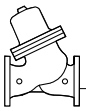


SI 800 Metric

Series Patterns and Sizes

- 800 Series – "Y" Pattern – DN40-500
- 800 Series – Angle – DN40-450

Connection Standard

- Flanged: ISO 7005-1(ISO 10, 16, 25 & 40)

Water Temperature

- Up to 80ºC

Working pressure

- ISO PN 16: 16 bar
- ISO PN 25: 25 bar
- ISO PN 40: 40 bar

Standard Materials

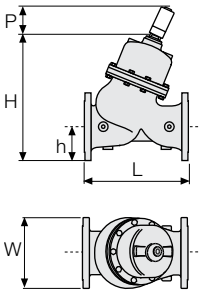
- **Main valve body**
  Carbon Steel to EN 10083-1
- **Valve cover (piston cylinder)**
  Stainless Steel or Bronze
- **Main valve internals**
  Stainless Steel and Bronze
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials

- **Main valve body and Cover**
  Ductile Iron to EN 1563
  Stainless Steel 316 to EN 10088-1
  Nickel Aluminum Bronze to BS-EN 1400 AB-2
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

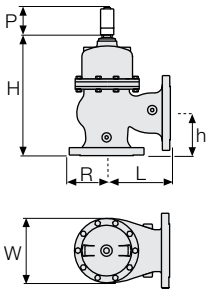
SI 800 Metric

800 "Y" Pattern



	DN	40	50	65	80	100	150	200	250	300	350	400	450	500
ISO PN 10; 16	L (mm)	205	210	222	250	320	415	500	605	725	733	990	1,000	1,100
	W (mm)	156	166	190	200	229	286	344	408	484	536	600	638	716
	h (mm)	78	83	95	100	115	143	172	204	242	268	300	319	358
	H (mm)	260	265	278	327	409	526	650	763	942	969	1,154	1,173	1,211
	P* (mm)	N/A	N/A	N/A	N/A	N/A	135	135	142	154	154	191	191	191
	Weight (Kg)	10.7	13	16	28	48	94	162	272	455	482	1,000	1,074	1,096
ISO PN 25; 40	L (mm)	205	210	222	264	335	433	524	637	762	767	1,024	1,030	1,136
	W (mm)	156	166	190	210	254	318	382	446	522	590	650	714	778
	h (mm)	78	83	95	105	127	159	191	223	261	295	325	357	389
	H (mm)	260	265	278	332	422	542	666	783	961	996	1,179	1,208	1,241
	P* (mm)	N/A	N/A	N/A	N/A	N/A	135	135	142	154	154	191	191	191
	Weight (Kg)	11.8	15	18.4	32	56	106	190	307	505	549	1,070	1,095	1,129

800 Angle



	DN	40	50	65	80	100	150	200	250	300	350	400	450
ISO PN 10 ; 16	L (mm)	124	124	149	152	190	225	265	320	396	400	450	450
	W (mm)	156	166	190	200	229	285	344	408	496	528	598	640
	R (mm)	78	83	95	100	115	143	172	204	248	264	299	320
	h (mm)	85	85	109	102	127	152	203	219	273	279	369	370
	H (mm)	252	252	271	308	390	476	619	717	911	915	1,144	1,144
	P* (mm)	N/A	N/A	N/A	N/A	N/A	141	141	156	156	156	195	195
	Weight (Kg)	10.7	13	16	26	46	90	153	259	433	459	950	1,020
ISO PN 25; 40	L (mm)	124	124	149	159	200	234	277	336	415	419	467	467
	W (mm)	150	155	190	200	254	318	381	446	522	586	650	716
	R (mm)	78	85	95	105	127	159	191	223	261	293	325	358
	h (mm)	85	85	109	109	135	165	216	236	294	299	386	386
	H (mm)	252	264	271	315	398	491	632	733	930	935	1,160	1,160
	P* (mm)	N/A	N/A	N/A	N/A	N/A	141	141	156	156	156	195	195
	Weight (Kg)	11.8	15	18.4	30	54	101	179	292	481	523	1,017	1,051

*P – Height of optional auxiliary closing piston or shaft balancing assembly

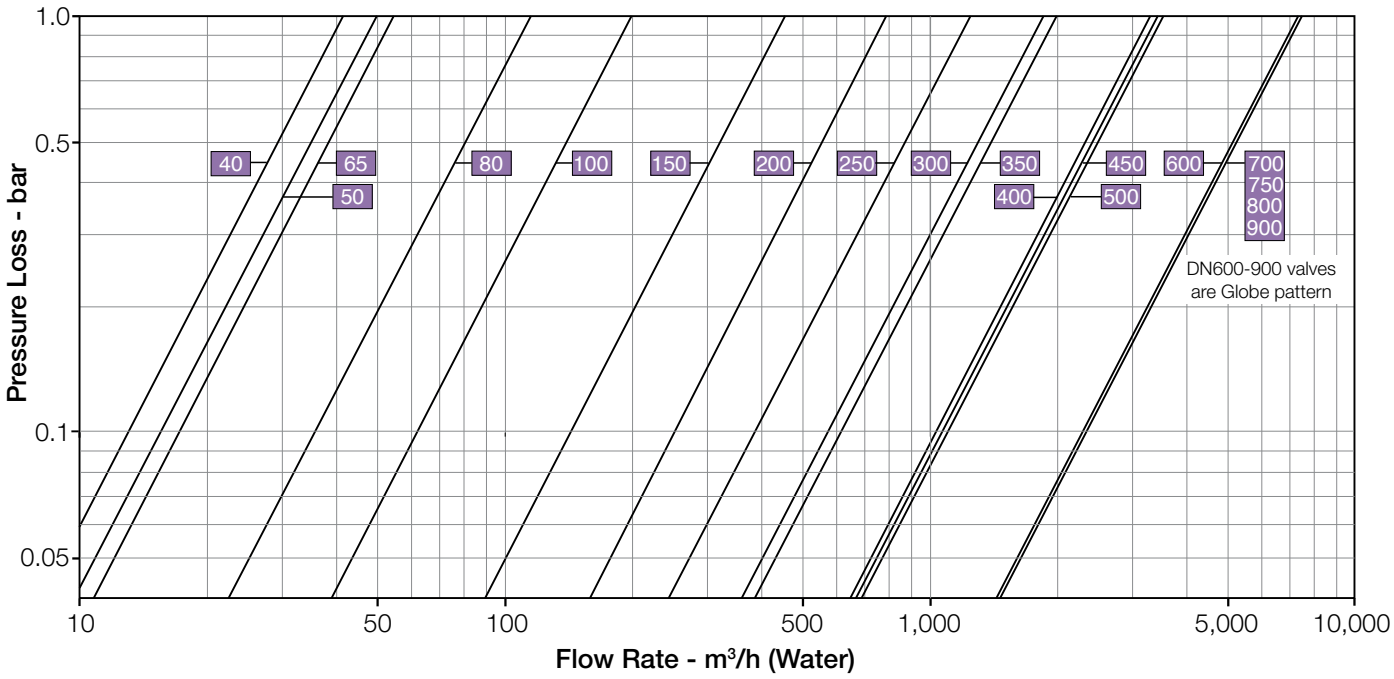
SI 800 Metric

Control Chamber Displacement Volume (liter)

