

**FLOATING BALL VALVES**

# INSTALLATION, OPERATION, & MAINTENANCE MANUAL

## API 598 FLANGED FULL & REDUCED PORT FLOATING BALL VALVE



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**FLOATING BALL VALVES****1) SCOPE**

This manual describes the methods of installation, operation, maintenance, and proper storage of reduced and full port floating ball valves from Warren Valve. Warren Valve offer ANSI class 150 - 600 flanges with Raised Face (RF) and Ring Type Joint (RTJ) sealing surfaces and sizes ranging from ½" to 12". Warren valves are manufactured from cast stainless steel, cast carbon steel and exotic alloys.

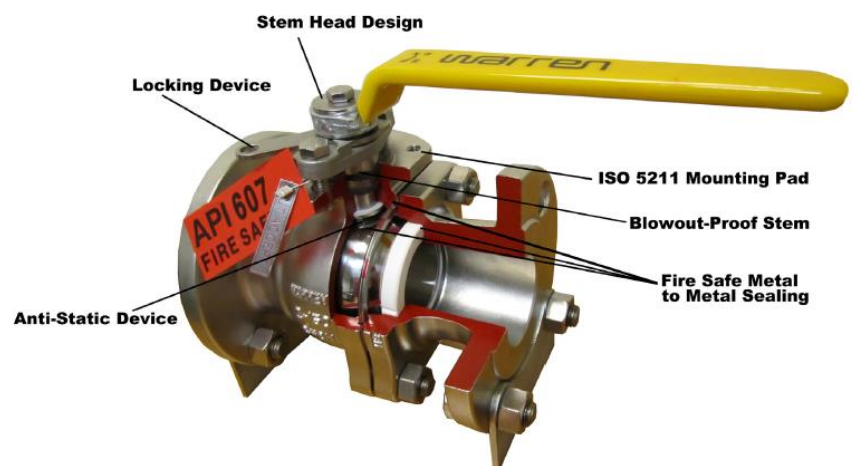
**NOTE:** *The procedures in this manual are to be performed in conjunction with the requirements and recommendations outlined in API specifications. Warren Valve will not be responsible for loss or expense resulting from any failure of equipment or any damage to any property or death or injury to any person resulting in whole or in part from any repairs performed by people other than authorized Warren Valve representatives. Such unauthorized repairs shall also serve to terminate any warranties, if any, on the equipment and may also result in equipment no longer meeting applicable requirements.*

**1.1) Description**

Floating ball valve is a general-purpose valve used for a wide range of oil and gas pipelines, petrochemicals, oil refining, gas, metallurgy, chemical, food, and other related industries. Its main function is to cut off the flow in the piping system. It is manually operated using a hand lever or gear operator which drives the ball to cut off or allow the flow passage.

**1.2) Features**

- Locking Device
- ISO 5211 Mounting Pad
- Anti-Static Device
- Fire Safe to API 607 4<sup>th</sup> Edition \* (Excludes – Non Fire-safe valves)



**FLOATING BALL VALVES**

## 1.3) General Design Standards

NON – FIRE SAFE Cast Stainless Steel Raised Face Flanged Ball Valves	
Design	API 608
Testing	API 598
Pressure Temperature Rating	ANSI B16.34
Face to Face Dimensions	ANSI B16.10
End Flange Dimensions	ANSI B16.5
Visual Inspection of Castings	MSS-SP-55
Standard Markings	MSS-SP-25
FIRE SAFE Cast Stainless Steel Raised Face Flanged Ball Valves	
Design	API 608
Testing	API 598
Fire Safe Tested	API 607
NACE	MRO-175-2003
Low Emissions	100 PPM or less
Pressure Temperature Rating	ANSI B16.34
Face to Face Dimensions	ANSI B16.10
End Flange Dimensions	ANSI B16.5
Visual Inspection of Castings	MSS-SP-55
Standard Markings	MSS-SP-25

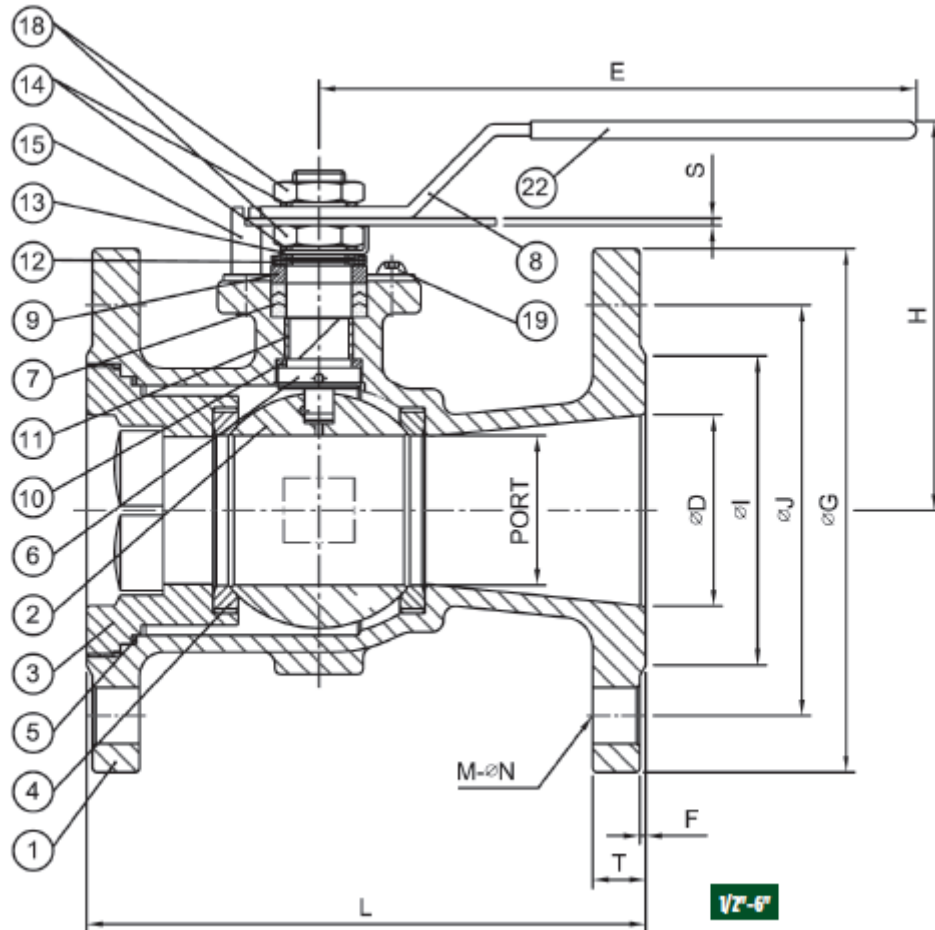
**FLOATING BALL VALVES****2) SAFETY PRECAUTIONS**

- a) Ball valves are pressure equipment, therefore the appropriate safety measures have to be taken into account.
- b) Any alterations or modifications on valves not performed by Warren Valve voids any warranty issued on the valve and might result in danger to equipment and/or personnel.
- c) All valves are designed for use within the limits specified herein and as described on the valve body. Exceeding these specified limits is to be considered misuse and can lead to serious injuries and/or damage to the installation and environment.
- d) When performing maintenance on the valves, operators must wear proper eye, head, and body protection.
- e) When the valves are operated on low or elevated temperature, operating personnel must be especially careful in order to avoid injuries.
- f) The valve's body rating can be higher than the seat rating. Valve surface temperature may become extremely hot or cold due to the ambient or operating conditions. Prevent any type of direct contact with the valve that may harm the workers.
- g) Valves and accessories must not be used as a sole support of the piping system.

