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**FLOW-TEK**

**SERIES M1**

**Severe Service Metal Seated Ball Valves**



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**Bray**<sup>®</sup>

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## **SERIES M1**

### **High Performance Severe Service Metal Seated Ball Valves**

Flow-Tek's High Performance Series M1 Severe Service Metal Seated Ball Valves are suitable for the harshest applications. The M1 Severe Service Ball Valve offers customizable, engineered-to-order solutions to fit unique and specific applications.

Each M1 valve is engineered for the customer's specific application and is backed by a specialized and trained service department.

Flow-Tek's Severe Service Ball Valve engineers offer years of experience to provide industry leading technical sales support. Since the early 1980's, Flow-Tek has successfully provided product solutions and performance improvements for our customers.

The M1 is designed with features and improvements to overcome common severe service challenges, while outperforming and outlasting other metal seated ball valves on the market. Flow-Tek is dedicated to continuous improvement and innovation in design to meet our customer's technical and commercial needs.

Flow-Tek's global operations allow for the production of technically advanced valves, designed with the highest quality and workmanship, at competitive pricing.



## **SERIES M1**

### **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 service ball 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 Service products are certified to the requirements of Annex III, Module H of the PED 2014/68/EU.

At Flow-Tek we understand that safety correlates to our success and that sound health, safety, and environmental practices are the foundation of successful business management. Safety is an integral part of the Flow-Tek core values and we aspire to eliminate any potential work place injuries or harm to the environment through the manufacturing and use of our products.



# INDUSTRIES SERVED

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## REFINING

### Heavy Oil Upgrading and Hydrocracking

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

### Delayed Coking

- > Coke Drum Feed and Bypass Isolation
- > Overhead Vapor Line
- > Cutting Water Pump Isolation
- > Steam Stripping, Quench Water and Drain Valves

### Reforming (CCR)

- > Catalyst Lockhopper Isolation and Vent
- > Regenerator Isolation
- > Catalyst Addition/Withdrawal

### Fluidized Catalytic Cracking (FCC)

- > Catalyst Handling
- > Slurry Isolation and Control Steam
- > Regeneration Dump
- > Heavy Oil
- > Flue Gas
- > Cyclone

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## POWER GENERATION

- > Above & Below Seat Drains
- > Ash Handling
- > Attenuator/Desuperheater Spray Block
- > 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
- > Choke Stations
- > Concentrators

### **Pressure acid leach & Pressure oxidation**

- > Acid Injection
- > Feed Pump Isolation
- > Oxygen Injection
- > Blowback Vessel Isolation
- > Steam Injection
- > HP Water Injection
- > Oxidized Slurry Isolation
- > Slurry Drains & Vents
- > Autoclave Isolation (Feed/Discharge)

## **CHEMICAL/PETROCHEMICAL**

- > Polyethylene
- > Ethane Cracking
- > DSIDA/Glyphosate
- > PDH
- > EDC/VCM Furnace
- > Polypropylene
- > Acetic Acid & PTA
- > Polysilicon
- > Molecular Sieve

