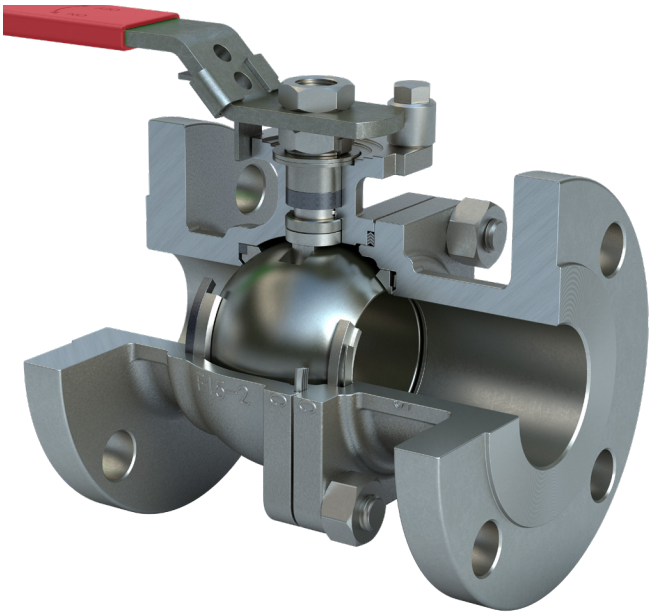
DESIGN FEATURES



The Uni-directional design uses some key features to create the required seal while minimizing the torque.

A wave spring is inserted between the upstream seat and valve body. The major benefit of a wave spring is that it produces a much lower initial valve torque in low pressure applications when compared to a Belleville spring.

The metal seated valve uses the wave spring to establish a preload on the metal to metal interface between the ball and seat and also at the graphite seal between the downstream seat and body. In service the ball floats as dictated by the pressure and the wave spring provides a variable load that helps to maintain constant contact between all sealing elements. When the temperature rises the internal components grow due to thermal expansion and the wave spring compresses compensating for the growth that occurs, thus preventing any binding or locking up of the ball and seat.

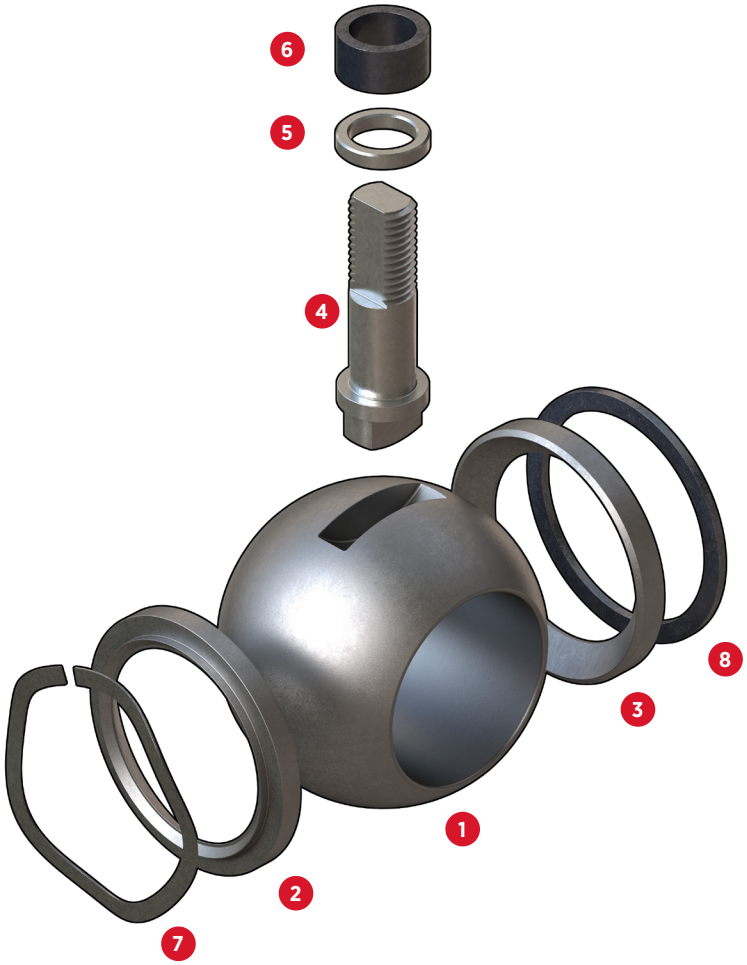
As a standard, the F15/F30 MS is available in either WCB or CF8M body and end cap, with both having a CF8M ball and seat set.

