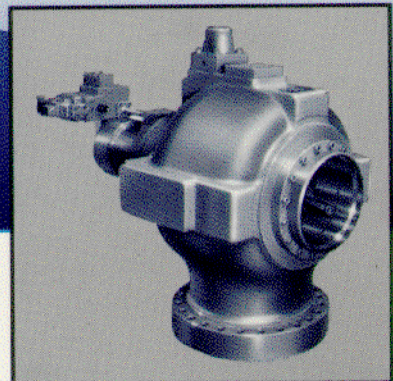
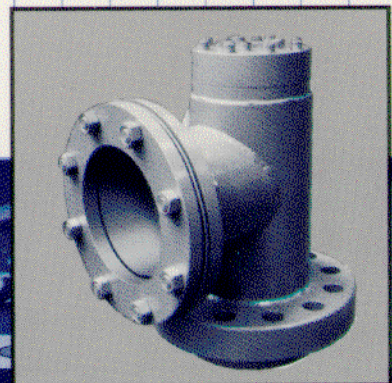
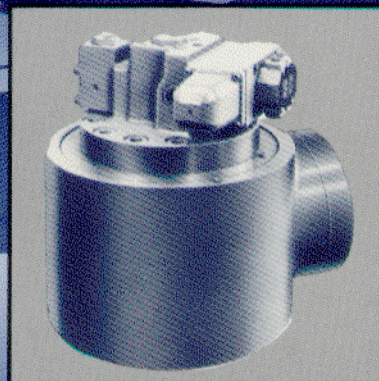


Oilgear

VPE, VSA, VSM

PREFILL AND

EXHAUST VALVE



PERFORMANCE ASSURANCE IS STANDARD WITH EVERY OILGEAR COMPONENT

Every Oilgear pre-H valve manufactured is shipped with a corporate commitment to support the component until it performs as specified.

This total dedication to performance is based upon experience gained since 1921 in matching fluid power equipment to a tremendous variety of machines and applications.

Oilgear's Performance Assurance is made possible because of experience gained over the years in supplying machinery builders and users with unique solutions to thousands of unusual fluid power problems.

Historically, Oilgear has concentrated its energies on hydraulic equipment and systems. Every Oilgear facility is staffed with factory trained and field experienced application engineers.

Performance Assurance doesn't stop with the design of the system or the sale of the component. Oilgear engineers will be there—when they are needed—supplying the technical support, field service, parts and repairs, to make sure each component operates correctly.



PREFILL AND EXHAUST VALVES

Accommodate Fast Approach
and Return Speeds For All Presses

Internationally known as a world class hydraulics company, Oilgear specializes in the design, engineering technology and equipment needed to solve difficult hydraulic problems by supplying the right components to meet specific needs.

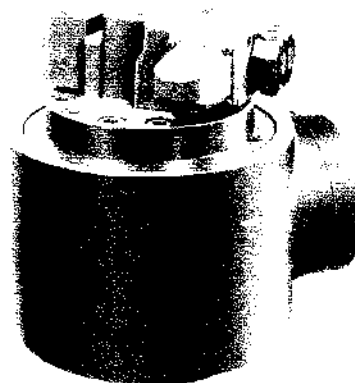
Three styles of prefill and exhaust valves are part of Oilgear's long line of hydraulic components. Collectively they present a range of valves from which to choose. Individually, each has a distinct application advantage.

CONTENTS

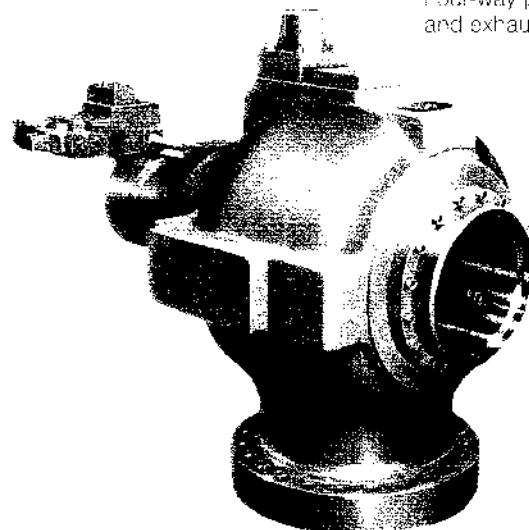
Items	Page No.
VPE Two-way prefill and exhaust valves	
Features and benefits	4
Specifications	6
Dimensions	7
Sizes and Weights	7
Performance Curves	8
How to order	9
VSA Three-way prefill and exhaust valves	
Features and benefits	10
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VSM Four-way prefill and exhaust valves	
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VPE
Two-way prefill
and exhaust valves



VSA
Three-way prefill
and exhaust valves



VSM
Four-way prefill
and exhaust valves

VPE TWO-WAY PREFILL AND EXHAUST VALVES

Fast Response

- These proven and precision built prefill and exhaust valves are designed to accommodate main ram fast approach and return for high speed presses.

High Flow

- Flow rates to 6,864 USgpm (26,000 lpm) prefill, 15,852 USgpm (60,000 lpm) exhaust.

High Pressure Ratings

- Maximum pressures to 14,500 psi (1000 bar).

Pilot Return Spring

For All Fluids

- Can be used with a wide range of hydraulic fluids.

Operating Piston

Operating Cylinder

Valve Casing

Return Spring

- When the pressure differential across the main valve exceeds the spring force, the valve opens automatically allowing prefill.
- When the prefiling requirements are satisfied, the valve closes automatically.

Simple Construction and Design

Positive Seat

- Seated valves are virtually leak free.
- These valves operate with very high pressures, up to 14,500 psi (1000 bar)

Pilot Supply Connection

Extensive Application Experience

- Typical applications for these two-way valves include—SMC presses, open and closed die forging presses, injection moulding machines, cable sheathing and lead cable presses, piercing presses, plus many more.

Rapid Exhaust

- After decompression, hydraulic pilot supply acts on the operating piston, overcoming the pilot return spring force to automatically depress and open the main valve. This permits hydraulic fluid to exhaust from press cylinder to tank.

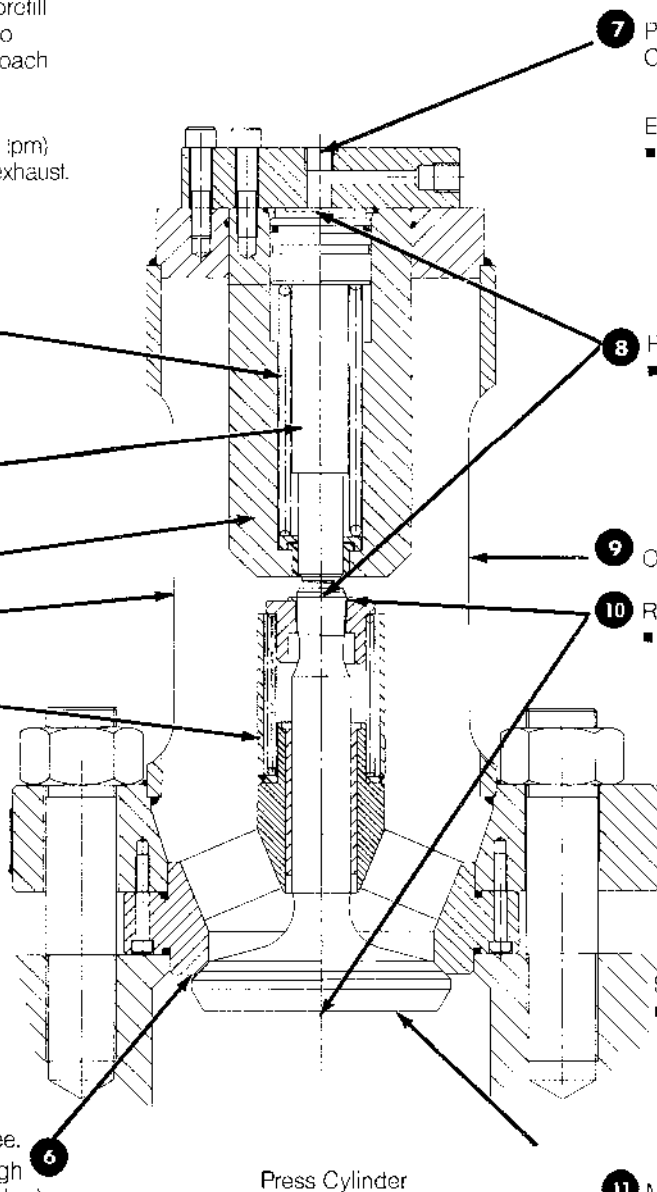
Opening To Tank

Rapid Prefilling

- When the press ram is displaced on its approach stroke, a pressure differential is created across the main valve causing it to open permitting a large volume of hydraulic fluid to flow from supply, at low pressure, into the cylinder.

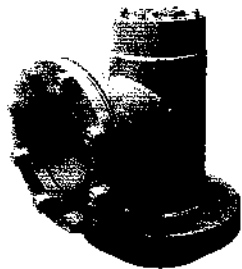
Sizes and Configurations

- Eight sizes are offered. Configurations include:
Cylinder and 90° line connection
Cylinder and straight line connection
Cylinder and tank connection



CB

Cylinder & 90 Line Connection



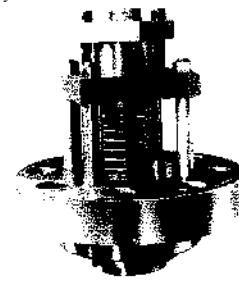
CL

Cylinder & Straight Line Connection



CT

Cylinder & Tank Connection



Integral Decompression

- On applications such as hot metalworking, where integral decompression is desirable, special versions of the standard prefill and exhaust valves are available. These two-stage valves in size 130 thru 250, incorporate design features to decompress the hydraulic fluid in the cylinder at a controlled rate prior to automatic opening for rapid exhaust.

