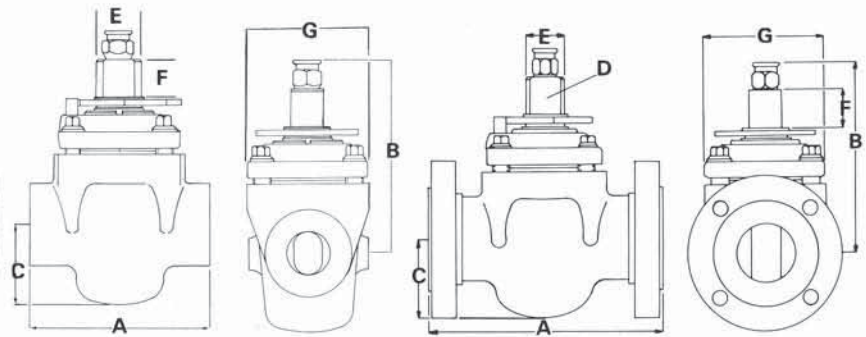


WALWORTH TOP ENTRY STEEL PLUG VALVES

ANSI 300
SHORT PATTERN
WRENCH OPERATED
CARBON STEEL BODY
AND ALLOY STEEL PLUG

1760
Threaded Ends
1760 WE
Weld Ends
1760F
Flanged Raised Face



DIMENSIONS and WEIGHTS

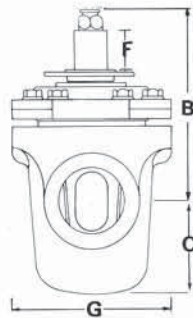
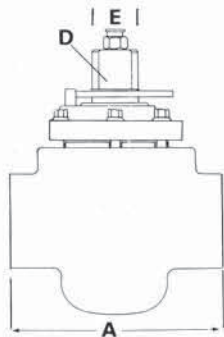
FIGURE NO.		SIZE OF VALVE IN INCHES								
		1/2	3/4	1	1 1/2	2	2 1/2	3	4	
1760	THREADED	A	4	4	4.50	6.69	7.75	10	10	—
1760F	FLANGED RAISED FACE	A	—	—	6.25	7.50	8.50	9.50	11.12	12
1760F	FLANGED RING TYPE JOINT	A	—	—	6.75	8	9.12	10.12	11.75	12.62
1760 WE	END TO END					10.50		13	14	
	CENTER TO TOP	B	6.25	6.25	6.87	7.62	9	9.62	10.87	11.12
	CENTER TO BOTTOM	C	1.75	1.75	2	2.50	3	3.75	4.37	4.87
	WIDTH OF FLAT STEM	D	0.81	0.81	0.87	0.99	1.12	1.12	1.34	1.34
	DIAMETER OF STEM	E	1.10	1.10	1.22	1.41	1.60	1.60	1.94	1.94
	HEIGHT OF PLUG STEM	F	0.95	0.95	1.69	1.21	1.34	1.35	1.25	1.25
	EXTREME BODY WIDTH	G	3.12	3.12	3.12	3.75	4.25	4.25	5.25	7
	SEALANT STICK SIZE		B	B	B	B	C	C	C	C
	WRENCH NUMBER		IH-1	IH-1	IH-2	IH-3	IH-4	IH-4	IA-1	IA-1
1760	WEIGHT (APPROX.) Lb.		7	7	9	18	27	38	69	85
1760F	WEIGHT (APPROX.) Lb.		—	—	21	30	42	57	89	121
1760 WE	WEIGHT (APPROX.) Lb.						35		88	105



WALWORTH

ANSI 600
REGULAR PATTERN
WRENCH OPERATED
CARBON STEEL BODY
AND ALLOY STEEL PLUG

WALWORTH TOP ENTRY STEEL PLUG VALVES

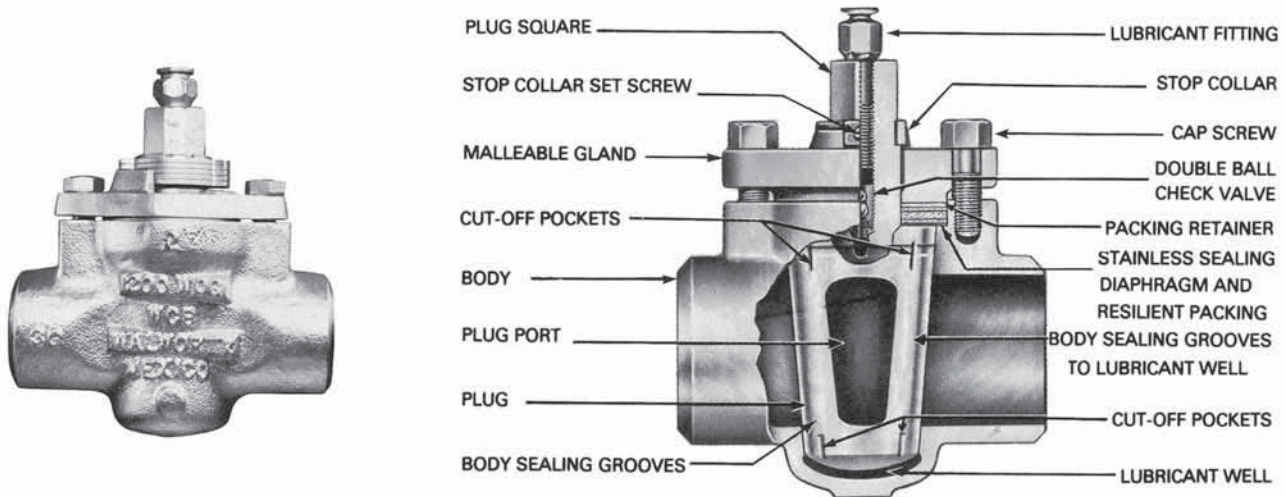


1748
Threaded Ends

DIMENSIONS and WEIGHTS

FIGURE NO.		SIZE OF VALVE IN INCHES					
		1/2	3/4	1	1 1/2	2	
1748	THREADED	A	4.25	4.25	4.50	6.70	7.75
	CENTER TO TOP	B	6.25	6.25	6.87	7.62	9
	CENTER TO BOTTOM	C	1.75	1.75	2.12	2.50	3.25
	WIDTH OF FLAT STEM	D	0.81	0.87	0.87	1	1.12
	DIAMETER OF STEM	E	1.10	1.10	1.22	1.41	1.60
	HEIGHT OF PLUG STEM	F	0.95	0.95	1.69	1.21	1.34
	EXTREME BODY WIDTH	G	3.25	3.25	3.25	4	5.43
	SEALANT STICK SIZE		B	B	B	B	C
	WRENCH SIZE		1H-1	1H-1	1H-2	1H-3	1H-4
	WEIGHT (APPROX.) Lb.		9	9	13	20	31

WALWORTH GAS SERVICE PLUG VALVES



The Walworth 1966 WE, 1967 WE and 1968 WE valves were designed specially to give natural gas utility companies high quality carbon steel lubricated plug valves at a price comparable to cast iron gate valves with flanged ends.

The cast carbon steel body and weld ends have proved to be far superior to conventional cast iron gate valves in cases where gas lines have been subjected to ground shifting.

These Walworth plug valves incorporate a high strength cast iron plug. This plug is coated for long trouble-free life and low operating torque. The valves are of single gland construction employing two cap screws and a packing arrangement.

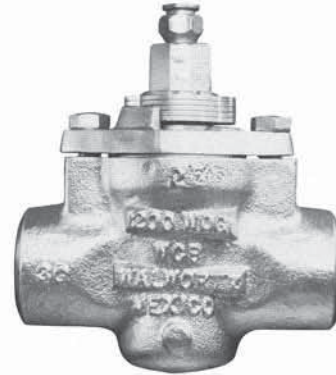
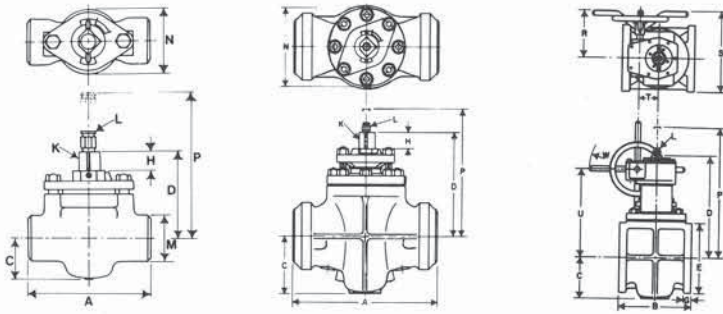
The 1967 WE (wrench operated) and the 1968 WE (gear operated) plug valves are available in sizes 6 inch and 8 inch. The 1966 WE plug valves are available in sizes 2, 3 and 4 inch. The 1966 SW (socket weld ends) plug valves are available in $\frac{3}{4}$ inch and $1\frac{1}{4}$ inch sizes.

CODES AND STANDARDS COMPLIANCE

ANSI B16.10	End to End Dimensions of Ferrous Valves
ANSI B16.25	Buttweld Ends
MSS SP-25	Marking System of Valves

CWP 200 1966WE, 1966SW
 ANSI 150 1967WE/1968WE
 WRENCH/GEAR OPERATED
 CARBON STEEL BODY
 HIGH STRENGTH CAST IRON PLUG

WALWORTH GAS SERVICE STEEL PLUG VALVES



1966 WE
 Weld Ends
1966 SW
 Socket Weld Ends
1967 WE
 Weld Ends
1968 WE
 Weld Ends

DIMENSIONS and WEIGHTS

FIGURE NO.		SIZE OF VALVE IN INCHES							
		1966SW		1966WE			1967/68WE		
		3/4	1 1/4	2	3	4	6	8	
1966WE/1967WE	END TO END	A	4.50	5.00	7	8	9	13	15.50
1966SW/1968WE	CENTER TO BOTTOM	C	1.62	1.94	2.56	3.12	3.87	6.12	7.50
	CENTER TO TOP (1966WE, 1967WE, 1966SW)	D	3.8	4.50	4.81	6.31	7.37	11.75	13.50
	CENTER TO TOP (1968WE)	D						19.75	20.75
	SHANK HEIGHT	H	0.87	0.97	1.06	1.44	1.50	1.62	2.06
	SHANK SQUARE*	K	0.81	0.91	1.06	1.37	1.50	1.50	1.75
	SEALANT FITTING	L	0.25	0.25	0.25	0.37	0.50	0.50	0.50
	EXTREME BODY WIDTH	N	3.00	3.12	3.62	4.75	5.75	8.37	9.62
	TO REMOVE SEALANT FITTING (1966WE 1967WE)	P	6.25	6.91	8.06	10.06	11.62	16	17.75
	TO REMOVE SEALANT FITTING (1968WE)	P						22.94	22.25
	CENTER TO HANDWHEEL FACE	R						8.56	8.56
	CENTER OF VALVE TO CENTER OF HANDWHEEL	T						3.50	3.50
	CENTER OF PORT TO CENTER OF HANDWHEEL	U						16.19	15.44
	HANDWHEEL DIAMETER	W						17.50	17.50
	TURNS TO OPEN							13.75	13.75
	SEALANT STICK SIZE	B	B	B	C	D	D	D	
1966WE 1967WE	WRENCH SIZE**	D-4	D-4	G-1	M-1	P-1	P-1	R-3	
1966WE	WEIGHT (APPROX.) Lb.			15	32	48			
1967WE	WEIGHT (APPROX.) Lb.						125	195	
1968WE	WEIGHT (APPROX.) Lb.						190	255	
1966SW	WEIGHT (APPROX.) Lb.	7	18						

*Complete with 2" square operating nut.

**Wrench size if 2" square operating nut is removed.

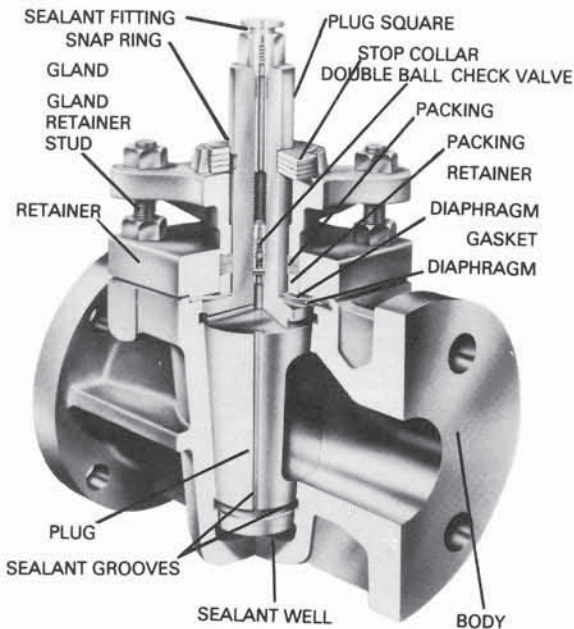
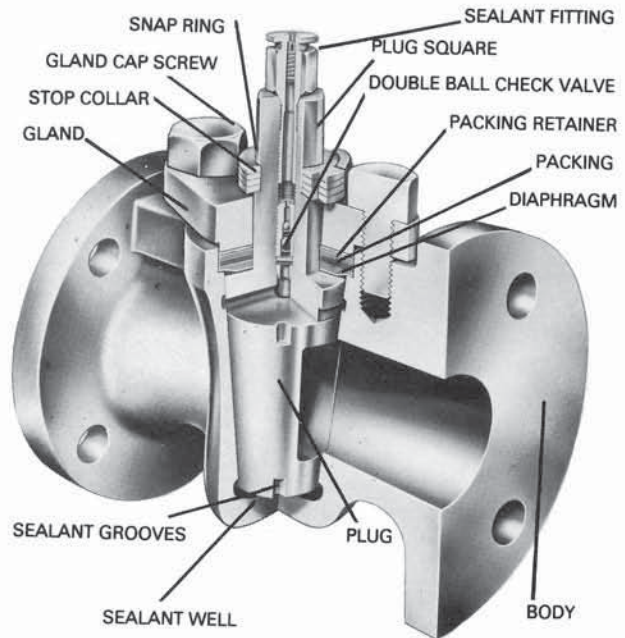
WALWORTH CAST IRON PLUG VALVES

SINGLE GLAND TYPE

Walworth Single Gland Lubricated Plug Valves are designed to meet the demand for an inexpensive valve that incorporates the principal features of the Regular Gland Lubricated Plug Valve.