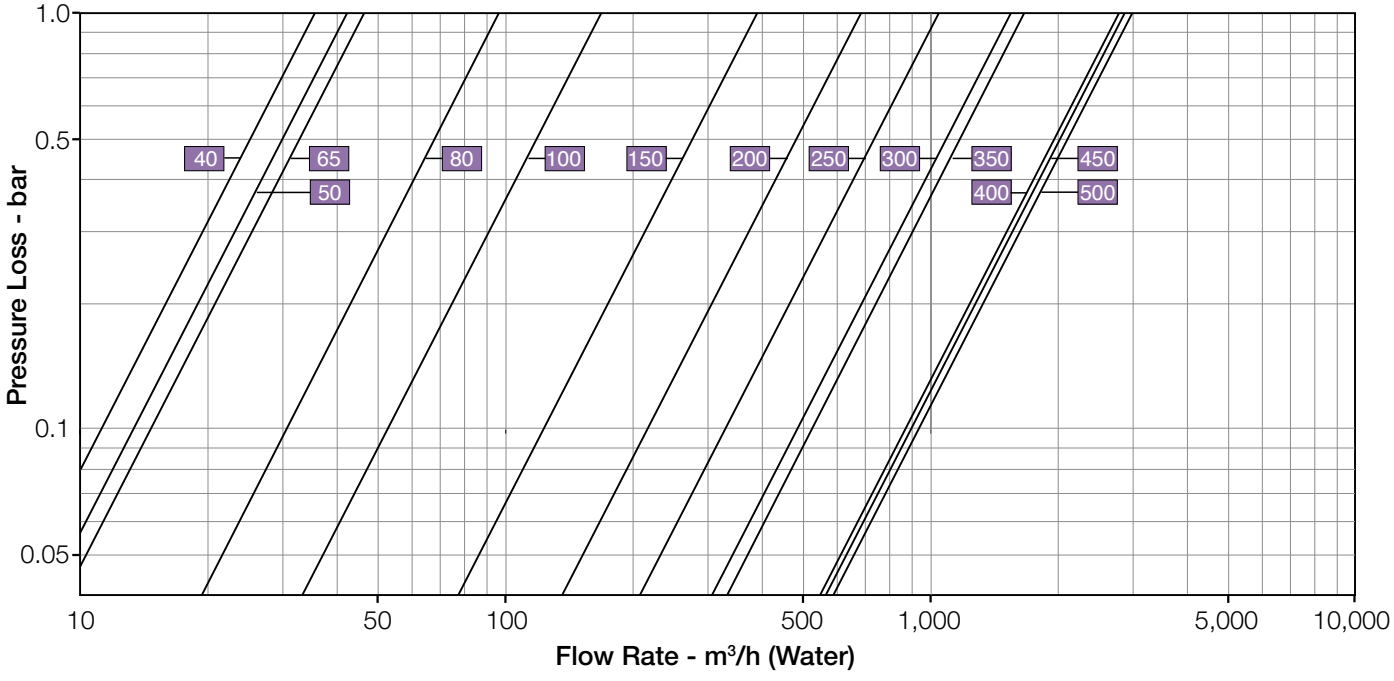
DN	40	50	65	80	100	150	200	250	300	350	400	450	500	600-900
800	0.04	0.04	0.04	0.12	0.3	1.1	2.3	4	8	8	18.7	18.7	18.7	N/A

SI 800 Metric

Y Pattern, Flat Disc

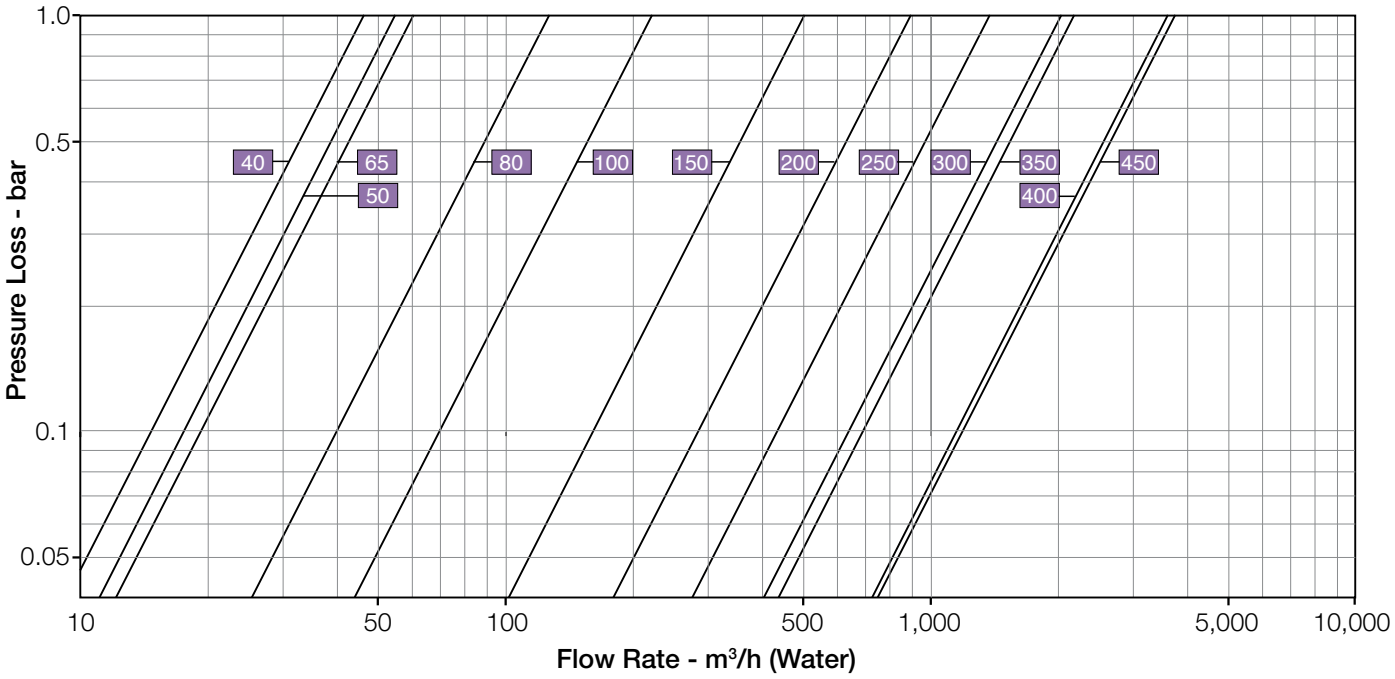


Y Pattern, Throttling Plug (V-Port)

