Evidence that Dex-Cool Harms the LT5 Cylinder Head Gasket

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Generally the head gaskets are reliable on the LT5. I believe that I have seen a pattern in the failed head gaskets that I have encountered. I have observed that head gasket failures are more likely to be associated with Dex-Cool than the OE style conventional coolant.

It is normal for a head gasket to fail if the engine is overheated. In the LT5 architecture the steel head bolts attach in the area below the liner support. The liners are aluminum material. If the cylinder block is overheated the aluminum liners will expand more than the head bolts. The liners then crush the head gasket beyond its normally installed crush. After an overheating event the head gaskets fit loose and are susceptible to damage from normal cylinder pressure.

I am aware of three causes of overheating for the LT5 engine:
1. Loss of coolant.
2. An air locked water pump after servicing. This can happen when several quarts of coolant are drained for service. When the system is refilled it may be observed that a large portion of the drained coolant can't be reinstalled. When the engine is started the water pump may not circulate the coolant. This can be observed in two ways. The vapor inlet, below the cap on the black surge tank, will not be flowing coolant when the engine is started. If this is ignored it can be observed that the engine is getting very hot but the coolant gauge is only at 25% of scale. Normally the gauge goes to 50% or more of the scale after about 5 minutes of run time. 50% of the scale is 200 degrees F.
3. Operation of the engine over 6000 rpm for more than one minute. Water pump cavitation occurs at 6000 rpm. When cavitation occurs, the coolant flow through the engine drops off sharply.

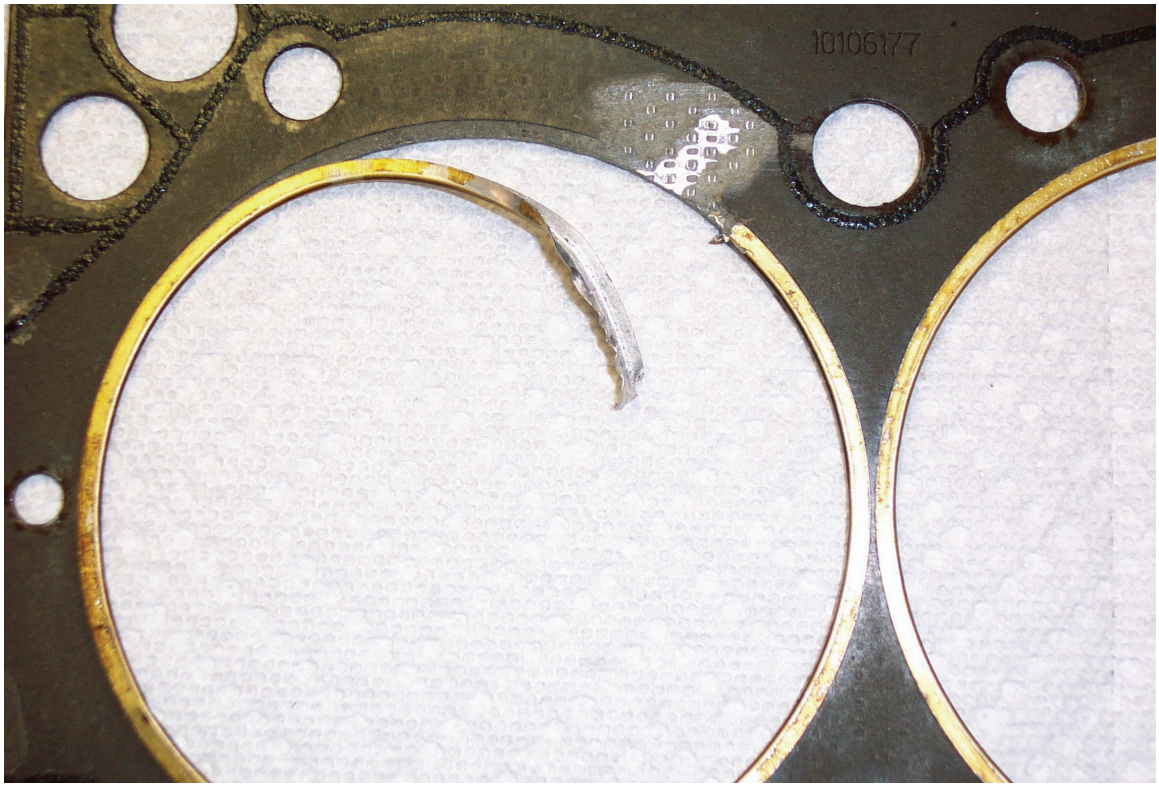
I have observed that coolant with an organic corrosion inhibiter causes the fiber material in the head gasket to swell more than with silicate corrosion inhibiter. Dex-Cool has an organic corrosion inhibiter and is color-coded orange. Conventional coolant has a silicate based corrosion inhibiter and is color-coded green. The head gasket is not compressed in the areas outside of the cylinder liners, so that area normally can swell. Engines that use the green silicate corrosion inhibiter are found to have gasket swelling of about .010" The thickness of a new gasket is .070". When installed the gasket is compressed to .065". A removed gasket is normally .068" thick in the compressed areas. The uncompressed areas are about .079" thick. This gasket was removed from a factory assembled engine with 10k miles.

A gasket exposed to coolant with organic corrosion inhibiter swells much more. This gasket was used with Dex-Cool for one year.

I believe that this is evidence that the fiber material is softened by coolant with an organic corrosion inhibiter. If the fiber is softened, it is possible that the sealing ring around the cylinder can loosen because it is crimped over the fiber.

This is a picture of a typical head gasket failure. Pressure in the cylinder has pushed the gasket back into the coolant passageway.

This a picture of a gasket that I dissected. It is a normally worn gasket that was used with conventional coolant. I sanded through the fiber layer to the steel core. The cylinder sealing ring is crimped onto the edge of the upper and lower fiber layers. I removed the sealing ring to show the paper under the ring. It was remarkably easy to remove the ring with a nip from a wire cutter. The metal material for the sealing ring is only .010” thick.



If the fiber softens the support for the sealing ring will lessen, and the ring can compress and fit looser between the cylinder liner and the cylinder head.

My Recommendation
Since it is possible that the head gasket material is softened by organic corrosion inhibiter, coolant containing organic corrosion protection should not be used in the LT5 engine. The possible values of using organic corrosion protection are small. Dex-Cool claims extended service interval and possible longer water pump seal life. It is not worth taking even a small risk since the consequences of head gasket damage are huge.

Some Guidance on Locating the OE Type Coolant for the LT5
Use coolant that has the following characteristics:
- Labeled, “For older cars.”
- Coolant that is colored green
- Texaco UPC number 76568 12016
- Chevron UPC number 23968 10000
- GM specification 1825M coolant. The current pn is 12378560.
- AutoZone part number 540722. The UPC number is 52948 59081.

Conventional green coolant with silicate corrosion inhibitor should be available for a long time because it is currently the preferred coolant for many diesel engines.

Universal coolant should be avoided because is unknown as to how it will affect the head gasket.