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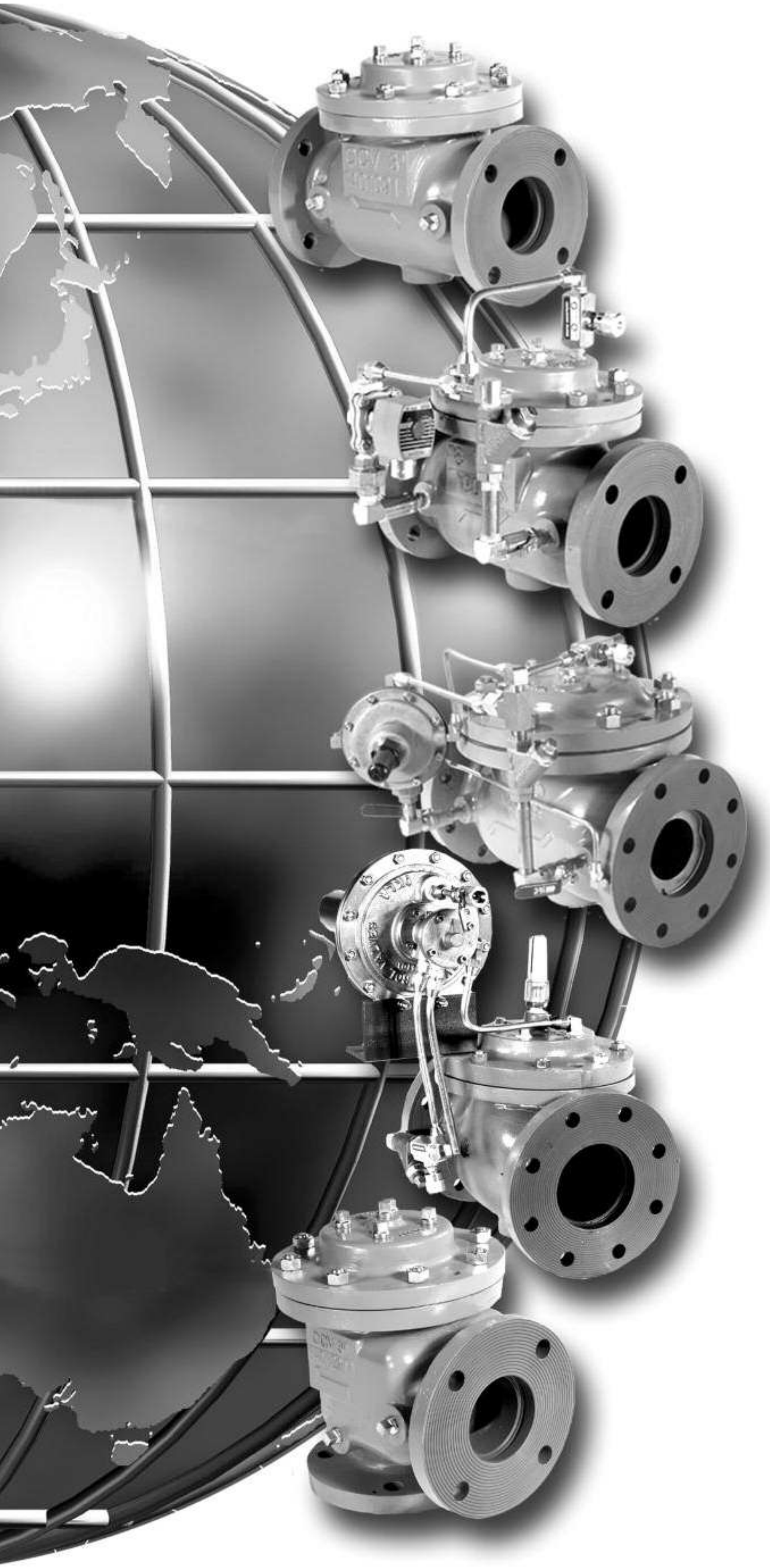

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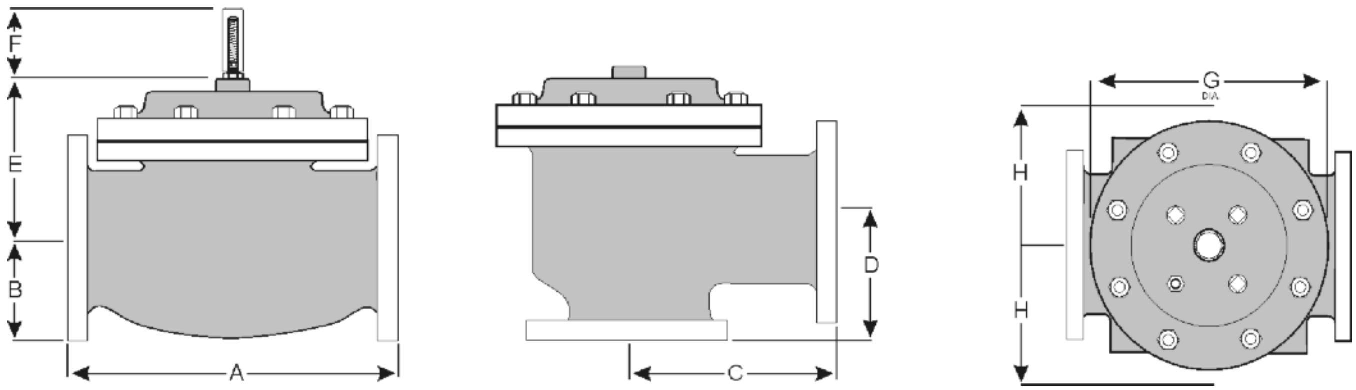
Engineering / Technical Section

