

# Catalyst Manufacturer

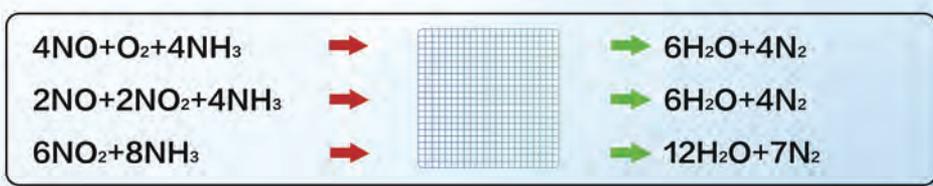
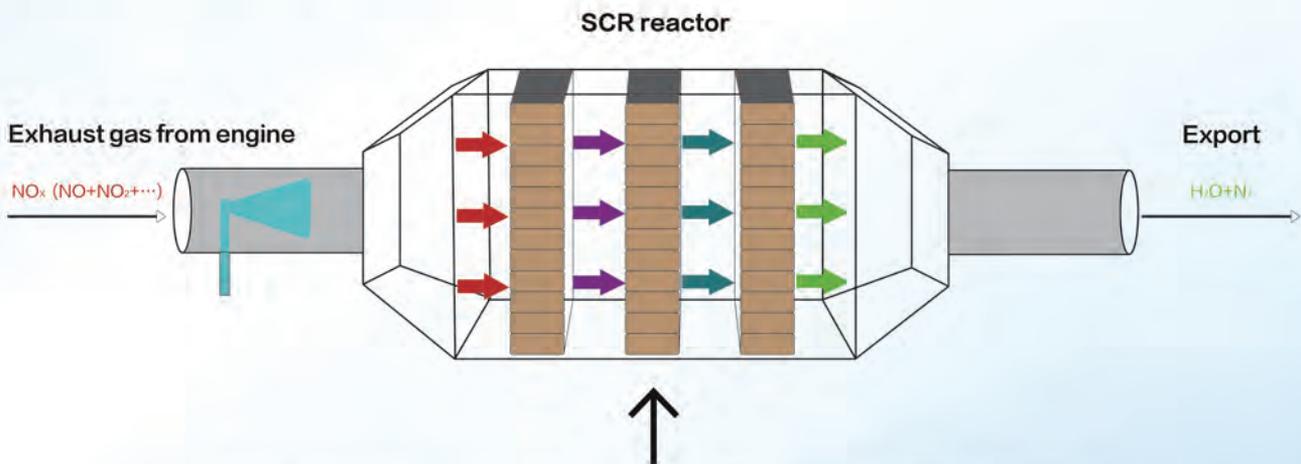


## Fe Zeolite Catalyst

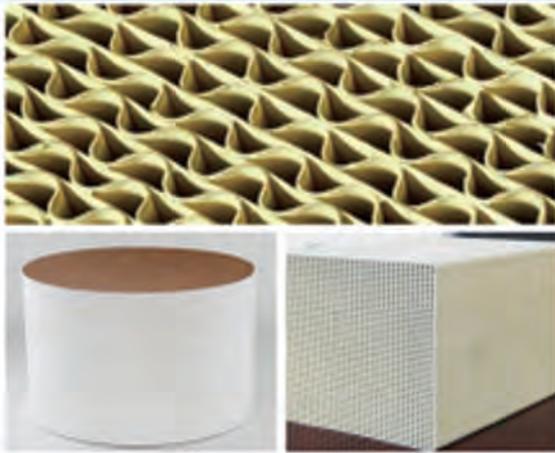
With the tightening of  $\text{NO}_x$  emission standards and the continuous expansion of industries requiring  $\text{NO}_x$  control, in addition to traditional industries such as coal and fuel oil, distributed gas turbine energy stations using natural gas, biogas, and rock gas as fuels have also put forward new requirements for  $\text{NO}_x$  control. The exhaust outlet temperature of traditional coal-fired and fuel industries is generally below  $750^\circ\text{F}$ . The temperature of the exhaust gas from both gas fired units and engines is much higher than  $750^\circ\text{F}$ , even exceeding  $1000^\circ\text{F}$ , reaching a high temperature of  $1100^\circ\text{F}$ . The high temperature conditions make traditional V/W/Ti catalysts (commonly used at temperatures below  $750^\circ\text{F}$ , and waste catalysts belong to hazardous waste) unable to meet the usage requirements. It is urgent to develop new SCR catalysts that will not cause secondary pollution and meet market demand.

