
Freecor[®] QFC

1 Description

Freecor[®] QFC is an ethylene glycol based engine coolant that provides - mixed with the appropriate amount of water - efficient cooling of the internal combustion engine. The coolant transfers the heat to the radiator where the mixture is cooled by means of airflow.

Freecor[®] QFC is a *lobrid* product, which means it is formulated with a backbone of organic inhibitors in combination with mineral inhibitors (silicate). Hence it delivers not only maintenance-free protection against *freezing and boiling* but also long-lasting protection against *corrosion*.

2 Benefits

Freecor[®] QFC offers many benefits to the engine designer as well as to the user:

- **Long life protection** by means of synergistic effect through a particular combination of organic inhibitors
- **Uniform & homogenous protective layer** through an engineered inhibitor package
- **Long-term stability** as a result of high performance silicate stabiliser which prevents gel-formation or drop-out
- **Protection of all metals**, including aluminium and ferrous alloys, thanks to high-performance additives
- **Environmentally friendly** due to the absence of borate, nitrite, amines and phosphates

3 Application

Freecor[®] QFC provides efficient frost and corrosion protection. To ensure good corrosion protection it is recommended to use at least 33 vol. % of **Freecor[®] QFC** in the coolant solution. Mixtures with more than 70 vol. % **Freecor[®] QFC** in water are not recommended. The maximum frost protection (about -69°C) is obtained at 68 vol%.

Freecor[®] QFC 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. **Freecor[®] QFC** is particularly recommended for hi-tech engines, where high temperature aluminium protection is important.

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4 Compatibility and mixability

Freecor[®] QFC is compatible with most other coolants based on ethylene glycol.

Exclusive use is however recommended for optimum corrosion protection and inhibitor stability.

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.

5 Availability

Freecor[®] QFC is available in bulk. Please contact your local Artec Area Sales Manager for availability of packages or dilutions.

6 Approval

Freecor[®] QFC technology meets the requirements of VW TL774J (G13), and has successfully passed all stringent VW lab, fleet & performance tests. Contact us for more information.

7 Storage 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 color dyes present in the coolant, and result in fading of the color 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.

Freecor[®] QFC can be stored for minimum 3 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 galvanized steel is not recommended for pipes or any other part of the storage/mixing installation.

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8 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

	Freecor [®] QFC	ASTM 3306 requirements	method
Ethylene glycol, % wt	min 78 %	Base	
Glycerol, % wt	max 20 %		
Water content, % wt	typ 3.4 %	5.0% max	ASTM D1123
Nitrite, amine, phosphate, borate	Nil		
Colour	Light red / violet		
Density, 15°C, kg/l	typ 1.135	1.110 to 1.145	ASTM D5931
Density, 20°C, kg/l	typ 1.132		ASTM D5931
Equilibrium boiling point, °C	typ > 170	> 163	ASTM D1120
Reserve alkalinity, ml HCl 0.1N (pH 5.5)	typ 5.7	report	ASTM D1121
pH, 20°C as is 33 vol%	typ 8.6 typ 8.3		ASTM D1287
Refractive Index, 20°C	typ 1.437		ASTM D1218
Foaming performance :			
<i>Step 1</i> Foaming properties @ 20°C (33 v%)			
↳ volume	7		
↳ volume after 1 minute	0		
<i>Step 2</i> Foaming properties @80°C (33 v%)			
↳ volume	2		TL774J
↳ volume after 1 minute	0		
<i>Step 3</i> Foaming properties @ 20°C (33 v%)			
↳ volume	4		
↳ volume after 1 minute	0		

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Special attention must be drawn to the **freezing point measurement**.

Refractometers are a very commonly used tool to verify the freezing point. However, with dilutions of **Freecor[®] QFC**, readings via a regular refractometer (ASTM D3321) on the MEG-scale will lead to a wrong conclusion regarding the right freeze point; this is because the reading is affected by the glycerol in the product.

Below table gives the data on different dilutions on density, refractive index and freeze point, and highlights the difference in results between the 2 standard test methods for antifreeze: ASTM D1177 and ASTM D3321.

For more information on freeze point measurements, see also our separate information bulletin.

Chemical and physical properties

Method	Correct freezing point, °C	Density, 20°C kg/l	Refractive index, 20°C	Refractometer reading*, °C	Dilution vol%
	ASTM D1177	ASTM D5931	ASTM D1218	ASTM D3321	
	-10	1.035	1.358	-12	22.3
	-15	1.046	1.366	-18	29.3
	-20	1.056	1.373	-25	35.6
	-25	1.064	1.379	-31	41.0
	-30	1.071	1.384	-36	45.8
	-35	1.077	1.388	-42	49.8
	-40	1.081	1.392	-46	53.2
	-45	1.085	1.394	-50	55.7
	-50	1.087	1.396	-52	57.6

* MEG scale

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VW modified ASTM D1384 glassware corrosion tests (88°C)

	Weight loss after chemical cleaning (g/m ²)								
	Copper	Solder CB	Brass	Steel	Cast Iron	AlSi10Mg	Al319 (Al6Cu4)	Al3003 (AlMn)	Al4047 (AlSi12)
TL774J (max)	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 2	≤ 2	≤ 2	≤ 2
Freecor[®] QFC	0.3	0.7	0.2	0.7	-0.1	-0.1	-0.1	0.1	0.1

VW modified ASTM D4340 Aluminum heat rejection test, 40 % FVV water

	Weight loss in mg/cm ² /week	
	Before chemical treatment	After chemical treatment
Freecor[®] QFC	0.3	0.3

VW modified Dynamic Heat Transfer Test, 40 % tap water (20° dH)

	Weight Gain (mg)	pH	
		Before	After
Freecor[®] QFC	28	8.2	8.2

Corrosion Protection