DIMENSIONS

DIM	END CONN.	1 1/4-1 1/2	2	2 1/2	3	4	6	8	10	12	14	16	24
						U.S. DIMENSIONS - INCHES							
A	SCREWED	8 3/4	9 7/8	10 1/2	13	--	--	--	--	--	--	--	--
	GROOVED	8 3/4	9 7/8	10 1/2	13	15 1/4	20	--	--	--	--	--	--
	150# FLGD	8 1/2	9 3/8	10 1/2	12	15	17 3/4	25 3/8	29 3/4	34	39	40 3/8	62
	300# FLGD	8 3/4	9 7/8	11 1/8	12 3/4	15 5/8	18 5/8	26 3/8	31 1/8	35 1/2	40 1/2	42	63 3/4
B	SCREWED	1 7/16	1 11/16	1 7/8	2 1/4	--	--	--	--	--	--	--	--
	GROOVED	1*	1 3/16	1 7/16	1 3/4	2 1/4	3 5/16	--	--	--	--	--	--
	150# FLGD	2 5/16-2 1/2	3	3 1/2	3 3/4	4 1/2	5 1/2	6 3/4	8	9 1/2	10 5/8	11 3/4	16
	300# FLGD	2 5/8-3 1/16	3 1/4	3 3/4	4 1/8	5	6 1/4	7 1/2	8 3/4	10 1/4	11 1/2	12 3/4	18
C ANGLE	SCREWED	4 3/8	4 3/4	6	6 1/2	--	--	--	--	--	--	--	--
	GROOVED	4 3/8*	4 3/4	6	6 1/2	7 5/8	--	--	--	--	--	--	--
	150# FLGD	4 1/4	4 3/4	6	6	7 1/2	10	12 11/16	14 7/8	17	--	20 13/16	--
	300# FLGD	4 3/8	5	6 3/8	6 3/8	7 13/16	10 1/2	13 3/16	15 9/16	17 3/4	--	21 5/8	--
D ANGLE	SCREWED	3 1/8	3 7/8	4	4 1/2	--	--	--	--	--	--	--	--
	GROOVED	3 1/8*	3 7/8	4	4 1/2	5 5/8	--	--	--	--	--	--	--
	150# FLGD	3	3 7/8	4	4	5 1/2	6	8	11 3/8	11	--	15 11/16	--
	300# FLGD	3 1/8	4 1/8	4 3/8	4 3/8	5 13/16	6 1/2	8 1/2	12 1/16	11 3/4	--	16 1/2	--
E	ALL	6	6	7	6 1/2	8	10	11 7/8	15 3/8	17	18	19	27
F	ALL	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	3 7/8	6 3/8	6 3/8	6 3/8	6 3/8	6 3/8	8
G	ALL	6	6 3/4	7 11/16	8 3/4	11 3/4	14	21	24 1/2	28	31 1/4	34 1/2	52
H	ALL	10	11	11	11	12	13	14	17	18	20	20	28 1/2

*GROOVED END NOT AVAILABLE IN 1 1/4"



For maximum efficiency, the OCV control valve should be mounted in a piping system so that the valve bonnet (cover) is in the top position. Other positions are acceptable but may not allow the valve to function to its fullest and safest potential. In particular, please consult the factory before installing 8" and larger valves, or any valves with a limit switch, in positions other than described. Space should be taken into consideration when mounting valves and their pilot systems.

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How to order your valve
When Ordering please provide:
Series Number - Valve size - Globe or Angle - Pressure Class - Screwed, Flanged, Grooved - Trim Material - Adjustment Range - Pilot Options - Special needs / or installation requirements.

ANSI FLANGE DATA

ANSI FLANGE DATA
American National Standards Institute

TABLE 1: ANSI B16.42 CLASS 150 (Ductile Iron) 250 PSI MAX. W.P.
ANSI B16.5 CLASS 150 (Steel and Stainless Steel) 285 PSI MAX. W.P.

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS	RAISED FACE DIAMETER*	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
1 1/4	4 5/8	5/8	2 1/2	4	5/8	3 1/2
1 1/2	5	11/16	2 7/8	4	5/8	3 7/8
2	6	3/4	3 5/8	4	3/4	4 3/4
2 1/2	7	7/8	4 1/8	4	3/4	5 1/2
3	7 1/2	15/16	5	4	3/4	6
4	9	15/16	6 1/5	8	3/4	7 1/2
6	11	1	8 1/2	8	7/8	9 1/2
8	13 1/2	1 1/8	10 5/8	8	7/8	11 3/4
10	16	1 3/16	12 3/4	12	1	14 1/4
12	19	1 1/4	15	12	1	17
14	21	1 3/8	16 1/4	12	1 1/8	18 3/4
16	23 1/2	1 7/16	18 1/2	16	1 1/8	21 1/4
18	25	1 9/16	21	16	1 1/4	22 3/4
20	27 1/2	1 11/16	23	20	1 1/4	25
24	32	1 7/8	27 1/4	20	1 3/8	29 1/2

*Raised face applies to ANSI B16.5 (steel) flanges only. All raised faces are 1/16" high.
Iron flanges are flat-faced.

Measure in inches.

ANSI FLANGE DATA
American National Standards Institute

TABLE 2: ANSI B16.42 CLASS 300 (Ductile Iron) 640 PSI MAX. W.P.
ANSI B16.5 CLASS 300 (Steel and Stainless Steel) 740 PSI MAX. W.P.

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS	RAISED FACE DIAMETER*	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
1 1/4	5 1/4	3/4	2 1/2	4	3/4	3 7/8
1 1/2	6 1/8	13/16	2 7/8	4	7/8	4 1/2
2	6 1/2	7/8	3 5/8	8	3/4	5
2 1/2	7 1/2	1	4 1/8	8	7/8	5 7/8
3	8 1/4	1 1/8	5	8	7/8	6 5/8
4	10	1 1/4	6 3/16	8	7/8	7 7/8
6	12 1/2	1 7/16	8 1/2	12	7/8	10 5/8
8	15	1 5/8	10 5/8	12	1	13
10	17 1/2	1 7/8	12 3/4	16	1 1/8	15 1/4
12	20 1/2	2	15	16	1 1/4	17 3/4
14	23	2 1/8	16 1/4	20	1 1/4	20 1/4
16	25 1/2	2 1/4	18 1/2	20	1 3/8	22 1/2
18	28	2 3/8	21	24	1 3/8	24 3/4
20	30 1/2	2 1/2	23	24	1 3/8	27
24	36	2 3/4	27 1/4	24	1 11/16	32

*Raised faces are 1/16" high.

Measure in inches.

A New Concept in Control Valve Sizing
By Stephen D. Jernigan, P.E., OCV V.P. Engineering

Most engineers and users of control valves are familiar with the flow charts that various manufacturers-OCV included-have published as a guide to properly sizing a valve. These are simple, straight-line graphs that plot pressure drop vs. flow for a wide-open valve of a given size. Quite frankly, the usefulness of such charts is rather limited because of a couple of factors:

1. Flow charts tell you virtually nothing about the performance of modulating valves (pressure reducing, rate-of-flow control, etc.). These are valves that rarely, if ever, reach the wide-open position depicted in conventional flow charts.

2. Flow charts are not entirely accurate for many on-off valves (e.g., check, solenoid) which operate on line pressure differential. Such valves normally contain an internal spring which takes a certain amount of differential to compress before the valve can reach the full-open position. In these cases, conventional flow charts are not accurate at the low flow end of the scale.

In 1984, with the publication of the Pressure Reducing Valve Sizing Guide, OCV Control Valves began a program to give the user a better and more accurate method of sizing valves. The ultimate goal of the program was to provide a simple, concise "tool" that would apply to sizing all valves. The culmination is the Performance Charts presented in the following pages.

