Unfollow Saiedeh

Separate flare headers for Cold Gas and Cold Liquid

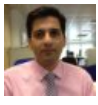
Saiedeh Nikraftar
Independent Consultant

Dear All,
Currently, I am engaged with detail design a flare system for a gas processing plant which has two separate headers of Cold and Warm with dedicated KO drums. Cold flare header, itself, consists of Cold gas (36")and Cold liquid(6") headers and all streams containing liquid conduct to cold liquid header. Both headers have the same material and the same design pressures.
My questions is:
1- What consideretion dictates us to route cold releases to separate headers of Cold gas and Cold Liquid?
2- What happens if we send all cold reliefs to one single header?
3- Somewhere on the plot, there is one relief stream from regeneration gas (Sales gas) which is directed to Cold liquid header, which seems to be odd! It seems that hydraulic issues dictates this.
Please share your opinions.

Like • Comment (4) • Share • Unfollow • Reply Privately • 11 months ago
Add to Manager's Choice • Close Discussion

Comments

4 comments



Saeid Rahimi Mofrad
Senior Specialty Process Engineer at Fluor

1- This is a good practice to route the liquid streams to the KOD separate from the gas streams which becomes increasingly popular these days. This is due to the fact that the slug force due to the piston of liquid which is pushed by gas can be too high for any flare system to withstand. This is of interest especially if:

• there is a common emergency case in which liquid and vapor release are release into the flare system at the same time.
• A liquid release from relief valve can be followed by a high flow depressuring operation.
• liquid is drained in to the flare system during normal operation (vessel drain sometimes) which can be pushed by gas any time a relief or blowdown valve pops up.

2- The liquid will travel with gas speed which can be really destructive.

3- I understand the question is that why a warm sale gas stream has been connected to the Cold flare. There could be lots of reasons for that including hydraulic considerations however, the main feature of cold flare is that there is no water in it which support the idea of connecting sale gas (which is dew-pointed gas, I guess) to the cold flare header. In reality, it is tried to stick to the following categories:
• wet flare header which carries the hot gas and water.
• dry flare header which carries the cold gas and (preferably) no water.

I guess the sale gas pressure is high and temperature downstream of relief/blowdown valve is less than freezing point of water in warm header so routing this stream into warm header is not correct/proper choice.

Delete • 11 months ago

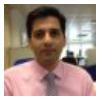
Saiedeh Nikraftar
Independent Consultant

Thanks for taking time to respond me.

Saiedeh

Theoretically, there is no water in the system and inlet gas to the plant is dehydrated gas. Hence, there should be another reason to route the sales gas to CFL. Sales gas tempererature/pressure is 300C/ 35 bar.
In addition, BDVs discharging to CFL in depressuring scenario are located on one or a group of vessel which release two-phase flows (like turbo-expander outlet) or slugs of liquid followed by a stream of gas. Is there any need for pushing gas in these cases?

Like • Reply privately • Delete • 11 months ago



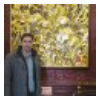
Saeid Rahimi Mofrad
Senior Specialty Process Engineer at Fluor

Routing the sales gas to CF can be because:
1- Connecting sale gas to warm flare increases the size of flare (cold flare is bigger and can accommodate the sale gas flow without any impact on size). what is the capacity of cold and warm flares compared to sale gas relief valve flow?
2- The warm flare back-pressure is too high for a relief valve at 35bar. Is there any difference between pressure in Cold and Warm flares? does warm flare have sonic tip?
3- Unavailability of warm header in Sale gas area.

by the way, do you think you can design the cold flare header for the design temperature range of -45C to 300C (because of sale gas)? is not this range too wide for cold flare material (I assume LTCS)?

Depressuring valves are normally installed on the gas side of the equipment and release the gas into the flare (even the process equipment is in two phase service). Condensation of gas can occur at flare side which can not be avoided and does not need a separate flare header.

Delete • 11 months ago



Mohammad

Mohammad Shaker
Senior Process Engineer at NIOC.

As Saeid mentioned, there are likely some technical reason such as slug flow behind this arrangement, however there are something else too:
1- Base on TOTAL practice, "For multiphase flow, lines downstream relieving devices, sub-headers and headers, the sizing criteria is as follows:
- Maximum velocity allowed is 0,25 Mach
- ρmvm2 < 50 000 kg/m/s2
while "For intermittent mono-phase gas flow, lines downstream relieving devices, sub-headers and headers, the sizing criteria is as follows:
- Maximum velocity allowed is 0,7 Mach
- ρv2 < 150 000 kg/m/s2 (for ρv2 < 100 000 kg/m/s2 vibration and line support studies are required).
It means lesser size with mono-phase stream.
2- Amount of purge gas will be reduced.
3- 36" is still a common size, and susequently cheaper than uncommon sizes such as 56".
4- Flare drum could be smaller, if inlet stream keep dry.

Like • Reply privately • Delete • 11 months ago

Add a comment...

Send me an email for each new comment.

Add Comment