

Havoline[®] Antifreeze Coolant

1 Description

Havoline[®] Antifreeze Coolant (Havoline[®] AFC) - 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 air flow. Formulated with powerful and efficient additives, **Havoline[®] AFC** is recommended for use in cooling

systems of all types of liquid cooled automotive and industrial internal combustion engines. Exempt from potentially harmful additives such as nitrites, amines and phosphates, the coolant also contributes to a safer environment. **Havoline[®] AFC** has been approved by a large number of passenger car and heavy duty Original Equipment Manufacturers.

Havoline[®] AFC offers the following benefits to the user:

- **Efficient and long lasting corrosion protection** combination of silicate and carboxylate inhibitor technology
- **Maintenance-free protection against freezing and boiling** ethylene glycol based fluid
- **Extended coolant life** low depletion rates of the corrosion inhibitor package
- **Excellent seal compatibility** no adverse effects on rubber hoses and gasket materials

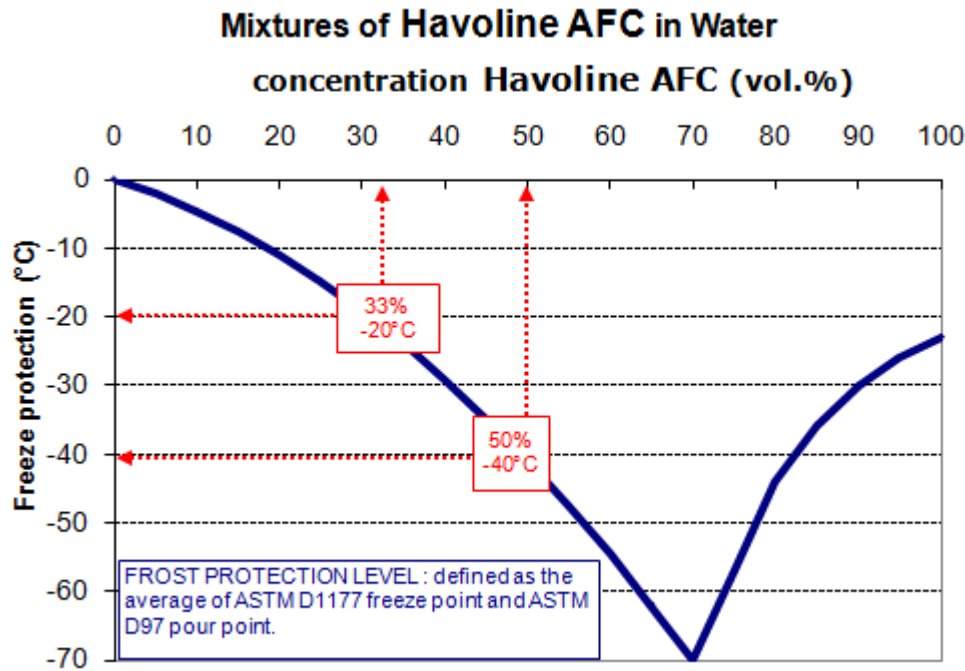
Havoline[®] AFC has been developed to meet the demanding requirements of the most important car and truck manufacturers.

2 Application

Havoline[®] AFC provides year-round frost and corrosion protection. To ensure good corrosion protection it is recommended to use at least 33 vol. % of **Havoline[®] AFC** in the coolant solution. This provides frost protection to -20°C. Typical mixtures in Northern Europe are 50/50 AFC/Water, offering frost protection down to -40°C. Mixtures with more than 70 vol. % of **Havoline[®] AFC** in water are not

recommended. The maximum frost protection (about -69°C) is obtained at 68 vol. % **Havoline[®] AFC**. This coolant 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.

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3 Compatibility and mixability

Havoline® AFC is compatible with most other coolants based on ethylene glycol. Exclusive use of **Havoline® AFC** is recommended for optimal 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. We refer to our product information leaflet on water quality recommendations. Contact your local area sales manager for more information.

