

**State of California
AIR RESOURCES BOARD**

EXECUTIVE ORDER DE-09-004-08

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)
Advanced Catalyzed Continuously Regenerating Technology (A_{dv}CCRT™) System

ARB has reviewed JM's request for verification of the A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 A_{dv}CCRT™ system as a Level 3 Plus system for heavy-duty on-road vehicles that use certain heavy-duty engines. Engines for which the A_{dv}CCRT™ 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/advccrt.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 originally manufactured from model year 2002 through 2006.
- The application must have a duty cycle with an average temperature profile:
 - Greater than 230 degrees Celsius for 40 percent of the operating cycle, or
 - Greater than 300 degrees Celsius for 10 percent of the operating cycle.
- The engine must be in its original certified configuration.
- The engine may or may 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 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 of at most 2.8 g/bhp-hr and at least 2.0 g/bhp-hr.
- The engine must have rated power of at least 150 horsepower but not more than 600 horsepower.
- The engine must have a minimum displacement of 5.9 liters and maximum displacement of 16 liters.
- The engine must have a four-stroke combustion cycle.
- The engine must be turbocharged.
- 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 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 other terms and conditions are specified below.

IT IS ALSO ORDERED AND RESOLVED: That installation of the A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 A_{dv}CCRT™ system 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, one backpressure sensor, one thermocouple, one diesel oxidation catalyst, one catalyzed cordierite wall-flow diesel particulate filter, one mixing module and dosing nozzle, one thermocouple, one decomposition catalyst module, one outlet head, and one thermocouple. The system also includes a fuel injection system, an electronic control unit, and a system display unit. The major components of the A_{dv}CCRT™ 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 A_{dv}CCRT™ includes one wall-flow DPF designed to filter the exhaust from a single engine. A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 A_{dv}CCRT™ system do not recommend tuning the vehicle to specifications different from those of the vehicle manufacturer.

JM must ensure that the installation of the A_{dv}CCRT™ system conforms to all applicable industrial safety requirements.

The A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 device without the written approval of ARB. Changes from the verified design without written approval of ARB shall invalidate this Executive Order.

Changes made to the design or operating conditions of the A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 A_{dv}CCRT™ 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 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/2009/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 5 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.

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

This Executive Order supersedes Executive Order DE-09-004-07, dated December 6, 2013; Executive Order DE-09-004-06, dated October 31, 2012; Executive Order DE-09-004-05, dated December 9, 2011; Executive Order DE-09-004-04, dated June 28, 2011; Executive Order DE-09-004-03, dated October 6, 2010; Executive Order DE-09-004-02, dated May 13, 2010; Executive Order DE-09-004-01, dated October 23, 2009; and Executive Order DE-09-004, dated April 9, 2009, for this DECS.

Executed at El Monte, California, and effective this 18th day of November, 2015.



For Annette Hebert, Chief
Emissions Compliance, Automotive Regulations and Science Division