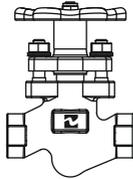


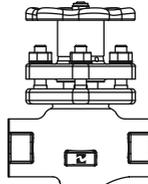
# Installation and Maintenance Manual

## Piston Valve

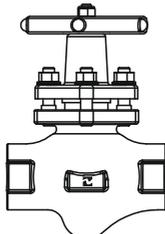
PSVAL



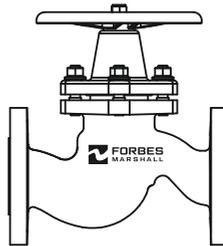
1/2" , 3/4"



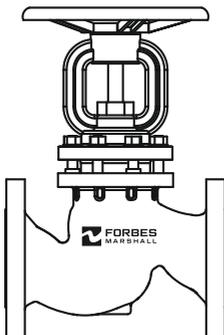
1"



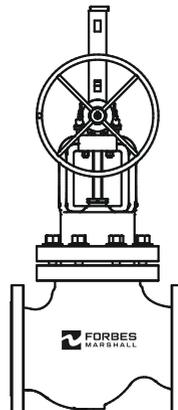
1-1/4" , 1-1/2"



2"



2-1/2"-4"



8" to 12"  
(with Gear Box)

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**PLEASE NOTE** - Throughout this manual this cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked. This symbol denotes CAUTION, WARNING or DANGER.



## 1. Preface:

This manual is intended for anyone using, commissioning, servicing, or disposing of the below mentioned products safely and efficiently.

### Piston Valve [PSVAL]

**Size:** DN15 (½") / DN20 (¾") / DN25 (1") / DN32 (1 ¼") / DN40 (1 ½") / DN50 (2") / DN65 (2 ½") / DN80 (3") / DN100 (4") / DN125 (5") / DN150 (6") / DN200 (8")

### PLEASE NOTE:

Throughout this manual the following cautionary symbol is used to describe a potential damage or injury that might occur if the safety considerations are overlooked.

## 2. Important Safety Notes:



Read this section carefully before installing/operating/maintaining the product. The precautions listed in this manual are provided for personnel and equipment safety. Furthermore, Forbes Marshall accepts no responsibility for accidents or damage occurring as a result of failure to observe these precautions. Note that the product is designed to perform for non-contaminated fluids only. A contamination in the form of chemical, foreign particle etc. can lead to problem with product performance and life of the product.

If these products in compliance with the operating instructions are, properly installed, commissioned, maintained and installed by qualified personnel (refer Section 2.7) the safety operations of these products can be guaranteed. General instructions for proper use of tools and safety of equipments, pipeline and plant construction must also be complied with.

### 2.1 Intended use:

Check if the product is suitable for intended use/ application by referring to the installation and maintenance instructions, name plates and technical information sheets.

- i) The product is suitable for use as defined in the technical information sheet. In case the need arises to use the product on any other fluid please contact Forbes Marshall for assistance.
- ii) Check for the suitability in conformance to the limiting conditions specified in technical information sheet of the product.
- iii) The correct installation and direction of fluid flow has to be determined.
- iv) Forbes Marshall products are not intended to resist external stresses, hence necessary precautions to be taken to minimize the same.

### 2.2 Accessibility and Lighting:

Safe accessibility and working conditions are to be ensured prior to working on the product.

### **2.3 Hazardous liquids or gases in the pipeline:**

Contemplate what may have been in the pipe or is in the pipe also for flammable Materials, substances hazardous to health, extremes of temperature.

### **2.4 Hazardous environment and media:**

The product has to be protected from hazardous environment and check to ensure that no Hazardous liquids or gases pass through the product.

### **2.5 Depressurizing of systems and normalizing of temperature:**

Ensure isolation and safety venting of any pressure to the atmospheric pressure. Even if the Pressure gauge indicates zero, do not make an assumption that the system has been Depressurized. To avoid danger of burns allow temperature to normalize after isolation.

### **2.6 Tools and consumables:**

Ensure you have appropriate tools and/ or consumables available before starting the work. Use of original Forbes Marshall replacement part is recommended.

### **2.7 Protective clothing:**

Consider for the requirement of any protective clothing for you/ or other in the vicinity for Protection against hazards of temperature (high or low), chemicals, radiation, dangers to Eye and face, noise and falling objects.

### **2.8 Permits to work:**

All work to be carried out under supervision of a competent person. Training should be imparted to operating personnel on correct usage of product as per installation and maintenance instruction. "Permit to work" to be complied with (wherever applicable), in case of absence of this system a responsible person should have complete information and Knowledge on what work is going on and where required, arrange to have an assistant with His primary goal and responsibility being safety. "Warning Notices" should be posted Wherever necessary.

### **2.9 Handling:**

There is a risk of injury if heavy products are handled manually. Analyze the risk and use Appropriate handling method by taking into consideration the task, individual, the working Environment and the load.

### **2.10 Freezing:**

Provision should be made to protect systems which are not self-draining. against frost Damage (in environment where they may be exposed to temperatures below freezing Point) to be made.

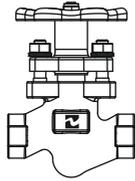
### **2.11 Product Disposal:**

It is necessary to dispose this product only in accordance with local regulations at the authorized, qualified collecting point specified for equipment's and its parts. Please refer the part details mentioned in the material table of this manual. Please follow all waste disposal guidelines (Management & Handling) as published by local governing authorities in India & abroad.

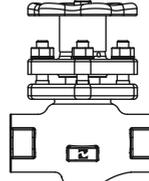
### 3. Brief Product Information:

#### 3.1 Description:

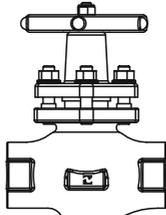
Forbes Marshall Piston Valves, PSVAL, provide perfect tightness and durable stability on different media such as steam, superheated steam, heat transfer fluid, water and compressed air.



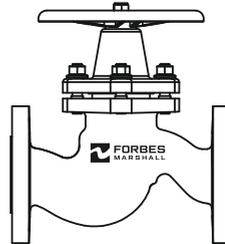
1/2" , 3/4"



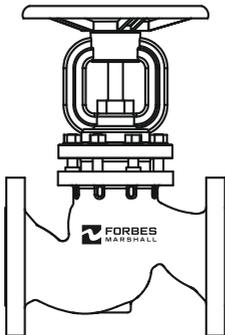
1"



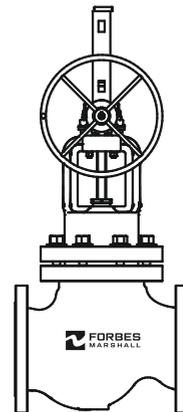
1-1/4" , 1-1/2"



2"



2-1/2"-4"



8" to 12"  
(with Gear Box)

#### 3.2 Sizes and Pipe Connection:(1/2" , 1-1/2")

1/2" to 1-1/2"

Screwed BSPT / NPT / BSP, socket weld ends, flanged to class

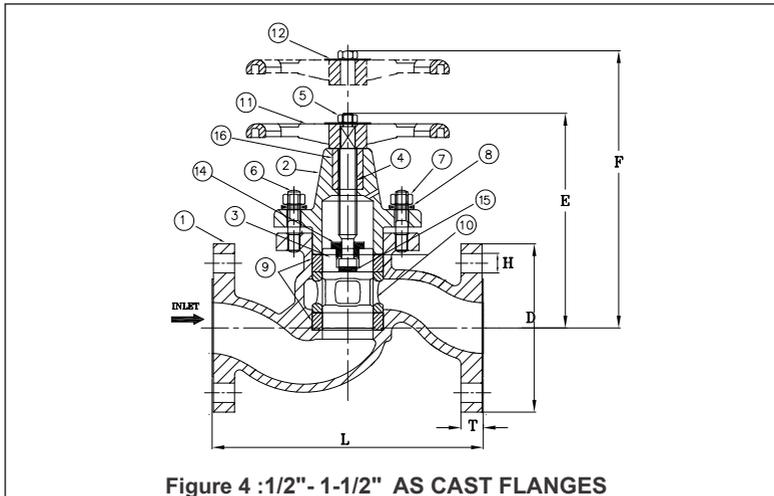
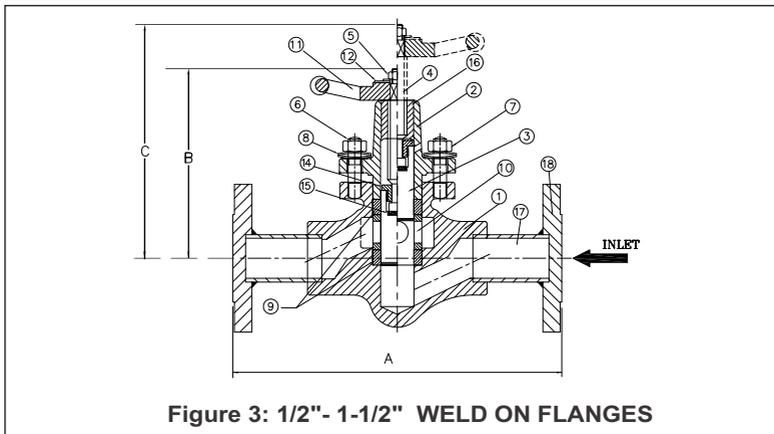
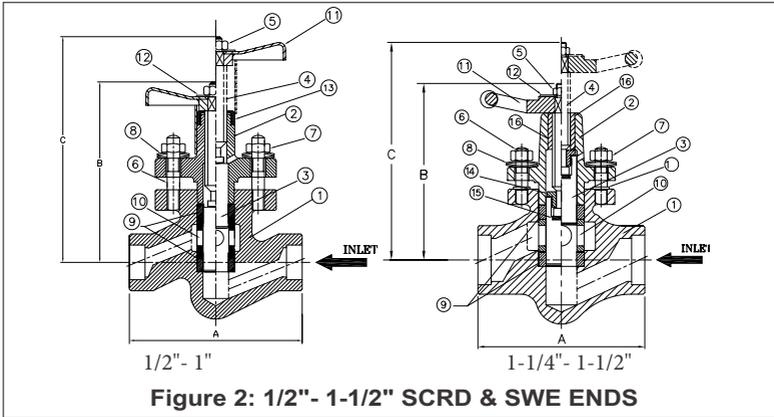
150 / 300 / 600 available on special request

