

3500 EBV

• Safety Valves



Consolidated®

The CONSOLIDATED Series 3500 Electromatic Ball Valve is designed to provide automatic or manual overpressure protection for steam boiler systems, and can also be used to assist start-up and shut-down venting.

3500EBV



INLET SIZES — 1-1/2", 2" and 2-1/2" in either flanged or weld neck design.

INLET RATINGS — ASME Class 1500 thru 4500

OUTLET SIZES — 3" and 4"

OUTLET RATINGS — ASME Class 300 and 900

BORE SIZES — .875 through 2.000. Reduced bores are available.

TEMP. RANGE — To 1100° F

MATERIALS — Alloy steel body with Titanium alloy seat and ball.

CERTIFICATION — ASME B & PVC Section I

Flanged Inlet - Type 351_, class 1500

Inlet ⁽²⁾		Outlet		Type Number	Max. Temp. ⁽¹⁾	Discharge Area		Orifice Designation
ASME Std.	R.F. Flange	ASME Std.	R.F. Flange			in ²	cm ²	
Size	Class	Size	Class	1050°F (566°C)				
1-1/2"	1500	3"	300	3515F	0.875	5.645		5
2"	1500	3"	300	3516F	1.000	6.451		6
2-1/2"	1500	4"	300	3517F	1.750	11.289		7

Flanged Inlet - Type 352_, class 2500

Inlet ⁽²⁾		Outlet		Type Number	Max. Temp. ⁽¹⁾	Discharge Area		Orifice Designation
ASME Std.	R.F. Flange	ASME Std.	R.F. Flange			in ²	cm ²	
Size	Class	Size	Class	1050°F (566°C)				
1-1/2"	2500	3"	300	3525F	0.875	5.645		5
2"	2500	3"	300	3526F	1.000	6.451		6
2-1/2"	2500	4"	300	3527F	1.750	11.289		7

Welded Inlet - Type 352_, class 2658 Ltd.

Inlet		Outlet		Type Number	Max. Temp. ⁽¹⁾	Discharge Area		Orifice Designation
Buttweld	ASME Std.	R.F. Flange	ASME Std.			in ²	cm ²	
Size	Class	Size	Class	1050°F (566°C)				
1-1/2"	2658	3"	300	3525W	0.875	5.645		5
2"	2658	3"	300	3526W	1.000	6.451		6

Welded Inlet - Type 353_, class 3090 Ltd.

Inlet		Outlet		Type Number	Max. Temp. ⁽¹⁾	Discharge Area		Orifice Designation
Buttweld	ASME Std.	R.F. Flange	ASME Std.			in ²	cm ²	
Size	Class	Size	Class	1050°F (566°C)				
2-1/2"	3090	4"	300	3537W	1.750	11.289		7
2-1/2"	3090	4"	900	3538W	2.000	11.903		8

Welded Inlet - Type 354_, class 4500

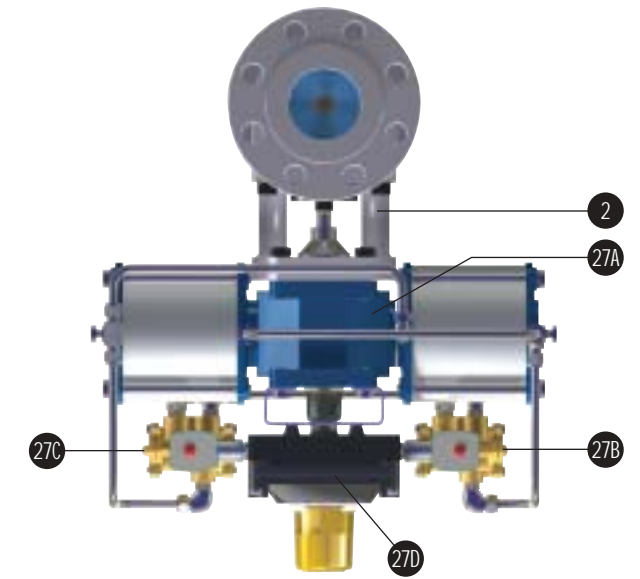
Inlet		Outlet		Type Number	Max. Temp. ⁽¹⁾	Discharge Area		Orifice Designation
Buttweld	ASME Std.	R.F. Flange	ASME Std.			in ²	cm ²	
Size	Class	Size	Class	1100°F (593°C)				
2-1/2"	4500	4"	900	3547W	1.750	11.289		7

Notes:

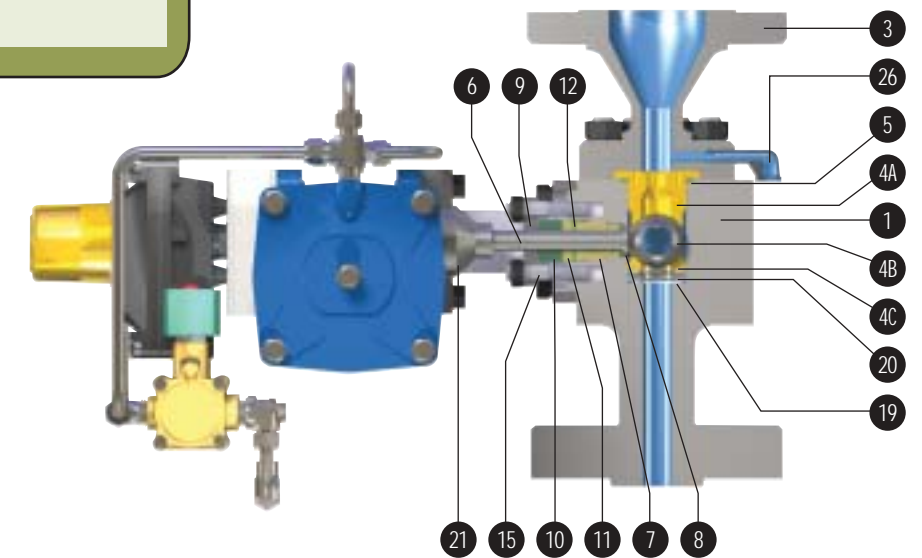
- To determine the maximum allowable pressure at a given temperature refer to the appropriate pressure temperature table. See page 3500EBV.14.
- Available with ASME B16.5 inlet flange facings. See General Info Section page GI.26.1 for selections.

Nomenclature	Material
1 Body (Butt Weld)	SA182 GR. F22 Alloy Steel
Body (Flanged)	SA217 WC9 Alloy Steel
2 Yoke	SA217 WC9 Alloy Steel
3 Discharge Collar	SA217 WC9 Alloy Steel
4 Ball & Seat Assembly	
4A Seat	Titanium Alloy Steel (Carbide Coated)
4B Ball	Titanium Alloy Steel (Carbide Coated)
4C Ball & Seat Loader	410 Stainless Steel (Carbide Coated)
5 Gasket	Grafoil
6 Stem	416 Stainless Steel (Carbide Coated)
7 Stem Nut	420 Stainless Steel
8 Bearing Washer	410 Stainless Steel (Carbide Coated)
9 Packing Gland Flange	SA105 Carbon Steel
10 Packing Gland	420 Stainless Steel
11 Packing Ring	Grafoil
12 Packing Stop Washer	410 Stainless Steel
13 Stud Body*	B16 Alloy Steel
14 Nut Body*	GR. 4 Alloy Steel
15 Stud Packing Gland	B16 Alloy Steel
16 Nut Packing Gland*	GR. 4 Alloy Steel
17 Cap Screw Yoke/Body*	B7 Alloy Steel
18 Lock Washer Yoke/Body*	Carbon Steel
19 Belleville Washer	17-4 Stainless Steel
20 Spacer	410 Stainless Steel
21 Drive Bushing	410 Stainless Steel
22 Cap Screw Yoke/Act. (Not Shown)	B7 Alloy Steel
23 Lock Washer Yoke/Act. (Not Shown)	Carbon Steel
24 Key Stem/Bushing*	Tool Steel
25 Set Screw*	Carbon Steel
26 Drain	Carbon Steel
27 Actuator Assembly	
27A Actuator	Ledeon
27B Solenoid	ASCO
27C Solenoid	ASCO
27D Westlock Switch w/Monitor	Westlock

