



# **Case Study**

## **CO, HC & PM**

### **Emission**

### **Reduction**

## **Perkins 4016TAG2**



# Emissions

GenCat Ltd  
Unit 16  
The Edge Business Centre  
Humber Road  
London  
NW2 6EW

T: 020 8450 6160  
F: 020 8452 2822

web: [www.gencat.co.uk](http://www.gencat.co.uk)  
email: [info@gencat.co.uk](mailto:info@gencat.co.uk)

Below is a guideline to the calculated emissions reduction for a Perkins 4016TAG2 (2000kVA) with an OSCA V3NA D500 catalytic converter and UGET 3 D1600 particulate filter applied.

**CO:** 82%

**HC:** 75%

**PM:** 85%

These figures applied to the specific CO and HC figures supplied from Perkins:

	<b>Engine Type</b>	<b>rpm</b>	<b>COmg/Nm<sup>3</sup></b>	<b>HCmg/Nm<sup>3</sup></b>
No filters	Perkins 4016 TAG2	1500	328	52
With filters	Perkins 4016 TAG2	1500	59.04	13

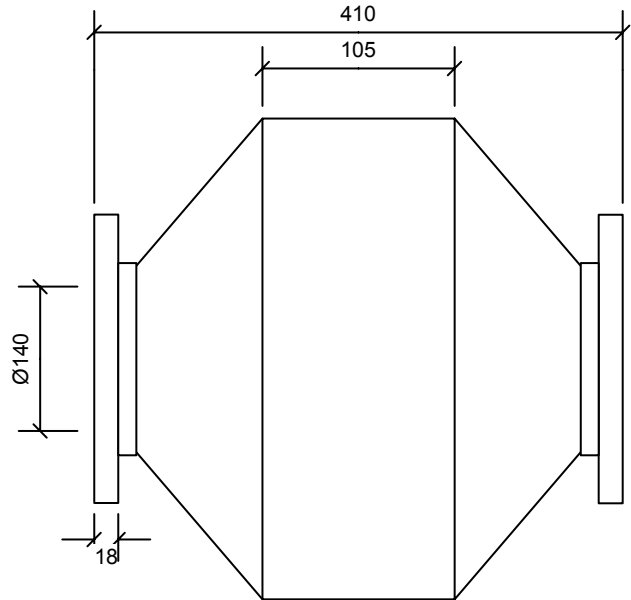
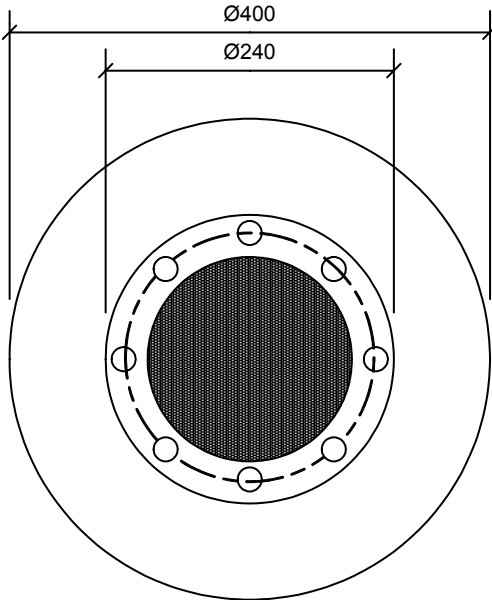
All data is a guideline and is subject to variation if engine and filters are not properly maintained.

All equipment is manufactured to ISO 9001:2000.

The incidental noise abatement due to the addition of both units is 20-25dBA.

Simon Taylor  
GenCat Ltd

## OSCA D500F 35,000 – 45,000cc\*



All dimensions in mm  
Not to scale

The **OSCA V3NA** Catalytic Converter uses a catalytic chemical conversion to transform carbon monoxide (CO) and unburned hydrocarbons (HC) into non-toxic carbon dioxide and water. This conversion is carried out through a metallic honeycomb substrate coated with platinum, palladium and rhodium. The catalyst is capable of reducing up to 90% of pollutants at an optimum operating temperature of 250°C.

