Conval INC.

Camseal® Ball Valve Servicing Instructions

I
INSTALLATION

Perform installation welding in accordance with ASME Boiler and Pressure Vessel Code, Sec. 1, Part PW, or ANSI B 3.1.1, Para 127. Camseal Valves are uni-directional and care should be taken to weld in line with flow in the direction of the arrow on the body of the valve.

A. Do not disassemble valve. Valve should be placed in the "full open" position during welding.
B. Allow 1/16" gap between bottom of socket weld end and the end of the pipe (PW 41.5.7, or ANSI B 3.1.1, Para 127.3.3).
C. Preheat per TABLE 1.

TABLE 1

P-1 SA-105	P-5 SA-182 GR. F22	P-8 SA-182 GR. F316	P15E SA-182-F91
PREHEAT 50° F (A100.4.1)*	PREHEAT 400° F (A100.4.4) *	PREHEAT NONE REQUIRED (A100.4.7) *	PREHEAT 400° F
POST WELD HEAT TREAT NONE REQUIRED (PW-39)	POST WELD HEAT TREAT REQUIRED WHEN NOMINAL WALL THICKNESS EXCEEDS 5/8" (PW-39) LOCALIZED ONLY PER (PW-39-4-2)	POST WELD HEAT TREAT NONE REQUIRED (PW-39)	POST WELD HEAT TREAT REQUIRED (PW-39)
* ASME BOILER AND PRESSURE VESSEL CODE, SECTION I, PART PW-38			

II
OPERATION

The handle is the position indicator on a manual valve. When the valve is in the open position the handle will be in line with the pipeline. To close the valve, rotate the handle 90 degrees clockwise. To open the valve, rotate the handle 90 degrees counterclockwise.

ALL MANUAL CONVAL CAMSEAL VALVES HAVE A POSITIVE EXTERNAL STOP AT EACH END OF TRAVEL.

THE CONVAL CAMSEAL BALL VALVE SHOULD BE OPERATED FOR ON-OFF SERVICE ONLY, THE BALL VALVE HANDLE SHOULD ALWAYS BE FULLY ROTATED TO THE OPEN OR CLOSED STOPS.

III
PACKING GLAND ADJUSTMENT

Camseal ball valves have a precision packing system with a single piece splined gland. Packing may need to be adjusted periodically to prevent leakage.

Camseal ball valves are furnished with an Integral Gland Wrench (IGW). The IGW provides for easy packing maintenance which helps extend packing life. To tighten the packing be sure the teeth of the IGW are engaged with the teeth in the gland and turn the IGW clockwise until you have the specified torque (see Figure 2 for gland torques) or until the leak stops. Once the packing has been properly adjusted, lift the IGW and rotate it back counter-clockwise until the IGW is locked against the arms of the bonnet. This will prevent the gland from backing off and allowing leakage to develop.

IV
VALVE REBUILDING

CAUTION: Before any attempt is made to disassemble the valve, verify that the valve is isolated from system pressure and secured against accidental pressurization. Follow all of the plant standard tag out safety procedures before proceeding.

The Camseal ball valve contains a cartridge assembly that allows the entire valve to be rebuilt by changing out the old cartridge assembly for a new one. All parts necessary to do this are included in a Camseal repair kit (repair kit includes: cartridge assembly, body c-ring, and body/bonnet laminate seal [c-ring for 4500#]). It is not necessary to disassemble the cartridge and rebuild any of the internal components, nor is it recommended. Refer to Figures 1A thru 1D for diagrams with more detail on the steps described below.

1. Remove the bonnet from the valve by rotating the nuts that are threaded onto the studs that secure the bonnet to the valve body. Remove the nuts by rotating counterclockwise (the #5 valve has 4 nuts, the #7 valve has 6 nuts, the #9 valve has 8 nuts, and #10 has 12 nuts.). If the nut has become locked to the stud and the stud and nut come out as a unit, this is acceptable. Simply remove and re-install as an assembly. When all of the nuts are removed, lift the bonnet straight up and off of the valve body.
2. Remove the cam retainer clip (spring) - if so equipped – and discard as it will not be replaced. Using a long socket wrench (sizes shown in Figure 3) rotate the 2 cams until the flat of the cam is resting on the cartridge spacer and has relaxed compression on the Belleville washer (the cam pins should be rotated in the direction that will allow the cartridge to be relaxed with just 90 degree turn).
3. Remove the cams.
4. Remove the cartridge by sliding it up and out from the body of the valve. The cartridge seal, Bellville washer and spacer will also come out as part of this sub-assembly.

5. Clean and inspect all sealing surfaces of the valve assembly: the bonnet seal, the mating seal surface in the body and the sealing surface that mates with the cartridge seal. Use Scotchbrite or a similar material to remove rust and dirt that may prevent the new cartridge seal from sealing. For valves which have a laminate seal, it may be necessary to remove any remnants of the seal which have bonded to the surfaces using a plastic knife or scraper. Examine all surfaces and make certain there is no corrosion or damage in the sealing surfaces. Once this has been done, take precautions to assure these critical surfaces are not damaged during handling and re-assembly. For 4500# valves using C-seals, if the body/bonnet seal area has too much wear to be cleaned up with Scotch-Brite, follow the special instructions for using the Camseal Body/ Bonnet Seal Refacing Tool (See Section VIII-A at the end of this document). For 3100# class (and below) valves – the C-seals will be replaced with laminate seals which require a rougher finish per the instructions of Section VIII-B.
6. The new cartridge needs to be sub-assembled with new mating components. Place the new cartridge seal in the seal groove of the new cartridge. Place the spacer onto the cartridge. Place the Belleville washer against the spacer, making certain the Belleville washer is installed with the small (convex) diameter facing away from the spacer.
7. Insert the new cartridge assembly into the body, carefully sliding it between the milled locating ribs on the inside of the valve body. The valve is designed so that the cartridge is automatically oriented correctly; it will only go into the valve one way. Make certain the cartridge seal remains in place and is not scraped or damaged during insertion of the cartridge into the body. Also make certain the cartridge slides all the way to the bottom of the internal cavity.
8. Slide the cams back into place. The cams must be oriented with the flat facing toward the spacer; this is the only orientation in which the cams will freely slide into position.
9. Rotate the cams 90 degrees to compress the Belleville washer and load the cartridge seal; for an optimum seal use two socket wrenches and rotate both cams simultaneously (for best results rotate the cam-pins so that the flat side faces the side wall of the valve). When in the correct position the witness mark on the cams will be in line with the pipe line.

V
REPACKING

1. Remove the handle from the valve by loosening the handle retaining screw and then lift off the handle.
2. Remove the stem from the bonnet by rotating the Integral gland wrench (IGW) counterclockwise to remove the pressure on the packing and continue turning until there is a gap between the packing chamber and the bottom of the gland (exposing a portion of the stem). Remove the snap ring from the top of the stem, hold onto the snap ring for reassembly, and tap the stem downward through the bonnet.

