



oxidation catalysts for environmental applications

C&CS – the distribution partner with expertise





inside C&CS - what's behind it?

- independent distribution, founded by Dr. J. Nickl, expert in catalysis & applied material science
- 15 years of experience in distribution
- 30 years research services for catalysis
- 100 tons on stock, 150 products, 500 customers
- distribution partner of CLARIANT
- 2015: C&CS division of GWP mbH gets C&CS GmbH
- 2017: extension of the sales contract with CLARIANT to oxidation catalysts for environmental applications



inside C&CS - our team



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environmental catalysis typical applications

- chemical / pharmaceutical industry
- food industry
- solvent production and handling (printing industry etc.)
- chemical and municipal waste incineration facilities
- soil decontamination
- wastewater stripping
- combustion engines
- industrial boilers
- combined thermal and catalytic combustion
- ...

oxidation catalysts general reaction principles

- volatile organic compounds (VOC)
$$\text{VOC} + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$$
- chlorinated hydrocarbons (CHC)
$$\text{CKW} + \text{O}_2 \rightarrow \text{CO}_2 + \text{HCl}$$
- carbon monoxide (CO)
$$2 \text{CO} + \text{O}_2 \rightarrow 2 \text{CO}_2$$
- ammonia, N-containing VOC
$$\text{NH}_3 + \text{O}_2 \rightarrow \text{H}_2\text{O} + \text{N}_2 (+ \text{NO}, \text{NO}_2 \dots)$$
- odorous compounds

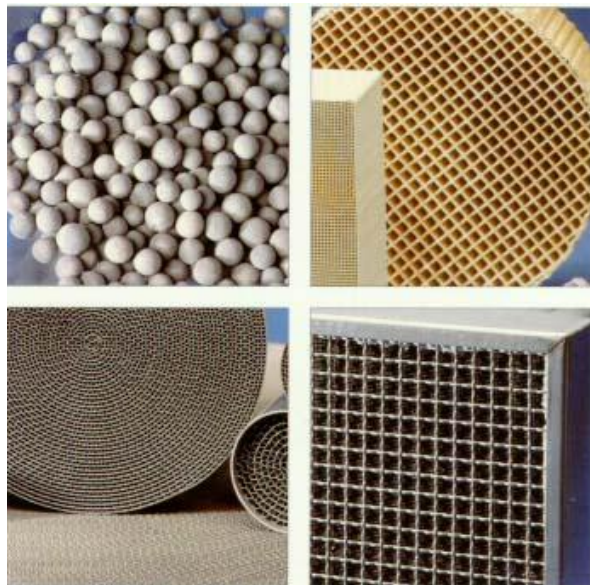


oxidation catalysts general operating conditions

- inlet temperature: 200 – 600°C
- exothermic: 2 – 35 K per g/Nm³ depending on type of VOC
- max. catalyst temperature: 500 – 680°C depending on type
- space velocity, SV-value (= ratio exhaust gas flow to catalyst volume): 1.000 – 300.000 1/h
depending on operating conditions, type of pollutant, conversion requirements, catalyst type, loading of active compounds...



oxidation catalysts for environmental applications



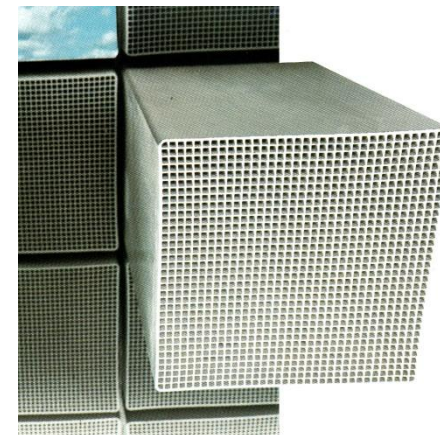
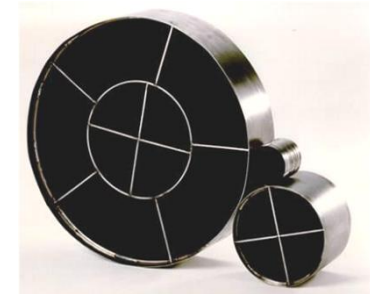
oxidation catalysts available as

monolithic catalysts on ceramic or metal support

based on noble or base metals

bulk catalysts

based on noble or base metals





bulk oxidation catalysts specification



- noble or base metals on alumina oxide
- preferred shape: spheres with diameter between 2 and 6 mm
- standard types:
 - EnviCat 55068-Sph: Pt/Pd as active compounds
for aliphatic and aromatic solvents
 - EnviCat HHC-5557: Pt/Pd as active compounds
for chlorinated VOC and aromatic compounds



