Havoline XLI

Premium performance extended life corrosion inhibitor

Product description

Havoline® XLI is a premium performance extended life, low toxicity, corrosion inhibitor concentrate. Havoline XLI is formulated with patented advanced carboxylate additive technology, designed to contribute to long-life and low maintenance corrosion protection.

Havoline XLI has been extensively field tested and the synergistic combination of mono- and di-carboxylic additives has been proven to promote effective protection for over 8,000 hours or 650,000 km in off-road, truck and bus applications, and 32,000 hours in marine and stationary engines. The product is compatible with a range of glycol-based engine coolants.

Customer benefits

- Advanced synergistic additive technologies contributes to extended, low maintenance corrosion protection, helping increase uptime
- Promotes high performance protection in thermostats, radiators, water pumps and other vulnerable cooling system components
- Helps provide effective protection to a wide range of metals including aluminium, iron, copper and solder alloys
- Aids performance and cooling system protection in modern high temperature aluminium engine environments
- High technology non-depleting inhibitors aid consistent long-life performance and protection
- Silicate and phosphate-free technology offers good, stable dilution in harder waters

Product highlights

- **Extended low maintenance service life**
- **Advanced non-depleting inhibitor technology**
- **Contributes to a vulnerable component protection**
- **Effective hard water stability**
- **High temperature aluminium corrosion resistance**

Applications

- Mixed with the appropriate amount of water, Havoline XLI is recommended as a coolant, flushing fluid or hot test fluid for engine blocks and cooling systems. During extensive field testing, the synergistic combination of mono- and di-carboxylic additives has proven to offer protection for at least 32,000 hours in marine and stationary applications
- Havoline XLI promotes long-life protection against corrosion through the use of optimised and patented organic corrosion inhibitors. Havoline XLI contributes to long-life protection to aluminium heat transfer surfaces contained in modern engines. The inhibitor package of Havoline XLI aids cavitation protection without nitrite or nitrite-based supplemental coolant additives (SCA's)
- Havoline XLI promotes long-life corrosion protection. Depending on the actual application the dosage may vary from 5 - 10 % but a minimum of 5 vol. % of Havoline XLI in water should be used. Havoline XLI may be used in engines manufactured from cast iron, aluminium or combinations of the two metals, and in cooling systems made from aluminium or copper alloys. The correct dosage of Havoline XLI may be established with a refractometer reading
- Havoline XLI is recommended for hi-tech engines such as race cars and heavy duty off-road equipment, where high temperature aluminium protection is important
- In marine applications, the concentration of Havoline XLI should not be lower than 5 vol. %. At this dosage the recommended life-time is at least 32,000 hours. If Havoline XLI is replenished regularly to compensate for leakage, the cooling water can be considered as fill for life
- For off-road, truck and bus applications the recommended life time is 8,000 hours or 650,000 km, provided a concentration of 7.5 % vol. Havoline XLI is used
- At 7.5 % vol., Havoline XLI will provide corrosion protection in stationary engines for at least 32,000 hours
- Havoline XLI can also be used at 10 % vol. as a hot test liquid for new engine blocks. Newly manufactured engines are tested for a duration of approximately 5 to 10 minutes, after which the fluid is drained and usually reused. If the engine blocks are not immediately built into vehicles, Havoline XLI will provide corrosion protection for the engine for up to two months
- At 5 % vol. Havoline XLI performs as a flushing fluid to clean cooling systems that were filled with other inhibitor packages. In most cases it is required to flush the system twice. For a good result it is important that the engine has reached normal operating temperatures and all thermo-valves are opened
- Havoline XLI can also be used as an inhibitor package for central heating systems, as a hydraulic safety and mining fluid
- The use of soft water is preferred for dilution. Laboratory 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. The water used for dilution should be free of zinc as the presence of zinc will result in the formation of a precipitate
- This product is compatible with glycol-based engine coolants. It is recommended to change the coolant every five years or at above operating times, whichever comes first

Approvals, performance and suitable for use

- Havoline XLI has been approved by several engine manufacturers and an up-to date list with approvals is available separately.

  Even though some OEMs have not yet given a formal approval, Havoline XLI is suitable for use in the applications as described in this PDS.

RESTRICTED TO PROFESSIONAL USERS ONLY.

Storage and handling

- The product should be stored above -5°C and preferably at ambient temperatures. Periods of exposure to temperatures above 35°C should be minimised. Further, it is strongly advised to use new dark containers and not recycled ones. Exposure to direct sunlight might cause discoloration, although the product itself and the properties remain stable.
- Havoline XLI can be stored for 5 years in unopened containers without any effect on the product quality or performance. As with any antifreeze coolant, the use of galvanized steel is not recommended for pipes or any other part of the storage/mixing installation.

Typical test data

Test	Test methods	Results
		Havoline XLI
Inhibitor content	—	32 % w/w
Water content	ASTM D1123	68 % w/w
Nitrite, amine, phosphate,borate, silicate	—	Nil
Colour	—	Uncoloured
Specific gravity, 20°C	ASTM D1122	1.058 typ.
pH	ASTM D1287	9.4 typ.
Cloud point	—	- 15°C typ.
5% dilution		
- pH	ASTM D1287	8.1 typ.
- Effect on non-metals	GME 60 255	No effect
- Hard water stability	VW PV 1426	No precipitate

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Corrosion Protection

Modified ASTM D1384 glassware corrosion tests – 300ppm chloride

	Weight loss in mg/coupon [1]						
	Brass	**Copper**	**Solder**	**Steel**	**Cast Iron**	**Aluminium**	**AlMn**
ASTM D5216 (max)	10	10	30	10	10	30	-
5% Havoline XLI	0.6	0.6	4.5	0.0	0.7	9.8	4.8

[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]		
Test duration, 116hrs	**Cast Iron**	**Aluminium**	
		SAE 329	**AlMgSil**
5% Havoline XLI in deionised water - hot coupon	-1.3	9.3	1.8
5% Havoline XLI in FVV water - hot coupon	-9.0	-16.4	40.7

[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 MEG coolant.

Aging test

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

Test Conditions	Typical Industry	Havoline XLI
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. %

Corrosion Protection

Aging test

	Weight loss in g/m² (using Chevron 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 XLI							
- after initial cleaning	23.91	27.05	0.52	0.36	1.03	1.13	0.27
- after final cleaning	60.16	63.15	0.69	0.40	1.46	1.76	0.52

[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 a conventional, high quality, silicate-based MEG coolant

The typical test data set out above does not constitute a specification. It is indicative only and can be affected by allowable production tolerances. Chevron may modify this test data. Modified data will supersede all previous data, so please ensure you refer to the latest version of this Product Data Sheet (PDS).