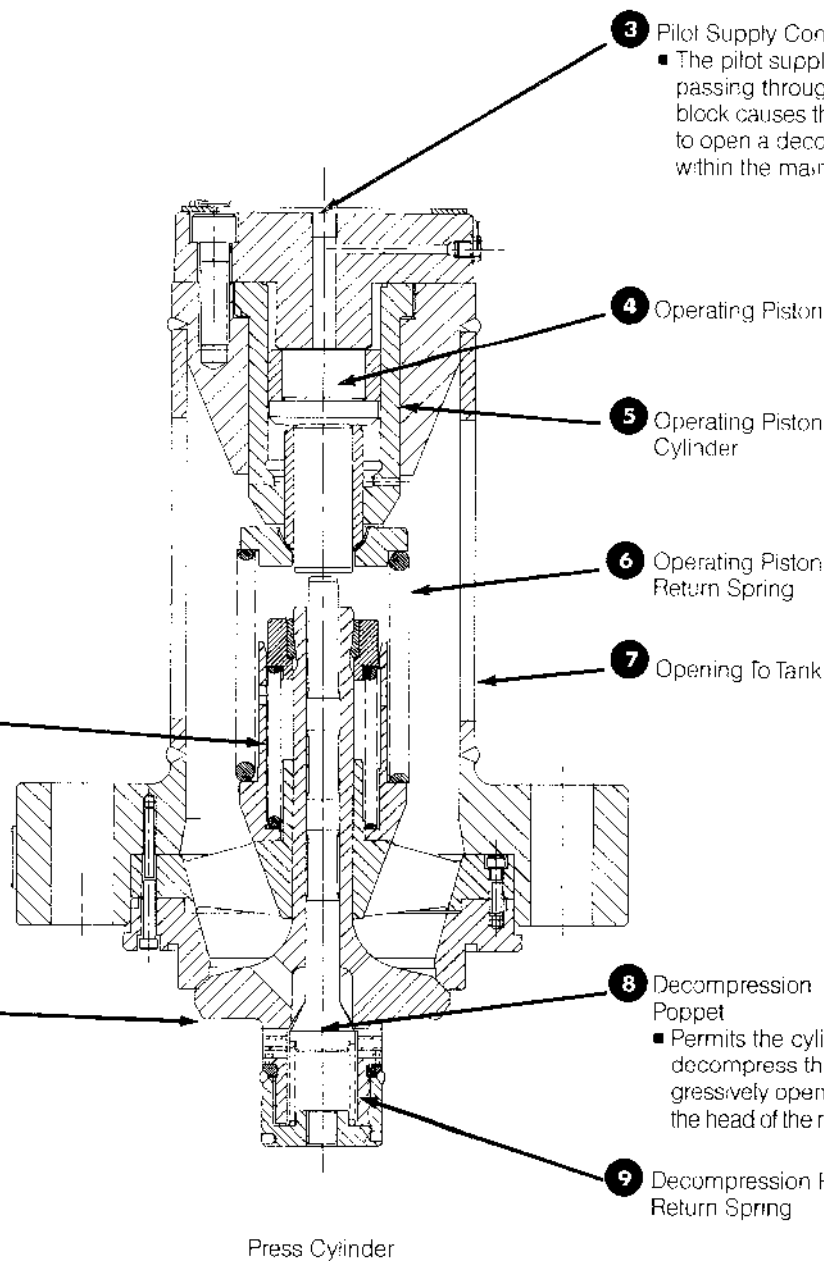
For All Fluids

- Can be used with a wide range of hydraulic fluids.

Main Poppet
Return Spring

Main Poppet

- After decompression, further downward movement of the operating piston fully opens the main poppet to allow exhaust from the press cylinder.



SPECIFICATIONS

AVAILABILITY

MOUNTING		CB CYLINDER & 90° LINE CONNECTION			CL CYLINDER & STRAIGHT LINE CONNECTION	CT CYLINDER & TANK CONNECTION
MAXIMUM PRESSURE	psi bar	7000 500	10,000 700	14,500 1000	7000 500	7000 500
VALVE SIZE						
40		—	X	X	—	—
50		—	X	X	—	—
65		X		X	—	
90		X	—	—	X	X
130*		X		—	X	X
190*		X		—	X	X
250*		X	—	—	X	X
300		X	—		X	X

X Available
*Available with integral decompression

CONTROL SPECIFICATIONS

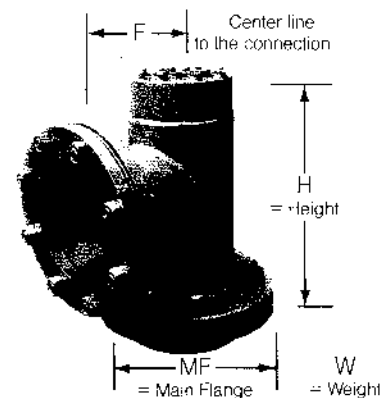
VALVE SIZE	MOUNTING	STROKE		PILOT AREA		VOLUME TO OPEN		AREA RATIO	SPRING PRESSURE		MAXIMUM PRESSURE	
		in.	mm	in. ²	mm ²	in. ³	cm ³	*	psi*	bar	psi	bar
40	CB	0.69	17,6	1.53	957,0	1.03	16,8	1.0	50	3,4	10,000	700
50	CB	0.69	17,6	1.53	957,0	1.03	16,8	1.53	54	3,7	10,000	700
65	CB	0.69	17,6	1.53	957,0	1.03	16,8	2.1	52	3,6	14,500	1000
90	CL & CT	0.97	24,7	1.53	957,0	1.44	23,6	5.6	70	4,83	7,000	500
90	CB	0.99	25,0	1.53	957,0	1.46	23,9	5.6	70	4,83	7,000	500
130	CL & CB	1.62	41,0	3.80	2376,8	5.94	97,5	6.0	90	6,2	7,000	500
130	CT	1.58	40,0	3.80	2376,8	5.80	95,1	6.0	90	6,2	7,000	500
190	all	1.77	45,0	8.05	5028,6	13.80	226,3	6.0	58	4,0	7,000	500
250	all	2.76	70,0	9.08	5676,8	24.24	397,4	7.8	73	5,0	7,000	500
300	all	2.76	70,0	9.08	5676,8	24.24	397,4	10.3	73	5,0	7,000	500

*Used in calculation of Minimum Pilot Pressure = [Cylinder Pressure x Area Ratio] – Spring Pressure.

DIMENSIONS*

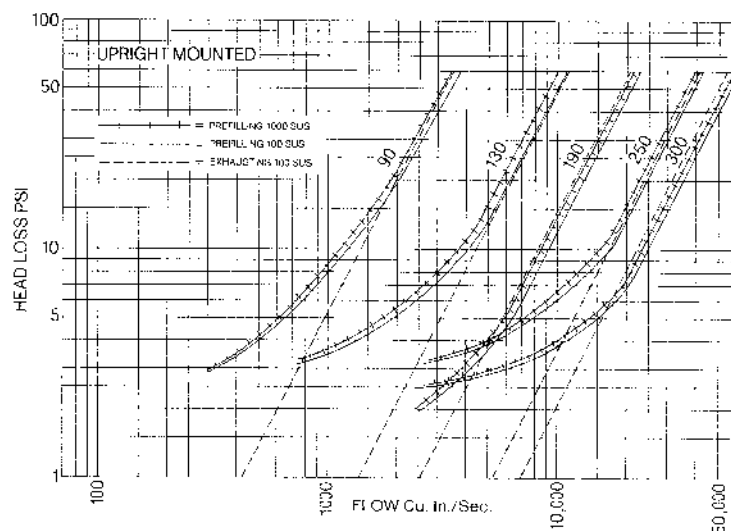
VALVE SIZE	MAX PRESSURE psi (bar)	MOUNTING									
		CB CYLINDER & 90° LINE CONNECTION				CL CYLINDER & STRAIGHT LINE CONNECTION			CT CYLINDER & TANK CONNECTION		
		"MF"	"F"	"H"	"W"	"MF"	"H"	"W"	"MF"	"H"	"W"
		in. (mm)	n. (mm)	in. (mm)	lbs. (kg)	in. (mm)	in. (mm)	lbs. (kg)	in. (mm)	in. (mm)	lbs. (kg)
40	10,000 (700)	5.1 (130)	3.1 (78)	8.6 (219)	20 (9)	— —	— —	— —	— —	— —	— —
	14,500 (1000)	5.5 (140)	3.5 (90)	8.6 (219)	22 (10)	— —	— —	— —	— —	— —	— —
50	10,000 (700)	6.3 (160)	3.8 (96)	9.1 (230)	35 (16)	— —	— —	— —	— —	— —	— —
	14,500 (1000)	7.1 (180)	4.7 (118)	9.1 (230)	43 (19.5)	— —	— —	— —	— —	— —	— —
65	7,000 (500)	7.5 (190)	5.0 (126)	10.2 (260)	69 (31.5)	— —	— —	— —	— —	— —	— —
	14,500 (1000)	8.7 (220)	5.6 (141)	10.2 (260)	90 (41)	— —	— —	— —	— —	— —	— —
90	7,000 (500)	12 (305)	8.7 (220)	16.5 (420)	115 (52)	11 (280)	13.7 (349)	115 (52)	12 (305)	11.5 (293)	115 (52)
130	7,000 (500)	13.8 (350)	9.7 (245)	19.8 (503)	253 (115)	13.8 (350)	19.4 (493)	275 (125)	13.8 (350)	19.8 (503)	198 (90)
190	7,000 (500)	19.3 (490)	12.6 (320)	25.9 (658)	517 (235)	19.3 (490)	25.6 (649)	561 (255)	19.3 (490)	25.9 (658)	451 (205)
250	7,000 (500)	24.1 (612)	15 (380)	29.5 (750)	902 (410)	24.1 (612)	29.5 (750)	979 (445)	24.1 (612)	29.5 (750)	803 (365)
300	7,000 (500)	27.6 (700)	18.1 (460)	35.6 (903)	1740 (790)	27.6 (700)	35 (895)	1820 (825)	27.6 (700)	35.9 (913)	1590 (720)

*All dimensions are approximate. For specific information consult factory representative.



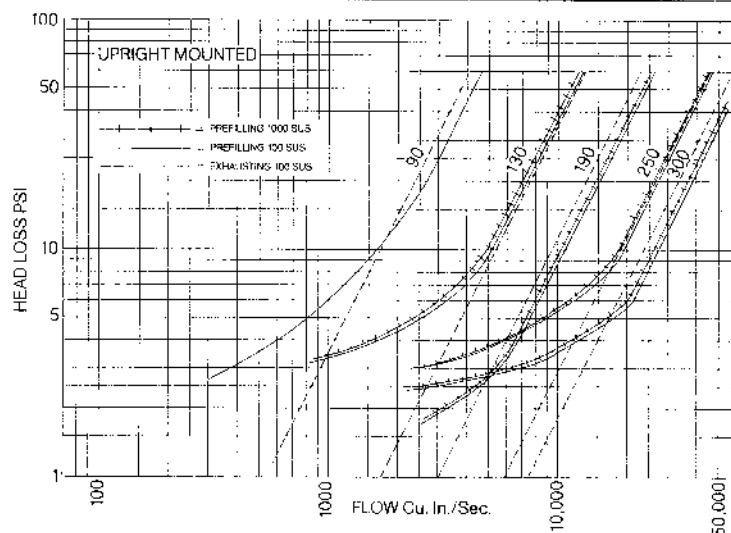
Pressure Drop vs. Flow

CL Cylinder & Straight Line Connection



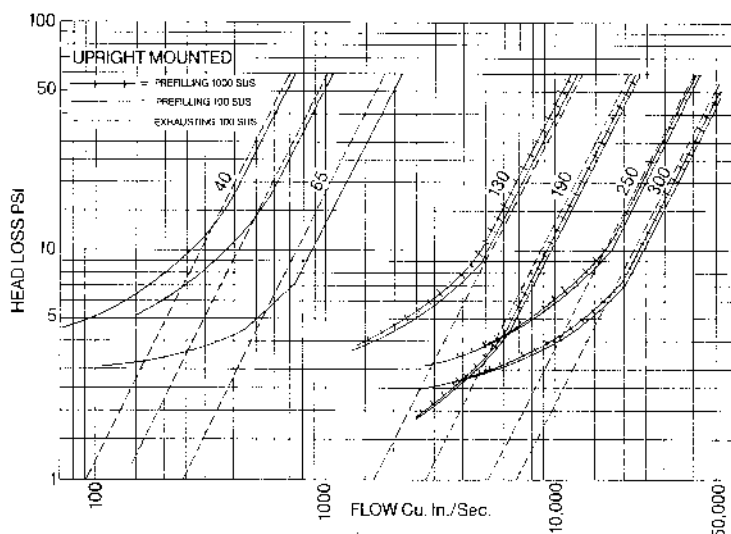
Pressure Drop vs. Flow

CT Cylinder & Tank Connection



Pressure Drop vs. Flow

CB Cylinder & 90° Line Connection



* For valves with internal decompression consult the factory for specifications.

