

**State of California  
AIR RESOURCES BOARD**

**EXECUTIVE ORDER DE-05-001**

Pursuant to the authority vested in the Air Resources Board (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 Section 39515 and 39616 and Executive Order G-02-003;

Relating to Exemptions under Section 27156 of the Vehicle Code, and Verification under Sections 2700 through 2710 of Title 13 of the California Code of Regulations

Extengine Transport Systems, LLC (Extengine)  
Advanced Diesel Emission Control (ADEC) System

ARB has reviewed Extengine’s request for verification of the ADEC 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 ADEC system reduces emissions of diesel particulate matter (PM) consistent with a Level 1 device (greater than or equal to 25 percent reductions) and emissions of oxides of nitrogen (NOx) at a level of 80 percent (Title 13 California Code of Regulations (“CCR”) Sections 2702 (f) and (g) and Section 2708). Accordingly, the Executive Officer determines that the system merits verification and, subject to the terms and conditions specified below, classifies the ADEC system as a Level 1 system for the engines and applications listed in Table 1.

Table 1: Appropriate Engines and Applications for the ADEC System

Diesel Emission Control Strategy	Engines	Applications
ADEC System	1991-1995 Model Year Off-road Cummins 5.9-liter 150-200 Horsepower	Rubber Tired Excavators, Rubber Tired Loaders, Rubber Tired Dozers, and Utility Tractor Rigs (UTRs)

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

- The engines are originally manufactured by Cummins from model year 1991 through 1995, belong to the off-road 5.9-liter series, and are rated at between 150 to 200 horsepower.
- The application must have a duty cycle with an average exhaust temperature profile greater than 180 degrees Celsius for at least 55 percent of the operating cycle.
- The engine must not employ exhaust gas recirculation.
- 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 must be turbocharged.
- The engine must be mechanically controlled.
- The engine should be well maintained and not consume lubricating oil at a rate greater than that specified by the engine manufacturer.
- The engines must be operated on fuel that has a sulfur content of no more than 500 parts per million by weight.
- Only Extengine may replace empty ammonia cylinders with refilled cylinders.
- The other terms and conditions specified below.

IT IS ALSO ORDERED AND RESOLVED: That installation of the ADEC system, manufactured by Extengine Transport Systems, LLC, of 1370 South Acacia Avenue, Fullerton, California 92831, has been found not to reduce the effectiveness of the applicable vehicle pollution control system.

The ADEC system consists of a diesel oxidation catalyst, a selective catalytic reduction catalyst, an ammonia slip catalyst, an anhydrous ammonia injection and storage system, an electronic control unit, and various sensors. The major components of the ADEC system are identified in Attachment 1.

The ADEC system requires the use of pressurized anhydrous ammonia. Anhydrous ammonia is a very hazardous substance. This Executive Order makes no determination concerning the safety of the ADEC system. Extengine is responsible for informing end-users of anhydrous ammonia safety procedures. Only Extengine may replace empty ammonia cylinders with refilled cylinders.

This Executive Order is valid only for the ammonia injection timing map designated by the code "ADEC ECU MAP 001."

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

Changes made to the design or operating conditions of the ADEC system, as verified 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 device. The ARB must be notified in writing of any changes to any part of the ADEC system. Any changes to the device must be evaluated and approved by ARB. Failure to do so shall invalidate this Executive Order.

Marketing of the ADEC 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 approval is obtained from ARB.

This Executive Order shall not apply to any ADEC system advertised, offered for sale, sold with, or installed on a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

The ARB estimates that the ADEC system might incur an average fuel economy penalty of 1.0 percent.

As specified in the Diesel Emission Control Strategy Verification Procedure (Title 13 CCR Section 2706 (g)), the ARB assigns each Diesel Emission Control Strategy a family name. The designated family name for the verification as outlined above is: CA/EXT/2005/PM1/N80/OFF/SYS01.

Additionally, as stated in the Diesel Emission Control Strategy Verification Procedure, Extengine is responsible for honoring the required warranty (Section 2707) and conducting in-use compliance testing (Section 2709).

In addition to the foregoing, ARB reserves the right in the future to review this Executive Order and the verification provided herein to assure that the verified add-on or modified part continues to meet the standards and procedures of the California Code of Regulations, Title 13, Sections 2700 through 2710.

The ADEC system utilizes selective catalytic reduction with ammonia as the reductant. This technology has the potential for generating a number of toxic compounds in the exhaust, but it is unknown at this time if these compounds are present in any significant quantity to pose a health risk. ARB will continue to study this potential concern as more information becomes available.

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

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

Executed at El Monte, California, this 20<sup>th</sup> day of January 2005.

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Robert H. Cross, Chief  
Mobile Source Control Division

Attachment 1: Parts List for the Extengine ADEC System