* Not Shown

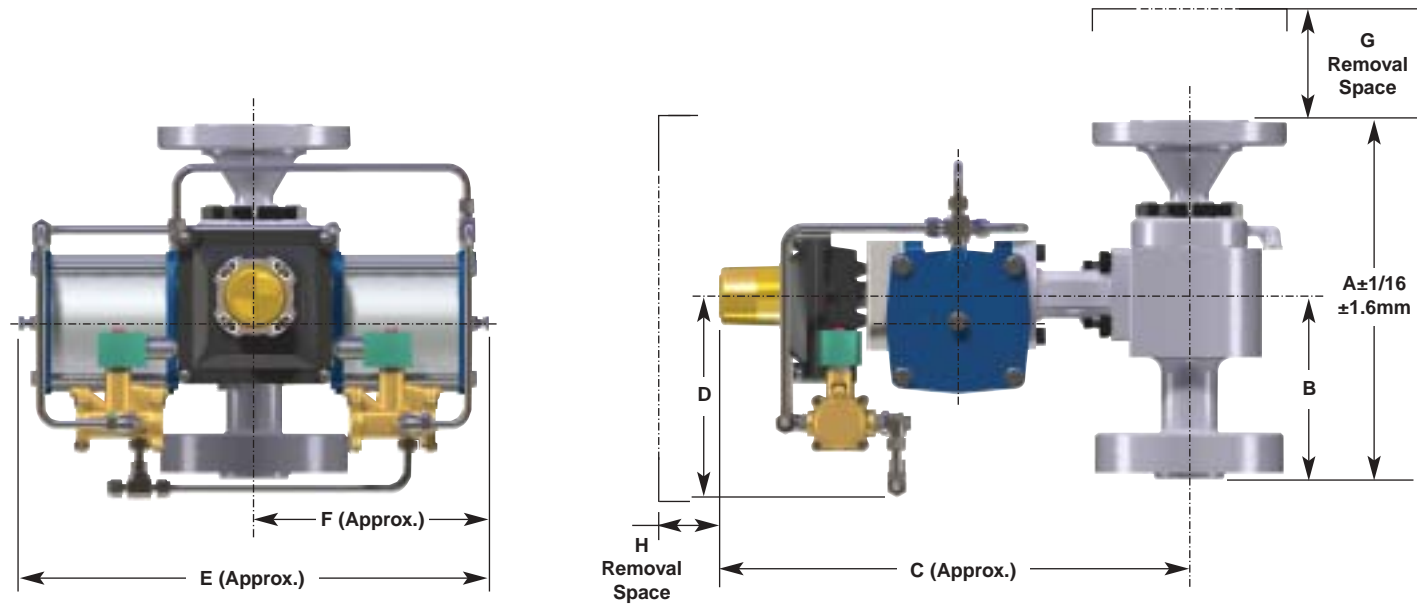


Top View

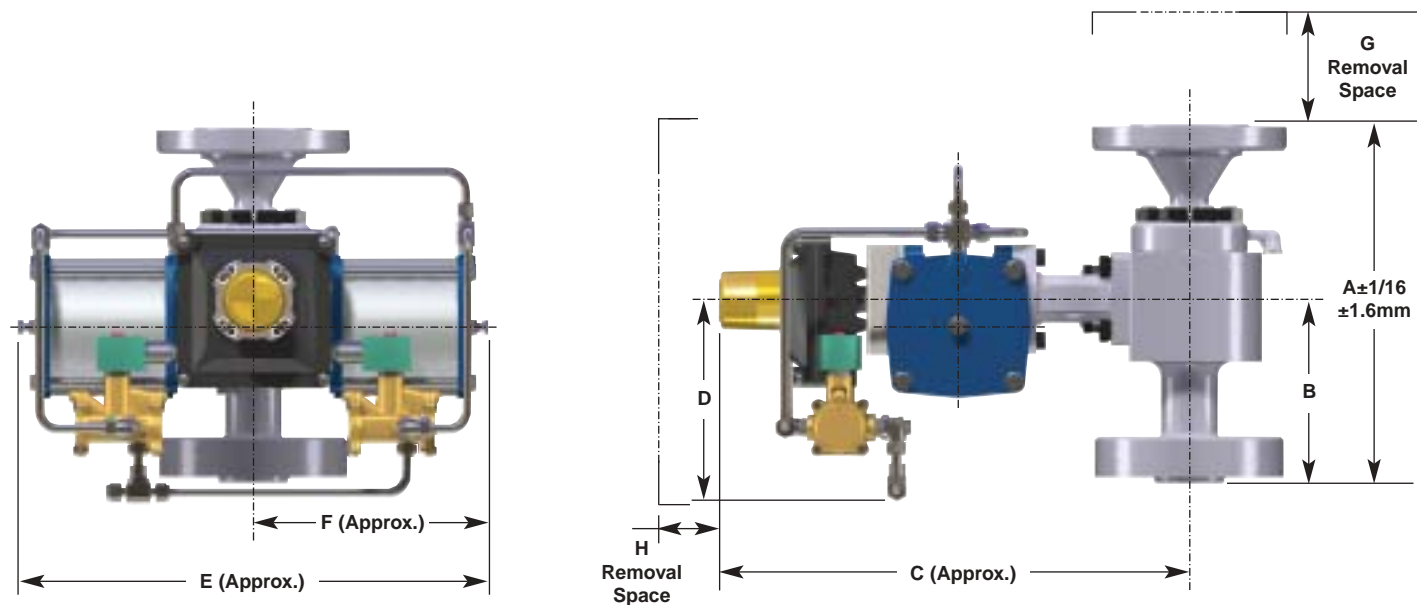


Front View

3500 Flange x Flange



3515, 3525, 3516 & 3526F w/LEDEEN VA115DA Actuator



3515, 3525, 3516 & 3526F w/LEDEEN VA123DA Actuator

3500 Flange x Flange

3515, 3525, 3516 & 3526F - w/ LEDEEN VA115DA Actuator

Valve Type	Actuator Type	Inlet ⁽¹⁾ ASME Std. Flange	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Approx. Weight lbs. (kg)
3515F	VA115DA	1-1/2" Class 1500 RF or RJ	3" Class 300 RF	15-1/4 387.4	7-1/2 190.5	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	190 86.2
3525F	VA115DA	1-1/2" Class 2500 RF or RJ	3" Class 300 RF	15-3/4 400.1	8 203.2	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	190 86.2
3516F	VA115DA	2" Class 1500 RF or RJ	3" Class 300 RF	15-1/2 393.7	7-3/4 196.9	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	190 86.2
3526F	VA115DA	2" Class 2500 RF or RJ	3" Class 300 RF	16 406.4	8-1/4 209.6	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	190 86.2

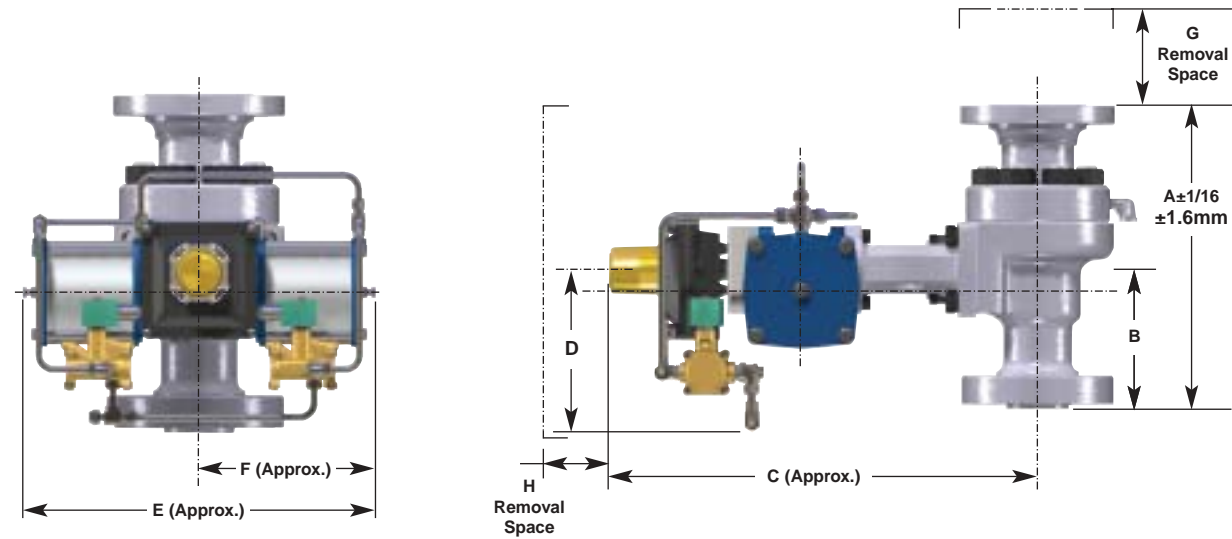
3515, 3525, 3516 & 3526F - w/ LEDEEN VA123DA Actuator

Valve Type	Actuator Type	Inlet ⁽¹⁾	Outlet	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Approx. Weight lbs. (kg)
3515F	VA123DA	1-1/2" Class 1500 RF or RJ	3" Class 300 RF	15-1/4 387.4	7-1/2 190.5	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2
3525F	VA123DA	1-1/2" Class 2500 RF or RJ	3" Class 300 RF	15-3/4 400.1	8 203.2	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2
3516F	VA123DA	2" Class 1500 RF or RJ	3" Class 300 RF	15-1/2 393.7	7-3/4 196.9	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2
3526F	VA123DA	2" Class 2500 RF or RJ	3" Class 300 RF	16 406.4	8-1/4 209.6	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2

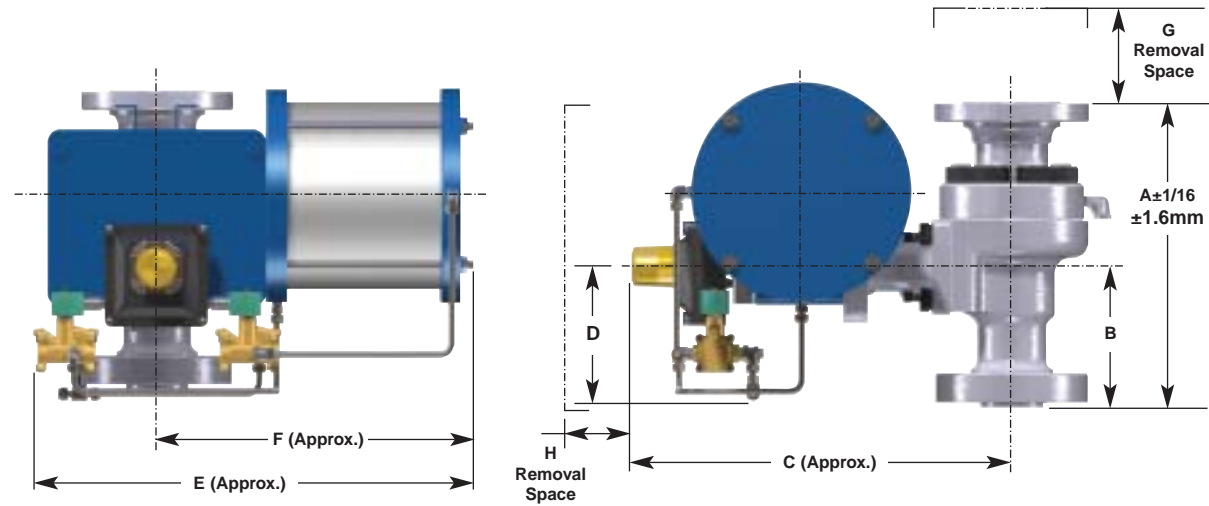
Note:

1. Available with ASME B16.5 inlet flange facings. See General Info Section page GI.27 for selections.

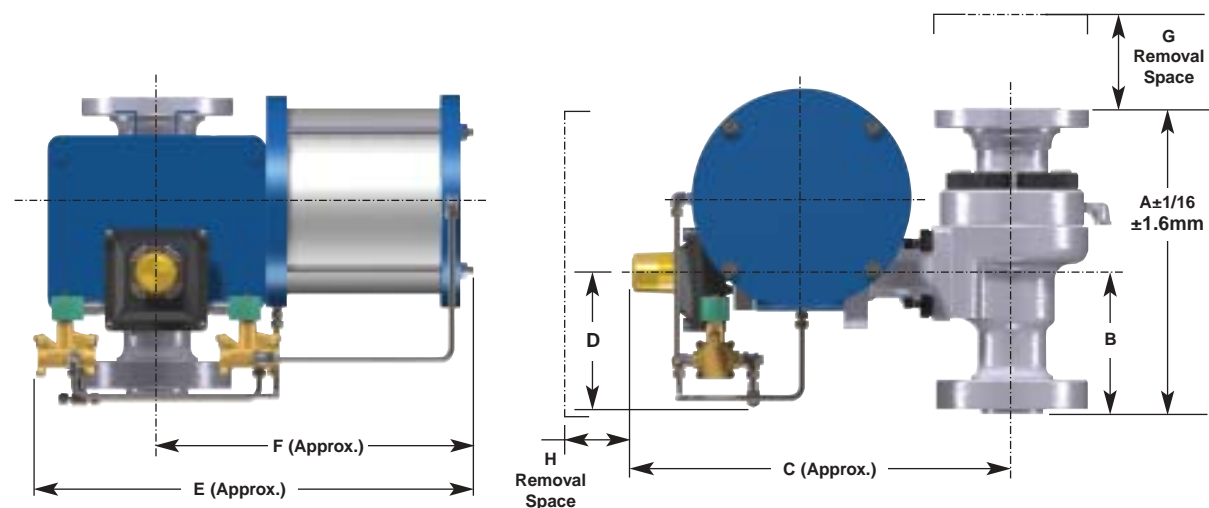
3500 Flange x Flange



3517 & 3527F w/LEDEEN VA123DA Actuator



3517 & 3527F w/LEDEEN GS620 Actuator



3517 & 3527F w/LEDEEN GS628 Actuator

3500 Flange x Flange

3517 & 3527F - w/ LEDEEN VA123DA Actuator

Valve Type	Actuator Type	Inlet ⁽¹⁾ ASME Std. Flange	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Approx. Weight lbs. (kg)
3517F	VA123DA	2-1/2" Class 1500 RF or RJ	4" Class 300 RF	19 482.6	8-5/8 219.1	23-1/2 596.9	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	4-1/2 114.3	7-1/2 190.5	212 96.2
3527F	VA123DA	2-1/2" Class 2500 RF or RJ	4" Class 300 RF	19 482.6	8-5/8 219.1	23-1/2 596.9	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	4-1/2 114.3	7-1/2 190.5	212 96.2

3517 & 3527F - w/ LEDEEN GS620 Actuator

Valve Type	Actuator Type	Inlet ⁽¹⁾ ASME Std. Flange	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Approx. Weight lbs. (kg)
3517F	GS620	2-1/2" Class 1500 RF or RJ	4" Class 300 RF	19 482.6	8-5/8 219.1	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 242.9	4-1/2 114.3	7-1/2 190.5	520 235.9
3527F	GS620	2-1/2" Class 2500 RF or RJ	4" Class 300 RF	19 482.6	9-1/4 253.0	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 242.9	4-1/2 114.3	7-1/2 190.5	520 235.9

