



WARRANTY: All return inquiries need to be sent directly to AFR, do not return your merchandise to the location purchased from. Call AFR toll free, (888) 549-2211 for a RMA #.

(661) 257-8124 FAX (661) 257-4462
www.airflowresearch.com

INSTRUCTIONS FOR THE SMALL BLOCK CHEVY ALUMINUM HEADS

For updates to instructions please see AFR's website.

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

VALVE SPRINGS: IT IS THE CUSTOMER'S RESPONSIBILITY TO CHECK AND MAKE SURE THAT SPRING PRESSURES ARE CORRECT FOR THE CAM. FAILURE TO DO SO CAN RESULT IN SUBSTANTIAL ENGINE DAMAGE.

VALVE GUIDE CLEARANCE: INTAKE AND EXHAUST GUIDE CLEARANCE ARE .0012" - .0015" ON SOME SEVERE APPLICATIONS (NITROUS, MARINE OR BLOWER) LOOSER GUIDES MIGHT BE REQUIRED.

IMPORTANT: IF YOU PURCHASE LT1, LT4 OR VORTEC STYLE AFR HEADS, IT IS NECESSARY WHEN USING PERIMETER BOLT VALVE COVERS TO FILL THE (2) BOTTOM SLOTTED HOLES WITH SILICONE. IF YOU SKIP THIS INSTRUCTION OIL WILL LEAK FROM YOUR VALVE COVERS.

IMPORTANT: APPLY ANTI-SEIZE TO ALL BOLTS AND SPARK PLUGS TO ENSURE A LONG THREAD LIFE.

WARNING: PISTON DOME TO CYLINDER HEAD CLEARANCE MUST BE CHECKED PRIOR TO FINAL ASSEMBLY OF ENGINE.

COMPRESSION RATIO AND PISTON TO VALVE CLEARANCE MUST BE CHECKED BEFORE FINAL ASSEMBLY.

VALVE TIPS: DO NOT GRIND YOUR VALVE TIPS. Some AFR heads have hardened stellite tips which cannot be reground. If ground the tip will mushroom over causing severe damage. If your valve tips are magnetic you can grind a maximum of .015" from the tip.

VORTEC HEAD: It is necessary to remove, tighten and put teflon tape or pipe thread sealer on the pipe plug that blocks off the EGR passage.

HEAD GASKETS: Fel Pro #1003 for all aluminum heads up to 4.100" bore. Fel Pro #1034 should be used for 4.100" or larger bore. Applications requiring steam holes should use Fel Pro #1014. Gen 2 92-97 LT1/LT4 reverse cool applications use GM gaskets or Fel-Pro #1074. AFR has removed the cooling passage between cylinders #1 & #3 and #5 & #7 to increase strength of the casting. Do not drill these areas out in an attempt to find water jacketing.

HEAD BOLTS & WASHERS: Quality relief ground bolts or studs are preferable. You must use a washer between the heads and the fastener to prevent galling.

VALVE SEATS: Both intake and exhaust valve seats are heat-treated and compatible with unleaded fuels.

INTAKE GASKETS: AFR #6820 gaskets Fel-Pro #1206 should be used for 210, 220, 227, 235 & 245 heads. AFR #6810 gaskets Fel-Pro #1205 should be used on the 195 street heads, the 195 competition PKG heads use AFR #6820 Fel-Pro #1206. We recommend AFR #6817 gasket Fel-Pro #1256 for 180 heads. A small amount of silicone is recommended around the water ports and the bottom of the intake ports. For 180 LT-1 reverse cool applications use GM gaskets or Fel-Pro #1284, for AFR 195, 210 & 227 LT-4 use AFR #6860. On some applications it is advised to eliminate the cork end gaskets and use a bead of silicone instead. Do not port match your manifold exactly to the gasket—leave .050" per side smaller. Do not port match your intake manifold to the above Fel-Pro gaskets because Fel-Pro doesn't precisely fit AFR heads.

EXHAUST GASKETS: Fel-Pro #1404 exhaust gaskets should be used on all street heads (180 & 195). With minor trimming Fel-Pro #1406 may be used on the 210, 220, 227 & 235cc standard exhaust heads. For spread-port heads Fel-Pro #1409 should be used. Do not under any circumstances port match exhaust ports to match gaskets. Reverse cool applications use GM gaskets only.

VALVE COVER GASKETS: Fel-Pro #1604 double thick cork with steel core is recommended for perimeter bolt valve covers. For center bolt applications, use GM factory replacement gaskets. **IMPORTANT:** If you purchased a LT1, LT4 or Vortec style AFR head, it is necessary when using perimeter bolt valve covers to fill the (2) bottom slotted holes with silicone. If you skip this instruction oil will leak from your valve covers.

400 BLOCKS: Steam holes are recommended for all 400-block applications. Use a 400 gasket as a template and drill the three holes nearest the spark plug side of the head straight down, the other three which are very near the head bolt holes should be drilled at a 30 degree angle away from the bolt hole. The center hole will intersect water about 1" down and the two outboard holes to a depth of 2 1/4". Use 1/8" drill.

PORTING INSTRUCTIONS: Polishing ports will not improve performance. The center head bolt hole and push rod cross section in intake ports are very thin/maximized from AFR.

ROCKER STUD LOCATION: Air Flow Research heads feature two rocker arm studs locations, standard GM and an offset (for maximum intake port volume). The 180, 195, 210 & 220 heads all use the standard GM L98 stud locations. The 227 & 235 heads use the offset location that will require a matching stud girdle. Air Flow Research stocks both standard, offset girdles and adjusting nuts for your convenience. The 245cc is a shaft mount rocker system only. Teflon or some non hardening thread sealer is required on the bottom threaded portion of the stud for all 195, 210, 220, 227, 235 and 245cc. Without sealer oil is drawn into the intake port under vacuum and will cause excessives smoking.

GUIDE PLATES: USE ONLY THE ADJUSTABLE GUIDE PLATES SUPPLIED BY AIR FLOW RESEARCH! Pushrod guide plates are furnished with each set of AFR aluminum heads. Studs should be torqued to 55 ft./lbs. Silicone sealer is recommended on applications where the stud hole intersects the intake port.

IMPORTANT* *5/16" THICK WALL CHROME MOLY HEAT TREATED PUSHRODS SHOULD BE USED TO AVOID WEAR OF THE PUSHROD FROM CONTACT WITH THE GUIDE PLATE. IF USING A TALL LIFTER/SHORT PUSHROD (6.150 O.L.) COMBINATION THE 227/235 WILL REQUIRE SOME CLEARANCING NEAR THE HEAD DECK SURFACE. DO NOT CLEARANCE ANY HIGHER THAN NEEDED OR YOU'LL BREAK INTO THE INTAKE PORT.*

PUSHROD LENGTH: This seems like an easily answered question, however, there are many variables. Block and cylinder head deck heights, head gasket thickness, varying cams, rocker arms, and valve length can all affect pushrod length. For exact pushrod length we suggest using an adjustable pushrod to determine the proper length pushrod. *See website under FAQ for detailed information on pushrod length.*

ROCKER ARMS: The Air Flow Research 180, 195, 210 & 220 aluminum heads are designed to use standard pushrod location rocker arms (offset rockers are not required). Clearance between rocker arms and the retainers should be checked. For high RPM stability, the Jessel or T & D shaft systems are recommended. AFR stocks a complete line of standard and shaft rocker arms for your convenience. AFR suggest for the 227 & 235 you use a shaft mount rocker and offset lifters or a .050" offset intake rockers. With the .050" offset the intake rocker arms will be at a slight angle and the roller tip will not be perfectly parallel or centered on the valve tip. The 245cc only accepts a shaft mount rocker system with an .180" offset intake lifter required.

SPARK PLUGS: (14mm x 3/4" gasket) no tapered seat style! For race applications Autolite 3910 or equivalent is a good starting point. For street application Autolite 3923 or equivalent is a good starting point. Please view manufacturer catalogs to find equivalent spark plugs. Plug selection is a choice dictated by many factors including rpm level, compression ratio and type of fuel. The above plugs are a starting heat range; blowers, turbo or nitrous applications usually require 1 to 2 heat ranges colder. Spark plug gap should be determined by the ignition manufacturer. You can cross reference to your favorite brand if desired.

COOLANT: It is important to maintain a 50/50 mix of antifreeze in the cooling system to prevent corrosion of aluminum heads. Don't use tap water use distilled water, most supermarkets have purified or distilled water. Check labeling to verify purified through deionization.

AIR CONDITIONING & ALTERNATOR BRACKETS: Late model vehicles with one piece brackets that bolt to the block and cylinder heads, may find it necessary to elongate the holes in the brackets to obtain proper hole alignment. Severe production variances from the O.E.M. as well as block and cylinder head milling will all affect this relationship.

CLEANING: AFR thoroughly cleaned your heads prior to shipment. Your heads were washed in a water soluble chemical agitation tank and blown out with high pressure air 3 to 4 times before they were boxed. However during some machining operations chips are packed and wedged into the water jacketing and occasionally come loose in transit. Keep in mind one chip the size of a dime breaks into hundreds of tiny chips and makes the situation appear much worse than it is in reality. It is not unusual if you blow high pressure air into the water jacketing to see additional foreign debris, or chips finding their way out. AFR recommends that you thoroughly blow out your heads prior to installation.

TORQUING: We suggest not using a torque wrench on intake and exhaust manifold bolts, accessory bolts, or spark plugs as inaccurate torque wrench values can easily strip the smaller threads. Just snug up hand tight with a wrench only.

HEAD BOLT TORQUE: All aluminum heads should be torqued to the bolt manufacturer's specifications. This should be done in the proper General Motors sequence in 10 ft./lbs. increments beginning at 40 ft./lbs. Moly lube should be applied between fasteners, washers and area around head bolt to prevent galling and improper torque values. If using ARP fasteners re-torquing is not necessary if you follow ARP instructions. However, it may be necessary under certain circumstances if the head gasket manufacturers instructions require it, particularly if a fire ring has been installed. Bolts containing a 12-point head are suggested in 3 areas on each head near the exhaust valve springs where it may be difficult to fit a standard 5/8 hex-head socket. In case of head studs use 12 point nuts. Air Flow Research stocks complete and partial head bolt kits, studs, and washers for your convenience. Proper ARP #'s for head bolt kit use #134-3701 and head stud kit use #234-4301. Sealer should be applied to all thread areas that enter into the block water-jacketing. Permatex is a good general purpose sealer. These are general guidelines, check directly with the manufacturers of fasteners for exact torque specifications.

TITANIUM VALVES: If you have upgraded to AFR Titanium valves in SB Chevy, SB Ford or BB Chevy applications they are coated with Chrome Nitrate (CrN) on the stem and seat area for longevity purposes. This is the same coating GM uses in the LS7 Z06 applications and designed to last 50,000 plus miles. **YOU CANNOT GRIND, REFACE OR LAP IN THE 45 DEGREE SEAT AREA.** If you grind or lap in the valve, the coating is removed and the seating area on the valve seat will wear prematurely reducing the service life substantially.



Valve Spring Specifications - 9/26/2018

All springs that come standard with AFR Cylinder Heads are made of high quality spring wire and are sufficient for most general applications when following the below recommendations. Keep in mind that forced induction, Nitrous, high RPM, and even modest RPM with aggressively designed (faster) cam lobes require additional spring pressure and higher quality spring wire. AFR offers various upgrades over standard valve springs; if you're questioning the spring requirement for your particular application, we advise you contact AFR directly. It is always better to run a higher quality spring than you need, resulting in greater spring life, and more importantly, a higher level of reliability while doing so.

Valve spring pressures may vary plus or minus 5%. It is the customer's responsibility to verify springs are correct for their application. Failure to do so could result in engine damage

Part #, Application, & Markings	Size (in)	Installed & Open Load (lbs/in)	Material, Manufacturer & Spring Type	Coil Bind (in)	Rate (lbs/ in)	Gross Max Lift General Guideline	Max RPM General Guideline
AFR-8000 Solid Roller Orange Stripe	1.550 OD .800 ID	220 lbs. @ 1.950 603 lbs. @ 1.240	Chrome Silicon PAC Racing Springs Dual Spring	1.155	540	.710 .680 for valves larger than 2.165	7200-7400
AFR-8001* Solid Roller Yellow Stripe	1.550 OD .788 ID	250 lbs. @ 2.000 762 lbs. @ 1.200	Pacaloy PAC Racing Springs #1225 Dual Spring	1.150	640	.800	8000-8200
AFR-8002 Hydraulic Roller Green Stripe	1.550 OD .755 ID	175 lbs. @ 2.000 505 lbs. @ 1.275	Pacaloy Pac Racing Springs #1940 Dual Spring with Damper	1.110	455	.725	6500-6700
AFR-8005 Solid Roller Yellow Stripe	1.550 OD .788 ID	265 lbs. @ 1.970 745 lbs. @ 1.220	Pacaloy PAC Racing Springs #1225 Dual Spring	1.150	640	.750	7400-7600
AFR-8014* Solid Roller No Stripe	1.645 OD .871 ID .633 ID	350 lbs. @ 2.150 1000 lbs. @ 1.200	Pacaloy PAC Racing Springs #1258 Triple Spring	1.130	688	.950	8300-8500
AFR-8016 Solid Flat Tappet No Stripe	1.540 OD .754 ID	144 lbs. @ 1.900 403 lbs. @ 1.300	Pacaloy PAC Racing Springs #1924 Dual Spring with Damper	1.125	431	.650	Solid Tappet 7200-7400 Hyd Roller 6300-6500
AFR-8017 Hydraulic Roller No Stripe	1.290 OD .685 ID	140 lbs. @ 1.810 356 lbs. @ 1.210	Premium Grade Chrome Silicon PAC Racing Springs Dual Spring	1.000	360	.600	6300-6500
AFR-8019* Hydraulic Roller Red or Pink Stripe	1.270 OD .645 ID	155 lbs. @ 1.810 448 lbs. @ 1.160	Premium Grade Chrome Silicon PAC Racing Springs Dual Spring	1.080	450	.650	7000-7200
AFR-8020 Hydraulic Flat Tappet Inner Blue	1.437 OD .720 ID	125 lbs. @ 1.800 304 lbs. @ 1.250	Chrome Silicon Pioneer Springs Dual Spring with Damper	1.090	320	.550	6100-6300
AFR-8022* Solid Roller Green Stripe	1.640 OD .860 ID	320 lbs. @ 2.040 862 lbs. @ 1.200	Premium Grade Chrome Silicon Manley Nextek #221425-16 Dual Spring	1.150	645	.840	8200-8400
AFR-8023* Solid Roller White Stripe	1.580 OD .832 ID	235 lbs. @ 1.950 625 lbs. @ 1.220	Premium Grade Chrome Silicon [†] Erson # E 915043 Dual Spring	1.170	535	.730	7200-7400
AFR-8031 Solid Roller No Stripe	1.625 OD .851 ID	275 lbs. @ 2.000 810 lbs. @ 1.150	Pacaloy PAC Racing Springs #1224 Dual Spring	1.100	629	.850	7400-7600

*Titanium Retainers Recommended

†Endurance Valve Spring

IMPORTANT: Break in cam per cam manufacturers specifications. This can be critical for solid flat tappet and hydraulic flat tappet cams.



WARRANTY: All returns/warranties need to be sent directly to AFR, do not return your merchandise to the location purchased from. Call AFR toll free, (888) 549-2211 for a RMA #.

(661) 257-8124 FAX (661) 257-4462
www.airflowresearch.com

TERMS and POLICIES

Returned Merchandise

Returned merchandise will not be accepted without prior permission from an authorized agent at Air Flow Research, Inc. Call your AFR sales rep for a RMA number; without a RMA number we will refuse delivery on parts. Return freight charges must be prepaid and include a copy of the original invoice. A **20% restocking** charge is levied on all returned merchandise except warranty returns due to Air Flow Research's error. Inventory exchange with approved authorization only. **Once merchandise has been installed or used, no returns are allowed.**

Cylinder Head & Aluminum Manifold Limited Lifetime Warranty

Effective on purchases on or after January 1st, 2010, AFR warrants the aluminum cylinder head casting for the lifetime of the product with proof of purchase to the original purchaser. Additionally, valves, guides, valve seats, valve springs, retainers, locks, studs, guide plates, and valve seals are warranted for two years with proof of purchase. All returns must have a RMA number in order to be returned, call for a RMA number. Parts must be returned prepaid freight by the original purchaser. When it has been determined that the product does indeed have a warrantable problem from workmanship, materials, or an undetermined cause (mystery failure) AFR will repair at no charge and reimburse UPS ground freight and return UPS ground freight. AFR will repair or replace the casting at its option. This warranty does not cover fitness for purpose and/or merchantability on any product sold by AFR.

Proposition 65 Warning

This product may contain one or more substances or chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.

This warranty does not cover the following:

1. Failure due to improper installation or maintenance, abuse, misuse, unauthorized repairs, modifications, or alterations. If your machine shop, engine builder, or installer performs any unauthorized repairs, AFR's warranty is voided and AFR will not reimburse any cost you incurred.
2. Removal, replacement, or materials cost.
3. Costs incurred due to down time of the vehicle.
4. Damage to related components.
5. Marine salt water corrosion.
6. Corrosion from not using/refreshing antifreeze.
7. Running heads without water.
8. Fitness for purpose or merchantability.

Implied Warranty

This warranty is in lieu of all other warranties and/or representations, express or implied, including, without limitations, warranties of merchantability and fitness for purpose, and all other liabilities, including special or consequential damages, in connection with the sale or use of any Air Flow Research product. Any warranties implied by law are limited in duration to the duration of this warranty, except in those states where prohibited by law.

Warning

Speed kills—please drive responsibly and enjoy our hobby at the racetrack only, as this is the designed application of AFR products. AFR products are not intended for street racing and AFR only promotes safe habits at your local track. With this additional performance AFR suggests you consider upgrading your brakes for better stopping performance.