

AFRPL-TR-66-124-Vol II

AD 839278

FLEXIBLE EXIT CONE
NOZZLE DEVELOPMENT PROGRAM
PHASE II REPORT

VOLUME II
COLD FLOW TEST DATA (PLOTTED)

APPENDIX I

August 1968

Prepared for

Air Force
Rocket Propulsion Laboratory
Research and Technology Division
Air Force Systems Command
Edwards, California

93523
attn: RPRR ST/WFO

Thiokol
CHEMICAL CORPORATION
WASATCH DIVISION

AFRPL-TR-68-124-Vol II

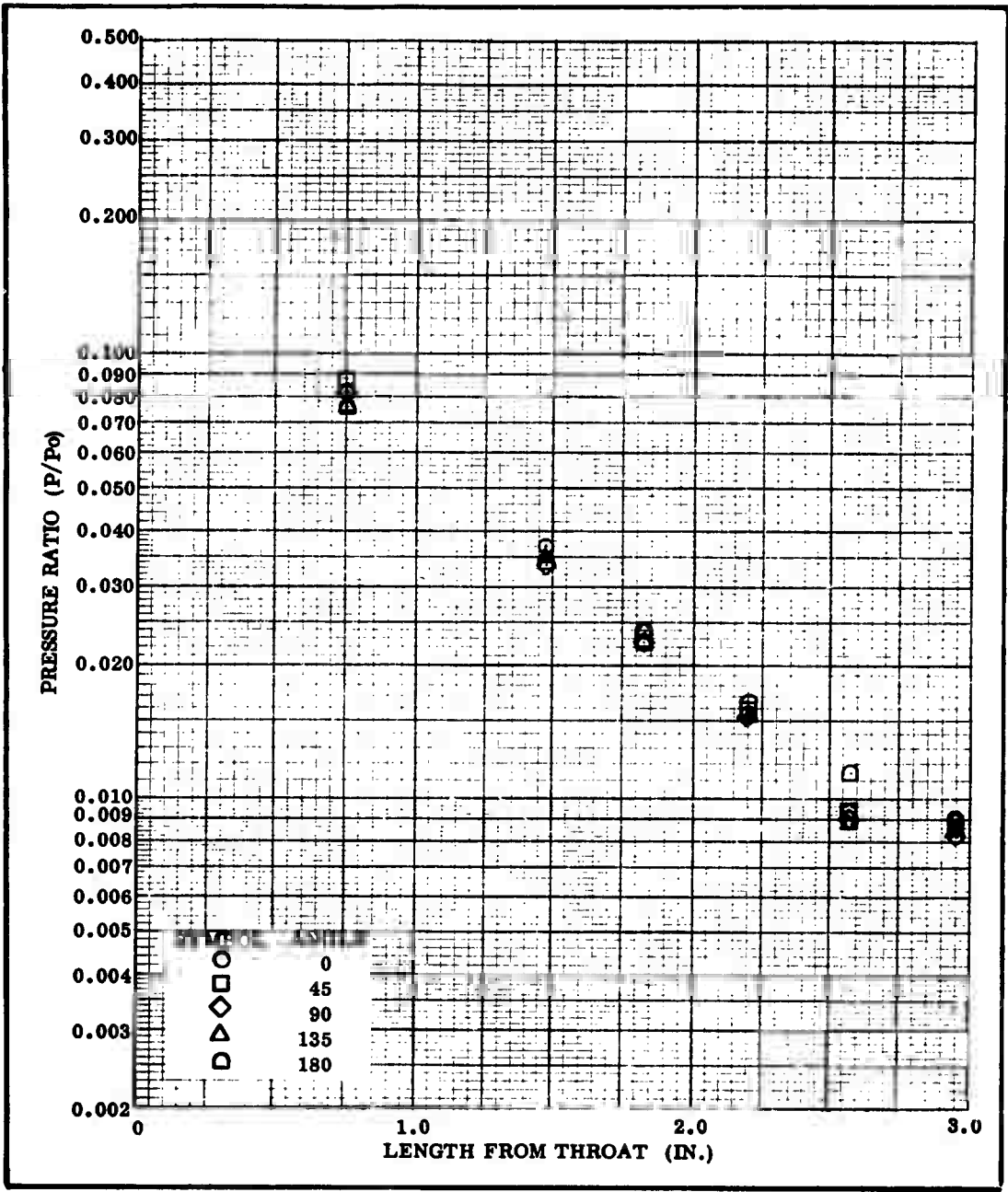
**FLEXIBLE EXIT CONE
NOZZLE DEVELOPMENT PROGRAM
PHASE II REPORT**

**VOLUME II
COLD FLOW TESTS DATA (PLOTTED)**

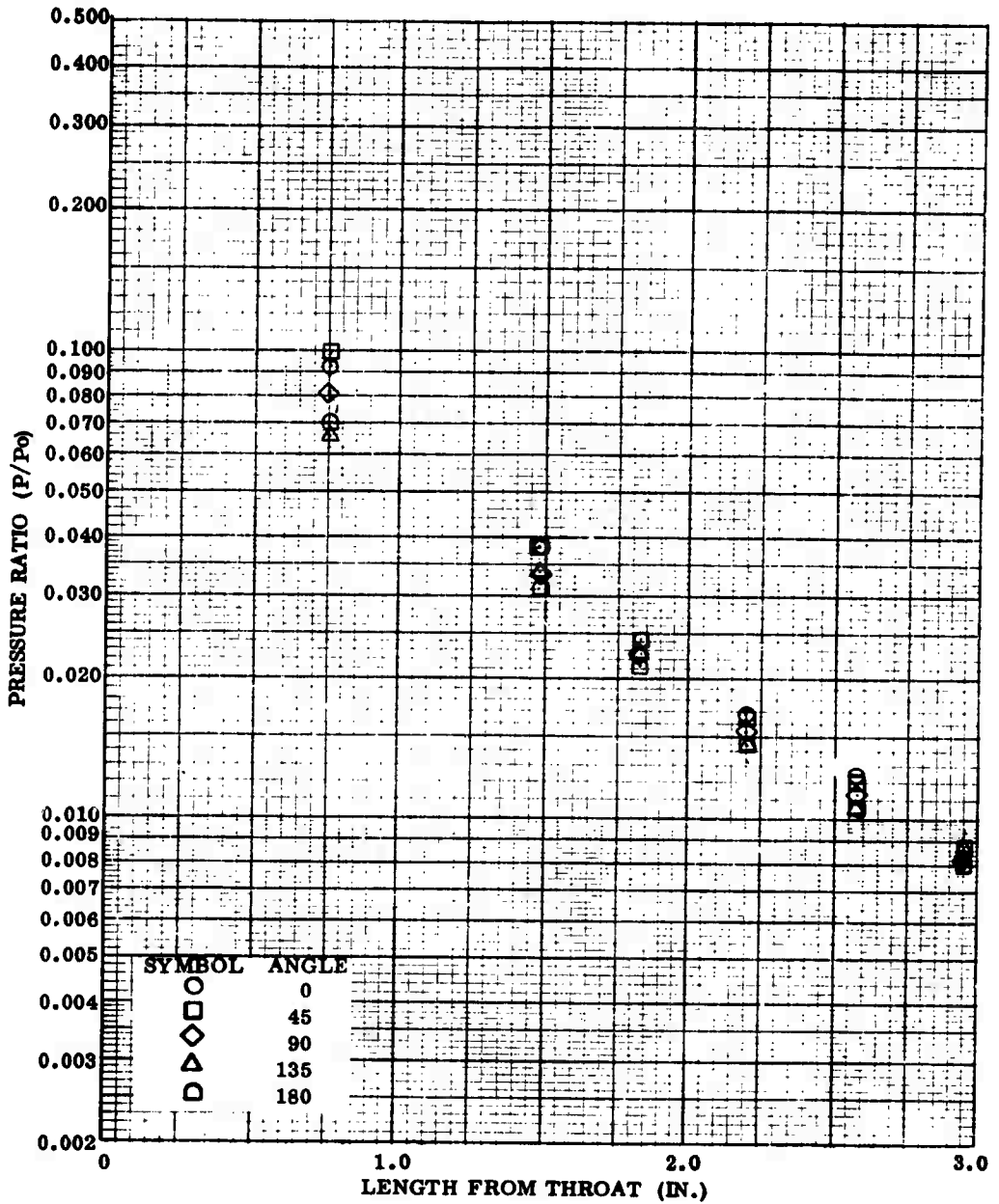
APPENDIX I

August 1968

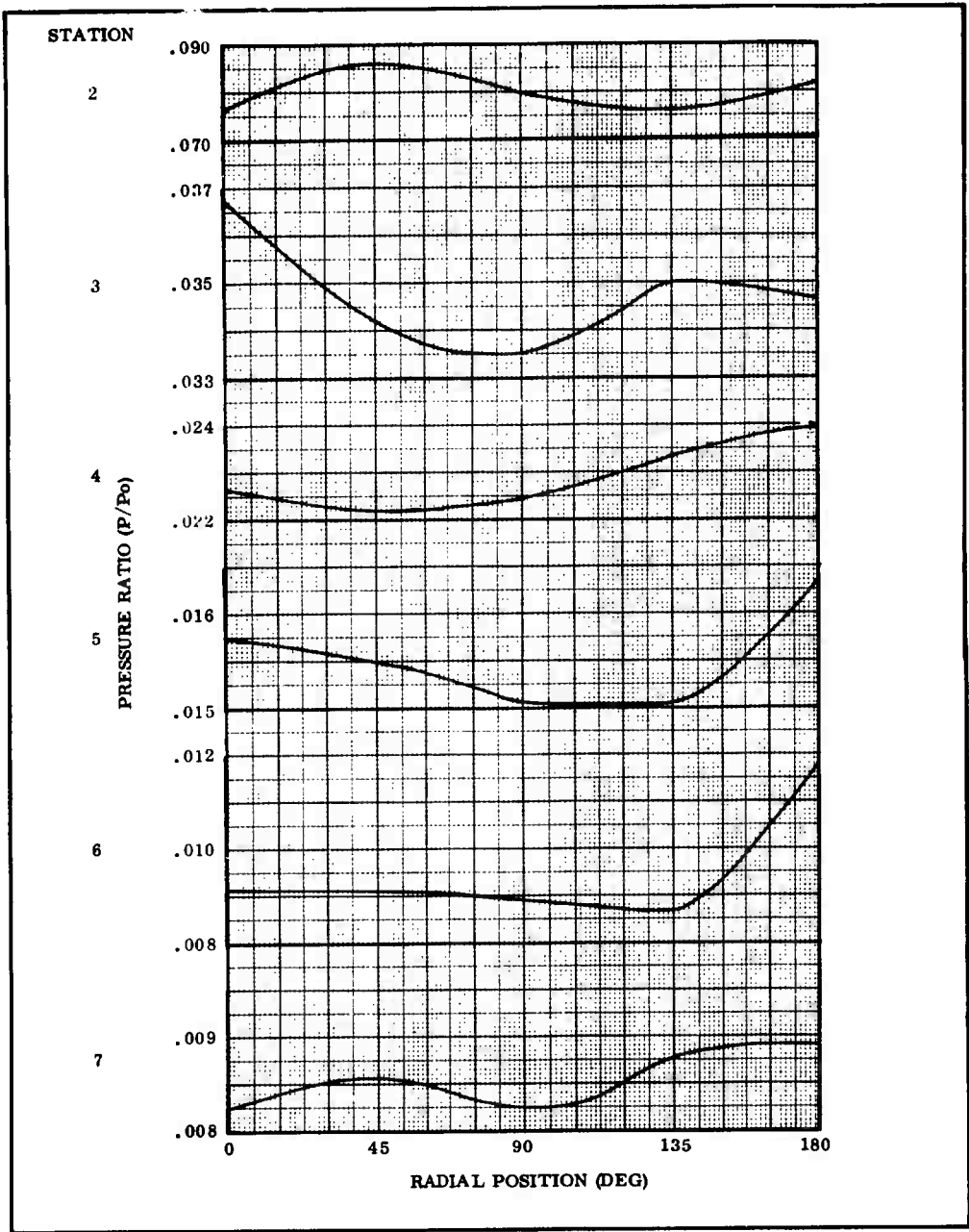
**Prepared by
THIOKOL CHEMICAL CORPORATION
WASATCH DIVISION
Brigham City, Utah**



Flex-X Cold Flow Run No. 1, Vector Angle 0 Degrees

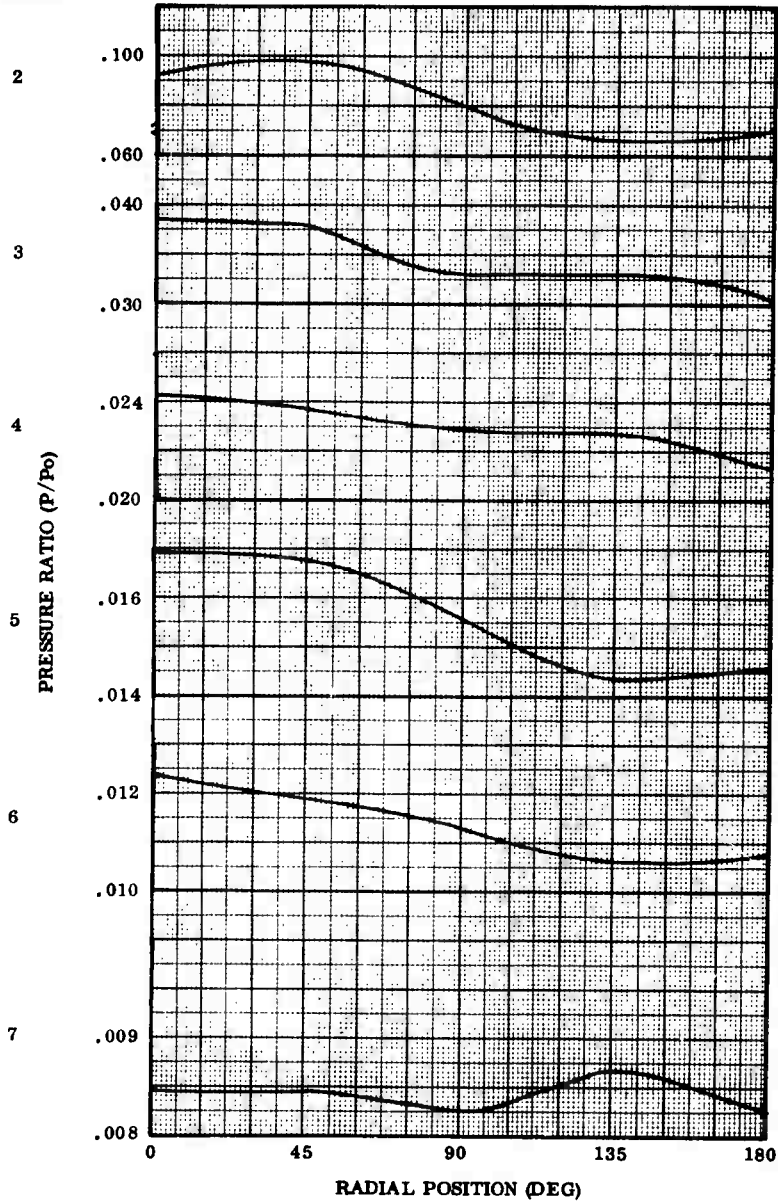


Flex-X Cold Flow Run No. 1 , Vector Angle 2.5 Degrees



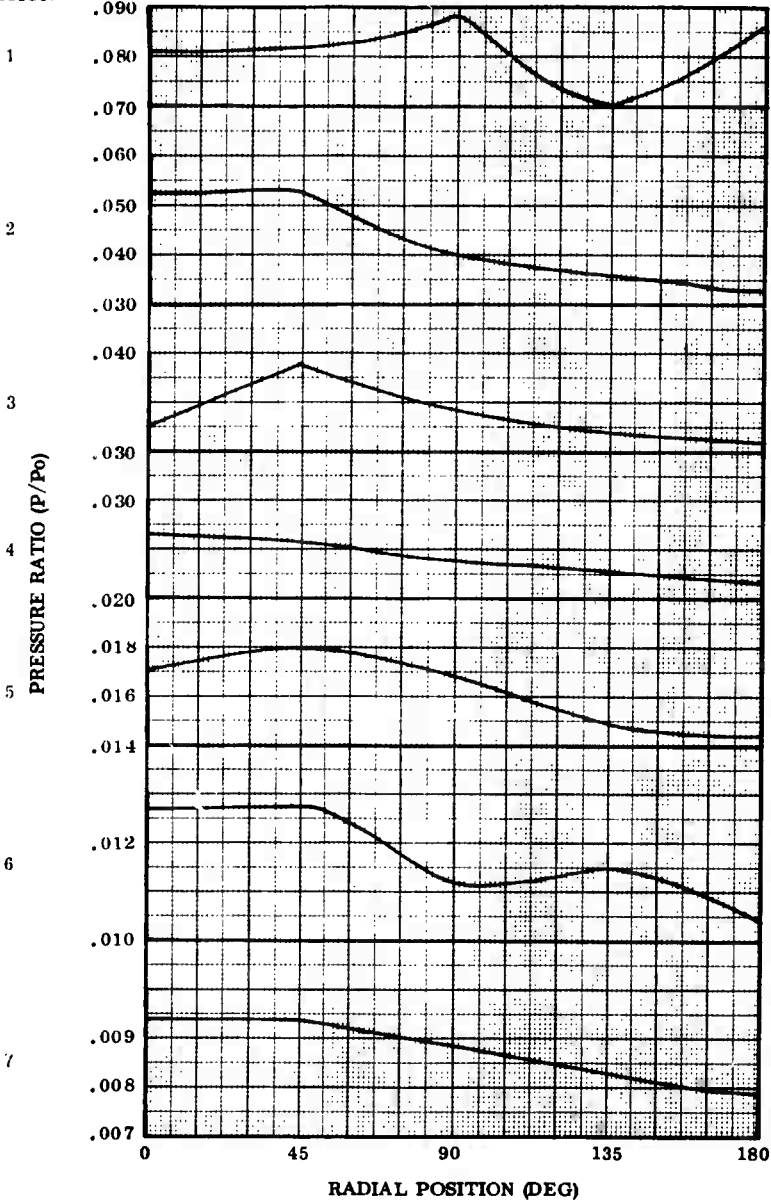
Flex-X Cold Flow Run 1, Vector Angle 0 Degrees

STATION

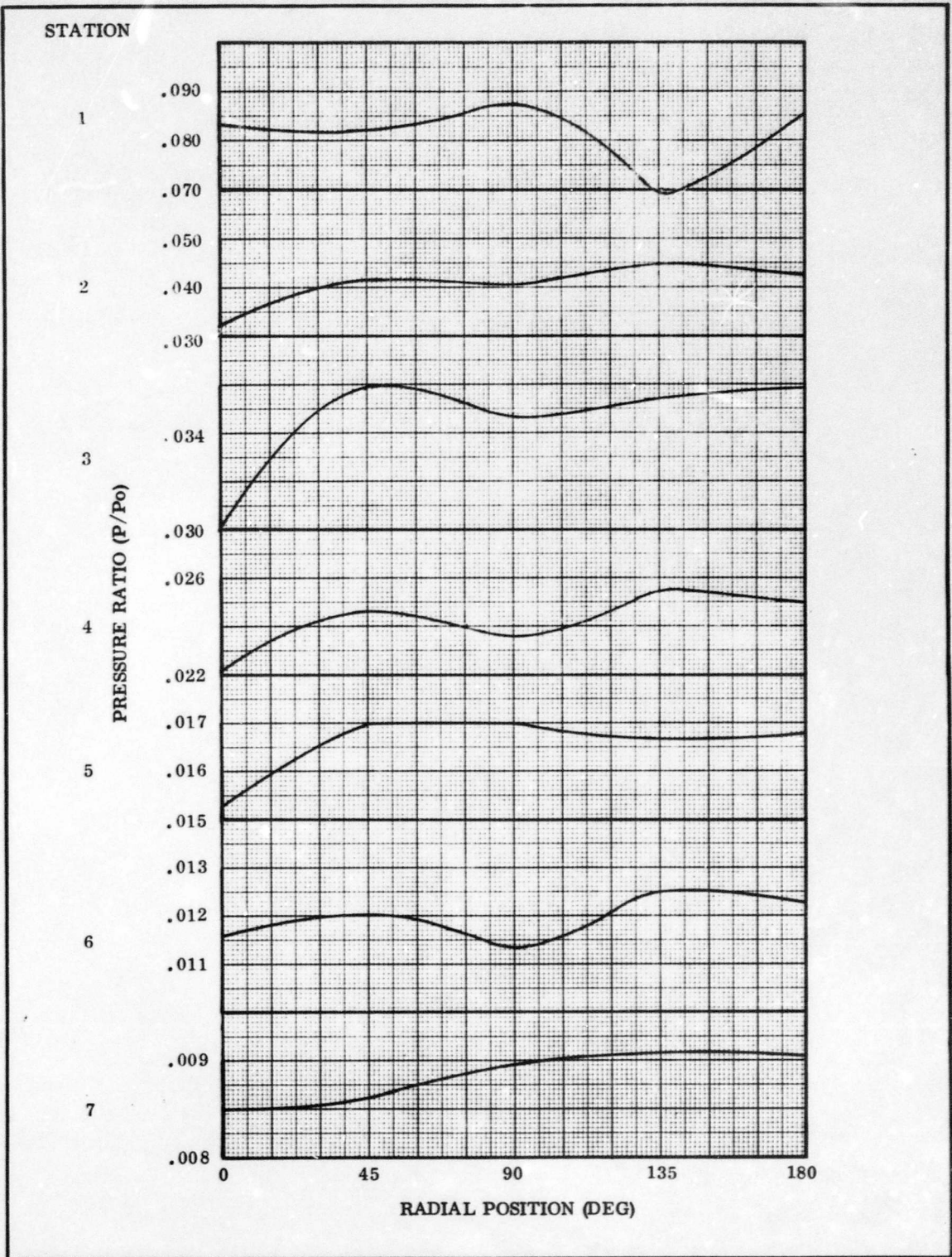


Flex-X Cold Flow Run 1, Vector Angle 2.5 Degrees

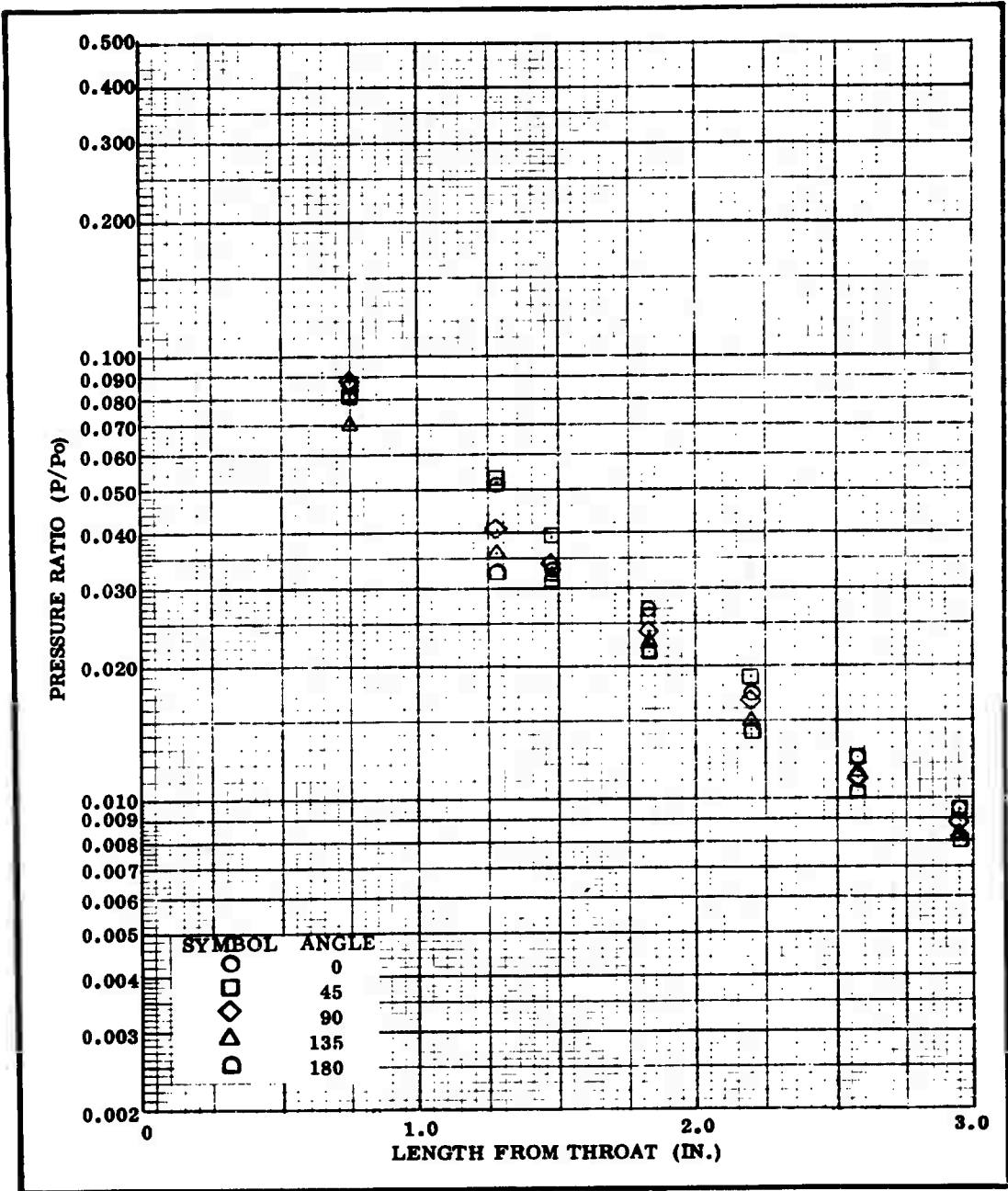
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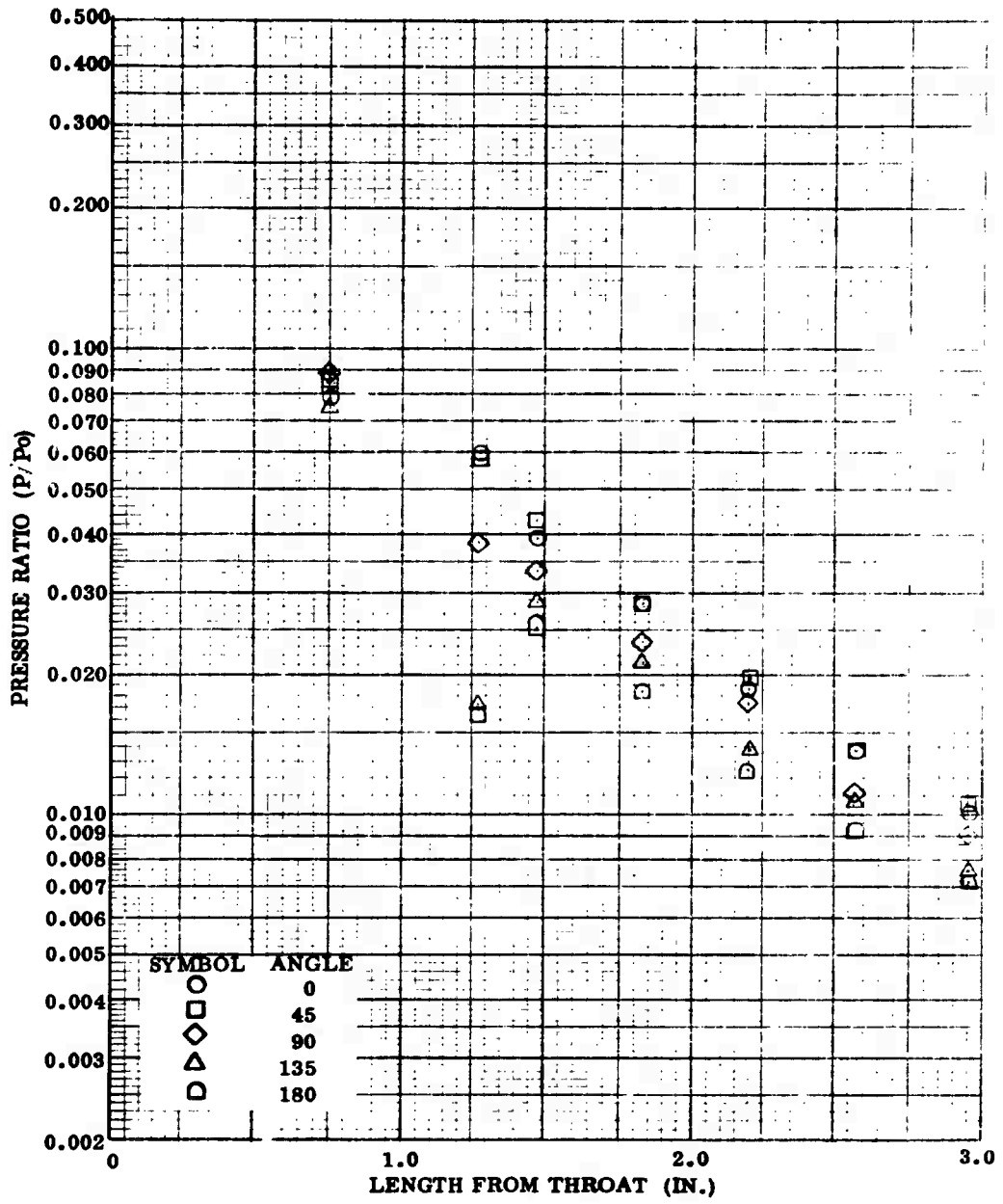
Flex-X Cold Flow Run 2, Vector Angle 2.5 Degrees



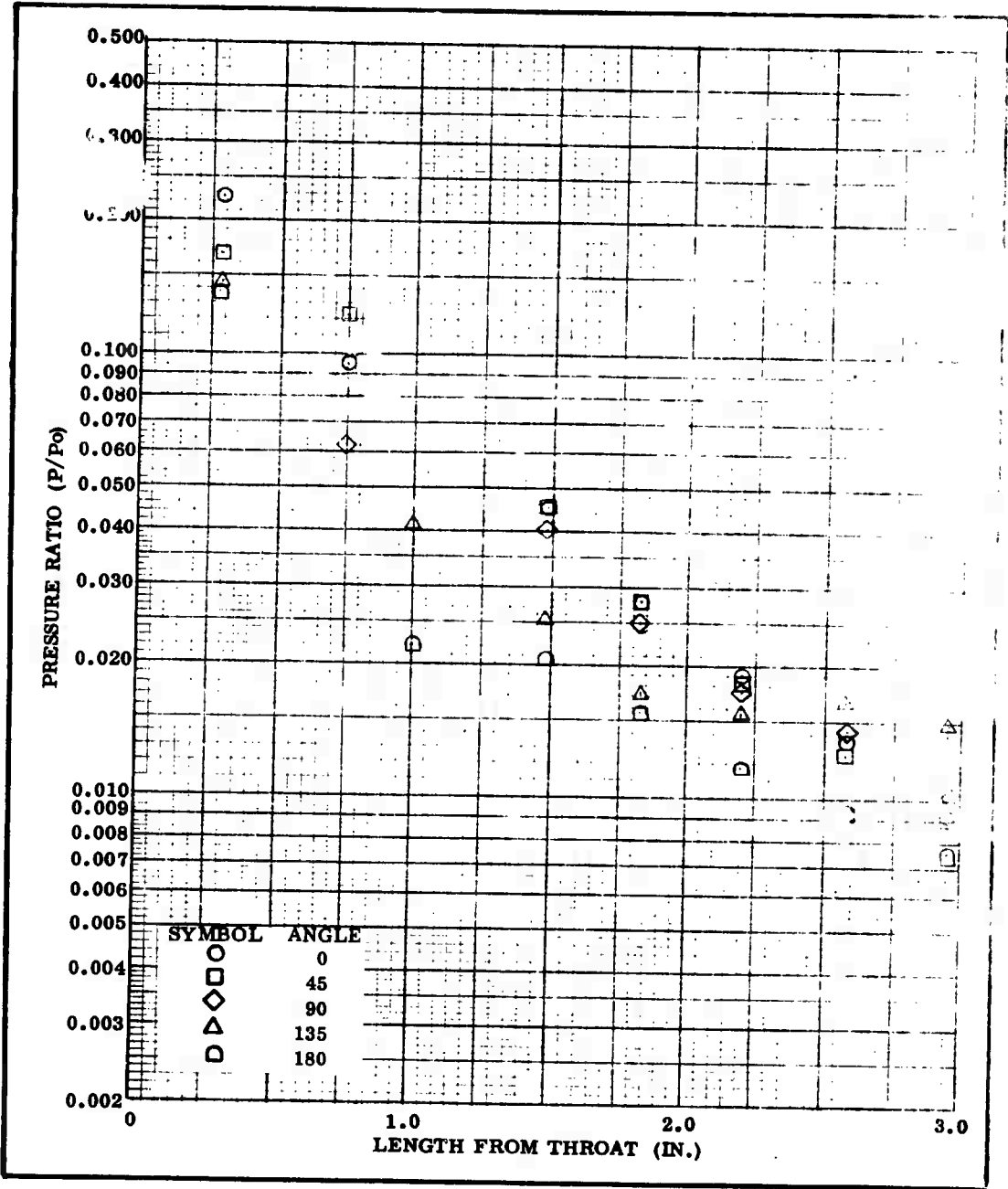
Flex-X Cold Flow Run 2 , Vector Angle 0 Degrees



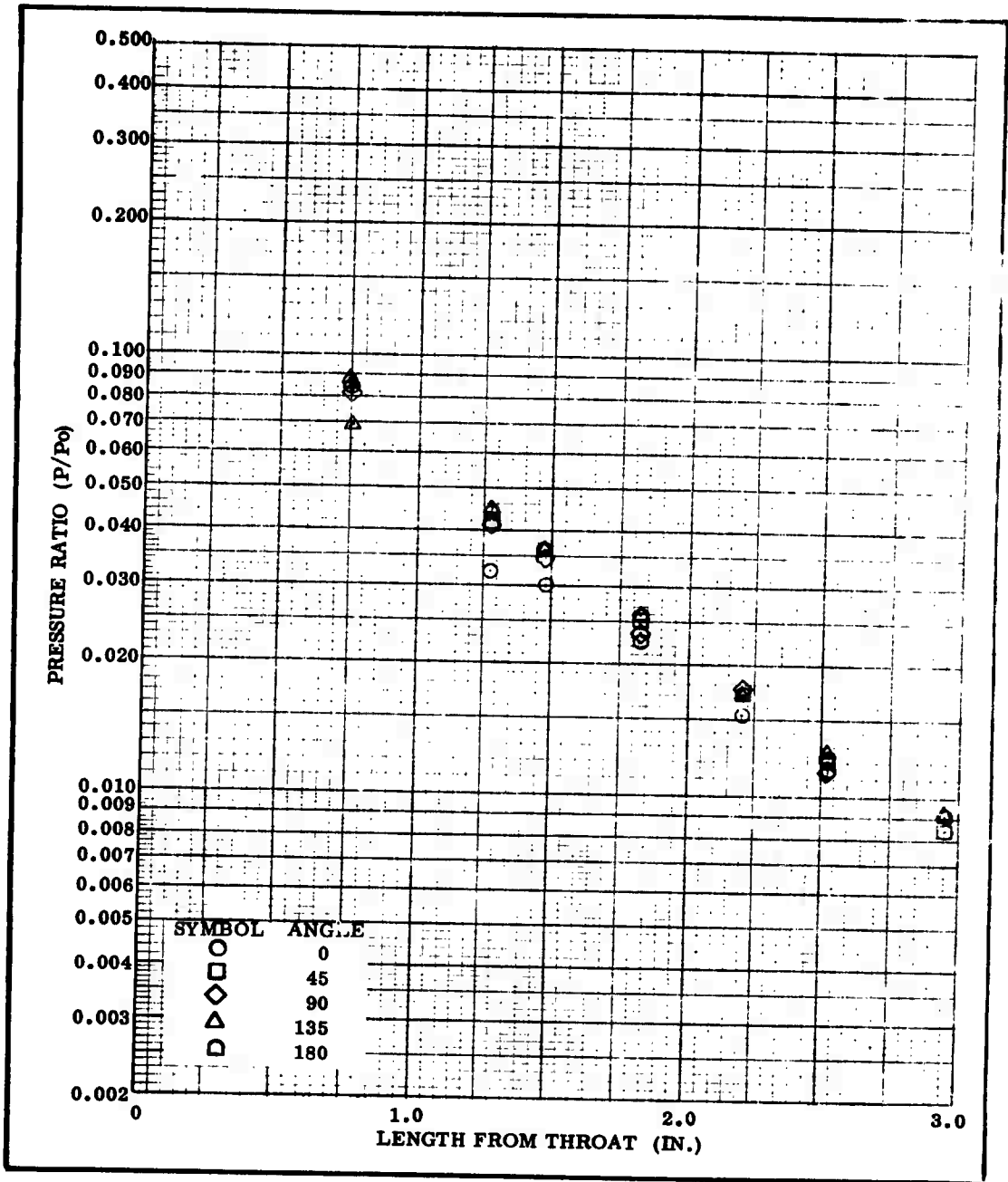
Flex-X Cold Flow Run No. 2 , Vector Angle 2.5 Degrees



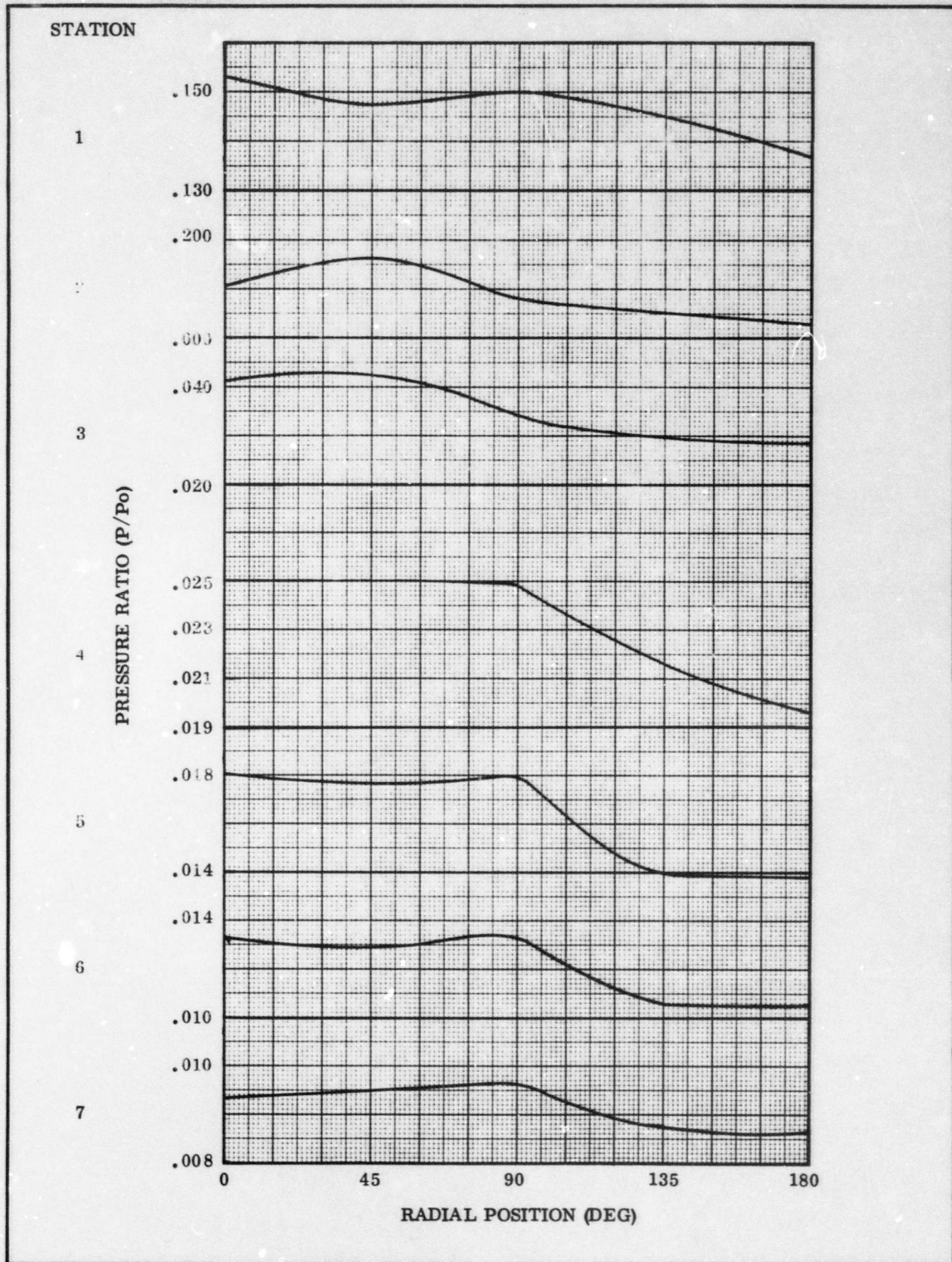
Flex-X Cold Flow Run No. 2 , Vector Angle 5 Degrees



Flex-X Cold Flow Run No. 1, Vector Angle 10 Degrees

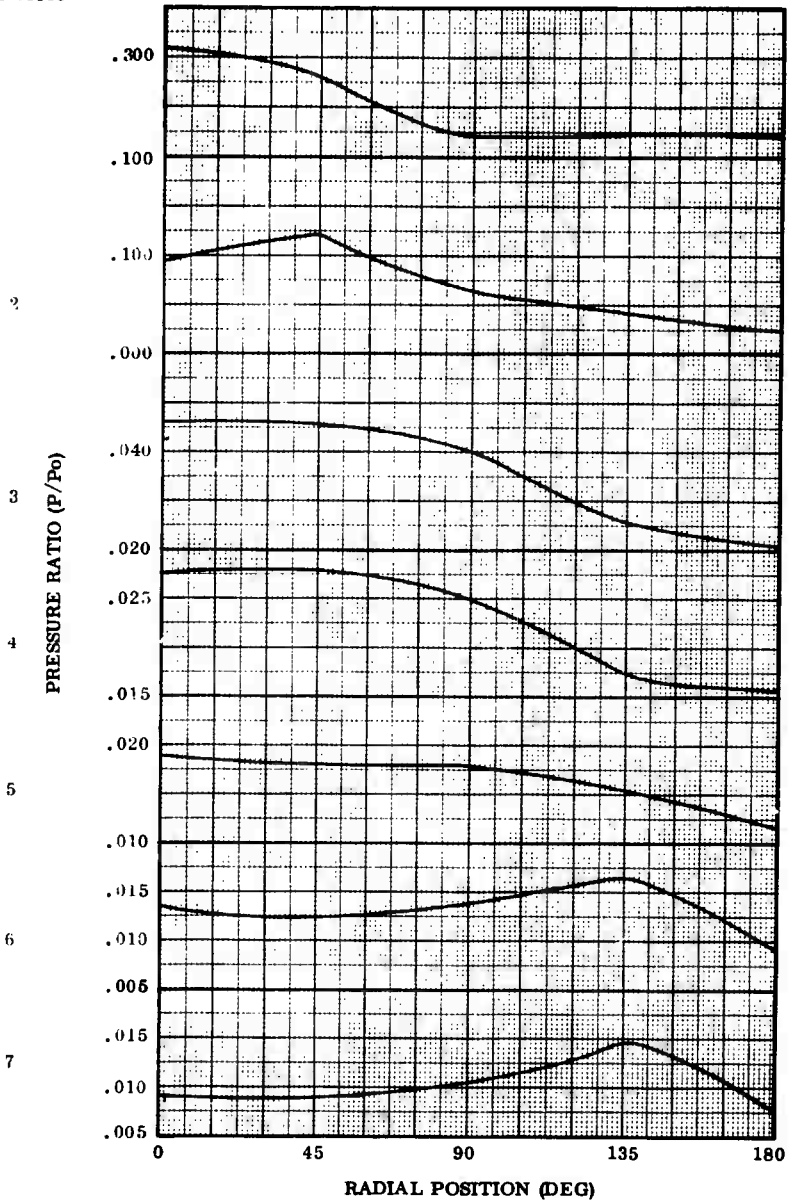


Flex-X Cold Flow Run No. 2 , Vector Angle 0 Degrees

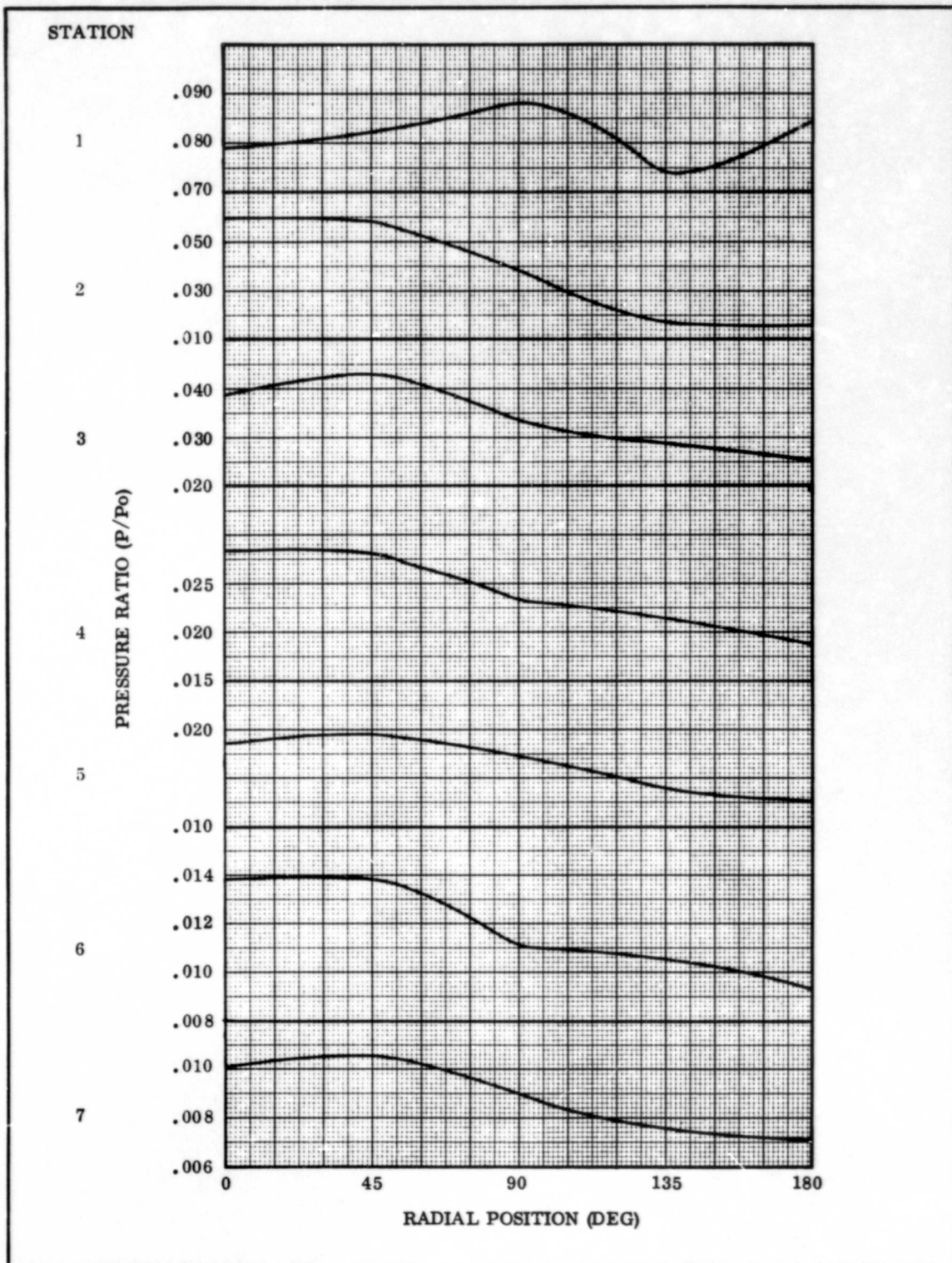


Flex-X Cold Flow Run 1, Vector Angle 5 Degrees

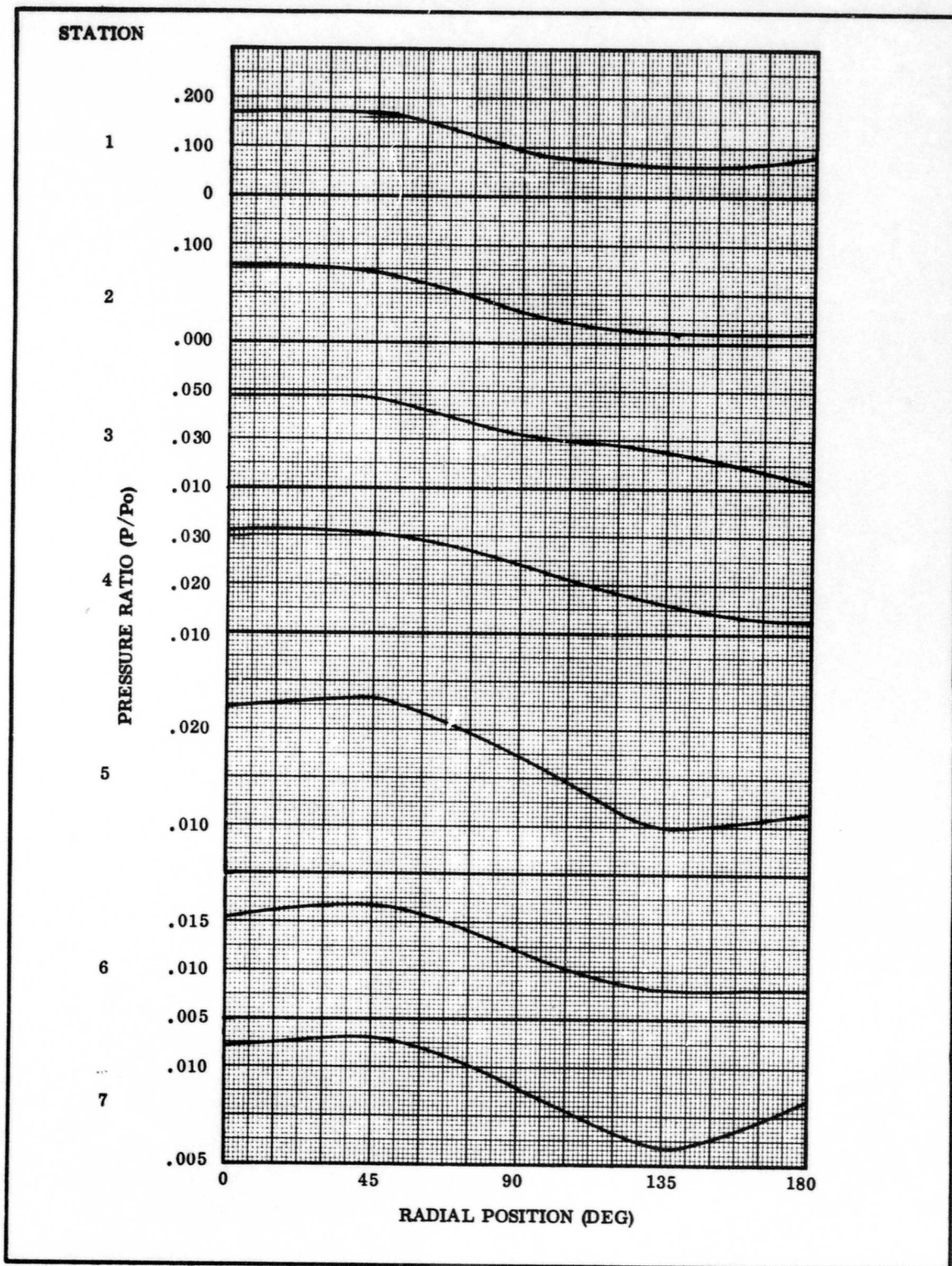
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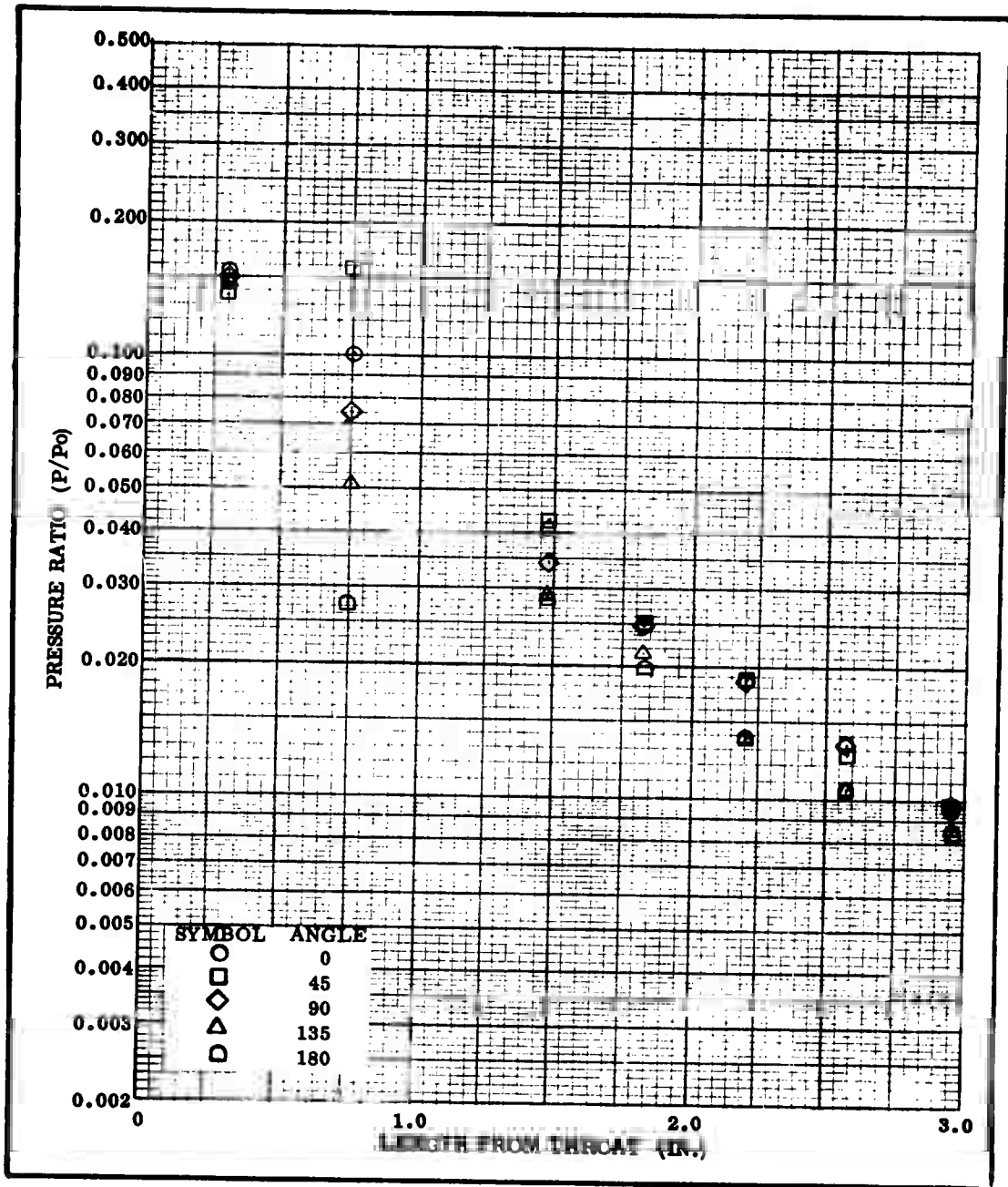
Flex-X Cold Flow Run 1, Vector Angle 10 Degrees



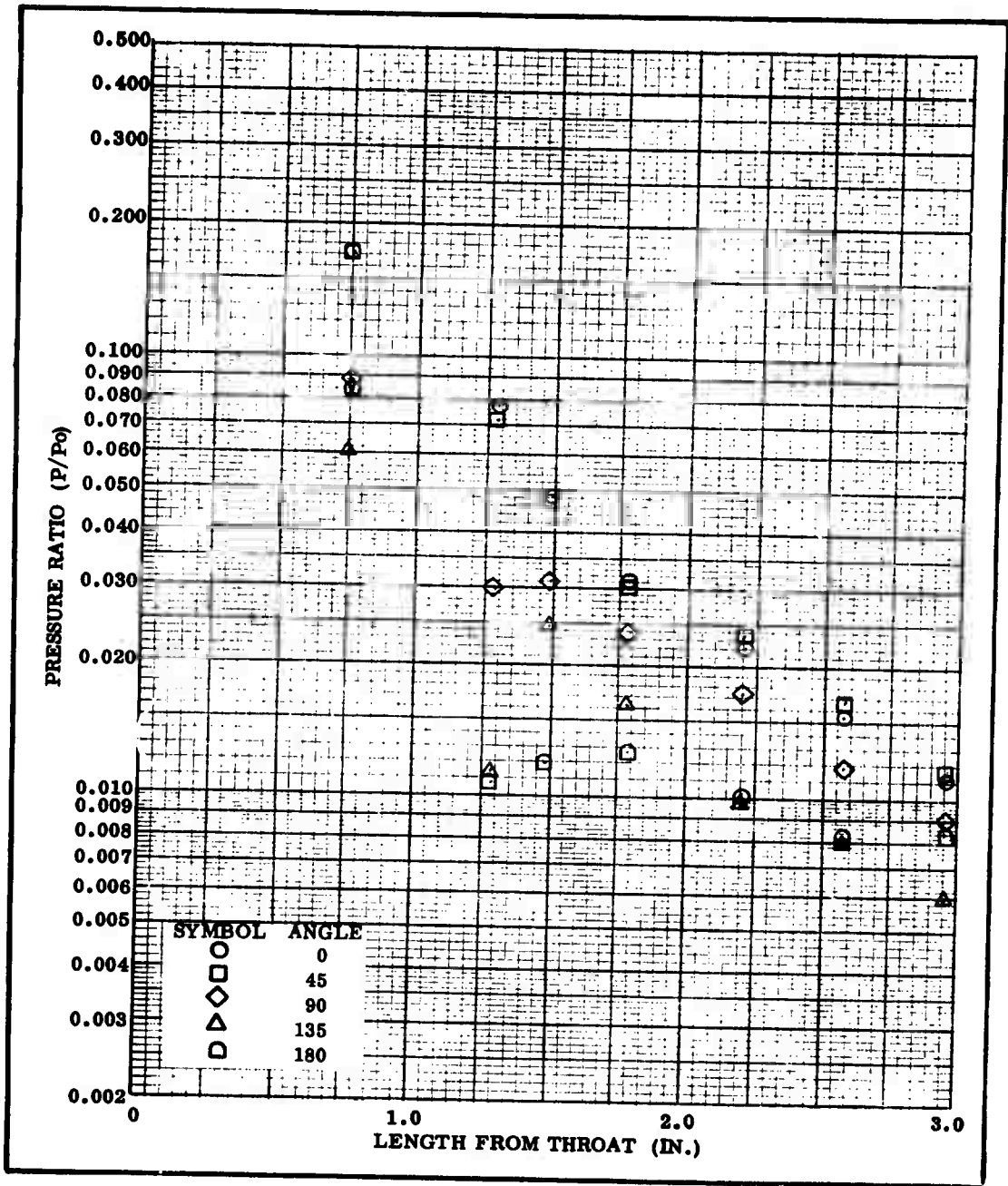
Flex-X Cold Flow Run 2 , Vector Angle 5 Degrees



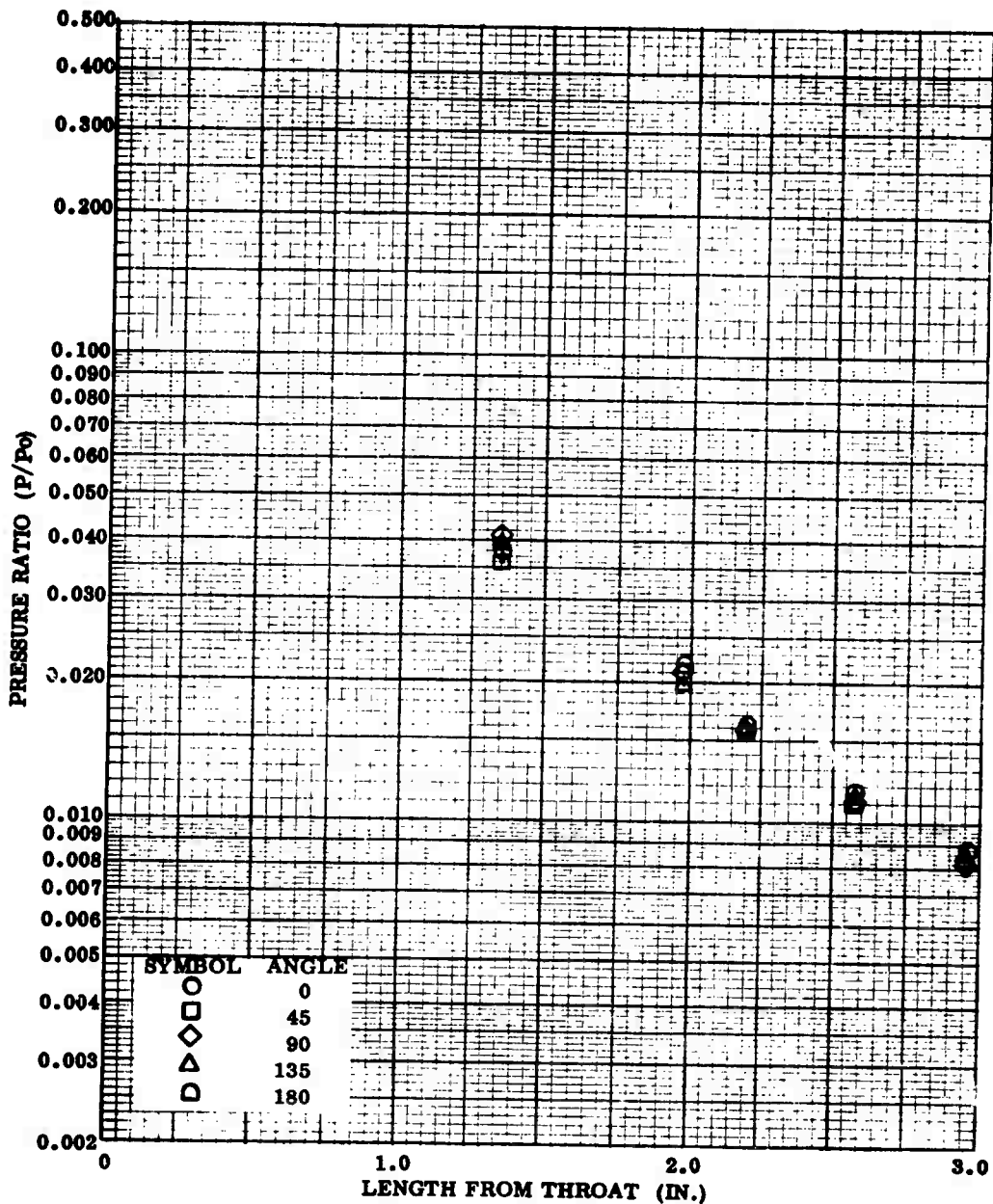
Flex-X Cold Flow Run 2, Vector Angle 10 Degrees



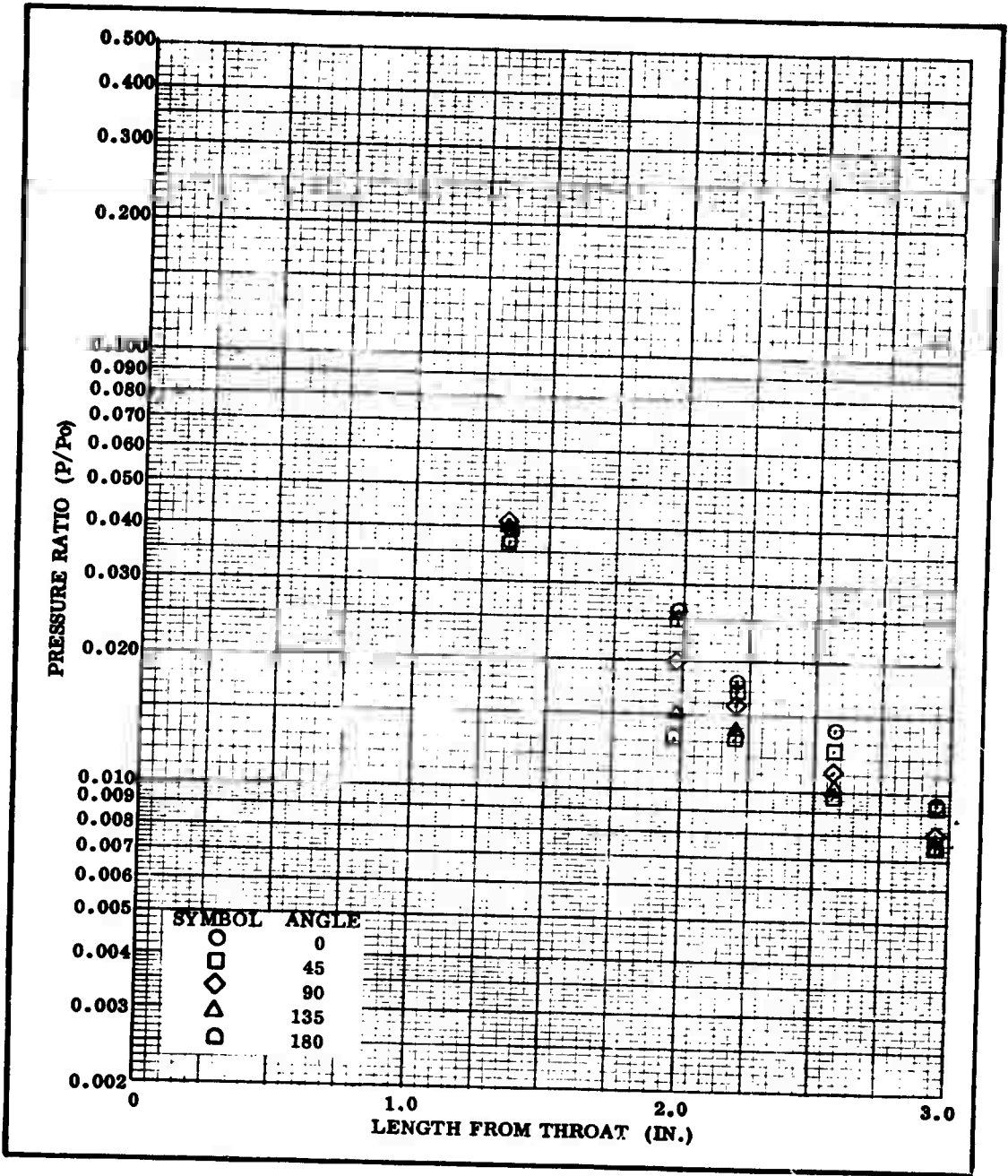
Flex-X Cold Flow Run No. 1 , Vector Angle 5 Degrees



