Havoline Extended Life Antifreeze Coolant

1 Description

Havoline Extended Life Antifreeze Coolant (Havoline XLC*)* - mixed with the appropriate amount of water - is used as a cooling and heat transferring fluid in combustion engines. The heat of the internal combustion is transferred via the fluid to the radiator where the mixture is cooled by means of airflow. **Havoline XLC** is an ethylene glycol based fluid that provides maintenance-free protection against *freezing and boiling* but also against *corrosion.* Extended coolant life, often for the whole life of the engine or vehicle, is obtained through the use of virtually non-depleting corrosion inhibitors.

2 Benefits

Havoline XLC offers many benefits to the engine designer as well as to the user:

- **Extended life** by synergistic combination
- **Improved heat transfer** leaves more flexibility to engine design
- **Reduces repairs** to thermostat, radiator and water pump
- **Reliability** depletion free and stable inhibitor
- **Improved hard water stability** absence of silicates and phosphates
- **Save time and money** maintenance-free coolant
- **Suitable for mixed fleets** 1 coolant for automotive & heavy duty application
- **Environmentally friendly** by using carboxylic acids in the additive package

Based on patented *silicate-free* aliphatic acid technology, **Havoline XLC** provides long-life corrosion protection for all engine metals, including aluminium and ferrous alloys. During extensive fleet testing, the synergistic combination of mono- and di-carboxylic acids present in this coolant, has proven to provide protection for at least **650,000 km** (ca. 8,000 hours) in truck & bus-application or **250,000 km** (ca. 2,000 hours) for passenger cars or **32,000 hours (or 6 years)** for stationary engines. It is recommended to change the coolant every five years or at above mileages or operating times, whichever comes first. **Havoline XLC** provides long-life protection against all forms of *corrosion* by the use of optimized and patented organic corrosion inhibitors. Excellent and lasting high temperature corrosion protection is provided for the **aluminium** heat transfer surfaces contained in modern engines. The inhibitor package of **Havoline XLC** offers excellent cavitation protection even without using nitrite or nitrite-based supplemental coolant additives (SCA's).

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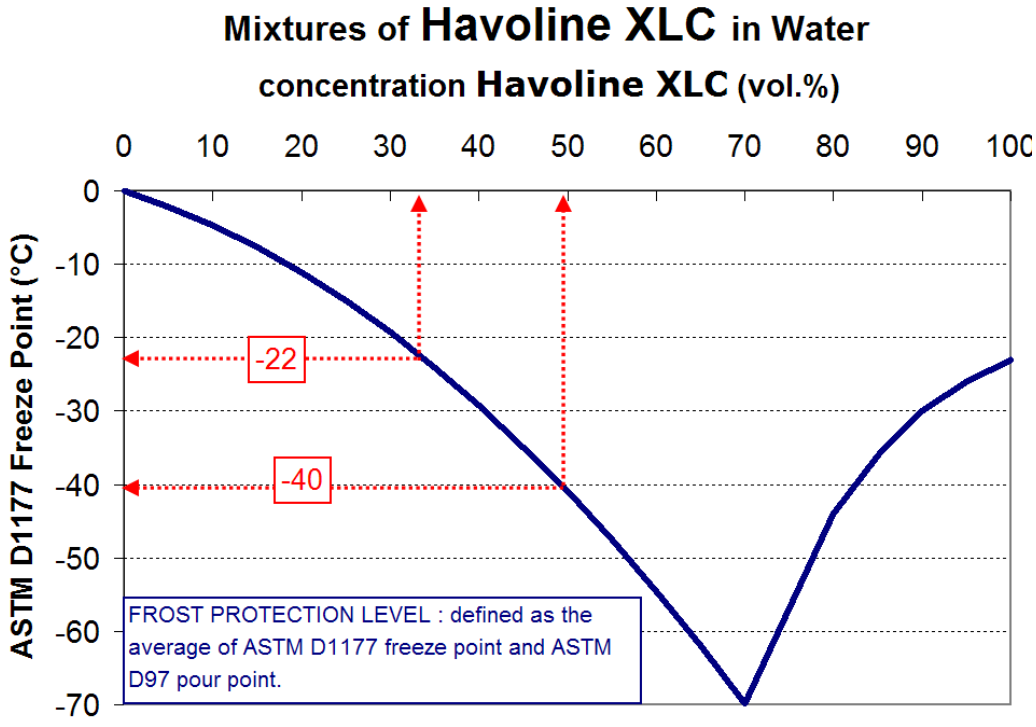
3 Application

Havoline XLC provides long-life frost and corrosion protection. To ensure good corrosion protection it is recommended to use at least 33 vol. % of **Havoline XLC** in the coolant solution. This provides frost protection to -20°C.