Denox Environment relies on its own research and development platform, combined with years of experience in developing automotive catalysts. Based on the characteristics of the flue gas emitted by distributed gas units, it has developed a high-temperature SCR catalyst using Fe-based molecular sieves as the basic active substance, with a usage temperature of  $800\sim 1000^\circ\text{F}$ , excellent anti poisoning performance, and no secondary pollution, effectively solving the industry's denitration problem.

## Reaction Principle

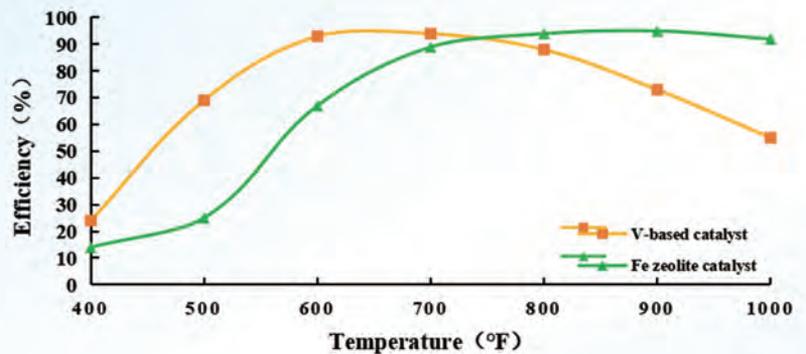


## Performance Characteristics



Content	Parameters
Active substance	Fe zeolite catalyst
Physical carrier	Cordierite/Glass fibre
Production process	Coating or impregnation
Shape	Square, Circular
Operation temperature ( °F )	800~1100
Efficiency ( % )	≥ 90
Unit size	150*150*H, 100*100*H, 464*464*H φ ≤ 13inch, non-standard

- ◆ Wide temperature window: 420~600°C
- ◆ High efficiency: ≥ 90%
- ◆ Long service life: ≥ 24000h
- ◆ Large SSA, Smaller volume
- ◆ Non- secondary pollution
- ◆ High compressive strength
- ◆ Lightweight per unit volume



## Applications



◆ Automotive



◆ BHKW



◆ Gas turbine



◆ Distributed energy generation

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## Advantages&Applications

- ◆ High efficiency
- ◆ Wide temperature window
- ◆ High mechanical strength
- ◆ Long service life



◆ Gas turbine



◆ Steel mill

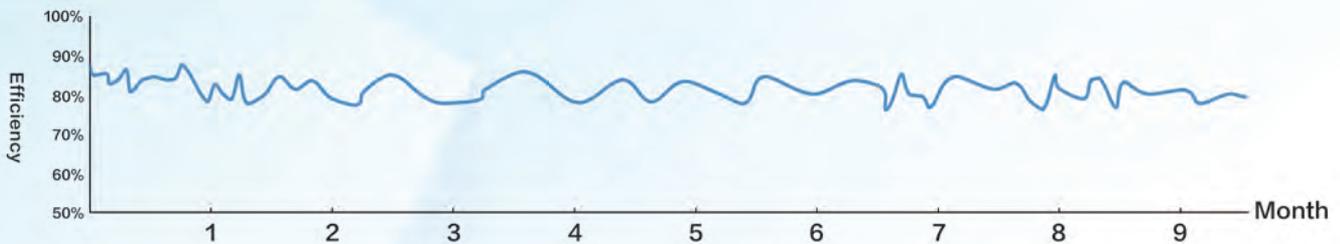


◆ Incinerator

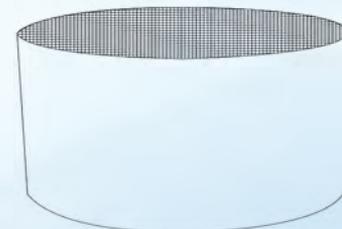


◆ CDQ flue gas

## Example of references



Flue gas parameters	
Application	Steel mill
Flow rate( Nm <sup>3</sup> /h )	17000
Temperature( °F )	≥ 500
CO inlet( mg/m <sup>3</sup> )	~8000
O <sub>2</sub> ( % )	~18
H <sub>2</sub> O( % )	~10
Dust( mg/m <sup>3</sup> )	20
Target	
CO/CO <sub>2</sub> Efficiency( % )	≥ 80
Life time	3 years



