

# Mission scrubbed!

## Foley's engine scrubbers in demand for construction, transportation, mining and other industries

**F**OLEY INDUSTRIAL Engines has been manufacturing and selling diesel and gas engine scrubbers for more than two decades. The demand for the devices has grown considerably in recent years as OSHA and MSHA have strengthened regulations on engine exhaust, particularly in the mining, construction and transportation industries.

The firm's newest line of scrubbers is branded as CleanAirExhaust365 exhaust scrubbers, and Foley has become a major supplier of the devices in the United States. The emission control devices install at the end of an engine's tail pipe and make the exhaust emissions legal and safe to breathe by converting harmful exhaust to water and carbon dioxide. Inside the canister is a honeycomb substrate coated with a small amount of precious metals where the catalytic reaction occurs. Foley scrubbers are used on construction sites, as well as in tight spaces, such as mines and tunnels, throughout the country. Foley scrubbers were used in the construction of Boston's Big Dig.

With a diesel exhaust scrubber a contractor can work safely and legally in a confined space without harming its employees. Foley has supplied scrubbers for both gas and diesel engines to forklift users, concrete saw operators, generator owners and others who need to run an engine in an enclosed space.

While the company maintains an extensive inventory of parts and engines in stock, the scrubbers are a made-to-order item. They can be custom built for almost any engine, according to Jessica Manos of Foley, who said that the company ships out between 500 and 1,000 catalytic scrubbers and mufflers a year.

"All of our scrubbers are made to order so we can guarantee a perfect fit," said Manos. She said contractors just need know the size of the tailpipe and the engine horsepower. Manos also noted the turnaround times for orders is usually within three to five days, but can be reduced



FOLEY ENGINES

**A custom scrubber made at Foley's Worcester, Massachusetts, plant.**

to 24 to 48 hours with an added rush option. Orders are shipped from Foley's Worcester facility via UPS.

Foley was founded more than a century ago, and has long been known as a supplier for Perkins and Deutz engines and engine parts, Ford industrial engines, Twin Disc / Rockford power takeoffs and Zenith carburetors, as well as remanufactured exchange parts. ■

FMI: To learn more visit [www.foleyengines.com](http://www.foleyengines.com) or call 800-233-6539.



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# Diesel Exhaust Scrubbers Made Easy

Puzzled by what a diesel scrubber or an exhaust purifier can do? We can help! Over the last 20 years Foley has become the major supplier here in the US of exhaust scrubbers for gas and diesel engines. Our exhaust scrubbers make exhaust emissions safe and legal to breathe. These innovative products have improved productivity and helped people live healthier lives. Without them, many construction projects just couldn't be built. Yet many people are confused about what a scrubber is and how to order one. But Foley can make it easy for you.

## Getting Up to Speed in Three Easy Steps

1. Check out our **Dr. Diesel™** [Tech Tip #26](#) for info on scrubbers. Taking a look at this link will get you up to speed on what a scrubber or purifier is and how it works.

### 2. Combination Muffler/Scrubber Style Scrubber

Displayed to the right is an example of a combination muffler/scrubber. This scrubber is identical in size and shape to your present muffler and installs permanently in its place. Because it installs in place of your present muffler it is tucked up out of the way and usually in no danger of being damaged while in use.



**Combination  
Muffler/Scrubber**

To order a combination muffler/purifier, let us know the make and model of the machine you want to install it on as well as the existing muffler part number. For example, if you have a skid steer loader, you would advise that you had a Bobcat Model 843 (with a part number of 6559979).

### 3. Clip on Style Scrubber



**Clip-on Style  
Scrubber**

Pictured to the left is a clip on style scrubber. This works just as well as the combination muffler/scrubber, but installs more easily and costs a lot less. As a result, most people order the clip on style.

To order a clip-on style scrubber, just let us know the horsepower of the engine and the OD of the tail pipe. If you don't know the horsepower of your engine, but do know the tail pipe OD, just give us the make and model of the machine instead and we can figure the rest out for you. To give you an idea on pricing, you can get a clip on style scrubber for a Perkins 4.236 for only \$699.

## Three and Done

That's it. Just three easy steps to ordering an exhaust scrubber. Because we are here in the US we can get one right out out to you without the hassles, delays, and hidden costs of bringing one in from Canada.

We believe that Tech Support matters and welcome your feedback. To contact **Dr. Diesel™** directly, email him at [DrDiesel@FoleyEngines.com](mailto:DrDiesel@FoleyEngines.com). For parts and service for your Deutz, Perkins or John Deere engine call us directly at 800.233.6539. International customers can call us at 1.508.753.2979.



