



DELO[®] EXTENDED LIFE COOLANT PRODUCT LINE

Coolant/Antifreeze Concentrate, Prediluted 50/50, Extender

CUSTOMER BENEFITS

Delo Extended Life Coolant/Antifreeze products delivers value through:

- **Improved profitability** — Eliminates the cost of SCAs (supplemental coolant additives), test strips and the manpower required to test coolant and add SCAs.
 - 750,000 miles on-road use (8 years or 12,000 hours off-highway use) on initial fill with no Extender needed
 - 1,000,000 miles/20,000 hours/8 years with a Delo Extender addition at 500,000 miles/10,000 hours/4 years.
 - Improved heat transfer that reduces down time due to non silicate containing formula.
 - Improved water pump life due to reduced water pump seal wear resulting from fewer dissolved solids
- **Reduced operating costs**
 - No inhibitor testing or SCA additions are required
 - Effective, long term corrosion protection of all cooling system components
 - Reduced hard water scale
 - Excellent heat transfer
 - Superior protection at high operating temperatures
 - Protects against winter freeze up and minimizes the chance of summer boil over
 - Outstanding hot surface aluminum protection
- **Reduced inventory costs**
 - One product for all applications including on-road, off-road and stationary
 - No inventory of SCA filters or liquids needed. No test strip inventory needed
 - Storage stable for a minimum of 8 years due to non-silicate containing formula

FEATURES

Delo Extended Life Coolant/Antifreeze products are heavy duty engine coolants that use a patented organic corrosion inhibitor technology called carboxylates. The product line consists of Delo Extended Life Coolant/Anti-Freeze Concentrate, Delo

Extended Life Prediluted 50/50 Coolant/Anti-Freeze and Delo Extender. Delo ELC products contain nitrite and molybdate for added protection against cavitation and erosion.

Delo Extended Life Coolant/Antifreeze concentrate is ethylene glycol based and contains Chevron's patented carboxylate technology. This product does not contain conventional inhibitors like silicates, nitrates, amines, phosphates or borates. Delo ELC concentrate can be used for initial fill or top up but it must be diluted. It should be used full strength for freeze point adjustment.

Delo Extended Life Prediluted 50/50 Coolant/Antifreeze is a 50/50 mixture of Delo Extended Life Coolant/Antifreeze concentrate with deionized water for freeze protection down to -34°F (-37°C) and boil over protection to 264°F (129°C) with a 15 lb pressure cap. Delo ELC Prediluted 50/50 is recommended for top up and can be used for initial fill.

Delo Extender should be added to Delo ELC at 500,000 miles/10,000 hours/4 years to reach a coolant service life of 1,000,000 miles/20,000 hours/8 years. The amount of Extender needed is based on the volume of the cooling system. Extender should only be added once during the service life of Delo ELC. Delo Extender contains nitrite and molybdate.

APPLICATIONS

The patented carboxylate technology in Delo ELC can be used in on-road, off-road and stationary engine applications. Delo ELC protects all cooling system components and has proven over years of field testing and customer use to improve water pump life and improve heat transfer. The inhibitors in Delo ELC do not readily deplete and for this reason there is no need to add SCAs or test the coolant/antifreeze as is required when using conventional coolants requiring SCA additions.

In service Delo ELC is recommended for use out to 750,000 miles/15,000 hours/8 years. If even longer service intervals are desired then the addition of Delo Extender at 500,000 miles/10,000 hours/4 years will extend the service life to 1,000,000 miles/20,000 hours/8 years.

When using Delo ELC it is not recommended that supplemental coolant additives be used. If an accidental addition of SCAs should happen it will not create any operational issues. Additions of SCAs to Delo ELC increases the overall cost of maintenance and adds inhibitors that are not needed for ELC to perform at maximum levels of protection. Delo ELC products are dilution tolerant up to 25% percent with other non-Delo ELC products or water. Dilution of more than 25% will reduce the extended life properties of this product.

When using Delo ELC it is recommended that the product freeze point be maintained between -12°F and -62°F. If the freeze point is higher or lower than the range specified it is an indication that water or concentrated coolant has been added to the system. To adjust freeze point for over or under concentration use the tables at the end of this document.

Note: These products are not to be used to protect the inside of potable water systems against freezing.

Boiling and Freezing Protection for Delo Extended Life Coolant/Antifreeze

Using a 15 lb Radiator Cap		
Coolant/ Water Ratio	Freeze Point	Boil Over Protection
50/50	-34°F (-36.7°C)	+265°F (129.4°C)
60/40	-62°F (-52.2°C)	+270°F (132.2°C)
40/60	-12°F (-24°C)	+224°F (107°C)

Delo Extended Life Coolant System is recommended for all heavy duty and natural gas engines including **Caterpillar, Navistar, Cummins, Detroit Diesel, Mack, MTU**, and other original equipment manufacturers (OEMs).

Delo Extended Life Coolant System is also recommended for use in the cooling systems of all types of industrial internal combustion engines using various types of fuels.

