



FORD PERFORMANCE

M-6049-X2

Ford Performance Aluminum SB Cylinder Head

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Overview:

This sheet contains important information regarding dimensions and specifications of the M-6049-X2 cylinder head(s). These cylinder heads are equipped with larger than stock valves, therefore piston to valve clearance **must** be checked. This includes both radial and depth clearance checks. These heads require bolt down rocker arms, and rocker arm to valve cover clearance also **must** be checked. These instructions should be reviewed by all engine builders, due to minor changes that could impact the engine assembly process.

Contents/Bill of Materials:

PAC-1219X	Valve Spring, Outer Beehive
PAC-L8027	Valve Retainer Locks
PAC-R310	Retainer, Valve Spring
M-6505-G302	Exhaust Valve, 1.54" dia. x 5.078"
M-6507-J302	Intake Valve, 1.94" dia. x 5.078"
VS-305V	Valve Seal
4705F-1	Valve Spring Seat/Locator

Features and Specifications:

Head material	Aluminum
Intake port location	Raised approximately .100"
Intake port volume	178 cc's
Intake valve part number	M-6507-J302
Intake Valve Head Diameter	1.94"
Intake valve length	5.078"
Intake valve material	Stainless steel
Intake valve stem diameter	11/32"
Intake guide material	Manganese-bronze
Intake valve seat material	Ductile Iron
Exhaust port location	Raised approximately .100"
Exhaust port volume	60 cc's

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Features and Specifications (continued):

Exhaust valve part number	M-6505-G302
Exhaust valve head diameter	1.54"
Exhaust valve length	5.078"
Exhaust valve material	Stainless steel
Exhaust valve stem diameter	11/32"
Exhaust valve guide material	Manganese-bronze
Exhaust seat material	Ductile Iron
Combustion chamber volume	64.0ccs
Valve spring locator part number	4705F-1
Valve spring part number	PAC-1219X
Valve spring installed height	1.800"
Valve spring closed pressure	145 lbs.
Valve spring open pressure	358 lbs. @ 1.175"
Retainer part number	PAC-R310
Retainer manufacturer	PAC
Valve lock angle	10°
Valve lock part number	PAC-L8027
Valve stem seal part number	VS-305V
Valve guide clearance intake	.0012"-.0022"
Valve guide clearance exhaust	.0016"-.0026"
Weight	27 lbs.

Typical Air Flow:

Flowed at 28" inches of water

Bore size	4.000	
Lift	Intake CFM	Exhaust CFM
0.600	230	160

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Recommended accessories:

Intake gasket	M-9439-A50
Exhaust gasket	Fel-Pro 1415
Head gasket	M-6051-A302, M-6051-S331, M-6051-CP331, M-6051-R351
Head bolts-studs	M-6065-BOSS, M-6014-Z304, M-6014-BOSS
Valve Covers	All Ford Performance 302/351 valve covers
Spark plugs	Motorcraft AGSP-32C, Autolite® 3924,3925
Valve Cover Gasket	Fel-Pro® VS13264T
Rocker Arms	Bolt down style

Assembly Notes:

Torque Specifications - Use light oil on threads except where noted,

Cylinder Head – see photo below for sequence

1. 7/16-14 (stock block) early reusable grade 8 bolts with ARP 200-8598 head bolt bushings. (apply Loctite® 567 or 565 thread sealant)
(2) steps:
 - 1) 50 lb*ft
 - 2) 70 lb*ft
2. 7/16-14(stock block) torque to yield bolts (apply Loctite® 567 or 565 thread sealant)
(3) steps:
 - 1) 35 lb*ft
 - 2) 55 lb*ft
 - 3) ¼ turn (90°)
3. 1/2-13 (performance block) grade 8 bolts
(2) steps:
 - 1) 55 lb*ft
 - 2) 100 lb*ft

Intake Manifold – (2) steps:

- 1) 10 lb*ft
- 2) 18 lb*ft

Consult Intake Manifold Installation for Crate Long Blocks IS-1850-434, included with this document

Rocker arm bolt – 18 to 22 lb*ft

Header/Exhaust Manifold – 35 lb*ft

Valve Cover – 9 lb*ft (Note check for rocker arm to valve cover clearance)

Pushrods – Check for clearance between the head and pushrod.