Flex-X Cold Flow Run No. 2 , Vector Angle 10 Degrees

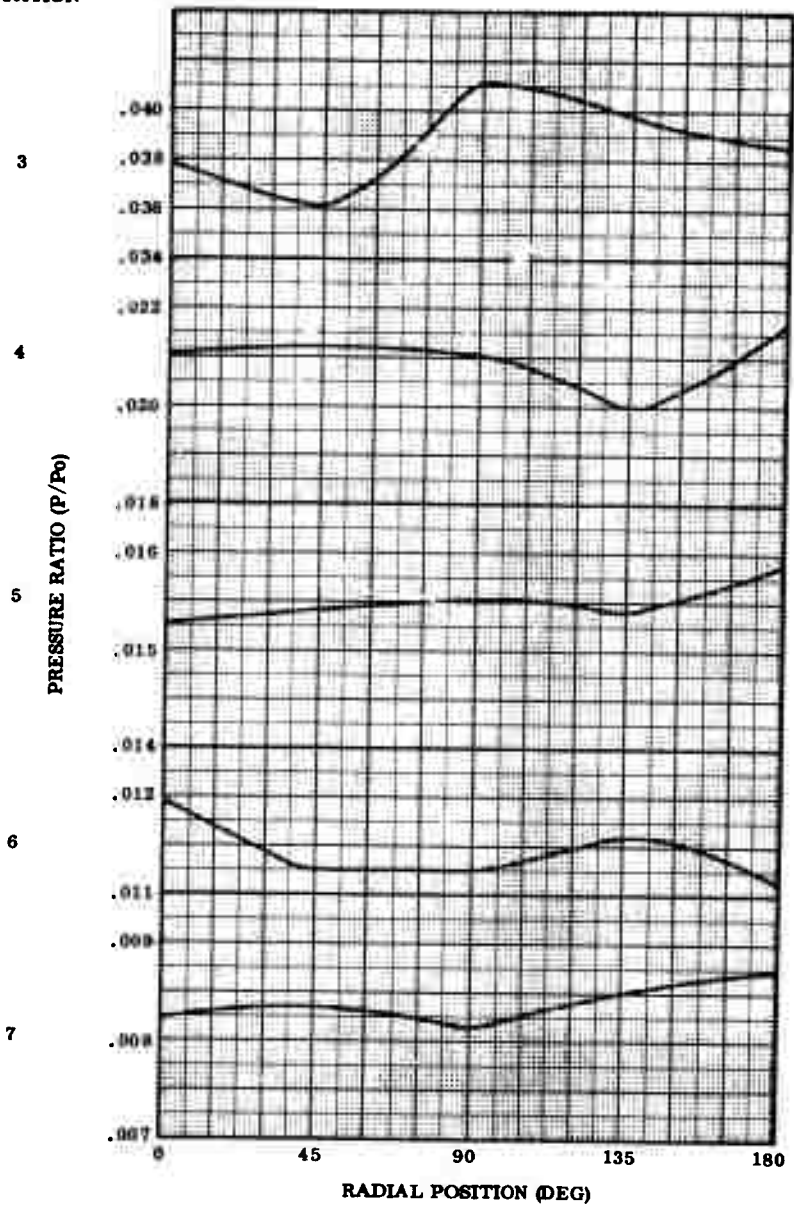


Flex-X Cold Flow Run No. 3, Vector Angle 0 Degrees

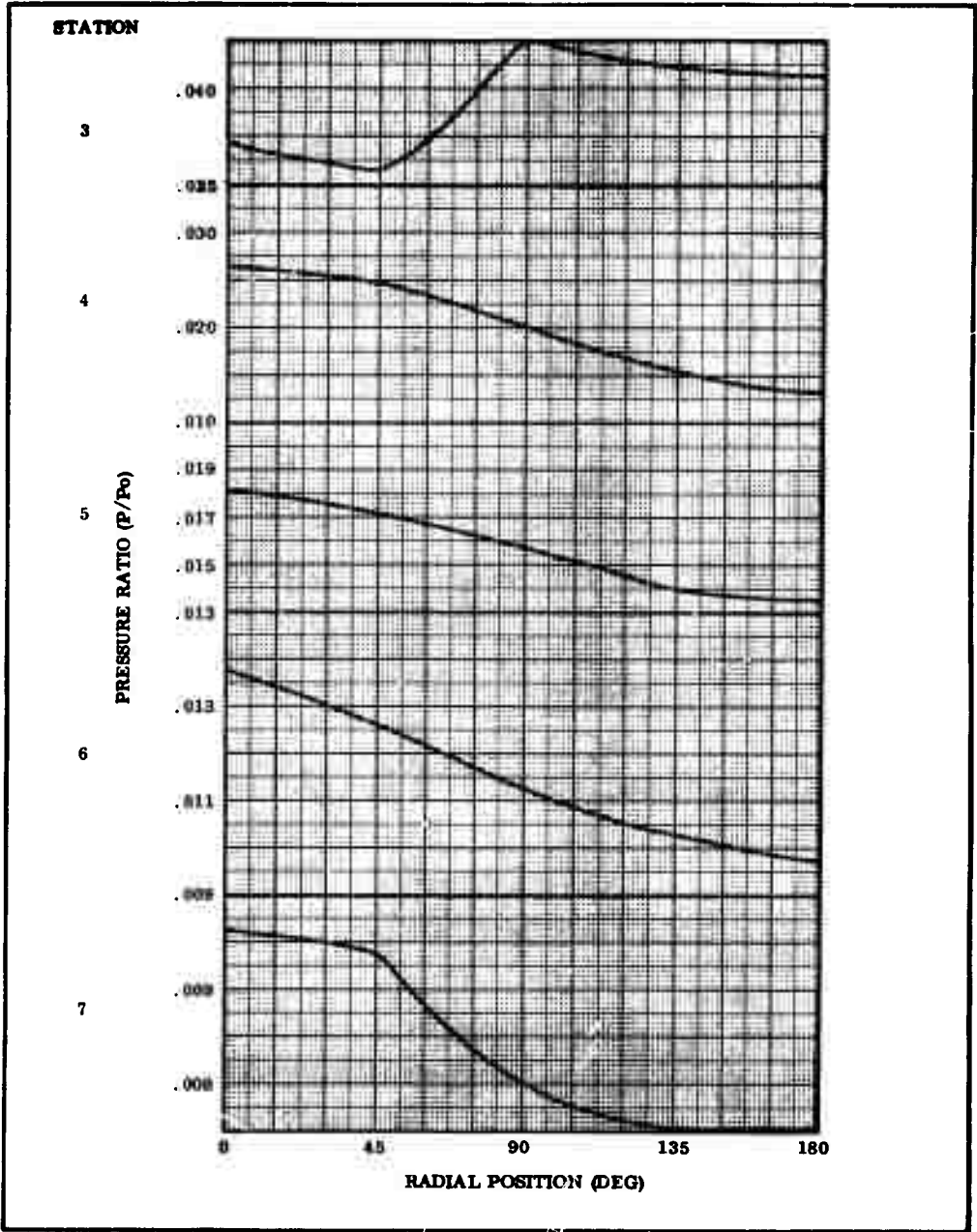


Flex-X Cold Flow Run No. 3 , Vector Angle 2.5 Degrees

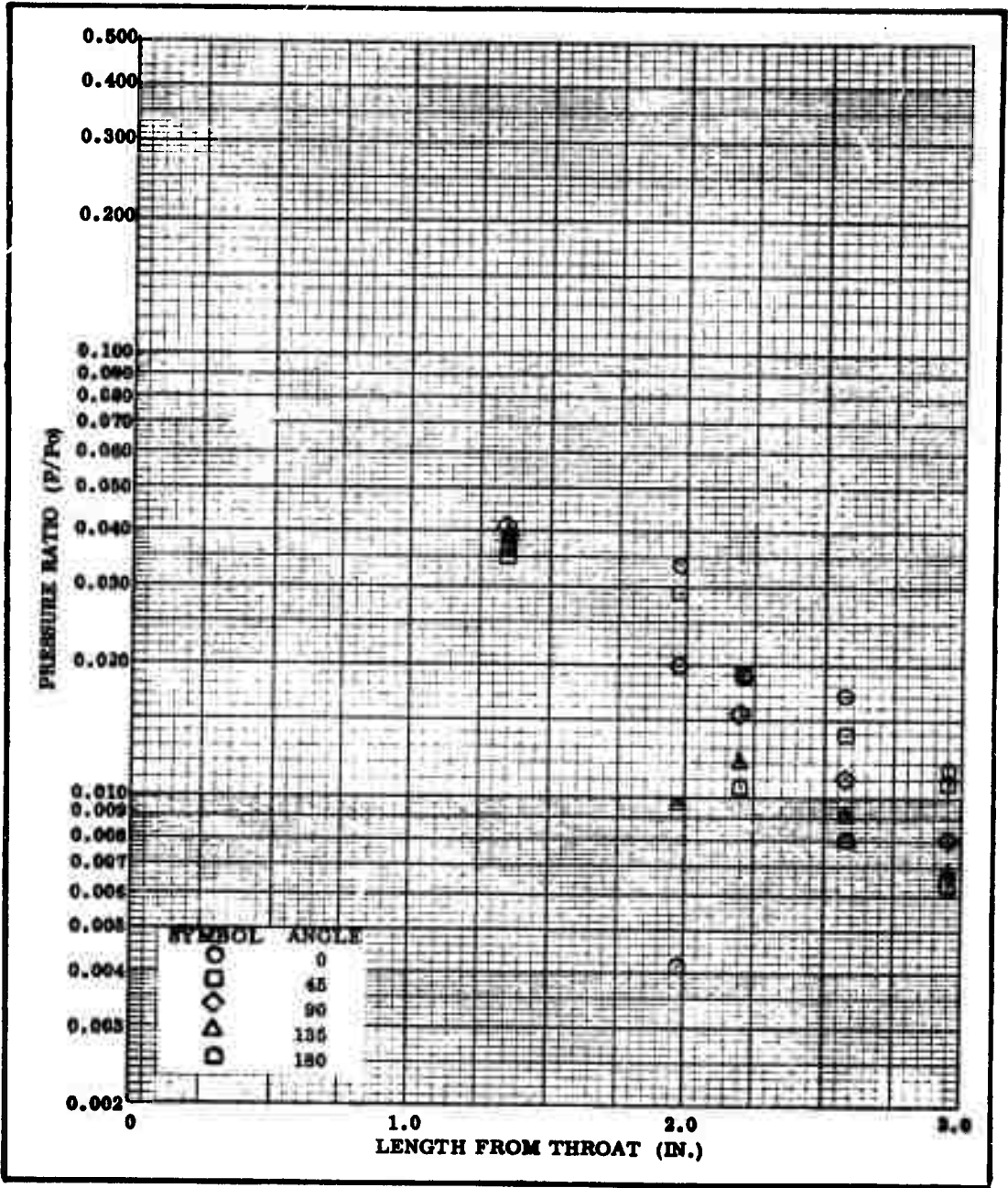
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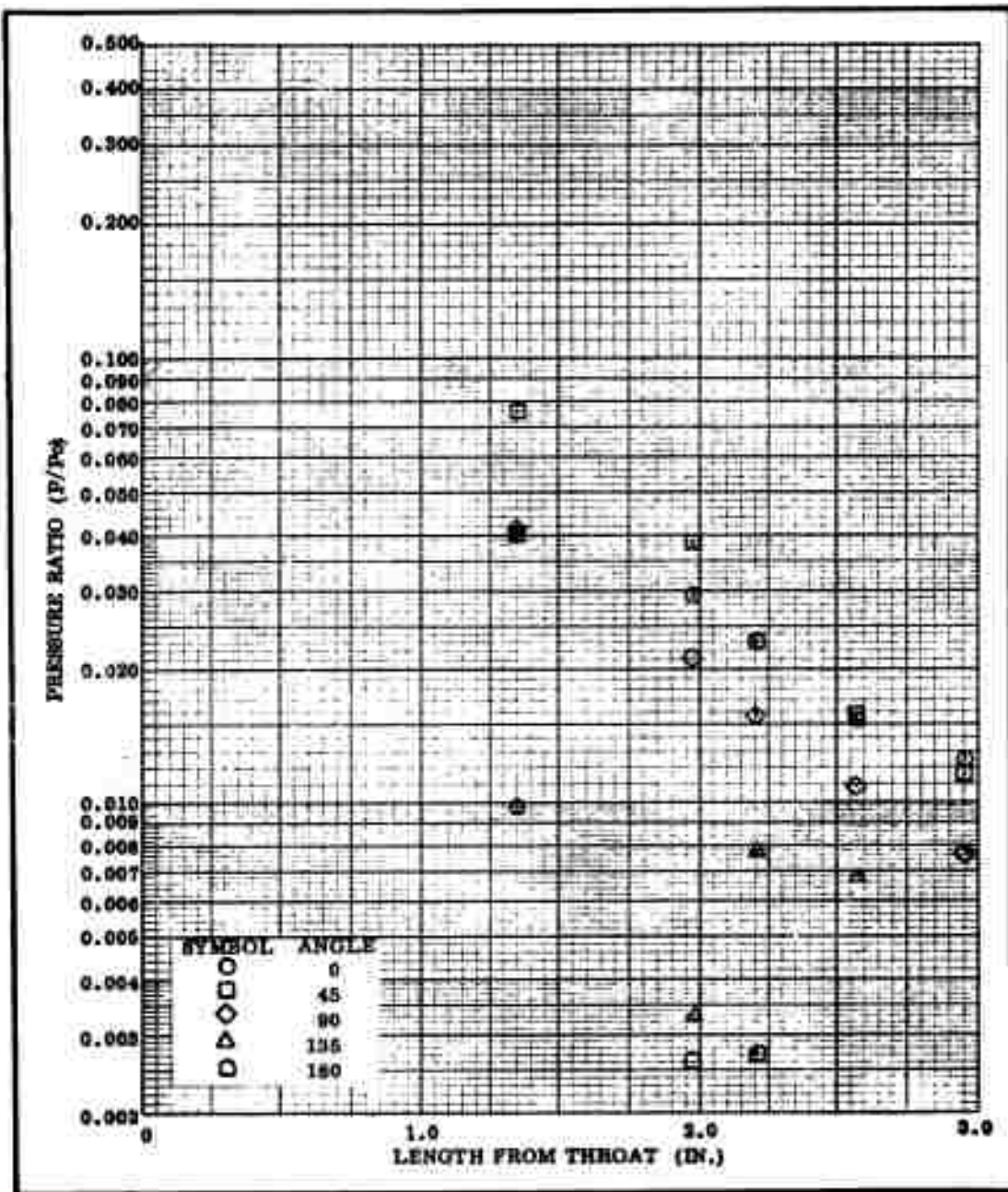
Flex-X Cold Flow Run 3, Vector Angle 0 Degrees



Flex-X Cold Flow Run 3 , Vector Angle 2.5 Degrees

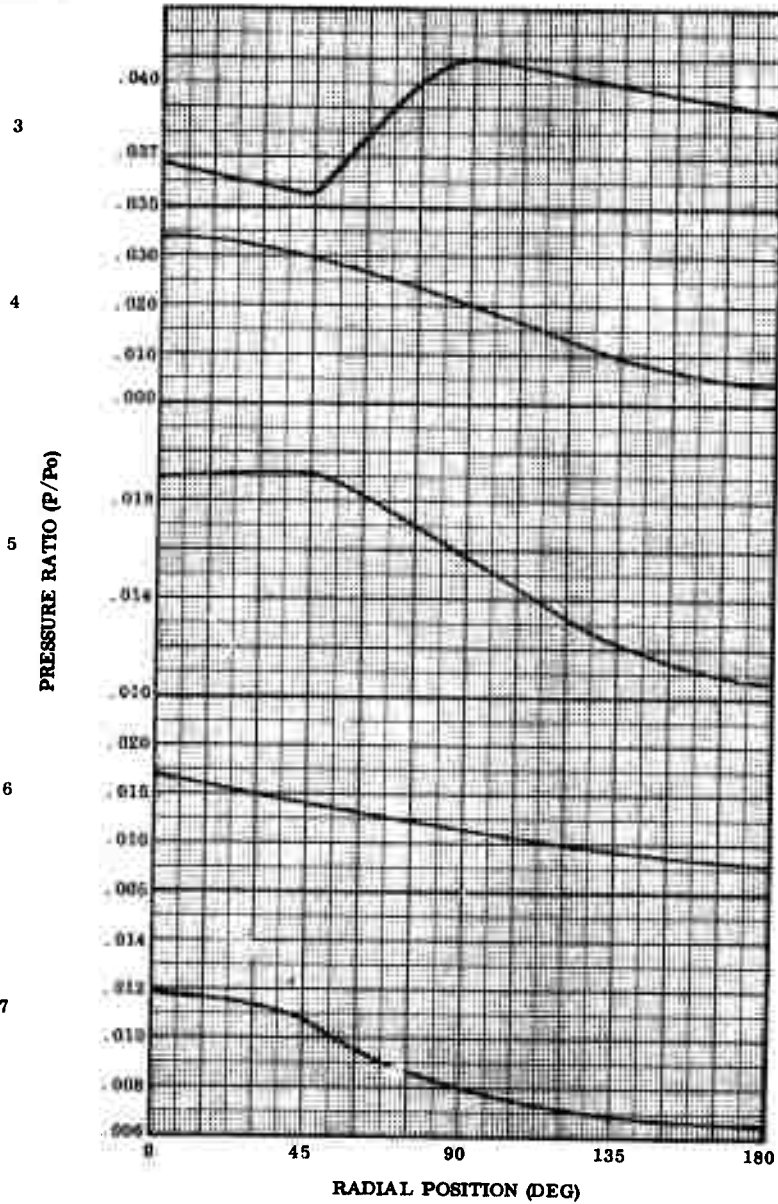


Flex-X Cold Flow Run No. 3 , Vector Angle 5 Degrees

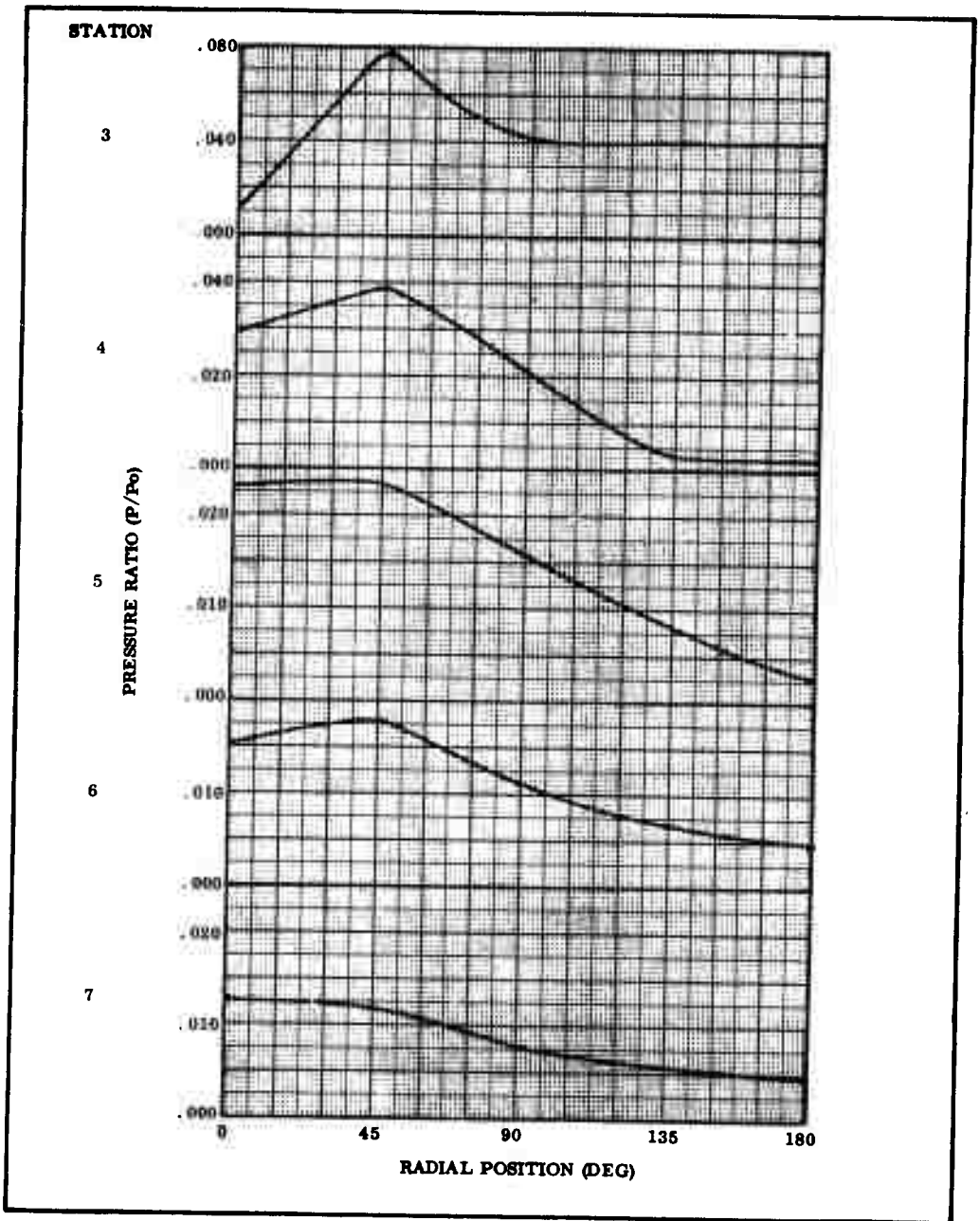


Flex-X Cold Flow Run No. 3 , Vector Angle 10 Degrees

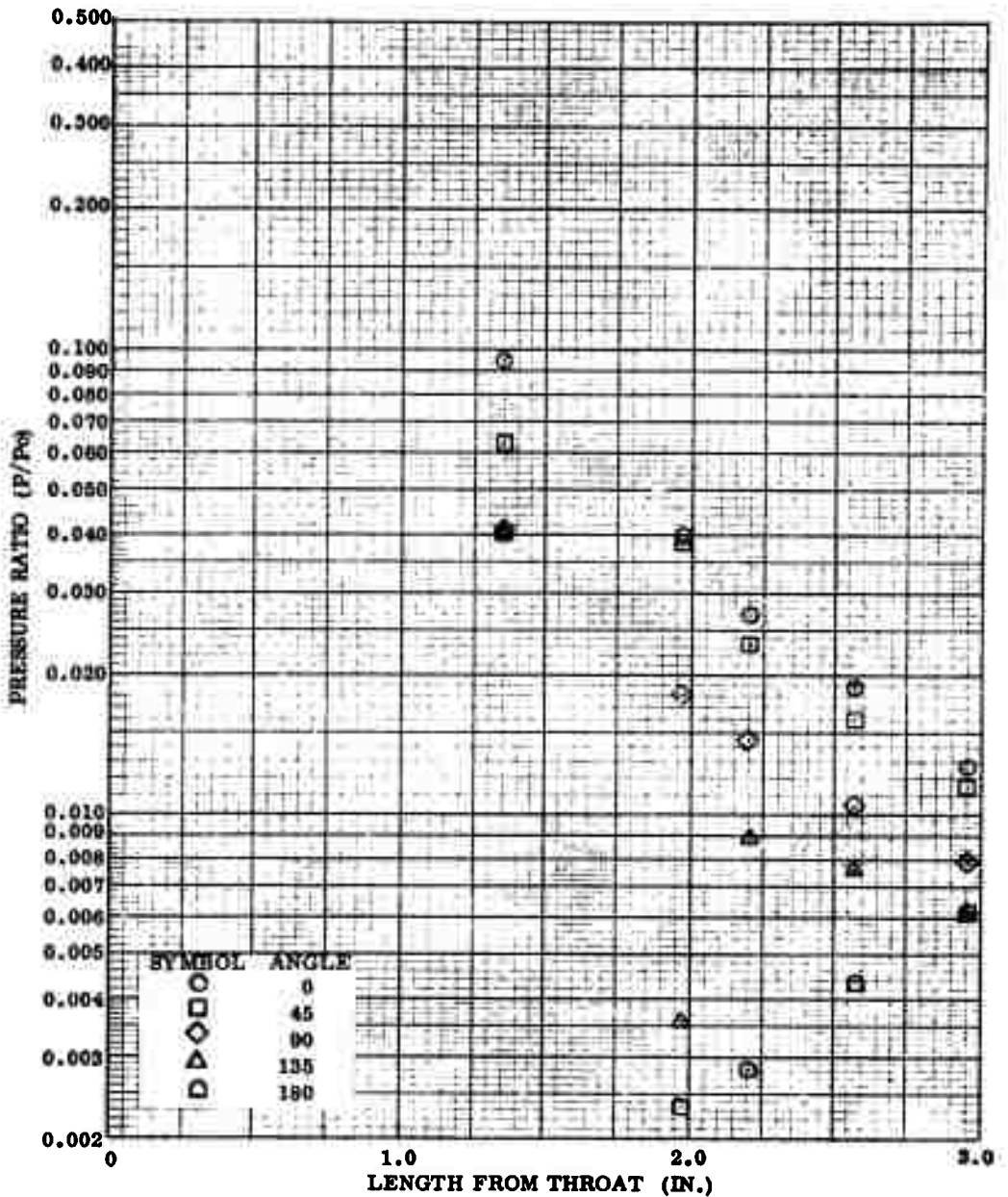
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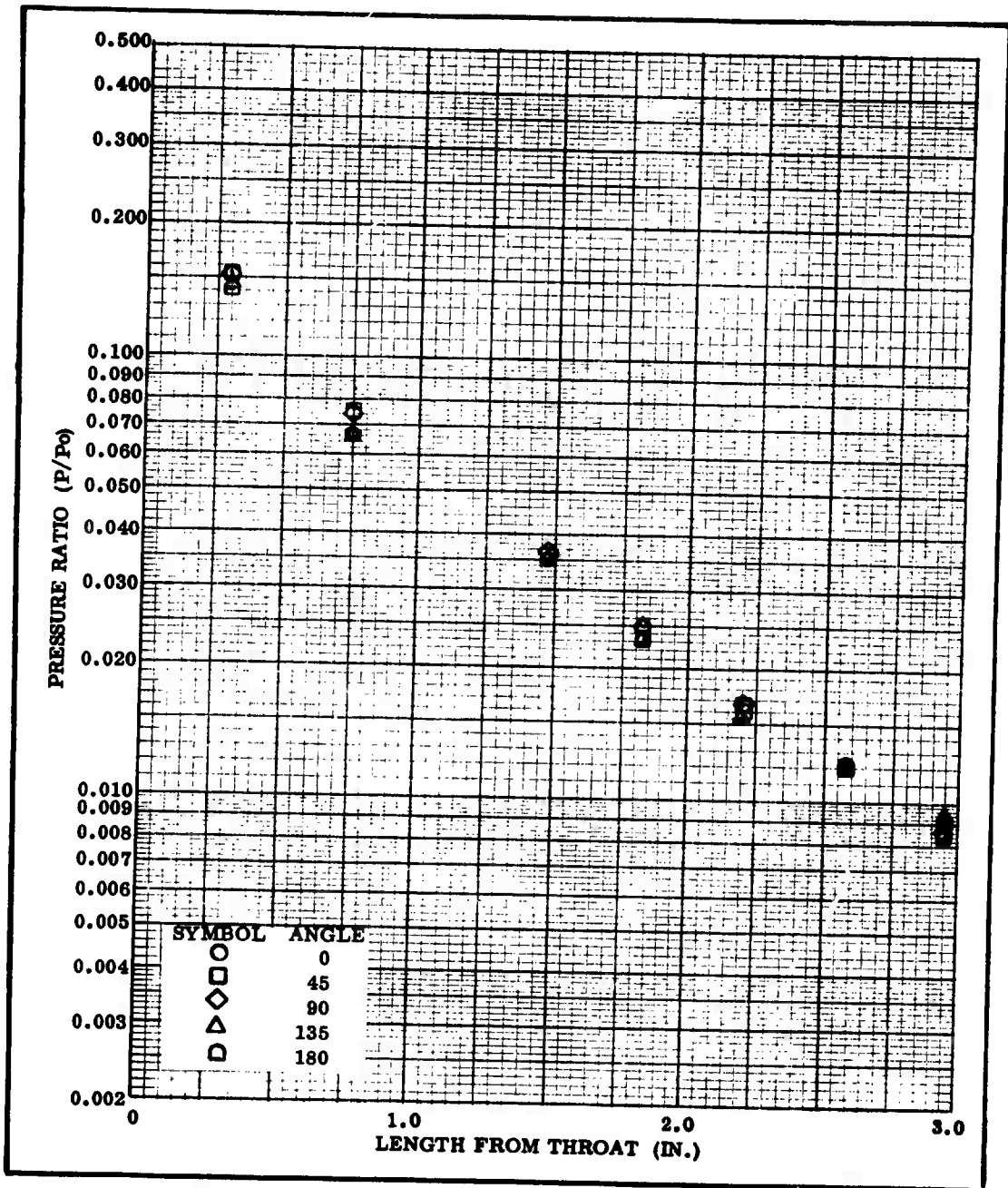
Flex-X Cold Flow Run 3 , Vector Angle 5 Degrees



Flex-X Cold Flow Run 3 , Vector Angle 10 Degrees



Flex-X Cold Flow Run No. 3A , Vector Angle 10 Degrees



Flex-X Cold Flow Run No. 4 , Vector Angle 0 Degrees

STATION

3

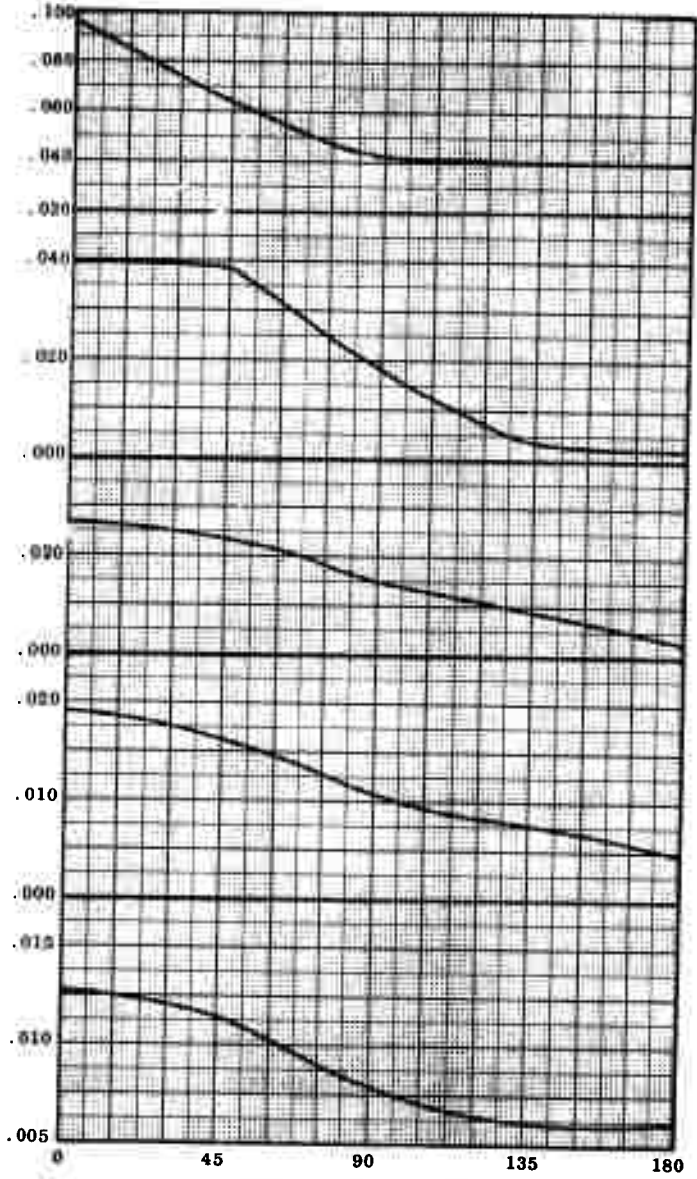
4

5

6

7

PRESSURE RATIO (P/P₀)



RADIAL POSITION (DEG)

Flex-X Cold Flow Run 3A, Vector Angle 10 Degrees

STATION

1

2

3

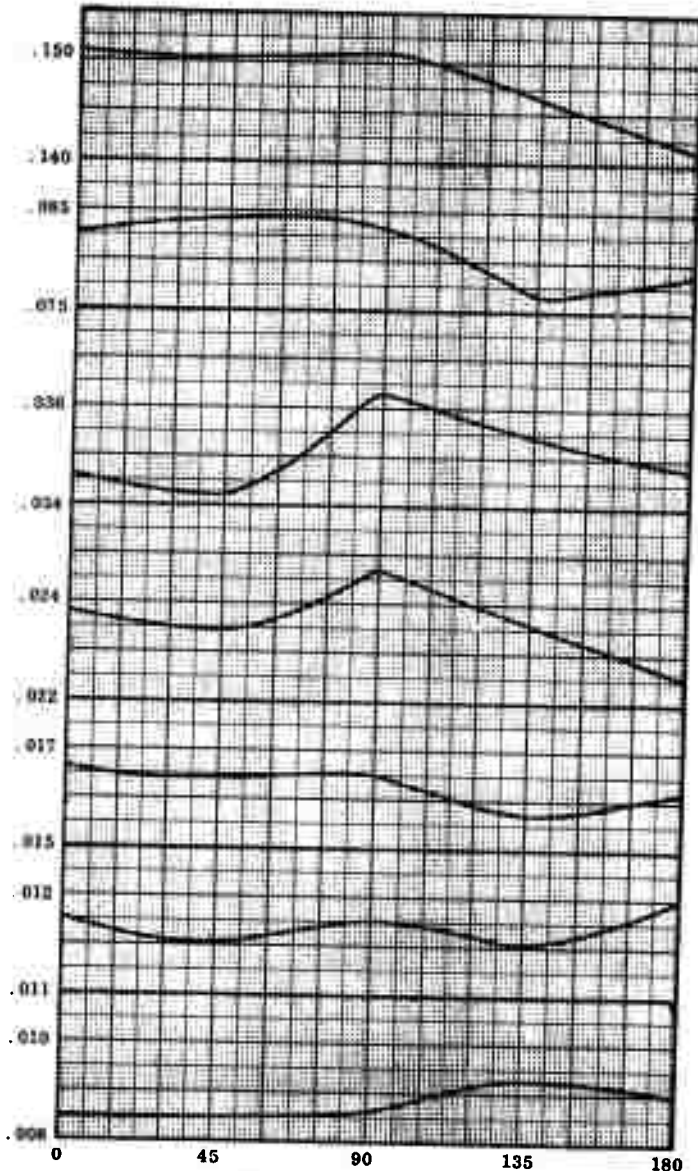
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5

6

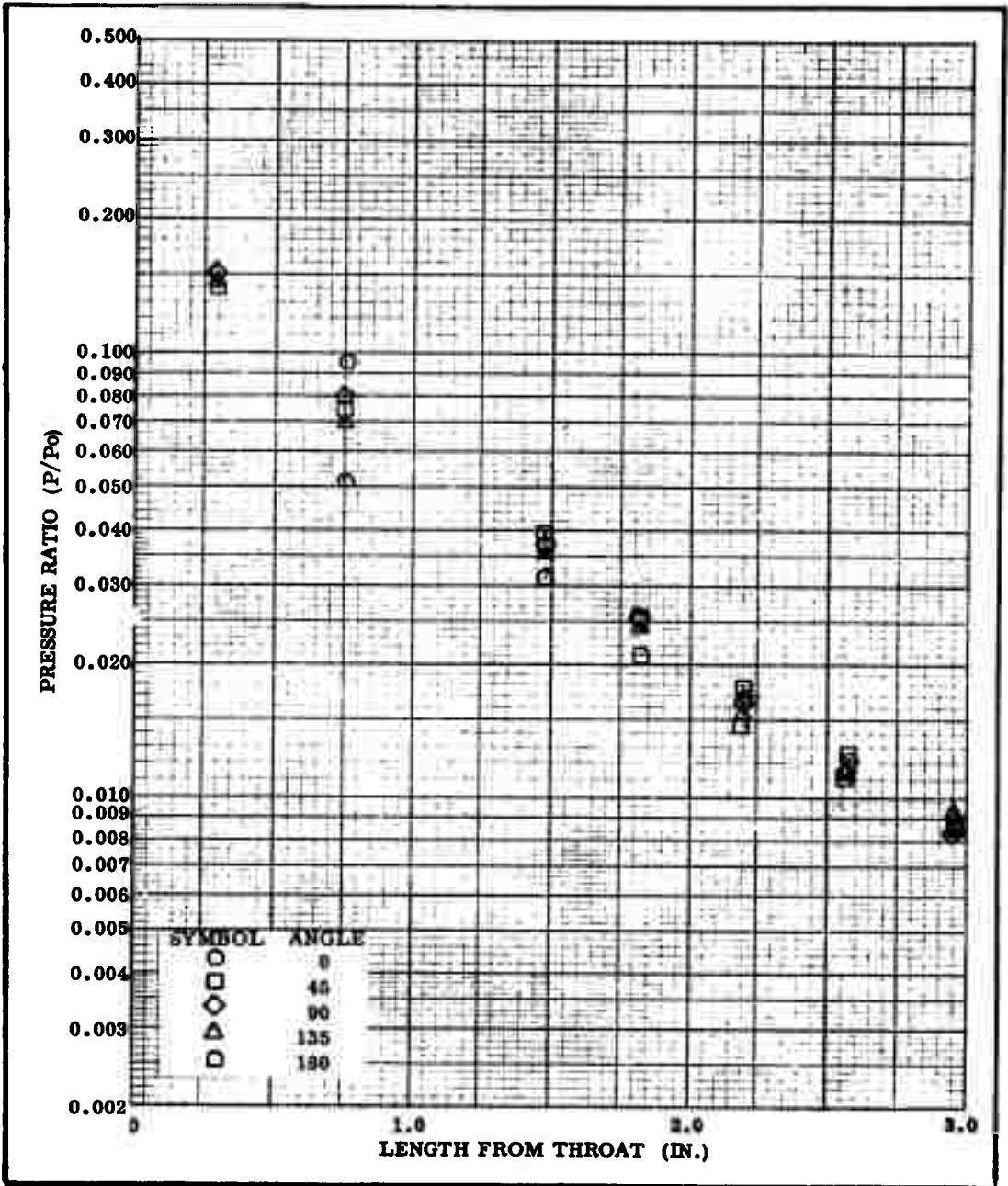
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PRESSURE RATIO (P/Po)

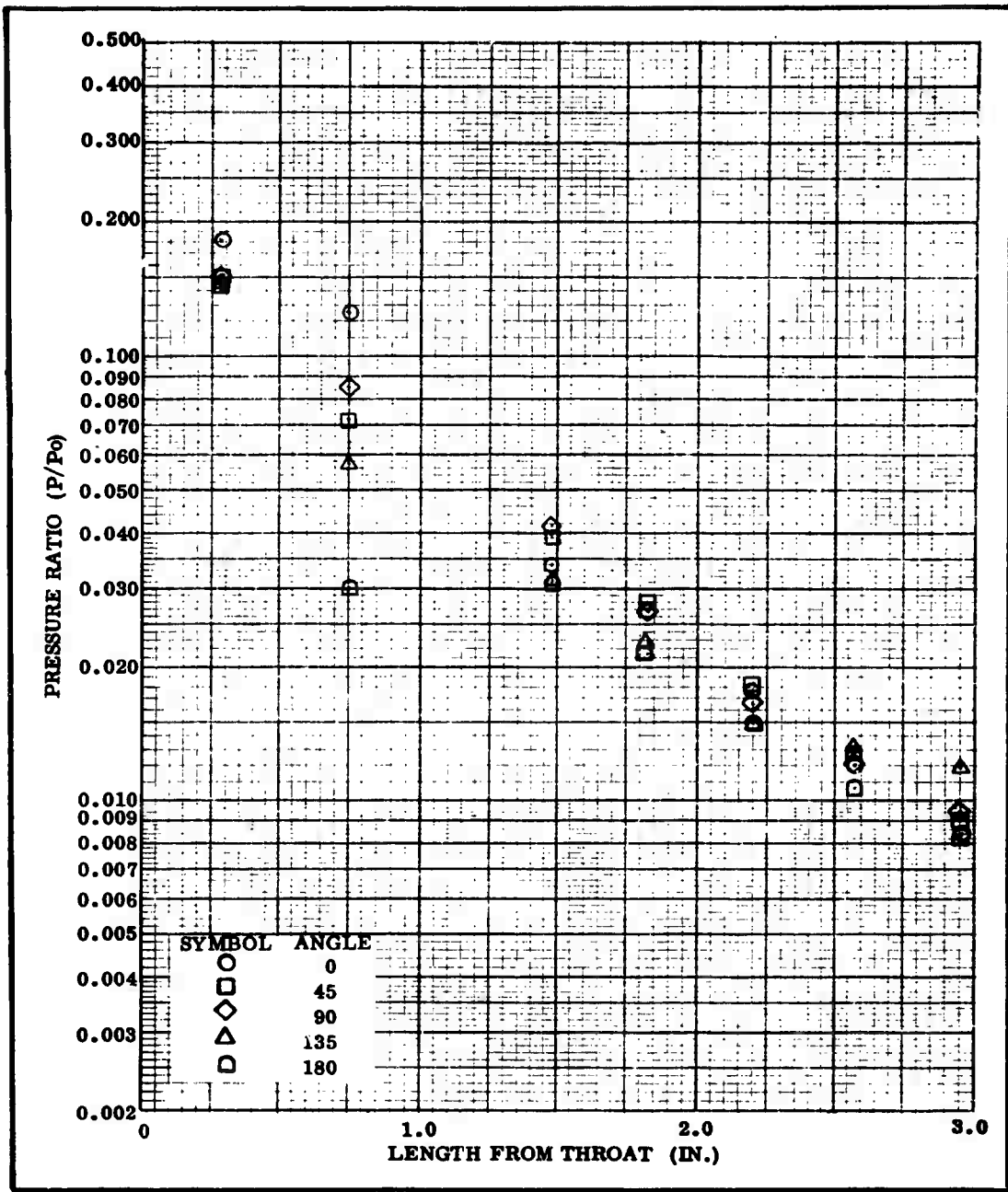


RADIAL POSITION (DEG)

Flex-X Cold Flow Run 4, Vector Angle 0 Degrees



Flex-X Cold Flow Run No. 4 , Vector Angle 2.5 Degrees



Flex-X Cold Flow Run No. 4 , Vector Angle 5 Degrees

STATION

1

2

3

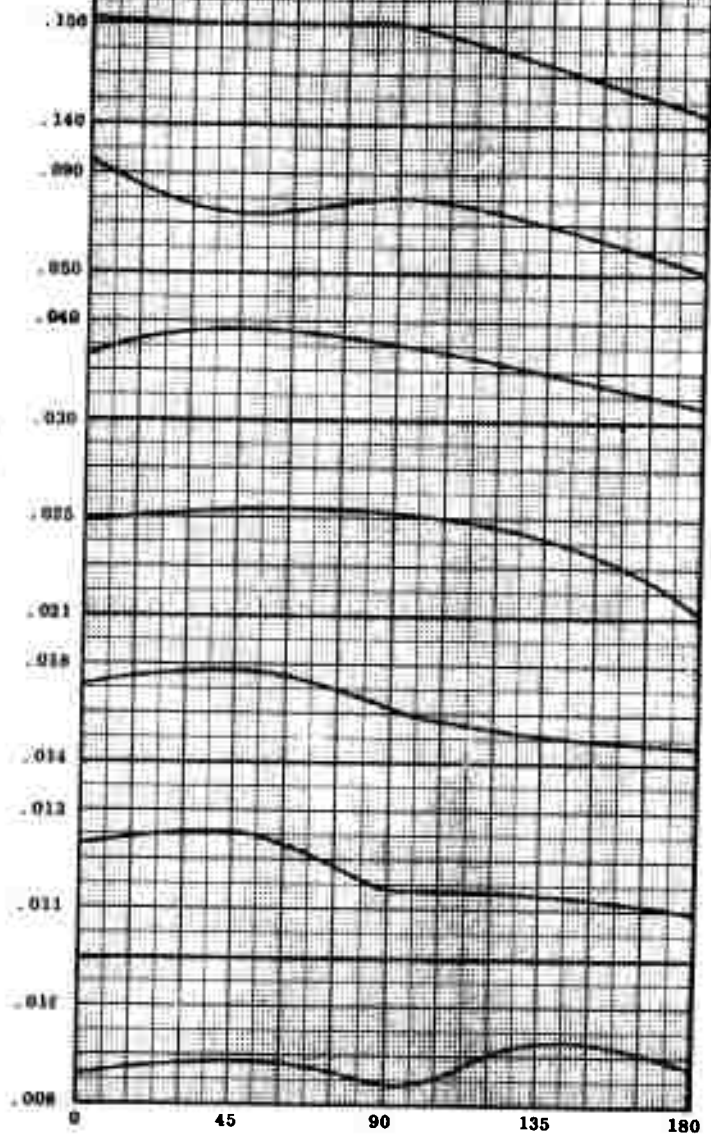
4

5

6

7

PRESSURE RATIO (P/Po)



RADIAL POSITION (DEG)

Flex-X Cold Flow Run 4 , Vector Angle 2.5 Degrees

STATION

1

.180

.140

2

.100

.000

3

.040

.030

4

.030

.020

5

.018

.014

6

.013

.010

7

.012

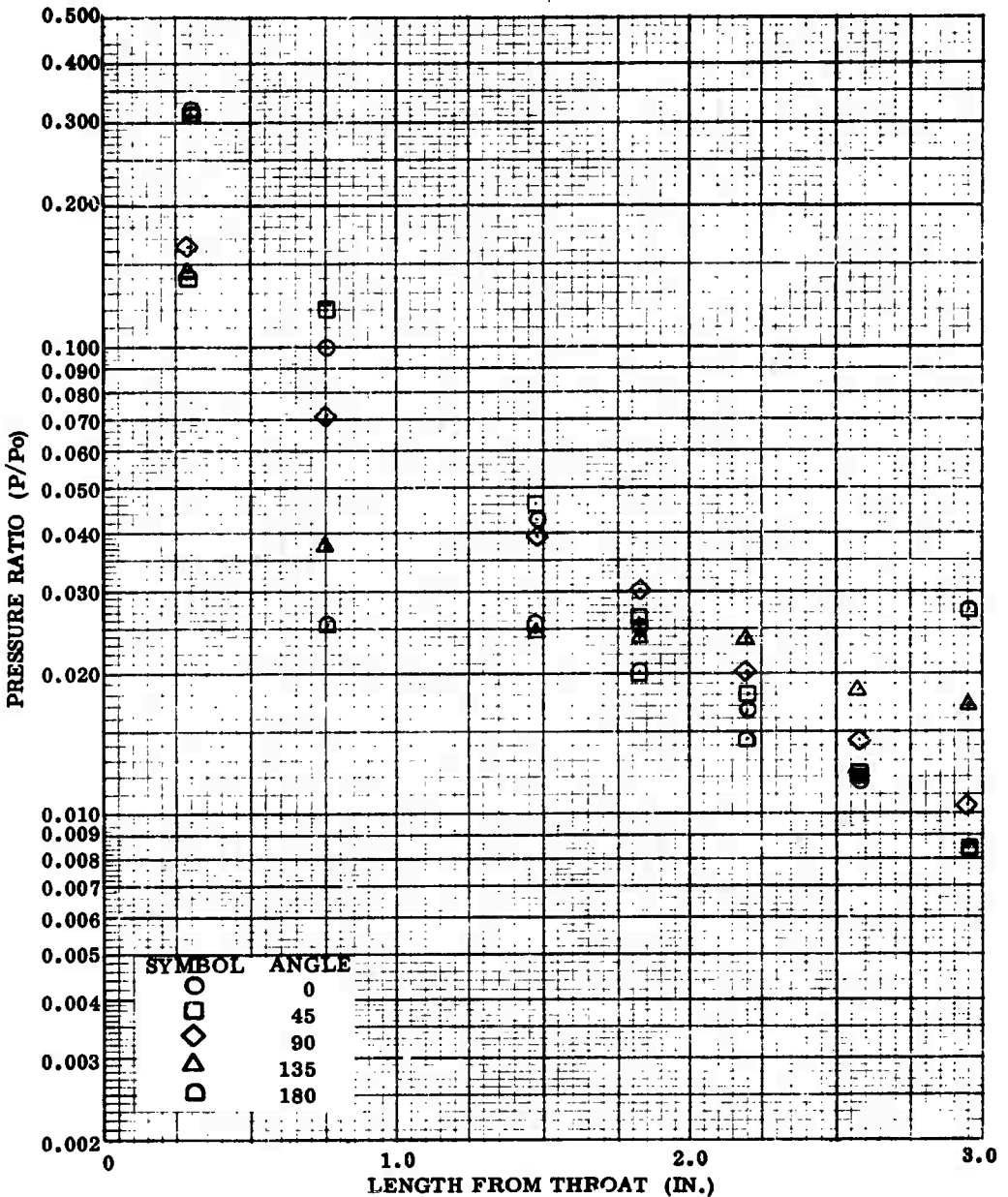
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0 45 90 135 180

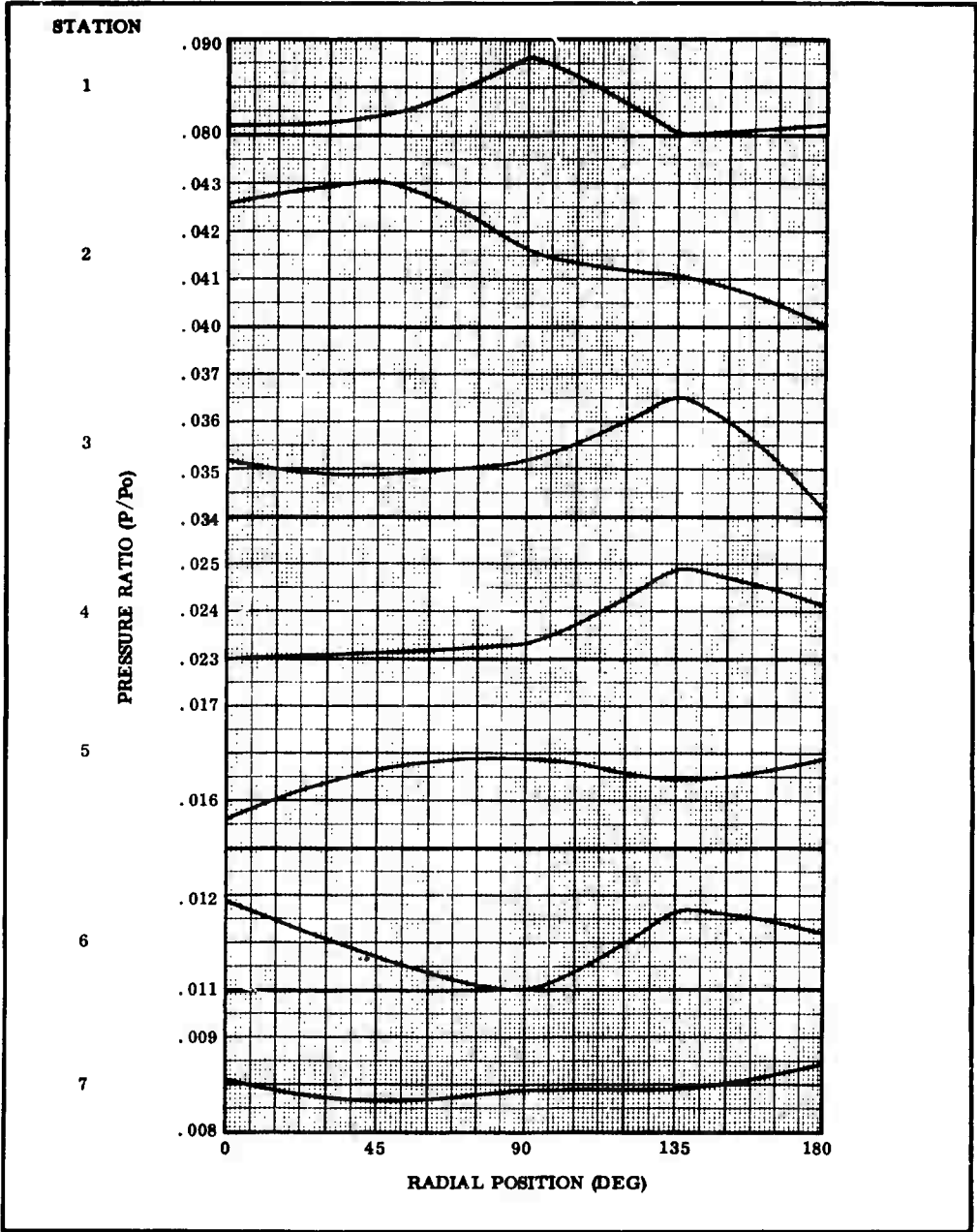
RADIAL POSITION (DEG)

PRESSURE RATIO (P/Po)

Flex-X Cold Flow Run 4, Vector Angle 5 Degrees



Flex-X Cold Flow Run No. 4 , Vector Angle 10 Degrees



Flex-X Cold Flow Run 5 , Vector Angle 0 Degrees

STATION

1

2

3

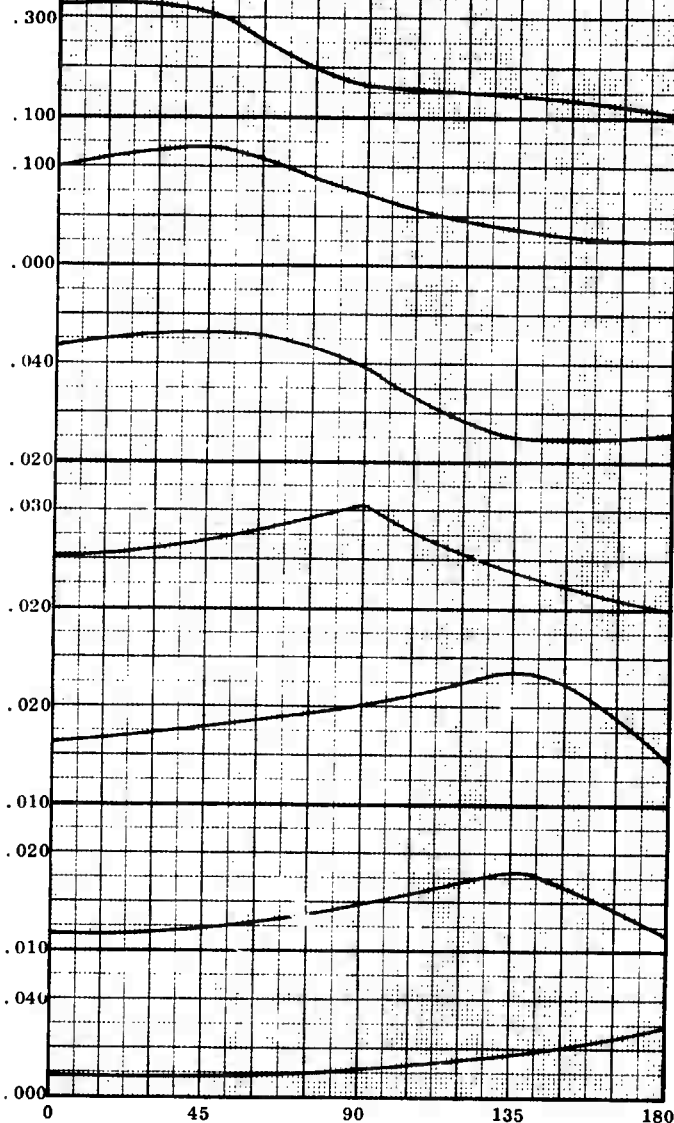
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5

6

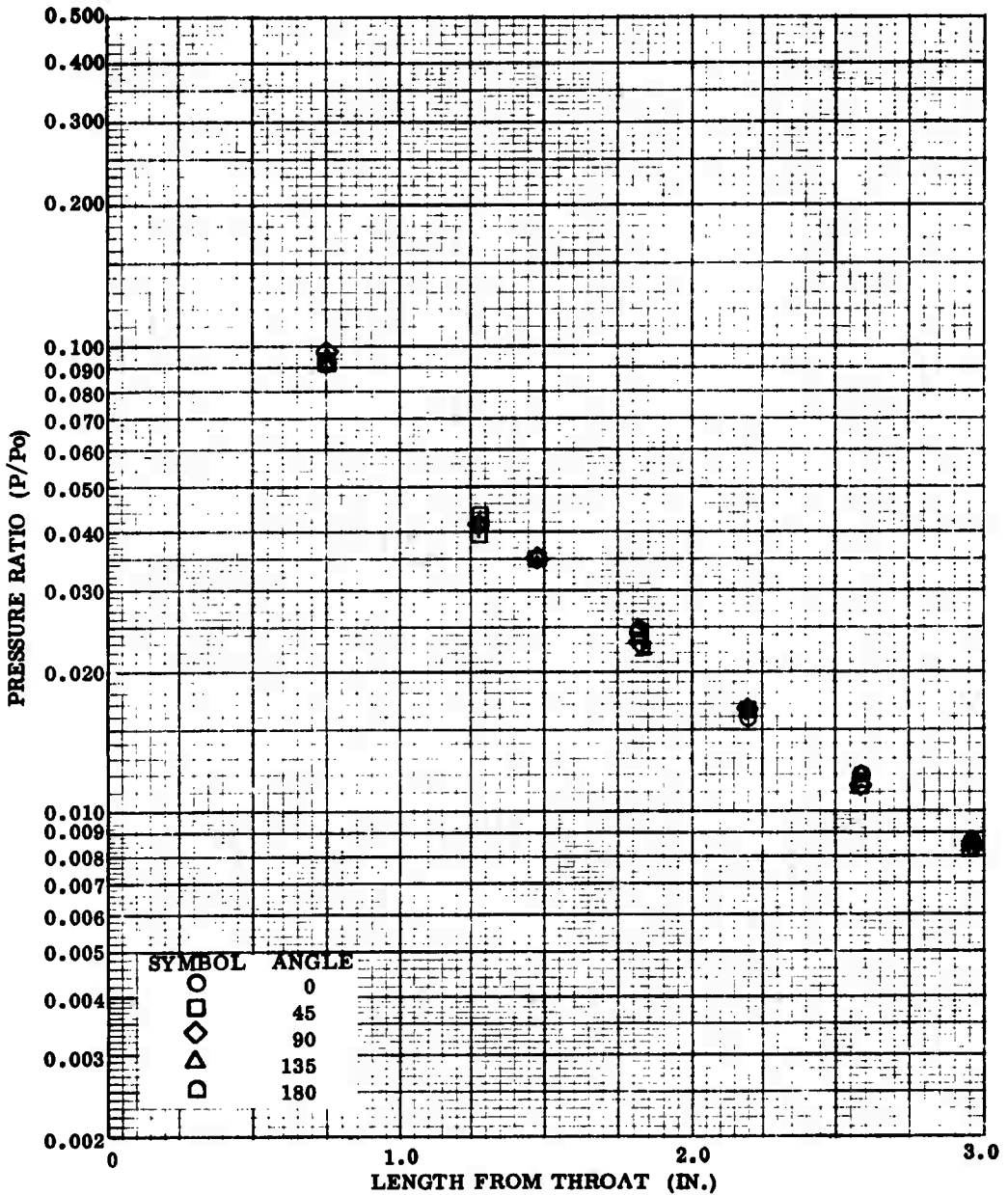
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PRESSURE RATIO (P/P₀)



RADIAL POSITION (DEG)

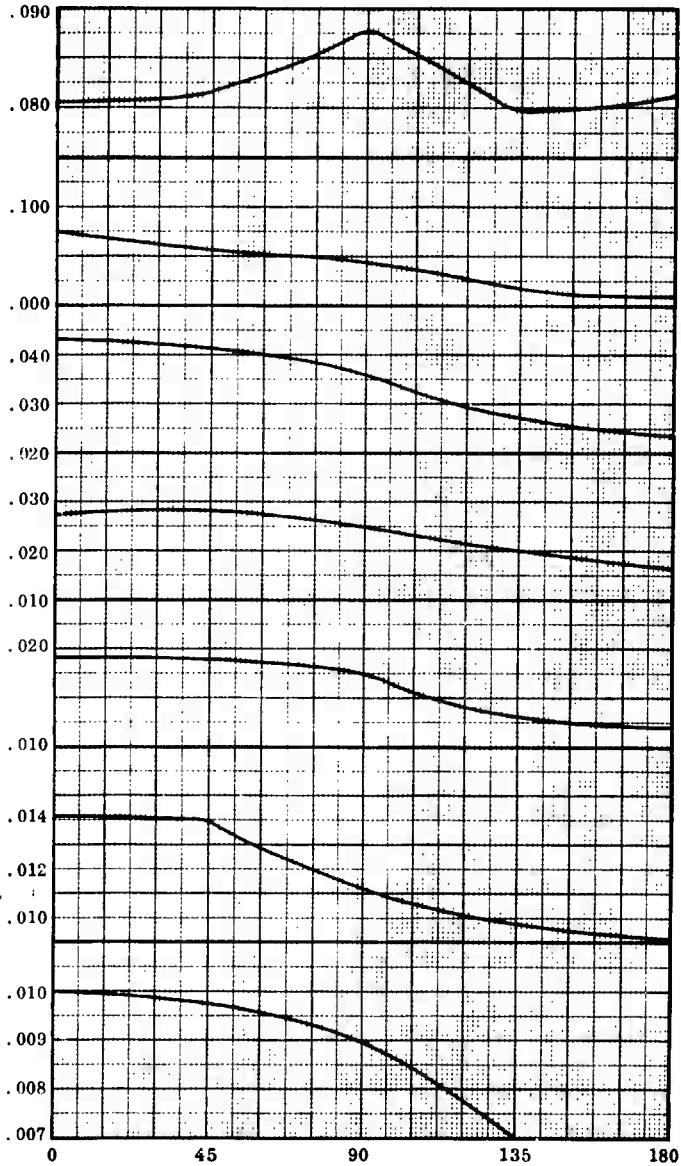
Flex-X Cold Flow Run 4 , Vector Angle 10 Degrees



Flex-X Cold Flow Run No. 5 , Vector Angle 0 Degrees

STATION

1



2

3

4

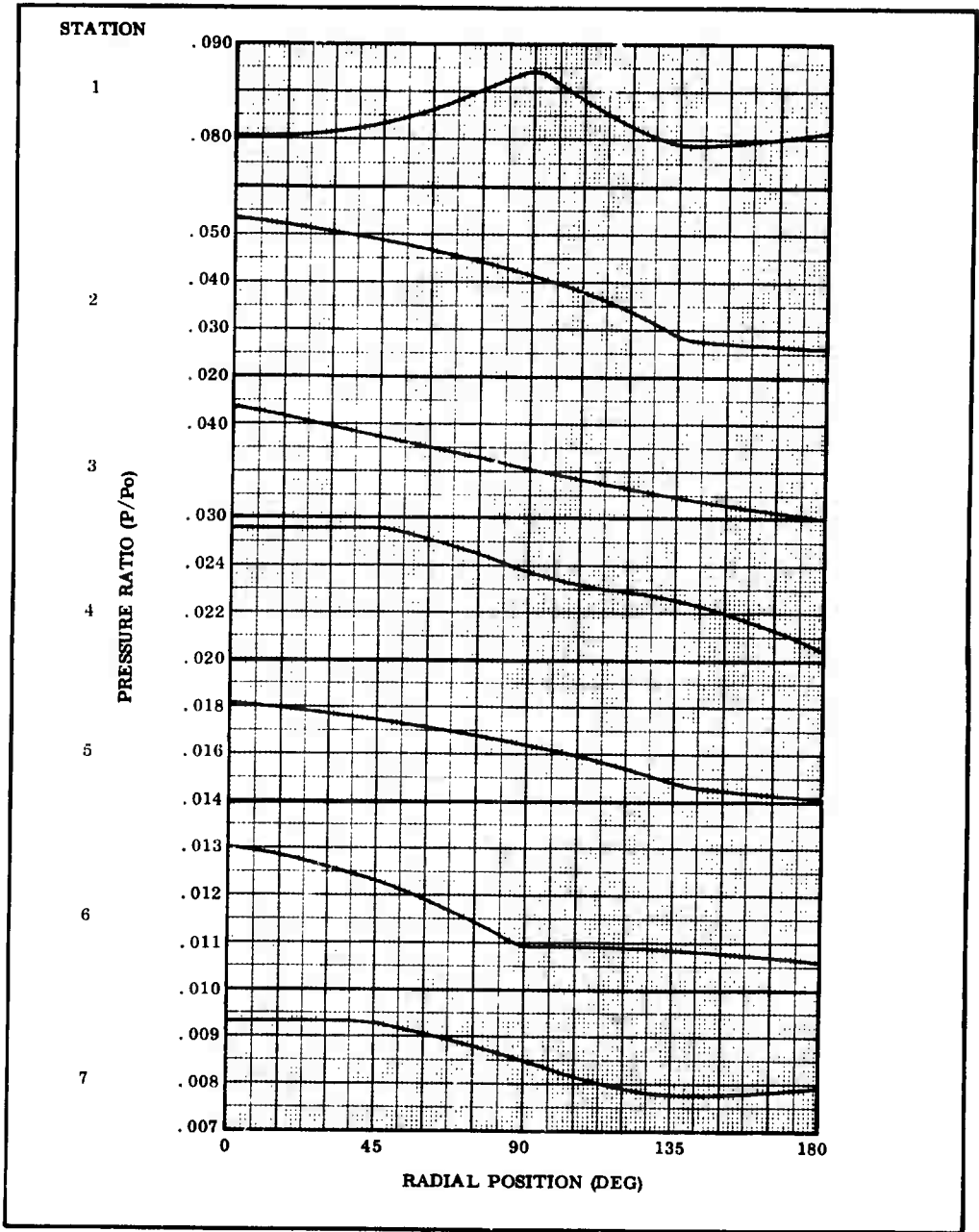
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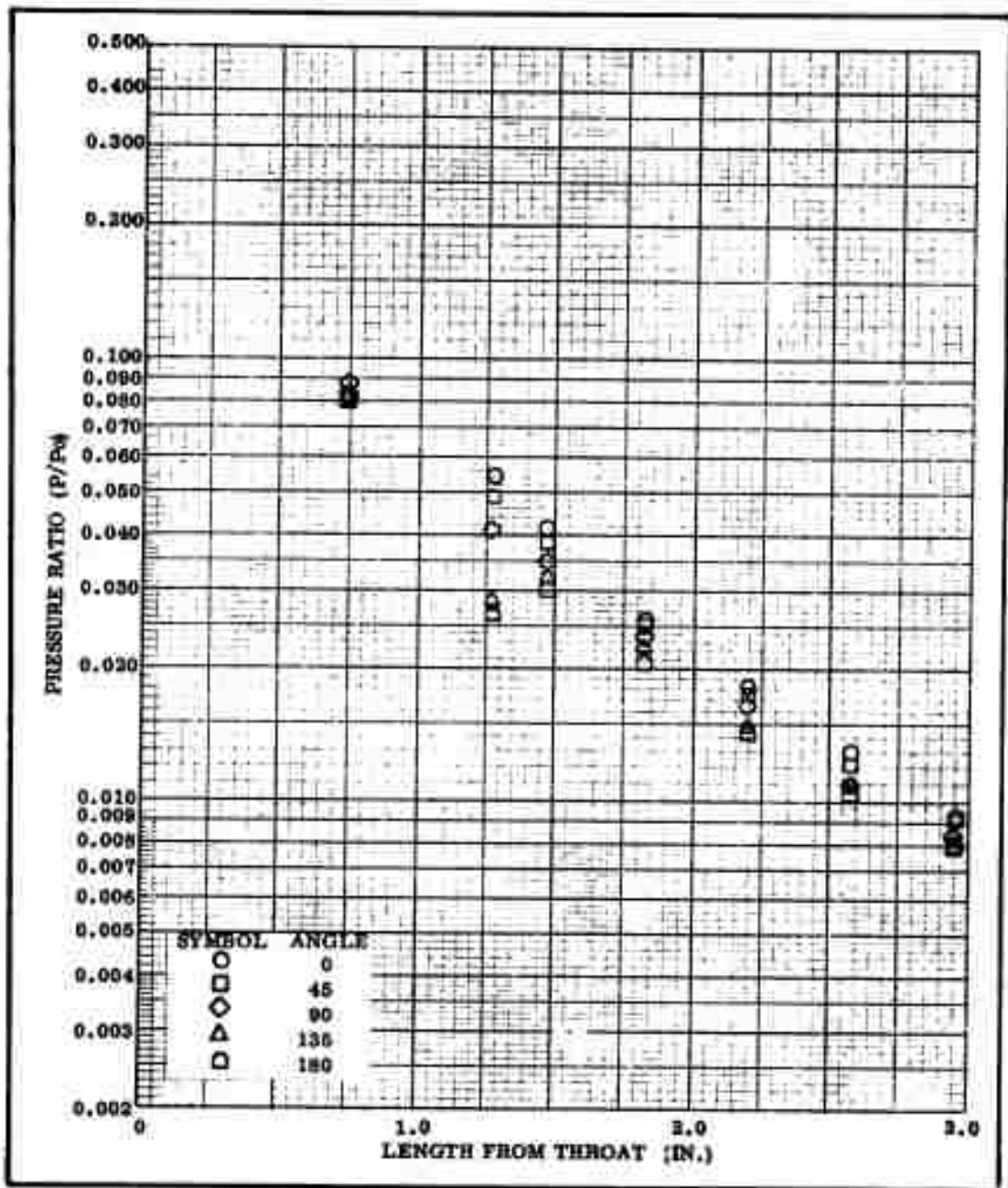
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RADIAL POSITION (DEG)

