

Ball Valve Torques and Actuator Selection Information



General Information:

This bulletin contains basic information on determining the actual ball valve torques to be used for actuator selection. The following pages contain valve torque tables for the various Sharpe Valve models, along with Media and Service Factors which must be considered.

Ball Valve Torques:

The torque values listed in the following tables are breakaway torques from the closed position. Breakaway torques are determined by measured after the valve has been in the closed position under pressure for a set time period, and are the highest torques expected.

Seat Materials:

The seat materials used in a valve will significantly influence operating torque. Softer, lower-friction seats (such as TFE or TFM™) will be lower in torque than the harder, higher friction factor materials such as Delrin or PEEK. Different tables have been provided where seat materials significantly affect operating torque

Service Application:

How the valve will be operated, and how frequently also affect actuator selection and torque. Infrequent operation will require higher torque values than for valves in modulating services, for example. Service factors are provided in the tables at the end of this bulletin.

Line Media:

What is flowing through the valve can have the most significant effect on valve operating torques. Fine solids, slurries, or

very viscous fluids can have great effect, not only on torque, but also on valve service life. Media factors are also provided in the tables at the end of this bulletin.

Torque Reduction Factor:

When being used with rack & pinion pneumatic spring return actuators, a 0.70 multiplier may be applied to the ball valve torque.

The valve torques are breakaway values from the closed position, and spring return actuators are selected on the minimum of either the spring ending or air ending torques. A "SR" actuator selected on this basis would probably be over-sized, since the valve torque is at maximum, and actuator torque is at minimum.

The 0.70 factor reflects the maximum valve torque expected other than breakaway, and considers that the maximum output torque of the spring return rack and pinion actuator is at the start of the stroke.

This would not apply to a scotch yoke or crank arm actuator, because the torque curve for these designs dips in the center, and may fall below the valve running torque if not sized based on full break torque for the valve.

The 0.70 torque factor does not apply to double acting rack & pinion actuators because the output torque is constant over the full stroke. Thus, double acting actuators are sized based on maximum valve torque and maximum actuator torque.

Sharpe 12 and 13 Series Dir-Act (lbf-in) TFM and NOVA seats

Series 13 (1000 CWP)

	<u>TFM/RTFE</u>
1/4, 3/8, 1/2"	40
3/4"	80
1"	110
1 1/4"	160
1 1/2"	190
2"	250

Series 12 (1500 CWP)

	<u>Nova/TFM</u>	<u>PEEK</u>
1/4, 3/8, 1/2"	50	70
3/4"	100	140
1"	140	200
1 1/4"	200	280
1 1/2"	240	340
2"	320	450

SHARPE 66, 86 and 88 Series (lbf-in) Torque Values at Maximum Rating

Teflon Seats

1/2"	65
3/4"	80
1"	120
1 1/4"	180
1 1/2"	215
2"	300
2 1/2"	680
3"	800
4"	1750

RTFE Seats

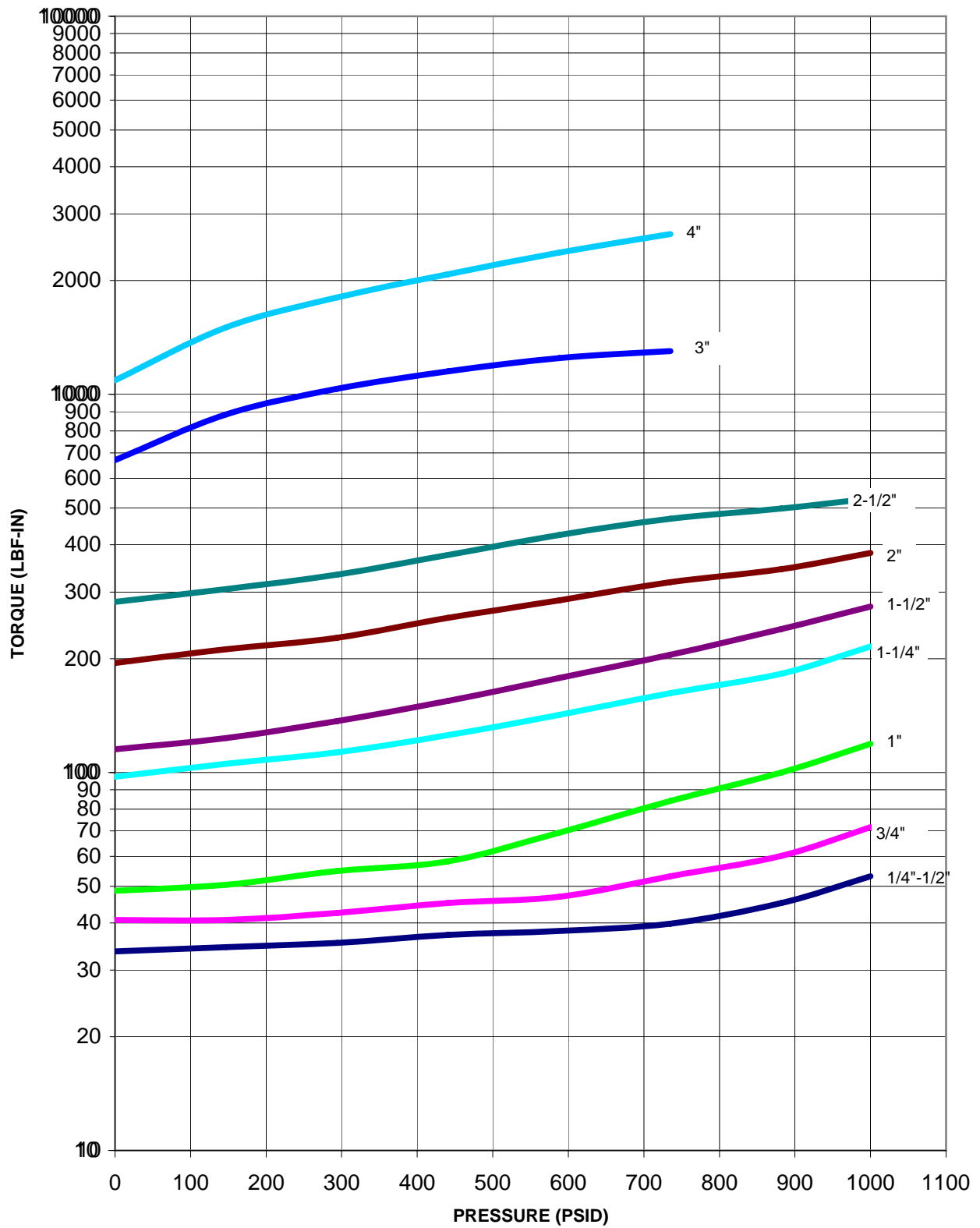
1/2"	70
3/4"	85
1"	126
1 1/4"	190
1 1/2"	226
2"	315
2 1/2"	715
3"	840
4"	1838