In 1995, OCV released the computer-based ValveMaster Selection and Size Program. The program logically walks you through the sizing, valve function and material selection process of a hydraulic control valve application. Your valve specification can be printed and/or transferred to a project specification file. The program exposes the variables of control valve selection and reduces the amount of time required to accurately size and select the valve. Refer to the last page of this catalog for ordering information.

At first glance, the Performance Charts appear much like the old flow charts, but with several extra lines added! Because of the added information represented by the extra lines, only two or three different sizes of valves are presented on an individual Performance Chart, each with its own flow rate scale.

In explaining how to use the Performance Charts, we need to consider three "classes" of valves.

1. The first class of valves includes those Models based on the Model 66 power-actuated valve (Model 125-27 and Model 126) and other valves with a pilot system that exhausts-to-atmosphere (Model 3331 and Model 3333 altitude valves). These valves will open fully regardless of flow or pressure differential. Their performance is represented by the straight line A-C-D (which, incidentally, is the same straight line found on the old flow charts).

Example: Find the pressure drop of a 2" Model 125-27 globe valve at 60 gpm.

Solution: Find 60 gpm on the 2" flow rate scale and trace horizontally to line A-C-D. Then trace vertically to the pressure drop scale and read 1.6 psi.

2. The second class of valves is the on-off types with a pilot system that exhausts to the downstream side of the valve. In this class are the Series 94 check valves, the Series 115 solenoid valves, the Models 125 and 125-7 pump control valves and the Model 8000 float valve. These valves operate along lines B-C-D, the B-C segment representing the "spring effect" described above.

Example: Find the pressure drop of a 2½" Model 115-2 globe valve at 60 gpm and at 200 gpm.

Solution: Trace horizontally from 60 gpm on the 2½" globe flow rate scale. This intersects line B-C, indicating the valve is not full open. Drop vertically to the flow rate scale and read 3.5 psi. Now trace horizontally from 200 gpm. This intersects line C-D (the valve is full open). Drop vertically to the pressure drop scale and read 8.7 psi.

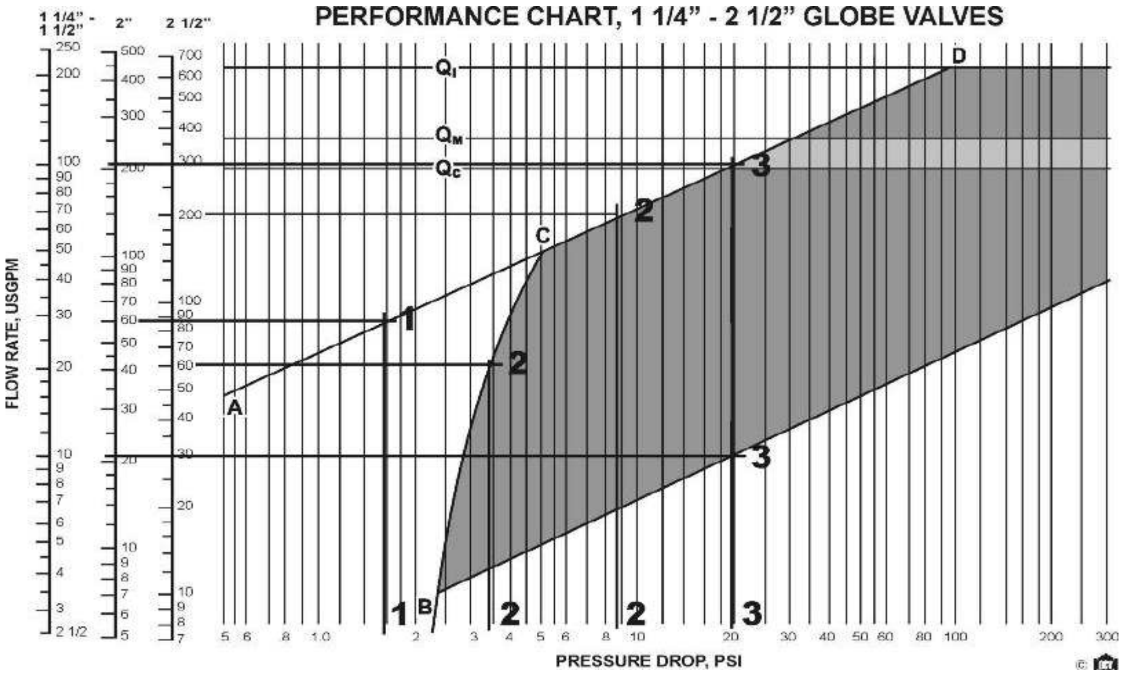
3. The third class of valves are the modulating types: Series 108 Pressure Relief, Series 110 Differential Control, Series 120 Rate-of-Flow Control, Series 127 Pressure-Reducing and Series 8101 Modulating-Float Control. Here performance is not defined by a line, but rather an area of the chart -- specifically the **shaded** area. Simply stated, a modulating valve can be expected to perform properly anywhere within the shaded area.

Example: Find the effective flow range of a 2" globe relief valve relieving 20 psi into an atmospheric drain.

Solution: Upstream pressure is 20 psi, downstream is zero. Therefore, pressure drop is 20 psi. Trace upward until you intersect the lower edge of the shaded area. Then, trace horizontally to the 2" flow rate chart and read 21 gpm. This is the minimum flow. Now continue upward along the 20 psi line to the upper edge of the shaded area. Trace horizontally and read a maximum flow of 210 gpm. The effective flow range, then, is 21-210 gpm.

