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Fire, Heat Exchanger and Relief Load

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Student

System Description:

HP Separator ---> Crude heater (Oil in Tube side) ---> LP Separator.

Query:
Do we need to consider fire case as a possible over-pressure scenario for Shell & Tube HEX?
I could not find the valid reason to say "NO". Have you come across such situations?
If yes, can you pen down your comments and opinions please.

I think the shell & tube HX will have gaskets which will break at high pressure and release the overpressure before PSV pops up. Hence, fire case PSV need not be considered as a possible overpressure scenario for shell & tube HEX. Even if it is applicable, I guess tube side fluid need not be considered as shell side fluid only exposed to external fire.

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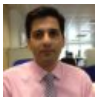

Saeid R. Mofrad
Principal Process Engineer at Petrofac (P.E.)
Top Contributor

I guess relief valve is required but not necessarily on the heat exchanger. It can be provided on the downstream vessel if nothing can obstruct the relief path during the fire.

Otherwise, you need a relief valve on the HX. You cannot rely on the gasket failure to relief the pressure. Furthermore, even if gasket fails, there is no proof that it will be able to release the fire relief load and ultimately the leakage through the gasket will feed the fire which is not desirable at all.

About applicable cases:

• if tube fluid's vapor fraction at the tube design pressure and shell fluid boiling temperature is more than zero, fire case is applicable.

• if tube fluid's vapor fraction at the tube design pressure and shell fluid boiling temperature is zero, liquid thermal expansion is applicable.

In this application, thermal expansion and heated in blocked-in condition can be other applicable cases which need to be considered.

Regards
Saeid

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Dattatray Kolte likes this

ASHOK KUMAR
Process Engineer at MODEC International INC

I trust PSV for fire case is required on both shell and tube side.

ASHOK

The staionary head - channel (Tube side) is exposed to fire. can we not consider this?

As Mr Saeid said the fire case PSV can be provided on the downstream vessel if nothing can obstruct the relief path during the fire.

Regards
Ashok

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