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PERFORMANCE CHARACTERISTICS OF THE FAIRCHILD 8A AND 8B CENTRIFUGAL COMPRESSORS

By

R. E. Foster
Process Equipment Technology Department
Quality & Technical Services Division

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MARTIN MARIETTA ENERGY SYSTEMS, INC.

POST OFFICE BOX 628 PIKETON, OHIO 45661

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ABSTRACT

The Fairchild 8A and 8B centrifugal compressors used in the X-326 isotopic cascade at the Portsmouth Gaseous Diffusion Plant have been modeled using the computer software code COMPAL. Performance characteristics curves for both machines are included for various mixtures of UF_6 and N_2 gases.

INTRODUCTION

Performance modeling of the Fairchild 8A and 8B centrifugal compressor has been completed and represents the completion of milestone number 17 of P&LRTS Project 9600. Computer analysis of the X-326 centrifugal compressors is being performed in support of efforts to improve the circuit balance model and the inventory model of the X-326 "top" cascade.

DISCUSSION

The Fairchild 8A and 8B machines are single inlet and double inlet, respectively, two stage centrifugal compressors used in the isotopic portion of the top cascade at the Portsmouth GDP. The geometric dimensions were taken from original Fairchild drawings and entered into a data file used by COMPAL. Modeling parameters used for both machines were taken from information obtained from Dr. David Japikse, President of Concepts and consultant on this project. The modeling effort is in support of the Systems Analysis Department goals to improve the top cascade circuit balance code.

The results of the computer modeling with COMPAL of the 8A and 8B compressor are shown on the pressure versus volumetric flow graphs in Figures 1 through 8.

FIGURE NUMBER	COMPRESSOR TYPE	INLET TEMPERATURE	NITROGEN CONCENTRATION	B/A	FLOW
1	8A	170^0	0,5,10,15%	N/A	Inlet
2	8A	170°,200°,230°	0%	N/A	Inlet
3	8B	170°	0,5,10,15%	0.8	Inlet
4	8B	170°	0,5,10,15%	0.8	Qbes
5	8B	170°	0,5,10,15%	1.0	Inlet
6	8B	170°	0,5,10,15%	1.0	Qbes
7	8B	170°	0,5,10,15%	1.2	Inlet
8	8B	170°	0,5,10,15%	1.2	Qbes

Qbes is the equivalent suction volume at the 'B' flange calculated using the combined mass flow of the 'A' and 'B streams at the inlet conditions of the 'B' flange.

Computer modeling of the X-326 centrifugal compressors will continue with the 9A and 9B Allis-Chalmers compressor.

