

Letting off Steam

by Lisa Walton, PE

Tired of restacking your deaerator trays? A multiport relief valve gently relieves steam pressure, protecting equipment and minimizing steam loss.

Steam relief valves are required by code to protect system components from dangerously high steam pressure. While a pop-type safety relief valve meets the code requirements, it does not offer regulation of minor pressure surges.

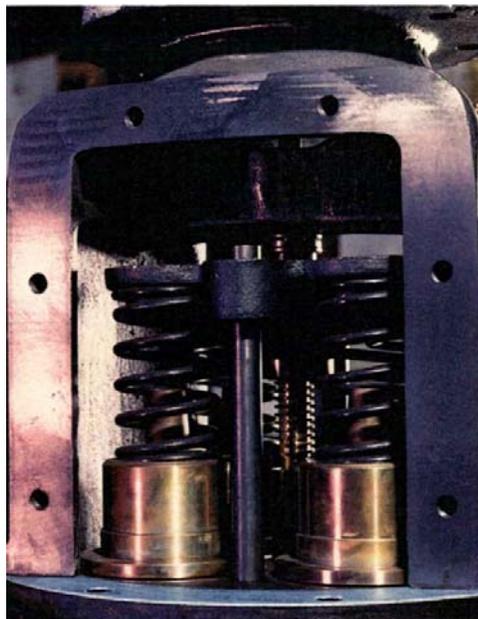
Pop-type relief valves

The standard steam relief valve, pop-type valves satisfy ASME code requirements from safety standpoint, but do not address operation issues. System pressure is not affected until the vessel design pressure is reached. At this point, the valve is activated. However, it will continue to relieve pressure until it re-seats itself, usually somewhat below the set pressure. Pop-type valves are usually set at vessel design pressure, which may affect the process or other components in the system. For example, in a system employing a deaerator and boiler feedwater pumps, the operating pressure of the deaerator is typically 5 psig. With a relief valve setting of 30-50 psig, water temperature in the deaerator storage tank (and boiler feed suction piping) will reach 250-280 F, meeting or exceeding the typical boiler feed pump design of 250 F.

Multiport relief valves

As its name implies, the multiport relief valve has a main housing comprised of multiple openings or ports. The increased surface area of the valve seats, combined with the reduced spring tension allows the valve to operate consistently over a broader range than a pop-type valve. A multiport relief valve relieves and regulates over-pressure in steam systems in the following manner:

1. Dampens pressure swings within deaerators, steam lines and associated components,
2. Provides smooth atmospheric relief of excess steam,
3. Relieves only that quantity of steam necessary to correct over-pressurization,
4. Limits operating pressure swings,
5. Protects equipment.



Deaerator protection

As deaerator pressure increases, deaerated water temperature also increases. When the operating pressure returns to normal, the water will flash in the storage tank and the boiler feed suction piping. When this pressure reduction is sudden, the flashed steam carries large quantities of water to the deaerator, causing displacement of the deaerator trays. This is the only operating condition which will upset the trays. A multiport relief valve located on the main steam header before the inlet to the deaerator will prevent the deaerator pressure from increasing, and eliminate flashing due to over-pressurization.

Boiler feed pump protection

A consequence of pressure swings in the deaerator is flashing in the boiler feed suction piping. As the pressure in the deaerator returns to normal, the water in the suction piping will flash, causing the boiler feed pumps to cavitate. This flashing is eliminated by keeping the deaerator pressure constant through the use of a multiport relief valve.

Condenser protection

By installing a multiport valve on the exhaust steam line, a condenser is protected against positive pressure when it loses vacuum.

Low pressure system protection

Another location for a multiport relief valve is downstream of a pressure reducing station on low pressure exhaust systems that use live steam. If the reducing valve fails in the open position, the relief valve provides protection against over-pressurization.

Steam savings

By opening and closing gradually, a multiport relief valve reduces the amount of steam lost during a pressure excursion.

Conclusion

When used in conjunction with a required safety relief valve, a multiport relief valve protects expensive system components from high pressure excursions.

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Kriebel Engineered Equipment, Ltd.

9 Humphreys Dr. - Warminster, Pa. 18974

Phone: 215-364-3400 - Fax: 215-364-4401

www.Kriebel-Ltd.com

