

Refineries.

Oxygen for the Claus process.



Gas application

O₂ enrichment for intensification of Claus processing

Background

Most oil refineries operate one or more Claus units for desulphurisation of gas streams rich in H₂S and in many cases containing considerable amounts of ammonia (NH₃) as well. Mainly due to legal regulations regarding the reduction of sulphur content in fuels, the amount of H₂S as well as NH₃ to be removed is increasing and often Claus units are becoming bottlenecks for the whole refinery.

Effects of O₂ enrichment

By enrichment of combustion air with O₂, a Claus unit's capacity in sulphur recovery can be increased significantly. A second beneficial effect is the fact that this raises the

temperature within the Claus furnace, which in turn contributes to the stabilisation of the process, e.g. by more efficient destruction of NH₃.

Situation on site in 2005

The three Claus units operated at one customer's refinery covered a total capacity of 180 tons of sulphur per day. Mainly due to NH₃ in the Claus feed, long-term stability of Claus operation was limited. In addition, a feedstock with higher H₂S could be expected for the future and additional use of O₂ appeared to be the measure of choice to tackle both challenges simultaneously.

Trials and measures

O₂ enrichment installations at Claus units (including the determination of NH₃ destruction effectiveness) were performed. The results clearly confirmed the expected

effects; i.e. a considerable improvement of NH_3 destruction in the furnace and a sufficient capacity increase can be realized by this flexible, minor-investment solution.

A long-term trial lasting more than a year was started in summer 2006. It led to a permanent implementation of O_2 enrichment.

Number of Claus units operated with O_2 enrichment

2 out of 3

Capacities (air-only mode)

50 tons of sulphur per day/plant

H_2S in feed streams

> 80 vol.-%

NH_3 in feed streams

A few percent (due to SWS gas processing)

Installed tailgas treatment

Selective H_2S oxidation "Superclaus"

Main purpose of O_2 application

Optimized NH_3 destruction and capacity increase (up to approx. 30%)

Maximum O_2 content in O_2 -enriched process air

28 vol.-%

O_2 trials in cooperation with Messer

From 2005 to 2007

Start-up

Routine operation with is O_2 enrichment since 2007

Hardware

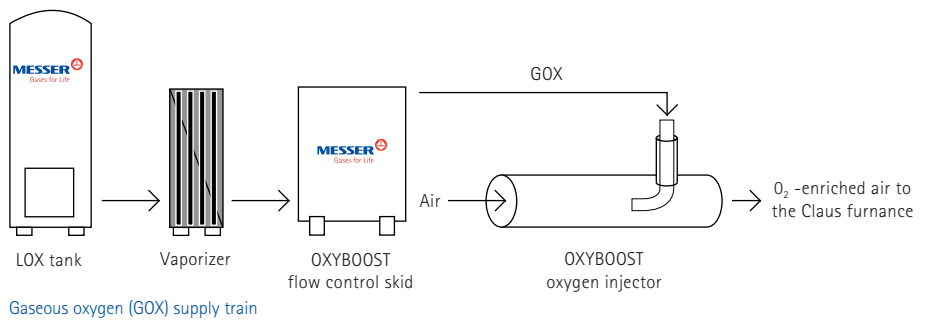
Messer's O_2 dosing system including a control system (OXYBOOST™ flow control skid) and injector (OXYBOOST oxygen injector) for application of gaseous oxygen

Mode of O_2 supply

Liquid oxygen (LOX) via tank/vaporizer system



Tailored OXYBOOST™ oxygen injector equipment implemented in the Claus unit's process air pipe



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