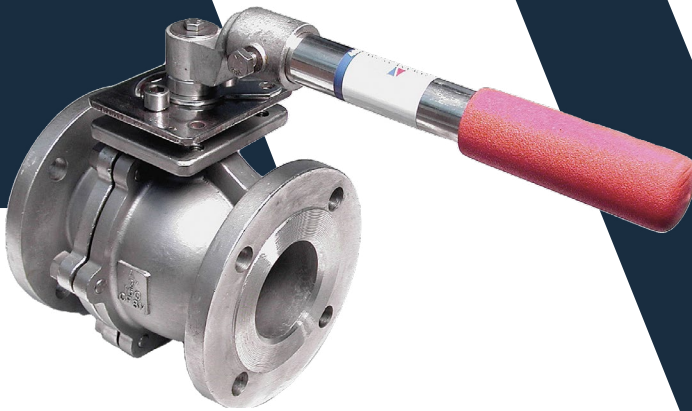




# 4000

## SERIES





## DELIVERING QUALITY SINCE 1901



### OUR TEAM

It is not enough to manufacture the highest quality valves on the market—we know it is also crucial to back them up with industry-leading customer service. At American Valve, our product specialists and customer service team are dedicated to supporting you and your project in every way possible.

From application questions to technical support, we're there to assist you via phone, email, and social media.



### OUR HISTORY

Founded in 1901, American Valve has demonstrated a long-standing commitment to quality. Our team works together to design and manufacture dependable plumbing, heating, and industrial flow control products of the highest standards.

For over 100 years, the American Valve brand has represented innovative commercial and industrial valves built with confidence and quality.



### OUR VALVES

Gate valves leak by design. They are made to a Class IV shut-off, and the discs and seat rings are constantly exposed to both wear and build-up of debris. They are also difficult to turn—often requiring a cheater bar to open.

The 4000 Series is the solution without compromise. Our design provides maximum flow rate free from obstruction. The seats are protected in the full open or closed position. Automation is a breeze with low operating torque and an ISO standard mounting pad. 4000 Series ball valves are used in critical applications around the world where gate, butterfly, or eccentric plug valves cannot be trusted.



GOLF COURSES, CITRUS GROVES,  
FARM FIELDS, PUBLIC PARKS,  
SPORTS FACILITIES



# APPLICATIONS

FOR THE 4000 SERIES BALL VALVE

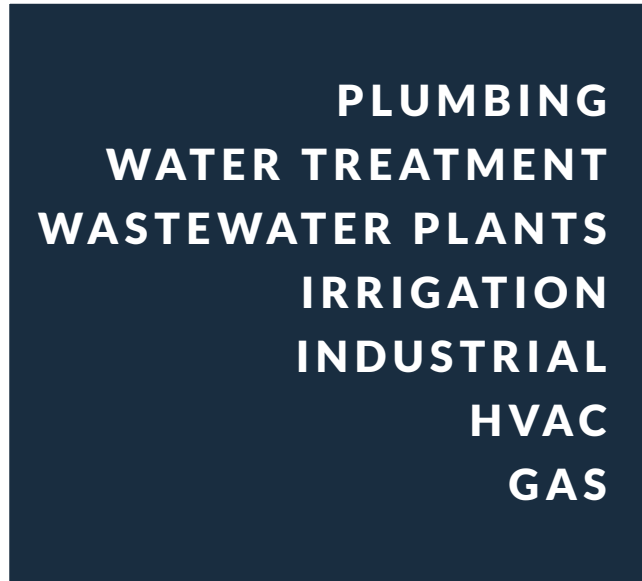
AIRLINES, DRAIN, WASTE, & VENT  
LINES, PUMP ISOLATION, WATER MAIN  
SHUTOFF



NATURAL GAS METER SETS,  
PROPANE GAS STORAGE & DISTRIBUTION



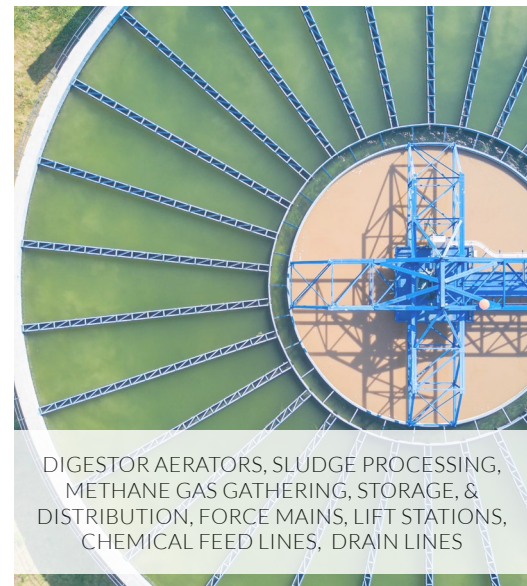
HI-RISE BUILDING BOOSTER  
PUMPS, DRAIN LINES, LEAD  
AND VOC FREE MATERIALS,  
GREEN INFRASTRUCTURE



**PLUMBING**  
**WATER TREATMENT**  
**WASTEWATER PLANTS**  
**IRRIGATION**  
**INDUSTRIAL**  
**HVAC**  
**GAS**



MINING, BIODIESEL & ETHANOL PRODUCTION, STORAGE, &  
DISTRIBUTION, PETROLEUM BLENDING, STORAGE, & LOADING,  
FOOD PROCESSING, PLANT UTILITIES, POWER PLANTS



