



Camet® ST
Sulfur-Tolerant
catalyst for today's
changing natural gas
fuel quality

 **BASF**

We create chemistry



Camet[®] ST Sulfur-Tolerant Catalyst for Today's Changing Natural Gas Fuel Quality

Recently, the quality of natural gas fuels has changed dramatically, and the presence of fracked gas, landfill gas, and other acceptable forms of biogas are commonly contained in pipeline gas. The result has been the unpredictable impact on emission catalysts, especially CO/VOC catalysts used in gas turbine applications.

To mitigate the impact of these gases on oxidation catalysts, a complete re-evaluation of catalysts for these applications is required. BASF has re-engineered the traditional CO/VOC catalyst to provide superior performance, even in the presence of higher levels of sulfur. BASF is now offering the patent pending **Camet ST Sulfur-Tolerant Oxidation Catalyst** to perform in these very unpredictable environments.





Developing an Effective Catalyst

A catalyst is comprised of a substrate, a carrier, and active components, and all three need to work together to obtain optimal performance.

- **Substrate** (herringbone) determines the efficient implementation of each component — minimum volume packaged in a most efficient manner
- **Carrier** determines performance, not the precious metal used; and since CO is mass transfer limited, it's all about surface engineering
- **Active component** (usually precious metal) determines poison resistance and catalyst longevity; this is why dispersion is important and experience and expertise is critical

The catalyst selection process defines and constrains those factors that may influence catalyst performance so as to ensure the manufactured product delivers the required performance in the application.

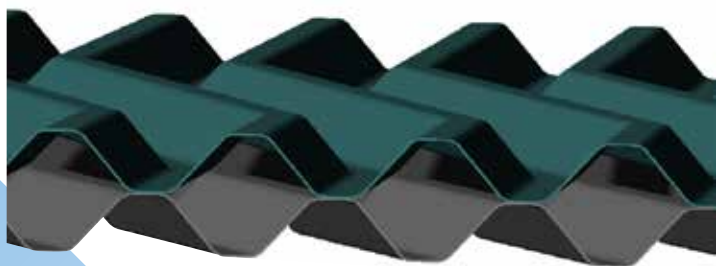
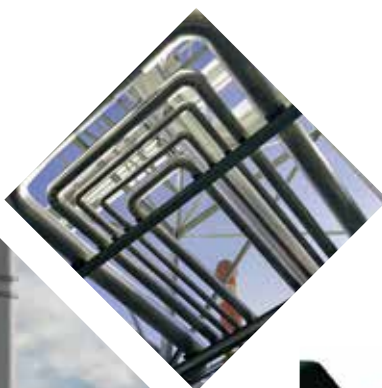


BASF is the leading oxidation catalyst supplier to the power generation industry. We have learned from over 30 years of success what makes for the most reliable performance for each application.



Substrate

BASF uses a unique, continuous, on-line, corrugating catalyst coating, and honeycomb forming process. This produces an even coating of catalyst materials across all surfaces. It eliminates uneven coating distribution (axially and around the cell walls) encountered on post-coating products.



Camet Oxidation Catalyst Herringbone Structure

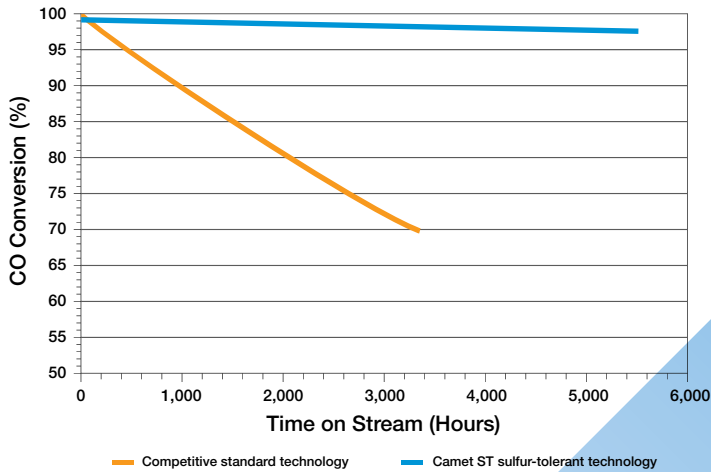
The most common structure is a herringbone pattern that reduces power loss by reducing pressure drop across the catalyst bed (~20% lower pressure drop than parallel flow honeycombs to achieve the same conversion efficiency). It all provides longer life with the effective utilization of catalyst materials. The herringbone pattern also maintains wider cell openings to minimize blocking and pressure drop, and allow gases to pass around a blockage to permit full catalyst use.

