HANCOCK®

installation, operation and maintenance manual

"Y" Pattern Forged Steel Globe Stop, Stop Check & Check Valves

Valve Series
4000
4080
4090
4100
4180
4190
4200
4280
4290

Manual Part No. 973332
Supersedes Han-5 dated 6/94

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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*** (at right), 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.

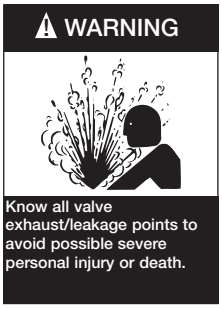
1. Safety Notice

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 damage to the product, which may render it unsafe. It is also important to note that these “safety messages” *are not* exhaustive. Hancock 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 has not undertaken any such broad evaluation. Thus, anyone who uses a procedure and/or tool, which is not recommended by Hancock, or deviates from Hancock recommendations, must be totally satisfied that neither personal safety, nor valve safety, will be jeopardized by the method and/or tools selected. Contact Hancock (at 610/825-2100) if there are any questions relative to tools, methods, or procedures.

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

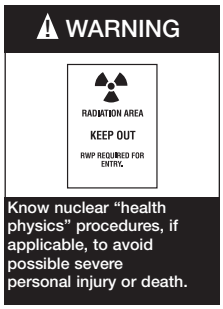
2. **WARNING — Hazards or unsafe practices which COULD result in severe personal injury or death.**



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.**

Some of the products manufactured by Hancock 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.



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, Hancock can not possibly evaluate all conditions that might injure personnel or equipment. Nevertheless, Hancock does offer the safety precautions listed in section 2 for customer information only.

It is the responsibility of the purchaser or user of Hancock 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 Y-Pattern Globe Stop and Stop Check valves are shipped with the packing gland nuts ***only*** hand tight. Always ***tighten*** the packing gland nuts before pressurizing a valve.
- Do ***not*** attempt to remove the packing gland nuts while the valve is under pressure.
- The yoke should ***not*** be removed while the valve is under pressure.
- Do ***not*** attempt to remove the thread bushing while the valve is under pressure.
- All Hancock valves equipped with permanent (fixed) 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 fluid from escaping through the packing chamber, 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 valve, except as sanctioned and/or authorized by Hancock.

- 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 Hancock.
- ***Extreme care*** should be taken to ensure that a Hancock Globe Stop, Stop Check or Check valve is installed so that the arrow (or "IN"/"OUT" markings) on the valve body indicates that the valve flow direction is 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.

* *The valve may have been modified internally by other than Hancock 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 Y-Pattern Valves

All Hancock 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 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 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 the Hancock service center for clarification prior to proceeding.

4. Globe Stop and Stop Check Valves

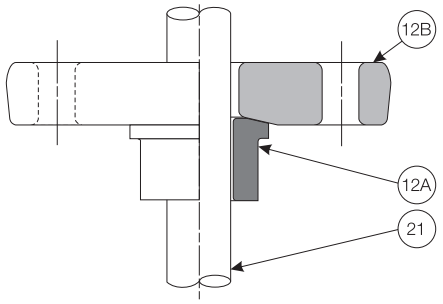
A. Valve Design & Parts Nomenclature

The Globe Stop Valve design and individual parts are illustrated in Figure 1. The Stop Check Valve design is shown in Figure 2. Reference dimensions, for use in valve identification and installation, are the same for both valve types and can be found in Table 1.

Parts List - Stop Valve

Part No.	Nomenclature
1	Body
1A	Hardfacing, Body Seat
2	Bonnet
3	Bonnet Gasket ("Dash 1" design only)
3A	Bonnet Gasket ("Dash 3" design only)
4	Yoke
5	Yoke Bolt
6	Yoke Nut
7	Stem-Disc
7A	Hardfacing, Stem-Disc
8	Upper Stem
9	Stem Collar
10	Lock Screw, Stem Collar
11	Bearing Pad
12	Packing Gland (1/2 - 1-1/2")
12A	Packing Gland (2-4")
12B	Packing Gland Flange (2-4")
13	Packing Gland Stud
14	Packing Gland Stud Nut
15	Packing Cartridge
15A	Packing Rings, Graphite
15B	Non Extrusion Ring, Packing
16	Packing Stop Ring
17	Thread Bushing
18	T-Handle/Handwheel
19	Handle Washer
20	Handle Nut
21*	Lock Weld ("Dash 1" design only)
22**	Seal Weld ("NBJ" models only)
23	Lock Plate ("Dash 3" design only)

* Not shown (See page 9, Fig. 11)
**Not shown (See page 9, Fig. 11A)



Gland & Gland Flange Assembly 2" through 4" valves only

TABLE 1—Reference Dimensions for Socket-Weld Design Valves

Nominal Valve Size in.(mm)	A			B	C
	4000 & 4090 Series in.(mm)	4100 & 4190 Series in.(mm)	4200 & 4290 Series in.(mm)	+0.010 -0.000 in.(mm)	(Min.) in.(mm)
1/2 (15)	4.750 (120.7)	4.750 (120.7)	7.500 (190.5)	0.855 (21.7)	0.38 (9.5)
3/4 (20)	4.750 (120.7)	4.750 (120.7)	7.500 (190.5)	1.065 (26.9)	0.50 (12.7)
1 (25)	5.750 (146.1)	5.870 (149.2)	8.125 (206.4)	1.330 (33.8)	0.50 (12.7)
1-1/4 (32)	7.500 (190.5)	8.120 (206.4)	12.500 (317.5)	1.675 (42.6)	0.50 (12.7)
1-1/2 (40)	7.500 (190.5)	8.120 (206.4)	12.500 (317.5)	1.915 (48.6)	0.50 (12.7)
2 (50)	9.500 (241.3)	10.000 (254)	12.375 (314.3)	2.406 (61.1)	0.62 (15.9)
2-1/2 (65)	10.000 (254)	12.500 (317.5)	14.250 (362)	2.906 (73.8)	0.62 (15.9)
3 (75)	12.500 (317.5)	12.500 (317.5)	14.250 (362)	Valves available in butt weld end only	
4 (100)	12.500 (317.5)	12.500 (317.5)	14.250 (362)		

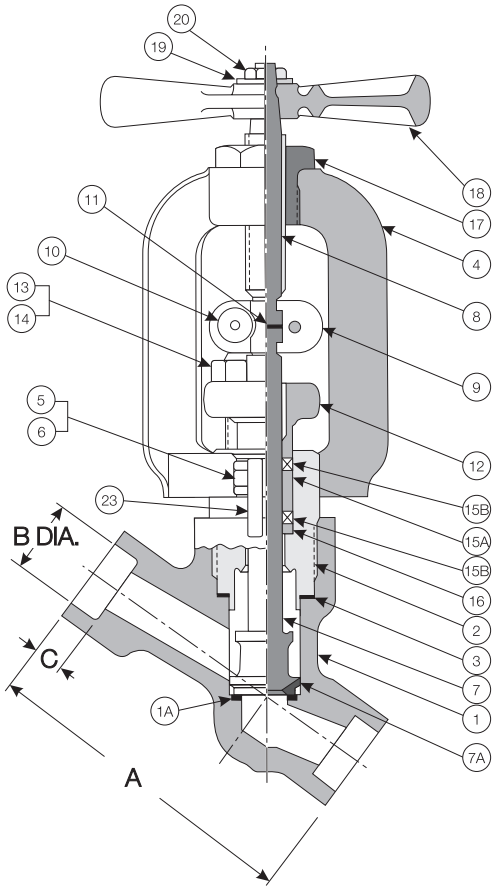
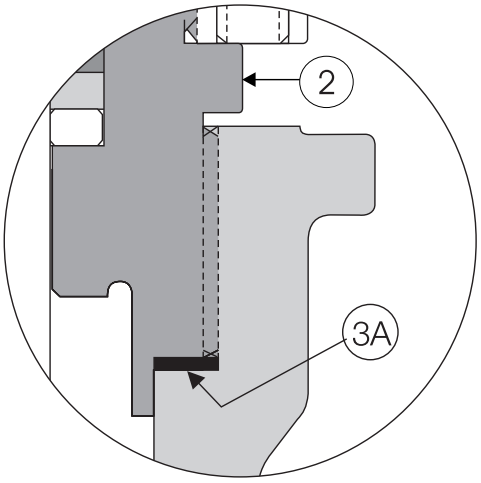


FIGURE 1—Y-Pattern Globe Stop Valve



Bonnet Gasket Detail for "Dash 1" Design Valves

Parts List - Stop Check Valve

Part No.	Nomenclature
1	Body
1A	Hardfacing, Body Seat
2	Bonnet
3	Bonnet Gasket ("Dash 3" design only)
3A	Bonnet Gasket ("Dash 1" design only)
4	Yoke
5	Yoke Bolt
6	Yoke Nut
7	Lower Stem
8	Upper Stem
9	Stem Collar
10	Lock Screw, Stem Collar
11	Bearing Pad
12	Packing Gland (1/2 - 1-1/2")
12A	Packing Gland (2-4")
12B	Packing Gland Flange (2-4")
13	Packing Gland Stud
14	Packing Gland Stud Nut
15	Packing Cartridge
15A	Packing Rings, Graphite
15B	Non Extrusion Ring, Packing
16	Packing Stop Ring
17	Thread Bushing
18	T-Handle / Handwheel
19	Handle Washer
20	Handle Nut
21	Disc
21A	Hardfacing, Disc
22	Spring
23*	Lock Weld ("Dash 1" design only)
24**	Seal Weld ("NBJ" models only)
25	Lock Plate ("Dash 3" design only)

