

**State of California
AIR RESOURCES BOARD**

EXECUTIVE ORDER DE-13-001

The diesel emission control strategy described herein qualifies as a potential compliance option for the Air Resources Board's (ARB) in-use diesel fleet rules.

Pursuant to the authority vested in ARB by *Health and Safety Code*, Division 26, Part 5, Chapter 2; and pursuant to the authority vested in the undersigned by *Health and Safety Code* Sections 39515 and 39516, and Executive Order G-02-003;

Relating to Exemptions under Section 27156 of the *Vehicle Code*, and Verification under Sections 2700 to 2711 of Title 13 of the *California Code of Regulations* (CCR)

Engine Control Systems Limited
(doing business as CDTi; hereafter referred to as CDTi)
Purifilter™ EGR

ARB has reviewed CDTi's request for verification of the Purifilter™ EGR system (Purifilter™ EGR or system). Based on an evaluation of the data provided, and pursuant to the terms and conditions specified below, the Executive Officer of ARB hereby finds that Purifilter™ EGR reduces emissions of diesel particulate matter (PM) consistent with a Level 3 Plus device (greater than or equal to an 85 percent reduction and meets the 2009 nitrogen dioxide emissions limit) (Title 13, CCR, Sections 2702 (f) and 2708). Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies Purifilter™ EGR as a Level 3 Plus system for heavy-duty on-road vehicles. Engines for which the Purifilter™ EGR system is verified, the verified parts list, the verified labels, swapping and re-designation information, and other product information can be found here: <http://www.arb.ca.gov/diesel/verdev/companies/ecs/purifilter-egr.htm>

The aforementioned verification is subject to the following terms and conditions:

- The engine must be used by an on-road motor vehicle with a manufacturer's gross vehicle weight rating of over 14,000 pounds.
- The engine must be certified at a PM emission level of at most 0.1 grams per brake horsepower-hour (g/bhp-hr), and greater than 0.01 g/bhp-hr.
- The engine must have exhaust gas recirculation (EGR).
- The engine must have a duty cycle with an exhaust temperature profile greater than 240 Celsius for at least 45 percent of the time.
- The engine must not have a pre-existing oxidation catalyst from the original equipment manufacturer (OEM).

- The engine must be in its original certified configuration.
- The engine must not have a pre-existing OEM diesel particulate filter (DPF).
- The engine must be certified for on-road applications.
- Each Purifilter™ EGR single or dual filter system can only be installed on one engine and used to treat the exhaust of one engine.
- The engine must have a four-stroke combustion cycle.
- The engine may be turbocharged or naturally aspirated.
- The engine may be mechanically or electronically controlled.
- The engine must be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.
- Lube oil, or other oil, must not be mixed with the fuel.
- The engine must be operated on fuel that has a sulfur content of no more than 15 parts per million by weight.
- The system must not be operated with fuel additives, as defined in Section 2701 of Title 13, CCR, unless explicitly verified for use with fuel additive(s).
- The system must not be used with any other systems or engine modifications without ARB and manufacturer approval.
- The system must be installed with a backpressure monitor to notify the operator when the backpressure limit is reached. The notification must occur and be clearly visible to the operator while the vehicle or equipment is in use.
- Swapping of the filter or any other system components among vehicle is not permitted for systems under manufacturer warranty. Spare filters may be used during cleaning of primary filters, but upon completion of cleaning the primary filter must be promptly re-installed on the vehicle. Primary filters can only be installed on the original installation vehicle. Engines fitted with Purifilter™ EGR must not be operated without all components present and in good working order. Spare filters labeling and swapping of spare filters must comply with Section 2706, Title 13, CCR, and the policy document found here:
<http://www.arb.ca.gov/diesel/verdev/companies/ecs/purifilter-egr.htm>
- Purifilter™ EGR in its entirety can be re-designated to another vehicle or piece of equipment within a common ownership fleet only if authorized by ECS. Re-designations must be performed in accordance with Section 2706, Title 13, CCR, and the policy document found here:
<http://www.arb.ca.gov/diesel/verdev/companies/ecs/purifilter-egr.htm>

- The other terms and conditions specified below.

IT IS ALSO ORDERED AND RESOLVED: That installation of the Purifilter™ EGR system, manufactured by Engine Control Systems Limited (doing business as CDTi) of 83 Commerce Valley Drive East, Markham, Ontario L3T 7T3, Canada, has been found not to reduce the effectiveness of the applicable vehicle pollution control system, and therefore, the Purifilter™ EGR system is exempt from the prohibitions in Section 27156 of the *Vehicle Code* for installation on heavy-duty on-road vehicles. This exemption is only valid provided the engines meet the aforementioned conditions.

