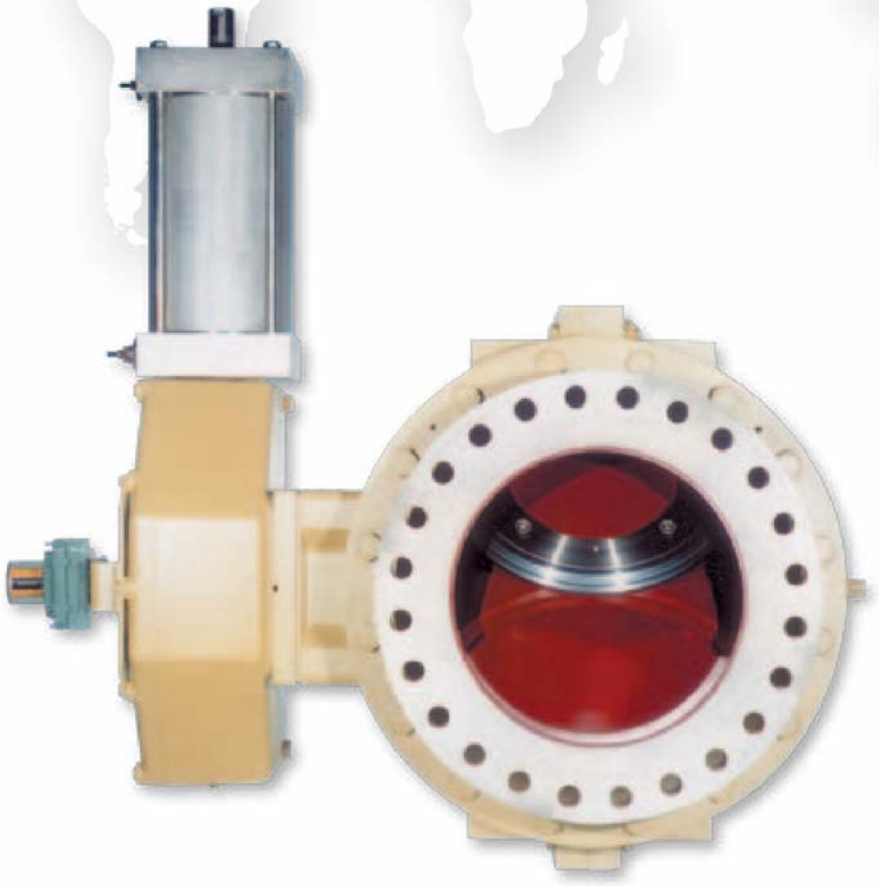
PRATT

Henry Pratt Company

Metal Seated Ball Valve



Engineering Creative Solutions
for Fluid Systems Since 1901

A Tradition of Excellence

With the development of the first rubber seated butterfly valve more than 70 years ago, the Henry Pratt Company became a trusted name in the flow control industry, setting the standard for product quality and customer service. Today Pratt provides the following range of superior products to the water, wastewater and power generation industries.

Butterfly Valves: from 3" to 162"

Rectangular Valves: 1' x 1' to 14' x 16'

Ball Valves –
Rubber Seated: from 4" to 60"
Metal Seated: from 6" to 48"

Plug Valves: from 1/2" to 36", 3 ways

Hydraulic Control Systems

Valve Controls

Energy Dissipating Valves and Fixed Energy Dissipaters

Cone Valves

Check Valves

A Commitment to Meeting The Customers' Needs

Henry Pratt valves represent a long-term commitment to both the customer and to a tradition of product excellence. This commitment is evident in the number of innovations we have brought to the industries we serve. In fact, the Henry Pratt Company was the first to introduce many of the flow control products in use today, including the first rubber seated butterfly valve, one of the first nuclear N-Stamp valves, and the bonded seat butterfly valve.

Innovative Products For Unique Applications

Though many of the standard valves we produce are used in water filtration and distribution applications, Pratt has built a reputation on the ability to develop specialized products that help customers to meet their individual operational challenges.

Creative Engineering for Fluid Systems

Pratt's ability to provide practical solutions to complex issues is demonstrated by the following case histories.

Earthquake Proof Valves

Pratt designed and manufactured hydraulically actuated valves for a water storage application so that the valves would automatically operate in the event of earthquakes. This lead to the development of a valve that will withstand acceleration forces of up to 6g's.

