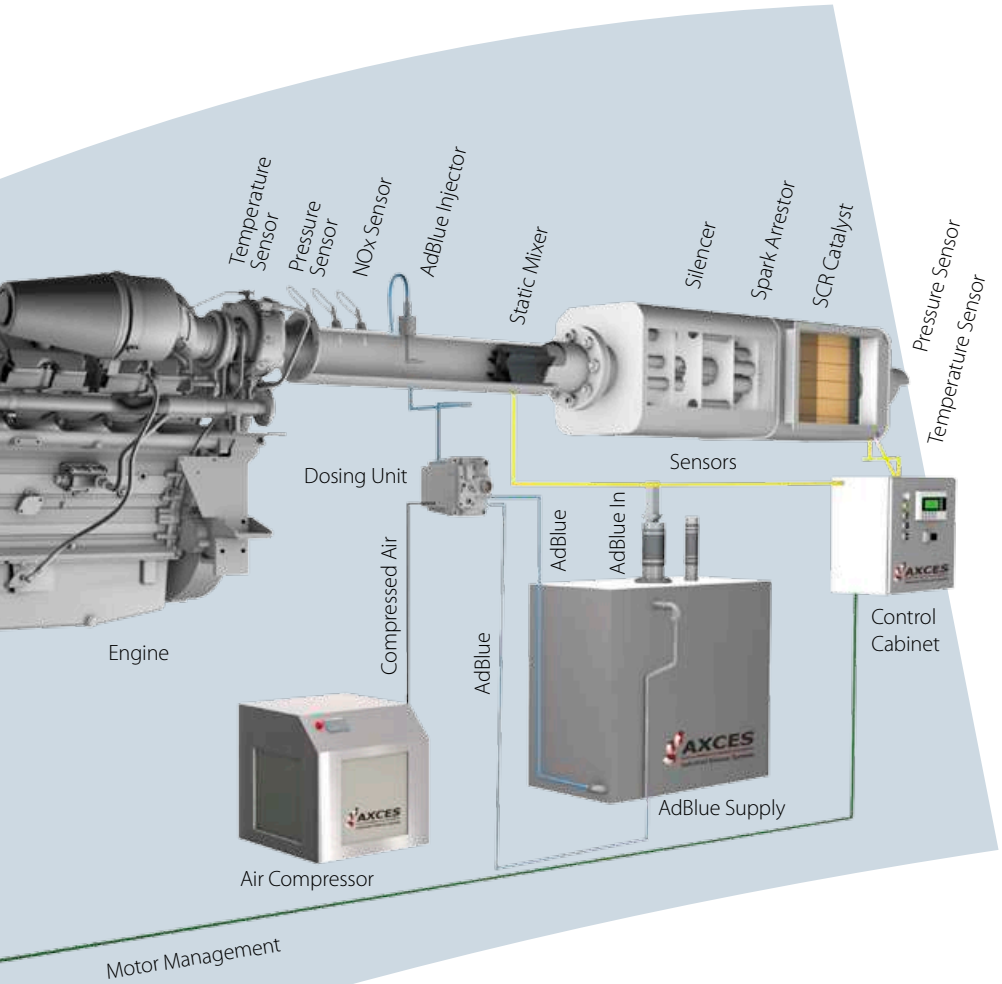


**EMISSION
TECHNOLOGY**



AXCES EMISSION TECHNOLOGY

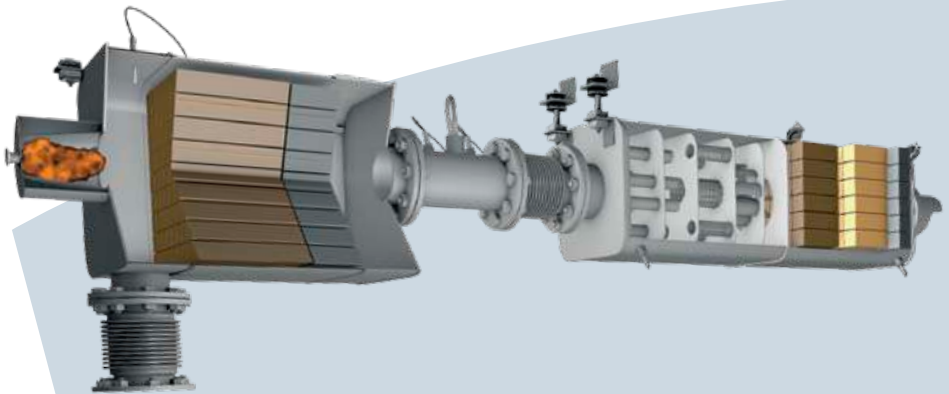


SCR SYSTEMS WITH INTEGRATED SILENCER AND TYPE APPROVED SPARK ARRESTOR

Moving forward to IMO Tier III and in-line with current EPA and IMO standards, regulating the release of harmful NOx compounds from exhaust systems.

