CRANE FLUID SYSTEMS

GATE VALVES

D151 / D151A / D151X / D155C / D255C / D156 / D159 / D160 / D161 / D162 / D166 / D180 / D235 / D237 / D237A / DM160 / DM161 / F53 / F58 / F84 / FM52 / FM57 / FM63 / FM82 / FM124 / FM125 BRONZE AND IRON GATE VALVES

INTRODUCTION

Gate valves provide complete shut off, providing the seats remain undamaged, and offer very little resistance to flow in the open position. Gate valves are best suited to infrequent valve operation, as any dirt in the system can cause scuffing of the seats. Gate valves are not recommended for use in the partially open position because vibration and erosion of the disc may occur.

GENERAL INSTALLATION

Preparation

- Ensure valve is suitable for service conditions e.g. pressure, temperature, service media.
- Remove dust caps/flange protectors, where fitted.
- The complete piping system must be flushed through prior to commissioning to ensure all foreign matter is removed. Subsequent valve failure is frequently caused by dirt and other matter left in the pipeline.
- Valves are precision manufactured items and as such, should not be subjected to misuse such as careless handling, allowing dirt to enter the valve through the end ports, lack of cleaning both valve and system before operation and excessive force during assembly and handwheel operation.

GENERAL INSTALLATION (CONTINUED)

Flanged Joints

Flanges may be damaged by over tightening the bolts. The following procedures will reduce this risk:

- Full-face gaskets reduce the stresses in flat face flanges.
- Always use the correct size and number of bolts.
- Find out the correct assembly torque for the specific gasket and conditions applicable, and use a torque wrench to achieve this. Use the correct tightening sequence.
- Do not match a flat-faced flange to a raised face flange.
- The flange gaskets should be suitable for operating conditions or maximum pressure/ temperature ratings.
- The flange gaskets should be checked to ensure freedom from defects or damage.
- Care should be taken to provide correct alignment of the flanges being assembled. A suitable lubricant on bolt threads is recommended. In assembly, flange bolts should be tightened sequentially to make the initial contact of flanges and gaskets flat and parallel followed by gradual and uniform tightening in an opposite bolting sequence to avoid bending one flange relative to the other, particularly on flanges with raised faces.
- Flanged joints depend on compressive deformation of the gasket material between the flange surfaces.

Threaded Joints

- The valves are supplied with taper threads and, with the use of a thread sealant will give a pressure tight seal.
- To avoid distortion of the valve, when fitting and tightening the pipe, the valve must be gripped using the flats provided at the same end as the pipe is being fitted.
- Care should be taken to avoid ‘pipe ending’. This can occur if the pipework is not threaded correctly resulting in distortion of the valve seat. The use of a thread gauge is recommended to check the thread dimensions.
- The male thread on the pipe must have fully formed, undamaged threads.

Compression end valves

- When using compression type connections, make sure the pipe ends are cut square and free from burrs. The pipe must pass through the olive (compression ring) until it seats firmly in the bottom of the valve housing.
- The compression nut should be tightened sufficiently to firmly grip and slightly indent the pipe. This will occur at between 3/4 and 1.1/4 turns from hand tight. The use of a pipe jointing compound is not recommended.
- End connection: Compression ends to BS EN 1057:2006: Half hard R250

Valve Location

- Valves should be located to ensure ease and safety of operation and access allowed for subsequent maintenance of the valve.

GENERAL INSTALLATION (CONTINUED)

Layout and Sitting

- The valves may be installed in horizontal pipework with the stem in the vertical position, or in vertical pipework with the stem horizontal. The valves should not be installed in horizontal pipework with the stem horizontal because shut of performance may be impaired.
- In the interests of safety, valves installed on end-of-line service in the closed position with infrequent opening should be fitted with a locking device on the operating mechanism. Alternatively, it should be fitted with a blanking plug on the downstream end connection of the valve.
- It is bad practice to install valves with the hand wheels pointing downwards, as damage may be caused to the gland packing and stem seal, by debris in the system.

Piping Supports

These must be carefully aligned and at the correct distance between centres for the size and type of pipe. Please refer to the current best practice for details of correct spans and installation details.

OPERATION

- The operating conditions shall be consistent with the requirements in the performance specification.
- Handwheels cannot be used for lifting.
- Gate Valves are designed for On-Off service, regulating or throttling services should be avoided. The valve is closed by turning the operating element i.e. Cap-Top, Handwheel or Extension Spindle in a clockwise or anti-clockwise direction, which is confirmed on the Identification label.
- Gate valves are designed to seat with the Crane standard handwheel. Levers, wrenches or other tools should not generally be used to operate a valve. Excessive torque can cause damage to seating faces and/or stem/handwheel. With larger valves the use of a 'pinch bar' is acceptable providing the bar length does not exceed 1.5 x the handwheel diameter.
- Once installed operate the valve through its full extent. The valve should be operated by Handwheel or Tee Key without applying excessive force. Valves can also be fitted with correctly sized and fitted gearboxes or Actuators that should be specific for the process or duty.
- Gate Valves are designed to operate either in the fully closed or open positions, if used in an intermediate position this will lead to increased wear and therefore reduced life expectancy.
- The maximum pressure rating is that on a closed valve.
- Where EPDM is used as the sealing medium, oil or grease should not be allowed to come into contact as this will cause swelling in the EPDM.