FIGURE 1
8A 170 DEG F

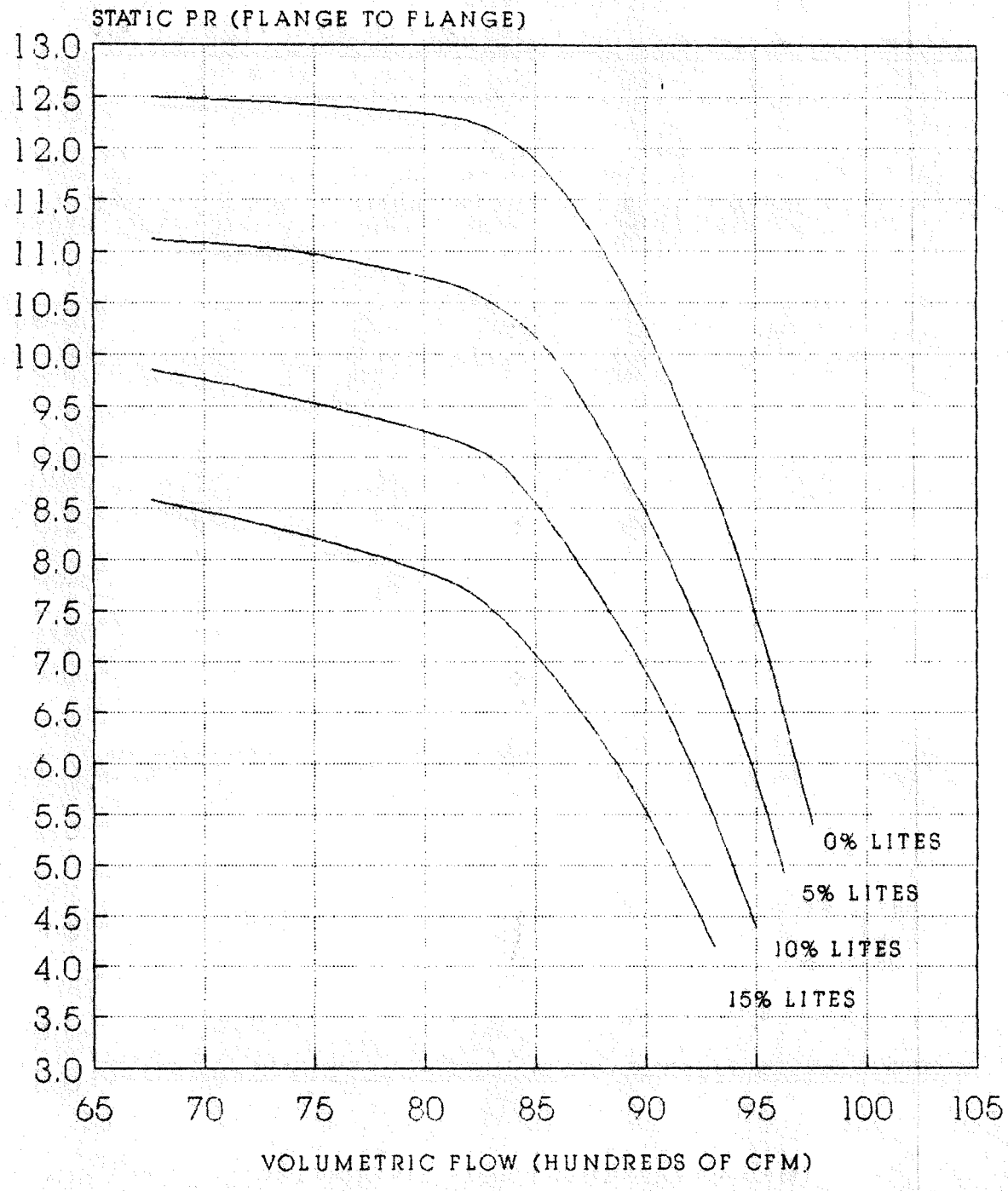

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FIGURE 2
8A COMPRESSOR

