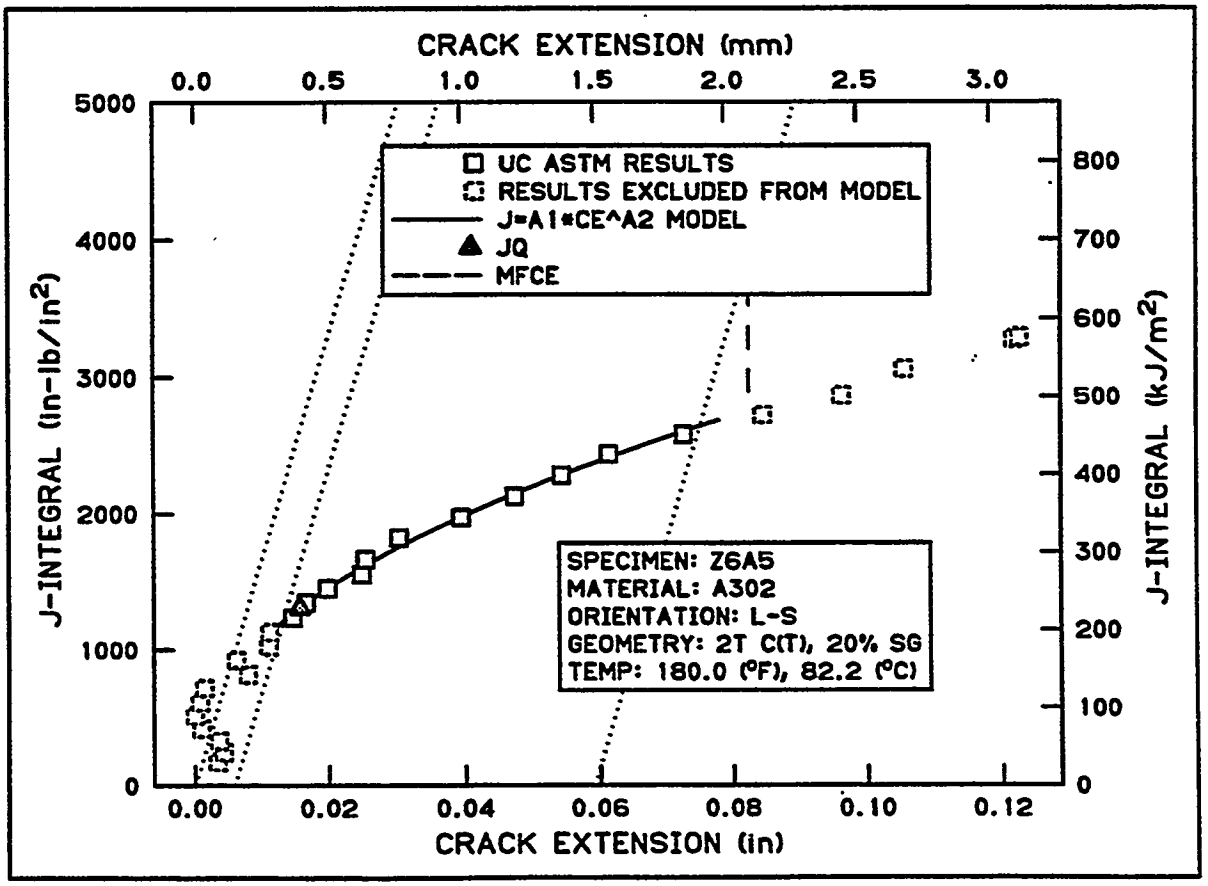
SPECIMEN
  IDENTIFICATION: Z6A5
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4834 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16751	0.0201	0.0034	172.8
2	19568	0.0243	0.0043	244.6
3	21926	0.0284	0.0036	327.1
4	23777	0.0325	0.0010	417.3
5	25244	0.0366	0.0000	513.3
6	26335	0.0407	0.0008	611.8
7	27185	0.0449	0.0014	715.8
8	27710	0.0489	0.0080	817.0
9	28071	0.0530	0.0063	923.1
10	28385	0.0571	0.0111	1023.7
11	28653	0.0612	0.0112	1129.8
12	28903	0.0654	0.0148	1235.7
13	29123	0.0696	0.0167	1345.4
14	29310	0.0736	0.0199	1449.7
15	29464	0.0777	0.0249	1551.8
16	29588	0.0818	0.0254	1661.1
17	29687	0.0879	0.0303	1819.3
18	29759	0.0940	0.0394	1968.7
19	29777	0.1002	0.0473	2122.9
20	29800	0.1064	0.0543	2277.7
21	29844	0.1125	0.0613	2431.9
22	29850	0.1186	0.0726	2574.8
23	29827	0.1247	0.0845	2719.5
24	29696	0.1309	0.0962	2863.8
25	29560	0.1389	0.1055	3057.7
26	29343	0.1483	0.1217	3279.1
#27	UNKNOWN	0.1504	0.1226	3291.0

#ESTIMATED FINAL CRACK LENGTH

  WIDTH: 3.9965 (IN),101.510 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0018 (IN),25.446 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4594 (IN),87.869 (MM)
    DISTANCE 2: 3.4769 (IN),88.313 (MM)
    DISTANCE 3: 3.4897 (IN),88.638 (MM)
    DISTANCE 4: 3.4943 (IN),88.755 (MM)
    DISTANCE 5: 3.4943 (IN),88.755 (MM)
    DISTANCE 6: 3.4911 (IN),88.674 (MM)
    DISTANCE 7: 3.4911 (IN),88.674 (MM)
    DISTANCE 8: 3.4801 (IN),88.395 (MM)
    DISTANCE 9: 3.4694 (IN),88.123 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5611 (IN),90.452 (MM)
    DISTANCE 2: 3.5536 (IN),90.261 (MM)
    DISTANCE 3: 3.5498 (IN),90.165 (MM)
    DISTANCE 4: 3.5686 (IN),90.642 (MM)
    DISTANCE 5: 3.5767 (IN),90.848 (MM)
    DISTANCE 6: 3.5651 (IN),90.554 (MM)
    DISTANCE 7: 3.5724 (IN),90.739 (MM)
    DISTANCE 8: 3.5799 (IN),90.929 (MM)
    DISTANCE 9: 3.5899 (IN),91.183 (MM)

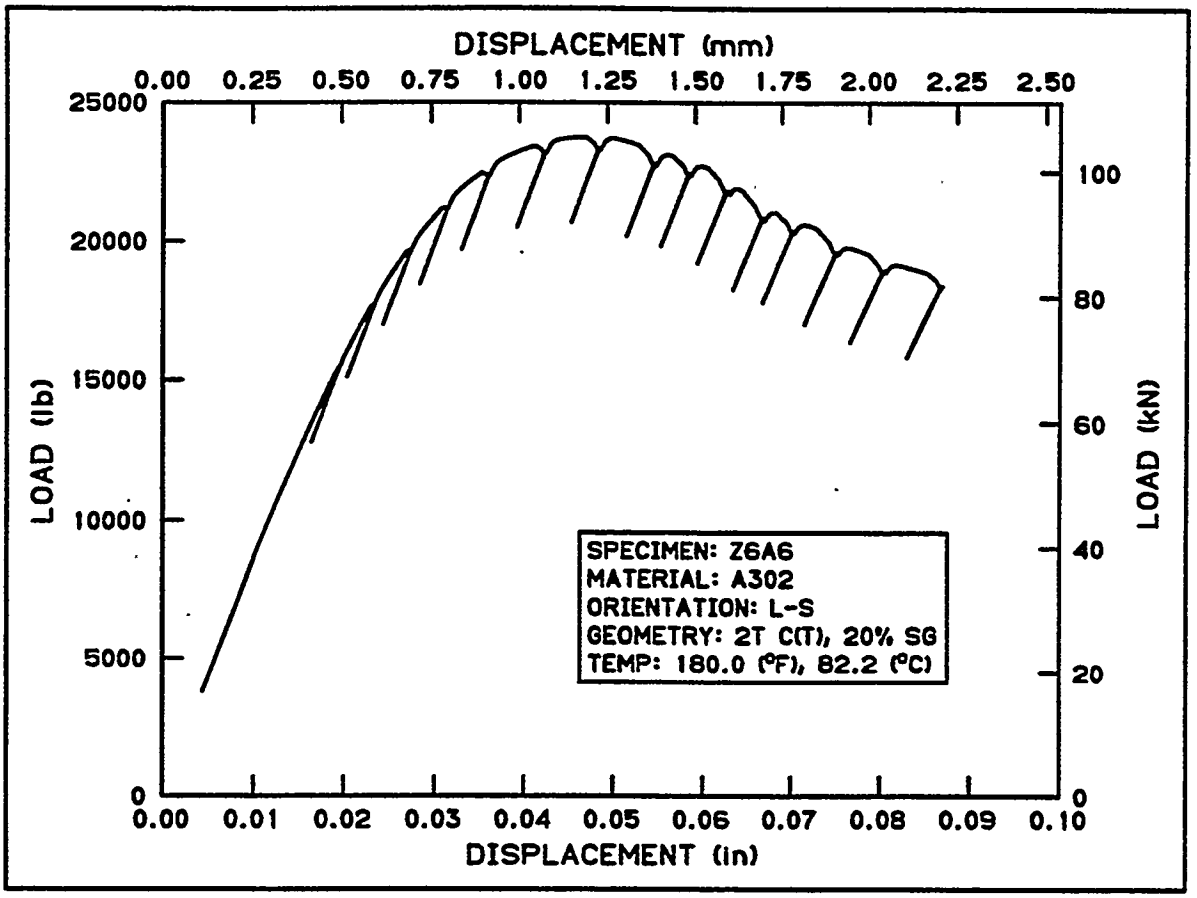

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z6A5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

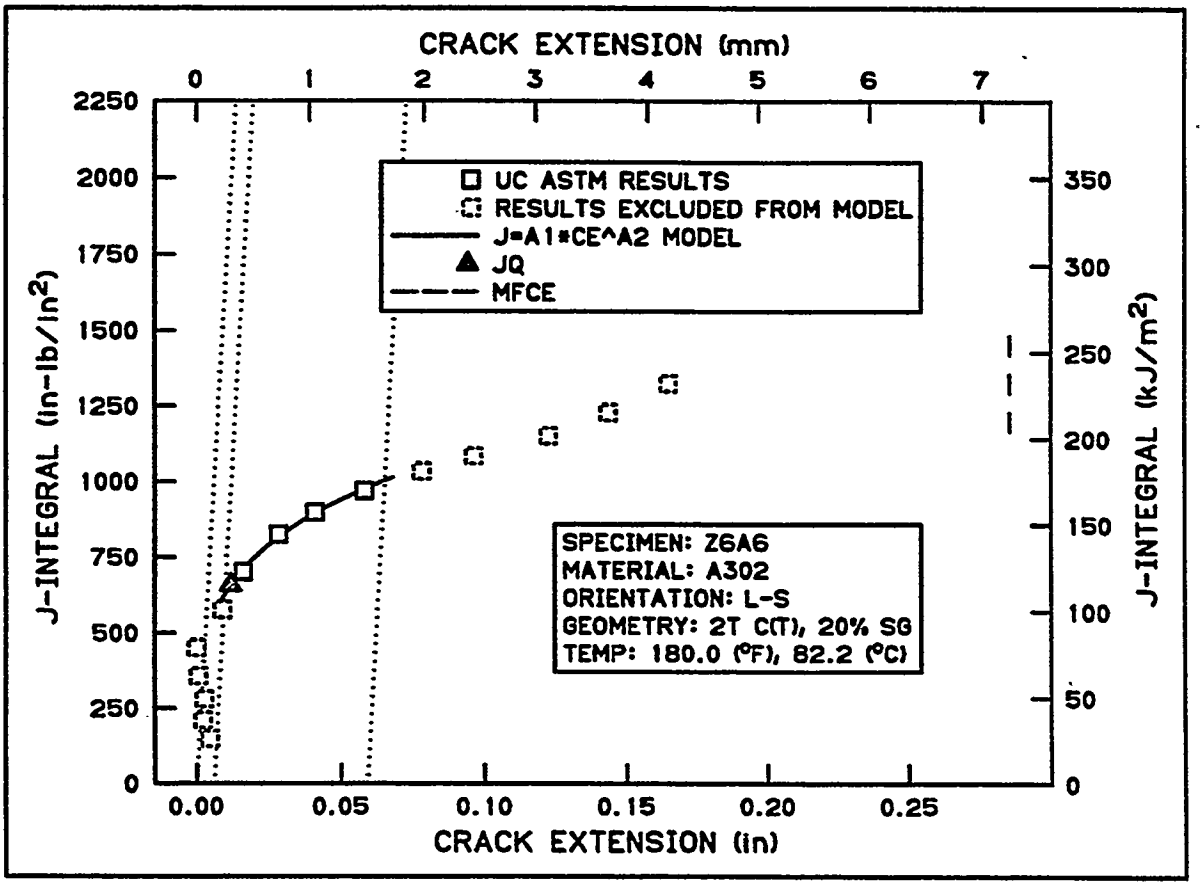

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z6A5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6A6
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.5069 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15218	0.0190	0.0046	149.4
2	17631	0.0230	0.0023	211.2
3	19593	0.0268	0.0027	280.6
4	21171	0.0308	0.0007	357.3
5	22459	0.0352	0.0000	450.7
6	23425	0.0411	0.0090	576.7
7	23738	0.0469	0.0161	702.1
8	23450	0.0527	0.0284	825.4
9	23061	0.0566	0.0410	897.3
10	22639	0.0605	0.0582	969.0
11	21806	0.0644	0.0779	1033.6
12	21046	0.0682	0.0963	1083.8
13	20455	0.0729	0.1224	1151.3
14	19544	0.0787	0.1437	1228.9
15	18877	0.0853	0.1647	1325.1

  WIDTH: 4.0068 (IN),101.770 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0007 (IN),25.418 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4626 (IN),87.950 (MM)
    DISTANCE 2: 3.4873 (IN),88.577 (MM)
    DISTANCE 3: 3.5684 (IN),90.637 (MM)
    DISTANCE 4: 3.5783 (IN),90.889 (MM)
    DISTANCE 5: 3.5006 (IN),88.915 (MM)
    DISTANCE 6: 3.4920 (IN),88.697 (MM)
    DISTANCE 7: 3.4896 (IN),88.636 (MM)
    DISTANCE 8: 3.4780 (IN),88.341 (MM)
    DISTANCE 9: 3.4708 (IN),88.158 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6344 (IN),92.314 (MM)
    DISTANCE 2: 3.8324 (IN),97.343 (MM)
    DISTANCE 3: 3.8129 (IN),96.848 (MM)
    DISTANCE 4: 3.8430 (IN),97.612 (MM)
    DISTANCE 5: 3.8016 (IN),96.561 (MM)
    DISTANCE 6: 3.7834 (IN),96.098 (MM)
    DISTANCE 7: 3.7996 (IN),96.510 (MM)
    DISTANCE 8: 3.7658 (IN),95.651 (MM)
    DISTANCE 9: 3.7707 (IN),95.776 (MM)

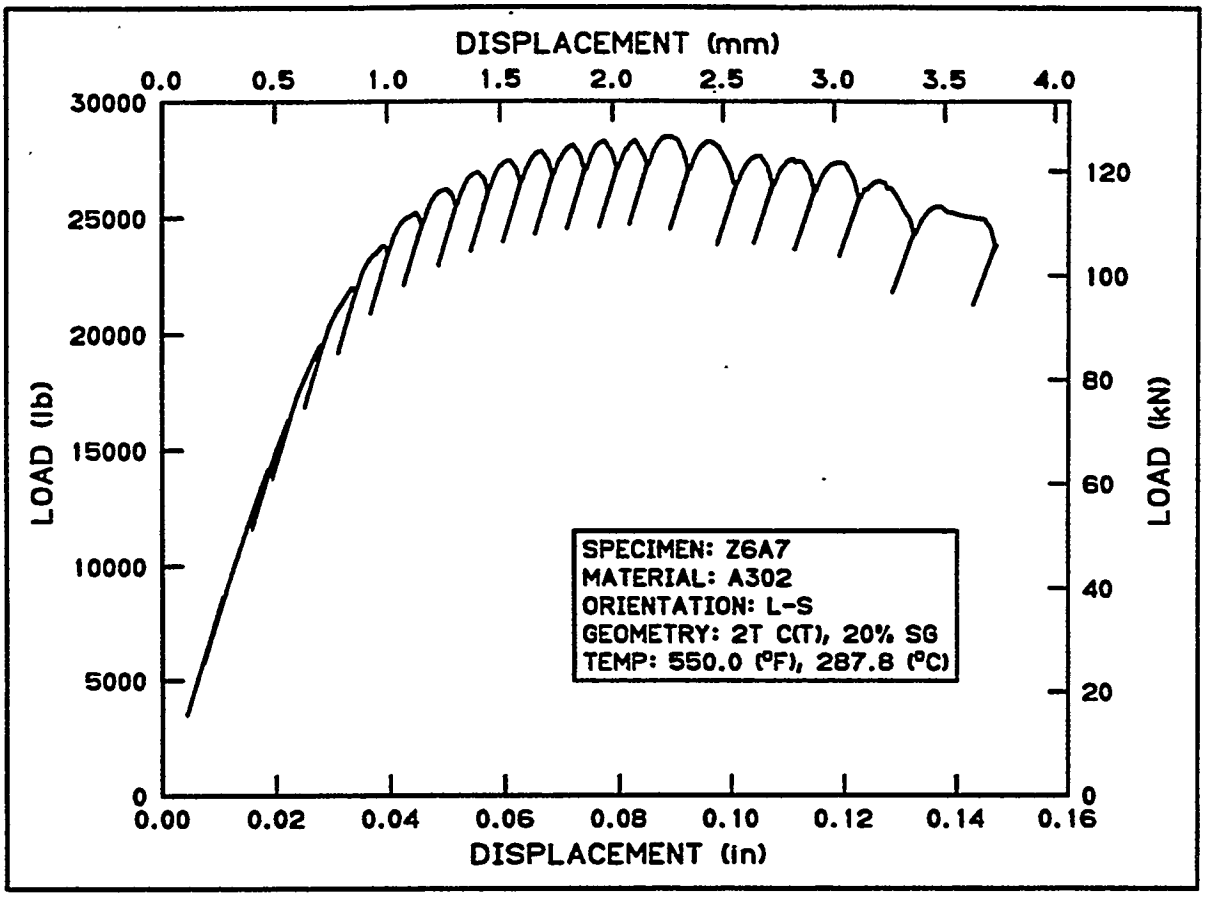

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
25000
20000
15000
10000
5000
0
LOAD (lb)
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

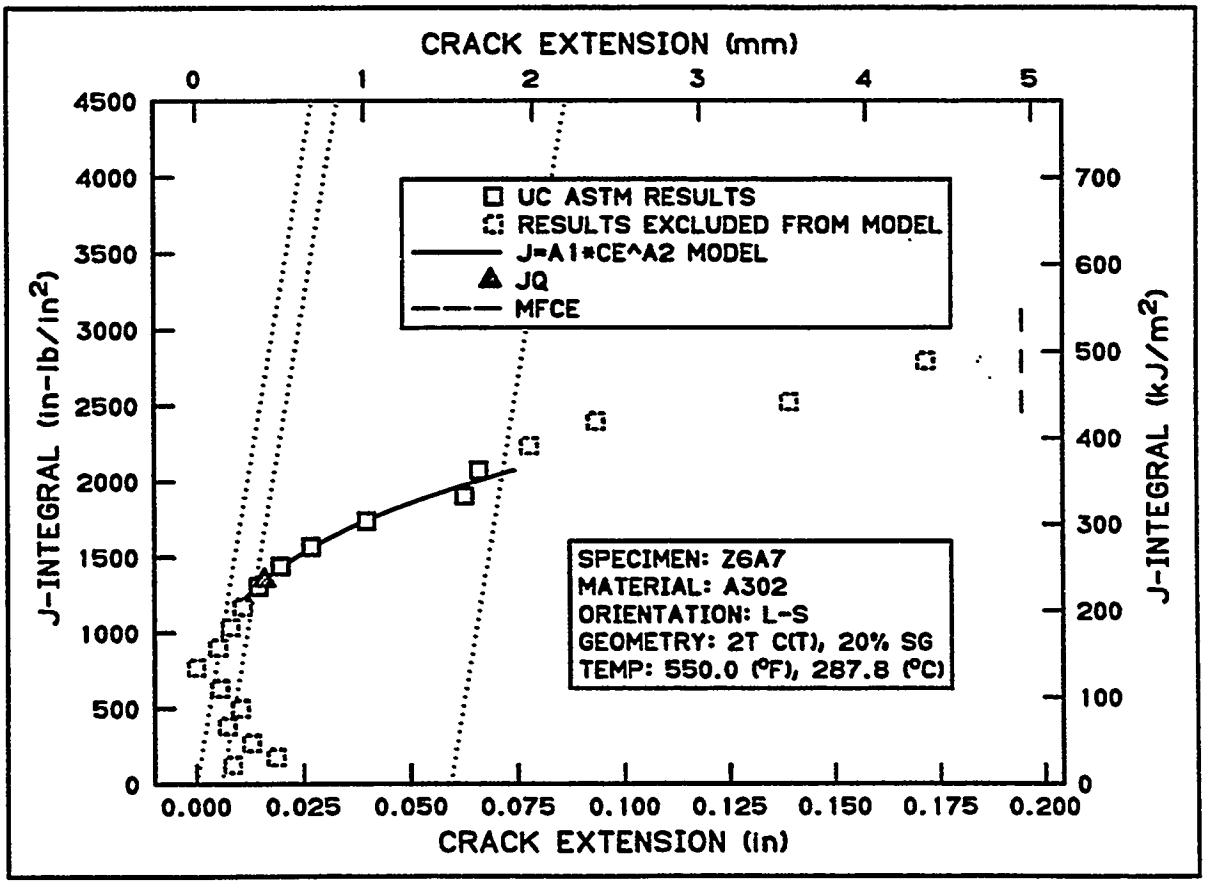

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7
2250
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z6A6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A7
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4975 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	14023	0.0184	0.0085	127.3
2	16261	0.0221	0.0186	176.7
3	19426	0.0275	0.0130	271.2
4	21926	0.0332	0.0073	382.4
5	23762	0.0387	0.0104	499.9
6	25200	0.0443	0.0056	629.8
7	26190	0.0498	0.0000	769.8
8	26935	0.0553	0.0051	900.6
9	27435	0.0609	0.0080	1036.5
10	27833	0.0664	0.0109	1170.3
11	28089	0.0718	0.0146	1305.0
12	28254	0.0774	0.0198	1440.9
13	28303	0.0829	0.0269	1568.2
14	28326	0.0905	0.0399	1736.0
15	28011	0.0978	0.0626	1901.4
16	27640	0.1052	0.0660	2070.3
17	27386	0.1126	0.0778	2231.3
18	27306	0.1201	0.0934	2394.2
19	25321	0.1305	0.1394	2524.1
20	24923	0.1449	0.1717	2793.0

WIDTH: 3.9973 (IN),101.530 (MM)
THICKNESS: 2.0000 (IN),50.800 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0001 (IN),25.403 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4766 (IN),88.306 (MM)
DISTANCE 2: 3.4854 (IN),88.529 (MM)
DISTANCE 3: 3.4970 (IN),88.824 (MM)
DISTANCE 4: 3.5058 (IN),89.047 (MM)
DISTANCE 5: 3.5054 (IN),89.037 (MM)
DISTANCE 6: 3.5077 (IN),89.096 (MM)
DISTANCE 7: 3.5052 (IN),89.032 (MM)
DISTANCE 8: 3.4925 (IN),88.709 (MM)
DISTANCE 9: 3.4866 (IN),88.560 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7792 (IN),95.992 (MM)
DISTANCE 2: 3.7096 (IN),94.224 (MM)
DISTANCE 3: 3.7406 (IN),95.011 (MM)
DISTANCE 4: 3.7216 (IN),94.529 (MM)
DISTANCE 5: 3.6754 (IN),93.355 (MM)
DISTANCE 6: 3.6884 (IN),93.685 (MM)
DISTANCE 7: 3.6396 (IN),92.446 (MM)
DISTANCE 8: 3.6268 (IN),92.121 (MM)
DISTANCE 9: 3.6918 (IN),93.772 (MM)

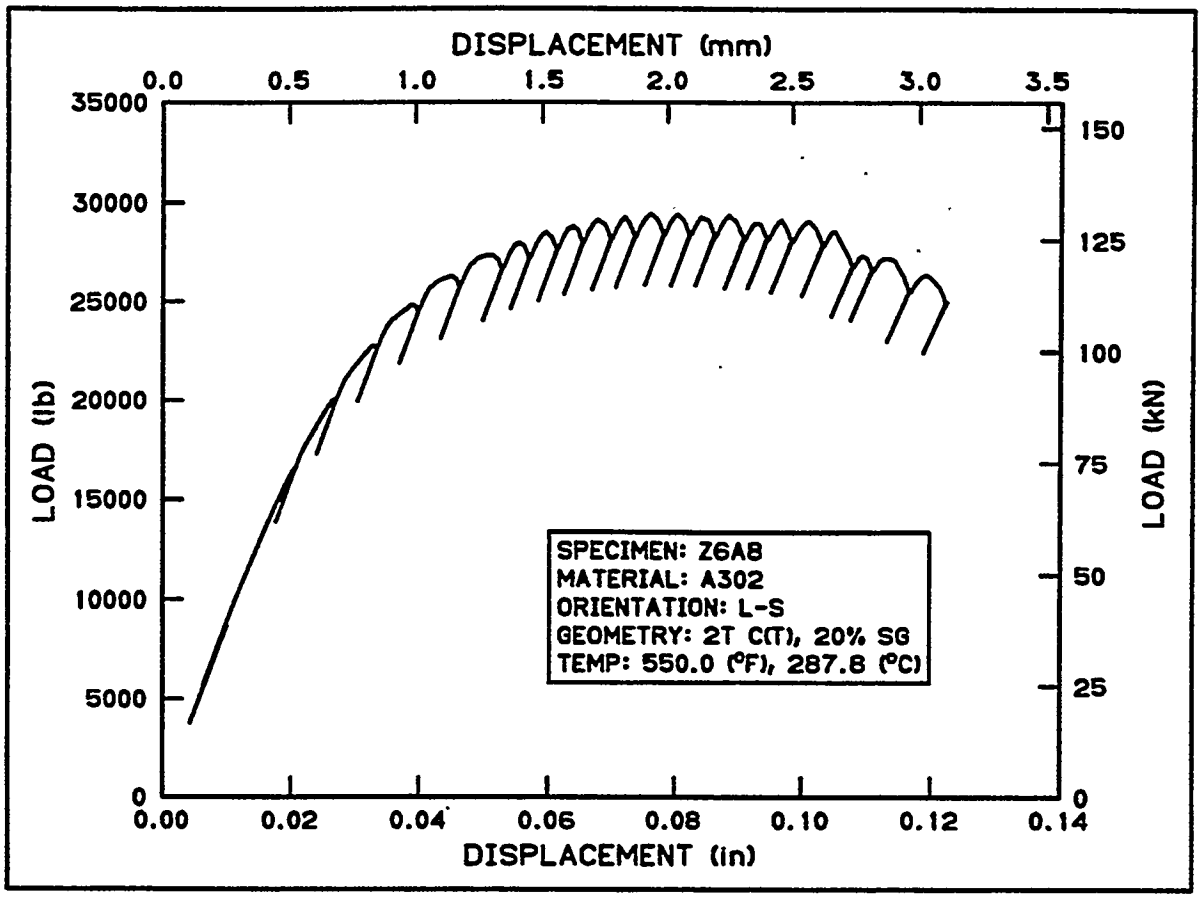

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

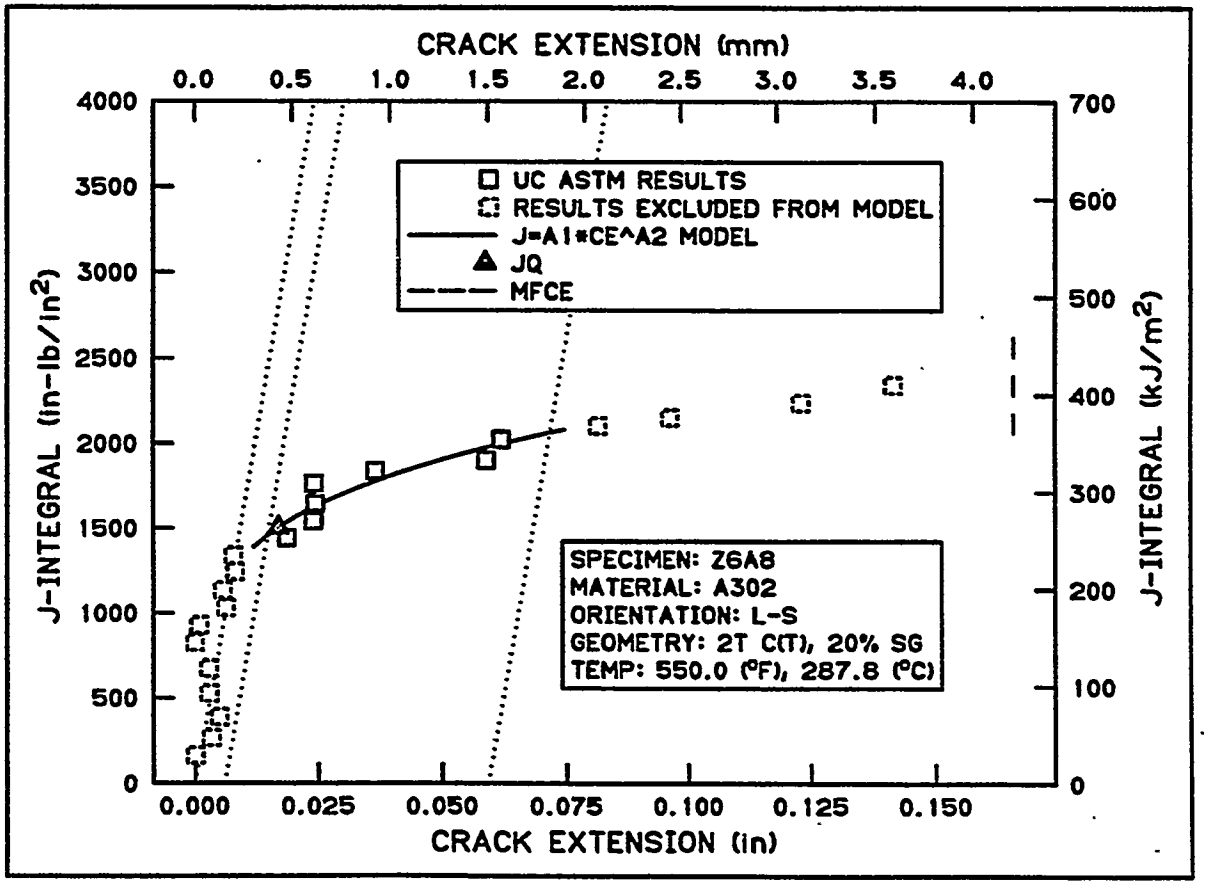

CRACK EXTENSION (mm)
0
1
2
3
4
5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6A8
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4679 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16379	0.0201	0.0001	162.8
2	19985	0.0264	0.0033	267.0
3	22733	0.0325	0.0049	388.8
4	24834	0.0388	0.0029	527.1
5	26285	0.0449	0.0028	673.3
6	27348	0.0512	0.0000	827.7
7	27964	0.0554	0.0009	929.9
8	28489	0.0596	0.0062	1032.6
9	28798	0.0638	0.0056	1135.0
10	29122	0.0677	0.0081	1244.2
11	29262	0.0720	0.0078	1340.4
12	29428	0.0761	0.0187	1444.3
13	29384	0.0803	0.0240	1544.3
14	29187	0.0843	0.0244	1646.0
15	29333	0.0885	0.0242	1765.3
16	28970	0.0925	0.0364	1840.1
17	29126	0.0967	0.0588	1902.7
18	29055	0.1010	0.0618	2022.2
19	28526	0.1050	0.0814	2104.1
20	27298	0.1092	0.0962	2151.1
21	27095	0.1141	0.1230	2239.3
22	26168	0.1200	0.1414	2343.0

WIDTH: 3.9969 (IN),101.520 (MM)
THICKNESS: 2.0000 (IN),50.800 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0006 (IN),25.415 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4620 (IN),87.935 (MM)
DISTANCE 2: 3.4258 (IN),87.015 (MM)
DISTANCE 3: 3.4828 (IN),88.463 (MM)
DISTANCE 4: 3.4836 (IN),88.483 (MM)
DISTANCE 5: 3.4706 (IN),88.153 (MM)
DISTANCE 6: 3.4796 (IN),88.382 (MM)
DISTANCE 7: 3.4774 (IN),88.326 (MM)
DISTANCE 8: 3.4674 (IN),88.072 (MM)
DISTANCE 9: 3.4599 (IN),87.881 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.6156 (IN),91.836 (MM)
DISTANCE 2: 3.5606 (IN),90.439 (MM)
DISTANCE 3: 3.5988 (IN),91.410 (MM)
DISTANCE 4: 3.6514 (IN),92.746 (MM)
DISTANCE 5: 3.6498 (IN),92.705 (MM)
DISTANCE 6: 3.6816 (IN),93.513 (MM)
DISTANCE 7: 3.6854 (IN),93.609 (MM)
DISTANCE 8: 3.6183 (IN),91.905 (MM)
DISTANCE 9: 3.6378 (IN),92.400 (MM)

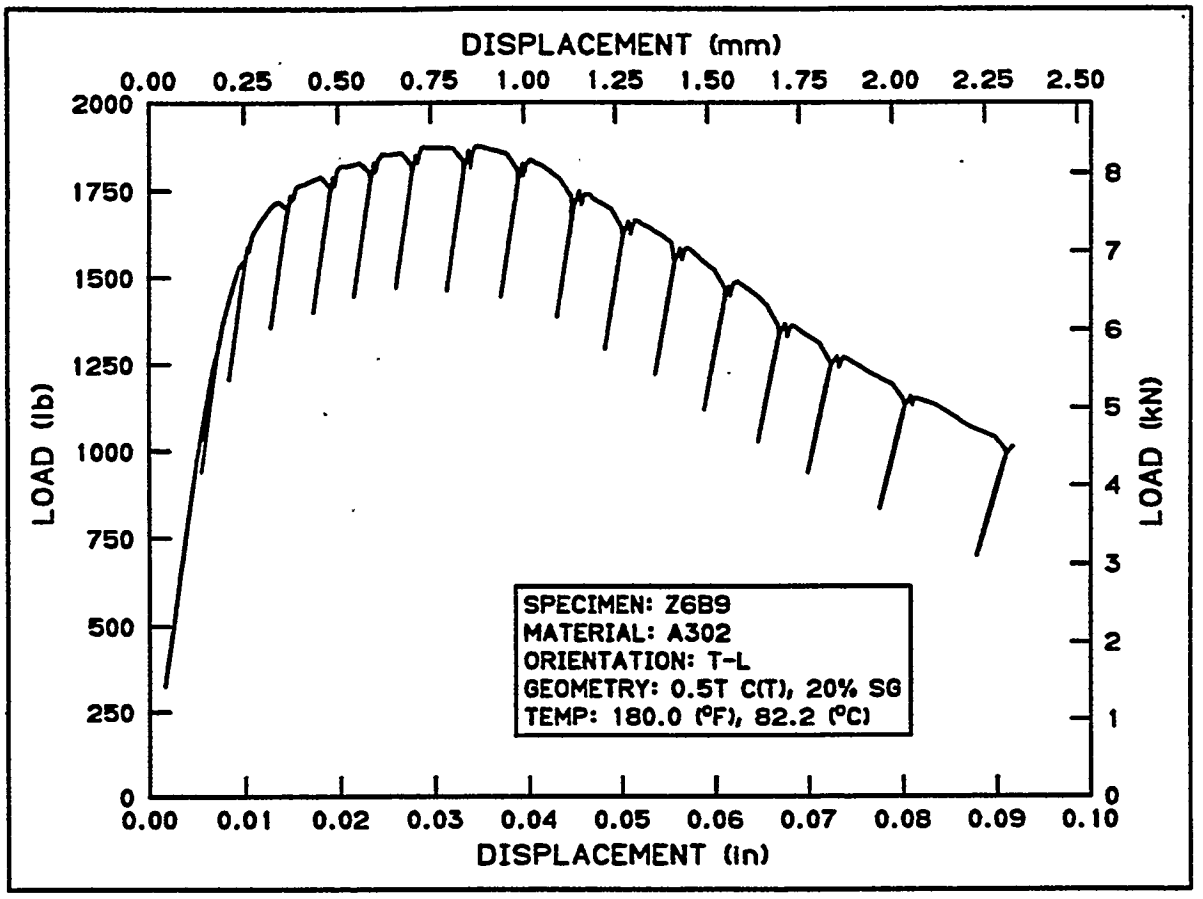

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

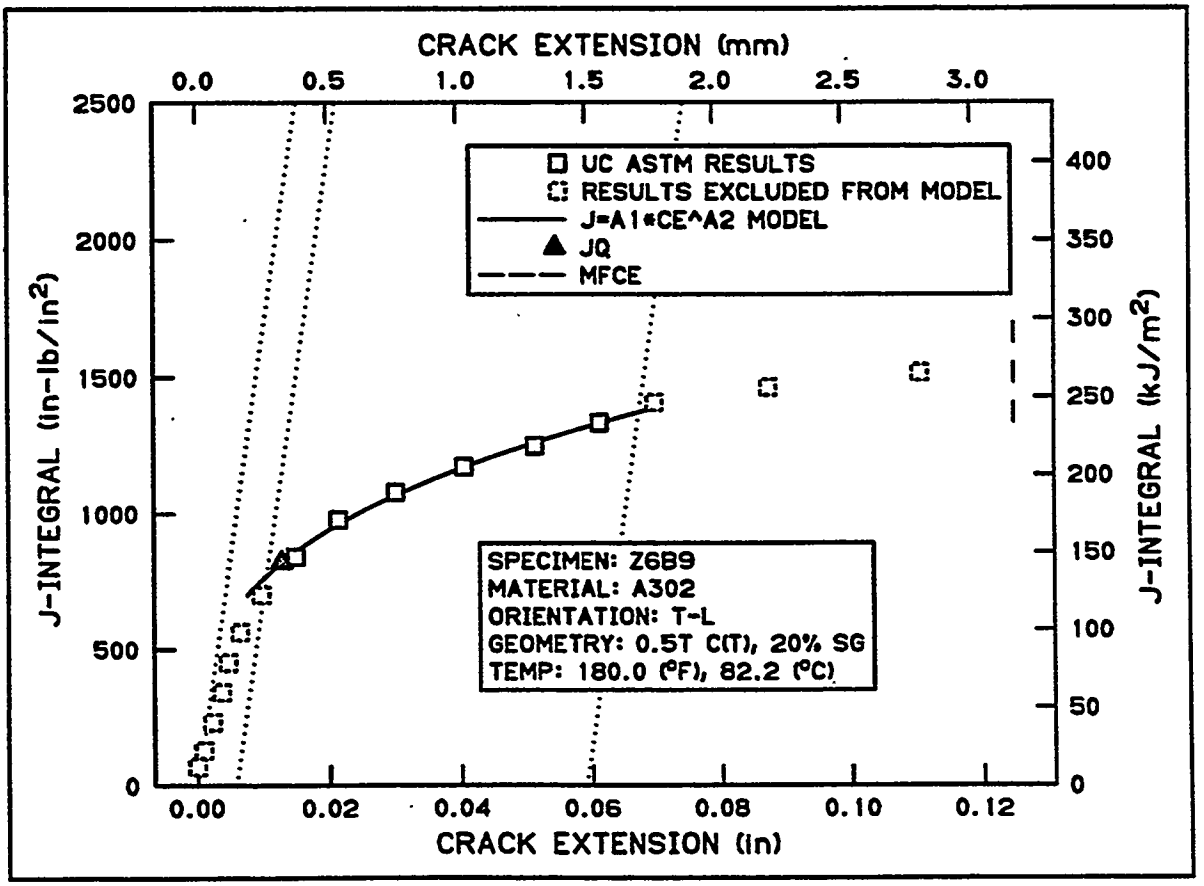

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6A8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B9
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6215 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1224	0.0066	0.0000	68.3
2	1528	0.0094	0.0010	128.6
3	1718	0.0135	0.0023	231.6
4	1788	0.0179	0.0037	341.1
5	1828	0.0220	0.0047	450.3
6	1855	0.0264	0.0065	562.4
7	1870	0.0320	0.0098	700.6
8	1854	0.0376	0.0149	839.8
9	1783	0.0433	0.0214	976.8
10	1697	0.0488	0.0300	1078.0
11	1621	0.0542	0.0405	1172.3
12	1521	0.0599	0.0513	1248.1
13	1419	0.0655	0.0613	1333.6
14	1311	0.0711	0.0698	1407.3
15	1189	0.0789	0.0873	1463.1
16	1040	0.0897	0.1104	1516.4

  WIDTH: 0.9987 (IN),25.367 (MM)
  THICKNESS: 0.5021 (IN),12.753 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2516 (IN),6.391 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8606 (IN),21.859 (MM)
    DISTANCE 2: 0.8694 (IN),22.083 (MM)
    DISTANCE 3: 0.8771 (IN),22.278 (MM)
    DISTANCE 4: 0.8788 (IN),22.322 (MM)
    DISTANCE 5: 0.8778 (IN),22.296 (MM)
    DISTANCE 6: 0.8769 (IN),22.273 (MM)
    DISTANCE 7: 0.8739 (IN),22.197 (MM)
    DISTANCE 8: 0.8704 (IN),22.108 (MM)
    DISTANCE 9: 0.8610 (IN),21.869 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9854 (IN),25.029 (MM)
    DISTANCE 2: 1.0089 (IN),25.626 (MM)
    DISTANCE 3: 1.0112 (IN),25.684 (MM)
    DISTANCE 4: 0.9817 (IN),24.935 (MM)
    DISTANCE 5: 0.9968 (IN),25.319 (MM)
    DISTANCE 6: 0.9973 (IN),25.331 (MM)
    DISTANCE 7: 0.9980 (IN),25.349 (MM)
    DISTANCE 8: 1.0070 (IN),25.578 (MM)
    DISTANCE 9: 0.9771 (IN),24.818 (MM)

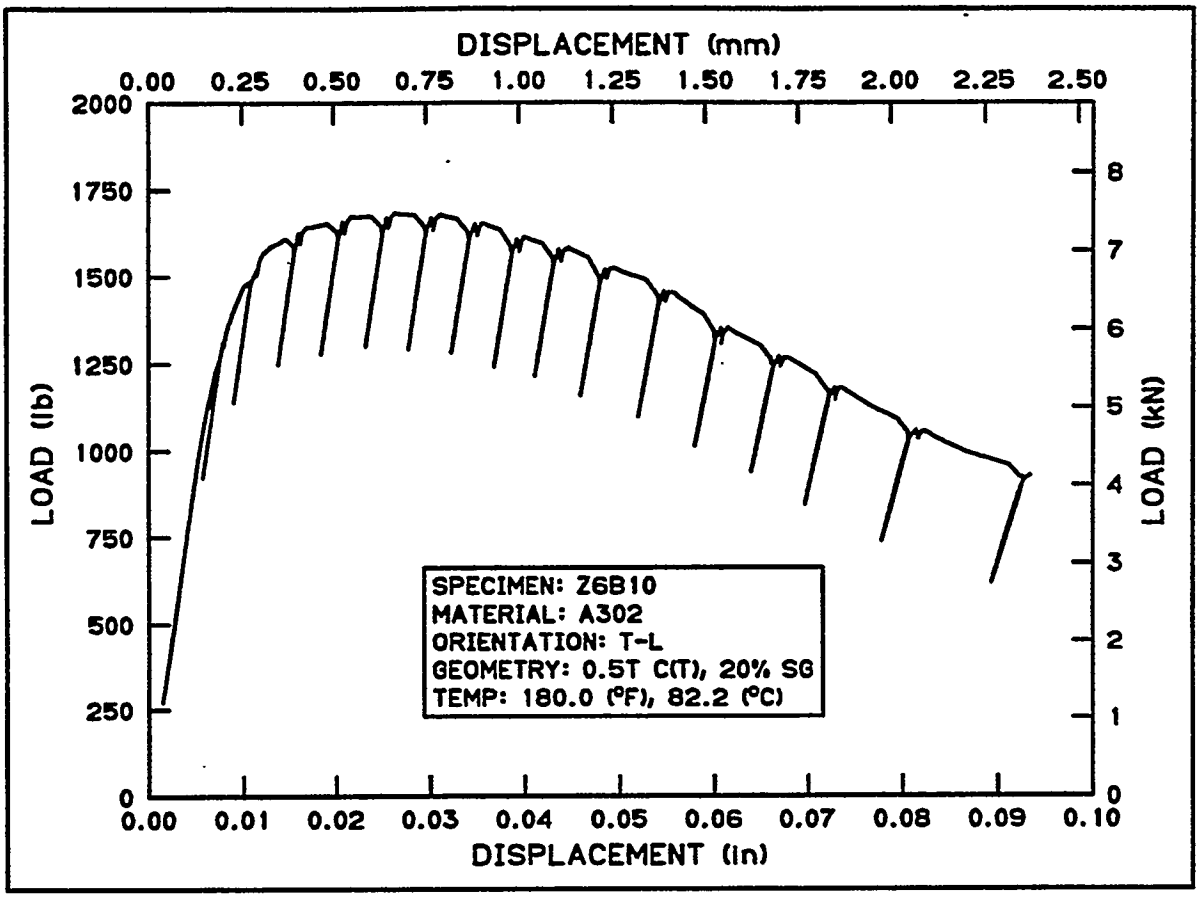

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z6B9
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

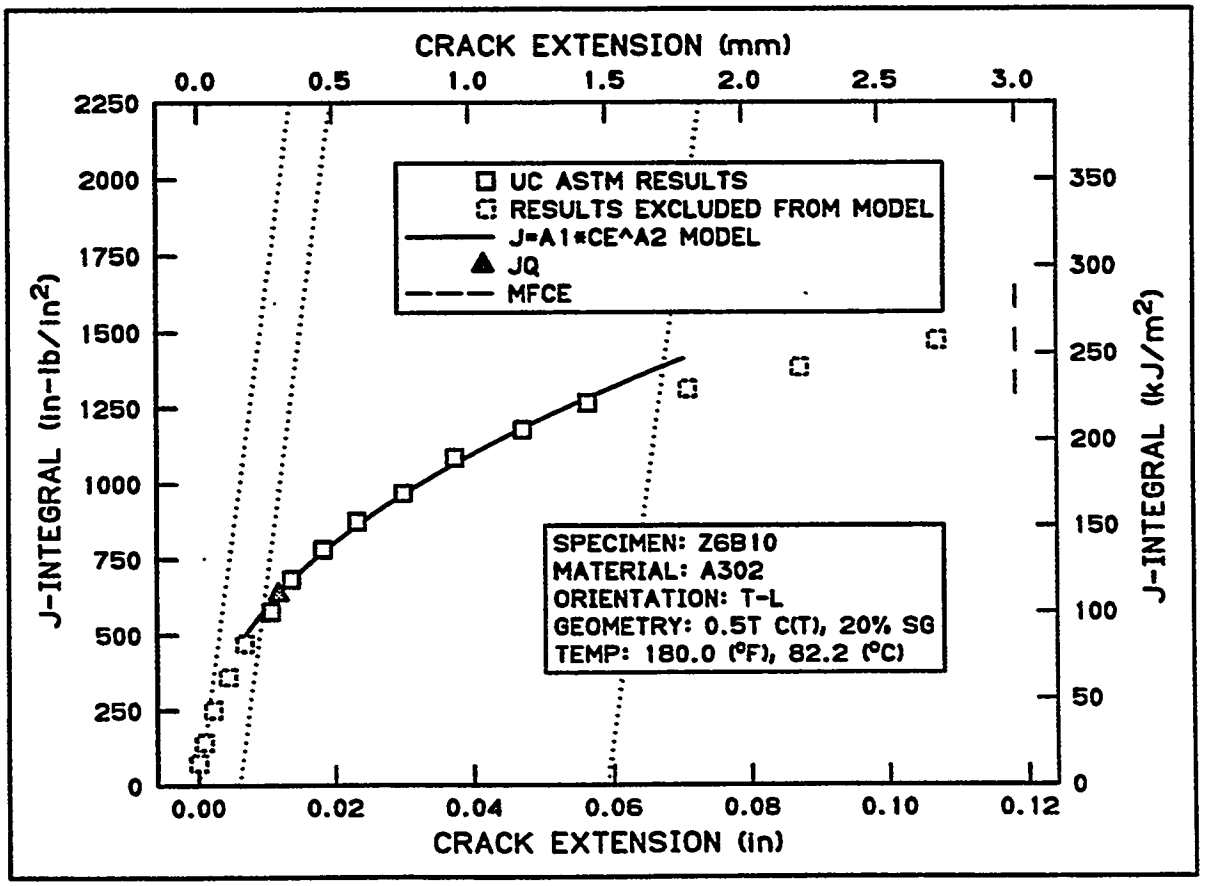

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B9
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B10
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6337 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1221	0.0070	0.0000	74.7
2	1472	0.0101	0.0008	141.8
3	1608	0.0146	0.0022	250.7
4	1652	0.0190	0.0043	359.5
5	1673	0.0237	0.0067	470.9
6	1676	0.0283	0.0106	576.8
7	1666	0.0328	0.0136	683.2
8	1634	0.0374	0.0183	782.0
9	1595	0.0419	0.0232	874.5
10	1554	0.0467	0.0299	967.3
11	1489	0.0529	0.0374	1083.7
12	1392	0.0589	0.0472	1175.7
13	1299	0.0650	0.0565	1263.8
14	1220	0.0708	0.0709	1310.2
15	1089	0.0794	0.0872	1381.8
16	957	0.0911	0.1070	1471.4

WIDTH: 0.9996 (IN),25.390 (MM)
THICKNESS: 0.5024 (IN),12.761 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2512 (IN),6.381 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8740 (IN),22.200 (MM)
DISTANCE 2: 0.8808 (IN),22.372 (MM)
DISTANCE 3: 0.8888 (IN),22.576 (MM)
DISTANCE 4: 0.8918 (IN),22.652 (MM)
DISTANCE 5: 0.8880 (IN),22.555 (MM)
DISTANCE 6: 0.8888 (IN),22.576 (MM)
DISTANCE 7: 0.8870 (IN),22.530 (MM)
DISTANCE 8: 0.8816 (IN),22.393 (MM)
DISTANCE 9: 0.8704 (IN),22.108 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.0065 (IN),25.565 (MM)
DISTANCE 2: 1.0200 (IN),25.908 (MM)
DISTANCE 3: 1.0062 (IN),25.557 (MM)
DISTANCE 4: 0.9928 (IN),25.217 (MM)
DISTANCE 5: 1.0058 (IN),25.547 (MM)
DISTANCE 6: 1.0118 (IN),25.700 (MM)
DISTANCE 7: 1.0084 (IN),25.613 (MM)
DISTANCE 8: 0.9929 (IN),25.220 (MM)
DISTANCE 9: 0.9668 (IN),24.557 (MM)

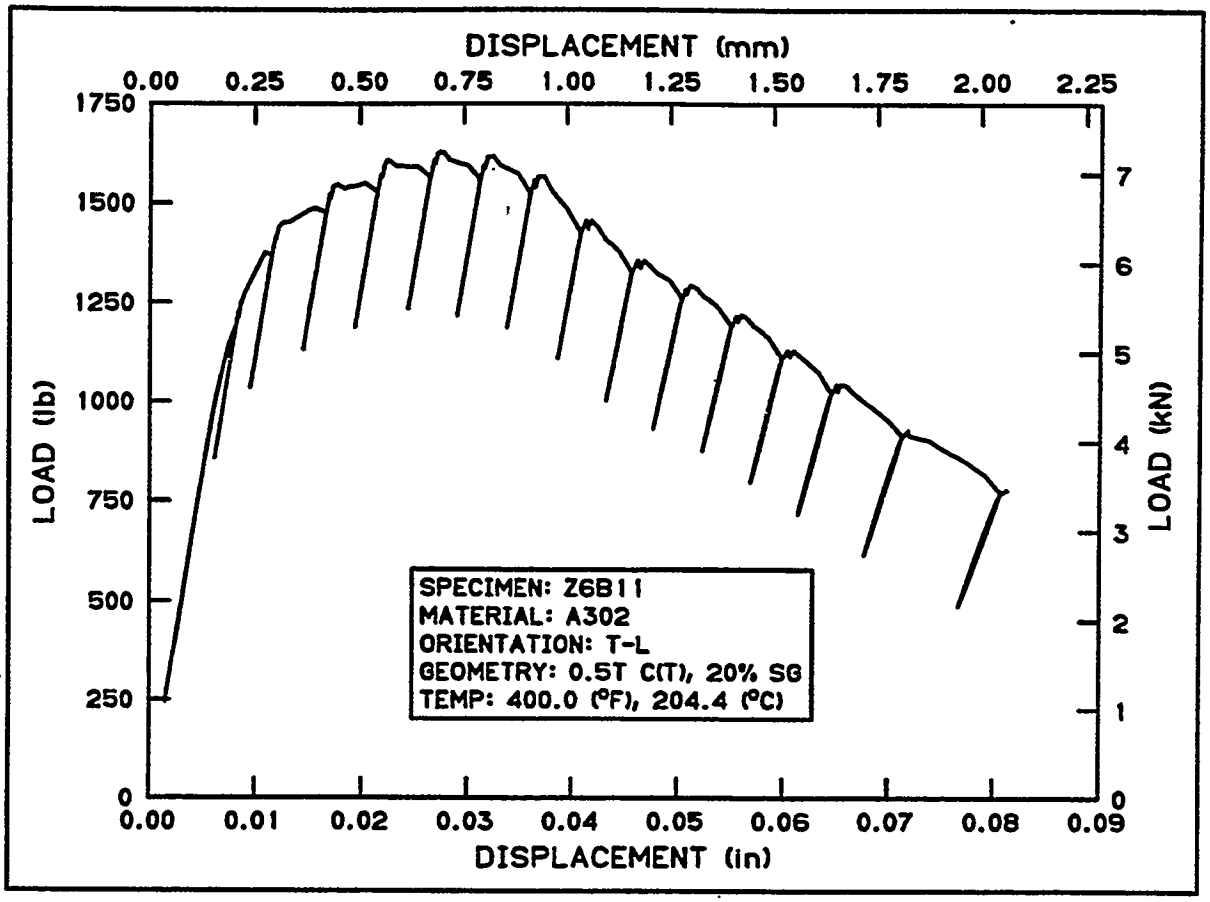

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z6B10
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

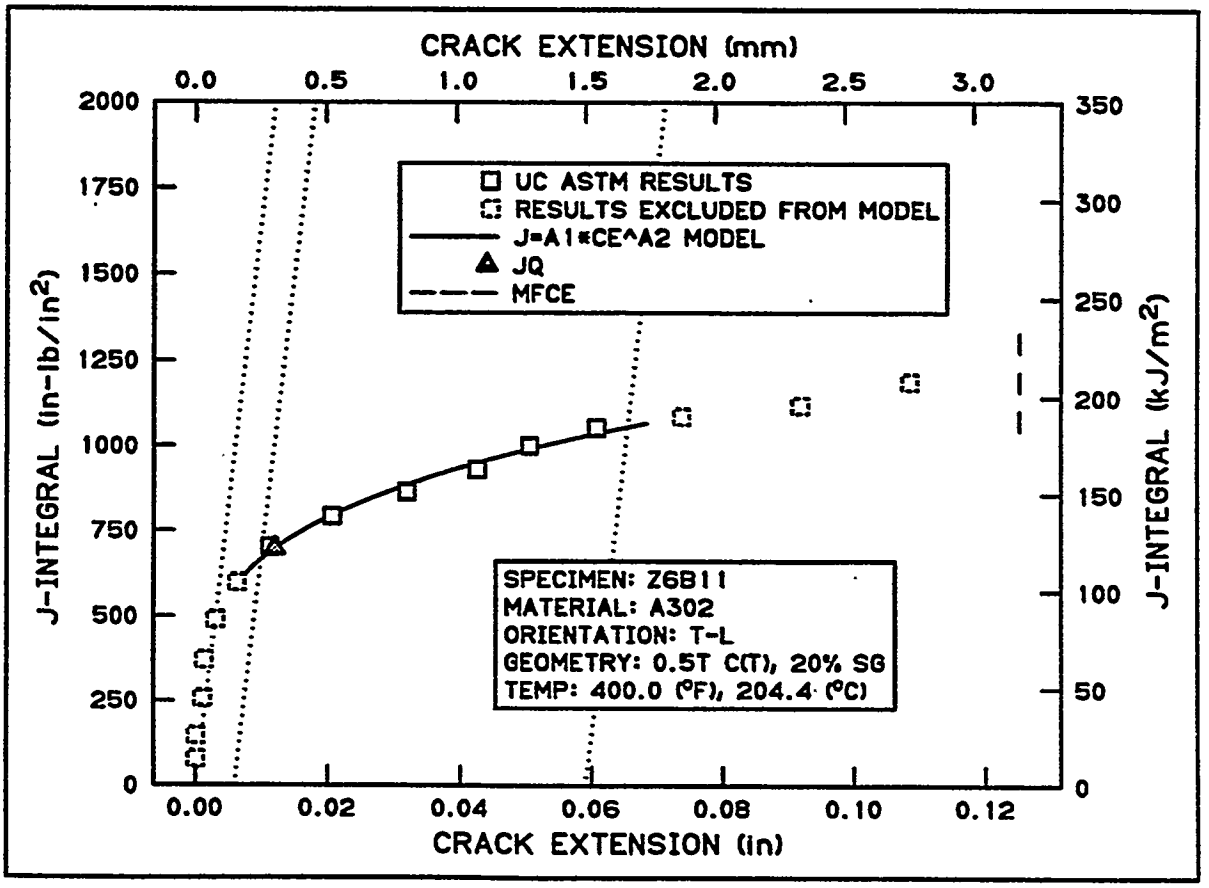

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2250 2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B10
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B11
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6471 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1146	0.0074	0.0000	78.7
2	1375	0.0108	0.0000	147.3
3	1488	0.0154	0.0010	258.1
4	1549	0.0202	0.0013	371.2
5	1591	0.0252	0.0030	489.8
6	1595	0.0298	0.0063	598.7
7	1574	0.0347	0.0114	702.9
8	1486	0.0394	0.0207	793.2
9	1378	0.0443	0.0319	864.8
10	1308	0.0491	0.0426	929.8
11	1240	0.0537	0.0505	1000.7
12	1162	0.0586	0.0608	1053.5
13	1073	0.0634	0.0737	1086.4
14	956	0.0699	0.0918	1119.5
15	817	0.0792	0.1084	1188.2

  WIDTH: 0.9957 (IN),25.291 (MM)
  THICKNESS: 0.4994 (IN),12.685 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2533 (IN),6.434 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8893 (IN),22.588 (MM)
    DISTANCE 2: 0.8989 (IN),22.832 (MM)
    DISTANCE 3: 0.9028 (IN),22.931 (MM)
    DISTANCE 4: 0.9048 (IN),22.982 (MM)
    DISTANCE 5: 0.9048 (IN),22.982 (MM)
    DISTANCE 6: 0.9044 (IN),22.972 (MM)
    DISTANCE 7: 0.9016 (IN),22.901 (MM)
    DISTANCE 8: 0.8978 (IN),22.804 (MM)
    DISTANCE 9: 0.8866 (IN),22.520 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9899 (IN),25.143 (MM)
    DISTANCE 2: 1.0332 (IN),26.243 (MM)
    DISTANCE 3: 1.0272 (IN),26.091 (MM)
    DISTANCE 4: 1.0258 (IN),26.055 (MM)
    DISTANCE 5: 1.0258 (IN),26.055 (MM)
    DISTANCE 6: 1.0218 (IN),25.954 (MM)
    DISTANCE 7: 1.0244 (IN),26.020 (MM)
    DISTANCE 8: 1.0368 (IN),26.335 (MM)
    DISTANCE 9: 1.0263 (IN),26.068 (MM)

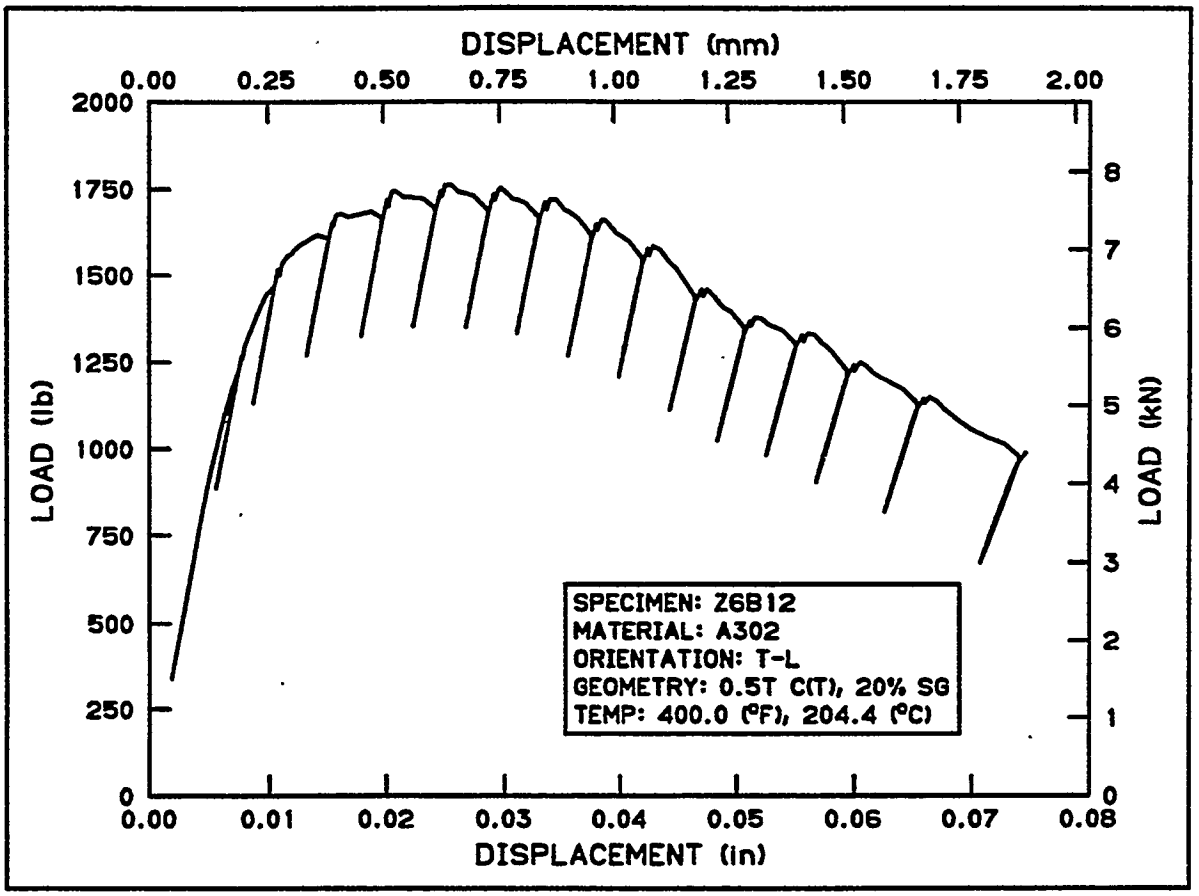

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
LOAD (lb)
1750 1500 1250 1000 750 500 250 0
LOAD (kN)
7 6 5 4 3 2 1 0
SPECIMEN: Z6B11
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
DISPLACEMENT (in)

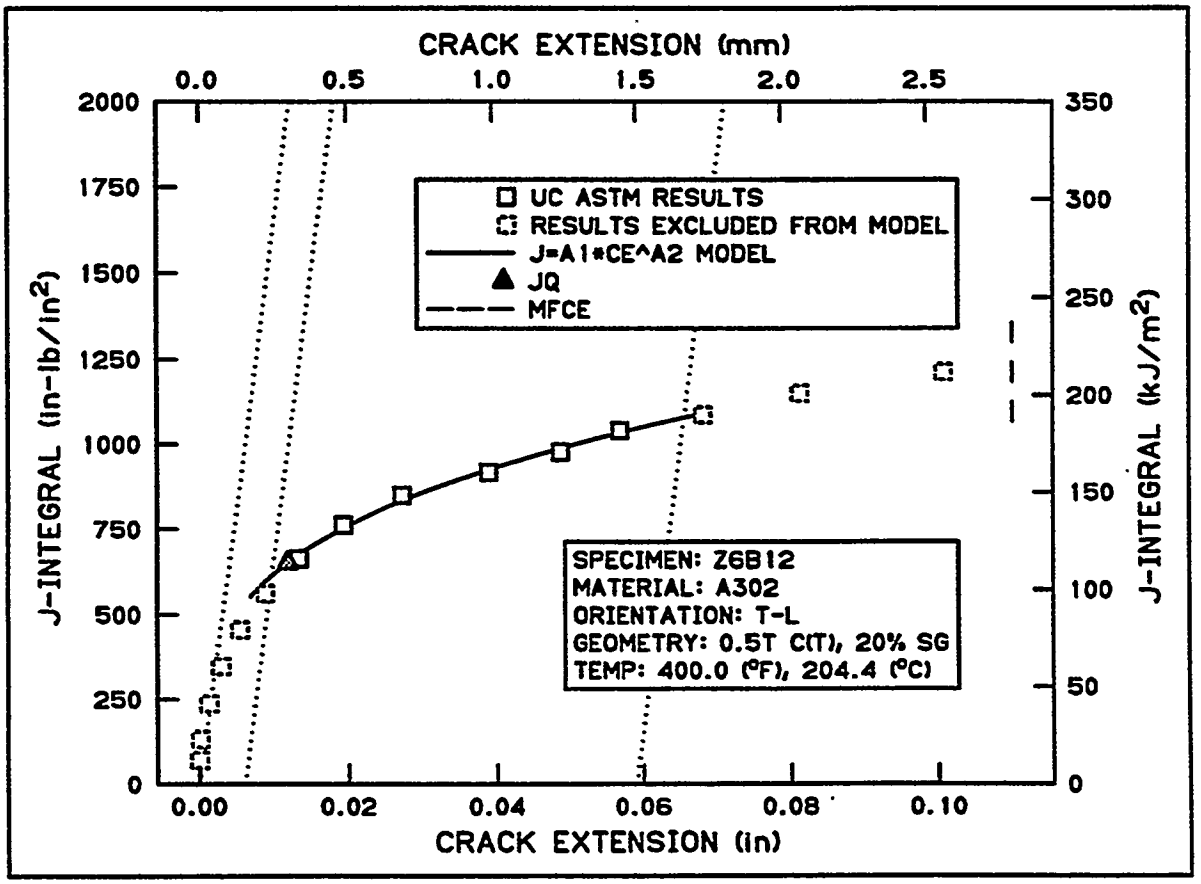

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B11
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B12
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6337 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1169	0.0068	0.0000	70.2
2	1443	0.0097	0.0001	131.9
3	1615	0.0141	0.0013	236.3
4	1684	0.0187	0.0028	346.9
5	1722	0.0231	0.0053	455.8
6	1731	0.0273	0.0087	562.8
7	1708	0.0318	0.0134	663.9
8	1663	0.0363	0.0193	762.2
9	1596	0.0408	0.0273	848.8
10	1517	0.0449	0.0389	916.5
11	1395	0.0495	0.0486	976.2
12	1341	0.0539	0.0568	1039.0
13	1284	0.0580	0.0682	1085.1
14	1167	0.0644	0.0813	1148.6
15	1013	0.0728	0.1007	1210.9

  WIDTH: 0.9992 (IN),25.380 (MM)
  THICKNESS: 0.5024 (IN),12.761 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2511 (IN),6.378 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8689 (IN),22.070 (MM)
    DISTANCE 2: 0.8798 (IN),22.347 (MM)
    DISTANCE 3: 0.8842 (IN),22.459 (MM)
    DISTANCE 4: 0.8872 (IN),22.535 (MM)
    DISTANCE 5: 0.8902 (IN),22.611 (MM)
    DISTANCE 6: 0.8908 (IN),22.626 (MM)
    DISTANCE 7: 0.8891 (IN),22.583 (MM)
    DISTANCE 8: 0.8855 (IN),22.492 (MM)
    DISTANCE 9: 0.8749 (IN),22.222 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9833 (IN),24.976 (MM)
    DISTANCE 2: 1.0056 (IN),25.542 (MM)
    DISTANCE 3: 0.9946 (IN),25.263 (MM)
    DISTANCE 4: 1.0063 (IN),25.560 (MM)
    DISTANCE 5: 1.0084 (IN),25.613 (MM)
    DISTANCE 6: 1.0046 (IN),25.517 (MM)
    DISTANCE 7: 0.9752 (IN),24.770 (MM)
    DISTANCE 8: 1.0068 (IN),25.573 (MM)
    DISTANCE 9: 0.9297 (IN),23.614 (MM)

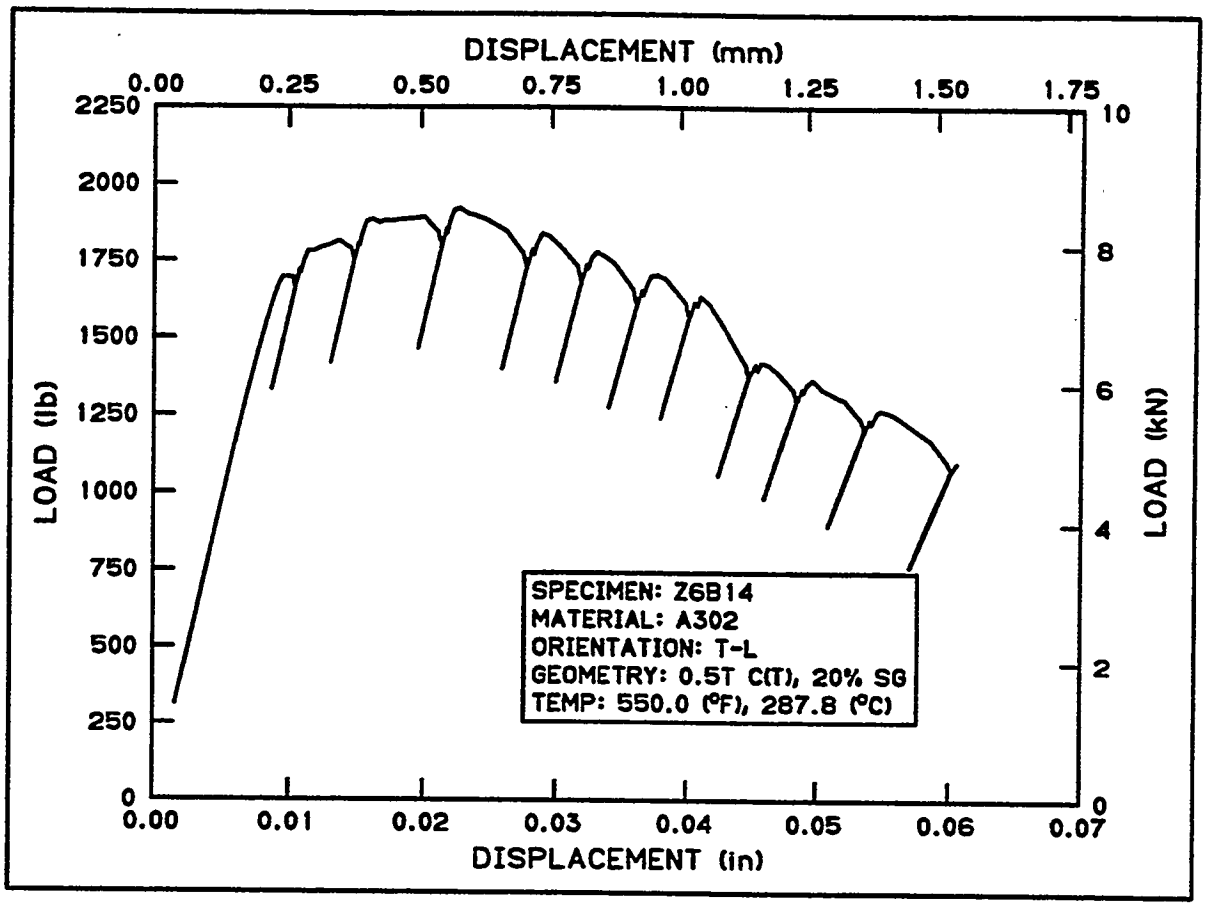

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
DISPLACEMENT (in)
SPECIMEN: Z6B12
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

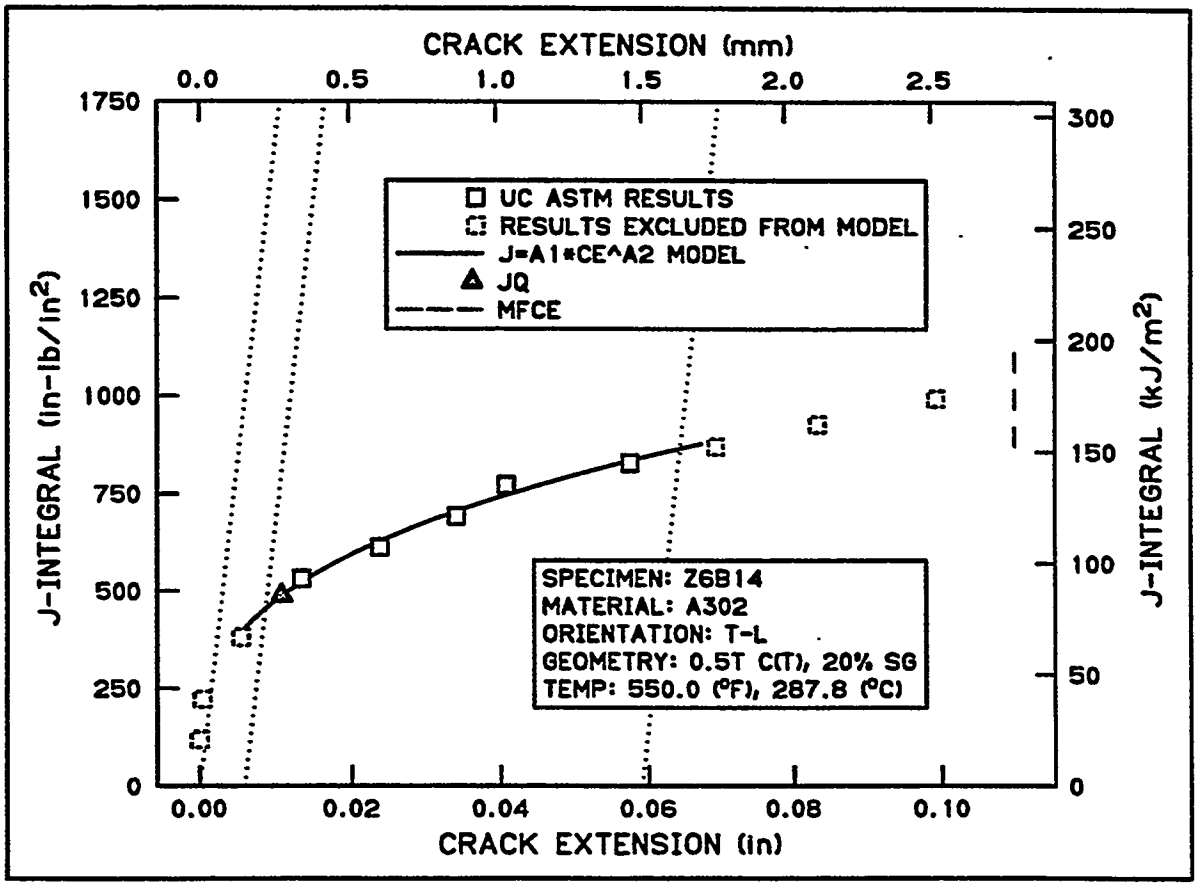

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
350
300
250
200
150
100
50
0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
SPECIMEN: Z6B12
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
IDENTIFICATION: Z6B14
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6132 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1699	0.0094	0.0000	118.3
2	1817	0.0136	0.0003	221.8
3	1893	0.0199	0.0055	380.8
4	1848	0.0262	0.0134	531.9
5	1804	0.0301	0.0238	612.8
6	1747	0.0342	0.0341	692.2
7	1695	0.0382	0.0408	772.6
8	1552	0.0426	0.0575	828.1
9	1391	0.0470	0.0693	869.0
10	1304	0.0521	0.0833	926.9
11	1176	0.0585	0.0992	992.2

WIDTH: 0.9988 (IN),25.370 (MM)
THICKNESS: 0.5023 (IN),12.758 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2516 (IN),6.391 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8479 (IN),21.537 (MM)
DISTANCE 2: 0.8544 (IN),21.702 (MM)
DISTANCE 3: 0.8617 (IN),21.887 (MM)
DISTANCE 4: 0.8656 (IN),21.986 (MM)
DISTANCE 5: 0.8701 (IN),22.101 (MM)
DISTANCE 6: 0.8714 (IN),22.134 (MM)
DISTANCE 7: 0.8718 (IN),22.144 (MM)
DISTANCE 8: 0.8692 (IN),22.078 (MM)
DISTANCE 9: 0.8606 (IN),21.859 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9900 (IN),25.146 (MM)
DISTANCE 2: 1.0050 (IN),25.527 (MM)
DISTANCE 3: 0.9908 (IN),25.166 (MM)
DISTANCE 4: 0.9978 (IN),25.344 (MM)
DISTANCE 5: 0.9654 (IN),24.521 (MM)
DISTANCE 6: 0.9674 (IN),24.572 (MM)
DISTANCE 7: 0.9411 (IN),23.904 (MM)
DISTANCE 8: 0.9556 (IN),24.272 (MM)
DISTANCE 9: 0.9564 (IN),24.293 (MM)

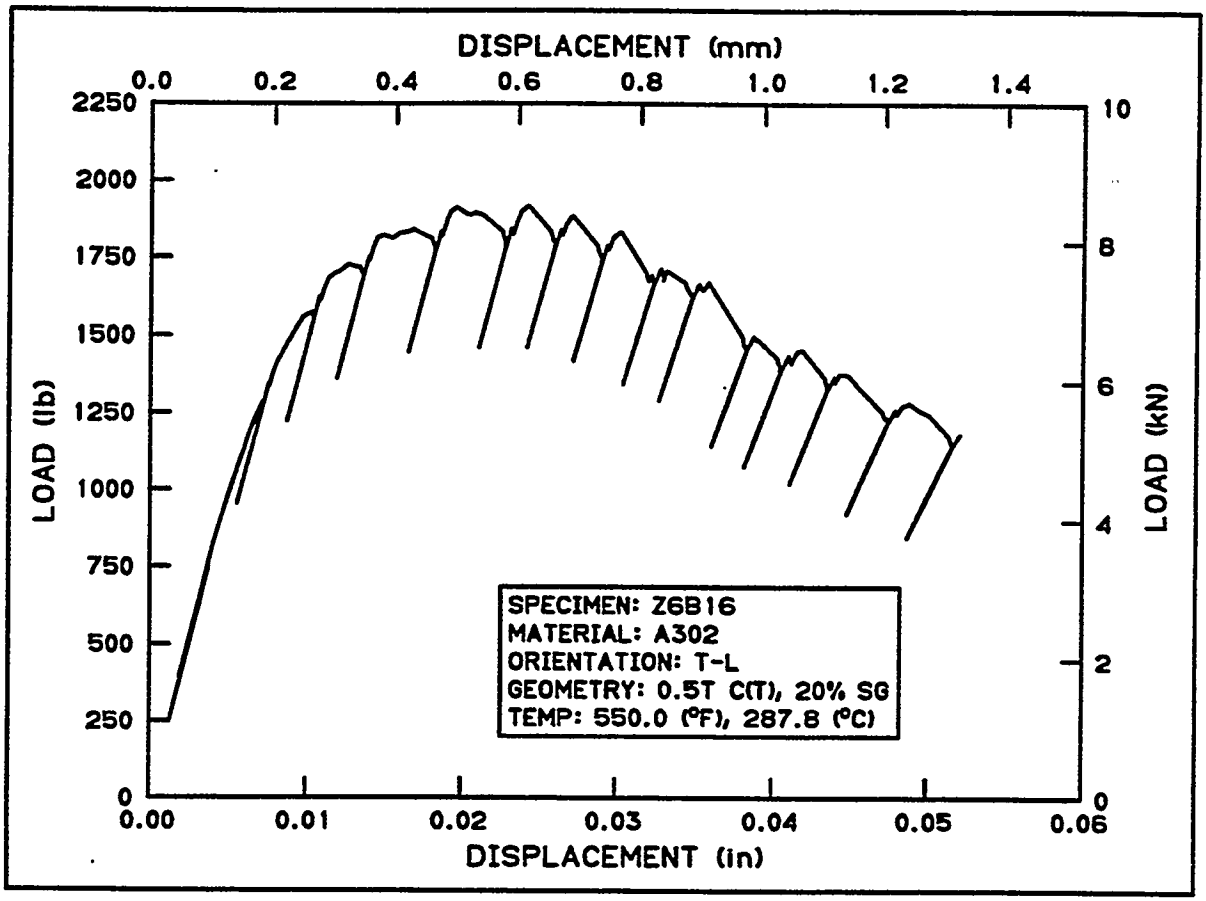

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z6B14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
DISPLACEMENT (in)

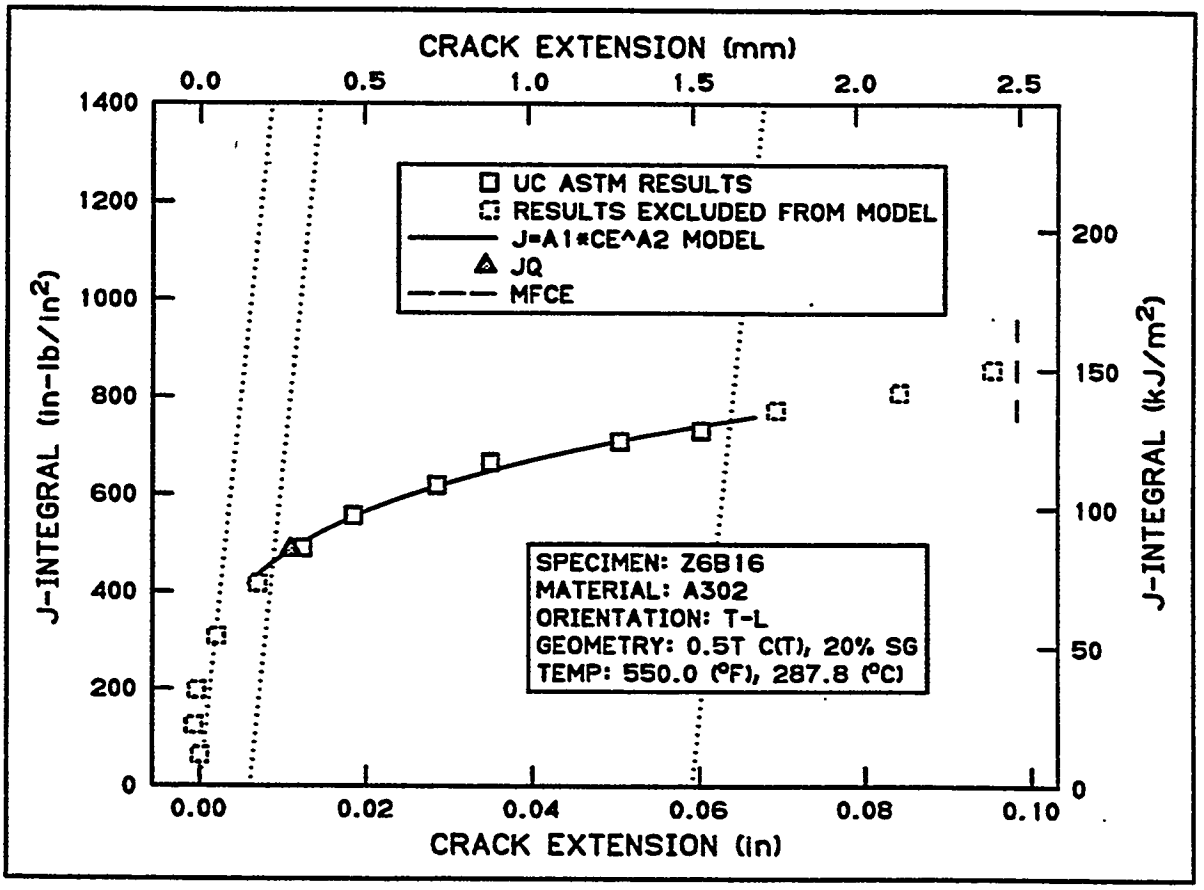

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B14
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B16
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6150 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1236	0.0067	0.0000	63.3
2	1558	0.0097	-0.0007	124.6
3	1727	0.0126	-0.0003	196.9
4	1840	0.0169	0.0020	308.0
5	1888	0.0213	0.0069	417.0
6	1914	0.0243	0.0123	489.7
7	1883	0.0271	0.0184	556.3
8	1829	0.0302	0.0285	618.9
9	1708	0.0332	0.0349	665.5
10	1670	0.0358	0.0505	708.5
11	1487	0.0390	0.0602	730.7
12	1453	0.0419	0.0691	773.6
13	1324	0.0458	0.0841	809.5
14	1244	0.0502	0.0952	857.5

  WIDTH: 0.9984 (IN),25.359 (MM)
  THICKNESS: 0.5024 (IN),12.761 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2520 (IN),6.401 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8590 (IN),21.819 (MM)
    DISTANCE 2: 0.8686 (IN),22.062 (MM)
    DISTANCE 3: 0.8708 (IN),22.118 (MM)
    DISTANCE 4: 0.8718 (IN),22.144 (MM)
    DISTANCE 5: 0.8710 (IN),22.123 (MM)
    DISTANCE 6: 0.8692 (IN),22.078 (MM)
    DISTANCE 7: 0.8666 (IN),22.012 (MM)
    DISTANCE 8: 0.8624 (IN),21.905 (MM)
    DISTANCE 9: 0.8526 (IN),21.656 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9631 (IN),24.463 (MM)
    DISTANCE 2: 0.9744 (IN),24.750 (MM)
    DISTANCE 3: 0.9542 (IN),24.237 (MM)
    DISTANCE 4: 0.9695 (IN),24.625 (MM)
    DISTANCE 5: 0.9642 (IN),24.491 (MM)
    DISTANCE 6: 0.9652 (IN),24.516 (MM)
    DISTANCE 7: 0.9588 (IN),24.354 (MM)
    DISTANCE 8: 0.9708 (IN),24.658 (MM)
    DISTANCE 9: 0.9658 (IN),24.531 (MM)

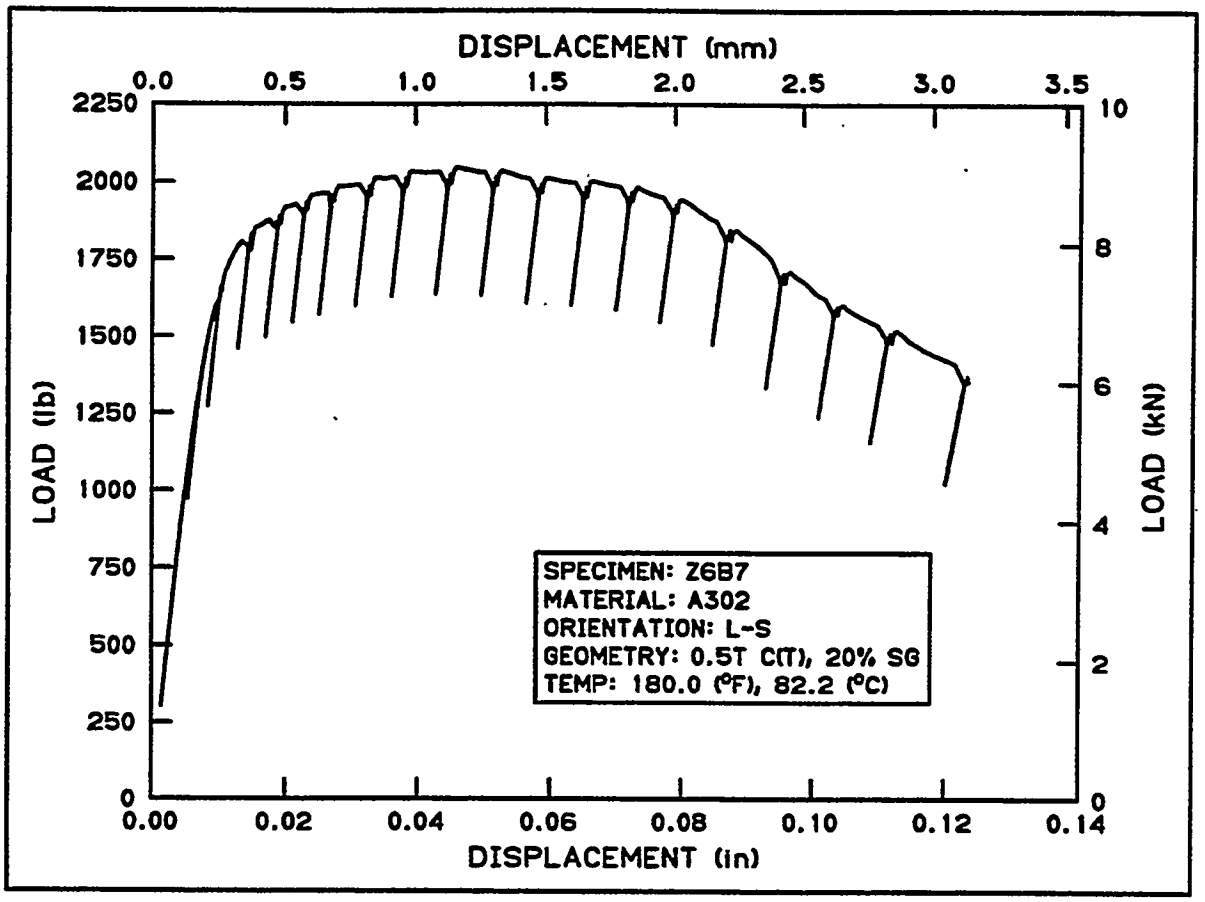

DISPLACEMENT (mm)
0.0
0.2
0.4
0.6
0.8
1.0
1.2
1.4
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z6B16
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
DISPLACEMENT (in)

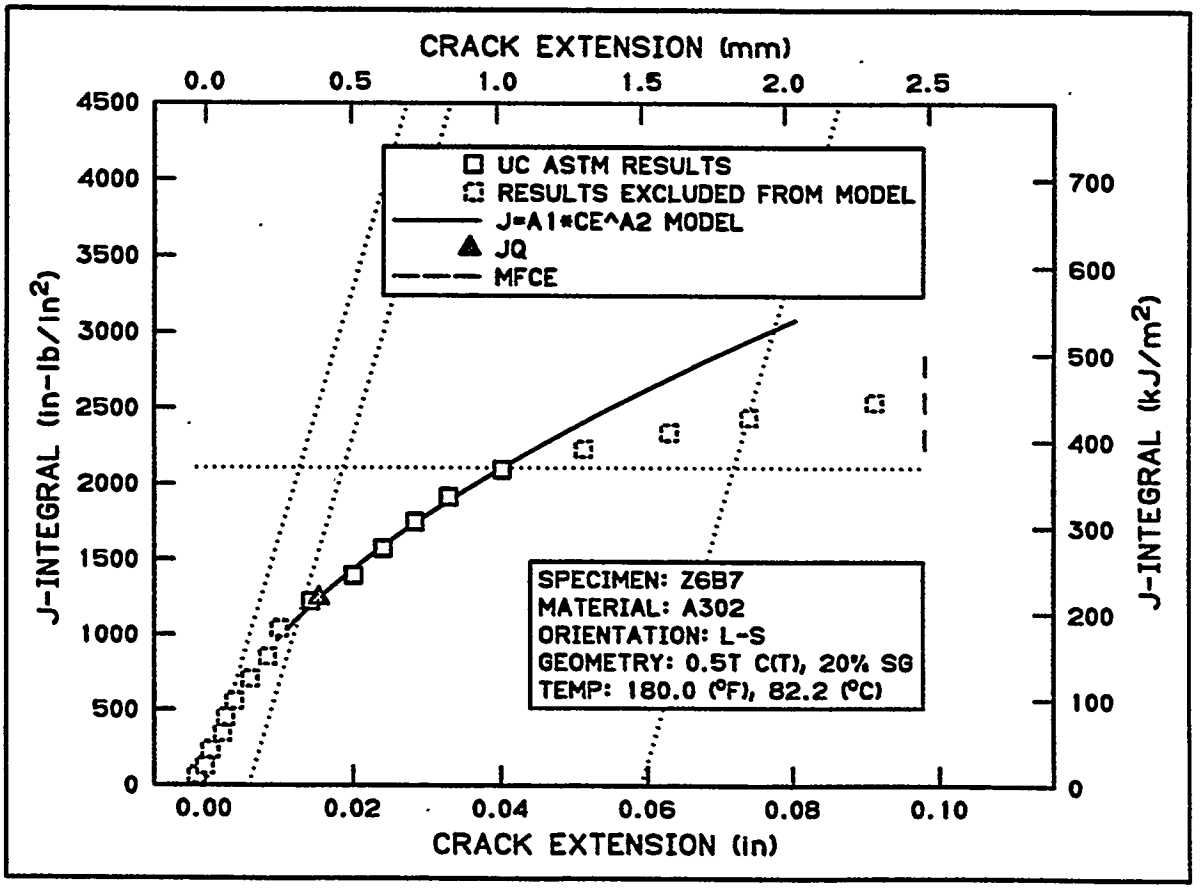

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
1400
1200
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B16
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B7
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6161 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1262	0.0064	-0.0011	67.0
2	1593	0.0092	0.0000	128.7
3	1807	0.0132	0.0007	236.6
4	1877	0.0173	0.0023	345.2
5	1927	0.0213	0.0028	450.4
6	1962	0.0253	0.0040	558.9
7	1991	0.0308	0.0061	705.7
8	2014	0.0363	0.0085	854.9
9	2031	0.0430	0.0101	1041.9
10	2030	0.0498	0.0143	1222.6
11	2008	0.0567	0.0201	1395.4
12	1996	0.0635	0.0240	1572.8
13	1983	0.0704	0.0284	1749.4
14	1949	0.0770	0.0330	1915.3
15	1874	0.0852	0.0401	2094.5
16	1749	0.0936	0.0513	2232.6
17	1623	0.1018	0.0629	2340.8
18	1537	0.1098	0.0740	2440.4
19	1412	0.1214	0.0912	2541.6

WIDTH: 0.9994 (IN),25.385 (MM)
THICKNESS: 0.5024 (IN),12.761 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2516 (IN),6.391 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8584 (IN),21.803 (MM)
DISTANCE 2: 0.8680 (IN),22.047 (MM)
DISTANCE 3: 0.8700 (IN),22.098 (MM)
DISTANCE 4: 0.8712 (IN),22.128 (MM)
DISTANCE 5: 0.8712 (IN),22.128 (MM)
DISTANCE 6: 0.8715 (IN),22.136 (MM)
DISTANCE 7: 0.8681 (IN),22.050 (MM)
DISTANCE 8: 0.8651 (IN),21.974 (MM)
DISTANCE 9: 0.8551 (IN),21.720 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9476 (IN),24.069 (MM)
DISTANCE 2: 0.9714 (IN),24.674 (MM)
DISTANCE 3: 0.9782 (IN),24.846 (MM)
DISTANCE 4: 0.9800 (IN),24.892 (MM)
DISTANCE 5: 0.9741 (IN),24.742 (MM)
DISTANCE 6: 0.9672 (IN),24.567 (MM)
DISTANCE 7: 0.9610 (IN),24.409 (MM)
DISTANCE 8: 0.9530 (IN),24.206 (MM)
DISTANCE 9: 0.9335 (IN),23.711 (MM)

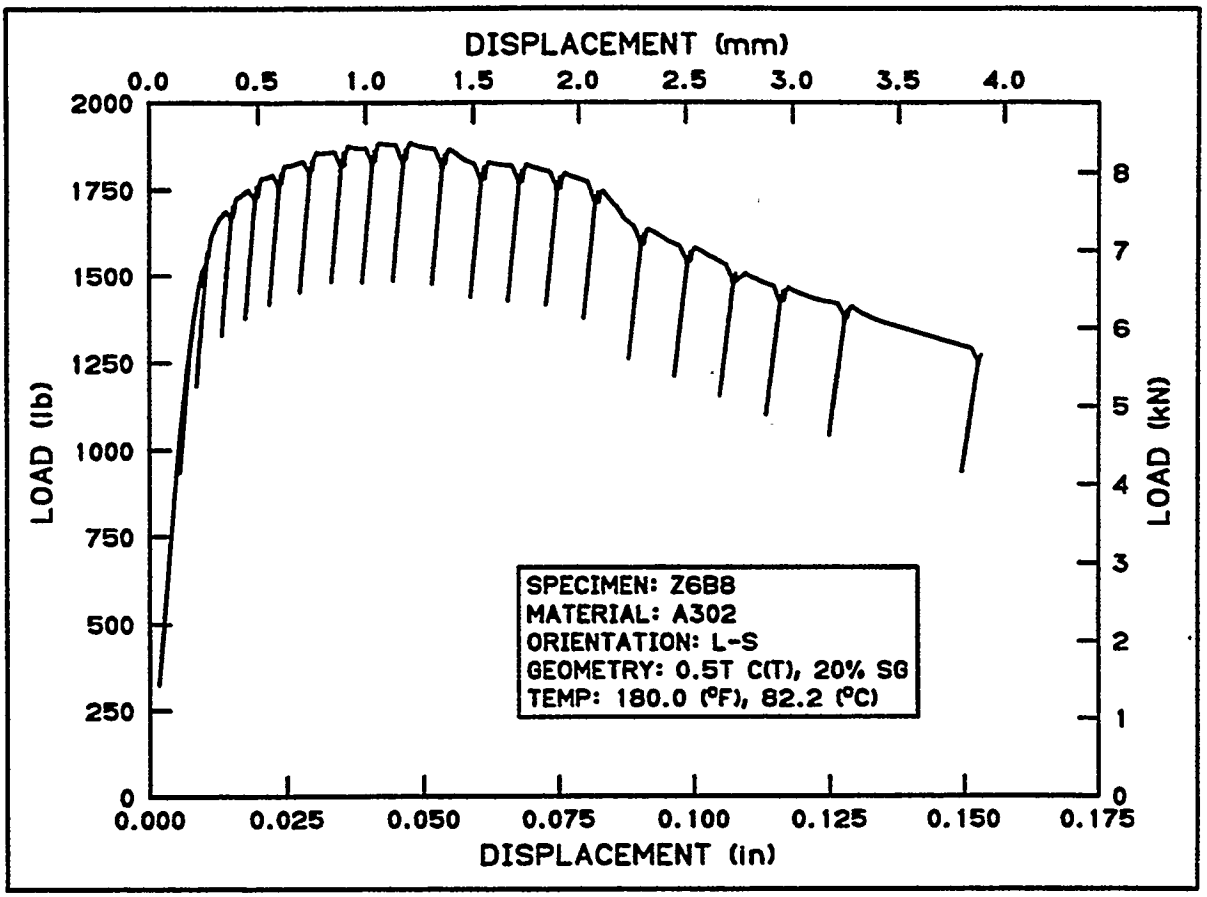

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

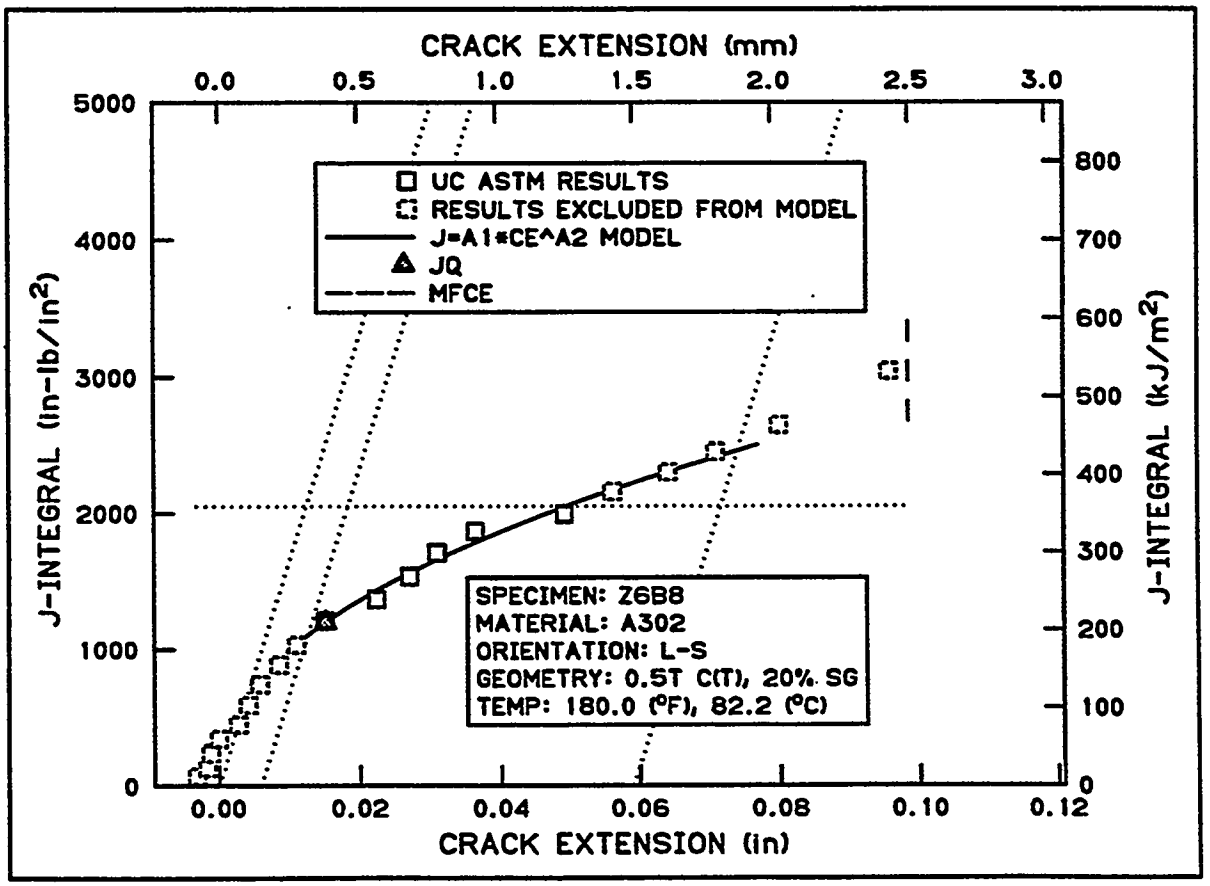

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B8
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6268 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1217	0.0067	-0.0031	68.6
2	1509	0.0095	-0.0016	129.5
3	1687	0.0138	-0.0012	235.5
4	1749	0.0178	0.0000	340.8
5	1791	0.0223	0.0028	447.5
6	1830	0.0279	0.0042	591.8
7	1859	0.0336	0.0058	741.7
8	1868	0.0394	0.0085	886.4
9	1878	0.0449	0.0110	1031.8
10	1867	0.0519	0.0151	1209.6
11	1824	0.0592	0.0224	1369.0
12	1817	0.0662	0.0271	1534.8
13	1801	0.0732	0.0310	1707.8
14	1770	0.0804	0.0363	1865.5
15	1645	0.0889	0.0492	1992.8
16	1586	0.0972	0.0561	2157.0
17	1532	0.1058	0.0640	2301.2
18	1469	0.1146	0.0708	2451.8
19	1417	0.1264	0.0799	2648.0
20	1288	0.1512	0.0956	3042.1

  WIDTH: 0.9997 (IN),25.392 (MM)
  THICKNESS: 0.5024 (IN),12.761 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2510 (IN),6.375 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8685 (IN),22.060 (MM)
    DISTANCE 2: 0.8770 (IN),22.276 (MM)
    DISTANCE 3: 0.8799 (IN),22.349 (MM)
    DISTANCE 4: 0.8812 (IN),22.382 (MM)
    DISTANCE 5: 0.8823 (IN),22.410 (MM)
    DISTANCE 6: 0.8814 (IN),22.388 (MM)
    DISTANCE 7: 0.8758 (IN),22.245 (MM)
    DISTANCE 8: 0.8760 (IN),22.250 (MM)
    DISTANCE 9: 0.8693 (IN),22.080 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9514 (IN),24.166 (MM)
    DISTANCE 2: 0.9884 (IN),25.105 (MM)
    DISTANCE 3: 0.9558 (IN),24.277 (MM)
    DISTANCE 4: 0.9862 (IN),25.049 (MM)
    DISTANCE 5: 0.9720 (IN),24.689 (MM)
    DISTANCE 6: 0.9584 (IN),24.343 (MM)
    DISTANCE 7: 0.9872 (IN),25.075 (MM)
    DISTANCE 8: 0.9926 (IN),25.212 (MM)
    DISTANCE 9: 0.9866 (IN),25.060 (MM)

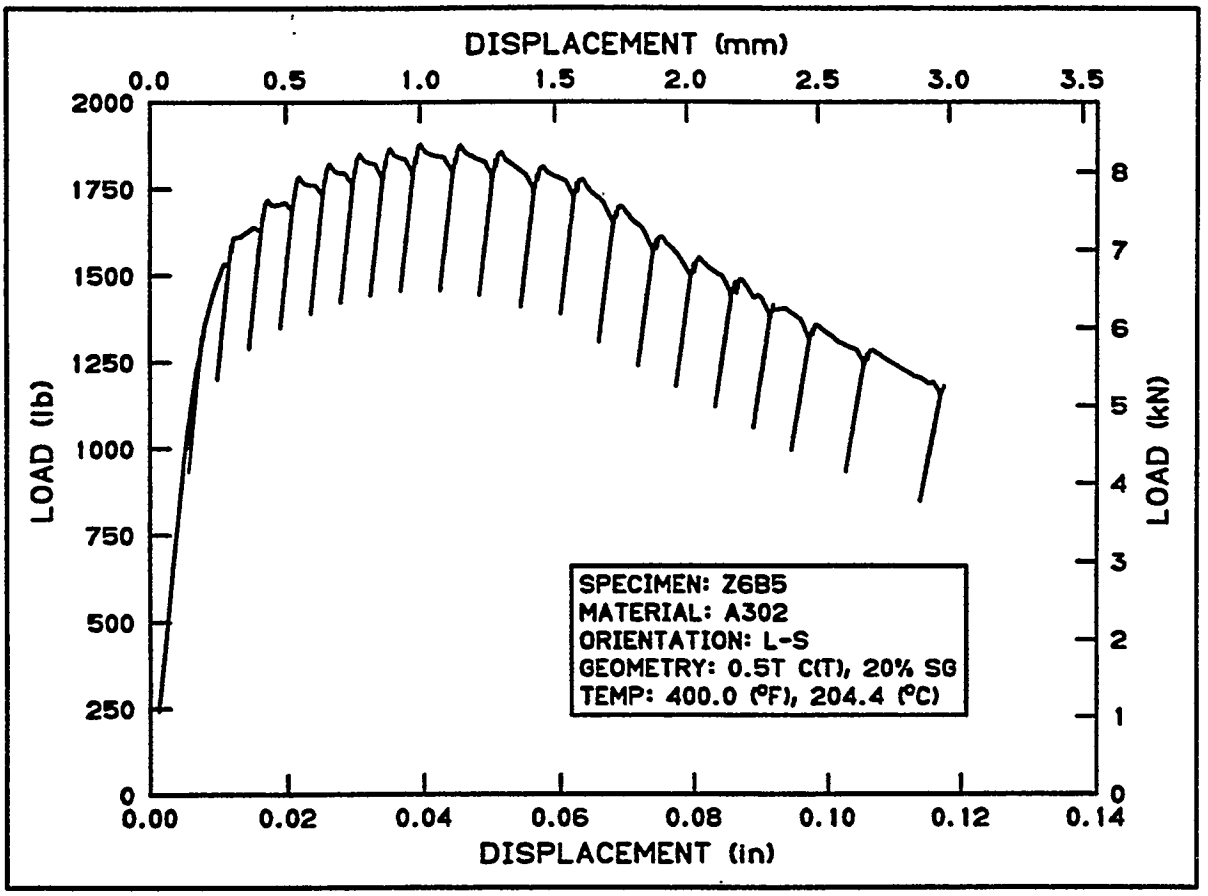

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z6B8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

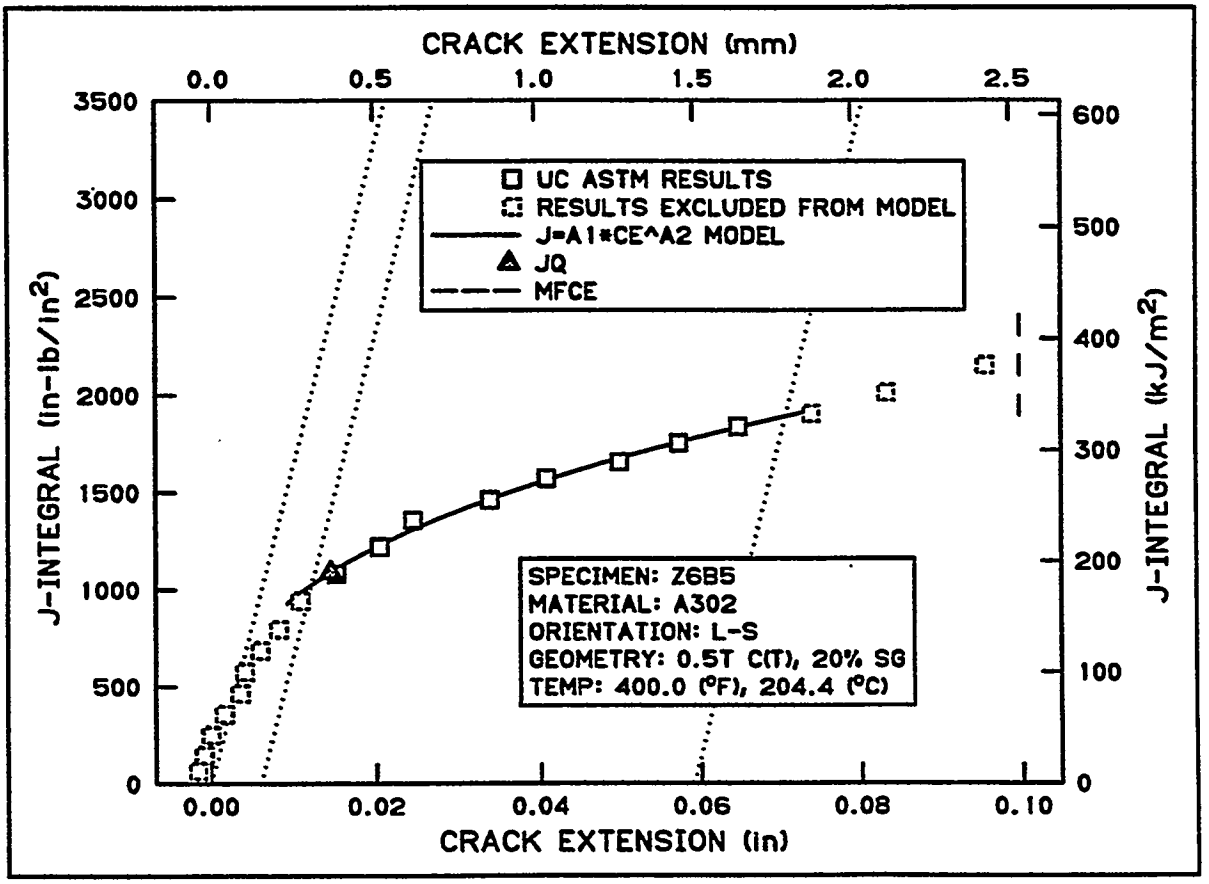

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B8
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B5
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6237 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1221	0.0068	-0.0016	65.1
2	1532	0.0108	-0.0008	147.9
3	1640	0.0150	0.0000	250.5
4	1710	0.0196	0.0016	357.7
5	1760	0.0240	0.0035	464.5
6	1795	0.0283	0.0040	575.6
7	1822	0.0328	0.0059	685.1
8	1835	0.0372	0.0082	795.8
9	1840	0.0429	0.0108	942.7
10	1829	0.0489	0.0152	1080.3
11	1792	0.0549	0.0204	1219.2
12	1772	0.0608	0.0245	1356.2
13	1711	0.0664	0.0339	1459.6
14	1635	0.0722	0.0408	1569.7
15	1537	0.0782	0.0499	1653.5
16	1496	0.0842	0.0572	1751.0
17	1432	0.0900	0.0646	1834.5
18	1371	0.0959	0.0737	1900.7
19	1286	0.1042	0.0832	2009.3
20	1192	0.1157	0.0955	2148.7

  WIDTH: 0.9985 (IN),25.362 (MM)
  THICKNESS: 0.5024 (IN),12.761 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2518 (IN),6.396 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8626 (IN),21.910 (MM)
    DISTANCE 2: 0.8750 (IN),22.225 (MM)
    DISTANCE 3: 0.8766 (IN),22.266 (MM)
    DISTANCE 4: 0.8778 (IN),22.296 (MM)
    DISTANCE 5: 0.8806 (IN),22.367 (MM)
    DISTANCE 6: 0.8788 (IN),22.322 (MM)
    DISTANCE 7: 0.8766 (IN),22.266 (MM)
    DISTANCE 8: 0.8731 (IN),22.177 (MM)
    DISTANCE 9: 0.8686 (IN),22.062 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9509 (IN),24.153 (MM)
    DISTANCE 2: 0.9708 (IN),24.658 (MM)
    DISTANCE 3: 0.9844 (IN),25.004 (MM)
    DISTANCE 4: 0.9548 (IN),24.252 (MM)
    DISTANCE 5: 0.9702 (IN),24.643 (MM)
    DISTANCE 6: 0.9750 (IN),24.765 (MM)
    DISTANCE 7: 0.9846 (IN),25.009 (MM)
    DISTANCE 8: 0.9922 (IN),25.202 (MM)
    DISTANCE 9: 0.9878 (IN),25.090 (MM)

