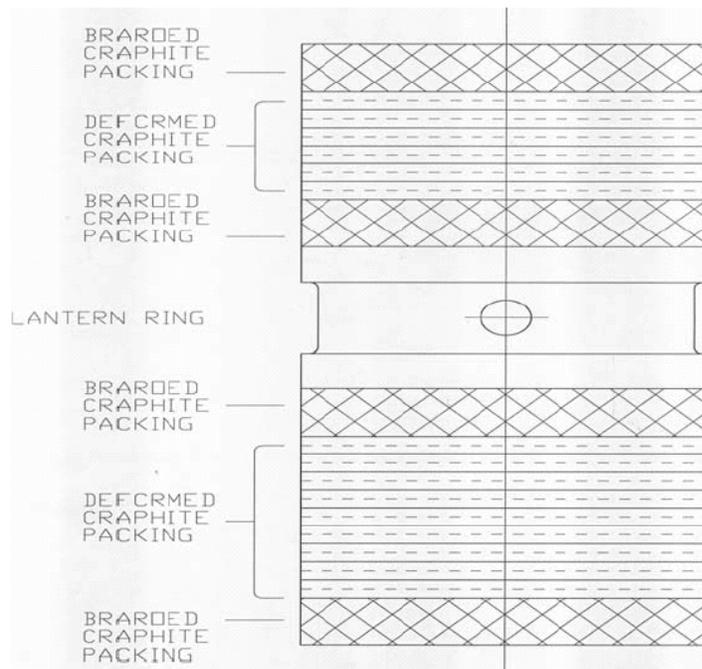


# STEAM & HOT WATER VALVE MAINTENANCE PROCEDURE

## 1. VALVE GLAND PACKING



**Gland packing arrangement**

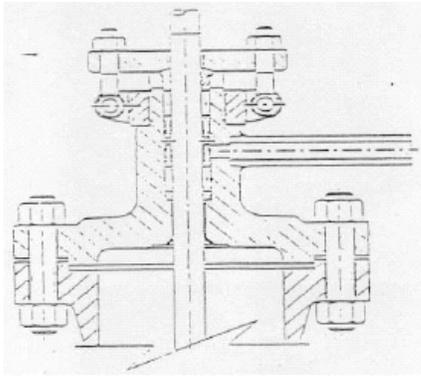
### 1.1. Removal of gland packing

- The packing should be removed by special tools.
- The packing should be replaced by completed set.
- Loosen gland bolt nut and raise the gland flange and the gland.
- Remove old packing using special tools. During removal packing, it must be taken to avoid scratching the stem or the walls of the stuffing box during packing removal.

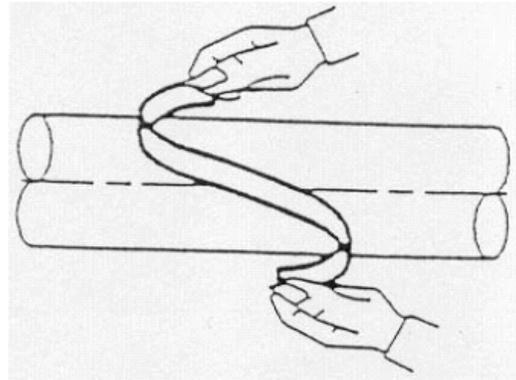
### 1.2. Repacking

- Check the stem and stuffing box wall for damage and repair, refurbish or replace as necessary.
- Clean the gland packing box by cloths and compressed air

- Insert new packing. Gently squeeze the packing rings manually and place into the Stuffing box as deeply as possible.