Cavity Filler

1/2"	80
3/4"	110
1"	180
1 1/4"	215
1 1/2"	300
2"	450
2 1/2"	1000
3"	1600
4"	3000

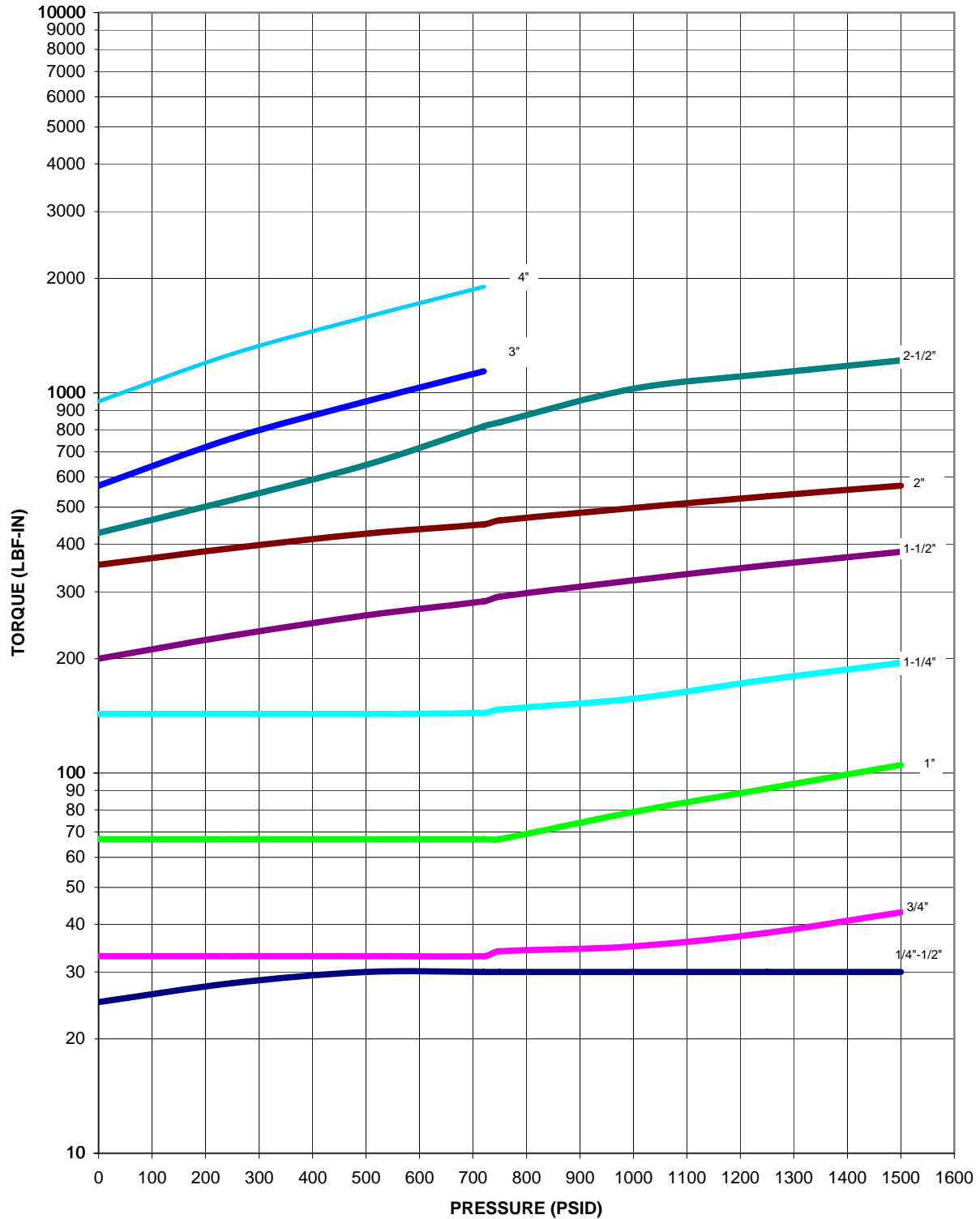


SERIES 84/99 TORQUES PTFE (T) SEATS



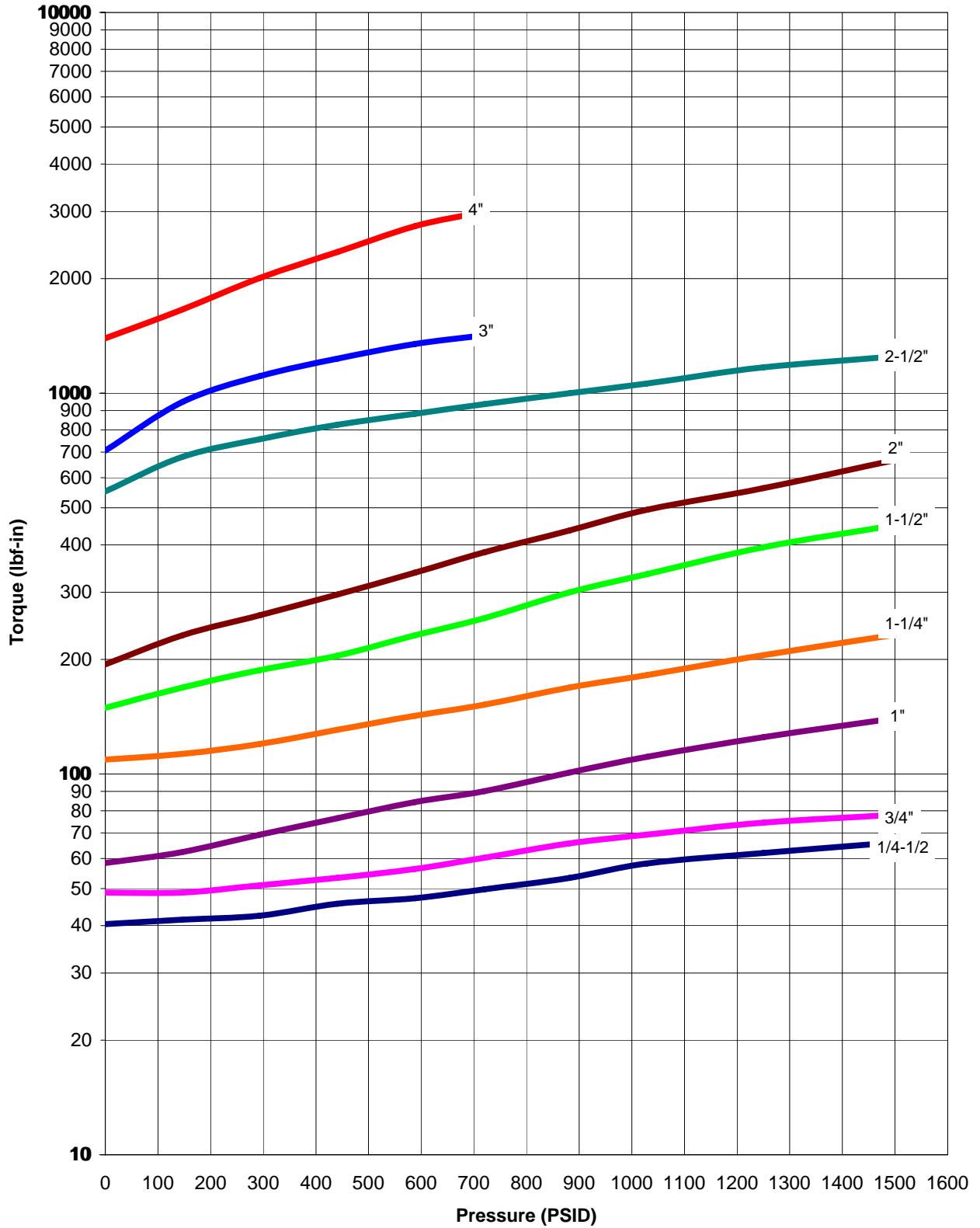


SERIES 84/99 TORQUES
TFM SEATS



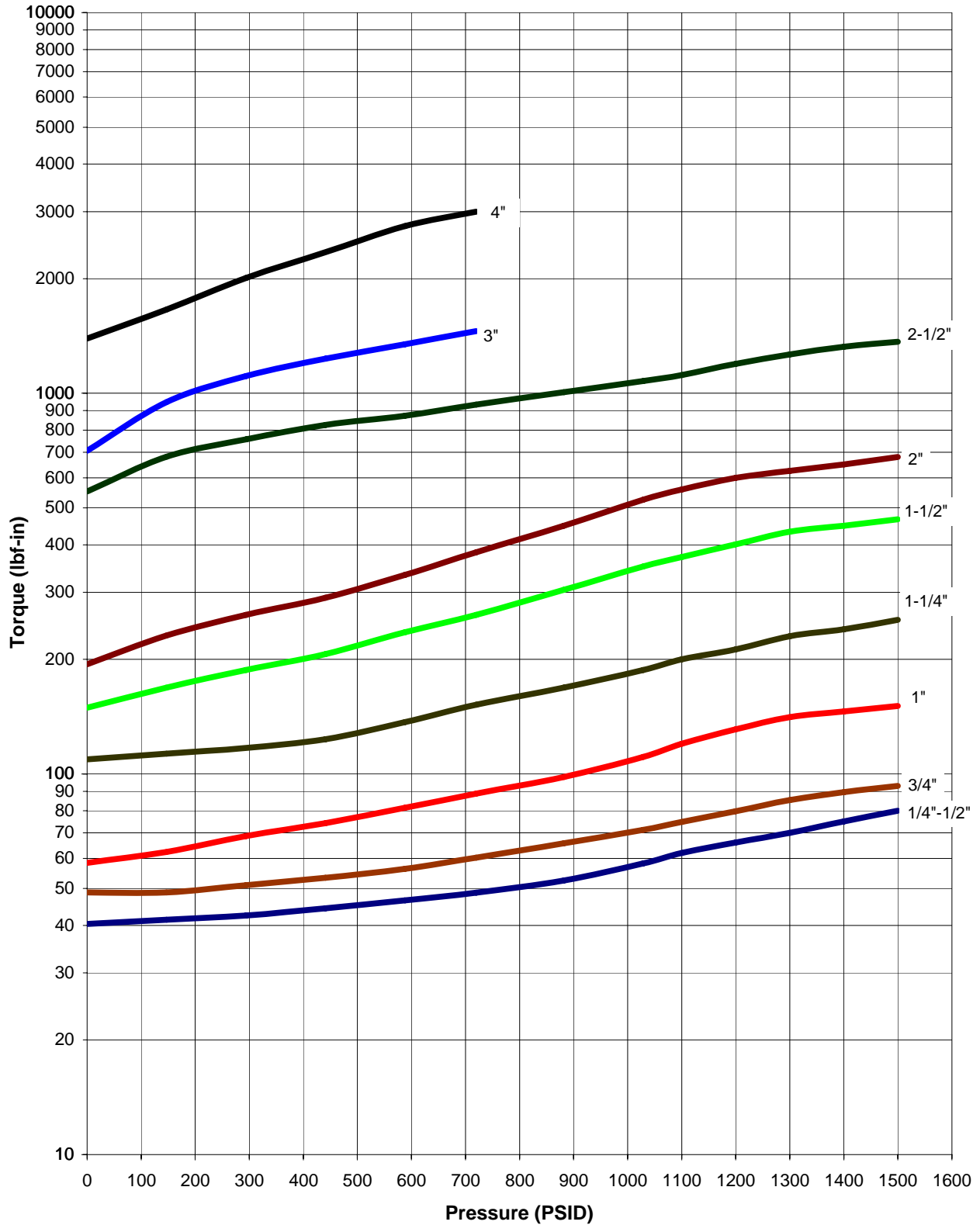


SERIES 84/99 TORQUES
RTFE ("R") SEATS



