HANCOCK FORGED STEEL - GATE, GLOBE AND CHECK VALVES

INSTALLATION, OPERATION AND MAINTENANCE INSTRUCTIONS

Before installation these instructions must be fully read and understood

Instructions for DN 15 - 50 (NPS ½ - 2)
ASME class 800 and 1500 forged 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 practice.

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 Safety precautions

a) Hancock Forged Steel valves are shipped with the packing gland nuts only hand tight. Always tighten the packing gland nuts before pressurizing a valve.
b) Do not attempt to remove the packing gland nuts while the valve is under pressure.
c) Do not attempt to eliminate bonnet gasket leakage by tightening the bonnet bolts whilethe valve is under pressure.
d) The bonnet should not be removed while the valve is under pressure.
e) Do not attempt to remove the thread bushing while the valve is under pressure.
f) No alteration and/or modification should be made to any Hancock valve, except as sanctioned and/or authorized by Emerson.
g) Any modification of a Hancock valve, to accept a gear operator, motor operator or pneumatic/hydraulic actuator should be accomplished using only those designs sanctioned and/or authorized by Emerson.
h) Never install, or attempt to use, any valve that is not properly identified as to its material and pressure class.

1.3 Screwed valves - joint assembly

Threaded pipe joints depend on a good fit between the external and internal pipe threads for tight sealing. Usually, a compatible soft or viscous material is used between the assembled threads to assist in ensuring a leak-free seal. The following installation practices are recommended:
a) Check the threads on both the valve and the mating pipe for correct thread form and cleanliness. Be alert for any indication of an impact that might have deformed the thread either out-of-round or by a local indentation. Be sure no chips or grit are present.
b) Note the internal length of the threads in the valve ends and the proximity of the valve internal seat to make sure the pipe end will not hit the seat when assembled. If there appears to be a possibility of a problem, carefully check the pipe end thread to make sure there is no extended straight portion beyond the standard tapered section.
c) Apply an appropriate thread tape or thread compound to the external pipe threads except when dry seal threading is specified. Avoid getting the thread tape or thread compound into the internal flow area.
d) Use care to align the threads at the point of assembly. Tapered pipe threads are inherently a loose fit at entry. Substantial wrenching force should not be applied until it is apparent that the threads are properly engaged.
e) Assemble the joint wrench-tight. The wrench on the valve should be on the valve end into which the pipe is being threaded.

NOTE

Because there is no clear limit on the torque that may be developed in a tapered thread joint, it is possible to damage the valves or piping by applying excessive twisting forces through the body of the valve. If at all possible a wrench should be used on the same end of the valve to which the pipe is being threaded into. This way the torque load will not be applied throughout the valve body.

f) Repeat the process at the second valve end. Again, apply the wrench at end of the valve to which the pipe is being assembled.

1.4 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.

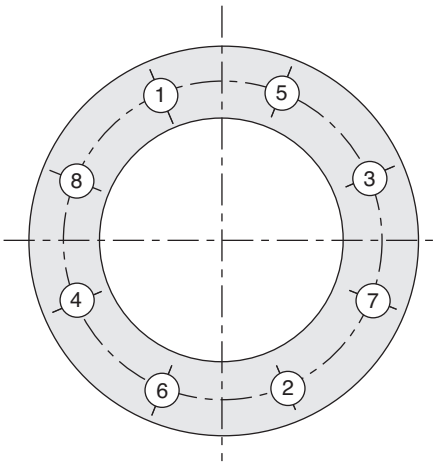
a) Check the mating flange facings (both valve and pipework flanges) for correct gasket contact face, surface finish and condition.
b) Check the bolting for proper size, length and material. A carbon steel bolt on a high temperature flange joint can result in early joint failure.
c) Check the gasket 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.

1.5 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 seating 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.

1.6 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.

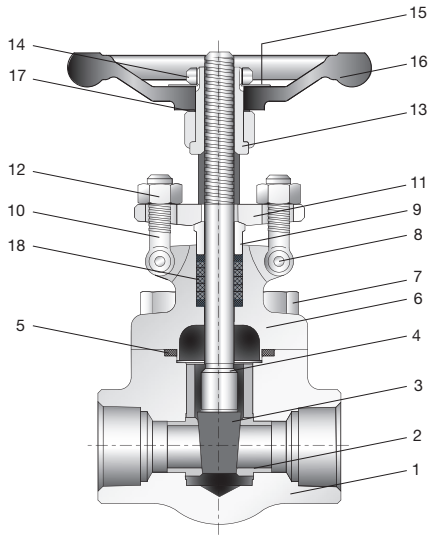
2.1.3 Operation
Rotation of the handwheel in the clockwise direction (see markings) will cause the valve to close, and vice versa. Shut off should be achieved by application of the handwheel torque only. Excessive application of force can result in failure of the thrust assembly or damage to the valve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

2.2 Maintenance
Hancock Forged gate, globe, and check valves can easily be disassembled for inspection or replacement of critical components as required.