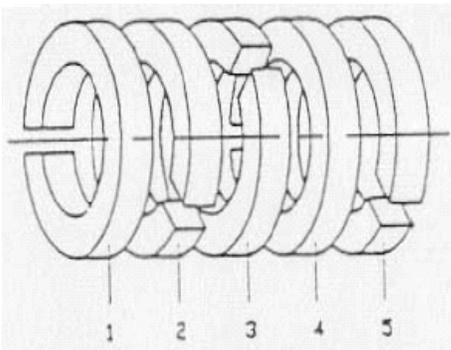


Repacking 1

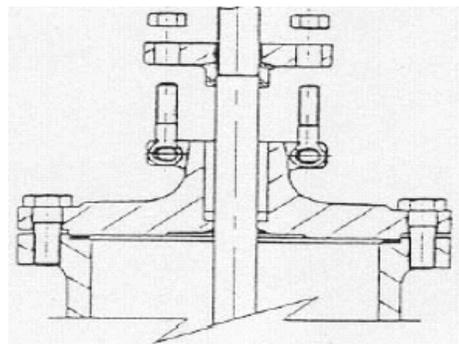


Repacking 2

- The lap joints of the packing rings should be staggered at approximately 120° intervals so that the joint of the fourth ring is above that of the first ring, the fifth ring is above the second and so on. (Photo Repacking 3)
- Carefully align the gland into the stuffing box and return the gland flange to its correct position. Tighten the gland bolt nuts on each side of the gland flange to the recommended torque listed in Table 3. (Photo Repacking 4)
- Cycle the valve at least five (5) times from the fully closed to the fully open position under line pressure if possible. Retighten gland bolt nuts to the required torque in Table 1.
- Gland packing should be carefully tightened only enough to create an effective seal yet still allow the hand wheel to turn properly.



Repacking 3



Repacking 4

**Table 1 - Recommended torque of gland bolts for gate and globe valve**

Stem outside diameter (mm)	Packing dimension (mm) x id (od)	Bolt/ stud size (mm)	Torque valve (kg-cm)	
			Classes 150 & 300	Class 600
16	26 x 16	M12	95 - 115	190 - 220
24	36 x 24	M12	165 - 195	210 - 240
28	44 x 28	M16	350 - 400	430 - 500
30	46 x 30	M16	370 - 420	450 - 530
32	48 x 32	M16	390 - 450	480 - 560
36	56 x 36	M20	690 - 730	870 - 910
40	60 x 40	M20	750 - 790	940 - 990
44	64 x 44	M20	810 - 860	1000 - 1100
48	74 x 48	M22	1300 - 1500	1600 - 1900
52	78 x 52	M24	1500 - 1750	1900 - 2200

## 2. LAPPING PROCEDURE

**Be sure to keep the work clean since dust, dirt or any other foreign matter on the surface to be lapped may cause galling of the seats.**

- Thoroughly clean the seating surfaces and adjacent areas before lapping
- Apply a thin layer of lapping compound to the lap.
- When the lap is manipulated, keep a firm grip on the lap handle and rotate the lap using a back and forth circular motion through a small angle. At the same time, we should rotate slowly around the body while applying uniform pressure.
- Note that lift the lap and rotate it frequently in order to prevent accumulation of materials in one area and to allow for proper distribution of the lapping compound. Replenish the lapping compound frequently and occasionally check to determine progress.
- The normal pressure to be applied to the working surface is 1 kg/cm<sup>2</sup>(14.5 psi). The pressure may be adjusted in accordance with the condition of the seating surface to be lapped.
- To complete the lapping process with a super-fine finish follows the following steps.
  - o First, remove all compounds from both the seat and the lap.
  - o Next, apply a very thin layer of compound to the lap.
  - o Then, continue to lightly lap the seat, carefully using the same lapping motion as before.
  - o Continue lapping until the applied compound completely dries up.
  - o Be careful to avoid over grinding since it may result in galling.

### Lapping when body remains in pipe line

- When reconditioning seats of valves that are installed in al pipe line, it is recommended that the lapping be accomplished using special machines and following the manufacturer’s instructions.

### Reconditioning the disc

- Set the disc so that its seating surfaces are horizontal, with one side ready for Lapping.

- Slight imperfections can be removed by grinding or polishing with emery cloth.
- Once the imperfections are removed, lapping can be performed to provide a good Surface finish to the disc. The lapping is performed in the same manner as described for the seat.

### **Procedure after lapping**

- After lapping, thoroughly clean the parts using soft, clean cloths and thinner (cleaning materials). Do not use chloride or fluoride bearing solvents.
- Coat the lapped surfaces of either the disc or the seats with a thin layer of red lead Paint. Fit the disc securely into the body between the seats in order to inspect the Mating surfaces for proper seating contact and tightness. (as an alternate to red lead Paint, machinists' blue ink may be used.)
- Again, clean the parts using soft, clean cloths and thinner.
- If the parts cannot be refurbished because of severe damage or extensive use, new replacement parts will be required to be obtained and installed in the valve.

