

Flow-Tek[®]

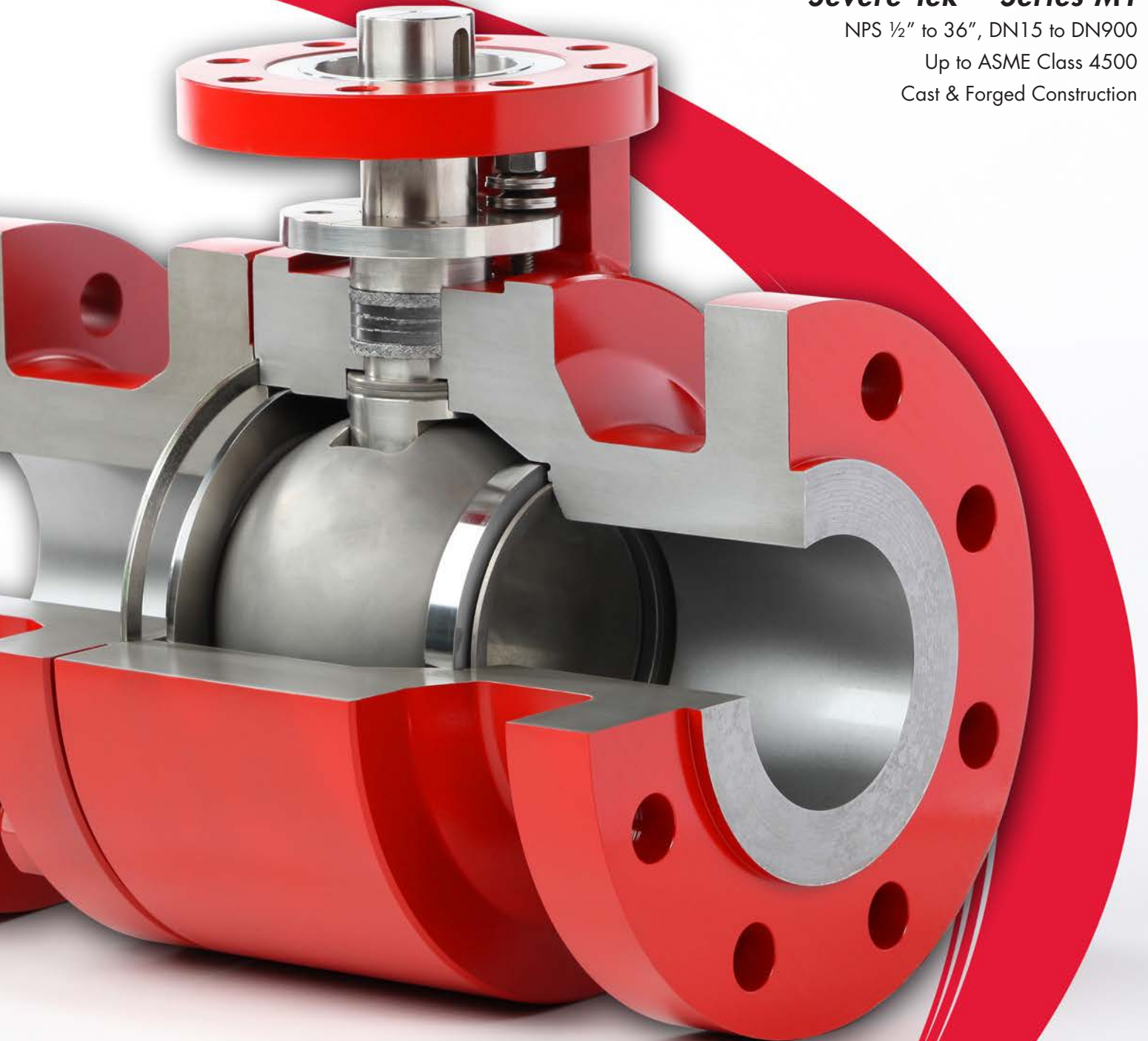
A Subsidiary of BRAY INTERNATIONAL, Inc.

Severe-Tek™ Series M1

NPS ½" to 36", DN15 to DN900

Up to ASME Class 4500

Cast & Forged Construction



HIGH PERFORMANCE
SEVERE SERVICE

Metal Seated Ball Valves

HIGH PERFORMANCE **SEVERE SERVICE**

Metal Seated Ball Valves

Flow-Tek's High Performance Severe Service (Severe-Tek™) *Metal Seated Ball Valves* are suitable for the harshest applications. These products are customized as required for specific applications.

Each Severe-Tek™ valve is engineered for the customer's specific application and is backed by a specialized and trained service department.

Flow-Tek's technical engineers are industry leaders with exclusive metal seated ball valve experience. Since the early 1980's, Flow-Tek has successfully found solutions and created performance improvements for our customers. Our Severe-Tek™ valves have the very best improvements and features that will outperform other *Metal Seated Ball Valves* in the market. Flow-Tek is dedicated to continuous improvement and innovation in design and service to meet the customer's technical and commercial needs.

