HANCOCK®

installation, operation and maintenance manual

Hancock 1500, 2500 and 4500 Pound Forged Steel, High Pressure, Tee Pattern/Angle Globe Valves and Check Valves

Valve Series
7130
7150
7170
7190
7230
7250
7270
7290
7440
7480
7640
7650

Contents

Product Safety Sign and Label System

If and when required, appropriate safety labels have been included in the rectangular margin blocks throughout this manual. Safety labels are vertically oriented rectangles as shown in the ***representative examples*** (below), consisting of three panels encircled by a narrow border. The panels can contain four messages which communicate:

- The level of hazard seriousness
- The nature of the hazard
- The consequence of human, or product, interaction with the hazard.
- The instructions, if necessary, on how to avoid the hazard.

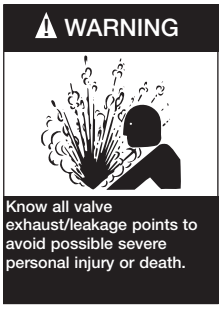
The top panel of the format contains a signal word (DANGER, WARNING, CAUTION or ATTENTION) which communicates the level of hazard seriousness.

The center panel contains a pictorial which communicates the nature of the hazard, and the possible consequence of human or product interaction with the hazard. In some instances of human hazards the pictorial may, instead, depict what preventive measures to take, such as wearing protective equipment.

The bottom panel may contain an instruction message on how to avoid the hazard, this message may also contain a more precise definition of the hazard, and the consequences of human interaction with the hazard, than can be communicated solely by the pictorial.

1. **DANGER — Immediate hazards which WILL result in severe personal injury or death.**

2. **WARNING — Hazards or unsafe practices which COULD result in severe personal injury or death.**



3. **CAUTION — Hazards or unsafe practices which COULD result in minor personal injury.**

4. **ATTENTION — Hazards or unsafe practices which COULD result in product or property damage.**

1. Safety Notice

Proper installation, operation and maintenance is essential to the safe and reliable operation of all valve products. The relevant procedures described in this manual, are effective methods of performing the required tasks. Some of these procedures require the use of tools specifically designed for an intended purpose. These special tools should be used when, and as, recommended.

It is important to note that this manual contains various “safety messages” which should be carefully read in order to minimize the risk of personal injury, or the possibility that improper procedures will be followed which may damage the product, or render it unsafe. It is also important to understand that these “safety messages” *are not* exhaustive. Hancock/Yarway can not possibly know, evaluate, and advise any customer of all the conceivable ways in which tasks might be performed, or of the possible hazardous consequences of each way. Consequently, Hancock/Yarway has not undertaken any such broad evaluation and, thus, anyone who uses a procedure and/or tool, which is not recommended by Hancock/Yarway, or deviates from Hancock/Yarway recommendations, must be thoroughly satisfied that neither personal safety, nor valve safety, will be jeopardized by the method and/or tools selected. If not so satisfied, contact Hancock/Yarway if there are any questions relative to tools/methods. Some of

the products manufactured by Hancock/Yarway may be used in radioactive environments. Consequently, prior to starting any operation in a radioactive environment, the proper "health physics" procedures should be consulted and followed, if applicable.

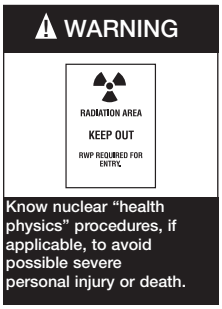
The installation, operation and maintenance of valves and/or valve products may involve proximity to fluids at extremely high pressure and/or temperature. Consequently, every precaution should be taken to prevent injury to personnel during the performance of any procedure. These precautions should consist of, but are not limited to, ear drum protection, eye protection, and the use of protective clothing, (i.e., gloves, etc.) when personnel are in or around a valve work area. Due to the various circumstances and conditions in which these operations may be performed and the possible hazardous consequences of each way, Hancock/Yarway can not possibly evaluate all conditions that might injure personnel or equipment. Nevertheless, Hancock/Yarway does offer the safety precautions for customer information only.

It is the responsibility of the purchaser or user of Hancock/Yarway valves/equipment to adequately train all personnel who will be working with the involved valves/equipment. Further, *prior* to working with the involved valves/equipment, personnel who are to perform such work should become thoroughly familiar with the contents of this manual.

2. Safety Precautions

- Hancock/Yarway Tee Pattern Globe valves are shipped with the packing gland nuts ***only*** hand tight. Always ***tighten*** the packing gland nuts before pressurizing a valve. Further, check and retighten these nuts, if necessary, immediately after warm up.
- Do ***not*** attempt to remove the packing gland nuts while the valve is under pressure.
- Do ***not*** attempt to remove the thread bushing while the valve is under pressure.
- Hancock/Yarway Type 7130, 7230, and 7640 valves have loose backseats and, therefore, ***cannot be repacked while under pressure.*** (The valve nameplate will state if a given valve is supplied with loose or fixed backseats.)
- Hancock/Yarway Type 7150, 7250 and 7650 valves are equipped with fixed (permanent) backseats are capable of being repacked under pressure. However, due to the inherent dangers* involved in working on equipment under internal pressure, it is strongly recommended that backseats only be used to prevent the line of fluid from escaping through the gland box, until such time as all internal pressure and/or hazardous fluids can be removed, and the valve can be repacked under safe conditions.
- ***No alteration and/or modification*** should be made to any Hancock/Yarway valve, except as sanctioned and/or authorized by Hancock/Yarway.
- Any modification of a Hancock/Yarway valve, to accept a gear operator, motor operator or pneumatic /hydraulic actuator should be accomplished using ***only*** those designs sanctioned and/or authorized by Hancock/Yarway.
- ***Extreme care*** should be taken to ensure that a Hancock/Yarway Tee Pattern Globe Check valve is installed so that the arrow on the valve body points in the same direction as the normal flow direction of the system.
- ***Never*** install, or attempt to use, any valve that is not properly identified as to its material and pressure class.
- All valves require periodic inspection and tests by qualified persons to ensure that the valves are in proper working condition, and will function as designed by Hancock/Yarway.
- The owner/operator of the valves must be aware of usage conditions, and must bear the responsibility for determining the appropriate frequency of examination of the valves.

* The valve may have been modified internally by other than Hancock/Yarway personnel, and/or may have damaged internal parts (e.g., broken, cracked or severely damaged stem). Such unauthorized modification, or such possible damage, could cause a sudden rupture, or pressurization, of the packing while the packing is being removed or installed, thus endangering the surrounding equipment and safety of personnel.



3. Introduction to Tee Pattern/Angle Valves

All Hancock/Yarway valves are made to the highest quality standards and meet or exceed the specification, code and application requirements for which they are designed. Although Hancock/Yarway valves are among the most ruggedly designed products in the industry, they are still precision pieces of equipment and, as such, require proper care. Adherence to the handling, storage, installation and maintenance procedures contained in this manual will greatly enhance the service life of the valve, as well as help ensure the safety of personnel. It is essential that all personnel assigned to install, operate and/or service Hancock/Yarway valves be trained, have read and be thoroughly familiar with all the information contained in this manual, prior to starting work on the product. In the event that there are any questions relative to the instructions contained in this manual, contact our service center for clarification prior to proceeding.