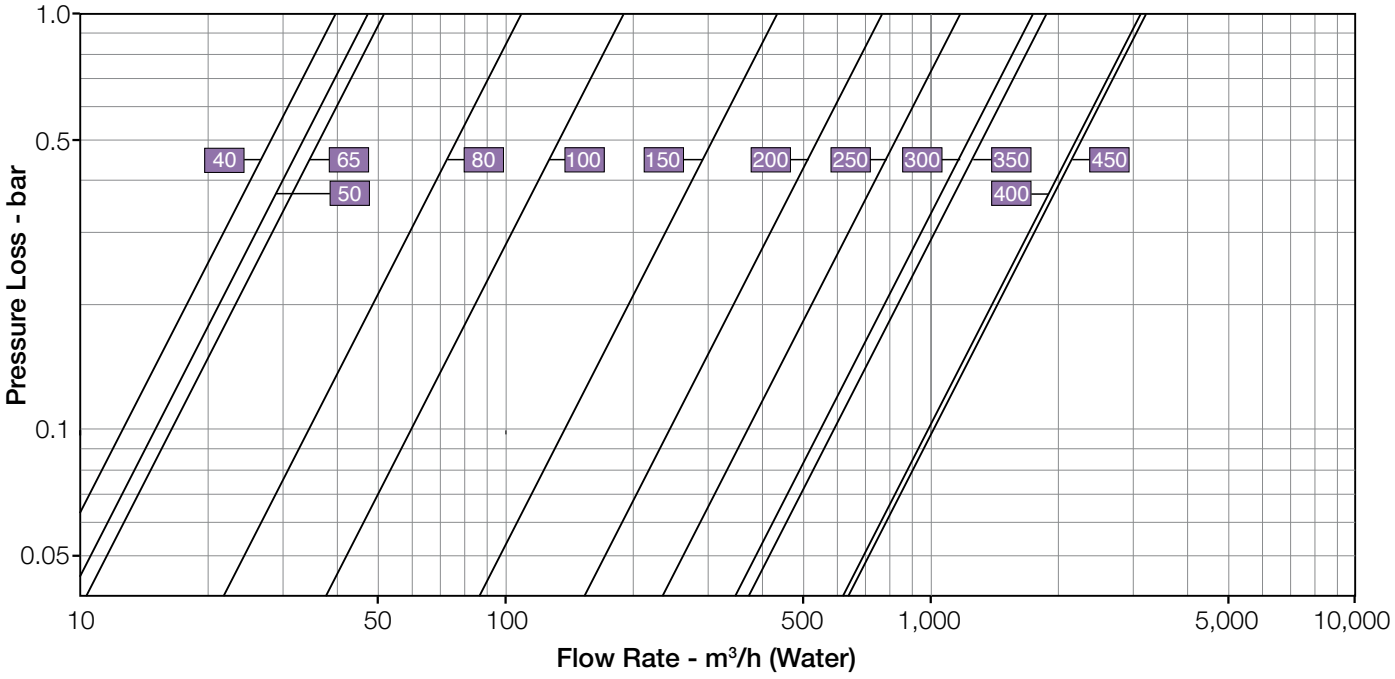


SI 800 Metric

Angle Pattern, Flat Disc



Angle Pattern, Throttling Plug (V-Port)



SI 800 Metric

		DN	40	50	65	80	100	125	150	200	250	300	350	400	450	500
800 Y-Pattern Flat Disc		Kv	42	50	55	115	200	N/A	460	815	1,250	1,850	1,990	3,310	3,430	3,550
		K	2.3	3.9	9.2	4.9	3.9	N/A	3.7	3.8	3.9	3.7	5.9	3.7	5.5	7.8
		Leq - m	4.3	10.3	33.4	21.6	23	N/A	37.5	53.9	70	85.6	159.9	112.7	204.8	323.8
800 Y-Pattern V-Port		Kv	36	43	47	98	170	N/A	391	693	1,063	1,573	1,692	2,814	2,916	3,018
		K	3.1	5.4	12.8	6.7	5.4	N/A	5.2	5.2	5.4	5.1	8.2	5.1	7.6	10.8
		Leq - m	6	14.3	46.2	29.9	31.9	N/A	51.9	74.6	96.8	118.4	221.3	155.9	283.5	448.1
800 Angle Flat Disc		Kv	46	55	61	127	220	N/A	506	897	1,375	2,035	2,189	3,641	3,773	N/A
		K	1.9	3.2	7.6	4	3.2	N/A	3.1	3.1	3.2	3.1	4.9	3	4.5	N/A
		Leq - m	3.6	8.5	27.6	17.8	19	N/A	31	44.6	57.8	70.7	132.1	93.1	169.3	N/A
800 Angle V-Port		Kv	39	47	51	108	187	N/A	430	762	1,169	1,730	1,861	3,095	3,207	N/A
		K	2.6	4.5	10.6	5.6	4.5	N/A	4.3	4.3	4.5	4.2	6.8	4.2	6.2	N/A
		Leq - m	5	11.8	38.2	24.7	26.4	N/A	42.9	61.7	80	97.9	182.9	128.9	234.3	NA

Differential Pressure Calculation

Valve flow coefficient, Kv or Cv $Kv\,(Cv) = Q\sqrt{\frac{Gf}{\Delta P}}$

Where:

Kv = Valve flow coefficient (flow in m^3/h at 1bar ΔP)

Cv = Valve flow coefficient (flow in gpm at 1psi ΔP)
(Cv = 1.155 Kv)

Q = Flow rate (m^3/h ; gpm)

ΔP = Differential pressure (bar ; psi)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$$Q = Kv\sqrt{\Delta P} \qquad \Delta P = \left(\frac{Q}{Kv}\right)^2$$

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (m ; feet)

V = Nominal size flow velocity (m/sec ; feet/sec.)

g = Acceleration of gravity (9.81 m/sec2 ; 32.18 feet/sec^2)

Practical formula:

$$\Delta H = K\frac{V^2}{2g}$$

Equivalent Pipe Length - Leq

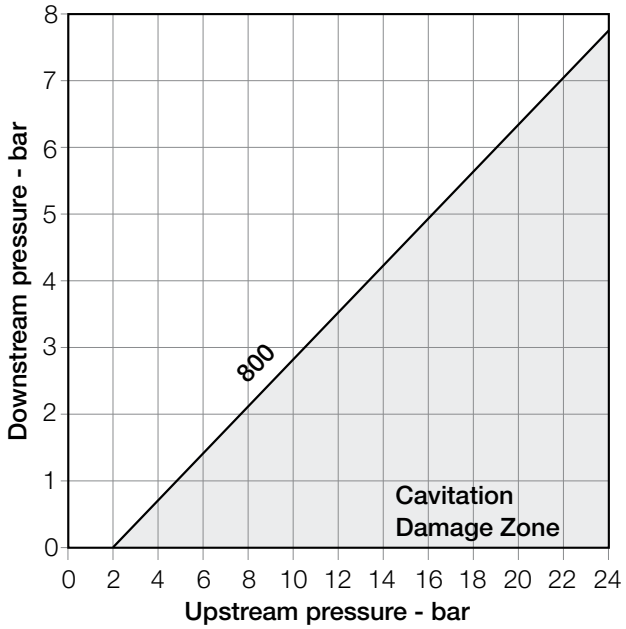
In order to simplify system head loss calculation,
add the Leq value to the pipe length of the relevant size

Note:

The Leq values given are for general consideration only.
Actual Leq may vary somewhat with each of the valve sizes.