Body design as per Class 800 - Available on request

### 3.3 Limiting Conditions:

#### Body design conditions :

PSVAL (LT)		PSVAL (HT)	
<b>For ½", ¾", 1", 1¼", 1½" Socket weld ends</b>		<b>For 1¼", 1½" Socket weld ends</b>	
Maximum operating pressure	1131.3 psi g	Maximum operating pressure	1131 psi g
Maximum operating temperature	797 deg F for 1" 449.6 deg F for 1-1/2"	Maximum operating temperature	797 °F
Maximum hydraulic test pressure	1696.94 psi	Maximum hydraulic test pressure	1696 psi g
<b>For ½", ¾", 1", 1" Screwed ends</b>		<b>For 1¼", 1½" Screwed ends</b>	
Maximum operating pressure	1131.3 psi g	Maximum operating pressure	602 psi g
Maximum operating temperature	449.6 deg F	Maximum operating temperature	797 °F
Maximum hydraulic test pressure	906.5 psi g	Maximum hydraulic test pressure	907 psi g
<b>For 1¼", 1½" Screwed ends</b>		<b>For 1¼", 1½" Class 150 Flanged ends</b>	
Maximum operating pressure	601.9 psi g	Maximum allowable pressure	284 psi g @ 100 °F
Maximum operating temperature	449.6 deg F	Maximum operating pressure	203 psi g @ 383 °F
Maximum hydraulic test pressure	906.5 psi g	Maximum operating temperature	80 psi g @ 797 °F
		Cold hydraulic test pressure	305 psi g
<b>For ½", ¾", 1", 1½" Class 150 Flanged ends</b>		<b>For 1¼", 1½" Class 300 Flanged ends</b>	
Maximum allowable pressure	284.3 psi g @ 100.4 °F	Maximum allowable pressure	741 psi g @ 100 °F
Maximum operating pressure	203.1 psi g @ 383 °F	Maximum operating pressure	605 psi g @ 487 °F
Maximum operating temperature	½"-1" : 797 °F at 79.8 psi g 1¼"-1½" : 449.6 °F at 184.2 psi g	Maximum operating temperature	417 psi g @ 797 °F
Cold hydraulic test pressure	304.6 psi g	Cold hydraulic test pressure	907 psi g
<b>For ½", ¾", 1", 1½" Class 300 Flanged ends</b>		<b>For 1¼", 1½" Class 600 Flanged ends</b>	
Maximum allowable pressure	741.1 psi g @ 100.4 °F	Maximum allowable pressure	1479 psi g @ 100 °F
Maximum operating pressure	604.8 psi g @ 487.4 °F 617.6 psi g @ 449.6 °F	Maximum operating pressure	1131 psi g @ 604 °F
Maximum operating temperature	½"-1": 797 °F at 417.7 psi g 1¼"-1½": 449.6 °F at 617.6 psi g	Maximum operating temperature	834 psi g @ 797 °F
Cold hydraulic test pressure	928.2 psi g	Maximum hydraulic test pressure	1696 psi g
<b>For ½", ¾", 1", 1½" Class 600 Flanged ends</b>		<b>For ½", ¾", 1", 1½" socket weld ends AS PER #800 (API 602) :</b>	
Maximum allowable pressure	1479.4 psi g @ 100.4 °F	Maximum allowable pressure	1976 psi g @ 100 °F
Maximum operating pressure	½"-1": 1131 psi @ 604 °F, 1¼"-1½": 1131 psi @ 450 °F	Maximum operating pressure	1515 psi g @ 599 °F
Maximum operating temperature	½"-1": 834 psi @ 797 °F, 1¼"-1½": 1131 psi @ 450 °F	Maximum operating temperature	1113 psi g @ 797 °F
Maximum hydraulic test pressure	1696 psi g	Maximum hydraulic test pressure	2963 psi g



**Material: 1/2"- 1-1/2" : (Refer Figure 2,3 and 4)**

No.	Description	Material	Standard
1	Body	Forged Carbon Steel/Cast Steel	ASTM A105N/ASTM A216 WCB
2	Bonnet	Forged Carbon Steel	ASTM A105N
3	Piston	Stainless Steel	ASTM A 276 TYPE 304
4	Spindle	Stainless Steel	ASTM A 276 TYPE 410
5	Nyloc Nut	Carbon Steel	
6	Stud	Carbon Steel	ASTM A193 Gr. B7
7	Nut	Carbon Steel	ASTM A 194 Gr.2H
8	Belleville Washer	Spring Steel	51CrV4
9	Sealing stack	S.S. Reinforced Graphite	
10	Spacer	Stainless Steel	ASTM A 276 TYPE 410
11	*Handwheel	Sheet Metal / SG Iron	
12	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
13	Grease Cap	Stainless Steel	SS 304

**\*Note : For 1/2"-1"Handwheel - Sheet Metal  
For 1-1/4" - 1-1/2" Hand wheel-S.G. Iron**

**Additional material: 1-1/4" - 1-1/2"**

Sr.No.	Description	Material	Standard
14	Split Nut	Bronze / Fe37(AISI410)	
15	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
16	Bush	Bronze	

**Additional material: 1/2"- 1-1/2" Weld on Flange(Refer Figure 3)**

Sr.No.	Description	Material	Standard
17	Pipe	Carbon Steel	ASTM A106 GR B
18	Flange	Forged Carbon Steel	ASTM A 105

**Dimensions (approx. in inches)**

**Screwed & Socket weld ends (Refer Figure 2)**

Size (NPS)	A (in)	B (in)	C (in)	Weight (lb)
1/2"	4.33	4.65	5.75	4.41
3/4"	4.33	5.75	4.65	4.41
1"	4.96	6.5	5.24	8.82
1-1/4"	6.5	6.89	8.46	16.53
1-1/2"	6.5	6.89	8.46	17.64

**Dimensions (approx. in inches)**

**Weld on Flanges (Refer Figure 3)**

Size (NPS)	A* Class 150 (in)	A* Class 300 (in)	A* Class 600 (in)	B (in)	C (in)
1/2"	9.92	10.43	10.43	4.65	5.75
3/4"	9.92	10.43	10.43	4.65	5.75
1"	10.24	10.94	10.94	5.24	6.5
1-1/4"	12.01	12.6	12.48	6.89	8.46
1-1/2"	12.01	12.6	12.48	6.89	8.46

**Weights (approx. in lbs)**

**Weld on Flanges (Refer Figure 3)**

Size (NPS)	Class 150 (lb)	Class 300 (lb)	Class 600 (lb)
1/2"	6.61	7.72	8.82
3/4"	8.82	11.02	12.13
1"	13.23	16.53	17.64
1-1/4"	23.59	26.46	28.66
1-1/2"	24.25	29.76	31.97

**Dimensions (approx. in inches) and Weights (approx. in lbs)**

**As Cast Flanges (Refer Figure 4)**

Size & Class	L (in)	D (in)	PCD (in)	H (in)	Holes	T (in)	E (in)	F (in)	Weight (lb)
1/2" #150	4.25	3.54	2.37	0.63	4	0.38	4.65	5.75	10.58
1/2" #300	5.98	3.74	2.63	0.63	4	0.5	4.65	5.75	8.82
3/4" #150	4.61	3.94	2.75	0.63	4	0.44	4.65	5.75	13.89
3/4" #300	7.01	4.53	3.25	0.75	4	0.56	4.65	5.75	10.14
1" #150	5	4.33	3.13	0.63	4	0.5	5.24	6.5	11.02
1" #300	7.99	4.92	3.5	0.75	4	0.63	5.24	6.5	14.33
1-1/4" #300	8.5	5.31	3.87	0.75	4	0.69	7.09	8.66	23.81
1-1/2" #150	6.5	4.92	3.87	0.63	4	0.63	7.09	8.66	20.39
1-1/2" #300	9.02	6.1	4.5	0.87	4	0.75	7.09	8.66	26.9

