Trick Flow®
Serious Horsepower

TWISTED WEDGE® HEADS

Recommended Components for the TFS-31400001 Twisted Wedge Street Head for Small Block Chevy

Head Gasket:	Fel-Pro 7733PT-2 (mild engine builds up to 4.060" bore) Fel-Pro 1034 (severe duty/high horsepower engine builds up to 4.155" bore) Fel-Pro 1014 (same application as 1034 but pre-drilled for steam holes for 400 c.i.d. engines)
Intake Gaskets:	Fel-Pro 1404
Head Bolts:	ARP-134-3601 or ARP-134-3701
Head Studs:	ARP-234-4301 This stud kit comes with 12 point nuts which are required for clearance purposes. The studs that lie under the rocker arms will need to be shortened to clear the rocker arm bodies.
Rocker Arms:	Crane extruded aluminum 11750-16 If other brand rockers are used, it is up to the installer to check them for operating clearances to the spring retainer and to the rocker stud. Stamped steel rockers should be checked for operation clearance to the slot in the rocker arm. If there is a need for more clearance, use a long slot rocker arm such as Crane 11801-16
Pushrods:	In most cases a hardened, .100" longer than stock pushrod is ideal, such as Crane 11632-16 or Comp Cams 7693-16.
Headers:	It is highly recommended that the headers and spark plugs be checked for fitment before installing the engine in the vehicle. There are instances where the header flanges need to be clearanced to the spark plug's and spark plugs wire boots.
Spark Plugs:	The following recommended spark plugs should be used as a starting point: Champion RC9YC NGK FR5 Autolite 3924 AC FR3LS

The TFS-31400002, TFS-31400003, and TFS-31400004 heads are intended to be factory replacements, therefore they accept most O.E. components. Center bolt valve covers will need to be modified for rocker arm clearance. The TFS-31400006 heads for 1987-up applications are designed for use with earlier, perimeter bolt valve covers.

Trick Flow Quick Reference Chart

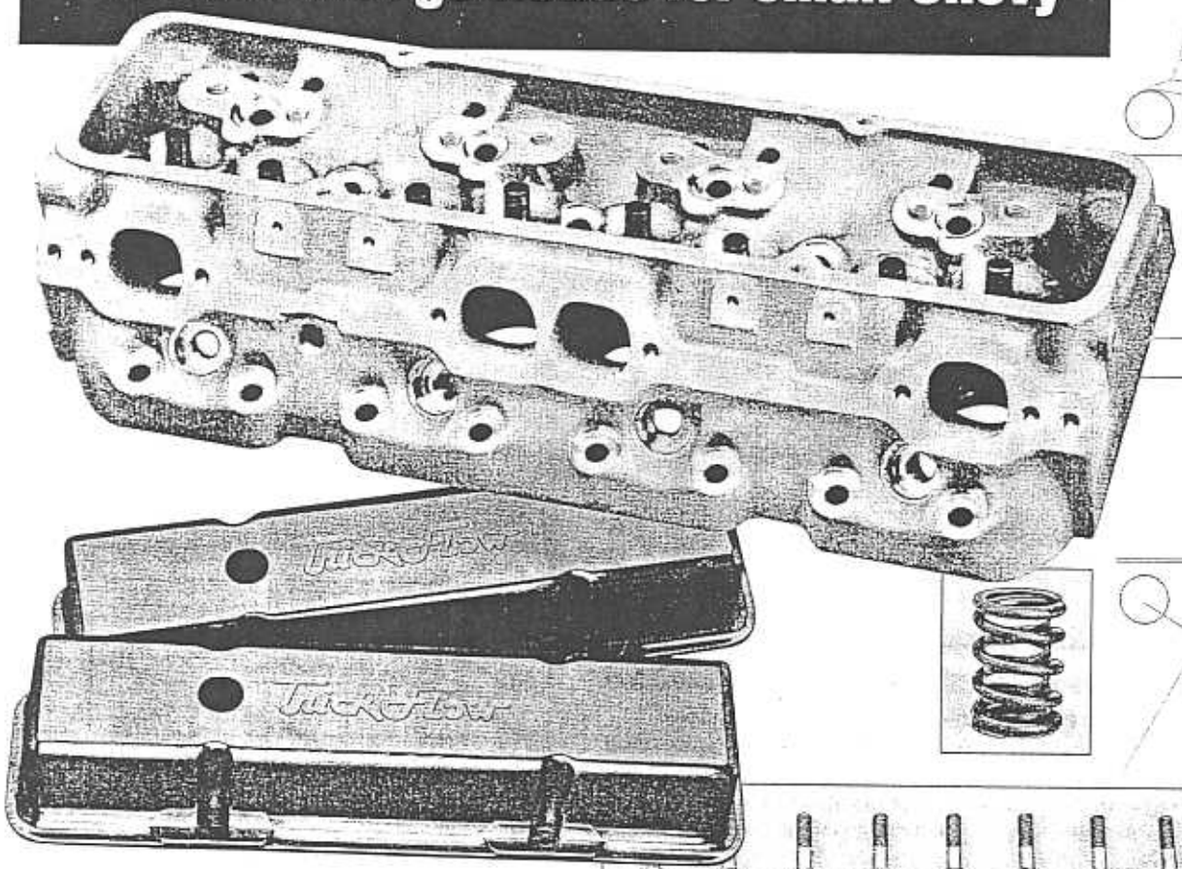
	TFS-31400006 same as 31400001 but with angled center intake bolt pattern	TFS-31400005 same as 31400001 but with 1.470" spring upgrade	TFS-31400004 1992 /newer LT-1, center bolt valve cover, reverse cooling unique to the LT-1 block	TFS-31400003 1986/newer Corvette replacement, (non LT-1 350), center bolt valve cover, std intake bolt	TFS-31400002 1986/newer 350 cast iron replacement, center bolt valve cover, angled center intake bolt	TFS-31400001 1987/older, standard valve cover bolt pattern
1. Standard 1.250" diameter springs	√	√	√	√		√
2. Optional 1.470" diameter springs					√	
3. Heat riser	√	√			√	√
4. Requires stock "rail style rocker arms"		√	√	√		
5. Comes with guideplates unique to the "Twisted Wedge" Design	√	√			√	√
6. Steam holes for 400 CID applications	√	√	√	√	√	√
7. Furnished with 3/8" rocker studs	√	√	√	√	√	√
8. 3 angle valve job with full radius	√	√	√	√	√	√
9. Hardened cast iron guides with oil metering grooves	√	√	√	√	√	√
10. Angled 3/4" reach spark plugs, either taper or gasket seat	√	√	√	√	√	√
11. Parts are compatible with unleaded fuel	√	√	√	√	√	√
12. 100% quality inspected	√	√	√	√	√	√
13. Water jacket surrounding the spark plug	√	√	√	√	√	√
14. Coolant circulation between center exhaust ports	√	√	√	√	√	√
15. 63cc combustion chamber with 180cc intake port	√	√	√	√	√	√
16. Equipped with all accessory holes	√	√	√	√	√	√
17. 2.020"/1.600" stainless steel valves with undercut stems	√	√	√	√	√	√
18. CNC profiled intake port entrances	√	√	√	√	√	√
19. Stock exhaust port exit location	√	√	√	√	√	√
20. Camshafts with 238° @ .050/106° lobe separate with .512" lift will clear stock pistons	√	√	√	√	√	√

