Under Pressure

The following pressure relief arrangement is often found on the thermosiphon oil cooling heat exchangers of screw compressors. In this particular instance, the heat exchanger is a shell and plate unit with isolation valves for servicing of the heat exchangers. A reseating relief regulator is piped around the isolation valve in the thermosiphon return (TSR) line. If the pressure rises in the thermosiphon heat exchanger due to an incomplete pump out while isolated, or if a fire breaks out around the heat exchanger, causing an overpressure, the regulator will open relieving excess pressure into the TSR line. There is no question that such an installation works. However, unfortunately, it is not compliant with the ASME Boiler and Pressure Vessel Code (B&PVC). In this case, there are multiple code violations.

First and foremost, the heat exchanger in question is built to the ASME B&PVC. It is U stamped, indicating as such as shown in the picture of its nameplate. Since the heat exchanger is built to the B&PVC, it must comply with the pressure relief provisions of the code.

UG-126(a) of the B&PVC state that "Safety, safety relief, and relief valves shall be of the direct spring-loaded

type." This regulator functions with a pilot through the relief regulator module.

UG-126 (B) continues by stating that "Pilot-operated pressure relief valves may be used, provided that the pilot is self-actuated and the main valve will open automatically at not over the set pressure and will discharge its full rated capacity if some essential part of the pilot should fail." While the pilot operation of this regulator is allowable, the fact that it's operation is required in order for the relief of pressure to occur makes it non-compliant with this provision.

UG-129(a) goes on to state "Safety, Safety Relief, Relief, Liquid Pressure Relief, and Pilot-Operated Pressure Relief Valves. "Each safety, safety relief, relief, liquid pressure relief, and pilot-operated pressure relief valve … shall be plainly marked by the Manufacturer or Assembler with the required data in such a way that the marking will not be obliterated in service." One of the required data items is the set pressure of the relief. If the regulator that is installed in this application is a reseating relief regulator with a seal preventing field adjustment of the set pressure, we are part way to compliance. However, the actual set pressure is usually not stamped on the regulator, thus preventing compliance with this provision. Another data marking required is the certified capacity of the relief valve. These regulators do not have this data point.

Finally, note that the last point mentioned a certified capacity. Yes, safety relief valves that are compliant with the ASME B&PVC must be certified by the National Board of Boiler and Pressure Vessel Inspectors and must be marked with the ASME Certification stamp, including a UV designation. You will not find such a mark on these regulators, again preventing them from being compliant with the B&PVC.

To give the facility credit, the downstream isolation valve for this pressure relief valve is locked open, thus complying with the requirements of IIAR2-2014 Section 15.14.1.

In order to make this installation code compliant, the relief regulators need to be replaced with UV stamped, safety relief valves that relieve internally back into the system.

If you have photos of an Epic Fail please pass them on to nh3isB2L@gmail.com.

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