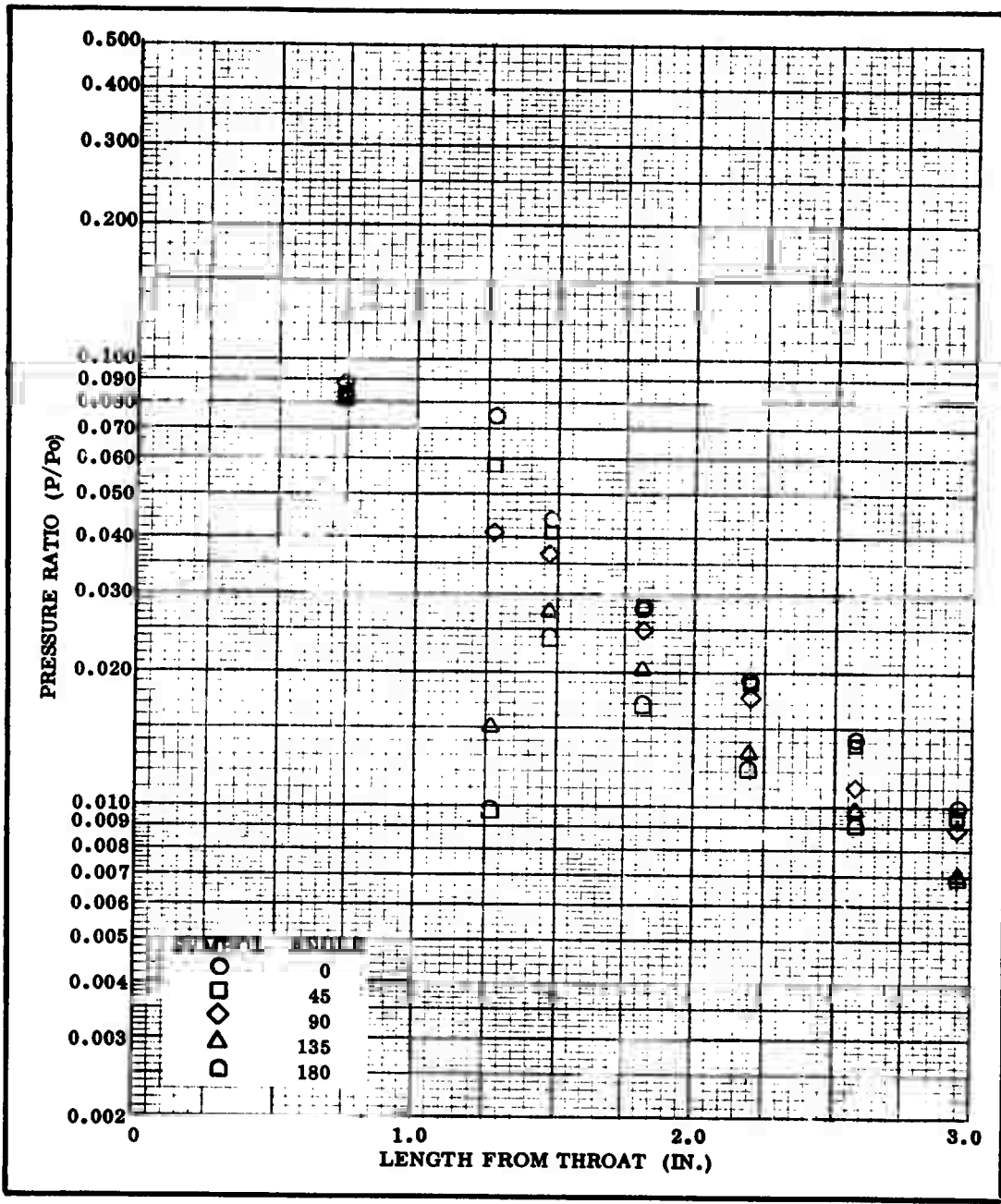
Flex-X Cold Flow Run 5 , Vector Angle 5 Degrees



Flex-X Cold Flow Run 5 , Vector Angle 2.5 Degrees

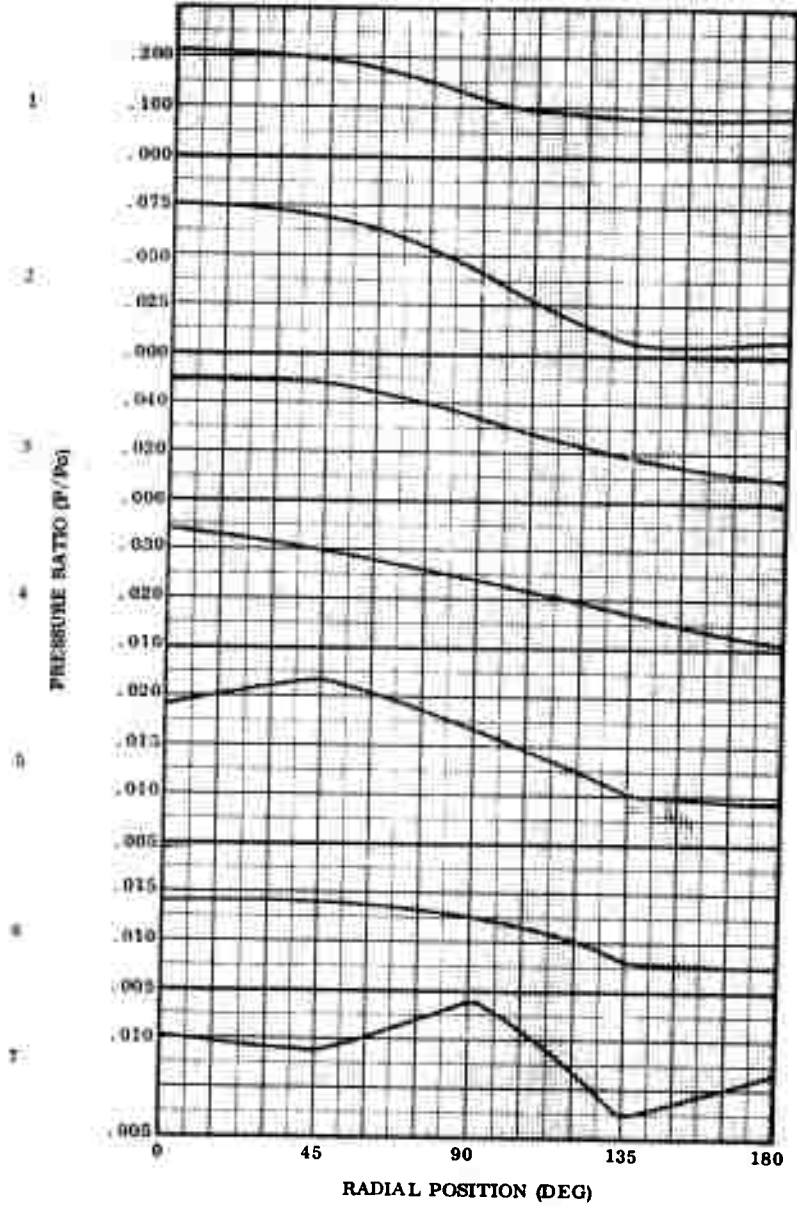


Flex-X Cold Flow Run No. 5 , Vector Angle 2.5 Degrees

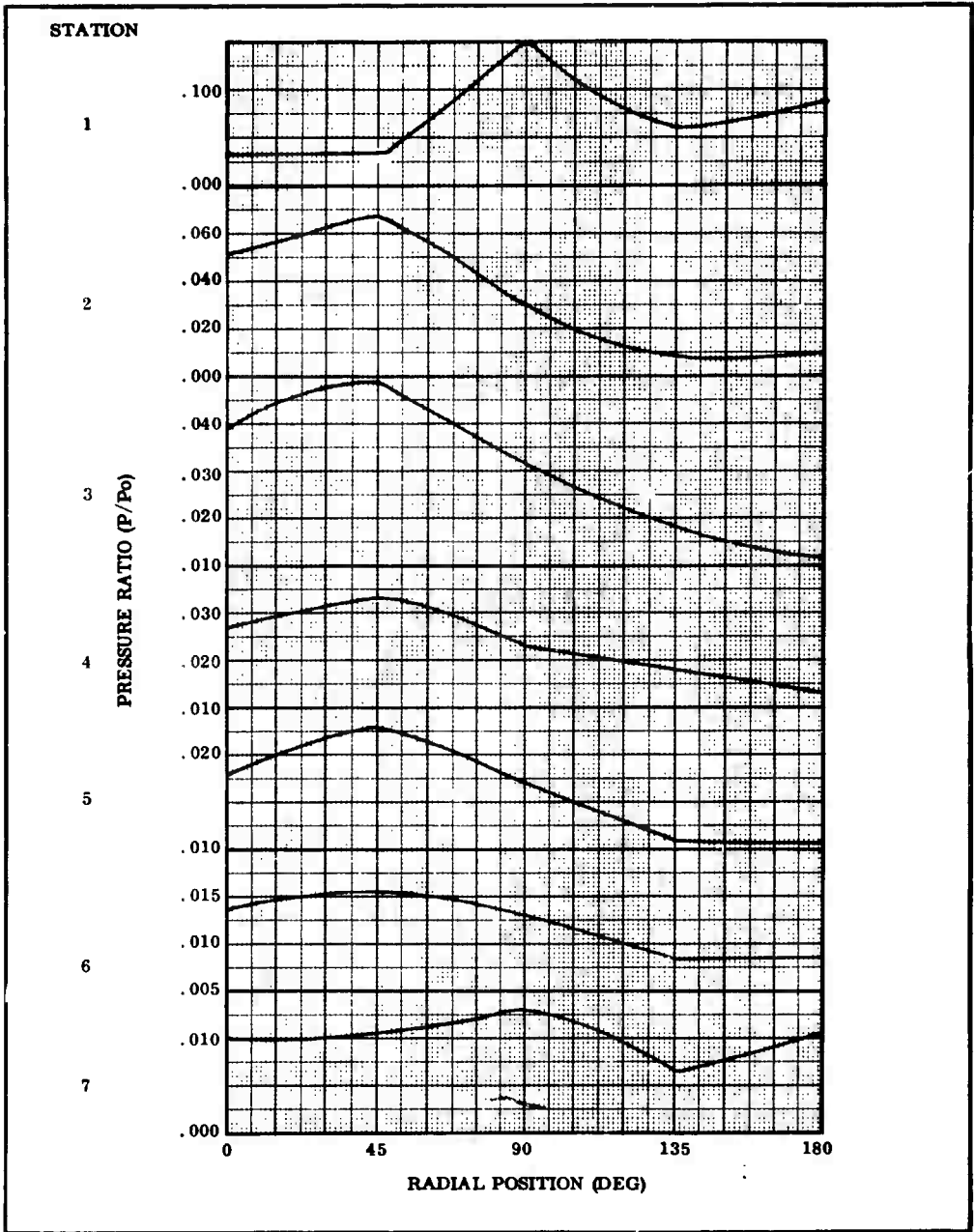


Flex-X Cold Flow Run No. 5 , Vector Angle 5 Degrees

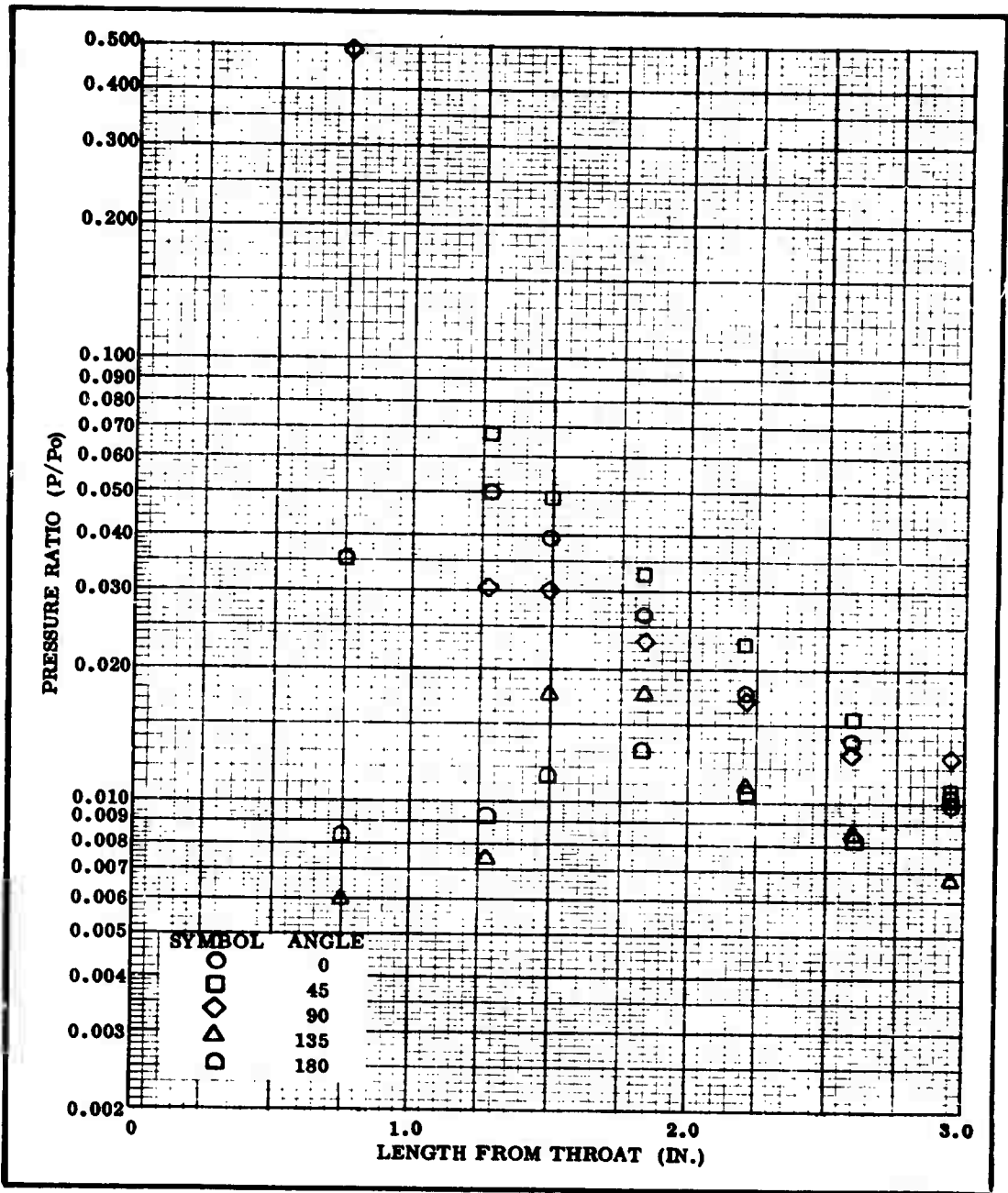
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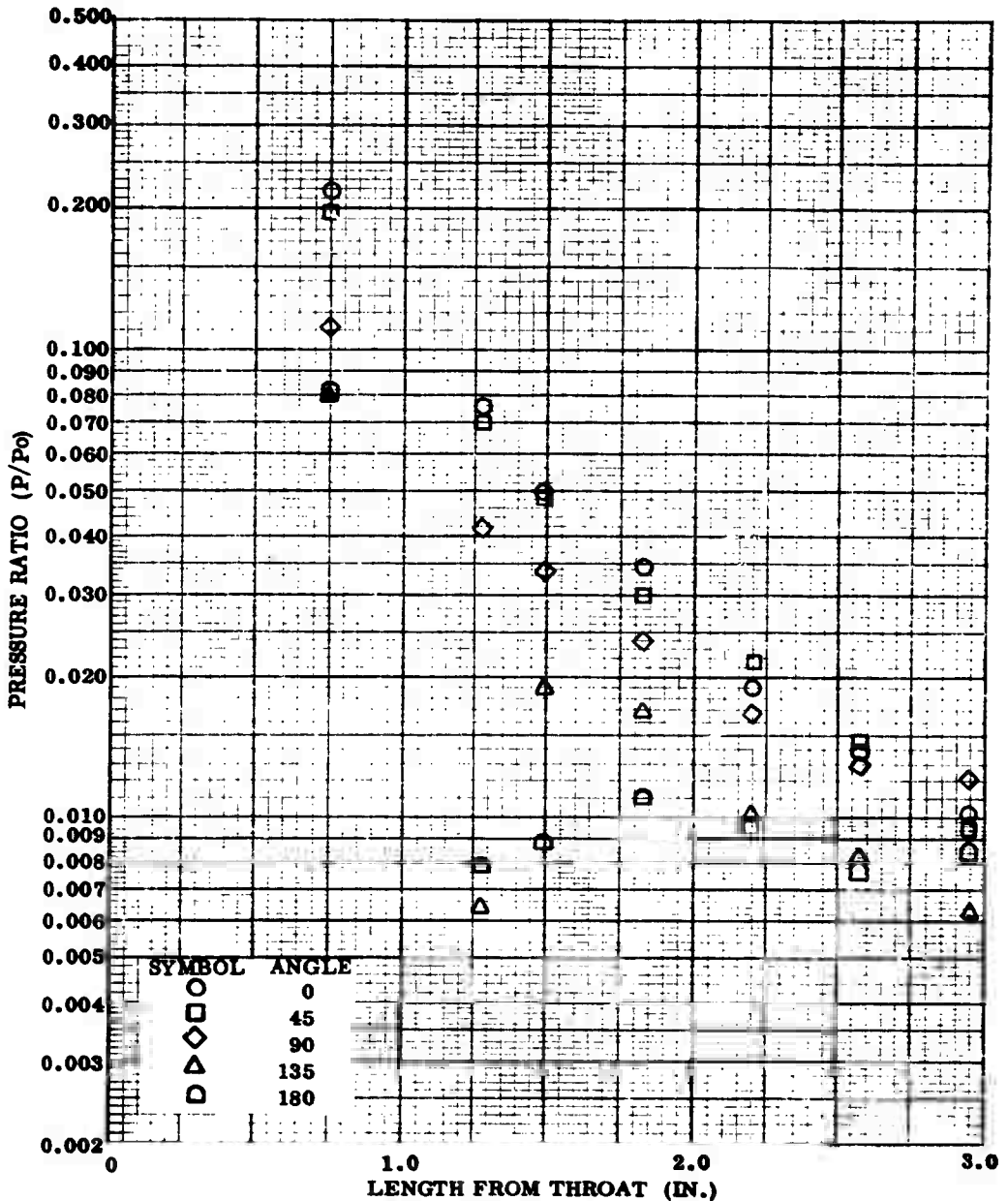
Flex-X Cold Flow Run 5 , Vector Angle 10 Degrees



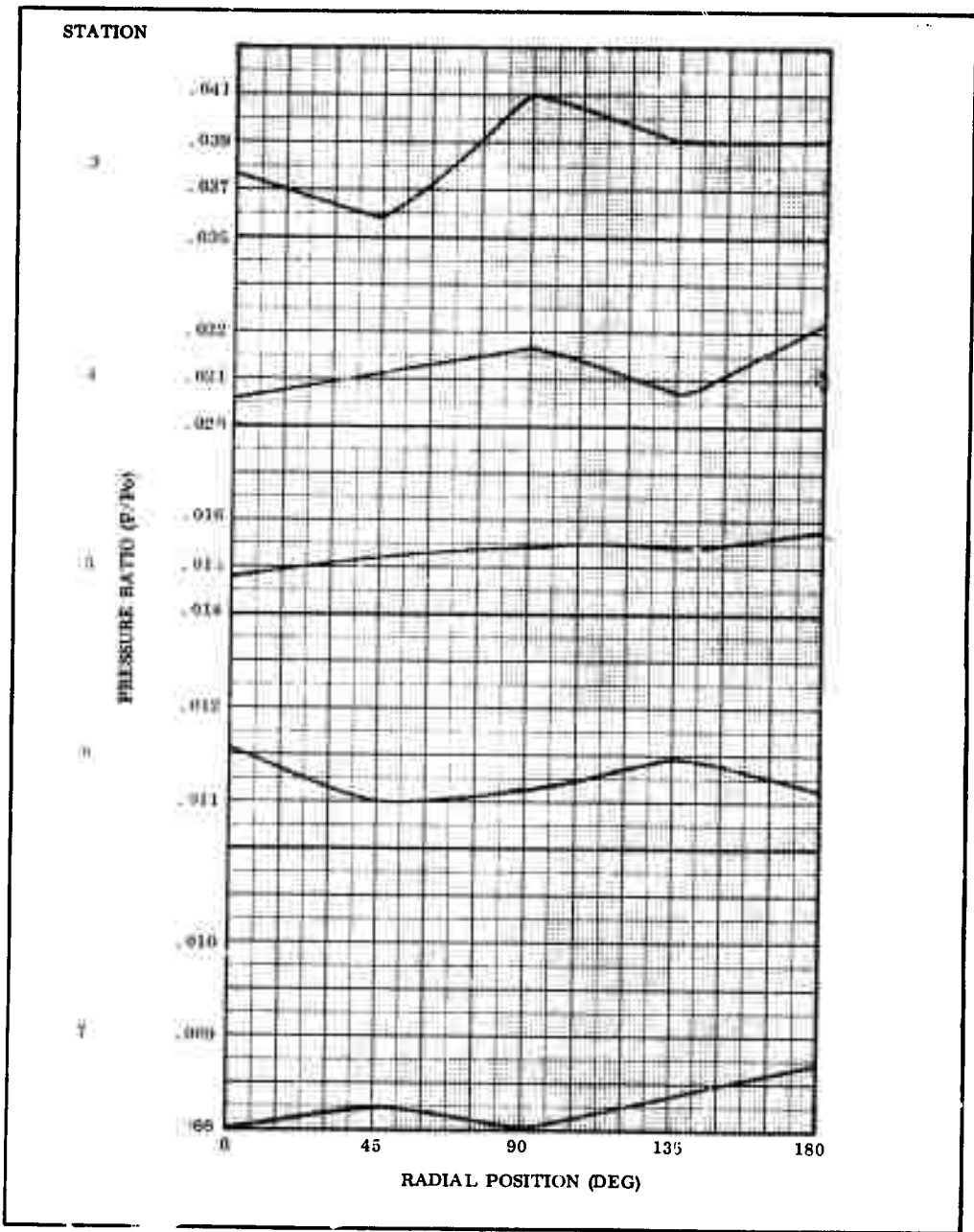
Flex-X Cold Flow Run 5C, Vector Angle 10 Degrees



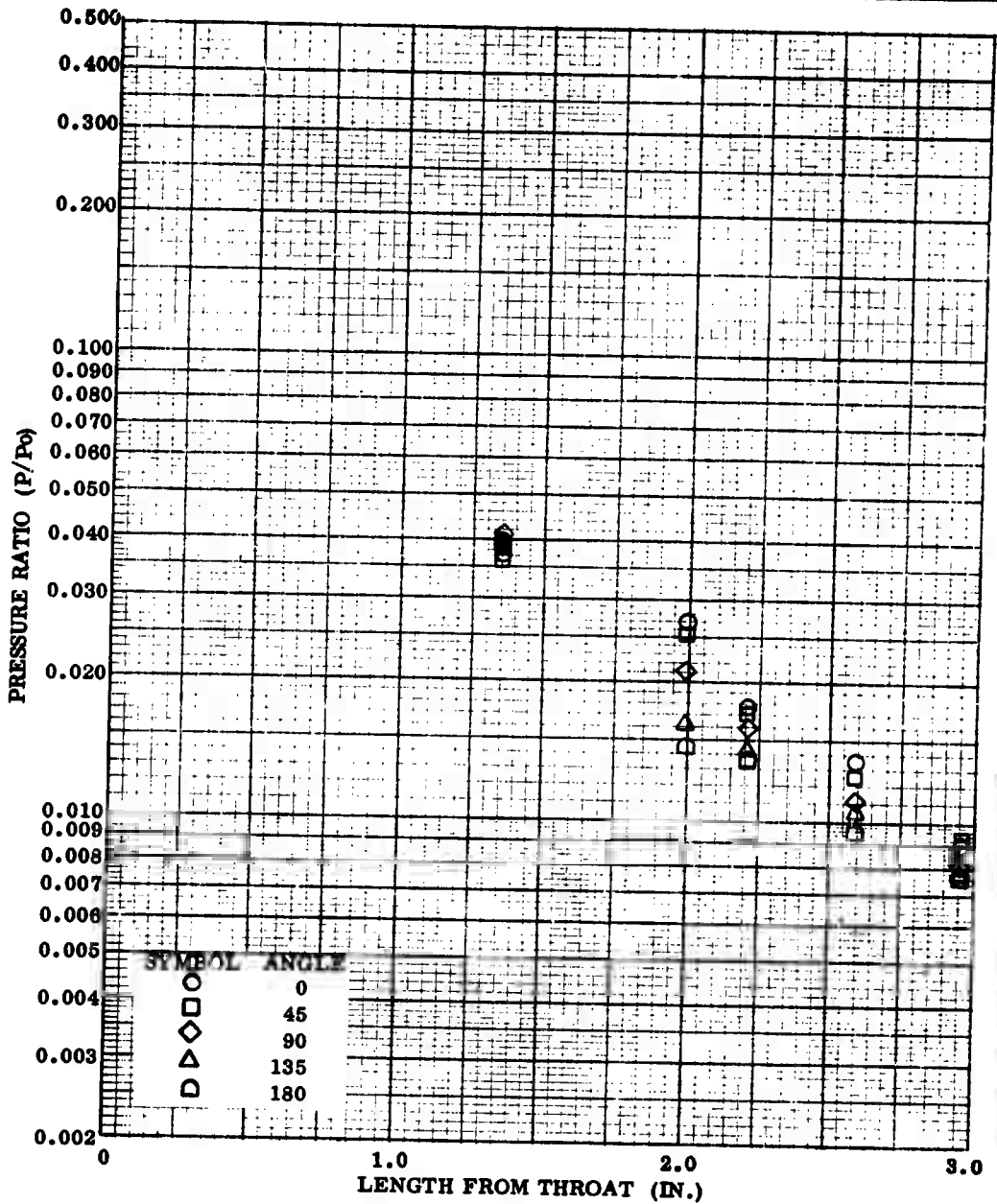
Flex-X Cold Flow Run No. 5C , Vector Angle 10 Degrees



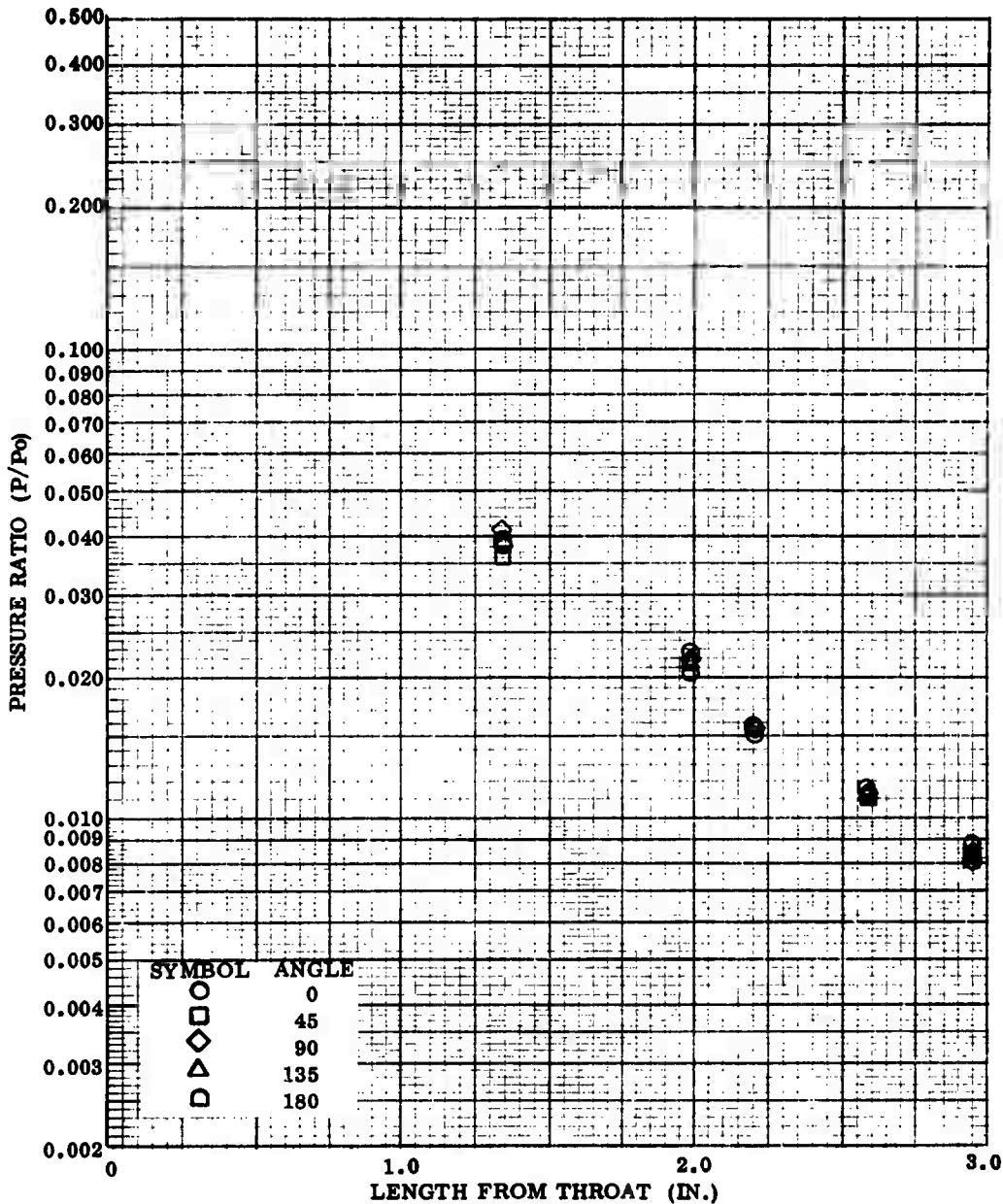
Flex-X Cold Flow Run No. 5 , Vector Angle 10 Degrees



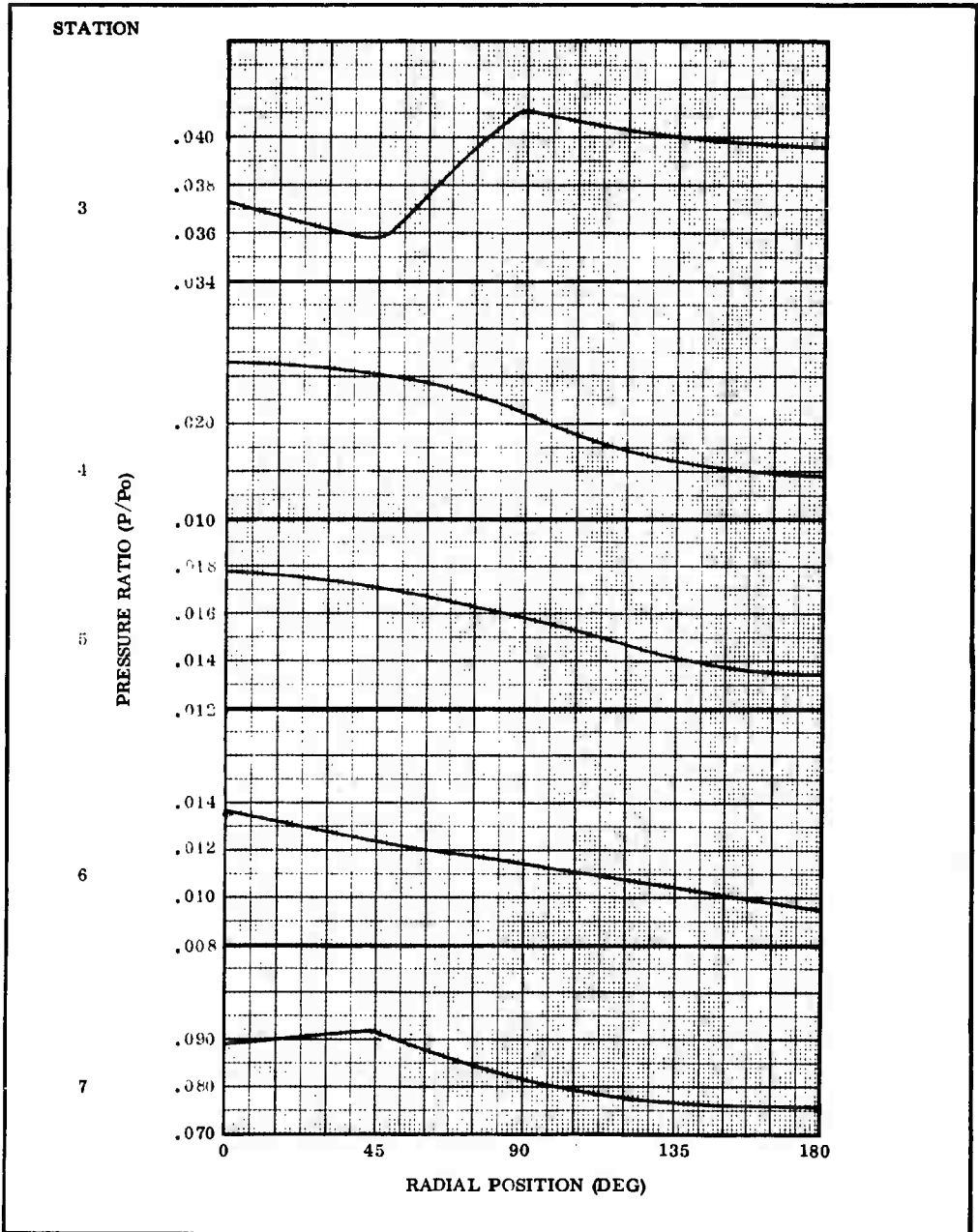
Flex-X Cold Flow Run 6 , Vector Angle 0 Degrees



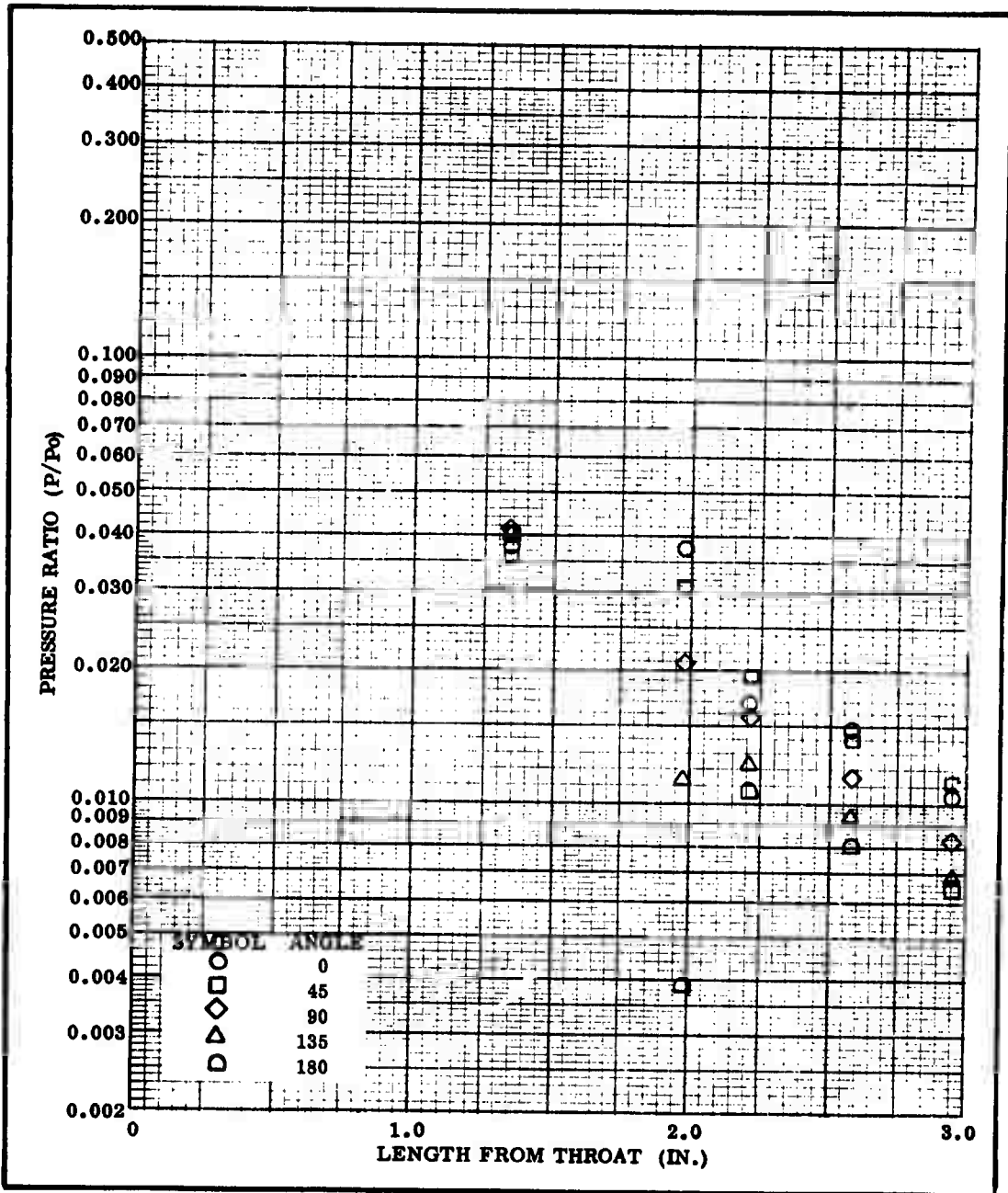
Flex-X Cold Flow Run No. 6 , Vector Angle 2.5 Degrees



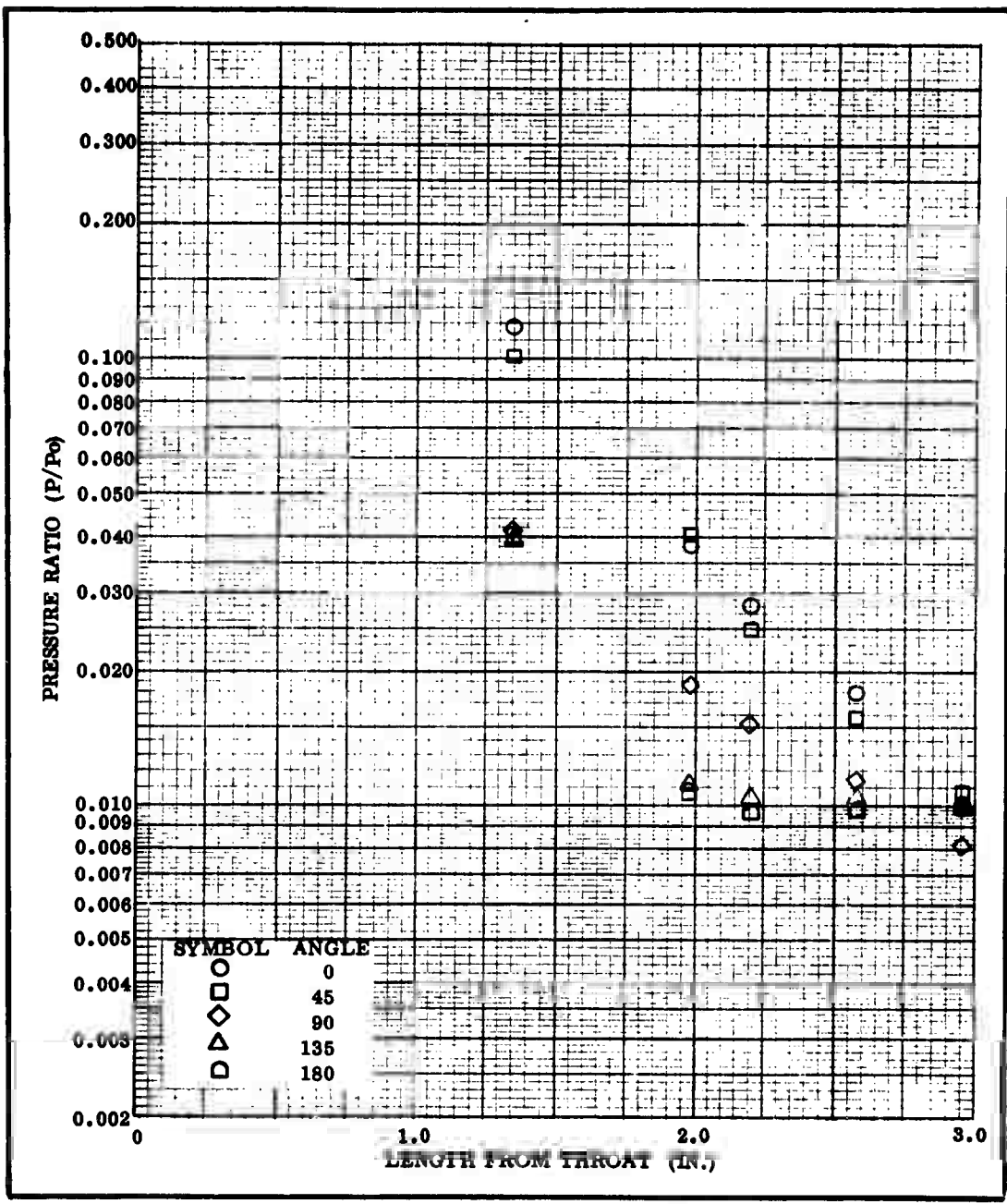
Flex-X Cold Flow Run No. 6 , Vector Angle 0 Degrees



Flex-X Cold Flow Run 6 , Vector Angle 2.5 Degrees

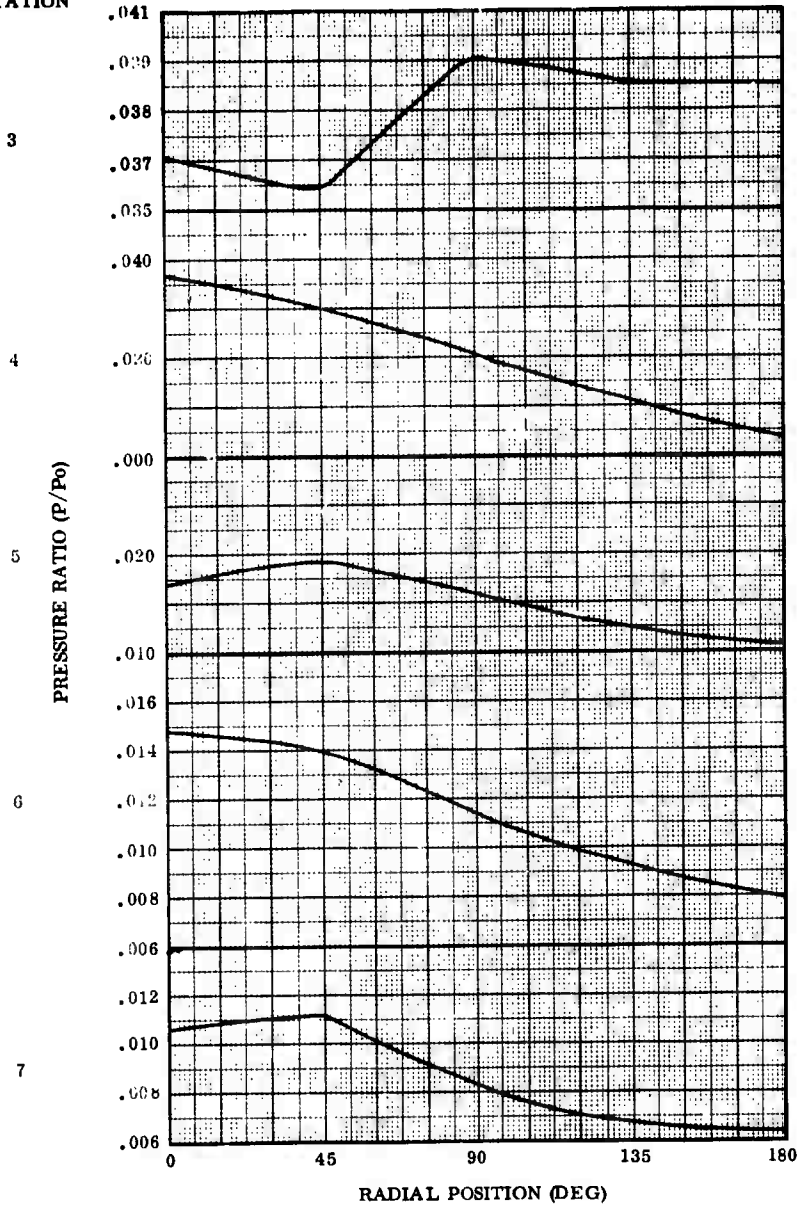


Flex-X Cold Flow Run No. 6 , Vector Angle 5 Degrees



Flex-X Cold Flow Run No. 6 , Vector Angle 10 Degrees

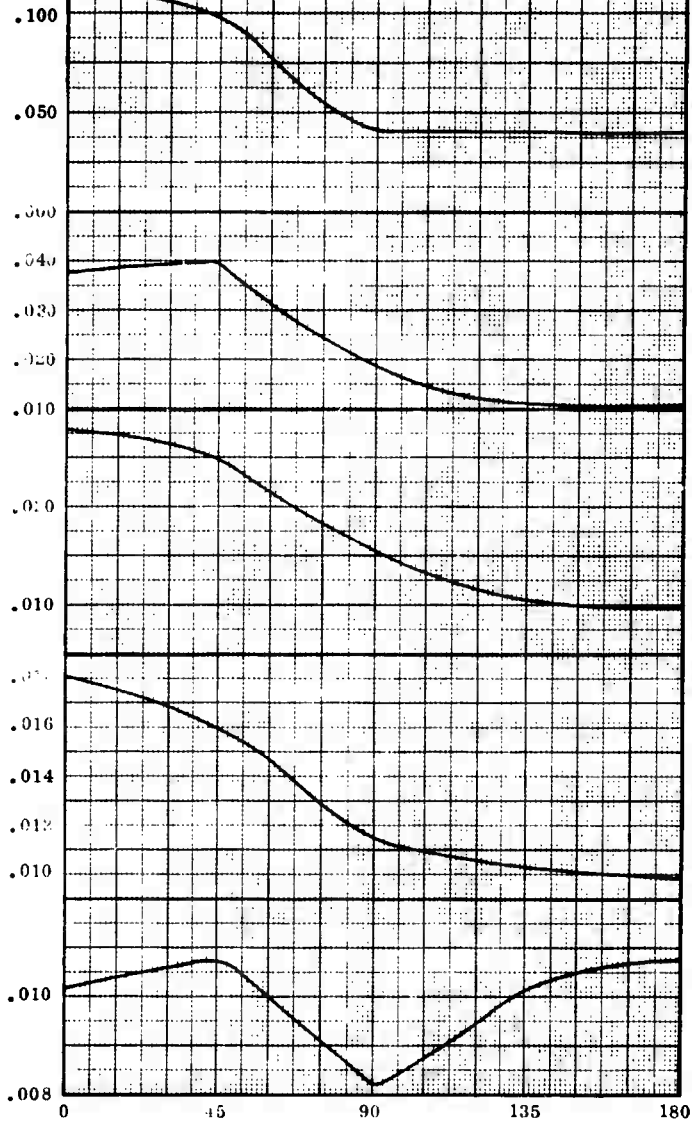
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Flex-X Cold Flow Run 6 , Vector Angle 5 Degrees

STATION

3

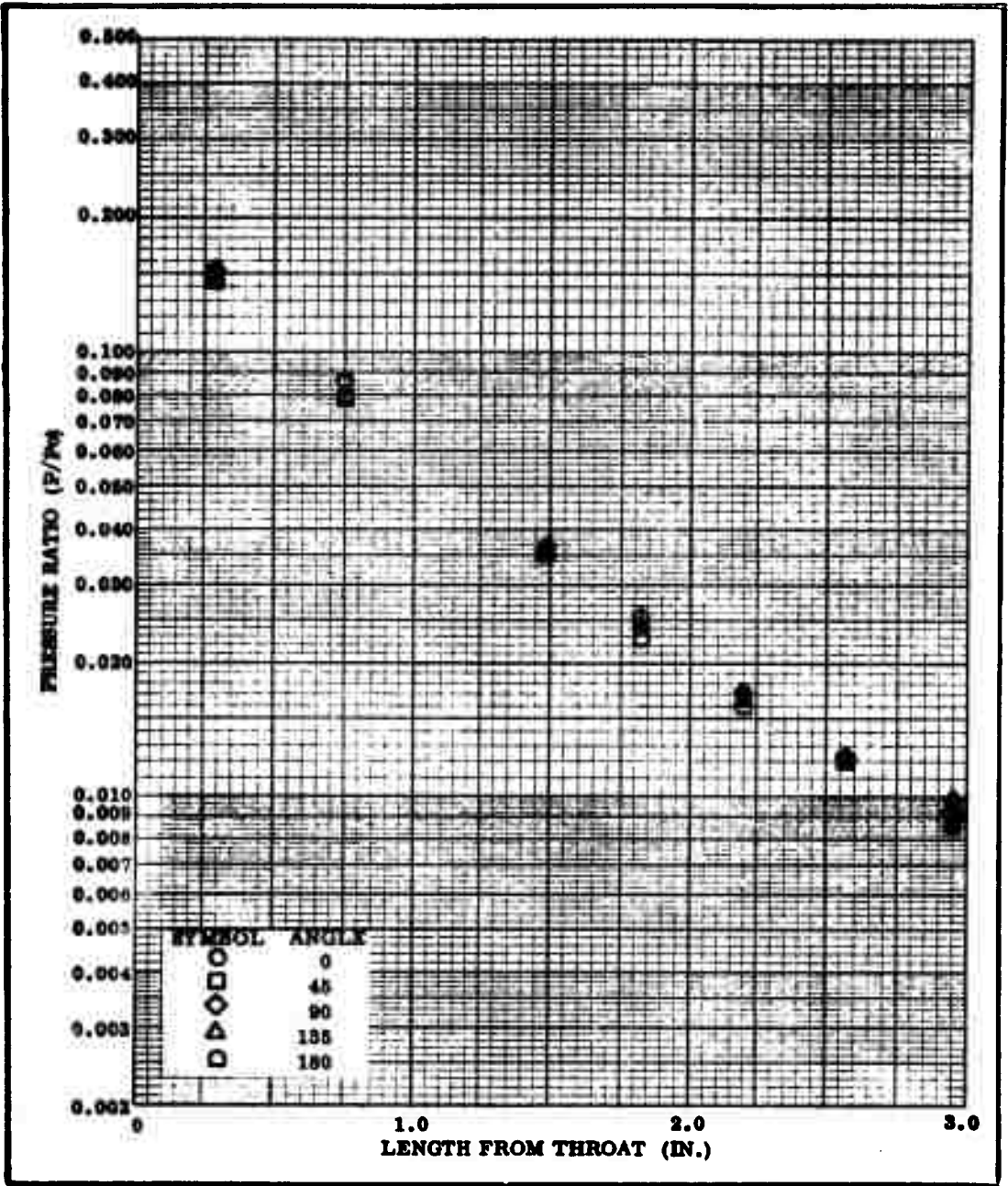


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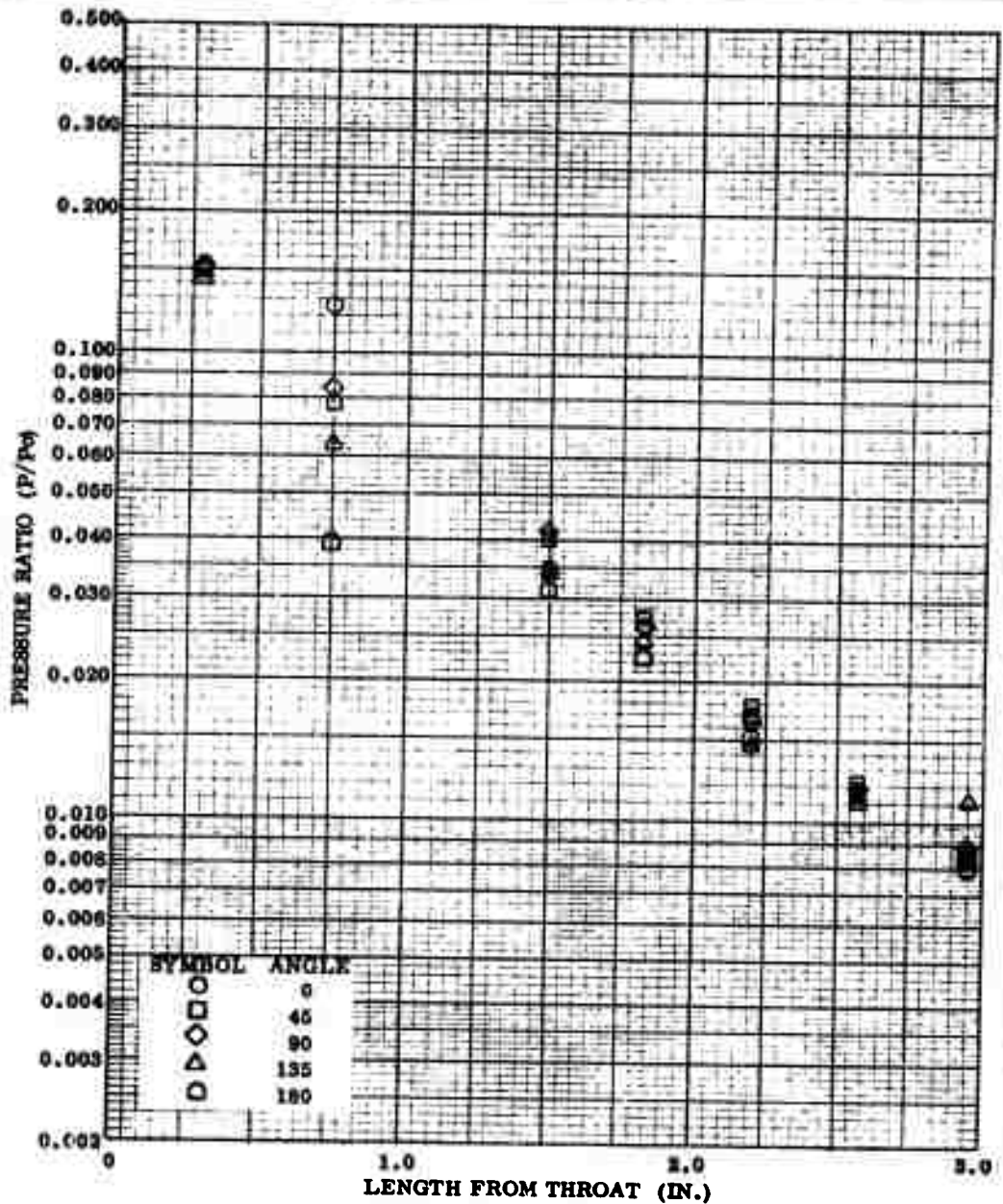
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RADIAL POSITION (DEG)

Flex-X Cold Flow Run 6 , Vector Angle 10 Degrees



Flux-X Cold Flow Run No. 7 , Vector Angle 0 Degrees



Flex-X Cold Flow Run No. 7 , Vector Angle 3.5 Degrees

STATION

1

.150

.140

2

.085

.080

3

.075

.036

.035

4

PRESSURE RATIO (P/Po)

.034

.026

.024

5

.022

.017

.016

6

.022

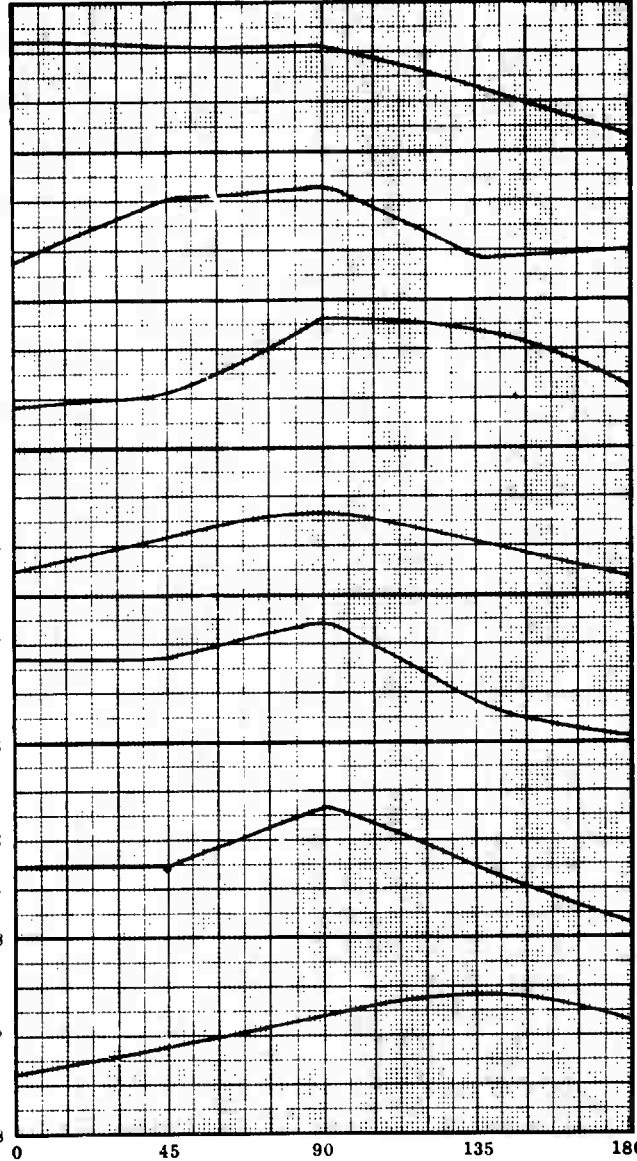
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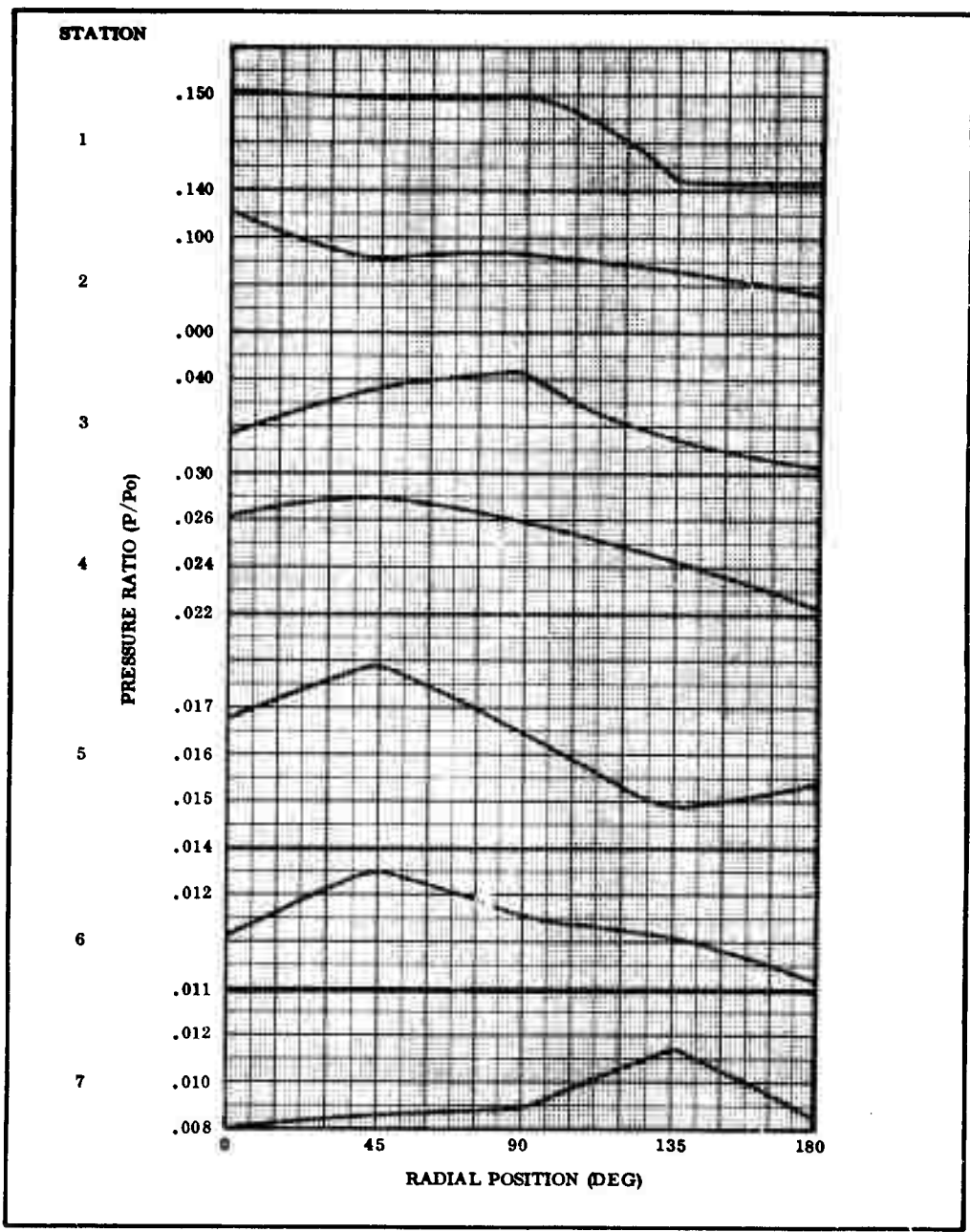
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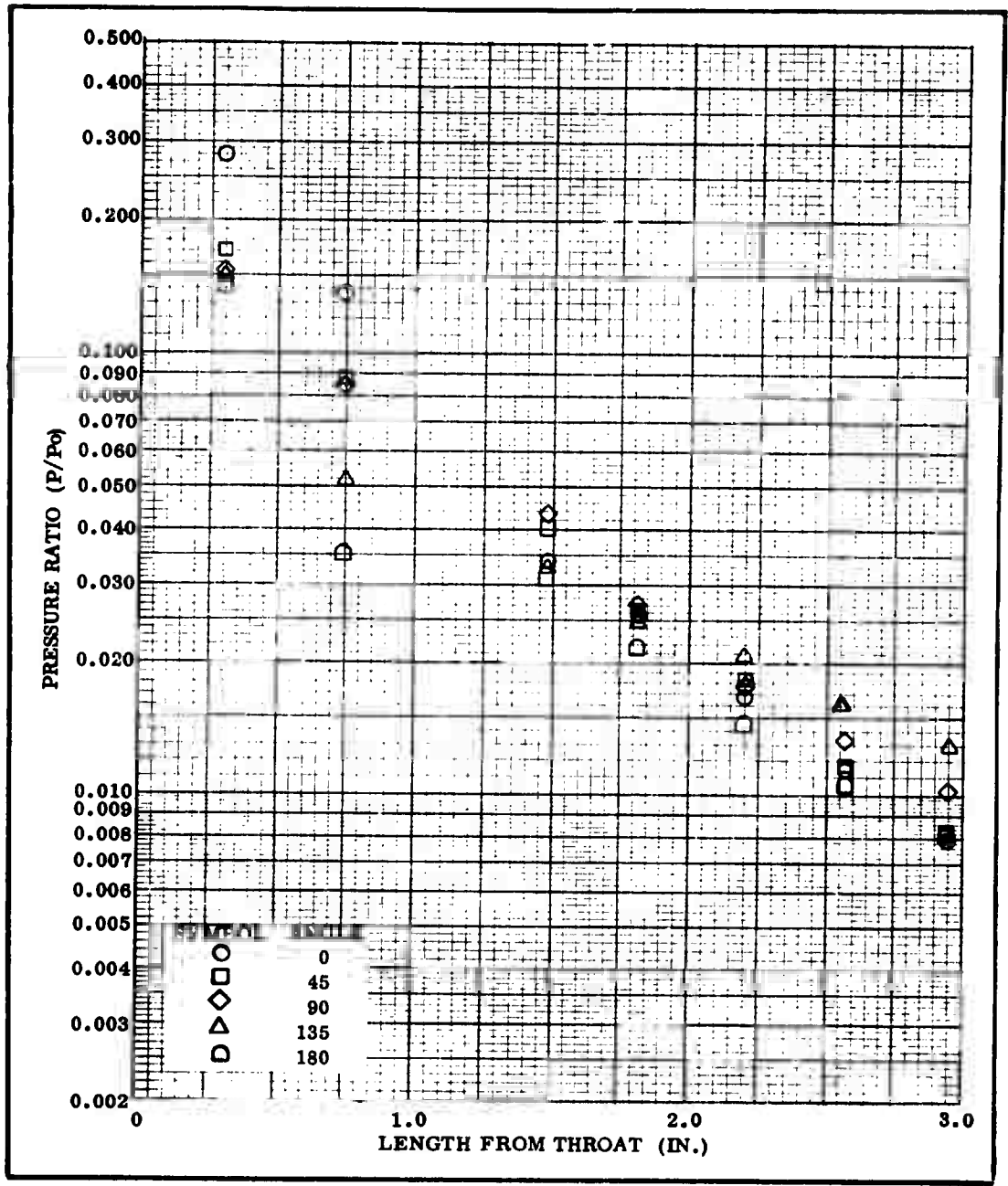


RADIAL POSITION (DEG)

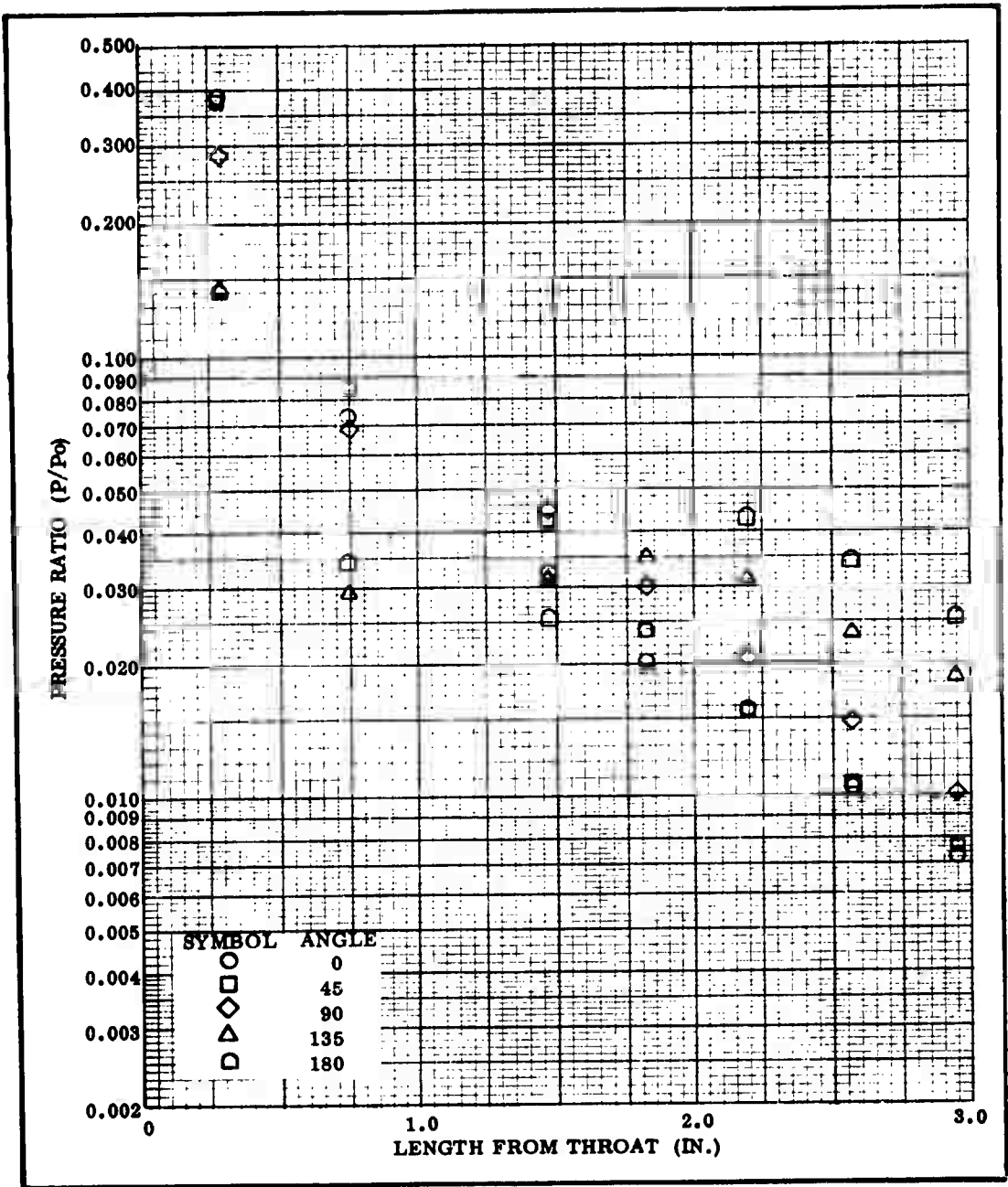
Flex-X Cold Flow Run 7 , Vector Angle 0 Degrees



