HUG COMBIKAT™: COMPREHENSIVE AFTER-TREATMENT FROM THE TECHNOLOGY LEADER

In stationary engine installations, Hug Engineering was the pioneer in the introduction of urea as an SCR reducing agent for exhaust gas aftertreatment and is the leading global source-of-supply of emissions abatement systems for large engines. Hug Engineering has developed combikat™, a flexible, modular after-treatment technology capable of reducing the major types of exhaust pollutants to legislation compliant levels.

VERSATILE AND INCLUSIVE
combikat™ targets stationary engine power systems such as power and cogeneration plants in a power range from 200 kW to 40 MW. It is designed to minimize emissions from diesel, gas and dual-fuel engines burning a full range of liquid and gaseous fuels.

Fossil fuels
- distillates (e.g. Diesel), MGO, MDO
- heavy residual oils (HFO)
- natural gas incl. well-head, associated and flare gases
- process streams (e.g. tail gas, coke oven vents and low-BTU fuels

Renewables
- bio-fuels including biogas or vegetable oils (exhaust, refined and crude)
- syngas from the gasification processes of different biomasses

In this way, Hug Engineering’s combikat™ emissions reduction system enables operators of large engines to comply with the strictest clean air legislation applicable, while also contributing to international environmental commitments such as greenhouse gas reduction.

MODULAR AND CONFIGURABLE
Following the proven Hug philosophy, combikat™ consists of modular SCR and oxidation catalysts, combined with optional particulate filter cassettes, configured by Hug’s engineers to meet the emissions regulations in force and the customer’s own specifications. The total system is packaged in robust, easily transportable, acoustically and thermally insulated casings, ready for quick installation on site.

COMPREHENSIVE AND PRE-TESTED
Hug Engineering aims to deliver complete emissions abatement systems for large engines which are immediately ready-to-use, thus minimizing expensive on-site activities and accelerating commissioning and start-up. A vital contribution to this capability is Hug’s longstanding specialization in the development and manufacturing of standardized and pre-commissioned control systems for aftertreatment units, including open and closed-loop dosing of urea/ammonia for SCR systems. The closed-loop systems are based on a proprietary, built-in emissions measuring system, also available in versions for high-sulfur fuels such as HFO, syngas and biogas.

QUALITY FOR PERFORMANCE
As a developer, designer, producer, packager and installer of both standard and tailor-made emissions reduction systems for a full spectrum of large engine applications on land and sea, Hug maintains comprehensive in-house R&D, manufacturing, application and plant engineering capabilities. In this way, Hug secures the maximum quality control over its entire product supply chain, hence always ensuring optimum performance from the installed systems.

ADVANCED TECHNOLOGY
Hug’s best-in-class technology is based on significant annual investments in R&D and extensive field experience in the science of ultra-low NOx emissions. As a result, we can guarantee emissions simultaneously lower than 3 ppm* for oxides of nitrogen (NOx) and 1 ppm* for ammonia (NH3) from gas engines, and up to 97 % reductions in particulate matter (PM) and NOx from diesel engines. (* at 15% O2).

CUSTOMIZED TURNKEY SOLUTIONS
HUG COMBIKAT™ CONVERTER

SCR, Oil and ammonia slip catalysts and/or DPF

built-in measuring system for NOx and CO

Built-in measuring system for NO X and CO

urea/ammonia injection

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HUG EMISSION REDUCTION:
Competence, Technology and Experience

FROM CONSULTATION TO COMMISSIONING AND SERVICE
Hug Engineering’s offering covers everything from component supply to full turn-key contracts with full after-sales support.

Hug’s customer engagement starts with close consultation to determine the correct solutions in terms of commercial viability and regulatory compliance, including accurate assessments and optimization of the entire life cycle performance of Hug products. In line with the agreed scope-of-supply, following manufacture of the emissions reduction systems, Hug offers execution of all on-site activities by Hug’s own highly qualified and experienced personnel – from pre-erection inspections to site supervision, commissioning and long-term supply of spares and service. Accordingly, aftermarket activities include management of operating and capital spare parts inventories in accordance with the operator’s specific needs.

ABOUT HUG
With over 30 years of experience with stationary, mobile and marine applications, Hug Engineering has a unique level of know-how in the reduction of emissions.

This success is based on intensive, targeted R&D and a wide and flexible scope of supply in advanced emissions reduction systems – from standardized modules to customized systems, based on the customers’ specifications and applicable legislation, and supplied and installed according to their individual preferences.

According to the application-specific configuration, the Hug combikat™ system is capable of significantly reducing pollutant exhaust gas constituents:

<table>
<thead>
<tr>
<th>TECHNOLOGY / PRODUCTS</th>
<th>EMISSIONS</th>
<th>EMISSIONS RESULTS:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• selective catalytic reduction (SCR)</td>
<td>• oxides of nitrogen (NOₓ)</td>
<td>NOₓ</td>
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<tr>
<td>• particulate filter</td>
<td>• particulate matter (PM)</td>
<td>PM</td>
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<tr>
<td>• oxidation catalyst</td>
<td>• unburnt hydrocarbons (HC)</td>
<td>NMHC</td>
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<tr>
<td></td>
<td>• carbon monoxide (CO)</td>
<td>CO</td>
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<tr>
<td></td>
<td>• overall volatile organic compounds (VOC)</td>
<td>NH₃</td>
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<td></td>
<td>• formaldehyde ethylenenon and methane</td>
<td></td>
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<tr>
<td></td>
<td>hydrocarbons (NMHC)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• ammonia slip (NH₃)</td>
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</tbody>
</table>

* at 15% O₂