



Technical Circular

0199-99-01228/5 EN

This Circular supersedes: TR 0199-99-01228/4

Date: 11.06.2024

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Liquid-cooled DEUTZ combustion engines

Cooling system protective agent

Alterations

In comparison to TR 0199-99-01228/4, the following changes have been made:

- Introduction of the new DEUTZ cooling system protective agent “DEUTZ Coolant Core Protect” as a concentrate and as a ready-mix product.
- Updates
 - Part numbers for original DEUTZ cooling system protective agent [2](#)
 - Mixing the coolant using cooling system protective agent concentrates [3](#)
 - Values for frost protection temperatures [5](#)
 - Limit value for fluoride content in the cooling system [6](#)
- Editorial changes

General information



This Technical Bulletin 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 protective 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 protective agents is essential so that the engine is not damaged due to overheating.

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



ATTENTION

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

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

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

- Cooling of the engine to protect from overheating
- Prevention of corrosion and cavitation
- Prevention of deposits



- Antifreeze



ATTENTION

Damage may occur if non-approved products are used or if the maintenance intervals are not observed.

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.



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 protective 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.

Product recommendation

We recommend the following DEUTZ cooling system protective agents for use in DEUTZ engines.

Advantages:

- extensive tests in DEUTZ engines
- adapted to the materials in DEUTZ engines
- extended coolant change interval
- supplied by the DEUTZ sales organisation
- price advantage
- long-term supply guaranteed



A1: Original DEUTZ cooling system protective agents



Specification	DEUTZ cooling system protection agent			
	Product	Container	Part number	
DQC CB-14	DEUTZ Coolant Core Protect (Concentrate)	Canister	5 litres	01016694
			20 litres	01016695
		Barrel	209 litres	01016696
	DEUTZ Coolant Core Protect RM (Ready-mix)	Canister	5 litres	01016697
			20 litres	01016698
		Barrel	209 litres	01016699

T1: Original DEUTZ cooling system protective agents

Cooling system protective agents of approval class DQC CC-14 are available from DEUTZ Service on request.

You can find further information on DEUTZ cooling system protective agents online:



– <https://www.deutz.com/en/parts-service/operating-liquids/coolant/>

Safety data sheets for DEUTZ products can be downloaded online.



– Safety data sheets
<https://www.deutz-sdb.com>



We recommend that end customers use ready-mix products.
When using cooling system protective agent concentrates, the customer must observe the following instructions when mixing these products.

Mixing the coolant using cooling system protective agent concentrates

It is preferable to use distilled, demineralized or fully demineralized fresh water for mixing the coolant with the cooling system protective agent concentrate. In many cases, drinking water is also suitable for this purpose.

The analysis values of the fresh water must never exceed the following limit values:

Analysis value	Unit	Limit value	
		minimum	maximum
pH value at 20°C		6.5	8.5
Chloride content	mg/l		100
Sulphate content	mg/l		100
Total chloride and sulphate content	mg/l		150
Water hardness (Calcium and magnesium content)	mmol/l		3.56
	°dH German degrees		20
	°e English degrees		25
	°fH French degrees		35.6
	mg/l mg/l CaCO ₃ (ppm)		356
Bacteria, fungi, yeast		Unverifiable	

T2: Analysis values of the fresh water

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



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.



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

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

● pH value too low

A too low pH value can lead to corrosion of metal parts.

- Remedy by adding 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.

● Chloride and/or sulphates too high

Too high a chloride or sulphate 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.

DEUTZ Quality Class (DQC)

If, due to compelling reasons (e.g. supply restrictions abroad), the DEUTZ cooling system protective agents are not available, alternative products of quality classes DQC CB-14 or DQC CC-14 approved by DEUTZ can be used.

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

Further information is available on the DEUTZ homepage.



– DQC cooling system protective agent release list

– DQC release procedure

<https://www.deutz.com/en/parts-service/operating-liquids/deutz-quality-class/>



ATTENTION

Manufacturers of cooling system protective agents change the cooling system protective agent formulation at regular intervals. Previous release lists (for example according to TR 0199-99-01115 or older operating instructions) are invalid.

Only cooling system protective agents from the DQC cooling system protective agent release list on the DEUTZ homepage may be used. Ready-Mix products are to be preferred here.

DEUTZ is not liable for damage caused by the use of cooling system protective agents that have not been released.