3. Once the stem has been removed from the bonnet, the bushing/gland assembly will remain in place because it is compressed between the top flange of the bonnet and the packing (there is no longer any mechanical hold). The gland must be loosened, or turned all the way back up and out of the packing area by turning the IGW counterclockwise. Once the gland has been turned all the way back up onto the bushing, the gland/bushing assembly should drop. If they do not drop out it may be necessary to tap the top of the bushing to remove these components.
4. Remove the packing assembly using a hook of brass or a similar soft material that will not score the packing bore. First pull out the metal junk ring that sits in top of the packing, and then remove all 5 of the individual packing rings, taking care not to damage the packing bore.
5. Clean the bonnet (packing) chamber in cleaning solvent to remove contaminants and polish with Scotchbrite or a similar material.
6. Polish the stem with Scotchbrite or a similar material making sure to remove any remnants of the old packing, dirt or corrosion.
7. To repack the valve, turn the stem upside down and slide it down through the top of the bonnet. The stem does not normally go in this way, but in the absence of the bushing it will fit through the top of the bonnet and can be used to guide the insertion of the packing.
8. The packing is pre-packaged in plastic wrap. This plastic needs to remain in place until the packing is installed in the packing bore. Place the packing assembly up onto the stem and push the stem down through the packing bore. It will protrude slightly out the bottom of the bonnet. Use the stem to pull the packing into place. As the packing slides into the bore, the plastic wrap will peel off and will need to be removed. It may be necessary to tap the stem with a rubber mallet to completely seat the packing in the packing bore. Once the packing is in place, remove the stem and repeat this process to install the metal junk ring.
   Make certain that the junk ring is at least partially inserted into the packing chamber.
9. Insert the bushing/gland assembly up into the bonnet making certain the flats on the top of the bushing mate up with the ribs built into the mating surface of the bonnet to prevent the bushing from rotating. For smaller #5 and #7 valves – ensure the bushing grooves line up with the spring pins protruding from the bonnet. Rotate the packing gland to mid stroke so that the stem will not work to push the packing out of the packing bore.
10. Holding the bushing/gland in place, insert the stem from the bottom of the bonnet and slide it up through the gland and bushing until it protrudes up through the top of the bonnet. Make certain the collar of the stem is fully seated against the thrust bearing on the bottom of the bonnet.
11. Reinstall the snap ring into the groove on the top of the stem to retain the stem.
12. Compress the packing by rotating the IGW clockwise. Note that this will require several turns since the gland will have been rotated all the way up during disassembly. Rotate the IGW until you achieve the proper gland torque (see Figure 2).

VI
REASSEMBLY

1. Clean the bonnet seal sealing surfaces of both the body and the bonnet with Scotchbrite or similar cloth to remove any dirt or imperfections. For valves which have a laminate seal, it may be necessary to remove any remnants of the seal which may have bonded to the surfaces using a plastic knife or scraper. Examine these surfaces and make certain there is no damage that could affect the sealing of the valve. Place the new seal ring in the seal groove in the body.
2. Position the stem in the open position, with the upper stem flats in line with the pipe line. (This will assure that the stem will line up with the ball slot, as the ball is assembled in the closed position in the cartridge by the factory.) Place the bonnet assembly (bonnet, stem, gland) onto the body making certain that the stem properly engages the ball slot and that the centering ring (some actuated valves do not have a centering ring, skip this step if no centering ring is supplied) on the bonnet is aligned with the body.
3. Lubricate the studs and nuts with Never-Seez or a similar high temperature anti-galling lubricant. Replace the nuts and tighten them by hand to snug the bonnet down in place. Gradually tighten the nuts one nut at a time following a diagonal pattern. Tighten the nuts to the torque values shown in Figure 4 (always be sure at least one thread is showing above the every nut when they are tight).
4. Replace the handle on the stem and tighten the handle retaining screw.

VII
ACTUATOR SIZING AND MOUNTING INSTRUCTIONS

General Actuator Mounting Notes

1. Please consult the factory when sizing actuators. Pressures and temperatures influence the actuator sizing and stand-off height required. Figure 5 shows the torque requirements for the various Camseal size codes.
2. If you have purchased a Conval ball valve as a manual valve and plan on automating the valve please make note of the guidelines in Figure 5A,B.
3. Only quarter turn actuators may be used with the Camseal ball valve.
4. Take care when mounting the actuator to the ball valve. Some applications require high torques and large actuators. In applications below 150 F, the actuator can be direct mounted. If a mounting bracket is required be certain that the mounting bracket is sufficient to support the weight of the actuator and remain rigid, stable and properly aligned under all operating conditions.
5. Be sure there is a slight vertical gap of approximately 0.050” to 0.060”between the actuator coupling and the actuator shaft. This gap will compensate for tolerances of the assembly and also allow slight movement due to thermal growth of individual components.

6. Alignment between the actuator, the stand-off, coupling and the valve is critical. Any off-center loading can create considerably high torques on the valve and cause premature wear of the internal components of the valve.
7. Set the actuator stops so that the actuator travels to both the fully open or fully closed positions. The setting of the actuator stops is very important. The actuator stops will provide the only rotation limits of the valve assembly, so it is critical that the actuator be set to provide a full and proper 0 and 90 degree positioning of the ball. This will require slight over-travel of the actuator at each end of travel, resulting in total actuator travel slightly more than 90 degrees.

Mounting Procedure

CAUTION: If removing an actuator which has been mounted at the factory for any reason, it is recommended that the precise positon of the actuator-to-bracket and bracket-to-bonnet location be MATCH MARKED to ensure the correct position of the stem and ball upon reassembly. IF NOT, the actuator will have to be CYCLED and the correct CLOSED and OPEN position of the stem (See Figure 1D) must be verified by adjustment of the actuator stops.

1. Remove the external position stops from the bonnet of the valve by unscrewing them from the top of the bonnet assembly.
2. Before mounting the operator to the valve, be certain the valve is in the closed position.
3. If direct mounting the actuator, insert the actuator coupling onto the end of the stem. The bottom of the coupling should be flush with the top of the valve stem. Tighten the set screw until it makes contact with the flat on the double D or square of the stem. In general – when the valve is open – the flats of the double-D end of the stem will be parallel with the pipeline axis, stems with a single keyway will be perpendicular to the pipeline axis, and stems with a square drive will have a mark perpendicular to the pipe axis. HOWEVER, to be the most accurate and ensure shutoff – it is always recommended to match up the stem valve-closed markings to the bushing as depicted in Figure 1D.
4. If the valve/actuator combination requires a stand-off, place the stand-off on the valve mounting flange. Orient the stand-off to align properly with the bolt circle of the valve flange. Bolt the two components together. Insert the coupler as in step 10 above.
5. Place the actuator on the valve (direct mount) or on the top of the bracket, making sure that the actuator is oriented in the closed position.
6. The coupling should engage the mating shaft of the actuator, leaving a 0.050 to 0.060 inch gap between the top of the coupling and the bottom of the mating shaft. This gap is essential to ensure proper assembly and operation of the valve/actuator unit.