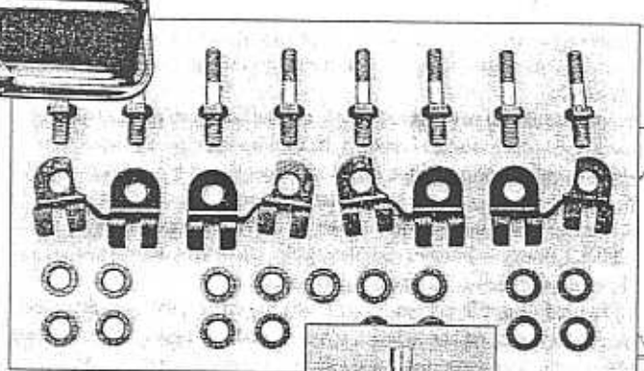
Trick Flow

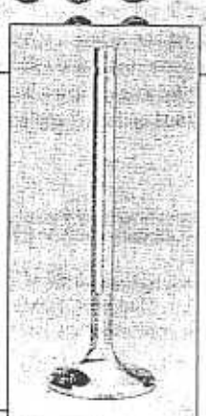
Trick Flow Specialties
1248 Southeast Avenue
Tallmadge, Ohio 44278
330-630-1555 Fax 330 630-5365

Printed 1-96

Individual Components for Trick Flow Twisted Wedge Heads for Small Chevy







Individual Components for Trick Flow Twisted Wedge for Small Chevy Heads

Die-Cast Aluminum Valve Covers and Breather w/Logo

TFS-31400902	Valve covers for pre-1987 heads, pair
TFS-31400904	Breather

Bare Castings with Seats and Guides

TFS-3141B001	Pre-1987 327-350-400, each
TFS-3141B002	1987-95 350 exc. LT-1, each
TFS-3141B003	1986-91 Corvette exc. LT-1, each
TFS-3141B006	1987-up 350 with perimeter bolt cover, each

