AVCO

Alloy Valves and Control

BALL VALVES
1500 SERIES

Size

1/4” - 4” (Full Port)

End Connections

NPT
Butt Weld
Socket Weld
Flanged (150#, 300#, 600#)
AN Fittings
SAE AS5202

Valve Materials

316 Stainless Steel
Hastelloy C
Monel 400

Ball and Stem Materials

316 Stainless Steel
Hastelloy C
Monel 400

Seat Materials

Teflon (PTFE)
Dyneon™ (TFM™)
Carbon Filled Teflon
Kel-F (PCTFE)

Flow Pattern

Uni-directional (standard)
Bi-directional (upon request)

Service Applications

Aerospace
Cryogenic Service
Food Processing
Liquid H_2
Liquid N_2
Liquid O_2
LNG
Petro-Chemical

Applicable Standards

ASME B16.34
MSS SP-134
API 598
API 607 4th Edition
BS 6364

3400 W. Fordham Av, Santa Ana, CA 92704 Tel (714) 427-0877 Fax (714) 427-6392 Website: www.avcovalve.com

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BALL VALVES 1500 SERIES

About the 1500 Series Ball Valve

The AVCO 1500 series ball valve brings all the features and benefits of our 1100 series valve to the cryogenic market. Utilizing design aspects of ASME B16.34 & ASME B31.3, it incorporates a single piece cryogenic bonnet extension bolted to the main valve body. The valve is available off the shelf or with customized bonnet lengths to give greater flexibility and ensure the operator is at a sufficient distance from the pipeline. The seal between the bonnet and valve is achieved with an engineered Flexitallic spiral wound gasket. The cryogenic bonnet houses an extended stem and, unlike most valve manufacturers, the valve is sealed twice – once at the valve body and again at the top of the bonnet. Sealing occurs at the thrust washers inside the body and bonnet to reduce the potential for leakage. The upper mount pad complies with ISO 5211 and provides positive travel stops and lock off. Inter-changeability enables this valve to be supplied as an L-port cryogenic diverter valve with bottom or side entry ports or as a Vee ported cryogenic control valve. Ideally suited to the aerospace, petrochemical, liquid nitrogen, LNG and liquid oxygen markets, this valve will meet all your requirements.

Design

- The main valve body has three cast sections (body and two end caps).
- The three cast sections are bolted together and conform to ASME B16.34 for wall thickness and bolting.
- The bonnet is an engineered single piece bolted to the valve body with its wall thickness and bolting designed using ASME B31.3.
- Valves are available up to class 600 or 2000 WOG.
- The end to end dimensions conform to ASME B16.10 for class 300 and 600 flanged versions and to AVCO standards for all other end styles including class 150 flanged.
- Butt weld ends conform to ASME B16.25.
- Flange ends conform to ASME B16.5.
- Threaded ends conform to ASME B1.20.1, B16.11 & B16.34.
- Socket weld ends conform to ASME B16.11 & B16.34.
- The ball is a vented full port for uni-directional flow (bi-directional option is available upon request).
- A flow direction arrow is added to the body for all standard uni-directional valves.
- The seats are encapsulated for greater durability.
- The valve is available for fire safe installations.
- The valve is designed for minimal pressure drop across the valve.
- The valve body has an integral mounting pad conforming to ISO 5211.
- The stem is bottom entry and has blow-out prevention.
- The stem has packing/sealing at two locations.
- The bonnet gasket is Flexitallic stainless steel 316 spiral wound with Flexicarb or Teflon filler.
- The body seal material is available in several materials to cover different media types.
- The seat material is available in several materials to cover different media types
- The stem assembly enables online adjustment of the packing.
- The packing material matches the seat material.
- The valves are tested to API 598 and ASME B16.34.
- Valve sizes available are 1/4” thru 4”.

Operation

The following operators can be utilized on the valve:

- Electric motor actuator.
- Hydraulic actuator.
- Manual (Lever handles etc.)
- Pneumatic actuator.
- Worm Gear operator.

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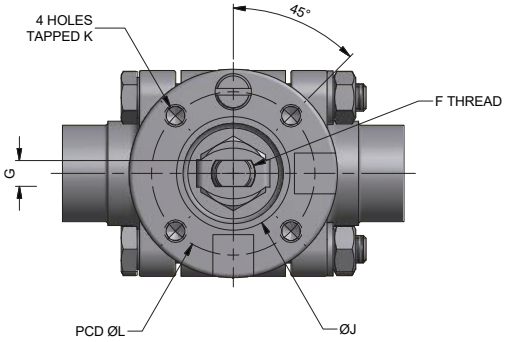
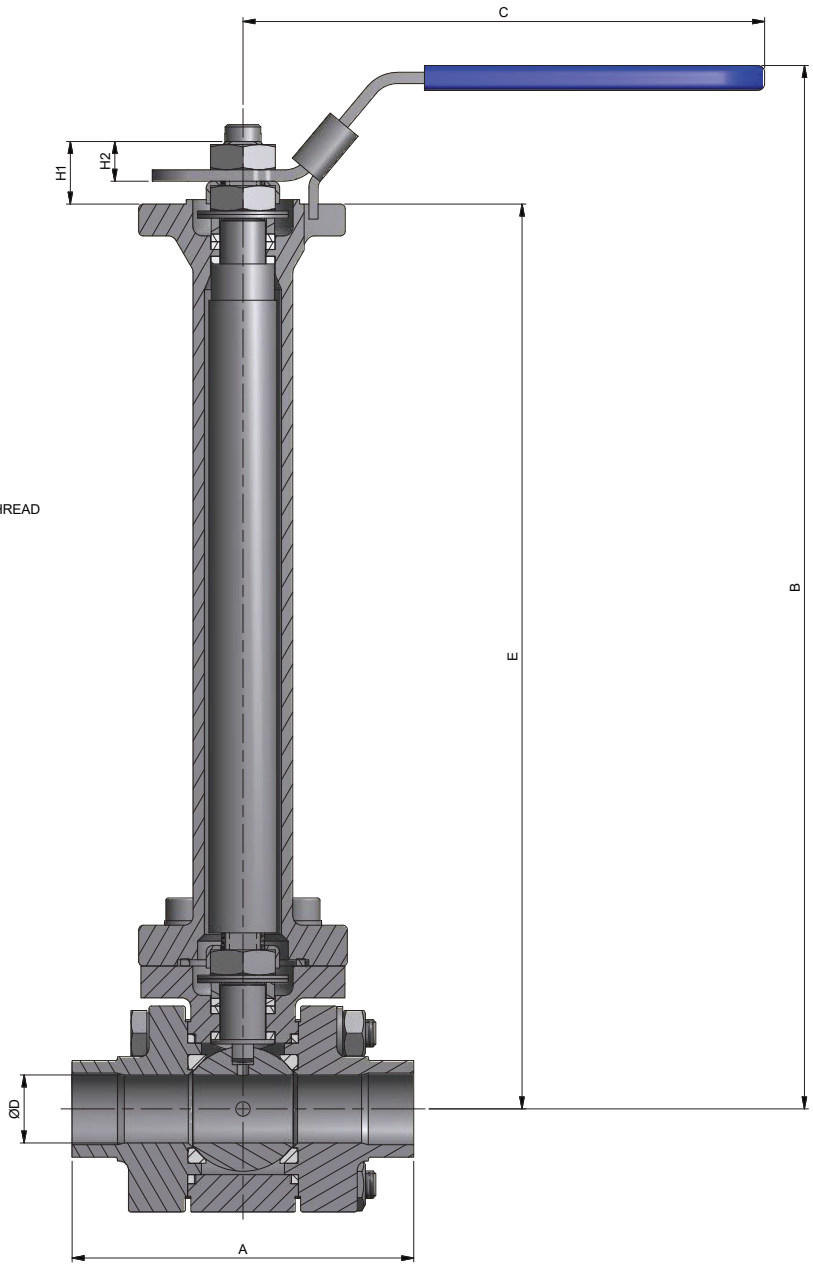
BALL VALVES
1500 SERIES