SI Metric

Cavitation Guide



Cavitation

The cavitation phenomenon has a significant affect on control valve and system performance.
Cavitation may damage the valve and piping by the affects of erosion and vibration. Cavitation also generates noise and may limit and ultimately choke the flow.
As the pressure differential across the valve increases, the static pressure of the flow passing through the throttling area of the valve (Vena Contracta) drops sharply.
When the fluid's static pressure reaches liquid vapor pressure, vapor cavities (bubbles) form and grow until they violently implode by the recovered pressure downstream to the valve seat.
The implosion of these cavities generates high-pressure surges, micro jets and intensive heat, which erode valve components and downstream piping. In its final stage, cavitation flashes and chokes the flow.
The above Cavitation Guides for Bermad 700 Series valves are based on the formula commonly used in the valve industry:

σ = (P2-Pv) / (P1-P2)

Where:

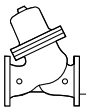
σ = Sigma, cavitation index, dimensionless
P1 = Upstream pressure, absolute
P2 = Downstream pressure, absolute
Pv = Liquid vapor pressure, absolute
(Water, 18ºC = 0.02 bar-a ; 65ºF = 0.3 psi-a)

Use these guides and your applications upstream and downstream pressures to determine whether their intersection lies in or out of the cavitation damage zone.
Considerations to avoid cavitation damage:

A) Reduce system pressure in stages designing each pressure stage to be above cavitation conditions.
B) Consider using other valve selection criteria
   a. Valve body and plug type
   b. Valve size
   c. Valve material

Notes:

1. An alternate cavitation index formula introduced by ISA is:
   σISA = (P1-Pv) / (P1-P2) which equals σ+1
2. The above charts should be considered only as a general guide.
3. For optimum system and control valve application please consult Bermad.



US 800 English

Series Patterns and Sizes

- 800 Series – Y Pattern – 1½"-20"
- 800 Series – Angle – 1½"-18"

Connection Standard

- Flanged: ANSI B16.5 (Cast steel)

Water Temperature

- Up to 180ºF

Working pressure

- Class #150: 250 psi
- Class #300: 400 psi
- Class #400: 600 psi

Standard Materials

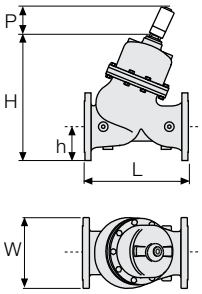
- **Main valve body**
  Carbon Steel to ASTM A-216-WCB
- **Valve cover (piston cylinder)**
  Stainless Steel or Bronze
- **Main valve internals**
  Stainless Steel and Bronze
- **Control Trim**
  Brass, Bronze accessories
  Stainless Steel 316 fittings & tubing
  or forged Brass fittings & Copper tubing
- **Elastomers**
  NBR
- **Coating**
  Blue fusion bonded Epoxy

Optional Materials

- **Main valve body and Cover**
  Ductile Iron to ASTM A-536
  Stainless Steel 316 to ASTM A-743 CF8M
  Nickel Aluminum Bronze to ASTM B-148 C 95800
  Other materials on request
- **Control Trim**
  Stainless Steel 316, Nickel Aluminum Bronze,
  Hastalloy C-276 accessories
  Monel fittings & tubing
- **Elastomers**
  EPDM
  FPM

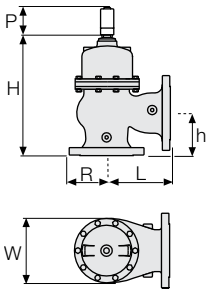
US 800 English

"Y" Pattern



	inch	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
ANSI 150	L	8.1	8.3	8.7	9.8	12.6	16.3	19.7	23.8	28.5	28.9	39	39.4	43.3
	W	6.1	6.5	7.5	7.9	9.0	11.3	13.5	16.1	19.1	21.1	23.6	25.1	28.2
	h	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8	9.5	10.6	11.8	12.6	14.1
	H	10.2	10.4	10.9	12.9	16.1	20.7	25.6	30	37.1	38.1	45.4	46.2	47.7
	P*	N/A	N/A	N/A	N/A	N/A	5.3	5.3	5.6	6.1	6.1	7.5	7.5	7.5
	Weight (lb)	24	29	35	62	106	207	356	598	1,001	1,060	2,200	2,363	2,411
ANSI 300; 400	L	8.1	8.3	8.7	10.4	13.2	17	20.6	25.1	30	30.2	40.3	40.6	44.7
	W	6.1	6.5	7.5	8.3	10.0	12.5	15.0	17.6	20.6	23.2	25.6	28.1	30.6
	h	3.1	3.3	3.7	4.1	5	6.3	7.5	8.8	10.3	11.6	12.8	14.1	15.3
	H	10.2	10.4	10.9	13.1	16.6	21.3	26.2	30.8	37.8	39.2	46.4	47.6	48.9
	P*	N/A	N/A	N/A	N/A	N/A	5.3	5.3	5.6	6.1	6.1	7.5	7.5	7.5
	Weight (lb)	26	33	40	70	123	233	418	675	1,111	1,208	2,354	2,409	2,484

Angle Pattern



	inch	1½"	2"	2½"	3"	4"	6"	8"	10"	12"	14"	16"	18"
ANSI 150	L	4.9	4.9	5.9	6	7.5	8.9	10.4	12.6	15.6	15.7	17.7	17.7
	W	6.1	6.5	7.5	7.9	9.0	11.2	13.5	16.1	19.5	20.8	23.5	25.2
	R	3.1	3.3	3.7	3.9	4.5	5.6	6.8	8.0	9.8	10.4	11.8	12.6
	h	3.3	3.3	4.3	4.0	5.0	6.0	8.0	8.6	10.7	11	14.5	14.6
	H	9.9	9.9	10.7	12.1	15.4	18.7	24.4	28.2	35.9	36	45	45
	P*	N/A	N/A	N/A	N/A	N/A	5.6	5.6	6.1	6.1	6.1	7.7	7.7
	Weight (lb)	24	29	35	57	101	198	337	570	953	1,010	2,090	2,244
ANSI 300; 400	L	4.9	4.9	5.9	6.3	7.9	9.2	10.9	13.2	16.3	16.5	18.4	18.4
	W	5.9	6.1	7.5	7.9	10.0	12.5	15.0	17.6	20.6	23.1	25.6	28.2
	R	3.1	3.3	3.7	4.1	5	6.3	7.5	8.8	10.3	11.5	12.8	14.1
	h	3.3	3.3	4.3	4.3	5.3	6.5	8.5	9.3	11.6	11.8	15.2	15.2
	H	9.9	10.4	10.7	12.4	15.7	19.3	24.9	28.9	36.6	36.8	45.7	45.7
	P*	N/A	N/A	N/A	N/A	N/A	5.6	5.6	6.1	6.1	6.1	7.7	7.7
	Weight (lb)	26	33	40	66	119	222	394	642	1,058	1,151	2,237	2,312

