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HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

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TITLE

EQUIPMENT DESIGN SCOPE CONVERSION OF
OF 313 TO I & E PRODUCTION



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February 11, 1957

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EQUIPMENT DESIGN SCOPE
CONVERSION OF 313 TO I & E PRODUCTION

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J. W. Talbott
Design and Projects
Engineering Operation
Fuels Preparation

EQUIPMENT DESIGN SCOPE CONVERSION OF 313 TO I & E PRODUCTION

Introduction

Equipment required to provide production capacity of 525 tons per month of I & E fuel elements "O", "C", and "K" sizes in the 313 Building is specified below.

Building layout and possible building alterations are not included in this scope, but will be provided in the near future by Industrial Engineering.

Both the I & E fuel element and the equipment required to produce it on a large scale, are still subject to modification. Much of the equipment described below is still in the development stage. It is, therefore, requested that we be notified as far in advance of the procurement as possible, so prints can be brought up to date on items on which prints are complete, and design and testing may be completed on those items which are still in the development stage.

We will notify you as soon as drawings are completed on the equipment items specified in Table III.

Assumptions

- These requirements are based on the following assumptions:

I & E Production	525 tons/month
Solid Production	225 tons/month
6" enriched production	50 tons/month
I & E yield	70%
Solid yield	80%
Operating efficiency	90%
Operation	3 shift, 5 day week

Equipment Requirements

The capacity of each major piece of equipment, throughput through each station and the quantity requirements of each major piece of equipment are shown in Table I. Total equipment requirements are summarized in Table II.

Specifications for equipment which has not yet been designed, or on which drawings are not yet complete, are shown in Table III. We will provide complete prints on these items as soon as possible.

Gage requirements shown in Table II include one each type of gage for use by Quality Audit.

The equipment specified here is for basic operation. Improvements in testing, operating, and handling equipment will be added to the process as they are developed and proven economically feasible.

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Since line identification is required on each fuel element, it is planned to transport the fuel elements from the quench tanks to the lathes and from the lathes to the stamping station on existing hand trucks.

K. Drumheller

K. Drumheller, Supervisor
Tool & Equipment Engineering
Manufacturing Operation
Fuels Preparation Dept.

KD:jj

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TABLE I

CAPACITY OF MAJOR EQUIPMENT
I & E PRODUCTION

<u>Equipment Description</u>	<u>Capacity Pieces/min.</u>	<u>Capacity Per Shift (410 min.)</u>	<u>Req'd thru- put/shift Avg.</u>	<u>No. of Machines Required Production Plus Standby</u>	<u>Installed At Present</u>	<u>Additional Equipment Required</u>
Cap and Can Machine	22.5	9200	5601	5750	1	2
Sleeve Machine	12.5	5125	5484	5500	2	2
Transformation Tester	15	6150	5748	5900	1	2
Pickle Machine	14.4	5900	5666	5800	1	2
Canning Line	13.5 per 5 lines	--	5430	5430	5	6
Facing Lathe	8 per pair	3280	5211	5300	4	5
Welder	2.4 per pair	985	5123	5300	12	16
Pen. & Bond Tester	4	1640	4572	4900	4	6
Etch Machine	12.4	5100	4131	4800	1	2
Radiograph Machine	24	9850	4109	4800	1	2
Slug Recovery	--	1800	--	3000	-	2*