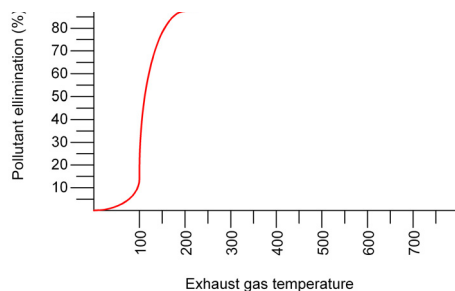
### Features

- Up to 90% reduction in pollutants
- Reduces Carbon Monoxide (CO)
- Reduces Unburned Hydrocarbons (HC)
- Effective on Aldehydes
- Suitable for any diesel engine

### Fitment

It is essential that fitment is as close as possible to the engine exhaust manifold, the OSCA V3NA requires high temperature to ensure maximum catalytic efficiency. There is no particular direction of flow through the catalyst and should be installed directly in the exhaust line, the original silencer system is left in place.

### Efficiency Curve for the OSCA Catalytic Converter



### Applications

The catalyst is suited to any diesel engine application, such as prime power or standby generator sets, NRMM such as earth moving equipment and materials handling equipment such as forklifts and telescopic handlers. In particular the catalyst is suited to equipment being used in a confined space such as tunnels, warehouses and mines.

### Life

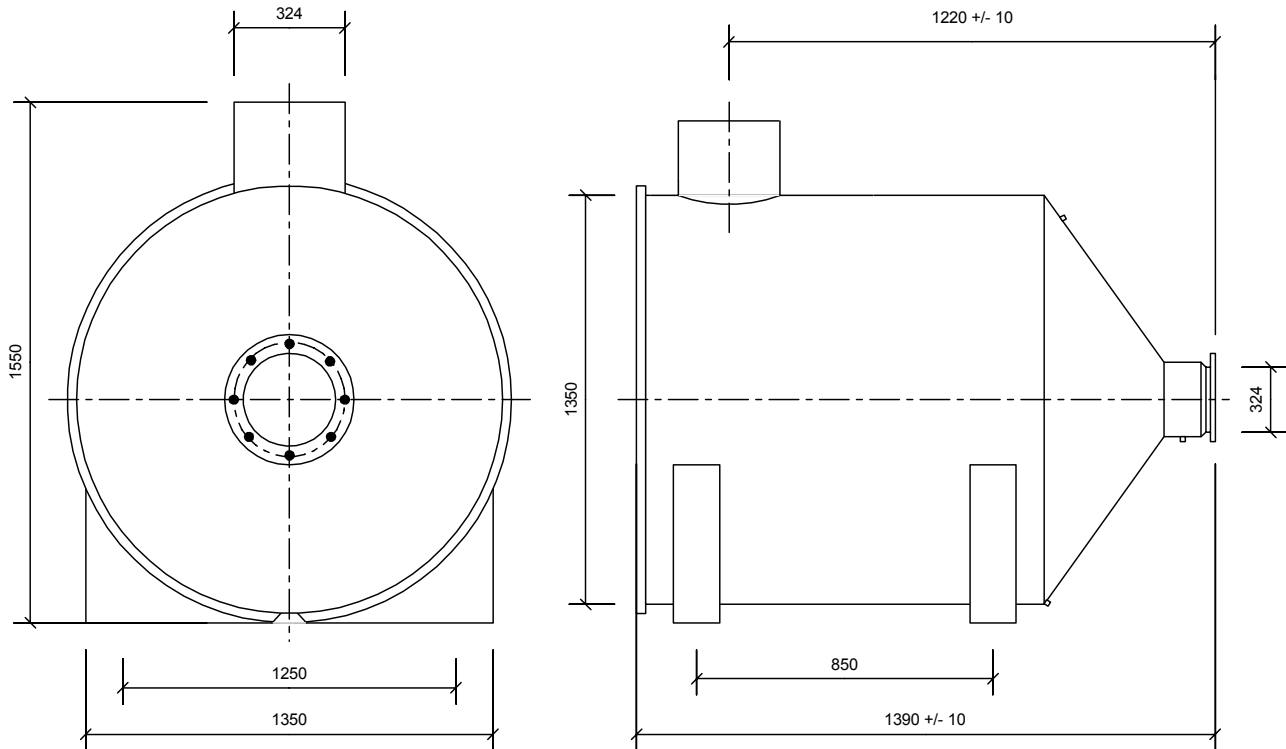
The nature of a catalytic converter is a catalytic reaction; hence the life of the catalyst is theoretically unlimited. Due to unavoidable operating conditions such as engine vibration, poorly tuned engines and abrasive action of the exhaust, the life of the catalyst is reduced. As a result of this, the catalyst requires replacement after 10,000 hours of use.

