EXTENDED LIFE COOLANTS FAMILY OF PRODUCTS

Kool Tools
Product Information

Delo®
Let's go further.®

EQUIPMENT MAINTENANCE CHALLENGES

Heavy-duty engines face more thermal stress on their cooling systems as engine manufacturers continue to improve fuel economy requirements.

Diesel engine OEMs continue to expand specification requirements for coolant fluids to meet new demanding engine operation, fuel economy standards and performance. This can lead to the use of multiple coolant requirements in mixed fleet applications.

Fleet owners and operators are also focusing on fuel economy improvement by reducing idle time. This has led to more start-and-stop conditions which increase thermal stress on the engine and coolant system, and require the use of high-quality coolants to ensure long-term protection.

The family of Delo® Extended Life Coolant products help:

- Reduce the number of coolants required to protect diesel engines
- Eliminate the need for supplemental coolant additives (SCAs) and repetitive inhibitor testing
- Minimize operating costs by eliminating costly coolant maintenance
- Extend diesel engine life and coolant system performance

In a wide variety of diesel engine applications and operating conditions, Delo Extended Life Coolant technology provides:

- Superb liner and water pump cavitation protection
- Outstanding corrosion protection for cooling system metals
- Great protection against cavitation induced pitting in wet sleeve liners
- Excellent pH stability
- Low electrical conductivity values
- Greater resistance to hard water than traditional coolants - (it is recommended to use deionized water or premixed 50/50 coolant where possible)

DELO® EXTENDED LIFE COOLANTS

Delo ELC Antifreeze/Coolant

- Nitrited formulation
- Achieves service life up to 1,000,000 miles / 1,600,000 km / 15,000 hours / 8 years
- Provides up to 32,000 hours / 8 years of coolant system protection for stationary engines
- Fully tested against CAT EC-1
- Meets ASTM D6210
- Delo Warranty Plus protection

Delo XLC Antifreeze/Coolant

- Nitrite-free formulation
- Achieves up to service life of 1,000,000 miles / 1,600,000 km / 15,000 hours / 8 years
- Recommended for use in heavy-duty equipment requiring nitrite- and silicate-free coolant, meeting ASTM D6210
- Approved under Detroit DFS93K217
- MB-Approval 325.3 and 326.3
- Recommended for Navistar CEMS B1 Type IIIa requirements
- Delo Warranty Plus protection

CONVERTING TO DELO® EXTENDED LIFE COOLANTS

When converting from another product to Delo ELC/XLC, you have a choice of conversion methods. For optimum performance, the Drain, Flush & Fill method is recommended.

Drain Flush & Fill

Optimal Protection Method

Procedure:
1. Drain the current coolant and inspect hoses and clamp fittings.
2. Flush with clean deionized/distilled water.
3. Refill with Delo ELC or Delo XLC Antifreeze/Coolant Premixed 50/50.
4. Check coolant system freeze point with a refractometer.

Reference Chevron How To Series – Converting a vehicle coolant system using the drain, flush and fill method.

Drain & Fill

Acceptable Change Method

This is the next-best option for ensuring optimal product performance and coolant system protection. With this option, up to 10% of the previous coolant can be left in the cooling system.

Procedure:
1. Drain the current coolant and inspect hoses and clamp fittings.
2. Refill with Delo ELC/XLC Antifreeze/Coolant Premixed 50/50.
3. Check coolant system freeze point with a refractometer.

Reference Chevron How To Series – Converting a vehicle coolant system using the drain and fill method.

