

LO-CAT[®] II PROCESS

FOR ELEVATED PRESSURE
REFINERY DESULFURIZATION



MOL Hungarian Oil & Gas Co. selected a LO-CAT[®] II Desulfurization System for operation at its production unit in Szeged, Hungary. The unit was custom-designed for direct treatment of sour associated and process gas streams at elevated operating pressures and relatively high CO₂ partial pressures.

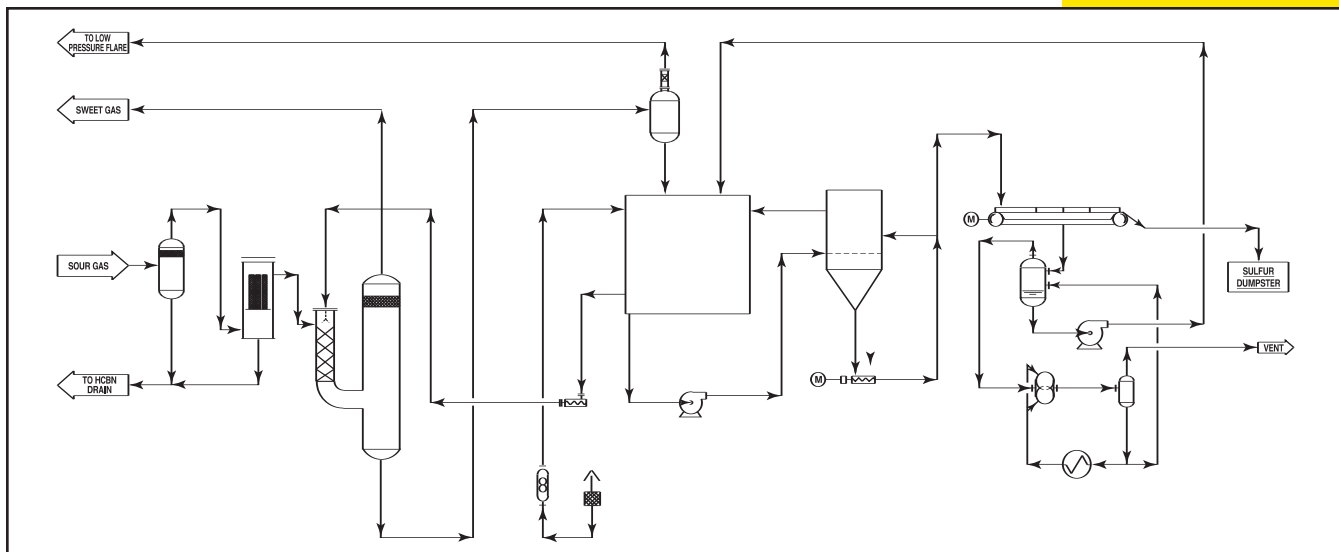
Recycled process gas and associated gases are collected from the oil fields around the plant and transported via a mixed-phase pipeline, followed by separation in a bank of gas-liquid separators. The associated gas is combined with the recycled process-gas stream, compressed to 16-18 barg, and sent to the LO-CAT II. Several technological challenges arose during the project due to process restrictions. Excessive liquid entrainment occurred whenever sour-gas flow exceeded 60,000 normal cu m/hr, so a new, larger separator was retrofitted into the plant. As a result, gas flow up to 80,000 normal cu m/hr was achieved. After startup, it was discovered that considerable condensate was frequently introduced from the process gas and the operation of the two-phase oil-gas pipeline. The presence of excessive liquid hydrocarbons in the LO-CAT II unit caused foaming and floating sulfur. The sour-gas transfer line was modified by retrofitting a simple drainage boot to catch the condensate. Later, a larger knockout pot replaced the original one, reducing the foaming and floating sulfur and increasing the unit's effectiveness. The unit's catalyst recirculation pump was replaced when the LO-CAT II capacity exceeded the pump's design. A new pump with the required capacity was installed and continues to operate successfully. The unit operates with a gas flow of 60,000 to 100,000 normal cu m/hr, with a sulfur load of about 50 kg/day (due to low H₂S concentration in the gas). Current H₂S removal efficiency is 90%, producing gas suitable for pipeline quality.

Gas Technology Products

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Liquid entrainment in the sour gas was anticipated, so the first two LO-CAT[®] II unit operations are a knockout pot and a coalescing filter. The sour gas is routed to the LO-CAT II static mixer absorbers, where it contacts the oxidized LO-CAT catalyst solution. A two-phase stream consisting of sweet gas and reduced LO-CAT solution exits the static mixer absorber, then enters the absorber separator, where the gas and liquid separate.

The treated gas exits the LO-CAT II unit after passing through a mist eliminator. The gas is cooled downstream of the unit to remove water, then compressed to 64 barg (approximately 930 psig) in the third-stage compressor.

The reduced LO-CAT solution from the separator passes through a pressure-reducing valve and flash drum, then gravity drains to the oxidizer, where the iron is regenerated for re-use in the absorber.

A slipstream of this oxidized solution is then sent to the settler where sulfur is allowed to settle and is subsequently transferred as slurry to the belt filter. Filtrate from the filter is returned to the oxidizer, while sulfur cake is discharged after washing. A small quantity of flash gas is vented to the flare header.

In the LO-CAT process, H₂S is converted to elemental sulfur by an environmentally safe, chelated iron catalyst. The chelated iron is capable of oxidizing the sulfide ions to elemental sulfur by means of a redox reaction in which the iron is reduced from the ferric state to the ferrous state and then is regenerated back to the ferric state by reacting with oxygen supplied from atmospheric air.

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