7. Bolt the actuator to the valve or stand-off making sure that the axes of the actuator output shaft and the coupler are very accurately aligned with the axes of the ball valve stem. Failure to properly align the assembly will result in valve stem leakage, potential damage to other portions of the valve assembly, and possible system shut down.

8. Verify that the actuator stops have been set so that the valve is operated to the fully open and fully closed positions.

9. Actuators can be direct mounted to the ISO pattern on the mounting pad of the Camseal for process temperatures up to 150 F. Stand-offs are required on process temperatures over 150 F to assure that the actuator is not damaged by excessive heat from the pipe line. Stand-off heights should be a minimum of 6 inches for the number 5 Camseal, and 4 inches for the number 7 and 9 valves.

Figure 1 A
Valve Assembly

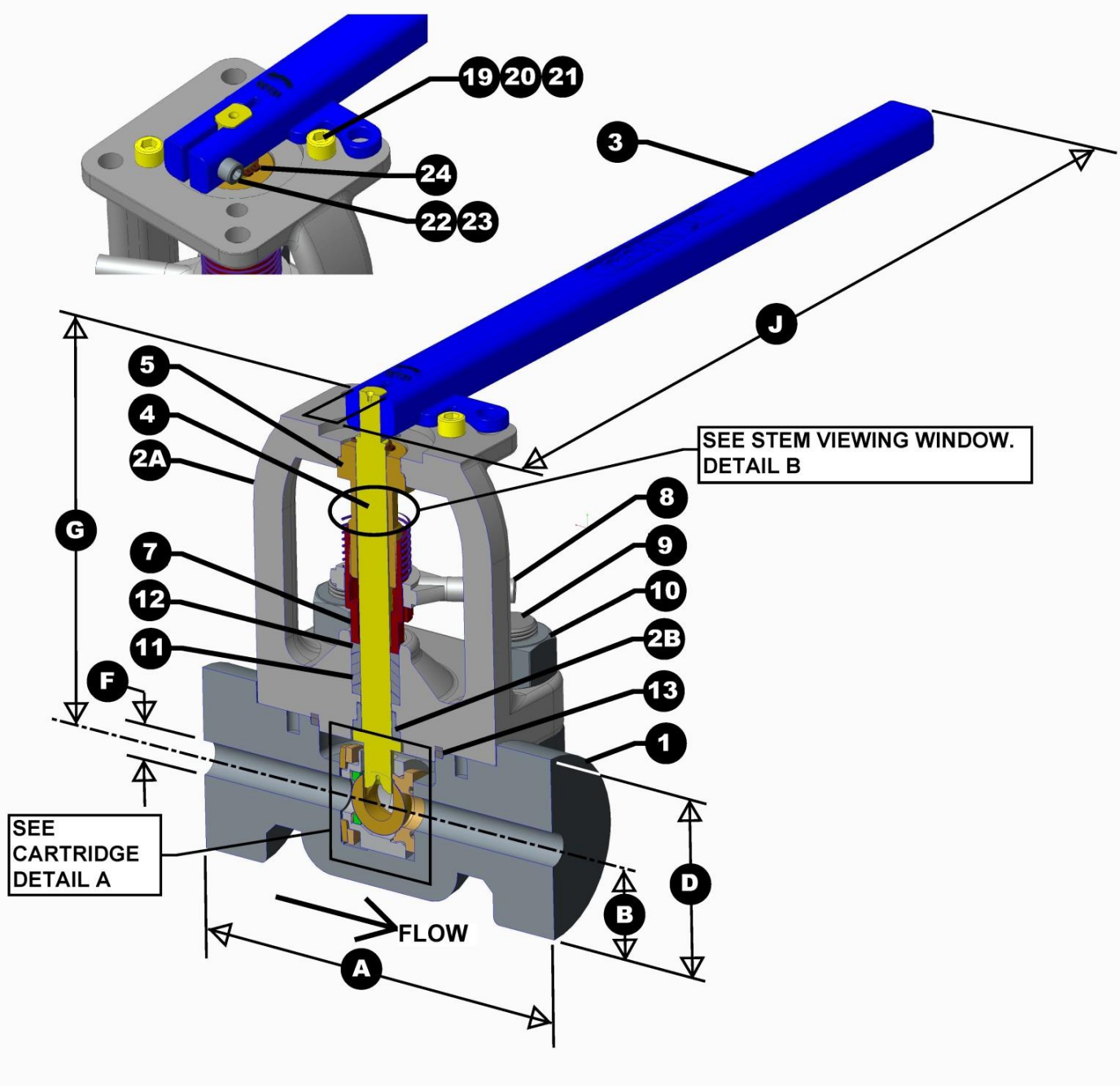


Figure 1 B
List of Items and Materials

	LIST OF MATERIALS FOR 1700# AND 3100# VALVES					
NO.	**NAME**	**QTY**	**MATERIALS**			
1	BODY	1	ASME SA-105	ASME SA-182 F22	ASME SA-182 F91	ASME SA-182 F316
2	BONNET ASSEMBLY	1	SEE MATERIALS BELOW			
2A	BONNET	1	ASME SA-216 Gr WCB	ASME SA-217 Gr WC9	ASME SA-217 Gr C12A	ASME SA-351 Gr CF3M
2B	BONNET STEM BEARING****	1	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	AMS 5387 STELLITE #6
3	HANDLE*	1	ASME SA-216 Gr WCB			
4	STEM**	1	ASTM A582 TYPE 416	ASME SB637 UNS N07718	ASME SB637 UNS N07718	ASME SB637 UNS N07718
5	BUSHING	1	ASME SB150 ALUMINUM BRONZE			
6	IGW SPRING	1	MFR STANDARD STAINLESS			
7	GLAND	1	ASTM A582 TYPE 416	ASTM A582 TYPE 416	ASTM A582 TYPE 416	ASME SA-479 TYPE 316
8	INTEGRAL GLAND WRENCH (IGW)	1	MFR STANDARD STAINLESS			
9	BODY STUD*	SD	ASME SA193 Gr B16	ASME SA193 Gr B16	ASME SA193 Gr B16	ASME SA193 Gr B8M
10	BODY FLANGE NUT*	SD	ASME SA194 Gr 4	ASME SA194 Gr 4	ASME SA194 Gr 4	ASME SA194 Gr 8M
11	PACKING SET	1	BRAIDED & DIE-MOLDED FLEXIBLE GRAPHITE			
12	PACKING SPACER	1	ASME SA-479 UNS S21800 (NITRONIC 60)			
13	BODY/BONNET SEAL***	1	316 SST/FLEXIBLE GRAPHITE LAMINATE			
14	CARTRIDGE ASSEMBLY	1	SEE MATERIALS BELOW			
14A	CARTRIDGE	1	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 TYPE 316
14B	COATED SEAT	1	ASME SB637 UNS N07718 / CHROME CARBIDE			
14C	COATED BALL	1	ASME SB637 UNS N07718 / CHROME CARBIDE			
14D	UPSTREAM SEAT	1	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	AMS 5387 STELLITE #6
14E	UPSTREAM SEAT BELLEVILLE	1	ASME SB637 UNS N07718			
15	SEAT/BODY SEAL (C-RING)	1	ASTM B670 PLATED			
16	CAM	1	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 TYPE 410	ASME SA-479 UNS S20910
17	SPACER	1	ASME SB637 UNS N07718			
18	CAM BELLEVILLE	1	ASME SB637 UNS N07718			
19	STOP BOLT*	1	MFR STANDARD STAINLESS			
20	STOP NUT*	1	MFR STANDARD STAINLESS			
21	STOP LOCK WASHER*	1	MFR STANDARD STAINLESS			
22	HANDLE NUT*	1	MFR STANDARD CARBON STEEL			
23	HANDLE BOLT*	1	MFR STANDARD ALLOY STEEL			
24	SNAP RING STEM RETAINER*	1	MFR STANDARD			
	NOTES:					
	* SD = SIZE DEPENDENT					
	** FOR 4500#, STEM IS ASME SB637 UNS N07718 (INCONEL 718)					
	*** FOR 4500#, BODY/BONNET SEAL IS ASTM B670 PLATED					
	*** FOR 4500#, STEM BUSHING IS AMS 5387 STELLITE #6.					

