



OPERATING & MAINTENANCE INSTRUCTIONS

ITEM: STAINLESS STEEL & CARBON STEEL BALL VALVE, 2-PIECE,
CLASS 150 FLANGED ENDS, FIRE-SAFE

MODEL NO.: M15F

SIZES: 1/2" - 4"

A. BASIC FUNCTIONS OF THE VALVES AND THEIR APPLICATIONS

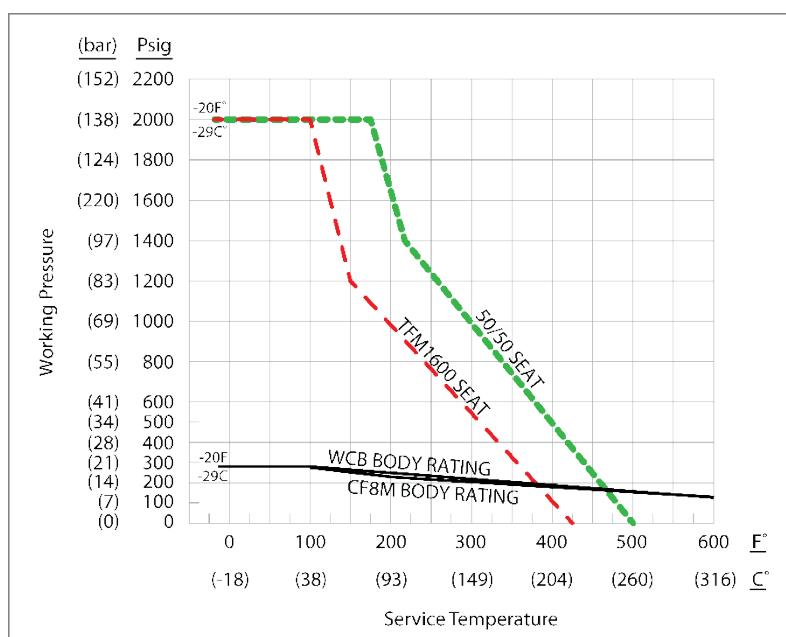
1. M15F series ball valves are designed for ON-OFF service. They should be used in either fully opened or fully closed position for shut-off service; they are not designed for throttling service, in which the valves are in partially opened or partially closed conditions. Leaving the valves partially opened or closed may cause the balls to deform or to be damaged due to the fluid flow and the leading edge of ball.
2. To open the valve, simply turn the handle in the counterclockwise direction to its fully opened position; the handle will stop at the in-line position to make sure the ball inside the valve is at its fully opened status.
3. To close the valve, simply turn the handle in the clockwise direction to its fully closed position; the handle will appear to be perpendicular to the pipeline to rotate the ball of valve to the fully closed status.

Note: Special attention must be given regarding the movement of handle to its fully opened and closed positions. In case the handle is not stopped at its uttermost position either at the in-line position or at the perpendicular position to pipeline, the valve may not be fully opened or fully closed.

4. The materials used for the construction of M15F series ball valves are shown in the MATERIALS LIST section in the catalogue. The basic material of valve body & cap for M15F-S is Stainless Steel (ASTM Grade CF8M / SS 316), which has good corrosion & erosion resistance. The basic material of valve body & cap for M15F-C is Carbon Steel (ASTM Grade WCB). The valve ball is made of Stainless Steel (Grade CF8M / SS 316), and the stem is made of 316 Stainless Steel (ASTM A276-316). The seats are made of TFM 1600 material (Modified PTFE compound with features of excellent weldability, low deformation under load, and denser polymer structure with fewer voids. TFM 1600 is a material produced by 3M). TFM 1600 is inert to most chemicals, but its ability to hold pressure decreases as the temperature of flow media rises. The decline starts at 65°C (150°F). At the temperature of 232°C (450°F), the seats are almost incapable to hold any pressure (see the below Pressure-Temperature Ratings chart). Therefore, when the temperature of flow media is higher than 65°C (150°F), special attentions regarding the pipeline pressure must be considered. Valves with TFM1600 seats are not recommended to be used at

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the temperature above 180°C (356°F). M15F ball valves also include firesafe features, including Graphite stem packing & body joint gasket, anti-static device, and post-fire metal-to-metal seal.