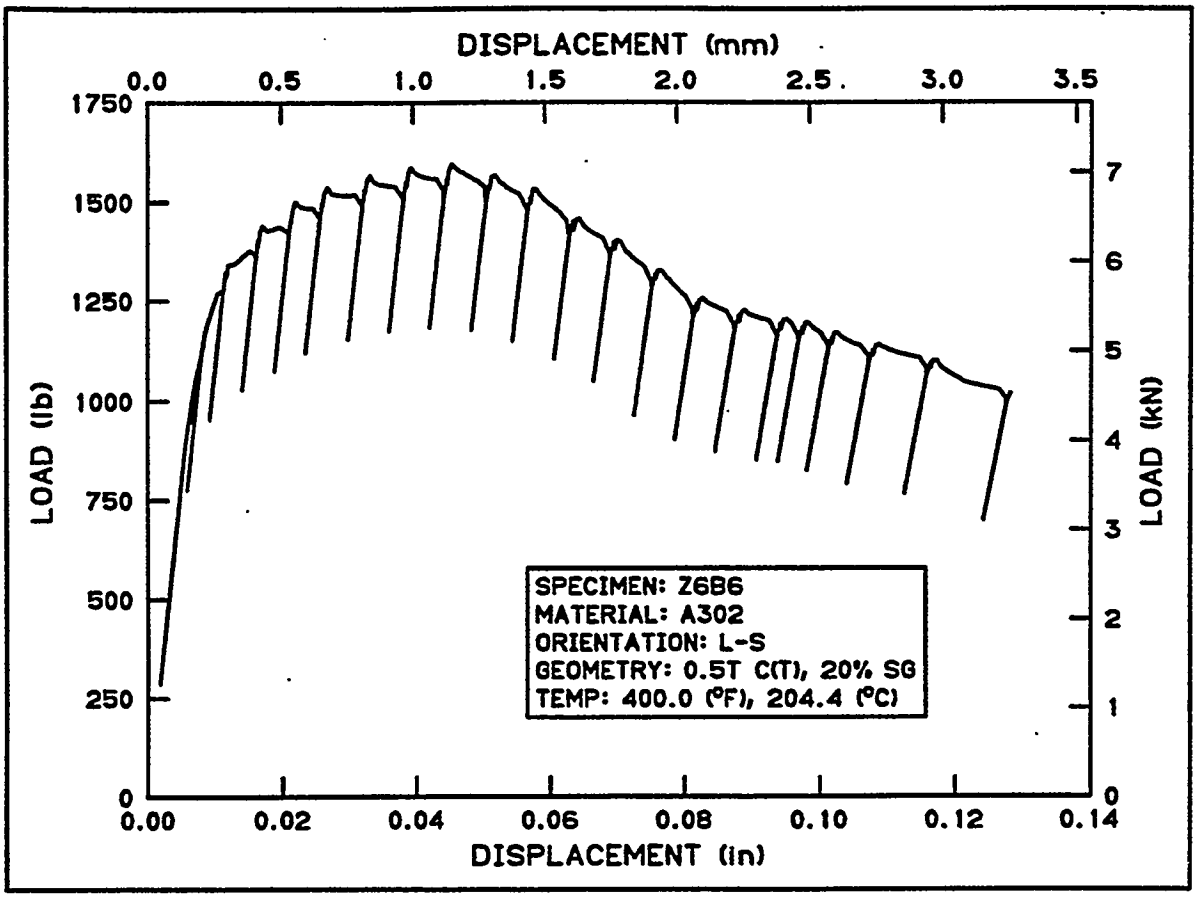

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z6B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

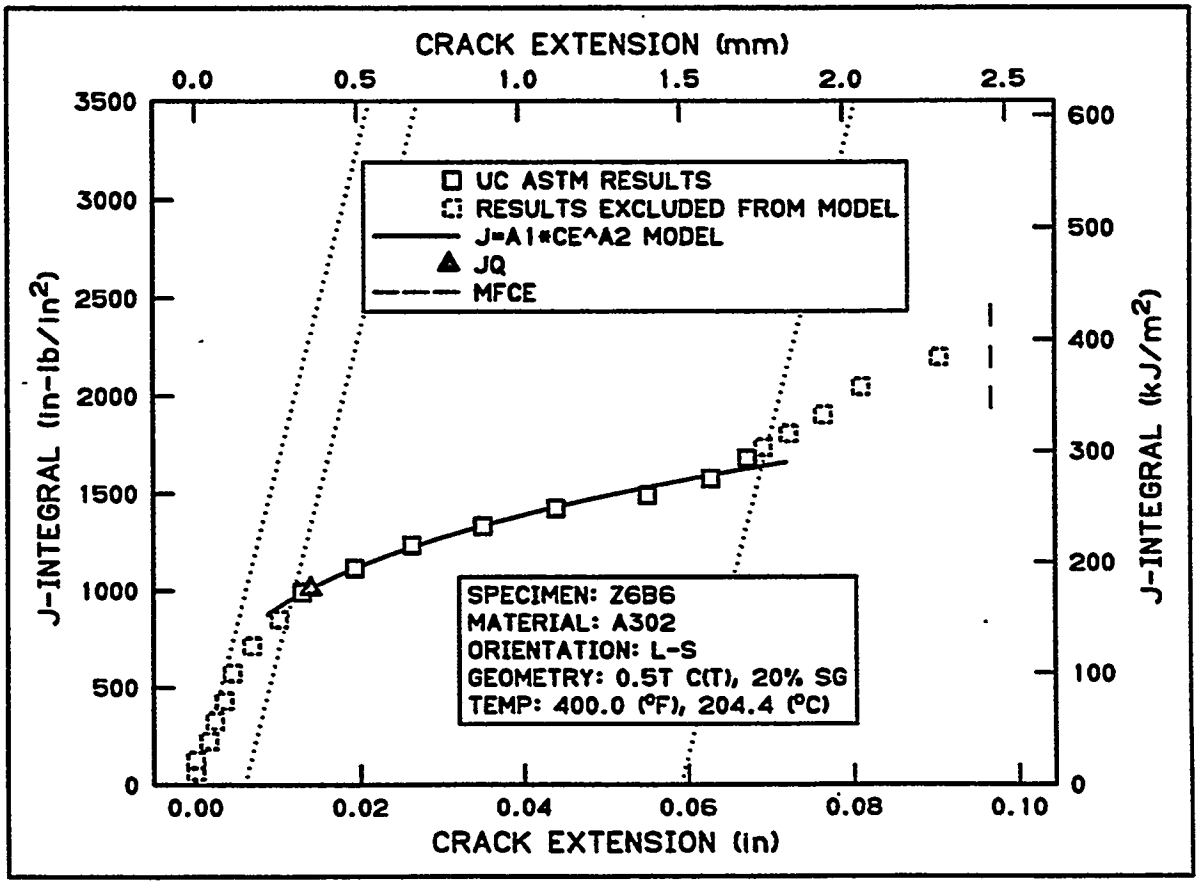

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B6
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6516 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1060	0.0071	0.0000	66.4
2	1268	0.0103	0.0000	126.5
3	1377	0.0151	0.0016	225.3
4	1436	0.0196	0.0023	328.8
5	1484	0.0245	0.0034	430.6
6	1518	0.0307	0.0044	574.6
7	1539	0.0367	0.0068	714.7
8	1557	0.0429	0.0101	851.2
9	1553	0.0491	0.0129	992.1
10	1518	0.0553	0.0193	1114.8
11	1472	0.0614	0.0263	1234.2
12	1408	0.0677	0.0350	1331.0
13	1336	0.0739	0.0439	1422.4
14	1260	0.0801	0.0551	1489.4
15	1222	0.0862	0.0628	1573.6
16	1199	0.0925	0.0673	1678.0
17	1195	0.0957	0.0691	1734.9
18	1171	0.1000	0.0722	1805.8
19	1137	0.1059	0.0764	1902.1
20	1106	0.1147	0.0809	2044.3
21	1027	0.1265	0.0904	2195.9

  WIDTH: 0.9974 (IN),25.334 (MM)
  THICKNESS: 0.5024 (IN),12.761 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2515 (IN),6.388 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8916 (IN),22.647 (MM)
    DISTANCE 2: 0.9008 (IN),22.880 (MM)
    DISTANCE 3: 0.9066 (IN),23.028 (MM)
    DISTANCE 4: 0.9067 (IN),23.030 (MM)
    DISTANCE 5: 0.9054 (IN),22.997 (MM)
    DISTANCE 6: 0.9054 (IN),22.997 (MM)
    DISTANCE 7: 0.9049 (IN),22.984 (MM)
    DISTANCE 8: 0.9023 (IN),22.918 (MM)
    DISTANCE 9: 0.8940 (IN),22.708 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0046 (IN),25.517 (MM)
    DISTANCE 2: 1.0372 (IN),26.345 (MM)
    DISTANCE 3: 1.0017 (IN),25.443 (MM)
    DISTANCE 4: 0.9970 (IN),25.324 (MM)
    DISTANCE 5: 0.9886 (IN),25.110 (MM)
    DISTANCE 6: 0.9818 (IN),24.938 (MM)
    DISTANCE 7: 1.0033 (IN),25.484 (MM)
    DISTANCE 8: 0.9891 (IN),25.123 (MM)
    DISTANCE 9: 0.9944 (IN),25.258 (MM)

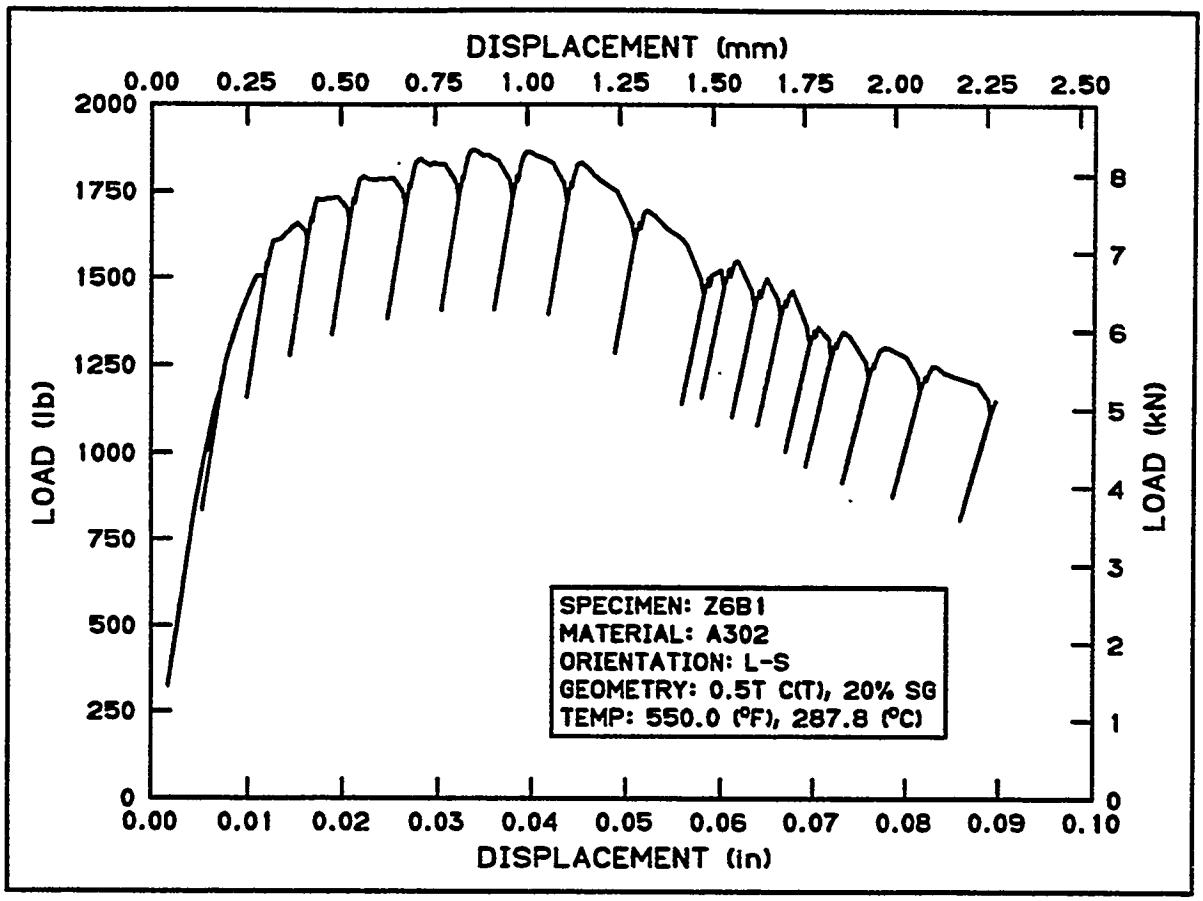

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

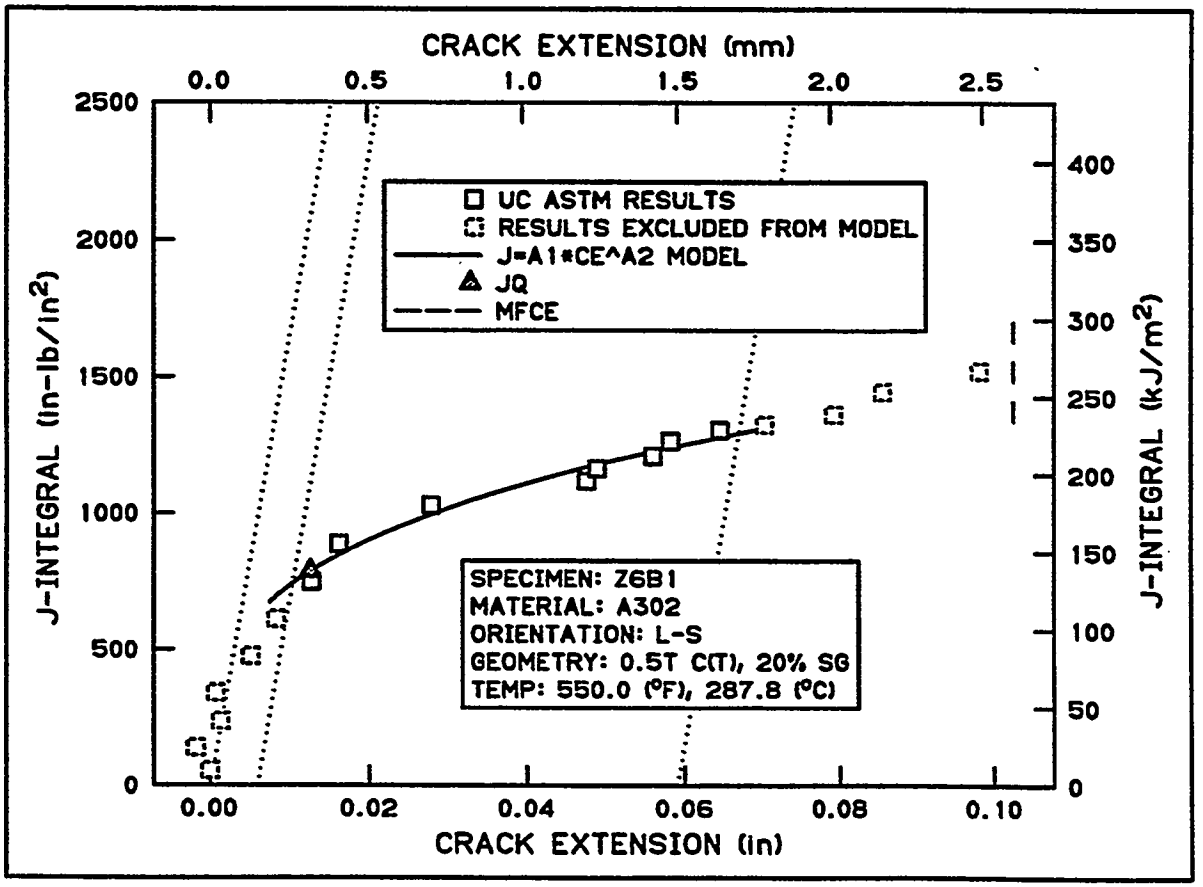

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B1
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6233 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1125	0.0065	0.0000	55.2
2	1503	0.0109	-0.0017	139.7
3	1657	0.0152	0.0013	237.2
4	1734	0.0193	0.0007	341.1
5	1790	0.0251	0.0051	476.4
6	1828	0.0307	0.0083	612.8
7	1840	0.0363	0.0128	748.9
8	1833	0.0422	0.0162	888.3
9	1751	0.0489	0.0278	1029.6
10	1595	0.0564	0.0476	1120.1
11	1508	0.0590	0.0489	1164.4
12	1549	0.0618	0.0560	1211.1
13	1499	0.0649	0.0583	1266.3
14	1464	0.0677	0.0645	1306.9
15	1358	0.0705	0.0703	1327.2
16	1308	0.0745	0.0792	1364.8
17	1275	0.0800	0.0855	1447.4
18	1197	0.0877	0.0981	1524.0

  WIDTH: 1.0000 (IN),25.400 (MM)
  THICKNESS: 0.5023 (IN),12.758 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2510 (IN),6.375 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8628 (IN),21.915 (MM)
    DISTANCE 2: 0.8682 (IN),22.052 (MM)
    DISTANCE 3: 0.8743 (IN),22.207 (MM)
    DISTANCE 4: 0.8782 (IN),22.306 (MM)
    DISTANCE 5: 0.8771 (IN),22.278 (MM)
    DISTANCE 6: 0.8778 (IN),22.296 (MM)
    DISTANCE 7: 0.8769 (IN),22.273 (MM)
    DISTANCE 8: 0.8754 (IN),22.235 (MM)
    DISTANCE 9: 0.8698 (IN),22.093 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9872 (IN),25.075 (MM)
    DISTANCE 2: 0.9584 (IN),24.343 (MM)
    DISTANCE 3: 0.9681 (IN),24.590 (MM)
    DISTANCE 4: 0.9774 (IN),24.826 (MM)
    DISTANCE 5: 0.9728 (IN),24.709 (MM)
    DISTANCE 6: 0.9846 (IN),25.009 (MM)
    DISTANCE 7: 0.9724 (IN),24.699 (MM)
    DISTANCE 8: 0.9932 (IN),25.227 (MM)
    DISTANCE 9: 0.9860 (IN),25.044 (MM)

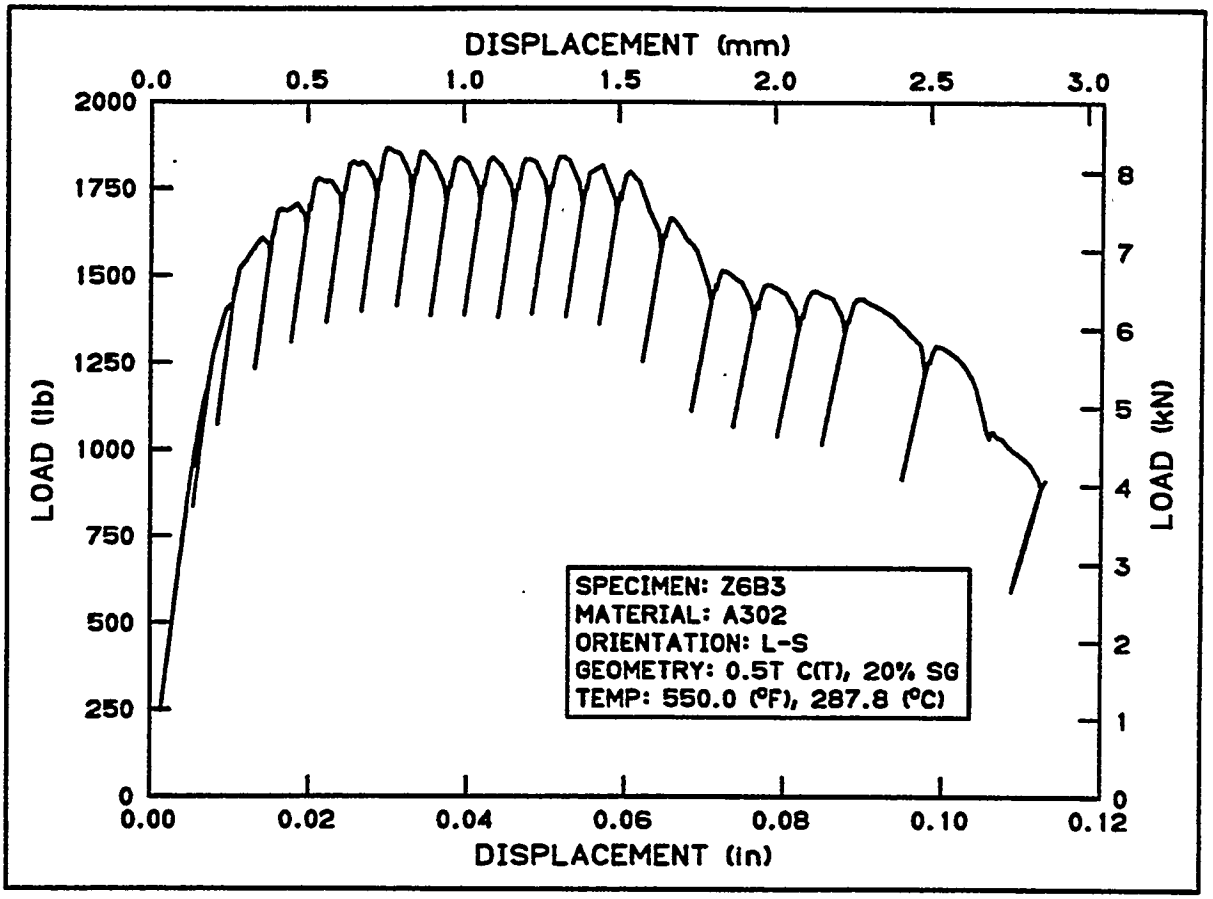

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z6B1
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

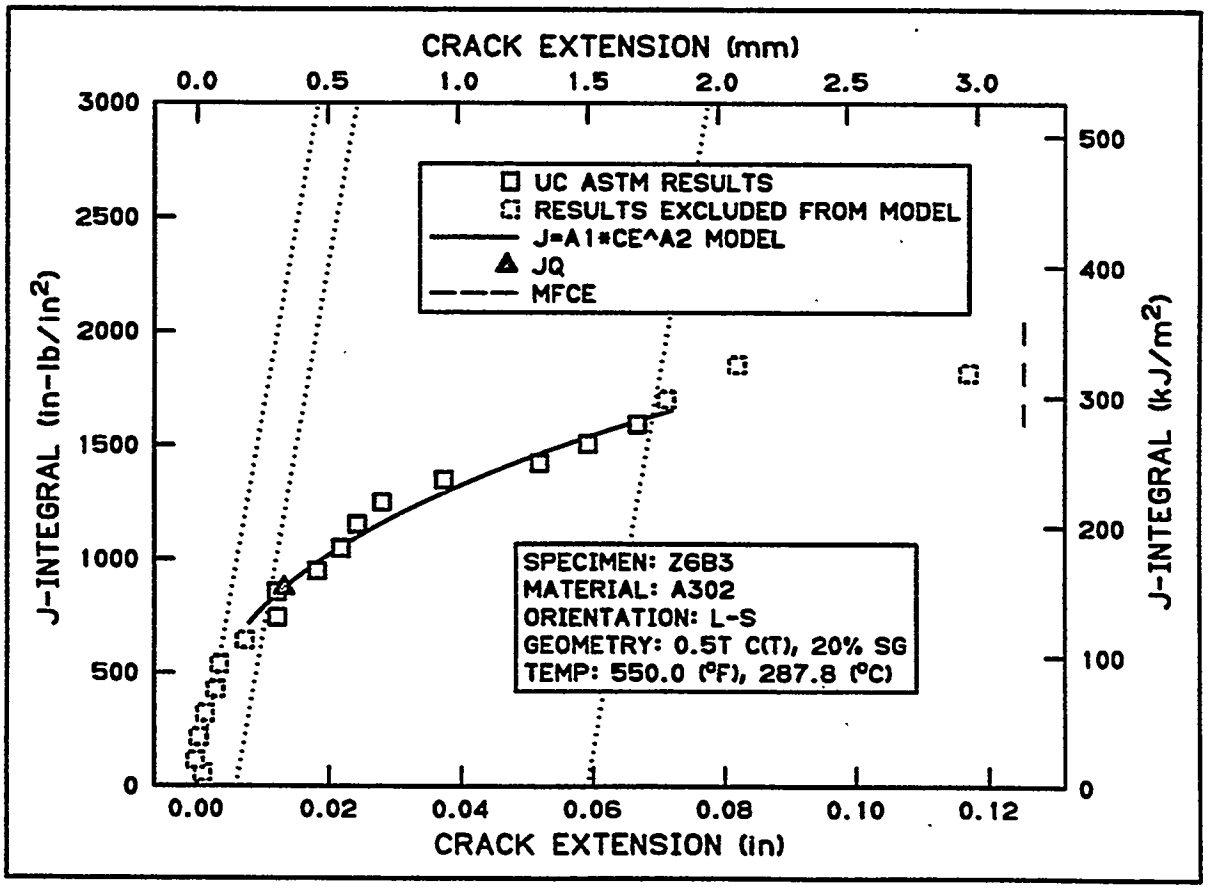

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B1
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B3
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6298 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1130	0.0067	0.0009	58.5
2	1401	0.0095	-0.0002	114.6
3	1608	0.0140	0.0003	215.5
4	1706	0.0184	0.0012	320.5
5	1772	0.0227	0.0028	426.9
6	1820	0.0270	0.0034	535.8
7	1852	0.0312	0.0073	642.0
8	1822	0.0357	0.0121	743.9
9	1825	0.0399	0.0121	855.7
10	1815	0.0442	0.0181	947.7
11	1827	0.0485	0.0217	1047.4
12	1831	0.0528	0.0242	1153.0
13	1816	0.0570	0.0279	1250.7
14	1688	0.0628	0.0373	1349.1
15	1568	0.0689	0.0519	1423.1
16	1481	0.0746	0.0592	1508.0
17	1451	0.0801	0.0667	1594.7
18	1434	0.0861	0.0710	1703.1
19	1324	0.0963	0.0818	1856.1
20	961	0.1110	0.1168	1820.7

  WIDTH: 0.9992 (IN),25.380 (MM)
  THICKNESS: 0.5023 (IN),12.758 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2511 (IN),6.378 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8698 (IN),22.093 (MM)
    DISTANCE 2: 0.8792 (IN),22.332 (MM)
    DISTANCE 3: 0.8792 (IN),22.332 (MM)
    DISTANCE 4: 0.8808 (IN),22.372 (MM)
    DISTANCE 5: 0.8819 (IN),22.400 (MM)
    DISTANCE 6: 0.8871 (IN),22.532 (MM)
    DISTANCE 7: 0.8856 (IN),22.494 (MM)
    DISTANCE 8: 0.8817 (IN),22.395 (MM)
    DISTANCE 9: 0.8732 (IN),22.179 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9670 (IN),24.562 (MM)
    DISTANCE 2: 1.0004 (IN),25.410 (MM)
    DISTANCE 3: 1.0090 (IN),25.629 (MM)
    DISTANCE 4: 0.9958 (IN),25.293 (MM)
    DISTANCE 5: 1.0040 (IN),25.502 (MM)
    DISTANCE 6: 1.0180 (IN),25.857 (MM)
    DISTANCE 7: 1.0248 (IN),26.030 (MM)
    DISTANCE 8: 1.0080 (IN),25.603 (MM)
    DISTANCE 9: 1.0094 (IN),25.639 (MM)

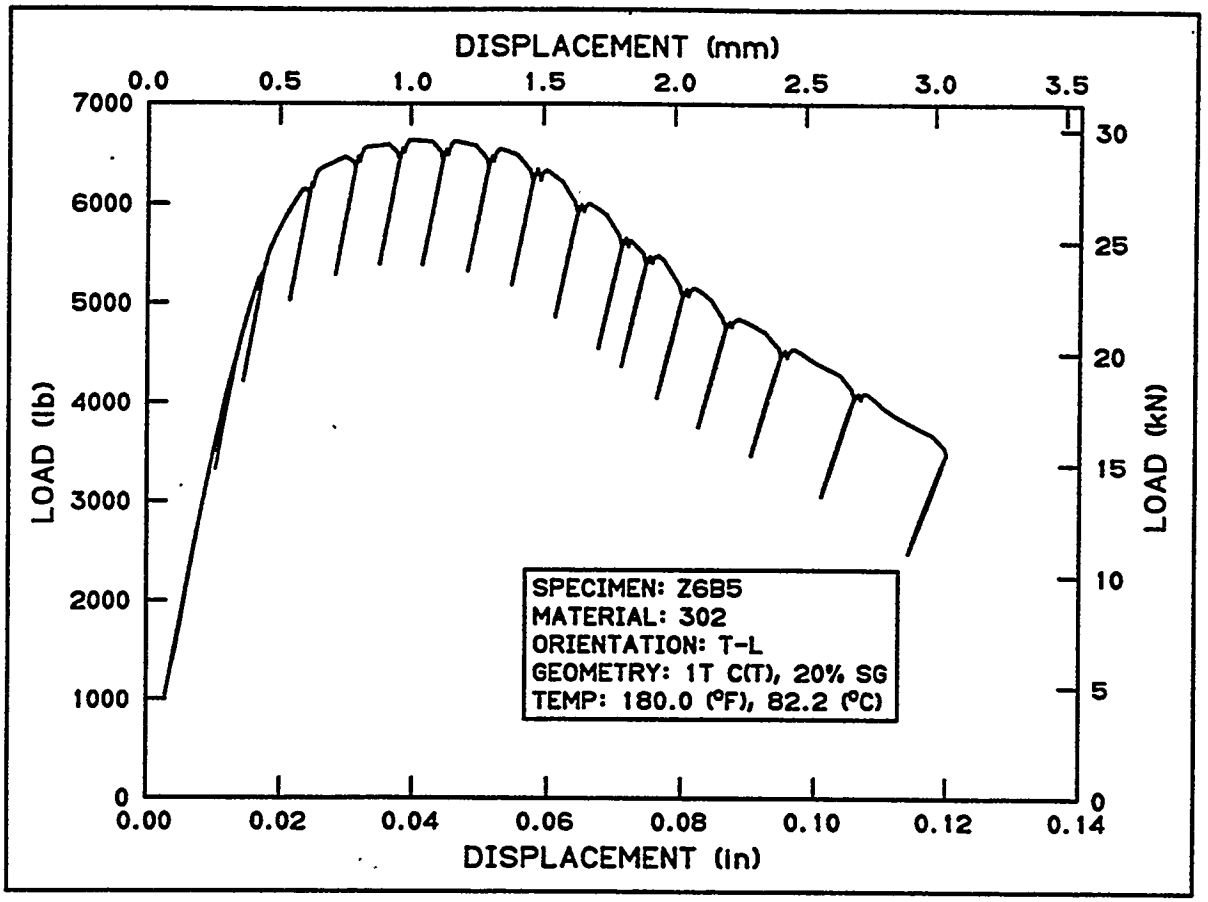

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

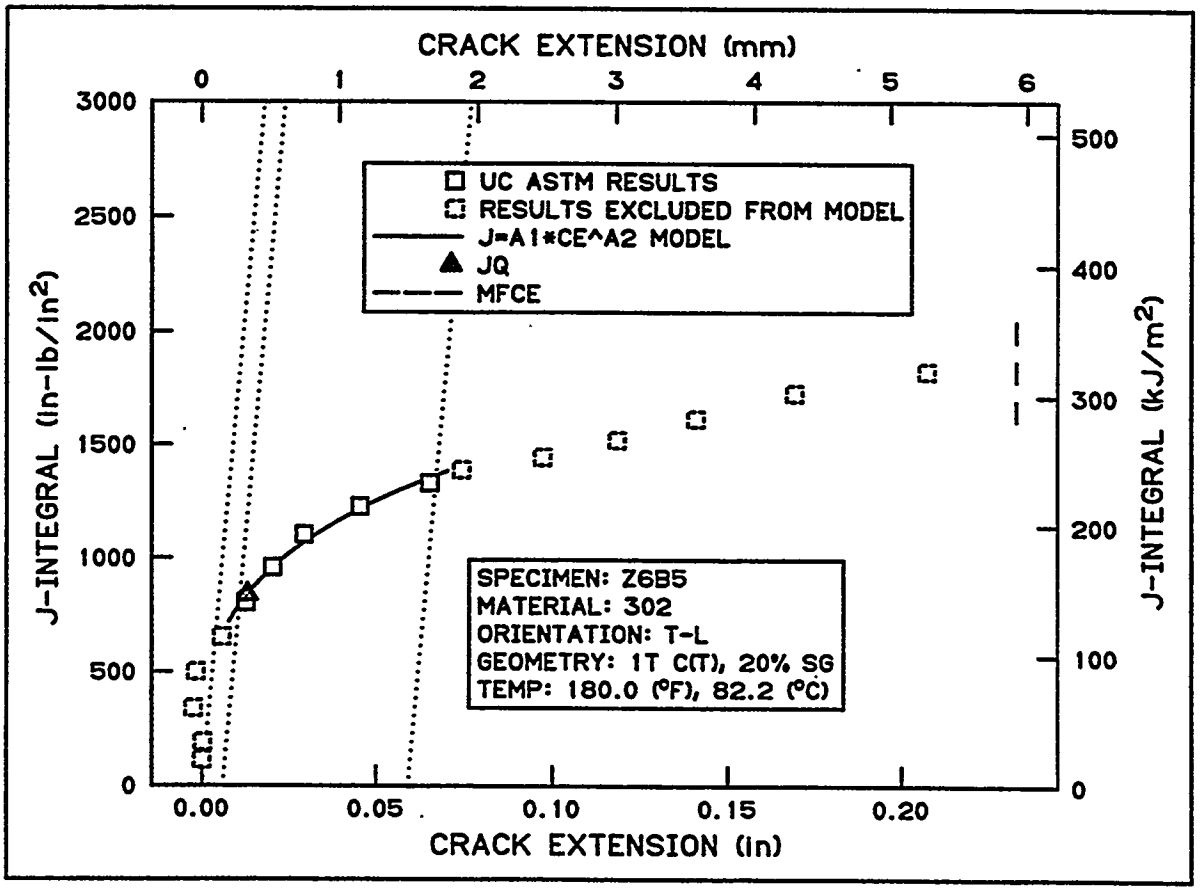

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B5
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2762 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4290	0.0126	0.0000	113.6
2	5249	0.0167	0.0002	190.4
3	6139	0.0232	-0.0024	339.7
4	6466	0.0295	-0.0017	500.8
5	6593	0.0360	0.0057	654.5
6	6624	0.0425	0.0126	804.0
7	6586	0.0490	0.0202	958.3
8	6486	0.0552	0.0292	1103.1
9	6221	0.0619	0.0454	1227.4
10	5888	0.0685	0.0653	1332.0
11	5634	0.0721	0.0743	1389.0
12	5432	0.0772	0.0972	1445.6
13	5037	0.0843	0.1185	1519.9
14	4719	0.0924	0.1409	1614.7
15	4282	0.1038	0.1691	1729.2
16	3675	0.1179	0.2074	1825.9

  WIDTH: 1.9996 (IN),50.790 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5014 (IN),12.736 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7727 (IN),45.027 (MM)
    DISTANCE 2: 1.7830 (IN),45.288 (MM)
    DISTANCE 3: 1.7855 (IN),45.352 (MM)
    DISTANCE 4: 1.7852 (IN),45.344 (MM)
    DISTANCE 5: 1.7826 (IN),45.278 (MM)
    DISTANCE 6: 1.7774 (IN),45.146 (MM)
    DISTANCE 7: 1.7728 (IN),45.029 (MM)
    DISTANCE 8: 1.7702 (IN),44.963 (MM)
    DISTANCE 9: 1.7560 (IN),44.602 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9837 (IN),50.386 (MM)
    DISTANCE 2: 2.0388 (IN),51.786 (MM)
    DISTANCE 3: 2.0162 (IN),51.211 (MM)
    DISTANCE 4: 2.0061 (IN),50.955 (MM)
    DISTANCE 5: 2.0268 (IN),51.481 (MM)
    DISTANCE 6: 1.9833 (IN),50.376 (MM)
    DISTANCE 7: 2.0072 (IN),50.983 (MM)
    DISTANCE 8: 2.0196 (IN),51.298 (MM)
    DISTANCE 9: 1.9937 (IN),50.640 (MM)

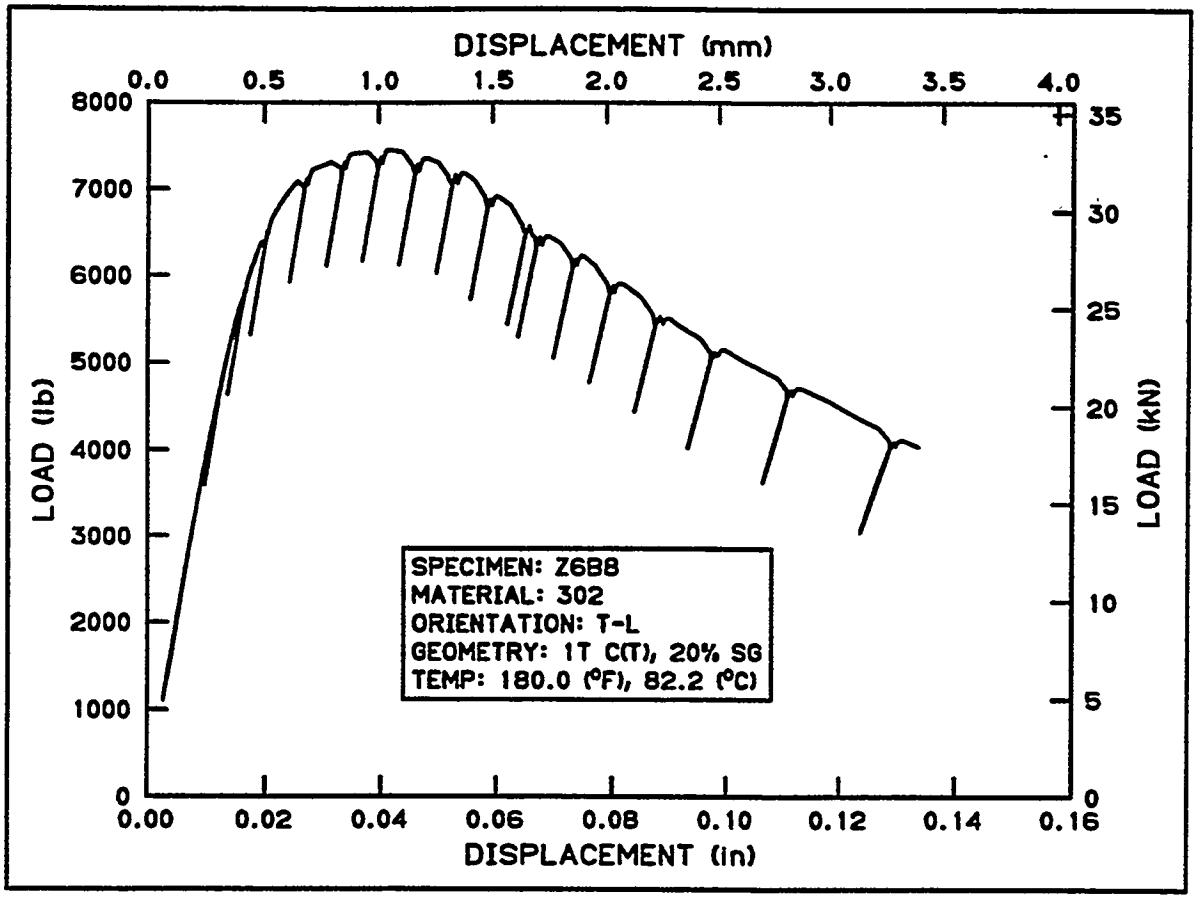

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6B5
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

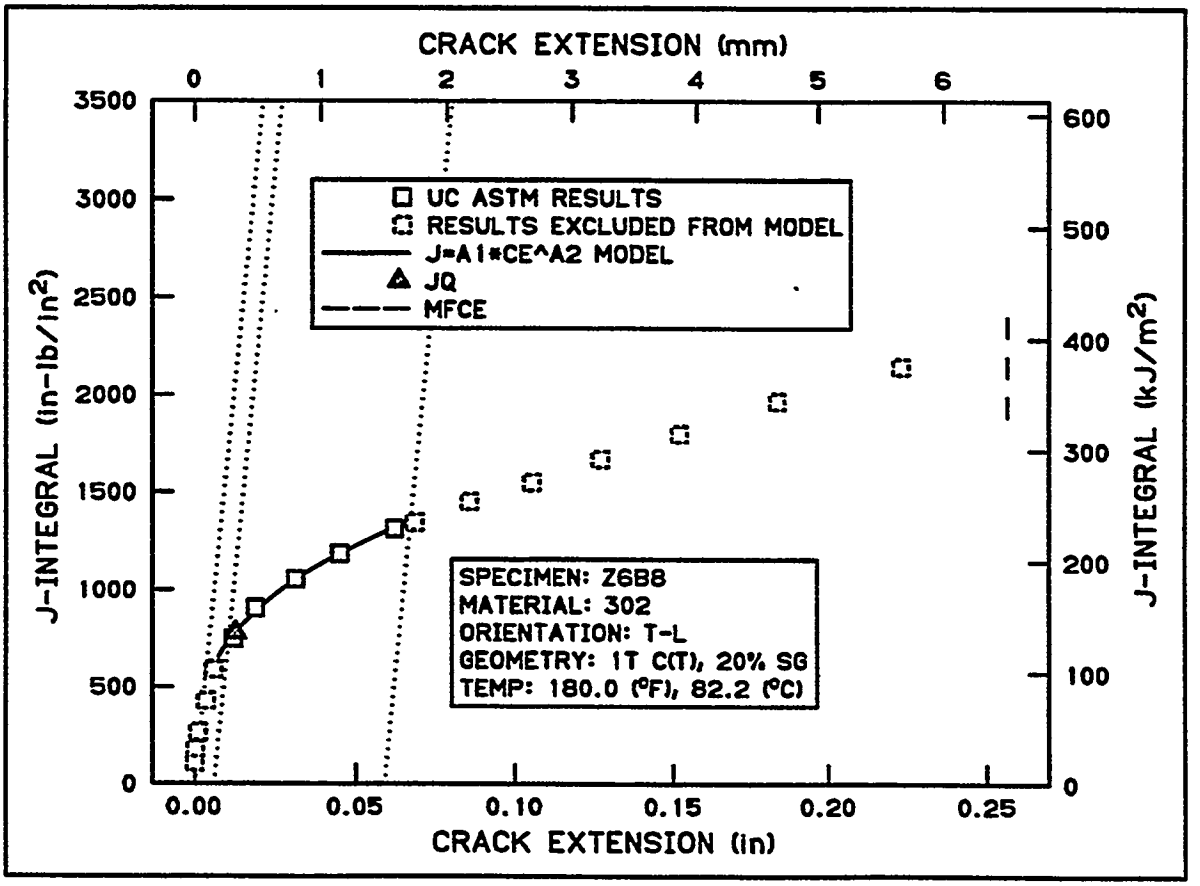

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B5
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B8
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2387 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4554	0.0118	0.0000	107.7
2	5620	0.0155	0.0002	180.5
3	6370	0.0191	0.0011	265.1
4	7081	0.0254	0.0035	428.1
5	7308	0.0312	0.0059	589.5
6	7423	0.0375	0.0120	747.2
7	7426	0.0436	0.0188	906.7
8	7304	0.0497	0.0314	1054.2
9	7097	0.0560	0.0451	1186.7
10	6812	0.0622	0.0624	1312.7
11	6462	0.0659	0.0686	1345.4
12	6368	0.0708	0.0858	1452.0
13	6114	0.0768	0.1054	1550.6
14	5747	0.0848	0.1270	1669.8
15	5273	0.0952	0.1520	1799.2
16	4820	0.1090	0.1836	1967.5
17	4248	0.1268	0.2229	2146.0

  WIDTH: 1.9989 (IN),50.772 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5018 (IN),12.746 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7334 (IN),44.028 (MM)
    DISTANCE 2: 1.7408 (IN),44.216 (MM)
    DISTANCE 3: 1.7458 (IN),44.343 (MM)
    DISTANCE 4: 1.7420 (IN),44.247 (MM)
    DISTANCE 5: 1.7452 (IN),44.328 (MM)
    DISTANCE 6: 1.7450 (IN),44.323 (MM)
    DISTANCE 7: 1.7427 (IN),44.265 (MM)
    DISTANCE 8: 1.7334 (IN),44.028 (MM)
    DISTANCE 9: 1.7246 (IN),43.805 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 2.0297 (IN),51.554 (MM)
    DISTANCE 2: 2.0048 (IN),50.922 (MM)
    DISTANCE 3: 1.9942 (IN),50.653 (MM)
    DISTANCE 4: 2.0182 (IN),51.262 (MM)
    DISTANCE 5: 1.9818 (IN),50.338 (MM)
    DISTANCE 6: 1.9842 (IN),50.399 (MM)
    DISTANCE 7: 1.9784 (IN),50.251 (MM)
    DISTANCE 8: 1.9968 (IN),50.719 (MM)
    DISTANCE 9: 2.0022 (IN),50.856 (MM)

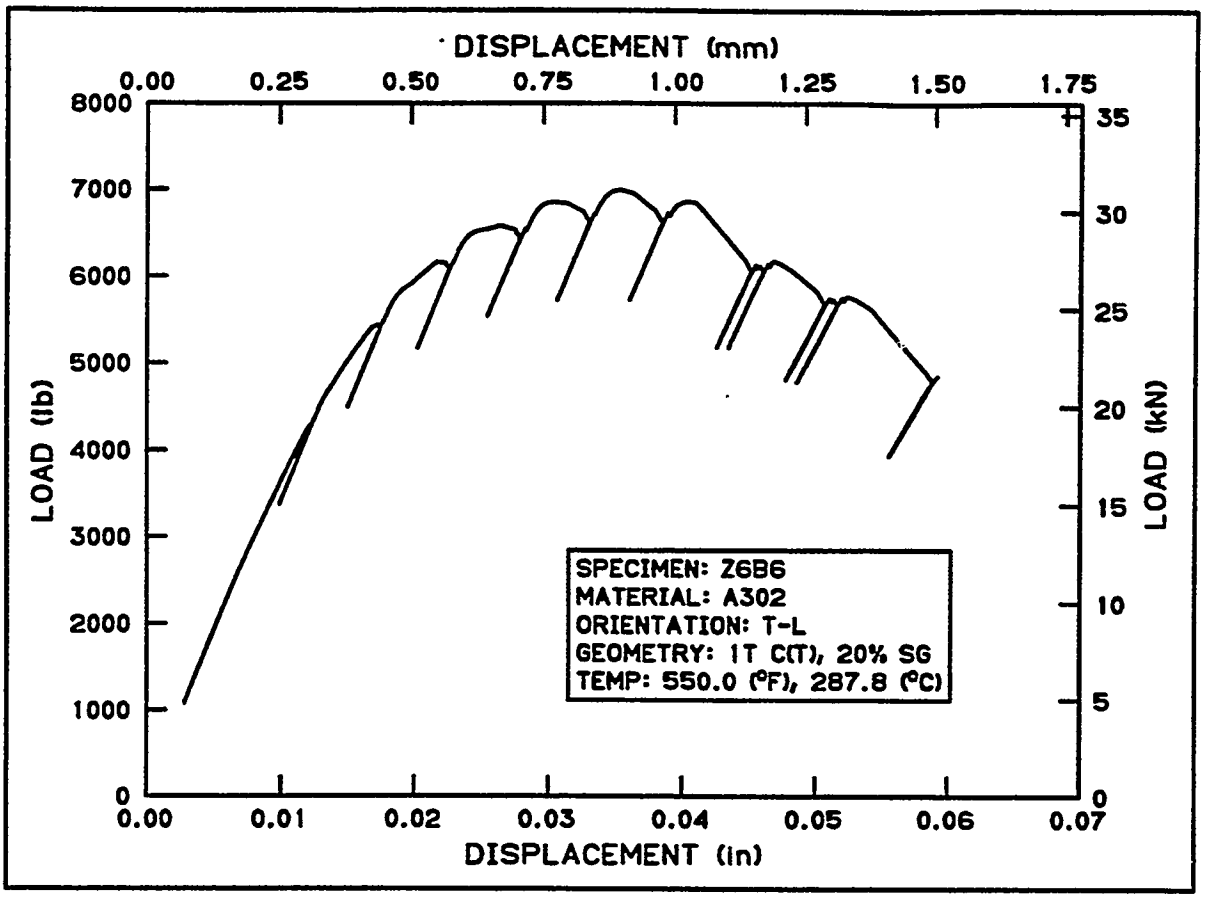

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6B8
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

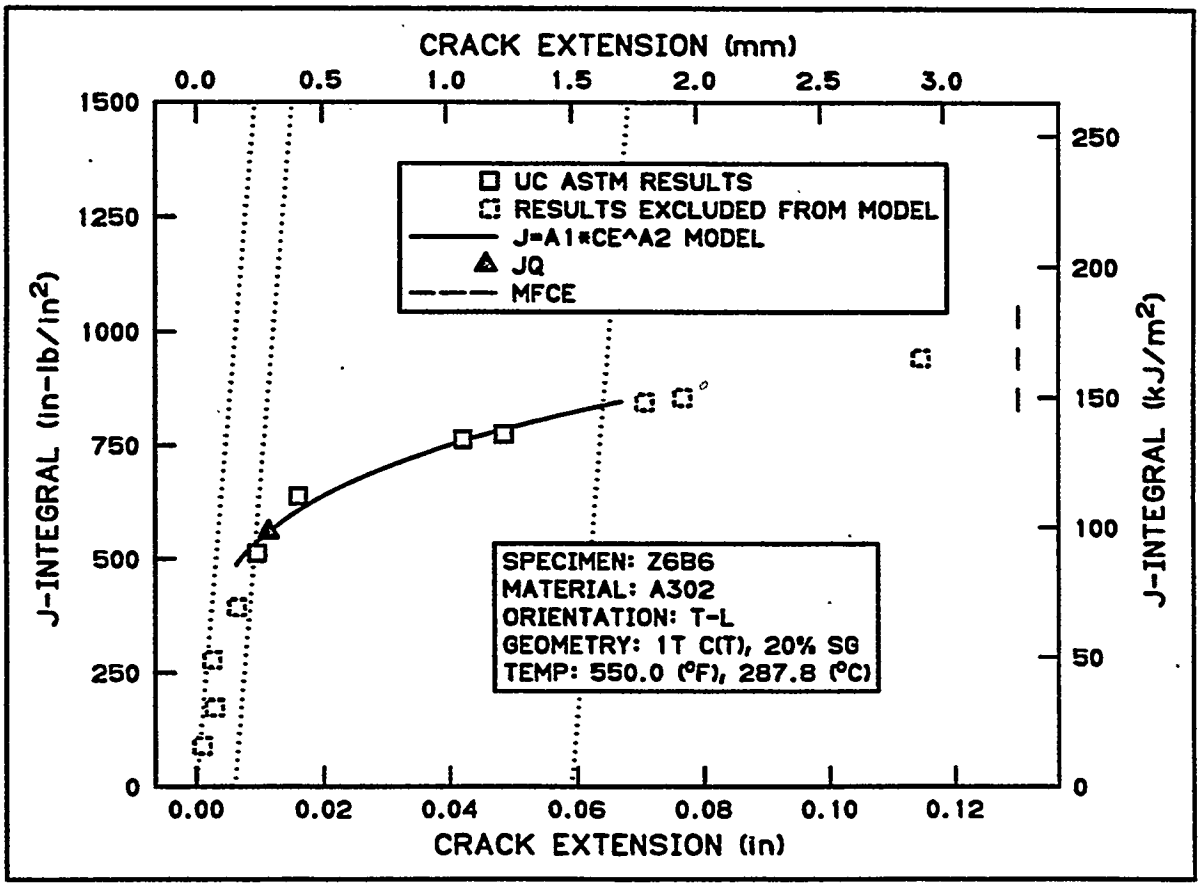

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B8
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B6
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2466 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4207	0.0119	0.0009	89.3
2	5409	0.0168	0.0028	173.2
3	6163	0.0216	0.0025	278.4
4	6581	0.0264	0.0063	394.0
5	6840	0.0313	0.0095	513.0
6	6952	0.0363	0.0160	639.5
7	6820	0.0411	0.0421	763.2
8	6090	0.0456	0.0486	774.8
9	6066	0.0482	0.0707	844.8
10	5705	0.0511	0.0767	855.2
11	5604	0.0543	0.1146	942.4

  WIDTH: 1.9991 (IN),50.777 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7256 (IN),43.830 (MM)
    DISTANCE 2: 1.7366 (IN),44.110 (MM)
    DISTANCE 3: 1.7435 (IN),44.285 (MM)
    DISTANCE 4: 1.7480 (IN),44.399 (MM)
    DISTANCE 5: 1.7526 (IN),44.516 (MM)
    DISTANCE 6: 1.7554 (IN),44.587 (MM)
    DISTANCE 7: 1.7565 (IN),44.615 (MM)
    DISTANCE 8: 1.7542 (IN),44.557 (MM)
    DISTANCE 9: 1.7454 (IN),44.333 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8364 (IN),46.645 (MM)
    DISTANCE 2: 1.8721 (IN),47.551 (MM)
    DISTANCE 3: 1.8784 (IN),47.711 (MM)
    DISTANCE 4: 1.8956 (IN),48.148 (MM)
    DISTANCE 5: 1.8556 (IN),47.132 (MM)
    DISTANCE 6: 1.8935 (IN),48.095 (MM)
    DISTANCE 7: 1.8800 (IN),47.752 (MM)
    DISTANCE 8: 1.8872 (IN),47.935 (MM)
    DISTANCE 9: 1.8844 (IN),47.864 (MM)

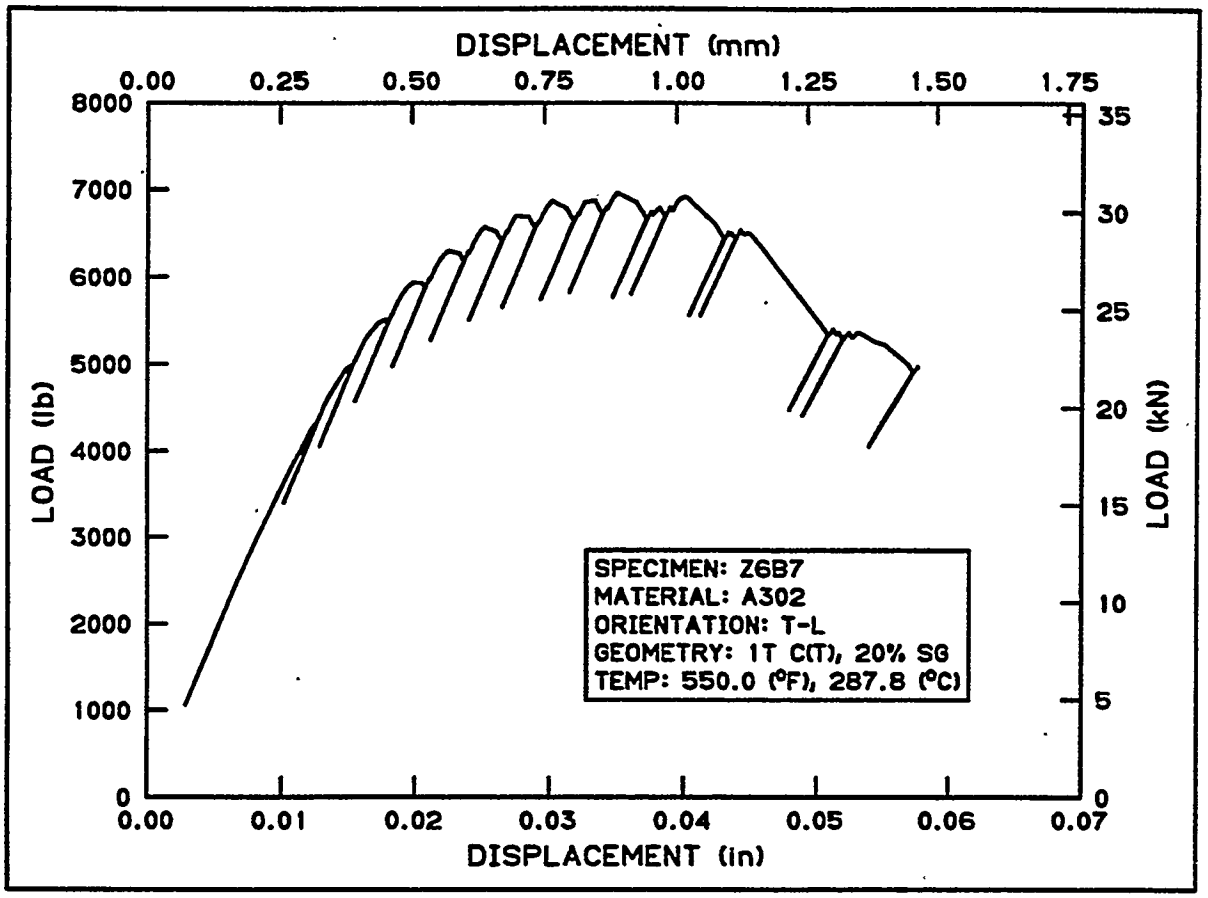

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
DISPLACEMENT (in)

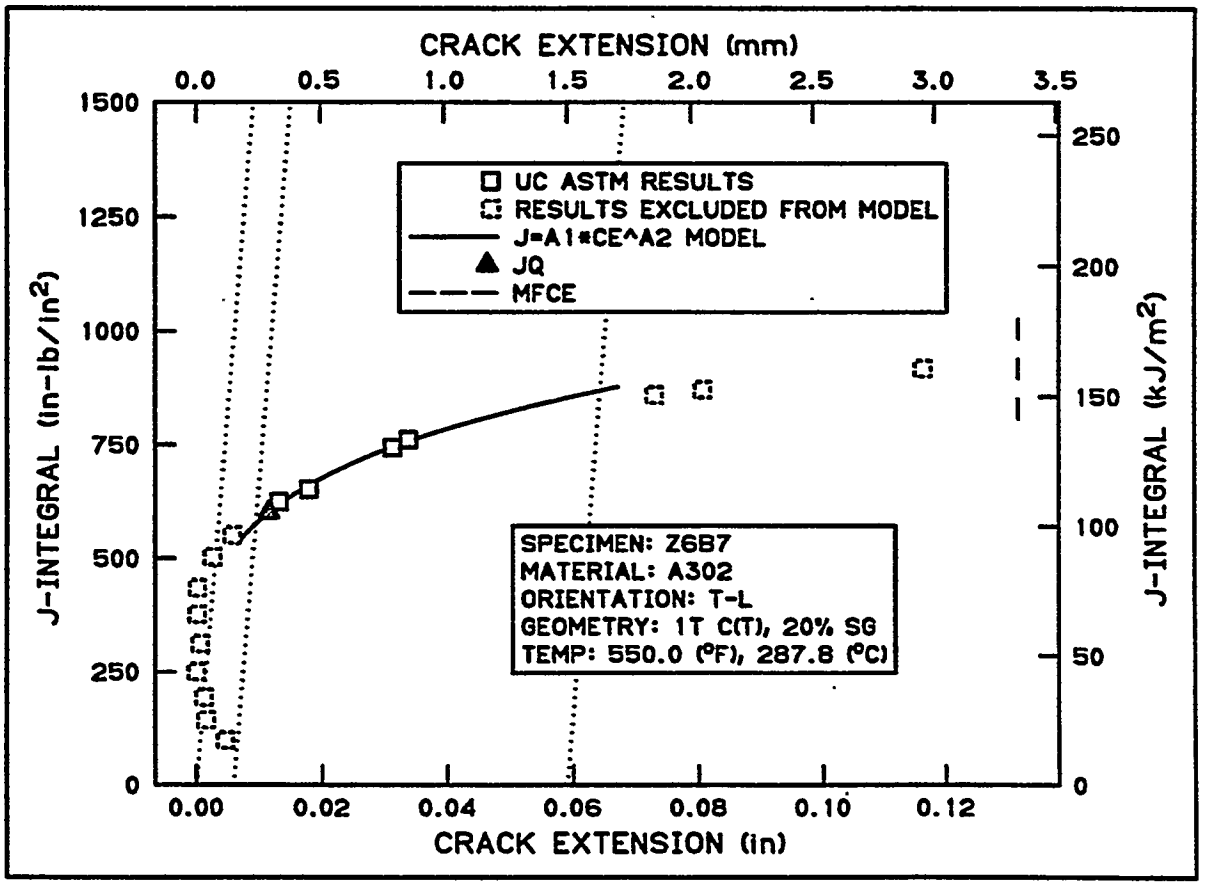

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B7
  MATERIAL CODE: A302.
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2506 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4242	0.0122	0.0046	98.6
2	4926	0.0148	0.0015	143.4
3	5467	0.0173	0.0012	193.2
4	5930	0.0198	0.0000	250.2
5	6295	0.0224	0.0006	311.8
6	6565	0.0250	0.0001	376.6
7	6694	0.0274	0.0001	435.0
8	6867	0.0301	0.0026	503.4
9	6847	0.0326	0.0057	552.3
10	6958	0.0350	0.0131	625.5
11	6715	0.0376	0.0179	653.5
12	6915	0.0401	0.0313	743.8
13	6476	0.0433	0.0338	761.6
14	6362	0.0456	0.0730	860.4
15	5346	0.0514	0.0806	871.9
16	5223	0.0551	0.1163	918.2

  WIDTH: 1.9982 (IN),50.754 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5017 (IN),12.743 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7248 (IN),43.810 (MM)
    DISTANCE 2: 1.7416 (IN),44.237 (MM)
    DISTANCE 3: 1.7479 (IN),44.397 (MM)
    DISTANCE 4: 1.7544 (IN),44.562 (MM)
    DISTANCE 5: 1.7578 (IN),44.648 (MM)
    DISTANCE 6: 1.7592 (IN),44.684 (MM)
    DISTANCE 7: 1.7592 (IN),44.684 (MM)
    DISTANCE 8: 1.7600 (IN),44.704 (MM)
    DISTANCE 9: 1.7510 (IN),44.475 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9202 (IN),48.773 (MM)
    DISTANCE 2: 1.9164 (IN),48.677 (MM)
    DISTANCE 3: 1.8926 (IN),48.072 (MM)
    DISTANCE 4: 1.8714 (IN),47.534 (MM)
    DISTANCE 5: 1.8901 (IN),48.009 (MM)
    DISTANCE 6: 1.8804 (IN),47.762 (MM)
    DISTANCE 7: 1.8646 (IN),47.361 (MM)
    DISTANCE 8: 1.8678 (IN),47.442 (MM)
    DISTANCE 9: 1.8556 (IN),47.132 (MM)

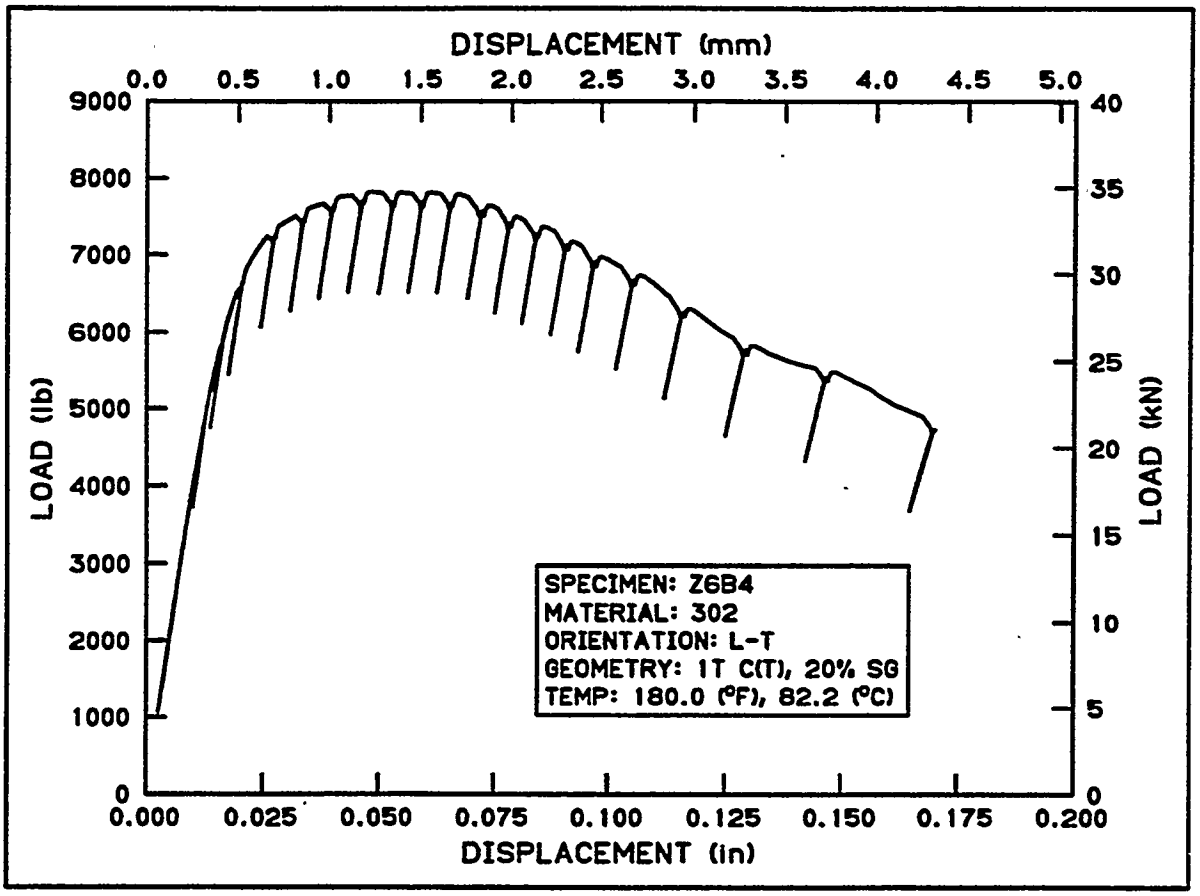

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
DISPLACEMENT (in)

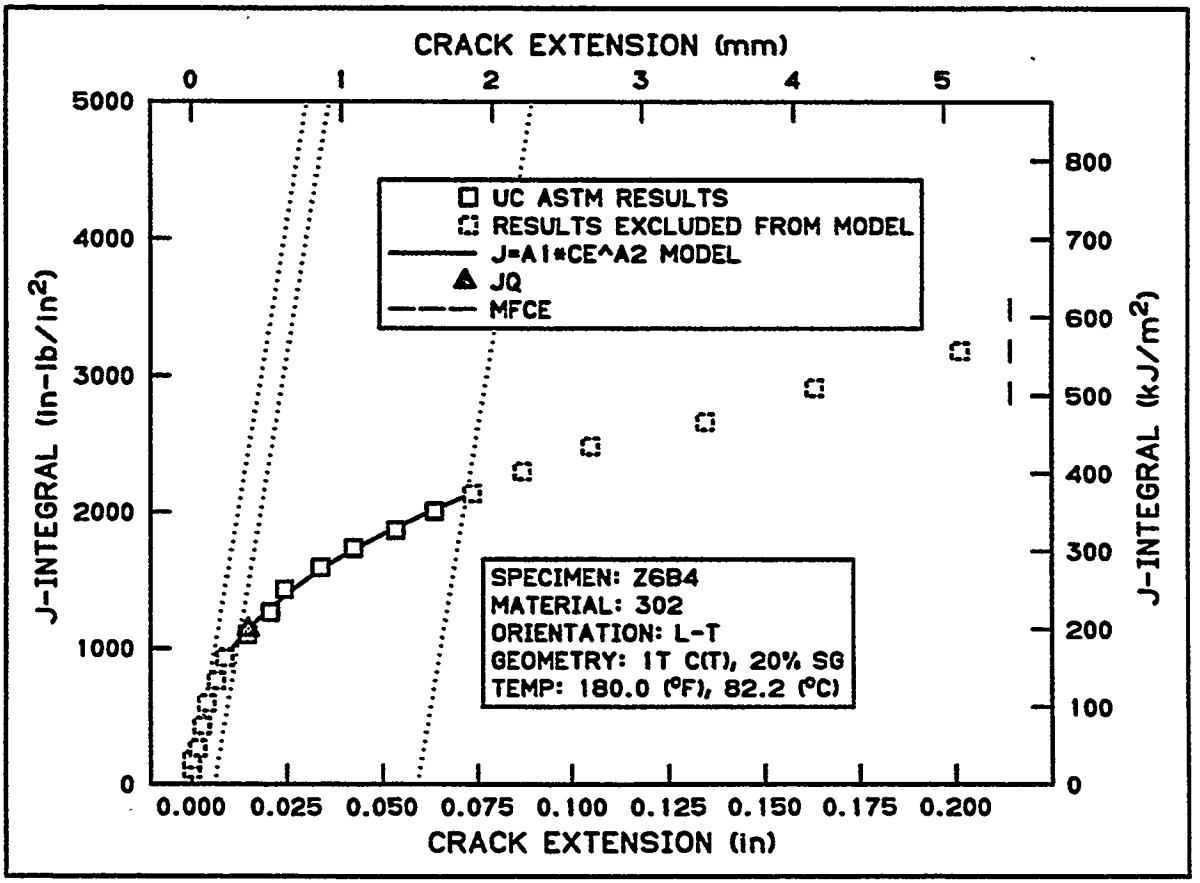

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B4
MATERIAL CODE: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2370 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4702	0.0121	0.0000	106.5
2	5752	0.0157	0.0001	178.3
3	6500	0.0193	0.0015	263.6
4	7240	0.0258	0.0027	430.2
5	7500	0.0319	0.0039	596.6
6	7666	0.0380	0.0065	762.4
7	7771	0.0441	0.0087	930.5
8	7804	0.0506	0.0146	1101.1
9	7796	0.0571	0.0206	1266.7
10	7790	0.0633	0.0243	1433.5
11	7747	0.0692	0.0339	1594.9
12	7595	0.0756	0.0424	1734.1
13	7449	0.0814	0.0534	1866.2
14	7306	0.0882	0.0636	2006.6
15	7100	0.0943	0.0735	2136.0
16	6835	0.1026	0.0867	2298.9
17	6457	0.1129	0.1048	2483.9
18	5924	0.1266	0.1344	2662.2
19	5528	0.1443	0.1630	2912.5
20	4903	0.1675	0.2012	3183.5

WIDTH: 1.9981 (IN),50.752 (MM)
THICKNESS: 1.0010 (IN),25.425 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5021 (IN),12.753 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7224 (IN),43.749 (MM)
DISTANCE 2: 1.7318 (IN),43.988 (MM)
DISTANCE 3: 1.7370 (IN),44.120 (MM)
DISTANCE 4: 1.7417 (IN),44.239 (MM)
DISTANCE 5: 1.7450 (IN),44.323 (MM)
DISTANCE 6: 1.7440 (IN),44.298 (MM)
DISTANCE 7: 1.7446 (IN),44.313 (MM)
DISTANCE 8: 1.7415 (IN),44.234 (MM)
DISTANCE 9: 1.7322 (IN),43.998 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 2.0198 (IN),51.303 (MM)
DISTANCE 2: 1.9842 (IN),50.399 (MM)
DISTANCE 3: 1.9633 (IN),49.868 (MM)
DISTANCE 4: 1.9850 (IN),50.419 (MM)
DISTANCE 5: 1.9385 (IN),49.238 (MM)
DISTANCE 6: 1.9484 (IN),49.489 (MM)
DISTANCE 7: 1.9085 (IN),48.476 (MM)
DISTANCE 8: 1.9336 (IN),49.113 (MM)
DISTANCE 9: 1.9111 (IN),48.542 (MM)

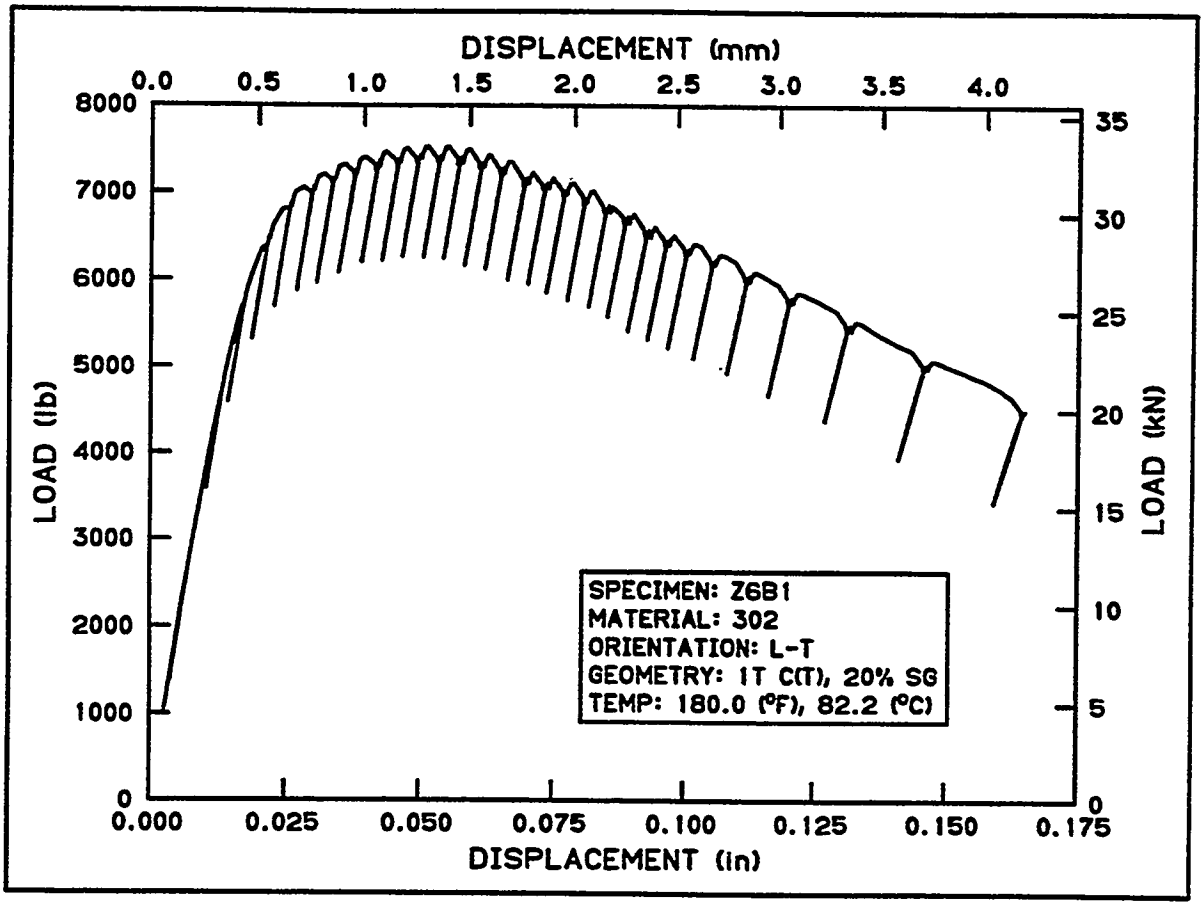

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
40 35 30 25 20 15 10 5 0
LOAD (kN)
SPECIMEN: Z6B4
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

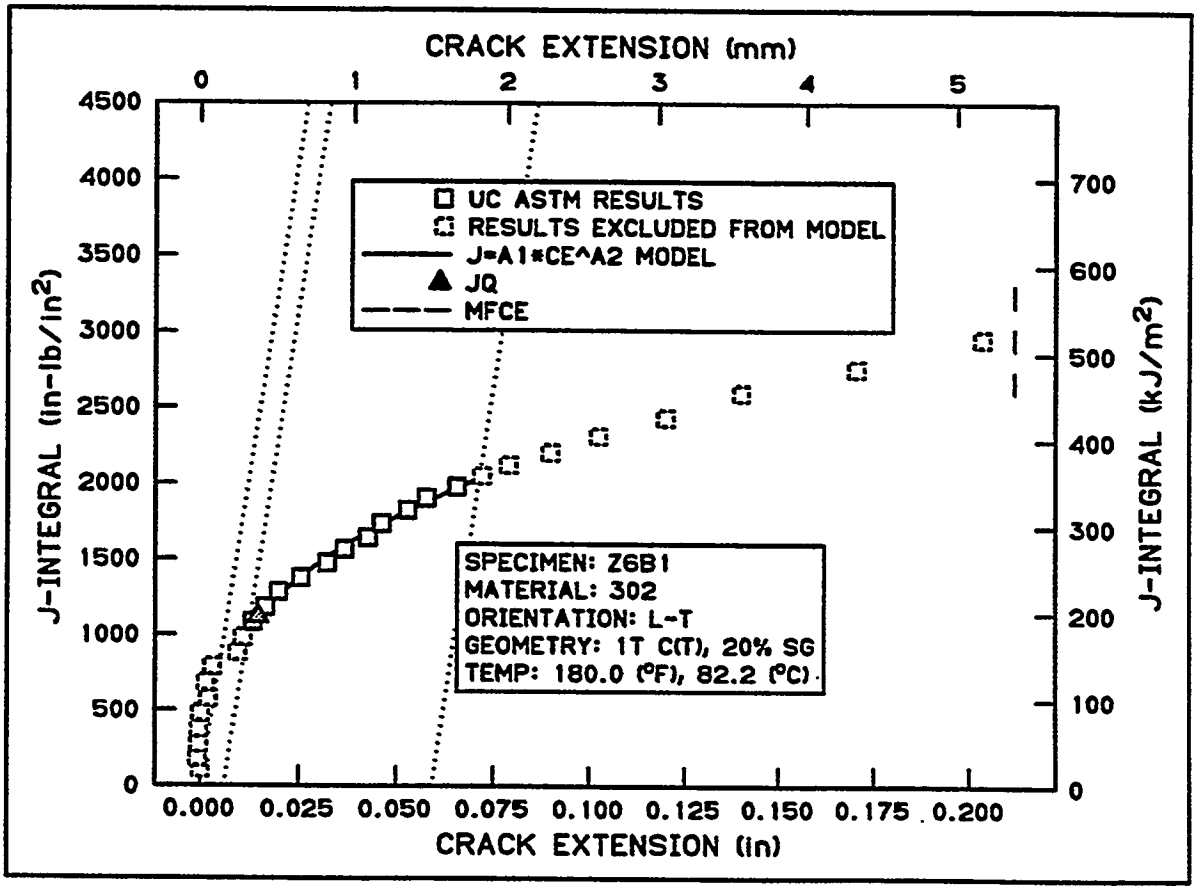

CRACK EXTENSION (mm)
0 1 2 3 4 5
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B4
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B1
MATERIAL CODE: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2535 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4571	0.0126	0.0000	109.7
2	5592	0.0163	-0.0007	182.3
3	6352	0.0204	-0.0004	275.8
4	6800	0.0242	-0.0003	373.7
5	7051	0.0280	0.0001	479.4
6	7203	0.0320	0.0021	576.7
7	7320	0.0359	0.0015	683.6
8	7404	0.0396	0.0030	790.2
9	7462	0.0434	0.0095	882.5
10	7505	0.0474	0.0108	984.4
11	7524	0.0512	0.0133	1086.3
12	7523	0.0551	0.0165	1183.3
13	7492	0.0591	0.0198	1284.8
14	7423	0.0629	0.0257	1376.6
15	7347	0.0670	0.0325	1473.6
16	7224	0.0708	0.0369	1564.5
17	7158	0.0746	0.0428	1641.2
18	7102	0.0786	0.0463	1735.0
19	7011	0.0824	0.0530	1823.8
20	6832	0.0860	0.0578	1904.1
21	6746	0.0901	0.0657	1979.3
22	6601	0.0940	0.0721	2049.7
23	6503	0.0977	0.0790	2121.8
24	6382	0.1029	0.0898	2203.4
25	6210	0.1094	0.1024	2312.6
26	5947	0.1178	0.1200	2433.6
27	5636	0.1291	0.1400	2598.1
28	5178	0.1436	0.1705	2758.2
29	4650	0.1624	0.2035	2954.6

WIDTH: 1.9988 (IN),50.770 (MM)
THICKNESS: 1.0009 (IN),25.423 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5014 (IN),12.736 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7301 (IN),43.945 (MM)
DISTANCE 2: 1.7454 (IN),44.333 (MM)
DISTANCE 3: 1.7541 (IN),44.554 (MM)
DISTANCE 4: 1.7532 (IN),44.531 (MM)
DISTANCE 5: 1.7586 (IN),44.668 (MM)
DISTANCE 6: 1.7622 (IN),44.760 (MM)
DISTANCE 7: 1.7610 (IN),44.729 (MM)
DISTANCE 8: 1.7616 (IN),44.745 (MM)
DISTANCE 9: 1.7556 (IN),44.592 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9949 (IN),50.670 (MM)
DISTANCE 2: 1.9986 (IN),50.764 (MM)
DISTANCE 3: 1.9628 (IN),49.855 (MM)
DISTANCE 4: 1.9741 (IN),50.142 (MM)
DISTANCE 5: 1.9442 (IN),49.383 (MM)
DISTANCE 6: 1.9704 (IN),50.048 (MM)
DISTANCE 7: 1.9534 (IN),49.616 (MM)
DISTANCE 8: 1.9426 (IN),49.342 (MM)
DISTANCE 9: 1.9798 (IN),50.287 (MM)

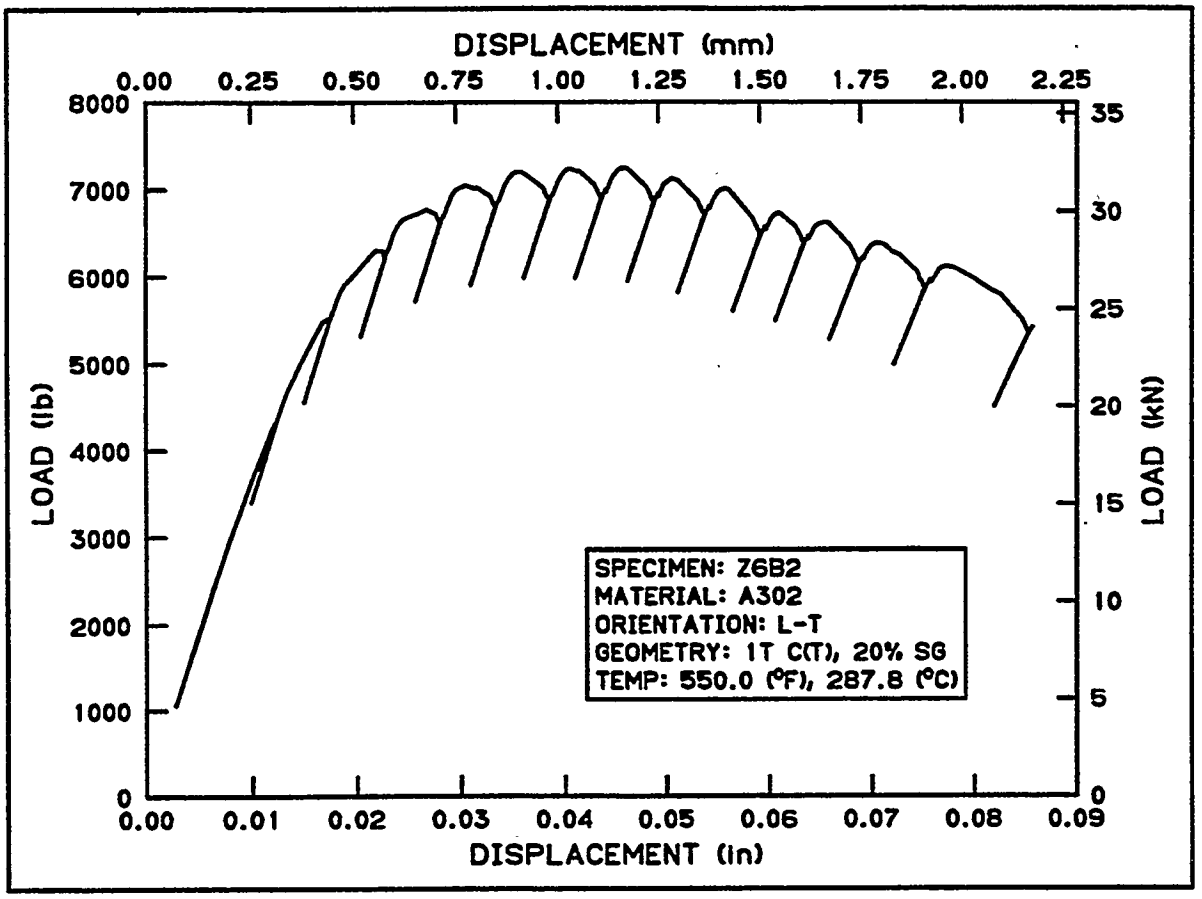

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
35
30
25
20
15
10
5
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)
SPECIMEN: Z6B1
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

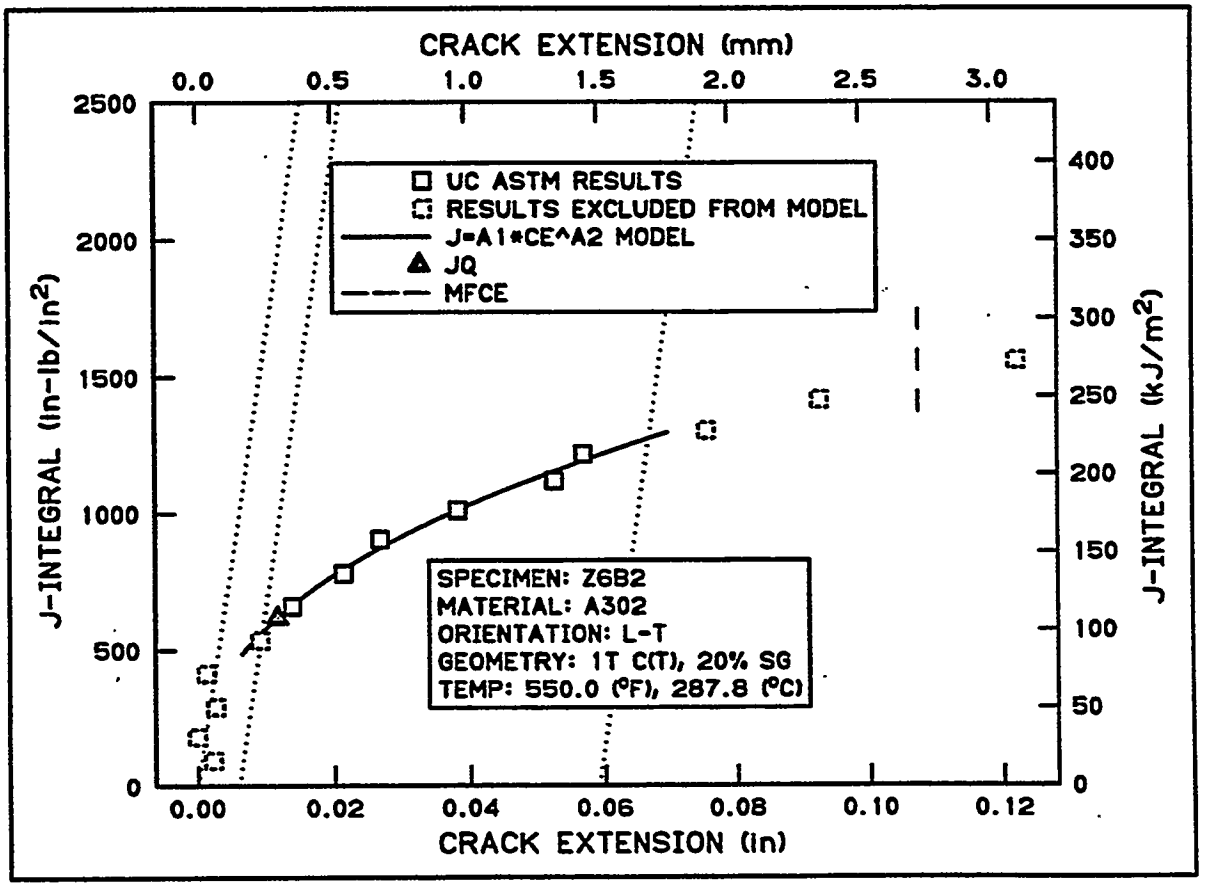

CRACK EXTENSION (mm)
0
1
2
3
4
5
J-INTEGRAL (in-lb/in²)
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B1
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z6B2
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2496 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4247	0.0119	0.0023	93.1
2	5473	0.0168	0.0000	180.4
3	6291	0.0218	0.0026	289.7
4	6766	0.0268	0.0013	413.0
5	7015	0.0316	0.0091	535.2
6	7146	0.0365	0.0138	659.8
7	7207	0.0414	0.0214	779.2
8	7231	0.0463	0.0268	904.1
9	7094	0.0512	0.0382	1010.6
10	6996	0.0561	0.0525	1119.0
11	6726	0.0610	0.0569	1216.3
12	6609	0.0658	0.0755	1302.9
13	6239	0.0728	0.0925	1415.9
14	5790	0.0826	0.1220	1559.7

  WIDTH: 1.9985 (IN),50.762 (MM)
  THICKNESS: 1.0011 (IN),25.428 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7335 (IN),44.031 (MM)
    DISTANCE 2: 1.7435 (IN),44.285 (MM)
    DISTANCE 3: 1.7484 (IN),44.409 (MM)
    DISTANCE 4: 1.7536 (IN),44.541 (MM)
    DISTANCE 5: 1.7566 (IN),44.618 (MM)
    DISTANCE 6: 1.7560 (IN),44.602 (MM)
    DISTANCE 7: 1.7573 (IN),44.635 (MM)
    DISTANCE 8: 1.7531 (IN),44.529 (MM)
    DISTANCE 9: 1.7422 (IN),44.252 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9138 (IN),48.611 (MM)
    DISTANCE 2: 1.8820 (IN),47.803 (MM)
    DISTANCE 3: 1.8770 (IN),47.676 (MM)
    DISTANCE 4: 1.8746 (IN),47.615 (MM)
    DISTANCE 5: 1.7877 (IN),45.408 (MM)
    DISTANCE 6: 1.9020 (IN),48.311 (MM)
    DISTANCE 7: 1.8423 (IN),46.794 (MM)
    DISTANCE 8: 1.8134 (IN),46.060 (MM)
    DISTANCE 9: 1.8590 (IN),47.219 (MM)

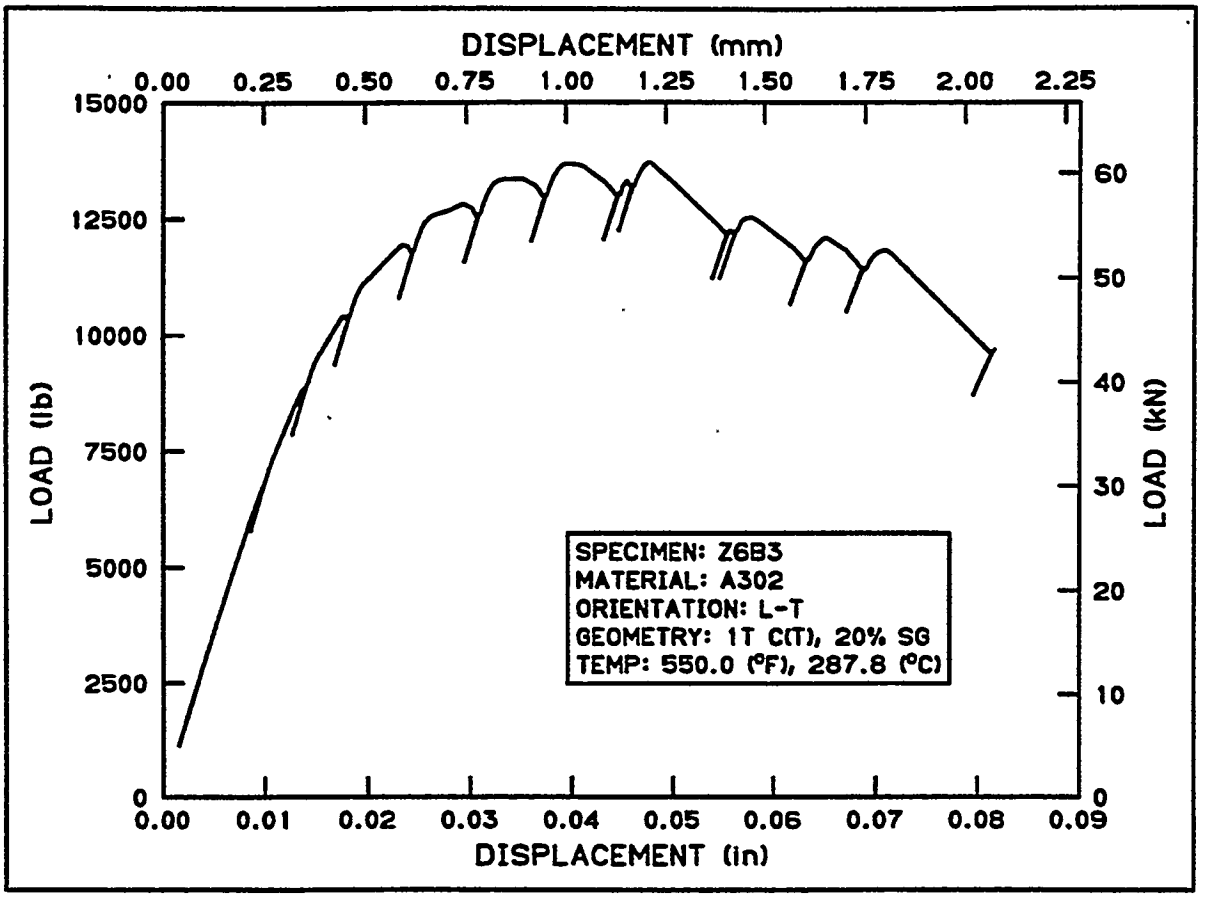

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
8000 7000 6000 5000 4000 3000 2000 1000 0
35 30 25 20 15 10 5 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6B2
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
DISPLACEMENT (in)

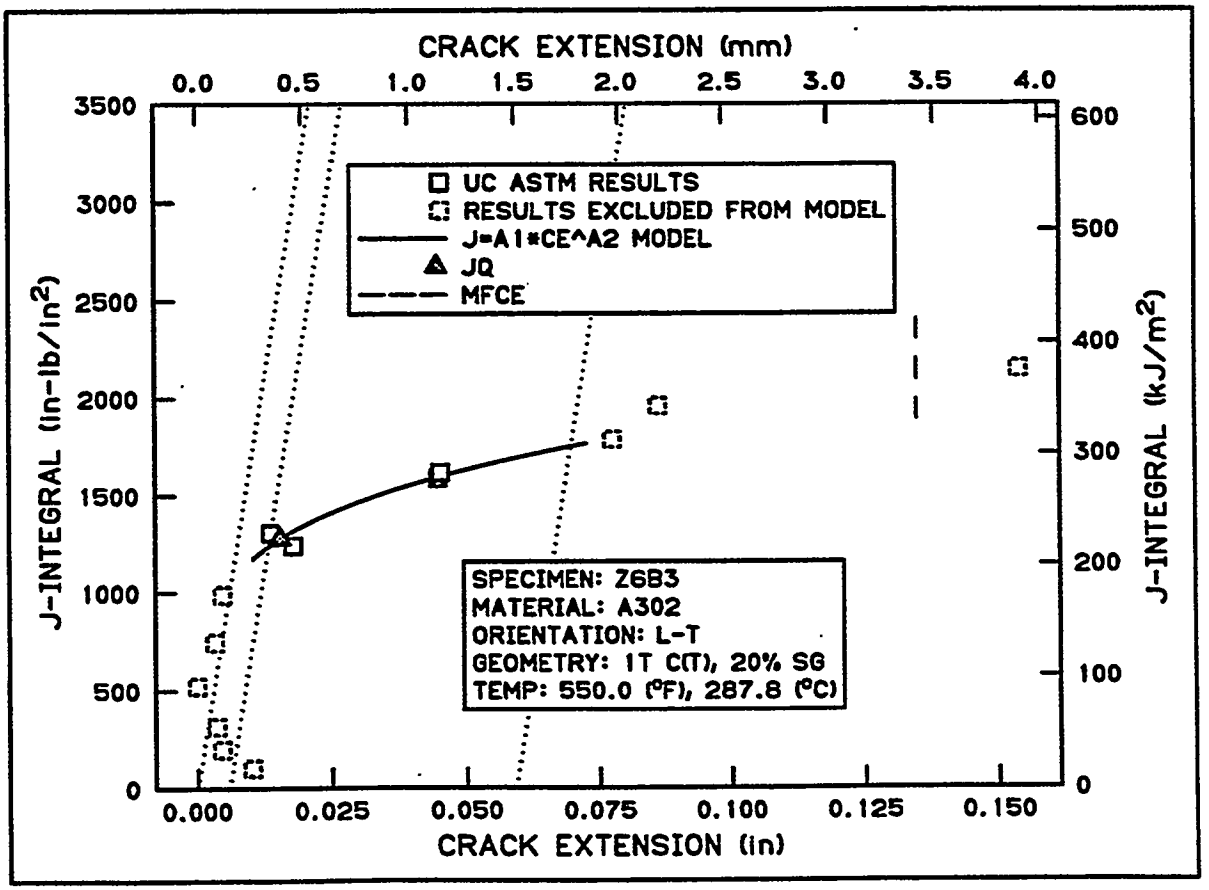

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
2500 2000 1500 1000 500 0
400 350 300 250 200 150 100 50 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B2
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B3
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.0358 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	6649	0.0097	0.0103	102.1
2	8802	0.0136	0.0046	197.8
3	10392	0.0175	0.0036	314.5
4	11945	0.0234	0.0000	521.6
5	12833	0.0293	0.0034	745.0
6	13364	0.0351	0.0047	987.7
7	13627	0.0411	0.0180	1240.2
8	13206	0.0450	0.0138	1305.1
9	13235	0.0502	0.0448	1589.5
10	12206	0.0557	0.0453	1616.1
11	12324	0.0593	0.0775	1784.9
12	12090	0.0651	0.0861	1957.9
13	11144	0.0743	0.1538	2147.5

  WIDTH: 1.9979 (IN),50.747 (MM)
  THICKNESS: 1.0010 (IN),25.425 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5012 (IN),12.730 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.5869 (IN),40.307 (MM)
    DISTANCE 2: 1.5372 (IN),39.045 (MM)
    DISTANCE 3: 1.5070 (IN),38.278 (MM)
    DISTANCE 4: 1.5356 (IN),39.004 (MM)
    DISTANCE 5: 1.5456 (IN),39.258 (MM)
    DISTANCE 6: 1.5302 (IN),38.867 (MM)
    DISTANCE 7: 1.5026 (IN),38.166 (MM)
    DISTANCE 8: 1.5498 (IN),39.365 (MM)
    DISTANCE 9: 1.5886 (IN),40.350 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7298 (IN),43.937 (MM)
    DISTANCE 2: 1.6912 (IN),42.956 (MM)
    DISTANCE 3: 1.6170 (IN),41.072 (MM)
    DISTANCE 4: 1.6819 (IN),42.720 (MM)
    DISTANCE 5: 1.6906 (IN),42.941 (MM)
    DISTANCE 6: 1.6897 (IN),42.918 (MM)
    DISTANCE 7: 1.6598 (IN),42.159 (MM)
    DISTANCE 8: 1.6564 (IN),42.073 (MM)
    DISTANCE 9: 1.6440 (IN),41.758 (MM)

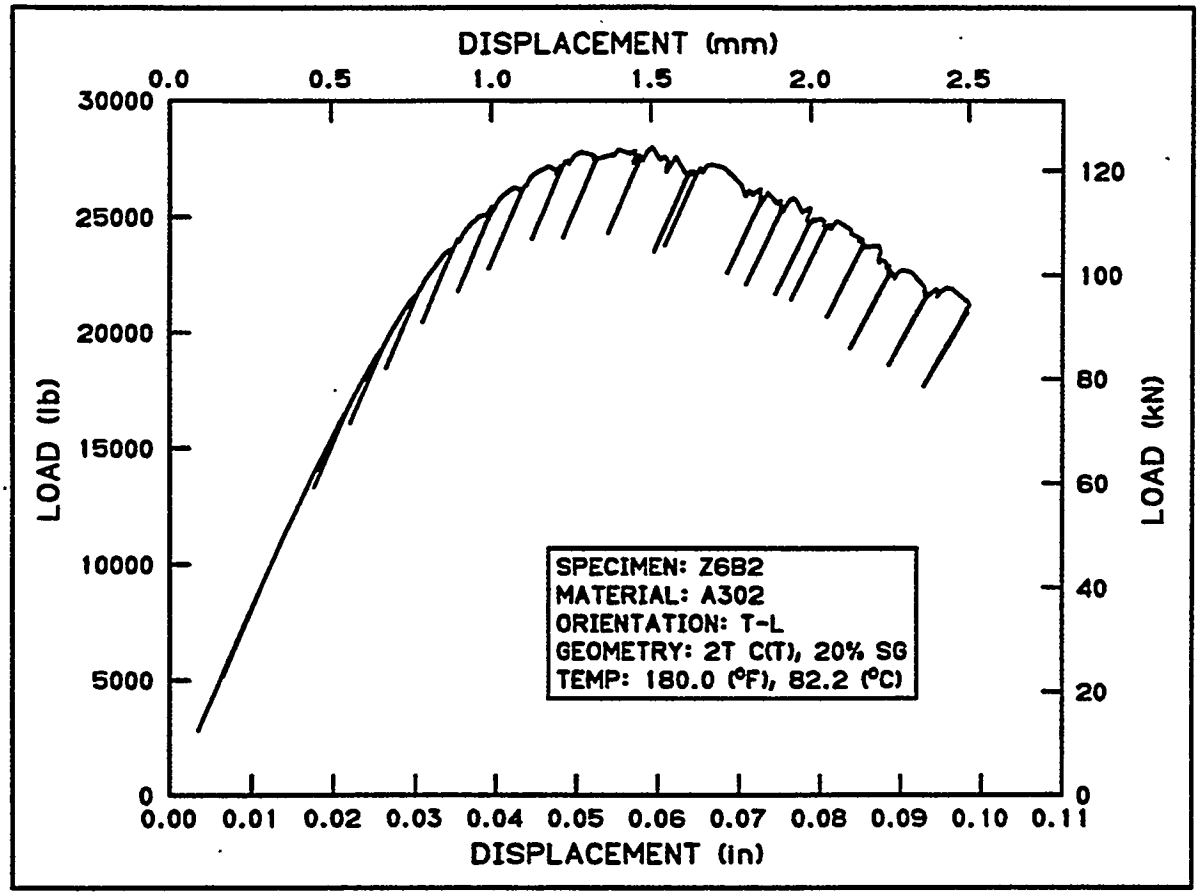

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
15000 12500 10000 7500 5000 2500 0
LOAD (lb)
60 50 40 30 20 10 0
LOAD (kN)
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
DISPLACEMENT (in)

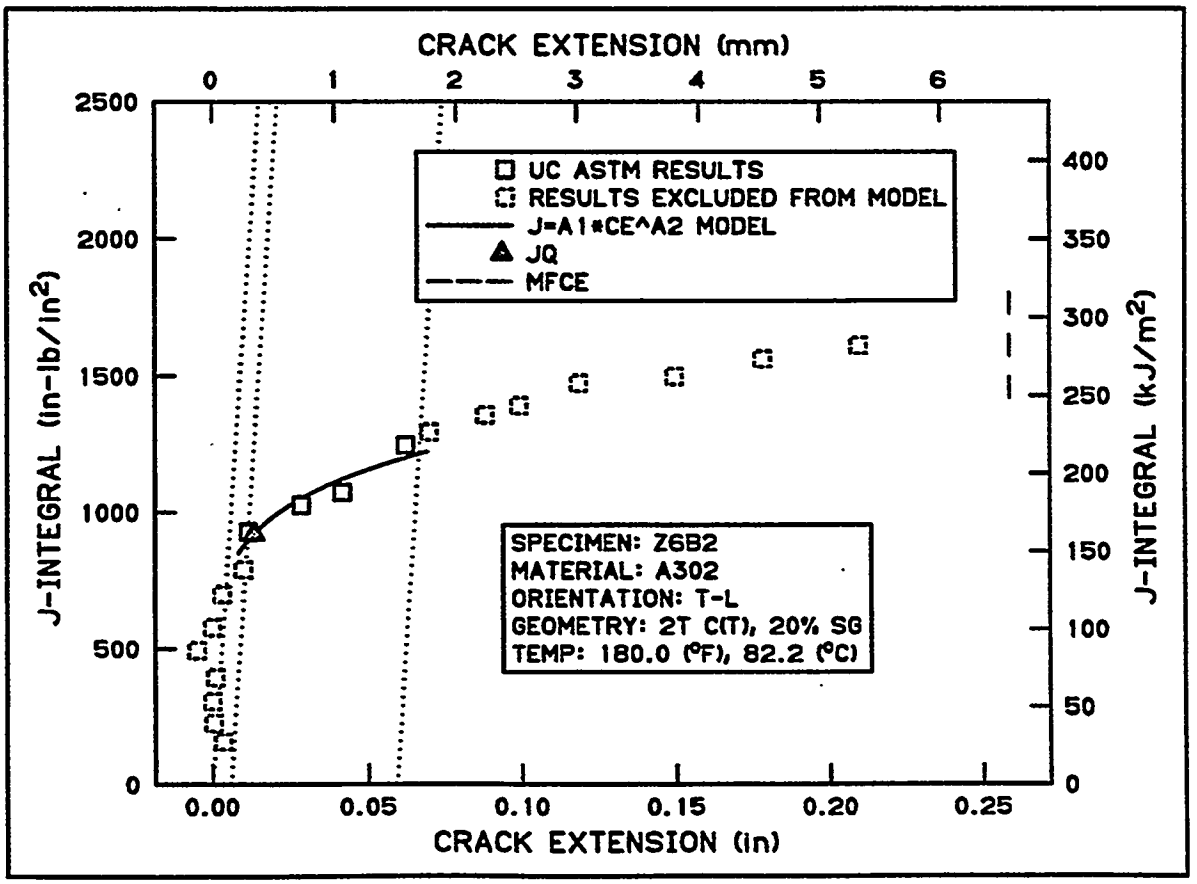

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
3500 3000 2500 2000 1500 1000 500 0
J-INTEGRAL (in-lb/in²)
600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B2
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4819 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16190	0.0210	0.0034	157.1
2	18986	0.0253	0.0003	226.1
3	21361	0.0294	0.0000	304.5
4	23425	0.0337	0.0010	393.0
5	25017	0.0379	-0.0050	492.9
6	26260	0.0422	0.0000	577.8
7	27169	0.0464	0.0031	699.2
8	27785	0.0505	0.0100	790.2
9	27871	0.0551	0.0118	927.3
10	27972	0.0592	0.0287	1025.7
11	26814	0.0640	0.0418	1073.8
12	27031	0.0683	0.0622	1246.5
13	25577	0.0749	0.0698	1294.7
14	25725	0.0769	0.0881	1357.3
15	24844	0.0793	0.0991	1390.9
16	24791	0.0821	0.1187	1473.9
17	23143	0.0872	0.1494	1498.2
18	22572	0.0915	0.1781	1563.4
19	21863	0.0964	0.2095	1612.2

WIDTH: 3.9980 (IN),101.550 (MM)
THICKNESS: 2.0038 (IN),50.897 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9996 (IN),25.390 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4616 (IN),87.925 (MM)
DISTANCE 2: 3.4808 (IN),88.412 (MM)
DISTANCE 3: 3.4842 (IN),88.499 (MM)
DISTANCE 4: 3.4850 (IN),88.519 (MM)
DISTANCE 5: 3.4848 (IN),88.514 (MM)
DISTANCE 6: 3.4884 (IN),88.605 (MM)
DISTANCE 7: 3.4860 (IN),88.544 (MM)
DISTANCE 8: 3.4796 (IN),88.382 (MM)
DISTANCE 9: 3.4644 (IN),87.996 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.6600 (IN),92.964 (MM)
DISTANCE 2: 3.7666 (IN),95.672 (MM)
DISTANCE 3: 3.7790 (IN),95.987 (MM)
DISTANCE 4: 3.7630 (IN),95.580 (MM)
DISTANCE 5: 3.7196 (IN),94.478 (MM)
DISTANCE 6: 3.7568 (IN),95.423 (MM)
DISTANCE 7: 3.6997 (IN),93.972 (MM)
DISTANCE 8: 3.7258 (IN),94.635 (MM)
DISTANCE 9: 3.7612 (IN),95.534 (MM)

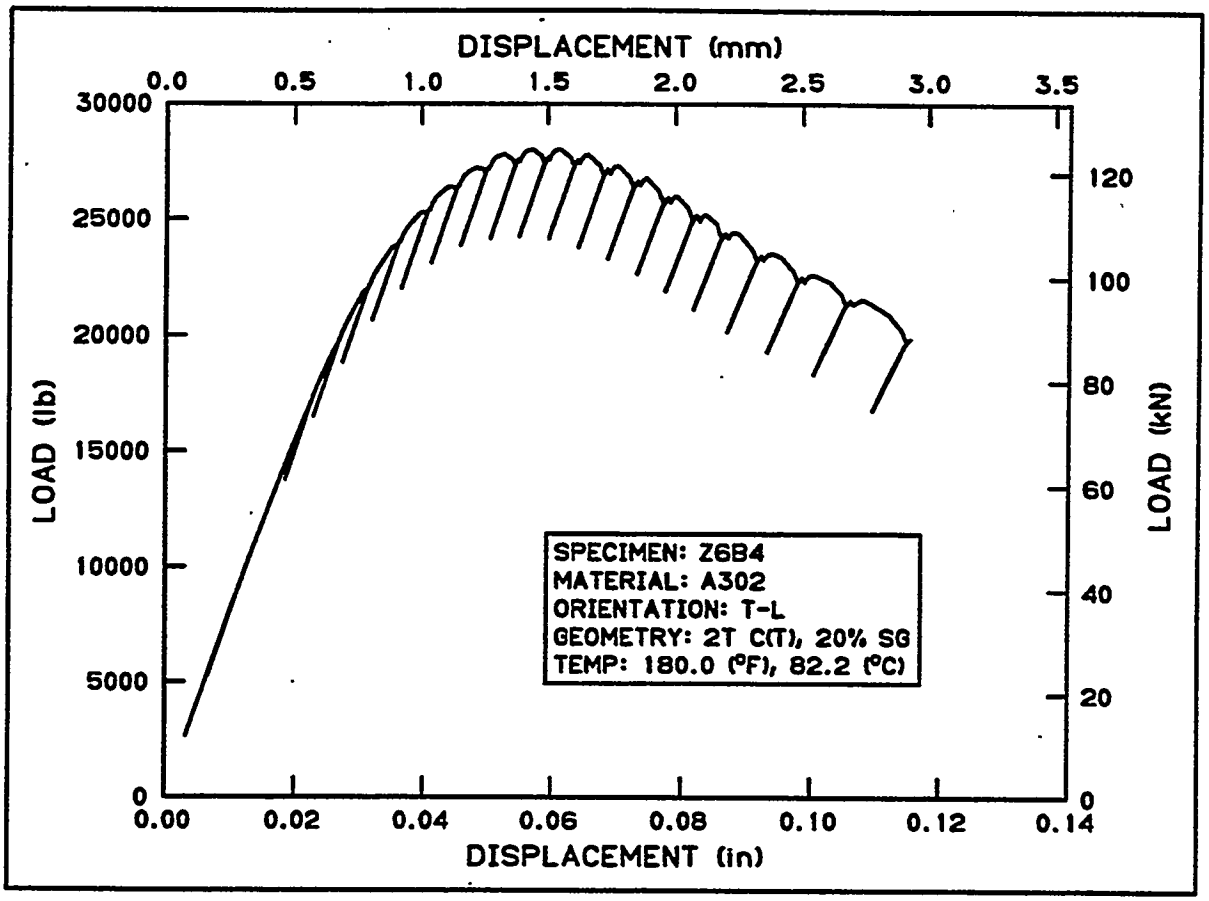

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6B2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

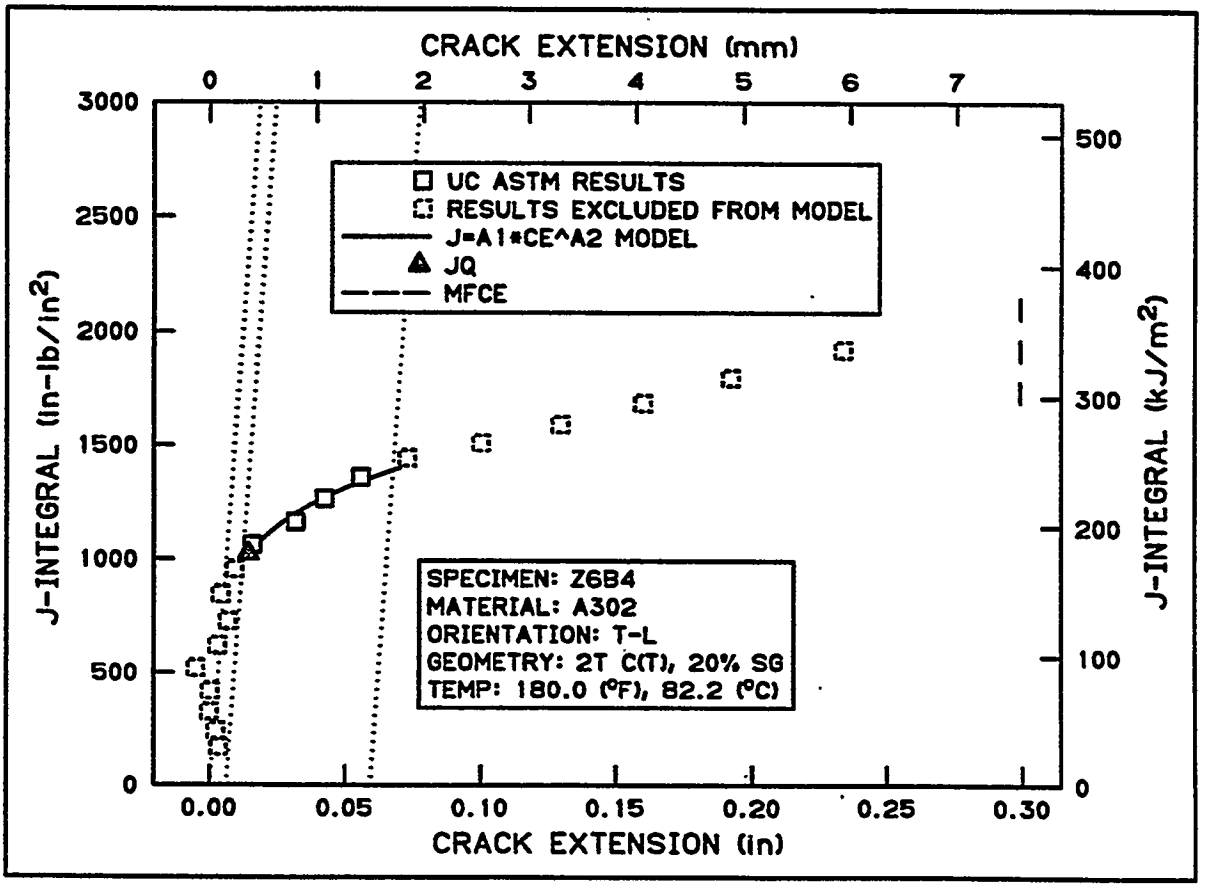

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
400
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B2
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B4
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4866 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16654	0.0217	0.0031	169.1
2	19358	0.0260	0.0021	240.8
3	21837	0.0305	-0.0003	325.0
4	23776	0.0350	0.0000	418.1
5	25275	0.0393	-0.0053	519.1
6	26397	0.0436	0.0029	619.9
7	27224	0.0479	0.0067	727.1
8	27802	0.0524	0.0040	844.5
9	28016	0.0568	0.0091	954.5
10	28014	0.0610	0.0156	1062.6
11	27784	0.0654	0.0315	1161.4
12	27293	0.0701	0.0423	1264.0
13	26752	0.0744	0.0558	1358.7
14	25990	0.0790	0.0729	1443.1
15	25195	0.0834	0.1002	1510.4
16	24377	0.0885	0.1296	1592.5
17	23344	0.0952	0.1600	1686.6
18	22315	0.1027	0.1922	1797.1
19	20891	0.1120	0.2335	1921.7

