

Oxygen For Sulfur Recovery

Increase Claus Plant Capacity With Oxygen

With the growing need to process “sour” crudes, petroleum refiners and natural gas processors face the twofold challenge of removing the increased sulfur content to meet strict environmental regulations and doing it cost-effectively. The solution?

Praxair’s enhanced combustion technology. It relies on oxygen enrichment to increase the capacity of Sulfur Recovery Unit (SRU) Claus plant equipment, eliminating the need for costly, new sulfur removal units.

Enriching Benefits

More than a dozen refiners have found that a Praxair oxygen enrichment system increases the capacity of their Claus plant equipment up to 30 percent with no capital expense for new units. It also:

- Increases flexibility by providing oxygen on demand.
- Allows greater ammonia destruction because of higher furnace operating temperatures.
- Improves conversion.
- Reduces gas volume in tail gas treatment by lowering nitrogen volumes.
- Offers low-cost installation.
- Saves energy.

A Proven Winner

These refiners also benefit from Praxair’s years of experience. As a leader in Sulfur Recovery Unit oxygen enrichment technology:

- We provide flow control equipment with an outstanding reliability and safety record.



- We offer extensive safety training for proper operation.
- Our engineering team uses a computer program to help determine the effect of oxygen enrichment on your SRU.

We work closely with you on piping and sparger design, as well as installation and start-up.

How It Works

Claus plants normally provide up to 98 percent of the sulfur recovery capability in a refinery or natural gas processing operation. To recover the sulfur from sour crudes, the Claus plant reaction furnace typically combusts air and hydrogen sulfide, which results from sulfur processing. The hydrogen sulfide is then partially oxidized and catalytically converted to produce high-purity molten sulfur. In a Praxair oxygen enrichment system, oxygen is supplied to the Claus

plant through a sparger into the air line to the reaction furnace. The oxygen also can be injected directly into the furnace through a lance or burner. Or, feed air can be completely replaced by oxygen through a burner in the furnace. In some cases, complete feed air replacement can double Claus plant capacity.

The resulting higher oxygen concentration increases the operating temperature of the furnace, which leads to steadier operation and greater ammonia destruction. As a result, your Claus reaction furnace maximizes its ability to combust the oxygen/air mixture and the hydrogen sulfide produced during processing, working with system converters and condensers to recover the sulfur.

Increased oxygen also means lower nitrogen volumes, which reduces gas volume in tail gas treatment.

Claus Plant Oxygen Enrichment Profile

How Much Increased Capacity?

Oxygen enrichment increases the treatment capacity of your SRU Claus plant — up to 30 percent — by reducing the volume of inerts that pass through the burner and converters. Fewer inerts also significantly reduce the volume for tail gas treating.

To determine how much an oxygen enrichment system can increase your Claus plant capacity, Praxair's engineering team uses a Sulfur Recovery Unit simulation computer program. This model can analyze a variety of sulfur processing options, including feed stream compositions, furnace temperatures, mass flow rates and conversion for both refinery and natural gas processing streams. Increased flexibility by providing oxygen on demand, a Praxair system increases flexibility. Oxygen is there when you need it to handle day-to-day swings in process stream content and volume, as well as the seasonal effects of air blower capacity.

Improved Conversion

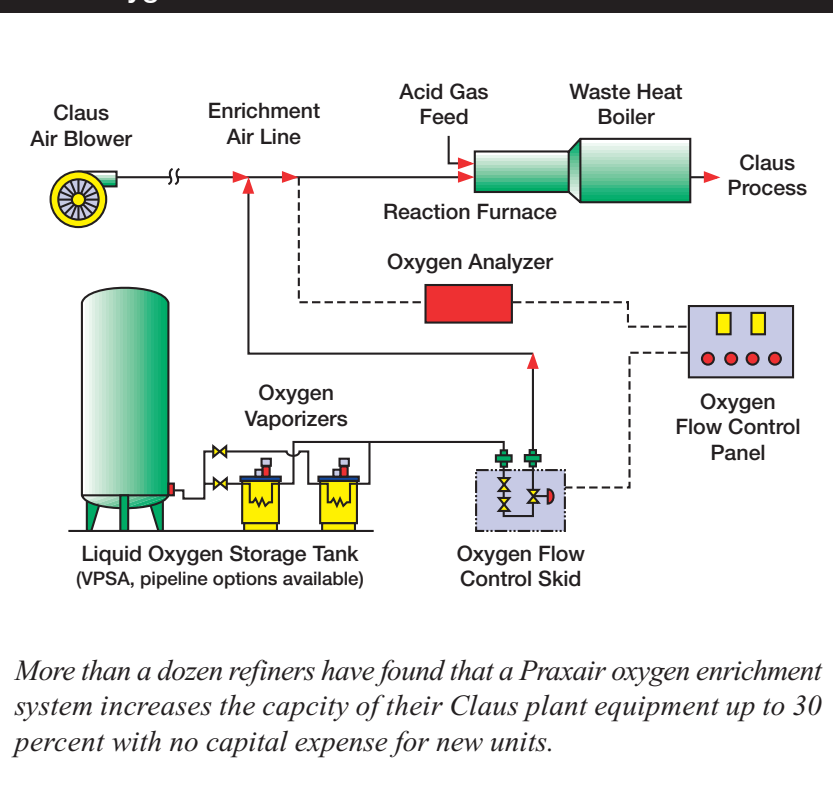
Because oxygen enrichment produces lower process stream volume in the Claus plant, the hydrogen sulfide stream spends more time in the catalytic reactor. This improves the Claus plant's recovery efficiency and reduces unwanted sulfur emissions.

A Low-Cost Option

Oxygen enrichment helps you save by offering low installation costs and eliminating:

- Costly new sulfur removal units.
- Tail gas treating units.
- Major unit modifications.

Claus Oxygen Enrichment Process



Energy Savings That Add Up

The higher combustion temperature produced in the thermal section by oxygen reduces the need for preheating the acid gas feed and supplementing fuel. The result is significant fuel savings. If your Claus unit's furnace temperature is limited, higher throughput is still possible from reduced inerts and enhanced reaction rates.

Praxair: Supplier Of Choice

To all of this, add the fact that Praxair is the largest supplier of industrial gases in North and South America and one of the largest in the world, and you'll fully understand why we are the supplier of choice for oxygen enrichment technology.

It begins with our strategically located air separation facilities, which provide a reliable oxygen supply. We also offer a full range of supply systems to meet any process requirements, from liquid oxygen storage tanks, to vacuum pressure swing adsorption (VPSA) systems, to pipelines. That means oxygen on demand for maximum flexibility and economy.

See for yourself. Call Praxair, and let us help you maximize the benefits of a Claus plant oxygen enrichment system.

For more information in the United States and Canada, call **1 (800) PRAXAIR**, or outside the United States and Canada, call **(716) 879-4077**.



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