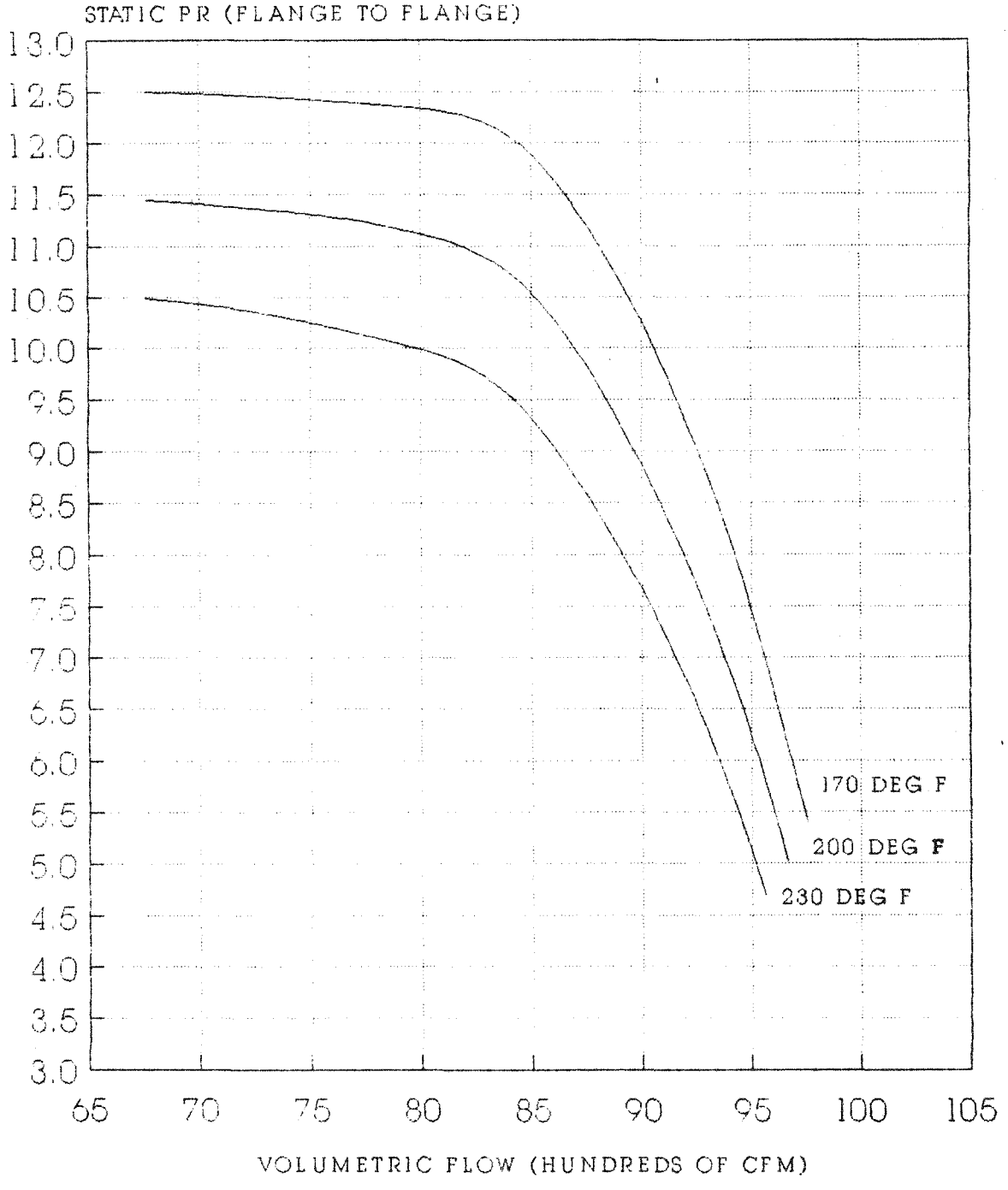

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FIGURE 3
8B,170 DEG F, B/A = 0.8
1ST STAGE