Flow-Tek's global sales, manufacturing and purchasing facilities allow us to produce the most technically advanced valves designed with the highest quality and workmanship at competitive pricing. Combined with our extensive service network, we are able to assist with any of your valve needs.



QUALITY, SAFETY, AND PERFORMANCE

Flow-Tek's Severe Service Division provides high quality designs and manufacturing focusing on professional customer service. As a result of our continual commitment to quality, our facilities have achieved ISO 9001:2008 for the design and manufacture of Severe-Tek™ valves.

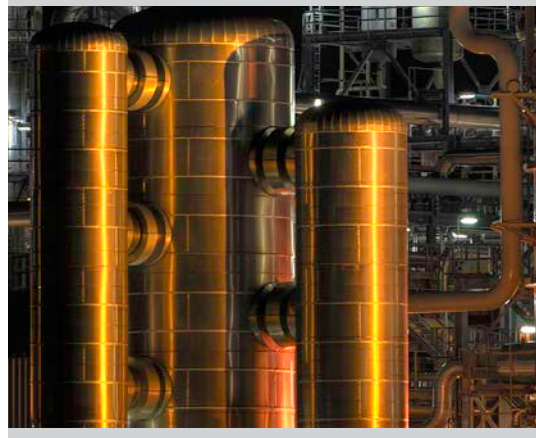
We recognize that the safety performance of our product is critical to our customers, therefore, all major part components are traceable to reassure our customers of consistent reliability throughout its life cycle. Our Severe-Tek™ products are certified to the requirements of Annex III, Module H of the PED 97/23/EC.

At Flow-Tek we understand that safety correlates with our success and that good Health Safety Environment management equates to good business management. Safety is integrated into our foundation aspiring to prevent and eliminate all work related injuries to our employees and reducing harm to our environment.





INDUSTRIES SERVED



REFINING

HEAVY OIL UPGRADING & HYDROCRACKING

- Catalyst Addition & Withdrawal
- Pump Isolation
- Overhead Vapor Isolation & Control
- Low, Medium, & High Control Letdown Stations

DELAYED COKING

- Coke Drum Feed Isolation
- Overhead Vapor Line
- Cutting Water Pump Isolation
- Bypass

REFORMING (CCR)

- Lockhopper

FLUIDIZED CATALYTIC CRACKING (FCC)

- Catalyst Handling
- Slurry Isolation & Control Steam
- Regeneration Dump
- Heavy Oil

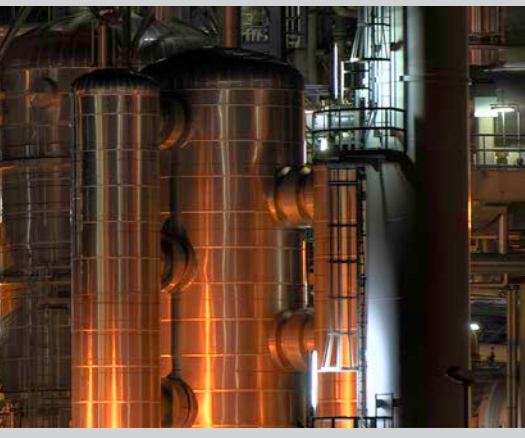
POWER GENERATION

- Above & Below Seat Drains
- Ash Handling
- Attenuator Spray Control
- Boiler Drains
- Boiler Feed Pump Isolation

- Continuous Boiler Blowdown
- Recirculation
- Feedwater Isolation
- Main Steam Stop
- Soot Blower

- Startup Vents/Drains
- Steam Dump
- Turbine Bypass Systems
- Turbine Drain





MINING

HIGH PRESSURE SLURRY TRANSPORTATION SYSTEMS

- Pump Discharge Isolation
- Pipeline Isolation Stations
- Instrument Isolation
- Vents & Drains
- Pigging Stations

PRESSURE ACID LEACH & PRESSURE OXIDATION

- Autoclaves
- Acid Injection
- Gas Injection
- Steam Injection
- Vessel Feed & Discharge

