HANCOCK CAST STEEL - GATE, GLOBE AND CHECK VALVES

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood



Instructions for DN 50 - 600 (NPS 2 - 24) ASME class 150, 300 and 600 bolted bonnet cast steel valves.

SAFETY NOTICE

It is essential that a safe system of work should be adopted before any maintenance work is done on a valve. The following safety considerations should be taken in to account when preparing maintenance instructions.
Before removing valves from a pipework system or dismantling a valve to carry out maintenance, it will be necessary to open, or partially open, the valves and to flush the system to remove all traces of dangerous fluids and pressures.
It is important to recognize the danger associated with the removal of the stem packing gland with pressure in the pipework system and the use of the backseat should not be regarded as a device permitting repacking of the stem packing gland whilst the valve is under pressure as this is recognized as dangerous practise.

1 GENERAL INSTALLATION INSTRUCTIONS

1.1 General

The installation procedure is a critical stage in the life of a valve and care should be taken to avoid damaging the valve.

1.2 Inspection

Before carrying out a valve installation, it is important to determine whether the valve is in a satisfactory condition.
The following generally applicable procedure may be helpful in avoiding subsequent valve problems and should be observed.

a) Carefully unpack the valve and check tags, identification plates, direction of rotation of handwheels etc, against bill of material, specifications, schematics etc.
b) Make a point of noting any special warning tags or plates attached to or accompanying the valve, and take any appropriate action.
c) Check the valve for any marking indicating flow direction. If the flow direction is indicated, appropriate care should be exercised to install the valve for proper flow direction.
d) As far as is practicable, inspect the valve interior through the end ports to determine whether it is reasonably clean, free from foreign matter and harmful corrosion. Remove any special packing materials, such as blocks used to prevent disk movement during transport and handling, and anti-corrosion packs. Wipe clean from preservation coatings, particularly seatings.
e) If practicable, cycle the valve through open and close. Check guides or seat faces, etc.
f) Immediately prior to valve installation, check the pipework to which the valve is to be fastened for cleanliness and freedom from foreign materials.

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1.3 Flanged joint assembly

Pipe flanged joints depend on compressive deformation of gasket material between the facing flange surfaces for tight sealing.
In order to obtain satisfactory flange joints, the following points should be observed.

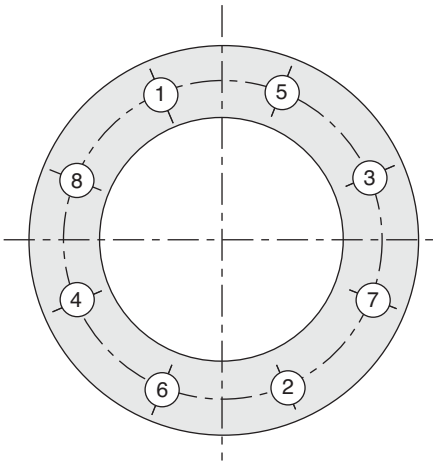
a) Check the mating flange facings (both valve and pipework flanges) for correct gasket contact face, surface finish and condition.
b) Check the bolting for proper size, length and material. A carbon steel bolt on a high temperature flange joint can result in early joint failure.
c) Check the gasket material. For flange joints using low strength bolting, such as may be provided for iron flanges, metal gaskets (flat, grooved, jacketed, corrugated or spiral wound) should not be used.
d) Check the gaskets for freedom from defects or damage.
e) Take care to provide good alignment of the flanges being assembled. Use suitable lubricants on bolt threads. In assembly, sequence bolt tightening to make the initial contact of flanges and gaskets as flat and parallel as possible. Tighten gradually and uniformly to avoid the tendency to twist one flange relative to other.
f) Parallel alignment of flanges is especially important in the case of the assembly of a valve in to an existing system. It should be recognized in such instances that, if the flanges are not parallel, it will be necessary to introduce bending to make the flange joint tight. Simply, forcing the flanges together with the bolting may bend the pipe, or it may bend the valve.
g) All bolts shall be tightened in a star pattern as shown below to ensure uniform gasket loading.

1.4 Butt weld joint assembly

All welding should comply with the appropriate pipe system or application code. Welded joints, properly made, provide a structural and metallurgical continuity between the pipe and the valve body.
Butt welds require full penetration and thickness at least equal to that of the pipes.
If a pipe of high strength alloy is welded to a valve with body material of lower mechanical strength, the weld should taper to a compensating greater thickness at the valve end, or the valve should have a matching high strength welded-on extension.
Particular care is necessary when welding valves into the line. Considerable distortion, resulting in line strains, may occur if valves are not welded into the line with care, where required, the weld properly stress relieved, but it is necessary to ensure that such stress relieving does not result in valve components, particularly the seatings being subjected to unacceptable temperatures.
It is recommended that the valves are not installed in the pipework at points of high bending moments, as this can adversely affect the seating performances.

