FIGURE 751
DUCTILE IRON FLANGED GATE VALVE

INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

INTRODUCTION

This instruction manual provides storage, installation, operation and maintenance information for ductile iron flanged gate valves. This manual describes 300PSI ductile iron valves. Valves are intended for use in water service. Do not use in steam or hydrocarbon service.

STORAGE

Be careful not to damage the valve stem while handling. If the valves are rack mounted for storage, their packing chambers should not be in direct contact with the rack. It is not recommended to place the valve directly on the ground or concrete floor.

TEMPORARY STORAGE

If the valve is to be temporarily stored prior to installation, the following rules should be followed:

- Always keep the valve wrapped and protected.
- It is best to store the valve in a dust-free, well-ventilated and low-humidity area.
- If stored outdoors, please ensure that the valve is protected by good environmental protection to ensure that there is no water accumulation on or in the valve.
- The valve comes with a protective end cap to prevent mechanical damage and prevent the intrusion of dust and foreign objects. If an end cap is found to be missing after shipping, use the appropriate type of end protector immediately.
- The valve should remain in the half-open position.

LONG TERM STORAGE

If the valve is to be stored for more than one year, it should be prepared following the rules above, as well as the following additional rules:

- Do not store the valve outdoors.
- Remove packaging and apply preservative to exposed areas of the valve.
- Do the following annually:
  - Apply lubricant to exposed areas.
  - Apply a protective surface coating to the outside of the valve as required. Make sure the surface area is clean before applying the protective spray.

INSTALLATION

WARNING

To avoid personal injury or property damage due to valve leakage, do the following before installation:

- Shut off the pipeline.
- Completely isolate the valve from the piping.
- Relieve pipeline pressure.
- Drain water from the valve.
- Remove protection cover of the valve.
- Inspect the valve body ports and associated equipment for damage and any foreign objects that may have been present during shipping or storage. Blow compressed air into the valve, making sure the inside of the valve body is clean.

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- Check the pipeline and supporting flange to ensure that the pipeline is free of foreign matter, the flange is clean, and there are no burrs or pits to avoid leakage.
- Make sure the connecting pipe has adequate support. Improper support can lead to valve deformation, leakage, operational inefficiency and early maintenance issues.
- When installing the gate valve, make sure that there is enough space around the handwheel to operate the valve easily and safely, and make sure that the valve stem has enough space to rise when the valve is opened.
- Ensure that the bolt and gasket material are compatible with the valve body material and pressure rating.
- With proper support, align the valve flange holes with the pipe flange holes.
- For ring washers, insert two to four bolts into the lowest bolt holes.
- Insert a suitable gasket between the flanges and center them. For ring spacers, use the inserted bolts to center the spacer.
- Insert and tighten all bolts and nuts. Care should be taken to ensure that the flanges are parallel.
- Using a cross pattern (star pattern), tighten each bolt evenly to ensure even shim loading. The ends of the tightening bolts should protrude evenly from each nut (see Figure 4).
- After the valve is installed, re-check all the bolts and nuts of the connecting flanges and re-tighten them if they are found to be loose.