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# Catalyst Manufacturer



## Carbon Monoxide(CO) Oxidation Catalyst

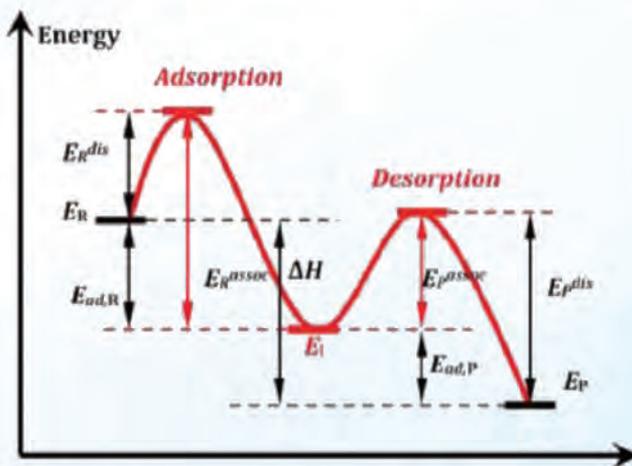
Leveraging our extensive expertise in catalyst coating technology for automotive industry Denox Environment is now offering CO oxidation catalysts for stationary applications. By applying precious metal coatings to substrates via our advanced coating technology, we ensure enhanced performance and efficiency for a wide range of industrial applications.



### Reaction Principle and Catalyst Specification

CO oxidation with precious metal-coated catalysts involves the catalytic conversion of carbon monoxide (CO) to carbon dioxide (CO<sub>2</sub>) through an exothermic reaction. In the presence of a catalyst, this reaction occurs at lower temperatures, increasing the rate of CO oxidation while minimizing energy consumption.

The exothermic nature of the reaction also means that the catalyst helps drive the process without additional external energy, improving overall system efficiency and reducing operational costs.

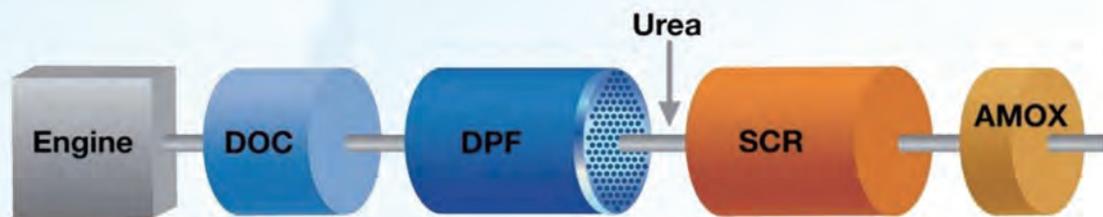


Specifications	
Shape	Square&Circle
Substrate	Cordierite or TiO <sub>2</sub> / glass fiber
Size(mm*mm*mm)	150*150*H 100*100*H 50*50*H
Operating temperature(°F )	400-750
Oxidation efficiency	CO/CO <sub>2</sub> ≥ 95%

