

# CAT EXTENDED LIFE COOLANT

The information contained herein includes recommendations regarding the maintenance and testing of coolant for trucks and earthmoving equipment using Cat Extended Life Coolant (ELC). Further information is available in your Caterpillar Operation and Maintenance Manual . ELC utilizes patented carboxylate inhibitors that allow the coolant to go at least 600,000 miles, 6,000 hours or 6 years before a coolant change. No SCA's are needed. A single addition of Cat Extender is all that is required at 300,000 miles, 3,000 hours or three years. It eliminates the need to use supplemental coolant additives (SCA's).

The carboxylate inhibitors in ELC deplete very slowly. Furthermore, the carboxylates provide protection of wet sleeve cylinder liners, which eliminates the need for routine testing of coolant for nitrite and/or molybdate levels. *When the cooling system is maintained properly and ELC (or equivalent) is used for top up, there is no need to conduct routine testing for inhibitor levels.* Therefore, when it comes to cooling system maintenance and testing, we suggest a focus on three areas for best maintenance practices:

- Freeze Point Testing
- Proper Top Up
- Cat S•O•S program

## Summary

1. Test the coolant for freeze point protection twice per year.
2. Top up with Cat ELC premixed 50/50.
3. Submit Level 1 SOS coolant sample for analysis every 500 hours or if there is concern over coolant quality, contamination, or possible mechanical problems.
4. Use of nitrite and/or molybdate test strips is not necessary when using ELC (or equivalent) for top up. If these test strips are used, no addition of supplemental coolant additives (SCA's) should ever be made based on results.

## Freeze Point Testing

Cooling systems should be checked twice a year or at regular maintenance intervals to assure proper water glycol concentration (i.e. freeze point). A 50/50 mixture is recommended and provides freeze protection down to minus 34 F as well as optimum corrosion protection. For vehicles operating in extremely cold climates, a concentration of 60 percent ethylene glycol will provide freeze protection down to minus 59 F. Concentrations greater than 60 percent are not recommended. Use of Cat Extended Life Coolant Pre-Diluted 50/50 (ELC 50/50) for top up significantly reduces concern of glycol/water concentrations getting out of balance.

## Proper Top Up

The carboxylate inhibitors in ELC deplete very slowly and do not require routine testing to assure coolant quality. Furthermore, the carboxylates provide protection of wet sleeve cylinder liners, which eliminates the need for routine testing of coolant for nitrite and/or molybdate levels. *When the cooling system is maintained properly and ELC (or equivalent) is used for top up, there is no need to conduct routine testing for inhibitor levels.*

## **Other Testing**

When freeze point testing of the coolant is conducted, a visual inspection of the coolant should be made. The coolant should be red/orange in color and should appear to be free of dirt, debris, rust, and other contaminants. If the coolant appears to be significantly contaminated then a Level 2 SOS sample should be submitted for analysis.

There are two primary reasons the coolant might not appear to be in good condition:

1. Mechanical problems.
2. Contamination/dilution with conventional coolants of different color and chemical properties.

Mechanical problems might include an oil cooler leak or exhaust blow by into the coolant. When these situations occur, a SOS Level 2, laboratory analysis is useful to help identify and/or confirm the problem.

Contamination with conventional coolants or over dilution with water can easily occur from improper top up procedures. While laboratory testing has shown that ELC is compatible with conventional coolants, top up with conventional coolants will result in dilution of extended life benefits. Cat literature states:

Should top up occur with conventional coolant(s) exceeding 10 percent of the total cooling system capacity, either, drain and refill with ELC, or maintain as a conventional coolant system using SCA's at recommended levels.

