

State of California  
AIR RESOURCES BOARD .

EXECUTIVE ORDER D-140-29  
Relating to Exemptions Under Section 27156  
of the Vehicle Code

SPEARCO PERFORMANCE PRODUCTS, INC.  
INTERCOOLER SYSTEM

Pursuant to the authority vested in the Air Resources Board by Section 27156 of the Vehicle Code; and

Pursuant to the authority vested in the undersigned by Section 39515 and Section 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the Intercooler System, Part #'s: 2-435, 2-436, 2-437, and 2-438, manufactured by Spearco Performance Products, Inc. (Spearco) of 14664 Titus Street, Panorama City, CA 91402, has been found not to reduce the effectiveness of required motor vehicle pollution control devices, and therefore is exempt from the prohibitions of Section 27156 of the Vehicle Code for installation on 1992 - 1994 model year General Motors 6.5 liter series 1500, 2500, and 3500 diesel pickups with OEM turbochargers.

This exemption shall not apply to any device, apparatus, or mechanism advertised, offered for sale or sold with, or installed on a motor vehicle prior to or concurrent with transfer to an ultimate purchaser.

This Executive Order is valid provided that the installation instructions for the intercooler system will not recommend tuning the vehicle to specifications different from those submitted by Spearco.

Changes made to the design or operating conditions of the intercooler system, as exempt by the Air Resources Board, which adversely affect the performance of a vehicle's pollution control system shall invalidate this Executive Order.

Marketing of the Intercooler System using an identification other than that shown in this Executive Order or marketing of the Intercooler System for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from the Air Resources Board. Exemption of the Intercooler System kit shall not be construed as exemption to sell, offer for sale, or advertise any component of the kit as an individual device.

This Executive Order does not constitute any opinion as to the effect that the use of the intercooler system may have on any warranty either expressed or implied by the vehicle manufacturer.

This Executive Order is granted based on an evaluation if emissions tests were conducted in accordance with Cold-Start CVS-75 Federal Test Procedure. However, if test results or other evidence provides the Air Resources Board with reason to suspect that the Spearco Intercooler System will affect motor vehicle emissions or the durability of the emission control, Spearco shall be required to submit emission and durability data to show that the emissions and durability of the vehicle emission control systems are not, in fact, affected and/or that for emission control systems, the add-on or modified part demonstrates adequate durability. If such test results demonstrate that the Spearco Intercooler System adversely affects emissions, this Executive Order shall be effectively rescinded as of the date the test results are validated.

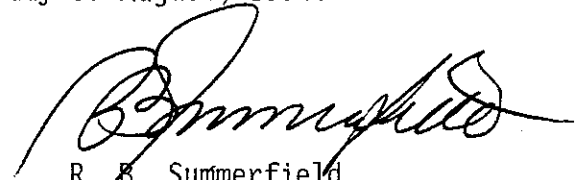
In addition to the foregoing, the Air Resources Board reserves the right in the future to review this Executive Order and the exemption provided herein to assure that the exempted add-on or modified part continues to meet the standards and procedures of Title 13, California Code of Regulations, Section 2222, 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 SPEARCO PERFORMANCE PRODUCTS, INC. INTERCOOLER SYSTEM.

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.

Violation of any of the above conditions shall be grounds for revocation of this order. The order may be revoked only after ten day written notice of intention to revoke the order, in which period the holder of the 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 order may not be revoked until a determination after hearing that grounds for revocation exist.

Executed at El Monte, California, this 18<sup>th</sup> day of August, 1994.



R. B. Summerfield  
Assistant Division Chief  
Mobile Source Division

State of California  
AIR RESOURCES BOARD

EVALUATION OF SPEARCO PERFORMANCE PRODUCTS, INC.'s  
AIR-TO-AIR INTERCOOLER SYSTEM  
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE  
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE  
CALIFORNIA CODE OF REGULATIONS

August 1994

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AIR RESOURCES BOARD

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CALIFORNIA CODE OF REGULATIONS

by

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Air Resources Board  
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(This report has been reviewed by the staff of the California Air Resources Board and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Air Resources Board, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.)

SUMMARY

Spearco Performance Products, Inc. (Spearco) of 14664 Titus Street, Panorama City, CA 91402 has applied for exemption from the prohibitions in Section 27156 of the California Vehicle Code (VC) on their air-to-air Intercooler System designed for 1992 - 1994 model-year General Motors 6.5 liter diesel engines with turbochargers.

Based on an engineering evaluation of the Spearco air-to-air Intercooler System, the staff concludes that the Spearco air-to-air Intercooler System will not adversely affect exhaust emission from vehicles for which the exemption is requested.

The staff recommends that Spearco Performance Products, Inc. be granted an exemption as requested and that Executive Order D-140-29 be issued.

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EVALUATION OF SPEARCO PERFORMANCE PRODUCTS, INC.'s  
AIR-TO-AIR INTERCOOLER SYSTEM  
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE  
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF THE  
CALIFORNIA ADMINISTRATIVE CODE

I. INTRODUCTION

Spearco Performance Products, Inc. (Spearco) of 14664 Titus Street, Panorama City, CA 91402 has applied for an exemption from the prohibitions in Section 27156 of the California Vehicle Code for the Spearco air-to-air Intercooler System designed for installation on 1992-1994 model-year General Motors 6.5 liter diesel engines with turbochargers.