Figure 1 C
Detail of Cartridge and Cam Assembly

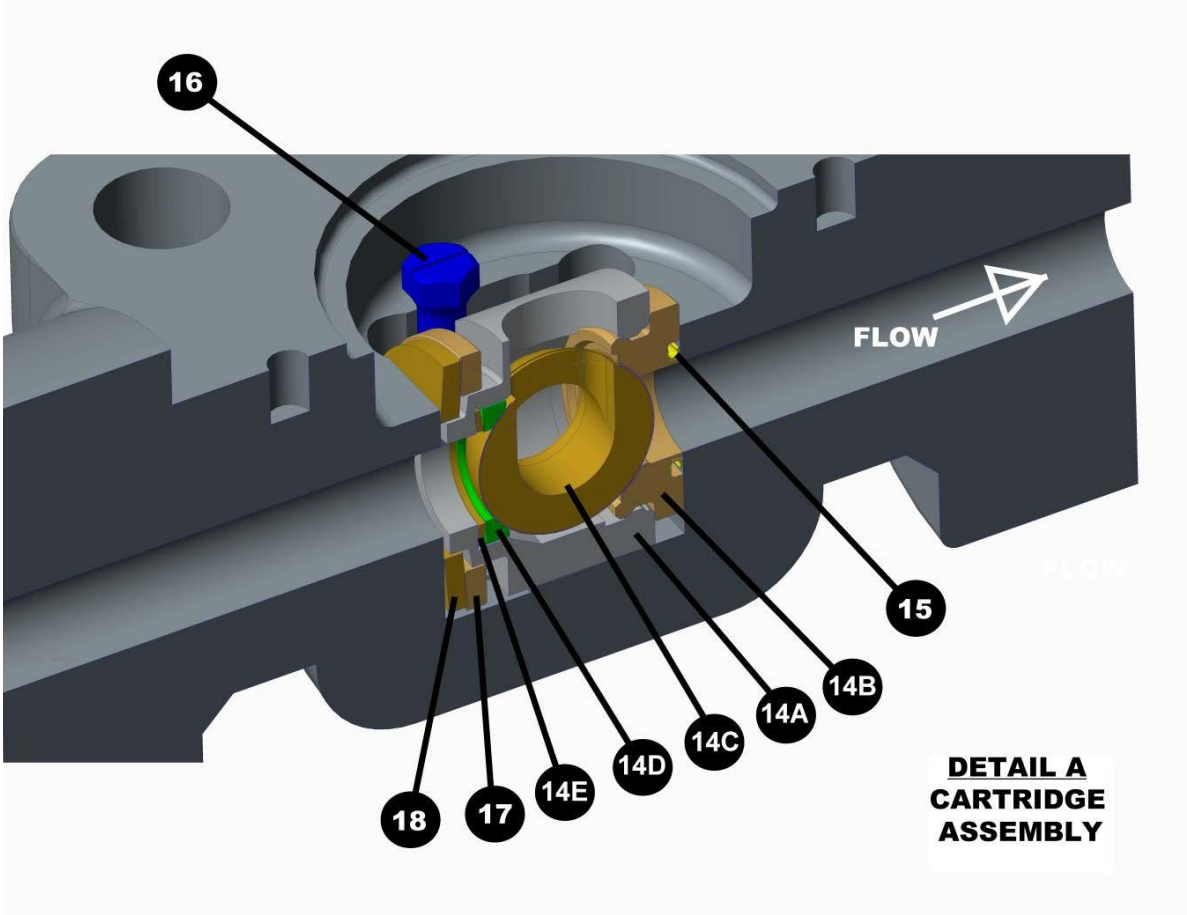
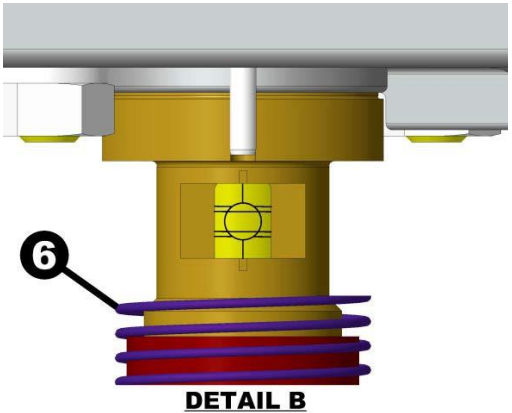


Figure 1 D
Stem Position Indication in Bushings



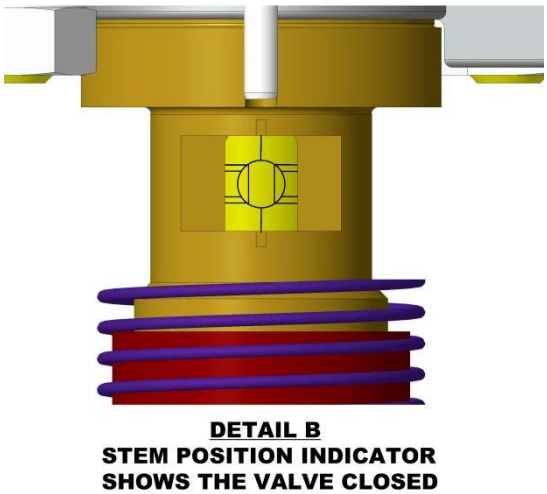


Figure 2

	REQUIRED TORQUE (FT-LBS)
VALVE SIZE CODE	GLAND
5E	37
7E	37
7H	47
9H	47
9J	180
9K	180
10N	340

Figure 3

CAM SOCKET WRENCH REQUIREMENTS	
VALVE SIZE CODE	CAM HEX DIMENSION
5E	3/8"
7E	3/8"
7H	7/16"
9H	7/16"
9J	7/16"
9K	7/16"
10N	9/16"

