



Air Resources Board



Matthew Rodriguez
Secretary for
Environmental Protection

Mary D. Nichols, Chairman
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Edmund G. Brown Jr.
Governor

November 27, 2013

Mr. David Kiefer, Director
Marketing and Product Development
Carrier Transicold
700 Olympic Drive
Athens, Georgia 30601

Dear Mr. Kiefer:

Using the California Air Resources Board's (ARB) *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines*¹ (Procedure), staff reviewed your application for verification and your request for conditional verification of the Carrier Transicold (Carrier) Engine Emissions System (EES). You have identified Dinex A/S as the Carrier EES manufacturer. Based on an evaluation of the data provided and completion of at least 333 hours of the durability/field demonstration, ARB hereby conditionally verifies the Carrier EES as a Level 3 Plus (greater than or equal to 85 percent reduction of diesel particulate matter and compliant with the 2009 nitrogen dioxide standard) diesel emission control system (DECS). The Carrier EES may be retrofitted on limited applications, as follows:

- Carrier Transicold X4-series and Vector 8500/8600MT transport refrigeration units (TRU) and type UG and RG TRU generator sets (genset) equipped with Kubota off-road diesel engines rated at less than 25 horsepower (hp) with model years 2012 and newer, as listed in Attachment 1;
- "In-use" TRU engines with less than 3,000 hours of accumulated operation at the time of installation; and
- "New" TRU engines, concurrent with sale or lease - installation of the Carrier EES on "new" TRUs or TRU gensets prior to sale to an ultimate purchaser or prior to lease to a lessee is prohibited.

Enclosed are the conditions related to the conditional verification of the Carrier EES. No design changes are permitted to the system, its components, applicable engine models, or software unless they are evaluated and approved by ARB.

¹ Title 13 California Code of Regulations (13 CCR), sections 2700 through 2711.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our website: <http://www.arb.ca.gov>.

California Environmental Protection Agency

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In order to be considered for full verification, Carrier must fulfill the following requirements within one year of the date of this letter:

- Complete a full 1,000 hour durability/field demonstration of the current close-coupled design Carrier EES system (with air control valve) installed on a Carrier X4-series or Vector 8500/8600MT TRU powered by a less than 25 hp Kubota V2203L engine that has accrued less than 3,000 hours of operation. Carrier shall ensure that the exhaust temperature, back pressure, and engine speed are measured and recorded for the duration of the durability/field demonstration.
- Report on the durability/field demonstration in the final application for verification, including all of the elements required under 13 CCR, section 2705(c):
 - Temperature and backpressure data, in accordance with 13 CCR section 2705(c)(1), must be provided in section 5.3.3 and Appendix B.1 of the final application.
 - Error codes, fault codes, and high backpressure codes, in accordance with 13 CCR section 2705(c)(3), must be provided section 5.3.5 of the final application.
 - Third-party statement, in accordance with 13 CCR section 2705(c)(4), must be provided in section 5.3.4 and Appendix B.2 of the final application.
 - Photographic documentation, in accordance with 13 CCR section 2705(c)(5), must be provided in section 5.3.2 of the final application.

If Carrier fails to complete the above-stated requirements within one year of the date of this letter, ARB will not grant Carrier full verification and will terminate the conditional verification.

The EES must only be installed on TRUs and TRU genset engines that are representative of the emission control group described in Attachment 1 of the enclosure and that meet the terms and conditions listed in the enclosure.

The DECS family name is included in the enclosure. Carrier shall include the DECS family name on two system labels per installation – one label on the system and one label on the engine.

As required by the *Procedure*, Carrier is responsible for meeting the warranty requirements of 13 CCR section 2707. In addition to a product warranty, Carrier must require its authorized installers to provide an installation warranty in accordance with 13 CCR section 2707(a)(2). Carrier must also submit warranty reports in accordance with 13 CCR section 2707(c) and must require their authorized installers to submit

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installation warranty reports in accordance with 13 CCR section 2707(d). Authorized installers are required to complete installation recordkeeping to facilitate the installation warranty reports.

Carrier is also responsible for conducting in-use compliance testing in accordance with 13 CCR section 2709, which requires Carrier to conduct field testing when 100 units have been sold or leased in the California market and emissions testing when 300 units have been sold or leased in the California market. Carrier must submit a test proposal for approval by the Executive Officer within 90 days of triggering the in-use field and emissions testing requirements and prior to performing these tests. The in-use compliance test proposal must meet the requirements of 13 CCR section 2709(d).