4. High Pressure Globe Valves

A. Design Features and Nomenclature

Hancock/Yarway High Pressure, Tee Pattern/Angle Globe Valves are "outside screw and yoke - no bonnet joint" valves. They feature a conical design plug seat, with both the disc and body contact surfaces hardfaced with Stellite®. These valves have a bolted gland flange, with split gland, to provide ease in adding packing, or repacking, the valve without removal of the stem assembly. Tee Pattern/Angle Globe valves are offered in both loose backseat and fixed backseat designs. The principle design features and nomenclature for loose backseat valves (Types 7130, 7170, 7230, 7270, and 7640) are shown in Figure 1, and the same information for fixed backseat valves (Types 7150, 7190, 7250, 7290, and 7650) are shown in Figure 2. Installation dimensions, applicable to both loose and fixed backseat valves are shown in Table 1.

B. Operating Principles

The Hancock/Yarway Tee Pattern/Angle Valve is of the basic Globe Type. To operate the valve, the handle is rotated clockwise to close, and counterclockwise to open. When the valve is to be continuously employed, longer seat life may be obtained if the valve is fully opened to the backseat, then closed approximately 1/4 turn off the backseat.

The Tee Pattern Globe/Angle Valve may also be used for throttling service. If so employed, the pressure drop should not be more than 25% of the inlet pressure. If a higher pressure differential is expected, it is advised that the Hancock/Yarway Service Department be contacted for consultation purposes.

FIGURE 1—Parts List

Part No.	Nomenclature
1	Body
2	Yoke
3	Stem
4	Disc
5	Disc Nut
6	Disc Pad
7	Disc Facing (Integral)
8	Seat Facing (Integral)
9	Packing Gland*
10	Packing Gland Flange
11	Packing Gland Stud
12	Packing Gland Stud Nut
13	Packing Ring
14	Packing Stop Ring
15	Thread Bushing
16	Tee Handle
17	Handle Nut
18	Name Plate

* Split Packing Gland made from two halves.

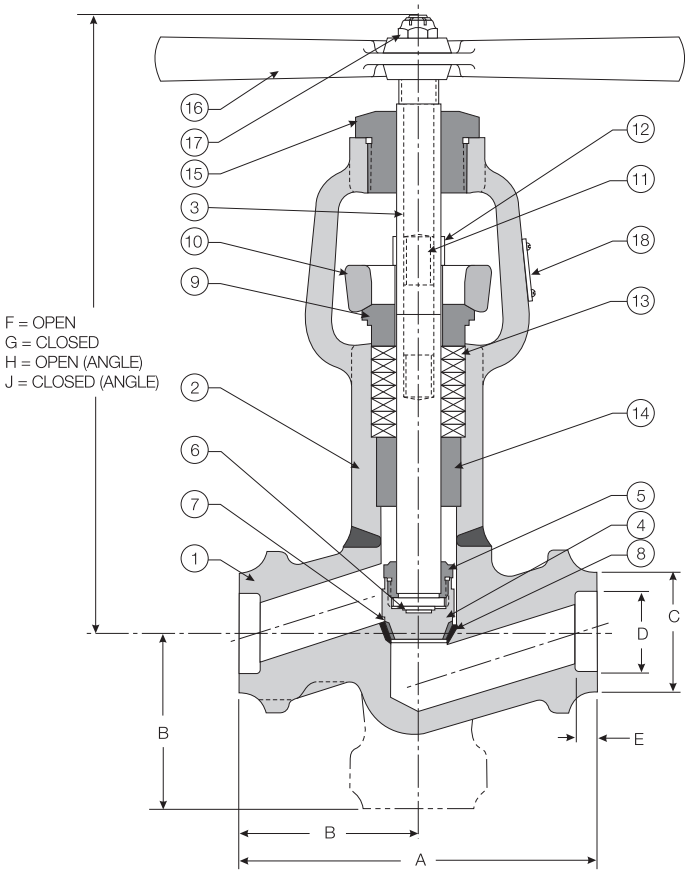


FIGURE 1—Loose Backseat Globe Valve

TABLE 1

Valve Size	A	B	C	D {+.010 -.000}	E	F Open		G Closed		H Open (Angle)		J Closed (Angle)	
						Loose	Fixed	Loose	Fixed	Loose	Fixed	Loose	Fixed
1/4	5	2	1	.555	3/8	8-3/16	8-7/8	7-3/4	8-15/32	8-1/2	9-5/32	8	8-3/4
3/8	5	2	1-1/4	.690	3/8	8-3/16	8-7/8	7-3/4	8-15/32	8-1/2	9-5/32	8	8-3/4
1/2	5	2	1-5/8	.855	3/8	8-3/16	8-7/8	7-3/4	8-15/32	8-1/2	9-5/32	8	8-3/4
3/4	5	2-1/2	1-5/8	1.065	1/2	11	11-1/4	10-5/16	10-5/8	11-1/4	11-7/8	10-5/8	11-3/16
1	5	2-1/2	1-31/32	1.330	1/2	11	11-1/4	10-5/16	10-5/8	11-1/4	11-7/8	10-5/8	11-3/16
1-1/4	8-1/2	4-1/4	2-21/32	1.675	1/2	15-3/4	16-3/4	14-5/16	15-5/16	15-5/16	15-1/4	13-15/16	13-15/16
1-1/2	8-1/2	4-1/4	2.915	1.915	1/2	15-3/4	16-3/4	14-5/16	15-5/16	15-5/16	15-1/4	13-15/16	13-15/16
2	8-1/2	4-1/4	3-1/2	2.406	5/8	15-3/4	16-3/4	14-5/16	15-5/16	15-5/16	15-1/4	13-15/16	13-15/16

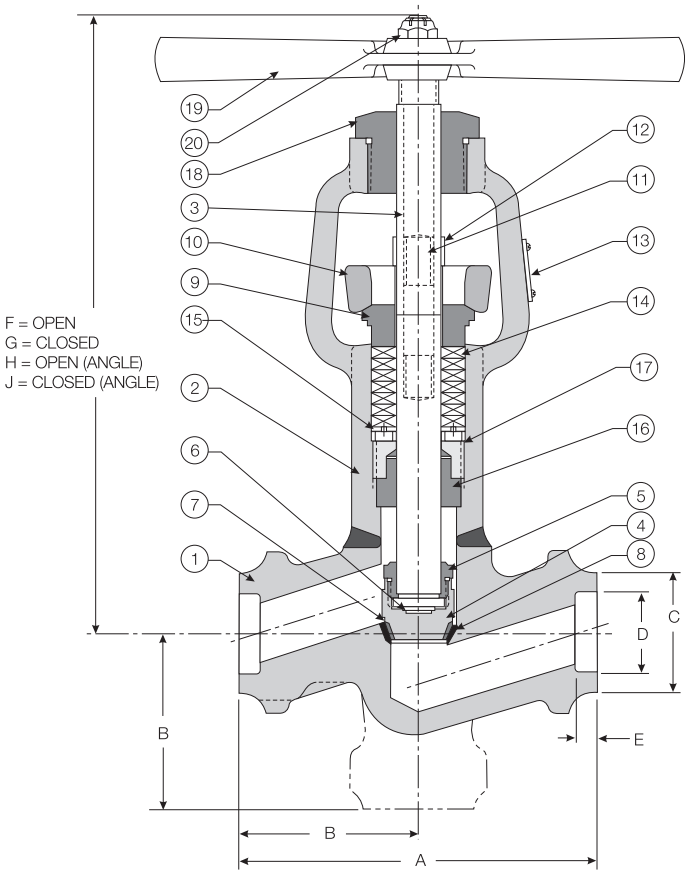


FIGURE 2—Fixed Backseat Globe Valve

FIGURE 2—Parts List

Part No.	Nomenclature
1	Body
2	Yoke
3	Stem
4	Disc
5	Disc Nut
6	Disc Pad
7	Disc Facing (Integral)
8	Seat Facing (Integral)
9	Packing Gland*
10	Packing Gland Flange
11	Packing Gland Stud
12	Packing Gland
13	Name Plate
14	Packing Ring
15	Packing Stop Ring
16	Yoke Bushing
17	Yoke Bushing Nut
18	Thread Bushing
19	Tee Handle
20	Handle Nut

* Split Packing Gland made from 2 halves.

