

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-702U

Relating to Exemptions under
Sections 38390 and 38391 of the Vehicle Code

ESW Technologies
ThermaCat Diesel Particulate Filter

Pursuant to the authority vested in the Air Resources Board by Part 5, Division 26 of the Health and Safety Code and Sections 38390, 38391, and 38395 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-02-003;

IT IS ORDERED AND RESOLVED: That installation of the ThermaCat diesel particulate filter, manufactured by ESW Technologies of 200 Progress Drive, Montgomeryville, Pennsylvania 18936, has been found not to reduce the effectiveness of the applicable engine pollution control system, and therefore, the ThermaCat diesel particulate filter is exempt from the prohibitions in Sections 38390 and 38391 of the Vehicle Code for installation on 1996 through 2010 model-year Tier 1 and Tier 2 off-road compression-ignition engines with displacements from 3 to 17 liters.

The exemption covers engines used in mobile applications. It does not cover engines used in stationary applications such as pumps, compressors, or generators. This Executive Order excludes all engines originally equipped with an aftertreatment emission control system such as a catalytic converter or a diesel particulate filter.

The ThermaCat diesel particulate filter consists of a diesel oxidation catalyst, diesel particulate filter, fuel injection system, pressure sensor, temperature sensors, and an electronic control unit. Major components of the ThermaCat diesel particulate filter are identified in Attachment A.

This Executive Order is based on emission testing and engineering evaluation of the impact the ThermaCat diesel particulate filter may have on engine emissions.

This Executive Order is valid provided that installation instructions for the ThermaCat diesel particulate filter do not recommend tuning the engines to specifications different from those of the engine manufacturer.

Changes made to the design or operating conditions of the ThermaCat diesel particulate filter, as exempt by the Air Resources Board, which adversely affect the performance of the engine's pollution control system, shall invalidate this Executive Order.

Marketing of the ThermaCat diesel particulate filter 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 the Air Resources Board.

This Executive Order shall not apply to any ThermaCat diesel particulate filter advertised, offered for sale, sold with, or installed on an engine, vehicle, or equipment prior to or concurrent with transfer to an ultimate purchaser.

This Executive Order does not constitute any opinion as to the effect the use of the ThermaCat diesel particulate filter may have on any warranty either expressed or implied by the engine manufacturer.

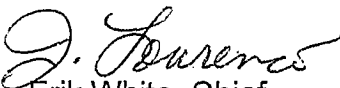

No claim of any kind, such as "Approved by the Air Resources Board," may be made with respect to the action taken herein in any advertising or other oral or written communication.

In addition to the foregoing, the Air Resources Board reserves the right in the future to review this Executive Order and the exemption provided herein to assure that the exempted add-on or modified part continues to meet the standards and procedures of California Code of Regulations, Title 13, Section 2474, et seq.

THIS EXECUTIVE ORDER DOES NOT CONSTITUTE A CERTIFICATION, ACCREDITATION, APPROVAL, OR ANY OTHER TYPE OF ENDORSEMENT BY THE AIR RESOURCES BOARD OF ANY CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF ESW TECHNOLOGIES' THERMACAT DIESEL PARTICULATE FILTER.

Violation of any of the above conditions shall be grounds for revocation of this Executive Order. The Executive Order may be revoked only after a ten-day written notice of intention to revoke the Executive Order, in which period the holder of the Executive Order may request in writing a hearing to contest the proposed revocation. If a hearing is requested, it shall be held within ten days of receipt of the request, and the Executive Order may not be revoked until a determination is made after a hearing that grounds for revocation exist.

Executed at El Monte, California, this 23rd day of May 2013.


Erik White, Chief
 Mobile Source Operations Division

Attachment A

ThermaCat Diesel Particulate Filter			
	Part	Qty	Part Number
1	Diesel Oxidation Catalyst + Diesel Particulate Filter	1	E145-M000-AX
2	Fuel Injector/Nozzle	1	E147-P901-A
3	Electronic Control Unit (containing fuel pump, backpressure sensor)	1	E147-P900-A
4	Thermocouple	2	E147-P906-A

EVALUATION SUMMARY

Manufacturer Name: ESW Technologies

Name of Device: ThermaCat diesel particulate filter

Background:

ESW Technologies (ESW) of 200 Progress Drive, Montgomeryville, Pennsylvania 18936 has requested exemption of its ThermaCat diesel particulate filter from the prohibitions in Section 38391 of the California Vehicle Code. The ThermaCat diesel particulate filter is designed for use on 1996 through 2010 model-year Tier 1 and Tier 2 off-road compression-ignition engines with displacements from 3 to 17 liters.

Recommendation:

Grant exemption to ESW as requested and issue Executive Order D-702U. The exemption covers ThermaCat diesel particulate filter installed on 1996 through 2010 model-year Tier 1 and Tier 2 off-road compression-ignition engines with displacements from 3 to 17 liters. The exemption covers engines used in mobile applications. It does not cover engines used in stationary applications such as pumps, compressors, or generators. This exemption is not valid for any engines originally equipped with an aftertreatment emission control system such as a catalytic converter or a diesel particulate filter. Major components of the ThermaCat diesel particulate filter are identified in Attachment A.

Device Description:

The ThermaCat diesel particulate filter is an actively regenerated filtration system designed to reduce hydrocarbons, carbon monoxide, and particulate matter emissions from diesel engines. It consists of a diesel oxidation catalyst (DOC), diesel particulate filter (DPF), fuel injection system, backpressure sensor, temperature sensors, and an electronic control unit (ECU). Particulate matter in the engine exhaust is captured on the ceramic wall-flow filter. The filter is catalyzed to maximize passive regeneration. DOC, installed upstream of the DPF, also promotes regeneration by increasing the exhaust temperature. When a pre-determined condition is met (backpressure and exhaust temperature), fuel is injected in the exhaust pipe between the exhaust manifold and the DOC. Fuel injection further increases exhaust temperatures by promoting oxidation of hydrocarbons and raising the exhaust temperature to the level required to support regeneration. The amount of injected fuel is controlled by the ECU. The DOC-DPF module is installed with exhaust pressure and temperature sensors. The system requires annual maintenance which includes cleaning of the injector nozzle, DPF ash removal, and overall system check.

Discussion/Basis for the Recommendation:

In support of its exemption request, ESW provided the following emission data:

	C1 8-Mode Test Results* (g/bhp-hr)	THC	CO	NOx	PM
	Baseline tests	0.155	1.104	5.256	0.1086
Thermacat without fuel injection	Degreened tests**	0.007	0.057	4.842	0.0059
Thermacat with fuel injection	Degreened tests**	0.007	0.057	4.843	0.0065
	Tier 1 emission standards	1.0	8.5	6.9	0.4
	Caterpillar certification levels	0.1	0.2	5.5	0.2

Notes:

* Reported data are averages of three hot start tests.

** The device was degreened for 25 hours.

Test engine: 1996 Caterpillar 14.6 liter 3406 289 hp engine; engine family TCP14.RZDBRJ

Test system: DOC ESW & DPF ESW

Test: ISO 8178 C1 8-mode steady-state engine dynamometer test

Emission tests were conducted at ESW America, Inc. (ESWA; also known as Air Testing Services (ATS)) in Montgomeryville, Pennsylvania.

Data on the off-road engine showed no adverse emission impact from using the Thermacat diesel particulate filter. To further support its exemption request, ESW provided field use information. The Thermacat diesel particulate filter was installed on a Caterpillar dozer (engine family 1CPXL10.5MRG; Tier 1) and operated for 1,020 hours. No problems or issues were encountered during its operation. Similar results are expected when the system is used on any of engines include in this application.