### Maintenance

The catalyst should be cleaned every 500 hours, this is achieved by letting the catalyst cool down after use, removing the honeycomb substrate from the housing and soaking in hot soapy water for 5 hours. The catalyst can be replaced once thoroughly dry.

\*For Turbocharged engines first multiply engine displacement by 1.4

## UGET3 D1600



All dimensions in mm  
Not to scale

The **UGET 3** diesel particulate filter collects the particulate matter in the exhaust stream by means of physical filtration. Effective from start-up, the filter is capable of retaining particles as small as 0.3 microns, trapping all PM10 and PM2.5 matter and is capable of reducing up to 85% of particulate matter (PM) in the exhaust stream. The UGET 3 is a non-regenerative type; it has a finite capacity of 1000 grams before the filter cartridge requires replacing.

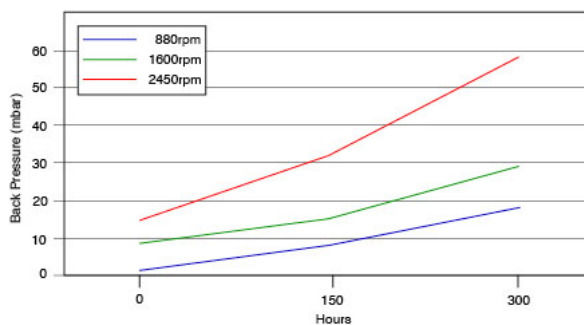
### Features

- Reduces particulate matter (PM) by up to 85%
- Operates from engine start-up
- Suitable for standby generator sets, low-usage forklift trucks, side-loaders, excavators etc.
- Bypass system available

### Filter Life

300-350 hours depending on condition and maintenance of the engine.

### Back pressure for the UGET Particulate Filter



### Applications

The filter is suited to low usage applications such as standby generator sets or on equipment being used for short periods at a time, it is particularly suited to equipment being used in confined spaces. The filters can be bypassed, so that it is only used when required, i.e. inside tunnels and warehouses, electronic or manual bypass valves are available.

### Fitment

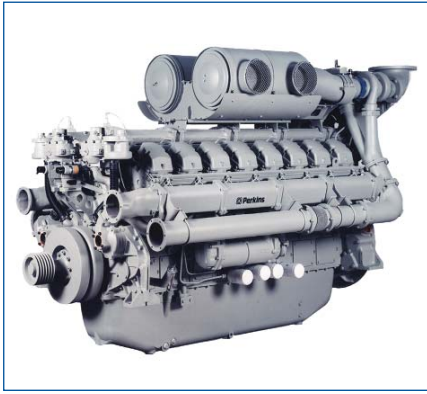
As the maximum operating temperature of the filter is 350°C, it is recommended that fitment of the filter is as far from the engine as possible, to avoid overheating. The filter can be bolted to the frame or body and simply attached with a length of flexible exhaust pipe. The filter cartridge is fire resistant and incorporates a heat shield for protection from burns.