  WIDTH: 3.9974 (IN),101.530 (MM)
  THICKNESS: 2.0042 (IN),50.907 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9994 (IN),25.385 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4792 (IN),88.372 (MM)
    DISTANCE 2: 3.4933 (IN),88.730 (MM)
    DISTANCE 3: 3.4927 (IN),88.715 (MM)
    DISTANCE 4: 3.4925 (IN),88.709 (MM)
    DISTANCE 5: 3.4838 (IN),88.489 (MM)
    DISTANCE 6: 3.4881 (IN),88.598 (MM)
    DISTANCE 7: 3.4879 (IN),88.593 (MM)
    DISTANCE 8: 3.4787 (IN),88.359 (MM)
    DISTANCE 9: 3.4631 (IN),87.963 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7397 (IN),94.988 (MM)
    DISTANCE 2: 3.8316 (IN),97.323 (MM)
    DISTANCE 3: 3.8366 (IN),97.450 (MM)
    DISTANCE 4: 3.8238 (IN),97.125 (MM)
    DISTANCE 5: 3.7240 (IN),94.590 (MM)
    DISTANCE 6: 3.7368 (IN),94.915 (MM)
    DISTANCE 7: 3.7694 (IN),95.743 (MM)
    DISTANCE 8: 3.7781 (IN),95.964 (MM)
    DISTANCE 9: 3.8200 (IN),97.028 (MM)

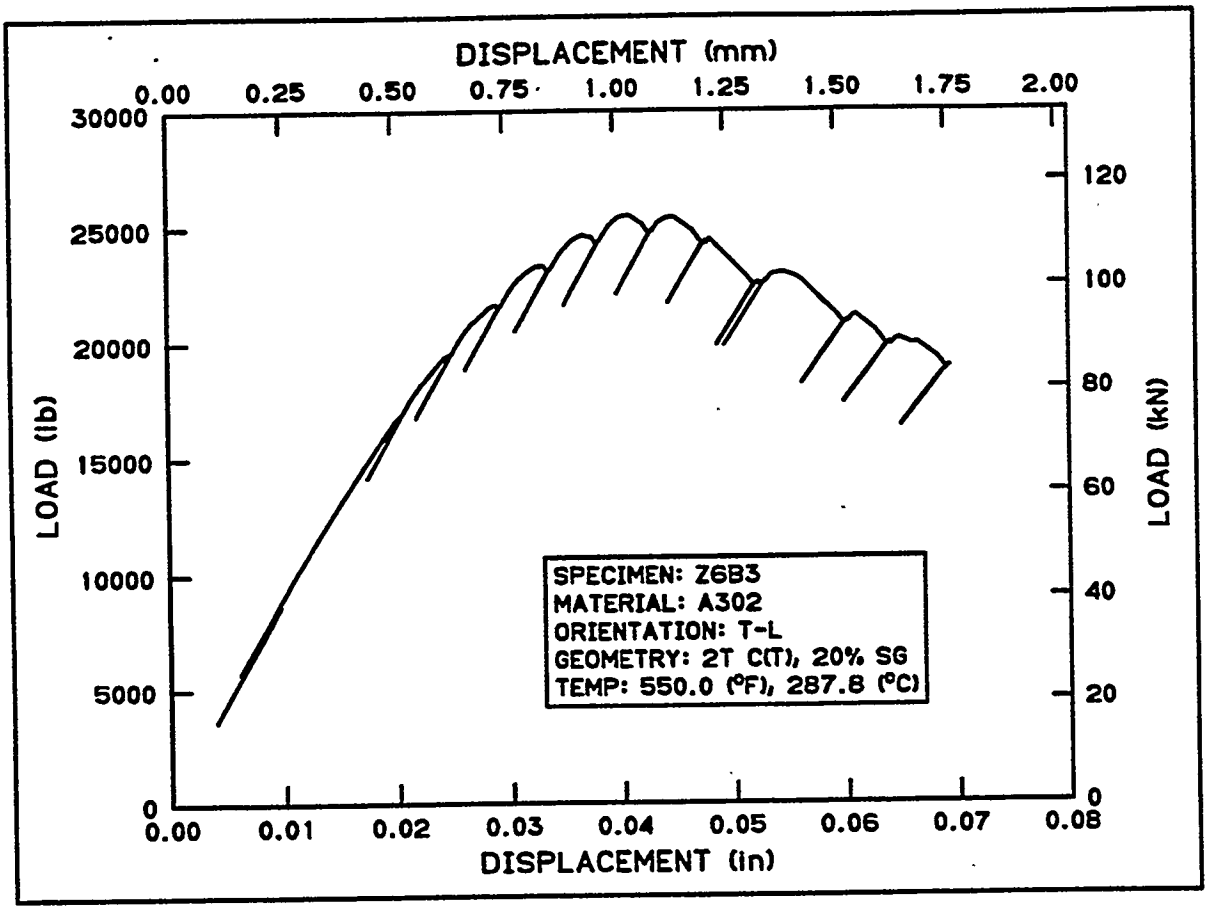

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6B4
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

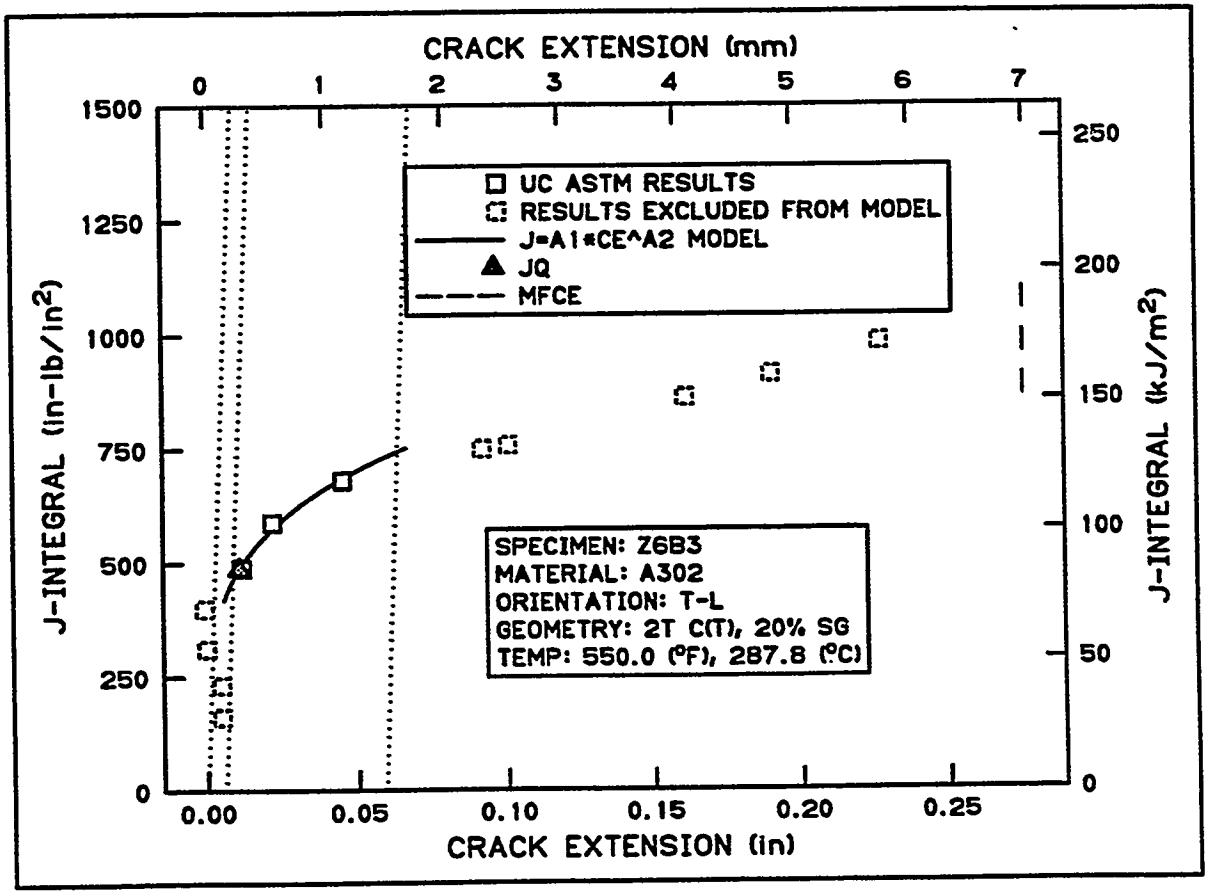

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B4
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B3
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4649 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16638	0.0200	0.0048	161.0
2	19372	0.0243	0.0048	231.1
3	21544	0.0283	0.0000	311.4
4	23307	0.0324	-0.0006	399.9
5	24642	0.0366	0.0118	488.3
6	25477	0.0408	0.0219	588.2
7	25396	0.0449	0.0453	679.9
8	24460	0.0480	0.0919	748.1
9	22502	0.0523	0.1006	756.7
10	22611	0.0563	0.1610	860.2
11	21143	0.0610	0.1899	911.4
12	19911	0.0665	0.2265	982.3

  WIDTH: 3.9976 (IN),101.540 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9990 (IN),25.375 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4510 (IN),87.655 (MM)
    DISTANCE 2: 3.4672 (IN),88.067 (MM)
    DISTANCE 3: 3.4711 (IN),88.166 (MM)
    DISTANCE 4: 3.4690 (IN),88.113 (MM)
    DISTANCE 5: 3.4716 (IN),88.179 (MM)
    DISTANCE 6: 3.4697 (IN),88.130 (MM)
    DISTANCE 7: 3.4636 (IN),87.975 (MM)
    DISTANCE 8: 3.4497 (IN),87.622 (MM)
    DISTANCE 9: 3.4476 (IN),87.569 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7191 (IN),94.465 (MM)
    DISTANCE 2: 3.7552 (IN),95.382 (MM)
    DISTANCE 3: 3.6715 (IN),93.256 (MM)
    DISTANCE 4: 3.7026 (IN),94.046 (MM)
    DISTANCE 5: 3.7674 (IN),95.692 (MM)
    DISTANCE 6: 3.7577 (IN),95.446 (MM)
    DISTANCE 7: 3.7742 (IN),95.865 (MM)
    DISTANCE 8: 3.7648 (IN),95.626 (MM)
    DISTANCE 9: 3.7218 (IN),94.534 (MM)

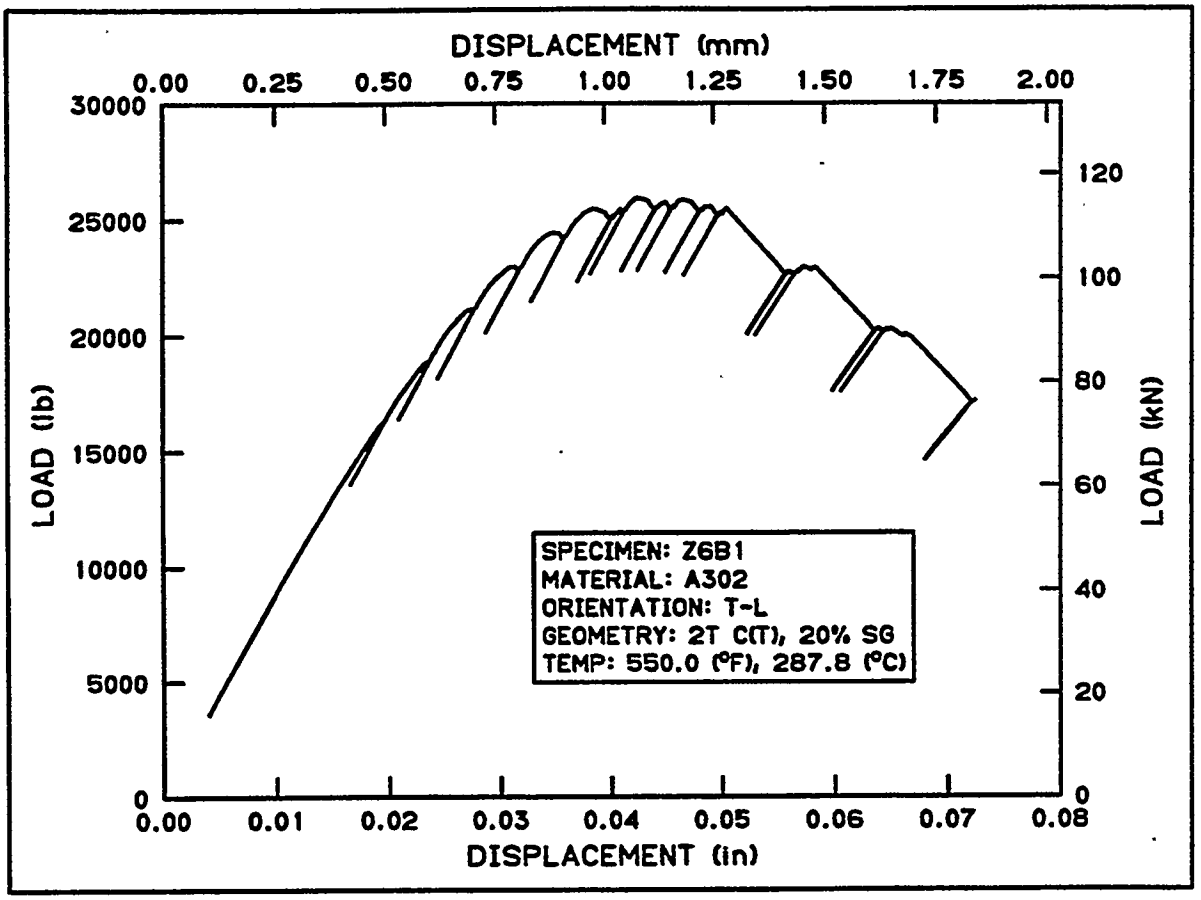

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
DISPLACEMENT (in)

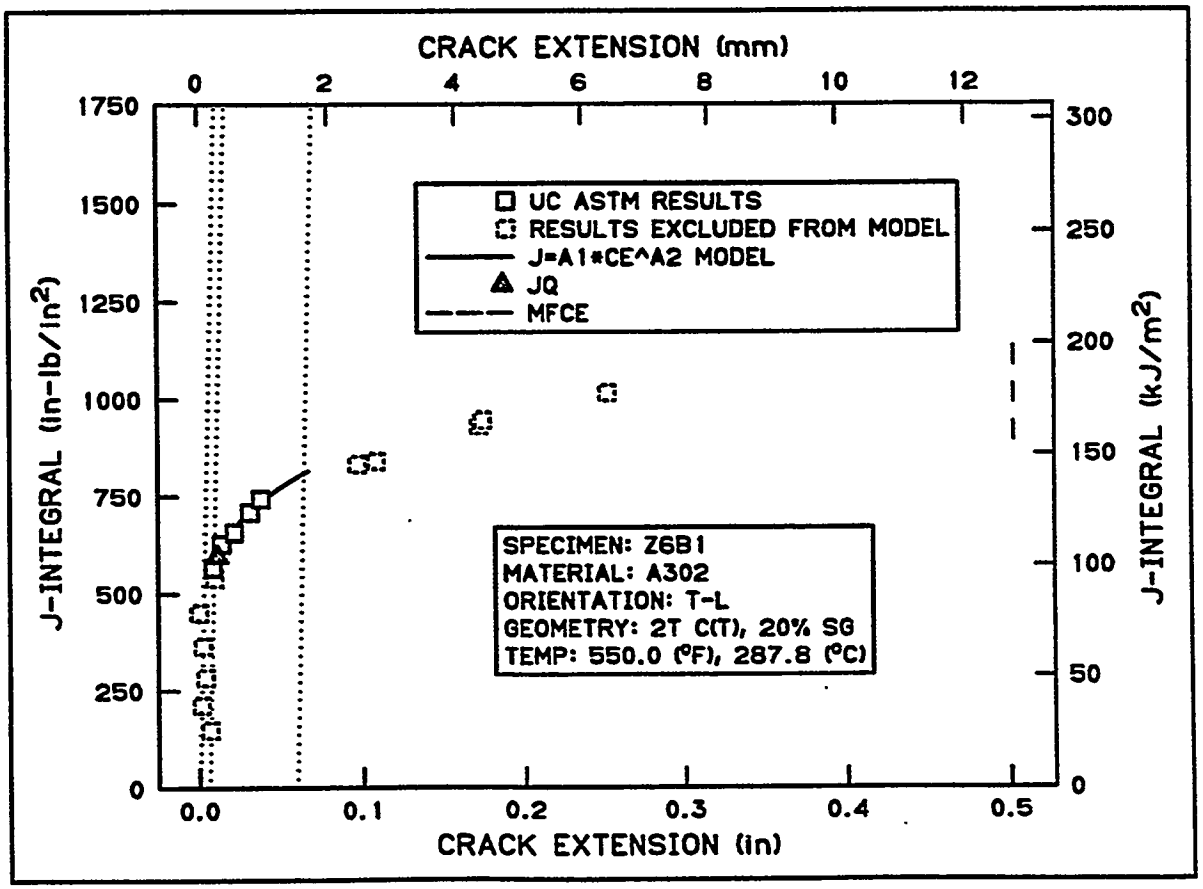

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B3
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B1
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4607 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16079	0.0192	0.0065	147.3
2	18722	0.0231	0.0013	211.3
3	21010	0.0269	0.0039	282.8
4	22924	0.0308	0.0022	363.5
5	24430	0.0346	0.0000	450.2
6	25467	0.0385	0.0096	538.9
7	25259	0.0405	0.0088	566.2
8	25933	0.0424	0.0141	626.9
9	25633	0.0444	0.0218	656.2
10	25850	0.0464	0.0313	708.5
11	25512	0.0484	0.0379	743.0
12	25482	0.0504	0.0971	831.5
13	22688	0.0560	0.1083	839.0
14	22935	0.0583	0.1721	930.6
15	20231	0.0639	0.1742	943.8
16	19887	0.0668	0.2523	1013.8

  WIDTH: 3.9993 (IN),101.580 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9973 (IN),25.331 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4505 (IN),87.643 (MM)
    DISTANCE 2: 3.4622 (IN),87.940 (MM)
    DISTANCE 3: 3.4636 (IN),87.975 (MM)
    DISTANCE 4: 3.4652 (IN),88.016 (MM)
    DISTANCE 5: 3.4602 (IN),87.889 (MM)
    DISTANCE 6: 3.4634 (IN),87.970 (MM)
    DISTANCE 7: 3.4600 (IN),87.884 (MM)
    DISTANCE 8: 3.4443 (IN),87.485 (MM)
    DISTANCE 9: 3.4395 (IN),87.363 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9120 (IN),99.365 (MM)
    DISTANCE 2: 3.9744 (IN),100.950 (MM)
    DISTANCE 3: 4.0071 (IN),101.780 (MM)
    DISTANCE 4: 3.9421 (IN),100.130 (MM)
    DISTANCE 5: 3.9594 (IN),100.570 (MM)
    DISTANCE 6: 3.9238 (IN),99.665 (MM)
    DISTANCE 7: 3.9783 (IN),101.050 (MM)
    DISTANCE 8: 3.9898 (IN),101.340 (MM)
    DISTANCE 9: 3.9009 (IN),99.083 (MM)

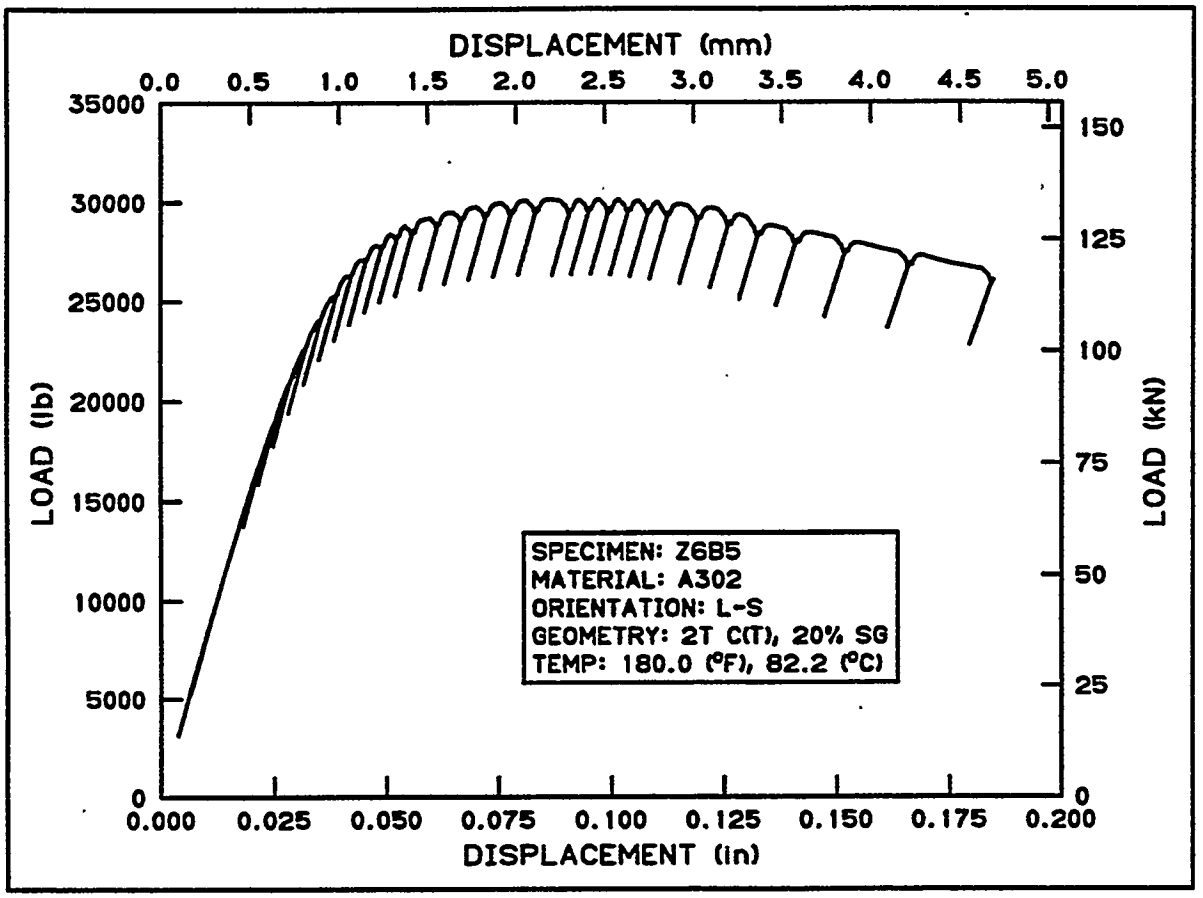

DISPLACEMENT (mm)
0.00
0.25
0.50
0.75
1.00
1.25
1.50
1.75
2.00
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z6B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
DISPLACEMENT (in)

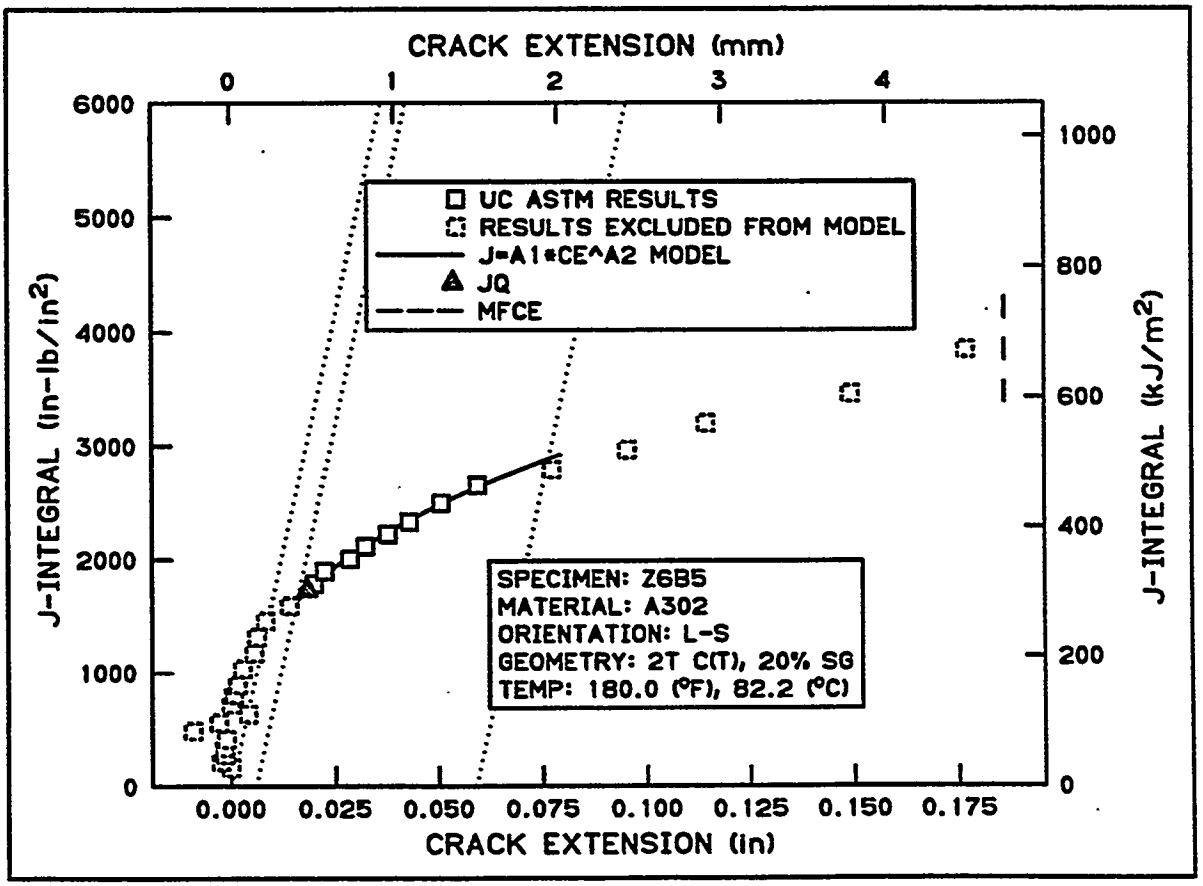

CRACK EXTENSION (mm)
0
2
4
6
8
10
12
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B1
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.0
0.1
0.2
0.3
0.4
0.5
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B5
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4790 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16618	0.0214	-0.0001	164.3
2	18750	0.0247	-0.0025	216.8
3	20700	0.0280	-0.0015	274.2
4	22461	0.0313	-0.0017	338.8
5	23982	0.0346	-0.0012	410.0
6	25202	0.0378	-0.0090	485.5
7	26242	0.0410	-0.0029	558.6
8	27068	0.0442	0.0041	633.9
9	27811	0.0476	0.0000	721.8
10	28368	0.0508	0.0007	804.3
11	28777	0.0540	0.0016	891.2
12	29174	0.0596	0.0028	1033.4
13	29477	0.0648	0.0056	1172.0
14	29733	0.0702	0.0062	1314.5
15	29932	0.0758	0.0083	1457.1
16	30061	0.0811	0.0141	1593.2
17	30064	0.0885	0.0200	1786.2
18	30082	0.0929	0.0225	1896.9
19	30116	0.0971	0.0287	2004.1
20	30100	0.1015	0.0324	2113.7
21	30055	0.1059	0.0378	2222.0
22	29965	0.1103	0.0430	2331.3
23	29778	0.1170	0.0508	2494.8
24	29600	0.1236	0.0597	2655.3
25	29173	0.1301	0.0773	2790.8
26	28608	0.1386	0.0954	2962.3
27	28176	0.1496	0.1144	3197.6
28	27457	0.1636	0.1492	3456.9
29	26573	0.1821	0.1767	3842.7

WIDTH: 3.9979 (IN),101.550 (MM)
THICKNESS: 2.0040 (IN),50.902 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9987 (IN),25.367 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4668 (IN),88.057 (MM)
DISTANCE 2: 3.4810 (IN),88.417 (MM)
DISTANCE 3: 3.4853 (IN),88.527 (MM)
DISTANCE 4: 3.4834 (IN),88.478 (MM)
DISTANCE 5: 3.4834 (IN),88.478 (MM)
DISTANCE 6: 3.4794 (IN),88.377 (MM)
DISTANCE 7: 3.4774 (IN),88.326 (MM)
DISTANCE 8: 3.4703 (IN),88.146 (MM)
DISTANCE 9: 3.4552 (IN),87.762 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.6284 (IN),92.161 (MM)
DISTANCE 2: 3.5860 (IN),91.084 (MM)
DISTANCE 3: 3.6442 (IN),92.563 (MM)
DISTANCE 4: 3.6952 (IN),93.858 (MM)
DISTANCE 5: 3.7094 (IN),94.219 (MM)
DISTANCE 6: 3.7186 (IN),94.452 (MM)
DISTANCE 7: 3.6470 (IN),92.634 (MM)
DISTANCE 8: 3.6650 (IN),93.091 (MM)
DISTANCE 9: 3.6593 (IN),92.946 (MM)

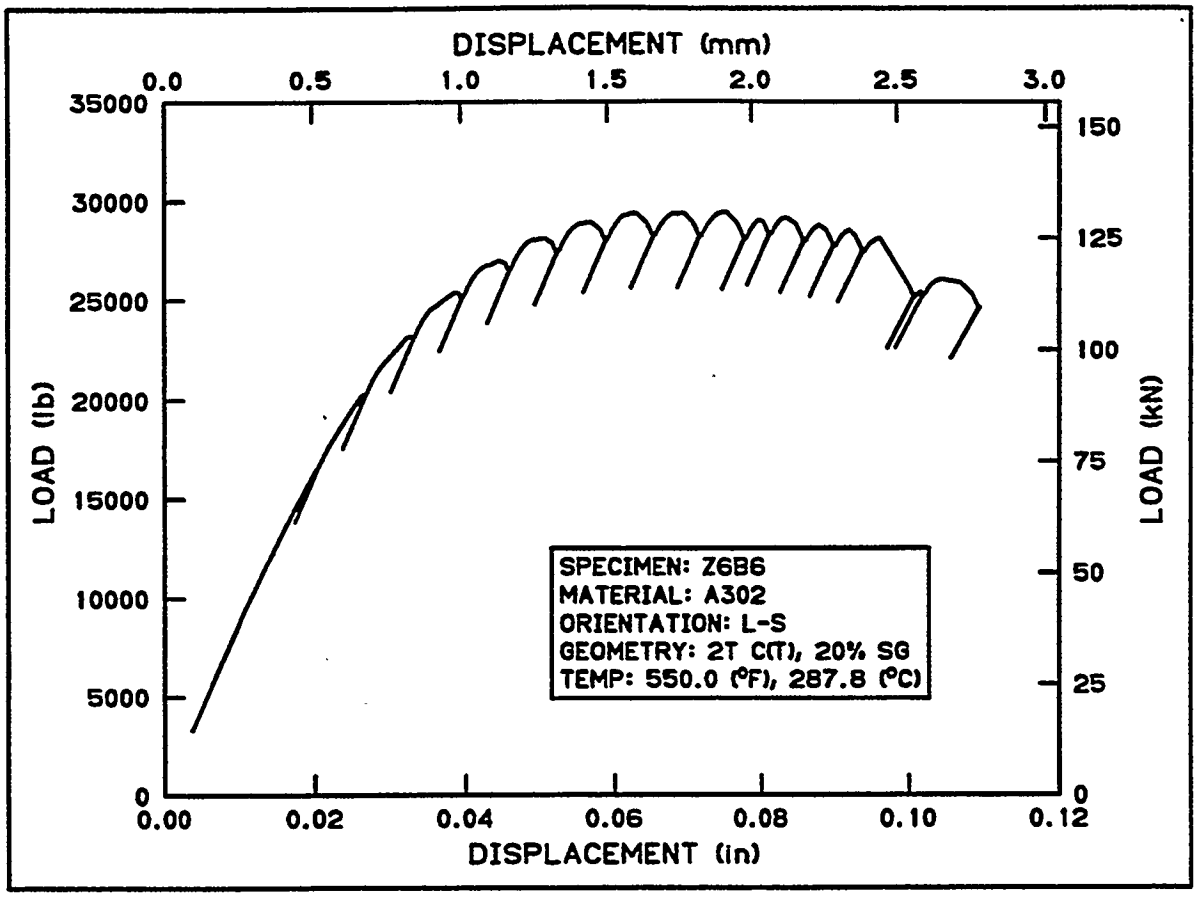

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
35000 30000 25000 20000 15000 10000 5000 0
150 125 100 75 50 25 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

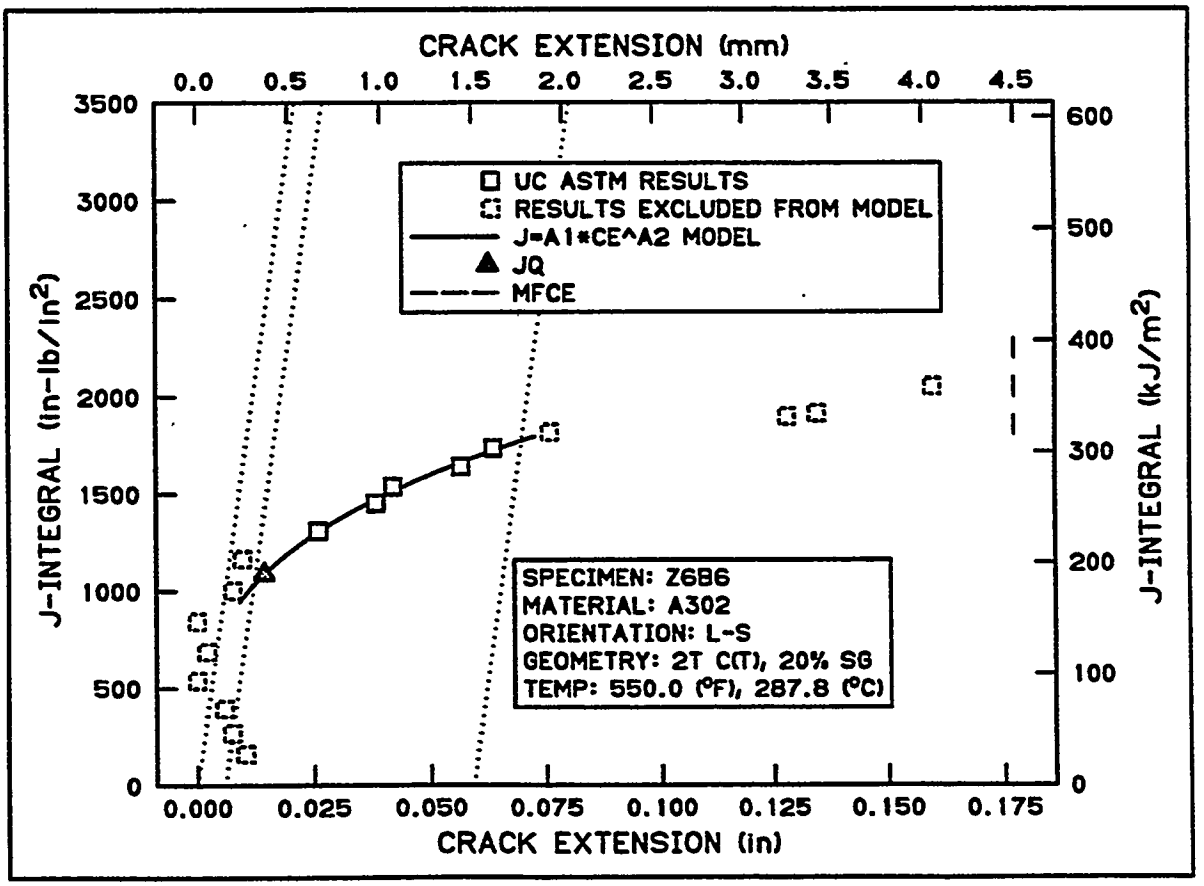

CRACK EXTENSION (mm)
0 1 2 3 4
6000 5000 4000 3000 2000 1000 0
1000 800 600 400 200 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B5
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B6
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4801 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16321	0.0201	0.0103	161.1
2	20160	0.0262	0.0075	268.1
3	23120	0.0323	0.0059	393.8
4	25378	0.0386	0.0000	538.0
5	26988	0.0446	0.0022	686.9
6	28112	0.0508	0.0000	844.4
7	28906	0.0571	0.0078	1001.9
8	29361	0.0631	0.0098	1164.1
9	29373	0.0695	0.0260	1307.4
10	29349	0.0755	0.0382	1451.7
11	29022	0.0797	0.0420	1537.1
12	29080	0.0839	0.0566	1640.3
13	28754	0.0881	0.0636	1734.9
14	28490	0.0922	0.0759	1816.0
15	28088	0.0962	0.1281	1896.3
16	25253	0.1012	0.1347	1912.5
17	25820	0.1070	0.1597	2049.2

WIDTH: 3.9980 (IN),101.550 (MM)
THICKNESS: 2.0030 (IN),50.876 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9988 (IN),25.370 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4612 (IN),87.914 (MM)
DISTANCE 2: 3.4749 (IN),88.262 (MM)
DISTANCE 3: 3.4832 (IN),88.473 (MM)
DISTANCE 4: 3.4832 (IN),88.473 (MM)
DISTANCE 5: 3.4860 (IN),88.544 (MM)
DISTANCE 6: 3.4890 (IN),88.621 (MM)
DISTANCE 7: 3.4832 (IN),88.473 (MM)
DISTANCE 8: 3.4708 (IN),88.158 (MM)
DISTANCE 9: 3.4612 (IN),87.914 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.6730 (IN),93.294 (MM)
DISTANCE 2: 3.6556 (IN),92.852 (MM)
DISTANCE 3: 3.6326 (IN),92.268 (MM)
DISTANCE 4: 3.6374 (IN),92.390 (MM)
DISTANCE 5: 3.6124 (IN),91.755 (MM)
DISTANCE 6: 3.6719 (IN),93.266 (MM)
DISTANCE 7: 3.6640 (IN),93.066 (MM)
DISTANCE 8: 3.6830 (IN),93.548 (MM)
DISTANCE 9: 3.7102 (IN),94.239 (MM)

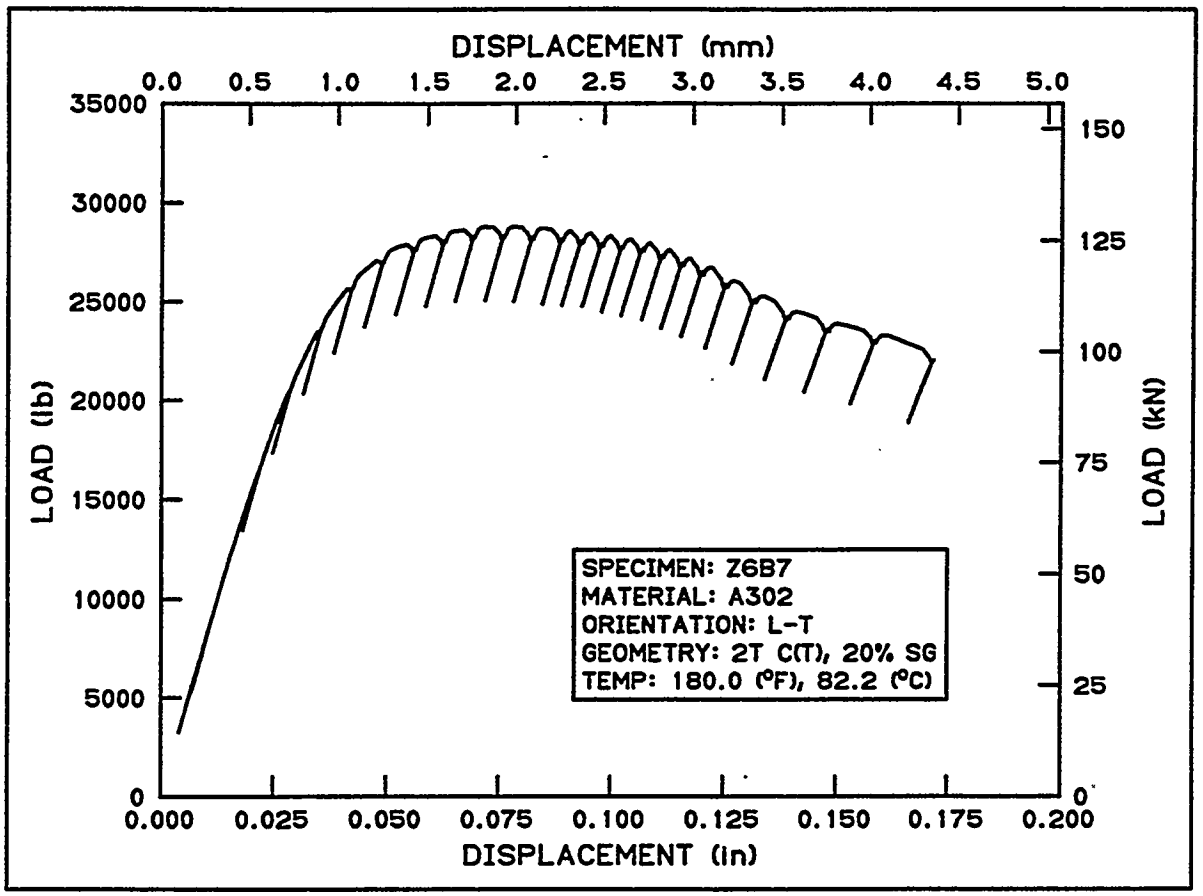

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

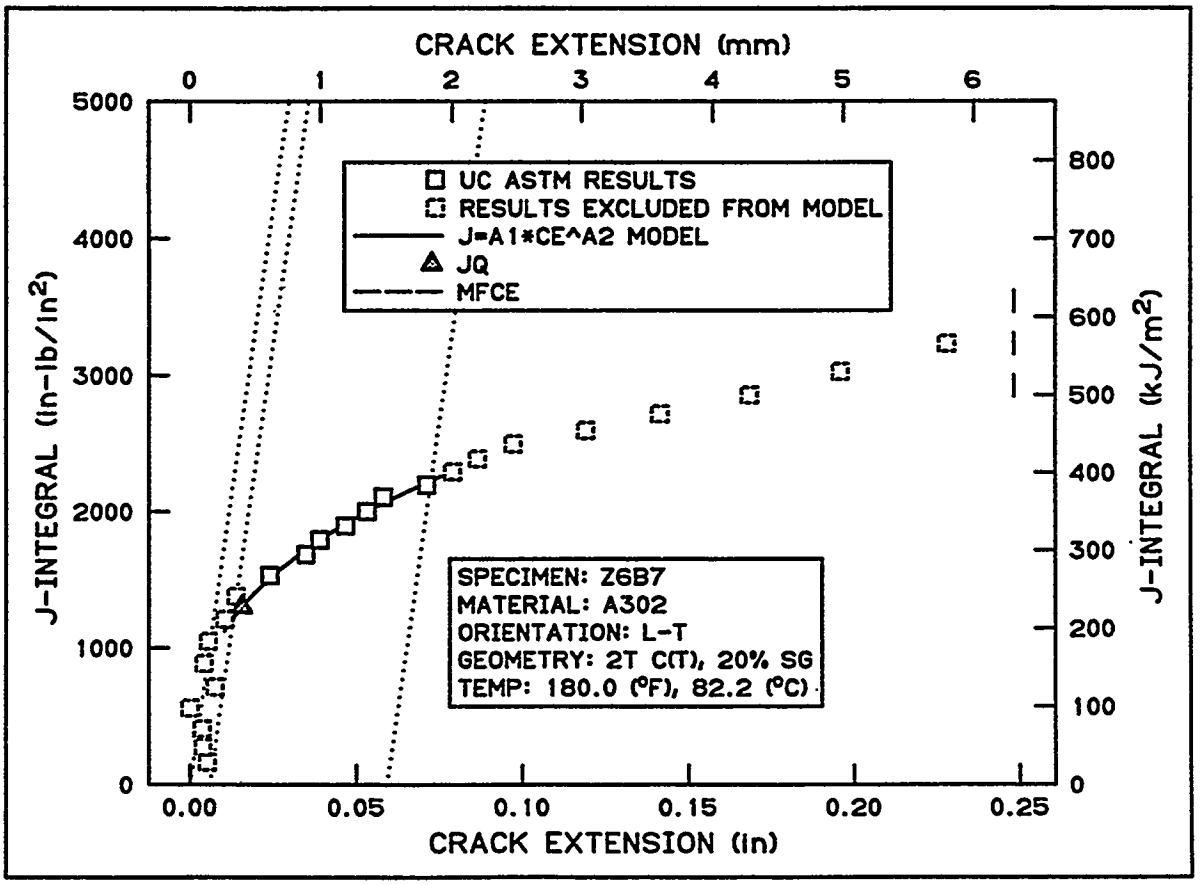

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B6
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z6B7
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4935 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16340	0.0215	0.0051	164.9
2	20357	0.0281	0.0039	274.7
3	23453	0.0347	0.0036	407.4
4	25630	0.0413	0.0000	559.1
5	27061	0.0477	0.0076	712.6
6	27900	0.0543	0.0042	885.6
7	28344	0.0607	0.0055	1049.3
8	28627	0.0671	0.0105	1212.0
9	28766	0.0738	0.0140	1380.1
10	28752	0.0801	0.0241	1534.2
11	28641	0.0867	0.0349	1686.4
12	28561	0.0911	0.0391	1793.0
13	28447	0.0955	0.0468	1895.2
14	28313	0.0999	0.0532	1999.4
15	28153	0.1044	0.0581	2105.6
16	27951	0.1086	0.0710	2194.5
17	27605	0.1130	0.0788	2291.6
18	27166	0.1175	0.0864	2387.1
19	26689	0.1225	0.0972	2497.1
20	25912	0.1286	0.1193	2596.8
21	25011	0.1361	0.1415	2716.9
22	24179	0.1454	0.1685	2856.1
23	23535	0.1561	0.1958	3028.4
24	22601	0.1693	0.2282	3232.9

WIDTH: 3.9998 (IN),101.590 (MM)
THICKNESS: 2.0040 (IN),50.902 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.8031 (IN),20.399 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.2780 (IN),83.261 (MM)
DISTANCE 2: 3.2970 (IN),83.744 (MM)
DISTANCE 3: 3.2980 (IN),83.769 (MM)
DISTANCE 4: 3.3012 (IN),83.850 (MM)
DISTANCE 5: 3.3000 (IN),83.820 (MM)
DISTANCE 6: 3.3040 (IN),83.922 (MM)
DISTANCE 7: 3.2988 (IN),83.790 (MM)
DISTANCE 8: 3.2948 (IN),83.688 (MM)
DISTANCE 9: 3.2794 (IN),83.297 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.5262 (IN),89.565 (MM)
DISTANCE 2: 3.5730 (IN),90.754 (MM)
DISTANCE 3: 3.5220 (IN),89.459 (MM)
DISTANCE 4: 3.5163 (IN),89.314 (MM)
DISTANCE 5: 3.5389 (IN),89.888 (MM)
DISTANCE 6: 3.5094 (IN),89.139 (MM)
DISTANCE 7: 3.5928 (IN),91.257 (MM)
DISTANCE 8: 3.5700 (IN),90.678 (MM)
DISTANCE 9: 3.5452 (IN),90.048 (MM)

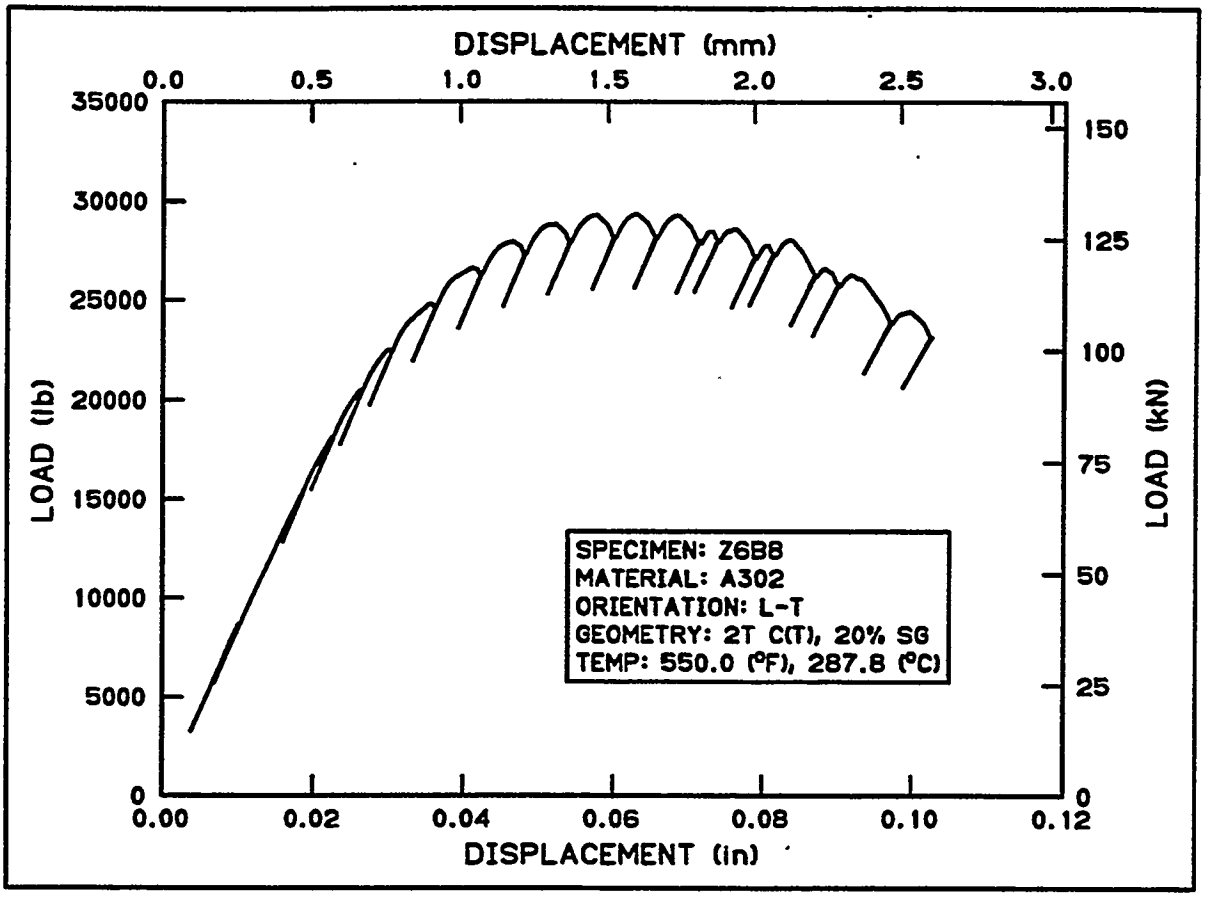

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
35000 30000 25000 20000 15000 10000 5000 0
150 125 100 75 50 25 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

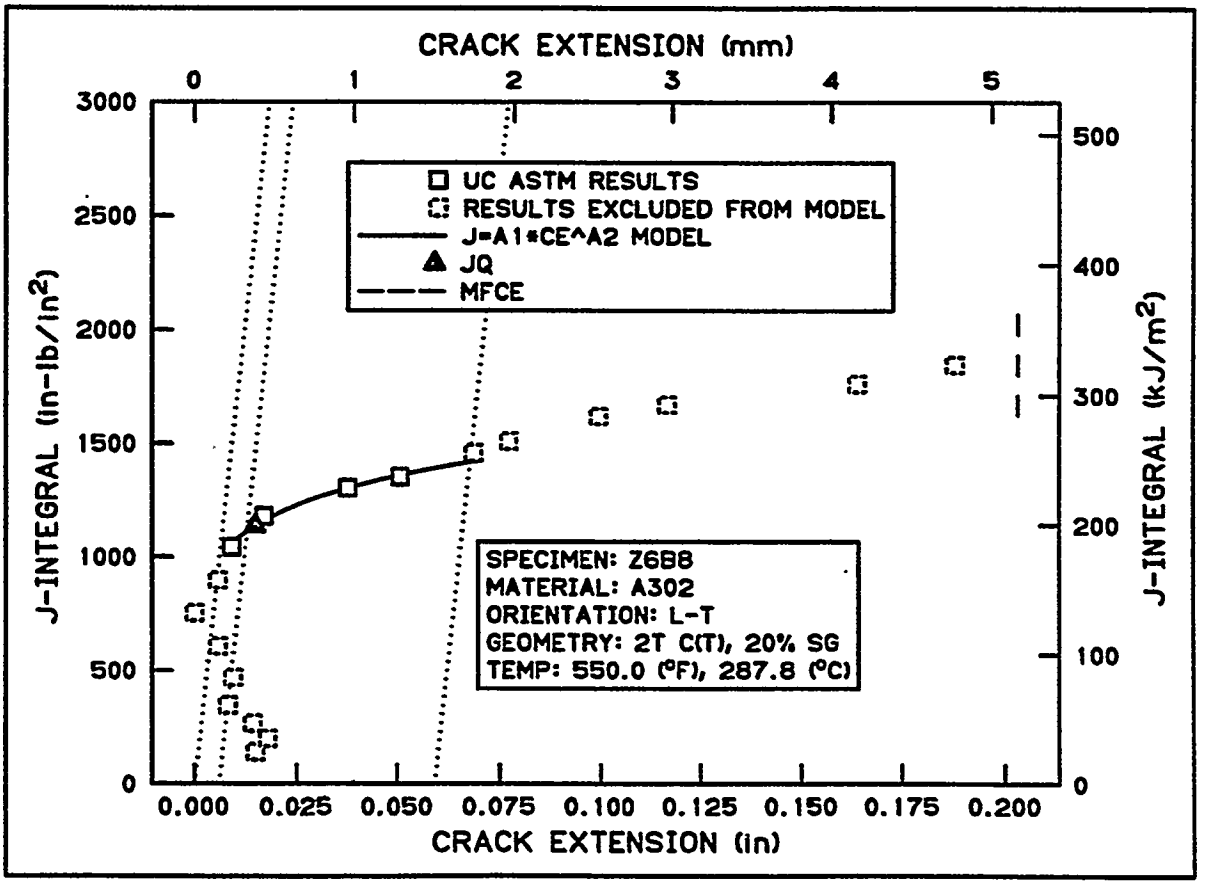

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
5000 4000 3000 2000 1000 0
800 700 600 500 400 300 200 100 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B7
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z6B8
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4689 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15322	0.0186	0.0148	139.2
2	18020	0.0223	0.0178	198.3
3	20374	0.0260	0.0142	266.6
4	22440	0.0298	0.0081	345.2
5	24796	0.0353	0.0094	467.8
6	26639	0.0410	0.0057	606.6
7	27963	0.0464	0.0000	752.3
8	28810	0.0522	0.0056	897.5
9	29263	0.0577	0.0090	1043.3
10	29306	0.0632	0.0169	1180.9
11	29245	0.0688	0.0377	1305.2
12	28469	0.0727	0.0507	1354.0
13	28584	0.0764	0.0686	1459.0
14	27735	0.0801	0.0773	1510.8
15	28044	0.0838	0.0995	1620.0
16	26600	0.0883	0.1167	1671.0
17	25973	0.0935	0.1638	1764.1
18	24424	0.0999	0.1879	1848.0

  WIDTH: 3.9998 (IN),101.590 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.8144 (IN),20.686 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.2709 (IN),83.081 (MM)
    DISTANCE 2: 3.2870 (IN),83.490 (MM)
    DISTANCE 3: 3.2896 (IN),83.556 (MM)
    DISTANCE 4: 3.2890 (IN),83.541 (MM)
    DISTANCE 5: 3.2886 (IN),83.530 (MM)
    DISTANCE 6: 3.2871 (IN),83.492 (MM)
    DISTANCE 7: 3.2863 (IN),83.472 (MM)
    DISTANCE 8: 3.2704 (IN),83.068 (MM)
    DISTANCE 9: 3.2655 (IN),82.944 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4857 (IN),88.537 (MM)
    DISTANCE 2: 3.4976 (IN),88.839 (MM)
    DISTANCE 3: 3.4910 (IN),88.671 (MM)
    DISTANCE 4: 3.5140 (IN),89.256 (MM)
    DISTANCE 5: 3.5028 (IN),88.971 (MM)
    DISTANCE 6: 3.4934 (IN),88.732 (MM)
    DISTANCE 7: 3.4437 (IN),87.470 (MM)
    DISTANCE 8: 3.4638 (IN),87.981 (MM)
    DISTANCE 9: 3.4826 (IN),88.458 (MM)

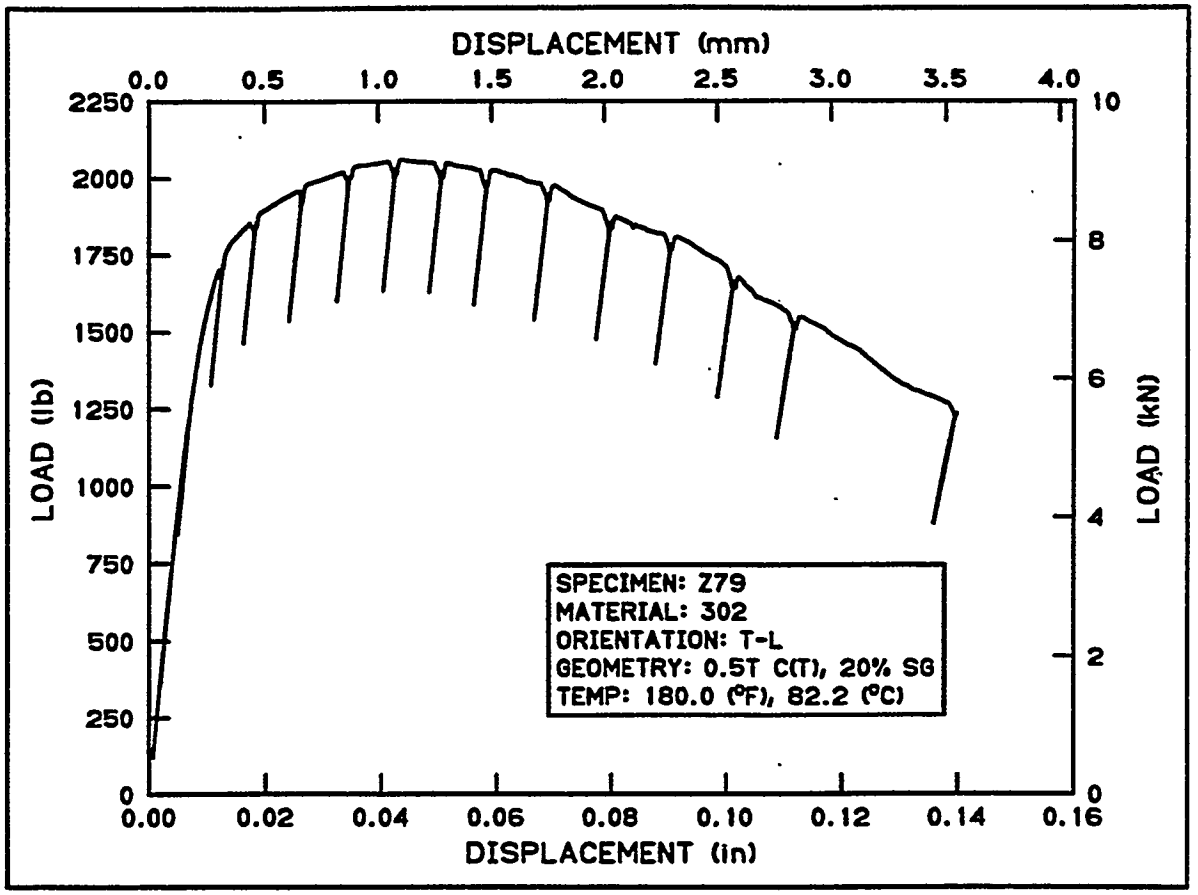

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z6B8
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

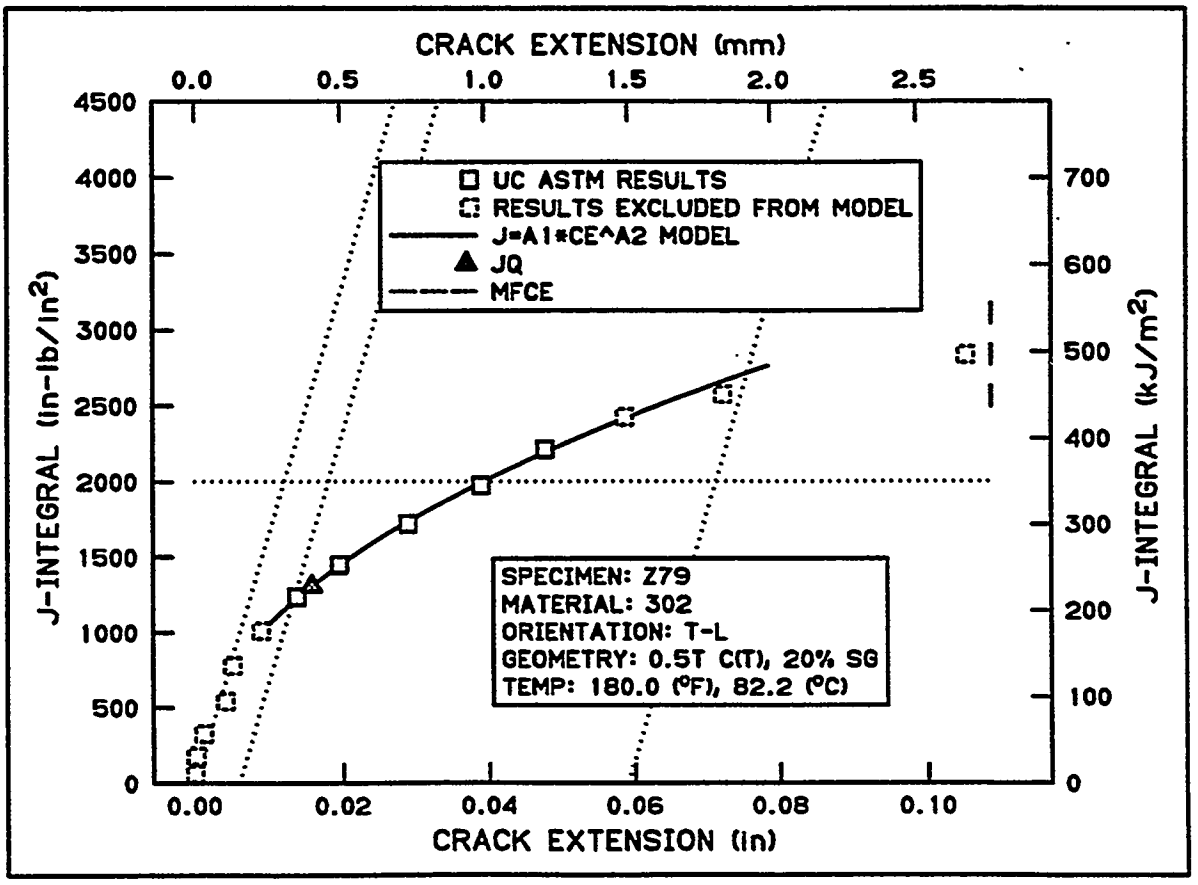

CRACK EXTENSION (mm)
0
1
2
3
4
5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z6B8
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z79
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6333 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1177	0.0066	0.0000	61.3
2	1701	0.0119	0.0002	181.3
3	1855	0.0172	0.0012	328.0
4	1955	0.0252	0.0041	542.2
5	2019	0.0333	0.0051	779.6
6	2052	0.0412	0.0089	1010.6
7	2049	0.0491	0.0138	1234.5
8	2025	0.0570	0.0196	1447.2
9	1979	0.0677	0.0289	1717.4
10	1895	0.0785	0.0390	1973.9
11	1818	0.0893	0.0478	2214.1
12	1712	0.1001	0.0587	2426.0
13	1563	0.1108	0.0722	2576.3
14	1269	0.1384	0.1052	2836.8

  WIDTH: 0.9970 (IN),25.324 (MM)
  THICKNESS: 0.5033 (IN),12.784 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2481 (IN),6.302 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8724 (IN),22.159 (MM)
    DISTANCE 2: 0.8822 (IN),22.408 (MM)
    DISTANCE 3: 0.8845 (IN),22.466 (MM)
    DISTANCE 4: 0.8856 (IN),22.494 (MM)
    DISTANCE 5: 0.8856 (IN),22.494 (MM)
    DISTANCE 6: 0.8845 (IN),22.466 (MM)
    DISTANCE 7: 0.8819 (IN),22.400 (MM)
    DISTANCE 8: 0.8768 (IN),22.271 (MM)
    DISTANCE 9: 0.8671 (IN),22.024 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9470 (IN),24.054 (MM)
    DISTANCE 2: 0.9749 (IN),24.762 (MM)
    DISTANCE 3: 0.9892 (IN),25.126 (MM)
    DISTANCE 4: 0.9750 (IN),24.765 (MM)
    DISTANCE 5: 0.9998 (IN),25.395 (MM)
    DISTANCE 6: 1.0092 (IN),25.634 (MM)
    DISTANCE 7: 0.9914 (IN),25.182 (MM)
    DISTANCE 8: 1.0017 (IN),25.443 (MM)
    DISTANCE 9: 1.0096 (IN),25.644 (MM)

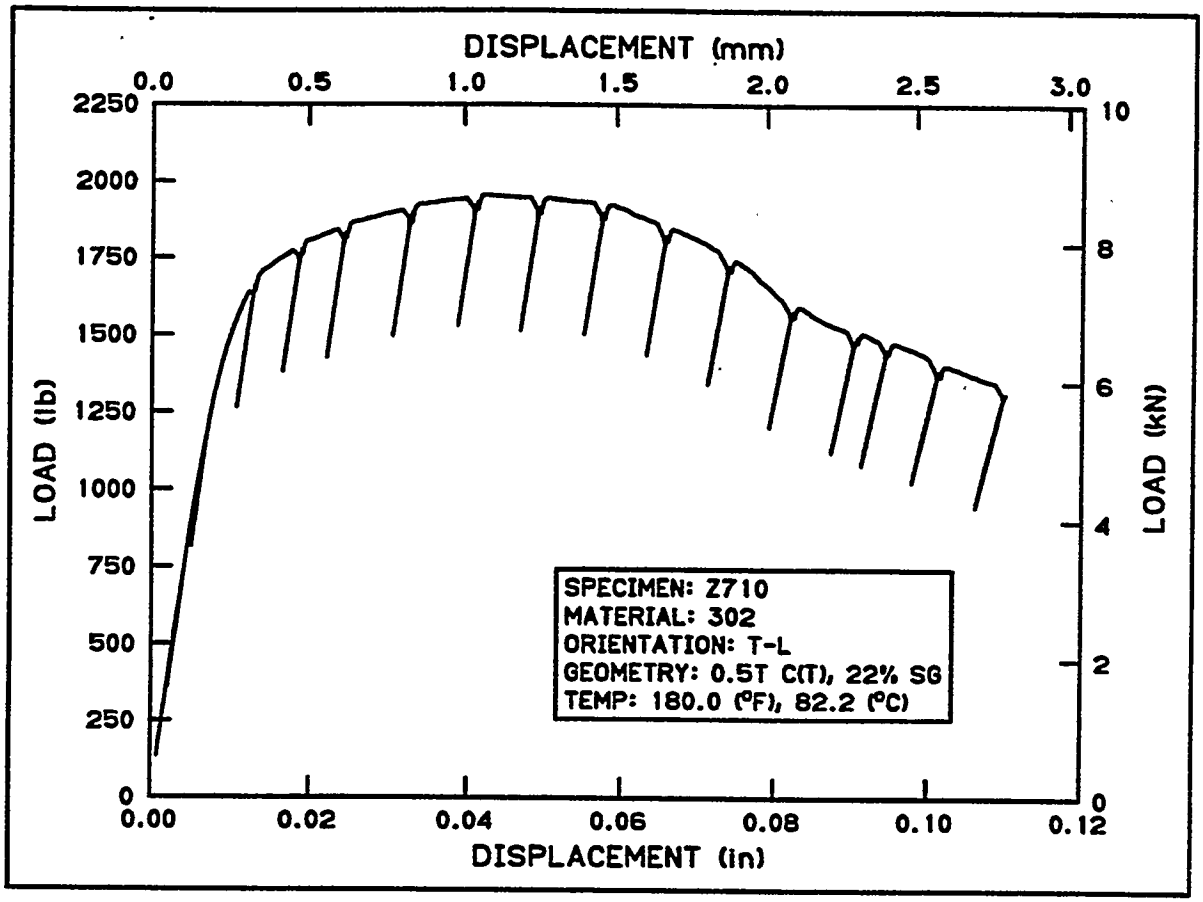

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)
SPECIMEN: Z79
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

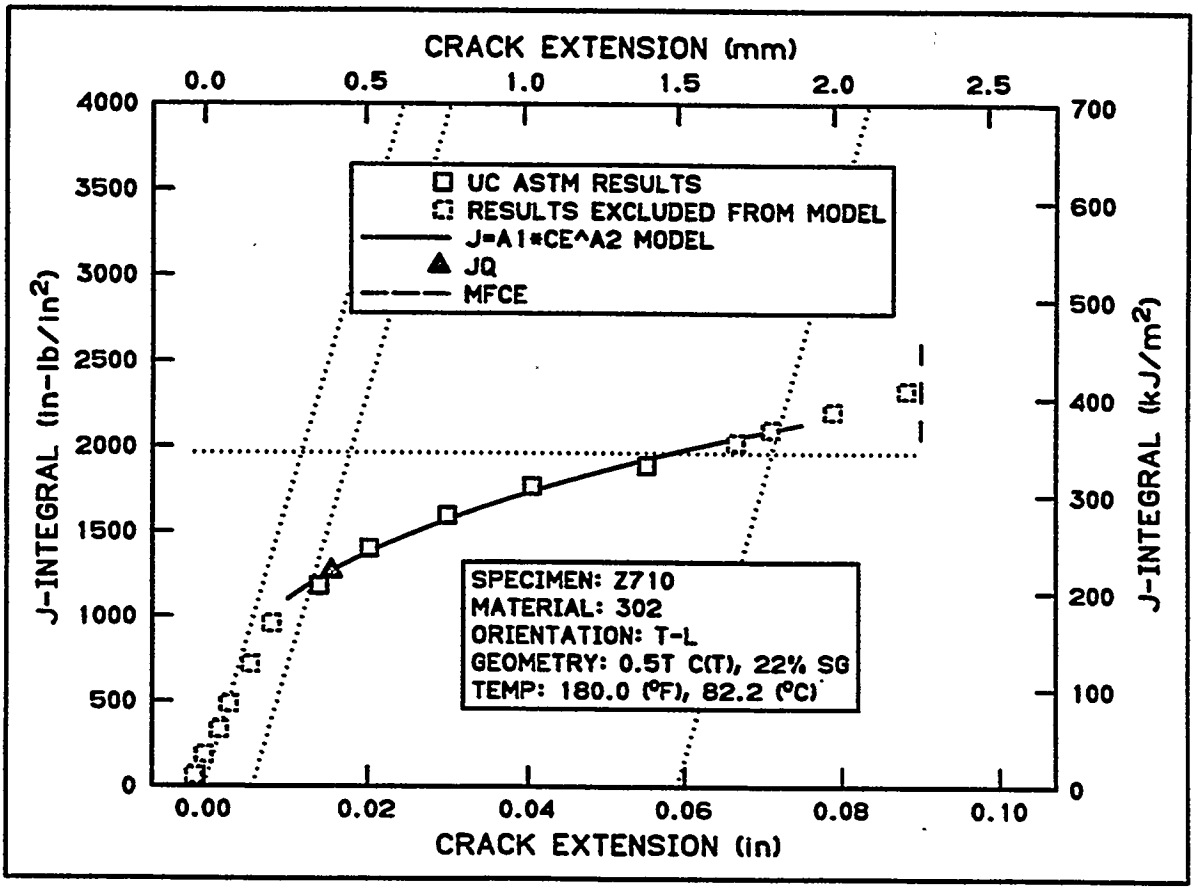

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
SPECIMEN: Z79
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z710
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 22 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6415 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1123	0.0066	-0.0013	63.4
2	1636	0.0122	0.0000	185.3
3	1773	0.0177	0.0018	334.9
4	1842	0.0233	0.0031	484.9
5	1906	0.0314	0.0057	718.5
6	1945	0.0396	0.0082	957.3
7	1948	0.0480	0.0140	1180.1
8	1930	0.0562	0.0202	1402.5
9	1864	0.0644	0.0298	1597.2
10	1775	0.0725	0.0405	1768.5
11	1618	0.0808	0.0551	1890.4
12	1518	0.0892	0.0664	2023.8
13	1487	0.0935	0.0708	2100.4
14	1429	0.1001	0.0787	2205.9
15	1350	0.1087	0.0881	2330.2

  WIDTH: 0.9984 (IN),25.359 (MM)
  THICKNESS: 0.5032 (IN),12.781 (MM)
  SIDE GROOVE RATIO: 22.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2481 (IN),6.302 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8736 (IN),22.189 (MM)
    DISTANCE 2: 0.8818 (IN),22.398 (MM)
    DISTANCE 3: 0.8856 (IN),22.494 (MM)
    DISTANCE 4: 0.8901 (IN),22.609 (MM)
    DISTANCE 5: 0.8935 (IN),22.695 (MM)
    DISTANCE 6: 0.8961 (IN),22.761 (MM)
    DISTANCE 7: 0.8958 (IN),22.753 (MM)
    DISTANCE 8: 0.8932 (IN),22.687 (MM)
    DISTANCE 9: 0.8876 (IN),22.545 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9832 (IN),24.973 (MM)
    DISTANCE 2: 0.9716 (IN),24.679 (MM)
    DISTANCE 3: 0.9712 (IN),24.668 (MM)
    DISTANCE 4: 0.9728 (IN),24.709 (MM)
    DISTANCE 5: 0.9720 (IN),24.689 (MM)
    DISTANCE 6: 0.9778 (IN),24.836 (MM)
    DISTANCE 7: 0.9909 (IN),25.169 (MM)
    DISTANCE 8: 0.9968 (IN),25.319 (MM)
    DISTANCE 9: 0.9827 (IN),24.961 (MM)

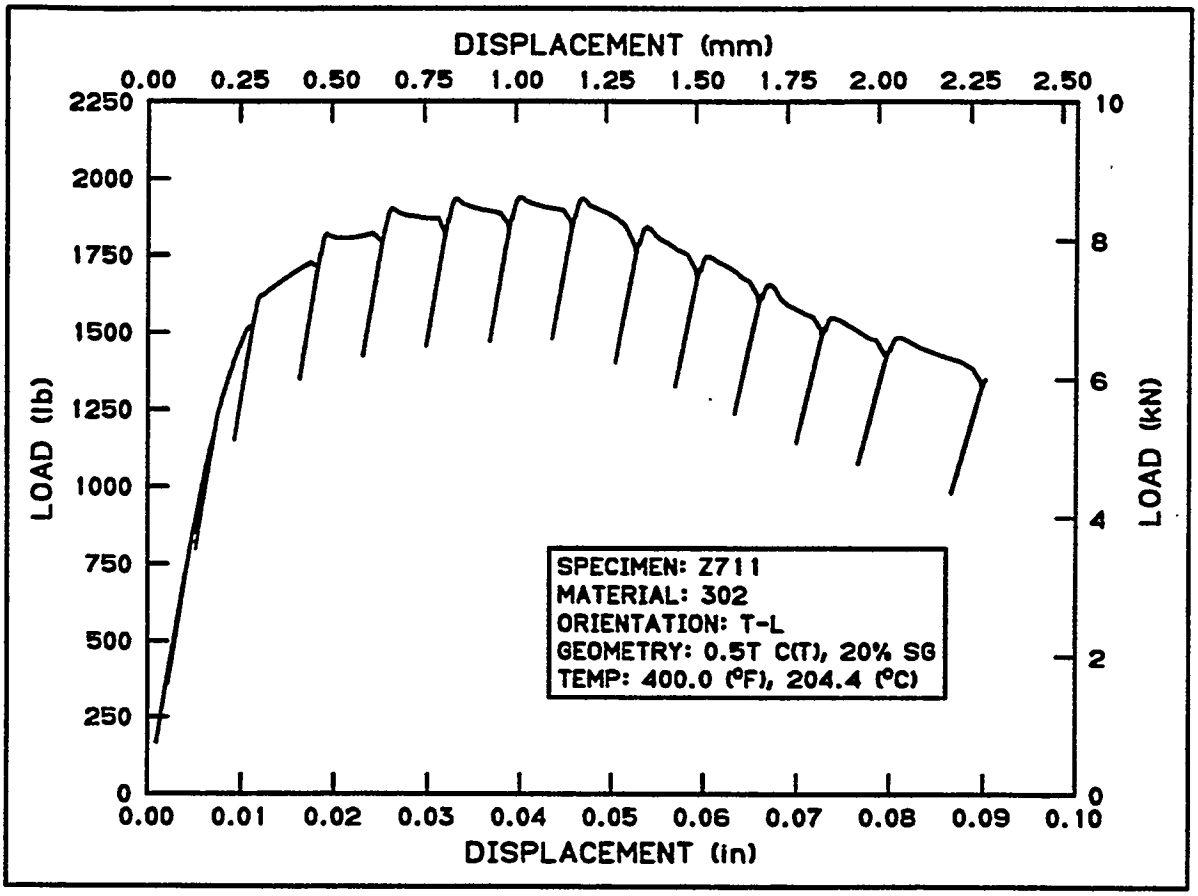

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
10
8
6
4
2
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z710
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)

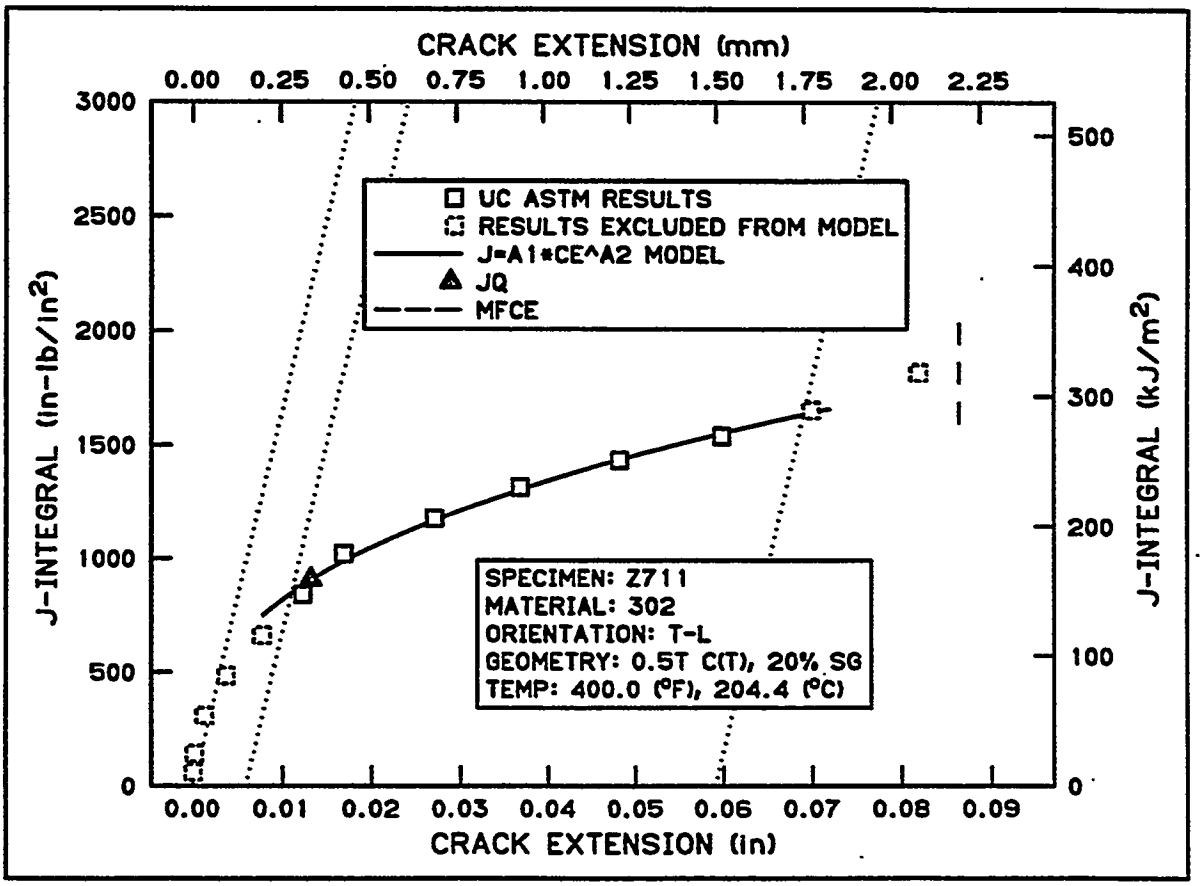

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z710
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z711
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6375 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1118	0.0066	0.0000	60.0
2	1514	0.0107	0.0002	142.3
3	1727	0.0174	0.0013	309.5
4	1821	0.0240	0.0037	484.0
5	1871	0.0310	0.0078	661.0
6	1885	0.0377	0.0123	840.3
7	1896	0.0445	0.0169	1019.3
8	1843	0.0515	0.0271	1177.0
9	1753	0.0582	0.0368	1314.8
10	1666	0.0649	0.0482	1432.9
11	1552	0.0717	0.0598	1540.2
12	1477	0.0786	0.0698	1652.4
13	1385	0.0888	0.0818	1815.7

  WIDTH: 0.9996 (IN),25.390 (MM)
  THICKNESS: 0.5032 (IN),12.781 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2494 (IN),6.335 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8777 (IN),22.294 (MM)
    DISTANCE 2: 0.8834 (IN),22.438 (MM)
    DISTANCE 3: 0.8868 (IN),22.525 (MM)
    DISTANCE 4: 0.8898 (IN),22.601 (MM)
    DISTANCE 5: 0.8893 (IN),22.588 (MM)
    DISTANCE 6: 0.8898 (IN),22.601 (MM)
    DISTANCE 7: 0.8902 (IN),22.611 (MM)
    DISTANCE 8: 0.8871 (IN),22.532 (MM)
    DISTANCE 9: 0.8800 (IN),22.352 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9790 (IN),24.867 (MM)
    DISTANCE 2: 0.9951 (IN),25.276 (MM)
    DISTANCE 3: 0.9753 (IN),24.773 (MM)
    DISTANCE 4: 0.9608 (IN),24.404 (MM)
    DISTANCE 5: 0.9705 (IN),24.651 (MM)
    DISTANCE 6: 0.9643 (IN),24.493 (MM)
    DISTANCE 7: 0.9746 (IN),24.755 (MM)
    DISTANCE 8: 0.9676 (IN),24.577 (MM)
    DISTANCE 9: 0.9760 (IN),24.790 (MM)

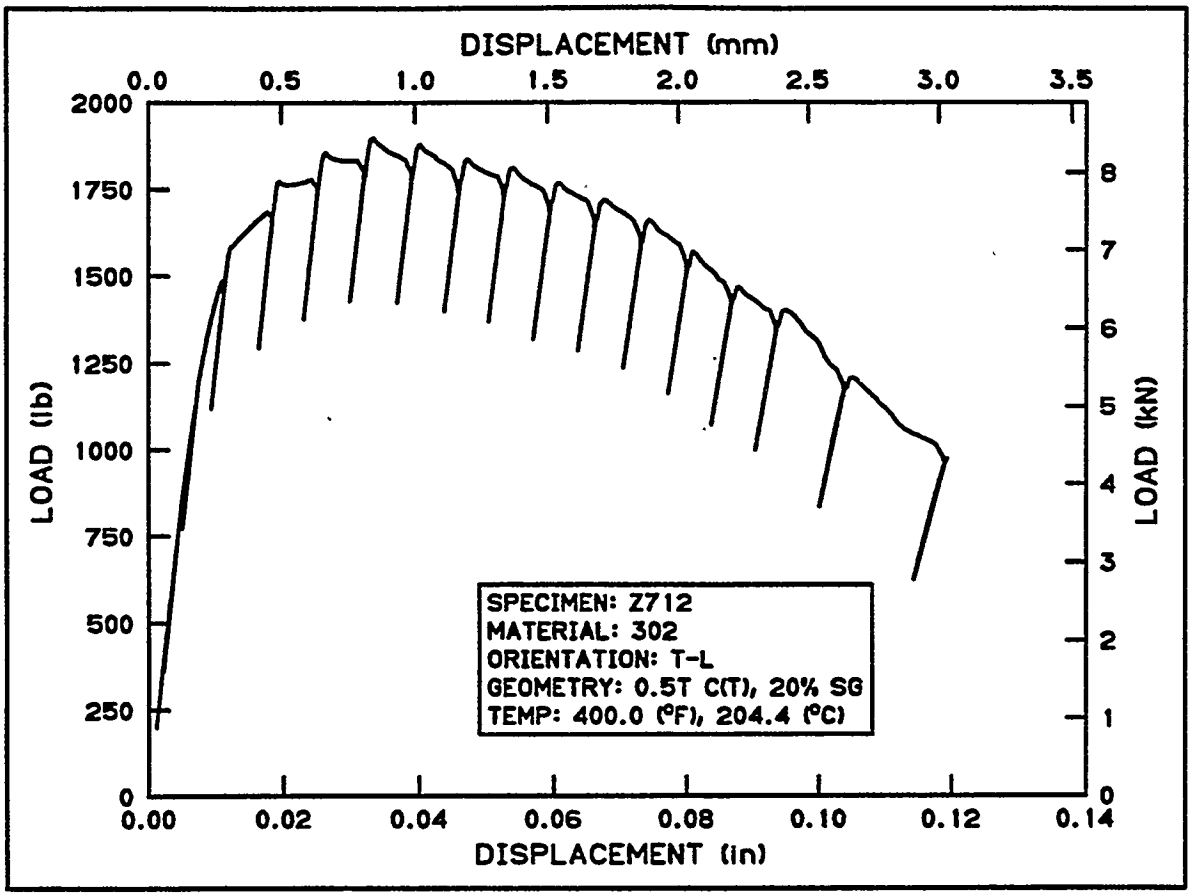

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z711
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

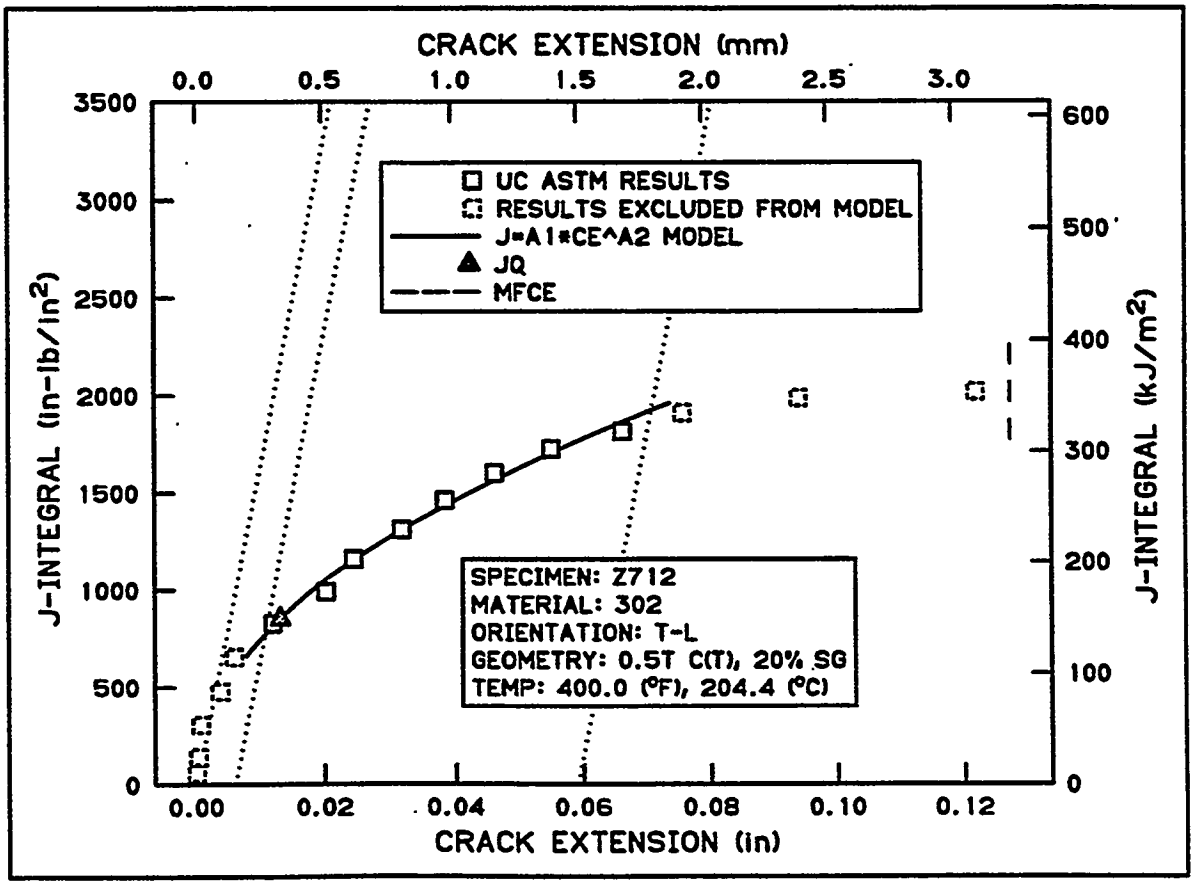

CRACK EXTENSION (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25
J-INTEGRAL (in-lb/in²)
3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z711
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z712
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6383 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1090	0.0066	0.0000	57.8
2	1483	0.0108	0.0003	139.4
3	1685	0.0175	0.0007	304.5
4	1778	0.0242	0.0037	476.6
5	1834	0.0310	0.0058	655.3
6	1834	0.0380	0.0119	828.4
7	1805	0.0449	0.0202	992.0
8	1786	0.0516	0.0245	1159.6
9	1745	0.0585	0.0318	1311.6
10	1715	0.0651	0.0384	1462.3
11	1659	0.0720	0.0461	1601.4
12	1588	0.0790	0.0550	1724.9
13	1481	0.0857	0.0662	1814.9
14	1399	0.0926	0.0756	1909.5
15	1231	0.1026	0.0940	1985.8
16	1012	0.1178	0.1218	2018.8

  WIDTH: 0.9967 (IN),25.316 (MM)
  THICKNESS: 0.5033 (IN),12.784 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2509 (IN),6.373 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8830 (IN),22.428 (MM)
    DISTANCE 2: 0.8904 (IN),22.616 (MM)
    DISTANCE 3: 0.8942 (IN),22.713 (MM)
    DISTANCE 4: 0.8926 (IN),22.672 (MM)
    DISTANCE 5: 0.8934 (IN),22.692 (MM)
    DISTANCE 6: 0.8921 (IN),22.659 (MM)
    DISTANCE 7: 0.8880 (IN),22.555 (MM)
    DISTANCE 8: 0.8830 (IN),22.428 (MM)
    DISTANCE 9: 0.8760 (IN),22.250 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0256 (IN),26.050 (MM)
    DISTANCE 2: 1.0278 (IN),26.106 (MM)
    DISTANCE 3: 1.0306 (IN),26.177 (MM)
    DISTANCE 4: 1.0098 (IN),25.649 (MM)
    DISTANCE 5: 1.0172 (IN),25.837 (MM)
    DISTANCE 6: 1.0094 (IN),25.639 (MM)
    DISTANCE 7: 1.0166 (IN),25.822 (MM)
    DISTANCE 8: 1.0024 (IN),25.461 (MM)
    DISTANCE 9: 1.0076 (IN),25.593 (MM)

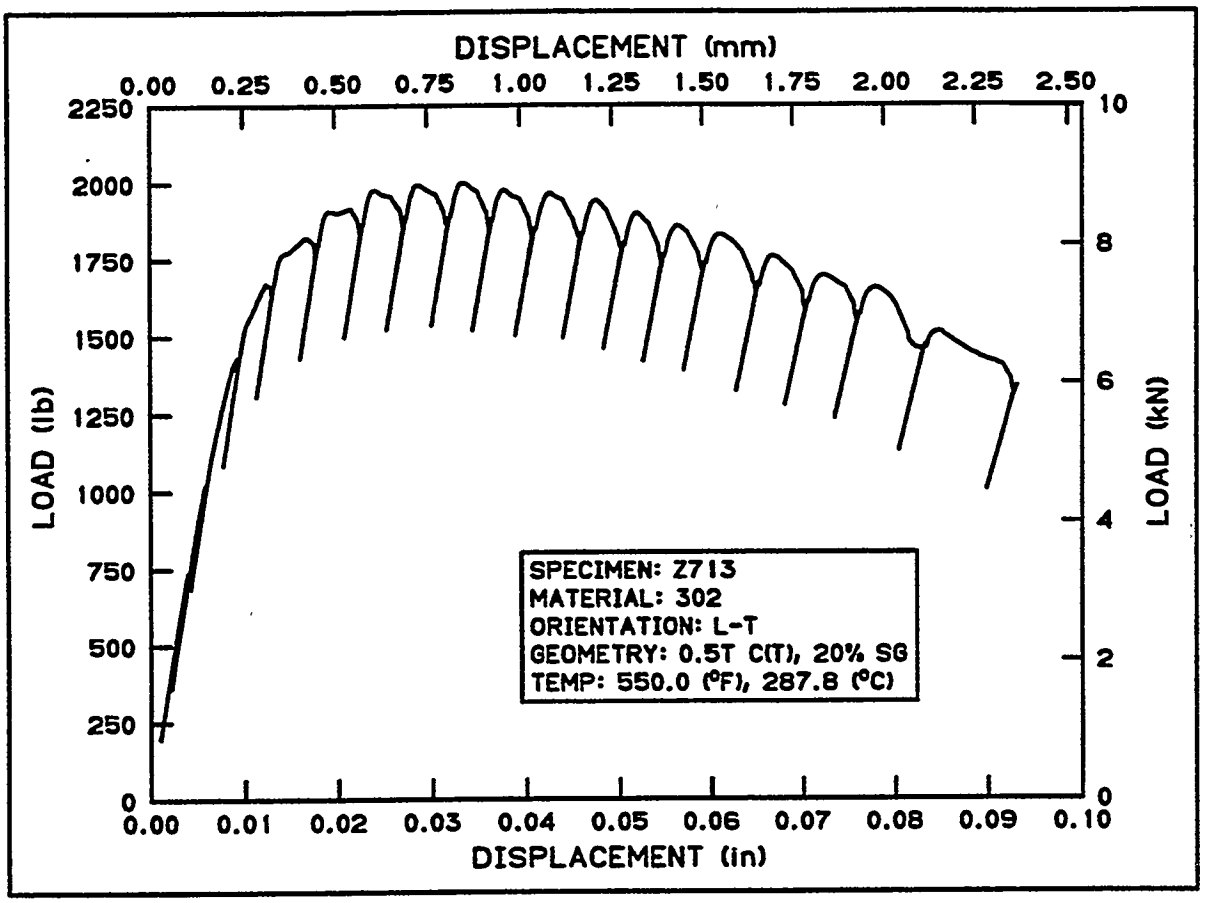

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z712
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

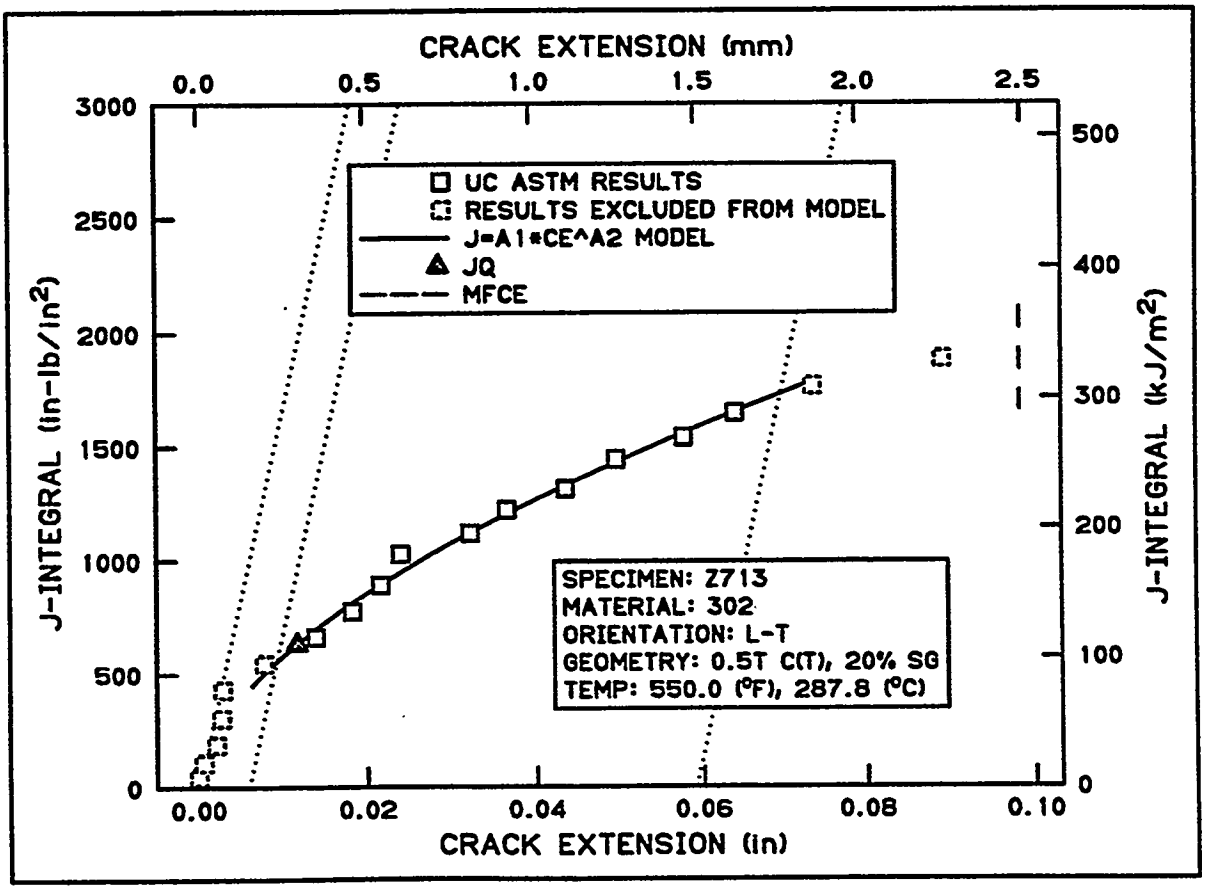

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z712
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z713
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6233 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	993	0.0056	0.0000	45.0
2	1411	0.0089	0.0006	106.8
3	1671	0.0124	0.0021	186.7
4	1824	0.0167	0.0027	303.2
5	1917	0.0214	0.0029	429.3
6	1955	0.0257	0.0078	544.4
7	1964	0.0305	0.0139	662.4
8	1971	0.0349	0.0183	775.7
9	1946	0.0394	0.0216	891.9
10	1941	0.0440	0.0240	1027.4
11	1910	0.0486	0.0323	1118.0
12	1866	0.0532	0.0366	1220.4
13	1837	0.0574	0.0435	1311.5
14	1775	0.0634	0.0495	1441.0
15	1712	0.0689	0.0577	1538.0
16	1658	0.0747	0.0640	1645.8
17	1599	0.0802	0.0735	1763.6
18	1407	0.0916	0.0891	1881.4

  WIDTH: 0.9970 (IN),25.324 (MM)
  THICKNESS: 0.5032 (IN),12.781 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2496 (IN),6.340 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8586 (IN),21.808 (MM)
    DISTANCE 2: 0.8660 (IN),21.996 (MM)
    DISTANCE 3: 0.8707 (IN),22.116 (MM)
    DISTANCE 4: 0.8738 (IN),22.195 (MM)
    DISTANCE 5: 0.8762 (IN),22.255 (MM)
    DISTANCE 6: 0.8769 (IN),22.273 (MM)
    DISTANCE 7: 0.8780 (IN),22.301 (MM)
    DISTANCE 8: 0.8773 (IN),22.283 (MM)
    DISTANCE 9: 0.8694 (IN),22.083 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9790 (IN),24.867 (MM)
    DISTANCE 2: 0.9640 (IN),24.486 (MM)
    DISTANCE 3: 0.9634 (IN),24.470 (MM)
    DISTANCE 4: 0.9729 (IN),24.712 (MM)
    DISTANCE 5: 0.9806 (IN),24.907 (MM)
    DISTANCE 6: 0.9702 (IN),24.643 (MM)
    DISTANCE 7: 0.9695 (IN),24.625 (MM)
    DISTANCE 8: 0.9732 (IN),24.719 (MM)
    DISTANCE 9: 0.9702 (IN),24.643 (MM)

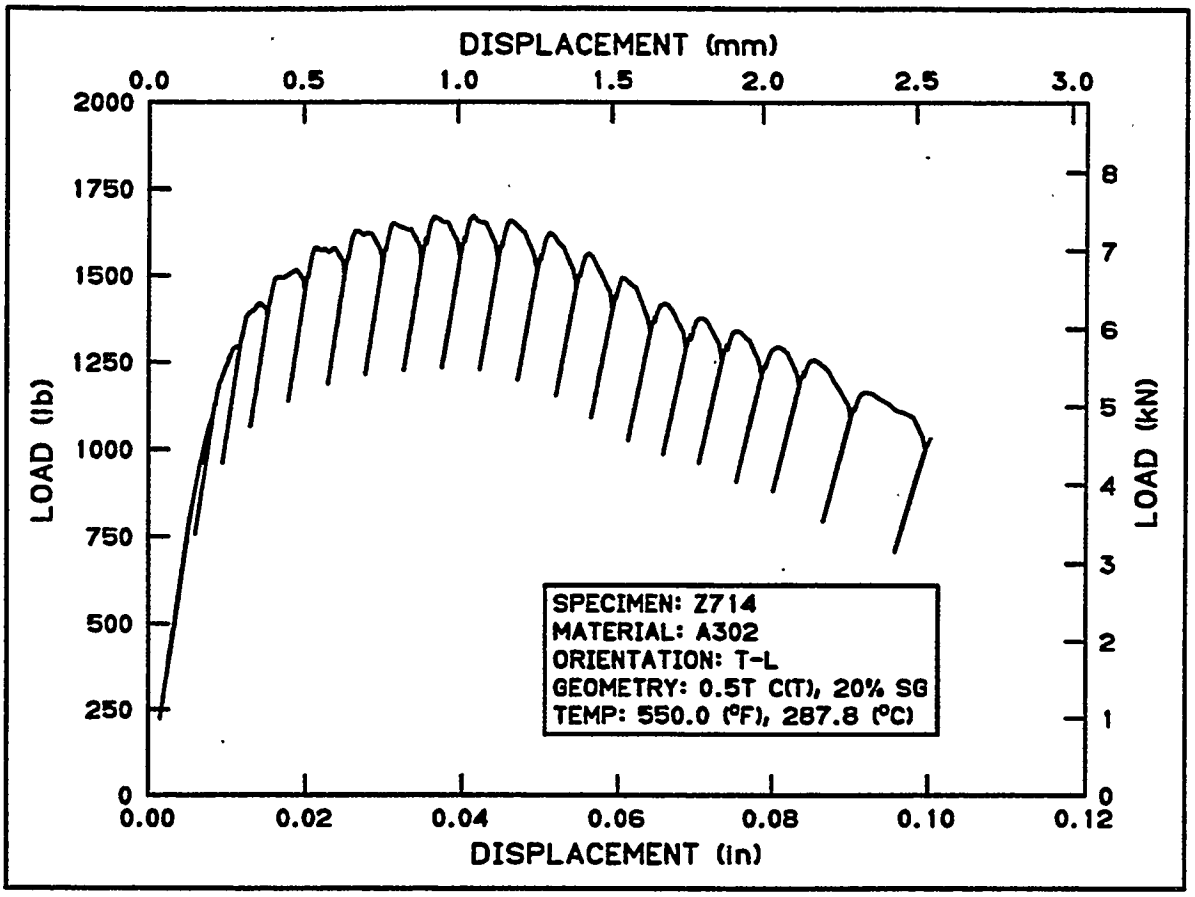

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z713
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

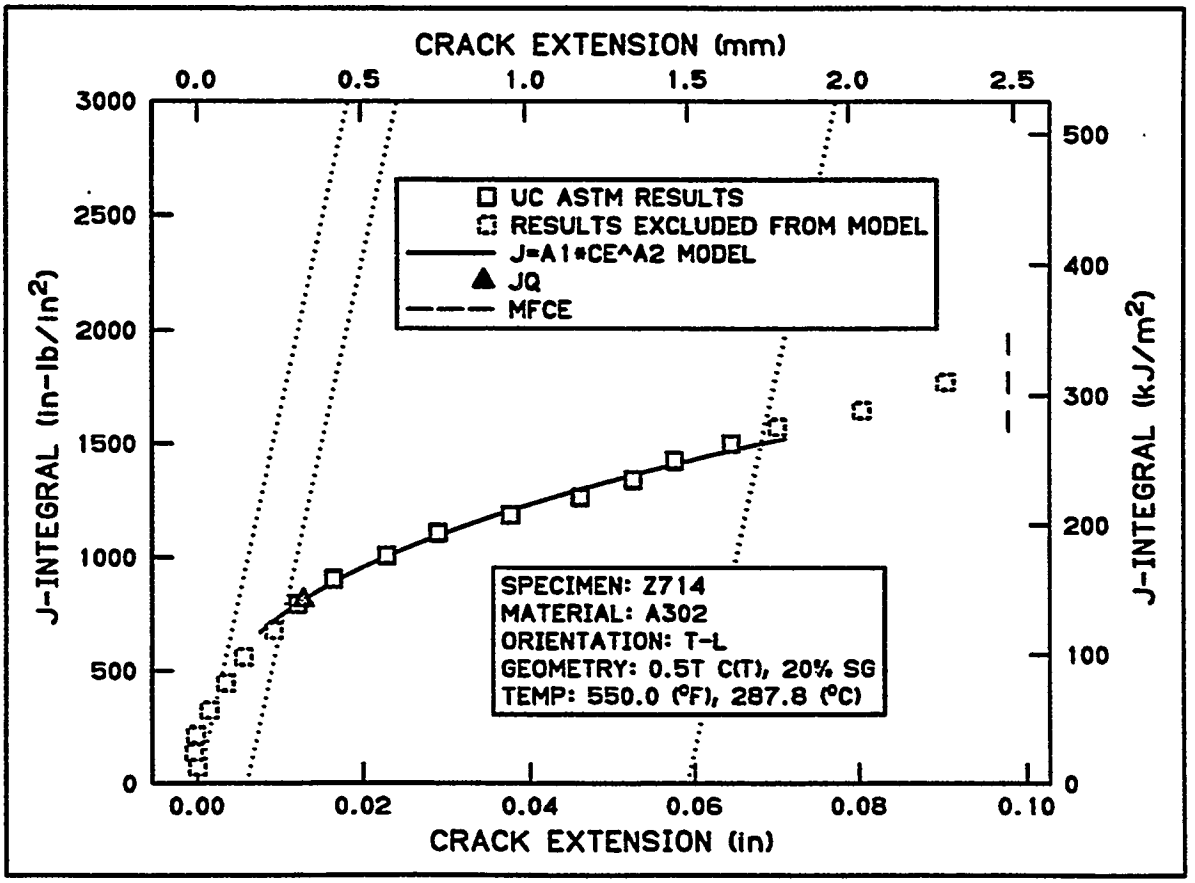

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z713
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z714
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6641 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1043	0.0073	0.0000	72.4
2	1287	0.0106	-0.0004	137.4
3	1421	0.0140	-0.0002	214.2
4	1518	0.0188	0.0014	323.6
5	1580	0.0237	0.0034	444.2
6	1620	0.0285	0.0055	560.2
7	1633	0.0335	0.0092	676.6
8	1655	0.0381	0.0121	793.8
9	1649	0.0431	0.0164	903.8
10	1624	0.0479	0.0229	1007.0
11	1581	0.0529	0.0290	1107.8
12	1516	0.0575	0.0376	1185.3
13	1464	0.0623	0.0460	1262.8
14	1396	0.0671	0.0524	1340.4
15	1367	0.0716	0.0575	1424.4
16	1316	0.0770	0.0645	1499.3
17	1278	0.0819	0.0701	1573.9
18	1178	0.0885	0.0804	1647.9
19	1093	0.0981	0.0904	1772.2

  WIDTH: 0.9990 (IN),25.375 (MM)
  THICKNESS: 0.5032 (IN),12.781 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2424 (IN),6.157 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9002 (IN),22.865 (MM)
    DISTANCE 2: 0.9070 (IN),23.038 (MM)
    DISTANCE 3: 0.9080 (IN),23.063 (MM)
    DISTANCE 4: 0.9099 (IN),23.111 (MM)
    DISTANCE 5: 0.9105 (IN),23.127 (MM)
    DISTANCE 6: 0.9086 (IN),23.078 (MM)
    DISTANCE 7: 0.9068 (IN),23.033 (MM)
    DISTANCE 8: 0.9028 (IN),22.931 (MM)
    DISTANCE 9: 0.8970 (IN),22.784 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0160 (IN),25.806 (MM)
    DISTANCE 2: 1.0125 (IN),25.718 (MM)
    DISTANCE 3: 0.9990 (IN),25.375 (MM)
    DISTANCE 4: 1.0030 (IN),25.476 (MM)
    DISTANCE 5: 1.0020 (IN),25.451 (MM)
    DISTANCE 6: 1.0034 (IN),25.486 (MM)
    DISTANCE 7: 1.0006 (IN),25.415 (MM)
    DISTANCE 8: 1.0006 (IN),25.415 (MM)
    DISTANCE 9: 1.0112 (IN),25.684 (MM)

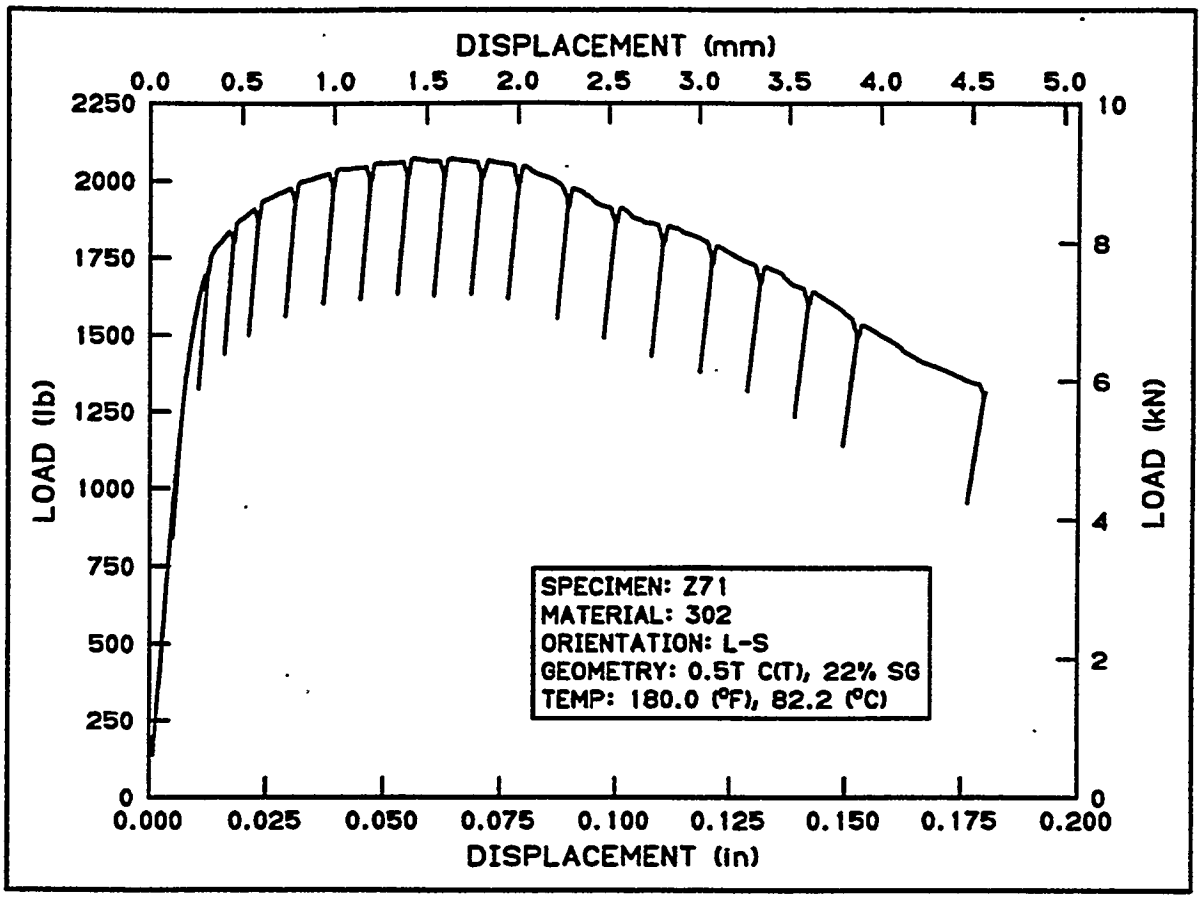

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
LOAD (lb)
2000
1750
1500
1250
1000
750
500
250
0
LOAD (kN)
8
7
6
5
4
3
2
1
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z714
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