# DOC and cDPF

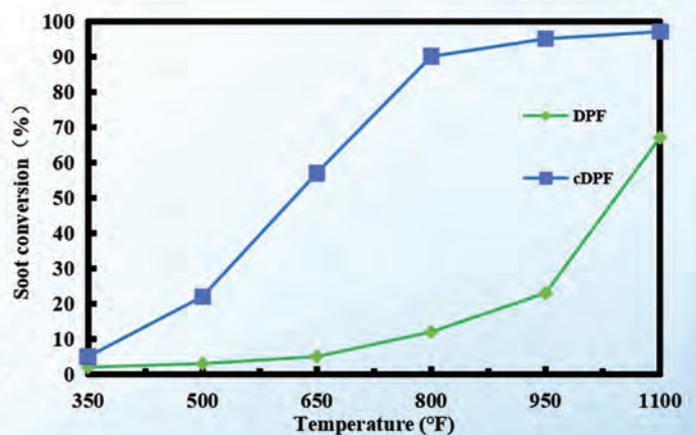
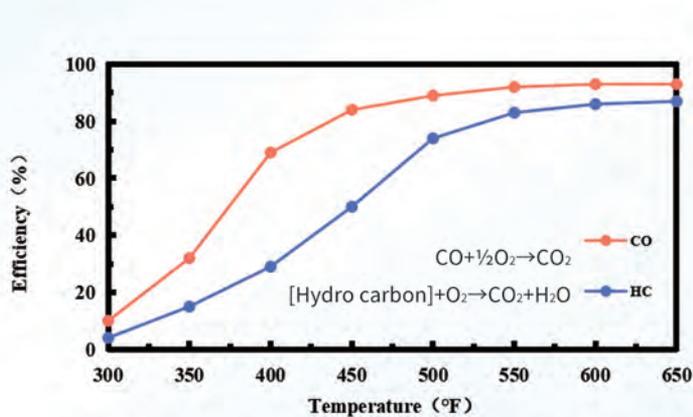
## Product Introduction

The DOC can convert hydrocarbons and carbon monoxide in diesel engine exhaust into carbon dioxide and water. The cDPF can effectively capture particles in diesel engine exhaust, reduce PM emissions, Oxidizes hydrocarbons and carbon monoxides and the catalyst component contained in cDPF can lower the regeneration temperature, achieving passive regeneration.



## Advantages of DOC & cDPF combination

1. Excellent oxidation efficiency
2. High PM Filtration Efficiency  $\geq 90\%$
3. Low operating temperature
4. Low passive regeneration temperature
5. Excellent high temperature resistance performance
6. Long service life.
7. Low pressure drop



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## cDPF and DOC

The main pollutants in diesel exhaust include carbon monoxide, hydrocarbons, nitrogen oxides, particulate matter, etc. These pollutants can have negative effects on human health and the environment. our Denox Environment cDPF and DOC products can effectively treat pollutants in diesel engine exhaust.



## Product Advantages

- ◆ High efficiency, and excellent anti clogging performance
- ◆ High dust tolerance, 45g~100g/m<sup>3</sup>
- ◆ Wide temperature window, 350~840°F
- ◆ Low SO<sub>2</sub> conversion rate, SO<sub>2</sub>/SO<sub>3</sub> ≤ 1%
- ◆ Excellent anti poisoning ability, with excellent resistance to substances such as As, Hg, Tl, etc.
- ◆ Low pressure drop
- ◆ High mechanical strength and long service life

## Applications



◆ Thermal power industry



◆ Biomass boiler



◆ Steel industry



◆ Petrochemical industry



◆ Glass industry



◆ Cement industry

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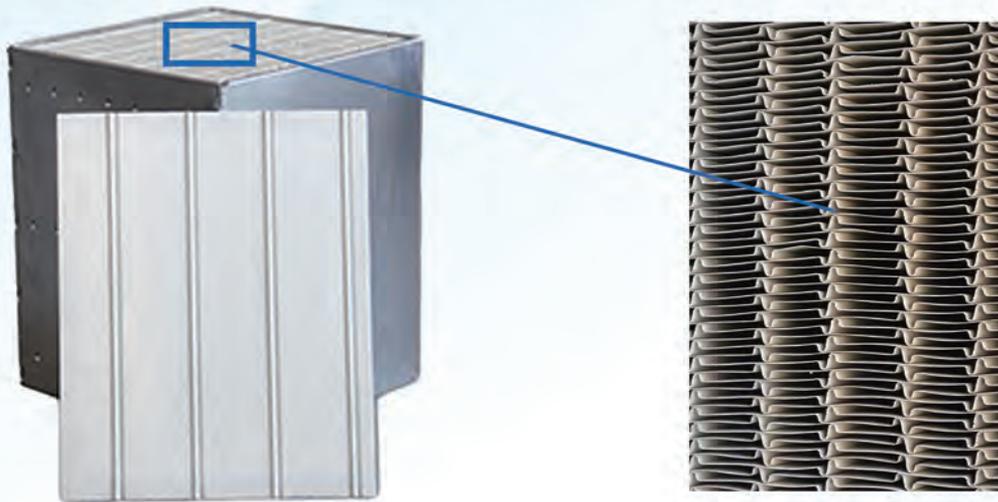
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# SCR Catalyst Manufacturer