DIGESTOR AERATORS, SLUDGE PROCESSING,  
METHANE GAS GATHERING, STORAGE, &  
DISTRIBUTION, FORCE MAINS, LIFT STATIONS,  
CHEMICAL FEED LINES, DRAIN LINES



# 4000 SERIES BALL VALVES

STRENGTH • LUBRICITY • BONDING

REMOVABLE HANDLE/  
A53 SCHEDULE 40 PIPE

BLOWOUT-PROOF  
STAINLESS STEEL STEM

LOCKABLE IN  
FULL OPEN OR  
CLOSED POSITIONS

ISO MOUNTING PAD  
FOR EASY AUTOMATION

POLYESTER  
POWDERCOATING

SAME FACE-TO-  
FACE FLANGED  
DIMENSIONS AS ANY  
125/150 CLASS GATE  
OR BALL VALVE

REINFORCED  
PTFE SEATS  
WITH LOW  
PRESSURE  
BACK SEAL

FULL PORT  
THROUGH 6 IN.

LEAD-FREE  
FOR POTABLE  
WATER

- CORROSION-RESISTANT
- INHIBITS SCALE BUILDUP
- LASTS TEN-TIMES LONGER
- EASY-TO-TURN



The 4000 Series Flanged Ball Valve replaces **any** traditional gate valve or eccentric plug valve. Featuring a corrosion-resistant PFA\* fused solid iron ball, the 4000 is more durable, less susceptible to accumulation of buildup, and longer-lasting than an ordinary unprotected ball.

With same end-to-end dimensions, and the convenience of a quarter-turn handle that dramatically lowers torque, the American Valve 4000 has continued to be the leader in ball valve technology.

*\*PFA is an ingredient commonly branded as Teflon®*



PFA\*-FUSED BALL



#### INSIDE THE AMERICAN VALVE PFA\*-FUSED BALL

- More corrosion-resistant than balls made with unprotected metal surfaces. (Refer to any manufacturer's chemical resistance guide for further information.)
- Inhibits the buildup of lime, calcium, sludge, etc. that accumulates on a ball's surface and prevents premature failure of the valve seats.
- 4000 Series valves with PFA\*-fused balls can last up to ten times longer than valves made with unprotected ball surfaces.
- The lubricity of the PFA\*-fused ball allows for lower torque ratings in any application, and eliminates ball pitting, prevents buildup, lowers torque, and stops premature valve failure.
- Since PFA\* is actually impregnated .008" into the solid metal, it can't wear, chip, or flake off.



## SPECIFICATIONS

- A126 Class B cast iron body
- PFA\* fused solid ball
- Blow-out proof stainless steel stem
- Reinforced PTFE seats
- Face to face and flanged dimensions conform to ANSI Standard B16.10 which exactly match end to end dimensions of all cast iron gate valves and plug valves
- Lockable in full open or closed positions
- ISO mounting pad for easy actuation
- Adjustable Length/removable handles to fit into areas of limited space
- Full port through 6"
- Certified to meet the requirements of:  
NSF/ANSI 61 and NSF/ANSI 372  
MSS SP-72  
ANSI B16.10  
FED. SPEC. WW-V-35  
AWWA C507-99 (Proof of Design)

## RATINGS

- 125 psi WSP
- 200 psi WOG
- 353° F
- This cast iron ball valve has been engineered to replace any IBBM gate valve, all iron gate valve, or plug valve.

\*PFA is an ingredient commonly branded as Teflon®.



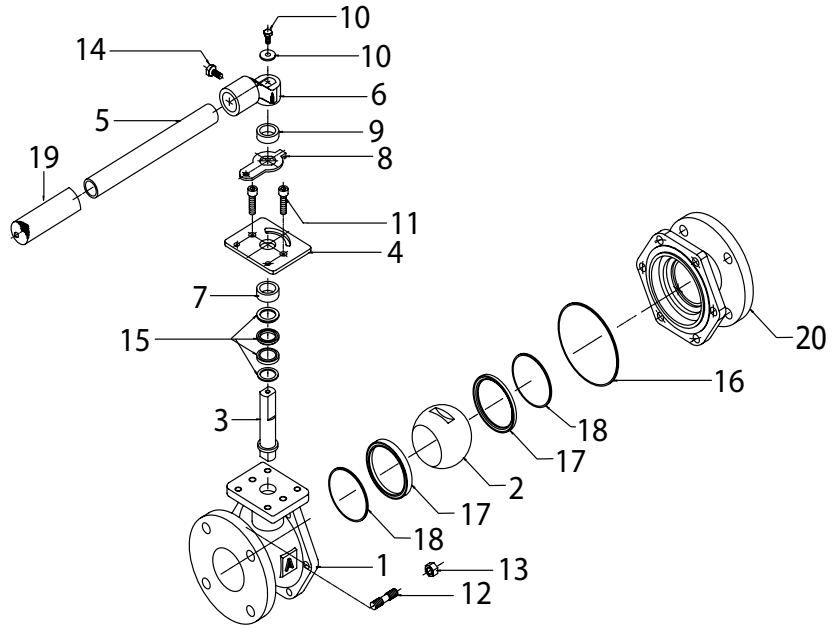
## SAMPLE SPECIFICATION

Ball valves shall be of the floating-ball design providing bi-directional, tight shutoff in accordance with MSS SP-72. The valves shall be rated at 125# WSP/200# WOG. Bodies shall be of cast iron per ASTM A126 Class B, With ANSI Class 125 flat-face flanges. The interior and exterior of the body shall be powder coated to meet NSF/ANSI 61 and NSF/ANSI 372. The ball shall be PFA infused cast iron, with a stainless steel blowout-proof stem. The seats and body seals shall be PTFE. The stem seal shall be PTFE, externally adjustable chevron type. Valves shall be equipped with locking handles as standard. Valves may be equipped with 2" square operating nuts, manual gear operators, or pneumatic, electric, or hydraulic actuators. Valves shall be the 4000 Series as manufactured by American Valve, Inc. or as approved by the engineer.



