

INSTRUCTIONS FOR MANLEY[®] RADIUS DISC VALVES

Proper maintenance and reconditioning is essential to successful compressor valve operation. Please refer to these instructions, valve assembly drawings and parts lists when performing maintenance on Cook Manley compressor valves. The assembly drawings and parts lists provide diagrams, part numbers of individual components, assembly envelope dimensions, pressure ratings, and relevant notes that will assist in properly maintaining the valves.

It is important to make sure that the correct parts are used. Each valve has a rebuild kit consisting of a complete set of discs, springs, and buttons (where applicable). The part number of this kit is shown on the parts list. Depending on the service conditions, the rebuild kit may or may not be the same for suction and discharge valves. If the kits are not on hand when performing maintenance, order genuine replacement kits from Cook Compression, Stafford, Texas, or your local Cook Compression representative. Cook Compression reserves the right to upgrade rebuild kit materials. *Note: Never mix old and new parts, even when they appear identical.*

In addition to using the correct parts, please make certain that the proper inspection tools, gauges and cutting tool are also utilized. The proper equipment is detailed in these instructions, and can be purchased from Cook Compression.

The lockwashers in Manley valves are special securing systems that use tension rather than friction to assure that the fastener cannot loosen during service. The system consists of two washers that have cams on one side. In order for these lockwashers to function properly, the cams must face each other when installed.

DISASSEMBLING AND CLEANING THE MANLEY RADIUS DISC VALVE

- To disassemble a breechlock design valve, place the valve in a suitable valve holding fixture with the guard down and use a 3-4 foot long bar with 2 pins to engage the seat ports (do not clamp in a vise). Rotate the bar counter-clockwise approximately 1/8 turn. *Note: If less than one thread remains engaged, the valve should be retired.*
- To disassemble a centerbolt design valve, place the valve in a suitable holding fixture and loosen the nut on the centerbolt. Rotate the nut counter-clockwise to loosen.
- Separate the seat from the guard.

- Discard the used discs, springs, and buttons (when applicable). *Note: If the parts appear damaged, broken, or excessively worn, it might be beneficial to return these valves to Cook Compression for analysis. In these cases, place the parts in a bag with the serial number, location of the valve, operating history, current operating conditions and gas analysis.*
- Depending on the amount of contamination present, the valve seat and guard can usually be cleaned with solvent and brushing. In the case of very heavy deposits or scaling, it might be necessary to bead-blast. Use caution when bead-blasting to ensure that the critical areas of the valve (radii, threads, etc...) are not eroded.

INSPECTING THE GUARD

Guards do not typically require re-work, but it is necessary to check the spring pockets for wear and damage. If guard damage is present, it is recommended that the guard be returned to Cook Compression for repairs, as special tooling is required.

INSPECTING THE SEAT

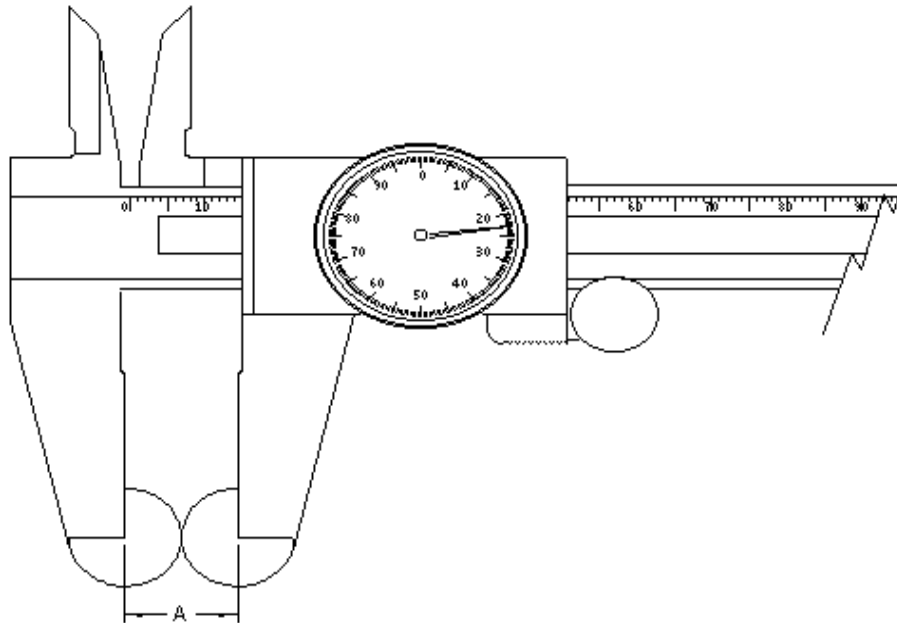
Condition Of The Sealing Radius:

- The critical area of the seats is the radius where the disc seals. Inspect this area carefully for burrs, scratches, or other damage that could keep the ring from sealing properly. If the seat is in good condition, the valve can be reassembled using a new rebuild kit, otherwise the radius should be machined (machining instructions discussed later).