The integrated SCR/silencer reactor is a novel solution making Axces a market leader in this field. The new IDE - NOx reactor can very easily be swapped with the existing noise reduction elements.

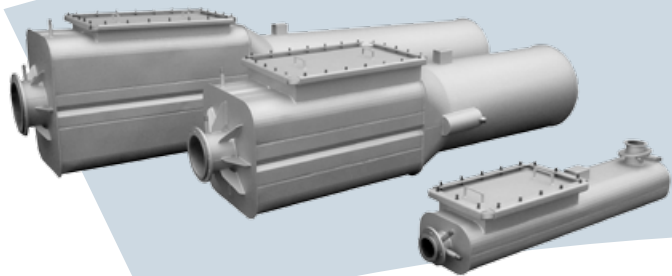
This upgrade of reactor leads to a reduction in the release of toxic NOx compounds through selective catalytic reduction. At the same time it operates as an exhaust silencer, with noise reduction of more than 45 dB(A).



THE IMO TIER III NO_x SYSTEM

To comply with the IMO Tier 3, EU Stage V, EPA Tier 4 and local land based NO_x emissions, NO_x requirements the Axces modular Zero NO_x System for diesel engines in generator set applications offers reliable reduction of NO_x for certain Emission Control Area's (ECA).

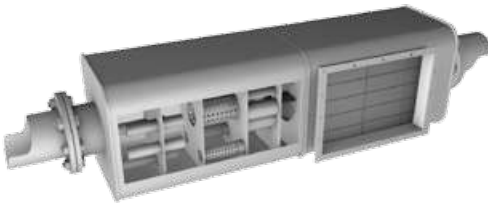
The Selective Catalytic Reduction (SCR) reduces NO_x with use of UREA (Ad Blue) injection in the exhaust stream.



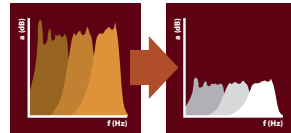
- Both Inline and Compact IDE-NO_x System available in every size engine room.
- It is possible to combine a customised Zero Soot Systems, to avoid guests experience particulates on deck, common diesel fuel in swimming water and diesel fuel smell.
- The Axces system range has been designed to form a match with the auxiliary and generators from 100 kW up to 8.000 kW.
- The PLC control ensures an smart trouble free operation for all available parameters, alarms & events, history and data logging.
- Integrated sound attenuation.

SCR SYSTEMS WITH INTEGRATED SILENCERS

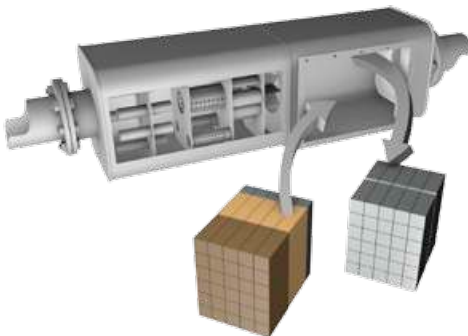
EXCELLENT SILENCER UNIT



This system has an excellent Prepared Silencer to SCR unit with an attenuation of more than 45 dB(A), which silences the complete frequency range.



NO_x REDUCTION UNIT



The damping units are easily swappable and guarantee a NO_x Reduction of more than 80%. The catalyst is a high quality Vanadium Based unit, which ensures minimum back pressure.

PERFORMANCE

NO _x – Nitrogen oxides*	>80-90% reduction
HC (Hydro-Carbons)	20 - 30%*
CO (Carbon-Monoxide)	20 - 30%*
Sound attenuation **	ca. 35/45 dB(A)

* depending on exhaust temperatures
** lower value for In-Line systems / higher value for compact systems



SYSTEM PARTS

CONTROLLER

PLC control terminal
Full colour 7" HMI touch screen
Logging of history
Communication with motor management
External I/O: Inputs: Engine load signal, Engine on.
Outputs: System ON, Alarm.



