Cylinder Block Deck Cracks On Caterpillar 3208 Engines

The AERA Technical Committee and Caterpillar explain how to inspect the Caterpillar 3208 engines for block cracks.

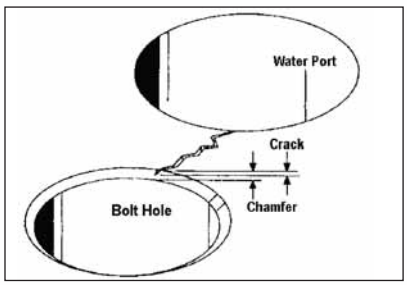


Figure 1 Cracked Cat 3208 heads can be used in service as long as the cracks don't extend below the depth of the bolt hole chamfer.

Part No.	Location	Insert OD Size	Depth	Tapered ID
3906854	Intake	1.375″	.227″	1.100-1.140″
3904105	Exhaust	1.375″	.227″	1.100-1.140″
1375E-1	Intake	1.375″	.227″	1.100-1.140″
1375E-2N	Exhaust	1.375″	.227″	1.100-1.140″
	Oversize*	1.385″	.227″	1.100-1.140″

*Specify Oversize When Ordering

Figure 2 To repair the cracked seat inserts on 1998-2006 Cummins/Chrysler 5.9L diesels, replacement seats are now available in standard size and .010″ oversize.

Caterpillar has approved the use of a cylinder block with cracks between the water port and the cylinder head bolt hole. However, the cracks must not extend below the depth of the bolt hole chamfer as shown in **Figure 1**, left.

A 3208 engine cylinder block that meets the inspection guidelines can be expected to perform normally in the same application until the next overhaul. Never install a cylinder block that does not meet the guidelines provided by Caterpillar.

Cracked Valve Seats On 1998-2006 Cummins/Chrysler 5.9L Diesel Engines

The AERA Technical Committee offers the following information regarding cracked exhaust seats on 1998-2006 Cummins/Chrysler 5.9L diesel engines. This information applies to the 24-valve engines with four valves per cylinder.

AERA members have noticed cracked exhaust seats on these

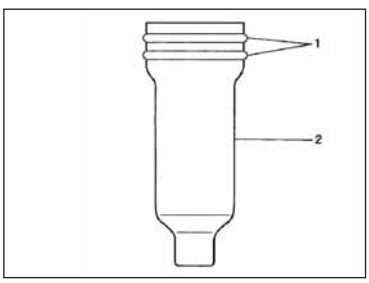


Figure 3 The 2001-2006 GM 6.6L Duramax diesel engine uses a removable sleeve to locate and house the injectors. These sleeves are in direct contact with the engine coolant, which allows the injector to be a constant temperature.

engines during routine engine service. In some instances the engines were not disassembled as an apparent valve sealing problem. Most of these cracks have been described as "hairline" but others are easily visible to the naked eye.

In none of the reported instances where cracks were observed and pressure testing was done, did any of the heads leak.

To repair the cracked seat inserts, replacement seats are now available in standard size and .010˝ oversize. Refer to the chart in **Figure 2** (page 30) for insert information. The inserts for both intake and exhaust locations are dimensionally identical; the material makeup, however, is unique to each location.

AERA says it is unaware of oversize seats available from anyone other than the aftermarket source located in Nashville, TN.

Injector Sleeve Installation On 2001-2006 GM 6.6L Duramax Diesel Engines

The 2001-2006 GM 6.6L Duramax diesel engine uses a removable sleeve to locate and house the injectors. These sleeves are in direct contact with the engine coolant, which allows the injector to be a constant temperature.

On occasion, the sleeve may come out with the injector when it is being removed from the cylinder head. It is important to replace any injector sleeve with scoring or other damage.

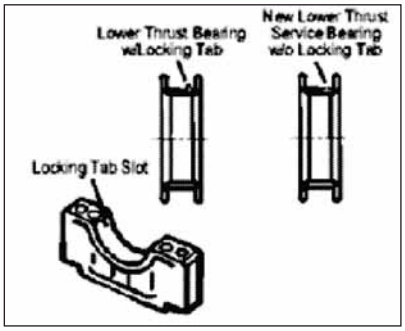


Figure 4 The 7.3L Navistar diesel uses a modified thrust main bearing in the Number 5 position. The bearing has been modified by removing the locking tab.

Clean the fuel injector sleeve lower sealing area and the sleeve bore (using GM p/n 12377981, Canadian p/n 10953463 or equivalent). When installing injector sleeves, always use new sealing O-rings.

1) Lubricate the new injector O-rings (1) and place in the injector sleeve (2) grooves (see **Figure 3**, page 30).

2) Apply sealant (Loctite® 272 or equivalent) to the lower sealing area of injector sleeve.

3) Place the sleeve in its respective bore and use the sleeve remover/installer tool (p/n J45910) to install the sleeve.

4) Lightly tap on the J45910 with a hammer to install and seat the fuel injector sleeve.

5) Remove J45910 from the fuel injector sleeve.

6) Install the fuel injector(s).

For additional information see AERA Technical Bulletins TB 2289.