HOW TO ORDER

BLOCK NUMBER EXPLANATION	1	2	3	4	5	6	7	8	9
TWO-WAY VALVE EXAMPLE	VPE	040	ST	CB	07	N	M	N	A1

1 = UNIT

VPE = Two-way prefill and exhaust valve

2 = VALVE SIZE (nominal mm)

040 = 40mm (1.5 in.)

050 = 50mm (2.0 in.)

065 = 65mm (2.5 in.)

090 = 90mm (3.5 in.)

130 = 130mm (5.0 in.)

190 = 190mm (7.5 in.)

250 = 250mm (10.0 in.)

300 = 300mm (12.0 in.)

3 = DECOMPRESSION

ST = Standard without Decompression

SS = With Decompression (available
in size 130, 190 and 250)

SP = Prefill Only w/o Operating Piston
for Exhaust Opening

4 = MOUNTING

CB = Cylinder and 90° Line Connection

CL = Cylinder and Straight Line
Connection

CT = Cylinder in Tank Connection
(See table on page 6 for availability)

5 = MAXIMUM PRESSURE

05 = 7,000 psi (500 bar)

07 = 10,000 psi (700 bar)

10 = 14,500 psi (1,000 bar)

(See table on page 6 for availability)

6 = ADDITIONS

S = Sequence from Pilot Piston

P = Electrical Proximity Switch

C = Check/Choke on Pilot Piston Line

N = None

Note: Consult factory for availability

7 DIMENSIONS

M = Metric

Y = Metric w/USA Fittings & Mounting
Bolts for Customer Connections

8 = SEALS

N = Buna -N (Standard)

V = Viton

Z = Special available on request;
specify in writing.

9 = DESIGN SERIES

01 = Assigned by factory

CONVERSIONS

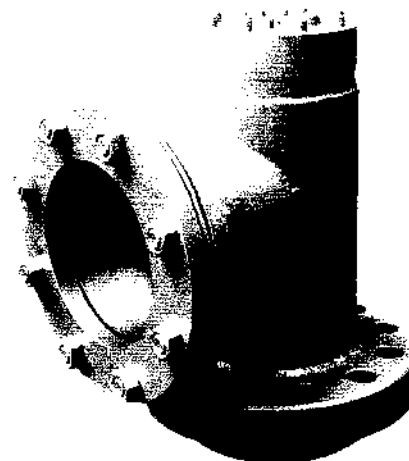
PSI ÷ 14.5 = bar

USGPM x 3.79 = liters/min.

Inches² x 645.16 = mm²

Inches³ x 16.39 = cm³

feet/sec. x 0.305 = m/sec.



VSA

THREE-WAY PREFILL AND EXHAUST VALVES

These fast shifting three-way prefill valves are used with hydraulic press circuits to gravity fill or exhaust press cylinder during rapid advance or return cycle. They include a port to connect pump to press cylinder during pressing cycle.

Press Cylinder
Tell-Tale Rod

- Optional main plunger position indicator with integral micro switches is available.

Operator Head

Maintenance Friendly

- Control, operator and main plungers can be easily removed for inspection without disturbing the main body or shroud piping.

High Pressure Supply

- Automatically connects high pressure fluid to the press cylinder during pressing cycle.
- Eliminates the necessity of extra cylinder port.
- If a two-way function is desired, port 3 can be blocked.

Pressure Energized Seal Rings

- Pressure energized seal ring design increases service life and minimizes leakage.

Optional Shroud

- An optional shroud is available with a flange connection for installing valve external to tank.
- Shroud can be rotated 360° to simplify piping alignment.

Main Plunger

- Sliding seal provides smooth operation.

Compact and Shock Resistant

- All masses are centered—all controls are small and centrally located.

Flush Mounted Flange

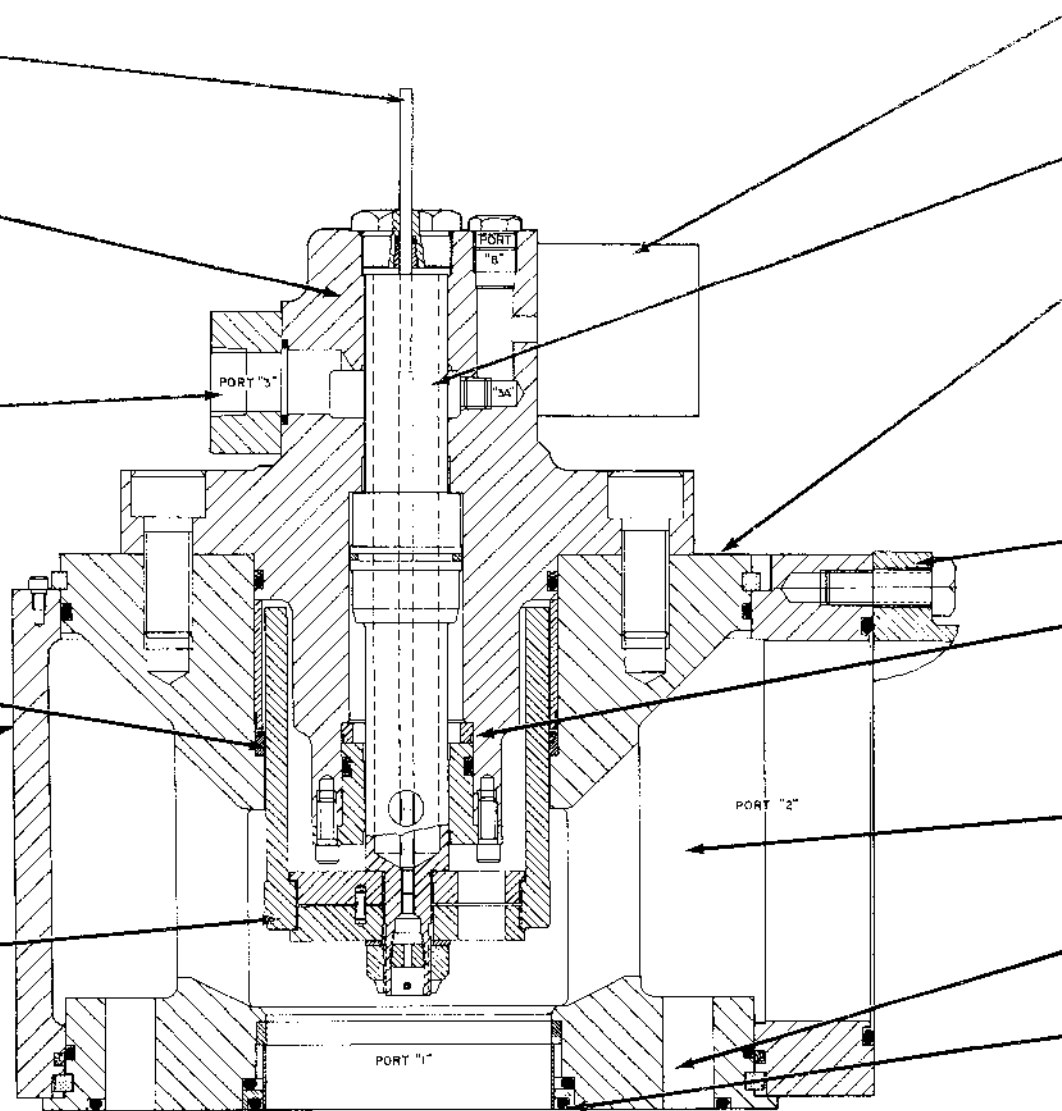
- For easy flush mounting "in-tank" or on cylinder or manifold block with minimum machining.

For All Fluids

- Can be used with a wide variety of hydraulic fluids.

Extensive Applications Experiences

- Common three-way prefill valve installation such as extrusion presses, forging presses, press brakes, die casting machines, forming presses, hot plate presses, molding and casting machines, compression molders and high speed shears are only a few of Oilgear's modern industrial applications.

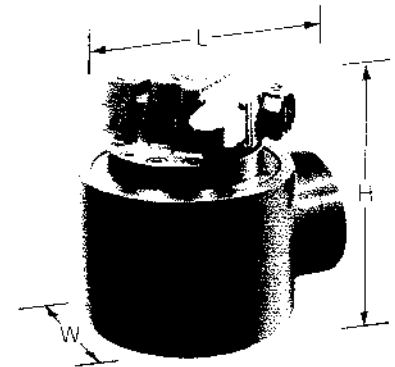


SPECIFICATIONS

DIMENSIONS with SHROUD*

VALVE SIZE			"W" WIDTH		"L" LENGTH		"H" HEIGHT		WEIGHT	
Model	in.	mm	in.	mm	in.	mm	in.	mm	lb	kg
100	4	100	13	312	15	381	16	390	180	82
150	6	150	17	432	21	525	19	480	400	182
200	8	200	21	534	26	658	26	647	740	336
250	10	250	27	686	34	845	31	772	2265	1028

* All dimensions are approximate. For specific information consult factory representative.



- 9** Integral Control Module
- Standard control modules are available that operate through port 4 and 6 to open and close the main plunger.
 - Custom controls available.

- 10** Precision Operator Ram
- Smoothly operates the main plunger.

- 4** Valve Body
- Has radially placed rectangular "gating" windows to allow flow between tank and cylinder. When open, these windows provide a flow area equal to or larger than nominal port size.

Size Range

- 100, 150, 200 and 250 mm (4," 6," 8," and 10") sizes available.

- 11** Flange
- Included with shroud.

- 12** Dashpot
- Integral dashpot cushions the operating ram protecting the unit against mechanical shocks.

Versatile

- Valve can be mounted in any position.

- 13** Tank Port
- Large flow passage minimizes flow resistance and turbulence.

- 14** Flange Mounting
- Use of short mounting bolts minimizes valve body distortion.

- 15** Sealing Ring
- Cylinder port includes pressure balanced sealing ring—allows flush mounting of valve.