**Note: For NPS 1-1/4" (DN 32), only Class 300 is available for integral (as cast) flange ends**

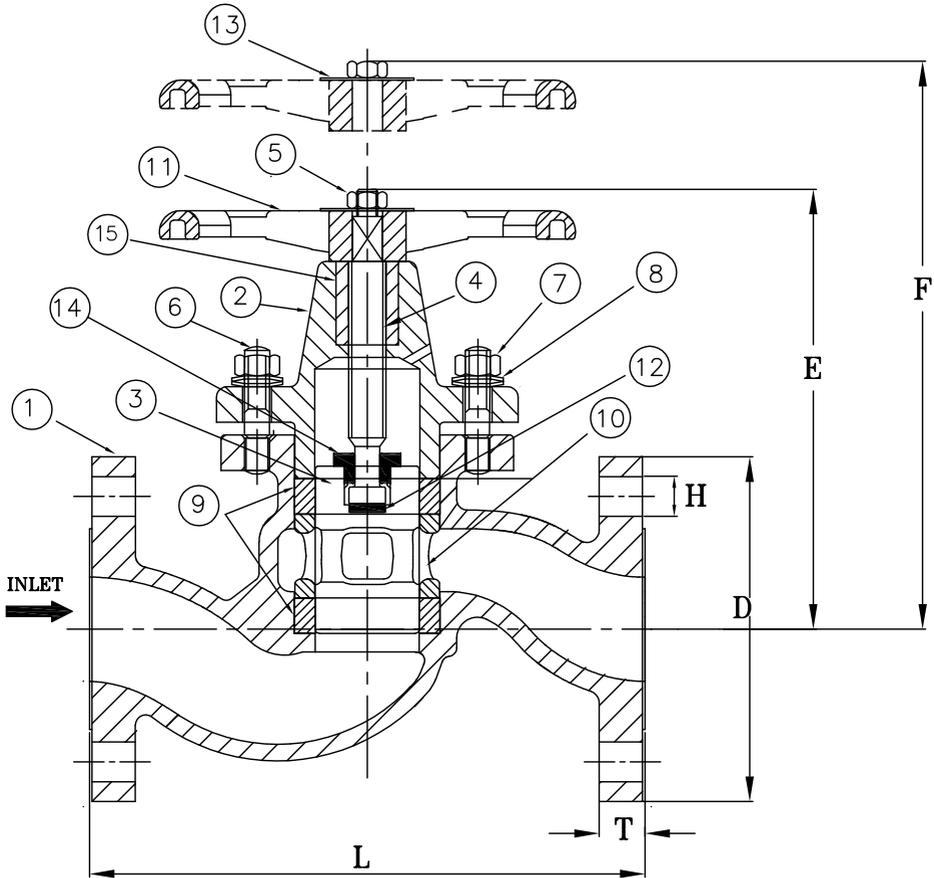
### 3.5 Sizes and Pipe Connection:

2" / 2½" / 3" / 4" / 5" / 6" / 8" / 10" Flanged to class 150 / 300

### 3.6 Limiting Conditions:

#### Body design conditions :

PSVAL (LT)		PSVAL (HT)	
<b>For ½", ¾", 1", 1¼", 1½" Socket weld ends</b>		<b>For 1¼", 1½" Socket weld ends</b>	
Maximum operating pressure	1131.3 psi g	Maximum operating pressure	1131 psi g
Maximum operating temperature	797 deg F for 1" 449.6 deg F for 1-1/2"	Maximum operating temperature	797 °F
Maximum hydraulic test pressure	1696.94 psi	Maximum hydraulic test pressure	1696 psi g
<b>For ½", ¾", 1" Screwed ends</b>		<b>For 1¼", 1½" Screwed ends</b>	
Maximum operating pressure	1131.3 psi g	Maximum operating pressure	602 psi g
Maximum operating temperature	449.6 deg F	Maximum operating temperature	797 °F
Maximum hydraulic test pressure	906.5 psi g	Maximum hydraulic test pressure	907 psi g
<b>For 1¼", 1½" Screwed ends</b>		<b>For 1¼", 1½" Class 150 Flanged ends</b>	
Maximum operating pressure	601.9 psi g	Maximum allowable pressure	284 psi g @ 100 °F
Maximum operating temperature	449.6 deg F	Maximum operating pressure	203 psi g @ 383 °F
Maximum hydraulic test pressure	906.5 psi g	Maximum operating temperature	80 psi g @ 797 °F
		Cold hydraulic test pressure	305 psi g
<b>For ½", ¾", 1", 1½" Class 150 Flanged ends</b>		<b>For 1¼", 1½" Class 300 Flanged ends</b>	
Maximum allowable pressure	284.3 psi g @ 100.4 °F	Maximum allowable pressure	741 psi g @ 100 °F
Maximum operating pressure	203.1 psi g @ 383 °F	Maximum operating pressure	605 psi g @ 487 °F
Maximum operating temperature	½"-1" : 797 °F at 79.8 psi g 1¼"-1½" : 449.6 °F at 184.2 psi g	Maximum operating temperature	417 psi g @ 797 °F
Cold hydraulic test pressure	304.6 psi g	Cold hydraulic test pressure	907 psi g
<b>For ½", ¾", 1", 1½" Class 300 Flanged ends</b>		<b>For 1¼", 1½" Class 600 Flanged ends</b>	
Maximum allowable pressure	741.1 psi g @ 100.4 °F	Maximum allowable pressure	1479 psi g @ 100 °F
Maximum operating pressure	604.8 psi g @ 487.4 °F 617.6 psi g @ 449.6 °F	Maximum operating pressure	1131 psi g @ 604 °F
Maximum operating temperature	½"-1": 797 °F at 417.7 psi g 1¼"-1½": 449.6 °F at 617.6 psi g	Maximum operating temperature	834 psi g @ 797 °F
Cold hydraulic test pressure	928.2 psi g	Maximum hydraulic test pressure	1696 psi g
<b>For ½", ¾", 1", 1½" Class 600 Flanged ends</b>		<b>For ½", ¾", 1", 1½" socket weld ends AS PER #800 (API 602) :</b>	
Maximum allowable pressure	1479.4 psi g @ 100.4 °F	Maximum allowable pressure	1976 psi g @ 100 °F
Maximum operating pressure	½"-1": 1131 psi @ 604 °F, 1¼"-1½": 1131 psi @ 450 °F	Maximum operating pressure	1515 psi g @ 599 °F
Maximum operating temperature	½"-1": 834 psi @ 797 °F, 1¼"-1½": 1131 psi @ 450 °F	Maximum operating temperature	1113 psi g @ 797 °F
Maximum hydraulic test pressure	1696 psi g	Maximum hydraulic test pressure	2963 psi g



**Figure 5: 2" Piston Valve**

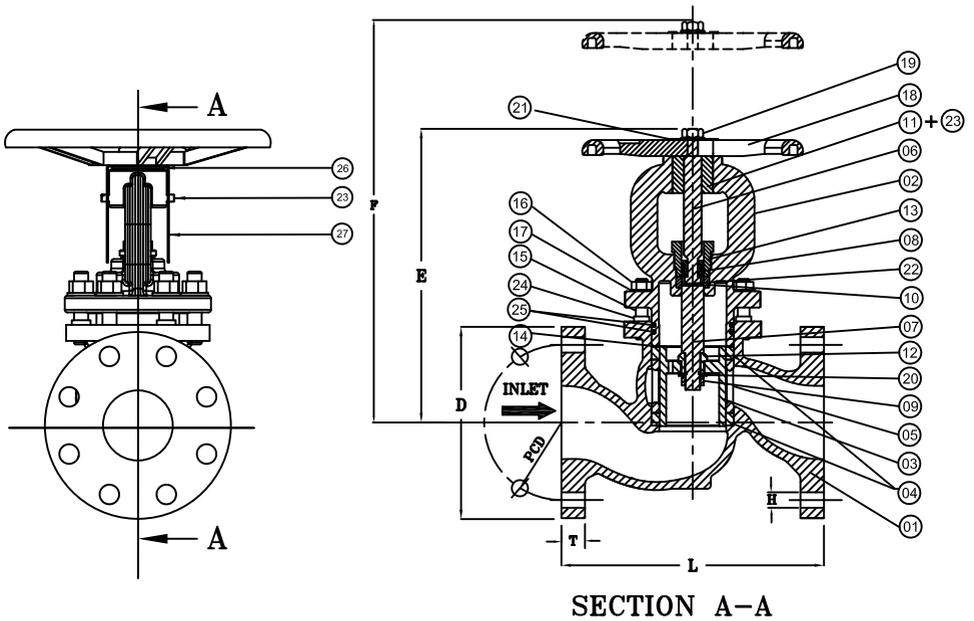
**Note:** Always open /close valve fully do not use valve key

**Material: 2" (Refer Figure 5)**

Sr no	Component	Material	Standard
1	Body	Cast Steel	ASTM A 216 Gr.WCB
2	Bonnet	Forged Carbon steel	ASTM A 105N
3	Piston	Stainless Steel	ASTM A 276 TYPE 304
4	Spindle	Stainless Steel	ASTM A 276 TYPE 410
5	Nyloc Nut	Carbon Steel	
6	Stud	Carbon Steel	ASTM A193 Gr. B7
7	Nut	Carbon Steel	ASTM A 194 Gr.2H
8	Belleville Washer	Spring Steel	51CrV4
9	Sealing stack	S/S Reinforced Graphite	
10	Spacer	Stainless Steel	ASTM A 743 Gr.CA15
11	Handwheel	SG Iron	
12	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
13	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
14	Split Nut	Bronze / Fe37(AISI410)	
15	Bush	Bronze	

**Dimensions (approx. in mm) : Size 2" (Refer Figure 5)**

ANSI Class	L	D	PCD	H	No. of Holes	T	E	F	Weight
150	203	152	121	19	4	19	210	262	14.5 kg
200	267	165	127	19	8	22	210	262	17.5 kg
PN 16/25	230	165	125	18	4	18	210	262	14.5 kg
PN 40	230	165	125	18	4	20	210	262	17.5 kg