Interconnected channels in the herringbone substrate provide greater tolerance to surface blockage by particulates (especially important for high CPSI's).

Carrier

A carrier is a very high surface area material with a complex pore structure to permit high mass transfer of gas to active catalyst materials dispersed throughout the carrier. This is a critical design criteria that significantly impacts performance and separates the most reliable catalysts from others that might attempt to mimic it. It is the carrier that is critical in defining activity, selectivity, and durability.

Camet ST Oxidation Catalyst vs. Competitive Standard Technology Full-Scale Field Demonstration – 550°F



Our newest innovation is the Camet ST Sulfur-Tolerant Oxidation Catalyst which significantly improves the ability of oxidation catalysts for gas-fired power generation systems to withstand sulfur contamination. Camet ST Sulfur-Tolerant Oxidation Catalyst builds off the global leading technology used in the standard Camet oxidation catalyst technology, but improves the ability of the catalyst to perform in the presence of most forms of sulfur contamination.

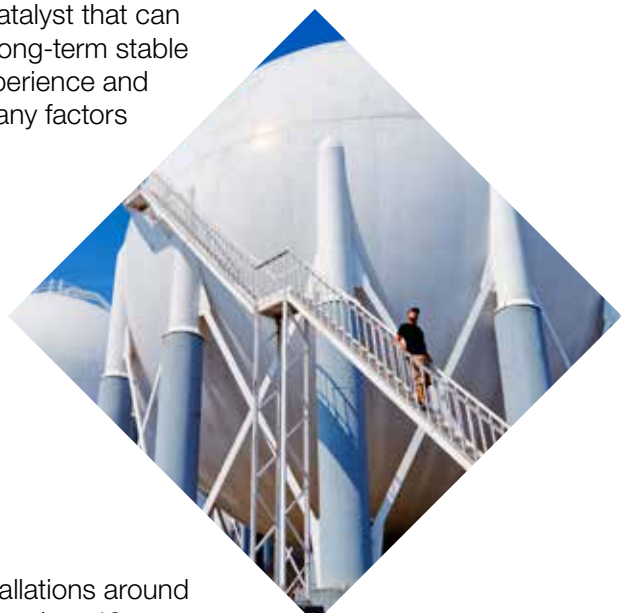
The chart above highlights the performance from a full-scale field demonstration, showing the extremely strong performance relative to the standard competitive technology. After the demonstration, the customer installed Camet ST. It has now been running successfully for over 20,000 hours.





Active Component

For most power generation applications, the common active components are precious metals, including platinum, palladium, and rhodium. These materials need to be well dispersed within the carrier — and fixed properly — to assure high performance and long life. The selection of the materials, and the amount required for optimal performance in power plant applications is critical and often misunderstood. It is relatively simple to produce a catalyst that can operate when fresh, but achieving long-term stable performance requires extensive experience and an intimate understanding of the many factors impacting the catalyst.



Putting It All Together

BASF has a history of over 850 installations around the world, with most operating longer than 10 years. We have been collecting data from many of these installations for more than 12 years, and have developed the only extensive understanding of the influence of turbines, fuels, water, and foreign debris on catalyst performance. We have also seen in this data how changes in fuel sources dramatically impact catalyst performance. The most significant is the increase in sulfur in the natural gas.



Why BASF?

Only BASF is offering a newly developed carrier which is being offered as Camet ST Sulfur-Tolerant Oxidation Catalyst. This innovative catalyst has been demonstrated in a field installation, shown the ability to perform where standard catalysts have failed, and is now in full scale commercial application.



About Us

BASF's Catalysts division is the world's leading supplier of environmental and process catalysts. The group offers exceptional expertise in the development of technologies that protect the air we breathe, produce the fuels that power our world and ensure efficient production of a wide variety of chemicals, plastics and other products, including advanced battery materials. By leveraging our industry-leading R&D platforms, passion for innovation and deep knowledge of precious and base metals, BASF's Catalysts division develops unique, proprietary solutions that drive customer success.

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