The ball and seat set are coated with HVOF chrome carbide. The mate lapped coated surfaces provide a low friction interface that is both wear resistant and able to withstand high temperature.

The stem is available in either SS660 or 17-4PH SS. These materials fill the basic requirements for a wide variety of “intermediate severe service” valve applications. When other materials are required, Bray will continue its practice of offering the F15/F30 in special alloys to suit specific customer requirements.

Care should be taken to evaluate whether an application may require non-standard coatings with advanced wear or corrosion properties (as tungsten carbide, chrome oxide, titanium oxide, etc.)

The factory should be consulted for any questions concerning material specifications.



COMPONENTS AND MATERIALS

Item	Description	Material	Qty.
1	Ball	ASTM A351 Gr CF8M/Chrome Carbide	1
2	Upstream Seat	ASTM A351 Gr CF8M/Chrome Carbide	1
3	Downtstream Seat	ASTM A351 Gr CF8M/Chrome Carbide	1
4	Stem	SS660 or17-4 PH	1
5	Thrust Washer	UNS S21800 (Nitronic® 60)	1
6	Packing	Graphite	1
7	Wave Spring	17-7 or Inconel®718	1
8	Seat Seal	Graphite	1

SEAT LEAKAGE CRITERIA

The metal seated valves are manufactured and offered in two leakage classes as defined in Fluid Control Institute standard, ANSI/FCI-70-2-2006 titled “Control Valve Seat Leakage”. Flow-Tek offers metal seats in both our control valves and valves intended for on-off service.

Class V: from the standard... “This class is usually specified for critical applications where control valve(s) may be required to be closed, without a blocking valve, for long periods of time against high pressure. It requires special manufacturing, assembly and testing techniques. This class is generally associated with metal seats(s), unbalanced single-seat control valve or balanced single-seat designs with exceptional seat and seal tightness.”

Comment: Flow-Tek ball valves are unbalanced single–seat design.

1. Seat test media is water at pressure equal to +/-5% of CWP.
2. Downstream seat tested only
3. Allowable seat leakage is 0.0005 ml/minute/inch/psi differential of seat diameter.

Class VI: from the standard... “This class establishes the maximum permissible seat leakage generally associated with resilient seating control valves either unbalanced or balanced single-seat with “O” rings or similar gapless seals.”