*Modification required to existing equipment

**Six sets of electronic equipment required

REF ID: A6542

TABLE II

EQUIPMENT REQUIREMENTS
313 CONVERSION TO I & E PRODUCTION

<u>Equipment Description</u>	<u>Drawing Number</u>	<u>Quantity Required</u>
<u>Fuel Element Inspection</u>		
Bore Mandrel "Go", O size fuel element	H-3-8600, Pt. #9	2
Bore Mandrel "Go", C size fuel element	H-3-8600, Pt. #13	2
Bore Mandrel "Go", K size fuel element	H-3-8600, Pt. #11	2
Bore Mandrel "No Go", O size fuel element	H-3-8600, Pt. #10	2
Bore Mandrel "No Go", C size fuel element	H-3-8600, Pt. #14	2
Bore Mandrel "No Go", K size fuel element	H-3-8600, Pt. #12	2
Concentricity and Straightness Gage, O size fuel element	H-3-8606, Pt. #1	2
Concentricity and Straightness Gage, C size fuel element	H-3-8606, Pt. #3	2
Concentricity and Straightness Gage, K size fuel element	H-3-8606, Pt. #2	2
<u>Cap Inspection</u>		
Cap Thickness Gage Adapter, O size fuel element	H-3-8604, Pt. #1	2
Cap Thickness Gage Adapter, C size fuel element	H-3-8604, Pt. #3	2
Cap Thickness Gage Adapter, K size fuel element	H-3-8604, Pt. #2	2
Tube Wall Thickness Gage	Spec. 1	2
Tube Wall Length Gage	Spec. 2	3
<u>Can Inspection</u>		
Can Mandrel, O size fuel element	H-3-8601, Pt. #3	2
Can Mandrel, C size fuel element	H-3-8601, Pt. #1	2
Can Mandrel, K size fuel element	H-3-8601, Pt. #2	2
<u>Sleeve Inspection</u>		
"Go" Mandrel, O size sleeve	H-3-6737, Pt. #1	2
"Go" Mandrel, C size sleeve	H-3-6737, Pt. #3	2
"Go" Mandrel, K size sleeve	H-3-6737, Pt. #5	2
"No Go" Mandrel, O size sleeve	H-3-6737, Pt. #2	2
"No Go" Mandrel, C size sleeve	H-3-6737, Pt. #4	2
"No Go" Mandrel, K size sleeve	H-3-6737, Pt. #6	2
<u>Component Cleaning</u>		
Cap Baskets	H-3-6773	80
Hanger Adapters	H-3-6833	16
Conveyor Adapters	H-3-6826	50

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<u>Equipment Description</u>	<u>Drawing Number</u>	<u>Quantity Required</u>
<u>Cap Loading</u>		
Conveyor		--
Cap Loading Station	Spec. 3 Spec. 4	--
<u>Component Conveyor Zig Zag</u>		
Zig zag conveyor hangers	H-3-6671	24
<u>Transformation Testing</u>		
Transformation Tester Crystal Holder	Spec. 5	3
<u>Pickle Inspection</u>		
Borescope	Spec. 6	1
Diffuse Light Source	Spec. 7	1
<u>Canning Tools and Baskets</u>		
Fuel element carrying tongs	H-3-6717*	30
Sleeve carrying tongs	H-3-6718*	20
Capping tongs	H-3-6718*	20
Replacement center rods, O size fuel element	H-3-6717*	165
Replacement center rods, C size fuel element	H-3-6717*	165
Replacement center rods, K size fuel element	H-3-6717*	300
Agitator baskets	Spec. 8	60
<u>Canning Area Conveyor</u>		
Cap stands	Spec. 9	--
<u>Quench</u>		
Quench Tanks	H-3-6620	5
Quench baskets	H-3-6649	20
Quench tank installation	Spec. 10	--
<u>Facing</u>		
Acme Gridley Lathes	Spec. 11	2
Acme Gridley Lathe Tooling	Spec. 12	--
Acme Gridley lathe collets, O & C size fuel element	H-3-6581, shts. 1 & 2*	12
Acme Gridley lathe collets, K size fuel element	Spec. 13	30
Acme Gridley lathe collet liners, O size fuel element	H-3-6581, shts. 1 & 2*	36
Acme Gridley lathe collet liners, C size fuel element	H-3-6581, shts. 1 & 2*	36
Acme Gridley lathe collet liners, K size fuel element	Spec. 14	36
Acme Gridley lathe service	Spec. 15	--