* Not shown (See page 9, Fig. 11)
** Not shown (See page 9, Fig. 11A)

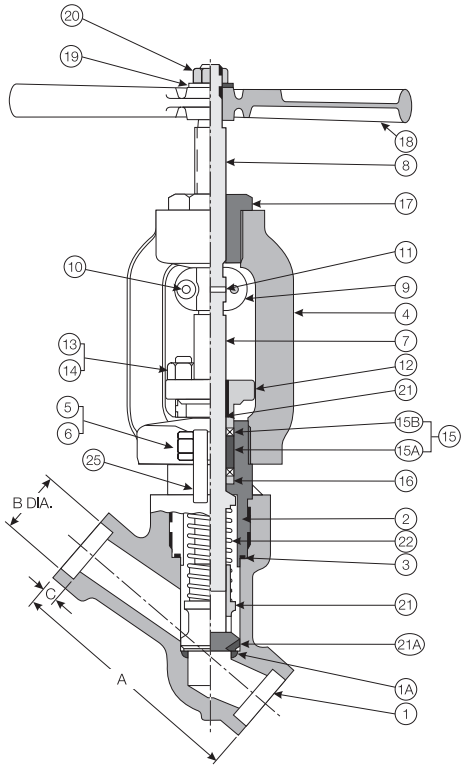


FIGURE 2—Y-Pattern Stop Check Valve

TABLE 2
Gasket Part No., Dash 1 & 3 Design Valves

Nominal Valve Size		Design No.	Part Numbers		
			4000, 4080 & 4090 Series (1690 Cl.)	4100, 4180 & 4190 Series (2680 Cl.)	4200, 4280 & 4290 Series (4500 Cl.)
in.	(mm)				
1/2	(15)	-1	7161201	7161201	7161208
		-3	N/A	N/A	7313907
3/4	(20)	-1	7161201	7161201	7161208
		-3	N/A	N/A	7313907
1	(25)	-1	7161202	7161202	7161208
		-3	7313901	7313901	7313907
1-1/4	(32)	-1	7161203	7161203	7161203
		-3	7313902	7313902	7313902
1-1/2	(40)	-1	7161203	7161203	7161203
		-3	7313902	7313902	7313902
2	(50)	-1	7161204	7161204	7161204
		-3	7313904	7313903	7313903
2-1/2	(65)	-1	7161207	7161205	7161209
		-3	7313904	7313905	7313908
3	(75)	-1	7161206	7161205	7161209
		-3	7313906	7313905	7313908
4	(100)	-1	7161206	7161205	7161209
		-3	7313906	7313905	7313908

4. Globe Stop and Stop Check Valves (Cont.)

B. Operating Principles

Both the Hancock 4000-series globe stop valve and the 4090-series stop check valve, have a Y-pattern body design. This provides a streamlined flow path and features hard-faced, flat seats, which eliminate seat scuffing or wear caused by misalignment, or by the discs being blown toward the outlet by high pressure flow. The flat seats also eliminate the need for precise alignment of seat angles during refinishing.

The Y-Pattern globe stop valves and stop check valves employ a two-piece stem, connected outside the flowing medium. This connection assures that the disc will not rotate during valve operation, reducing galling and seat wear, and it also eliminates spinning caused by high velocity flow.

Compressed Graphite, a non-asbestos product, is the standard packing and gasket material for the Y-pattern valve. The body-bonnet-yoke combination allows disassembly in stages, for ease of maintenance.

C. Operation

Hancock Y-pattern globe stop valves and stop check valves are operated by rotating the handwheel (or T-handle) clockwise to close, and counterclockwise to open. The Y-pattern valve has integral backseats, but for continuous open operation, packing life will be extended if the valve is closed approximately 1/4 turn off the backseats.

When opening or closing the valve, torques, as specified in Table 3 should not be exceeded. If the valve is not tight when properly torqued, opening the valve and reclosing may free 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, the valve should be scheduled for servicing.

D. Handling

Hancock Y-pattern valves are durable and rugged, and require no special handling.

E. Storage

Indoor storage of valves is recommended. If prolonged storage is anticipated, the valves should be stored in a humidity controlled environment with the end seals tightly in position to prevent contamination. All seals should remain in place until immediately prior to valve installation in the line.

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

F. Pre-installation

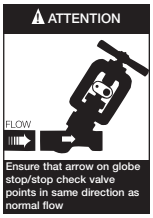
Prior to installation, the following steps should be taken:

1. Leave end caps 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 Disassembly instruction (Section 4.K) in this manual for packing installation directions.

G. Installation

Y-pattern globe stop and stop check valves may be installed with the stem in any relative position. However, ***the flow path as marked by the arrow on the body must be maintained.***



H. Welding

When the valve is being welded into a line, it should be in mid-open position. **Do not use the yoke, handle or stem for a weld ground**. Maintain 350°F interpass temperature requirement when installing stainless steel valves.

TABLE 3—Suggested Operating Torque In Ft./Lbs. {+10% -0%}

Valve Type	Nominal Valve Size – in., (mm)								
	1/2 (15)	3/4 (20)	1 (25)	1-1/4 (32)	1-1/2 (40)	2 (50)	2-1/2 (65)	3 (75)	4 (100)
4000 & 4090	30	30	65	75	85	175	350	390	390
4100 & 4190	40	40	75	85	100	225	390	390	390
4200 & 4290	50	50	50	140	140	250	425	425	425

NOTE: In applications where thermal transients are present, the closing torque should be increased approximately 10 percent above those shown.

I. Packing Leakage

(For Parts Nomenclature, refer to Figures 1 and 2 of this manual.)

After the valve is installed and brought to operating temperature, it should be visually examined for packing leakage. If the valve is opened onto the backseats, close it 1/2 to 1 full turn and check for leakage. If the packing is leaking, tighten the packing gland nuts 1/2 turn each and recheck for leakage. Continue this process until the leakage has stopped. Then operate the valve open and closed approximately 1/2 turn and check for binding between the stem and the packing. If the leakage has stopped and the binding is too firm, loosen the packing gland nuts 1/4 turn each.

If the leakage cannot be stopped by tightening the packing gland, the valve should be firmly backseated to prevent erosion of the stem-disc or bonnet. The valve should then be "tagged out" (to prevent accidental operation), and inspection/repair scheduled.

J. Repacking Under Pressure

1. General Information

The Hancock screwed bonnet valve design is fitted with an integral backseat as standard. Although the backseat provides a means of packing the gland box under pressure, ***this is not recognized as a safe practice. (Again, see "Safety Precautions" in Section 2 of this manual.)***

2. Specific Steps

If adding, or changing, packing is ***absolutely necessary,*** first open the valve until the backseat on the stem firmly contacts the bonnet backseat. If no leakage through the packing is visible, remove the T-handle, or handwheel, to preclude accidentally opening the valve off the backseats. Slowly loosen the packing gland nuts, checking for leakage through the packing after each complete revolution of the nuts. ***Do not remove the packing gland until the nuts are free, and it is known that the packing is not leaking.*** If after this action, the backseats are still sealing, remove the packing gland nuts. Wire the packing gland to the yoke to allow more space to remove or add packing. If the old packing is to be removed, do so carefully. (See Figure 3.)

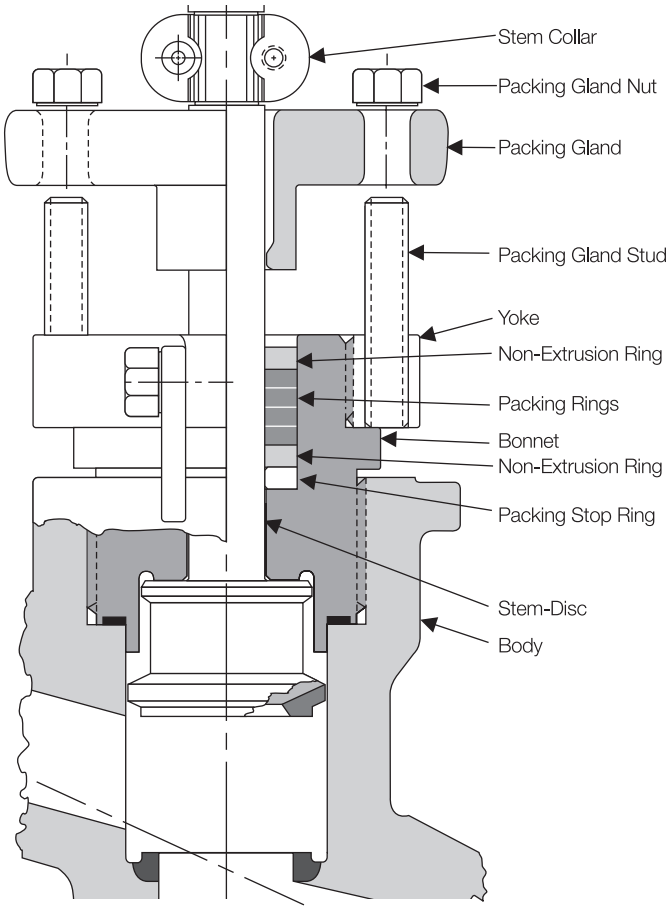


FIGURE 3

Individual packing split rings must be used to repack under pressure (See Figure 4, and the applicable split ring part numbers shown in Table 4).