## **SYNFUELS**

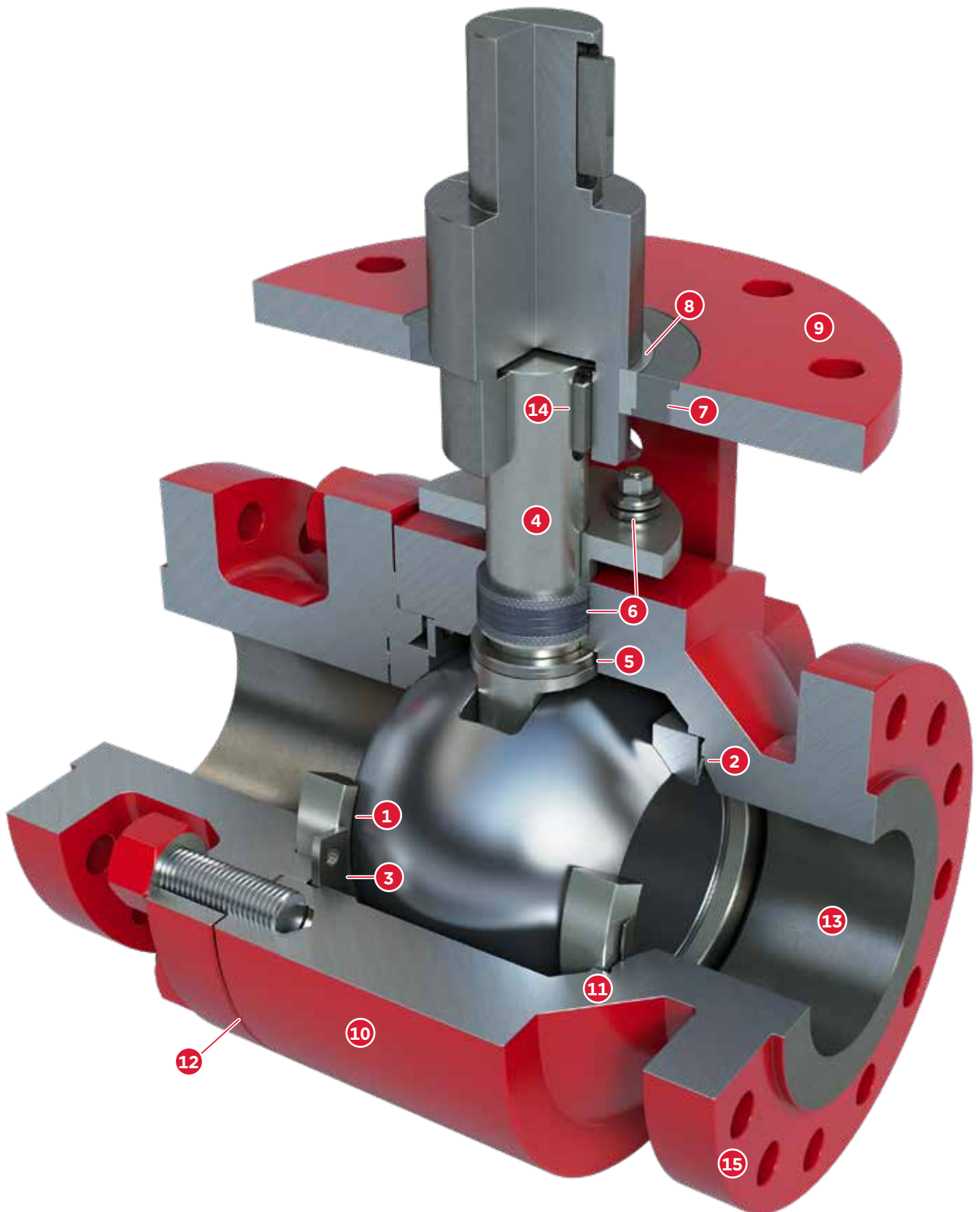
- > Coal Gasification
- > Coal Liquefaction

