Freecor© NRC

1 Description

Freecor© NRC 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© NRC 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 Application

Freecor© NRC offers many benefits to the engine designer as well as to the user:

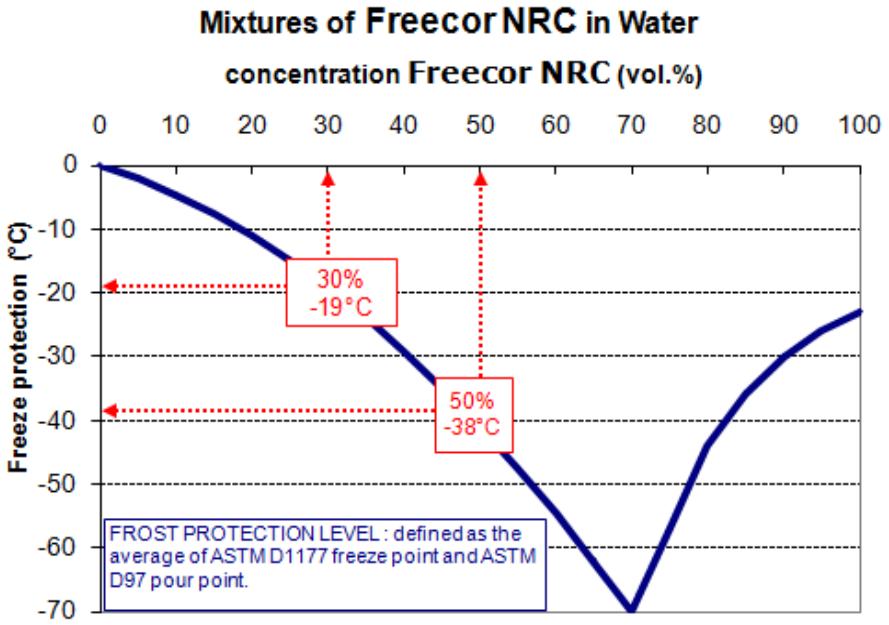
- **extended life** by synergistic combination
- **improved heat transfer** leaves more flexibility to engine design
- **reduces repairs** to thermostat, radiator and water pump
- **improved water pump performance** improved lubricity of water pump seal
- **reliability** depletion free and stable inhibitor
- **improved hard water stability** absence of silicates and phosphates
- **save time and money** maintenance-free coolant
- **environmentally friendly** by using carboxylic additives in the inhibitor package

Based on patented *silicate-free* aliphatic additive technology, **Freecor© NRC** provides long-life corrosion protection for all engine metals, including aluminum and ferrous alloys. **Freecor© NRC** provides long-life protection against all forms of *corrosion* by the use of optimized and patented organic corrosion inhibitors. Excellent and lasting high temperature corrosion protection is provided for the **aluminum** heat transfer surfaces contained in modern engines. The inhibitor package of **Freecor© NRC** offers excellent cavitation protection even without using nitrite or nitrite-based supplemental coolant additives (SCA's).

Freecor© NRC

3 Application

Freecor© NRC provides long-life freeze and corrosion protection. To ensure good corrosion protection it is recommended to use at least 30 vol. % of **Freecor© NRC** in the coolant solution. This provides freeze protection to -19°C. Typical mixtures in Northern Europe are 50/50, offering freeze protection down to -38°C.



Freecor© NRC may be used with confidence in engines manufactured from cast iron, aluminum or combinations of the two metals, and in cooling systems made of aluminum or copper alloys.

Freecor© NRC is particularly recommended for hi-tech engines, where high temperature aluminum protection is important.

Freecor© NRC

4 Compatibility and mixability

Freecor© NRC is compatible with most other coolants based on ethylene glycol. Exclusive use of **Freecor© NRC** 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. We refer to our product information leaflet on water quality recommendations. Contact your local area sales manager for more information. Despite these recommendations, 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 sulfates.

5 Approvals by OEMs

Freecor® NRC has been approved by following engine manufacturers:

Dacia	specification 41-01-001/--T
Mercedes-Benz	specification 325.7
Renault	specification 41-01-001/--T

6 Availability

Freecor© NRC is available in bulk. Please contact your local **Arteco** area sales manager on availability of packages, dilutions and colours.

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© NRC

Freecor© NRC can be stored for minimum 8 years in unopened containers without any effect on the product 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© NRC**

	Freecor© NRC	ASTM D3306 requirements	method
ethylene glycol	90 % w/w glycol	base	
other glycols	1 % max.	5 % w/w max.	
inhibitor content	5 % w/w		
water content	4.3 % w/w max	5 % w/w max	ASTM D1123
ash content	1.01 % w/w typ.	5 % w/w max	ASTM D1119
nitrite, amine, phosphate, borate, silicate	nil		
colour	green or yellow		
specific gravity, 15°C	1.119 typ.	1.110 to 1.145	ASTM D5931
specific gravity, 20°C	1.115 typ.		ASTM D5931
equilibrium boiling point	173°C typ.	> 163°C	ASTM D1120
reserve alkalinity (pH 5.5)	7.6 typ.	report	ASTM D1121
pH, 20°C	8.3 typ.		ASTM D1287
refractive Index, 20°C	1.432 typ.		ASTM D1218

Chemical and physical properties **dilutions**

	50 % dilution	40 % dilution	30 % dilution	ASTM D3306	method
pH	8.1	8.1	8.0	7.5 – 11.0	ASTM D1287
foaming properties at rt ■ break time	< 40 ml < 10 s	-	-		CEC-C-10
initial crystallization	< -36°C	< -24°C	< -15°C	< -37°C	ASTM D1177
freezing protection	- 38°C typ.	- 26 typ.	-19 typ.		
specific gravity, 20°C	1.069	1.056	1.042		ASTM D5931
reserve alkalinity (pH 5.5)	3.7 typ.	3.0 typ.	2.3 typ.		ASTM D1121
equilibrium boiling point	112°C typ.	111°C typ.	109°C typ.		ASTM D1120

Freecor© NRC

	Freecor© NRC		ASTM D3306 requirements	method
effect on non-metals	no effect	-	-	Renault 41-01-001/--S
hard water stability	no precipitate	-	no precipitate	VW PV 1426 or GFC L-106-A-90

Dynamic corrosion test CEC-C23-T-99 (cast iron 1400W/aluminum 1000W, 20vol%, 72Hrs)

Corrosion protection

	weight loss in mg/coupon [1]		
	cast iron	aluminium	
		before chemical treatment	after chemical treatment
Renault Nissan common spec	-	-40 to +10 mg	-80 to +10 mg
Freecor© NRC	5 mg	-13 mg	-19 mg

[1] weight loss acc. to CEC-C23-T-99 is indicated by a minus sign.