Figure 4

	REQUIRED TORQUE (FT-LBS)
VALVE SIZE CODE	BONNET NUT
5E	330
7E	500
7H	500
9H	500
9J	500
9K	500
10N	500

Figure 5A - Camseal Torques (to 3100#)

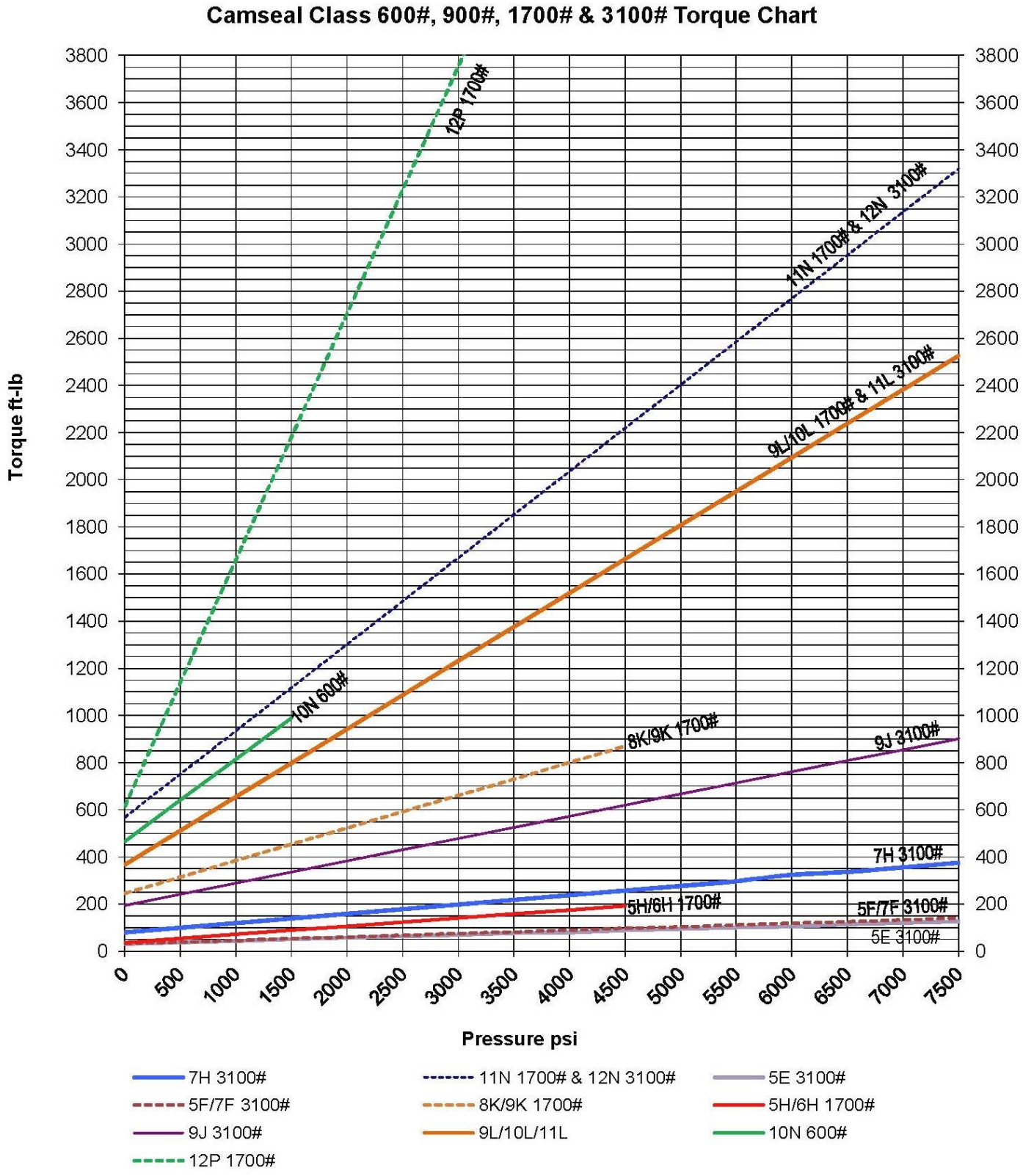
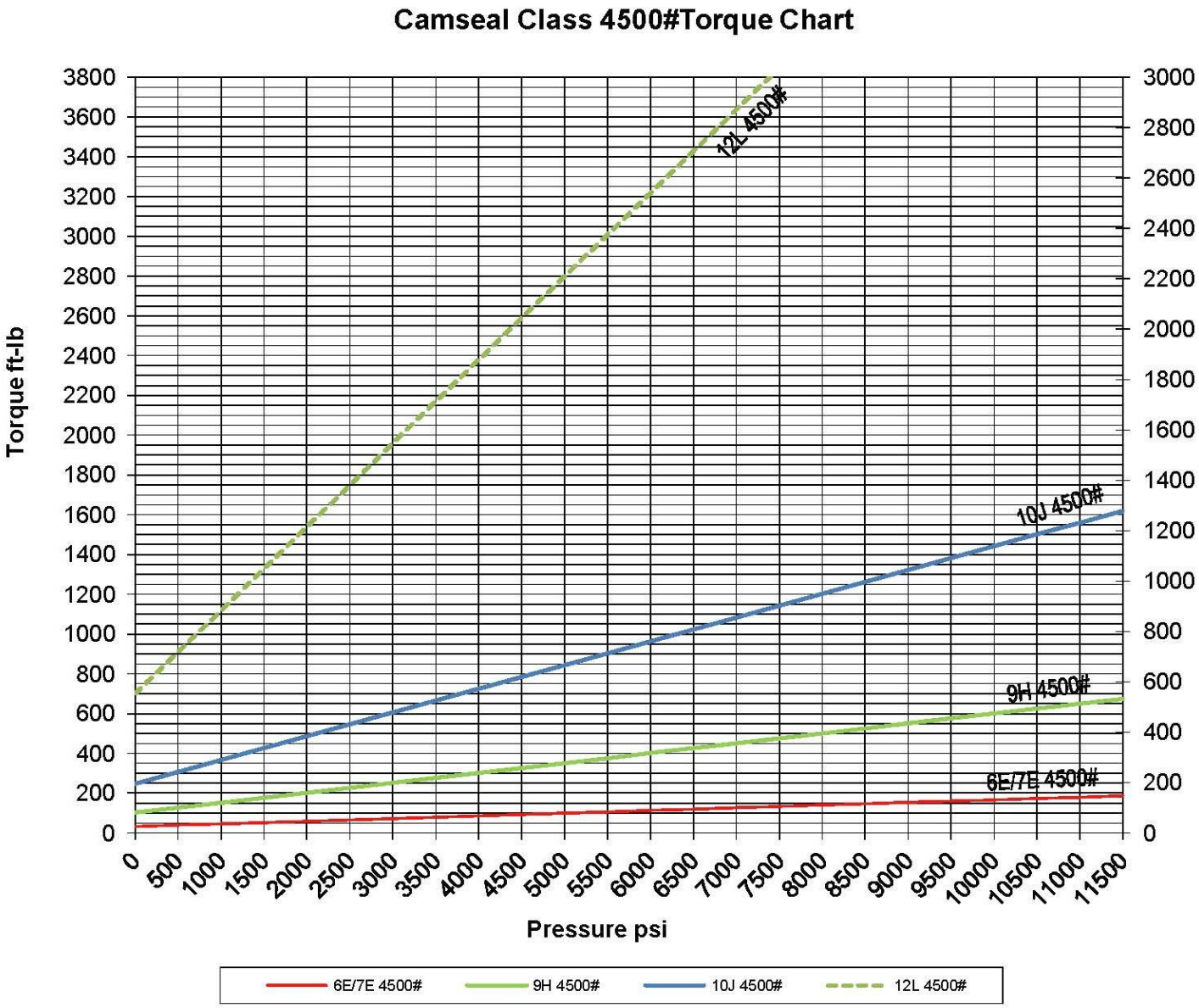