2-1/2" to 10" : always open / close valve  
fully Do not use 'F' Key

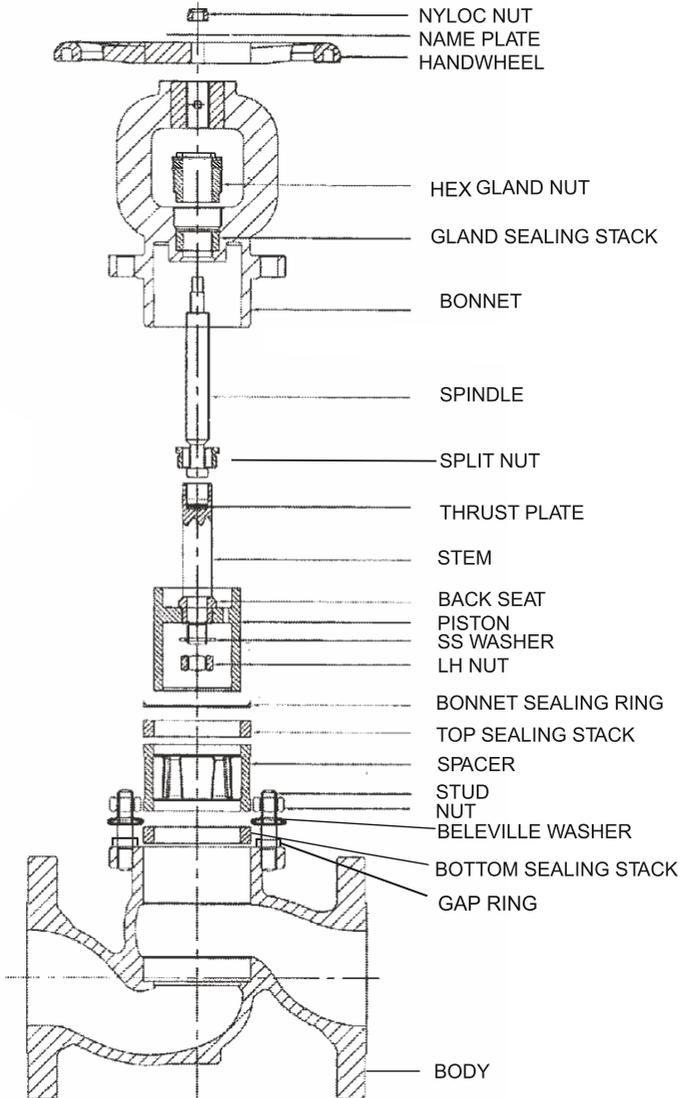
**Figure 6: 2-1/2" to 10" Piston Valve**

**Material:2-1/2" to 10" (Refer Figure 6)**

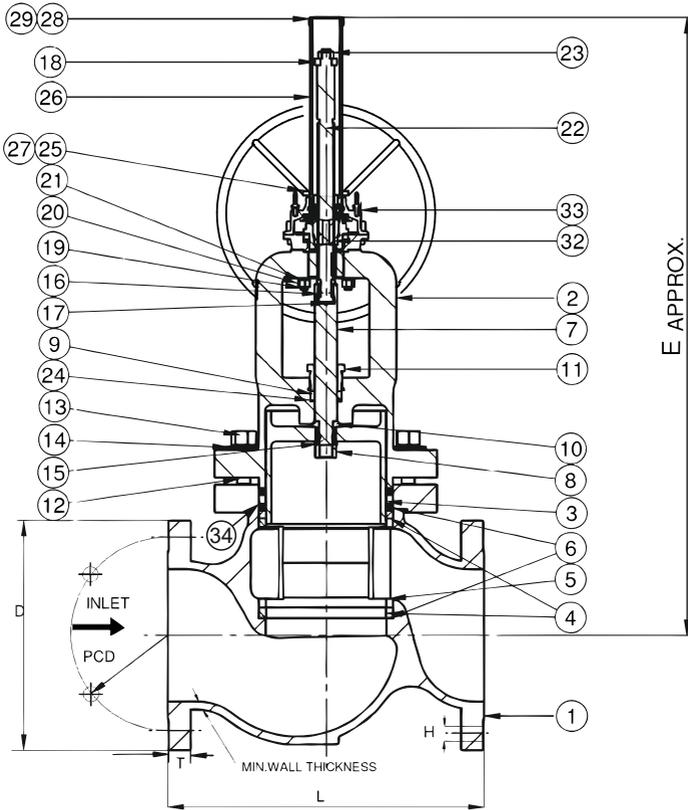
<b>Sr.No.</b>	<b>Description</b>	<b>Material</b>	<b>Standard</b>
1	Body	Cast Steel	ASTM A 216 Gr.WCB
2	Bonnet(5"-10")	Cast Steel	ASTM A 216 Gr.WCB
	Bonnet(2-1/2" ,3" ,4")	Forged Carbon Steel	ASTM A 105N
3	Piston	Stainless Steel	ASTM A 351 CF8
4	Body sealingstack	S/S ReinforcedGraphite	
5	Spacer	Stainless Steel	ASTM A 743 CA 15
6	Spindle	Stainless Steel	ASTM A 276 Type 410
7	Stem	Stainless Steel	ASTM A 276 Type 304
8	Split Nut	Bronze/Carbon Steel	
9	LH Nut	Stainless Steel	ASTM A 276 Type 304
10	Gland SealingStack	S/S ReinforcedGraphite	
11	Threaded Bush	Bronze	
12	Back Seat	Stainless Steel	ASTM A 276 Type 410
13	Hex.Gland Nut	Stainless Steel	ASTM A 276 Type 410
14	Bonnet SealingRing	Graphite	
15	Stud	Carbon Steel	ASTM A 193 Gr.B7
16	Nut	Carbon Steel	ASTM A 194 Gr.2H
17	Beleville Washer	Spring Steel	51CrV4
18	Handwheel	S.G. Iron	
19	Nyloc Nut	Carbon Steel	
20	Name Plate	Stainless Steel	ASTM A 240 TYPE 304
21	Thrust Plate	Stainless Steel	ASTM A 276 TYPE 420
22	Washer	Stainless Steel	ASTM A 240 TYPE 304
23	Stopper Screw	Stainless Steel	ASTM A 276 TYPE 304
24	Gap Ring(4"-10")	Stainless Steel	ASTM A 276 Type 410
25	GP Flexible Rope (6"-10" Steam PSVAL)	Graphite	
	GP Flexible Rope (4"-10" HT PSVAL)		
26	Spindle Circular Plate	Stainless Steel	ASTM A 276 TYPE 304
27	On-Off Indicator Plate	Stainless Steel	ASTM A 240 TYPE 304

**Dimensions (approx. in inches) : Size 2-1/2" to 10" (Refer Figure 6)**

<b>NPS</b>	<b>Pressure Class</b>	<b>L (in)</b>	<b>D (in)</b>	<b>PCD (in)</b>	<b>H (in)</b>	<b>Holes</b>	<b>T (in)</b>	<b>E (in)</b>	<b>F (in)</b>	<b>Weight (lb)</b>
2-1/2"	CLASS 300	11.5	7.52	5.87	0.87	8	0.98	13.19	15.75	68.34
2-1/2"	CLASS 150	8.5	7.01	5.51	0.75	4	0.87	13.19	15.75	59.52
3"	CLASS 300	12.52	8.27	6.61	0.87	8	1.1	12.6	15.12	81.57
3"	CLASS 150	9.49	7.52	5.98	0.75	4	0.94	12.6	15.12	68.34
4"	CLASS 300	14.01	10	7.87	0.87	8	1.26	15.55	18.86	127.87
4"	CLASS 150	11.5	9.02	7.52	0.75	8	0.94	15.55	18.86	103.62
5"	CLASS 300	15.75	11.02	9.25	0.87	8	1.38	17.56	21.26	191.8
5"	CLASS 150	14.01	10	8.5	0.87	8	0.94	17.56	21.26	154.32
6"	CLASS 300	17.52	12.52	10.63	0.87	12	1.46	19.13	23.54	257.94
6"	CLASS 150	15.98	10.98	9.49	0.87	8	1.02	19.13	23.54	198.42
8"	CLASS 300	22.01	15	12.99	0.98	12	1.61	23.27	28.66	462.97
8"	CLASS 150	19.49	13.5	11.73	0.87	8	1.1	23.27	28.66	361.56
10"	CLASS 300	24.49	17.91	15	1.02	16	1.89	25.71	32.01	749.57
10"	CLASS 150	24.49	15.94	14.25	0.98	12	1.22	25.71	32.01	661.39