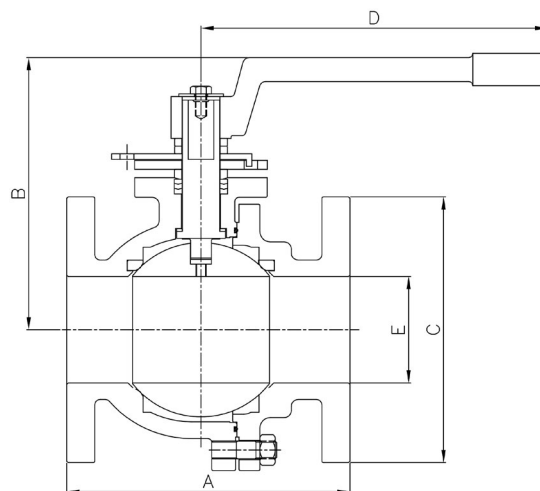
## MATERIAL SPECIFICATIONS

	Part	Material	ASTM
1	Body	Cast Iron	ASTM A126 Class B
2	PFA* Fused Ball	Cast Iron	ASTM A48 Class-35
3	Stem	Stainless Steel	ASTM SA 479 -10a
4	Gland Plate	Steel	ASTM A53M
5	Handle	Steel	ASTM A53M
6	Handle Bracket	Stainless Steel	ASTM A536
7	Packing Follower	Stainless Steel	ASTM SA 479 -10a
8	Stem Indicator	Steel	ASTM A53M
9	Handle Bracket Spacer	Stainless Steel	ASTM SA 479 -10a
10	Stem Stud	Steel	ASTM A193
11	Gland Stud	Steel	ASTM A53M
12	Body Stud	Steel	ASTM A53M
13	Body Nut	Steel	ASTM A53M
14	Handle Bracket Bolt	Steel	ASTM A193
15	Packing	PTFE	ASTM D3294
16	Body Gasket	PTFE	ASTM D3294
17	Seat Ring	RPTFE 15% GF	ASTM D4894
18	Back Seat O-Ring	PTFE	ASTM D3294
19	Handle Grip	Red Foam Rubber	ASTM D 749
20	Body Cap	Cast Iron	ASTM A126 Class B



## DIMENSIONS

	1/2"	3/4"	1"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"
A Face to Face	4.25"	4.625"	5"	6.5"	7"	7.5"	8"	9"	10.5"	11.5"	13"
B Center of Port to Top	4.25"	4.25"	4.75"	6"	6.5"	7.5"	8.25"	9"	12"	12.25"	13.5"
C Flange Diameter	3.5"	3.875"	4.25"	5"	6"	7"	7.5"	9"	11"	13.5"	16"
D Center of Valve to Handle End	11.875"	11.875"	11.875"	12.25"	12.5"	14"	14"	16"	30.5"	30.5"	33.625"
E Port Diameter	0.5"	0.75"	1"	1.5"	2"	2.5"	3"	4"	6"	6"	7.875"
Bolt Holes	4	4	4	4	4	4	4	8	8	8	12
Weight lbs.	6	7	10	17	24	43	50	77	149	190	309
CV	26	50	100	260	500	750	1245	2500	5470	4150	6700
Mounting Pad				F07	F07	F10	F10	F10	F12	F12	F12





**MODEL 4000D**  
DUCTILE IRON FLANGED END BALL VALVE



**SPECIFICATIONS:**

- A536 grade 65-45-12 ductile iron body
- PFA\* fused solid stainless steel ball
- Blow-out proof stainless steel stem
- Reinforced PTFE seats
- Face to face and flanged dimensions conform to ANSI Standard B16.10 which exactly match end to end dimensions of carbon steel ball valves, ductile iron gate valves, and plug valves
- Lockable in full open or closed positions
- ISO mounting pad for easy actuation
- Adjustable length/removable handles to fit into areas of limited space
- Full port through 6"
- Certified to meet the requirements of:  
NSF/ANSI 61 and NSF/ANSI 372  
MSS SP-72  
ANSI B16.5 Raised Face  
FED. SPEC. WW-V-35  
AWWA C507-99 (Proof of Design)

**RATINGS:**

- 150 psi WSP
- 300 psi WOG
- 366° F
- This ductile iron ball valve has been engineered to replace any plug valve, carbon steel ball valve, or gate valve.

\*PFA is an ingredient commonly branded as Teflon®.