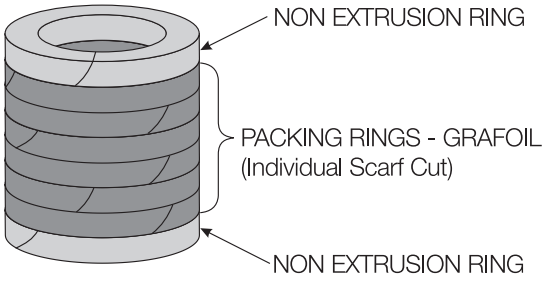


FIGURE 4—Split Ring Packing Set

Table 4—Split Ring Packing Set* Part Numbers

Valve Type	Nominal Valve Size – in., (mm)					
	1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
4000 & 4090	7221125	7221126	7221127	7221128	7221128	7221129
4100 & 4190	7221125	7221126	7221127	7221128	7221129	7221129
4200 & 4290	7221134	7221134	7221132	7221128	7221129	7221129

* Each set contains individual packing rings and 2 non-extrusion rings.

4. Globe Stop and Stop Check Valves (Cont.)

To insert the rings, open the split and ***first fit the lower Non-Extrusion ring*** around the stem. Close the split and slide the ring into the gland stuffing box. Repeat the process with the packing rings, offsetting the splits in alternate rings by 90 degrees. Add a new top Non-Extrusion ring. Remove the wire holding the packing gland, and reassemble the packing gland with the nuts. Tighten the nuts snugly. Reinstall the T-handle or hand-wheel. Slowly close the valve approximately 1/4 turn, and check for packing leakage. If the packing leaks, tighten both packing gland nuts 1/2 turn each, and recheck. Continue until leakage stops. Then, open and close the valve approximately 1/2 turn, checking for binding of the stem and packing. If binding seems excessive and the packing is not leaking, loosen the gland nuts approximately 1/4 turn to relieve the binding. Recheck for leakage. The objective of this action is to eliminate packing leaks, while creating a minimum of stem binding.

K. Disassembly

1. For Packing Replacement with No Pressure

(For parts nomenclature, refer to Figures 1 and 2)

a. Removing the Yoke Assembly

NOTE: Wrench sizes required to perform the following operations are provided in Appendix B of this manual.

Do not attempt to disassemble a Hancock Y-pattern globe stop or stop check valve if either the line or the valve is pressurized. To assure that no pressure exists, open the valve until the backseats contact, then close it approximately 1/2 turn. Loosen the packing gland nuts 1/2 turn each, in succession, watching for visible signs of leakage. Continue loosening the nuts until the packing gland is completely unloaded, but **do not remove the nuts** entirely. **Leave the valve in this condition for two minutes.**

If, after that time, the gland and bolts have not "loaded up," remove the two screws securing the stem collar, separate the two halves of the collar and remove them. Using the T-handle, screw the upper stem counterclockwise approximately two turns while holding the bearing pad in place. Remove the bearing pad from between the upper and lower stems. Loosen the yoke bolting until the yoke is free to turn.

(1) For 1/2" through 1-1/2" valves: Unscrew the yoke from the bonnet and remove the entire yoke assembly, including the packing gland and the bolting.

(2) For valves 2" and larger: Remove the packing gland stud nuts, gland and gland flange completely, then unscrew the yoke and remove it from the bonnet.

b. Removing the Packing

Packing can be removed at this time, or delayed until the bonnet has been removed from the valve. Repair tool kits, which include a Packing Removal Tool, may be obtained from Hancock for each standard valve size. (See Appendix A for applicable kit and tool numbers.)

Valve packing should be removed using a Hancock Packing Removal Tool, which consists of a bonnet adapter, drive sleeve, packing remover and drive handle. (See Figure 5)

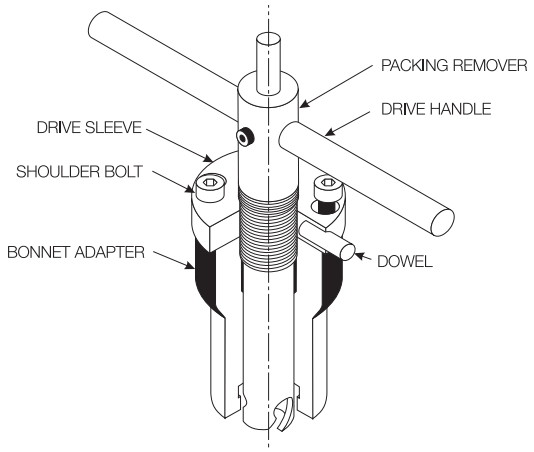


FIGURE 5—Packing Removal Tool (Cutaway)

To use this tool, attach the drive sleeve and packing remover to the bonnet adapter, hooking the slotted holes in the sleeve under the cap screws on the adapter. Adjust the packing remover so that the cutting face is flush with the counterbore on the bottom of the adapter (i.e., Surface A) as shown in Figure 6.

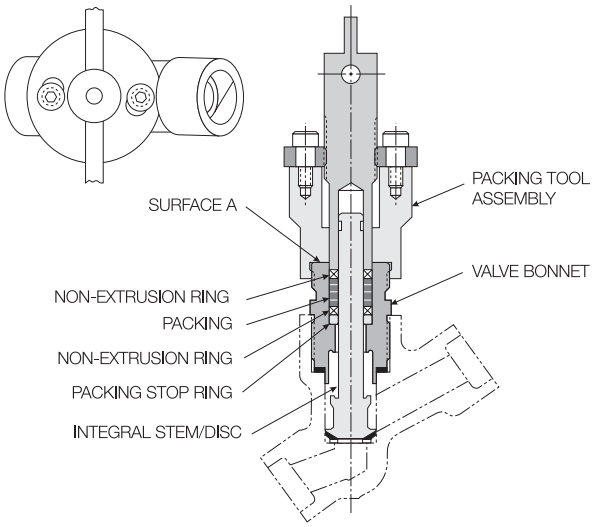


FIGURE 6—Packing Removal Tool (Installed)

Screw the assembled tool onto the yoke threads of the bonnet, being careful not to damage the lower stem. Then tighten until the tool firmly contacts the top of the bonnet. If the drive handle has not been installed in the tool, slide it into position and tighten the set screw.

The pitch of the threads on the Packing Removal Tool is such that each revolution of the tool advances the cutter .050 inches. Table 5 shows the approximate number of revolutions of the handle required to completely remove all the packing.

Table 5—Packing Chamber Depths and Packing Remover Revolutions

	Nominal Valve Size - in., (mm)			
	1/2, 3/4 (15), (20)	1 (25)	1-1/4, 1-1/2 (32), (40)	2, 2-1/2, 3, 4 (50), (65), (75), (100)
Packing Chamber Depth	0.937* (23.4)	1.281 (32.53)	1.562 (39.68)	1.875 (47.63)
Packing Remover Revolutions (Approx.)	18.75**	25.5	31.25	37.5

* 1.281" (32.53 mm) for 4500 Class.
** 25.5 for 4500 Class

Rotate the handle clockwise to cut into, and remove, the packing. The tool should be emptied after each five to seven revolutions. To empty the tool, disengage the drive sleeve from the bonnet adapter bolts. (A tap on the dowel pin may be required.) Lift the packing remover from the adapter, and clean the old packing from the tool. **Do not change the position of the remover in the drive sleeve**.

Reinstall the packing remover onto the adapter, and continue to cut out the old packing. Continue this process until the required number of revolutions has been made, at which time all packing should have been removed. Finally, unscrew the entire tool from the bonnet.

c. Complete Replacement of the Packing

If seat refinishing is required, omit this step and continue disassembly by removing the bonnet (per Section 4 K.1.d. (1) through (3) of this manual). If replacing the packing is the only repair necessary, it can be done at this point.

Appropriate packing is available from Hancock in either the "Solid" cartridge form (see Figure 7) or the split ring cartridge form (see Figure 8.) The applicable part numbers for each form are shown in Table 6.

