Freecor® QRC

1 Description

Freecor® QRC - 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. **Freecor® QRC** is an ethylene glycol based fluid that provides maintenance-free protection against *freezing and boiling* but also against *corrosion.*

Freecor® QRC has been developed to meet specific demands of particular OEMs by combining organic and silicate technology.

2 Benefits

Freecor® QRC offers many benefits to the engine designer as well as to the user:

- **Long life protection** synergistic effect by a combination of organic inhibitors
- **Uniform & homogenous protective layer** engineered inhibitor package
- **No gel formation or drop-out** performant silicate stabiliser
- **Environmentally friendly** free of borate, nitrite, amines and phosphates
- **Aluminium protection** high-performance additives

Freecor® QRC provides effective corrosion protection for all engine metals, including aluminium and ferrous alloys.

3 Application

Freecor® QRC provides efficient frost and corrosion protection. To ensure good corrosion protection it is recommended to use at least 33 vol. % of **Freecor® QRC** in the coolant solution. This provides frost protection to -22°C. Typical mixtures in Northern Europe are 50/50, offering frost protection down to -40°C. Mixtures with more than 70 vol. % **Freecor® QRC** in water are not recommended. The maximum frost protection (about -69°C) is obtained at 68 vol. % **Freecor® QRC**. **Freecor® QRC** 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® QRC** is particularly recommended for hi-tech engines, where high temperature aluminum protection is important.

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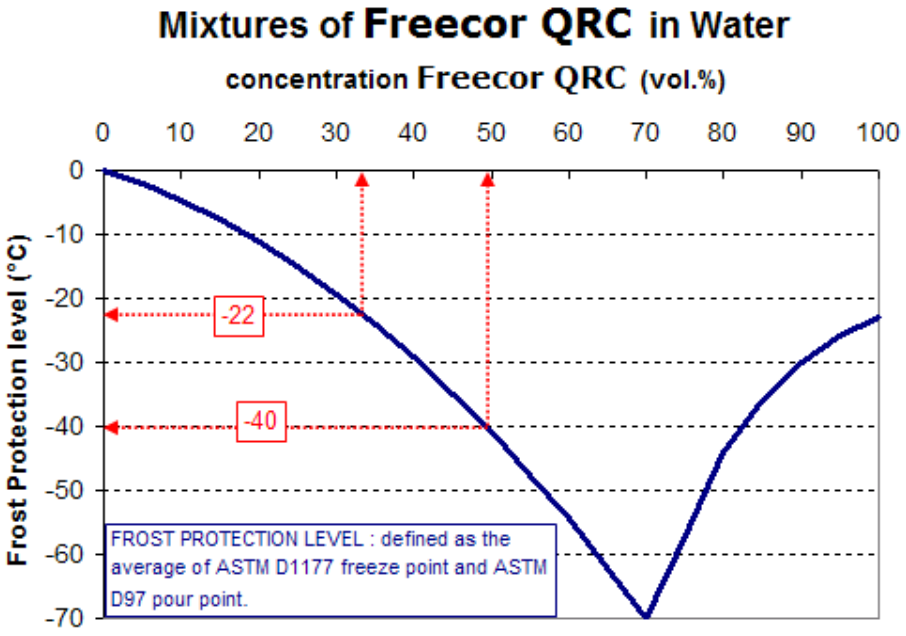

4 Compatibility and mixability

Freecor® QRC is compatible with most other coolants based on ethylene glycol. Exclusive use is however recommended for optimum corrosion protection and inhibitor stability.This coolant is compatible with European hard tap waters. It satisfies the most stringent requirements for hard water stability. However, 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® QRC is available in bulk. Please contact your local Arteco Area Sales Manager for availability of packages, dilutions and colours.

6 Approval

Freecor® QRC meets the requirements of VW TL774G[1] (G12++), and has successfully passed all stringent VW lab 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 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.

Freecor® QRC can be stored for minimum 3 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.

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® QRC	ASTM 3306 requirements	method
Ethylene glycol	93 % w/w glycol	Base	
Other glycols	0.5 % max.	5 % w/w max.	
Water content	3 % w/w max	5 % w/w max	ASTM D1123
Nitrite, amine, phosphate, borate	Nil		
Colour	Light red		
Density @ 15°C (kg/m³)	typ 1.117	1.110 to 1.145	ASTM D5931
Density @ 20°C	typ 1.114		ASTM D5931
Equilibrium boiling point, °C	typ > 170	> 163	ASTM D1120
Reserve alkalinity (pH 5.5)	typ 6.0	Report	ASTM D1121
pH @ 20°C as is 40v/v%	 typ. 8.6 typ. 8.4	 7.5 to 11.0	ASTM D1287
Refractive Index, 20°C	typ 1.432		ASTM D1218
Foaming performance : *Step 1* Foaming properties @ 20°C (33 v%) ↳ volume ↳ collapse time after 1 minute	 14 0		
Step 2 Foaming properties @80°C (33 v%) ↳ volume ↳ collapse time after 1 minute	 16 0		TL774G[1]
Step 3 Foaming properties @ 20°C (33 v%) ↳ volume ↳ collapse time after 1 minute	 14 0		
Freezing point 40 v/v % 50 v/v %	 typ – 24.9°C typ – 37.2°C	< - 37°C	ASTM D1177

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Corrosion Protection

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

		Weight increase after water cleaning							
		Copper	Solder CB	Brass	Steel	Cast Iron	Al319 (Al6Cu4)	Al3003 (AlMn)	Al4047 (AlSi12)
mg/coupon	**Freecor® QRC**	-0.1	-0.2	0.2	0.4	0.9	2.1	0.5	0.7
g/m²	TL774G[1] (max)	≤ 1	≤ 1	≤ 1	≤ 1	≤ 1	≤ 2	≤ 2	≤ 2
	Freecor® QRC	0.0	-0.1	0.1	0.2	0.3	0.7	0.2	0.2

		Weight loss after chemical cleaning							
		Copper	Solder CB	Brass	Steel	Cast Iron	Al319 (Al6Cu4)	Al3003 (AlMn)	Al4047 (AlSi12)
mg/coupon	**Freecor® QRC**	0.9	1.0	0.4	-0.2	-0.7	-0.7	-0.2	0.3
g/m²	TL774G[1] (max)	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3	≤ 2	≤ 2	≤ 2
	Freecor® QRC	0.3	0.3	0.2	-0.1	-0.2	-0.2	-0.1	0.1

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

	Weight loss in mg/cm²/week [1]	
	Before chemical treatment	After chemical treatment
Freecor® QRC	-0.8	-0.2

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

	Weight Gain (mg)	pH	
		Before	After
Freecor® QRC	24	8.7	8.6

[1] *specification VW TL774G version August 2010*