### Maintenance

There is minimal maintenance required, at the end of the filter life it is removed and simply replaced with a new one. Failure to do so will cause the filter to block, which in turn can damage or destroy the filter itself or cause damage to the engine due to increased backpressure.

Besides a wide range of standard models, special models can be produced for engines with any power rating.

\*For Turbocharged engines multiply engine power by 1.3 first



## 4000 Series

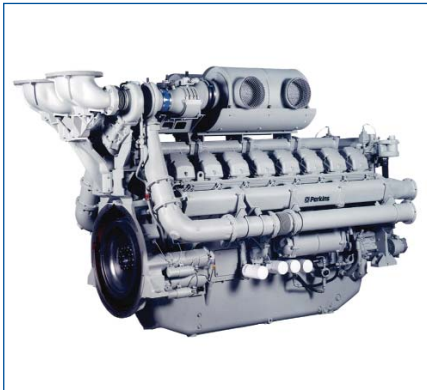
### 4016TAG2

### 4016TAG2A

#### Diesel Engine – Electro Unit

1540 kWm 1200 rev/min

1886 kWm 1500 rev/min



#### Economic power

Individual 4 valve cylinder heads give optimised gas flows, while unit fuel injectors ensure ultra fine fuel atomisation and hence controlled rapid combustion for efficiency and economy.

Commonality of components with other engines in 4000 Series family allows reduced parts stocking levels.

#### Reliable power

Developed and tested using latest engineering techniques.

Piston temperatures are controlled by an advanced gallery jet cooling system.

All engines are tolerant of a wide range of temperatures without derate.

Service is provided through the extensive Perkins network of over 4000 distributors and dealers worldwide.

#### Clean, efficient power

Exceptional power to weight ratio and compact size for easier transportation and installation.

Designed to provide excellent service access for ease of maintenance.

Engines designed to comply with major international standards.

Low gaseous emissions for cleaner operation.

The Perkins 4000 Series family of 8, 12 and 16 cylinder diesel engines was designed in advance of today's uncompromising demands within the power generation industry and includes superior performance and reliability.

The 4016TAG2/2A are turbocharged, air to air charge cooled, 16 cylinder vee form diesel engines. Their premium design and specification features provide economic and durable operation as well as exceptional power to weight ratio, improved serviceability, low gaseous emissions, overall performance and reliability essential to the power generation market. The 4016TAG2A is specially tuned for improved load acceptance response in standby duty.

Engine Speed (rev/min)	Type of Operation	Typical Generator Output (Net)		Engine Power			
		kVA	kWe	Gross		Net	
				kWm	bhp	kWm	bhp
1200 4016 TAG2	Baseload Power	1329	1063	1166	1563	1108	1485
	Prime Power	1680	1344	1458	1954	1400	1877
	Standby (maximum)	1848	1478	1598	2148	1540	2065
1500 4016 TAG2A	Baseload Power	1634	1307	1413	1894	1362	1826
	Prime Power	2058	1646	1766	2367	1715	2300
	Standby (maximum)	2264	1811	1937	2596	1886	2529

Note: 4016TAG2A is offered for 50Hz operation only.

The above ratings represent the engine performance capabilities guaranteed within plus or minus 3% at the reference conditions equivalent to those specified in ISO 8528/1, ISO 3046/1, BS 5514/1.

Ratings conditions: 25°C air inlet temperature, barometer pressure 100 kPa, relative humidity 30%. Please consult your distributor or the factory for ratings in ambient conditions.

Note: For full ratings please refer to Perkins Engines Company Limited. All electrical ratings are based on an average alternator efficiency and a power factor of 0.8.

Fuel specification: BS 2869 Class A1 + A2 or ASTM D975 No 2D.

#### Rating Definitions

**Baseload Power:** Power available for continuous full load operation. No overload is permitted.

**Prime Power:** Power available for variable load with an average load factor not exceeding 80% of the prime power rating in any 24 hour period. Overload of 10% permitted for 1 hour in every 12 hours operation.

