



## AIR FLOW RESEARCH HEADS. INC.

### INSTRUCTIONS FOR THE BIG BLOCK CHEVY ALUMINUM HEADS

*For updates to instructions please see AFR's website.*

*AFR would like to congratulate you on your purchase of the highest flowing and strongest castings currently offered in a "production" style BB Chevrolet cylinder head. These heads, when properly installed and maintained, will generate impressive power figures and provide you with years of trouble free service. The following instructions and guidelines are meant to assist you in the proper installation and set-up of your new cylinder heads. It is important that you read through all of this information before attempting installation!*

**INSPECTION:** Check all machined surfaces for nicks, burrs, etc, that might have occurred during shipping or storage. If necessary, carefully dress with a file, or sandpaper supported flat by a straightedge. This is especially important on the head deck and intake manifold flange to have an effective trouble-free gasket seal.

**VALVE SPRINGS:** It is the customer's responsibility to check and make sure that spring pressures are correct for his/her camshaft application. We recommend a **minimum** of .060" clearance from coil bind at full valve lift.

**VALVE GUIDE CLEARANCE:** Our typical valve guide clearances are .0013"-.0016". In some severe applications (nitrous, marine endurance racing, or blower usage) looser guides might be required. Check with your engine builder.

**Important:** Apply anti-seize to all bolts and spark plugs to ensure long thread life.

**PISTON DOME CLEARANCE:** Piston dome to combustion chamber clearance **MUST** be checked prior to final engine assembly. This is especially important for pistons that have a .700" + dome height which are common on high compression 427-511 based engine configurations. Pay special attention to the crest in the chamber directly across from the spark plug. Consider .040" **minimum** clearance with 7000 rpm or less. Slightly more would be required for motors that are turned higher.

**ENGINE BUILDER'S TIP:** With some domed aftermarket pistons, it may be necessary to slightly clearance or modify the piston due to our more modern (efficient) heart shaped combustion chamber design. Most of the newer manufacturer's dome profiles will clear.

Note that usually less than 1cc of aluminum is removed which only equates to a weight reduction in the piston of one to two grams. If your rotating assembly is already balanced, this is a non-event and creates a VERY slight overbalance which in theory brings your engine into a better balance at slightly higher RPM. While some of you might be inclined to remove the material from the actual cylinder head note that all of the combustion chamber shapes are very critical to flow and altering the cylinder head can and will effect flow and power production. The easiest way to check for this is by turning the engine over slowly with the cylinder head installed without the head gasket. See web site for more details.

**PISTON TO VALVE CLEARANCE:** It is your responsibility to check and make sure you have adequate piston to valve clearance before final engine assembly. Don't forget to check radial (side) clearance as well.

**SPARK PLUG CLEARANCE:** In the event your engine has extremely tall piston domes, it might be necessary to index the plug electrodes and/or slightly clearance your piston domes to provide a **minimum** of .060" from piston dome to electrode tip. Do not use projected tip plugs with extremely tall dome designs (unless you are certain you have enough clearance).

**NOTE:** While on the subject of clearance, it is vital that you check clearance of **ALL** moving parts due to the vast array of rocker arms, lifters, cams, springs, etc. Don't forget to check pushrod to head clearance as well as any potential interference from your rocker arms and spring assemblies prior to final engine assembly.

## BBC Installation Instructions



**ROCKER STUDS:** AFR BB Chevy heads require two different length rocker studs. The (8) shorter studs (referring to the coarse thread length that screws into the head) must be installed on the intake side with a small amount of teflon or some other non-hardening thread sealer. Without thread sealer oil is drawn into the intake port under vacuum and will cause excessive smoking. Conventional bolt thread lubricant can be used on the longer (8) exhaust studs. Never use a shorter stud on the exhaust side.

**NOTE:** Torque Rocker Studs to 55 – 60 ft./lbs.

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

**GUIDE PLATES:** Only AFR guide plates will properly fit our AFR Big Block Chevy cylinder heads. We carry them in stock under AFR part #6109. The Comp Cams part # is 4806.

**PUSHRODS:** All AFR heads will require pushrods that are longer than stock length. The most common lengths are a +.200" to a +.250"; **however**, due to a large number of variables (deck height, cam base circle, lifter height, etc.) **ALL** pushrod lengths must be physically checked to achieve proper valve train geometry. See website under FAQ for detailed information on pushrod length.

**STUD GIRDLE:** All of our BB Chevy cylinder heads have been designed with valve angles rolled over two degrees from stock location to provide better flow characteristics. Stud girdles produced for stock Chevy castings as well as other aftermarket pieces that have standard valve angles will not fit properly. We stock a high quality girdle in a convenient two piece design that will fit our heads correctly.

**HEAD STUDS/BOLTS:** AFR BB heads take one inch longer fasteners along the exhaust port (bottom) side of the cylinder head. AFR stocks complete kits or partial kits (studs or bolts) for the eight additional longer fasteners.

**NOTE:** We recommend the use of studs due to the higher clamping load they place on the cylinder heads. Blown, turbo, or nitrous engines should always use studs due to the much higher cylinder pressures they create.

### RECOMMENDED GASKETS:

#### HEAD GASKETS:

Mark IV Block 4.540" Bore Felpro 1017-1

**NOTE:** 1017-2 is .051" compressed thickness

Mark IV Block 4.630" bore Felpro 1057

Mark IV Block 4.625" bore Felpro 1093

**NOTE:** 0-ring perfectly round, .051" thick,  
Typical "pro-stock" style gasket

Mark V-VI 4.540" bore Felpro 1047 or 17048

Mark V-VI 4.630" bore Felpro 17049

#### INTAKE GASKETS: (For best fit)

AFR #6855 for 305, 315, 325, 335cc Felpro #1275  
AFR #6856 for 345,357cc Mr gasket #121

**NOTE:** Only use AFR's gaskets for port matching. Most other gaskets have a slightly larger entrance. You will see **NO PERFORMANCE GAIN** by opening your heads or intake manifold to the larger gasket opening.

**EXHAUST GASKET:** AFR #6858.

#### SPARK PLUG RECOMMENDATION:

(Flat seat with gasket, .750" long reach, 5/8" hex head) Do not use a tapered seat plug.

Autolite #3932	Std. Tip,	Race Application
Champion #C59C	Std. Tip,	Race Application
Champion #C59YC	Projected tip,	Race application
Champion #RC12YC	Projected tip,	Street Application

**NOTE:** Other Spark plug manufacturers offer plugs that will also cross-reference and fit our AFR BBC castings. Always consult with the manufacturer for the heat range that best fits your application.

**HEAD BOLT TORQUE:** All AFR BB Chevy heads should be torqued to 75 ft/lbs. This should be done in the proper General Motors sequence in 15 lb. increments beginning at 30 ft/lbs. Moly lube should be applied between fasteners, washers, threads, and areas around head bolt to prevent galling and improper torque values. Sealer should be applied to all thread areas of fasteners that enter into block water jackets. Sealer is unnecessary with blocks that have "blind holes" in the deck surface and do not go into water.

**HEAD FASTENER RE-TORQUE:** 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.

**VALVE LENGTH:** Intake Valve 5.500" (+.250) Exhaust Valve 5.450" (+.100)

**IMPORTANT:** Apply anti-seize to all bolts and sparkplug threads to ensure long thread life.

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

**VALVE LASH:** Be aware that an aluminum headed/iron block combination usually requires approximately .006 tighter lash when it is cold. An all aluminum engine could be as much as .010 – .020 tighter when the motor is cold. Every motor is different, but these guidelines should get you in the ballpark.

**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.

**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 is 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 - 10/26/2015

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	385 lbs. @ 2.100 1000 lbs. @ 1.200	Pacaloy PAC Racing Springs #1258 Triple Spring	1.130	688	.900	8300-8500
AFR-8016 Solid Flat Tappet No Stripe	1.550 OD .750 ID	140 lbs. @ 1.930 406 lbs. @ 1.280	Chrome Silicon Pioneer Springs Dual Spring with Damper	1.140	410	.650	7200-7400
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.**

### **TERMS and POLICIES**

#### **Returned Merchandise**

Returned merchandise will not be accepted without prior permission from an authorized agent at Air Flow Research, Inc. 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 to the original purchaser, AFR warrants the aluminum cylinder head casting for the lifetime of the product with proof of purchase. 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, by AFR at its sole discretion, 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.

#### **Manifold Warranty**

AFR warrants their composite intake manifold to be free of defects for a period of one year's time. 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 AFR determines at its sole discretion that the product does indeed have a warrantable problem from workmanship, material, or an undetermined cause, AFR will repair or replace the product at no charge. This warranty does not cover fitness of purpose and/or merchantability on any products sold by AFR.

#### **This warranty does not cover the following:**

1. Failure due to improper installation or maintenance, abuse, misuse, unauthorized repairs, modifications, or alterations determined at the sole discretion of AFR. 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 or replacement 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.