Custom Actuation/Isolation Valves

Pratt designed and manufactured valves that would isolate a working chamber in the event of a nuclear emergency during the decommissioning of armed nuclear warheads. The valves were able to close in a millisecond using specially designed Pratt electro-pneumatic actuators.

Valves Designed for Harsh Environments

Pratt designed and manufactured a 144" diameter butterfly valve for the emergency cooling system at a jet engine test facility. The valve was designed to supply water to help dissipate the tremendous heat generated by the engines during testing.

PRATT
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Through experience, commitment and creative engineering, Pratt is uniquely suited to provide superior products for our customers' special needs.
For more information, contact our corporate headquarters in Aurora, Illinois.

PRATT
Henry Pratt Company

401 South Highland Avenue
Aurora, Illinois 60506-5563
www.henrypratt.com
phone: 630.844.4000
fax: 630.844.4160

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Pratt / Metal Seated Ball Valve

Introduction

For more than seventy years, the Henry Pratt Company has provided superior quality valves for pump control applications. Continuing this tradition of excellence, in 1991 Pratt introduced a metal seated ball valve to the municipal water and waste water marketplace. Further design developments resulting from the use of state-of-the-art software technology have led to improvements in the seat geometry and additional features to help propel Pratt into the forefront of metal seated ball valve technology.

The Pratt metal seated ball valve is constructed of the highest quality materials and workmanship, backed by decades of engineering and manufacturing know-how. Designed to meet or exceed AWWA C507 standards for ball valves, the Pratt metal seated ball valve provides the following benefits to the user.

Scope of Line:
Metal Seated Ball Valves

Sizes: 6 through 48 inches

Pressure Class: ANSI B16.1 CL.125 or CL.250

Pressure Ratings: 150 or 300 psig

Shafts Available:
- ASTM A564
- Type 630 H1150 (17-4 PH)
- Stainless Steel

Actuators Available:
- Manual
- Cylinder
- Motor

18" Metal Seated Ball Valve

Feature	Benefit
Pressure Assisted Metal Seat	– Long life – No scraping, galling, or wedging during operation – Field adjustable
Cast Ductile Iron Construction	– Rated for 300 PSIG service* – Superior impact resistance – Higher strength than cast iron
Trunnion Mounted Bal	– Resists deflection – Allows smooth operation
100% Full Port Body Design	– Head loss equal to an equivalent length of straight pipe – Lower pumping requirements result in reduced power costs – Operates equally well at high or low velocities without cavitation
Self Flushing Operation	– Ideal for waste water pumping applications – Suitable for continuous throttling applications

* Consult factory for higher pressures

Suggested Specification for AWWA C507 Metal Seated Ball Valves

General

The ball valve shall be metal to metal seated with flanged ends, drilled to the applicable ANSI B16.1 standard Class 125. Valve shall have a clear unobstructed waterway, which will result in no significant head loss, when the valve is in the full open position.

The valve shall be drop tight and meet or exceed the AWWA C507-(latest revision) inspection and testing standard. The valve shall be single seated for pump control and rated at 150 or 300 psi. The valve shall be as manufactured by "HENRY PRATT CO."

The valve shall consist of a body, ball and operating unit (actuator).

Body

The body shall be cast ductile iron ASTM A 536 grade 65-45-12 having an inlet and outlet flanged waterway equal to the required valve size. Flanges shall be flat-faced and machined parallel to each other to within .005 inch. Valve body shall have both a drain and vent hole drilled and tapped.

The body shall have bronze bearings installed in each half accurately located in the center of the housing to receive the trunnion bearings on the ball and place the ball in the central position. The bearing load shall not exceed 2000 lb/sq. inch at 250 psi differential pressure. The body seat shall be Monel electronically fused to the base metal, then accurately machined to form the seating seal, or other C507-(latest revision) approved materials. The body seat shall not protrude into the waterway.

20" Metal Seated Ball Valves in Pump Control Service

Ball

The ball shall be cast ductile iron ASTM A 536 grade 65-45-12. It shall have integrally cast trunnions which will be bronze-bushed. One trunnion holds the operating shaft which passes through a packing seal area and connects to the actuator. To prevent leakage around the shaft, V-Type packing is installed to form a seal. The ball seat shall be stainless steel 300 series. It shall be a pressure-assisted design and by using an offset on the body and ball, the seats will only be in contact at the actual point of closing. The seat is connected to the ball by means of a stainless steel mounting ring which is securely attached and pinned into position after the correct setting has been attained. Seats threaded directly on to the ductile iron ball shall not be acceptable.

