REFRIGERATION REVIEW

Dual Relief Valve Manifolds

While coaching a young engineer, I had the opportunity to try and explain why a dual relief valve manifold is really a two-way valve and not a three-way valve. While it could be operated incorrectly as a three-way valve, its design function is to operate as two-way on one relief or the other.

Years ago I had a refrigeration operator ask me what position the dual relief valve should be in. He had always thought it should be in the “neutral” position, where both valves would be exposed to the vessel pressure, and he was quite surprised that all the years he had operated systems he didn’t know it was one way or the other. This obviously makes it a two-way valve, not a three-way valve, as he had operated it.

As shown in the cut away pictures, the manifold valve is either to the left or right, which exposes vessel pressure to one or the other of the safety relief valves. The reason for the dual manifold is for the convenience of replacing either of the relief valves without having to pump down the vessel, evacuate the liquid and gas, which might take days, not just hours. Also, it would be well to note that quite often we use two sets of dual

manifolds on vessels to standardize the relief valve sizes and make it a lower volume release if a valve should go off.

If one is using a retention tank, with one gallon of water for the matching pounds of ammonia released from the largest relief valve in one hour, this two-set dual manifold set up also permits a smaller retention tank. It would also be well to note that once the pressure has subsided after a relief valve opens, the relief valve will want to close. The general practice is to replace a relief valve once it has opened with a new relief valve, and as has become industry standard, all relief valves should be changed out every five years.

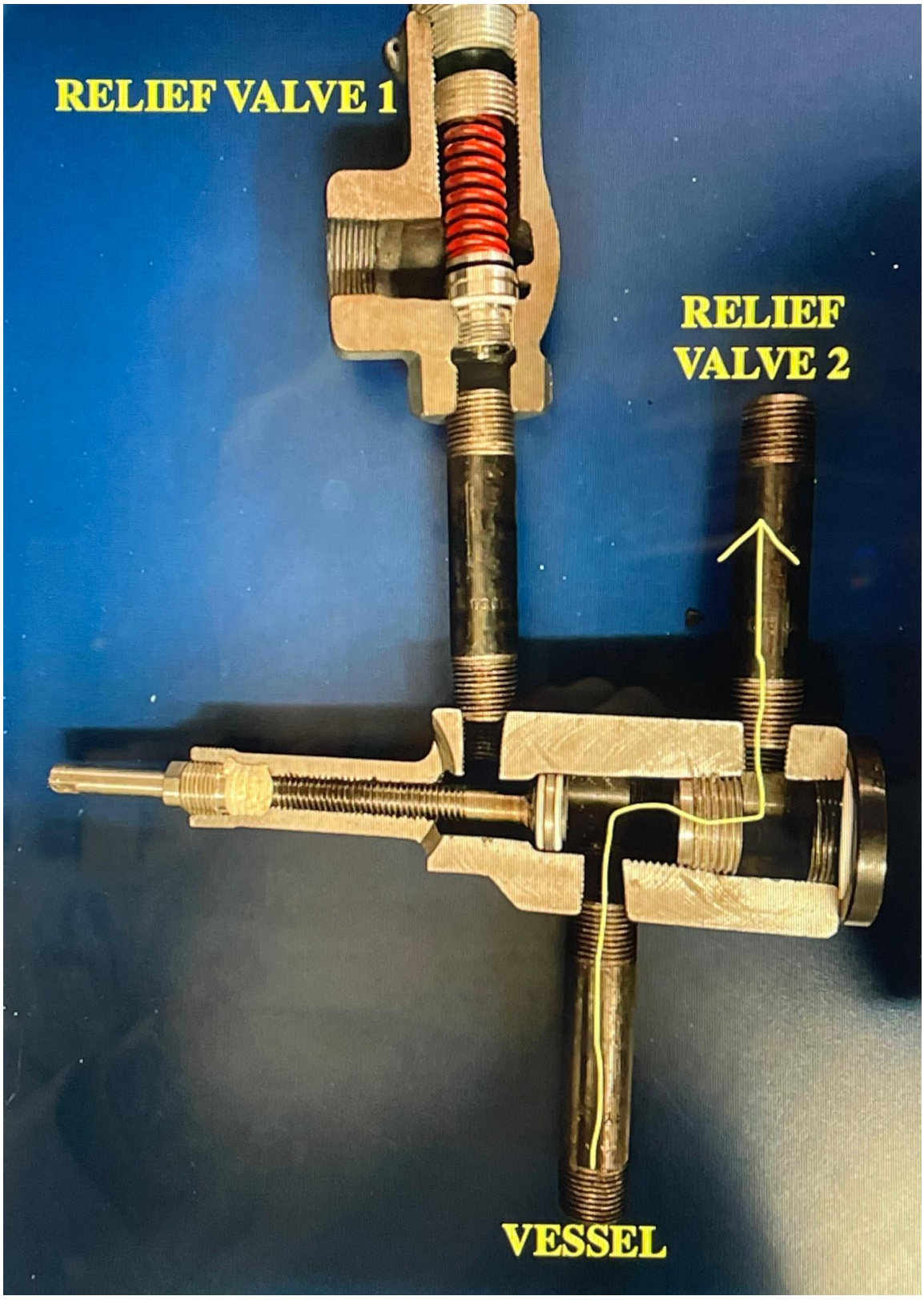
One incident that might help explain vessel pressure and what happens when pressure subsides is an incident that happened years ago with a horizontal receiver. The dual relief valve had been manifolded in such a way that it discharged in the direction, that, if it blew, it would unscrew the entire manifold and relief valve assembly – which it did after a Barber-Coleman condenser fan control device failed, and all the compressors but one cut off on high pressure cutout. That lone compressor was an HDI that kept pumping until the relief valve blew, and the manifold unscrewed and ammonia blew out of the receiver until it had coated itself with frost and ice. This took about 9 minutes, at which time the gas had slowed way down and a man could go over and screw on a valve and stop the release of ammonia.

You think about what the residual pressure would be. Of course, the ammonia would go to near -28°F at 0 psig, and the frost

would have built up fairly rapidly, and the gas volume would have been greatly diminished. A good exercise one day would be to calculate the theoretical curve of the reduced pressure as a function of the frost and ice buildup on the receiver.

So, hopefully that gives some insight into relief valves, their proper application, and the difference between two-way and three-way operation of a dual relief manifold.

Dual Relief Manifold in Position 1



Dual Relief Manifold in Position 2