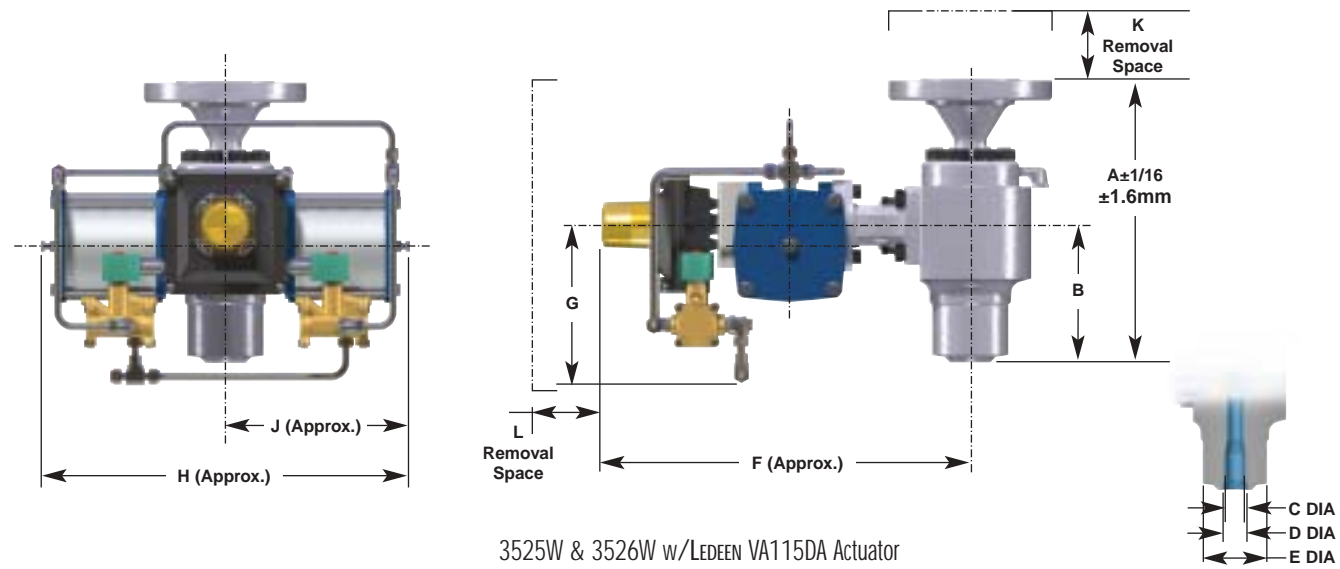
3517 & 3527F - w/ LEDEEN GS628 Actuator

Valve Type	Actuator Type	Inlet ⁽¹⁾ ASME Std. Flange	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	Approx. Weight lbs. (kg)
3517F	GS628	2-1/2" Class 1500 RF or RJ	4" Class 300 RF	19 482.6	8-5/8 219.1	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 242.9	4-1/2 114.3	7-1/2 190.5	546 247.7
3527F	GS628	2-1/2" Class 2500 RF or RJ	4" Class 300 RF	19 482.6	8-5/8 219.1	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 242.9	4-1/2 114.3	7-1/2 190.5	546 247.7

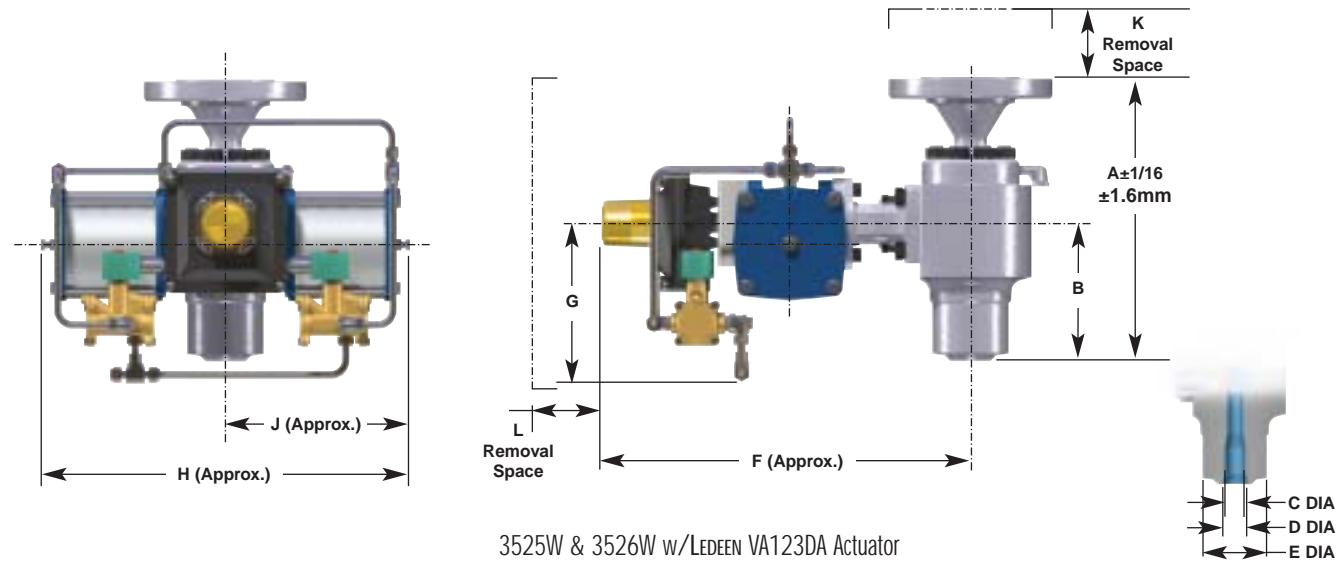
Note:

1. Available with ASME B16.5 inlet flange facings. See General Info Section page GI.27 for selections.

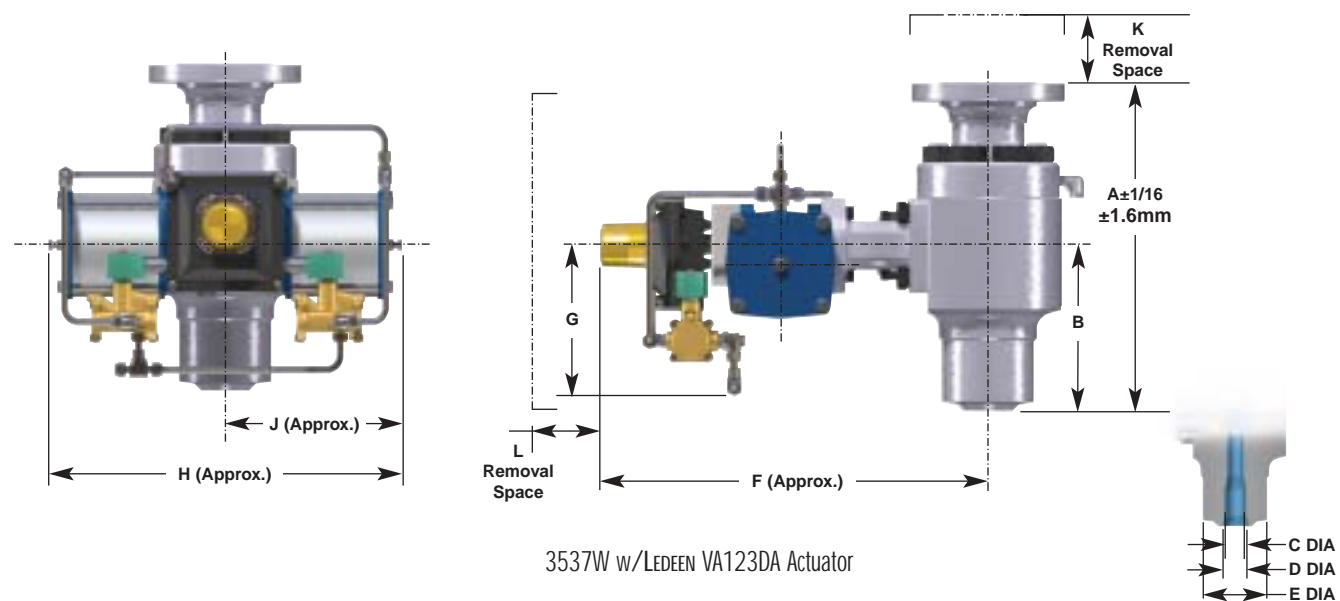
3500 Butt Weld x Flange



3525W & 3526W w/LEDEEN VA115DA Actuator



3525W & 3526W w/LEDEEN VA123DA Actuator



3537W w/LEDEEN VA123DA Actuator

3500 Butt Weld x Flange

3525W & 3526W - w/ LEDEEN VA115DA Actuator

Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3525W	VA115DA	1-1/2" Butt Weld	3" Class 300 RF	14 355.6	6-1/4 158.8	1.105 28.06	1-1/2 38.1	4-1/2 114.3	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	212 96.2
3526W	VA115DA	2" Butt Weld	3" Class 300 RF	14 355.6	6-1/4 158.8	1-1/2 38.1	2 50.8	4-1/2 114.3	19-1/2 495.3	6-3/8 161.9	27-7/8 708.0	13-15/16 354.0	3 76.2	5 127.0	212 96.2

3525W & 3526W - w/ LEDEEN VA123DA Actuator

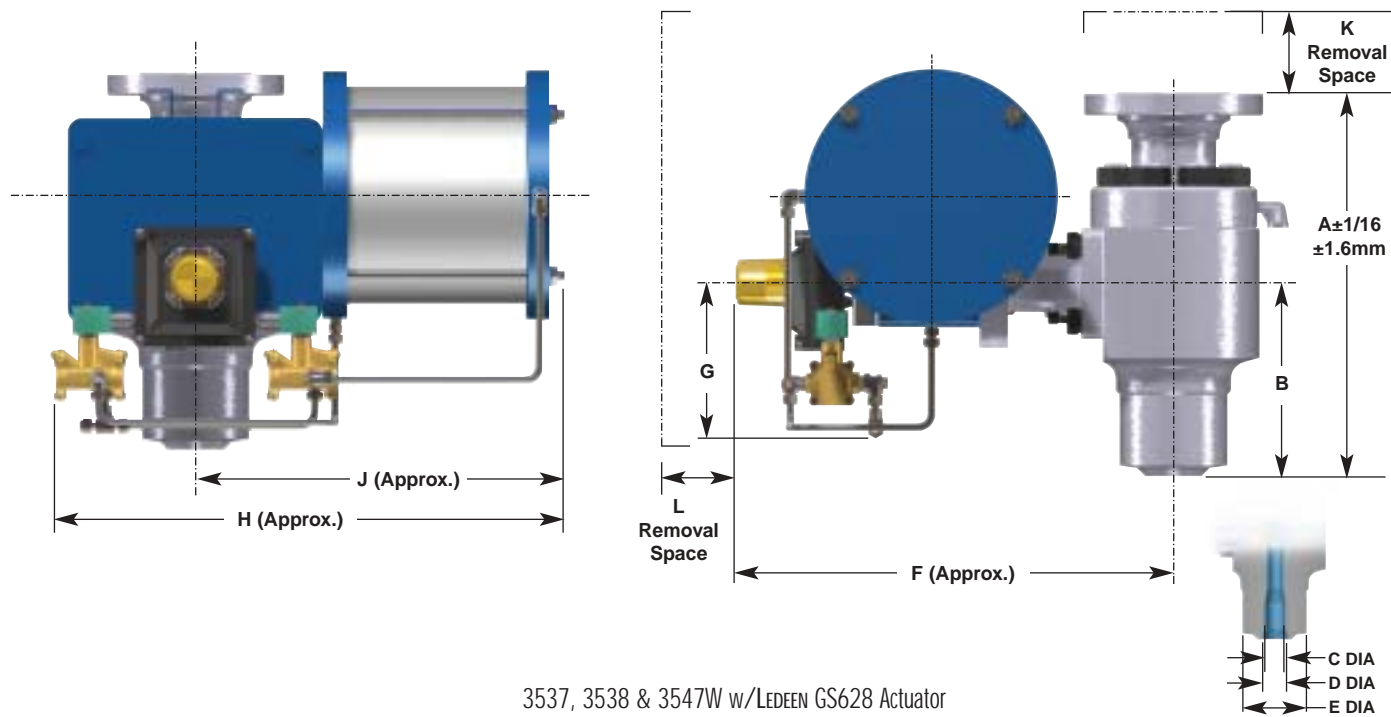
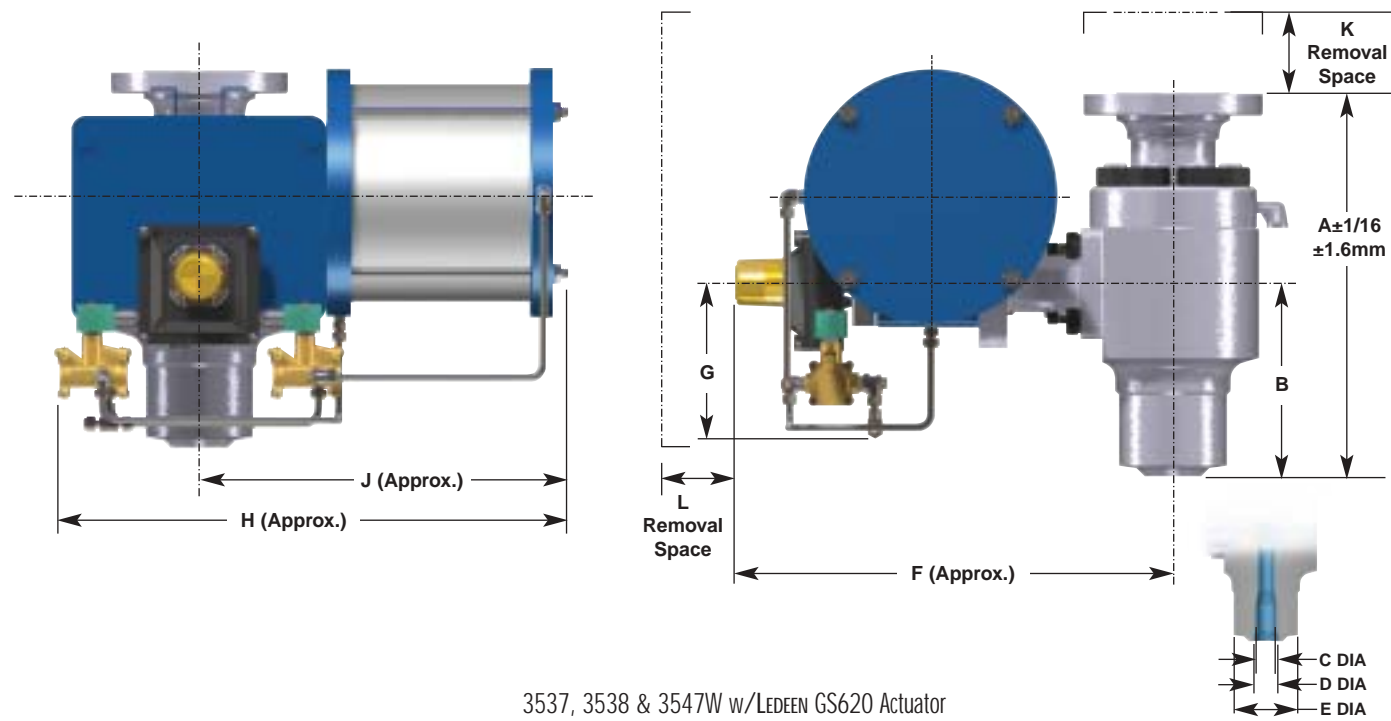
Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3525W	VA123DA	1-1/2" Butt Weld	3" Class 300 RF	14 355.6	6-1/4 158.8	1.105 28.06	1-1/2 38.1	4-1/2 114.3	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2
3526W	VA123DA	2" Butt Weld	3" Class 300 RF	14 355.6	6-1/4 158.8	1-1/2 38.1	2 50.8	4-1/2 114.3	19-1/2 495.3	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	3 76.2	5 127.0	212 96.2

