

Troubleshooting excessive relieving of pressure relief valves

Tips to remedy this frustrating problem with closed-loop systems.

By Mario C. Uy

Pressure relief valves are installed on closed-water loops for safety and to protect the system from damage due to excessive pressure buildup. But when they relieve or pop too frequently, new problems are created.

Excessive pop-off leads to excessive make-up water. Makeup water brings in additional dissolved gasses, i.e., oxygen, carbon dioxide, increasing potential for corrosion.

It brings in additional minerals and/or microorganisms, increasing potential for deposition and fouling. It will also drop any chemical treatment in the closed loop, reducing the intended protection.

Additional chemical treatment will have to be replaced, increasing costs. In many cases, the chemical treatment is abandoned completely because it simply becomes too costly to replenish infinitely. The system then suffers damages in geometrical progressive proportion.

Abandonment is obviously not the right solution. The root cause of the excessive pop-off of the relief valves must be investigated and remedied.

The following are the most common

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sources of the problems and some suggested troubleshooting guides:

Feedwater regulator

- Check the make-up feedwater regulator valve.

The regulator controls the intake of make-up water to the closed loop. If you lose water in the closed loop, the pressure in the loop drops.

When the pressure drops to a low preset point on the regulator, makeup water is able to pass through to replenish the loss. As the loop is being filled, the pressure in the loop will rise and eventually reach the high preset point on the regulator, which then stops any further makeup.

If you have a defective regulator, it may not shut completely. Therefore, makeup water will continue to enter the

loop, increasing the pressure until it exceeds the pressure rating of the pressure relief valves, causing the relief valves to pop.

As the system loses water, the pressure drops back down to below the pressure rating of the relief valves, deactivating the valves. The cycle then repeats.

The frequency of the pop-off is a function of the infiltration rate of the make-up water.

- Check the preset pressure points on the feedwater regulator valve.

Investigate the set points to ensure that they are where they should be and have not been inadvertently changed.

A quick fix is to shut the makeup valve manually. You may want to do this temporarily for observation to see if the pop-off disappears.

If it does, you can conclude that the problem is in the feedwater regulator valve - either it's defective or it simply needs readjustments.

Expansion tank

- Your expansion tank could be flooded with too much water.

If so, there's not enough air space for expansion. As such, when the water is heated, and the water expands, the pressure will build up excessively, causing the relief valves to pop.

A quick fix is to drain the tank to the proper level (compensating for temperature) and then recharge the air space.

Hopefully, the air space will stay charged. If not, you will need to find out why you're losing the air space.

Perhaps, you may have a pinhole leak in the expansion tank, i.e., via sight glass, valve packing, fill valve, etc.

If your expansion tank does not have

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a bladder or diaphragm, the water is in contact with the air in the expansion tank. As the water cools, it absorbs some of this air. As it is reheated, it releases the air, but not necessarily back into the expansion tank.

Most likely, the air is released at the high point of the loop where the air is released through air vents. As this cycle repeats, more air and pressure is lost, resulting in more makeup water.

Eventually, the expansion tank becomes waterlogged, resulting in insufficient expansion space and causing the relief valves to pop.

● Your expansion tank could be undersized.

If you have recently increased the size of the closed loop significantly, without accounting for the additional expansion, then any sudden pop-off could be attributed to this increase.

Again, if your tank is undersized, there will not be enough room for expansion during peak temperature. As such, the pressure will build up excessively and pop your relief valves.

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Pressure relief valves

The pressure relief valves may be defective or, although unlikely, over-rated. The pressure rating on the relief valves should be about 10 percent higher than the pressure rating of the lowest pressure-rated component.


Different components of the system will have different pressure rating. Find

out which component has the lowest pressure rating and choose your relief valves based on this rating. This will require an engineering study.

Conclusion

Excessive relieving of the valves results in an excessive water turnover that will deteriorate your system very quickly. It is not just about water lost and annoyance. The true consequences are costly. A concerted effort must be made to find the root causes and to fix them permanently. □

Mario C. Uy is with World Environmental Technologies Inc. (WET Inc.), Carol Stream, IL, an international firm specializing in commercial and industrial water treatment. For comments about this article, email him at info@wet-usa.com.



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