One of the advantages of ELC is that routine testing for nitrite and other inhibitor levels is not required unless there is a reason to believe the system has been significantly contaminated with other coolants or foreign material. For those that feel the need to conduct routine testing of the coolant (other than freeze point) we suggest the following:

1. **ELC Field Test Kit** - This kit is to be used when there is concern over possible contamination of ELC with standard heavy-duty coolant. This test kit will provide pass/fail results on the carboxylate levels in the coolant to determine if the additive is in an acceptable range for continued use. The ELC Field Test Kit can be obtained by ordering part number 172-8851 from your Caterpillar dealer.
2. **SOS Level 1 Analysis** – This program provides a quick look into the condition of your cooling system. Level 1 analysis checks the freeze protection, nitrite level, pH, conductivity, water hardness, and visual and odor analysis. Results are reported and appropriate recommendations are made.
3. **SOS Level 2 Analysis** - Similar to the SOS Level 1 analysis, Level 2 can provide additional information on the condition of the coolant and cooling system of your engine and track history. It is recommend that SOS Level 2 analysis be conducted annually as a check on the condition of the cooling

system, or if there is concern that the coolant has been contaminated with standard heavy duty coolant or SCA's.

## **ANSWERS TO COMMON QUESTIONS CONCERNING ELC**

*Next 3 questions were moved from later in the document...*

**Question:** Why are trucks and equipment being filled with extended life coolant?

**Answer:** As engine and truck builders extend service intervals, factory fill products must be able to reach the extended service goals. Cat equipment is factory filled with ELC because we believe it is the best overall technology providing longer maintenance free operation and reducing overall maintenance costs. Some truck manufacturers are filling new trucks with extended life coolant to offer their customers what they feel is the highest coolant performance and lowest maintenance expense available. For customers that choose to use extended life coolant for top up, they can receive these benefits by the truck being factory filled. For customers that desire not to change from current practices, they can continue use of conventional coolant and SCA's.

**Question:** I've never heard of Extended Life Coolant. Who else is using it and why?

**Answer:** For many, extended life coolant offers lowest cost of ownership through longer coolant life, longer coolant change intervals, the elimination of SCA's and routine inhibitor testing. Proper maintenance and top up procedures are necessary to realize these benefits and every fleet or owner/operator should make their own assessment to assure the technology they use provides for lowest overall cost. Similar technology is used by General Motors in their passenger cars and trucks. All Caterpillar equipment is factory filled with ELC. The technology is now entering the over the road truck market.

**Question:** Does ELC really have acid in it? Does "acid based" mean it is corrosive? Since it is acid based, does it attack aluminum?

**Answer:** The organic acids used in ELC's additive package have been neutralized to form highly effective corrosion inhibitors often referred to as carboxylates. The difference is they are "organic" acids versus the "inorganic" acids found in standard heavy-duty coolants. The use of acids as corrosion inhibitors is not new. Conventional coolants contain inorganic inhibitors such as phosphate and/or borate, which are derived from phosphoric acid and boric acid respectively.

**Question:** I'm confused – some coolants on the market are referred to as, "extended life, long life, extended service," etc. How do I know what to use? Are they all the same?

**Answer:** There are many new products on the market making many claims. To insure proper protection, if Cat ELC is not available, use a coolant that meets Caterpillar's EC-1 industry coolant specification.

**Question:** What is EC-1?

**Answer:** EC-1 is Caterpillar's industry specification for an extended service, or long life, coolant. EC-1 defines the minimum requirements of a long life engine coolant and coolant extender intended for use in Caterpillar engines. EC-1 defines the physical and chemical properties, compatibility characteristics, bench and performance testing, and field testing requirements.

A coolant meeting EC-1 also meets ASTM D4985. What makes EC-1 unique from other coolant specifications, is the field-testing. Field-testing establishes the practice for evaluating the ability of a long life coolant to provide acceptable corrosion control and cooling system performance with significantly reduced or no maintenance additions of inhibitor in field service.

To summarize the field testing method; There must be a minimum of six engines of known initial condition, monitored for coolant and cooling system condition, subject to full tear down inspection upon completion of the test. Additionally, there must be at least one copper-brass radiator and one aluminum radiator included in the test. Preferred application is line-haul-trucking service, but any vehicle application operating at greater than 60% load factor is considered acceptable. Engine component inspection and coolant sample analysis results determine acceptable performance.