Diameter Of The Sealing Radius:

- The diameter of the sealing radius is measured using ball calipers. With the calipers closed (balls in contact with each other), the dial reading should match calibration dimension. The calibration dimension will vary with the seat radius.

Figure 1 shows the radius size, calibration dimension, and the part number and caliper length for calipers purchased from Cook Compression.



SEAT RADIUS (in.)	CALIBRATION DIMENSION 'A' (in.)	COOK MANLEY PART NUMBER	CALIPER LENGTH (in.)
3/16	.375	18026	8
1/4	.500	18028	8
5/16	.625	18001	8
5/16	.625	18030	12
3/8	.750	18046	12
13/32	.812	18040	12
7/16	.875	18042	8
7/16	.875	18002	12
9/16	1.125	18031	12
11/16	1.375	18045	12

Figure 1. Caliper Calibration

- Measure the seat centerline by placing the caliper balls into the same seat groove. While keeping one ball stationary, obtain the maximum centerline reading
- A tolerance of $+.003''/-0.001''$ ($+.08\text{mm}/-.025\text{mm}$) is acceptable. This measurement should be checked before and after each seat cutting.

Depth Of The Sealing Radius:

- Choose the correct gauge from Figure 2:

PART NUMBER	SEAT RADIUS (in.)
18006	5/16
18007	7/16
18027	3/16
18029	1/4
18032	9/16
18039	13/32
18044	11/16

Figure 2. Depth Gauge Part Numbers

- Place the gauge block over the seat radius to be checked.
- With the ball of the gauge resting in the radius, place a standard depth micrometer onto the top of the block and measure through the hole to the top of the steel ball (see Figure 3).

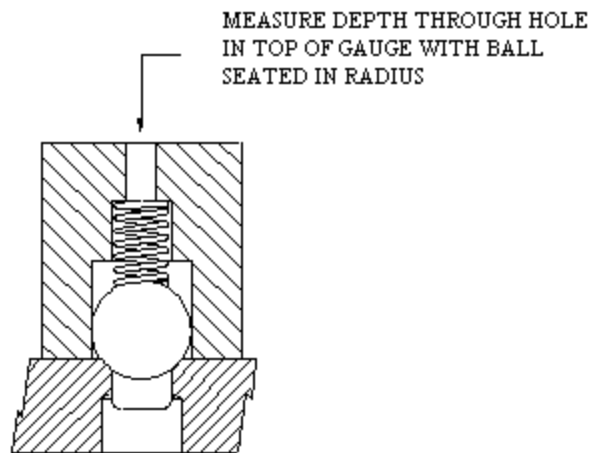


Figure 3. Depth Gauge Use

- Compare the measurement to the correct depth on the side of the block. A tolerance of $+0.011''/-0.001''$ ($+0.280\text{mm}/-0.025\text{mm}$) is acceptable.

REMACINING THE SEAT RADII

- Measure the flange thickness of the valve. Cook Compression allows a maximum of .085” to be removed from the seat. The valve thickness of a new valve is indicated on the assembly drawing. If the thickness of the valve being reconditioned is thinner than the indicated thickness minus .085”, then the seat should be replaced. Catastrophic failures are possible if the seat is too thin.
- If the seat is from a discharge valve, remove the center stud.
- Inspect the damage to the seating surface to determine approximately how much needs to be cleaned up. Measure the existing seat radius, radius depth, and centerlines.
- Set-up the seat in the lathe, and confirm that the outside diameter and the face are running true to within .002” (.05mm) max T.I.R.
- If the depth of the radius exceeds the tolerance on the depth gauge block, face the seat surface to allow sufficient depth to re-cut the seat.
- If a centerbolt style seat is faced, then it is important to increase the depth of the centerbolt counterbore the same amount (see Figure 4).



Figure 4. Centerbolt Style Seat

- If a Breechlock style seat is faced, then remove equal amounts of materials from surfaces X & Y (Figure 5) to ensure the proper lift is maintained. Also, there must be a minimum of one thread remaining (Z).