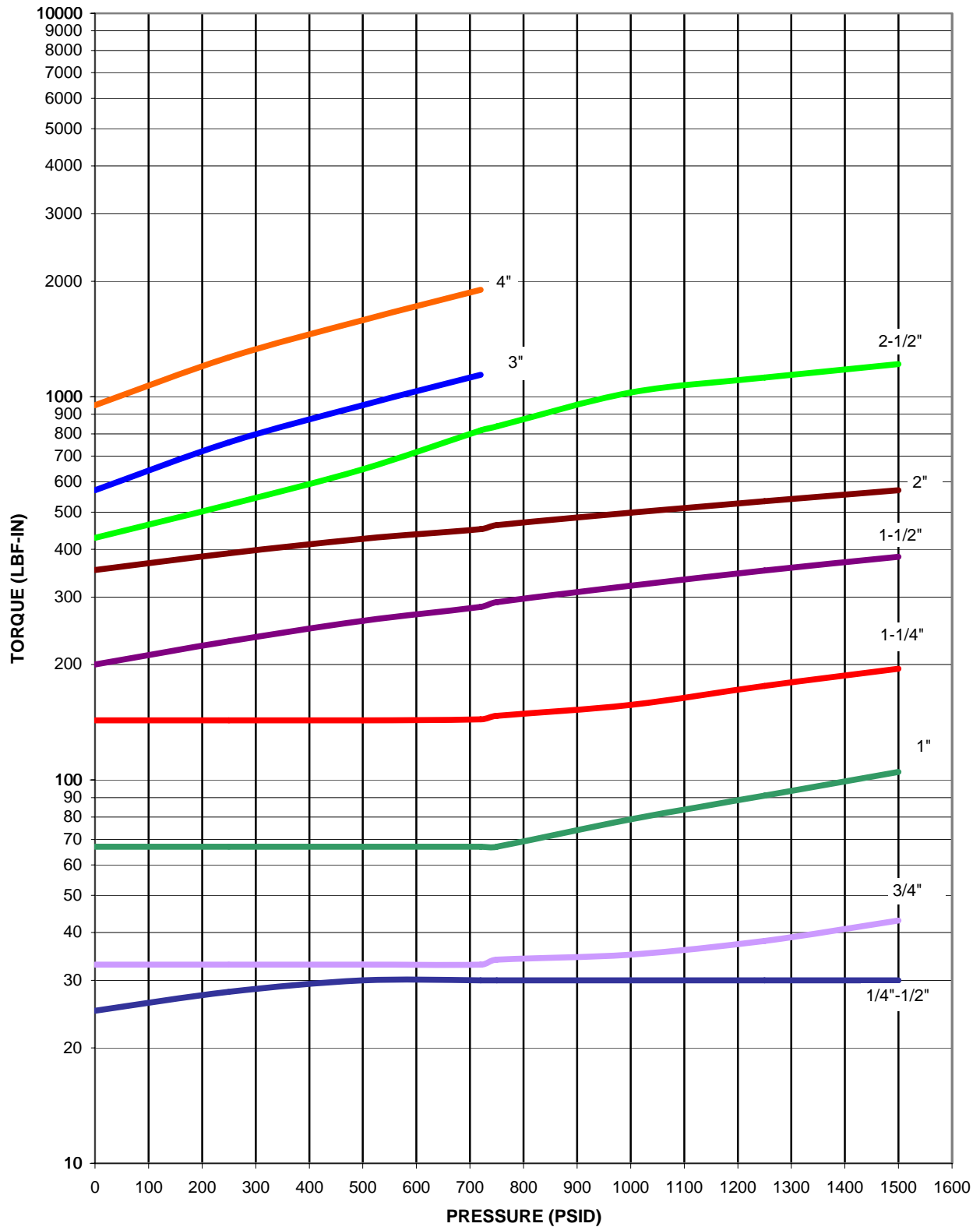


SERIES 84/99 TORQUES NOVA (N) SEATS



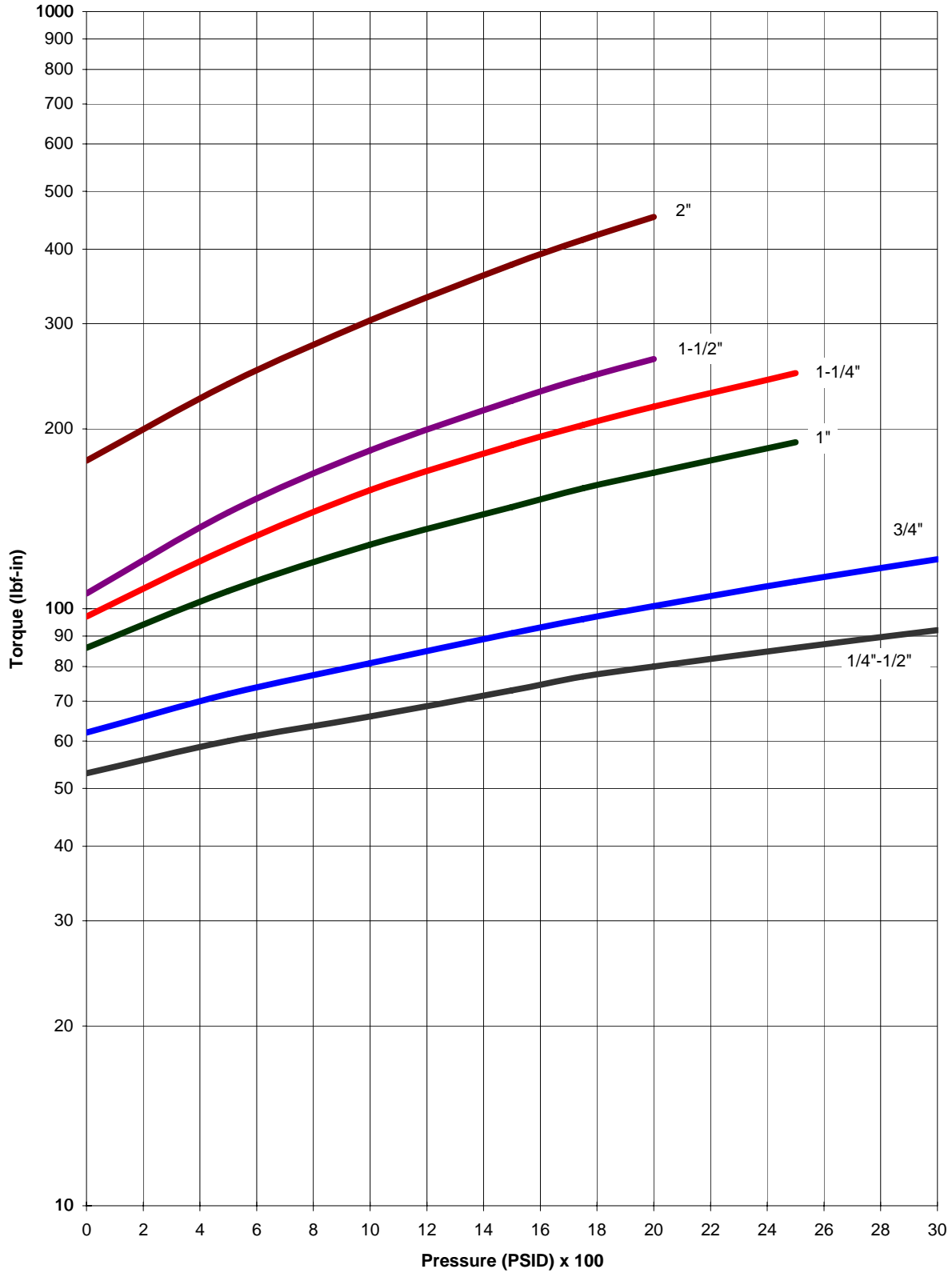


SERIES 84/99 TORQUES UHMWPE SEATS



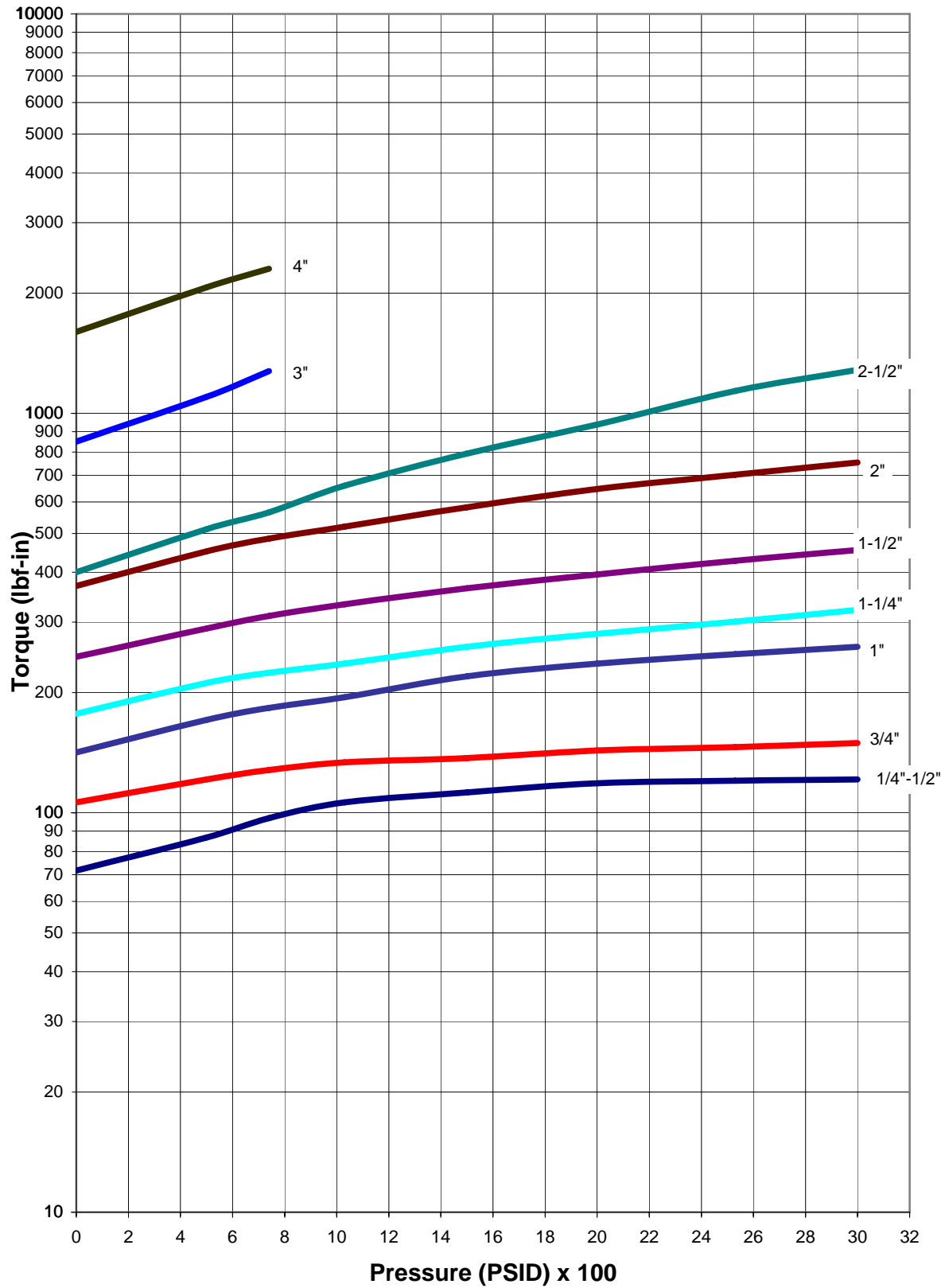


SERIES 84/99 TORQUES DELRIN SEATS



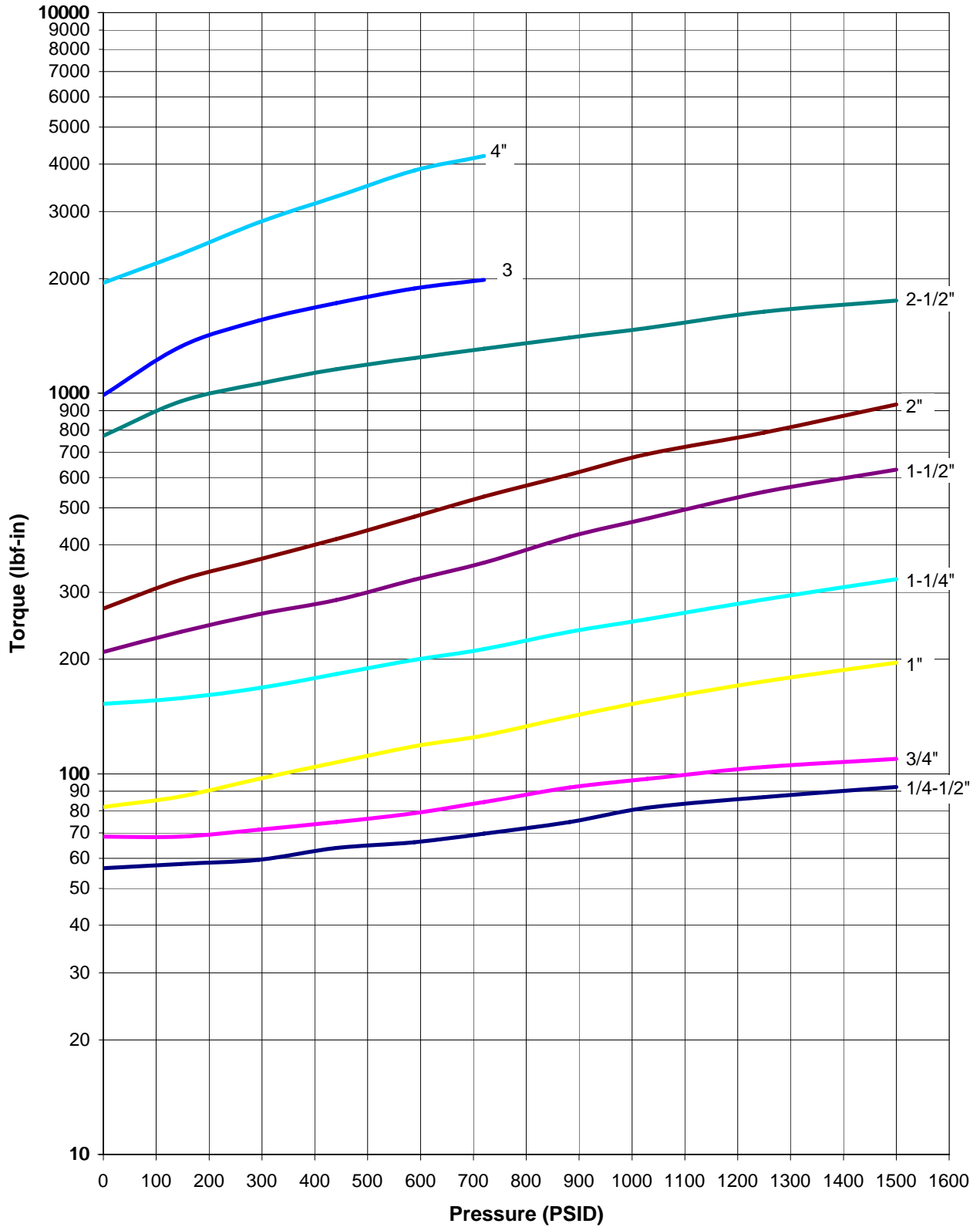


**SERIES 84/99 TORQUES
PEEK SEATS**