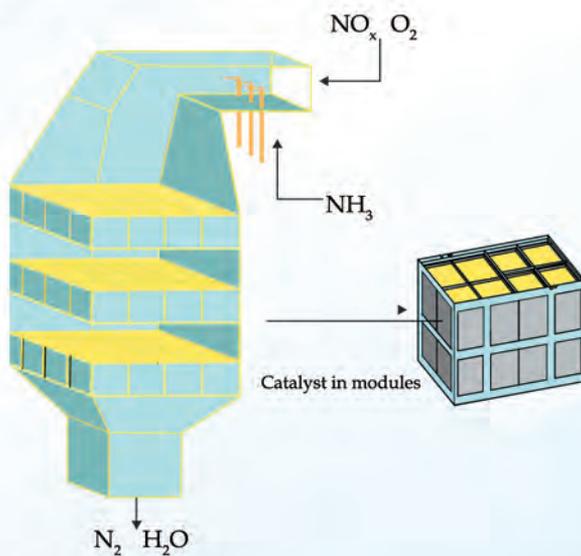


## Plate Catalyst

Denox Environment Group has supplied plate type NOx removal catalyst since 2010. The plate catalyst uses stainless steel mesh plate as the substrate, with V<sub>2</sub>O<sub>5</sub>, WO<sub>3</sub> (or MoO<sub>3</sub>), and TiO<sub>2</sub> as the main components. The active components are pressed onto the stainless steel mesh plate, cut and calcined according to a certain length, and assembled into specific modules and used to remove nitrogen oxides in flue gas. Plate catalysts have advantages such as low pressure drop and strong anti clogging performance.



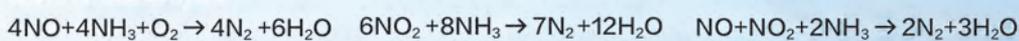
### Reaction Principle



### Parameters

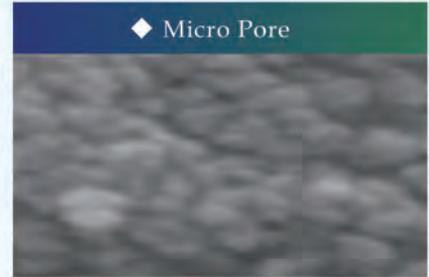
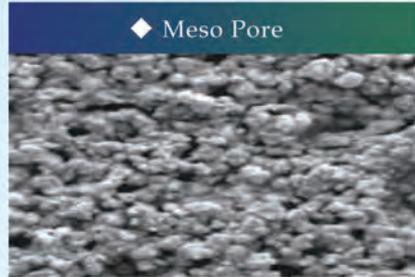
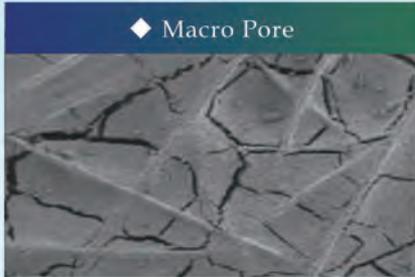
Composition	V-Mo-Ti
Operating temperature(°F)	350~840
Denox efficiency%(%)	≥ 90
Pitch(mm)	5/6/7
SSA(m <sup>2</sup> /m <sup>3</sup> )	390/350/300
SO <sub>2</sub> /SO <sub>3</sub> (%)	≤ 1
Dust tolerance(g/m <sup>3</sup> )	≥ 45

