Diesel Emissions Glossary

A	**Active DPF System**	A DPF system that actively generates the heat necessary to ensure reliable and consistent filter regeneration. Two common heat sources are fuel injection and electric grid heaters. Found on newer diesel engines (2007+) and some retrofit applications, these systems delivery highly efficient filter regeneration while the vehicle is in operation.
	Aftertreatment Devices	Devices that remove pollutants from exhaust gases after they leave the combustion chamber (e.g., catalytic converters or diesel particulate filters). They are also known as emission control devices or exhaust aftertreatment systems.
	Air Toxics	Toxic air pollutants, as classified by pertinent regulations. Examples of substances classified as air toxics by the U.S. Clean Air Act include acetaldehyde, benzene, 1,3-butadiene, formaldehyde, and polycyclic organic matter (POM). California air toxics regulations also classify diesel exhaust particulates as a toxic air contaminant.
	Alternative Fuel	Fuel other than petroleum diesel or gasoline, i.e., biodiesel, compressed natural gas (CNG) or liquidified natural gas (LNG).
B	**Backpressure Monitor**	See Filter Monitor
	BACT (Best Available Control Technology)	This acronym was started in California and is migrating into many other states as regulatory agencies make decisions on what technologies to apply to in-use diesel engine powered vehicles and equipment. Because technology improvements are continually taking place, BACT means that the end user should always apply the best available emissions control technology available – in other words the system that delivers the highest emissions reduction.
	Biodiesel Fuel	A renewable diesel fuel derived from various organic feedstocks, including vegetable oils and animal fats, for use in compression ignition (diesel) engines
C	**California Air Resources Board**	A state regulatory agency charged with regulating the air quality in California, commonly referred to as California ARB or CARB.
	Carbon Dioxide (CO_2)	A colorless, odorless, non-toxic gas that is one of main products of fossil-fuel combustion. Carbon dioxide is a greenhouse gas that contributes to the potential for global warming.
	Carbon Monoxide (CO)	A colorless, odorless and toxic gas. It blocks the lungs' ability to obtain oxygen. CO is produced by incomplete combustion of fossil fuels and is a major part of air pollution. Compression ignition (diesel) engines generate significantly lower CO emissions than spark ignited engines, but reductions are easy to achieve and should be pursued.
	Catalyst	A substance which influences the rate of a chemical reaction but is not consumed or altered in the reaction. Catalysts are used in many processes in the chemical and petroleum industries. Emission control catalysts are used to promote reactions that change exhaust pollutants from internal combustion engines into harmless substances.
	Cordierite	A ceramic material used for automotive flow-through catalyst substrates and ceramic wall-flow diesel filters.
	Corrugated Metal Filter	A metallic filter made of alternating layers of corrugated metal foil and sintered metal fleece. Vanes cut into the corrugated foil create turbulence that ejects diesel PM into the fleece where it resides until oxidized. The filter is designed not to plug, nor does it require ash cleaning.
	Crankcase Emissions	Blow-by combustion gases and vaporized engine lube oil from the engine crankshaft make up crankcase emissions. They are emitted from the crankcase vent and can make up 25% of vehicle emissions for modern diesel engines. Most turbocharged diesel engines have open crankcase vents because these contaminants can foul turbocharger and after-cooler components. These emissions can be eliminated 100% by applying a Donaldson Spiracle crankcase filter system.
	Critical Pollutants	The critical air pollutants established by the U.S. NAAQS include six air pollutants: ozone, lead, carbon monoxide, sulfur dioxide, nitrogen dioxide, and respirable particulate matter. Visit http://epa.gov/ttn/naaqs/ for more information.