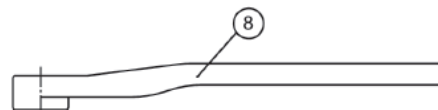
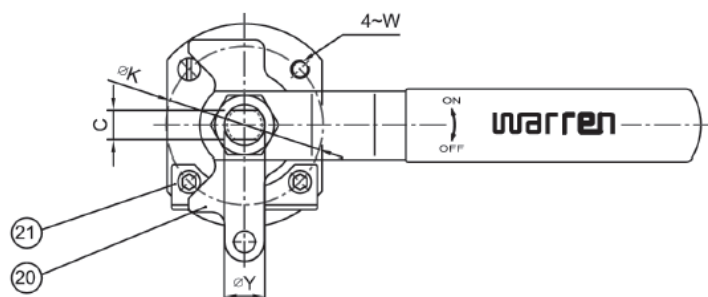
## FLOATING BALL VALVES

### 3) BILL OF MATERIALS

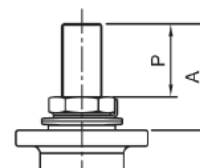
#### 3.1) Reduced port Cast Stainless Steel (Non Fire-Safe, Class 150)



## FLOATING BALL VALVES



FCD45 HANDLE For 3"-6"

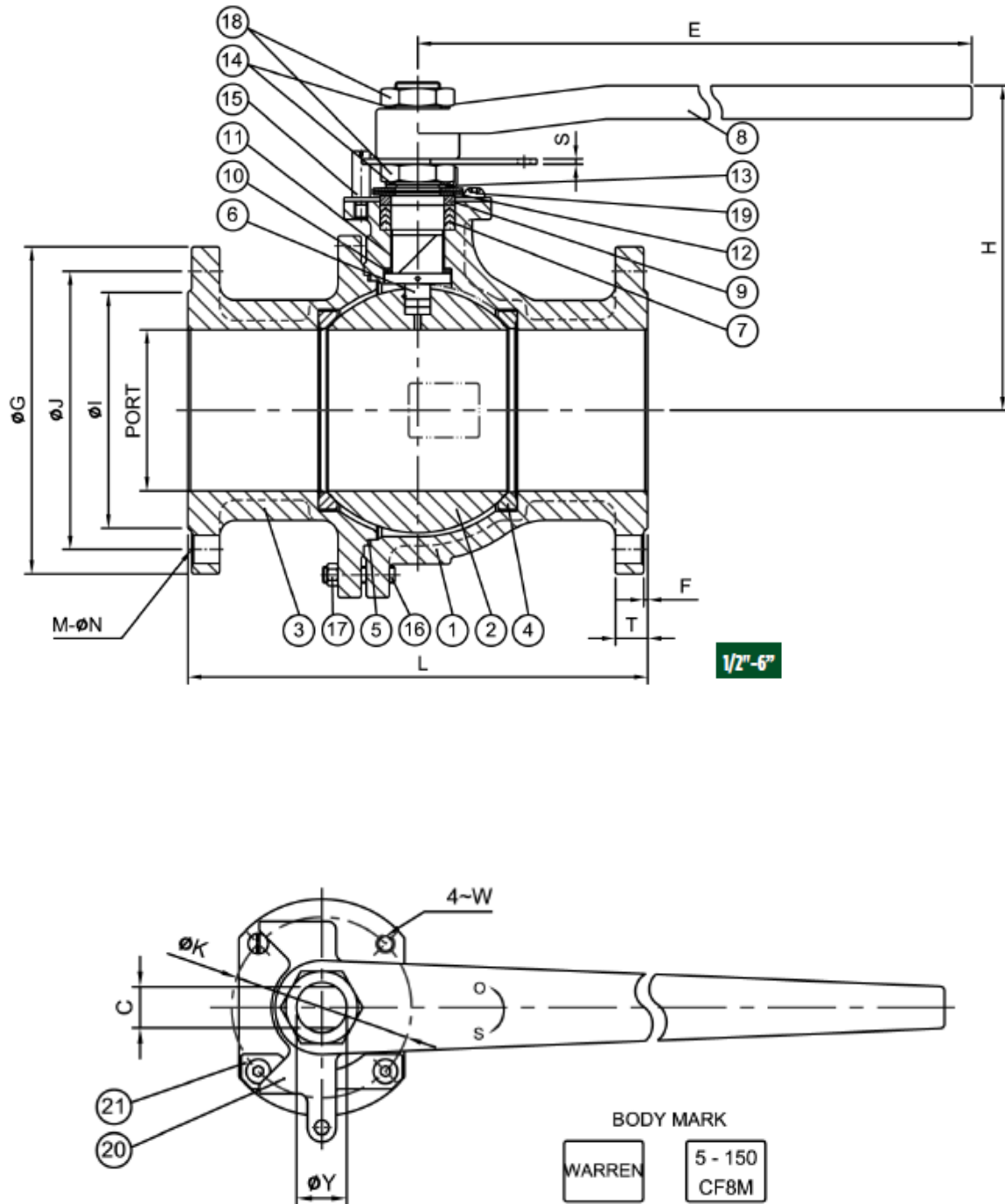


### MATERIAL LIST

No.	Part Name	Material
1	Body	ASTM A351-CF8M
2	Ball	ASTM A351-CF8M
3	Cap	ASTM A351-CF8M
4	Seat	RPTFE
5	Gasket	PTFE
6	Stem	ASTM A276-316
7	Stem Packing	PTFE
8	Handle	AISI SS304 (1/2" - 2-1/2") ASTM A536-65-45-12 (3" - 6")
9	Sleeve	AISI SS304
10	Thrust Washer	PTFE
11	Steam Bearing	PTFE
12	Disk Spring Washer	AISI SS301
13	Lock Washer	AISI SS304
14	Washer	AISI SS304
15	Set Screw	AISI SS304
18	Thin Nut	AISI SS304
19	Screw	AISI SS304
20	Travel Stopper (1)	AISI SS304
21	Travel Stopper (2)	AISI SS304
22	Handle Cover	PLASTIC