Piston Ring

- Minimizes pilot piston leakage to assure consistent control.

Rated Pressure

- 5000 psi (345 bar).

CONTROL SPECIFICATIONS

UNIT SIZE			STROKE		PILOT AREA		PILOT VOLUME*	
Model	in.	mm	in.	mm	in. ²	mm ²	in. ³	cm ³
100	4	100	1.81	46.0	1.18	761	2.13	34.9
150	6	150	2.56	65.0	2.02	1303	5.19	85.0
200	8	200	3.25	82.6	3.09	1994	10.05	164.7
250	10	250	3.88	98.6	3.14	2026	12.18	199.6

*Volume necessary to shift from open to close or close to open.

Note: System should be decompressed to 250 psi (17.2 bar) or less before opening port 1.

CONTROL SPECIFICATIONS (continued)

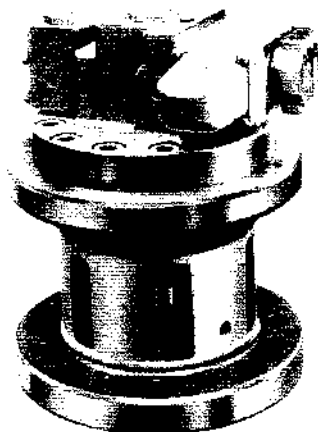
UNIT SIZE			MINIMUM PILOT PRESSURE		RATED PRESSURE	
Model	in.	mm	psi	bar	psi	bar
100	4	100	80	5.5	5000	345
150	6	150	80	5.5	5000	345
200	8	200	80	5.5	5000	345
250	10	250	100	6.9	5000	345

VSA

CONTROL MODULES

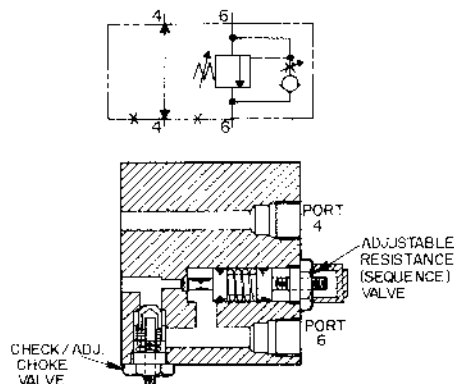
Control Modules

Control modules are an integral part of Oilgear's "VSA" Prefill units. Functional controls are available for greater flexibility and optimum circuit design. Special controls can be designed on request. The correct control selection can greatly simplify your system.



Resistance Control

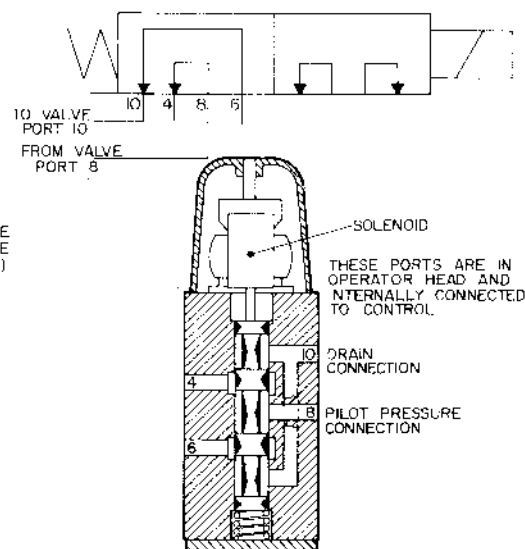
Has a built-in resistance valve connected to port 6. When pressure builds up (at port 6) to an adjustable preset value (from 1250 to 5000 psi—86 to 345 bar), the resistance valve opens, porting fluid to operating ram and closing the main plunger. When pressure at port 6 is reduced, pilot pressure applied to port 4 will open the valve. Opening rate is adjusted through the check/choke which meters fluid from the closed end of operating ram back to port 6.



Type "T"
Resistance Control.

Solenoid Control

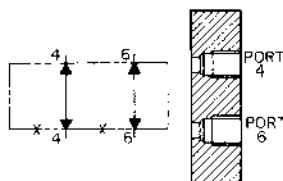
A solenoid operated 4-way valve directs pilot fluid and pressure (up to 5000 psi—345 bar) to open or close the prefill as commanded by an electrical signal.



Type "C"
Solenoid Control.

Plain Control

Pressure at port 6 closes the main prefill plunger and pressure at port 4 opens it.



Type "P"
Plain Control.

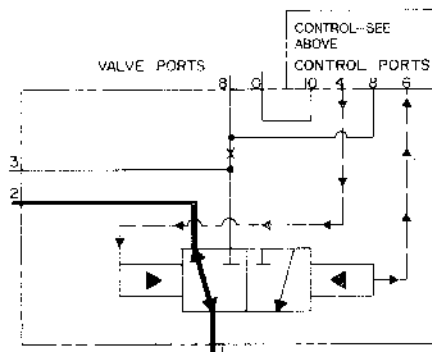


Diagram of "VSA" Prefill Unit in open position

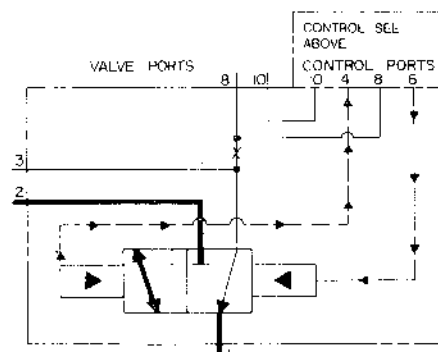
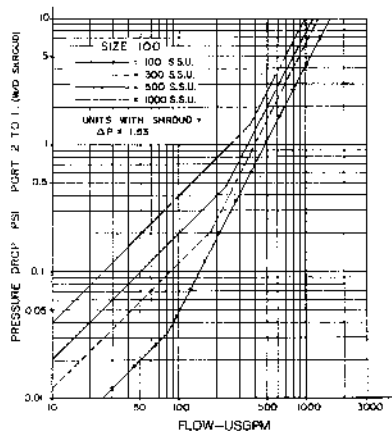


Diagram of "VSA" Prefill Unit in closed position.

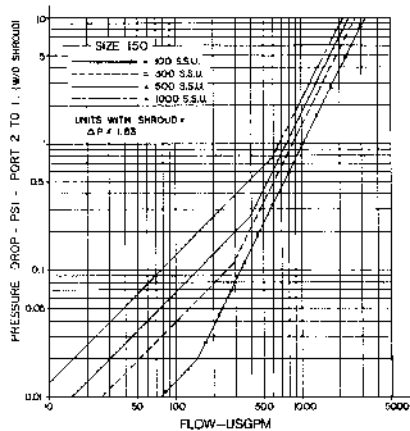
PERFORMANCE SPECIFICATIONS

SIZE 100

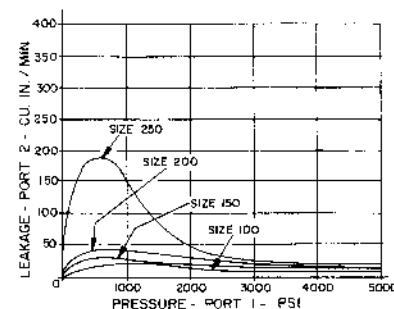


Pressure Drop vs Flow Port 2 to Port 1

SIZE 150

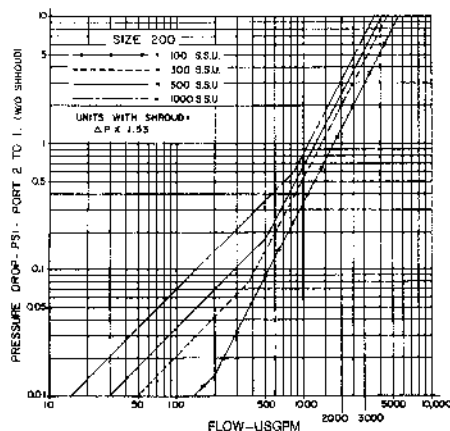


Pressure Drop vs Flow Port 2 to Port 1



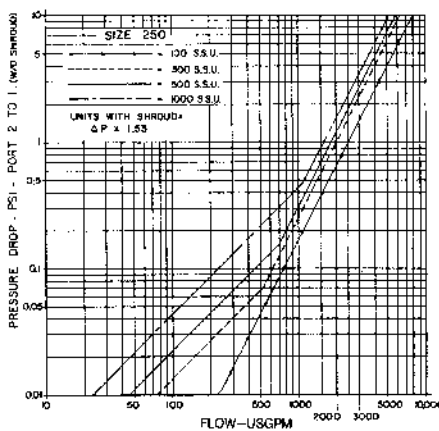
Average Leakage (Port 1 to 2) vs
Line Pressure
Typical for 500 SSU fluid

SIZE 200



Pressure Drop vs Flow Port 2 to Port 1

SIZE 250



Pressure Drop vs Flow Port 2 to Port 1

CONVERSIONS

PSI ÷ 14.5 = bar

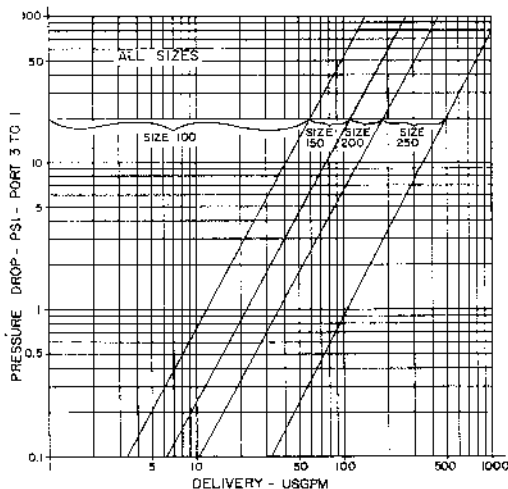
GPM x 3.79 = liters

Inches² x 645.16 = mm²

Inches³ x 16.39 = cm³

feet/sec. x 0.305 = m/sec.

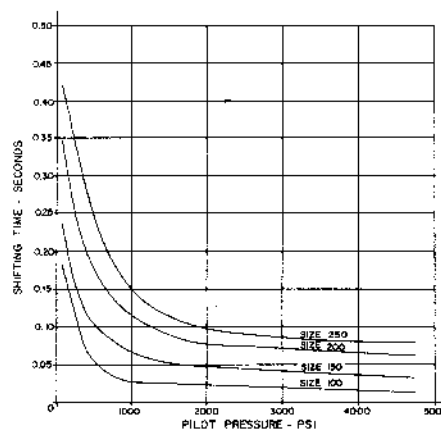
ALL SIZES



Pressure Drop vs Flow, Port 3 to Port 1

Performance typical of 300 SSU fluid. For other oil viscosities,
 $\Delta P \text{ corrected} = (\Delta P) (0.241)^{(\text{SSU}^{-25})}$. For fluids other than oil,
 $\Delta P = (\Delta P \text{ given}) (\text{Specific Gravity of fluid})^{-0.85}$.