D	**Data Logging**	The process of recording typical exhaust temperatures for a specific vehicle application. This is done to help identify the best aftertreatment technology for a given application and is accomplished via an electronic recorder that takes temperature readings every 15 seconds for several consecutive days to characterize operating temperatures associated with a duty cycle.
	Diesel Multi-stage Filter (DMF) Muffler	An aftertreatment device designed and verified by Donaldson that uses a multi-stage metallic filter to reduce diesel tailpipe emissions by 70-75%. It does not require a filter monitor or routine maintenance, but it does require the use of ULSD fuel.
	Diesel Oxidation Catalyst (DOC)	A catalyst for diesel engines that promotes the oxidation or flameless burning of diesel exhaust gases. Usually designed to reduce emissions of the organic fraction of diesel particulates, gas phase hydrocarbons and carbon monoxide. Typically 15-30% PM reduction.
	Diesel Particulate Filter (DPF)	A cordierite or silicon carbide wall flow filter that physically captures diesel particulates, preventing their discharge from the tailpipe. They are often coated with a catalytic material to continuously burn the particulate collected in the filter in a process known as 'regeneration'. Typically 85-95% PM reduction.
	DPF Pulse Cleaner	Diesel particulate filters require routine cleaning to remove ash and unburned hydrocarbons that build up over time. A DPF pulse cleaner uses high volume, low pressure air pulses to remove the contaminant quickly and efficiently.
	DPF Thermal Regenerator	Diesel particulate filters need occasional thermal regeneration to remove the unburned hydrocarbons and ash that build up over time. The system uses electric heat to burn the filter clean over a 7-hour cleaning interval.
	DRRP (Diesel Risk Reduction Plan)	The California Diesel Risk Reduction Plan to reduce exposure of diesel emissions on the general population to minimize the health risks associated with exposure.
E	**ECD**	Emissions Control Device, see Aftertreatment Devices
	Elemental Carbon (EC)	Inorganic carbon, as opposed to organic compounds, sometimes used as a surrogate measure for diesel particulate matter, especially in occupational health environments. Elemental carbon usually accounts for 40-60% of the total diesel PM mass.
F	**Federal Test Procedure (FTP)**	A prescriptive test cycle used in the U.S. for emission testing and certification of engines and vehicles. The chassis dynamometer cycle for light duty vehicle testing is commonly referred to as FTP-75. The engine dynamometer cycle for testing of heavy-duty (HD) engines is known as HD FTP, or FTP Transient cycle.
	Filter Monitor	An electronic device that monitors DPF or aftertreatment back pressure, and warns or alarms when the filter plugs or requires ash cleaning. Sophisticated monitors can record temperature, back pressure and recent fault conditions for troubleshooting purposes.
	Flow Through Filter	A mechanical filter used in aftertreatment devices to capture diesel PM. The device selectively captures the high number of micro and nano particles, allowing the larger particles to pass through without capture in an effort to provide a less efficient, but more tolerant aftertreatment device than wall flow filters.
H	**Hydrocarbons (HC)**	An exhaust or evaporative pollutant of hydrogen and carbon atoms in various chain lengths resulting from incomplete combustion of fossil fuels.
I	**ICC**	A compact DOC package that is inserted in front of a standard OEM muffler.
L	**Lean NO_x Catalyst (LNC)**	Catalyst designed to reduce nitrogen oxides from diesel or spark-ignited engine exhaust gas conditions, i.e., in the presence of excessive amount of oxygen. Requires hydrocarbon injection to enhance the reduction process. 25-40% NO_x reduction is achievable.
	Level 1, 2, 3 Control	Level 1 = > 25% PM reduction, typically DOC Muffler with a crankcase filtration system. Level 2 = >50% PM reduction, typically DMF Muffler or other partial filter. Level 3 = >85% PM reduction, typically a DPF or LTF Muffler or other wall flow device.
	Low Temperature Filter (LTF) Muffler	Donaldson's newest CARB level 3 verified retrofit emission solution that uses a wall-flow filter to achieve a 90% emissions reduction. The filter in this unit requires routine ash cleaning and ULSD fuel.