Note: When the valve is closed at extreme high temperature and then cooled, the wedge may become tight in the valve and prove difficult to open.

Conversely, a valve closed at room temperature can be difficult to open if there is an increase in fluid temperature causing a linear expansion of the stem, which tightens the wedge further into the body seats.

INSPECTION AND MAINTENANCE

For enhanced life of the valve and better operability, it is recommended to do a periodic inspection and maintenance of the valves as explained below:

The frequency of observation depends on its application. Crane recommends that valve shall be inspected every 50 cycles or three months (whichever earlier) for smooth operation and leak free performance. This is recommended even for stored valves also. It is advisable to maintain a record of the performance of the valve.

- Where the handwheel, and therefore the identification plate, is removed, they must be refitted after the work is completed. The absence of the identification plate invalidates the valve's CE status.
- Occasionally operate valves that remain open or closed for long periods to ensure they are in good working order, thus avoiding the possibility of being inoperable in a time of emergency.
- Check for leaks at gland. If gland is leaking tighten the gland nut(s). The gland nut(s) should be tightened only enough to prevent stuffing box leakage. Over-tightening can cause excessive wear on stem and packing and make valve difficult to operate.
- The valve should be at zero pressure and ambient temperature prior to any inspection.
- Maintenance Engineers & Operators should have the appropriate level of competence and are reminded to use correct fitting tools and equipment.

Gland Adjustment

The gland may need adjustment during installation and then periodically thereafter to maintain a stem gland seal. The following procedure is recommended:

- The gland nut should be tightened in a clockwise direction until increased resistance to operate the valve is obtained, or if leakage is present until the leakage stops.

Other than gland adjustment, Crane Gate Valves are maintenance free. For any technical queries, please contact Crane Technical Department.

- Crane Fluid Systems do not offer spares for this product.
- If product is disassembled, warranty is void.

GENERAL CONSIDERATIONS

- The surfaces of valves in service may be subject to extreme temperatures; care should be taken when handling.

LIMITS OF USE

These valves have been categorised in accordance with the Pressure Equipment Directive 2014/68/EU.

The fluid to be transported is limited to those shown in the product table below. On no account can these valves be used on any unstable fluids, or for the fluids groups not specified in the product table.

Note: Valves that are classified as SEP (Sound Engineering Practice) are not CE marked and therefore do not require a declaration of conformity.

Products conforming to Cat I of the PED 2014/68/EU shall include the CE Mark.

Products conforming to Cat II and above of the PED 2014/68/EU shall include the CE Mark and applicable Notified Body Number.

Fig. No	Material	PED category by valve size (DN)			Product Applications			
		SEP	1	2	Group 1 Gas	Group 2 Gas	Group 1 Liquid	Group 2 Liquid
D151 / D151.AT / D151A	Bronze / DZR	8-50	65-100	-	-	✓	✓	✓
D151X / D151X.AT	Bronze	8-40	50-80	-	-	✓	✓	✓
D155C / D255C	Bronze	15-54	-	-	-	-	-	✓
D156 / D156.AT	Bronze	8-50	65-100	-	-	✓	✓	✓
D159 / D159.AT	Bronze	8-32	40-50	65-80	-	✓	✓	✓
D160	Bronze	20-65	80	-	-	✓	✓	✓
D161	Bronze	20-40	50-80	-	-	✓	✓	✓
D162	Bronze	20-50	65-80	-	-	✓	✓	✓
D166 / D166.AT	Bronze	8-32	40-50	65-80	-	✓	✓	✓
D180 / D180.AT	Bronze	8-32	40-50	65-80	-	✓	✓	✓
D235	Bronze	15-32	40-50	65-80	-	✓	✓	✓
D237 / D237A	Bronze	15-50	65-80	-	-	✓	✓	✓
DM160	Bronze	20-50	65-80	-	-	✓	✓	✓
DM161	Bronze	20-40	50-80	-	-	✓	✓	✓
F53	Cast Iron	50-65	80-125	150-300	-	✓	✓	✓
F58	Cast Iron	50-65	80-125	150-300	-	✓	✓	✓
F84	Cast Iron	50-65	80-125	150-300	-	✓	✓	✓
FM52	Cast Iron	50-150	200-300	-	-	✓	✓	✓
FM57	Cast Iron	50-100	125-300	-	-	✓	✓	✓
FM63	Cast Iron	50	65-125	150-300	-	✓	✓	✓
FM82	Cast Iron	50	65-125	150-300	-	✓	✓	✓
FM124 / FM125	Ductile Iron Resilient Seat	50-300	-	-	-	-	-	✓