*Prints to be modified to provide separate number on each part

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<u>Equipment Description</u>	<u>Drawing Number</u>	<u>Quantity Required</u>
<u>Stamping</u>		
Manual stamper for I & E fuel elements	H-3-6747*	2
Stamper sleeve, O size fuel element	H-3-6747*	3
Stamper sleeve, C size fuel element	H-3-6747*	3
Stamper sleeve, K size fuel element	H-3-6747*	3
Metal Stamps, Set, Numbers 0 to 9 inclusive	H-3-6809	4
Metal Stamps, Set, Letters A to Z inclusive	H-3-6809	4
I & E Stamper stand	H-3-6791	2
<u>Braze Inspection</u>		
Contour gages, Male, O size fuel element	Spec. 16	4
Contour gages, Male, C size fuel element	Spec. 16	4
Contour gages, Male, K size fuel element	Spec. 16	4
Contour gages, Female, O size fuel element	Spec. 17	4
Contour gages, Female, C size fuel element	Spec. 17	4
Contour gages, Female, K size fuel element	Spec. 17	4
Comparator, Bench type	Spec. 18	1
<u>Welding</u>		
Semi automatic welders	Spec. 19	6
Modify present semi automatic welders	Spec. 20	10
Transformers and controls	Spec. 21	18
Weld Booth Modification	Spec. 22	--
Argon System extension	Spec. 23	--
Ventilation supply revision	Spec. 24	--
Exhaust revision	Spec. 25	--
Service revisions, electrical, air, water	Spec. 26	--
Overhang gages, Internal, O size fuel element	H-3-8600-1	8
Overhang gages, Internal, C size fuel element	H-3-8600-5	8
Overhang gages, Internal, K size fuel element	H-3-8600-3	8
Overhang gages, External, O size fuel element	H-3-8616-1	8
Overhang gages, External, C size fuel element	H-3-8616-2	8
Overhang gages, External, K size fuel element	H-3-8616-3	8
Welding Buffer	H-3-6815 & 16	16
<u>Weld Inspection</u>		
Modify weld inspection booths	Spec. 27	2
Overhang gages, Internal, O size fuel element	H-3-8600-1	5
Overhang gages, Internal, C size fuel element	H-3-8600-5	5
Overhang gages, Internal, K size fuel element	H-3-8600-3	5
Overhang gages, External, O size fuel element	H-3-8616-1	5
Overhang gages, External, C size fuel element	H-3-8616-2	5
Overhang gages, External, K size fuel element	H-3-8616-3	5
Bead width gage, Internal and External, all sizes fuel elements	Spec. 28	5
Bore Mandrel and cleaner, O size fuel element	Spec. 29	5
Bore Mandrel and cleaner, C size fuel element	Spec. 29	5
Bore Mandrel and cleaner, K size fuel element	Spec. 29	5

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<u>Equipment Description</u>	<u>Drawing Number</u>	<u>Quantity Required</u>
<u>Penetration and Bond Test</u>		
Penetration & bond tester conveyor tank	Spec. 30	2
Load unit, pen. & bond test	H-3-6676, 6677, 6678	2
Unload unit, pen. & bond test	H-3-6668, 6669	2
Reject switch, pen. & bond test	H-3-6670	2
Probe carrier, pen. & bond test	Spec. 31	6
Pneumatic controls, pen. & bond test	Spec. 32	2
Reject marker, pen. & bond test	Spec. 33	6
Internal bond test unit	Spec. 34	6
External bond test unit, with test head	Spec. 35	2
Internal pen. test unit	Spec. 36	6
External pen. test unit, with test head	Spec. 37	2
Internal Probe O size fuel element	SK-3-6962 & SK-3-6963*	20
Internal Probe C size fuel element	SK-3-6962 & SK-3-6963*	20
Internal Probe K size fuel element	SK-3-6962 & SK-3-6963*	40
Reject control circuit	H-3-6755	6
Load control circuit	Spec. 38	6
Load spacer	Spec. 39	6
Service revisions	Spec. 40	6
<u>Penetration and Bond Test Area Conveyor</u>		
Conveyor components	Spec. 41	-
<u>Autoclaves</u>		
Autoclave basket sleeve-revisions	Spec. 42	-
<u>Final Inspection</u>		
Internal radiograph	Spec. 43	-
Conveyor, final inspection	Spec. 44	-
Diffuse light source	Spec. 7	5
Bore mandrel, O size fuel element	H-3-8600, Pt. #1	5
Bore mandrel, C size fuel element	H-3-8600, Pt. #5	5
Bore mandrel, K size fuel element	H-3-8600, Pt. #3	5
Tube gage, O size fuel element	H-3-8603, Pt. #7	5
Tube gage, C size fuel element	H-3-8603, Pt. #3	5
Tube gage, K size fuel element	H-3-8603, Pt. #4	5
Borescope	Spec. 6	4
<u>Final Storage</u>		
K size fuel element pallets	Spec. 45	200
Modify existing pallets	Spec. 46	-

