

Verified Off-Road Technologies

This table shows all the diesel retrofit products that have been approved for use in off-road engine retrofit programs.

Company	Product Name/ Technology Type	Applications	Example Equipment Types	PM Reduction (%)	NOx Reduction (%)	Fuel Type
Caterpillar, Inc.	Diesel Particulate Filter ○	Nonroad, 4-cycle, non-EGR equipped, model year 1996-2005, turbocharged engines with power ratings between 174.2 to 301.5 Horsepower	Certain Caterpillar nonroad engines	89	NA	15 ppm sulfur diesel
Caterpillar, Inc.	Caterpillar Emissions Upgrade Group ○	Select Caterpillar 3306 diesel engines for nonroad applications with model years from 1988 to 1995 with mechanical direct fuel injection, turbocharged with power ratings in 75 = Kilowatts < 130 (100 = Horsepower < 174).	Certain nonroad Caterpillar engines	15	27	500 ppm sulfur diesel
CleanAIR Systems	CleanAIR Systems / DPF ●	Certain 1996-2003 nonroad engines used in stationary emergency generators.	Includes most manufacturers of stationary emergency generators	85 (Level 3)	NA	15 ppm sulfur diesel
Donaldson Company	Donaldson / Series 6000 DOC + Crankcase Filter ●	Certain 1996-2003 nonroad engines used in yard tractors, large lift trucks, top picks, side picks, and gantry cranes	Includes turbocharged engines from 150 – 600 hp by Case, CAT, Cummins, DDC & Komatsu	25 (Level 1)	NA	CARB diesel or 15 ppm sulfur diesel
Engine Control Systems	Engine Control Systems Combifilter / Diesel Particulate Filter (DPF) ●	Certain 1996-2004 nonroad applications used in construction, material and cargo handling equipment	Includes most nonroad engines by most manufacturers	85 (Level 3)	NA	CARB diesel or 15 ppm sulfur diesel
Engine Control Systems	Engine Control Systems AZ Purimuffler and Purifier / Diesel Oxidation Catalyst (DOC) + PuriNOx ●	Certain 1996-2002 nonroad port, railway yard, and other intermodal + freight handling operation equipment	Includes Case, Komatsu, Cummins, & International engines	50 (Level 2)	20	Emulsified fuel
Engine Control Systems	Engine Control Systems AZ Purifier and Purimuffler / DOC ●	Certain 1996-2002 nonroad port, railway yard, and other intermodal + freight handling operation equipment	Includes Cummins & International engines	25 (Level 1)	NA	15 ppm sulfur diesel

Extengine Transport Systems	Extengine - Advanced Diesel Emission Control System (ADEC) / DOC + Selective Catalytic Reduction (SCR) ●	Certain 1991-1995 Cummins 5.9-liter, 150 to 200 HP nonroad engines used in excavators, dozers, loaders, and utility tractor rigs	Includes only Cummins 5.9 engines	25 (Level 1)	80	CARB diesel or 15 ppm sulfur diesel
HUSS Umwelttechnik GmbH	HUSS Umwelttechnik FS-MK diesel particulate filter (DPF) with diesel fuel burner for regeneration ●	Most on-road and off-road diesel engines through the 2006 model year except those already equipped with either DOC, DPF or exhaust gas recirculation system	Most nonroad & highway diesel engines	85 (Level 3 Plus)	Complies with the 20 % NO2 limit increase●	
Lubrizol	Lubrizol PuriNOx / Water Emulsion (Alternative) Fuel ○	Heavy Duty, 2 & 4 Cycle engines	All nonroad & highway diesel engines	16.8 to 23.3	17 to 20.2	Emulsified fuel with 2D having 500 ppm sulfur
Miratech Corporation	Miratech Corporation Combikat (DPF) ●	Stationary emergency and prime generators with a PM emission rate of 0.2 g/bhp-hr or less.	Includes most manufacturers of stationary emergency generators	85	NA	
Paceco Corporation	Mitsui Engineering and Shipbuilding diesel particulate filter (MES-DPF). ○	Pre-1996 nonroad, 4-cycle, heavy-duty diesel engines in the 225 - 450 kW power range in electrical generation applications	All nonroad engines	39	NA	50 ppm sulfur diesel
Rypos Inc.	Rypos ADPF (DPF) ●	1996-2002 stationary engines in applications such as land and marine-based gensets	Stationary engines	50	NA	CARB diesel
Sud-Chemie, Inc.	EnviCat-DPF™ diesel particulate filter (DPF) ●	Stationary prime and emergency power generation or pumping having PM emission levels less than or equal to 0.2 g/bhp-hr.	Includes most manufacturers of generators or pumps with diesel engines without EGR	85	NA	CARB diesel

○ EPA Verified Technologies are listed and explained at: <http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm>

● CARB Verified Technologies are listed and explained at: <http://www.arb.ca.gov/diesel/verdev/verdev.htm>

Memorandum of Agreement (MOA) with California Air Resources Board (ARB)

The Environmental Protection Agency's (EPA's) Voluntary Diesel Retrofit Program signed a Memorandum of Agreement (MOA) (online at http://www.epa.gov/otaq/retrofit/documents/epa-arb_moa.pdf) with the State of California Air Resources Board (ARB) for the Coordination and Reciprocity in Diesel Retrofit Device Verification. The MOA establishes reciprocity in verifications of hardware or device-based retrofits, and further reinforces EPA's and ARB's commitment to cooperate on the evaluation of retrofit technologies. This agreement commits EPA and ARB to work toward accepting particulate matter (PM) and oxides of nitrogen (NOx) verification levels assigned by the other's verification programs. Additionally, as retrofit manufacturers initiate and conduct in-use testing, EPA and ARB agreed to coordinate this testing so data generated may satisfy the requirements of each program. This MOA is intended to expedite the verification and introduction of innovative emission reduction technologies. Additionally, this MOA should reduce the effort needed for retrofit technology manufacturers to complete verification.

EPA recognizes and accepts those retrofit hardware strategies or device-based systems that have been verified by the California Air Resources Board (CARB). Information about CARB's Verification Program and its list of verified technologies can be found at the ARB verification page at <http://www.arb.ca.gov/diesel/verde/verde.htm>. Information about EPA's Verification program and its list of verified technologies can be found on EPA's verification page at <http://www.epa.gov/otaq/retrofit/retroverifiedlist.htm>.