As in other types of Walworth Lubricated Plug Valves, the surfaces of the Single Gland Lubricated Plug Valve are "Pressure Sealed" when the valve is in either the open or closed position. This seal is renewed by forcing a lubricant under high pressure into a grooving system which completely encircles the ports.

Figure numbers 1796 1797F



REGULAR GLAND TYPE

The Walworth Regular Gland Type Lubricated Plug Valves are made in Regular and Short Pattern types, for wrench or worm gear operation.

These valves are all provided with separate retainers (cover plate) and adjusting glands; generally sizes 3 inches and smaller have four-bolt square retainers, while 4 inches and larger sizes have round retainers. They all incorporate the Pressure Sealed Lubrication features.

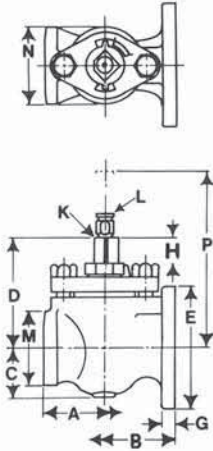
Figure numbers 1700 1700F 1703F 1707F 1718F 1727F

CODES AND STANDARDS COMPLIANCE

ANSI B1.20.1 Pipe Threads
ANSI B16.1 Cast Iron Flanges
ANSI B16.10 Face to face and End to End Dimensions
of Ferrous Valves
MSS SP-25 Standard Marking System for Valves
MSS SP-78 Cast Iron Plug Valves

CWP 200
SHORT PATTERN
WRENCH OPERATED
CAST IRON BODY
AND PLUG

**WALWORTH
CAST IRON
PLUG VALVES**



1796
Threaded Ends
1797F
Flanged Ends

DIMENSIONS and WEIGHTS

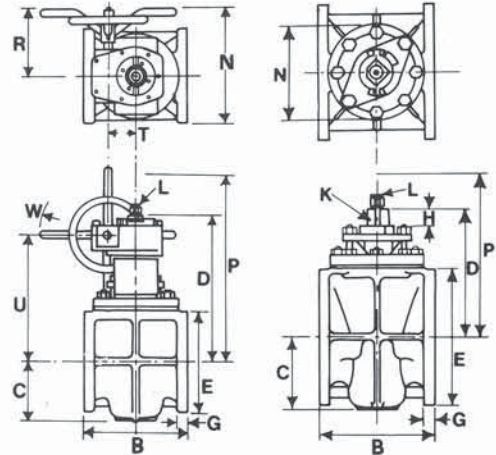
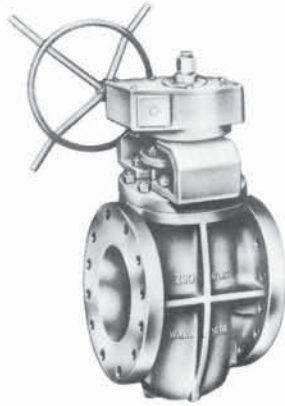
FIGURE NO.		SIZE OF VALVE IN INCHES										
		1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	
1796	END TO END	A	4.50	4.50	4.50	5	5	5.87	6.75	7.62	9	—
1797F	FACE TO FACE	B	—	—	5.50	6.50	6.50	7	7.50	8	9	10
	CENTER TO BOTTOM	C	1.62	1.62	1.62	2	2	2.37	2.37	3.25	4.06	4.50
	CENTER TO TOP	D	3.87	3.87	3.87	4.56	4.56	4.81	5.62	6.31	7.37	7.68
	FLANGE DIAMETER	E	4.25	4.25	4.25	4.62	5	6	7	7.50	9	10
	FLANGE THICKNESS	G	0.43	0.43	0.43	0.56	0.56	0.62	0.68	0.75	0.93	0.93
	SHANK HEIGHT	H	0.93	0.93	0.93	1	1	1.06	1.31	1.43	1.50	1.62
	SHANK SQUARE	K	0.81	0.81	0.81	0.90	0.90	1.06	1.25	1.37	1.50	1.50
	SEALANT FITTING	L	0.25	0.25	0.25	0.25	0.25	0.25	0.37	0.37	0.50	0.50
	HUB DIAMETER	M	2.12	2.12	2.12	2.50	2.81	3.37	3.93	4.62	5.81	—
	WIDTH	N	2.56	2.56	2.56	3.12	3.12	3.62	4.12	4.75	5.75	6.50
	TO REMOVE SEALANT FITTING	P	7.12	7.12	7.12	7.81	7.81	8.06	9.37	10.06	11.62	11.93
	SEALANT STICK SIZE		B	B	B	B	B	B	C	C	D	D
	WRENCH SIZE		D-4	D-4	D-4	E-4	E-4	G-7	K-1	M-1	P-1	P-1
1796	WEIGHT (APPROX.) Lb.		4.8	4.8	4.8	9.3	8.5	13.7	22.5	34.3	54.0	—
1797F	WEIGHT (APPROX.) Lb.		—	—	7.7	13.0	13.4	21.7	33.2	49.0	66.0	88.0

Flanges are ANSI Class 125

WALWORTH CAST IRON PLUG VALVES

200 CWP
SHORT PATTERN
WRENCH OPERATED
CAST IRON BODY
AND PLUG

1718F
Wrench Operated
1727F
Gear Operated



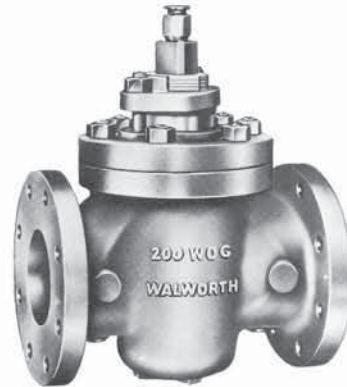
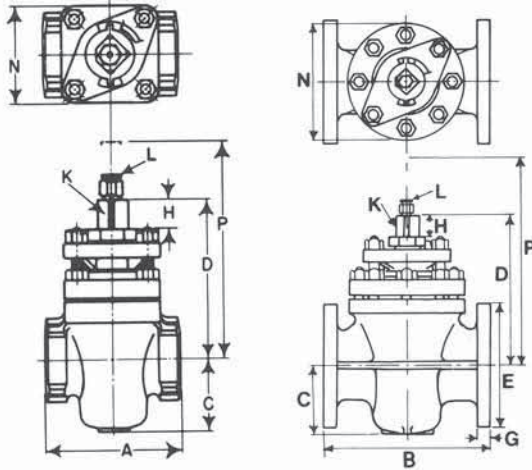
DIMENSIONS and WEIGHTS

FIGURE NO.	SIZE OF VALVE IN INCHES	SIZE OF VALVE IN INCHES				
		6	8	10	12	
1718/1727F	FACE TO FACE	B	10.50	11.50	13	14
	CENTER TO BOTTOM	C	6.12	7.56	9.12	10.68
	CENTER TO TOP (1718F)	D	11.75	13.50	14.50	18.18
	CENTER TO TOP (1727F)	D	18.68	18	20.06	22.68
	FLANGE DIAMETER	E	11	13.50	16	19
	FLANGE THICKNESS	G	1.06	1.18	1.25	1.31
	SHANK HEIGHT	H	1.62	2.06	2.50	3.12
	SHANK SQUARE	K	1.50	1.75	2	2.43
	SEALANT FITTING	L	0.75	0.75	0.75	0.75
	EXTREME BODY WIDTH (1718F)	N	8.37	9.62	10.87	13.50
	EXTREME BODY WIDTH (1727F)	N	14.06	15.31	19.81	22.68
	TO REMOVE SEALANT FITTING (1718F)	P	16	17.75	19.75	23.43
	TO REMOVE SEALANT FITTING (1727F)	P	22.93	22.25	24.31	26.93
	CENTER OF BODY TO HANDWHEEL FACE	R	8.56	8.56	11.81	13.18
	CENTER OF BODY TO CENTER OF HANDWHEEL	T	3.50	3.50	3.50	3.50
	CENTER OF PORT TO CENTER OF HANDWHEEL	U	16.18	15.43	17.50	20.18
	HANDWHEEL DIAMETER	W	23	23	23	23
	SEALANT STICK SIZE		D	D	G	G
	WRENCH SIZE		P-1	R-3	T-3	V-3
	WEIGHT (APPROX.) Lb. (1718F)		154	237	334	580
	WEIGHT (APPROX.) Lb. (1727F)		220	290	450	685

Flanges are ANSI Class 125

CWP 200
 REGULAR PATTERN
 WRENCH OPERATED
 CAST IRON BODY
 AND PLUG

**WALWORTH
 CAST IRON
 PLUG VALVES**



1700
 Threaded Ends
1700F
 Flanged Ends

DIMENSIONS and WEIGHTS

FIGURE NO.		SIZE OF VALVE IN INCHES					
		2	3	4	6	8	
1700	END TO END	A	6.50	8.06	—	—	—
1700F	FACE TO FACE	B	7.50	9	12	15.50	18
	CENTER TO BOTTOM	C	3.25	4.18	5.18	7.12	8.43
	CENTER TO TOP	D	7.37	9	10.81	13.12	16.50
	FLANGED DIAMETER	E	6	7.50	9	11	13.50
	FLANGED THICKNESS	G	0.68	0.81	1	1.06	1.18
	SHANK HEIGHT	H	1.31	1.50	1.62	2.50	3.12
	SHANK SQUARE	K	1.25	1.37	1.50	2	2.43
	SEALANT FITTING	L	0.37	0.37	0.50	0.75	0.75
	WIDTH	N	4.31	5.50	8.37	10.87	13.50
	TO REMOVE SEALANT FITTING	P	11.12	12.75	15.06	18.37	21.75
	SEALANT STICK SIZE	C	C	D	G	G	
	WRENCH SIZE	K-1	M-1	P-1	T-3	V-3	
1700	WEIGHT (APPROX.) Lb.		26	57	—	—	—
1700F	WEIGHT (APPROX.) Lb.		31	59	128	255	457

Flanges are ANSI Class 125

WALWORTH CAST IRON PLUG VALVES

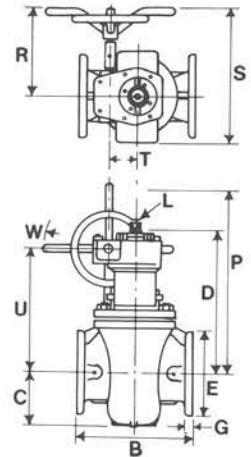
CWP 175 VENTURI PATTERN
CWP 200 REGULAR PATTERN
GEAR OPERATED
CAST IRON BODY
AND PLUG

1703F

Venturi Pattern
CWP 175, Flanged Ends
14", 16" and 18" only

1707F

Regular Pattern
CWP 200, Flanged Ends
6", 8", 10" and 12" only



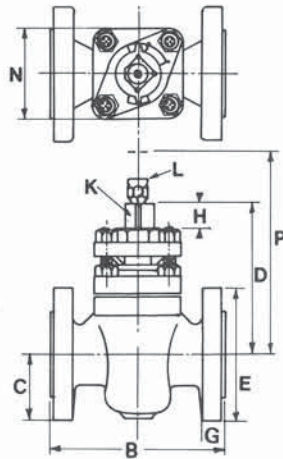
DIMENSIONS and WEIGHTS

FIGURE NO.			SIZE OF VALVE IN INCHES							
			6	8	10	12	14	16	18	
1703F/1707F	FACE TO FACE	B	15.50	18	21	24	27	30	34	
	CENTER TO BOTTOM	C	6.81	8.43	10	11.50	11.87	13.37	14.75	
	CENTER TO TOP	D	18.68	21	23.56	27.87	20.37	21.62	23.37	
	FLANGE DIAMETER	E	11	13.50	16	19	21	23.50	25	
	FLANGE THICKNESS	G	1.06	1.18	1.25	1.35	1.37	1.44	1.56	
	SEALANT FITTING	L	0.50	0.50	0.75	0.75	.75	.75	.75	
	TO REMOVE SEALANT FITTING	P	22.93	25.25	28.81	33.12	25.62	26.87	28.62	
	CENTER TO HANDWHEEL FACE	R	11.81	11.81	12.93	16.25	13.12	14.12	15.75	
	WIDTH	S	17.31	18.31	21.43	25.75	23.62	25.87	28.25	
	CENTER TO WORM	T	3.50	3.50	4.25	2.37	10.65	10.65	11.82	
	CENTER TO WORM	U	16.12	18.50	21.06	24.50	17.12	18	19.75	
	HANDWHEEL DIAMETER	W	23	23	23	23	26	26	30	
	SEALANT STICK SIZE		D	D	G	G	G	G	G	
	TURNS TO OPEN			9	12.50	12.50	12.50	22.50	22.50	25.50
	1703F/1707F	WEIGHT (APPROX.) Lb.		330	540	924	1310	1256	1455	1890

Flanges are ANSI Class 125

CWP 500
 VENTURI PATTERN
 WRENCH/GEAR OPERATED
 CAST IRON BODY
 AND PLUG

**WALWORTH
 CAST IRON
 PLUG VALVES**



2721F
 Wrench Operated
 Flanged Ends

2723F
 Gear Operated
 Flanged Ends

DIMENSIONS and WEIGHTS

FIGURE NO.

