BB00.40-P-0310-01A	Coolant specifications		

MODEL ALL

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

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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 anticorrosion/antifreeze agent and water for cooling engines. Normally coolants comprise anticorrosion/ antifreeze agent 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 anticorrosion/antifreeze agents 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.

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2. Overview

Tables 1 and 2 give an overview for the application of the tested anticorrosion/antifreeze agents 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.

Table 1: For passenger cars and vehicles with passenger car combustion engines				
Sheet No.	**Major assembly model series**			**Change interval** **years/km**
	M1xx/ M2xx	OM6 xx		
325.0 and 326.0	•	•	For all vehicles with a manufacture date including April 2014	15/250.000 [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] Whichever occurs first must be observed; exception: in the vehicle's maintenance manual, shorter change intervals are stipulated.

Table 2: For vehicles with commercial vehicle engines								
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 anticorrosion/ antifreeze agent and the corresponding sheet number 326.x shows the finally mixed coolant. The anticorrosion/ antifreeze agents must be mixed with water before use.

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

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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.

Table 3: Specifications for Operating Fluids sheet number and coolant type				
Coolant sheet no.	**Anticorrosion/ antifreeze sheet 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!

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3.1. Mixing ratio

Generally a coolant must be used with approx. 50 % by volume of anticorrosion/antifreeze agent 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 anticorrosion/antifreeze agent 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.

Table 4: Target concentration of anticorrosion/antifreeze agent and water		
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 anticorrosion/antifreeze agent. 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.

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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.

Table 5: Water quality			
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 Ca^{2+} or 4.336 mg/l Mg^{2+}

With the use of premixed coolant, compliance with the concentration (50/50) must also be observed in addition to the MB approval.

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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.

Mixtures of different products as stated in sheet 311.0 and 312.0 are not permitted.

When producing the anticorrosion oil emulsion in accordance with sheet 311.0, the following must be noted: When carrying out a new filling (initial filling or filling after a cleansing operation), an emulsion of 1.0 - 1.5 % by volume must be used. When refilling, an emulsion of 0.5 - 1.0 % by volume should be used. Concentrations that are too high (>1.5 % by volume) do not improve the corrosion protection, but rather exert a negative influence on seals and hoses.

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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.

The inspection of the mixing ratio should be conducted with suitable apparatus. To do so, the density can be used to determine this in accordance with picture 1 or the refractive index in accordance with picture 2. The specifications on the mixing ratio may vary slightly for individual coolants from the values in pictures 1 and 2.

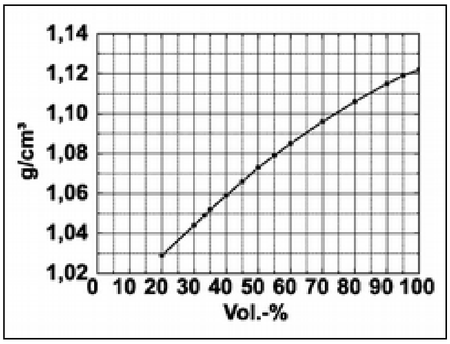

Bild 1: *Density of KFM/ water mixtures*

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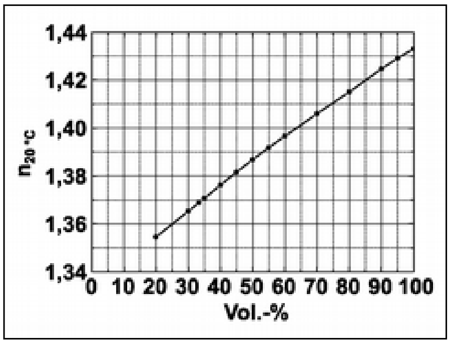

Bild 2: *Refractive index of KFM/water mixtures*

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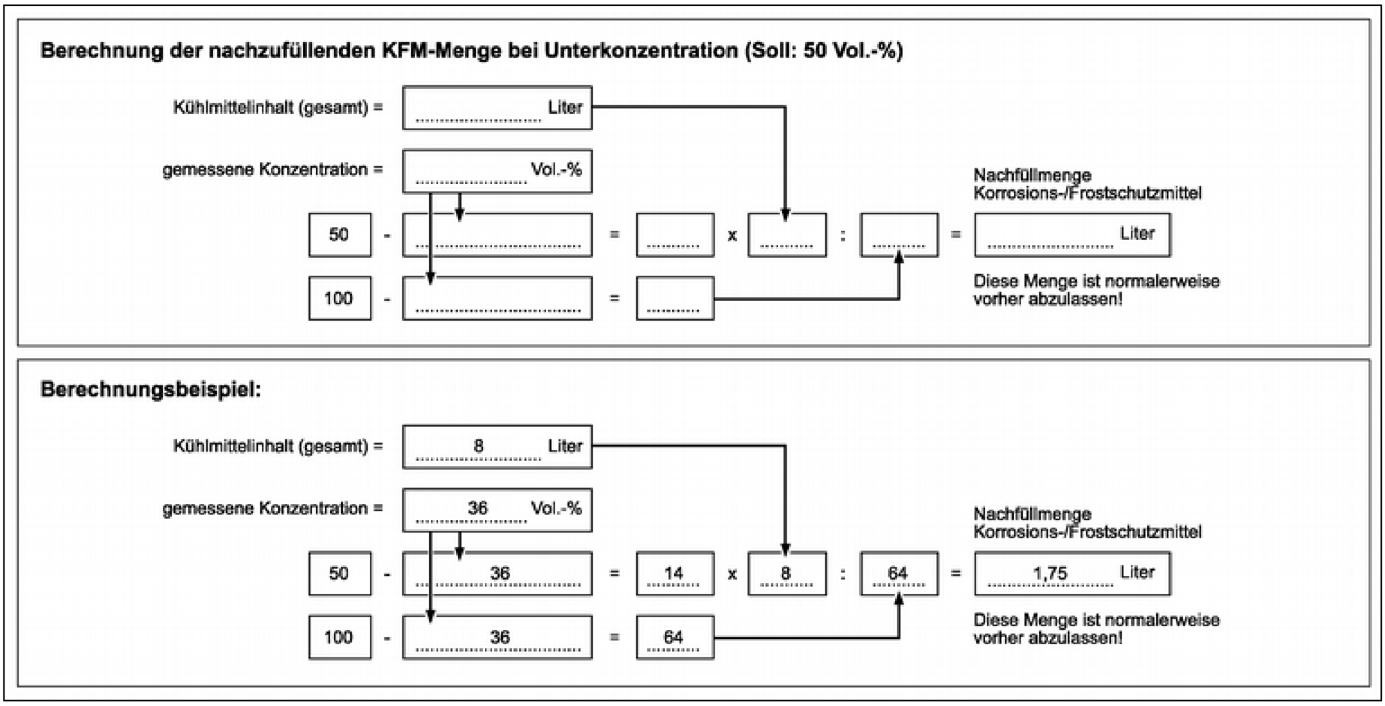
Should the coolant contain only 40 % by volume or greater than 55 % by volume of anticorrosion/antifreeze agent, the mixing ratio must be corrected immediately. To calculate the refill quantity, the following calculation aid can be used:



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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.