

Improved safety and performance for your operation **WITH ADVANCED TECHNOLOGY FOR STEAM REFORMING**



In today's cost/price environment, Syngas plants must perform at their full potential to be competitive. Our cutting-edge monitoring and catalyst solutions help you create ideal conditions for optimum efficiency.

The primary reformer is the heart of any Syngas plant – and also the part that is most cost and energy intensive. Ensuring a well balanced and reliable operation of the reformer tubes is key for an efficient ammonia, methanol or hydrogen production. For best results, the internal heat distribution amongst the tubes must be constantly watched and adjusted, and a high-performing catalyst must be used to boost the chemical reaction in the tubes.

reaction rate hence to a lower production and/or higher energy consumption. Uneven firing leads to a sublevel performance and can cause overheating of several tubes (visible by hot spots) which drastically reduce the tube lifetime if the maximum temperature is exceeded. The mechanical stress on the hot tubes increases exponentially up to a tube rupture as the worst possible scenario. Another reason for closely watching TWT is that it gives an indication about catalyst performance and overall heat distribution.

One parameter that must be monitored with special care is the tube wall temperature (TWT). Too cautious firing leads to a lower

CLARIANT OFFERS 3 TECHNOLOGIES FOR MONITORING TUBE WALL TEMPERATURE:

PYROMETER

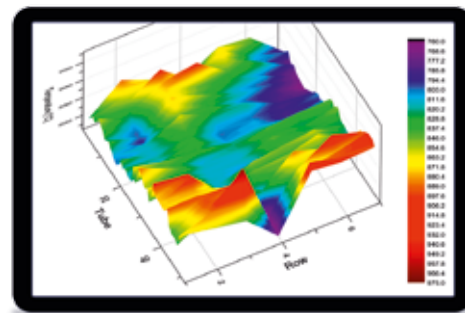
Provides single-point readings of TWT. The limitations are that the readings have to be corrected for background radiation and that only tubes accessible through the peephole can be measured.

THERMAL SCAN PLUS GOLD CUP

Gold Cup readings are taken with a golden cup reflector that provides superior accuracy due to its reflectance of nearly 100%. The data is used to calibrate the Thermal Scan, which then provides an extremely accurate temperature profile of the entire furnace ($dT < +/-5\text{ }^{\circ}\text{C}$).

THERMAL SCAN

The scan is performed with a high-resolution thermal imaging borescope that measures temperatures from 600 to 1100 °C at a short, accuracy-enhancing wavelength. It provides a real-time 3D heat profile that includes all tube rows of the furnace and can easily be examined for areas of inhomogeneous heat distribution and hot spots on the tubes. The equipment also furnishes live thermal images of reformer tubes and refractory. It allows to offer a comprehensive temperature survey that includes recommendations for burner adjustments.



COMPREHENSIVE real-time 3D heat profile

YOUR BENEFITS



Highly accurate 3D heat profile of the entire furnace, allowing maximization of performance and lifespan



Identification of hot and cold spots and recommendations for burner adjustments



Troubleshooting and monitoring of catalyst performance

What else can you do to maximize performance?

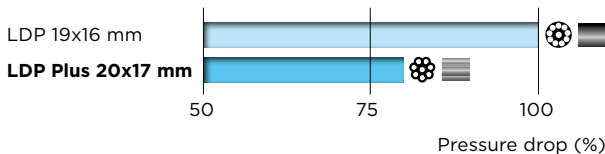
USE OUR NEW GENERATION OF STEAM REFORMING CATALYSTS

ReforMax® 330 LDP Plus (standard) and ReforMax® 210 LDP Plus (lightly alkalized) catalysts for steam methane reforming cause a significantly lower pressure drop in the reactor tubes whilst also providing outstanding activity and selectivity, heat transfer, and physical strength.

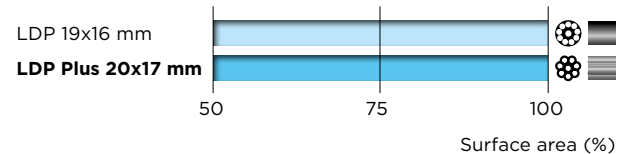
The performance and influence on gas pressure of a reforming catalyst is mainly determined by its size and geometric surface area (GSA). The size, aspect ratio, and inner and outer channels of ReforMax® LDP Plus catalysts have been designed to provide both a low pressure drop and a high GSA and crush strength.



Relative pressure drop in a 4" tube



Relative geometric surface area in a 4" tube



YOUR BENEFITS



Approx. 20% lower pressure drop compared to LDP standard shape



Outstanding physical strength



High activity due to large geometric surface area



Increased gas throughput thanks to lower pressure drops



Better heat transfer due to larger holes and suppression of carbon formation



Less energy needed to produce hydrogen, ammonia or methanol

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