SIZE OF VALVE IN INCHES
 6 8

		SIZE OF VALVE IN INCHES	
		6	8
2721F/2723F	FACE TO FACE	B	15.87 16.50
	CENTER TO BOTTOM	C	6.18 7.62
	CENTER TO TOP	D	10.56 12.25
	FLANGE DIAMETER	E	12.50 15
	FLANGE THICKNESS	G	1.68 1.93
	SHANK HEIGHT	H	1.62 2.06
	SHANK SQUARE	K	1.50 1.75
	SEALANT FITTING	L	— —
	WIDTH	N	8.37 9.62
	TO REMOVE SEALANT FITTING	P	14.81 16.50
	SEALANT STICK SIZE		D G
	WRENCH SIZE		P-1 R-3
2721F	WEIGHT (APPROX.) Lb.		219 337
2723F	WEIGHT (APPROX.) Lb.		294 420

WALWORTH PLUG VALVES WRENCHES

COMPENSATOR WRENCHES

WRENCH NUMBER	SIZE OPENING	HANDLE LENGTH	FOR USE WITH VALVES, SIZE CLASS OR NUMBER
IB-0	1-1/16" X 1/2"	18"	1" 600 Class 1/2", 3/4", 1" 1500 Class
IB-1	1-1/8" X 13/16"	27"	1 1/2" 600 and 1500 Class
IB-2	1-1/2" X 1-1/8"	36"	2", 3" and 4" 150, 300 and 600 Class
			2" 900 and 1500 Class
IB-3	2-1/8" X 1-7/16"	48"	6" and 8" 300 Class, 6" 600 Class
			3" and 4" 900 and 1500 Class

TOP ENTRY STEEL WRENCHES

IH-1	1-7/64" X 13/16"	5 1/2"	1/2" and 3/4" 1748, 1749WE, 1760, 1760WE
IH-2	1-1/4" X 57/64"	6"	1" 1748, 1749F, 1749WE, 1760, 1760F, 1760WE
IH-3	1-1/2" X 1-1/64"	9"	1 1/2" 1748, 1749F, 1749WE, 1760, 1760F, 1760WE
IH-4	1-21/32" X 1-9/64"	12"	2" 1748, 2" & 2 1/2" 1749F, 1749WE, 1750, 1760, 1760F, 1760WE
IA-1	2-1/16" X 1-25/64"	24"	3" 1749F, 1749WE, 1750, 1760, 1760F, 1760WE
			4" 1749F, 1749WE, 1750, 1760F, 1760WE
IA-2	1-7/8" X 1-7/8"	24--1/8"	6" 1749F
IA-3	2-1/8" X 2-1/8"	40-1/8"	8" 1749F
G-1	1-1/16" X 1-1/16"	9"	2" 1966WE and 1966SW*
M-1	1-3/8" X 1-3/8"	15"	3" 1966WE and 1966SW*
P-3	1-1/2" X 1-1/2"	36"	6" 1967WE, 4" 1966WE
R-3	1-3/4" X 1-3/4"	36"	8" 1967WE

TOP ENTRY IRON WRENCHES

WRENCH NUMBER	SIZE SQUARE	HANDLE LENGTH	FOR USE WITH VALVES, SIZE AND NUMBER
D-4	13/16"	9"	1/2", 3/4" and 1" 1796 and 1" 1797F, 3/4" and 1 1/4" 1966*
E-1	29/32"	6"	1 1/4", 1 1/2" 1796 and 1797F,
G-1	1 1/16"	9"	2" 1796, 2" 1797F
K-1	1 1/4"	24"	2" 1700, 2" 1700F, 2 1/2" 1796, 2 1/2" 1797F
M-1	1 3/8"	15"	3" 1700, 1700F, 1796, and 1797F
P-1	1 1/2"	30"	4" 1796 and 1797F, 4" 1700F, 6" 1718F, 5" 1797F
R-3	1 3/4"	36"	8" 1718F and 2721F
T-3	2 1/16"	36"	6" and 8" 1967WE when using 2" square operating nuts.
			6" 1700F, 10" 1718F and for valves with 2" square operating nuts
V-3	2 7/16"	48"	8" 1700F and 12" 1718F

* Wrench size if 2" square operating nut is removed.

WALWORTH

2" SQUARE OPERATING NUTS

TOP ENTRY STEEL VALVES

NUT No.	VALVE	FOR VALVE NUMBER
ON-1	1/2 & 3/4"	1748, 1760
ON-2	1"	1748, 1749F, 1760, 1760F
ON-3	1 1/2"	1748, 1749F, 1760, 1760F
ON-4	2" 2 1/2"	1748, 1749F, 1750, 1760, 1760F 1749F, 1750, 1760, 1760F
ON-10	3" 4"	1749F, 1750, 1760, 1760F

COMPENSATOR STEEL VALVES

ON 7	1"	6511 TO 6516
	1/2", 3/4"	5511 TO 5516
ON 8	1 1/2"	6511 TO 6516
	1 1/2"	5511 TO 5516
ON 9	2", 3", 4"	1412 TO 6516
	2"	9511 TO 9516
ON 10	6", 8"	3412 TO 3616
	6"	6512 TO 6616
	3", 4"	9511 TO 5516
ON 11	ALL COMPENSATOR VALVES WITH GEAR OPERATORS.	

TOP ENTRY IRON VALVES

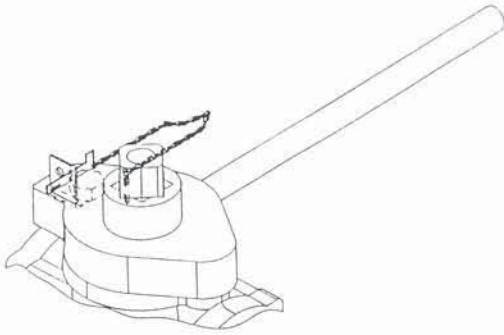
NUT No.	VALVE SIZE	FOR VALVE NUMBER
LN-1	1/2", 3/4", 1"	1796, 1797F
LN-2	1 1/4", 1 1/2"	1796, 1797F
LN-3	2"	1796, 1797F, 1966WE
LN-4	2"	1700, 1700F
LN-5	3"	1700, 1700F, 1796, 1797F, 1966WE
LN-6	4"	1700F, 1796, 1797F, 1966WE
	5"	1797F
	6"	1718F
LN-7	8"	1718F

OPERATING NUT. RECTANGLE OPENING SIZE

ON. 1	1 ⁷ / ₆₄ " X 1 ³ / ₁₆ "
ON. 2	1 ¹ / ₄ " X 5 ⁷ / ₆₄ "
ON. 3	1 ¹ / ₂ " X 1 ¹ / ₆₄ "
ON. 4	1 ²¹ / ₃₂ " X 1 ⁹ / ₆₄ "
ON. 7	1 ¹ / ₁₆ " X 1 ¹ / ₂ "
ON. 8	1 ¹ / ₈ " X 1 ³ / ₁₆ "
ON. 9	1 ¹ / ₂ " X 1 ¹ / ₈ "
ON. 10	2 ¹ / ₈ " X 1 ⁷ / ₁₆ "

WALWORTH LOCKING DEVICES FOR PLUG VALVES

FOR CAST IRON VALVES



Standard Combination Wrench and Locking Device to fit Walworth Figure Numbers 1796 & 1797F

Valve Size	Device with Handle Dart & Chain No.	Device with Dart & Chain Less Handle No.
1"	CWLDH-1	CWLD-1
1 1/4"	CWLDH-1 1/2	CWLD-1 1/2
1 1/2"	CWLDH-1 1/2	CWLD-1 1/2
2"	CWLDH-2	CWLD-2
2 1/2"	CWLDH-2 1/2	CWLD-2 1/2
3"	CWLDH-3	CWLD-3
4"	CWLDH-4	CWLD-4

Darts, Chains, Pins and locking devices may be ordered separately.

FOR CAST STEEL VALVES

Compensator and small top entry steel valve locking device.

The kit includes two locking plates and extra snap rings.

Padlock is not included.



Locking Device Cross Reference for Walworth Lubricated Plug Valves

Size	Figure No.												
	14XX	3XXX	6XXX	95XX	55XX	25XX	505XX	1700	1718	1748	1749	1750	1760
0.50	—	—	—	—	681168	—	—	—	—	681170	—	—	681170
0.75	—	—	—	—	681168	—	—	—	—	681172	—	—	681170
1.00	—	—	681168	—	681168	—	—	—	—	681173	681173	681173	681173
1.25	—	—	—	—	—	—	—	F10-1	—	—	—	—	—
1.50	—	—	681169	—	681169	—	—	F10-1	—	681177	681177	681177	681177
2.00	681175	681176	681176	681176	681176	681171	681176	K10-2	—	681180	681179	681179	681179
2.50	—	—	—	—	—	—	—	M10-2	—	—	681179	681179	681197
3.00	681175	681176	681176	681182	681182	681178	681183	M10-2	—	—	681193	—	681198
4.00	681175	681176	681176	681182	681182	—	—	P10-2	—	—	681194	—	681199
6.00	681184	681182	681182	—	—	—	—	T10-2	P10-2	—	681195	—	—
8.00	681184	681182	—	—	—	—	—	V10-1	R10-2	—	681196	—	—
10.00	—	—	—	—	—	—	—	—	T10-2	—	—	—	—

WALWORTH OPERATING EXTENSIONS AND ELEVATIONS

High Head Extensions

High head extensions are made for operating wrench operated valves installed below the surface of the ground, or in other inaccessible locations.

The operating end of the extension is 2-inches square, permitting the use of a 2-inch square socket wrench, or any other suitable 2-inch square wrench.

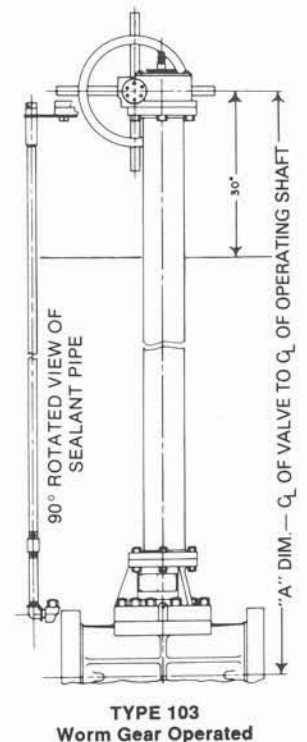
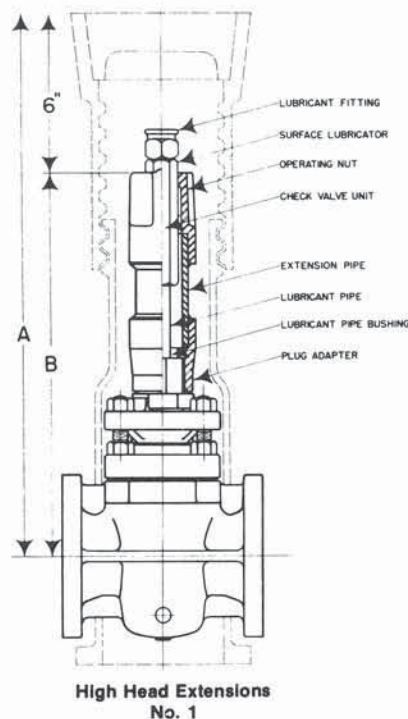
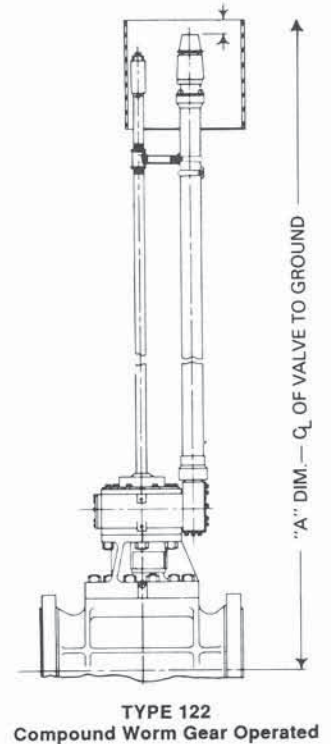
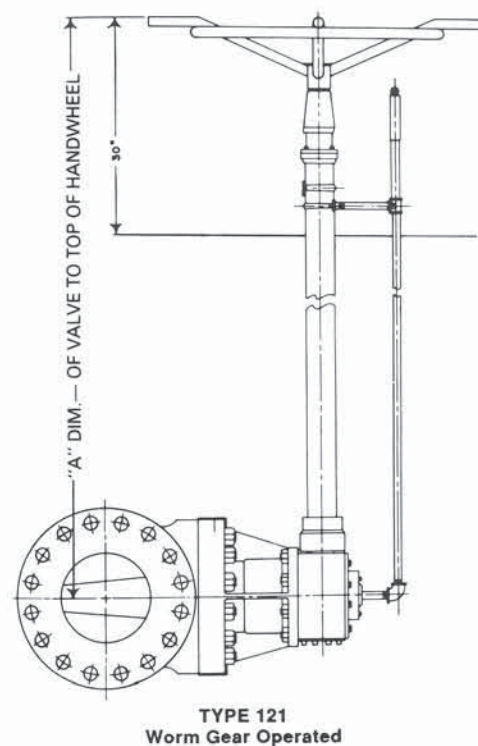
The use of elevations for buried valves eliminates the need of building vaults for the valves. This construction permits the gearing to be brought above the surface of the ground so that it can be periodically checked and more readily serviced when necessary.