## **3. VALVE DISMANTLE PROCEDURE**

### **Removing of motor actuator**

- Turn off the electric power source and open the compartment cover of the motor actuator (221).
- Disconnect outside wiring.
- Move the operation lever from the motor operation position to the manual operation position.
- Prepare a hoist to support the actuator, so that when disengagement is begun the valve stem is not damaged by supporting the entire weight of actuator.
- Unscrew and remove the stem protector (268).
- Note: Support the actuator with a hoist so that the weight of the actuator is not support by the valve stem. This will prevent damage to the stem.
- For actuator mounted directly to the yoke, unscrew and remove the mounting bolt nuts (218) and spring washer (270).
- Slowly turn hand wheel in the valve closing direction.
- Continuing turning the hand wheel. This will cause the valve stem to unthread itself from the actuator and the actuator to rise from the mounting flange.
- Remove the actuator when it is completely disengaged from the stem.

### **Disassembly of pressure seal bonnet casting steel gate valve (Figure 7.c).**

- Open the valve approximately half-way.
- Hang the yoke (30) with a chain block.
- Remove the gland bolt nut (24) of gland bolt (23) and release the gland flange (21).

- Loosen the bonnet clamp (87) (it may be necessary to apply penetrating oil to the Threads). A c-wrench is recommended for easy loosening of the bonnet clamp (87).
- Turn the yoke (30) manually so that it rises from the body (1) and contacts the bonnet clamp (87).
- Fasten the bonnet clamp (87) so that the bonnet (2) is drawn from the body (1) and the seal ring (81) contacts the yoke (30).
- Caution: Care should be taken when removing these parts so as not to deform the seal ring or damage other critical valve parts.
- Repeat steps e and f as necessary in order gradually draw the yoke from the threaded Part of the body (1). The bonnet (2) and seal ring (81) can be removed from the Body with the stem (4) and disc (5).

#### **4. INSPECTION**

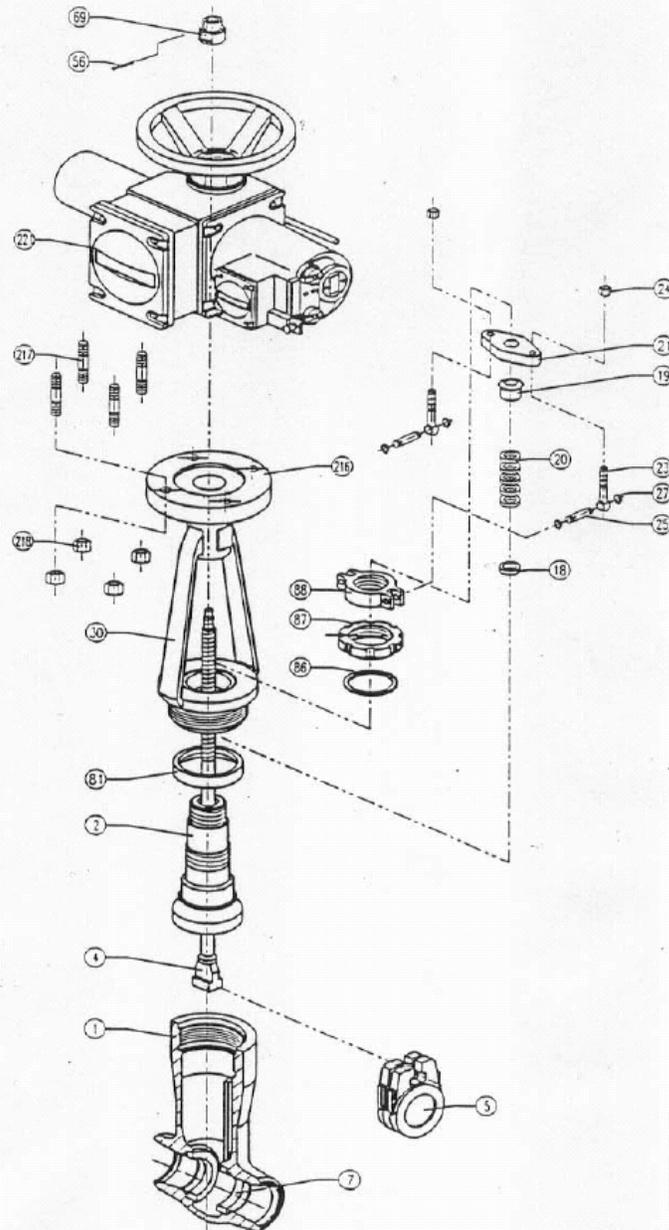
- When the valve is disassembled for maintenance or repaired, all parts should be thoroughly inspected.
- Sliding or mating surfaces should be carefully examined for signs of scratches, gouging,
- Pitting or other defects which might cause leakage or other types of unacceptable performance.
- Special attention should be given to the stem, stuffing box and seating surfaces.
- There are no specific wear limits or tolerances that are required to be observed or maintained for this equipment. Generally maintaining the equipment in good condition with smooth surface finishes free of scratches or other surface defects will ensure proper operation.
- The inspection detail should be following the inspection check list. (Please see the check list attachment).