Valve seat assembly shall be fully adjustable and replaceable in the field without removing the valve from the line. The ball seat shall be located at the top, when the valve is in the open position.

Valve Actuators

Valve actuators shall conform to the operating requirements of AWWA Standard C507-(latest revision) and shall be designed to hold the valve in any intermediate position between full open and fully closed without creeping or fluttering.

A. Manual actuators shall be of the travelling nut, self-locking type and shall be equipped with mechanical stop limiting devices to prevent over-travel of the ball in the open or closed positions. Actuators shall be fully enclosed and designed to produce specified torque with a maximum pull of 80 lbs. on a handwheel or a maximum input of 150 ft.-lbs. on operating nuts. Actuator components shall withstand an input torque of 450 ft.-lbs. at extreme actuator positions without damage.

B. Cylinder actuators shall move the valve to any position from full open to fully closed when a maximum of _____ psi or a minimum of _____ psi is applied to the cylinder. All wetted parts of the cylinder shall be corrosion resistant and cylinder rods shall be chromium-plated stainless steel. Cylinders furnished with enclosed operating mechanisms shall have all wetted parts constructed of non-metallic materials except the cylinder rod which shall be chromium-plated stainless steel. Rod seals shall be of the non-adjustable wear-compensating type. A rod wiper for removing deposits inside the cylinder shall be provided in addition to the external dirt wiper. Cylinder actuators of this type shall be Pratt MDT with Duracyl cylinder.

Bearings

Bearings for ball and body trunnions shall be bronze of dissimilar hardness as per AWWA C507-(latest revision) standard to prevent galling or binding. Self-lubricating Teflon reinforced would also be acceptable.

Shafts

Acceptable materials for valve shafts shall be: ASTM A 564 Type 630, H1150 (17-4 PH) Stainless Steel, or other C507-(latest revision) approved materials.

Valve Testing

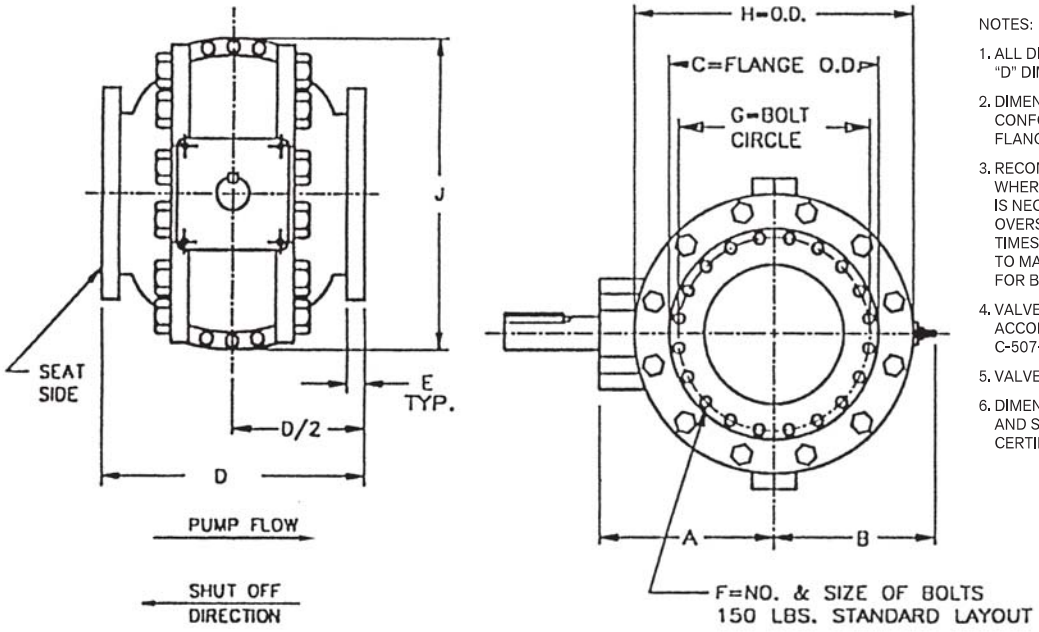
All ball valves shall be subjected to hydrostatic, shop leakage and performance tests as specified in AWWA Standard C507-(latest revision). Maximum seat leakage allowance 1 fl. oz. per diameter inch per hour as per AWWA C507-(latest revision).

