



Cogeneration

40. Emissions

As a matter of course our Engine complies with TA-Luft and EPA Rules & Regulations and is also carrying the voluntary Manufacturers EPA Emissions Certificate of Compliance.

We are compliant to the applicable Federal Code:

EPA – Subpart JJJJ of Part 60 (Digester Gas, Biogas, LFG, Natural Gas) lean burn Gas Engine (IC Internal Combustion) - 73 FR 3591.

A Declaration of Conformity (Manufacturer Certification) will be provided.

Because we are compliant to this particular Federal Code, your Clean Air Agency's Review Process and Permit Application will be accelerated.

Please contact us if you have to comply with specific local Regulations. Depending on State, or County certain Values can only be achieved with additional and suitable Exhaust Gas Treatment. 2G® offers Exhaust Gas Treatment Solutions, if required.

Standard Emissions (before any Treatment)



Emissions are well below U.S. EPA Requirements.

CO	<2.5 g/bhp-h x 1
NOx	<0.99 g/bhp-h x 2
HCHO	<0.07 g/bhp-h x 1
NMHC	<0.19 g/bhp-h x 2
SO ₂	<0.6 g/bhp-h* x 2 <small>*depending on H₂S Content</small>

The offered Scope of Supply ensures the Compliance with U.S. Federal EPA Rules & Regulations. Stated Emissions correspond to Exhaust Gas at 100% Load, and 15% Residual Oxygen O₂.

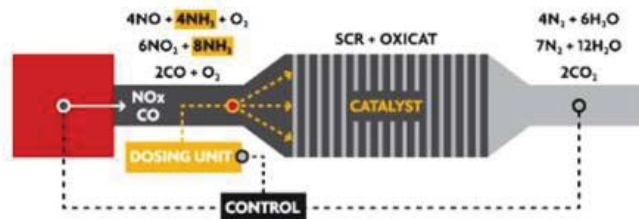
(Please Note: Changes in the Gas Fuel Composition might result in different Emission Values. Variations in Fuel Compositions, if large enough, can have a significant Impact.)

41. SCR – Selective Catalytic Reduction System



(Example Photo of SCR System Housing)

The SCR – Selective Catalytic Reduction System offered is designed to provide Emission Reduction for Oxides of Nitrogen (NOx), and Carbon Monoxide (CO) as described in the Specifications.





(Example Illustration of SCR System Housing)

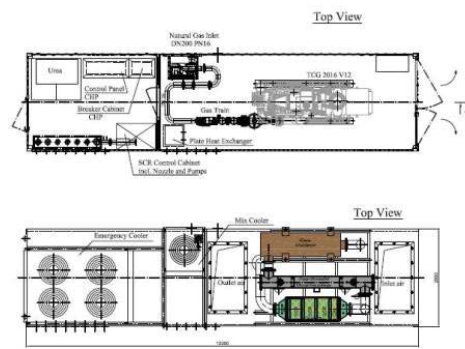
Exhaust Gas Pollutants include Oxides of Nitrogen, (NO_x), Carbon Monoxide (CO), and unburned Hydrocarbons (HC) comprising Hazardous Air Pollutants (HAPs) and Volatile Organic Compounds (VOCs). Our SCR System works in two efficient Stages: the NO_x Reduction Stage and the Oxidation Stage for CO and HC Reduction.

Both Stages work together, drastically reducing harmful Emissions to satisfy the strictest Regulatory Requirements. In the Mixing Section, either Ammonia or Aqueous Urea is injected into the Exhaust Stream. Urea is often used instead of Ammonia; since it's much less toxic than Ammonia, it's generally easier to transport and store, and allows easier Permitting. This Urea is hydrolyzed and breaks down in the Exhaust Stream to form Ammonia.

Ammonia, whether injected directly or formed from Urea, reacts with NO_x at the SCR Catalyst to form harmless Water and Nitrogen.

The Oxidation Stage uses Oxidation Catalyst Elements, with Surface Coatings impregnated with precious Metals, to reduce CO, HAPs, and VOCs – oxidizing these Pollutants to form Water and Carbon Dioxide.

Our SCR System has been developed for improved Urea / Ammonia Distribution that ensures greater Rates of NO_x Conversion and reduced Ammonia Slip. The System is self-balancing so it does not require expensive Valves or complicated Balancing Procedures to be effective.



SCR/Oxidation System

- Reactor incl. Housing (1 per CHP Engine/Module)
- SCR Catalyst (1 per CHP Engine/Module)
- Mixer and Dosing Unit (1 per CHP Engine/Module)
- Oxidation Catalyst (1 per CHP Engine/Module)
- Oxidation Cat Housing (1 per CHP Engine/Module)
- Complete System Control (1 per CHP Engine/Module)

Emissions Reducing SRC System

The SCR System's advanced Urea Reactant Injection Control assures Emission Compliance, while allowing your Engine to run efficiently, longer and with greater Flexibility. The SCR Catalytic Converter reduces regulated Exhaust Stream Pollutants from the Reciprocating lean-burn Natural Gas Engine.

Emissions after SCR Treatment

NO_x 0.10 g/bhp-h
CO 0.68 g/bhp-h

Calculated Percent Reductions

% Reduction / approximate
NO_x 90%
CO 65%

SCR remains the only proven Catalyst Technology which is capable of reducing NO_x and CO Emissions to levels required by certain Emission Regulations.

Our Engineers designed this SCR Package to meet your specific Needs. We use the highest quality Components, durable Materials coupled with Application-specific Washcoats and Catalyst Coatings for high Efficiency, Resistance and low Pressure Drop.

Equipment Details:

- Exhaust Flow Rate has been matched to the Engine Specs
- Design Exhaust Temperature: 457°C / 854°F
- Material: 16 MO3
- Oxidation Catalyst Volume sized adequately to the Flow Rate
- Layers each 300mm: 3
- Combs per Layer 3x4: 12
- Sound Attenuation: 25-30 dBA Insertion Loss
- Reactant: Urea
- Percent Concentration: 40%
- System Dosing Capacity: see Spec Sheet
- Estimated Reactant Consumption: see Spec Sheet

The quoted SCR System is only available in direct Connection with the CHP Container Module Option, and will be supplied as a fully integrated Solution.

The SCR Process requires precise Control of the Urea / Ammonia Injection Rate. An insufficient Injection may result in unacceptably NO_x Conversions. An Injection Rate that is too high results in Release of undesirable Ammonia to the Atmosphere. These Ammonia Emissions are known as Ammonia Slip.

With today's Emissions Requirements in various States, you need an Exhaust Gas Treatment System that can exceed your Needs for NO_x and CO Reduction. Our vast Experience and Knowledge of SCR System Integration makes us the ideal Solutions Provider. A "One Stop Shop" and "Single Point of Contact" and a seamless Integration of the SCR System and Oxidation Catalyst into the CHP Module.