

Warranty provision for catalysts

Emission Partner warrants (pro rata temporis) that the catalysts supplied by us comply with the legal limits under the following conditions:

Oxidation catalysts	Conversions	Term	Remarks
Biogas plant	HCHO < 20 mg/Nm ³ CO < 300 mg/Nm ³	8.000 hours or 1 year from date of installation; maximum 18 months after date of sale	At space velocity < 80.000 h-1
Natural gas operation	HCHO < 30 mg/Nm ³ CO < 300 mg/Nm ³	16.000 hours or 2 years from date of installation; maximum 27 months after date of sale	At space velocity < 80.000 h-1
Special gas (mine gas and sewage gas)	HCHO < 30 mg/Nm ³ CO < 300 mg/Nm ³	Delivery according to specification	At space velocity < 80.000 h-1

SCR catalysts	Conversions	Term	Remarks
Natural gas operation without (with) urea dosing by Emission Partner	HCHO < 20 mg/Nm ³ (NO _x < 100 mg/Nm ³) *	16.000 hours or 2 years from date of installation; maximum 27 months after date of sale	At space velocity < 15.000 h-1 ¹ < 30.000 h-1 ²
Biogas operation without (with) urea dosing by Emission Partner	HCHO < 20 mg/Nm ³ (NO _x < 100 mg/Nm ³) *	8.000 hours or 1 year from date of installation; maximum 18 months after date of sale	At space velocity < 15.000 h-1 ¹ < 30.000 h-1 ²
Special gas (mine gas and sewage gas)	HCHO < 30 mg/Nm ³	Delivery according to specification	At space velocity < 15.000 h-1

¹ Ceramic catalysts, ² SCR catalysts on metal carrier

* Based on a raw NO_x emission of ≤ 500 mg/Nm³

Three-Way-Catalysts	Conversion rate**	Life time	Remarks
Natural gas operation mode	HCHO < 5 mg/Nm ³ CO < 250 mg/Nm ³ NO _x < 250 mg/Nm ³	Delivery according specification	At space velocity < 60.000 h-1

** Based on a gas composition with NO_x raw emissions of ≤ 6500 mg/Nm³ and CO raw emissions of <3600 mg/Nm³ (dry, at 5% residual oxygen).

Further prerequisites for the warranty promise

Mechanical damage (e.g. due to shocks, vibrations, falling or thermal overload of the catalytic converter) during installation and operation must be avoided and will result in immediate loss of warranty if Emission Partner or its subcontractors we are not responsible for it.

Technical conditions

The oxidation catalyst works optimally in the temperature range from 360 °C to 550 °C. Impurities in the gas and oil reduce the activity of the catalyst. The SCR catalysts operate optimally in the temperature range from 350 °C to 500 °C. The Three-Way-Catalyst should be operated in the temperature range of 500 °C up to 700 °C.

The following maximum values must not be exceeded by the exhaust gas and engine oil:

Parameter	Value
Maximum exhaust gas temperature	550 °C ^{1,2} 500 °C ³ / 530 °C ⁴
Ash content in engine oil	< 0,5 Gew. %
Maximaler Ölverbrauch	< 0,5 g/kWh
H ₂ S in fuel gas (biogas, natural gas,...)	< 20 ppm ¹ < 150 ppm ^{2,3}
SO ₂ in the exhaust	< 6 mg/Nm ³ ¹ < 40 mg/Nm ³ ^{2,3}
SiO ₂ -Aerosole in gas	< 1 mg/Nm ³
Organosilicon compounds in exhaust gas	< 0,01 mg/Nm ³
Acids (HCl, HF, ...)	< 0,2 mg/Nm ³
Phosphorous in exhaust gas	< 0,05 mg/Nm ³
Arsenic in exhaust gas	< 0,01 mg/Nm ³
Pb in exhaust gas	< 0,005 mg/Nm ³
Cr in exhaust gas	< 0,005 mg/Nm ³
Ni in exhaust gas	< 0,01 mg/Nm ³
Cd in exhaust gas	< 0,005 mg/Nm ³
Hg in exhaust gas	< 0,005 mg/Nm ³
K + Na in exhaust gas	< 0,05 mg/Nm ³

¹ Oxidation catalyst, ²ALHS-based oxidation catalysts, ³SCR catalytic converter, ⁴SCR ceramic carrier up to 100 hours, SCR metal carrier up to 1000 Bh

The plant operator is responsible for the verification of the proper fuel gas, oil input and oil consumption.

The following maximum values of ash deposits must not be exceeded on the catalytic converter:

Parameter	Value
Dust	350 g/m ³ catalyst volumes
Pb	< 200 ppm
Hg	< 200 ppm
As	< 200 ppm
Sb	< 200 ppm
Sn	< 200 ppm
Cr	< 200 ppm
Ni	< 200 ppm
Cd	< 200 ppm
S	< 0,5 % ² / < 1 % ^{1,3}
P	< 0,5 % ² / < 1 % ^{1,3}
Zn	< 0,5 % ² / < 1 % ^{1,3}
S + P + Zn	< 1 % ² / < 1,5 % ^{1,3}
Si	< 1 % *
Fe	< 2 % *

* relative to reference

¹ Oxidation catalyst, ²ALHS-based oxidation catalysts, ³SCR catalytic converter

Determination of the ash content by gravimetric methods and comparison with reference.
Determination of the individual ash components using suitable measuring methods (e.g. RFA or ICP-OES, etc.). Limit value exceeded as soon as an analysis value exceeds the specifications. For proving purposes, Emission Partner or its subcontractors will take the probe and carry out analyses.

Liability in the event of a warranty claim is governed by our general terms and conditions, which can be viewed on the Internet: <https://emission-partner.de/de/agb/>

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Emission Partner GmbH & Co. KG



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