

Extended Life Coolants Family of Products



Delo[®]
Let's go further.[®]



Kool Tools
Product Information

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 Coolants and Delo FleetFix® CME 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 Coolant Family

Delo ELC Antifreeze/Coolant



- Nitrited formulation with longest protection
- Achieves service life up to 750,000 miles/15,000 hours/ 8 years
- Provides up to 32,000 hours of coolant system protection for stationary engines
- Lengthens service life up to 1,000,000 miles/20,000 hours/ 8 years with addition of Delo Extender
- Fully tested against CAT EC-1
- Meets ASTM D6210
- Delo Warranty Plus protection

Delo XLC Antifreeze/Coolant



- Nitrite-free formulation
- Achieves service life up to 600,000 miles/12,000 hours/ 6 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

Delo XLI Corrosion Inhibitor



- Nitrite-free water based corrosion inhibitor recommended for use where freeze point is not a concern
- Achieves service life up to 600,000 miles/12,000 hours/ 6 years in mobile equipment applications
- Offers excellent elastomer compatibility
- Features low aquatic toxicity, based on recommended mix rate of 5.5-10% wt in water
- Approved against MAN B&W D36 5600; MAN 248; Wartsila 32-9011; Deutz (TR0199-99-2091); MaK; MWM
- Delo Warranty Plus protection

Delo ELI Corrosion Inhibitor



- Nitrited corrosion inhibitor, recommended for use where freeze point is not a concern
- Achieves service life up to 600,000 miles/12,000 hours/ 6 years in mobile equipment applications
- Offers excellent elastomer compatibility
- Features low aquatic toxicity, based on recommended mix rate of 5.5-10% wt in water
- Approved for use in Caterpillar engines that do not require freeze protection
- Delo Warranty Plus protection

Specifications and OEM Recommendations



Delo® ELC Antifreeze/Coolant fully meets the requirements of:

ASTM D 3306
ASTM D 6210
Caterpillar EC-1
Navistar CEMS B1 Type III
TMC RP 329, RP 351 (color)

Delo ELC Antifreeze/Coolant is recommended for use in most OEM equipment, regardless of fuel type:

- Caterpillar
- Cummins
- Ford Power Stroke®
- Freightliner
- GM Duramax
- J. I. Case
- John Deere
- Kenworth
- New Holland
- Peterbilt
- Volvo/Mack
- Waukesha
- MAN
- Most major engine and equipment manufacturers requiring a nitrite-containing extended life coolant



Delo XLC Antifreeze/Coolant fully meets the requirements of:

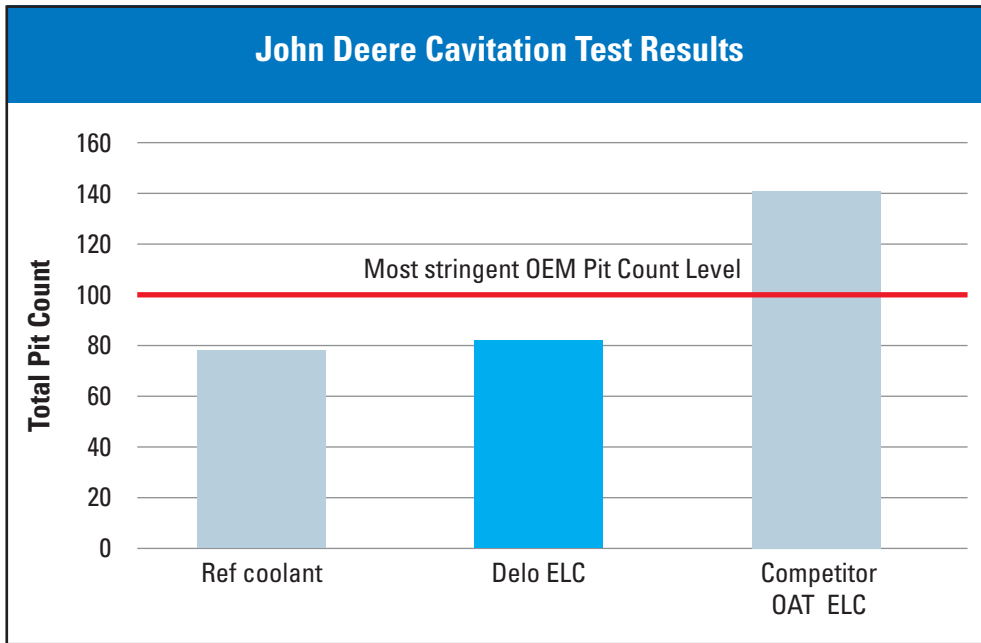
ASTM D 3306
ASTM D 6210
TMC RP 364

Delo XLC Antifreeze/Coolant is recommended for use with the following OEM specifications and engines:

