



# Technical Circular

0199-99-01228/3 EN



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## DEUTZ engines

- Assemblies:  
99

### Cooling system protection agent

Replacement is made on account of:

- Updating
  - Cooling system protection agent concentration
  - Contains fluoride as a result of flux residues in the cooling system
  - Coolant replacement intervals

### General information



This TR applies to all liquid-cooled DEUTZ engines belonging to the newly developed series with exhaust aftertreatment systems.

Modern engines place very high demands on the cooling system protection agent used.

The specific engine performances increased constantly in recent years lead to increased thermal stress.

Since the engine and its components are not able to emit the comparatively high amount of heat to the environment very quickly, optimum heat dissipation via the engine cooling system using modern cooling system protection agents is essential so that the engine is not damaged due to overheating.

For this reason, DEUTZ is introducing the new **DEUTZ cooling system protection agent DQC-CB**, in order to meet the aforementioned requirements and not reduce the service life of the engines.

Note:  
The part numbers indicated in this document are not subject to updating.  
Binding for the identification of spare parts is exclusively the spare parts documentation.

Using unsuitable coolants often leads to:

- Leakage of the cooling system as a result of corrosion and due to incompatibility with the sealing materials.
- Pitting corrosion on the aluminium components and flocculation, which attacks and blocks the cooling channels.

These damages may cause the engine to overheat and lead to severe engine damage as a result.

Cooling system protection agents consist of a base liquid (usually a polyvalent alcohol such as ethylene glycol for protection against cold) and an additive package.

The most important duties of a cooling system protection agent are:

- Cooling of the engine to protect from overheating
- Prevention of corrosion and cavitation
- Prevention of deposit formation
- Antifreeze

In liquid-cooled engines the coolant must be prepared by mixing a cooling system protective agent with the fresh water and testing it within the given maintenance intervals.



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**Damages can be expected when using products which have not been released and failing to observe the maintenance intervals as well as the quality of fresh water.**

**Examples for such damage profiles can be found in the appendix to this bulletin.**

**Damage due to failure to observe this bulletin is strictly excluded from the warranty.**

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**All details refer to the current state of knowledge and apply exclusively to the components and engines for which DEUTZ is responsible.**

**They do not release the owner or the equipment manufacturer from their own obligations for caution due to the possible impacts when using these products.**

**The cooling system protection agent must be used exclusively for the specified purpose, any other use above and beyond this is considered improper use.**

**The user will be liable exclusively for damages resulting from this. Relevant country-specific legal conditions must be observed by the user under their own responsibility.**

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### Fresh water quality

The right quality of fresh water is important for preparing the cooling system protection agent. Clear, clean, fresh water within the following analysis values should always be used:

Analysis values of the fresh water	
pH value at 20 °C	6.5 to 8.5
Chloride-ion content	max. 100 mg/l
Sulphate-ion content	max. 100 mg/l
Total content of chloride and sulphate ions	max. 150 mg/l
Water hardness (ion content of calcium and magnesium)	max. 3.56 mmol/l
Conversion to other units:	
German degrees:	max. 20 °dH
English degrees:	max: 25 °eH
French degrees:	max: 35.6 ° fH
mg/l CaCO <sub>3</sub> (ppm)	max: 356
Bacteria, fungi, yeast	Unverifiable

T 1 Analysis values

The measuring methods for determining the limit values must be applied according to the respectively valid water standards.



**Never use sea water, river water, brackish water, industrial waste water or seepage water for conditioning the coolant.**

Data on the fresh water quality can be provided by the local water boards.

If the analysis values of the fresh water are unknown, these must be determined by means of a water analysis.

The fresh water must be conditioned if the analysis values deviate.

- **pH value too low:**

Can lead to corrosion on metal parts.

- Add diluted caustic or potassium soda. It is advisable to make small test mixtures.

- **Water too hard:**

Water which is too hard leads to deposits of limescale which prevent heat conduction. This can lead to overheating problems.