1/4" THRU 3/4"



Plan View with Handle Removed



SIZE	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F	G (in.)	H1 (in.)	H2 (in.)	J (in.)	K	L (in.)	ISO 5211	Cv	Weight (lbs)
1/4"	2.61	9.06	4.53	0.36	7.85	3/8-24 UNF	0.224	0.524	0.344	0.984	M5	1.417	F03	9	3.7
3/8"	2.61	9.06	4.53	0.49	7.85	3/8-24 UNF	0.224	0.524	0.344	0.984	M5	1.417	F03	18	3.7
1/2"	2.97	9.06	4.53	0.59	7.85	3/8-24 UNF	0.224	0.524	0.344	0.984	M5	1.417	F03	28	3.7
3/4"	3.18	9.14	4.53	0.75	7.93	3/8-24 UNF	0.224	0.524	0.344	0.984	M5	1.417	F03	49	4.5

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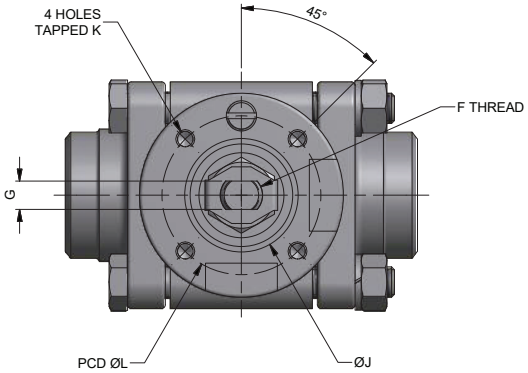
BALL VALVES
1500 SERIES

1” THRU 2”



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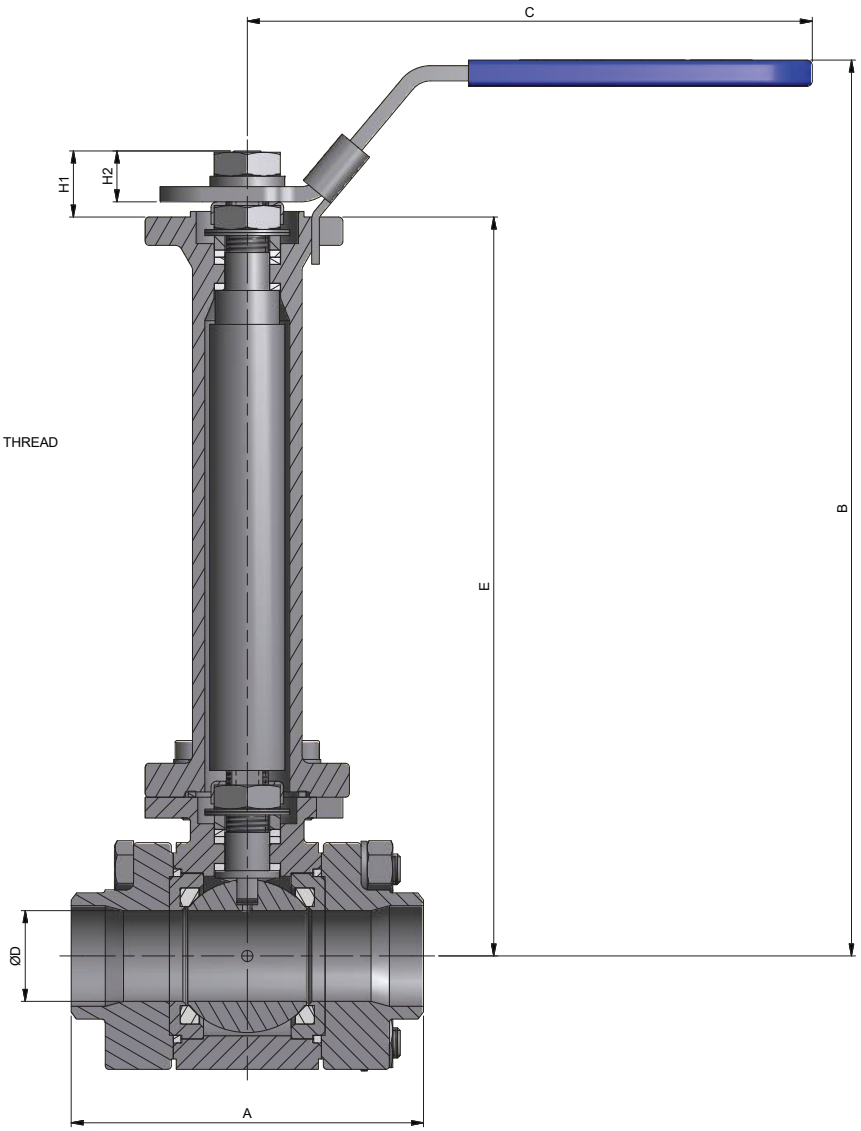

SIZE	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F	G (in.)	H1 (in.)	H2 (in.)	J (in.)	K	L (in.)	ISO 5211	Cv	Weight (lbs)
1”	3.67	9.35	5.91	0.95	7.70	7/16-20 UNF	0.295	0.654	0.478	1.181	M5	1.654	F04	82	7.1
1 1/4”	4.37	9.55	5.91	1.18	7.89	7/16-20 UNF	0.295	0.654	0.478	1.181	M5	1.654	F04	135	9.5
1 1/2”	4.72	11.30	6.85	1.50	9.35	9/16-18 UNF	0.339	1.122	0.660	1.378	M6	1.969	F05	225	13.9
2”	5.53	11.66	6.85	1.97	9.71	9/16-18 UNF	0.339	1.122	0.660	1.378	M6	1.969	F05	400	19.6