The Purifilter™ EGR system must be installed properly according to its design and the engine-DPF sizing chart listed in Attachment 1. The standard Purifilter™ EGR system assembly part numbers, components, and iAD backpressure monitor system installation kit are identified in Attachment 2. For single DPF systems, the following major components must be installed in the following order from exhaust inlet to outlet: one backpressure sensor and one thermocouple (these can be in reverse order or in the same cross-sectional area before the inlet section), one inlet section, one catalyzed diesel oxidation catalyst, one catalyzed DPF, one outlet section and one thermocouple installed after the DPF. For dual DPF systems: one backpressure sensor, one CDTi supplied Y-pipe exhaust splitter, two DPF systems installed in parallel where each is composed of one inlet section, one catalyzed diesel oxidation catalyst, one catalyzed DPF and one outlet section. For asymmetric dual DPF systems, one thermocouple shall be installed in front of the DPF which is farthest away from the engine and one thermocouple installed after it. For symmetric dual DPF systems, the thermocouples can be installed before and after either DPF. The system must also be equipped with a backpressure monitor and data logger that notifies the operator in a clearly visible manner when the backpressure limits have been reached while the vehicle or equipment is in use.

This Executive Order is valid provided that installation instructions for the Purifilter™ EGR system do not recommend tuning the vehicle to specifications different from those of the vehicle manufacturer.

CDTi must ensure that the installation of the Purifilter™ EGR system conforms to all applicable industrial safety requirements.

Changes made to the design or operating conditions of the Purifilter™ EGR system, as exempted by ARB, which adversely affect the performance of the vehicle's pollution control system, shall invalidate this Executive Order.

No changes are permitted to the system. ARB must be notified in writing of any changes to any part of the Purifilter™ EGR system. Any changes to the system must be evaluated and approved by ARB in writing. Failure to do so shall invalidate this Executive Order.

Marketing of the Purifilter™ EGR system using identification other than that shown in this Executive Order or for an application other than that listed in this Executive Order shall be prohibited unless prior written approval is obtained from ARB.

Identification must include both device and engine labels consistent with the requirements of Title 13, CCR, Section 2706 and California verification labels of this Executive Order. Changes or modifications to the label or label placement are prohibited without prior written approval from ARB.

This Executive Order does not apply to any Purifilter™ EGR system advertised, offered for sale, offered for lease, sold with, leased with, or installed on a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

A copy of this Executive Order must be provided to the ultimate purchaser at the time of sale.

As specified in Section 2706(j) (Title 13, CCR) of the *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines* (Procedure), ARB assigns each diesel emission control strategy a family name. The designated family name for the verification as outlined above is:

CA/ECS/2013/PM3+/N00/ON/DPF01

Additionally, as stated in the Procedure, CDTi is responsible for record keeping requirements (Section 2702), honoring the warranty (Section 2707), and conducting in-use compliance testing (Section 2709).

This Executive Order is valid provided that the diesel fuel used in conjunction with the device complies with Title 13, CCR, Sections 2281 and 2282, and if biodiesel is used, the biodiesel blend shall be 20 percent or less subject to the following conditions:

- The biodiesel portion of the blend complies with the American Society for Testing and Materials Specification D6751 applicable for 15 parts per million sulfur content; and
- The diesel fuel portion of the blend complies with Title 13, CCR, Sections 2281 and 2282.

Other alternative diesel fuels such as, but not limited to, ethanol diesel blends and water emulsified diesel fuel are excluded from this Executive Order.

Proper engine maintenance is critical for the proper functioning of the diesel emission control strategy. The owner and/or operator of the vehicle on which the diesel emission control strategy is installed, is strongly advised to adhere to all good engine maintenance practices. Failure to document proper engine maintenance, including keeping records of the engine's oil consumption, may be grounds for denial of a warranty claim.

Use of system parts or replacement parts not authorized by CDTi, may be grounds for denial of a warranty claim.

The Purifilter™ EGR system must not be located over any occupied space (e.g., driver or passenger compartments); or in a way which would result in any noncompliance with any applicable safety standards such as but not limited to Federal Motor Carrier Safety Administration, Subpart G, Miscellaneous parts and accessories, Section 393.83 Exhaust systems; and any other location deemed unacceptable by CDTi.

In addition to the foregoing, ARB reserves the right in the future to review this Executive Order and the exemption and verification provided herein to assure that the exempted and verified add-on or modified part continues to meet the standards and procedures of Title 13, CCR, Section 2222, et seq, and Title 13, CCR, Sections 2700 through 2711.

Systems included in this Executive Order shall conform to all applicable California emissions regulations.

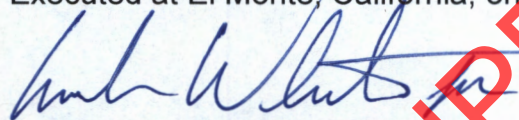
The terms and conditions of this Executive Order must be satisfied regardless of where the system is sold in order for the system to be considered verified.

Systems sold as verified, or which carry an ARB-approved label, must satisfy all the terms and conditions of this Executive Order.

This Executive Order does not release CDTi from complying with all other applicable regulations.

Violation of any of the above conditions shall be grounds for revocation of this Executive Order.

Executed at El Monte, California, on this 24th day of January 2013.



Robert H. Cross, M.S.M.E., P.E.
Chief, Mobile Source Control Division