*P – Height of optional auxiliary closing piston or shaft balancing assembly

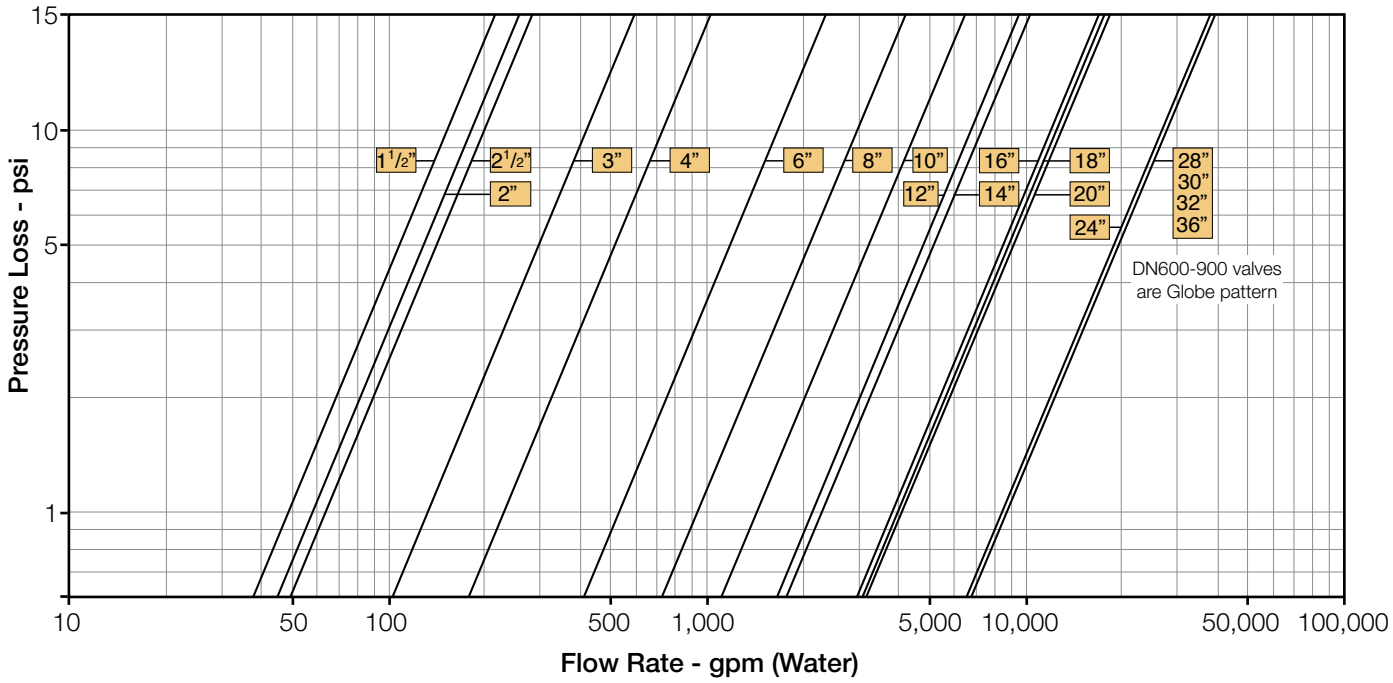
US 800 English

Control Chamber Displacement Volume (gallon)

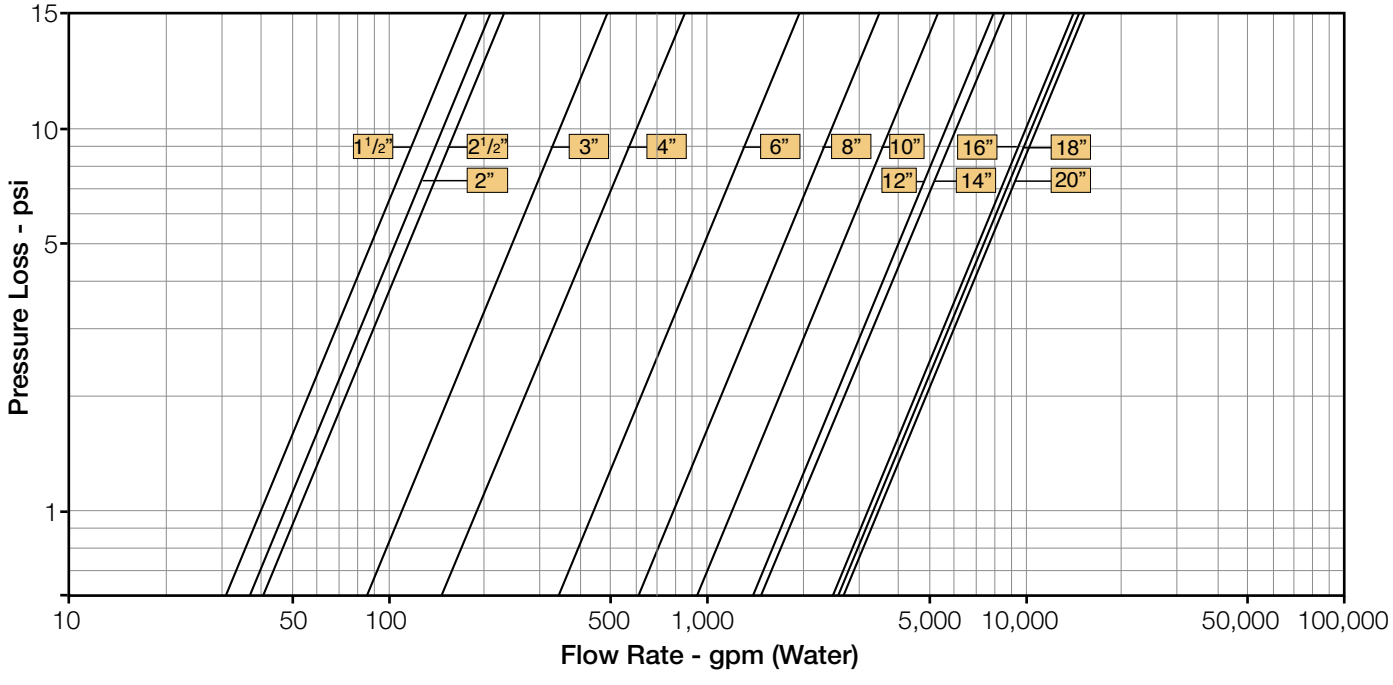
Sizes	1½"-2½"	3"	4"	6"	8"	10"	12"-14"	16"-20"	24"-36"
800 Series	0.01	0.03	0.08	0.29	0.61	1.06	2.12	4.95	-