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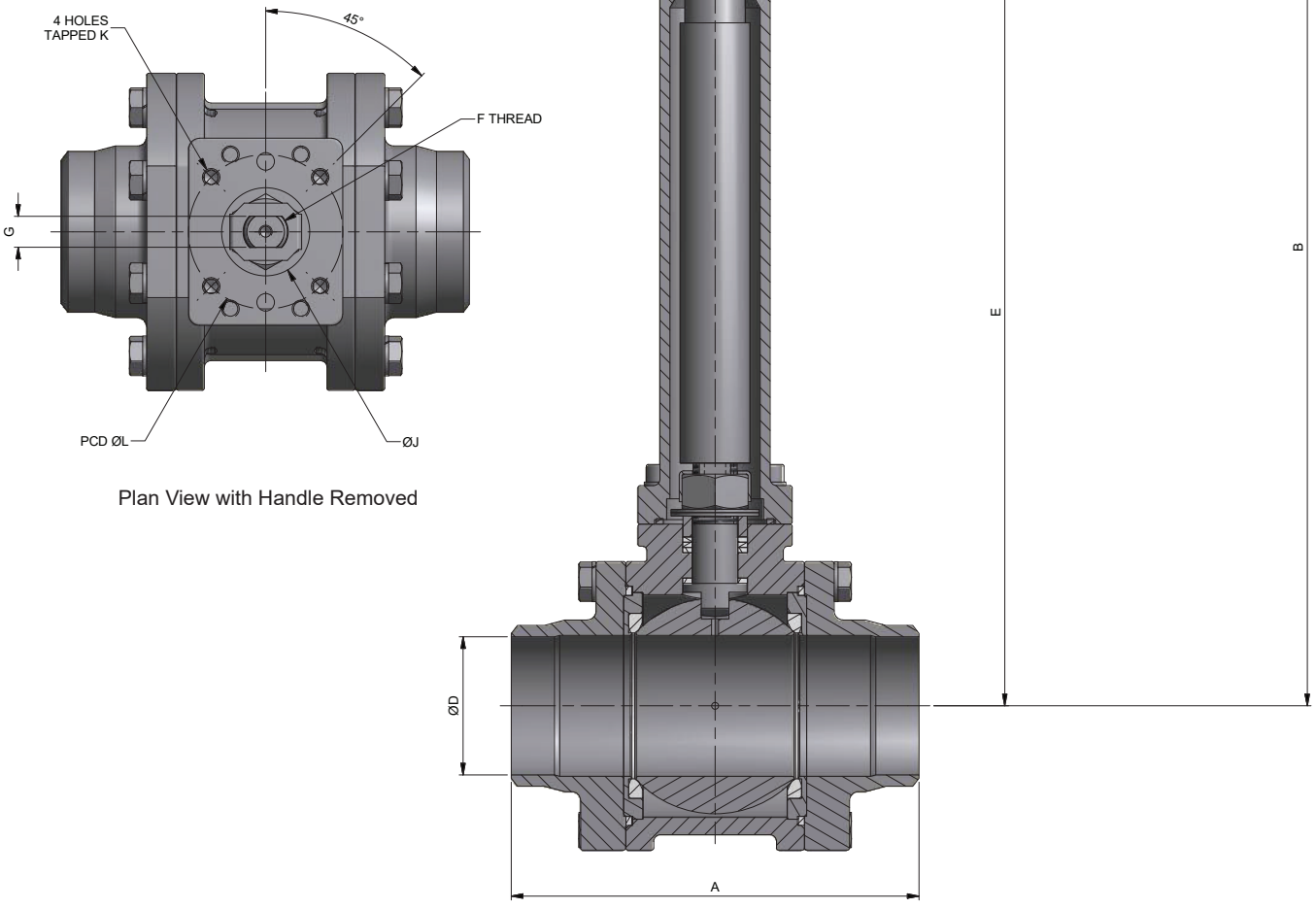
BALL VALVES
1500 SERIES

2 1/2”



Plan View with Handle Removed

SIZE	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F	G (in.)	H1 (in.)	H2 (in.)	J (in.)	K	L (in.)	ISO 5211	Cv	Weight (lbs)
2 1/2”	7.27	16.39	8.84	2.52	14.08	M20	0.551	1.673	0.728	1.575	M8	2.756	F07	665	35.8

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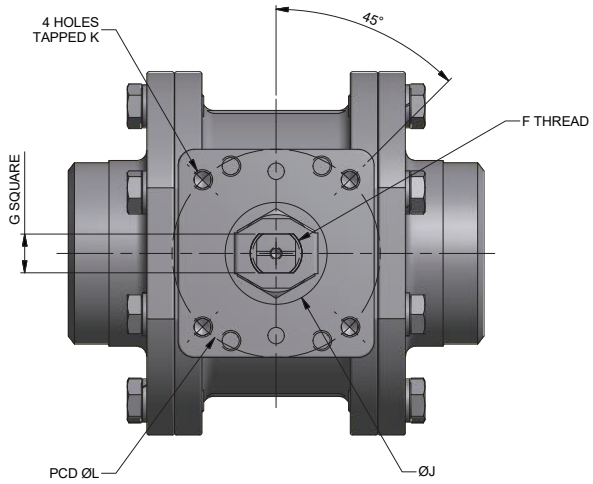
BALL VALVES
1500 SERIES

3” & 4”



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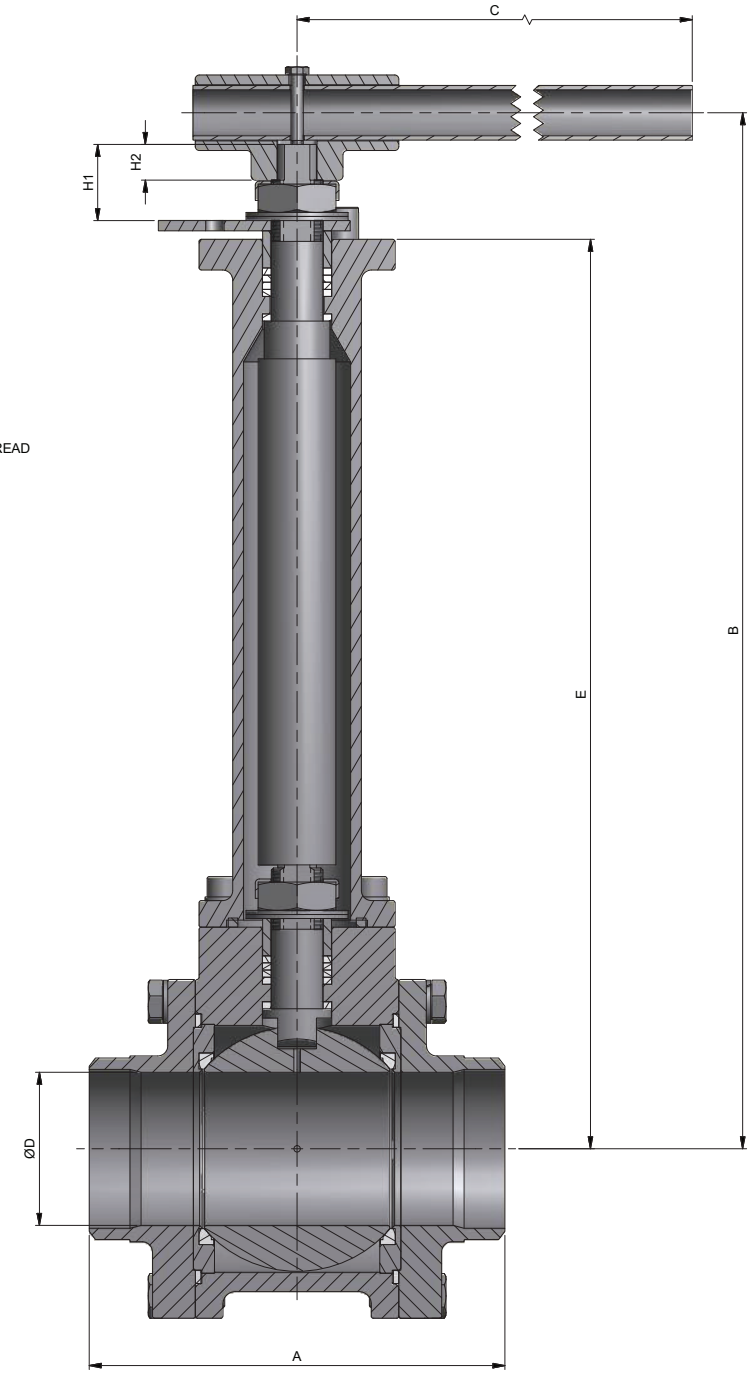