*Prints to be modified to provide separate number on each part

TABLE III

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EQUIPMENT SPECIFICATIONS
313 CONVERSION TO I & E PRODUCTION

Specification 1

Tube Wall Thickness Gage

Federal Products Model KB-4-11, with mandrel for each size fuel element.

Specification 2

Tube Wall Length Gage

A gage which will measure the overall length of the spire, and the uncurved length of the spire on O, C and K size fuel element caps to an accuracy of .002".

Specification 3

Conveyor for Transporting I & E Caps to Cap & Can Machine

Roller conveyor, with suitable supports, of sufficient length and width to transport I & E cap baskets No. H-3-6773 from a loading station approximately 20 feet west of the existing cap and can machines to either cap and can machine loading station.

Specification 4

Cap Loading Station

A loading station, capable of supporting 4 I & E cap baskets, No. H-3-6773, in a position suitable for loading, to be located approximately 20' west of the cap and can machines and on a line approximately midway between the two cap and can machines.

Specification 5

Transformation Tester Crystal Holder

A crystal holder per Dwg. H-3-6700. This holder has not yet been tested. It will be modified before production use.

Specification 6

Borescopes

Borescope, Model B-22-A, American Cystoscope Makers, Inc., .260 dia., 10" long, right angle.

Specification 7

Diffuse Light Source

Diffuse light source, G. E. Model AW, Type 3, 115 Volt.

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Specification 8

Duplex Agitator Baskets

Agitator baskets, Dwg. No. H-3-6253 are to be modified to change the shaft angle.
The ideal angle has not yet been determined.

Specification 9

Canning Area Cap Stands

A stand suitable for holding I & E cap baskets No. H-3-6773, installed at the canning furnaces in such a manner that the caps are readily available to the cappers.

These stands are designed and sketches are available, but drawings have not yet been made.

Specification 10

Quench Tank Installation

Water supply and drain connections for installing five quench tanks No. H-3-6620 on lines 2, 3, 4, 5, and 6 similar to the existing installation on line 1. Outlets are in place.

Specification 11

Facing Lathes

Two Acme Gridley, six spindle, $1\frac{1}{4}$ " Model RAG bar machines modified as per P.O. HWC-4371, with the following exceptions:

1. Tooling specifications including tool holders, spindle speed, feed rates, and cam requirements to be furnished by Purchaser.
2. Loading cylinder, BPF 7066, Dwg. No. TC913080, to be altered to 12" stroke.
3. Spindle stopping and chuck opening at position #5 to be eliminated.
4. Collet design to be altered to conform to Dwg. No. H-3-6581, modification to drawing required for I & E components "O", "C", & "K".
5. Loading mechanism at station #2 to be provided by purchaser.
6. Inspection plating on gear case to be undercoated with fireproof, sound absorbent material.
7. Lubrication system to be of modern design to eliminate oil collection on machine bed.