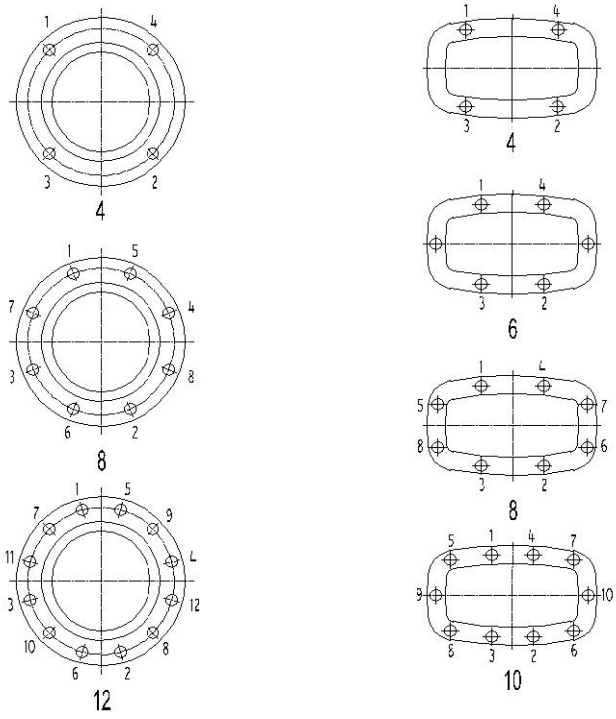

Figure 4 Tightening pattern

OPERATION

- Gate valves are not designed for throttling (modulating) service and should be used in the open or closed position. Prolonged use in the partially open or closed position may result in the erosion of the wedge and/or seat. This position may also cause a “chatter” noise in the line or cause damage to the valve.
- For gate valves, turn the hand wheel counterclockwise to open the valve. Turn the hand wheel clockwise to close the valve. Do not use pipe extensions (cheater bars) to operate the valve as this may damage seat surfaces, yoke or stem.
- For gate valves, on a new valve or a valve that has had new packing installed, the hand wheel torque may be relatively high. This high torque will diminish to a reasonable level after the valve has been operated several times. Hand wheel operating torque also depends on the type and size of each valve and its position. Note that the operating torque is high when opening a fully closed valve or when closing the valve and near the end of valve travel.
- For gate valves, sometimes material in the line can get stuck between the disc and seating area. Should this happen, re-open the valve to allow the process fluid to clear the material. If the condition persists, it may be necessary to shut down the line and inspect the interior of the valve.

300PSI UL/FM OS&Y FLANGED GATE VALVE							
	2.5"	**3"**	**4"**	**6"**	**8"**	**10"**	**12"**
Closing torque ft/lbs	≤50	≤55	≤77	≤110	≤150	≤185	≤225
Turn	11±0.5	10±0.5	13±0.5	19.5±0.5	26±0.5	32±0.5	38±0.5

Table 1 Closing torque and turns to open

FIGURE 751
DUCTILE IRON FLANGED GATE VALVE

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INSTALLATION, OPERATION & MAINTENANCE INSTRUCTIONS

TROUBLESHOOTING

Problem	Possible Causes	Remedy
Leakage through the stem packing	Gland nuts are loose	Tighten gland nuts
	Gland is binding against the stem	Check to ensure that the gland is centered and evenly tightend
	Inadequate amount of packing rings	Install additonal packing rings
Leakage through the stem packing	Packing is hard and dry	Replace with new packing
	Packing was not properly cut and staggered	Replace with new packing
	Stem is damaged	Repair or replace as required
Hand wheel is difficult to turn	Stem is binding during travel	Remove dirt and lubricate stem with grease
	Stem packing is exerting excessibe force on stem	Check torque on gland nuts
	Stem is damaged	Examine stem through full open and close action. Repair or replace as required.
	Internal components may be damaged	Disassemble the valve. Inspect and repair as needed.

FIGURE 751
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TROUBLESHOOTING

Problem	Possible Causes	Remedy
Leakage from the bonnet	Bonnet nuts are loose	Tighten to values listed in Table 2
	Bonnet sealing gasket is damaged	Disassemble valve and install a new gasket
	Bonnet flange faces are damaged	Repair damaged area and install a new gasket
Leakage past the seat	Valve is not properly seated	Check with hand wheel to see if the valve is tightly closed
	There is an obstruction between the seat and disc	Open and close the valve a couple times to see if the obstruction clears
	Disc is damaged or worn	Disassemble the valve, inspect internal components, and repair or replace as required

INSPECTION

Valve components are subject to normal wear and tear and must be inspected and replaced as needed. The frequency of inspection and maintenance depends on the severity of the conditions of use.

Size	Torque-Bolts between bonnet and body (NM)
2.5"	65
3"	70
4"	70
6"	80
8"	100
10"	100

Table 2 Tightening values

FIGURE 751
DUCTILE IRON FLANGED GATE VALVE

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FREQUENT INSPECTION

Frequent inspections are recommended for safe, uninterrupted operation of the valve. Frequent inspections should include:

- Inspect packing gland areas, flange connections, bonnet flanges, threaded areas, body surfaces and any media fluid leakage. Packing gland, flange and bonnet flange leaks should be handled as described in the maintenance section. For leaks through the valve body surface, consult a valve repair specialist.
- Listen for abnormal noise from the valve, loose bolts or pipe vibration. With frequent inspection, familiarity can better distinguish abnormal noise from normal noise. Loose bolts should be tightened immediately. Unusual noise or piping vibration should be brought to the attention of the piping engineer.
- Visually confirm the correct operating position of the valve, whether the bolts are firm, and whether the valve stem has sufficient lubrication. The valve should be operated in the fully open or fully closed position as described in the operation section. Intermediate positioning is not recommended. If necessary, immediately tighten any loose bolts and grease around the valve stem.

