

Coolex[®] N

Heat transfer fluid based on monoethylene glycol (MEG), offering protection against frost and corrosion in technical systems.

Brief description

- Colored red
- Corrosion inhibitor/antifreeze concentrate to be diluted with water
- Permanent usage temperature: approx. -35 to +150 °C
- Nitrite-, nitrate-, amine-, silicate-, borate-, phosphate- and heavy metal free
- Minimum usage concentration 20 % v/v
- Free of CMR substances (cancerogene, mutagene, reprotoxic), e.g. borate
- Water hazard class: WGK 1 (slightly water polluting)
- Readily biodegradable and environmentally friendly
- Long life product (OAT product; organic acid technology)
- Not suitable for use in the food industry (→ Coolex[®] L)
- Non-regulated according to ADR/GGVE/GGVSEB

Product description

Coolex[®] N is a red colored corrosion inhibitor and antifreeze concentrate based on monoethylene glycol. It protects the circuits in technical systems – even in mixed installations – against frost and corrosion. The heat transfer fluid is formulated free of CMR substances and is free of nitrite, nitrate, amine, silicate, borate and phosphate. Additionally, it prevents the circuit from scaling.

Coolex[®] N is universally applicable in many installations such as:

- Heating and cooling systems
 - Warm water heating circuits
 - Heat pumps
 - Geothermal systems
 - Heat recovery systems
 - Air conditions
- etc.

Coolex[®] N is not suitable for use as a car coolant.

The corrosion inhibitors in Coolex[®] N protect the whole heating or cooling circuit sustainably from corrosion.

Coolex[®] N must always be mixed homogeneously with water (see also at *frost protection and usage notes*).

Physical parameters

Parameter	Unit	Value	Standard
Density (20 °C)	g/cm ³	approx. 1.112	DIN 51757
Refractive index n _{D20}	---	approx. 1.431	DIN 51423
pH value, 1:2 in water	---	approx. 8.0	DIN 51369
Reserve alkalinity	ml 0.1 M HCl	approx. 4.5	ASTM D 1121
Boiling point (1,013 mbar)	°C	approx. 160	ASTM D 1120
Kinematic viscosity (20 °C)	mm ² /s	approx. 22.7	DIN 51562-1
Specific heat (20 °C)	kJ/(kg*K)	approx. 2.40	--- (calculated)
Thermal conductivity (20 °C)	W/(m*K)	approx. 0.29	--- (calculated)
Specific electrical conductivity (25 °C), 1:2 in water	μS/cm	approx. 2,350	DIN EN 27888

Corrosion protection

The inhibitor system in Coolex[®] N protects all common used metals in technical systems effectively and sustainably from corrosion.

The following table shows the corrosion performance (**weight loss in g/m²**) according to ASTM D 1384¹.

Material	Coolex [®] N 20 % v/v	Coolex [®] N 33 % v/v	Pure MEG ² without inhibitors 33 % v/v	ASTM limit ³ at 33 % v/v
Copper	-0.2	-0.2	-2.6	-3.6
Soft solder	-0.4	-0.1	-143	-10.9
Brass	-0.4	-0.3	-7.2	-3.6
Steel	-0.5	-0.2	-158	-3.6
Cast iron	±0	±0	-285	-3.3
Cast aluminium	-1.6	-0.6	-19	-10.0

¹ Modified ASTM D 1384 test: Instead of using the standard ASTM concentration of 33 % v/v, the test was modified down to the minimum usage concentration of only 20 % v/v. The reduced concentration intensifies the standard significantly.

All observations were done by an independent, certified and accredited laboratory.

The abbreviation „ASTM“ stands for „American Society for Testing and Materials“.

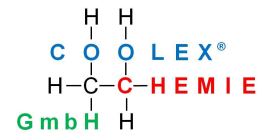
² For comparison.

³ The limits for the maximum acceptable weight changes are given according to the standard ASTM D 3306.

Frost protection and general usage notes

Basically, Coolex[®] N can be diluted with water in every thinkable concentration. Though, the minimum usage concentration of 20 % v/v must not be lowered. The desired frost protection can be adjusted by means of the following table.

Coolex[®] N should be used as a mixture with water only. The minimum usage concentration of Coolex[®] N is 20 % v/v. This concentration represents a frost protection (= crystallization point) of approx. -9 °C.