Component swapping and system re-designation shall not be allowed until Carrier has submitted detailed written procedures to ARB and they have been approved in writing.

Carrier and their authorized installers are responsible for keeping records on all units that are sold and installed, in accordance with 13 CCR section 2702(n)(1). These records include, but are not limited to end user contact information and descriptions of the equipment and engines the units are installed on. In addition, 13 CCR section 2702(n)(2) requires authorized installers to keep all pre-installation compatibility assessment records as described in section 2706(t)(2) to (4).

Thank you for participating in ARB's Diesel Emission Control Strategies Verification program. If you have any questions or comments, please contact Mr. Rod Hill, Staff Air Pollution Specialist, at (916) 327-5636 or by email at: rhill@arb.ca.gov.

Sincerely,



Cynthia Marvin, Chief
Stationary Source Division

Enclosure

cc: See next page.

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cc: Mr. Bill Maddox, Manager
Service and Comprehensive Maintenance
Carrier Transicold
700 Olympic Drive
Athens, Georgia 30601

Mr. Lars Christian Larsen
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Mr. Richard Boyd, Manager
Process Evaluation Section

Mr. Rod Hill
Staff Air Pollution Specialist
Process Evaluation Section

Enclosure

Carrier EES Conditional Verification November 27, 2013

Using the California Air Resources Board's (ARB) *Verification Procedure, Warranty and In-Use Compliance Requirements for In-Use Strategies to Control Emissions from Diesel Engines*¹ (Procedure), staff reviewed your application for verification and your request for conditional verification of the Carrier Transicold (Carrier) Engine Emissions System (EES). Dinex A/S is the Carrier EES manufacturer. Based on an evaluation of the data provided and completion of at least 333 hours of the durability/field demonstration, ARB hereby conditionally verifies the Carrier EES as a Level 3 Plus (greater than or equal to 85 percent reduction of diesel particulate matter and compliant with the 2009 nitrogen dioxide standard) diesel emission control system (DECS) for use on Carrier Transicold X4-series and Vector 8500/8600MT Transport Refrigeration Units (TRU) and type UG and RG TRU generator sets (genset) powered by less than 25 horsepower (hp) off-road engines manufactured by Kubota Corporation from model year 2012 and newer, as listed in Attachment 1.

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

- The Carrier EES is conditionally verified for a period not to exceed one year from the date of this letter;
- For the Carrier EES to be considered for full verification, Carrier must complete all remaining requirements, as specified herein, within one year of the date of this letter:
 - Complete a full 1,000 hour field demonstration of the current-design Carrier EES system (with air control valve) installed on a Carrier X4-series or Vector TRU powered by a model year 2012 through 2014 less than 25 hp Kubota V2203L Tier 4f engine that has accrued less than 3,000 hours of operation at the start of the demonstration. Carrier shall ensure that the exhaust temperature, back pressure, and engine speed are measured and recorded for the duration of the field demonstration.
 - Report on the field demonstration in the final application for verification, including all of the elements required under 13 CCR, section 2705(c).
- If Carrier fails to complete the above-stated requirements within one year of the date of this letter, ARB will not grant Carrier full verification and will terminate the conditional verification.
- Conditional verification is equivalent to verification for the purposes of satisfying the requirements of in-use emission control regulations;
- Conditional verification is restricted to only those Kubota engine families and models listed in Attachment 1;

¹ Title 13 California Code of Regulations (13 CCR), sections 2700 through 2711.

- The Carrier EES shall only be installed on Carrier X4-series and Vector 8500 or 8600MT TRU models, or Carrier type UG or RG TRU generator sets;
- The engine must be certified in California;
- The engine's accumulated operating hours must be less than 3,000 hours at the time of installation;
- The engine must be in its original certified configuration;
- The engine must not employ exhaust gas recirculation;
- The engine must not have a pre-existing diesel oxidation catalyst;
- The engine must not have a pre-existing diesel particulate filter;
- The engine must not have a pre-existing turbocharger;
- The engine must be naturally aspirated;
- The engine must be well maintained and not consume lubricating oil at a rate greater than one quart per 200 hours of engine operation;
- The engine must be operated on fuel that has a sulfur content of no more than 15 parts per million by weight;
- Lube oil, or other oil, must not be mixed with the fuel;
- The system must not be operated with fuel additives, as defined in section 2701 of Title 13, of the CCR, unless explicitly verified for use with the fuel additive(s);
- The product must not be used with any other systems or engine modifications without approval from ARB and the applicant/manufacturee;
- Carrier or their authorized installer must review actual operating conditions and perform engine checks to determine the engine is in good mechanical working order prior to retrofitting an engine with a Carrier EES to ensure compatibility;
- And, the other terms and conditions specified below.