PERIODIC INSPECTION

Valves should be inspected periodically to detect wear on the stem, stem nut, internal corrosion of the valve body or bonnet, and wear on the packing. Typically, packing and gaskets are replaced during periodic inspections as part of a basic maintenance program. Periodic inspections should include the following, which are described in more detail in the maintenance section:

- Valve disassembly
- Examination of valve components
- Component repair and/or replacement
- Valve reassembly
- Test and inspections

MAINTENANCE

Valve components are subject to normal wear and tear and must be inspected and replaced as needed. The frequency of inspection and maintenance depends on the severity of the conditions of use.

WARNING

To avoid personal injury or property damage due to fluid leakage, before performing any maintenance do the following:

- Shut off the pipeline.
- Completely isolate the valve from the piping.
- Release process pressure.
- Drain the process fluid from the valve.

PRELIMINARY

Before removing from the pipe, mark the edges of the valve and pipe flange so that the valve can be returned to its original position. If multiple valves are to be inspected and they are not already marked, number the valves and flanges separately for proper matching during maintenance.

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DISASSEMBLY AND ASSEMBLY

GATE VALVES

See Figure 5 for the following disassembly and assembly instructions. NOTE: All gate valves may not have the same components listed below. Refer to the corresponding valve drawing for a parts list. These steps are after the valve has been removed from the pipeline.

DISASSEMBLY

- Turn the handwheel (12) to open the valve.
- Remove the bonnet screws (7).
- Mark the body (5) and bonnet (2) flanges to hold them in place during assembly.
- Lift the bonnet (2), stem (15) and disc (4) assembly out of the body (5), taking care not to scratch the disc surface.
- Remove the bonnet gasket (6) from the valve.
- Remove the valve plate (4) from the lifting nut (18) of the valve stem (15).
- Loosen the locking screw (14) on the handwheel lock nut (13). Remove the handwheel lock nut (13) from the valve stem nut (16), and then remove the handwheel (12) from the valve stem nut (16).
- Loosen the nut (10) on the gland bolt (11) to release the gland (8). Turn the valve stem counterclockwise from the bottom of the valve cover (2) to remove the valve stem nut (16), pull out the valve stem (15), and remove the valve stem nut (16) from the valve cover (2).
- Remove packing (3) using a suitable tool.

ASSEMBLY

- Thoroughly clean the inside of the valve and all parts. Remove any limescale, oil, grease or other foreign matter. Wipe disc (4) with a cloth. Clean body (5) and bonnet (2) inside and outside surfaces and all nuts and bolts.
- Put packing (3) into the packing groove of bonnet (2), align and center the packing gland (8) into the packing groove, put on the gland bolts (11), tighten the nuts (10) by hand, and carefully pass the valve stem (15) through the valve Packing hole in cap (2), gland (8), until the stem thread engages with stem nut (16). Slowly rotate the valve stem female (16) counterclockwise until the valve stem (15) protrudes from the valve stem female (16) and passes through the top of the valve cover (2).
- Put the handwheel (12) on the valve stem nut (16) and fix it with the handwheel lock nut (13), then lock it with the locking screw (14).
- Put a new gasket (6) in the groove of the top flange face of the valve body (5), the gasket can be greased with butter. Do not reuse the gasket.