1.5 Testing and adjustment

Following installation, all valves should be operated to check that they still function correctly.
On new pipework systems, system pressure testing and commissioning follow after installation when various checks are made.
Valves are usually supplied in the lubricated condition, but it is recommended that checks are made to ensure that this is still intact, particularly after the application of heat (e.g. welding operation).
A first observation can be made by actuating the valve through an open-close or close-open cycle.
It is common practice, after installation of pipework systems, to clean the system by blowing with a gas or steam or flushing with a liquid to remove debris and / or internal protective films and coatings. It should be recognized that valve cavities may form a natural trap in a pipework system and material not dissolved in or carried out by the flushing fluid may settle in such cavities and adversely affect valve operation. Also, abrasive material carried by a high velocity fluid stream may cause serious damage to seating surfaces.
Do not subject the valve to pressures/ temperature testing in excess of its stated limits.



BOLT TORQUING SEQUENCE
1-2-3-4-5-6-7-8

2 GATE VALVES

2.1 Installation and operation

2.1.1 Prior to installation

Valves not required for immediate use should be stored under clean conditions to reduce the risk of foreign matter entering the valve during unpacking. If the valves are unpacked for checking purposes, they should be immediately re-packed until required for use.
Protection caps fitted to inlet and outlet connections must be removed, but not until immediately prior to installation.
Seating faces should be wiped clean with a dry cloth before commencing installation.

2.1.2 Installation

Valves are suitable for flow in either direction, but they should be fitted in either horizontal pipelines with the stem upright or vertical lines. Other positions can be detrimental to the proper seating of the wedge.
The valves should be installed in positions where the minimum stress is imposed on them from expansion and contraction of the pipe, and pipework should be adequately supported close to the valve to minimize mechanical pipe strain.
For bolting valves into the pipeline, see General Installation Instructions Section 1.
All valves will have been pressure tested at ambient temperature before delivery, so it is recommended that gland packing nuts should be tightened after a short time on higher temperature service.

2.1.3 Operation

Rotation of the handwheel in the clockwise direction (see markings) will cause the valve to close, and vice versa. Shut off should be achieved by application of the handwheel torque only. Excessive application of force can result in failure of the thrust assembly or damage to the valve seating.

2.2 Maintenance

Gland leakage

CAUTION

On no account should stem gland repacking be attempted under pressure if the contained fluid is dangerous because of temperature, high pressure or chemical composition.

Evenly tighten the gland adjusting nuts to compress the packing rings.
If this does not correct the leakage or if the adjustment is fully used up, it will be necessary to repack the gland using a new set of the correct grade packing, or to add packing ring(s).

Re-packing glands

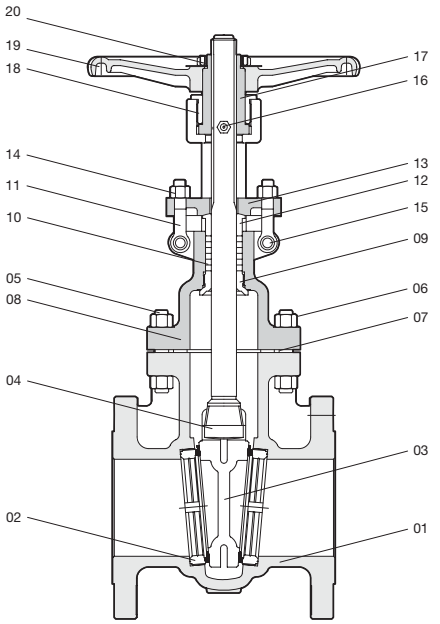
To gain access to the packing box, the gland adjusting nuts should be removed and the gland and packing flange removed or retracted along the stem as far as possible. When the stuffing box has been completely emptied of the original packing, it must be thoroughly cleaned before the new packing is introduced. It is recommended that the packing manufacturers general instructions are followed when repacking glands.

General

It is recommended that the reconditioned valve should be subjected to hydrostatic testing in line, before being reinstated on line working conditions.

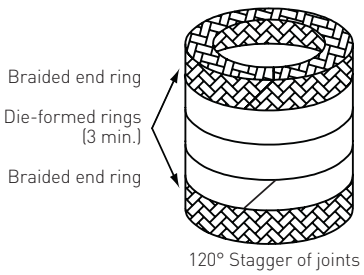
2.3 Spares

The normal requirement for spare parts for normal wear in service are gland packing and gaskets.

