Freecor® JNB

1 Description

Freecor® JNB is an aqueous solution of phosphate corrosion inhibitors that allows easy blending of engine coolants.
In today's combustion engines, the engine and cooling system need to be protected against corrosion and frost damage. Therefore, the engine coolant needs to provide freezing and boiling protection, be compatible with commonly used metals and elastomers while providing efficient heat transfer.
A coolant blended from **Freecor® JNB** and **Freecor® LPSB** is an all-round coolant that exceeds the industry standards **JIS K 2234-2006 Class II, ASTM D3306** and **BS 6580**, and is suitable for use in Japanese and Korean vehicles.
Exempt from potentially harmful additives such as nitrites, borates and amines, the coolant also contributes to a safer environment. The coolant is also free of silicates, which excludes any possible issues caused by instable silicate gel or silicate drop-out.

2 Benefits

Coolants formulated from **Freecor® JNB** offer the following benefits to the user:

- **highly performing corrosion protection** — well-balanced hybrid inhibitor package
- **efficient frost & boiling protection**
- **seal compatible**
- **hard water stable** — unique sequestering package
- **low treat rate** — dosage as low as 6% in MEG

3 Blending engine coolant from Freecor® JNB

A coolant concentrate fully meeting **JIS K 2234-2006 Class II, ASTM D3306** and **BS 6580** can be blended from **Freecor® JNB** by simply mixing the following ingredients at ambient temperatures in the exact order as described below:

Ingredient (wt %)	**Freecor® JNC**
Mono ethylene glycol	93.825
Freecor® LPSB	0.175
Freecor® JNB	6.000
Colouring agent	optional
Bitterant	optional

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Freecor® LPSB is a water-based inhibitor package that requires separate addition in the blending procedure. The mix of **Freecor® LPSB** with **Freecor® JNB** assures the unique corrosion protection properties.

During blending, the following guidelines should be followed:

- The equipment must be suitable for engine coolant blending.
- During and after blending, precautions should be taken to avoid any contamination of the product
- Check the equipment for cleanliness.
- First pump the mono ethylene glycol (MEG) into the blender and start stirring.
- Add **Freecor® LPSB** into the blender. Continue stirring for 15 minutes.
- Pump **Freecor® JNB** into the blender. If needed, use part of the MEG to rinse the **Freecor® JNB** container or drum.
- If required, add the dye-components or bitterant into the blender
- Continue stirring for at least 15 minutes.
- Take a sample for evaluation according to chemical and physical properties mentioned in Addendum – technical information.

4 Application

Coolants made from **Freecor® JNB** according to the described formulation provide year-round frost and corrosion protection. It is recommended to use at least 33 vol. % of the antifreeze in the final coolant solution. This provides freezing protection to -18°C. Concentrations higher than 70 vol. % are not recommended as the maximum frost protection is reached.

5 Proof of Performance & Standards

Coolants based on this in-house developed technology have established excellent performance, with outstanding corrosion protection for in excess of 80,000 km in automotive applications.
Coolants made from **Freecor® JNB** and blended according to the specified formulation fully comply with following standards:

- **JIS K 2234-2006 Class II**
- **ASTM D3306**
- **British Standard BS 6580:2010**

6 Availability

Freecor® JNB is available in bulk and in drums. Product is available undyed.

7 Storage requirements & Product handling

The product should be stored above -5°C and preferably at ambient temperatures. Periods of exposure to temperatures above 35°C should be minimized.
Freecor® JNB can be stored for 24 months in unopened plastic containers without any effect on the product quality or performance. It is strongly recommended to use new dark and not recycled containers.

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

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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Addendum - Technical information

Chemical and physical properties

	Freecor® JNB	Freecor® LPSB	method
Appearance	Slightly hazy liquid, slightly yellowish	Clear liquid, colourless	visual
Nitrite, amine, borate, silicate	nil	nil	
Density, 20°C, kg/l	1.145 typ.	1.135 typ.	ASTM D5931
pH	8.5 typ.	6.0 typ.	ASTM D1287

	Freecor® JNC[1]	method
Appearance	Clear liquid, slightly yellowish	visual
Density, 20°C, kg/l	1.116 typ.	ASTM D5931
pH in water, 30 vol%	7.5 typ.	ASTM D1287
Water content, %	3.5% typ.	ASTM D1123
Reserve alkalinity, ml HCl 0.1N (inflection point)	15.6 typ.	ASTM D1121
Reserve alkalinity, ml HCl 0.1N (pH 5.5)	4.4 typ.	ASTM D1121
Boiling point, °C	169°C typ.	ASTM D1120
Foaming properties,		
30 vol.%	1 ml typ.	JIS K2234-2006 Class II
50 vol.%	50ml / 2s typ.	ASTM D1188
Freezing Point, °C		
30 vol.%	-15.0°C typ.	ASTM D1177
50 vol.%	-36.7°C typ.	

[1] *as blended according to the specified formulation*

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JIS K2234-2006 Class II Metal Corrosion properties (30vol%, 336 hrs)

	Weight changes in mg/cm²					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
JIS K-2234-2006 Class II (max)	0.15	0.15	0.30	0.15	0.15	0.30
Freecor® JNC	-0.05	-0.03	-0.13	-0.02	-0.12	0.01

JIS K2234-2006 Class II Circulating Corrosive Properties (30vol%, 1000hrs)

	Weight changes in mg/cm²					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
JIS K-2234-2006 Class II (max)	0.30	0.30	0.60	0.30	0.30	0.60
Freecor® JNC	-0.07	-0.05	-0.03	-0.03	-0.02	-0.01

JIS K2234-2006 Class II Corrosion property of Cast Aluminium at heat transfer surface (25vol%, 168hrs)

	Corrosion Rate in mg/cm²
JIS K 2234-2006 Class II (max)	2.0
Freecor® JNC	-0.1

ASTM D1384 Glassware corrosion test (33vol%)

	Weight loss in mg/coupon[1]					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
BS 6580 (max)	10	10	15	10	10	15
ASTM D3306 (max)	10	10	30	10	10	30
Freecor® JNC	2	2	4	0	-1	2

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

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ASTM D4340 Corrosion of Cast Aluminium at heat rejecting surfaces, (25vol%, 168hrs)

	Corrosion rate in mg/cm²/week
BS 6580 (max)	1.0
ASTM D3306 (max)	1.0
Freecor® JNC	-0.3

ASTM D2570 Simulated Service Test (44vol%, 1064hrs)

	Weight loss in mg/coupon[1]					
	Brass	Copper	Solder	Steel	Cast Iron	Aluminium
ASTM D3306 (max)	20	20	60	20	20	60
Freecor® JNC	6	10	13	3	4	4

ASTM D2809 Water pump Cavitation Erosion

	Rating
ASTM D3306 (min)	8
Freecor® JNC	10

ASTM D7437 Hard water stability

	Amount of deposit (cm^3)
BS 6580 (max)	0.5
Freecor® JNC	<0.05