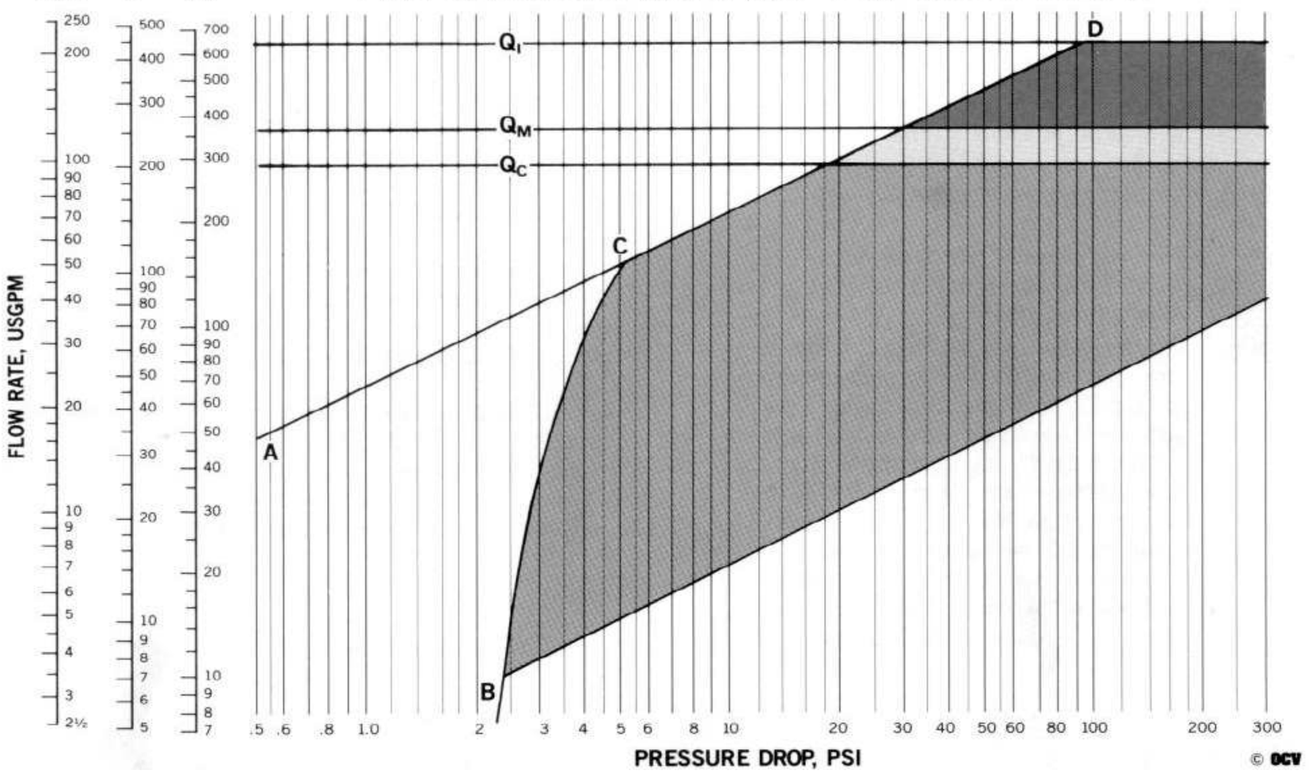
A final set of information is given by the horizontal lines labeled Q_C, Q_I. These are the maximum recommended flows based on fluid velocity.

Q_C represents a velocity of 20 ft/sec and is the maximum recommended flow for continuous service.
Q_M represents a velocity of 25 ft/sec and is the maximum recommended flow for occasional "bursts" of high flow that would occur no more than 20% of the time.
Q_I represents a velocity of 45 ft/sec and is the maximum recommended flow for very intermittent service -- no more than 1-2% of the time. It is primarily intended for surge relief service.