### Main Reactions



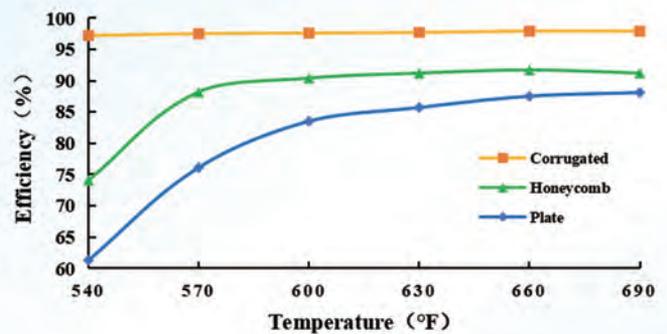
## Product Advantages

- ◆ High geometric specific surface area
- ◆ Low SO<sub>2</sub>/SO<sub>3</sub> conversion rate
- ◆ Light weight per unit volume
- ◆ Excellent anti-poisoning performance



- ◆ Unique three-state pore structure

Thanks to its unique three-stage pore structure and high surface area, the corrugated catalyst offers superior catalytic activity compared to honeycomb and plate-type catalysts. This design also ensures a lower pressure drop, making it particularly advantageous for applications in the power industry.



## Applications



- ◆ Petrochemical



- ◆ Waste incineration



- ◆ Diesel engine



- ◆ Gas turbine

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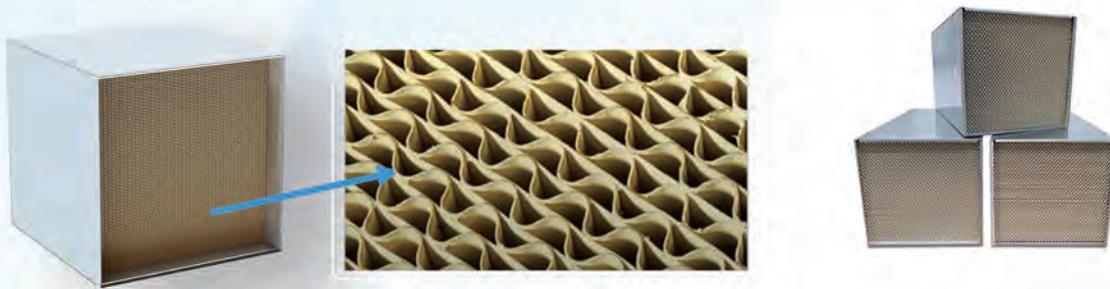
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# SCR Catalyst Manufacturer



## Corrugated Catalyst

Our advanced corrugated SCR catalysts are designed specifically for low dust environments, making them an excellent choice for applications in gas turbines, gas and diesel engines, and the petrochemical industry. Constructed from glass fiber reinforced carrier, these catalysts offer superior durability and efficiency. The unique impregnation of  $V_2O_5$  ensures optimal performance in reducing nitrogen oxides (NOx) emissions. With a unique three-state pore structure, our innovative SCR catalysts provide reliable, cost-effective solutions for your emission control needs.



## Product Specifications

Type	Wave length (mm)	Wave width (mm)	Wall thickness (mm)	Opening ratio (%)	Surface area ( $m^2/m^3$ )	Volume density (g/L)
DNS15	16	9	1.0	74	460	290
DNS18	15.5	8	0.8	73	540	290
DNS25	10	5.5	0.6	75	660	290
DNS35	7.9	3.9	0.4	76	887	300
DNS40	7.8	3.8	0.4	76	1010	300
DNS45	5.8	3.1	0.3	75	1150	300
DNS50	5.0	2.8	0.3	75.5	1250	300

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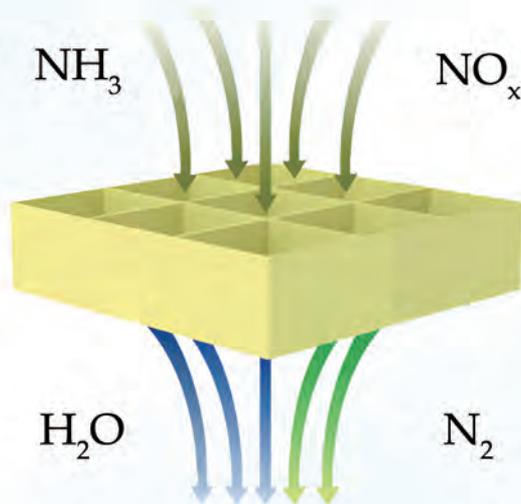