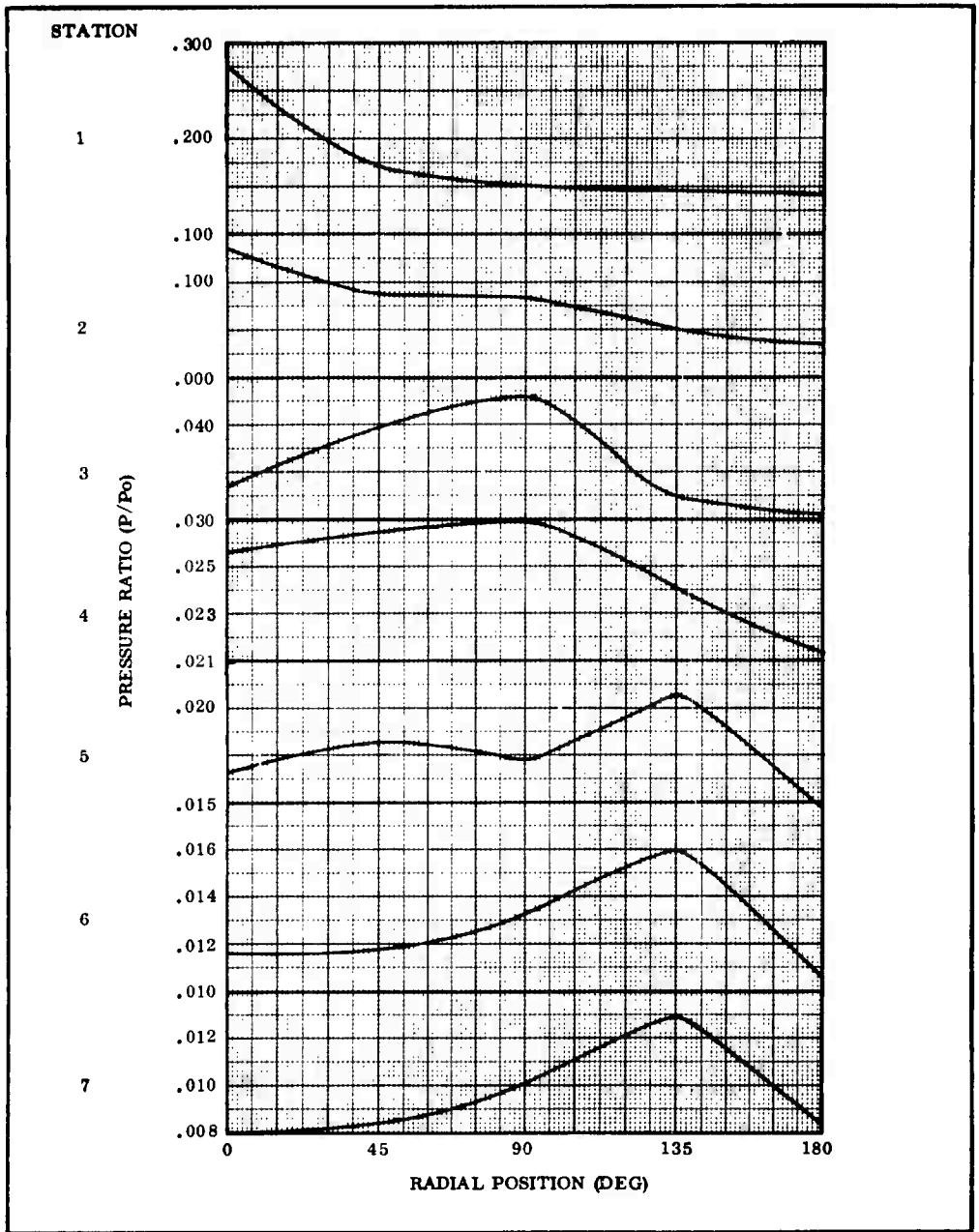
Flex-X Cold Flow Run 7, Vector Angle 3.5 Degrees



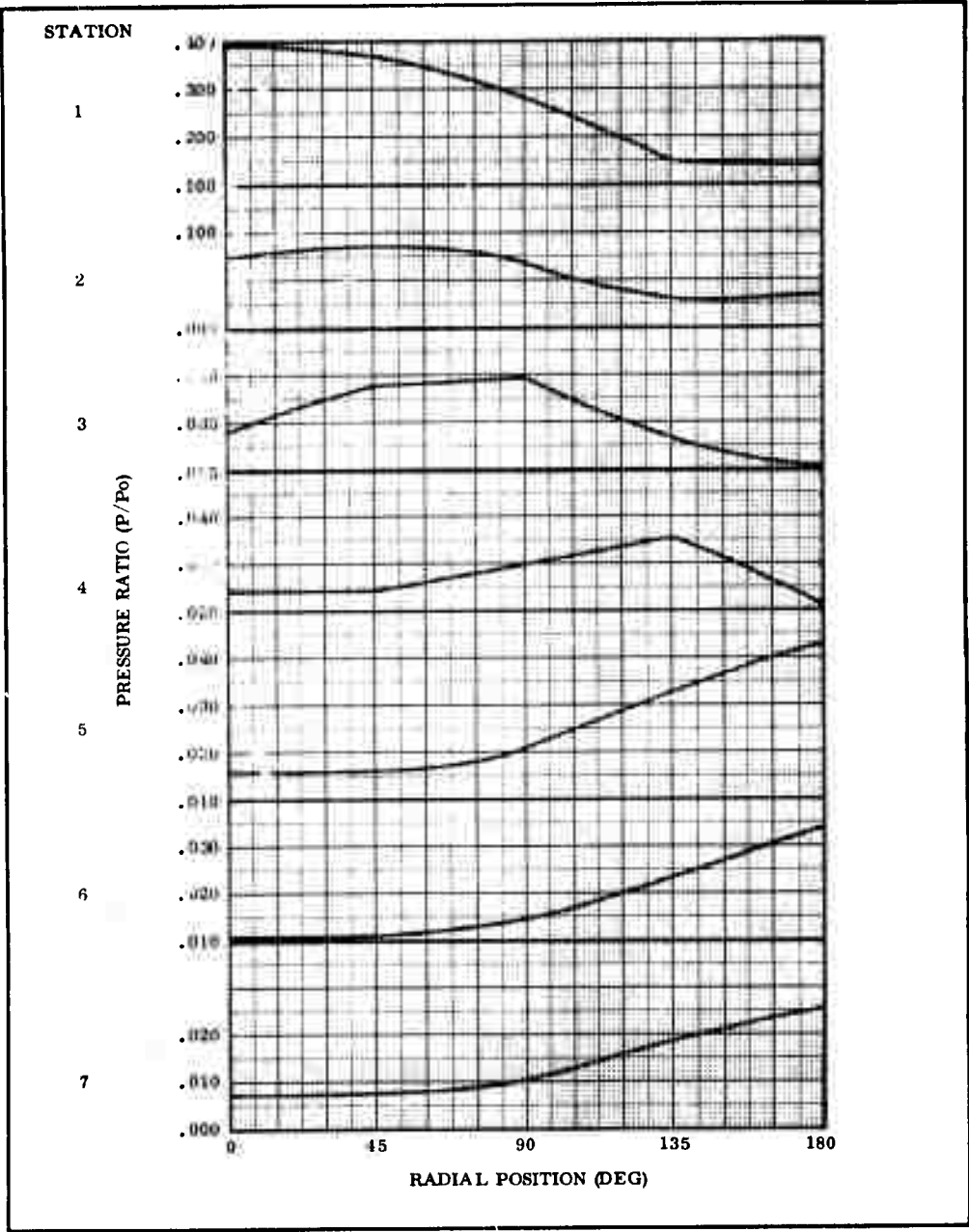
Flex-X Cold Flow Run No. 7 , Vector Angle 5 Degrees



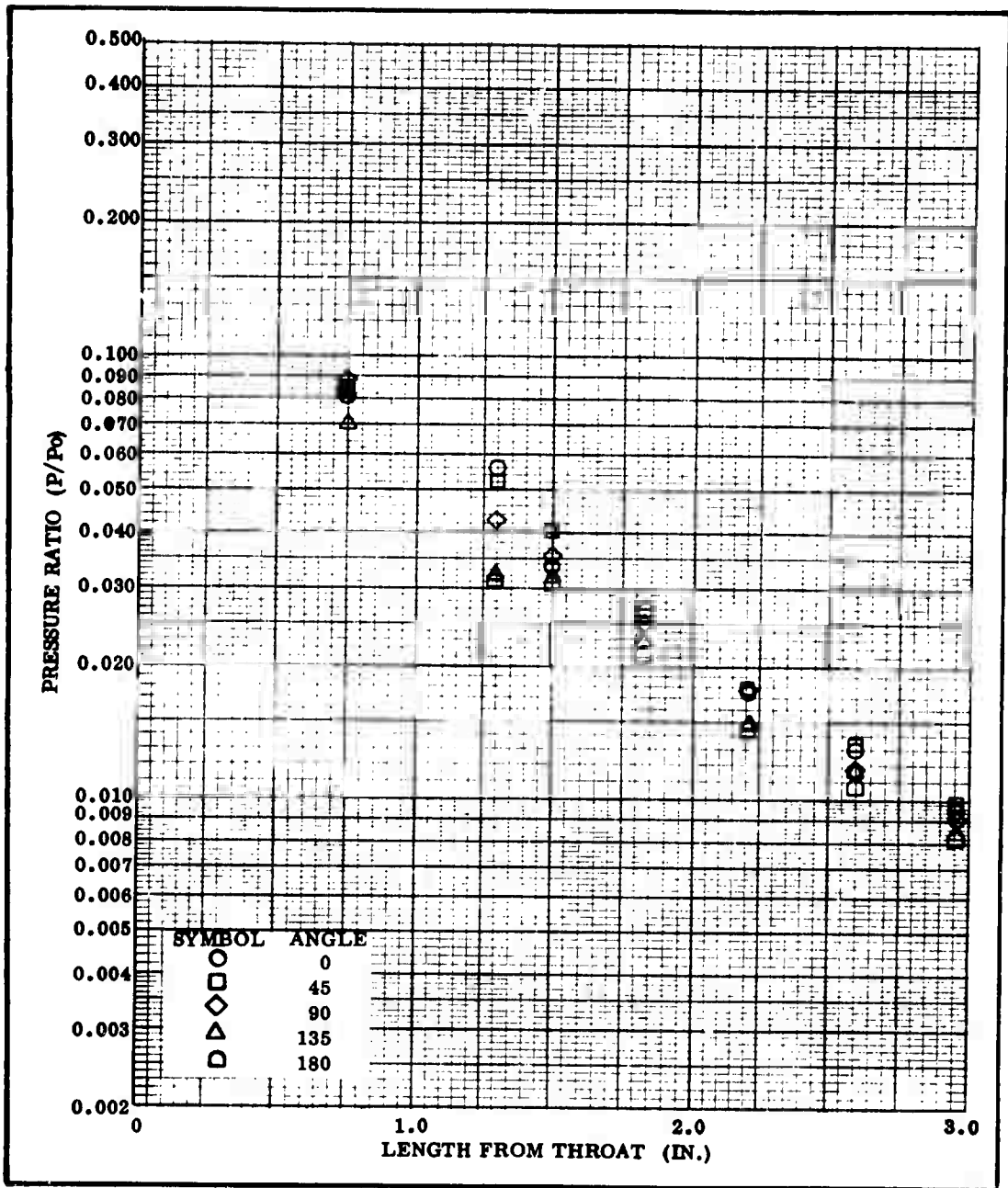
Flex-X Cold Flow Run No. 7 , Vector Angle 10 Degrees



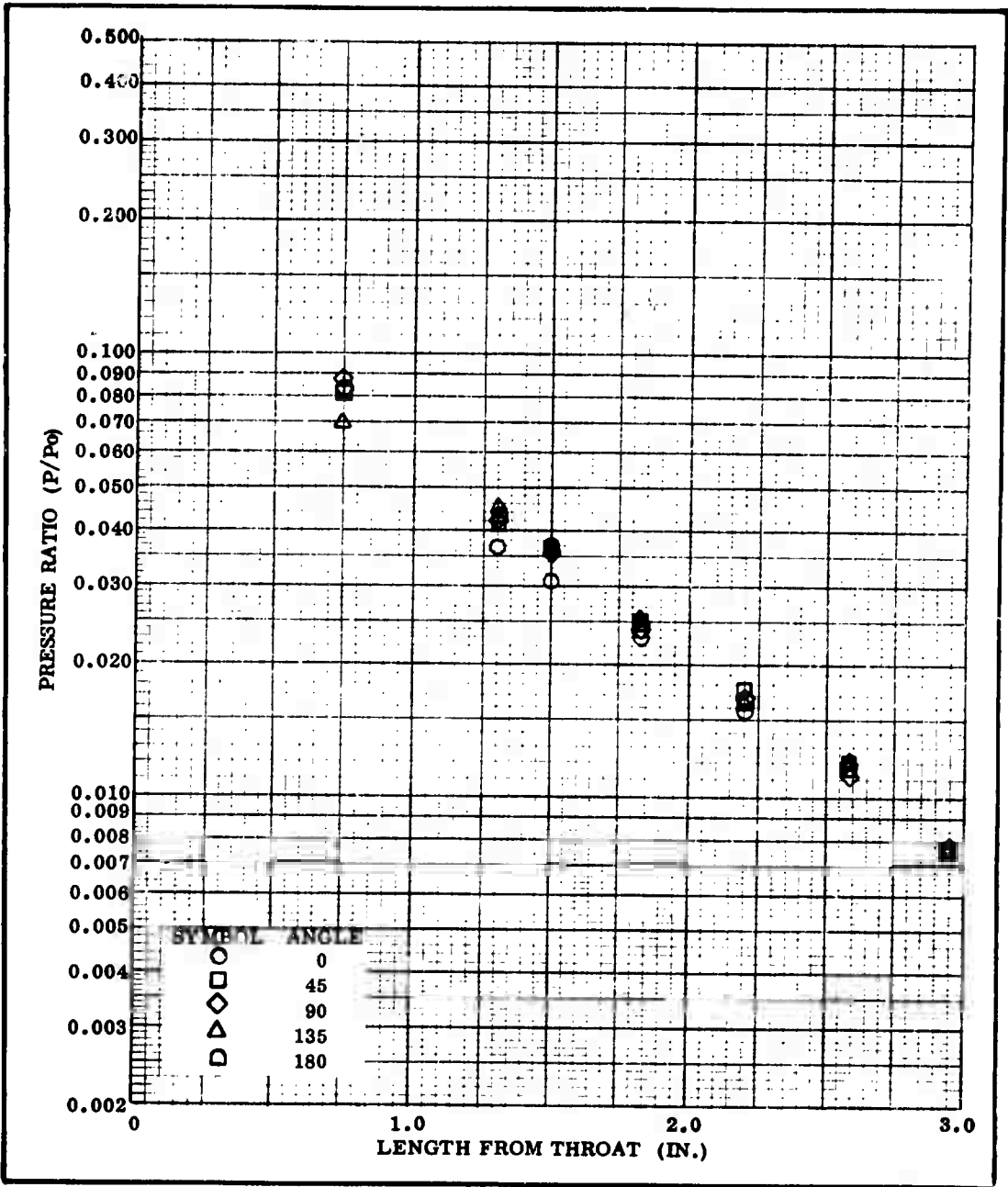
Flex-X Cold Flow Run 7, Vector Angle 5 Degrees



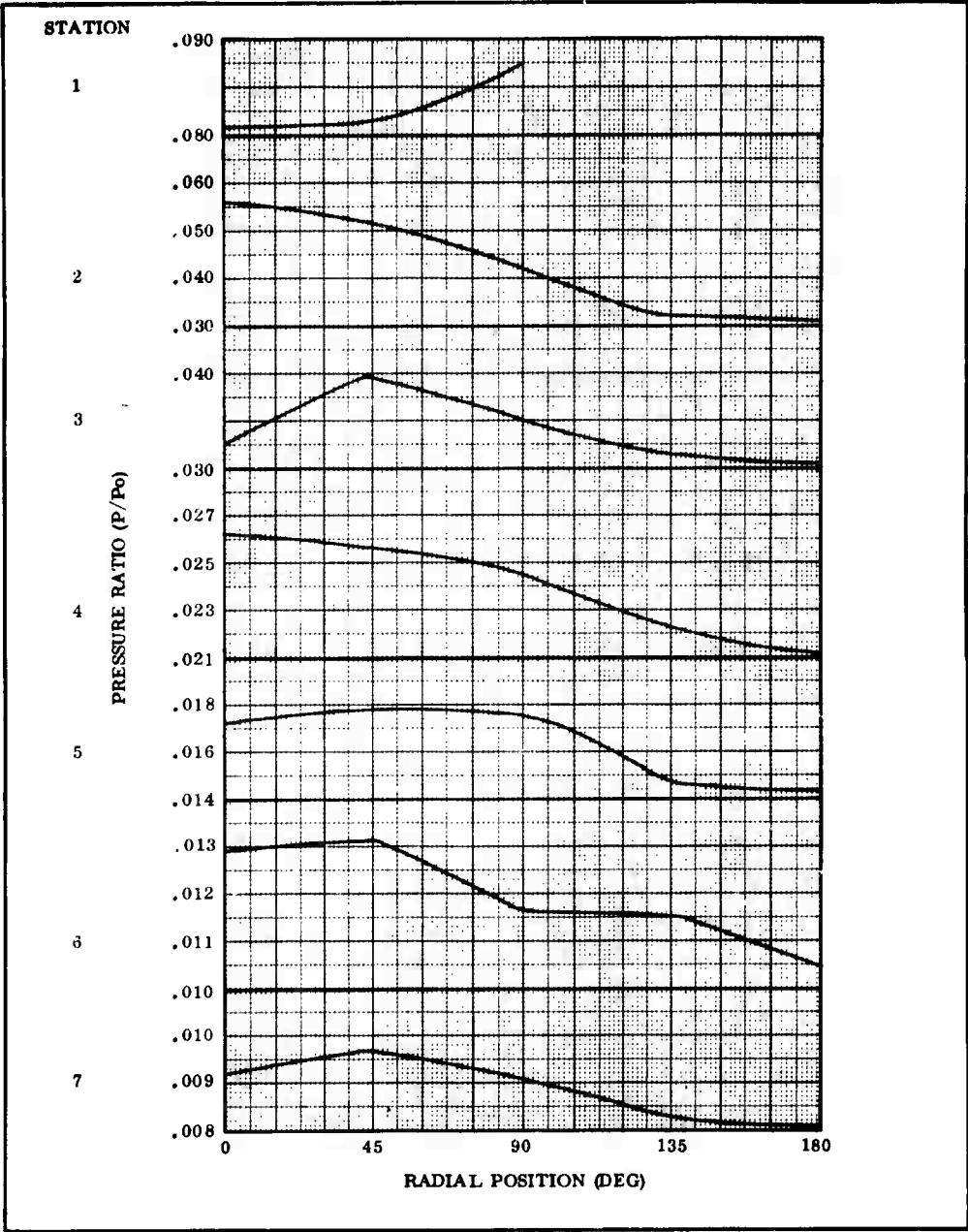
Flex-X Cold Flow Run 7 , Vector Angle 10 Degrees



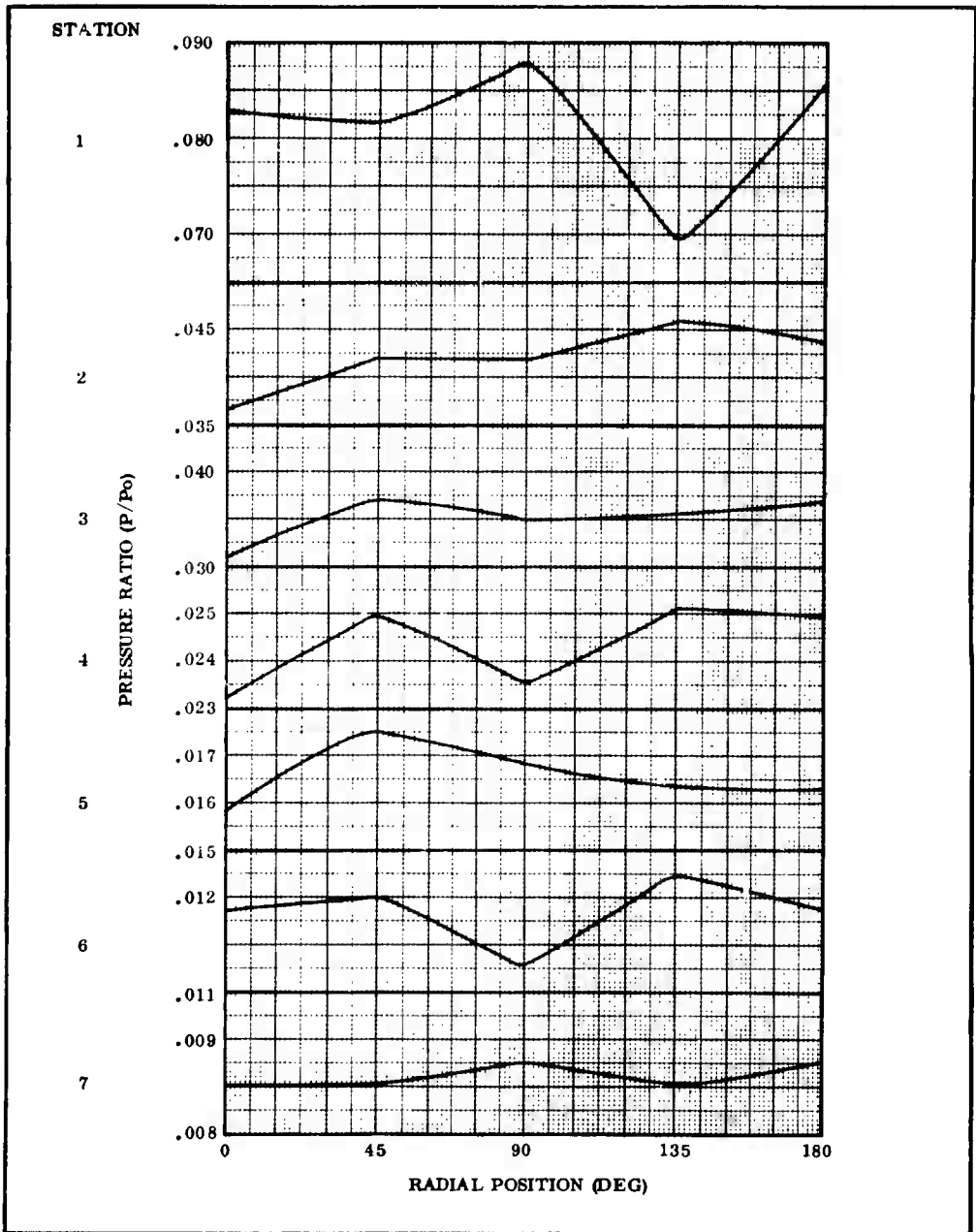
Flex-X Cold Flow Run No. 8 , Vector Angle 2.5 Degrees



Flex-X Cold Flow Run No. 8 , Vector Angle 0 Degrees



Flex-X Cold Flow Run 8, Vector Angle 25 Degrees



Flex-X Cold Flow Run 8 , Vector Angle 0 Degrees

STATION

1

.200

.100

.000

2

.050

.030

.010

3

.050

.030

.010

4

.030

.020

.010

5

.020

.010

6

.018

.016

.014

.012

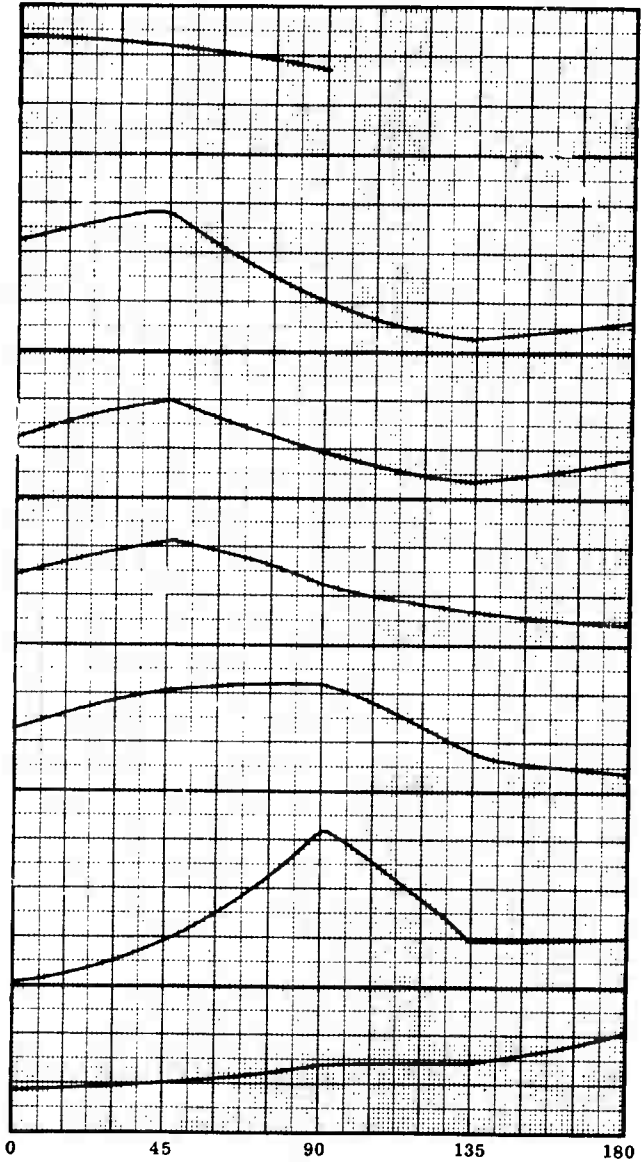
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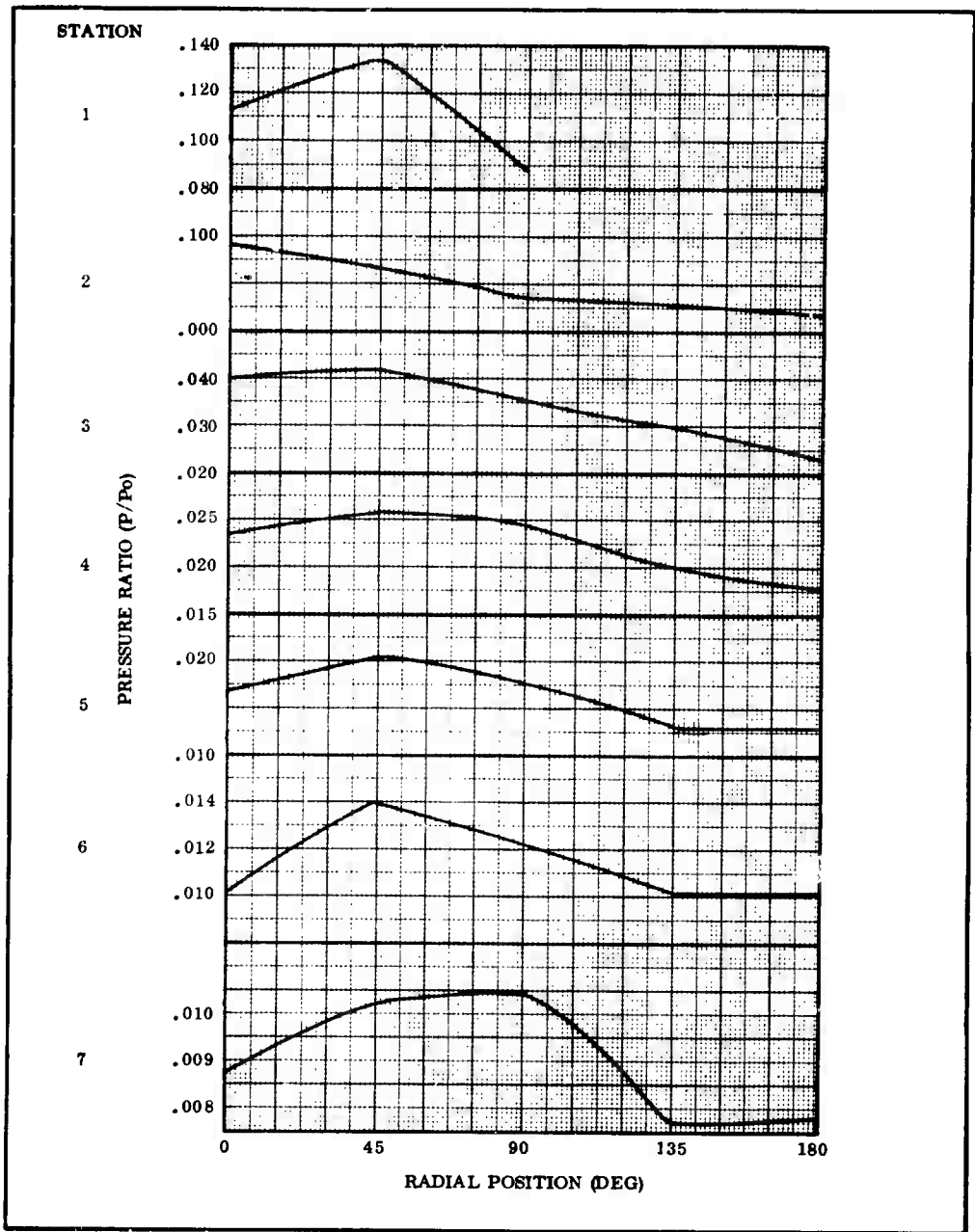
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PRESSURE RATIO (P/Po)

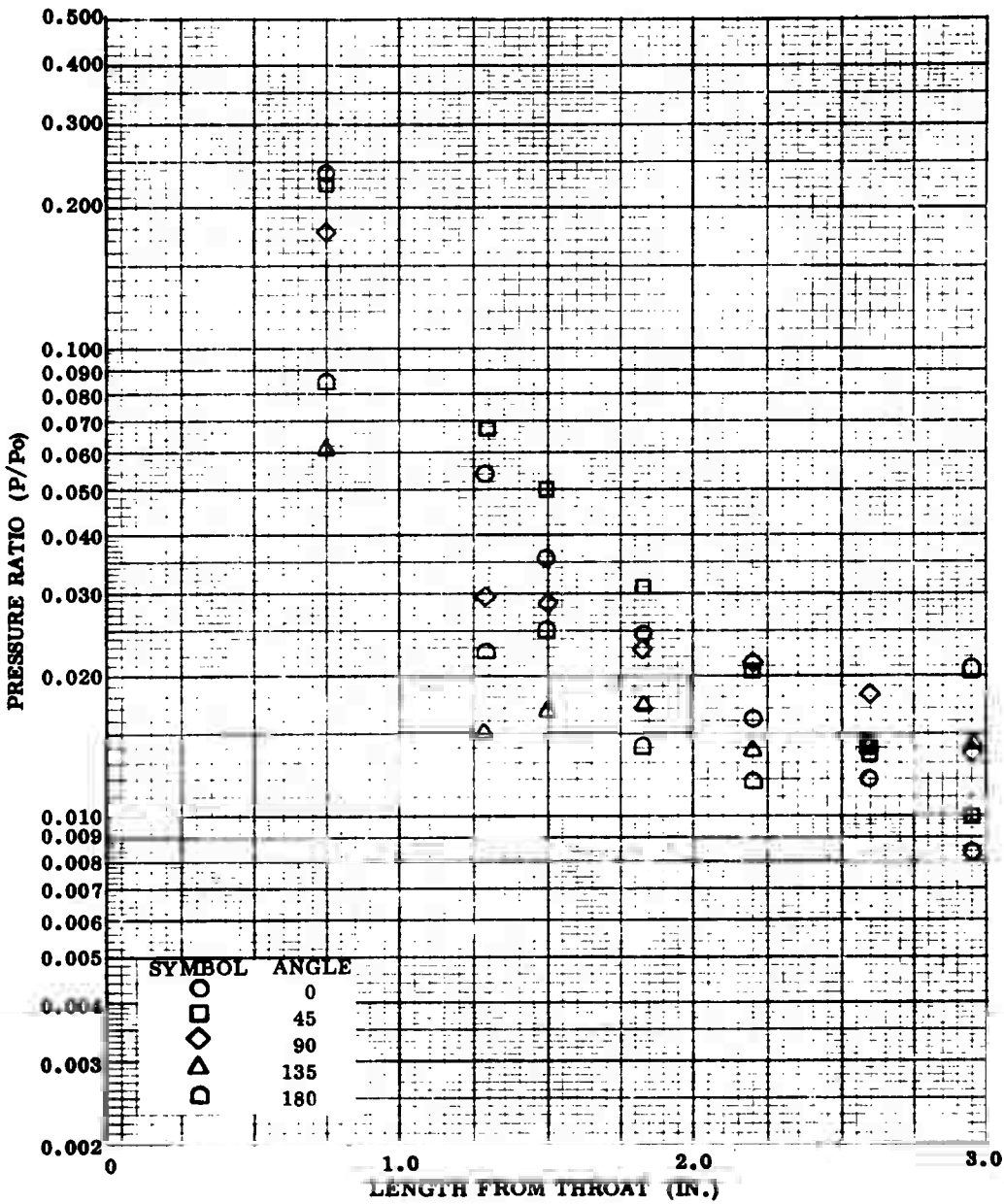


RADIAL POSITION (DEG)

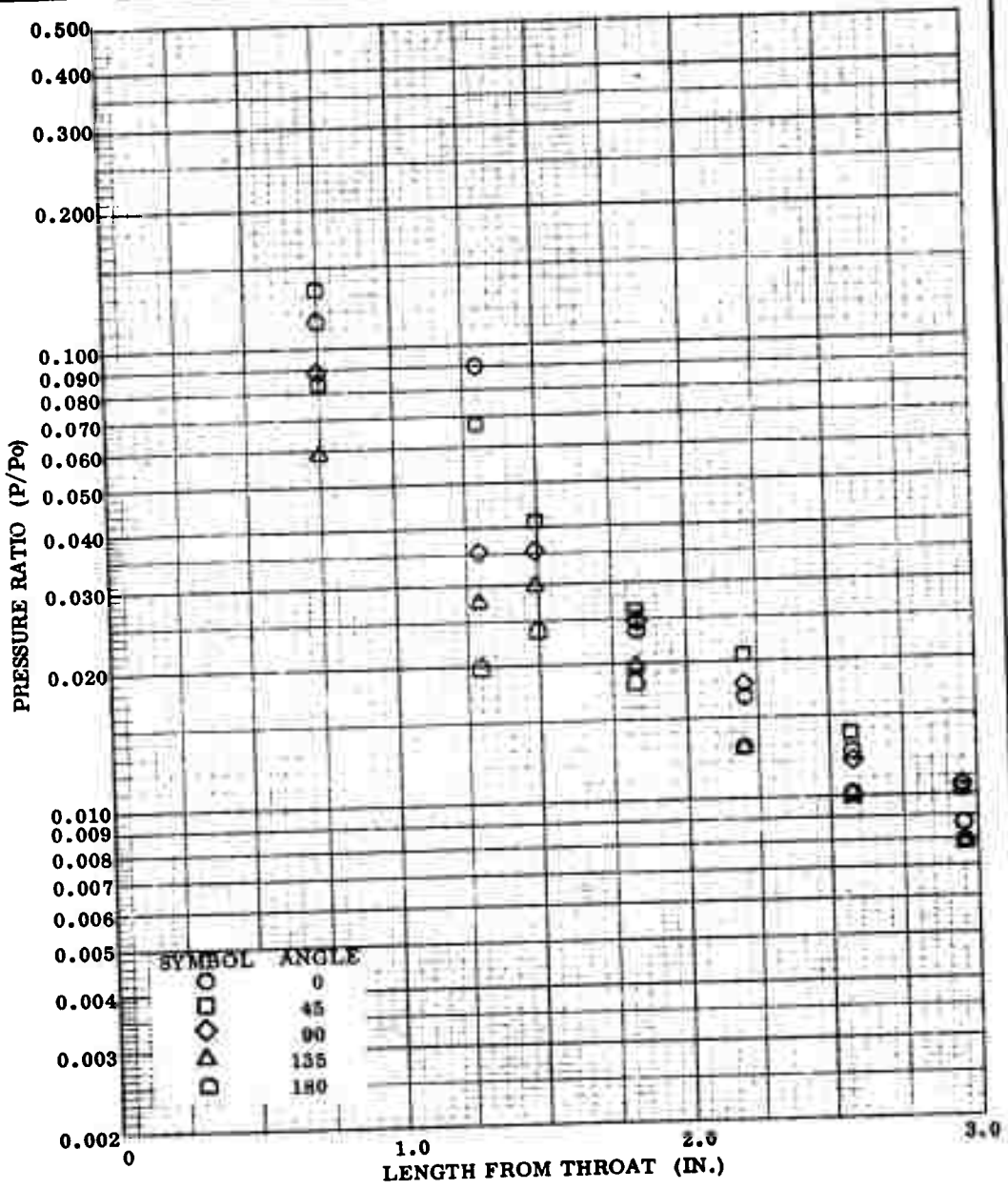
Flex-X Cold Flow Run 8 , Vector Angle 10 Degrees



Flex-X Cold Flow Run 8 , Vector Angle 5 Degrees

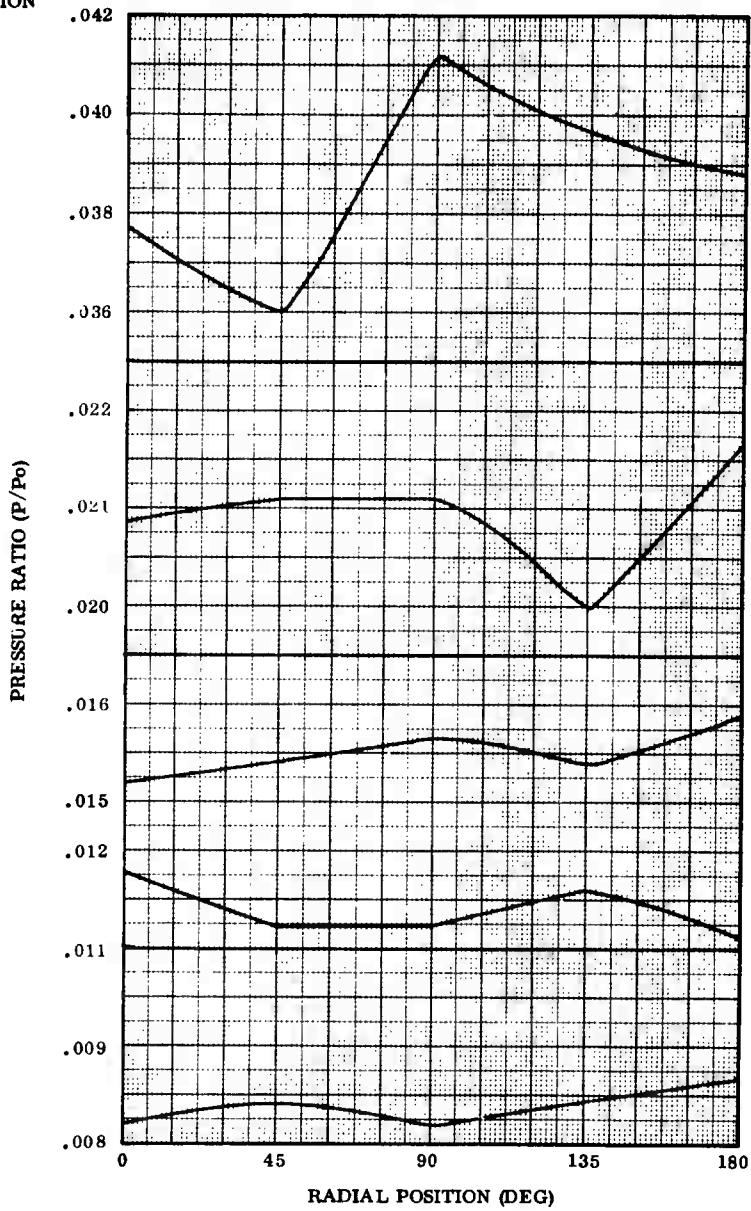


Flex-X Cold Flow Run No. 8 , Vector Angle 10 Degrees

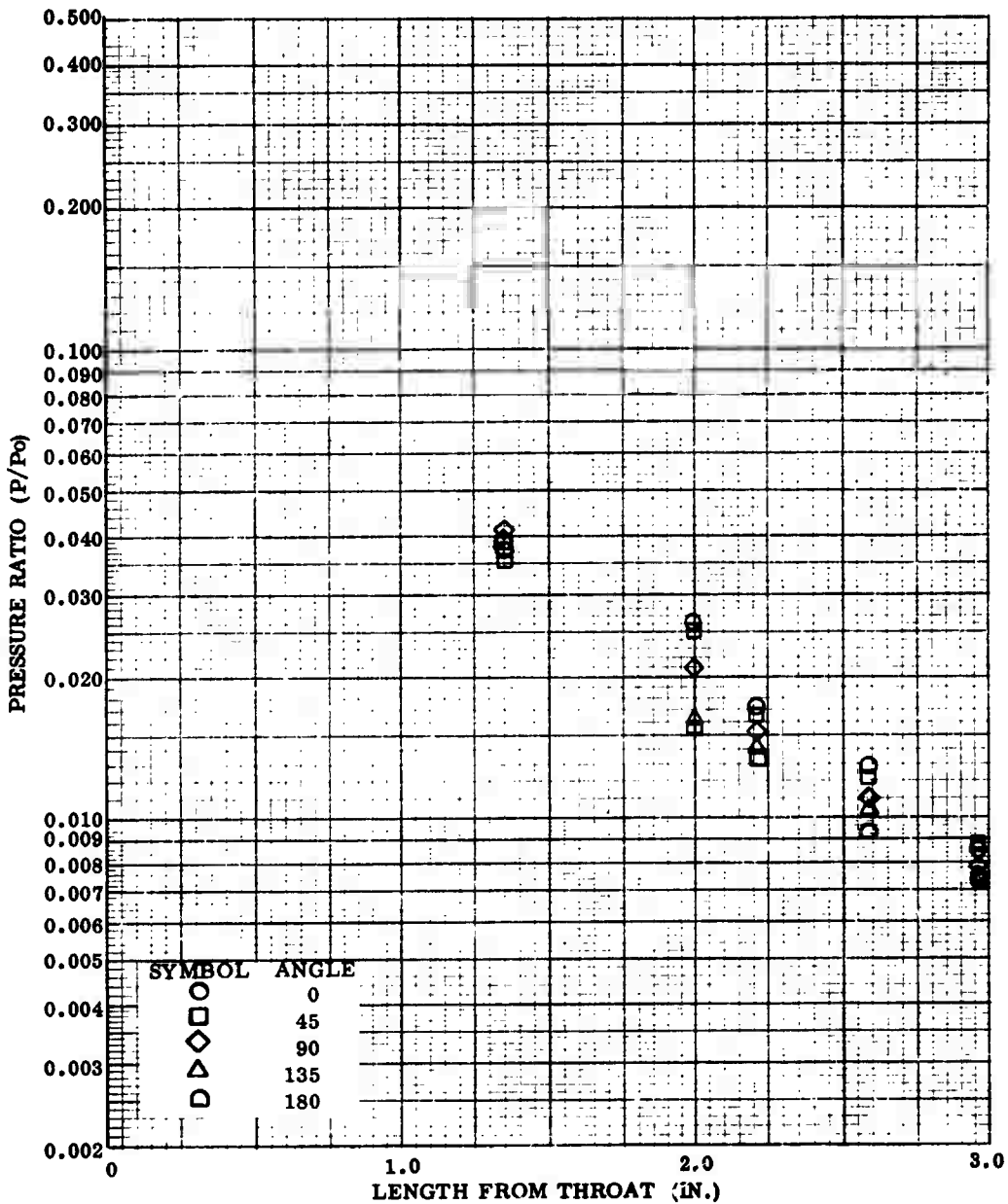


Flex-X Cold Flow Run No. 8 , Vector Angle 5 Degrees

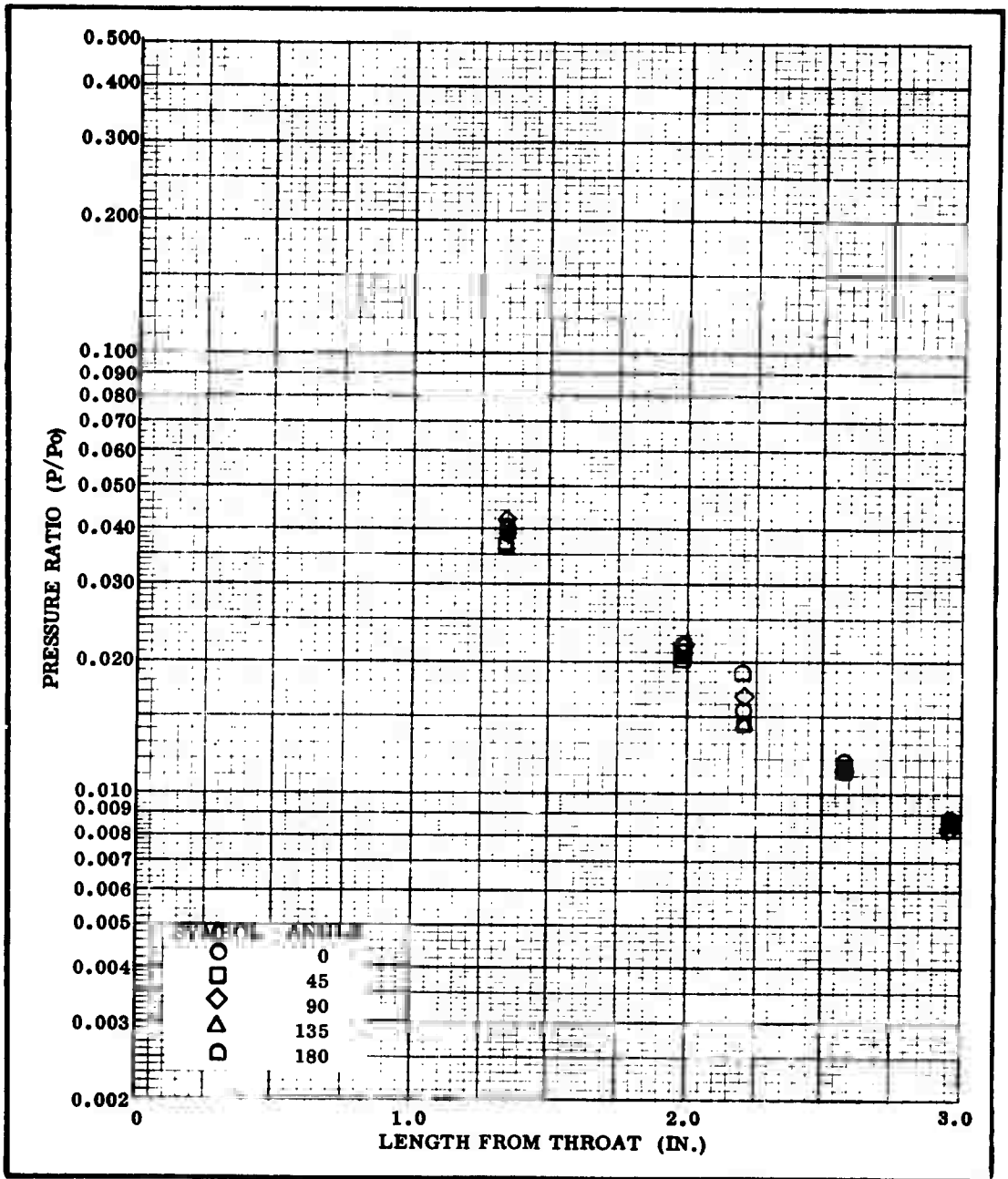
STATION



Flex-X Cold Flow Run 9, Vector Angle 0 Degrees

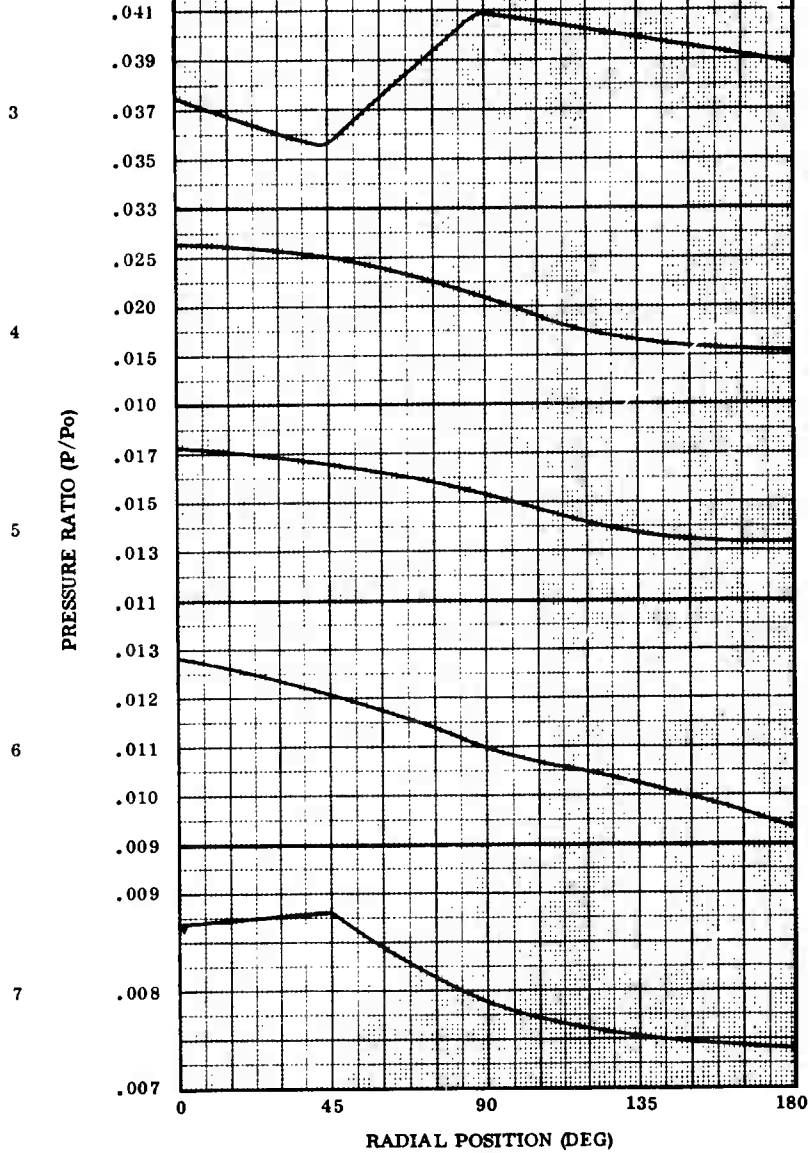


Flex-X Cold Flow Run No. 9 , Vector Angle 2.5 Degrees

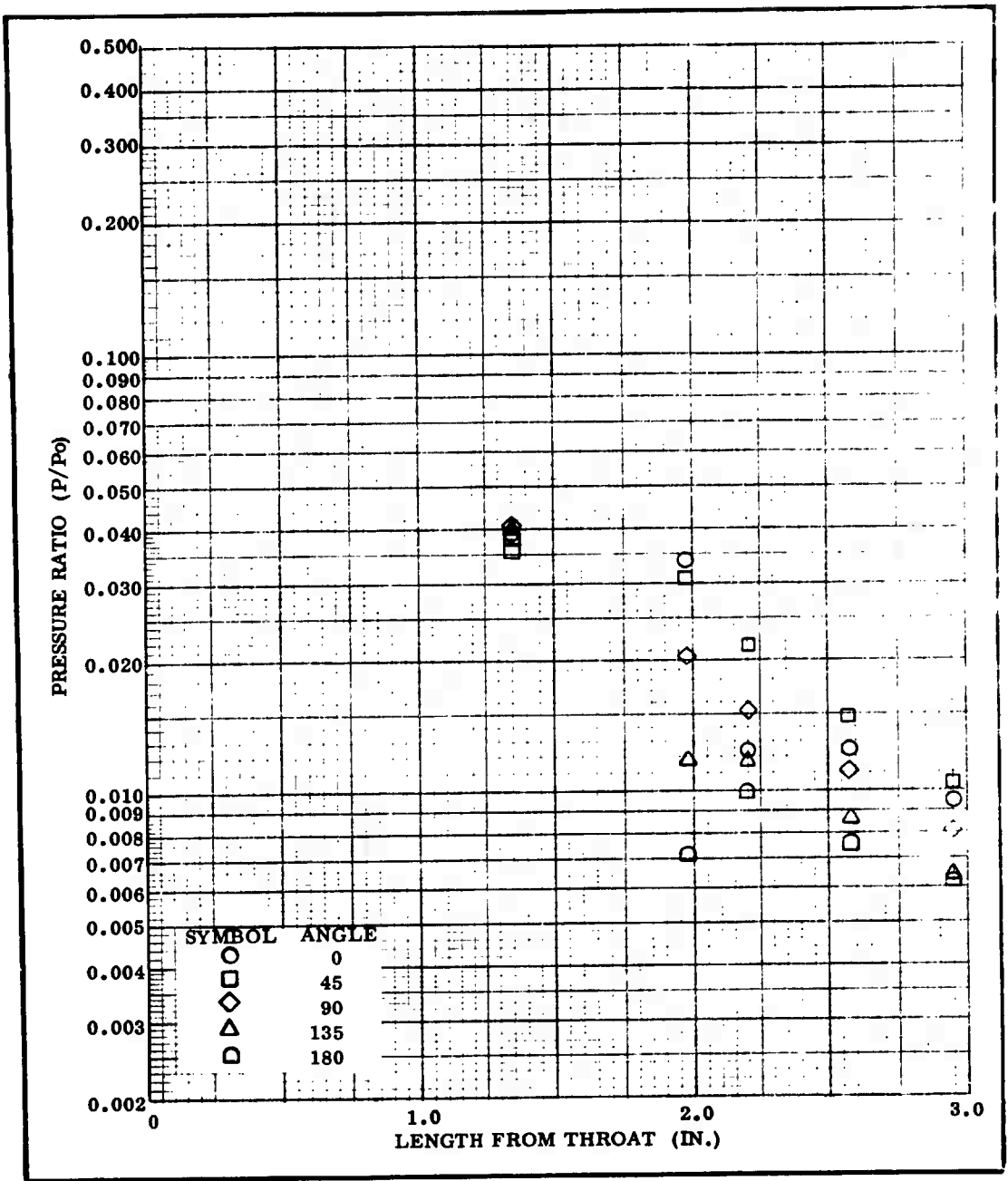


Flex-X Cold Flow Run No. 9 , Vector Angle 0 Degrees

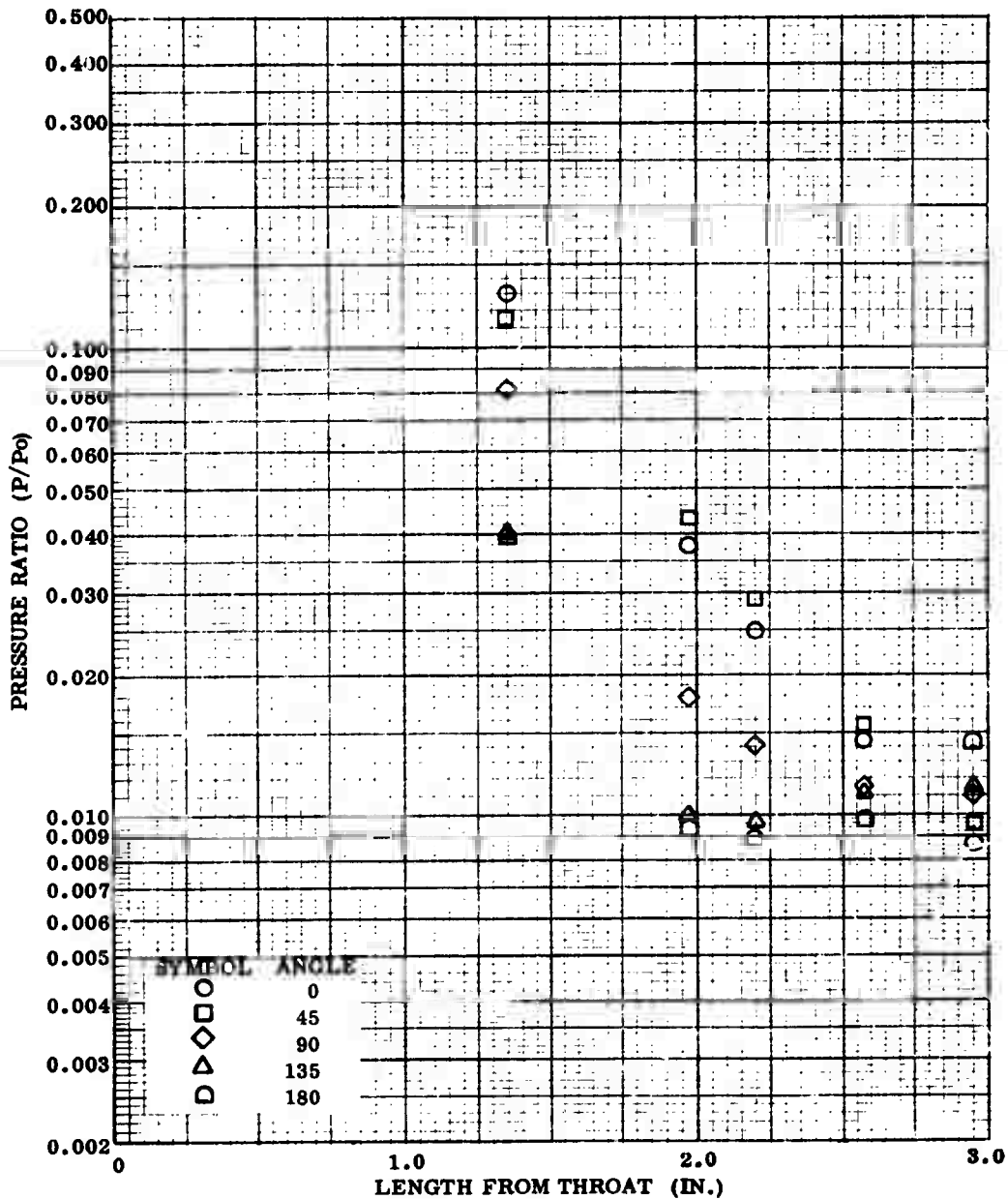
STATION



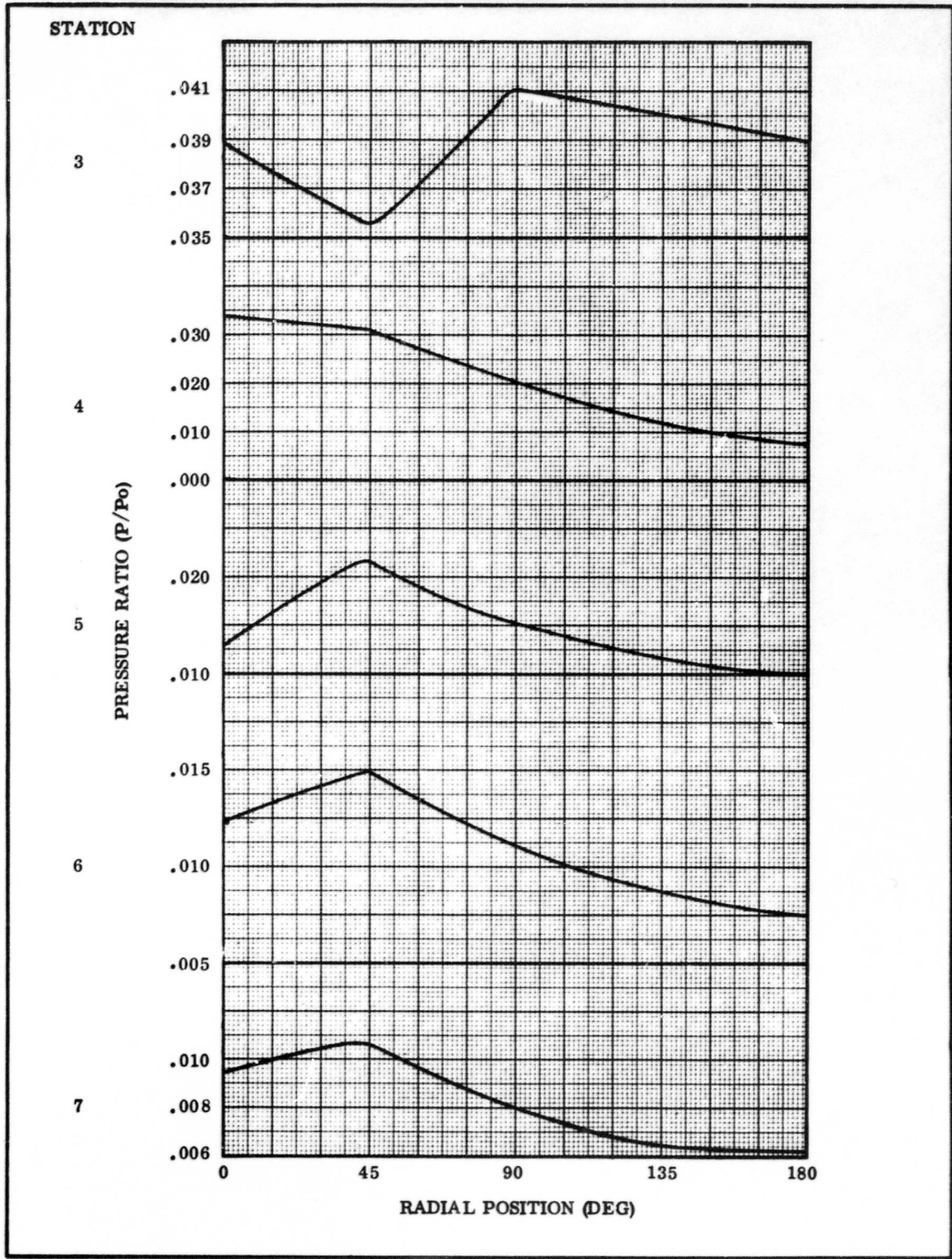
Flex-X Cold Flow Run 9, Vector Angle 2.5 Degrees



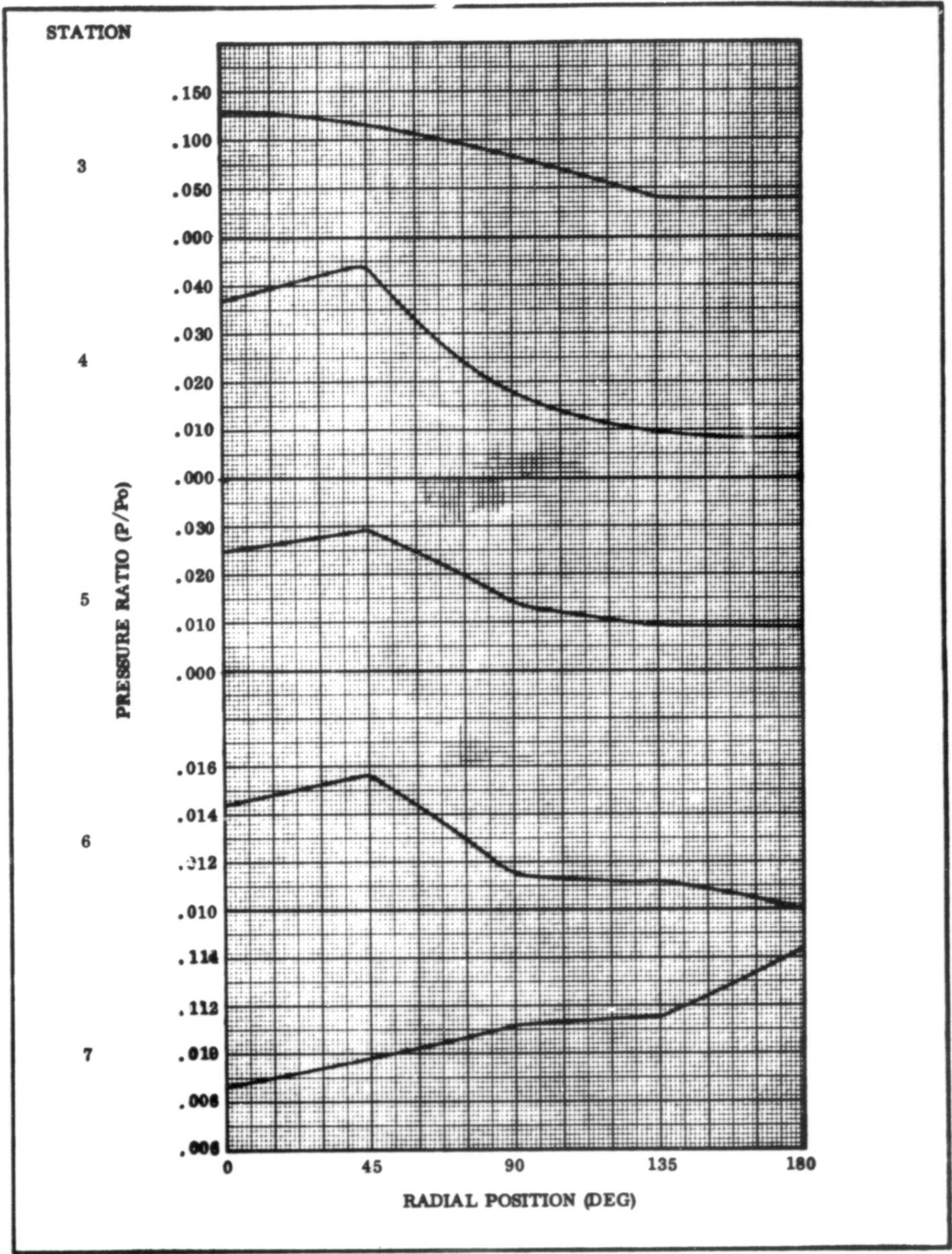
Flex-X Cold Flow Run No. 9 , Vector Angle 5 Degrees



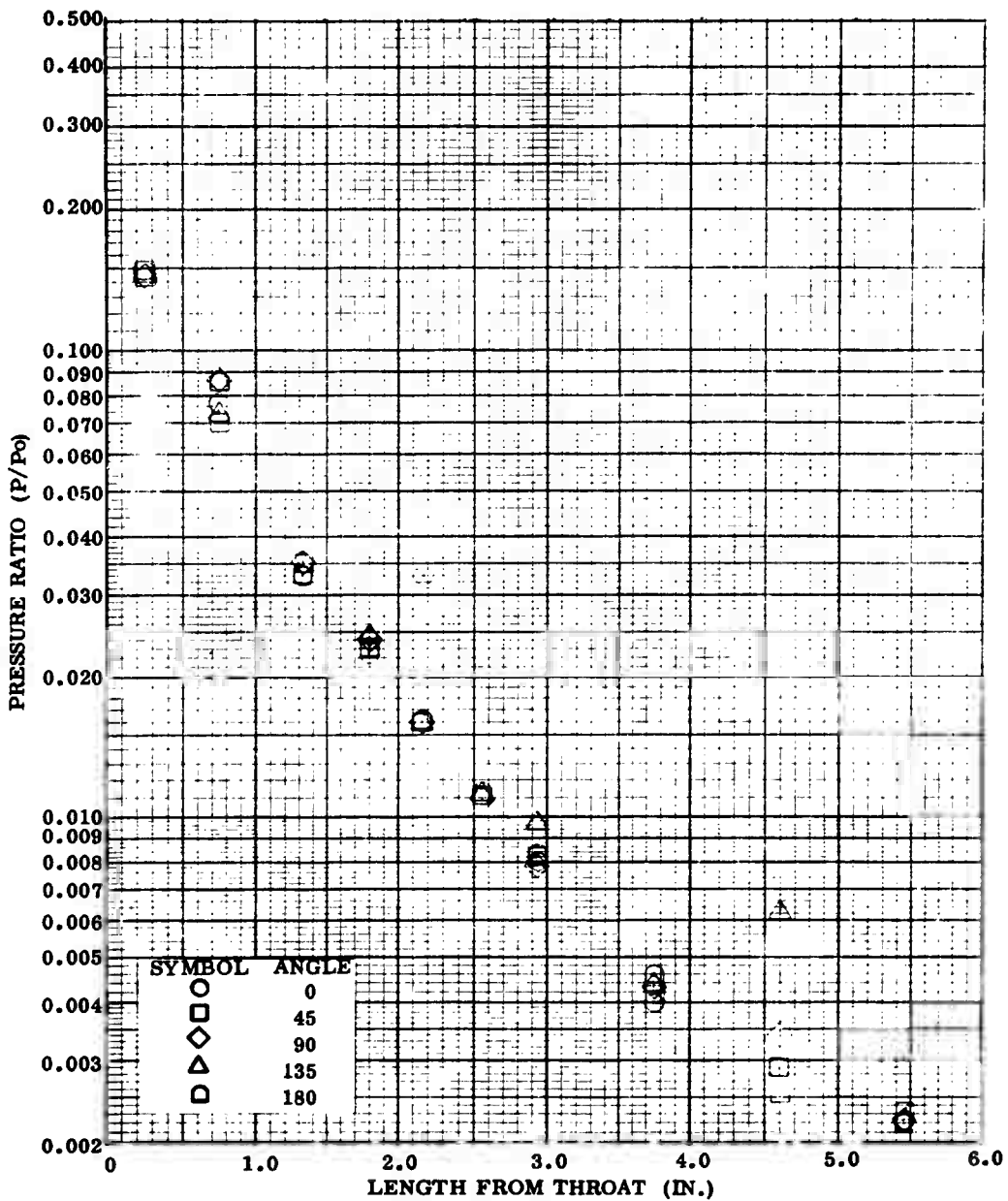
Flex-X Cold Flow Run No. 9 , Vector Angle 10 Degrees