4 Approval by OEM's

Havoline® AFC has been approved by most engine manufacturers and an up-to-date approvals list is available separately. Even though some OEM's have not yet given a

formal approval, **Havoline® AFC** is suitable for use as antifreeze/coolant in any combustion engine.

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5 Availability

Havoline® AFC is available in bulk and in various packages in different colours and with or without a bittering agent. Please contact your local Arteco Area Sales Manager for advice on the availability of packages, dilutions and colours.

- **Havoline® Premixed Antifreeze Coolant** is the final mixture of coolant & water filled in the radiator.
- **Havoline® Antifreeze Base** is a MEG-based superconcentrate of **Havoline® AFC**.

6 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 minimized.

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. It is therefore advisable to store coolant filled in

translucent packages indoors to avoid this issue.

Havoline® Antifreeze Coolant can be stored for minimum 5 year 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 galvanized steel is not recommended for pipes or any other part of the storage/mixing installation.

7 Toxicity & safety

For Toxicity and Safety Data we refer to the Material 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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Addendum - Technical information

Chemical and physical properties

	Havoline® AFC		ASTM D3306 requirements		method
Ethylene glycol	93.5 % w/w glycol		base		
Inhibitor content	5.4 % w/w				
Water content	3.5 % w/w max		5 % w/w max		ASTM D1123
Ash content	1.3 % w/w typ.		5 % w/w max		ASTM D1119
Nitrite, amine, phosphate	nil				
Colour	Colorless				
Specific gravity, 20°C	1.125 typ.		1.110 to 1.145		ASTM D5931
Equilibrium boiling point	174°C typ.		> 163°C		ASTM D1120
Reserve alkalinity (pH 5.5)	16 typ.		report		ASTM D1121
pH	7.2 typ.				ASTM D1287
Refractive Index, 20°C	1.432 typ.				ASTM D1218
	50 % dilution	40 % dilution	33 % dilution	ASTM 3306	method
PH	8.4 typ.	8.4 typ.	8.6 typ.	7.5 to 11.0	ASTM D1287
Foaming properties at 88°C ■ break time			60 ml max. 3 sec typ.	150 ml max. ¹ 5 sec. max. ¹	ASTM D1881
Initial crystallization	< - 37°C	< - 26°C	< -18°C	< - 37°C	ASTM D 1177
Freezing protection	-40°C typ.	- 28°C typ.	-20°C typ.		
Specific gravity, 20°C	1.076 typ.	1.068 typ.	-		ASTM D5931
Reserve alkalinity (pH 5.5)	8.0 typ.	7.0 typ.	-		ASTM D1121
Effect on non-metals	no effect	No effect	no effect		GME 60 255
Staining characteristics	-	-	no effect	no effect	ASTM D 1882
Hard water stability	no precipitate	-	-		VW PV 1426

(1) limit for the 33 % dilution.

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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
GM 1825-M (max)	10	10	20	10	10	20
GM 1899-M (max)	10	10	20	10	10	20
Havoline® AFC	2	2	-3	-1	-1	0

Corrosion Protection

ASTM D4340 Aluminium heat rejection test, 25 %

	Weight loss in mg/cm ² /week ¹
ASTM D3306 (max)	1.0
Havoline® AFC	< 0.1

ASTM D2570 Simulated service test

	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminum
ASTM D3306 (max)	20	20	60	20	20	60
SAE J1034 (max)	20	20	60	20	20	60
GM 1825-M (max)	20	20	40	20	20	40
GM 1899-M (max)	20	20	40	20	20	40
Havoline® AFC	6	7	-1	-1	-3	1

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

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GM-OPEL hot finger test (QL130100)

Corrosion Protection

	Weight loss in mg/coupon					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
44 % solution						
Specification (max)	10	10	30	10	10	30
Havoline[®] AFC	10	10	20	10	10	20
25 % solution						
Specification (max)	10	10	20	10	10	20
Havoline[®] AFC	2	2	-3	-1	-1	0