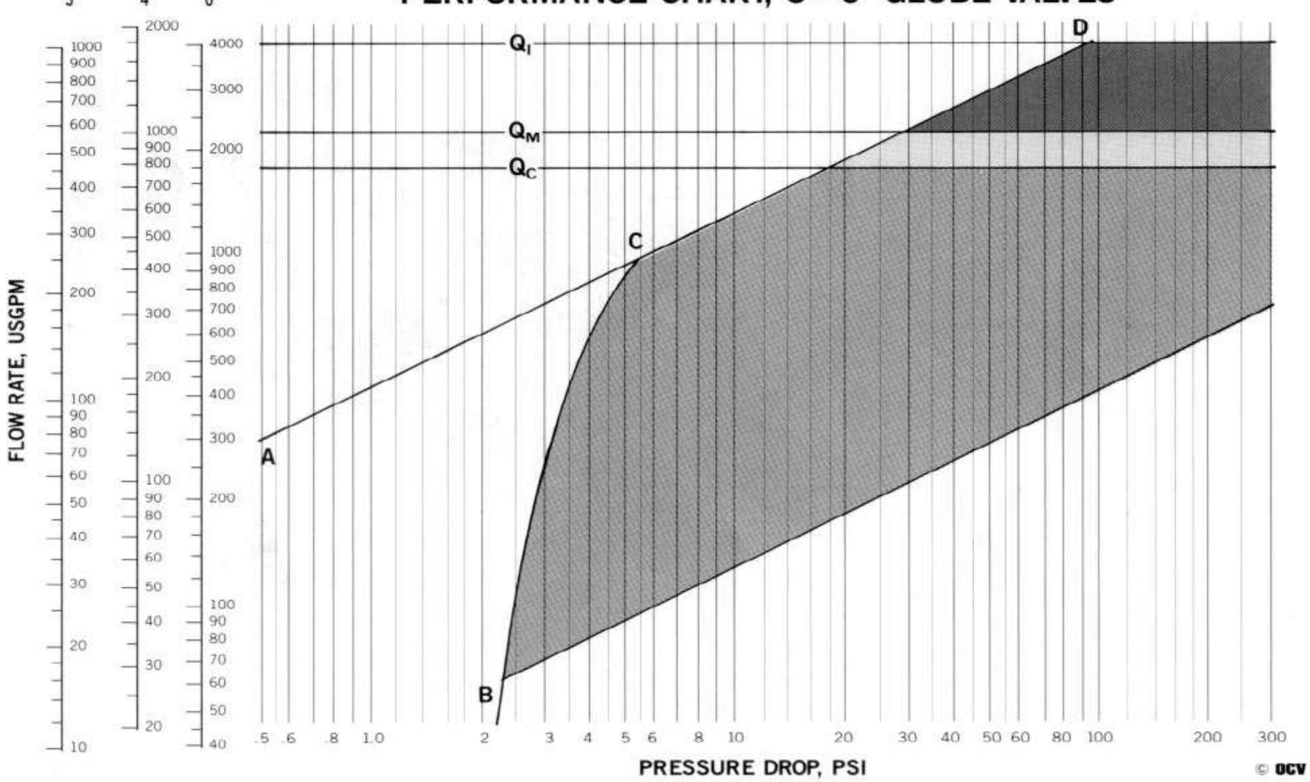


PERFORMANCE CHARTS

PERFORMANCE CHART, 1¼"–2½" GLOBE VALVES



PERFORMANCE CHART, 3"–6" GLOBE VALVES