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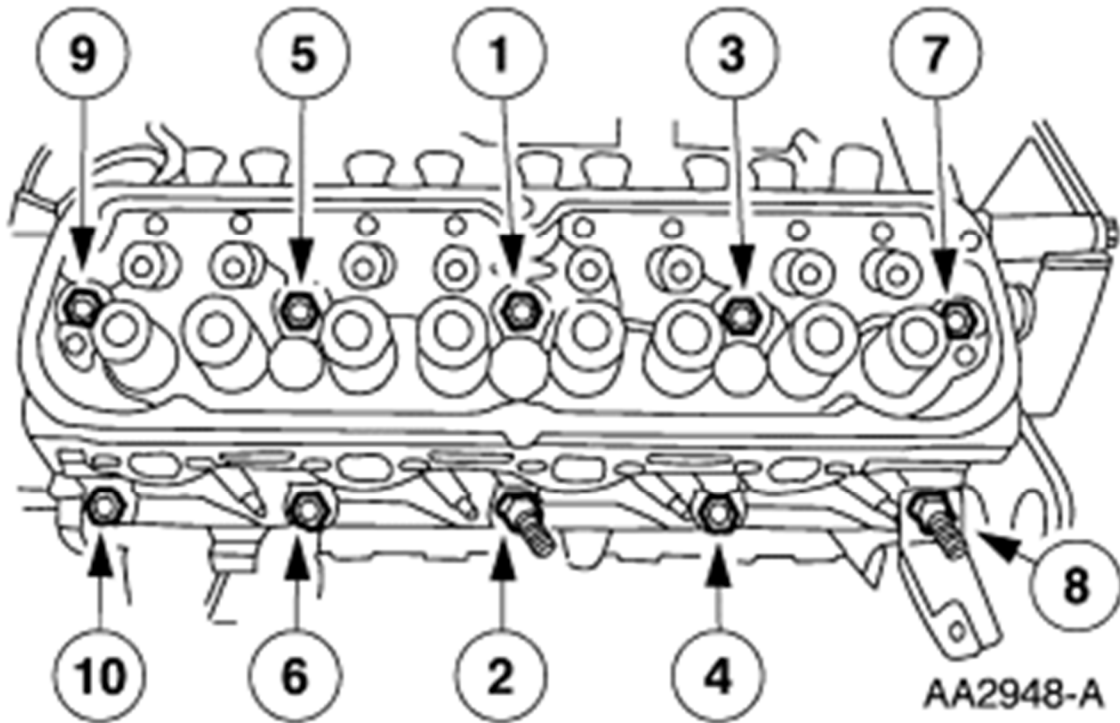


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Assembly Notes (continued):

Accessory drive bolt holes are in stock locations. Stock brackets will fit.

Exhaust flange location and bolt pattern - The exhaust manifold plane is in the stock location. The exhaust is configured with the stock "narrow" 2.00" bolt spacing.

Spark plug installation – a small amount of nickel or copper based anti-seize is recommended on the spark plug threads. Be cautious not to get any near the electrode or ground strap. Remember a little goes a long way with anti-seize.

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Intake Manifold Installation for Crate Long Blocks INSTALLATION INSTRUCTIONS

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FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN ENGINE FAILURE DUE TO:

- **PISTON SCUFFING**
- **DETONATION – IMPROPER COMBUSTION**
- **OIL LEAKS**
- **COOLANT LEAKS**

NOTE: READ THRU COMPLETE INSTRUCTIONS BEFORE STARTING

STEP 1: Below is a picture of everything needed to accomplish the installation.