Figure 5B - Camseal Torques (4500#)



VIII-A

Camseal Body/Bonnet Seal Surface Refurbishment Instructions – for Valves Equipped with C-Seals [Class 4500# or as designated]

Note: The tool numbers referenced in the following steps are for the size 5E (beginning with C-242). Tools for other sizes are available and start with the prefixes as follows:

Size	Tool #		Size	Tool #		Size	Tool #
5E	C-242		7H	C-245		9J	C-247
7E	C-244		9H	C-246			

1. Disassemble the bonnet from body and remove the cartridge assembly as described in section IV of these instructions.
2. Observe the C-seal groove in the body for potential damage. Take a measurement with a depth micrometer from the face of the valve to the C-seal groove. It should be 0.125 to 0.130" all the way around with a maximum variance of 0.0001". Note this measurement in 4 places.
3. The seal groove "potential damage" may have a cut in the surface that looks like wire draw, the cut could be 0.001 to 0.004" deep. The seal groove may have minor imperfections to a maximum depth of 0.001".
4. Please refer to drawing C-242 (See Figure 6A) for all parts.
5. A body seal groove with a wire cut will require the use of the C-242-E-120-2.750C abrasive, red/orange paper. Stick the abrasive to the C-242-C black oxide steel disc (See Figure 6C). Note: be sure to remove any sanding abrasives still on the disc C-242-C.
6. Place the disc C-242-C with the abrasive side against the C-seal groove. Place the drill arbor assembly C-242-D onto the disc C-242-C. Locate the housing assembly P/N C-242- F over the arbor assembly C-242-D and two of the 7/8-14 studs on the body assembly. Lock the housing in place with two 7/8-14 hex nuts.
7. Take measurements using the Depth Mic measuring locations on the housing. Ensure that the Sanding disc P/N C-242-C is properly seated in the seal groove.
8. Attach a ½" chuck screw gun to the arbor assembly P/N C-242-D. Apply light pressure (5-10 lbs) as you operate the screw gun at its max RPM. Run the screw gun for about 30 to 45 seconds. This should remove 0.001" to 0.002" of material.
9. Remove the screw gun from the arbor. Remove the 7/8-14 nuts and carefully remove the housing assembly C-242-F and arbor assembly C-242-D from the body. Remove the disc P/N C-242-C from the body.
10. Blow or vacuum out any debris caused during the sanding operation. Visually examine the location of the wire draw. Depending on the depth of the cut, it may require a little more time with the C-242-E-120-2.750C. If the cut looks minor at this point go to the next step.
11. Repeat steps 5 through 10 using the C-242-E-240-2.750 abrasive paper. This will create a phonographic surface finish that is between 63 µin Ra and 32 µin Ra. Running time should be 30 seconds to 1 minute. Clean the body. Depending on the appearance of the groove this step may need to be repeated.
12. Repeat steps 5 through 10 using the C-242-E-400-2.750 abrasive paper. This will create a smoother circular lay surface finish that is between 32 µin Ra and a 16 µin Ra. Running time should be 30 seconds to 1 minute. Clean the body. Depending on the appearance of the groove this step may need to be repeated. Measure the final depth of the C-seal groove.

13. If the final depth of the groove exceeds 0.135", the C- seal will not hold pressure and the body will require replacement.
14. Clean the components of the valve. Be sure to use a new C-seal for the body to seat surface and a new C-seal for the body to bonnet surface. Also a new bonnet assembly may be required to ensure that the mating surface of the C-Seal is in new condition.
15. Continue with reassembly of the valve in accordance with the procedures in Section IV.

VIII-B

Camseal Body/Bonnet Seal Surface Refurbishment Instructions – for Valves Equipped with Graphite/SST Laminate Seals [Class 3100# or lower]

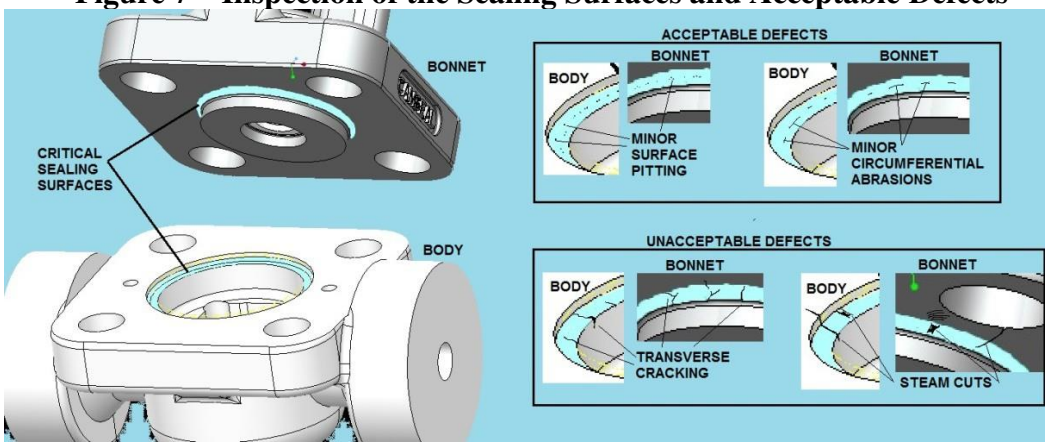
<u>Note:</u> Valves 4500# or above use C-Seals, but all Class 3100# and below valves shall be retrofit with laminate seals per these instructions

1. Disassemble the bonnet from body and remove the cartridge assembly as described in section IV of these instructions.
2. For valves which have been in service – whose critical body or bonnet surfaces have been corroded, worn or eroded to the point where surface refurbishment for the use of a replacement C-seal is not possible – a graphite laminate body/bonnet seal can be used in its place.
3. However; replacement **<u>laminate seals cannot be used with a mirror-smooth or polished finish</u>** and should have an optimum finish of 32 to 63-microinch AARH with either a concentric lay or serrated/phonographic finish.
   3.a. The sealing surfaces can be hand-worked using sandpaper of specific grits to achieve the desired finish.
   3.b. OR, using an arbor or lapping tool (C-242-C or C-242-G) with self-adhesive sandpaper to roughen the surfaces of the body and bonnet while applying a circular lay pattern.