C. Operation

For prolonged service life, with a minimum of body disc seat erosion, the valve normally should be operated in the fully open or fully closed position. However, as stated previously, when operating the valve fully open, it should actually be positioned approximately 1/4 handle turn off the backseat.

To backseat the valve, the maximum torque valves shown in Table 2 shold not be exceeded. Excessive torque applied during backseating could result in failure of the stem-to-disc connection.

To close the valve, utilize the torque valves shown in Table 3 regardless of the involved pressure and temperature. It is recognized however, that seat wear incurred through normal use may necessetiate increases in seating torque, therefore, the valve may be safely seated at torques 25% higher than those identified in Table 3.

TABLE 2—Suggested Backseating Torques

Valve Size	Torque - Ft. Lbs. {±0}		
	1500 Class	2500 Class	4500 Class
1/4	15	15	15
3/8	15	15	15
1/2	15	15	15
3/4	20	20	20
1	20	20	20
1-1/4	75	75	75
1-1/2	75	75	75
2	75	75	75

TABLE 3—Suggested Seating Torques

Valve Size	Torque - Ft. Lbs. {+25% -0}		
	1500 Class	2500 Class	4500 Class
1/4	25	25	30
3/8	25	25	30
1/2	25	25	30
3/4	30	35	60
1	30	35	60
1-1/4	100	150	200
1-1/2	100	150	200
2	100	150	200

If the valve is leaking when properly torqued, opening the valve and reclosing may flush out foreign material trapped on the seats. ***Do not use a wrench to close the valve.*** If the valve will not shut off tightly when seating surfaces are free of foreign material, refinishing of the seat and disc is indicated.

D. Handling

Hancock/Yarway Tee Pattern/Angle Valves are durable and rugged, and require no special handling.

E. Storage

Indoor storage of valves is recommended, however, if prolonged storage is inticipated, the valves should be stored in a humidity controlled storage area. The end protectors on the valves should be tightly in position to prevent contamination and should remain in place until immediately prior to installation in the line. Further, gland nuts should only be hand tight during storage.

If valves are ordered to a more stringent cleaning and storage procedure, the recommendations in that procedure should be followed.

F. Pre-installation

Prior to installation, the following steps should be taken:

1. Leave end protectors in place until ready for installation, then remove.
2. Inspect both ports for obstruction or foreign materials. Clean when necessary.
3. Valves are shipped with the gland nuts loose. ***These nuts must be tightened*** before putting the valve in service. Operate the valve to determine whether the packing gland nuts are tight, a firm drag between the stem and the packing should be felt. If necessary, retighten the gland nuts until the drag is firm.

4. If packing is not installed in the valve, refer to the Maintenance instructions (Section 4.L) in this manual for packing installation directions.

G. Welding

These valves should be in the mid-open position prior to welding. ***Care should be taken not to ground the valve yoke, stem or the tee handle.*** Maintain 350°F interpass temperature requirement when installing stainless steel valves.

H. Installation

The Tee Pattern Globe/Angle Valve may be installed with the stem in position relative to the horizontal or vertical plane. However, ***the flow path as marked by the arrow on the body must be maintained.***

After the valve is welded in line, the packing gland nuts should be tightened. Further, after the system start up, and when the valve has reached its expected operating temperature, the gland nuts should be checked and adjusted as necessary to ensure proper tightness. This precaution is due to possible loss of packing vloume from “off gasing” of lubricants and impurities in the packing.

I. Packing Leakage

If packing leakage is discovered early and it is not severe, nor is severe stem pitting present, leakage may be stopped by tightening the packing gland nuts. Tighten the nuts by rotating them clockwise, alternating 1/2 turn on each nut. Using an alternate tightening sequence will help insure that the gland does not cock and bind stem. If leakage stops after tightening, rotate the stem clockwise or counter-clockwise 1’2 turn using the valve tee handle. If the packing load required to stop leakage causes stem binding, this indicates that severe stem pitting, or

gland stuffing box pitting has occured. The packing gland nuts should be suffciently loosened to allow counterclockwise rotation of the stem to backseat the valve. Then the valve should be tagged for inspection to determine if the stem should be replaced during the next system outage.

If the gland is adjusted to it's full travel, but the leakage has not stopped and stem binding has not occured, addition of packing is indicated. Available valve packings are shown in Figures 3 and 3A, and applicable part numbers are shown in Tables 4 and 4A. ***Do not attempt to backseat and add packing to loose backseat valves while they are pressurized.***

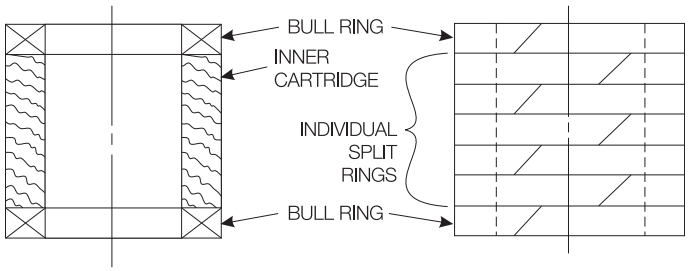


FIGURE 3
Cartridge

FIGURE 3A
Packing Set

Before attempting to add packing to a loose backseat valve, verify that there is no pressure in the line. After determining that the line is not pressurized, loosen and remove the packing gland stud nuts on the packing gland flange. Move the packing gland flange along the stem until it contacts the thread bushing portion of the yoke. Next, remove the two halves of packing gland and the upper bull ring. Install the required numbers of split, compressed graphite rings around the stem and into the gland stuffing box. (Always add a new outer bull ring when adding packing.) Place the two halves of the packing gland on the stem and against the packing. Slide the packing gland flange over the packing gland. Then slide the two packing gland studs through the two holes in the packing gland flange. Install the packing gland nuts onto the packing gland studs. Tighten by rotating the nuts clockwise in 1/2 turn increments, alternating between nuts. A final adjustment may be necessary after the valve has been pressurized.

Note: Adding packing to fixed backseat valves, with no pressure in the line, is done in the same way as for loose backseated valves.