3537W - w/ LEDEEN VA123DA Actuator

Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3537W	VA123DA	1-1/2" Butt Weld	4" Class 300 RF	20-1/4 514.4	9-7/8 250.8	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	23-1/2 596.9	6-3/8 161.9	21-5/8 549.3	10-13/16 274.6	4-1/2 114.3	7-1/2 190.5	370 167.8

Note:
Inside and outside diameters other than those specified may reduce the valve pressure/temperature rating.
Engineering review and approval is required for dimensions other than those specified in the tables.

3500 Butt Weld x Flange



3500 Butt Weld x Flange

3537, 3538 & 3547W - w/ LEDEEN GS620 Actuator

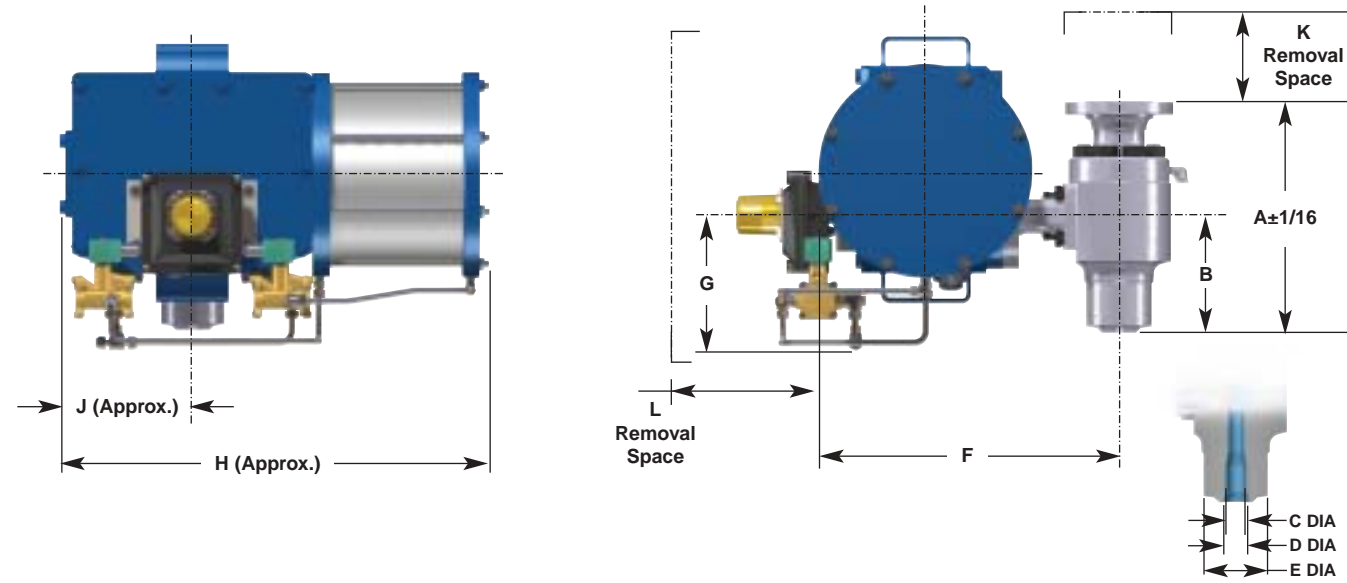
Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3537W	GS620	2-1/2" Butt Weld	4" Class 300 RF	20-1/4 514.4	9-7/8 250.8	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	4-1/2 114.3	7-1/2 190.5	520 235.9
3538W	GS620	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 59.9	6-5/8 168.3	23-9/16 598.4	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	6 152.4	10 254.0	520 235.9
3547W	GS620	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	22-9/16 598.4	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	6 152.4	10 254.0	520 235.9

3537, 3538 & 3547W - w/ LEDEEN GS628 Actuator

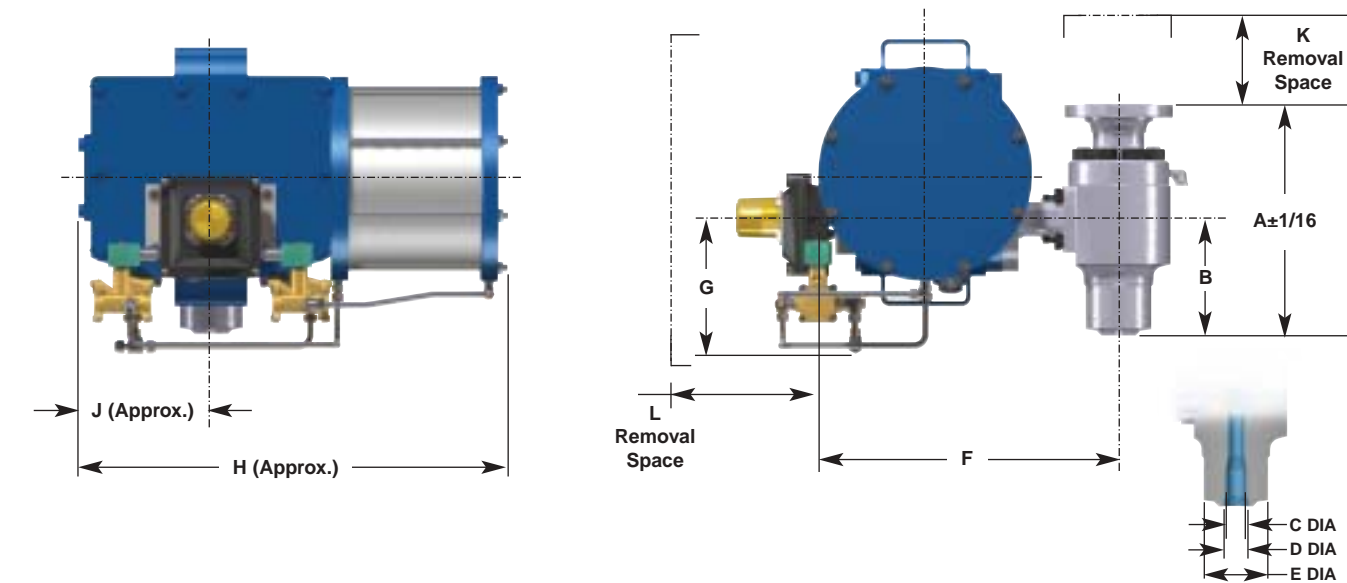
Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3537W	GS628	2-1/2" Butt Weld	4" Class 300 RF	20-1/4 514.4	9-7/8 250.8	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	22-3/8 568.3	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	4-1/2 114.3	7-1/2 190.5	546 247.7
3538W	GS628	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 59.9	6-5/8 168.3	23-9/16 598.4	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	6 152.4	10 254.0	575 260.8
3547W	GS628	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	23-9/16 598.4	6-3/8 161.9	27-5/16 693.7	19-9/16 496.9	6 152.4	10 254.0	575 260.8

Note:
Inside and outside diameters other than those specified may reduce the valve pressure/temperature rating. Engineering review and approval is required for dimensions other than those specified in the tables.

3500 Butt Weld x Flange



3538W & 3547W w/LEDEEN SY1032 Actuator



3538W & 3547W w/LEDEEN SY1043 Actuator

3500 Butt Weld x Flange

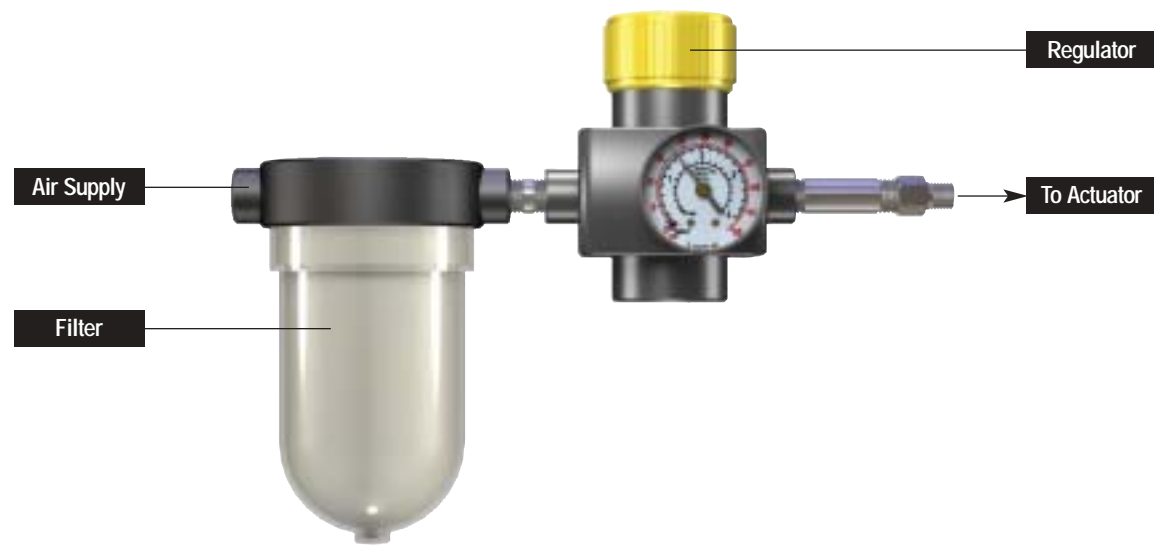
3538W & 3547W - w/ LEDEEN SY1032 Actuator

Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3538W	SY1032	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	26-3/16 665.2	6-3/8 161.9	31-1/2 800.1	21-11/16 550.9	6 152.4	10 254.0	807 366.0
3547W	SY1032	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	26-3/16 665.2	6-3/8 161.9	31-1/2 800.1	21-11/16 550.9	6 152.4	10 254.0	807 366.0

3538W & 3547W - w/ LEDEEN SY1043 Actuator

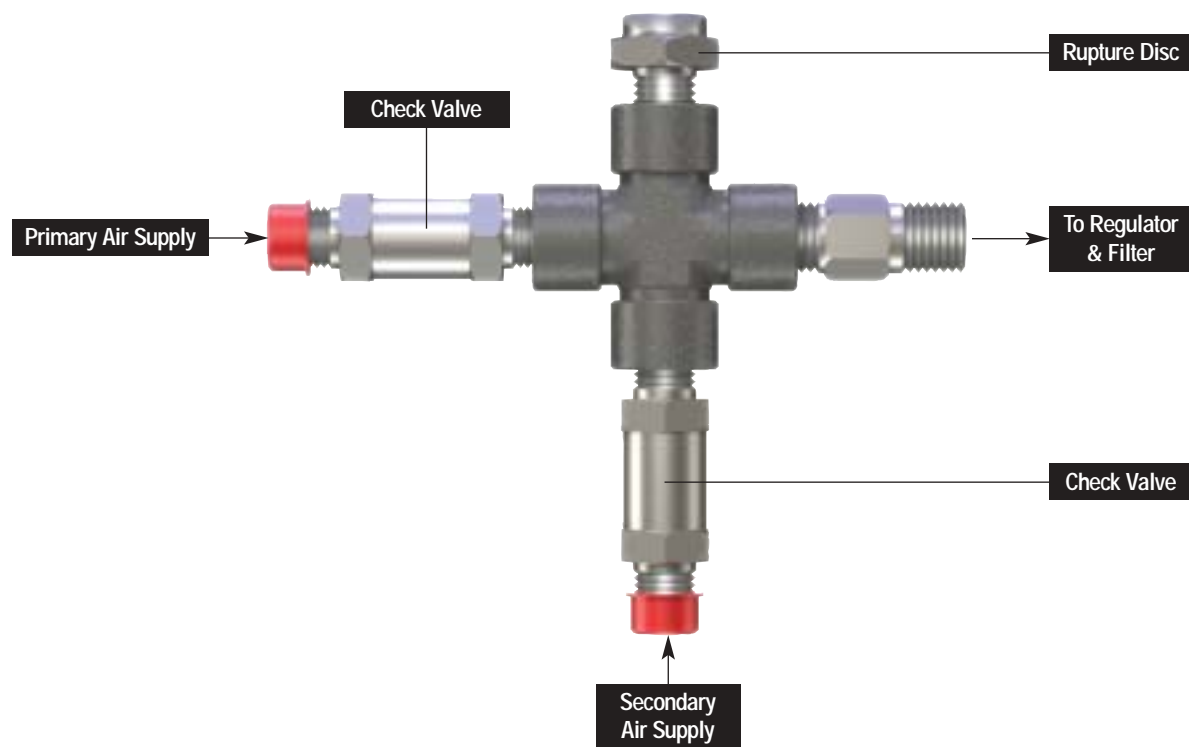
Valve Type	Actuator Type	Inlet	Outlet ASME Std. Flange	A in. (mm)	B in. (mm)	C in. (mm)	D in. (mm)	E in. (mm)	F in. (mm)	G in. (mm)	H in. (mm)	J in. (mm)	K in. (mm)	L in. (mm)	Approx. Weight lbs. (kg)
3538W	SY1043	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	26-3/16 665.2	6-3/8 161.9	31-1/2 800.1	21-11/16 550.9	6 152.4	10 254.0	973 441.4
3547W	SY1043	2-1/2" Butt Weld	4" Class 900 RF	24-5/8 625.5	9-3/8 238.1	2-3/8 60.3	2-3/4 69.9	6-5/8 168.3	26-3/16 665.2	6-3/8 161.9	31-1/2 800.1	21-11/16 550.9	6 152.4	10 254.0	973 441.4

Note:
Inside and outside diameters other than those specified may reduce the valve pressure/temperature rating. Engineering review and approval is required for dimensions other than those specified in the tables.



Pressure Regulator and Filter

Note:
Pressure regulator & filter are required prior to 3500EBV actuator.
A quotation for a filter regulator can be provided on request.



Auxiliary Supply Manifold

Note:
When an alternate or backup is required to the instrument air supply, an auxiliary supply manifold can be quoted. The auxiliary supply can be connected to a secondary air supply or nitrogen bottle. In the event that the regulator on the auxiliary supply pressure fails, a rupture disc is supplied as standard on the auxiliary supply manifold.

Meets ASME B&PVC Section I, (2001 Edition), and ASME B16.34, (1996 Edition.)

Valve Type & Pressure Class

TEMP. (DEG F)	1-1/2" 3515F	1-1/2" 3525F	1-1/2" 3525W	2-1/2" 3537W	2-1/2" 3547W
	2" 3516F	2" 3526F		2-1/2" 3538W	
	2-1/2" 3517F	2-1/2" 3527F	2" 3526W		
	1500 STD. Class (PSIG)	2500 STD. Class (PSIG)	2658 LTD. Class (PSIG)	3092 LTD. Class (PSIG)	4500 LTD. Class (PSIG)
1100	N/A	N/A	N/A	1630	2546
1075	N/A	N/A	N/A	2113	3305
1050	875	1455	1935	2596	4064
1040	961	1598	2125	2851	4461
1030	1047	1741	2316	3000	4500
1020	1133	1884	2500	3000	4500
1010	1219	2027	2500	3000	4500
1000	1305	2170	2500	3000	4500
990	1421	2366	2500	3000	4500
985	1479	2465	2500	3000	4500
980	1537	2500	2500	3000	4500
970	1653	2500	2500	3000	4500
960	1769	2500	2500	3000	4500
950	1885	2500	2500	3000	4500
940	1957	2500	2500	3000	4500
930	2029	2500	2500	3000	4500
920	2101	2500	2500	3000	4500
910	2173	2500	2500	3000	4500
900	2245	2500	2500	3000	4500
890	2283	2500	2500	3000	4500
880	2321	2500	2500	3000	4500
870	2359	2500	2500	3000	4500
860	2379	2500	2500	3000	4500
850	2435	2500	2500	3000	4500
840	2456	2500	2500	3000	4500
830	2477	2500	2500	3000	4500
820	2498	2500	2500	3000	4500
810	2500	2500	2500	3000	4500

Note:
Inside and outside diameters other than those specified may reduce the valve pressure/temperature rating.
Engineering review and approval is required for dimensions other than those specified in the
dimensions & weights section of this catalog. See pages 3500EBV.3 thru 3500EBV.12.

Sizing Examples

The 3500 Series Electromatic Ball Valve is supplied with standard orifice bores. Capacity tables on pages 3500EBV.17 through .22 specify the relieving capabilities of these valves with a maximum or standard orifice size. Orifice sizes smaller than standard may be specified to reduce the capacity to less than that stated in the capacity tables.

Dresser, Inc. recommends that the 3500 EBV be sized as an integral part of the total safety valve system in order to ensure that the safety valves operate properly and within ASME requirements for set pressure, lift and blowdown. Total system sizing is not included in the following examples. For total system sizing, refer to Safety Valve Product Information Sheet SV/PI-53, or submit the total information required in the "Ordering Information" section to the factory for review.

Example 1

For a new installation with no piping connections specified:

Set Pressure: 2000 psig
Required Capacity: 90,000 pph steam @
 1000°F and 3% overpressure
 Non-ASME Section I rated

Step 1

Determine the saturated capacity and full bore size from the appropriate capacity tables on pages 3500EBV.17 through .22. The selected capacity should be greater than or equal to the required capacity. If not, select the next larger bore size.

Page 3500EBV.18 "Capacity Tables"
 1.750 Bore, 2-1/2", 35_7
 Capacity at 2000 psig = 258,364 pph saturated
 258,364 pph ≥ 90,000 pph
 Select #7 orifice designation

Step 2

Correct for superheated steam temperatures using the "Superheat Correction Factors" on page 3500EBV.26. Convert the set pressure from psig to psia flowing pressure then determine the superheat correction factor at the relieving temperature (interpolate when necessary). Multiply the saturated steam capacity calculated in Step 1 by the selected correction factor. The calculated capacity should be greater than or equal to the required capacity. If not, repeat Step 1 and select a larger bore size.

"Superheat Correction Factors"
 $PSIA = (2000 \text{ psig} \times 1.03) + 14.7 = 2074 \text{ psia}$
 $2074.7 \text{ psia} @ 1000^\circ\text{F} = 0.760 \text{ SHCF}$
 $0.760 \times 258,364 \text{ pph} = 196,396 \text{ pph}$
 $196,396 \text{ pph} \geq 90,000 \text{ pph}$

Step 3

Determine any required reduction in capacity or bore size. Calculate the percentage of required capacity versus the full capacity as calculated in Steps 1 and 2. Using the section titled "Reduced Bore Selection and Capacity Factor" on page 3500EBV.23, refer to the table that corresponds to the full bore size selected. From the column marked "Relation to 100%", select the percentage that is equal to or greater than the calculated percentage. Multiply the full capacity corrected for temperature by the capacity factor selected. The reduced bore capacity should be greater than or equal to the required capacity.

Required capacity / Full bore capacity @ 1000°F
 $90,000 \text{ pph} / 196,396 \text{ pph} = 45.8\%$

Page 3500EBV.23 "Reduced Bore Selection and Capacity Factor",
 1.750 Bore, 2-1/2", 3517, 3527 3537 & 3547
 $46\% \geq 45.8\%$
 $.46 \times 196,396 \text{ pph} = 90,342 \text{ pph}$
 $90,342 \text{ pph} \geq 90,000 \text{ pph}$
 Select 1-3/16 Reduced Bore

Step 4

Verify "Pressure Class" using page 3500EBV.14 for "Maximum Pressure and Temperature" for 3500 EBV.

2000 psig @ 1000°F, 1.750 Bore (#7 designation)
 2-1/2" 3527F, 2170 psig > 2000 psig
 or
 2-1/2" 3537W, 3000 psig > 2000 psig

Step 5

Review section titled "Scope of Design" on Page 3500EBV.1.

Replace With

3527F = 2500 Class, 2-1/2" 2500 Class Flange x 4" 300 Class Flange
 Reduced bore from 1.750 to 1-3/16
 Set 2000 psig 90,342 pph @ 1000°F

or 3537W = 3000 Class, 2-1/2" Butt weld x 4" 300 Class Flange
 Reduced bore from 1.750 to 1-3/16
 Set 2000 psig 90,342 pph @ 1000°F

Example 2

For replacement valve selection when valve type and/or a serial number is provided:

Replace a 2-1/2" 2533VX (15) - XI S/N BV03275
Set 1200 psig
Required capacity is 100,856 pph at 900°F
3% overpressure 100% of Actual Capacity -
Non-ASME Section I Rated
Full 1-5/8" bore, 1500 Class Inlet Flange

Step 1

Review section titled "Scope of Design" on page 3500EBV.1.

3517F, 1500 Class, Bore 1.750, 2-1/2"
 1500 Class Flange x 4" 300 Class Flange

Step 2

Verify "Maximum Pressure Temperature Limits" on page 3500EBV.14. Maximum pressure for valve selected at a given temperature must be greater than or equal to the set pressure of the valve being replaced.

Page 3500EBV.14 for 3517F @ 900°F = 2245 psig
 $2245 \text{ psig} \geq 1200 \text{ psig}$

Step 3

Verify capacity in section titled "Capacity Tables" on pages 3500EBV.17 through .22.