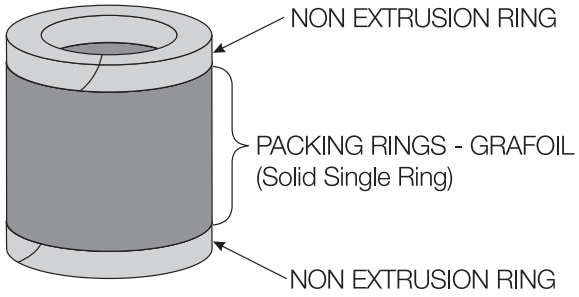


FIGURE 7—Solid Packing Cartridge

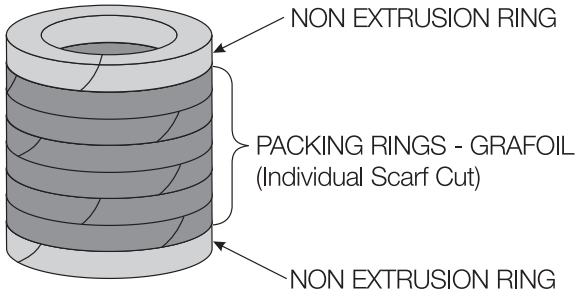


FIGURE 8—Packing Cartridge–Split Ring

(1) To install the packing cartridge, place the lower non-extrusion ring over the lower stem and into the packing chamber. Seat the ring by using the packing compression tool shown in Figures 9 and 10.

Table 6—Packing Part Numbers

Description	Valve Type	Nominal Valve Size - in., (mm)					
		1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
Solid	4000 & 4090	7220825	7220826	7220827	7220828	7220828	7220829
Packing	4100 & 4190	7220825	7220826	7220827	7220828	7220829	7220829
Cartridge*	4200 & 4290	7220834	7220834	7220827	7220828	7220829	7220829
Split Ring	4000 & 4090	7221125	7221126	7221127	7221128	7221128	7221129
Packing	4100 & 4190	7221125	7221126	7221127	7221128	7221129	7221129
Cartridge Set**	4200 & 4290	7221134	7221134	7221132	7221128	7221129	7221129

* Each set contains a one-piece solid graphite ring and 2 non-extrusion rings.
** Each set contains individual packing rings and 2 non-extrusion rings.

4. Globe Stop and Stop Check Valves (Cont.)

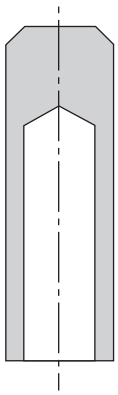


FIGURE 9—Cross Section of Packing Compression Tool

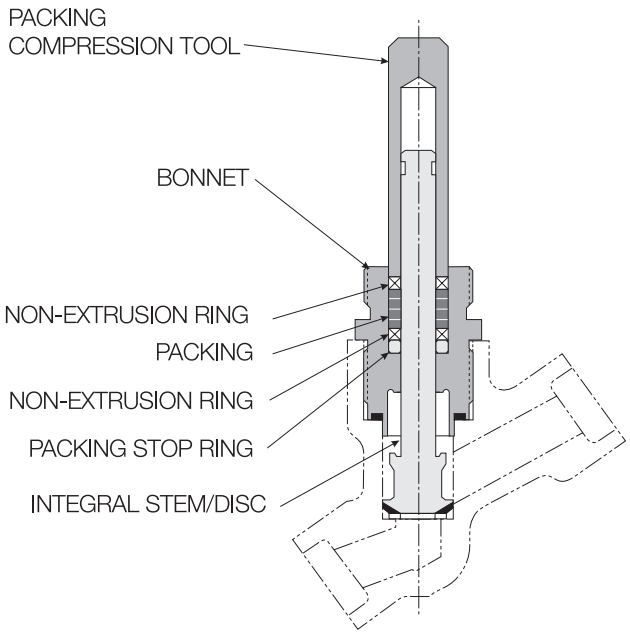


FIGURE 10—Packing Compression Tool Installed

Installation of the Solid packing cartridge is accomplished by placing the tool over the stem and onto the bottom non-extrusion ring and then using a small mallet to tap the tool and seat the ring. Remove the tool, install the inner cartridge in the same manner and add the upper non-extrusion ring. (See Figure 10)

(2) To install the split rings, use the same procedure as above, but seat each ring as it is installed, and offset the splits in successive rings by 90 degrees.

d. Completing Disassembly For Seat Repair

(1) Bonnet Removal - 1/2" through 1" valves.

For valves with a bonnet lock weld, use a disc grinder, or other suitable tool, and grind off the weld. (See Figure 11.) For valves with a bonnet seal weld, cut through the entire circumference of the weld, leaving a minimum gap between the body and bonnet, using an abrasive cut off wheel. (See Figure 11A.)

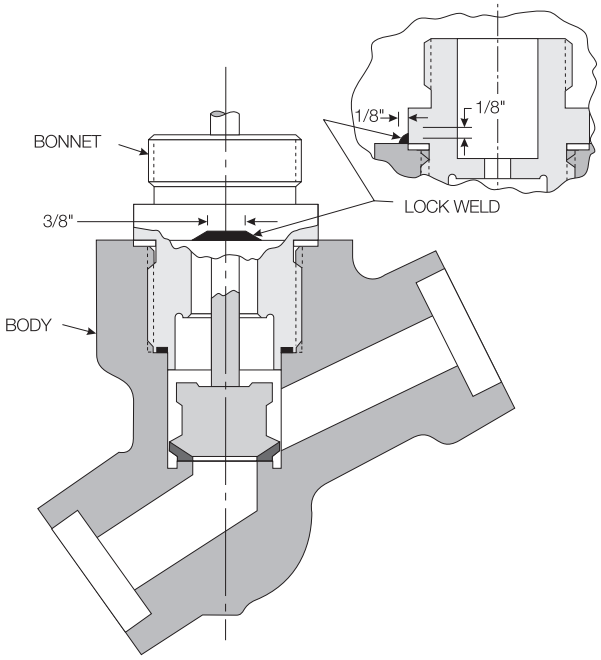


FIGURE 11—Bonnet Lock Weld

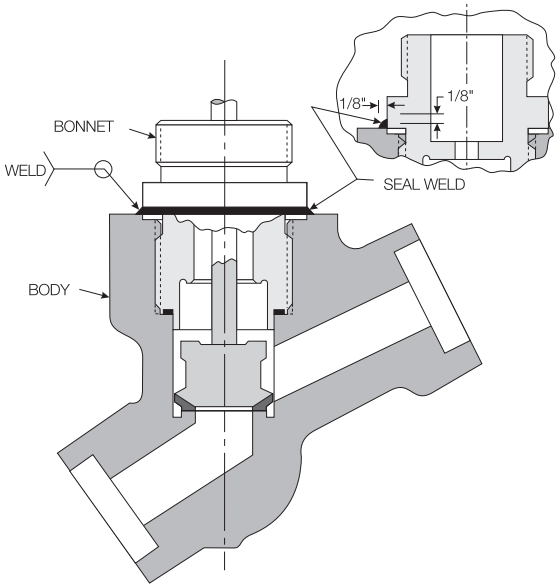


FIGURE 11A—Bonnet Seal Weld

The 1/2", 3/4" and 1" valve bonnets are most easily removed with a special tool (See Figure 12) which consists of a bonnet adapter, driver and socket head cap screws.

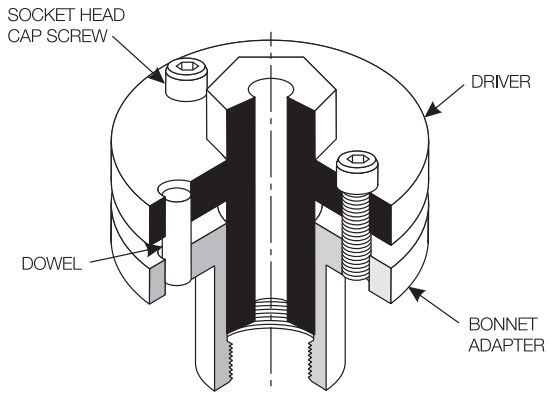


FIGURE 12—Bonnet Removal/Installation Tool 1/2" Through 1" Valves

To use this tool, first adjust the cap screws until the gap between the driver and the adapter is approximately 1/16". Next, screw the tool onto the bonnet yoke thread until the driver engages the top of the bonnet. (See Figure 13) Now, tighten the cap screws to lock the tool to the bonnet. Using an appropriate wrench, rotate the driver counterclockwise to remove the bonnet. Loosen the cap screws, and remove the tool from the bonnet. Slide the lower stem-disc out of the bonnet through the packing chamber, being careful not to damage either end of the stem.