- Remedy by mixing with soft, distilled or completely desalinated water.

- **Chlorides and/or sulphates too high:**

Too high a chloride or sulphation content leads to dissolution of the protective layer and thus to corrosion of the metal parts.

- Remedy by mixing with distilled or completely desalinated water.

A new analysis should be made after conditioning the fresh water.

- Pictures of damaged parts

See:

- Typical damage profiles

### DEUTZ product recommendation

Best results are achieved with **DEUTZ cooling system protection agent DQC-CB**.

DEUTZ recommends using the DEUTZ cooling system protection agent DQC-CB.

Advantages:

- extensive tests in DEUTZ engines
- adapted to the materials in DEUTZ engines
- extended coolant replacement interval
- supplied by the DEUTZ sales organisation
- price advantage
- fulfils the requirements of the REACH ordinance  
(friendly to health and the environment)
- long-term supply guaranteed



When switching field engines from the previous product (DEUTZ cooling system protection agent) to the new product (DEUTZ cooling system protection agent DQC-CB), the cooling system must be flushed once before filling in order to prevent flow malfunctions due to incompatibility.

Mixing of the products or filling up with the new product is not permitted.

Before the product switch between the groups, the entire cooling system must be cleaned, see TR 0199-99-01116.

Does not apply to new engines or first-time filling.



DEUTZ cooling system protective agent DQC-CB		
Container size:	Container type:	Part no.:
5 litre	Canister	01017990
20 litre	Canister	01017991
210 litres	Barrel	01017992



The safety data sheets for DEUTZ products can be downloaded on the Internet.

See:

<http://www.deutz-sdb.com/de/sdb-de.html>

If **DEUTZ cooling system protection agent DQC-CB** is not available for any reason (e.g. delivery limitations abroad), alternative products approved by DEUTZ can be used.

Products released are recorded according to the following DEUTZ cooling system protection specifications.

DEUTZ DQC cooling system protection agent specifications	
Specification	Remark
DQC CA-14	Siliceous on the basis of MEG
DQC CB-14	Free of silicates on the basis of organic acids (OAT) and MEG
DQC CC-14	Siliceous on the basis of organic acids and MEG
DQC = DEUTZ Quality Class	
MEG = Monoethylene glycol (1,2-Ethanediol)	
OAT = Organic Acid Technology	
Other cooling system protection agents are currently being tested	

The use of the DQC cooling system protection release list should make the choice of cooling system protection agents for DEUTZ engines easier for the customer and ensure a quality level that is tailor made for the requirements of DEUTZ engines.

The list of approved cooling system protection agents and information about the approval process in accordance with works standard H 0685-06 can be downloaded on the Internet.

See:

[http://www.deutz.de/service/maintenance/operating\\_liquids/coolant/deutz\\_approval\\_system\\_for\\_cooling\\_system\\_protective\\_agents.en.html](http://www.deutz.de/service/maintenance/operating_liquids/coolant/deutz_approval_system_for_cooling_system_protective_agents.en.html)

For engines, only cooling system protection agents from the internet release list may be used.

The release lists in earlier editions of TR 0199-99-01115 and in older operating instructions are dispensed with. As the manufacturers often change or adapt the cooling system protection formulations at regular intervals for marketing and cost reasons, solely the details in the most up-to-date internet release list apply.

To ensure adequate corrosion protection the cooling system protective agent must be used all year round and may not drop below or exceed the following concentration.

Mixing ratio		
Cooling system protective agent	Fresh water	Cold protection up to approx.
min. 35 %	65 %	- 22 °C
40 %	60 %	- 28 °C
45 %	55 %	- 35 °C
max. 50 %	50 %	- 41 °C

T 2 Mixing ratio



- When using the cooling system protection agent the heat transfer value of the coolant is reduced.
  - DEUTZ cooling systems are designed for a percentage of max. 50 % cooling system protection agent (up to -41 °C ).  
At temperatures below - 41 °C:  
Consult your responsible DEUTZ agent.
  - A percentage of >50 % cooling system protection agent leads to poorer cooling performance.
  - In permanent Arctic temperatures under -30 °C, the proportion of cooling system protection agent can be increased to 55 %. The reduced cooling performance due to the cooling system protection agent's reduced thermal capacity compared with water can thereby be disregarded due to the Arctic ambient temperatures.



