Top seven reasons why relief valves leak

Relief valves serve a very important function in keeping a closed pressurized heating system safe. If for some reason the system were to experience a pressure increase beyond the rated capacities of the heating components, the relief valve would open to discharge the excessive pressure, thus preventing a potential explosion.

Unfortunately, there are times when the operation of the valve is viewed more as a nuisance than a safety function. How many times have you heard this: a service technician responds to a "leaky relief valve call" from a customer by simply condemning the existing valve and replacing it with a new one…only to have the same service call come back to the office within a day or two? There is always the possibility that the relief valve is bad, but more often than not, the valve is just doing its job—reacting to a system experiencing too much pressure. And this leads us to the subject of what CAN cause a system to experience excessive pressures?

By George Carey

1. DIAPHRAGM EXPANSION TANK HAS LOST ITS CHARGE.

When attaching a diaphragm tank to a hot water system, the pre-charge on the air side of the tank HAS to match the fill valve's setting. If for some reason (oxygen diffusion or rupture) the charge is lost, there is no cushion left to absorb the expanding water as it is heated. Since water is NOT compressible, the pressure in the system will rise dramatically whenever the boiler fires, heating the water.

2. DIAPHRAGM EXPANSION TANK IS NOT CHARGED PROPERLY.

These tanks come pre-charged from the manufacturer normally at 12 psi. Why? Because the majority of the systems they will be installed in are two story structures. The pressure reducing valve is set to 12 psi so that water is under pressure (usually 4-5 lbs psi) at the high point in the system. If the tank is installed in a taller building, the air charge in the tank has to be changed to match the pressure reducing valve's setting. If the tank's charge is not increased, cold system water will enter into the tank and when the boiler heats up the system water and it expands, there won't be enough room in the tank to accept the expanding volume of heated water.

3. PRESSURE REDUCING VALVE IS LEAKING BY.

If the diaphragm in the PRV is compromised, it may allow water from the city pressure-side to leak by, which would slowly over-pressurize the system and cause the relief valve to discharge.

4. DHW INDIRECT TANK'S COIL HAS A SMALL HOLE IN THE COIL.

Typically when using an indirect water heater, the boiler water in circulated through the stainless steel coil and the potable water is stored in the tank itself. Every now and then, a pinhole may develop in the coil. If that occurs, the higher pressure water (potable water from the cold water line feeding the tank) will overcome the heating system's operating pressure. This will eventually over-pressurize the heating system and cause the relief valve to discharge.

5. BOILER HAS AN INTERNAL TANKLESS COIL.

Although not as popular, there are still a certain number of boilers in the field that use an internal tankless coil to produce domestic hot water. Over the years, depending upon water quality conditions and liming, the coil can become scaled up, affecting its ability to transfer heat resulting in cooler water. The aquastat is turned up to overcome the scaling and eventually the tankless coil's wall thickness is compromised and it starts to leak. The city water pressure overcomes the heating system's operating pressure and eventually causes the relief valve to discharge.

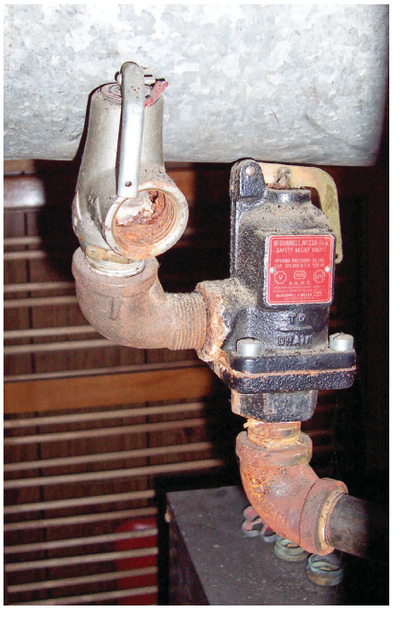
6. STEEL COMPRESSION TANK HAS LOST ITS AIR CHARGE.

There are still numerous older steel compression tanks installed that frequently become water-logged. Once that happens, there is no "spring" left to absorb the expanding water, the pressure increases quickly and the relief valve opens to relieve the pressure. The solution is to find out why the tank continually loses its air. One of the most common reasons is someone has installed one or more automatic air vents in the system.

A system that uses a steel compression tank is called an Air Control system. For this type of system to work properly, there can be no automatic vents. Any air found in the system needs to be directed back to the steel tank. If this air is vented, then the system pressure is reduced, which causes the feed valve to open to replenish the system's pressure. Unfortunately, the only place the water can go to is into the tank. After enough cycles, there isn't enough "cushion" to absorb the heated water. The system pressure quickly rises and the relief valve opens to discharge the excessive pressure.

7. THE BOILER'S AQUASTAT IS FAULTY.

Most heating systems are designed to operate between 180°–200°F at design outdoor conditions. Some may go as high as 210°F, but not beyond that range. What sometimes can happen is when the aquastat goes out of calibration or the sensing probe becomes fouled, instead of shutting off the burner it allows it to continue firing. Naturally, the water temperature continues to elevate and eventually cause the relief valve to discharge. Why? When diaphragm tanks (or steel tanks for that matter) are sized, there are a couple of factors that come into play to select the right unit. The volume of water in the system is very important because that will determine what the acceptance volume is for a diaphragm tank. When you look at the sizing charts that most manufacturers publish, in the small print you will see that all the tanks are sized based on a maximum temperature of 200°F. If an aquastat becomes faulty and allows the system water temperature to rise too high, this would increase the amount of water expansion that occurs in that system. The net result is an expansion tank that suddenly is too small to accept ALL of the expanding water. The system pressure then rises dramatically and the relief valve discharges!



If you have any questions or comments, please call me at 1-800-423-7187 or email me at gcarey@fiainc.com