- M-9439-A50 intake gaskets are included with the crate engine.
NOTE: cork end rail gaskets are not used
- (12) Intake manifold bolts 5/16-18 UNC grade 8, with flat washers
- Torque wrench
- Motorcraft TA-29 silicone or equivalent RTV high temperature silicone sealer
- 6" Ruler and set of feeler gauges
- Surface cleaner (Brake Cleaner) or lacquer thinner (not pictured)
- A gasket sealer/contact cement: such as Gasgacynch®, High Tack® or Indianhead®

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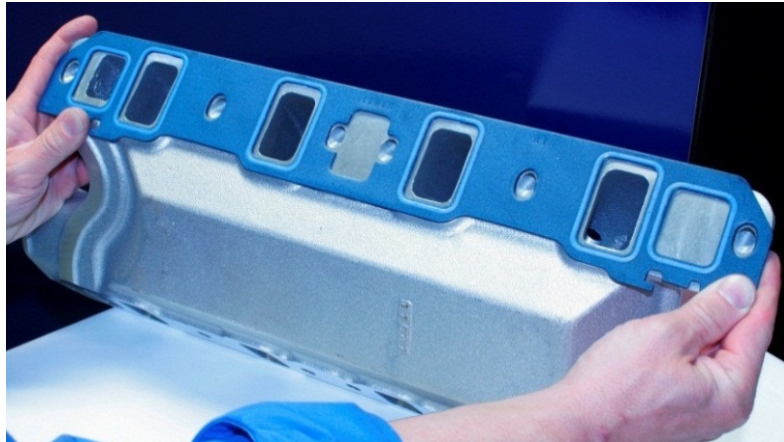


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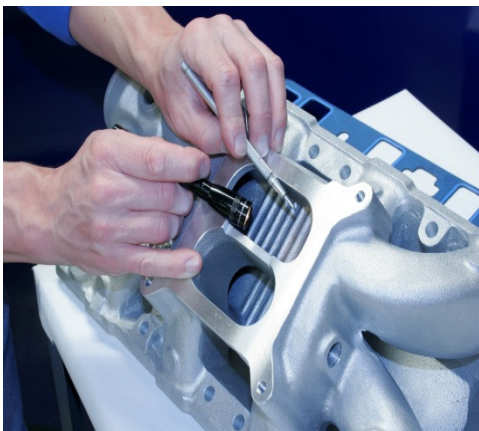
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STEP 2: Check port and gasket alignment to intake manifold and cylinder head. Some aftermarket intake manifolds do not match Ford Performance Parts cylinder heads. Position the gasket on the manifold where the locating tabs (beneath the water cross over holes) will contact the head gaskets.



STEP 3: Inspect intake manifold for debris, and make sure it's clean. Check all threaded holes and tap deeper if necessary. Check the carburetor/throttle body gasket alignment. Also look at the gasket surfaces for nicks and damage, raised surfaces on the flanges can prevent sealing. Minor raised imperfections can be repaired by wrapping a sheet of 320 grit wet/dry sandpaper around a flat block and lightly sanding the surface (do not be too aggressive as this will cause the surface to become uneven). If installing a used intake manifold it is not recommended to dry blast it to clean it. The media will become imbedded and eventually fall out with heat cycling of the engine. If the manifold is being transferred from a "failed" engine, be sure to inspect all passages for any debris that may have been lodged from the previous engine.



STEP 4: Test fit the carburetor/throttle body and actuate the linkage. Check to make sure the throttle blades do not contact the manifold.

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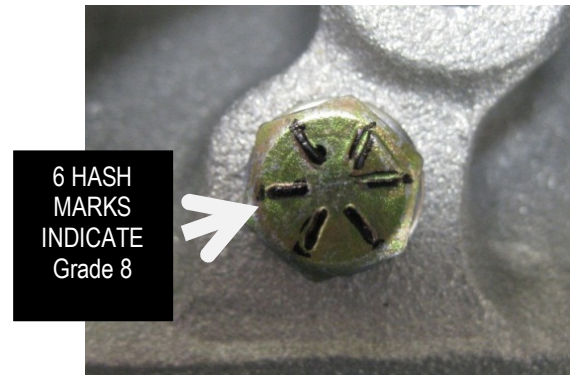


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STEP 5: Grade 8 bolts are recommended for intake manifold installation. Grade 8 bolts are identified by (6) hash marks on the head of the bolt. The torque specs supplied are for grade 8 fasteners.