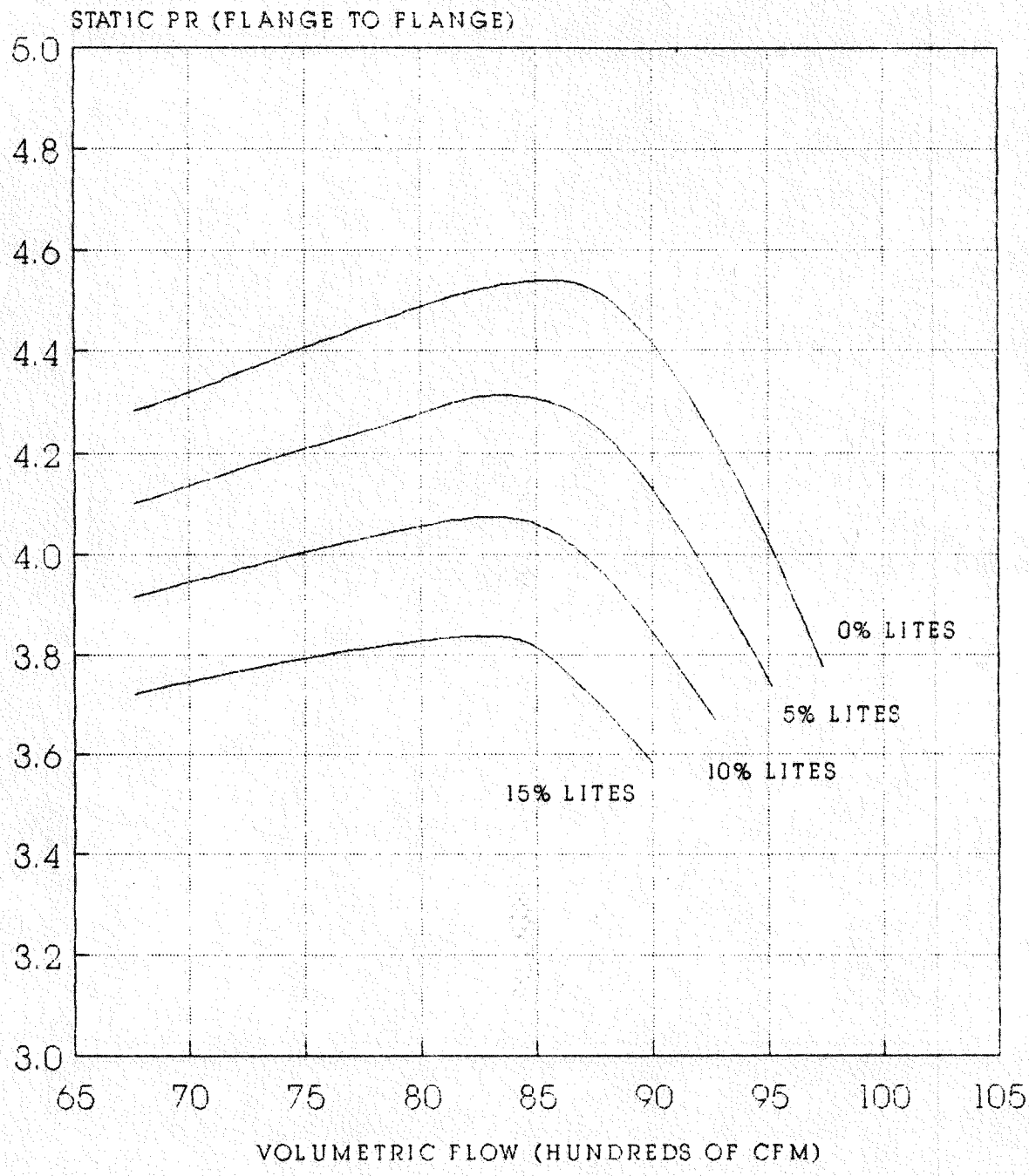

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FIGURE 4
8B,170 DEG F, B/A = 0.8
2ND STAGE