- Ball valves are Class 150 rated, and are designed for the service under 275 psi (19 bar) working pressure with the temperature of 65°C (150°F) and below. They should not be used at any working pressure higher than their ratings. Temperatures higher than 65°C (150°F) will decrease the valves' ability to hold pressure due to the nature of seat materials stated above.
- Ball valves are full port design. Thus, the pressure drop in the system is minimized.
- For lines with high risk of accidents due to valve operation errors, appropriate markings (tags or color-coded classification) should be attached at the location of valves. It is recommended to use valves with locking device in such applications. M15F series ball valves are designed with a locking device on the handle. Simply use a pad lock to get through the lockable hole on the lever handle, and the valve can be locked in either OPEN or CLOSE position.

B. INSTALLATION OF VALVES TO PIPELINE

SAFETY CAUTION: Before installing or servicing, please ensure the line pressure is relieved and any hazardous fluid is drained or purged from the system. Please also observe the maximum temperature and pressure rating of the valve & the system.

- Cleaning:** Prior to connecting ball valves to pipeline, remove sand, mud, rust particles and any other foreign materials from the flange surface of pipe and valve by liquid flushing or blown air.
- Spacing:** The Face-to-Face dimensions comply with ASME/ANSI B16.10 (see the dimensional chart in the catalogue). When installing these ball valves into pipelines, be sure to have sufficient and proper space between the pipe flanges for the installation of valves.

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3. **Valve installation:** **First**, hold the pipe in a pipe vice. **Second**, apply proper gaskets between the valve flanges and pipe flanges to prevent leakage between the connection interfaces. **Third**, connect the valve flanges and pipe flanges with bolts & nuts as per the table below. It is important that the flange bolts are tightened evenly.

VALVE SIZE	BOLT SIZE	NUMBER OF BOLTS
1/2"	1/2" - 13 UNC	4
3/4"	1/2" - 13 UNC	4
1"	1/2" - 13 UNC	4
1 1/2"	1/2" - 13 UNC	4
2"	5/8" - 11 UNC	4
2 1/2"	5/8" - 11 UNC	4
3"	5/8" - 11 UNC	4
4"	5/8" - 11 UNC	8

- Notes:**
- The valves may be installed in any position on the pipeline.*
 - The pipeline should be free of tension during valve installation.*

C. MAINTENANCE INSTRUCTIONS

M15F series ball valves are designed for high performance and long durability. All components are produced of high-quality materials and are precisely machined, assembled, and tested. Therefore, under normal operation, the valves rarely require regular maintenance. Only after a long period of service time, very frequent ON-OFF operation, or high corrosive flow media service, should the maintenance become necessary and periodic.

The most common problem under the above service conditions is stem leakage due to wear-down of the resilient parts in the stem area. However, these ball valves feature live-loaded packing glands for self-adjustment of stem packing compression, so there is almost no need to manually adjust the packing gland unless after long service hours or under critical conditions.

In the case of stem leakage, the following steps are to be taken:

- First, apply appropriate wrench to unfasten the handle nut. Take out the handle washer, handle, & nut lock. Second, tighten the packing nut clockwise (see the drawing in the catalogue) by a wrench. Tightening the packing nut will increase pressure to the gland and Belleville washers in order to compress the Graphite stem packing (which may have already worn down) to cause tighter contact with body neck & stem to stop leakage. The sizes of the packing nuts and the fastening torques are as below. Under normal conditions, the torques applied to the packing nut should not exceed the below ranges:

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VALVE SIZE	SIZE OF PACKING NUT	FASTENING TORQUES
1/2"	M12	133 In-lbs (15 N-m)
3/4"	M12	133 In-lbs (15 N-m)
1"	M14	221 In-lbs (25 N-m)
1 1/2"	3/4"-10 UNC	301 In-lbs (34 N-m)
2"	3/4"-10 UNC	301 In-lbs (34 N-m)
2 1/2"	M22	390 In-lbs (44 N-m)
3"	M22	390 In-lbs (44 N-m)
4"	M28	702 In-lbs (79 N-m)

Note: Tolerances of +/- 10% of the above Fastening Torques are within the acceptable range.