Refurbishment procedure for the use of laminate seals:

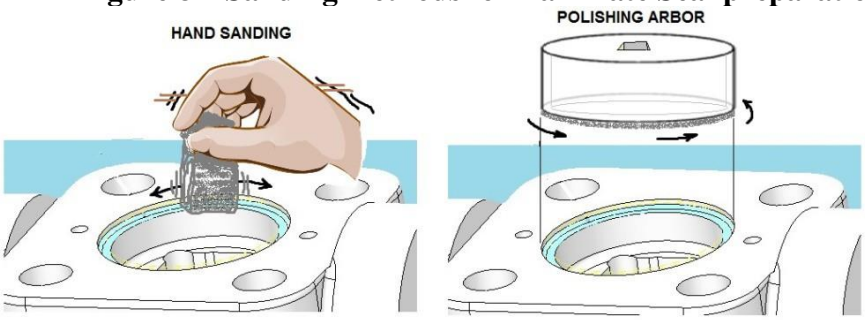
4. For parts that have been in service – CLEAN all corrosion, rust and scale from the critical sealing surfaces of the body and bonnet using SCOTCH-BRITE or equivalent abrasive pads.
5. INSPECT the cleaned surfaces of the body and bonnet to ensure there are no excessive pits, cracks, chipped plating or other damage that would cause leakage across the critical seal contact faces (see Figure 7 below):

Figure 7 – Inspection of the Sealing Surfaces and Acceptable Defects



6. Increase the surface roughness of both the body and bonnet critical sealing surfaces by SANDING using 120-grit sandpaper – or rougher as needed – using the following methods:
   6.a. BY HAND – using moderate hand pressure, fold a piece of sandpaper sheet and form into approximate circular contour of the surface and sand in a CONCENTRIC fashion with a slight back-and-forth motion repeatedly around the circumference until the desired roughness is reached (See Figure 8 below).
   6.b. Using a POLISHING TOOL / ARBOR – using adhesive-backed sandpaper (Ref: Tool C-242-E-120-2.750C for 5E) attached to a polishing tool or arbor (as suggested in Figure 8), and apply the arbor to the sealing surfaces using MODERATE PRESSURE at LOW RPM, frequently brushing or blowing off surfaces until the desired roughness is achieved.

Figure 8 – Sanding methods for Laminate Seal preparation



7. CLEANLINESS – clean surfaces with a mild degreaser and lint-free cloths to remove any grease or residue, or any loose grit from sandpaper before attempting to install the laminate seals.

8. FINAL INSPECTION – use a fingernail to verify that a rougher surface with a concentric lay has been created by the sanding operation. Use a roughness height comparison block, or visual comparison to verify approximate roughness height to ensure it is within specification.

9. FINAL ASSEMBLY AND VERIFICATION –
   9.a. Prior to assembly, inspect the replacement laminate seals and ensure their top and bottom surfaces have not been damage, cut or dented during shipment or handling. Deep dents, cuts or abrasions will adversely affect sealing performance.
   9.b. Reassemble the valve in accordance with the procedures of Section IV. It is recommended that a SYSTEM PROOF TEST be performed – if a full hydrostatic test of the valve assembly is not possible – to ensure the new seal in the assembly is ready for service.

Figure 6A – Body/Bonnet C-Seal Groove Resurfacing Tool (5E shown)