Specification 12

Facing Lathe Tooling

Tooling for Acme Gridley lat... described in Specification 11 above which will:

1. Face cap end of O, C, and K size I & E fuel elements.
2. Face Base End of O, C, and K size I & E fuel elements.
3. Deburr Cap End of O, C, and K size I & E fuel elements.
4. Brush bore of base end 1" on O, C, and K size I & E fuel elements.

One end only is to be machined in one lathe at one time.

Specification 13

Acme Gridley Lathe Collets, K Size Fuel Element

Collets similar to those in drawing No. H-3-6581, sheets 1 and 2, altered to fit collet liners for K size fuel elements described in Specification 14 below.

Specification 14

Acme Gridley Lathe Collet Liners, K Size Fuel Element

Collet liners similar to those in drawing No. H-3-6581, sheets 1 and 2, altered to fit K size fuel elements and the collet described in Specification 13 above.

Specification 15

Facing Lathe Service

Air and electrical service for two additional six spindle, 1 $\frac{1}{4}$ " Model RA6 Acme Gridley lathes, to be installed in the same general area as the three existing lathes.

Specification 16

Contour Gage, Male, O, C, and K Size Fuel Element

Contour gages, fabricated by machining a piece of tool steel approximately 1 $\frac{1}{2}$ " dia. by 3/4" long to the reverse of the male end dimension, accurate to $\pm .001"$, and cutting in half. Sketches are available, but drawings have not yet been made.

Specification 17

Contour Gage, Female, O, C, and K Size Fuel Element

Contour gages, fabricated in the same manner as male gages described in Specification 16 above, to the reverse of the female end. Sketches are available, but drawings have not yet been made.

Specification 18

Optical Comparator

Jones & Lamson Company Bench Comparator, for 1 $\frac{1}{2}$ " work piece. Micrometer adjustment on horizontal and vertical.

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Specification 19

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Semi-Automatic Welders

The following design modifications are to be made prior to procurement of the mechanical part of the semi-automatic welders:

1. Replace cam drive gearing with separate synchronized programming, the cams to be relocated within the programming assembly.
2. Alter torch mounting system to provide:
 - a. Angle mounting of torch
 - b. Positive overhang adjustment
3. Alter arc shield design to accommodate new torch mounting system.

Drawings for these units are listed on drawing H-3-6342, Automatic Welding Machine Procedure and Drawing List.

Specification 20

Modification of Existing Semi-Automatic Welders

Modifications 1, 2, and 3, as described in Specification 19 above, are to be made to the ten existing semi-automatic welders.

Specification 21

Transformers and Controls

This specification covers the design and fabrication requirements of a special moveable coil, capacitor balanced current wave, inert arc welding-transformer with air cylinder operated crater filler. The transformer is for fusion welding on aluminum assembly composed of a thin and thick section of 1100 alloy aluminum brazed together with Alcoa A-13 alloy. In order to produce a homogeneous alloy of the 1100 and A-13 alloys in the weld, a sinusoidal welding current is required.

General

1. The power supply to the primary of the welding transformer shall be 480 volts, 60 cycle, single phase.
2. The open circuit potential of the secondary of the welding transformer shall be 165 volts alternating current.
3. The current range of the secondary shall be continuously adjusted from 25 to 200 amperes.
4. Each transformer shall be equipped with 17,700 microfarads of capacitor in series with the lead to the work piece.
5. The minimum time for decaying or building the current up over the range of 25 to 200 amperes shall be one second.
6. The duty cycle for the transformer shall be 65 per cent when using a welding current of 200 amperes.

