



**E.I. WILLIAMS
INDUSTRIES**



SMARTER. CLEANER. QUIETER.

SCR Custom Built Tier 4 Compliant Systems

E.I. Williams is a global leader in designing and manufacturing silencers, exhaust accessories, and emission products.

From Silencers and Exhaust Accessories to Selective Catalytic Reduction (SCR), Diesel Oxidation Catalysts (DOC), and Diesel Particulate Filters (DPF), we have a full line of products made in the USA customized to meet your requirements.

Tier 4 Emission standards set by the Environmental Protection Agency (EPA) focus primarily on the reductions of NO_x, PM, CO, and HC. To reduce NO_x, an SCR system will be required. To reduce PM, CO, & HC, you will also need to install DOCs and DPFs where all emissions will need to be reduced by a factor of approximately ~90%.



Our SCR Technology is a cost effective “bespoke” solution for the Power Generation Industry.

E.I. Williams can offer both SCR, DOCs and DPFs in separate housing all supplied on a roof mounted framework for quick and easy installation for any size engine.



SCR (Selective Catalytic Reduction) technology

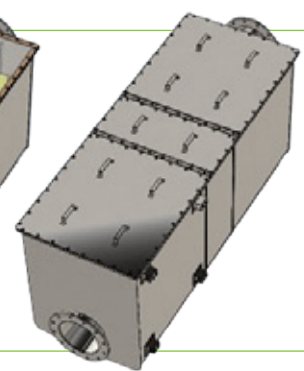
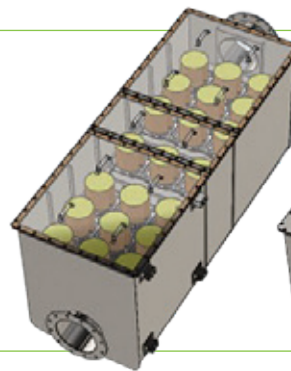
Our SCR Technology is a cost effective “bespoke” solution for the Power Generation Industry that provides compliance to Tier 4 NOx legislation for both Mobile Generating sets and Large Stationary Engines

The SCR technology is a “closed loop” control system that comes with an electronic Diesel Exhaust Fluid (DEF) dosing and monitoring package with NOx, temperature and backpressure sensors, airless injectors, and an ECU housed within the control panel for NOx control and measurement.

The airless injectors located in the mixer pipe up front of the SCR Reactor utilize a pressure rail to inject the DEF under pressure into the exhaust gas stream which eliminates the need for an air compressor.

Once injected, the DEF solution (32.5% Urea in Water) is hydrolyzed to produce the ammonia gas that is required for NOx (NO/NO2) reduction across the SCR catalyst.

Modular SCR
Technology custom
built for Mobile Gensets
(up to 560 kw) &
Large Stationary Engines
(up to 95 Ltr - 3.5 MW)



The SCR Catalysts within the SCR Reactor (manufactured in full stainless steel) comes with an Ammonia Slip Catalyst Coating (ASC) on the rear face of the SCR that kills any ammonia (NH₃) preventing any excess ammonia gas not used in the catalytic reaction to reduce NOx across the SCR catalysts from exiting the tailpipe. The SCR Reactors are built in a modular concept with multiple catalysts and an upfront mixer pipe for any size engine.

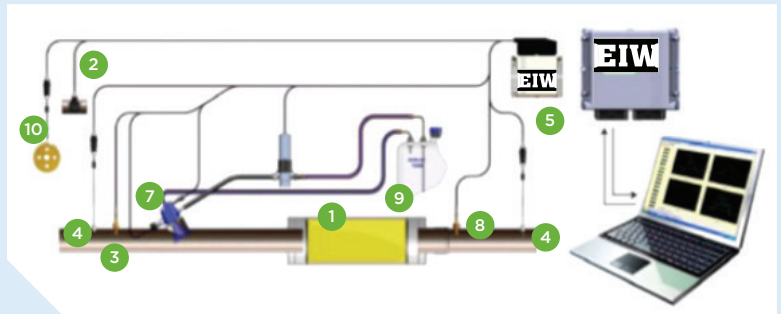
Our Electronic Control Unit (ECU) has been developed as a link between the engine and the diesel emission after treatment system. The ECU constantly monitors the performance, operational conditions of the engine and pressure drop of the exhaust.

The software calibration provides an optimal balance between emission requirements, DEF Consumption and NOx Reduction. The normal DEF consumption for NOx Reductions in the region of 90-95% is around 5-6% of the overall fuel usage. We recommend that Ultra Low Sulfur Diesel Fuel (generally 10ppm) be used.