Page 3500EBV.18 1.750 bore, #7 orifice designation, 2-1/2", 3517 at 3% overpressure 100% of actual capacity - non-ASME Section I rated.
 At 1200 psig set pressure = 150,834 pph saturated steam capacity.
 $150,834 \text{ pph} \geq 100,856 \text{ pph}$

Step 4

Correct for superheated steam temperatures using the "Superheat Correction Factors" on page 3500EBV.26. Convert psig to psia. Select correction factor for set pressure psia at the required relieving temperature and multiply saturated steam capacity calculated in Step 3 by correction factor. Verify it is greater than or equal to the required capacity.

$1200 \text{ psig} = (1200 \times 1.03) + 14.7 = 1250 \text{ psia}$
 $1250 \text{ psia} @ 900^\circ\text{F} = .804 \text{ SHCF}$
 $.804 \times 150,834 \text{ pph} = 121,270 \text{ pph} @ 900^\circ\text{F}$
 $121,270 \text{ pph} \geq 100,856 \text{ pph}$

Step 5

Select reduced bore if required. Calculate the percentage of required capacity versus the full bore capacity as calculated in Step 4. Using the section titled "Reduced Bore Selection and Capacity Factor" on page 3500EBV.23, refer to the Tables that corresponds to the 1.750 full bore size selected. From the column marked "Relation to 100%", select the percentage that is equal to or greater than the calculated percentage. Multiply the full capacity corrected for temperature by the capacity factor selected. The reduced bore capacity should be greater than or equal to the required capacity.

Required capacity / Full bore capacity @ 900°F
 $100,856 \text{ pph} / 121,270 \text{ pph} = 84\%$
 Select 1-5/8, $86.2\% \geq 84\%$
 Use 3517F with 1-5/8 reduced bore
 $121,270 \text{ pph} (\text{full bore capacity}) \times .862 = 104,534 \text{ pph}$
 $104,534 \text{ pph} \geq 100,856 \text{ pph}$

Replace With

2-1/2" 3517F-1-x1, 2-1/2" 1500 Class Flange
 x 4" 300 Class Flange with 1-5/8 Reduced Bore
 Set 1200 psig
 $104,534 \text{ pph} @ 900^\circ\text{F}$

Non ASME Rated

pounds per hour saturated steam at 3% overpressure,
100% of actual capacity

W = Slope x P for P less than or equal to 1580 psia
 W = Slope x P x [-1.906 x P - 1000 / .2292 x P - 1061] for P greater than 1580 psia
 P = (1.03 x set pressure) + 14.7

3500 Series EBV Ball Valve

Set Pressure (psig) ⁽¹⁾	Slope			
	29.9	37.8	120.6	157.4
	Flow Area			
	.875	1.000	1.750	2.000
	Designation			
	5	6	7	8
100	3519	4449	14195	18526
110	3827	4838	15437	20147
120	4135	5228	16679	21768
130	4443	5617	17921	23390
140	4751	6006	19163	25011
150	5059	6396	20406	26632
160	5367	6785	21648	28253
170	5675	7174	22890	29875
180	5983	7564	24132	31496
190	6291	7953	25374	33117
200	6599	8342	26616	34738
210	6907	8732	27859	36359
220	7215	9121	29101	37981
230	7523	9510	30343	39602
240	7831	9900	31585	41223
250	8139	10289	32827	42844
260	8447	10679	34070	44466
270	8755	11068	35312	46087
280	9063	11457	36554	47708
290	9371	11847	37796	49329
300	9679	12236	39038	50950
310	9987	12625	40280	52572
320	10295	13015	41523	54193
330	10603	13404	42765	55814
340	10911	13793	44007	57435
350	11218	14183	45249	59056
360	11526	14572	46491	60678
370	11834	14961	47733	62299
380	12142	15351	48976	63920
390	12450	15740	50218	65541
400	12758	16129	51460	67163
410	13066	16519	52702	68784
420	13374	16908	53944	70405
430	13682	17297	55187	72026
440	13990	17687	56429	73647
450	14298	18076	57671	75269
460	14606	18465	58913	76890
470	14914	18855	60155	78511
480	15222	19244	61397	80132
490	15530	19633	62640	81754
500	15838	20023	63882	83375
510	16146	20412	65124	84996
520	16454	20801	66366	86617
530	16762	21191	67608	88238
540	17070	21580	68851	89860
550	17378	21969	70093	91481
560	17686	22359	71335	93102
570	17994	22748	72577	94723
580	18302	23137	73819	96345
590	18610	23527	75061	97966

Note:
1. The minimum set pressure is 50 psig. For set pressures 50 psig to 99 psig contact the factory.

Non ASME Rated

pounds per hour saturated steam at 3% overpressure,
100% of actual capacity

W = Slope x P for P less than or equal to 1580 psia
 W = Slope x P x [-1.906 x P - 1000 / .2292 x P - 1061] for P greater than 1580 psia
 P = (1.03 x set pressure) + 14.7

3500 Series EBV Ball Valve

Set Pressure (psig) ⁽¹⁾	Slope			
	29.9	37.8	120.6	157.4
	Flow Area			
	.875	1.000	1.750	2.000
	Designation			
	5	6	7	8
1100	34316	43383	138413	180648
1110	34624	43772	139655	182269
1120	34932	44162	140897	183890
1130	35240	44551	142139	185512
1140	35548	44940	143381	187133
1150	35856	45330	144624	188754
1160	36164	45719	145866	190375
1170	36472	46108	147108	191997
1180	36780	46498	148350	193618
1190	37088	46887	149592	195239
1200	37396	47276	150834	196860
1210	37704	47666	152077	198481
1220	38012	48055	153319	200103
1230	38320	48444	154561	201724
1240	38628	48834	155803	203345
1250	38936	49223	157045	204966
1260	39244	49613	158288	206588
1270	39552	50002	159530	208209
1280	39860	50391	160772	209830
1290	40168	50781	162014	211451
1300	40476	51170	163256	213072
1310	40784	51559	164498	214693
1320	41092	51949	165741	216315
1330	41400	52338	166983	217936
1340	41708	52727	168225	219557
1350	42016	53117	169467	221178
1360	42324	53506	170709	222800
1370	42632	53895	171951	224421
1380	42940	54285	173194	226042
1390	43248	54674	174436	227663
1400	43556	55063	175678	229285
1410	43864	55453	176920	230906
1420	44172	55842	178162	232527
1430	44480	56231	179405	234148
1440	44788	56621	180647	235769
1450	45096	57010	181889	237391
1460	45404	57400	183131	239012
1470	45712	57789	184373	240633
1480	46020	58179	185615	242254
1490	46328	58568	186857	243876
1500	46636	58958	188100	245497
1510	46944	59347	189342	247118
1520	47252	59737	190584	248739
1530	47560	60126	191826	250360
1540	47868	60516	193068	251981
1550	48176	60905	194310	253602
1560	48484	61295	195552	255223
1570	48792	61684	196794	256844
1580	49100	62074	198036	258465
1590	49408	62463	199278	260086

Note:
1. The minimum set pressure is 50 psig. For set pressures 50 psig to 99 psig contact the factory.

Set Pressure (psig) ⁽¹⁾	Slope			
	29.9	37.8	120.6	157.4
	Flow Area			
	.875	1.000	1.750	2.000
	Designation			
	5	6	7	8
1600	49947	63144	201460	262933
1610	50287	63573	202829	264721
1620	50627	64003	204201	266511
1630	50968	64434	205576	268305
1640	51309	64866	206952	270102
1650	51651	65298	208332	271902
1660	51994	65731	209713	273706
1670	52337	66165	211098	275512
1680	52681	66600	212484	277322
1690	53025	67035	213873	279135
1700	53370	67471	215265	280952
1710	53716	67908	216660	282771
1720	54062	68346	218057	284595
1730	54409	68785	219456	286421
1740	54757	69224	220859	288252
1750	55105	69665	222264	290085
1760	55454	70106	223671	291923
1770	55804	70548	225082	293764
1780	56154	70991	226495	295608
1790	56505	71435	227911	297456
1800	56857	71880	229330	299308
1810	57210	72325	230752	301164
1820	57563	72772	232177	303024
1830	57917	73219	233605	304887
1840	58272	73668	235036	306755
1850	58627	74117	236469	308626
1860	58983	74568	237906	310501
1870	59340	75019	239346	312381
1880	59698	75471	240789	314264
1890	60057	75925	242236	316152
1900	60416	76379	243685	318043
1910	60776	76834	245138	319939
1920	61137	77291	246594	321840
1930	61499	77748	248053	323744
1940	61862	78206	249516	325653
1950	62225	78666	250982	327566
1960	62589	79126	252451	329484
1970	62955	79588	253924	331407
1980	63321	80051	255401	333334
1990	63688	80515	256881	335265
2000	64055	80980	258364	337202
2010	64424	81446	259852	339143
2020	64794	81913	261343	341089
2030	65164	82382	262837	343040
2040	65536	82852	264336	344995
2050	65908	83322	265838	346956
2060	66282	83794	267344	348922
2070	66656	84268	268854	350893
2080	67032	84742	270369	352869
2090	67408	85218	271887	354851

Non ASME Rated

pounds per hour saturated steam at 3% overpressure,
100% of actual capacity

W = Slope x P for P less than or equal to 1580 psia

P = (1.03 x set pressure) + 14.7

W = Slope x P x [1.906 x P - 1000 / 2.292 x P - 1061] for P greater than 1580 psia

Capacity Tables for 3547 EBV

ASME B & PVC Section I, 90% of actual capacity

W = 1135.8 x 0.90 x Slope x (P/V) 0.5/51.45

Slope = 120.6

V = specific volume

For Non-Code applications multiply capacity by 1.1

3500 Series EBV Ball Valve

Set Pressure (psig) ⁽¹⁾	Slope			
	29.9	37.8	120.6	157.4
	Flow Area			
	.875	1.000	1.750	2.000
	Designation			
	5	6	7	8
2100	67785	85695	273409	356837
2110	68164	86174	274935	358829
2120	68543	86653	276466	360827
2130	68924	87135	278001	362830
2140	69305	87617	279540	364839
2150	69688	88101	281083	366853
2160	70072	88586	282631	368873
2170	70457	89072	284183	370899
2180	70843	89560	285740	372931
2190	71230	90050	287301	374969
2200	71618	90540	288867	377013
2210	72007	91033	290438	379063
2220	72398	91527	292013	381119
2230	72790	92022	293594	383181
2240	73183	92519	295179	385250
2250	73577	93017	296769	387325
2260	73973	93517	298364	389407
2270	74369	94019	299964	391496
2280	74767	94522	301570	393591
2290	75167	95027	303180	395693
2300	75567	95533	304796	397802
2310	75969	96041	306417	399918
2320	76372	96551	308044	402041
2330	76777	97063	309676	404171
2340	77183	97576	311314	406309
2350	77591	98091	312958	408454
2360	78000	98608	314607	410606
2370	78410	99127	316262	412767
2380	78822	99648	317923	414934
2390	79235	100170	319590	417110
2400	79650	100694	321263	419294
2410	80066	101221	322943	421486
2420	80484	101749	324628	423686
2430	80904	102279	326320	425894
2440	81325	102812	328019	428111
2450	81747	103346	329724	430336
2460	82172	103883	331435	432570
2470	82598	104421	333154	434812
2480	83026	104962	334879	437064
2490	83455	105505	336611	439325
2500	83886	106050	338350	441595
2510	—	—	340097	443874
2520	—	—	341850	446163
2530	—	—	343612	448462
2540	—	—	345380	450770
2550	—	—	347156	453088
2560	—	—	348940	455416
2570	—	—	350732	457755
2580	—	—	352532	460104
2590	—	—	354340	462464

Set Pressure (psig) ⁽¹⁾	Slope			
	29.9	37.8	120.6	157.4
	Flow Area			
	.875	1.000	1.750	2.000
	Designation			
	5	6	7	8
2600	—	—	356156	464834
2610	—	—	357981	467215
2620	—	—	359814	469608
2630	—	—	361656	472012
2640	—	—	363506	474427
2650	—	—	365366	476854
2660	—	—	367234	479292
2670	—	—	369112	481743
2680	—	—	370999	484206
2690	—	—	372896	486682
2700	—	—	374802	489170
2710	—	—	376718	491671
2720	—	—	378645	494185
2730	—	—	380581	496712
2740	—	—	382528	499253
2750	—	—	384486	501808
2760	—	—	386454	504377
2770	—	—	388433	506960
2780	—	—	390423	509557
2790	—	—	392425	512170
2800	—	—	394438	514797
2810	—	—	396463	517440
2820	—	—	398500	520098
2830	—	—	400549	522773
2840	—	—	402610	525463
2850	—	—	404684	528170
2860	—	—	406771	530894
2870	—	—	408871	533634
2880	—	—	410984	536392
2890	—	—	413111	539168
2900	—	—	415252	541962
2910	—	—	417407	544775
2920	—	—	419576	547606
2930	—	—	421760	550456
2940	—	—	423959	553326
2950	—	—	426173	556215
2960	—	—	428402	559125
2970	—	—	430648	562056
2980	—	—	432909	565008
2990	—	—	435187	567981
3000	—	—	437482	570976
3010	—	—	439795	573994
3020	—	—	442124	577034
3030	—	—	444472	580098
3040	—	—	446837	583186
3050	—	—	449222	586298
3060	—	—	451625	589435
3070	—	—	454048	592597
3080	—	—	456491	595785
3090	—	—	458954	599000

Note:
1. The minimum set pressure is 50 psig. For set pressures 50 psig to 99 psig contact the factory.