CHEMICAL / PETRO-CHEMICAL

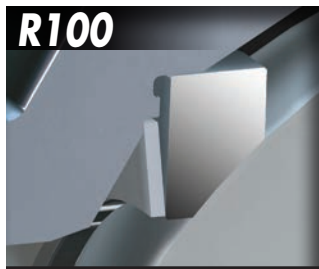
- Polyethylene
- Ethylene

SYNFUELS

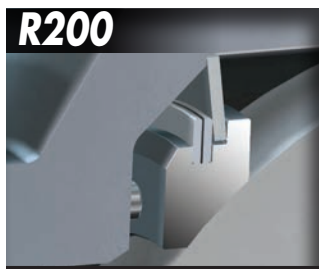
- Coal Gasification
- Coal Liquefaction



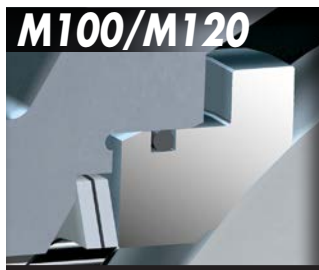
APPLICATION SPECIFIC VALVE MODELS



R100

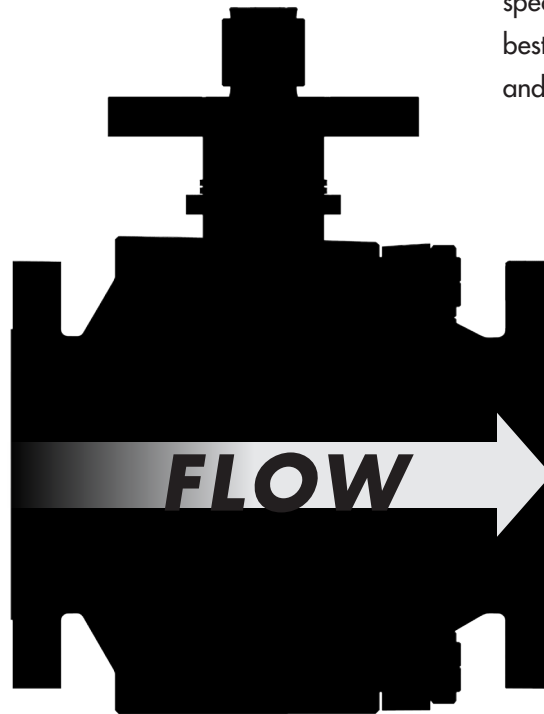


R200

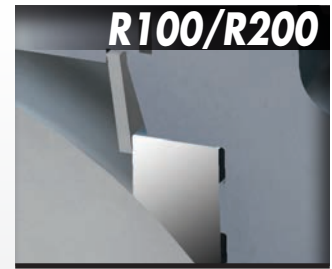


M100/M120

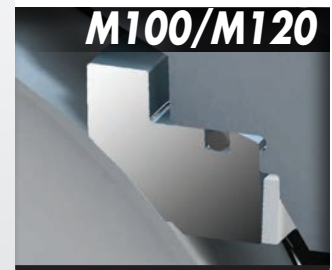
HIGH PRESSURE SEATS**



LOW PRESSURE SEATS



R100/R200



M100/M120

Flow-Tek's Severe-Tek™ Valves offer application specific trims customized specifically for each application, giving the best solution for long-term tight isolation and lowest maintenance operations.

MODEL	SEALING SYSTEM			SEAT CHARACTERISTICS	MEDIA USE	APPLICABLE INDUSTRIES
	UNI-	BI-	*DB&B			
R100	●	●		Solids resistant design, Low to High Temperature	Light to Medium Catalyst Slurry, Saturated and Superheated Steam, General Hydrocarbons, Pressure Acid-Leaching and Pressure Oxidation Services over 450 °F (232 °C)	<ul style="list-style-type: none"> • Refining • Power • Mining • Chemical • Synfuels
R200	●			Solids proof design, Low to High Temperature	Heavy Catalyst Slurry, Fouling Hydrocarbons, Coking	<ul style="list-style-type: none"> • Refining
M100	●	●		Solids resistant design, Low Temperature	Slurry Transport, Erosive and Abrasive. Pressure Acid-Leaching and Pressure Oxidation Services under 450 °F (232 °C)	<ul style="list-style-type: none"> • Mining
M120	●	●	●	Solids resistant design, double-block and bleed system, Low Temperature	Slurry Transport, Erosive and Abrasive	<ul style="list-style-type: none"> • Mining

*Double Block and Bleed

**May vary for specific designs

SPECIFICATIONS

Valve	ASME B16.34
Design:	ASME Section VIII - Div 1, Appendix 2
Sizes:	½ - 36 in. (DN 15 - 900) Custom and larger sizes available upon request
Pressure Ratings:	ASME 150 - 4500 Custom higher pressures upon request.
Temperature:	Standard design rated up to 1100 °F (593 °C), can be customized for higher temperatures
End Connections:	Raised Face and Ring-Joint (ASME B16.5 and DIN 2501) Buttwelds (ASME B16.25) Hubs Socketweld (ASME B16.11) Custom Ends available
End-To-End:	ASME B16.10 (Long Pattern)
Testing:	MSS SP-61, API 598, ANSI/FCI Class VI Custom Tests available