ALL SIZES



Shift time vs Flow

Performance typical for solenoid control, with accumulator
at control pressure supply inlet, and for fluids up to
1000 SSU. See chart for control specifications.

HOW TO ORDER

BLOCK NUMBER EXPLANATION	1	—	2	—	3	4	5	6	/	7	/	8	9	10
THREE WAY VALVE EXAMPLE	VSA	—	100	—	P	M	N	N	/	01	/	K	7	8

1 = Unit

VSA = Three-way Prefill and Exhaust Valve

2 = Valve Size (nominal mm)

100 = 100 mm (4")

150 = 150 mm (6")

200 = 200 mm (8")

250 = 250 mm (10")

3 = Operator

P = Plain

R = Resistance

C = CETOP 05 Solenoid Valve

N = CETOP 5 mtg. without valve

H = Solenoid CETOP 05P Valve

F = CETOP 5 valve w/meter out flow control module at directional ports

4 = TELL TALE

M = Proximity Limit Switch (Inductive Type)

L = Proximity Limit Switch (Non-Induction Type)

N = None

5 = CONTROL PLUNGER MODS

N = None (Standard)

S = Port 5 Inlet Option

(Size 150, 200 & 250 only)

I = Interlock

L = Interlock & Port 5 Inlet Option

6 = SHROUD

N = None

S = With Shroud

G = With Shroud—

Water Glycol Service

K = Without Shroud—

Water Glycol Service

7 = DESIGN STYLE

01 = Assigned by factory

8 = CONNECTOR

N = PG-11

P = PG-11 w/light

Q = PG-11 w/rectifier

Y = PG-11 w/light & rectifier

K = .500 NPT (Standard)

W = .500 NPT w/light

H = .500 NPT w/rectifier

L = .500 NPT w/light & rectifier

B = Conduit Box w/.500 NPT & Light

9 = SOLENOID VOLTAGE

0 = 115/60—110/50*

1 = 230/60--220/50*

2 = 12 VDC

3 = 24 VDC

6 = 220/50

7 = 115/60

8 = 110/50

9 = 230/60

*With "B" Connector Only

10 = PILOT VALVE SEALS

B = Buna—N (Standard)

V = Viton



VSM FOUR-WAY PREFILL AND EXHAUST VALVES

Tell Tale

- An optional ram position indicator is available with integral micro switches to provide positive interlocking for proper sequencing of functions and/or safety interlocking.

Port 4

- Pilot fluid at port 4 shifts control piston and main plunger from closed to open position at a speed determined by pilot flow or unit control.

Port 3 Option

- Multiple high pressure supply ports available to provide increased capacity and/or flexibility of piping.

Port 5 Option

- Multiple auxiliary cylinder ports are available which can be used to increase the valve's ability to pass fluid from the pump source into the cylinder.
- Port 5 is open to port 1 at all times. Port 5 can be used to unload the pumps. Pressure switch, pressure transducers, etc. mounted on port 5 can sense cylinder pressure.

Built-In Port 7 Interlock

- The spool type four-way multiported valve design provides a built-in interlock between valve ports.

No Entry Valve Required

- Due to the interlocking spool function you can have individual prefill valves on multiple cylinders for multiple tonnage and speeds. There is no need for a valve to block off the flow from pump to the cylinders not being pressurized.

Large valves up to 400 mm (16")

- Large valves provide for large flow rates.

Decompression Slots

- Controlled decompression of stored up energy leaving the main cylinder reduces hydraulic shocks.
- Units with adjustable open/close cushions for controlled decompression as well as "interlock" options are available.

Extensive Application Experience

- Oilgear has been designing and building fluid power components and systems since 1921.
- Common 4-way prefill valve installations such as extrusion presses, forging presses, forming presses, "O"ing and "U"ing presses, hot plate presses, molding and casting machines, compression molders and high speed shears are only a few of Oilgear's modern industrial applications.

Port 7

2

3

Cylinder Control Mounting

- These valves are available with either a plain hydraulic, hydraulic resistance, a solenoid valve, or a solenoid pilot operated four-way valve control.

4

Built-In Adjustable Cushion

- On 250 valves and larger there is a built-in check valve and choke to cushion closing of the main plunger.
- Sizes 100 to 200 are available with port "B" for installing a check valve and adjustable choke.

Many Sizes

- 75, 100, 150, 200, 250, 300, 350 and 400 mm (3", 4", 6", 8", 12", 14", & 16") sizes are available.

Operating Ram

13

Flange

11

10

Piston Rings

5

Main Plunger

- Sliding spool provides smooth operation.

Port 1 Flush Mounted

- Flange mounted directly to top of cylinder for easy mounting with minimum machining.

6

Rated Pressure

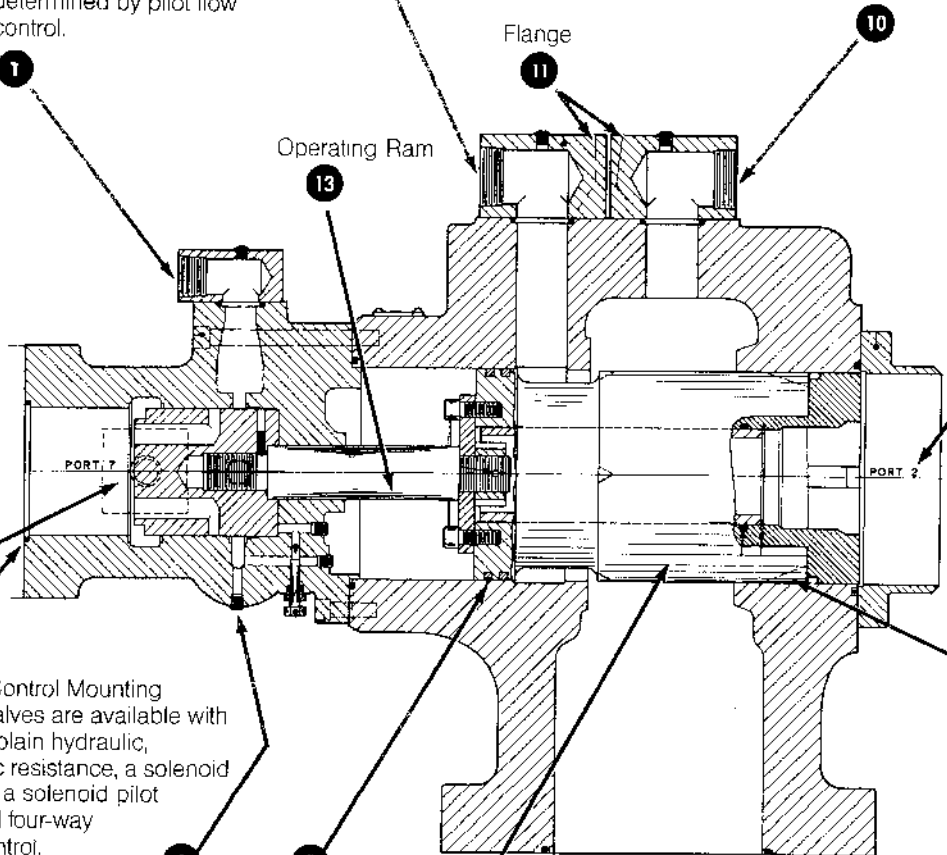
- 3500 psi (241 bar)

7

Port 2 Tank Connection

9

8



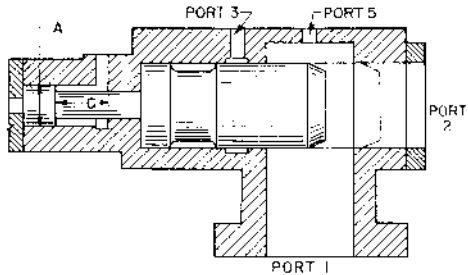
VSM

SPECIFICATIONS

CONTROL SPECIFICATIONS

VALVE SIZE		"C" STROKE		"A" AREA		CLOSING VOLUME		OPENING VOLUME		MINIMUM PILOT PRESS.		RATED PRESSURE	
mm	in.	in.	mm	in. ²	mm ²	in. ³	cm ³	in. ³	cm ³	psi	bar	psi	bar
75	3	1.9	49	9	228	17	284	17	284	125	9	3500	241
100	4	2.3	57	7	180	16	261	7	114	300*	21	3500	241
150	6	3.3	83	7	180	23	376	13	209	300*	21	3500	241
200	8	4.8	121	12	300	56	918	33	536	300*	21	3500	241
250	10	5.2	132	28	718	147	2406	121	1989	300*	21	3500	241
300	12	5.7	144	28	718	155	2549	128	2106	300*	21	3500	241
350	14	5.7	144	28	718	155	2549	128	2106	300*	21	3500	241
400	16	6.3	159	28	718	177	2899	146	2396	300*	21	3500	241

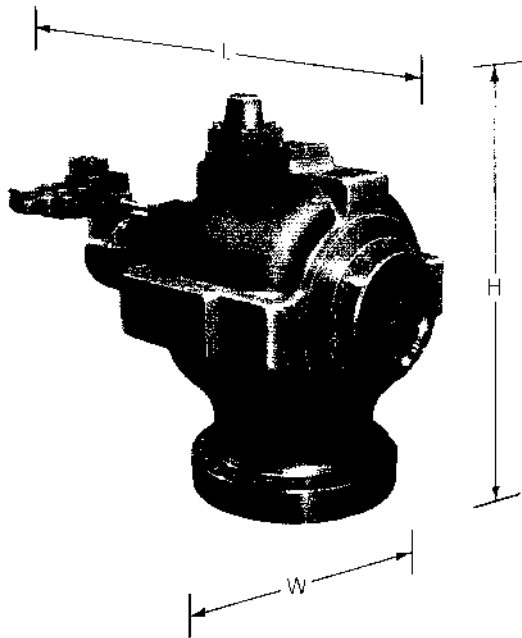
*Units for operating at lower pressure available on request.



DIMENSIONS*

VALVE SIZE		"W" WIDTH		"L" LENGTH		"H" HEIGHT		WEIGHT	
mm	in.	in.	mm	in.	mm	in.	mm	lb	kg
75	3	11	280	22	556	13	315	225	496
100	4	10	247	27	676	15	361	300	137
150	6	22	557	39	967	21	527	720	327
200	8	26	659	45	1137	26	654	1240	536
250	10	33	832	53	1326	35	870	2850	1294
300	12	38	964	57	1428	40	1003	3500	1589
350	14	45	1142	62	1566	49	1232	6000	2724
400	16	50	1256	67	1701	55	1397	8500	3859

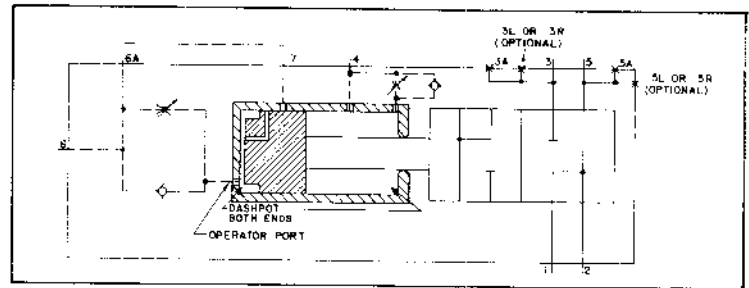
*All dimensions are approximate. For specific information consult factory representative.