## Honeycomb Catalyst

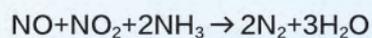
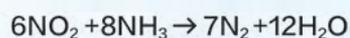
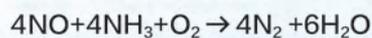
The Honeycomb catalyst is a monolithic catalyst used for removing nitrogen oxides from flue gas. The entire catalyst unit is composed of uniform catalytic materials, and the active components of the catalyst are evenly distributed. The production process of honeycomb catalyst is to mix the catalyst raw materials, then extrude and cut them into a certain length. After drying and calcination, they are assembled into various specifications of catalyst modules as needed.



### Reaction Principle



### Main Reactions



### Parameters

Cell	Cpsi	Pitch (mm)	Inner wall thickness (mm)	Surface area (m <sup>2</sup> /m <sup>3</sup> )
13×13	5	11.41	1.30	303
18×18	10	8.2	0.85	423
20×20	12	7.4	0.80	470
22×22	14	6.73	0.75	514
25×25	18	5.92	0.70	583
30×30	26	4.95	0.65	688
35×35	35	4.25	0.60	794
40×40	46	3.73	0.45	933
55×55	87	2.71	0.35	1270
60×60	100	2.5	0.32	1396
70×70	140	2.1	0.30	1524

## Product Advantages

- ◆ Multiple product types: 11~108 cell, suitable for various industry application;
- ◆ Excellent sulfur resistance, low SO<sub>2</sub> conversion rate, SO<sub>2</sub>/SO<sub>3</sub> ≤ 1%;
- ◆ Wide temperature window, 300~930°F;
- ◆ High geometric specific surface area: 300-1000m<sup>2</sup>/m<sup>3</sup>, low loading volume;
- ◆ Adjustable catalyst height: 100-1300mm;
- ◆ Wide range of fuel adaptability: coal, oil, gas.

## Applications



◆ power industry



◆ Biomass boiler



◆ Ceramics industry



◆ Coking industry



◆ Glass industry



◆ Cement industry

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## Atlas Enerji | Thermal power

Operation Conditions of SCR DeNOx Catalyst:

Flue gas flow:	8196018m <sup>3</sup> /h
Dust concentration:	26.33g/Nm <sup>3</sup>
Operating temperature:	570 ~ 790°F
DeNOx efficiency:	85.8%



## Vietnam Duyen Hai Thermal Power Company | Thermal power

Operation Conditions of SCR DeNOx Catalyst:



Flue gas flow:	1921941Nm <sup>3</sup> /h
Dust concentration:	40g/Nm <sup>3</sup>
Operating temperature:	570 ~ 790°F
DeNOx efficiency:	80%

## Indonesia KCC | Glass Plant

Operation Conditions of SCR DeNOx Catalyst:

Flue gas flow:	170000Nm <sup>3</sup> /h
Dust concentration:	50mg/Nm <sup>3</sup>
Operating temperature:	610 ~ 790°F
DeNOx efficiency:	86.67%



## Vattenfall energy group Sweden | Thermal power

Operation Conditions of SCR DeNOx Catalyst:



Flue gas flow:	2050000Nm <sup>3</sup> /h
Dust concentration:	21.5g/Nm <sup>3</sup>
Operating temperature:	610 ~ 805°F
DeNOx efficiency:	88.33%

# SCR Catalyst

## Selected Projects

### Client References



Project location	Project industry	DeNOx efficiency
Netherlands	Thermal power	74.28
Germany	Thermal power	88.33
Poland	Thermal power	75.00
China	Thermal power	87.00
China	Metal sintering	80.23
Vietnam	Thermal power	80.00
China	Cement Plant	80.00
China	Incinerator	85.25
Vietnam	Thermal power	53.30
China	Steel Mill	84.56
Korea	Glass Plant	65.00
Indonesia	Glass Plant	86.67
Vietnam	Thermal power	60.00
Turkey	Thermal power	85.23
Germany	Waste to Energy	80.89
France	Biomass Plant	82.20
Spain	Diesel Engine	86.68
Korea	Waste to Energy	58.50
Italy	Gas Turbine	55.25
Italy	Waste to Energy	82.25



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