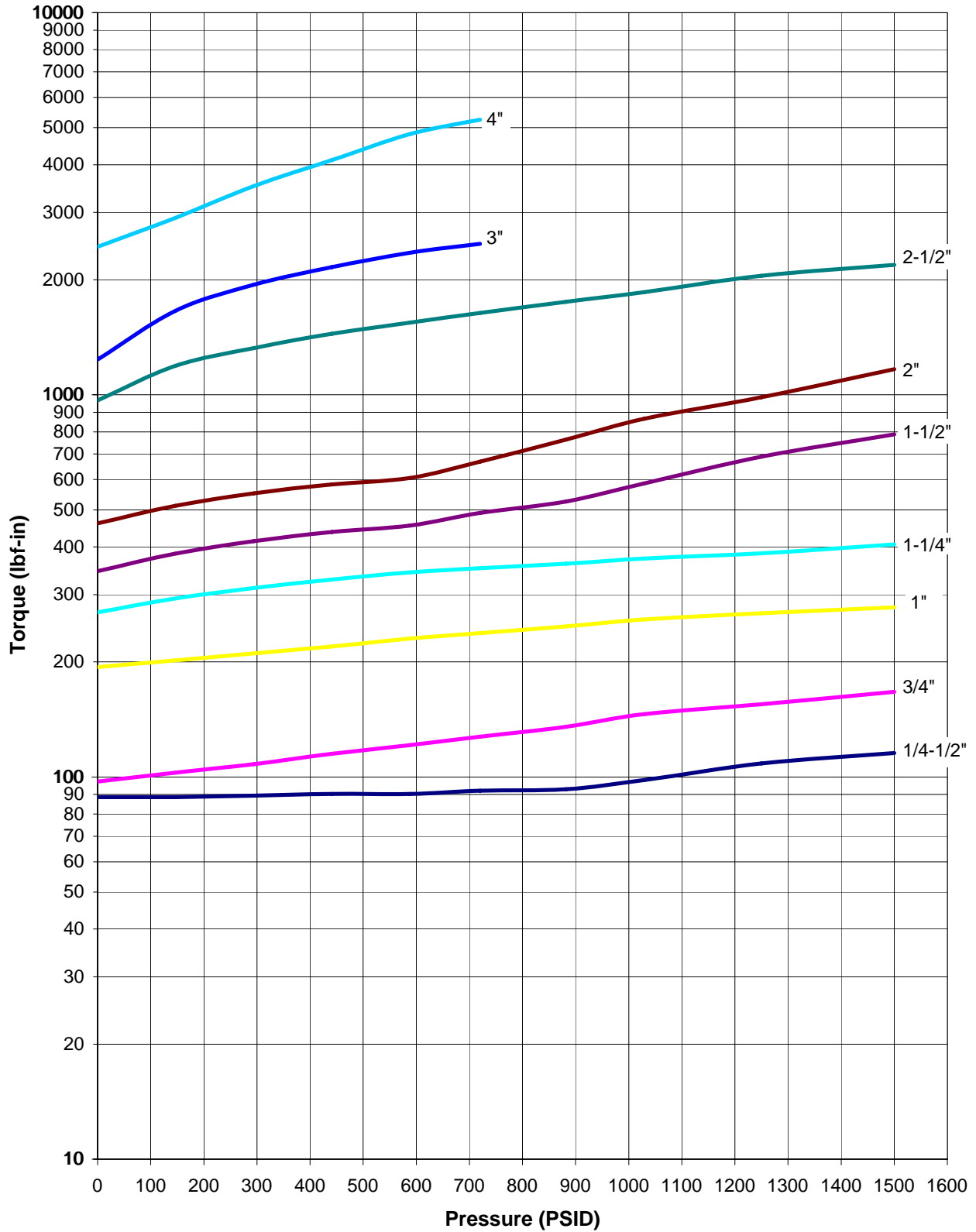


SERIES 84/99 TORQUES RTFE Cryo



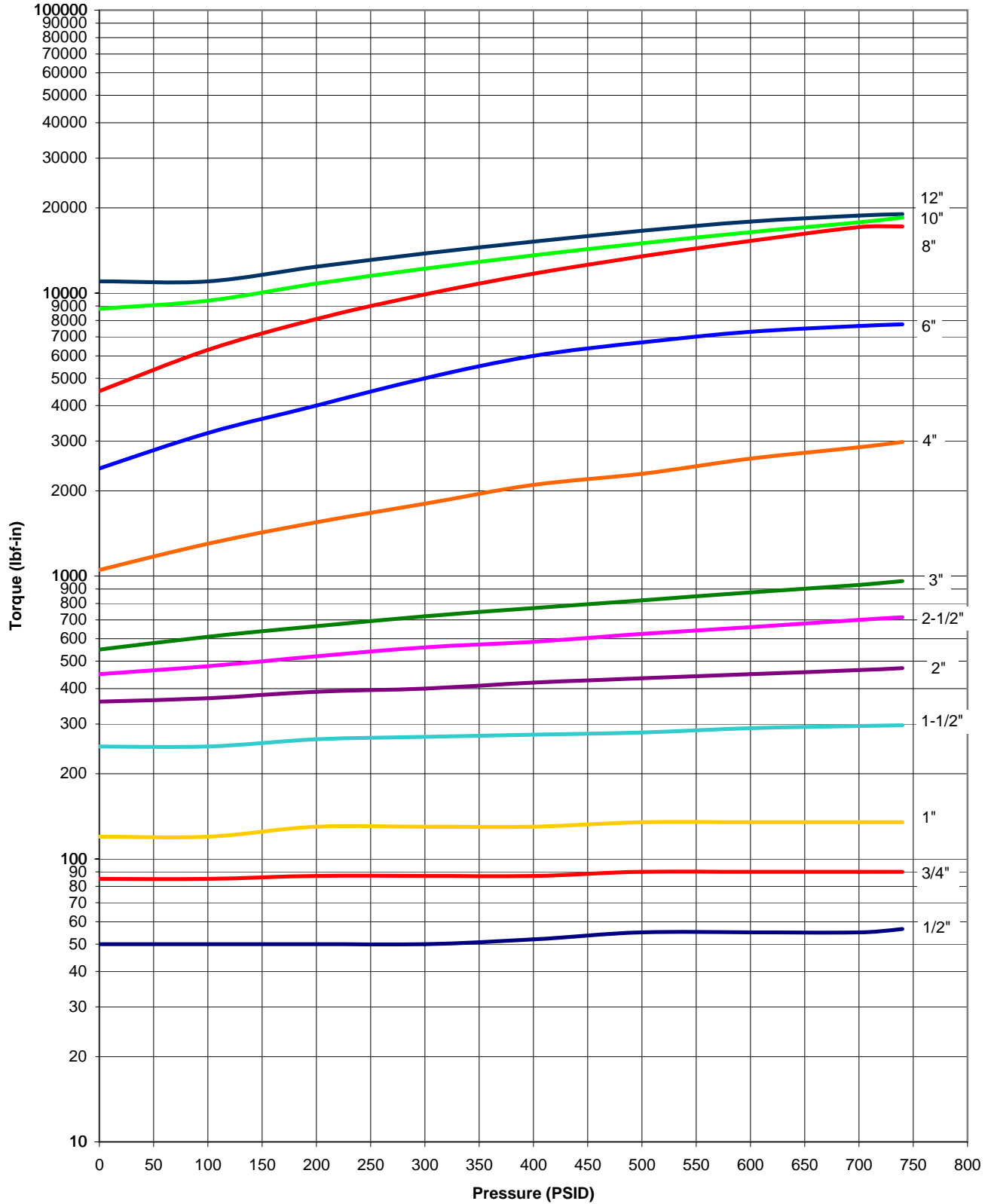


SERIES 84/99 TORQUES PCTFE (Kel-F) Cryo



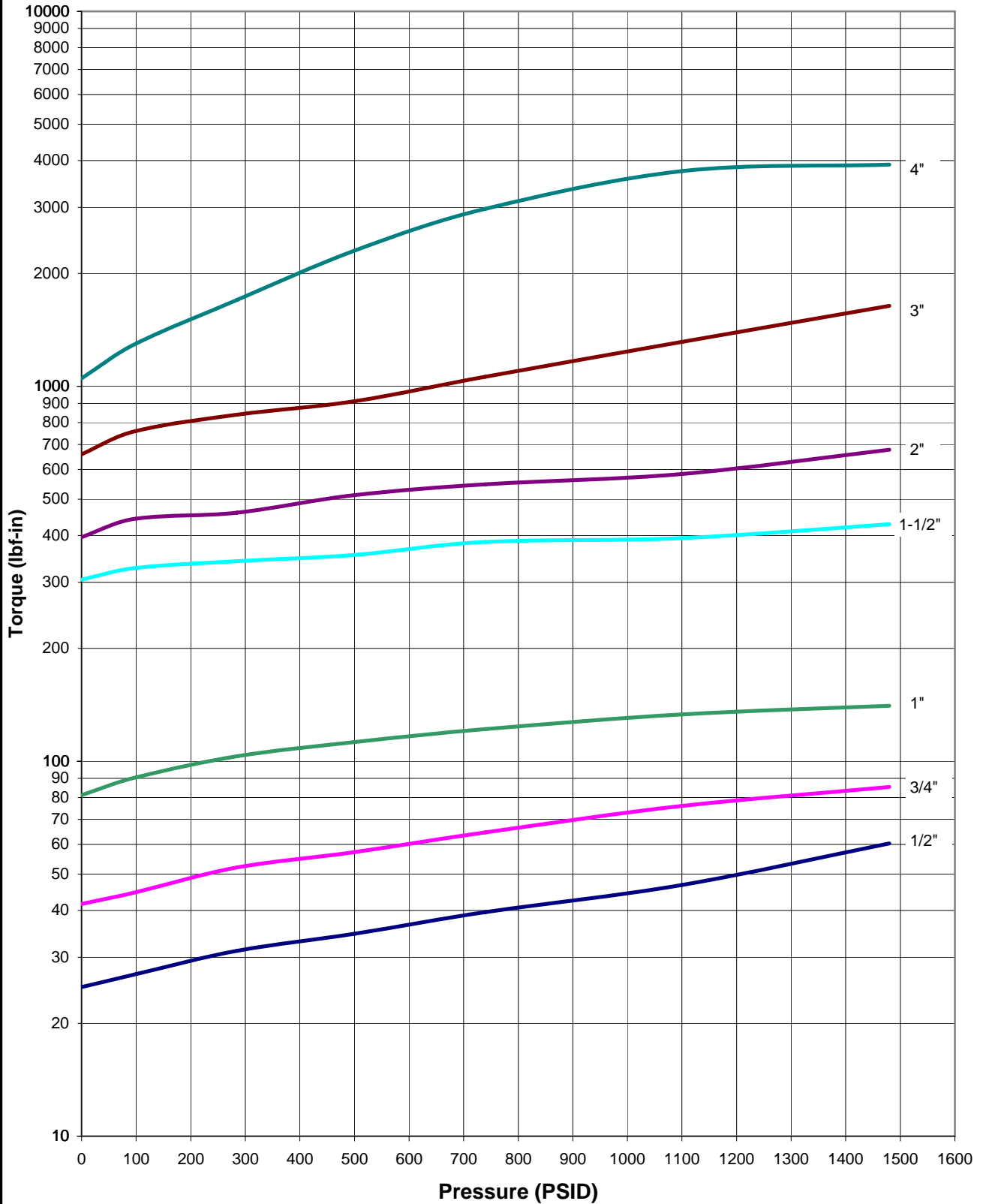


SERIES 50/FS50 TORQUES
CLASS 150/300
TFM, RTFE & NOVA SEATS



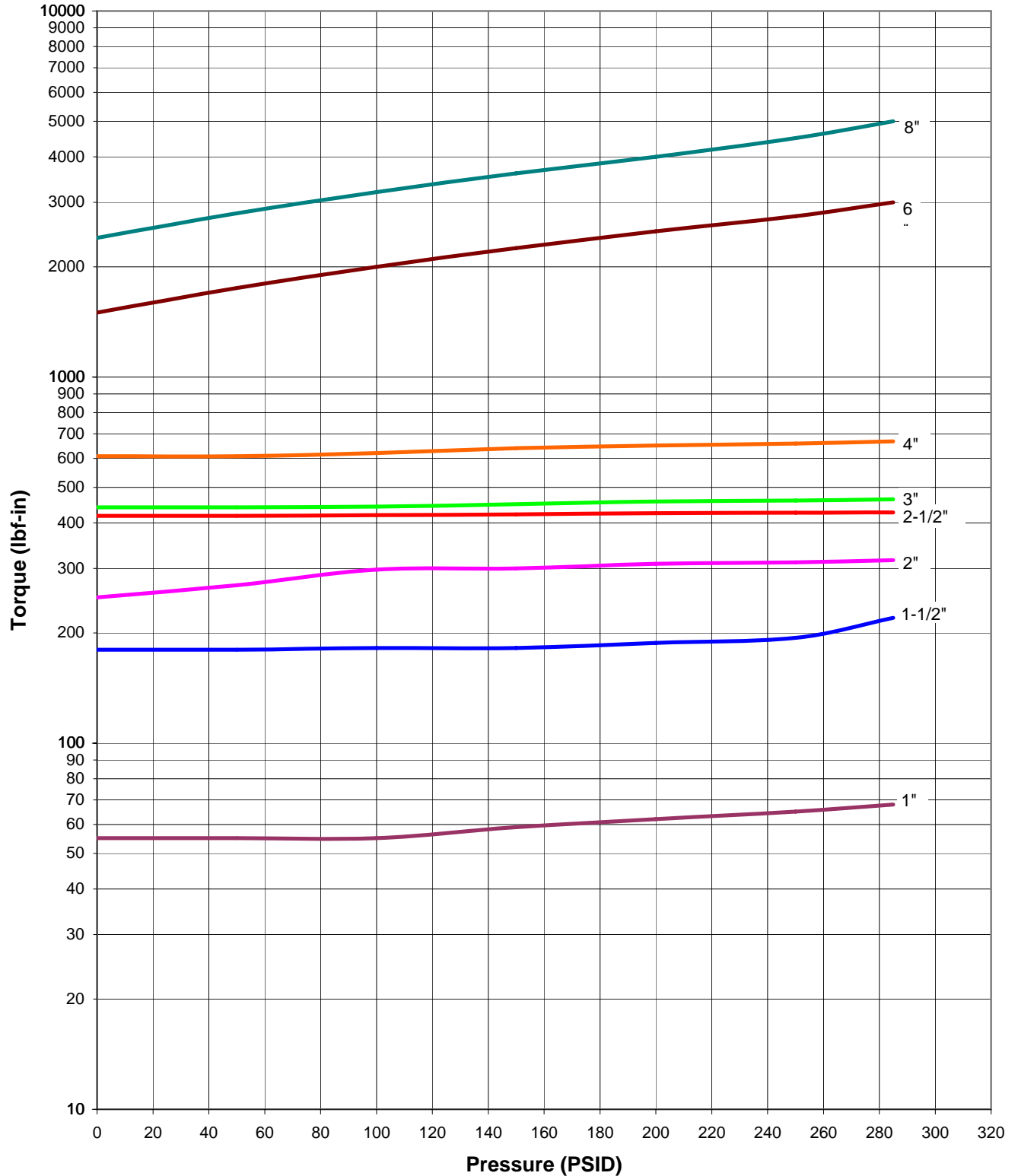


SERIES 50 TORQUES