# FEATURES & BENEFITS

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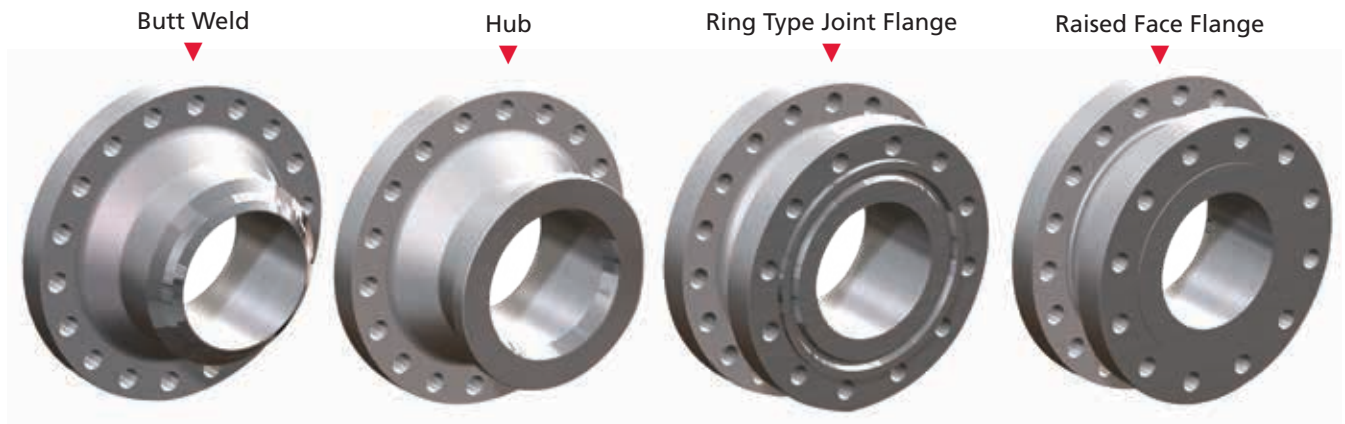
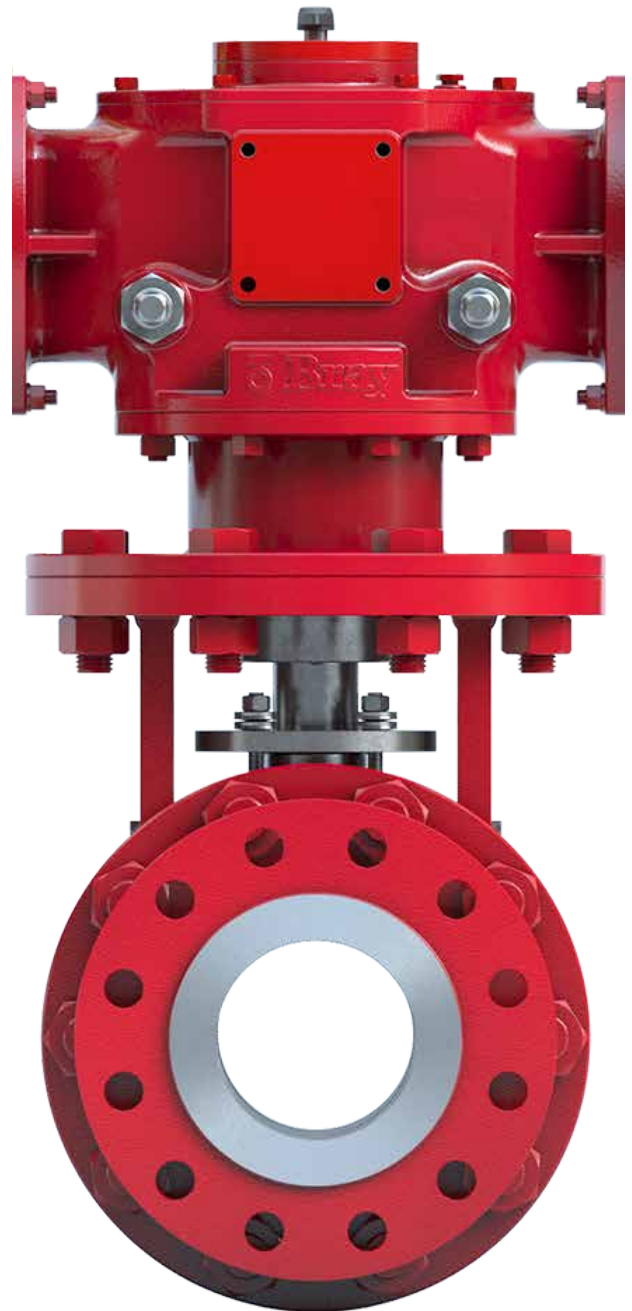
## FEATURES

- 1 BALL-TO-SEAT INTERFACE:** Wide sealing surfaces lower dynamic contact stress between the ball and seat during operation and extend the valve's life cycle. These sliding surfaces utilize qualified hard coatings for specific applications.
  - > **QUALIFIED PROPRIETARY COATINGS:** Maximum sealing life achieved through widest sealing surfaces and advanced coating technology.
  - > **SEALING SYSTEM:** Series M1 valves feature trims that are designed to isolate flow direction (unidirectional) and/or reverse flow direction (bidirectional).
- 2 SEAT SPRING:** The large seat spring energizes the ball and seats to create a tight seal at low pressure and compensates for thermal expansion of the seat and ball during thermal cycling.
- 3 LOCKING RING (R100/R200):** A large locking ring stabilizes and locks the seat in place. The ring provides a uniform load around the seat ring to maintain a consistent seal with the valve body.
- 4 BLOWOUT-PROOF STEM:** Features a highly corrosion resistant super alloy, blowout-proof, one-piece stem design. The stem is designed to meet the requirements of API 608 and API 6D.
- 5 INNER STEM BEARINGS:** Multiple inner stem bearing rings are used as thrust washers for rotational movement. Ultra-hard, gall resistant thermal spray coatings are available to maximize the bearing service life. The stem bearings are flat-lapped to provide low friction operation.
- 6 ZERO EMISSION LIVE LOADED PACKING:** Zero emission packing rings reduce the carbon footprint of the M1 in conjunction with Belleville washers that compensate for packing compression fluctuations during temperature and pressure swings.
- 7 BUSHING RETAINER:** To eliminate stem side loading during valve cycling caused by the operator, the bushing retainer and outer stem bushing (8) maintain concentric alignment of the valve stem.
- 8 OUTER STEM BUSHING:** Gall resistant materials to withstand high cycles.
- 9 MOUNTING FLANGE:** A large, robust mounting flange is built into the valve body to support heavy operators, and is critical to the drive train sealing feature.
- 10 VALVE CONSTRUCTION:** Series M1 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:** Series M1 valves are designed to have additional corrosion allowances that exceeds ASME B16.34 minimum requirements 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 and ASME B16.34 criteria.
  - > Series M1 valves rated up to ASME 1500 utilize a large cross-sectional spiral wound gasket.
  - > Series M1 valves rated ASME 2500 and higher utilize our proprietary seal ring.
- 13 VALVE BORES:** Bore sizes are based on ASME B16.34 Appendix A Table A-1. Custom or reduced bore sizes are available.
- 14 STEM KEYS:** Drive 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:** Series M1 valves are available in raised face, ring joint, butt weld, socket weld, and hub-type configurations.



