WHAT YOU WILL NEED…

Apart from the typical tools you will need (assorted wrenches, sockets, hammers, screw drivers, slide calipers, feeler gauges, and the like…), there are some specialized tools you will also require:

Micrometer

Protractor

Dial Indicator

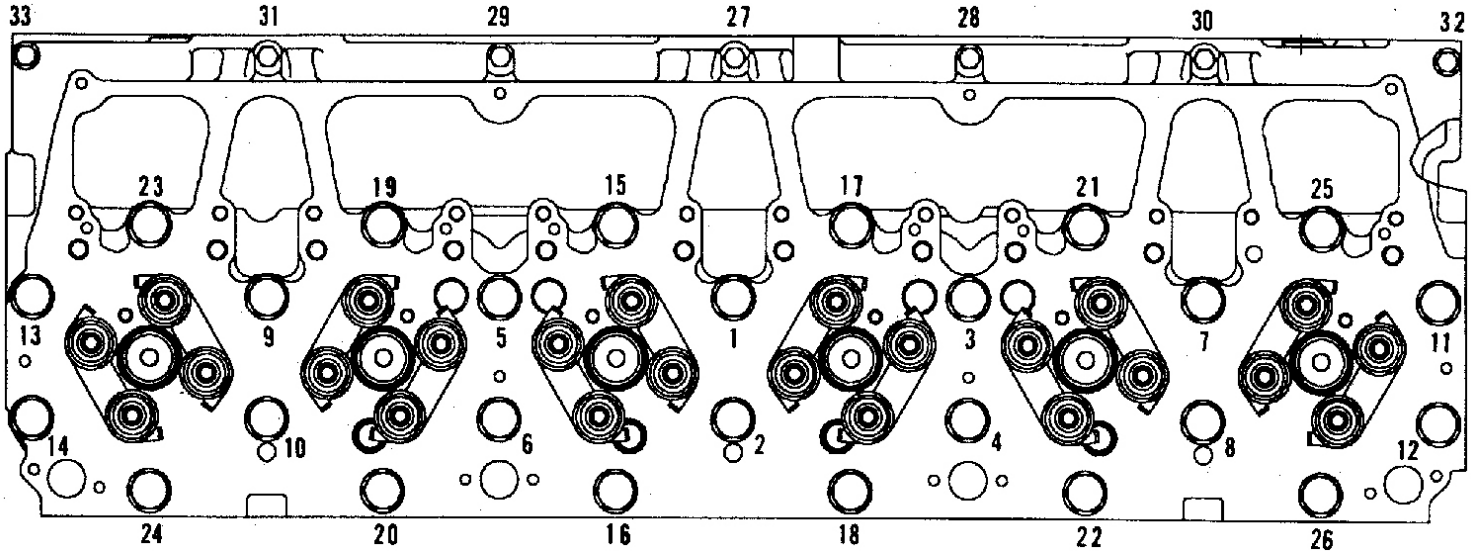
Torque Wrench

Also, it is a good idea to have some type of cleaning and/or degreasing solution on hand as well as lint-free rags. One of the most important aspects of engine assembly is, **KEEP IT CLEAN!**

ENGINE BUILD SPECIFICATIONS – CATERPILLAR® C12

MAIN CAP BOLTS:	71-74 ft/lbs, +90° (w/ SAE 30 or Moly Lube)
CONNECTING ROD BOLTS:	75-85 ft/lbs, +55-65°
INTAKE MANIFOLD BOLTS:	34-48 ft/lbs
EXHAUST MANIFOLD BOLTS:	Lock Nuts: 33-47 ft/lbs Studs: 22-30 ft/lbs
FLYWHEEL BOLTS:	170 ft/lbs
VIBRATION DAMPER:	190-250 ft/lbs
CYLINDER LINER PROTRUSION/RECESSION:	Protrusion: .0016” - .0071”
CAMSHAFT GEAR BOLT:	Gear: 145-205 ft/lbs Thurst Pin: 15-25 ft/lbs
CRANKSHAFT (TRUST) END PLAY:	.004” - .020”
OIL PRESSURE @ IDLE:	10 PSI @ 600-800 RPM
VALVE CLEARANCE (Set Cold):	Intake: .015” | Exhaust: .025”
CYLINDER HEAD BOLTS:	See Attached Technical Bulletin
FIRING ORDER:	1 – 5 – 3 – 6 – 2 – 4

CYLINDER HEAD TORQUE SEQUENCE:



Revised Cylinder Head Torque Procedure For Caterpillar C10 & C12 Diesel Engines

AERA members have reported a revised cylinder head torque procedure on Caterpillar® C10 & C12 diesel engines. Following the revised procedures is critical to eliminating repeat head gasket failures.

Caterpillar® has supplied the following steps to ensure that a cylinder head gasket failure does not occur again. Before beginning the following steps, determine source of coolant leak prior to removal of cylinder head. Pressurizing the cooling system with the oil pan removed can differentiate between a water pump leak and a cylinder head gasket leak.

1. Replace all cylinder head bolts, Part #129-3184, reduced shank bolts. (Jake engines use stud Part #132-3229). Failure to replace the bolts that have corrosion damage, may lead to premature yielding or breakage, or bolt load due to damaged threads.

2. Check cylinder head/block deck surface for warpage. Use a straight edge and feeler gauge. Surface flatness specs are as follows: .002" per 6" or .006" overall. If the decks are uneven, this could lead to uneven gasket sealing. If either the block or head surface is out of spec, replacement or resurfacing is required.

3. Use an M16 X 2 (8T-3096) non-bottoming hand tap to run down each of the 26 bolt holes in the block and then clean all holes with compressed air. Use of the tap will remove debris from the threads of the cylinder block head bolt holes. If threads are not cleaned out, the head bolt will not be allowed to reach the correct clamping load.

4. Inspect threads in cylinder block. If damaged, an insert repair must be implemented. Caterpillar recommends Heli-coil® insert PN 1084-16CN-32 for these engines. To repair, drill cylinder block bolt holes with a 21/32” drill bit and tap (PN4C-9732) cylinder block bolt hole(s) for M16 X 2 X 32 mm thread insert (PN1084-16CN-32). Insert inserts in all affected bores.

5. Use only the revised reduced wrap fire ring head gasket. Serial numbers prior to 2KS00388, 9NS16228, 8YS05399 & 3CS00718 use Part #187-3306. Engines beyond that serial number use 187-3307. If the engine has a combination of scalloped and straight cylinder block or head the 187-3306 head gasket must be used.

6. Use a double torque procedure when tightening the head bolts. This torque procedure is used to obtain the proper head gasket loading and results in more uniform and higher average clamping load of the bolts. Use the following torque procedure and sequence to properly torque the cylinder head bolts.

1. Lubricate all bolt threads, underside of head bolt and washer with 6V-4876 molycoat paste or aftermarket equivalent.
2. Tighten bolts 1-26 in proper sequence to 120 ft/lbs.
3. Tighten bolts 1-26 again in sequence to 120 ft/lbs.
4. Rotate each bolt in sequence an additional 90 degrees.
5. Loosen all bolts (washers should be loose under bolts).
6. Repeat steps 2, 3, 4.
7. Tighten bolts 27-33 in proper sequence to 20 ft/lbs.