When dropping below the minimum concentration the corrosion protection capacity is reduced in addition to the frost protection. The protection effect is therefore lost abruptly and not gradually.

The reduction in the ethylene glycol content also increases the risk of cavitation especially on the coolant pump and the cylinder liner.

As such, it is important to make sure that a sufficient amount of cooling system protection agent is present, even in warm countries.

If the maximum concentration is exceeded by a large amount, the amount of engine heat that needs to dissipate will not be able to do so.

From a concentration of 67 % ethylene glycol (corresponds to frost protection down to -68 °C), the freezing point cannot physically be lowered any further.

Undiluted cooling system protection agent can therefore freeze again at higher temperatures (-22 °C).

- Pictures of damaged parts  
See:
  - **Typical damage profiles**
- The use of a chemical corrosion protection agent (without antifreeze) for DEUTZ engines is possible only in justifiable exceptional cases after consultation with the head office.

Consult your responsible DEUTZ agent.

### Mixing cooling system protection agents

The cooling system protection agents of various specifications, DQC CA-14, DQC CB-14 and DQC CC-14, have a different chemical basis.



**Mixing of the different product groups is not permitted as this may cause incompatibilities and thus flow malfunctions.**

**All cooling system protection agents within one specification group (e.g. DQC CB-14) may be mixed with each other.**

**In the event of a change of product or supplier, DEUTZ generally recommends that the cooling system protection agent be completely replaced even within the product group.**

**If switching field engines from one to the other product group, the cooling system must be flushed once before filling in order to prevent flow malfunctions due to incompatibility.**

**Before the product switch between the groups, the entire cooling system must be cleaned, see TR 0199-99-01116.**

**Does not apply to new engines or first-time filling.**

## Corrosion protection oil



It is prohibited to use corrosion protection oils as cooling system protective agents for DEUTZ engines.

## Specifications of the cooling system

- The coolant must be tested constantly and maintained at regular intervals. Monitoring includes inspection of the coolant level, the contamination of the coolant and checking of the cooling system protection concentration, e.g. with a refractometer, see the maintenance schedule in the operation manual.

See also:

- Technical Bulletin  
0199-49-01214  
Refractometer

- Contains fluoride due to flux residues in the cooling system

Fluoride is a component of modern flux agents such as  $K_3AlF_6$ ,  $K_2AlF_5$  and  $KAlF_4$ , which are used for the soldering of heavy and light metals in the so-called CAB process (CAB = Controlled Atmosphere Brazing). Flux residues can fall off during the soldering process in the manufacture of coolers and add-on parts. The presence of CAB flux residues can lead to a decomposition of the fluid and adversely affect the service life and the function of the cooling system.



DEUTZ recommends that the installation customer has the previous supplier confirm that the fluoride content is kept as low as possible in customer components within the cooling system by using suitable flushing measures. DEUTZ recommends not exceeding the limit value of 50 mg/l for fluoride content in the entire system.

For additional attachment parts in the cooling system, which are set up or installed with OEM and where it cannot be ensured that the fluoride input is minimal, further approval tests must be carried out on the entire system if necessary in order to determine that no replacement impacts between the engine, coolant, heat exchanger and other components occur.

