
Freecor® HDC

1 Description

Freecor® HDC - mixed with the appropriate amount of water - is used as a cooling and heat transferring fluid in combustion engines and in particular for heavy duty applications. Excessive heat is transferred

via the fluid to the radiator where the mixture is cooled by means of airflow.

Freecor® HDC is a phosphate-free ethylene glycol coolant based on low silicate technology in combination with nitrite and molybdate.

2 Benefits

Freecor® HDC provides maintenance-free protection against *freezing and boiling* and offers many benefits to the engine designer as well as to the user:

- | | |
|--|---|
| ▪ Effective corrosion protection | optimized inhibitor package |
| ▪ Excellent pitting protection | for wet sleeve cylinder liners |
| ▪ Aluminium protection | high-performance additives |
| ▪ Uniform & homogenous protective layer | engineered low-silicate inhibitor package |
| ▪ No gel formation or drop-out | performing silicate stabiliser |
| ▪ No scale formation | phosphate free inhibitor package |

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

3 Application

Freecor® HDC has been specially designed for heavy-duty engine coolants, and 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® HDC** is suitable for gasoline, diesel, and natural gas powered automotive and industrial engines and is particularly recommended for heavy duty engines, where high temperature aluminium protection is important.

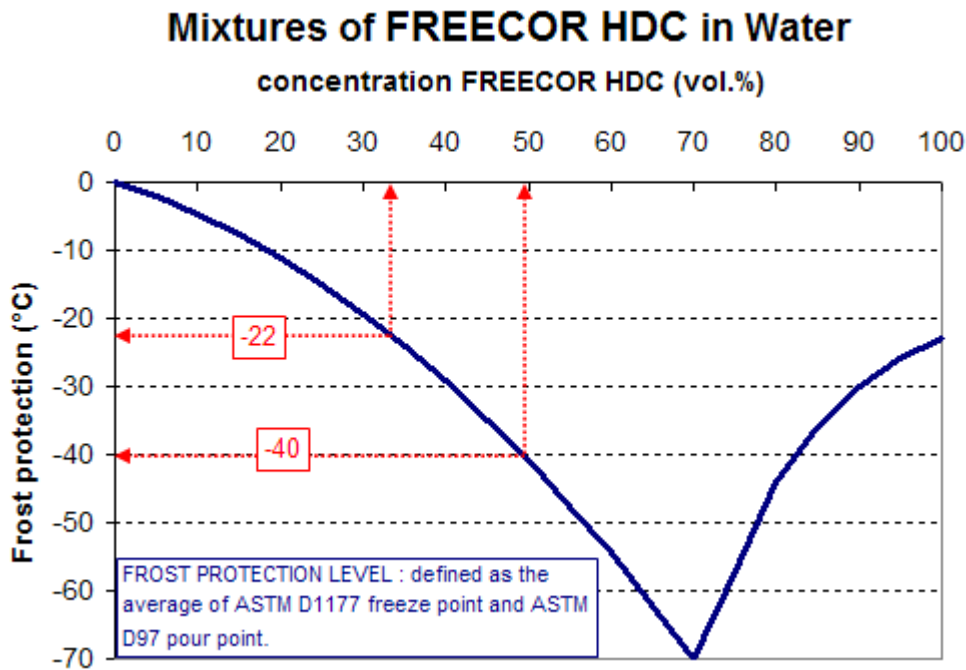
Freecor® HDC meets the heavy duty engine coolant specifications of TMC RP329 and ASTM D6210.

A good maintenance practice is to regularly check levels of nitrite and molybdate as stated in OEM recommendations. A variety of commercial test kits are available on the market to easily monitor this. In case nitrite levels have dropped below 800ppm, we recommend draining the fluid and refilling with fresh product.

Freecor® HDC

To ensure good corrosion protection it is recommended to use at least 33 vol.% of **Freecor® HDC** 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® HDC** in water are not recommended. The maximum frost protection (about -69°C) is obtained at 68 vol.% **Freecor® HDC**.



Note: Above graph shows the frost protection in function of the dilution ratio under ideal conditions. In real life conditions, dilutions rates in the proximity of the eutecticum must be avoided, as any impurities or crystals can result in freezing at lower temperatures.

4 Compatibility and mixability

Freecor® HDC 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 most European hard tap waters. 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 information leaflet on water quality recommendations. Contact your local area sales manager for more information.

Freecor® HDC

5 Availability

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

6 Approval

Freecor® HDC meets the following industry requirements:

- ASTM D6210 for heavy duty engines
- ASTM D3306 for automotive service
- ASTM D4985 for low silicate coolants for heavy duty engines
- TMC RP329 for nitrite-containing coolants

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 minimised.

As with any antifreeze coolant, the use of galvanised steel is not recommended for pipes or any other part of the storage/mixing installation.

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.

8 Toxicity & safety

For Toxicity and Safety Data we refer to the 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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Page 3 of 5

Freecor® HDC

Addendum - Technical information

Chemical and physical properties

	Freecor® HDC	ASTM 3306 requirements	method
Ethylene glycol	96 % w/w glycol	Base	
Other glycols	0.7 % max.	5 % w/w max.	
Water content, % w/w	typ 3.5 %	5 % max	ASTM D1123
Colour	purple or colourless		
Nitrites (as NO ₂)	typ 2300 ppm		IC
Molybdate (as Molybdenum)	typ 370 ppm		X-ray/ICP/AA
Density @ 15°C (kg/m ³)	typ 1.123	1.110 to 1.145	ASTM D1122
Density @ 20°C	typ 1.120		ASTM D1122
Equilibrium boiling point, °C	typ 170	> 163	ASTM D1120
Reserve alkalinity, ml HCl 0.1N	typ 9.5	Report	ASTM D1121
pH @ 20°C 50v/v	typ. 10.5	7.5 to 11.0	ASTM D1287
Foaming properties @ 88°C (33 v%)			
↳ volume, ml	33	150 max	ASTM D1881
↳ break time, seconds	0.9	5 max	
Freezing point 50 v/v %	typ. – 37.2°C	< - 36.4°C	ASTM D1177
Staining characteristic	no effect	no effect	ASTM D1882

Freecor® HDC

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
Freecor® HDC	0	0	3	0	-1	-3

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

ASTM D2570 Simulated service test

	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
ASTM D3306 (max)	20	20	60	20	20	60
SAE J1034 (max)	20	20	60	20	20	60
Freecor® HDC	2	2	2	0	-1	-4

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

ASTM D4340 Aluminium heat rejection test, 25 %

	Weight loss in mg/cm ² /week ¹
ASTM D3306 (max)	1.0
Freecor® HDC	0.2

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

ASTM D2809 Water pump cavitation erosion corrosion test

	Rating, 100hrs
ASTM D2809 (min)	8
Freecor® HDC	10 ²

² rating 10 = No corrosion or erosion present; no metal loss. No change from original casting configuration. Staining permitted