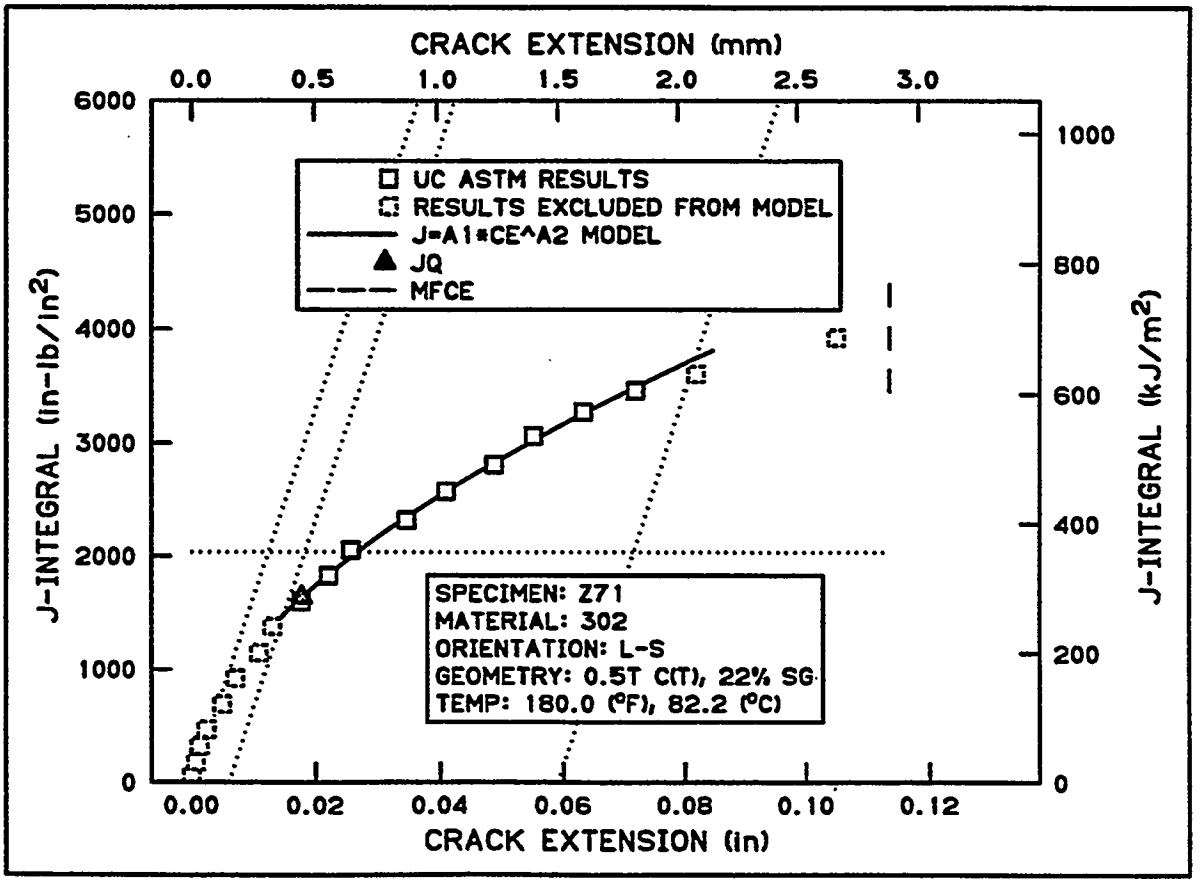

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
J-INTEGRAL (in-lb/in²)
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
500
400
300
200
100
0
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z714
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z71
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 22 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6288 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1169	0.0065	0.0000	60.1
2	1690	0.0118	0.0007	177.9
3	1835	0.0169	0.0012	320.7
4	1907	0.0223	0.0024	466.5
5	1974	0.0301	0.0049	688.0
6	2022	0.0382	0.0070	920.5
7	2043	0.0461	0.0108	1144.3
8	2060	0.0540	0.0130	1379.8
9	2062	0.0619	0.0177	1598.9
10	2060	0.0699	0.0220	1825.5
11	2048	0.0777	0.0256	2052.2
12	1982	0.0882	0.0345	2315.6
13	1911	0.0987	0.0409	2573.8
14	1856	0.1091	0.0487	2809.5
15	1799	0.1199	0.0551	3060.4
16	1724	0.1304	0.0633	3270.4
17	1649	0.1410	0.0718	3456.3
18	1549	0.1514	0.0818	3604.3
19	1340	0.1788	0.1048	3923.2

  WIDTH: 0.9990 (IN),25.375 (MM)
  THICKNESS: 0.5032 (IN),12.781 (MM)
  SIDE GROOVE RATIO: 22.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2500 (IN),6.350 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8586 (IN),21.808 (MM)
    DISTANCE 2: 0.8736 (IN),22.189 (MM)
    DISTANCE 3: 0.8788 (IN),22.322 (MM)
    DISTANCE 4: 0.8821 (IN),22.405 (MM)
    DISTANCE 5: 0.8834 (IN),22.438 (MM)
    DISTANCE 6: 0.8844 (IN),22.464 (MM)
    DISTANCE 7: 0.8824 (IN),22.413 (MM)
    DISTANCE 8: 0.8804 (IN),22.362 (MM)
    DISTANCE 9: 0.8727 (IN),22.167 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0047 (IN),25.519 (MM)
    DISTANCE 2: 0.9955 (IN),25.286 (MM)
    DISTANCE 3: 0.9888 (IN),25.116 (MM)
    DISTANCE 4: 0.9858 (IN),25.039 (MM)
    DISTANCE 5: 0.9862 (IN),25.049 (MM)
    DISTANCE 6: 0.9863 (IN),25.052 (MM)
    DISTANCE 7: 0.9973 (IN),25.331 (MM)
    DISTANCE 8: 1.0012 (IN),25.430 (MM)
    DISTANCE 9: 0.9900 (IN),25.146 (MM)

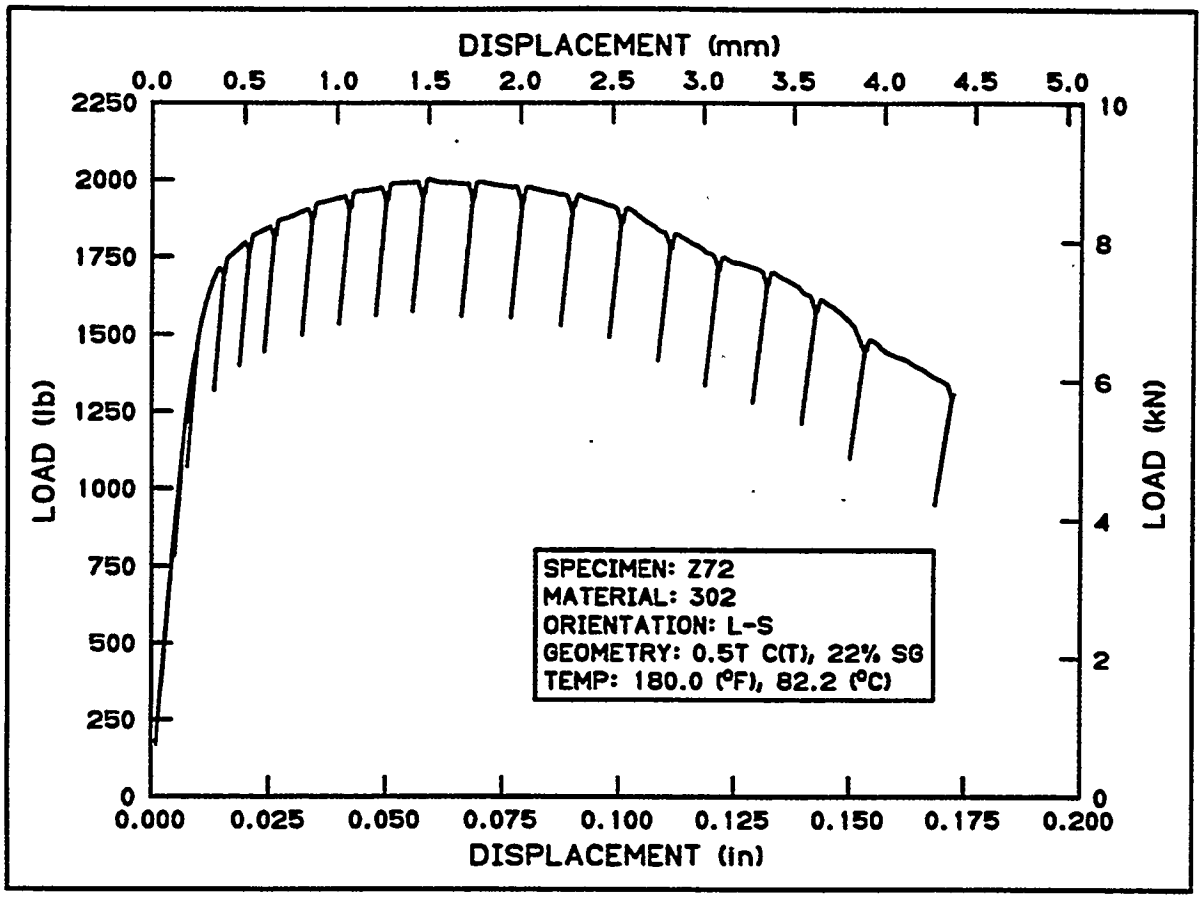

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z71
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

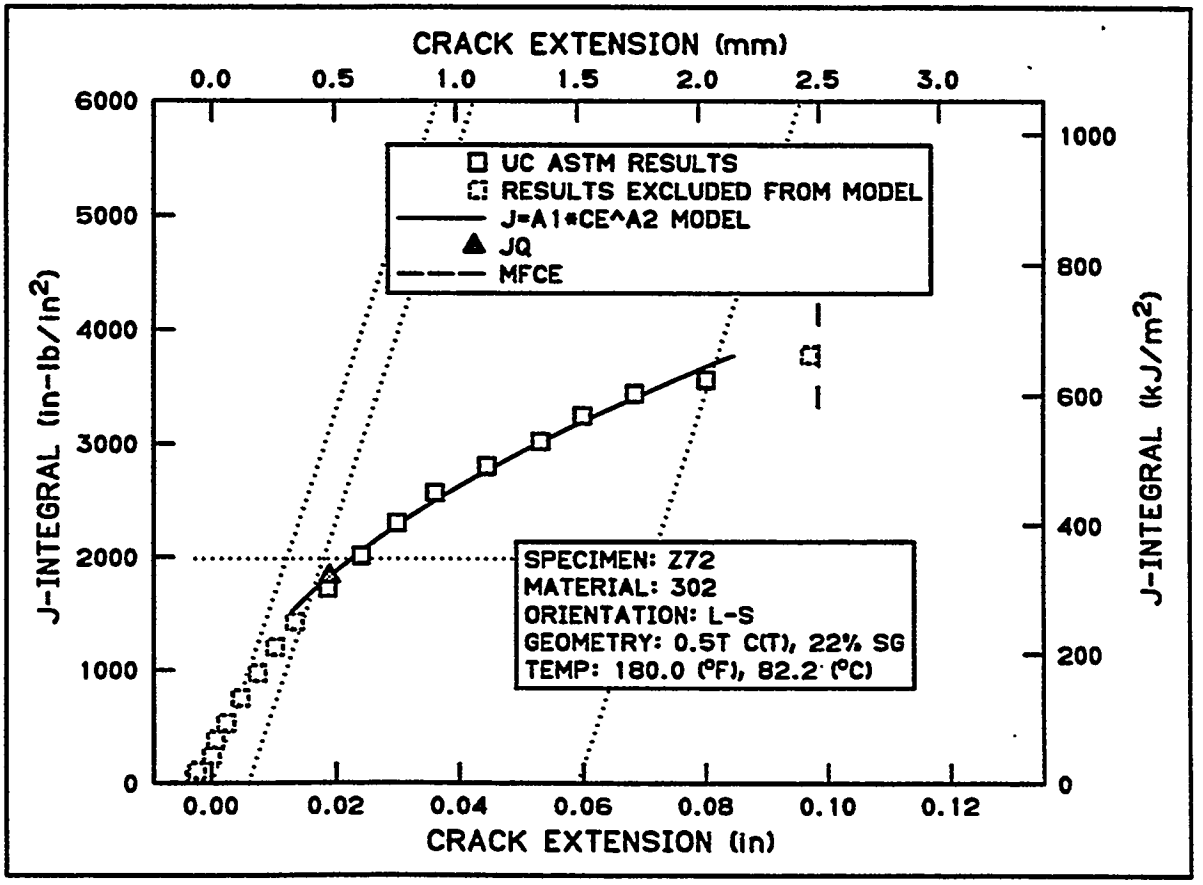

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z71
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z72
MATERIAL CODE: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 22 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6377 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1111	0.0065	-0.0027	56.9
2	1418	0.0091	-0.0023	107.8
3	1713	0.0144	0.0000	242.1
4	1795	0.0198	0.0007	383.3
5	1847	0.0251	0.0023	526.5
6	1905	0.0331	0.0047	748.0
7	1946	0.0410	0.0074	971.4
8	1973	0.0489	0.0102	1198.6
9	1990	0.0568	0.0133	1425.6
10	1986	0.0675	0.0186	1721.5
11	1976	0.0780	0.0241	2013.4
12	1947	0.0887	0.0299	2303.7
13	1908	0.0992	0.0361	2568.7
14	1829	0.1097	0.0445	2806.0
15	1757	0.1204	0.0532	3020.8
16	1702	0.1311	0.0599	3247.1
17	1622	0.1415	0.0683	3441.4
18	1527	0.1510	0.0800	3563.0
19	1340	0.1713	0.0970	3778.6

WIDTH: 0.9987 (IN),25.367 (MM)
THICKNESS: 0.5034 (IN),12.786 (MM)
SIDE GROOVE RATIO: 22.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2501 (IN),6.353 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8812 (IN),22.382 (MM)
DISTANCE 2: 0.8883 (IN),22.563 (MM)
DISTANCE 3: 0.8896 (IN),22.596 (MM)
DISTANCE 4: 0.8914 (IN),22.642 (MM)
DISTANCE 5: 0.8918 (IN),22.652 (MM)
DISTANCE 6: 0.8908 (IN),22.626 (MM)
DISTANCE 7: 0.8876 (IN),22.545 (MM)
DISTANCE 8: 0.8842 (IN),22.459 (MM)
DISTANCE 9: 0.8763 (IN),22.258 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8885 (IN),22.568 (MM)
DISTANCE 2: 1.0005 (IN),25.413 (MM)
DISTANCE 3: 0.9992 (IN),25.380 (MM)
DISTANCE 4: 0.9901 (IN),25.149 (MM)
DISTANCE 5: 0.9859 (IN),25.042 (MM)
DISTANCE 6: 0.9868 (IN),25.065 (MM)
DISTANCE 7: 0.9867 (IN),25.062 (MM)
DISTANCE 8: 0.9980 (IN),25.349 (MM)
DISTANCE 9: 0.9964 (IN),25.309 (MM)

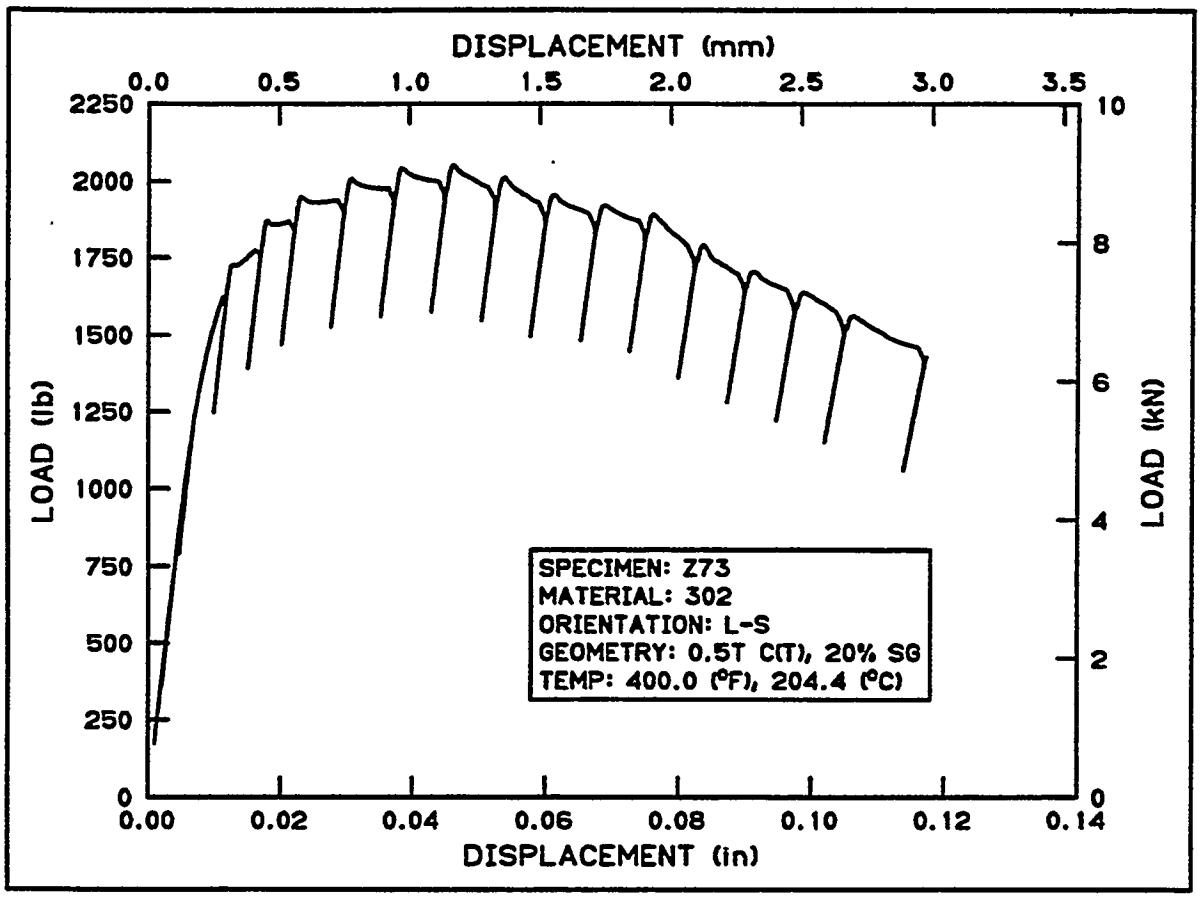

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z72
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

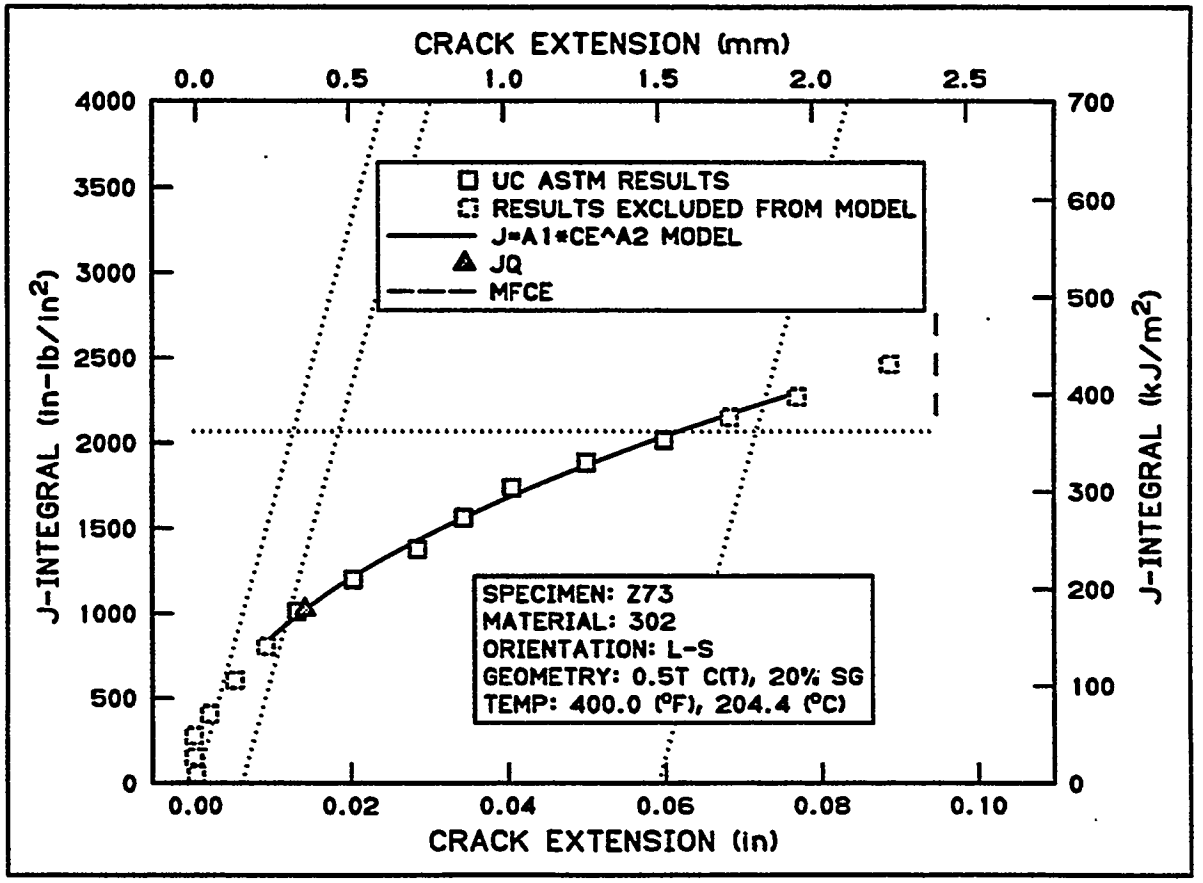

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z72
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 22% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z73
MATERIAL CODE: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6228 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1124	0.0062	0.0000	50.8
2	1619	0.0112	-0.0002	153.0
3	1772	0.0161	-0.0003	277.8
4	1868	0.0212	0.0017	406.5
5	1936	0.0286	0.0050	604.2
6	1975	0.0363	0.0090	804.9
7	1997	0.0439	0.0130	1010.3
8	1980	0.0512	0.0203	1199.3
9	1930	0.0589	0.0284	1378.2
10	1893	0.0663	0.0343	1562.1
11	1868	0.0739	0.0404	1738.3
12	1784	0.0813	0.0499	1885.0
13	1695	0.0889	0.0599	2015.6
14	1642	0.0963	0.0682	2150.5
15	1569	0.1038	0.0768	2270.8
16	1458	0.1159	0.0885	2462.6

WIDTH: 0.9987 (IN),25.367 (MM)
THICKNESS: 0.5030 (IN),12.776 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2504 (IN),6.360 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8619 (IN),21.892 (MM)
DISTANCE 2: 0.8684 (IN),22.057 (MM)
DISTANCE 3: 0.8726 (IN),22.164 (MM)
DISTANCE 4: 0.8744 (IN),22.210 (MM)
DISTANCE 5: 0.8758 (IN),22.245 (MM)
DISTANCE 6: 0.8772 (IN),22.281 (MM)
DISTANCE 7: 0.8768 (IN),22.271 (MM)
DISTANCE 8: 0.8738 (IN),22.195 (MM)
DISTANCE 9: 0.8705 (IN),22.111 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9880 (IN),25.095 (MM)
DISTANCE 2: 0.9764 (IN),24.801 (MM)
DISTANCE 3: 0.9656 (IN),24.526 (MM)
DISTANCE 4: 0.9613 (IN),24.417 (MM)
DISTANCE 5: 0.9603 (IN),24.392 (MM)
DISTANCE 6: 0.9666 (IN),24.552 (MM)
DISTANCE 7: 0.9654 (IN),24.521 (MM)
DISTANCE 8: 0.9640 (IN),24.486 (MM)
DISTANCE 9: 0.9760 (IN),24.790 (MM)

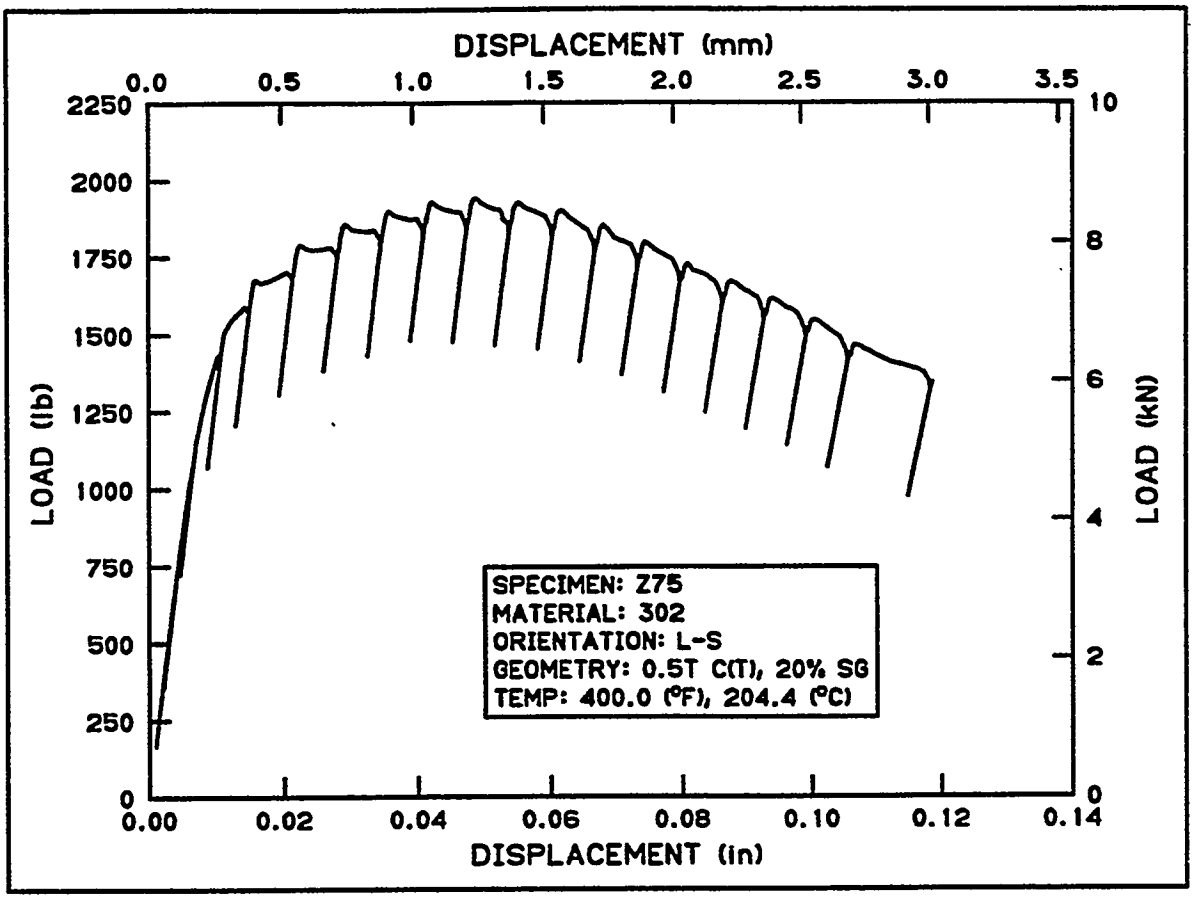

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z73
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

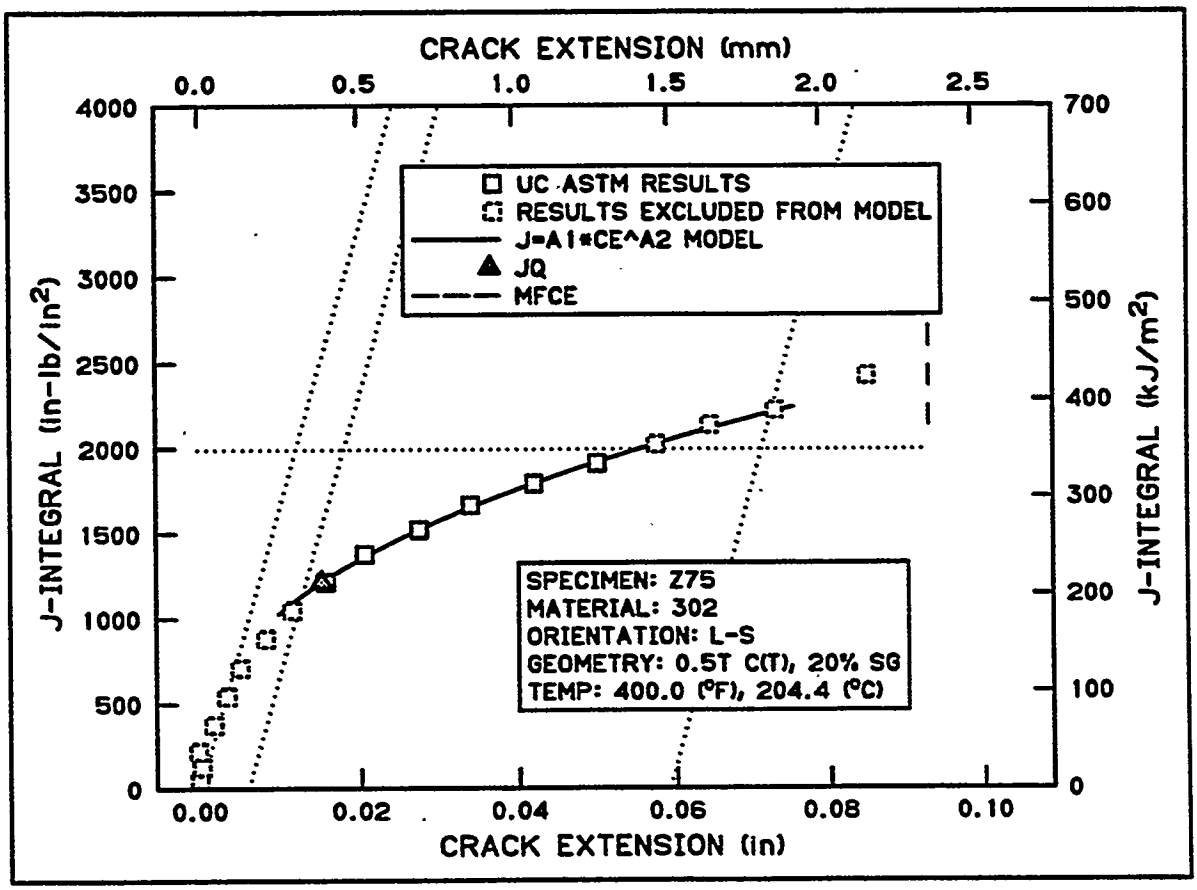

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z73
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z75
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6383 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1047	0.0063	0.0000	51.6
2	1430	0.0103	0.0002	126.1
3	1589	0.0142	-0.0002	218.5
4	1701	0.0205	0.0017	374.1
5	1781	0.0271	0.0034	540.9
6	1835	0.0335	0.0050	708.7
7	1872	0.0400	0.0082	880.9
8	1893	0.0465	0.0115	1048.0
9	1872	0.0529	0.0158	1212.7
10	1881	0.0593	0.0205	1375.6
11	1836	0.0657	0.0275	1519.9
12	1787	0.0723	0.0339	1662.9
13	1739	0.0786	0.0420	1788.3
14	1665	0.0852	0.0500	1907.2
15	1615	0.0916	0.0574	2018.9
16	1561	0.0979	0.0644	2133.8
17	1483	0.1043	0.0729	2221.4
18	1373	0.1173	0.0848	2424.1

  WIDTH: 1.0006 (IN),25.415 (MM)
  THICKNESS: 0.5016 (IN),12.741 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2511 (IN),6.378 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8759 (IN),22.248 (MM)
    DISTANCE 2: 0.8838 (IN),22.449 (MM)
    DISTANCE 3: 0.8879 (IN),22.553 (MM)
    DISTANCE 4: 0.8933 (IN),22.690 (MM)
    DISTANCE 5: 0.8940 (IN),22.708 (MM)
    DISTANCE 6: 0.8940 (IN),22.708 (MM)
    DISTANCE 7: 0.8927 (IN),22.675 (MM)
    DISTANCE 8: 0.8894 (IN),22.591 (MM)
    DISTANCE 9: 0.8842 (IN),22.459 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9967 (IN),25.316 (MM)
    DISTANCE 2: 0.9863 (IN),25.052 (MM)
    DISTANCE 3: 0.9848 (IN),25.014 (MM)
    DISTANCE 4: 0.9760 (IN),24.790 (MM)
    DISTANCE 5: 0.9764 (IN),24.801 (MM)
    DISTANCE 6: 0.9824 (IN),24.953 (MM)
    DISTANCE 7: 0.9840 (IN),24.994 (MM)
    DISTANCE 8: 0.9767 (IN),24.808 (MM)
    DISTANCE 9: 0.9866 (IN),25.060 (MM)

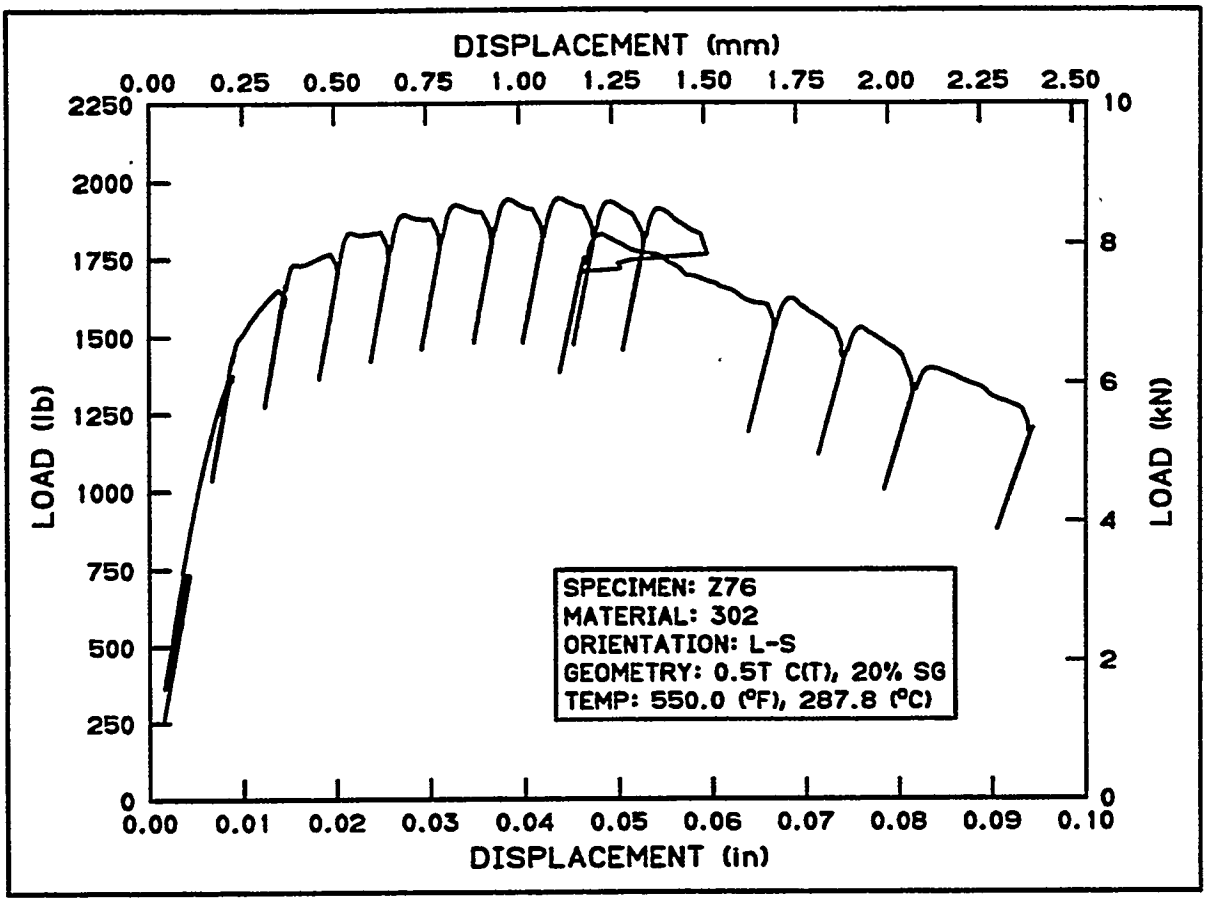

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z75
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

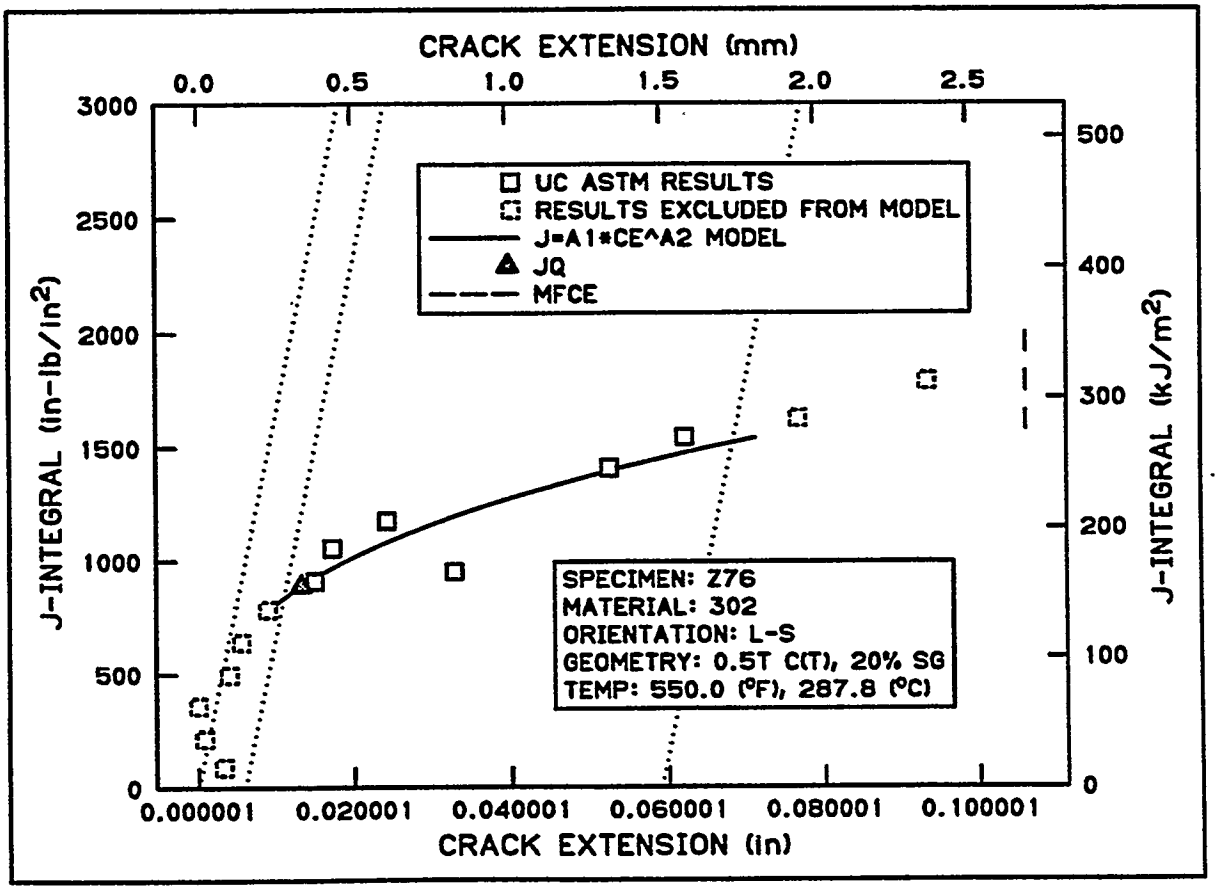

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z75
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z76
MATERIAL CODE: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6405 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1349	0.0083	0.0032	88.3
2	1649	0.0138	0.0008	213.7
3	1767	0.0193	0.0000	358.3
4	1836	0.0248	0.0040	494.6
5	1879	0.0301	0.0055	638.8
6	1900	0.0355	0.0089	783.6
7	1908	0.0408	0.0150	909.0
8	1914	0.0462	0.0172	1054.8
9	1893	0.0515	0.0242	1175.4
10	1827	0.0587	0.0328	950.9
11	1599	0.0659	0.0525	1404.5
12	1523	0.0731	0.0622	1541.2
13	1437	0.0803	0.0767	1623.6
14	1259	0.0931	0.0934	1785.7

WIDTH: 0.9988 (IN),25.370 (MM)
THICKNESS: 0.5018 (IN),12.746 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2529 (IN),6.424 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8886 (IN),22.570 (MM)
DISTANCE 2: 0.8953 (IN),22.741 (MM)
DISTANCE 3: 0.8984 (IN),22.819 (MM)
DISTANCE 4: 0.8988 (IN),22.830 (MM)
DISTANCE 5: 0.8988 (IN),22.830 (MM)
DISTANCE 6: 0.8950 (IN),22.733 (MM)
DISTANCE 7: 0.8918 (IN),22.652 (MM)
DISTANCE 8: 0.8856 (IN),22.494 (MM)
DISTANCE 9: 0.8780 (IN),22.301 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.0166 (IN),25.822 (MM)
DISTANCE 2: 1.0044 (IN),25.512 (MM)
DISTANCE 3: 0.9970 (IN),25.324 (MM)
DISTANCE 4: 0.9950 (IN),25.273 (MM)
DISTANCE 5: 0.9863 (IN),25.052 (MM)
DISTANCE 6: 0.9940 (IN),25.248 (MM)
DISTANCE 7: 0.9896 (IN),25.136 (MM)
DISTANCE 8: 1.0128 (IN),25.725 (MM)
DISTANCE 9: 1.0128 (IN),25.725 (MM)

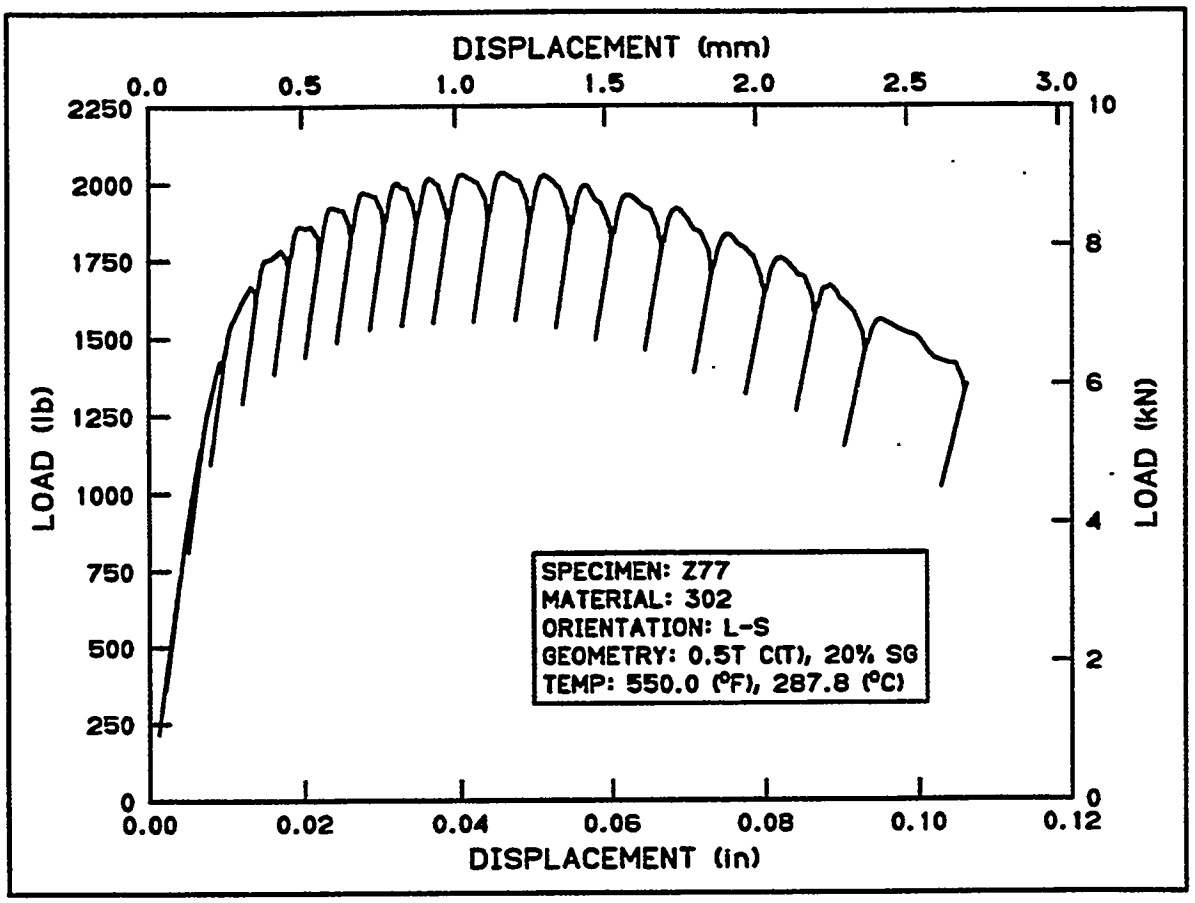

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z76
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

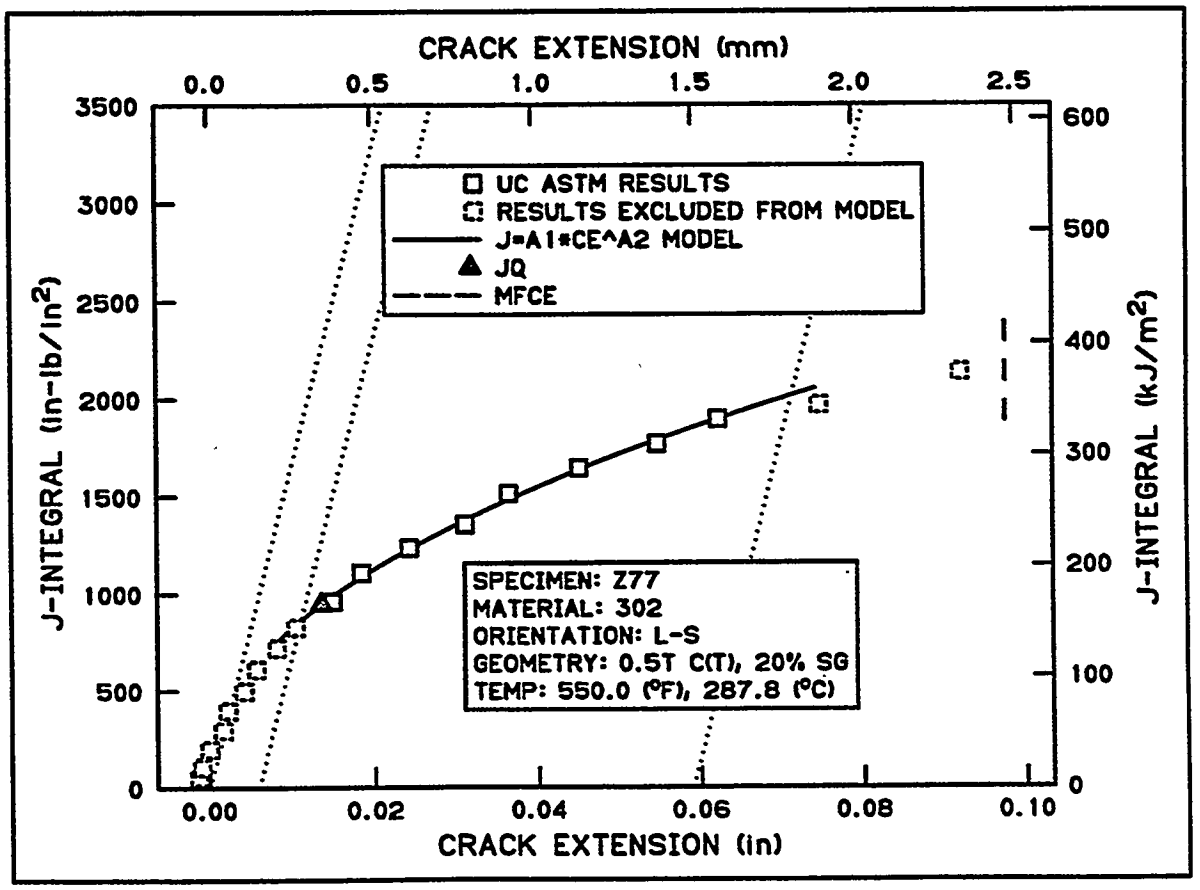

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z76
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000001 0.020001 0.040001 0.060001 0.080001 0.100001
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z77
  MATERIAL CODE: 302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6291 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1124	0.0065	-0.0013	53.7
2	1424	0.0092	-0.0009	105.2
3	1665	0.0131	0.0000	196.3
4	1781	0.0170	0.0016	294.6
5	1858	0.0209	0.0022	396.2
6	1913	0.0250	0.0042	497.8
7	1957	0.0291	0.0057	609.7
8	1982	0.0331	0.0082	718.4
9	1995	0.0372	0.0105	826.0
10	2001	0.0423	0.0150	959.7
11	2005	0.0478	0.0184	1106.0
12	1982	0.0532	0.0242	1236.2
13	1934	0.0585	0.0310	1356.0
14	1911	0.0651	0.0364	1515.4
15	1837	0.0716	0.0452	1643.8
16	1761	0.0785	0.0548	1767.4
17	1696	0.0851	0.0623	1894.1
18	1580	0.0916	0.0746	1966.2
19	1412	0.1049	0.0920	2135.9

  WIDTH: 1.0000 (IN),25.400 (MM)
  THICKNESS: 0.5031 (IN),12.779 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2514 (IN),6.386 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8714 (IN),22.134 (MM)
    DISTANCE 2: 0.8783 (IN),22.309 (MM)
    DISTANCE 3: 0.8817 (IN),22.395 (MM)
    DISTANCE 4: 0.8817 (IN),22.395 (MM)
    DISTANCE 5: 0.8829 (IN),22.426 (MM)
    DISTANCE 6: 0.8848 (IN),22.474 (MM)
    DISTANCE 7: 0.8838 (IN),22.449 (MM)
    DISTANCE 8: 0.8789 (IN),22.324 (MM)
    DISTANCE 9: 0.8729 (IN),22.172 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9716 (IN),24.679 (MM)
    DISTANCE 2: 0.9744 (IN),24.750 (MM)
    DISTANCE 3: 0.9757 (IN),24.783 (MM)
    DISTANCE 4: 0.9766 (IN),24.806 (MM)
    DISTANCE 5: 0.9705 (IN),24.651 (MM)
    DISTANCE 6: 0.9756 (IN),24.780 (MM)
    DISTANCE 7: 0.9802 (IN),24.897 (MM)
    DISTANCE 8: 0.9867 (IN),25.062 (MM)
    DISTANCE 9: 0.9970 (IN),25.324 (MM)

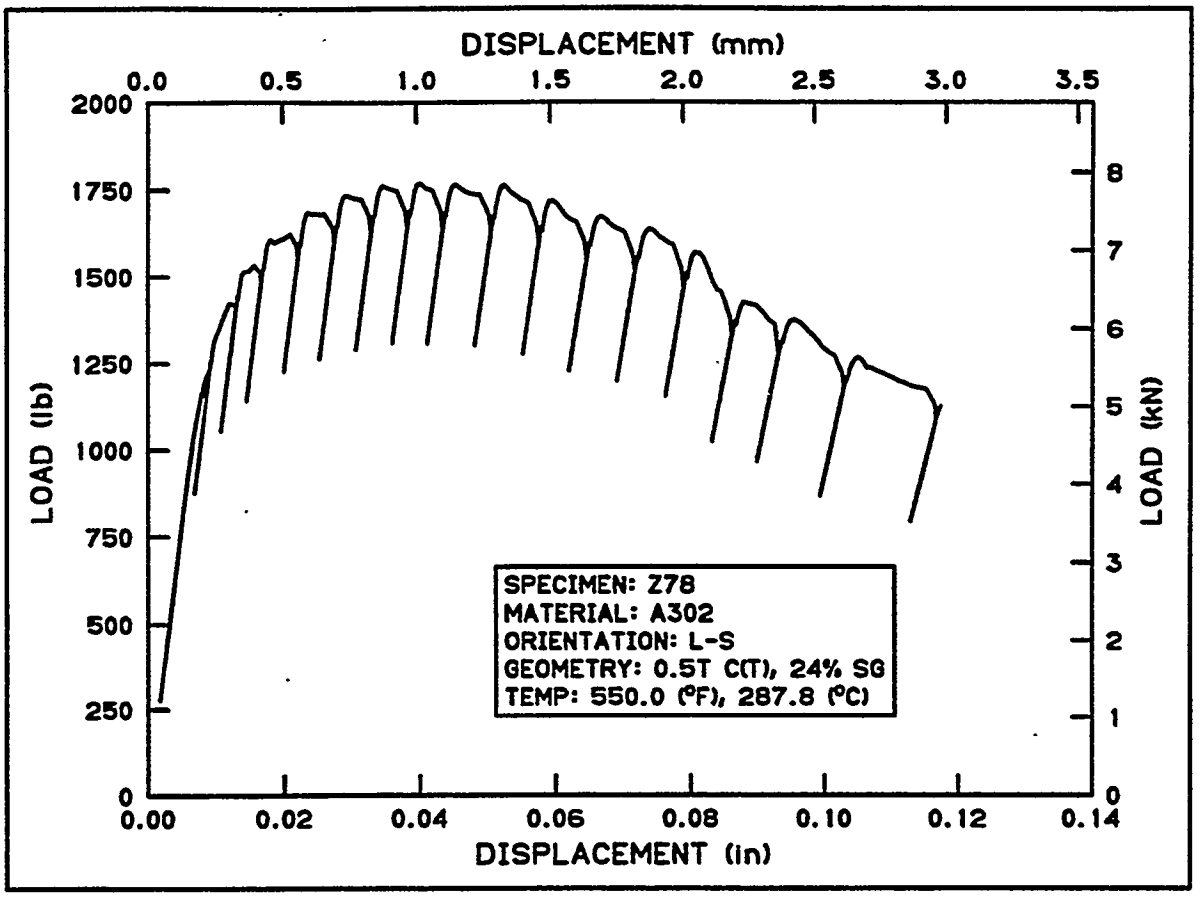

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)
SPECIMEN: Z77
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

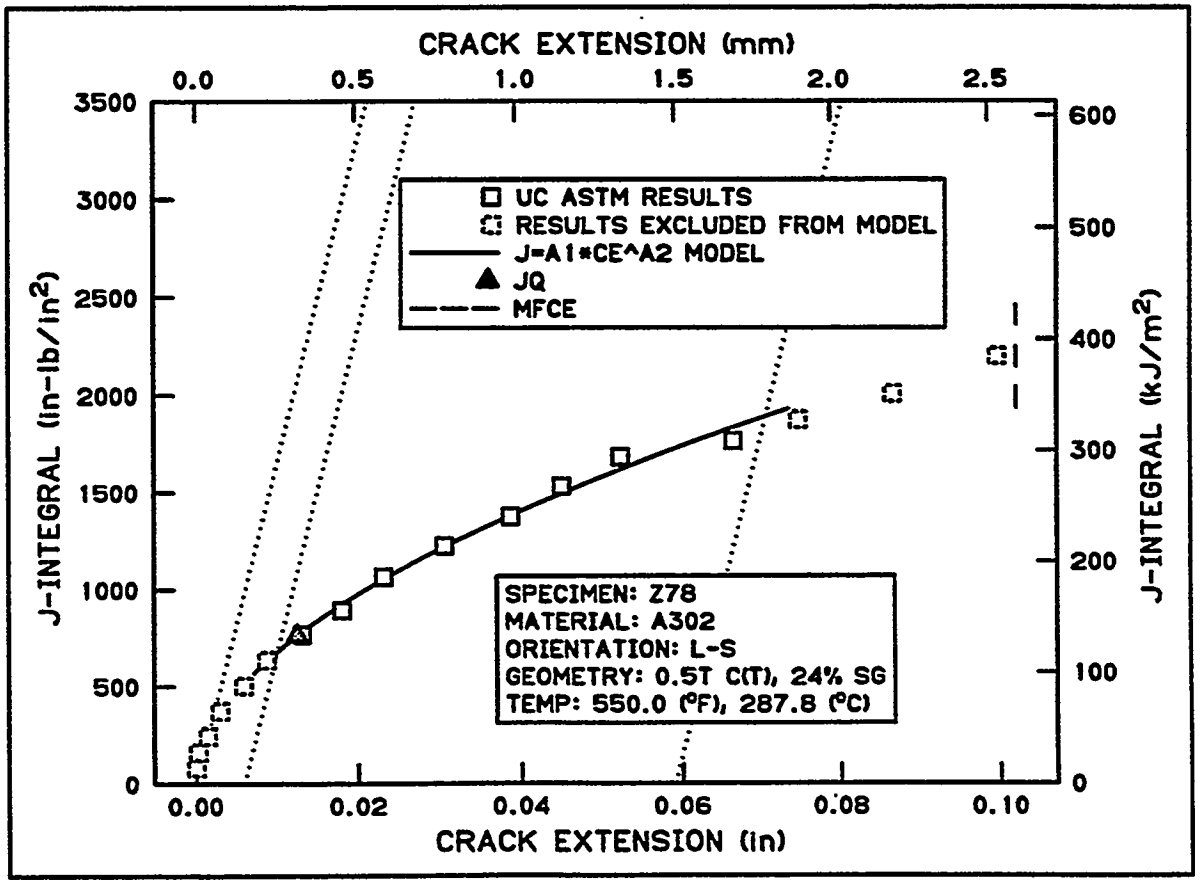

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z77
MATERIAL: 302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)

SPECIMEN
  IDENTIFICATION: Z78
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 24 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6420 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1194	0.0082	0.0000	81.6
2	1422	0.0119	0.0003	159.4
3	1532	0.0155	0.0014	242.7
4	1621	0.0208	0.0029	371.5
5	1680	0.0259	0.0058	502.1
6	1722	0.0314	0.0087	635.9
7	1746	0.0365	0.0131	766.1
8	1747	0.0418	0.0180	891.7
9	1735	0.0487	0.0232	1063.7
10	1710	0.0559	0.0306	1223.8
11	1655	0.0630	0.0387	1375.0
12	1626	0.0701	0.0451	1531.0
13	1588	0.0773	0.0524	1678.8
14	1453	0.0845	0.0665	1762.5
15	1373	0.0916	0.0746	1871.7
16	1269	0.1015	0.0866	2005.1
17	1172	0.1152	0.0996	2198.9

  WIDTH: 0.9985 (IN),25.362 (MM)
  THICKNESS: 0.5033 (IN),12.784 (MM)
  SIDE GROOVE RATIO: 24.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2512 (IN),6.381 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8926 (IN),22.672 (MM)
    DISTANCE 2: 0.8972 (IN),22.789 (MM)
    DISTANCE 3: 0.8972 (IN),22.789 (MM)
    DISTANCE 4: 0.8984 (IN),22.819 (MM)
    DISTANCE 5: 0.8974 (IN),22.794 (MM)
    DISTANCE 6: 0.8949 (IN),22.730 (MM)
    DISTANCE 7: 0.8902 (IN),22.611 (MM)
    DISTANCE 8: 0.8843 (IN),22.461 (MM)
    DISTANCE 9: 0.8796 (IN),22.342 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0008 (IN),25.420 (MM)
    DISTANCE 2: 0.9950 (IN),25.273 (MM)
    DISTANCE 3: 0.9937 (IN),25.240 (MM)
    DISTANCE 4: 0.9888 (IN),25.116 (MM)
    DISTANCE 5: 0.9934 (IN),25.232 (MM)
    DISTANCE 6: 0.9979 (IN),25.347 (MM)
    DISTANCE 7: 0.9956 (IN),25.288 (MM)
    DISTANCE 8: 0.9956 (IN),25.288 (MM)
    DISTANCE 9: 1.0030 (IN),25.476 (MM)

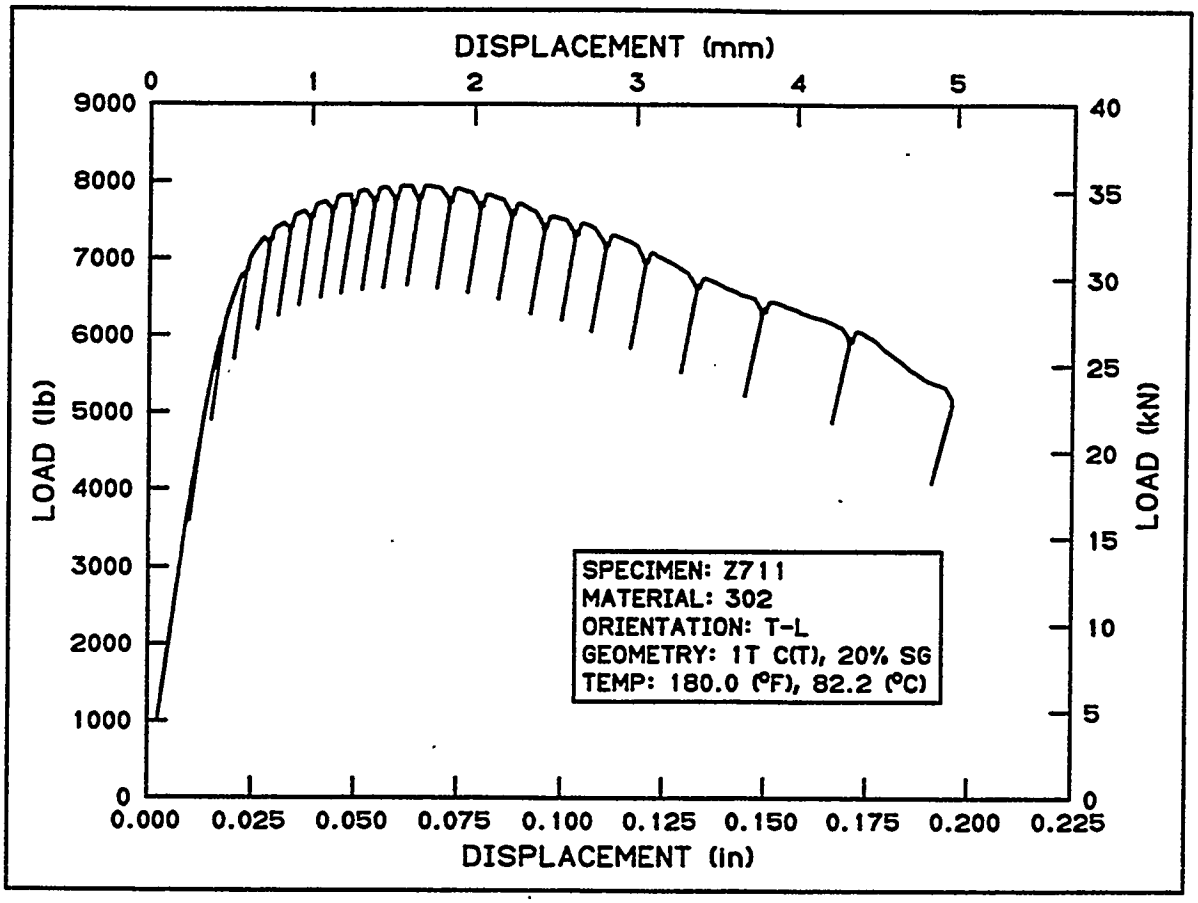

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z78
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 24% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

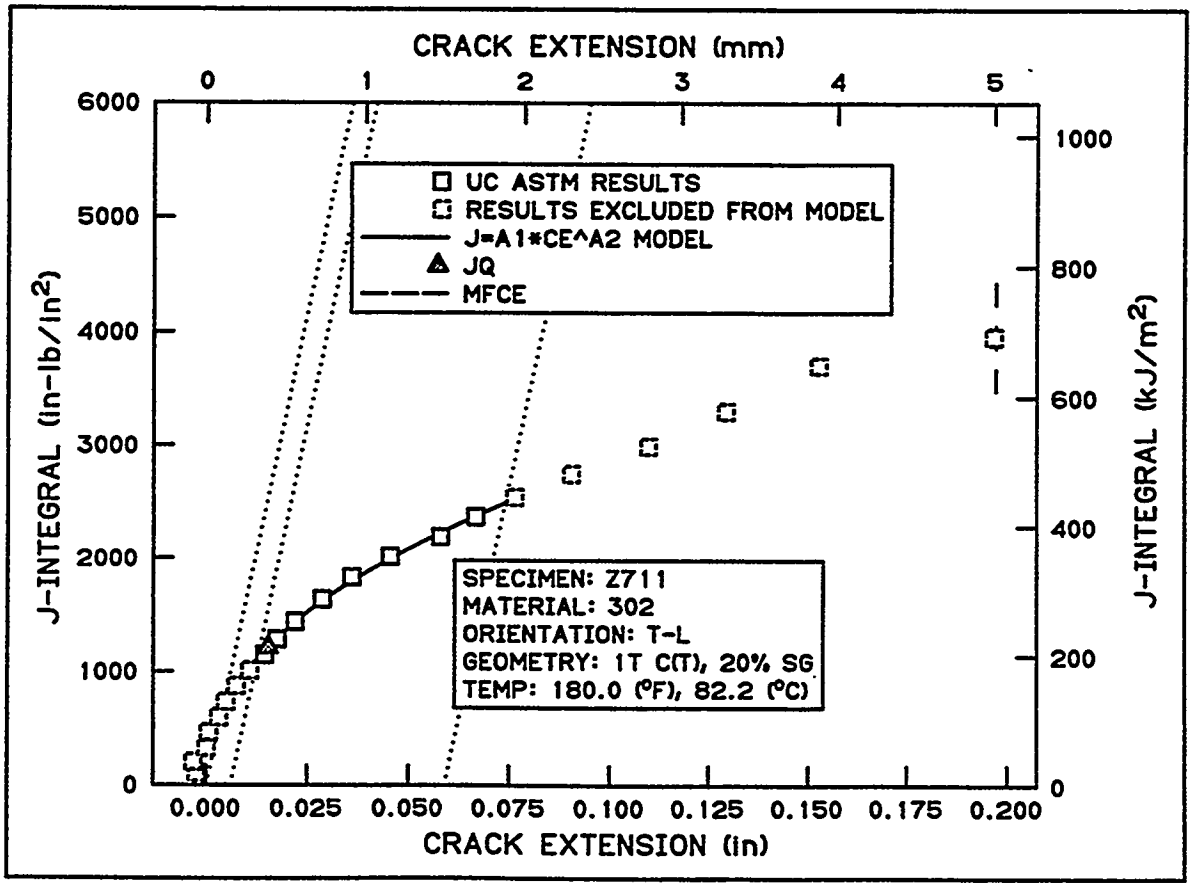

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z78
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 24% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z711
MATERIAL CODE: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2502 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4555	0.0122	-0.0024	105.8
2	5935	0.0172	-0.0032	203.1
3	6788	0.0223	0.0000	325.2
4	7264	0.0275	0.0006	467.2
5	7458	0.0322	0.0031	597.8
6	7618	0.0374	0.0048	734.3
7	7740	0.0426	0.0073	875.3
8	7825	0.0475	0.0107	1010.1
9	7882	0.0524	0.0144	1145.7
10	7916	0.0575	0.0175	1282.6
11	7937	0.0633	0.0220	1438.6
12	7912	0.0705	0.0288	1636.7
13	7855	0.0780	0.0361	1832.2
14	7762	0.0857	0.0455	2016.5
15	7610	0.0935	0.0580	2194.0
16	7493	0.1010	0.0668	2373.0
17	7387	0.1081	0.0764	2543.3
18	7173	0.1183	0.0904	2747.4
19	6821	0.1308	0.1098	2990.1
20	6488	0.1473	0.1295	3302.7
21	6114	0.1687	0.1527	3707.2
22	5337	0.1943	0.1967	3958.5

WIDTH: 1.9986 (IN),50.764 (MM)
THICKNESS: 1.0020 (IN),25.451 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5018 (IN),12.746 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7342 (IN),44.049 (MM)
DISTANCE 2: 1.7524 (IN),44.511 (MM)
DISTANCE 3: 1.7560 (IN),44.602 (MM)
DISTANCE 4: 1.7576 (IN),44.643 (MM)
DISTANCE 5: 1.7572 (IN),44.633 (MM)
DISTANCE 6: 1.7585 (IN),44.666 (MM)
DISTANCE 7: 1.7558 (IN),44.597 (MM)
DISTANCE 8: 1.7480 (IN),44.399 (MM)
DISTANCE 9: 1.7272 (IN),43.871 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9450 (IN),49.403 (MM)
DISTANCE 2: 1.9450 (IN),49.403 (MM)
DISTANCE 3: 1.9336 (IN),49.113 (MM)
DISTANCE 4: 1.9482 (IN),49.484 (MM)
DISTANCE 5: 1.9299 (IN),49.019 (MM)
DISTANCE 6: 1.9566 (IN),49.698 (MM)
DISTANCE 7: 1.9602 (IN),49.789 (MM)
DISTANCE 8: 1.9613 (IN),49.817 (MM)
DISTANCE 9: 1.9734 (IN),50.124 (MM)

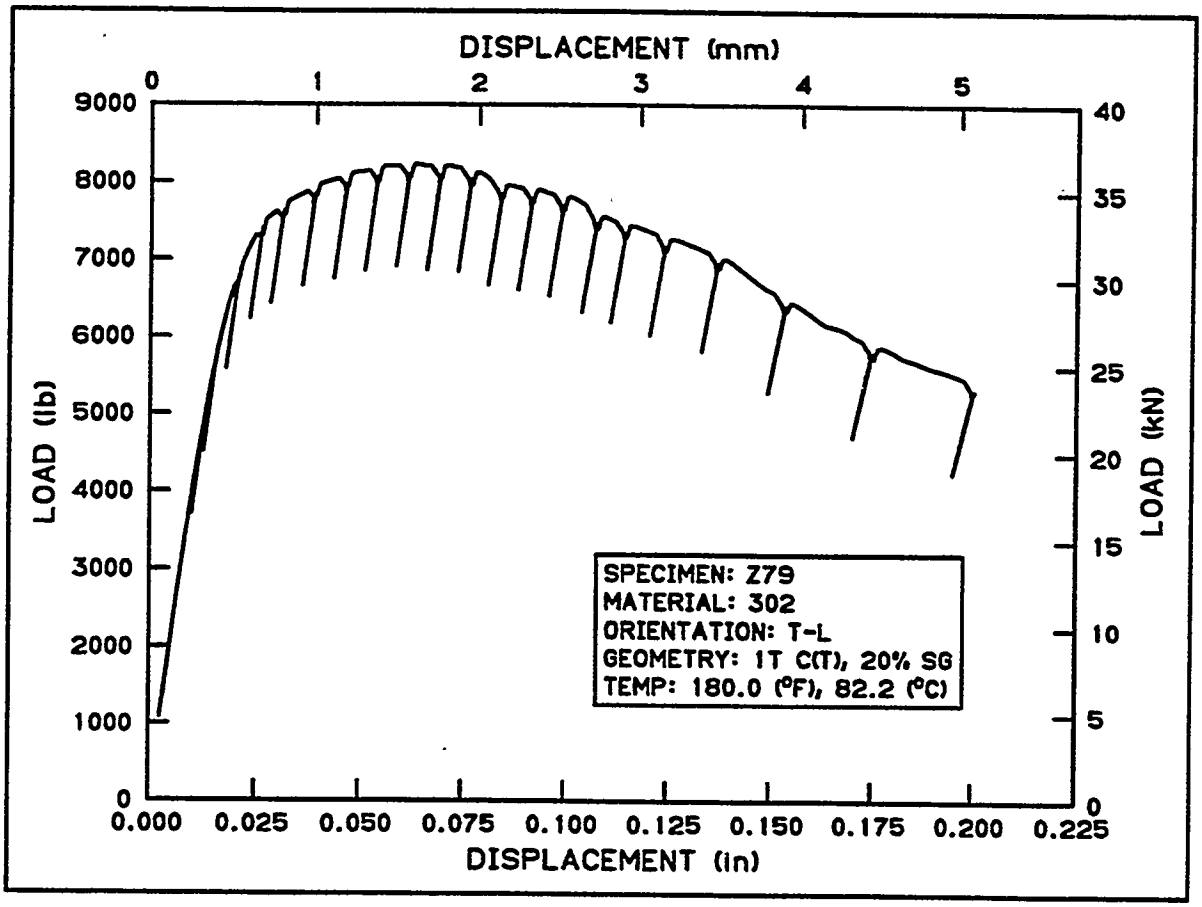

DISPLACEMENT (mm)
0
1
2
3
4
5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
40
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z711
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

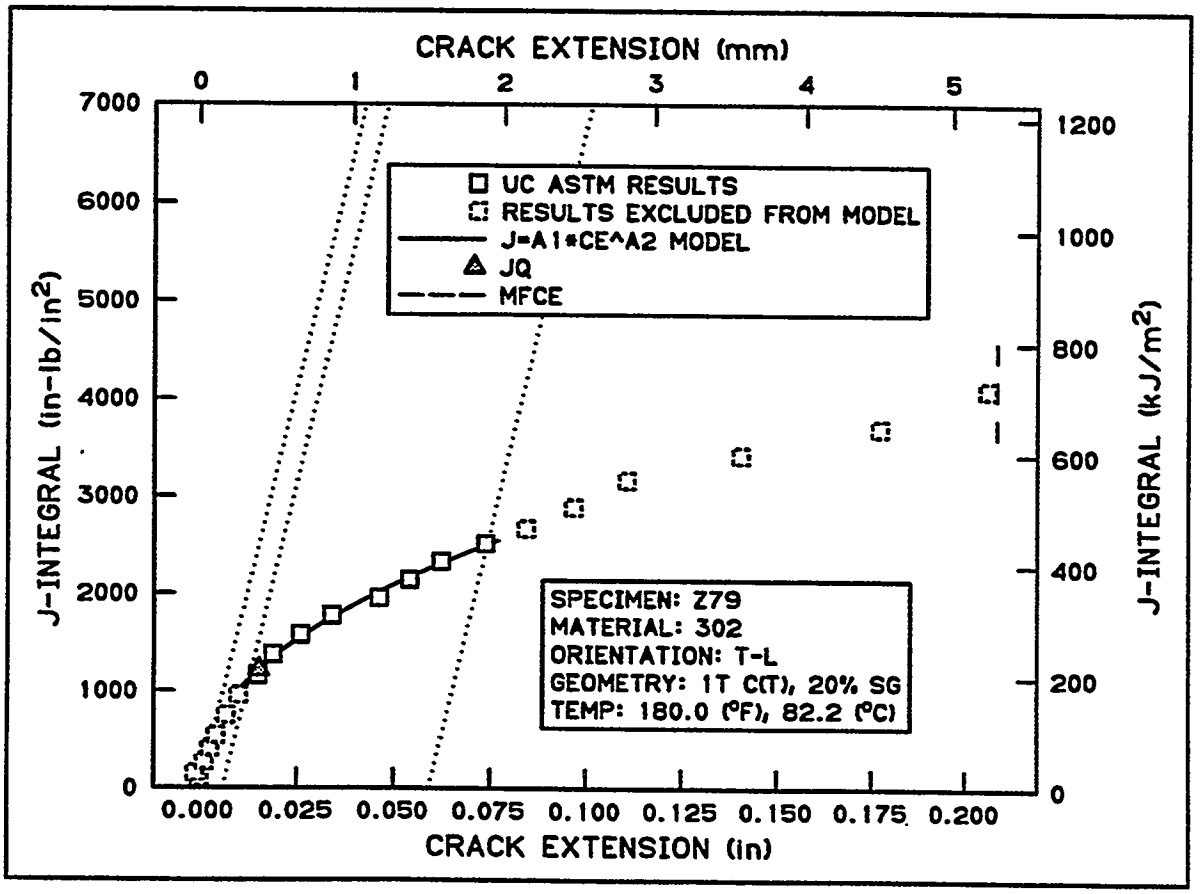

CRACK EXTENSION (mm)
0
1
2
3
4
5
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z711
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z79
  MATERIAL CODE: 302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2375 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4719	0.0121	0.0000	106.5
2	5520	0.0147	-0.0010	155.6
3	6647	0.0197	0.0013	269.8
4	7309	0.0248	0.0027	408.1
5	7616	0.0298	0.0042	542.6
6	7871	0.0371	0.0068	747.8
7	8041	0.0447	0.0100	955.4
8	8142	0.0521	0.0150	1161.4
9	8203	0.0595	0.0188	1376.0
10	8209	0.0669	0.0260	1577.7
11	8178	0.0742	0.0340	1776.2
12	8008	0.0817	0.0461	1955.4
13	7922	0.0894	0.0541	2143.4
14	7834	0.0970	0.0623	2331.5
15	7708	0.1047	0.0738	2515.3
16	7504	0.1119	0.0844	2669.3
17	7336	0.1219	0.0967	2886.1
18	7103	0.1347	0.1107	3166.5
19	6576	0.1508	0.1405	3420.9
20	5963	0.1723	0.1771	3699.3
21	5470	0.1979	0.2061	4097.0

  WIDTH: 1.9991 (IN),50.777 (MM)
  THICKNESS: 1.0020 (IN),25.451 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5008 (IN),12.720 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7180 (IN),43.637 (MM)
    DISTANCE 2: 1.7312 (IN),43.972 (MM)
    DISTANCE 3: 1.7386 (IN),44.160 (MM)
    DISTANCE 4: 1.7422 (IN),44.252 (MM)
    DISTANCE 5: 1.7454 (IN),44.333 (MM)
    DISTANCE 6: 1.7464 (IN),44.359 (MM)
    DISTANCE 7: 1.7456 (IN),44.338 (MM)
    DISTANCE 8: 1.7364 (IN),44.105 (MM)
    DISTANCE 9: 1.7238 (IN),43.785 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9940 (IN),50.648 (MM)
    DISTANCE 2: 1.9249 (IN),48.892 (MM)
    DISTANCE 3: 1.9496 (IN),49.520 (MM)
    DISTANCE 4: 1.9374 (IN),49.210 (MM)
    DISTANCE 5: 1.9253 (IN),48.903 (MM)
    DISTANCE 6: 1.9406 (IN),49.291 (MM)
    DISTANCE 7: 1.9453 (IN),49.411 (MM)
    DISTANCE 8: 1.9655 (IN),49.924 (MM)
    DISTANCE 9: 1.9770 (IN),50.216 (MM)

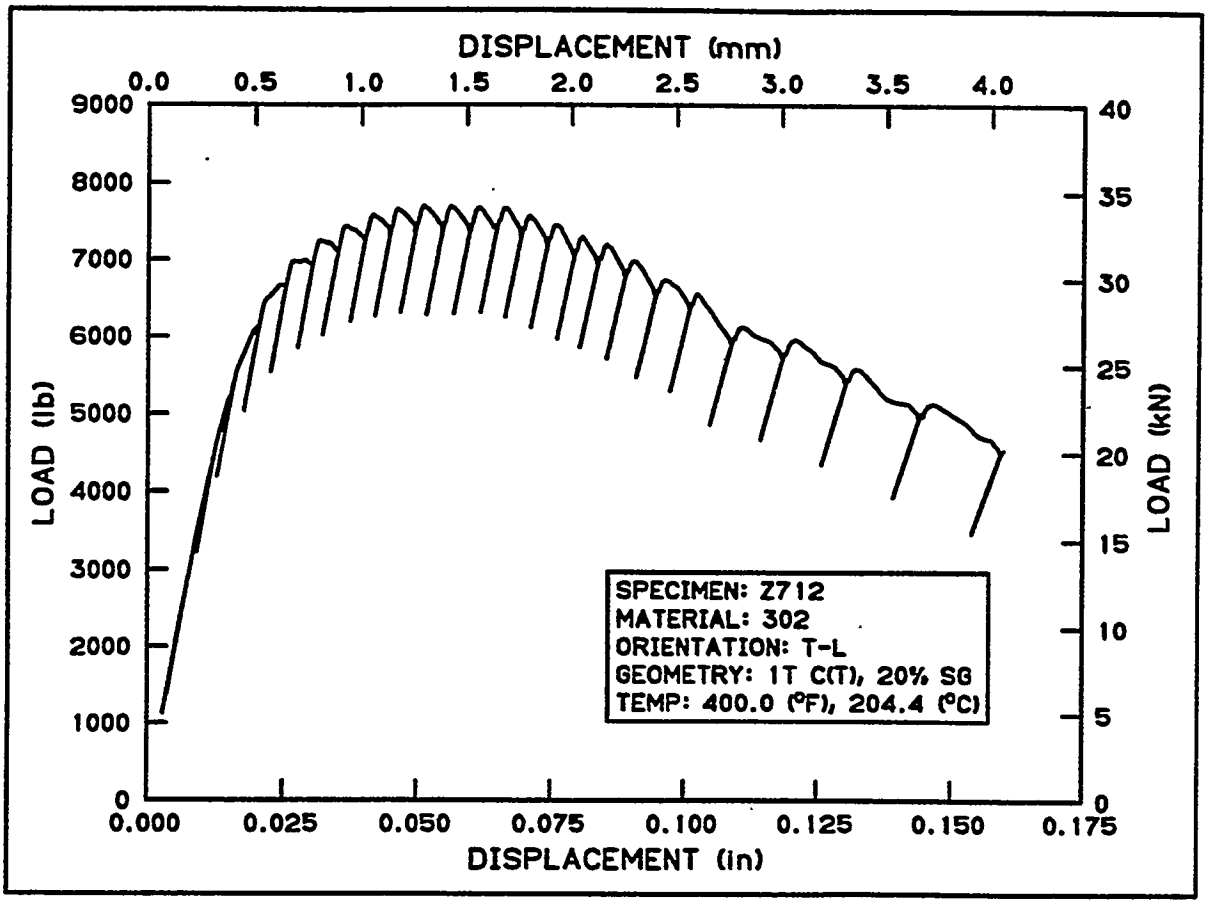

DISPLACEMENT (mm)
0
1
2
3
4
5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
40
35
30
25
20
15
10
5
0
LOAD (kN)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)
SPECIMEN: Z79
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

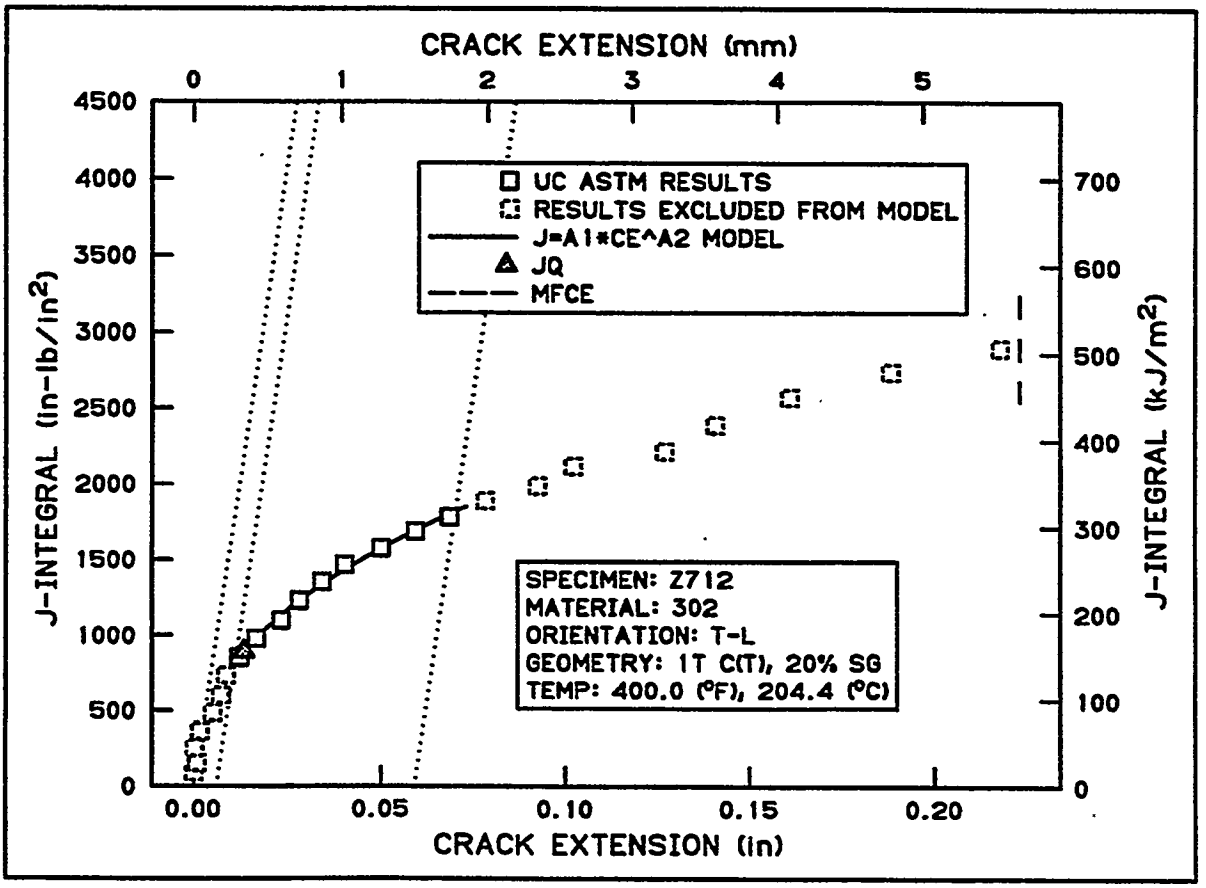

CRACK EXTENSION (mm)
0
1
2
3
4
5
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)
SPECIMEN: Z79
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
IDENTIFICATION: Z712
MATERIAL CODE: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2490 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4176	0.0114	0.0000	91.4
2	5178	0.0149	0.0008	152.7
3	6064	0.0195	0.0003	252.0
4	6659	0.0243	0.0017	363.4
5	6985	0.0290	0.0051	483.8
6	7214	0.0335	0.0072	601.4
7	7386	0.0381	0.0085	733.8
8	7517	0.0430	0.0121	853.1
9	7581	0.0476	0.0166	976.9
10	7604	0.0526	0.0232	1098.8
11	7602	0.0576	0.0281	1230.5
12	7625	0.0621	0.0341	1354.2
13	7649	0.0668	0.0402	1469.1
14	7496	0.0718	0.0500	1578.1
15	7417	0.0765	0.0593	1689.0
16	7290	0.0808	0.0685	1782.1
17	7142	0.0863	0.0779	1888.6
18	6891	0.0918	0.0923	1985.2
19	6631	0.0986	0.1021	2116.9
20	6144	0.1067	0.1268	2213.1
21	5936	0.1161	0.1407	2387.2
22	5608	0.1281	0.1609	2571.2
23	5131	0.1419	0.1882	2737.0
24	4680	0.1574	0.2178	2891.7

WIDTH: 1.9986 (IN),50.764 (MM)
THICKNESS: 1.0020 (IN),25.451 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5021 (IN),12.753 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7298 (IN),43.937 (MM)
DISTANCE 2: 1.7449 (IN),44.320 (MM)
DISTANCE 3: 1.7512 (IN),44.480 (MM)
DISTANCE 4: 1.7554 (IN),44.587 (MM)
DISTANCE 5: 1.7568 (IN),44.623 (MM)
DISTANCE 6: 1.7582 (IN),44.658 (MM)
DISTANCE 7: 1.7572 (IN),44.633 (MM)
DISTANCE 8: 1.7514 (IN),44.486 (MM)
DISTANCE 9: 1.7374 (IN),44.130 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 2.0088 (IN),51.024 (MM)
DISTANCE 2: 2.0014 (IN),50.836 (MM)
DISTANCE 3: 1.9630 (IN),49.860 (MM)
DISTANCE 4: 1.9650 (IN),49.911 (MM)
DISTANCE 5: 1.9596 (IN),49.774 (MM)
DISTANCE 6: 1.9527 (IN),49.599 (MM)
DISTANCE 7: 1.9642 (IN),49.891 (MM)
DISTANCE 8: 1.9834 (IN),50.378 (MM)
DISTANCE 9: 2.0026 (IN),50.866 (MM)

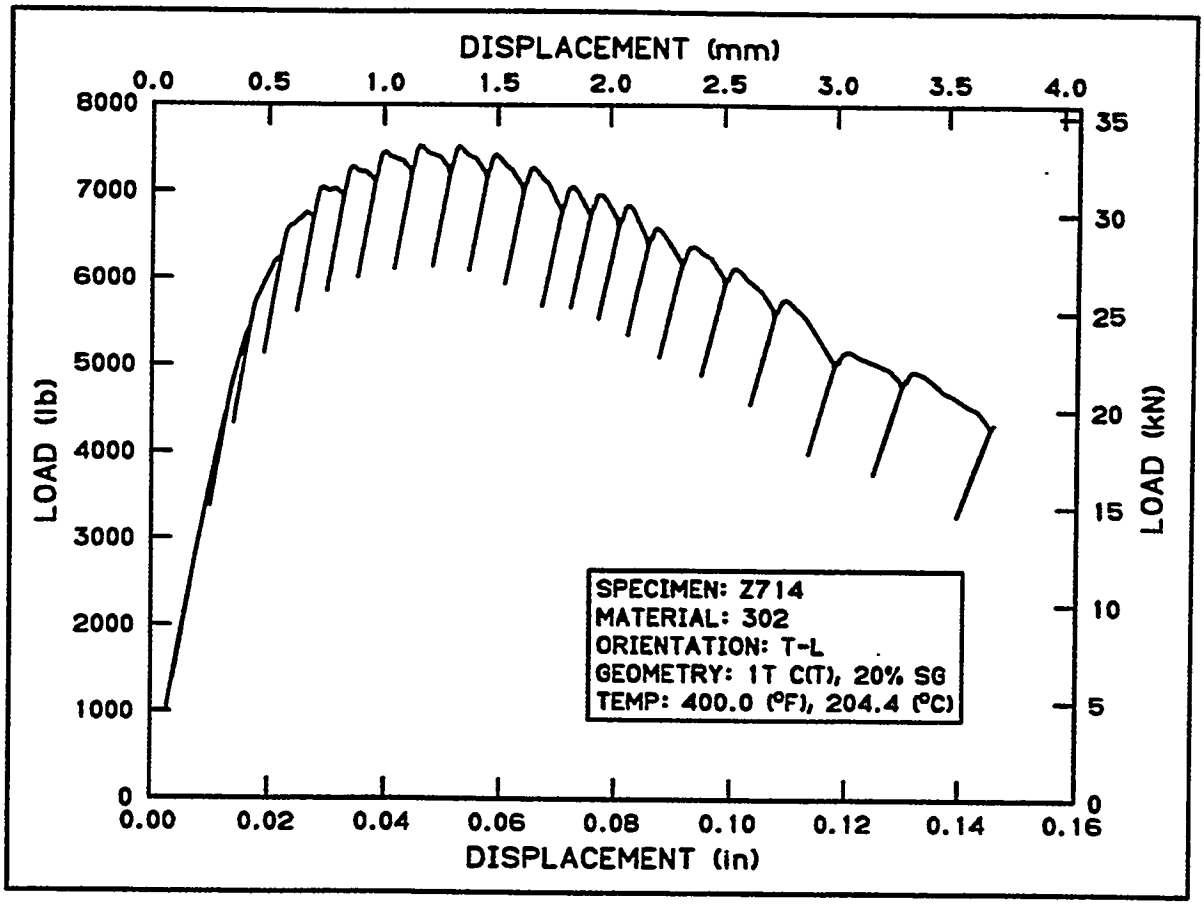

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
LOAD (lb)
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
40 35 30 25 20 15 10 5 0
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)
SPECIMEN: Z712
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

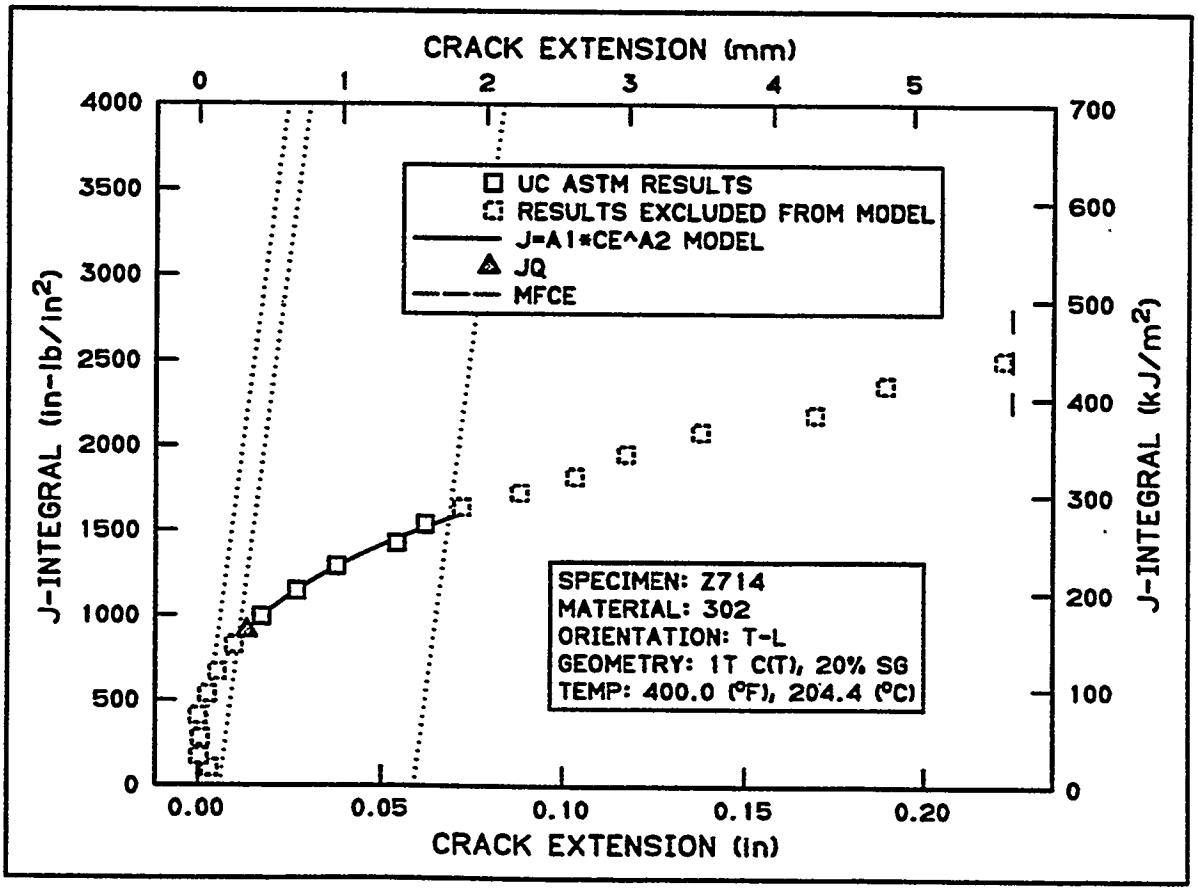

CRACK EXTENSION (mm)
0 1 2 3 4 5
J-INTEGRAL (in-lb/in²)
4500 4000 3500 3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
700 600 500 400 300 200 100 0
0.00 0.05 0.10 0.15 0.20
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z712
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
IDENTIFICATION: Z714
MATERIAL CODE: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 1.2535 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4359	0.0122	0.0031	102.6
2	5351	0.0160	0.0003	171.3
3	6191	0.0209	0.0006	279.9
4	6751	0.0262	0.0000	409.5
5	7032	0.0311	0.0026	535.7
6	7228	0.0363	0.0053	669.6
7	7359	0.0425	0.0099	828.6
8	7402	0.0491	0.0174	995.5
9	7384	0.0553	0.0269	1148.5
10	7254	0.0615	0.0378	1293.6
11	7097	0.0679	0.0542	1430.0
12	6999	0.0731	0.0621	1542.2
13	6905	0.0781	0.0721	1641.6
14	6794	0.0829	0.0879	1727.3
15	6421	0.0891	0.1033	1822.6
16	6248	0.0962	0.1175	1956.7
17	5861	0.1050	0.1379	2086.0
18	5325	0.1150	0.1693	2189.3
19	4967	0.1274	0.1891	2362.0
20	4494	0.1430	0.2216	2511.8

WIDTH: 1.9984 (IN),50.759 (MM)
THICKNESS: 1.0019 (IN),25.448 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5014 (IN),12.736 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.7316 (IN),43.983 (MM)
DISTANCE 2: 1.7446 (IN),44.313 (MM)
DISTANCE 3: 1.7534 (IN),44.536 (MM)
DISTANCE 4: 1.7591 (IN),44.681 (MM)
DISTANCE 5: 1.7605 (IN),44.717 (MM)
DISTANCE 6: 1.7630 (IN),44.780 (MM)
DISTANCE 7: 1.7634 (IN),44.790 (MM)
DISTANCE 8: 1.7571 (IN),44.630 (MM)
DISTANCE 9: 1.7450 (IN),44.323 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.9768 (IN),50.211 (MM)
DISTANCE 2: 1.9726 (IN),50.104 (MM)
DISTANCE 3: 1.9461 (IN),49.431 (MM)
DISTANCE 4: 1.9560 (IN),49.682 (MM)
DISTANCE 5: 1.9668 (IN),49.957 (MM)
DISTANCE 6: 1.9788 (IN),50.262 (MM)
DISTANCE 7: 1.9916 (IN),50.587 (MM)
DISTANCE 8: 2.0102 (IN),51.059 (MM)
DISTANCE 9: 2.0430 (IN),51.892 (MM)

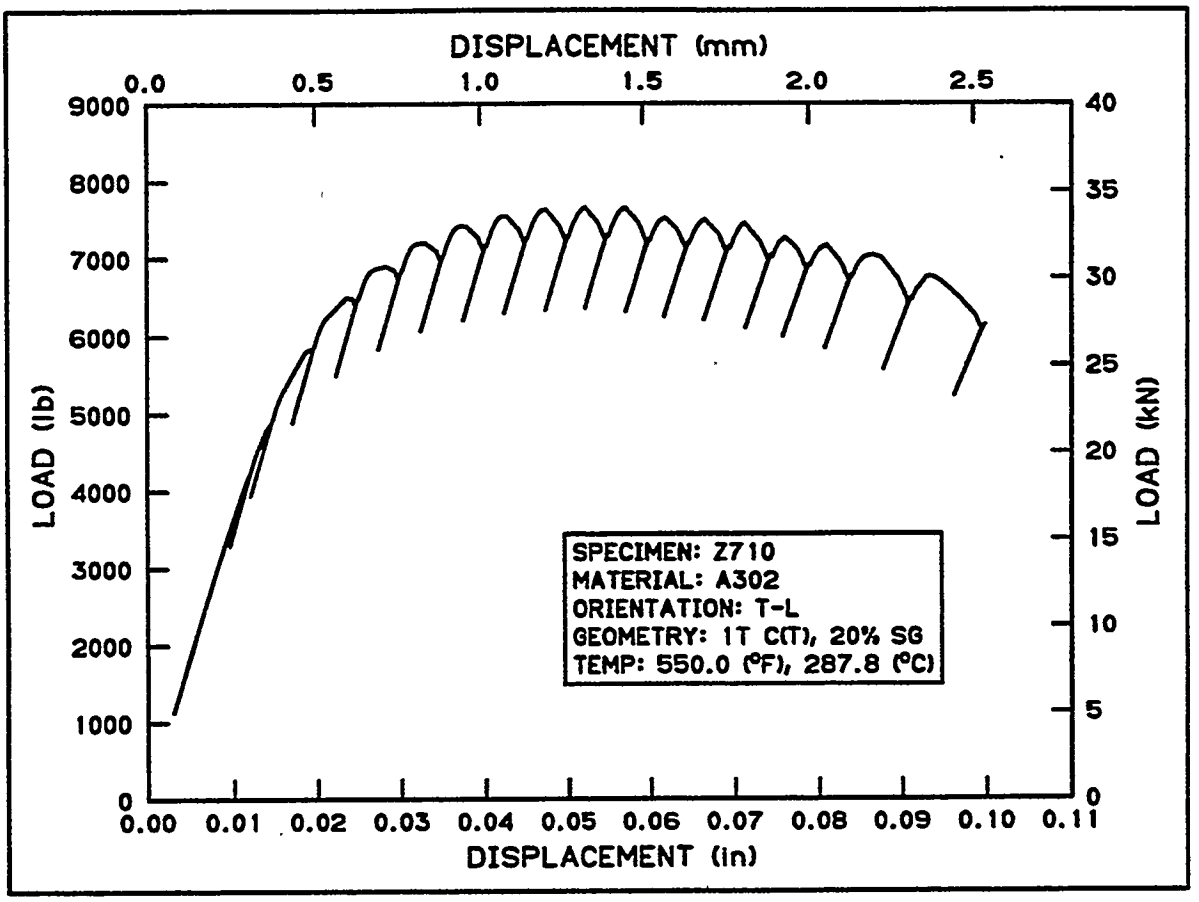

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
LOAD (lb)
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (kN)
35
30
25
20
15
10
5
0
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)
SPECIMEN: Z714
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

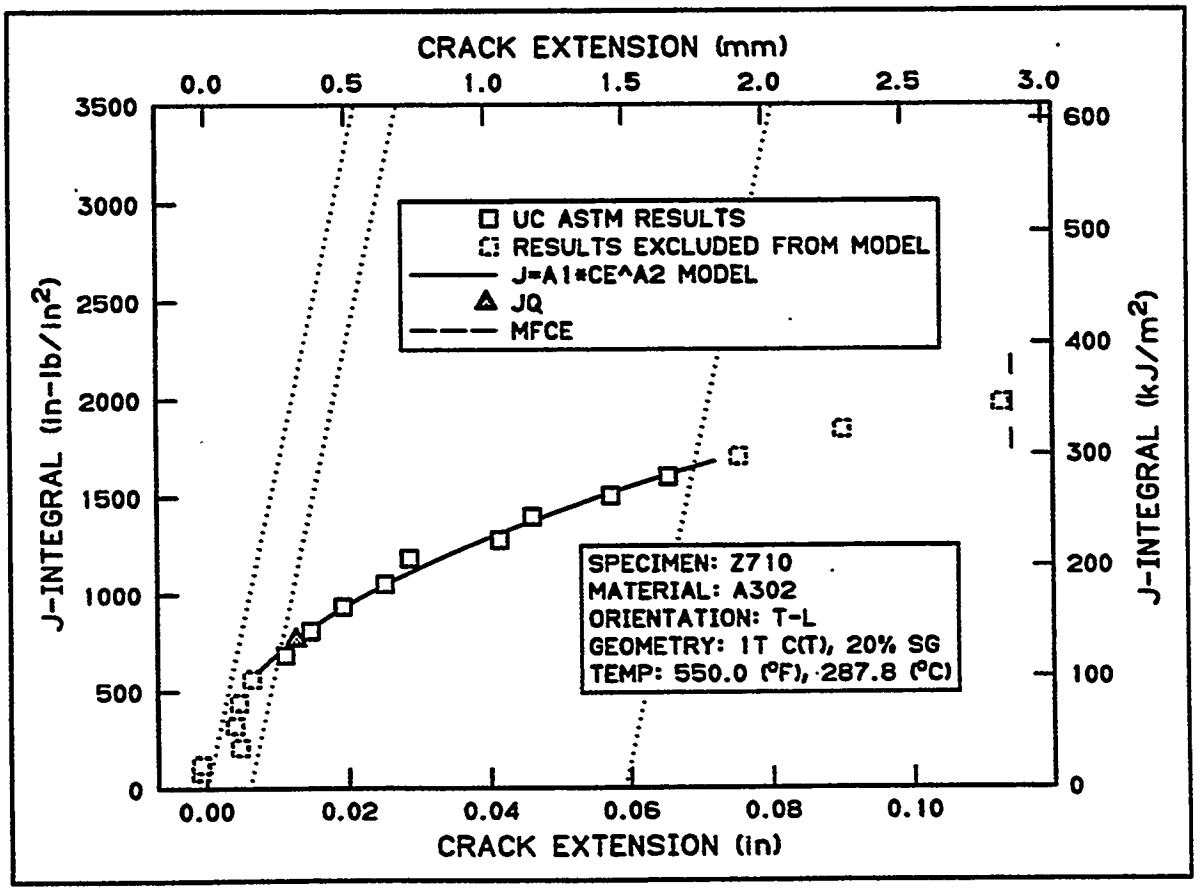

CRACK EXTENSION (mm)
0
1
2
3
4
5
J-INTEGRAL (in-lb/in²)
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (kJ/m²)
700
600
500
400
300
200
100
0
0.00
0.05
0.10
0.15
0.20
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z714
MATERIAL: 302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
  IDENTIFICATION: Z710
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2448 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4113	0.0115	-0.0009	84.0
2	4789	0.0139	-0.0007	121.3
3	5799	0.0186	0.0046	210.3
4	6497	0.0235	0.0039	323.2
5	6897	0.0282	0.0045	441.8
6	7193	0.0329	0.0063	563.0
7	7405	0.0378	0.0110	688.2
8	7542	0.0426	0.0146	811.8
9	7627	0.0473	0.0192	936.0
10	7648	0.0521	0.0251	1054.3
11	7646	0.0570	0.0286	1183.9
12	7516	0.0618	0.0414	1279.2
13	7495	0.0665	0.0460	1397.5
14	7448	0.0712	0.0573	1502.4
15	7263	0.0760	0.0654	1599.5
16	7162	0.0809	0.0753	1704.9
17	6993	0.0876	0.0900	1844.1
18	6480	0.0969	0.1124	1979.9

  WIDTH: 1.9980 (IN),50.749 (MM)
  THICKNESS: 1.0017 (IN),25.443 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5020 (IN),12.751 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7286 (IN),43.906 (MM)
    DISTANCE 2: 1.7410 (IN),44.221 (MM)
    DISTANCE 3: 1.7482 (IN),44.404 (MM)
    DISTANCE 4: 1.7512 (IN),44.480 (MM)
    DISTANCE 5: 1.7521 (IN),44.503 (MM)
    DISTANCE 6: 1.7522 (IN),44.506 (MM)
    DISTANCE 7: 1.7502 (IN),44.455 (MM)
    DISTANCE 8: 1.7470 (IN),44.374 (MM)
    DISTANCE 9: 1.7360 (IN),44.094 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8861 (IN),47.907 (MM)
    DISTANCE 2: 1.8682 (IN),47.452 (MM)
    DISTANCE 3: 1.8698 (IN),47.493 (MM)
    DISTANCE 4: 1.8754 (IN),47.635 (MM)
    DISTANCE 5: 1.8516 (IN),47.031 (MM)
    DISTANCE 6: 1.8453 (IN),46.871 (MM)
    DISTANCE 7: 1.8444 (IN),46.848 (MM)
    DISTANCE 8: 1.8528 (IN),47.061 (MM)
    DISTANCE 9: 1.8678 (IN),47.442 (MM)

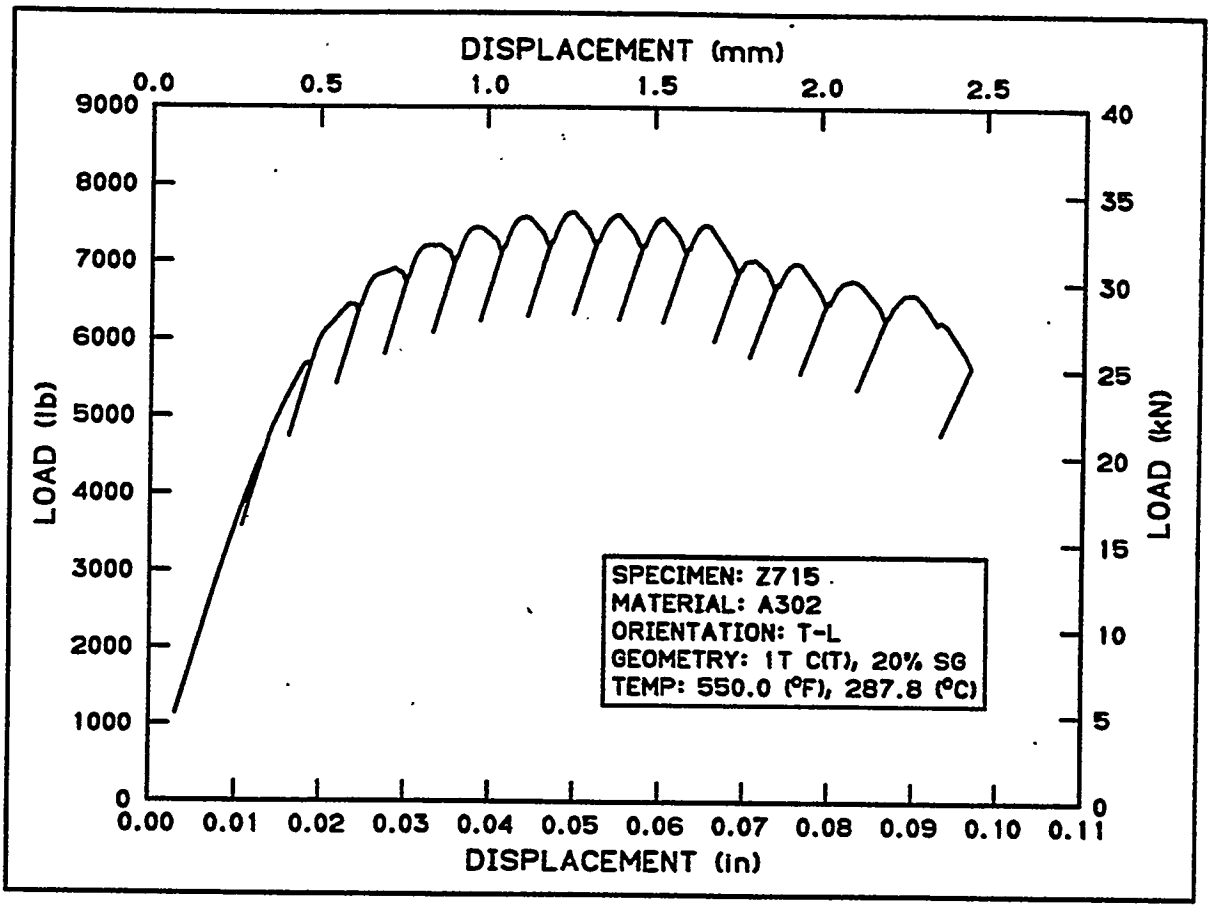

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
40
35
30
25
20
15
10
5
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z710
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

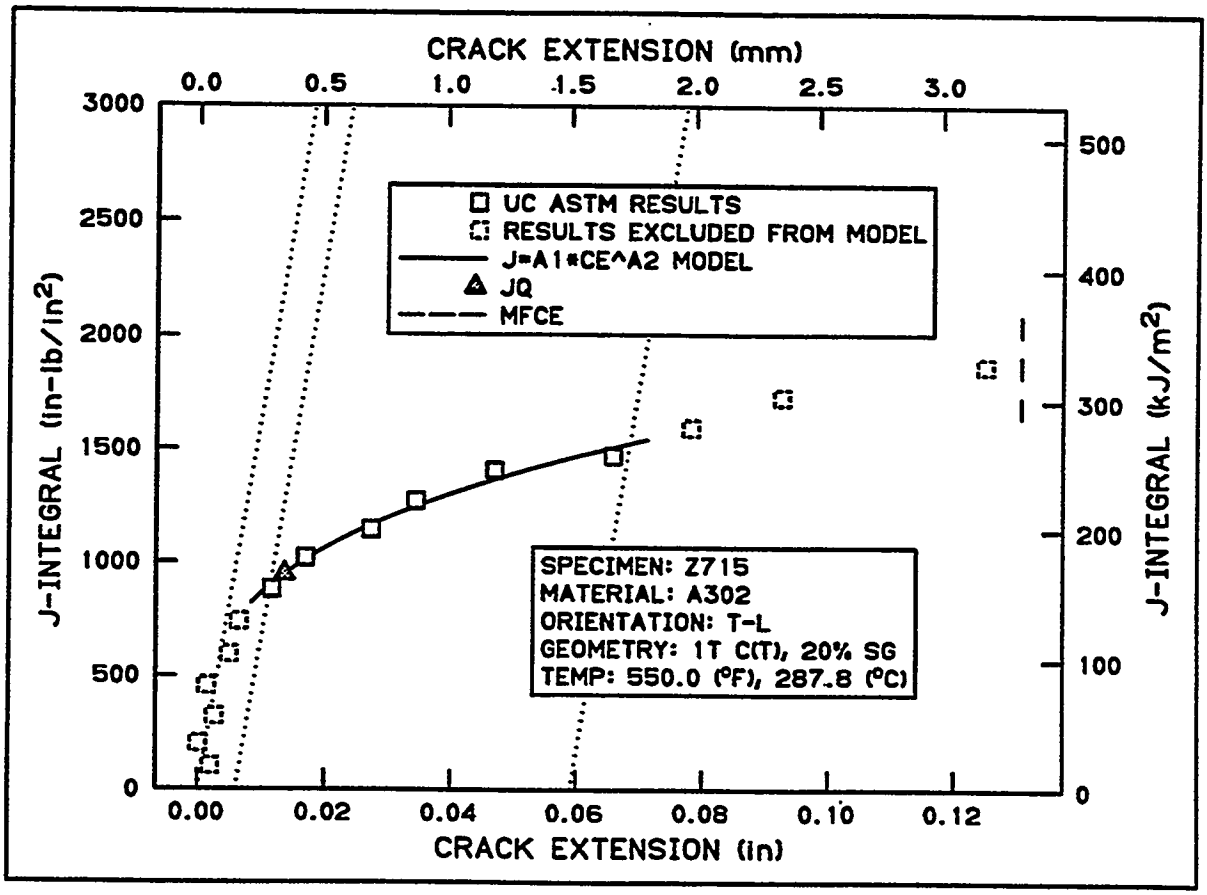

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3500
3000
2500
2000
1500
1000
500
0
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z710
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z715
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2597 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4418	0.0127	0.0019	103.3
2	5669	0.0180	0.0000	202.4
3	6442	0.0231	0.0026	321.6
4	6908	0.0285	0.0014	457.3
5	7213	0.0339	0.0049	596.6
6	7436	0.0388	0.0064	740.6
7	7563	0.0445	0.0116	883.2
8	7643	0.0497	0.0170	1020.6
9	7614	0.0549	0.0273	1144.8
10	7577	0.0602	0.0344	1272.4
11	7469	0.0657	0.0470	1407.6
12	7041	0.0710	0.0657	1471.5
13	6978	0.0765	0.0781	1595.9
14	6716	0.0837	0.0925	1730.7
15	6193	0.0938	0.1250	1869.0