## FLOATING BALL VALVES

### 3.2) Full Port Cast Stainless Steel (Non Fire-Safe, Class 150)



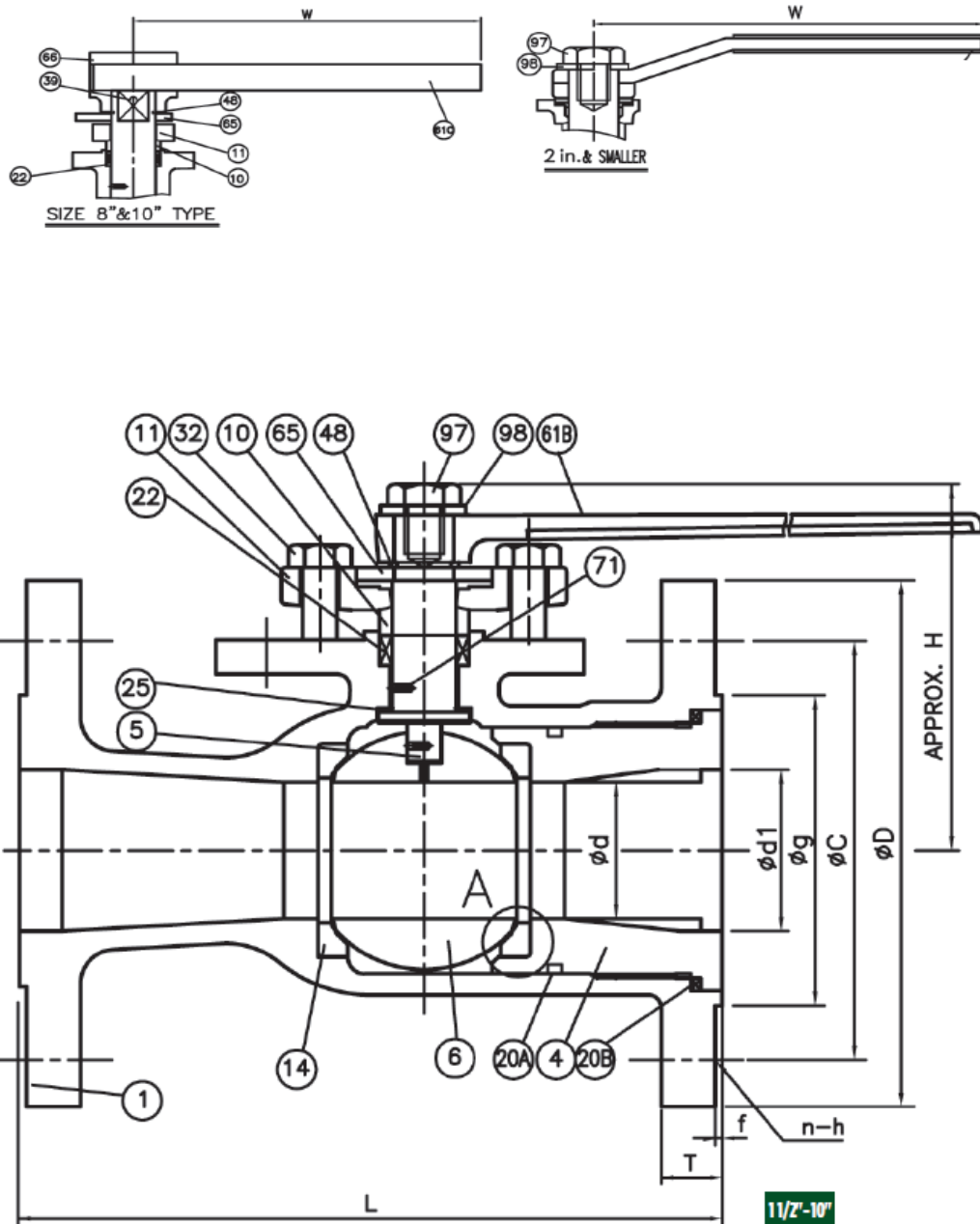


**FLOATING BALL VALVES**

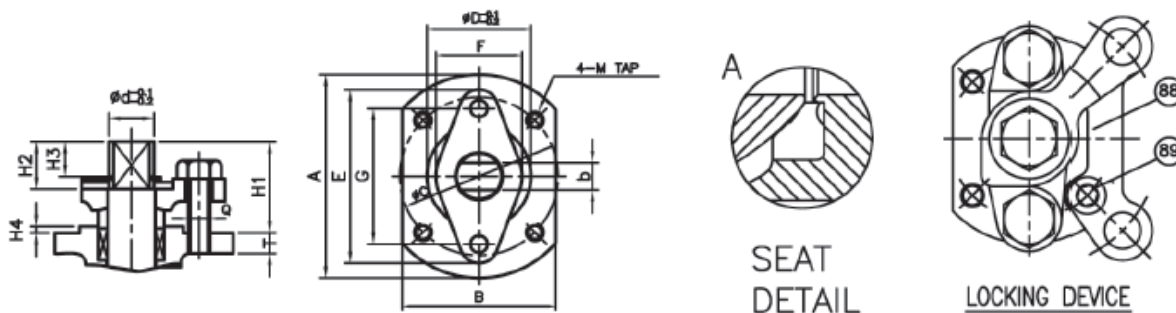
MATERIAL LIST		
No.	Part Name	Material
1	Body	ASTM A351-CF8M
2	Ball	ASTM A351-CF8M
3	Cap	ASTM A351-CF8M
4	Seat	RPTFE
5	Gasket	PTFE
6	Stem	ASTM A276-316
7	Stem Packing	PTFE
8	Handle	AISI SS304 (1/2" - 2-1/2") ASTM A536-65-45-12 (3" - 6")
9	Sleeve	AISI SS304
10	Thrust Washer	PTFE
11	Stem Bearing	PTFE
12	Disk Spring Washer	AISI SS301
13	Lock Washer	AISI SS304
14	Washer	AISI SS304
15	Set Screw	AISI SS304
16	Stud	AISI SS304
17	Nut	AISI SS304
18	Thin Nut	AISI SS304
19	Screw	AISI SS304
20	Travel Stopper (1)	AISI SS304
21	Travel Stopper (2)	AISI SS304
22	Handle Cover	PLASTIC