Dr. Diesel  
[DrDiesel@FoleyEngines.com](mailto:DrDiesel@FoleyEngines.com)  
Foley: One of America's Top Clean Energy Companies

P.S. For people running generators placed directly below HVAC intakes (aren't they always?) we also have Walker AirSeps. These devices recycle the unburned diesel fuel back into the oil pan, prevent it from accumulating in a cloud above the genset, and minimize fumes and odors. All in all, Walker AirSeps work well at reducing complaints from people working near by. Check **Dr. Diesel™** [Tech Tip #40: Walker Airsep Systems](#) for more information.



P.P.S. We're looking for Perkins engine cores for our factory reman program. Call us if you wanted to take some grease out of your yard and put green in your wallet.



## **Foley Industrial Engines**

### **Introduction**

This report contains a summary of emissions data for a Kubota engine model V3307-DI-T, tier 4i, obtained with and without the application of four Foley Industrial Engines (FIE) exhaust devices for the control of diesel particulate matter (DPM). The devices included three diesel oxidation catalysts (DOCs) and a diesel particulate filter (DPF). The testing was performed at the Diesel Emissions Research Laboratory of CANMET-MMSL, Ottawa. This laboratory is registered to ISO 9001:2000 standards. In addition, the test facility is recognized as an Accredited Testing Laboratory by the Standards Council of Canada to comply with the requirements of ISO/IEC 17025 for specific tests. The engine dynamometer followed ISO 8178-C1 8-mode test cycle protocol and used ultra-low sulfur diesel fuel.

A total of five 8-mode tests were performed for this study including, (1) engine only-baseline, (2) engine with a catalyst, model #SC DOC, (3) engine with a second catalyst, model #2G CC, (4) engine with a third catalyst, model #5G SXC and (5) engine with a diesel particulate filter, model #SC DPF.

For all test cycles, carbon monoxide (CO), carbon dioxide (CO<sub>2</sub>), oxygen (O<sub>2</sub>), nitric oxide (NO), oxides of nitrogen (NO<sub>x</sub>), total hydrocarbons (THC) and diesel particulate matter (DPM) were measured.

For this testing, all three catalysts and the diesel particulate filter were provided by Foley Industrial Engines.

### **Experimental Approach**

This section provides some information on the test engine, test fuel and test procedure for the evaluation of the DPM control technologies.

## Test Engine

The engine used for the testing was a Kubota engine, model V3307-DI-T, 4-cylinder, turbocharged, EGR, EPA tier 4i engine. Table 1 provides some engine specification data.

**Table1. Test Engine Specifications**

Make	Kubota
Model	V3307-DI-T, tier 4i
Serial Number	8A0651
Displacement	3.3 Liter
Rated Power, gross	74hp @ 2600rpm
Fuel Rate (at rated power)	31.9lb/hr
Peak Torque	195.5lb.ft @ 1600rpm
Peak Torque Speed	1600rpm
Aspiration	Turbocharged
Fuel System	DI, mechanically controlled fuel injection
Max Exhaust Backpressure	61.5" H <sub>2</sub> O
Low Idle Speed	775-825rpm
High Idle Speed	2820rpm

## Test Fuel

The diesel fuel used for this study was an ultra-low sulfur diesel with a sulfur value of 11ppm (CAN/CGSB-3.517-2000). Some of the laboratory analyzed fuel properties are given in Table 2.

**Table 2 Some Diesel Fuel Properties**

Properties	ASTM test method	Analysis
Specific Gravity 60/60F	D4052	0.8248
Density @ 15°C, kg/m <sup>3</sup>	D4052	824.1
Carbon, wt%	D5291	86.32
Hydrogen, wt%	D5291	13.94
Nitrogen, wt%	D5291	<0.3
Flash Point, °C	D93	54.1
Sulfur, ppm	D7039	10.8

## DPM Control Devices

FIE supplied three catalysts and one diesel particulate filter for this study. The devices were tested as supplied, and were de-greened by the client prior to shipping the devices to the laboratory.

Prior to testing, all the devices were mounted within 30 inches from the outlet of the engine turbocharger. The devices were tested in the following order and configurations:

- Baseline Test Engine baseline, without any devices (called Baseline Data)
- Test 1 Engine plus the catalytic #SC DOC
- Test 2 Engine plus the catalytic #2G CC
- Test 3 Engine plus the catalytic #5G SXC
- Test 4 Engine plus the diesel particulate filter #SC DPF

### **Test Procedure**

The engine exhaust emissions were measured at all modes of the ISO 8178-C1 test cycle. The 8-mode test cycle for the Kubota engine is defined in Table 3. The integrated 8-mode average values for all tests were calculated using the appropriate weighing factors for each mode.

