

MODEL ALL

Note: These regulations apply to the Mercedes-Benz, Maybach, smart and Setra brands.

1. Terms used

Antifreeze with corrosion inhibitor, KFM:

Component of the coolant for combustion engines as corrosion and antifreeze protection, for lowering the freezing point as well as raising the boiling point.

Coolant, KM:

Mixture of antifreeze with corrosion inhibitor and water for cooling engines. Normally coolants consists of antifreeze with corrosion inhibitor and water. The coolants must exhibit the following properties:

- Guarantee of heat transfer
- Long-term corrosion and cavitation protection for all components in cooling system
- Guarantee of antifreeze protection

- Increase of boiling point
- Resistance to microorganisms
- Effective foaming suppression

Coolant additives:

Anticorrosion agent that can be used for special applications mixed with water. The mixture has no antifreeze protection!

MB approval:

Marking of the coolants or antifreezes with corrosion inhibitor that are tested by Daimler AG and approved for the corresponding use, see table 1 and 2. On the containers with tested brand-name products, you will find **MB approval 325.0**, for example, as a note.

2. Overview

Tables 1 and 2 give an overview for the application of the tested antifreezes with corrosion inhibitor and the maximum change intervals. Pay attention to the MB approval before using a coolant. With the correct use of tested coolant qualities with MB approval, you ensure the full protection of the cooling system. The vehicles with combustion engine are defined in the assignment across the engine model series. Table 1 therefore applies for all vehicles with an OM642 engine, for example.

Sheet No.	Major assembly model series			Change interval years/km
	M1xx/M2xx	OM6xx		
325.0 and 326.0	●	●	For all vehicles with a manufacture date up to and including April 2014	15/250.000 <i>i</i> Whichever occurs first must be observed; exception: in the vehicle's maintenance manual, shorter change intervals are stipulated.
325.6 and 326.6	●	●	Usable for all vehicles	15/250.000 <i>i</i> Whichever occurs first must be observed; exception: in the vehicle's maintenance manual, shorter change intervals are stipulated.

Sheet No.	Major assembly model series							Change interval in years
	OM300	OM400	OM904 up to 926	OM934, 936	OM457, 460	OM500	OM470 up to 473	
311.0	●	●						0.5
312.0	●	●	●		●	●		1
325.0 or 326.0	●	●	●		●	●		3
325.2 or 326.2	●	●	●		●	●		3
325.3 or 326.3	●	●	●		●	●		5
325.5 or 326.5			●	●	●	●	●	3

Coolants or antifreezes with corrosion inhibitor that are listed on different sheet numbers in tables 1 and 2 must not be mixed, as a considerably reduced corrosion protection may damage the cooling system. In general, mixtures of different antifreezes with corrosion inhibitor offer a lesser performance than the specially adapted active components of a formulation.

The sheet numbers: 325.x show the antifreezes with corrosion inhibitor and the corresponding sheet number 326.x shows the finally mixed coolant. The antifreezes with corrosion inhibitor must be mixed with water before use.

Vehicles with a fuel cell require a special coolant for cooling the fuel cell. Coolants for fuel cell vehicles must only be refilled in an F-Cell support point.

3. Coolant

The coolants and antifreezes with corrosion inhibitor are based on ethylene glycol as the antifreeze component but differ with regard to the remaining ingredients, e.g. for corrosion protection, table 3.

Coolantsheet no.	Anticorrosion/antifreezesheet no.	Inhibitors		Free of
		inorganic	organic	
326.0	325.0	Si, B	X	amine, phosphate
326.2	325.2	Si, B	X	amine, phosphate
326.3	325.3		X	nitrite, amine, phosphate, borat, silicon
326.5	325.5	Si	X	nitrite, amine, phosphate, borat, 2-ethylhexanoic acid
326.6	325.6	Si	X	nitrite, amine, phosphate, borat, 2-ethylhexanoic acid

The coolant must remain in the cooling system year round to protect against corrosion under all operating conditions. Corrosion may lead to poor heat output and engine overheating!

3.1. Mixing ratio

Generally a coolant must be used with approx. 50 % by volume of antifreeze with corrosion inhibitor and 50 % by volume of water. The water quality must satisfy the requirements in the following chapter. The antifreeze protection of this mixture is sufficient up to approx. -37 °C. Even with extremely low ambient temperatures, not more than 55 % by volume of antifreeze with corrosion inhibitor should be used. With 55 % antifreeze with corrosion inhibitor, the maximum antifreeze protection, approx. -45 °C, of a water-based ethylene glycol solution is reached; a higher KFM portion lowers the antifreeze protection and the heat dissipation in the engine worsens.

