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Process Safety Beacon

Messages for Manufacturing Personnel

CCPS CENTER FOR CHEMICAL PROCESS SAFETY 20 YEARS
An AIChE Industry Technology Alliance

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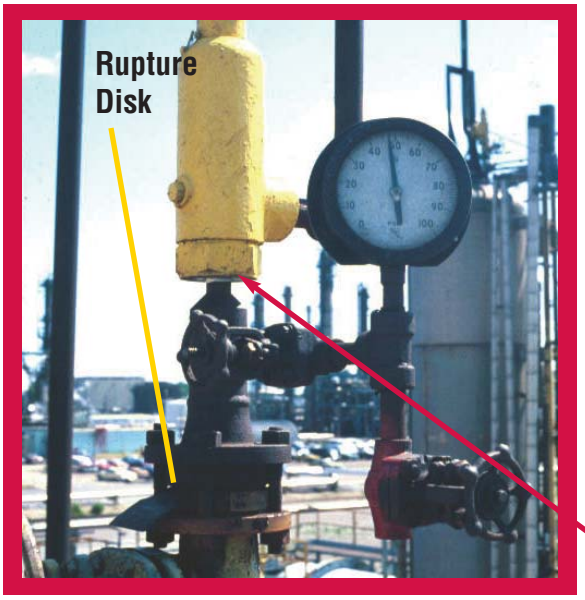
Hazards of Relief Devices in Series



A vessel is equipped with a rupture disk and a pressure relief valve in series to protect against high pressure in the vessel. There is a pressure gage on the pipe between the rupture disk and the relief valve. As a part of your regular plant inspection, you are supposed to check the pressure gage, which normally reads zero. Today you observe a pressure of nearly 50 psig (~3.5 barg), as shown in the photo.

Do you understand why this is a significant hazard? How does pressure between the rupture disk and the pressure relief valve affect the performance of the vessel overpressure-protection system?

Did You Know?

▶A rupture disk bursts when the pressure on the process side of the disk exceeds the pressure on the downstream side by the design pressure of the rupture disk. So, a 100-psi (6.9 bar) rupture disk will burst when the pressure on the process side of the disk is 100 psi (6.9 bar) greater than the pressure downstream of the disk.

▶The pressure might be caused by a small "pinhole" leak in the rupture disk, which will allow material to slowly seep through the disk and build up pressure; or it could be the result of a burst rupture disk.

▶ Because the pressure on the downstream side of this rupture disk is nearly 50 psig (~3.5 bar), if the pressure were caused by a pinhole leak, the rupture disc would not burst until the pressure in the vessel equaled the rupture disk design pressure plus 50 psi (3.5 bar). If this were a 100 psi disk, it would not burst until the vessel pressure were nearly 150 psig (~10.3 barg).

▶The rupture might result in failure of other equipment attached to the vessel — a sight glass, a hose or a gasket that cannot withstand the higher pressure.

What Can You Do?

▶ Check to ensure that your training program covers a rupture disk burst.

▶ Do you know what to look for to recognize a rupture disk and relief valve in series?

▶ If you have installations like this, check the pressure regularly.

▶ If you observe pressure between a relief valve and a rupture disk, investigate and correct the problem as soon as possible.

▶ Make sure you understand the reason for all process data that you are asked to observe and record. Know when an observed reading warns of a hazardous situation, and know what action to take to correct the problem.

CCPS PSID Members, see Free Search -Relief Valves

Don't just write down the data – understand what it means!

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