CONTROLS

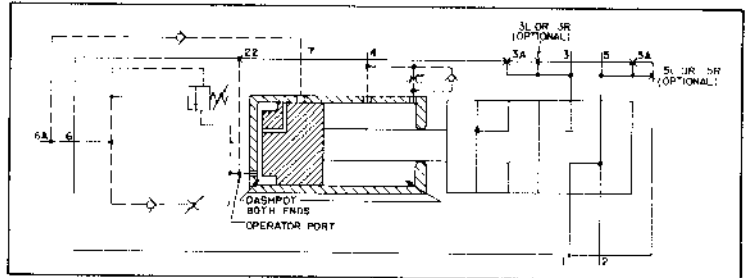
Plain Control

This simple double-acting cylinder control shifts main plunger when fluid is alternately directed to piston or rod end.



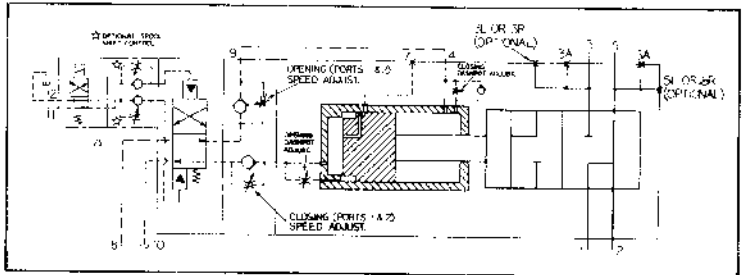
Resistance Valve Control

Piston end head of control has built-in resistance valve, adjustable from 500 to 3500 psi (35-241 bar), to resist flow for closing plunger until a preset pressure is reached. If the pressure at port 6 is below the setting of the sequence valve, the pressurized fluid at port 4 opens valve.



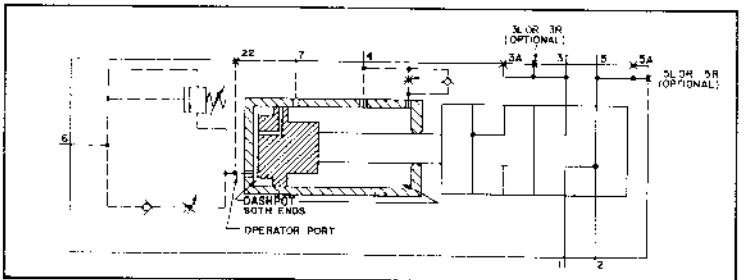
CETOP Pilot Operated 4-Way Valve Control

A CETOP solenoid operated pilot valve shifts a four-way valve manifolded to operator end head and directs flow to open and close the main plunger.



Interlock Operator Pistons

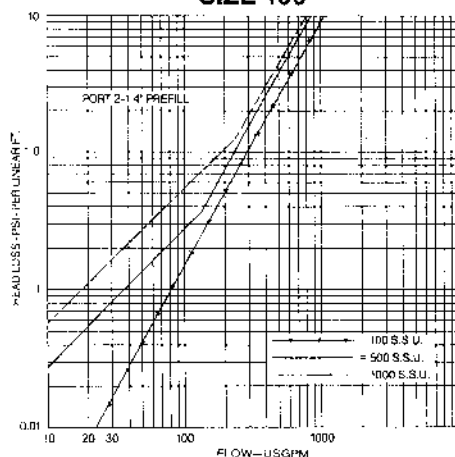
Optional interlock port 7, permits fluid entering port 4 on ram end of control to flow out port 7 when main plunger is open. Can be furnished with any of the above controls on units 100 mm (4") through 400 mm (16").



VSM

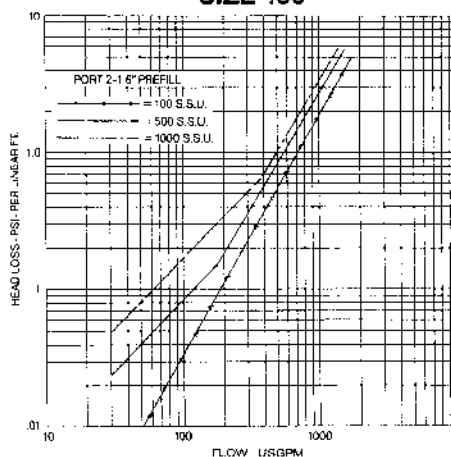
PERFORMANCE SPECIFICATIONS

SIZE 100



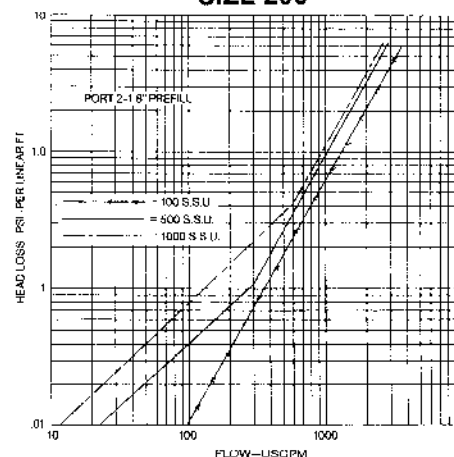
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 150



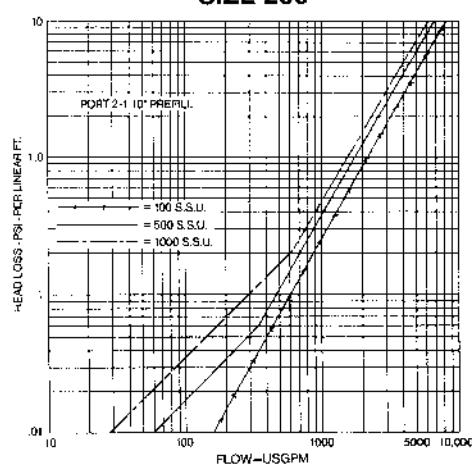
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 200



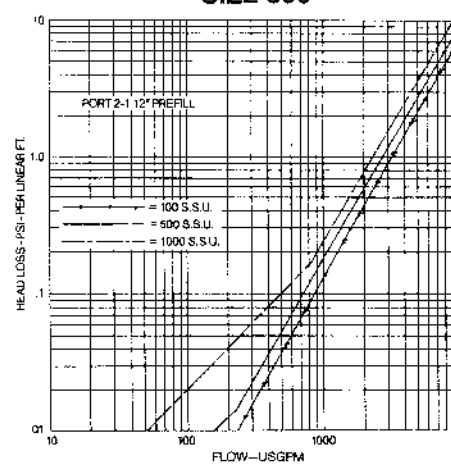
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 250



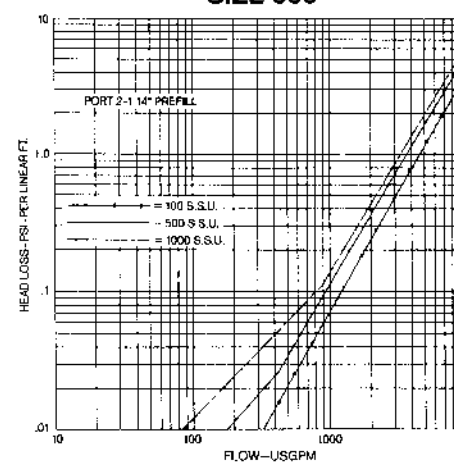
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 300



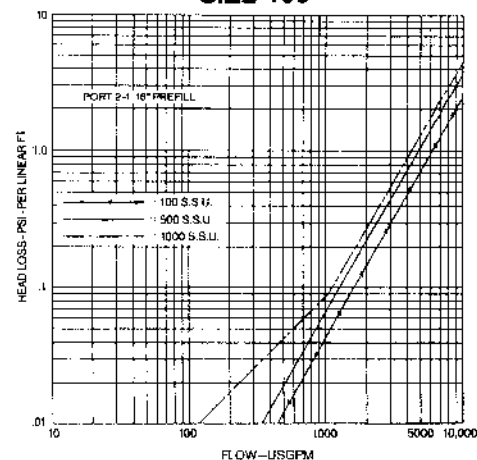
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 350



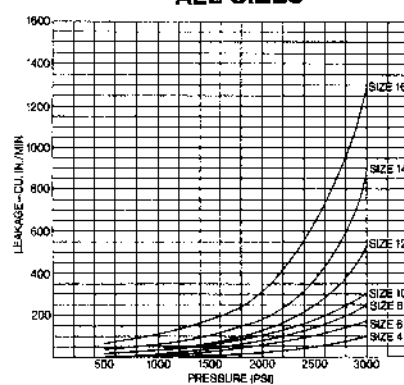
Pressure Drop vs Flow, Port 2 to Port 1

SIZE 400



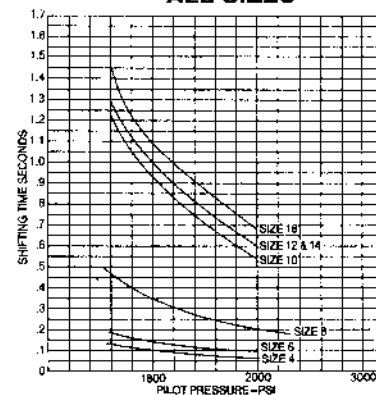
Pressure Drop vs Flow, Port 2 to Port 1

ALL SIZES



Average Leakage vs Pressure, Ports 3 to 2 with valve closed

ALL SIZES



Shift Time to Close vs Pressure

Modular prefill (VSM100 TYPE) closing choke backed out HSF802 flow control open

HOW TO ORDER

BLOCK NUMBER EXPLANATION	1	—	2	—	3	4	5	6	7	8	/	9	/	10	11	12
FOUR-WAY VALVE EXAMPLE	VSM	—	10	—	C	V	N	S	N	S	/	01	/	K	O	B

1 = UNIT

VSM = Four-way Prefill and Exhaust Valve

2 = VALVE SIZE (Nominal mm)

75 = 75 mm (3")
100 = 100 mm (4")
150 = 150 mm (6")
200 = 200 mm (8")
250 = 250 mm (10")
300 = 300 mm (12")
350 = 350 mm (14")
400 = 400 mm (16")

3 = OPERATOR

C = w/CETOP 4-way valve
N = CETOP Mounting Without Valve
P = Plain
R = Resistance