- Cummins CES 14439
- Detroit DFS93K217ELC
- MB-Approval 325.3 & 326.3
- MAN 324 Type SNF
- MTU MTL 5048
- Navistar CEMS B1 Type IIIa
- Deutz Diesel Engines
- GE - Jenbacher Natural Gas Engines
- Hino Diesel Engines
- Isuzu Diesel Engines
- Kobelco Diesel Engines
- Komatsu Diesel Engines
- MTU 2000/4000 Diesel Engines
- Navistar™ MAXXFORCE Engines
- Scania Truck Diesel Engines
- Volvo VCE Diesel Engines
- Volvo and Mack Diesel Engines
- Wärtsilä Stationary Diesel Engines

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.



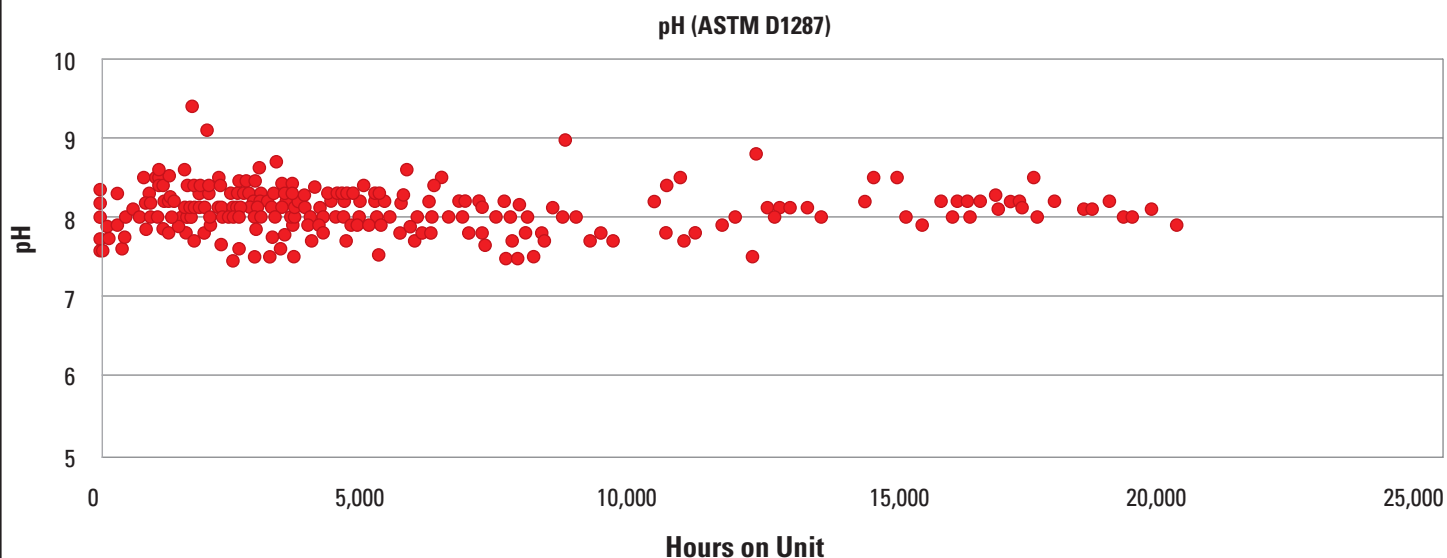
Off-Road Engines

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.