SIZE	A (in.)	B (in.)	C (in.)	D (in.)	E (in.)	F (in.)	G (in.)	H1 (in.)	H2 (in.)	J (in.)	K	L (in.)	ISO 5211	Cv	Weight (lbs)
3”	8.02	19.98	13.74	2.95	17.54	1-14 UNS	0.748	1.823	0.685	1.969	M10	4.016	F10	935	65.4
4”	9.46	20.52	13.74	3.78	18.08	1-14 UNS	0.748	1.823	0.685	1.969	M10	4.016	F10	1575	82.7

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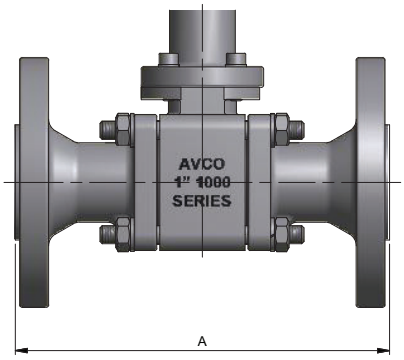
Flanged Ends (150#, 300#, 600#)

SIZE	A (in.)		
	150#	300#	600#
1/2”	5.50	5.50	6.50
3/4”	6.00	6.00	7.50
1”	6.50	6.50	8.50
1 1/4”	7.00	7.00	9.00
1 1/2”	7.50	7.50	9.50*
2”	8.50	8.50	11.50*
2 1/2”	9.50	9.50	13.00*
3”	11.12	11.12	14.00*
4”	12.00	12.00	17.00*

See tables on pages 3 thru 6 for all other dimensions



Note

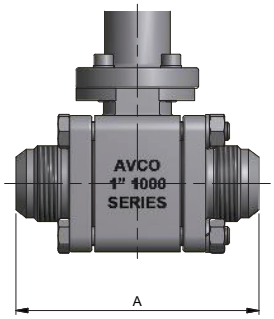
Flanged ends are raised face per ASME B16.5. End to end dimensions meet ASME B16.10 for class 300 and 600. Please contact AVCO if you require flanged ends other than raised face or custom end to end dimensions.

* Valve body wall thicknesses and bolting for sizes 1 1/2” thru 4” with class 600 flanges do not meet ASME B16.34.

AN Fitting Ends

SIZE	A (in.)
1/4”	2.77
3/8”	2.77
1/2”	2.96
3/4”	3.61
1”	4.22
1 1/4”	5.04
1 1/2”	5.55
2”	6.99

See tables on pages 3 thru 6 for all other dimensions



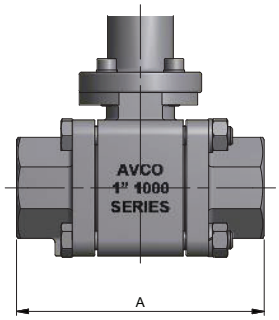
Note

AN Fitting ends are 37° flare type meeting SAE AS4395. They are designed for use with fittings per SAE AS4841.

Internal Straight Thread Ends

SIZE	A (in.)
1/4”	3.04
3/8”	3.04
1/2”	3.04
3/4”	3.73
1”	4.30
1 1/4”	4.98
1 1/2”	5.32
2”	6.44

See tables on pages 3 thru 6 for all other dimensions



Note

Internal Straight Thread ends meet SAE AS5202. They are designed for use with fittings per SAE AS4875.

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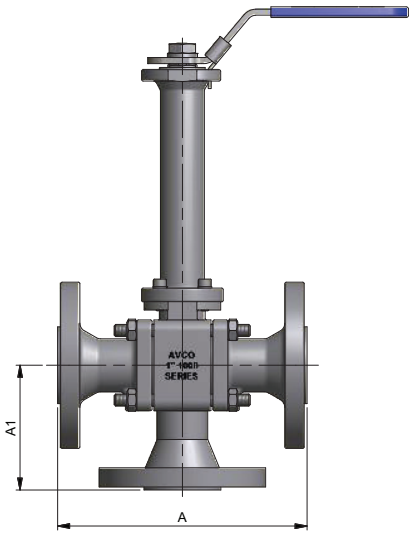
3 Way Bottom Entry with Flanged Ends (150#, 300#, 600#)

SIZE	A (in.)			A1 (in.)		
	150#	300#	600#	150#	300#	600#
1/2”	5.50	5.50	6.50	2.75	2.75	3.25
3/4”	6.00	6.00	7.50	3.00	3.00	3.75
1”	6.50	6.50	8.50	3.25	3.25	4.25
1 1/4”	7.00	7.00	9.00	3.50	3.50	4.50
1 1/2”	7.50	7.50	N/A	3.75	4.33	N/A
2”	8.50	8.50	N/A	4.25	4.75	N/A
2 1/2”	9.50	9.50	N/A	4.75	5.75	N/A
3”	11.12	11.12	N/A	6.25	6.25	N/A
4”	12.00	12.00	N/A	7.25	7.25	N/A

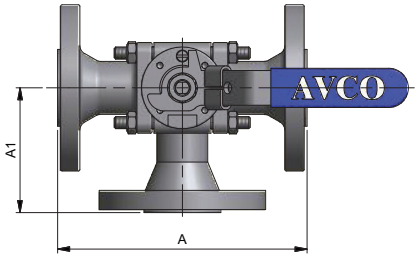
See tables on pages 3 thru 6 for all other dimensions



3 Way Side Entry with Flanged Ends (150#, 300#, 600#)

SIZE	A (in.)			A1 (in.)		
	150#	300#	600#	150#	300#	600#
1/2”	5.50	5.50	6.50	2.75	2.75	3.25
3/4”	6.00	6.00	7.50	3.00	3.00	3.75
1”	6.50	6.50	8.50	3.25	3.25	4.25
1 1/4”	7.00	7.00	9.00	3.50	3.50	4.50
1 1/2”	7.50	7.50	N/A	3.75	4.33	N/A
2”	8.50	8.50	N/A	4.25	4.75	N/A
2 1/2”	9.50	9.50	N/A	4.75	5.75	N/A
3”	11.12	11.12	N/A	6.25	6.25	N/A
4”	12.00	12.00	N/A	7.25	7.25	N/A