3500 Series EBV Ball Valve

Temp°F	750°F	760°F	770°F	780°F	790°F	800°F	810°F	820°F	830°F	840°F	850°F	860°F	870°F	880°F
Press	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
3100	377402	369184	361481	354241	347419	340977	336420	332042	327830	323774	319865	316662	313553	310534
3150	387217	378405	370169	362448	355191	348353	343573	338985	334576	330335	326251	322925	319699	316567
3200	397331	387848	379012	370754	363014	355739	350708	345885	341255	336807	332528	329081	325739	322497
3250	407757	397547	388068	379236	370980	363242	357947	352877	348017	343353	338871	335280	331801	328428
3300	418695	407651	397437	387954	379119	370861	365315	360010	354929	350058	345382	341639	338015	334504
3350	429996	418008	406970	396763	387287	378459	372656	367111	361807	356726	351854	347195	342816	338535
3400	441889	428428	416126	404826	394399	384739	378707	372950	367447	362181	357136	353361	349704	346157
3450	454438	440202	427225	415332	404380	394251	387831	381714	375878	370301	364966	360768	356712	352790
3500	467714	452134	438014	425139	413337	402466	395678	389222	383072	377204	371599	367232	363017	358943
3550	482066	466485	452324	439378	427484	416507	407902	399810	392181	384973	378148	373637	369285	365081
3600	497368	478163	461023	445603	431634	418901	411403	404294	397541	391116	384993	380275	375727	371338
3650	513744	492378	473473	456591	441395	427621	419692	412188	405073	398313	391882	387003	382302	377768
3700	531681	507621	486558	467916	451265	436273	427937	420060	412604	405530	398809	393738	388856	384151
3750	550703	523585	500115	479543	461317	445023	436261	427998	420186	412788	405767	400499	395431	390551
3800	571336	540673	514470	491741	471781	454069	444814	436102	427883	420112	412749	407280	402022	396963
3850	593842	559037	529712	504565	482690	463434	453689	444533	435911	427772	420072	414383	408919	403666
3900	616006	577109	544757	517300	493615	472912	462612	452957	443883	435333	427258	421352	415683	410238
3950	637962	594993	559680	529989	504573	482494	471613	461437	451893	442917	434456	428326	422449	416808
4000	662414	614429	575559	543240	515819	492170	480729	470051	460054	450669	441836	435472	429376	423528
4050	688513	635028	592340	557244	527729	502455	490346	479072	468542	458677	449410	442799	436471	430407
4100	709737	652417	607062	570018	539020	512585	499846	488012	476981	466665	456992	450090	443943	437177
4150	728509	668284	620886	582326	550160	522795	509349	496889	485301	474488	464367	457255	450460	443960
4200	749194	685592	635850	595569	562086	533681	519450	506300	494101	482743	472134	464751	457705	450969
4250	771195	703725	651340	609145	574213	544675	529682	515863	503072	491188	480107	472398	465048	458031
4300	786919	718210	664837	621831	586218	556098	540223	525634	512167	499684	488072	480027	472367	465062
4350	802247	732501	678265	634529	598292	567629	550766	535321	521107	507969	495776	487490	479605	472092
4400	817082	746846	692079	647827	611105	579994	562029	545637	530600	516742	503915	495317	487145	479364
4450	833505	762221	706568	661560	624185	592504	573451	556125	540281	525718	512272	503297	494778	486677
4500	844856	774356	718994	674027	636563	604724	584571	566308	549656	534391	520331	511035	502220	493845

Capacity Tables for 3547 EBV ASME B & PVC Section I, 90% of actual capacity

W = 1135.8 x 0.90 x Slope x (P/V) 0.5/51.45
P = (Set x 1.03) + 14.7

Slope = 120.6
V = specific volume
For Non-Code applications multiply capacity by 1.1

3500 Series EBV Ball Valve											
Temp°F	890°F	900°F	910°F	920°F	930°F	940°F	950°F	960°F	970°F	980°F	990°F
Press	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
3100	307600	304748	302304	299917	297586	295309	293083	291014	288987	287003	285059
3150	313526	310571	308573	306614	304691	302804	300951	298278	295675	293138	290666
3200	319350	316293	314543	312822	311128	309462	307823	304739	301747	298840	296017
3250	325156	321979	319636	317343	315099	312902	310750	308141	305596	303113	300690
3300	331100	327798	324960	322194	319498	316868	314303	312015	309776	307585	305440
3350	336998	333570	330642	327791	325012	322302	319659	317305	315002	312748	310542
3400	342717	339377	336152	333017	329968	327001	324113	321712	319363	317065	314816
3450	348994	345318	342185	339136	336167	333275	330456	328000	325598	323248	320948
3500	355003	351190	347963	344823	341767	338790	335890	333366	330898	328484	326122
3550	361017	357087	353743	350491	347327	344248	341249	338658	336125	333648	331225
3600	367099	363003	359583	356257	353023	349875	346810	344109	341471	338892	336371
3650	373392	369164	365617	362171	358820	355560	352388	349614	346904	344257	341669
3700	379612	375231	371581	368035	364589	361238	357978	355110	352309	349574	346902
3750	385847	381309	377531	373862	370299	366835	363467	360526	357656	354853	352115
3800	392090	387392	383508	379738	376077	372521	369063	366047	363104	360231	357424
3850	398611	393740	389716	385812	382024	378345	374770	371676	368657	365711	362835
3900	405001	399959	395796	391761	387846	384046	380356	377187	374095	371079	368134
3950	411387	406171	401895	397751	393733	389834	386049	382777	379588	376477	373441
4000	417913	412516	408093	403810	399659	395633	391726	388377	385112	381927	378821
4050	424589	419000	414454	410052	405788	401654	397644	394184	390813	387527	384322
4100	431123	425314	420649	416134	411761	407523	403414	399846	396371	392985	389684
4150	437733	431760	426908	422216	417675	413277	409016	405370	401819	398361	394990
4200	444523	438345	433329	428481	423793	419255	414860	411129	407497	403960	400513
4250	451322	444900	439752	434780	429972	425320	420816	416968	413225	409580	406030
4300	458086	451415	446137	441040	436113	431348	426736	422771	418915	415163	411509
4350	464920	458066	452580	447286	442174	437234	432455	428407	424471	420642	416914
4400	471944	464858	459192	453727	448453	443359	438434	434296	430274	426360	422552
4450	478961	471601	465790	460189	454785	449568	444526	440262	436119	432091	428172
4500	485876	478281	472289	466517	460951	455580	450392	446041	441813	437704	433707

Capacity Tables for 3547 EBV ASME B & PVC Section I, 90% of actual capacity

W = 1135.8 x 0.90 x Slope x (P/V) 0.5/51.45
P = (Set x 1.03) + 14.7

Slope = 120.6
V = specific volume
For Non-Code applications multiply capacity by 1.1

3500 Series EBV Ball Valve											
Temp°F	1000°F	1010°F	1020°F	1030°F	1040°F	1050°F	1060°F	1070°F	1080°F	1090°F	1100°F
Press	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP	CAP
3100	283154	281432	279740	278079	276447	274844	273268	271719	270196	268698	267745
3150	288255	286480	284737	283025	281344	279693	278070	276475	274907	273366	272281
3200	293271	290756	288305	285914	283582	281306	279084	276914	274794	272722	271690
3250	298324	292334	286690	281362	276320	271539	266999	262679	258562	254632	250900
3300	303339	295573	288375	281678	275427	269574	264079	258908	254028	249415	245126
3350	308382	303940	299684	295602	291683	287915	284290	280798	277432	274184	270776
3400	312614	310606	308636	306703	304806	302944	301115	299320	297556	295822	294624
3450	318697	316600	314545	312529	310551	308610	306706	304836	302999	301196	300016
3500	323810	321659	319550	317482	315454	313464	311511	309594	307712	305864	304660
3550	328855	326650	324489	322370	320292	318254	316254	314292	312366	310474	309246
3600	333906	331664	329467	327313	325201	323129	321096	319101	317143	315221	313910
3650	339139	336841	334588	332380	330216	328093	326010	323967	321961	319993	318655
3700	344289	341936	339629	337369	335153	332981	330850	328759	326708	324695	323409
3750	349439	347030	344670	342357	340091	337869	335689	333552	331455	329396	328008
3800	354683	352216	349801	347434	345115	342841	340612	338426	336281	334177	332763
3850	360025	357479	354986	352545	350154	347810	345513	343261	341053	338886	337515
3900	365259	362655	360107	357611	355167	352772	350424	348124	345867	343655	342260
3950	370478	367817	365213	362663	360166	357720	355323	352974	350671	348412	346906
4000	375789	373069	370408	367802	365251	362752	360304	357904	355552	353246	351715
4050	381196	378415	375694	373031	370424	367870	365369	362918	360516	358160	356509
4100	386465	383603	380804	378064	375384	372759	370189	367671	365203	362785	361284
4150	391703	388807	385974	383202	380489	377833	375231	372683	370186	367739	366034
4200	397153	394170	391254	388401	385611	382879	380205	377585	375020	372506	370857
4250	402571	399527	396551	393641	390793	388007	385280	382609	379993	377430	375756
4300	407950	404820	401761	398770	395844	392983	390182	387441	384756	382126	380518
4350	413284	410094	406976	403929	400949	398034	395182	392390	389656	386979	385239
4400	418844	415562	412355	409222	406159	403164	400234	397367	394560	391813	390141
4450	424359	421012	417743	414549	411428	408375	405390	402469	399611	396812	395002
4500	429818	426379	423022	419743	416539	413407	410345	407350	404419	401551	399816

Reduced Bore Selection and Capacity Factor

3500 Series EBV Ball Valve

.875 Bore, 1-1/2" 3515 & 3525	
Orifice	Relation to 100%
7/8	100
27/32	92.9
13/16	86.2
25/32	79.7
3/4	73.4
23/32	67.4
11/16	61.7
21/32	56.2
5/8	51
19/32	46
9/16	41.3

1.000 Bore, 2" 3516 & 3526	
Orifice	Relation to 100%
1	100
31/32	93.8
15/16	87.8
29/32	82.1
7/8	76.5
27/32	71.1
13/16	66
25/32	61
3/4	56.2
23/32	51.6
11/16	47.2
5/8	39

1.750 Bore, 2-1/2" 3517, 3527, 3537 & 3547			
Orifice	Relation to 100%	Orifice	Relation to 100%
1-3/4	100	1-3/8	61.7
1-23/32	96.4	1-11/32	58.9
1-11/16	92.9	1-5/16	56.2
1-21/32	89.5	1-9/32	53.6
1-5/8	86.2	1-3/16	46
1-19/32	82.9	1-5/32	43.6
1-9/16	79.3	1-1/8	41.3
1-17/32	76.5	1-3/32	39
1-1/2	73.4	1-1/16	36.8
1-15/32	70.4	1-1/32	34.8
1-7/16	67.4	1	32.6
1-13/32	64.5	-	-

Note:

1. Reduced bore selection not available on the 3538W.

Reaction Forces

Illustrated to the right is a CONSOLIDATED Electromatic Ball Valve. When the valve is closed, an upward force is exerted in the valve neck (F_P), due to valve internal pressure. Valve necks are designed to resist the force and circumferential stresses due to valve internal pressure.