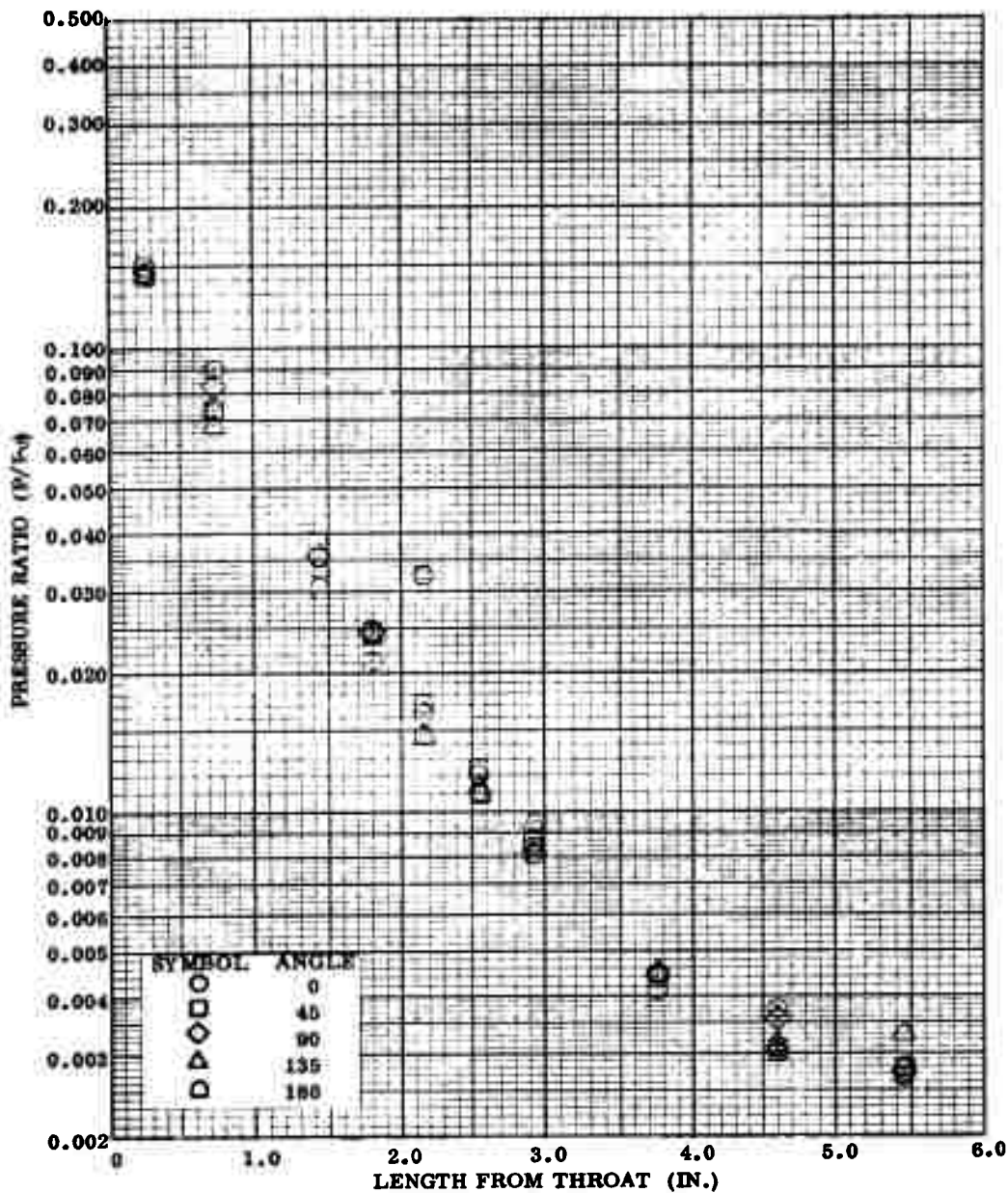
Flex-X Cold Flow Run 9 , Vector Angle 5 Degrees



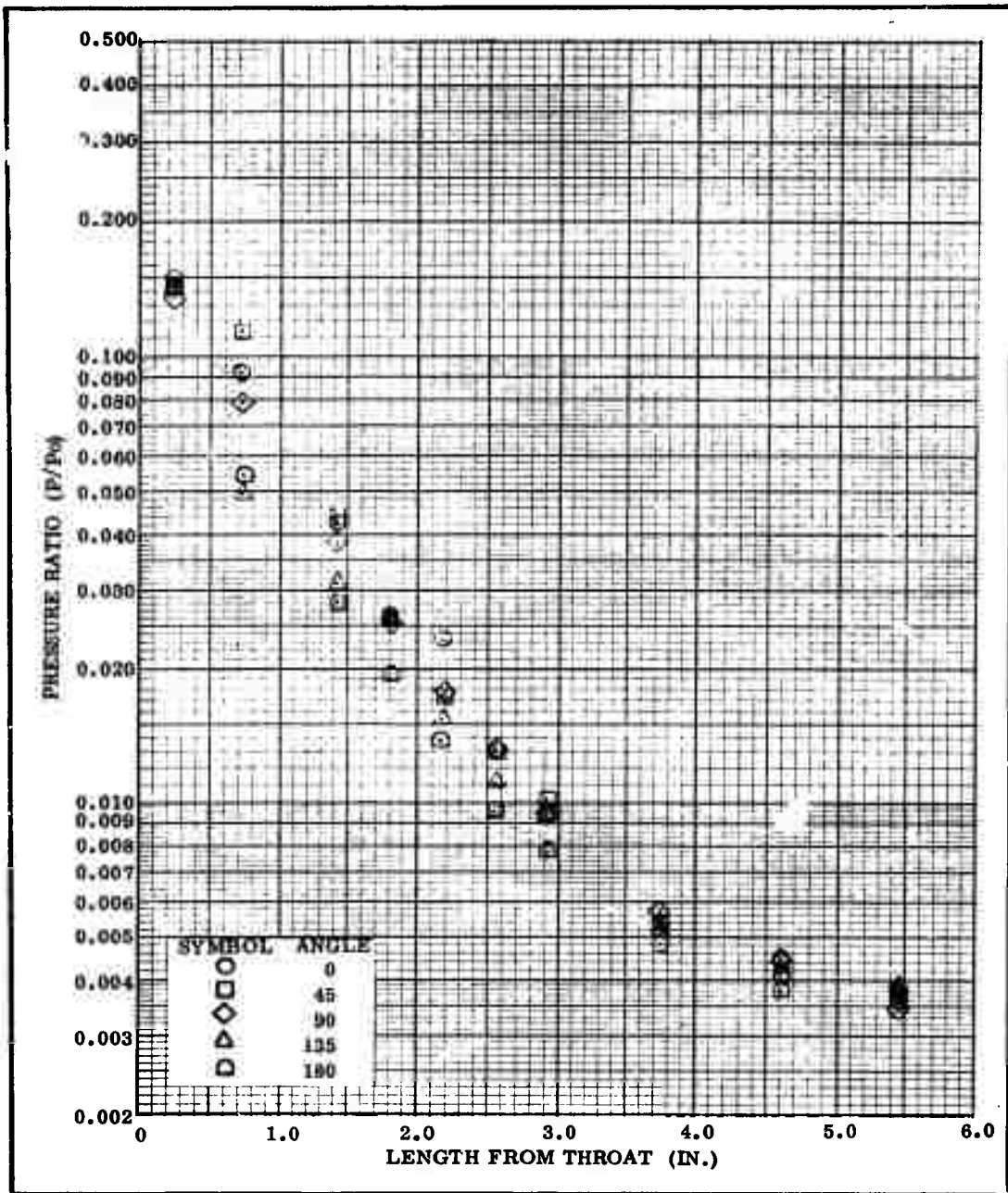
Flex-X Cold Flow Run 9, Vector Angle 10 Degrees



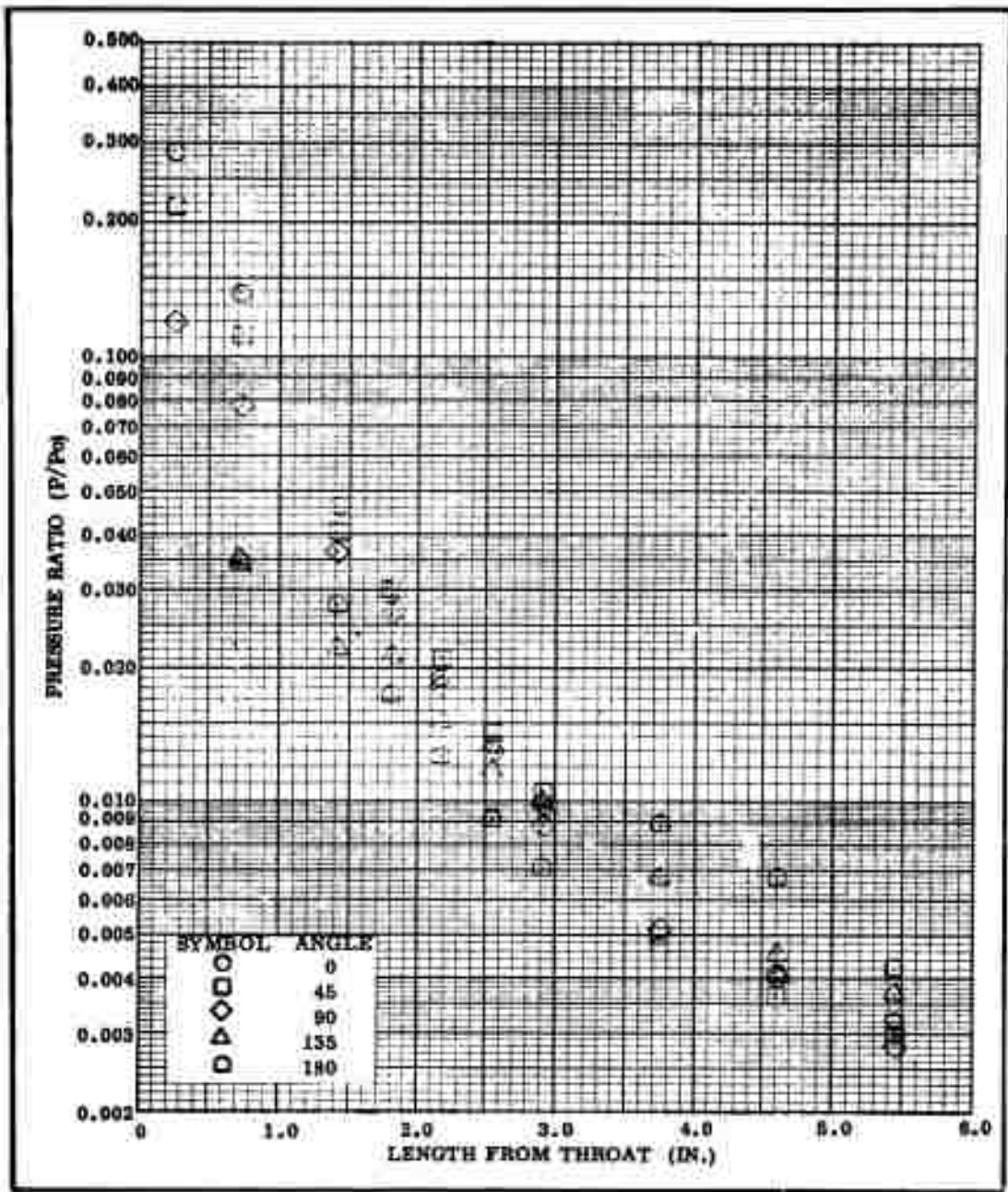
Flex-X Cold Flow Run No. 10 , Vector Angle 0 Degrees



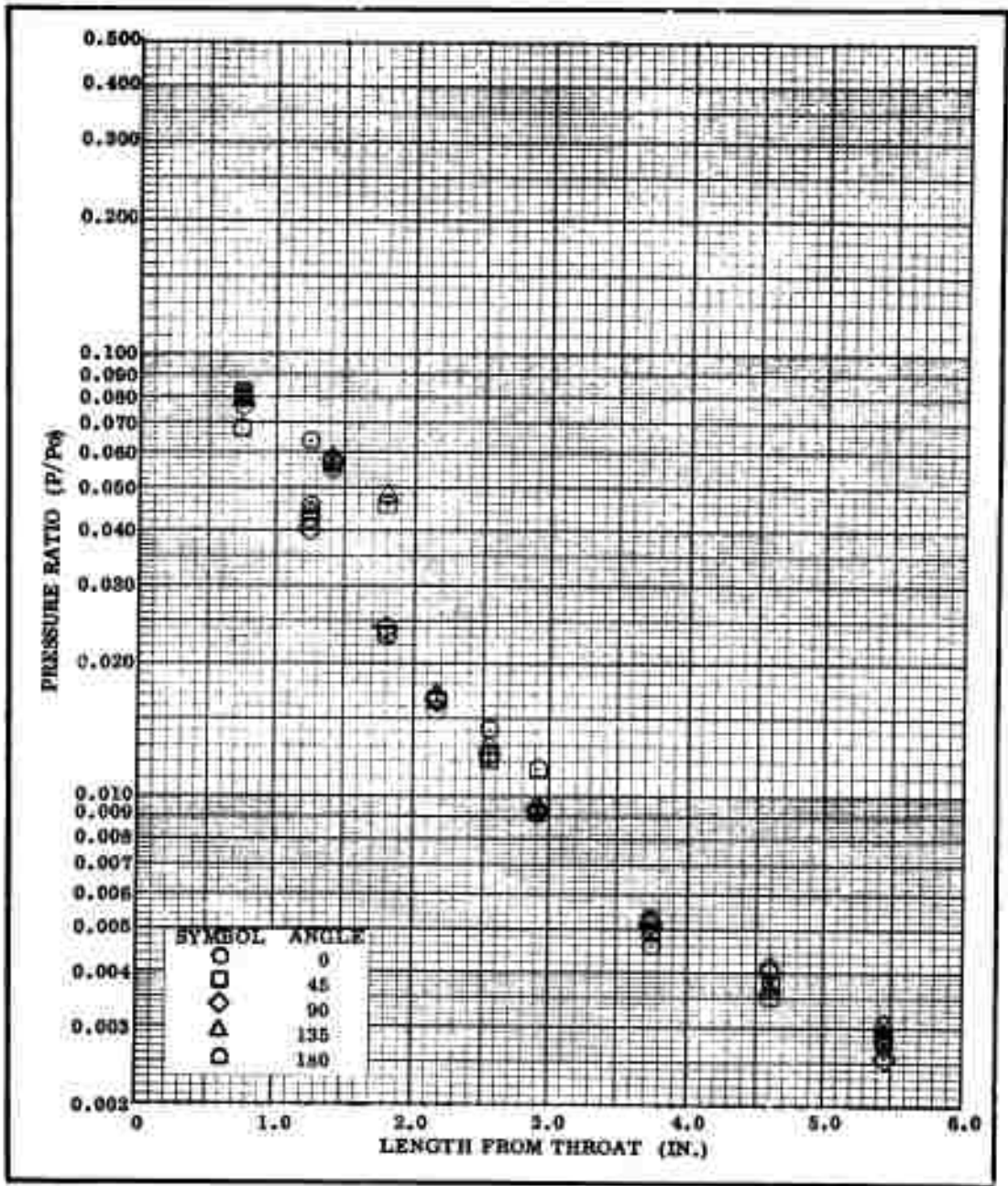
Flex-X Cold Flow Run No. 10 , Vector Angle 2.5 Degrees



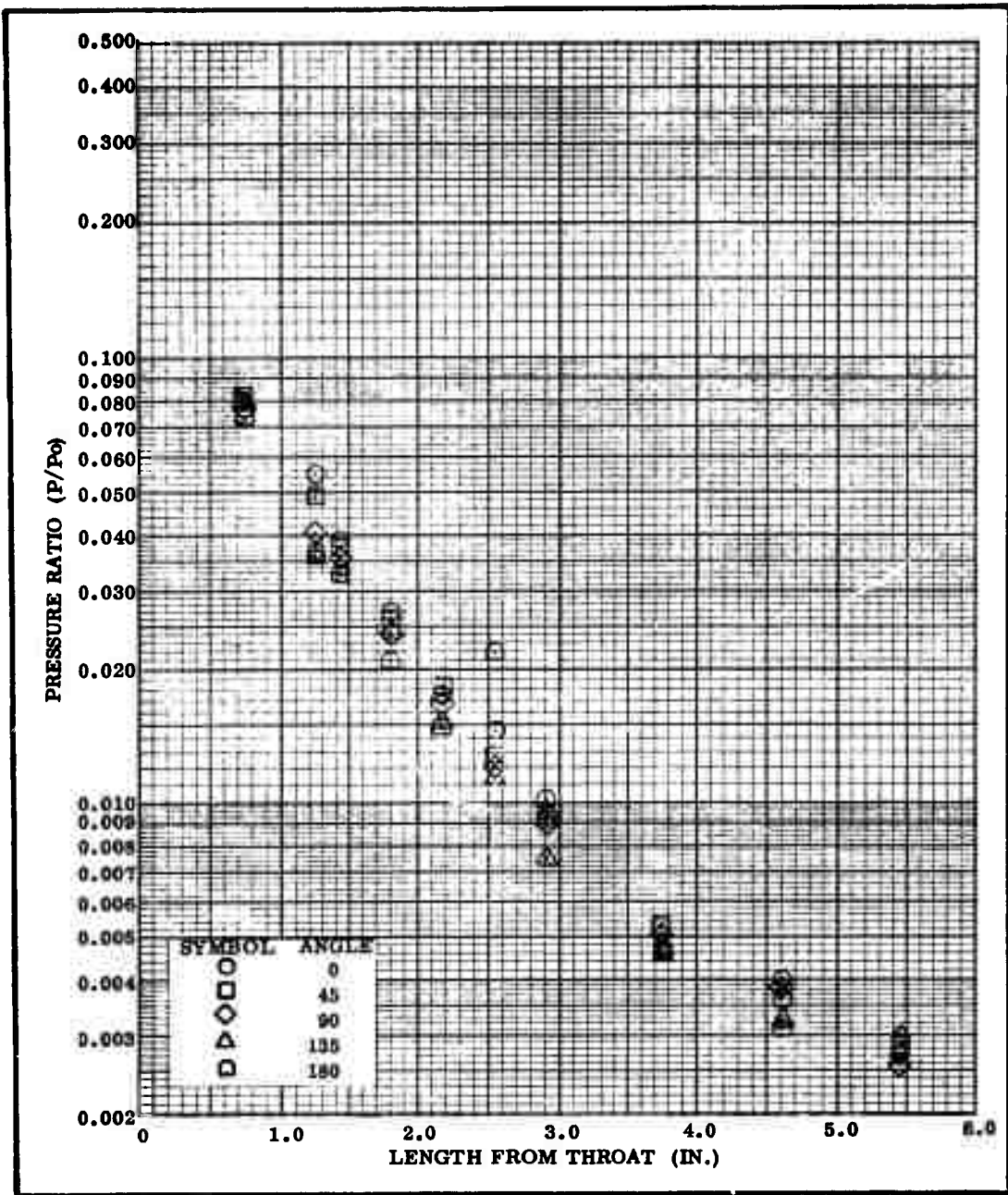
Flex-X Cold Flow Run No. 10, Vector Angle 5 Degrees



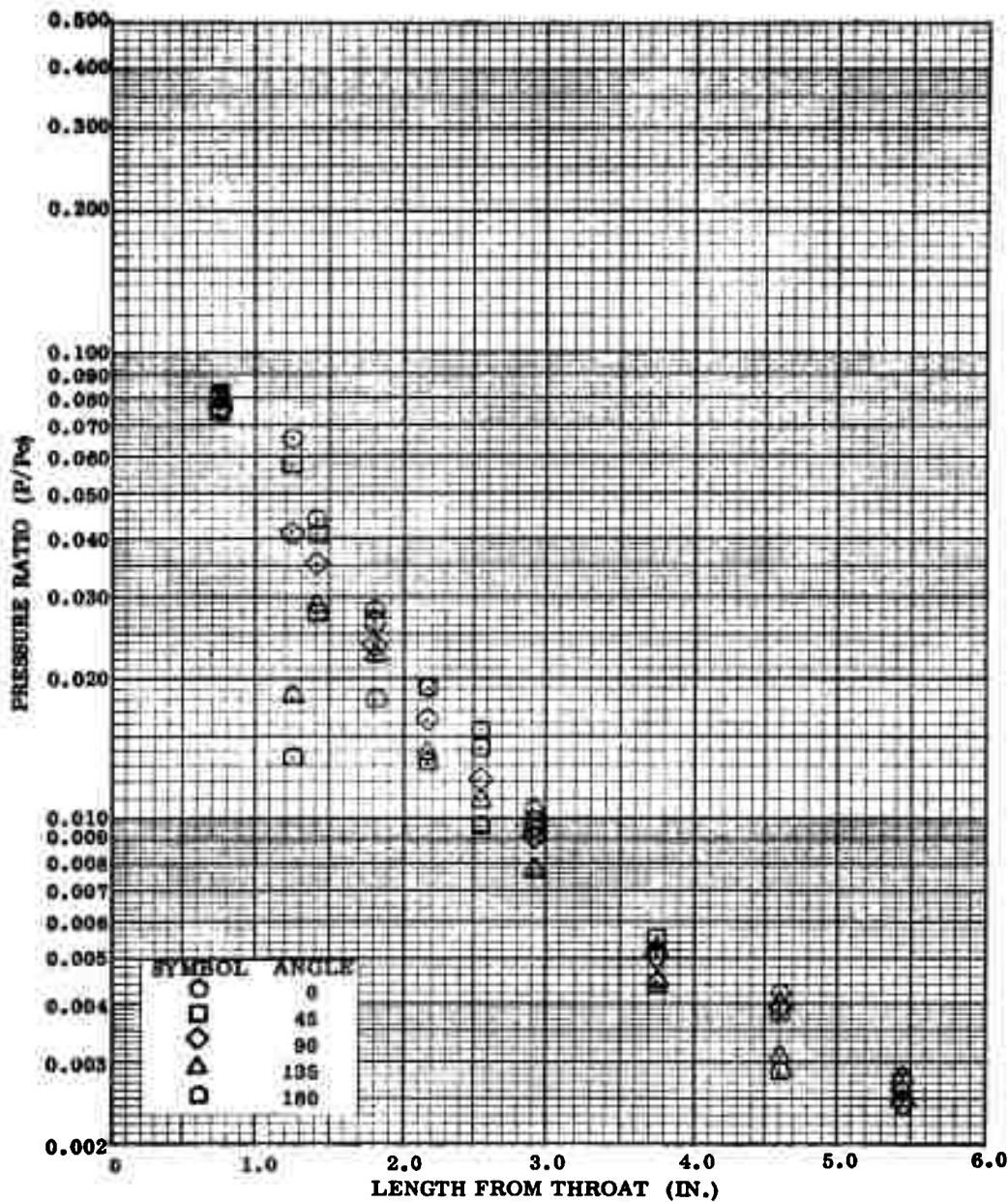
Flex-X Cold Flow Run No. 10, Vector Angle 10 Degrees



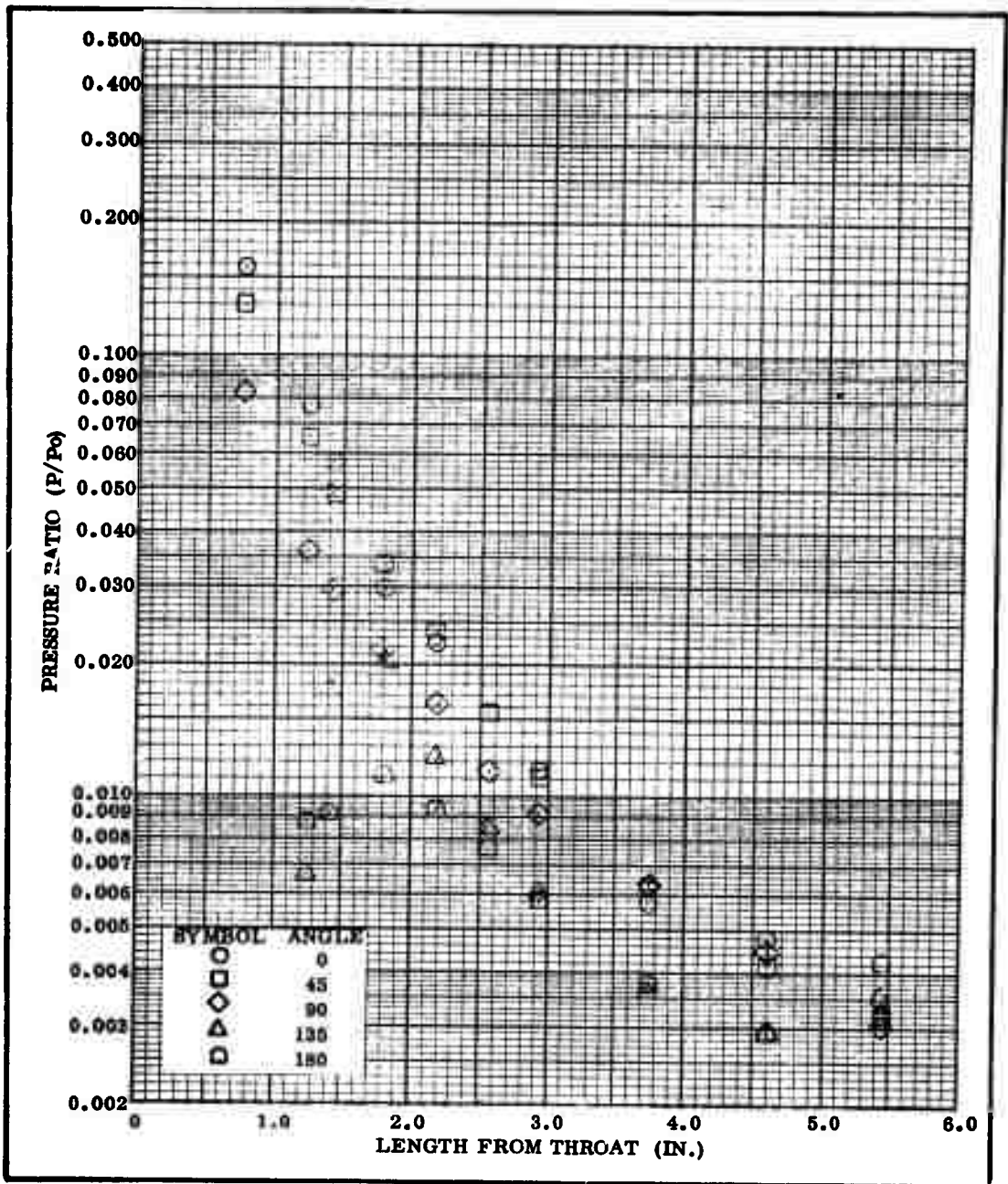
Flex-X Cold Flow Run No. 11 , Vector Angle 0 Degrees



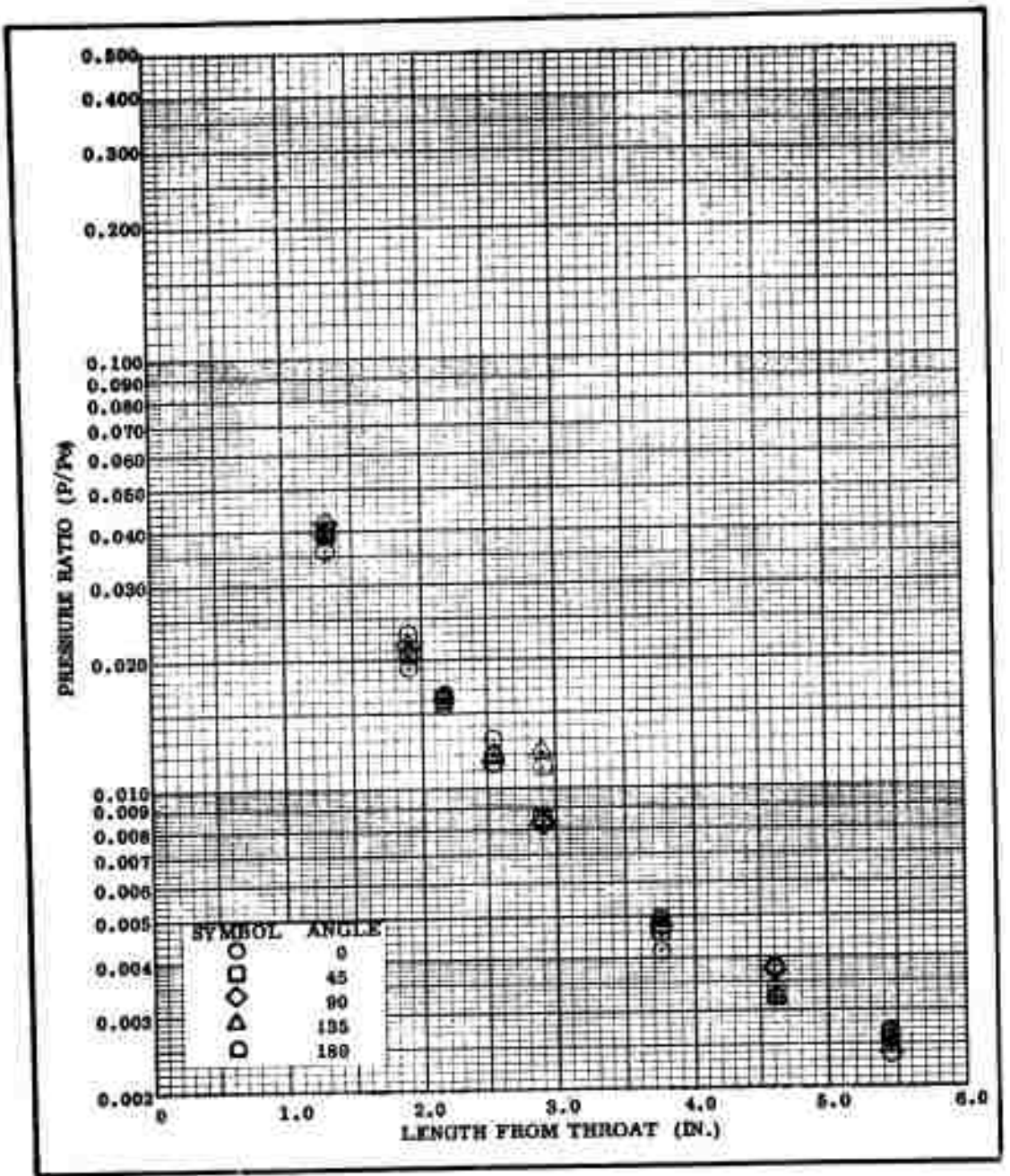
Flex-X Cold Flow Run No. 11, Vector Angle 2.5 Degrees



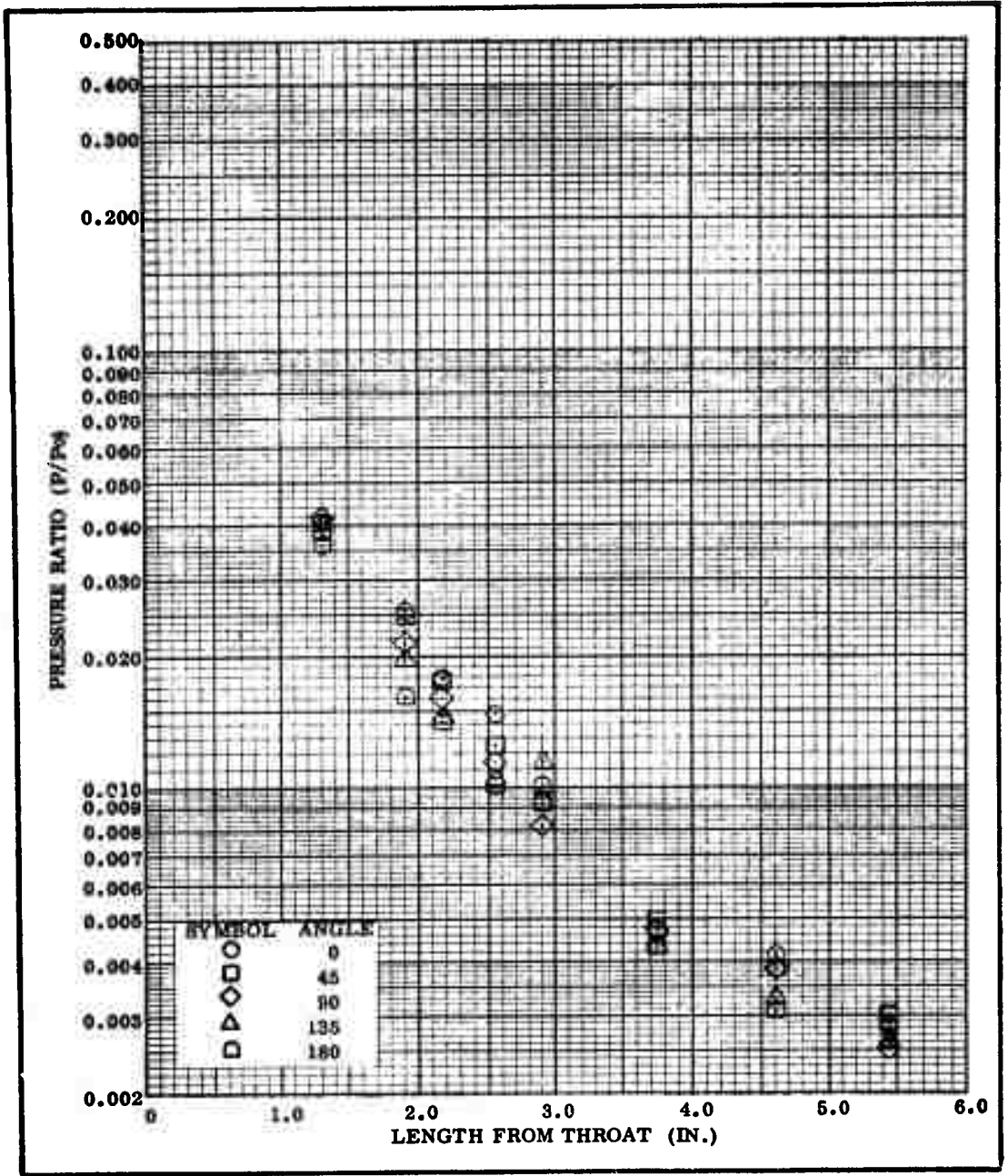
Flex-X Cold Flow Run No. 11, Vector Angle 5 Degrees



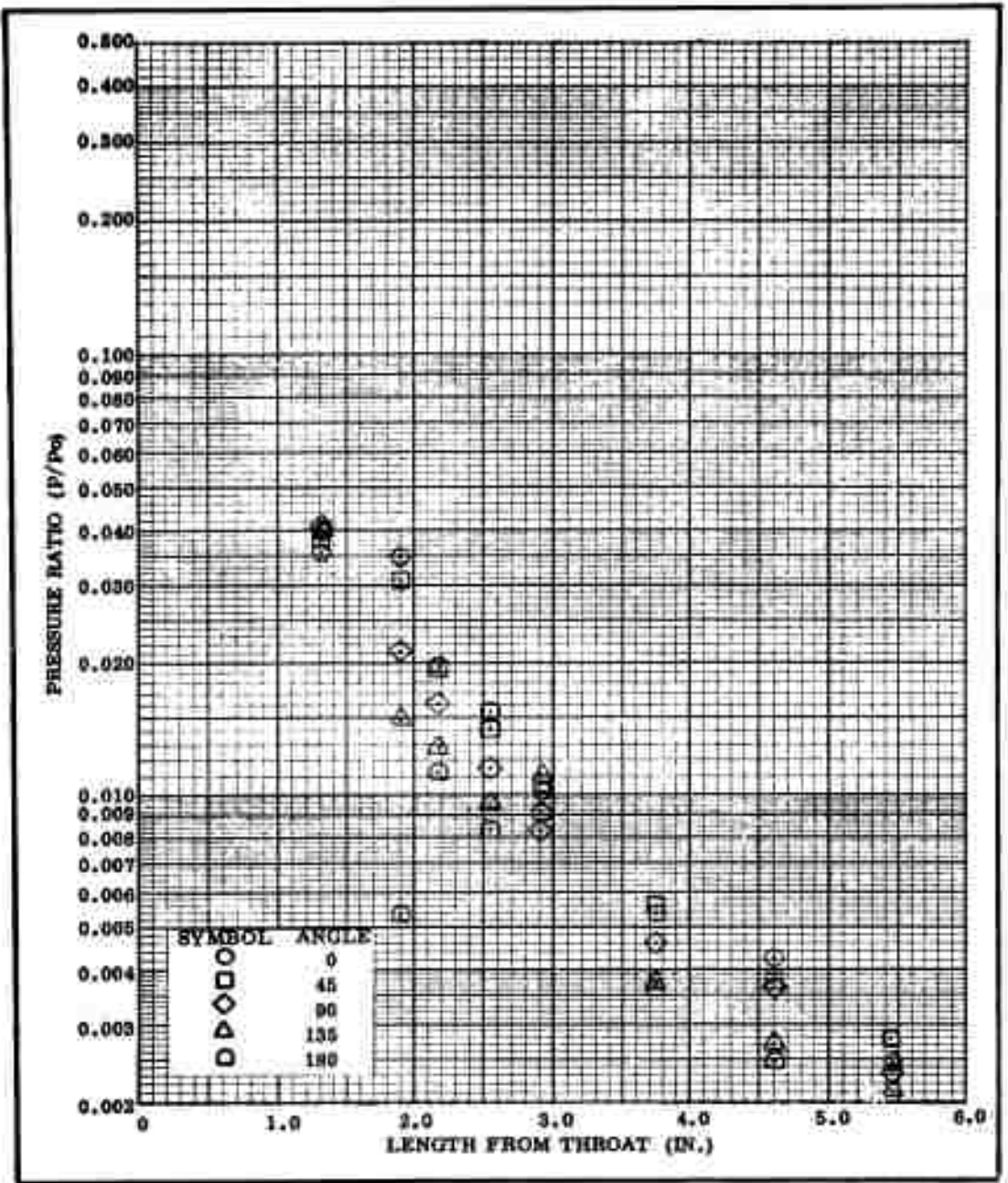
Flex-X Cold Flow Run No. 11 , Vector Angle 10 Degrees



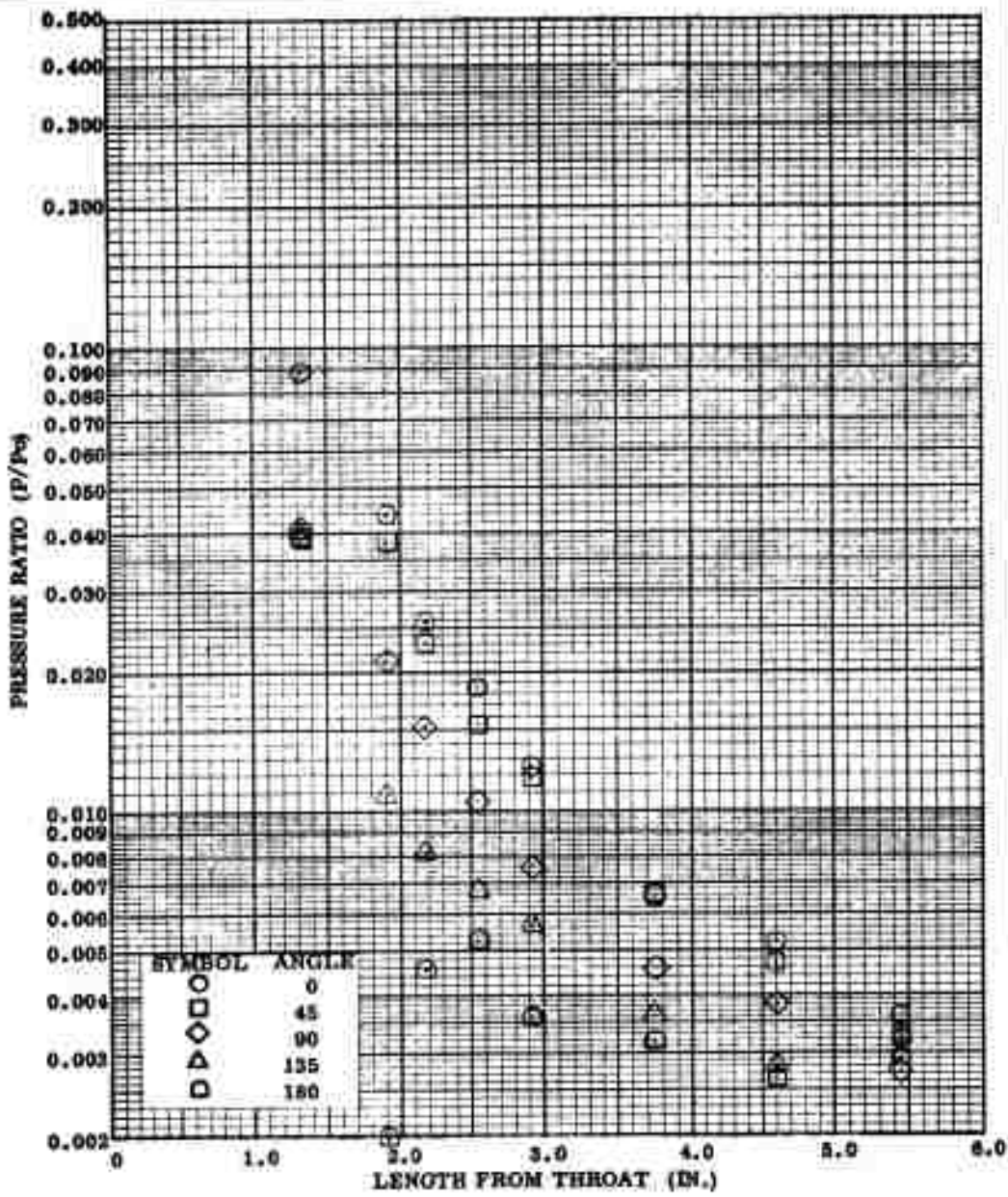
Flex-X Cold Flow Run No. 12, Vector Angle 0 Degrees



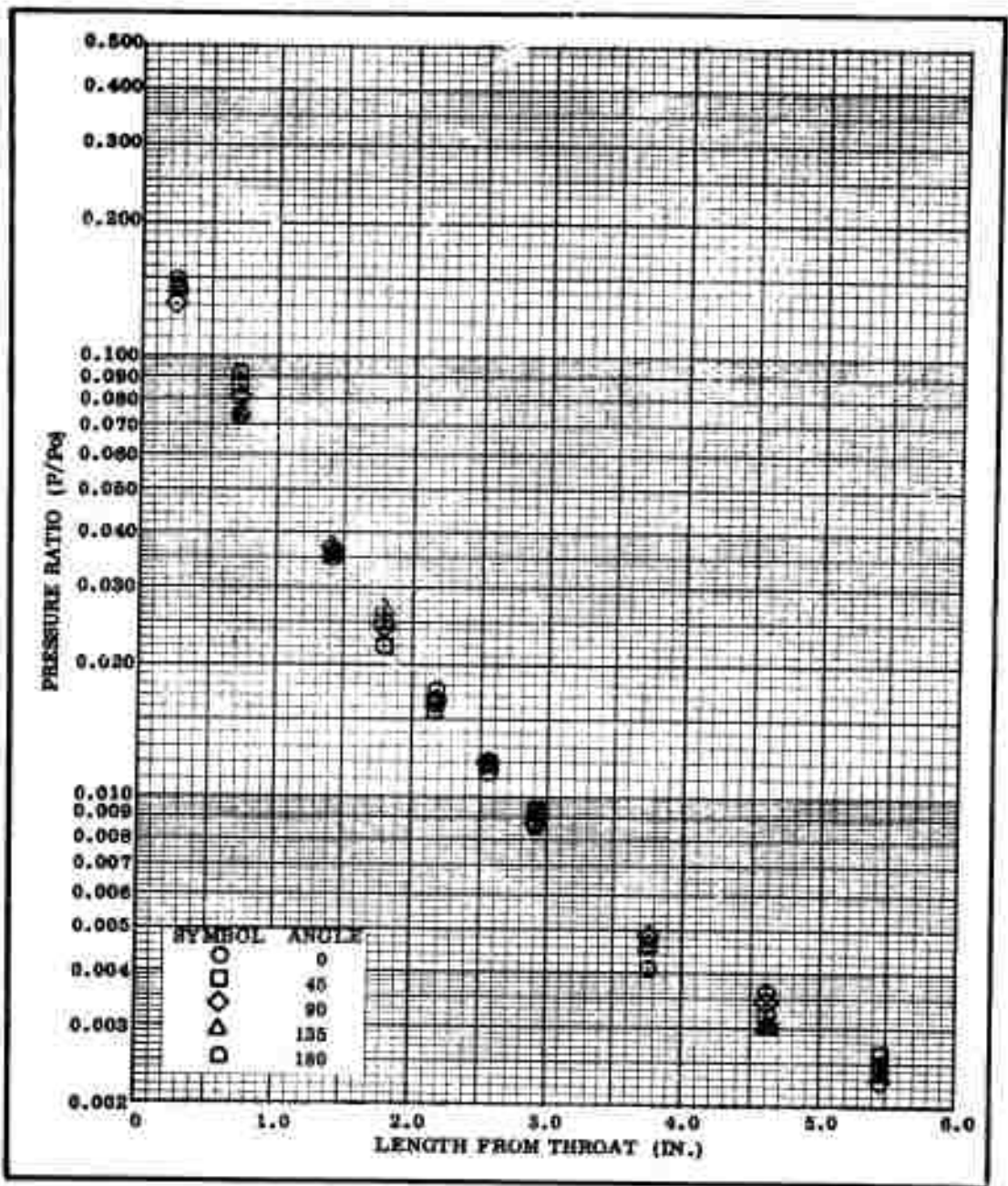
Flex-X Cold Flow Run No. 12, Vector Angle 2.5 Degrees



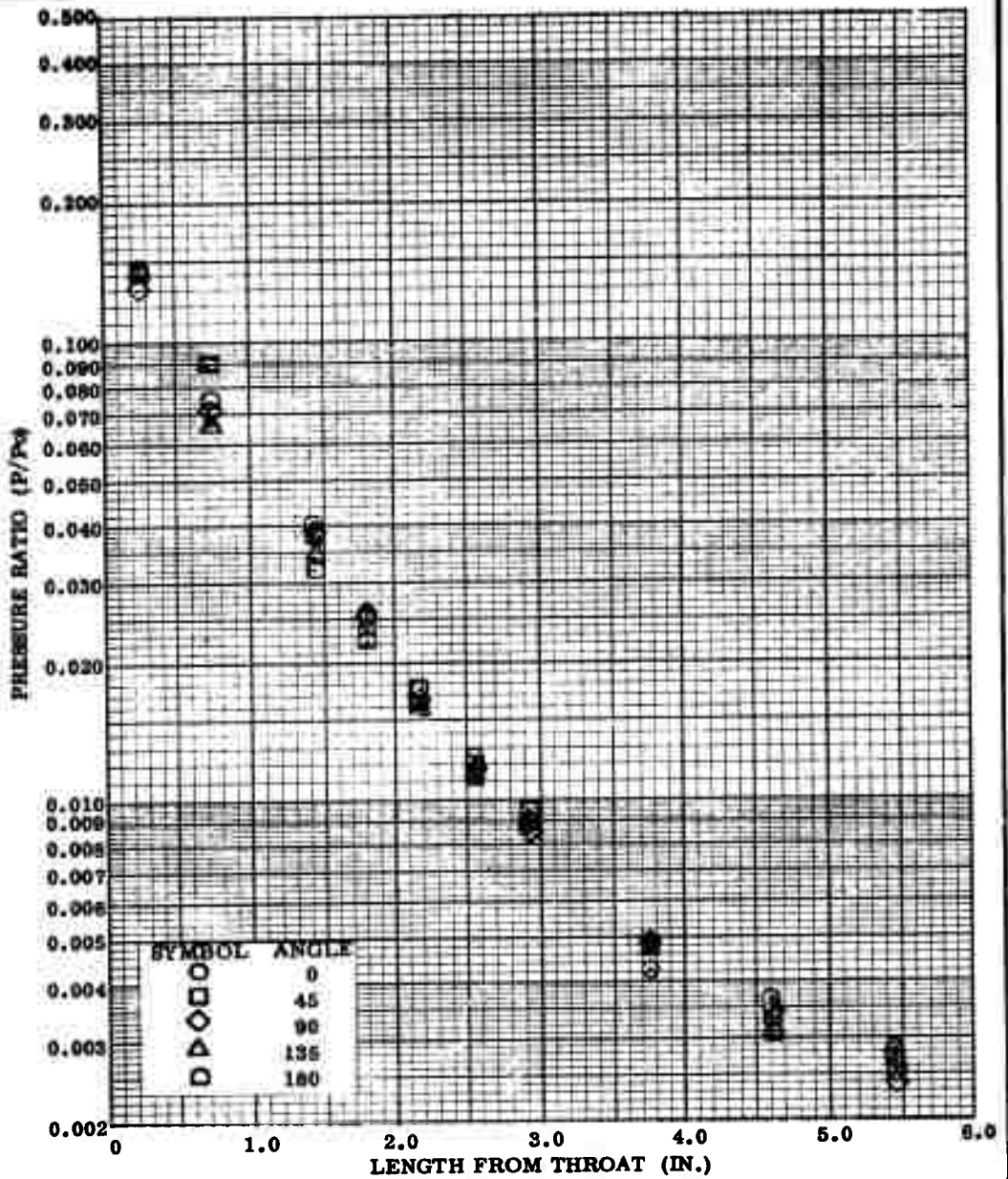
Flex-X Cold Flow Run No. 12 , Vector Angle 5 Degrees



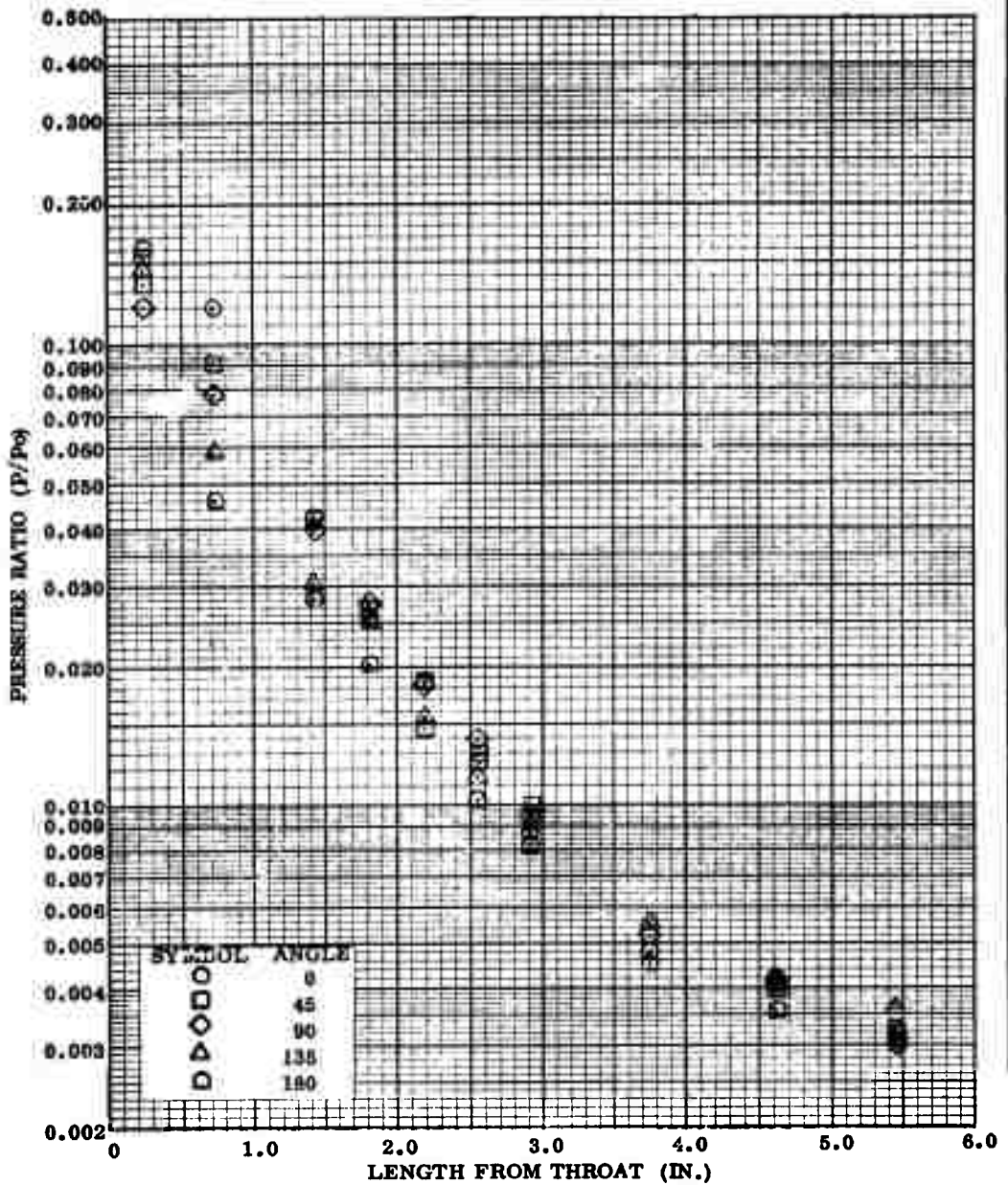
Flex-X Cold Flow Run No. 12, Vector Angle 10 Degrees



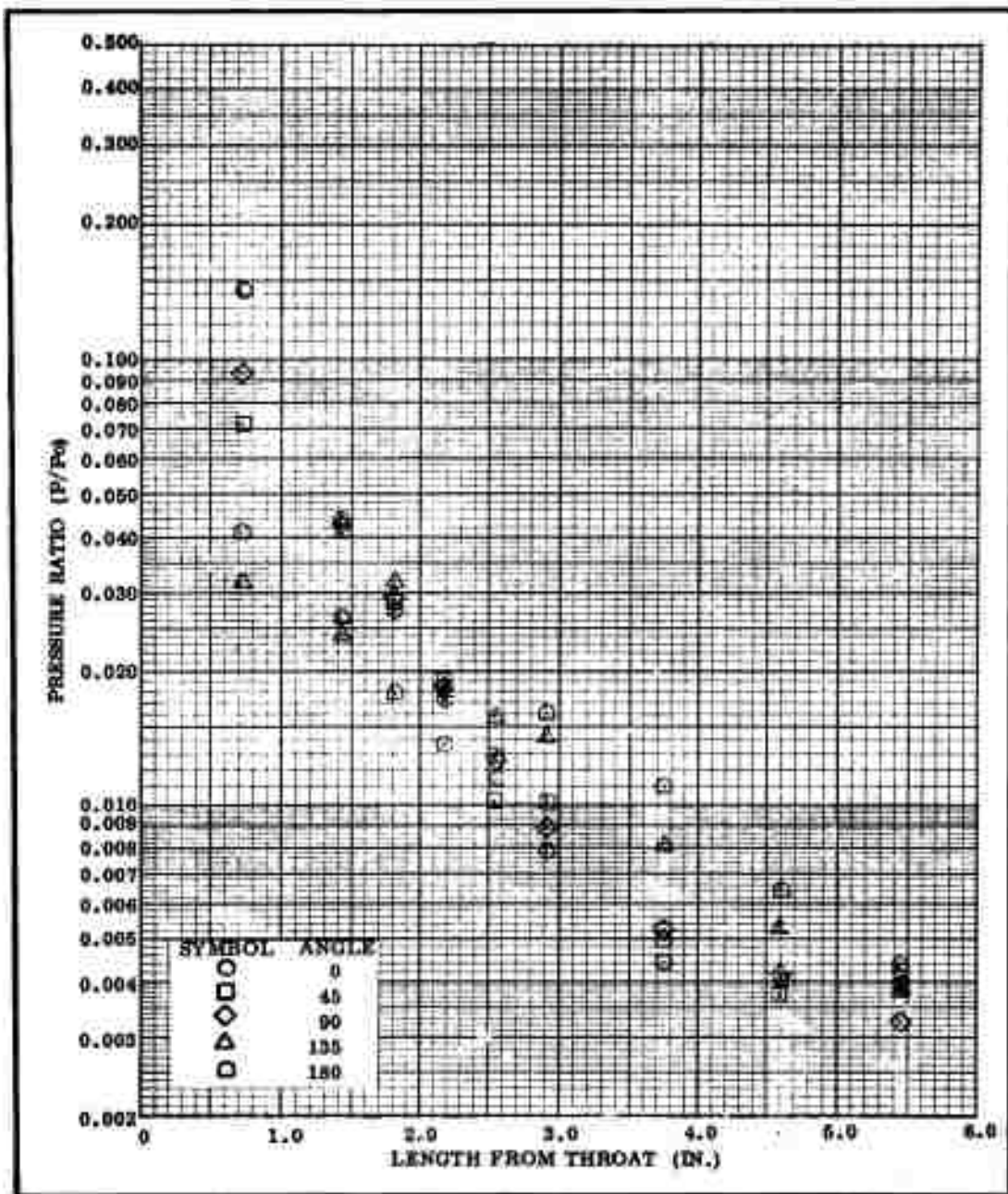
Flex-X Cold Flow Run No. 13 , Vector Angle 0 Degrees



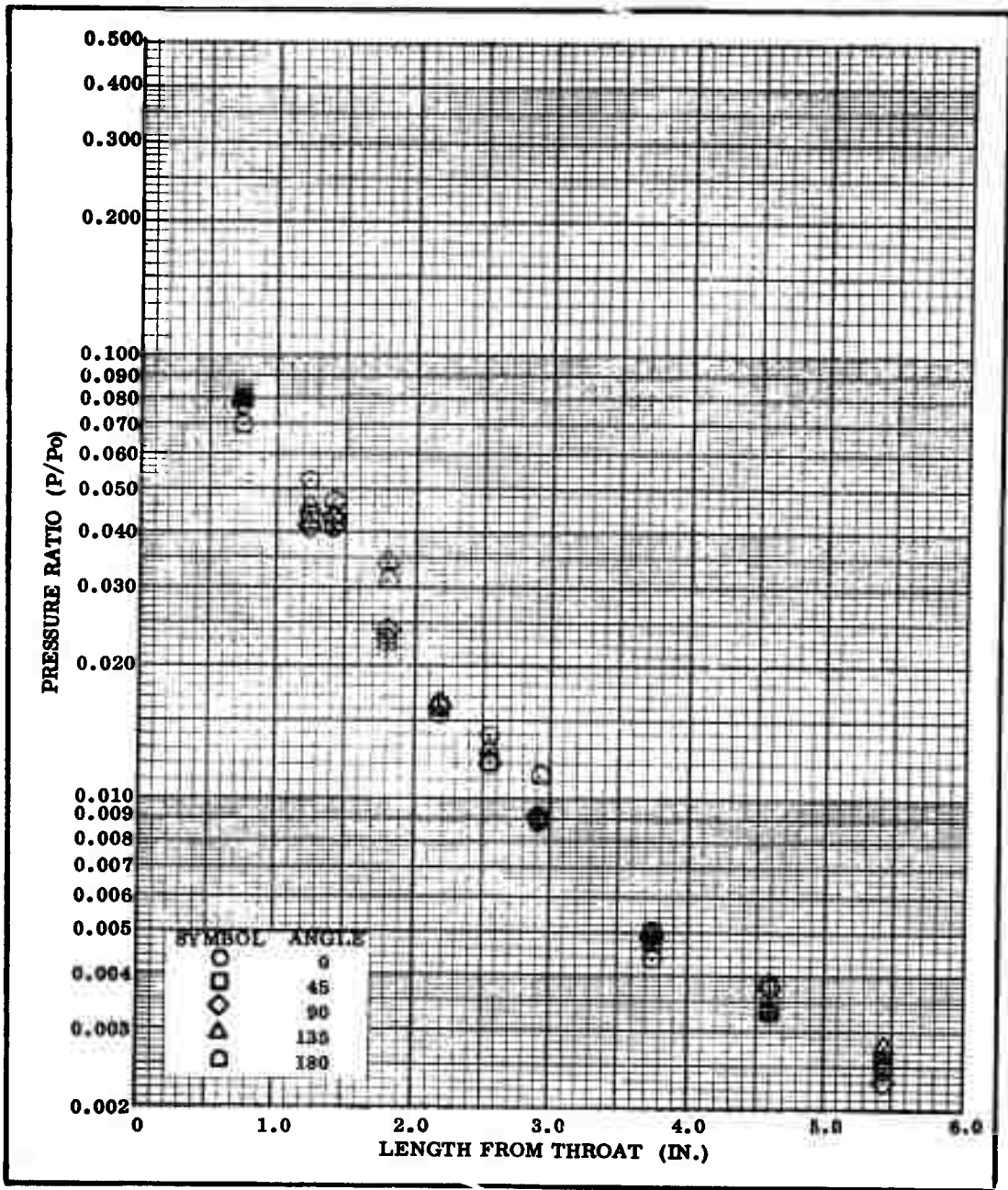
Flex-X Cold Flow Run No. 13 , Vector Angle 2.5 Degrees



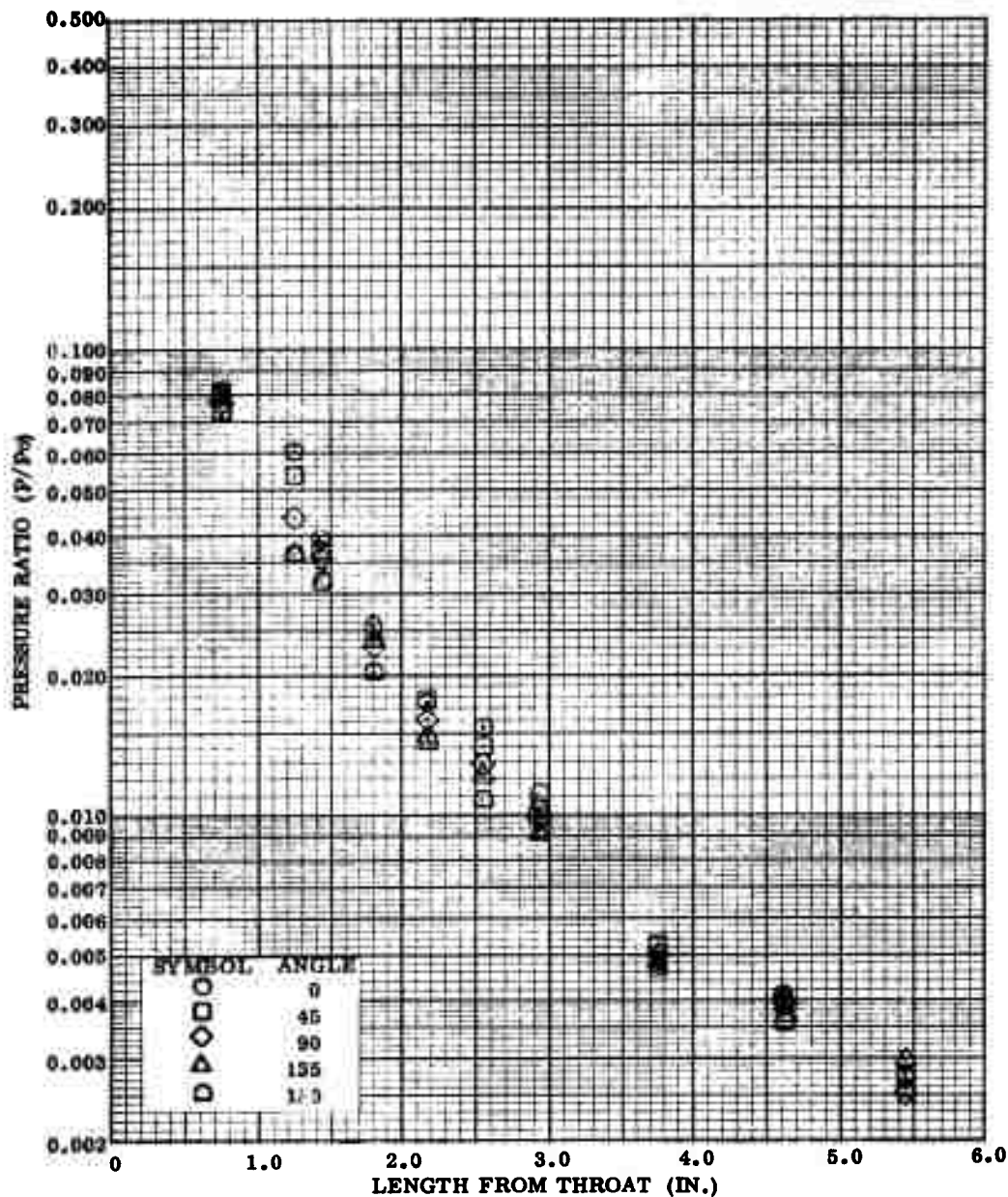
Flex-X Cold Flow Run No. 13 , Vector Angle 5 Degrees



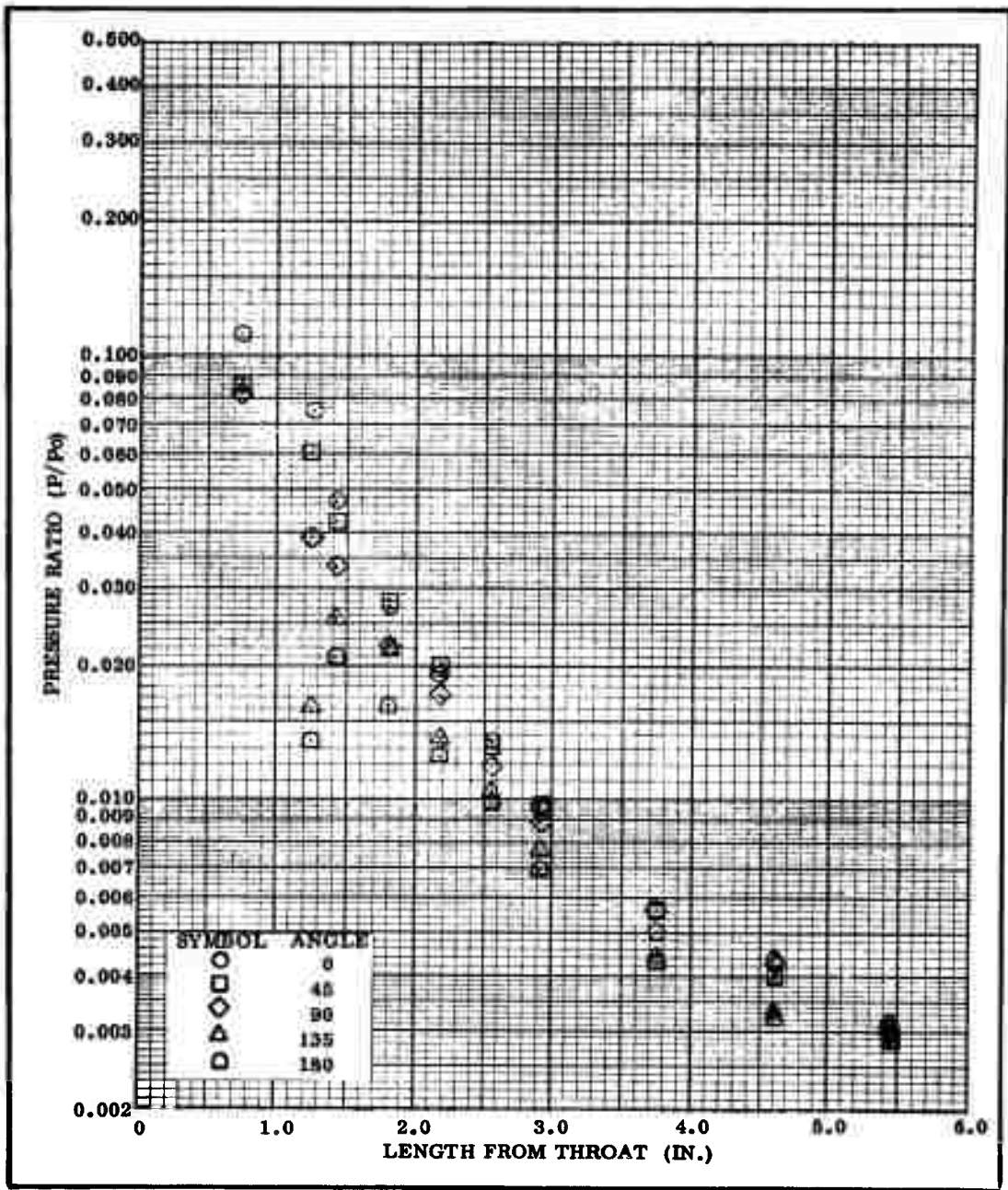
Flex-X Cold Flow Run No. 13 , Vector Angle 10 Degrees



