



GenX® Cathedral Port Cylinder Heads

GM LS Vortec, LS1, LS2 and LSX

Thank you for purchasing Trick Flow GenX Cathedral Port aluminum cylinder heads for the GM LS Vortec, LS1, LS2 and LSX engines.

Please follow the steps outlined in this instruction manual to ensure that the installation of your new cylinder heads is done correctly and that they perform according to design.

Please read all of the enclosed information before beginning any work. If you have any questions regarding installation or the written materials supplied with your new heads, contact the Trick Flow technical department at 1-330-630-1555 for assistance, Monday through Friday from 9:00 am to 5:00 pm ET.

Important Information:

1. Roller rockers are highly recommended.
 - a. Harland Sharp SLS17: Non-Adjustable Rocker for use with hydraulic rollers
 - b. Harland Sharp SLS17A: Adjustable Rocker for use with solid rollers
2. While your Trick Flow cylinder head is designed with optimized geometry, you can change geometry with shimming under the rocker stand.
3. Pushrod length will vary from stock. The pushrod length is not used to adjust geometry with shaft rockers. It is instead used to obtain the proper position of the adjuster in relation to the rocker body on an adjustable rocker and it'll affect the preload on a hydraulic roller setup.
4. If using 6-bolt heads on a 6-bolt block, be sure that you're using the proper head gasket that extends to those extra head bolt holes and use the proper torque specified by your fastener manufacturer. *Failure to do so may result in damage to the casting.*

Project Overview

- Review all paperwork included in the installation packet
- Inspect the condition of all components
- Verify the part numbers and quantities of each product received (See "Parts Checklist")
- Gather recommended tools (See "Recommended Tools")
- Purchase any necessary additional parts. See "Additional Parts Required." **Do not purchase pushrods** until the proper length has been determined.
- Remove existing cylinder heads.
- Clean and inspect the engine block thoroughly.
- If necessary, install new cylinder head locating dowels.
- Check piston to valve clearance.
- Check pushrod length and purchase new ones accordingly.
 - Length checker for ball-ball pushrod: TFS-9501
- Install new cylinder heads and adjust valvetrain.
- Make necessary tuning adjustments.
- Perform a proper break-in.
- Test drive and enjoy your new cylinder heads.

Parts Checklist

You should have received the parts listed here. Please verify the part numbers and quantities of each component received.

- (1) Cylinder head
- (1) Instruction packet

If you are missing an item or a part was received in error, please contact Trick Flow at **1-330-630-1555**, Monday through Friday from 9:00 am to 5:00 pm ET.

Recommended Tools

- Shop manual for your vehicle/engine
- Basic mechanics tool set
- Torque wrench (0 – 100 ft.-lbs)
- Timing Light
- Vacuum gauge
- Spark plug gauge
- Straightedge
- Feeler gauge
- Modeling clay
- Adjustable checking pushrod (TFS-9000)
- Torque angle meter
- Solid mockup lifter

Additional Parts Required

These components are required to complete the installation of your new GenX cylinder heads. Please refer to the Recommended Components chart on the Technical Specifications sheet for specific part numbers.

- Head Gaskets
- Intake Gaskets
- Exhaust Gaskets
- Head Bolts/Studs
- Intake Bolts
- Exhaust Bolts
- Moly Lube
- Spark Plugs
- RTV Sealant
- Pushrods (Different than stock may be required)
- Rocker Arms

Installation Instructions

1) Cylinder Head Removal

- Consult your shop manual for the proper cylinder head removal procedure for your vehicle. Taking notes, pictures, and even making a video of the disassembly will help you greatly when reinstalling brackets, routing hoses and electrical/sensor connections.

2) Prepping the Block

- With the old cylinder heads removed, inspect the cylinder bores for scratches, ridges, and cracks.
- If everything appears to be OK, put clean shop rags in the cylinders to catch any loose debris when the old head gaskets are scraped off of the engine's deck surface.
- Remove all traces of the gaskets and any oil/grease that may be present by wiping the surface with brake cleaner.
- Check the deck surfaces for flatness by laying a straight-edge across the deck lengthwise and sticking a .004" feeler gauge under it. If the feeler gauge fits anywhere under the straightedge, the block will need to be decked or head gasket failure will result.
- Once the block decks have been cleaned and checked, use the correct size tap to chase the threads in the bolt holes. This will clean out old sealer and debris, which is extremely important for preventing leaks and achieving the proper torque on your new cylinder heads.
- After cleaning is complete, carefully remove the shop rags from the cylinders and discard. Use new, unused, and clean shop rags to clean the cylinders and coat the cylinder walls with a thin film of engine oil to protect them from corrosion.
- Inspect the old dowels in the block. If they are in poor condition, then install new head alignment dowels.
- Place the new head gaskets on the engine block.