# SPECIFICATIONS

<b>Valve Design</b>	ASME B16.34 ASME Section VIII - Div 1, Appendix 2
<b>Sizes</b>	1/2 - 36 in. (DN 15 - 900) Custom and larger sizes available upon request
<b>Pressure Ratings</b>	ASME 150 - 4500 Custom and higher pressures available upon request.
<b>Temperature</b>	Standard design rated up to 1100 °F (593 °C), can be customized for higher temperatures
<b>End Connections</b>	Raised Face and Ring Type Joint (ASME B16.5 and EN 1092/ISO 7005) Butt weld (ASME B16.25) Hubs Socket weld (ASME B16.11) Custom Ends available
<b>End-To-End</b>	ASME B16.10 (Long Pattern) Custom End-to-End available upon request.
<b>Testing</b>	API 598, ANSI/FCI Class VI, MSS SP-61 Custom tests available.
<b>Certifications</b>	PE(S)R UKCA S.I. 2016:1105





# APPLICATION SPECIFIC VALVE MODELS



Flow-Tek's Series M1 offers application specific sealing systems, providing customized solutions for long-term isolation and low maintenance operation.



### R100

- > Unidirectional full rated sealing with preferred flow direction<sup>1</sup>.
- > Derated sealing in non-preferred direction<sup>2</sup>.

High Pressure Side (HP)



### R200

- > Unidirectional full rated sealing with preferred flow direction<sup>1</sup>.
- > Derated sealing in non-preferred direction<sup>2</sup>.

High Pressure Side (HP)



### M100

- > Bidirectional, full rated sealing with preferred flow direction<sup>1</sup>.

Preferred High Pressure (HP) Side

Model	Sealing System			Seat Characteristics	Media Use
	Unidirectional	Bidirectional	DB&B		
R100	●			Solids resistant design, low to high temperature	Light to Medium Catalyst Slurry Saturated and Superheated Steam General Hydrocarbons Pressure Acid-Leaching Pressure Oxidation Services over 450°F (232°C)
R200	●			Solids proof design, low to high temperature	Heavy Catalyst Slurry Fouling Hydrocarbons Coking
M100		●		Solids resistant design, low temperature	Slurry Transport Erosive and Abrasive Pressure Acid-Leaching Pressure Oxidation Services under 450°F (232°C)
M120		●	●	Solids resistant design, double-block and bleed system, low temperature	Slurry Transport Erosive and Abrasive

<sup>1</sup>Marked on valve and detailed in order specific drawings.