**Figure 7: Exploded View of 2-1/2" to 10" Piston Valve**



**Figure 8: 8" - 12" Gearbox Operated Piston Valve**  
**Note:** Always open & close piston valve fully

**Dimensions (approx. in mm) : Size 8" to 12" (Refer Figure 8)**

SR.NO	DESCRIPTION	MATERIAL	
1.	BODY CASTING	CAST STEEL	ASTM A 216 GR.WCB
2.	BONNET CASTING	CAST STEEL	ASTM A 216 GR.WCB
3.	PISTON	STAINLESS STEEL	ASTM A351 Cf8
4.	BODY SEALING STACK	S/S REINFORCED GRAPHITE	GRAPHITE+ S/S
5.	SPACER	STAINLESS STEEL	ASTM A743 Ca15
6.	BONNET SEALING RING	ELASTOMER	NA 265
7.	STEM	STAINLESS STEEL	ASTM A 276 GRADE 304
8.	M30 L. H. HEX NUT	STAINLESS STEEL	ASTM A 276 GRADE 304
9.	GLAND SEALING STACK	S/S REINFORCED GRAPHITE	GRAPHITE+ S/S
10.	BACK SEAT	STAINLESS STEEL	ASTM A 276 GRADE 410
11.	GLAND NUT	STAINLESS STEEL	ASTM A 276 GRADE 410
12.	M30 STUD	CARBON STEEL	ASTM A 193 GRADE B7
13.	M30 HEX NUT	CARBON STEEL	ASTM A194 GRADE 2H
14.	BELLEVILLE WASHER	SPRING STEEL	50 CrV4
15.	SS WASHER	STAINLESS STEEL	ASTM A 276 GRADE 304
16.	SPLIT NUT	BRONZE / Fe37 (AISI4140)	—
17.	THRUST PLATE	STAINLESS STEEL	ASTM A 276 GRADE 410
18.	GUIDE BLOCK	BRASS	—
19.	M16 STUD	CARBON STEEL	ASTM A 193 GRADE B7
20.	M16 NUT	CARBON STEEL	ASTM A194 GRADE 2H
21.	M16 SPRING WASHER	STAINLESS STEEL	ASTM A 276 GRADE 304
22.	SPINDLE	STAINLESS STEEL	ASTM A 276 GRADE 410
23.	LOCK NUT	STAINLESS STEEL	ASTM A 276 GRADE 410
24.	GLAND SEAL	ELASTOMER	NA 265
25.	ANTI-ROTATION BRACKET	CARBON STEEL	IS2062
26.	ANTI-ROTATION SPINDLE COVER	CARBON STEEL	IS2062
27.	BRACKET MOUNTING ALLEN BOLT (NOT SHOWN IN ASSEMBLY DRG.)	CARBON STEEL	GR8.8
28.	SPINDLE COVER CAP	CARBON STEEL	IS2062
29.	CAP RETAINING SCREW (NOT SHOWN IN ASSEMBLY DRG.)	CARBON STEEL	GR4.4
30.	NAME PLATE (NOT SHOWN IN ASSEMBLY DRG.)	STAINLESS STEEL	ASTM240 GRADE 304
31.	SELF TAPPING SCREW (NOT SHOWN IN ASSEMBLY DRG.)	ALLUMINIUM	—
32.	STEM NUT	ALLUMINIUM BRONZE	—
33.	GEAR BOX UNIT with HANDWHEEL		—
34.	GP Flexible Rope	Graphite	—

**Dimensions (approx. in inches) and Weights (approx. in lbs):      Size 8" to 12" (Refer Figure 8)**

<b>SIZE (NPS)</b>	<b>CLASS</b>	<b>L (in)</b>	<b>ØD (in)</b>	<b>OPCD (in)</b>	<b>H (in)</b>	<b>NO. OF HOLES</b>	<b>T (in)</b>	<b>E (Approx. in)</b>	<b>WEIGHT (Approx. lbs)</b>
8" (DN200)	150	19.49	13.58	11.75	0.87	8	1.06	39.76	396.83
8" (DN200)	300	22.01	14.96	13	1	12	1.56	39.76	496.04
10" (DN250)	150	24.49	15.94	14.25	1	12	1.13	39.76	694.46
10" (DN250)	300	24.49	17.52	15.25	1.13	16	1.81	43.31	782.64
12" (DN300)	150	27.48	19.09	17	1	12	1.19	55.12	1300.73
12" (DN300)	300	27.99	20.47	17.75	1.25	16	1.95	55.12	1366.86

All dimensions are in mm.

\* Contact Forbes Marshall for these sizes

#### 4.1 Operation: [Refer figure 6]

The piston valve is operated manually by a handwheel (18) it should be either fully open or fully closed. To open the piston valve turn the handwheel (18) in the anticlockwise direction until it stops completely. To close the piston valve turn the handwheel (18) until it stop rotating further.

#### 4.2 Operation [Refer figure 8]

The piston valve is operated manually by a gearbox operated handwheel(33) it should be either fully open or fully closed. To open the piston valve turn the handwheel in the anticlockwise direction until it stops completely & Guide block is visible in Upper window. To close the piston valve turn the handwheel in opposite direction until it stop rotating further & guide block is visible in lower window.

**Note:** The piston valve spindle should be periodically checked to ensure adequate lubrication is present for efficient valve operation. For Lubrication 'Molykote M30' lubricating oil is recommended. When fitted on high temperature applications or where severe weather conditions prevail, the lubrication should be checked more frequently.

**Note:** Never tighten bonnet nuts when piston valve is in open condition. Do not use piston valve for throttling which result in excessive wear of internals. Operation of the handwheel (18) should always be by the hand, it is not recommended to use a valve key or F key. If the handwheel is over-tightened, damage of the piston valve internals may occur.

**Do not use valve "F" key for opening & closing the valve.**

**Use suitable PPEs (handgloves) while operating the valve as the hand wheel may be hot.**

#### 5. Installation Guidelines:[ Refer figure 9 and 10]



**Note:** Before implementing any installations observe the 'Important Safety notes' in section 2. Referring to the installation and maintenance instructions, name – plate and technical information sheet check the product is suitable for intended installation.

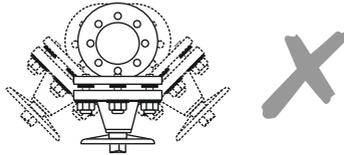
1. The piston valve should be installed in the direction of fluid flow given by the arrow on the body. The preferred orientation is with the spindle vertical with handwheel on the top. The piston valve can be installed from the vertical to the horizontal plane.

**Note:** Do not install the piston valve with handwheel on lower side as maintenance or lubrication of the piston valve will be difficult.



The preferred orientation for installation    The valve can be installed in vertical pipework

**Figure 9 : Correct orientation for installation**



**Figure 10 : Incorrect orientation for installation**

**Note:** For Horizontal lines, PSVAL should not be installed upside down or in inclined.

2. Adequate space should be available while installation of the piston valve so that they can be conveniently operated and maintained.
3. Before installing a piston valve, check to ensure that the size, pressure rating, materials of construction, end connections, etc. are suitable for the service conditions of the particular application. Remove the cover plugs from the ports.

**Note: Lubricate the product before installation as indicated if stored for more than 6 months.**

4. **Care must be taken to ensure before installing the piston valve that the line is clear from all foreign particles such as welding fluxes, metal burr and dirt and maintain cleanliness during installation since the introduction of foreign particles can result in damage to the piston and sealing stack.**
5. **When a socket weld piston valve is being installed the welding should be carried out to an approved procedure to a recognised standard. During welding the piston valve should be in the open position to allow maximum heat dissipation.**
6. Ensure that the discharged flow is directed to a safe place
7. **Insulation :**The piston valve can be insulated using Forbes Marshall Insulation jackets specifically made for piston valves. Please refer to the technical information sheet for insulation jacket for more details on wrapping around and removal of these jackets. The piston valves can also be insulated using standard insulation practices used for insulating Steam lines. Precaution should be taken to keep the insulation below the bonnet flange.

## **6. Start-up and Commissioning:**

### **6.1. Flushing of lines:**

As part of pre-installation all fluid handling equipment particularly piping should be thoroughly cleaned of scale and the internal debris which accumulates during construction. This is accomplished by blowing or flushing with air, steam, water and other suitable medium.

**Note:** For a detailed procedure on flushing of lines please visit Forbes Marshall website.

### **6.2. Commissioning:**

After installation or maintenance ensure that the system is fully functioning by confirming fluid is passing through it.

1. After flushing of lines is complete, open the piston valve fully by rotating handwheel in anticlockwise direction.
2. Operation of the handwheel should always be by hand.
3. Check for leaks and attend if any.

**Ensure that water hammer is not present in the lines under any circumstances. This can be done by gradually charging the line and draining all the residual condensate through drain valves every time the line is charged with steam. Heavy water hammer may permanently damage the piston valve.**

## 7 Maintenance Guidelines:



**Note:** Before undertaking any maintenance of the product it must be isolated from both supply line and return line and ensure pressure is normalized to atmosphere. The product should then be allowed to cool. When re-assembling ensure that all joint faces are clean. Once completed open the product slowly and check for leaks.

### 7.1. Routine and preventive maintenance:

Please refer to the maintenance schedule mentioned in the table below to undertake routine maintenance of the piston valve.

SR. NO.	PARAMETERS TO BE CHECKED	FREQUENCY FOR CHECKING PARAMETERS					
	PISTON VALVE	Daily	Weekly	Monthly	Quarterly	Half yearly	Annually
1	Manually Operate the valve.			Y			
2	Lubrication of piston valves.				Y		
3	Visual inspection and cleaning of stem-piston threads.				Y		
4	Refilling of *Loctite Anti-Seize (in grease cap) for DN 15/20/25.						Y

\*Loctite Anti-seize threaded compound 767 high performance conforms to ML-A-907-E.

**7.2. Tool Kit:** To carry out maintenance of the PSVAL refer the tools mentioned in the table below. .

Sizes	Component	Tool used & size
1/2" ,3/4" ,1"	M 10 Stud	Stud runner M10 x 1.5
	Nut	Box spanner of 17 mm (A/F)
	Nyloc nut	Box spanner of 13 mm (A/F)
	Sealing stack	Insertor tool (Available as spares)
	Sealing stack	Extractor tool (Available as spares)
1-1/2" ,1-1/2",2"	M12 Stud	Stud runner M12 x 1.75
	Nut	Box spanner of 17mm (A/F)
	Sealing stack	Insertor tool (Available as spares)
	Sealing stack	Extractor tool (Available as spares)
2½" / 3" / 4" / 5"	M16 Stud	Stud runner M 16 x 2A
	Nut	Box spanner of 24 mm (A/F)
	Sealing stack	Insertor tool (Available as spares)
	Sealing stack	Extractor tool (Available as spares)
6"	M20 Stud	Stud runner M20 x 2
	Nut	box spanner of 30mm (A/F)
	Sealing stack	Insertor tool (Available as spares)
	Sealing stack	Extractor tool (Available as spares)
8"	M24 Stud	Stud runner M24 x 3
	Nut	Box spanner of 36mm (A/F)
	Sealing stack	Insertor tool (Available as spares)
	Sealing stack	Extractor tool (Available as spares)
1½" / 2" / 2½" / 3"	Split nut tightening	Open spanner of 20mm (A/F)
4" / 5" / 6" / 8"	Split nut tightening	Open spanner 24 mm (A/F)
10"	Split nut tightening	Open spanner 32 mm (A/F)
12"	Split nut tightening	Open spanner 36 mm (A/F)