The approved products are grouped according to the following DEUTZ cooling system protective agent specifications.



DEUTZ specification	Remark
DQC CA-14	Contains silicate based on monoethylene glycol (MEG) Suitable for all liquid-cooled DEUTZ internal combustion engines except G 2.2 L3, G 2.9 L4, TCD 9.0 L4, TCD 12.0 L6, TCD 13.5 L6, TCD 18.0 L6.
DQC CB-14	Free of silicates on the basis of organic acids (OAT) and monoethylene glycol (MEG) Suitable for all liquid-cooled DEUTZ internal combustion engines except TCD 9.0 L4, TCD 12.0 L6, TCD 13.5 L6, TCD 18.0 L6.
DQC CC-14	Contains silicates on the basis of organic acids (Si-OAT) and monoethylene glycol (MEG) Suitable for all liquid-cooled DEUTZ internal combustion engines.
DQC = DEUTZ Quality Class MEG = Monoethylene glycol (1,2-Ethanediol) OAT = Organic Acid Technology Si-OAT = Organic Acid Technology with silicates Other cooling system protective agents are currently being tested.	

T3: DEUTZ cooling system protective agent specifications

Mixing ratio

To ensure adequate corrosion protection the cooling system protective agent must be used all year round.

The following cooling system protective agent concentration must not drop below or be exceeded:

Mixing ratio		Frost protection up to approx.
Cooling system protection agent	Fresh water	
At least 35%	65%	- 23°C
40%	60%	- 28°C
45%	55%	- 35°C
Maximum 50%	50%	- 38°C

T4: Mixing ratio: Cooling system protective agent / fresh water



When using the cooling system protective agent the heat transfer value of the coolant is reduced. EUTZ cooling systems are designed for a percentage of maximum 50% cooling system protective agent.

At lower temperatures:

Consult your responsible DEUTZ agent.

In permanent Arctic temperatures under -30°C , the proportion of cooling system protective agent can be increased to 55%. The reduced cooling performance due to the cooling system protective agent's reduced thermal capacity compared with water can thereby be disregarded due to the Arctic ambient temperatures.

Dropping below the minimum concentration:

- In addition to the frost protection, the corrosion protection capacity is also reduced. The protection effect is therefore lost abruptly and not gradually.
- The reduction in the ethylene glycol content increases the risk of cavitation (especially on the coolant pump and on the cylinder liners).



ATTENTION

For these reasons, a sufficient amount of cooling system protective agent is also necessary, even in warm countries.

The use of a chemical corrosion protective agent (without antifreeze) for DEUTZ engines is not permitted.



Exceeding the maximum concentration:

- 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 protective agent can therefore freeze again at higher temperatures (-22°C).

Mixing cooling system protective agents



ATTENTION

Mixing cooling system protective agents of different specifications (for example DQC CA-14 with DQC CB-14) should be avoided where possible. Cooling system protective agents of various specifications have a different chemical basis. Mixing cooling system protective agents of different specifications may cause incompatibilities and thus flow malfunctions.

- All cooling system protective agents within a specification group (for example DQC CB-14) can be mixed with one another.
- As the unique benefits of the cooling system protective agents are only achieved when they are used alone, mixing them with other cooling system protective agents is not recommended.
- When switching field engines from a specification group to another specification group (for example from DQC CA-14 to DQC CB-14), the cooling system should be flushed once before filling in order to prevent flow malfunctions due to incompatibility.



– TR 0199-99-01116
Cleaning of the engine coolant system

Specifications of the cooling system

- The cooling system must be tested constantly and maintained at regular intervals (see the maintenance schedule in the operation manual).
 - Checking the coolant level
 - Checking the coolant for contamination
 - Checking the cooling system protective agent concentrationSee also:
TR 0199-49-01214
Refractometer
- Contains fluoride as a result of 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 soldering of heavy and light metals in the CAB process (CAB = Controlled Atmosphere Brazing). Flux residues can fall off during the soldering process in the manufacture of coolers and add-on parts. These can lead to a decomposition of the fluid and adversely affect the service life and the function of the cooling system.



DEUTZ advises the installation customer to have 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 measure DEUTZ recommends not exceeding the limit value of 30 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 ensure that there is no interaction. In such cases, the use of OAT or Si-OAT coolants, which are particularly suitable for compensating for flux deposits, is also recommended.