**WATER QUALITY**  
IN ACCORDANCE  
WITH NSF/ANSI 372  
<MH60647>



**WATER QUALITY**  
NSF/ANSI 61  
<MH60647>

**SAMPLE SPECIFICATION**

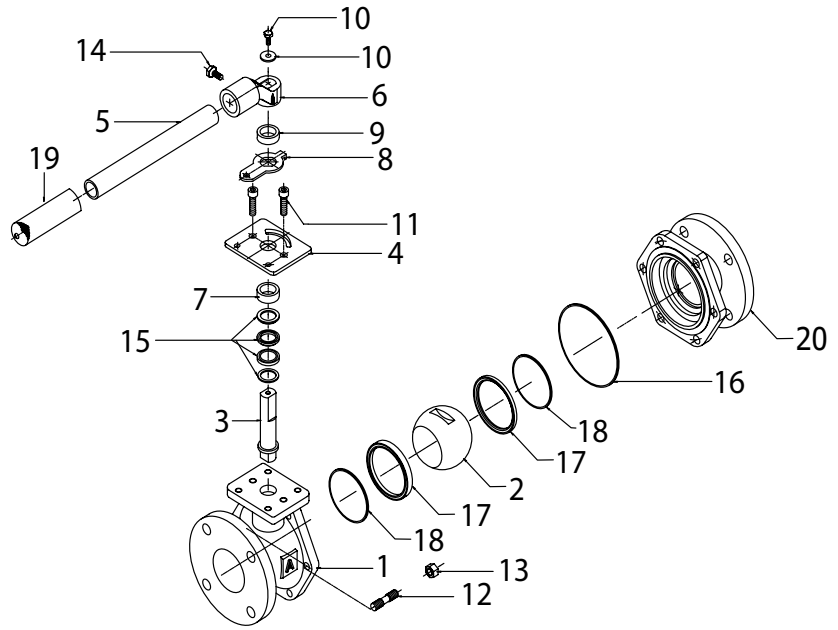
Ball valves shall be of the floating-ball design providing bi-directional, tight shutoff in accordance with MSS SP-72. The valves shall be rated at 150# WSP/300# WOG. Bodies shall be ductile iron per ASTM A536, With ANSI Class 150 raised-face flanges. The interior and exterior of the body shall be powder coated to meet NSF/ANSI 61 and NSF/ANSI 372. The ball shall be PFA infused stainless steel, with a stainless steel blowout-proof stem. The seats and body seals shall be PTFE. The stem seal shall be PTFE, externally adjustable chevron type. Valves shall be equipped with locking handles as standard. Valves may be equipped with 2" square operating nuts, manual gear operators, or pneumatic, electric, or hydraulic actuators. Valves shall be the 4000D Series as manufactured by American Valve, Inc. or as approved by the engineer.





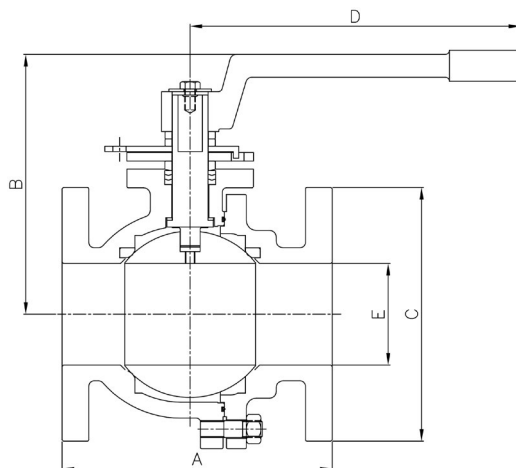
## MATERIAL SPECIFICATIONS

	Part	Material	ASTM
1	Body	Ductile Iron	ASTM A536
2	PFA* Fused Ball	Stainless Steel	ASTM A743 GR.CA 15
3	Stem	Stainless Steel	ASTM SA 479 -10a
4	Gland Plate	Steel	ASTM A53M
5	Handle	Steel	ASTM A53M
6	Handle Bracket	Ductile Iron	ASTM A536
7	Packing Follower	Stainless Steel	ASTM SA 479 -10a
8	Stem Indicator	Steel	ASTM A53M
9	Handle Bracket Spacer	Stainless Steel	ASTM SA 479 -10a
10	Stem Stud	Steel	ASTM A193
11	Gland Stud	Steel	ASTM A53M
12	Body Stud	Steel	ASTM A53M
13	Body Nut	Steel	ASTM A53M
14	Handle Bracket Bolt	Steel	ASTM A193
15	Packing	PTFE	ASTM D3294
16	Body Gasket	PTFE	ASTM D3294
17	Seat Ring	RPTFE 15% GF	ASTM D4894
18	Back Seat O-Ring	PTFE	ASTM D3294
19	Handle Grip	Red Foam Rubber	ASTM D 749
20	Body Cap	Ductile Iron	ASTM A536



## DIMENSIONS

	2"	2 1/2"	3"	4"	6"	8"	10"
A Face to Face	7"	7.5"	8"	9"	10.5"	11.5"	13"
B Center of Port to Top	6.5"	7.5"	8.25"	9"	12"	12.25"	13.5"
C Flange Diameter	6"	7"	7.5"	9"	11"	13.5"	16"
D Center of Valve to Handle End	12.5"	14"	14"	16"	30.5"	30.5"	33.625"
E Port Diameter	2"	2.5"	3"	4"	6"	6"	7.875"
Bolt Holes	4	4	4	8	8	8	12
Weight lbs.	25	42	55	78	149	194	318
CV	500	750	1245	2500	5470	4150	6700
Mounting Pad	F07	F10	F10	F10	F12	F12	F12