Valves with elevated worm gearing can be equipped with motor actuators or with air cylinder or gas hydraulic actuators. When ordering:

1. Elevated worm gearing (with or without motor actuators)—Specify valve size and Figure Number and dimension "A" (distance from center line of valve to center line of worm shaft).
2. Elevated air cylinder or gas hydraulic actuators—Specify valve size and Figure Number and dimension "A" (distance from center line of valve to center line of cylinder).

For Buried Service

When ordering extensions for Walworth Plug Valves, give the figure number of the valve, also the size of the valve, and dimension A.



WALWORTH WALSEAL PLUG VALVE SEALANTS

FUNCTION AND PROPERTIES OF WALSEAL SEALANTS

To assure thoroughly satisfactory service, Walworth Walseal Sealants should always be used with Walworth Plug Valves.

Function: The sealant minimizes friction during operation of the valve and protects seating surfaces from corrosion. Because the ports of valves are completely encircled with sealant grooves, leakage is prevented by the Walseal sealant.

Properties: Walseal sealants have the necessary properties to serve a variety of purposes.

1. Have lubricating value to allow the valve to turn easily.
2. Have sufficient body to resist dilution by line fluids and still assure tight sealing.
3. Are chemically inert in the fluids for which they are specified and have the ability to adhere to the metal of the finished seating surfaces to protect from corrosion.
4. Remains in a plastic state over a wide range of temperature conditions to act as a hydraulic medium, and provide for lubrication and corrosion protection.
5. Contain a minimum of ingredients that might solidify from temperature or chemical reactions and clog the groove system.

SELECTION AND MAINTENANCE OF WALSEAL SEALANT

How to select a sealant:

1. Line Contents — Select a sealant recommended for the particular service requirements.
2. Color — Where discoloration of the line contents must be guarded against, select a white sealant if available. In special cases consult a Walworth representative.
3. Contamination — Sealant for use with foodstuffs or pharmaceuticals must be non-toxic, taste and color-free and chemically inert.
4. Temperature — As a general rule, choose the sealant with the lowest maximum temperature rating. Such a sealant will usually have greater lubricating value at normal temperatures than one with a higher limit. This is important as it affects the ease of operation of the valve.
5. Compromise — If a sealant is required for a mixed service condition, a good practical rule is to select the sealant recommended to the predominating part of the pipe-line contents.
6. Nitrating Acids — It is dangerous to use certain sealants on nitrating acids. Please contact your Walworth representative for this application.

Proper sealant maintenance:

The amount of maintenance required depends upon the frequency of operation of the valve.

Regular maintenance: Preserves the seating surfaces and prevents leakage. Definite periodic service gives the best results. Any valve not regularly operated should be serviced at least every six months.

Ordering information:

1. State whether jumbo, stick or bulk sealant is desired.
2. For bulk sealant give Walseal number and container size.

STICK	STICK SIZE	AVAILABLE IN WALSEAL NO.
B (24/box)	3/8" X 1 1/2" (Box approx. 1.2 lb.)	10, 20, 40 and 60
C (24/box)	7/16" X 2 1/8" (Box approx. 1.2 lb.)	10, 20, 40 and 60
D (24/box)	1/2" X 2 1/4" (Box approx. 1.2 lb.)	10, 20, 40 and 60
G (24/box)	5/8" X 3 1/2" (Box approx. 1.2 lb.)	10, 20, 40 and 60
CARTRIDGE – (Box of 4 - 1 Lb. each)		ALL TYPES
BULK		
J-Jumbo Jr. (6)	1 3/8" X 8 1/2" (Box approx. 3.2 lb.)	10, 20, 40 and 60
K-Jumbo (12)	1 1/2" X 10 1/2" (Box approx. 9.2 lb.)	10, 20, 40 and 60
Gun Pack (Box-6 GP)		
10 pound (5 quart can)		
40 pound (5 gallon can)		ALL TYPES
400 pound (55 gallon drum)		

Bulk sealants are of thinner consistency than stick form.

If in doubt about the best sealant to order, explain nature of solution to be handled and state temperature and pressure conditions.

WALWORTH

WALSEAL SEALANTS

WALSEAL #10

Temperature range from -20F to 500F Stick /
-40F to 500F Bulk

Dark Gray

Service: General purpose sealant intended for use in natural gas and liquid petroleum services including crude distillates, combustible fuels such as gasoline, jet fuel, and heating oils. Used as assembly sealant in all Walworth plug valves unless otherwise specified.

Not intended for use in: Solvents (aromatic), strong acids and alkalies, and steam.

WALSEAL #20

Temperature range from 0F to 650F Bulk /
30F to 690F Stick

Color red

Service: High temperature general purpose sealant for use in acids, alkalies, alcohols, amines, asphalt, aqueous solutions, fats, glycerine, glycols, soap, steam, and water service having continuous exposure to temperatures above 400F.

Not intended for use in: Aromatic solvents, light liquid hydrocarbons, nitrating acids.

WALSEAL #40

Temperature range from 10F to 350F Stick /
-10F to 350F Bulk

Color light brown

Service: Specifically formulated for resistance to all octane gasolines, aviation and jet fuels, kerosene, fuel blending ingredients, and water. Approved for government use per MIL-G-6032.

Not intended for use in: Strong acids and alkalies.

WALSEAL #50

Temperature range from -50F to 300F

Color beige

Service: Low temperature general purpose sealant for use in services similar to Walseal #10. Recommended for continuous exposure to temperatures below 0°F.

Not intended for use in: Solvents (aromatic and chlorinated), strong acids and alkalies.

WALSEAL #60

Temperature range from 10F to 350F Stick /
0F to 300F Bulk

Service: Suitable for water, acids, alkalies, alcohols, and amines. May be used in food or pharmaceutical applications if approved by user. Certified by the National Sanitary Foundation.

Not intended for use in: Hydrocarbon solvents.

Continued use of any sealant at either the low or high temperature limit is not recommended.

For more information concerning these sealants or recommendations for a particular service contact your Walworth representative.

WALWORTH VALVE FLUSH

For hard-to-operate valves

-20°F to 400°F

(-28°C) (204°C) BLACK

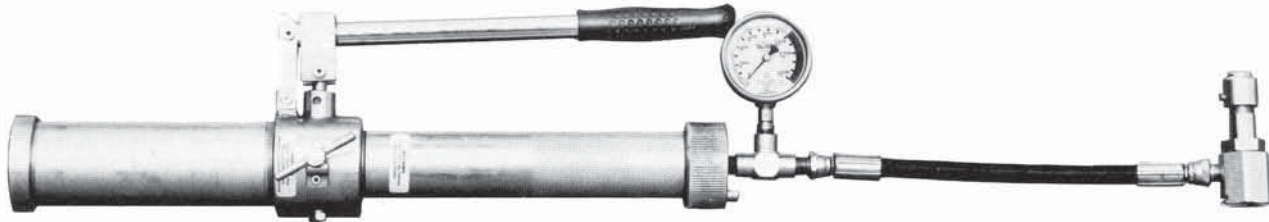
VALVE FLUSH is not a sealant; however, it is compatible with any lubricant or sealant. It contains molybdenum disulfide for added lubricity. VALVE FLUSH may be applied with conventional lubricating equipment. VALVE FLUSH will work through any fitting that is not completely plugged. In other words, if VALVE FLUSH cannot be injected past the fitting, it will not free the valve. If the fitting is plugged, then it is recommended that fitting be removed and replaced with the appropriate WALWORTH fitting.

WALWORTH "VALVE FLUSH" JUMBO, JR. BAG 6/BX
WALWORTH "VALVE FLUSH" JUMBO, BAG 6/BX
WALWORTH "VALVE FLUSH" 1 CARTRIDGE 12/CTN
WALWORTH "VALVE FLUSH" 10LB. (5QT.) CAN.
WALWORTH "VALVE FLUSH" 20 LB. (3GAL.) PAIL
WALWORTH "VALVE FLUSH" 40 LB. (6GAL.) PAIL



WALWORTH

LUBRICANT ACCESSORIES



1699 HIGH PRESSURE LUBRICANT GUN

1699 G HIGH PRESSURE LUBRICANT GUN WITH GAUGE

Where a number of valves are installed under the same, or related, service conditions it is advantageous to lubricate them with a Walworth High Pressure Lubricant Gun.

The Walworth High Pressure Lubricant Gun is the only portable gun that can handle full-bodied valve lubricants in stick form.

The gun is self-priming and may be used in any position. The pump handle is detachable and has a hole drilled near one end. By detaching the handle and placing the hole over the protruding button on the charging cap, the cap can readily be removed and replaced. The handle is also used as a pusher for returning the piston to the bottom of the cylinder for the purpose of charging the gun.

To charge the gun the by-pass is opened and the piston pushed down as far as it will go. The by-pass valve is then closed and two sticks of Walworth Jumbo Size Lubricant inserted. Then the charging cap is replaced, using the pump handle and protruding button on the cap to tighten it, and the gun is ready for use. The lever handle is then pumped until sealant appears at the end of the hose.

During operation of the gun, should the pressure created lock the coupling to the button-head fitting, the pressure can be relieved and the coupling disconnected by opening the bypass valve. Relief fittings are provided on the hose and within the gun to prevent valve damage should the lubricating system be clogged, or prevent damage to the gun itself in the event it is operated when empty.

HIGH PRESSURE GAUGE

For use with Sealant hand guns and pumps. An essential accessory to indicate when sufficient Sealant pressure has been developed. Gauge needle pulsation goes up by steps until valve is completely filled with Sealant. When Sealant pressure reaches a certain point, the gauge needle begins to drop showing that the valve is full. Gauge also indicates valve adjustment and other service required.

WALWORTH LUBRICANT ACCESSORIES

WALWORTH LUBRICANT FITTING

Most types of Walworth Lubricated Plug Valves are regularly provided with the Walworth Lubricant Fitting illustrated. It is a Giant Button-Head Fitting to which the lubricant gun may be coupled easily for a leakproof connection. These fittings may also be used as regular lubricant screws with standard size lubricant sticks.

One size of Button-Head Fitting is used for all Compensator Plug Valves. The Button-Head figure number for other Walworth Plug Valves is the same as the "Sealant Stick Size" listed on the catalog page for each valve type and size.



WALWORTH BUTTON-HEAD LUBRICANT FITTINGS	LUBRICANT FITTING SIZE	WALWORTH LUBRICANT FITTING NUMBER
For standard Compensators	1/4"	BH1
For NACE MRO-01-75 Compensators	1/4"	BH1-N
For valves with Sealant Stick Size: B	1/4"	BH2
C	3/8"	BH3
D	1/2"	BH4
G	3/4"	BH5

DOUBLE BALL CHECK VALVE ASSEMBLIES	
NO.	VALVE SIZES
B	1/2 to 2"
C	2 1/2 to 3"
D	4 & 5"
G	6 & up"

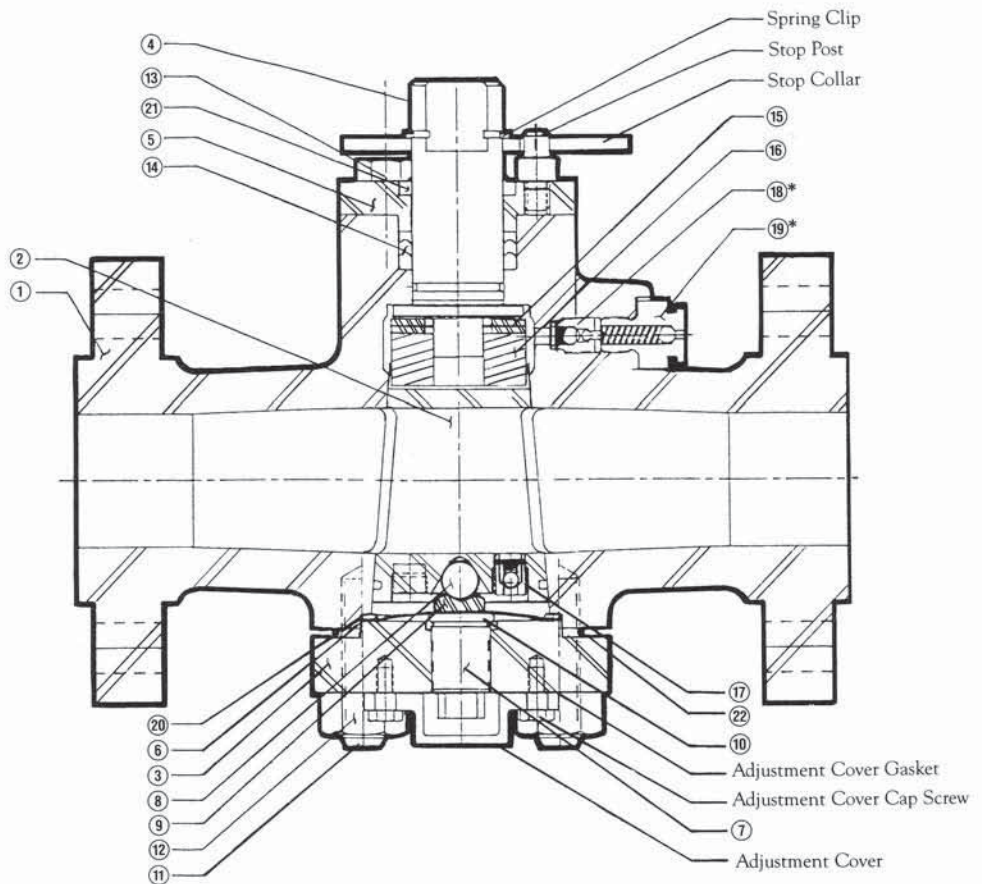
WALWORTH COMPENSATOR CONSTRUCTION MATERIALS