## FLOATING BALL VALVES

### 3.3) Reduced Port Cast Stainless Steel (Fire-Safe, Class 150)



## FLOATING BALL VALVES

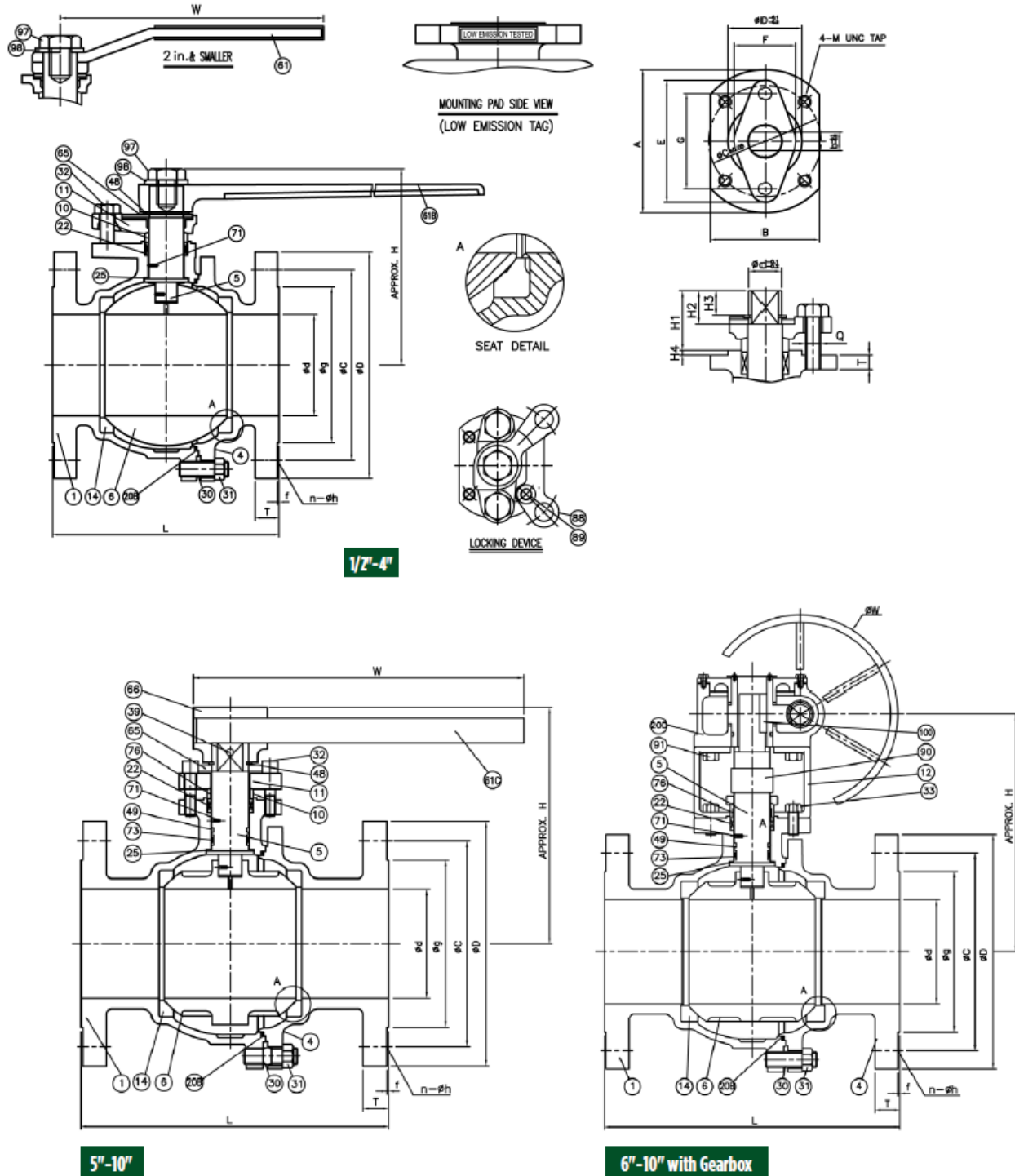


### MATERIAL LIST

No.	Part Name	Material	Remarks
1	BODY	A351-CF8M	
4	CAP	A351-CF8M	
5	STEM	A564-630	
6	BALL	A351-CF8M	
10	GLAND	A276-316	
11	GLAND FLANGE	A351-CF8	
14	SEAT RING	RTFE	15% Glass Filled
20A	O-RING	VITON	
20B	GASKET	GRAPHITE	
22	GLAND PACKING	EXPANDED GRAPHITE +CORROSION INHIBITOR	3" & Larger Cup and cone design
25	THRUST WASHER	RTFE	
32	GLAND BOLT	A193-B8	
39	SET SCREW	A193-B8	8" & Larger
48	SNAP RING	A686-W1	Ni+Cr PLATED
61	VINYL COATED HANDLE	A283-D	2" & Smaller
61B	HANDLE	A536	3" & Larger
61C	HANDLE	CARBON STEEL	8" & Larger
65	STOPPER	A240-304	
66	HANDLE GUIDE	A216-WCB	8" & Larger
71	ANTI STATIC	A276-316	
88	LOCKING PLATE	A240-304	
89	LOCKING PLATE BOLT	A193-B8	
97	TOP BOLT	A193-B8	
98	TOP WASHER	A240-304	

## FLOATING BALL VALVES

### 3.4) Full Port Cast Stainless Steel (Fire-Safe, Class 150)

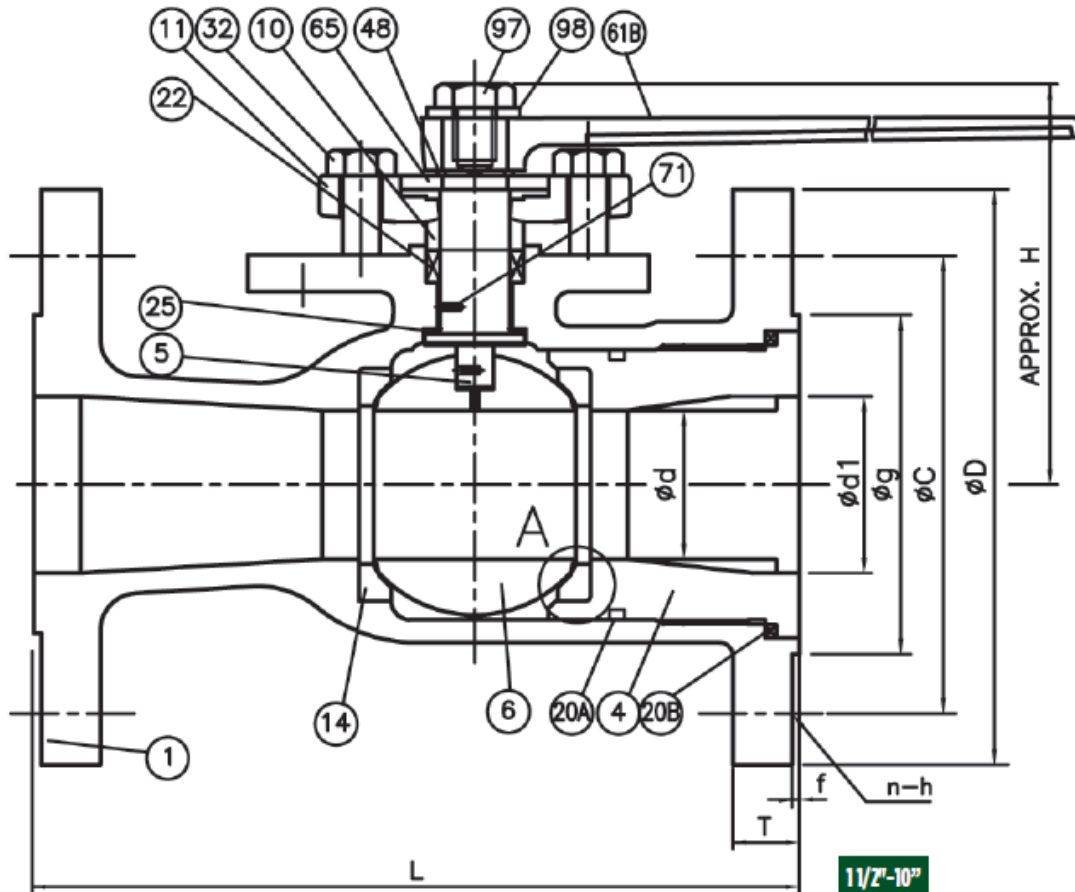
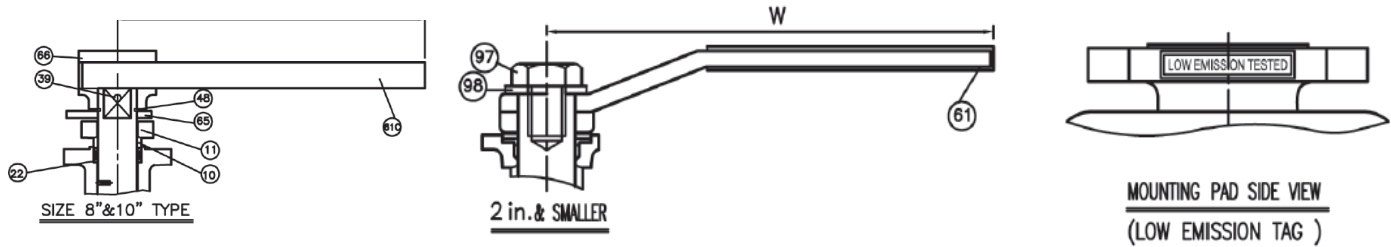


