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### **INSTRUCTIONS FOR THE SMALL BLOCK FORD 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 HIS CAM.

**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:** 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. PISTON MIGHT NEED CLEARANCE WITH AFR HEART SHAPED CHAMBER.

**MUST BE CHECKED BEFORE ASSEMBLY, HEADS WITH 2.020" VALVES OR LARGER USUALLY WILL NOT FIT A PISTON WITHOUT VALVE NOTCHES HAVING PROPER RELIEFS.**

**NOTE:** 1986 5.0L MUST HAVE PISTONS NOTCHED FOR CLEARANCE. HIGH FLOW 2.020" OR LARGER VALVES MIGHT REQUIRE AFTERMARKET PISTONS, OR NOTCHED STOCK PISTONS FOR VALVE CLEARANCE.

**THERMO ADAPTERS:** Thermo adapters are installed for shipping purposes only. They need to be sealed, tightened and put in their proper location; proper location is the front of the engine compartment facing the radiator. If you are not using the air pump on part numbers 1402, 1422, 1420, 1426, 1428, 1472 or 1492 you must block off the open holes on the back of the heads facing the firewall with a 5/8"-11 plug or bolt to prevent an exhaust leak. The above instructions need to be done before installing the heads on the block.

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

**TORQUING:** We suggest not using a torque wrench on intake and exhaust manifold bolts. Just snug up hand tight with a wrench only.

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

**ACCESSORIES:** Although AFR street cylinder heads will accept OEM components, rocker arms, valve covers, intake manifold, 7/16" bolts for 165cc head (except part #1396 & 1399) and 1/2" for 185cc, 195cc, 205cc & 220cc head, we highly recommend that premium quality hardware be used with your new heads.

**HEAD GASKETS:** Use Fel-Pro #1011-1 for years 1962-95. For high compression (12:1 and above) nitrous or forced induction, consider using Fel-Pro #1006 Locwire.

**NOTE:** #1006 Locwire gasket will require modification of the head deck surface by a competent machine shop to Fel-Pro specifications, also put a small amount of silicone around water cross-over in head deck when using #1006 gasket.

**INTAKE GASKETS:** Use AFR #6828 on the 165cc, 185cc & 195cc intake runner head. For the 205cc use AFR #6832. The 220cc runner head will require the AFR #6812. A small amount of silicone is recommended around the water ports and the intake port. Do not port match your manifold exactly to the gasket—leave .050" per side smaller. Use gasket cinch to adhere and center gasket port openings to the head port openings.

**EXHAUST GASKETS:** Any header or manifold gasket designed for original equipment heads will fit the AFR 165cc, 185cc, or 195cc street cylinder heads, use Fel-Pro #1415 exhaust gasket. For the 205cc and 225cc use Fel-Pro #1487 exhaust gasket.

**VALVE COVER GASKET:** Use Fel-Pro #1645 1/4" thick cork-lam with steel core.

**HEAD BOLTS or STUDS:** High quality head studs or head bolts with hardened washers must be used to prevent galling of the aluminum head. Recommended head bolts are ARP #1543701 for engines with 7/16" head bolt holes (289 and 302 CI). Engines with 1/2" head bolts holes (351-w and 302 CI SVO) should use ARP #154-3603. For maximum head gasket clamping AFR recommends head stud kits. AFR 185cc, 195cc, 205cc & 220cc heads come with head bolt hole drilled to 1/2". If installing on a 289-302 block with 7/16" threads, a headbolt reducer bushing 1/2" to 7/16" must be used, AFR part #6324.

**HEAD BOLT TORQUE:** Apply moly-oil mixture to washers, threads, and area around head bolt to prevent galling and improper torque readings. Torque to 70 ft/lbs. for 7/16" bolts or studs (289 or 302) or 100 ft/lbs. for 1/2" bolts or studs (351W) in three or four steps following the factory tightening sequence. Then tighten the long (upper) head bolts or studs to 80 ft/lbs. (7/16") or 110 ft/lbs. (1/2"). If using ARP fastener's re torque is not necessary as long as you follow ARP instructions. However, it may be necessary under certain circumstances if the head gasket manufacturer's instruction require it (in particular if a fire ring has been installed). Sealer should be applied to all head bolts or studs that enter into the blocks water-jacketing system. Permatex is a good general-purpose sealer. These are general guidelines, check directly with manufacturer of fasteners for exact torque specs.

**SPARK PLUGS:** Use 14mm x 3/4" reach gasketed spark plugs, no tapered seat plugs. Street application use Autolite #3924, for 205cc & 220cc race head use Autolite #3922, or equivalent. Plug selection is of course dictated by many factors including RPM level, compression ratio, and fuel type. Forced induction 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.

**HYDRAULIC LIFTER PRE-LOAD:** With part #'s 1400, 1402, 1420, & 1422 (stud mount heads) cylinder head hydraulic lifter pre-load is easily adjustable due to the stud/guide plate design. Harden heat treated chrome moly pushrods are required with guideplate style heads. Rocker arm studs should be torqued to 55 ft./lbs. They are not torqued from AFR, torque pedestal rocker arms to stock recommendation. On part #'s 1472, and 1492 adjustments to lifter pre-load with non-adjustable pedestal bolt down rocker arms can only be made with shims as sold by Ford SVO HM-6529-A302 or Crane #99170-1. AFR recommends 1/4"-1/2" turn pre-load for hydraulic cams. Rocker arm geometry should be checked making sure that the contact point of the roller or pad on a stock rocker remains centered on the valve tip and does not roll off the edge. Visual inspection of the rockers, valve springs, retainers, and pushrods should be made to ensure that none of the components come into contact with each other. If problems with valve train exist, simple changes such as pushrod length may have to be made. Pushrod length is affected by many variables. Block and cylinder head deck heights, head gasket thickness, varying cams, rocker arms, and valve length can all affect pushrod length. Please see our following best estimates:

for 165, 185cc or 195cc heads typically a standard or .100" long pushrod works. For 205 or 220cc typically a .100" or .200" long pushrod works. If pushrod to cylinder head contact is evident, loosen rocker stud and re-align guideplate as needed. See website under FAQ for detailed information on pushrod length.

**VALVE TIPS: DO NOT GRIND YOUR VALVE TIPS.** Some AFR heads have harden stellite tips which cannot be re-ground. 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.

**ALTERNATOR BRACKET:** Some years require the supplied 5/8"-11-7/16"-14 reducer to be installed into air pump thread in order to properly mount the alternator.

**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.

**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, rockers arms, and valve length can all affect pushrod length. Please see our following best estimates: for 165, 185 or 195cc standard or .100" long pushrods work in most cases. For 205 or 220cc typically .100" or .200" long pushrods will usually achieve proper geometry. For exact pushrod length we suggest using an adjustable pushrod to determine the proper length pushrod to be used. See our website under FAQ for detailed information on pushrod length.

**ROCKER ARMS:** Verify that your rocker arm has a minimum of .015 clearance to the retainer.

**TITANIUM VALVES: 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.

**GUIDE PLATES: ONLY USE 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. Thread sealer is required on 185cc-220cc heads where the intake stud intersects/protrudes into the intake port. Without thread sealer oil is drawn into the intake port under vacuum and will cause excessive smoking. Pedestal mount heads do not require guide plates, part #'s 1472 & 1492, torque pedestal mount rockers to 25-30 ft./lbs.



## 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.**



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(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 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.