  WIDTH: 1.9978 (IN),50.744 (MM)
  THICKNESS: 1.0017 (IN),25.443 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5016 (IN),12.741 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7449 (IN),44.320 (MM)
    DISTANCE 2: 1.7579 (IN),44.651 (MM)
    DISTANCE 3: 1.7634 (IN),44.790 (MM)
    DISTANCE 4: 1.7667 (IN),44.874 (MM)
    DISTANCE 5: 1.7678 (IN),44.902 (MM)
    DISTANCE 6: 1.7668 (IN),44.877 (MM)
    DISTANCE 7: 1.7646 (IN),44.821 (MM)
    DISTANCE 8: 1.7590 (IN),44.679 (MM)
    DISTANCE 9: 1.7434 (IN),44.282 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9047 (IN),48.379 (MM)
    DISTANCE 2: 1.9025 (IN),48.324 (MM)
    DISTANCE 3: 1.8750 (IN),47.625 (MM)
    DISTANCE 4: 1.8926 (IN),48.072 (MM)
    DISTANCE 5: 1.8818 (IN),47.798 (MM)
    DISTANCE 6: 1.8728 (IN),47.569 (MM)
    DISTANCE 7: 1.8786 (IN),47.716 (MM)
    DISTANCE 8: 1.9147 (IN),48.633 (MM)
    DISTANCE 9: 1.9310 (IN),49.047 (MM)

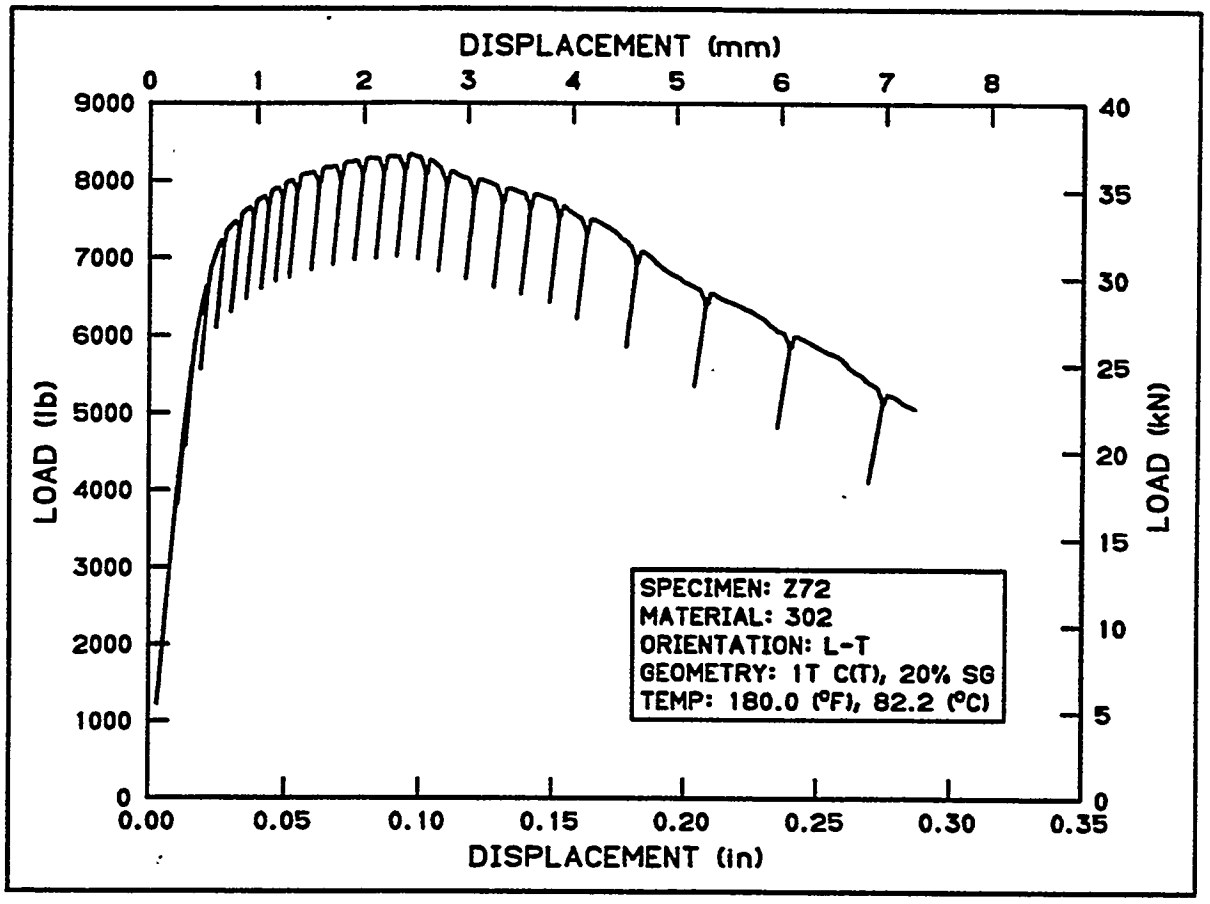

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
LOAD (lb)
40
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z715
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

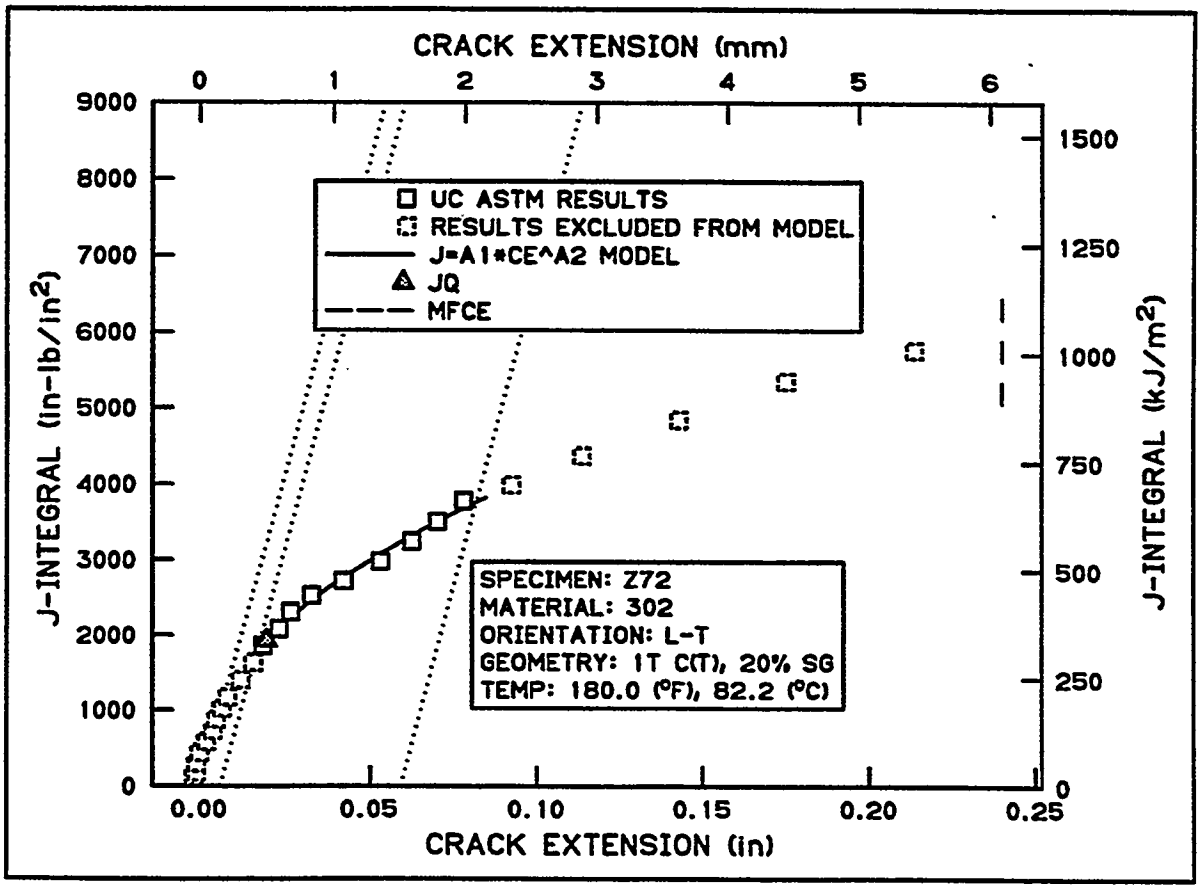

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z715
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z72
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2486 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4817	0.0130	-0.0018	122.3
2	5566	0.0156	-0.0009	174.6
3	6619	0.0209	-0.0009	297.7
4	7217	0.0262	0.0000	439.8
5	7469	0.0314	0.0019	583.7
6	7646	0.0366	0.0039	727.6
7	7793	0.0421	0.0048	877.6
8	7904	0.0471	0.0065	1023.1
9	7997	0.0523	0.0081	1172.2
10	8107	0.0603	0.0120	1402.7
11	8184	0.0685	0.0156	1628.5
12	8249	0.0763	0.0185	1854.8
13	8287	0.0841	0.0233	2078.1
14	8304	0.0918	0.0267	2305.4
15	8294	0.1000	0.0330	2523.4
16	8167	0.1076	0.0423	2720.4
17	8020	0.1183	0.0531	2980.8
18	7927	0.1288	0.0625	3244.7
19	7828	0.1392	0.0703	3506.9
20	7741	0.1501	0.0782	3782.1
21	7517	0.1604	0.0924	3989.5
22	7150	0.1795	0.1136	4370.9
23	6598	0.2058	0.1428	4842.3
24	6028	0.2376	0.1750	5353.0
25	5332	0.2724	0.2135	5758.4

  WIDTH: 1.9983 (IN),50.757 (MM)
  THICKNESS: 1.0019 (IN),25.448 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5013 (IN),12.733 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7286 (IN),43.906 (MM)
    DISTANCE 2: 1.7425 (IN),44.260 (MM)
    DISTANCE 3: 1.7489 (IN),44.422 (MM)
    DISTANCE 4: 1.7548 (IN),44.572 (MM)
    DISTANCE 5: 1.7567 (IN),44.620 (MM)
    DISTANCE 6: 1.7565 (IN),44.615 (MM)
    DISTANCE 7: 1.7551 (IN),44.580 (MM)
    DISTANCE 8: 1.7498 (IN),44.445 (MM)
    DISTANCE 9: 1.7414 (IN),44.232 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9860 (IN),50.444 (MM)
    DISTANCE 2: 1.9804 (IN),50.302 (MM)
    DISTANCE 3: 1.9810 (IN),50.317 (MM)
    DISTANCE 4: 1.9918 (IN),50.592 (MM)
    DISTANCE 5: 1.9912 (IN),50.576 (MM)
    DISTANCE 6: 1.9794 (IN),50.277 (MM)
    DISTANCE 7: 1.9926 (IN),50.612 (MM)
    DISTANCE 8: 1.9943 (IN),50.655 (MM)
    DISTANCE 9: 2.0280 (IN),51.511 (MM)

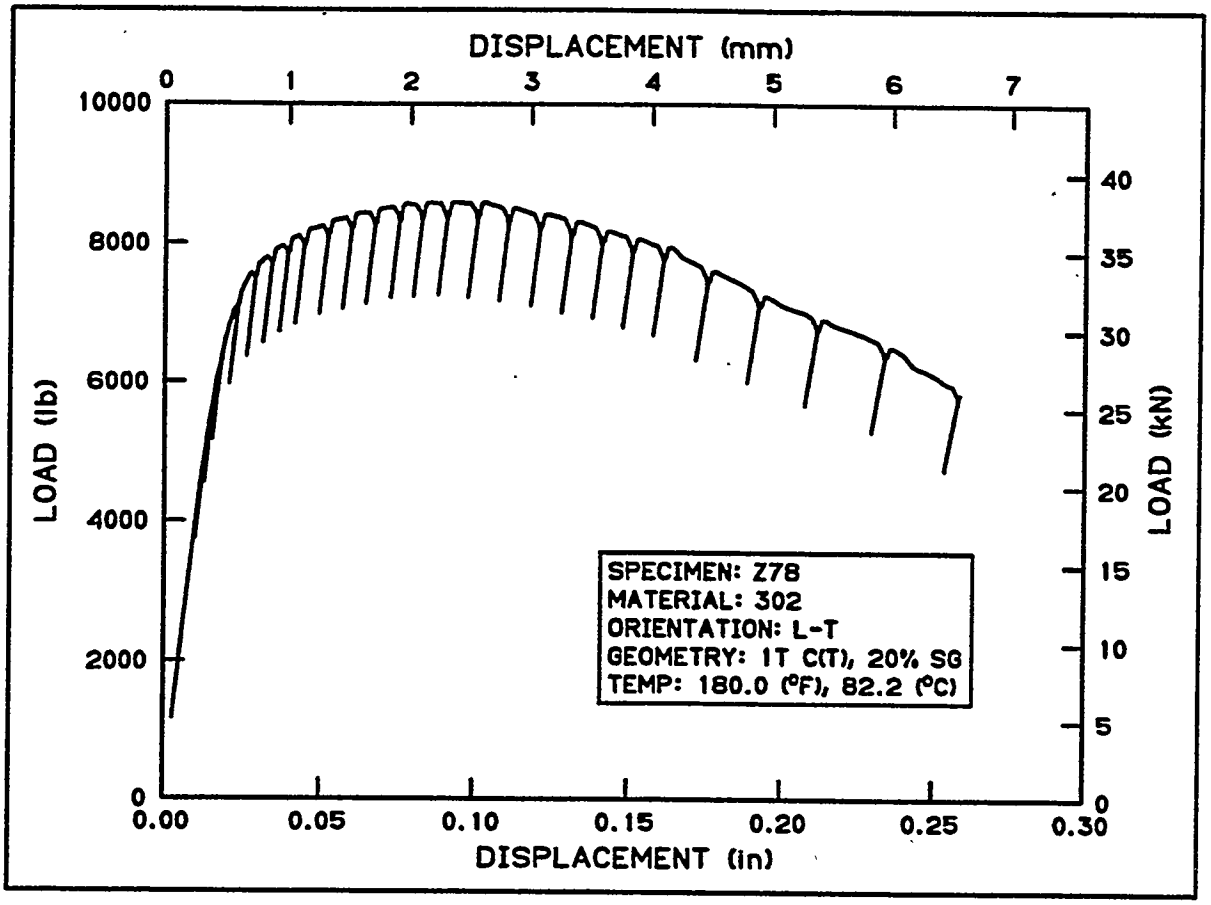

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
40 35 30 25 20 15 10 5 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z72
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

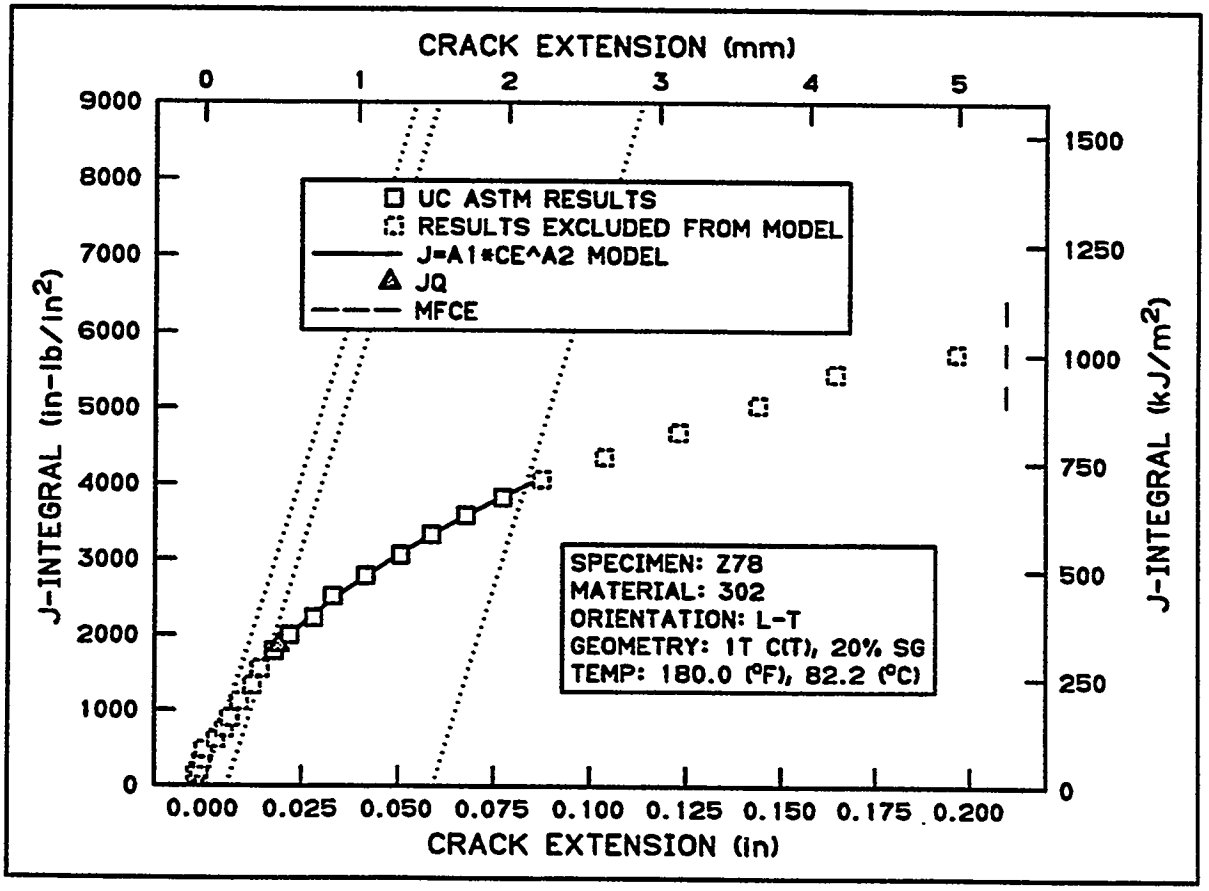

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z72
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z78
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2351 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4753	0.0122	-0.0013	107.9
2	5550	0.0148	-0.0021	156.7
3	6149	0.0171	-0.0012	211.5
4	7036	0.0221	-0.0005	335.1
5	7561	0.0273	0.0000	476.4
6	7791	0.0325	0.0031	616.2
7	7958	0.0373	0.0053	755.6
8	8100	0.0425	0.0067	899.7
9	8241	0.0502	0.0091	1120.2
10	8356	0.0577	0.0123	1332.9
11	8435	0.0651	0.0143	1555.0
12	8508	0.0729	0.0179	1785.0
13	8546	0.0803	0.0219	1999.0
14	8558	0.0887	0.0281	2226.9
15	8569	0.0984	0.0331	2515.5
16	8502	0.1087	0.0415	2786.6
17	8419	0.1189	0.0506	3058.6
18	8344	0.1291	0.0587	3329.6
19	8224	0.1390	0.0677	3584.0
20	8097	0.1489	0.0774	3822.5
21	7971	0.1591	0.0873	4061.5
22	7673	0.1731	0.1037	4357.5
23	7327	0.1899	0.1230	4686.1
24	6950	0.2095	0.1439	5042.9
25	6579	0.2317	0.1643	5460.3
26	5957	0.2561	0.1963	5731.2

  WIDTH: 1.9977 (IN),50.742 (MM)
  THICKNESS: 1.0021 (IN),25.453 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5020 (IN),12.751 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7150 (IN),43.561 (MM)
    DISTANCE 2: 1.7265 (IN),43.853 (MM)
    DISTANCE 3: 1.7390 (IN),44.171 (MM)
    DISTANCE 4: 1.7420 (IN),44.247 (MM)
    DISTANCE 5: 1.7435 (IN),44.285 (MM)
    DISTANCE 6: 1.7450 (IN),44.323 (MM)
    DISTANCE 7: 1.7446 (IN),44.313 (MM)
    DISTANCE 8: 1.7376 (IN),44.135 (MM)
    DISTANCE 9: 1.7227 (IN),43.757 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9443 (IN),49.385 (MM)
    DISTANCE 2: 1.9409 (IN),49.299 (MM)
    DISTANCE 3: 1.9346 (IN),49.139 (MM)
    DISTANCE 4: 1.9386 (IN),49.240 (MM)
    DISTANCE 5: 1.9418 (IN),49.322 (MM)
    DISTANCE 6: 1.9504 (IN),49.540 (MM)
    DISTANCE 7: 1.9452 (IN),49.408 (MM)
    DISTANCE 8: 1.9599 (IN),49.781 (MM)
    DISTANCE 9: 1.9804 (IN),50.302 (MM)

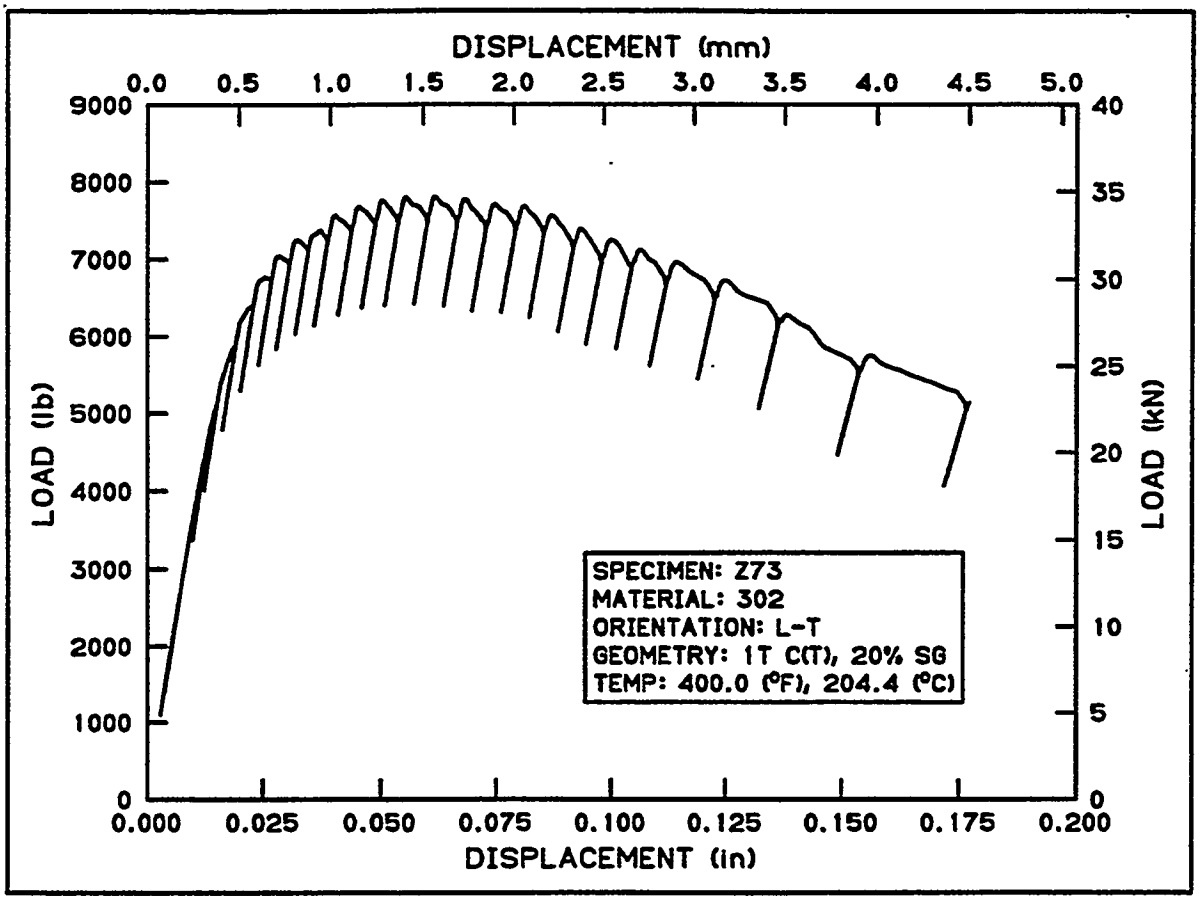

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
10000
8000
6000
4000
2000
0
LOAD (lb)
40
35
30
25
20
15
10
5
0
LOAD (kN)
SPECIMEN: Z78
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

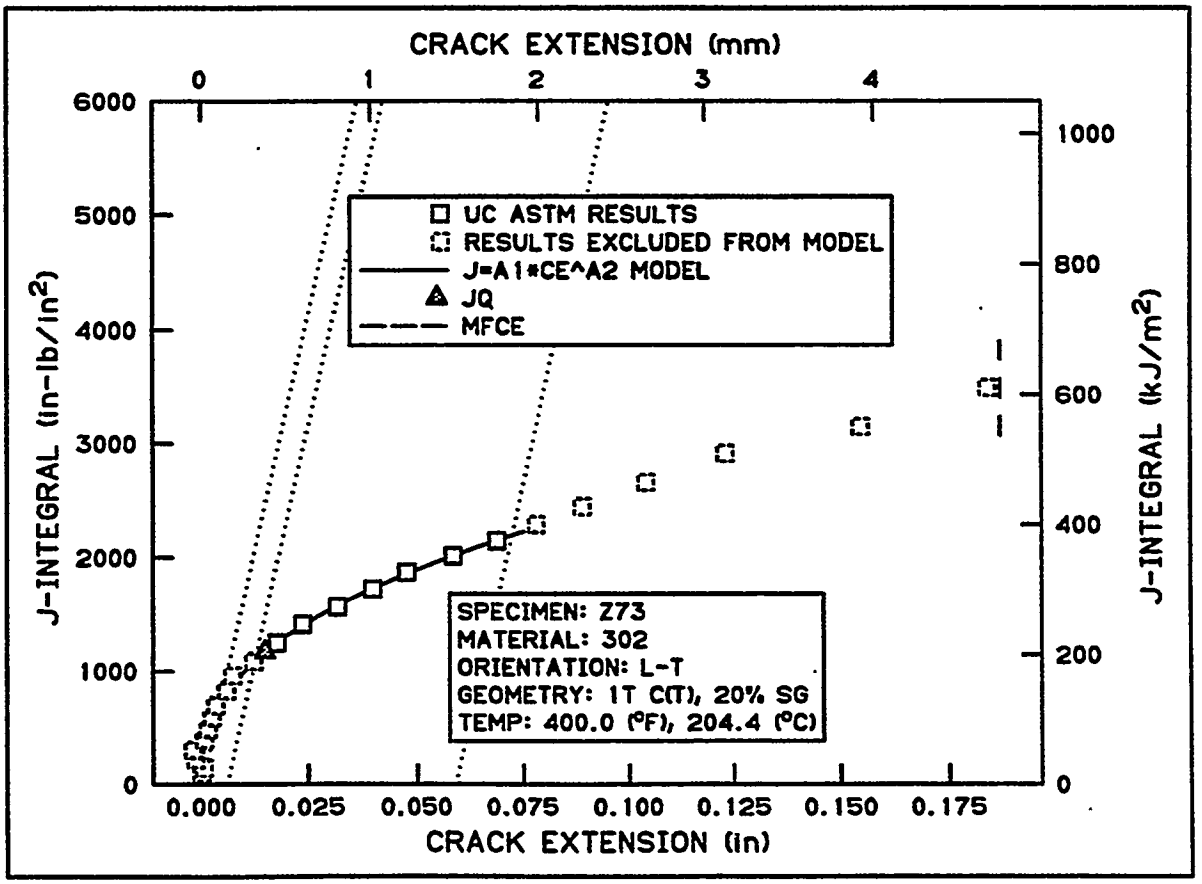

CRACK EXTENSION (mm)
0
1
2
3
4
5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z78
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z73
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2516 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4305	0.0119	0.0000	98.0
2	5024	0.0145	0.0006	140.0
3	5824	0.0182	-0.0014	216.8
4	6365	0.0218	-0.0019	300.9
5	6765	0.0254	0.0006	392.3
6	7018	0.0291	0.0015	487.3
7	7224	0.0332	0.0024	589.0
8	7382	0.0372	0.0033	694.5
9	7508	0.0419	0.0059	826.1
10	7622	0.0469	0.0073	959.1
11	7668	0.0518	0.0123	1084.6
12	7680	0.0582	0.0177	1247.7
13	7668	0.0646	0.0237	1413.9
14	7622	0.0704	0.0317	1566.3
15	7606	0.0771	0.0398	1720.9
16	7562	0.0832	0.0477	1869.1
17	7405	0.0896	0.0586	2011.8
18	7270	0.0952	0.0688	2142.9
19	7177	0.1016	0.0781	2284.0
20	6948	0.1096	0.0891	2441.2
21	6726	0.1204	0.1042	2652.7
22	6425	0.1341	0.1230	2910.9
23	5699	0.1518	0.1546	3145.6
24	5273	0.1745	0.1839	3486.4

  WIDTH: 1.9993 (IN),50.782 (MM)
  THICKNESS: 1.0020 (IN),25.451 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5013 (IN),12.733 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7317 (IN),43.985 (MM)
    DISTANCE 2: 1.7464 (IN),44.359 (MM)
    DISTANCE 3: 1.7542 (IN),44.557 (MM)
    DISTANCE 4: 1.7570 (IN),44.628 (MM)
    DISTANCE 5: 1.7597 (IN),44.696 (MM)
    DISTANCE 6: 1.7606 (IN),44.719 (MM)
    DISTANCE 7: 1.7594 (IN),44.689 (MM)
    DISTANCE 8: 1.7504 (IN),44.460 (MM)
    DISTANCE 9: 1.7392 (IN),44.176 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9540 (IN),49.632 (MM)
    DISTANCE 2: 1.9114 (IN),48.550 (MM)
    DISTANCE 3: 1.9158 (IN),48.661 (MM)
    DISTANCE 4: 1.9184 (IN),48.727 (MM)
    DISTANCE 5: 1.9645 (IN),49.898 (MM)
    DISTANCE 6: 1.9488 (IN),49.500 (MM)
    DISTANCE 7: 1.9533 (IN),49.614 (MM)
    DISTANCE 8: 1.9420 (IN),49.327 (MM)
    DISTANCE 9: 1.9731 (IN),50.117 (MM)

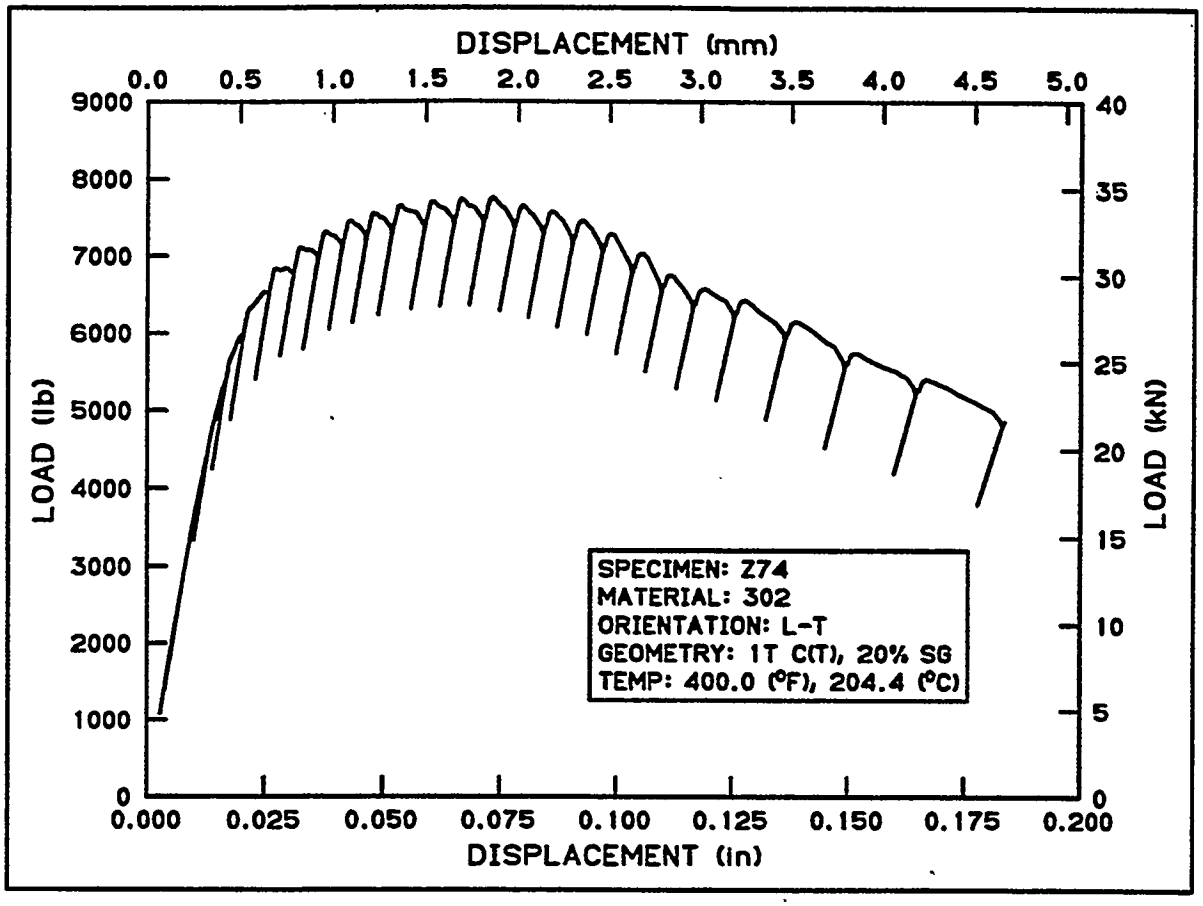

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (lb)
40 35 30 25 20 15 10 5 0
LOAD (kN)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)
SPECIMEN: Z73
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

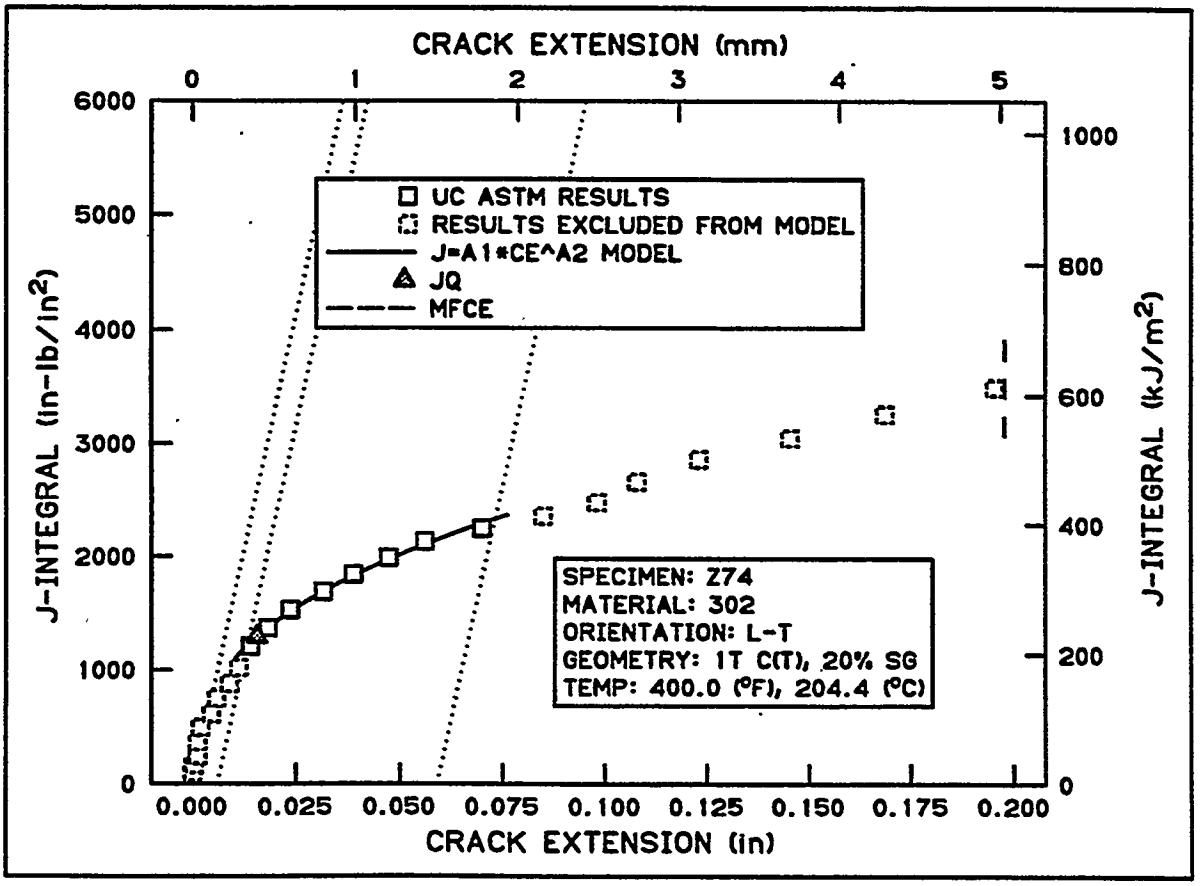

CRACK EXTENSION (mm)
0 1 2 3 4
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z73
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

SPECIMEN
  IDENTIFICATION: Z74
  MATERIAL CODE: 302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2580 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4286	0.0121	0.0000	99.2
2	5273	0.0159	0.0004	165.9
3	5941	0.0196	0.0012	244.1
4	6537	0.0248	0.0012	365.7
5	6849	0.0297	0.0019	493.8
6	7082	0.0348	0.0045	613.4
7	7266	0.0397	0.0058	750.1
8	7398	0.0447	0.0089	877.5
9	7496	0.0500	0.0112	1022.8
10	7565	0.0569	0.0141	1206.3
11	7623	0.0630	0.0183	1370.2
12	7632	0.0694	0.0237	1532.9
13	7618	0.0758	0.0317	1692.3
14	7541	0.0818	0.0389	1843.3
15	7463	0.0883	0.0474	1991.0
16	7361	0.0944	0.0561	2136.5
17	7158	0.1004	0.0701	2251.7
18	6986	0.1064	0.0848	2358.4
19	6604	0.1140	0.0981	2477.8
20	6428	0.1234	0.1078	2664.0
21	6151	0.1342	0.1230	2862.3
22	5828	0.1470	0.1453	3048.9
23	5429	0.1625	0.1686	3259.3
24	4986	0.1811	0.1954	3492.4

  WIDTH: 1.9986 (IN),50.764 (MM)
  THICKNESS: 1.0021 (IN),25.453 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5017 (IN),12.743 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7360 (IN),44.094 (MM)
    DISTANCE 2: 1.7502 (IN),44.455 (MM)
    DISTANCE 3: 1.7585 (IN),44.666 (MM)
    DISTANCE 4: 1.7634 (IN),44.790 (MM)
    DISTANCE 5: 1.7658 (IN),44.851 (MM)
    DISTANCE 6: 1.7667 (IN),44.874 (MM)
    DISTANCE 7: 1.7667 (IN),44.874 (MM)
    DISTANCE 8: 1.7618 (IN),44.750 (MM)
    DISTANCE 9: 1.7528 (IN),44.521 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.9800 (IN),50.292 (MM)
    DISTANCE 2: 1.9652 (IN),49.916 (MM)
    DISTANCE 3: 1.9466 (IN),49.444 (MM)
    DISTANCE 4: 1.9088 (IN),48.484 (MM)
    DISTANCE 5: 1.9464 (IN),49.439 (MM)
    DISTANCE 6: 1.9583 (IN),49.741 (MM)
    DISTANCE 7: 1.9619 (IN),49.832 (MM)
    DISTANCE 8: 1.9782 (IN),50.246 (MM)
    DISTANCE 9: 2.0093 (IN),51.036 (MM)

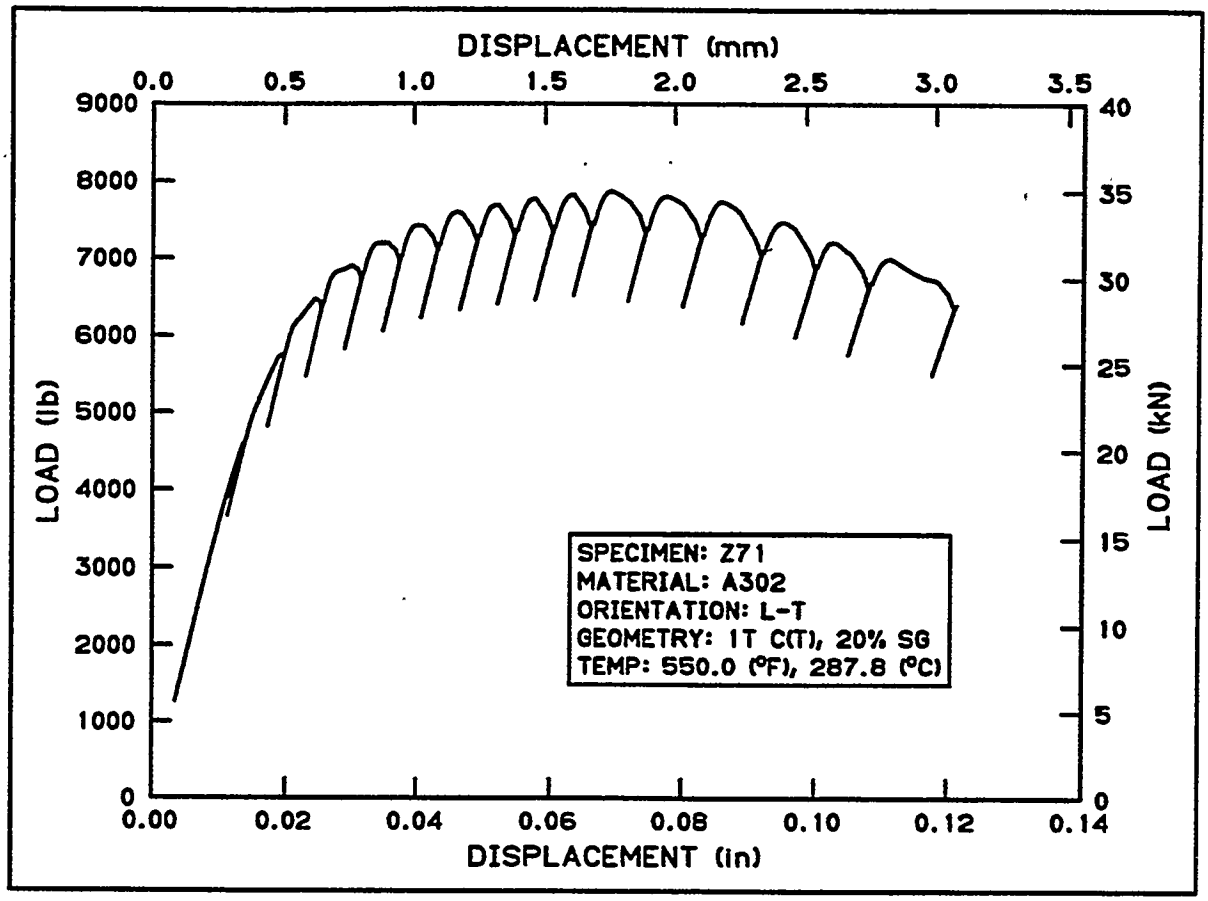

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
LOAD (kN)
40 35 30 25 20 15 10 5 0
SPECIMEN: Z74
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

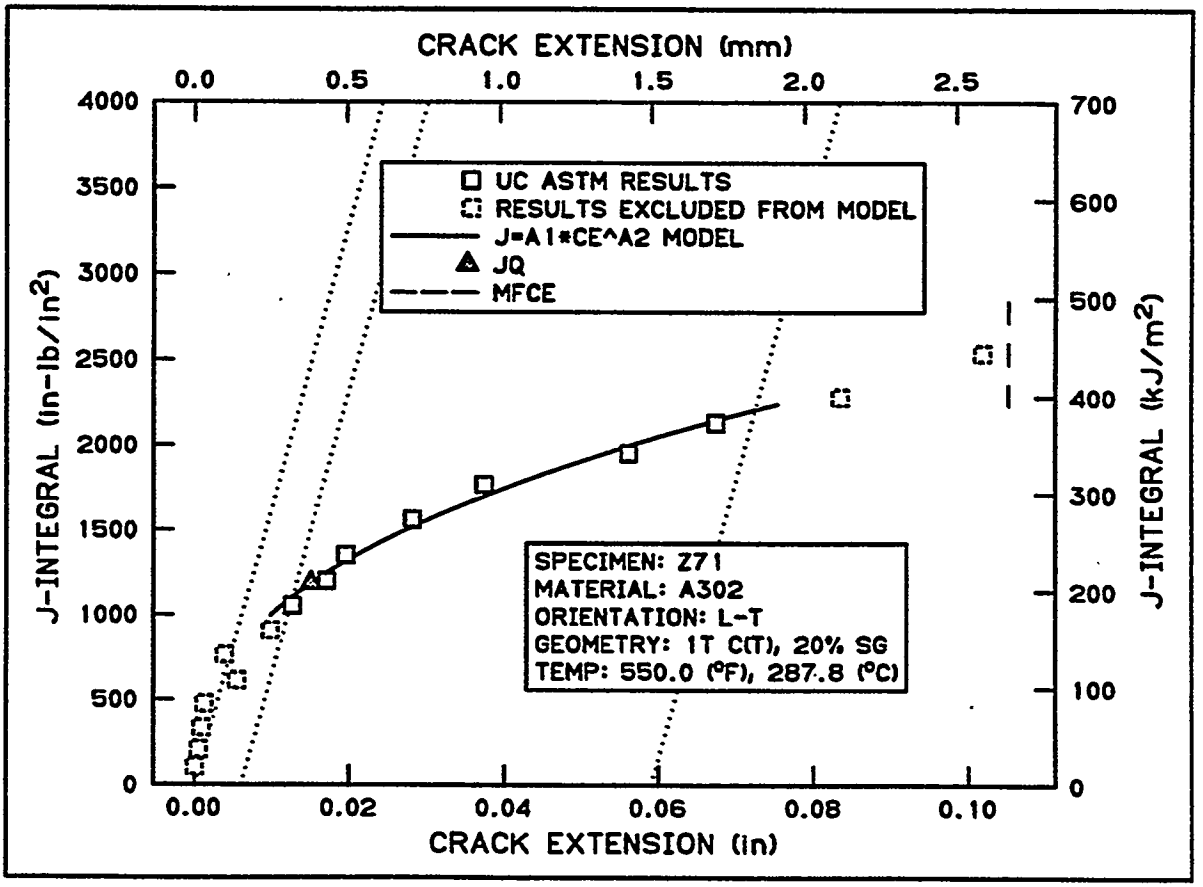

CRACK EXTENSION (mm)
0 1 2 3 4 5
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z74
MATERIAL: 302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z71
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2554 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4537	0.0134	0.0000	108.4
2	5722	0.0189	0.0005	210.6
3	6471	0.0244	0.0009	335.8
4	6905	0.0300	0.0013	475.3
5	7200	0.0354	0.0054	614.1
6	7416	0.0410	0.0039	764.9
7	7580	0.0466	0.0097	910.0
8	7689	0.0520	0.0126	1055.5
9	7769	0.0577	0.0171	1202.3
10	7824	0.0634	0.0196	1354.6
11	7740	0.0718	0.0282	1564.3
12	7698	0.0800	0.0374	1768.9
13	7586	0.0886	0.0561	1952.2
14	7395	0.0968	0.0674	2131.8
15	7071	0.1053	0.0834	2283.3
16	6712	0.1184	0.1017	2539.3

  WIDTH: 1.9992 (IN),50.780 (MM)
  THICKNESS: 1.0018 (IN),25.446 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5010 (IN),12.725 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7414 (IN),44.232 (MM)
    DISTANCE 2: 1.7539 (IN),44.549 (MM)
    DISTANCE 3: 1.7584 (IN),44.663 (MM)
    DISTANCE 4: 1.7602 (IN),44.709 (MM)
    DISTANCE 5: 1.7608 (IN),44.724 (MM)
    DISTANCE 6: 1.7602 (IN),44.709 (MM)
    DISTANCE 7: 1.7592 (IN),44.684 (MM)
    DISTANCE 8: 1.7550 (IN),44.577 (MM)
    DISTANCE 9: 1.7456 (IN),44.338 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8917 (IN),48.049 (MM)
    DISTANCE 2: 1.8585 (IN),47.206 (MM)
    DISTANCE 3: 1.8637 (IN),47.338 (MM)
    DISTANCE 4: 1.8407 (IN),46.754 (MM)
    DISTANCE 5: 1.8490 (IN),46.965 (MM)
    DISTANCE 6: 1.8642 (IN),47.351 (MM)
    DISTANCE 7: 1.8740 (IN),47.600 (MM)
    DISTANCE 8: 1.8553 (IN),47.125 (MM)
    DISTANCE 9: 1.8804 (IN),47.762 (MM)

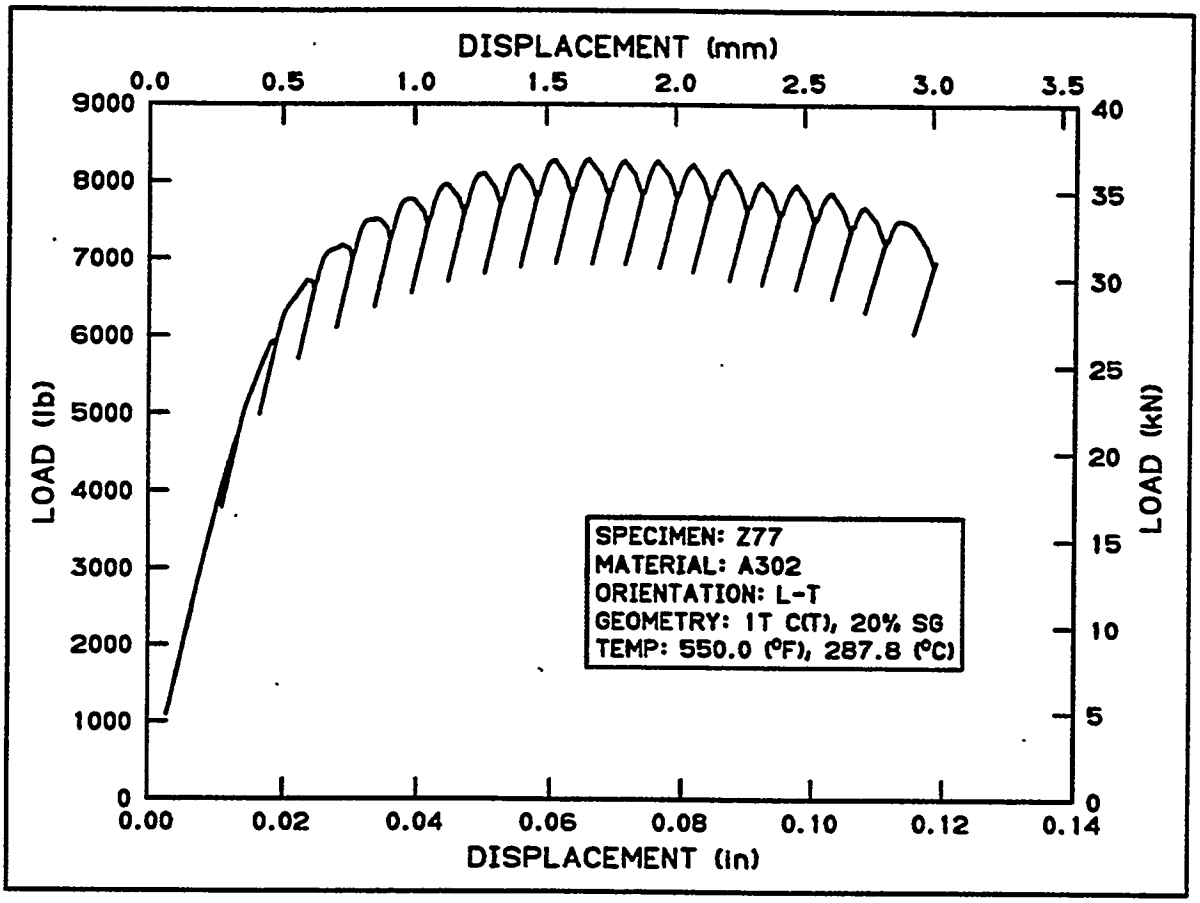

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
40
35
30
25
20
15
10
5
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

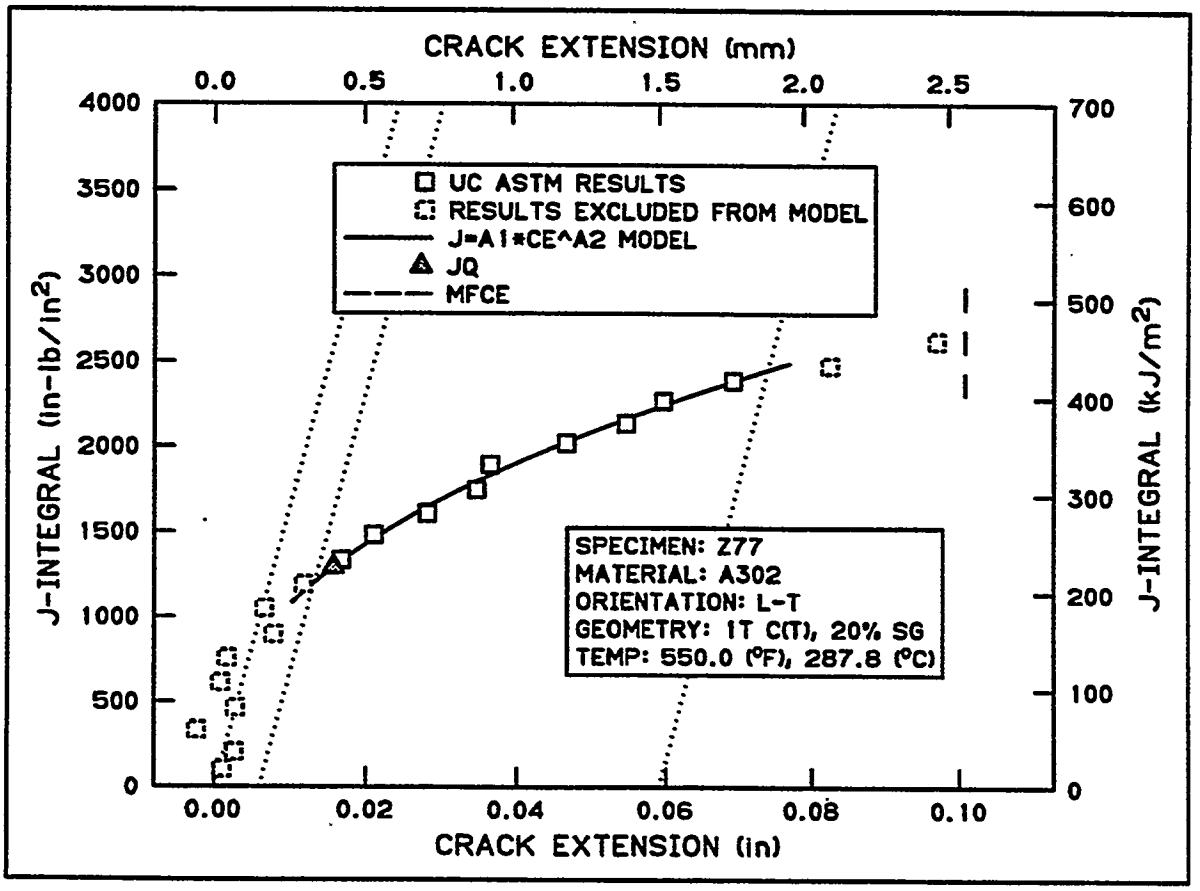

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z77
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 1T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 1.2444 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	4624	0.0128	0.0010	105.2
2	5911	0.0181	0.0026	206.3
3	6711	0.0234	-0.0023	334.0
4	7176	0.0285	0.0028	466.0
5	7505	0.0340	0.0008	613.7
6	7763	0.0393	0.0017	760.2
7	7951	0.0444	0.0078	899.0
8	8094	0.0499	0.0066	1052.9
9	8203	0.0550	0.0118	1193.7
10	8271	0.0604	0.0167	1334.9
11	8285	0.0654	0.0210	1481.0
12	8265	0.0709	0.0281	1608.2
13	8264	0.0760	0.0347	1746.6
14	8222	0.0815	0.0365	1892.6
15	8152	0.0868	0.0466	2019.7
16	7999	0.0919	0.0545	2135.2
17	7965	0.0973	0.0597	2267.9
18	7869	0.1027	0.0692	2387.1
19	7686	0.1078	0.0824	2476.4
20	7440	0.1152	0.0969	2621.3

  WIDTH: 1.9998 (IN),50.795 (MM)
  THICKNESS: 1.0021 (IN),25.453 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.5008 (IN),12.720 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.7178 (IN),43.632 (MM)
    DISTANCE 2: 1.7364 (IN),44.105 (MM)
    DISTANCE 3: 1.7451 (IN),44.326 (MM)
    DISTANCE 4: 1.7466 (IN),44.364 (MM)
    DISTANCE 5: 1.7492 (IN),44.430 (MM)
    DISTANCE 6: 1.7517 (IN),44.493 (MM)
    DISTANCE 7: 1.7528 (IN),44.521 (MM)
    DISTANCE 8: 1.7510 (IN),44.475 (MM)
    DISTANCE 9: 1.7402 (IN),44.201 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.8732 (IN),47.579 (MM)
    DISTANCE 2: 1.8404 (IN),46.746 (MM)
    DISTANCE 3: 1.8519 (IN),47.038 (MM)
    DISTANCE 4: 1.8404 (IN),46.746 (MM)
    DISTANCE 5: 1.8389 (IN),46.708 (MM)
    DISTANCE 6: 1.8456 (IN),46.878 (MM)
    DISTANCE 7: 1.8376 (IN),46.675 (MM)
    DISTANCE 8: 1.8396 (IN),46.726 (MM)
    DISTANCE 9: 1.8736 (IN),47.589 (MM)

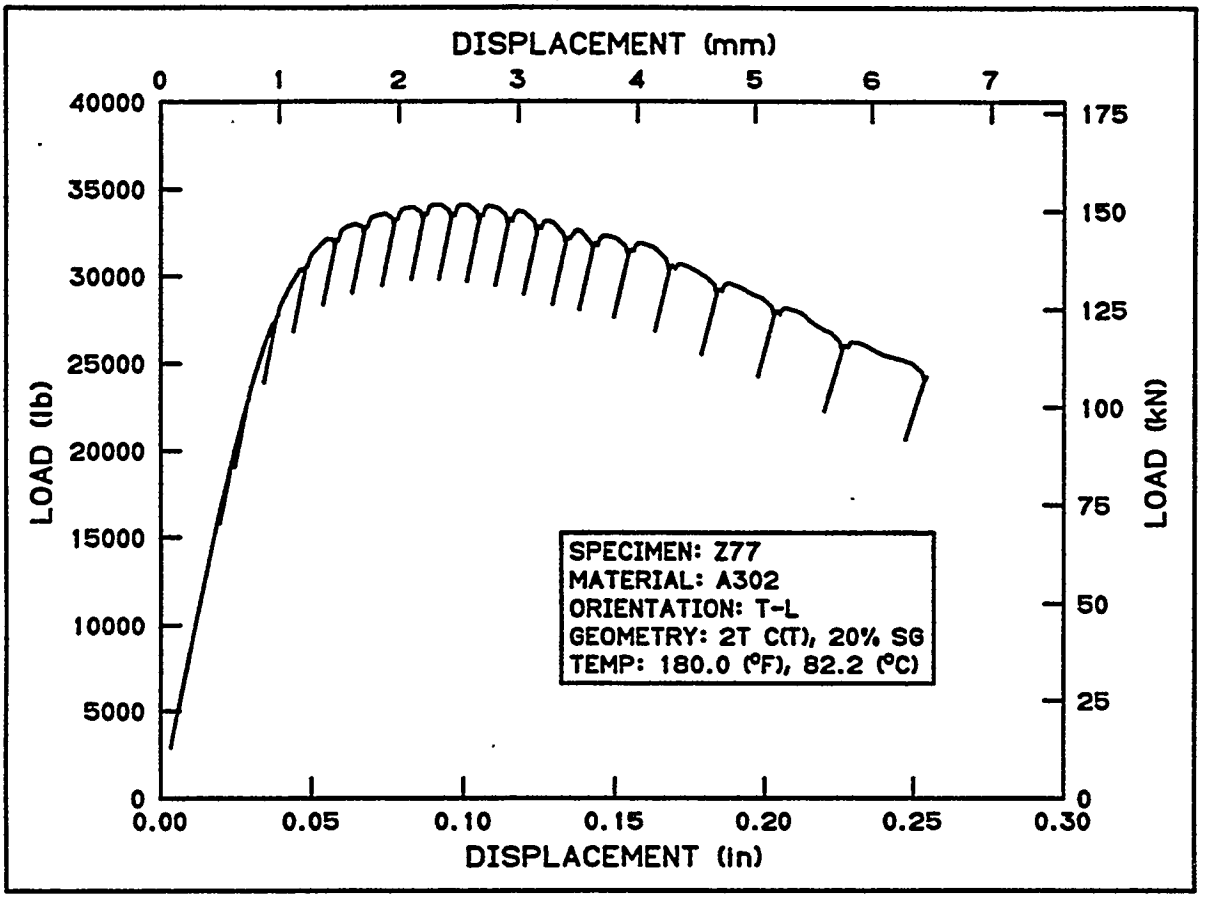

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
40
35
30
25
20
15
10
5
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z77
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

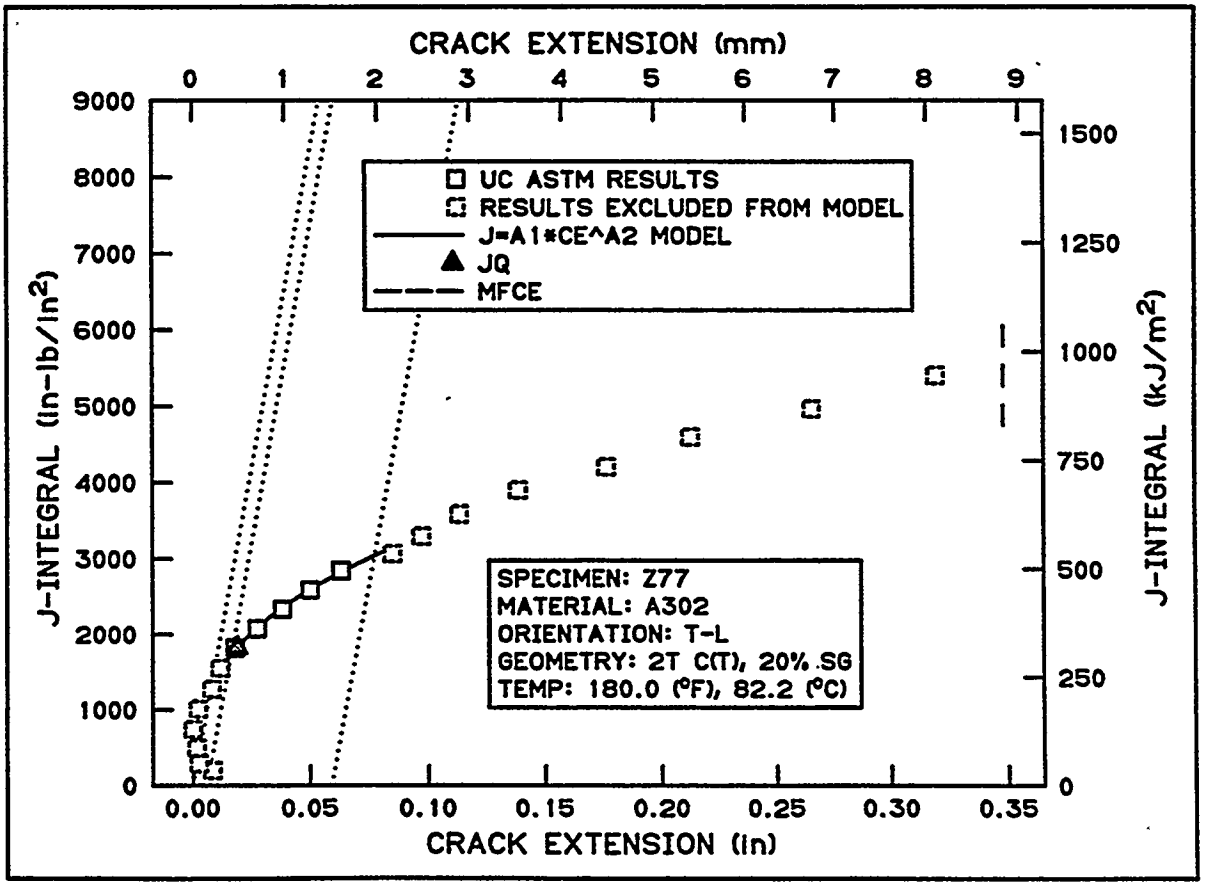

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z77
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 1T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z77
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4350 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18709	0.0227	0.0083	198.3
2	22090	0.0276	0.0026	286.4
3	27144	0.0368	0.0016	495.1
4	30345	0.0461	0.0000	741.5
5	32149	0.0551	0.0023	1008.6
6	32995	0.0643	0.0081	1271.0
7	33583	0.0741	0.0117	1549.4
8	33946	0.0833	0.0181	1818.1
9	34103	0.0924	0.0275	2074.8
10	34072	0.1016	0.0383	2332.0
11	33911	0.1112	0.0502	2589.7
12	33648	0.1200	0.0632	2841.7
13	32998	0.1299	0.0850	3063.6
14	32566	0.1388	0.0972	3295.0
15	32160	0.1505	0.1135	3584.0
16	31586	0.1636	0.1385	3896.8
17	29968	0.1801	0.1765	4200.6
18	28722	0.1993	0.2125	4589.8
19	26754	0.2222	0.2654	4963.0
20	24987	0.2494	0.3189	5398.9

WIDTH: 3.9981 (IN),101.550 (MM)
THICKNESS: 2.0020 (IN),50.851 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9998 (IN),25.395 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4376 (IN),87.315 (MM)
DISTANCE 2: 3.4478 (IN),87.574 (MM)
DISTANCE 3: 3.4443 (IN),87.485 (MM)
DISTANCE 4: 3.4376 (IN),87.315 (MM)
DISTANCE 5: 3.4320 (IN),87.173 (MM)
DISTANCE 6: 3.4225 (IN),86.931 (MM)
DISTANCE 7: 3.4242 (IN),86.975 (MM)
DISTANCE 8: 3.4334 (IN),87.208 (MM)
DISTANCE 9: 3.4358 (IN),87.269 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.9248 (IN),99.690 (MM)
DISTANCE 2: 3.8670 (IN),98.222 (MM)
DISTANCE 3: 3.8215 (IN),97.066 (MM)
DISTANCE 4: 3.7685 (IN),95.720 (MM)
DISTANCE 5: 3.7305 (IN),94.755 (MM)
DISTANCE 6: 3.7322 (IN),94.798 (MM)
DISTANCE 7: 3.7212 (IN),94.518 (MM)
DISTANCE 8: 3.7426 (IN),95.062 (MM)
DISTANCE 9: 3.8302 (IN),97.287 (MM)

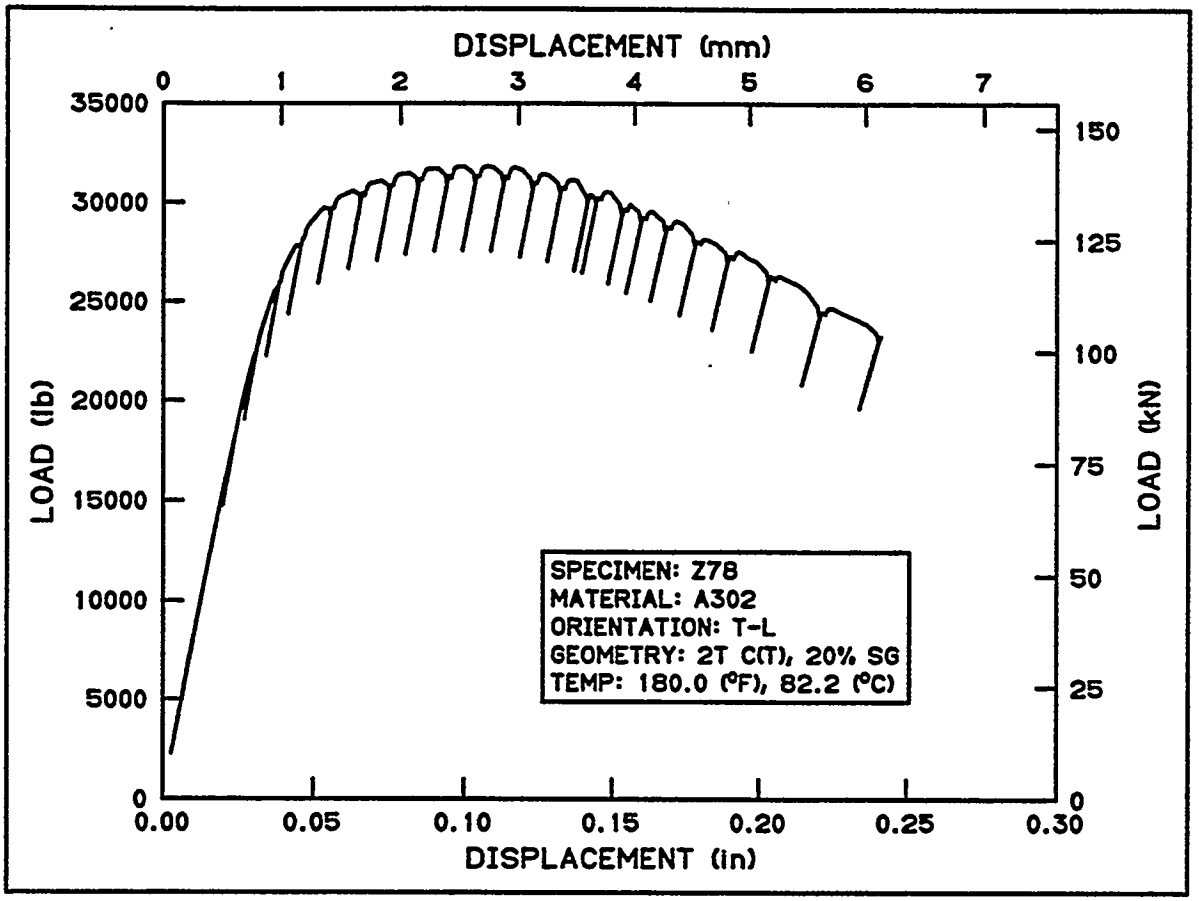

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30
DISPLACEMENT (in)
SPECIMEN: Z77
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

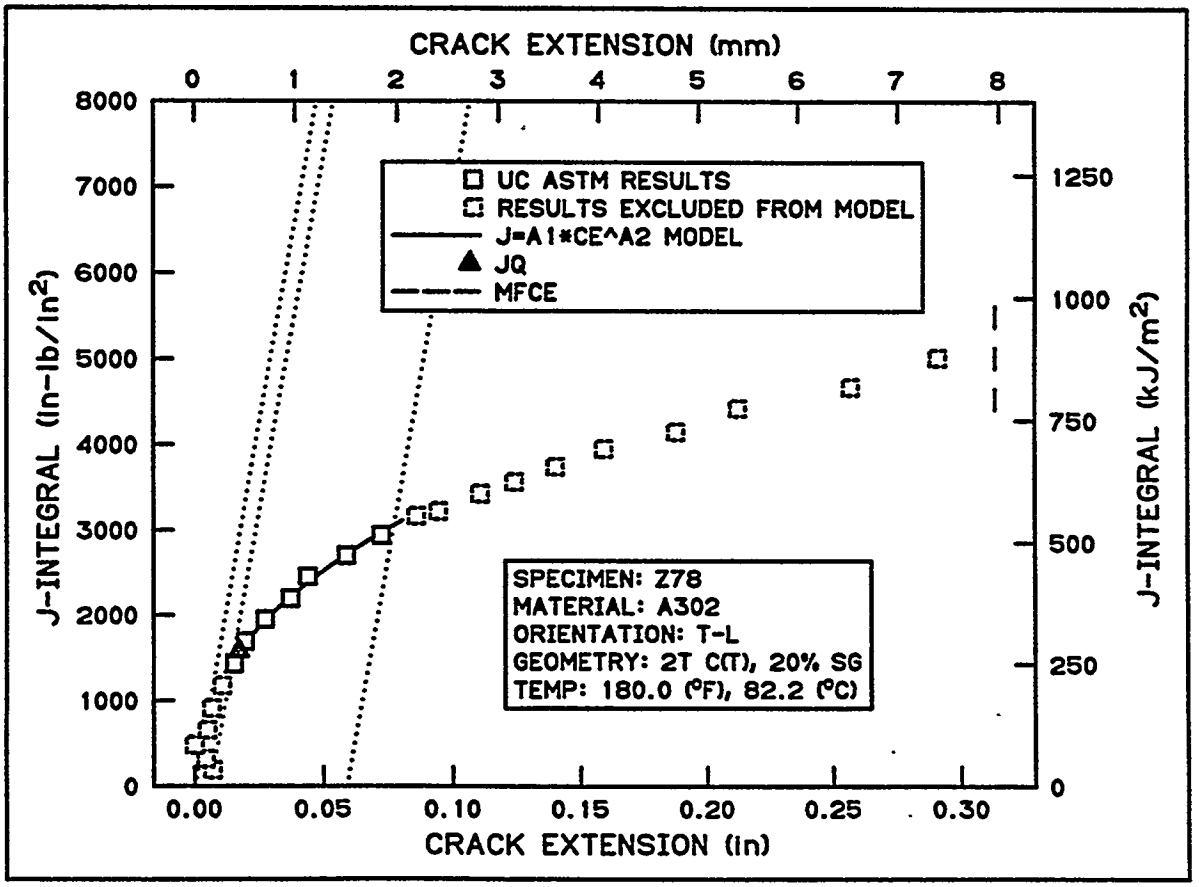

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8 9
9000 8000 7000 6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z77
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z78
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4801 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17688	0.0229	0.0069	192.6
2	22142	0.0301	0.0041	323.8
3	25508	0.0371	0.0000	485.2
4	27829	0.0441	0.0048	659.0
5	29724	0.0533	0.0066	911.0
6	30589	0.0630	0.0106	1175.8
7	31101	0.0723	0.0154	1431.0
8	31501	0.0815	0.0199	1691.0
9	31730	0.0912	0.0276	1950.4
10	31812	0.1002	0.0375	2198.7
11	31801	0.1096	0.0442	2457.3
12	31667	0.1194	0.0590	2705.4
13	31384	0.1284	0.0724	2939.6
14	31105	0.1379	0.0859	3167.6
15	30213	0.1435	0.0943	3222.8
16	30501	0.1494	0.1105	3427.3
17	29891	0.1560	0.1240	3564.1
18	29539	0.1637	0.1402	3741.9
19	28948	0.1739	0.1593	3950.2
20	27924	0.1853	0.1876	4148.8
21	27020	0.1992	0.2123	4424.4
22	25482	0.2164	0.2571	4674.4
23	23859	0.2368	0.2910	5014.7

  WIDTH: 3.9988 (IN),101.570 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9991 (IN),25.377 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4752 (IN),88.270 (MM)
    DISTANCE 2: 3.4876 (IN),88.585 (MM)
    DISTANCE 3: 3.4913 (IN),88.679 (MM)
    DISTANCE 4: 3.4918 (IN),88.692 (MM)
    DISTANCE 5: 3.4855 (IN),88.532 (MM)
    DISTANCE 6: 3.4760 (IN),88.290 (MM)
    DISTANCE 7: 3.4695 (IN),88.125 (MM)
    DISTANCE 8: 3.4661 (IN),88.039 (MM)
    DISTANCE 9: 3.4561 (IN),87.785 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9480 (IN),100.280 (MM)
    DISTANCE 2: 3.8608 (IN),98.064 (MM)
    DISTANCE 3: 3.8366 (IN),97.450 (MM)
    DISTANCE 4: 3.7915 (IN),96.304 (MM)
    DISTANCE 5: 3.7800 (IN),96.012 (MM)
    DISTANCE 6: 3.7852 (IN),96.144 (MM)
    DISTANCE 7: 3.7228 (IN),94.559 (MM)
    DISTANCE 8: 3.6898 (IN),93.721 (MM)
    DISTANCE 9: 3.7982 (IN),96.474 (MM)

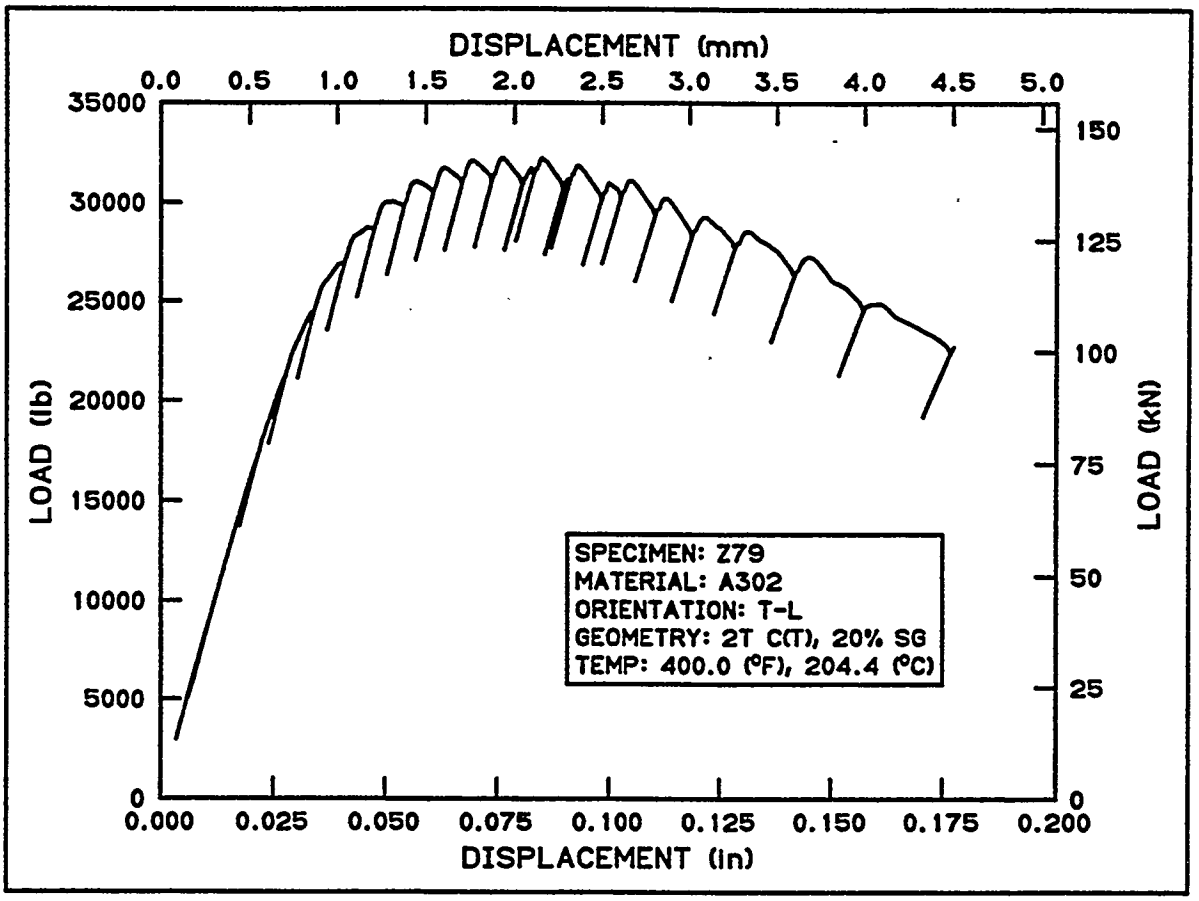

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z78
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

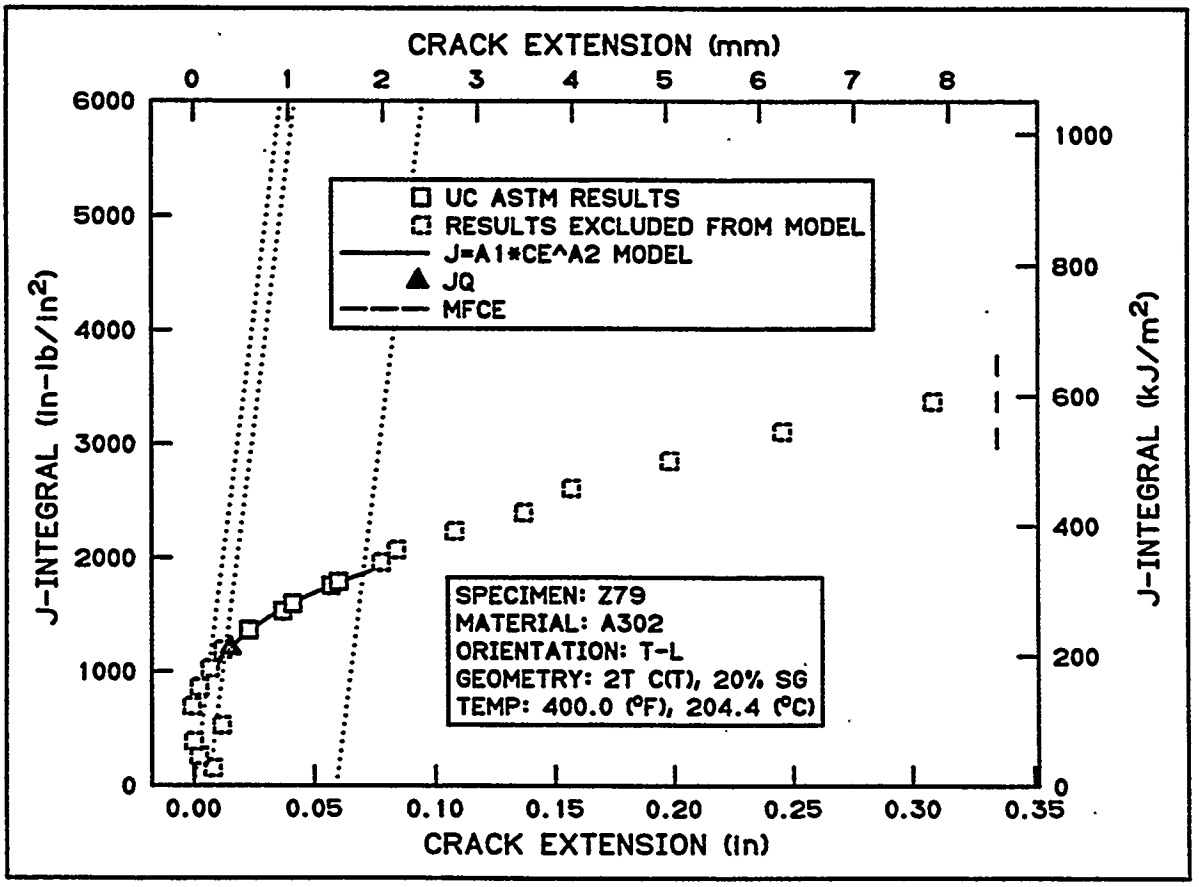

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
8
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z78
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z79
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4348 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16674	0.0206	0.0077	254.6
2	20931	0.0270	0.0021	259.8
3	24311	0.0332	0.0000	386.8
4	26859	0.0396	0.0115	528.4
5	28725	0.0459	-0.0006	695.4
6	30049	0.0518	0.0023	861.3
7	30953	0.0582	0.0067	1028.1
8	31617	0.0642	0.0119	1194.9
9	31849	0.0711	0.0228	1365.3
10	32099	0.0769	0.0369	1533.3
11	31339	0.0814	0.0411	1597.3
12	32013	0.0860	0.0571	1757.1
13	31058	0.0905	0.0601	1792.1
14	31504	0.0945	0.0777	1963.1
15	30979	0.0998	0.0841	2072.0
16	30717	0.1066	0.1081	2238.5
17	29911	0.1142	0.1370	2399.7
18	28712	0.1250	0.1569	2613.1
19	27567	0.1379	0.1982	2855.0
20	25674	0.1534	0.2456	3110.2
21	23154	0.1738	0.3084	3376.4

WIDTH: 4.0014 (IN),101.640 (MM)
THICKNESS: 2.0027 (IN),50.869 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9986 (IN),25.364 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4454 (IN),87.513 (MM)
DISTANCE 2: 3.4534 (IN),87.716 (MM)
DISTANCE 3: 3.4531 (IN),87.709 (MM)
DISTANCE 4: 3.4464 (IN),87.539 (MM)
DISTANCE 5: 3.4272 (IN),87.051 (MM)
DISTANCE 6: 3.4124 (IN),86.675 (MM)
DISTANCE 7: 3.4145 (IN),86.728 (MM)
DISTANCE 8: 3.4238 (IN),86.965 (MM)
DISTANCE 9: 3.4266 (IN),87.036 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.9157 (IN),99.459 (MM)
DISTANCE 2: 3.8233 (IN),97.112 (MM)
DISTANCE 3: 3.7920 (IN),96.317 (MM)
DISTANCE 4: 3.7879 (IN),96.213 (MM)
DISTANCE 5: 3.7438 (IN),95.093 (MM)
DISTANCE 6: 3.7257 (IN),94.633 (MM)
DISTANCE 7: 3.7036 (IN),94.071 (MM)
DISTANCE 8: 3.7195 (IN),94.475 (MM)
DISTANCE 9: 3.7845 (IN),96.126 (MM)

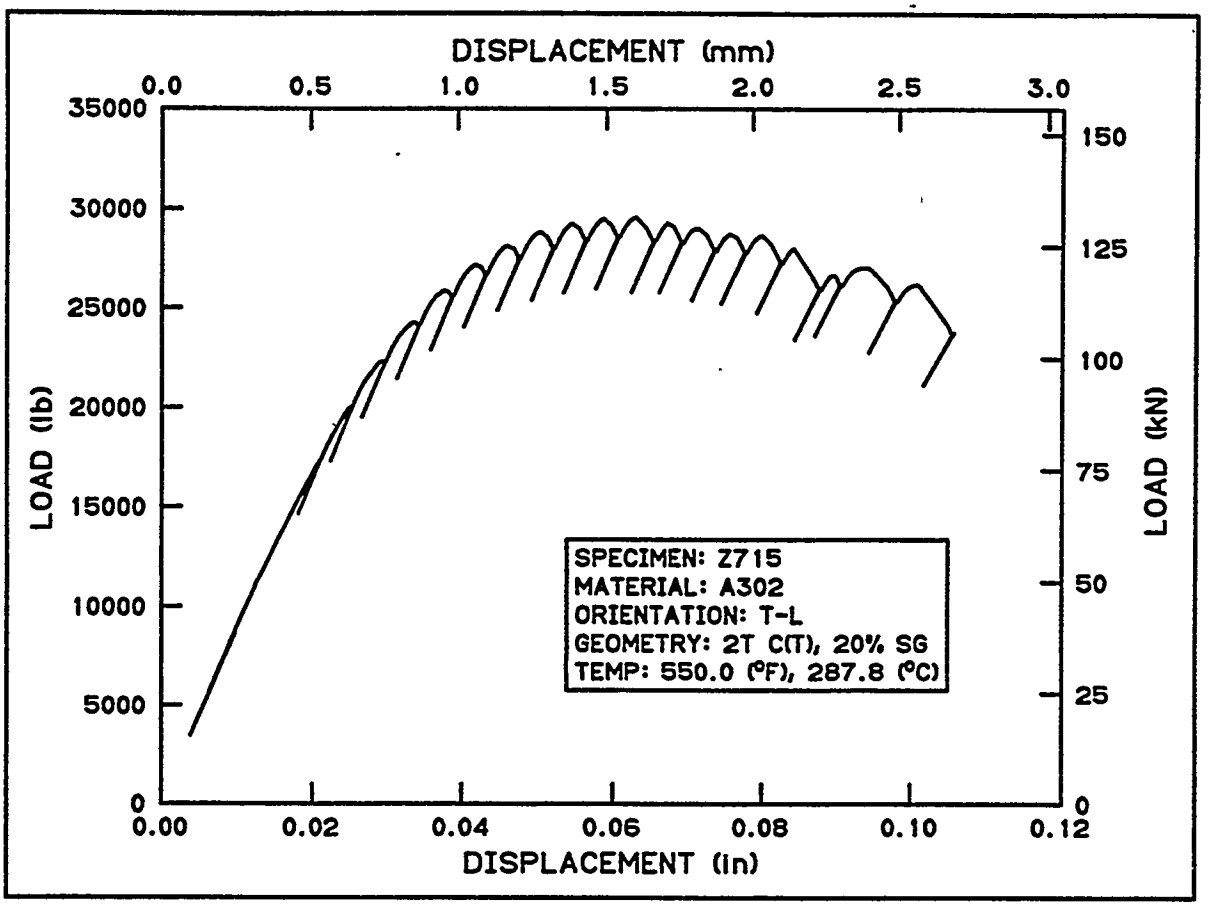

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z79
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

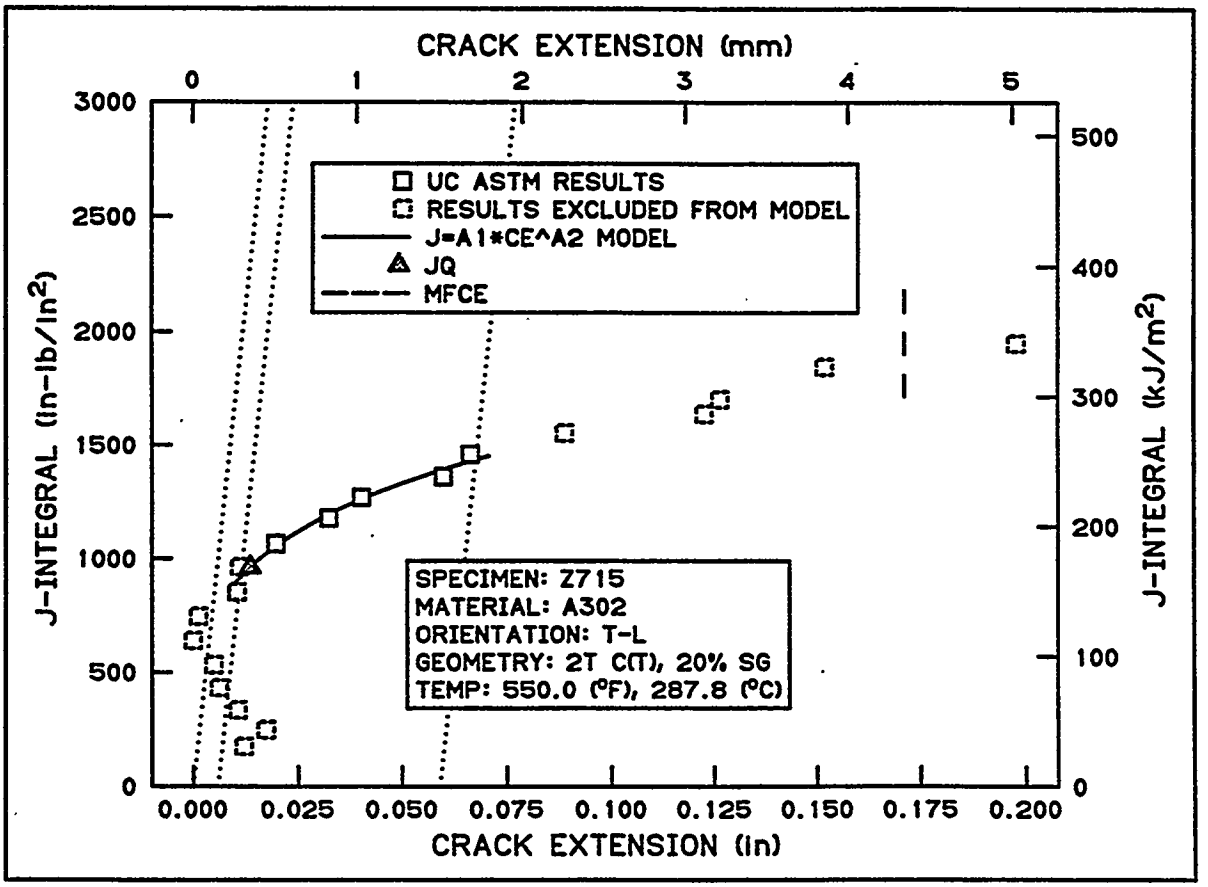

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z79
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z715
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4784 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17162	0.0206	0.0122	175.3
2	19902	0.0248	0.0174	248.0
3	22263	0.0290	0.0107	333.6
4	24267	0.0333	0.0063	431.0
5	25880	0.0376	0.0049	532.5
6	27170	0.0417	0.0000	639.7
7	28098	0.0458	0.0013	746.7
8	28799	0.0502	0.0106	853.4
9	29214	0.0545	0.0112	963.4
10	29453	0.0587	0.0198	1066.6
11	29553	0.0630	0.0324	1177.9
12	29282	0.0673	0.0403	1269.2
13	29000	0.0716	0.0599	1361.8
14	28728	0.0756	0.0664	1459.7
15	28656	0.0800	0.0888	1553.3
16	27990	0.0842	0.1227	1636.5
17	26627	0.0892	0.1264	1701.3
18	26749	0.0952	0.1518	1844.7
19	25592	0.1022	0.1977	1948.1

  WIDTH: 3.9987 (IN),101.570 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9996 (IN),25.390 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4560 (IN),87.782 (MM)
    DISTANCE 2: 3.4748 (IN),88.260 (MM)
    DISTANCE 3: 3.4835 (IN),88.481 (MM)
    DISTANCE 4: 3.4877 (IN),88.588 (MM)
    DISTANCE 5: 3.4888 (IN),88.616 (MM)
    DISTANCE 6: 3.4871 (IN),88.572 (MM)
    DISTANCE 7: 3.4792 (IN),88.372 (MM)
    DISTANCE 8: 3.4650 (IN),88.011 (MM)
    DISTANCE 9: 3.4602 (IN),87.889 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6598 (IN),92.959 (MM)
    DISTANCE 2: 3.6246 (IN),92.065 (MM)
    DISTANCE 3: 3.6418 (IN),92.502 (MM)
    DISTANCE 4: 3.6246 (IN),92.065 (MM)
    DISTANCE 5: 3.6261 (IN),92.103 (MM)
    DISTANCE 6: 3.6682 (IN),93.172 (MM)
    DISTANCE 7: 3.6504 (IN),92.720 (MM)
    DISTANCE 8: 3.6702 (IN),93.223 (MM)
    DISTANCE 9: 3.7136 (IN),94.325 (MM)

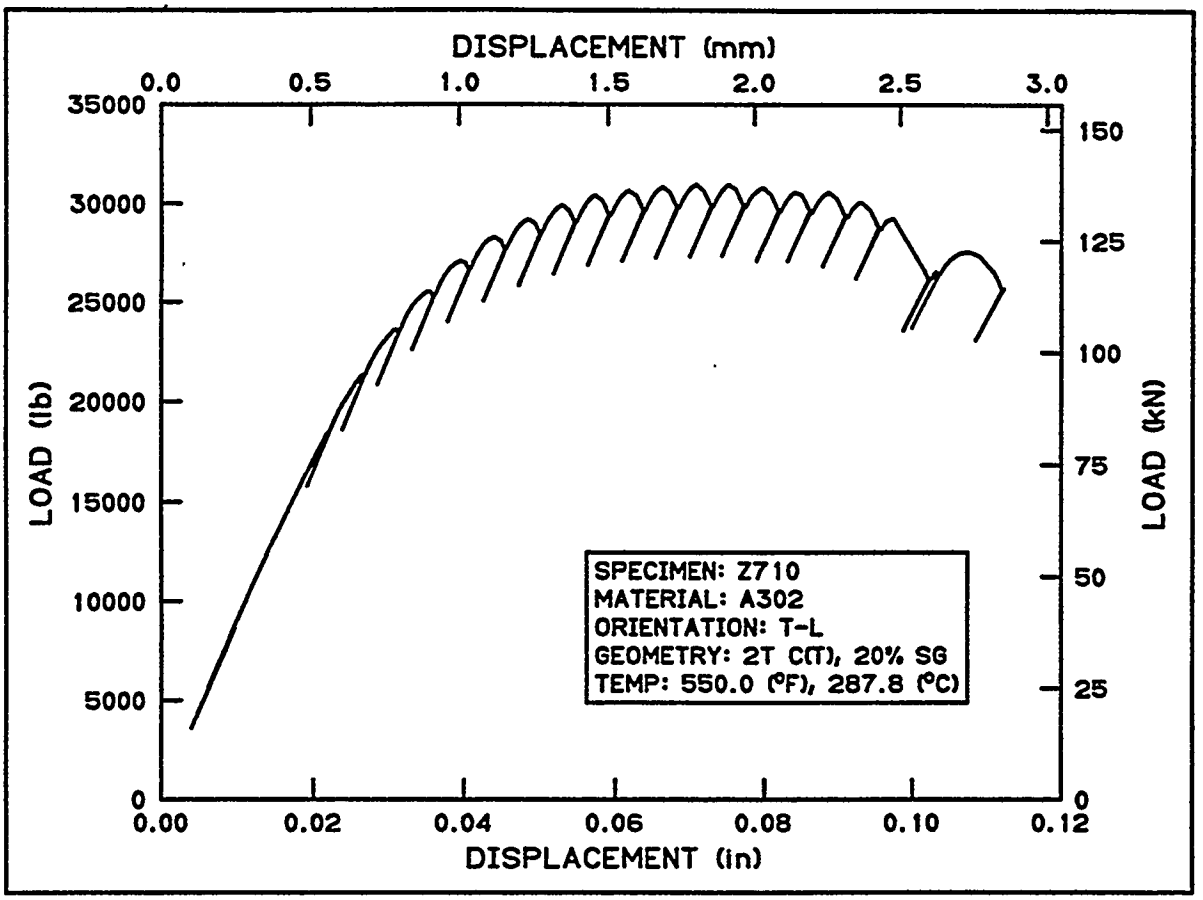

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
35000
30000
25000
20000
15000
10000
5000
0
150
125
100
75
50
25
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z715
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

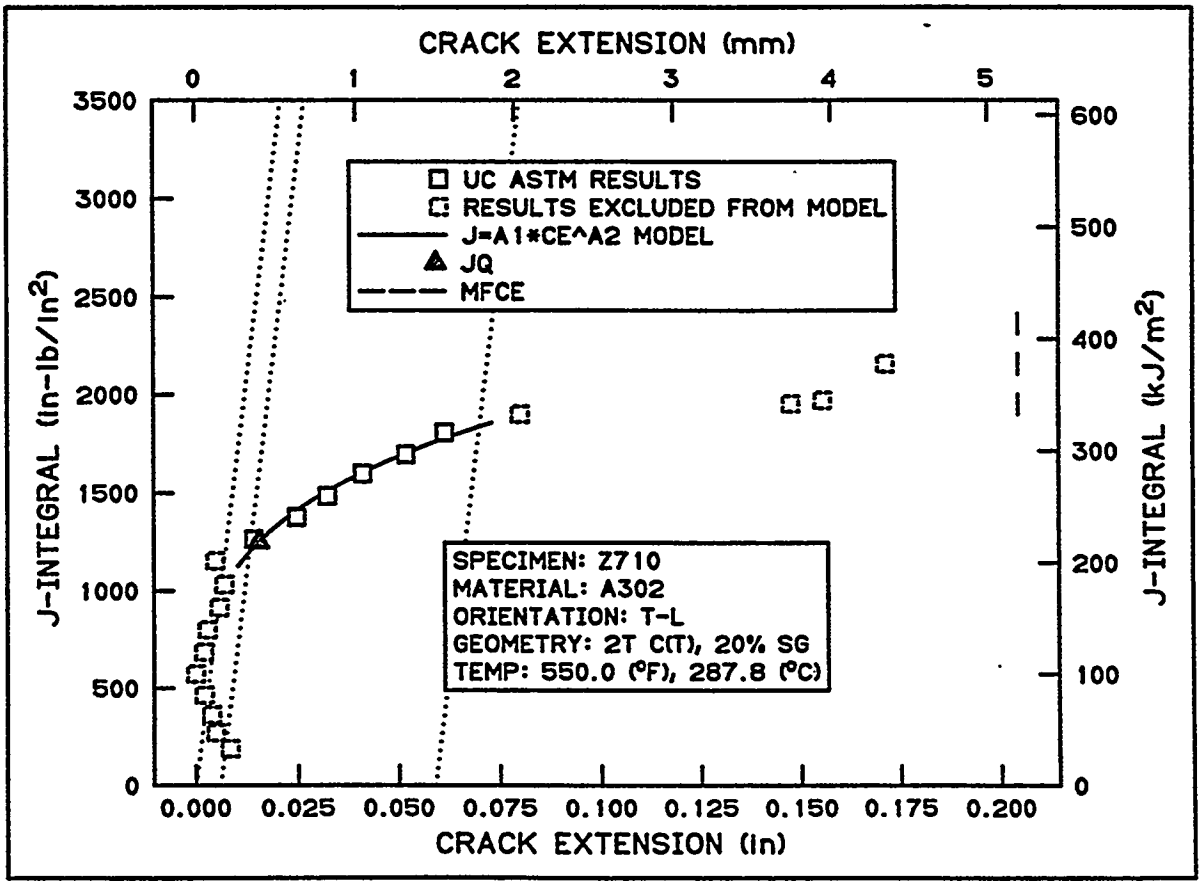

CRACK EXTENSION (mm)
0
1
2
3
4
5
3000
2500
2000
1500
1000
500
0
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z715
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z710
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4546 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18353	0.0218	0.0082	188.4
2	21247	0.0263	0.0048	270.5
3	23580	0.0306	0.0038	362.2
4	25529	0.0351	0.0021	463.3
5	27083	0.0395	0.0000	572.4
6	28285	0.0440	0.0020	684.3
7	29179	0.0485	0.0029	798.8
8	29900	0.0530	0.0058	914.5
9	30404	0.0574	0.0070	1031.8
10	30644	0.0617	0.0048	1154.0
11	30837	0.0663	0.0142	1263.6
12	30958	0.0709	0.0247	1375.7
13	30939	0.0752	0.0324	1483.9
14	30802	0.0798	0.0410	1598.4
15	30578	0.0841	0.0519	1694.9
16	30567	0.0887	0.0615	1808.0
17	30056	0.0930	0.0800	1900.1
18	29217	0.0975	0.1475	1953.3
19	26413	0.1029	0.1554	1971.0
20	27313	0.1090	0.1712	2156.3

WIDTH: 3.9993 (IN),101.580 (MM)
THICKNESS: 2.0030 (IN),50.876 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9992 (IN),25.380 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4495 (IN),87.617 (MM)
DISTANCE 2: 3.4633 (IN),87.968 (MM)
DISTANCE 3: 3.4707 (IN),88.156 (MM)
DISTANCE 4: 3.4738 (IN),88.235 (MM)
DISTANCE 5: 3.4590 (IN),87.859 (MM)
DISTANCE 6: 3.4446 (IN),87.493 (MM)
DISTANCE 7: 3.4388 (IN),87.346 (MM)
DISTANCE 8: 3.4367 (IN),87.292 (MM)
DISTANCE 9: 3.4367 (IN),87.292 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7614 (IN),95.540 (MM)
DISTANCE 2: 3.7288 (IN),94.712 (MM)
DISTANCE 3: 3.7040 (IN),94.082 (MM)
DISTANCE 4: 3.6728 (IN),93.289 (MM)
DISTANCE 5: 3.6230 (IN),92.024 (MM)
DISTANCE 6: 3.5967 (IN),91.356 (MM)
DISTANCE 7: 3.6058 (IN),91.587 (MM)
DISTANCE 8: 3.6230 (IN),92.024 (MM)
DISTANCE 9: 3.6630 (IN),93.040 (MM)

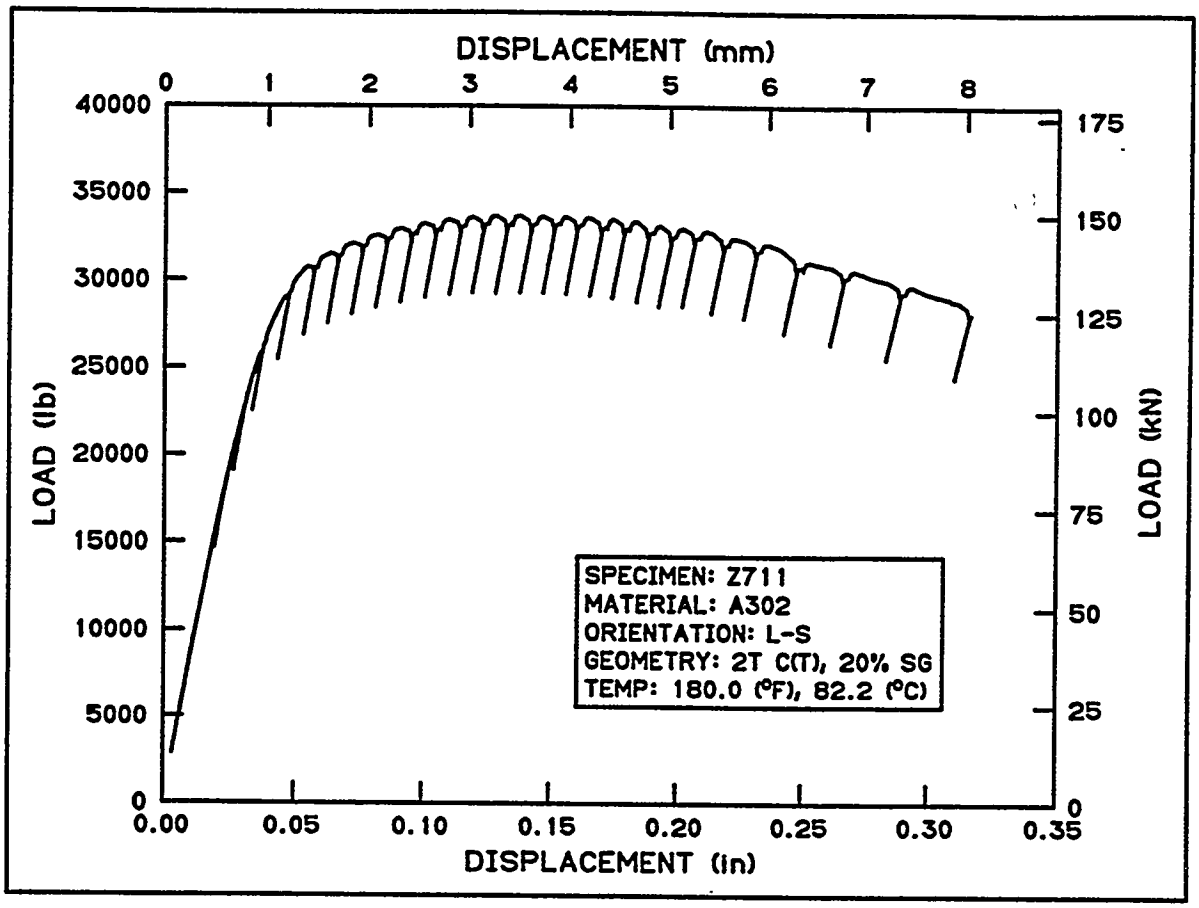

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
35000
30000
25000
20000
15000
10000
5000
0
150
125
100
75
50
25
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z710
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

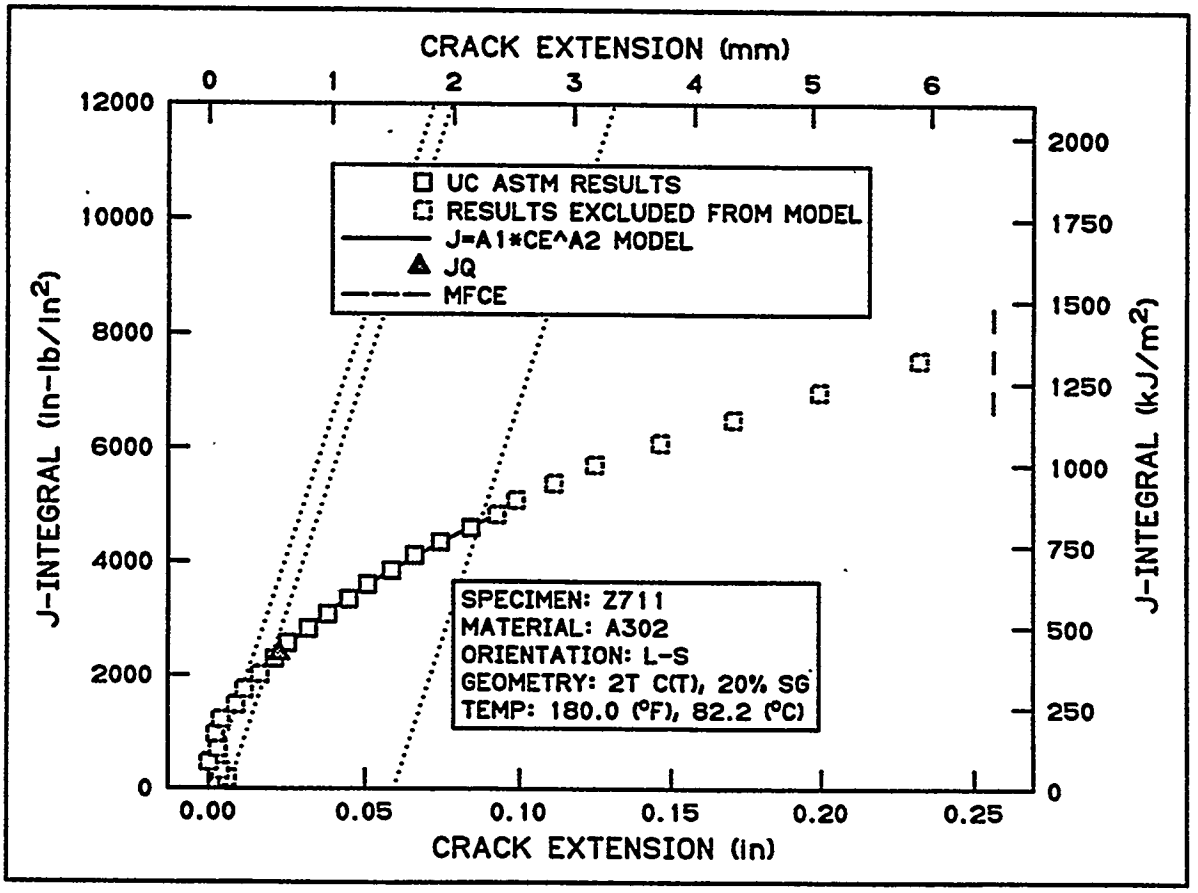

CRACK EXTENSION (mm)
0
1
2
3
4
5
3500
3000
2500
2000
1500
1000
500
0
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z710
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z711
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4675 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17594	0.0224	0.0058	187.4
2	22038	0.0293	0.0036	313.2
3	25609	0.0361	0.0000	467.8
4	28883	0.0454	0.0029	705.6
5	30732	0.0546	0.0022	968.6
6	31519	0.0637	0.0038	1223.0
7	32108	0.0726	0.0086	1483.2
8	32578	0.0822	0.0112	1749.6
9	32950	0.0912	0.0162	2016.2
10	33238	0.1007	0.0208	2288.3
11	33447	0.1101	0.0250	2569.3
12	33593	0.1195	0.0317	2821.9
13	33666	0.1287	0.0380	3078.3
14	33685	0.1377	0.0448	3345.4
15	33652	0.1465	0.0508	3601.8
16	33619	0.1560	0.0585	3851.5
17	33566	0.1655	0.0660	4117.3
18	33494	0.1746	0.0744	4350.7
19	33357	0.1838	0.0843	4604.1
20	33128	0.1932	0.0927	4840.2
21	32986	0.2022	0.0989	5097.4
22	32742	0.2136	0.1114	5387.8
23	32288	0.2266	0.1249	5712.9
24	31691	0.2424	0.1464	6088.8
25	30777	0.2617	0.1704	6502.9
26	29951	0.2844	0.1993	6985.7
27	28813	0.3116	0.2322	7542.7

  WIDTH: 3.9990 (IN),101.570 (MM)
  THICKNESS: 2.0015 (IN),50.838 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9998 (IN),25.395 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4466 (IN),87.544 (MM)
    DISTANCE 2: 3.4594 (IN),87.869 (MM)
    DISTANCE 3: 3.4670 (IN),88.062 (MM)
    DISTANCE 4: 3.4726 (IN),88.204 (MM)
    DISTANCE 5: 3.4750 (IN),88.265 (MM)
    DISTANCE 6: 3.4767 (IN),88.308 (MM)
    DISTANCE 7: 3.4738 (IN),88.235 (MM)
    DISTANCE 8: 3.4638 (IN),87.981 (MM)
    DISTANCE 9: 3.4530 (IN),87.706 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7930 (IN),96.342 (MM)
    DISTANCE 2: 3.7045 (IN),94.094 (MM)
    DISTANCE 3: 3.7075 (IN),94.171 (MM)
    DISTANCE 4: 3.7040 (IN),94.082 (MM)
    DISTANCE 5: 3.7280 (IN),94.691 (MM)
    DISTANCE 6: 3.7228 (IN),94.559 (MM)
    DISTANCE 7: 3.7244 (IN),94.600 (MM)
    DISTANCE 8: 3.7228 (IN),94.559 (MM)
    DISTANCE 9: 3.7528 (IN),95.321 (MM)