Valves and Valve Springs

TFS-31400211	2.02" intake valve, each
TFS-31400212	1.60" exhaust valve, each
TFS-31400413	1.250" valve springs, set of 16
TFS-31400423	1.250" valve spring retainers, set of 16
TFS-31400433	1.250" valve spring seats, set of 16
TFS-31400251	Intake and exhaust valve guide, each
TFS-31400443	Valve locks for 1.250" springs, set of 32, stamped
TFS-31400453	Valve stem seals, set of 16

Guide Plates, Rocker Arm Studs and Head Bolt Washers

TFS-314L0623	Pushrod guide plate 5/16" left, each
TFS-314R0623	Pushrod guide plate 5/16" right, each
TFS-31400623	Pushrod guide plate 5/16", set of 8
TFS-31410623	Pushrod guide plate 5/16", set of 4
TFS-31400613	3/8" rocker arm studs, set of 16
TFS-31400417	Head bolt washers, set of 17 (one head)

Trick Flow

Twisted Wedge™ Aluminum Cylinder Heads

Instructions For Trick Flow Specialties®
Twisted Wedge™ Aluminum Cylinder Heads For Small Block Chevrolet

Your Trick Flow Twisted Wedge heads will give your small block Chevy V8-equipped vehicle the performance you are looking for—if they are installed properly. Follow the steps outlined in this instruction sheet to insure your heads will perform according to design.

Parts List

Your heads should have all the parts listed below. (Except for parts not needed for your specific head. These are noted.)

- 2 assembled cylinder heads
- 2 packs of 17 head bolt washers
- 2 packs of eight 3/8" rocker arm studs
- 2 packs of four 5/16" guideplates
- 2 packs of eight rocker arm stud washers for centerbolt heads only
- 1 windshield decal (TFS-P102)

Tools Required

- Shop manual for your vehicle
- 0-100 ft.-lb. torque wrench
- 3/8" drive socket set with 7/16" through 13/16" sockets
- 3/16" and 3/8" allen wrenches
- 7/16" and 13/16" open or box end wrenches
- Induction timing light

Additional Parts Required

- ARP-134-3601 head bolt set
- Upper engine gasket kit
- 8 Autolite #3924, Champion RC9YC, NGK-FR5, or Accel-416 spark plugs

Head Removal

Consult your shop manual for proper factory cylinder head removal. The manual will also list any other tools you may need for removal and reassembly of any engine accessories.

Preparing Block, Installing Head Bolts and Head Gaskets

1. Before assembly, we suggest that all block bolt holes be chased with the appropriate tap to clean out the threads. This will insure proper torque values will be obtained. Use Permatex #3D or #3H on the head bolt threads to prevent coolant from seeping past them. Some of the bolt holes in the block can go into water passages.
Failure to Properly Seal Head Bolts Will Lead To Engine Failure!

2. We recommend the use of Fel-Pro head gaskets, part number #7733-PT2 for mild buildups on engines up to 4.060" bore. If your Twisted Wedge heads are going to be used on a higher horsepower engine with a bore up to 4.155", we recommend Fel-Pro gasket #1034, or #1014 with steam holes for 400 c.i.d. engines.

How to Optimize Pushrod Length For Better Performance

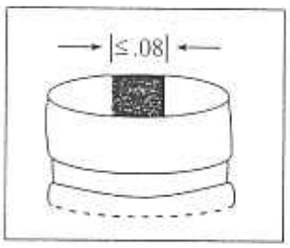


Figure 1

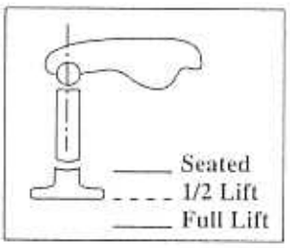


Figure 2

When it comes to performance, the valvetrain can make or break an overhead valve-type V8 engine. Since the cam in an OHV engine is located in the block, the valvetrain provides the link between the cam and the valves. In simple terms, this link multiplies and transfers the motion of the cam and lifters to the valves. The one component that plays a big part in this transfer is the pushrod—and more specifically, pushrod length.

Pushrod length affects the efficiency of cam motion transfer to the valves by changing the tip travel, or sweep, of the rocker arm. The generally accepted tip travel specification is .080" or less. This provides maximum valve movement efficiency and minimum side thrust against the valve guide. Figure 1 shows where the rocker arm tip contact patch should be located on the valve stem tip.

Keep in mind that using different brands of rocker arms (even with the same ratio) can change tip travel, even when you are using the same length pushrod. Once you find a rocker/pushrod length combination that provides minimum tip travel, consider that combination a matched set. If you change either, you're back to square one.

You will need an adjustable checking pushrod and a machinist's rule to find the optimum pushrod length for use with your particular rocker arms. As a general rule, a longer pushrod will decrease tip travel. You can check this by marking the valve stem tip with bluing or a black or red marker, then turning the engine over by hand a few times. This lets the rocker arm tip simulate a wear pattern on the valve stem tip. Take the rocker arm off; tip travel should show up as a bright strip. Measure this strip with the machinist's rule, and make any pushrod length or rocker arm changes.