Valve Painting

All internal ductile iron surfaces, except finished or bearing surfaces, shall be shop painted, and AWWA C550.

All exterior steel or cast or ductile iron surfaces of each valve, except finished or bearing surfaces, shall be shop painted with one or more coats of Alkyd primer.

Dimensional Data: 150# Metal Seated Ball Valve

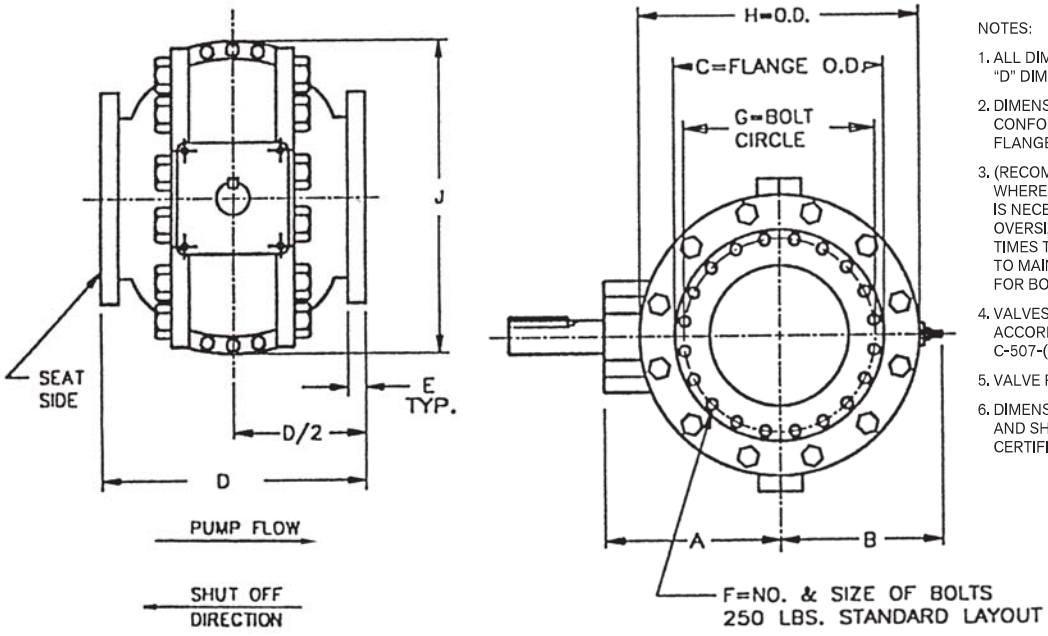


NOTES:

1. ALL DIMENSIONS SHOWN IN INCHES. "D" DIMENSION ± 1/8".
2. DIMENSIONS AND DRILLING OF END FLANGES CONFORM TO THE AMERICAN CAST IRON FLANGE STANDARDS, CLASS 125 (B16.1).
3. RECOMMENDATIONS FOR MATING FLANGES WHERE INSULATING BUSHINGS ARE USED, IT IS NECESSARY THAT BOLT HOLES BE DRILLED OVERSIZE BY AN AMOUNT EQUAL TO TWO TIMES THE INSULATING SLEEVE THICKNESS TO MAINTAIN THE SAME MINIMUM CLEARANCE FOR BOLTS.
4. VALVES MANUFACTURED AND TESTED IN ACCORDANCE WITH AWWA SPECIFICATIONS C-507-(LATEST REVISION).
5. VALVE ROTOR SHOWN IN OPEN POSITION.
6. DIMENSIONS GIVEN ARE NOMINAL ENVELOPE AND SHOULD NOT BE USED IN PLACE OF CERTIFIED DRAWINGS.

VALVE SIZE	A	B	C	D	E	F	G	H	J
6	10	12	11	14	1	8 x ¾	9½	18	15⅜
8	12⅜	10	13⅞	15	1⅛	8 x ¾	11¾	18⅝	20½
10	13¾	11¼	16⅜	18½	1¼	12 x ⅞	14¼	21 9/16	22
12	15⅛	12⅝	19⅜	19½	1¼	12 x ⅞	17	24¼	26¼
14	16⅝	14⅛	21⅜	22⅛	1⅜	12 x 1	18¾	27¼	31¼
16	17⅞	15⅝	23⅞	25	1½	16 x 1	21¼	29 11/16	34½
18	19¼	17⅝	25⅜	28½	1⅝	16 x 1⅛	22¾	32 7/16	37¾
20	20⅜	17¾	27⅞	30	1¾	20 x 1⅛	25	34 11/16	40¾
24	23¼	22	32⅜	35⅜	1⅞	20 x 1¼	29½	40 9/16	46½
30	28¼	26⅝	39⅛	44¼	2⅛	28 x 1¼	36	48¼	57⅛
36	32¾	31⅝	46⅜	53	2⅜	32 x 1½	42¾	56⅜	66¼
42	37 11/16	35⅞	53⅜	59½	2⅝	36x1½	49½	63⅛	77⅛
48	42 7/16	40⅜	59⅞	72	2¾	44 x 1½	56	71⅛	86¾