Delo Extended Life Coolant/Antifreeze products meet or exceed the requirements of the following:

- **ASTM D 6210**
- **ASTM D 3306**
- **TMC RP 329, 302A, 351 (color)**
- Phosphate-free requirement of European OEMs
- Silicate-free requirement of Japanese OEMs
- **Caterpillar EC-1**

- **Navistar B1**

CORROSION PROTECTION

Delo Extended Life Coolant/Antifreeze products have been tested against all ASTM standards for heavy duty and light duty coolants. ASTM 1384 results are as follows. Note that negative numbers show a weight gain versus a weight loss.

Delo Extended Life Coolant/Antifreeze ASTM D 1384 Glassware Corrosion Test		
	ASTM Limit	Weight loss, mg per coupon*
Copper	10 max	2
Solder	30 max	0
Brass	10 max	-1
Steel	10 max	-1
Iron	10 max	-1
Aluminum	30 max	3

* Negative indicates net gain

PHYSICAL PROPERTIES OF DELO ELC

Traditional coolants containing phosphate and borate exhibit high pH and reserve alkalinity (RA¹) when compared with Delo Extended Life Coolant/Antifreeze. This comparison cannot be used to make conclusions about relative corrosion protection since the definition of RA is based upon the buffering curve of inhibitors that are not present in the coolant. Delo Extended Life Coolant's unique corrosion inhibitor system is designed to protect aluminum and other system metals at lower pH levels than conventional coolants.

A comparison of Delo Extended Life Coolant/Antifreeze with traditional coolants is shown below:

	Delo Extended Life Coolant/ Antifreeze	Traditional Coolant/ Antifreeze
Typical pH	8.3	10.5
Typical RA (mL)	6.0	12.0

Delo ELC has low pH and RA relative to traditional coolants. The pH change profile in service is a more important performance measure than the RA level.

1. RA is defined as the amount in milliliters (mL), of 0.1 normal hydrochloric acid required to reduce the pH of 10 ml of antifreeze to 5.5.

Delo Extended Life Coolant/Antifreeze shows a typical pH reduction of less than 1.5 units in 160,000-kilometer fleet tests compared with a pH reduction of up to 3 units for traditional coolants.

The American Society for Testing Materials (ASTM) has eliminated RA Level requirements in both key anti-freeze specifications: ASTM D 3306 for automotive and ASTM D 4985 for heavy-duty engines. This action by the ASTM acknowledges that coolants that are not based on phosphate and borate can provide excellent corrosion protection for cooling system metals.

HOW TO MAINTAIN DELO ELC

There are three simple steps to maintaining Delo Extended Life Coolant while in service:

1. Check the coolant color and insure the product is bright red, contains no debris or any signs of oil at every PM.
2. Test the freeze point of Delo ELC at least two times per year. Maintain freeze point between -12°F and -62°F. Use of a refractometer is recommended.
3. Keep cooling system at full levels by topping-up using only Delo Extended Life Coolant Prediluted 50/50.

Using these three simple steps will keep Delo ELC performing at maximum protection levels and provide a service life of 750,000 miles/15,000 hours/8 years.

If a longer service interval is desired addition of Delo Extender as per chart below at 500,000 miles/10,000 hours/4 years will result in total coolant service life of 1,000,000 miles/20,000 hours/8 years.

Delo Extender has been specially formulated to double the life of Delo Extended Life Prediluted 50/50 Coolant Antifreeze. It should only be added at 500,000 miles/10,000 hours/4 years.

Quantity of Delo Extender needed at 500,000 miles of on-road use (4 years or 10,000 hours of off-highway use)	
Cooling System Capacity, liters	Delo Extender Quantity, liters
22-30	0.5
30-49	1
49-83	1.5
83-114	2
114-155	3
155-197	4
197-243	5

Delo Extender should only be used with Delo Extended Life Coolants.

TYPICAL TEST DATA

Delo Extended Life Coolant/Antifreeze Concentrate

Product Number	227804
MSDS Number	10391
Appearance	Red
Specific gravity 15/15°C	1.130
Freezing point, °C ¹ , ASTM D 1177	-37
pH ² , ASTM D 1287	8.3
Reserve alkalinity ³ , ASTM D 1121	6.0
Silicate, % ⁴	None

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

- 1 50 vol % aqueous solution
- 2 1:2 dilution with water
- 3 as received
- 4 as anhydrous alkali metasilicate

Delo Extended Life Prediluted 50/50 Coolant/Antifreeze

Product Number	227805
MSDS Number	10400

Delo Extended Life Extender

Product Number	227018
MSDS Number	10644
Appearance	Red
Specific gravity	1.06
Silicate, %	None

Typical test data are average values only. Minor variations which do not affect product performance are to be expected in normal manufacturing.

HANDLING PRACTICES

All coolants, including extended life coolants should be stored in such a manner that package integrity is maintained. It is recommended that all coolants be agitated before use to insure inhibitors have not separated in storage.

Delo® Extended Life Coolant Product Line — Continued

The primary limiting factor in the shelf life of a coolant is silicate instability. Since silicate will eventually polymerize to silicate gel, all traditional silicate-based coolants have a shelf life of about 18 months. Delo Extended Life Coolant System is silicate-free and, therefore, can be stored for extended periods (up to 8 years) provided the integrity of the container is maintained.

