Diesel particle filter systems for ships

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EXHAUST AFTERTREATMENT – FOR HIGH HORSEPOWER ENGINES

**Stationary**
- Power plants
- Cogeneration plants
- Emergency power

Power range | Installed units | Installed power
--- | --- | ---
200 – 40,000 kW | 2,100 | 9.5 GW

**CO₂-fertilizing in greenhouses**

Power range | Installed units | Installed power
--- | --- | ---
200 – 6,000 kW | 1,800 | 3.2 GW

**On- and offshore vessels**
- Cruise liners
- Freight vessels
- Inland water vessels

Power range | Installed units | Installed power
--- | --- | ---
500 – 40,000 kW | 550 | 1.5 GW

**Yachts**
- Inland water vessels
- Ships

Power range | Installed units | Installed power
--- | --- | ---
200 – 9,000 kW | 850 | 600 MW

**Mobile**
- Locomotives
- Track construction machines
- Railcars

Power range | Installed units | Installed power
--- | --- | ---
200 – 5,000 kW | 1,100 | 1,200 MW

- Construction machines
- Commercial machines
- Trucks & buses
- Railcars
- Agricultural & forest machines

Power range | Installed units | Installed power
--- | --- | ---
15 – 5,000 kW | More than 37,000 | n.m.
EXHAUST AFTERTREATMENT – FOR HIGH HORSEPOWER ENGINES

clean4marine™

Reliable SCR systems for marine vessels. Applicable on marine engines up to 40 MW.

550 systems
1.5 GW

- Railcars
- Agricultural & forest machines
EXHAUST AFTERTREATMENT – FOR HIGH HORSEPOWER ENGINES

nauticlean™

Soot Filter and/or SCR DeNOx system for yachts.
Suitable for retrofit and new vessels - both in main engines and gensets.

860 systems
600 MW

- Railcars
- Agricultural & forest machines
CHALLENGE: MIDSPEED ENGINES

Mid speed engines have high oil consumption and emit large amounts of black carbon. New filter material FA2 with focus on BC from mid speed engines. Certification/measurement standards needed. BC, SOF already in discussion at IMO.
Comparison of medium speed and high speed emissions

High load engine operation, particle collection by ISO 8178

* G. Hellen, J. Ristimäki, Wärtsilä, CIMAC 2007 paper #56
CIMAC methods for PM measurement recommended

4.3.1.2 Direct Measurement Method – All Fuel Qualities

Measurement after engine and before heat recovery boiler, before flue gas cleaning system, etc - Recommended methods:


- VDI 2066 Blatt 1 (Germany): Particulate matter measurement: Measuring of particulate matter in flowing gases. Gravimetric determination of dust load.

- EPA Method 17 (USA): Determination of particulate emissions from stationary sources

- JIS Z8809 (Japan): Methods of measuring dust concentration in flue gases

Measurement of Black Carbon

→ dry dust measurement protocols for medium speed DPF assessment

* CIMAC Internat. Council on Combustion Engines  WGS guide to diesel exhaust emission control 28/2008
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