

Freecor[®] HCB

1 Description

Freecor[®] HCB, designed for heavy duty applications, is an additive package that allows easy blending of engine coolants. **Freecor[®] HCB** dosed at 6% in Mono ethylene glycol (MEG) results in a coolant that provides adequate freezing and corrosion protection.

The corrosion inhibitor package of **Freecor[®] HCB** consists of an OAT backbone, with the addition of nitrites and molybdates. The formulation is free from amines, silicates, borates and phosphates. The absence of silicates excludes any possible issues caused by instable silicate gel or silicate drop-out.

2 Benefits

Coolants formulated from **Freecor[®] HCB** provide efficient freezing and boiling protection, and offer the following benefits to the user:

- **Adequate corrosion protection** balanced inhibitor package
- **Excellent cavitation protection** Nitrite and Molybdate reinforce the passivation layer of the metal
- **Stable additive package** with OAT inhibitors backbone
- **Highly efficient cast iron protection**
- **Designed for HD applications** combination of additives according to industry requirements
- **No scale or gel formation** absence of phosphates and silicates
- **Low treat rate** dosage as low as 6% in MEG

3 Blending engine coolant from Freecor[®] HCB

Freecor[®] HCB allows easy blending of a coolant concentrate meeting ASTM D6210, ASTM D3306 and GB 29743-2013, by simply mixing the following ingredients at normal operating temperatures in the exact order as described below:

<i>Ingredient (wt %)</i>	<i>Formulation</i>
Mono ethylene glycol	94.0
Freecor[®] HCB	6.00
Colouring agent	optional
Bitterant	optional

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The equipment must be suitable for engine coolant blending. During and after blending, precautions should be taken to avoid any contamination of the product and the following guidelines should be followed:

- Check the equipment for cleanliness;
- Pump first the MEG into the blender and start stirring;
- Pump **Freecor® HCB** into the blender. If needed, use part of the MEG to rinse the tank/container;
- In case you want to blend a ready-to-use mixture: Add the appropriate amount of water*;
- If required, add the dye-components or bitterant into the blender;
- Continue stirring for at least 30 minutes;
- Take a sample for evaluation according to chemical and physical properties mentioned in Addendum – technical information.

** For the correct dosage of water, please read the instructions mentioned in Addendum – technical information. We strongly recommend the use of deionized or distilled water for optimal performance and controlled quality. We refer to our product information leaflet on water quality recommendations*

4 Proof of performance & Standards

Coolants made from **Freecor® HCB**, and blended according to the specified formulation, comply with the requirements of the heavy duty standard ASTM D6210 and the heavy duty coolant requirements of GB 29743-2013 (HEC). It is also conform to the industry standard ASTM D3306, and the Chinese national standard GB 29743-2013 (LEC). These claims are endorsed by reports and coolant analysis performed by an external independent lab.

Coolants based on the technology used for **Freecor® HCB**, have proven to offer protection for in excess of 100.000 km in heavy duty applications.

5 Availability

Freecor® HCB is available in bulk and 1000L containers. Product is available uncoloured.

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6 Storage requirements & Product handling

The product should be stored above -5°C. Periods of exposure to temperatures above 35°C should be minimized. **Freecor® HCB** can be stored for minimum 2 years in unopened containers without any effect on the product quality or performance. It is strongly recommended to use new containers and not recycled. Exposure to direct sunlight might cause some discoloration, although the

product itself and its properties remain stable. This reaction can be accelerated if coupled with high ambient temperatures.

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

7 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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Addendum - Technical information

Chemical and physical properties

	Freecor® HCB	method
Appearance	Clear liquid	Visual
Colour	Light yellowish	Visual
Density, 20°C, kg/l	1.102 typ.	ASTM D5931
pH	9.9 typ.	ASTM D1287

	Freecor® HCB @ 6% in MEG	GB 29743-2013 HEC-I	method
Appearance	Clear liquid	Clear, transparent without deposits	Visual
Density 20°C, kg/l	1.114.	1.108 – 1.144	SH/T0068
pH, 50vol%	8.8	7.5 – 11.0	SH/T0069
Reserve alkalinity, ml HCl 0.1N	3.3	-	SH/T0091
Boiling point °C, 50vol%	111.2	≥108.0	SH/T0089
Freezing point, °C, 50vol%	-37.9	≤ -36.4	SH/T0090
Ash content (wt%)	0.8	≤ 5.0	SH/T0086
Chloride (mg/kg)	≤ 10	≤ 60	SH/T0621
Water content (wt%)	3.7	≤ 5.0	SH/T0086
Foam volume, ml	40	≤ 150	SH/T0066
Foam disappear time, s	2.0	≤ 5.0	SH/T0066

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Properties for ready-mix coolants from Freecor[®] HCB

For heavy duty applications, ready-mix products meeting GB 29743-2013 can be prepared by simply mixing MEG and water* with **Freecor[®] HCB**, as shown in the below table.