US 800 English

Y Pattern, Flat Disc

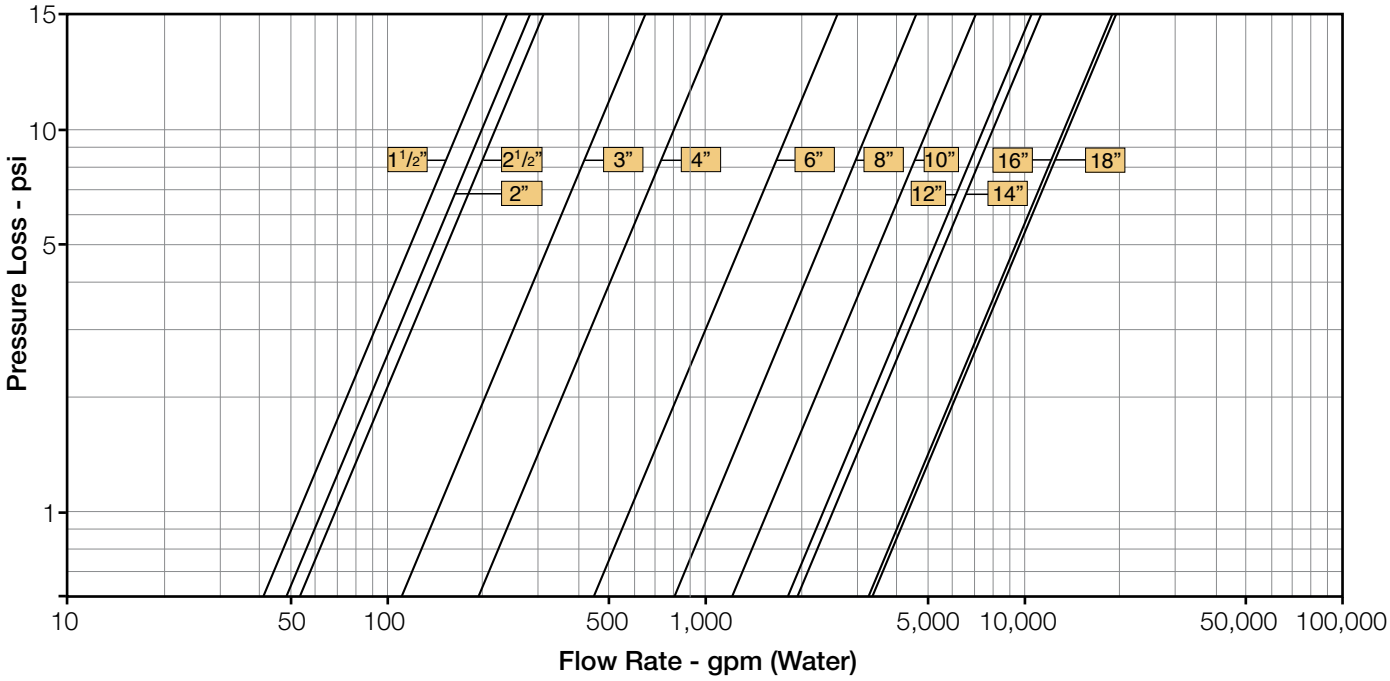


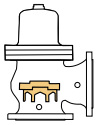
Y Pattern, Throttling Plug (V-Port)



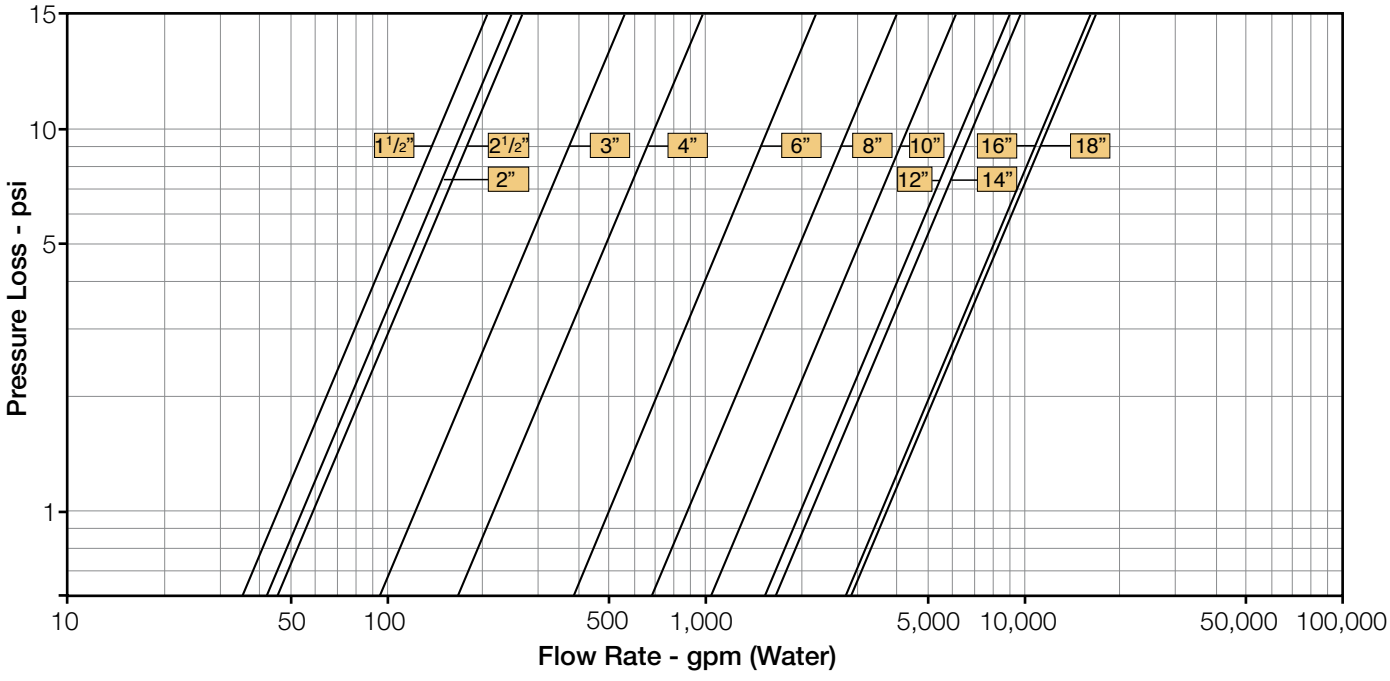
US 800 English

Angle Pattern, Flat Disc





Angle Pattern, Throttling Plug (V-Port)



US 800 English

		inch	1.5"	2"	2.5"	3"	4"	6"	8"	10"	12"	14"	16"	18"	20"
Y-Pattern Flat Disc		Cv	49	58	64	133	230	530	940	1,440	2,140	2,300	3,820	3,960	4,100
		K	2.3	3.9	9.2	4.9	3.9	3.7	3.8	3.9	3.7	5.9	3.7	5.5	7.8
		Leq-feet	14.2	33.8	109.5	70.8	75.6	123.0	176.9	229.5	280.8	524.5	369.6	671.9	1,062.3
Y-Pattern V-Port		Cv	41	49	54	113	200	450	800	1,230	1,820	1,950	3,250	3,370	3,490
		K	3.1	5.4	12.8	6.7	5.4	5.2	5.2	5.4	5.1	8.2	5.1	7.6	10.8
		Leq-feet	19.7	46.8	151.6	97.9	104.6	170.2	244.8	317.6	388.6	725.9	511.6	930.0	1,470.3
Angle Pattern Flat Disc		Cv	53	64	70	146	250	580	1,040	1,590	2,350	2,530	4,210	4,360	NA
		K	1.9	3.2	7.6	4.0	3.2	3.1	3.1	3.2	3.1	4.9	3.0	4.5	NA
		Leq-feet	11.7	28.0	90.5	58.5	62.5	101.6	146.2	189.7	232.0	433.4	305.5	555.3	NA
Angle Pattern V-Port		Cv	45	54	59	124	220	500	880	1,350	2,000	2,150	3,580	3,710	NA
		K	2.6	4.5	10.6	5.6	4.5	4.3	4.3	4.5	4.2	6.8	4.2	6.2	NA
		Leq-feet	16.3	38.7	125.3	80.9	86.5	140.7	202.4	262.5	321.2	599.9	422.8	768.6	NA

Differential Pressure Calculation

Valve flow coefficient, Kv or Cv $Kv\,(Cv) = Q\sqrt{\frac{Gf}{\Delta P}}$

Where:

Kv = Valve flow coefficient (flow in m^3/h at 1bar ΔP)

Cv = Valve flow coefficient (flow in gpm at 1psi ΔP)
(Cv = 1.155 Kv)

Q = Flow rate (m^3/h ; gpm)

ΔP = Differential pressure (bar ; psi)

Gf = Liquid specific gravity (Water = 1.0)

Practical formulas for water:

$$Q = Kv\sqrt{\Delta P} \qquad \Delta P = \left(\frac{Q}{Kv}\right)^2$$

Flow resistance or Head loss coefficient, $K = \Delta H \frac{2g}{V^2}$

Where:

K = Flow resistance or Head loss coefficient (dimensionless)

ΔH = Head loss (m ; feet)

V = Nominal size flow velocity (m/sec ; feet/sec.)

g = Acceleration of gravity (9.81 m/sec2 ; 32.18 feet/sec^2)

Practical formula:

$$\Delta H = K\frac{V^2}{2g}$$

Equivalent Pipe Length - Leq

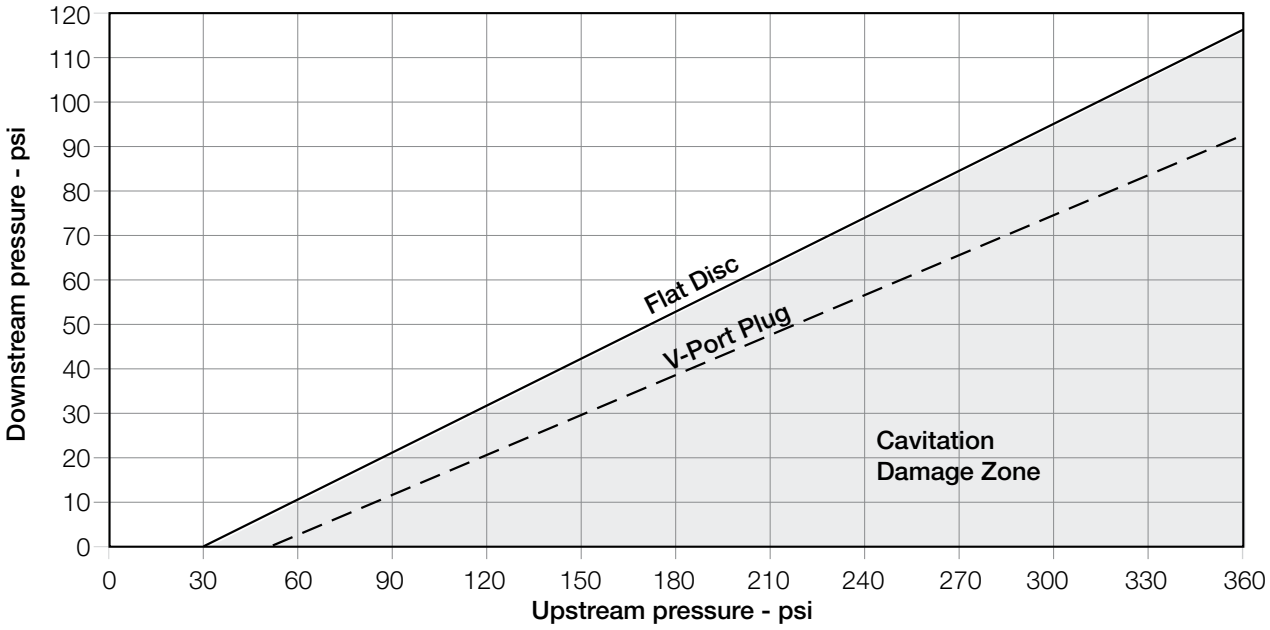
In order to simplify system head loss calculation,
add the Leq value to the pipe length of the relevant size

Note:

The Leq values given are for general consideration only.
Actual Leq may vary somewhat with each of the valve sizes.

US English

Cavitation Guide



Cavitation

The cavitation phenomenon has a significant affect on control valve and system performance.
Cavitation may damage the valve and piping by the affects of erosion and vibration. Cavitation also generates noise and may limit and ultimately choke the flow.
As the pressure differential across the valve increases, the static pressure of the flow passing through the throttling area of the valve (Vena Contracta) drops sharply.
When the fluid's static pressure reaches liquid vapor pressure, vapor cavities (bubbles) form and grow until they violently implode by the recovered pressure downstream to the valve seat.
The implosion of these cavities generates high-pressure surges, micro jets and intensive heat, which erode valve components and downstream piping. In its final stage, cavitation flashes and chokes the flow.
The above Cavitation Guide for Bermad 700 Series valves are based on the formula commonly used in the valve industry:

σ = (P2-Pv) / (P1-P2)

Where:

σ = Sigma, cavitation index, dimensionless
P1 = Upstream pressure, absolute
P2 = Downstream pressure, absolute
Pv = Liquid vapor pressure, absolute
(Water, 18ºC = 0.02 bar-a ; 65ºF = 0.3 psi-a)

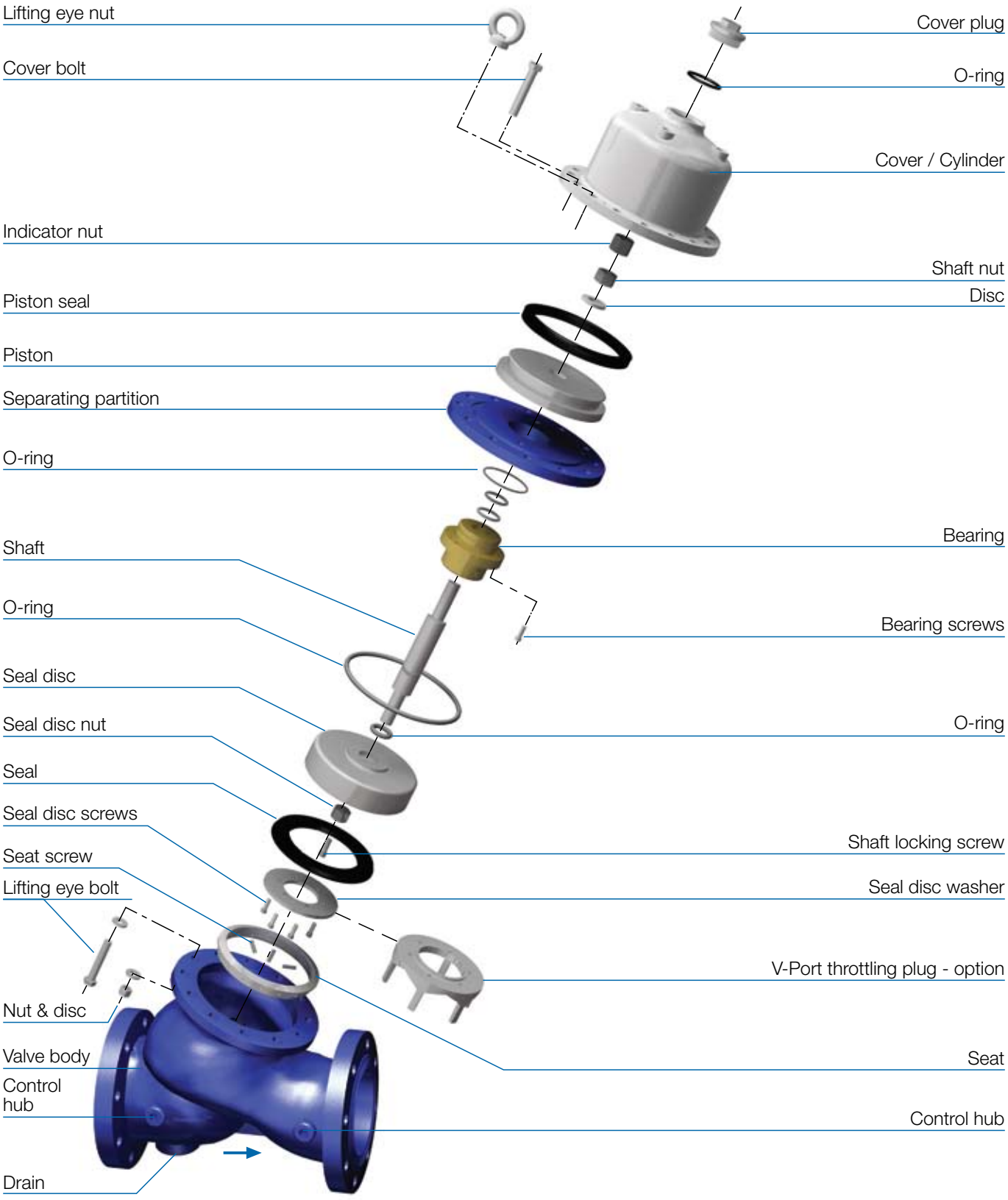
Use these guide and your applications upstream and downstream pressures to determine whether their intersection lies in or out of the cavitation damage zone.
Considerations to avoid cavitation damage:

A) Reduce system pressure in stages designing each pressure stage to be above cavitation conditions.
B) Consider using other valve selection criteria
   a. Valve body and plug type
   b. Valve size
   c. Valve material

Notes:

1. An alternate cavitation index formula introduced by ISA is:
   σISA = (P1-Pv) / (P1-P2) which equals σ+1
2. The above charts should be considered only as a general guide.
3. For optimum system and control valve application please consult Bermad.

800 Valve - Exploded View



For spare parts ordering, please use BERMAD "Spare Parts Ordering Guide."

Standard Operation Pressure – Materials Data

End Connections Standards / Pressure Ratings / Materials / Max. Operating Pressure

Bermad Code	End Connections Standard	Pressure Class	Ductile Iron to ASTM A-536 or EN 1563	Carbon Steel to ASTM A-216-WCB or EN 10083-1	Stainless Steel 316 to ASTM A-743 CF8M or EN 10088-1	Nickel Aluminum Bronze to ASTM B-148 C 95800 or BS-EN 1400 AB-2
10 or E1	I S O	PN 10	+	+	+	+
16 or E6	I S O	PN 16	+	+	+	16 bar
25 or E5	I S O	PN 25	25 bar	25 bar	25 bar	25 bar
40	I S O	PN 40 *	–	40 bar	40 bar	–
A5	A N S I	# 150	250 psi	285 psi	285 psi	250 psi
A3	A N S I	# 300	400 psi	400 psi	400 psi	400 psi
A4	A N S I	# 400 *	–	600 psi	600 psi	–
BD	BS 10	Table D	+	+	+	+
BH	BS 10	Table H	400 psi	400 psi	400 psi	400 psi
J1	J I S	10 K	+	+	+	+
J6	J I S	16 K	27 bar	27 bar	27 bar	27 bar
J2	J I S	20 K	28 bar	28 bar	28 bar	28 bar
J3	J I S	30 K *	–	40 bar	40 bar	–
B1	A B N T	10	+	+	+	+
B6	A B N T	16	+	+	+	16 bar
B2	A B N T	25	25 bar	25 bar	25 bar	25 bar
	Threads					
BP	B S P (Rp ISO 7/1)					
PH	B S P (Rp ISO 7/1)		25 bar	25 bar	25 bar	25 bar
NP	N P T					
NH	N P T		400 psi	400 psi	400 psi	400 psi

External flange diameter might vary from the standard.

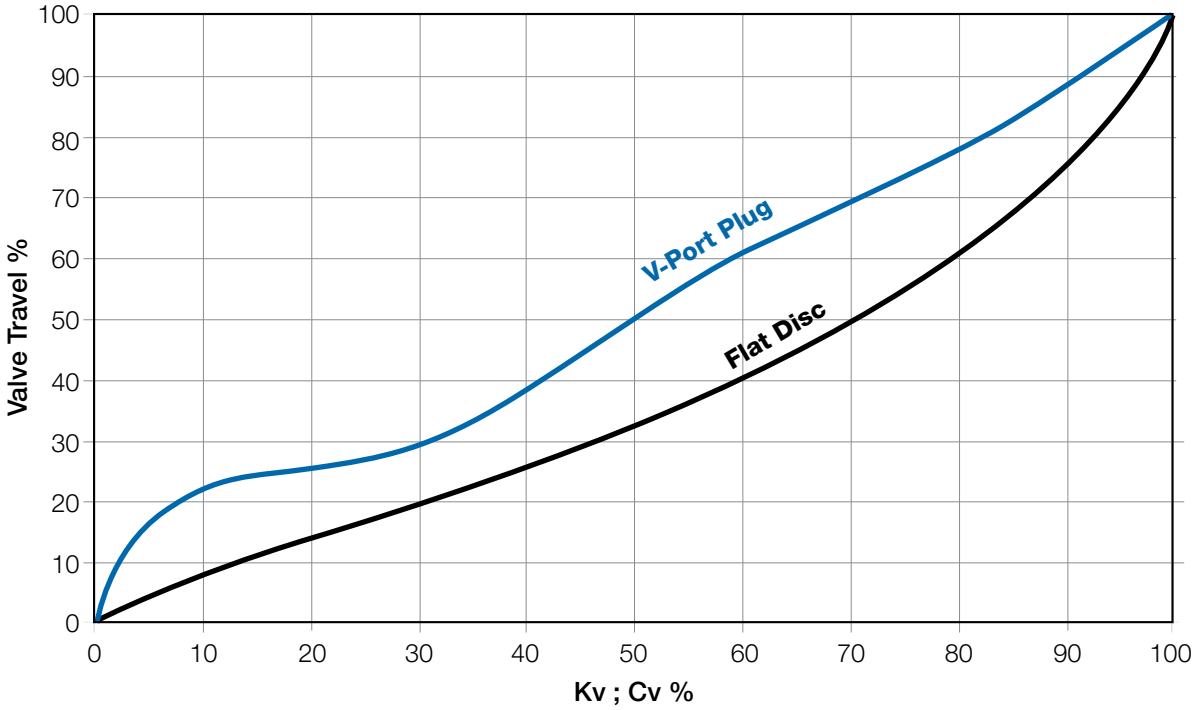
* Can be used in 800 series only.

\+ Available, Not required by the standard pressure class

– Not available

Valve Plugs Characteristics

Kv ; Cv to Valve Opening Chart



Typical Pressure Reducing Performance Chart

Actual Hydraulic Laboratory Results