STYLE		A	B	C	D
Service		Standard for API 6D ANSI B16.34	Low Temperature for API 6D ANSI B16.34	Sour Environment API 6D ANSI B16.34 NACE MR-01-75	Sour Environment and Low Temperature for API 6D ANSI B16.34 NACE MR-01-75
Temperature Range		-20°F to +500°F	-50°F to +350°F	-20°F to +500°F	-50°F to +350°F
NO.	PART				
1	BODY	Carbon Steel A216 Gr. WCB	Carbon Steel A352 Gr. LCB	Standard HRC 22 Max.	Carbon Steel A352 Gr. LCB HRC 22 Max.
2	PLUG NOTE: All venturi pattern COMPENSATORS will have cast iron plugs.	Alloy Steel A487 Class 4A or A322 GR4140 Perflo Coated *	Standard	Standard HRC 22 Max. Electroless Nickel Coated	Standard HRC 22 Max. Electroless Nickel Coated
3	COVER	A515 Gr. 70 Plate or A216 Gr. WCB	A516 Gr. 70 Plate or A352 Gr. LCB	Standard HRC 22 Max.	A516 Gr. 70 Plate or A352 Gr. LCB; HRC 22. Max.
4	STEM	Stainless Steel A276 Type 410	Standard	Standard HRC 22 Max.	Standard HRC 22 Max.
5	GLAND	A515 Gr. 70	A516 Gr. 70	A515 Gr. 70	A516 Gr. 70
6	DIAPHRAGM	Stainless Steel A167 Type 304	Standard	Standard HRC 22 Max.	Standard HRC 22 Max.
7	ADJUSTMENT SCREW	Alloy Steel A322 Gr. 4140	Standard	Standard HRC 22 Max.	Standard HRC 22 Max.
8	THRUST BALL	CR. Steel Gr. 200 A295 Type 52100	Monel K500 HRC 35 Max.	Monel K500 HRC 35 Max.	Monel K500 HRC 35 Max.
9	THRUST BALL SEAT	Alloy Steel AISI 4140	Standard	Standard HRC 22 Max.	Standard HRC 22 Max.
10	THRUST BUTTON	Carbon Steel	Standard	Standard	Standard
11	COVER STUDS	Alloy Steel A193 Gr. B7	Alloy Steel A320 Gr. L7	Alloy Steel A193 Gr. B7M HRC 22 Max.	Alloy Steel A320 Gr. L7M HRC 22 Max.
12	COVER STUD NUTS	Carbon Steel A194 Gr. 2H	Alloy Steel A 194 Gr. 4 or 7	Carbon Steel A194 Gr. 2HM HRC 22 Max.	Alloy Steel A194 Gr. 7M HRC 22 Max.
13	GLAND CAP SCREW	Carbon Steel A449 Gr. 5	Alloy Steel A 320 Gr. L7	Alloy Steel A193 Gr. B7M HRC 22 Max.	Alloy Steel A320 Gr. L7M HRC 22 Max.
14	STEM PACKING	Graphite Stem Packing	Standard	Standard	Standard
15	BALANCE SPRING	Inconel X750	Standard	Standard	Standard
16	STEM TO PLUG COUPLING	Alloy Steel AISI 4140	Standard	Standard HRC 22 Max.	Standard HRC 22 Max.
17	PLUG CHECK VALVE BODY BALL PIN SPRING	Stainless Steel A276 Type 316 Stainless Steel A756 Type 316 Stainless Steel A276 Type 316 Inconel X750 or A313 Type 316	Standard Standard Standard	Standard HRC 22 Max. Monel K500 HRC 35 Max. Standard HRC 22 Max. Standard	Standard HRC 22 Max. Monel K500 HRC 35 Max. Standard HRC 22 Max. Standard
18	SEALANT CHECK VALVE BODY BALL PIN	Carbon Steel A108 Gr. 1213 CD Plated CR Steel A295 Type 52100 Carbon Steel	Standard Standard Standard	Stainless Steel A276 Type 316 HRC 22 Max Monel K500 HRC 35 Max. Stainless Steel A276 Type 316 HRC 22 Max.	Stainless Steel A276 Type 316 HRC 22 Max Monel K500 HRC 35 Max. Stainless Steel A276 Type 316 HRC 22 Max.
19	SEALANT INJECTION FITTING BODY SPRING BALL	Carbon Steel A108 Gr. 1213 CD Plated A229 Class II CR Steel A295 Type 52100	Standard Standard Standard	Stainless Steel A276 Type 316 HRC 22 Max. Inconel X750 Monel K500 HRC 35 Max.	Stainless Steel A276 Type 316 HRC 22 Max. Inconel X750 Monel K500 HRC 35 Max.
20	COVER GASKET	Soft Steel	Standard	Standard	Standard
21	STEM ENVIRONMENTAL SEAL	Elastomer	Standard	Standard	Standard
22	COVER STUDS ENVIRONMENTAL SEALS	Buna N	Standard	Standard	Standard
23	IDENTIFICATION PLATE	Stainless Steel A167 Type 304	Standard	Standard	Standard
24	SEALANT	Walseal #10	Walseal #50	Walseal #10	Walseal #50

* TEFLON Molydisulfide over Phosphatized Base.

WALWORTH COMPENSATOR CONSTRUCTION MATERIALS

E	F
Standard for API 6A ANSI B 16.34	Sour Environment API 6A ANSI B 16.34 NACE MR-01-75
0°F to +250°F	0°F to +250°F
A487 Class 4A	A487 Class 4A HRC 22 Max.
A216 Gr. WCB Perflo Coated	A216 Gr. WCB Electroless Nickel Coated
A487 Class 4A or A515 Gr. 70	A487 Class 4A HRC 22 Max. or A515 Gr. 70
Stainless Steel A276 Type 410	Standard HRC 22 Max.
A487 Class 4A or A515 Gr. 70	A487 Class 4A HRC 22 Max. or A515 Gr. 70
Stainless Steel A167 Type 304	Standard HRC 22 Max.
Alloy Steel A322 Gr. 4140	Standard HRC 22 Max.
CR. Steel Gr. 200 A295 Type 52100	Monel K500 HRC 35 Max.
Alloy Steel AISI 4140	Standard HRC 22 Max.
Carbon Steel	Standard
Alloy Steel A193 Gr. B7	Alloy Steel A193 Gr. B7M HRC 22 Max.
Carbon Steel A194 Gr. 2H	Carbon Steel A194 Gr. 2HM HRC 22 Max.
Carbon Steel A449 Gr. 5	Alloy Steel A193 Gr. B7M HRC 22 Max.
Graphite Stem Packing	Standard
Inconel X750	Standard
Alloy Steel AISI 4140	Standard HRC 22 Max.
Stainless Steel A276 Type 316 Stainless Steel A756 Type 316 Stainless Steel A276 Type 316 Inconel X750 or A313 or Type 316	Standard HRC 22 Max. Monel K500 HRC 35 Max. Stainless Steel HRC 22 Max. Standard
Carbon Steel A108 Gr. 1113 CD Plated CR Steel A295 Type 52100 Carbon Steel	Stainless Steel A276 Type 316 HRC 22 Max. Monel K500 HRC 35 Max. Stainless Steel A276 Type 316 HRC 22 Max.
Carbon Steel A106 Gr. 1113 CD Plated A229 Class II CR Steel A295 Type 52100 Soft Steel	Stainless Steel A276 Type 316 HRC 22 Max. Inconel X750 Monel K500 HRC 35 Max. Standard
Elastomer	Standard
Buna N	Standard
Stainless Steel A167 Type 304	Standard
Walseal #10	Walseal #10



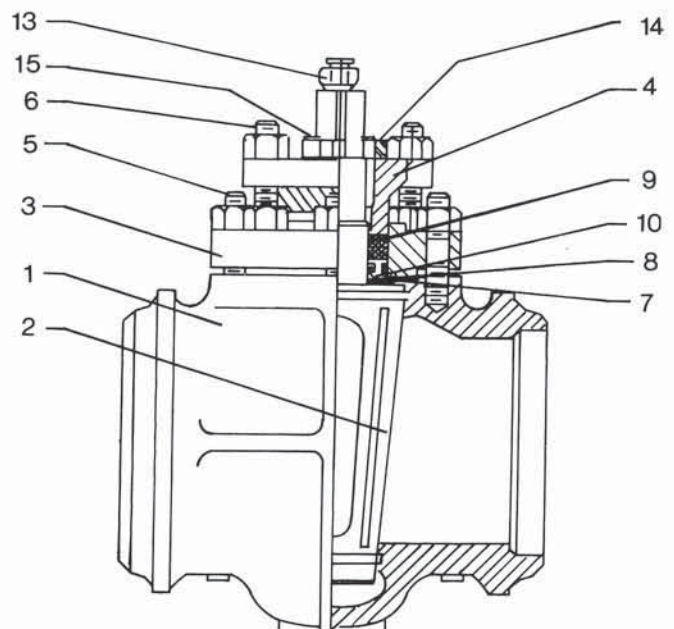
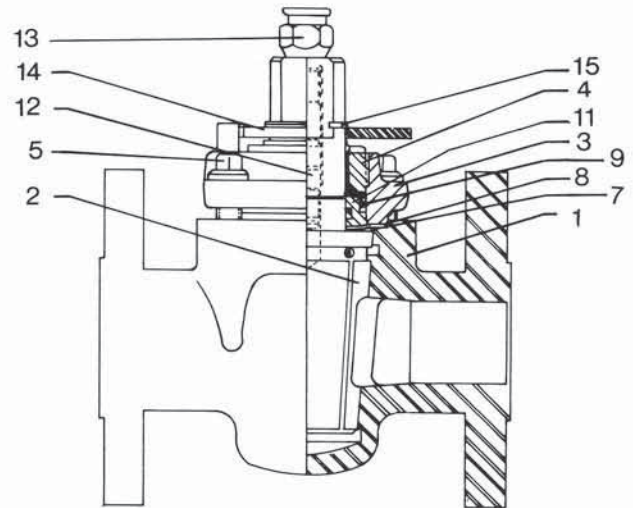
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WALWORTH CAST STEEL PLUG VALVES

TOP ENTRY AND GAS SERVICE

CONSTRUCTION MATERIALS

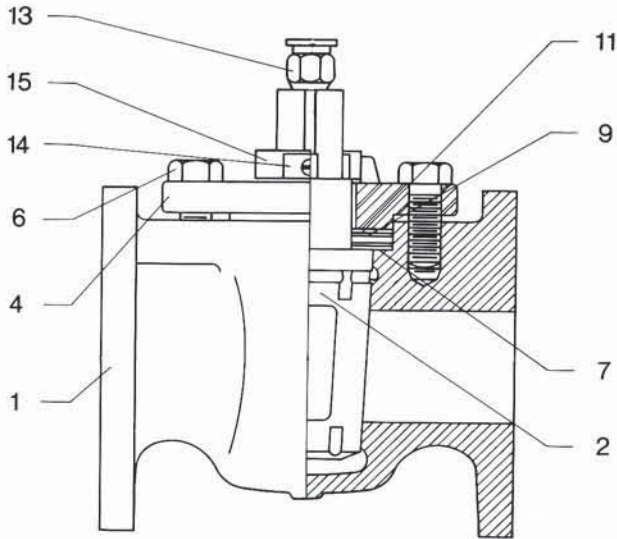
NO.	PART	STEEL PLUG VALVE MATERIAL
1	BODY	WCB CAST CARBON STEEL
2	PLUG	CAST ALLOY STEEL A487 CLASS 4A (CLASS B CAST IRON IN FIGURES 1966WE, 1967WE AND 1968WE)
3	RETAINER	WCB CAST CARBON STEEL (STEEL PLATE IN FIG. 1752F) (CL.B CAST IRON IN FIGS. 1967WE AND 1968WE)
4	GLAND	WCB CAST CARBON STEEL (MALLEABLE IRON IN FIGURES 1966WE, 1967WE AND 1968WE)
5	RETAINER BOLTING	B7 ALLOY STEEL STUDS; 2H STEEL NUTS (CARBON STEEL STUDS AND NUTS IN FIGS. 1967WE AND 1968WE)
6	GLAND BOLTING	B7 ALLOY STEEL STUDS, CARBON STEEL NUTS (B7 STUDS AND 2H NUTS IN FIG. 1752F) (CARBON STEEL STUDS AND NUTS IN FIGURES 1967WE AND 1968WE) (CARBON STEEL CAP SCREWS IN FIG. 1966WE)
7	DIAPHRAGM	TYPE 410 STAINLESS STEEL
8	DIAPHRAGM GASKET	NON-ASBESTOS COMPOSITE
9	PACKING	ALLOY STEEL O-RING RETAINER SLEEVE WITH BUNA-N O-RING
10	PACKING SPREADER	STEEL
11	PACKING RETAINER	STEEL
12	PLUG CHECK VALVE	STEEL *
13	SEALANT FITTING	STEEL
14	STOP COLLAR	STEEL
15	COLLAR RETAINER	STEEL