**Table 3 ISO 8178-C1 8-mode Test Cycle**

Mode #	1	2	3	4	5	6	7	8
Engine Speed, rpm	2600				1600			785
Torque, %	100	75	50	10	100	75	50	0
Weighting Factor	0.15	0.15	0.15	0.1	0.1	0.1	0.1	0.15

### **Gaseous Emission Measurement**

The raw exhaust gas concentrations were measured using a California Analytical Instruments (CAI) gas chart. The gas chart consists of an exhaust gas sampling and conditioning system, emission analyzers, 64 point gas divider for system calibration and NOx efficiency tester. The gas chart contains the following gas analyzers:

- Low range carbon monoxide (CO), model CAI 100IR, non-dispersive infrared (NDIR) detection system, span ranges 0-100ppm and 0-2000ppm.
- Carbon dioxide (CO<sub>2</sub>) and high carbon monoxide (HCO) model CAI 300 IR, non-dispersive infrared (NDIR) detection system, CO<sub>2</sub> span ranges 0-5.0% and 0-20.0%, and CO span range 0-1.0%.
- Oxygen (O<sub>2</sub>), model CAI 300 Oxygen, paramagnetic (PMA) detection system, span ranges 0-5% and 0-25%.
- Oxides of nitrogen (NO/NO<sub>x</sub>), model CAI 400 HCLD heated, chemiluminescence (CLD) detection system, span ranges 0-1000ppm and 0-3000ppm. The gas chart has two NO/NO<sub>x</sub> analyzers that provide simultaneous measurements of NO and NO<sub>x</sub>. The concentration of NO<sub>2</sub> is determined by the difference of NO<sub>x</sub> and NO concentrations.

- Total hydrocarbons (THC), model CAI 300 HFID, heated flame ionization detector (HFID), span ranges 0-100ppm and 0-1000ppm.

## **Particulate Measurement**

The Diesel Particulate Matter (DPM) was measured gravimetrically using a Sierra BG-2 particulate partial flow sampling system. This is a fully automated test stand with a micro-dilution chamber which draws a sample of exhaust gas directly from the engine exhaust stack and dilutes the entire sample fraction. The system's two mass flow controllers provide the required control of flow rates and dilution ratios.

The particulate sample is collected on dual Pallflex T60A20 (Teflon coated glass fiber) 90mm filters. All filters are conditioned in an environmentally controlled balance room with air conditions of  $22 \pm 3^{\circ}\text{C}$  temperature and at  $45 \pm 8\%$  relative humidity for at least one hour before weighing. After conditioning, the filters are weighed and placed in stainless steel filter holders. After particulate sample collection using the BG2 micro-dilution system, the filters were returned to the controlled balance chamber for reconditioning and weighed again to determine the DPM mass. The DPM concentration is then calculated using the sample mass, exhaust gas sample flow rate and sampling duration.

## **Test Results**

The exhaust emissions data for the 8-mode test cycles are given in Appendix A. prior to testing, the engine intake restriction at Mode 1 was adjusted to a maximum allowable value of 15.8 inch H<sub>2</sub>O for the engine, and similarly exhaust backpressure at Mode 1 was adjusted to a maximum allowable value of 61.5 inch H<sub>2</sub>O for all five tests. Data in Appendix A include basic engine parameters and exhaust emissions. The exhaust backpressure and exhaust temperature at the inlet and the outlet of the devices was also measured.

Table 4 provides 8-mode integrated average values of specific emission data for gases and DPM.

**Table 4 Specific exhaust emissions for the integrated 8-mode cycle test**

		Baseline Data	Test 1 SC DOC	Test 2 2G CC	Test 3 5G SXC	Test 4 SC DPF
CO <sub>2</sub>	g/hr	22106	22326	22103	21962	22177
CO	g/hr	27.7	4.1	4.5	3.8	0.9
NO <sub>2</sub>	g/hr	3.6	2.6	7.4	5.6	14.1
NO	g/hr	42.4	44.8	40.5	43.4	37.3
NO <sub>x</sub>	g/hr	46.0	47.4	47.9	48.9	51.5
THC	g/hr	8.7	2.2	2.5	2.6	1.2
DPM	g/hr	6.8	6.2	6.0	5.4	0.3

The percent reduction in emissions compared to engine baseline data is calculated using equation 1, and the results for all devices shown in Tables 5 to 8. A negative value in Tables 5 to 8 indicates an increase.

$$\text{Percent reduction in emission} = \frac{\text{baseline emission} - \text{device emission}}{\text{baseline emission}} \times 100 \quad \text{Equation (1)}$$

Similarly, incremental decrease in NO<sub>2</sub> emission due to the application of the device is calculated using equation 2. The equation is based on the California Diesel Aftertreatment Verification Procedure Program, which limits the incremental increase in NO<sub>2</sub> device emission based on the baseline NO<sub>x</sub> emission.