Butt-Weld



Hub

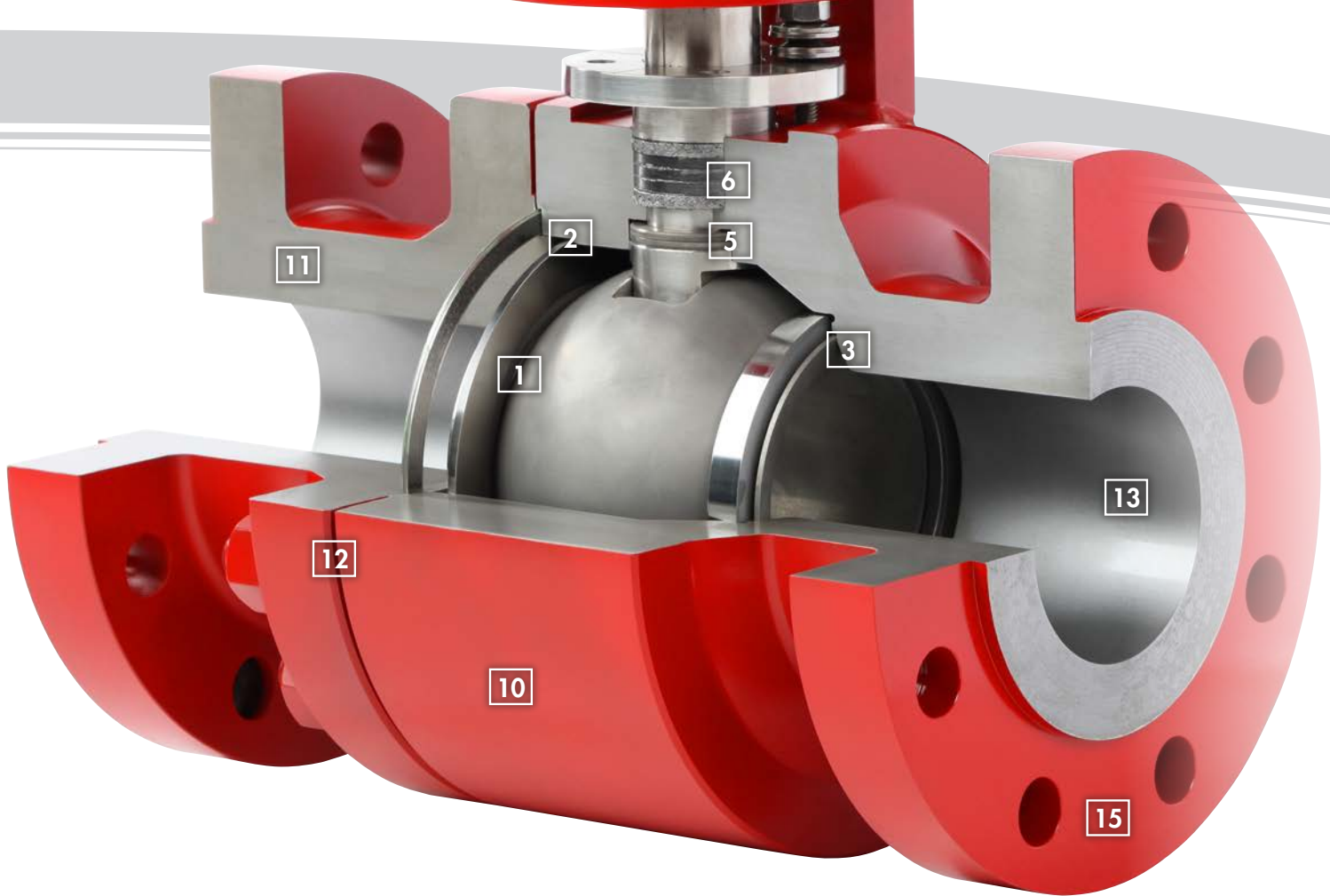


Ring-Joint
Flange



Raised Face
Flange





7. **OUTER STEM BUSHING**

To eliminate side loading caused by valve cycling and/or valve orientation, this bushing ring maintains concentric alignment on the valve stem.

8. **STEM BUSHING INSERT**

Gall resistant materials to withstand high cycles.

9. **MOUNTING FLANGE**

A large, robust mounting flange is built into the Severe-Tek™ valve body to support heavy operators, and is critical to the drive train sealing feature.

10. **VALVE CONSTRUCTION**

Severe-Tek™ valve bodies are offered in both forged and cast material grades to meet or exceed specifications. Available in two piece or three piece construction.

11. **WALL THICKNESS**

Severe-Tek™ valves are designed to have additional corrosion allowances that exceeds ASME B16.34 minimum standards to ensure the highest safeguards against corrosive and erosive service environments.

12. **BODY JOINT**

The bolted connection is designed to meet and exceed ASME Section VIII, Div 1, Appendix 2 criteria.

- Severe-Tek™ valves rated up to ASME 1500 utilize a large cross-sectional spiral wound gasket.