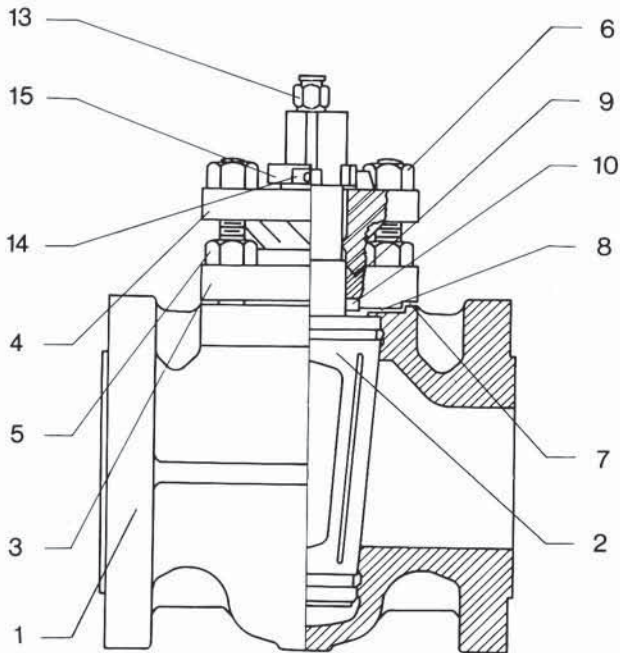
* Not Shown

CONSTRUCTION MATERIALS

WALWORTH CAST IRON PLUG VALVES



SINGLE GLAND TYPE
USED ON FIGURES 1796, 1797F



REGULAR GLAND TYPE
USED ON FIGURES 1700, 1700F, 1707F, 1718F, 1727F

NO.	PART	CAST IRON PLUG VALVE MATERIAL
1	BODY	CAST IRON (ASTM A126 GRB)
2	PLUG **	CAST IRON (ASTM A126 GRB)
3	RETAINER *	1/2" TO 1 1/2": DUCTILE IRON 2" AND LARGER: CL. B CAST IRON
4	GLAND	DUCTILE IRON
5	RETAINER BOLTING	1/2" TO 1": B7 STUDS; 2H NUTS 1 1/4" AND LARGER: CARBON STEEL STUDS AND NUTS
6	GLAND BOLTING	1/2" TO 1": B7 STUDS; CARBON STEEL NUTS 1 1/4" AND LARGER: CARBON STEEL STUDS AND NUTS (CARBON STEEL CAP SCREWS IN FIGURES 1796 AND 1797F)
7	DIAPHRAGM	TYPE 410 STAINLESS STEEL
8	DIAPHRAGM GASKET	NON-ASBESTOS COMPOSITE
9	PACKING	1796 AND 1797F – NON-ASBESTOS COMPOSITE AND BUNA-N GASKETS. ALL OTHER MODELS EMPLOY ALLOY STEEL RETAINER SLEEVE WITH BUNA-N O-RING.
10	PACKING SPREADER	CAST IRON
11	PACKING RETAINER	STEEL
12*	PLUG CHECK VALVE	STEEL
13	SEALANT FITTING	STEEL
14	STOP COLLAR	STEEL
15	COLLAR RETAINER	STEEL

* Not Shown

** Plug is treated with Dow Corning MOLYKOTE 106 to reduce friction.

WALWORTH

REFERENCE CODES AND STANDARDS

ANSI STANDARDS - AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI/ASME B1.20.1	Pipe Threads, General Purpose (Inch).
ANSI B16.1	Cast Iron Pipe Flanges and Flanged Fittings.
ANSI B16.5	Pipe Flanges and Flanged Fittings.
ANSI B16.10	Face-To-Face and End-To-End Dimensions of Valves.
ANSI B16.20	Ring-Joint Gaskets and Grooves For Steel Pipe Flanges.
ANSI B16.25	Buttwelding Ends.
ANSI B16.34	Valves – Flanged, Threaded and Welding End.

API STANDARDS - AMERICAN PETROLEUM INSTITUTE

API 6D	Pipeline Valves (Gate, Plug, Ball and Check Valves).
API 6A	Wellhead and Christmas Tree Equipment.
API 6FA	Fire Test For Valves.
API 598	Valve Inspection and Testing.
API 599	Steel and Ductile Iron Plug Valves.

ASME CODES – THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS

ANSI Guide	Corrosion Control for ANSI B31.1. Power Piping Systems.
ANSI/ASME B31.1	Power Piping.
ANSI B31.2	Fuel Gas Piping.
ANSI/ASME B31.3	Chemical Plant and Petroleum Refinery Piping.
ANSI/ASME B31.4	Liquid Transportation Systems For Hydrocarbons...
ANSI/ASME B31.8	Gas Transmission and Distribution Piping Systems.
ANSI/ASME B31.9	Building Services Piping.
ASME GUIDE	For Gas Transmission and Distribution Piping Systems.
BOILER AND PRESSURE VESSEL CODE:	
Section II	Material Specifications – Part A, B and C.
Section V	Non-Destructive Examination.
Section VIII	Pressure Vessels, Divisions 1 and 2.
Section IX	Welding and Brazing Qualifications.

ASTM STANDARDS – AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM A126	Gray Iron Castings For Valves, Flanges, and Pipe Fittings.
ASTM A193	Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service.
ASTM A194	Carbon and Alloy Steel Nuts For Bolts for High-Pressure and High-Temperature Service.
ASTM A216	Steel Castings, Carbon, Suitable for Fusion Welding for High-Temperature Service.
ASTM A276	Stainless and Heat-Resisting Steel Bars and Shapes.
ASTM A307	Carbon Steel Bolts and Studs, 60,000 psi Tensile.
ASTM A320	Alloys – Steel Bolting Materials for Low-Temperature Service.
ASTM A352	Steel Castings, Ferritic and Martensitic, for Pressure-Containing Parts. Suitable for Low-Temperature Service.
ASTM A487	Steel Castings Suitable for Pressure Service.
ASTM A515	Pressure Vessel Plates, Carbon Steel, for Intermediate- and Higher-Temperature Service.

WALWORTH REFERENCE CODES AND STANDARDS

MSS STANDARDS — MANUFACTURERS SOCIETY OF THE VALVE AND FITTINGS INDUSTRY

MSS SP-6	Standard Finishes for Contact Faces of Pipe Flanges and Connecting-end Flanges of Valves and Fittings.
MSS SP-9	Spot Facing for Bronze, Iron and Steel Flanges.
MSS SP-25	Standard Marking System for Valves, Fittings, Flanges, and Unions.
MSS SP-44	Steel Pipeline Flanges.
MSS SP-45	Bypass and Drain Connection Standard.
*MSS SP-53	Magnetic Particle Examination Method.
*MSS SP-54	Radiographic Examination Method.
*MSS SP-55	Visual Method.
MSS SP-61	Pressure Testing of Steel Valves.
MSS SP-78	Cast Iron Plug Valves, Flanged and Threaded Ends.
MSS SP-91	Guide Lines for Manual Operation of Valves.
MSS SP-92	MSS Valve User Guide.
*MSS SP-93	Liquid Penetrant Examination Method.

NACE STANDARD — NATIONAL ASSOCIATION OF CORROSION ENGINEERS

NACE MR-01-75	Sulfide Stress Cracking Resistant-Metallic Materials for Oilfield Equipment.
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CANADIAN NATIONAL STANDARDS

CSA Z 245.15	Steel Valves
CSA Z 299.1	Quality Assurance

*Quality standard for steel castings for valves, flanges and fittings and other piping components.

HOW TO ORDER

All requirements should be stated at the time of purchase with the understanding that, if not otherwise specified on the order, the item or items may be supplied standard in respect to materials, end connections, etc. The following information should be furnished:

1. Name of product as described herein.
2. Quantity.
3. Complete size description. If product is a valve, include nominal (flange or pipe) size and bore size.
4. Plate or part number if known.
5. Pressure rating (working pressure in psi, ANSI, API rating or equivalent).
6. End connection: Complete description of flange, thread, weld or other connection desired. If weld end, state grade and wall of pipe.
7. Body and trim material.
8. Type of operator for valve: Handwheel, bevel gear, worm gear. If power actuator desired, specify make and model.
9. Service conditions: Type of installation, working pressure, temperature, type of products, presence of corrosive or abrasive conditions.
10. Delivery requirements.
11. Special requirements.

WALWORTH

PRESSURE AND TEMPERATURE RATINGS

CAST CARBON STEEL PLUG VALVES ANSI B 16 . 34

	FLUID TEMPERATURE °F	WORKING PRESSURES PSI, MAX.						
		200 CWP	CL. 150	CL. 300	CL. 600	CL. 900	CL. 1500	CL. 2500
WCB CAST CARBON STEEL BODIES TO ASTM A 216 GRADE WCB	-20 TO 100	200	285	740	1480	2220	3705	6170
	200	190	260	675	1350	2025	3375	5625
	300	165	230	655	1315	1970	3280	5470
	400	140	200	635	1270	1900	3170	5280
	500	—	170	600	1200	1795	2995	4990
	TEST PRESSURES, PSI							
	HYDROSTATIC SHELL TEST	400	450	1125	2225	3350	5575	9275
	SEAT (CLOSURE) HYDROSTATIC PNEUMATIC	220 80 TO 100	315 80 TO 100	815 80 TO 100	1630 80 TO 100	2445 80 TO 100	4080 80 TO 100	6800 80 TO 100

	FLUID TEMPERATURE °F	WORKING PRESSURES PSI, MAX.						
		200 CWP	CL. 150	CL. 300	CL. 600	CL. 900	CL. 1500	CL. 2500
LCB CAST CARBON STEEL BODIES TO ASTM A 352 GRADE LCB	-50 TO 100	180	265	695	1390	2085	3470	5785
	200	165	250	655	1315	1970	3280	5470
	300	145	230	640	1275	1915	3190	5315
	400	115	200	620	1235	1850	3085	5145
	500	—	170	585	1165	1745	2910	4850
	TEST PRESSURES, PSI							
	HYDROSTATIC SHELL TEST	360	400	1050	2100	3150	5225	8700
	SEAT (CLOSURE) HYDROSTATIC PNEUMATIC	200 80 TO 100	295 80 TO 100	765 80 TO 100	1530 80 TO 100	2295 80 TO 100	3820 80 TO 100	6375 80 TO 100

CAST IRON PLUG VALVES ASTM A-126 CLASS B

FLUID TEMPERATURE °F	WORKING PRESSURES PSI, MAX.		
	175 CWP	200 CWP	500 CWP
-20 TO 150	175	200	500
200	165	190	460
225	155	180	440
250	150	175	415
275	—	170	395
300	—	165	375
325	—	155	355
350	—	150	335
375	—	145	315
400	—	140	290
425	—	130	270
450	—	125	250
TEST PRESSURES PSI, MIN.			
HYDROSTATIC SHELL TEST	350	400	1000
SEAT (CLOSURE) TEST	275	300	750

Maximum allowable working pressures, derived from API 599, API 6D, ANSI B16.1, ANSI B16.34 and/or MSS SP-78 are shown. For intermediate temperatures, linear interpolation may be used. Ratings for threaded valves smaller than 1" and for 175 CWP valves are manufacturer's. Application of ratings is subject to the temperature limitations of the sealants used. Applicable Codes and Standards should be consulted for restrictions on pressure, temperature and usage of these valves. Further, reference should be made to individual description pages for additional comments or restrictions.

WALWORTH BUTT WELD DIMENSIONS

NOMINAL PIPE SIZE (INCHES)	3	4	5	6	8	10	12	14	16	18	20	24
AA DIAMETER (INCHES)	3 ¹ / ₃₂	4 ⁷ / ₈	5 ¹ / ₁₆	6 ² / ₃₂	8 ² / ₃₂	10 ¹ / ₁₆	12 ³ / ₃₂	14 ¹ / ₄	16 ¹ / ₄	18 ⁷ / ₃₂	20 ⁷ / ₁₆	24 ³ / ₈

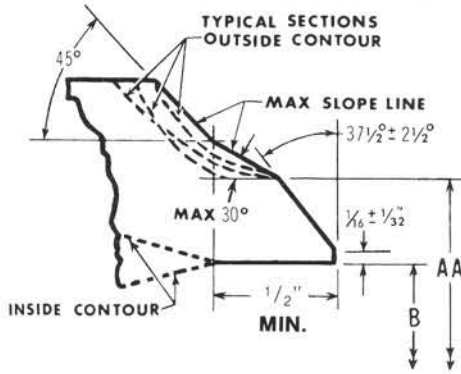


Fig. 1A.- Welding End for No Backing Ring or for Split Backing Ring. Pipe Wall Thickness "t" ⁷/₈ in and less.

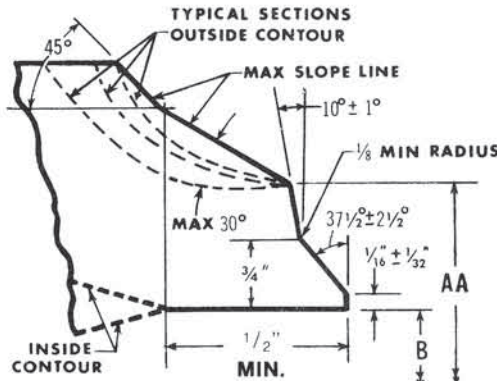


Fig. 1B.- Welding End for No backing Ring or for Split Backing Ring. Pipe Wall Thickness "t" Greater Than ⁷/₈ in.