(2) Bonnet Removal—
1-1/4" and 1-1/2" Valves

Grind or cut off the bonnet lock weld, or seal weld when applicable (again, see Figures 11 and 11A). 1-1/4" and 1-1/2" bonnets are most easily removed with a special tool, which consists of a driver and a lock ring. (See Figure 14)

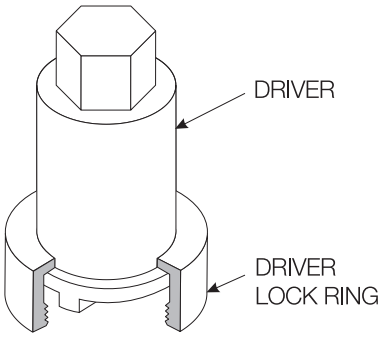


FIGURE 14—Bonnet Removal/Installation Tool 1-1/4" and 1-1/2" Valves

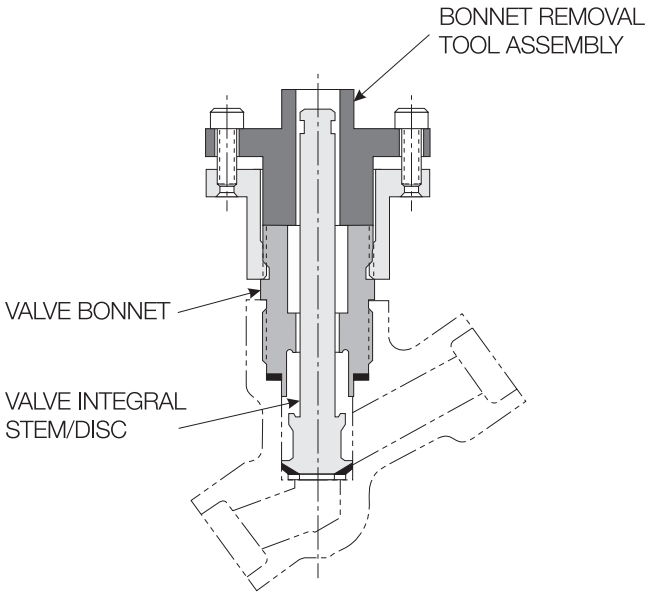


FIGURE 13—1/2 - 1" Bonnet Removal Tool Installed

Place the driver over the stem and onto the bonnet, engaging the lugs into the bonnet slots (See Figure 15). Slip the ring over the driver and screw it onto bonnet yoke threads. Using an appropriate wrench, rotate the driver counterclockwise to remove the bonnet, then unscrew the ring from the bonnet and remove the driver. Slide the lower stem-disc out of the bonnet through the packing chamber, being careful not to damage either end of the stem.

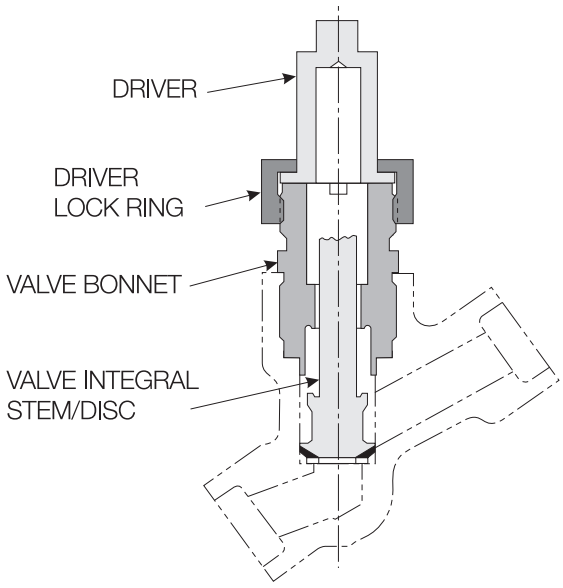


FIGURE 15— Bonnet Removal Tool Installed 1-1/4 and 1-1/2"

4. Globe Stop and Stop Check Valves (Cont.)

(3) Bonnet Removal— 2" through 4" Valves

Grind or cut off the bonnet lock weld, or seal weld when applicable (again, see Figures 11 and 11A). The 2" and larger valve bonnet is most easily removed using a special tool (See Figure 16) which consists of a driver and two lock bolts.

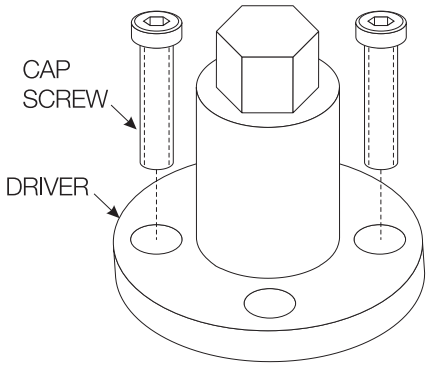


FIGURE 16—Bonnet Removal Tool 2" through 4" Valves

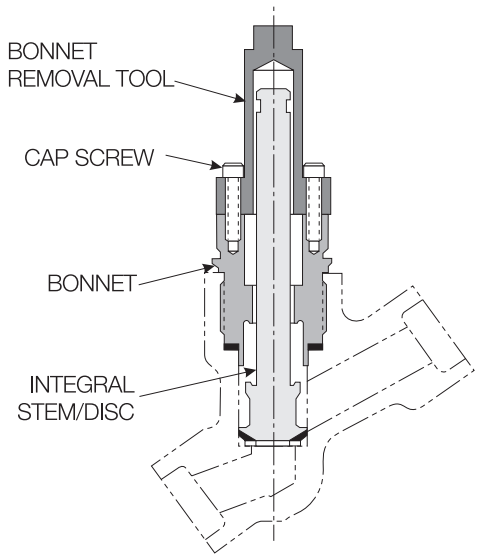


FIGURE 17—Bonnet Removal Tool Installed 2" through 4" Valves

First remove the packing gland studs, then slide the driver over the stem and onto the bonnet. Next, align the two holes in the driver with the stud threads in the bonnet. Now insert and tighten the lock bolts into the packing gland stud threads, (See Figure 17) Using an appropriate wrench, remove the bonnet by rotating the driver counterclockwise.

Remove the lock bolts and the driver from the bonnet. Slide the lower stem-disc through the gland stuffing box and remove it, being careful not to damage either end of the stem.

(4) Removing The Packing

If the packing was not previously removed from the bonnet, use the procedure detailed in section 4.K. to accomplish this step.

(5) Removing The Packing Stop Ring

Remove the packing stop ring (again, see Figures 1 and 2) from the bonnet by using a screwdriver or similar tool to apply force to alternate sides of the ring through the bottom of the bonnet.

(6) Removing The T-Handle

Remove the handle nut and washer, and tap lightly on the underside of the handle to free it from the tapered square on the upper stem.

(7) Removing the Upper Stem and Thread Bushing

Rotate the upper stem clockwise, then down and out through the lower end of the yoke. To remove the thread bushing, grind or file the raised, staked area smooth, then turn the bushing counterclockwise.

(8) Removing Bonnet Gasket

Remove the bonnet gasket from the shoulder inside the body (Dash 1 design) or from the groove in the bottom of the bonnet (Dash 3 design). Disassembly is now complete.

L. Maintenance

1. General Information

The Hancock 4000, 4080, 4090 series valves have integral, hardfaced seats which can be reconditioned with high consistency using the tools and techniques described below.

NOTE:
The procedures for refinishing the valve body seat and the disc seat are applicable to all valve types addressed in this manual (i.e., globe stop, stop check and check valves.)

2. Repairing the Body Seat

The tool used for refinishing the body seat consists of a housing, lap shaft, lap disc, three (3) grades of Borazon cutter discs, adhesive-backed sandpaper, a retainer washer and a lock screw. (See Figure 18.) A handle for hand-lapping is also included. The grades of cutter discs are indicated by the color of

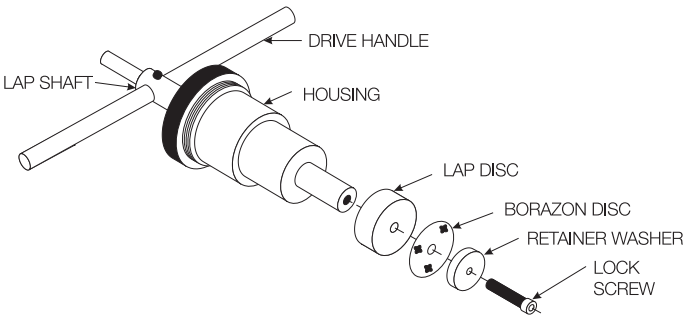


FIGURE 18—Seat Refinishing Tool

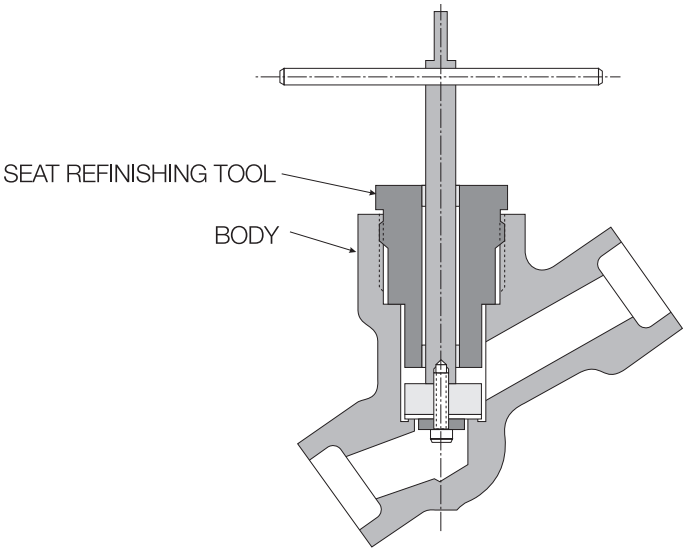


FIGURE 19—Tool Assembled to Valve

non-cutting surfaces (green = 200 grit; gold = 600 grit; blue = 12 micron). The 200 grit cutter is used only to remove large imperfections in the seat(nicks .010" or more deep). The 600 grit is for lighter indications, (damage less than .010"), and the 12 micron Borazon disc is for finish grinding before the final lapping with the sandpaper. The **adhesive-backed sandpaper is always used as the final step.**

NOTE:
Lapping compound is not recommended when refinishing the body seat. Grinding of the stem-disc to the body seat is also not recommended.