- The coolant must be renewed and the entire cooling system cleaned if necessary, see TR 0199-99-01116
  - in case of heavy turbidity due to corrosion residue or other floating particles,
  - in case of penetration by lubricating oil,
  - when changing to a different product group
  - in accordance with the maintenance plan of the operating instructions, at the latest upon reaching the replacement interval





### Coolant replacement intervals

Replacement interval		Cooling system protection agent specification
Former	Current	
Every 2 years	Every 3000 oh or after 2 years at the latest	DQC CA-14
	Every 6000 oh or after 4 years at the latest	DQC CB-14
		DQC CC-14

Please make a note of the new/changed specifications in your documentation.

Specifications in our documentation will be changed accordingly in the next revision.

- Special tags for operating media are available to document the change and for the used cooling system protection agent. These can be stuck to the engine.

See also:

- Technical Bulletin  
0199-99-01236

### Disposal / safe handling:

The respectively valid national regulations and all necessary safety / environmental regulations specified on the safety data sheet or canister are to be considered for disposal.

- Coolant may not be poured down the drain. It must be disposed of properly according to legal regulations and specifications of the supplier.



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If you have questions on this topic, please contact the staff member(s) below.

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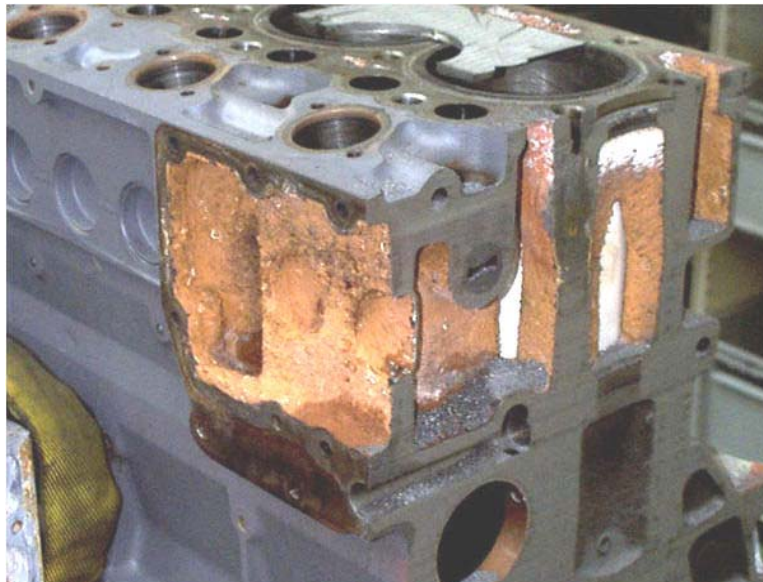
- Typical damage profiles

### Appendix

#### Typical damage profiles

Examples of damage due to failure to observe the recommended instructions

Damage description	Causes
Corrosion	– pH value too low
	– Chloride and/or sulphates too high
	– Operation with too low a concentration of the cooling system protection agent



A 1 Crankcase



A 2 Crankcase crack in the area of the cylinder liner

Damage description	Causes
Corrosion	– pH value too low
	– Chloride and/or sulphates too high
	– Operation with too low a concentration of the cooling system protection agent



A 3 Cylinder liner



A 4 Cylinder liner



Damage description	Causes
Corrosion	– pH value too low
	– Chloride and/or sulphates too high
	– Operation with too low a concentration of the cooling system protection agent



A 5 Thermostat housing



A 6 Crankcase in the area of the lubricating oil cooler housing

Damage description	Causes
Corrosion	– pH value too low
	– Chloride and/or sulphates too high
	– Operation with too low a concentration of the cooling system protection agent