If you can't get a tip travel measurement of .080" or less after trying several different pushrod lengths, you will have to go try another brand of rocker arm and start the process over again.

When checking pushrod length with roller tip rocker arms, note the position of the roller tip on the valve stem when the valve is at one-half of its net lift. This is called half-lift centering. You will need a dial indicator to do accurate half-lift measurements. Ideally, the centerline of the roller tip should coincide with the centerline of the valve at one-half of its actual lift. This provides an equal amount of tip travel on each half of the valve. In reality, a slightly off-center roller tip position at half-lift is OK as long as tip travel is minimized. Refer to Figure 2.

Take the time to check pushrod length, and you will be rewarded with better performance and less valvetrain wear or possible breakage. If you have questions about checking pushrod length or pushrod/rocker arm recommendations for your combination, feel free to call Trick Flow Specialties at 1-330-630-1555.

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http://www.trickflow.com

SPRING SPECS

TYPE	STANDARD CHEVY SINGLE W/ DAMPER	UPGRADE CHEVY DUAL W/ DAMPER
FORCE RATINGS	110 LBS @ 1.700 290 LBS @ 1.200	125 LBS @ 1.780 350 LBS @ 1.230
RATE	364 LBS / IN	460 LBS / IN
INSTALLED HEIGHT	1.700	1.780
COIL BIND	1.130	1.100
MAX LIFT	.520	.600
O.D.	1.264	1.460
I.D.	.880	.727
PART #	TFS-31400413	TFS-31400414
SUBSTITUES	CCA-981-16	CRO-68390-3

HEAD GASKETS

CHEVY

FEL-1010 (NO STEAM HOLE 4.155 MAX BORE)

FEL-1014 (STEAM HOLES, 4. MAX BORE)

FEL-1034 (NO STEAM HOLE 4.155 MAX BORE)

FEL-7733PT-2 (NO STEAM HOLES, 4.060 MAX BORE, MILD BUILD-UPS)

VALVE ANGLES

INTAKE @ 13 DEGREES

EXHAUST @ 23 DEGREES

PORT & CHAMBER DATA

	CHEVYS
CHAMBER VOLUME	63CC
INTAKE RUNNER VOL.	180CC
INTAKE PORT SIZE	2.00 HIGH X 1.25 WIDE
RECOMENDED INTAKE GASKET	FEL-1256
EXHAUST RUNNER VOL.	76CC
EXHAUST PORT SIZE	1.35 HIGH X 1.50 WIDE
RECOMENDED EXHAUST GASKET	FEL-1404

SERDI CUTTER #S

HP 1496 INTAKE

HP 1497 EXHAUST

TFS PLUG DATA

AUTOLITE	CHAMPION	MOTORCRAFT	NGK	ACCEL	AC	BOSCH	
3926	RC14YC	AGSP32	FR4			F9DCO	HOTTER
3924	RC12YC	AGSP32C	FR5	416	FR3LS		
3923	RC9YC	AGSP22C	FR5		FR3LS		
3922	RC9YC	AGSP12C	FR6			FR5DTC	COLDER

14MM, 3/4 REACH, 5/8 HEX PLUGS
GASKET OR TAPERED SEAT

3. Clean any residue and old gasket material from the block deck surface to insure a good sealing surface.

4. We strongly recommend using ARP #134-3601 head bolts. The heads you have come with washers that must be used to protect the head bolt boss. Make sure the chamfered side of the washers face up. If you do use stock head bolts, you should measure the thread protrusion of the bolts. The protrusion should measure close to 5/8" (.625 ± .025) with the washers in place.

5. We suggest using Permatex #3D or #3H on head bolt threads and engine oil on the washers and bolt heads to insure proper sealing and torquing.

6. Put the Twisted Wedge heads in place on the engine.

Torquing the Heads

The heads will need to be torqued down in the sequence shown in Illustration A.
The torque sequence is done in four steps:

1. Torque bolts down to 35 ft.-lbs.
2. Torque bolts down to 50 ft.-lbs.
3. Torque bolts down to 70 ft.-lbs.
4. Repeat Step #3.

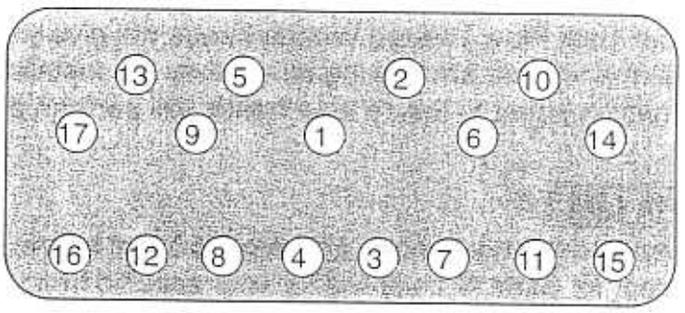


Illustration A

Installing Studs, Pushrods, and Guideplates

1. After torquing down the heads, proceed with the installation of the rocker arm studs and guideplates, or rocker studs and washers on late model applications with self-aligning "rail-type" rockers. Illustration B shows both types of installation.

