
Question 31: As more and more refiners consider installing zeolite catalyst in their hydrotreating units, what are your recommendations for a depressuring system?

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Though, many hydrotreating units operate at lower pressures than most hydrocracking units, loading zeolite catalysts poses a risk of temperature excursion which should be mitigated. Reactor thermometry, depressuring system capacity, and automating depressuring based on indication of excursion must be evaluated when cracking catalyst is loaded in a hydrotreating unit. Therefore, when zeolitic catalysts are used in hydrotreating units, in order to avoid temperature runaways and consequent damage in the event of an emergency, the unit should be able to depressure in a relatively short period of time versus a traditional hydrotreating unit. Cracking reactions are not self-limiting as are hydrotreating reactions. Therefore, the reactants, liquid feed and hydrogen, are to be removed to stop the exothermic cracking reaction(s). To achieve the required rapid rate of reactant removal, the fastest and most efficient way is to de-pressure the unit.

The required depressuring rate depends on the unit volume and operating pressure. The lower both the volume and the pressure, the lower the required depressuring rate. UOP evaluates these factors when introducing cracking catalyst into hydrotreating units. There have been cases where the existing depressuring system satisfies the requirements for safe operation. Other cases involve small modifications to existing depressuring valve and / or restriction orifice. In the most extreme cases, the refinery flare system might need to be modified to accommodate the increased load in the event of depressuring from the hydrotreating / mild hydrocracking unit due to the required high rate of depressurization.

UOP recommendations for depressuring systems are automatic depressuring on high bed or skin temperature. The addition of this feature is highly recommended, but in unit revamp cases, the decision is typically made by the customer.

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