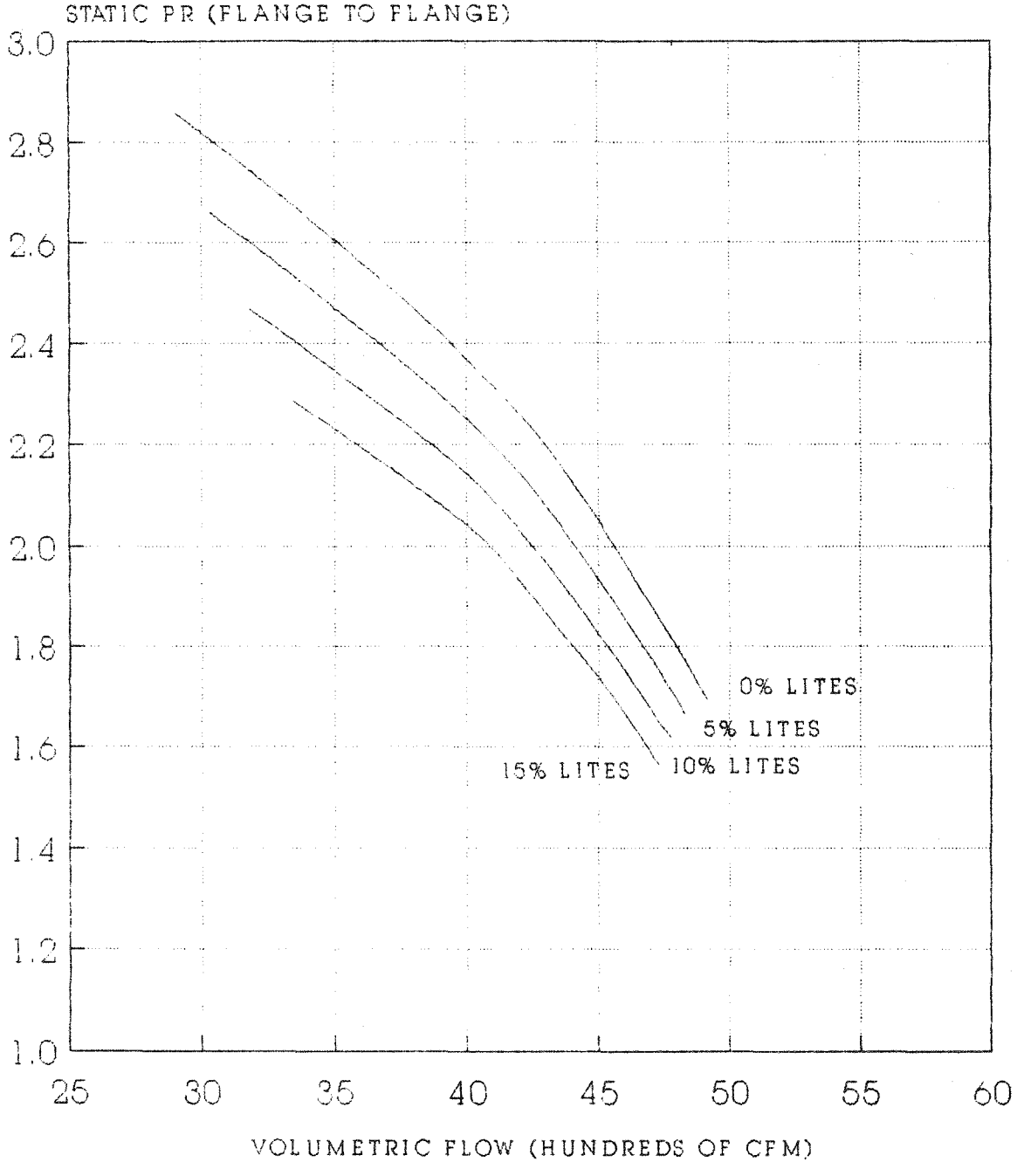

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FIGURE 5
8B,170 DEG F, B/A = 1.0
1ST STAGE