Do Not Use Guideplates with Rail-Type Rocker Arms!

2. Torque the rocker arm studs to 55 ft.-lbs. It is OK to use Permatex #3 on the studs.

Do Not Use Antiseize Compound on the Stud Threads!

3. In most cases a .100" longer pushrod is ideal for these heads. If you use stock length pushrods, make sure they are hardened for use with guideplates and that the rocker arms clear the hex on the rocker arm stud.

4. Install and adjust the rocker arms. Check the alignment of the rocker tip to the valve stem tip. Loosen the stud and realign it if necessary. Roller rocker arms are required for heads with the larger 1.470" valve springs. We recommend Crane rockers, part #11750-16, or equivalent with a machined valve spring retainer relief for clearance.

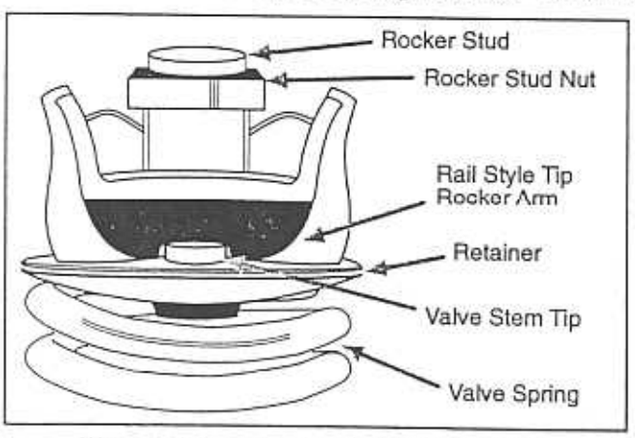


Illustration B 1 Rail-Type Rocker Arm

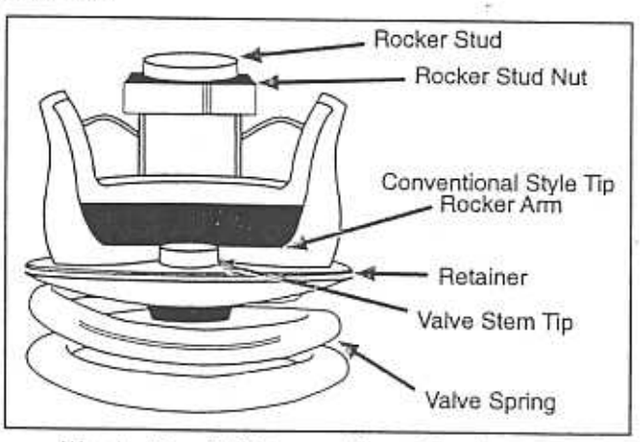
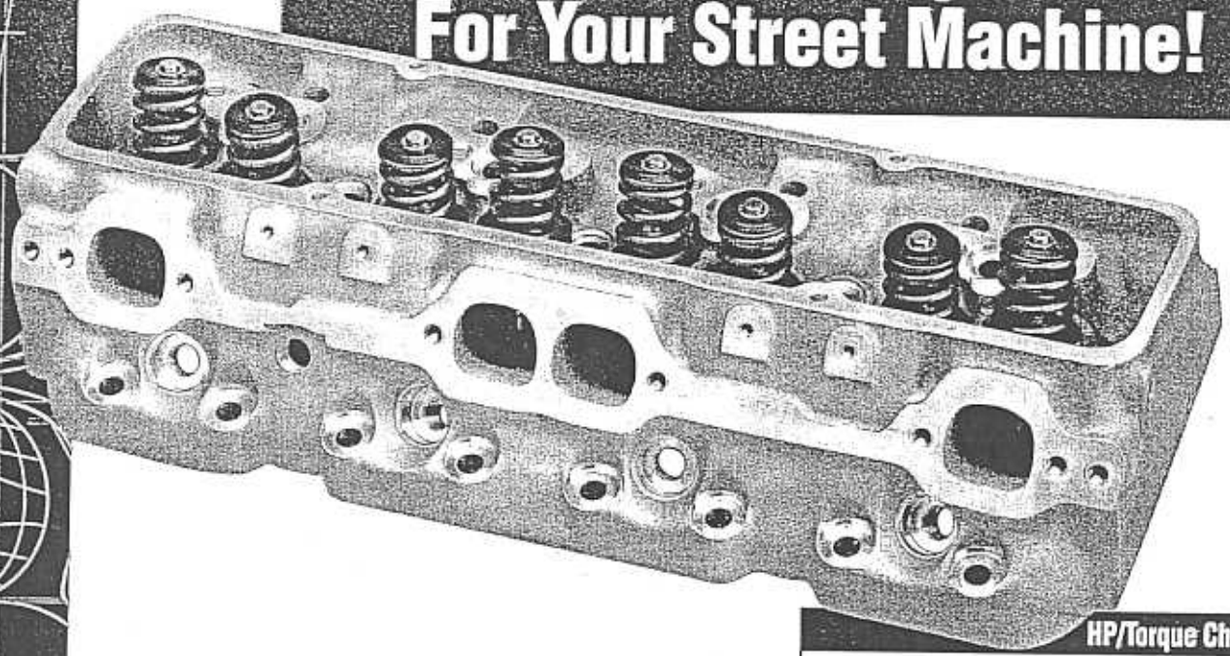