All coolants should be disposed of in compliance with all laws, rules and regulations applicable to the this product line.

FREEZE POINT ADJUSTMENT CHARTS

UNDER CONCENTRATED		FREEZE POINT ADJUSTMENT CHART FOR UNDERCONCENTRATED SYSTEMS									
		(Use this chart to adjust your freeze point up to -35F)									
		For use with ethylene glycol based fluids									
TESTED FREEZE PROTECTION	%AF IN COOLANT	TOTAL COOLANT SYSTEM VOLUME									
		7-GAL	8-GAL	9-GAL	10-GAL	11-GAL	12-GAL	13-GAL	14-GAL	15-GAL	
VOLUME TO DRAIN AND REPLACE WITH COOLANT CONCENTRATE											
25	10	3	3-1/2	4	4-1/2	5	5-1/4	5-3/4	6-1/4	6-3/4	
20	16	2-3/4	3-1/4	3-3/4	4	4-1/2	4-3/4	5-1/4	5-3/4	6	
15	21	2-1/2	3	3-1/4	3-3/4	4	4-1/2	4-3/4	5-1/4	5-1/2	
10	25	2-1/4	2-3/4	3	3-1/4	3-3/4	4	4-1/4	4-3/4	5	
5	29	2	2-1/4	2-3/4	3	3-1/4	3-1/2	3-3/4	4-1/4	4-1/2	
0	33	1-3/4	2	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	3-3/4	
-5	36	1-1/2	1-3/4	2	2-1/4	2-1/2	2-3/4	2-3/4	3	3-1/4	
-10	39	1-1/4	1-1/2	1-1/2	1-3/4	2	2-1/4	2-1/4	2-1/2	2-3/4	
-15	42	1	1	1-1/4	1-1/2	1-1/2	1-3/4	1-3/4	2	2	
-20	44	3/4	3/4	1	1	1-1/4	1-1/4	1-1/2	1-1/2	1-1/2	
-25	46	1/2	1/2	3/4	3/4	3/4	1	1	1	1	
-30	48	1/4	1/4	1/4	1/2	1/2	1/2	1/2	1/2	1/2	
-35	50	0	0	0	0	0	0	0	0	0	

Using a refractometer measure freeze point of coolant. Match reading with a value under the "Tested freeze point protections" column. Determine cooling system volume and using chart, determine volume of coolant to drain from cooling system. Replace drained volume with coolant concentrate.

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USE REFRACTOMETER TO CHECK FREEZE PROTECTION

OVER CONCENTRATED		FREEZE POINT ADJUSTMENT CHART FOR OVERCONCENTRATED SYSTEMS									
		(Use this chart to adjust your freeze point down to -35F)									
FREEZE PROTECTION OF SAMPLE MIXED 50/50 WITH WATER	%AF IN COOLANT	TOTAL COOLANT SYSTEM VOLUME									
		7-GAL	8-GAL	9-GAL	10-GAL	11-GAL	12-GAL	13-GAL	14-GAL	15-GAL	
VOLUME TO DRAIN AND REPLACE WITH DEIONIZED WATER											
+10	50	0	0	0	0	0	0	0	0	0	0
+7	55	3/4	3/4	3/4	1	1	1-1/4	1-1/4	1-1/4	1-1/2	
+5	60	1-1/4	1-1/4	1-1/2	1-3/4	1-3/4	2	2-1/4	2-1/4	2-1/2	
0	65	1-3/4	1-3/4	2-1/4	2-1/4	2-1/2	2-3/4	3	3-1/4	3-1/2	
-5	70	2	2-1/4	2-3/4	2-3/4	3-1/4	3-1/2	3-3/4	4	4-1/4	
-6	75	2-1/4	2-3/4	3	3-1/4	3-3/4	4	4-1/4	4-3/4	5	
-12	80	2-3/4	3	3-1/2	3-3/4	4-1/4	4-1/2	5	5-1/4	5-3/4	
-18	85	3	3-1/4	3-3/4	4-1/4	4-1/2	5	5-1/2	5-3/4	6-1/4	
-23	90	3	3-1/2	4	4-1/2	5	5-1/4	5-3/4	6-1/4	6-3/4	
-29	95	3-1/4	3-3/4	4-3/4	4-3/4	5-1/4	5-3/4	6-1/4	6-3/4	7-1/4	
-34	100	3-1/2	4	4-1/2	5	5-1/2	6	6-1/2	7	7-3/4	

If refractometer reading is off scale or shows a freeze point for the sample lower than -62F, use the chart above to adjust the freeze point to -35F. To do this, take the coolant sample and dilute it 50/50 with water. Take a new refractometer reading and match this value to the reading under the "Freeze protection of sample mixed 50/50 with water" column. Determine your cooling system volume and based on the chart above, drain the recommended amount of coolant and relace that volume with water. Recheck freeze point.

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USE REFRACTOMETER TO CHECK FREEZE PROTECTION