**Table 7 Percent mass emission reduction for device 5G SXC**

	Baseline Data	Device Value	Device Reduction
CO <sub>2</sub>	22106	21962	1
CO	27.7	3.8	86
NO <sub>2</sub>	3.6	5.6	-55
NO	42.4	43.4	-2
NO <sub>x</sub>	46.0	48.9	7
THC	8.7	2.6	71
DPM	6.8	5.4	20
Incremental % decrease in NO <sub>2</sub> emission		-4	

**Note: a negative value indicates an increase in emission**



**Table 8 Percent mass emission reduction for device model SC DPF**

	Baseline Data	Device Value	Device Reduction
CO <sub>2</sub>	22106	22177	0
CO	27.7	0.9	97
NO <sub>2</sub>	3.6	14.1	-292
NO	42.4	37.3	12
NO <sub>x</sub>	46.0	51.5	-12
THC	8.7	1.2	87
DPM	6.8	0.3	96
Incremental % decrease in NO <sub>2</sub> emission			-23

**Note: a negative value in Table 5 indicates an increase in emission.**



## Foley Environmental

Thank you for inquiring about our Foley Exhaust Purifiers and Scrubbers for diesel engines.

Foley Environmental is a division of Foley Industrial Engines. We are the oldest engine distributor in North America. With almost 100 years in the engine business we have extensive knowledge of fuel injection and exhaust systems. This makes us the ideal supplier for your company's needs. Foley Environmental serves both the public and private sectors. Our customer base includes Boston's Big Dig, California public works projects, Brown University, Bucknell University, Hyster Forklift Co., Narragansett Electric Co, IBM, and many more public works projects and companies. Many OEMs, such as NACCO, the parent company of both Yale and Hyster Forklift Co, now include our Foley Environmental purifiers as standard equipment on new machines. These companies are a testimony to our effective solutions to exhaust emission problems. As the only U.S. based exhaust purifier specialist, we pride ourselves on shipping within 24 to 48 hours of the receipt of an order.



### **TWO STYLES OF PURIFIERS / SCRUBBERS**



Our exhaust scrubbers allow you to work indoors close to a diesel or a gas engine without any health risk. These air purifiers install easily and come in different styles, depending on the application. Here in the East, purifiers

really came into their own on Boston's Big Dig. This was the largest public works project since the Tennessee Valley Authority. Foley Engines supplied most of the purifiers used on this project. Because of the experience gained during the Big Dig, Foley Engines is now an OEM supplier to Hyster and Yale for their forklift purifiers.

**Clip-On Style.** The easiest to install is simply a clip-on style purifier that installs at the end of the tail pipe. We supply the purifier with the appropriate sized muffler clamp and it installs easily. Depending on the horsepower of the engine, the scrubber is typically the size of a coffee can. Although scrubbers are physically larger for a high horsepower engine such as a 1000 HP engine in a generator. When the purifier is no longer needed, such as in a rental application, it can be removed and stored.



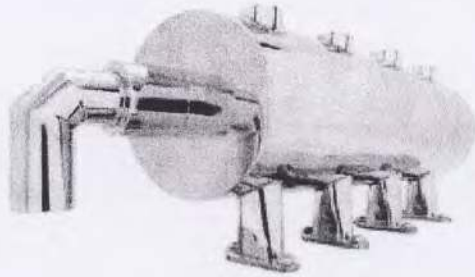
**Combination Muffler/Purifier.** The other style of purifier or scrubber is a direct fit combination exhaust purifier/muffler. This style is most appropriate where there is no room at the end of the tail pipe for a clip-on purifier. These applications include skid steer loaders, and zero tail swing mini-excavators. These combination muffler purifiers are exactly the same shape and spatial dimensions as the OEM muffler. Installation time is similar to changing out a muffler. Typically, once installed these are not removed. Because this style is closer to the exhaust manifold, they do work better than the clip-on style, but usually cost up to twice as much. This is due to the fact that they are both a muffler as well as a purifier.

To keep you up and running, we stock here in the US over 400 scrubbers. Both the clip-on style and the combination muffler/scrubber version. Since we are the only U.S. based exhaust purifier specialist, we are able to ship these units quickly. Often the same day as the order is placed, and without any customs delays.

We have diesel scrubbers for all industrial engines, including Perkins, Deutz, Deere, Cummins, and Caterpillar.

We also have scrubbers for gas-fueled engines, such as Honda and Wisconsin. The scrubbers for the Honda's are combination muffler/purifiers





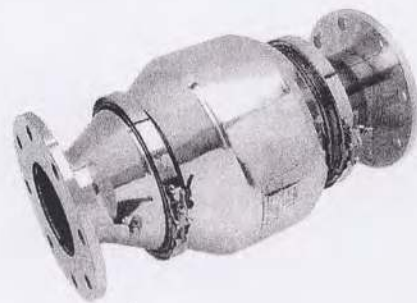
that are identical to the OEM Honda muffler in size and shape. For Wisconsin engines, we supply a clip-on purifier. Due to the fact that Wisconsin engines are inherently "dirty," we recommend that you change the carburetor jet size and install new spark plugs and Accell plug wires. See [Tech Tip 28, "Spark Plug 101,"](#) on our

website for more info on Wisconsin spark plugs. [Tech Tip 13, "Foley Engines Clean Air Tip,"](#) will also have more info on exhaust scrubbers for gasoline fueled engines.