Caterpillar Extended Life Coolant was introduced once the stringent requirements of EC-1 were met. EC-1 ensures that the coolant not only performs in the laboratory, but more importantly, on the road and at the job site where it counts most to the customer.

**Question:** My truck/equipment was factory filled with extended life coolant. What do I need to do to assure good protection of my cooling system?

**Answer:** We recommend four steps:

1. Always use Cat Extended Life Coolant Pre-diluted 50/50 for top up. If Cat ELC is not readily available, use a commercial extended life coolant that meets Caterpillar's EC-1 specification.
2. Check the freeze point protection twice per year or at regular service intervals. Test the freeze point with a glycol refractometer. Perform a visual inspection of the coolant at the same time. The coolant should be red/orange in color with no cloudiness or floating debris. Or, perform a level 1 SOS coolant analysis to monitor and optimize your cooling system every 500 hours.
3. At 300,000 miles (or 3 years) add Cat Extender. **Do not add SCA's**
4. Submit a SOS Level 2, coolant sample for analysis if there is concern over coolant quality, contamination, or possible mechanical problems. An annual SOS Level 2 analysis is recommended for best maintenance practices.

**Question:** What about testing for SCA or nitrite levels?

**Answer:** The Cat Extended Life Coolant factory filled in your truck/equipment contains patented carboxylate inhibitors that eliminate the need for routine testing of inhibitor levels. Supplemental coolant additives (SCA's) are not required and should not be used.

**Question:** Should I use spin on filters? Don't you need a coolant filter without additives to protect from debris?

**Answer:** Most coolant filters contain chemicals (SCA's) which should not be used with ELC. Non-chemical filters (commonly referred to as blank filters) can be used. Caterpillar engines do not require a blank filter in the cooling systems. As always, follow the manufacturer's recommendations if a blank filter is required for the cooling system.

**Question:** Okay, I understand that I am not supposed to use SCA's or chemical filters with ELC. How do you know how much Cat Extender is needed and when? Shouldn't I be using test strips to know?

**Answer:** In a standard cooling system, the spin-on SCA filter element has a pre-determined, amount of SCA to add to the system. The interval for the addition of additive was determined by depletion data. The amount of additive required is related to the system capacity. Test strips are used to monitor SCA levels in conventional coolant systems because of the rapid depletion of these inhibitors.

The correct amount of Cat Extender to add is also dependent on system capacity. The addition of Cat Extender is based on ELC additive depletion data in the same manner that standard coolant SCA additions were determined. Due to the extremely slow depletion rate of ELC's additives, Extender is only required once at the ½ life of the coolant, (300K miles, 3K hours or three years, whichever comes first) and routine testing for inhibitor levels is not required. Best maintenance practices would include an annual Level 2 SOS analysis.

**Question:** What if I believe there is a problem with my coolant. How do I test it?

**Answer:** Unless foreign material or conventional coolants are being added to your cooling system, you should not experience any problems. If there are concerns about possible mixture with conventional coolants, mechanical problems, or introduction of foreign material, a Level 2 SOS sample should be submitted for analysis.

**Question:** My truck/equipment was filled with ELC and I know that conventional coolant has been added to my truck as top up. Now what do I do?

**Answer:** The ELC in your truck/equipment is compatible with conventional coolant, however continual additions of conventional coolant will reduce the long life attributes of the coolant. If you accidentally topped up with a small amount of conventional coolant or inadvertently added an SCA you should not experience any problems. Should you believe that additions of conventional coolant have well exceeded 10 percent of the coolant capacity of your truck/equipment, submit a Level 2 SOS sample for analysis to verify carboxylate levels. Use only ELC for top up. Or, use a commercial coolant that meets Caterpillar's EC-1 specification.

**Question:** My new truck/equipment was filled with Cat Extended Life Coolant, but I have no desire to convert my fleet or use an extended life coolant. What do I do if I am happy with my current maintenance practices and the brand of coolant/SCA I am using?