Usage concentrations and frost protection:

Coollex [®] N/water mixture	Concentration of Coollex [®] N % m/m	Frost protection		Density [g/cm ³]
		Crystallization point (ASTM D 1177)	Solidifying point (DIN ISO 3016)	
20 % v/v	21.78	approx. -9 °C	approx. -12 °C	approx. 1.027
27 % v/v	29.18	approx. -14 °C	approx. -18 °C	approx. 1.038
30 % v/v	32.32	approx. -16 °C	approx. -20 °C	approx. 1.042
34 % v/v	36.47	approx. -19 °C	approx. -24 °C	approx. 1.047
39 % v/v	41.60	approx. -24 °C	approx. -30 °C	approx. 1.054
44 % v/v	46.68	approx. -29 °C	approx. -35 °C	approx. 1.060
50 % v/v	52.70	approx. -36 °C	approx. -43 °C	approx. 1.068

Mixtures with a concentration of Coollex[®] N above 60 % v/v does not make sense because the frost protection is getting worse at higher concentrations than 60 % v/v (exceeding the Eutectic Point of the mixture).

The frost resistance of Coollex[®] N/water mixtures can be checked by means of an antifreeze tester or with a refractometer.

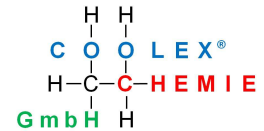
Both instruments can be obtained at Coollex Chemie GmbH – please contact us!

Application fields

Coollex[®] N/water mixtures are universally applicable in all thinkable heating and cooling systems like heat pumps, air conditioning or warm water heating systems, heat recovery or geothermal systems and as a heat transfer medium in industrial production plants.

Application notes

- Coollex[®] N must be always diluted with water homogeneously. Homogeneous Coollex[®] N/water mixtures do not separate anymore – even not after years of application.
- For diluting Coollex[®] N only water with a chloride concentration below 100 ppm must be used. Ideally, de-ionized water is used only. Factory-made Coollex[®] N/water mixtures are made with de-ionized water only – to offer optimal water quality.
- The minimum usage concentration for Coollex[®] N/water mixtures is 20 % v/v. This represents a frost resistance (crystallization point) of approx. -9 °C. Due to the danger of bacterial growth and microbial induced corrosion, the minimum usage concentration should not fall short.
- The frost resistances relating to each specific application can be found in the table „usage concentrations and frost protection“.
- Thus Coollex[®] N/water mixtures are based on glycol, they show a much lower surface tension than pure water. This could lead to a peeling of rust layers if an old system is topped up with



the heat transfer fluid. Old systems should be flushed with water until they are rust-free. In particular cases, sufficient cleaning of the old system by pickling may be necessary. Coolex[®] N/water mixtures should be filled only in clean systems without rust damages.

Please note: Due to their huge surface, fine residues of rust can lead to an early waste of the corrosion inhibitors.

- Zinc-coated (galvanized) pipes should be avoided in the installation. Glycol/water mixtures dissolve the zinc surface and lead to both elemental zinc and – as a result of its reaction with glycol – zinc glycolates. Concerning the corrosion performance, this should not be a problem because the corrosion inhibitors in Coolex[®] N will protect the steel surface under the zinc layer. However, zinc and/or zinc glycolates may settle at the mechanical seal of the circulating pump and damage it to finally cause a leakage. In order to get rid of the deposits, a fine filter can be installed and cleaned regularly (e.g. in a bypass). A mesh size of 100 to 150 µm has to be proved as being practical.
- Before first fill of the heating or cooling circuit all parts of the system must be cleaned thoroughly (e.g. flushing). Rust and tinder must be removed.
- Temporarily emptied systems should be topped up as soon as possible (within a few days) in order to prevent a possible corrosion damage.
- Because Coolex[®] N/water mixtures have a much higher viscosity than pure water, the pressure drop in the system pipes must be taken into account. Specific data can be provided at request.
- Please note: Pure glycol/water mixtures without corrosion inhibitors are not to be used because these fluids are more corrosive than pure water.