When the valve opens, the force remains constant until some overpressure occurs. The force resulting from set pressure plus overpressure (F_{SP}) must be balanced by resisting forces in the valve neck.

Once flow has been established, the steam escapes upward through the discharge connection; this results in force (F_R) acting downward at the center line of the discharge pipe.

Force F_R is represented by the equation:

$$F = MV + PA$$

A = area of outlet, sq. in.

$$M = \frac{W}{g} = \frac{\text{lb}/\text{sec}}{\text{ft}/\text{sec}^2} = \frac{\text{lb} \cdot \text{sec}}{\text{ft}}$$

P = static pressure, lb/sq. in.

V = velocity, ft/sec.

In addition to actual valve capacities, reaction force valves are based on pressure, temperature, and valve configuration. Forces for a particular valve type will apply regardless of inlet connection used; i.e. flange, screwed, or welded.

For valve installations which vent to a closed system or solidly piped discharge lines, changes which occur in reaction forces, and the effects on nozzles, headers, and discharge lines should be considered.

Force values indicated apply only when valves have been installed in accordance with ASME Code or Dresser Industrial Valve Operation Maintenance Manual recommendations.



Typical Vertical Discharge
Consolidated Electromatic Ball Valve

Reaction Forces - Steam



- Notes:
1. For capacity on superheated steam, multiply saturated steam capacity by correction factor.
 2. Convert set pressure from (psig) to (psia) flowing pressure.

*** PSIA flowing = [set pressure psig x overpressure] + 14.7**

Superheat Correction Factor

Flowing Pressure* (psia)	Superheat Correction Factor K_{sh} Total Temperature, °F, of Superheated Steam																
	400	450	500	550	600	650	700	750	800	850	900	950	1000	1050	1100	1150	1200
50	0.987	0.957	0.930	0.905	0.882	0.861	0.841	0.823	0.805	0.789	0.774	0.759	0.745	0.732	0.719	0.708	0.696
100	0.998	0.963	0.935	0.909	0.885	0.864	0.843	0.825	0.807	0.790	0.775	0.760	0.746	0.733	0.720	0.708	0.697
150	0.984	0.970	0.940	0.913	0.888	0.866	0.846	0.826	0.808	0.792	0.776	0.761	0.747	0.733	0.721	0.709	0.697
200	0.979	0.977	0.945	0.917	0.892	0.869	0.848	0.828	0.810	0.793	0.777	0.762	0.748	0.734	0.721	0.709	0.698
250	-	0.972	0.951	0.921	0.895	0.871	0.850	0.830	0.812	0.794	0.778	0.763	0.749	0.735	0.722	0.710	0.698
300	-	0.968	0.957	0.926	0.898	0.874	0.852	0.832	0.813	0.796	0.780	0.764	0.750	0.736	0.723	0.710	0.699
350	-	0.968	0.963	0.930	0.902	0.877	0.854	0.834	0.815	0.797	0.781	0.765	0.750	0.736	0.723	0.711	0.699
400	-	-	0.963	0.935	0.906	0.880	0.857	0.836	0.816	0.798	0.782	0.766	0.751	0.737	0.724	0.712	0.700
450	-	-	0.961	0.940	0.909	0.883	0.859	0.838	0.818	0.800	0.783	0.767	0.752	0.738	0.725	0.712	0.700
500	-	-	0.961	0.946	0.914	0.886	0.862	0.840	0.820	0.801	0.784	0.768	0.753	0.739	0.725	0.713	0.701
550	-	-	0.962	0.952	0.918	0.889	0.864	0.842	0.822	0.803	0.785	0.769	0.754	0.740	0.726	0.713	0.701
600	-	-	0.964	0.958	0.922	0.892	0.867	0.844	0.823	0.804	0.787	0.770	0.755	0.740	0.727	0.714	0.702
650	-	-	0.968	0.958	0.927	0.896	0.869	0.846	0.825	0.806	0.788	0.771	0.756	0.741	0.728	0.715	0.702
700	-	-	-	0.958	0.931	0.899	0.872	0.848	0.827	0.807	0.789	0.772	0.757	0.742	0.728	0.715	0.703
750	-	-	-	0.958	0.936	0.903	0.875	0.850	0.828	0.809	0.790	0.774	0.758	0.743	0.729	0.716	0.703
800	-	-	-	0.960	0.942	0.906	0.878	0.852	0.830	0.810	0.792	0.774	0.759	0.744	0.730	0.716	0.704
850	-	-	-	0.962	0.947	0.910	0.880	0.855	0.832	0.812	0.793	0.776	0.760	0.744	0.730	0.717	0.704
900	-	-	-	0.965	0.953	0.914	0.883	0.857	0.834	0.813	0.794	0.777	0.760	0.745	0.731	0.718	0.705
950	-	-	-	0.969	0.958	0.918	0.886	0.860	0.836	0.815	0.796	0.778	0.761	0.746	0.732	0.718	0.705
1000	-	-	-	0.974	0.959	0.923	0.890	0.862	0.838	0.816	0.797	0.779	0.762	0.747	0.732	0.719	0.706
1050	-	-	-	-	0.960	0.927	0.893	0.864	0.840	0.818	0.798	0.780	0.763	0.748	0.733	0.719	0.707
1100	-	-	-	-	0.962	0.931	0.896	0.867	0.842	0.820	0.800	0.781	0.764	0.749	0.734	0.720	0.707
1150	-	-	-	-	0.964	0.936	0.899	0.870	0.844	0.821	0.801	0.782	0.765	0.749	0.735	0.721	0.708
1200	-	-	-	-	0.966	0.941	0.903	0.872	0.846	0.823	0.802	0.784	0.766	0.750	0.735	0.721	0.708
1250	-	-	-	-	0.969	0.946	0.906	0.875	0.848	0.825	0.804	0.785	0.767	0.751	0.736	0.722	0.709
1300	-	-	-	-	0.973	0.952	0.910	0.878	0.850	0.826	0.805	0.786	0.768	0.752	0.737	0.723	0.709
1350	-	-	-	-	0.977	0.958	0.914	0.880	0.852	0.828	0.807	0.787	0.769	0.753	0.737	0.723	0.710
1400	-	-	-	-	0.982	0.963	0.918	0.883	0.854	0.830	0.808	0.788	0.770	0.754	0.738	0.724	0.710
1450	-	-	-	-	0.987	0.968	0.922	0.886	0.857	0.832	0.809	0.790	0.771	0.754	0.739	0.724	0.711
1500	-	-	-	-	0.993	0.970	0.926	0.889	0.859	0.833	0.811	0.791	0.772	0.755	0.740	0.725	0.711
1550	-	-	-	-	0.972	0.930	0.892	0.861	0.835	0.812	0.792	0.773	0.756	0.740	0.726	0.712	0.702
1600	-	-	-	-	0.973	0.934	0.894	0.863	0.836	0.813	0.792	0.774	0.756	0.740	0.726	0.712	0.704
1650	-	-	-	-	0.973	0.936	0.895	0.863	0.836	0.812	0.791	0.772	0.755	0.739	0.724	0.710	0.702
1700	-	-	-	-	0.973	0.938	0.895	0.863	0.835	0.811	0.790	0.771	0.754	0.738	0.723	0.709	0.702
1750	-	-	-	-	0.974	0.940	0.896	0.862	0.835	0.810	0.789	0.770	0.752	0.736	0.721	0.707	0.705
1800	-	-	-	-	0.975	0.942	0.897	0.862	0.834	0.810	0.788	0.768	0.751	0.735	0.720	0.705	0.704
1850	-	-	-	-	0.976	0.944	0.897	0.862	0.833	0.809	0.787	0.767	0.749	0.733	0.718	0.704	0.702
1900	-	-	-	-	0.977	0.946	0.898	0.862	0.832	0.807	0.785	0.766	0.748	0.731	0.716	0.702	0.700
1950	-	-	-	-	0.979	0.949	0.898	0.861	0.832	0.806	0.784	0.764	0.746	0.729	0.714	0.700	0.698
2000	-	-	-	-	0.982	0.952	0.899	0.861	0.831	0.805	0.782	0.762	0.744	0.728	0.712	0.698	0.696
2050	-	-	-	-	0.985	0.954	0.899	0.860	0.830	0.804	0.781	0.761	0.742	0.726	0.710	0.696	0.694
2100	-	-	-	-	0.988	0.956	0.900	0.860	0.828	0.802	0.779	0.759	0.740	0.724	0.708	0.694	0.692
2150	-	-	-	-	-	0.956	0.900	0.859	0.827	0.801	0.778	0.757	0.738	0.722	0.706	0.692	0.690
2200	-	-	-	-	-	0.955	0.901	0.859	0.826	0.799	0.776	0.755	0.736	0.720	0.704	0.690	0.687
2250	-	-	-	-	-	0.954	0.901	0.858	0.825	0.797	0.774	0.753	0.734	0.717	0.702	0.688	0.685
2300	-	-	-	-	-	0.953	0.901	0.857	0.823	0.795	0.772	0.751	0.732	0.715	0.699	0.685	0.682
2350	-	-	-	-	-	0.952	0.902	0.856	0.822	0.794	0.769	0.748	0.729	0.712	0.697	0.682	0.679
2400	-	-	-	-	-	0.952	0.902	0.855	0.820	0.791	0.767	0.746	0.727	0.710	0.694	0.679	0.677
2450	-	-	-	-	-	0.951	0.902	0.854	0.818	0.789	0.765	0.743	0.724	0.707	0.691	0.677	0.674
2500	-	-	-	-	-	0.951	0.902	0.852	0.816	0.787	0.762	0.740	0.721	0.704	0.688	0.674	0.671
2550	-	-	-	-	-	0.951	0.902	0.851	0.814	0.784	0.759	0.738	0.718	0.701	0.685	0.671	0.664
2600	-	-	-	-	-	0.951	0.903	0.849	0.812	0.782	0.756	0.735	0.715	0.698	0.682	0.664	0.661
2650	-	-	-	-	-	0.952	0.903	0.848	0.809	0.779	0.754	0.731	0.712	0.695	0.679	0.664	0.657
2700	-	-	-	-	-	0.952	0.903	0.846	0.807	0.776	0.750	0.728	0.708	0.691	0.675	0.661	0.653
2750	-	-	-	-	-	0.953	0.903	0.844	0.804	0.773	0.747	0.724	0.705	0.687	0.671	0.657	0.649
2800	-	-	-	-	-	0.956	0.903	0.842	0.801	0.769	0.743	0.721	0.701	0.684	0.668	0.653	0.645
2850	-	-	-	-	-	0.959	0.902	0.839	0.798	0.766	0.739	0.717	0.697	0.679	0.663	0.649	0.645
2900	-	-	-	-	-	0.963	0.902	0.836	0.794	0.762	0.735	0.713	0.693	0.675	0.659	0.645	0.640
2950	-	-	-	-	-	-	0.902	0.834	0.790	0.758	0.731	0.708	0.688	0.671	0.655	0.640	0.635
3000	-	-	-	-	-	-	0.901	0.831	0.786	0.753	0.726	0.704	0.684	0.666	0.650	0.635	0.630
3050	-	-	-	-	-	-	0.899	0.827	0.782	0.749	0.722	0.699	0.679	0.661	0.645	0.630	0.625
3100	-	-	-	-	-	-	0.896	0.823	0.777	0.744	0.716	0.693	0.673	0.656	0.640	0.625	0.620
3150	-	-	-	-	-	-	0.894	0.819	0.772	0.738	0.711	0.688	0.668	0.650	0.634	0.620	0.614
3200	-	-	-	-	-	-	0.889	0.815	0.767	0.733	0.705	0.682	0.662	0.644	0.628	0.614	0.614