Typical mixtures in Northern Europe are 50/50, offering frost protection down to -40°C. Mixtures with more than 70 vol. % **Havoline XLC** in water are not recommended. The maximum frost protection (about -69°C) is obtained at 68 vol. % **Havoline XLC**.

Havoline XLC may be used with confidence in engines manufactured from cast iron, aluminium or combinations of the two metals, and in cooling systems made of aluminium or copper alloys. **Havoline XLC** is particularly recommended for hi-tech engines, where high temperature aluminum protection is important. For racing cars we recommend the usage of **Havoline Extended Life Corrosion Inhibitor**, an aqueous solution of the same carboxylic acid inhibitors.



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4 Compatibility and mixability

Havoline XLC is compatible with most other coolants based on ethylene glycol. Exclusive use of **Havoline XLC** is, however, recommended for optimum corrosion protection and sludge control.

Also, the use of soft water is preferred for dilution. Though, lab testing has shown that acceptable corrosion results are still obtained with water of 20°dH, containing up to 500 ppm chlorides and 500 ppm sulfates.

5 Approvals by OEMs

Havoline XLC has been approved by many engine manufactures, both car and truck manufacturers. Some of these approvals are:

Ford	specification WSS-M97B44-D
Mercedes-Benz	specification 325.3
General Motors	specification GM 6277M
MAN	specification 324 type SNF
Volkswagen	specification TL 774F

A complete and up- to date list with all approvals is available separately. Contact your local Area Sales Manager for information.

Even though some OEMs have not yet given a formal approval, **Havoline XLC** is suitable for use as antifreeze / coolant in any combustion engine. See the OEM' manual on recommended coolant type.

6 Fleet tests

Havoline XLC has been extensively fleet tested for over 100,000,000 km! 540 vehicles, both heavy duty and automotive, have been closely monitored and showed:

- limited depletion rates of the corrosion inhibitors: less than 10 %
- superior Aluminium protection
- average pump life increased by 50 %
- excellent cavitation protection even without the addition of nitrite
- no compatibility problems with good quality traditional coolants
- no compatibility problems with seals, hoses and plastic components

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7 Availability

Havoline XLC is available in bulk and various packages in different colors and with/without bittering agent. Please contact your local Arteco Area Sales Manager on availability of packages, dilutions and colors or customer adapted variants.

In the range of organic acid technology, Arteco can offer:

- **Havoline Extended Life Antifreeze Base (Havoline XLB)** is a MEG-based superconcentrate. **Havoline XLC** is obtained by mixing 25 % wt of **Havoline Extended Life Antifreeze Base** with 75 % MEG.
- **Havoline Extended Life Corrosion Inhibitor (Havoline XLI)** is an aqueous superconcentrate of the same inhibitor package.
- **Havoline Extended Life Antifreeze Coolant – PG (Havoline XLC-PG)** is based on MPG instead of MEG.

Separate information bulletins with more details are available for all these different products.

8 Storage and requirements

The product should be stored at ambient temperatures and periods of exposure to temperatures above 35° should be minimized. **Havoline Extended Life Antifreeze Coolant** can be stored for minimum 8 years in unopened containers without any effect on the product quality or performance. It is strongly recommended to use new containers and not recycled ones. As with any antifreeze coolant, the use of galvanised steel is not recommended for pipes or any other part of the storage/mixing installation..

9 Toxicity & Safety

For Toxicity and Safety Data we refer to the Material Safety Data Sheet. The transport is not regulated. Labeling as for any MEG based coolant is required: Xn: R 22 (Harmful if swallowed) and S 2 (Keep out of reach of children).
This product should not be used to protect the inside of drinking water systems against freezing.

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Addendum - Technical information

Chemical and physical properties **Havoline XC**

	Havoline XLC	ASTM 3306 requirements	method
Ethylene glycol	93 % w/w glycol	Base	
Other glycols	0.5 % max.	5 % w/w max.	
Inhibitor content	5 % w/w		
Water content	5 % w/w max	5 % w/w max	ASTM D1123
Ash content	1.1 % w/w typ.	5 % w/w max	ASTM D1119
Nitrite, amine, phosphate, borate, silicate	Nil		
Colour	Orange		
Specific gravity, 15°C	1.116 typ.	1.110 to 1.145	ASTM D5931
Specific gravity, 20°C	1.113 typ.		ASTM D5931
Equilibrium boiling point	180°C typ.	> 163°C	ASTM D1120
Reserve alkalinity (pH 5.5)	6.2 typ.	Report	ASTM D1121
pH, 20°C	8.6 typ.		ASTM D1287
Refractive Index, 20°C	1.430 typ.		ASTM D1218