The Carrier EES consists of a wall-flow diesel particulate filter, air control valve, diesel fuel burner, and electronic control system. The Carrier EES also includes a backpressure monitoring and warning system. System labels are shown in Attachment 2.

The Carrier EES may be installed on both "new" and "in-use" TRU engines with less than 3,000 hours of accumulated operation; however, retrofits on "new" TRU engines are only allowed concurrent with sale or lease. Installation of the Carrier EES on "new" TRUs or TRU gensets prior to sale to an ultimate purchaser or prior to lease to lessee is prohibited.

Carrier must provide all authorized installers with specific criteria that must be used to determine the compatibility of the Carrier EES with the candidate engine pursuant to 13 CCR section 2706(t). Depending on the number of hours an engine has accrued at the time of EES installation, the items indicated by "X" in the chart below must be performed and any out-of-specification conditions shall be repaired prior to EES installation:

Checks to Perform	Engine Hours at EES Installation		
	<100 hrs	100 to <1,500 hrs	1,500 to 3,000 hrs
Perform Pre-Trip visual inspection	X	X	X
Run TRU Pre-Trip	X	X	X
Check for abnormal exhaust smoke	X	X	X
Review service records	X	X	X
Check lube oil consumption*		X	X
Check injectors (pop test and spray pattern)			X

*Maximum lube oil consumption shall not exceed 1 quart per 200 hours of engine operation.

Proper engine maintenance is critical to the proper functioning of the DECS. The owner of the equipment on which the DECS is installed is strongly advised to adhere to the engine maintenance schedules in the Carrier EES owner's manual. Failure to maintain the engine so that emissions control systems are in operating condition may be grounds for citation and penalty. Failure to document engine maintenance, including keeping records of oil consumption, may be grounds for denial of a warranty claim.

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

This conditional verification is valid provided that the diesel fuel used in conjunction with the device complies with 13 CCR, sections 2281 and 2282, and if biodiesel is used, it shall be a blend of 20 percent or less subject to the following conditions:

- The biodiesel portion of the blend complies with the American Society for Testing and Materials (ASTM) specification D6751 applicable for 15 ppm sulfur content;
- The diesel fuel portion of the blend complies with 13 CCR, sections 2281 and 2282; and
- The use of biodiesel applies to devices verified to reduce only diesel particulate matter.

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

This conditional verification is valid provided that installation instructions for the Carrier EES do not recommend tuning the vehicle to specifications different from those of the engine manufacturer.

Changes made to the design or operating conditions of the Carrier EES, as exempted by ARB, which adversely affect the performance of the engine's pollution control system, shall invalidate this conditional verification. As such, no changes are permitted to the device.

No changes are permitted to the Carrier EES. ARB must be notified in writing of any changes to parts of the Carrier EES. Any changes to the system, components,

applicable engine models, or software must be evaluated and approved in writing by ARB. Failure to do so shall invalidate this conditional verification.

Marketing of the Carrier EES using identification other than that shown in this conditional verification or for an application or operating conditions other than that listed in this conditional verification shall be prohibited unless prior approval is obtained from ARB.

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/CAR/2013/PM3+/N00/TR/DPF01

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

ARB reserves the right in the future to review this conditional verification letter and the conditions provided herein to assure that the conditionally verified add on or modified part continues to meet the standards and procedures of 13 CCR, sections 2222, et seq and sections 2700 through 2711.

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

Systems verified under this conditional verification shall conform to all applicable California emissions regulations. This conditional verification does not release Carrier from complying with all other applicable regulations.

Violation of any of the above conditions shall be grounds for revocation of the conditional verification.

Attachment 1: Engine family list

Attachment 2: System label