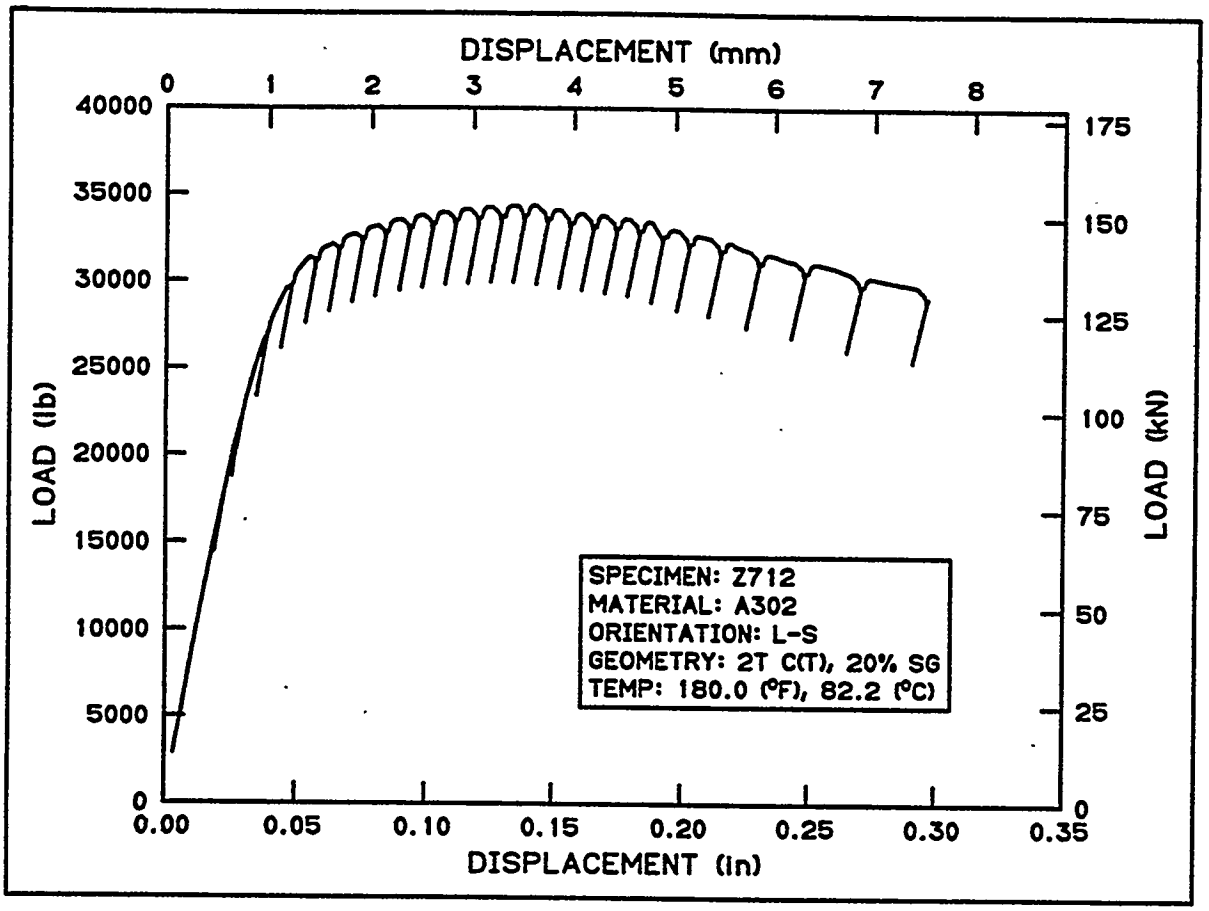

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z711
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

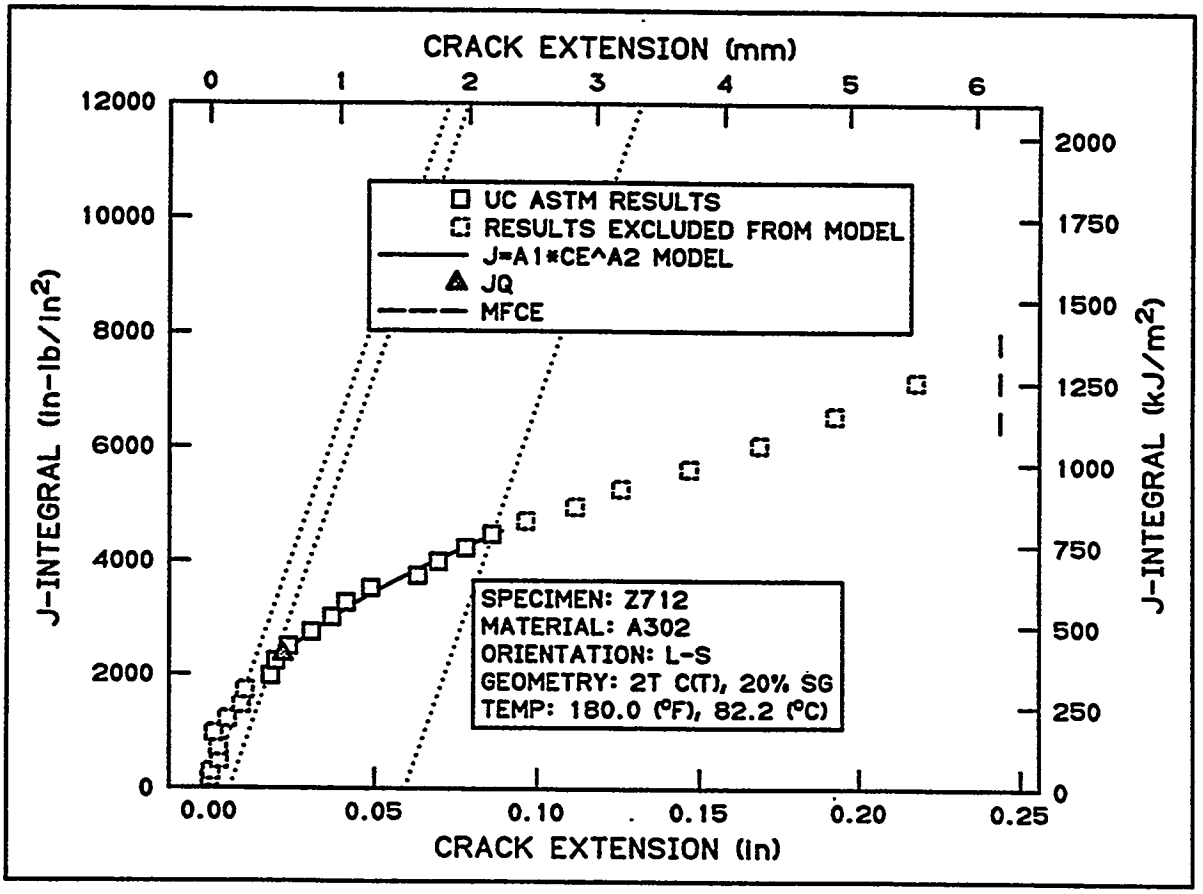

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
12000 10000 8000 6000 4000 2000 0
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z711
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z712
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4547 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17367	0.0218	0.0000	175.4
2	21801	0.0284	0.0004	291.4
3	26570	0.0373	0.0029	486.9
4	29591	0.0461	0.0026	717.0
5	31367	0.0549	0.0013	967.8
6	32140	0.0636	0.0053	1214.1
7	32736	0.0722	0.0095	1463.6
8	33196	0.0812	0.0106	1720.6
9	33550	0.0903	0.0184	1977.6
10	33785	0.0989	0.0200	2237.8
11	33973	0.1079	0.0238	2494.6
12	34137	0.1168	0.0307	2749.5
13	34235	0.1258	0.0369	3007.5
14	34318	0.1343	0.0412	3266.4
15	34327	0.1430	0.0487	3521.2
16	34080	0.1524	0.0630	3748.1
17	33886	0.1614	0.0693	3992.0
18	33782	0.1698	0.0777	4234.9
19	33622	0.1790	0.0859	4473.8
20	33420	0.1879	0.0964	4710.5
21	32935	0.1984	0.1116	4957.0
22	32492	0.2109	0.1254	5269.6
23	31795	0.2261	0.1466	5614.8
24	31159	0.2443	0.1686	6037.8
25	30468	0.2663	0.1921	6552.1
26	29771	0.2924	0.2175	7152.5

  WIDTH: 3.9990 (IN),101.570 (MM)
  THICKNESS: 2.0018 (IN),50.846 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9988 (IN),25.370 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4478 (IN),87.574 (MM)
    DISTANCE 2: 3.4556 (IN),87.772 (MM)
    DISTANCE 3: 3.4571 (IN),87.810 (MM)
    DISTANCE 4: 3.4598 (IN),87.879 (MM)
    DISTANCE 5: 3.4578 (IN),87.828 (MM)
    DISTANCE 6: 3.4576 (IN),87.823 (MM)
    DISTANCE 7: 3.4524 (IN),87.691 (MM)
    DISTANCE 8: 3.4476 (IN),87.569 (MM)
    DISTANCE 9: 3.4325 (IN),87.185 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7774 (IN),95.946 (MM)
    DISTANCE 2: 3.6479 (IN),92.657 (MM)
    DISTANCE 3: 3.6900 (IN),93.726 (MM)
    DISTANCE 4: 3.7150 (IN),94.361 (MM)
    DISTANCE 5: 3.7032 (IN),94.061 (MM)
    DISTANCE 6: 3.7026 (IN),94.046 (MM)
    DISTANCE 7: 3.6892 (IN),93.706 (MM)
    DISTANCE 8: 3.6648 (IN),93.086 (MM)
    DISTANCE 9: 3.7506 (IN),95.265 (MM)

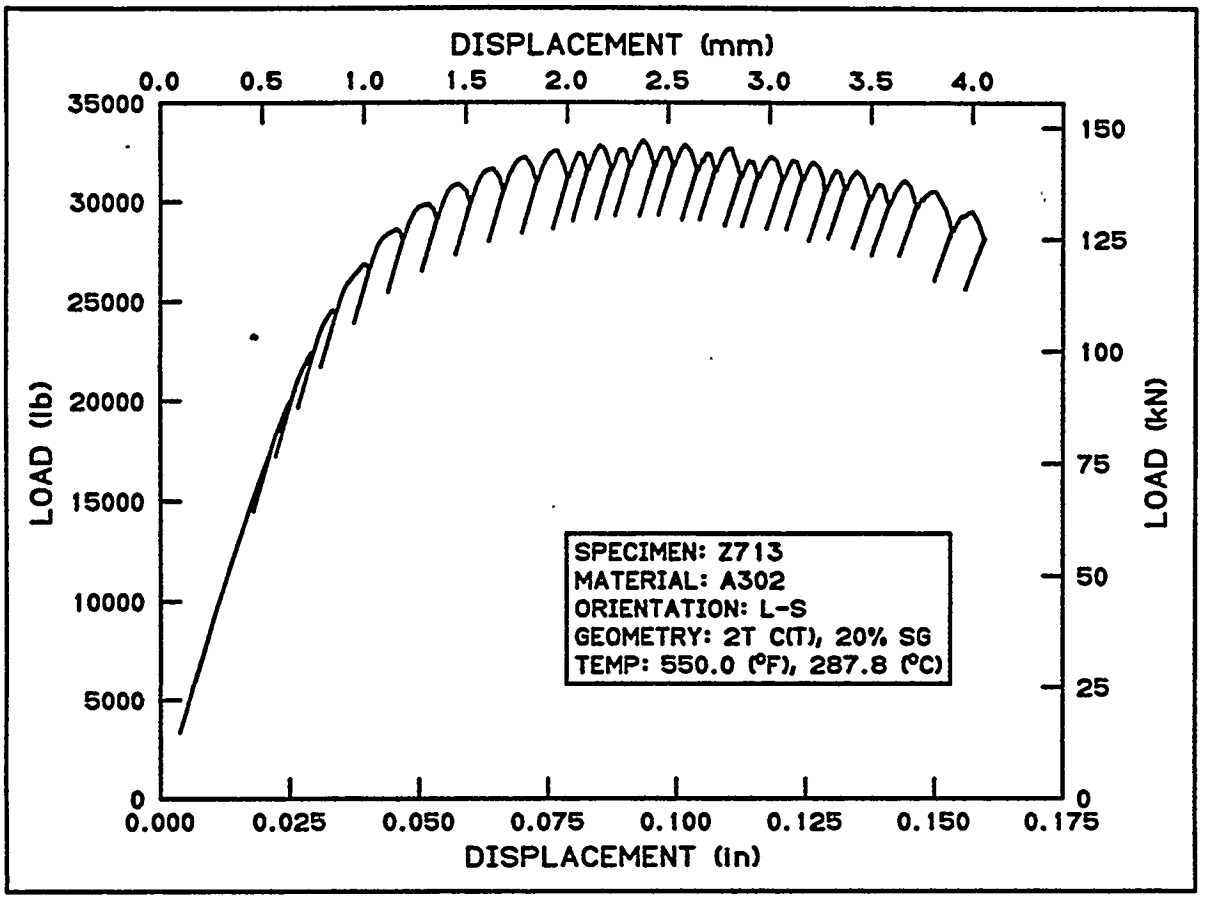

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z712
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

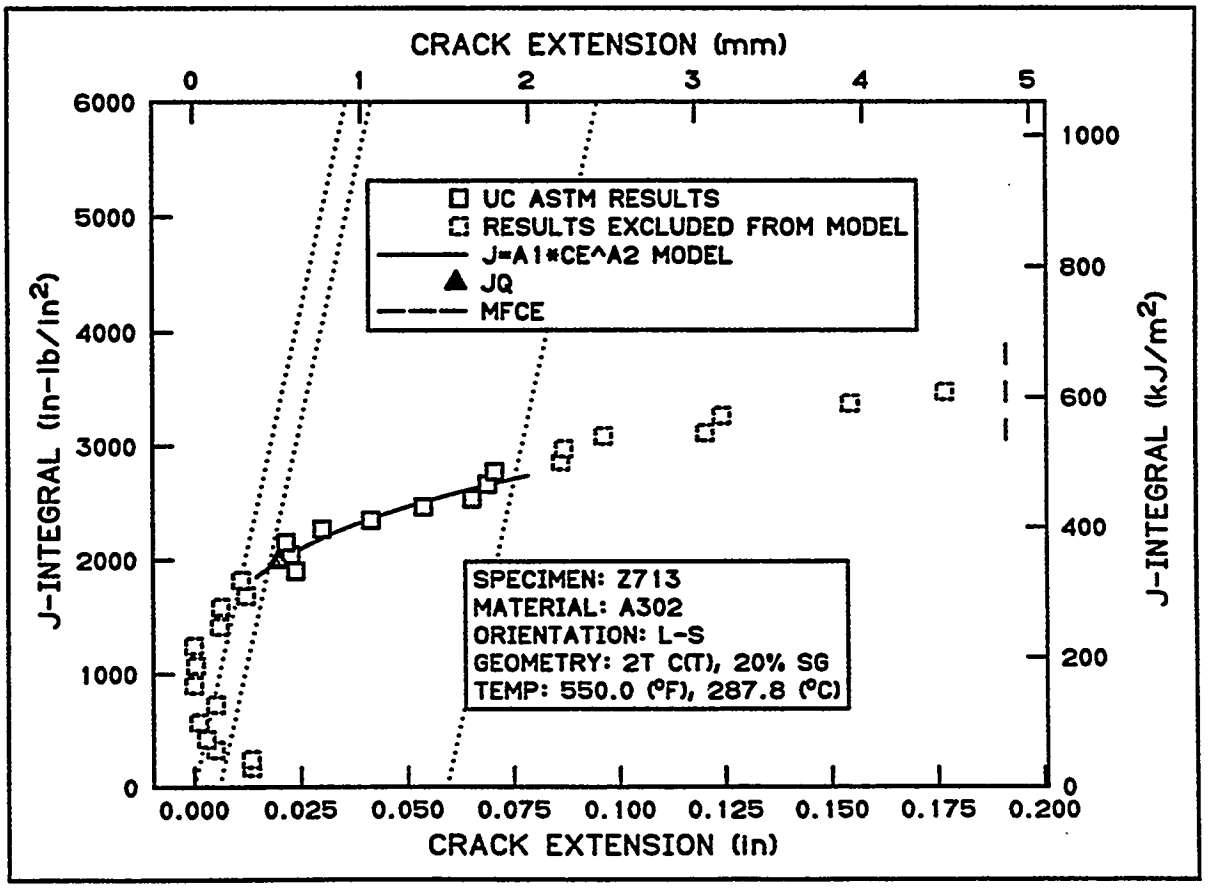

CRACK EXTENSION (mm)
0 1 2 3 4 5 6
12000 10000 8000 6000 4000 2000 0
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z712
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z713
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4654 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17012	0.0205	0.0135	170.0
2	19825	0.0247	0.0133	241.9
3	22371	0.0289	0.0050	327.4
4	24516	0.0331	0.0028	421.5
5	26849	0.0393	0.0012	570.3
6	28632	0.0456	0.0051	727.9
7	29880	0.0518	0.0000	899.9
8	30810	0.0580	0.0005	1070.7
9	31639	0.0644	0.0000	1246.5
10	32225	0.0706	0.0061	1417.5
11	32551	0.0768	0.0063	1586.2
12	32442	0.0810	0.0122	1686.6
13	32816	0.0851	0.0111	1819.2
14	32599	0.0893	0.0239	1904.1
15	33060	0.0935	0.0228	2044.4
16	32691	0.0975	0.0216	2153.6
17	32851	0.1018	0.0301	2271.8
18	32403	0.1059	0.0416	2349.7
19	32632	0.1100	0.0538	2466.2
20	31978	0.1142	0.0653	2536.9
21	32278	0.1183	0.0690	2666.8
22	32058	0.1225	0.0706	2775.1
23	31960	0.1266	0.0862	2863.1
24	31565	0.1309	0.0870	2973.0
25	31524	0.1350	0.0963	3086.2
26	30885	0.1392	0.1205	3115.1
27	31057	0.1442	0.1244	3265.3
28	30492	0.1503	0.1545	3372.2
29	29518	0.1574	0.1768	3473.9

  WIDTH: 3.9982 (IN),101.550 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9999 (IN),25.397 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4586 (IN),87.848 (MM)
    DISTANCE 2: 3.4660 (IN),88.036 (MM)
    DISTANCE 3: 3.4641 (IN),87.988 (MM)
    DISTANCE 4: 3.4660 (IN),88.036 (MM)
    DISTANCE 5: 3.4679 (IN),88.085 (MM)
    DISTANCE 6: 3.4658 (IN),88.031 (MM)
    DISTANCE 7: 3.4673 (IN),88.069 (MM)
    DISTANCE 8: 3.4648 (IN),88.006 (MM)
    DISTANCE 9: 3.4626 (IN),87.950 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7096 (IN),94.224 (MM)
    DISTANCE 2: 3.6130 (IN),91.770 (MM)
    DISTANCE 3: 3.6196 (IN),91.938 (MM)
    DISTANCE 4: 3.6560 (IN),92.862 (MM)
    DISTANCE 5: 3.6556 (IN),92.852 (MM)
    DISTANCE 6: 3.6571 (IN),92.890 (MM)
    DISTANCE 7: 3.6756 (IN),93.360 (MM)
    DISTANCE 8: 3.6731 (IN),93.297 (MM)
    DISTANCE 9: 3.6950 (IN),93.853 (MM)

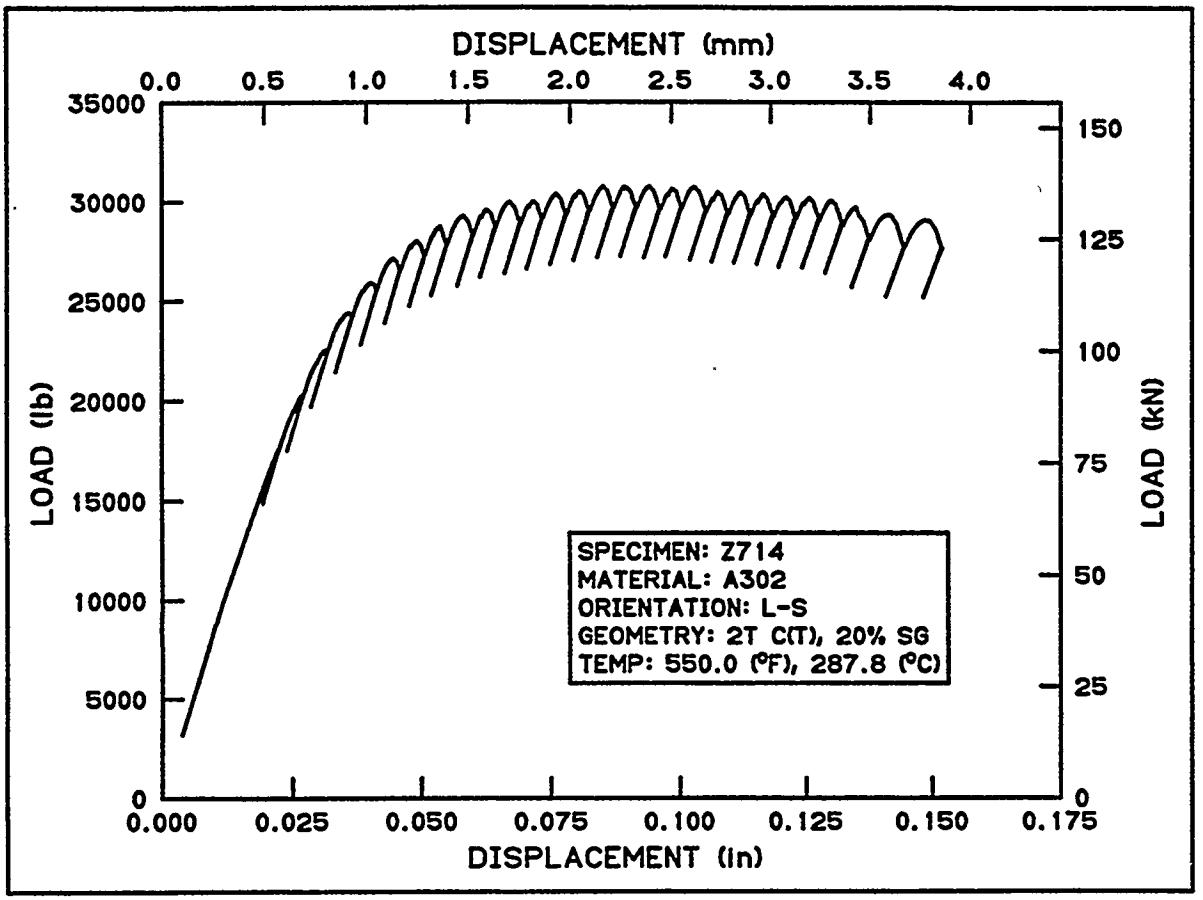

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z713
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

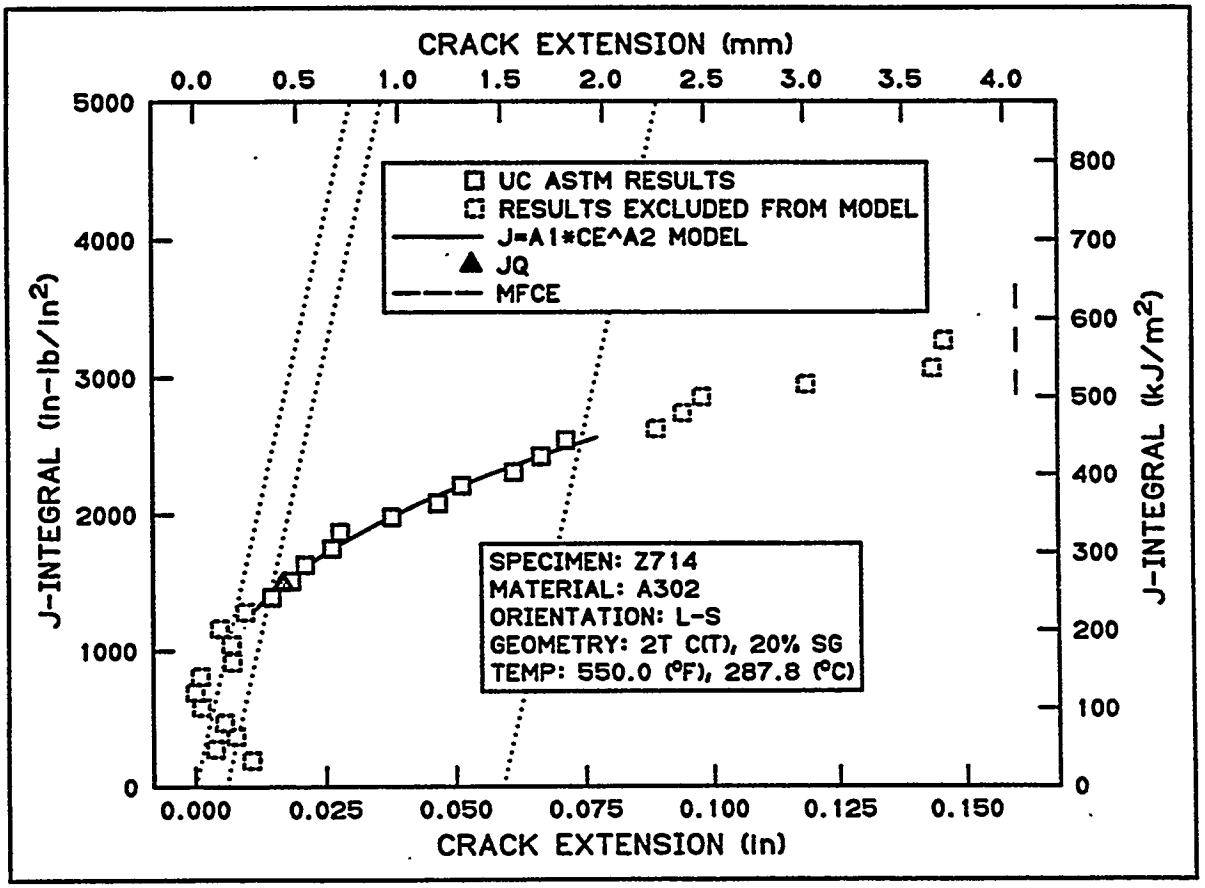

CRACK EXTENSION (mm)
0 1 2 3 4 5
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z713
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z714
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4956 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17177	0.0217	0.0107	193.4
2	20159	0.0265	0.0038	277.5
3	22498	0.0311	0.0077	369.3
4	24382	0.0355	0.0056	471.5
5	25918	0.0401	0.0012	583.5
6	27134	0.0445	0.0000	695.4
7	28011	0.0492	0.0010	810.8
8	28750	0.0537	0.0071	914.1
9	29277	0.0581	0.0069	1043.3
10	29581	0.0625	0.0047	1159.8
11	29985	0.0671	0.0096	1280.7
12	30014	0.0716	0.0147	1388.2
13	30391	0.0761	0.0185	1508.4
14	30517	0.0806	0.0212	1626.6
15	30760	0.0852	0.0263	1746.0
16	30706	0.0895	0.0279	1865.8
17	30757	0.0941	0.0378	1977.2
18	30618	0.0985	0.0468	2078.2
19	30725	0.1029	0.0513	2206.5
20	30459	0.1076	0.0614	2305.1
21	30456	0.1121	0.0666	2419.0
22	30346	0.1166	0.0714	2534.6
23	30210	0.1210	0.0888	2617.9
24	30181	0.1256	0.0940	2735.8
25	30056	0.1299	0.0979	2855.0
26	29307	0.1354	0.1185	2947.9
27	29321	0.1418	0.1435	3063.9
28	29018	0.1495	0.1458	3269.9

WIDTH: 3.9984 (IN),101.560 (MM)
THICKNESS: 2.0030 (IN),50.876 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0002 (IN),25.405 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4750 (IN),88.265 (MM)
DISTANCE 2: 3.4920 (IN),88.697 (MM)
DISTANCE 3: 3.5034 (IN),88.986 (MM)
DISTANCE 4: 3.5074 (IN),89.088 (MM)
DISTANCE 5: 3.5066 (IN),89.068 (MM)
DISTANCE 6: 3.5042 (IN),89.007 (MM)
DISTANCE 7: 3.4960 (IN),88.798 (MM)
DISTANCE 8: 3.4806 (IN),88.407 (MM)
DISTANCE 9: 3.4773 (IN),88.323 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.6770 (IN),93.396 (MM)
DISTANCE 2: 3.6425 (IN),92.519 (MM)
DISTANCE 3: 3.6468 (IN),92.629 (MM)
DISTANCE 4: 3.6494 (IN),92.695 (MM)
DISTANCE 5: 3.6554 (IN),92.847 (MM)
DISTANCE 6: 3.6582 (IN),92.918 (MM)
DISTANCE 7: 3.6406 (IN),92.471 (MM)
DISTANCE 8: 3.6712 (IN),93.248 (MM)
DISTANCE 9: 3.6852 (IN),93.604 (MM)

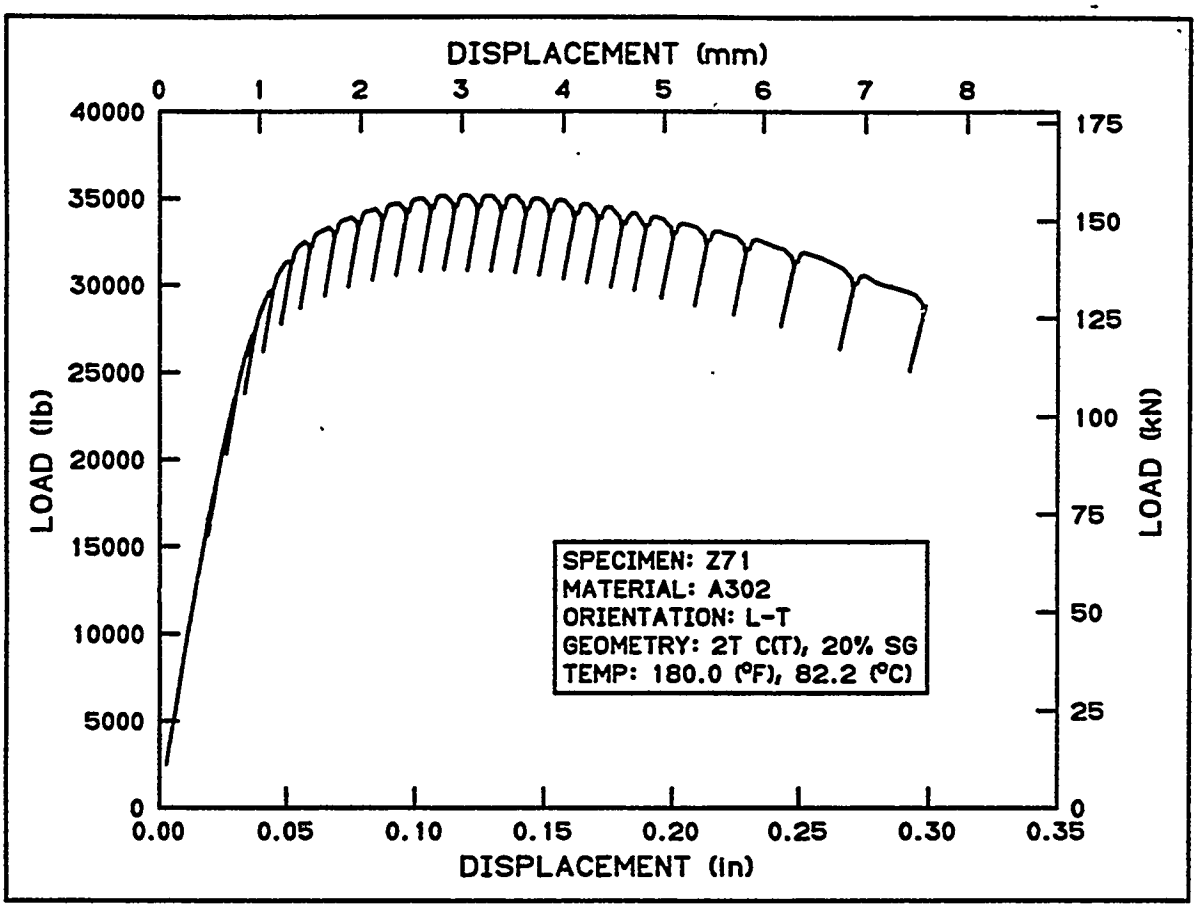

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z714
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

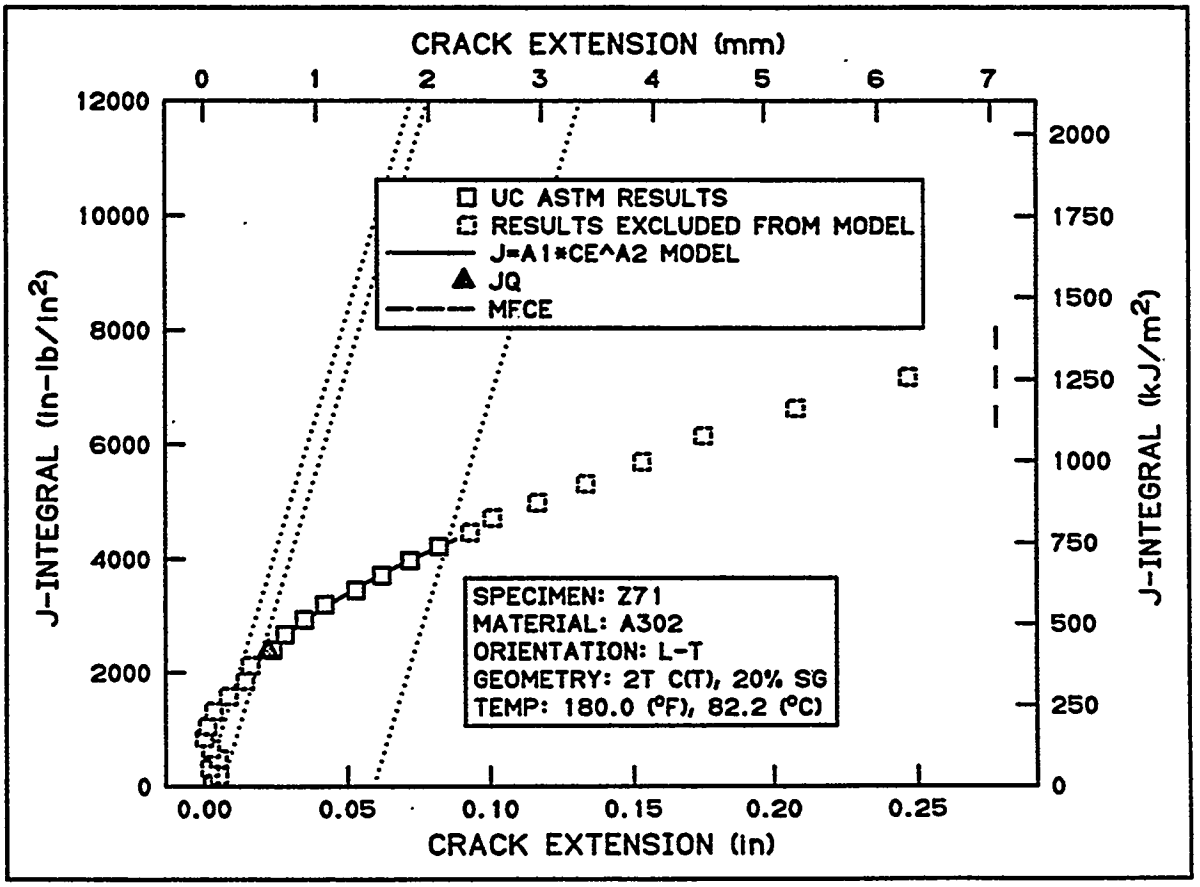

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
800 700 600 500 400 300 200 100 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z714
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z71
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4353 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18677	0.0226	0.0051	193.3
2	23405	0.0295	0.0020	324.1
3	26989	0.0362	0.0050	480.0
4	29573	0.0430	0.0024	658.6
5	31336	0.0498	0.0000	849.5
6	32489	0.0570	0.0011	1054.1
7	33307	0.0662	0.0035	1319.7
8	33899	0.0752	0.0084	1581.2
9	34357	0.0846	0.0143	1852.1
10	34669	0.0935	0.0161	2125.8
11	34949	0.1030	0.0240	2396.2
12	35094	0.1119	0.0283	2668.0
13	35122	0.1212	0.0351	2931.7
14	35113	0.1301	0.0422	3194.6
15	35107	0.1393	0.0530	3452.6
16	34943	0.1489	0.0621	3712.8
17	34835	0.1582	0.0720	3973.7
18	34649	0.1672	0.0821	4222.0
19	34466	0.1761	0.0930	4469.0
20	34142	0.1859	0.1009	4722.3
21	33806	0.1966	0.1164	4986.1
22	33339	0.2097	0.1334	5313.2
23	32789	0.2253	0.1532	5692.3
24	32075	0.2444	0.1748	6150.7
25	30985	0.2669	0.2079	6634.4
26	29468	0.2946	0.2468	7176.2

  WIDTH: 3.9990 (IN),101.570 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9988 (IN),25.370 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4536 (IN),87.721 (MM)
    DISTANCE 2: 3.4658 (IN),88.031 (MM)
    DISTANCE 3: 3.4564 (IN),87.793 (MM)
    DISTANCE 4: 3.4472 (IN),87.559 (MM)
    DISTANCE 5: 3.4307 (IN),87.140 (MM)
    DISTANCE 6: 3.4134 (IN),86.700 (MM)
    DISTANCE 7: 3.4109 (IN),86.637 (MM)
    DISTANCE 8: 3.4150 (IN),86.741 (MM)
    DISTANCE 9: 3.4134 (IN),86.700 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8156 (IN),96.916 (MM)
    DISTANCE 2: 3.7279 (IN),94.689 (MM)
    DISTANCE 3: 3.7284 (IN),94.701 (MM)
    DISTANCE 4: 3.7188 (IN),94.458 (MM)
    DISTANCE 5: 3.6987 (IN),93.947 (MM)
    DISTANCE 6: 3.7082 (IN),94.188 (MM)
    DISTANCE 7: 3.6714 (IN),93.254 (MM)
    DISTANCE 8: 3.6447 (IN),92.575 (MM)
    DISTANCE 9: 3.7745 (IN),95.872 (MM)

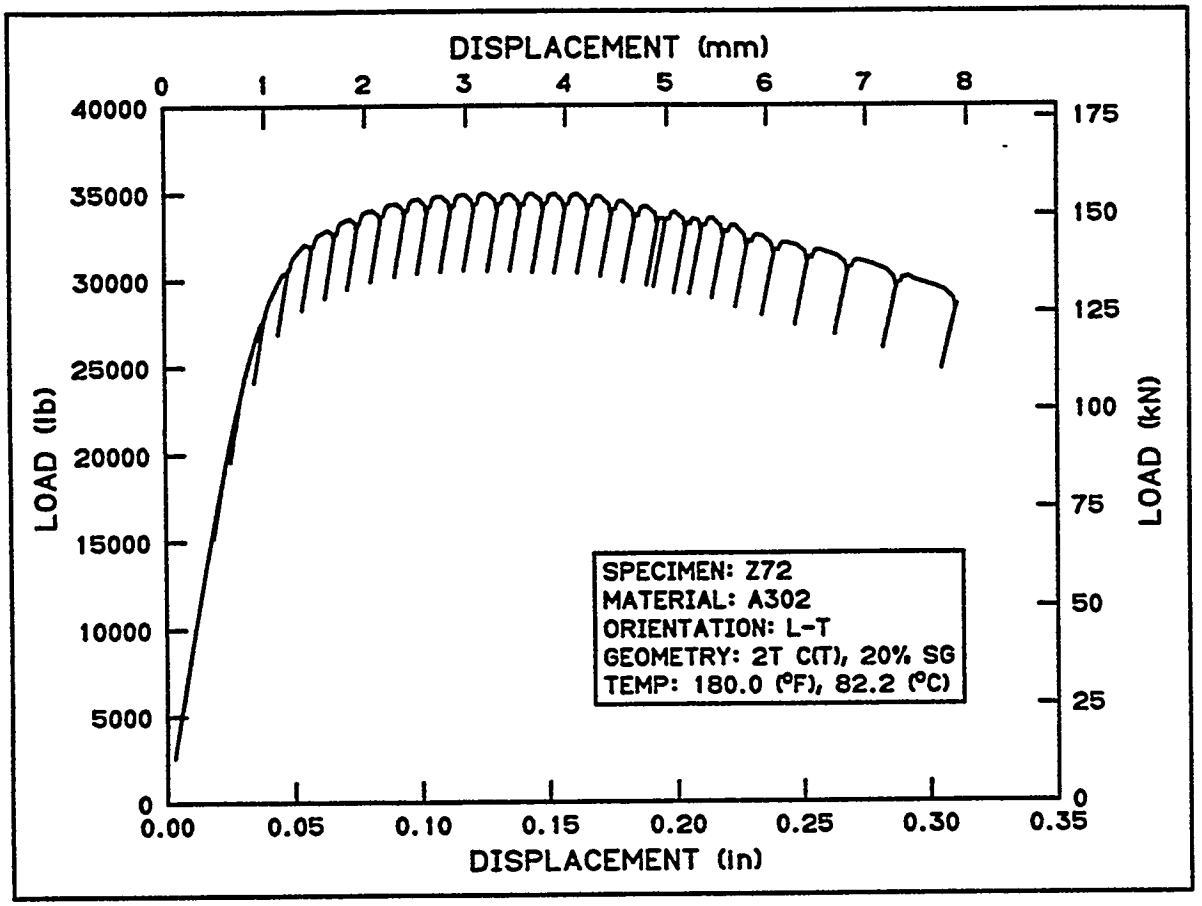

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

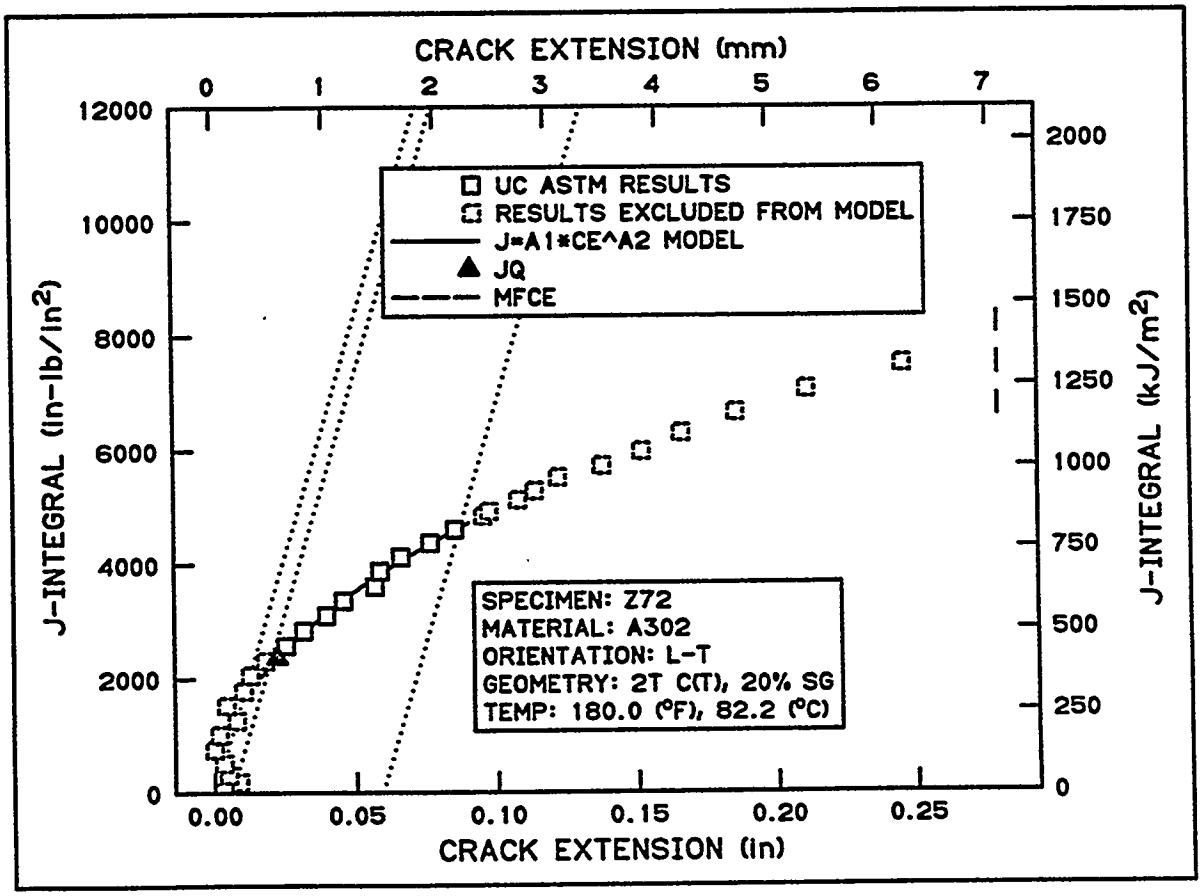

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7
12000 10000 8000 6000 4000 2000 0
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z72
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4421 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18146	0.0219	0.0087	185.9
2	22672	0.0285	0.0048	309.8
3	27320	0.0373	0.0032	515.1
4	30345	0.0463	0.0000	754.6
5	32068	0.0548	0.0017	1009.6
6	32907	0.0639	0.0078	1259.9
7	33535	0.0728	0.0043	1523.9
8	34012	0.0815	0.0103	1781.2
9	34399	0.0908	0.0128	2056.2
10	34648	0.0996	0.0180	2313.0
11	34783	0.1087	0.0252	2573.0
12	34884	0.1177	0.0315	2834.9
13	34917	0.1268	0.0396	3100.5
14	34893	0.1358	0.0458	3356.0
15	34942	0.1444	0.0569	3602.5
16	34893	0.1535	0.0588	3868.5
17	34883	0.1623	0.0661	4119.8
18	34744	0.1711	0.0765	4362.3
19	34481	0.1797	0.0853	4600.4
20	34163	0.1890	0.0954	4839.3
21	33468	0.1948	0.0974	4918.7
22	33881	0.1998	0.1078	5122.9
23	33476	0.2067	0.1138	5281.2
24	33512	0.2146	0.1223	5512.7
25	33098	0.2235	0.1379	5717.5
26	32480	0.2347	0.1518	5971.3
27	31932	0.2483	0.1659	6296.4
28	31342	0.2641	0.1852	6655.1
29	30549	0.2833	0.2110	7060.1
30	29326	0.3065	0.2453	7494.5

  WIDTH: 4.0002 (IN),101.610 (MM)
  THICKNESS: 2.0018 (IN),50.846 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9992 (IN),25.380 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4616 (IN),87.925 (MM)
    DISTANCE 2: 3.4815 (IN),88.430 (MM)
    DISTANCE 3: 3.4652 (IN),88.016 (MM)
    DISTANCE 4: 3.4470 (IN),87.554 (MM)
    DISTANCE 5: 3.4354 (IN),87.259 (MM)
    DISTANCE 6: 3.4214 (IN),86.904 (MM)
    DISTANCE 7: 3.4152 (IN),86.746 (MM)
    DISTANCE 8: 3.4223 (IN),86.926 (MM)
    DISTANCE 9: 3.4232 (IN),86.949 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8471 (IN),97.716 (MM)
    DISTANCE 2: 3.7036 (IN),94.071 (MM)
    DISTANCE 3: 3.7254 (IN),94.625 (MM)
    DISTANCE 4: 3.7256 (IN),94.630 (MM)
    DISTANCE 5: 3.7204 (IN),94.498 (MM)
    DISTANCE 6: 3.7180 (IN),94.437 (MM)
    DISTANCE 7: 3.6801 (IN),93.475 (MM)
    DISTANCE 8: 3.6784 (IN),93.431 (MM)
    DISTANCE 9: 3.7764 (IN),95.921 (MM)

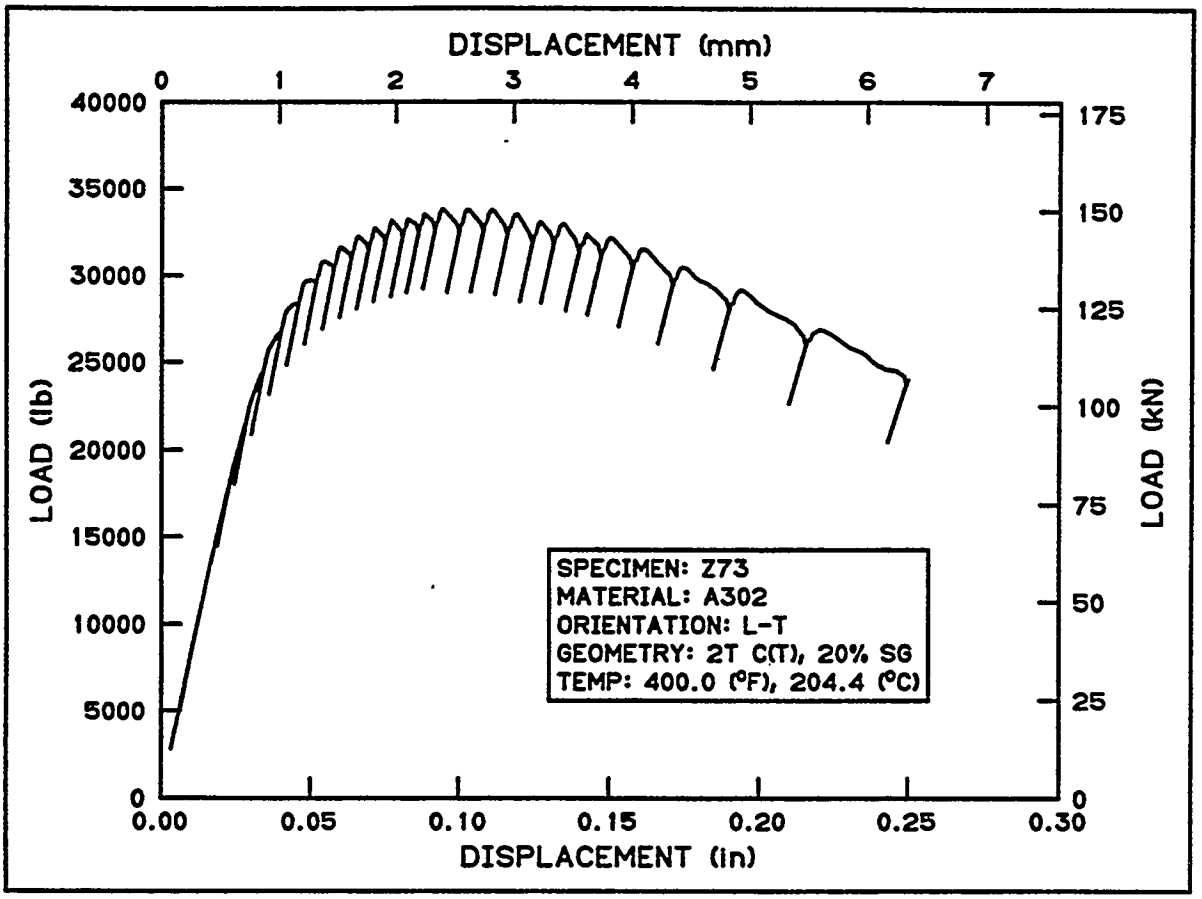

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
DISPLACEMENT (in)
SPECIMEN: Z72
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

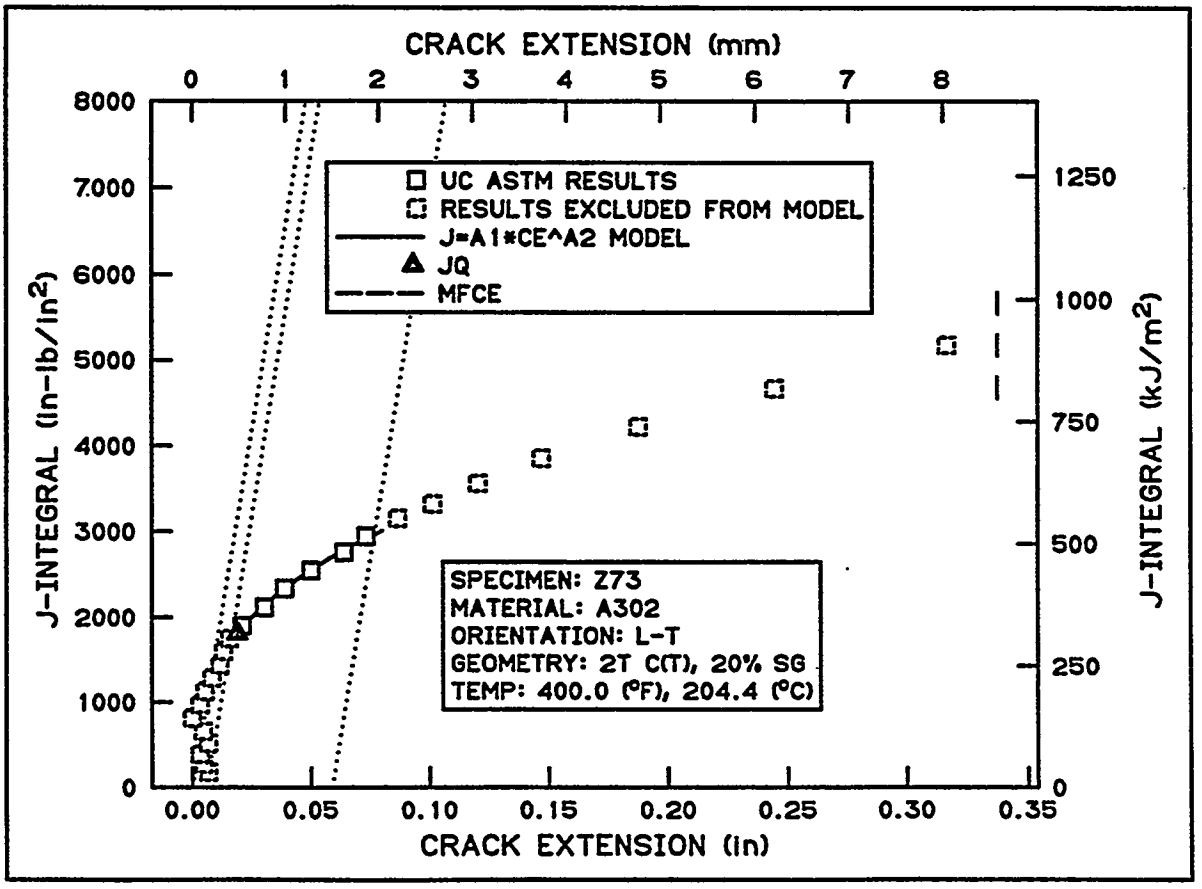

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7
12000 10000 8000 6000 4000 2000 0
J-INTEGRAL (in-lb/in²)
2000 1750 1500 1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
0.00 0.05 0.10 0.15 0.20 0.25
CRACK EXTENSION (in)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z72
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)

SPECIMEN
  IDENTIFICATION: Z73
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4381 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17340	0.0216	0.0066	174.9
2	21089	0.0273	0.0046	271.6
3	24113	0.0328	0.0031	386.8
4	26466	0.0384	0.0066	514.8
5	28282	0.0439	0.0045	656.9
6	29710	0.0494	0.0000	812.5
7	30792	0.0551	0.0032	969.2
8	31610	0.0604	0.0053	1126.9
9	32236	0.0662	0.0082	1282.3
10	32703	0.0718	0.0116	1434.8
11	33122	0.0774	0.0130	1596.9
12	33208	0.0827	0.0155	1748.9
13	33517	0.0883	0.0209	1898.2
14	33589	0.0958	0.0303	2116.4
15	33734	0.1033	0.0388	2332.1
16	33681	0.1114	0.0501	2541.8
17	33462	0.1194	0.0641	2754.2
18	33050	0.1271	0.0733	2940.7
19	32923	0.1351	0.0866	3150.3
20	32334	0.1425	0.1012	3317.7
21	31736	0.1531	0.1202	3561.8
22	30671	0.1668	0.1469	3854.1
23	29075	0.1861	0.1873	4221.1
24	27175	0.2116	0.2444	4666.7
25	24509	0.2461	0.3165	5175.0

  WIDTH: 3.9980 (IN),101.550 (MM)
  THICKNESS: 2.0020 (IN),50.851 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0000 (IN),25.400 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4423 (IN),87.434 (MM)
    DISTANCE 2: 3.4441 (IN),87.480 (MM)
    DISTANCE 3: 3.4468 (IN),87.549 (MM)
    DISTANCE 4: 3.4440 (IN),87.478 (MM)
    DISTANCE 5: 3.4399 (IN),87.373 (MM)
    DISTANCE 6: 3.4336 (IN),87.213 (MM)
    DISTANCE 7: 3.4296 (IN),87.112 (MM)
    DISTANCE 8: 3.4303 (IN),87.130 (MM)
    DISTANCE 9: 3.4309 (IN),87.145 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.9097 (IN),99.306 (MM)
    DISTANCE 2: 3.7957 (IN),96.411 (MM)
    DISTANCE 3: 3.7748 (IN),95.880 (MM)
    DISTANCE 4: 3.7812 (IN),96.042 (MM)
    DISTANCE 5: 3.7585 (IN),95.466 (MM)
    DISTANCE 6: 3.7518 (IN),95.296 (MM)
    DISTANCE 7: 3.7322 (IN),94.798 (MM)
    DISTANCE 8: 3.7540 (IN),95.352 (MM)
    DISTANCE 9: 3.7989 (IN),96.492 (MM)

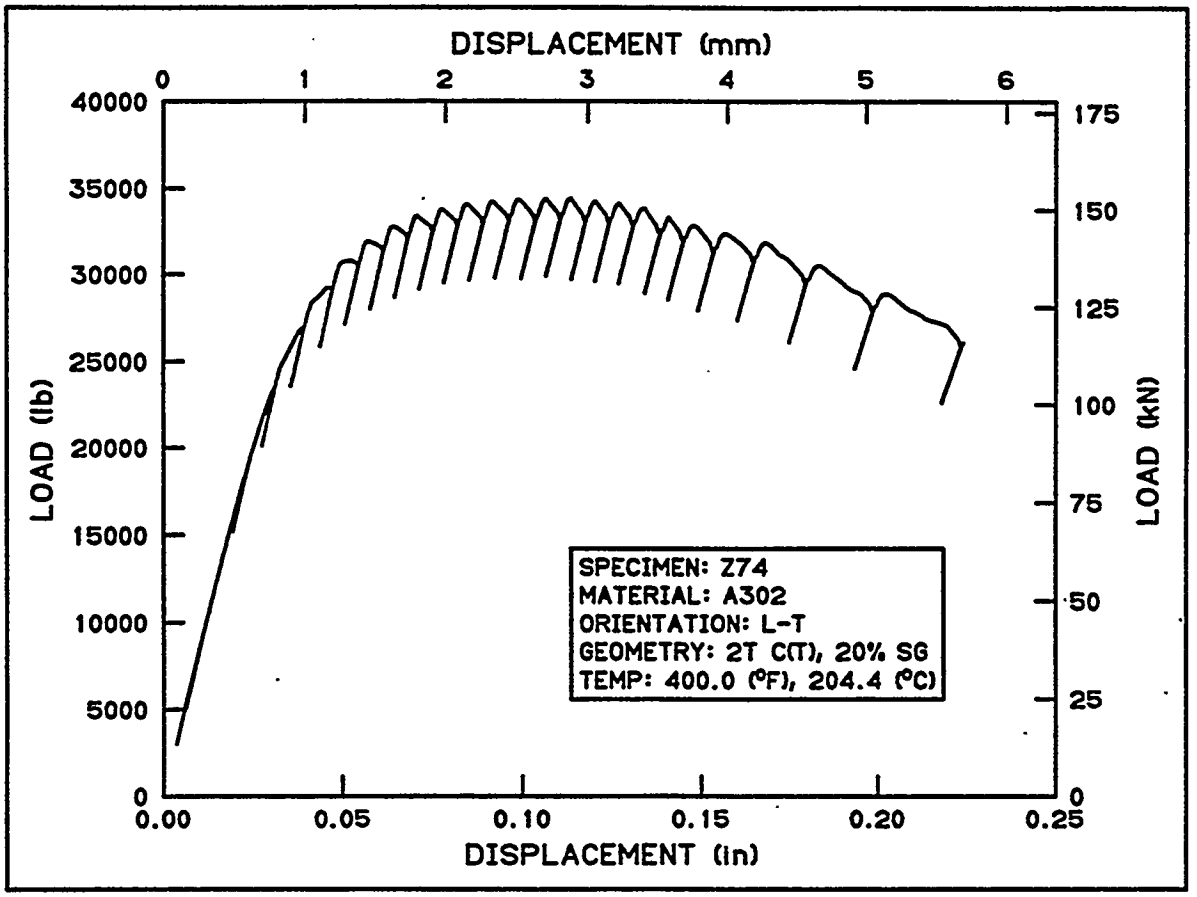

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7
40000 35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
175 150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z73
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30
DISPLACEMENT (in)

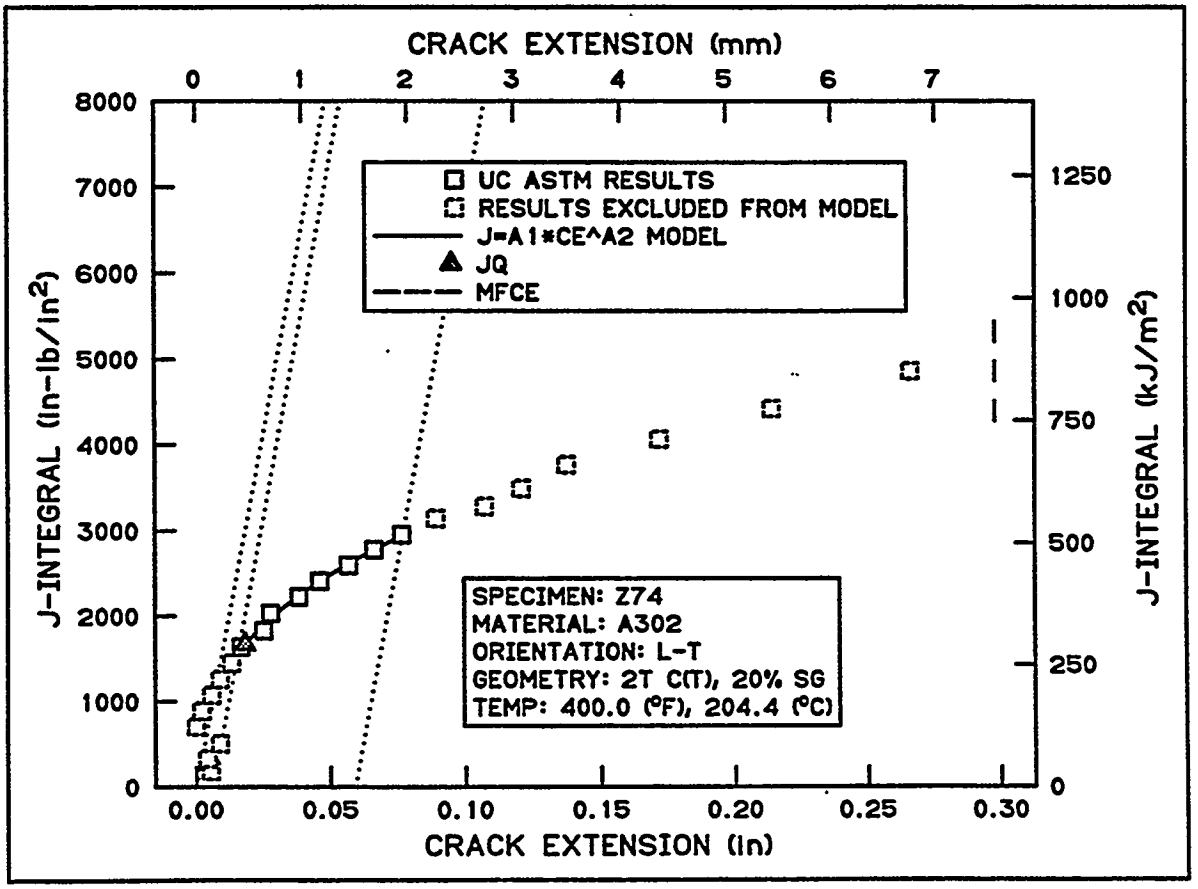

CRACK EXTENSION (mm)
0 1 2 3 4 5 6 7 8
8000 7000 6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
1250 1000 750 500 250 0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z73
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z74
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4200 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18093	0.0220	0.0052	182.8
2	23142	0.0299	0.0041	326.4
3	26770	0.0378	0.0086	501.2
4	29237	0.0456	0.0000	704.3
5	30792	0.0523	0.0019	886.8
6	31772	0.0590	0.0056	1071.1
7	32590	0.0656	0.0088	1256.8
8	33151	0.0720	0.0129	1447.3
9	33550	0.0790	0.0165	1637.0
10	33821	0.0860	0.0249	1827.5
11	33976	0.0931	0.0276	2032.0
12	34217	0.1000	0.0383	2226.0
13	34393	0.1064	0.0461	2410.1
14	34422	0.1132	0.0568	2594.5
15	34235	0.1204	0.0663	2775.3
16	34118	0.1272	0.0766	2951.7
17	33815	0.1342	0.0891	3138.5
18	33285	0.1408	0.1070	3278.4
19	32684	0.1491	0.1207	3487.2
20	31771	0.1612	0.1371	3762.1
21	30533	0.1759	0.1719	4057.5
22	28889	0.1950	0.2138	4418.9
23	26995	0.2199	0.2663	4856.7

  WIDTH: 3.9987 (IN),101.570 (MM)
  THICKNESS: 2.0028 (IN),50.871 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0004 (IN),25.410 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4284 (IN),87.081 (MM)
    DISTANCE 2: 3.4357 (IN),87.267 (MM)
    DISTANCE 3: 3.4314 (IN),87.158 (MM)
    DISTANCE 4: 3.4229 (IN),86.942 (MM)
    DISTANCE 5: 3.4124 (IN),86.675 (MM)
    DISTANCE 6: 3.4005 (IN),86.373 (MM)
    DISTANCE 7: 3.4063 (IN),86.520 (MM)
    DISTANCE 8: 3.4254 (IN),87.005 (MM)
    DISTANCE 9: 3.4292 (IN),87.102 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8563 (IN),97.950 (MM)
    DISTANCE 2: 3.7133 (IN),94.318 (MM)
    DISTANCE 3: 3.7396 (IN),94.986 (MM)
    DISTANCE 4: 3.7272 (IN),94.671 (MM)
    DISTANCE 5: 3.7418 (IN),95.042 (MM)
    DISTANCE 6: 3.7050 (IN),94.107 (MM)
    DISTANCE 7: 3.6650 (IN),93.091 (MM)
    DISTANCE 8: 3.6579 (IN),92.911 (MM)
    DISTANCE 9: 3.7368 (IN),94.915 (MM)

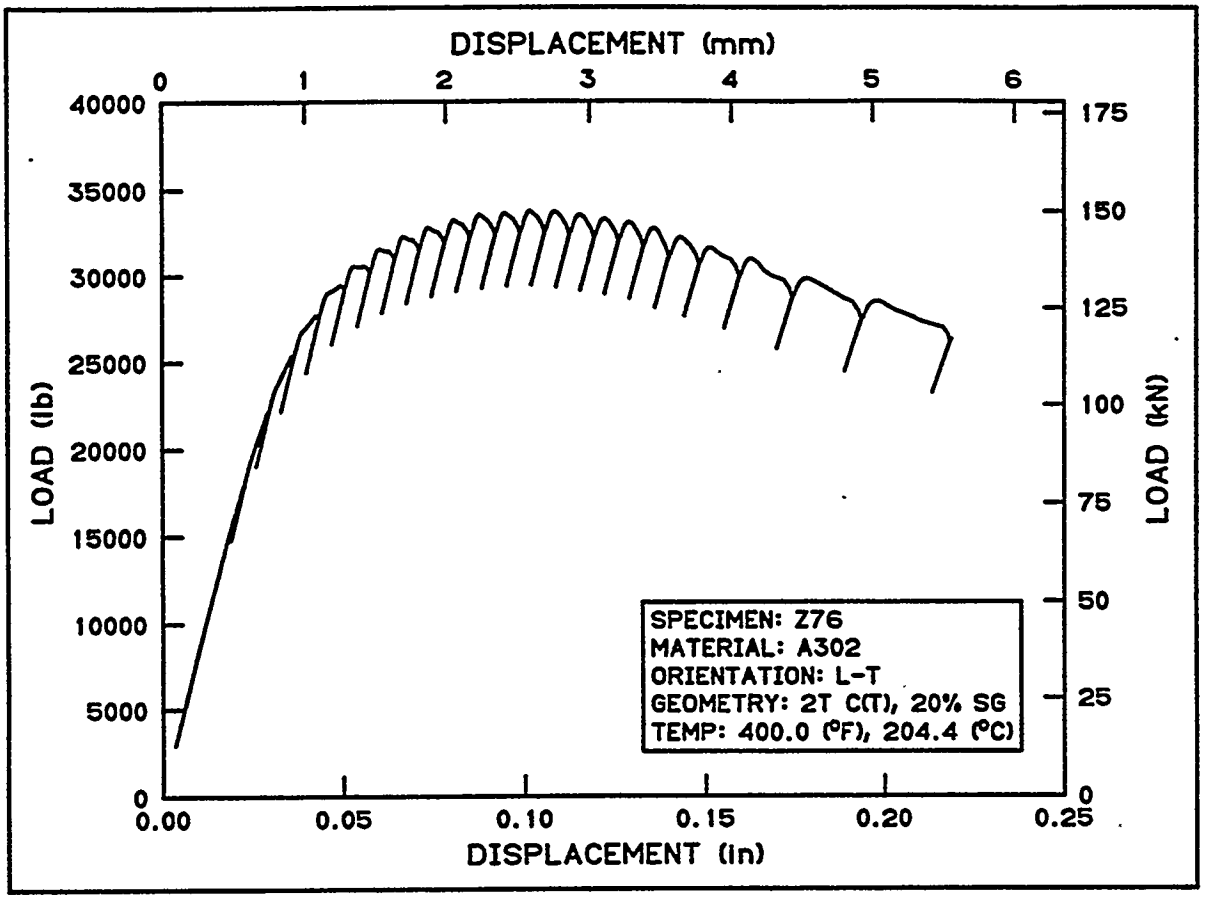

DISPLACEMENT (mm)
0
1
2
3
4
5
6
40000
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
175
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z74
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

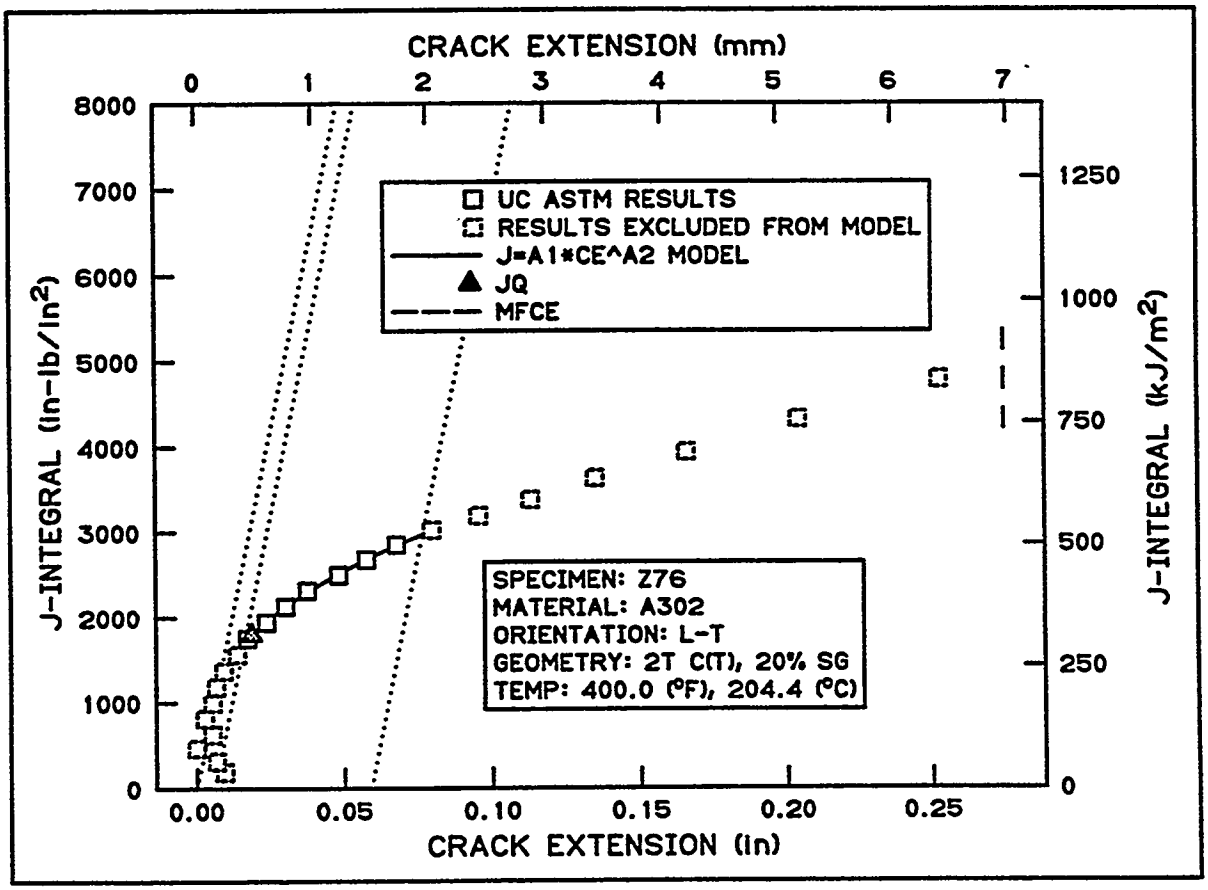

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
SPECIMEN: Z74
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z76
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4450 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17757	0.0222	0.0095	190.3
2	22036	0.0289	0.0068	315.0
3	25314	0.0356	0.0000	464.1
4	27704	0.0424	0.0053	626.3
5	29456	0.0492	0.0028	808.1
6	30593	0.0561	0.0054	993.9
7	31459	0.0629	0.0067	1181.9
8	32101	0.0696	0.0092	1370.2
9	32563	0.0765	0.0139	1561.7
10	32971	0.0831	0.0173	1752.7
11	33218	0.0899	0.0238	1941.5
12	33301	0.0968	0.0303	2128.8
13	33447	0.1035	0.0376	2316.6
14	33450	0.1102	0.0483	2496.3
15	33294	0.1169	0.0578	2674.7
16	33101	0.1235	0.0682	2847.4
17	32953	0.1302	0.0801	3020.8
18	32520	0.1373	0.0957	3186.5
19	31745	0.1460	0.1131	3376.4
20	30911	0.1573	0.1349	3628.3
21	29718	0.1720	0.1659	3938.1
22	28459	0.1912	0.2041	4322.1
23	26977	0.2164	0.2525	4782.5

  WIDTH: 3.9978 (IN),101.540 (MM)
  THICKNESS: 2.0012 (IN),50.830 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9999 (IN),25.397 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4358 (IN),87.269 (MM)
    DISTANCE 2: 3.4480 (IN),87.579 (MM)
    DISTANCE 3: 3.4487 (IN),87.597 (MM)
    DISTANCE 4: 3.4494 (IN),87.615 (MM)
    DISTANCE 5: 3.4448 (IN),87.498 (MM)
    DISTANCE 6: 3.4406 (IN),87.391 (MM)
    DISTANCE 7: 3.4436 (IN),87.467 (MM)
    DISTANCE 8: 3.4451 (IN),87.506 (MM)
    DISTANCE 9: 3.4425 (IN),87.440 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.8376 (IN),97.475 (MM)
    DISTANCE 2: 3.7164 (IN),94.397 (MM)
    DISTANCE 3: 3.7361 (IN),94.897 (MM)
    DISTANCE 4: 3.7054 (IN),94.117 (MM)
    DISTANCE 5: 3.6977 (IN),93.922 (MM)
    DISTANCE 6: 3.7020 (IN),94.031 (MM)
    DISTANCE 7: 3.6952 (IN),93.858 (MM)
    DISTANCE 8: 3.6998 (IN),93.975 (MM)
    DISTANCE 9: 3.7664 (IN),95.667 (MM)

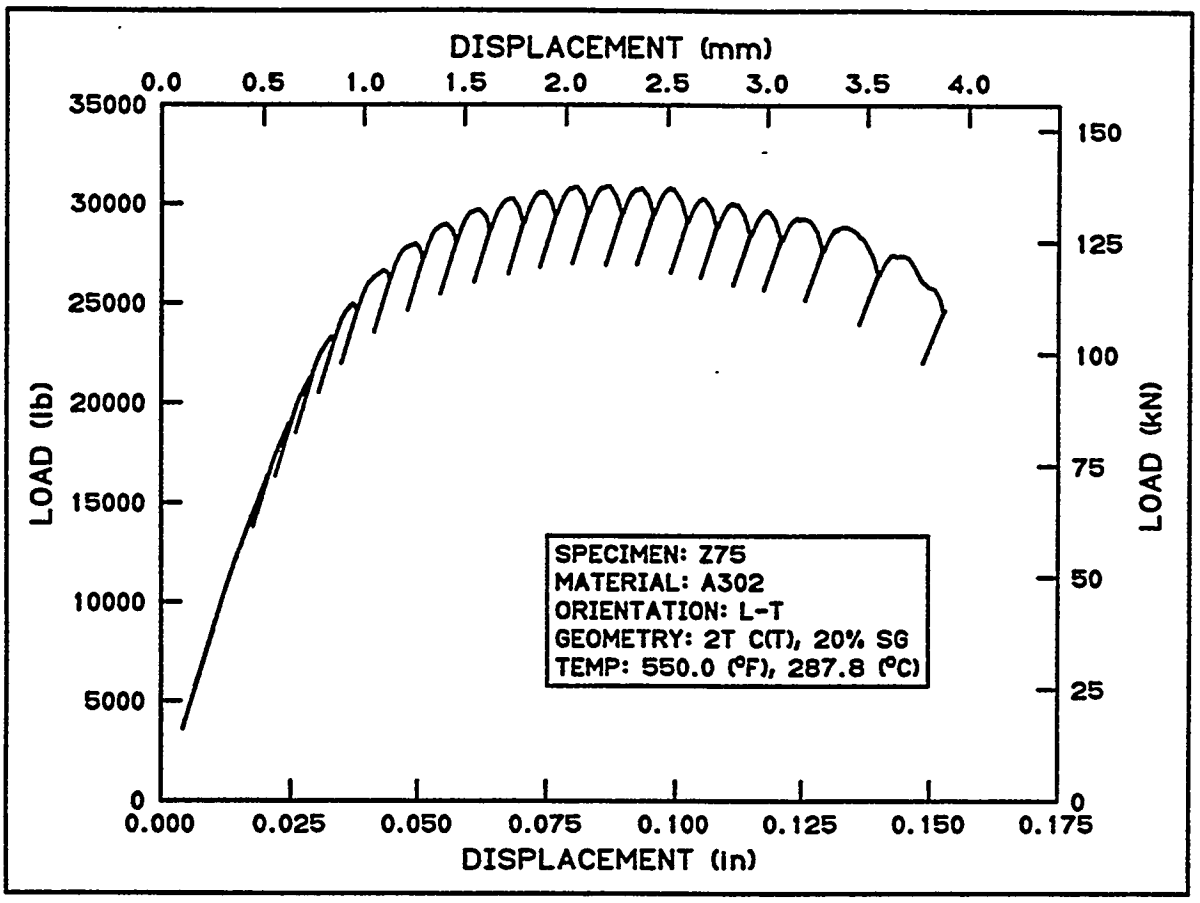

DISPLACEMENT (mm)
0
1
2
3
4
5
6
40000
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
175
150
125
100
75
50
25
0
LOAD (kN)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)
SPECIMEN: Z76
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)

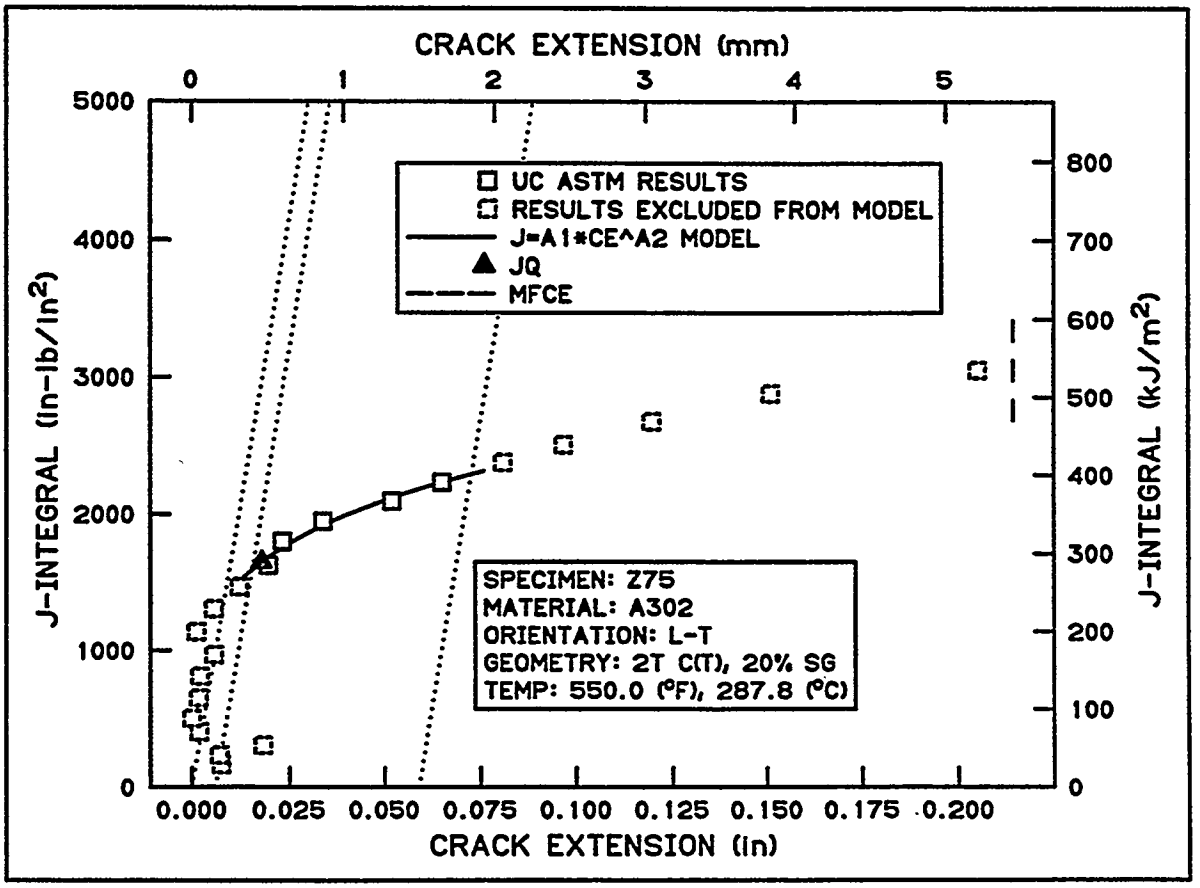

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z76
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z75
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4900 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16282	0.0203	0.0075	163.3
2	18938	0.0245	0.0071	233.3
3	21214	0.0286	0.0182	305.9
4	23318	0.0329	0.0019	402.3
5	24971	0.0371	0.0000	501.4
6	26667	0.0432	0.0018	650.4
7	28009	0.0496	0.0021	809.5
8	28982	0.0557	0.0057	969.4
9	29707	0.0619	0.0012	1139.7
10	30251	0.0684	0.0056	1307.2
11	30605	0.0746	0.0122	1468.0
12	30878	0.0808	0.0196	1628.5
13	30896	0.0872	0.0232	1800.3
14	30789	0.0934	0.0339	1948.3
15	30744	0.0995	0.0520	2095.6
16	30151	0.1060	0.0652	2233.1
17	29963	0.1122	0.0808	2378.1
18	29621	0.1185	0.0967	2507.9
19	29149	0.1267	0.1196	2676.0
20	28211	0.1371	0.1510	2880.9
21	25723	0.1509	0.2050	3051.9

  WIDTH: 3.9984 (IN),101.560 (MM)
  THICKNESS: 2.0030 (IN),50.876 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9996 (IN),25.390 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4650 (IN),88.011 (MM)
    DISTANCE 2: 3.4932 (IN),88.727 (MM)
    DISTANCE 3: 3.5066 (IN),89.068 (MM)
    DISTANCE 4: 3.5040 (IN),89.002 (MM)
    DISTANCE 5: 3.5008 (IN),88.920 (MM)
    DISTANCE 6: 3.4916 (IN),88.687 (MM)
    DISTANCE 7: 3.4824 (IN),88.453 (MM)
    DISTANCE 8: 3.4718 (IN),88.184 (MM)
    DISTANCE 9: 3.4675 (IN),88.075 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7007 (IN),93.998 (MM)
    DISTANCE 2: 3.6666 (IN),93.132 (MM)
    DISTANCE 3: 3.6945 (IN),93.840 (MM)
    DISTANCE 4: 3.6996 (IN),93.970 (MM)
    DISTANCE 5: 3.6797 (IN),93.464 (MM)
    DISTANCE 6: 3.7128 (IN),94.305 (MM)
    DISTANCE 7: 3.6835 (IN),93.561 (MM)
    DISTANCE 8: 3.7548 (IN),95.372 (MM)
    DISTANCE 9: 3.7772 (IN),95.941 (MM)

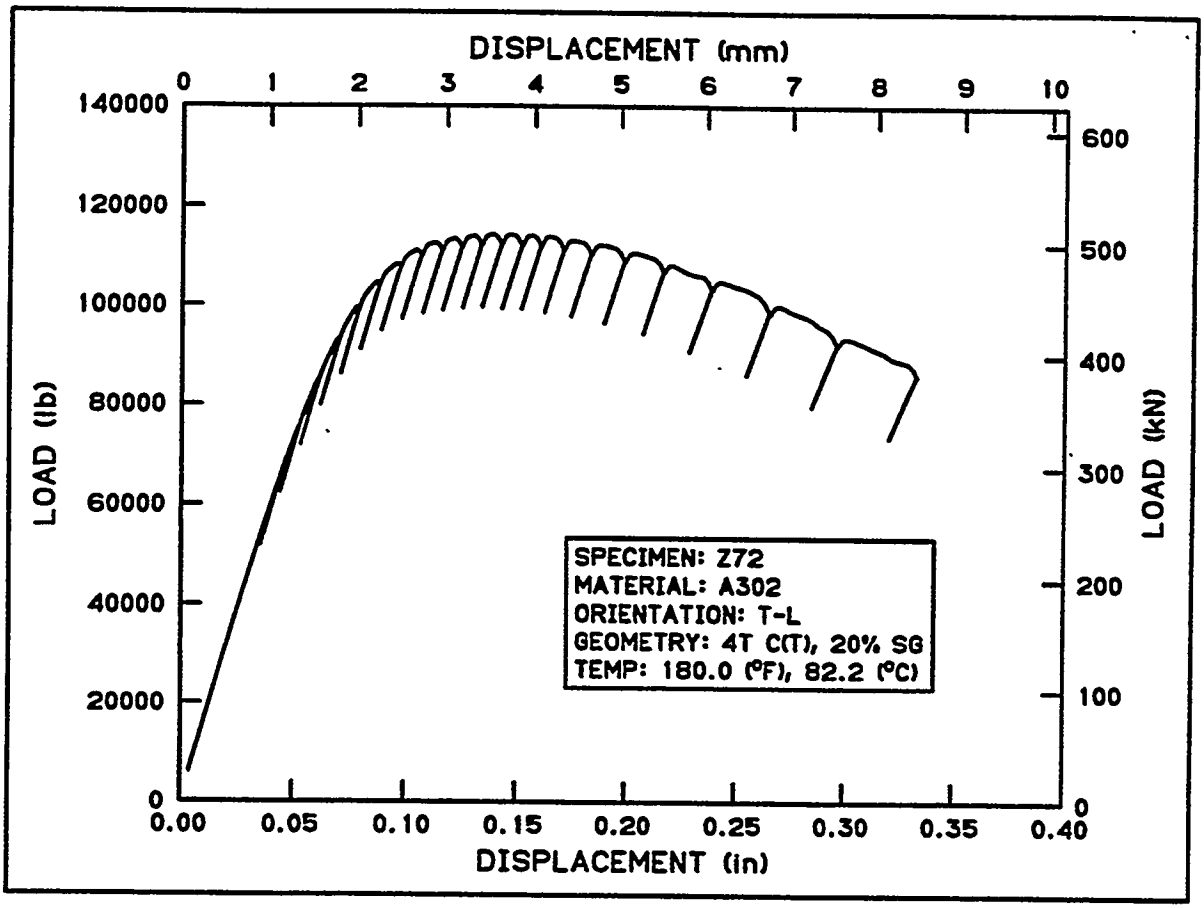

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
150 125 100 75 50 25 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z75
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

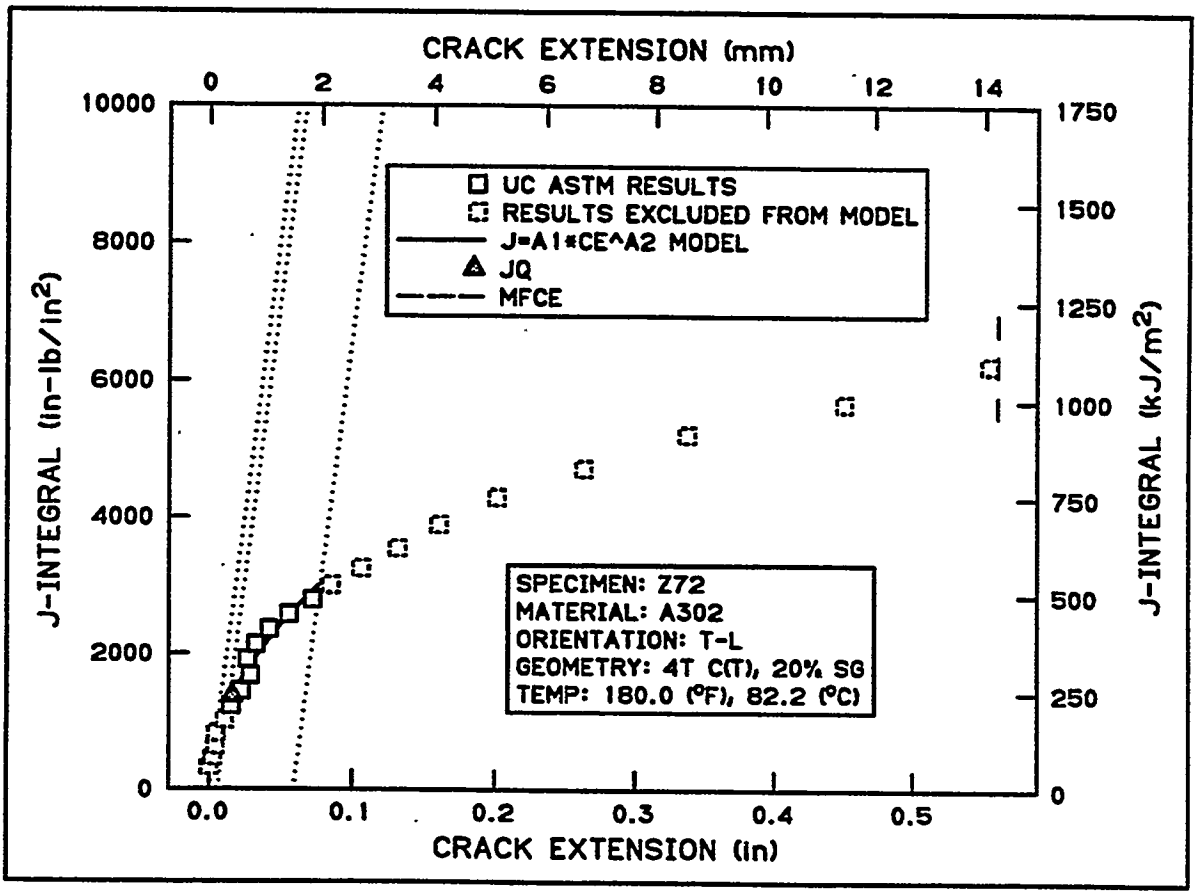

CRACK EXTENSION (mm)
0 1 2 3 4 5
5000 4000 3000 2000 1000 0
800 700 600 500 400 300 200 100 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z75
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z72
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 5.0313 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	64114	0.0432	0.0000	334.0
2	74943	0.0519	0.0025	476.2
3	84689	0.0606	0.0045	639.9
4	92830	0.0693	0.0049	823.2
5	99284	0.0780	0.0109	1019.3
6	104428	0.0868	0.0155	1229.2
7	108329	0.0957	0.0224	1449.7
8	111146	0.1045	0.0290	1677.6
9	112697	0.1132	0.0268	1915.2
10	113405	0.1219	0.0329	2138.6
11	114037	0.1308	0.0423	2363.0
12	114324	0.1393	0.0562	2578.6
13	114218	0.1483	0.0726	2794.2
14	114158	0.1570	0.0851	3007.4
15	113601	0.1674	0.1062	3255.5
16	112750	0.1798	0.1317	3545.7
17	111530	0.1949	0.1605	3896.5
18	109481	0.2127	0.2014	4291.8
19	105813	0.2347	0.2633	4718.3
20	101867	0.2605	0.3372	5217.3
21	95067	0.2919	0.4503	5672.8
22	88560	0.3292	0.5541	6237.4

  WIDTH: 8.0200 (IN),203.710 (MM)
  THICKNESS: 4.0000 (IN),101.600 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 6.9500 (IN),176.530 (MM)
    DISTANCE 2: 7.0600 (IN),179.320 (MM)
    DISTANCE 3: 7.1200 (IN),180.850 (MM)
    DISTANCE 4: 7.1100 (IN),180.590 (MM)
    DISTANCE 5: 7.1000 (IN),180.340 (MM)
    DISTANCE 6: 7.0500 (IN),179.070 (MM)
    DISTANCE 7: 7.0100 (IN),178.050 (MM)
    DISTANCE 8: 6.9400 (IN),176.280 (MM)
    DISTANCE 9: 6.9300 (IN),176.020 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.7385 (IN),196.560 (MM)
    DISTANCE 2: 7.6540 (IN),194.410 (MM)
    DISTANCE 3: 7.6595 (IN),194.550 (MM)
    DISTANCE 4: 7.6151 (IN),193.420 (MM)
    DISTANCE 5: 7.6154 (IN),193.430 (MM)
    DISTANCE 6: 7.5448 (IN),191.640 (MM)
    DISTANCE 7: 7.5730 (IN),192.350 (MM)
    DISTANCE 8: 7.4596 (IN),189.470 (MM)
    DISTANCE 9: 7.6382 (IN),194.010 (MM)

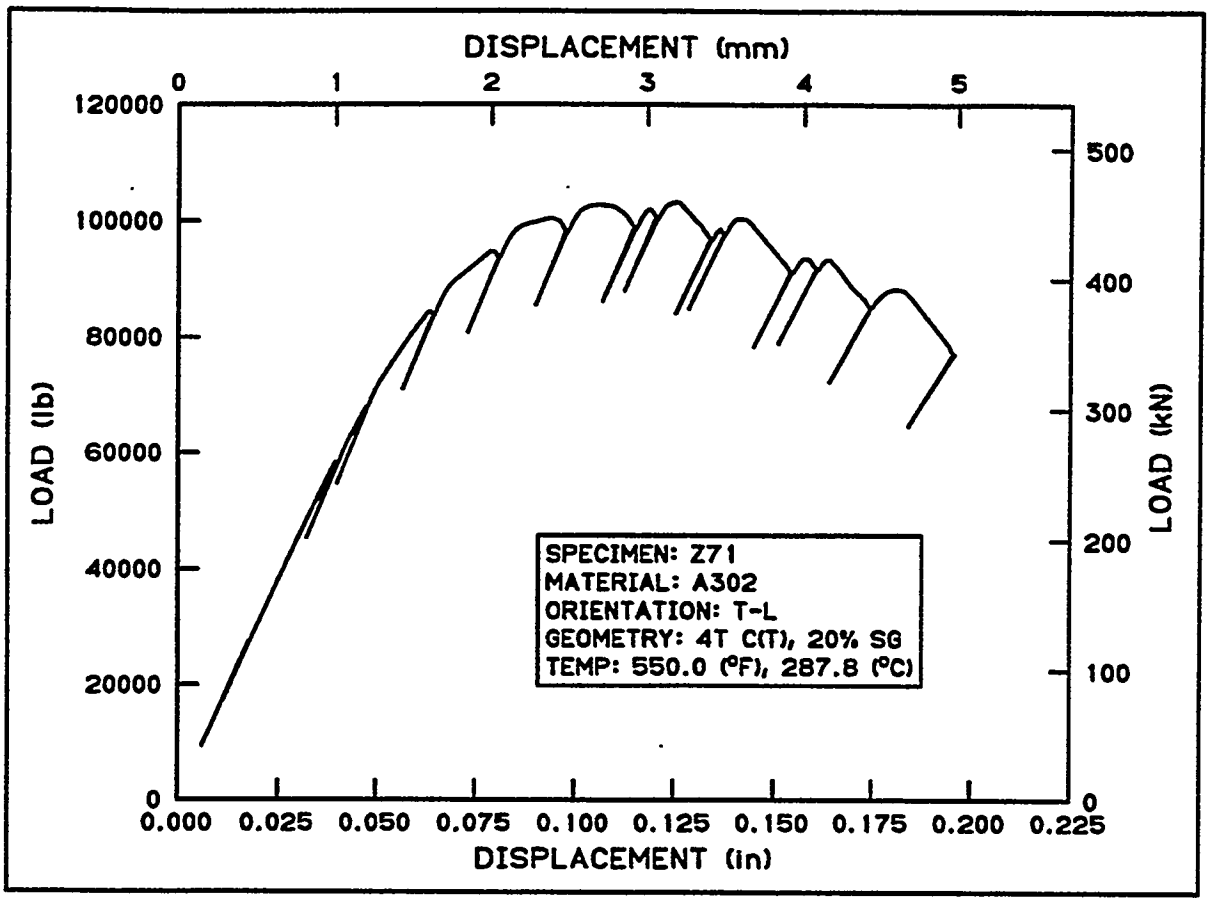

DISPLACEMENT (mm)
0 1 2 3 4 5 6 7 8 9 10
140000
120000
100000
80000
60000
40000
20000
0
600
500
400
300
200
100
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z72
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.05 0.10 0.15 0.20 0.25 0.30 0.35 0.40
DISPLACEMENT (in)

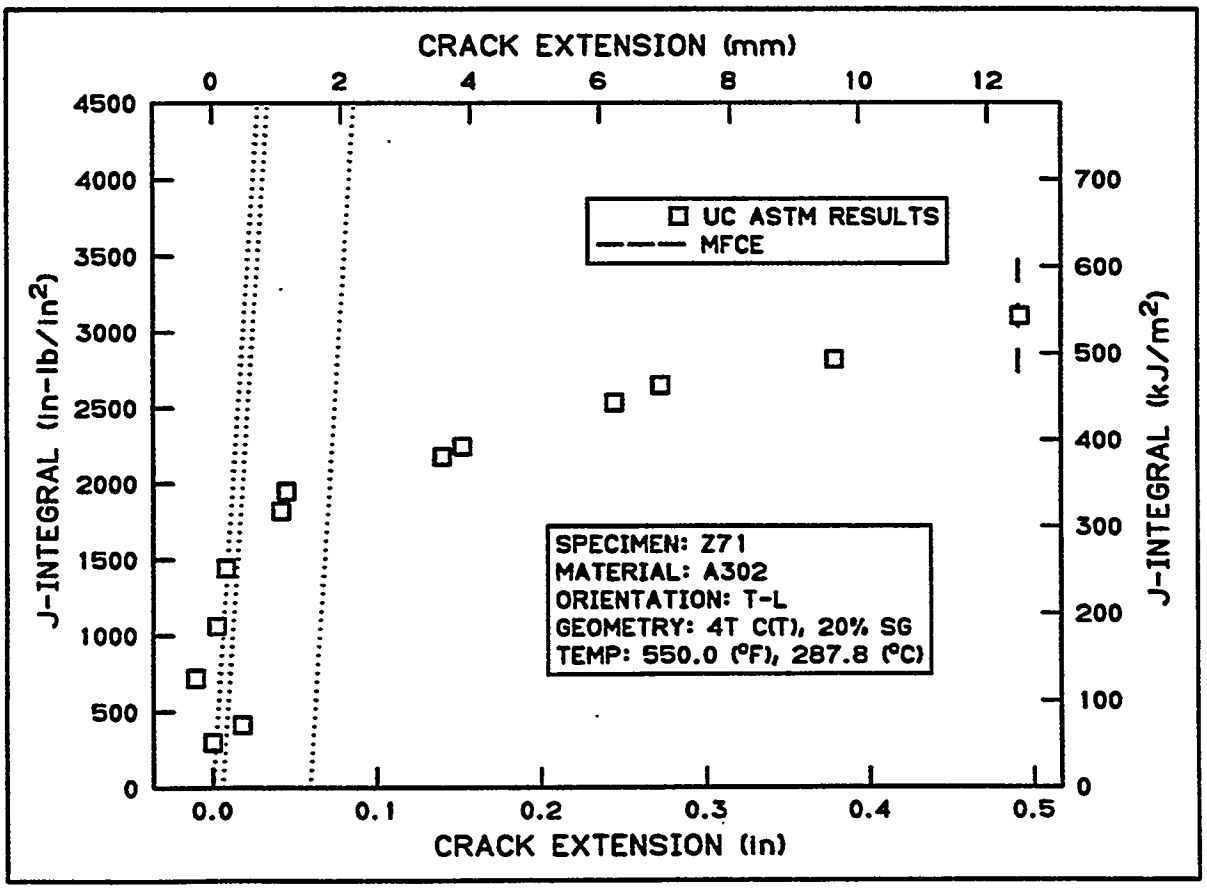

CRACK EXTENSION (mm)
0 2 4 6 8 10 12 14
10000
8000
6000
4000
2000
0
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z72
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.0 0.1 0.2 0.3 0.4 0.5
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z71
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 5.1088 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	57913	0.0392	0.0000	297.1
2	67492	0.0471	0.0178	414.3
3	84269	0.0628	-0.0101	719.3
4	94813	0.0785	0.0027	1060.8
5	100549	0.0940	0.0083	1443.6
6	102426	0.1100	0.0417	1819.0
7	101732	0.1178	0.0450	1947.8
8	103307	0.1260	0.1403	2174.9
9	98197	0.1354	0.1526	2242.6
10	99908	0.1437	0.2451	2531.0
11	93525	0.1571	0.2731	2646.3
12	88633	0.1697	0.3786	2816.3
13	86417	0.1855	0.4919	3102.4

WIDTH: 8.0300 (IN),203.960 (MM)
THICKNESS: 4.0200 (IN),102.110 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 7.0100 (IN),178.050 (MM)
DISTANCE 2: 7.1900 (IN),182.630 (MM)
DISTANCE 3: 7.2000 (IN),182.880 (MM)
DISTANCE 4: 7.2200 (IN),183.390 (MM)
DISTANCE 5: 7.1900 (IN),182.630 (MM)
DISTANCE 6: 7.1400 (IN),181.360 (MM)
DISTANCE 7: 7.0600 (IN),179.320 (MM)
DISTANCE 8: 6.9800 (IN),177.290 (MM)
DISTANCE 9: 6.9300 (IN),176.020 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 7.6949 (IN),195.450 (MM)
DISTANCE 2: 7.6528 (IN),194.380 (MM)
DISTANCE 3: 7.6620 (IN),194.610 (MM)
DISTANCE 4: 7.7029 (IN),195.650 (MM)
DISTANCE 5: 7.6371 (IN),193.980 (MM)
DISTANCE 6: 7.6140 (IN),193.400 (MM)
DISTANCE 7: 7.4988 (IN),190.470 (MM)
DISTANCE 8: 7.4694 (IN),189.720 (MM)
DISTANCE 9: 7.5834 (IN),192.620 (MM)

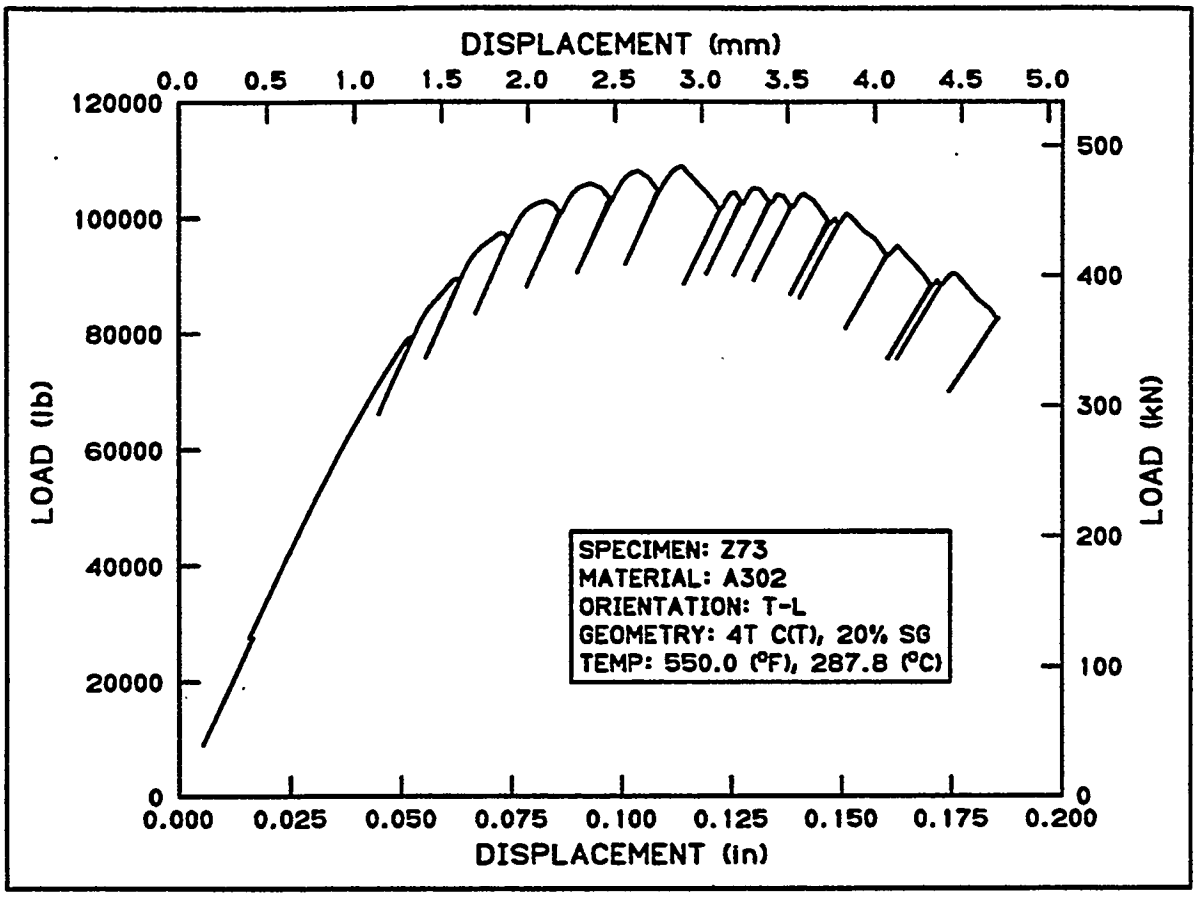

DISPLACEMENT (mm)
0
1
2
3
4
5
120000
100000
80000
60000
40000
20000
0
LOAD (lb)
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

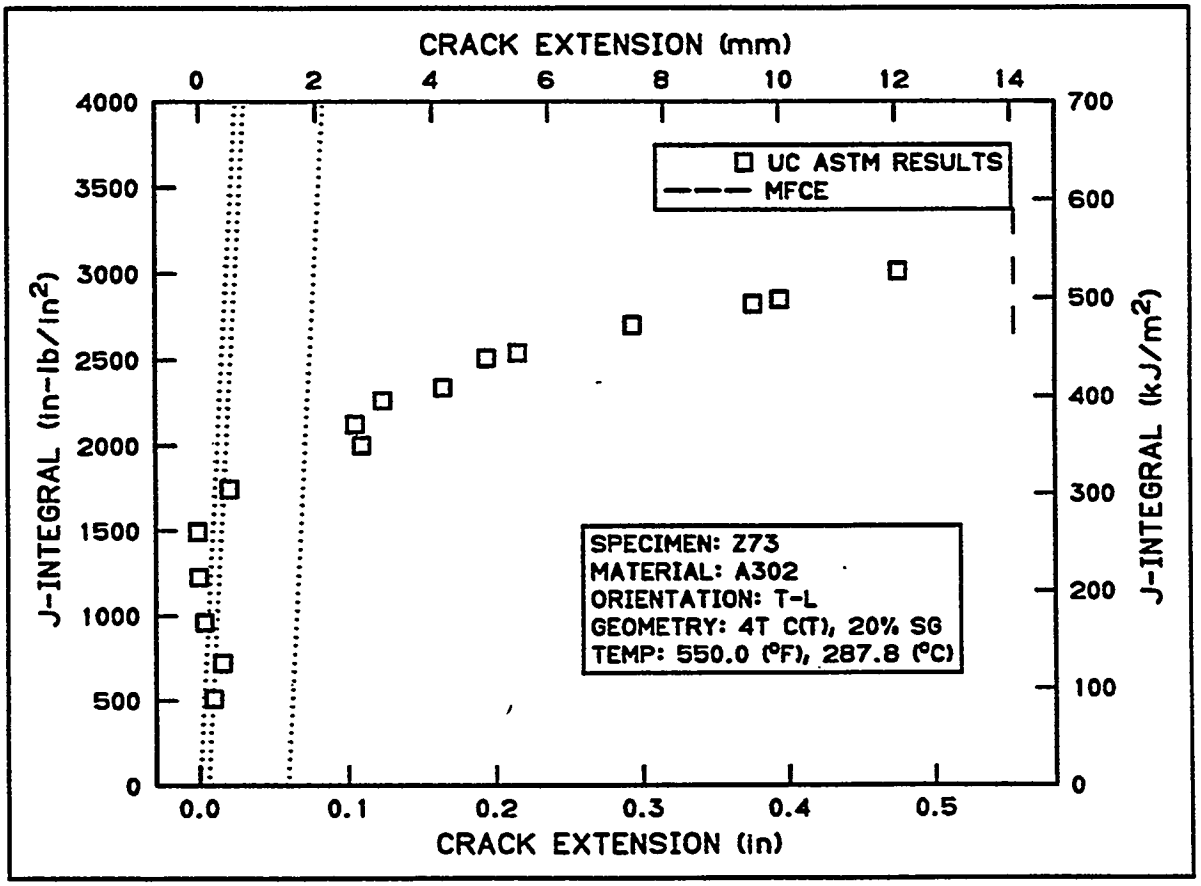

CRACK EXTENSION (mm)
0
2
4
6
8
10
12
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
MFCE
SPECIMEN: Z71
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.0
0.1
0.2
0.3
0.4
0.5
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z73
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 5.0088 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	78820	0.0513	0.0097	509.1
2	89304	0.0619	0.0156	719.8
3	97361	0.0723	0.0036	961.1
4	102893	0.0828	0.0000	1227.0
5	105877	0.0930	-0.0010	1494.3
6	108041	0.1039	0.0205	1744.5
7	108802	0.1138	0.1096	2000.9
8	104159	0.1248	0.1053	2122.2
9	105199	0.1301	0.1241	2262.2
10	103986	0.1354	0.1647	2337.9
11	104144	0.1414	0.1944	2509.6
12	99305	0.1477	0.2155	2541.6
13	97745	0.1549	0.2935	2700.6
14	95062	0.1626	0.3762	2822.4
15	88550	0.1711	0.3943	2849.0
16	86063	0.1807	0.4747	3013.7

  WIDTH: 8.0000 (IN),203.200 (MM)
  THICKNESS: 4.0100 (IN),101.850 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 6.9700 (IN),177.040 (MM)
    DISTANCE 2: 7.0300 (IN),178.560 (MM)
    DISTANCE 3: 7.0700 (IN),179.580 (MM)
    DISTANCE 4: 7.0900 (IN),180.090 (MM)
    DISTANCE 5: 7.0800 (IN),179.830 (MM)
    DISTANCE 6: 7.0300 (IN),178.560 (MM)
    DISTANCE 7: 6.9800 (IN),177.290 (MM)
    DISTANCE 8: 6.9300 (IN),176.020 (MM)
    DISTANCE 9: 6.9100 (IN),175.510 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 7.6887 (IN),195.290 (MM)
    DISTANCE 2: 7.5235 (IN),191.100 (MM)
    DISTANCE 3: 7.6730 (IN),194.890 (MM)
    DISTANCE 4: 7.6366 (IN),193.970 (MM)
    DISTANCE 5: 7.6437 (IN),194.150 (MM)
    DISTANCE 6: 7.6160 (IN),193.450 (MM)
    DISTANCE 7: 7.4614 (IN),189.520 (MM)
    DISTANCE 8: 7.4073 (IN),188.150 (MM)
    DISTANCE 9: 7.5464 (IN),191.680 (MM)

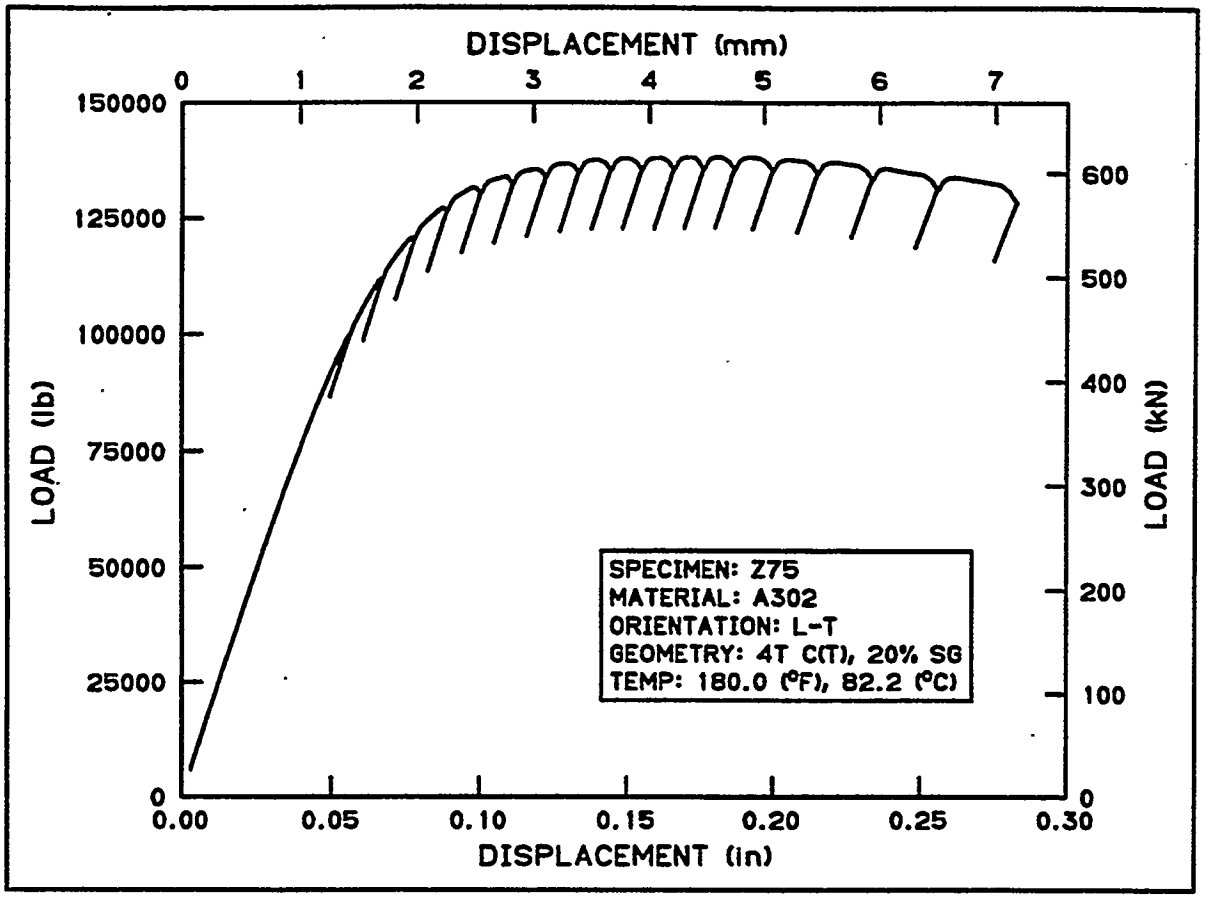

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
120000
100000
80000
60000
40000
20000
0
LOAD (lb)
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z73
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

