

# P & E SERIES VALVES

## OPERATION NOTES & CLEANING INSTRUCTIONS

### Technical Note 304

#### DESCRIPTION

VICI Valco P and E Series valves are rotary multi-port devices available in a variety of flow configurations, temperature ratings (-198° to 175°C P, or 225°C for E), and pressure ratings (106 torr to 3000 psig). The standard valve bodies are 300 Series stainless steel. For corrosive service, bodies are also available in other alloys such as Nitronic 60, Nitronic 50, Hastelloy C®, and Monel. In all P and E Series valves, the seal material is an inert fluorocarbon polymer blend.

#### INITIAL PRECAUTIONS

1. After unpacking the valve, do not remove the protective tape from the valve ports until you are ready to install the valve. As supplied, all surfaces are clean and free of contaminants, and must be kept clean to prevent premature failure. Open ports and fittings cause unnecessary risk of particulate matter entering the valve and scratching the sealing surfaces, which is the most frequent cause of premature valve failure.
2. The most common source of particulate and chemical contamination is tubing which has not been properly cleaned before installation in the valve. To avoid this problem, we suggest purchasing our electrolytically pre-cut and polished tubing, available in standard lengths for any plumbing requirement. If other tubing is to be used, make certain that all tubing ends are burr-free and cut square with the tube axis, and that all tubing has been chemically and mechanically cleaned.

**CAUTION: Failure to observe proper cleanliness procedures during installation of the valve voids the manufacturer's warranty.**

3. Make certain that tubes are seated completely before forming the one-piece Valco ferrule on the tube. This insures that the minimum connection volume will be obtained. (For more information on installing fittings, refer to Technical Note 503, Fitting Instructions.)
4. Always support the valve body with a wrench (an adjustable open variety is suitable) when tightening fittings. Failure to do so can apply a side-loading of the valve body to the rotor, which can distort the polymeric sealing surface and cause leakage."
5. Always leave the valve fully in its clockwise or counterclockwise position, never partially actuated.

#### DISASSEMBLY

**CAUTION: Do not disassemble the valve unless the system malfunction is definitely isolated to the valve: perform all other system checks first. If disassembly is required, make certain that the instructions which follow are carefully observed.**

All disassembly operations must be performed in a clean, well-lit area. Flush all hazardous or toxic materials from the valve before starting.

1. Using a wrench or nut-driver, loosen and remove the standard and elastic hex nuts from the threaded rotor shaft. **(Figure 1)**
2. Carefully slide the coil spring and washers from the shaft, noting their sequence.
3. Cycle the valve one time to break the "shear seal" between the rotor and the valve body.
4. Pull the valve body slowly away from the rotor. Be very careful to avoid contact of the threaded shaft with the polished interior of the valve body.

### **CLEANING THE VALVE BODY**

1. Using clean dry air, blow any loose debris from the interior of the valve body.
2. Wet a cotton swab with a solvent which is compatible with the chromatographic system. Isopropyl alcohol is recommended. Avoid using halocarbon solvents if the valve is to be used in a system with electron capture detection, since some of the solvents may persist at the trace level.

**NOTE:** If the valve has been used with aqueous buffer solutions and some leakage has occurred, wipe the sealing surfaces of the valve with a water-moistened lint-free tissue before using a non-polar solvent to clean any seal material still adhering to the valve's interior.

3. Blow with clean compressed gas to remove any lint left by the swab.
4. Visually inspect the interior of the valve body. The conical surface should appear highly polished. If any scratches are visible between the ports or anywhere which might suggest a potential leakage path or wear source, the valve should be returned to the factory for regrinding and polishing.

### **CLEANING THE ROTOR**

1. Grasp the rotor by the 1/4" shaft and briefly immerse it in solvent.
2. Gently wipe the polymer with a clean tissue.
3. Blow with clean compressed gas to remove any lint left by the tissue.
4. Visually inspect the rotor. If it shows any scratches and/or a narrowing of the flow passages, replacement is necessary.

### **ASSEMBLY PROCEDURE (NEW OR USED ROTOR)**

1. Make sure that all sealing surfaces are clean and dry.
2. Insert the rotor into the valve body, carefully avoiding contact between the threaded shaft of the rotor and the polished interior of the valve body.
3. While holding the rotor firmly in the valve body, slide the 3 washers over the threaded shaft in this sequence: 3/4" OD washer, polyimide washer, 1/2" OD washer. The flat side of the 3/4" washer should rest on the rear collar of the valve. Next, put the coil spring, the standard hex nut, and the elastic hex nut loosely in place. Orient the elastic hex nut so that the nylon side is toward the end of the shaft. "
4. Tighten the standard hex nut 1/2 turn past the point where the spring touches the hardware at both ends, and butt the elastic nut against it.
5. Actuate the valve 25 to 30 times.
6. Repeat the disassembly, cleaning, and inspection procedures.

7. Reassemble the valve as in Steps 2 - 4. Cycle the valve 10 times to seat the sealing surfaces, leaving the valve fully in its clockwise or counterclockwise position.
8. Add tension in three 1/4 turn increments, cycling the valve 10 times after each addition. This will make a total of 1-1/4 turns.
9. Test the valve with a gas leak detector. If a leak detector is unavailable, the valve may be pressurized with an appropriate gas and immersed in a solvent with low surface tension, e.g., 2-propanol. Test for gross leaks before immersing the valve, and always wear eye protection.
10. If the valve leaks, add tension in 1/4 turn increments, cycling the valve 10 times after each addition. Two more increments can be added if necessary, which will bring the total number of turns to 1-3/4. Never tighten the spring to the point where its windings touch one another.
11. If the valve still leaks after the additional half turn, cycle the valve from one position to the other while heating it. (Heat P Series valves to 175°C and E Series valves to 225°C.) If the valve still leaks after this, it must be returned to the factory for refurbishing.

**FIGURE 1: Exploded view of a P or E series valve**