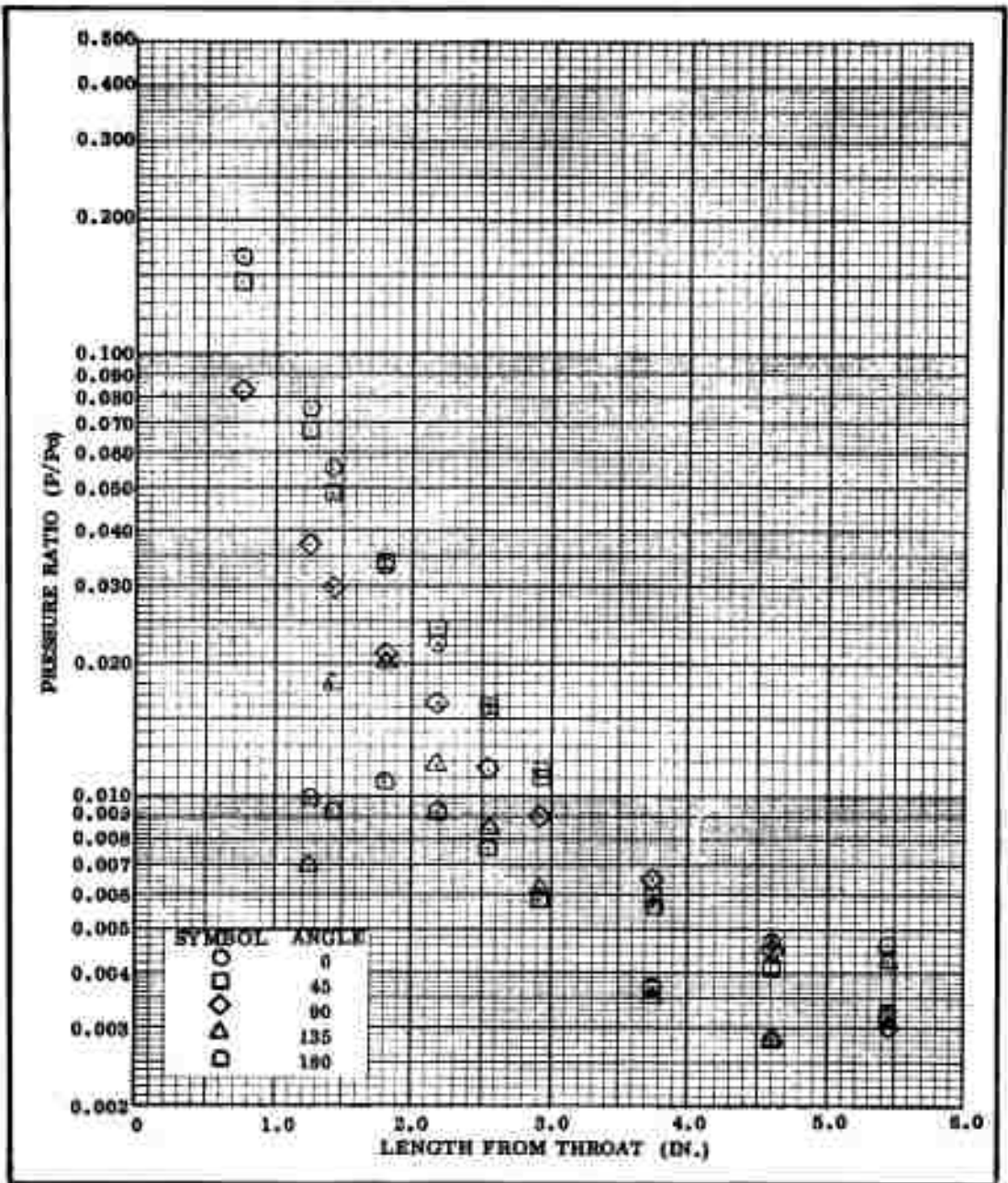
Flex-X Cold Flow Run No. 14 , Vector Angle 0 Degrees



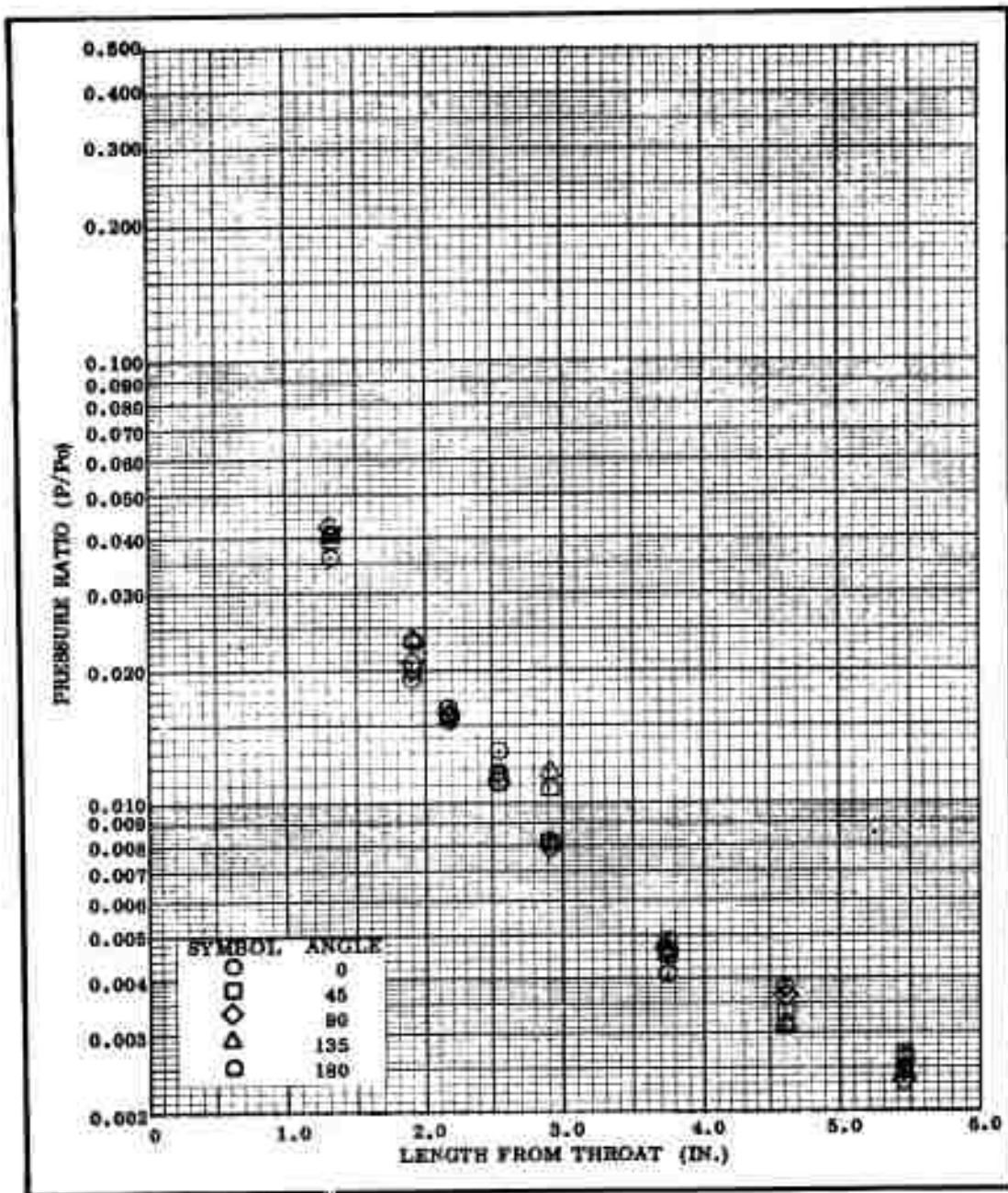
Flex-X Cold Flow Run No. 14 , Vector Angle 2.5 Degrees



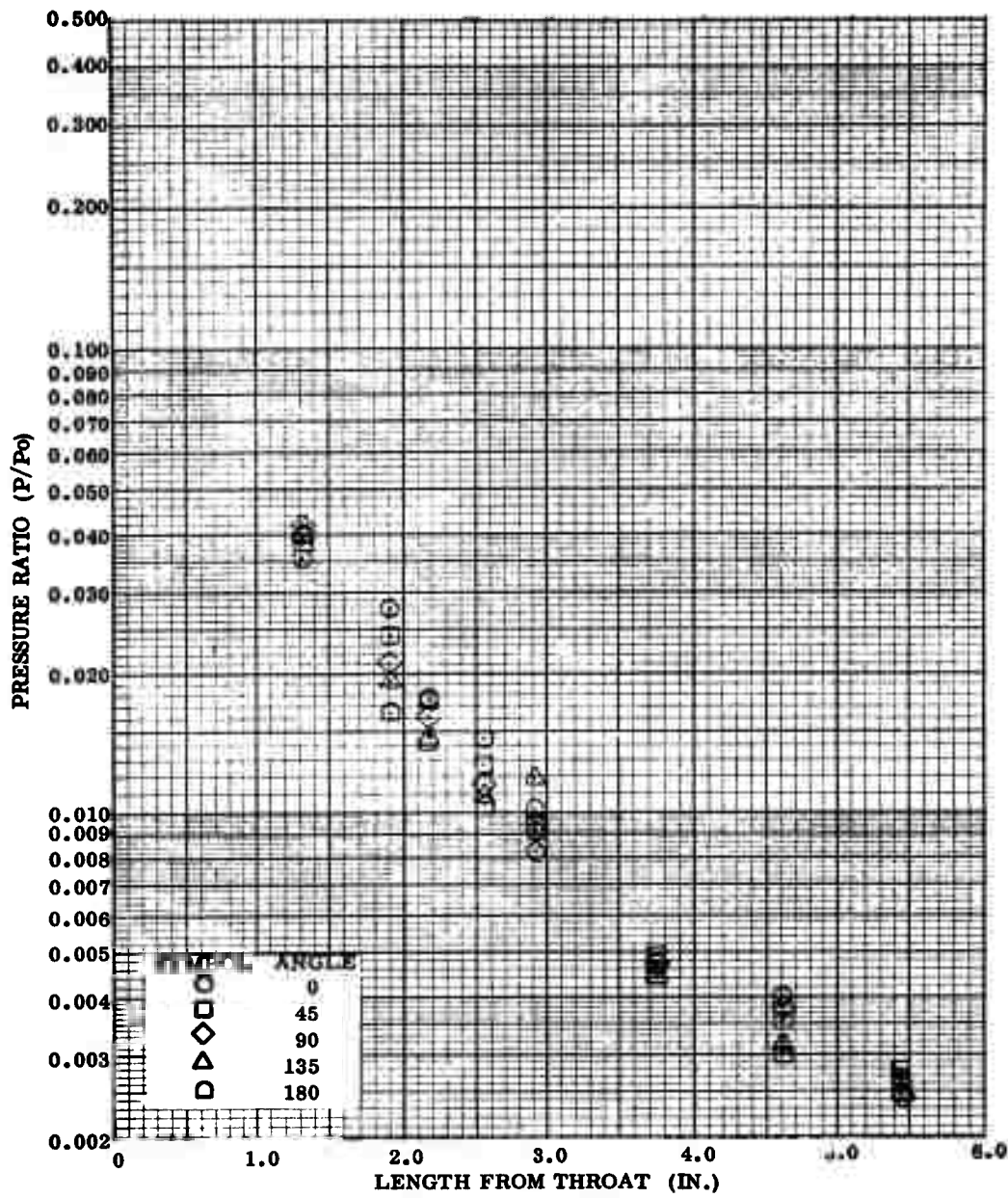
Flex-X Cold Flow Run No. 14, Vector Angle 5 Degrees



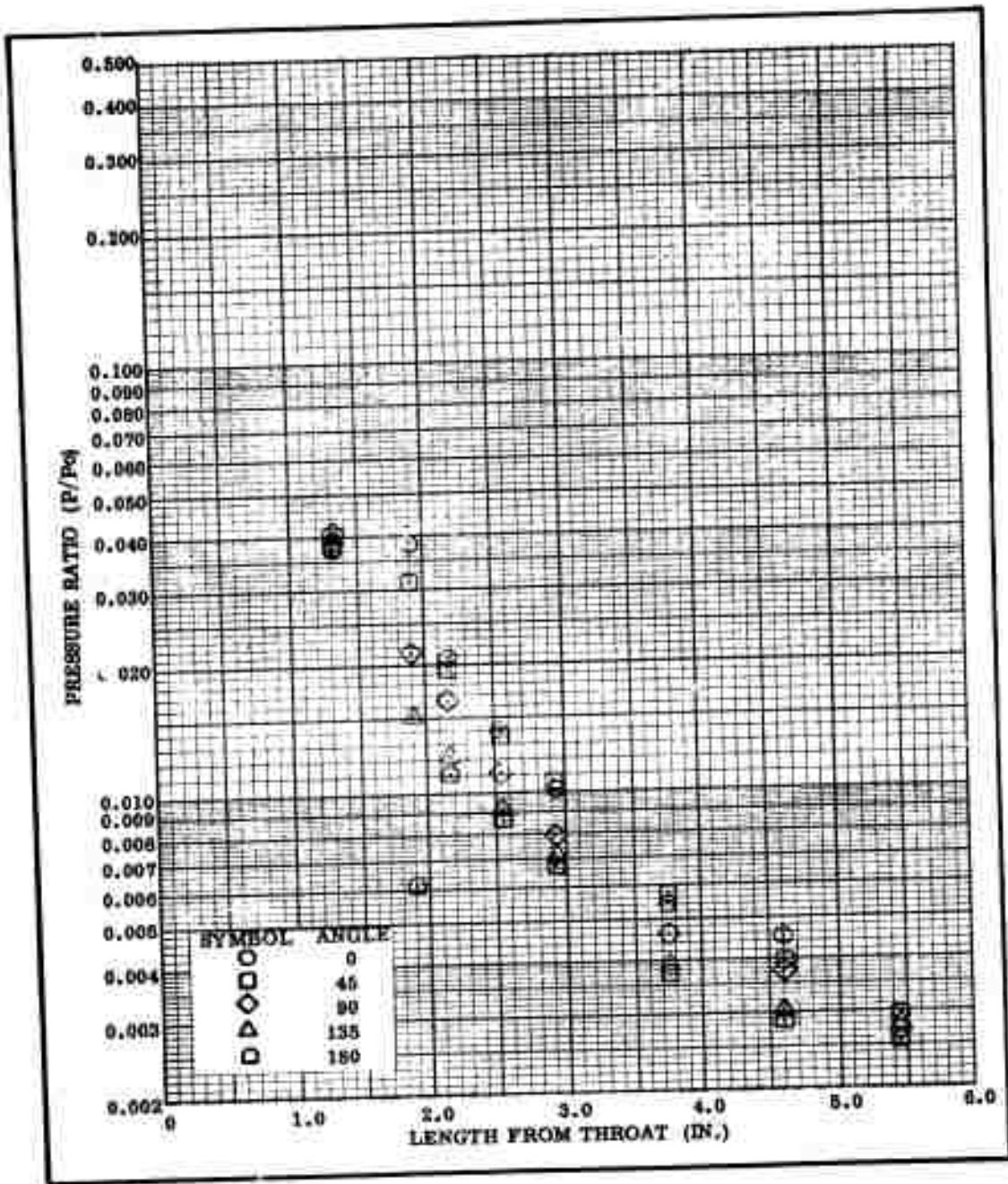
Flex-X Cold Flow Run No. 14 , Vector Angle 10 Degrees



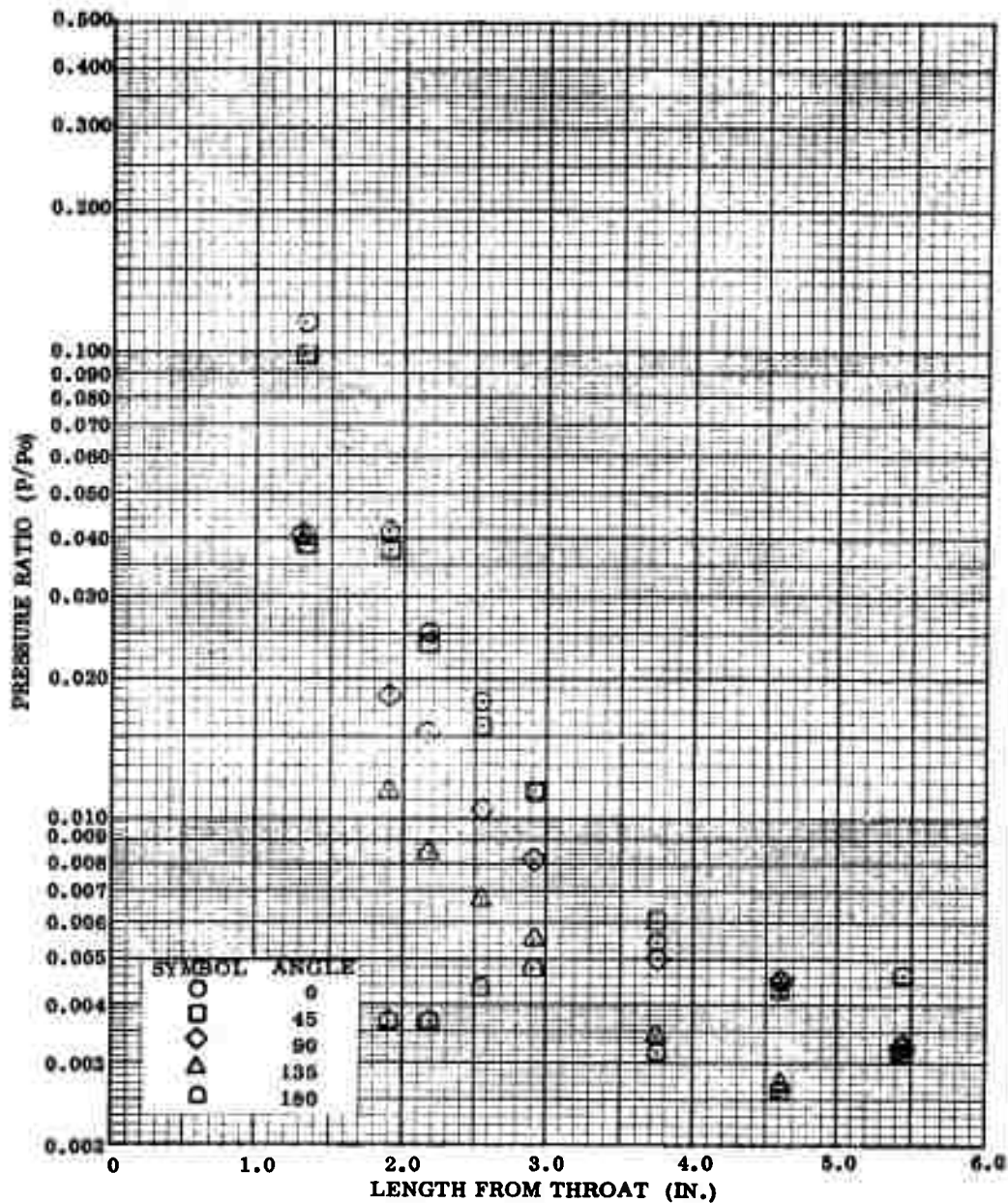
Flex-X Cold Flow Run No. 15, Vector Angle 0 Degrees



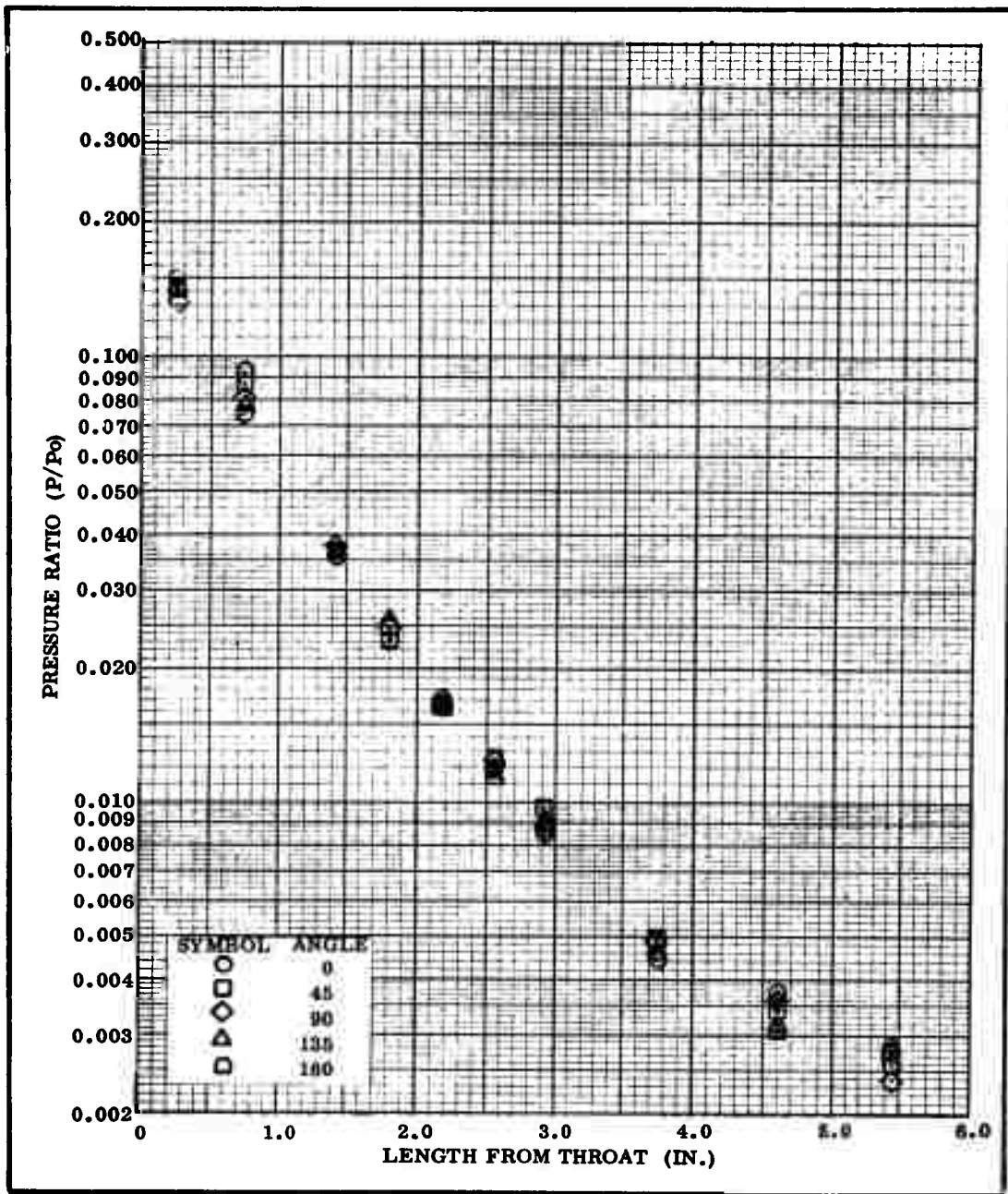
Flex-X Cold Flow Run No. 15, Vector Angle 2.5 Degrees



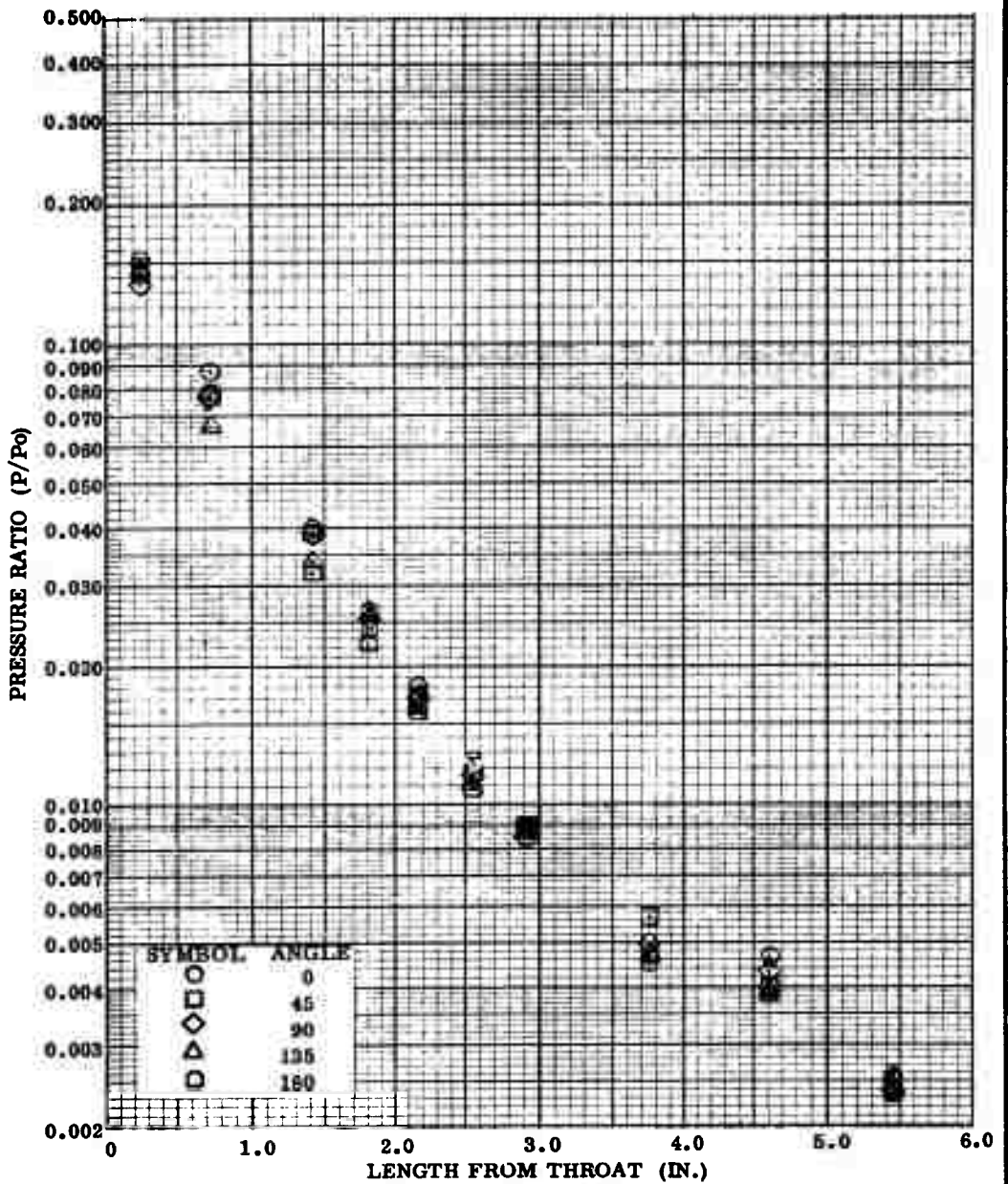
Flex-X Cold Flow Run No. 15, Vector Angle 5 Degrees



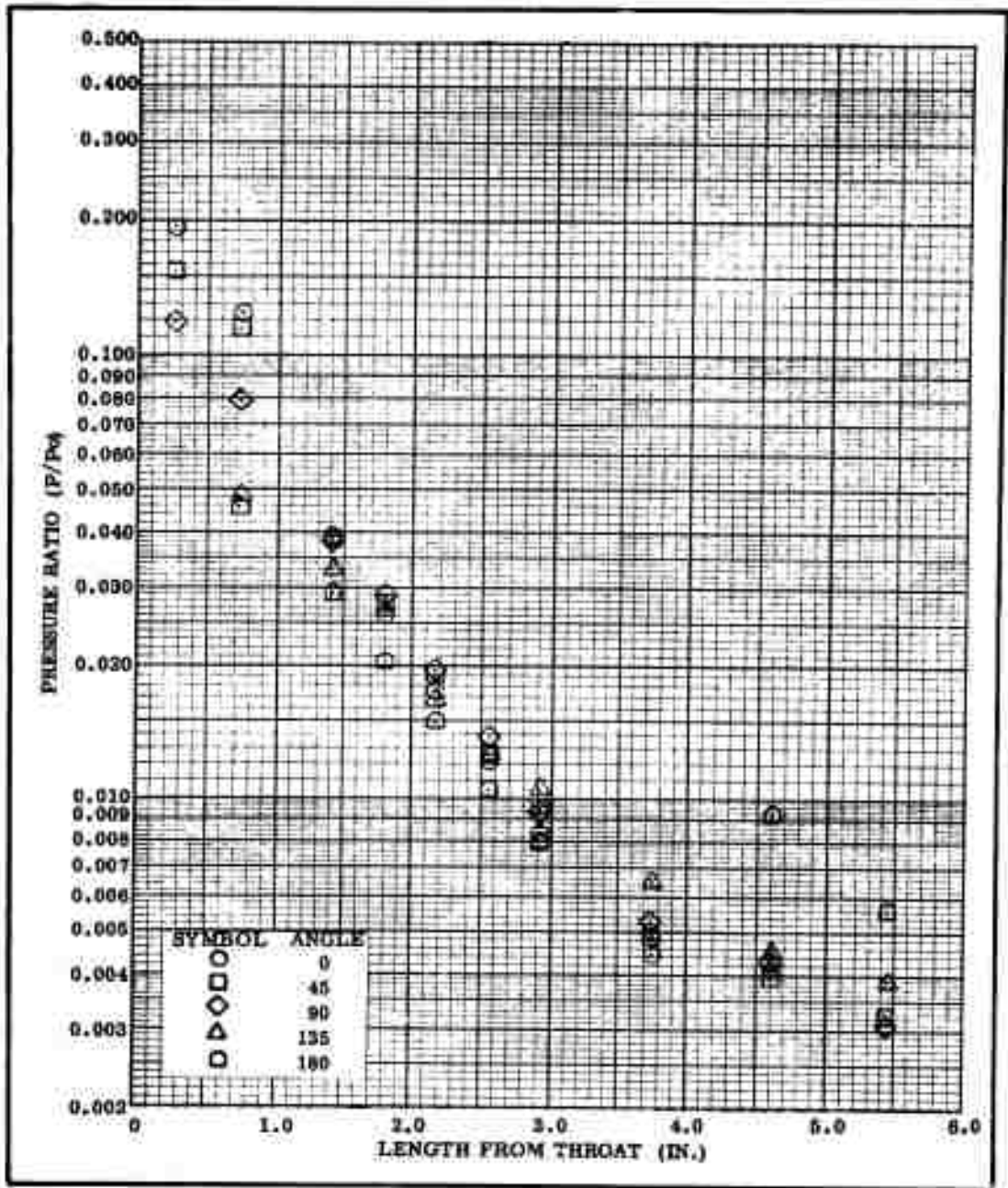
Flex-X Cold Flow Run No. 15, Vector Angle 10 Degrees



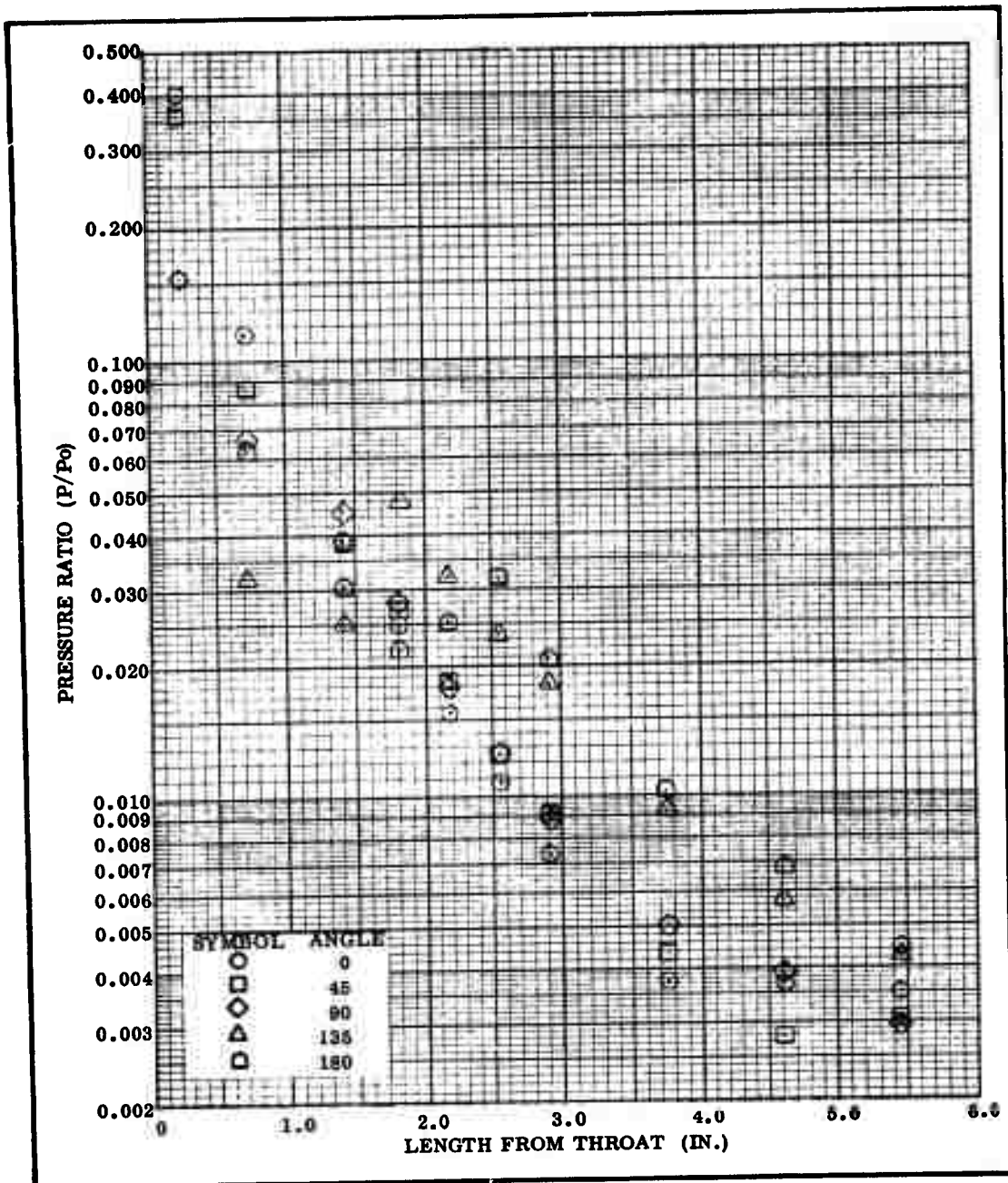
Flex-X Cold Flow Run No. 16, Vector Angle 0 Degrees



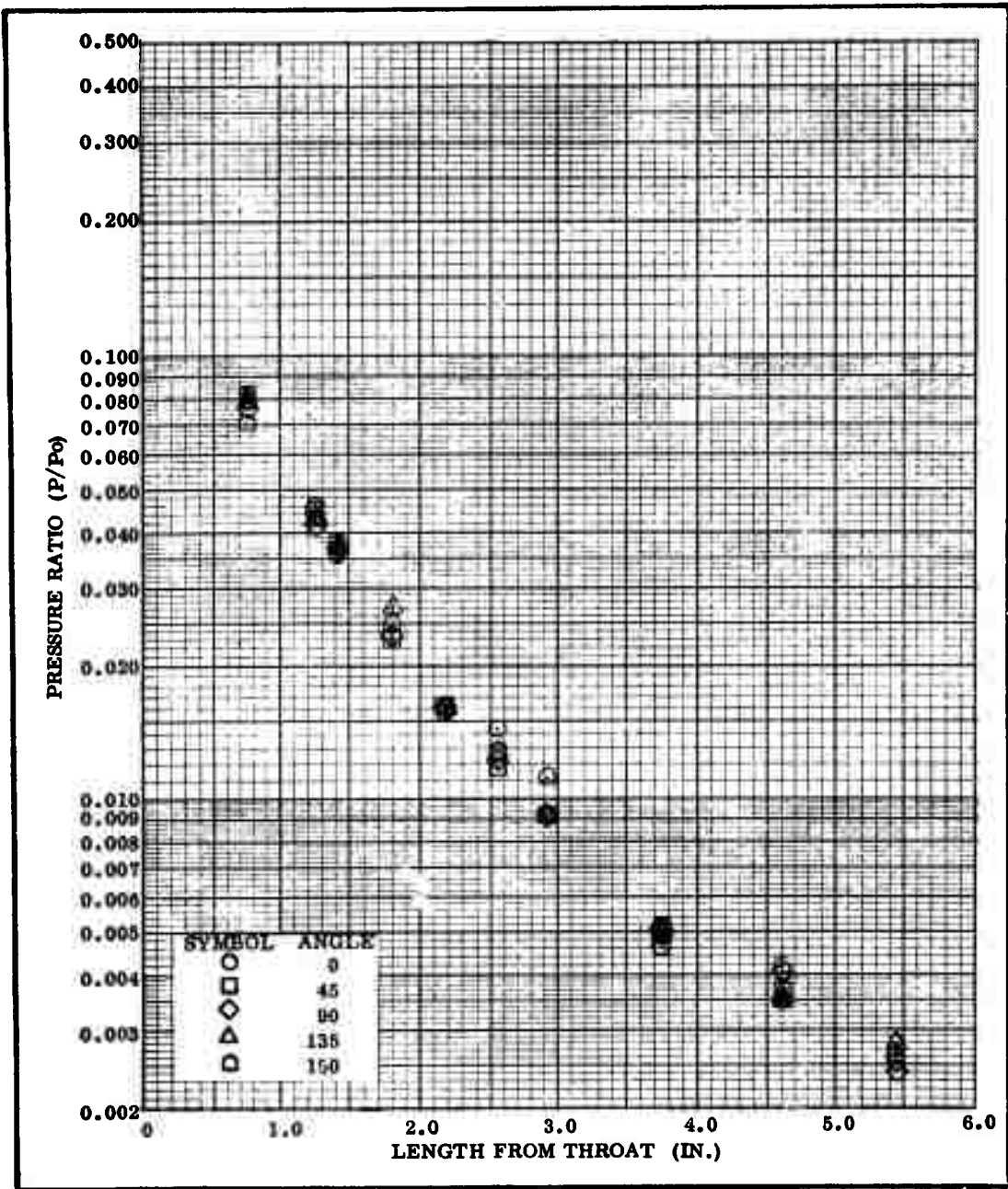
Flex-X Cold Flow Run No. 16 , Vector Angle 2.5 Degrees



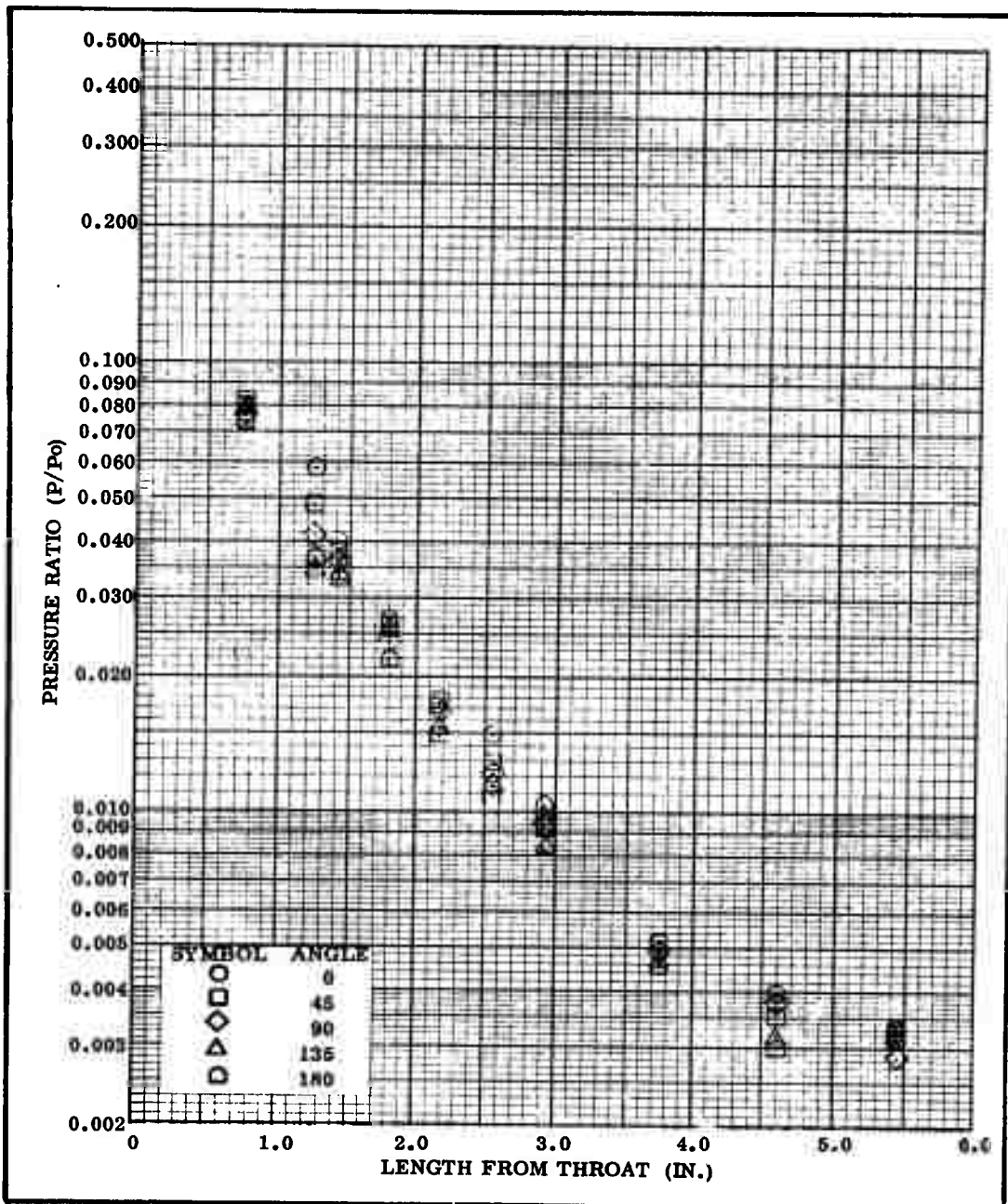
Flex-X Cold Flow Run No. 16 , Vector Angle 5 Degrees



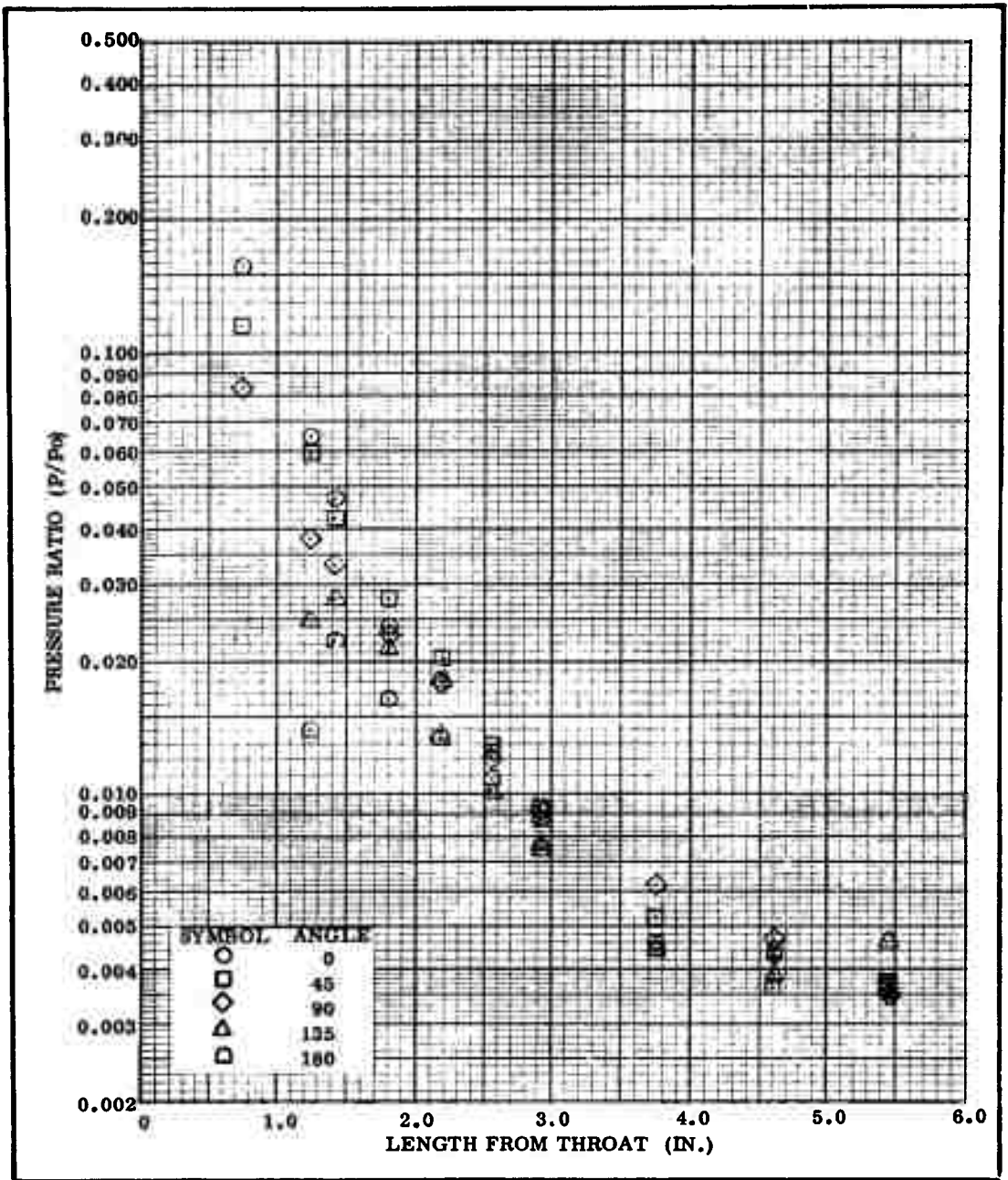
Flex-X Cold Flow Run No. 16 , Vector Angle 10 Degrees



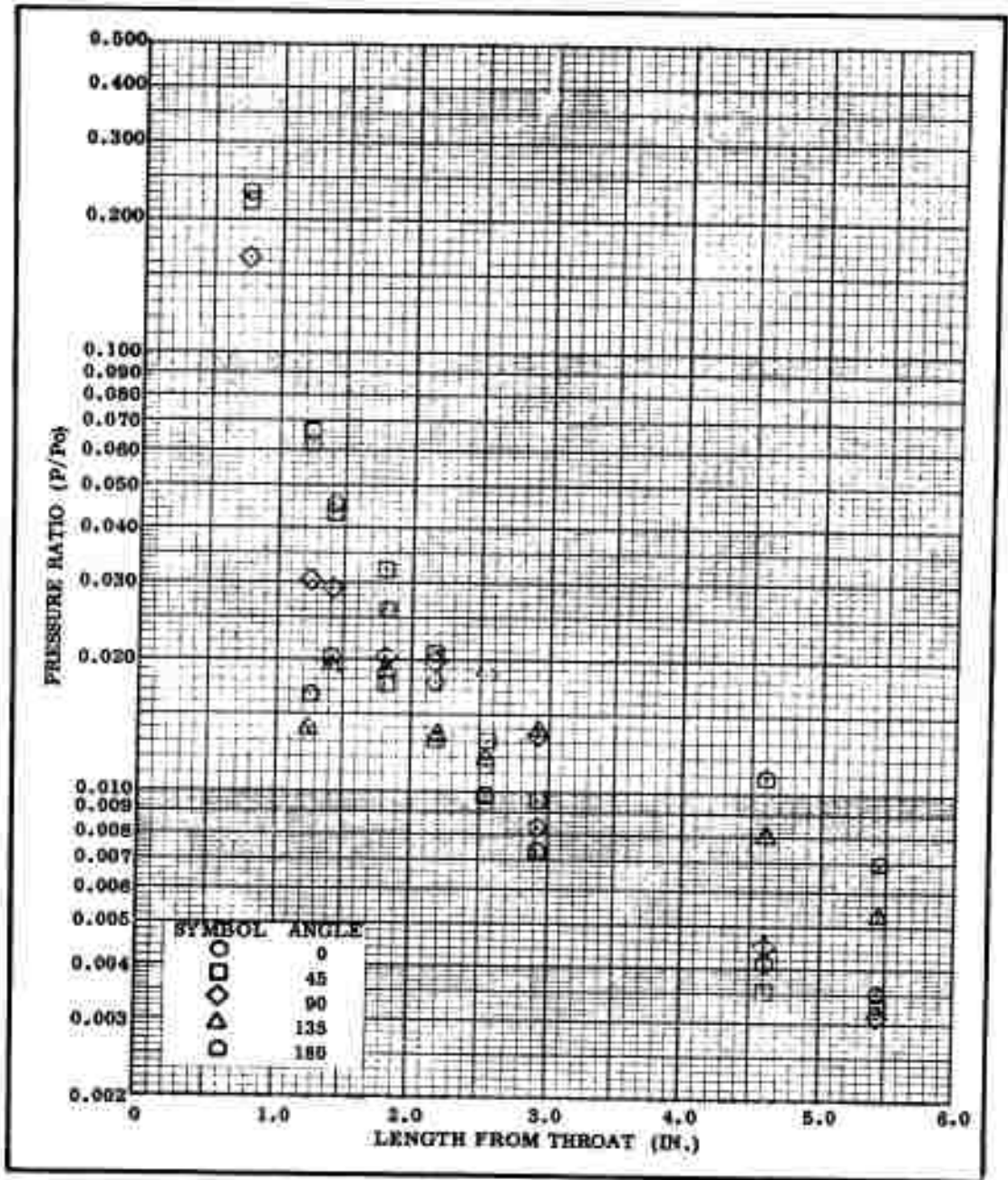
Flex-X Cold Flow Run No. 17 , Vector Angle 0 Degrees



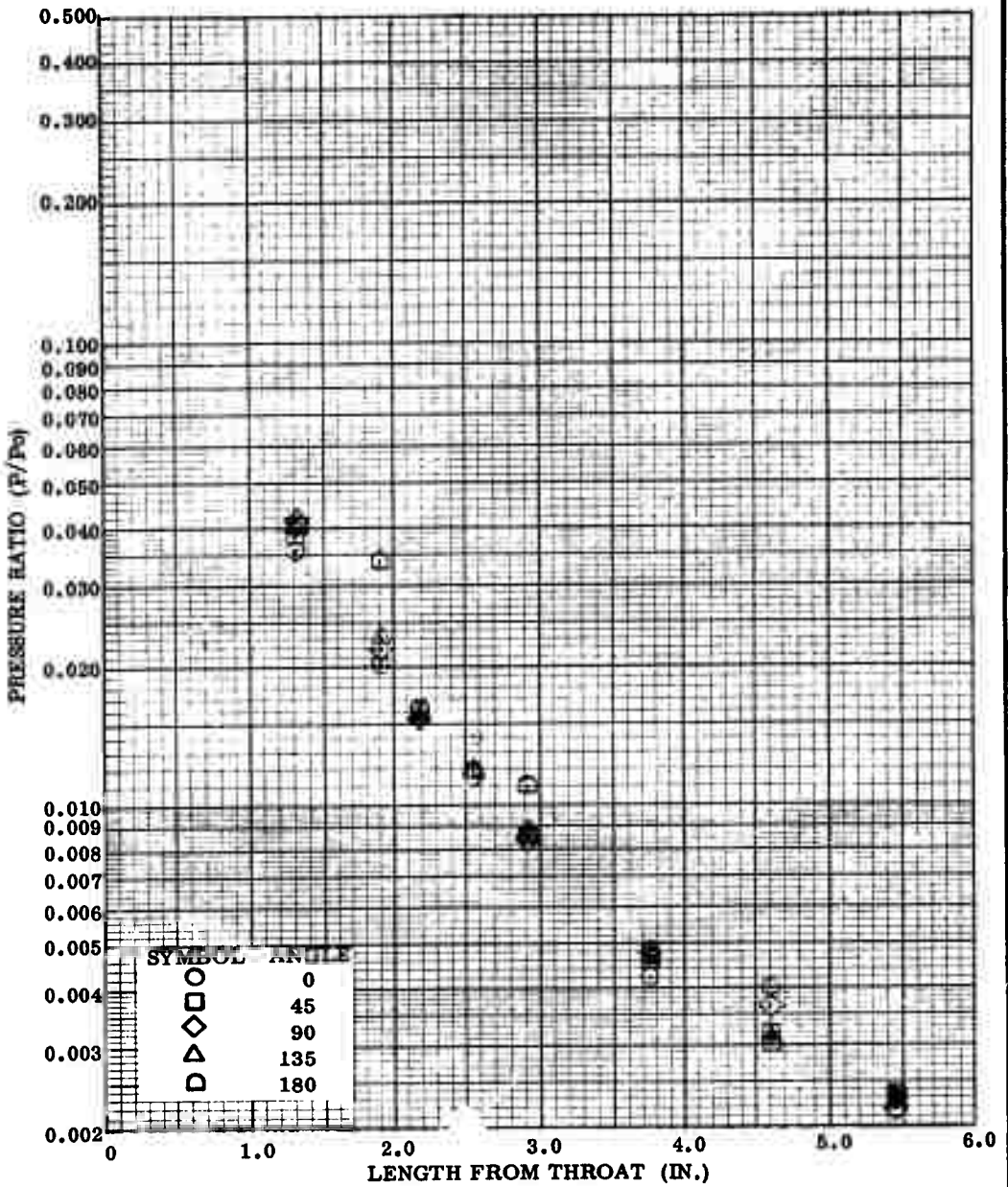
Flex-X Cold Flow Run No. 17 , Vector Angle 2.5 Degrees



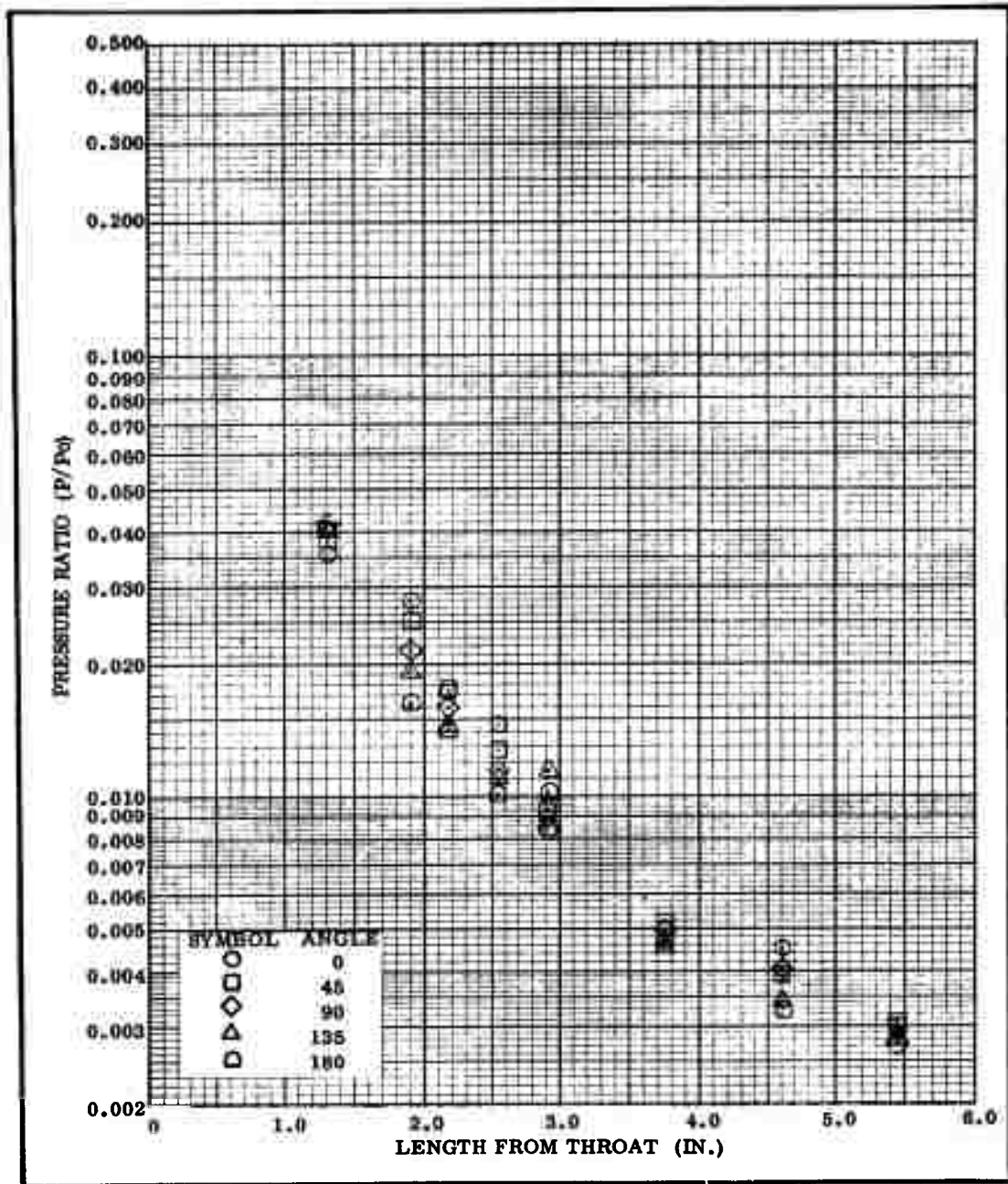
Flex-X Cold Flow Run No. 17 , Vector Angle 5 Degrees



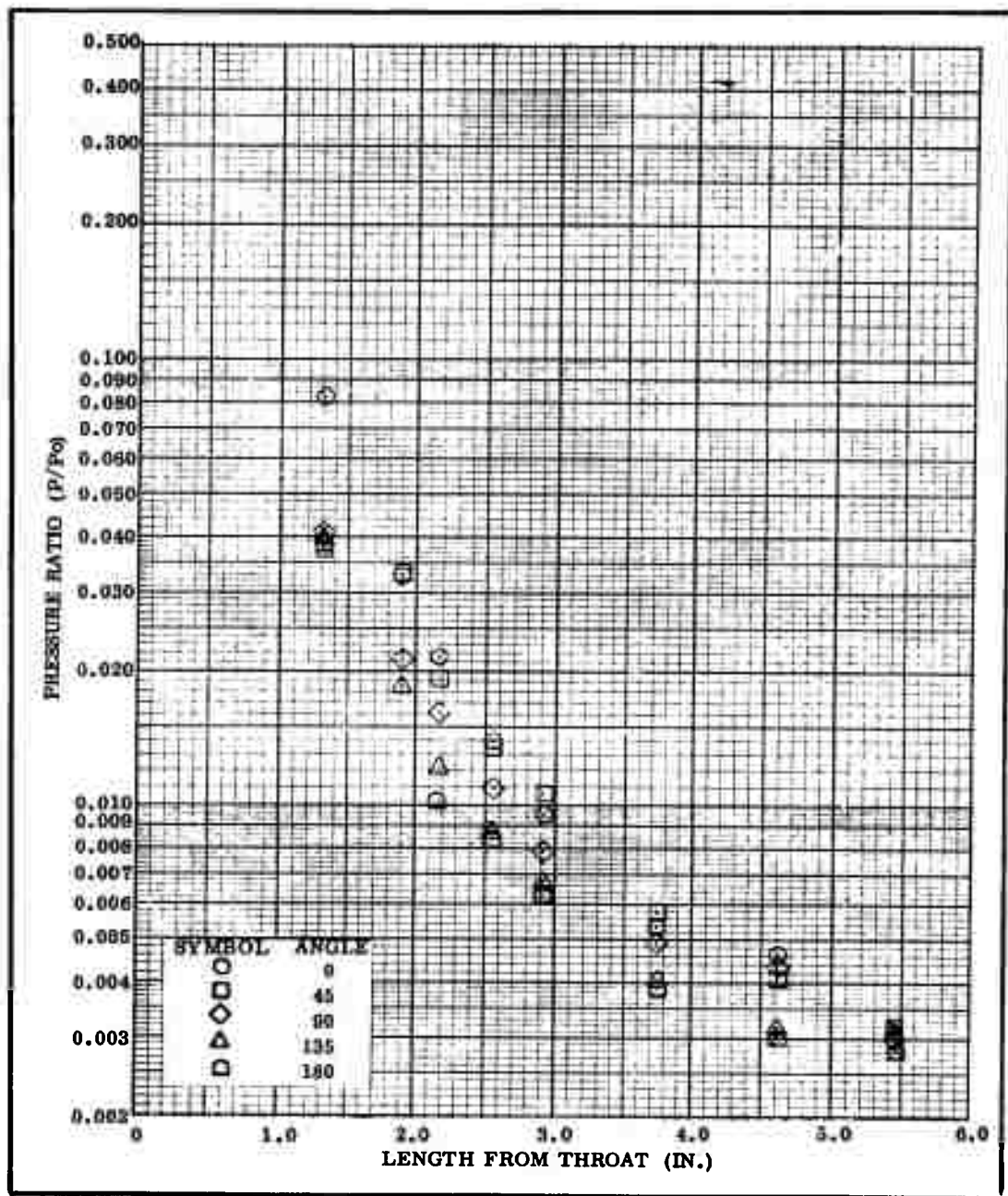
Flex-X Cold Flow Run No. 17 , Vector Angle 10 Degrees



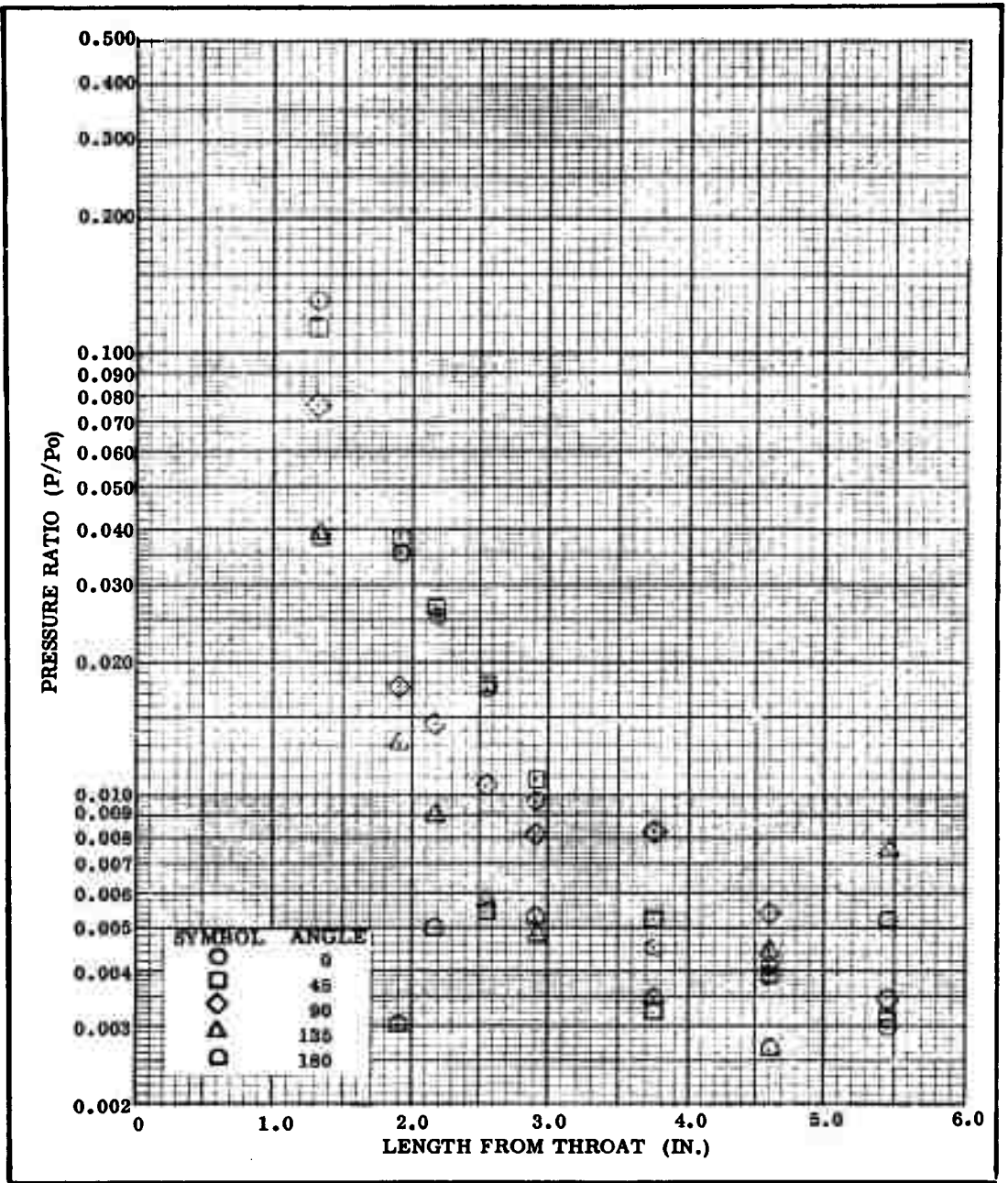
Flex-X Cold Flow Run No. 18 , Vector Angle 0 Degrees



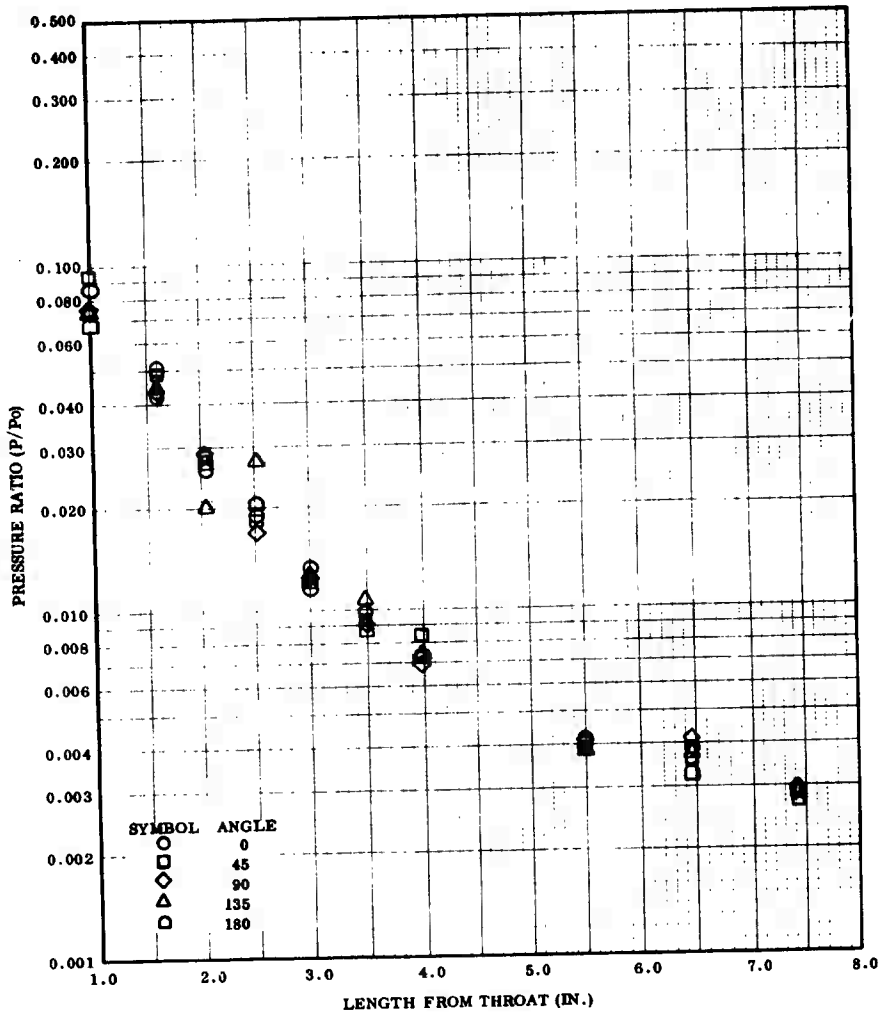
Flex-X Cold Flow Run No. 18 , Vector Angle 2.5 Degrees