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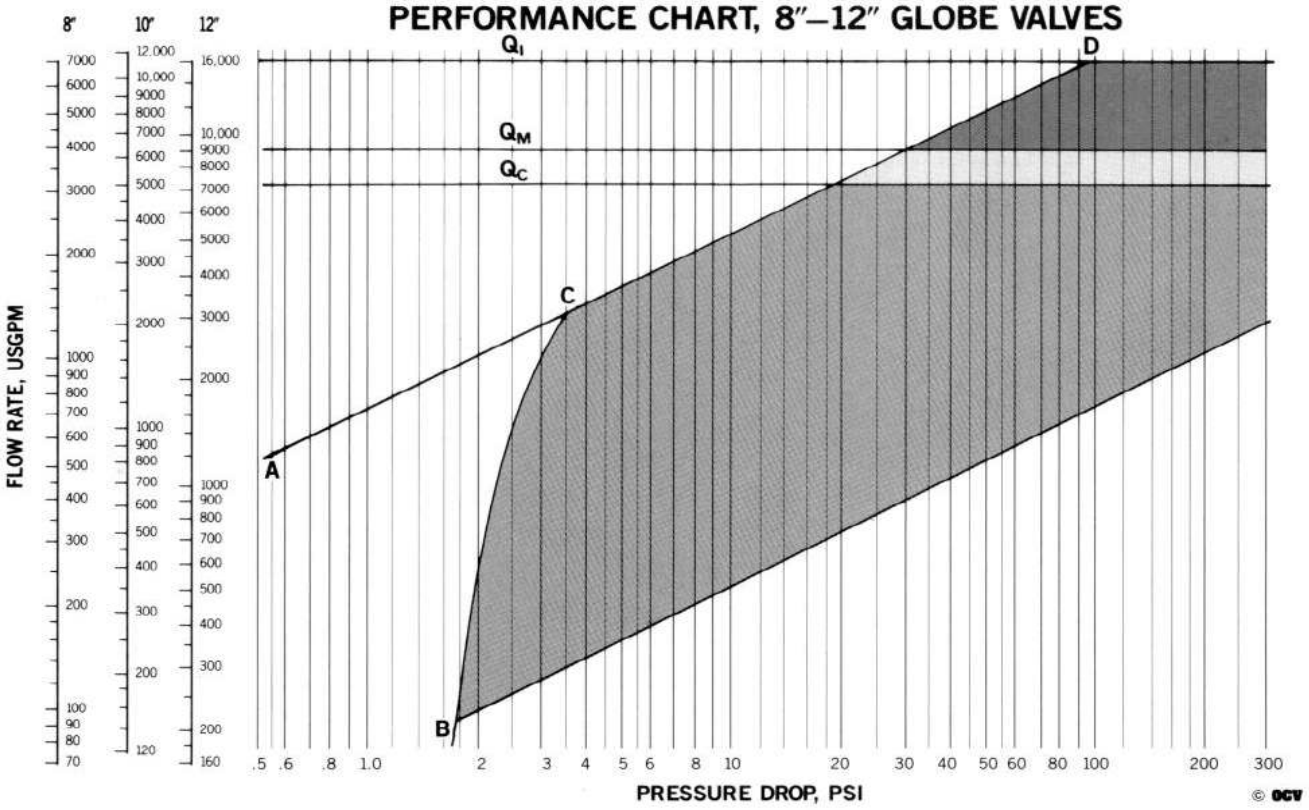
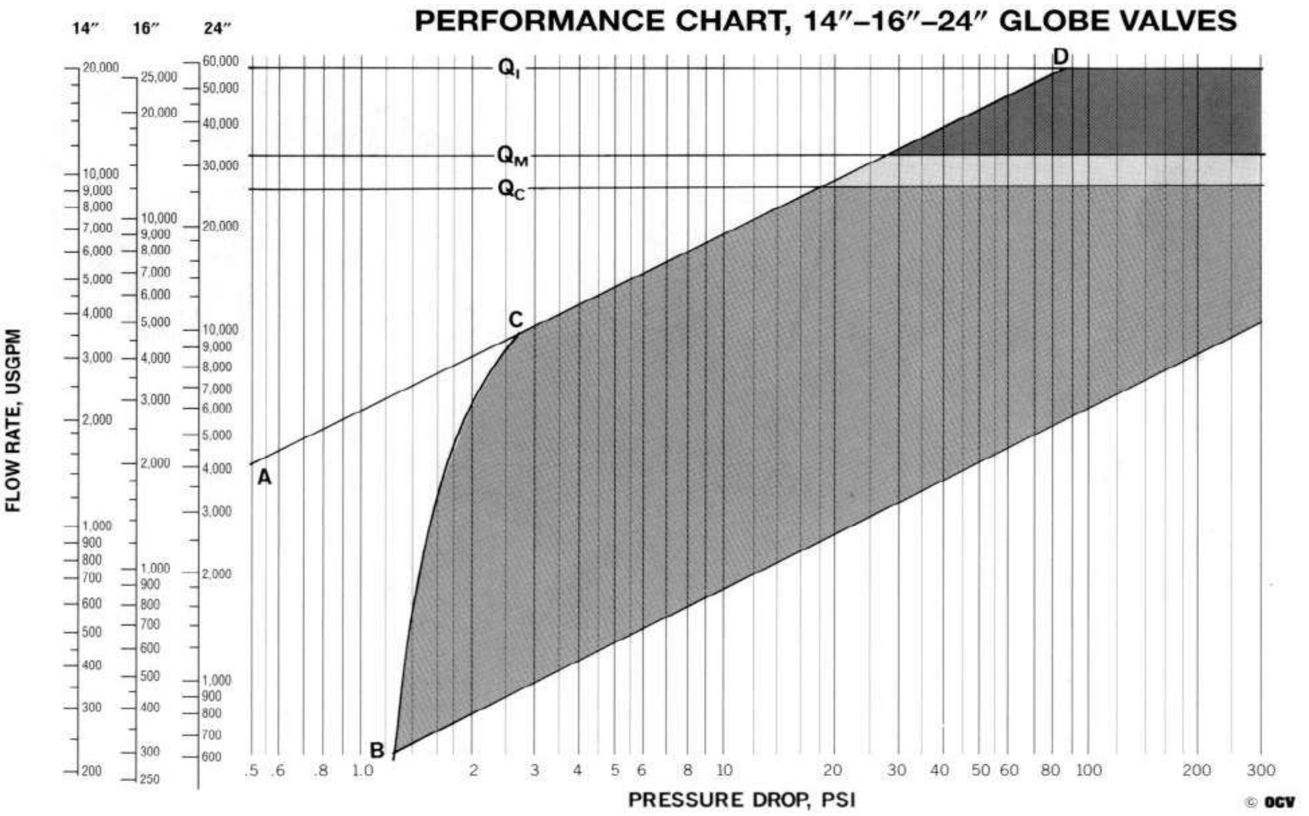
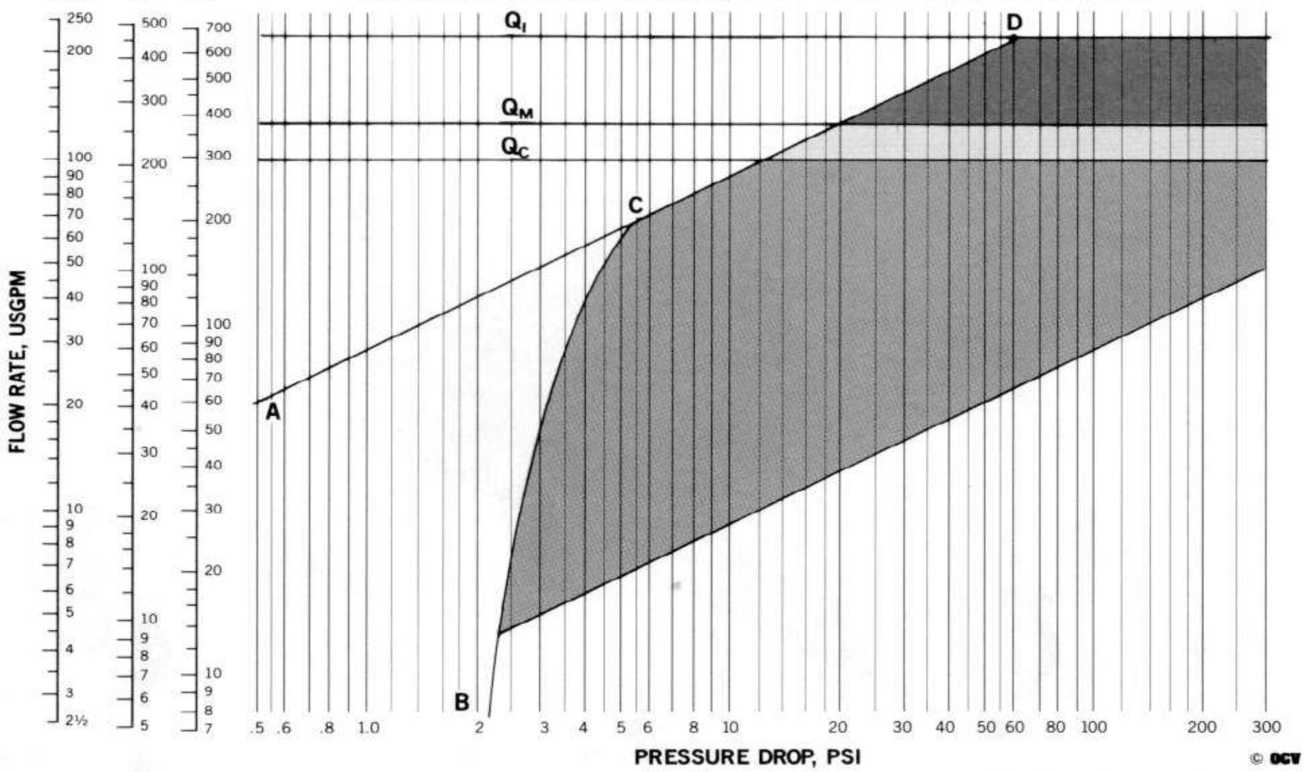
PERFORMANCE CHARTS