UREA DOSING PUMP

UREA PUMP SET

UREA INJECTOR

SENSORS

Temperature and back pressure transmitter

WIRING

Wiring by electrician



OPERATIONAL CONDITIONS

Application	Sea going vessels, inland vessels, superyachts, power plants, CO-generation
Ambient Temperature	5 + 60°C (lower temperatures on request)
Degree of Protection	IP55
Relative humidity	5 to 95% Non-condensing
Inspection & service interval	1x per year or 4.000 operating hours
Compressed air for urea atomizer	8-12 Nm ³ /h @ min 6 barg (2-phase nozzle)
Urea nozzle type	2-phase nozzle, compressed air atomization
Urea specification	AUS32 or AUS40 or equivalent



SUPPLIES

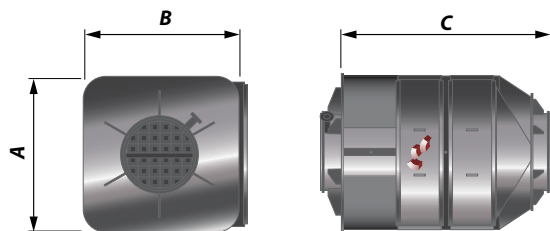
Fuel	EN590 (Diesel), DMA, DMX (max 2000 ppm S)
Power supply	230VDC

DESIGN DATA

Materials	Aisi 304 / 316 (mixing tube)
Temperature exhaust in	0 - 520 °C (optional higher temperatures)
Max system pressure (design)	100 mbar (for housing design) design temperature 600°C
Max pressure drop	20 mbar (wet exhaust)
Emission reduction	NOx ca. 80% to reach IMO III Tier limit of 2 g/kWh CH / CO >30-50% (depending on temperature)
Operational temperature	>220°C (EN590 fuel) >250°C (max 2000 ppm sulphur)
Control strategy	Open loop (Standard) Closed loop with NOx sensor (optional with EN 590 fuel only)
Supports	Bottom (standard), top support possible
Thermal insulation	Max. 80 mm insulation / Blankets or cladded insulation (by customer)



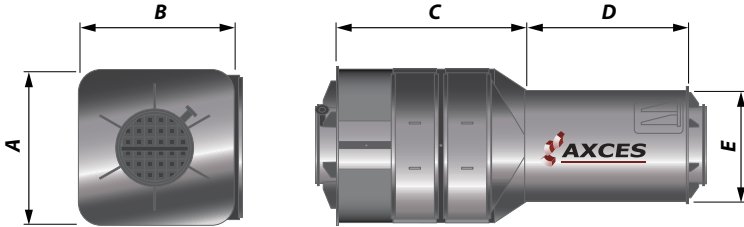
SEPERATE SCR



Engine Power (kW)	Nominal Bore (NB)	A (mm)	B (mm)	C (mm)
100	100	500	200	1250
150	125	350	350	1300
200	150	350	500	1350
250	150	350	650	1350
300	200	350	650	1450
350	200	500	500	1450
400	200	500	650	1450
450	250	500	650	1550
500	250	650	650	1550
550	250	650	650	1550
600	250	650	650	1550
650	300	650	850	1650
700	300	650	850	1650
750	300	650	850	1650
800	300	850	850	1650
850	350	850	850	1750
900	350	850	850	1750
950	350	850	850	1750
1000	350	850	950	1750
1100	350	850	950	1750
1200	400	850	1200	1850
1300	400	850	1200	1850
1400	400	950	950	1850
1500	450	950	1200	1950
1600	450	950	1200	1950
1700	450	1200	1200	1950
1800	450	1200	1200	1950
1900	450	1200	1200	1950
2000	500	1200	1350	2050
2100	500	1200	1350	2050
2200	500	1350	1350	2050

