

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-186-3
Relating to Exemptions Under Section 27156
of the Vehicle Code

HKS USA, INC.
"AIR-TO-AIR INTERCOOLER SYSTEM SERIES 5010EC"

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 Sections 39515 and 39516 of the Health and Safety Code and Executive Order G-45-5;

IT IS ORDERED AND RESOLVED: That the installation of the air-to-air intercooler system series 5010EC and 5030EC manufactured by HKS USA, Inc. of 20312 Gramercy Place, Torrance, California 90501 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 vehicle applications indicated in Attachment A.

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 installation instructions for this intercooler system will not recommend tuning the vehicle to specifications different from those submitted by the system manufacturer.

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

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

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

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 HKS USA, INC.'S AIR-TO-AIR INTERCOOLER SYSTEM SERIES 5010EC AND 5030EC.

HKS USA, INC.
"AIR-TO-AIR INTERCOOLER SYSTEM
SERIES 5010EC"

EXECUTIVE ORDER D-186-3
(Page 2 of 2)

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.

Section 17500 of the Business and Professions Code makes untrue or misleading advertising unlawful, and Section 17534 makes violation punishable as a misdemeanor.

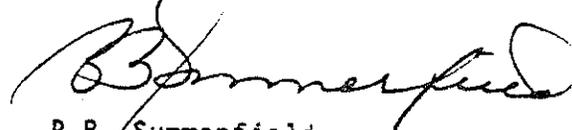
Section 43644 of the Health and Safety Code provides as follows:

"43644, (a) No person shall install, sell, offer for sale, or advertise, or, except in an application to the state board for certification of a device, represent, any device as a motor vehicle pollution control device for use on any used motor vehicle unless that device has been certified by the state board. No person shall sell, offer for sale, advertise, or represent any motor vehicle pollution control device as a certified device which, in fact, is not a certified device. Any violation of this subdivision is a misdemeanor."

Any apparent violation of the conditions of this Executive Order will be submitted to the Attorney General of California for such action as he deems advisable.

Executive Order D-186-1, dated June 23, 1989, is superseded and of no further force and effect.

Executed at El Monte, California, this 17th day of September, 1991.



R.B. Summerfield
Assistant Division Chief
Mobile Source Division

List vehicle makes, model years, engine displacements and systems that are compatible with the device, and for which exemption is requested. Specify the correct device model for each vehicle.

<u>HKS Part No.</u>	<u>Model-Years</u>	<u>Make</u>	<u>Model/Engine</u>	<u>Displ. (L,CU)</u>
5010EC-11026L	1987-1988	Toyota	Supra Turbo (7MG-TE)	3.0,183
5010EC-12721J	1985-1987	Toyota	4WD PU Turbo (22R-TE)	2.4,144
5010EC-12821J	1985-1987	Toyota	4 Runner Turbo (22R-TE)	2.4,144
5010EC-12221J	1985-1987	Toyota	2WD PU Turbo (22R-TE)	2.4,144
5010EC-24046H	1984-1986	Nissan	300ZX Turbo (VG30ET)	3.0,181
5010EC-24046L	1987	Nissan	300ZX Turbo (VG30ET)	3.0,181
5010EC-24447H	1984-1986	Nissan	200SX Turbo (CA18ET)	1.8,110
5010EC-24243E	1981-1983	Nissan	280ZX Turbo (L28ET)	2.8,168
5010EC-47070G	1983	Mitsub	Starion Turbo (6S4BT)	2.6,156
5010EC-47070H	1984-1987	Mitsub	Starion ES/LE (6S4BT)	2.6,156
5010EC-47070H	1984-1987	Dodge/ Plymth/ Chrysler	Conquest Turbo (6S4BT)	2.6,156
5010EC-47171J	1985-1986	Mitsub	Mirage Turbo (632BT)	1.6,98
5010EC-47171J	1985-1986	Dodge/ Plymth	Colt Turbo (632BT)	1.6,98
5010EC-47171L	1987-1988	Mitsub	Mirage Turbo (632BT)	1.6,98
5010EC-47171L	1987-1988	Dodge/ Plymth	Colt Turbo (632BT)	1.6,98
5010EC-58383K	1986-1987	Mazda	626 GT Turbo (FE Turbo)	2.0,122

List vehicle names, model years, engine displacements and systems that are compatible with the device, and for which exemption is requested. Specify the correct device model for each vehicle.

<u>HKS Part No.</u>	<u>Years</u>	<u>Make</u>	<u>Model (Engine)</u>	<u>Disp. L (CI)</u>
5010EC-11026L	1987-1991	Toyota	Supra (7MGT)	3.0 (183)
5010EC-24046M	1988	Nissan	300ZX (VG30ET)	3.0 (181)
5010EC-24751P	1990-1991	Nissan	300ZX (VG30DETT)	3.0 (181)
5010EC-58182K	1986-1988	Mazda	RX-7 (13BT)	1.3 (80)
5010EC-58182N	1989-1991	Mazda	RX-7 (13BT)	1.3 (80)
5030EC-58585M *	1988-1991	Mazda	MX-6 (F2T)	2.2 (134)
5030EC-58985M *	1988-1991	Ford	Probe (F2T)	2.2 (134)

* Please note that part numbers 5030EC-58585M & 5030EC-58985M are intercooler plumbing or tube upgrades only and do not include a new intercooler core as in all 5010EC systems.