TABLE 4—Packing Cartridges

Valve Size		Part Numbers		
		1500 Class	2500 class	4500 Class
Fixed Backseat	1/4	7220802	7220802	7220812
	3/8	7220802	7220802	7220812
	1/2	7220802	7220802	7220812
	3/4	7220801	7220801	7220813
	1	7220801	7220801	7220813
	1-1/4	7220804	7220804	7220814
	1-1/2	7220804	7220804	7220815
	2	7220804	7220804	7220816
Loose Backseat	1/4	7220807	7220807	7220809
	3/8	7220807	7220807	7220809
	1/2	7220807	7220807	7220809
	3/4	7220805	7220824	7220810
	1	7220805	7220824	7220810
	1-1/4	7220806	7220806	7220811
	1-1/2	7220806	7220806	7220811
	2	7220806	7220806	7220811

TABLE 4A—Packing Set With Individual Split Rings

Valve Size		Part Numbers		
		1500 Class	2500 class	4500 Class
Fixed Backseat	1/4	7221102	7221102	7221112
	3/8	7221102	7221102	7221112
	1/2	7221102	7221102	7221112
	3/4	7221101	7221101	7221113
	1	7221101	7221101	7221113
	1-1/4	7221104	7221104	7221114
	1-1/2	7221104	7221104	7221114
	2	7221104	7221104	7221114
Loose Backseat	1/4	7221107	7221107	7221109
	3/8	7221107	7221107	7221109
	1/2	7221107	7221107	7221109
	3/4	7221105	7221124	7221110
	1	7221105	7221124	7221110
	1-1/4	7221106	7221106	7221111
	1-1/2	7221106	7221106	7221111
	2	7221106	7221106	7221111

J. Adding Packing or Repacking Under Pressure

1. General Information

Hancock/Yarway Tee Pattern Globe Valves **with fixed backseats,** incorporate design features which make it possible to add packing or change packing while the valves are under pressure. **Nevertheless, Hancock/Yarway does not recognize the adding or changing of packing to fixed backseat valves under**

pressure as a safe practice and therefore discourages sech re-packing when not indicated by operational necessity. (Again, see "Safety Precautions" Section 2.)

2. Specific Steps

If operational considerations dictate that adding or changing packing in a fixed backseat valve is **absolutely necessary,** adherence to the following steps is recommended to reduce the possibility of personal injury.

a. Check the valve nameplate to be sure it is marked "fixed backseat". If it does not say fixed backseat, or the nameplate cannot read or is missing, **DO NOT** attempt to add packing if the valve is under pressure.

b. Once it has been determined that the valve is of the fixed backseat design, rotate the tee handle counterclockwise until the disc nut contacts the yoke bushing. Firmly backseat the valve by applying torques as listed in Table 2, Section 4 of this manual.

c. Remove the valve tee handle to prevent accidentally rotating the stem.

d. Loosen the packing gland stud nuts by rotating them one full turn counterclockwise.

e. Wait 2 to 3 minutes, then visually check the valve packing for leakage.

f. If no leakage is detected, slowly loosen the stud nuts until the gland flange is no longer tight against the packing gland. Do not remove the nuts at this point. Again, wait 2 to 3 minutes and check to be sure that the gland flange has not been forced tight against the gland by pressure.

g. Once assured the backseat is not leaking, remove the two packing gland stud nuts and packing gland nut.

Notes: If packing is only to be added to the valve, it may be done at this point.

If the packing is to be totally changed in the valve, adhere to the requirements of steps h-n, below.

h. Remove the old packing by using a cork screw or wire hook.

i. A new split ring packing set can now be installed in the valve.

j. Place a bull ring around the stem at the area between the yoke arms, then slide the ring into the gland stuffing box.

k. Spread open the cut in the individual compressed grafoil ring just enough to slip it onto the stem. Slide the individual rings into the gland stuffing box, being careful to place the split on successive rings 90° apart. This will ensure that no possible leak path exists when re-packing is complete.

l. The last ring to be installed must be a braided graphite filament "bull ring".

m. Reassembly the packing gland, gland stud nuts and tee handle as described in the Reassembly instructions (Section 4.m) of this manual.

n. Tighten the packing as described in Section 4.l of this manual.

K. Disassembly

1. Loose Backseat Valves

(For parts nomenclature, refer to Figure 1 Section 4 of this manual.)

Remove the two packing stud nuts which are located above the packing gland flange by a counterclockwise rotation. Remove the two packing gland studs and two remaining stud nuts. Move the packing gland flange along the stem toward the tee handle, then remove the two halves of the packing gland.

Rotate the tee handle counterclockwise until the disc nut contacts the backseat. Remove the tee handle locknut by a counterclockwise rotation. Observe that the thread bushing has been stake locked at the factory to prevent it's rotation during valve operation, (see Figure 4). Because of this factory stake locking, the raised boss must now be removed before the thread bushing can be removed from the yoke.

The stake lock may be removed by peering, or by a hand held grinder or a file. Remove the thread bushig by rotating it counterclockwise.

Note: The stem should br prevented from rotation while the bushing is being rotated.

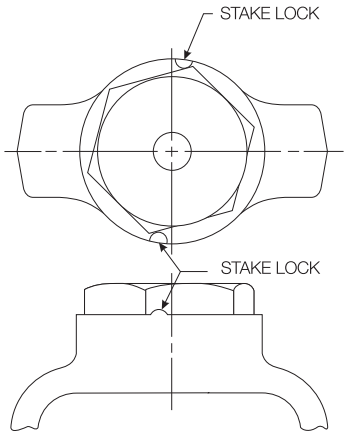


FIGURE 4—Stake Lock

After each 10 complete rotations of the thread bushing, the stem should be rotated counterclockwise until it contacts the backseat. This action will ensure that the disc does not engage the seat and bind the thread bushing. After the thread bushing has been disengaged from the yoke, continue the counterclockwise rotation until the bushing disengages from the Acme thread on the stem.

The packing and stem/disc assenbly can now be removed in one operation. The packing gland can be used to accomplish this by placing the two halves of the packing gland in the thread bushing opening of the yoke. (See Figure 5.)

Screw the thread bushing onto the stem by rotating it clockwise until it contacts the packing gland. Install the tee handle and rotate counterclockwise until all the packing is drawn out of the gland stuffing box. The entire assembly can now be removed. Now, remove the old packing from the stem.