Illustration B 2 Conventional Rocker Arm

Also note that TFS-31400003 and TFS-31400004 heads require the use of the factory "rail" style rocker arms. Due to clearance for the center bolt valve cover, guideplates cannot be used in these applications. The only heads that are furnished with guideplates are the TFS-31400001, TFS-31400002, TFS-31400005, and the TFS-31400006.

Bolt-On Horsepower For Your Street Machine!



Trick Flow® Twisted Wedge® Street Aluminum Cylinder Heads for Small Block Chevrolet

Bolt a pair of Trick Flow Twisted Wedge Street heads on a small block Chevy, and you're bolting on horsepower. On the dyno, a 350 cubic inch small block Chevy with Twisted Wedge heads made 374 horsepower at 5,500 rpm—50 over the same engine with stock Corvette L98 aluminum heads. The Twisted Wedge engine also made 420 ft.-lbs. of torque at 4,000 rpm, 20 more than with the L98 heads.

The secret to all that power is in the 64cc combustion chambers (see diagram). That unique shape is caused by rotating the intake and exhaust valve centers. Moving the centers unshrouds the intake valve, providing a significant increase in airflow rates over stock-type heads. The rotation also moves the spark plug closer to the center of the cylinder—closer than any other street head design for a small block Chevy—for more complete combustion. That allows you to run a 10.5:1 compression ratio on premium pump gasoline.

The Twisted Wedge Street heads come fully assembled, with stainless steel valves, valve springs, retainers, locks, screw-in studs, and guide plates. All heads are sold in pairs unless otherwise noted. Heads are patent-pending. The Trick Flow Twisted Wedge Street heads listed below carry CARB E.O. Number D-369 for use in California. 1994 and 1995 applications will require the use of a 160° thermostat to be legal.

NOTES
- Maximum cam specifications with flat top pistons and 1.250" springs: 238° duration at .050 lift, 106° lobe separation with .512 lift
- Always check piston to valve clearance before installation
- TFS-31400002/314P0001, 31400003/314P0003 may require minor clearance modifications to inside of valve covers

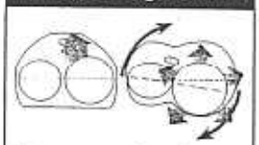
Pre-1987 327-350-400
TFS-31400001 Heads, pair

1987-95 350 (Except LT-1)
TFS-31400002 Heads, pair

1986-91 Corvette (Except LT-1)
TFS-31400003 Heads, pair

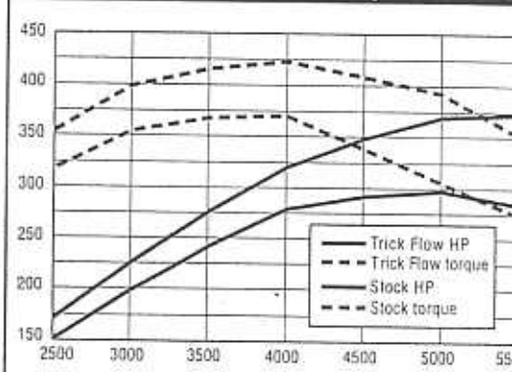
1987-Up 350 With Perimeter Bolt Valve Covers
TFS-31400006 Heads, pair

What Is a Twisted Wedge Head?



Compare a stock combustion chamber (left) with the patent-pending chamber in the Twisted Wedge® head. The valve angles are rotated to unshroud the valves, and the spark plug has been moved closer to the center of the cylinder.

HP/Torque Chart



350 cubic inch Chevy motor with Twisted Wedge Heads as compared to L98 Corvette aluminum Chevrolet head.