Spearco Performance Products, Inc. submitted pictures and specifications of the system for evaluation.

II. CONCLUSIONS

Based on previous comparative tests evaluating the exhaust emission effects of several add-on intercooler systems and the staff's engineering evaluation of the intercooler's impact on exhaust emissions from turbocharged vehicles, the staff concludes that Spearco's air-to-air intercooler system will not adversely affect exhaust emissions from the vehicles for which exemption is requested.

III. RECOMMENDATION

The staff recommends that Spearco be granted an exemption for their Intercooler System for installation on 1992-1994 model-year General Motors 6.5 liter diesel engines with turbochargers. The staff also recommends that Executive Order D-140-29 be issued.

#### IV. INTERCOOLER SYSTEM DESCRIPTION AND OPERATION

The purpose of the Spearco air-to-air intercooler system is to reduce the temperature of the intake air going into the turbocharged engine. This reduction in intake air temperature allows a higher charge density which results in increased power and torque. In addition, as the thermal loading on the engine is reduced, so is the transfer of heat to the cooling system, which assists in maintaining normal coolant temperature under high demand engine operating conditions.

The components of the Spearco air-to-air Intercooler System are a heat exchanger, a modified intake manifold extension, and inter-connecting mandrel bent tubing. The system is packaged with installation hardware and instructions and sold as a kit. Spearco modifies the 1994 model-year General Motors intake manifold extension for use with all the kits. Although this manifold extension is shortened to make room for the intercooler tubing, the two OEM sensor port locations are not changed since they are in the end that is not modified. For the 1992-1993 model years, this modified manifold extension will need to have the M.A.P. and air intake temperature sensor ports plugged, as these model-years do not have these two sensors. For the 1994 model year, these two sensors are placed in the modified intake manifold extension in the original OEM configuration. Aside from these sensors, Spearco stated that the manifold does not change for the 1992-1994 model years.

The Spearco Intercooler System is located at a low location which does not affect ground clearance, and allows the intercooler to use air passing beneath the vehicle as its working/cooling fluid. The heated charge air flows from the turbocharger and through the cooling tubing of the air-to-air heat exchanger. The charge air is cooled as air flows around and between the tubing and heat exchanging fins of the intercooler.



For the 1994 model year, the wastegate actuator, which controls boost pressure, is electronically controlled through inputs from intake air temperature and manifold pressure sensors. These two sensors are downstream of the Spearco Intercooler System, so there is no compensation necessary for the change in boost pressure caused by the intercooler.

For the 1992 - 1993 model years, the wastegate actuator controls boost pressure by turbine pressure or backpressure inside the turbocharger. With the addition of an intercooler into the intake system, the pressure into the intake manifold will be decreased. Spearco states that at all conditions, except near maximum rpm, at full load, the loss in pressure is offset by the cooled, more dense air entering the engine. However, Spearco recommends modification of the wastegate actuator rod for all applications to increase the boost pressure upstream of the intercooler. To do this Spearco recommends removing the wastegate actuator rod, shortening the actuator rod 0.05 - 0.10 inches, and then welding the actuator rod back in place. This should result in the same pre-intercooler boost pressure into the intake manifold.

The Spearco air-to-air intercooler system does not require the movement or modification of any of the OEM emission control devices, or change the tune-up specifications.

#### V. DISCUSSION

The staff conducted an engineering evaluation on the Spearco air-to-air Intercooler System's effect on the exhaust emissions of the 1992-1994 model year General Motors 6.5 liter diesel turbocharged engines. The Intercooler System was evaluated for potential changes in the boost pressure which could increase exhaust emissions.

Since the wastegate actuator is electronically controlled on the 1994 model-year, and the two input sensors for this control are downstream of the Spearco Intercooler System, there is no compensation necessary for the change in boost pressure caused by the intercooler. The wastegate actuator rod is modified on the the 1992 - 1993 model-years to maintain the pre-intercooler boost pressure. Therefore, it is staff's opinion that there will be no adverse effect in emissions due to boost pressure changes from the Spearco Intercooler System on the affected vehicles.

Spearco has previously been issued a number of exemptions for their intercooler systems. The previous exemptions were granted on the basis that the use of the intercooler system would not adversely affect the vehicle's emissions or degrade the vehicle's driveability. Spearco has stated that the thermal efficiency of this Intercooler System ranges between 60% and 85%. Based on the predicted efficiency of the Spearco Intercooler System, and a review of the device theory of operation, the staff believe's that the use of Spearco's Intercooler System will not adversely affect vehicle emissions or degrade the vehicle's driveability.

In addition, it is the staff's opinion that the combustion temperature will be reduced as a result of cooler intake charge with use of an air-to-air intercooler. This reduction in combustion temperature will reduce the formation of NOx gases in the combustion chamber, resulting in less NOx emissions in the exhaust emissions.