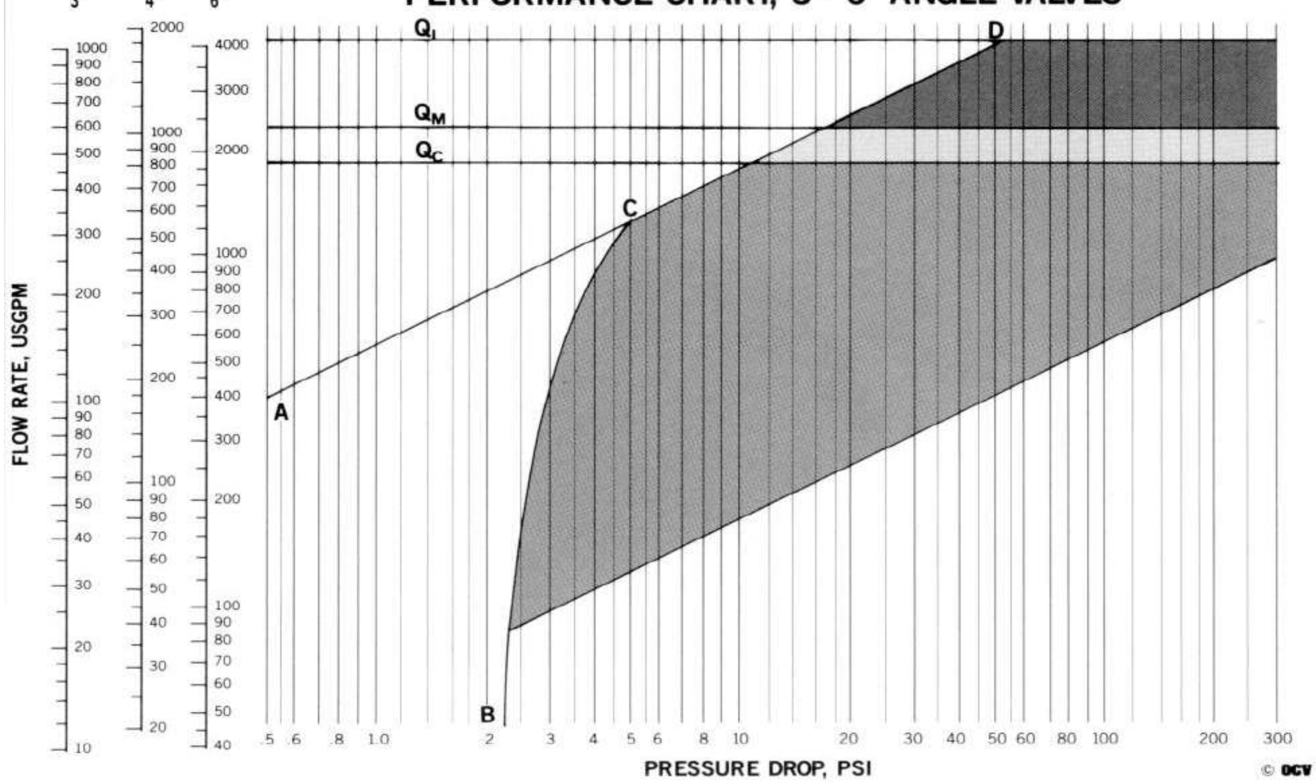


PERFORMANCE CHARTS

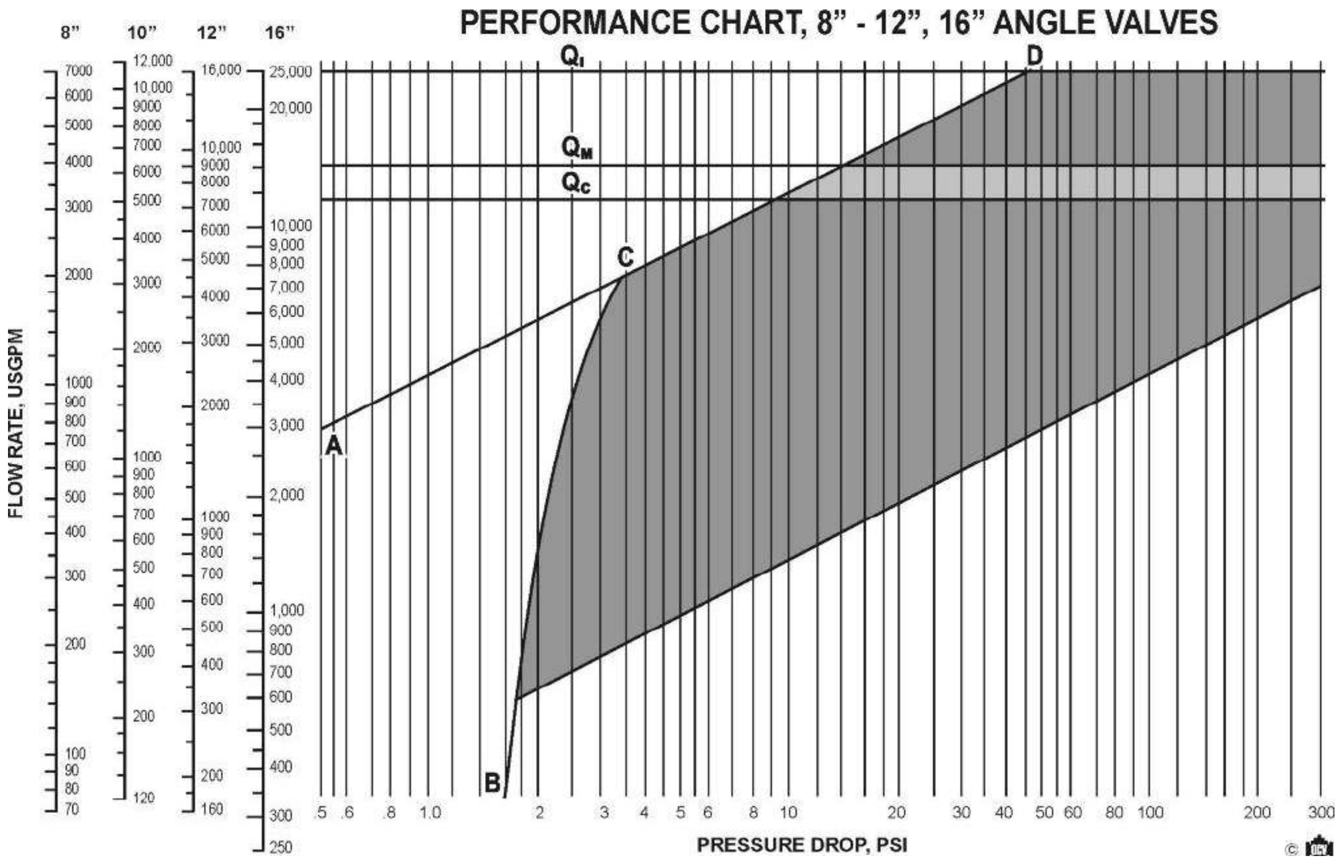
PERFORMANCE CHART, 1¼"–2½" ANGLE VALVES



PERFORMANCE CHART, 3"–6" ANGLE VALVES



PERFORMANCE CHARTS



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CAVITATION INFORMATION

If you're looking for a cavitation chart, the one usually found in control valve catalogs, forget it! The chart is outdated, simplistic and, in most cases, highly inaccurate. Therefore, we no longer publish or subscribe to the data represented. We offer a simple definition that will assist you in understanding this phenomenon.

Cavitation:
the formation of partial vacuums (bubbles of negative pressure) caused by rapid flow and high pressure differential across a valve seat. These negative bubbles collapse under the force of positive downstream pressure. The energy released by these implosions can result in pitting and wearing of the surfaces.

This is a complex phenomenon that cannot be predicted by looking at only the inlet and outlet pressures of the control valve. Here are the variables that contribute to cavitation.

The pressure differential at which cavitation occurs, DP_{cav}, can be predicted from the equation:

$$DP_{cav} = C_f^2(P_1-P_v)$$

where:
C_f = critical flow factor
P_1 = valve inlet pressure, psia
P_v = liquid vapor pressure, psia

P_1 is determined from your system data. P_v is determined from the type of liquid and its temperature. The control valve determines C_f and varies with the degree of valve opening. The degree of opening is determined by the function of the valve (e.g., pressure reducing, pressure relief, etc.) and the flow rate.

OCV can take the guesswork out of cavitation. The easiest way to predict if your control valve will cavitate is to let us do the calculation for you. Simply fax or e-mail the data listed below. Our engineering team will return a graphical cavitation analysis, and, if cavitation is a possibility, OCV can offer solutions to prevent it.

TYPE OF VALVE:
(e.g., pressure reducing, pressure relief, pump control, etc.)
(or valve function)

MODEL NUMBER:
(if known or we will provide)

SIZE OF VALVE:

FLOW RANGE:
(minimum to maximum):

VALVE INLET PRESSURE:
(including variations, if any, with flow rate):

VALVE OUTLET PRESSURE:
(including variations, if any, with flow rate):

LIQUID BEING HANDLED:

LIQUID TEMPERATURE:

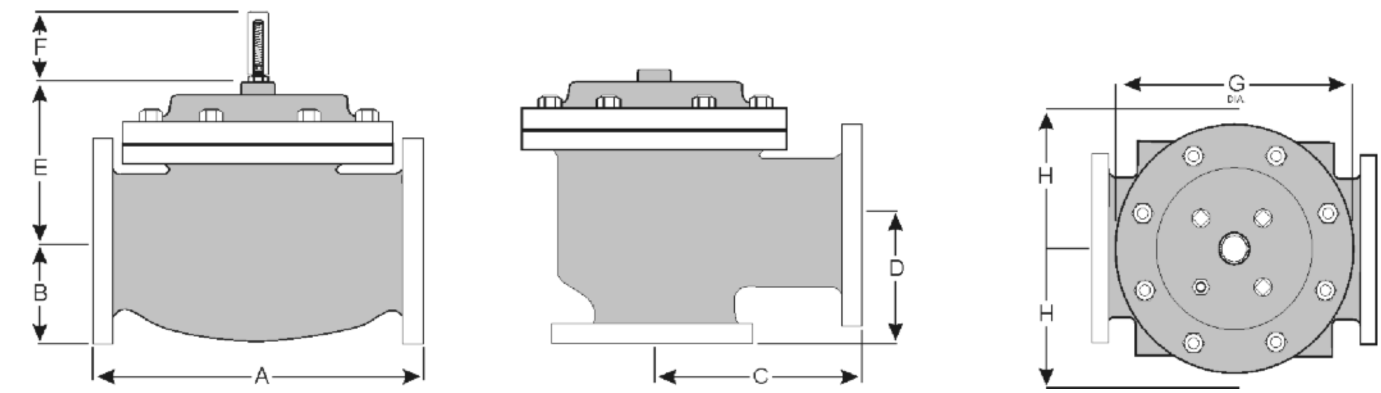
LIQUID VAPOR PRESSURE AT STATED TEMPERATURE:
(if other than water):

METRIC DIMENSIONS

METRIC DIMENSIONS - M.M.