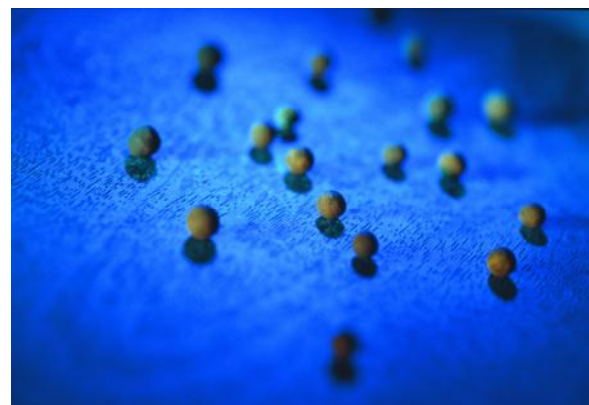
bulk oxidation catalysts specification

- standard types:

EnviCat VOC-1544: Cu/Mn as active compounds
for O-containing VOC and ammonia

further catalyst types (e.g. for methane oxidation) obtainable on demand

most of the standard bulk catalysts
available on stock for a short-term
delivery

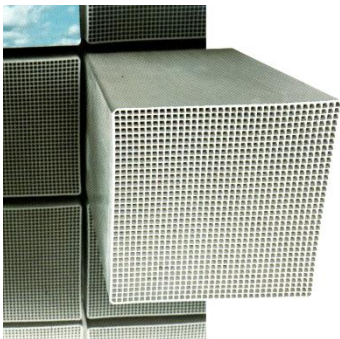


oxidation catalysts on ceramic support / specification

- noble or base metal on cordierite support with aluminosilica washcoat
- preferred shape: square cross-section with 150 x 150 mm, length between 50 and 150 mm and cell density between 35 and 400 cpsi (cells per square inch)
- standard types:

EnviCat 50300-CH: Pt/Pd as active compounds
for aliphatic and aromatic solvents, CO etc.

EnviCat 2520-CH: Pt as active compound
for carbon monoxide etc.





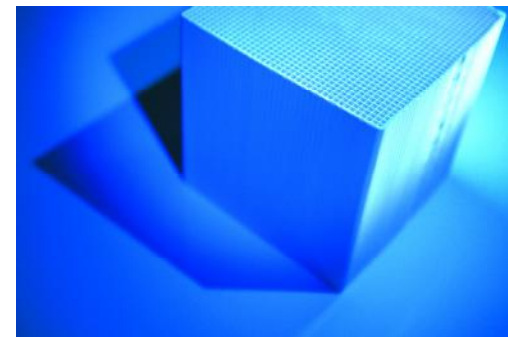
oxidation catalysts on ceramic support / specification

- standard types:

EnviCat 2500-CH: Pt as active compound especially for sulphur-containing exhaust gas (Diesel etc.)

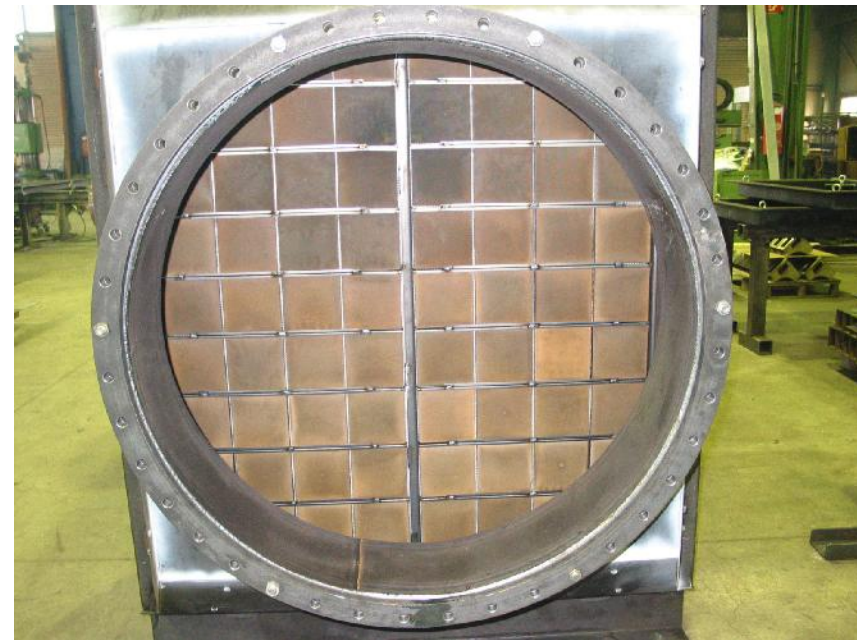
EnviCat 15200-CH: Cu/Mn as active compound for O-containing VOC and ammonia