- Severe-Tek™ valves rated ASME 2500 and higher utilize our proprietary seal ring.

13. **VALVE BORES**

Severe-Tek™ valve bore sizes are based on ASME B16.34 Appendix A Table A-1. Custom or reduced bore sizes are available.

14. **STEM KEYS**

Keys are engaged in a 'closed' keyway slot to eliminate disengagement from the valve stem and are positioned in-line with ball bore (flow path).

15. **END CONNECTIONS**

Severe-Tek™ valves are available in raised face, ring joint, butt weld, socket weld, and hub-type configurations.

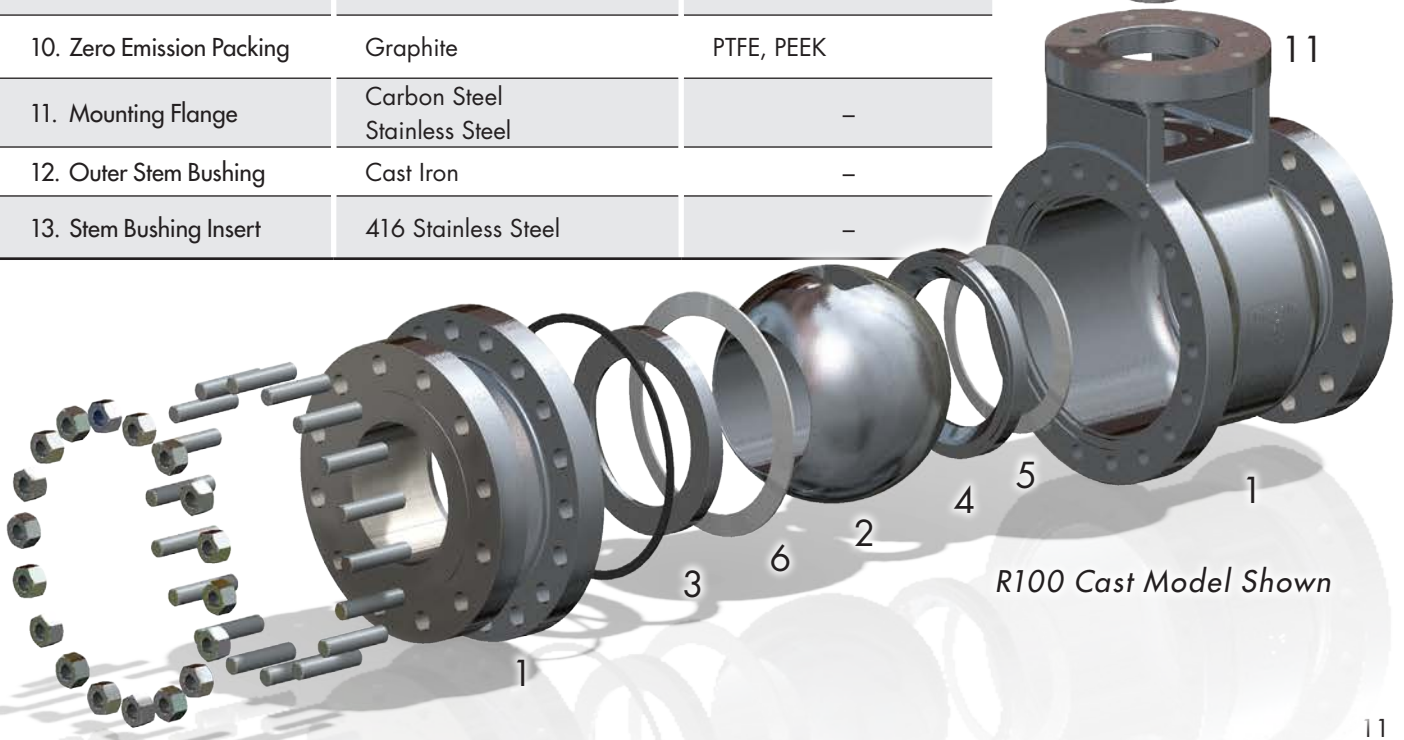
MATERIALS OF CONSTRUCTION



ITEM	STANDARD	OPTIONAL
1. Body & Closure	Forged A105 Carbon Steel, A182 F316 Austenitic Stainless Steel A182 F9 Alloy Steel	A182 F347 & F347H Titanium Duplex & Super Duplex Stainless Steel
	Cast A216 Gr WCB A351 Gr CF8M A217 Gr C12 Alloy Steel	A351 Gr CF8C
2. Ball	410 Stainless Steel 316 Stainless Steel	Inconel, Incolloys, Titanium Duplex Stainless Steel, 17-4 PH Stainless Steel
	Thermally Sprayed Coatings	
	HVOF Chromium Carbide HVOF Tungsten Carbide Fused Carbides	Metallic Ceramics Cobalt Based Carbides
3. Primary Seat Ring	410 Stainless Steel 316 Stainless Steel	Inconel, Incolloys, Titanium Duplex Stainless Steel, 17-4 PH Stainless Steel
	Thermally Sprayed Coatings	
	HVOF Chromium Carbide HVOF Tungsten Carbide Fused Carbides	Metallic Ceramics Cobalt Based Carbides
4. Spring Seat Ring	410 Stainless Steel 316 Stainless Steel	Inconel, Incolloys, Titanium Duplex Stainless Steel, 17-4 PH Stainless Steel
	Thermally Sprayed Coatings	
	HVOF Chromium Carbide HVOF Tungsten Carbide Fused Carbides	Metallic Ceramics Cobalt Based Carbides
5. Spring	Inconel 718	17-4 PH Stainless Steel
6. Locking Spring	316 Stainless Steel	Inconel, Incolloys, Duplex Stainless Steel, 17-4 PH Stainless Steel