### 7.3. Recommended tightening torques for bonnet nuts, gland nuts and Kv values

Size (NPS)	Component Part No.	Torque Range (lbf-ft)
1/2" & 3/4"	Nut (7)	2.2 – 3.7
1"	Nut (7)	3.7 – 5.2
1-1/4" & 1-1/2"	Nut (7)	5.9 – 8.9
2"	Nut (7)	11.1 – 14.8
2-1/2" & 3"	Nut (16)	36.9 – 44.3
4" & 5"	Nut (16)	51.6 – 59.0
6" & 8"	Nut (16)	59.0 – 66.4
10" & 12"	Nut (16)	81.1 – 88.5

Size (NPS)	Component	Part No.	Torque Range (lbf-ft)
2-1/2" & 3"	Gland Nut	13	25.8 – 33.2
4" & 5"	Gland Nut	13	55.3 – 62.7
6"	Gland Nut	13	62.7 – 70.1
8"	Gland Nut	13	70.1 – 81.1
10" & 12"	Gland Nut	13	73.8 – 84.8

Size	Kv Values
1/2" & 3/4"	2.5
1"	5.8
1-1/4" , 1-1/2"	13
2"	41
2-1/2"	51
3"	77
4"	131
5"	194
6"	221
8"	438
10"	650
12"	955

**Table 2 : Recommended tightening torques for gland nuts**

**Table 3: Kv Values (Cv = Kv × 1.156)**

### 7.4. Maintenance of size 1/2" to 2" piston valve : [Refer Figure 2, 3 and 4]



**Note:** The graphite sealing stacks contain thin stainless steel support rings which may cause physical injury if not handled and disposed carefully.

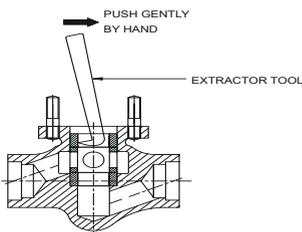
Maintenance of piston valve is very easy and can be done when valve is not in operation. If any leakage is observed through the bonnet hole, close the valve till handwheel (11) touches bonnet (2) then tighten all nuts (7) equally by half or one turn until leakage stops. (Refer Table 1 for recommended tightening torques).

**Note:** Never tighten nuts (7) when valve is in open condition.

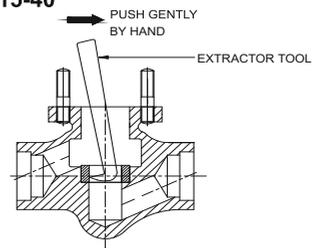
If leakage still does not stop then follow the procedure mentioned below.

1. Keep piston valve fully open remove nuts (7) & Belleville washer (8) turn handwheel (11) in clockwise direction till it stops at the top.
2. Pull handwheel (11) carefully along with bonnet (2) to remove piston (3) from body (1).
3. Avoid any damage to piston (3).
4. Clean piston (3) with lint free cloth.
5. Remove top sealing stack (9) with the help of extractor tool, remove spacer (10) [which is free in the body (1)] and remove bottom sealing stack (9) with the help of extractor tool. Replace with new set of bottom sealing stack (9), place spacer (10) and replace top sealing stack (9) with the insertor tool. Use mallet to apply light strokes on insertor tool ensuring they fit perfectly. (Refer figure 11 for extractor tool and insertor tool of piston valve for size DN15 – 40 and figure 12 for extractor tool and insertor tool of piston valve for size DN50)
6. Align piston (3) with the top sealing stack (9) and push gently and close the piston valve by rotating handwheel (11) in the clockwise direction until it touches the bonnet (2).
7. Ensure that the Belleville washer (8) are placed properly in cup form and tighten all nuts (7) with equal torque when the piston (3) is at the end of bottom sealing stack (9). (Refer Table 1 for recommended tightening torque).

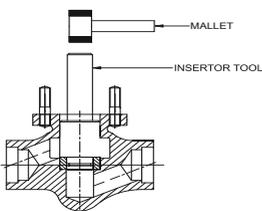
### For piston valve of size DN15-40



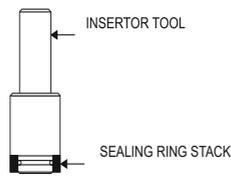
1. Extract top sealing stack first



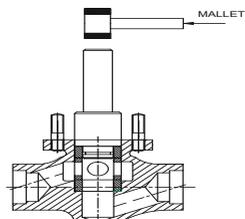
2. Remove spacer which is free from the body and then extract bottom sealing stack



3. Insert bottom sealing stack first



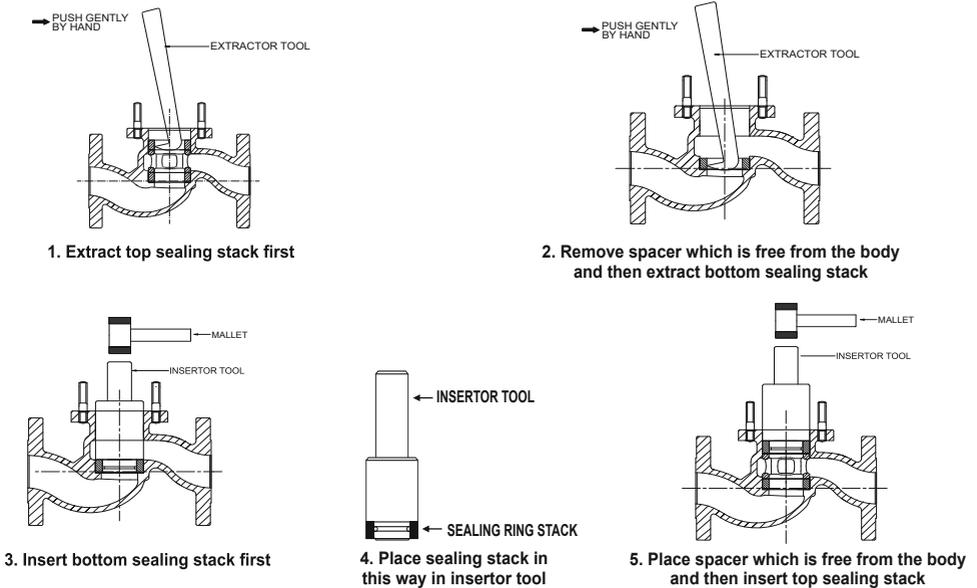
4. Place sealing stack in this way on insertor tool



5. Place spacer which is free from the body and then insert top sealing stack

Figure 11 : View showing extractor tool and insertor tool for sealing stack of piston valve of size 1/2" to 1-1/2"

## For piston valve of size 2"



**Figure 12: View showing extractor tool and insertor tool for sealing stack of piston size of 2"**

### 7.5.1 Maintenance of piston valve of size DN65-DN200 : [Refer Figure 6]



**Note:** The graphite sealing stacks contain thin stainless steel support rings which may cause physical injury if not handled and disposed carefully.

Maintenance of piston valve is very easy and can be done when piston valve not in operation. If any leakage is observed through the gland, tighten gland nut (13) to stop the leakage through gland. If any leakage is observed through outlet or between the body (1) and the bonnet (2) first close the valve till handwheel (18) touches the bonnet (2) then tighten all nuts (16) equally by half or one turn until leakages stops. (Refer Table 1 for recommended tightening torques)

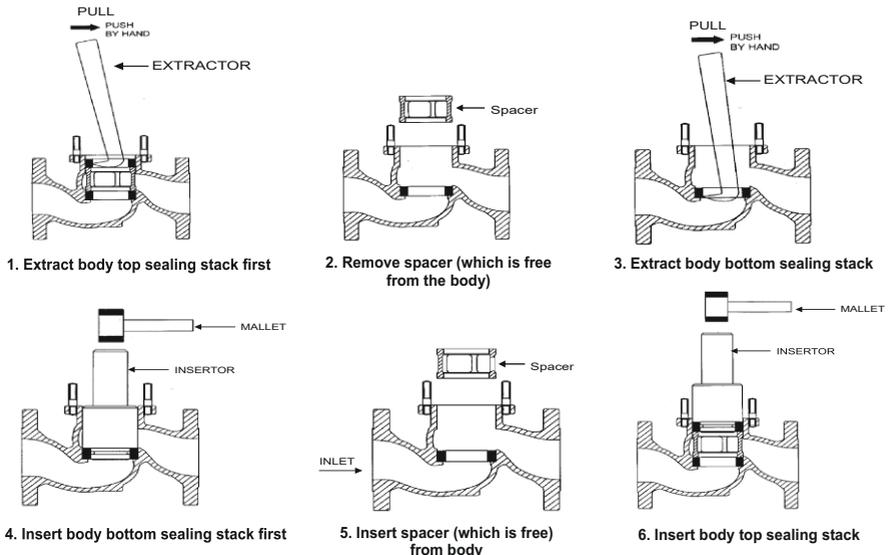
**Note:** Never tighten nuts (7) when valve is in open condition.

If leakage yet does not stop then follow the procedure mentioned below.

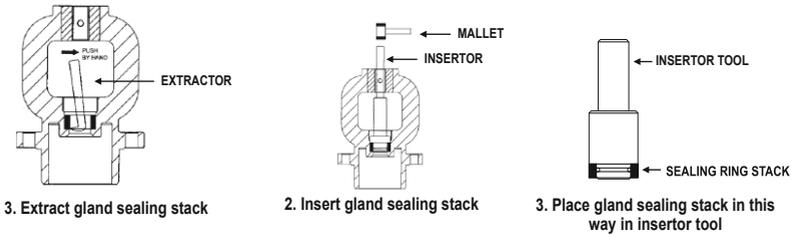
1. Keep piston valve fully open remove nuts (16) & Belleville washer (17) turns handwheel (18) in anti- clockwise direction until it touches the bonnet (2). Pull handwheel carefully along with bonnet (2) to remove piston (3) from body (1).
2. In case the bonnet assembly does not come out of the body (1) use tapped hole for removing bonnet assembly. Avoid any damage to piston (3).
3. Clean piston (3) with lint free cloth.