**Answer:** It is totally acceptable to use conventional coolant for top up, however you will lose the extended life benefits. If you choose to continue with conventional coolants for top up, make sure to follow the standard recommendations for a conventional coolant system. This includes use of supplemental coolant additives and monitoring SCA levels at regular intervals. Caterpillar DEAC (Diesel Engine Antifreeze/Coolant), or a coolant meeting ASTM D 5345, ASTM D4985, or TMC RP-329 are a good conventional coolant choices.

**Question:** My truck/equipment has conventional coolant in it, but I would like to use ELC. How do I convert my truck?

**Answer:** Follow these steps:

1. Drain the coolant into a suitable container.
2. Dispose of the coolant according to local regulations.
3. Remove the empty ACA filter and remove the filter base. Plug the coolant lines or bypass the coolant lines to the filter base.
4. Flush the system with clean water to remove any debris.
5. Use Cat cleaner to clean the system. Follow the instructions on the label.
6. Drain the cleaner into a suitable container. Flush the cooling system with clean water.
7. Fill the cooling system with clean water and operate the engine until the engine is warmed to 49 to 66 deg. C (120 to 150 deg. F)
8. Drain the cooling system into a suitable container and flush the cooling system with clean water.

NOTE: the cooling system cleaner must be thoroughly flushed from the cooling system. Cooling system cleaner that is left in the system will contaminate the coolant. The cleaner may also corrode the cooling system.

9. Repeat steps 7 and 8 until the system is completely clean.
  10. Fill the cooling system with Caterpillar ELC.
  11. Attach the special publication, PEEP5027, 'label' to the radiator in order to indicate the use of Caterpillar ELC.
- \* Caterpillar recommends submitting a S•O•S Coolant Analysis Level 2 sample to verify that no cleaner is left in the system.

**Question:** Are there test strips for use with ELC? When will test strips be available?

**Answer:** ELC test strips are in the process of development. As is the case with development, testing and verification of the product are required. Because this is new chemistry, the development of the test strips is both complex and time consuming. ---- IF,

the final stages of development proceed well, we anticipate a test kit will be available early 2000.

**Question:** What does a change in color from red to brown mean?

**Answer:** The change could mean that the system has been topped-off with standard coolant. A significant change in color is a good reason to take a sample and have a Level 2 SOS coolant analysis performed to determine if the coolant has been contaminated and/or if there is a problem in the cooling system.

**Question:** Is Cat ELC specifically formulated to protect aluminum parts? I have heard from other suppliers that Cat ELC can attack aluminum? How about aluminum radiators?

**Answer:** ELC is formulated for, and has, excellent aluminum corrosion protection. ELC does not attack aluminum. A portion of the trucks in the original Cat fleet tests had aluminum radiators. Aluminum radiators are a part of successful completion of EC-1 requirements (Caterpillar's industry coolant specification).

**Question:** When will ELC be available at truck stops?

**Answer:** Cat ELC is currently available through Cat dealers and distributors. Texaco Extended Life Coolant which meets EC-1, is available at many Texaco truck stops. ROTELLA ELC, which also meets EC-1, is now being introduced into the market and should be available at most truck stops by mid 2000.

**Question:** Do you have to use special water to mix with ELC?

**Answer:** Water can be corrosive and/or have too many solids. This is one of the reasons why additives are required in coolant. The water quality needed for use with ELC is no different than that required for standard heavy duty or automotive coolants. While deionized water is always preferred, good clean tap water from most municipal facilities is usually satisfactory for an emergency situation. To eliminate the concern over water quality, Cat **ELC comes pre-mixed.**

**Question:** What is the life of ELC coolant?

**Answer:** The life of ELC is 600K miles, 6K hours or six years, whichever comes first, under normal operating conditions.

**Question:** Is there a compatibility problem with silicon hoses? Does ELC attack O-rings and gaskets? Can you use it in old engines with different O-rings?

**Answer:** ELC does not attack hoses, O-rings or gaskets. In general, the glycol and the water in the coolant determine elastomer compatibility. As with any product, there are

many formulations for many different types of seal/gasket/hose materials. ELC is compatible with seal materials in Cat engines.

