

**State of California
AIR RESOURCES BOARD**

EXECUTIVE ORDER DE-08-009-12

Pursuant to the authority vested in the California Air Resources Board (CARB) 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 section 39515 and 39516 and Executive Order G-14-012;

This action relates to Verification under sections 2700 through 2711 of title 13 of the California Code of Regulations:

**Johnson Matthey Inc.
CRT(+) Diesel Particulate Filter**

CARB has reviewed the request by Johnson Matthey Inc. for verification of the CRT(+) diesel particulate filter (DPF). Based on an evaluation of the data provided, and pursuant to the terms and conditions specified below, the Executive Officer of CARB hereby finds that the CRT(+) DPF reduces emissions of diesel particulate matter (PM) consistent with a Level 3 device (greater than or equal to 85 percent reductions) (California Code of Regulations (CCR), title 13, sections 2702 (f) and (g) and section 2708) and complies with the CARB January 1, 2009, nitrogen dioxide (NO₂) limit (CCR, title 13, section 2702 (f) and section 2706 (a)). Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies the CRT(+) DPF as a Level 3 Plus system, for use with stationary emergency standby and prime generators using engine families listed in Attachment 1.

This verification is subject to the following terms and conditions:

- The engine must be used in a stationary application associated with emergency standby or prime generators.
- The engines are model years 1996 or newer, having the engine family names listed in Attachment 1.
- The engine must be certified to:
 - Tier 1, Tier 2, Tier 3, or Tier 4 Alt 20% nitrogen oxides (NO_x) and PM standards;
 - or
 - Tier 4i standards with a rated horsepower (hp) between 50 and 75 or over 750.
- The engine must be certified as an off-road or stationary diesel engine meeting 0.2 grams per brake horsepower-hour (g/bhp-hr) diesel PM or less based on certification or in-use emissions testing (as tested on an appropriate steady-state certification cycle outlined in the CARB off-road regulations – similar to ISO 8178 D2).
- The engine must be in its original certified configuration.
- The engine must not employ exhaust gas recirculation (EGR).
- The engine must not have a pre-existing selective catalytic reduction system.
- The engine must not have a pre-existing oxidation catalyst.
- The engine must not have a pre-existing diesel particulate filter.
- The engine must be four-stroke.

- The engine can be turbocharged or naturally-aspirated.
- The engine must be certified for use in California or certified by the United States Environmental Protection Agency, and the engine must be in its original certified configuration.
- Johnson Matthey Inc. must review actual operating conditions (duty cycle, baseline emissions, exhaust temperature profiles, and engine backpressure) prior to retrofitting an engine with the CRT(+) DPF to ensure compatibility.
- The engine should be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.
- The engine must not be operated with fuel additives, as defined in section 2701 of title 13, of the CCR, unless explicitly verified for use with fuel additive(s).
- The other terms and conditions are specified in Table 1.

Table 1: Conditions for the CRT(+) DPF

Parameter	Value
Application	Stationary Emergency Standby and Prime Power Generation
Engine Type	Diesel; with or without turbocharger; without EGR; mechanically or electronically controlled; certified off-road or stationary engines meeting 0.2 g/bhp-hr diesel PM or less based on certification or in-use emissions testing; certified to Tier 1, Tier 2, Tier 3, or Tier 4 Alt 20% NOx and PM standards; or certified to Tier 4i standards with a rated horsepower between 50 and 75 or over 750
Minimum Exhaust Temperature for Filter Regeneration	The engine must operate at the load level required to achieve 240 degrees Celsius (°C) for a minimum of 40 percent of the engine’s operating time and NOx/PM ratio of 15 @ $\geq 300^{\circ}\text{C}$ and 20 @ $\leq 300^{\circ}\text{C}$. Operation at lower temperatures is allowed, but only for a limited duration as specified below.
Maximum Consecutive Minutes Operating Below Passive Regeneration Temperature	720 Minutes
NOx/PM Ratio Requirements	NOx/PM ratio of at least 8 with a preference for 20 or higher.
Number of Consecutive Cold Starts and 30 Minute Idle Sessions before Regeneration Required	24
Number of Months of Operation Before Cleaning of Filter Required	Filter cleaning is not required till after 150 half-hour cold starts with associated regenerations or 1000 hours of emergency/standby use or 6 to 12 months of prime operation depending on hours of operation, maintenance practice, and oil used. The SootAlert, (replaces the CRTdM) which monitors engine exhaust back pressure and temperature will determine the actual cleaning interval and provide an alert when filter cleaning is required.
Fuel	California diesel fuel with less than or equal to 15 ppm sulfur or a biodiesel blend provided that the biodiesel portion of the blend complies with ASTM D6751, the diesel portion of the blend complies with title 13 (CCR), sections 2281 and 2282, and the blend contains no more than 20 percent biodiesel by volume. Other alternative diesel fuels such as, but not limited to, ethanol diesel blends and water emulsified diesel fuel are excluded from this Executive Order.
Verification Level	Level 3 Plus Verification: PM - at least 85 percent reduction NO2 - meets January 2009 limit

