
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 corrosion | 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 aluminum protection is important.

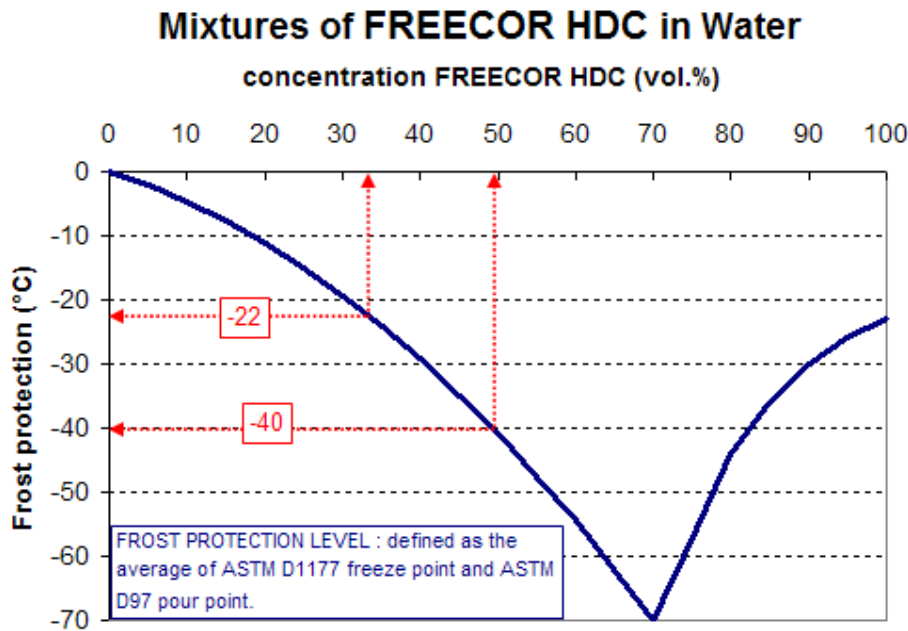
Freecor HDC meets the heavy duty engine coolant specifications of TMC RP329 and ASTM D6210.

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.

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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 the use of soft water is recommended.

5 Availability

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

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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 minimized.

As with any antifreeze coolant, the use of galvanized 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 Material Safety Data Sheet. The transport is not regulated. Labelling as for any MEG based coolant is required: Xn: R 22 (Harmful if swallowed).

This product should not be used to protect the inside of drinking water systems against freezing.

All information contained in this Product Information Leaflet is accurate to the best of our knowledge and belief as at the date of issue specified. However, the Company makes no warranty or representation, express or implied, as to the accuracy or completeness of such information.

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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 | | |
| 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 | tp 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 |

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ASTM D1384 glassware corrosion tests

| | Weight loss in mg/coupon ¹ | | | | | |
|-------------------------|---------------------------------------|--------|--------|-------|-----------|----------|
| | Brass | Copper | Solder | Steel | Cast Iron | Aluminum |
| 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 | Aluminum |
| 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 Aluminum 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