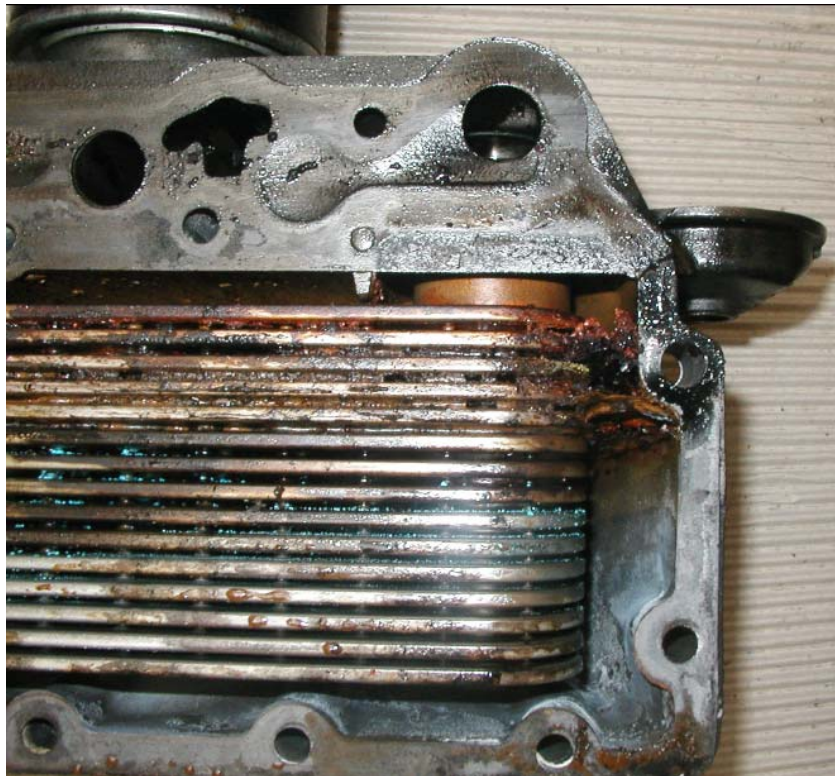
A 7 Crankcase in the area of the lubricating oil cooler housing



A 8 Coolant pump seat on the crankcase



Damage description	Causes
Corrosion	– pH value too low
	– Chloride and/or sulphates too high
	– Operation with too low a concentration of the cooling system protection agent



A 9 Lubricating oil cooler housing



A 10 Sealing cover, corroded

Damage description	Causes
Corrosion	– Chloride and/or sulphates too high



A 11 Aluminium thermostat cover, corroded

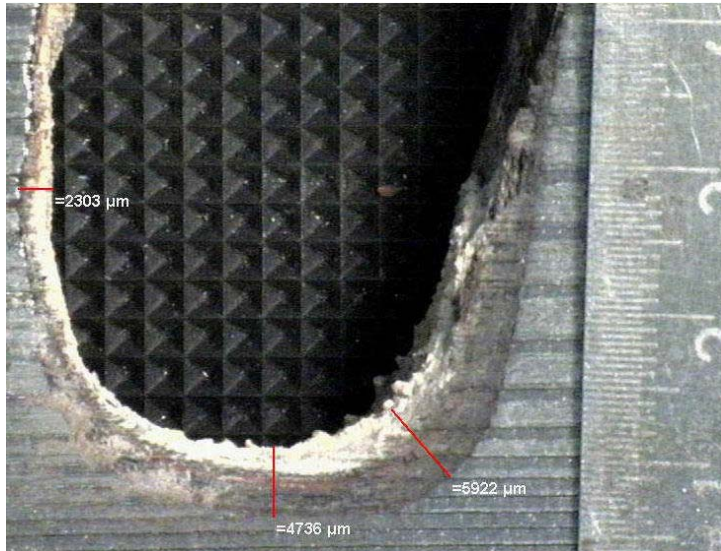
Damage description	Causes
Limescale deposits	– Water too hard



A 12 Limescale deposits on a cylinder liner



Damage description	Causes
Limescale deposits	– Water too hard



A 13 Thickness of limescale deposits in a cooling channel of a crankcase

Damage description	Causes
Cavitation	<ul style="list-style-type: none"> <li>– Operation with too low a concentration of the cooling system protection agent</li> <li>– Unsuitable cooling system protection agent</li> <li>– Unsuitable fresh water for conditioning the coolant</li> </ul>



A 14 Flywheel of the coolant pump, cavitated