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Setting of Depressuring Model Details

Mojtaba Habibi

Process Engineer at Petroleum Engineering and Development Company (PEDEC)

Top Contributor

Dears,

This is with regards to paper titled " Effect of Different Parameters on Depressuring Calculation Results" published on www.chemwork.org/board.html

1. Page 3, Section Initial pressure mentions " adiabatic blowdown is usually from high-high pressure switch or settle out pressure of

compressor loop"

I want to know if the compressor loop settle out pressure should also be used as the initial pressure for fire case?

2. Page 4: liquid filled systems is mentioned as one of the cases. I want to know if liquid filled systems subjected to emergency depressurization?

3. Page 4, heat loss model section, isentropic efficiency:

Is this equal to "recycle efficiency" term of Hysys depressuring utility?

4. There are 2 terms at Hysys depressuring utility which are metal mass in contact with liquid and vapor. What is the effect of these terms?

All The Best,
Mojtaba

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Learn Syan Lee

Process Design Engineer

Hi Mojtaba,

Learn
Syan

For item 4, the effect of metal mass input in HYSYS depressuring utility is explained in one of the technical solutions available from the AspenTech Support website. See extract below for details:

The contribution of the metal wall to the heat losses is only taken into account if "Detailed" is selected as Heat Loss Model on the Heat Flux page (Design tab). The metal mass that is going to absorb part of the heat being transferred is calculated assuming cylindrical shape for the vessel with flat ends (times the thickness, times the density). If the vessel is known to have some additional metal parts that need to be taken into account (like valves or other attached fittings) or if it is necessary to account for non-flat vessel ends (i.e. semispherical) the Correction Factors can then be used.

Regards,
Syan

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**Saeid R. Mofrad**

Principal Process Engineer at Petrofac (P.E.)

Top Contributor

'1. Under any circumstances (fire or plant shutdown for maintenance) if compressor trips, entire isolated section will reach settle out condition. Hence, compressor depressurization should be started from settle out pressure.

'2. Depending on vessel fluid's nature (flammability, toxicity, volatility, explosion limit, etc), quantity, pressure and damage mechanism (radiation impact, explosion impact, missile impact, environmental impact) using depressuring facility may be justified. Quantitative Risk Analysis (QRA) can help decide cases where depressurization is required for liquid filled system.

'3. This was a typo in the article which was corrected shortly. Download the revised one from website. The correct word is recycling efficiency not isentropic efficiency.

'4. While doing depressurization calculation, the effect of vessel metal mass is automatically taken care by HYSYS based on model surface area and the metal thickness and density provided in heat loss model "Conduction" tab.

The correction factors "metal mass in contact with vapor" or "metal mass in contact with liquid" are only for the internals of vessels like demister pad, baffle or nozzles etc.

Refer to

http://www.chemwork.org/PDF/board/Set%20depressuring%20model%20dimensions%20to%20g-et%20more%20accurate%20results%20_Autosaved_.pdf on how to match Hysys model's weight with actual system.

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**Mojtaba Habibi**

Process Engineer at Petroleum Engineering and Development Company (PEDEC)

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Mojtaba

Dear Saeid,

Regarding to the second point:

The reason that I asked for necessity of depressurization for liquid filled systems is that based on good engineering practice no emergency depressuring facility is considered for these systems because:

1. Operating pressure of the liquid systems is low.
2. It is generally safer to retain liquids within the process vessels, which benefit from the cooling effect of the liquid.
3. Liquid blowdown gives negligible reduction in pressure until all the liquid has been discharged and the resulting mass flow rates are high in comparison to those required for gas blowdown.

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**Saeid R. Mofrad**

Principal Process Engineer at Petrofac (P.E.)

Top Contributor

Your understanding is generally correct. Non toxic, nonflammable, low pressure systems containing heavy liquid hydrocarbons (such as oil filled desalters) are usually not depressurized.

In contrast, there are systems that need depressuring facility such as:

'1) Liquid filled reactor where exotheric reaction can lead to loss of primary containment in a relatively short timeframe (such as hydro-cracking process)

'2) System containing highly toxic fluid which can devolve a toxic cloud if there is a leak.

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