ITEM	STANDARD	OPTIONAL
7. Stem	A638 Gr 660	Inconel, Incolloys, Titanium 17-4 PH Stainless Steel Duplex Stainless Steel
8. Inner Stem Bearings	410 Stainless Steel	Titanium
	316 Stainless Steel	Duplex Stainless Steel
	Thermally Sprayed Coatings	
	HVOF Chromium Carbide	Metallic Ceramics
	HVOF Tungsten Carbide	Cobalt Based Carbides
	Fused Carbides	
9. Gland Flange	316 Stainless Steel	-
10. Zero Emission Packing	Graphite	PTFE, PEEK
11. Mounting Flange	Carbon Steel Stainless Steel	-
12. Outer Stem Bushing	Cast Iron	-
13. Stem Bushing Insert	416 Stainless Steel	-



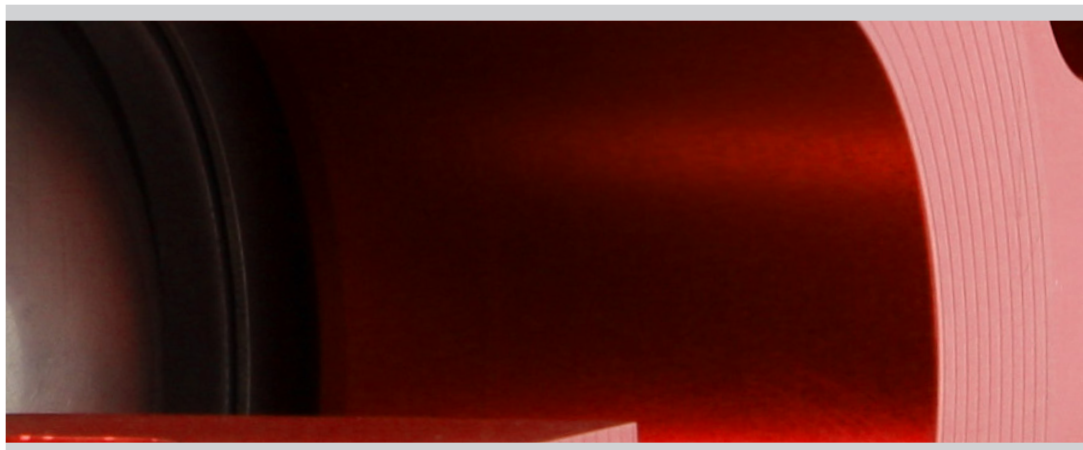
PRESSURE/TEMP RATINGS

Based on ASME B16.34-2009 Standard Class

Carbon Steel - A105 - A216 Gr WCB - A350 Gr LF2

Temp °F	Working Pressures by Class, psig							Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500		150	300	600	900	1500	2500	4500
-20 to 100	285	740	1,480	2,220	3,705	6,170	11,110	-29 to 38	19.6	51.1	102.1	153.2	255.3	425.5	765.9
200	260	680	1,360	2,035	3,395	5,655	10,185	100	17.7	46.6	93.2	139.8	233.0	388.3	699.0
300	230	655	1,310	1,965	3,270	5,450	9,815	150	15.8	45.1	90.2	135.2	225.4	375.6	676.1
400	200	635	1,265	1,900	3,170	5,280	9,505	200	13.8	43.8	87.6	131.4	219.0	365.0	657.0
500	170	605	1,205	1,810	3,015	5,025	9,040	250	12.1	41.9	83.9	125.8	209.7	349.5	629.1
600	140	570	1,135	1,705	2,840	4,730	8,515	325	9.3	38.7	77.4	116.1	193.6	322.6	580.7
650	125	550	1,100	1,650	2,745	4,575	8,240	350	8.4	37.6	75.1	112.7	187.8	313.0	563.5
700	110	530	1,060	1,590	2,665	4,425	7,960	375	7.4	36.4	72.7	109.1	181.8	303.1	545.5
750	95	505	1,015	1,520	2,535	4,230	7,610	400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
800 (1)	80	410	825	1,235	2,055	3,430	6,170	425 (1)	5.5	28.8	57.5	86.3	143.8	239.7	431.5
850 (1)	65	320	640	955	1,595	2,655	4,785	450 (1)	4.6	23.0	46.0	69.0	115.0	191.7	345.1