further catalyst types on demand





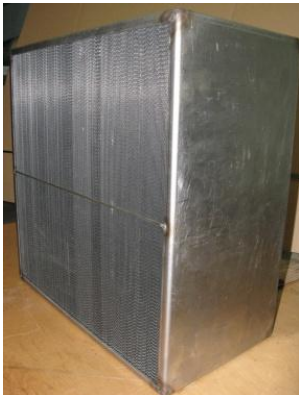
oxidation catalyst on ceramic support / optional casing





oxidation and 3-way catalysts on metal support / specification

- noble metal on stainless steel support with aluminosilica washcoat
- cell density between 35 and 400 cpsi (cells per square inch)
round shape: diameter between 200 and 1.200 mm
rectangular shape: different sizes available
- standard types:



EnviCat 50300-MH: Pt/Pd as active compounds
for aliphatic and aromatic solvents, CO etc.

EnviCat 2520-MH: Pt as active compound for CO etc.

oxidation and 3-way catalysts on metal support / specification

- standard types:

EnviCat 2500-MH: Pt as active compound
especially for Sulphur-containing
gas (Diesel etc.)

EnviCat TWC-8503: Pt/Rh as active compounds
3-Way catalyst

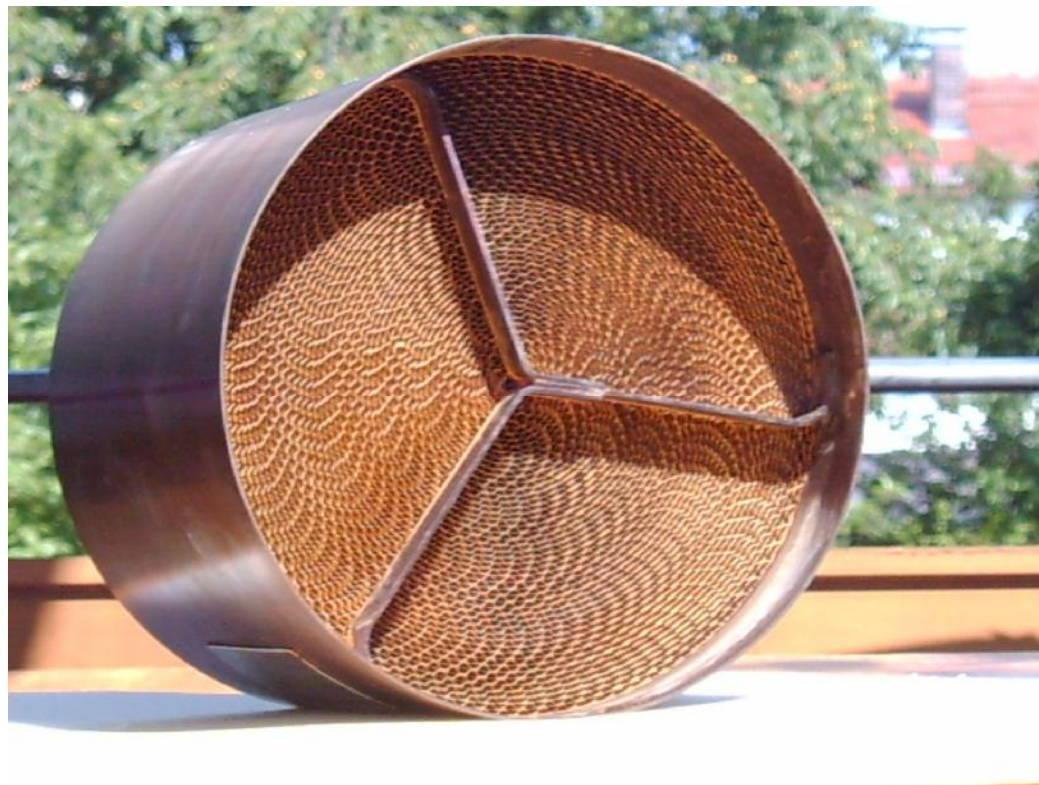
EnviCat 15200-MH: Cu/Mn as active compounds
for O-containing VOC and ammonia