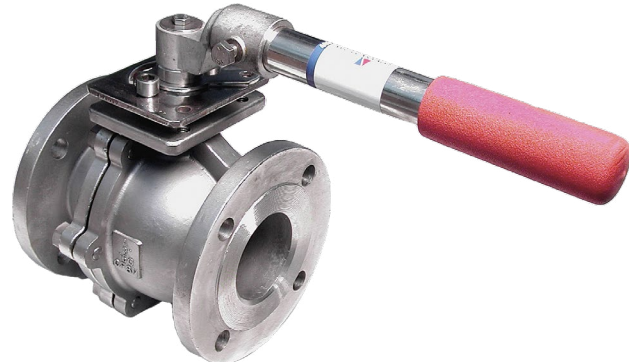
## SPECIFICATIONS

- Cast 316 stainless steel (CF8M)
- PFA\* fused solid stainless steel ball
- Blow-out proof stainless steel stem
- Reinforced PTFE seats
- Full opening for unrestricted flow
- Lockable in full open or closed positions
- API 607 fire safe design
- Mounting pad for easy actuation
- Adjustable length/removable handles to fit into areas of limited space
- Certified to meet the requirements of NSF/ANSI 61 and NSF/ANSI 372  
MSS SP-72

## RATINGS

- 150 psi WSP
- 300 psi WOG
- 366° F
- This Stainless steel ball valve with PFA\* fused ball has been engineered to more effectively resist corrosion and prolong valve life.

\*PFA is an ingredient commonly branded as Teflon®.



**WATER QUALITY**  
IN ACCORDANCE  
WITH NSF/ANSI 372  
<MH60647>



**WATER QUALITY**  
NSF/ANSI 61  
<MH60647>

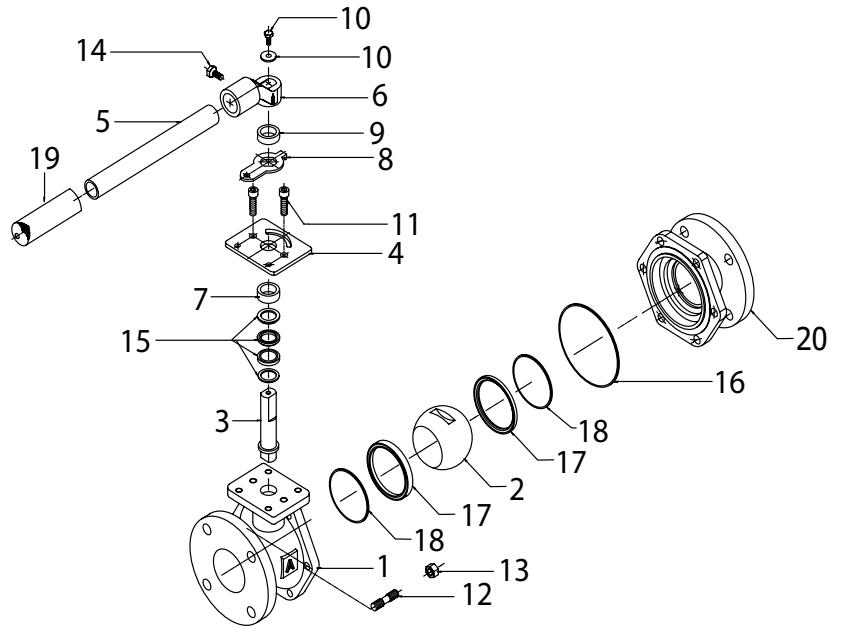
## SAMPLE SPECIFICATION

Ball valves shall be full port and of the floating-ball design providing bi-directional, tight shutoff in accordance with MSS SP-72. The valves shall be rated at 150# WSP/300# WOG. Bodies shall be stainless steel per ASTM A351-CF8M, With ANSI Class 150 raised-face flanges. The ball shall be PFA infused stainless steel, with a 316 stainless steel blowout-proof stem. The seats and body seals shall be PTFE. The stem seal shall be PTFE, externally adjustable chevron type. Valves shall be equipped with locking handles as standard. Valves may be equipped with 2" square operating nuts, manual gear operators, or pneumatic, electric, or hydraulic actuators. Valves shall be the Series 4001 as manufactured by American Valve, Inc. or as approved by the engineer. The valve shall be certified to meet the requirements of NSF/ANSI 61 and NSF/ANSI 372.