STEP 6: A pre-assembly mock up is required to check the proper fit of the intake manifold to the long block assembly.

- Place the intake manifold on the long block without the intake manifold gaskets
- **The gap at the end rails needs to be .040" minimum.** This check insures that the manifold will not “bottom out” on the end rails of the block. If it bottoms out, there is insufficient clamp load between the intake manifold and cylinder head, and it’s likely that oil will be sucked into the intake runners.
- ***If the gap is less than .040” the end rails of the manifold will need to be machined.*** This can be checked with a scale or feeler gauges.



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STEP 7: The minimum thread engagement required for the intake manifold bolts is $.625''$ or $5/8''$.

- Too little thread engagement can damage threads and strip out.
- Thread engagement **must** be checked on an individual basis due to the variety of intake manifolds available.
- Measure thread engagement from intake manifold to bottom of flat washer.



STEP 8: Apply surface cleaner to a lint free cloth or paper towel, clean all gasket surfaces, manifold and block end rails.



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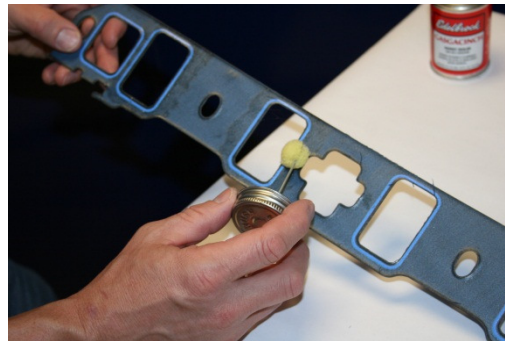
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STEP 9: Two different types of sealers are used during intake manifold installation: 1) a contact cement type such as Gasegacinch®, or High Tack®, and, 2) Silicone. The recommended silicone is Motorcraft TA-29®.



STEP 10: Apply a thin coating of Gasegacinch on the head intake port flange and the head side of the intake manifold gasket. Within a few minutes, the surfaces will start to dry and become tacky. Carefully place the gaskets on the head surface aligning ports and bolt holes.



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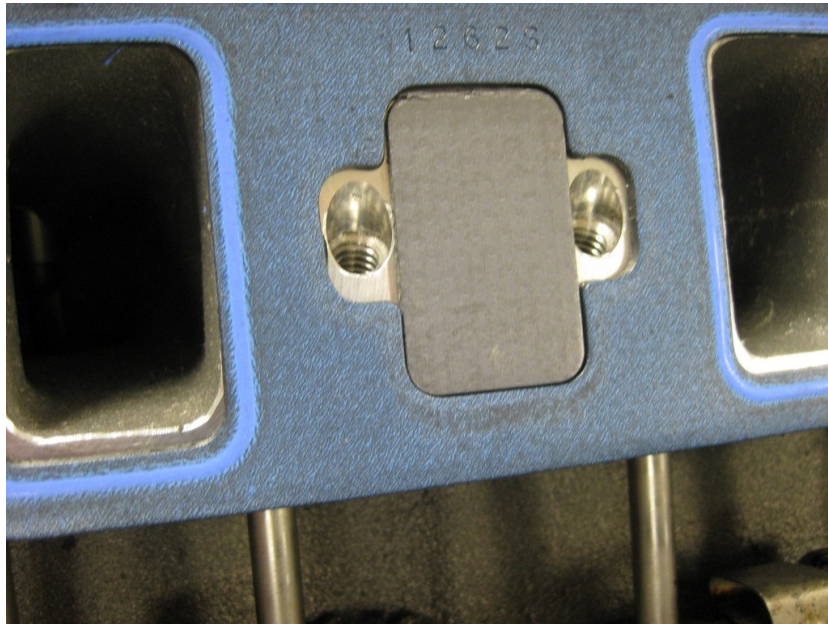


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STEP 11: Install EGR gasket or block-off, depending on intake manifold style. If the manifold does not have an EGR passage (no EGR passage on our example) the block-off is used.