3) Checking Exhaust Manifold/Header Clearance

- Place one of the cylinder heads on a suitable work stand and install the recommended spark plugs.
- Bolt the exhaust manifold/headers to the cylinder head and check for any interference.
- Repeat this procedure on the other cylinder head.

4) Determining Pushrod Length

IMPORTANT NOTE: This step must be completed before heads are torqued to block.

- Trick Flow GenX® LSX Cylinder Heads have been designed to use a 7.500" OAL pushrods. However, due to the multitude of parts combinations, it is necessary to measure for proper pushrod length for your unique combinations of parts.
- Refer to the TFS "Pushrod Length Addendum" to determine what pushrod length you will need.

5) Checking Piston-To-Valve Clearance

- Once the proper pushrod length has been established, piston-to-valve clearance must be checked. This is an extremely important assembly step if using aftermarket pistons and/or high performance camshafts. Engine failure may occur from the valves contacting the pistons.
- Rotate the crankshaft until the engine is on the compression stroke of the #1 cylinder. Place a solid setup lifter in the lifter bore of the valve that you will be measuring. Be sure that the setup lifter is the same height as the lifters that will be installed in the engine permanently.

- Place a few 1/4" thick pieces of modeling clay across the upper half of the piston. Coat the clay with a very thin layer of new engine oil. Place the head gasket you will be using on the block and temporarily bolt the head on with five or six head bolts.
- Install the Trick Flow rocker arm rail followed by the adjustable pushrod set to previous setup length. Tighten the rocker to zero lash, rotate the crankshaft at least twice, remove the cylinder head and gently remove the clay.
- Carefully cut the clay into slices and look for the thinnest section of the valve impression. The impression is a 3D representation of the clearance between the piston and valve. Carefully measure the thickness of the clay with a machinist's scale or calipers. The intake valve side of the clay should have .080" or more of clearance, and the exhaust should have .100" or more of clearance. Modify pistons as necessary.

NOTE: Reference the maximum recommended valve lift for the valve springs in the Technical Specifications sheet before purchasing an aftermarket camshaft.

6) Installing the GenX Cylinder Heads

- With the block deck surfaces and cylinders clean and all checks completed, position the head gaskets on the block per the manufacturer's markings.
- Blow out the head bolt holes in the block with compressed air before installing the fasteners.
- Don't be alarmed if some of the coolant holes in the block are restricted by a smaller hole in the gasket. This is done intentionally to regulate coolant flow.
- New torque-to-yield cylinder head bolts must be installed during reassembly. Torque the bolts according to the owner's manual for your engine or per the requirements of your fastener manufacturer.
- **If you are utilizing the front row of bolts for your 6 bolt heads, make sure that your gasket extends to this surface otherwise, damage to your casting can occur!**

7) Installing the Valvetrain

- Consult your shop manual for the proper cylinder head valvetrain assembly procedure for your vehicle. Apply thread sealer to the threads of the intake rocker arm bolts during reassembly.
- **Do not torque your rocker arm bolts while the camshaft is at any lift. The valve must be on the base circle of the camshaft to prevent pulling threads out of the casting.**
- Rocker arm bolt threads protruding into the intake ports will not affect airflow results.

8) Reassembling the Rest of the Engine

- Install as many items as you can without putting the valve covers on. This will allow you to pre-lube the valvetrain, which is explained in the Pre-lubing the valvetrain section.

9) Pre-lubing the Valvetrain

- Use an oil pump primer to pre-lube the valvetrain.
- Lubricate your valvetrain with motor oil. An excessive amount is not necessary; just enough to lubricate each moving part.
- Reinstall the valve covers as soon as possible to keep contaminants out of the engine.
- **DO NOT START THE ENGINE IF THE TOP HALF OF THE ENGINE HAS NOT BEEN PRELUBED!**
- Finish reassembling all other components, brackets and vacuum lines.

Specifications

Head Material: A-356 Aluminum

Combustion Chamber Volume:

01: 64cc CNC profiled
02: 65cc CNC profiled
C00: 58cc CNC profiled
C01: 64cc CNC profiled
C02: 65cc CNC profiled
C03: 70cc CNC profiled
C04: 70cc CNC profiled

Intake Port Volume:

01/02: 220cc Fast as Cast
C00: 205cc CNC Competition Ported
C01: 215cc CNC Competition Ported
C02: 225cc CNC Competition Ported
C03: 235cc CNC Competition Ported
C04: 245cc CNC Competition Ported

Intake Port Dimensions: 3.250" x 1.070" cathedral

Intake Port Location: Stock

Intake Valve Diameter:

C00: 2.000" (TFS-30500211)
01/C01: 2.040" (TFS-30600211)
02/C02: 2.055" (TFS-30600210)
C03: 2.080" (TFS-30600209)
C04: 2.100" (TFS-30600208)

Exhaust Port Volume:

01/02: 80cc Fast as Cast
C00 - C04: 80cc CNC Competition Ported

Exhaust Port Dimensions: 1.460" x 1.670" oval

Exhaust Port Location: Stock

Exhaust Valve Diameter:

C03/C04: 1.600" (TFS-30600213)
01/02/C00 - C02: 1.575" (TFS-30600212)

Valve Stem Diameters: 8mm

Valve Angles: 13.5°

Valve Spring Pockets: 1.480"

Valve Spring ID Locators: 1.300" OD (TFS-21400442)

Valve Guide Material:

C00: Powdered metal (TFS-30700252)
C01 - C04: Bronze alloy (TFS-30600251)

Valve Seal: Viton® Fluoroelastomer canister (TFS-30600455)

Valve Seat (Intake):

C00: Ductile Iron (TFS-30300271)
All others: Ductile Iron Interlock (TFS-51600271)

Valve Seat (Exhaust):

C00: Ductile Iron (TFS-30600272)
All others: Ductile Iron Interlock (TFS-30600274)

Valve Seat Angles: 45° x multi-angle

Valve Spring Retainers:

Chromoly steel 7° x 1.300" OD, (TFS-21400410)
Titanium 7° x 1.300" OD, (TFS-214T0415)

Valve Stem Locks: 7° machined steel (TFS-30600444)

Valve Springs: Standard

1.300" O.D. dual spring (TFS-16306-16)
155 lbs. @ 1.820" installed height
463 lbs. @ 1.200" open
463 lbs. per inch rate
1.100" Coil Bind, .650" Maximum Lift (Roller Rockers)

Push Rod Length: Determined by End User

Minimum Bore Diameter: C00: 3.780"

01/C01: 3.900"
02/C02: 4.000"
C03/C04: 4.125"

Rocker Arm Type: C00: Roller rocker arms recommended.
01/02/C01/C02/C03/C04: Roller rocker arms required

CARB E.O Number: D-747

Recommended Components

Head gasket: 01/C00/C01: TFS-30694030-045 or TFS-30694030-051
02/C02: TFS-30694060-046 or TFS-30694060-051
C03/C04: TFS-30694125L051 & R051 or
TFS-30694185L051 & R051

Exhaust gasket: GM 12558573

Head bolts: TFS-92010

Head studs: ARP 234-4316 (12 pt., LS1)
ARP 234-4317 (12 pt., 6.0L/LS2)

Pistons: OEM

Rocker arms: Harland Sharp SLS17 or SLS17A Roller Rocker

Spark plugs: NGK-4177

Valve Cover Spacers: TFS-3060800, .500" height

Replacement Cylinder Heads

TFS-3061B001: Bare, 220 Fast as Cast, 64cc CNC chambers, each

TFS-3061B002: Bare, 220 Fast as Cast, 65cc CNC chambers, each

TFS-3051B001-C00: Bare, 205 CNC Competition Ported, each

TFS-3061B001-C01: Bare, 215 CNC Competition Ported, each

TFS-3061B001-C02: Bare, 225 CNC Competition Ported, each

TFS-3061B001-C03: Bare, 235 CNC Competition Ported, each

TFS-3061B001-C04: Bare, 245 CNC Competition Ported, each

TFS-3061B003-C03: Bare, 235 CNC Competition Ported, 6-Bolt, each

TFS-3061B003-C04: Bare, 245 CNC Competition Ported, 6-Bolt, each

NOTE: On pollution controlled motor vehicles, please consult the shop manual, for your specific vehicle, for tuning specifications.

NOTE: For specific state emission inspection compliance, please affix the included label on or near the cylinder heads.

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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.

Trick Flow Specialties

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Ultimate Bolt-On Performance® Lifetime Warranty

Trick Flow Specialties cylinder head castings are backed by a lifetime warranty. If a cylinder head casting fails to provide the original purchaser with complete satisfaction, Trick Flow Specialties will repair or replace it free of charge — guaranteed!

Moreover, the valves, valve guides, valve seats, valve job, valve springs, valve spring retainers, valve locks, rocker arm studs, guideplates, and valve stem seals included on assembled Trick Flow Specialties cylinder heads are warranted to the original purchaser to be free from defects in materials and workmanship for a period of two years from the date of purchase. All other Trick Flow Specialties products are warranted to be free from defects in materials and workmanship for a period of 90 days. There are no mileage limitations.

Extent of Warranty

Customers who believe they have a defective product should return it to the dealer from which they purchased or ship it freight prepaid to Trick Flow Specialties along with proof of purchase and a complete description of the problem. If a thorough inspection indicates defects in materials or workmanship, our sole obligation is to repair or replace the product.

This warranty is only if the product is properly installed, subjected to normal use and service, did not fail due to owner negligence or misuse, and has not been altered or modified.

Trick Flow Specialties warranties do not cover any installation or removal costs.

Trick Flow Specialties is not liable for consequential damages for breach of contract of any warranty in excess of the purchase price of the product sold.

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