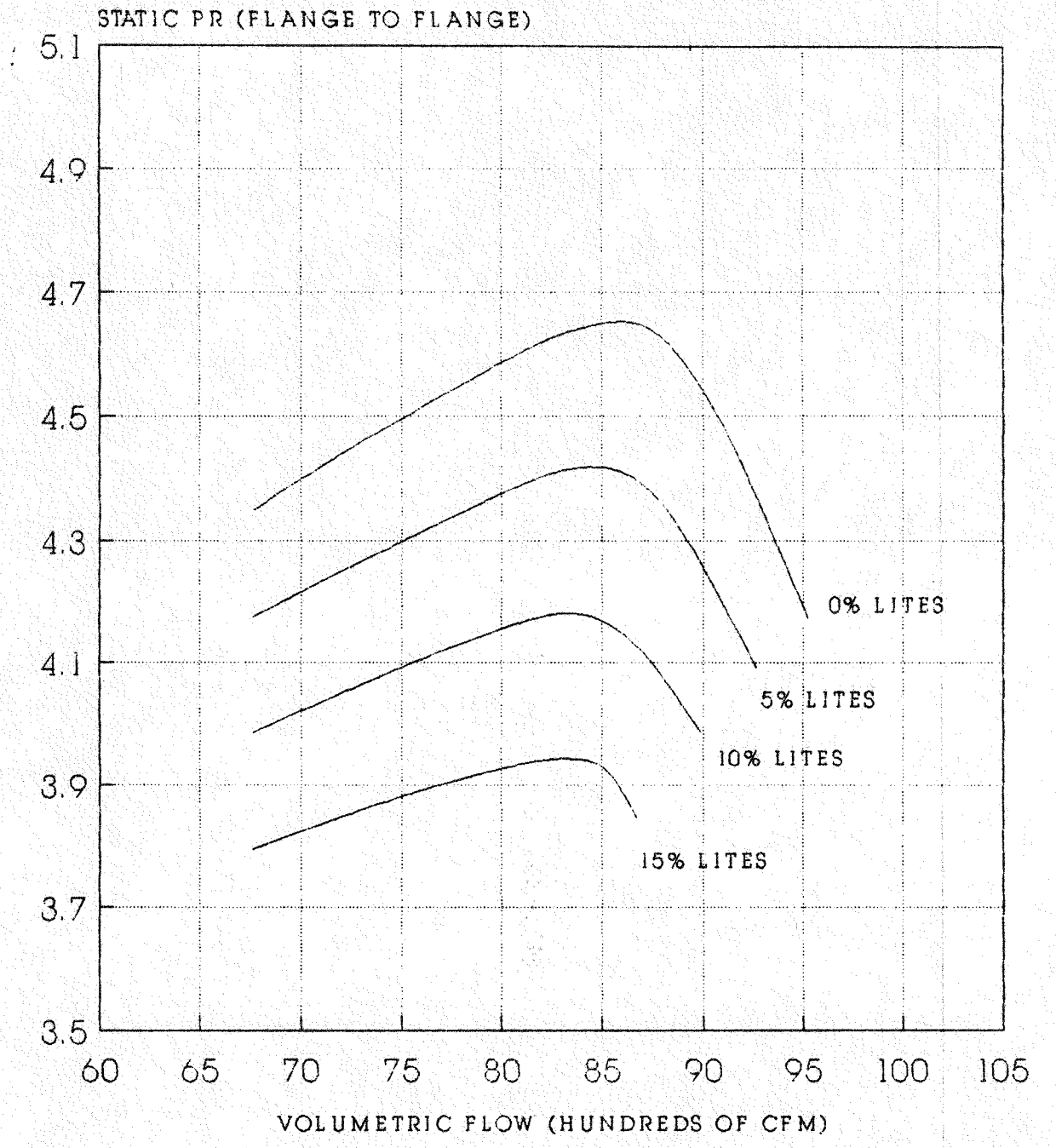

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FIGURE 6
8B,170 DEG F, B/A = 1.0
2ND STAGE