**Standby (maximum):** Power available at variable load in the event of a main power network failure for a maximum of 500 hours per year. No overload is permitted.

# 4000 Series

## 4016TAG2

## 4016TAG2A

### Standard Electro Unit Specification

#### Air inlet

- Mounted air filters and turbochargers

#### Fuel system

- Unit fuel injectors with lift pump and hand stop control
- Electronic governor to ISO 3046 Part 4 class A1
- Full-flow spin-on fuel oil filters

#### Lubrication system

- Wet sump with filler and dipstick
- Full-flow spin-on oil filters
- Engine jacket water/lub oil temperature stabiliser

#### Cooling system

- Twin gear driven circulating pumps
- Two twin thermostats
- Crankshaft pulley for fan drive

#### Electrical equipment

- 24 volt starter motor and 24 volt/40 amp alternator with integral regulator and DC output
- 24 volt combined high coolant temperature/low oil pressure switch
- Overspeed switch and magnetic pickup
- Turbine inlet temperature shutdown switch
- 24 volt stop solenoid (energised to run)
- Flywheel and Housing
- Flywheel to SAE J620 size 18
- SAE 00 flywheel housing

### Optional Equipment

The following optional equipment is available to make up the specifications to Perkins ElectropaK specification:

Tropical radiator including: Water pipes, clips and hoses  
Fan, fan guards and belts

#### Other optional extra equipment available

Twin heavy duty air cleaner – paper element with pre-cleaner

Changeover lubricating oil filters

Changeover fuel oil filters

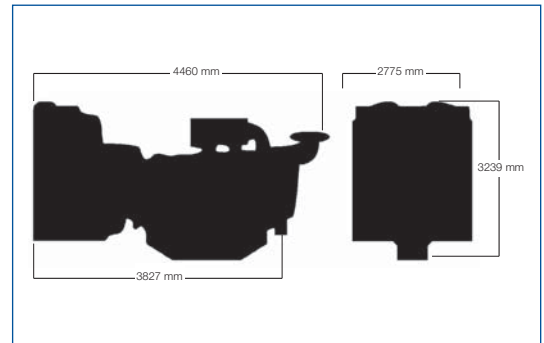
Immersion heater with thermostat

Water pipes, clips and hoses for radiator

Air starters

Instrument panel

NB This list is not exhaustive, further options may be available to meet to particular applications on enquiry to Perkins Sales Department



### General Data

Number of cylinders	16
Cylinder arrangement	60° Vee form
Cycle	4 stroke
Induction system	Turbocharged
	Air to air charge cooled
Combustion system	Direct injection
Cooling system	Water-cooled
Displacement	61.123 litres
Bore and stroke	160 x 190 mm
Compression ratio	13.6:1
Direction of rotation	Anti-clockwise, viewed from flywheel end
Firing order	1A, 1B, 3A, 3B, 7A, 7B, 5A, 5B, 8A, 8B, 6A, 6B, 2A, 2B, 4A, 4B
Total lubrication system capacity	237.2 litres
	<b>Electro Unit</b> <b>ElectropaK</b>
Total coolant capacity	95 litres    316 litres
Length	3302 mm    4460 mm
Width	1723 mm    2775 mm
Height	2128 mm    3239 mm
Total weight (dry)	5570 kg    8010 kg

Final weight and dimensions will depend on completed specification

Fuel Consumption (g/kWh)		
Engine Speed	1200 rev/min 4016TAG2	1500 rev/min 4016TAG2A
At Standby Maximum Rating	212	212
At Prime Power Rating	208	209
At Continuous Baseload Rating	207	205
At 75% of Prime Power Rating	207	203
At 50% of Prime Power Rating	215	202
At 25% of Prime Power Rating	251	212



### Perkins Engines Company Limited

Peterborough PE1 5NA

United Kingdom

Telephone +44 (0)1733 583000

Fax +44 (0)1733 582240

[www.perkins.com](http://www.perkins.com)

Distributed by