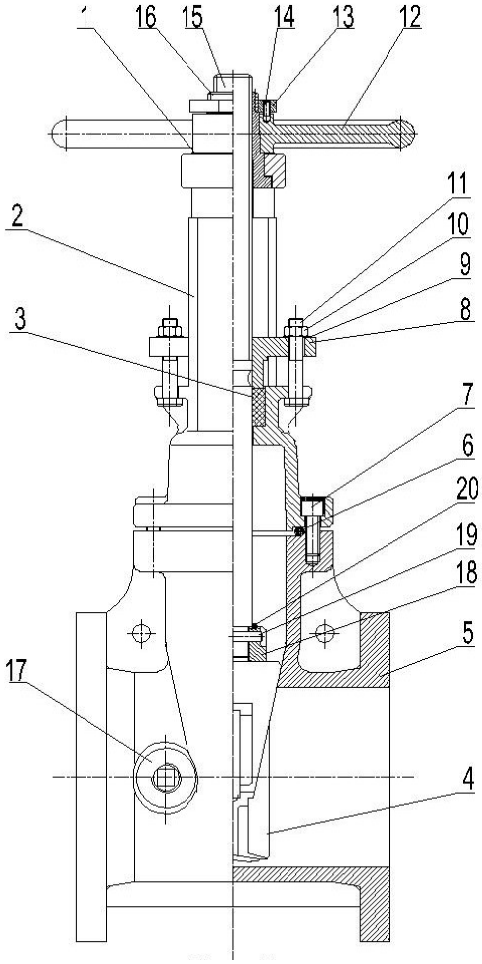

Figure 5 Disassemby and assembly

- Install the valve plate (4) on the lifting nut (18) on the valve stem (15) to complete the assembly of the valve cover (2), valve stem (15) and valve plate (4) and other components.
- Slowly place the bonnet (2), stem (15) and disc (4) assembly into the body (5). Pay attention to prevent the surface of the valve seat from being scratched, align the flange of the valve cover (2) with the top flange of the valve body (5) according to the mark made in advance, make sure that the gasket (6) does not extend out of the groove of the top flange of the valve body, and then fasten it with screws (7) , when tightening the screws, do so diagonally until tight. See recommended torque values in Table 2.
- Tighten the gland nuts (10) alternately by hand.
- Use handwheel (12) to open and close the valve. The action should be smooth throughout the stroke

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STEM PACKING REPLACEMENT

WARNING
To avoid injury to yourself, fellow workers, or damage to property from release of process fluids, ensure that all pressure is removed from the valve both upstream and downstream before disassembly.

- Loosen the gland nut (10) and remove the gasket (9) and the bonnet bolt (11). Lift the gland (8) to tie and secure it with string or wire. (See Figure 1).
- Use a suitable tool to remove the existing packing ring (3). Do not scratch or damage the surface of the stem or packing with tools. Next tie the loose packing rings (3) with string or wire (see Figure 1).
- Check that the stem and packing are intact. Any burrs and scratches should be removed with emery cloth. Clean the valve stem with a cloth soaked in solvent.
- Count the original number of packing rings.
- If replacing with new packing, use a sharp tool to cut each ring at a 45° angle (see Figure 2), stagger adjacent packing openings 90°–120° into the bonnet packing groove. (See Figure 3). Tamp each ring when installing.
- After the packing groove is filled with the packing rings, reassemble the gland, gland nuts (10), washers (9) and bonnet bolts (11). Alternately tighten the gland nuts (10) one quarter turn at a time until the gland nuts (10) begin to tighten.
- Open and close the valve with handwheel (12). The action should be smooth throughout the stroke. Adjust the tightness of the packing by adjusting the gland nut. If the packing leaks, turn the gland nut (10) evenly in 1/4 turn increments until it stops.

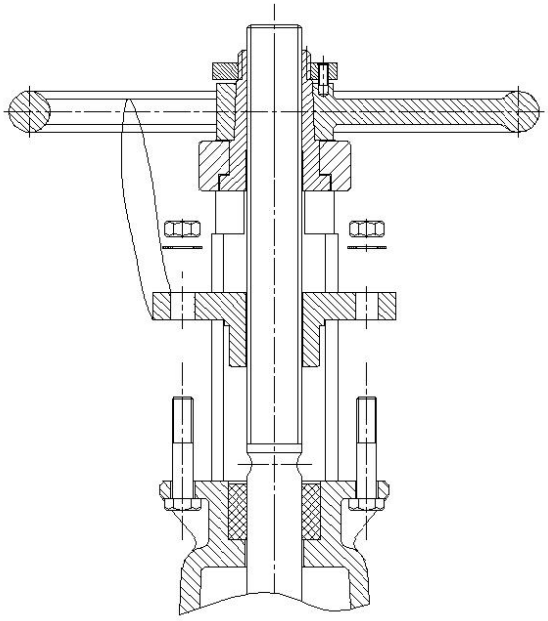

Figure 1 Stem packing replacement

Figure 2

Figure 3

LIMITED WARRANTY

WARRANTY

Limited Warranty

Subject to the limitations expressed herein, Seller warrants that products manufactured by Seller shall be free from defects in design, material and workmanship under normal use for a period of one (1) year from installation but in no case shall the warranty period extend longer than eighteen months from the date of sale. This warranty is void for any damage caused by misuse, abuse, neglect, acts of God or improper installation. For the purpose of this section, “Normal Use” means in strict accordance with the installation, operation and maintenance manual. The warranty for all other products is provided by the original equipment manufacturer.

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