N	**NAAQS**	A national standard developed by the U.S. EPA for regulated pollutants that are considered harmful to public health (including sensitive populations) and the environment.
	Nitrogen Oxides (NO_x)	Several air-polluting gases composed of nitrogen and oxygen which play an important role in the formation of photochemical smog. Nitrogen oxides are collectively referred to as "NO_x", where "x" represents a changing proportion of oxygen to nitrogen. Internal combustion engines are significant contributors to the worldwide ambient NO_x levels. For the purpose of emission regulations, NO_x is composed of colorless nitric oxide (NO), and the reddish-brown, very toxic and reactive nitrogen dioxide (NO_2). Other nitrogen oxides, such as nitrous oxide N_2O (the anesthetic "laughing gas"), are not regulated emissions.
	Nonattainment Area	A region that exceeds the U.S. National Ambient Air Quality Standards (NAAQS) for one or more criteria pollutants. Nonattainment regions, or areas, are required to develop State Implementation Plans (SIPs), setting forth a reasonable timetable using means that are approved by the Environmental Protection Agency (EPA), including retrofits, to achieve compliance. Under the U.S. Clean Air Act, if a nonattainment area fails to attain NAAQS, the EPA may superimpose a Federal Implementation Plan (FIP) with stricter requirements, impose fines, construction bans, or cut-offs in Federal grant revenues until the area achieves applicable NAAQS compliance.
O	**On-Board Diagnostics (OBD)**	A system on board the vehicle that monitors emission control components and alerts the driver (via a filter monitor) if malfunctions or emission deterioration occurs. The OBD system involves a number of sensors and a data processor, which are typically integrated with the vehicle's electronic control system.
P	**Particulate Matter (PM)**	Carbon-based particles formed by the incomplete combustion of fossil fuel. Compression ignition (diesel) engines generate significantly higher PM emissions than spark ignited engines. The particles are composed of elemental carbon, heavy hydrocarbons (SOF), and hydrated sulfuric acid ("sulfate particulates").
	Passive DPF	A catalyzed DPF that relies on latent engine exhaust gas temperature to oxidize or burn the PM captured in a wall flow filter.
R	**Reciprocity**	The U.S. EPA and California ARB have a memorandum of agreement that simply states they will accept each other's procedures for verification. The change, adopted in June 2004, assists EPA, ARB and other states in meeting air quality objectives.
S	**Selective Catalytic Reduction (SCR)**	A catalytic reduction process that reduces NO_x in diesel exhaust or flue gases using the an injection of nitrogen-based reductants, such as ammonia or urea. Such SCR systems are commercially available for stationary applications and are being developed for mobile diesel engines.
	SiC (Silicon Carbide)	A conductive material used to make wall flow filters. This material offers some advantages over cordierite in that they conduct heat away from hot spots and are more robust against other failure modes. However, they are heavier, more expensive and cannot be extruded in standard industry sizes to date.
	Soluble Organic Fraction (SOF)	The organic fraction of diesel particulates, including heavy hydrocarbons from the fuel and from the engine lubricating oil. The term "soluble" originates from the analytical method used to measure SOF which is based on extraction of particulate matter samples using organic solvents.
T	**Total Carbon (TC)**	The sum of the elemental carbon and organic carbon associated with diesel particulates. Typically amounts to 80-85% of the total diesel PM mass.
	Total Emissions Filtration	The sum of all emissions generated by diesel engines, including tailpipe AND crankcase. An open crankcase vent can contribute up to 25% of total emissions.
	Total Particulate Matter (TPM)	The total particulate matter emissions including all fractions of diesel particulates, i.e. the carbonaceous, organic (SOF), and sulfate particulates.
U	**Ultra Low Sulfur Diesel (ULSD)**	U.S. diesel fuel with 15 ppm sulfur maximum, introduced beginning mid-2006 as required by the U.S. EPA. This fuel is a requirement for many exhaust emissions solutions devices to ensure long term performance and durability of aftertreatment devices.
V	**Verification**	The process of approval for aftertreatment devices by the US EPA or California ARB that confirms a device meets performance and durability requirements of the respective programs.
	Volatile Organic Compounds (VOC)	Hydrocarbon-based emissions released through evaporation or combustion. The term VOC is usually used in regard to stationary emission sources.
W	**Wall Flow Filter**	An extruded filter (ceramic or SiC) with hundreds of small square channels per inch, but every other channel is plugged. Dirty exhaust flow is directed into the open channels, through the wall and exits through a corresponding channel – capturing and encasing particulate matter. Wall Flow Filters are used in DPFs

Donaldson®

Donaldson Company, Inc.
Minneapolis, MN
55440-1299

www.donaldson.com

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