

Havoline® XLC

1 Description

Havoline® XLC (Havoline® Extended Life Coolant) - mixed with the appropriate amount of water - is used as a cooling and heat transferring fluid in combustion engines. Excessive heat 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:

- | | |
|--|--|
| <ul style="list-style-type: none"> ▪ Extended life ▪ Improved heat transfer ▪ Reduces repairs ▪ Reliability ▪ Improved hard water stability ▪ Save time and money ▪ Suitable for mixed fleets ▪ Environmentally friendly | <p>by synergistic combination</p> <p>leaves more flexibility to engine design to thermostat, radiator and water pump</p> <p>depletion free and stable inhibitor</p> <p>absence of silicates and phosphates</p> <p>maintenance-free coolant</p> <p>1 coolant for automotive & heavy duty application</p> <p>by using carboxylic additives</p> |
|--|--|

Based on patented *silicate-free* aliphatic additive 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-carboxylates 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 when above mileages or

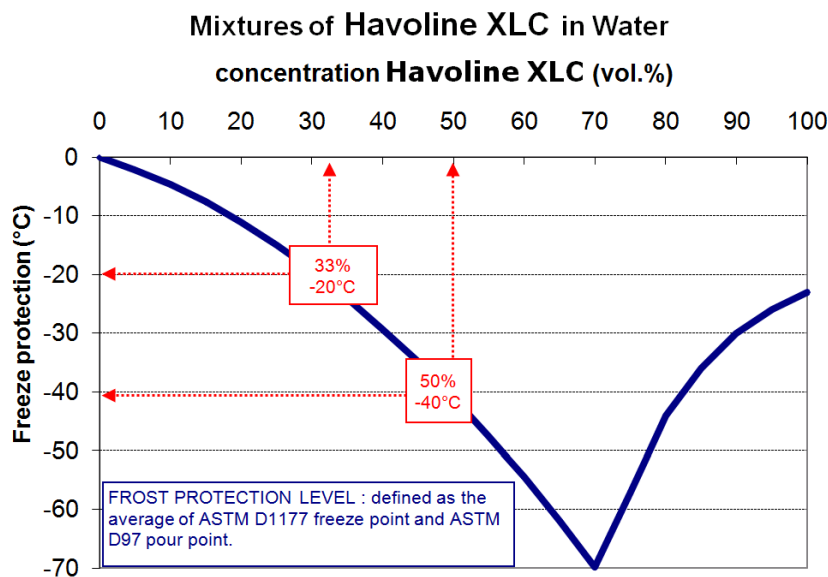
operating times are reached, whichever comes first. **Havoline® XLC** provides long-life protection against all forms of *corrosion* by the use of optimised and patented organic corrosion inhibitors. Excellent and lasting high temperature corrosion protection is provided for the **aluminium** heat transfer 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).

Havoline® XLC

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 aluminium protection is important. For racing cars we recommend the usage of **Havoline® XLI (Havoline® Extended Life Corrosion Inhibitor)**, an aqueous solution of the same carboxylic additives.



Havoline® XLC

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.

For optimal performance and controlled quality, we recommend the use of deionised or distilled water to prepare the ready-to-use

dilutions although lab testing has shown that acceptable corrosion results are still obtained with water of 20°dH, containing up to 500 ppm chlorides or 500 ppm sulphates. We refer to our information leaflet on water quality recommendations. Contact your local Area Sales Manager for more information.

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 upon request. Contact your local Area Sales Manager for more information.

Even though a formal approval has not been obtained from some OEMs, **Havoline® XLC** is suitable for use as antifreeze / coolant in any combustion engine. We refer to the OEM's manual for 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

Havoline® XLC

7 Availability

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

In the range of organic additive technology, Artec can offer:

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

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

8 Storage and requirements

The product should be stored above -20 °C and preferably at ambient temperatures. Periods of exposure to temperatures above 35 °C should be minimised.

Further, it is strongly advised not to expose the coolant in translucent packages to direct sunlight because this can degrade the colour dyes present in the coolant, and result in fading of the colour or discoloration over time. This reaction can be accelerated if coupled with high ambient temperatures. To avoid this

issue it is therefore advisable to store coolant filled in translucent packages indoors.

Havoline® XLC 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.

Havoline® XLC

9 Toxicity & Safety

For Toxicity and Safety Data we refer to the Safety Data Sheet. The information and advice given should be observed and due attention should be given to the precautions

necessary for handling chemicals. This product should not be used to protect the inside of drinking water systems against freezing. The transport is not regulated.

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Havoline® XLC

Addendum - Technical information

Chemical and physical properties Havoline® XLC

	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		
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 crystallisation	< - 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

Havoline® XLC

ASTM D1384 glassware corrosion tests

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

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

ASTM D4340 Aluminium heat rejection test, 25 %

	Weight loss in mg/cm ² /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 coolant³						
hot coupon	-30.0	-13.1	4.3	-18.2	284.2	-
top coupon	-20.0	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

Havoline® XLC

Aging test

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

Corrosion Protection

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/m ² (using Artecó 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.