Twisted Wedge Airflow Chart

Intake

Lift Value	Flow Scale	Flow Percent	CFM	Average CFM
0.10	71.90	93%	66.87	66.51
0.20	152.00	95%	144.40	142.50
0.30	302.00	62%	187.24	187.24
0.40	302.00	75%	226.50	221.22
0.50	302.00	76%	229.52	232.54
0.60	302.00	79%	238.58	237.07

Exhaust

Lift Value	Flow Scale	Flow Percent	CFM	Average CFM
0.10	76.90	67%	51.52	52.29
0.20	157.00	71%	112.10	109.27
0.30	157.00	96%	150.72	147.19
0.40	317.00	57%	180.69	176.73
0.50	317.00	62%	196.54	194.16
0.60	317.00	65%	206.05	204.47

Tests conducted at 28" of water (pressure)

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Intake Manifold Installation

1. We recommend Fel-Pro intake manifold gaskets, part number #1256. Place the intake manifold on the engine and note the end gaps. Remove the manifold and apply a bead of RTV silicone across the end rails; Permatex "Ultra Black" is one of the best silicones to use. The RTV should be thick enough to fill the end gap between the manifold and the engine block. The only sealant the gaskets require is around the water openings.

2. Torque the intake manifold down in the sequence shown in Illustration C.
Torque the bolts in sequence at 10 ft.-lbs., then retorque in sequence until the bolts reach 30 ft.-lbs.

Installing Exhaust Headers

1. Before installing the engine or the heads in your vehicle, we recommend you test-fit your headers up to the heads and check for spark plug interference. Most headers will fit without a problem, but some will not.

2. We recommend using Fel-Pro header gasket #1404. The header bolts should have a touch of antiseize on them, as should the spark plugs.

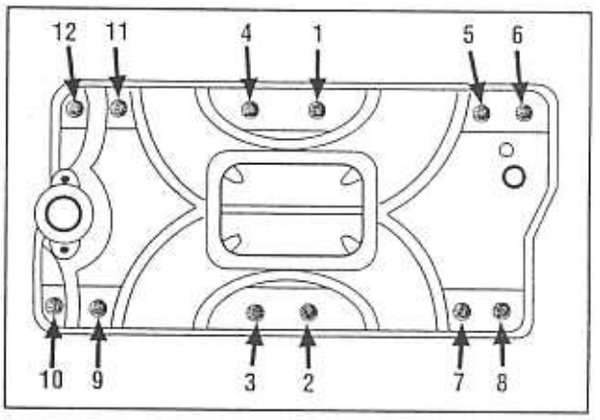


Illustration C

Valve Cover Clearance for 1987-Up Centerbolt Head Applications

Due to limited valve cover clearance on Trick Flow Twisted Wedge™ center bolt applications, it may be necessary to spread the hold down bolt bosses inside the stock stamped steel valve covers. The clearance point is 1½" to 2⅛" measured along the length of the bolt pillar from bottom of the pillar to the inside top of the valve cover. At this point the pillar should be spread away from the intake rocker arms approximately 1/32".

You may also grind a relief in the side of the pillar adjacent to the intake rocker to get the required clearance. Corvette magnesium valve covers will not fit without milling to the center of the hold down bolt pillars. When using guideplates, the web inside the valve cover (on the intake manifold side) will need to be removed. As a suggestion, LT-1 plastic valve covers are the easiest to modify. Consult Figure D.