4. Remove body top sealing stack (4) with the help of extractor tool, remove spacer (5) [which is free in the body (1)] and remove body bottom sealing stack (4) with the help of extractor tool. Replace body bottom sealing stack (4), place spacer (5) and replace body top sealing stack (4) with the insertor tool. Use mallet to apply light strokes on insertor tool ensuring they fit perfectly. Insert bonnet sealing stack (14) carefully. (Refer figure 13 for extractor tool and insertor tool for piston valve of size DN65 – 200).
5. Place bonnet piston-spindle sub assembly on clean table.
6. To replace gland sealing stack (10) remove nyloc nut (19) and handwheel (18). Hold bonnet (2) by hand and remove spindle-piston sub assembly by rotating spindle (6) in clockwise direction with the help of screw driver.
7. Remove gland nut (13) and extract gland sealing stack (10) with extractor tool. Insert new gland sealing stack (10) with the insertor tool. Use mallet to apply light strokes on insertor tool ensuring they fit perfectly. (Refer Fig. 14 for extractor tool and insertor tool for piston valve of size DN65 – 200). Screw gland nut (13) in the bonnet (2). Place bonnet (2) on spindle-piston sub assembly and rotate spindle (6) in anticlockwise direction until it stops.
8. Align bonnet piston-spindle sub assembly in the body top sealing stack (4) and push it gently. Place the handwheel (18) on the square of spindle (6), place name plate (21) and nyloc nut (19). Place Belleville washer (17) in the cup form and hand tighten all the nuts. Now rotate handwheel (18) in clockwise direction until it touches the bonnet (2). (Close position of the valve).
9. Tighten all the nuts (16) equally. Open isolation valve, if any leakage is observed through the gland tighten gland nut (13). In case leakage is observed at the outlet or between body face (1) and bonnet (2) tighten nut equally half or one turn as explained earlier.

### For piston valve of size DN65 – 300



**Fig.13 : View showing exactor tool & insertor tool for sealing stack of piston valve of size DN65 - 300**



**Fig. 14 : View showing extractor tool and insertor tool for gland sealing stack of piston size of DN656 - 200**

### 7.5.2 Maintenance of piston valve of size DN200-DN300 : [Refer Figure 7]



**Note:** The graphite sealing stacks contain thin stainless steel support rings which may cause physical injury if not handled and disposed carefully. Maintenance of piston valve is very easy and can be done when piston valve not in operation. If any leakage is observed through the gland,

tighten gland nut (11) to stop the leakage through gland. If any leakage is observed through outlet or between the body (1) and the bonnet (2) first close the valve till handwheel stops then tighten all nuts (13) equally by half or one turn until leakages stops. (Refer Table 1 for recommended tightening torques) Note: Never tighten nuts (7) when valve is in open condition. If leakage yet does not stop then follow the procedure mentioned below.

1. Keep piston valve fully open remove nuts (13) & Belleville washer (14) turn handwheel in anti-clockwise direction until it stops. Pull Piston (3) carefully along with bonnet sub assembly to remove piston (3) from body (1).
2. In case the bonnet assembly does not come out of the body (1) use tapped hole for removing bonnet assembly. Avoid any damage to piston (3).
3. Clean piston (3) with lint free cloth.
4. Remove body top sealing stack (4) & sealing Ring (6) with the help of extractor tool, remove spacer (5) [which is free in the body (1)] and remove body bottom sealing stack (4) sealing Ring (6) with the help of extractor tool. Replace body bottom sealing Ring (6) & sealing stack (4), place spacer (5) and replace body top sealing stack (4) & sealing Ring (6) with the insertor tool. Use mallet to apply light strokes on insertor tool ensuring they fit perfectly. (Refer figure 13 for extractor tool and insertor tool for piston valve of size DN 200-300).
5. Place bonnet piston-spindle sub assembly on clean table.
6. To replace gland sealing stack (9) & Gland seal (24) Detach Spindle from stem by removing split nut (16) and dismount gearbox sub assembly. Hold piston (3) by hand and separate stem-piston sub assembly & bonnet sub assembly.
7. Remove gland nut (11) and extract gland sealing stack (9) & gland seal (24) with extractor tool. Insert new gland seal (24) & gland sealing stack (9) with the insertor tool. Use mallet to apply light strokes on insertor tool ensuring they fit perfectly. (Refer Fig. 14 for extractor tool and insertor tool for piston valve of size DN200 – 300). Screw gland nut (11) in the bonnet (2).
8. now use Piston insertion tool to insert Piston stem assembly in Body sub assembly. Place fixture on top flange locate it with dowel pins. Place Piston stem assembly on top in set it using light mallet strokes. Piston's top level should match with insertion tool level.
9. Now attach stem insertion tool & put bonnet (2) on stem-piston sub assembly to mate bonnet & piston stem assembly. Care should be taken so as to match stud holes with exact alignment while lowering a bonnet sub assembly on to a body.
10. remove stem insertion tool. Mount Gearbox sub assembly. Now couple spindle with stem using split nut.
11. Place Belleville washer (14) in the cup form and hand tighten all the nuts. Now rotate handwheel in clockwise direction until it stops & guide block is visible in bottom window. (Close position of the valve).
12. Tighten all the nuts (13) equally. Open isolation valve, if any leakage is observed through the gland tighten gland nut (11). In case leakage is observed at the outlet or between body face (1) and bonnet (2) tighten nut equally half or one turn as explained earlier.

**Note: For Gearbox maintenance refer Gearbox User Manual.**

## 7.6. Lubrication Procedure for Piston Valves of all sizes: [Refer figure 15]

Clean the valve unit before lubrication. For lubrication use \*Molykote M30 lubricating oil.

### For sizes DN15–50

lubricate spindle through the hole provided in the bonnet and spindle threads on quarterly basis.

### For sizes (DN 65-150)

lubricate between the spindle and threaded bush at the upper part of bonnet & stem and spindle at the lower part of bonnet on quarterly basis as mentioned in section 7.1.

### For sizes DN200-300

lubricate between the spindle, Spindle cover & Guide block at the upper part of bonnet and Stem and Spindle at the lower part of the bonnet.

**Note:** \*Molykote M30 lubricating oil is not available please use equivalent lubricating oil with specification as shown in table 4.

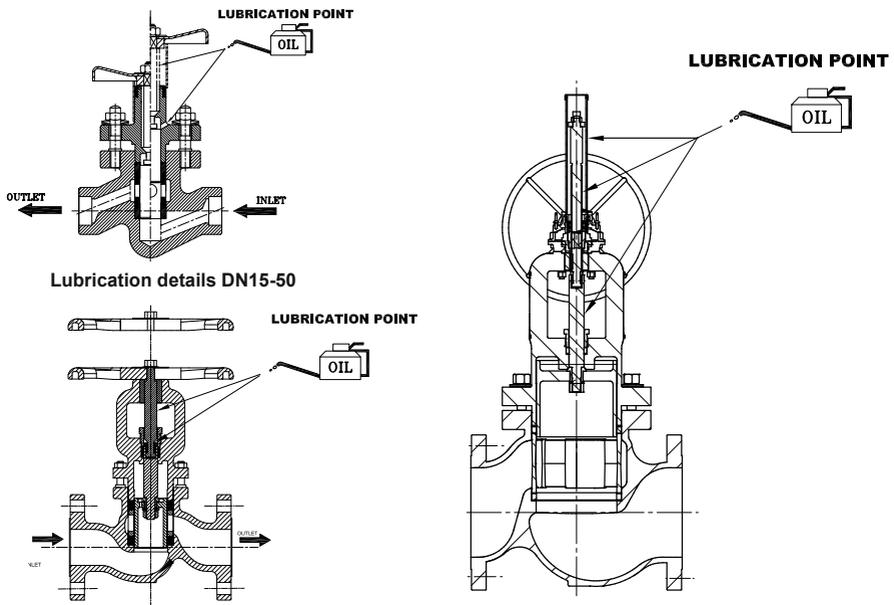


Figure 15 Lubrication details for piston valve DN15-50, DN65-150, DN200-300

## 8. Troubleshooting:

If the expected performance is unachievable after installation of the piston valve, check the following points for appropriate corrective measures.

Failure Mode	Possible Cause	Remedy
Inadequate flow rate at outlet.	The piston valve is not completely	Ensure the piston valve is completely open.
Fluid leakage from end connection.	End connection is not tight.	Tighten the end connection with proper torque for flange end and tighten the screwed end piston valve.
Fluid leakage from bonnet and body.	Sealing stack worn out.	For piston valve of sizes DN15-50 if any leakage is observed through bonnet hole, first close the valve till handwheel touches bonnet and then tighten all the nuts equally by half or one turn until leakage stops. (Refer table 1 for recommended tightening torque.) If leakage does not stop dismantle the valve, check if sealing stack is worn-out. If worn-out replace with new set of sealing stack. <b>Note: Never tighten nuts when valve is in open condition.</b> For piston valve of sizes DN65 –300 if any leakage is observed through the gland, tighten gland nut half or one turn until leakage stops. To stop the leakage between body and bonnet, first close the valve till handwheel touches bonnet and then tighten all the nuts equally by half or one turn until leakage stops. (Refer table 1 for recommended tightening torque). If leakage does not stop dismantle the valve, check if gland sealing stack, bonnet sealing stack & body sealing stack is worn-out. If worn-out replace with new one. <b>Note: Never tighten nuts when valve is in open condition.</b>
	Piston is damaged or corroded.	Check if piston is damaged due to scouring, corrosion of the piston valve. If damaged replace with new
Excessive force is required to turn the handwheel.	Seizing of the piston valve.	Lubricate the piston valve using *Molykote M30 lubricating oil on quarterly basis for sizes DN15- 50 lubricate spindle through the hole provided in the bonnet and spindle threads and for sizes DN65-200 lubricate between the spindle and threaded bush at the upper part of bonnet and stem and also spindle at the lower part of the bonnet.