Dimensional Data: 300# Metal Seated Ball Valve

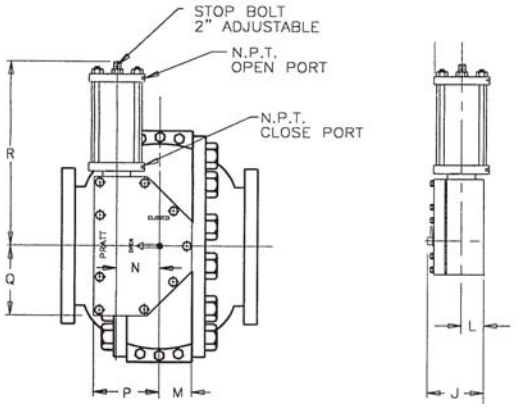


NOTES:

1. ALL DIMENSIONS SHOWN IN INCHES. "D" DIMENSION ± 1/8".
2. DIMENSIONS AND DRILLING OF END FLANGES CONFORM TO THE AMERICAN CAST IRON FLANGE STANDARDS, CLASS 250 (B16.1).
3. (RECOMMENDATIONS FOR MATING FLANGES) WHERE INSULATING BUSHINGS ARE USED, IT IS NECESSARY THAT BOLT HOLES BE DRILLED OVERSIZE BY AN AMOUNT EQUAL TO TWO TIMES THE INSULATING SLEEVE THICKNESS TO MAINTAIN THE SAME MINIMUM CLEARANCE FOR BOLTS.
4. VALVES MANUFACTURED AND TESTED IN ACCORDANCE WITH AWWA SPECIFICATIONS C-507-(LATEST REVISION).
5. VALVE ROTOR SHOWN IN OPEN POSITION.
6. DIMENSIONS GIVEN ARE NOMINAL ENVELOPE AND SHOULD NOT BE USED IN PLACE OF CERTIFIED DRAWINGS.

VALVE SIZE	A	B	C	D	E	F	G	H	J
6	10	12	12 1/2	14 7/8	17/16	12 x 3/4	10 5/8	18	15 3/8
8	12 3/8	10	15 3/8	15 1/4	1 5/8	12 x 7/8	13	18 5/8	20 1/2
10	13 3/4	11 1/4	17 7/8	20 1/8	1 7/8	16 x 1	15 1/4	21 1/2	22
12	15 1/8	12 5/8	20 7/8	21 3/8	2	16 x 1 1/8	17 3/4	24 1/4	26 1/4
14	16 5/8	14 1/8	23 3/8	26 1/2	2 1/8	20 x 1 1/8	20 1/4	27 1/4	31 1/4
16	17 7/8	15 5/8	25 7/8	27	2 1/4	20 x 1 1/4	22 1/2	29 11/16	34 1/2
18	19 1/4	17 5/8	28 3/8	31	2 3/8	24 x 1 1/4	24 3/4	32 7/16	37 3/4
20	20 3/8	17 3/4	30 7/8	34	2 1/2	24 x 1 1/4	27	34 11/16	40 3/4
24	23 1/4	22	36 3/8	39 1/8	2 3/4	24 x 1 1/2	32	40 9/16	46 1/2
30	28 1/4	26 5/8	43 3/8	47 1/4	3	28 x 1 3/4	39 1/4	48 1/4	57 1/8
36	32 3/4	31 5/8	50 3/8	55	3 3/8	32 x 2	46	56 3/8	66 1/4
42	37 11/16	35 7/8	57 3/8	63	3 3/4	36 x 2	52 3/4	63 1/8	77 1/8
48	42 7/16	40 3/8	65 3/8	74 1/2	4	40 x 2	60 3/4	71 1/8	86 3/4