### **What They Do & How They Do It**

Simply put, exhaust purifiers allow you to work indoors close to a diesel or gas fueled engine without any health risks. They do this by using catalytic exhaust technology to make the exhaust emissions safe to breathe. Each purifier houses a catalytic core, which eliminates harmful emissions by collecting diesel particles and burning off dangerous pollutants. These include particles such as Carbon Monoxide (CO) and Hydrocarbons (HC). The harmful emissions of diesel engines are converted into water (H<sub>2</sub>O) and Carbon Dioxide (CO<sub>2</sub>), which makes it safe to work in close proximity with your machine.

Attached, you will find 5 diesel exhaust gas emission reduction curves, and 1 exhaust emission reduction table. Emission reduction curves #1-3 (for CO, HC, and SOF) are optimized reduction curves, which were obtained through in-house testing. Emission reduction curves #4 and #5 are part of an underground mining approval test. Emission reduction table #6 represents mining approval test data. In a typical diesel exhaust gas purifier application, the following average exhaust gas emission reductions can be expected:



Carbon Monoxide (CO)	=	80% - 90%+
Hydrocarbons (HC)	=	65% - 80%
Diesel Odor (HCHO)	=	70% - 85%
Soluble Organics (SOF)	=	70% - 85%
Diesel Particulate (DPM)	=	20% - 39%

These average exhaust gas emission reductions depend upon using a well-maintained diesel engine operating with a moderate to heavy load while burning a low sulfur content diesel fuel. Whenever possible the purifier/scrubber should be mounted as close (within 12"-24") to the engine's exhaust manifold or turbocharger.

Emission reduction curves #4 and #5 most accurately reflect the actual exhaust gas emission reductions, which can be expected in field tests. In curves #4 and # 5 average carbon monoxide (CO) reductions were in the range of 93% to 97%, while average hydrocarbon (HC) reductions were in the range of 65% to 78%.

Please review the sample drawings and the listings found in these sections.

To better clarify curves #4 and #5, the following symbols are defined as:

Copd	=	Carbon Monoxide before purifier
Cozd	=	Carbon Monoxide after purifier
CHpd	=	Hydrocarbon before purifier
CHzd	=	Hydrocarbon after purifier
Td	=	Exhaust gas temperature in (°C) before purifier

In emission reduction table #6 (which is an 8 mode steady state test) maximum CO reductions was 95%, maximum HC reductions was 62%, and maximum DPM reduction was 39%.

We have detailed directions on how to install both styles of diesel exhaust purifiers in our Forms Section at [FoleyEngines.com](http://FoleyEngines.com). See [Exhaust Purifier Installation Procedures](#). For the clip-on style, simply call us toll free at 1-800-233-6539.

If you have any questions, please call us toll free at 1-800-233-6539, or simply email your inquiry to [info@foleyengines.com](mailto:info@foleyengines.com).



Foley Environmental is different: we're a three-generation, 95 year old family firm that wants to help!



Sincerely,

**The Foley Engine Team**

P.S. After you've got the exhaust fumes taken care of, you should think of the noise. Most diesel noise is from the air intake. We supply a combination air filter/noise reducer. This innovative device is called a Walker Airsep and it is ideal for noisy generators and other equipment.

Please call us toll free at 800-233-6539 with any questions. We can fax you detailed information. Or, email Dr. Diesel directly at [DrDiesel@FoleyEngines.com](mailto:DrDiesel@FoleyEngines.com).

P.P.S. In a rush? We have an optional special rush service, which guarantees shipment within 24 hours.