See tables on pages 3 thru 6 for all other dimensions



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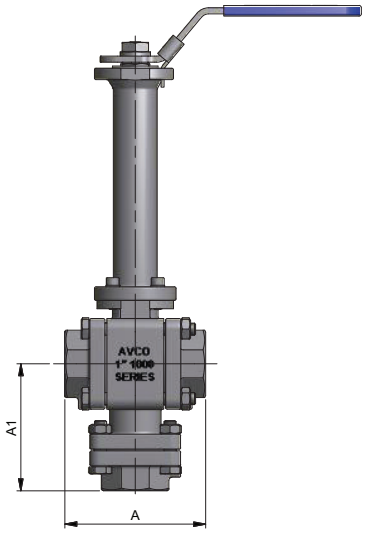
3 Way Bottom Entry with BW, NPT or SW Ends

SIZE	A (in.)	A1 (in.)
1/4”	2.61	2.72
3/8”	2.61	2.72
1/2”	2.95	2.90
3/4”	3.17	3.05
1”	3.67	3.31
1 1/4”	4.37	3.93
1 1/2”	4.72	4.23
2”	5.53	4.85

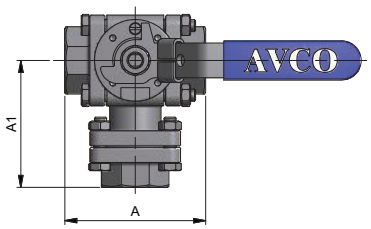
See tables on pages 2 & 3 for all other dimensions



3 Way Side Entry with BW, NPT or SW Ends

SIZE	A (in.)	A1 (in.)
1/4”	2.61	2.72
3/8”	2.61	2.72
1/2”	2.95	2.90
3/4”	3.17	3.05
1”	3.67	3.31
1 1/4”	4.37	3.93
1 1/2”	4.72	4.23
2”	5.53	4.85

See tables on pages 2 & 3 for all other dimensions



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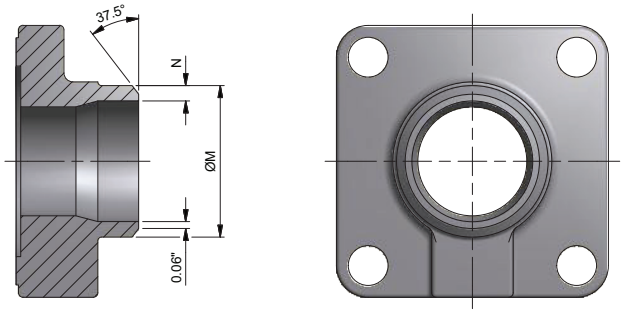
BALL VALVES 1500 SERIES

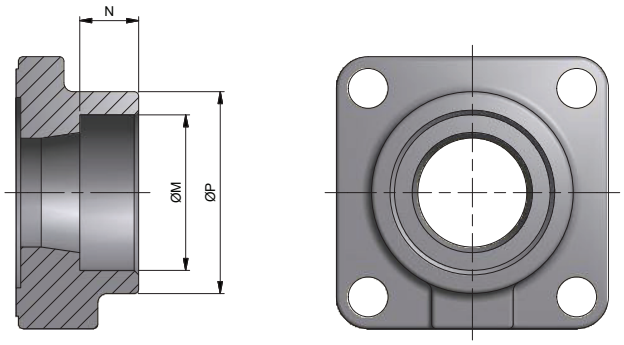
BUTT WELD END STYLE (SCH 10, SCH 40, SCH 80)



SIZE	M (in.)	N (in.)		
		Sch 10	Sch 40	Sch 80
1/4”	0.540	0.065	0.088	0.119
3/8”	0.675	0.065	0.091	0.126
1/2”	0.840	0.083	0.109	0.147
3/4”	1.050	0.083	0.113	0.154
1”	1.315	0.109	0.133	0.179
1 1/4”	1.660	0.109	0.140	0.191
1 1/2”	1.900	0.109	0.145	0.200
2”	2.375	0.109	0.154	0.218
2 1/2”	2.875	0.120	0.203	0.276
3”	3.500	0.120	0.216	0.300
4”	4.500	0.120	0.237	0.337

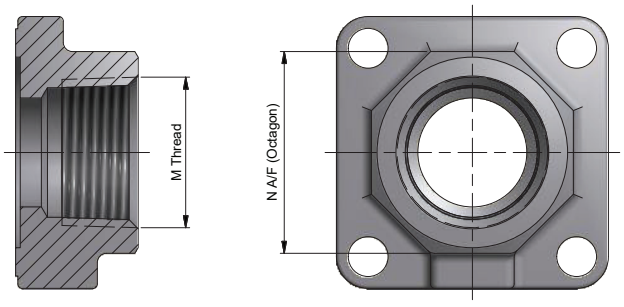
Note: As stated in ASME B16.25, paragraphs 3.1a and 3.2a, butt weld ends are square cut where N is less than or equal to 0.12”.

SOCKET WELD END STYLE



SIZE	M (in.)	N (in.)	P (in.)
1/4”	0.57	0.39	1.00
3/8”	0.71	0.39	1.00
1/2”	0.87	0.39	1.20
3/4”	1.07	0.51	1.42
1”	1.35	0.51	1.75
1 1/4”	1.70	0.51	2.13
1 1/2”	1.94	0.51	2.44
2”	2.43	0.65	2.99
2 1/2”	2.93	0.65	3.62
3”	3.56	0.65	4.33
4”	4.56	0.79	5.59

THREADED NPT END STYLE



SIZE	M (NPT)	N (in.)
1/4”	1/4	1.00
3/8”	3/8	1.00
1/2”	1/2	1.20
3/4”	3/4	1.42
1”	1	1.75
1 1/4”	1 1/4	2.13
1 1/2”	1 1/2	2.44
2”	2	2.99
2 1/2”	2 1/2	3.62
3”	3	4.33
4”	4	5.59

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Valve Pressure Ratings

The AVCO 1500 series ball valve can be supplied with WOG or ASME B16.34 pressure ratings. ASME B16.34 restricts the allowable bolt stress to 20,000 psi, whereas WOG has no restrictions on bolting allowing us to achieve greater pressure ratings within the same valve pattern. The WOG rated valves use the standardized ASME B31.3 allowable stress values to determine wall thickness, thereby resulting in safe and reliable designs. For ASME B16.34 rated valves, the main valve body is compliant when used within the pressure/temperature limits defined on the next page - the cryogenic bonnet extension meets ASME B31.3 stress calculations for both wall thickness and bolting.