State of California
AIR RESOURCES BOARD

EVALUATION OF HKS USA, INC.'S AIR-TO-AIR INTERCOOLER SYSTEM FOR EXEMPTION
FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 AND TITLE 13,
CALIFORNIA CODE OF REGULATIONS, SECTION 2222

September, 1991

EVALUATION OF HKS USA, INC.'S AIR-TO-AIR INTERCOOLER SYSTEM FOR EXEMPTION
FORM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 AND TITLE 13,
CALIFORNIA CODE OF REGULATIONS, SECTION 2222

by

Mobile Source Division

State of California
AIR RESOURCES BOARD
9528 Telstar Avenue
El Monte, CA 91731-2990

(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

HKS USA, Inc. (HKS) of 20312 Gramercy Place, Torrance, California 90501 has applied for an update to Executive Order (E.O.) No. D-186-1 for their intercooler system series 5010EC to include the turbocharged vehicles shown in the appendix. The vehicles are equipped with original equipment manufacturer (OEM) turbocharger. The intercooler system was previously granted an exemption from the prohibitions in Vehicle Code (VC) Section 27156 in the Executive Order D-186 and then updated in E.O. D-186-1 at the request of the applicant as new turbocharged vehicles compatible with the intercooler system became available.

Based on previous comparative data collected in the evaluation of the exhaust emissions impact of several add-on intercooler kits and staff's engineering evaluation, staff believes that the HKS's air-to-air intercooler system will not adversely affect exhaust emissions from vehicles for which the exemption is requested. The staff recommends that the update be granted as requested.

CONTENTS

	<u>Page Number</u>
<u>SUMMARY</u>	i
<u>CONTENTS</u>	ii
I. <u>INTRODUCTION</u>	1
II. <u>CONCLUSION</u>	1
III. <u>RECOMMENDATION</u>	1
IV. <u>DEVICE DESCRIPTION</u>	1
V. <u>DISCUSSION</u>	2
<u>APPENDIX</u>	
List of Vehicles included in the update	A-1

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FROM THE PROHIBITIONS IN VEHICLE CODE SECTION 27156 AND TITLE 13,
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I. INTRODUCTION

HKS USA, Inc. (HKS) of 20312 Gramercy Place, Torrance, California 90501, has applied for an update of Executive Order (E.O.) No. D-186-1 for their intercooler system to include turbocharged vehicles listed in the appendix. All vehicles shown in this update request are factory turbocharged but are not equipped with intercoolers.

II. CONCLUSION

Previous comparative tests to determine the emission impact of different add-on intercooler kits as well as staff's engineering evaluation showed that the installation of intercoolers on turbocharged vehicles will not adversely affect exhaust emissions from such vehicles. Based on the above, staff concludes that the HKS intercooler kit will not reduce the effectiveness of the pollution control system of the application vehicles listed in the appendix.

III. RECOMMENDATION

The staff recommends that the exemption update be granted as requested and that Executive Order No. D-186-3 be issued, permitting the advertisement, sale and installation of the intercooler kit.

IV. DEVICE DESCRIPTION

The purpose of the intercooler is to increase the density of the intake air/fuel charge of a turbocharged engine by reducing the temperature of the charge air. Higher charge density results in possible increase in horsepower and volumetric efficiency for a given engine speed.

The major components of the HKS air-to-air intercooler kit are: aluminum heat exchanger, pressure pipes, cadmium plated brackets, silicone rubber connector hoses, hose clamps, compressor by-pass valve, silicone rubber vacuum and blow-by hoses.

They are packaged with other installation hardware and instructions and sold as a kit or system. The system is designed to suit an individual vehicle by using different tubing lengths, diameter, and bends.

The HKS air-to-air intercooler system heat exchanger is mounted in the frontal area of the vehicles' air stream. It is spliced into the original intake air plumbing between the turbocharger compressor and the intake manifold throttle body. During boost conditions, compressed air, normally 230 degrees F to 240 degrees F, is cooled to 130 degrees F by the HKS intercooler core before being delivered to the engine. Some HKS intercooler systems incorporate a compressor by-pass valve which routes the compressor discharge directly into the compressor intake under deceleration. This arrangement prevents impeller deceleration between gear shifts and reduces shock waves in intercooler plumbing and core.

V. DISCUSSION

HKS air-to-air intercooler is similar in design as other manufacturers' systems that have been exempted by the Air Resources Board (ARB). Performance analysis that were previously submitted to the ARB by other manufacturers of similar system indicated that typical thermal efficiency of a turbocharger intercooler system ranges between 40% and 84%. Based on predicted efficiency of a heat exchanger on previous air temperature measurements of other exempted intercoolers installed and tested on vehicles, and on a review of the device theory of operation, the staff has concluded that the use of an intercooler would not adversely affect vehicle emissions or result in the degrading of a vehicle's driveability.

In addition, it is staff's opinion that the combustion temperature will be reduced as a result of cooler intake charge with the use of the air-to-air intercooler system.

This reduction in combustion temperature will reduce the formation of NOx gases in the combustion chamber, resulting in less NOx exhaust emissions. Based on the above, staff determined that no testing was required for the purpose of exempting the intercooler from the prohibitions in VC Section 27156.

APPENDIX

List vehicle names, model years, engine displacements and systems that are compatible with the device, and for which exemption is requested. Specify the correct device model for each vehicle.

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