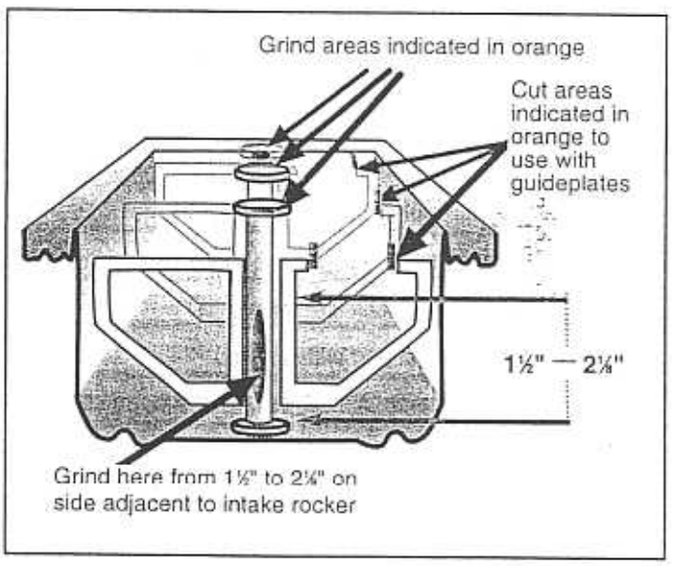


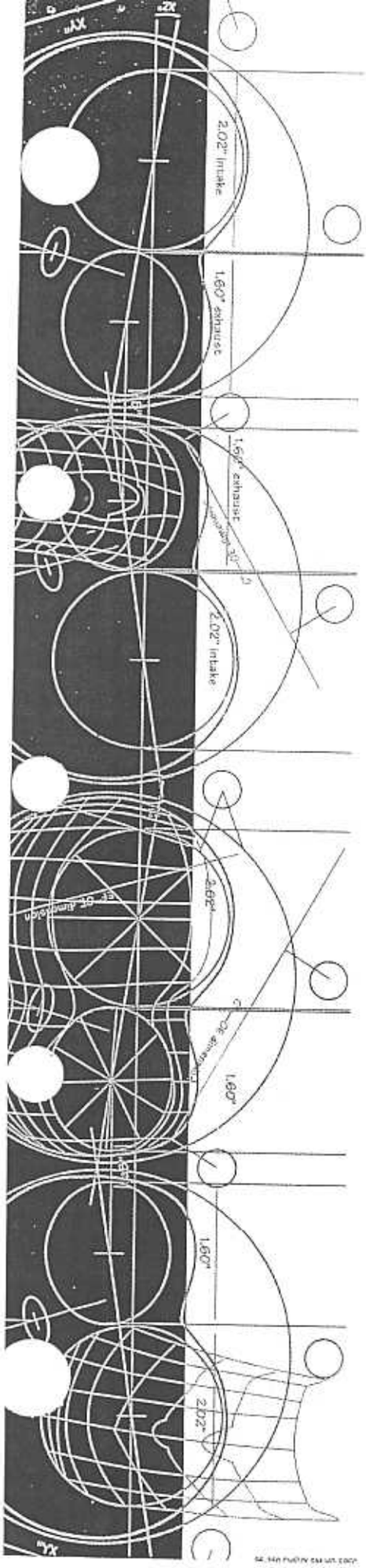
Illustration D (Side View)

Emissions Tuning Information for Twisted Wedge Heads

To insure the proper tune to comply with emissions standards, you must use a 160° thermostat and retain the stock base timing on all 1995 and earlier Chevrolet 350 c.i.d/5.7L engines in cars and trucks (CARB E.O. Number D-369.)

Dome Piston Warning for Twisted Wedge Heads

Twisted Wedge heads will not work with conventional 23° domed pistons. Flattop pistons are required. Contact your piston manufacturer for custom-made dome pistons if desired.



Specifications Sheet Trick Flow® Twisted Wedge® Heads for Small Block Chevy

Trick Flow Twisted Wedge Aluminum Cylinder Heads for 262-400 CID Small Block Chevrolet Engines TFS-31400001, 31400002, 31400003, 31400004, 31400006

- Material: A356-T61 aluminum
- Combustion Chamber Volume: 64cc
- Intake Port Volume: 180cc
- Port Locations: OEM/production
- Intake Port Dimensions: 1.25" x 2.00"
- Exhaust Port Dimensions: 1.35" x 1.500"
- Valve Type: CNC profiled one piece stainless steel
- Valve Size: 2.02" intake, 1.60" exhaust
- Guide Size: 11/32" stem x .500" OD
- Guide Material: Special alloy
- Intake/Exhaust Valve Seats: Tungsten alloy compatible with unleaded fuels
- Springs: 1.250" diameter single with damper
- Spring Installed Height: 1.700"
- Spring Seat Pressure: 110 lbs.
- Spring Open Pressure: 290 lbs. on 1.25" @.500" lift
- Locks: 7 degree stamped steel
- Retainers: Chromemoly steel
- Max Cam Specifications (1.250" valve springs): 238° duration at .050" lift, 106° lobe separation with .512" lift
- Max RPM: 6500 on 1.25" spring
- Studs: 3/8" diameter top, 7/16"-14 diameter bottom, included with all heads
- Guide Plates: 5/16", included with all heads (requires hardened pushrods)
- OEM Accessory Holes: Yes
- Spark Plug: Autolite-3924, NGK-FR5, ACCEL-416, AC-FR3LS, 3/4" reach, 5/8" hex gasket seat or taper seat type

Applications

- TFS-31400001 fits 1987 and earlier motors with perimeter bolt valve covers and regular intake manifolds
- TFS-31400002 fits 1987 to 1995 Camaro/Firebird and trucks (except LT-1) with center bolt valve covers and canted center intake manifold bolts
- TFS-31400003 fits 1987 to 1991 Corvettes with center bolt valve covers, early intake pattern, and no heat crossover under the intake
- TFS-31400006 fits 1987 to 1992 Camaro/Firebird and trucks (except LT-1) and uses early style perimeter bolt valve covers for use with roller rocker arms
- All Trick Flow Twisted Wedge cylinder heads for small block Chevrolet are 50-state emission certified for 1995 and earlier applications under CARB approval E.O. #D-369. 1994 and 1995 applications will require the use of a 160° F thermostat to be legal.

Trick Flow®
Serious Horsepower

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