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

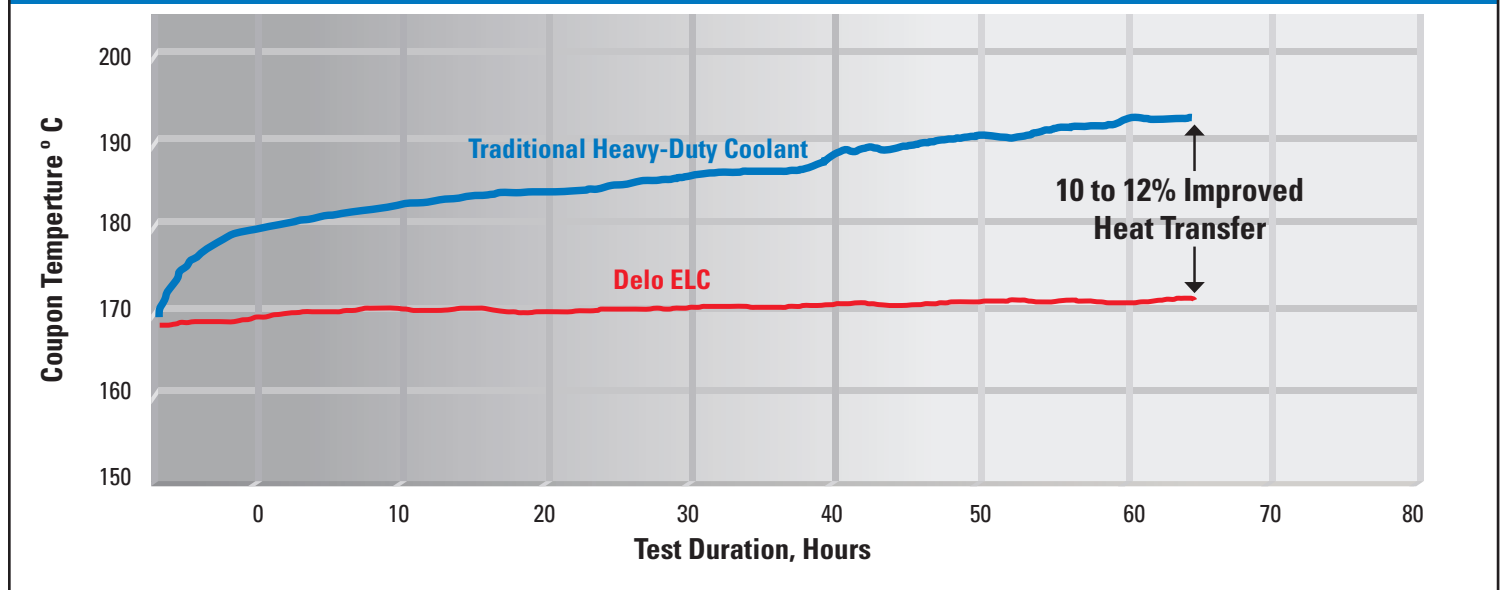


Unstable pH Performance from
a Competitor-Recycled
Extended Service Coolant



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.



Maintaining Delo® Extended Life Coolants

Keeping your engines operating efficiently takes high-performing, extended life coolant plus a good coolant maintenance program.

Follow these steps to help maintain optimal Delo ELC performance:

Step 1. Visually inspect coolant color and coolant level in overflow tank.

Step 2. Top up coolant as needed using only Delo ELC Antifreeze/Coolant Premixed 50/50.

Step 3. Check freeze point with a refractometer at every scheduled inspection and adjust as needed.

Step 4. Test coolant condition twice per year using pH and nitrite coolant test strips.

Step 5. Test corrosion inhibitors using the FleetFix® Extended Life Coolant Dilution Test Kit on a yearly basis.



USE THE DELO COOLANT MAINTENANCE KIT TO EASILY CHECK ON DELO ELC PERFORMANCE.



Delo Coolant Maintenance Kit includes:

1. Refractometer
2. pH test strips
3. Nitrite test strips
4. Carboxylate test strips
5. FleetFix Dilution test kit
6. Sample takers
7. Chevron "How To" Series Reference Materials



Converting to Delo® Extended Life Coolants

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

Optimal Protection Method

Drain Flush & Fill

Procedure:

1. Drain the current coolant and inspect hoses and clamp fittings.
2. Flush with clean deionized/distilled water.
3. Refill with Delo ELC 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.

Acceptable Change Method

Drain & Fill

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 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.

Reduced Coolant Waste Method

Delo FleetFix® CME

This is best option for larger fleets that cannot drain and flush all vehicles, or to avoid the expense associated with large amounts of coolant waste. This method safely converts a system to achieve excellent protection while helping to minimize waste.

Procedure:

1. Check coolant dilution level with a refractometer - ensure a premixed 50/50.
2. Test pH of coolant with a pH test strip.
3. Based on results of tests above, drain, flush and refill cooling system with Delo ELC Antifreeze/Coolant Premixed 50/50 or add Delo FleetFix CME as directed.
4. Check the new coolant in system with a refractometer.
5. Mail coolant system samples collected for testing.

Reference Chevron How To Series - Converting a vehicle coolant system using Delo FleetFix CME.