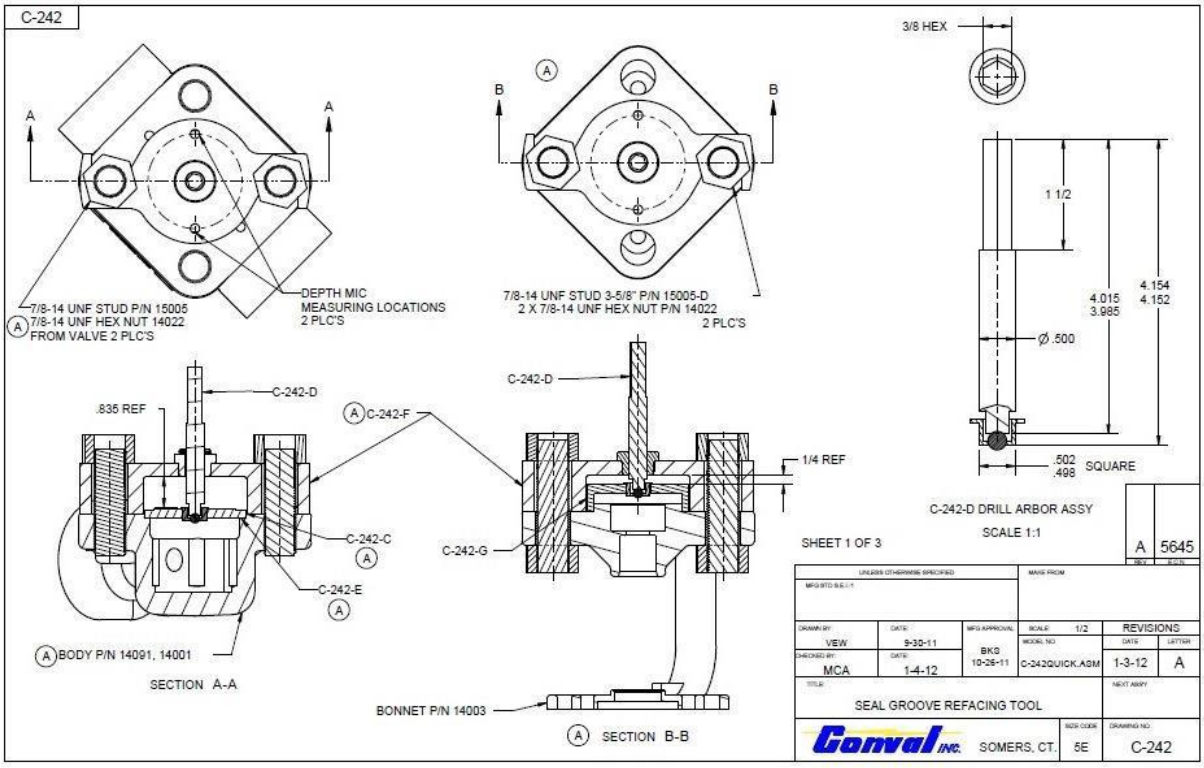
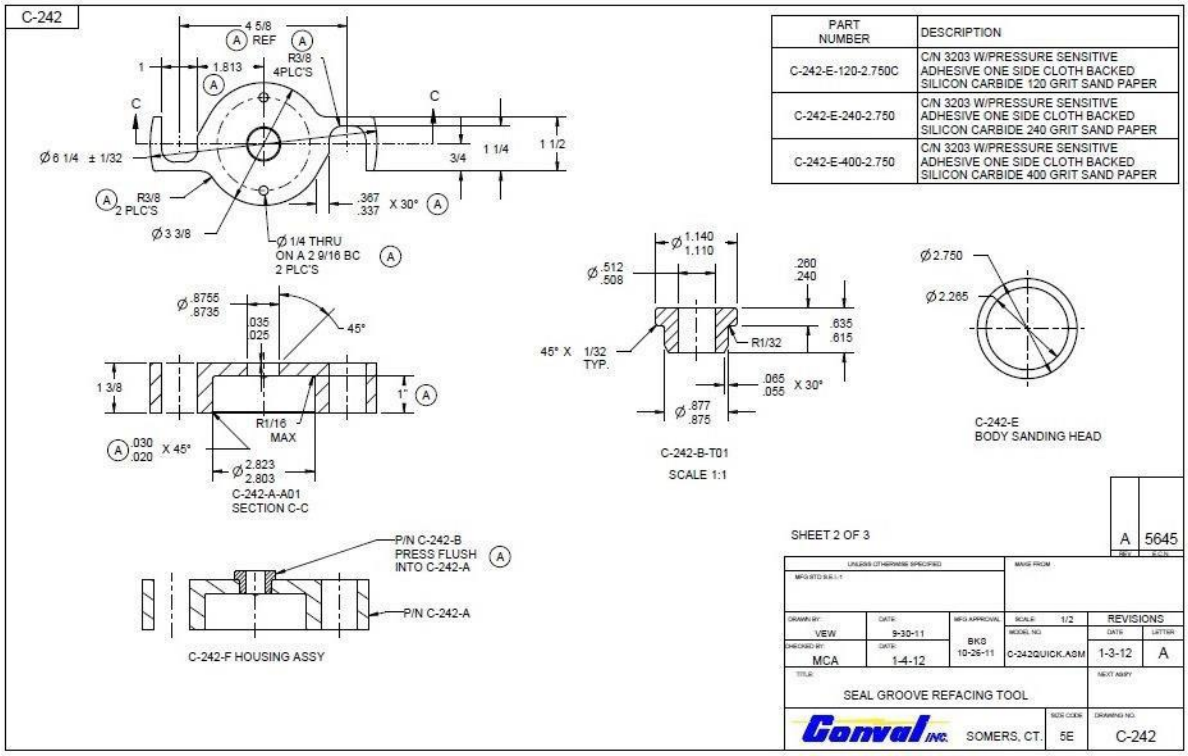
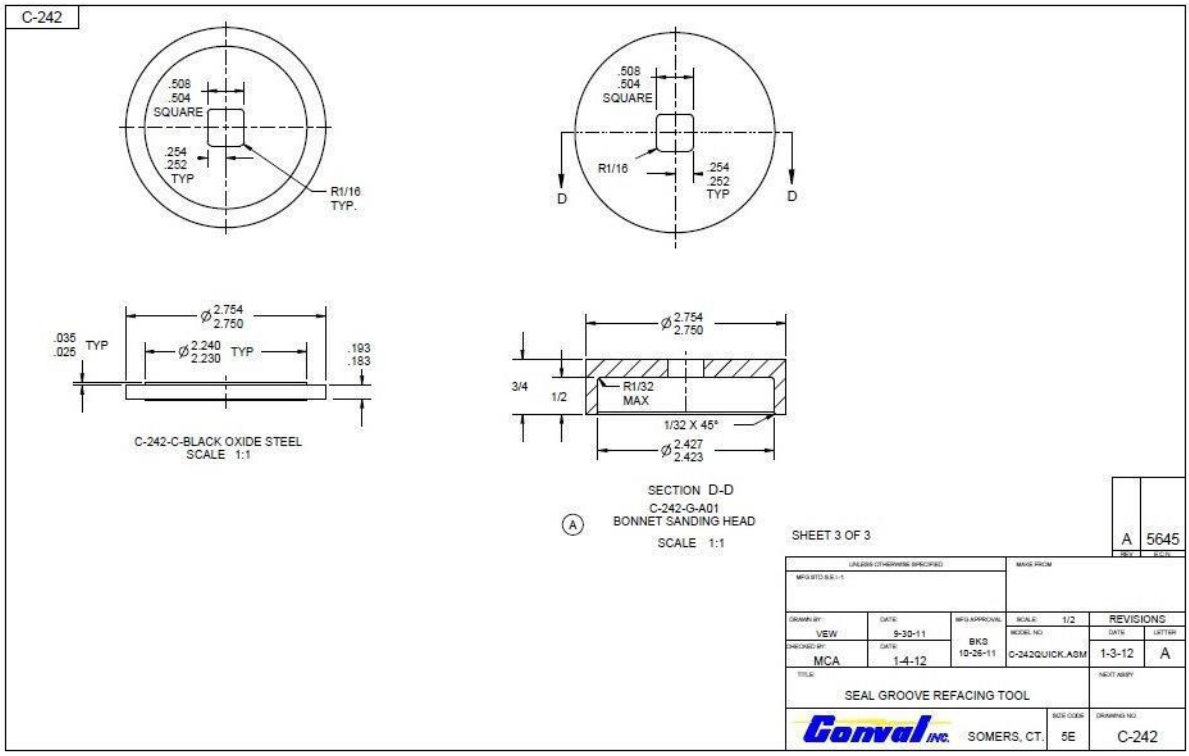


Figure 6B – Body/Bonnet C-Seal Groove Resurfacing Tool (5E shown)



PART NUMBER	DESCRIPTION
C-242-E-120-2.750C	C/N 3203 W/PRESSURE SENSITIVE ADHESIVE ONE SIDE CLOTH BACKED SILICON CARBIDE 120 GRIT SAND PAPER
C-242-E-240-2.750	C/N 3203 W/PRESSURE SENSITIVE ADHESIVE ONE SIDE CLOTH BACKED SILICON CARBIDE 240 GRIT SAND PAPER
C-242-E-400-2.750	C/N 3203 W/PRESSURE SENSITIVE ADHESIVE ONE SIDE CLOTH BACKED SILICON CARBIDE 400 GRIT SAND PAPER

Figure 6C – Body/Bonnet C-Seal Groove Resurfacing Arbor Tools (5E shown)



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