Material compatibility

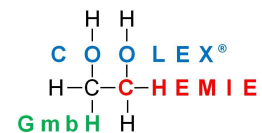
All plastics and elastomers which are compatible with Coolex[®] N/water mixtures are given in the following table:

Nitril rubber	NBR	Polyamide	PA (up to approx. 110 °C) ⁵
Olefin rubber	EPDM	Silicone rubber	Si
Nature rubber	NR	Polypropylene	PP
Styrene butadiene rubber	SBR (up to approx. 100 °C) ⁵	Fluorocarbon elastomers	FKM
Polyethylene (low and high density)	LD-PE, HD-PE	Acrylonitrile butadiene styrene	ABS
Polytetrafluoroethylene	PTFE	Polyester resins	UP
Polyvinylchloride (hard)	PVC, h	Polyacetal	POM

⁴ All plastics and elastomers were tested at a temperature of +80 °C. Additionally, please consult the product informations of the manufacturers.

⁵ Literature values.

Additionally, hemp and PTFE tapes are suitable for sealing pipe threads, too.



Packaging



Standardly, Coolex[®] N (concentrate) is available in polyethylene containers, steel drums, IBC's (Intermediate Bulk Containers) and road tankers:

Packaging	PE container			PE container 60 litre	Steel drum 216 litre	IBC 1.000 litre	Road tanker 23,000 kg
	10 litre	20 litre	30 litre				
Packing content	10 kg	20 kg	30 kg	60 kg	230 kg	1,100 kg	10,000 to 23,000 kg
Filling weight Coolex [®] N (concentrate)	AT REQUEST						

Coolex[®] N/water mixtures are available in IBC's (1,000 litre) or road tankers (min. 10,000 kg).

Ecology and toxicology

Coolex[®] N does not contain any toxic inhibitors and has a good biodegradability. Due to its MEG base, Coolex[®] N is rated as „H302: Harmful if swallowed and H373: May cause kidney disease through prolonged or repeated exposure“.

Additionally, the product is labeled with the pictograms  and .

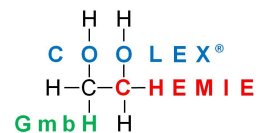
This labeling is valid even for the corresponding water mixtures.

According to VwVwS, both Coolex[®] N concentrate and its corresponding water mixtures are rated as WGK 1 (slightly water polluting).

For more details, please consult the corresponding safety data sheets.

Special/Miscellaneous

- **WGK:** Both the concentrate and the corresponding water mixtures of Coolex[®] N are classified in water hazard class 1 (slightly water polluting). Coolex[®] N is environmentally friendly and good biodegradable.
- **CMR free formulation:** Coolex[®] N does not contain any CMR substances (cancerogenic, mutagenic and reprotoxic effects).
- **RoHS:** The Coolex[®] N formulation does not contain any substances which are restricted according to EU Directive 2011/65/EU (lead, mercury, cadmium, chromium, chrome (VI), polybrominated biphenyl, polybrominated diphenyl ether).
- Coolex[®] N is a modern, long-life heat transfer fluid, based on Organic Acid Technology (OAT) with extreme long change intervals.
- **REACH** (Registration, Evaluation, Authorisation and Restriction of Chemicals): All substances in Coolex[®] N are registered or pre-registered according to EC Regulation No. 1907/2006.
- Coolex[®] N is also suitable as an additive according to **VDI 2035**.



Contact

Please call us – we would be happy to advice you!

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All informations in this technical leaflet represent our actual state of knowledge and merely informs on general product features and possible applications of the products.