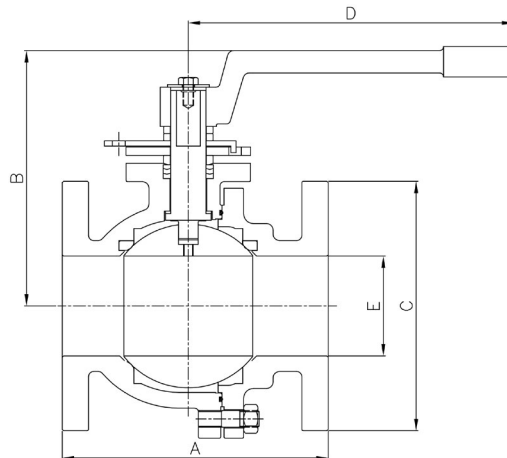
## MATERIAL SPECIFICATIONS

	Part	Material	
1	Body	Stainless Steel	ASTMA351-CF8M
2	PFA* Fused Ball	Stainless Steel	ASTMA351-CF8M
3	Stem	Stainless Steel	ASTMA276-316
4	Gland Plate	Stainless Steel	ASTM A479-11
5	Handle	Stainless Steel	ASTMA312
6	Handle Bracket	Stainless Steel	ASTMA351 CF8
7	Packing Follower	Stainless Steel	ASTMA276-316
8	Stem Indicator	Stainless Steel	ASTM A479-11
9	Handle Bracket Spacer	Stainless Steel	ASTMA276-316
10	Stem Stud	Stainless Steel	ASTM 0193-B8
11	Gland Stud	Stainless Steel	ASTM 0193-B8
12	Body Stud	Stainless Steel	ASTM 0193-B8
13	Body Nut	Stainless Steel	ASTM 0193-B8
14	Handle Bracket Bolt	Stainless Steel	ASTM 0193-B8
15	Packing	PTFE	ASTM D3294
16	Body Gasket	PTFE	ASTM D3294
17	Seat Ring	RPTFE 15% GF	ASTM D4894
18	Back Seat O-Ring	PTFE	ASTM D3294
19	Handle Grip	Red Foam Rubber	ASTM D 749
20	Body Cap	Stainless Steel	ASTMA351-CF8M



## DIMENSIONS

	1 1/2"	2"	2 1/2"	3"	4"	6"
A Face to Face	6.5"	7"	7.5"	8"	9"	10.5"
B Center of Port to Top	6"	6.5"	7.5"	8.25"	9"	12"
C Flange Diameter	5"	6"	7"	7.5"	9"	11"
D Center of Valve to Handle End	12.25"	12.25"	14"	14"	16"	30.5"
E Port Diameter	1.5"	2"	2.5"	3"	4"	6"
Bolt Holes	4	4	4	4	8	8
Weight lbs.	16	22	38	49	73	145
CV	260	500	750	1245	2500	5470
Mounting Pad	F07	F07	F10	F10	F10	F12





# ADVANTAGES

of the 4000 Series Ball Valve versus the Gate, Butterfly, and Plug Valve

## 4000 SERIES

### VS. TRADITIONAL GATE VALVES

- Quarter turn provides instant shutoff.
- Full unobstructed opening provides superior flow rate.
- Easy to open and close, no cheater bar required.
- Class VI positive shutoff.
- No bronze seat rings, bronze disc rings or bronze stems to wear out.
- Lighter than gate valves, making installation and handling easier.
- Handle shows whether open or closed.
- Ball wipes clean during opening and closing.
- No bronze parts enables use in all-iron gate valve applications.
- Compact design fits into areas of limited space.
- Throttling is permitted. Open and shut are not the only working positions.
- Low profile design enables easier storage and shipping.
- Can be locked in either open or closed position.
- PFA\* fused ball resists corrosion, in a wider range of applications.
- Zero wear rate in the open position.
- Packaging prevents damage during shipping and facilities storage.
- Easy and inexpensive to rebuild/repair.

## 4000 SERIES

### VS. BUTTERFLY VALVES

- No disc in waterway to create turbulence .
- Same ANSI flanged dimensions as gate valves for easier retrofit.
- PTFE seats, not Buna N or EPDM.
- More suitable for steam, petroleum, and corrosive applications.
- Main seating surface does not face upstream pressure in open position.
- Full opening provides superior flow characteristics.
- PTFE packing instead of O-ring stem seals.
- Class VI positive shutoff.
- Blow-out proof stainless steel stem.

## 4000 SERIES

### VS. PLUG VALVES

- Full unobstructed flow.
- No exposed internal components to catch and retain debris.
- No lubrication required to ensure smooth operation and maintain seals.
- Lower torque for more efficient and cost effective automation.
- Class VI positive shutoff.





## MORE THAN JUST A VALVE



American Valve offers a complete package of pneumatic, hydraulic and electric actuators, gear operators, and operating nuts for the 4000 Series. Our unique PFA\* fused ball and lower operating torques make the 4000 Series an effective alternative to cast iron gates, carbon steel ball valves, carbon steel gate valves, and plug valves. Our in-house automation program provides a fast, cost-effective, and turn-key solution for your automation needs.

Pneumatic, hydraulic and electric actuators made for the 4000 Series have an unmatched cycle life and are the industry-wide preference for even the most severe applications. These actuators offer adaptability to a variety of process conditions to accommodate your application.

The flexible, modular design of the patented 4000 Series can be used to combine actuators, solenoid valves, limit switches, and other accessories in a variety of applications. American Valve delivers the 4000 Series fully automated and factory tested under a single manufacturer's warranty.

Standard 2" square operating nuts are available to effectively satisfy underground requirements.

## OPERATING TORQUES

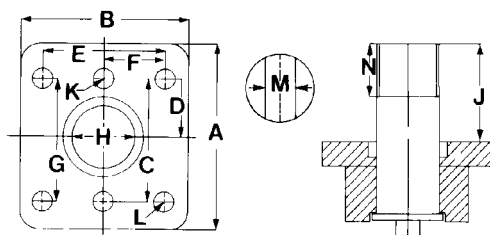
The actual amount of torque required to operate a valve is dependent upon many variables, such as line pressure, temperature, type of fluid, and frequency of operation. This table is based on average breakaway torque requirements for a valve handling a clean, particle-free liquid such as water. The following chart includes a safety allowance for service conditions. The torque figures listed should be further adjusted for dry or special service conditions.