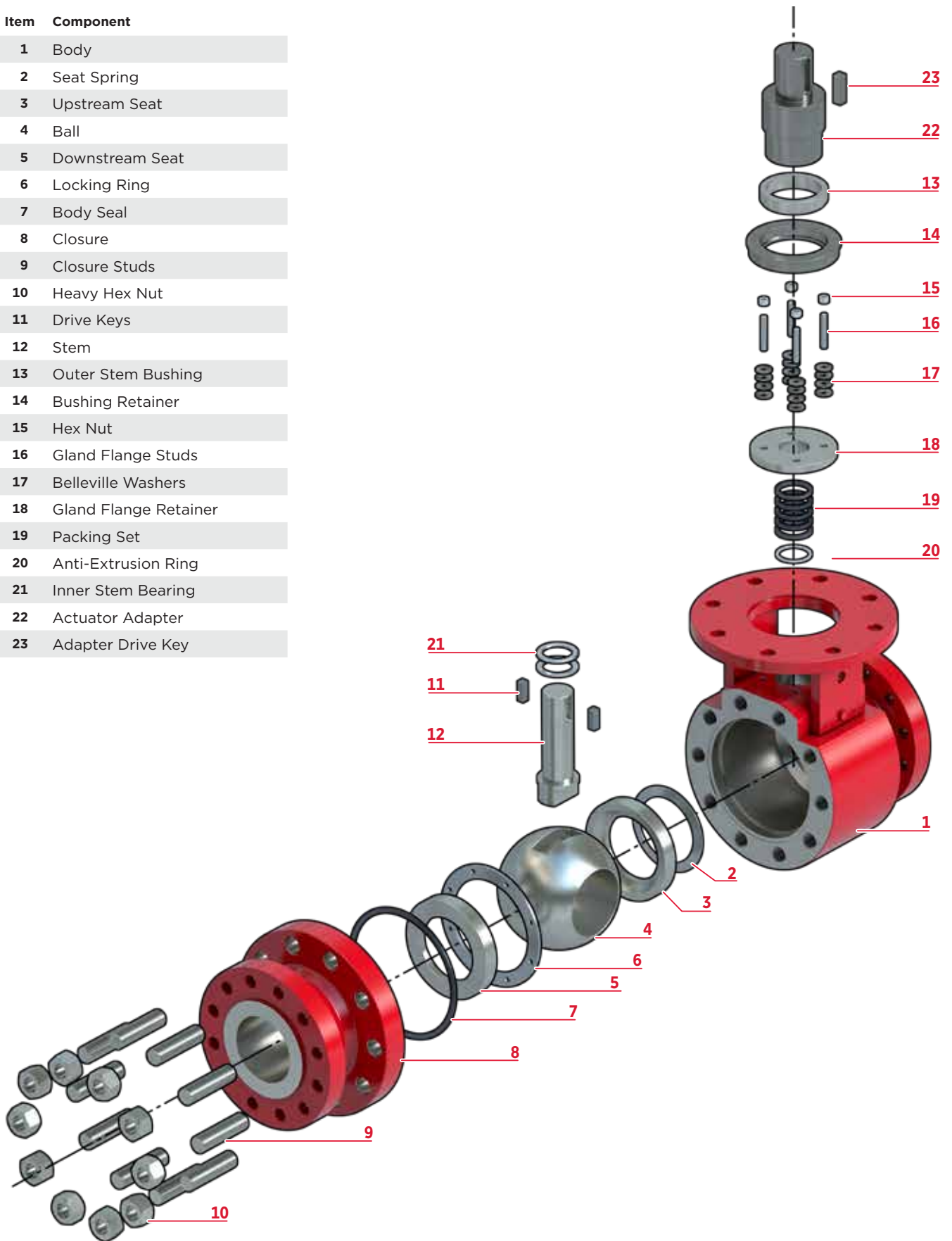
Double Block and Bleed available upon request for Model M120.

<sup>2</sup>Contact Bray Engineering for derating details.