Freezing Point (°C), ASTM D1177	-15.0	-25.0	-35.0	-45.0
Formulation (w/w%)				
Freecor[®] HCB	3.1	3.1	3.1	3.5
MEG	31.3	41.3	49.3	55.3
Water*	65.6	55.6	47.6	41.2
Density 20°C, kg/l, ASTM D5931 (typ.)	1.044	1.057	1.068	1.075
Nitrite/Molybdate level				
Nitrites as NO ₂ , mg/kg (IC)	≥300	≥300	≥300	≥300
Molybdates as MoO ₄ , mg/kg (ICP)	≥300	≥300	≥300	≥300
Total amount, mg/kg	≥780	≥780	≥780	≥780

* We strongly recommend the use of deionized or distilled water for optimal performance and controlled quality. We refer to our product information leaflet on water quality recommendations

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Corrosion Protection

GB 29743-2013: SH/T 0085 Corrosion test for engine coolants in glassware

	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
GB 29743-2013 (max)	+/-10	+/-10	+/-30	+/-10	+/-10	+/-30
Freecor[®] HCB @ 6% in MEG (typ.)	0.4	0.2	-5.4	0.2	-0.3	-7.7

¹ Weight loss AFTER chemical cleaning acc. to SH/T0085. Weight gain is indicated by a - sign.

GB 29743-2013: SH/T 0620 Corrosion of cast Aluminium alloys in engine coolants under heat-rejecting conditions

	Weight loss in mg/cm ² /week ¹
GB 29743-2013 (max)	+/-1.0
Freecor[®] HCB @ 6% in MEG (typ.)	0.20

¹ Weight loss AFTER chemical cleaning acc. to SH/T 0620. Weight gain is indicated by a - sign.

GB 29743-2013: SH/T 0087 Cavitation corrosion and erosion characteristics of Aluminium pumps

	Visual rating
GB 29743-2013 (max)	8 min
Freecor[®] HCB @ 6% in MEG (typ.)	9

GB 29743-2013: SH/T 0088 Simulated service corrosion testing of engine coolants

	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
GB 29743-2013 (max)	+/-20	+/-20	+/-60	+/-20	+/-20	+/-60
Freecor[®] HCB @ 6% in MEG (typ.)	2.5	2.0	8.2	0.4	0.4	3.5

¹ Weight loss AFTER chemical cleaning according to SH/T 0088. Weight gain is indicated by a - sign.

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ASTM D1384: Glassware corrosion test

	Weight loss in mg/coupon ¹					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
ASTM D3306 (max)	10	10	30	10	10	30
ASTM D6210 (max)	10	10	30	10	10	30
Freecor® HCB @ 6% in MEG (typ.)	1	1	2	1	1	5

¹ Weight loss AFTER chemical cleaning acc. to ASTM D1384. Weight gain is indicated by a - sign.

ASTM D4340: Corrosion of cast Aluminium alloys at heat-rejecting surfaces

ASTM D3306 (max)	1.0
ASTM D6210 (max)	1.0
Freecor® HCB @ 6% in MEG (typ.)	-0.11

¹ Weight loss AFTER chemical cleaning acc. to ASTM D4340. Weight gain is indicated by a - sign.

ASTM D2809 Cavitation corrosion and erosion characteristics of Aluminium pumps

	Visual rating
ASTM D3306 (max)	8 min
ASTM D6210 (max)	8 min
Freecor® HCB @ 6% in MEG (typ.)	8

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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
ASTM D6210 (max)	20	20	60	20	20	60
Freecor[®] HCB @ 6% in MEG (typ.)	6	6	4	0	3	1

¹ Weight loss AFTER chemical cleaning according to ASTM D2570. Weight gain is indicated by a - sign.