**Note:** Never attempt to modify the product. When replacing old parts with new parts, use the spare parts listed in section 9.

\*Molykote M30 lubricating oil is not available please use equivalent lubricating oil with specification as shown in table 4.

\*Molykote M30 lubricating oil is not available please use equivalent lubricating oil with specification

<b>Specification of Molykote M30</b>			
<b>Colour</b>		<b>Black</b>	
Composition		Synthetic oil Molybdenum disulphide Dispersant	
Density	Density at 20°C (68°F) (Standard - DIN 51 757)	0.04 lbs/in <sup>3</sup>	
Viscosity	Base oil viscosity at 40°C (104°F) (Standard - DIN 51 562)	0.19 in <sup>3</sup> /s	
Temperature	Service temperature range	Oil lubrication up to +200°C(397°F)	
		Dry lubrication up to +450°C (842°F)	
Load -carrying capacity, wear protection.	Four- ball tester (VKA)	Weld Load (Standard – DIN 51 562 pt.2)	450 lbs
		Wear scar under 180 lbs, (Standard-DIN 51 350 pt.3)	1/24"
		Almen-Wieland machine OK load.	4496 lbs
Storage life		1 year	

**9. Available Spares: [Refer figure 2, 3, 4 and 5,6]**

Always order spares part by using the description and Spare Code No. given below & stating size

Sr. No.	Spares	Spare Codes
1	Body Sealing Ring-2 Nos. for 1/2' , 3/4"	SPARE-1520PSVAL-BSRKIT
2	Body Sealing Ring-2 Nos. for 1"	SPARE-25PSVAL-BSRKIT
3	Body Sealing Ring-2 Nos. for 1-1/2"	SPARE-3240PSVAL-BSRKIT
4	Body Sealing Ring-2 Nos. for 2"	SPARE-50PSVAL-BSRKIT
5	Body Sealing Ring-2 Nos. , Bonnet Sealing Ring -1 No. , Bonnet Stem Sealing Ring -1 No. for 2-1/2"	SPARE-65PSVAL-BSRKIT
6	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No., Bonnet Stem Sealing Ring -1 No. for 3"	SPARE-80PSVAL-BSRKIT
7	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No., Bonnet Stem Sealing Ring -1 No. for 4"	SPARE-100PSVAL-BSRKIT
8	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No., Bonnet Stem Sealing Ring -1 No. for 5"	SPARE-125PSVAL-BSRKIT
9	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No., Bonnet Stem Sealing Ring -1 No. for 6"	SPARE-150PSVAL-BSRKIT
10	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No. , Bonnet Stem Sealing Ring -1 No. for 8"	SPARE-200PSVAL-BSRKIT
11	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1 No. , Bonnet Stem Sealing Ring -1 No. for 10"	SPARE-250PSVAL-BSRKIT
12	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1No., Na265 Bonnet Seal-2 and Gland Seal-1No. for 8"	SPARE-200PSVAL-GB-SRKIT
13	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1No., Na265 Bonnet Seal-2 and Gland Seal-1No. for 10"	SPARE-250PSVAL-GB-SRKIT
14	Body Sealing Ring-2 Nos., Bonnet Sealing Ring -1No., Na265 Bonnet Seal-2 and Gland Seal-1No. for 12"	SPARE-300PSVAL-GB-SRKIT
15	Piston With Spindle Pack Of 1 Set for 1/2", 3/4"	SPARE-1520PSVAL-PKIT
16	Piston With Spindle Pack Of 1 Set for 1"	SPARE-1520PSVAL-PKIT
17	Piston With Spindle Pack Of 1 Set for 1-1/2"	SPARE-3240PSVAL-PKIT
18	Piston With Spindle Pack Of 1 Set for 2"	SPARE-50PSVAL-PKIT
19	Piston With Spindle Pack Of 1 Set for 2-1/2"	SPARE-65PSVAL-PKIT
20	Piston With Spindle Pack Of 1 Set for 3"	SPARE-80PSVAL-PKIT
21	Piston With Spindle Pack Of 1 Set for 4"	SPARE-100PSVAL-PKIT
22	Piston With Spindle Pack Of 1 Set for 5"	SPARE-125PSVAL-PKIT
23	Piston With Spindle Pack Of 1 Set for 6"	SPARE-150PSVAL-PKIT
24	Piston With Spindle Pack Of 1 Set for 8"	SPARE-200PSVAL-PKIT
25	Piston With Spindle Pack Of 1 Set for 8" (Gear Box)	SPARE-200PSVAL-GB-PKIT
26	Piston With Spindle Pack Of 1 Set for 10" (Gear Box)	SPARE-250PSVAL-GB-PKIT

Sr. No.	Spares	Spare Codes
27	Piston With Spindle Pack Of 1 Set for 12"	SPARE-300PSVAL-GB-PKIT
28	Handwheel Pack Of 1 No.1/2" , 3/4" ,1"	SPARE-15PSVAL-HKIT
29	Handwheel Pack Of 1 No. 1-1/4" , 1-1/2"	SPARE-40PSVAL-HKIT
30	Handwheel Pack Of 1 No.2"	SPARE-50PSVAL-HKIT
31	Handwheel Pack Of 1 No.2-1/2" , 3" ,4"	SPARE-80PSVAL-HKIT
32	Handwheel Pack Of 1 No.5" , 6"	SPARE-150 PSVAL-HKIT
33	Handwheel Pack Of 1 No.8"	SPARE-200PSVAL-HKIT
34	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 2-1/2"	SPARE-65PSVAL-BNSRKIT
35	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 3"	SPARE-80PSVAL-BNSRKIT
36	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 4"	SPARE-100PSVAL-BNSRKIT
37	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 5"	SPARE-125PSVAL-BNSRKIT
38	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 6"	SPARE-150PSVAL-BNSRKIT
39	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 8"	SPARE-200PSVAL-BNSRKIT
40	Set Of Bonnet Stem Sealing Rings (Pack Of 5 Nos.) for 10"	SPARE-250PSVAL-BNSRKIT
41	Sealing Ring Inserter Tool - 1 No. for 1/2" ,3/4"	SPARE-1520PSVAL-INSTKIT
42	Sealing Ring Inserter Tool - 1 No. for 1"	SPARE-25PSVAL-INSTKIT
43	Sealing Ring Inserter Tool - 1 No. for 1-1/4" ,1-1/2"	SPARE-3240PSVAL-INSTKIT
44	Sealing Ring Inserter Tool - 1 No. for 2"	SPARE-50PSVAL-INSTKIT
45	Sealing Ring Inserter Tool - 1 No. for 2-1/2"	SPARE-65PSVAL-INSTKIT
46	Sealing Ring Inserter Tool - 1 No. for 3"	SPARE-80PSVAL-INSTKIT
47	Sealing Ring Inserter Tool - 1 No. for 4"	SPARE-100PSVAL-INSTKIT
48	Sealing Ring Inserter Tool - 1 No. for 5"	SPARE-125PSVAL-INSTKIT
49	Sealing Ring Inserter Tool - 1 No. for 6"	SPARE-150PSVAL-INSTKIT
50	Sealing Ring Inserter Tool - 1 No. for 8"	SPARE-200PSVAL-INSTKIT
51	Sealing Ring Extractor Tool - 1 No. for 1/2" ,10"	SPARE-15250PSVAL-EXTKIT
52	Anti Rotation Spindle Bracket, Spindle Cover, Spindle Cover Cap, Guide Block, Stopper Nut, M10 Allen Bolt, M6 Screw for 8"	SPARE-200PSVAL-GB-ARAKIT
53	Anti Rotation Spindle Bracket, Spindle Cover, Spindle Cover Cap, Guide Block, Stopper Nut, M10 Allen Bolt, M6 Screw for 10"	SPARE-250PSVAL-GB-ARAKIT
54	Anti Rotation Spindle Bracket, Spindle Cover, Spindle Cover Cap, Guide Block, Stopper Nut, M10 Allen Bolt, M6 Screw for 12"	SPARE-300PSVAL-GB-ARAKIT
55	Pinion Bearing 2no., Adaptor Sleeve Bearing 2no., Pinion 'O' Ring, Adaptor Sleeve 'O'ring 2No. for 8"	SPARE-200PSVAL-GB-BOKIT
56	Pinion Bearing 2no., Adaptor Sleeve Bearing 2no., Pinion 'O' Ring, Adaptor Sleeve 'O'ring 2No. for 10 /12"	SPARE-250300PSVAL-GB-BOKIT
57	Pinion, Bevel Gaer, Adaptor Sleeve for 8"	SPARE-200PSVAL-GB-SIKIT
58	Pinion, Bevel Gaer, Adaptor Sleeve for 10,12"	SPARE-300250PSVAL-GB-SIKKIT

**How to Order :**

Example: 1/2" Piston Valve with socket weld ends.

**How to Order Spares :**

Order Spares as per the code no. specified in the user manual.

**10. Warranty Period :**

As per ordering information and agreements in the contract.



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