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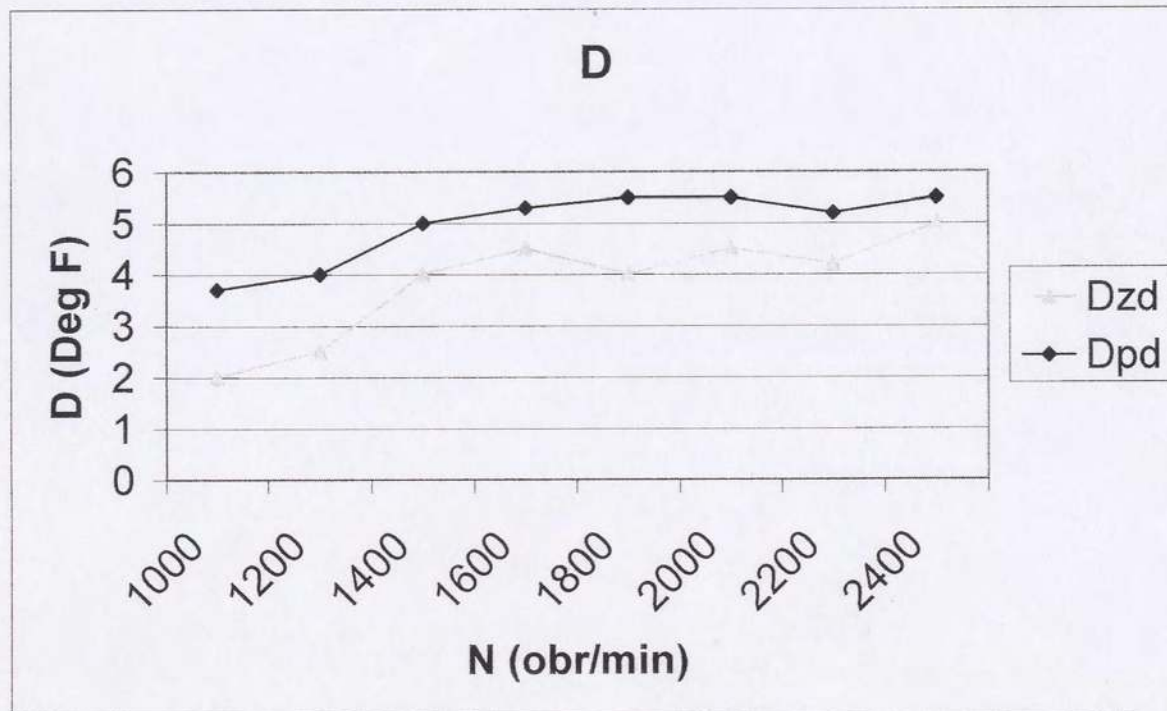
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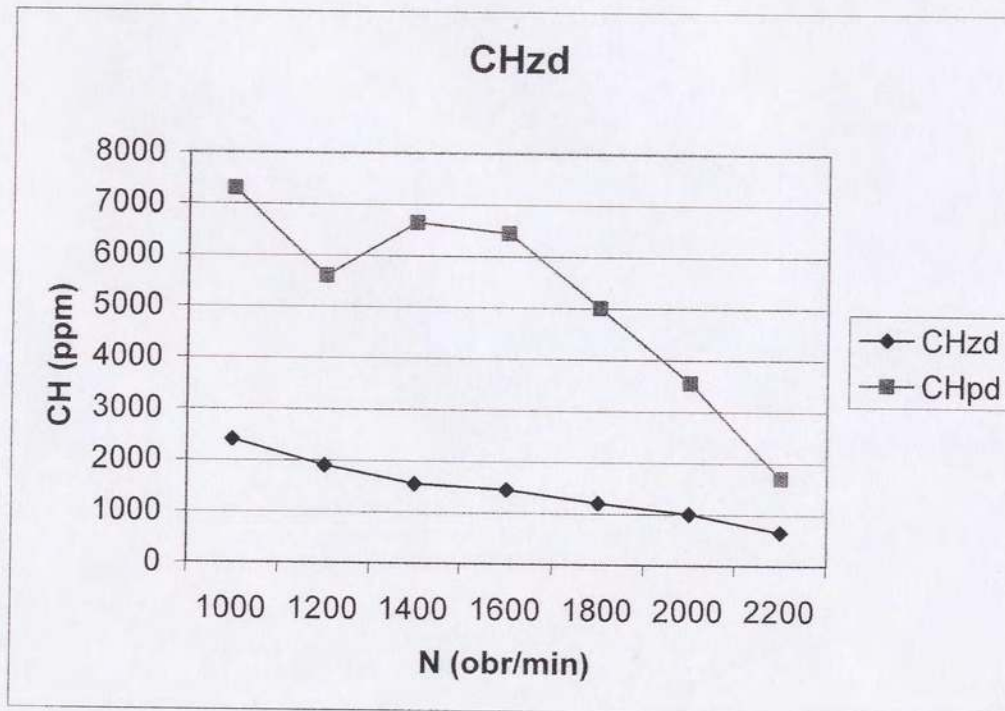
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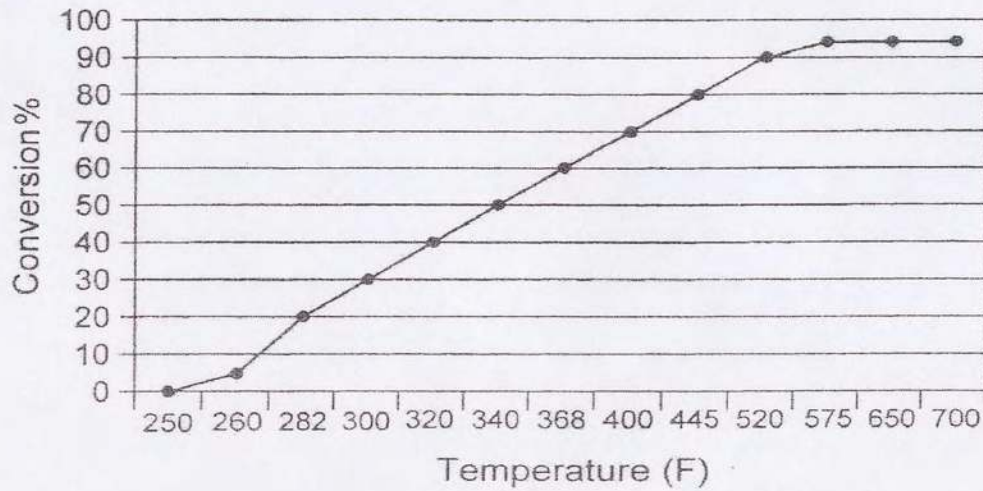