6"-48" 150# and 300# Metal Seated Ball Valve with MDT and Cylinder Actuator



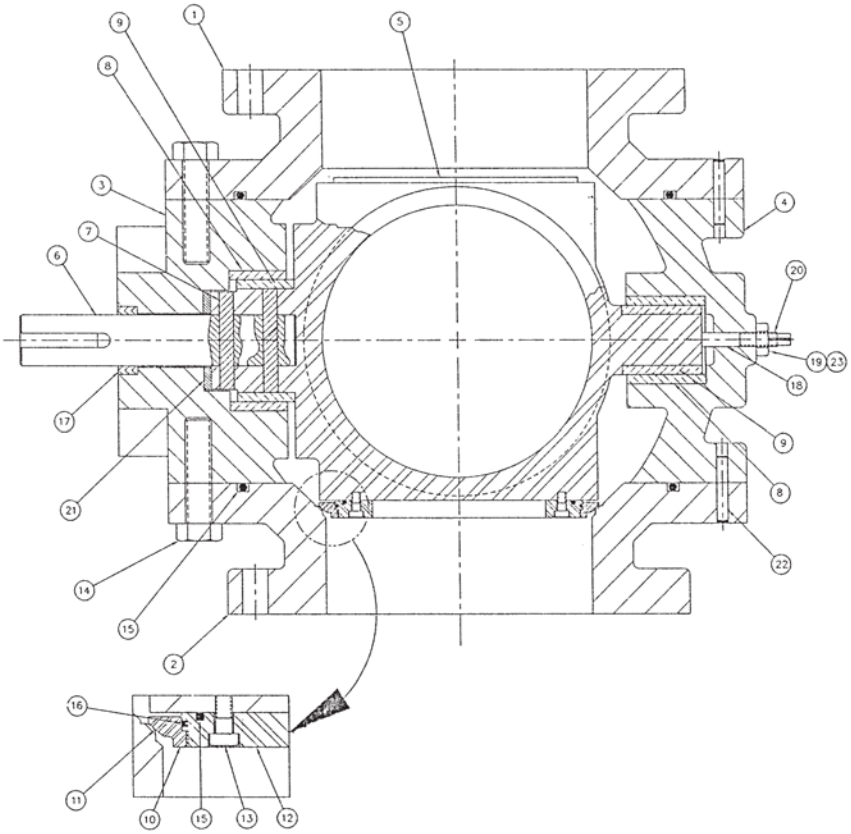
NOTES:

1. ALL DIMENSIONS SHOWN IN INCHES.

MDT-15 with cylinder actuator

ACTUATOR SIZE	J	L	M	N	P	Q	R
MDT4S	8	4 1/2	3 3/8	4	7 5/16	6 3/4	27 3/8
MDT5	10	5 5/8	4 1/2	5 1/2	8 3/4	10 1/2	33 1/2
MDT6S	11	7 5/8	7	8 1/4	12 5/8	18 9/16	44 1/4
MDT10	12 3/16	5 7/8	11 15/16	11 5/8	19 1/16	19 29/32	57 1/4
MDT15	16 3/16	7 7/8	16 1/4	17 1/2	27 1/8	27 1/8	70 1/2

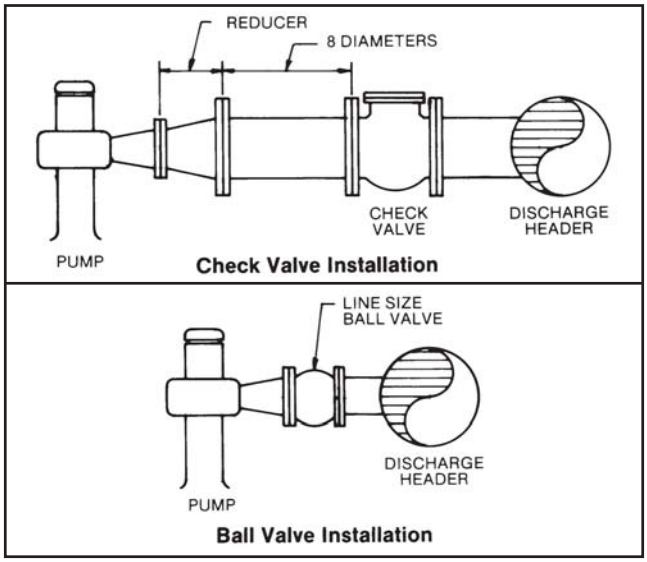
Design Details: Metal Seated Ball Valve 150#



