Case 2254
Changeover Valves Installed Between Safety Valves or Safety Relief Valves and Boilers
Section 1

Inquiry: Section 1, PG-71.3, requires that no valve be placed between the safety valve and boiler. For boilers whose MAWP does not exceed 800 psi, under what conditions may a changeover valve be installed between safety valves or safety relief valves and the boiler or piping to be protected?

Reply: It is the opinion of the Committee that for boilers whose MAWP does not exceed 800 psi, changeover valves may be installed between safety valves or safety relief valves and the boiler or piping to be protected (excluding Organic Fluid Vaporizers, Part PPG) under the following conditions.

(a) The stamped relieving capacity of the safety valve or safety relief valve shall be available whenever the boiler is in service.

(b) The changeover valve shall be designed such that there is no position where the internal plug, disc, or ball would isolate or block both safety valves or safety relief valves simultaneously.

(c) The changeover valve shall have an indicator that shows which safety valve or safety relief valve is in service. This may be accomplished by indicating which port of the changeover valve is open.

(d) The changeover valve shall have a positive locking device that permits it to be locked only when one of the outlet ports is fully open and the other outlet port is fully closed. Also, a warning tag shall be affixed to the changeover valve stating that the unchangeover valve is to be locked or sealed at all times except when being operated by a person who shall remain stationed at the changeover valve until it is again locked or sealed.

(e) The changeover valve shall be equipped with external valves to safely bleed off the pressure between the isolated safety valve or safety relief valve and the fully closed port of the changeover valve. Also, a warning tag shall be affixed to the changeover valve stating that the bleed valve shall be fully opened prior to servicing the isolated safety valve or safety relief valve.

(f) The changeover valve shall meet the requirements for materials and design of ASME B16.34.

(g) Calculations demonstrating that the changeover valve, the mounting nozzle, and its supporting vessels or pipe are capable of sustaining reaction forces from the safety valve or safety relief valve discharge shall be made available to the Authorized Inspector.

(h) The changeover valve inlet shall be permanently and clearly marked with the word “inlet.”

(i) The changeover valve shall be marked in accordance with the requirements of ASME B16.34. In addition, a nameplate shall be permanently affixed to the valve by the changeover valve manufacturer with the following information:

(1) the number of this Code Case;
(2) the actual orifice area of the safety valve or safety relief valve and coefficient of discharge $K_d$;
(3) $C_r$ value of changeover valve; and
(4) the name of the changeover valve manufacturer.

(j) The changeover valve flow path length may exceed the limit imposed by PG-71.2 provided the valve coefficient $C_r$ meets the requirement of (k) below. The use of the Y-bases and intervening pipe or fittings as provided for in PG-71.1 and PG-71.2 respectively shall not be permitted when applying this Code Case.

(k) The changeover valve shall have a valve coefficient, $C_r$, equal to or greater than the following:

$$C_r = 5.69 K_d K_s A \sqrt{\frac{p_t}{\delta}}$$

where

- $K_d = $ actual coefficient of discharge of the safety or safety relief valve
- $K_s = $ superheat correction factor for the safety or safety relief valve
- $A = $ actual orifice area of the safety or safety relief valve (in.$^2$)

---

The Committee's function is to establish rules of safety, relating only to pressure integrity, governing the construction of boilers, pressure vessels, transport tanks and nuclear components, and in-service inspection for pressure integrity of nuclear components and transport tanks, and to interpret these rules when questions arise regarding their intent. This Code does not address other safety issues relating to the construction of boilers, pressure vessels, transport tanks and nuclear components, and the in-service inspection of nuclear components and transport tanks. The user of the Code should refer to other pertinent codes, standards, laws, regulations or other relevant documents.

---

1 Changeover Valve: A three-way stop (or diverter) valve with one inlet port and two outlet ports designed to isolate either one of the two outlet ports from the inlet port, but not both simultaneously during any mode of operation.
\[ P_r = (1.03 \times \text{set pressure of the safety or safety relief valve}) + 14.7 \text{ (psia)} \]
\[ \delta = \text{density of steam @ } P_r \text{ (lb/ft}^3\text{)} \]

(1) The manufacturer of the changeover valve shall provide to the certificate holder a certified test report determining the rated \( C_v \) for the valve model, type, and size. The tests shall be made under the supervision of and certified by the manufacturer. The testing facilities, methods, and procedures shall be in accordance with the applicable requirements of ANSI/ISA-S75.02-1988.

(m) This Case number and the changeover valve nameplate information shall be shown on the Manufacturer's Data Report.

NOTE: It is recommended that the changeover valve be operated under the following conditions. Personnel trained in the operation of boilers (ASME Code Section VII) should be present during the operation of a changeover valve. Care should be taken to protect personnel from elevated temperature, excessive noise levels, and escaping fluids. It is further recommended that the boiler be operating at a reduced pressure and steady state conditions when a changeover valve is operated and also during the time any servicing is done on the safety valve or safety relief valve that is isolated from the boiler.