For fluids with high solids or abrasive content, consult factory for recommendations.

Size	Torque (ft. lbs.)
½"	10
¾"	10
1"	10
1 ½"	20
2"	35
2 ½"	48
3"	62
4"	130
6"	260
8"	360
10"	535

## MOUNTING PAD DIMENSIONS

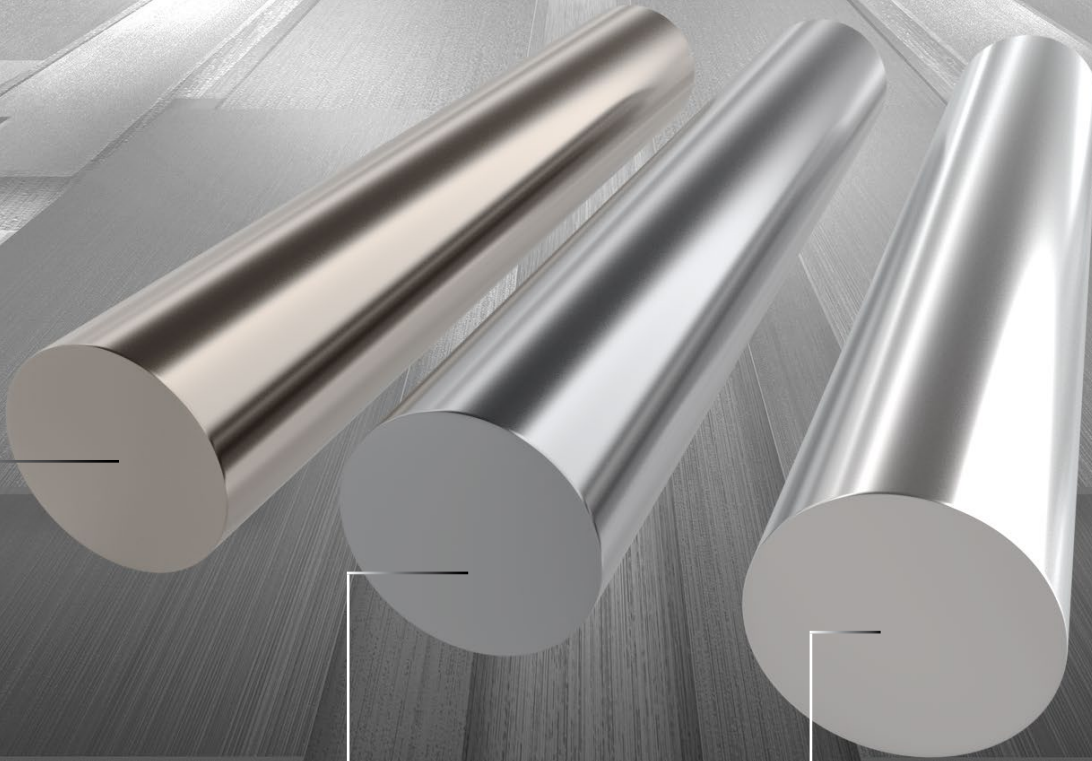
Size	A	B	C	D	E	F	G	H	J	K	L	M	N
½	2.37	1.75	1.565	0.57	1.14	0.57	1.14	0.5	1.5	2 x M8	4 x .25UNC	0.31	0.67
¾	2.37	1.75	1.565	0.57	1.14	0.57	1.14	0.5	1.5	2 x M8	4 x .25UNC	0.31	0.67
1	2.37	1.75	1.565	0.57	1.14	0.57	1.14	0.5	1.5	2 x M8	4 x .25UNC	0.31	0.67
1 ½	3.62	2.746	2.323	0.985	1.97	0.985	1.97	0.825	2.1	2 x M12	4 x M8	0.47	1.495
2	3.62	2.746	2.323	0.985	1.97	0.985	1.97	0.825	2.1	2 x M12	4 x M8	0.47	1.495
2 ½	4.725	3.74	2.957	1.418	2.835	1.418	2.835	1.1	2.4	2 x M12	4 x .4375UNC	0.665	1.81
3	4.725	3.74	2.957	1.418	2.835	1.418	2.835	1.1	2.4	2 x M12	4 x .4375UNC	0.665	1.81
4	4.725	3.74	2.957	1.418	2.835	1.418	2.835	1.1	2.4	2 x M12	4 x .4375UNC	0.665	1.81
6	5.16	4.725	3.465	1.733	3.465	1.733	3.465	1.775	2.75	2 x .5UNC	4 x .5UNC	1.06	2.205
8	5.16	4.725	3.465	1.733	3.465	1.733	3.465	1.775	2.75	2 x .5UNC	4 x .5UNC	1.06	2.205
10	5.16	4.725	3.465	1.733	3.465	1.733	3.465	1.775	2.75	2 x .5UNC	4 x .5UNC	1.06	2.205



Dimensions and weights are given as approximates; consult factory for details.



# METALLURGY



## **CAST IRON** A126 CLASS B CAST IRON

- For most non-corrosive applications.
- Lowest cost.
- Best valve for utility service.

## **DUCTILE IRON** A536 GRADE 65-45-12 DUCTILE IRON BODY

- Lower cost alternative to steel for utility and petrochemical applications where thermal crack resistance is required.