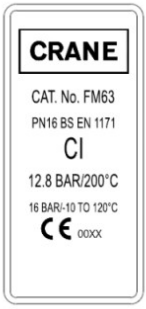
LIMITS OF USE (CONTINUED)

- Valves must be installed into a well-designed system and it is recommended that the system be inspected in accordance with the appropriate national and regional legislation.
- Valves must be installed by trained personnel only.
- Maximum operating pressure reduces as service temperature increases. Service temperature and pressure indicated on the identification plate or body marking should not be exceeded – please refer to example below.
- The installation should be designed to provide adequate means of draining and venting to avoid harmful effects such as water hammer, vacuum collapse, corrosion and uncontrolled chemical reactions and to permit cleaning, inspection and maintenance in the correct manner.
- Valves are not designed to operate under high shock loadings. Where pressure increases occur due to shock loading (water hammer), they should be added to the working pressure to obtain the total pressure acting on the valve. The total must not exceed the pressure rating of the valve. A pressure surge, or shock, is usually caused by the rapid closure of a check valve or quarter turn valve resulting in a sudden reduction in flow rate.
- It is the responsibility of the installer to ensure that the valves do not exceed the allowable limits of pressure. However, the equipment is designed to withstand a momentary pressure surge of up to 10% above the maximum working pressure.
- The product has not been designed to include corrosion, erosion or abrasion allowances. Any queries regarding service applications should be addressed to the Crane Fluid Systems - Technical Sales Department.
- The valves have been designed for loadings, appropriate to its intended use and other reasonably foreseeable operating conditions. Loadings caused by traffic, wind and earthquake have not been taken into account.
- Not suitable for fatigue loading, creep conditions, fire testing, fire hazard environment, corrosive or erosive service, transporting fluids with abrasive solids.
- The piping system shall be designed to reduce the risk of fatigue due to vibration of pipes.
- Crane valves have not been designed as fire safe valves.

OPERATING PRESSURE AND TEMPERATURE

Fig. No	Maximum Operating Pressure Conditions	Maximum Operating Temperature Conditions
D151 / D151.AT / D151A	20 Bar / 100°C	9 Bar / 180°C
D151X / D151X.AT	25 Bar / 100°C	10.5 Bar / 186°C
D155C / D255C	16 Bar / 30°C	5 Bar / 120°C
D156 / D156.AT	16 Bar / 100°C	7 Bar / 170°C
D159 / D159.AT	32 Bar / 100°C	14 Bar / 198°C
D160	13.8 Bar / 38°C	6.9 Bar / 170°C
D161	20.7 Bar / 38°C	10.4 Bar / 186°C
D162	15.5 Bar / 66°C	11.1 Bar / 186°C
D166 / D166.AT	32 Bar / 100°C	14 Bar / 198°C
D180 / D180.AT	32 Bar / 120°C	14 Bar / 260°C
D235	32 Bar / 100°C	14 Bar / 198°C
D237 / D237A	20 Bar / 100°C	9 Bar / 180°C
DM160	16 Bar / 100°C	7 Bar / 170°C
DM161	25 Bar / 100°C	10.5 Bar / 186°C
F53	13.8 Bar / 65°C	8.6 Bar / 230°C
F58	13.8 Bar / 65°C	8.6 Bar / 230°C
F84	13.8 Bar / 65°C	8.6 Bar / 230°C
FM52	6 Bar / 120°C	5.4 Bar / 150°C
FM57	10 Bar / 120°C	8.4 Bar / 180°C
FM63	16 Bar / 120°C	12.8 Bar / 200°C
FM82	16 Bar / 120°C	12.8 Bar / 200°C
FM124 / FM125	16 Bar / 80°C*	Max. temperature 80°C

*Insulation is essential for external temperatures up to 10°C.



Example of Identification plates showing service pressure and temperature limitations.

STRESS CORROSION CRACKING

The use of chemicals for system dosing must be determined by the user as all aspects of the system must be established and considered, and the effect of the chemicals used (including compounds arising from chemical combinations) must also be established in order to accurately determine compatibility.

Crane (and its related brands) manufacture hardware (valves, couplings, etc) for the Building Services industry and Utilities industries. However, we are not system designers or operators and cannot make recommendations regarding chemical compatibility for the system, as a result of the above variables. Any comments from Crane regarding chemical compatibility shall relate solely to the Crane product and does not constitute a recommendation on compatibility for the wider system, resultant chemical compounds, components, substances or materials, in whole or in part.

For reference, and not exhaustive, certain austenitic stainless steels and aluminium alloys crack in the presence of chlorides, mild steel cracks in the presence of alkali and nitrates, copper alloys crack in ammoniacal solutions and iron with almost any caustic species (hydrogen presence notwithstanding).

For more information on how SCC can occur, please visit www.cranefs.com

YouTube To visit our Video Library go to:
www.youtube.com/user/CraneBSU

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