7. All transformers shall have Class H insulation.
8. The input power factor with maximum welding current is to be corrected to 80 per cent lagging with static capacitors.
9. Forced air cooling shall be supplied by a cooling fan driven by a 115 volt, single phase, totally enclosed ball bearing motor.
10. Each transformer shall be equipped with a size 3, two pole magnetic contactor for energizing the primary of the welding transformer, the operating coil of which is 115 volts, 60 cycles.
11. Each transformer shall be equipped with a 0.5 KVA, 480/120 volt, 60 cycle control transformer.
12. Each transformer shall be equipped with an ebonite terminal board 18" x 18" x 1" thick on which all power, welding and control circuits have terminals.
13. A cartridge fuse block for fusing the secondary of the control transformer shall be located on the terminal board.
14. The ordinates of the wave shape of the welding current of the transformer shall be within plus or minus two per cent of a true sine wave.
15. The transformer shall be enclosed in a ventilated case having down draft ventilation.
16. The transformer enclosures shall be equipped with access doors having full length hinges and heavy duty fasteners.
17. Each transformer shall be equipped with four inch by one and one-half inch solid rubber tired casters, the two on the back side being swivel type.
18. All metal surfaces of the transformer enclosing and supporting structure shall be scaled, primed and given two coats of light gray machinery enamel.
19. Design of the complete transformer units shall be in accordance with NEMA standards for inert arc welding transformers, except for the open circuit voltage and the current wave shape requirement.
20. Design of the complete transformer units shall be in accordance with the National Electrical Code.
21. The transformer shall be equipped with a mechanical means for continuously adjusting the welding current over the full range 25 to 200 amperes.
22. The transformer shall be equipped with an air cylinder operated crater filling device for reducing the welding current to the minimum value at weld closure.
23. The crater filling air cylinder shall be equipped with speed control and cushion valves.

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24. The crater filling air cylinder shall be equipped with a heavy duty industrial type solenoid valve with a 115 volt, 60 cycle operating coil.
25. The maximum dimensions of the welding transformer, including casters and crater filling air cylinder, shall be 22 wide, 38 deep and 60 high.

Specification 22

Weld Booth Modification

Modify existing weld booths to provide for operation of two welders by a single operator. A total of 4 weld booths, with two welders in each is required on each finishing line.

Specification 23

Argon System Extension

Modify the argon system to provide service to 16 welders arranged as described in Specification 22 above. Argon system is to provide 15 cubic feet per hour per welder, a total added capacity of 90 cubic feet per hour.

Specification 24

Ventilation Air Supply Revision

Modify the ventilation air supply system to provide service to 16 welders arranged as described in Specification 22 above. Air supply system is to provide 300 CFM per machine, a total added capacity of 1800 CFM.

Specification 25

Exhaust Revision

Modify exhaust system to provide exhaust for 16 welders arranged as described in Specification 22 above. Exhaust system is to provide 900 CFM per machine, a total added capacity of 5400 CFM.

Specification 26

Service Revisions, Water, Air, Electrical

Modify water, air, and electrical service to provide service to 16 welders arranged as described in Specification 22 above.

Specification 27

Weld Inspection Booth Modification

Modify two existing weld inspection booths to allow two weld inspectors to work comfortably in each booth.

Specification 28

Bead Width Gage

A bead width gage to measure weld bead width to insure minimum width of 3/32" and minimum penetration of .050".

Sketches are available on this gage, but drawings have not been made..

Specification 29

Bore Mandrel and Cleaner

A mandrel which will allow the weld inspectors to check the bore clearance of each fuel element and will remove from the bore foreign material which might damage the internal penetration and bond test probe. This mandrel and cleaner is to be mounted on a stand so the inspector can perform this operation by lowering the fuel element over it with one hand.

A mandrel of this type is in use, but drawings have not yet been made.

Five mandrels must be provided for each size of fuel element.

Specification 30

Penetration and Bond Test Conveyor Tank

Tank assemblies per drawings H-3-6616, H-3-6617, H-3-6615, H-3-6656, and H-3-6657, modified to accommodate internal probe mounting system described in Specification 31 below.

A completely new conveyor and tank are being designed with the above modification included. Drawings are not yet complete on this new tank.

Specification 31

Probe Carrier

A probe carrier which will insert internal probe, Dwg. Nos. SK-3-6962 and SK-3-6963, in the fuel element after it is placed on the conveyor rollers in the conveyor tank as described in Specification 30 above.