**Question:** Does ELC need special block heaters? Can you use block heaters with ELC?

**Answer:** There are no special requirements for use with block heaters or requirement that block heaters be used. Both conventional coolants and ELC are composed of water, ethylene glycol and corrosion inhibitors. The difference in the coolants is in the corrosion inhibitors used. The water provides heat transfer. The glycol provides anti-boil/freeze protection. The corrosion inhibitors protect metal components. The ambient temperature and percent glycol determine if block heaters are required.

**Question:** If there is a coolant leak and ELC enters the crankcase, will it turn the engine oil to mud?

**Answer:** Gelling of oil happens when an excessive amount of coolant has leaked into the oil compartment. This gelling phenomenon becomes worse when large amounts of coolant and higher amounts of solids are mixed with the oil. When large amounts of coolant are quickly leaked into the oil, a gel will form. This is not related to ELC but to the volume of glycol and water contaminating the system. With a high amount of dissolved solids in the coolant, the gel will become thicker and heavier regardless of the type of coolant used. ELC does not have the solids found in traditional coolants. If a cooling system was switched from standard coolant to ELC, there could be a higher amount of solids than are normally seen due to carry over contamination.

**Question:** What other OEMs/engine manufactures endorse the use of EC-1 coolants?

**Answer:** Detroit Diesel, Mercedes Truck, Volvo, Navistar, Mack, British Leyland, Isuzu, Yanmar, Komatsu, and Renault Trucks support ELC use. Caterpillar, Detroit Diesel, and Texaco offer EC-1 coolants worldwide. Shell Rotella ELC is available in the USA.

**Question:** Will ELC work in competitive engines?

**Answer:** Unless specified by the manufacturer, ELC should function fine in competitive engines.

**Question:** ELC sounds too good to be true. Can you list the advantages again? What's the catch? There must be a downside?

**Answer:** ELC and the Cat EC-1 represent the latest advancements in coolant technology. There are many advantages to using ELC including:



- Extended life through inhibitors that deplete slowly
- No more SCA's
- High temperature aluminum corrosion protection
- Improved heat transfer
- Less tendency to form deposits
- Improved water pump life
- Reduced maintenance costs

The only catch is that good maintenance practices must be employed including the use of ELC for top up. Use of products not meeting Cat EC-1 performance will shorten the life of the ELC in your system. Good maintenance practices including proper top up with ELC will reduce overall maintenance costs and provide better cooling system performance.

---

**Copyright 1999 Caterpillar Inc.**

All Rights Reserved.

Caterpillar retains all copyrights in any text, graphic images, and software owned by Caterpillar and hereby authorizes you to electronically copy documents published herein solely for the purpose of transmitting or viewing the information. You may not mirror, modify or otherwise alter any files in this website for rebroadcast, or print the information contained therein, without written permission from Caterpillar. Except as expressly provided above, nothing contained herein shall be construed as conferring any license or right under any Caterpillar copyright, patent or trademark.

Cat and Caterpillar are registered trademarks of Caterpillar Inc., 100 N.E. Adams, Peoria IL 61629

<http://www.CAT.com>

**Legal Notices**

The information in this publication, including text, images, and links, are PROVIDED "AS IS" BY CATERPILLAR INC. SOLELY AS A CONVENIENCE TO ITS DEALERS AND CUSTOMERS WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT. Caterpillar Inc. assumes no responsibility for errors or omissions in this publication or other documents which are referenced by or linked to this publication. This publication could include technical or other inaccuracies, and not all products or services referenced herein are available in all areas. Changes are periodically added to the information, and Caterpillar may change the products or services described in this publication at any time. Contact your local Caterpillar dealer for further information before relying on any information contained herein.

Should you choose to respond directly to Caterpillar with any information including comments, questions, suggestions, ideas or the like relating to this Web Site or Caterpillar products and services, you agree that such information shall be deemed as non-confidential and Caterpillar shall have no obligation to respond and be free to reproduce, use, disclose and distribute the information to others without limitation, including but not limited to developing, manufacturing, and marketing products incorporating such information.