Warranty exclusion:

DEUTZ is not liable for damage to the engine and engine components caused by components flushed incorrectly by the installation customer (fluoride content > 30 mg/l).

- In the following cases, the coolant must be replaced and the entire cooling system cleaned if necessary:
 - 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 cooling system protective agent specification
 - in accordance with the maintenance plan of the operating instructions, at the latest upon reaching the replacement interval



– TR 0199-99-01116
Cleaning of the engine coolant system

Coolant change interval

Cooling system protective agent specification	Replacement interval
DQC CA-14	Every 3000 operating hours or after 2 years at the latest
DQC CB-14	Every 6000 operating hours or after 4 years at the latest
DQC CC-14	

T5: Coolant change intervals

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



– TR 0199-99-01236
Tags for operating media

Disposal / safe handling:

The applicable national regulations and all necessary safety regulations and environmental regulations specified on the safety data sheet or canister must be observed during 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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Contact

If you have questions about any of the topics mentioned here, please contact us using the details given below:

e-mail: lubricants.de@deutz.com

DEUTZ Ticket System (DTS): <https://www.dts-deutz.com> (for registered users only)

Email: service-kompaktmotoren.de@deutz.com

For the America region:

e-mail: service.usa@deutz.com

For the Asia region:

e-mail: dapservice@deutz.com

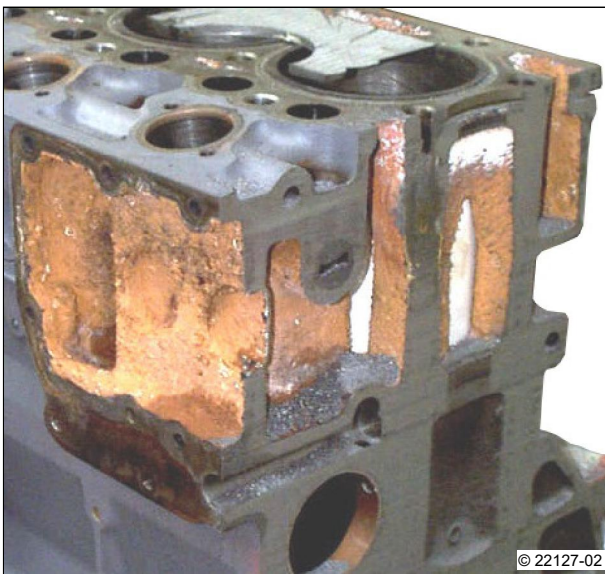
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Appendix

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 protective agent



A2: Crankcase



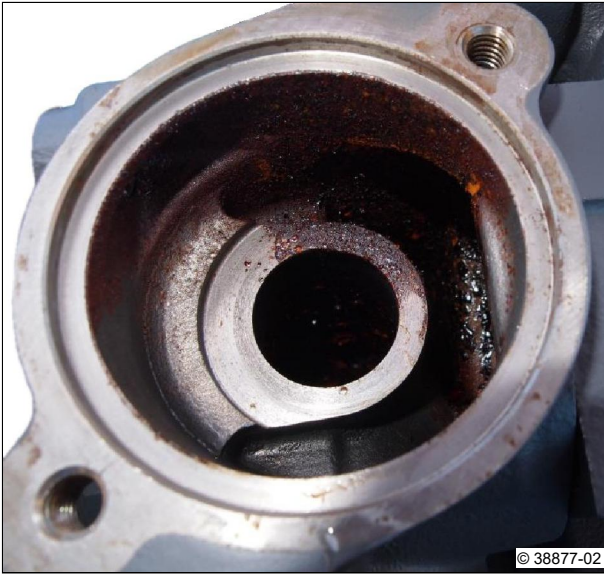
A3: Crankcase crack in the area of the cylinder liner