Chemical and physical properties **dilutions**

	50 % dilution	40 % dilution	33 % dilution	ASTM 3306	method
pH	8.6	8.4	8.3	7.5 to 11.0	ASTM D1287
Foaming properties at 25°C ↳ break time	50 ml typ. 5 sec. typ.	-	-		ASTM D1881
Foaming properties at 88°C ↳ break time	50 ml typ. 5 sec. typ.	-	50 ml typ. 5 sec typ.	150 ml max.	ASTM D1881
Initial crystallization	< - 37°C	< - 24°C	< -18°C	< - 37 °C	ASTM D1177
Freezing protection	- 40°C typ.	- 27°C typ.	- 20 °C typ.		
Specific gravity, 20°C	1.068 typ.	1.056 typ.	1.053 typ.		ASTM D5931
Reserve alkalinity (pH 5.5)	3.0 typ.	2.4 typ.	2.1 typ.		ASTM D1121
Refractive Index, 20°C	1.385 typ.	-	1.369 typ.		ASTM D1218
Equilibrium boiling point	108°C typ.	-	104°C typ.		ASTM D1120
Effect on non-metals	no effect	no effect	no effect		GME60 255
Staining characteristics	-	-	no effect	no effect	ASTM D 1882
Hard water stability	no precipitate	-	-		VW PV 1426

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ASTM D1384 glassware corrosion tests

	Weight loss in mg/coupon[1]						
	Brass	Copper	Solder	Steel	Cast Iron	Aluminum	AlMn
ASTM D3306 (max)	10	10	30	10	10	30	-
Havoline XLC	1.6	1.9	0.1	-0.5	-1.4	4.6	2.9

1 Weight loss AFTER chemical cleaning acc. to ASTM procedure. Weight gain is indicated by a - sign.

ASTM D4340 Aluminum heat rejection test, 25 %

	Weight loss in mg/cm²/week [1]
ASTM D3306 (max)	1.0
Havoline XLC	< 0.2

1 Weight loss AFTER chemical cleaning acc. to ASTM procedure. Weight gain is indicated by a - sign.

Modified MTU High Temperature corrosion test (2000 W)

	Weight loss in mg/coupon [2]					
	Cast Iron			Aluminium		
test duration, hrs	48	69	116	²48	69	116
Reference coolant [3]						
hot coupon	-	-13.1	4.3	-18.2	284.2	-
top coupon	30.	1.6	5.7	6.2	152.2	-
Havoline XLC						
hot coupon	-0.2	-2.1	-0.5	20.2	24.6	35.1
top coupon	3.4	0.1	1.9	20.1	42.1	18.5

2 Weight loss AFTER chemical cleaning acc. to (shortened) MTU procedure. Weight gain is indicated by a - sign.
3 Reference coolant is a conventional, high quality, silicate-based coolant

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Aging test

To emphasize the corrosion protection offered by **Havoline XLC**, the aging test is conducted under more severe conditions compared to those commonly used in the industry.

Test Conditions	Typical Industry	**Havoline XLC**
Test duration	169 h	504 h
Fluid content	5.0 l	6.0 l
Pressure	1.5 bar	2.5 bar
Flow	3.0 l/min	3.5 l/min
Heat input	5500 W	5000 W
Temperature in heating vessel	95 °C	115°C
Temperature in cooling vessel	75 °C	95°C
Concentration of coolant in water	40 vol. %	20 vol. %

	Weight loss in g/m² (using Arteco test parameters) [1]						
	Al [2]	AlMn	Cast Iron	Steel	Cu	CuZn	Solder CB
Reference Coolant [3]							
after initial cleaning	82.10	64.02	-2.19	-1.68	3.62	2.90	21.45
after final cleaning	125.01	94.33	-0.36	0.11	4.99	5.66	25.83
Havoline XLC							
after initial cleaning	9.77	0.71	-0.07	0.17	1.44	1.62	0.43
after final cleaning	23.58	4.14	0.0	0.24	2.63	2.53	0.55

1. Weight loss AFTER chemical cleaning acc. to (shortened) MTU procedure. Weight gain is indicated by a - sign.
2. Aluminium SAE 329.
3. Reference coolant is conventional, high quality, silicate-based coolant.

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