SPECIFICATIONS AND OEM RECOMMENDATIONS

Delo® ELC Antifreeze/ Coolant is approved for:

- Deutz DQC CB-14

Delo ELC Antifreeze/ Coolant meets the specifications of:

- ASTM D6210
- ASTM D3306
- Caterpillar EC-1
- Detroit Series 60 and DD15 engines per SVC BRO 0002
- Navistar B1 Type 3
- TMC RP 329, 302A, 351 (color)

Delo ELC Antifreeze/Coolant is recommended for:

- Caterpillar Stationary Natural Gas Engines
- Cummins QSK, QST, ISX 15, ISX, ISM, ISL, ISC and ISB Diesel Engines
- Cummins Westport ISX 12G and ISL G CNG engines
- Freightliner and Western Star Truck Diesel Engines
- GE - Jenbacher Stationary Natural Gas Engines
- Hino Truck Diesel Engines
- Isuzu Truck Diesel Engines
- Kenworth and Peterbilt Truck Diesel Engines
- Kobelco Construction Equipment Diesel Engines
- Komatsu Construction Equipment Diesel Engines
- MTU 4000 Diesel Engines
- Navistar Truck Diesel Engines
- Scania and MAN Truck Diesel Engines
- Volvo and Mack Truck Diesel Engines
- Wärtsilä Stationary Diesel Engines
- Waukesha Stationary Natural Gas Engines
- White-Superior Stationary Natural Gas Engines

Delo XLC Antifreeze/ Coolant is approved for:

- Cummins CES 14439
- Detroit Diesel DFS93K217ELC
- Deutz DQC CB-14
- Komatsu KES 07.892
- MAN 324 Type SNF
- MB-Approval 325.3 (Concentrate)
- MB-Approval 326.3 (Premixed 50/50)

Delo XLC Antifreeze/Coolant meets the specifications of:

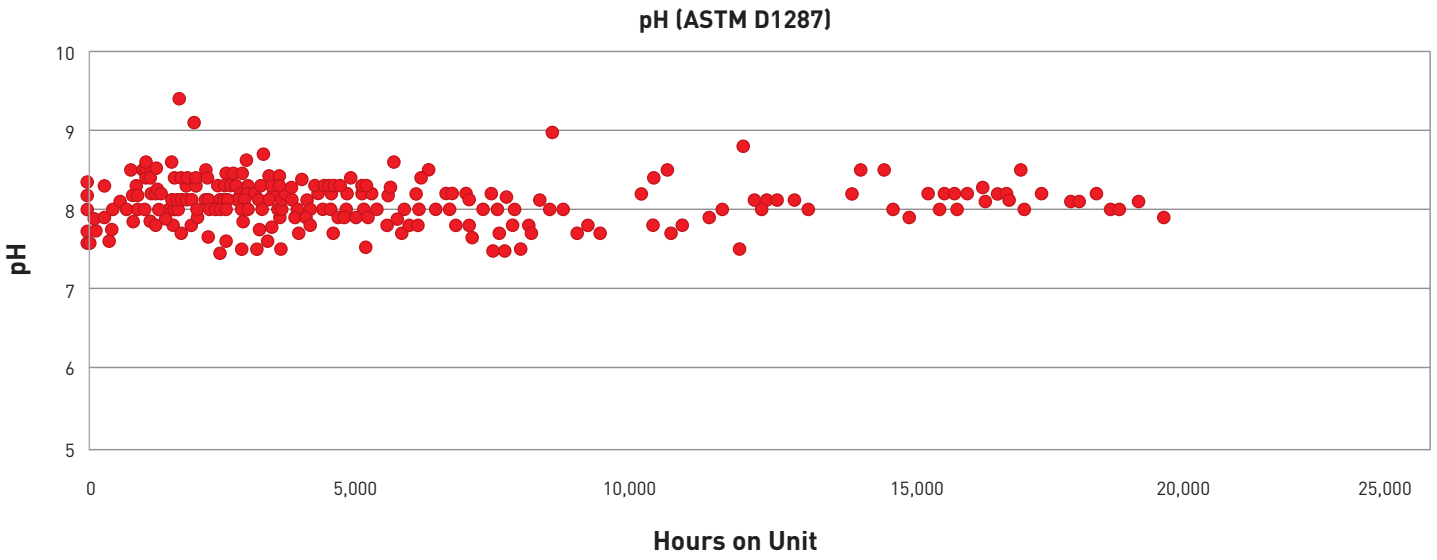
- ASTM D3306
- ASTM D6210
- DAF 74002
- MTU MTL 5048
- TMC RP 364