#### **5. REASSEMBLY**

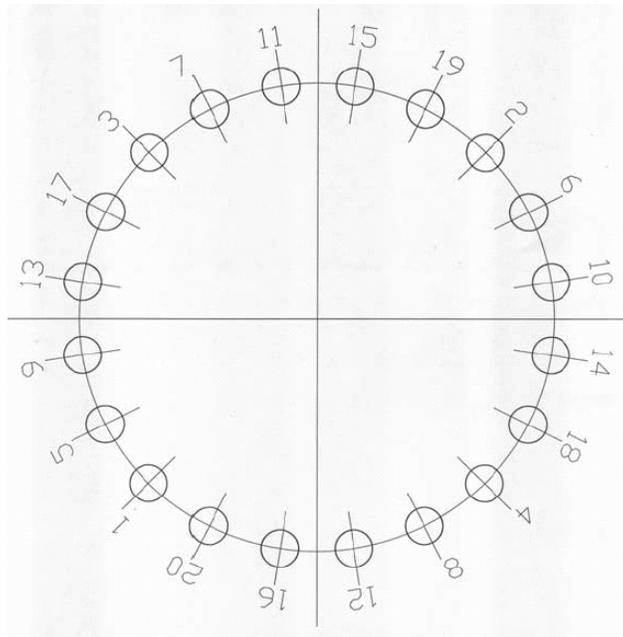
- The reassembly procedures are not as detailed as those provided for disassembly since, in most cases, reassembly is performed in reverse order of the disassembly.
- Ensure that all of the parts that are required for valve assembly are available.
- Note: When reassembling the valve use new gaskets and packing. Re-using sealing parts may lead to unwanted leakage.
- Ensure that the valve and all of the parts are thoroughly clean and free of oil, grease, rust, dirt or other contaminants that may affect the operation of the valve.
- Note: Special care should be given to the stuffing box to ensure that it is thoroughly clean is not scratched during the packing removal or cleaning process.
- Lubricants should be applied for the spindle and gear box.
- In order to avoid uneven tightening, it is recommended that bonnet bolting be tightened in a diagonal pattern similar to that shown in the following below figure and table (2).
- Tighten the packing should be follow the above repacking procedure.
- Test the function of the valve after overhaul.
- Check around for any pending and clear the permit. Clean the working area.

PARTS DESCRIPTION

- 1 – BODY
- 2 – BONNET
- 4 – STEM
- 5 – DISC
- 7 – SEAT RING
- 18 – PACKING WASHER
- 19 – GLAND
- 20 – GLAND PACKING
- 21 – GLAND FLANGE
- 23 – GLAND BOLT
- 24 – GLAND BOLT NUT
- 25 – GLAND BOLT PIN
- 27 – RETAINING RING\*
- 30 – YOKE
- 56 – SPLIT PIN
- 69 – DISC STOPPER
- 81 – SEAL RING
- 86 – CLAMP WASHER
- 87 – BONNET CLAMP
- 216 – MOUNTING FLANGE
- 217 – MOUNTING BOLT
- 218 – MOUNTING BOLT NUT
- 221 – ELECTRIC ACTUATOR



**Figure 7.c**  
**Exploded view of pressure seal motor operated**  
**Casting steel gate valve for 2 ½" and larger.**



**Typical bolting tightening sequence**

**Table 2 - Recommended torque of bonnet / cover bolts Bolt/ stud**

<b>Bolt/ stud size(mm)</b>	<b>Torque valve(kg-cm)</b>	<b>Bolt/ stud size(mm)</b>	<b>Torque-valve(kg-cm)</b>
<b>M12</b>	330 - 390	<b>M24</b>	2700 - 3150
<b>M14</b>	530 - 620	<b>M27</b>	4000 - 4650
<b>M16</b>	810 - 940	<b>M30</b>	5650 - 6550
<b>M18</b>	1100 - 1300	<b>M33</b>	7600 - 8850
<b>M20</b>	1550 - 1850	<b>M36</b>	10650 - 12400
<b>M22</b>	2150 - 2500	<b>M39</b>	13000 - 15000

**Notes**

1. The lower value of torque is based on new and lubricated threads, such as at the time of manufacturing assembly.
2. The higher value of torque is based on higher coefficients of friction such as assembly at the site or when performing further tightening.