# MATERIALS OF CONSTRUCTION

Item	Description	Standard	Optional/Special
1   8	Body and Closure	<b>Forged</b> A105 Carbon Steel A182 F316 Austenitic Stainless Steel A182 F9/F11/F22/F91 Alloy Steel	A182 F347 & F347H Titanium   Hastelloy   Monel Duplex & Super Duplex Stainless Steel
		<b>Cast</b> A216 Gr WCB A351 Gr CF8M A217 Gr C12 Alloy Steel	A351 Gr CF8C
2	Seat Spring	Inconel 718	17-4 PH Stainless Steel   Titanium
3   5	Upstream Seat and Downstream Seat	410 Stainless Steel 316 Stainless Steel	Inconel   Incolloys   Titanium Duplex Stainless Steel 17-4 PH Stainless Steel
		<b>Thermally Sprayed Coatings</b>	
		HVOF Chromium Carbide HVOF Tungsten Carbide Fused Carbides	Metallic Ceramics Cobalt Based Carbides
4	Ball	410 Stainless Steel 316 Stainless Steel	Inconel   Incolloys   Titanium Duplex Stainless Steel 17-4 PH Stainless Steel
		<b>Thermally Sprayed Coatings</b>	
		HVOF Chromium Carbide HVOF Tungsten Carbide Fused Carbides	Metallic Ceramics Cobalt Based Carbides
6	Locking Ring	316 Stainless Steel	Inconel   Incolloys Duplex Stainless Steel 17-4 PH Stainless Steel
7	Body Seal	Spiral Wound 316 Stainless Steel/Graphite Inconel Metal Ring	Spiral Wound Titanium Inconel   Alloy 20   Monel   Graphite
9	Closure Studs	A193 Gr. B16 A193 Gr. B8M A193 Gr. B7	A453 Gr. 660
10	Heavy Hex Nut	A194 Gr. 4 A194 Gr. 7 A194 Gr. 8M	--
11	Drive Keys	AISI 1018 Carbon Steel	17-4 PH Stainless Steel
12	Stem	A638 Gr 660	Inconel   Incolloys   Titanium 17-4 PH Stainless Steel Duplex Stainless Steel
13	Outer Stem Bushing	416 Stainless Steel	Nitronic Grades
14	Bushing Retainer	316 Stainless Steel	--
15	Hex Nut	A194 Gr. 4, A194 Gr. 7 A194 Gr. 8M	--
16	Gland Flange Studs	A193 Gr. B8M A193 Gr. B7 A193 Gr. B16	--
17	Belleville Washers	Inconel 718	--
18	Gland Flange Retainer	316 Stainless Steel	--
19	Packing Set	Graphite	PTFE, PEEK
20	Anti-Extrusion Ring	316 Stainless Steel	Titanium Duplex Stainless Steel
21	Inner Stem Bearing	Stellite 3	410 Stainless Steel / HVOF 17-4 PH Stainless Steel / HVOF Titanium / HVOF
22	Actuator Adapter	AISI 1018 Carbon Steel	17-4 PH Stainless Steel
23	Adapter Drive Key	AISI 4142 Alloy Steel	410 Stainless Steel

Item	Component
1	Body
2	Seat Spring
3	Upstream Seat
4	Ball
5	Downstream Seat
6	Locking Ring
7	Body Seal
8	Closure
9	Closure Studs
10	Heavy Hex Nut
11	Drive Keys
12	Stem
13	Outer Stem Bushing
14	Bushing Retainer
15	Hex Nut
16	Gland Flange Studs
17	Belleville Washers
18	Gland Flange Retainer
19	Packing Set
20	Anti-Extrusion Ring
21	Inner Stem Bearing
22	Actuator Adapter
23	Adapter Drive Key



# PRESSURE/TEMPERATURE RATINGS - Based on ASME B16.34 Standard Class

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

### Imperial

Temp °F	Working Pressures by Class, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	285	740	1,480	2,220	3,705	6,170	11,110
200	260	680	1,360	2,035	3,395	5,655	10,185
300	230	655	1,310	1,965	3,270	5,450	9,815
400	200	635	1,265	1,900	3,170	5,280	9,505
500	170	605	1,205	1,810	3,015	5,025	9,040
600	140	570	1,135	1,705	2,840	4,730	8,515
650	125	550	1,100	1,650	2,745	4,575	8,240
700	110	530	1,060	1,590	2,665	4,425	7,960
750	95	505	1,015	1,520	2,535	4,230	7,610
800 (1)	80	410	825	1,235	2,055	3,430	6,170
850 (1)	65	320	640	955	1,595	2,655	4,785

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

### Metric

Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.6	51.1	102.1	153.2	255.3	425.5	765.9
100	17.7	46.6	93.2	139.8	233.0	388.3	699.0
150	15.8	45.1	90.2	135.2	225.4	375.6	676.1
200	13.8	43.8	87.6	131.4	219.0	365.0	657.0
250	12.1	41.9	83.9	125.8	209.7	349.5	629.1
325	9.3	38.7	77.4	116.1	193.6	322.6	580.7
350	8.4	37.6	75.1	112.7	187.8	313.0	563.5
375	7.4	36.4	72.7	109.1	181.8	303.1	545.5
400	6.5	34.7	69.4	104.2	173.6	289.3	520.8
425 (1)	5.5	28.8	57.5	86.3	143.8	239.7	431.5
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 427°C