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### Carbon Monoxide Conversion



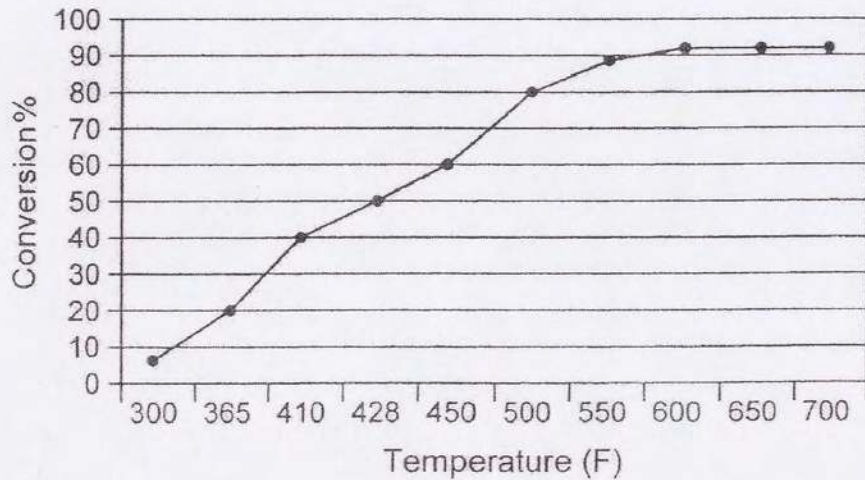
Temperature (F)	Conversion
250	0
260	8
282	20
300	30
320	40
340	50
368	60
400	70
445	80
520	90
575	94
650	94
700	94



## Foley Environmental

Toll Free: 1-800-233-6539  
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### Hydrocarbon Conversion

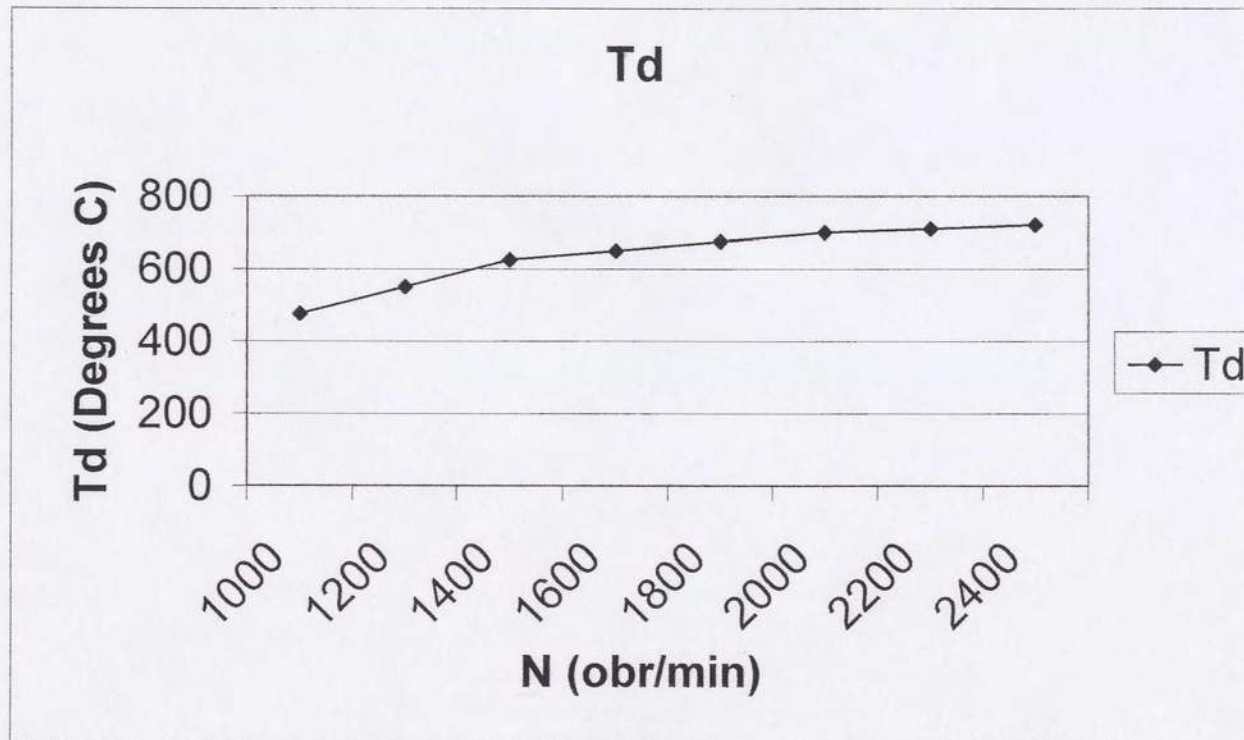


Temperature (F)	Conversion
300	6
365	20
410	40
428	50
450	61
500	80
550	88
600	91
650	92
700	92