4 = TELL TALE

V = Visual
T = Open and Close Limit Switch
S = Open only Limit Switch
N = None

5 = CONTROL PISTON MODIFICATIONS

N = None
I = Interlock

6 = SPOOL SHIFT SPEED CONTROL

S = Spool Shift Speed Control
W = Port 4-9 Piped
B = Port 4-9 Piped and w/Spool Shift Speed Control
N = No opening speed adjustment, closing adjustment or spool shift speed control

7 = ADDITIONAL PORT "3"s & "5"s

N = Standard—one Port "3" and one Port "5"
3 = three Port "3"s
5 = three Port "5"s
B = three Port "3"s and three Port "5"s

8 = CLOSING DASHPOT

S = Standard—Size 10 and larger
D = Closing Dashpot (Size 200 only)
N = No Dashpot (Size 200 only)

9 = DESIGN STYLE

01 = Assigned by factory

10 = CONNECTOR

N = PG-11
P = PG-11 w/Light
Q = PG-11 w/Rectifier
Y = PG-11 w/Light & Rectifier
K = .500 NPT (Standard)
W = .500 NPT w/Light
H = .500 NPT w/Rectifier
L = .500 NPT w/Light & Rectifier
B = Conduit Box w/.500 NPT & w/Light

11 = SOLENOID VOLTAGE

0 = 115/60—110/50*
1 = 230/60—220/50*
2 = 12 VDC
3 = 24 VDC
6 = 220/50
7 = 115/60
8 = 110/60
9 = 230/60
*With "B" Connector Only

12 = PILOT VALVE SEALS

B = Buna-N (Standard)
V = Viton

CONVERSIONS

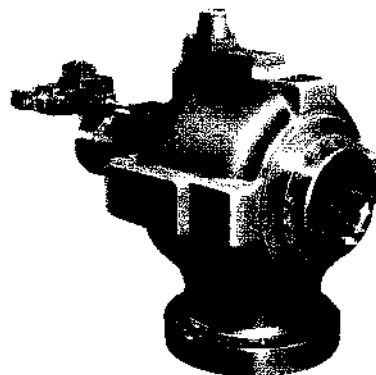
PSI ÷ 14.5 = bar

USGPM x 3.79 = liters/min.

Inches² x 645.16 = mm²

Inches³ x 16.39 = cm³

feet/sec. x 0.305 = m/sec.



APPLICATION GUIDE LINES

An atmospheric prefill valve functions on the basis of a vacuum being generated in the main cylinder. Pressure differential between the vacuum and atmospheric pressure causes fluid to flow into the cylinder. The maximum vacuum allowable in the cylinder during prefill is a function of several variables including the amount of air present in the fluid, machine cycle and cylinder seals exposed to the vacuum.

When applying prefill valve type VSA and VSM, which are open and closed by pilot cylinder, timing of opening and closing functions are critical. If the valve is not opened before movement starts or is closed before the cylinder stops moving, complete filling may not take place.

The VPE check type prefill is opened and closed by the cylinder to atmospheric pressure differential. It therefore takes care of the opening/closing timing automatically. Maximum discharge capacity is limited by pressure drop and prefill pipe flow dynamics. Excessive pressure drops in the prefill valve on return may generate a force large enough so that the return cylinders cannot achieve the return speed desired. Dynamic conditions in prefill return pipes involving length of prefill piping velocity, of return oil, acceleration and deceleration of the column can result in water hammer and extreme shock.

Due to the complexity in dealing with the variables referred to above, care should be exercised in the selection of a prefill valve.

For special installations or assistance in valve selections consult your Oilgear representative.

CALCULATIONS

■ Refer to figures 1, or 2, or 3. Determine head "H" (in feet) between ram and level of fluid in reservoir.

■ Check the valve size selection by determining pressure in cylinder during prefill for the following: $P_{abs} =$

$$P_{atm} + P_H - P_V - P_L$$

Where: --

See figures 1 or 2 or 3.

P_H = Pressure due to head = 0.37 psi/ft x "H" (assuming a fluid specific gravity of 0.87).

See the Pressure Drop vs Flow chart for the valve involved.

P_V = Pressure drop through the prefill valve.

See figure 1 through 3 with reference to the Line Head Loss vs Flow for the pipe size involved.

P_L = Pressure drop due to line loss and elbows

For special installation or assistance in valve selection, consult your Oilgear representative.

CONVERSIONS

PSI x 14.5 = bar

USGPM x 3.79 = liters/min.

Inches² x 645.16 = mm²

Inches³ x 16.39 = cm³

feet/sec. x 0.305 = m/sec.

FLOW/VELOCITY IN SCHEDULE 40 PIPES

NOM. Pipe Size	Bore in.	4 fpm USgpm	1.2 fpm lpm	8 fpm USgpm	2.4 fpm lpm	12 fpm USgpm	3.6 fpm lpm	16 fpm USgpm	4.8 fpm lpm
3	3.07	92	344	184	688	276	1032	368	1376
4	4.03	159	593	317	1186	476	1780	635	2372
6	6.06	360	1341	720	2682	1080	4023	1441	5365
8	7.98	624	2325	1247	4650	1871	6977	2495	9303
10	10.02	983	3666	1966	7333	2949	11000	3933	14666
12	11.94	1396	5206	2791	10413	4187	15620	5582	20827
14	13.12	1687	6286	3373	12574	5060	18860	6747	25148
16	15.00	2203	8217	4406	16435	6609	24653	8812	32870

	VALVE SIZE	PIPE TO RESERVOIR
	mm	in.
VPE	40	1.5
	50	2
	65	2.5
	90	4
	130	7
	190	10
	250	12
VSA	300	16
	100	5
	150	8
	200	10
VSM	250	12
	75	3
	100	4
	150	6
	200	8
	250	10
	300	12
	350	16
	400	18

*For valves with internal decompression consult the factory for specifications.

IN TANK MOUNTED P_L DOES NOT APPLY

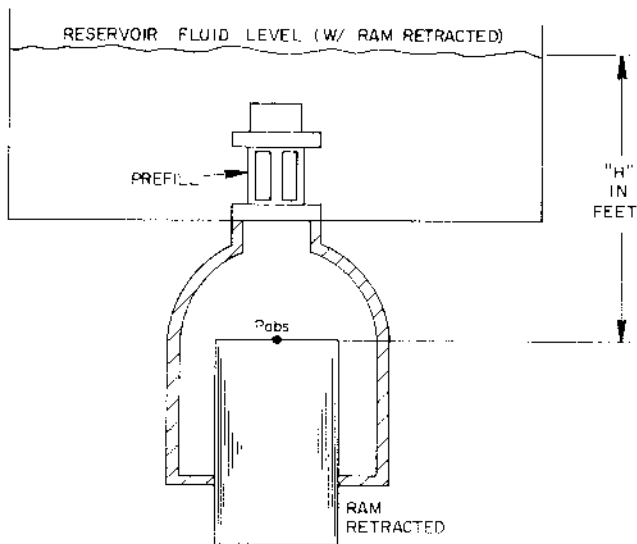


Fig. 1 Prefill installed in reservoir and directly connected to cylinder.

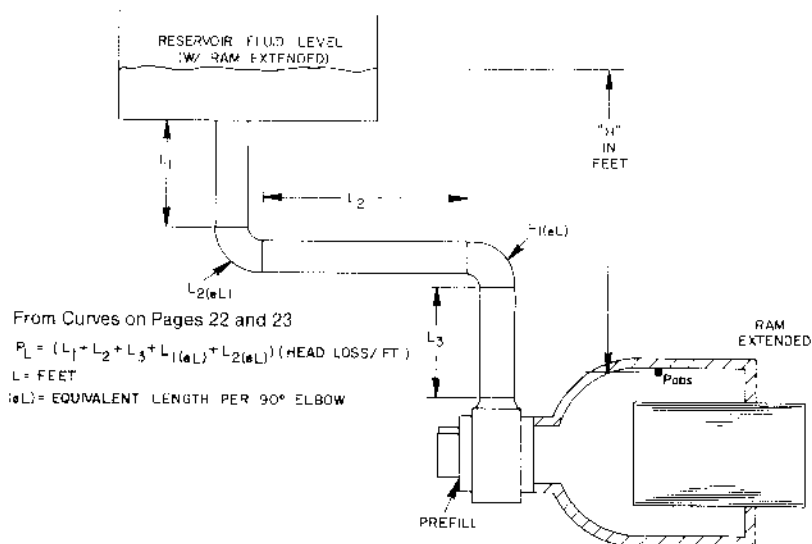


Fig. 2 Prefill mounted on cylinder and connected to bottom of reservoir.

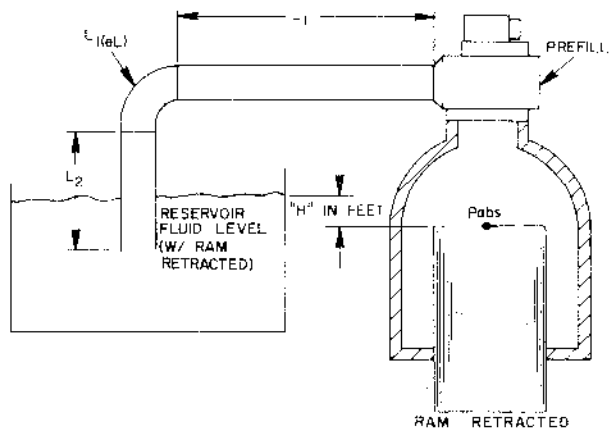
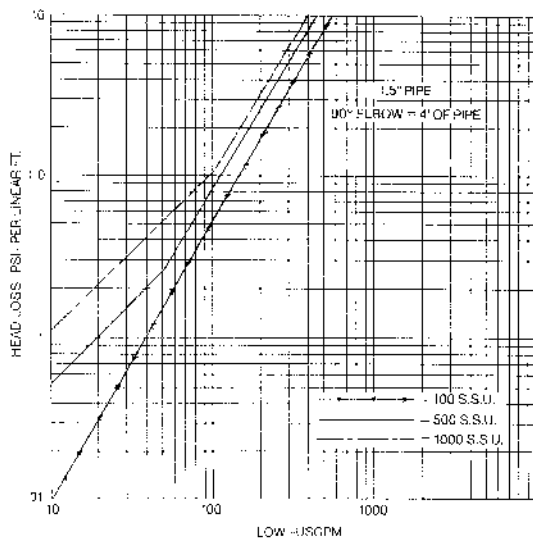


Fig. 3 Prefill mounted on cylinder and connected to top of reservoir.

