

**State of California
AIR RESOURCES BOARD**

EXECUTIVE ORDER DE-08-008-07

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 the *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-14-012;

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)*

Johnson Matthey, Incorporated (JM)
Continuously Regenerating Technology (CRT®) System

ARB has reviewed JM's request for verification of the CRT® 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 the CRT® system reduces emissions of diesel particulate matter (PM) consistent with a Level 3 device (greater than or equal to 85 percent reductions) (Title 13, CCR, Sections 2702(f) and Section 2708) and is compliant with the 2009 nitrogen dioxide emissions limit. Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies the CRT® system as a Level 3 Plus system for heavy-duty on-road vehicles that use certain heavy-duty engines. Engines for which the CRT® 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/jm/crt.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 for on-road applications.
- The engine must be originally manufactured from model year 1993 through 2006.
- The application must have a duty cycle with an average temperature profile:
 - Greater than 240 degrees Celsius for 40 percent of the operating cycle, or
 - Greater than 260 degrees Celsius for 20 percent of the operating cycle.
- The engine must be in its original certified configuration, except that the OEM DOC may be removed if the CRT® Particulate Filter system is installed. Should the CRT®

Particulate Filter system be removed, the OEM DOC must be reinstalled, returning the engine to its original certified configuration.

- The engine must not have exhaust gas recirculation.
- The engine may or may not be certified to have an original equipment manufacturer (OEM) diesel oxidation catalyst (DOC).
- The engine must not be certified to have an OEM diesel particulate filter (DPF)
- The engine must have a particulate matter (PM) certification level of at most 0.1 grams per brake horsepower-hour (g/bhp-hr) and at least 0.01 g/bhp-hr.
- The engine must be certified for on-road applications at either an oxides of nitrogen (NO_x) or NO_x plus non-methane hydrocarbon level above 3.2 g/bhp-hr.
- The certified engine emissions levels must be such that the NO_x to PM ratio is at least 8.
- The engine must have rated power of at least 100 horsepower but not more than 650 horsepower.
- The engine must have a minimum displacement of 5 liters and maximum displacement of 17 liters.
- The engine must have a four-stroke combustion cycle.
- The engine may be turbocharged or naturally aspirated.
- The engine must be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.
- Only one filter may be installed per engine.
- The engine can be mechanically or electronically controlled.
- 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 of CCR, unless explicitly verified for use with the 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 which must notify the operator when the backpressure limit is reached. When the system issues a backpressure warning notification, it must occur while the vehicle or equipment is in use and be clearly visible to the operator.
- The other terms and conditions are specified below.

IT IS ALSO ORDERED AND RESOLVED: That installation of the CRT[®] system, manufactured by Johnson Matthey, Incorporated, of 900 Forge Avenue, Suite 100, Audubon, Pennsylvania 19403-2305, has been found not to reduce the effectiveness of the applicable vehicle pollution control system, and therefore the CRT[®] 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 CRT[®] system must be installed as designed and consists of the following major components listed in order from exhaust inlet to outlet as they are arranged within the exhaust system of the vehicle: one inlet head with one backpressure sample hose (for the backpressure sensor), one backpressure sensor, one thermocouple, one diesel oxidation catalyst, one cordierite wall-flow diesel particulate filter, one outlet head. The system also includes an electronic control unit and a system display unit. The major components of the CRT[®] system are identified in the parts list. The parts list and schematics of the approved product and engine labels are available on the website shown above.

The CRT[®] includes one wall-flow DPF designed to filter the exhaust from a single engine. CRT[®] systems with multiple DPFs, including designs with two or more DPFs canned together or multiple individually-canned DPFs in parallel or in series (or any combination thereof), are not valid under this Executive Order. Channeling exhaust from a single engine through multiple CRT[®] systems, deployed in parallel or in series or any combination thereof, is also not valid under this Executive Order.

This Executive Order is valid provided that installation instructions for the CRT[®] system do not recommend tuning the vehicle to specifications different from those of the vehicle manufacturer.

JM must ensure that the installation of the CRT[®] system conforms to all applicable industrial safety requirements.

The CRT[®] 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 JM.

JM must provide each installer with the specific criteria used to determine the compatibility of the CRT[®] system with a candidate engine pursuant to Section 2706(t), Title 13, CCR.

JM is responsible for ensuring all system filters are correctly sized for each engine.

No changes are permitted to the system. ARB must be notified, in writing, of any changes to any part of the CRT[®] Particulate Filter system. Any changes to the system must be evaluated and approved in writing by ARB. Failure to do so shall invalidate this Executive Order.

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

Marketing of the CRT[®] 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 requirement 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 CRT[®] system advertised, offered for sale, sold 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/JMI/2008/PM3+/N00/ON/DPF01

As stated in the Procedure, JM is responsible for complying with recordkeeping requirements (Section 2702), honoring the required 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 system complies with Title 13, CCR, Sections 2281 and 2282, or U.S. EPA diesel fuel compliant with standards set forth in Title 40, *Code of Federal Regulations* (CFR), Part 80, for the applications covered by this Executive Order, 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.

- The diesel fuel portion of the blend complies with Title 13, CCR, Sections 2281 and 2282 or U.S. EPA diesel fuel compliant with standards set forth in Title 40, *Code of Federal Regulations* (CFR), Part 80 for the applications covered by this Executive Order.

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 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 JM may be grounds for denial of a warranty claim.

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 verified under 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 the ARB-approved label, must satisfy all the terms and conditions of this Executive Order.

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

JM, its distributors, or installers shall review the actual operating conditions of each vehicle prior to retrofitting an engine with a CRT[®] Particulate Filter system to ensure compliance with the terms and conditions of this Executive Order.

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

This Executive Order supersedes Executive Order DE-08-008-06, dated October 21, 2013; Executive Order DE-08-008-05, dated September 6, 2012; Executive Order DE-08-008-04, dated July 12, 2011; Executive Order DE-08-008-03, dated June 28, 2011; Executive Order DE-08-008-02, dated November 3, 2009; Executive Order DE-08-008-01, dated July 31, 2009; and Executive Order DE-08-008, dated December 30, 2008, for this DECS.

Executed at El Monte, California, and effective this 19th day of November, 2015.



Annette Hebert, Chief

Emissions Compliance, Automotive Regulations and Science Division