Sheet No.	Mixing ratio	
	KFM vol %	Water % by vol.
325.0	50	50
325.2	50	50
325.3	50	50
325.5	50	50
325.6	50	50
311.0	1	99
312.0	10	90

The boiling point of the coolant increases with the portion of the antifreeze with corrosion inhibitor. In the vehicle, the coolant is additionally protected against boiling by the pressure in the cooling system. By raising the pressure, the boiling temperature of the coolant is increased further.

Only approved products offer reliable protection of the cooling system. In special cases (commercial-vehicle engines, no antifreeze specification) coolant additives can be used that are primarily corrosion protection additives.

4. Water quality

Clean and the softest possible water should be used for processing the coolant. Drinking water often satisfies the requirements. Information concerning the water quality of drinking water is available from the local water-plant authorities or the official water utilities on request.

If there is no available information regarding the water quality or if no suitable water is available, then distilled or deionized water should be used to prepare the coolant. Sea water, brackish water, brine and industrial waters are not suitable. Salts may promote corrosion or form disruptive deposits.

The analysis values of the water for mixing coolants must be within the limits of table 5.

Water quality		min	max.
Earth alkali ions	mmol/l		2.7
Hardness	°dH		15
Chloride	mg/l		80
Chloride + sulfate	mg/l		160
pH-value	-	6.5	8.0

1° dH = 1.783 mmol/l alkaline earth ions = 7.147 mg/l Ca²⁺ or 4.336 mg/l Mg²⁺

4.1. Coolant additives for commercial vehicle engines without antifreeze specification

In climate zones free of frost year round, no antifreeze protection is required as the cooling systems are adapted to coolant according to sheet 325.x and 326.x. However in justified exceptional cases an aqueous solution with corrosion protection should be used. The use of anticorrosion agents in water is limited to the engines named in table 2. The use of anticorrosion oil emulsion according to sheet 311.0 is limited thermally. The emulsion must therefore not be used in efficient modern engines.

5. Monitoring coolant operation

During operation the corrosion inhibitors of the coolant are consumed and the mixing ratio may be changed due to the evaporation of water. It is therefore very important to regularly monitor the coolant if the engine is to run trouble free.

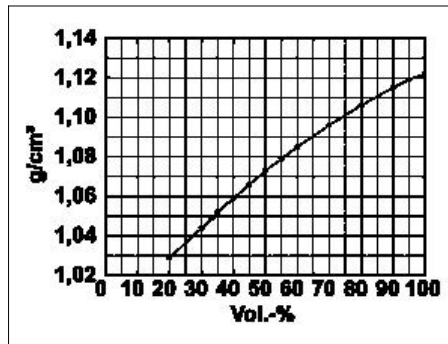
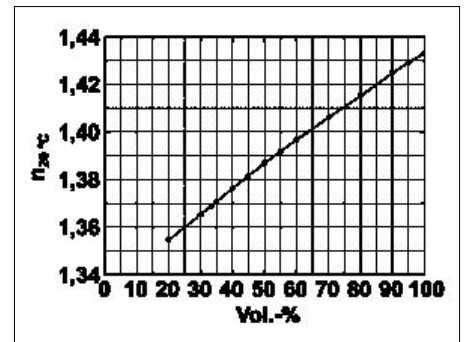


Bild 1: Density of KFM/water mixtures

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Bild 2: Refractive index of KFM/water mixtures



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Should the coolant contain only 40 % by volume or greater than 55 % by volume of antifreeze with corrosion inhibitor, the mixing ratio must be corrected immediately. To calculate the refill quantity, the following calculation aid can be used:

Berechnung der nachzufüllenden KFM-Menge bei Unterkonzentration (Soll: 50 Vol.-%)

Kühlmittelinhalt (gesamt) = Liter

gemessene Konzentration = Vol.-%

50 - = x : = Liter

100 - =

Nachfüllmenge Korrosions-/Frostschutzmittel
Diese Menge ist normalerweise vorher abzulassen!

Berechnungsbeispiel:

Kühlmittelinhalt (gesamt) = Liter

gemessene Konzentration = Vol.-%

50 - = x : = Liter

100 - =

Nachfüllmenge Korrosions-/Frostschutzmittel
Diese Menge ist normalerweise vorher abzulassen!

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Refrigerant protection/concentration table (approx.)

°C	-10	-14	-15	-18	-20	-23	-25	-27	-30	-33	-35	-40
vol %	20	25	26	30	32	35	37	40	42	45	47	50

6. Disposal of coolants

The coolants are biologically-degradable material. The statutory regulations or waste water ordinances in each individual country must be observed when disposing of used coolant. It is recommended to have the possibilities available for disposing of materials explained by the local responsible water authorities.