Delo XLC Antifreeze/Coolant is recommended for use in:

- GE - Jenbacher Stationary Natural Gas Engines
- Hino Truck Diesel Engines
- Isuzu Truck Diesel Engines
- Kobelco Construction Equipment Diesel Engines
- MTU 2000/4000 Diesel Engines
- Navistar MAXXFORCE Engines
- Scania Truck Diesel Engines
- Volvo Construction Equipment (VCE) Diesel Engines
- Volvo and Mack Truck Diesel Engines
- Wärtsilä Stationary Diesel Engines
- Vestas Wind Turbine Power Electronics External Coolant System
- European HD OEMs that require both Phosphate-free and Nitrite-free formulations

EFFECTIVE CORROSION PREVENTION

Chart 1: Delo® Extended Life Coolant pH Stability Performance (ASTM D 1287)



Patented carboxylate inhibitors in Delo Extended Life Coolants effectively protect against pH shifts.

When coolant breaks down (or oxidizes), acids are released that cause pH instability, increasing the potential for corrosion. Internal Chevron laboratory testing demonstrates the inhibitors in Delo Extended Life Coolants help maintain stable pH levels and prevent corrosion.

Chart 1 shows that over time, the pH of Delo Extended Life Coolants in fleet engines remains virtually unchanged – regardless of the engine age.

Shown to the right are real world examples of radiators that show the impact of stable and unstable pH performance.

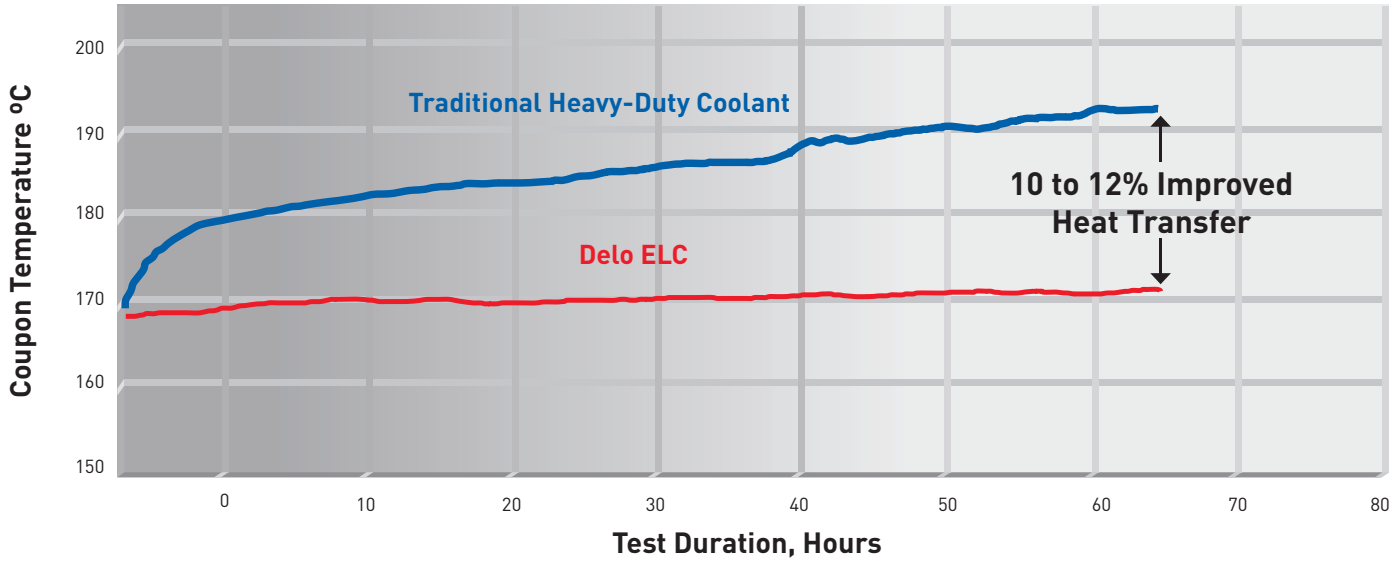
Radiator Corrosion Protection

Excellent pH Performance Provided by Delo ELC

Unstable pH Performance from a Competitor-Recycled Extended Service Coolant

HEAT TRANSFER ADVANTAGE

Chart 2: Delo® Extended Life Coolant Heat Transfer Properties - Coupon Test



Compared to coolants containing silicate, Delo Extended Life Coolants maintain like-new heat transfer.