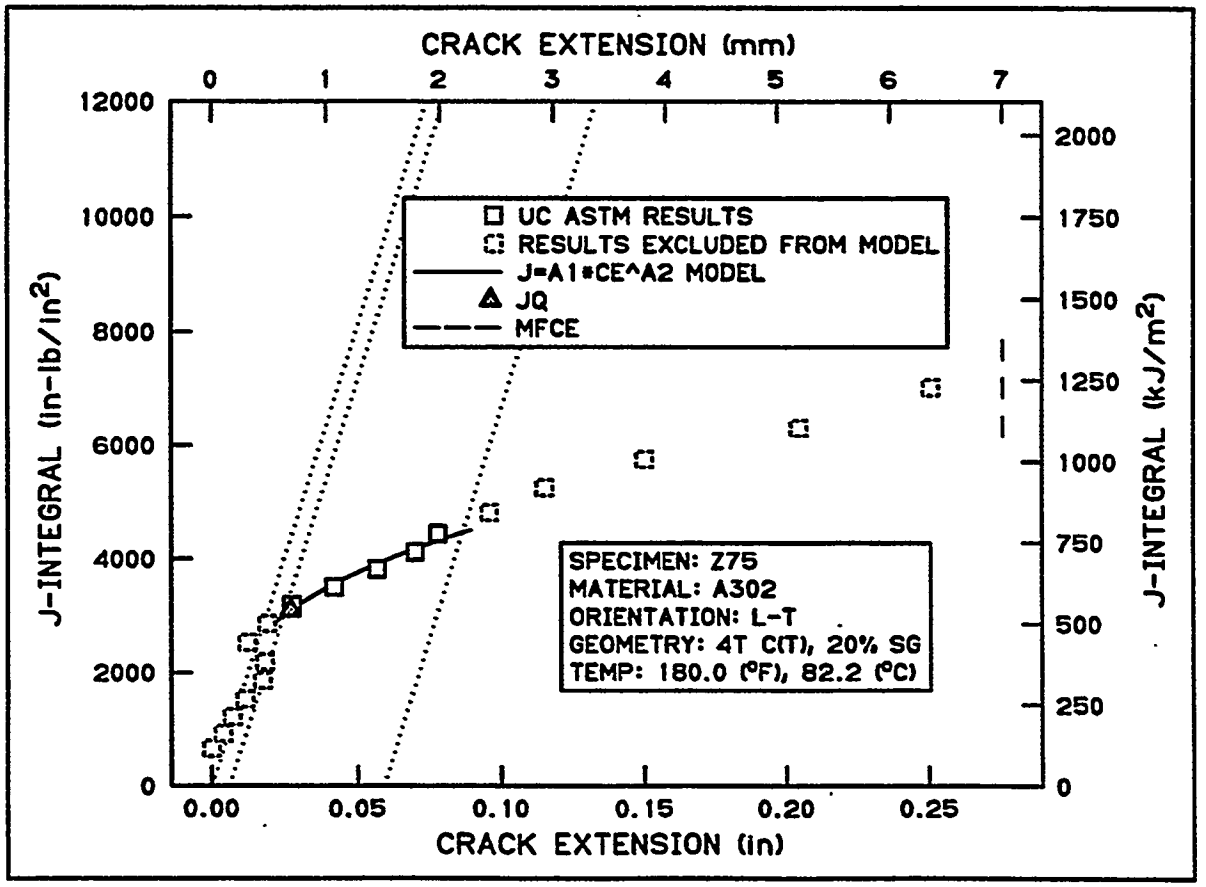

CRACK EXTENSION (mm)
0 2 4 6 8 10 12 14
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
MFCE
SPECIMEN: Z73
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.0 0.1 0.2 0.3 0.4 0.5
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z75
  MATERIAL CODE: A302
  ORIENTATION: L-T
  GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 4.2769 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	99224	0.0552	0.0000	658.9
2	111537	0.0658	0.0039	923.6
3	120605	0.0763	0.0070	1215.4
4	127142	0.0869	0.0114	1522.7
5	131623	0.0976	0.0173	1854.3
6	133852	0.1081	0.0181	2182.4
7	135592	0.1190	0.0122	2525.6
8	136872	0.1297	0.0189	2859.1
9	137685	0.1401	0.0275	3186.4
10	137904	0.1510	0.0419	3497.7
11	138107	0.1617	0.0567	3811.9
12	138228	0.1721	0.0701	4118.2
13	138280	0.1828	0.0780	4441.6
14	138107	0.1955	0.0959	4811.9
15	137482	0.2105	0.1150	5247.2
16	136480	0.2290	0.1500	5747.4
17	134522	0.2512	0.2045	6301.7
18	132346	0.2774	0.2507	7010.8

  WIDTH: 7.3100 (IN),185.670 (MM)
  THICKNESS: 4.0100 (IN),101.850 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 6.2300 (IN),158.240 (MM)
    DISTANCE 2: 6.2600 (IN),159.000 (MM)
    DISTANCE 3: 6.3200 (IN),160.530 (MM)
    DISTANCE 4: 6.3200 (IN),160.530 (MM)
    DISTANCE 5: 6.3200 (IN),160.530 (MM)
    DISTANCE 6: 6.3000 (IN),160.020 (MM)
    DISTANCE 7: 6.2700 (IN),159.260 (MM)
    DISTANCE 8: 6.2700 (IN),159.260 (MM)
    DISTANCE 9: 6.2400 (IN),158.500 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 6.5288 (IN),165.830 (MM)
    DISTANCE 2: 6.5490 (IN),166.340 (MM)
    DISTANCE 3: 6.6042 (IN),167.750 (MM)
    DISTANCE 4: 6.6118 (IN),167.940 (MM)
    DISTANCE 5: 6.5778 (IN),167.080 (MM)
    DISTANCE 6: 6.5852 (IN),167.260 (MM)
    DISTANCE 7: 6.4979 (IN),165.050 (MM)
    DISTANCE 8: 6.4893 (IN),164.830 (MM)
    DISTANCE 9: 6.6442 (IN),168.760 (MM)

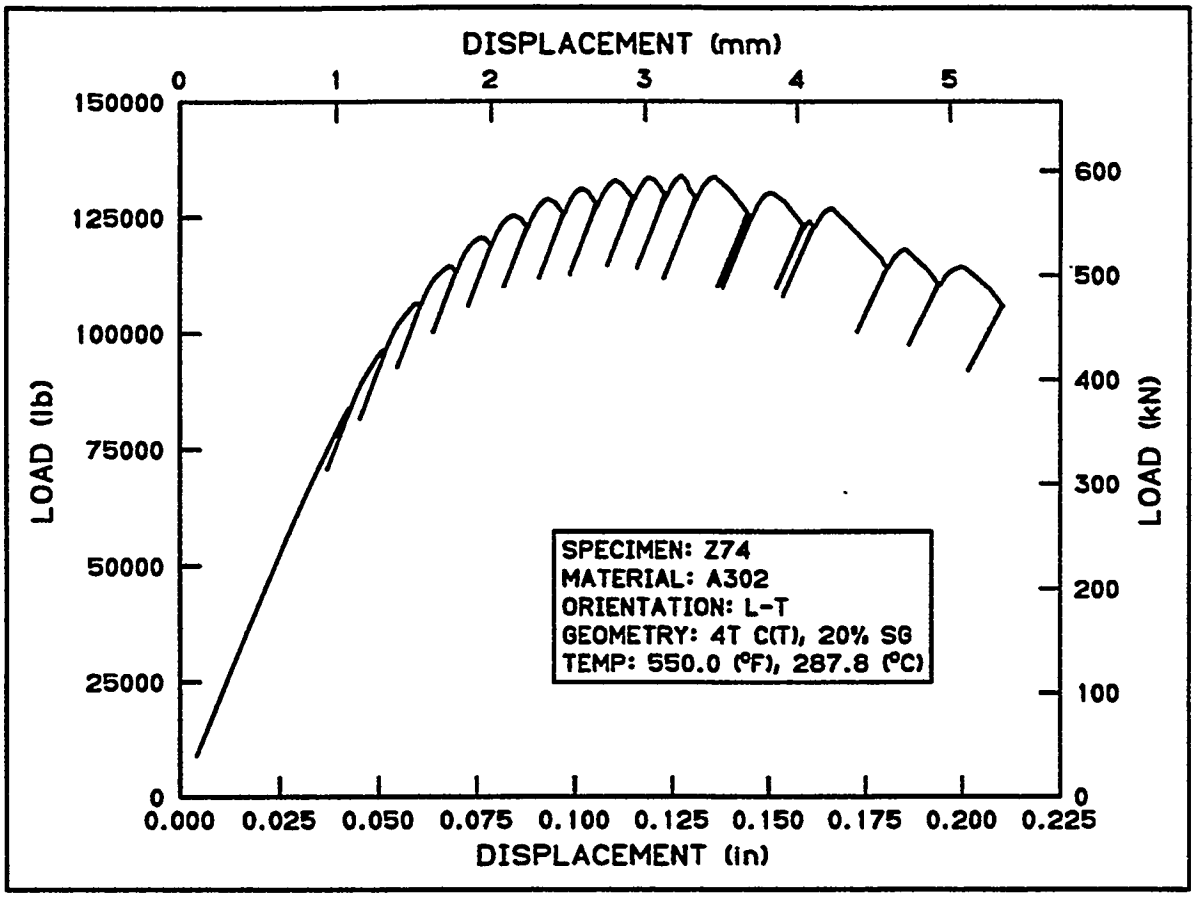

DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
150000
125000
100000
75000
50000
25000
0
LOAD (lb)
600
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z75
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)

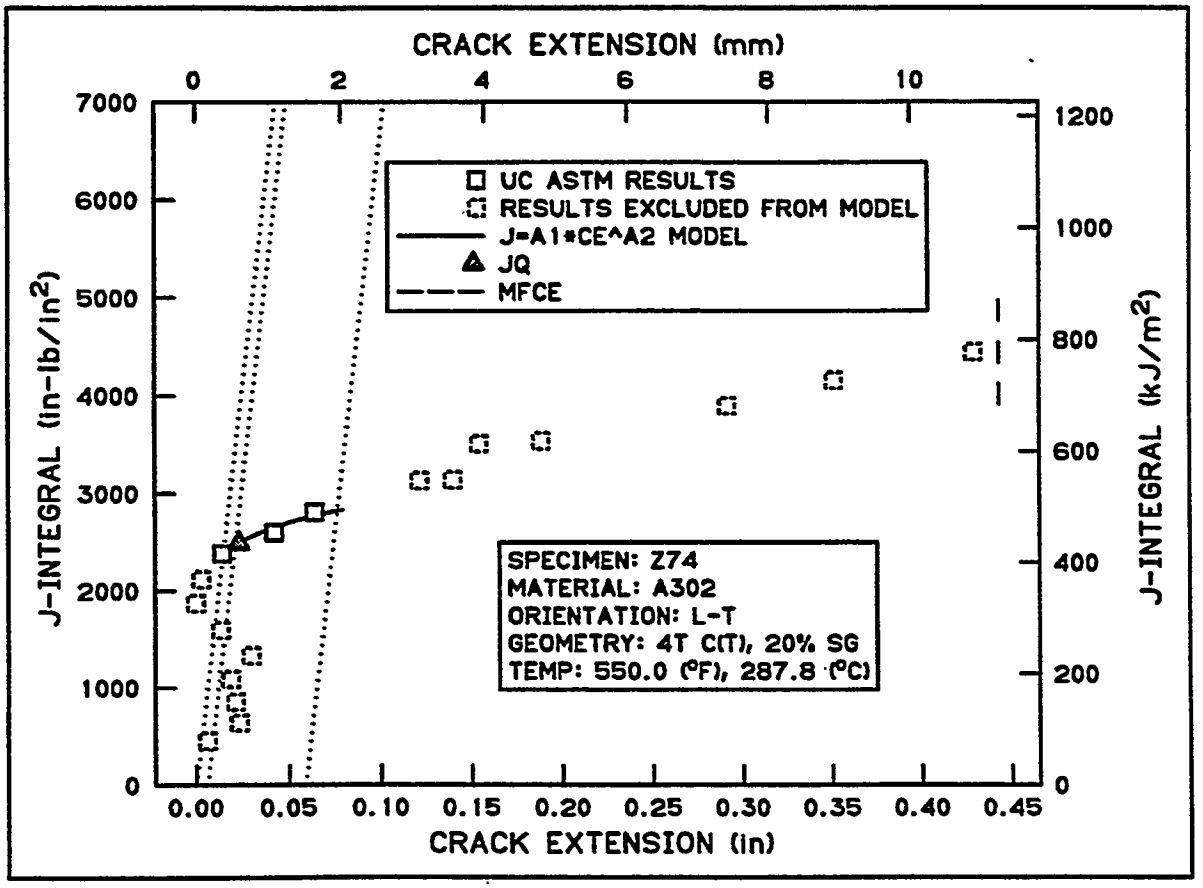

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
12000
10000
8000
6000
4000
2000
0
J-INTEGRAL (in-lb/in²)
2000
1750
1500
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z75
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z74
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 4.2944 (IN)
TEST
ATMOSPHERE: AIR
.TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	83546	0.0423	0.0060	454.1
2	96110	0.0508	0.0233	640.5
3	106126	0.0592	0.0213	853.1
4	114289	0.0677	0.0187	1088.1
5	120597	0.0762	0.0297	1329.9
6	125330	0.0847	0.0133	1595.4
7	128857	0.0932	0.0000	1871.7
8	131066	0.1018	0.0028	2115.6
9	132807	0.1104	0.0142	2382.2
10	133417	0.1189	0.0422	2598.7
11	133854	0.1274	0.0642	2807.6
12	133598	0.1361	0.1213	3131.3
13	125360	0.1449	0.1396	3138.7
14	130063	0.1514	0.1544	3507.9
15	123702	0.1599	0.1883	3533.8
16	122496	0.1715	0.2913	3893.1
17	117801	0.1856	0.3510	4152.3
18	112924	0.2022	0.4288	4441.8

WIDTH: 7.3300 (IN),186.180 (MM)
THICKNESS: 4.0000 (IN),101.600 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0000 (IN),50.800 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.2600 (IN),159.000 (MM)
DISTANCE 2: 6.2700 (IN),159.260 (MM)
DISTANCE 3: 6.2500 (IN),158.750 (MM)
DISTANCE 4: 6.3400 (IN),161.040 (MM)
DISTANCE 5: 6.3200 (IN),160.530 (MM)
DISTANCE 6: 6.3200 (IN),160.530 (MM)
DISTANCE 7: 6.3100 (IN),160.270 (MM)
DISTANCE 8: 6.2900 (IN),159.770 (MM)
DISTANCE 9: 6.2500 (IN),158.750 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.8093 (IN),172.960 (MM)
DISTANCE 2: 6.6033 (IN),167.720 (MM)
DISTANCE 3: 6.6294 (IN),168.390 (MM)
DISTANCE 4: 6.7594 (IN),171.690 (MM)
DISTANCE 5: 6.7815 (IN),172.250 (MM)
DISTANCE 6: 6.7214 (IN),170.720 (MM)
DISTANCE 7: 6.7664 (IN),171.870 (MM)
DISTANCE 8: 6.7676 (IN),171.900 (MM)
DISTANCE 9: 6.9289 (IN),175.990 (MM)

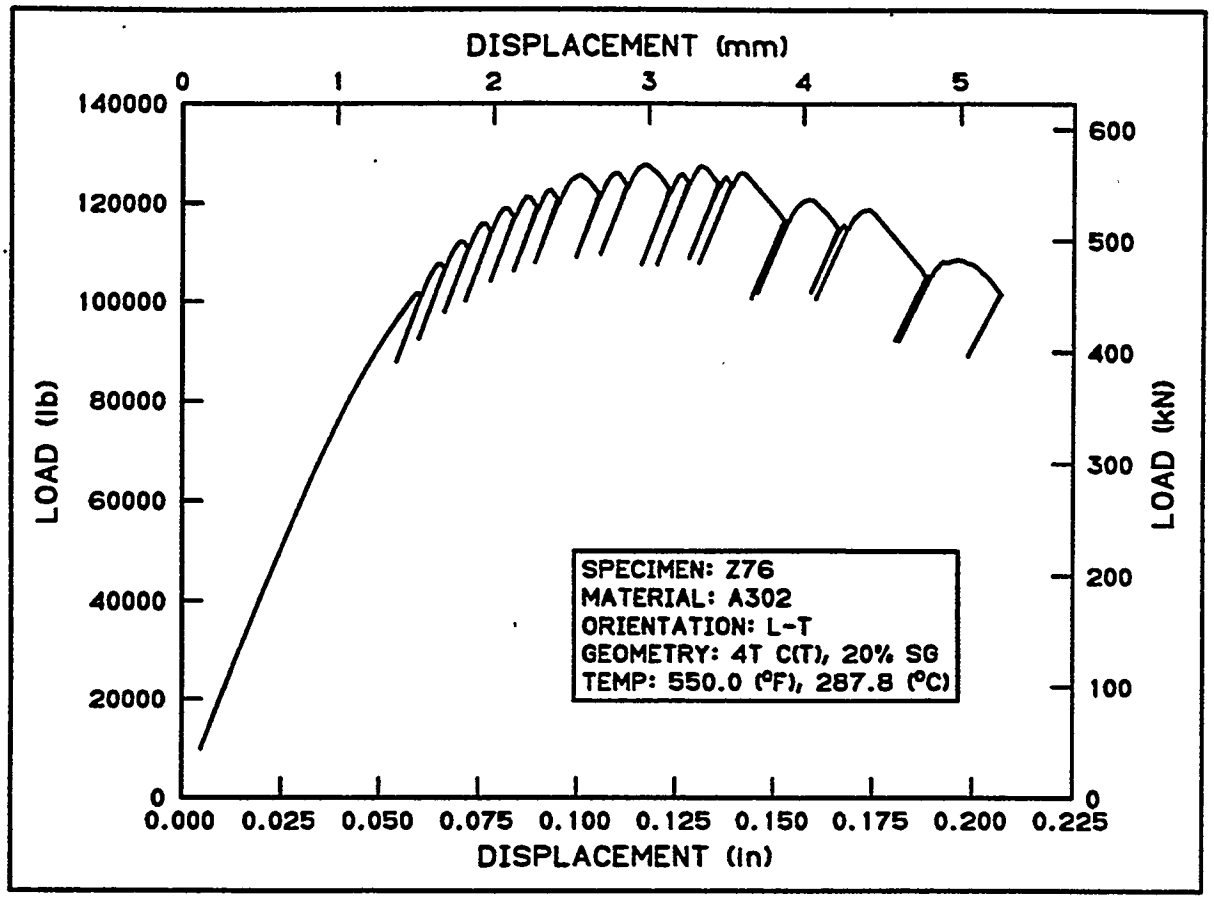

DISPLACEMENT (mm)
0
1
2
3
4
5
150000
125000
100000
75000
50000
25000
0
LOAD (lb)
600
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z74
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

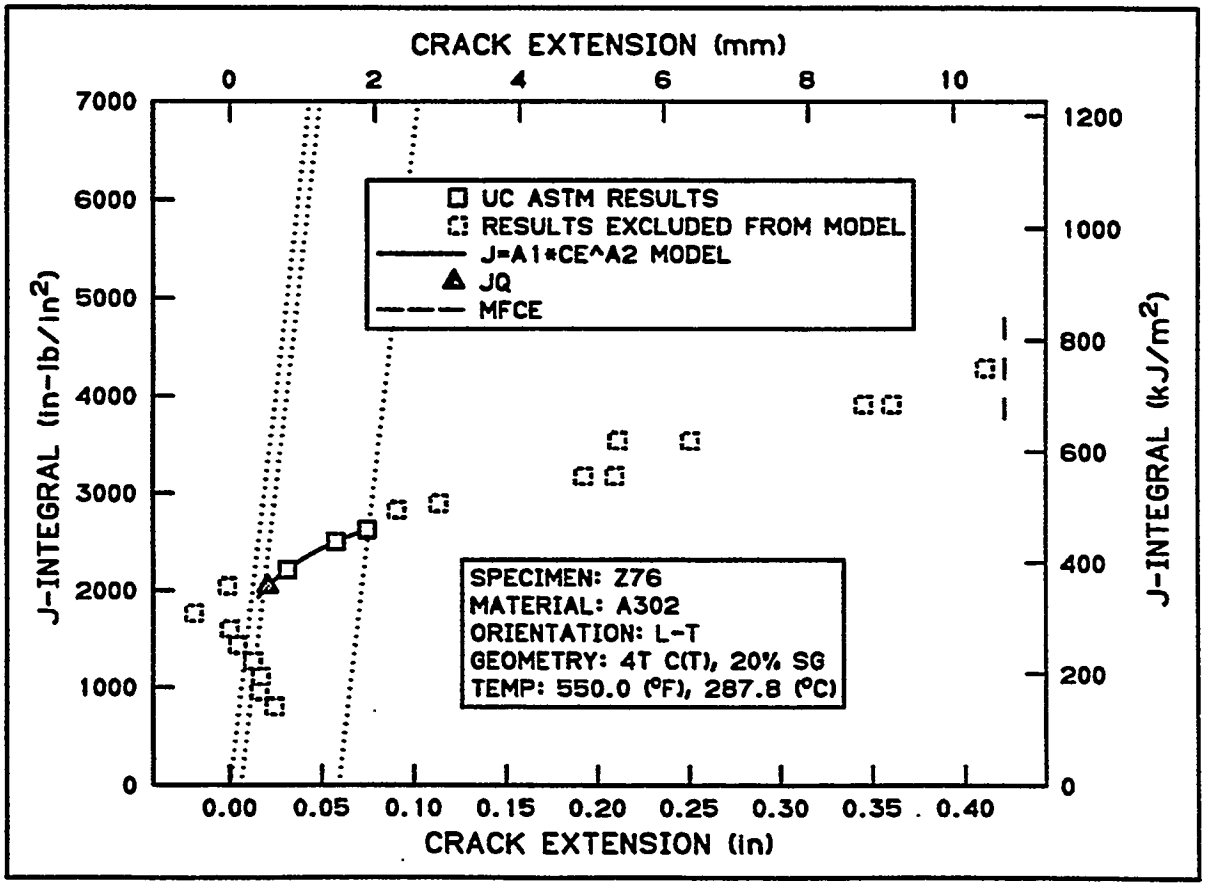

CRACK EXTENSION (mm)
0
2
4
6
8
10
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1200
1000
800
600
400
200
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z74
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
0.45
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z76
MATERIAL CODE: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 4.3319 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	101483	0.0591	0.0241	803.0
2	107528	0.0646	0.0159	957.4
3	112186	0.0703	0.0166	1111.3
4	115766	0.0757	0.0124	1269.4
5	118856	0.0813	0.0043	1433.3
6	121155	0.0869	0.0000	1597.9
7	122361	0.0923	-0.0197	1762.2
8	125511	0.1009	-0.0013	2043.6
9	125963	0.1093	0.0311	2213.4
10	127712	0.1175	0.0577	2502.5
11	125421	0.1258	0.0746	2626.3
12	127440	0.1313	0.0905	2828.5
13	124757	0.1371	0.1132	2895.5
14	124772	0.1438	0.1922	3174.6
15	116308	0.1529	0.2090	3177.0
16	120702	0.1597	0.2107	3538.2
17	114997	0.1671	0.2505	3537.1
18	117869	0.1753	0.3452	3911.9
19	105124	0.1888	0.3603	3911.2
20	107272	0.2006	0.4106	4281.5

WIDTH: 7.3000 (IN),185.420 (MM)
THICKNESS: 4.0100 (IN),101.850 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0000 (IN),50.800 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.2600 (IN),159.000 (MM)
DISTANCE 2: 6.3000 (IN),160.020 (MM)
DISTANCE 3: 6.3200 (IN),160.530 (MM)
DISTANCE 4: 6.3900 (IN),162.310 (MM)
DISTANCE 5: 6.3400 (IN),161.040 (MM)
DISTANCE 6: 6.3800 (IN),162.050 (MM)
DISTANCE 7: 6.3600 (IN),161.540 (MM)
DISTANCE 8: 6.3100 (IN),160.270 (MM)
DISTANCE 9: 6.2500 (IN),158.750 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.8558 (IN),174.140 (MM)
DISTANCE 2: 6.6591 (IN),169.140 (MM)
DISTANCE 3: 6.7170 (IN),170.610 (MM)
DISTANCE 4: 6.7722 (IN),172.010 (MM)
DISTANCE 5: 6.6785 (IN),169.630 (MM)
DISTANCE 6: 6.8568 (IN),174.160 (MM)
DISTANCE 7: 6.7503 (IN),171.460 (MM)
DISTANCE 8: 6.7090 (IN),170.410 (MM)
DISTANCE 9: 6.9020 (IN),175.310 (MM)

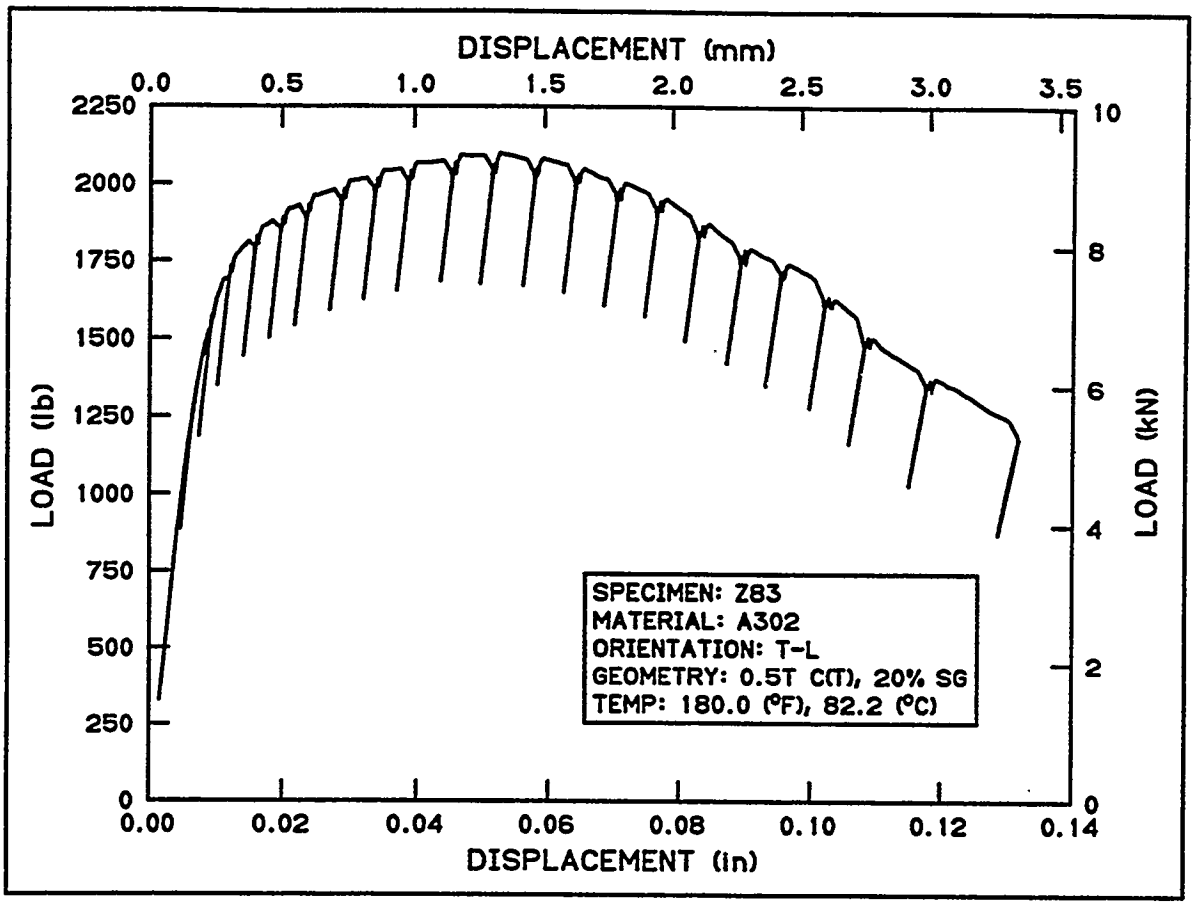

DISPLACEMENT (mm)
0
1
2
3
4
5
140000
120000
100000
80000
60000
40000
20000
0
600
500
400
300
200
100
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z76
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

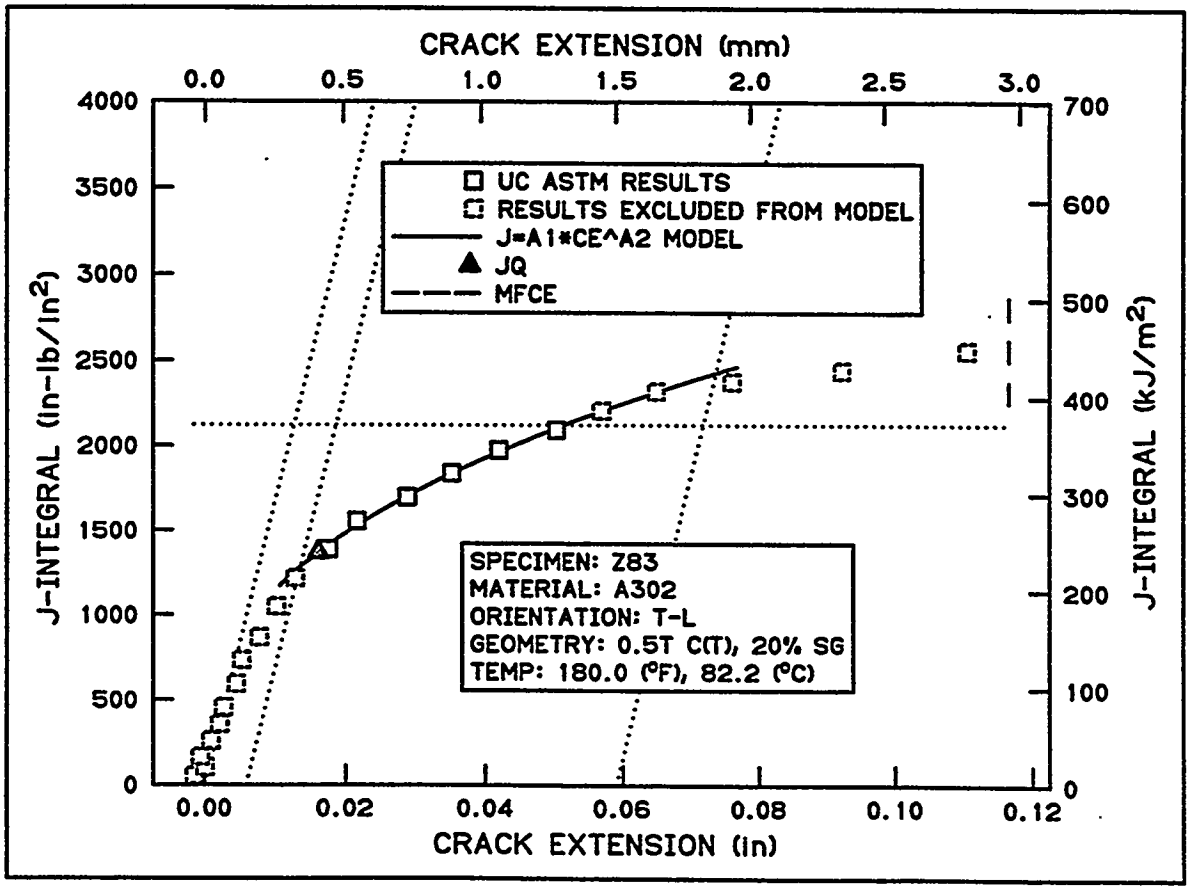

CRACK EXTENSION (mm)
0
2
4
6
8
10
7000
6000
5000
4000
3000
2000
1000
0
1200
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z76
MATERIAL: A302
ORIENTATION: L-T
GEOMETRY: 4T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
0.35
0.40
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z83
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6133 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1173	0.0059	-0.0015	53.6
2	1489	0.0083	0.0000	103.8
3	1688	0.0110	-0.0006	165.5
4	1812	0.0147	0.0008	260.6
5	1879	0.0183	0.0021	358.0
6	1930	0.0222	0.0027	457.3
7	1980	0.0274	0.0045	595.5
8	2018	0.0322	0.0053	735.7
9	2047	0.0373	0.0078	869.1
10	2073	0.0438	0.0103	1051.3
11	2089	0.0500	0.0129	1217.9
12	2079	0.0564	0.0176	1390.6
13	2063	0.0626	0.0217	1556.5
14	2015	0.0688	0.0288	1698.6
15	1968	0.0750	0.0351	1839.7
16	1900	0.0814	0.0420	1974.8
17	1814	0.0878	0.0504	2092.7
18	1757	0.0941	0.0570	2206.4
19	1695	0.1005	0.0650	2320.4
20	1573	0.1070	0.0760	2378.1
21	1403	0.1164	0.0921	2442.6
22	1242	0.1303	0.1105	2559.7

WIDTH: 0.9992 (IN),25.380 (MM)
THICKNESS: 0.5000 (IN),12.700 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2500 (IN),6.350 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8527 (IN),21.659 (MM)
DISTANCE 2: 0.8585 (IN),21.806 (MM)
DISTANCE 3: 0.8635 (IN),21.933 (MM)
DISTANCE 4: 0.8680 (IN),22.047 (MM)
DISTANCE 5: 0.8682 (IN),22.052 (MM)
DISTANCE 6: 0.8684 (IN),22.057 (MM)
DISTANCE 7: 0.8650 (IN),21.971 (MM)
DISTANCE 8: 0.8598 (IN),21.839 (MM)
DISTANCE 9: 0.8570 (IN),21.768 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9637 (IN),24.478 (MM)
DISTANCE 2: 0.9951 (IN),25.276 (MM)
DISTANCE 3: 0.9944 (IN),25.258 (MM)
DISTANCE 4: 1.0008 (IN),25.420 (MM)
DISTANCE 5: 0.9856 (IN),25.034 (MM)
DISTANCE 6: 0.9602 (IN),24.389 (MM)
DISTANCE 7: 0.9724 (IN),24.699 (MM)
DISTANCE 8: 0.9750 (IN),24.765 (MM)
DISTANCE 9: 0.9460 (IN),24.028 (MM)

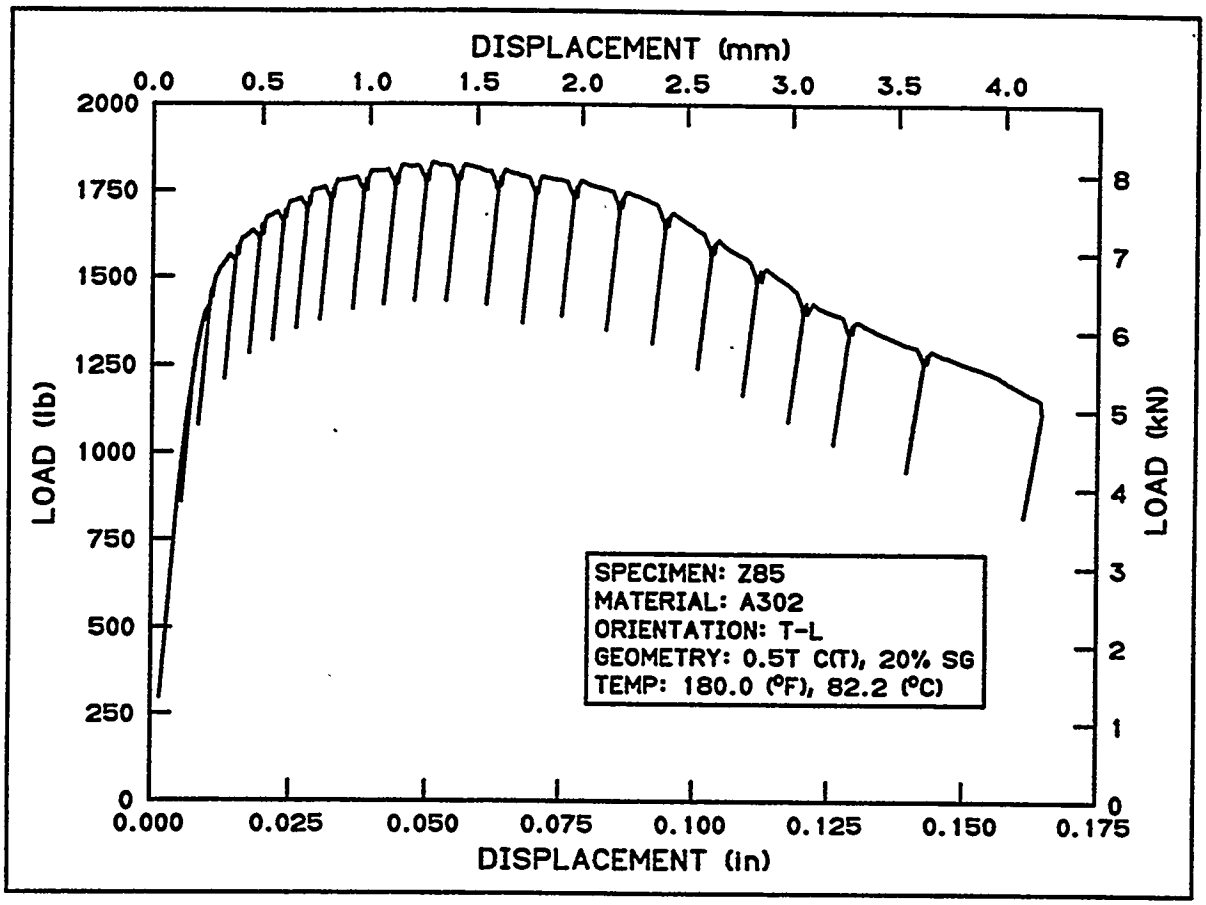

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z83
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

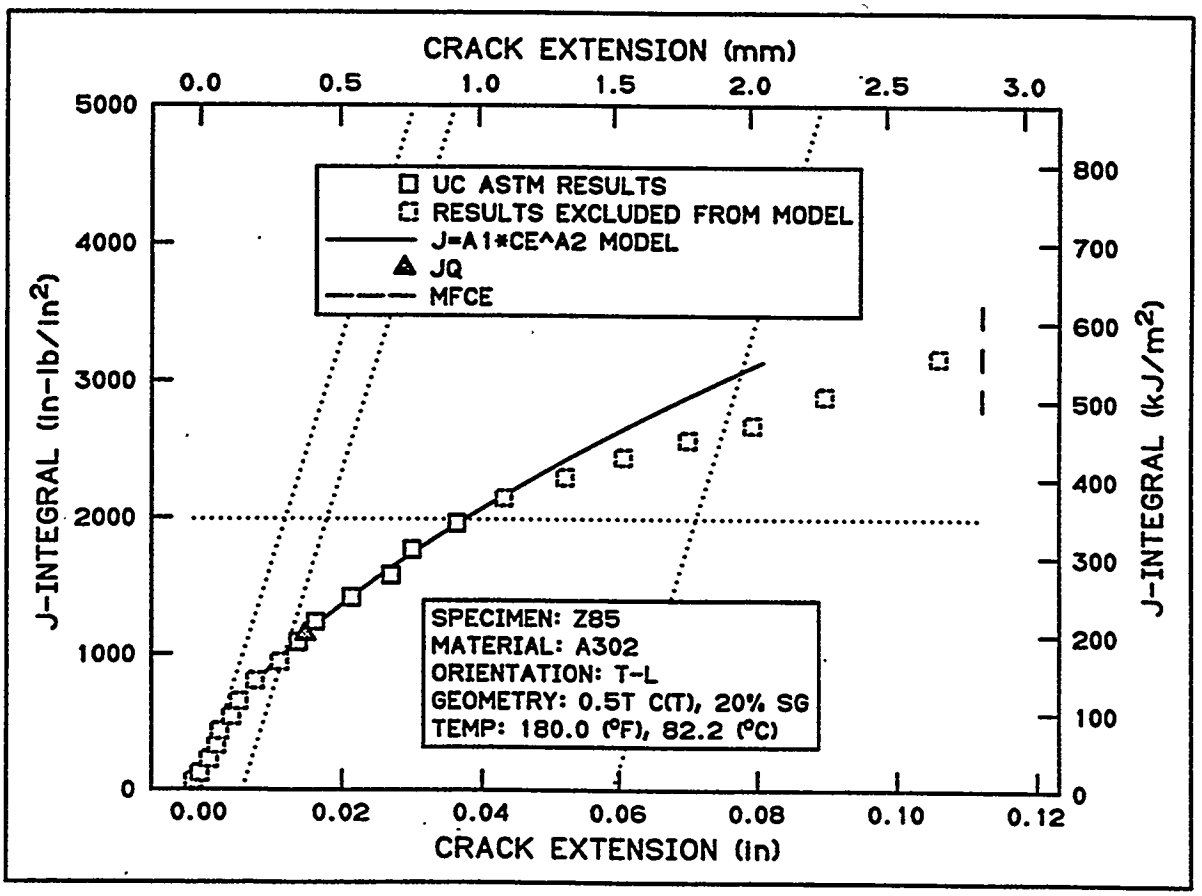

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
700
600
500
400
300
200
100
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z83
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z85
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6364 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1142	0.0066	-0.0008	64.9
2	1399	0.0095	0.0000	122.6
3	1564	0.0139	0.0013	224.6
4	1633	0.0179	0.0023	328.5
5	1688	0.0225	0.0027	433.1
6	1729	0.0267	0.0044	539.7
7	1760	0.0311	0.0054	650.5
8	1788	0.0369	0.0077	802.2
9	1808	0.0426	0.0112	942.1
10	1820	0.0483	0.0138	1087.9
11	1819	0.0542	0.0163	1239.0
12	1805	0.0615	0.0214	1420.4
13	1788	0.0687	0.0269	1581.7
14	1778	0.0759	0.0299	1767.0
15	1750	0.0845	0.0363	1960.3
16	1711	0.0930	0.0431	2145.6
17	1627	0.1016	0.0520	2296.6
18	1549	0.1102	0.0605	2441.8
19	1463	0.1189	0.0698	2568.1
20	1391	0.1275	0.0791	2677.9
21	1304	0.1414	0.0895	2889.1
22	1164	0.1632	0.1059	3170.1

  WIDTH: 0.9979 (IN),25.347 (MM)
  THICKNESS: 0.4998 (IN),12.695 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2517 (IN),6.393 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8681 (IN),22.050 (MM)
    DISTANCE 2: 0.8808 (IN),22.372 (MM)
    DISTANCE 3: 0.8881 (IN),22.558 (MM)
    DISTANCE 4: 0.8904 (IN),22.616 (MM)
    DISTANCE 5: 0.8928 (IN),22.677 (MM)
    DISTANCE 6: 0.8935 (IN),22.695 (MM)
    DISTANCE 7: 0.8922 (IN),22.662 (MM)
    DISTANCE 8: 0.8912 (IN),22.636 (MM)
    DISTANCE 9: 0.8830 (IN),22.428 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9876 (IN),25.085 (MM)
    DISTANCE 2: 1.0137 (IN),25.748 (MM)
    DISTANCE 3: 0.9986 (IN),25.364 (MM)
    DISTANCE 4: 0.9986 (IN),25.364 (MM)
    DISTANCE 5: 0.9880 (IN),25.095 (MM)
    DISTANCE 6: 0.9977 (IN),25.342 (MM)
    DISTANCE 7: 0.9950 (IN),25.273 (MM)
    DISTANCE 8: 1.0160 (IN),25.806 (MM)
    DISTANCE 9: 0.9999 (IN),25.397 (MM)

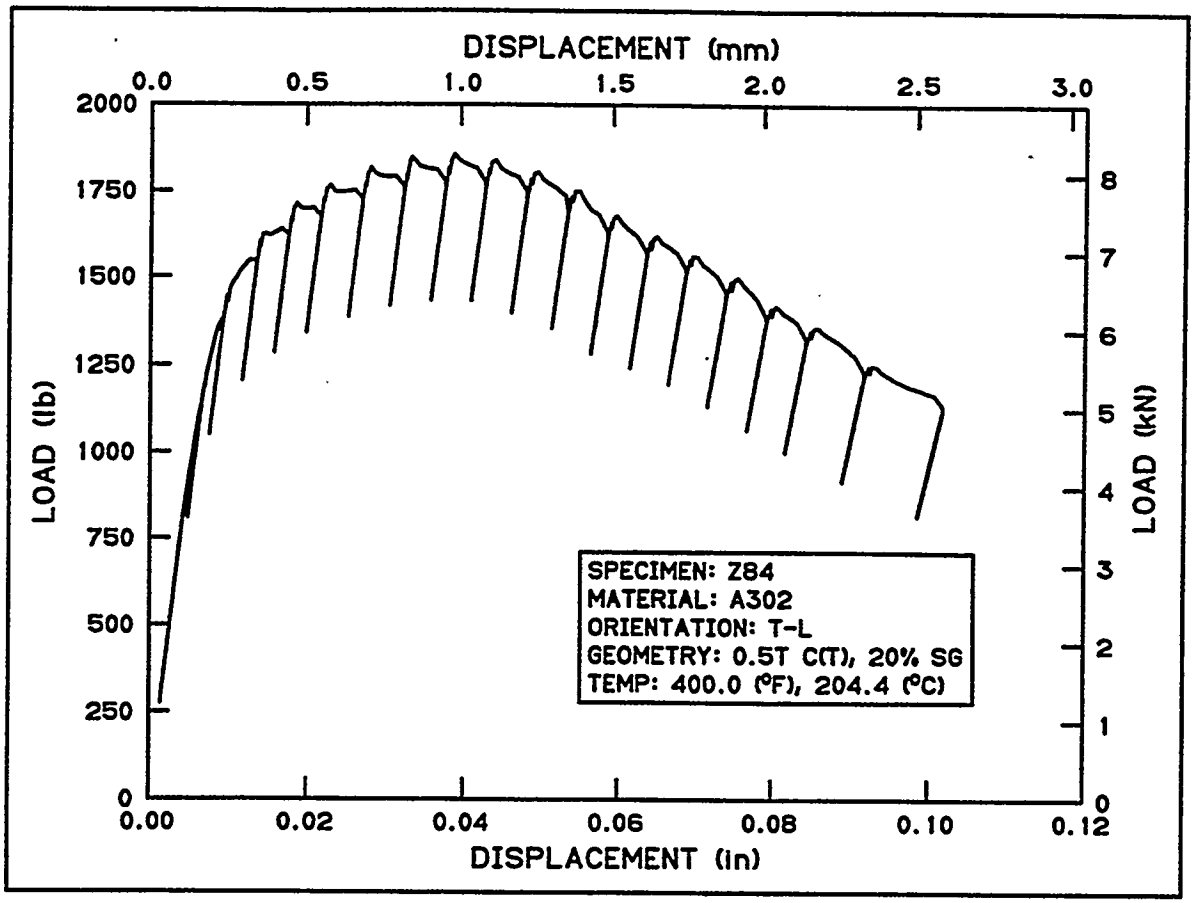

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z85
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
DISPLACEMENT (in)

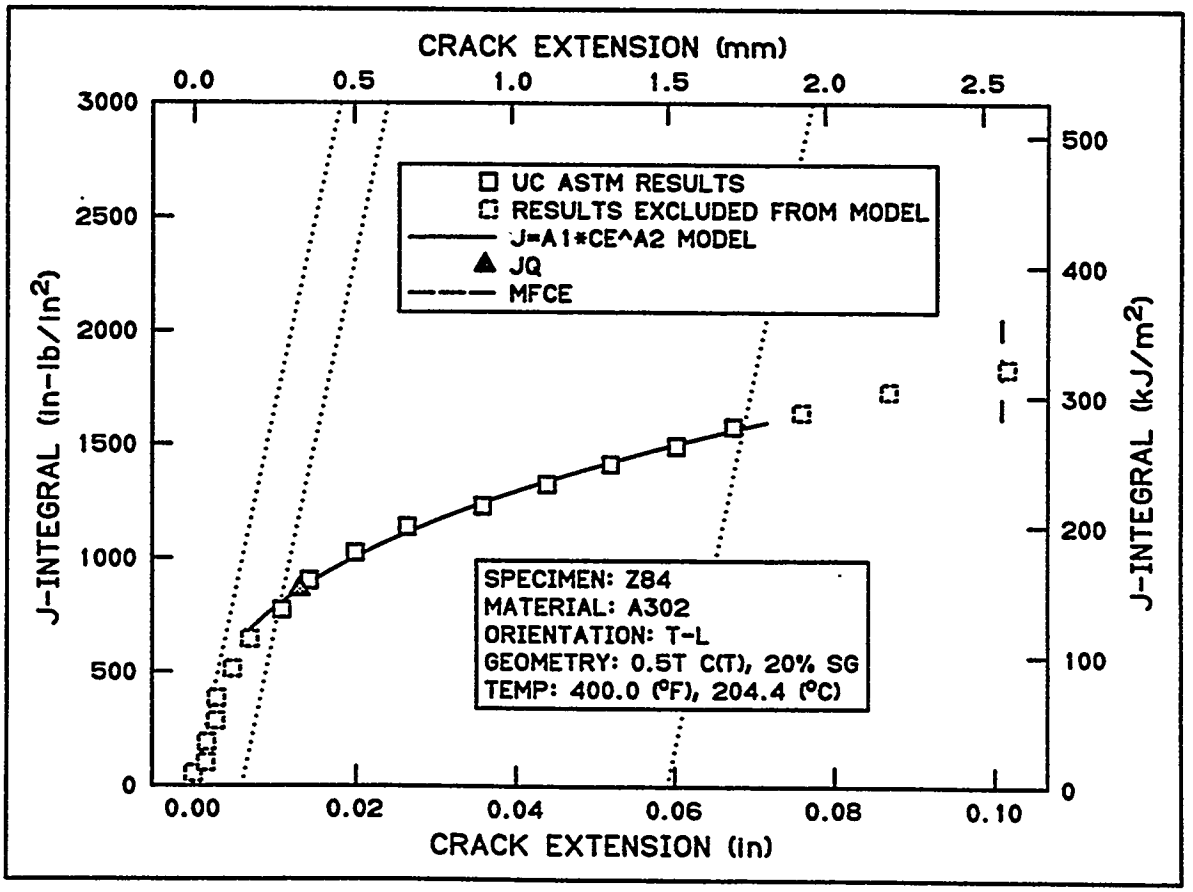

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z85
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z84
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6248 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1091	0.0061	0.0000	54.5
2	1361	0.0086	0.0015	103.1
3	1547	0.0124	0.0016	191.1
4	1640	0.0165	0.0027	284.5
5	1701	0.0205	0.0028	384.2
6	1753	0.0258	0.0048	513.2
7	1792	0.0310	0.0069	646.2
8	1811	0.0363	0.0109	775.9
9	1817	0.0414	0.0143	904.6
10	1792	0.0468	0.0199	1026.2
11	1760	0.0516	0.0264	1140.6
12	1682	0.0571	0.0358	1231.7
13	1620	0.0622	0.0438	1325.9
14	1572	0.0675	0.0518	1414.7
15	1505	0.0727	0.0602	1494.6
16	1439	0.0779	0.0673	1579.0
17	1371	0.0831	0.0759	1643.4
18	1278	0.0904	0.0868	1735.2
19	1166	0.1006	0.1015	1837.8

WIDTH: 0.9966 (IN),25.314 (MM)
THICKNESS: 0.4995 (IN),12.687 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2524 (IN),6.411 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8604 (IN),21.854 (MM)
DISTANCE 2: 0.8708 (IN),22.118 (MM)
DISTANCE 3: 0.8803 (IN),22.360 (MM)
DISTANCE 4: 0.8798 (IN),22.347 (MM)
DISTANCE 5: 0.8805 (IN),22.365 (MM)
DISTANCE 6: 0.8826 (IN),22.418 (MM)
DISTANCE 7: 0.8818 (IN),22.398 (MM)
DISTANCE 8: 0.8763 (IN),22.258 (MM)
DISTANCE 9: 0.8712 (IN),22.128 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9705 (IN),24.651 (MM)
DISTANCE 2: 0.9832 (IN),24.973 (MM)
DISTANCE 3: 0.9688 (IN),24.608 (MM)
DISTANCE 4: 0.9686 (IN),24.602 (MM)
DISTANCE 5: 0.9706 (IN),24.653 (MM)
DISTANCE 6: 0.9854 (IN),25.029 (MM)
DISTANCE 7: 0.9868 (IN),25.065 (MM)
DISTANCE 8: 0.9871 (IN),25.072 (MM)
DISTANCE 9: 0.9774 (IN),24.826 (MM)

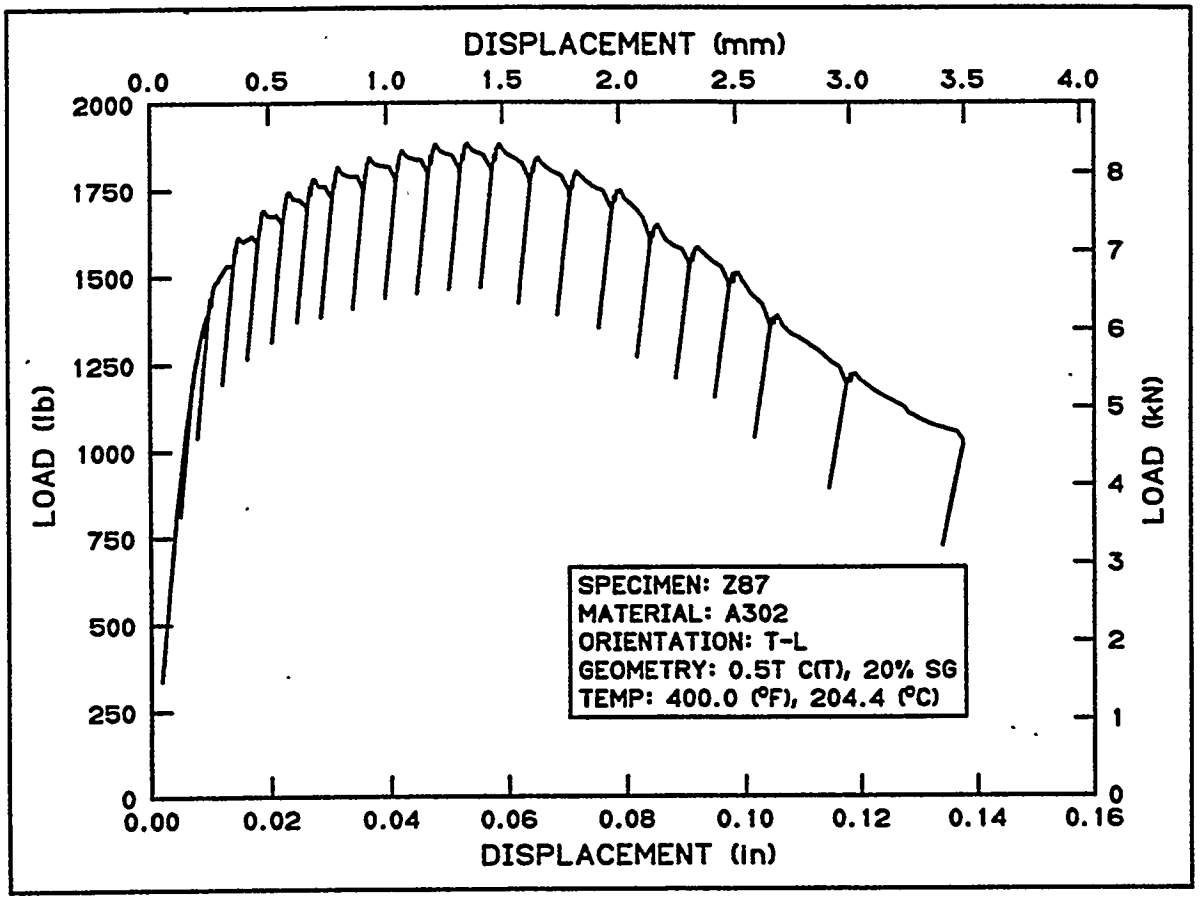

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z84
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
DISPLACEMENT (in)

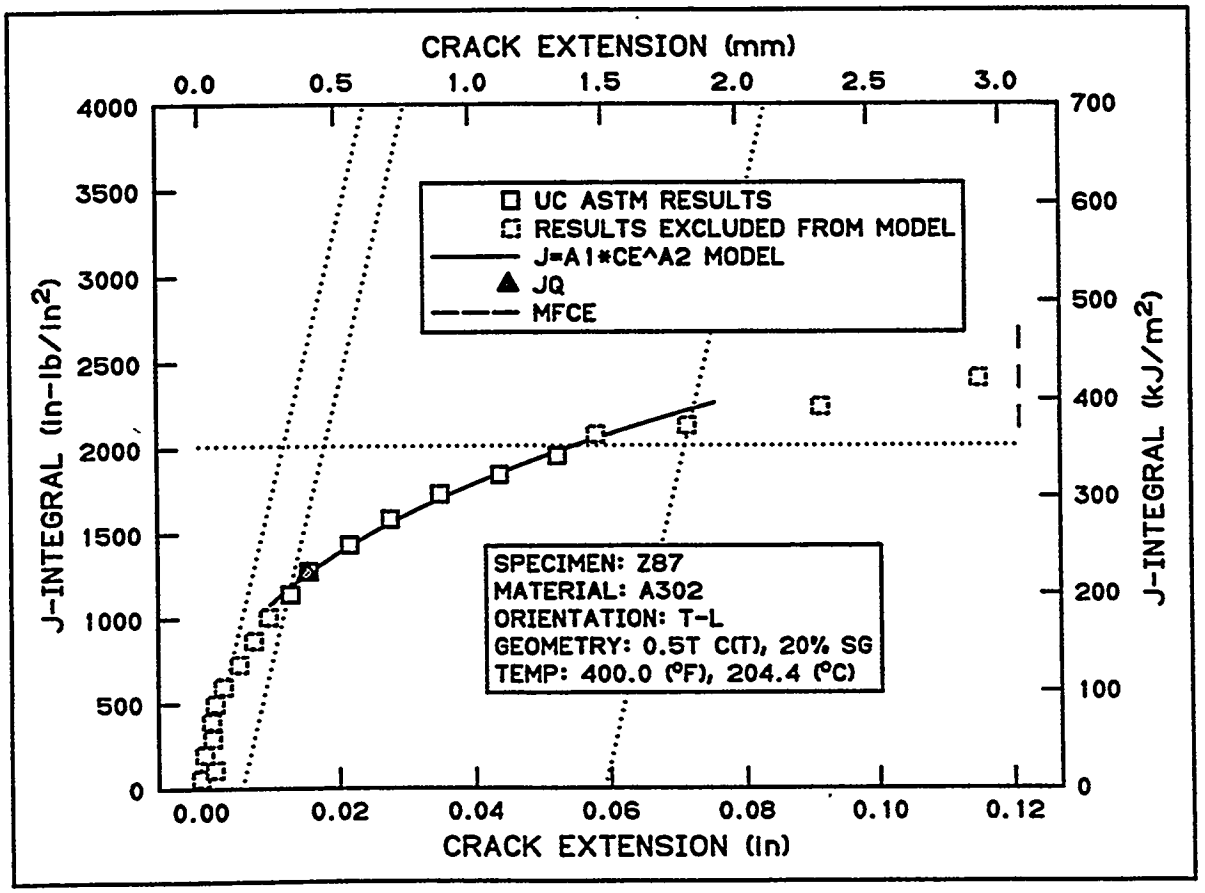

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z84
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z87
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6328 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1084	0.0062	0.0000	57.0
2	1355	0.0089	0.0020	110.0
3	1533	0.0128	0.0006	200.1
4	1618	0.0170	0.0017	294.9
5	1677	0.0210	0.0016	394.2
6	1721	0.0249	0.0021	498.1
7	1758	0.0291	0.0033	598.0
8	1789	0.0345	0.0056	729.5
9	1816	0.0399	0.0077	869.0
10	1835	0.0453	0.0099	1009.2
11	1849	0.0505	0.0131	1143.7
12	1850	0.0558	0.0157	1282.7
13	1825	0.0625	0.0216	1436.4
14	1788	0.0692	0.0276	1588.0
15	1744	0.0762	0.0349	1732.5
16	1667	0.0828	0.0438	1844.7
17	1578	0.0895	0.0524	1955.5
18	1525	0.0962	0.0581	2080.8
19	1421	0.1031	0.0716	2131.7
20	1241	0.1164	0.0914	2243.3
21	1053	0.1366	0.1150	2407.6

  WIDTH: 0.9993 (IN),25.382 (MM)
  THICKNESS: 0.4997 (IN),12.692 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2486 (IN),6.314 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8673 (IN),22.029 (MM)
    DISTANCE 2: 0.8781 (IN),22.304 (MM)
    DISTANCE 3: 0.8837 (IN),22.446 (MM)
    DISTANCE 4: 0.8840 (IN),22.454 (MM)
    DISTANCE 5: 0.8850 (IN),22.479 (MM)
    DISTANCE 6: 0.8846 (IN),22.469 (MM)
    DISTANCE 7: 0.8852 (IN),22.484 (MM)
    DISTANCE 8: 0.8813 (IN),22.385 (MM)
    DISTANCE 9: 0.8715 (IN),22.136 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9902 (IN),25.151 (MM)
    DISTANCE 2: 1.0038 (IN),25.497 (MM)
    DISTANCE 3: 1.0086 (IN),25.618 (MM)
    DISTANCE 4: 1.0114 (IN),25.690 (MM)
    DISTANCE 5: 0.9932 (IN),25.227 (MM)
    DISTANCE 6: 0.9998 (IN),25.395 (MM)
    DISTANCE 7: 1.0029 (IN),25.474 (MM)
    DISTANCE 8: 1.0026 (IN),25.466 (MM)
    DISTANCE 9: 1.0036 (IN),25.491 (MM)

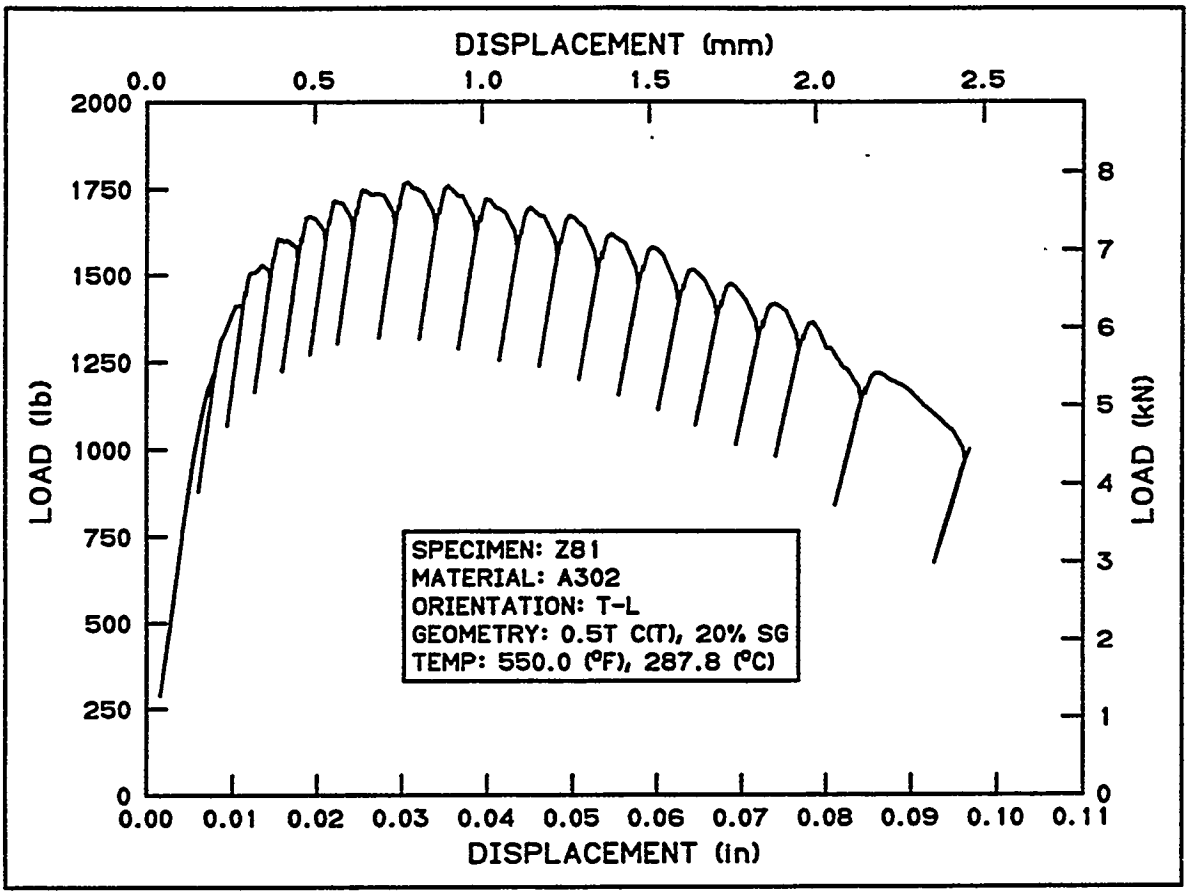

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z87
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

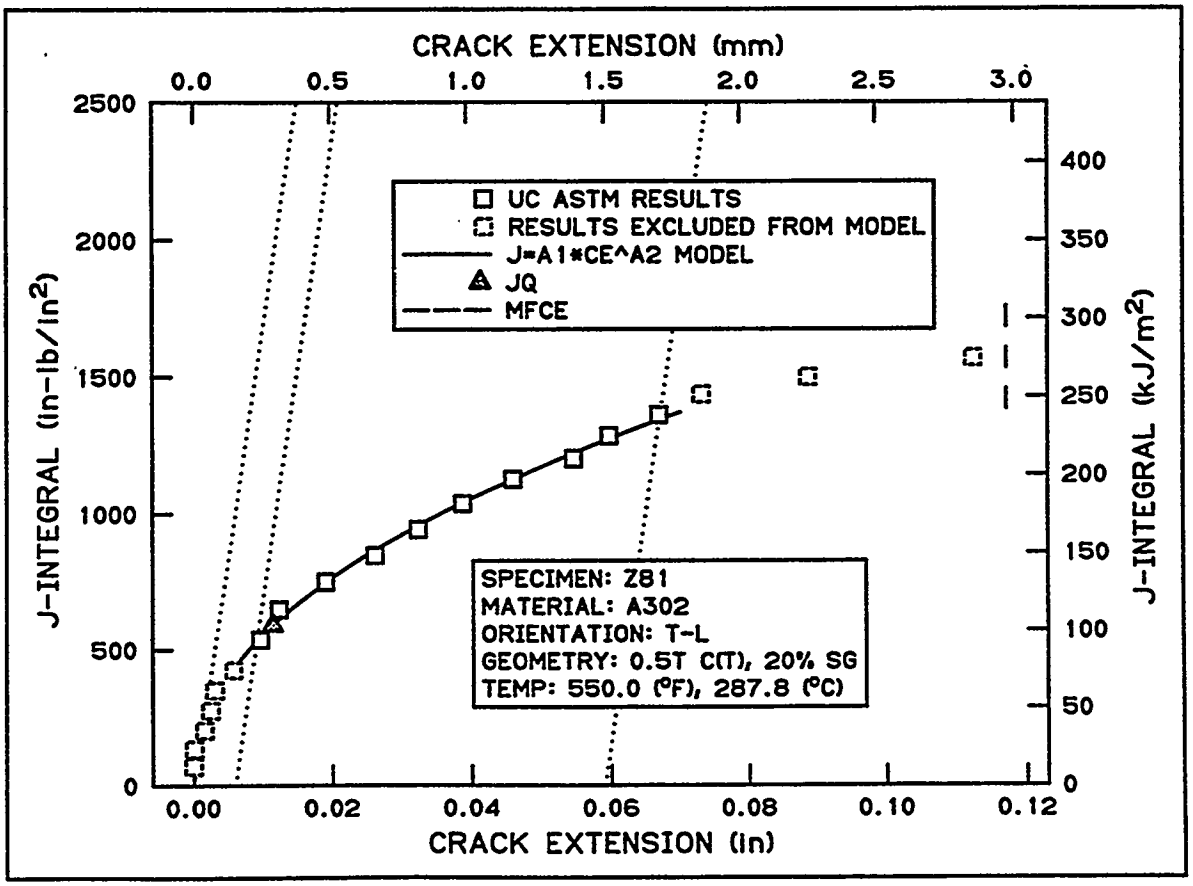

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z87
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z81
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6310 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1171	0.0072	0.0000	70.4
2	1410	0.0104	0.0001	133.0
3	1529	0.0135	0.0015	201.6
4	1602	0.0165	0.0024	273.4
5	1665	0.0197	0.0030	347.6
6	1709	0.0230	0.0057	422.8
7	1731	0.0279	0.0096	536.6
8	1740	0.0325	0.0124	649.6
9	1730	0.0371	0.0191	750.4
10	1683	0.0420	0.0262	847.6
11	1671	0.0466	0.0324	943.4
12	1639	0.0514	0.0388	1037.2
13	1592	0.0562	0.0459	1125.5
14	1558	0.0607	0.0546	1200.2
15	1484	0.0656	0.0598	1283.0
16	1427	0.0705	0.0670	1360.0
17	1396	0.0753	0.0731	1435.4
18	1229	0.0825	0.0887	1497.7
19	1050	0.0949	0.1124	1568.4

  WIDTH: 1.0007 (IN),25.418 (MM)
  THICKNESS: 0.4997 (IN),12.692 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2501 (IN),6.353 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8688 (IN),22.068 (MM)
    DISTANCE 2: 0.8764 (IN),22.261 (MM)
    DISTANCE 3: 0.8816 (IN),22.393 (MM)
    DISTANCE 4: 0.8850 (IN),22.479 (MM)
    DISTANCE 5: 0.8845 (IN),22.466 (MM)
    DISTANCE 6: 0.8853 (IN),22.487 (MM)
    DISTANCE 7: 0.8840 (IN),22.454 (MM)
    DISTANCE 8: 0.8808 (IN),22.372 (MM)
    DISTANCE 9: 0.8735 (IN),22.187 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0117 (IN),25.697 (MM)
    DISTANCE 2: 0.9982 (IN),25.354 (MM)
    DISTANCE 3: 1.0046 (IN),25.517 (MM)
    DISTANCE 4: 1.0001 (IN),25.403 (MM)
    DISTANCE 5: 1.0069 (IN),25.575 (MM)
    DISTANCE 6: 0.9998 (IN),25.395 (MM)
    DISTANCE 7: 0.9915 (IN),25.184 (MM)
    DISTANCE 8: 0.9896 (IN),25.136 (MM)
    DISTANCE 9: 0.9780 (IN),24.841 (MM)

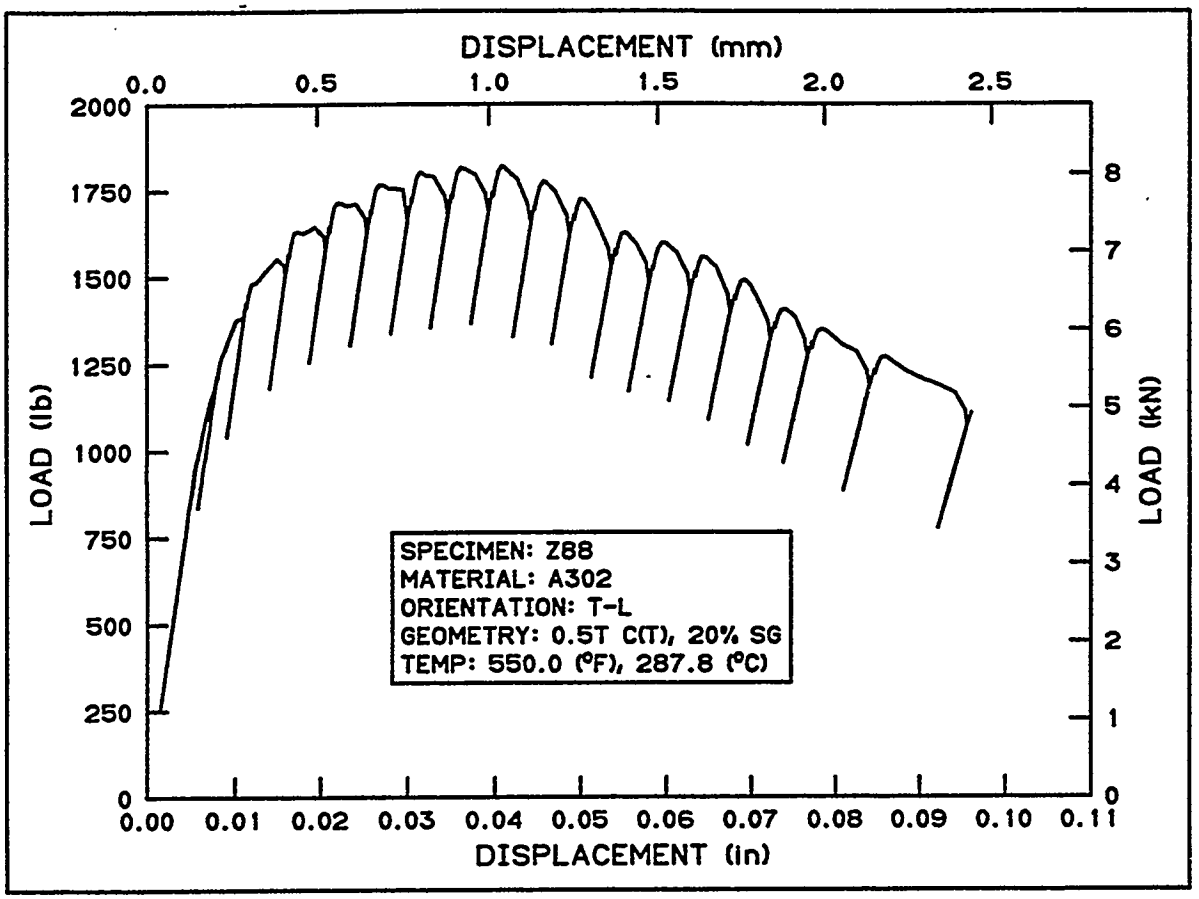

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

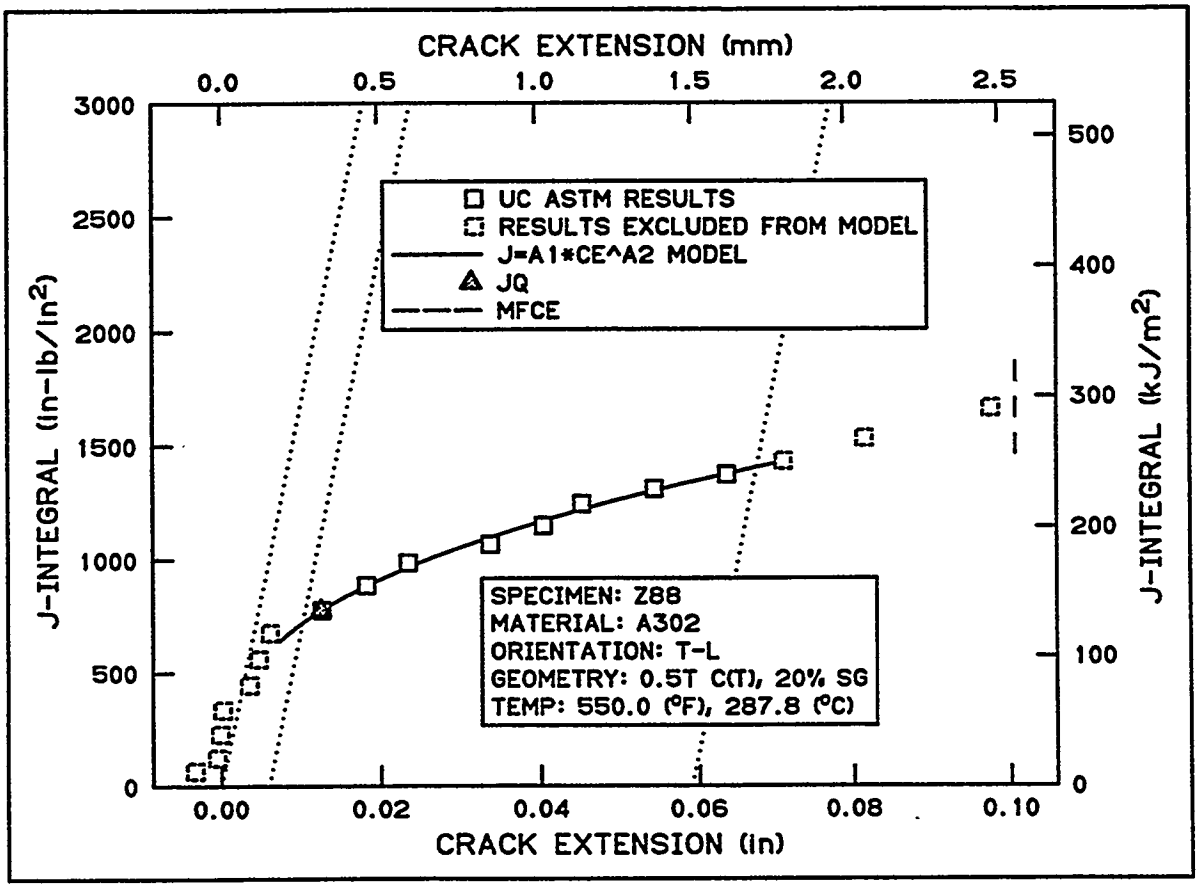

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
400
350
300
250
200
150
100
50
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z88
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6356 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1137	0.0072	-0.0033	65.6
2	1377	0.0102	-0.0006	124.3
3	1552	0.0149	-0.0001	228.8
4	1645	0.0194	0.0002	336.7
5	1710	0.0242	0.0035	445.6
6	1757	0.0286	0.0046	559.9
7	1789	0.0332	0.0061	674.3
8	1798	0.0378	0.0127	774.9
9	1785	0.0426	0.0182	885.4
10	1749	0.0470	0.0235	985.1
11	1653	0.0520	0.0336	1066.3
12	1595	0.0565	0.0403	1147.9
13	1569	0.0613	0.0452	1242.9
14	1527	0.0659	0.0544	1308.7
15	1441	0.0707	0.0636	1371.4
16	1382	0.0753	0.0709	1430.8
17	1285	0.0825	0.0814	1530.2
18	1162	0.0943	0.0975	1661.0

  WIDTH: 0.9988 (IN),25.370 (MM)
  THICKNESS: 0.4997 (IN),12.692 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2494 (IN),6.335 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8801 (IN),22.355 (MM)
    DISTANCE 2: 0.8881 (IN),22.558 (MM)
    DISTANCE 3: 0.8898 (IN),22.601 (MM)
    DISTANCE 4: 0.8895 (IN),22.593 (MM)
    DISTANCE 5: 0.8895 (IN),22.593 (MM)
    DISTANCE 6: 0.8876 (IN),22.545 (MM)
    DISTANCE 7: 0.8832 (IN),22.433 (MM)
    DISTANCE 8: 0.8777 (IN),22.294 (MM)
    DISTANCE 9: 0.8694 (IN),22.083 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9946 (IN),25.263 (MM)
    DISTANCE 2: 0.9846 (IN),25.009 (MM)
    DISTANCE 3: 0.9885 (IN),25.108 (MM)
    DISTANCE 4: 0.9846 (IN),25.009 (MM)
    DISTANCE 5: 0.9862 (IN),25.049 (MM)
    DISTANCE 6: 0.9842 (IN),24.999 (MM)
    DISTANCE 7: 0.9732 (IN),24.719 (MM)
    DISTANCE 8: 0.9921 (IN),25.199 (MM)
    DISTANCE 9: 0.9892 (IN),25.126 (MM)

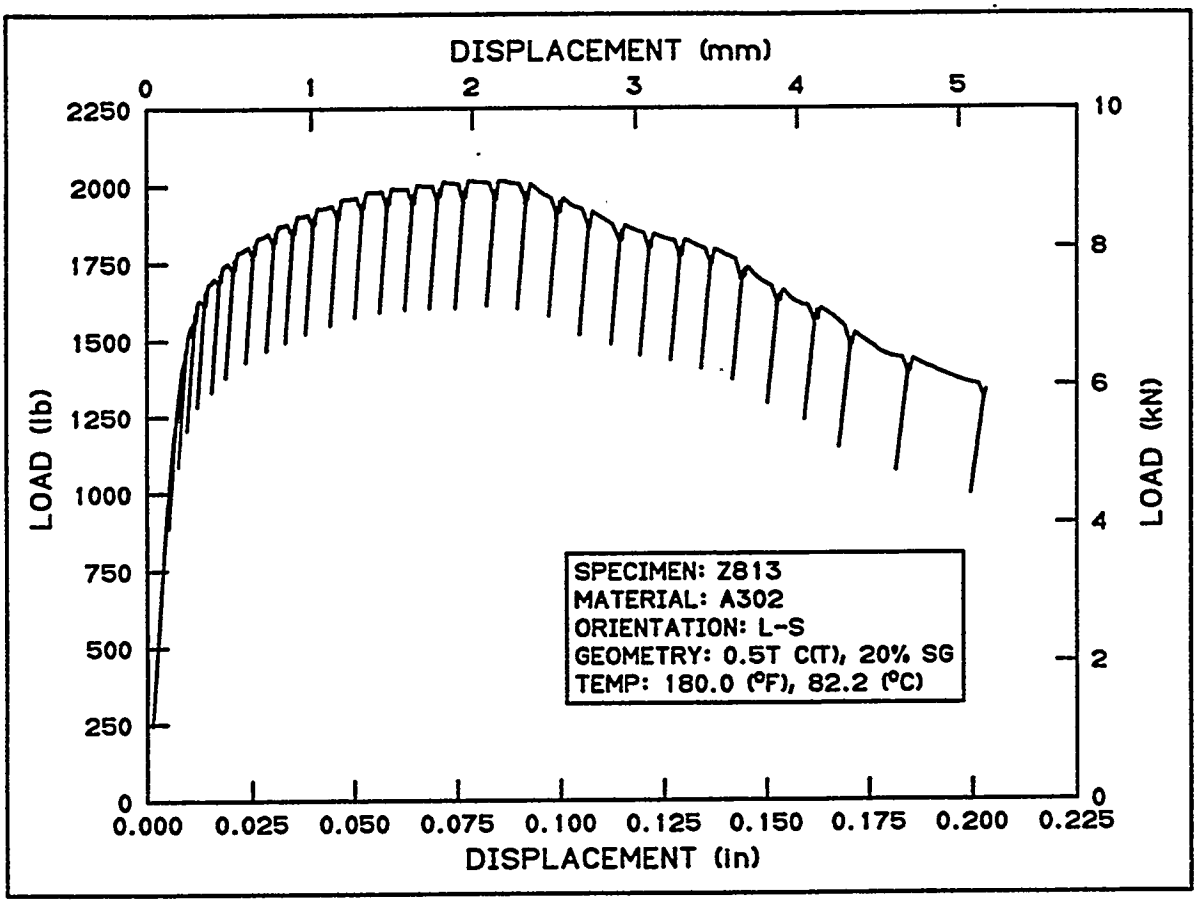

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
8
7
6
5
4
3
2
1
0
LOAD (kN)
SPECIMEN: Z88
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.01
0.02
0.03
0.04
0.05
0.06
0.07
0.08
0.09
0.10
0.11
DISPLACEMENT (in)

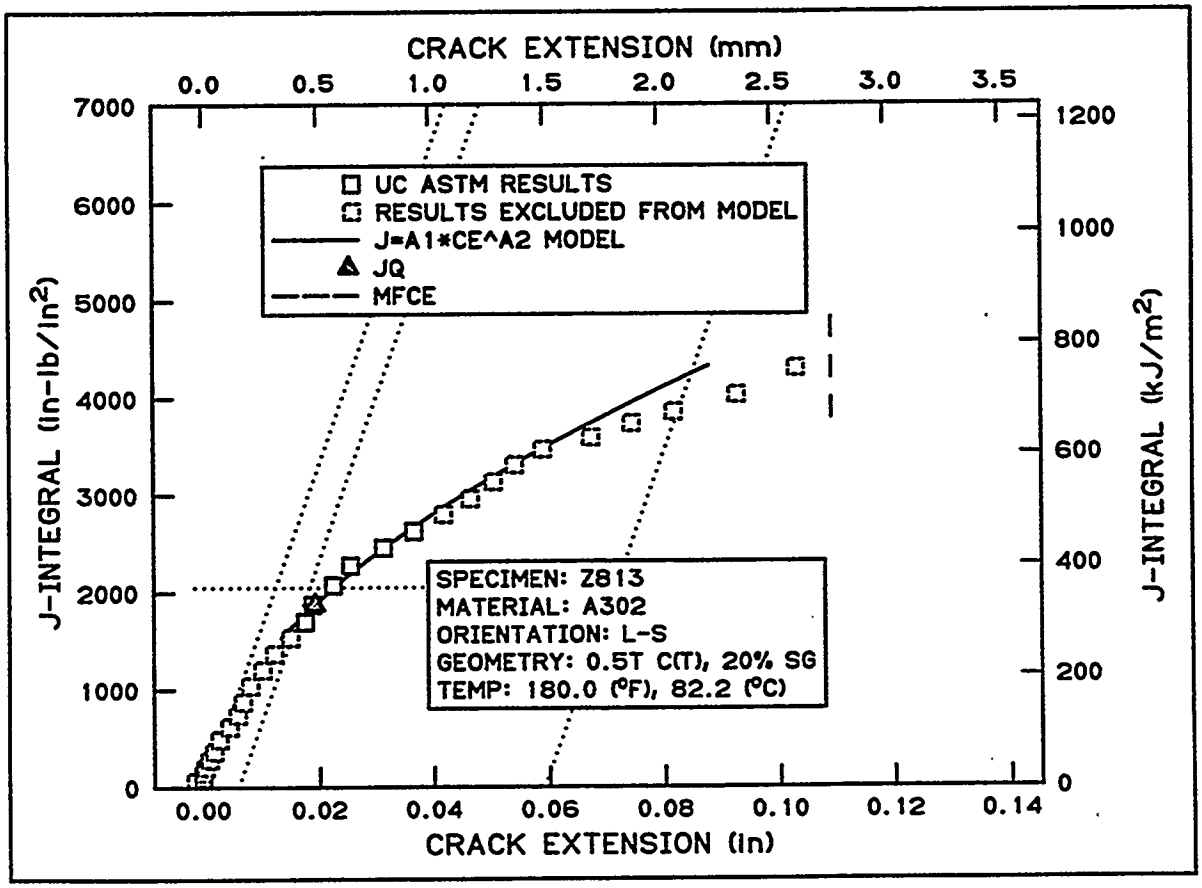

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z88
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z813
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6256 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1172	0.0064	-0.0014	61.0
2	1410	0.0086	0.0000	102.0
3	1543	0.0105	-0.0001	146.9
4	1628	0.0126	0.0003	203.9
5	1699	0.0161	0.0010	286.5
6	1748	0.0193	0.0018	369.0
7	1801	0.0242	0.0028	489.9
8	1845	0.0290	0.0045	617.9
9	1877	0.0335	0.0059	737.7
10	1906	0.0387	0.0068	871.1
11	1935	0.0446	0.0080	1036.6
12	1960	0.0506	0.0101	1202.0
13	1980	0.0569	0.0122	1368.5
14	1988	0.0630	0.0150	1532.7
15	1997	0.0691	0.0176	1696.5
16	2006	0.0754	0.0189	1873.1
17	2008	0.0827	0.0225	2071.3
18	2004	0.0900	0.0256	2274.7
19	1957	0.0978	0.0313	2456.4
20	1921	0.1052	0.0366	2627.2
21	1875	0.1125	0.0417	2799.1
22	1845	0.1201	0.0464	2958.2
23	1819	0.1277	0.0503	3132.5
24	1793	0.1352	0.0540	3305.5
25	1759	0.1425	0.0589	3464.7
26	1672	0.1513	0.0672	3587.1
27	1608	0.1601	0.0743	3733.7
28	1538	0.1692	0.0816	3852.2
29	1436	0.1831	0.0926	4029.3
30	1349	0.2015	0.1029	4306.5

WIDTH: 0.9978 (IN),25.344 (MM)
THICKNESS: 0.4996 (IN),12.690 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2516 (IN),6.391 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8694 (IN),22.083 (MM)
DISTANCE 2: 0.8752 (IN),22.230 (MM)
DISTANCE 3: 0.8781 (IN),22.304 (MM)
DISTANCE 4: 0.8796 (IN),22.342 (MM)
DISTANCE 5: 0.8816 (IN),22.393 (MM)
DISTANCE 6: 0.8806 (IN),22.367 (MM)
DISTANCE 7: 0.8784 (IN),22.311 (MM)
DISTANCE 8: 0.8748 (IN),22.220 (MM)
DISTANCE 9: 0.8690 (IN),22.073 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9634 (IN),24.470 (MM)
DISTANCE 2: 0.9893 (IN),25.128 (MM)
DISTANCE 3: 0.9916 (IN),25.187 (MM)
DISTANCE 4: 0.9842 (IN),24.999 (MM)
DISTANCE 5: 0.9801 (IN),24.895 (MM)
DISTANCE 6: 0.9852 (IN),25.024 (MM)
DISTANCE 7: 0.9863 (IN),25.052 (MM)
DISTANCE 8: 0.9930 (IN),25.222 (MM)
DISTANCE 9: 0.9966 (IN),25.314 (MM)

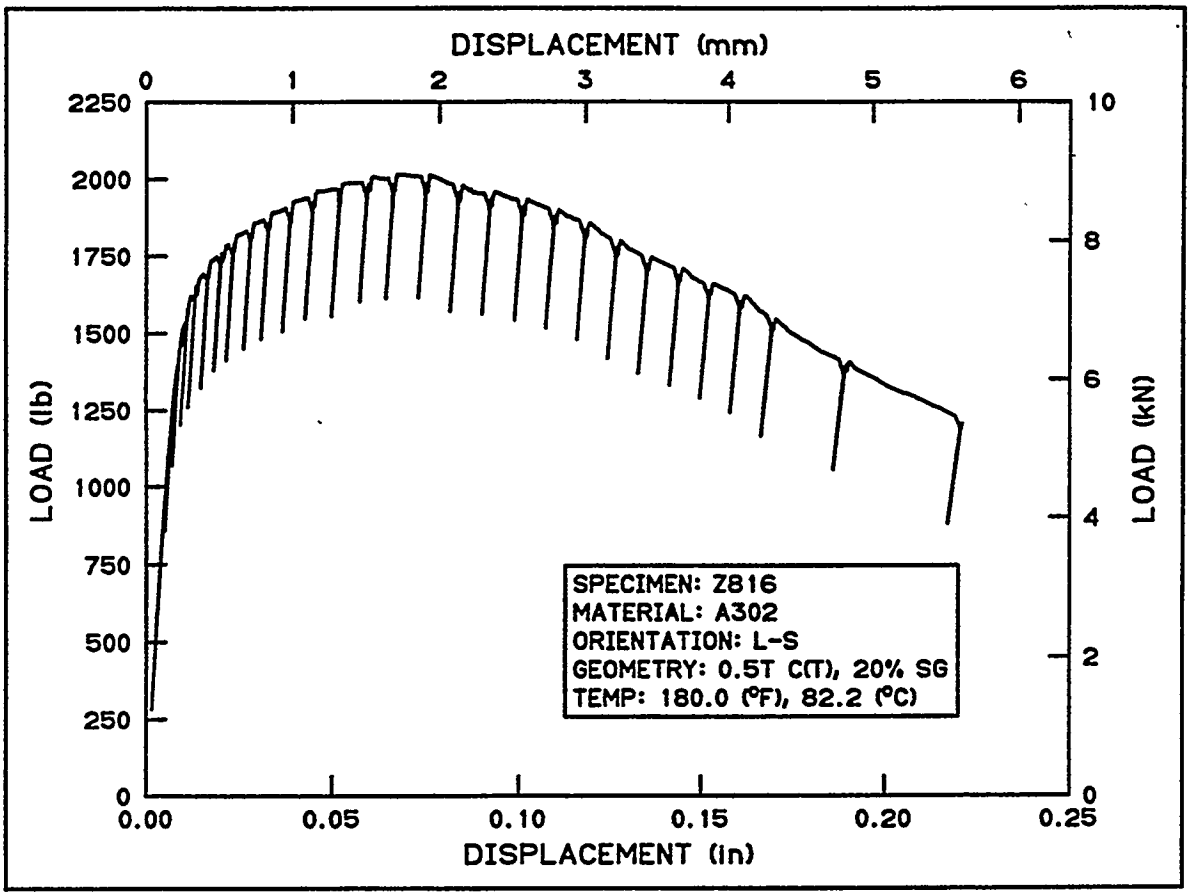

DISPLACEMENT (mm)
0
1
2
3
4
5
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z813
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
0.200
0.225
DISPLACEMENT (in)

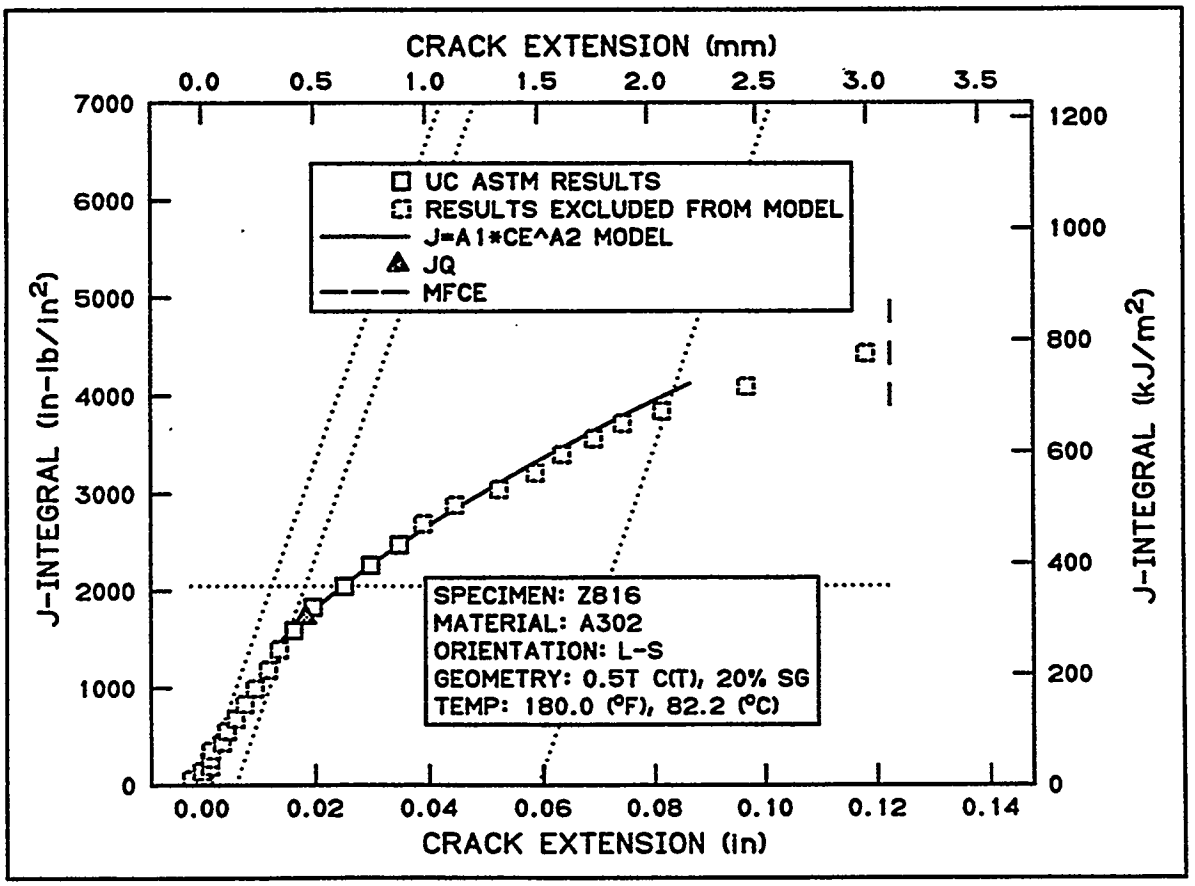

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
1200
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z813
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z816
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6254 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1120	0.0061	-0.0018	57.8
2	1370	0.0082	0.0004	94.7
3	1516	0.0100	0.0000	140.6
4	1620	0.0121	0.0014	188.1
5	1691	0.0153	0.0014	266.3
6	1747	0.0188	0.0016	353.4
7	1788	0.0219	0.0035	435.4
8	1832	0.0268	0.0044	555.8
9	1868	0.0316	0.0060	680.3
10	1905	0.0374	0.0076	833.2
11	1938	0.0434	0.0094	995.3
12	1968	0.0506	0.0117	1187.8
13	1987	0.0579	0.0137	1395.8
14	2002	0.0650	0.0163	1592.3
15	2007	0.0738	0.0196	1830.7
16	1981	0.0822	0.0251	2046.9
17	1951	0.0908	0.0298	2262.9
18	1931	0.0995	0.0348	2478.0
19	1904	0.1080	0.0390	2693.2
20	1864	0.1164	0.0445	2886.1
21	1806	0.1248	0.0523	3045.4
22	1750	0.1335	0.0587	3211.9
23	1710	0.1424	0.0634	3398.6
24	1661	0.1506	0.0692	3559.5
25	1626	0.1592	0.0743	3717.1
26	1557	0.1679	0.0814	3841.9
27	1414	0.1877	0.0967	4094.6
28	1229	0.2189	0.1180	4432.4

WIDTH: 0.9982 (IN),25.354 (MM)
THICKNESS: 0.4998 (IN),12.695 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2512 (IN),6.381 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8628 (IN),21.915 (MM)
DISTANCE 2: 0.8740 (IN),22.200 (MM)
DISTANCE 3: 0.8783 (IN),22.309 (MM)
DISTANCE 4: 0.8789 (IN),22.324 (MM)
DISTANCE 5: 0.8802 (IN),22.357 (MM)
DISTANCE 6: 0.8814 (IN),22.388 (MM)
DISTANCE 7: 0.8790 (IN),22.327 (MM)
DISTANCE 8: 0.8752 (IN),22.230 (MM)
DISTANCE 9: 0.8691 (IN),22.075 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 1.0071 (IN),25.580 (MM)
DISTANCE 2: 1.0042 (IN),25.507 (MM)
DISTANCE 3: 0.9972 (IN),25.329 (MM)
DISTANCE 4: 1.0022 (IN),25.456 (MM)
DISTANCE 5: 1.0018 (IN),25.446 (MM)
DISTANCE 6: 0.9938 (IN),25.243 (MM)
DISTANCE 7: 0.9910 (IN),25.171 (MM)
DISTANCE 8: 1.0038 (IN),25.497 (MM)
DISTANCE 9: 0.9869 (IN),25.067 (MM)

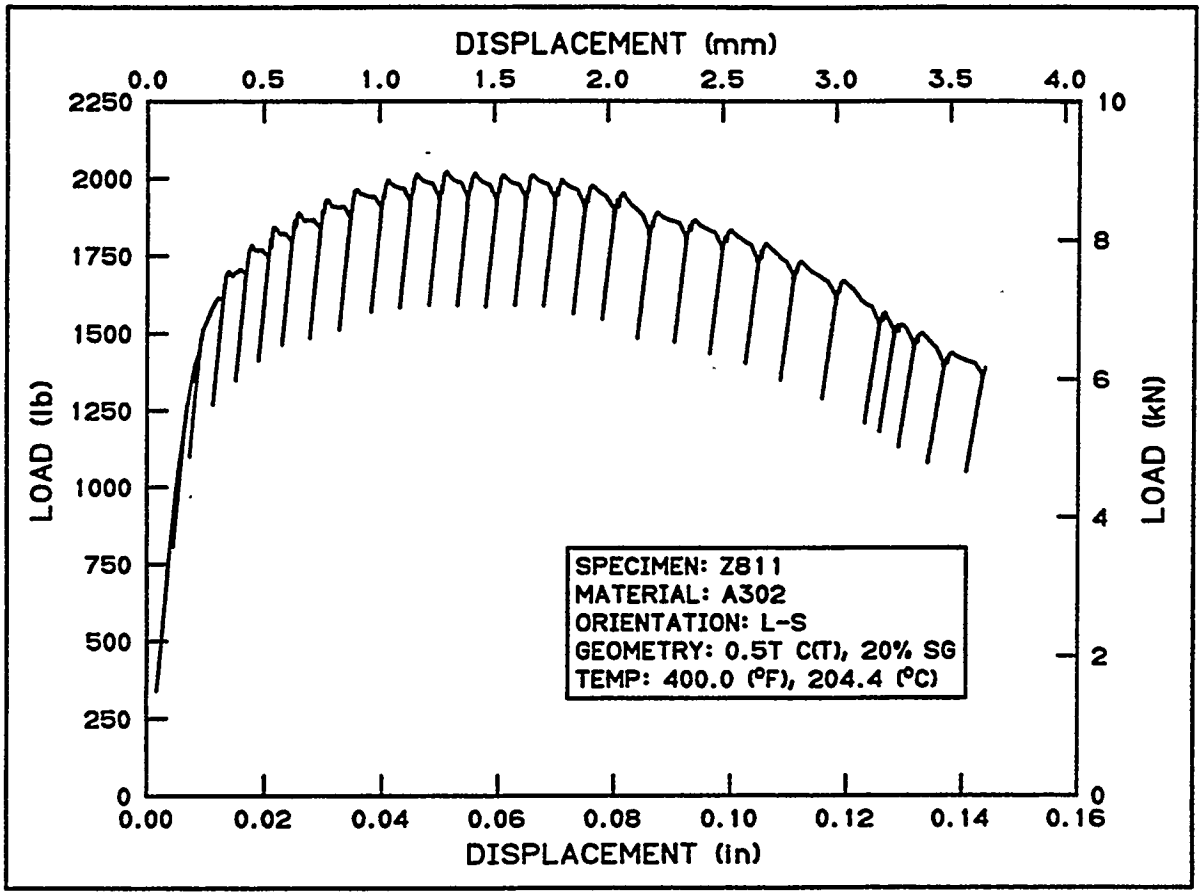

DISPLACEMENT (mm)
0
1
2
3
4
5
6
2250
2000
1750
1500
1250
1000
750
500
250
0
10
8
6
4
2
0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z816
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

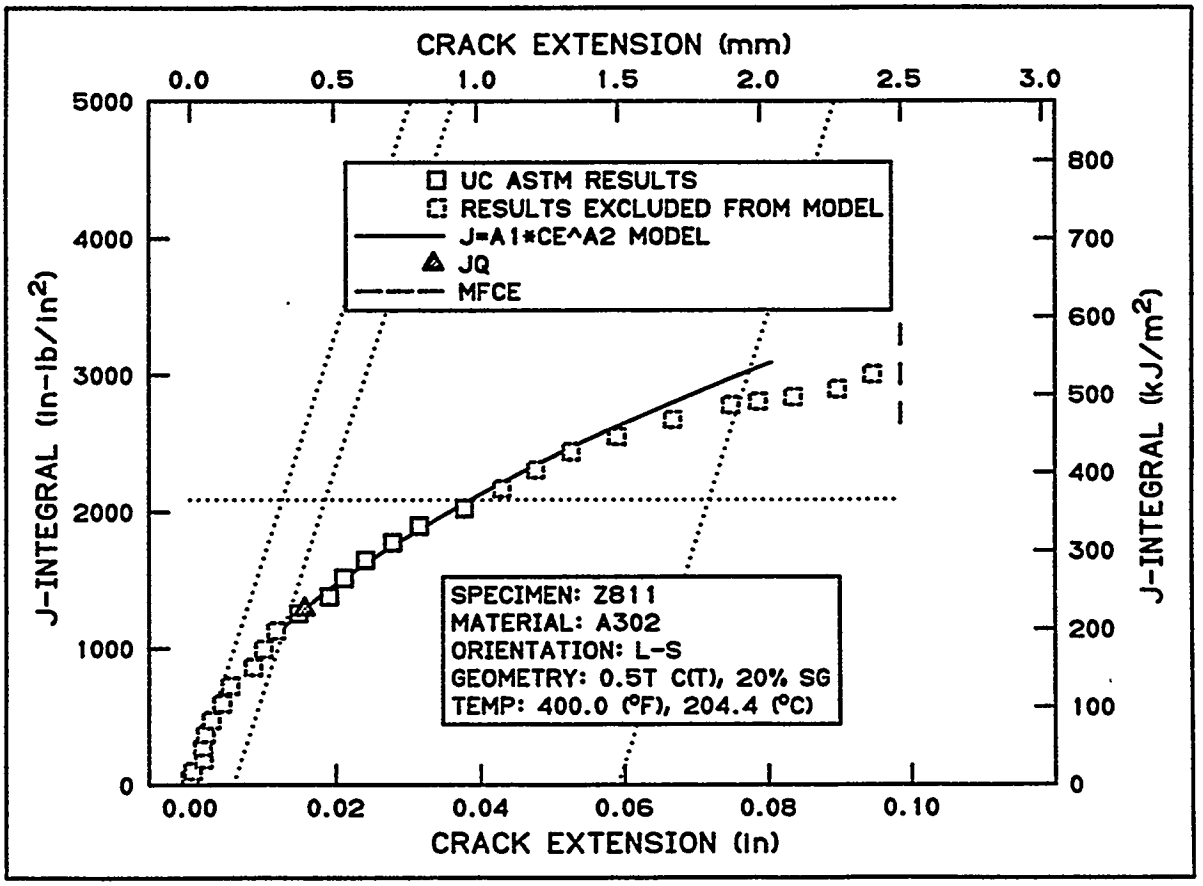

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
7000
6000
5000
4000
3000
2000
1000
0
1200
1000
800
600
400
200
0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z816
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z811
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 0.6180 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 400.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1123	0.0059	0.0000	51.4
2	1408	0.0084	0.0004	100.7
3	1613	0.0121	0.0019	185.6
4	1705	0.0159	0.0018	276.8
5	1767	0.0194	0.0021	371.2
6	1820	0.0234	0.0029	472.5
7	1865	0.0282	0.0044	595.4
8	1908	0.0334	0.0055	725.8
9	1939	0.0385	0.0086	862.4
10	1966	0.0435	0.0101	996.0
11	1981	0.0485	0.0118	1132.2
12	1985	0.0534	0.0149	1258.4
13	1979	0.0583	0.0191	1382.2
14	1978	0.0634	0.0211	1517.6
15	1979	0.0684	0.0240	1648.7
16	1962	0.0735	0.0277	1777.7
17	1942	0.0784	0.0314	1898.7
18	1881	0.0846	0.0377	2025.9
19	1853	0.0910	0.0429	2167.9
20	1824	0.0971	0.0477	2305.0
21	1783	0.1033	0.0527	2436.9
22	1730	0.1094	0.0590	2547.6
23	1664	0.1167	0.0666	2672.2
24	1583	0.1243	0.0748	2781.1
25	1564	0.1266	0.0785	2807.3
26	1509	0.1304	0.0835	2840.0
27	1452	0.1354	0.0897	2897.2
28	1401	0.1421	0.0945	3005.5

WIDTH: 0.9978 (IN),25.344 (MM)
THICKNESS: 0.4996 (IN),12.690 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2511 (IN),6.378 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.8573 (IN),21.775 (MM)
DISTANCE 2: 0.8642 (IN),21.951 (MM)
DISTANCE 3: 0.8682 (IN),22.052 (MM)
DISTANCE 4: 0.8710 (IN),22.123 (MM)
DISTANCE 5: 0.8721 (IN),22.151 (MM)
DISTANCE 6: 0.8733 (IN),22.182 (MM)
DISTANCE 7: 0.8744 (IN),22.210 (MM)
DISTANCE 8: 0.8700 (IN),22.098 (MM)
DISTANCE 9: 0.8616 (IN),21.885 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 0.9662 (IN),24.541 (MM)
DISTANCE 2: 0.9688 (IN),24.608 (MM)
DISTANCE 3: 0.9732 (IN),24.719 (MM)
DISTANCE 4: 0.9721 (IN),24.691 (MM)
DISTANCE 5: 0.9668 (IN),24.557 (MM)
DISTANCE 6: 0.9604 (IN),24.394 (MM)
DISTANCE 7: 0.9632 (IN),24.465 (MM)
DISTANCE 8: 0.9761 (IN),24.793 (MM)
DISTANCE 9: 0.9527 (IN),24.199 (MM)

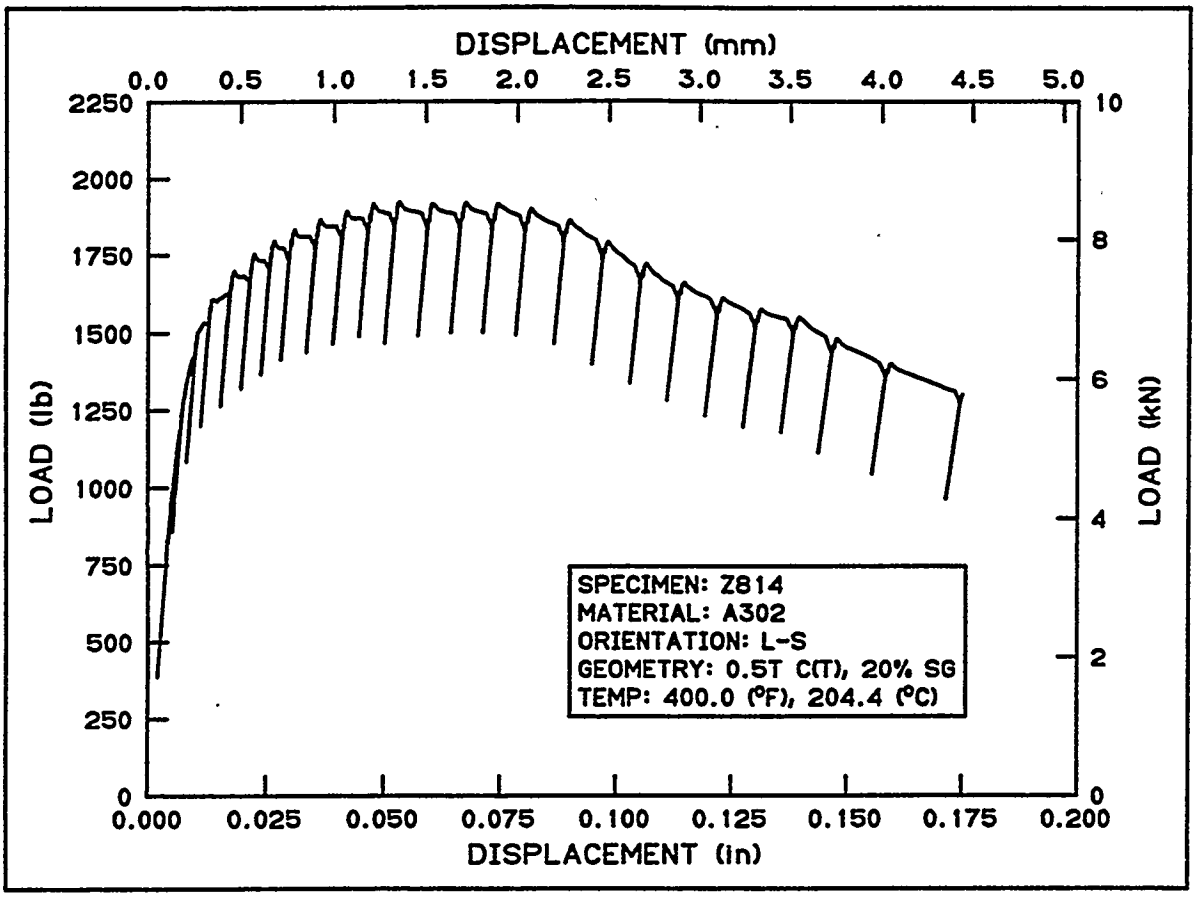

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
2250
2000
1750
1500
1250
1000
750
500
250
0
LOAD (lb)
10
8
6
4
2
0
LOAD (kN)
SPECIMEN: Z811
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
0.16
DISPLACEMENT (in)