Inspect the seat to determine the extent of rework required and select the appropriate Borazon disc.

To prepare the seat Refinishing Tool for use, remove the lock screw and retainer washer from the lower end of the lap shaft. Place a Borazon disc of the appropriate grit onto the lap disc with the color-coded side against the disc. Thread the screw into the lap shaft and tighten it with an Allen wrench. **Before inserting the tool into the body, clean the body gasket surface to remove all gasket material.** This ensures that the tool will seat properly; otherwise, runout between the seat and the gasket surface may result.

Insert the tool into the body (See Figure 19). Tighten the tool housing until it seats firmly on the gasket surface inside the body. The handle provided, or a hand-operated drill may be used to turn the lap shaft for cutting and grinding; however, a variable-speed drill (as shown in Figure 20) is recommended. When using drills, drive speeds should be kept between 100 and 600 rpm.

To use the handle, slide it through the hole in the shaft and lock it with the setscrew. **Always remove handle before using drill motor.**

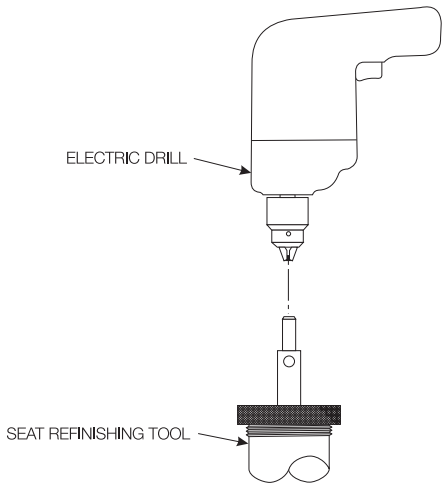


FIGURE 20—Seat Refinishing With Power Drill

When using a drill, attach the drill chuck to the lap shaft and tighten the chuck. Lower the drill and shaft until the Borazon disc contacts the seat, then apply light pressure during cutting. Remove the drill and refinishing tool every 45 to 60 seconds and inspect the seat. After all defects have been removed, the seat should be finish-ground using the 12 micron Borazon disc. Either the drill, or the handle provided for the lap shaft may be used for this operation. If the handle is used, rotate it back and forth through a 90-degree rotation while applying firm pressure on the seat. With either option, remove the tool assembly every 3 to 5 minutes to check the condition of the seat.

Use the adhesive-backed sandpaper for the final lapping of the seat. **Always use the handle for lapping.**

4. Globe Stop and Stop Check Valves (Cont.)

To install the sandpaper, remove the screw, lockwasher, and Borazon disc from the refinishing tool. Strip the adhesive cover from the sandpaper, and firmly press the adhesive to the lap disc. Be sure that the paper does not wrinkle. Reassemble the lap disc, washer, and screw. If the handle was not used, or was removed from the lap shaft, install it into the shaft. Spray the sandpaper with a light oil (such as WD-40). Insert the tool into the body, and tighten the housing until it seats on the gasket surface of the body. Rotate the shaft by hand, back and forth, through an arc of 90 degrees for 5 to 10 repetitions, then rotate the lap 180 degrees and repeat the cycle. Continue to lap in this manner for 3 to 5 minutes. Remove the Seat Refinishing Tool from the body, clean any oil from seat, and inspect the surface. If the seat is completely “grayed in” and no irregularities are visible, the valve may be reassembled. Otherwise, repeat the lapping operation until a proper finish is obtained.

(3) Repairing the Disc Seat

The disc seat may be easily reconditioned using a precision ground lap plate, as shown in Figure 21.

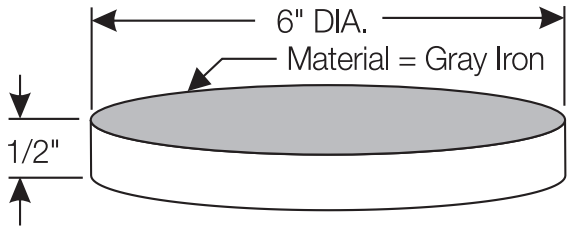


FIGURE 21—Lapping Plate

Apply 200 grit lapping compound to the plate while holding the disc firmly and flat against the plate, move the disc in a figure-eight motion across the plate as shown in Figure 22.

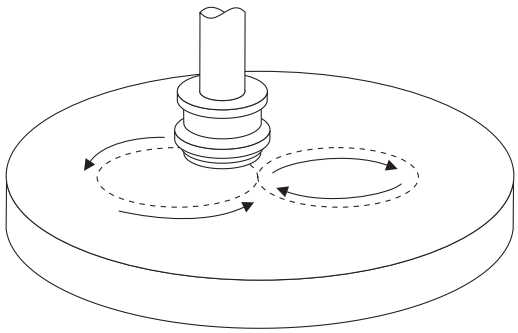


FIGURE 22—Lapping Motion

After all defects are removed, clean the plate and the disc and apply 1000 grit compound to the plate. Polish the disc in the same figure-eight motion. Inspect the disc frequently. When the proper finish has been achieved, remove all compound from the disc.

Once both seats have been reconditioned, the valve may then be reassembled.

M. Reassembly

After the seats are refinished, clean the gasket surface in the counterbore of the body and insert a new gasket into the counterbore, (bonnet groove on "-3" designs) using care not to bend or break the gasket.

Next, place the lower stem-disc (or lower stem in the case of a stop-check valve) through the bottom of the bonnet, then lubricate the body-bonnet threads with solid film X-ERGON (Gladiator®) or equal lubricant.

When dealing with a globe stop valve, carefully lower the bonnet and stem into the body and let the stem-disc contact the body seat.

- When dealing with a stop check valve, insert the disc into the body, being careful not to damage the seating surface on the disc, place the spring over the disc, then position the stem/bonnet assembly so that the lower stem is inserted into the disc bore.

Next, screw bonnet, hand tight, into the body. With the tool used to remove the bonnet, tighten the bonnet to the torque value shown in Table 7, then remove the tool. Place the packing stop ring over the stem and into the bonnet. Next, install the packing using the method described in Section 4 K.1.c. of this manual.

- For valves having a bonnet lock weld (Dash 1 design), tack-weld the bonnet to the body as shown in Figure 11.
- For valves having a bonnet seal weld,(Figure Number suffix “NBJ”), circumferentially seal weld the bonnet to the body as shown in Figure 11A.

NOTE:
Seal welding of the bonnet to the body should only be done to qualified procedures. Heat input must be restricted to control the maximum temperature at the gland stuffing box area. Excessive temperatures will damage the graphite packing.

Screw the upper stem through the thread bushing and assemble the yoke and thread bushing. Torque the bushing to the value shown in Table 7, then stake-lock the thread bushing to the yoke as shown in Figure 23.

Table 7—Assembly Torques, Ft./Lb. {+10% -0%}

Description	Valve Type	Material	Nominal Valve Size - in., (mm)				
			1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2, 3, 4 (65, 75, 100)
Body to Bonnet	4000/4100 Series	SA105, SA182 Gr F22	165-170	310-330	685-700	900-925	1600-1800
	4200 Series	SA105, SA182 Gr F22	310-330	310-330	685-700	900-925	1600-1800
	4000/4100 Series	SA182 Gr F316	200-250	330-375	1000-1600	1200-1800	1800-2000
	4200 Series	SA182 Gr F316	330-375	330-375	1000-1600	1200-1800	1800-2000
Thread Bushing to Yoke	4000, 4100 & 4200 Series	SA105, SA182 Gr F22 & SA182 Gr F316	50-75	50-75	60-85	60-85	60-85
Yoke Lock Bolt			10-12	18-20	60-70	30-32	30-32
Collar Bolting			3-5	10-12	10-12	18-20	18-20

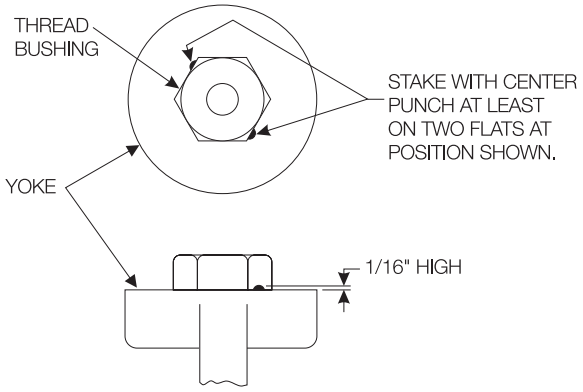


FIGURE 23—Staking Thread Bushing

For valves 1/2" through 1-1/2", screw the two packing gland studs into the threaded holes in the yoke. For larger valves, screw the two packing gland studs into the threaded holes in the bonnet.

Unscrew the upper stem through the top of the yoke to assure that it will not contact the lower stem when the yoke is installed. Lubricate the yoke-bonnet threads and assemble the yoke to the bonnet. Thread the yoke onto the bonnet until the top of the bonnet is flush with the lower flange of the yoke, then loosen or tighten sufficiently to orient the yoke arms to the desired position. Install the yoke lock plate (dash 3 design valves only), yoke lock bolt and yoke nut. Tighten the lock bolt to the torque values shown in Table 7.