DIM	END CONN.	DN32-DN40	DN50	DN65	DN80	DN100	DN150	DN200	DN250	DN300	DN350	DN400	DN600
A	SCREWED	222	251	267	330	--	--	--	--	--	--	--	--
	GROOVED	222	251	267	330	387	508	--	--	--	--	--	--
	150# FLGD	216	238	267	305	381	451	645	756	864	991	1026	1575
	300# FLGD	222	251	283	324	397	473	670	791	902	1029	1067	1619
B	SCREWED	37	43	48	57	--	--	--	--	--	--	--	--
	GROOVED	25*	30	37	44	57	84	--	--	--	--	--	--
	150# FLGD	59-64	76	89	95	114	140	171	203	241	270	298	406
	300# FLGD	67-78	83	95	105	127	159	191	222	260	292	324	457
C ANGLE	SCREWED	111	121	152	165	--	--	--	--	--	--	--	--
	GROOVED	111*	121	152	165	194	--	--	--	--	--	--	--
	150# FLGD	108	121	152	152	191	254	322	378	432	--	529	--
	300# FLGD	111	127	162	162	198	267	335	395	451	--	549	--
D ANGLE	SCREWED	79	98	102	114	--	--	--	--	--	--	--	--
	GROOVED	79*	98	102	114	143	--	--	--	--	--	--	--
	150# FLGD	76	98	102	102	140	152	203	289	279	--	398	--
	300# FLGD	79	105	111	111	148	165	216	306	298	--	419	--
E	ALL	152	152	178	165	203	254	302	391	432	457	483	686
F	ALL	98	98	98	98	98	98	162	162	162	162	162	203
G	ALL	152	171	195	222	298	356	533	622	711	794	876	1321
H	ALL	254	279	279	279	305	330	356	432	457	508	508	724

*GROOVED END NOT AVAILABLE IN DN32



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DIN FLANGE DATA

TABLE 3: PN-10 (IRON ONLY) WORKING PRESSURE = 10 BAR (145 PSI)

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS	RAISED FACE DIAMETER*	RAISED FACE HEIGHT	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
32	140	18	78	2	4	18	100
40	150	18	88	3	4	18	110
50	165	20	102	3	4	18	125
65	185	20	122	3	4	18	145
80	200	22	138	3	8	18	160
100	220	24	158	3	8	18	180
150	285	26	212	3	8	22	240
200	340	26	268	3	8	22	295
250	395	28	320	3	12	22	350
300	445	28	370	4	12	22	400
350	505	30	430	4	16	22	460
400	565	32	482	4	16	26	515
450	615	32	532	4	20	26	565
500	670	34	585	4	20	26	620
600	780	36	685	5	20	30	725

Measure in millimeters.

TABLE 4: PN-16 (IRON OR STEEL) WORKING PRESSURE = 16 BAR (232 PSI)

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS IRON	FLANGE THICKNESS STEEL	RAISED FACE DIAMETER*	RAISED FACE HEIGHT	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
32-50	SAME AS PN-10							
65	185	20	(18)	122	3	4	18	145
80	200	22	(20)	138	3	8	18	160
100	220	24	(20)	158	3	8	18	180
150	285	26	(22)	212	3	8	22	240
200	340	30	(24)	268	3	12	22	295
250	405	32	(26)	320	3	12	26	355
300	460	32	(28)	378	4	12	26	410
350	520	36	(30)	438	4	16	26	470
400	580	38	(32)	490	4	16	30	525
450	640	40	(34)	550	4	20	30	585
500	715	42	(36)	610	4	20	33	650
600	840	48	(40)	725	5	20	36	770

Measure in millimeters.

TABLE 5: PN-25 (IRON OR STEEL) WORKING PRESSURE = 25 BAR (362 PSI)

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS IRON	FLANGE THICKNESS STEEL	RAISED FACE DIAMETER*	RAISED FACE HEIGHT	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
32	140	20	(18)	78	2	4	18	100
40	150	20	(18)	88	3	4	18	110
50	165	22	(20)	102	3	4	18	125
65	185	24	(22)	122	3	8	18	145
80	200	26	(24)	138	3	8	18	160
100	235	28	(24)	162	3	8	22	190
150	300	34	(28)	218	3	8	26	250
200	360	34	(30)	278	3	12	26	310
250	425	36	(32)	335	3	12	30	370
300	485	40	(34)	395	4	16	30	430
350	555	44	(38)	450	4	16	33	490
400	620	48	(40)	505	4	16	36	550
450	670	50	(42)	555	4	20	36	600
500	730	52	(44)	615	4	20	36	660
600	845	*	(46)	720	5	20	39	770

*Not included in DIN DATA .

Measure in millimeters.

OCV Control Valves

DIN FLANGE DATA

TABLE 6: PN-40 (STEEL ONLY) **WORKING PRESSURE = 40 BAR (580 PSI)**

SIZE	OUTSIDE DIAMETER	FLANGE THICKNESS	RAISED FACE DIAMETER*	RAISED FACE HEIGHT	NUMBER OF HOLES	HOLE DIAMETER	BOLT CIRCLE DIAMETER
32-150	----------SAME AS PN-25----------						
200	375	34	285	3	12	30	320
250	450	38	345	3	12	33	385
300	515	42	410	4	16	33	450
350	580	46	465	4	16	36	510
400	660	50	535	4	16	39	585
450	685	50	560	4	20	39	610
500	755	52	615	4	20	42	670
600	890	60	735	5	20	48	795

Measure in millimeters

METRIC (AND OTHER) CONVERSIONS

PRESSURE

1 kilo Paschal (kPa) = 0.145 psi
1 kg / cm^2 = 14.19 psi
1 bar = 14.50 psi
= 100 kPa
1 meter of water = 3.28 ft. of water
= 1.419 psi

LENGTH

1 meter (m) = 39.37 inches
= 3.28 feet
= 1000 millimeters (mm)
=100 centimeters (cm)

FLOW

1 m^3 / hr = 4.403 gpm
1 l / sec = 15.85 gpm
1 l / min = .264 gpm

MASS

1 kilogram (k) = 2.20 pounds mass
= 0.0685 slugs
= 1000 grams (gm)

VOLUME

1 liter (l) = 0.264 gallons
= 1000 milliliters
1 cubic meter (m) = 264.2 gallons

FORCE

1 newton (n) = 0.2248 pounds force
1 kilogram force = 2.20 pounds force

Represented by: