



INSTRUCTIONS FOR THE LS1 SMALL BLOCK CHEVY [ALUMINUM HEADS](#)

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**ATTENTION:** 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.

**VALVE GUIDE CLEARANCE:** INTAKE & EXHAUST GUIDE CLEARANCES ARE .00125". ON SOME SEVERE APPLICATIONS WITH NITROUS, MARINE, OR BLOWER USAGE, 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 TO VALVE CLEARANCE ALSO MUST BE CHECKED, PAY SPECIAL ATTENTION TO THE OUTSIDE EDGE OF THE VALVE TO THE INSIDE EDGE OF THE VALVE RELIEF IN THE PISTON.

## LS1 SBC Installation Instructions



**HEAD GASKETS:** For AFR 210 or 230cc small bore heads use Cometic 3.930 gasket that is .040 thick, AFR #6846. For AFR 215 or 230cc large bore heads use Cometic 4.125 gasket that is .040 thick, AFR #6848. AFR 245cc heads use Cometic 4.200 gasket that is .040 thick, AFR #6845.

**INTAKE GASKETS:** Use factory o-ring style gasket or AFR #6830.

**EXHAUST GASKETS:** Use GM stock replacement gaskets only.

**VALVE COVER GASKETS:** Use factory o-ring style gasket.

**HEAD BOLTS & STUDS:** High quality head bolts or studs with hardened washers must be used to prevent galling of the aluminum head. Recommended head bolts are ARP #134-3609, for head studs use ARP #234-4316. For maximum gasket clamping AFR recommends head stud kits.

**VERY IMPORTANT:** *You cannot re-use the factory LS1 head bolts. They are "torque to yield" design and can only be used once.*

**HEAD BOLT TORQUE:** Moly lube-oil mixture should be applied between fasteners, washers and area around head bolt to prevent galling and improper torque readings. Recommended torque values as follows: 11mm ARP, torque to 70 ft. lbs with moly lube and 8mm ARP, torque to 23 ft. lbs with moly lube. 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 thread areas that enter into the block water jacketing system. Permatex is a good general purpose sealer.

**IMPORTANT:** Intake Pedestal Bolt: The intake pedestal bolt requires Teflon or some other non hardening thread sealer to be installed on the bottom of the pedestal bolt thread. Without thread sealer oil is drawn into the intake port under vacuum causing excessive smoking.

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

**SPARK PLUGS:** Use A/C #41-985 Platinum spark plug as a starting heat range. Plug selection is dictated by many factors including rpm level, compression ratio and type of fuel. Forced induction or nitrous applications usually required 1 to 2 heat ranges colder such as Autolite #3924. Spark plug gap should be determined by the ignition manufacturer. You can cross reference to your favorite brand if desired.

**COMPRESSION RATIO AND PISTON TO VALVE CLEARANCE MUST BE CHECKED BEFORE FINAL ASSEMBLY. PART #1610 THROUGH #1680-1 WITH THE 2.080" INTAKE VALVE USUALLY WILL NOT FIT A PISTON WITHOUT VALVE NOTCHES HAVING PROPER RELIEFS.**

**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.

**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. Just snug up hand tight with a wrench only.

**VALVE TIPS:** Do not grind your valve tips. Some AFR heads have harden 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.

**PUSHROD LENGTH:** This seems like an easily answered question but in fact there are too many variables for AFR to quote a specific length. Block deck height, head milling, gasket thickness, camshaft basecircles, lifter and rocker arm design just to name a few. With a hydraulic roller, you will likely end up between 7.300" and 7.550" and we recommend the use of an adjustable length pushrod to calculate the correct length for you individual application. Note that the LSx family is a pedestal mount system and pushrod length does not effect the wipe pattern of the roller tip, it only directly effects the lifter preload (the height of the rocker stand or pedestal can alter the wipe pattern which in turn also effects optimal pushrod length). Most OEM lifters require 1-2 turns of preload of the stock rocker arm bolt (about .075"-.140" preload at the lifter) but beware that some brands of aftermarket lifters call out for less preload. Consult with the lifter manufacturer for that information.

**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.

## LS1 SBC Installation Instructions



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 <sup>†</sup> 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.**



## 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 RGA number; without a RGA 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, 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.