## FLOATING BALL VALVES

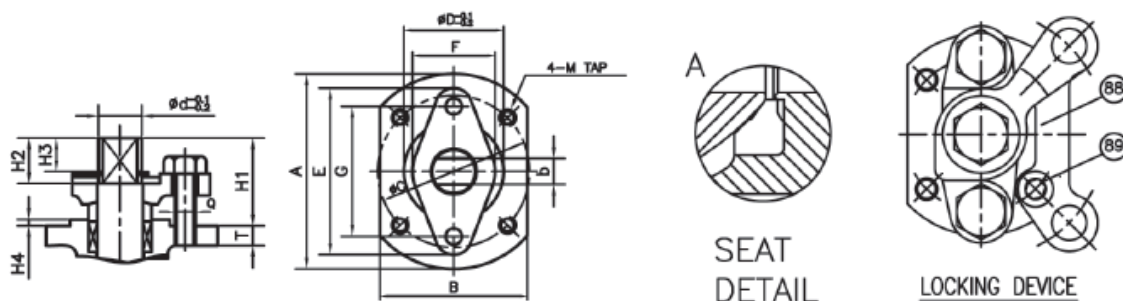
MATERIAL LIST			
No.	Part Name	Material	Remarks
1	BODY	A351-CF8M	
4	CAP	A351-CF8M	
5	STEM	A564-630	
6	BALL	A351-CF8M	A276-316 1/2" Only
10	GLAND	A276-316	
11	GLAND FLANGE	A351-CF8	
12	YOKE	SS400	Zn Plated Painted black
14	SEAT RING	RTFE	15% Glass Filled
208	GASKET	SW316+GRAPHITE	
22	GLAND PACKING	EXPANDED GRAPHITE +CORROSION INHIBITOR	2" & Larger Cup and cone design
25	THRUST WASHER	RTFE	
30	CAP BOLT	A193-B8M	
31	CAP BOLT NUT	A194-8M	
32	GLAND BOLT	A193-B8	
33	YOKE BOLT	A193-B8	
39	SET SCREW	A193-B8	
48	SNAP RING	A686-W1	1 1/2 & Larger + Ni+Cr PLATED
49	O-RING	VITON	Only size 10"
61	VINYL COATED HANDLE	A283-D	2" & Smaller
61B	HANDLE	A536	2 1/2" & Larger
61C	HANDLE	CARBON STEEL	
65	STOPPER	A240-304	
66	HANDLE GUIDE	A216-WCB	
71	ANTI STATIC	A276-316	
73	STEM BEARING	PTFE	Only size 10"
76	GLAND BEARING	PTFE	Only size 10"
88	LOCKING PLATE	A240-304	
89	LOCKING PLATE BOLT	A193-B8	
90	COUPLING	A276-410	END
91	MOUNTING BOLT	A193-B8	
97	TOP BOLT	A193-B8	
98	TOP WASHER	A240-304	
100	KEY	AISI1045	
200	GEAR BOX	A536	

