SAFETY MEMO

March 13th, 2023 – Pressure Relief Device Types

Did you know?

*This is **Part Four** of a multi-part series on Pressure Safety Valves. Always ensure you are following appropriate jurisdictional codes and standards when designing systems with pressure safety valves.*

Pressure Relief Valves (PRVs)

Pressure relief valves are reclosing pressure relief devices. There are several different pressure relief devices. Local safety standards such as API Standard 520 and CSA B52 contain detailed information about the different types and situations in which each type is permitted. PRVs are designed for vapor service, liquid service, or both.

Rupture Disks

Rupture disks are a non-reclosing type of pressure relief device. They can be used for either pressure or vacuum. They have no moving parts, and do not leak often. They are a disk that sits in the pipe, and will fail at a certain pressure, once failed the disk rips or breaks open allowing pressure to escape. Therefore, they are non-reclosing as they physically break when used. Thus, the major downside of rupture disks is that the pipe must be opened, and they must be replaced once used. Rupture disks must be compatible with the system chemistry. They can be made from metal or graphite and come in several sub varieties which are used based on the pressures (including vacuum) and temperatures. Another major downside of rupture disks is that their burst pressure varies greatly with temperature. Rupture disks can be outfitted with a burst detector to alarm when it has ruptured.

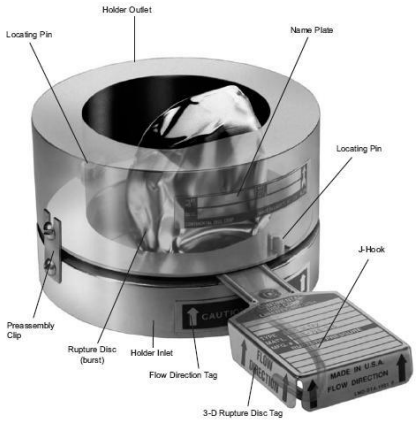

Figure 1: Ruptured Disc[1]

Buckling Pin Valves

Buckling Pin Valves are the rarest pressure relief devices and are relatively new. They work like a Conventional PRV but instead of having a spring they have an external pin which breaks once the set pressure is reached, thus they are non-reclosing. The main advantages over bursting discs are that they can be rearmed without opening the line and that the bursting device is not exposed and damaged by process chemicals. The main disadvantage is the higher initial cost. Use of a buckling pin device should be limited to specific special circumstances, with used cases from safety codes verified before use in design.

Figure 2: Buckling Pin Valve courtesy of VectorStock

Summary

There are several pressure relief devices, each having its own pros and cons. Selection of the correct type is dependent upon the specific process and operation of the equipment. Care must be taken to understand the process properly to select the correct device.

A review of the relevant safety codes must also be included in the selection of the proper type, as some codes provide rules on which type can be used.

Once the device is selected, the relief scenarios and relieving rates must be determined to properly size the pressure relief device and associated piping. There are also code requirements for proper use, labeling, maintenance, and replacement.

Pressure relief devices are a critical part of the safety of the system, relieving overpressure conditions and protecting pressurized systems.

[1] Ruptured Disc by Jens Huckauf. Retrieved from Wikimedia https://commons.wikimedia.org/wiki/Category:Rupture_discs#/media/File:Rupture_disc_burst.JPG No changes made to original image per Creative Commons licensing agreements.

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