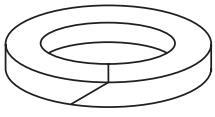


PARTS LIST

No.	Description
1	Body
2	Seat ring
3	Wedge gate
4	Stem
5	Bonnet bolt
6	Bonnet nut
7	Gasket
8	Bonnet
9	Backseat
10	Packing
11	Gland eyebolt
12	Gland
13	Gland flange
14	Eyebolt nut
15	Eyebolt pin
16	Nipple
17	Stem nut
18	Yoke sleeve nut
19	Hand wheel
20	Hand wheel nut



120° Stagger of joints



45° End cut

3 GLOBE VALVES

3.1 Installation and operation

3.1.1 Prior to installation

Valves not required for immediate use should be stored under clean conditions to reduce the risk of foreign matter entering the valve during unpacking. If the valves are unpacked for checking purposes, they should be immediately re-packed until required for use.
Protection caps fitted to inlet and outlet connections must be removed together with any internal anti-corrosion sachets, but not until immediately prior to installation.

3.1.2 Installation

Valves are suitable for flow in one direction only (as indicated on the body) and must be installed accordingly. They should be installed with the stem in either the upright or horizontal position. Other positions may be detrimental to the proper seating of the disk.
The valves should be installed in positions where minimum stress is imposed on them from expansion and contraction of the pipe, and pipework should be adequately supported close to the valve to minimize mechanical pipe strain.
All valves will have been pressure tested at ambient temperature before delivery so it is recommended that gland packing nuts should be tightened after a short time on higher temperature service.

3.1.3 Operation

Rotation of the handwheel in the clockwise direction (see marking) will cause the valve to close, and vice versa.
Excessive force application other than by the handwheel can result in failure of the thrust assembly or damage to the valve seating.

3.2 Maintenance

Routine maintenance

While the valve is working satisfactorily, the only requirement for routine service is lubrication of the thrust assembly.
Valves are supplied with this assembly fully lubricated and should operate smoothly.
To avoid problems from developing, the assembly should be regularly lubricated on the stem.
Recommended grade of grease is:
Mobulux EP2 (or equivalent).

Gland Leakage

CAUTION

On no account should stem gland repacking be attempted under pressure if the contained fluid is dangerous because of temperature, high pressure or chemical composition.

Evenly tighten the gland adjusting nuts to compress the packing rings.
If this does not correct the leakage or if the adjustment is fully used up, it will be necessary to repack the gland using a new set of the correct grade packing, or to add packing ring(s).

Re-packing glands

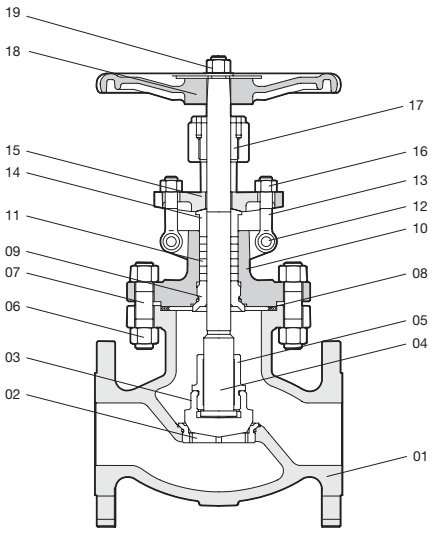
To gain access to the packing box, the gland adjusting nuts should be removed and the gland and packing flange removed or retracted along the stem as far as possible. When the stuffing box has been completely emptied of the original packing, it must be thoroughly cleaned before the new packing is introduced. It is recommended that the packing manufacturers general instructions are followed when repacking glands.

General

It is recommended that the reconditioned valve should be subjected to hydrostatic testing in-line, before being reinstated on line working conditions.

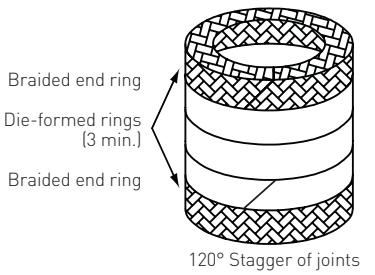
3.3 Spares

The normal requirement for spare parts for normal wear in service are gland packing and gaskets.