Flex-X Cold Flow Run No. 18 , Vector Angle 5 Degrees

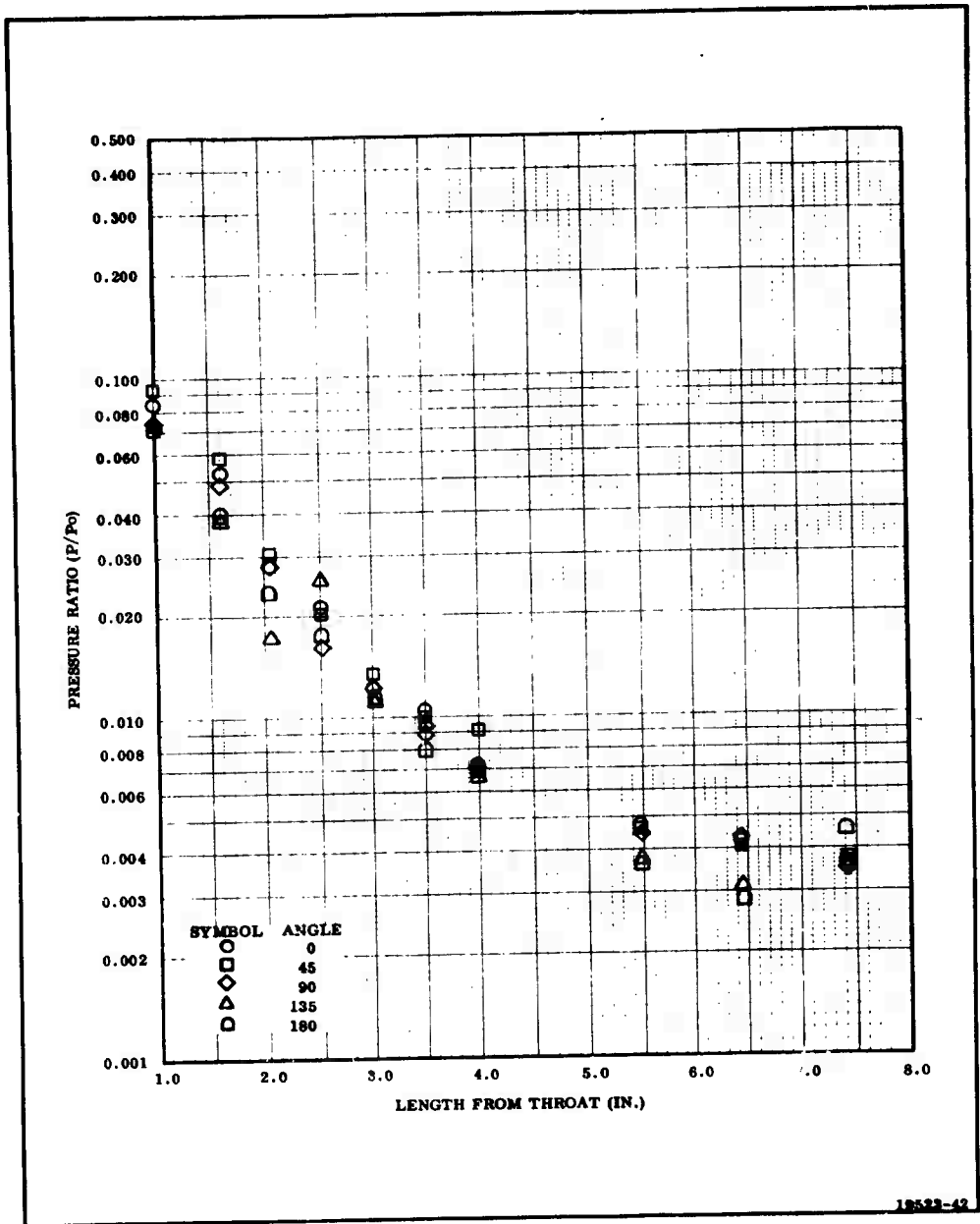


Flex-X Cold Flow Run No. 18 , Vector Angle 10 Degrees

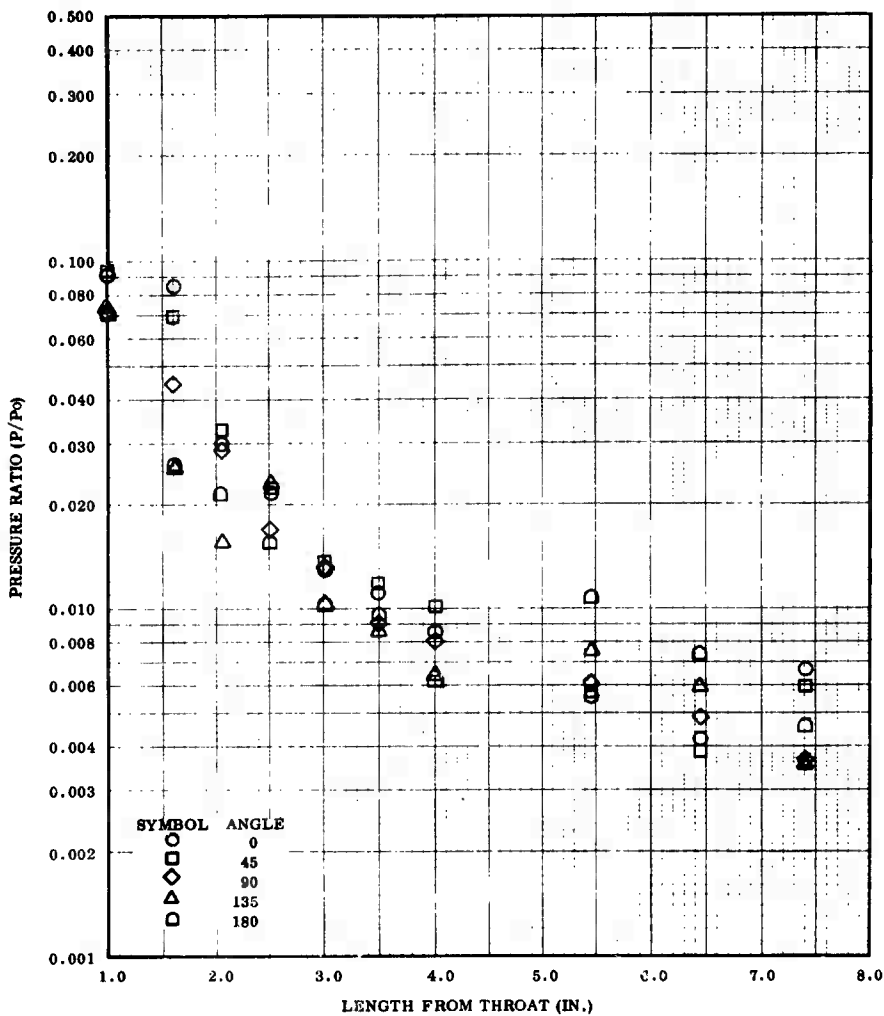


19523-43

Flex-X Cold Flow Run No. 19, Vector Angle 0 Degrees

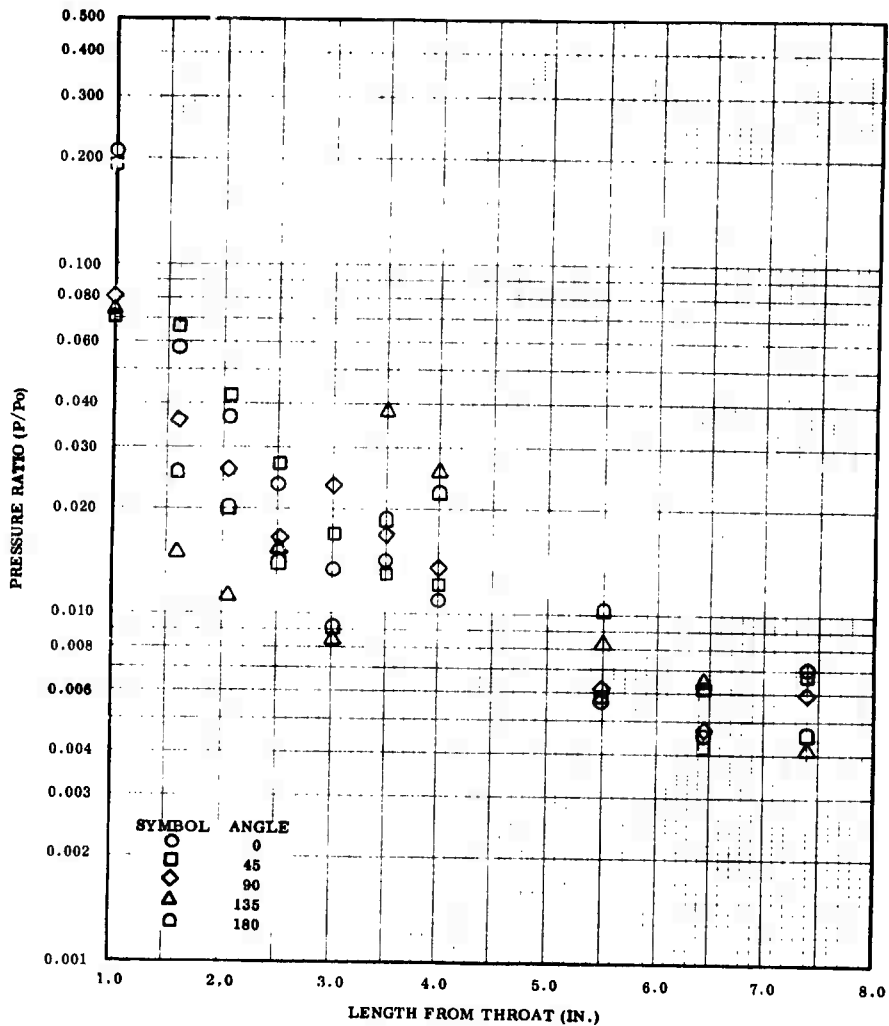


Flex-X Cold Flow Run No. 19, Vector Angle 2.5 Degrees



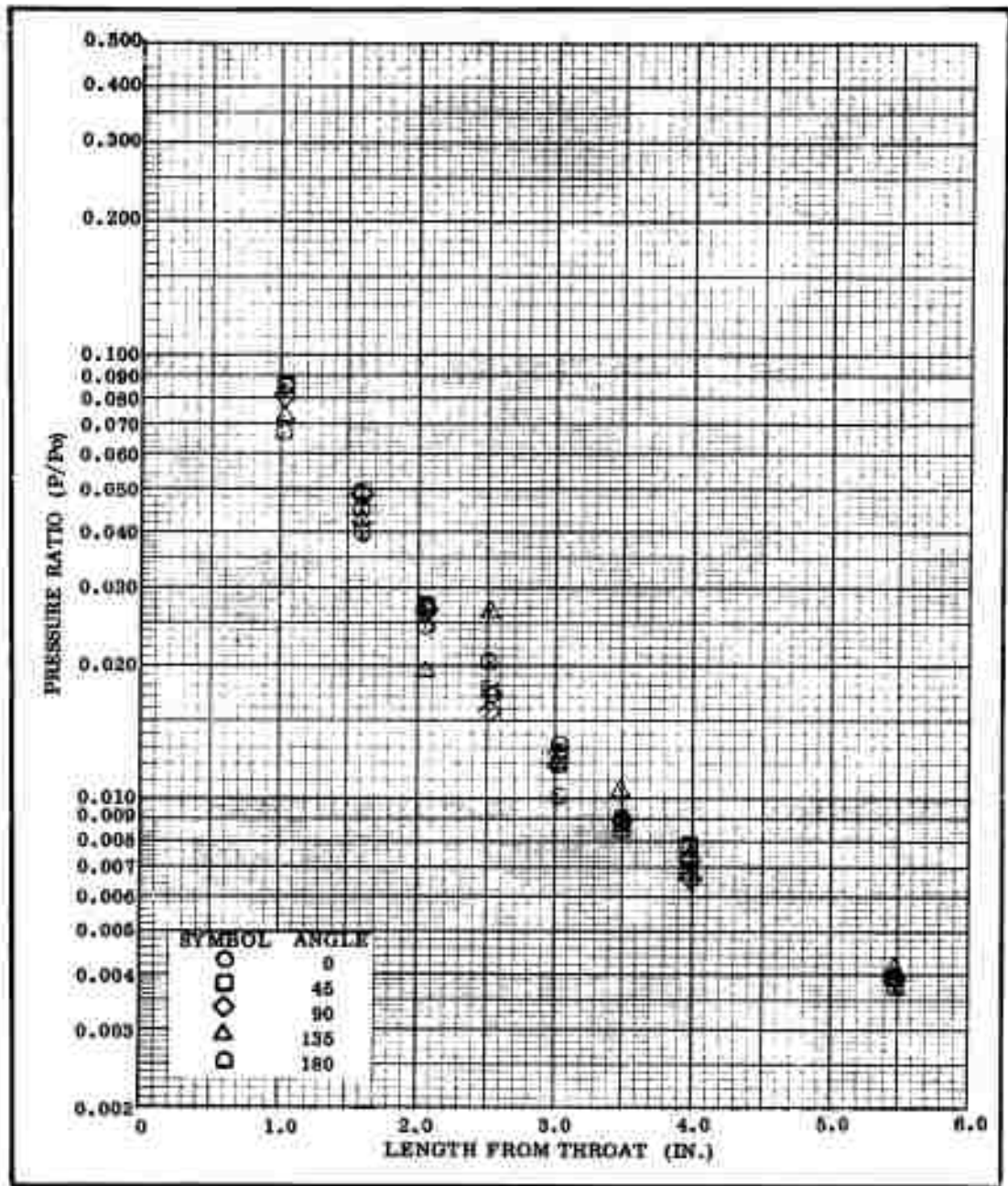
19523-41

Flex-X Cold Flow Run No. 19, Vector Angle 5 Degrees

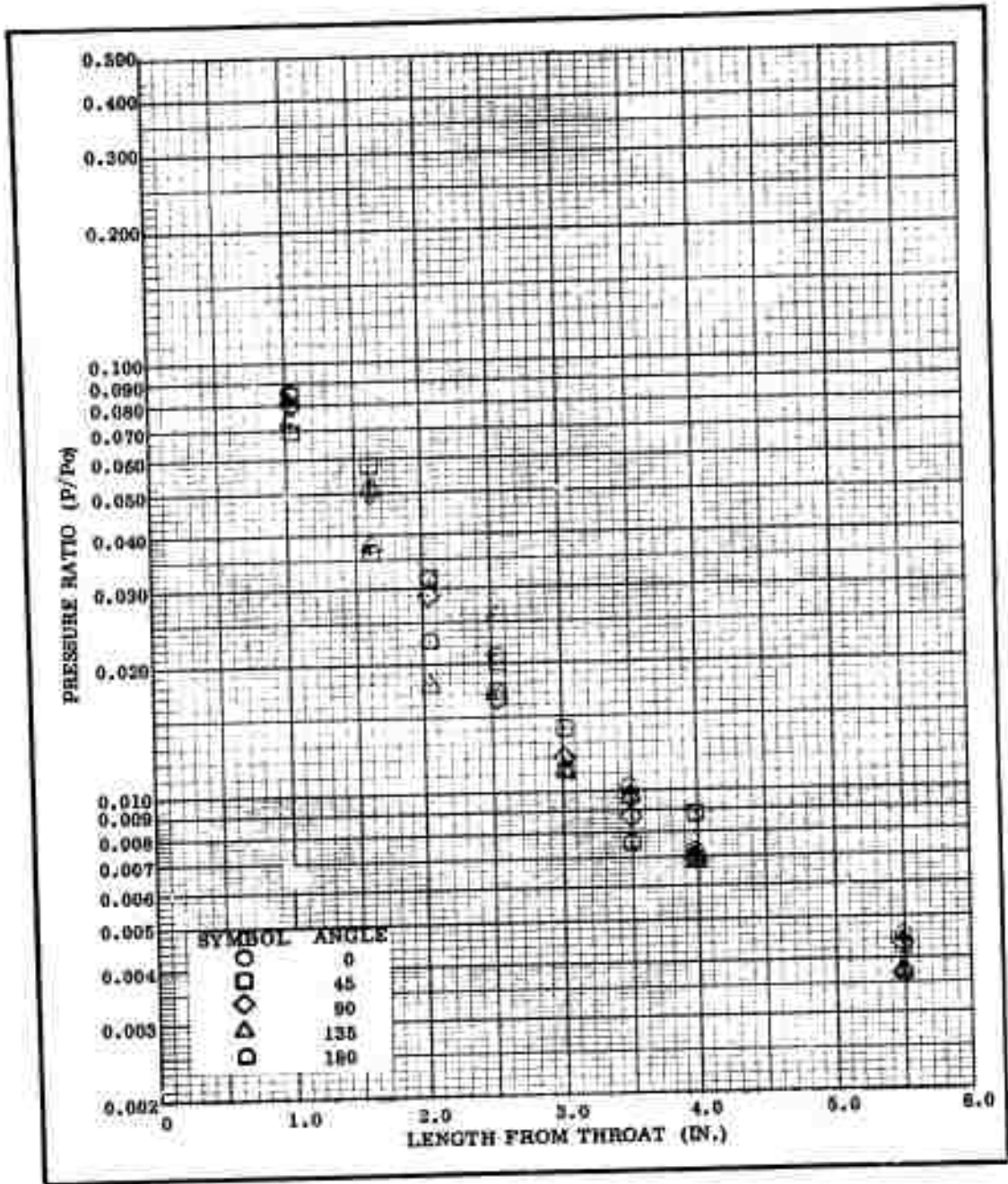


19623-40

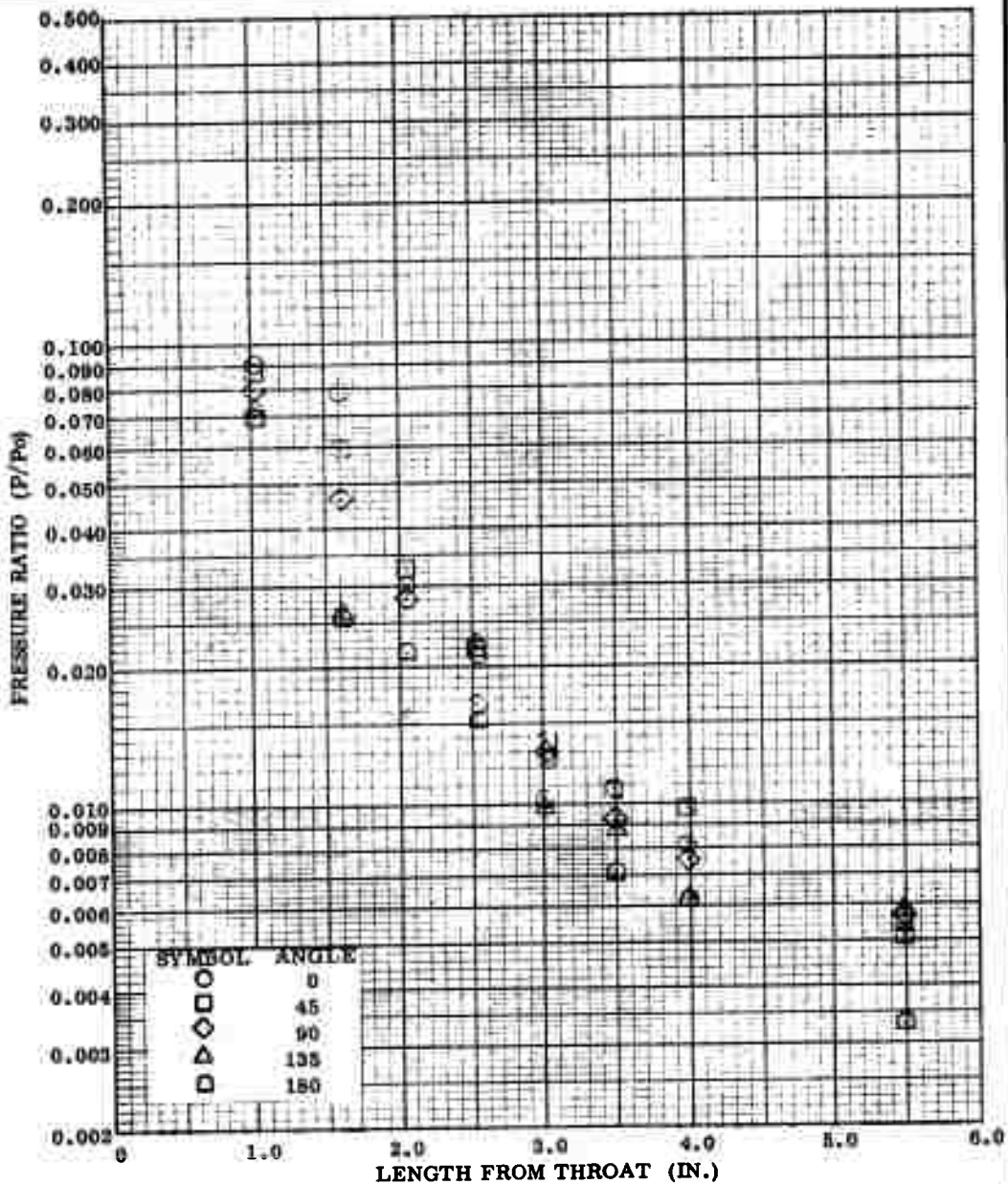
Flex-X Cold Flow Run No. 19, Vector Angle 10 Degrees



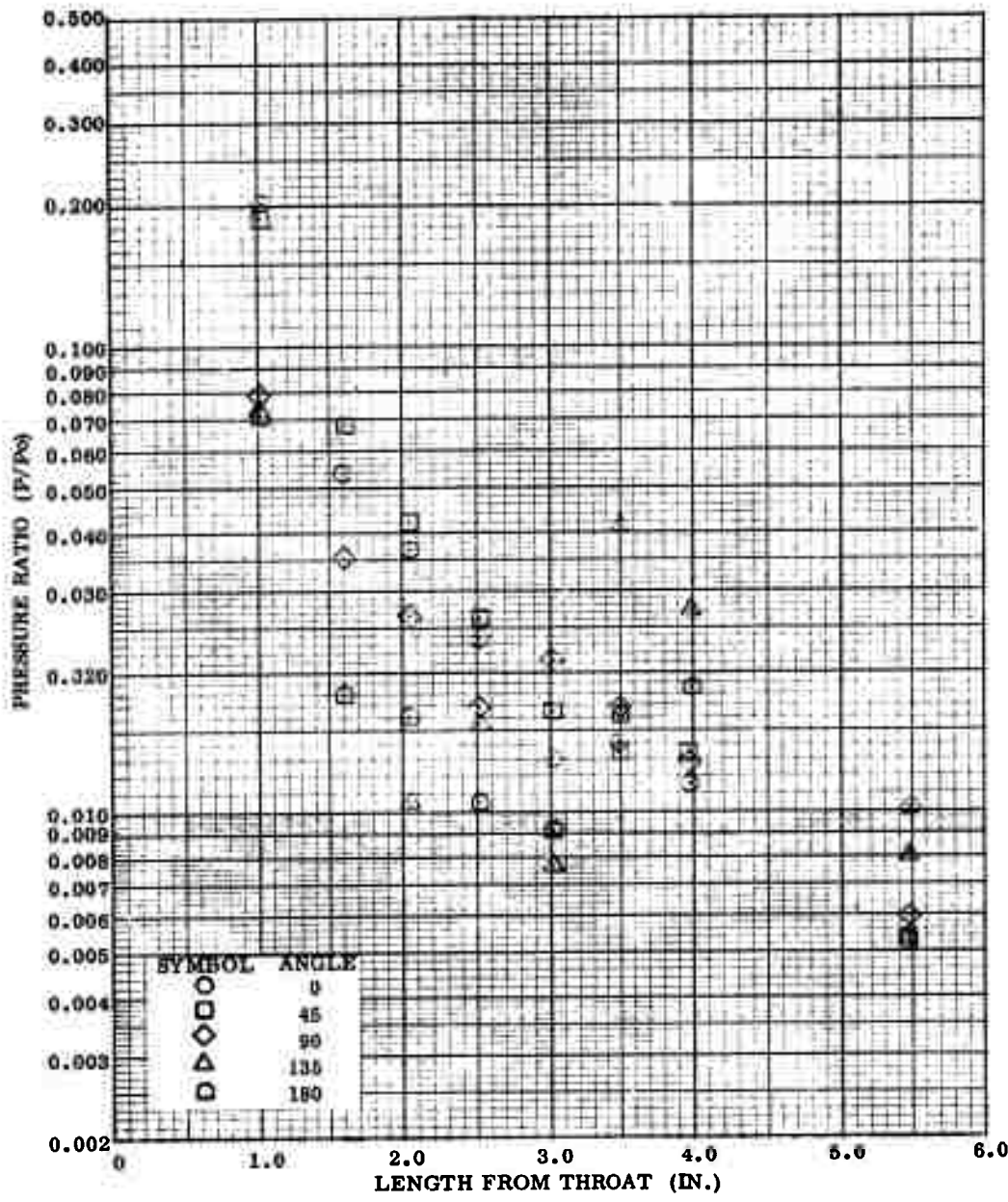
Flex-X Cold Flow Run No. 20 , Vector Angle 0 Degrees



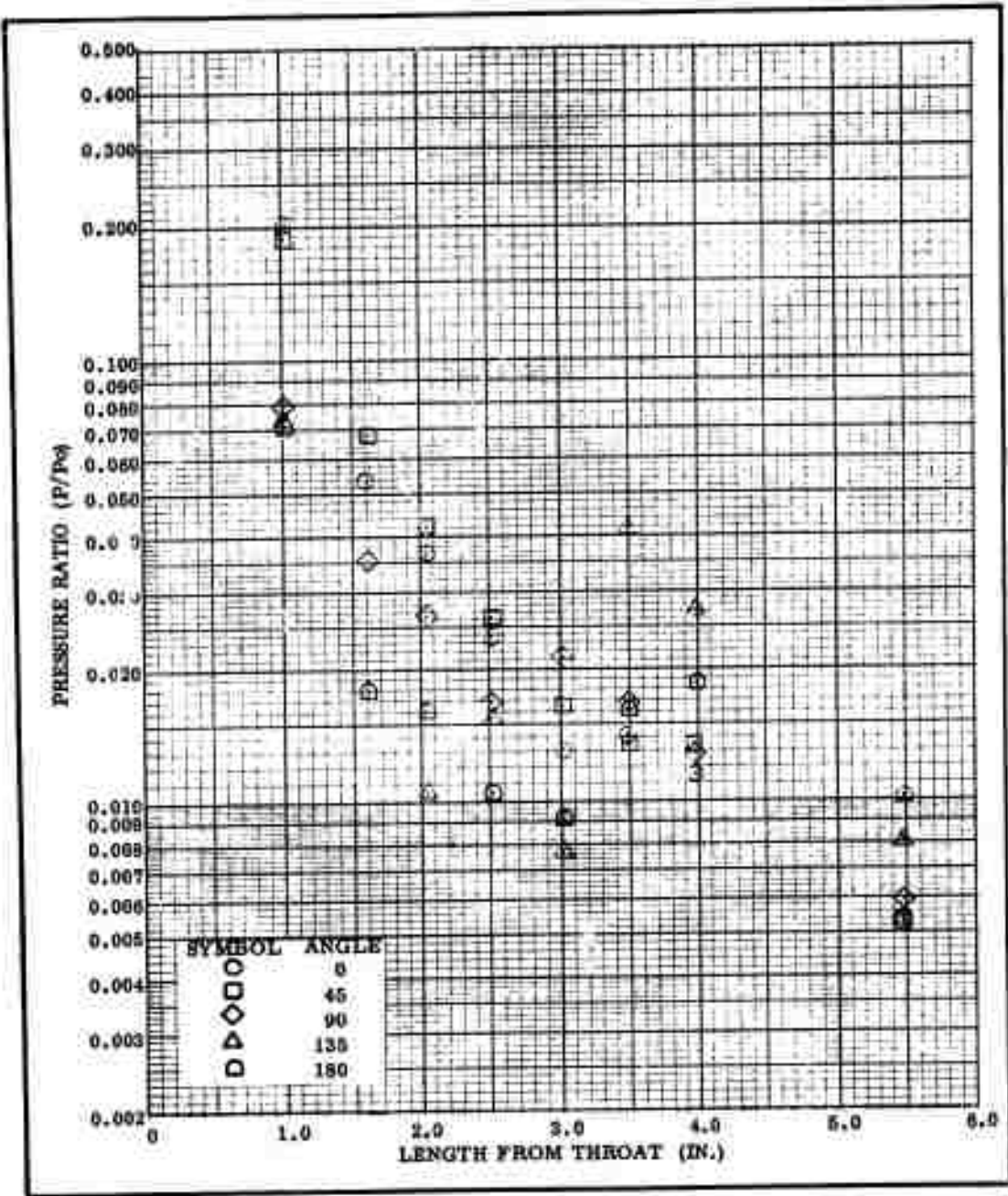
Flex-X Cold Flow Run No. 20 , Vector Angle 2.5 Degrees



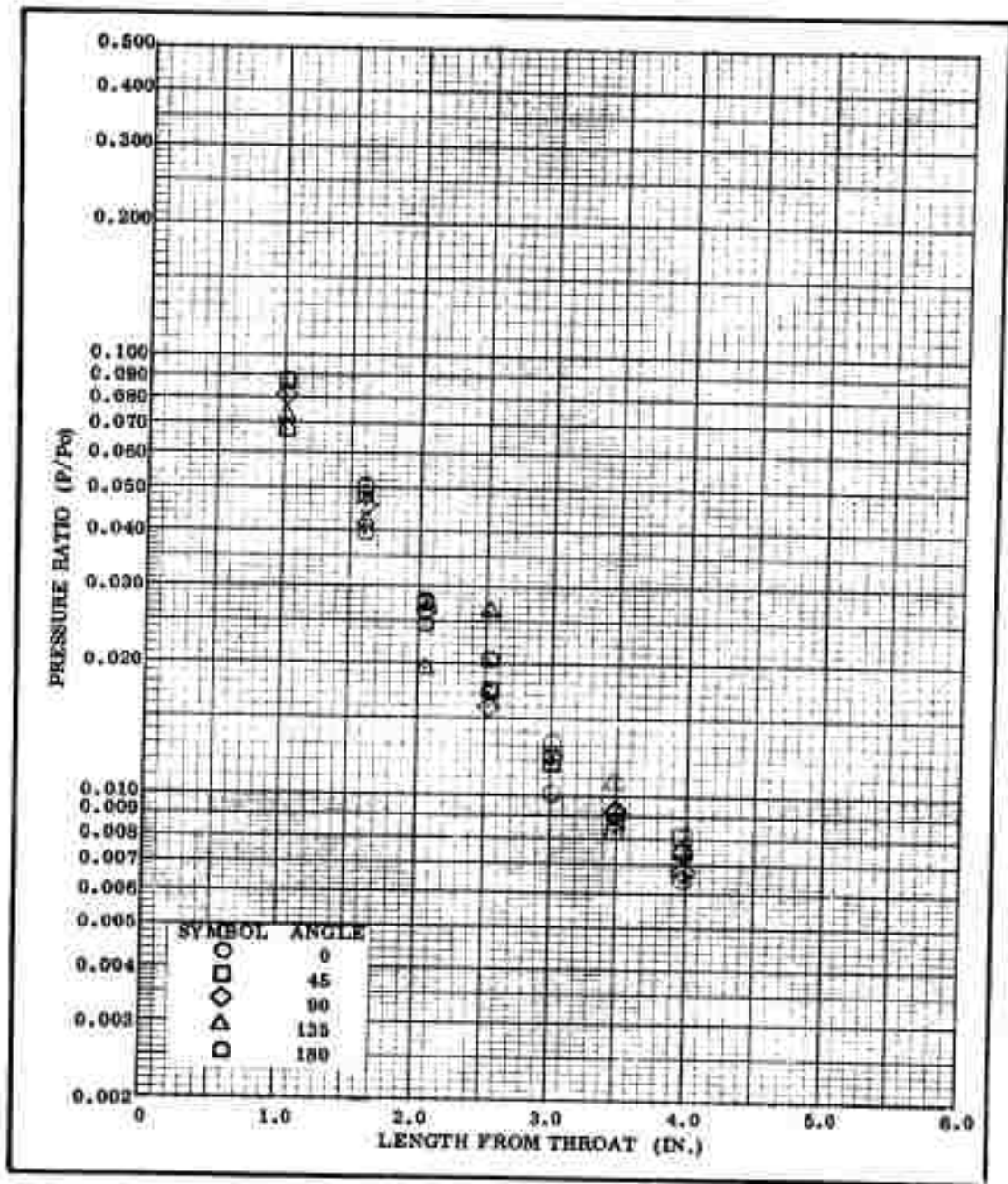
Flex-X Cold Flow Run No. 20, Vector Angle 5 Degrees



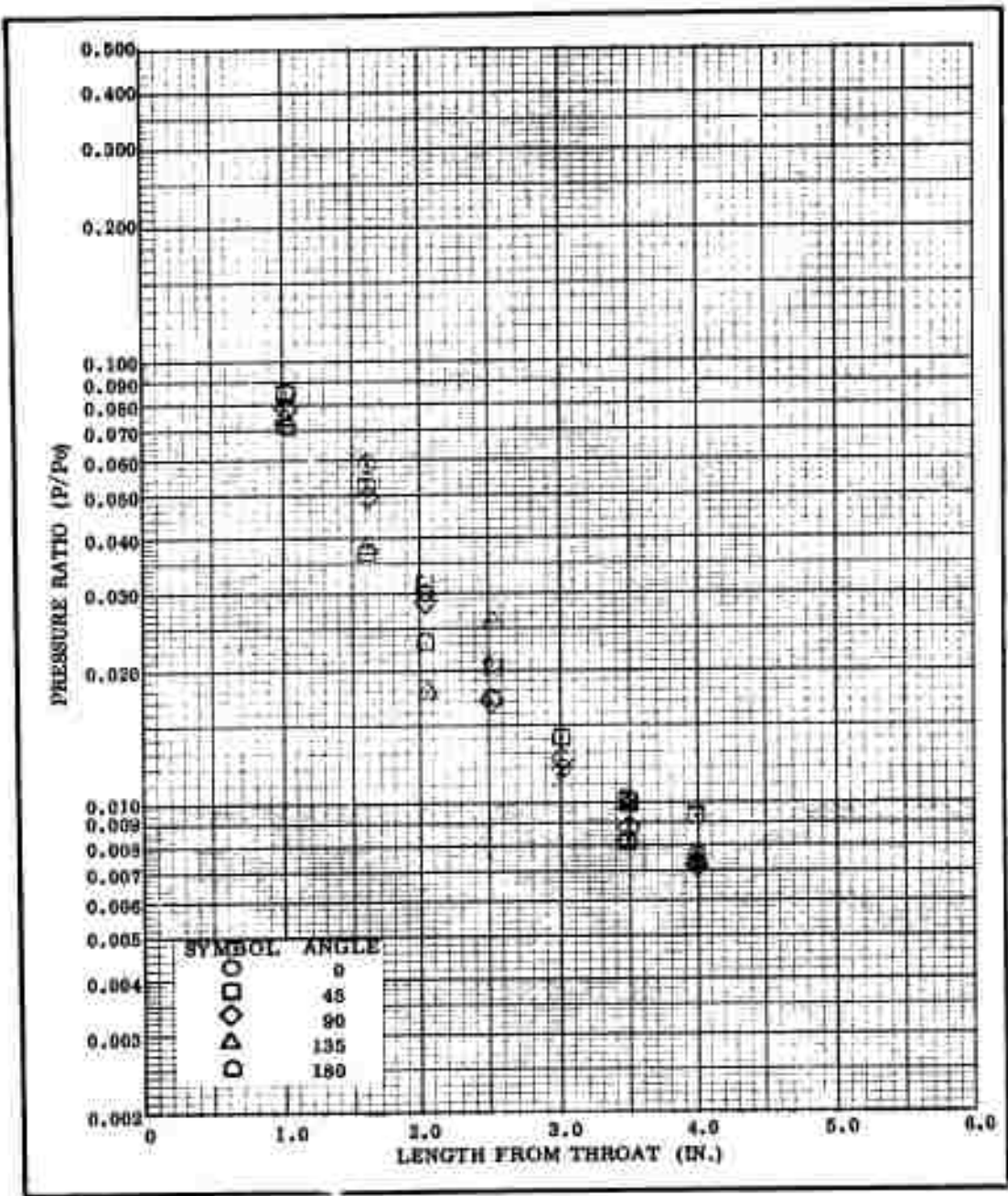
Flex-X Cold Flow Run No. 20 , Vector Angle 10 Degrees



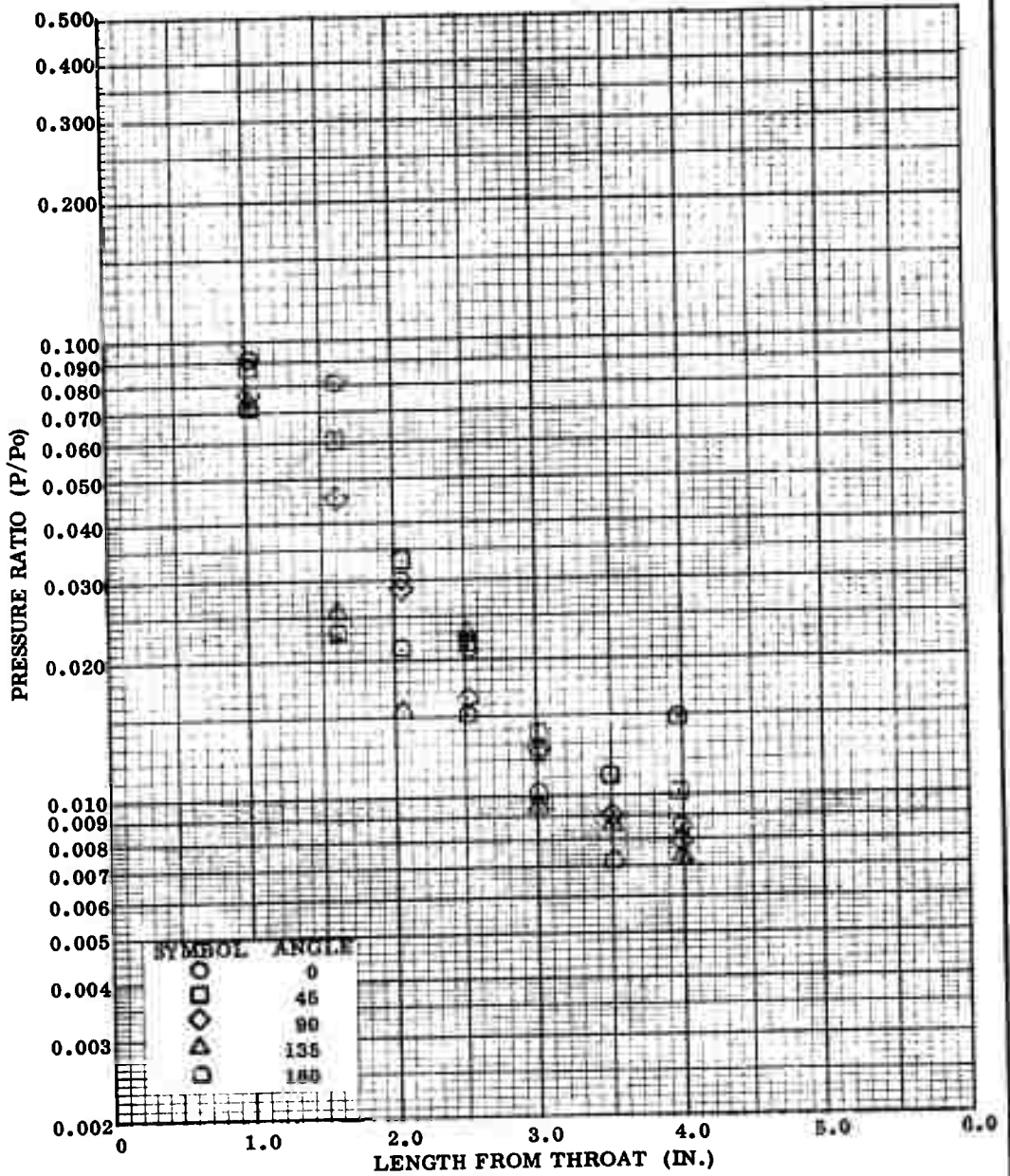
Flex-X Cold Flow Run No. 20 , Vector Angle 10 Degrees



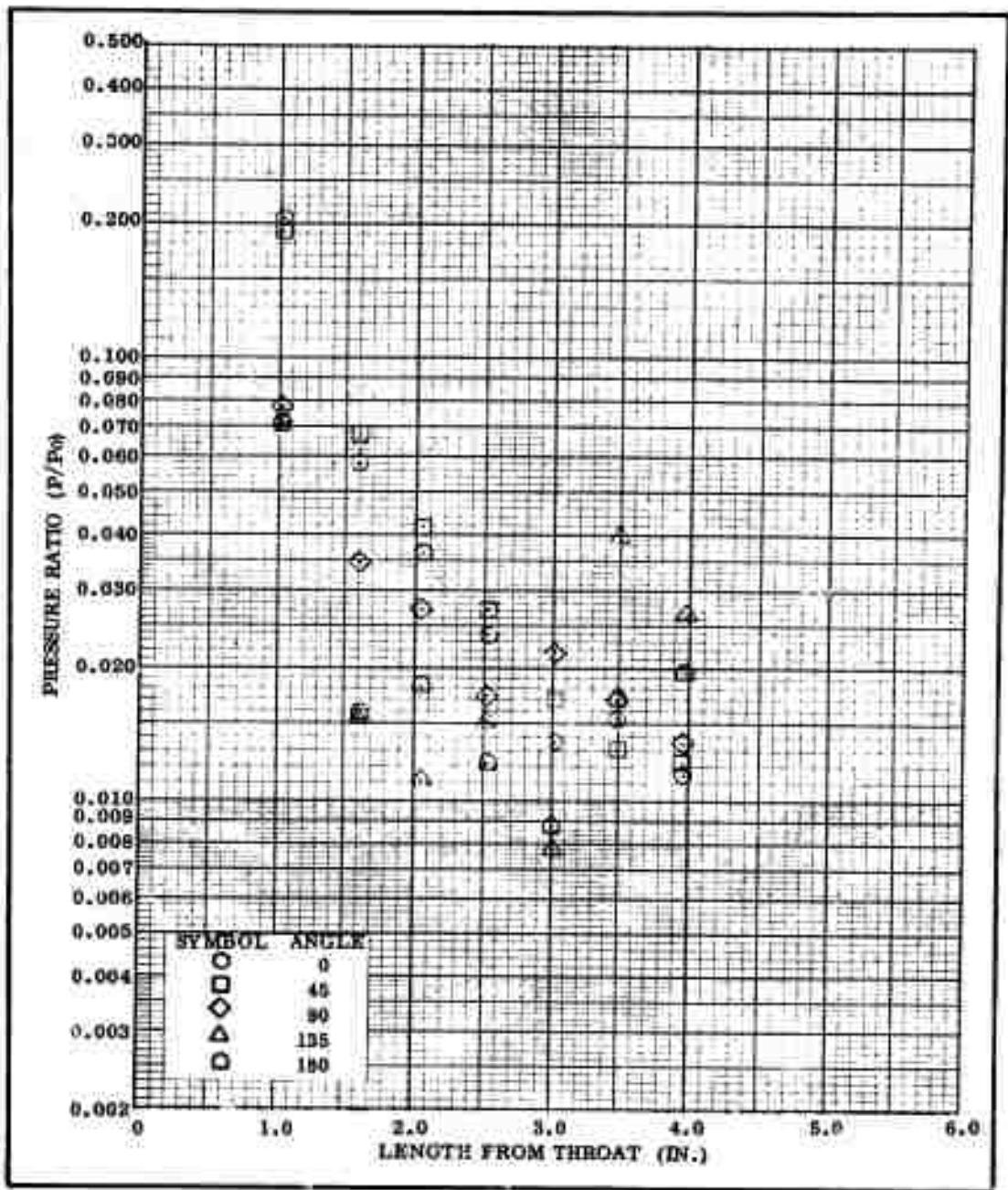
Flex-X Cold Flow Run No. 21 , Vector Angle 0 Degrees



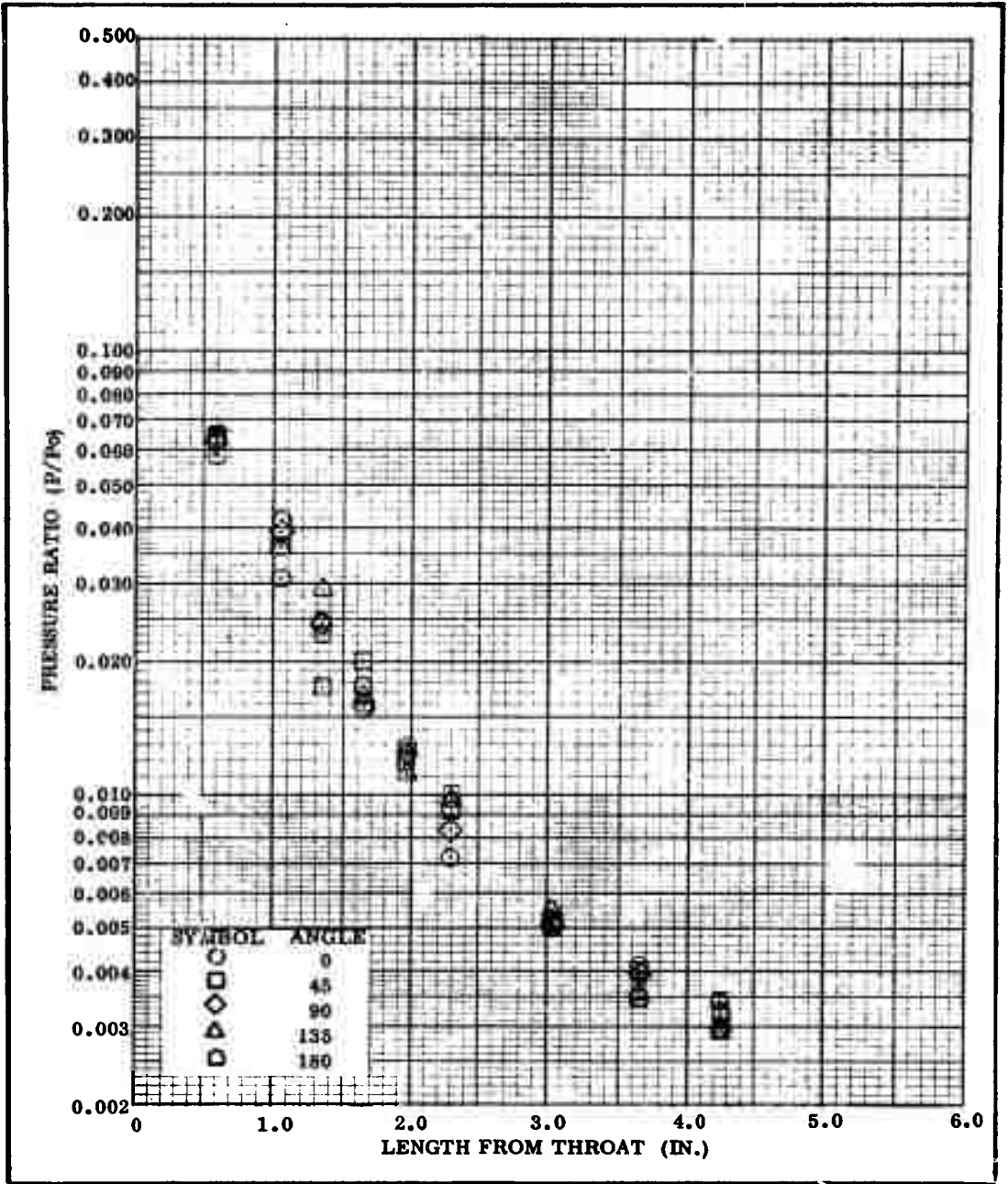
Flex-X Cold Flow Run No. 21 , Vector Angle 2.5 Degrees



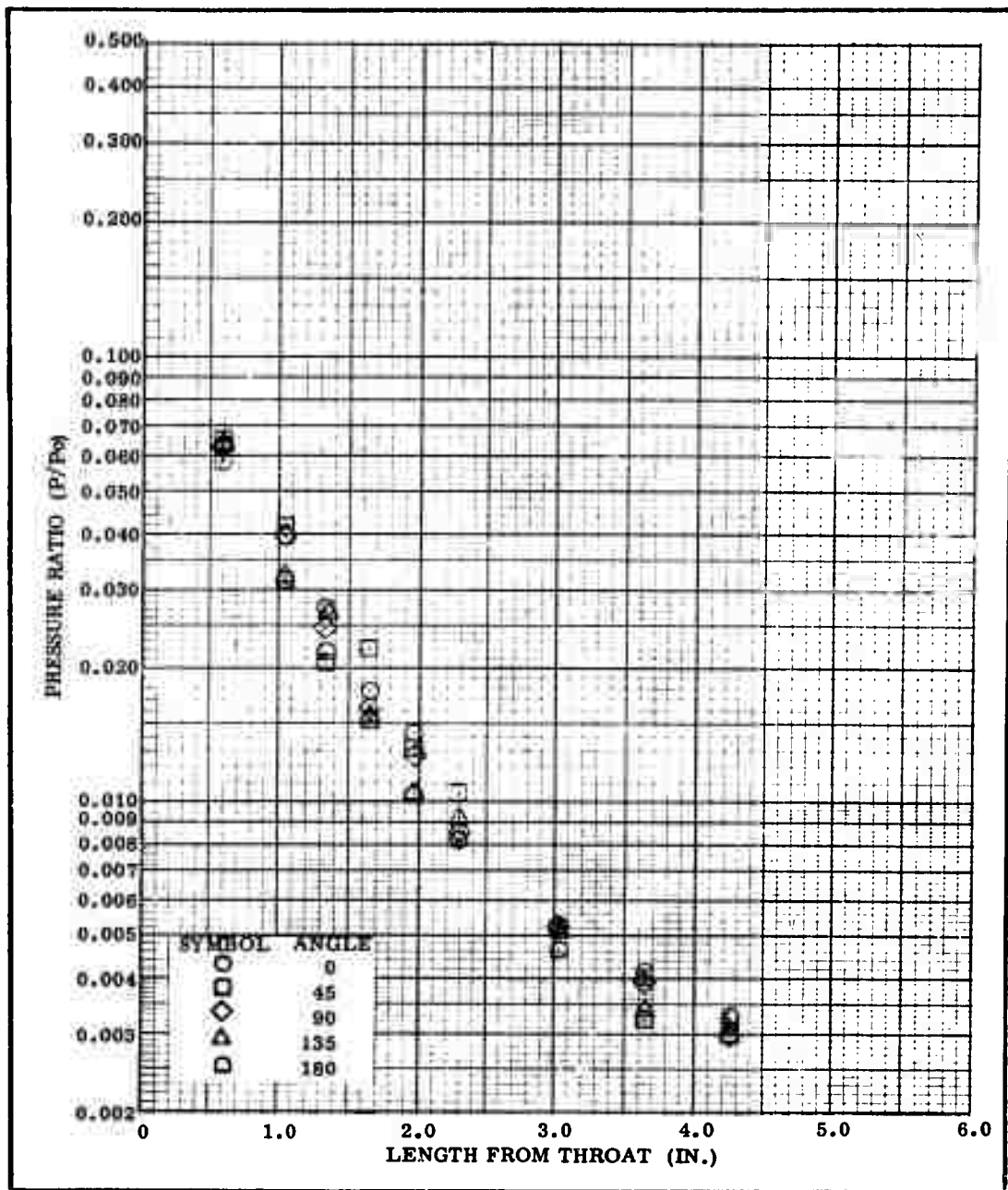
Flex-X Cold Flow Run No. 21 , Vector Angle 5 Degrees



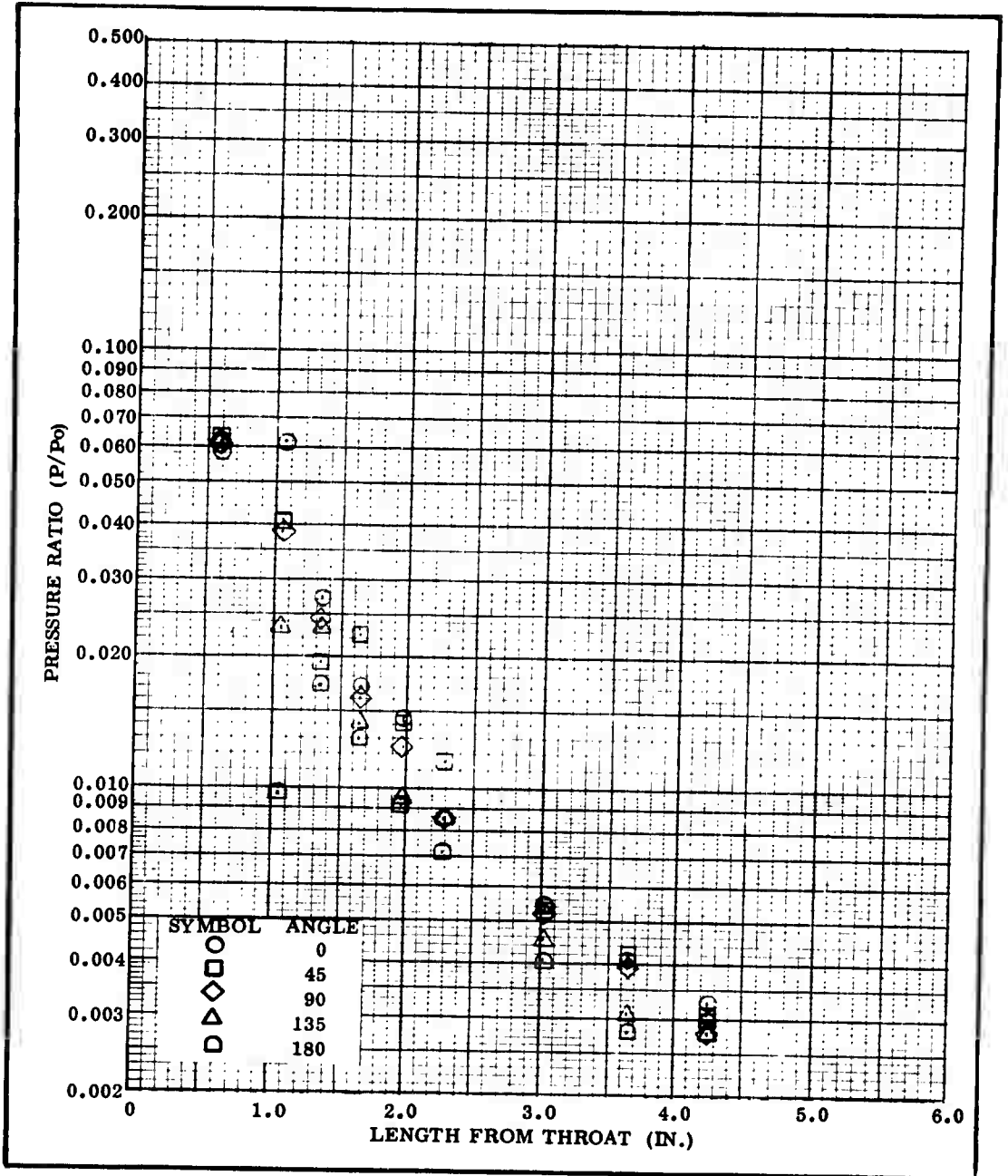
Flex-X Cold Flow Run No. 21 , Vector Angle 10 Degrees



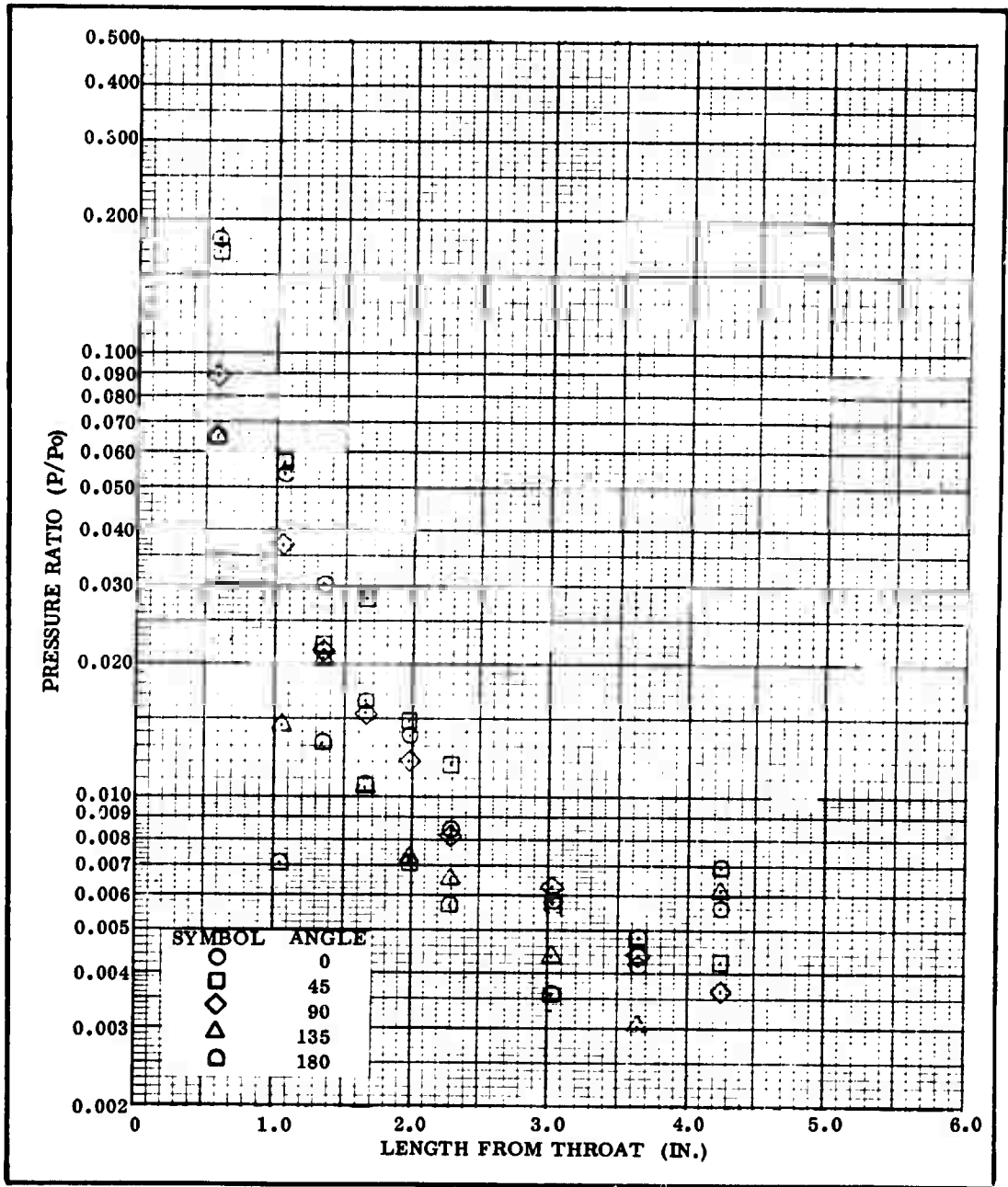
Flex-X Cold Flow Run No. 22 , Vector Angle 0 Degrees



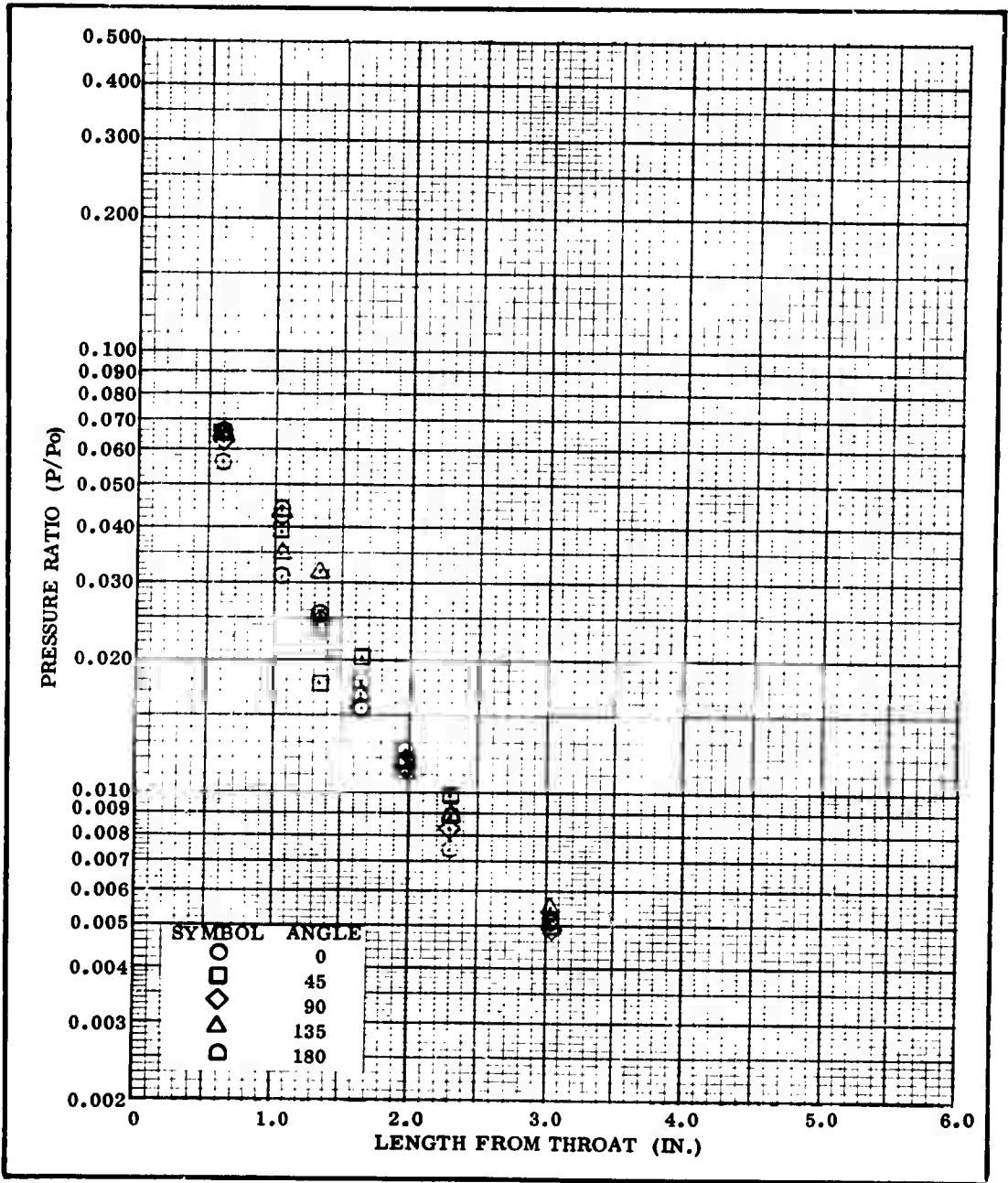
Flex-X Cold Flow Run No. 22 , Vector Angle 2.5 Degrees



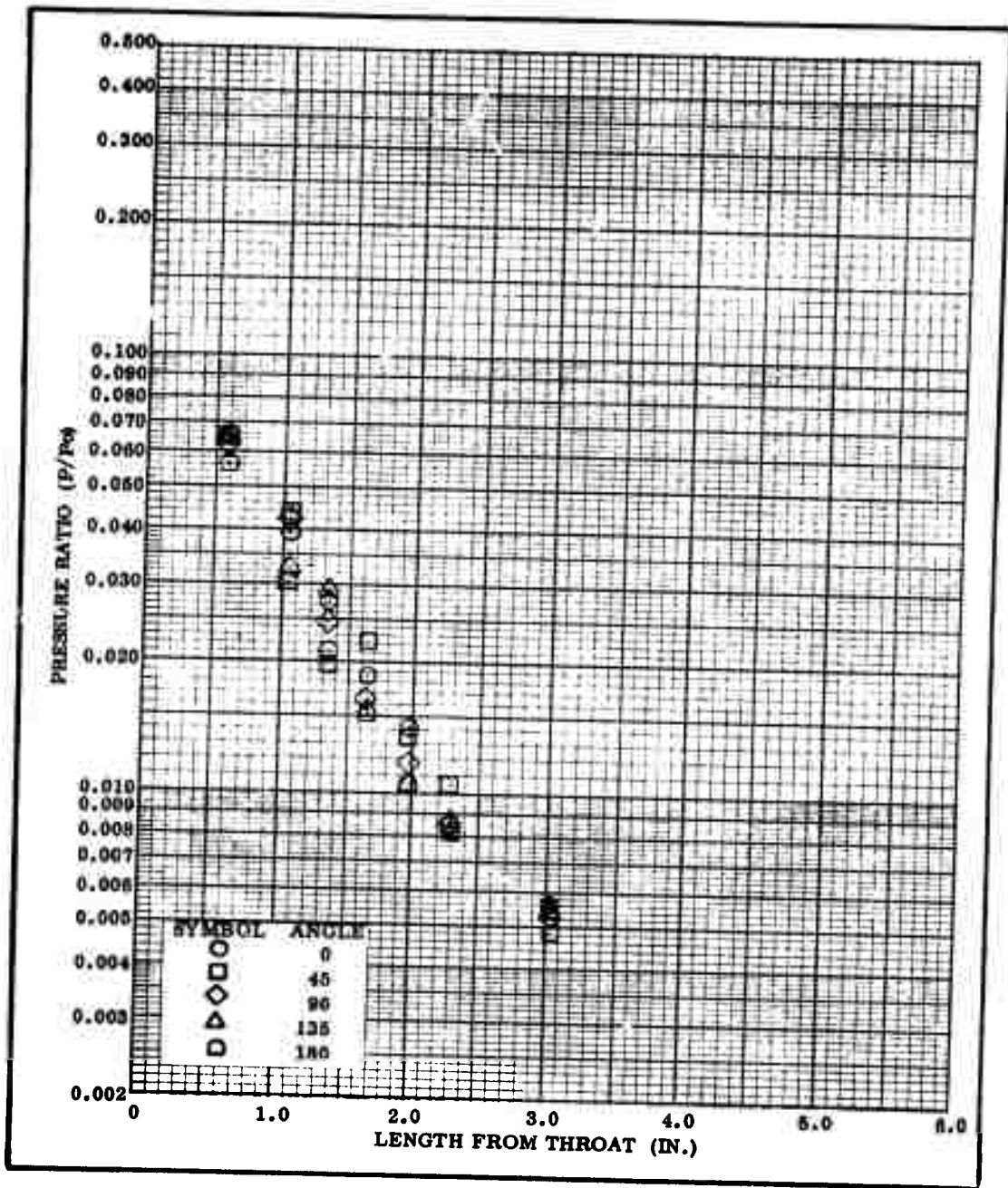
Flex-X Cold Flow Run No. 22 , Vector Angle 5 Degrees