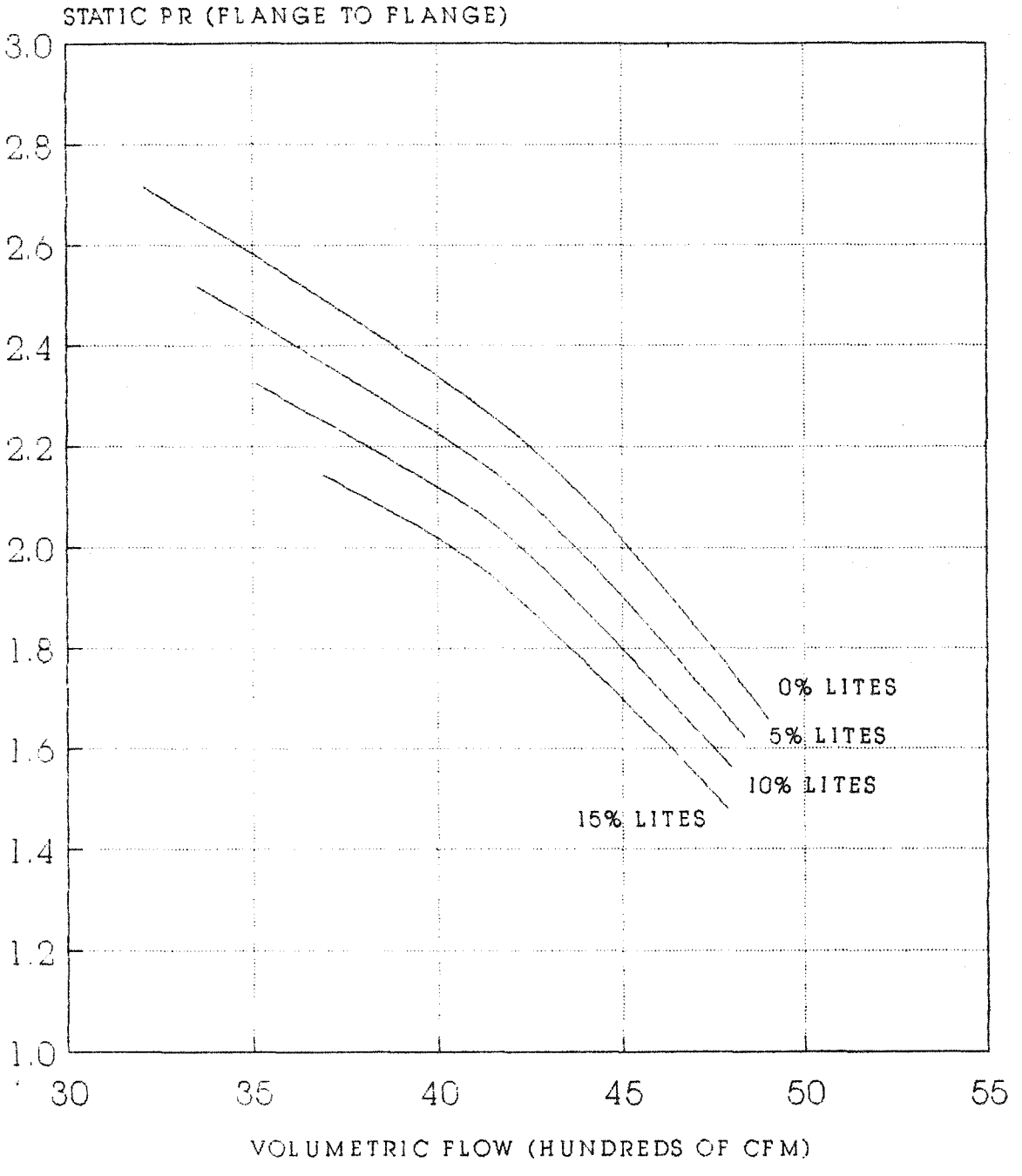

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FIGURE 7
8B,170 DEG F, B/A = 1.2
1ST STAGE