## FLOATING BALL VALVES

### 3.5) Reduced Port Cast Carbon Steel (Fire Safe, Class 150)



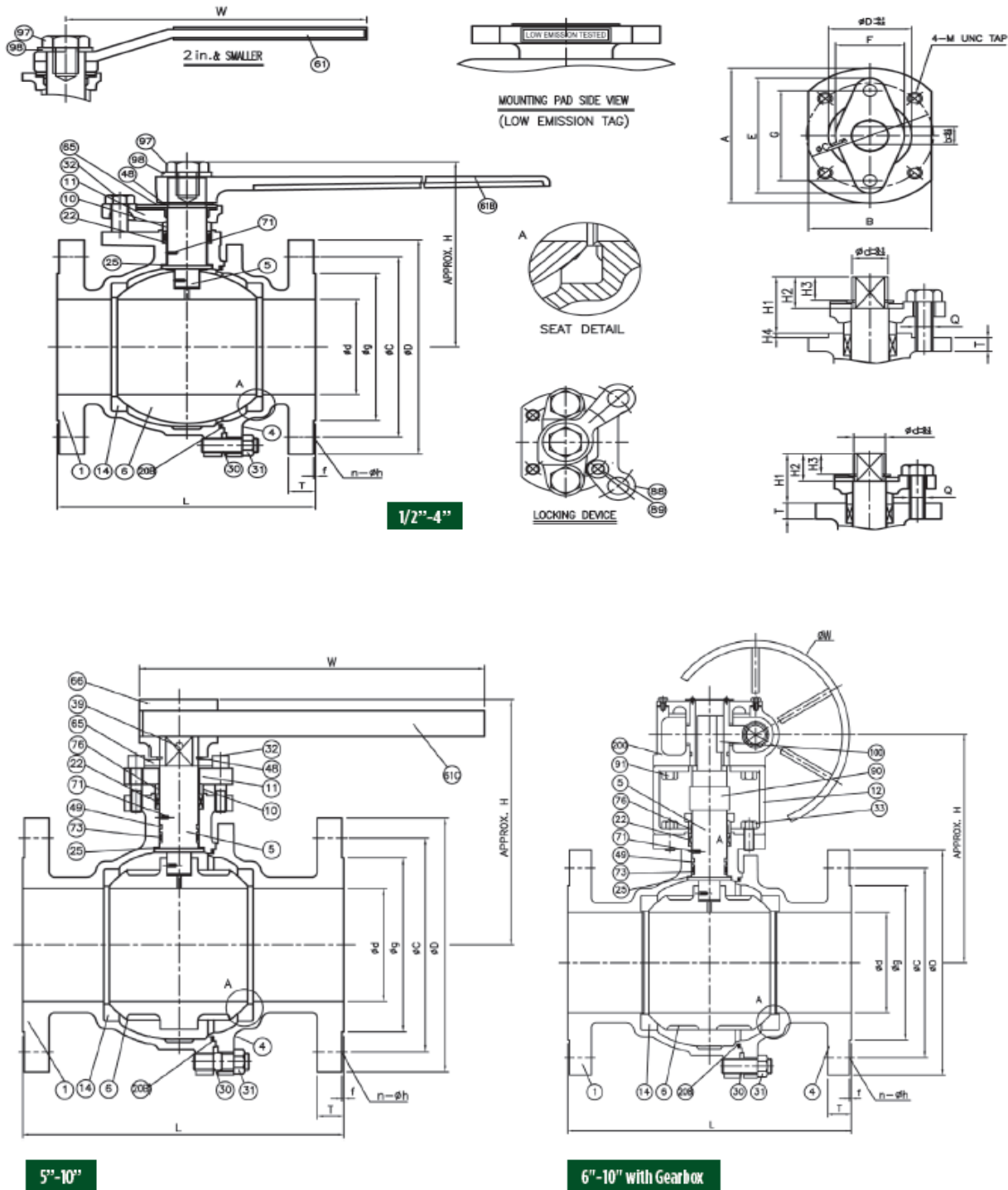
## FLOATING BALL VALVES



MATERIAL LIST			
No.	Part Name	Material	Remarks
1	BODY	A216-WCB	
4	CAP	A216-WCB	
5	STEM	A564-630	
6	BALL	A351-CF8M	
10	GLAND	A276-316	
11	GLAND FLANGE	A351-CF8	
14	SEAT RING	RTFE	15% Glass Filled
20A	O-RING	VITON	
20B	GASKET	GRAPHITE	
22	GLAND PACKING	EXPANDED GRAPHITE +CORROSION INHIBITOR	3" & Larger Cup and cone design
25	THRUST WASHER	RTFE	
32	GLAND BOLT	A193-B8	
39	SET SCREW	A193-B8	8" & Larger
48	SNAP RING	A686-W1	Ni+Cr PLATED
61	VINYL COATED HANDLE	A283-D	2" & Smaller
61B	HANDLE	A536	3" & Larger
61C	HANDLE	CARBON STEEL	8" & Larger
65	STOPPER	A240-304	
66	HANDLE GUIDE	A216-WCB	8" & Larger
71	STATIC BALL	A276-316	
88	LOCKING PLATE	AISI1020	Zn Plated
89	LOCKING PLATE BOLT	A307-B	Zn Plated
97	TOP BOLT	A193-B8	
98	TOP WASHER	A240-304	

## FLOATING BALL VALVES

### 3.6) Full Port Cast Carbon Steel (Fire Safe, Class 150)





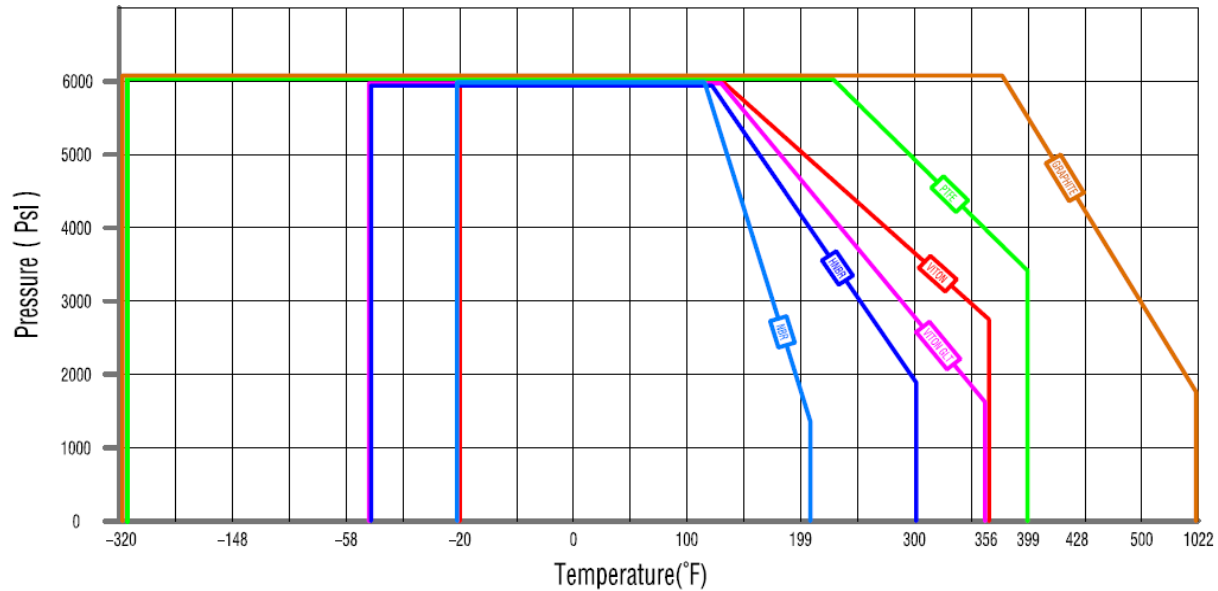
## FLOATING BALL VALVES

MATERIAL LIST			
No.	Part Name	Material	Remarks
1	BODY	A216-WCB	
4	CAP	A216-WCB	
5	STEM	A564-630	
6	BALL	A351-CF8M	A276-316 1/2" Only
10	GLAND	A276-316	
11	GLAND FLANGE	A351-CF8	
12	YOKE	SS400	Zn Plated Painted black
14	SEAT RING	RTFE	15% Glass Filled
20B	GA SKET	SW316+GRAPHITE	
22	GLAND PACKING	EXPANDED GRAPHITE +CORROSION INHIBITOR	2" & Larger Cup and cone design
25	THRUST WASHER	RTFE	
30	CAP BOLT	A193-B7M	
31	CAP BOLT NUT	A194-2HM	
32	GLAND BOLT	A193-B8	
33	YOKE BOLT	A193-B8	
39	SET SCREW	A193-B8	
48	SNAP RING	A686-W1	1 1/2 & Larger + Ni+Cr PLATED
49	O-RING	VITON	Only size 10"
61	VINYL COATED HANDLE	A283-D	2" & Smaller
61B	HANDLE	A536	2 1/2" & Larger
61C	HANDLE	CARBON STEEL	
65	STOPPER	A240-304	
66	HANDLE GUIDE	A216-WCB	
71	ANTI STATIC	A276-316	
73	STEM BEARING	PTFE	Only size 10"
76	GLAND BEARING	PTFE	Only size 10"
88	LOCKING PLATE	AISI3020	Zn Plated
89	LOCKING PLATE BOLT	A307-B8	Zn Plated
90	COUPLING	A276-410	ENP
91	MOUNTING BOLT	A193-B8	
97	TOP BOLT	A193-B8	
98	TOP WASHER	A240-304	
100	KEY	AISI3045	
200	GEAR BOX	A536	