Revised Connecting Rod For 2000-2003 Ford/Navistar 7.3L Diesel Engines

The AERA Technical Committee offers the following information regarding a revised connecting rod for 2000-2003 Ford/Navistar

Main Set Part No.	Description
1812325C92	Standard Crankshaft Bearing Package
1812326C92	.010˝ (.25 mm) Crankshaft Bearing Package
1812327C92	.020˝ (.50 mm) Crankshaft Bearing Package
1812328C92	.030˝ (.75 mm) Crankshaft Bearing Package

Figure 5 Service bearings for the 7.3L diesel are available in standard and three common undersizes.

7.3L diesel engines. A design change was implemented to feature a powdered metal (PM) connecting rod for this engine. The PM connecting rod went into production on 8/17/2000 beginning with engine serial number 1440712.

The method of securing the connecting rod cap to the rod also changed with the revised PM rod. In its service information Navistar refers to the difference between the rods as "old style" and "new style." The old style connecting rod used bolts with nuts while the new style rod uses only bolts.

The assembly torque for the two different rods is also different as shown in the procedures listed below. Using the wrong torque value during repair could lead to engine failure.

• Installation of old-style connecting rod with bolts AND nuts:

1) Coat the connecting rod bearing half with clean engine oil. Position the connecting rod cap onto the connecting rod and seat the cap onto the crankshaft journal.

2) Install the nuts. Tighten the nuts in two stages.

Stage 1: Tighten the nuts to 53 ft.lbs. (71 Nm).

Stage 2: Tighten the nuts to 80 ft.lbs (108 Nm).

Installation of new style PM connecting rods with bolts only:

1) Coat the connecting rod bearing half with clean engine oil. Position the connecting rod cap onto the connecting rod and seat the cap onto the crankshaft journal.

2) Install the bolts. Tighten the bolts in two stages.

Stage 1: Tighten the bolts to 52 ft.lbs. (70 Nm).

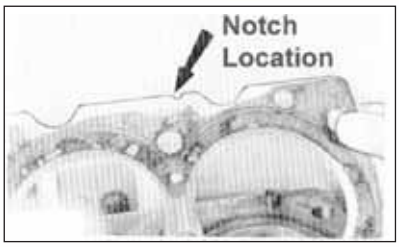
Stage 2: Tighten the bolts to 90 ft.lbs. (122 Nm).

Note: Although the two different connecting rods are similar in weight, both AERA and Navistar recommend that you use only complete sets in an engine.

Revised Lower Thrust Main Bearings For 2000-2003 Ford/Navistar 7.3L Diesels

The AERA Technical Committee offers the following information regarding a revised lower thrust bearing for 2000-2003 Ford/Navistar 7.3L diesel engines. Service technicians have reported confusion while re-assembling the crankshaft into engine blocks for this engine. The confusion becomes evident during installation of the lower thrust bearing shell because it has no locating lug.

This confusion, which is unwar-



	Compression Height
Piston A	2.1720″ (55.17 mm)
Piston B	2.1760″ (55.27 mm)
Piston C	2.1800″ (55.37 mm)

Figure 6 The proper head gasket for use on a Deutz 1011 will be identified by its notches or by the engine's piston compression height.

Piston Protrusion	Notch Marking (Gasket)	Gasket Thickness
.023-.027″ (.590-.690 mm)	1	.058″ (1.48 mm)
.027-.030″ (.691-.760 mm)	2	.061″ (1.55 mm)
.030-.033″ (.761-.830 mm)	3	.063″ (1.60 mm)

Figure 7 The different notch(s) on the head gasket indicate the gaskets thickness.

ranted, is the result of a revised bearing introduced with the model year 2000 engines. The new lower thrust main bearing (#5 position only) was released for production and service for ease of installation. The bearing was modified by removing the locking tab as shown in **Figure 4**, page 32.

The new production and service bearing now allows service technicians to install and orient the lower thrust bearing in either direction. Additionally, the elimination of the locking tab for the #5 main bearing lower thrust position prevents assembly interference issues with the lower thrust bearing locking tab and the #5 main bearing cap. The functionality of the new bearing is not impeded because it is secured by the upper bearing with locking tab. Service bearings are available in standard and three common undersizes (see **Figure 5**, page 33).

Note: Service bearings for lower main bearings 1-4 and crankcase (upper 1-5) continue to require bearings with the locking tab feature.

Head Gasket Selection For Deutz 1011 Diesel Engines

The AERA Technical Committee offers the following information regarding cylinder head gasket selection for Deutz 1011 engines. These in-line engines are supplied in multiple cylinder configurations under various engine models.

The cylinder head gaskets are identified by a notch(s) cut out of the gaskets outer edge as shown in **Figures 6** and **7** (above). There are three different gaskets available and the correct selection is based upon the present piston protrusion of that engine. The different notch(s) on the head gasket indicate the gaskets thickness.