further catalyst types on demand

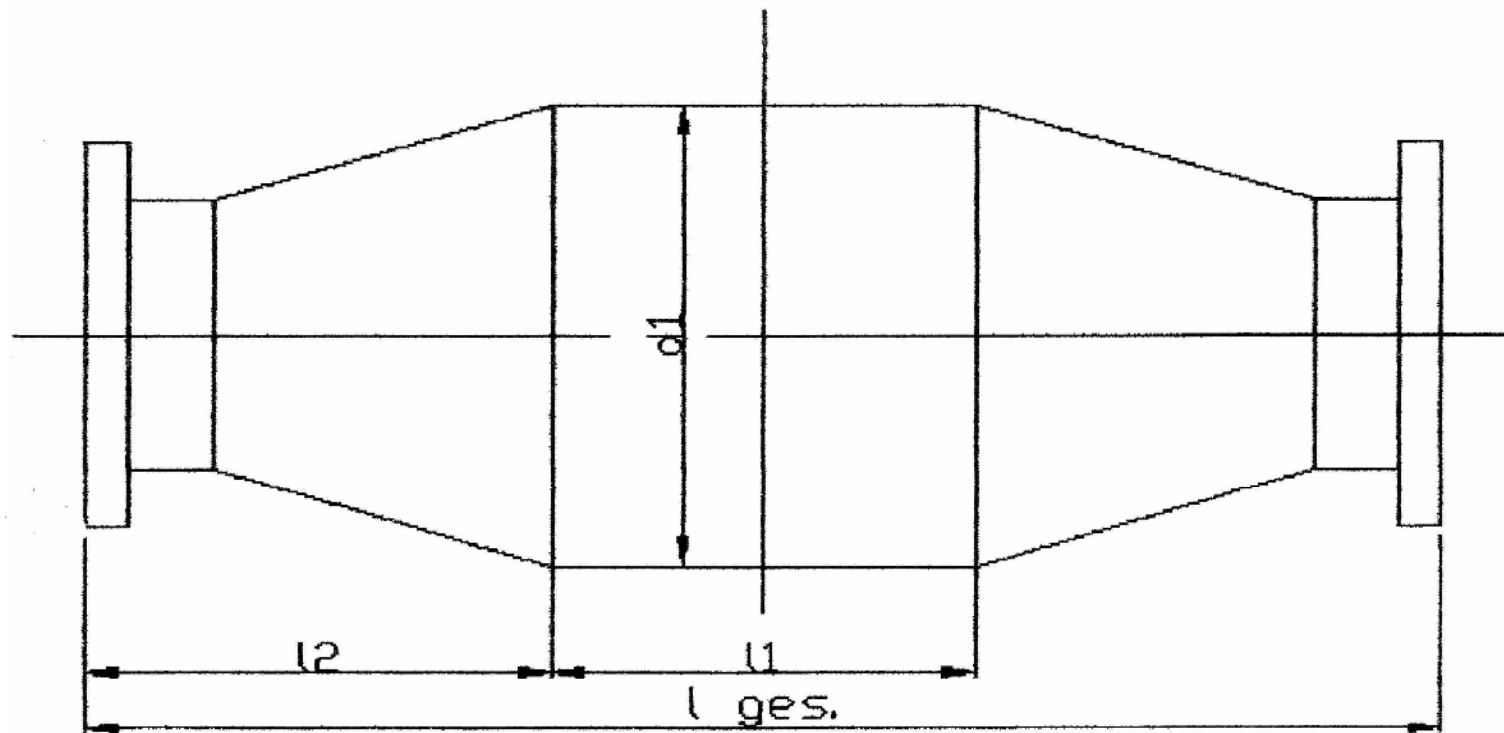


oxidation and 3-way catalysts on metal support / matrix





oxidation catalyst on metal support / optional casing





oxidation catalyst on metal support / optional casing



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