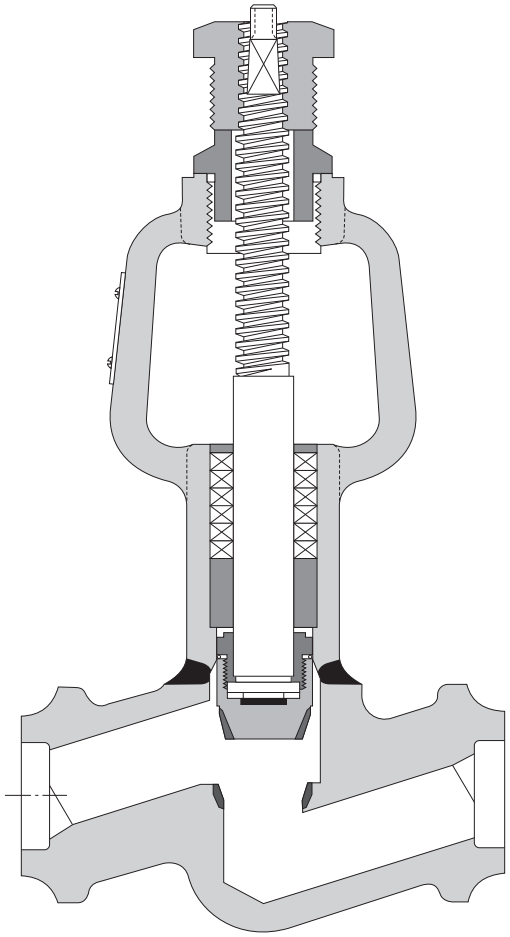


FIGURE 5

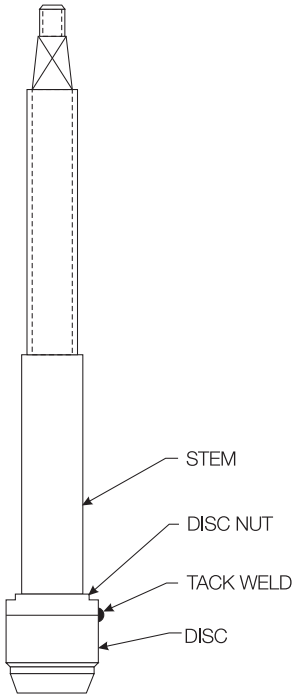


FIGURE 6—Disc-To-Disc Nut Tack Weld

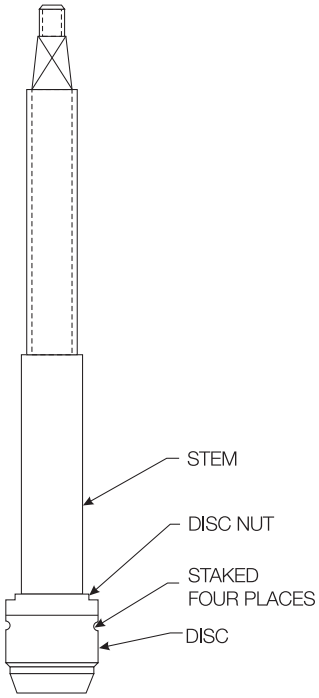


FIGURE 6A—Disc-To-Disc Nut Stake Locked

The disc and disc nut are now locked together by either a tack weld or by staking. (See Figure 6 and 6A). If they are locked by welding, the weld must be ground off before disassembly.

After the weld has been removed, place the disc in a vice between two soft pieces of metal, such as brass.

The soft metal will prevent damage to the disc O.D. Next, remove the disc nut by rotating it counterclockwise. The stem and the disc pad can now be removed.

2. Fixed Backseat Valves

(For parts nomenclature, refer to Figure 2 Section 4 of this manual.)

Remove the two packing stud nuts located above the packing gland flange, by a counterclockwise rotation. Remove the two packing gland studs and the two remaining stud nuts. Move the packing gland flange along the stem toward the tee handle. Then remove the two halves of the packing gland.

Rotate the tee handle counterclockwise until the disc nut contacts the backseat. Remove the tee handle locknut by a counterclockwise rotation. Observe that the thread bushing has been stake locked at the factory to prevent it's rotation during the valve operation (again, refer

to Figure 4 (Section 4), thus the raised boss resulting from stake locking must be removed before the thread bushing can be removed from the yoke. The stake lock may be removed by peening, or by a hand held grinder or file. Remove the thread bushing by rotating it counterclockwise.

Note: The stem should br prevented from rotating while the bushing is being rotated.

After each 10 complete rotations of the thread bushing, the stem should be rotated counterclockwise until it contacts the backseat. This action will ensure that the disc does not engage the seat and bind the thread bushing. After the thread bushing has been disengaged from the yoke, continue the counterclockwise rotation until the bushing disengages from the Acme thread on the stem.

The packing of the fixed backseat globe valve muct now be removed by using the packing removal tool, shown in Figure 7, and for which applicable valve size and part number information is provided in Table 5.

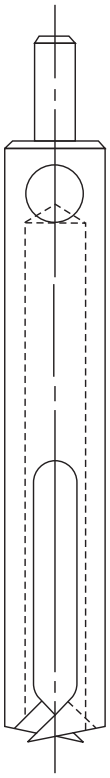


FIGURE 7—Packing Removal Tool

TABLE 5—Packing Removal Tools P/NS

Vavle Size	P/N
1/4, 3/8, & 1/2	7101909
3/4 & 1	7101901
1-1/4, 1-1/2 & 2	7101910

Touse the packing removal tool, place the tool over the stem, through the thread bushing opening of the yoke and into the gland stuffig box. Next, place a rod through the hole in the removal tool. Using the rod, rotate the tool clockwise while exerting force on the tool toward the packing. Remove the tool and clean the packing from the flute after each 3 to 5 complete rotations. Repeat the operation until all the packing is removed. The packing stop ring can now be removed, and this can be done by screwing a piece of No. 8-32 threaded rod into one of the two tapped holes in the ring, or by using a wire hook in one of the two tapped holes.

The yoke bushing nut is removed by using the wrench shown in Figure 8, and for which applicable valve size and part number information is provided in Table 6.

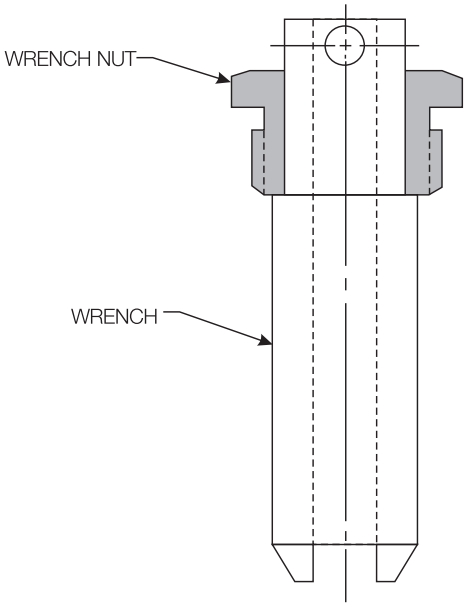


FIGURE 8—Yoke Bushing Nut Wrench

TABLE 6—Wrench Selection

Vavle Size	P/N
1/4, 3/8, & 1/2	7101909
3/4 & 1	7101901
1-1/4, 1-1/2 & 2	7101910

Insert the tool through the thread bushing opening, and into the gland stuffing box, with the lug end first. Rotate the wrench until the lugs engage the slots in the yoke bushing nut, then screw the wrench nut into the thread bushing of the yoke until it hits the shoulder on the wrench. (See Figure 9)