2. If tightening the packing nut does not stop leakage, the stem packing & thrust washer are probably worn out and require replacement. The steps for the replacement are shown in the next section.

The second possible problem under the above service conditions is seat leakage in the closed position due to damaged seats. In this case, damaged seats should be replaced with new ones.

M15F series ball valves are of 2-piece bolted body joint construction. If replacing resilient parts is necessary, the following steps are to be taken:

- a. Disconnect the valve flanges and pipe flanges by unfastening the flange connecting bolts & nuts as per the table below. It is important to support the valve from falling down when taking out of the flange connecting bolts. After proper supporting of the valve, take out the connecting bolts and the valve can be lifted from the pipe line. Place the valve on a working table with its flange facing up for disassembly.

VALVE SIZE	BOLT SIZE	NUMBER OF BOLTS
1/2"	1/2" - 13 UNC	4
3/4"	1/2" - 13 UNC	4
1"	1/2" - 13 UNC	4
1 1/2"	1/2" - 13 UNC	4
2"	5/8" - 11 UNC	4
2 1/2"	5/8" - 11 UNC	4
3"	5/8" - 11 UNC	4
4"	5/8" - 11 UNC	8

- b. When disassembling the valves, the following steps are to be taken. Turn the valve in the partially opened position, disassemble the valve body & cap by unfastening the body joint bolts as per the table below. Unfasten the bolts in a star-shaped sequence. Take out the bolts to separate the body & cap.
- c. Turn the ball to the closed position, so that the ball can be taken out. New seats & body joint gaskets can be replaced at this position.

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- d. In case there is need to replace stem packing & thrust washer (see the drawing on the catalogue), firstly, loosen the handle nut and take out the handle. Second, loosen the packing nut counterclockwise by a wrench, and then the packing nut, Belleville washers, and gland can be taken out. Press the stem from the top toward the inside body and then the stem is free to be removed; the stem packing and thrust washer can then be replaced.
- e. After replacements are done, the valves should be re-assembled and pressure-tested. It is important that the packing nut is tightened properly. The fastening torque is listed in the below tables. After fastening, the top surface of the packing nut should not be extruded above the mounting pad surface.

The body joint bolts should be tightened when the valve is in the closed position.

Evenly tighten the body joint bolts to keep the body and cap in perfectly parallel position; thus, to prevent any distortion to the end cap that may cause leakage. When tightening the bolts, pay special attention to the tightening sequence – the bolts should be tightened in a cross corner sequence, to avoid any uneven tightness. The bolts should be tightened evenly until the cap is in contact with the body (metal to metal).

- Notes:**
1. ***The pressure in the pipeline should be relieved before disassembling the valves. Any fully closed or fully opened valves could hold pressure in the body cavity for an extended period of time, especially with high temperature media. Therefore, before removing valves from the pipeline, turn the valves to their partially opened position to relieve pressure.***
 2. ***For valves in hazardous media service, decontamination procedures must be taken before disassembling the valves.***

VALVE SIZE	SIZE OF BODY JOINT BOLTS	NUMBER OF BOLTS	FASTENING TORQUES
1/2"	M 8	4	239 In-lbs (27 N-m)
3/4"	M 8	4	239 In-lbs (27 N-m)
1"	M 10	4	390 In-lbs (44 N-m)
1 1/2"	M 12	4	664 In-lbs (75 N-m)
2"	M 12	4	699 In-lbs (79 N-m)
2 1/2"	M 12	6	876 In-lbs (99 N-m)
3"	M 12	6	876 In-lbs (99 N-m)
4"	M 12	8	965 In-lbs (109 N-m)

Note: Tolerances of +/- 10% of the above Fastening Torques are within the acceptable range.

D. STORAGE OF VALVE

When storing M15F series ball valves, care should be taken to leave the valves fully opened to protect the surfaces of balls and seats.