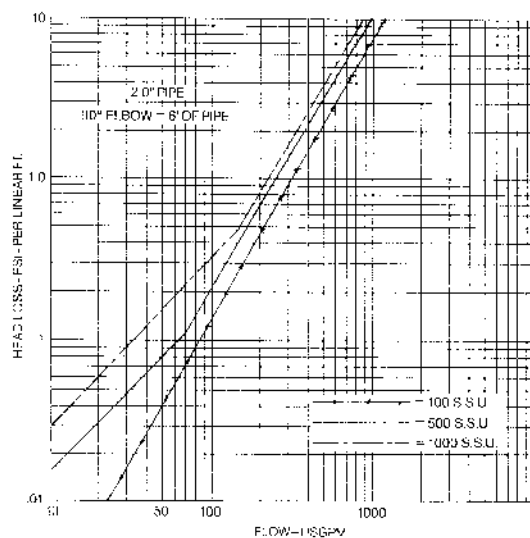
APPLICATION GUIDE LINES

PRESSURE LOSS VS. FLOW PER FOOT OF PIPE

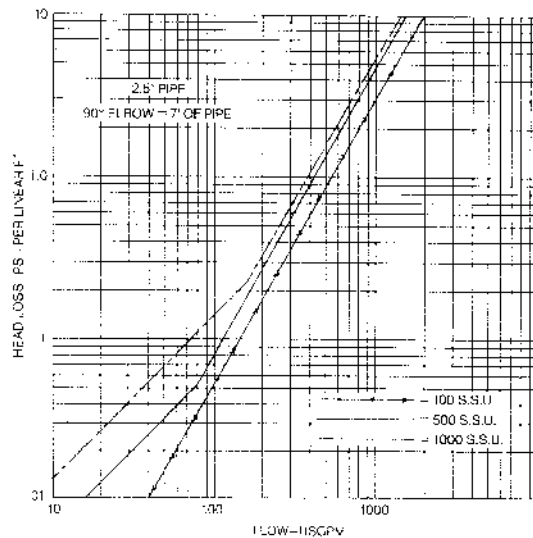
1.5" PIPE



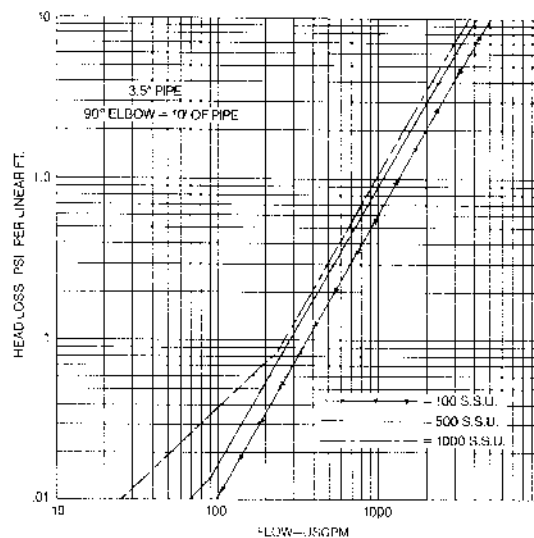
2" PIPE



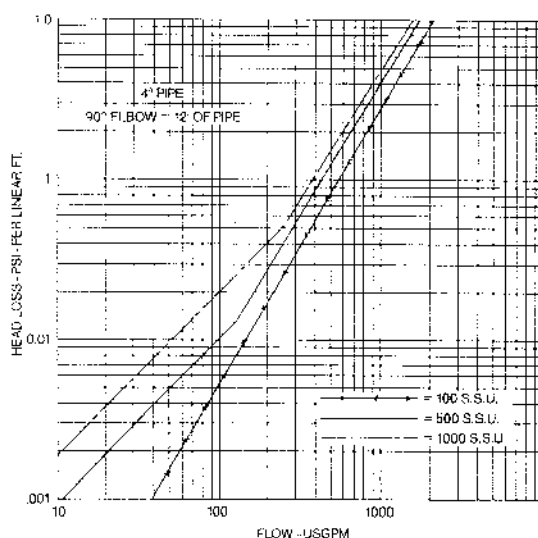
2.5" PIPE



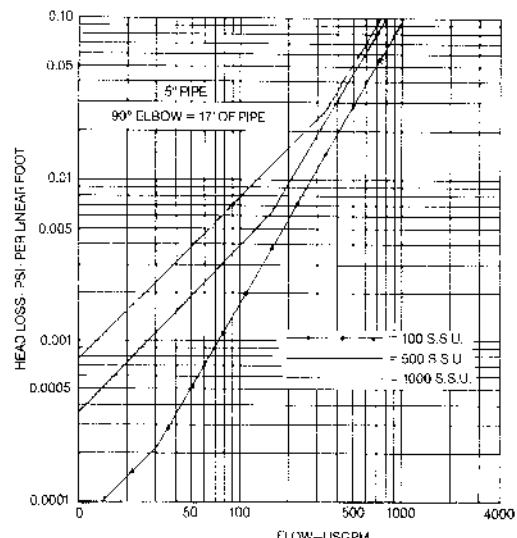
3.5" PIPE



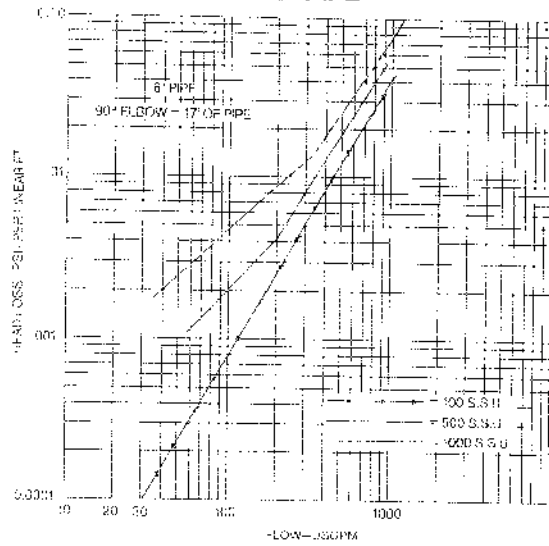
4" PIPE



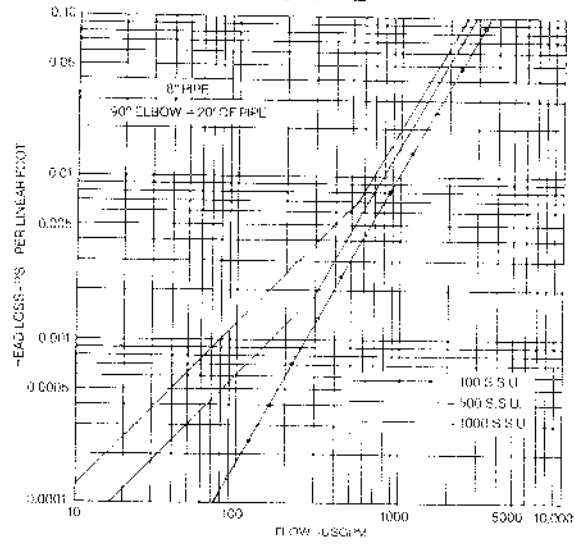
5" PIPE



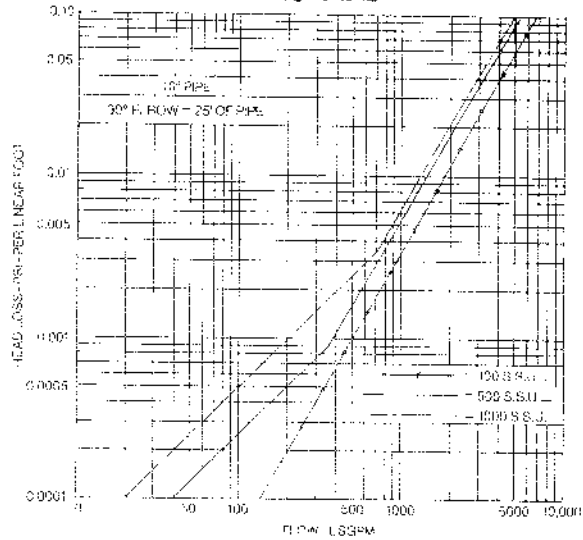
6" PIPE



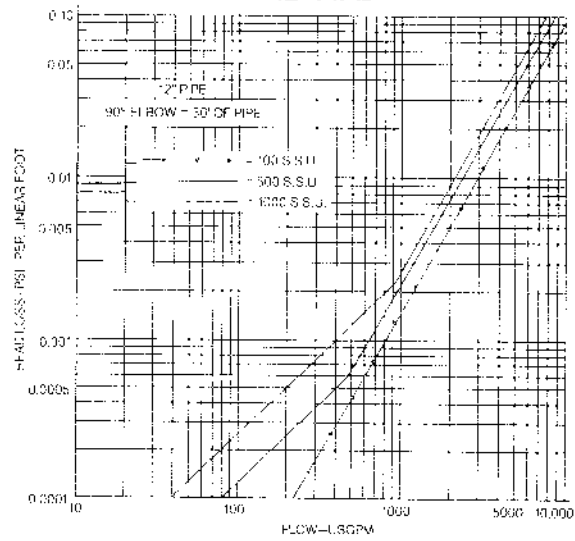
8" PIPE



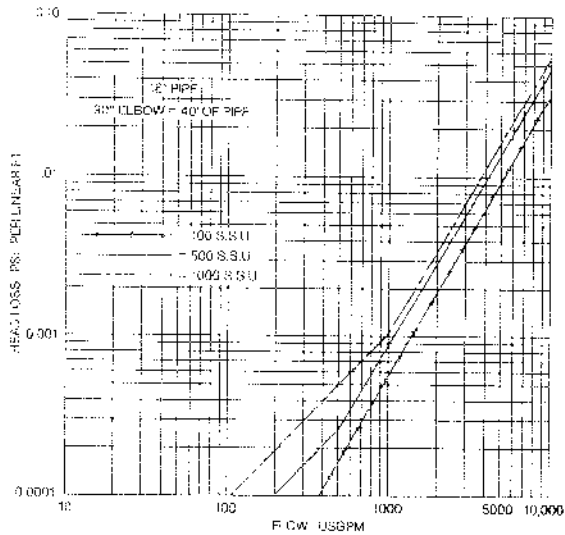
10" PIPE



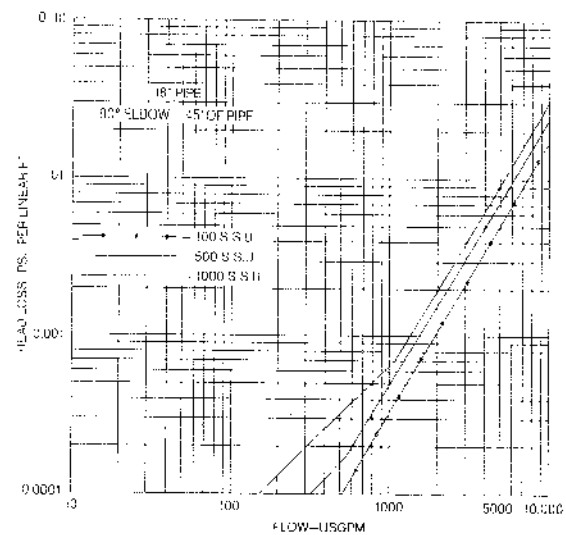
12" PIPE



16" PIPE



18" PIPE



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internet: <http://www.oilgear.com>

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Oilgear Towler GmbH

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