The pressure ratings are available as follows:

WOG Ratings

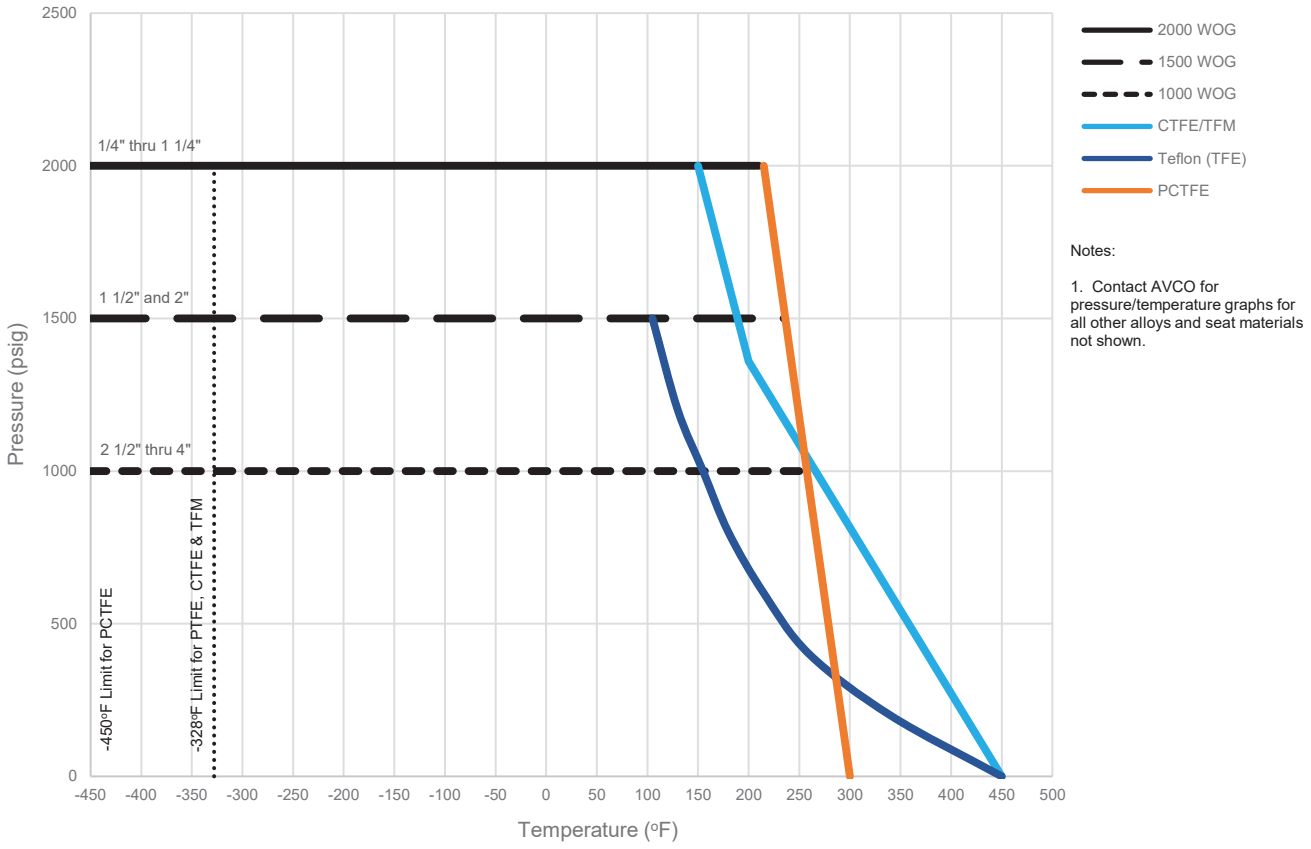
2000 WOG - 1/4” thru 1 1/4”
1500 WOG - 1 1/2” and 2”
1000 WOG - 2 1/2” thru 4”

ASME B16.34 Ratings

Class 600 - 1/4” thru 1 1/4”
Class 300 - 1 1/2” thru 4”

Unless otherwise requested, the 1500 series will be supplied with WOG ratings on the valve tag.

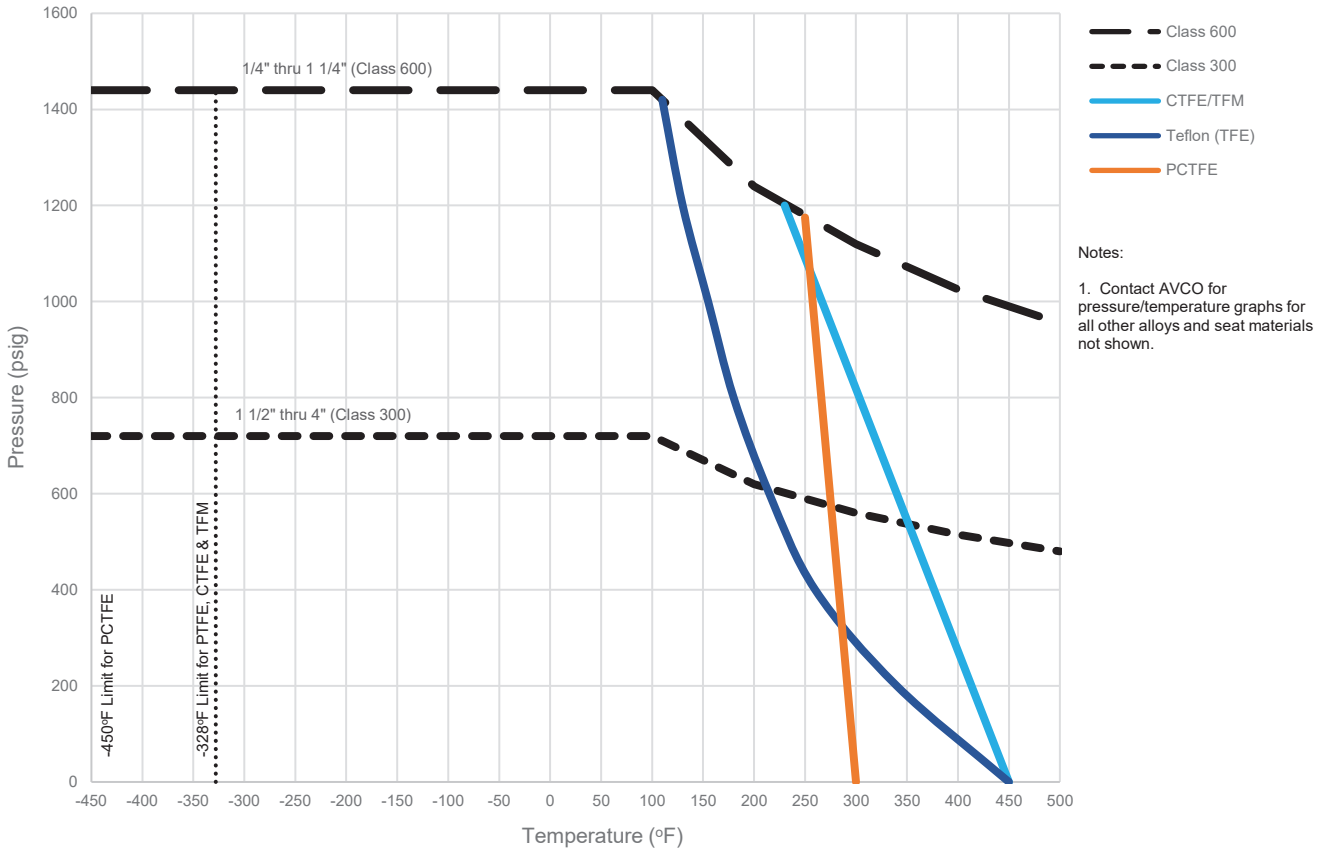
Pressure/Temperature Rating Graph for WOG rated valves



Notes:

1. Contact AVCO for pressure/temperature graphs for all other alloys and seat materials not shown.

Pressure/Temperature Rating Graph Per ASME B16.34



Notes:

1. Contact AVCO for pressure/temperature graphs for all other alloys and seat materials not shown.

Notes

1. The pressure/temperature ratings shown are based upon the main valve body and end materials being ASTM A351 CF8M. Please contact AVCO for other valve materials.
2. The cryogenic bonnet extension does not meet ASME B16.34, but is based upon design guidelines outlined in ASME B31.3 for process piping.

