



Cylinder Liner Cavitation.

Some questions and answers on cavitation.

What is it? Cavitation is the pitting on replaceable wet cylinder liners.

What causes cavitation? Vibration. As the engine runs, vibrations occur as a result of the fuel burning in the combustion chambers, driving the pistons down on each power stroke. As this happens, the piston "slaps" against the liner wall resulting in compression waves being sent into the coolant, which surrounds each liner. Each time the liner wall moves away from the coolant due to vibration, tiny (microscopic) vapor bubbles are formed, primarily on the major thrust side of the liner. The bubbles actually have a negative pressure and therefore collapse violently when the liner moves in the opposite direction. Because of the nature of liquids, the bubbles implode against the liner with such force as to actually remove tiny particles from the protective skin of the liner. As this action continues, it progresses to the point of developing pits or liner erosion. The pitting can penetrate the liner wall until perforations go all the way through to the combustion chamber. That's cavitation.

When can it happen? Anytime the engine is running under load.

How quickly can cavitation occur? This is difficult to estimate. In some cases, without proper coolant in the engine, evidence of cavitation can be identified within the first several hours of use. Sometimes it takes 500 to 600 hours or more. In one case, we have seen the beginning of cavitation in less than 100 hours.

Will all engines develop cavitation damage? Cavitation of the liners can occur on any heavy-duty diesel engine utilizing wet cylinder liners, regardless of the manufacturer.

Can engines be protected against cavitation? Yes. Using coolant conditioners in the cooling system can attain control of cavitation. Coolant for the engine must contain the proper levels of Supplemental Coolant Additives (SCAs) to protect the engine against all of the "gremlins" attacking the engine, including cavitation. In addition to carrying away the heat from the engine, the cooling system must provide freeze protection, prevent rust, corrosion, scale, and aid boil over protection.

What else should I know? In addition to using quality SCAs, use only distilled water. It makes a difference. Use only heavy-duty low silicate antifreeze, not the automotive type that is designed for lightweight high-speed aluminum structural engines. Maintain the cooling system ingredients. A good maintenance program is essential to keep the SCAs at the proper level for complete engine protection.