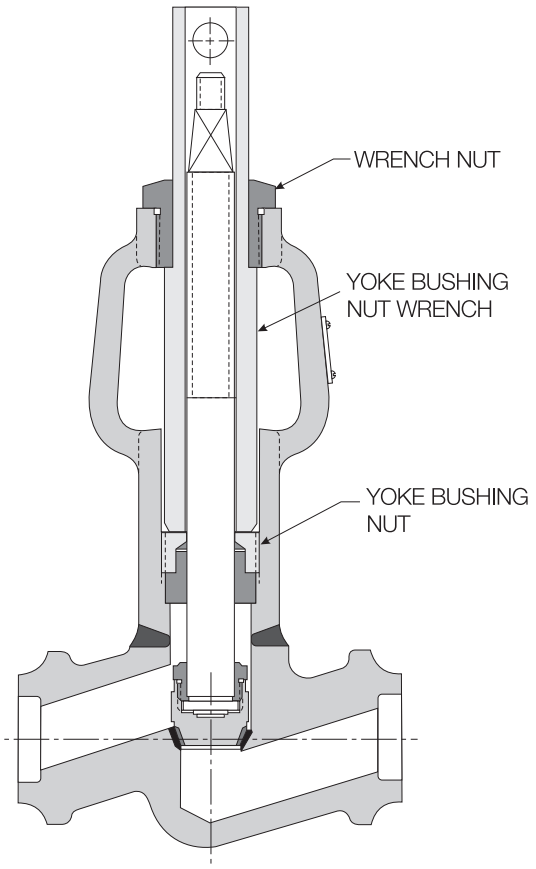


FIGURE 9—Yoke Bushing Nut Wrench In Valve Body

Rotate the wrench nut counterclockwise one half turn. Next, place a round bar through the hole in the wrench and turn the wrench counterclockwise while tapping the end of the wrench with a hammer. After loosening the yoke nut, remove the wrench nut from the yoke. Using the wrench, rotate the yoke bushing nut counterclockwise until it disengages from the thread in the yoke. Remove the stem/disc assembly, yoke bushing nut and yoke bushing. The removal of the disc and disc nut from the stem on fixed backseat valves is done in the same manner as for loose backseat valves.

L. Maintenance

1. General Information

Hancock/Yarway High Pressure Tee Pattern/Angle Glaobe Valve seats are hardfaced with Stellite as standard, and can be reconditioned with high consistency using the tools and techniques described in this section of the manual.

Note: The following procedures for refinishing the valve body seat and the disc seat are applicable to both loose and fixed backseat valves.

2. Reconditioning the Body Seat

The maximum possible amount of body seat rework is shown in Figure 10 together with applicable dimensional information, which is shown in Table 7.

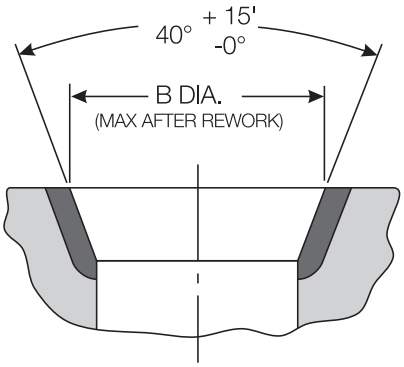


FIGURE 10—Body Angle

To recondition the valve body seat, the tools shown in Figure 11 with the applicable part numbers shown in Table 8 must be used.

With the valve having been disassenbled (per Section 4.K), inspect the seat area for the amount and location of damage. Following an appropriate assessment, insert the seat cutting tool assembly through the thread bushing

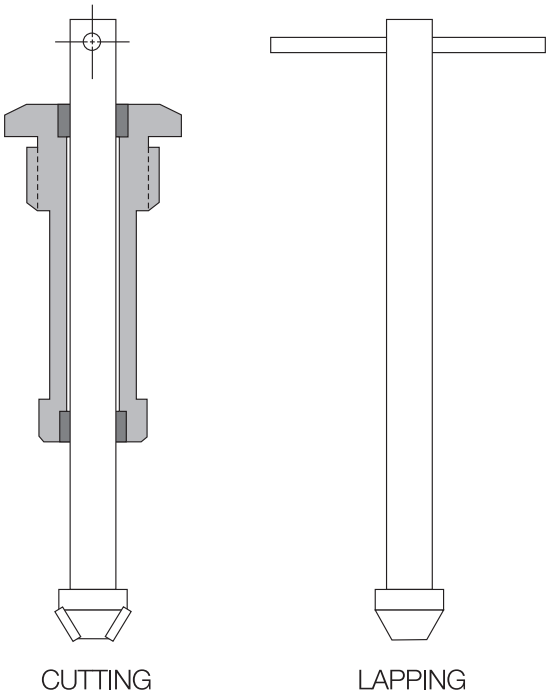


FIGURE 11—Seat Refinishing Tools

TABLE 7—Seat & Disc Rework References

Valve Size	Part Numbers					
	1500		2500		4500	
	A	B	A	B	A	B
1/4	.031	.656	.031	.656	—	—
3/8	.031	.656	.031	.656	—	—
1/2	.031	.656	.031	.656	.031	.656
3/4	.031	.984	.031	.843	.031	.843
1	.031	.984	.031	.843	.031	.843
1-1/4	.046	1.750	.031	1.468	.031	1.468
1-1/2	.046	1.750	.031	1.468	.031	1.468
2	.046	1.750	.031	1.468	.031	1.468

TABLE 8—Seat Refinishing Tools

Valve Size		Part Numbers		
		1500 Class	2500 class	4500 Class
Fixed Backseat	1/4	7085910	7085901	7085901
	3/8	7085910	7085901	7085901
	1/2	7085910	7085901	7085901
	3/4	7085902	7085902	7085902
	1	7085902	7085902	7085902
	1-1/4	7085911	7085903	7085903
	1-1/2	7085911	7085903	7085903
	2	7085911	7085903	7085903
Loose Backseat	1/4	7085907	7085904	7085904
	3/8	7085907	7085904	7085904
	1/2	7085907	7085904	7085904
	3/4	7085908	7085905	7085905
	1	7085908	7085905	7085905
	1-1/4	7085909	7085906	7085906
	1-1/2	7085909	7085906	7085906
	2	7085909	7085906	7085906

opening of the yoke and into the gland stuffing box. Screw the tool body into the thread bushing thread of the yoke by rotating the tool body clockwise. Then tighten the tool body until it is hand tight. Next insert the tool operating handle through the hole in the cutter handle and apply pressure while rotating the cutting tool clockwise to remove all seat defects. The length of time required to remove the defects is totally dependent upon the extent of the seat damage. As a general rule, however, the tool should be removed and the seat checked after approximately 90 seconds of cutting. After all defects have been removed by the cutting tool, the seat muct then be lapped.

Remove the operating handle from the cutting tool shaft and extract the cutting tool from the tool housing. Next insert the lapping tool shaft through the unthreaded end of the tool housing. Insert the operating handle through the hole in the lap shaft handle and tighten the handle lock screw. Apply grade C or D grinding compound to the tappered portion of the lap head, then install the lapping tool assembly in the valve. Rotation the handle back and forth through a 90° rotation while applying light pressure. At approximately 90 second intervals, stop and check the work to see that the lap face still has lapping compound on it. Repeat the lapping process until a light gray area, approximately 1/16 inch wide, is present on the full circumference of the seat. After lapping is complete, remove all lapping compound from the seat.

3. Reconditioning the Disc Seat

The maximum possible amount of disc seat rework is shown in Figure 12, and the applicable dimensional information is shown in Table 7 Section 4.