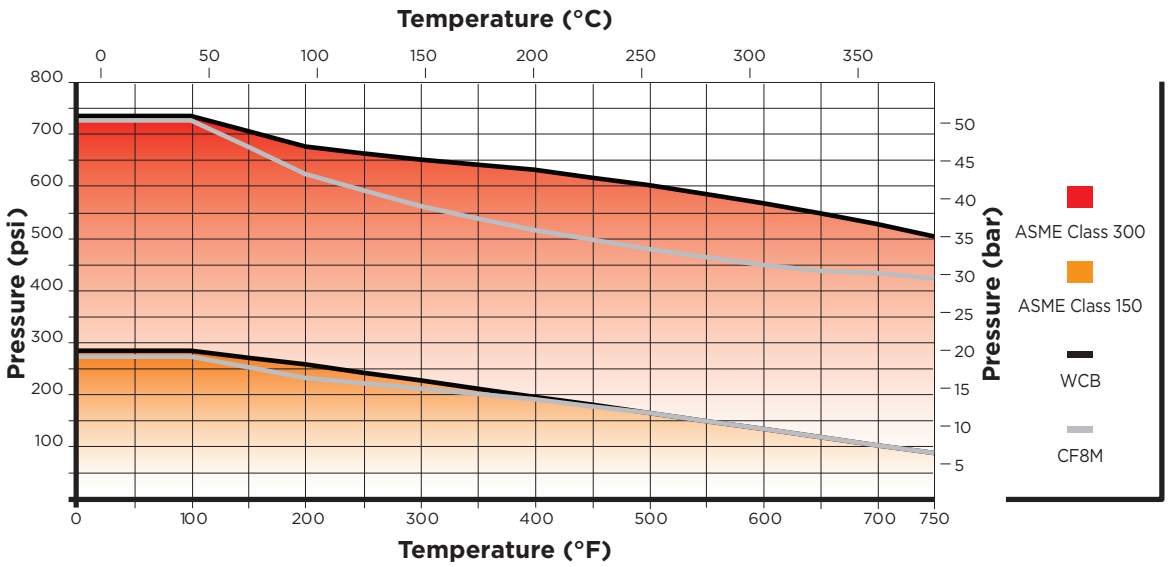
Comment: Class VI leakage has never been intended for metal seated valves. Class VI allowable leakage is the toughest criteria to meet with metal-to-metal seating. Bray will offer metal-to-metal seated ball valves to Class VI as an unbalanced single-seat design. Metal seats to Class VI require special manufacturing and assembly techniques. Bray Class VI metal seated valves will be unidirectional with the upstream seat spring loaded and only the downstream seat tested.

1. Seat test media is air at 60 to 100 psig.
2. Downstream seat tested only.
3. Allowable seat leakage per Table 2 of FCI 70-2.

MAXIMUM ALLOWABLE LEAKAGE

FCI 70-2	Test Method	Units	½″	¾″	1″	1 ½″	2″	3″	4″	6″
Class V	Hydro (150#)	(ml/min)	0.07	0.11	0.14	0.21	0.29	0.43	0.57	0.86
	Hydro (300#)	(ml/min)	0.19	0.28	0.37	0.56	0.74	1.11	1.48	2.22
	Air	(bubbles/min)	15	23	31	47	62	94	125	188
		(ml/min)	2.35	3.525	4.7	7.05	9.4	14.1	18.8	28.2
Class VI	Air	(bubbles/min)	0.19	0.42	1	2	3	6	11	27
		(ml/min)	0.03	0.06	0.15	0.30	0.45	0.90	1.70	4.00

PRESSURE / TEMPERATURE RATINGS



F15 & F30 METAL-SEATED BALL VALVE TORQUES (lb-in)

	½"	¾"	1"	1½"	2"	3"	4"	6"
0 psi	116	79	160	412	308	484	568	1,948
100 psi	120	95	191	520	478	1,409	2,975	5,258
200 psi	125	110	223	629	648	2,334	5,382	8,568
300 psi	129	126	254	738	818	3,259	7,789	11,878
400 psi	134	142	286	847	988	4,184	10,196	15,188
500 psi	138	157	317	956	1,158	5,109	12,603	18,498
600 psi	143	173	348	1,065	1,327	6,033	15,011	21,808
700 psi	147	189	380	1,174	1,497	6,958	17,418	25,117
750 psi	149	196	395	1,228	1,582	7,421	18,621	26,772

The torque values given above are based on testing conditions with clean water service and without safety factors. Additional safety factors shall be applied when sizing actuators.

SUMMARY

Unlike other metal seated ball valves, the internal components fit directly into the standard F15/F30 valve body and end piece seat pockets with no machining modifications. This allows for a significant reduction in lead times for the metal seated valves. This standardization also means that the F15/F30 can make use of many traditional F15/F30 options like V-ball control or the Media Containment Unit.

Bray will offer metal-to-metal seated ball valves to two leakage classes as defined in ANSI/FCI-70-2-2006 at different pricing levels. Each leakage class represents a tighter allowable leakage as the class number increases. Flow-Tek metal seated ball valves are tested to be below the allowable leakage rate specified in the leakage class at the time of shipment. Seat tightness may change with the valve service.