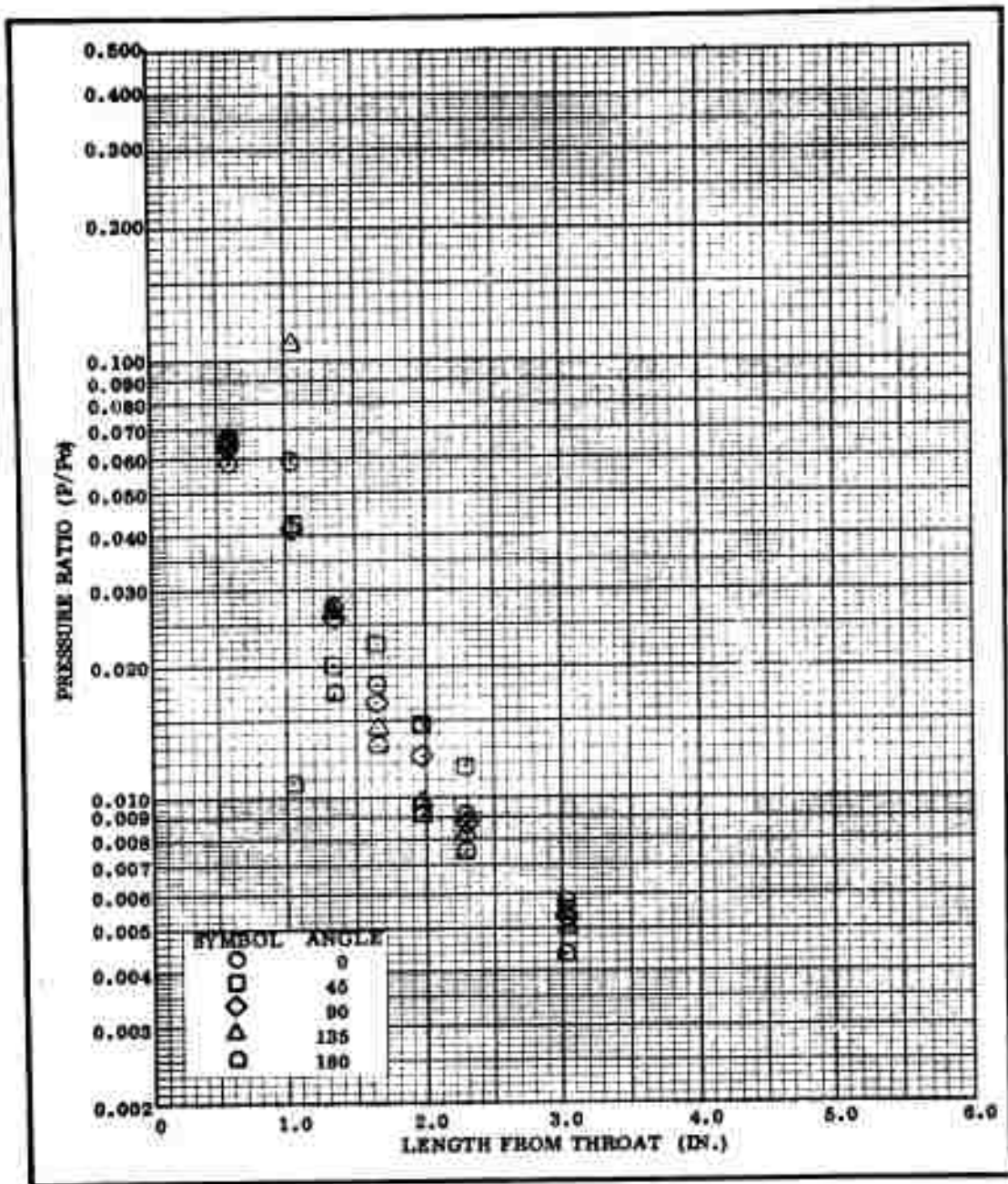
Flex-X Cold Flow Run No. 22 , Vector Angle 10 Degrees



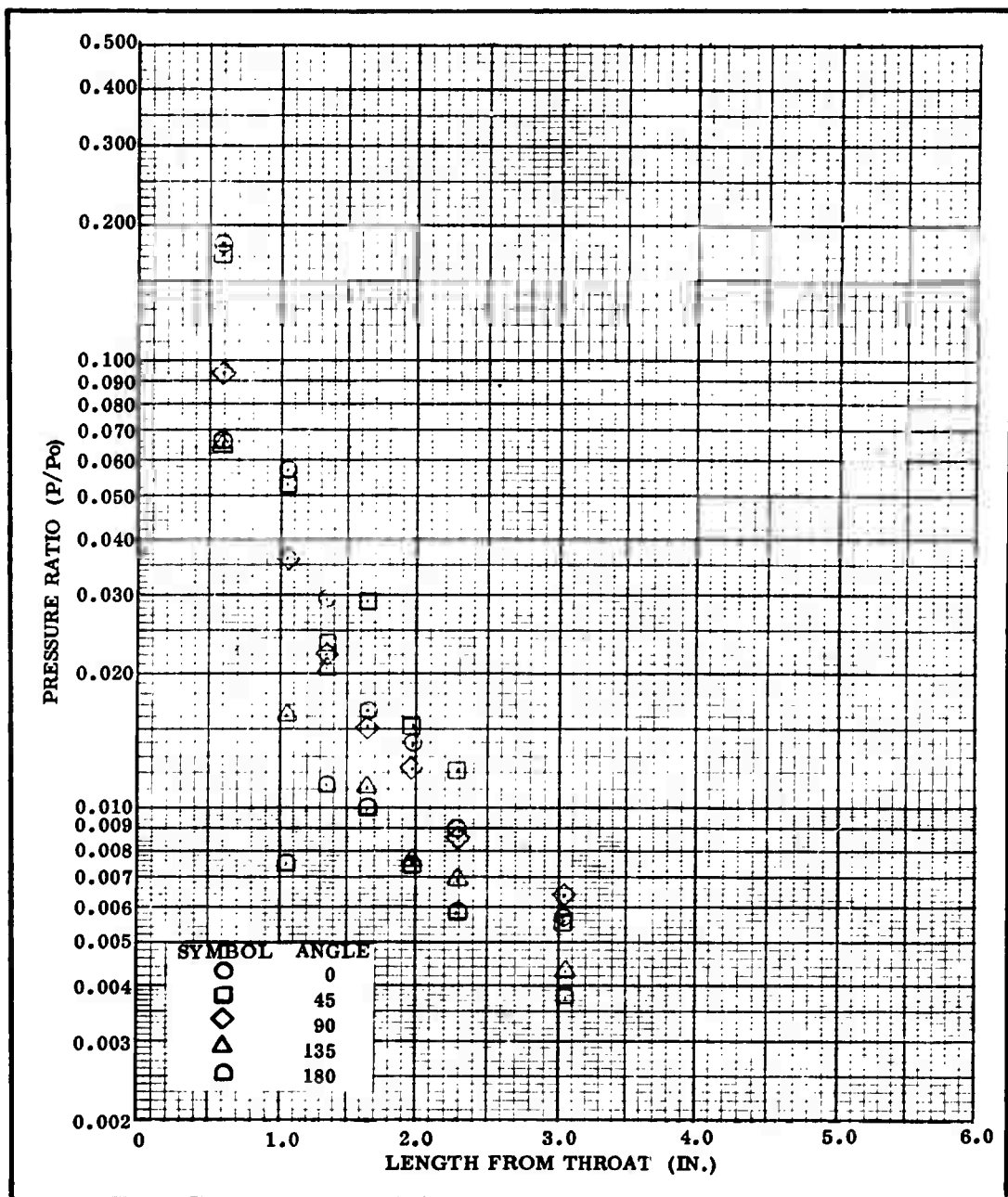
Flex-X Cold Flow Run No. 23, Vector Angle 0 Degrees



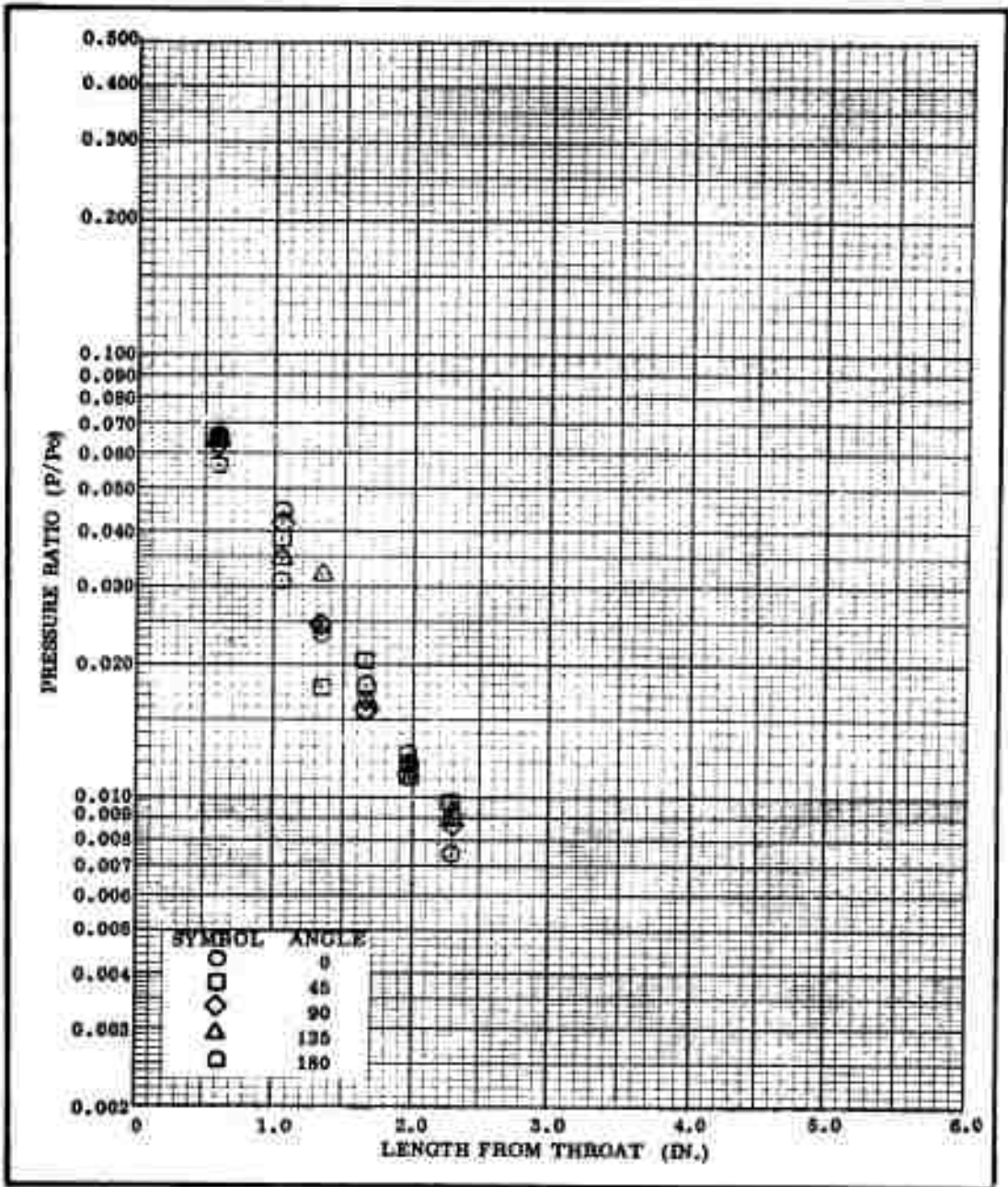
Flex-X Cold Flow Run No. 23, Vector Angle 2.5 Degrees



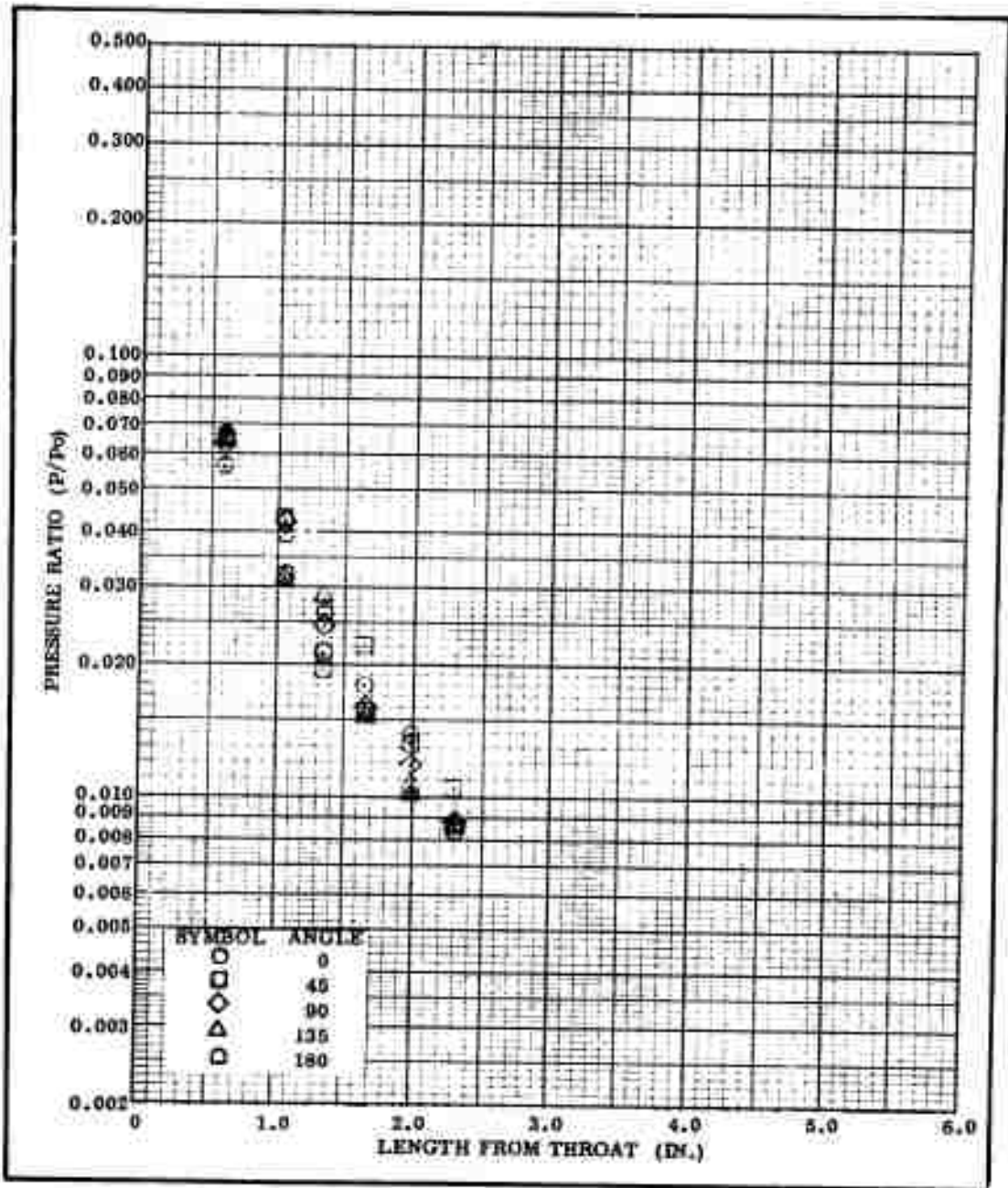
Flex-X Cold Flow Run No. 23 , Vector Angle 5 Degrees



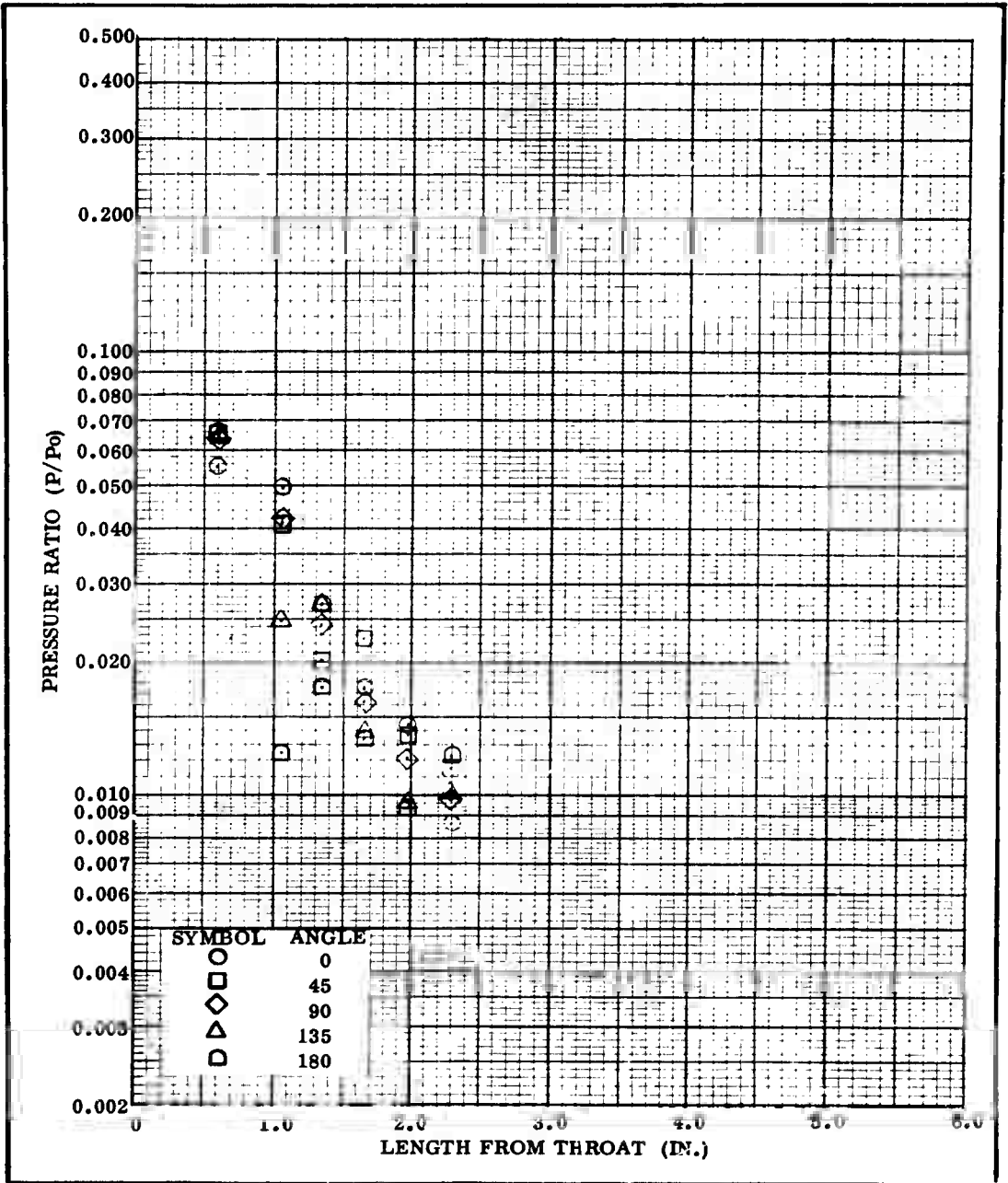
Flex-X Cold Flow Run No. 23 , Vector Angle 10 Degrees



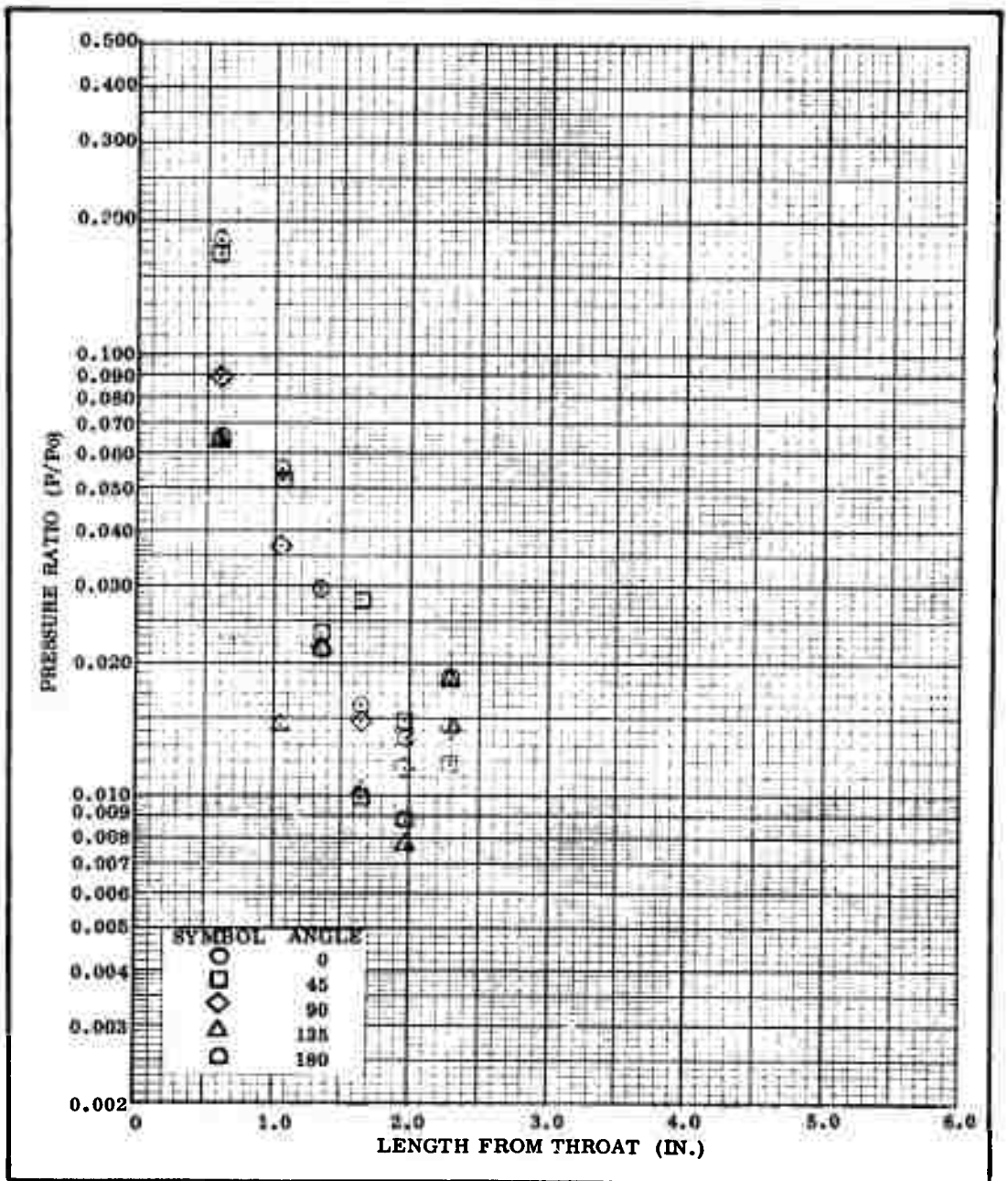
Flex-X Cold Flow Run No. 24 , Vector Angle 0 Degrees



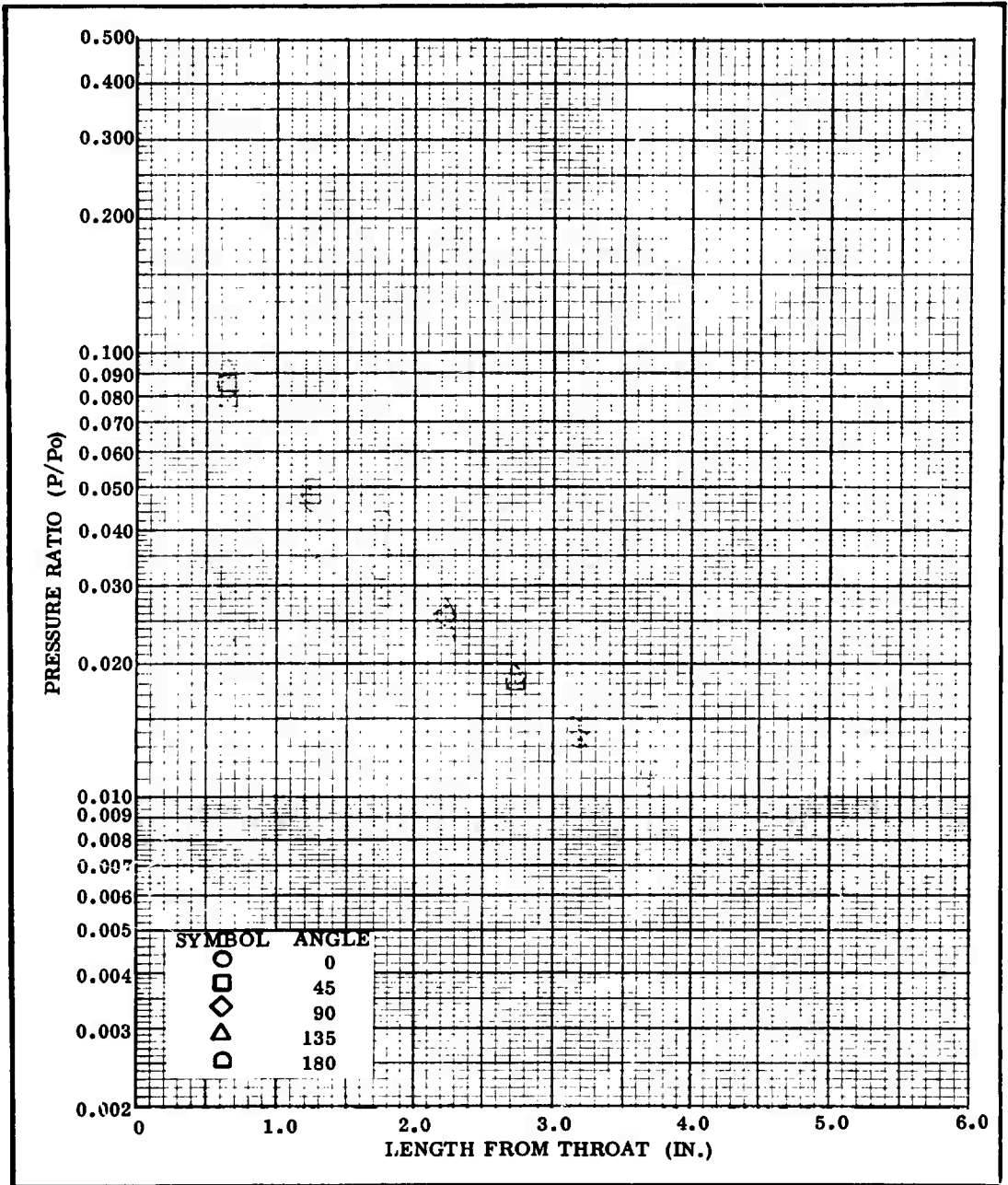
Flex-X Cold Flow Run No. 24 , Vector Angle 2.5 Degrees



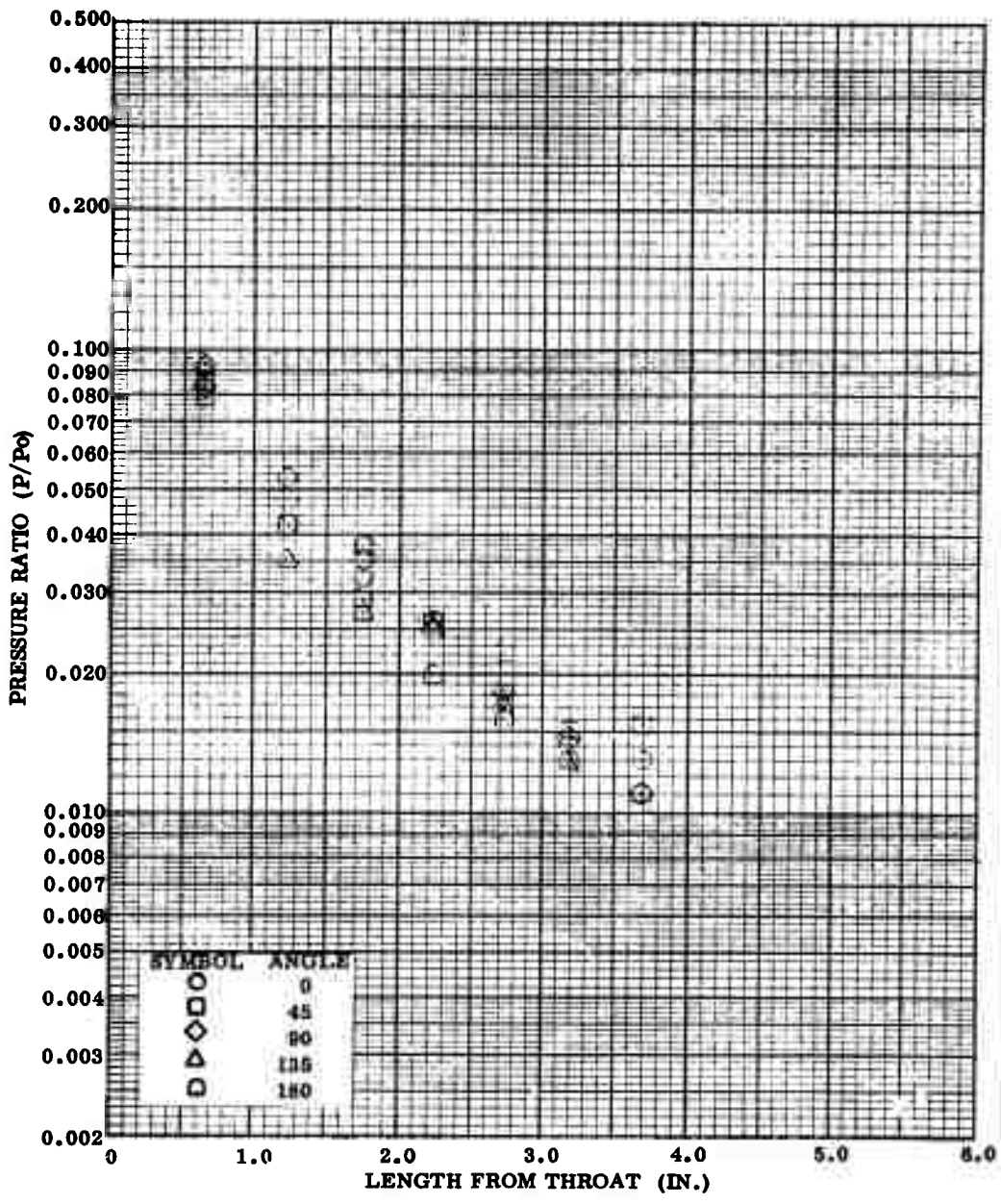
Flex-X Cold Flow Run No. 24 , Vector Angle 5 Degrees



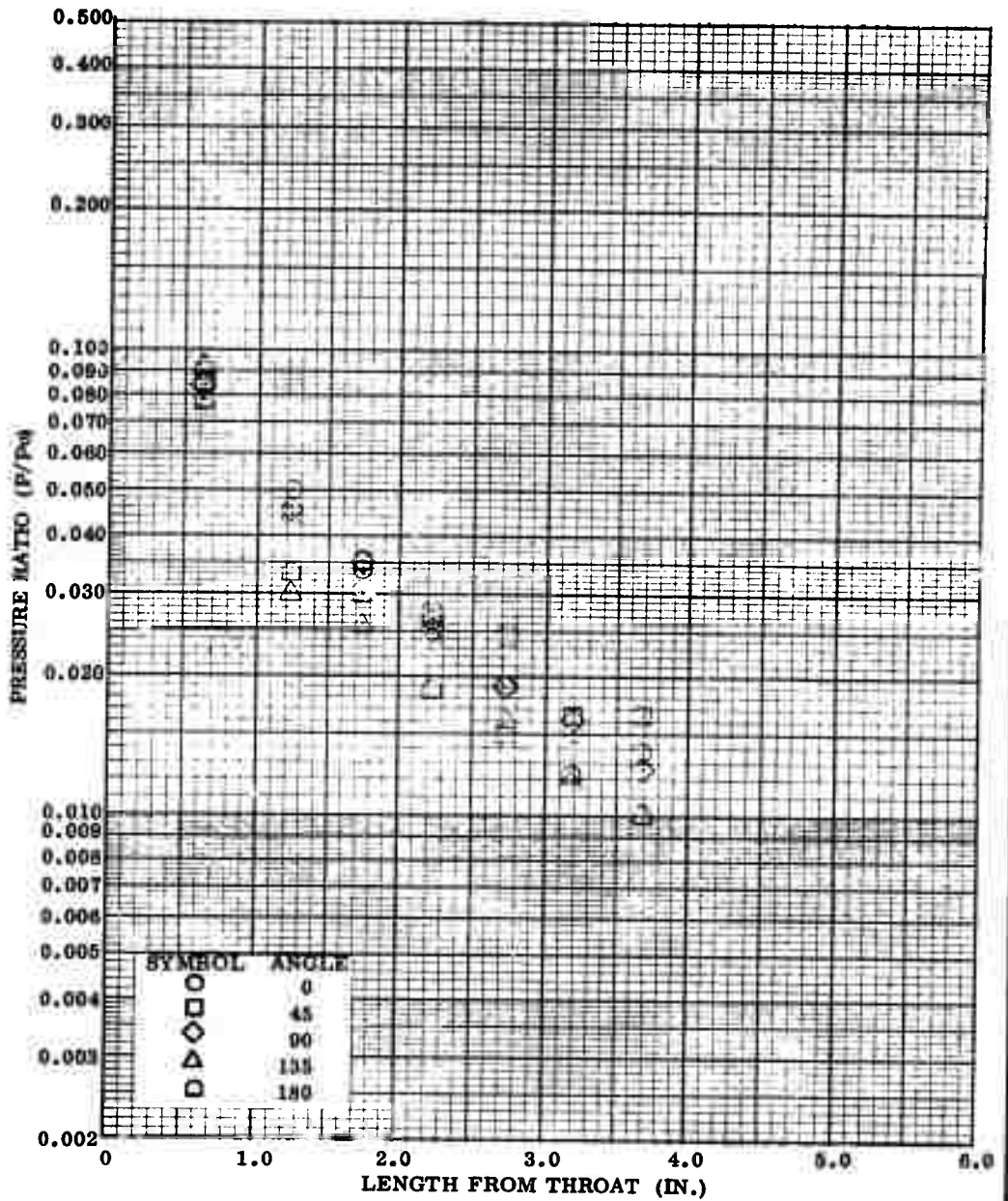
Flex-X Cold Flow Run No. 24 , Vector Angle 10 Degrees



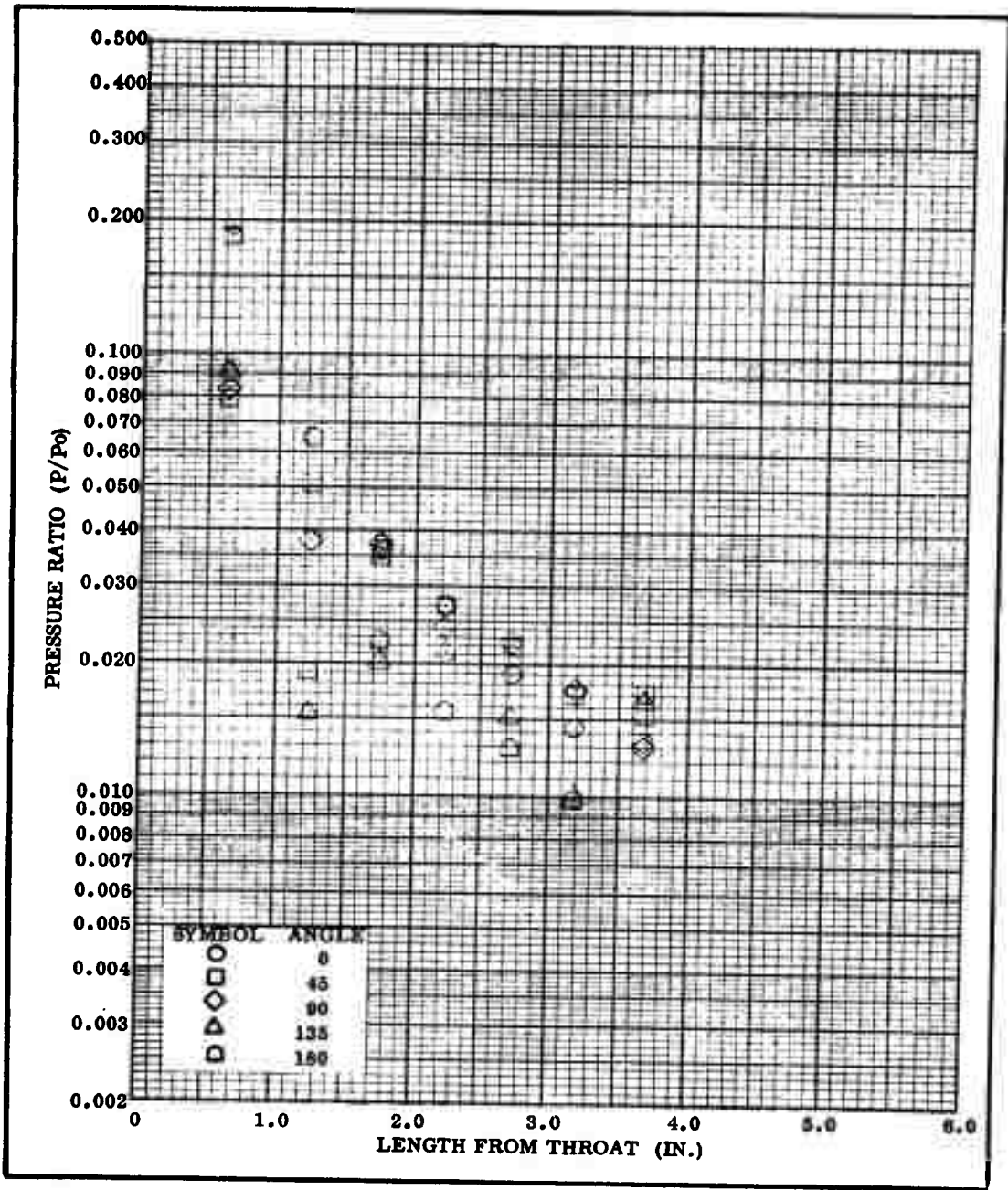
Flex-X Cold Flow Run No. 25 , Vector Angle 0 Degrees



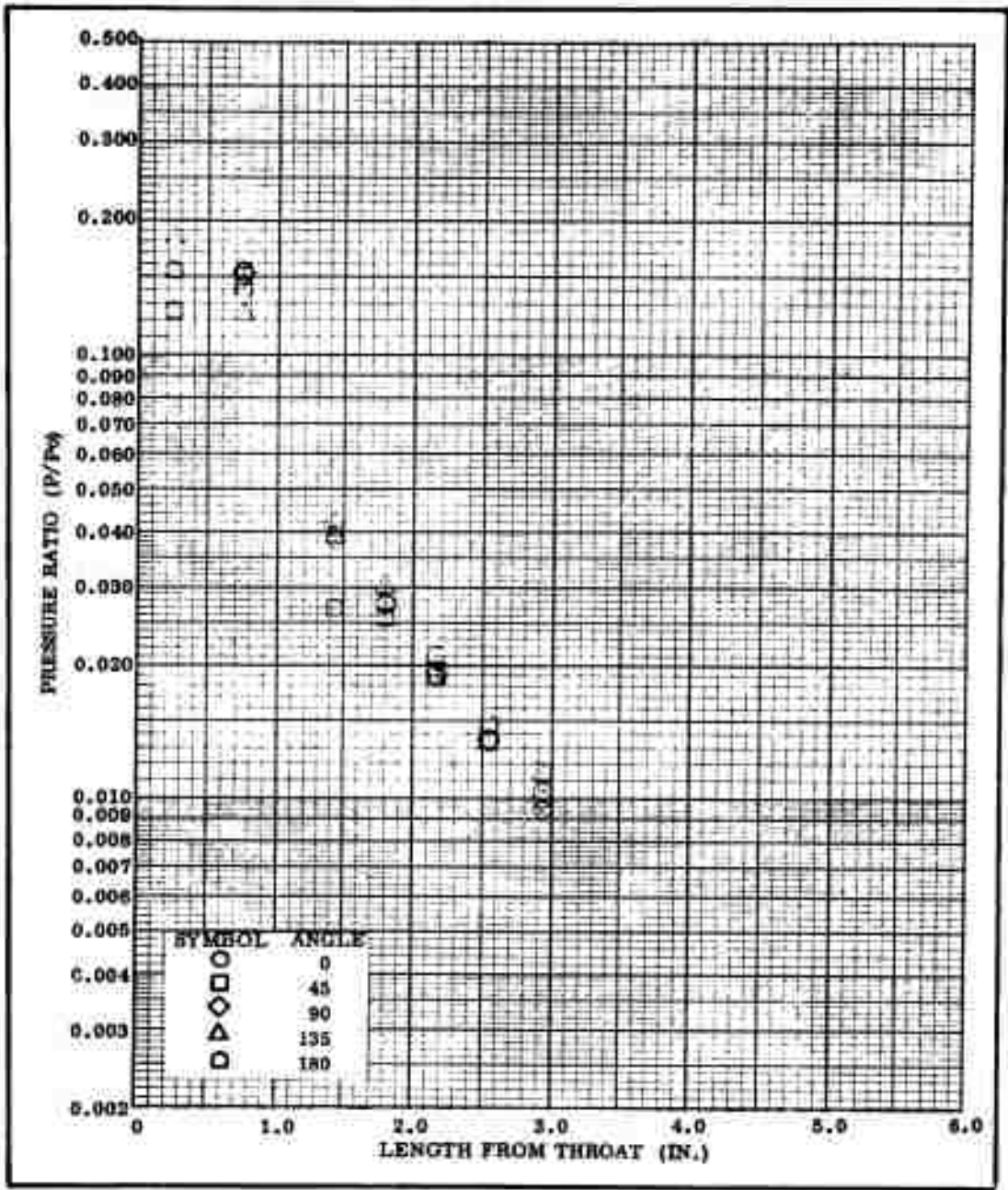
Flex-X Cold Flow Run No. 25 , Vector Angle 2.5 Degrees



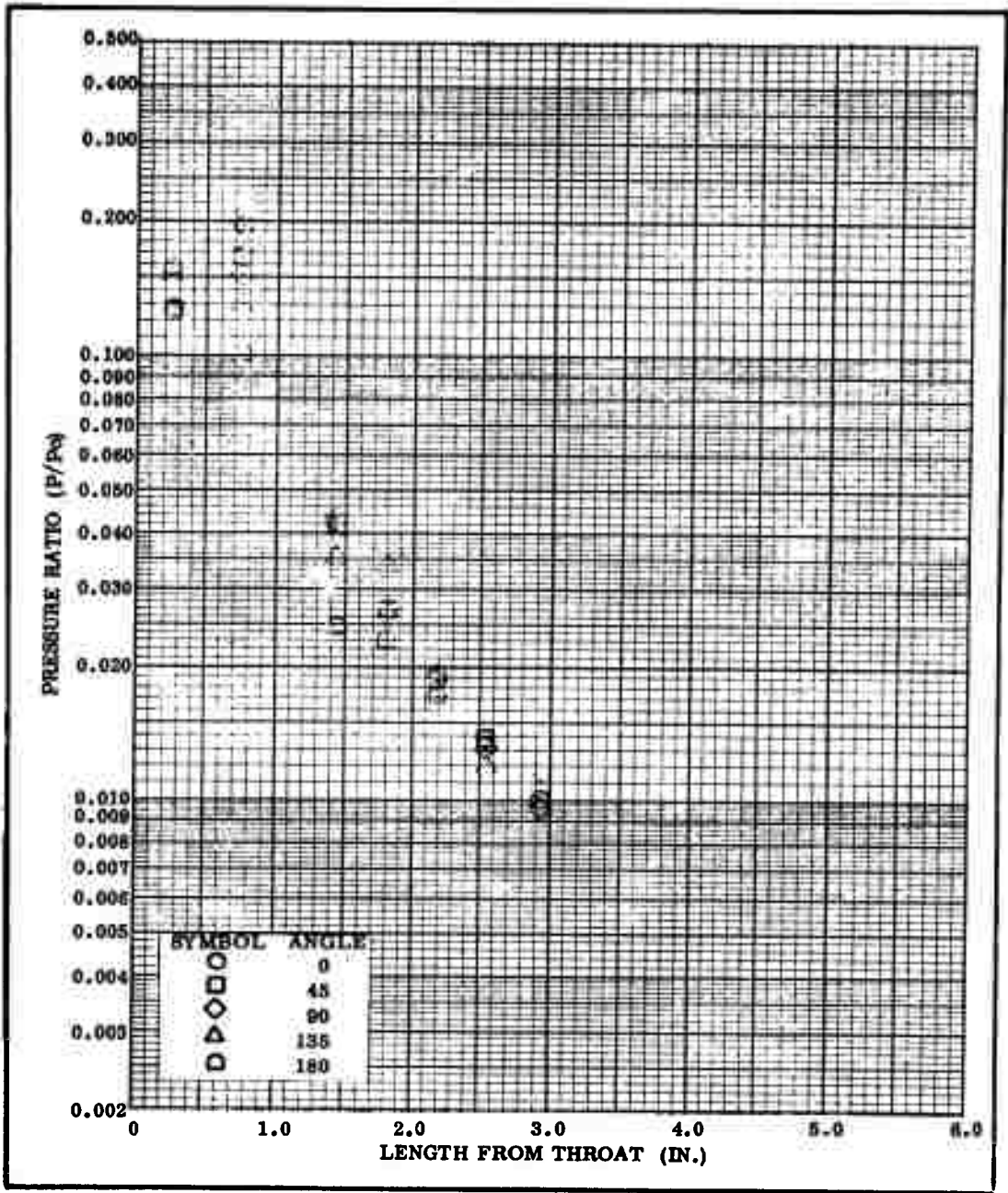
Flex-X Cold Flow Run No. 25 , Vector Angle 5 Degrees



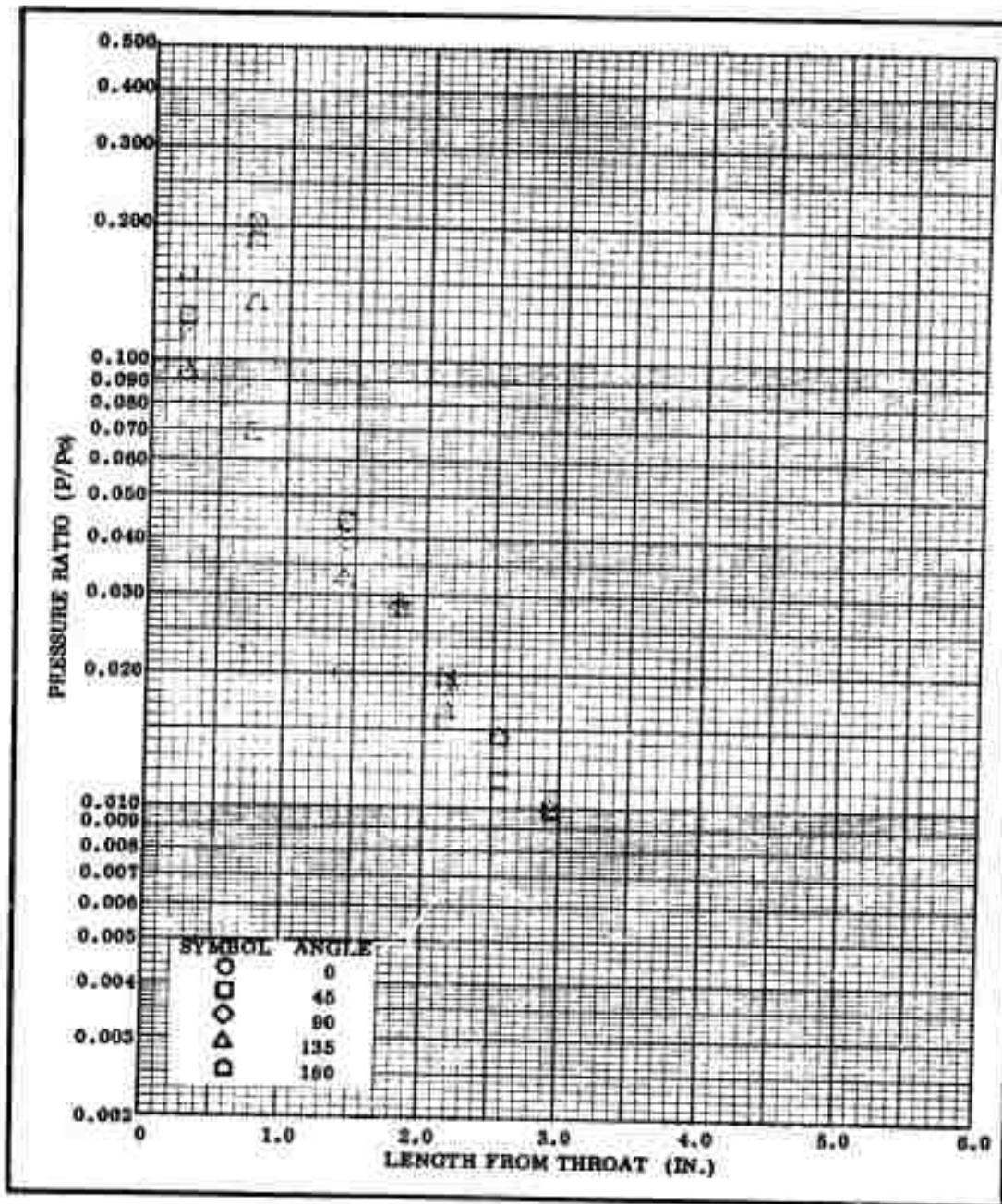
Flex-X Cold Flow Run No. 25 , Vector Angle 10 Degrees



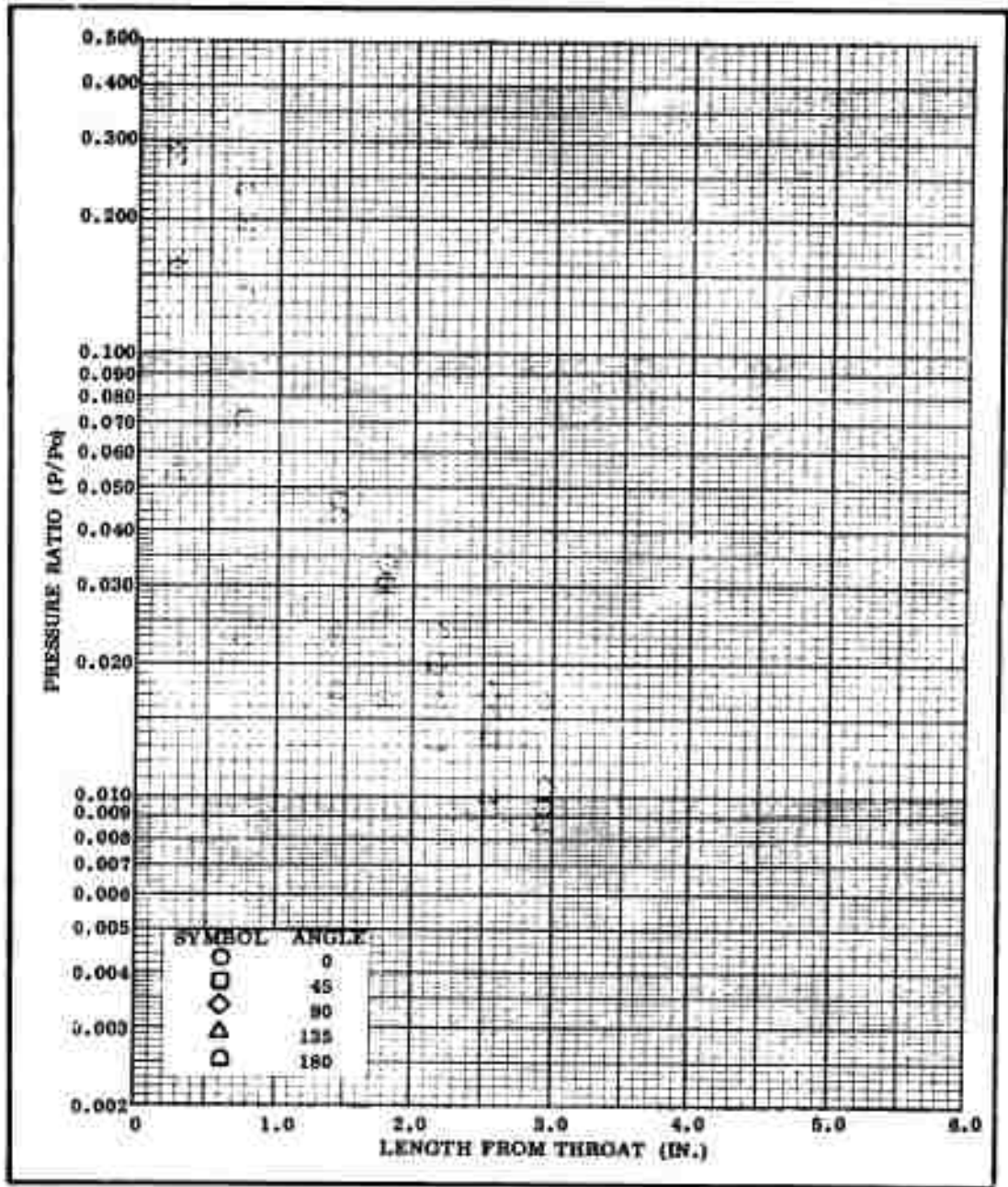
Flex-X Cold Flow Run No. 26 , Vector Angle 0 Degrees



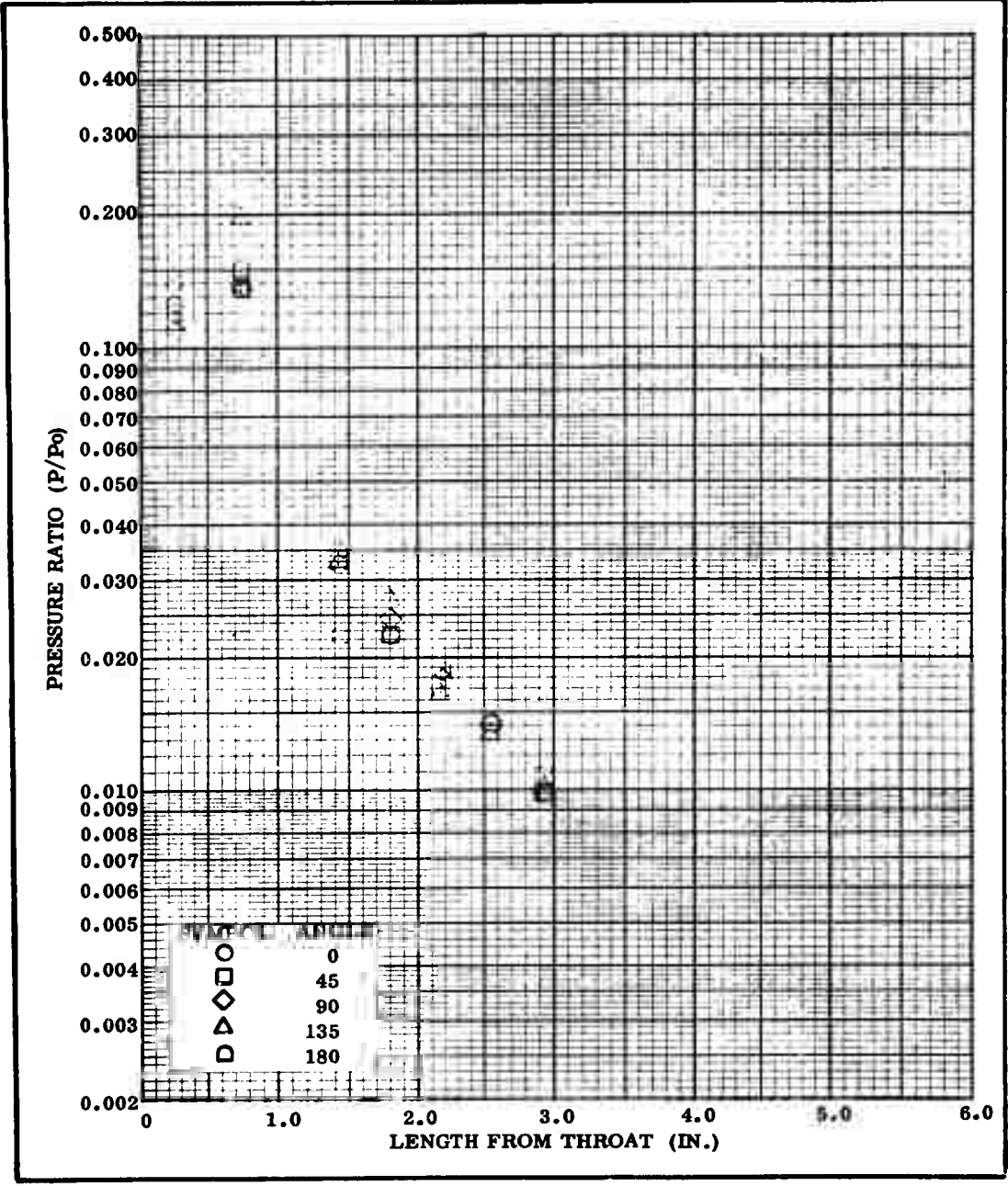
Flex-X Cold Flow Run No. 26 , Vector Angle 2.5 Degrees



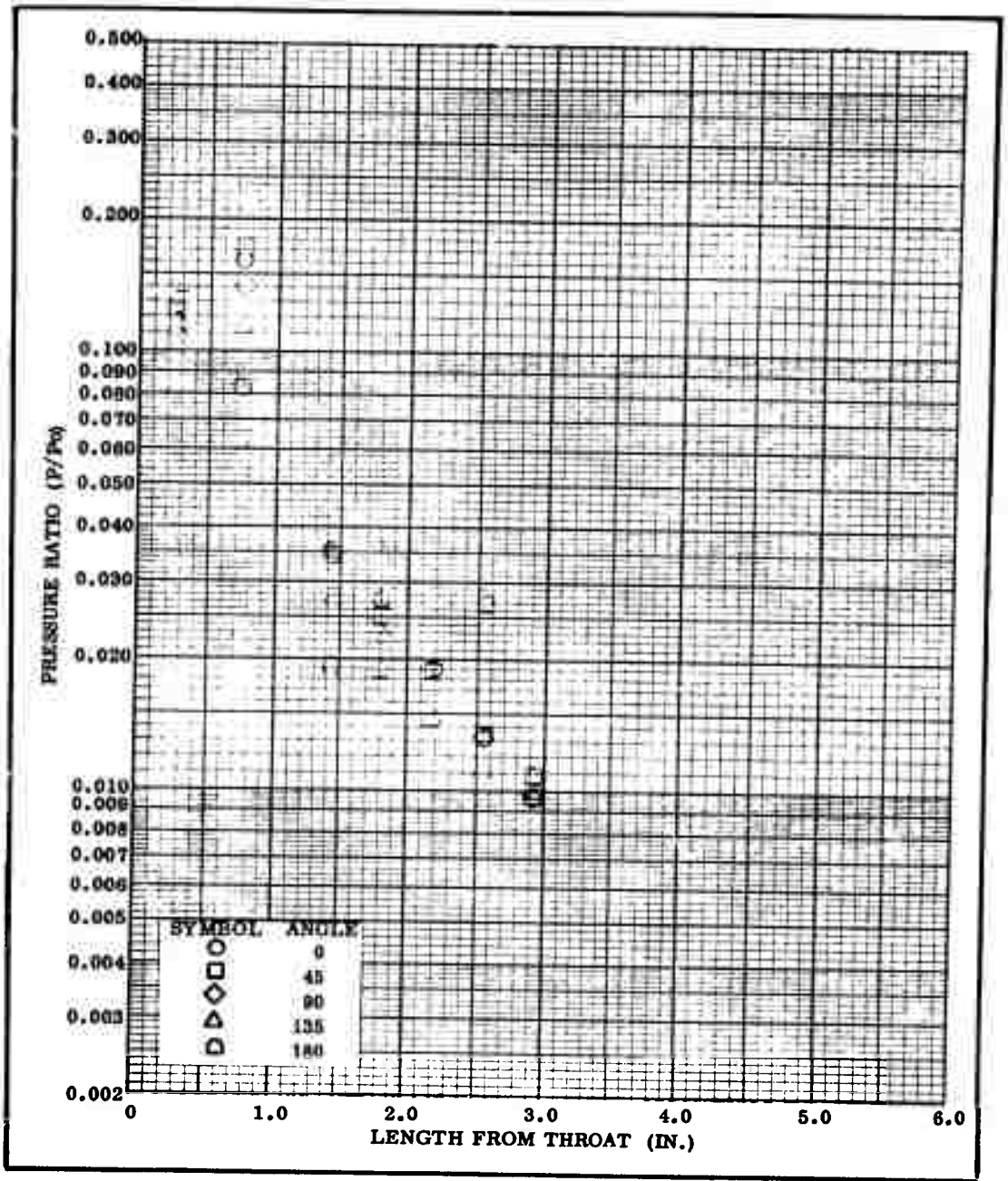
Flex-X Cold Flow Run No. 26 , Vector Angle 5 Degrees



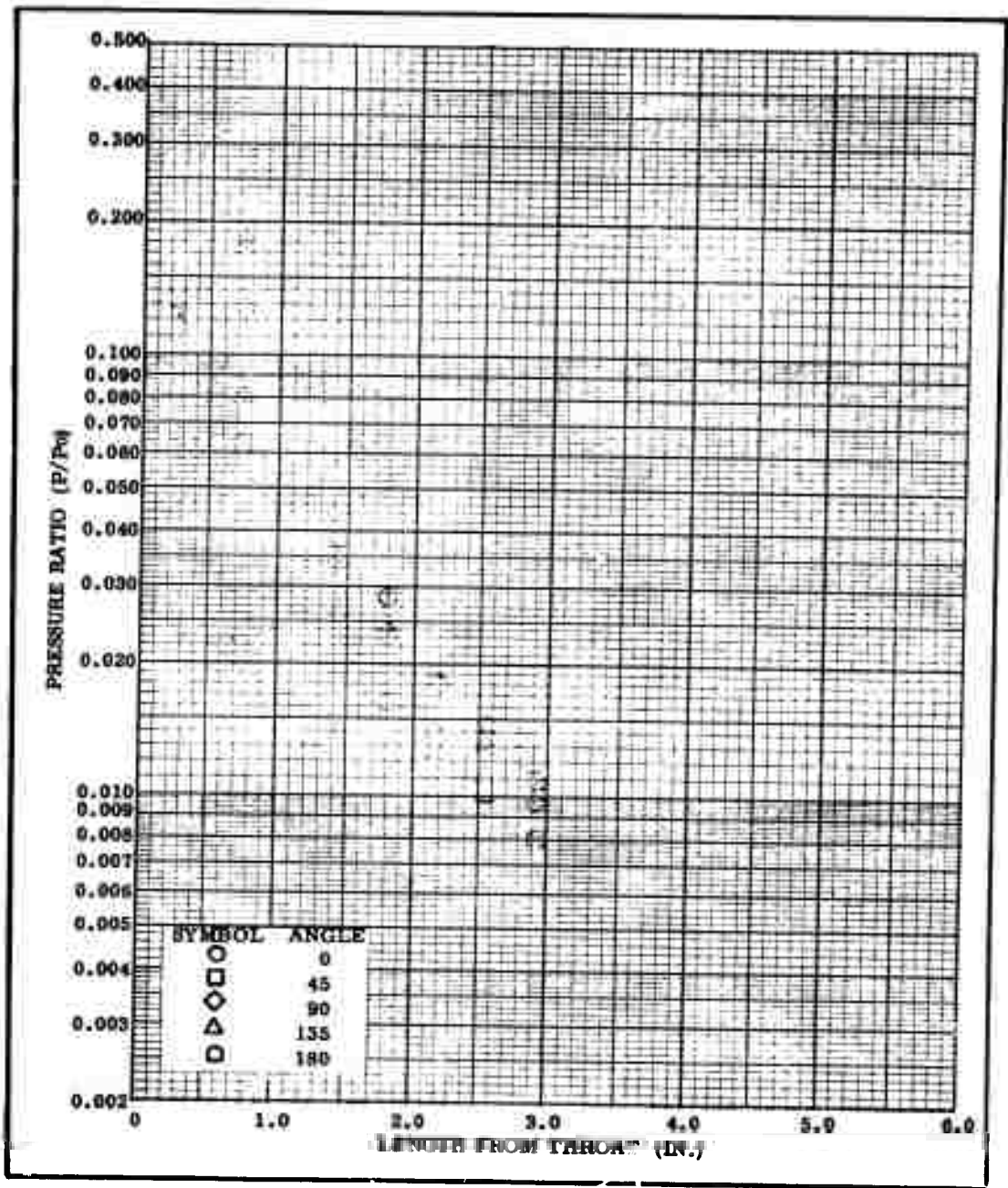
Flex-X Cold Flow Run No. 26 , Vector Angle 10 Degrees



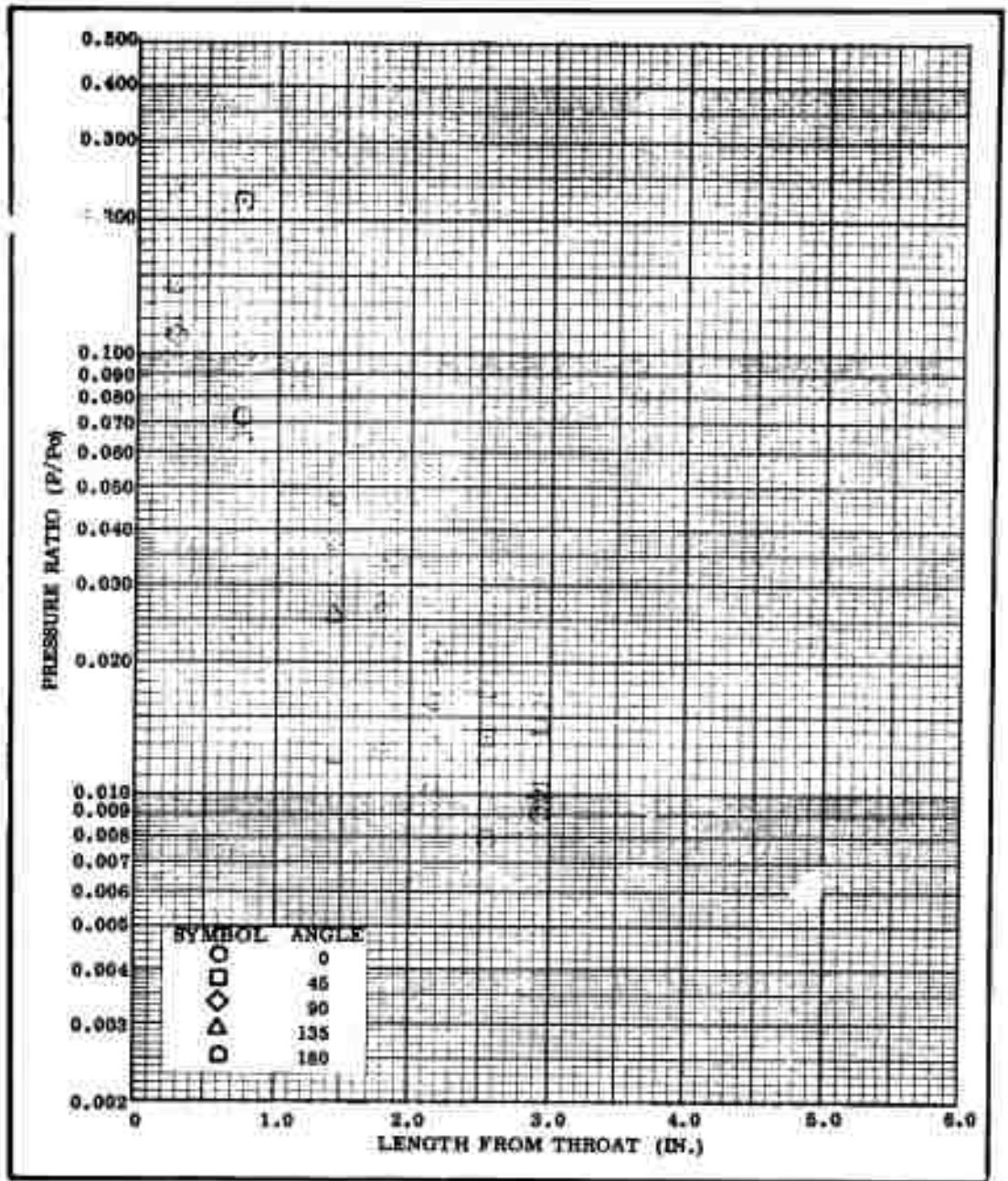
Flex-X Cold Flow Run No. 27 , Vector Angle 0 Degrees



Flex-X Cold Flow Run No. 27 , Vector Angle 2.5 Degrees



Flex-X Cold Flow Run No. 27 , Vector Angle 5 Degrees



Flex-X Cold Flow Run No. 27 , Vector Angle 10 Degrees