

Effects of Coolant Contamination on Engine Oil

When a lubricating oil is contaminated with coolant, your machines are exposed to a powerful and poisonous mixture of chemicals with the potential to cause massive failure of machine components in little time. In fact, a major diesel engine OEM has estimated that 53 percent of all catastrophic engine failures are due to coolant leaks.

When glycol – the main chemical component of antifreeze/coolant – is present in the oil, it oxidizes to form organic acids that can pit bearings, promote rust on steel and iron surfaces, and corrode bronze or brass. The acids and water will also impair the oil's dispersancy, allowing sludge and insolubles to form. This problem is especially acute in highly additized motor oils, where the viscosity of the oil can increase dramatically. High viscosity can lead to plugged oil filters and oil intake screens, providing inadequate lubricant flow to critical frictional surfaces. Simply changing the oil and filter does not solve the problem. Up to 15 percent of the old oil remains in the engine, either in the oil pan or stuck to the engine surfaces. The detergents and dispersants in the new oil will mobilize the sludge and carry it to the new filter, which will soon become plugged.

Setting alarms and limits for glycol is difficult because of the transient states of glycol in the lubricant. Because glycol can rapidly degrade chemically and thermally, its presence in used oil may be completely disguised. Coolant does, however, leave other calling cards in the contaminated oil.

The elemental families from the coolant additive system help serve as marker, like DNA, to identify coolant contamination of lubricating oils. Sodium, boron, potassium and silicon are commonly found in antifreeze formulations. The analyst should report a positive for coolant contamination when levels of additives such as sodium and potassium are higher than normal for the oil.

If you receive a report that shows coolant contamination, you should first fix the leak. Then, flush the engine and replace the oil and filter. Then check the cooling system again. You can't be too careful with glycol.

by Allen Bender - OAI Manager