Install the packing gland (with gland flange on 2" and larger valves) over the lower stem. Next, loosely install the packing gland nuts. Lubricate the contact surfaces of the upper and lower stems, then place the bearing pad between the stems and screw the upper stem down onto the lower stem to trap the pad. Position the stem collar halves around the stems and install the lock screws. Tighten to the torque values in Table 7. Attach the T-handle or handwheel to the upper stem with the washer and locknut. Tighten the packing gland bolting evenly until snug, then in 1/2-turn increments, check for drag between the lower stem and the packing. When a firm drag is felt, actuate the valve two turns open and two turns closed to check for binding in the stem collar (lower stem should not rotate when valve is operated).

5. Check Valves

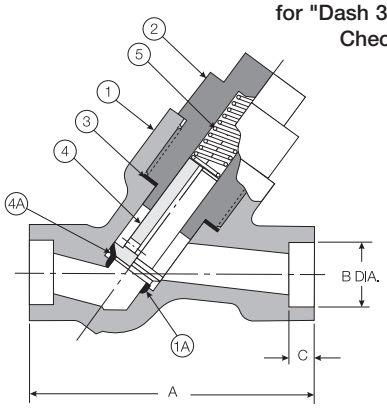
A. Design Features

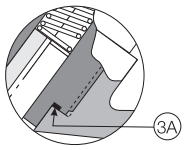
Available in 1500 through 4500 Class pressure ratings The Hancock 4080, 4180 and 4280 series check valve has a Y-pattern body design that provides a streamlined flow path. Hard-faced flat seats eliminate seat scuffing or wear caused by misalignment or by the discs being blown toward the outlet by high pressure flow. The flat seats also eliminate the need for precise alignment of seat angles during refinishing.

Compressed graphite, a non-asbestos product, is the standard gasket material for the Y-pattern valve.

B. Nomenclature

A cross-sectional drawing and parts list are shown in Figure 25. Reference dimensions are listed in Table 8.





Bonnet Gasket Detail for "Dash 3" Design Check Valves

FIGURE 25
Y-Pattern Check Valve

Parts List

Part No.	Nomenclature
1	Body
1A	Hardfacing
2	Cover
3	Cover Gasket
3A	Cover Gasket*
4	Disc
4A	Hardfacing
5	Spring

*For "Dash 3" Design Valves

5. Check Valves (Cont.)

Table 8—Reference Dimensions for Socket-Weld Check Valves

Nominal Valve Size in.(mm)	A			B DIA.	C
	4080 Series in.(mm)	4180 Series in.(mm)	4280 Series in.(mm)	+0.010 -0.000 in.(mm)	(MIN.) in.(mm)
1/2 (15)	4.750 (120.7)	4.750 (120.7)	7.500 (190.5)	0.855 (21.7)	0.38 (9.5)
3/4 (20)	4.750 (120.7)	4.750 (120.7)	7.500 (190.5)	1.065 (26.9)	0.50 (12.7)
1 (25)	5.750 (146.1)	5.870 (149.2)	8.125 (206.4)	1.330 (33.8)	0.50 (12.7)
1-1/4 (32)	7.500 (190.5)	8.120 (206.4)	12.500 (317.5)	1.675 (42.6)	0.50 (12.7)
1-1/2 (40)	7.500 (190.5)	8.120 (206.4)	12.500 (317.5)	1.915 (48.6)	0.50 (12.7)
2 (50)	9.500 (241.3)	10.000 (254)	12.375 (314.3)	2.406 (61.1)	0.62 (15.9)
2-1/2 (65)	10.000 (254)	12.500 (317.5)	14.250 (362)	2.906 (73.8)	0.62 (15.9)
3 (75)	12.500 (317.5)	12.500 (317.5)	14.250 (362)	Valves available in butt weld end only	
4 (100)	12.500 (317.5)	12.500 (317.5)	14.250 (362)		

C. Operation

The Hancock 4080, 4180 and 4280 series check valves are piston-lift type. The disc is forced upward by the inlet pressure and reseats when the pressure differential is reversed. No manual action is required by an operator for use of this valve.

D. Handling

The Hancock Y-pattern check valves are durable and rugged and require no special handling.

E. Storage

Indoor storage of valves is recommended, however, for extended storage, the polyethylene end seals should be tightly in position to prevent contamination. These caps should remain in place until immediately prior to valve installation in the line.

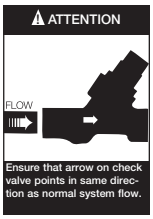
If valves are ordered to a more stringent cleaning and storage procedure, the recommendations in that procedure should be followed.

F. Pre-Installation

Prior to installation, the following steps should be taken:

1. Leave end caps in place until ready for installation, then remove.
2. Inspect both ports for obstruction or foreign materials. Clean when necessary.

G. Installation



The Y-pattern check valve may be installed with the cover in any relative position. **The flow path as marked by the arrow on the body must be maintained.**

H. Welding

Maintain 350°F interpass temperature requirement when installing stainless steel valves.

I. Disassembly

To disassemble the check valve for repair, proceed as follows:

- For a valve with a bonnet lock weld use a disc grinder or other suitable tool, and grind off the weld. (See Figure 26.)
- For a valve with a bonnet seal weld , cut through the entire circumference of the weld, with a minimum gap, using an abrasive cut off wheel. (See Figure 26A.)

With a wrench, rotate the cover counterclockwise to remove it. Lift the spring and disc from the body, then remove the cover-body gasket.

J. Maintenance

Procedures for refinishing the seats are common to the globe stop valve, stop check valve and the check valve. These procedures are detailed in Section 4.L. of this manual.

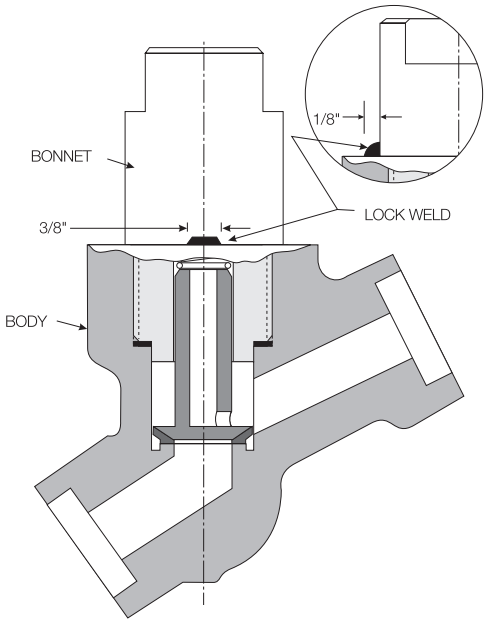


FIGURE 26—Cover Lock Weld

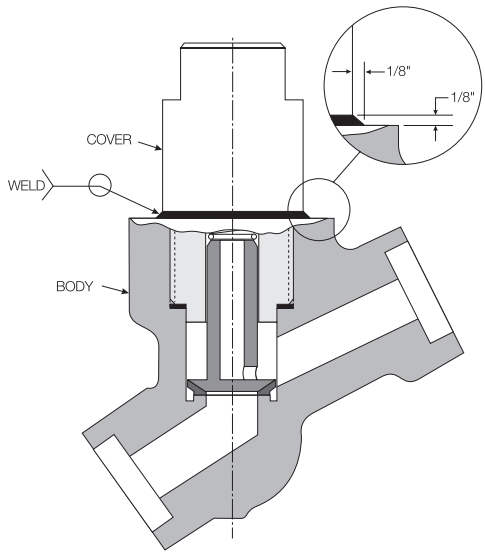


FIGURE 26A—Cover Seal Weld

K. Reassembly

After the seats are refinished, clean the gasket surface in the counterbore of the body and insert a new gasket into the body (into the bonnet groove on "dash 3" design valves), using care not to bend or break the gasket. Place the disc into the body, seat end first. Insert the spring into the bore of the cover and install the cover over the disc and into the body. Tighten the cover to the torque specified in Table 7 for the bonnet-to-body threads. This completes reassembly of the Y-pattern check valve.

6. Y-Pattern Valve Trouble Shooting

Problem	Probable Cause	Corrective Action
Seat Leakage	Valve not fully torqued closed.	Tighten handwheel to specified torque (Table 7)
	Foreign material between the seat and disc.	Open valve to flush material away.
	Seat and/or disc steam cut.	Repair seat and disc; replace stem/disc.
	Seat and/or disc eroded.	Repair seat and disc; replace stem/disc.
Packing Leakage	Packing gland loose.	Tighten packing gland nuts.
	Insufficient packing.	Add packing.
	Non-extrusion ring(s) missing.	Replace packing.
	Wrong packing for service.	Replace packing.
Backseat Leakage	Backseat surfaces damaged.	Repair backseat, replace stem/disc if necessary.
	Cracked or broken stem	Replace integral stem/disc.
High Operating Torque	Packing gland too tight.	Loosen packing gland nuts.

7. Inventory Philosophy

A. General Information

Maintenance 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, unscheduled outages, etc.

