

Understanding Torque-to-Yield Head Bolts

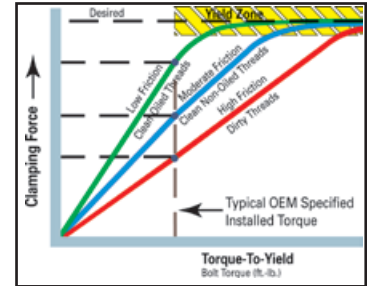


The Fel-Pro Torque-to-Angle Indicator eliminates uncertainty when torquing T-T-Y head bolts.

Head bolts might have the toughest job on a vehicle: In a stock engine operating near wide-open throttle, for example, each bolt may have to withstand more than 5 tons of combustion pressure.

In spite of their vital role, head bolts are often misunderstood by technicians. One contributing factor is the now-popular use of advanced “torque-to-yield” (T-T-Y) head bolts, which help OEMs and rebuilders achieve far more consistent clamping loads across the head-to-block mating surface. T-T-Y bolts are particularly common on engines using aluminum heads and/or multi-layer-steel head gaskets.

T-T-Y head bolts are engineered to stretch within a controlled “yield zone.” Once they reach this zone, they spring back to provide a precise level of clamping force. In general, the technician will torque the T-T-Y bolt to a specified limit, then continue with an additional partial turn to reach the bolt’s yield zone.



It’s crucial to understand that once T-T-Y bolts are stretched beyond their yield zone, they become useless. For this reason, it’s important to use an angle gauge to carefully follow the manufacturer’s tightening specification.

Are T-T-Y Head Bolts Reusable?

The torque-to-yield procedure stretches the bolts into their elastic range. On some engines, this stretching approaches the bolts’ elastic limit and the bolts are permanently stretched. If these bolts are removed and reused, it is likely that either the head gasket will fail due to false torque readings or that the bolts may break. Each engine manufacturer offers guidelines as to whether torque-to-yield head bolts are reusable. Some guidelines allow limited reuse, while others recommend you never reuse the bolts. Since technicians may not know how many times a T-T-Y bolt has been removed and reinstalled, we recommend never reusing a T-T-Y head bolt.



T-T-Y Head Bolts

T-T-Y Head Bolt Info in the Catalog

The Fel-Pro catalog offers replacement head bolts for many T-T-Y applications. When available, the head bolt set number will be listed right below the Cylinder Head Gasket and Head Set numbers.



2.3L 138 SOHC L4 (8 Valve/Olds.), 3.62" Bore 1992-94 28 VIN Code "3" 1992-94 (Quad OHC)			
CYLINDER HEAD	YEARS	PART NO.	DESCRIPTION
Head Gasket	94-92	9515PT	Head bolts not incl.
Head Set	94-92	H59515PT-1	Head bolts, exh. pipe packing, First design valve cover seals not incl.; PermaDry® molded rubber valve cover gskts. incl.; Premium valve stem seals incl.
Head Installation Set	94-92	H59515PT-1	Head bolts, exh. pipe packing, Second design valve cover seals not incl.; PermaDry® molded rubber valve cover gskts. incl.
Head Bolt Set	94-92	E572727	REPLACEMENT RECOMMENDED
CONVERSION SET	YEARS	PART NO.	DESCRIPTION
Gasket Conversion Set	94-92	C99515	PermaDry® molded rubber oil pan gskt. incl.