Delo® ELC Antifreeze/Coolant

Proof of Performance - Ozark Transport

Delo ELC Antifreeze/Coolant has performed for billions of miles in heavy-duty trucks across North America.

Ozark Transport, located in Sacramento, California, has used Delo Extended Life Coolant in its fleet of over-the-road trucks since 2003. Ozark's trucks average close to 120,000 miles per year and haul groceries across the Sierra Nevada Mountains on a daily basis, which severely stresses the cooling system.

To see the protection of Delo ELC, company mechanics recently tore down a Cummins ISX 15 EPA 07 engine that had a total of 450,000 miles and had run extended oil drain intervals to inspect the cooling system and check its performance (actual engine parts shown below).

The maintenance manager and mechanics were impressed to see no visible corrosion, rust or any scale buildup in the cooling system of the engine. Furthermore, the radiator and water pump were in such good condition they could be reused according to the on-site mechanics.

It's this type of performance that customers can expect from Delo ELC to protect their engines and help minimize total operating costs.

Ozark Transport has achieved 360 million miles without a coolant system failure using Delo ELC.

Ed Gamache
Maintenance Manager



Piston Liner

Clean of any silicate or phosphate scale buildup allowing excellent heat transfer performance; no visible liner pitting showing excellent cavitation protection.



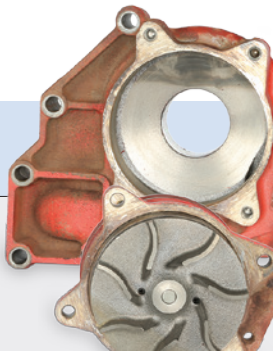
Radiator Tubes

Clean with no silicate or corrosion buildup allowing for excellent fluid circulation and heat transfer.



Water Pump Impeller & Housing

In excellent condition and can be reused without any additional maintenance required.



Thermostat

Visibly clean, in excellent working condition and could be reused.



Delo® ELC Antifreeze/Coolant

Proof of Performance - Universal Well

Delo ELC Antifreeze/Coolant has performed for millions of hours in off-road equipment across North America and providing significant reliability improvement for customers' equipment in the construction, mining, oil & gas and agricultural segments.

Universal Well, located in Meadville, Pennsylvania, has used Delo Extended Life Coolant since 2008 in its fleet of Cummins QSK 50 fracking engines at its Williamsport, Pennsylvania, location. The company also used a traditional heavy-duty coolant at other locations for a long period of time. Interested in consolidating coolant requirements, the company decided to inspect its engines' coolant system performance.

Company mechanics tore down two fracking engines to review the cooling system performance to see if there were visible differences (actual engine parts shown to the right).

The unit using the traditional heavy-duty coolant had silicate and phosphate scale buildup on key components and the engine ran hotter. The unit using Delo ELC showed clean and well-protected components as shown to the right.

This convinced Universal Well to switch to Delo ELC across its entire fleet of fracking and truck engines to help provide better thermal transfer performance.

Universal Well has seen the benefits of running Delo ELC at our Williamsport location for 10,000+ hours. We recently converted our entire fleet to Delo ELC to ensure we maintain excellent reliability.

Bob Sullinger
Maintenance, Universal Well



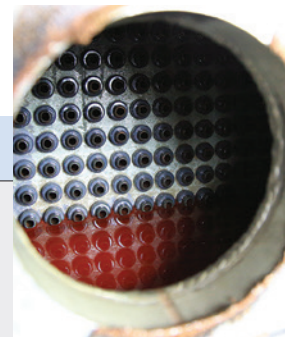
Piston Liner

Exterior surface is clean and shows no pitting. Shows excellent protection provided by Delo ELC.



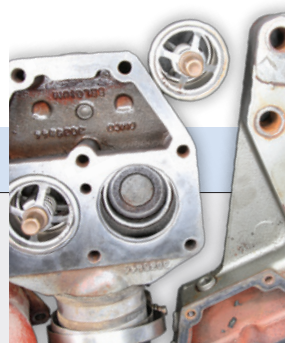
Heat Transfer Tubes

Clearly clean and free of any corrosion or scale buildup. Allows for excellent circulation of coolant and optimal heat transfer.



Thermostat

Shows no scale deposit formation and capability for continued use. Housings are also clean and show great protection of Delo ELC against harmful corrosion.





www.ChevronDelo.com

A **Chevron** company product

© 2015 Chevron U.S.A. Inc. All rights reserved. All trademarks are property owned by Chevron Intellectual Property LLC or their respective owners.

DLELCFAMBR_06-15