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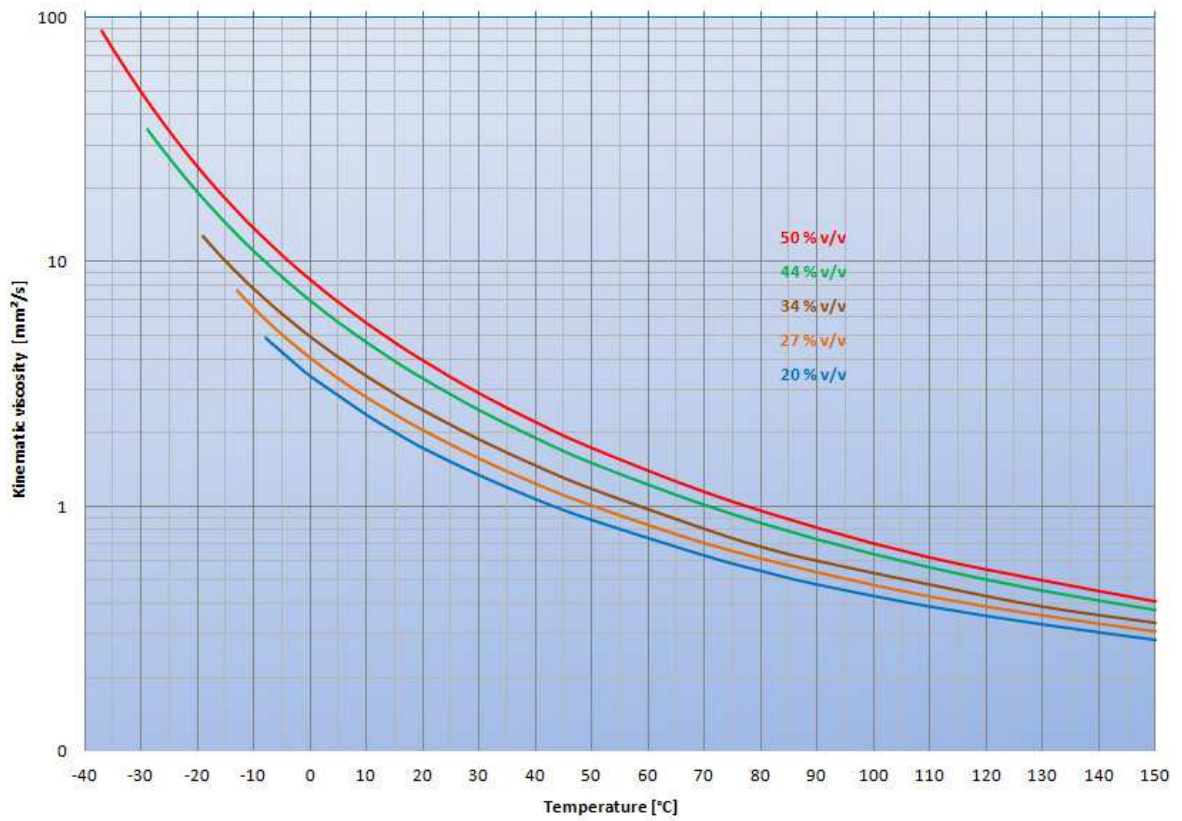
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Physical data of Coolex[®] N

Crystallization point [°C]	Concentration [% v/v]	Concentration [% m/m]	Temperature [°C]	Density [kg/m ³]	Kinematic viscosity [mm ² /s]	Specific heat [kJ/(kg*K)]	Cubic expansion coefficient [*10 ⁻⁶ /K]
-9	20	21.78	-5	1034	4.3	3.78	264
			0	1033	3.4	3.78	290
			10	1030	2.4	3.79	340
			20	1028	1.8	3.80	388
			40	1019	1.1	3.83	478
			70	1002	0.63	3.90	598
			90	988	0.49	3.95	667
-14	27	29.18	-10	1048	6.5	3.63	277
			-5	1046	5.0	3.63	303
			0	1045	4.1	3.64	326
			20	1038	2.1	3.66	418
			40	1027	1.3	3.70	502
			70	1010	0.70	3.76	615
			90	997	0.55	3.81	681
-19	34	36.47	-15	1063	10.0	3.48	310
			-10	1061	7.8	3.48	332
			-5	1059	6.1	3.49	353
			0	1056	4.9	3.50	375
			10	1052	3.5	3.51	417
			20	1047	2.5	3.53	458
			40	1037	1.5	3.56	534
			70	1019	0.81	3.63	636
			90	1005	0.60	3.68	695
-29	44	46.68	-25	1082	27.3	3.28	335
			-15	1078	15.0	3.29	373
			-5	1073	8.6	3.31	411
			0	1070	7.0	3.32	431
			10	1065	4.8	3.33	466
			20	1060	3.4	3.35	501
			40	1048	1.9	3.39	568
			70	1029	1.0	3.45	659
			90	1016	0.73	3.50	712
-36	50	52.70	-35	1097	74.5	3.15	328
			-25	1092	34.4	3.17	367
			-15	1087	18.6	3.18	404
			-5	1082	10.9	3.20	439
			0	1079	8.5	3.20	456
			10	1074	5.8	3.22	490
			20	1067	4.0	3.24	523
			40	1056	2.2	3.27	585
			70	1037	1.2	3.33	669
			90	1023	0.83	3.38	720

All values given in the table above are calculated data which are based on measured values out of which mathematical formulas were built (can be provided on request). Small deviations from the real values are unavoidable.

Cooler[®] N: Kinematic viscosity [mm²/s]



Cooler[®] N: Frost protection (crystallization point / solidifying point) [°C]