(1) Permissible, but not recommended for prolonged use above 800 °F (427 °C)



Low Alloy Steel - A182 Gr F9 - A217 Gr C12

Temp °F	Working Pressures by Class, psig							Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500		150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250	-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
200	260	750	1,500	2,250	3,750	6,250	11,250	100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
300	230	730	1,455	2,185	3,640	6,070	10,925	150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
400	200	705	1,410	2,115	3,530	5,880	10,585	200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
500	170	665	1,330	1,995	3,325	5,540	9,965	250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
600	140	605	1,210	1,815	3,025	5,040	9,070	325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
650	125	590	1,175	1,765	2,940	4,905	8,825	350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
700	110	570	1,135	1,705	2,840	4,730	8,515	375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
750	95	530	1,065	1,595	2,660	4,430	7,970	400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
800	80	510	1,015	1,525	2,540	4,230	7,610	425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
850	65	485	975	1,460	2,435	4,060	7,305	450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
900	50	450	900	1,350	2,245	3,745	6,740	475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
950	35	375	755	1,130	1,885	3,145	5,655	500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
1,000	20	255	505	760	1,270	2,115	3,805	538	1.4	17.5	35.0	52.5	87.5	145.8	262.4
1,050	20(a)	170	345	515	855	1,430	2,570	575	1.4(a)	10.5	20.9	31.4	52.3	87.1	156.8
1,100	20(a)	115	225	340	565	945	1,695	600	1.4(a)	7.2	14.4	21.5	35.9	59.8	107.7
1,150	20(a)	75	150	225	375	630	1,130	625	1.4(a)	5.0	9.9	14.9	24.8	41.4	74.5
1,200	20(a)	50	105	155	255	430	770	650	1.4(a)	3.5	7.1	10.6	17.7	29.5	53.2

(a) Flanged-end valve ratings terminate at 1,000°F (538 °C)

PRESSURE/TEMPERATURE RATINGS

Based on ASME B16.34 Standard Class

Stainless Steel - A182 Gr. F316 - A182 Gr. F316H - A351 Gr. CF8M

Temp °F	Working Pressures by Class, psig							Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500		150	300	600	900	1500	2500	4500
-20 to 100	275	720	1,440	2,160	3,600	6,000	10,800	-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
200	235	620	1,240	1,860	3,095	5,160	9,290	100	16.2	42.2	84.4	126.6	211.0	351.6	632.9
300	215	560	1,120	1,680	2,795	4,660	8,390	150	14.8	38.5	77.0	115.5	192.5	320.8	577.4
400	195	515	1,025	1,540	2,570	4,280	7,705	200	13.7	35.7	71.3	107.0	178.3	297.2	534.9
500	170	480	955	1,435	2,390	3,980	7,165	250	12.1	33.4	66.8	100.1	166.9	278.1	500.6
600	140	450	900	1,355	2,255	3,760	6,770	325	9.3	30.9	61.8	92.7	154.4	257.4	463.3
650	125	440	885	1,325	2,210	3,680	6,625	350	8.4	30.3	60.7	91.0	151.6	252.7	454.9
700	110	435	870	1,305	2,170	3,620	6,515	375	7.4	29.9	59.8	89.6	149.4	249.0	448.2
750	95	425	855	1,280	2,135	3,560	6,410	400	6.5	29.4	58.9	88.3	147.2	245.3	441.6
800	80	420	845	1,265	2,110	3,520	6,335	425	5.5	29.1	58.3	87.4	145.7	242.9	437.1
850	65	420	835	1,255	2,090	3,480	6,265	450	4.6	28.8	57.7	86.5	144.2	240.4	432.7
900	50	415	830	1,245	2,075	3,460	6,230	475	3.7	28.7	57.3	86.0	143.4	238.9	430.1
950	35	385	775	1,160	1,930	3,220	5,795	500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
1,000	20	365	725	1,090	1,820	3,030	5,450	538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
1,050	20(a)	360	720	1,080	1,800	3,000	5,400	575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
1,100	20(a)	305	610	915	1,525	2,545	4,575	600	1.4(a)	19.9	39.8	59.7	99.5	165.9	298.6
1,150	20(a)	235	475	710	1,185	1,970	3,550	625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2
1,200	20(a)	185	370	555	925	1,545	2,775	650	1.4(a)	12.7	25.3	38.0	63.3	105.5	189.9
1,250	20(a)	145	295	440	735	1,230	2,210	675	1.4(a)	10.3	20.6	31.0	51.6	86.0	154.8
1,300	20(a)	115	235	350	585	970	1,750	700	1.4(a)	8.4	16.8	25.1	41.9	69.8	125.7
1,350	20(a)	95	190	290	480	800	1,440	725	1.4(a)	7.0	14.0	21.0	34.9	58.2	104.8
1,400	20(a)	75	150	225	380	630	1,130	775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
1,450	20(a)	60	115	175	290	485	875	800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
1,500	15(a)	40	85	125	205	345	620	816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