Chart 2 shows Delo Extended Life Coolants' superior results in laboratory tests comparing heat transfer properties. This heat transfer advantage delivers important customer benefits:

- Longer engine life
- Improved coolant life
- Ability to increase productivity of equipment - less downtime
- Reduced coolant system maintenance required

Piston Liner Exterior

Delo ELC

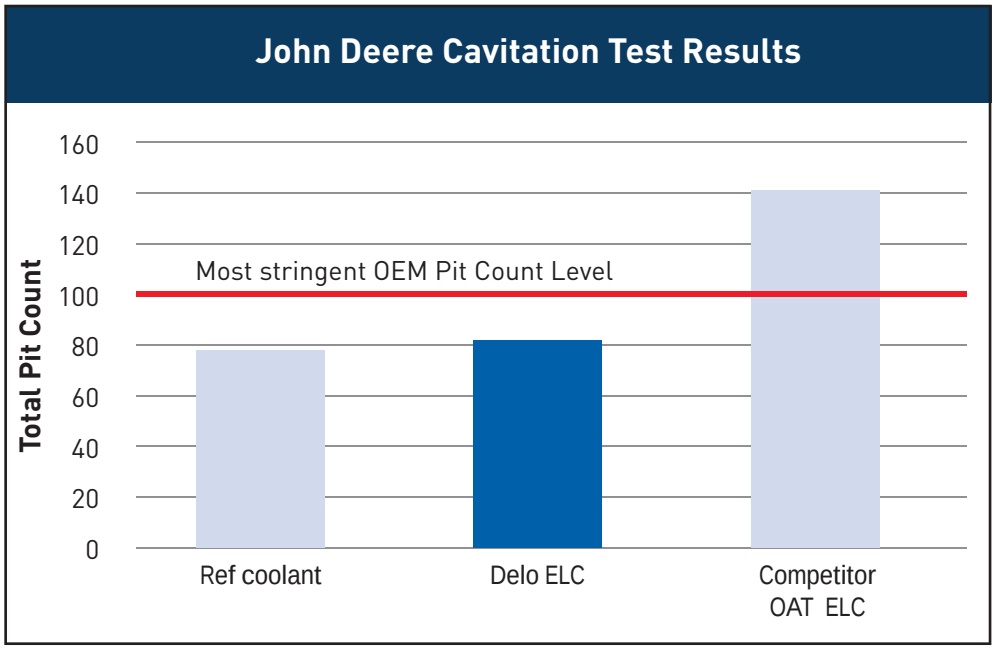
This liner shows the excellent performance attributed by Delo ELC in preventing cavitation and eliminating silicate buildup.

Traditional Heavy-Duty Coolant

This liner is in poor condition with silicated scale buildup that can inhibit heat transfer performance and reduce engine life over time.

EXCELLENT LINER PROTECTION

Bench-test data shows how well Delo® ELC Antifreeze/Coolant protects liners from pitting due to cavitation.



THE STRENUOUS JOHN DEERE CAVITATION TEST CONFIRMED THAT DELO EXTENDED LIFE COOLANTS PROTECT BETTER THAN A WELL-KNOWN COMPETITOR EXTENDED LIFE COOLANT.

Piston Liner Protection

On-Road Engines

In severe on-road driving conditions, Delo ELC still provides excellent pitting protection as shown in this Detroit Diesel Series 60 piston liner with over 1.5 million miles / 2.4 million km.

Off-Road Engines

In harsh off-road operations, Delo ELC still provides excellent pitting protection as shown in this MTU 4000 piston liner with over 21,000 hours.

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Product Information

Chevron

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