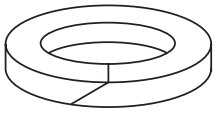


PARTS LIST

No.	Description
1	Body
2	Seat ring
3	Disc
4	Stem
5	Disc nut
6	Bonnet nut
7	Bonnet stud
8	Gasket
9	Backseat
10	Bonnet
11	Packing
12	Eyebolt pin
13	Gland eyebolt
14	Gland
15	Gland flange
16	Eyebolt nut
17	Stem nut
18	Hand wheel
19	Hand wheel nut



120° Stagger of joints



45° End cut

4 SWING CHECK VALVES

4.1 Installation of valve

4.1.1 Prior to installation

Valves not required for immediate use should be stored under clean conditions to reduce the risk of foreign matter entering the valve during unpacking. If the valves are unpacked for checking purposes, they should be immediately re-packed until required for use.
Protection caps fitted to inlet and outlet connections must be removed but not until immediately prior to installation.
Check that the disk is swinging freely on its hinge arrangement with no hang-ups.
Seating faces should be wiped clean with a dry clean cloth before commencing installation.

4.1.2 Installation

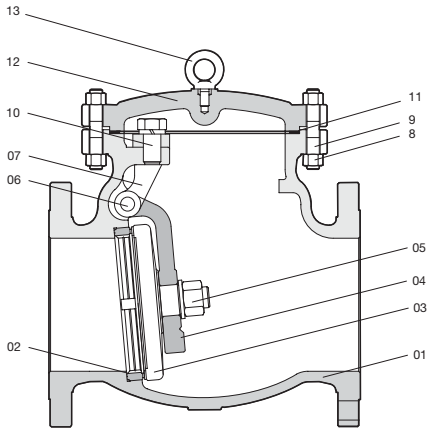
Valves are suitable for flow in one direction only and this is shown by a direction arrow marked on the valve body. It is essential that they are installed in the correct flow (arrow) situation.

They may be fitted in horizontal or vertical (flow-upwards) pipelines, or any in-between lines with flow-upward. They must always be orientated so that the hinge swings downwards and with the hinge pin horizontal.
The valves should be installed in positions where the minimum stress is imposed on them from expansion and contraction of the pipe, and pipe work should be adequately supported each side of the valve to minimize mechanical pipe strain.

4.2 Maintenance

Routine Maintenance

While the valve is working satisfactory, there is no requirement for servicing.



PARTS LIST

No.	Description
1	Body
2	Seat ring
3	Disc
4	Lever arm
5	Nut
6	Hinge pin
7	Yoke
8	Bonnet nut
9	Bonnet stud
10	Bolt
11	Gasket
12	Cover
13	Eye bolt

5 TROUBLE-SHOOTING

The following table will cover the various problems which are common to most valves.
The information provided will aid in isolating and correcting these problems.

Problem	Possible cause	Solution
Leakage through the stem packing	1. Gland nuts are loose.	1. Tighten gland bolts.
	2. Gland is binding against the stem or packing chamber wall.	2. Check to ensure gland is centered and evenly tightened.
	3. Inadequate amount of packing rings.	3. Install additional packing rings.
	4. Packing is hard and dry.	4. Replace with new packing.
	5. Packing was not properly cut and staggered.	5. Replace with new packing.
	6. Stem is damaged.	6. Repair or replace as required.
Problems in operating valve	1. Stem binding during travel.	1. Remove dirt and lubricate stem with grease.
	2. Stem packing is exerting excessive force on the stem.	2. Check torque on gland nuts.
	3. Stem is damaged.	3. Examine stem through full open and close action. Repair or replace as required.
	4. Internal components may be damaged.	4. Disassemble the valve. Inspect and repair as needed.
Bonnet leakage	1. Bonnet nuts are loose.	1. Tighten to values as listed.
	2. Gasket is damaged.	2. Disassemble and install a new gasket.
	3. Flange faces are damaged.	3. Repair and install a new gasket.
Seat leakage	1. Valve not properly seated.	1. Check to see if valve is tightly closed.
	2. Internal components are damaged or worn.	2. Inspect internal components and repair as required.

6 TORQUE VALUES FOR BONNET BOLTING

	Torque	
Bolt nominal diameter (in)	**(Nm)**	**(ft·lb)**
½	61	45
9⁄16	88	65
5⁄8	118	87
3⁄4	206	152
7⁄8	328	242
1	488	360
1 1⁄8	725	533
1 1⁄4	1017	750
1 3⁄8	1383	1020
1 1⁄2	1627	1200
1 5⁄8	2237	1650
1 3⁄4	3051	2250
1 7⁄8	4068	3000
2	4475	3300

NOTES

1. Values are for B7 bolting only. For other materials please consult Hancock.
2. Values listed are based on 45000 psi bolting stress, lubricated with heavy graphite/oil mixture.
   Non lubricated bolts have an efficiency of 50% of the values stated above.
3. All bolts should be torqued in the bolting sequence shown above to ensure uniform bonnet gasket loading.

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