(a) Flanged-end valve ratings terminate at 1,000°F (538 °C)

Stainless Steel - A182 Gr. F347 - A182 Gr. F347H - A351 Gr. CF8C

Temp °F	Working Pressures by Class, psig							Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500		150	300	600	900	1500	2500	4500
-20 to 100	275	720	1,440	2,160	3,600	6,000	10,800	-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
200	255	660	1,325	1,985	3,310	5,520	9,935	100	17.4	45.3	90.6	135.9	226.5	377.4	679.4
300	230	615	1,235	1,850	3,085	5,140	9,250	150	15.8	42.5	84.9	127.4	212.4	353.9	637.1
400	200	575	1,150	1,730	2,880	4,800	8,640	200	13.8	39.9	79.9	119.8	199.7	332.8	599.1
500	170	540	1,085	1,625	2,710	4,520	8,135	250	12.1	37.8	75.6	113.4	189.1	315.1	567.2
600	140	515	1,030	1,550	2,580	4,300	7,740	325	9.3	35.4	70.7	106.1	176.8	294.6	530.3
650	125	505	1,015	1,520	2,530	4,220	7,595	350	8.4	34.8	69.5	104.3	173.8	289.6	521.3
700	110	495	995	1,490	2,485	4,140	7,450	375	7.4	34.2	68.4	102.6	171.0	285.1	513.1
750	95	490	985	1,475	2,460	4,100	7,380	400	6.5	33.9	67.8	101.7	169.5	282.6	508.6
800	80	485	975	1,460	2,435	4,060	7,310	425	5.5	33.6	67.2	100.8	168.1	280.1	504.2
850	65	485	970	1,455	2,425	4,040	7,270	450	4.6	33.5	66.9	100.4	167.3	278.8	501.8
900	50	450	900	1,350	2,245	3,745	6,740	475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
950	35	385	775	1,160	1,930	3,220	5,795	500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
1,000	20	365	725	1,090	1,820	3,030	5,450	538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
1,050	20(a)	360	720	1,080	1,800	3,000	5,400	575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
1,100	20(a)	325	645	965	1,610	2,685	4,835	600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
1,150	20(a)	275	550	825	1,370	2,285	4,115	625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
1,200	20(a)	205	410	620	1,030	1,715	3,085	650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
1,250	20(a)	180	365	545	910	1,515	2,725	675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
1,300	20(a)	140	275	410	685	1,145	2,060	700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
1,350	20(a)	105	205	310	515	860	1,545	725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
1,400	20(a)	75	150	225	380	630	1,130	775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
1,450	20(a)	60	115	175	290	485	875	800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
1,500	15(a)	40	85	125	205	345	620	816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

(a) Flanged-end valve ratings terminate at 1,000°F (538 °C)

BRAY INTERNATIONAL, INC

USA

Houston, TX. +281.894.5454

FLOW-TEK

USA

Houston, TX +832.912.2300

CHINA

Hangzhou, Zhejiang +86.571.828.52200

BRAZIL

Paulinia SP-Brazil +55.19.3517.5555

BRAY CONTROLS / FLOW-TEK

BRAY CONTROLS USA

Houston, TX +832.912.2300

ARGENTINA

Buenos Aires + 54.11.4362.0666

BENELUX

Heerhugowaard +31.72.572.1410

BRAZIL

Paulinia SP-Brazil +55.19.3517.6161

CANADA

Montréal +514.344.2729

CHILE

Santiago +56.2739.2966

CHINA

Hangzhou, Zhejiang +86.571.828.52200

GERMANY

Krefeld +49.2151.53360

INDIA

Gujarat +91.2667.664444

MEXICO

Zapopan, Jalisco, +52.33.3836.4460

PACIFIC

Melbourne, Australia +613.9580.9755

PERU

Lima +511.251.0251

POLAND

Oświęcim +48.33.842.1968

UNITED KINGDOM

Inchinnan +44.141.812.5199

VIETNAM

Ho Chi Minh City +84.8.3742.3428

RITEPRO

CANADA,

Montréal +514.324.8900

CHINA,

Hangzhou, Zhejiang +86.571.828.52200

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Flow-Tek®

A Subsidiary of BRAY INTERNATIONAL, Inc.
8323 N. Eldridge Pkwy #100 Houston, Texas 77041
832.912.2300 Fax: 832.912.2301 www.flow-tek.com