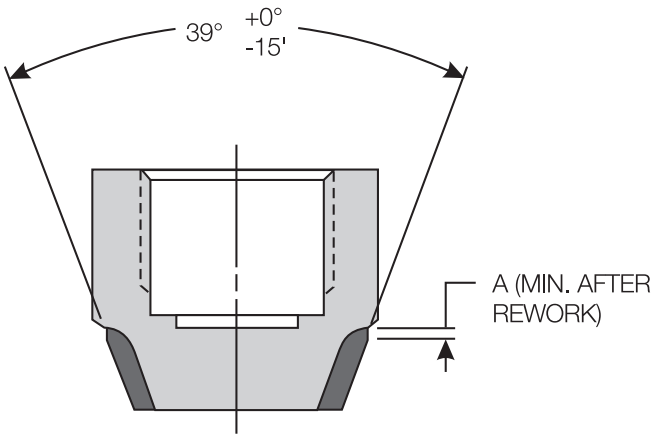


FIGURE 12—Disc Seat

If at all possible, the disc seat contact surfaces should be refinished by machine grinding. However, if grinding is not possible, the disc seat may be refinished by machining. If machining is used, the disc must be lapped to the body seat and this can be accomplished after the stem and disc are assembled. Use duct tape to prevent the disc from rotating on the stem. This can be done by wrapping tape around the stem and disc at the point where the stem enters the disc nut. Apply C or D grinding compound to the seat contact area oif the disc, then install the stem disc assembly in the body. Place the two halves of the packing gland around the stem and into the gland stuffing box. This will provide a guide to align the stem/disc assembly with the backseat. Using the valve tee handle as a lapping handle, rotate the handle back and forth through a 90° rotation while applying light pressure toward the seat. Check the work at approximately 90 second intervals.

The disc will be properly lapped when a bright ring, approximately 1/16 inch wide, is present on the full circumference of the lower end of the disc seat angle. All grinding compound should be removed from the disc and the body seats when lapping is complete.

4. Repair of Stem Pitting

Stem pitting is a very common cause of packing leakage, and if found, the following corrective action should be taken durig maintenance operations:

Light pitting (.005 or less in depth) may be removed by chucking the stem in a lathe, and grinding it with fine sand paper (400 grit or better). This should then be followed by polishing the stem with emery cloth.

Heavy pitting (up to .010 in depth) should be removed by machining, followed by polishing the stem with emery cloth. If machining will result in reducing the stem diameter by .025 or more, the stem should be replaced.

5. Repacking with No Pressure

a. Loose Backseat Valves

Hancock/Yarway Tee Pattern Globe Valves with loose backseats can only be repacked after all pressure has been removed from the line. Never attempt to repack a loose backseat valve under pressure.

In order to repack a loose backseat valve, ensure that the valve has been correctly disassembled and the old packing removed from the stem, as described in Section 4.K.1. of this manual. Once this has been accomplished, insert the stem/disc assembly through the thread bushing opening of the yoke, and then into the gland stuffing box. A grafoil packing cartridge, or a grafoil packing set of individual rings can now be added. (Refer to Figure 3 and 3-A for illustrations of the two types of packing.) When installing either of these packing styles, the first and last ring installed must be a braided graphite “bull ring”.

Install the packing by slipping it over the stem through thr thread bushing opening of the yoke and into the gland stuffing box.

Assemble the packing gland, gland nuts, thread bushing, tee handle and handle nut as described in “Re-assenbly” (Section 4.M. of this manual). Finally, adjust the packing as described earlier in this manual.

b. Fixed Backseat Valves

In order to completely repack a fixed backseat valve, ensure that the valve has been correctly disassembled as described in Section4.K.2. of this manual and the old packing removed by using the tool shown in Figure 7. Once this has been accomplished, insert a round rod (8" to 10" long) through the hole in the unfluted end of the packing removal tool. Insert the tool over the stem, through the thread bushing opening of the yoke and into the gland stuffing box until it contacts the packing. Using the round rod as a handle, rotate the tool clockwise, while exerting force toward the packing. After making two of three complete rotations, extract the tool and remove the packing material from the flute. Repeat this process until all packing is removed from the gland stuffing box.

After all the packing has been removed, place the yoke bushing over the stem with the small, raised face, backseat diameter facing down. Lubricate the threads of the yoke bushing nut and slip it over the stem with the two slots facing up. Slip the packing gland flange through the yoke arms and line it up with the gland stuffing box.

Insert the stem and disc assembly, yoke bushing and yoke bushing nut through the yoke and packing gland flange. Using a yoke bushing wrench (again, see Figure8), tighten the yoke bushing nut.

For applicable torque information, see Table 9.

TABLE 9—Yoke Bushing Nut Torques

Valve Size	Torque In Ft. Lbs. {+10% -0}
1/4 thru 1/2	100
3/4 and 1	150
1-1/4 thru 2	250

Next, install the packig stop ring over the stem and into the gland stuffing box.

A grafoil packing cartridge, or a grafoil packing ring set can now be installed in the valve. This is accomplished using the same methods described above for loose backseat valves. Next, reassemble the packing gland, packing gland nuts, thread bushing and tee handle as described in “Re-assembly” (Section 4.M. of this manual). Finally, adjust the packing as described earlier in this manual.

M. Reassembly

1. General Information

A Hancock/Yarway Tee Pattern/Globe Globe Valve can be as easily reassembled as it was disassembled.

Note: The following procedures are applicable to both loose backseat and fixed backseat valves.

2. Procedure

With the packing installed (as described in Section 4.L.5 of this manual), raise the packing gland flange and insert the split packing gland. Next, lubricate and install the packing gland studs and nuts, but do not tighten them.

Before installing the thread bushing, raise the stem until contact on the backseat is felt. Now lubricate the Acme thread on the stem and the external thread of the thread bushing. Install the thread bushing over the stem and screw it onto the Acme thread until make-up with the yoke thread is felt. Rotating the stem and thread bushing clockwise, tighten the thread bushing to 30 ft./lbs. of torque. Next, the thread bushing must be stake locked as illustrated in Figure 4 of this manual. The packing gland nuts can now be tightened, adjusting the nuts evenly to prevent tilting of the packing gland and packing gland flange.

Install the handle onto the stem. Finally, lubricate the handwheel locknut and install it on the stem.

5. Check Valves

A. Design Features and Nomenclature

Hancock/Yarway Tee Pattern Check Valves are available in ANSI 1500 and 2500 pressure classes. These valves are designated as the Type 7440 and Type 7480, respectively. The principal design features and parts are illustrated in Figure 13, and reference dimensions are listed in Table 10.

TABLE 10—Socket Weld and End to End Dimensions

Valve Size	A	B	C {+.010 -.000}	D
1/4	5	1	.555	3/8
3/8	5	1-1/4	.690	3/8
1/2	5	1-5/8	.855	3/8
3/4	5	1-15/16	1.065	1/2
1	5	2-1/4	1.330	1/2
1-1/4	8-1/2	2-21/32	1.675	1/2
1-1/2	8-1/2	3-5/32	1.915	1/2
2	8-1/2	3-15/16	2.406	5/8

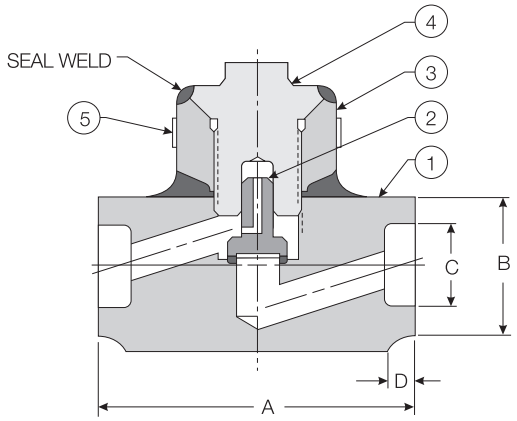
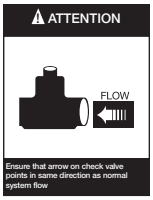


FIGURE 13—Tee Pattern Check Valve

Part Number	Nomenclature
1	Body
2	Disc
3	Body Extension
4	Cap
5	Name Plate

B. Installation

Hancock/Yarway recommends that Tee Pattern Check Valves only be installed horizontally. (If other than a horizontal orientation is required, a spring loaded type check valve is recommended.) However, regardless of it's orientation, **the flow path as marked by the arrow on the body must be maintained.**



C. Disassembly

To disassemble a Tee Pattern Check Valve, the seal weld on the cap muct be ground away. Therefore, grind until the cap and extension contact line is visible all around the valve. Next, remove the cap by screwing counterclockwise. The disc can now be removed.