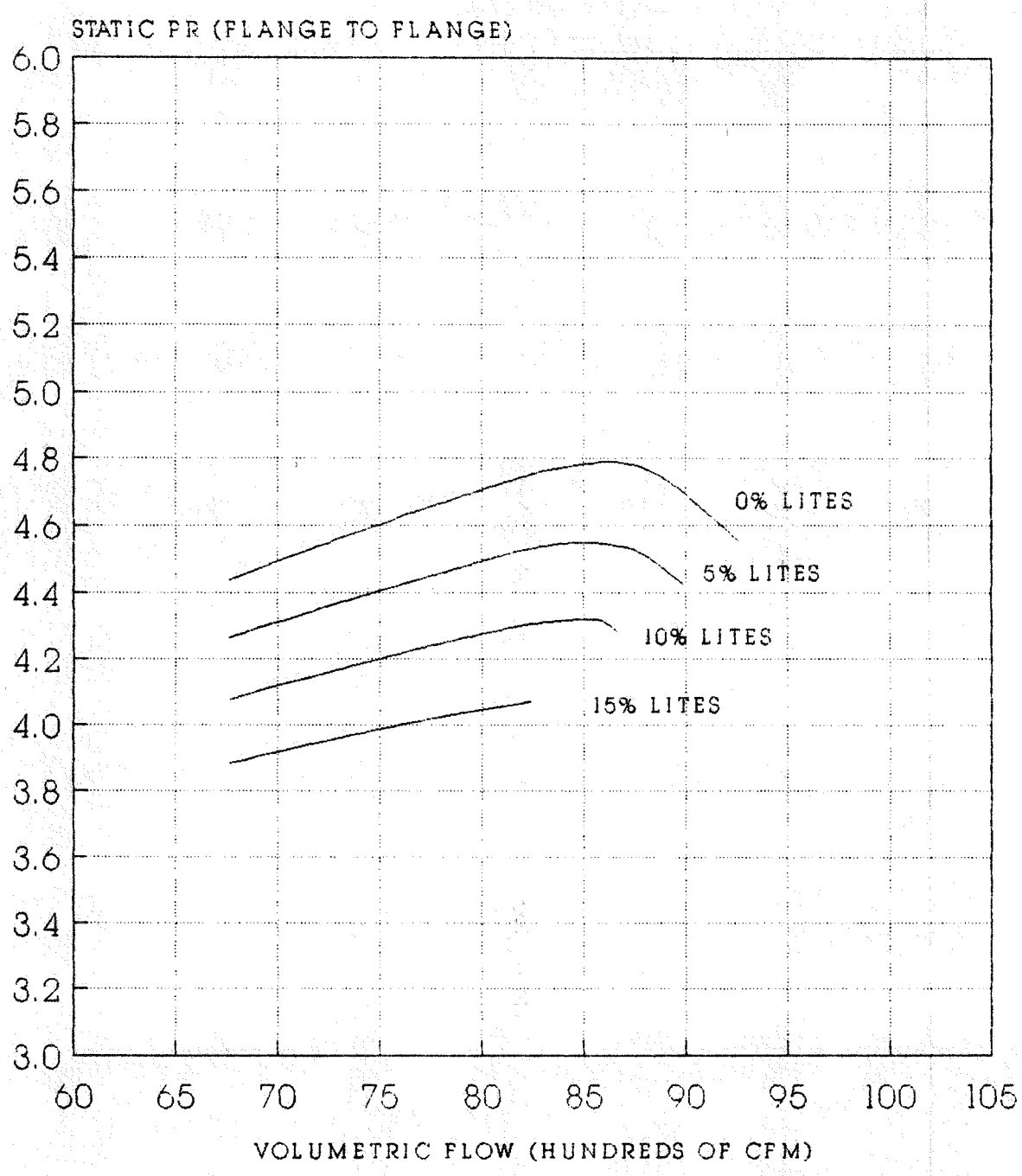

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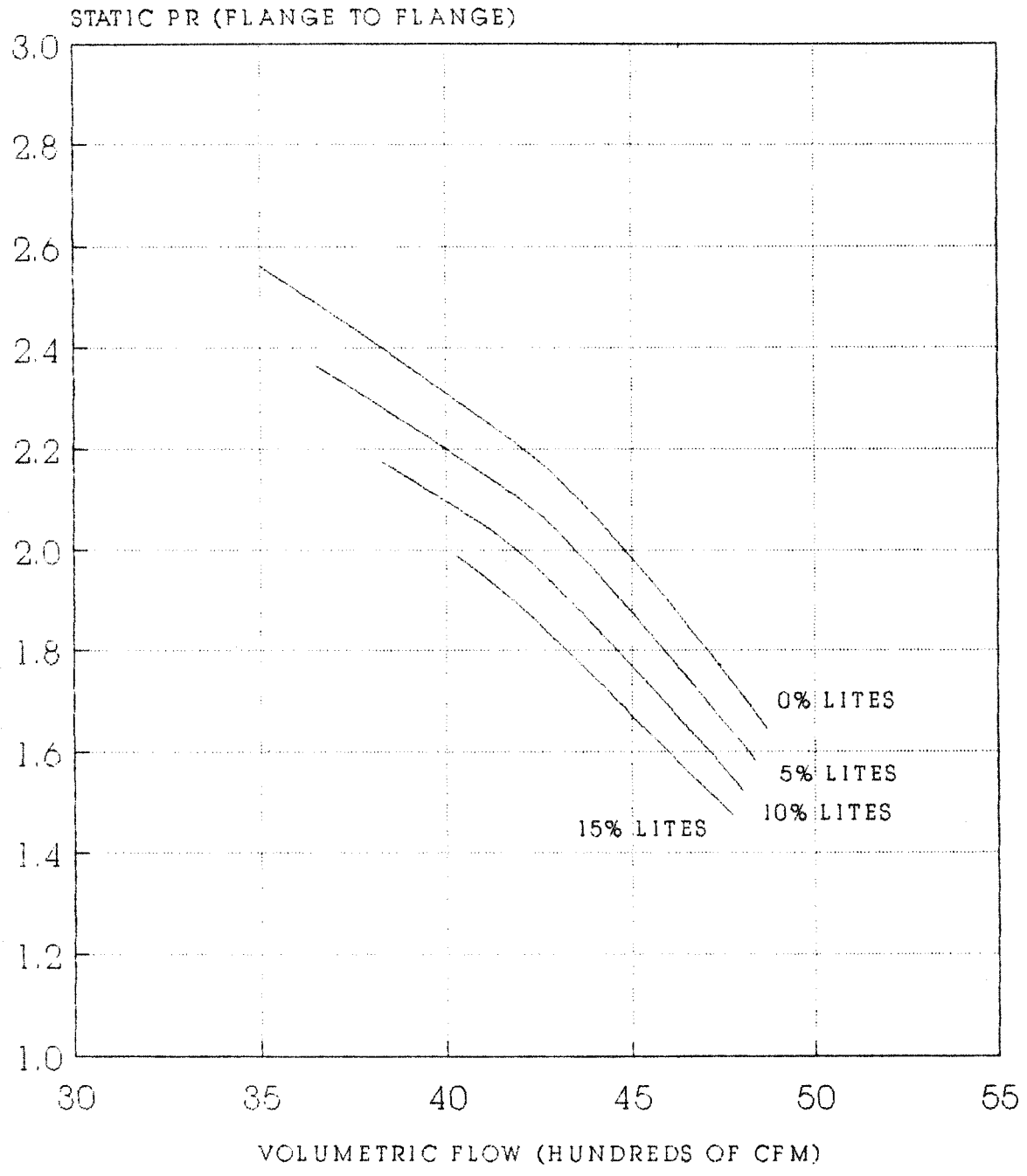
FIGURE 8
8B,170 DEG F, B/A = 1.2
2ND STAGE



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