## LOW ALLOY Steel - A182 Gr F9 - A217 Gr C12

### Imperial

Temp °F	Working Pressures by Class, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	290	750	1,500	2,250	3,750	6,250	11,250
200	260	750	1,500	2,250	3,750	6,250	11,250
300	230	730	1,455	2,185	3,640	6,070	10,925
400	200	705	1,410	2,115	3,530	5,880	10,585
500	170	665	1,330	1,995	3,325	5,540	9,965
600	140	605	1,210	1,815	3,025	5,040	9,070
650	125	590	1,175	1,765	2,940	4,905	8,825
700	110	570	1,135	1,705	2,840	4,730	8,515
750	95	530	1,065	1,595	2,660	4,430	7,970
800	80	510	1,015	1,525	2,540	4,230	7,610
850	65	485	975	1,460	2,435	4,060	7,305
900	50	450	900	1,350	2,245	3,745	6,740
950	35	375	755	1,130	1,885	3,145	5,655
1,000	20	255	505	760	1,270	2,115	3,805
1,050	20(a)	170	345	515	855	1,430	2,570
1,100	20(a)	115	225	340	565	945	1,695
1,150	20(a)	75	150	225	375	630	1,130
1,200	20(a)	50	105	155	255	430	770

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

### Metric

Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	20.0	51.7	103.4	155.1	258.6	430.9	775.7
100	17.7	51.5	103.0	154.6	257.6	429.4	773.0
150	15.8	50.3	100.3	150.6	250.8	418.2	752.8
200	13.8	48.6	97.2	145.8	243.4	405.4	729.8
250	12.1	46.3	92.7	139.0	231.8	386.2	694.8
325	9.3	41.4	82.6	124.0	206.6	344.3	619.6
350	8.4	40.3	80.4	120.7	201.1	335.3	603.3
375	7.4	38.9	77.6	116.5	194.1	323.2	581.8
400	6.5	36.5	73.3	109.8	183.1	304.9	548.5
425	5.5	35.2	70.0	105.1	175.1	291.6	524.7
450	4.6	33.7	67.7	101.4	169.0	281.8	507.0
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	17.5	35.0	52.5	87.5	145.8	262.4
575	1.4(a)	10.5	20.9	31.4	52.3	87.1	156.8
600	1.4(a)	7.2	14.4	21.5	35.9	59.8	107.7
625	1.4(a)	5.0	9.9	14.9	24.8	41.4	74.5
650	1.4(a)	3.5	7.1	10.6	17.7	29.5	53.2

(a) Flanged-end valve ratings terminate at 538°C

# PRESSURE/TEMPERATURE RATINGS - Based on ASME B16.34 Standard Class

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

### Imperial

Temp °F	Working Pressures by Class, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	275	720	1,440	2,160	3,600	6,000	10,800
200	235	620	1,240	1,860	3,095	5,160	9,290
300	215	560	1,120	1,680	2,795	4,660	8,390
400	195	515	1,025	1,540	2,570	4,280	7,705
500	170	480	955	1,435	2,390	3,980	7,165
600	140	450	900	1,355	2,255	3,760	6,770
650	125	440	885	1,325	2,210	3,680	6,625
700	110	435	870	1,305	2,170	3,620	6,515
750	95	425	855	1,280	2,135	3,560	6,410
800	80	420	845	1,265	2,110	3,520	6,335
850	65	420	835	1,255	2,090	3,480	6,265
900	50	415	830	1,245	2,075	3,460	6,230
950	35	385	775	1,160	1,930	3,220	5,795
1,000	20	365	725	1,090	1,820	3,030	5,450
1,050	20(a)	360	720	1,080	1,800	3,000	5,400
1,100	20(a)	305	610	915	1,525	2,545	4,575
1,150	20(a)	235	475	710	1,185	1,970	3,550
1,200	20(a)	185	370	555	925	1,545	2,775
1,250	20(a)	145	295	440	735	1,230	2,210
1,300	20(a)	115	235	350	585	970	1,750
1,350	20(a)	95	190	290	480	800	1,440
1,400	20(a)	75	150	225	380	630	1,130
1,450	20(a)	60	115	175	290	485	875
1,500	15(a)	40	85	125	205	345	620

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

### Metric

Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
100	16.2	42.2	84.4	126.6	211.0	351.6	632.9
150	14.8	38.5	77.0	115.5	192.5	320.8	577.4
200	13.7	35.7	71.3	107.0	178.3	297.2	534.9
250	12.1	33.4	66.8	100.1	166.9	278.1	500.6
325	9.3	30.9	61.8	92.7	154.4	257.4	463.3
350	8.4	30.3	60.7	91.0	151.6	252.7	454.9
375	7.4	29.9	59.8	89.6	149.4	249.0	448.2
400	6.5	29.4	58.9	88.3	147.2	245.3	441.6
425	5.5	29.1	58.3	87.4	145.7	242.9	437.1
450	4.6	28.8	57.7	86.5	144.2	240.4	432.7
475	3.7	28.7	57.3	86.0	143.4	238.9	430.1
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	19.9	39.8	59.7	99.5	165.9	298.6
625	1.4(a)	15.8	31.6	47.4	79.1	131.8	237.2
650	1.4(a)	12.7	25.3	38.0	63.3	105.5	189.9
675	1.4(a)	10.3	20.6	31.0	51.6	86.0	154.8
700	1.4(a)	8.4	16.8	25.1	41.9	69.8	125.7
725	1.4(a)	7.0	14.0	21.0	34.9	58.2	104.8
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