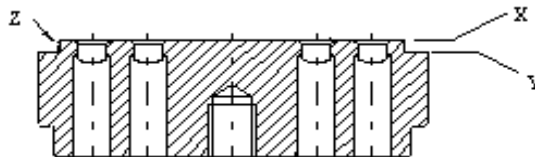


Figure 5. Breechlock Style Seat

- Using the gauge provided, set the tip of the cutting tool for the correct radius. The tool length is correct when the tip of the tool touches the gauge. Make sure that the tool is 90° to the gauge (see Figure 6). The tool length is adjusted by loosening the setscrew.

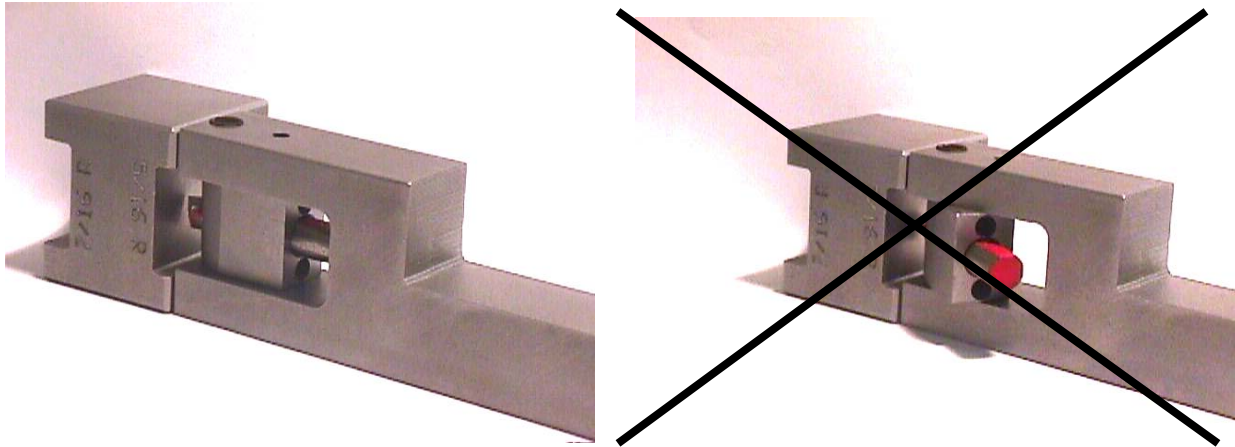


Figure 6. Correct and Incorrect Setting of Tool Length

- Beginning with the largest centerline, align the cutting tool with both sides of the seat radius.
- In order to ensure that the tool is properly aligned, make a skim cut of the seat. Using the ball calipers, re-check the seat centerline and adjust the tool if necessary. Continue this process until the tool is aligned.
- Once assured that the tool is aligned, cut the seat sufficient to clean up the damage. Check the depth with the depth gauge. If the depth is too shallow, cut deeper and re-check the depth. If the depth is too deep, then the seat needs to be faced. *Note: In order to prevent cutting too deep, it is recommended to take several shallower cuts until within tolerance.*
- If there are several valves to be re-cut, it is recommended to machine all of the same sized radii prior to moving to the next centerline. This eliminates the need to set-up for each valve. Once ready to move to the next centerline, if there not excessive play in the cross slide, then it is possible to move to the next centerline and bypass the skim cuts to align the tool. If there is play in the cross slide, then it is recommended to repeat the prior three procedures for each individual disc. *Note: Centerlines on the assembly drawings are nominal not actual.*

- Check the seat centerlines and depths prior to reassembling the valve. Clean off any burrs on the edges of the seat radius to assure that the discs will seal properly.
- *Note: When one seat radius is machined, all of the radii of that seat must be machined.*

REASSEMBLING THE MANLEY RADIUS DISC VALVE

- Place the guard on a bench with the spring pockets up. Install new springs and buttons (if applicable). Check the spring and button to ensure that they move freely, compress completely into the spring pocket, and return to their starting position.
- Replace the discs.
- Place the seat on top of the guard.
- Place the assembly in a suitable holding fixture and tighten to the torque value specified on the assembly drawing.
- For a breechlock assembly, place the valve in a suitable holding fixture, and using a bar with two pins to engage the seat, tighten the valve assembly. *Note: Do not over-tighten – just more than hand tight is sufficient.*

PROTECTION AND STORAGE

- Prior to storing the valves, they should be protected with a light coat of a rust preventative. *Note: Some preventatives contain additives that might be harmful to certain plastics. When in doubt, seek advice from the supplier.*
- The valves should be wrapped in a protective oiled paper or plastic bags.
- Ultraviolet rays adversely affect most plastics currently used for compressor valves, therefore it is preferable to store the valves out of direct sunlight.
- Humidity can adversely affect some disc materials, therefore it is preferable to store the valves in a dry location.