A prototype of this unit has been fabricated, but has not been tested.

Specification 32

Pneumatic Controls, Penetration and Bond Test Load-Unload

Pneumatic controls similar to those on the prototype automatic load-unload unit operating in 313. Sketches are available on this system, but drawings are not complete.

Specification 33

Reject Marker

A marking device, utilizing Flowmaster pens, which will fit on the reject conveyor from the penetration and bond testers, and through the Reject Control circuit No. H-3-6755 mark each type of reject which goes down the conveyor with a mark which identifies it as to reject type.

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Specification 34

Internal Bond Test Unit

HW-3712

Bond test electronic units and connectors, per Dwg. H-4-2841, 2842, 2843, 2844, 2845, and 39040.

Crystal holders similar to those in use in 313 are to be provided with these units. Drawings on these crystal holders are not yet available.

Specification 36

Internal Penetration Test Unit

Penetration test units per drawings SK-3-6078, sheets 2, 3, 4, 6, 7, and 8, and SK-3-6986, with Dumont type 401, 5" oscilloscope.

Specification 37

External Penetration Test Unit, with Test Head

Penetration test units per Dwg. SK-3-6078, sheets 1 through 8, with test head similar to head in use in 313. Drawings are not yet available on test head.

Specification 38

Load Control Circuit, Penetration and Bond Test

A control circuit for load unit per drawings H-3-5558 and H-3-6669 which will actuate the load unit in proper sequence with probe carrier described in Specification 31 above.

Specification 39

Load Spacer, Penetration and Bond Test

A load spacer per Dwg. No. H-3-5833 modified to fit conveyor per Dwg. No. H-3-6662.

Specification 40

Service Revisions, Penetration and Bond Test

Modify electrical, air, water, and sewer facilities to provide for operation of six penetration and bond test units in the space bounded by the existing drag chain conveyors, the end of the drag chain conveyors, and 30 feet south of the end of the drag chain conveyors.

Specification 41

Penetration and Bond Test Area Conveyor

Conveyor which will transport fuel elements from the weld inspection station to the penetration and bond testers and from the penetration and bond testers to the etch machines utilizing the following components:

Straight Conveyor	H-3-6662
Curved Conveyor	H-3-6646
Skate Wheel Elevator	H-3-6660
Stands	H-3-6661
Switch	H-3-6670

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HW-47887

Specification 42

Autoclave Basket Revisions

Process tube in 240 autoclave baskets must be reamed to 1 $\frac{1}{2}$ " minimum inside diameter to provide for K size fuel elements.

This may also be accomplished by replacing the present liners with aluminum tubing of 1-3/4" maximum O.D. and 1-1/2" minimum I.D.

Specification 43

Internal Radiograph

A means of radiographing the weld bead at the juncture of the cap spire and the can bottom.

This will be one of the following devices:

1. Thulium source radiograph machine
A device which will use a thulium source to expose film through the weld bead.

This machine is designed and sketches are available, but drawings have not yet been made.

2. Radiograph trays which will support 18 fuel elements in a horizontal position and permit radiographing of the weld bead with the present radiograph machine.
The existing machines must be modified to handle these trays. If this method is used 10 trays will be required.

Specification 44

Final Inspection Conveyor

Conveyor which will provide handling from autoclave baskets to storage pallets, utilizing the following components.

Straight Conveyor	H-3-6662
Curved Conveyor	H-3-6646
Skate Wheel Elevator	H-3-6660
Stands	H-3-6661

Specification 45

Storage Pallets, K Size Fuel Elements

Pallets per Dwg. H-3-6293 modified to provide 1 inch of additional height around the top rim, 1-9/16 holes instead of 1-1/2" holes, and a rubber pad under the holes.

Specification 46

Modify Existing Pallets

Modify 600 existing pallets, No. H-3-6293, as described in Specification 45 above, except that 1-1/2" holes will not be enlarged.

END

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3 / 18 / 92