SCR SYSTEMS

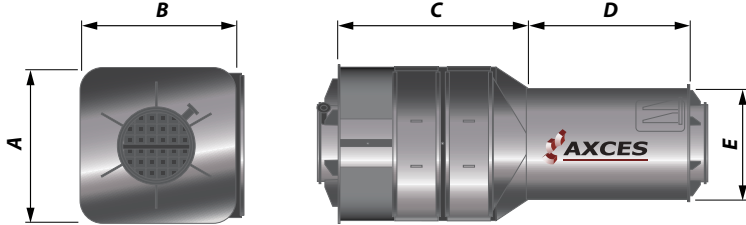
With Integrated Silencer Type AES - 35



Engine Power (kW)	Nominal Bore (NB)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Attenuation (dB(A))
100	100	500	200	1250	600	360	35
150	125	350	350	1300	750	400	35
200	150	350	500	1350	800	475	35
250	150	350	650	1350	800	475	35
300	200	350	650	1450	1000	560	35
350	200	500	500	1450	1000	560	35
400	200	500	650	1450	1000	560	35
450	250	500	650	1550	1200	635	35
500	250	650	650	1550	1200	635	35
550	250	650	650	1550	1200	635	35
600	250	650	650	1550	1200	635	35
650	300	650	850	1650	1500	760	35
700	300	650	850	1650	1500	760	35
750	300	650	850	1650	1500	760	35
800	300	850	850	1650	1500	760	35
850	350	850	850	1750	1900	800	35
900	350	850	850	1750	1900	800	35
950	350	850	850	1750	1900	800	35
1000	350	850	950	1750	1900	800	35
1100	350	850	950	1750	1900	800	35
1200	400	850	1200	1850	2100	860	35
1300	400	850	1200	1850	2100	860	35
1400	400	950	950	1850	2100	860	35
1500	450	950	1200	1950	2500	910	35
1600	450	950	1200	1950	2500	910	35
1700	450	1200	1200	1950	2500	910	35
1800	450	1200	1200	1950	2500	910	35
1900	450	1200	1200	1950	2500	910	35
2000	500	1200	1350	2050	2700	960	35
2100	500	1200	1350	2050	2700	960	35
2200	500	1350	1350	2050	2700	960	35

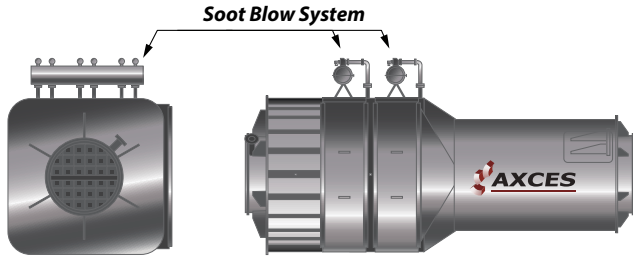
SCR SYSTEMS

With Integrated Silencer Type AES - 45



Engine Power (kW)	Nominal Bore (NB)	A (mm)	B (mm)	C (mm)	D (mm)	E (mm)	Attenuation (dB(A))
100	100	500	200	1250	600	475	45
150	125	350	350	1300	750	475	45
200	150	350	500	1350	800	560	45
250	150	350	650	1350	800	560	45
300	200	350	650	1450	1000	660	45
350	200	500	500	1450	1000	660	45
400	200	500	650	1450	1000	660	45
450	250	500	650	1550	1200	860	45
500	250	650	650	1550	1200	860	45
550	250	650	650	1550	1200	860	45
600	250	650	650	1550	1200	860	45
650	300	650	850	1650	1500	910	45
700	300	650	850	1650	1500	910	45
750	300	650	850	1650	1500	910	45
800	300	850	850	1650	1500	910	45
850	350	850	850	1750	1900	960	45
900	350	850	850	1750	1900	960	45
950	350	850	850	1750	1900	960	45
1000	350	850	950	1750	1900	960	45
1100	350	850	950	1750	1900	960	45
1200	400	850	1200	1850	2100	1100	45
1300	400	850	1200	1850	2100	1100	45
1400	400	950	950	1850	2100	1100	45
1500	450	950	1200	1950	2500	1270	45
1600	450	950	1200	1950	2500	1270	45
1700	450	1200	1200	1950	2500	1270	45
1800	450	1200	1200	1950	2500	1270	45
1900	450	1200	1200	1950	2500	1270	45
2000	500	1200	1350	2050	2700	1300	45
2100	500	1200	1350	2050	2700	1300	45
2200	500	1350	1350	2050	2700	1300	45