ITEM NO.	DESCRIPTION	MATERIAL
1	END PIECE (RIGHT)	DUCTILE IRON ASTM A536- GR:65-45-12
2	END PIECE (LEFT)	DUCTILE IRON ASTM A536- GR:65-45-12
3	CENTER PIECE (TOP)	DUCTILE IRON ASTM A536- GR:65-45-12
4	CENTER PIECE (BOTTOM)	DUCTILE IRON ASTM A536- GR:65-45-12
5	ROTOR	DUCTILE IRON ASTM A536- GR:65-45-12
6	SHAFTS	STN. STL. ASTM A564 TYPE 630 COND. H1150
7	SHAFT PINS	STN. STL. ASTM A564 TYPE 630 COND. H1150
8	BEARINGS (BODY)	BRONZE ASTM B271 GR. C95400
9	BEARINGS (ROTOR)	BRONZE ASTM B584 GR. C93200
10	SEAT (ROTOR)	STN. STL. ASTM A351 GRADE CF8M
11	SEAT (BODY)	MONEL ALLOY UNS: N04060
12	RETAINER RING	STN. STL. ASTM A240 TYPE 316
13	CAP SCREWS	STAINLESS STEEL ASTM A193 GRADE B8M ANSI TYPE 316
14	CAP SCREWS	CARBON STEEL SAE GRADE 8
15	O-RING	BUNA-N
16	O-RING	BUNA-N
17	V-TYPE PACKING	BUNA-N
18	THRUST BEARING	BRONZE ASTM B505 ALLOY C93200
19	SEALING NUT	CARBON STEEL ASTM A307 GRADE B
20	THREADED STUD	STN. STL. ASTM A564 TYPE 630 COND. H1150
21	THRUST COLLAR	BRONZE ASTM B584 GR. 93200
22	SPRING PIN	STAINLESS STEEL TYPE 420
23	PARKER "THREDSEAL"	N/A

The full port ball valve with a properly selected automatic actuator is recognized by many experts in the industry as the ideal valve type for minimizing surges on pump start-up, shutdown and loss of power. In addition, the installed cost is often lower than other valve types and operating cost savings are lower than virtually all other valve types.

Lower Installation Cost



Center Post and Swing Check Valves have limitations based on maximum/minimum velocity and turbulence while efficient pump design has high exit velocities and considerable turbulence. The designer, therefore, must use an increaser on the pump discharge nozzle or specify a large discharge nozzle to accommodate the check valve. Additionally, some types of check valves require approximately 8 diameters of unrestricted pipe on the inlet side to ensure proper operation.

The Pratt Ball Valve does not have these restrictions and, therefore, the piping and building size can be smaller and less expensive.

Lower Operating Cost

While center post, swing and globe-type check valves may cost less initially, their high operating cost in terms of energy usage continue for the life of the plant as the table below indicates.

Because of their full port area, ball valves minimize pumping costs. Annual power costs in dollars can be calculated.

$$\text{Cost} = \frac{QHRT}{(5810)(e)}$$

Q=Flow Rate, gpm
H=Head Loss, Feet of Water Column
R=Electric Rate, $/KWHR
T=Yearly Use, Hours
e=Pump Efficiency

$$H = 2.33 \left(\frac{Q}{Cv}\right)^2$$

Annual costs are summarized below for commonly used values based on 75% use, 8 feet per second flow, 12¢/KWHR and 80% efficiency.

ANNUAL OPERATING COSTS, DOLLARS						
Valve Size	Pratt Ball Valve	Butterfly Valve	Plug Valve	Globe Valve	Swing Check	Tilt Check
8	$9.00	$145.50	$202.50	$1077.00	$210.00	$127.50
12	19.50	213.00	457.50	2700.00	477.00	285.00
16	36.00	378.00	810.00	4350.00	855.00	510.00
24	79.50	574.50	1830.00	9300.00	1950.00	1140.00
30	124.50	900.00	2850.00	–	3000.00	1800.00
36	180.00	975.00	4125.00	–	4200.00	2250.00

PRATT BALL VALVE Cv FULL OPEN			
Valve Size	Cv	Globe Valve	Cv
6	5250	24	84000
8	9330	30	131300
10	14600	36	189000
12	21000	42	257300
14	28600	48	336000
16	37300	54	425300
18	47300	60	525100
20	58300		