

State of California
AIR RESOURCES BOARD

EXECUTIVE ORDER D-250
Relating to Exemptions Under Section 27156
of the Vehicle Code

AIR FLOW RESEARCH COMPANY
ALUMINUM STREET HEAD

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 Aluminum Street Head manufactured by Air Flow Research Company (Air Flow Research) of 10490 Ilex Ave., Pacoima, California 91331-3137 has been found not to reduce the effectiveness of the applicable vehicle pollution control system and, therefore, is exempt from the prohibitions of Section 27156 of the Vehicle Code for 1992 and older General Motors vehicles sold in California equipped with 262 CID (4.2L) to 400 CID (6.6L) V-8 gasoline engines.

This Executive Order is valid provided that installation instructions for this Aluminum Street Head will not recommend tuning the vehicle to specifications different from those submitted by Air Flow Research.

Changes made to the design or operating conditions of the Aluminum Street Head, 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 this cylinder head using any identification other than that shown in this Executive Order or marketing of this cylinder head 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 cylinder head 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 the use of this cylinder head 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 CLAIMS OF THE APPLICANT CONCERNING ANTI-POLLUTION BENEFITS OR ANY ALLEGED BENEFITS OF AIR FLOW RESEARCH COMPANY'S ALUMINUM STREET HEAD.

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.

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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 1st day of April, 1992.


R. B. Sommerfield
Assistant Division Chief
Mobile Source Division

State of California
AIR RESOURCES BOARD

EVALUATION OF AIR FLOW RESEARCH COMPANY ALUMINUM STREET HEAD
FOR EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE
SECTION 27156 IN ACCORDANCE WITH SECTION 2222, TITLE 13, OF
THE CALIFORNIA CODE OF REGULATIONS

April 1992

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AIR RESOURCES BOARD

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THE CALIFORNIA CODE OF REGULATIONS

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 the mention of trade names or commercial products constitute endorsement or recommendation for use.)

SUMMARY

Air Flow Research Company (Air Flow Research) has applied for an exemption from the prohibitions of Vehicle Code Section 27156 for their Aluminum Street Head for installation on 1992 and older General Motors (GM) vehicles equipped with 262 CID (4.2L) to 400 CID (6.6L) V-8 gasoline engine. Air Flow Research has submitted a completed application and all the required information, as well as exhaust emissions test data performed at the Automobile Club of Southern California which demonstrated that the Aluminum Street Head does not have any adverse effect on the exhaust emissions of the affected vehicles.

Based on submitted information and results of emission tests performed at the Automobile Club of Southern California, the staff concludes that the installation of Air Flow Research's Aluminum Street Head will not adversely affect exhaust emissions on the specified vehicles.

The staff recommends Air Flow Research Company be granted an exemption as requested and that Executive Order D-250 be issued.

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EVALUATION OF AIR FLOW RESEARCH'S ALUMINUM STREET HEAD
EXEMPTION FROM THE PROHIBITIONS OF VEHICLE CODE SECTION 27156 IN ACCORDANCE
WITH SECTION 2222, TITLE 13, OF THE CALIFORNIA CODE OF REGULATIONS

I. INTRODUCTION

Air Flow Research Company (Air Flow Research) of 10490 Ilex Ave., Pacoima, California 91331-3137, has applied for an exemption from the prohibitions of Vehicle Code Section 27156 for their Aluminum Street Head for installation on 1992 and older General Motors (GM) vehicles equipped with 262 CID to 400 CID V-8 gasoline engines. Air Flow Research has submitted a completed application and all the required information, as well as exhaust emissions test data performed at the Automobile Club of Southern California which demonstrated that the Aluminum Street Head does not have any adverse effect on the exhaust emissions of the affected vehicles.

II. CONCLUSIONS

Based on submitted information and the results of the emission tests performed at Automobile Club of Southern California, the staff concludes that Air Flow Research's Aluminum Street Head will not adversely affect exhaust emissions from vehicles for which the exemption is requested.

III. RECOMMENDATION

The staff recommends that Air Flow Research Company be granted an exemption as requested and that Executive Order D-250 be issued.

IV. ALUMINUM STREET HEAD DESCRIPTION

The Aluminum Street Heads are specifically designed for installation on 1992 and older GM vehicles powered by 262 CID (4.2L) to 400 CID (6.6L) V-8 gasoline engines. The Aluminum Street Head operates in conjunction with the original equipment manufacturer's (OEM) emission control systems already certified with the stock engine. The purpose of using the modified Aluminum Street Head is to increase the overall engine performance which is accomplished through the use of the finest materials

available along with labor intensive machining. The intake and exhaust ports are machined to match the gasket and manifold surfaces, thus eliminating reversion at those junctures. The interior surfaces of the ports have been machined in the critical areas to reduce backpressure and maintain laminar flow. The valve seats are machined to provide optimum sealing and increased flow. The combustion chambers are polished to eliminate hot spots which could cause detonation or pre-ignition.

The following are the Aluminum Street Head specifications:

1. Head Casting ----- Aluminum
2. Valves ----- 2.02" Diameter Intake
----- 1.6" Diameter Exhaust

V. DISCUSSION OF THE ALUMINUM STREET HEAD

Air Flow Research submitted emission testing conducted at the Automobile Club of Southern California. A 1990 California-certified Chevrolet full size truck powered by a 350 CID (5.7 liter) engine was used as the test vehicle for the Aluminum Street Head. The dynamometer inertia weight and loading used during the testing were 4500 lbs. and 9.8 hp, respectively.

Emission testing consisted of one cold-start CVS-75 Federal Test Procedure in the modified configuration, and evaluated against the vehicle's emission standards. The test results are shown in Table 1.

Table 1

CVS-75 TEST RESULTS (Automobile Club of Southern California)

Test	Exhaust Emissions (gm/mi)		
<u>Mode</u>	<u>HC</u>	<u>CO</u>	<u>NOx</u>
Standards	0.50	9.00	1.00
Aluminum Street Head	0.31	3.57	0.55
Difference	-0.19	-5.43	-0.45

The CVS-75 emissions test results at Automobile Club of Southern California indicate that HC, CO and NOx emissions of the vehicle, with the Aluminum Street Head installed, are below the emission standards set for that engine family.

The Air Resources Board did not conduct confirmatory tests to validate the emission test results submitted by Air Flow Research. The Aluminum Street Head is functionally identical to the original equipment manufacturer's (OEM) cylinder head except for its valve sizes and casting material. A typical GM cylinder head may have intake valves ranging from 1.72 to 1.94 inches and exhaust valves ranging from 1.5 to 1.6 inches, with cast iron construction. Air Flow Research consolidated these variations by designing their cylinder head to be at the top end of the OEM scale, 2.02 inches on intake and 1.6 inches on exhaust with the cylinder head constructed out of aluminum. The exhaust valve diameter is still within acceptable OEM range while the intake valve diameter translates to a 5 percent increase over OEM. The test results confirmed that the minimal increase in the intake valve diameter does not cause any significant increase in emissions.

Air Flow Research has submitted all the required information and fulfilled the requirements for an exemption.

APPENDIX

AIR FLOW RESEARCH HEADS, INC.
(818)890-0616 FAX (818)890-0490

GENERAL INFORMATION
SMALL BLOCK ALUMINUM HEADS

ATTN: PLEASE READ THROUGH ALL INSTRUCTIONS BEFORE ATTEMPTING CYLINDER HEAD INSTALLATION.

AIR FLOW RESEARCH STREET HEADS ARE DIRECT REPLACEMENT CYLINDER HEADS FOR ALL SMALL BLOCK CHEVROLET ENGINES WITH LT-1 HEADS. SEE ATTACHED LISTING FOR SPECIFIC MODELS AND YEARS.

HEAD GASKETS: Fel Pro No. 1010 for all aluminum heads up to 4.155" bore.

INTAKE GASKETS: Fel Pro No. 1256 gaskets should be used on all 190cc street heads. Fel Pro No. 1205 gaskets should be used on the 195cc street heads. These gaskets are designed to seal properly, installed dry (no silicone); however, a small amount of gasket cinch at each end of the gasket, between the head and gasket, is helpful in reducing movement during assembly.

EXHAUST GASKETS: Fel Pro No. 1404 exhaust gasket should be used on all street heads (190cc, 195cc).

HEAD BOLTS & WASHERS: Quality relief ground bolts or studs are preferable. Large (3/4" or larger) head washers are necessary to prevent the bolts from indenting into the aluminum head. Washer size should be same size of the bolt or nut you are using. Insufficient diameter and/or bevel faced washers will sink into the head and cause a loss of head bolt torque.

HEAD BOLT TORQUE: Heads should be torqued to 65 to 70 lbs. This should be done in the proper General Motors sequence in 10 ft./lb. increments beginning at 40 ft./lbs. All head bolts should be retorqued after the first run in and cool down. Failure to retorque all bolts may cause undue stress and cracking.

ROCKER STUD LOCATION: The Air Flow Research head has a standard G.M. rocker arm stud locations. The 190cc and 195cc heads use standard pushrod location.

STUD GIRDLE: The AFR 190cc and 195cc heads use standard G.M. offset stud girdle is necessary for the 220cc stud girdles.

PUSHROD - GUIDEPLATE INSTALLATION: ATTN: USE AFR GUIDEPLATES SUPPLIED WITH EACH SET OF HEADS ONLY. Pushrod guideplates are furnished with all AFR aluminum heads at no extra cost. Studs should be torqued to 50 ft./lbs. The 190cc and 195cc street heads require the long slot of the guideplate to straddle the exhaust pushrod.

* IMPORTANT - 5/16 THICKWALL CHROME MOLY HEAT TREATED PUSHRODS SHOULD BE USED TO AVOID GALLING OF PUSHRODS.

ROCKER ARMS: The Air Flow Research 190cc and 195cc Street aluminum heads are designed to use standard GM or GE rocker arms.

VALVE SIZES: Both intake and exhaust valve seats are heat treated and will run on unleaded fuel.

SPARK PLUGS: Champion "N" series, AC "XL" series or Autolite "AG" series spark plugs are recommended. (14MM X 3/4)
For street use, AFR recommends AC FR3LS spark plugs or its equivalent. Plug selection is of course dictated by rpm level, application and fuel used. For those with header clearance problems, we suggest AC FR3LS spark plugs with 1/4" shorter top.

400 BLOCK: We suggest that you or Air Flow Research drill steam holes in the heads to keep the block distortion to a minimum. Use Fel Pro Head Gasket #1034 for 400 blocks. These will fit bores up to 4.190. Fel Pro #8364 has steam holes in gasket but should be considered for street applications only.

PISTON TO VALVE CLEARANCE: Be sure to check your compression ratio and piston to valve clearance before final assembly of these heads on your engine.