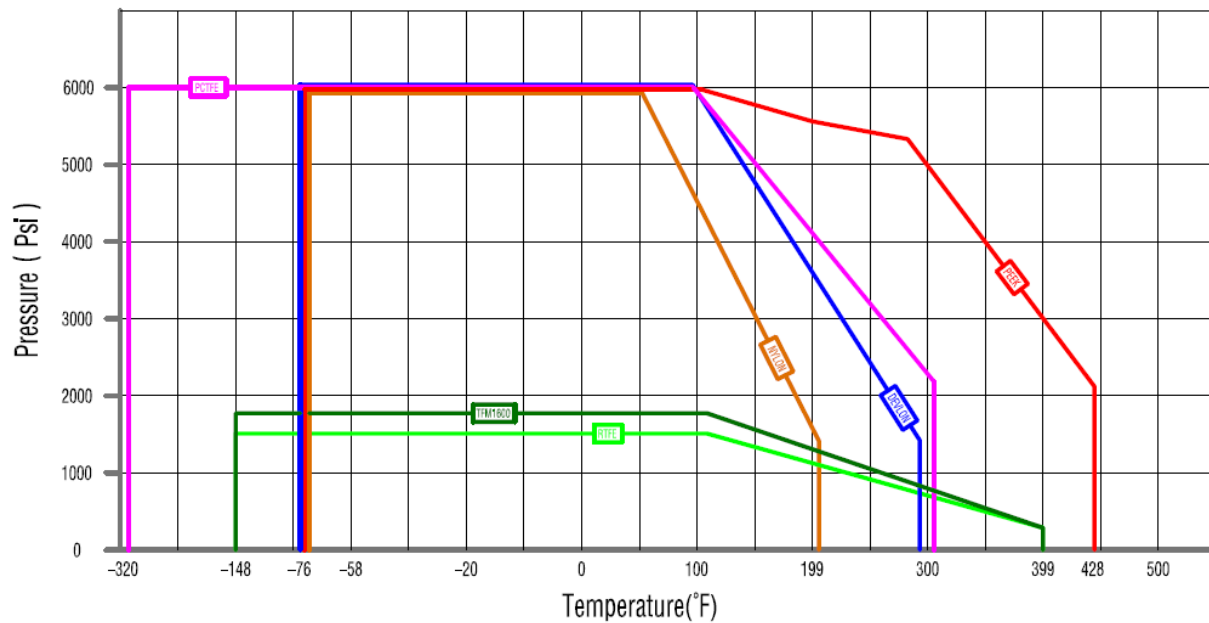
## FLOATING BALL VALVES

### 4) CHARTS & GRAPHS

#### SEALS MATERIAL



#### SEAT INSERT MATERIAL



**FLOATING BALL VALVES****5) CONSIDERATIONS PRIOR TO INSTALLATION**

1. Ensure that during transportation and before installation the sealing surfaces of end connection flanges are not damaged.
2. Remove all left over particles of rust, slag, and debris from inside the pipeline.
3. Prior to installation, confirm markings (pressure size, material) on the valve body and nameplate.
4. Ensure that only trained personnel install, operate, and perform maintenance on all valves.
5. Always use tools to the intent they were designed, to prevent damage to the valve and prevent injury or death to the user.
6. Remove all end protectors.

**6) INSTALLATION**

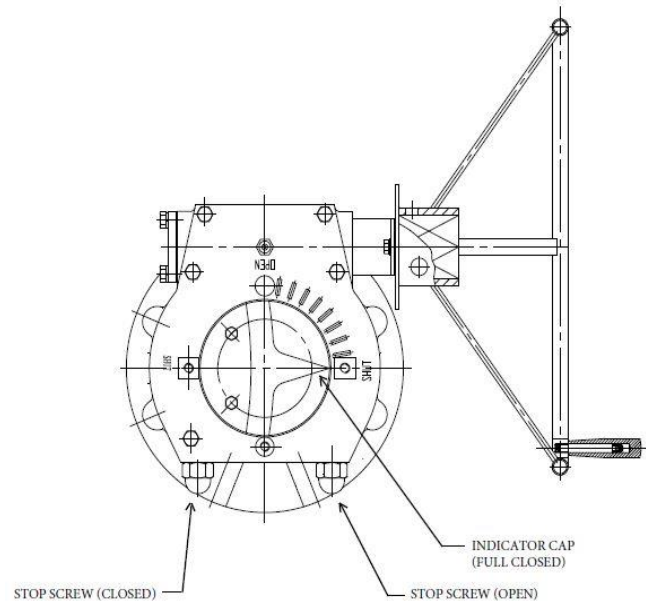
Warren's floating ball valves can be installed in any position with flow from either direction. However, horizontal installation is suggested and preferred to maximize sealing and best control the accumulation of sediment. When handling or installing floating ball valves, keep the valves in the full open position whenever possible to prevent foreign object damage to the ball. Valve should be tightened between flanges using appropriate gaskets and fasteners prior to usage. Tighten the bolts in compliance with the requirements of the gasket manufacturer. Unequal partial tightening may cause stress on lined pipes which may induce damages on the flange or excessive operation torque. Install valves in a manner that will allow future service and ease of operation. Use suitable tools when installing the valve. It is not permitted to make any alteration on the valves and the documentation without prior notifying the manufacturer with formal documentation. Connect flanges to the valve with gaskets in between using the appropriate sized bolts and heavy hex nuts which conform to ASME B16.5.

