

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER DE-06-008-02
(Supersedes EO DE-06-008-01)

Pursuant to the authority vested in the California 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;

This action relates to Verification under sections 2700 through 2710 of Title 13 of the California Code of Regulations

Thermo King Corporation – Proventia Emission Control Oy
Thermo King PDPF™

ARB has reviewed the request by Thermo King Corporation and Proventia Emission Control Oy (formerly Finnkatalyt Oy) for verification of the Thermo King PDPF™ flow-through filter. Based on an evaluation of the data provided, and pursuant to the terms and conditions specified below, the Executive Officer of the ARB hereby finds that the Thermo King PDPF™ reduces emissions of diesel particulate matter (PM) consistent with a Level 2 device (greater than or equal to 50 percent reductions) (California Code of Regulations (CCR), Title 13, sections 2702 (f) and (g) and section 2708(b)).

The Thermo King PDPF™ does not increase NO₂ emissions more than 20 percent, compared to baseline emissions and is therefore compliant with the 2009 nitrogen dioxide emissions limit (13 CCR section 2706(a)), and as such merits designation as a “Plus” system per Section 2702(f).

This verification is subject to the following terms and conditions:

- The engine must be model year 2002 and older, having the engine family and model names listed in Attachment 1;
- The engine must be used in a Thermo King transport refrigeration unit (TRU) application;
- The engine must be in its original configuration;
- 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 naturally-aspirated;
- The engine must be well maintained and not consume lubricating oil at a rate greater than one quart per 50 engine hours;
- Thermo King Corp shall supply a TRU engine inspection checklist and data sheet with each PDPF™, to ensure compatibility. Using the

checklist, the installer shall review the PDPF™ candidate engine actual operating conditions (e.g. lube oil consumption, injector service) prior to retrofitting the TRU with the Thermo King PDPF™, specifically, to determine if the candidate engine is suitable for installation of a PDPF™. Thermo King will also conduct training for installers, on an as-needed basis. The installer shall record the results on the data sheet, and the data sheet must be retained by the Thermo King dealer point of sale for a minimum of four (4) years (warranty period).

- The other terms and conditions specified below.

Table 1: Conditions for the Thermo King PDPF™

Parameter	Value
Application	Thermo King transport refrigeration units
Engine Type	Diesel, four-stroke, direct injection, naturally aspirated, without exhaust-gas recirculation (EGR).
Engine lube oil consumption rate	Less than one quart per 50 engine hours. A high lube oil consumption rate may cause premature clogging of the filter.
Fuel injector service	Injectors must be serviced at time of Thermo King PDPF™ installation if they have not been serviced within the past 3,000 engine hours. Thereafter, injectors must be serviced at 3,000 hours (or less) service intervals to maintain proper combustion and operation of the Thermo King PDPF™.
Fuel	CARB ultra-low sulfur diesel fuel (less than 15 ppm sulfur) or biodiesel blends. (See further fuel requirements below.)
PM Verification Level	Level 2 Plus classification: At least 50 percent reduction of PM and no more than 20 percent NO ₂ increase from baseline.

The Thermo King PDPF™ consists of a catalyzed knitted wire mesh flow-through filter with backpressure control system, an exhaust system insulation package, and a backpressure warning indicator. These components shall be installed exactly as described in Thermo King's Application for Verification of Thermo King TRU Level 2 Plus Filter, dated August 25, 2006. The parts list for the Thermo King PDPF is included in Attachment 2.

This Executive Order is valid provided that the diesel fuel used in conjunction with the device complies with Title 13, California Code of Regulations (CCR), sections 2281 and 2282, 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 (ASTM) specification D6751 applicable for 15 ppm sulfur content;
- The diesel fuel portion of the blend complies with Title 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 Executive Order.

This Executive Order is valid provided that installation instructions for the Thermo King PDPF™ do not recommend tuning the engine to specifications different from those of the engine manufacturer.

Changes made to the design or operating conditions of the Thermo King PDPF™, as exempted by ARB, which adversely affect the performance of the engine's pollution control system, shall invalidate this Executive Order. Therefore, no changes are permitted to the design of the Thermo King PDPF™.

If Thermo King Corporation plans to make changes to the design of the Thermo King PDPF™, ARB must be notified in writing of any changes to any part of the Thermo King PDPF™. Any changes to the device must be evaluated and approved by ARB. Failure to do so shall invalidate this Executive Order.

Marketing of the Thermo King PDPF™ using identification other than that shown in this Executive Order or for an application or operating conditions 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 Thermo King PDPF advertised, offered for sale, sold with, or installed on a TRU prior to or concurrent with transfer to an ultimate purchaser.

As specified in the Diesel Emission Control Strategy Verification Procedure (Title 13 CCR Section 2706 (g)), ARB assigns each diesel emission control strategy a family name. The designated family name for the verification, as outlined above is:

CA/TKC/2006/PM2+/N00/OF/FTF01

Additionally, as stated in the Diesel Emission Control Strategy Verification Procedure, Thermo King Corporation is responsible for honoring their warranty (California Code of Regulations (CCR), Title 13, section 2707) and conducting in-use compliance testing (section 2709).

In addition, ARB 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 2710.

Systems verified under this Executive Order shall conform to all applicable California emissions regulations. This Executive Order does not release Thermo King Corporation from complying with all other applicable regulations.

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

Executed at Sacramento, California, this 14th day of December 2007.

James Goldstene
Executive Officer
by

Robert D. Fletcher, Chief
Stationary Source Division

Attachment 1: Thermo King PDPF Engine Family List
Attachment 2: Thermo King PDPF Parts List (Confidential)

S:\Verification\TRU DECS Verifications\TK-Proventia PDPF\Extension\Approval Docs\ThermoKingPDPF EO DE-06-008-02.doc