ANSI STANDARD B16.25

- A - Nominal outside diameter of pipe, inches.
- AA - Nominal outside diameter for cast steel valves, inches (see table).
- B - Nominal inside diameter of pipe, inches. **
- t - Nominal wall thickness of pipe, inches.
- C - A-0.031-1.75t-0.010, inches.

For complete dimensions, details other configurations and tolerances, ANSI B16.25

OUTSIDE CONTOUR

When the thickness of the welding end of the valve is greater than that of the mating pipe, and when the additional thickness increases the outside diameter, a taper weld having a slope not exceeding 1:3 may be employed or the greater outside diameter may be extended back in a manner within the maximum slope lines indicated in Figs. 1A and 1B. The transition shall be of a shape avoiding sharp re-entrant angles and abrupt changes in slope. The profile of the outside contour shall be at the manufacturer's option provided above conditions are met.

INSIDE CONTOUR

For a joint without a continuous backing ring, the inside contour of the valve end shall be bored to a diameter B to a depth of 1/2" min. The inside diameter of a valve end beyond this machined surface may be either larger or smaller than the inside diameter of the pipe. The transition shall be of a shape avoiding sharp re-entrant angles and abrupt changes in slope. See Figs. 1A and 1B. (Transition shape also applies to Figs. 2 and 3).

For a joint with a continuous rectangular backing ring, the contour of the valve end shall be a straight bore of diameter C, 1/2 in, deep. This depth is based on a backing ring 3/4 in, wide; but if a wider ring is used, the depth shall be increased to provide the 1/8 in, minimum end clearance indicated. See Fig. 2.

For a joint with a continuous tapered backing ring, the inside contour of the valve end shall be tapered from diameter C at the lip tapering at 10 deg to a taper length of 7/32 in minimum. Beyond this taper length the bore may be extended to the inside port diameter. See fig. 3

* See Figs. 1A and 1 for Outside Contours.

** Tolerances for B: NPS 10 and Smaller: +0.03"; NPS 12 to 18: ±0.06"; NPS 20 to 24: +0.12, -0.06"

BORES: Walworth standard practice for Class 150 and 300 cast steel valves is that butt welding ends be machined in accordance with Figs. 1A and 1B, bored to match the inside diameters of Schedule 40 pipe in sizes 12-inch and smaller, and of 0.375 inch Standard Wall Pipe in larger sizes, unless otherwise specified. Orders for all sizes of Class 600 and higher valves must specify the diameter of bore, type of backing ring, etc.

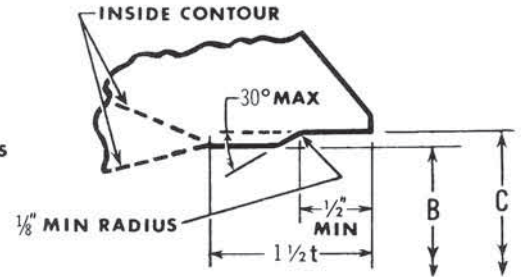


Fig. 2.- Welding End for Continuous Rectangular Backing Ring (inside contour).*

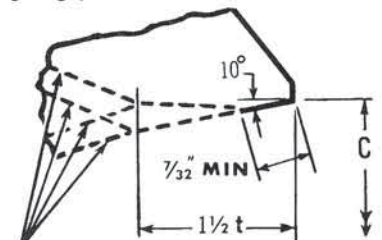
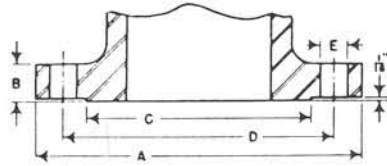


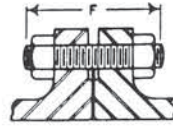
Fig. 3.- Welding End for Continuous Tapered Backing Ring (Inside Contour).*

WALWORTH FLANGE DIMENSIONS AND TEMPLATES

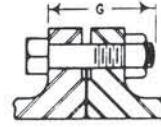
STEEL FLANGE DIMENSIONS AND DRILLING TEMPLATES ANSI B16.5



CLASS 150 AND 300 STEEL



LENGTH OF STUD BOLT



LENGTH OF MACHINE BOLT

CLASS 150

NOMINAL PIPE SIZE	FLANGE DIAMETER A	FLANGE THICKNESS		DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF BOLTS	DIAMETER OF BOLTS	LENGTH OF STUD BOLTS F	LENGTH OF MACHINE BOLTS G
		COMPANION FLANGE B	VALVE FLANGE B							
1	4 1/2	9/16	7/16	2	3 1/8	5/8	4	1/2	2 1/2	2 1/4
1 1/2	5	11/16	9/6	2 7/8	3 7/8	5/8	4	1/2	2 3/4	2 1/2
2	6	3/4	5/8	3 5/8	4 3/4	3/4	4	5/8	3 1/4	2 3/4
2 1/2	7	7/8	11/16	4 1/8	5 1/2	3/4	4	5/8	3 1/4	3
3	7 1/2	15/16	3/4	5	6	3/4	4	5/8	3 1/2	3
4	9	15/16		6 3/16	7 1/2	3/4	8	5/8	3 1/2	3
6	11	1		8 1/2	9 1/2	7/8	8	3/4	4	3 1/4
8	13 1/2	1 1/8		10 5/8	11 3/4	7/8	8	3/4	4 1/4	3 1/2
10	16	1 3/16		12 3/4	14 1/4	1	12	7/8	4 1/2	4
12	19	1 1/4		15	17	1	12	7/8	4 3/4	4
14	21	1 3/8		16 1/4	18 3/4	1 1/8	12	1	5 1/4	4 1/2
16	23 1/2	1 7/16		18 1/2	21 1/4	1 1/8	16	1	5 1/4	4 1/2
18	25	1 9/16		21	22 3/4	1 1/4	16	1 1/8	5 3/4	5
20	27 1/2	1 11/16		23	25	1 1/4	20	1 1/8	6 1/4	5 1/2
24	32	1 7/8		27 1/4	29 1/2	1 3/8	20	1 1/4	6 3/4	6

CLASS 300

NOMINAL PIPE SIZE	FLANGE DIAMETER A	FLANGE THICKNESS B	DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF BOLTS	DIAMETER OF BOLTS	LENGTH OF STUD BOLTS WITH 2 NUTS F	MACHINE BOLTS G
3/4	4 5/8	5/8	1 11/16	3 1/4	3/4	4	5/8	3	2 1/2
1	4 7/6	11/16	2	3 1/2	3/4	4	5/8	3	2 1/2
1 1/4	5 1/4	3/4	2 1/2	3 7/8	3/4	4	5/8	3 3/4	2 3/4
1 1/2	6 1/8	13/16	2 7/8	4 1/2	7/8	4	3/4	3 1/2	3
2	6 1/2	7/8	3 5/8	5	3/4	8	5/8	3 1/2	3
2 1/2	7 1/2	1	4 1/8	5 7/8	7/8	8	3/4	4	3 1/4
3	8 1/4	1 1/8	5	6 5/8	7/8	8	3/4	4 1/2	3 1/2
4	10	1 1/4	6 3/16	7 7/8	7/8	8	3/4	4 1/2	3 3/4
5	11	1 3/8	7 5/16	9 1/4	7/8	8	3/4	4 3/4	4 1/4
6	12 1/2	1 7/16	8 1/2	10 5/8	7/8	12	3/4	4 3/4	4 1/4
8	15	1 5/8	10 5/8	13	1	12	7/8	5 1/2	4 3/4
10	17 1/2	1 7/8	12 3/4	15 1/4	1 1/8	16	1	6	5 1/2
12	20 1/2	2	15	17 3/4	1 1/4	16	1 1/8	6 3/4	5 3/4
14	23	2 1/8	16 1/4	20 1/4	1 1/4	20	1 1/8	7	6 1/4
16	25 1/2	2 1/4	18 1/12	22 1/2	1 3/8	20	1 1/4	7 1/2	6 1/2
18	28	2 3/8	21	24 3/4	1 3/8	24	1 1/4	7 3/4	6 3/4
20	30 1/2	2 1/2	23	27	1 3/8	24	1 1/4	8	7 1/4
24	36	2 3/4	27 1/4	32	1 5/8	24	1 1/2	9	8

The regular 1/16-inch raised face of Class 150 and 300 flanges is included in the minimum flange thickness given above, but other raised faces must be added thereto.

Class 150 loose flanges are thicker than integral flanges for sizes 3" inch and smaller. Note Column B.

Lengths of stud bolts do not include the height of the points.

Bolt lengths not shown in the tables can be determined by reference to Appendix F of ANSI B16.5-1981

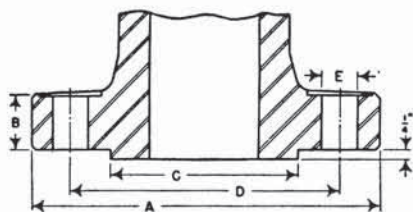
When flanges are integral with valves, the bolt holes, which are in multiples of four, are drilled to straddle the centerline unless otherwise ordered.



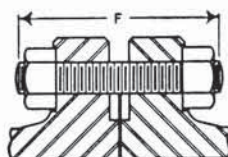
WALWORTH FLANGE DIMENSIONS AND TEMPLATES

CLASS 600

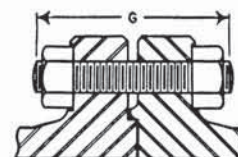
NOMINAL PIPE SIZE	FLANGE DIAMETER A	FLANGE THICKNESS B	DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF STUD BOLTS	DIAMETER OF STUD BOLTS	LENGTH OF STUD BOLTS WITH 2 NUTS F	G
1	4 7/8	1 1/16	2	3 1/2	3/4	4	5/8	3 1/2	3 1/4
1 1/2	6 1/8	7/8	2 7/8	4 1/2	7/8	4	3/4	4 1/4	4
2	6 1/2	1	3 5/8	5	3/4	8	5/8	4 1/4	4
3	8 1/4	1 1/4	5	6 5/8	7/8	8	3/4	5	4 3/4
4	10 3/4	1 1/2	6 3/16	8 1/2	1	8	7/8	5 3/4	5 1/2
6	14	1 7/8	8 1/2	11 1/2	1 1/8	12	1	6 3/4	6 1/2
8	16 1/2	2 3/16	10 5/8	13 3/4	1 1/4	12	1 1/8	7 1/2	7 1/4
10	20	2 1/2	12 3/4	17	1 3/8	16	1 1/4	8 1/2	8 1/4
12	22	2 5/8	15	19 1/4	1 3/8	20	1 1/4	8 3/4	8 1/2
14	23 3/4	2 3/4	16 1/4	20 3/4	1 1/2	20	1 3/8	9 1/4	9
16	27	3	18 1/2	23 3/4	1 5/8	20	1 1/2	10	9 3/4
18	29 1/4	3 1/4	21	25 3/4	1 3/4	20	1 5/8	10 3/4	10 1/2
20	32	3 1/2	23	28 1/2	1 3/4	24	1 5/8	11 1/4	11
24	37	4	27 1/4	33	2	24	1 7/8	13	12 3/4



CLASS 900 AND 1500 STEEL



MALE TO MALE
FLANGED JOINT



MALE TO FEMALE
FLANGED JOINT

STUD BOLT LENGTH "G" ALSO APPLIES FOR TONGUE TO GROOVE FLANGED JOINT

CLASS 900

NOMINAL PIPE SIZE	FLANGE DIAMETER A	FLANGE THICKNESS B	DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF STUD BOLTS	DIAMETER OF STUD BOLTS	LENGTH OF STUD BOLTS WITH 2 NUTS F	G
3*	9 1/2	1 1/2	5	7 1/2	1	8	7/8	5 1/2	5 1/4
4	11 1/2	1 3/4	6 3/16	9 1/4	1 1/4	8	1 1/8	6 1/2	6 1/4
6	15	2 3/16	8 1/2	12 1/2	1 1/4	12	1 1/8	7 1/2	7 1/4
8	18 1/2	2 1/2	10 5/8	15 1/2	1 1/2	12	1 3/8	8 1/2	8 1/4
10	21 1/2	2 3/4	12 3/4	18 1/2	1 1/2	16	1 3/8	9	8 3/4
12	24	3 1/8	15	21	1 1/2	20	1 3/8	9 3/4	9 1/2
16	27 3/4	3 1/2	18 1/2	24 1/4	1 3/4	20	1 5/8	11	10 3/4

* Use Class 1500 dimensions in sizes smaller than 3-inch.

CLASS 1500

NOMINAL PIPE SIZE	FLANGE DIAMETER A	FLANGE THICKNESS B	DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF STUD BOLTS	DIAMETER OF STUD BOLTS	LENGTH OF STUD BOLTS WITH 2 NUTS F	G
1	5 7/8	1 1/8	2	4	1	4	7/8	5	4 3/4
2	8 1/2	1 1/2	3 5/8	6 1/2	1	8	7/8	5 3/4	5 1/2
3	10 1/2	1 7/8	5	8	1 1/4	8	1 1/8	7	6 3/4
4	12 1/4	2 1/8	6 3/16	9 1/2	1 3/8	8	1 1/4	7 3/4	7 1/2
6	15 1/2	3 1/4	8 1/2	12 1/2	1 1/2	12	1 3/8	10	9 3/4
8	19	3 5/8	10 5/8	15 1/2	1 3/4	12	1 5/8	11 1/4	11

The regular 1/4-inch raised face of class 600, 900 and 1500 flanges is not included in the minimum flange thickness given above.

The addition of any facing is beyond the outside edge of the flange.