**CAUTION:** *Warren floating ball valves are designed to operate in fully open or fully closed position. Improper setting of valve and actuator stops can lead to a slightly open or closed positioning of valves which will cause damage to the ball and/or seat face and will cause valve leakage.*

**FLOATING BALL VALVES****6.1) Gear Operator Installation**

Warren floating ball valves are equipped with universal mounting plates for gear operator installation and are manufactured in accordance with ISO Mounting Pad 5211 specifications. For installation, place the gear operator over the stem and bolt down to the ISO mounting plate located on top of the valve. Gear operators have an arrow on the indicator cap located on top of the operator. This indicator cap shows whether the valve is in the “FULL OPEN” or “FULL CLOSED” position. Verify the position of ball and make adjustments to open and closed position utilizing the stop screws located on the side of the gear operator. (See figure 2)

Warren valves are equipped with an ISO mounting plate that will adapt to all types of actuators. For installation of actuation, you will need to verify stem diameter of valve and match that to gear operator sleeve diameter. If those dimensions differ, you will need to have an adapter coupler constructed along with an adapter bracket for coupling the stem to the gear operator and securing gear operator to valve. Follow actuator manufacturer instructions to set actuator stops.



While setting actuation stops, you must also verify that the valve is fully opening and fully closing. This is accomplished by verifying the stem key stock position when in both “FULL OPEN” and “FULL CLOSED” positions. The stem key stock will be perpendicular to the fluid bore centerline of valve in the full closed position and should be touching the full closed stop in the ISO adapter plate of the valve. The stem key stock will be in line with the fluid bore centerline of valve in the full open position in the ISO adapter plate of the valve.

On a Double - D design of stem, the flats of the stem are perpendicular to the fluid bore centerline of the valve when in the “FULL CLOSED” position. The flats of the stem are in line with the fluid bore centerline of the valve in the “FULL OPEN” position. These flats should be touching the ISO mounting plate stops in the full open and full closed positions.

- a) Setting the stop screws
  - i. Full Open position

**FLOATING BALL VALVES**

1. Verify that the valve will travel to the “FULL OPEN” position
  2. If the ball stops short of the full open position, back out the gear operator stop screws (counter clockwise) until the ball reaches the fully open position.
  3. Verify full open with position of stem key stock or Double – D flat locations in relation to the fluid bore centerline of valve.
  4. Turn the open valve stop screw clockwise until it stops, then tighten the lock nut.
- ii. Full closed position
1. Verify that the valve will travel to the “FULL CLOSED” position
  2. If the ball stops short of the full closed position, back the gear operator stop screws (counter clockwise) until the ball reaches the fully closed position.
  3. Verify full closed with position of stem key stock or Double – D flat locations in relation to the fluid bore centerline of valve.
  4. Turn the closed stop set screw clockwise until it stops, then tighten the lock nut.
- iii. Verify the valve opens and closes properly after gear operator installation by cycling three or four times. Verify that the gear operator stop set screws have been set properly
1. Perform a seat and seal test on each side of the valve to verify the stop set screws have been set properly and the valve is sealing in the “FULL OPEN” and “FULL CLOSED” positions.

**CAUTION:** *Verify that valve opens fully and closes fully after installation of gear operator. Ensure that the valve is not in a “throttling” or “pinching” flow situation. These situations will cause abnormal flow which will cause premature seat failure.*

**7) OPERATION**

Once the valve is installed in line, leave the valve in fully open or fully closed position depending on needed starting position. All ball valves of this series are 1/4 turn-operated valve, if the valve lever or handle is turned according to 90 degrees clockwise, the valve will be fully closed. If the valve lever or handle is turned according to 90 degrees counter clockwise, the valve will be fully opened. Partial opening or restricted flow can lead to excessive wear on seats, which will prevent the valve from sealing properly in the closed position. Warren floating ball valves are designed for on-off service only. Extending the lever or handle from the ball valve is to be considered misuse and can cause serious injuries, damages to the valve. Prior to operation, it might be necessary to flush the ball valve, valve cavity and the pipes to remove accumulated dirt and metal burrs. The valve maximum breakaway torques are available upon request. Keyhole to be locked is equipped at each position of open & close for preventive purposes against operation. It shall be locked to prevent valve from being operated.



## FLOATING BALL VALVES

### 8) MAINTENANCE

General maintenance requires periodic operation to ensure that the valve is properly functioning. Routine maintenance may consists of tightening the gland bolts periodically to compensate for stem seal wear. Overhaul maintenance consists of replacing seats and seals periodically in order to keep the valve functioning properly. Ball valves should not be immobilized for long periods of time. If possible, they should be cycled at periodic intervals to ensure continued and proper operation as part of your maintenance program.

**NOTE:** *Allowing sediment and build-up of foreign matter inside the valve body can not only limit the valve from opening and closing fully, but can also cause damage to the seat sealing surface of the valve.*

### 9) VALVE STORAGE

Warren Valves are positioned in the "FULL OPEN" position and plastic covers are pressed firmly into the ends of the valves to ensure that no foreign debris enter the valve at any time before installation. Valves should be stored in a suitably sheltered space to prevent contamination by weather, dirt, or moisture. Valves may rust or get contamination inside them over time if proper storage is not exercised.

**FLOATING BALL VALVES****10) TROUBLESHOOTING**

<b>SYMPTOM</b>	<b>POSSIBLE CAUSE</b>	<b>CORRECTIVE ACTION</b>
Valve is difficult to operate	<ol style="list-style-type: none"><li>1. Debris in valve.</li><li>2. Seats &amp; seals may be swollen.</li><li>3. Stem seized.</li></ol>	<ol style="list-style-type: none"><li>1. Flush valve to remove debris. Valve may have to be removed from the line in order to clean.</li><li>2. Remove valve from line and disassemble. Clean stem. Inspect stem seals and thrust bearing, replace worn part if required.</li><li>3. Trim incompatible with flow media. Reevaluate trim choice and replace with compatible seats &amp; seals.</li></ol>
Valve will not open or close	<ol style="list-style-type: none"><li>1. Foreign matter in line.</li><li>2. Iced up due to pressure drop or low temperatures.</li></ol>	<ol style="list-style-type: none"><li>1. Flush line to remove debris. In some cases valve may have to be removed from line to clean.</li><li>2. Flush line with warm liquid.</li></ol>
Leaking through valve when closed	<ol style="list-style-type: none"><li>1. Downstream seat is damaged or trapped debris inhibiting seal.</li></ol>	<ol style="list-style-type: none"><li>1. Clean/inspect and/or replace seat. Inspect ball for wear and replace if necessary.</li></ol>
Leakage from stem	<ol style="list-style-type: none"><li>1. Loose stem packing gland bolts.</li></ol>	<ol style="list-style-type: none"><li>1. Tighten stem packing bolts using a wrench. Only apply enough torque until the leak is stopped.</li></ol>



*INSTALLATION, OPERATION,  
MAINTENANCE MANUAL*

Document No.  
**IOM-FFBV**

Rev.  
**D**

Date  
**1.26.21**

Owner: Product Engineer

**FLOATING BALL VALVES**

**11) Revisions**

Revision	Description	Revision Date	Approved By
A	Original Issue	8.12.16	G. Mundy
B	Added most current pictures and edited content as requested.	8.17.16	G. Mundy
C	Added watermark to the document	9.15.2016	G. Mundy
D	Changed and updated the possible cause and corrective action section under troubleshooting	1.26.21	Jon Valliere