2.3 Packing adjustment
a) All Hancock forged steel gate and globe valves are supplied with flexible graphite and carbon fiber.
b) Do not repack valve while valve is in service.
c) When the valve has been placed in service and has been brought up to temperature, the packing should be checked for leakage. Close the valve ½ turn and check the packing for leakage. If leakage occurs, adjust the packing gland.
d) To adjust the packing gland, run the nuts down every ½ turn on all bolts. Turn the handwheel back and forth ½ turn after each adjustment. Again, check for leakage. If binding of the stem occurs and the leakage has stopped, loosen the packing nuts ¼ turn. Check the stem for binding and check for leakage. The object is to tighten the packing a minimum amount to prevent leakage, while producing a minimum amount of stem binding.
e) Packing glands on valves used on elevated temperatures should be adjusted shortly after being brought up to operating temperature.
f) Continued leakage through the stem packing may damage the valve beyond repair. The packing gland should be adjusted as soon as leakage is detected.

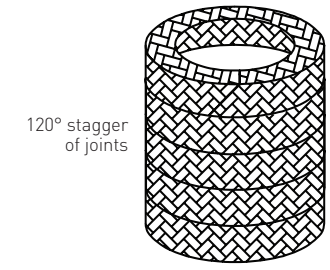
If leaking through the packing continues and cannot be completely stopped by tightening the packing, then the valve should be firmly backseated to prevent steam damaging the stem or bonnet. The valve should be scheduled for inspection and repair.

2.4 Disassembly
A. Body/bonnet
a) Never attempt to disassemble a valve bonnet if there is pressure in the line.
b) Before beginning disassembly, open the valve approximately half way. Remove the bonnet bolts using standard socket wrenches. The bonnet assembly may then be lifted off the body. Remove the bonnet gasket from the body, taking care not to damage the gasket seating surfaces.
B. Bonnet
a) The bonnet assembly may now be disassembled.
b) Remove the two packing gland nuts. Free the packing gland from the packing chamber.
c) Remove handwheel from stem.
d) Remove the stem assembly by screwing it out of the yoke nut and forcing it down through the stuffing box. Rotating the stem while forcing will help ease the stem through the stuffing box.
e) The packing gland and gland flange can now be removed.
f) Remove packing, taking care not to damage the stuffing box.



PARTS LIST

No.	Description
1	Body
2	Seat
3	Wedge
4	Stem
5	Gasket
6	Bonnet
7	Bolt
8	Pin
9	Gland
10	Gland eyebolt
11	Gland flange
12	Hex nut
13	Stem nut
14	Locking nut
15	Nameplate
16	Handwheel
17	Lubricating gasket
18	Packing



Packing

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

Hancock Forged gate, globe, and check valves can easily be disassembled for inspection or replacement of critical components as required.

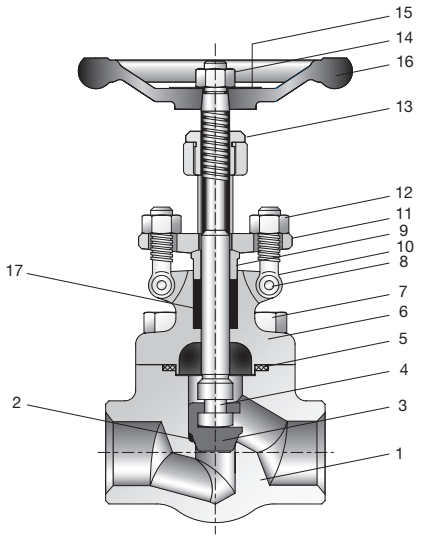
3.3 Packing adjustment

a) All Hancock forged steel gate and globe valves are supplied with flexible graphite and carbon fiber.
b) Do not repack valve while valve is in service.
c) When the valve has been placed in service and has been brought up to temperature, the packing should be checked for leakage. Close the valve ½ turn and check the packing for leakage. If leakage occurs, adjust the packing gland.
d) To adjust the packing gland, run the nuts down every ½ turn on all bolts. Turn the handwheel back and forth ½ turn after each adjustment. Again, check for leakage. If binding of the stem occurs and the leakage has stopped, loosen the packing nuts ¼ turn. Check the stem for binding and check for leakage. The object is to tighten the packing a minimum amount to prevent leakage, while producing a minimum amount of stem binding.
e) Packing glands on valves used on elevated temperatures should be adjusted shortly after being brought up to operating temperature.
f) Continued leakage through the stem packing may damage the valve beyond repair. The packing gland should be adjusted as soon as leakage is detected.

If leaking through the packing continues and cannot be completely stopped by tightening the packing, then the valve should be firmly backseated to prevent steam damaging the stem or bonnet. The valve should be scheduled for inspection and repair.

