

High Temperature SCR

For simple cycle gas turbine applications

Product data

BASF has developed a family of selective reduction catalysts (SCR) for simple cycle peaking power plants that need to control NO_x below turbine exhaust levels. The operating conditions of these plants is much different than combined cycle plants in exhaust temperature, load cycles, operating time, vibration, and temperature profiles during startup and shutdown. Traditional SCR catalysts operate up to 800°F, above which the performance declines. BASF has developed an SCR product line to control NO_x emissions up to 1075°F. Our NO_xCat catalysts outperform conventional SCR catalysts at high temperatures (Figure 1)

Description of the System

NO_xCat VNX-HT catalyst is designed to continuously operate at 875°F. It offers the activity of a vanadia/titania catalyst with the added benefit of high temperature operation.

NO_xCat ETZ catalyst is a patented zeolite catalyst that efficiently destroys NO_x up to 1075°F and can withstand even higher temperatures (1200°F) without damage. This product is unique in that it can physically withstand the exhaust temperature of the new larger frame turbines (1100+°F),

although the SCR reaction efficiency declines.

A major factor for selecting a catalyst is the exhaust gas temperature. Cooling systems (air or water) can be included to lower the exhaust temperature, but there are practical limitations on the amount of cooling that can be added and the potential failure of the cooling system must be considered.

Failure of the cooling system is not a concern with ETZ catalyst because the catalyst has a maximum operating temperature that exceeds the maximum turbine exhaust temperature. If the cooling system were to fail, the catalyst would not be destroyed as with other catalyst technology. As soon as the cooling system is repaired, the ETZ catalyst system can resume performance. Other SCR catalyst would be irreparably damaged in such an instance, requiring a prolonged outage to replace the catalyst and shut down of the power plant until new catalyst can be produced; or a full replacement set of catalyst must be purchased and stored.

Also, other catalyst technologies require cooling to significant lower temperatures. That requires much

larger cooling systems and operating costs to maintain the proper temperature. With the greater cooling requirements comes the need to control the temperature profile more closely. At the typical upper limit of conventional SCR catalysts (800°F), the exhaust temperature needs to be controlled to a much lower temperature to ensure that no part of the catalyst is exposed to a higher temperature.

Advantages of NO_xCat SCR Catalysts

- Cost effective compared to other high temperature NO_x control strategies
- Proven technology for operating in the temperature range of 700°F to 1075°F
- High NO_x conversion, typically 80% to 95%, with low ammonia slip
- Thermal shock resistant against rapid startup, shutdown, and turbine trips
- No need to restrict the rate of startup to protect the catalyst
- No need for cooling the turbine exhaust in most applications
 - LM6000 and other aeroderivative turbine operation up to 875°F without cooling
 - Frame turbine operation up to 1075°F

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The Chemical Company

Benefits of NOxCat SCR Catalyst

- No loss of power during startup due to temperature ramp up restrictions
- Much less power consumption to cool the exhaust gas, if required
- Low pressure drop
- Reliable system operation

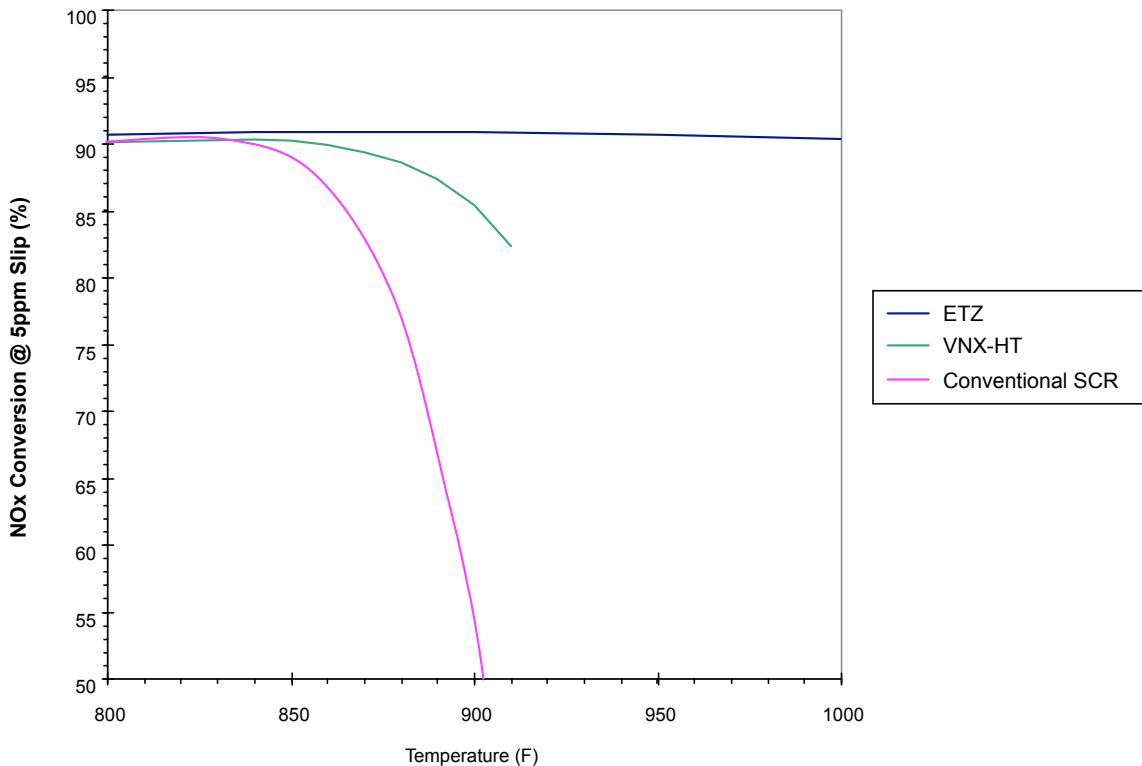
Important Things to Consider When Choosing an SCR System

- Aero-derivative turbine operating temperatures tend to rise with continued operation. Be sure this is understood before designing an SCR system. If a specification states 850°F, this must be the highest operating temperature over the life of the turbine, not just first operation.
- Be sure the SCR catalyst can withstand the operating temperature ramp up rate

About BASF

As the world's leading chemical company, BASF's portfolio ranges from chemicals, plastics, performance products, agricultural products and fine chemicals to crude oil and natural gas. BASF's intelligent system solutions and high-value products help its customers to be more successful. BASF develops new technologies and uses them to open up additional market opportunities. It combines economic success with environmental protection and social responsibility, thus contributing to a better future.

Figure 1
NOxCat VNX and ETZ Catalysts Outperform Conventional SCR Catalysts at High Temperatures



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