Torque Table (in.lbs)

SEAT MATERIAL	1/4"	3/8"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"
TFE	50	50	50	60	80	140	150	650	900	1000	1100
TFM	50	50	50	60	80	125	135	600	900	1000	1700
CTFE	80	80	80	120	200	240	500	900	1000	1620	2750
PCTFE	120	120	120	140	250	265	1000	1380	1450	2600	3000

Notes

1. Torque shown is actual measured maximum values, using water, at the maximum valve pressure rating and ambient temperature. For cryogenic service we recommend a multiplier of 1.5 be used for actuator sizing due to the nature of cryogenic fluids.

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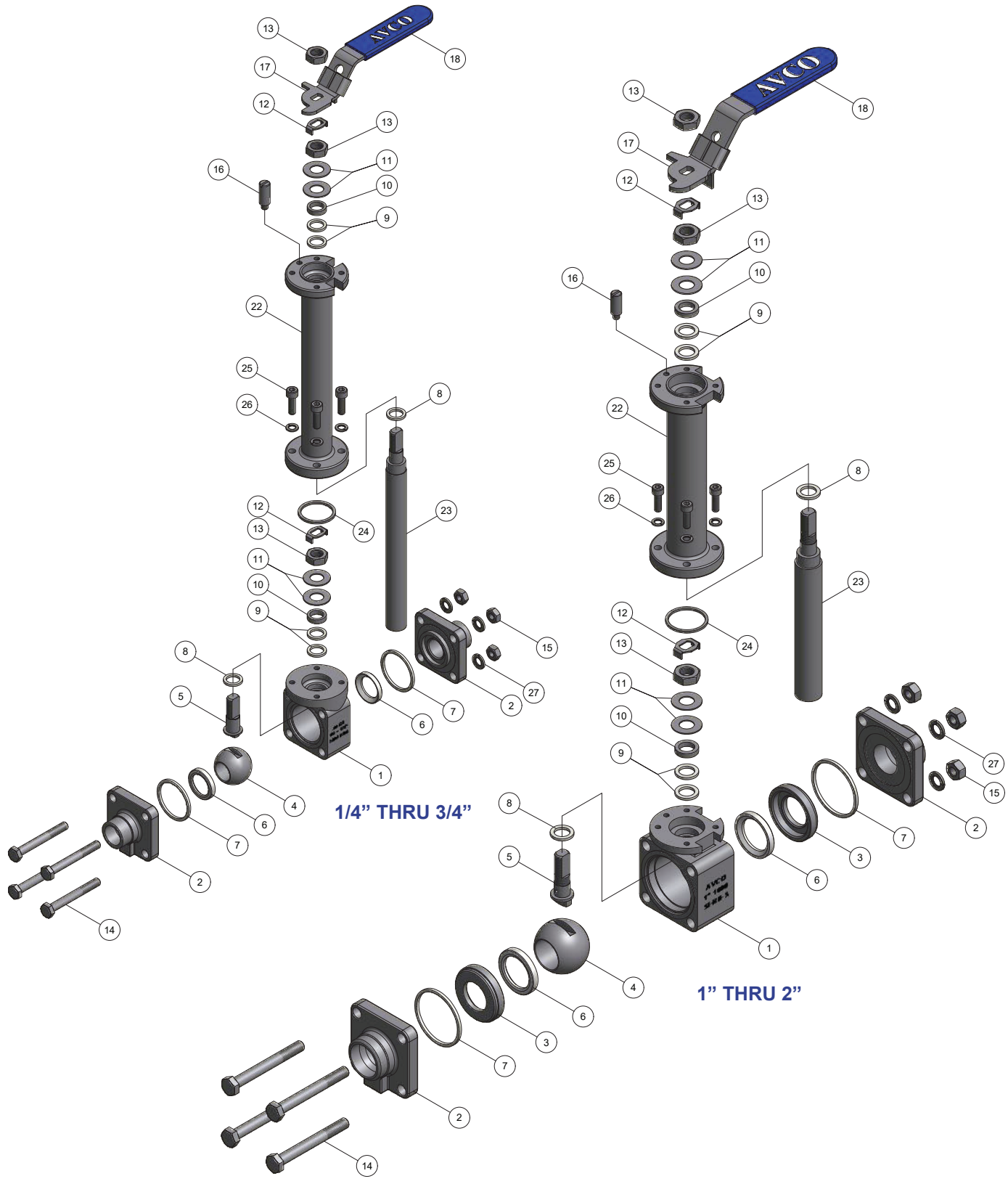
Alloy Valves and Control

BALL VALVES
1500 SERIES



3400 W. Fordham Av, Santa Ana, CA 92704 Tel (714) 427-0877 Fax (714) 427-6392 Website: www.avcovalve.com

AVCO

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BALL VALVES
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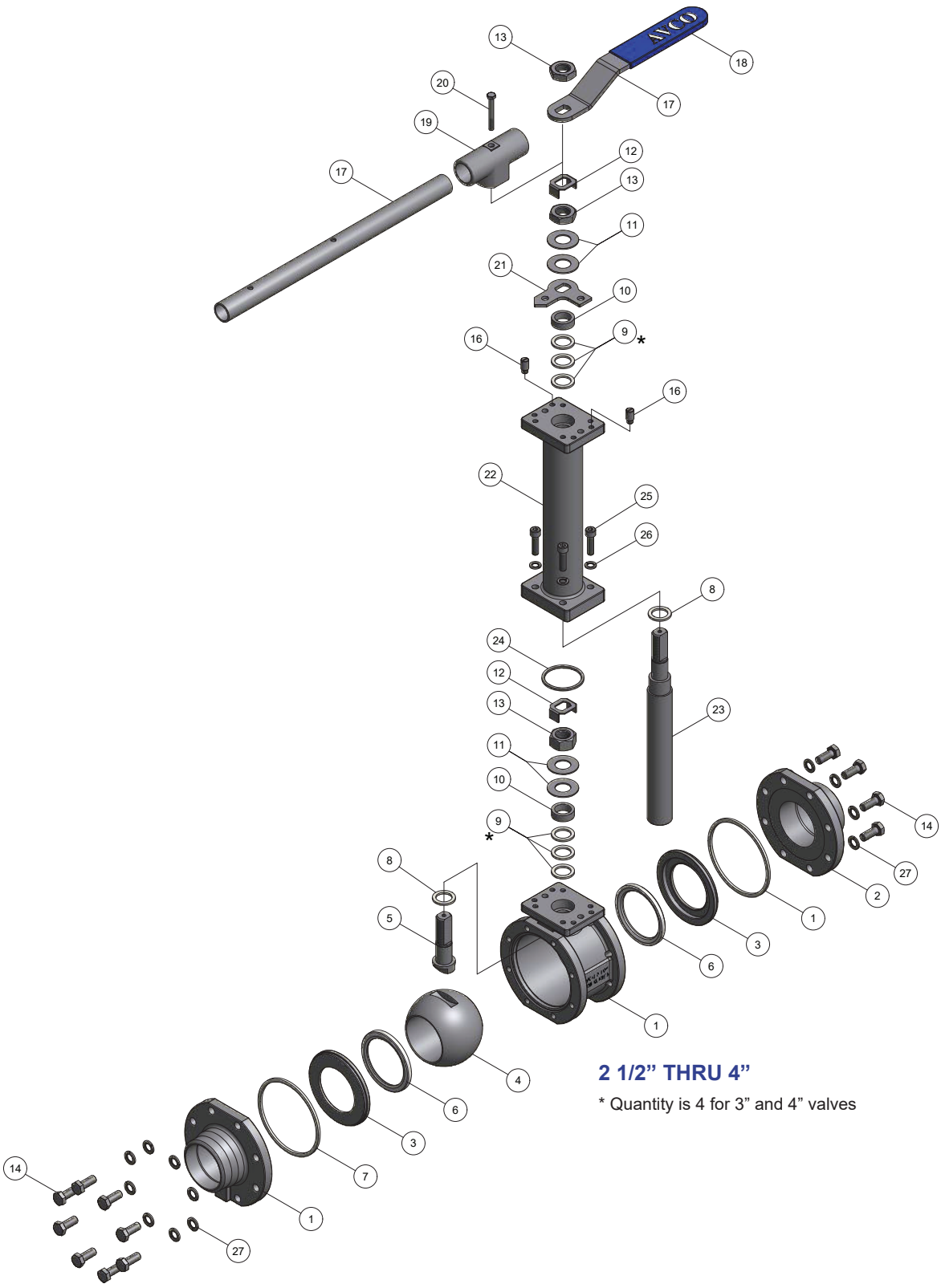