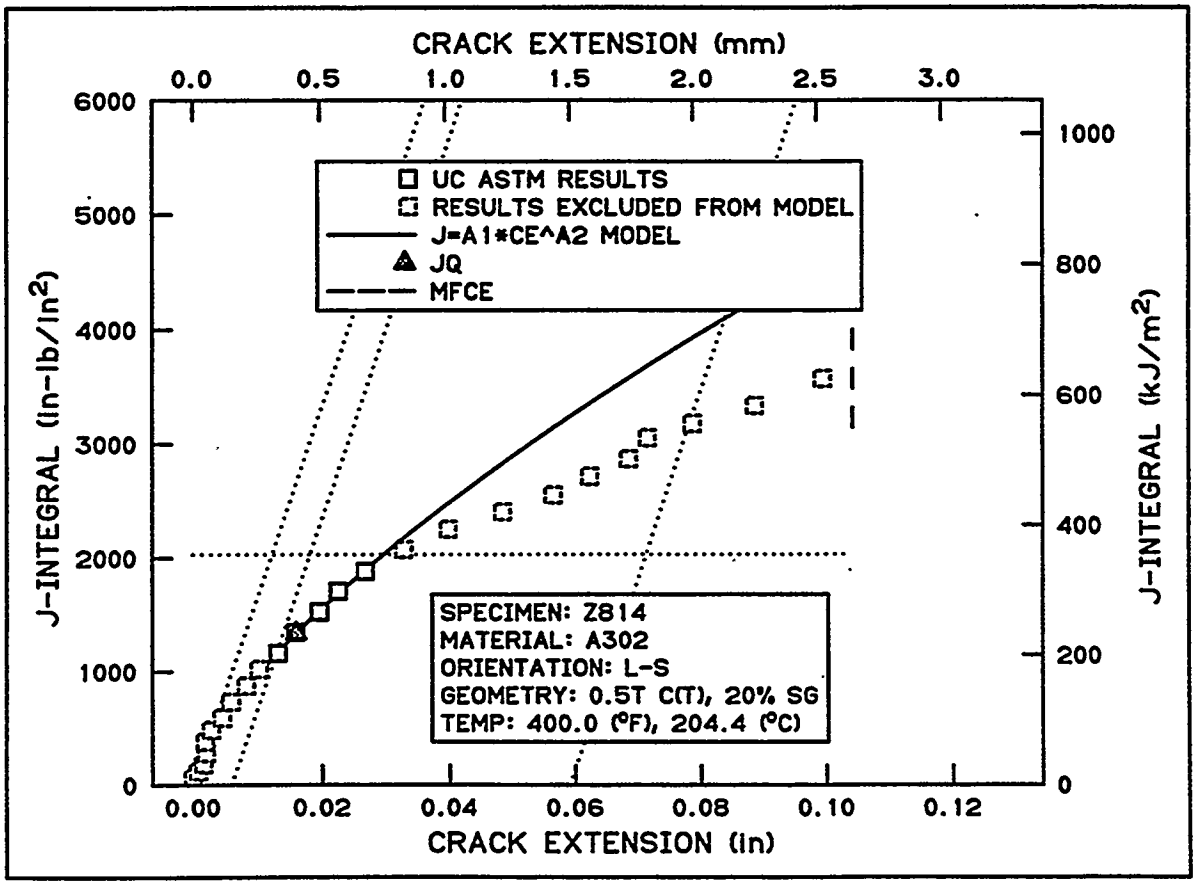

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
800
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z811
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z814
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6305 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 400.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1148	0.0065	0.0000	61.8
2	1412	0.0094	0.0008	118.3
3	1533	0.0119	0.0016	182.7
4	1618	0.0160	0.0020	280.1
5	1683	0.0204	0.0019	382.5
6	1732	0.0246	0.0028	485.6
7	1772	0.0288	0.0045	591.4
8	1811	0.0343	0.0059	732.3
9	1845	0.0398	0.0082	874.7
10	1870	0.0454	0.0102	1019.9
11	1886	0.0511	0.0131	1161.5
12	1885	0.0581	0.0160	1348.0
13	1885	0.0652	0.0196	1527.5
14	1886	0.0719	0.0225	1706.8
15	1879	0.0791	0.0267	1881.9
16	1846	0.0874	0.0328	2074.3
17	1799	0.0956	0.0398	2252.6
18	1713	0.1039	0.0484	2404.4
19	1649	0.1123	0.0565	2551.7
20	1607	0.1203	0.0623	2715.8
21	1562	0.1288	0.0685	2868.3
22	1542	0.1369	0.0715	3052.9
23	1487	0.1453	0.0786	3177.8
24	1403	0.1570	0.0886	3335.6
25	1310	0.1733	0.0994	3572.8

  WIDTH: 0.9996 (IN),25.390 (MM)
  THICKNESS: 0.5000 (IN),12.700 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2502 (IN),6.355 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8664 (IN),22.007 (MM)
    DISTANCE 2: 0.8769 (IN),22.273 (MM)
    DISTANCE 3: 0.8816 (IN),22.393 (MM)
    DISTANCE 4: 0.8840 (IN),22.454 (MM)
    DISTANCE 5: 0.8858 (IN),22.499 (MM)
    DISTANCE 6: 0.8852 (IN),22.484 (MM)
    DISTANCE 7: 0.8838 (IN),22.449 (MM)
    DISTANCE 8: 0.8803 (IN),22.360 (MM)
    DISTANCE 9: 0.8698 (IN),22.093 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9896 (IN),25.136 (MM)
    DISTANCE 2: 0.9902 (IN),25.151 (MM)
    DISTANCE 3: 0.9772 (IN),24.821 (MM)
    DISTANCE 4: 0.9729 (IN),24.712 (MM)
    DISTANCE 5: 0.9866 (IN),25.060 (MM)
    DISTANCE 6: 0.9878 (IN),25.090 (MM)
    DISTANCE 7: 0.9856 (IN),25.034 (MM)
    DISTANCE 8: 0.9900 (IN),25.146 (MM)
    DISTANCE 9: 0.9876 (IN),25.085 (MM)

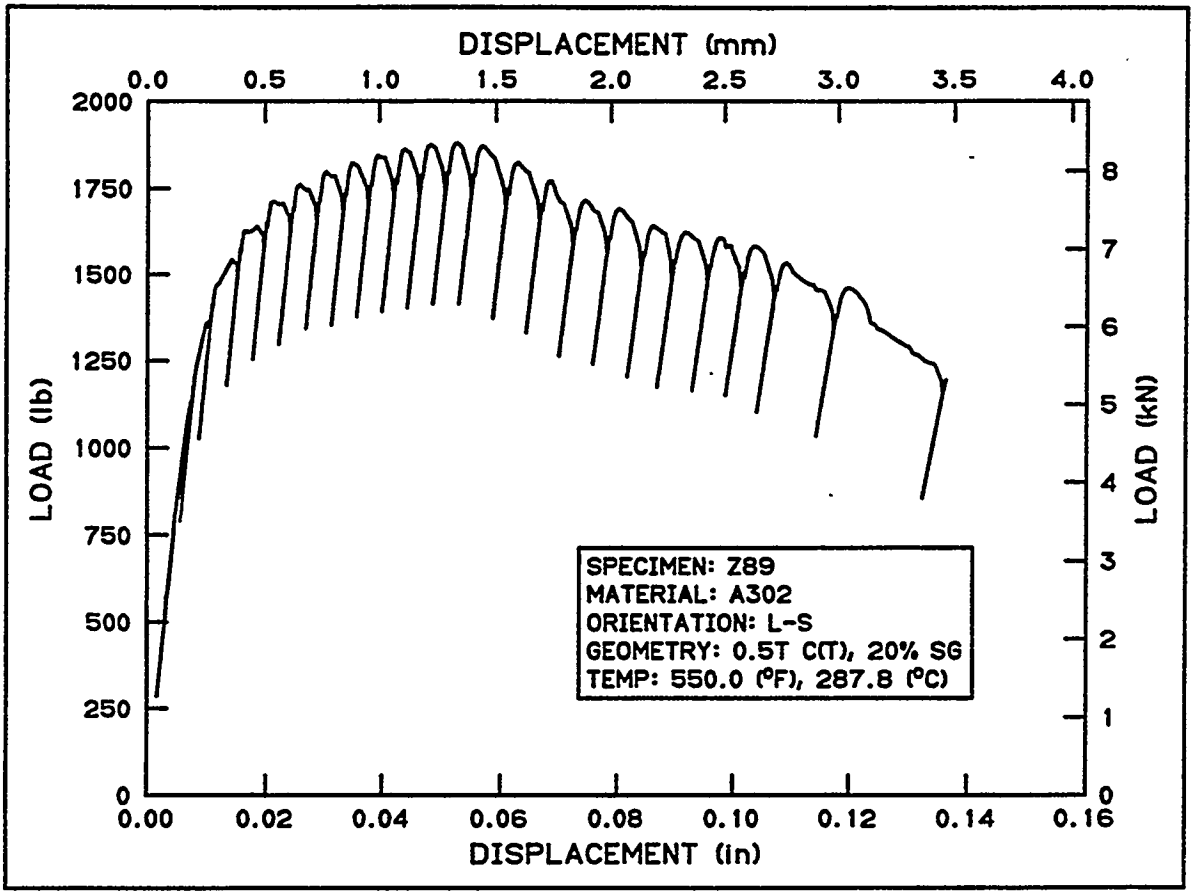

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z814
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

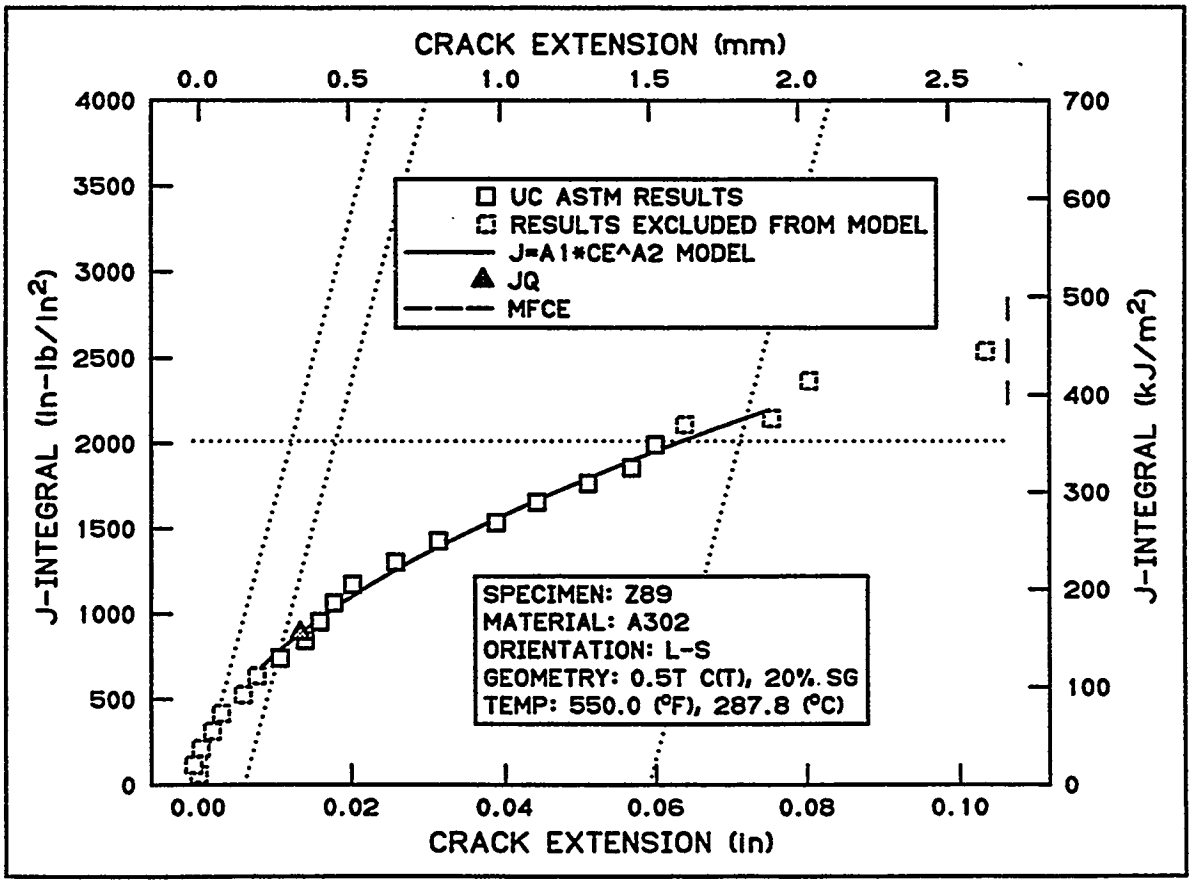

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z814
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 400.0 (°F), 204.4 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z89
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6328 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1094	0.0068	0.0000	60.0
2	1356	0.0098	-0.0007	115.5
3	1542	0.0141	0.0003	212.2
4	1639	0.0183	0.0018	312.8
5	1706	0.0227	0.0029	417.2
6	1745	0.0272	0.0058	526.8
7	1784	0.0317	0.0076	637.5
8	1811	0.0358	0.0106	741.5
9	1837	0.0403	0.0139	845.8
10	1850	0.0446	0.0158	954.2
11	1864	0.0489	0.0177	1064.3
12	1868	0.0533	0.0202	1172.8
13	1836	0.0588	0.0259	1303.8
14	1792	0.0647	0.0314	1429.1
15	1705	0.0706	0.0389	1536.1
16	1678	0.0765	0.0442	1656.1
17	1652	0.0824	0.0509	1767.1
18	1617	0.0882	0.0568	1859.3
19	1597	0.0938	0.0599	1993.2
20	1580	0.0995	0.0638	2111.2
21	1563	0.1052	0.0753	2148.7
22	1448	0.1158	0.0803	2367.7
23	1239	0.1345	0.1033	2541.0

  WIDTH: 0.9992 (IN),25.380 (MM)
  THICKNESS: 0.4994 (IN),12.685 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2506 (IN),6.365 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8720 (IN),22.149 (MM)
    DISTANCE 2: 0.8791 (IN),22.329 (MM)
    DISTANCE 3: 0.8836 (IN),22.443 (MM)
    DISTANCE 4: 0.8879 (IN),22.553 (MM)
    DISTANCE 5: 0.8874 (IN),22.540 (MM)
    DISTANCE 6: 0.8880 (IN),22.555 (MM)
    DISTANCE 7: 0.8860 (IN),22.504 (MM)
    DISTANCE 8: 0.8815 (IN),22.390 (MM)
    DISTANCE 9: 0.8750 (IN),22.225 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 1.0078 (IN),25.598 (MM)
    DISTANCE 2: 1.0010 (IN),25.425 (MM)
    DISTANCE 3: 0.9940 (IN),25.248 (MM)
    DISTANCE 4: 0.9876 (IN),25.085 (MM)
    DISTANCE 5: 0.9843 (IN),25.001 (MM)
    DISTANCE 6: 0.9853 (IN),25.027 (MM)
    DISTANCE 7: 0.9789 (IN),24.864 (MM)
    DISTANCE 8: 0.9834 (IN),24.978 (MM)
    DISTANCE 9: 0.9963 (IN),25.306 (MM)

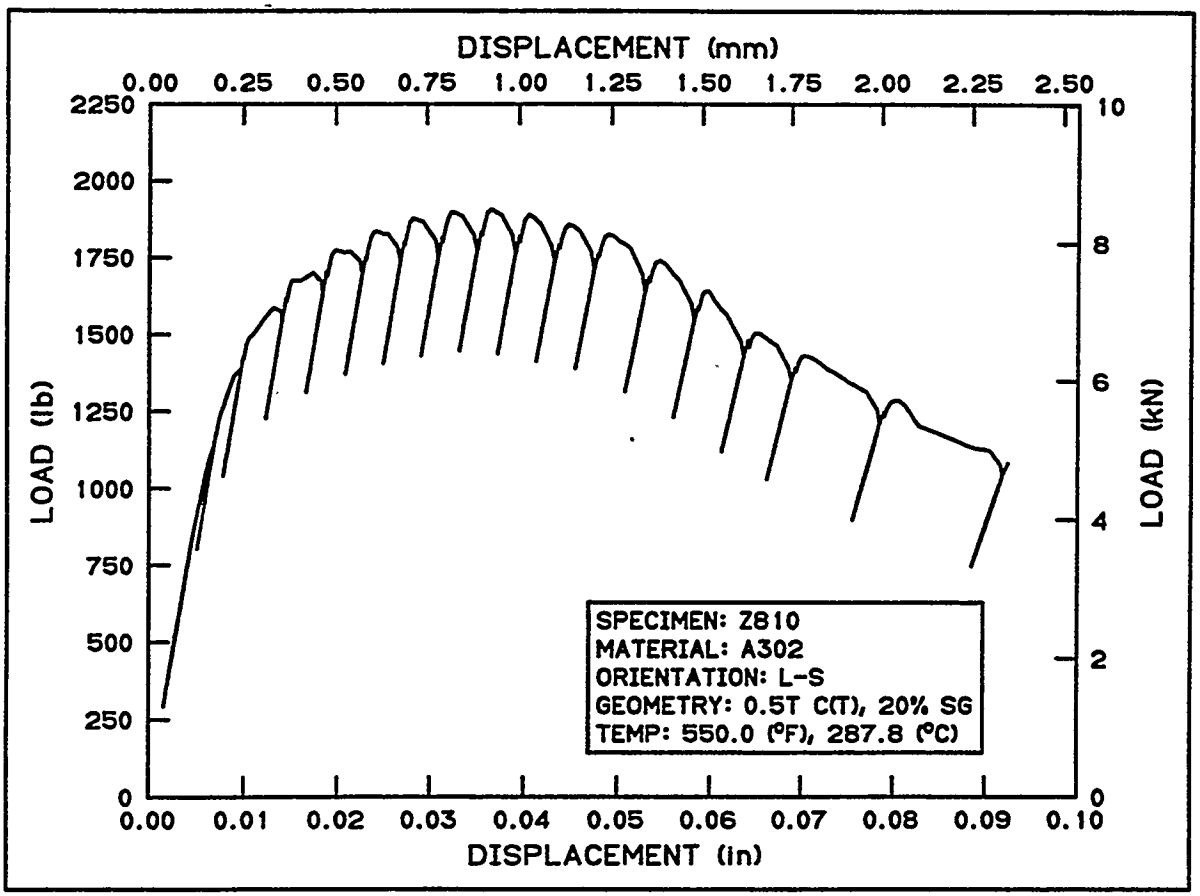

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
LOAD (lb)
2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
8 7 6 5 4 3 2 1 0
SPECIMEN: Z89
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12 0.14 0.16
DISPLACEMENT (in)

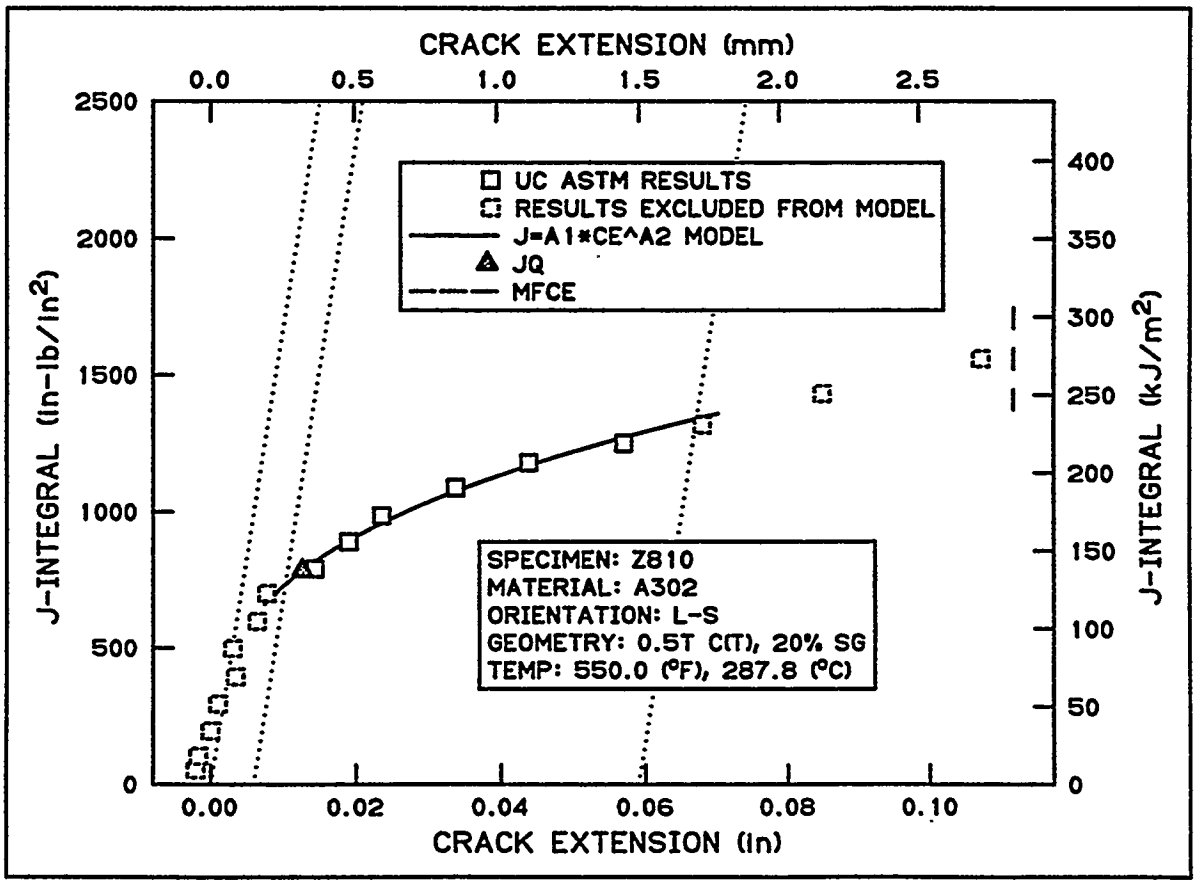

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
4000 3500 3000 2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
700 600 500 400 300 200 100 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z89
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z810
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 0.5T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 0.6277 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	1091	0.0063	-0.0020	53.8
2	1366	0.0089	-0.0016	103.3
3	1587	0.0131	0.0000	196.1
4	1701	0.0173	0.0010	294.8
5	1771	0.0212	0.0034	393.3
6	1829	0.0253	0.0030	497.6
7	1867	0.0291	0.0064	597.7
8	1886	0.0333	0.0077	701.4
9	1889	0.0375	0.0144	791.6
10	1861	0.0417	0.0190	889.9
11	1836	0.0459	0.0236	985.9
12	1782	0.0513	0.0339	1088.2
13	1678	0.0565	0.0439	1179.9
14	1562	0.0618	0.0570	1250.1
15	1466	0.0673	0.0679	1317.2
16	1314	0.0771	0.0848	1432.0
17	1123	0.0905	0.1071	1559.4

  WIDTH: 1.0018 (IN),25.446 (MM)
  THICKNESS: 0.4996 (IN),12.690 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.2489 (IN),6.322 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.8657 (IN),21.989 (MM)
    DISTANCE 2: 0.8717 (IN),22.141 (MM)
    DISTANCE 3: 0.8772 (IN),22.281 (MM)
    DISTANCE 4: 0.8807 (IN),22.370 (MM)
    DISTANCE 5: 0.8814 (IN),22.388 (MM)
    DISTANCE 6: 0.8818 (IN),22.398 (MM)
    DISTANCE 7: 0.8798 (IN),22.347 (MM)
    DISTANCE 8: 0.8733 (IN),22.182 (MM)
    DISTANCE 9: 0.8685 (IN),22.060 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 0.9863 (IN),25.052 (MM)
    DISTANCE 2: 0.9782 (IN),24.846 (MM)
    DISTANCE 3: 0.9926 (IN),25.212 (MM)
    DISTANCE 4: 0.9811 (IN),24.920 (MM)
    DISTANCE 5: 0.9961 (IN),25.301 (MM)
    DISTANCE 6: 0.9984 (IN),25.359 (MM)
    DISTANCE 7: 0.9960 (IN),25.298 (MM)
    DISTANCE 8: 0.9788 (IN),24.862 (MM)
    DISTANCE 9: 0.9848 (IN),25.014 (MM)

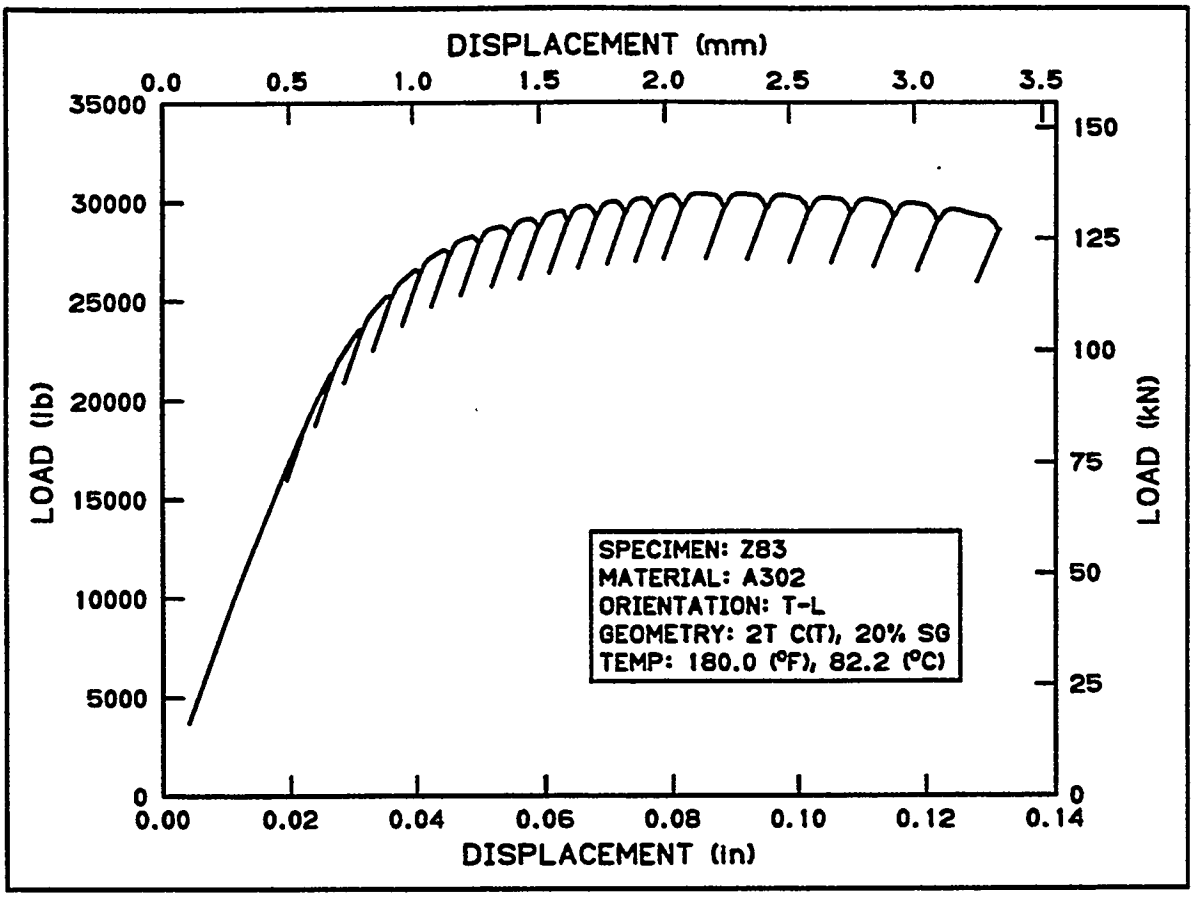

DISPLACEMENT (mm)
0.00 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 2.25 2.50
LOAD (lb)
2250 2000 1750 1500 1250 1000 750 500 250 0
LOAD (kN)
10 8 6 4 2 0
SPECIMEN: Z810
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.01 0.02 0.03 0.04 0.05 0.06 0.07 0.08 0.09 0.10
DISPLACEMENT (in)

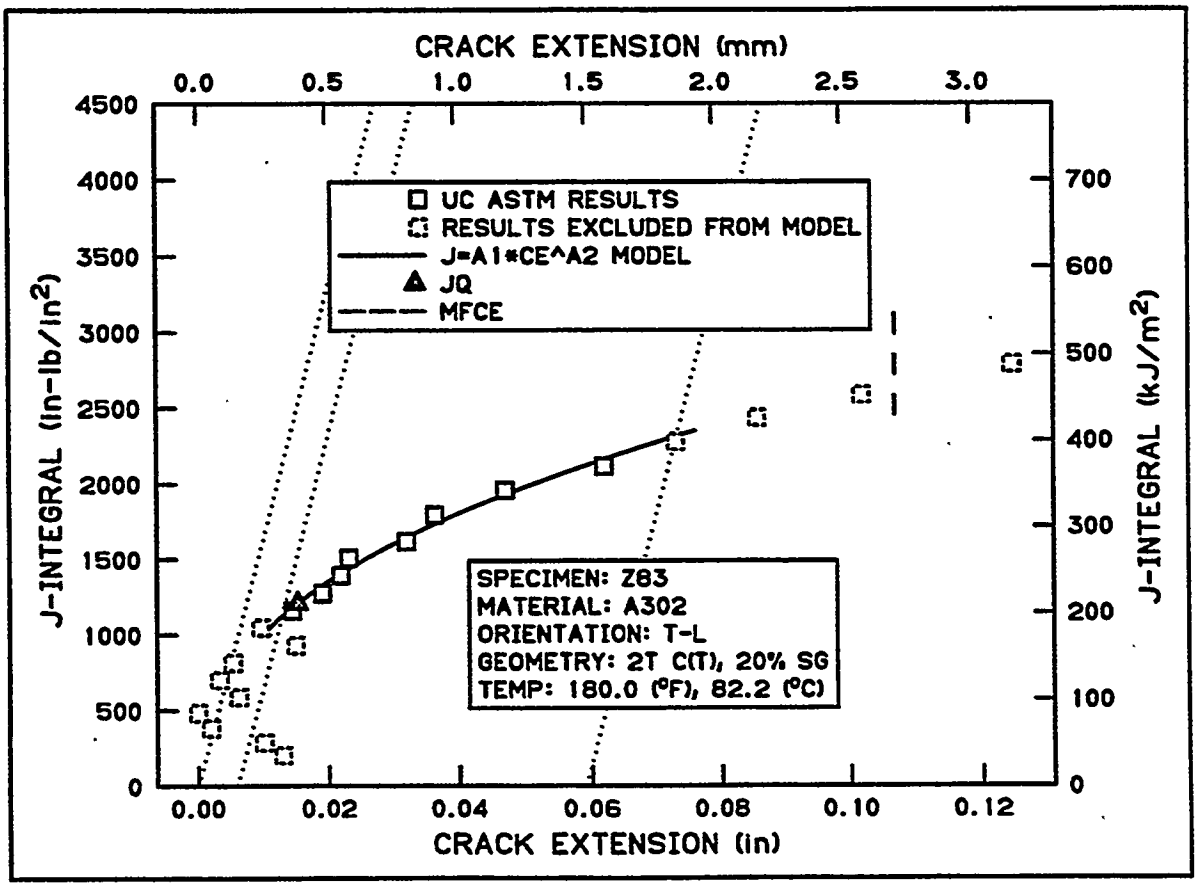

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5
J-INTEGRAL (in-lb/in²)
2500 2000 1500 1000 500 0
J-INTEGRAL (kJ/m²)
400 350 300 250 200 150 100 50 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z810
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 0.5T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00 0.02 0.04 0.06 0.08 0.10
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z83
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4590 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	18419	0.0220	0.0128	201.4
2	21277	0.0265	0.0099	286.3
3	23517	0.0309	0.0020	382.3
4	25212	0.0353	0.0000	483.6
5	26540	0.0398	0.0062	587.9
6	27571	0.0443	0.0033	701.8
7	28254	0.0487	0.0053	814.6
8	28750	0.0534	0.0148	930.5
9	29155	0.0578	0.0095	1047.4
10	29505	0.0622	0.0144	1159.1
11	29774	0.0667	0.0191	1273.1
12	30000	0.0712	0.0220	1391.4
13	30154	0.0757	0.0232	1508.6
14	30287	0.0801	0.0320	1617.2
15	30306	0.0867	0.0364	1792.4
16	30285	0.0934	0.0471	1956.2
17	30175	0.1001	0.0620	2113.2
18	30094	0.1068	0.0730	2274.8
19	29946	0.1134	0.0856	2432.9
20	29779	0.1200	0.1018	2583.2
21	29194	0.1295	0.1245	2785.6

  WIDTH: 3.9972 (IN),101.530 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0014 (IN),25.436 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4451 (IN),87.506 (MM)
    DISTANCE 2: 3.4592 (IN),87.864 (MM)
    DISTANCE 3: 3.4662 (IN),88.041 (MM)
    DISTANCE 4: 3.4632 (IN),87.965 (MM)
    DISTANCE 5: 3.4692 (IN),88.118 (MM)
    DISTANCE 6: 3.4650 (IN),88.011 (MM)
    DISTANCE 7: 3.4630 (IN),87.960 (MM)
    DISTANCE 8: 3.4512 (IN),87.660 (MM)
    DISTANCE 9: 3.4468 (IN),87.549 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5904 (IN),91.196 (MM)
    DISTANCE 2: 3.5631 (IN),90.503 (MM)
    DISTANCE 3: 3.5558 (IN),90.317 (MM)
    DISTANCE 4: 3.5740 (IN),90.780 (MM)
    DISTANCE 5: 3.5528 (IN),90.241 (MM)
    DISTANCE 6: 3.5678 (IN),90.622 (MM)
    DISTANCE 7: 3.5492 (IN),90.150 (MM)
    DISTANCE 8: 3.5827 (IN),91.001 (MM)
    DISTANCE 9: 3.5940 (IN),91.288 (MM)

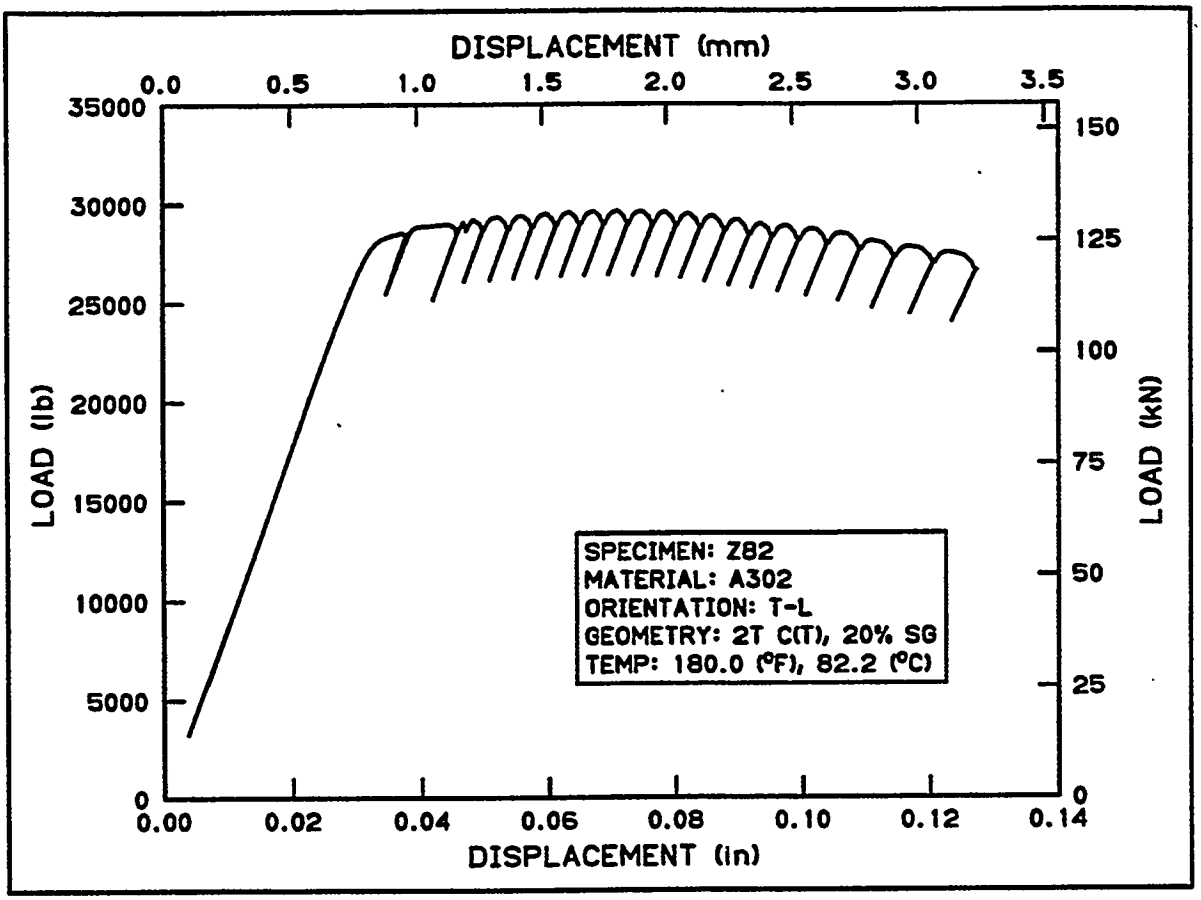

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z83
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

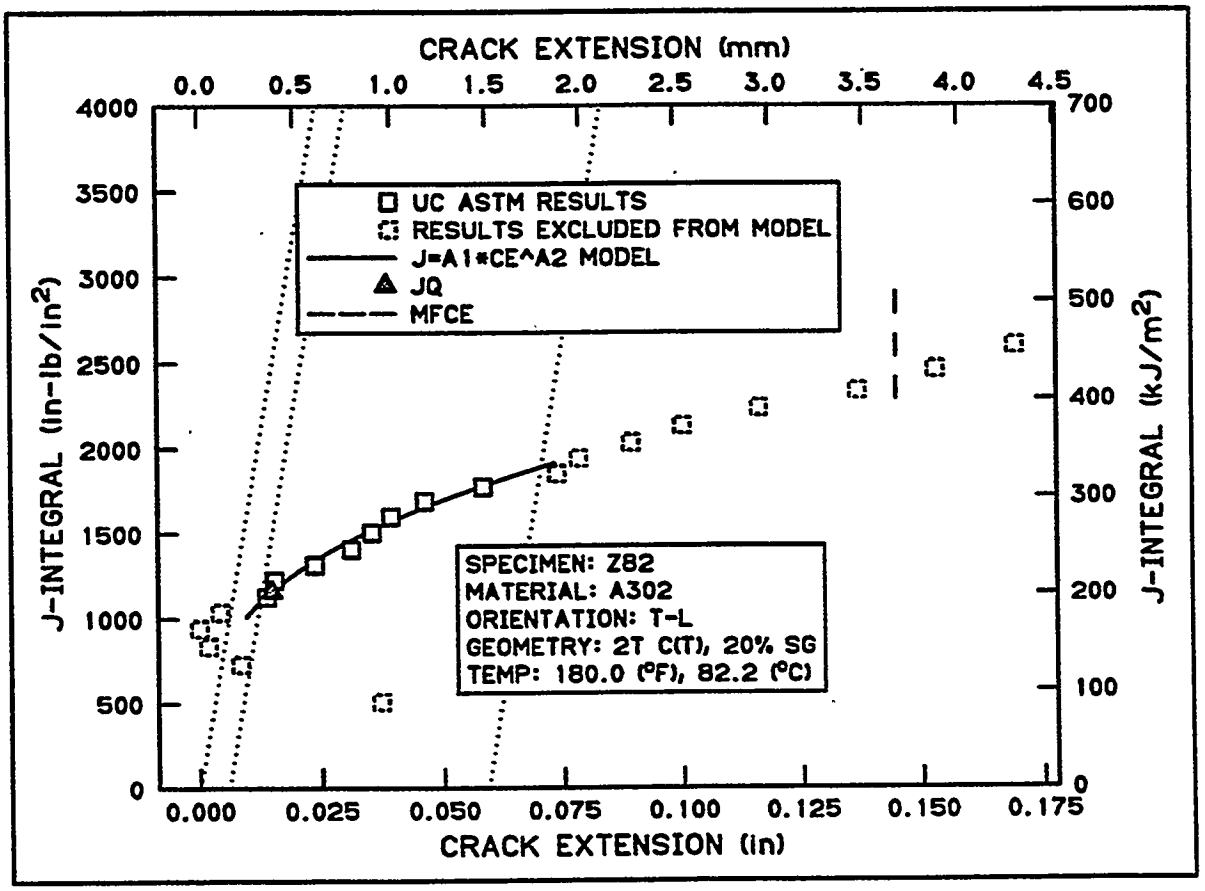

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
4500
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z83
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z82
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4771 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	28508	0.0370	0.0371	506.9
2	28971	0.0445	0.0084	727.2
3	29176	0.0482	0.0019	836.0
4	29316	0.0522	0.0000	941.5
5	29395	0.0559	0.0043	1036.5
6	29474	0.0597	0.0139	1125.3
7	29536	0.0635	0.0155	1224.4
8	29578	0.0673	0.0237	1315.0
9	29600	0.0711	0.0312	1405.9
10	29583	0.0749	0.0353	1504.2
11	29545	0.0786	0.0393	1598.9
12	29453	0.0823	0.0463	1688.8
13	29345	0.0861	0.0583	1772.6
14	29156	0.0900	0.0738	1849.2
15	28951	0.0936	0.0784	1938.7
16	28828	0.0979	0.0893	2029.9
17	28655	0.1023	0.1001	2130.5
18	28427	0.1073	0.1161	2235.0
19	27979	0.1128	0.1367	2334.8
20	27675	0.1188	0.1529	2459.6
21	27306	0.1255	0.1692	2597.4

  WIDTH: 3.9991 (IN),101.580 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9977 (IN),25.342 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4588 (IN),87.854 (MM)
    DISTANCE 2: 3.4755 (IN),88.278 (MM)
    DISTANCE 3: 3.4850 (IN),88.519 (MM)
    DISTANCE 4: 3.4863 (IN),88.552 (MM)
    DISTANCE 5: 3.4838 (IN),88.489 (MM)
    DISTANCE 6: 3.4820 (IN),88.443 (MM)
    DISTANCE 7: 3.4772 (IN),88.321 (MM)
    DISTANCE 8: 3.4562 (IN),87.787 (MM)
    DISTANCE 9: 3.4452 (IN),87.508 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6637 (IN),93.058 (MM)
    DISTANCE 2: 3.6634 (IN),93.050 (MM)
    DISTANCE 3: 3.6258 (IN),92.095 (MM)
    DISTANCE 4: 3.6118 (IN),91.740 (MM)
    DISTANCE 5: 3.5828 (IN),91.003 (MM)
    DISTANCE 6: 3.6152 (IN),91.826 (MM)
    DISTANCE 7: 3.6035 (IN),91.529 (MM)
    DISTANCE 8: 3.6052 (IN),91.572 (MM)
    DISTANCE 9: 3.6329 (IN),92.276 (MM)

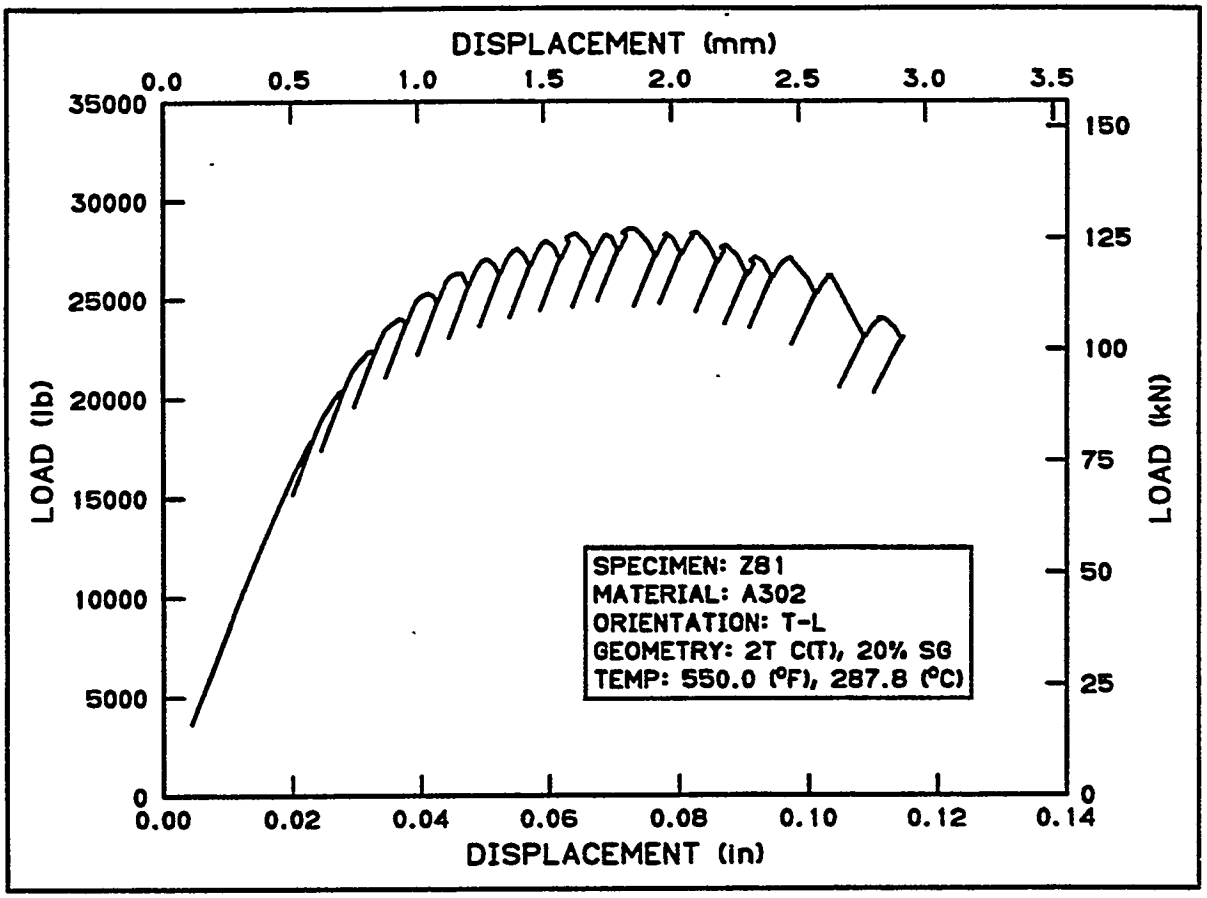

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z82
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

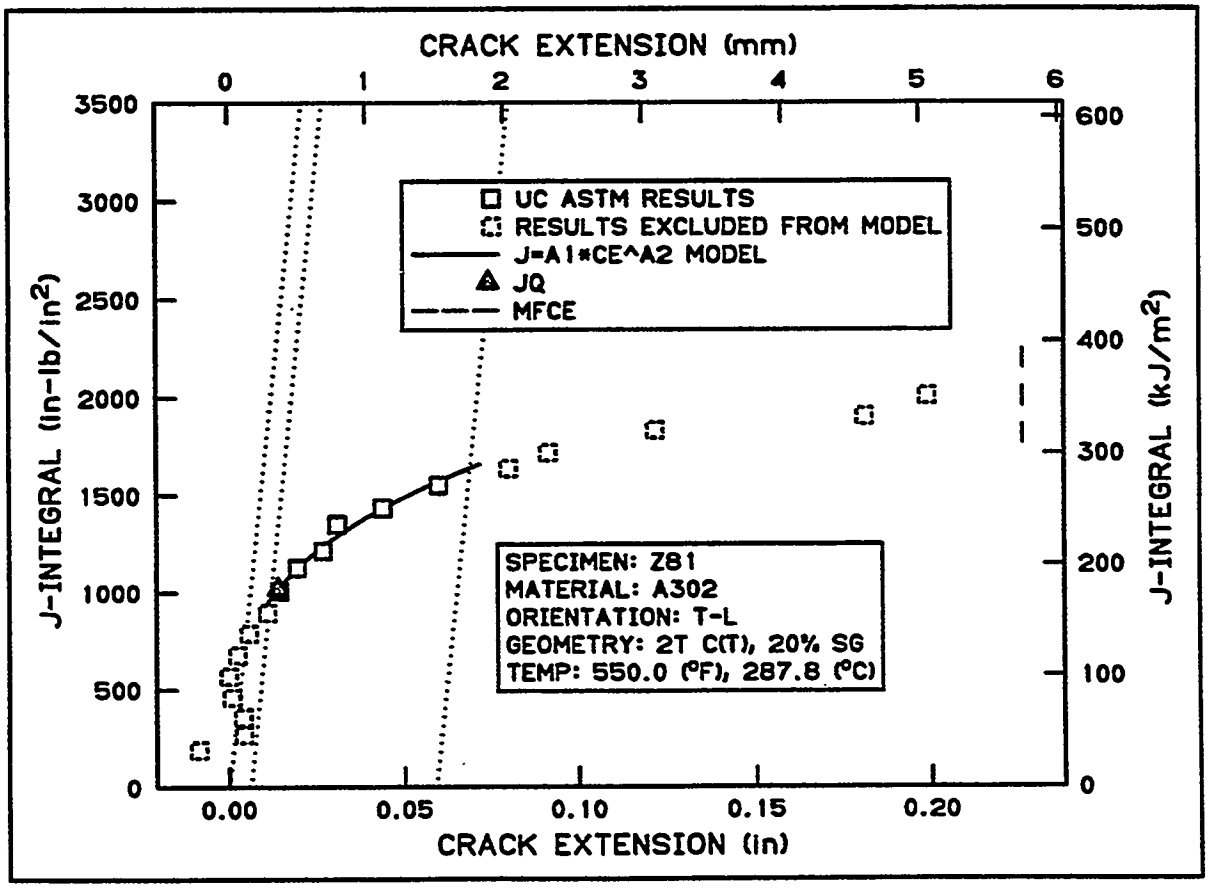

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
4000
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
700
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z82
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z81
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4675 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17736	0.0226	-0.0086	190.8
2	20330	0.0273	0.0041	268.6
3	22376	0.0319	0.0039	359.1
4	24037	0.0365	0.0008	460.3
5	25306	0.0410	0.0000	567.7
6	26291	0.0457	0.0025	677.4
7	27045	0.0504	0.0057	788.1
8	27574	0.0550	0.0110	895.4
9	27960	0.0595	0.0145	1007.1
10	28318	0.0642	0.0196	1127.3
11	28266	0.0688	0.0271	1214.6
12	28520	0.0734	0.0312	1351.4
13	28312	0.0780	0.0440	1434.0
14	28358	0.0828	0.0599	1551.1
15	27744	0.0872	0.0800	1635.7
16	27147	0.0918	0.0914	1715.9
17	26979	0.0974	0.1216	1830.5
18	26017	0.1037	0.1810	1902.4
19	23985	0.1119	0.1990	2005.7

  WIDTH: 3.9972 (IN),101.530 (MM)
  THICKNESS: 2.0010 (IN),50.825 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0024 (IN),25.461 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4602 (IN),87.889 (MM)
    DISTANCE 2: 3.4745 (IN),88.252 (MM)
    DISTANCE 3: 3.4784 (IN),88.351 (MM)
    DISTANCE 4: 3.4782 (IN),88.346 (MM)
    DISTANCE 5: 3.4745 (IN),88.252 (MM)
    DISTANCE 6: 3.4724 (IN),88.199 (MM)
    DISTANCE 7: 3.4651 (IN),88.014 (MM)
    DISTANCE 8: 3.4538 (IN),87.727 (MM)
    DISTANCE 9: 3.4651 (IN),88.014 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7892 (IN),96.246 (MM)
    DISTANCE 2: 3.6652 (IN),93.096 (MM)
    DISTANCE 3: 3.6469 (IN),92.631 (MM)
    DISTANCE 4: 3.6488 (IN),92.680 (MM)
    DISTANCE 5: 3.6462 (IN),92.613 (MM)
    DISTANCE 6: 3.6878 (IN),93.670 (MM)
    DISTANCE 7: 3.7131 (IN),94.313 (MM)
    DISTANCE 8: 3.7760 (IN),95.910 (MM)
    DISTANCE 9: 3.7796 (IN),96.002 (MM)

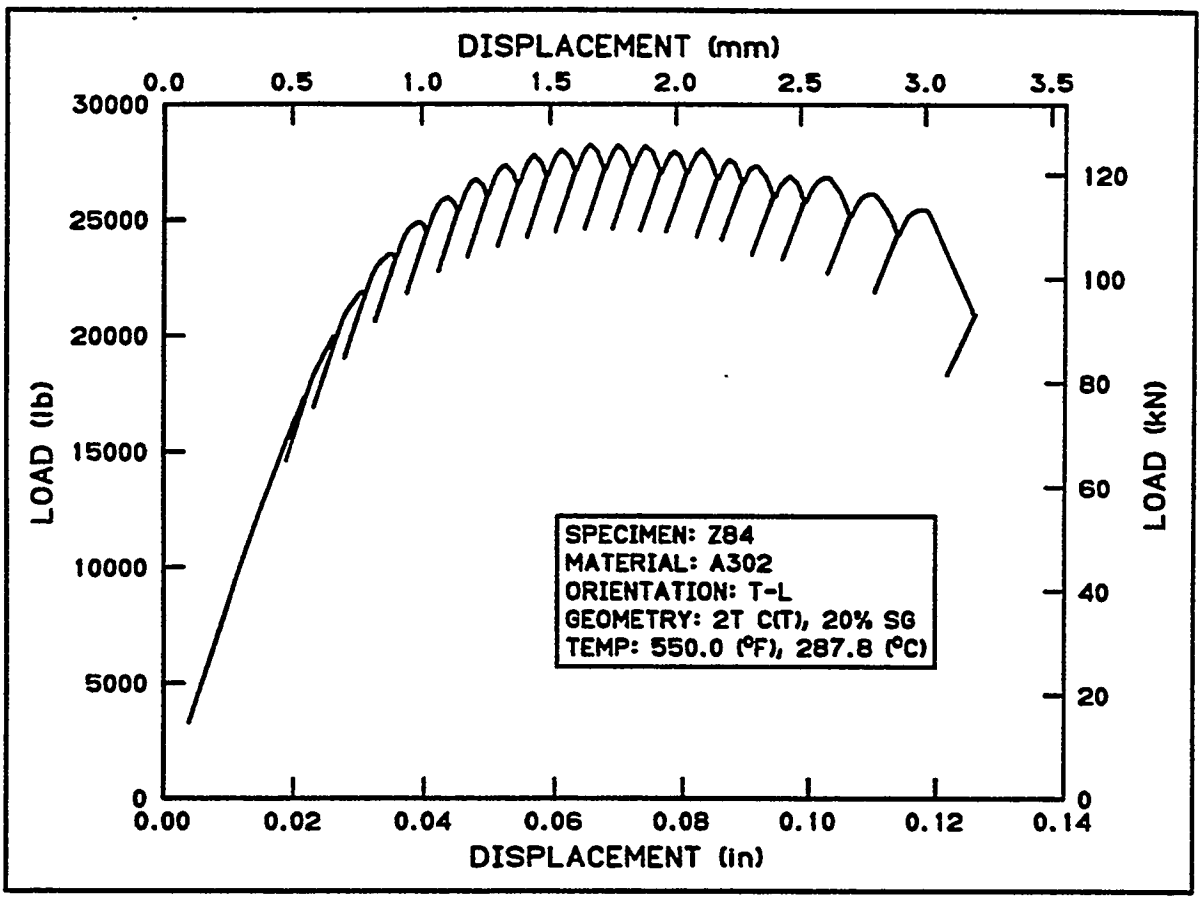

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

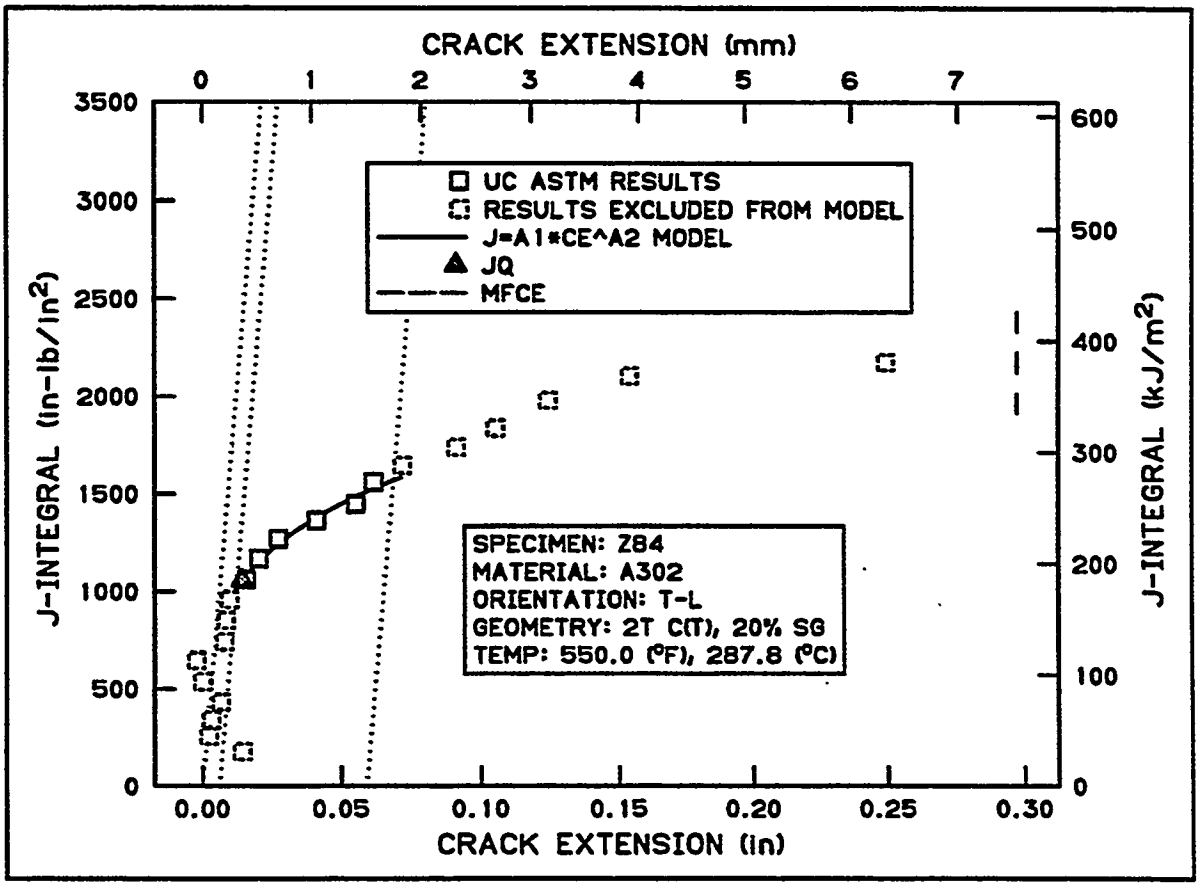

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z84
  MATERIAL CODE: A302
  ORIENTATION: T-L
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4679 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	17209	0.0214	0.0143	177.1
2	19791	0.0258	0.0023	256.3
3	21825	0.0301	0.0032	340.3
4	23526	0.0345	0.0065	431.9
5	24912	0.0390	0.0000	537.5
6	25973	0.0435	-0.0022	645.8
7	26766	0.0477	0.0079	743.2
8	27354	0.0522	0.0085	852.9
9	27779	0.0566	0.0097	959.1
10	28003	0.0609	0.0158	1061.8
11	28239	0.0653	0.0202	1169.0
12	28210	0.0697	0.0273	1269.4
13	28174	0.0739	0.0411	1363.9
14	27937	0.0784	0.0553	1447.3
15	28023	0.0828	0.0617	1559.7
16	27589	0.0871	0.0718	1645.2
17	27333	0.0917	0.0912	1739.1
18	26899	0.0968	0.1053	1836.7
19	26831	0.1030	0.1241	1979.5
20	25895	0.1109	0.1540	2105.1
21	24856	0.1196	0.2489	2174.5

  WIDTH: 3.9971 (IN),101.530 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0002 (IN),25.405 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4532 (IN),87.711 (MM)
    DISTANCE 2: 3.4710 (IN),88.163 (MM)
    DISTANCE 3: 3.4764 (IN),88.301 (MM)
    DISTANCE 4: 3.4753 (IN),88.273 (MM)
    DISTANCE 5: 3.4749 (IN),88.262 (MM)
    DISTANCE 6: 3.4752 (IN),88.270 (MM)
    DISTANCE 7: 3.4691 (IN),88.115 (MM)
    DISTANCE 8: 3.4528 (IN),87.701 (MM)
    DISTANCE 9: 3.4470 (IN),87.554 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7738 (IN),95.855 (MM)
    DISTANCE 2: 3.7851 (IN),96.142 (MM)
    DISTANCE 3: 3.7473 (IN),95.181 (MM)
    DISTANCE 4: 3.7504 (IN),95.260 (MM)
    DISTANCE 5: 3.7384 (IN),94.955 (MM)
    DISTANCE 6: 3.7322 (IN),94.798 (MM)
    DISTANCE 7: 3.7460 (IN),95.148 (MM)
    DISTANCE 8: 3.8180 (IN),96.977 (MM)
    DISTANCE 9: 3.8370 (IN),97.460 (MM)

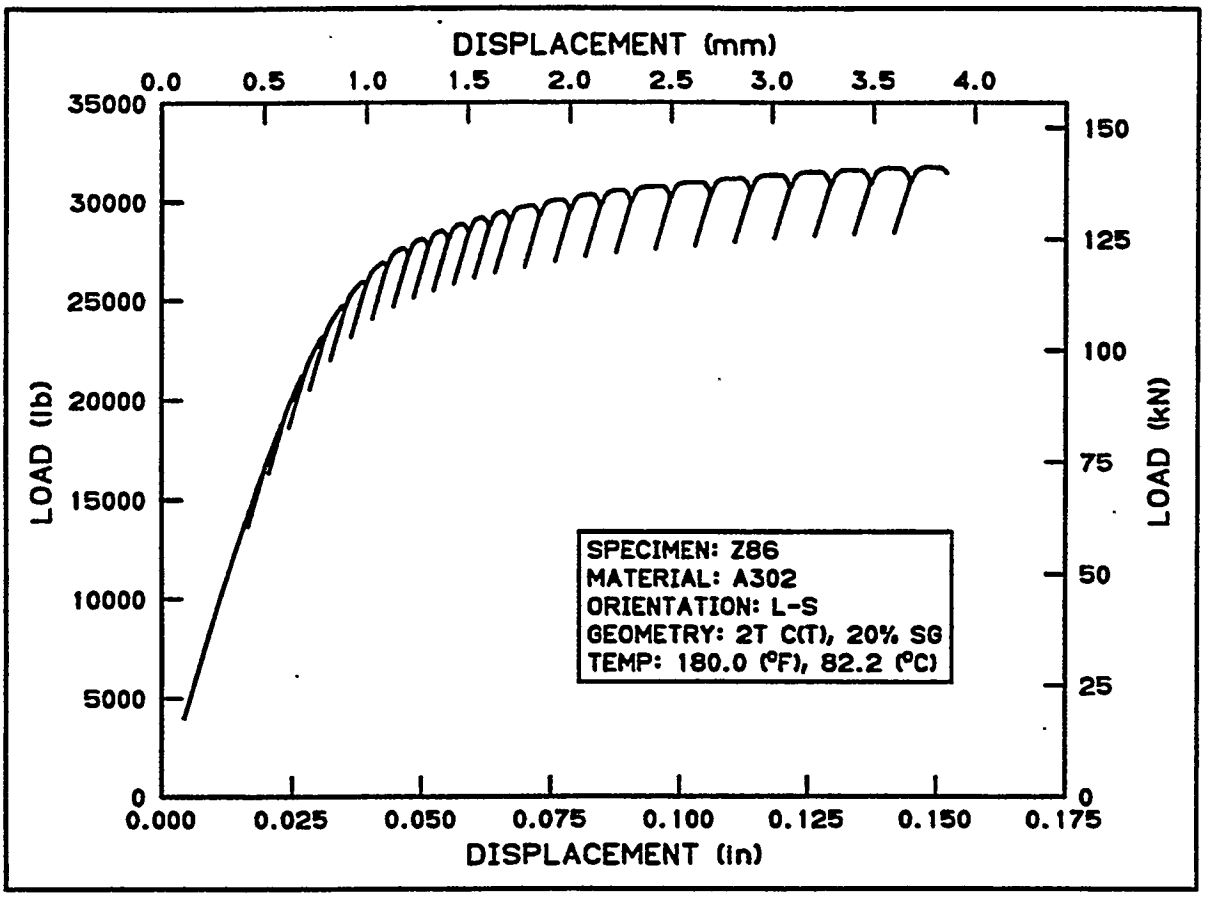

DISPLACEMENT (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
120
100
80
60
40
20
0
LOAD (kN)
SPECIMEN: Z84
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.02
0.04
0.06
0.08
0.10
0.12
0.14
DISPLACEMENT (in)

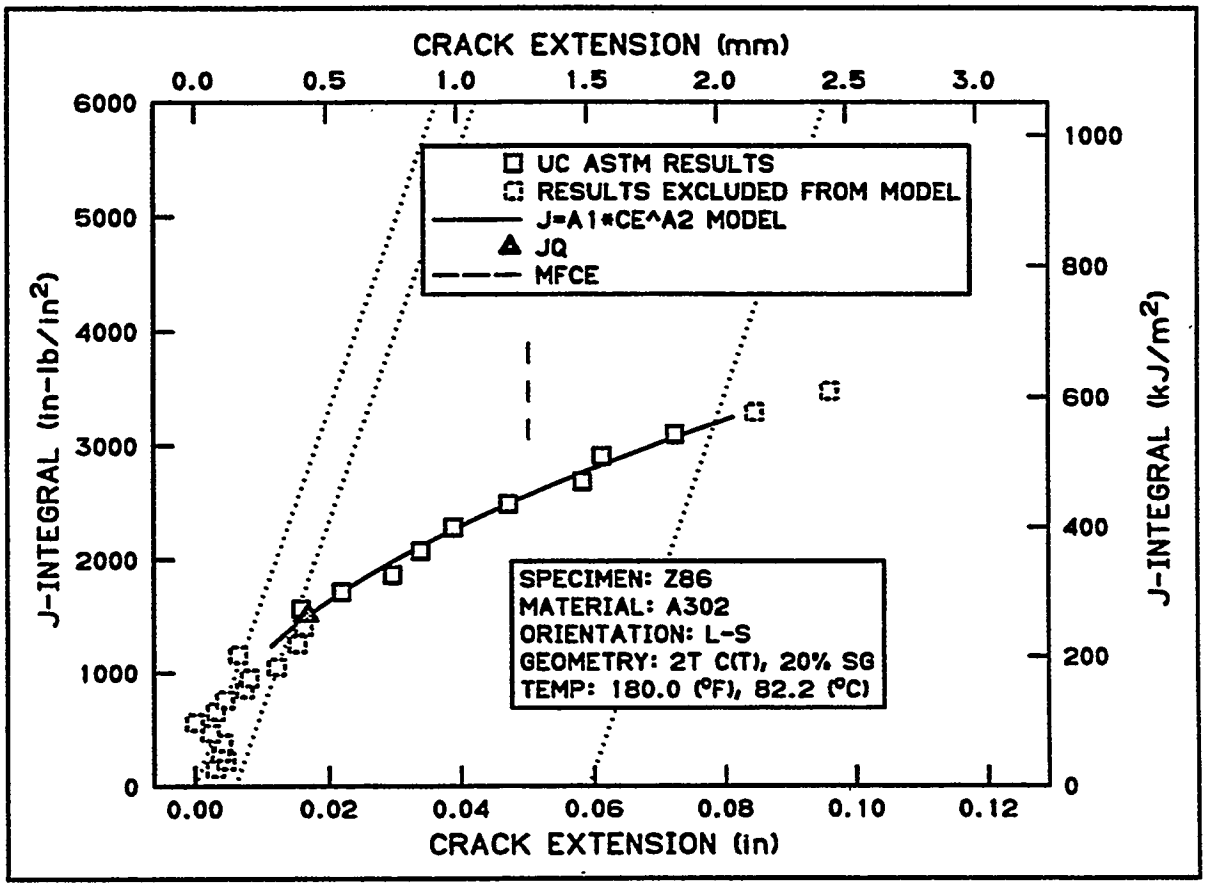

CRACK EXTENSION (mm)
0
1
2
3
4
5
6
7
3500
3000
2500
2000
1500
1000
500
0
J-INTEGRAL (in-lb/in²)
600
500
400
300
200
100
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z84
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z86
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4776 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16140	0.0191	0.0030	156.6
2	18820	0.0230	0.0045	221.7
3	21156	0.0268	0.0038	296.1
4	23144	0.0307	0.0041	378.1
5	24716	0.0346	0.0023	467.0
6	25937	0.0385	0.0000	560.0
7	26909	0.0424	0.0030	656.2
8	27646	0.0464	0.0045	758.2
9	28113	0.0502	0.0074	854.5
10	28511	0.0540	0.0081	954.3
11	28872	0.0580	0.0122	1052.5
12	29185	0.0618	0.0064	1159.7
13	29476	0.0658	0.0153	1256.2
14	29788	0.0716	0.0162	1408.7
15	30083	0.0773	0.0159	1566.9
16	30338	0.0832	0.0220	1717.4
17	30543	0.0890	0.0296	1867.8
18	30747	0.0969	0.0339	2075.9
19	30941	0.1046	0.0389	2285.2
20	31140	0.1125	0.0472	2488.2
21	31315	0.1202	0.0583	2685.2
22	31467	0.1280	0.0613	2905.8
23	31560	0.1357	0.0723	3099.6
24	31633	0.1434	0.0845	3293.2
#25	31698	0.1510	0.0960	3477.5

  #ESTIMATED FINAL CRACK LENGTH
  WIDTH: 3.9958 (IN),101.490 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0025 (IN),25.464 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4611 (IN),87.912 (MM)
    DISTANCE 2: 3.4841 (IN),88.496 (MM)
    DISTANCE 3: 3.4850 (IN),88.519 (MM)
    DISTANCE 4: 3.4851 (IN),88.522 (MM)
    DISTANCE 5: 3.4866 (IN),88.560 (MM)
    DISTANCE 6: 3.4866 (IN),88.560 (MM)
    DISTANCE 7: 3.4824 (IN),88.453 (MM)
    DISTANCE 8: 3.4699 (IN),88.135 (MM)
    DISTANCE 9: 3.4606 (IN),87.899 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.5470 (IN),90.094 (MM)
    DISTANCE 2: 3.5128 (IN),89.225 (MM)
    DISTANCE 3: 3.5371 (IN),89.842 (MM)
    DISTANCE 4: 3.5406 (IN),89.931 (MM)
    DISTANCE 5: 3.5440 (IN),90.018 (MM)
    DISTANCE 6: 3.5306 (IN),89.677 (MM)
    DISTANCE 7: 3.5221 (IN),89.461 (MM)
    DISTANCE 8: 3.5189 (IN),89.380 (MM)
    DISTANCE 9: 3.5252 (IN),89.540 (MM)

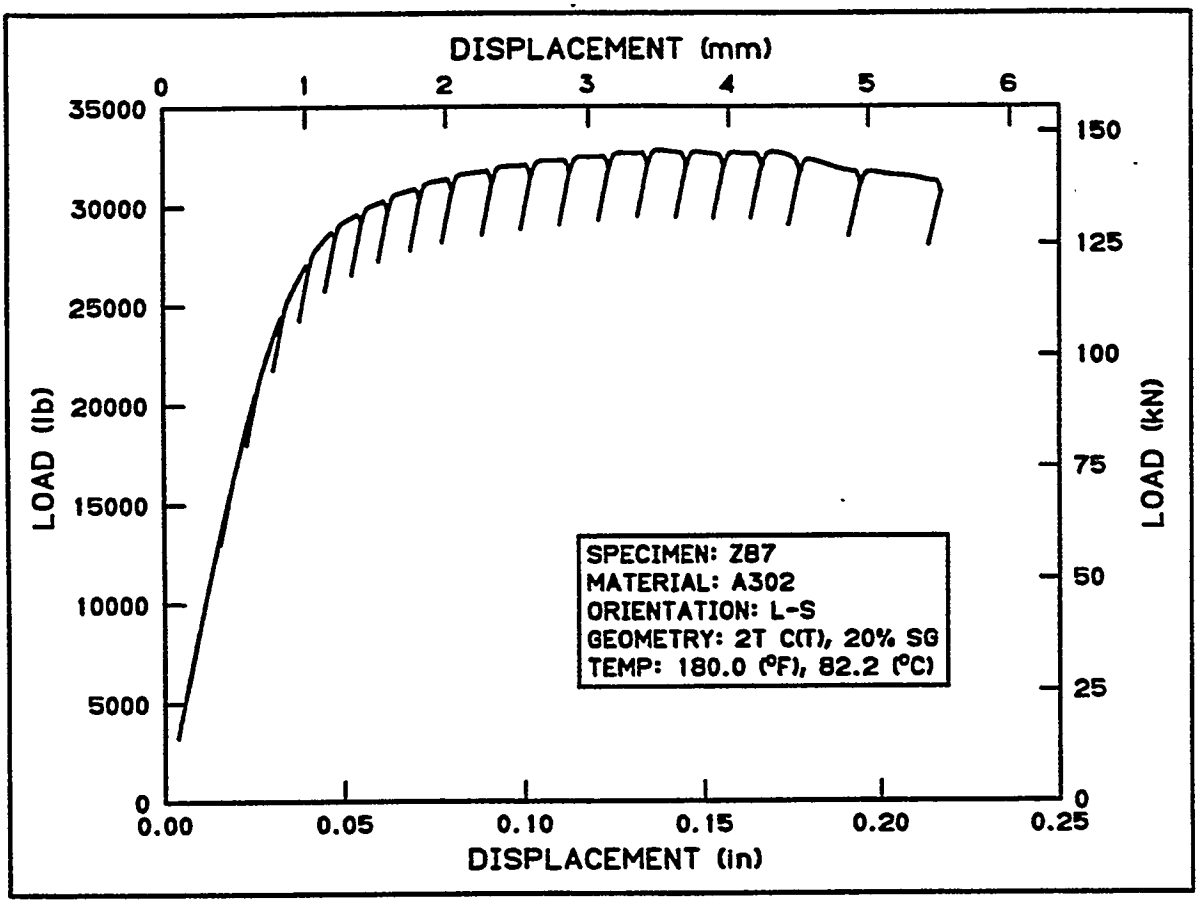

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
LOAD (lb)
35000 30000 25000 20000 15000 10000 5000 0
LOAD (kN)
150 125 100 75 50 25 0
SPECIMEN: Z86
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

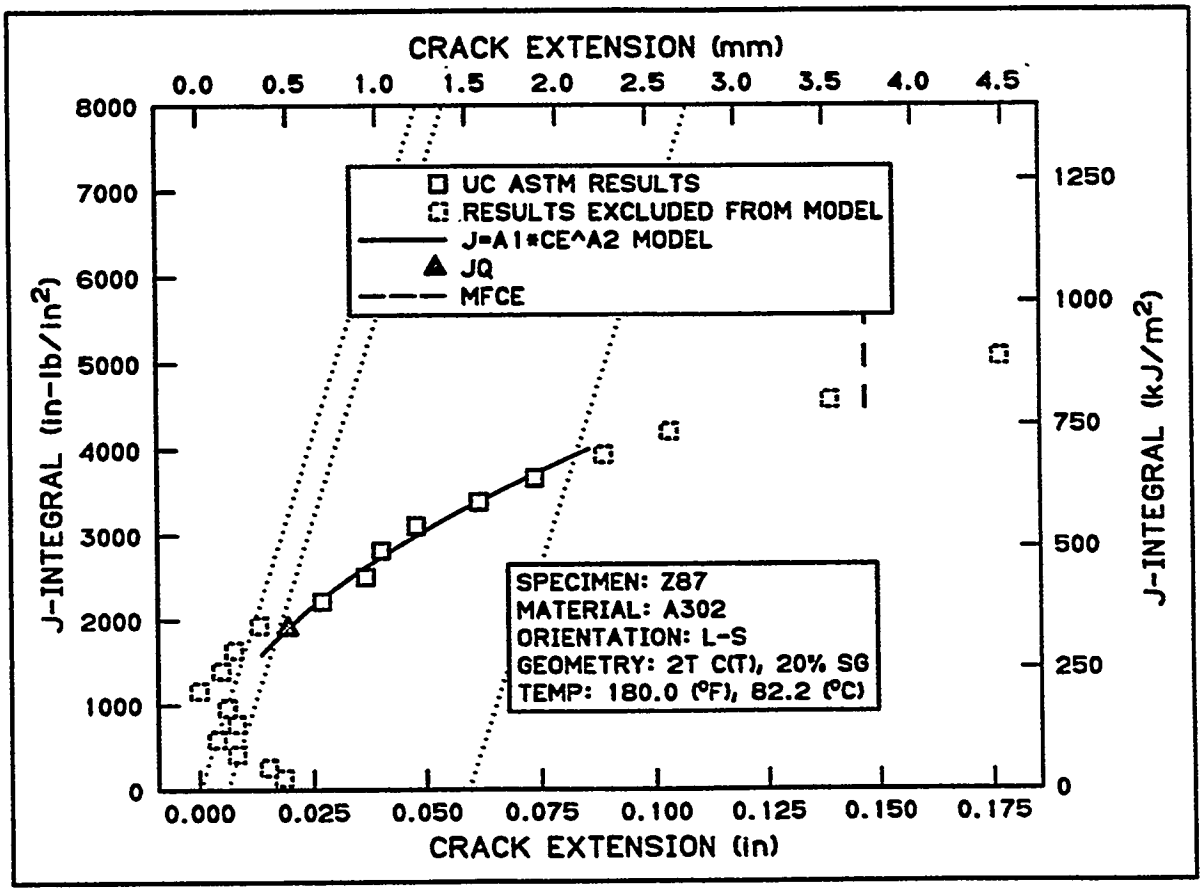

CRACK EXTENSION (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0
J-INTEGRAL (in-lb/in²)
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (kJ/m²)
1000 800 600 400 200 0
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z86
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00 0.02 0.04 0.06 0.08 0.10 0.12
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z87
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4547 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 180.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	15459	0.0180	0.0182	138.7
2	20514	0.0252	0.0149	263.1
3	24394	0.0323	0.0081	417.8
4	27031	0.0396	0.0039	592.5
5	28698	0.0468	0.0081	774.6
6	29594	0.0539	0.0060	964.3
7	30257	0.0611	0.0000	1165.0
8	30866	0.0701	0.0048	1401.1
9	31343	0.0790	0.0076	1643.8
10	31737	0.0899	0.0132	1939.0
11	32040	0.1008	0.0271	2219.7
12	32272	0.1115	0.0367	2507.1
13	32472	0.1224	0.0401	2813.6
14	32634	0.1331	0.0480	3107.1
15	32638	0.1439	0.0616	3385.0
16	32566	0.1546	0.0739	3664.3
17	32594	0.1653	0.0889	3933.4
18	32341	0.1761	0.1033	4205.2
19	31683	0.1935	0.1392	4572.3
20	31223	0.2160	0.1767	5078.0

  WIDTH: 3.9986 (IN),101.560 (MM)
  THICKNESS: 2.0040 (IN),50.902 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9986 (IN),25.364 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4388 (IN),87.346 (MM)
    DISTANCE 2: 3.4560 (IN),87.782 (MM)
    DISTANCE 3: 3.4606 (IN),87.899 (MM)
    DISTANCE 4: 3.4571 (IN),87.810 (MM)
    DISTANCE 5: 3.4581 (IN),87.836 (MM)
    DISTANCE 6: 3.4574 (IN),87.818 (MM)
    DISTANCE 7: 3.4530 (IN),87.706 (MM)
    DISTANCE 8: 3.4474 (IN),87.564 (MM)
    DISTANCE 9: 3.4352 (IN),87.254 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.6652 (IN),93.096 (MM)
    DISTANCE 2: 3.5682 (IN),90.632 (MM)
    DISTANCE 3: 3.5936 (IN),91.277 (MM)
    DISTANCE 4: 3.5742 (IN),90.785 (MM)
    DISTANCE 5: 3.6140 (IN),91.796 (MM)
    DISTANCE 6: 3.5972 (IN),91.369 (MM)
    DISTANCE 7: 3.5888 (IN),91.156 (MM)
    DISTANCE 8: 3.6130 (IN),91.770 (MM)
    DISTANCE 9: 3.6418 (IN),92.502 (MM)

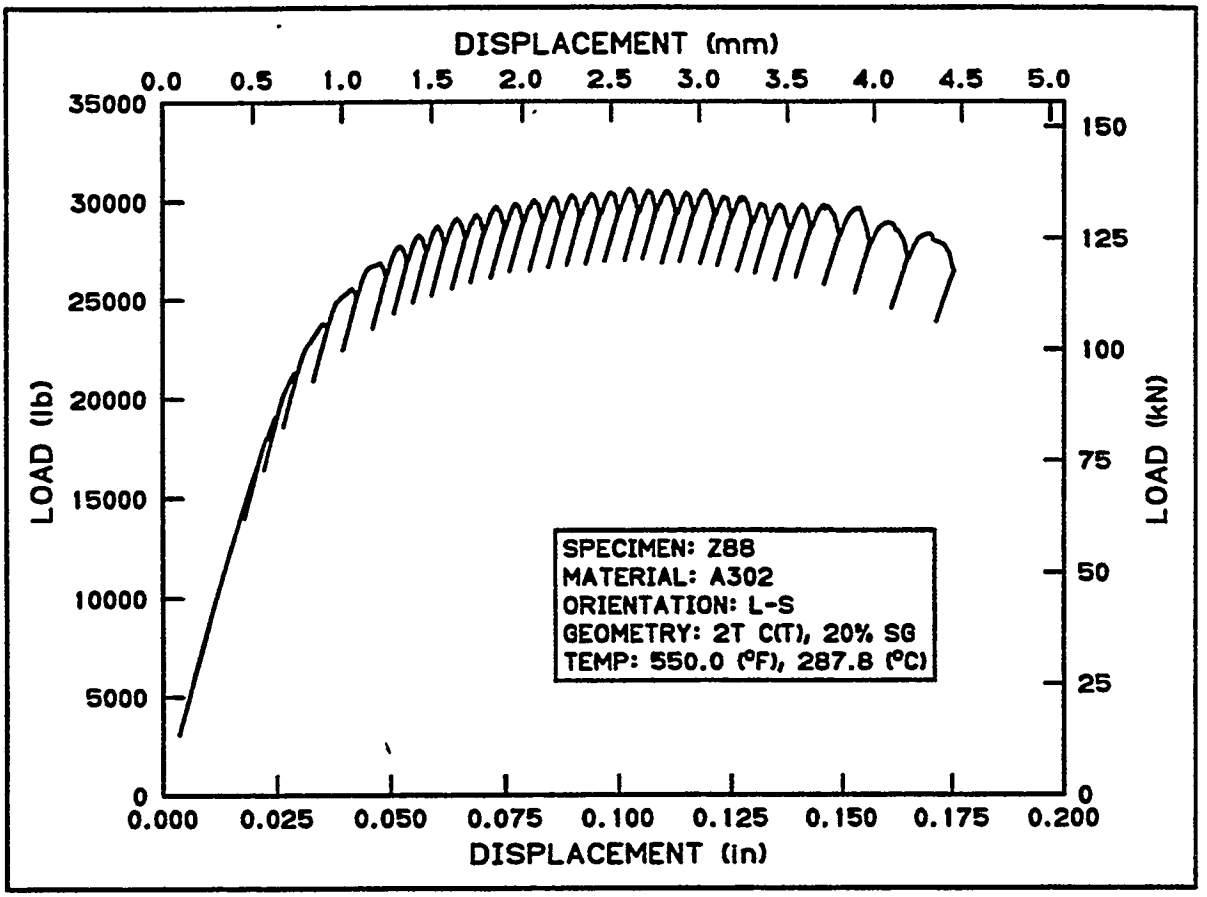

DISPLACEMENT (mm)
0
1
2
3
4
5
6
35000
30000
25000
20000
15000
10000
5000
0
LOAD (lb)
150
125
100
75
50
25
0
LOAD (kN)
SPECIMEN: Z87
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
DISPLACEMENT (in)

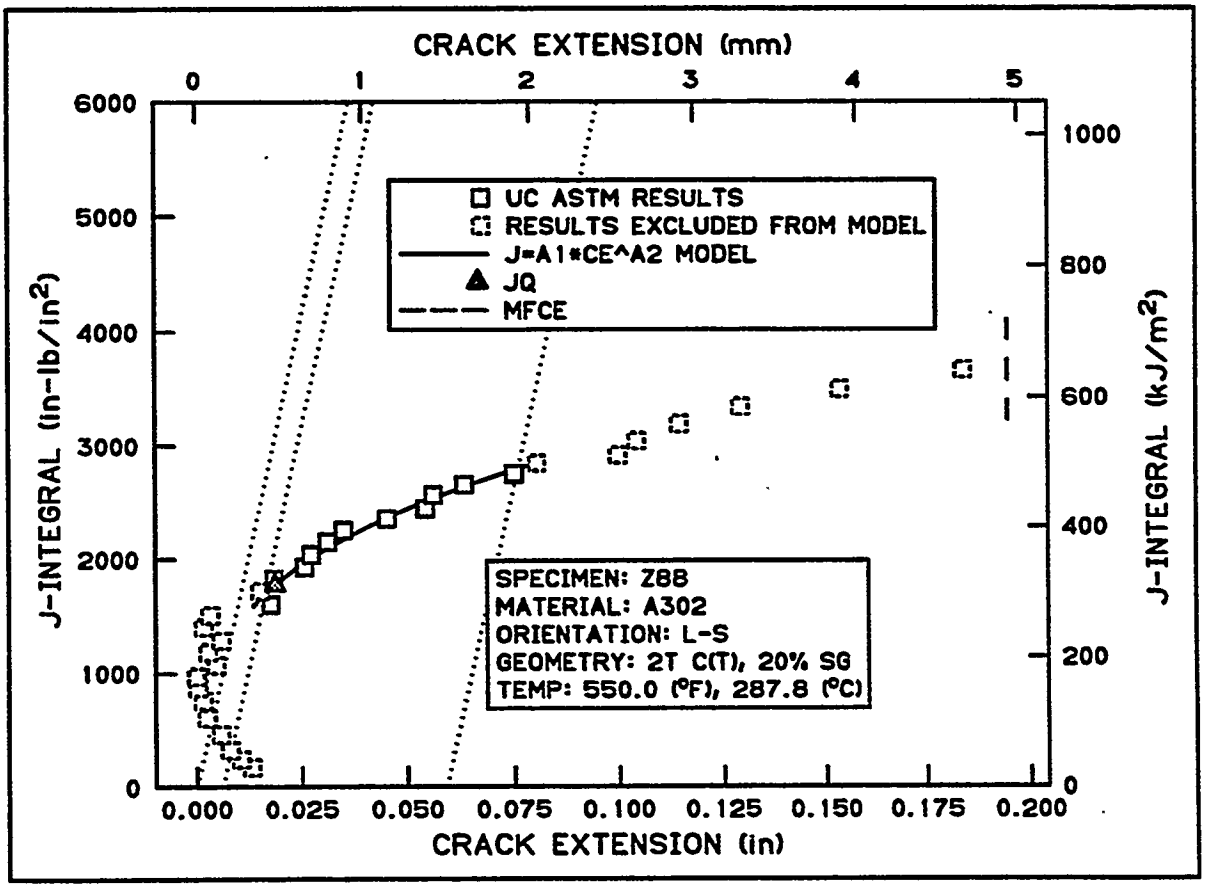

CRACK EXTENSION (mm)
0.0
0.5
1.0
1.5
2.0
2.5
3.0
3.5
4.0
4.5
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z87
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.000
0.025
0.050
0.075
0.100
0.125
0.150
0.175
CRACK EXTENSION (in)

SPECIMEN
  IDENTIFICATION: Z88
  MATERIAL CODE: A302
  ORIENTATION: L-S
  GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
  INITIAL CRACK LENGTH: 2.4820 (IN)
TEST
  ATMOSPHERE: AIR
  TEMPERATURE: 550.0 (DEG F)
ANALYSIS
  CRACK EXTENSION CALCULATION: UC
  J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	16496	0.0205	0.0129	167.6
2	18990	0.0246	0.0102	239.2
3	21287	0.0289	0.0077	321.2
4	23779	0.0351	0.0056	458.3
5	25550	0.0415	0.0024	602.7
6	26804	0.0478	0.0015	755.5
7	27682	0.0521	0.0003	867.9
8	28233	0.0563	0.0000	971.7
9	28691	0.0604	0.0045	1070.5
10	29043	0.0646	0.0027	1185.9
11	29256	0.0688	0.0057	1286.4
12	29663	0.0731	0.0016	1406.6
13	29820	0.0772	0.0032	1509.7
14	30005	0.0813	0.0176	1605.1
15	30139	0.0857	0.0149	1721.8
16	30249	0.0899	0.0184	1828.9
17	30312	0.0942	0.0258	1931.4
18	30389	0.0983	0.0273	2039.6
19	30572	0.1025	0.0311	2151.3
20	30487	0.1067	0.0349	2253.7
21	30462	0.1109	0.0452	2354.4
22	30362	0.1151	0.0543	2443.0
23	30495	0.1193	0.0562	2565.3
24	30157	0.1234	0.0635	2652.6
25	30145	0.1277	0.0751	2748.9
26	29809	0.1317	0.0805	2843.4
27	29788	0.1360	0.0999	2911.5
28	29767	0.1411	0.1043	3039.0
29	29704	0.1469	0.1146	3187.7
30	29597	0.1542	0.1292	3337.7
31	28510	0.1629	0.1535	3494.2
32	27767	0.1733	0.1838	3666.0

  WIDTH: 3.9969 (IN),101.520 (MM)
  THICKNESS: 2.0000 (IN),50.800 (MM)
  SIDE GROOVE RATIO: 20.0 (PERCENT)
  FRONT SURFACE-TO-LOAD LINE DISTANCE: 1.0001 (IN),25.403 (MM)
  FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.4626 (IN),87.950 (MM)
    DISTANCE 2: 3.4812 (IN),88.422 (MM)
    DISTANCE 3: 3.4849 (IN),88.516 (MM)
    DISTANCE 4: 3.4871 (IN),88.572 (MM)
    DISTANCE 5: 3.4902 (IN),88.651 (MM)
    DISTANCE 6: 3.4886 (IN),88.610 (MM)
    DISTANCE 7: 3.4848 (IN),88.514 (MM)
    DISTANCE 8: 3.4752 (IN),88.270 (MM)
    DISTANCE 9: 3.4666 (IN),88.052 (MM)
  FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
    DISTANCE 1: 3.7552 (IN),95.382 (MM)
    DISTANCE 2: 3.6935 (IN),93.815 (MM)
    DISTANCE 3: 3.7014 (IN),94.016 (MM)
    DISTANCE 4: 3.6554 (IN),92.847 (MM)
    DISTANCE 5: 3.6548 (IN),92.832 (MM)
    DISTANCE 6: 3.6546 (IN),92.827 (MM)
    DISTANCE 7: 3.6507 (IN),92.728 (MM)
    DISTANCE 8: 3.6788 (IN),93.442 (MM)
    DISTANCE 9: 3.6909 (IN),93.749 (MM)

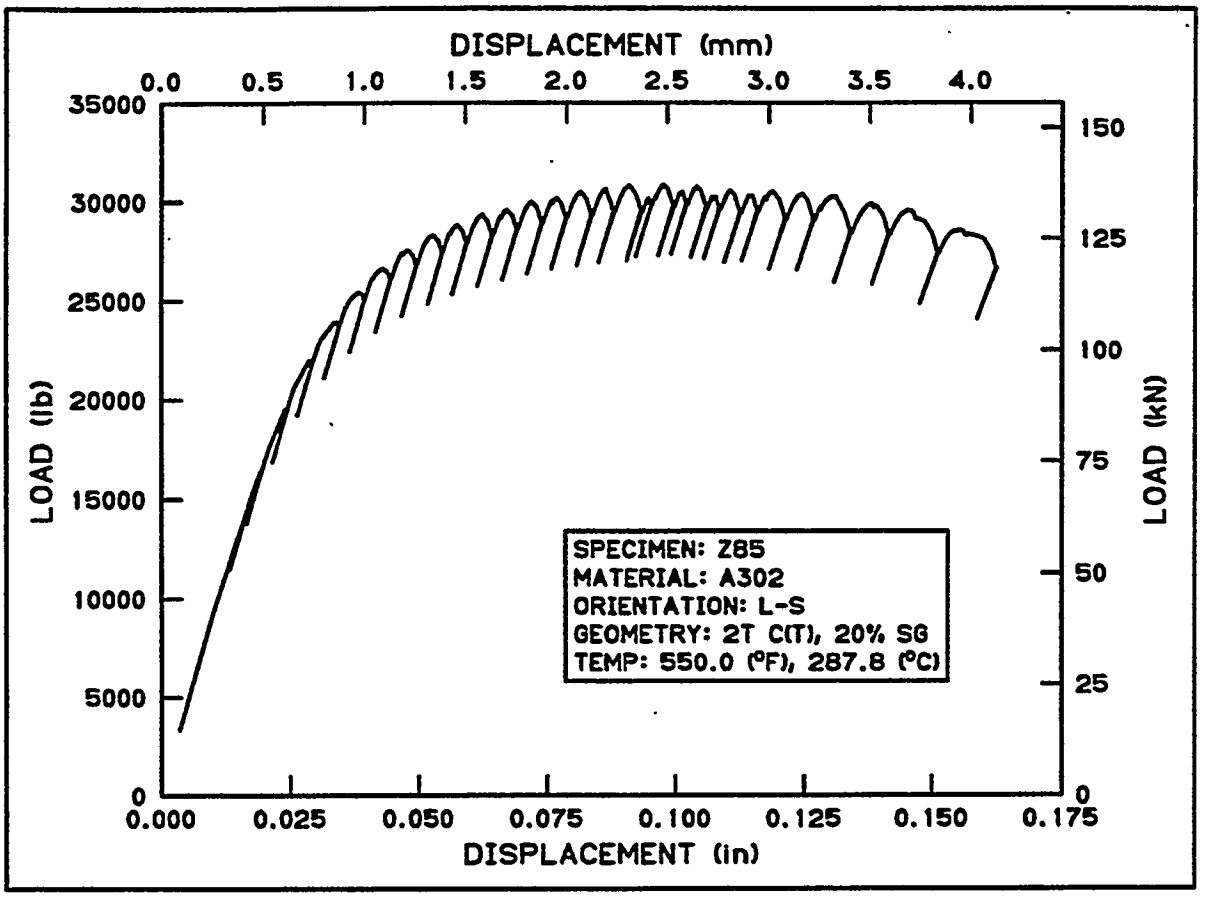

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0
35000 30000 25000 20000 15000 10000 5000 0
150 125 100 75 50 25 0
LOAD (lb)
LOAD (kN)
SPECIMEN: Z88
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
DISPLACEMENT (in)

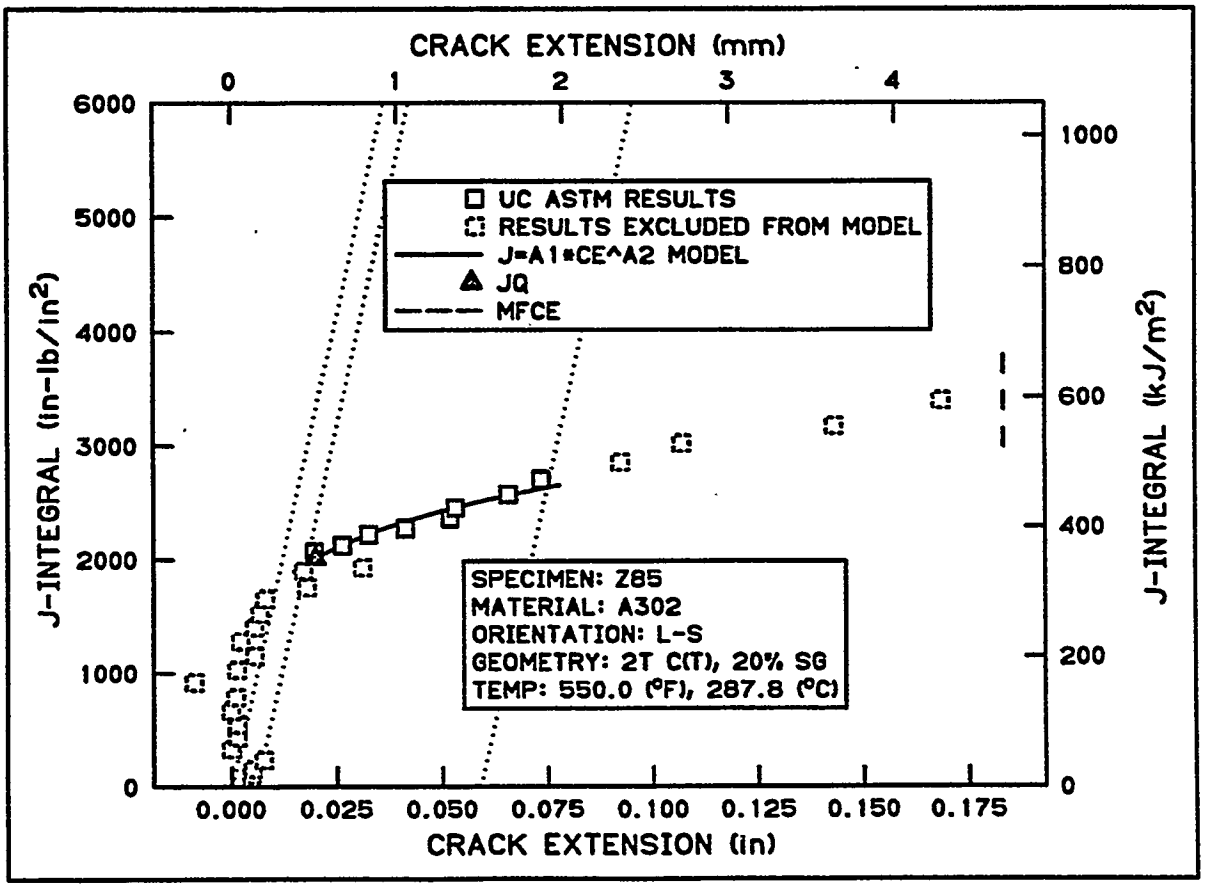

CRACK EXTENSION (mm)
0 1 2 3 4 5
6000 5000 4000 3000 2000 1000 0
1000 800 600 400 200 0
J-INTEGRAL (in-lb/in²)
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z88
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175 0.200
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z85
MATERIAL CODE: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 2.4742 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 550.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	13961	0.0159	0.0047	106.9
2	16315	0.0190	0.0049	153.0
3	19456	0.0239	0.0076	235.9
4	21945	0.0287	0.0000	330.1
5	23917	0.0335	0.0014	437.5
6	25419	0.0382	0.0014	548.3
7	26612	0.0431	-0.0001	666.5
8	27547	0.0479	0.0010	785.9
9	28297	0.0528	-0.0086	916.7
10	28832	0.0575	0.0013	1029.6
11	29336	0.0624	0.0055	1151.9
12	29591	0.0671	0.0022	1278.6
13	29984	0.0719	0.0055	1401.3
14	30169	0.0767	0.0068	1523.8
15	30468	0.0815	0.0081	1654.0
16	30623	0.0864	0.0180	1755.2
17	30789	0.0911	0.0172	1902.3
18	29994	0.0944	0.0312	1930.7
19	30826	0.0977	0.0198	2068.6
20	30379	0.1008	0.0264	2124.5
21	30727	0.1040	0.0327	2217.7
22	30085	0.1072	0.0413	2270.6
23	30530	0.1105	0.0519	2358.6
24	30284	0.1142	0.0532	2450.0
25	30510	0.1188	0.0658	2569.6
26	30388	0.1245	0.0735	2700.7
27	30224	0.1311	0.0924	2851.3
28	29756	0.1391	0.1069	3015.9
29	29009	0.1485	0.1430	3172.8
30	28080	0.1600	0.1686	3394.6

WIDTH: 3.9981 (IN),101.550 (MM)
THICKNESS: 2.0000 (IN),50.800 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 0.9992 (IN),25.380 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.4588 (IN),87.854 (MM)
DISTANCE 2: 3.4784 (IN),88.351 (MM)
DISTANCE 3: 3.4816 (IN),88.433 (MM)
DISTANCE 4: 3.4832 (IN),88.473 (MM)
DISTANCE 5: 3.4834 (IN),88.478 (MM)
DISTANCE 6: 3.4782 (IN),88.346 (MM)
DISTANCE 7: 3.4708 (IN),88.158 (MM)
DISTANCE 8: 3.4577 (IN),87.826 (MM)
DISTANCE 9: 3.4496 (IN),87.620 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 3.7045 (IN),94.094 (MM)
DISTANCE 2: 3.6494 (IN),92.695 (MM)
DISTANCE 3: 3.6558 (IN),92.857 (MM)
DISTANCE 4: 3.6354 (IN),92.339 (MM)
DISTANCE 5: 3.6483 (IN),92.667 (MM)
DISTANCE 6: 3.6370 (IN),92.380 (MM)
DISTANCE 7: 3.6432 (IN),92.537 (MM)
DISTANCE 8: 3.6725 (IN),93.281 (MM)
DISTANCE 9: 3.7188 (IN),94.458 (MM)

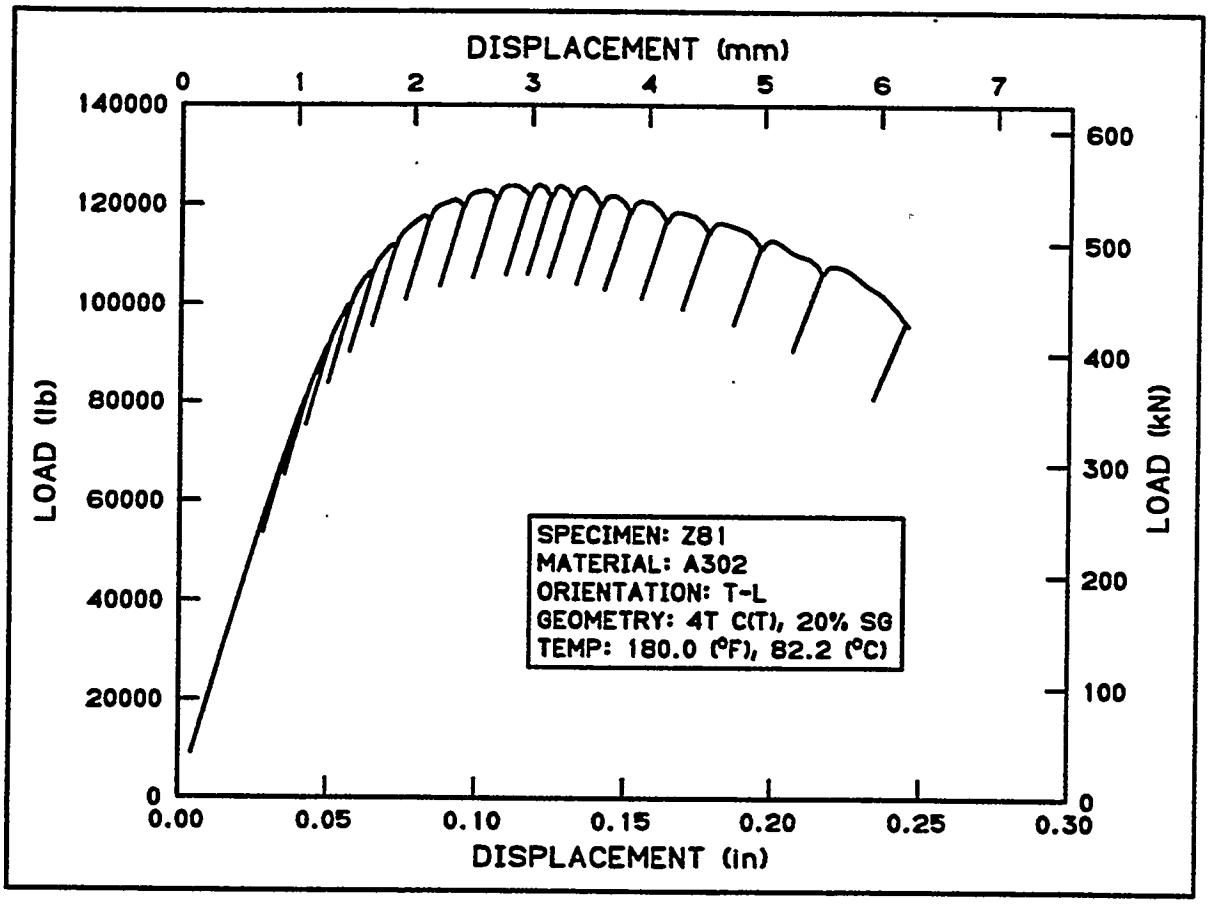

DISPLACEMENT (mm)
0.0 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0
35000 30000 25000 20000 15000 10000 5000 0
LOAD (lb)
150 125 100 75 50 25 0
LOAD (kN)
SPECIMEN: Z85
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
DISPLACEMENT (in)

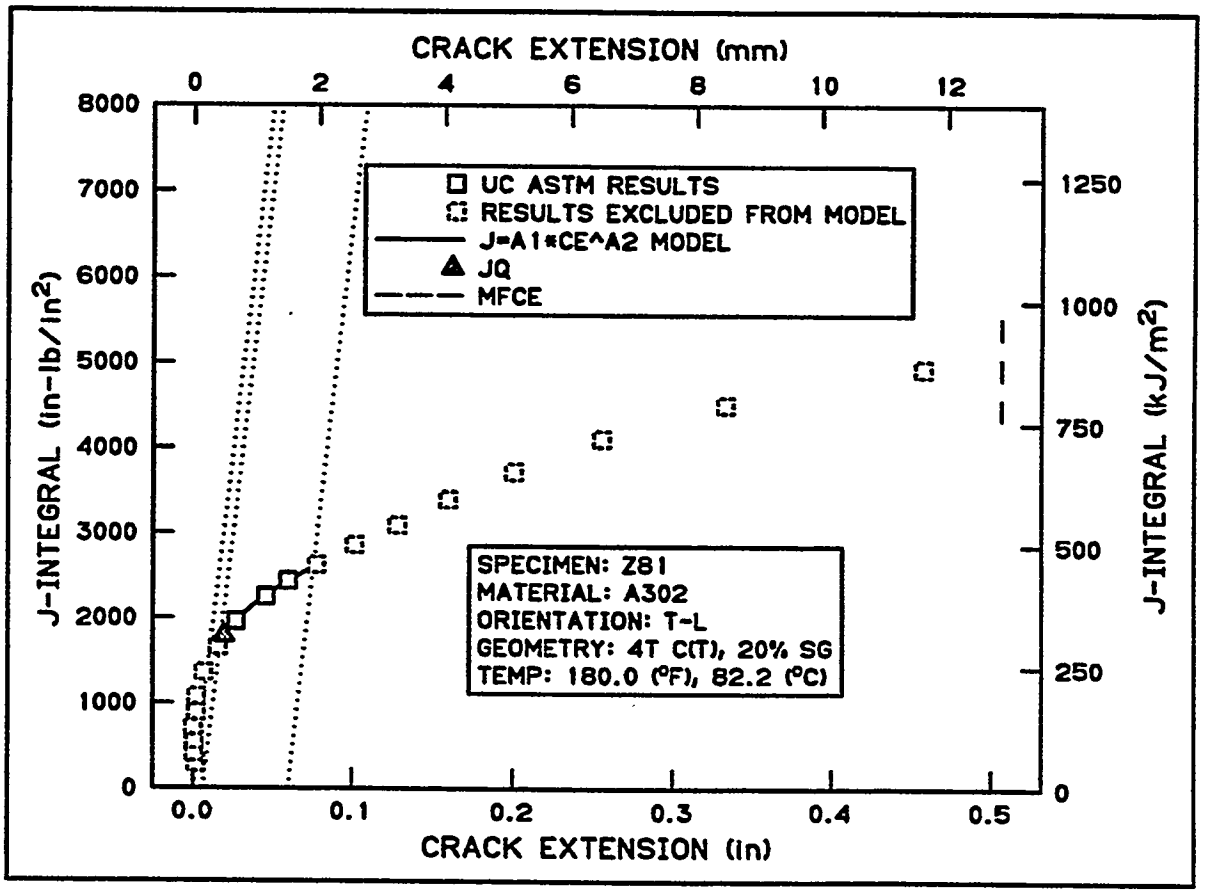

CRACK EXTENSION (mm)
0 1 2 3 4
6000 5000 4000 3000 2000 1000 0
J-INTEGRAL (in-lb/in²)
1000 800 600 400 200 0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z85
MATERIAL: A302
ORIENTATION: L-S
GEOMETRY: 2T C(T), 20% SG
TEMP: 550.0 (°F), 287.8 (°C)
0.000 0.025 0.050 0.075 0.100 0.125 0.150 0.175
CRACK EXTENSION (in)

SPECIMEN
IDENTIFICATION: Z81
MATERIAL CODE: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T) 20 PERCENT SIDE GROOVE
INITIAL CRACK LENGTH: 4.2475 (IN)
TEST
ATMOSPHERE: AIR
TEMPERATURE: 180.0 (DEG F)
ANALYSIS
CRACK EXTENSION CALCULATION: UC
J-INTEGRAL CALCULATION: ASTM

CYCLE	EXTEND-END LOAD (LB)	EXTEND-END DISPLACEMT (IN)	CRACK EXTN (IN)	J-INTEGRAL (IN*LB/IN^2)
1	68949	0.0351	0.0016	289.9
2	80720	0.0423	0.0004	414.3
3	90977	0.0494	0.0007	556.5
4	99608	0.0566	0.0000	718.7
5	106145	0.0636	0.0017	889.5
6	111650	0.0708	0.0019	1073.8
7	117524	0.0813	0.0065	1361.3
8	120876	0.0921	0.0153	1665.0
9	122766	0.1027	0.0264	1961.3
10	123775	0.1132	0.0451	2251.2
11	123971	0.1204	0.0592	2439.4
12	123753	0.1275	0.0771	2625.5
13	123414	0.1361	0.1014	2860.7
14	121749	0.1464	0.1279	3094.9
15	120364	0.1584	0.1595	3395.7
16	117743	0.1732	0.2005	3723.4
17	114821	0.1909	0.2555	4109.2
18	109300	0.2121	0.3330	4507.7
19	101897	0.2371	0.4569	4935.2

WIDTH: 7.3000 (IN),185.420 (MM)
THICKNESS: 4.0000 (IN),101.600 (MM)
SIDE GROOVE RATIO: 20.0 (PERCENT)
FRONT SURFACE-TO-LOAD LINE DISTANCE: 2.0100 (IN),51.054 (MM)
FRONT SURFACE-TO-INITIAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.2300 (IN),158.240 (MM)
DISTANCE 2: 6.2500 (IN),158.750 (MM)
DISTANCE 3: 6.2700 (IN),159.260 (MM)
DISTANCE 4: 6.2800 (IN),159.510 (MM)
DISTANCE 5: 6.2800 (IN),159.510 (MM)
DISTANCE 6: 6.2700 (IN),159.260 (MM)
DISTANCE 7: 6.2500 (IN),158.750 (MM)
DISTANCE 8: 6.2400 (IN),158.500 (MM)
DISTANCE 9: 6.2100 (IN),157.730 (MM)
FRONT SURFACE-TO-FINAL-CRACK FRONT DISTANCES
DISTANCE 1: 6.8005 (IN),172.730 (MM)
DISTANCE 2: 6.6940 (IN),170.030 (MM)
DISTANCE 3: 6.7510 (IN),171.480 (MM)
DISTANCE 4: 6.8728 (IN),174.570 (MM)
DISTANCE 5: 6.7852 (IN),172.340 (MM)
DISTANCE 6: 6.8735 (IN),174.590 (MM)
DISTANCE 7: 6.7211 (IN),170.720 (MM)
DISTANCE 8: 6.6409 (IN),168.680 (MM)
DISTANCE 9: 6.7406 (IN),171.210 (MM)


DISPLACEMENT (mm)
0
1
2
3
4
5
6
7
140000
120000
100000
80000
60000
40000
20000
0
LOAD (lb)
600
500
400
300
200
100
0
LOAD (kN)
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.00
0.05
0.10
0.15
0.20
0.25
0.30
DISPLACEMENT (in)


CRACK EXTENSION (mm)
0
2
4
6
8
10
12
8000
7000
6000
5000
4000
3000
2000
1000
0
J-INTEGRAL (in-lb/in²)
1250
1000
750
500
250
0
J-INTEGRAL (kJ/m²)
UC ASTM RESULTS
RESULTS EXCLUDED FROM MODEL
J=A1*CE^A2 MODEL
JQ
MFCE
SPECIMEN: Z81
MATERIAL: A302
ORIENTATION: T-L
GEOMETRY: 4T C(T), 20% SG
TEMP: 180.0 (°F), 82.2 (°C)
0.0
0.1
0.2
0.3
0.4
0.5
CRACK EXTENSION (in)

NRC FORM 335 (2-89) NRCM 1102, 3201, 3202

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(See instructions on the reverse)

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10. SUPPLEMENTARY NOTES
S. N. M. Malik, NRC Project Manager

11. ABSTRACT *(200 words or less)*

The objective of this work was to develop ductile fracture toughness data in the form of J-R curves for modified A 302 grade B plate materials typical of those used in fabricating reactor pressure vessels. A previous experimental study at Materials Engineering Associates (MEA) on one particular heat of A 302 grade B plate showed decreasing J-R curves with increased specimen thickness. This characteristic has not been observed in numerous tests made on the more recent production materials of A 533 grade B and A 508 class 2 pressure vessel steels. It was unknown if the departure from norm for the MEA material was a generic characteristic for all heats of A 302 grade B steels or just unique to that one particular plate. Seven heats of modified A 302 grade B steel and one heat of vintage A 533 grade B steel were provided to this project by the General Electric Company of San Jose, California. All plates were tested for chemical content, tensile properties, Charpy transition temperature curves, drop-weight nil-ductility transition (NDT) temperature, and J-R curves. Tensile tests were made in the three principal orientations and at four temperatures, ranging from room temperature to 550°F (288°C). Charpy V-notch transition temperature curves were obtained in longitudinal, transverse, and short transverse orientations. J-R curves were made using four specimen sizes (1/2T, 1T, 2T, and 4T). The fracture mechanics-based evaluation method covered three test orientations and three test temperatures [180, 400, and 550°F (82, 204, and 288°C)]. However, the coverage of these variables was contingent upon the amount of material provided. Drop-weight NDT temperature was determined for the T-L orientation only. None of the seven heats of modified A 302 grade B showed size effects of any consequence on the J-R curve behavior. Crack orientation effects were present, but none were severe enough to be reported as atypical. A test temperature increase from 180 to 550°F (82 to 288°C) produced the usual loss in J-R curve fracture toughness. Generic J-R curves and mathematical curve fits to the same were generated to represent each heat of material. Volume 1 deals with evaluation of data and discussion of technical findings. This volume (Volume 2) is a compilation of all data developed.

12. KEY WORDS/DESCRIPTORS *(List words or phrases that will assist researchers in locating the report.)*
A 302 Grade B, Charpy impact toughness, fracture toughness, J-integral, J-R curve, orientation effects, reactor pressure vessels, specimen size, steel plate, tensile strength

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