## Foley Environmental

Toll Free: 1-800-233-6539  
Email: [info@foleyengines.com](mailto:info@foleyengines.com)



## Exhaust Purifier Installation Procedures



Click to download the PDF of the [Installation Procedure](#).

### 1. Installation procedure for Exhaust Gas Purifier / Scrubbers

- The Exhaust Gas Purifier / Scrubber should be located as close to the outlet of the engine exhaust manifold (or turbocharger) as possible. The purifier should be located no more than 30” (760 mm) from the engine exhaust manifold outlet (or turbocharger). In addition, the exhaust gas purifier should be located between the engine exhaust manifold (or turbocharger) and the muffler. In order to eliminate harmful diesel exhaust gas pollutants, as much exhaust heat energy as possible is required for proper purifier operation. The hotter the exhaust gases at the inlet cone of the purifier, the more heat energy is available to “oxidize” (reduce) harmful exhaust gas pollutants. The Exhaust Gas Purifier can be installed vertically or horizontally. Do not allow the exhaust gas purifier to contact any structural members of the vehicle or equipment. Avoid locating the exhaust gas purifier in close proximity to electrical components, fuel lines, fuel tanks or any combustible materials.

If it is impossible to locate the exhaust gas purifier between the engine exhaust manifold (or turbocharger) and the muffler, then we recommend installing the purifier immediately after the muffler. However, we recommend that the full length of exhaust pipe, the muffler and the purifier be insulated with a commercially available heat wrap tape. Contact the sales office for additional heat wrap tape information. Alternately we do supply a large variety of combination purifier mufflers for Atlas Copco, CASE, Caterpillar, Bobcat, Gehl, Genie, Honda, International, Ingersol Rand, JCB, etc. In some circumstances the use of purifier mufflers may be the only option available. Contact the sales office at 1-(800) 233-6539 for additional information.

- To install the Exhaust Gas Purifier / Scrubber cut the appropriate length of exhaust pipe from the existing engine exhaust system. Generally the pipe length to be cut is approximately 1.5” (38 mm) to 2.5” (64 mm) less than the overall length of the exhaust gas purifier. The required pipe length to be cut will vary depending on the particular exhaust purifier model. Alternately measure the distance between the stop pins located on the purifier inlet / outlet cones to determine the required cut length.





exhaust pipe  
of the inlet and outlet cone.



2. Use the directional flow arrow located on the exhaust gas purifier label to orient the exhaust flow direction of the Exhaust Gas Purifier. Install the exhaust pipe into the exhaust gas purifier inlet/outlet cones until the butts up squarely against the stop pins
3. Once the Purifier is installed into the exhaust pipe use wide band muffler clamps or flat band clamps to secure the purifier. We recommend using "Easyseal," "Torctite," or "Accuseal" wide band clamps (manufactured by Nelson, Donaldson, Riker, Stemco, etc...). Wide band clamps are readily available at local truck exhaust parts or truck parts jobbers/suppliers. Alternately arc or mig welding can be used to weld the exhaust purifier inlet/outlet cone directly to the engine exhaust pipe. Use type SS309 filler wire or rod with a DC current of approximately 40 to 45 AMPS maximum. Do not weld onto any other part of the purifier or purifier body.
4. Torque the wide band muffler clamp bolts to the correct torque specification. Usually 45 to 55 foot pounds torque is sufficient. Start and idle the engine for a period of 15 to 20 minutes. Re-torque the clamp bolts to the correct torque specification. Double check for any apparent exhaust leaks.
5. Once installation of the exhaust gas purifier/scrubber is complete, the engine exhaust backpressure restriction should be measured. Use a backpressure gauge/manometer (0 to 40" H2O range) to measure the exhaust gas flow restriction. Remove the 1/8" NPT brass plug located at the 1/8" NPT port on the inlet cone of the purifier. Install the metal probe of the exhaust backpressure restriction gauge into the 1/8" NPT port. Start the engine and operate the engine at high idle and load stall conditions. Measure and note the exhaust gas restriction at both high idle and load stall conditions. Ensure that the total exhaust gas flow restriction is within the engine manufacturers recommendations.

The Exhaust Gas Purifier / Scrubber is now ready for use, if you have any additional requirements, comments or questions please call the sales office at 1-(800)-233-6539.

Click [here](#) for detailed information on Foley's exhaust scrubbers and purifiers, as well as diesel particulate filters.

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