There is a third consideration that allows additional component reuse on these engines; there are three standard piston compression heights available. Those pistons are

Description	Thickness	Part No.
Shim, Cylinder Liner Shoulder	.002″ (.051 mm)	505GC26P2
Shim, Cylinder Liner Shoulder	.003″ (.076 mm)	505GC26P3
Shim, Cylinder Liner Shoulder	.004″ (.102 mm)	505GC26P4
Shim, Cylinder Liner Shoulder	.010″ (.254 mm)	505GC26P10
Shim, Cylinder Liner Shoulder	.012″ (.305 mm)	505GC26P12
Shim, Cylinder Liner Shoulder	.014″ (.356 mm)	505GC26P14

Figure 8 Several different shims are available to adjust the liner height during installation in the Mack E7 and E-Tech engine.

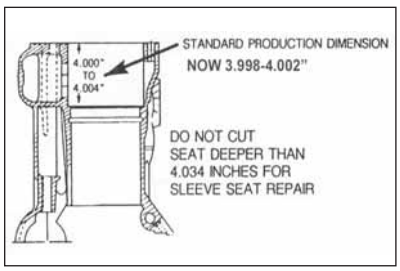


Figure 9 The original counterbore distance from the top deck of the Mack block has been modified slightly to 3.998″-4.002″

identified by A, B and/or C markings.

It is crucial that you use the correct components to assemble these engines as piston to valve contact is probable if incorrect combinations are used.

Liner Shims For 1998- 2006 Mack 12.0L E7 & E-Tech Diesel Engines

The AERA Technical Committee offers the following information regarding liner shims for 1998-2006 Mack E7 and E-Tech diesel engines. These shims may be used to correctly adjust the liner height during installation into the cylinder block.

AERA supplies the following part number information for these liner shims as difficulty has been reported obtaining them. The shims are available in six thicknesses to allow adjusting the cylinder liner height (see **Figure 8**, above). Several different thicknesses of shims keep liner heights within the acceptable liner-to-liner variation of only .002″ under one cylinder head. When installing shims, it is important to always use the thickest shims and the least amount of shims as possible to obtain the proper liner flange height.

It should also be noted that the original counterbore distance from the top deck of the block has been modified slightly to 3.998″-4.002″ (see **Figure 9**, left). Don't cut the counterbore depth deeper than 4.034″ (102.463 mm) when making seat repairs.

AERA is unaware of a source other than Mack Truck parts distribution systems for these shims.

Upper Bore Repair For 1986-2006 11.1, 12.7 & 14.0L DDC 60 Series Engines

An upper bore repair recently authorized by the Detroit Diesel Corporation (DDC) for 1986-2006 DDC 11.1, 12.7 and 14.0L 60 Series diesel engines offers extended block service and may be performed on single or multiple cylinder locations.

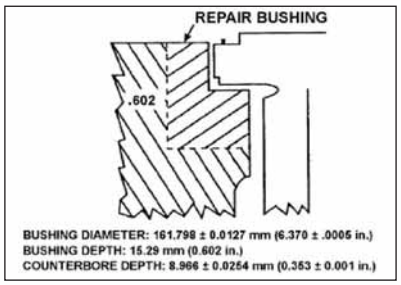


Figure 10 Repairs to the upper bore of several Detroit Diesel 60-series engines can be accomplished by pressing in a new repair bushing and using the dimensions show to the right.

DDC now offers an upper repair bushing (p/n 23525500). The repair requires boring the damaged bores and pressing the insert into the block deck. DDC also offers specific tooling to perform this repair. Some AERA shops report they've already been doing this type repair with fabricated bushings inserts.

This bulletin applies only to the new DDC parts (p/n 23525500), as shown in **Figure 10**, left.

After the repair bushing has been inserted into the block, the sleeve counterbore must be machined into each installed bushing. Cut the counterbore ledge depth to .352″-.354″ (8.941-8.9991 mm) using the appropriate counterbore tooling.

Area to be Machined:
Upper Counterbore

Cutter Setting:
6.3695″-3.3705″

Dimensions Depth of Cut:
.602″ (15.290 mm)

Series 60 Iron Piston Failures On DDC 12.7L Engines

The AERA Technical Committee offers the following information regarding Series 60 iron piston failures on DDC 12.7L engines.

DDC has made an improvement by adding piston cooling nozzle machining to all Series 60 cylinder blocks with unit number 6R-408505 on or about 3/2/1998. This change occurred just before the introduction of the steel piston to the premium engines on or about 3/16/1998. All 12.7L standard rated units continued using iron pistons until about 6/1/1999.

Engines with serial number 6R-408505 and higher were machined to accept the steel pistons and piston cooling nozzles. It is recommended that steel pistons be used if you encounter an iron piston or saddle strut failure on the effective serial number blocks. Note that you will need ADDITIONAL parts to be compatible with the new steel pistons. Reuse the original cooling nozzle plug bolts for the cooling nozzles. In the event that only one iron piston fails, the remaining 5 cylinders should also receive the steel pistons.

This is not a formal DDC modification program, but is considered an upgrade. It is also important to note that during May 2001 the crankshaft was redesigned and will only accept the newer steel piston assembly. The iron piston pin bolts will interfere with the new "lightweight" crankshaft design as mentioned in AERA Technical Bulletin TB 2307. ***TSG***