A4: Cylinder liner



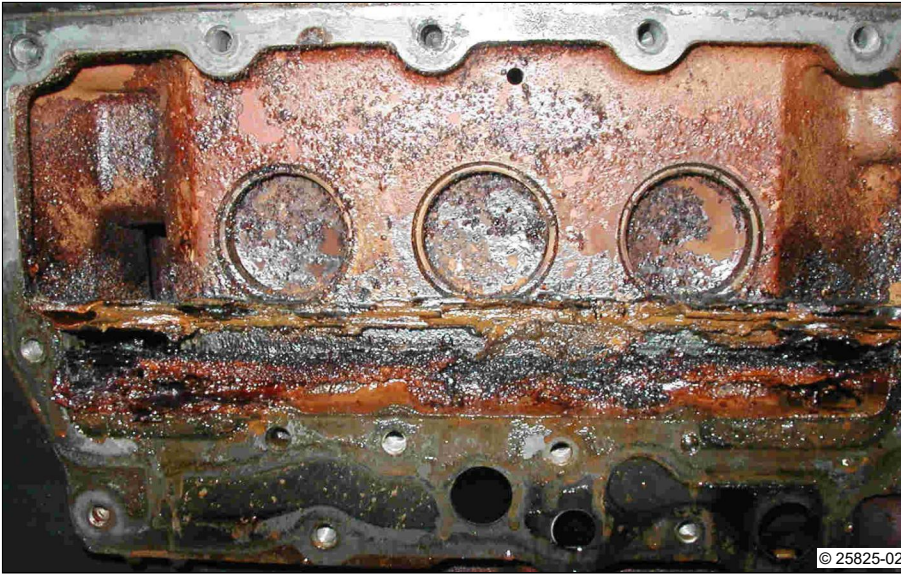
A5: Cylinder liner



A6: Thermostat housing



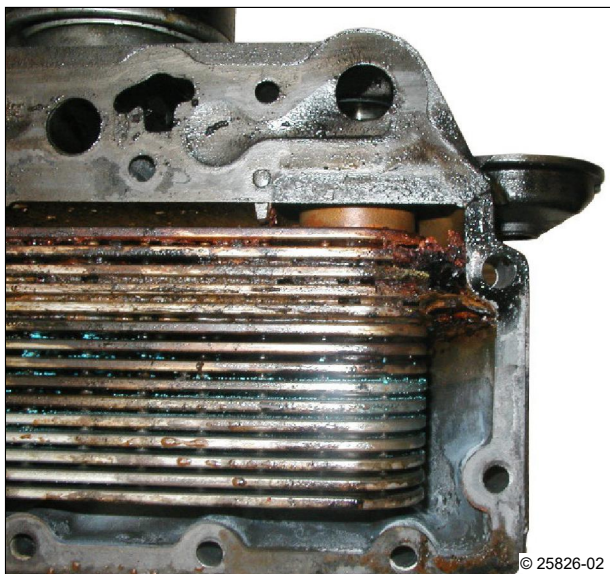
A7: Crankcase in the area of the lubricating oil cooler housing



A8: Crankcase in the area of the lubricating oil cooler housing



A9: Coolant pump seat on the crankcase



A10: Lubricating oil cooler housing



A11: Sealing cover, corroded

Damage description	Causes
corrosion	Chloride and/or sulphates too high

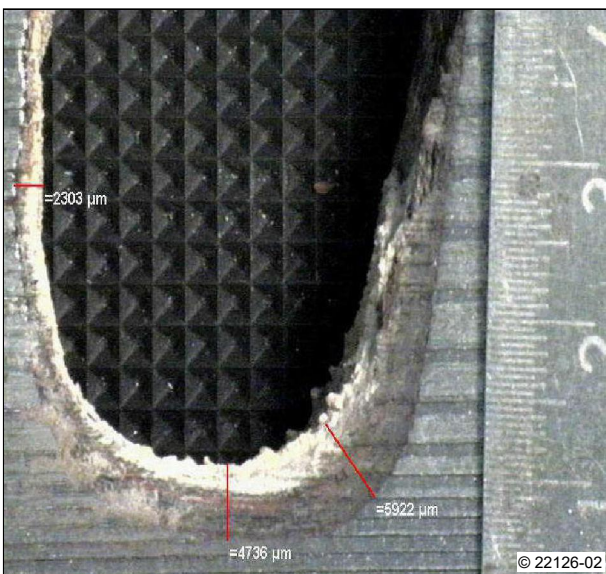


A12: Aluminium thermostat cover, corroded

Damage description	Causes
Limescale deposits	Water too hard



A13: Limescale deposits on a cylinder liner



A14: Thickness of limescale deposits in a cooling channel of a crankcase

Damage description	Causes
Cavitation	Operation with too low a concentration of the cooling system protective agent Unsuitable cooling system protective agent Unsuitable fresh water for conditioning the coolant



A15: Flywheel of the coolant pump, cavitated