SCR System Components

The SCR system comprises of the following components:

1. SCR Reactor
2. MAP Sensor or CanBus Signal
3. Exhaust Temperature Sensor
4. NOx sensors (Engine Out and Tailpipe)
5. ECU
6. AdBlue Pump
7. AdBlue Injector
8. Backpressure Sensor
9. AdBlue Buffer Tank
10. Speed Sensor (RPM) or CanBus Signal

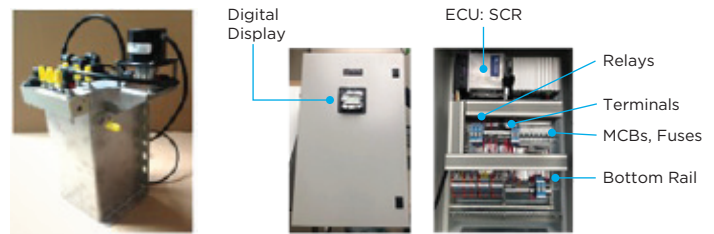


Electronic AdBlue/DEF Dosing System - Data Logging

As well as measuring NOx levels, the ECU also records the pressure drop, temperature, RPM, turbo pressure, engine operation time, exhaust gas flow and levels of DEF that remains in the Buffer Tank and Main DEF Bulk Tank and provides feedback as to when to replenish with DEF. If the system is allowed to run out of DEF as an added precaution, there is a small, sealed water tank that recirculates water across the injectors to keep them cool until the DEF is replenished and normal operation is resumed.

If any errors occur, the ECU stores this in its “date/time stamped” electronic memory where the data can be retrieved by hooking up to a laptop and downloading at any time.

The Electronic Control Cabinet houses the ECU (Relays, Terminals, MCB/Fuses) can also be fitted with a ModBus Converter to interface with the customers site system. The Control Cabinet can be mounted either on the outside of the Generator Enclosure or on the roof alongside the SCR Reactor. The Electronic Control Cabinet has a “Display Unit” on the front door that can be used to view any of the parameters being measured by the ECU.



We can also provide separate PCs if required that connects to our control cabinet that will provide remote access for system support.

The DEF “Buffer Tank” comes with its own Level Sensor, Pump and Pressure rail used to pressurize the DEF for injection into the exhaust via the injectors located in the inlet end of the DEF Mixer Pipe upstream of the SCR Reactor. The number of injectors depends on the size of the engine on which the system is to be installed.

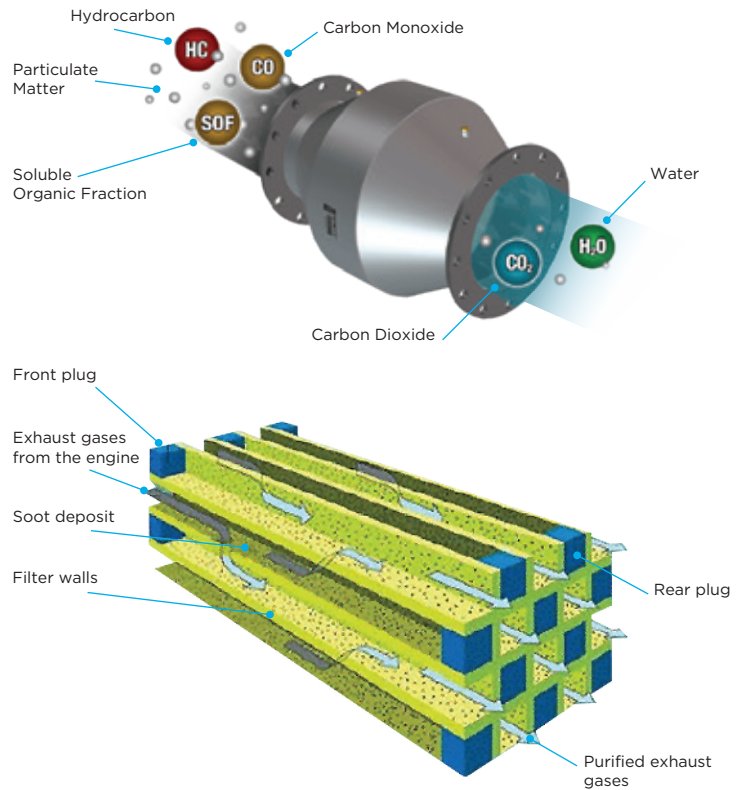
A separate DEF Bulk Tank that feed the small buffer tank can also be provided along with Level Sensors, Alarms and Gauges if required.

To reduce PM, CO, and HC, the SCR System can also be supplied complete with multiple close-coupled DOC/DPFs in a separate housing upfront to the SCR Reactor/Mixer Pipe.