The CRT(+) DPF consists of an oxidation catalyst and diesel particulate filter, referred to as a catalyzed passive continuously regenerated DPF, and a backpressure monitor and data logger combination, originally the CRTdM and now replaced with the SootAlert. A schematic of the approved label is shown in Attachment 2. Labels attached to the CRT(+) DPF and the engine must be identical.

This Executive Order is valid provided that installation instructions for the CRT(+) DPF do not recommend tuning the engine to specifications different from those of the engine manufacturer. As such, no engine modifications are permitted without CARB and manufacturer approval.

No changes are permitted to the CRT(+) DPF, and the product must not be used with any other systems without CARB evaluation and approval. CARB must be notified in writing of any changes to any part of CRT(+) DPF. Failure to do so shall invalidate this Executive Order.

No person shall alter, physically disable, disconnect, bypass, or tamper with an installed CARB verified diesel emissions control strategy, as outlined in title 13 CCR section 2711(e). Should CARB become aware that a design feature of a verified device is altered, physically disabled, disconnected, bypassed, or tampered on multiple units by independent persons, Johnson Matthey will be responsible to propose a design modification and recall plan to the Executive Officer to minimize existing and potential for future tampering of the verified device.

Marketing of the CRT(+) DPF 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 approval is obtained from CARB.

As specified in the Diesel Emission Control Strategy Verification Procedure (title 13 CCR section 2706 (j)), the CARB 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/ST/DPF01

This designated family name must be used in reference to this verification as part of the system labeling requirement.

The terms and conditions of this verification 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 a CARB-approved label, must satisfy all the terms and conditions of this verification Executive Order.

Additionally, as stated in the Diesel Emission Control Strategy Verification Procedure, Johnson Matthey Inc. is responsible for record-keeping requirements (CCR, title 13, section 2702), their warranty (CCR, title 13, section 2707), conducting in-use compliance testing (CCR, title 13, section 2709), and complying with the system labeling requirements (CCR, title 13, section 2706 (j)).

Johnson Matthey Inc. must ensure that the installation of the CRT(+) DPF system conforms to all applicable industrial safety requirements.

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

Proper engine maintenance is critical for the proper functioning of the diesel emission control strategy. The owner of the equipment 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.

In addition, CARB reserves the right in the future to review this Executive Order and verification provided herein to assure that the verified add-on or modified part continues to meet the standards and procedures of CCR, title 13, section 2222, et seq. and CCR, title 13, sections 2700 through 2711.

Systems verified under this Executive Order shall conform to all applicable California emissions regulations.

This Executive Order does not release Johnson Matthey Inc. from complying with all other applicable regulations.

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

Executive Order DE-08-009-11 is hereby superseded and is of no further force and effect.

Executed at Sacramento, California, this 21 day of December 2022.



Richard Boyd
Assistant Chief
Transportation and Toxics Division

Attachment 1: Johnson Matthey CRT(+) Diesel Particulate Filter Off-Road Certified Engine Family List ($0 \leq 0.2$ g/hp-hr PM)

Attachment 2: Diesel Emission Control System Label