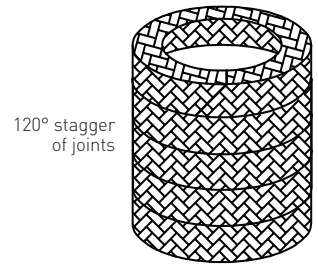
3.4 Disassembly

A. Body/bonnet
   a) Never attempt to disassemble a valve bonnet if there is pressure in the line.
   b) Before beginning disassembly, open the valve approximately half way. Remove the bonnet bolts using standard socket wrenches. The bonnet assembly may then be lifted off the body. Remove the bonnet gasket from the body, taking care not to damage the gasket seating surfaces.



PARTS LIST

No.	Description
1	Body
2	Seat
3	Disc
4	Stem
5	Gasket
6	Bonnet
7	Bolt
8	Pin
9	Gland
10	Gland eyebolt
11	Gland flange
12	Hex nut
13	Stem nut
14	Locking nut
15	Nameplate
16	Hand wheel
17	Packing



Packing

B. Bonnet
   a) The bonnet assembly may now be disassembled.
   b) Remove the two packing gland nuts. Free the packing gland from the packing chamber.
   c) Remove handwheel from stem.
   d) Remove the stem assembly by screwing it out of the yoke nut and forcing it down through the stuffing box. Rotating the stem while forcing will help ease the stem through the stuffing box.
   e) The packing gland and gland flange can now be removed.
   f) Remove the packing, taking care not to damage the stuffing box.

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

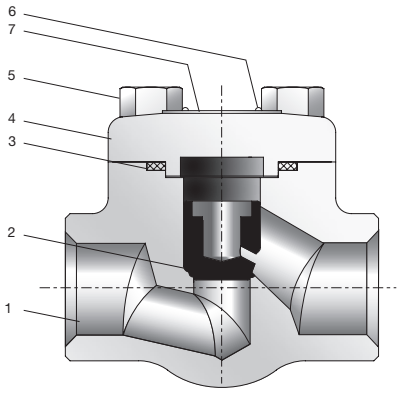
Valves are suitable for flow in one direction only and this is shown by a direction arrow marked on the valve body. It is essential that they are installed in the correct flow (arrow) situation. They may be fitted in horizontal or vertical (flow-upwards) pipelines, or any in-between lines with flow-upward. 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

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

General

It is recommended that the re-conditioned valve should be subjected to hydrostatic testing in-line before being re-instated on line working conditions.



PARTS LIST

No.	Description
1	Body
2	Disc
3	Gasket
4	Cover
5	Bolt
6	Rivet
7	Nameplate

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	Probable cause	Corrective action
Seat leakage	1. Foreign material between seats and disc.	1. Open valve to flush material out.
	2. Steam cut or damaged wedge (gate).	2. Replace stem and wedge assembly.
	3. Steam cut or damaged disc (globe).	3. Replace stem disc assembly.
	4. Valve not fully torque closed.	4. Add torque.
Leakage through the stem packing	1. Packing gland loose.	1. Tighten gland bolts.
	2. Insufficient packing in box.	2. Add packing.
	3. Wrong packing for the service and conditions.	3. Change packing.
	4. Stem and/or bonnet steam cut.	4. Replace stem and/or bonnet.
Body-bonnet joint leakage	1. Bonnet bolts loose.	1. Tighten bonnet bolts.
	2. Thermal or hydraulic shock.	2. Replace bonnet gasket.
	3. Corrosion of sealing surface.	3. Replace body or bonnet, as required.
	4. Steam cut sealing surface.	4. Replace body or bonnet, as required.
Problems in operating valve	1. Overpressure.	1. Replace bonnet gasket.
	2. Packing gland pulled down too tight.	2. Loosen gland nuts.
	3. Stem threads not lubricated.	3. Lubricate threads.
	4. Stem or stem threads bent.	4. Replace stem.

6 RECOMMENDED SPARE PARTS

Class	Part name	Quantity of parts same size and type of service
Forged gate valves		
Most frequent	Packing	1 set/1
	Bonnet gasket	1/1
Less frequent	Stem and wedge assembly	1/10
Seldom	Packing gland	1/20
	Packing gland flange	1/20
	Packing gland nut	2/10
	Packing gland bolt	2/10
	Packing gland pin	2/10
	Yoke nut	1/20
Forged globe valves		
Most frequent	Packing	1 set/1
	Bonnet gasket	1/1
Less frequent	Stem and wedge assembly	1/10
Seldom	Packing gland	1/20
	Packing gland flange	1/20
	Packing gland nut	2/10
	Packing gland bolt	2/10
	Packing gland pin	2/10
	Yoke nut	1/20
Forged check valves		
Most frequent	Bonnet gasket	1/1
Less frequent	Disc	1/10

TORQUING SEQUENCE

Tighten the bonnet bolts in a cross-circular pattern (as shown), using several increments to obtain the recommended torque.

7 TORQUE VALUES FOR BONNET BOLTING

	ASME 800		ASME 1500	
Bolt nominal diameter (in)	**(Nm)**	**(ft·lb)**	**(Nm)**	**(ft·lb)**
½	20	15	41	30
¾	20	15	41	30
1	52	38	65	48
1¼	80	59	89	66
1½	85	63	110	81
2	110	81	121	89

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.