DaimlerChrysler Powersystems

Series 60 Cylinder Head Gasket

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There has been a considerable amount of study of head gasket complaints and a review of warranty documents to support a need for review of the basics of failure analysis. In many cases there are legitimate reasons for examination of root cause of a failure.

**Cylinder Head Gaskets Have Several Distinct Failure Modes**

- Compression Seals
- Compression gasses builds pressure in cooling system.
- Coolant Leaks
- Oil Leaks
- Coolant in Oil or Oil in coolant

**Notice:** Liner height measurement is very important for the success of a head gasket repair.

It is mandatory (per Labor Time Guide) that liner protrusion be measured (see Series 60 Service Manual Section 1.20) whenever a cylinder head is removed. Liner measurements are required to be posted in the claim narrative.

Liners should be removed and liners and counterbores inspected only when liners heights are not within specifications.

**Compression Seals**

Note: Pressure building in the cooling system is not always attributed to the head gasket compression seal failure. Pressure in the cooling system may originate from the air compressor pumping air into cooling system or, in some applications, from an air operated cab heater control valve. Eliminate these possibilities first.

If the head gasket compression seal ruptures and liner heights are within spec, then DDC's responsibility.

If the compression seal ruptures and liner heights are below spec and liner surfaces show no signs of cavitation/pitting, then the repair is DDC's responsibility.

If compression seal ruptures and liner heights are below spec and liners exhibit cavitation/pitting, then the repair is Customer Responsibility.

Many compression seal failures are the result of poor workmanship on a previous repair. If the head is off the engine during a previous repair, and liner heights are not mentioned in the claim narrative and are found low at current repair, then the failure is the responsibility of the previous service facility.
**Grooved Head**

The compression seal will leave an impression in the cylinder head deck. This is not a groove.

If a groove is found after cylinder deck is thoroughly cleaned, perform “thumbnail” check. A groove may exist after a ruptured compression seal.

Compare the area of the head at the compression seal failure area to all other impressions on the cylinder head. If the area of failure is definitely grooved, then replace head.

If the head is not grooved, it will not be covered under a head gasket repair.

**Impression Marks: This Head is Not Grooved**

**Ruptured Compression Seal**

A ruptured compression seal is the result of high-temperature and motion between the cylinder head and the liner. In some cases the liner can withdraw its support for the compression seal allowing it to flex and resulting in a localized fatigue failure of the metal wrap around the compression wire.

**Compression Seal: This Gasket is Failed and will be covered under the warranty.**
External Coolant Leaks

Coolant leaks from the head gasket are warrantable unless low liners heights and pitted liners are found during the repair.

External Oil Leaks

Source of oil leak at front of engine can originate from:
1. Valve Cover Gasket
2. Cam seals (perimeter or diamond seal)
3. #1 Cam Cap (race track seal or RTV sealant)
4. Head Gasket
5. Gear case (crack on gear case at the oil passage to idler gear)

Oil leaking at the front end of a Series 60 engine is often misdiagnosed. To correctly diagnose source of an oil leak in this area:

1. Clean area with brake clean.
2. Run engine and inspect for leaks.
3. Consider installing the front gear case brackets first if leak is determined to originate from the cam thrust plate area.

If a cylinder head gasket is removed for any of the above reasons, other than a specific head gasket failure, these repairs will only be covered under the engine warranty for the component which has actually caused the leak and not the head gasket.
**External Oil Leak**

Photographs show fretted oil grommets.

Both of these conditions would be considered warranty repairs.

**External Oil Leak**

This grommetless gasket has an oil leak at oil port. They Gasket appears fretted and oil saturated from port to edge of gasket. This is a warrantable failure.
Debris Between Cylinder Head or Block

In this particular case, this head gasket was not the original gasket and failed shortly after installation at a repairing outlet. The cause of the failure was debris. Notice the rubber grommet appears to be “smashed” in the corner.

This is a failure is not covered under the warranty because it is a workmanship issue with the previous repairing outlet.

Engine Overheat

All four grommets will appear melted when engine overheating occurs, causing the grommet to fail.
**Improper Coolant Inhibitors**

Improper coolant inhibitors caused pitting at the liner surface and counterbore resulting in low liner heights and blown compression seal.

This is not a warrantable failure.

Coolant also corrosive and “eating” through the body of gasket at coolant ports and coolant stop area of head gasket

This is not a warrantable failure.

**Coolant in Oil or Oil in Coolant**

Always check oil cooler for leaks whenever coolant and oil are cross-contaminated.

Photograph shows advanced stage of coolant leak which caused cross-contamination of oil and coolant. Notice oil grommet is melted.

Again, if all four grommets are melted, then engine was overheated and is not warrantable.
In summary, there are legitimate failure modes and there are reasons for non crediting warranty claims based on misdiagnosis or other reasons: these are as follows:

**Reasons For Non-Credited Head Gasket Claims**

- No coolant leak path detected
- No oil leak path detected
- Wrong vintage head gasket (wrong head gasket returned)
- Head gasket appears too new or too old for indicated mileage (wrong head gasket returned)
- Failure due to prior workmanship
- Not all parts returned as requested
- Engine overheated
- Liners cavitaded (causing counterbore damage resulting in low liner heights and compromised compression seal)

**A Note on Marking Warranty Return Material**

There have been a number of concerns raised about denied warranty because of improper marking or possible mix-up of the returned parts.

When you remove a head gasket, wipe the area where the leak was evident and mark it with a paint pencil. Also mark the head gasket with the engine serial number somewhere near the middle of the part so there is no question about the failure mode and the match between the failed part and the claim. If appropriate, take a digital photo of the area of the engine where the leak was evident. This will assist both you at the repairing outlet and DDC in resolving any concerns about claims and parts in an expeditious manner.