STEP 12: Rub an initial thin layer of silicone onto the end rails of the intake manifold and block.



STEP 13: Apply a thick layer of silicone onto the end rails of the block, be sure to apply in corners.

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STEP 14: Apply a thin layer of silicone around the water openings (4 places).



STEP 15: Set intake manifold on engine.

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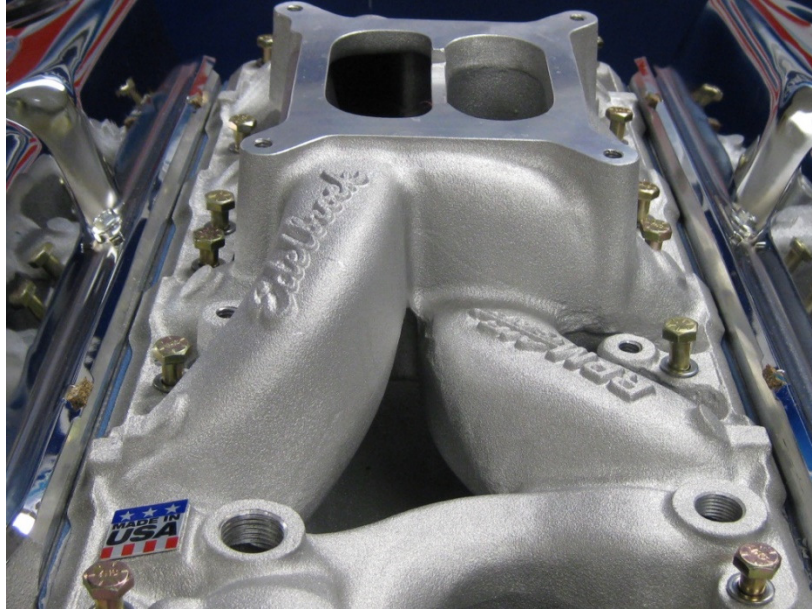


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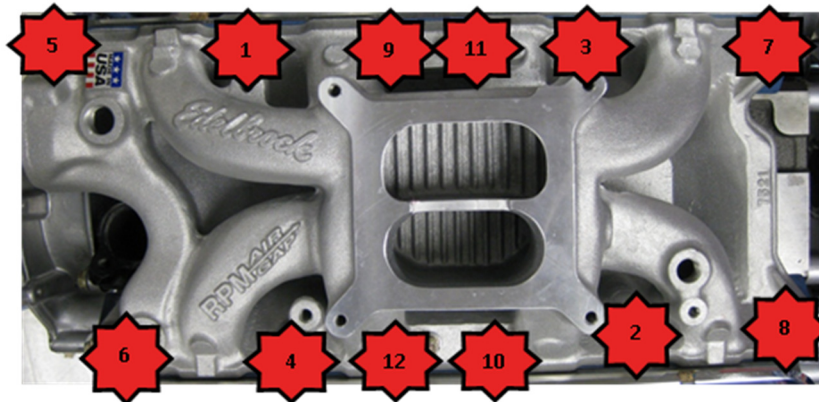
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STEP 16: Apply a drop of oil to the threads of the intake manifold bolts, and install intake manifold bolts.



STEP 17: Start all bolts by hand and hand tighten. Torque intake manifold bolts in two steps (sequence is shown below):

- Step 1: Tighten to 5-10 lb. ft (6-14 Nm)
- Step 2: Tighten to 15-18 lb*ft (31-34 Nm)
- **Note:** Repeat step 2 several times until bolt torque is stabilized
- **Re-torque after 10 engine heat cycles – completely cold to full operating temperature**



END

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