DOC/DPF Modules

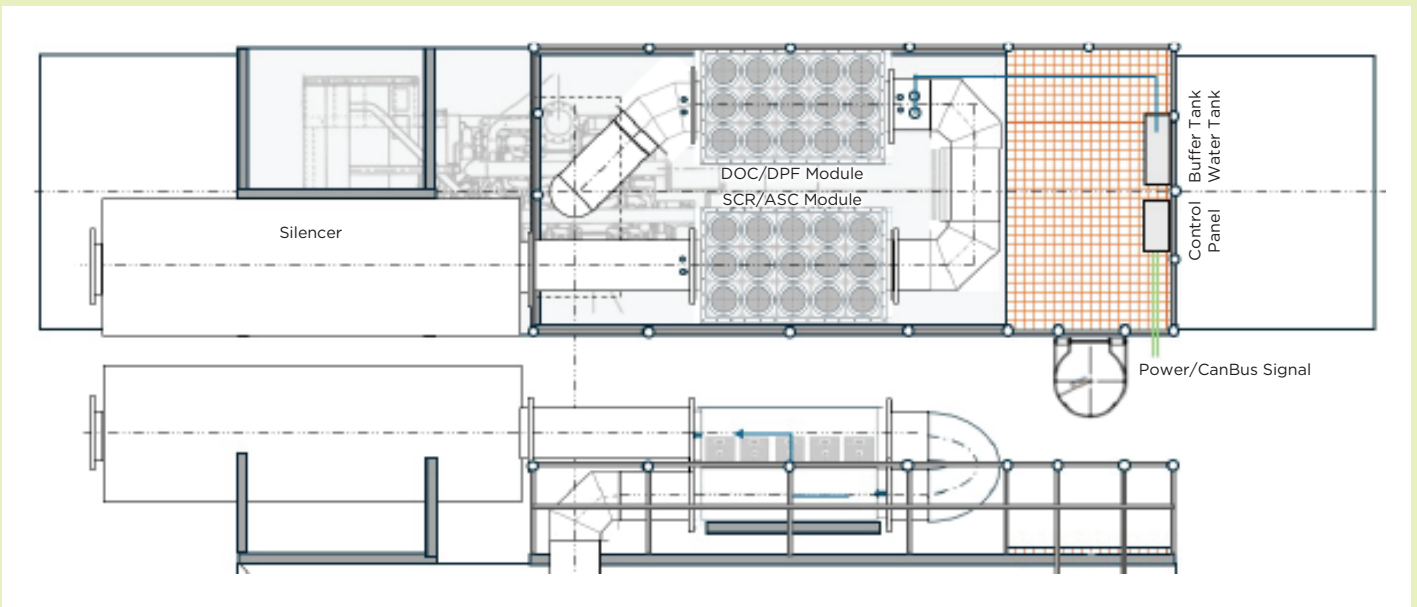
The DOC will dramatically reduce CO/HC and assist with passive regeneration of the Wall-Flow DPF which captures up to 99% of all Diesel Particulate Matter (PM10/PM2.5) which gets regenerated (combusted) passively on duty cycles with exhaust gas temperatures of around 300C. Once combusted the soot will turn to ash which will need to be removed periodically by taking out the DPF filter at the center flanges and cleaning. The multiple DOCs and DPFs are close coupled together and are lowered (or removed) from the housing via an access lid above the DOC/DPFs.

As the housing is to be sited before the DEF Injection of the SCR Reactor, it means the housing can be made from a mild steel painted structure. We would recommend that the systems be lagged/Clad to retain heat to improve performance and prevent any heat loss into the plantroom.



The Wall-Flow DPF will remove up to 99% of the Soot Particles (PM10/PM2.5) present in the exhaust.

The illustration below shows a typical roof mounted framework housing both the DOC/DPF Modules followed by the DEF Mixer Pipe and SCR Reactor/Module.



Advantages of EIW Tier 4 SCR/DPF emissions systems

- Designed for Tier 4 Final Compliance for all legislated emissions (NO_x, PM, CO, HC) with approx. 90-95% reductions.
- Can be designed to fit any size engine from Mobile Generating Sets to Large Stationary Powered Engines.
- The system can be supplied as SCR only, DPF only or a combined SCR/DPF System configured to your requirements.
- The SCR Catalysts comes with ASC (Ammonia Slip Coating) on the rear face to prevent any unused ammonia (NH₃) from escaping from the Tailpipe.
- The housings allow easy removal of each individual catalyst/filter via a top lid for cleaning/maintenance if required.
- The SCR is always manufactured in Stainless Steel due to the corrosive nature of the DEF. The DOC/DPF Housing can be made from Mild Steel painted or stainless, whichever is preferred.
- Comes with Airless DEF Injectors, no requirement for a compressor.
- The system has “Closed Loop” control, measures temperature and NO_x levels upstream and downstream of the SCR and automatically adjusts for changes in NO_x levels to optimize the DEF usage.
- The system is compact with all electrical wiring/DEF transfer lines to the sensors and injectors pre-installed before shipping so all required on site is to provide power to the control panel and feed from the DEF Bulk Tank before commissioning
- The system generally comes complete on a roof mounted frame that gets lowered on to the generating set reducing site installation time.
- Can be supplied with pre-installed safety rails/ladders for safe working at height.
- The control panel comes with a digital display to view all system parameters and has capacity for additional sensors if required.
- The system has various alarms (i.e. DEF levels) with date/time stamped memory which can be downloaded at any time for review.
- The system has a sealed water system that recirculates water to keep the injectors cool if the engine is running without DEF.
- The system has its own software with real-time reporting that can be used to generate reports/graphs to show system performance.
- The J1939 CANbus signals can be interfaced with the site BMS (ModBus) if required or be supplied with a PC with Teams for Remote Access/Support.

For further information on the Tier 4 Systems that can be provided please contact info@eiwilliams.com

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