B. Inventory Planning

The basic objectives in formulating a replacement parts plan are:

- PROMPT AVAILABILITY
- MINIMUM DOWNTIME
- SENSIBLE COST
- SOURCE CONTROL

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, guidelines for establishing meaningful inventory levels are summarized in the table below.

Part Classification	Replacement Frequency	Predicted Availability*
Class I	Most frequent	70%
Class II	Less frequent but critical	85%
Class III	Seldom replaced	95%
Class IV	Hardware	99%
Class V	Practically never replaced	100%

* Predicted availability means that percentage of time the user plant will have the right parts to make the proper repair on the product, (i.e.: if Class I parts are stocked at the owners facility, the parts needed to repair a given valve will be immediately available in 70% of all instances. If both Class I and II parts are stocked, availability would increase to 85%).

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. Identification and Ordering Essentials

When ordering service parts, please furnish the following information (from nameplate see Figure 27) to ensure receiving the correct replacement parts:

1. Nominal Pipe Size
2. Figure Number
3. Class (i.e. 1500; 1690; 2500; 2680)
4. Body Material

Example: 1/2" - 4102W - 1 Class 2680 SA182 F22

Specify parts required by:

1. Quantity Required
2. Part Name
3. Material
4. Part Number (if known)

Example:Two (2) each Packing Set (Split ring cartridge); Graphite Part No. 7221125.

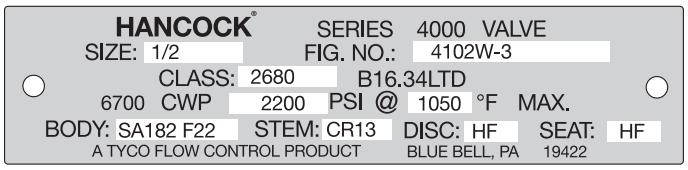


FIGURE 27—Hancock Valve Marker Plate

9. Recommended Spare Parts

Series 4000, 4100, 4200 Globe Stop Valves and 4090, 4190, 4290 Stop Check Valves

Part Class	Part Description		Recomm. No. of Spares	Qty. of Same Valves in Service	Predicted Availability
I	Packing Set	Split Ring Cartridge	1	5	70%
		Solid Cartridge	1	5	
	Bonnet Gasket		1	10	
	Stem Collar Lock Screw		1	10	
	Bearing Pad		1	10	
II	Lower Stem-Disc	Globe Stop Valves	1	20	85%
	Lower Stem	Globe Stop Check Valves	1	20	
	Disc		1	20	
	Spring		1	20	
III	Yoke Lock Bolt		1	20	95%
	Yoke Lock Nut		1	20	
	Yoke Lock Plate		1	20	
	Packing Stop Ring		1	20	
	Packing Gland		1	20	
	Packing Gland Flange	2" and Larger Valves	1	20	
	Packing Gland & Flange	1-1/2" and Smaller Valves	1	20	
	Packing Gland Stud		1	20	
	Packing Gland Stud Nut		1	20	
	Stem Collar		1	20	
	Tee Handle/Handwheel		1	20	
	Tee Handle Nut		1	20	
	Tee Handle/Handwheel Washer		1	20	

Series 4080, 4180, 4280 Check Valve

Part Class	Part Description	Recomm. No. of Spares	Qty. of Same Valves in Service	Predicted Availability
I	Bonnet Gasket	1	10	70%
II	Spring	1	20	85%
	Disc	1	20	

Appendix A.

Repair Kit Part Numbers

Tool Description	Valve Series Number	Nominal Valve Size - in., (mm)					
		1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
Tool Kit*	4000	34000RK1	54000RK1	64000RK1	84000RK1	94000RK1	104000RK1
	4100	34000RK1	54000RK1	64000RK1	84000RK1	94000RK1	94100RK1
	4200	34200RK1	34200RK1	64200RK1	84200RK1	94200RK1	94200RK1

* Part numbers shown are for a complete kit consisting of the individual tools shown below. Each kit is packaged in a tool box.

Individual Tool Part Numbers

Tool Description	Valve Series Number	Nominal Valve Size - in., (mm)					
		1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
Packing Compression Tool	4000	7216601	7216602	7216603	7216604	7216605	7216606
	4100	7216601	7216602	7216603	7216604	7216606	7216606
	4200	7216602	7216602	7216603	7216604	7216606	7216606
Packing Removal Tool	4000	7213901	7214301	7214701	7214702	7214702	7214703
	4100	7213901	7214301	7214701	7214702	7214703	7214703
	4200	7214301	7214301	7214701	7214702	7214704	7214704
Bonnet Removal Tool	4000	7215801	7215901	7195801	7196001	7196001	7195901
	4100	7215801	7215901	7195801	7196001	7195901	7195901
	4200	7215901	7215901	7195801	7196001	7240701	7240701
Cap Screw, Bonnet Removal Tool	4000	------	------	------	2311545	2311545	2311513
	4100	------	------	------	2311545	2311513	2311513
	4200	------	------	------	2311545	2311556	2311556
Seat Refinishing Tool	4000	7212801	7212802	7212803	7212804	7212805	7212807
	4100	7212801	7212802	7212803	7212804	7212806	7212806
	4200	7212808	7212808	7212809	7212810	7212811	7212811
Abrasive Disc Set (See Note 1)	4000	7196401	7196402	7196403	7196404	7196406	7196407
	4100	7196401	7196402	7196403	7196404	7196405	7196405
	4200	7196401	7196401	7196402	7196403	7196404	7196404
12 Micron Perforated Borazon Disc	4000	7196408	7196412	7196416	7196420	7196428	7196432
	4100	7196408	7196412	7196416	7196420	7196424	7196424
	4200	7196408	7196408	7196412	7196416	7196420	7196420
200 Grit Perforated Borazon Disc	4000	7196409	7196413	7196417	7196421	7196429	7196433
	4100	7196409	7196413	7196417	7196421	7196425	7196425
	4200	7196409	7196409	7196413	7196417	7196421	7196421
600 Grit Perforated Borazon Disc	4000	7196411	7196415	7196419	7196423	7196431	7196435
	4100	7196411	7196415	7196419	7196423	7196427	7196427
	4200	7196411	7196411	7196415	7196419	7196423	7196423
400 Grit Adhesive Backed Sandpaper Disc	4000	7196410	7196414	7196418	7196422	7196430	7196434
	4100	7196410	7196414	7196418	7196422	7196426	7196426
	4200	7196410	7196410	7196414	7196418	7196422	7196422
Lapping Plate	ALL	7196701	7196701	7196701	7196701	7196701	7196701

Note 1: Each set consists of 3 perforated Borazon Discs (1 each 12 micron, 1 each 200 grit, 1 each 600 grit) and 10 each 400 grit adhesive backed sandpaper discs, as shown in this table.

Appendix B.

Valve Assembly/Disassembly Wrench Sizes
Globe Stop and Stop Check Valves

Nomenclature		Valve Series Number	Nominal Valve Size - in., (mm)					
			1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
Hex Size Across Flats	Handle Nut	4000	9/16	9/16	15/16	1-1/4	1-1/4	1-1/4
		4100	9/16	9/16	15/16	1-1/4	1-1/4	1-1/4
		4200	9/16	9/16	15/16	1-1/4	1-1/4	1-1/4
	Thread Bushing	4000	1-1/2	1-1/2	2-1/4	2-1/4	2-1/4	2-1/4
		4100	1-1/2	1-1/2	2-1/4	2-1/4	2-1/4	2-1/4
		4200	1-1/2	1-1/2	2-1/4	2-1/4	3-1/2	3-1/2
	Packing Gland Stud Nut	4000	11/16	3/4	7/8	7/8	7/8	1-1/16
		4100	11/16	3/4	7/8	7/8	1-1/16	1-1/16
		4200	3/4	3/4	7/8	7/8	1-1/4	1-1/4
	Yoke Nut	4000	1/2	11/16	1-1/16	3/4	3/4	3/4
		4100	1/2	11/16	1-1/16	3/4	3/4	3/4
		4200	11/16	11/16	1-1/16	3/4	1-1/16	1-1/16
Hex Key Size	Yoke Bolt	4000	1/4	5/16	1/2	3/8	3/8	3/8
		4100	1/4	5/16	1/2	3/8	3/8	3/8
		4200	5/16	5/16	1/2	3/8	1/2	1/2
	Stem Collar Lock Screw	4000	5/32	3/16	3/16	7/32	7/32	7/32
		4100	5/32	3/16	3/16	7/32	7/32	7/32
		4200	5/32	5/32	1/8	7/32	7/32	7/32

Check Valves

Nomenclature		Valve Series Number	Nominal Valve Size - in., (mm)					
			1/2, 3/4 (15, 20)	1 (25)	1-1/4, 1-1/2 (32, 40)	2 (50)	2-1/2 (65)	3, 4 (75, 100)
Hex Size Across Flats	Cover	4080	1	1-1/2	1-3/4	2-1/8	2-1/8	2-3/4
		4180	1	1-1/2	1-3/4	2-1/8	2-3/4	2-3/4
		4280	1-1/8	1-1/8	—	—	—	—

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