CLASS 600
TFM, RTFE / NOVA SEATS



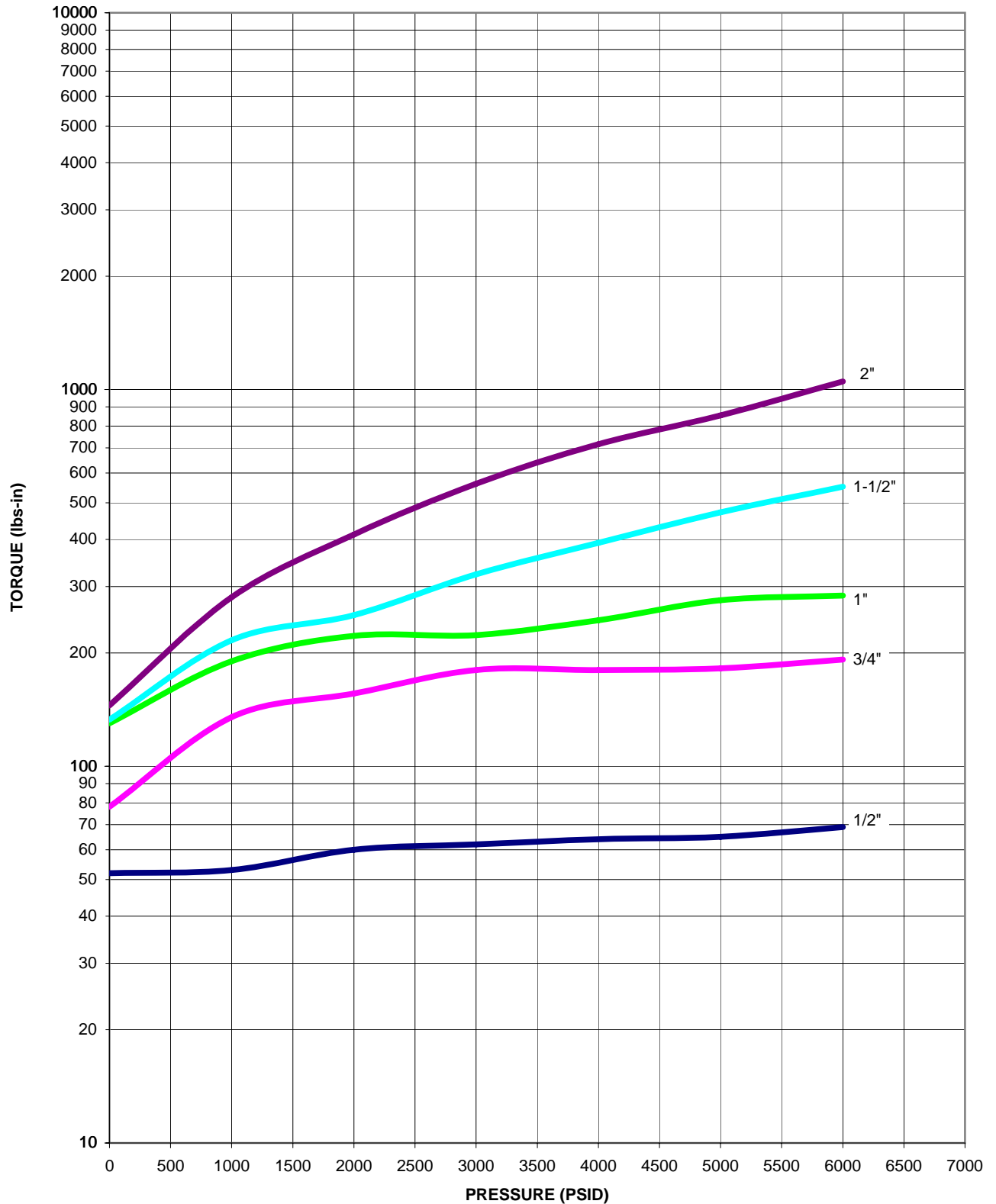


SERIES 54 TORQUE CHART
RTFE AND NOVA SEATS





SER. 60 Torques
CL2500 Delrin/PEEK Seats



Series 99 Torques (lbf-in)

Use values in tables for Series 84 valves, except select one size larger. For example, to find the torque for a 1-1/2" Series 99 valve, use the torque value listed for a 2" Series 84 valve.

Media and Service Factors:

Media Factors	Multiplier
Clean, particle free, non-lubricating (water, alcohol, etc.)	1.00
Clean, particle free, lubricating (oils, hydraulic fluid, etc)	0.80
Slurries or heavily corroded and contaminated systems	2.00
Gas or saturated steam, clean and wet	1.00
Gas or superheated steam, clean and dry	1.30
Gas, dirty unfiltered e.g. natural gas, Chlorine	1.50

Service Factors	Multiplier
Simple On and Off Operations	1.00
Throttling	1.20
Positioner Control	1.50
Once per day Operations	1.20
Once every two days or a "Plant Critical" Operation	1.50

Design Factors	Multiplier
Spring Return - R &P Actuator	0.70
All Other Actuators	1.00

Torque Determination Example:

3" Series 84 w/Nova Seats, 600 PSIG, Nitrogen Gas, On-Off Service, Fail Closed Actuator

<u>Basic Torque</u>		<u>Design Factor</u>		<u>Media Factor</u>		<u>Service Factor</u>		<u>Sizing Torque</u>
1393	X	0.70	X	1.30	X	1.00	=	1449 lbf-in