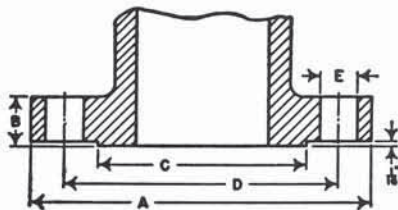
Lengths of steel stud bolts do not include the height of the points.

Bolt lengths not shown in the tables can be determined by reference to Appendix F of ANSI B16.5 - 1981.

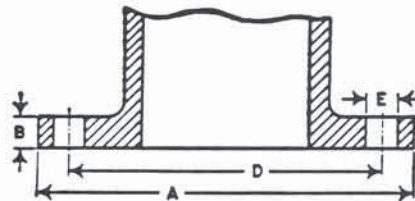
When flanges are integral with valves, the bolt holes, which are in multiples of four, are drilled to straddle the centerline unless otherwise ordered.

WALWORTH FLANGE DIMENSIONS AND TEMPLATES

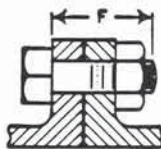
CAST IRON FLANGE DIMENSIONS AND DRILLING TEMPLATES ANSI B16.1



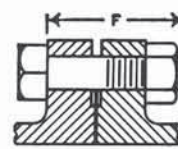
CLASS 125 CAST IRON



CLASS 250 CAST IRON



LENGTH OF MACHINE BOLT



LENGTH OF MACHINE BOLT

CLASS 125

NOMINAL PIPE SIZE	FLANGES		DRILLING		BOLTING		LENGTH OF MACHINE BOLTS F
	FLANGE DIAMETER A	FLANGE THICKNESS MIN B	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF BOLTS	DIAMETER OF BOLTS	
1	4 1/4	7/16	3 1/8	5/8	4	1/2	1 3/4
1 1/4	4 5/8	1/2	3 1/2	5/8	4	1/2	2
1 1/2	5	9/16	3 7/8	5/8	4	1/2	2
2	6	5/8	4 3/4	3/4	4	5/8	2 1/4
2 1/2	7	11/16	5 1/2	3/4	4	5/8	2 1/2
3	7 1/2	3/4	6	3/4	4	5/8	2 1/2
4	9	15/16	7 1/2	3/4	8	5/8	3
5	10	15/16	8 1/2	7/8	8	3/4	3
6	11	1	9 1/2	7/8	8	3/4	3 1/4
8	13 1/2	1 1/8	11 3/4	7/8	8	3/4	3 1/2
10	16	1 3/16	14 1/4	1	12	7/8	3 3/4
12	19	1 1/4	17	1	12	7/8	3 3/4

Bolt lengths are for flanges of thickness shown herein. Bolt lengths should be checked for the thicker flanges shown in some individual valve description pages.

When flanges integral with valves or fittings, the bolt holes, which are in multiples of four, are drilled to straddle the center lines unless otherwise ordered. Class 125 cast iron flanges have plain faces.

CLASS 250 (FOR USE ON 500 CWP VALVES)

NOMINAL PIPE SIZE	FLANGES		DRILLING		BOLTING		LENGTH OF MACHINE BOLTS F	
	FLANGE DIAMETER A	FLANGE THICKNESS B	DIAMETER OF RAISED FACE C	DIAMETER OF BOLT CIRCLE D	DIAMETER OF BOLT HOLES E	NUMBER OF BOLTS		DIAMETER OF BOLTS
1	4 7/8	1 1/16	2 11/16	3 1/2	3/4	4	5/8	2 1/2
2	6 1/2	7/8	4 3/16	5	3/4	8	5/8	2 3/4
3	8 1/4	1 1/8	5 11/16	6 5/8	7/8	8	3/4	3 1/2
4	10	1 1/4	6 15/16	7 7/8	7/8	8	3	3 3/4

The 1/16-inch raised face on the Class 250 cast iron flanges is included in the dimension B for thickness of flange.

Bolt lengths are for flanges of thickness shown herein. Bolt lengths should be checked for the thicker flanges shown in some individual valve description pages.

WALWORTH'S PATENTED ANTI-LOCK COMPENSATOR FEATURES

Tapered plug valves are known for their superior sealing ability over many other types of valves, even under some of the harshest operating conditions. One of the problems that has kept them from gaining more widespread use is their inherent tendency to "taper lock" which renders the valve inoperable after being subjected to pressure transients. When a plug is taper locked it is very difficult, and sometimes impossible, to operate it using conventional actuating means. The commonly accepted remedy has been to inject high pressure sealant to unwedge the locked plug before the valve can be operated freely. This is unacceptable in most applications where automatic valve operation is desired.

This problem has plagued the conventional tapered plug valves for years. In order to gain a thorough understanding of all the important factors responsible for the taper locking problem and develop a reliable solution, The Walworth Company has performed extensive research directed toward the development of a tapered plug valve designed to prevent "taper lock."

This investigation has resulted in a computer program capable of simulating the dynamic response of plug valves when subjected to line pressure transients. The program allows for systematic investigation of the important variables which affect plug valve performance and, in particular, is capable of predicting the taper locking phenomenon.

Design changes have been implemented in the Walworth tapered plug valve which make it immune to taper locking when exposed to transients as severe as 38,000 psi/sec. which causes conventional valves to lock.

A secondary benefit of the design change is a reduced need for mechanical spring preload, resulting in lower operating torques.

Write for a complimentary copy of a paper published by the American Society of Mechanical Engineers which details this research.

Free safety and maintenance seminars are available for Engineering, Maintenance and Operations personnel. Call your representative or 1-800-735-6007 for details.

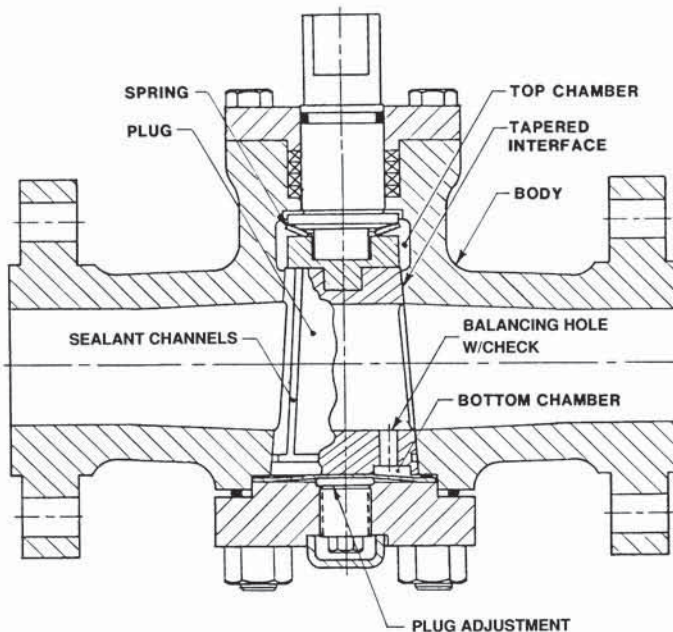


Fig. 1: COMPENSATOR Plug Valve Features

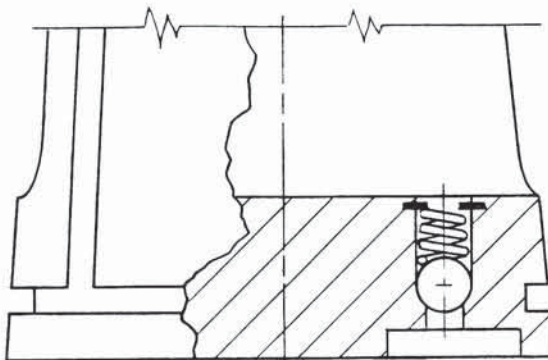


Fig. 2: New Valve Design - Detail Showing Check Valve

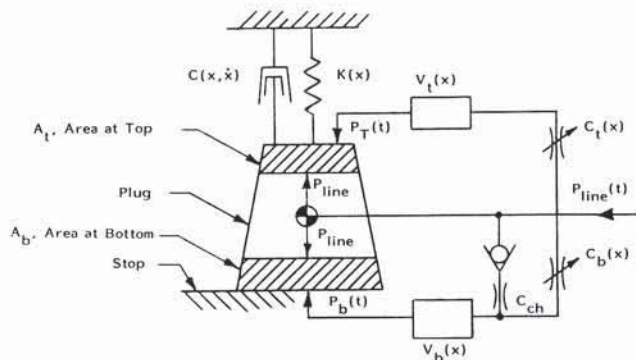


Fig. 3: Hydromechanical Model of the COMPENSATOR Tapered Plug Valve

WALWORTH TERMS AND CONDITIONS

ACCEPTANCE: All quotations for acceptance within 45 days from date of quotation unless extended in writing in the event a purchase order is placed after this period of time. The Walworth Company reserves the right to requote base prices of all valves offered. All orders and contracts are subject to credit approval and acceptance by the Walworth Company.

FREIGHT: When prices are f. o. b. point of shipment — no freight allowance, we will attempt to route shipments in the method which will result in the lowest cost unless otherwise instructed. All shipments will be freight charges collect except when stipulated on the purchase order in which case you will be invoiced for all transportation charges.

Delivery of material to a common carrier shall be considered to be delivery to Buyer and shall be at Buyer's risk thereafter.

Claims of loss of or damage to material in transit shall be filed by the Buyer directly with the carrier.

PRICES: There will be added to all prices quoted, sales, use, occupation or any other excise or similar tax which Seller may be required to pay or collect on or in connection with the sale. Seller reserves the right to cancel any order in the event that selling price(s) shall be established by Federal, State or other government regulation with respect to the product(s) covered by the order which shall be lower than the price(s) specified in the order.

ESCALATION TERMS: Prices shown in the price schedule reflect the costs in effect at the time of publication. These prices will remain firm on all products with a quoted delivery of twenty-six (26) weeks or less. On products which have a scheduled delivery of more than twenty-six (26) weeks the goods will be invoiced based on the applicable price sheet in effect at the time of shipment. In no event will the invoiced price be less than the price originally quoted.

PURCHASED COMPONENTS: (i.e. motors, gearing, etc.) Prices are quoted on supplier price in effect at time of quotation. Actual invoice price will be adjusted in accordance with the supplier's escalation policy.

DEFERRED SHIPMENTS: If for any reason the customer desires to delay shipments more than 30 days after manufacturing is complete or to place a hold or stop to the order during the manufacturing cycle, The Walworth Company reserves the right to consider the order cancelled and to invoke cancellation charges per the schedule below.

CANCELLATION: After order acceptance by Walworth, items or complete orders may be cancelled and buyer will be charged for work performed, based on the following schedule:

Five (5%) percent of price of stock items.

Ten (10%) percent of price of stock items ordered in quantities which exceed normal inventory levels.

Five (5%) percent of price prior to drawing submittal on made to order items.

15% after drawing approval, but prior to the start of castings.

30% to 50% during casting cycle, depending on the state of completion.

55% to 75% during machining and assembly operations, depending on the state of completion.

100% after final assembly and test.

REMITTANCES: Remittances must be made to the address indicated on the invoice.

CREDIT TERMS: As quoted. Invoices on balances overdue will be subject to a service charge of 1 1/2% per month on such indebtedness.

DELIVERIES: Shipments and deliveries shall at all times be subject to the approval of Seller's Credit Department. If the Buyer shall fail to make any payments according to the terms of the contract, Seller may in addition to and not in limitation of its other rights and remedies, at its option, cancel all or any part of Buyer's incomplete contracts with Seller or may defer shipments or deliveries under Buyer's contracts with Seller except upon receipt of satisfactory security or for cash before shipment.

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Seller shall not be liable for any direct, indirect or consequential damage or loss caused by any delay in delivery, regardless of the cause of delay. Without limiting the generality of the foregoing, Seller assumes no responsibility for delays in delivery resulting from fire, flood, accidents, riots, strikes, transportation delays, labor or material shortages, existing or future laws, acts of any governmental authority, or any other cause beyond Seller's control.

Items offered from stock are subject to prior sale.

INSPECTION: Final inspection and acceptance of products must be made at the plant facility, unless otherwise provided in the order and/or in agreed upon specifications. Prices do not include charges for special tests or inspections performed at the request of the Buyer, unless called for in the order and/or in agreed upon specifications.

RETURNS: Permission in writing and return tagging instructions must be obtained from Seller before any goods returned for credit or adjustment will be accepted. Where returned goods are accepted, a minimum charge of 25% of the invoice price will be made, plus freight from both directions and costs of reconditioning the material for resale as new.

WARRANTY: Seller will replace without charge or refund the purchase price of products manufactured by Seller which prove to be defective in material or workmanship, provided in each case that the product is properly installed and is used in the service for which the Seller recommends it and that written claim, specifying the alleged defect, is presented to Seller within one year from date of shipment. Seller shall in no event be responsible for (a) claims for labor, expenses or other damages occasioned by defective products or (b) for consequential or secondary damages. **THE WARRANTY STATED IN THIS PARAGRAPH IS IN LIEU OF ALL OTHER WARRANTIES EITHER EXPRESSED OR IMPLIED. WITH RESPECT TO WARRANTIES THIS PARAGRAPH STATES BUYER'S EXCLUSIVE REMEDY AND SELLER'S EXCLUSIVE LIABILITY.**

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MINIMUM CHARGE: Orders totaling less than \$100.00 net will be billed at a minimum charge of \$100.00. Repair parts will be billed at a minimum charge of \$50.00.

NOTE: We reserve the right to correct obvious clerical errors in quotations, invoices, and other contracts.





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