(a) Flanged-end valve ratings terminate at 538°C

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

### Imperial

Temp °F	Working Pressures by Class, psig						
	150	300	600	900	1500	2500	4500
-20 to 100	275	720	1,440	2,160	3,600	6,000	10,800
200	255	660	1,325	1,985	3,310	5,520	9,935
300	230	615	1,235	1,850	3,085	5,140	9,250
400	200	575	1,150	1,730	2,880	4,800	8,640
500	170	540	1,085	1,625	2,710	4,520	8,135
600	140	515	1,030	1,550	2,580	4,300	7,740
650	125	505	1,015	1,520	2,530	4,220	7,595
700	110	495	995	1,490	2,485	4,140	7,450
750	95	490	985	1,475	2,460	4,100	7,380
800	80	485	975	1,460	2,435	4,060	7,310
850	65	485	970	1,455	2,425	4,040	7,270
900	50	450	900	1,350	2,245	3,745	6,740
950	35	385	775	1,160	1,930	3,220	5,795
1,000	20	365	725	1,090	1,820	3,030	5,450
1,050	20(a)	360	720	1,080	1,800	3,000	5,400
1,100	20(a)	325	645	965	1,610	2,685	4,835
1,150	20(a)	275	550	825	1,370	2,285	4,115
1,200	20(a)	205	410	620	1,030	1,715	3,085
1,250	20(a)	180	365	545	910	1,515	2,725
1,300	20(a)	140	275	410	685	1,145	2,060
1,350	20(a)	105	205	310	515	860	1,545
1,400	20(a)	75	150	225	380	630	1,130
1,450	20(a)	60	115	175	290	485	875
1,500	15(a)	40	85	125	205	345	620

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

### Metric

Temp °C	Working Pressures by Class, bar						
	150	300	600	900	1500	2500	4500
-29 to 38	19.0	49.6	99.3	148.9	248.2	413.7	744.6
100	17.4	45.3	90.6	135.9	226.5	377.4	679.4
150	15.8	42.5	84.9	127.4	212.4	353.9	637.1
200	13.8	39.9	79.9	119.8	199.7	332.8	599.1
250	12.1	37.8	75.6	113.4	189.1	315.1	567.2
325	9.3	35.4	70.7	106.1	176.8	294.6	530.3
350	8.4	34.8	69.5	104.3	173.8	289.6	521.3
375	7.4	34.2	68.4	102.6	171.0	285.1	513.1
400	6.5	33.9	67.8	101.7	169.5	282.6	508.6
425	5.5	33.6	67.2	100.8	168.1	280.1	504.2
450	4.6	33.5	66.9	100.4	167.3	278.8	501.8
475	3.7	31.7	63.4	95.1	158.2	263.9	474.8
500	2.8	28.2	56.5	84.7	140.9	235.0	423.0
538	1.4	25.2	50.0	75.2	125.5	208.9	375.8
575	1.4(a)	24.0	47.9	71.8	119.7	199.5	359.1
600	1.4(a)	21.6	42.9	64.2	107.0	178.5	321.4
625	1.4(a)	18.3	36.6	54.9	91.2	152.0	273.8
650	1.4(a)	14.1	28.1	42.5	70.7	117.7	211.7
675	1.4(a)	12.4	25.2	37.6	62.7	104.5	187.9
700	1.4(a)	10.1	20.0	29.8	49.7	83.0	149.4
725	1.4(a)	7.9	15.4	23.2	38.6	64.4	115.8
775	1.4(a)	4.6	9.0	13.7	22.8	38.0	68.4
800	1.2(a)	3.5	7.0	10.5	17.4	29.2	52.6
816	1.0(a)	2.8	5.9	8.6	14.1	23.8	42.7

(a) Flanged-end valve ratings terminate at 538°C

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SINCE 1986, BRAY HAS PROVIDED FLOW CONTROL SOLUTIONS FOR A VARIETY OF INDUSTRIES AROUND THE WORLD.

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