D. Maintenance

1. General Information

Maintenance of Tee Pattern Check Valves should be limited to replacing the disc or reconditioning the seating surfaces of the disc and seat. Reconditioning of the seating surfaces of the disc and seat is accomplished by lapping with a flat cast iron ring lap coated with suitable lapping compound.

2. Lapping Procedure

a. Keep all work clean.

b. A lap should not be used on more than one valve without being reconditioned.

c. Apply a very thing layer of lapping compound to the lap, as this will prevent rounding off of the edges of the seat.

d. Lap the disc using a figure eight reciprocating motion while at the same time, applying uniform pressure and rotating the lap slowly. (See Figure 14).

   Care should be taken not to run the lap off the seating surface, as this will cause the seat to become uneven. When lapping the disc seat, the lap should be held stationary and the disc moved as shown in Figure 14.

e. Replace the lapping compound frequently after wiping off the old compound. The greater the pressure put on the lap, the more this will speed the cutting action of the lapping compound.

f. To check the seat, remove all compound from the seat and lap. Then using a dry lap, and the same lapping motion as describbed previously, the low sections of the seating surface will show up as a shadow in contrast to the shiny portions. If shadows are present, further lapping is necessary. Only laps known to be flat should be used, as only a few minutes will be required to remove any shadows.

g. When the lapping is completed, any lines appearing as cross scratches can be removed by rotating the lap on the seat about it's own axis. (After it has been wiped clean of all compound.)

h. To check a ring lap for flatness, wipe all compound off the lapping plate and the ring lap. Then, use a figure eight motion to move the ring lap on the lapping plate. (Again, see Figure 14.) If the lap is flat, there will be no shadow. However, if there is a shadow, coat the lapping plate with compound and lap the ring lap using a figure eight motion across the lapping plate to remove the shadow.

i. The seat should then be thoroughly cleaned using a lint free cloth or tissue paper.

E. Reassembly

To reassemble the check valve, first place the disc into the body. Next, lubricate the threads of the cap, then screw the cap into the body, torquing it to 50 ft./lbs. The cap muct finally be seal welded.

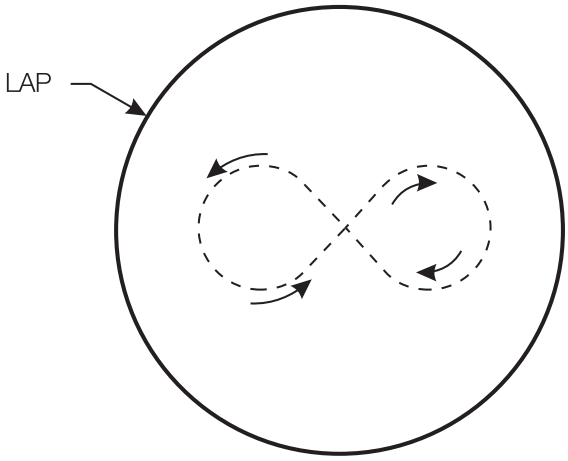


FIGURE 14—Lapping Motion

7. Inventory Philosophy

A. General Information

The importance of planning is the key to good plant operations. Part of that planning involves making sure that replacement parts needed to repair valves are available at the jobsite when required. Developing and implementing a standard valve maintenance plan will quickly pay for itself by eliminating costly downtime, inscheduled outages, etc.

B. Inventory Planning

The basic objective in formulating a replacement parts list plan are:

Promt Availability
Minimum Downtime
Sensible Cost
Source Control

6. Tee Pattern Valve Trouble Shooting

Problem	Probable Cause	Corrective Action
Seat Leakage	Foreign material between the seat and disc.	Open valve to flush material out.
	Steam cut seat and/or disc.	Seat repair or stem/disc replacement, or both.
	Erosion of seat and/or disc.	Seat repair or stem/disc replacement, or both.
	Valve not full torqued closed.	Add torque—See Table 3..
Packing Leakage	Packing gland loose.	Tighten gland bolts.
	Insufficient packing in box.	Add packing.
	Wrong packing for the service and conditions.	Change packing.
High Torque	Packing Gland pulled down too tight.	Loosen gland bolts.
	Stem threads not lubricated.	Lubricate threads.

Having parts immediately available from plant storeroom inventory is obviously the best way to accomplish those objectives. Since it is impractical to have every part that might be needed to accomplish a given repair in stock at all times, guidlines for establishing meaningful inventory levels are summarized in the table below:

Part Classification	Replacement Frequency	Predicted Availability*
Class 1	Most frequent	70%
Class 2	Less frequent but critical	85%
Class 3	Seldom Replaced	95%
Class 4	Hardware	99%
Class 5	Practically never replaced	100%

* Predicted availability means that precentage of time the user plant will have the right parts to make the proper repair on the product, i.e. if Class 1 parts are srocked at the owners facility, the parts needed to repair valve in question will be immediately available in 70% of all instances.

C. Replacement Parts List

Consult the Recommended Spare Parts list (see Section 9 of this manual) to define the parts to be included in the inventory plan.

Select the desired parts and determine those required for proper maintenance of the valve population in the plant.

8. Inventory Philosophy

When ordering service parts, please furnish the following information to ensure recieving the correct replacement parts:

Identify valve by:

1. Nominal Pipe Size
2. Type
3. Pressure/Temperature Class (i.e. 1500 ANSI; 2500 ANSI)
4. Orifice Size (Standard on body - see Figure 15.)

Example:
1" - 7150W
1500 ANSI

Specify Parts required by:

1. Part Name
2. Part Number
3. Quantity
4. Material

Example:
1. Packing Set (Service)
2. 7221101
3. Two (2)
4. Grafoil

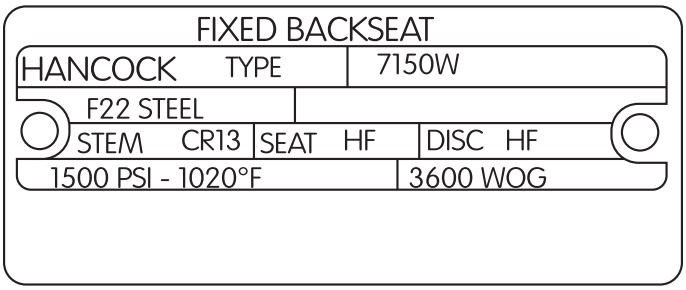


FIGURE 15—Hancock/Yarway Valve Marker PLate

9. Recommended Spare Parts

Class	Part Name	Qty. Parts/Same Size & Type Valves in Service	Need Probability Coverage
1	Stem & Assembly	1/10	70%
	Packing	One Set For Each Valve	
2	Packing Stop Ring	1/20	85%
	Packing Gland	1/20	
	Thread Bushing	1/20	

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