2 1/2" THRU 4"

* Quantity is 4 for 3" and 4" valves

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Item	Description	Included in Valve Assembly				Material
		1/4" thru 3/4"	1" thru 2"	2 1/2"	3" thru 4"	
1	Body	Yes	Yes	Yes	Yes	A351 CF8M
2	End Cap	Yes	Yes	Yes	Yes	A351 CF8M
3	Retainer	No	Yes	Yes	Yes	A276 316
4	Ball	Yes	Yes	Yes	Yes	A276 316
5	Stem	Yes	Yes	Yes	Yes	A276 316 or ASTM A594 17-4
6	Seat	Yes	Yes	Yes	Yes	Varies by Trim
7	Body Seal	Yes	Yes	Yes	Yes	Varies by Trim
8	Thrust Washer	Yes	Yes	Yes	Yes	Varies by Trim
9	Packing	Yes	Yes	Yes	Yes	Varies by Trim
10	Gland Ring	Yes	Yes	Yes	Yes	A276 316
11	Disc Spring	Yes	Yes	Yes	Yes	Stainless Steel
12	Lock Washer	Yes	Yes	Yes	Yes	Stainless Steel
13	Stem Nut	Yes	Yes	Yes	Yes	Stainless Steel
14	Body Bolt	Yes	Yes	Yes	Yes	A2-70 or A193 B8
15	Body Nut	Yes	Yes	No	No	A2-70 or A194 2H
16	Stop Pin	Yes	Yes	Yes	Yes	Stainless Steel
17	Handle	Yes	Yes	Yes	Yes	Stainless Steel
18	Handle Sleeve	Yes	Yes	Yes	No	Vinyl
19	Wrench Block	No	No	No	Yes	Stainless Steel
20	Handle Bolt	No	No	No	Yes	Stainless Steel
21	Stop Pad	No	No	Yes	Yes	Stainless Steel
22	Bonnet Extension	Yes	Yes	Yes	Yes	A351 CF8M
23	Stem Extension	Yes	Yes	Yes	Yes	A276 316 or ASTM A594 17-4
24	Bonnet Gasket	Yes	Yes	Yes	Yes	316 SS w/ Flexicarb or PTFE
25	Bonnet Bolt	Yes	Yes	Yes	Yes	A2-70
26	Bonnet Washer	Yes	Yes	Yes	Yes	Stainless Steel
27	Body Bolt Washer	Yes	Yes	Yes	Yes	Stainless Steel

Maintenance & Repair

The AVCO 1500 series ball valve is a very reliable and robust design, but as with all resilient seated valves, the 'soft' parts are subject to wear over time. Replacing a whole valve is an unnecessarily high cost and as such, the 1500 series is fully repairable while in-line. Repair and maintenance kits are usually available for same day shipping and are easy to install when following the 1500 series IOM manual.

AVCO is committed to ensuring repair and maintenance kits are available for your valves for the foreseeable future. In the event AVCO makes design improvements to our products, we ensure all changes are backwards compatible.

Fire Safe Design

When supplied with graphoil seals AVCO 1500 series ball valves meet the requirements of API 607 (7th Edition) for fire safe applications. Please contact AVCO for full details of applicable valve materials and trim details.

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BALL VALVES
1500 SERIES

Electric Actuator

120 VAC
12/24 VDC
NEMA 4/7
Positioners 4-20 MA
Reversing
Telemetry
Battery Back-up
Spring Return

Pneumatic Actuator

Double Acting
Spring Return
Solenoid Valves
Limit Switches
Positioners 3-15 PSI
Positioners 4-20 MA
Intelligent Postioner
Declutchable Manual Override

Manual Valves

Oval Handle
Spring Return
Fusible Link
Lock Device
Gear Operators

HOW TO ORDER

15	3	3	T	T	SE	100	LH
Series	**Body & End Material**	**Ball & Stem Material**	**Seat Material**	**Seal Material**	**End Style**	**Size**	**Options**
1500 Series 3 Piece Cryogenic Full Port Ball Valve	3 - 316 SS 4 - Monel 400 6 - Hastelloy C	3 - 316 SS 4 - Monel 400 6 - Hastelloy C	T - Teflon (PTFE) C - 25% Carbon PTFE K - Kel-F (PCTFE) E - TFM™	T - Teflon (PTFE) K - Kel-F (PCTFE) G - Graphoil	SE - NPT SW - Socket Weld BW - Butt Weld 150 - 150# Flange 300 - 300# Flange 600 - 600# Flange AN - SAE 4395 AS5202 - SAE Ends Variations of the above or special ends can be supplied upon request	025 - 1/4” 038 - 3/8” 050 - 1/2” 075 - 3/4” 100 - 1” 125 - 1 1/4” 150 - 1 1/2” 200 - 2” 250 - 2 1/2” 300 - 3” 400 - 4”	B3L90 - 90° Bottom Diverter B3L180B - 180° Bottom Diverter S3L90 - 90° Side Entry Diverter BAV15 - 15° Vee Port BAV30 - 30° Vee Port BAV45 - 45° Vee Port BAV60 - 60° Vee Port BAV90 - 90° Vee Port EBxx - Custom Bonnet Length O2CB - O_2 Cleaned & Bagged LH - Locking Lever Handle LGO - Locking Gear Operator

Example ordering codes:

1533TT-SE-100-LH = 1” ball valve with stainless steel body/ball, Teflon seats/seals, NPT ends & locking lever handle
1544KG-300-100 = 1” ball valve with Monel 400 body/ball, Kel-F seats, Graphoil Seals, 300# RF Flange and bare stem

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