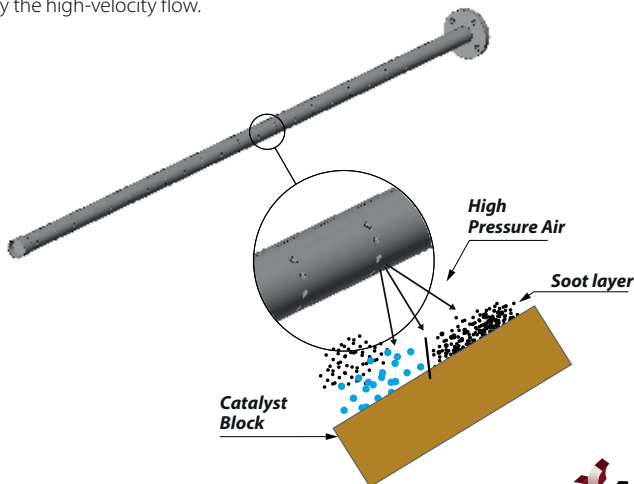
SCR WITH SOOT BLOWER



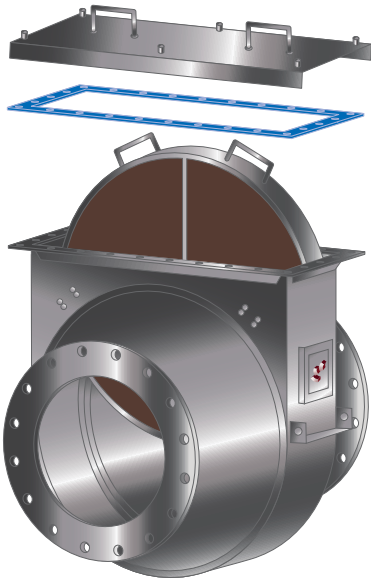
Axces has an integrated soot blower system available for internal cleaning of soot residue on the surface of the catalyst blocks. The Axces sootblow system has excellent results in cleaning performance, using the most effective cleaning lance tube with a maximized cleaning impact.

Sootblowers clean the surface of the SCR blocks by extending a lance tube into the SCR and blowing high pressure air directly onto the surfaces of the catalyst blocks. The effectiveness of a sootblower is primarily dependent on the ability of the nozzles at the end of the lance tube to convert the potential energy of high-pressure air into a coherent jet of high-velocity flow.

In turn, the high-velocity air flow impacts the soot deposits on the surface of the catalyst blocks and removes them by fracturing the residue and sweeping them off the catalyst blocks via shear stresses imposed by the high-velocity flow.



DOC: DIESEL OXIDATION CATALYST



A Catalytic converter is used on diesel engines to reduce hydrocarbon and carbon monoxide emissions.

The diesel oxidation catalyst (DOC) owes its name to its ability to promote oxidation of several exhaust gas components by oxygen, which is present in small quantities in diesel exhaust. When passed over an oxidation catalyst, the following diesel pollutants can be oxidized to harmless products, and thus can be controlled using the DOC:

- Carbon monoxide (CO)
- Gas phase hydrocarbons (HC)

It converts three harmful substances into harmless ones: carbon monoxide (a poisonous gas) into carbon dioxide, nitrogen oxides (cause acid rain and smog) into nitrogen, oxygen and hydrocarbons (cause smog and respiratory problems) into carbon dioxide and water.

Catalytic converters consist of a stainless steel box attached to the muffler and containing ceramic beads or honeycomb coated with catalysts.

Common applications include natural gas engines and diesel engines, power generation, co-generation.

FEATURES

- Cover plates for easy removal and service of individual DPF elements.
- Individual DPF elements can be lifted by hand without the need for special lifting equipment.
- Modular, scalable design for any size engine.
- Available in a variety of connection types, including ANSI and DIN bolt pattern flanges.
- Heavy gauge housing, available in stainless and mild steel.

DPF: DIESEL PARTICULATE FILTERS



DPF's are used for high efficiency (>85%) reduction of particulates (soot) in stationary diesel engines, providing long term passive regeneration.

Diesel engines produce a variety of particles during combustion of the fuel/air mix due to incomplete combustion.

The composition of the particles

varies widely dependent upon engine type, age, and the emissions specification that the engine was designed to meet.

Diesel particulate matter resulting from the incomplete combustion of diesel fuel produces soot (black carbon) particles. These particles include tiny nanoparticles—smaller than a thousandth of a millimeter (one micron). Soot and other particles from diesel engines worsen the particulate matter pollution in the air and are harmful to health.

New particulate filters can capture from 30% to greater than 95% of the harmful soot. With an optimal diesel particulate filter (DPF), soot emissions are being enormously decreased.

The quality of the fuel also influences the formation of these particles. For example, a high sulfur content diesel produces more particles. Lower sulfur fuel produces fewer particles, and allows use of particulate filters. The injection pressure of diesel also influences the formation of fine particles.



FEATURES

- Cover plates for easy removal and service of individual DPF elements.
- Individual DPF elements can be lifted by hand without the need for special lifting equipment.
- Modular, scalable design for any size engine.
- Available in a variety of connection types, including ANSI and DIN bolt pattern flanges.
- Heavy gauge housing, available in stainless and mild steel.
- Space for future upgrade.