## **STAINLESS STEEL** CAST STAINLESS STEEL (CF8M)

- Better resistance to cracking/pitting.
- Reduced risk of stress corrosion.
- Corrosion resistance across the entire pH range.



## METALLURGY TECHNICAL INFO FOR 4000 SERIES

	Minimum Tensile Strength	Minimum Yield Point	Minimum Elongation
Grey Iron A126 Class B	31,000 psi	---	0.1%
Ductile Iron A536 Grade 65-45-12	65,000 psi	45,000 psi	12%
Carbon Steel A216 WCB	70,000 psi	30,000 psi	22%
304 Stainless Steel A-351 CF8	70,000 psi	28,000 psi	35%
316 Stainless Steel A-351 CF8M	70,000 psi	30,000 psi	30%

Model 4000 is made of cast iron (ASTM A126 Class B, standard gray iron). Model 4000D is made of ductile iron (ASTM 536, grade 65-45-12). Model 4001 is made of stainless steel (ASTM A351 CF8M).

It is useful to understand basic information about ferrous metals (cast irons, steels) and their relationships. 100% pure iron is never used as a cast metal because it is too soft and weak. When carbon is added, hardness and strength appear. When approximately 0.3% carbon is added, the resulting alloy is steel. Steel is a strong but difficult ferrous metal to manufacture from a production standpoint. Adding more carbon (up to about 2%) creates even more production problems. These “semi-steels” are seldom used.

When more carbon is added (between 2% and 3%), white iron is formed. White iron is true cast iron and is easy to produce. The problem with white iron is that it is very brittle because the carbon exists as iron carbide instead of pure carbon. Iron carbide (Fe<sub>3</sub>C) is a hard and brittle compound sometimes referred to as cementite. If white iron is subjected to a lengthy heat treatment, the Fe<sub>3</sub>C decomposes into iron and nodules of graphite. The end product is malleable iron.

When approximately 3.5% carbon is added, Fe<sub>3</sub>C exceeds its solubility in solid iron (the Fe<sub>3</sub>C is fully absorbed in the iron until there is no room left. The excess Fe<sub>3</sub>C is dispersed as graphite flakes). The result is gray iron. Grey iron (standard cast iron) delivers only moderate strength with almost no elongation because the excess Fe<sub>3</sub>C flakes act as stress raisers (they make cast iron easy to crack). Since gray iron is so economical to produce, its use has been widespread for centuries.

Cast Iron with spheroidal graphite (ductile iron) was first produced in 1948. Its chemical composition and percent of carbon is about the same as gray iron. The transformation to ductile iron occurs when molten gray iron is treated with magnesium. The insertion of magnesium into the pouring ladle (the process is called inoculation) transforms the Fe<sub>3</sub>C flakes into spheroids. These spheroids

	Grey Iron	65-45-12 Ductile Iron	WCB	CF8	CF8M
Carbon % (max.)	3.500	3.500	0.300	0.080	0.080
Manganese %	0.500	0.100	1.000	1.500	1.500
Phosphorous %	0.100	0.030	0.040	0.040	0.040
Sulfur %	0.100	0.005	0.050	0.040	0.040
Nickel %	0.020	0.000	0.500	8.000	9.000
Chromium %	0.050	0.025	0.040	18-21	18-21
Molybdenum %	0.05	0.002	0.250	-	2-3
Silicon %	2.100	3.200	0.300	2.000	2.000
Magnesium %	0.005	0.025	-	-	-

strengthen the metal by acting as crack arresters instead of crack facilitators. Ductile iron is sometimes referred to as spheroidal or nodular iron.

65-45-12 ductile iron is named for its physical properties (65,000 psi tensile strength, 45,000 psi yield, 12% elongation). Ductile iron chemically can be manufactured as Ferritic or Pearlitic. In Ferritic mixes, the graphite spheroids are in a matrix of pure iron. In Pearlitic mixes, the graphite spheroids are in a matrix of pure iron and cementite (Fe<sub>3</sub>C). The most common grade of ductile is Pearlitic-Ferritic, a combination of the two. American Valve's 4000D uses a predominately Ferritic mix (9:1) to take advantage of its high impact resistance and added tensile strength (80,000 psi).

Except where API 800° F fire safe standards are required for petrochemical refineries, ductile iron is generally preferable to a carbon steel because WCB has a tendency to flake, whereas ductile iron powders when subjected to liquid erosion. Ductile iron also possesses 50% higher yield strength properties and is more cost effective. Ductile iron castings have a maximum temperature rating of 650° F. Traditional glass reinforced PTFE seats begin to deform at 360° F.

ASTM A536-70 (MIL SPEC D-4512) requires each casting to be marked by its foundry heat number. Each heat is chemically tested prior to magnesium inoculation and also afterwards. Chemical certification by heat number is available upon request.

Standard cast steel (carbon steel) uses the symbol WCB and is defined under ASTM A-216. It contains a maximum of 0.3% carbon. Stainless steel (ASTM A-351) has carbon levels even lower than WCB (0.08% maximum) making its production more costly. 304 Stainless Steel (CF8) adds 8% nickel, about 20% chromium, and a little more silicon. 316 stainless steel (CF8M) adds 2-3% molybdenum to the above. The addition of chromium, nickel and molybdenum enhances corrosion resistance, allowing CF8M to be utilized in a wide variety of chemical, petrochemical, and corrosive environments.

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## 4000 SERIES

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