

# Coolex<sup>®</sup> L

**Heat transfer fluid for applications in the food or pharmaceutical industry, based on 1,2-propylene glycol (MPG), offering protection against frost and corrosion in technical systems.**

## Brief description

- Green colored
- Corrosion inhibitor/antifreeze concentrate to be diluted with water
- Permanent usage temperature: approx. -25 to +150 °C
- Nitrite-, nitrate-, amine-, silicate-, borate-, phosphate- and heavy metal free
- Non-toxic corrosion inhibitors
- Free of CMR substances (cancerogene, mutagene, reprotoxic), e.g. borate
- Suitable for food-related and pharmaceutical applications
- Minimum usage concentration 25 % v/v
- Water hazard class: WGK 1 (slightly water polluting)
- Readily biodegradable and environmentally friendly
- Long-living product (OAT product; organic acid technology)
- Non-regulated according to ADR/GGVE/GGVSEB

## Product description

Coolex<sup>®</sup> L is a green colored corrosion inhibitor and antifreeze concentrate based on 1,2-propylene 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 as well as nitrite, nitrate, amine, silicate, borate and phosphate. Additionally, it prevents the circuit from scaling.

Coolex<sup>®</sup> L is universally applicable in the food and pharmaceutical industry, such as:

- Heating and cooling systems in breweries and/or pharmaceutical industry
  - Heat pumps
  - Geothermal systems
  - Solar panels
  - Heat recovery systems
  - Air conditioning
- etc.

The corrosion inhibitors in Coolex<sup>®</sup> L protect the whole heating or cooling circuit sustainably from corrosion.

Coolex<sup>®</sup> L must always be mixed homogeneously with water (see also *frost protection and general usage notes*).

## Physical parameters

Parameter	Unit	Value	Standard
Density (20 °C)	g/cm <sup>3</sup>	ca. 1.041	DIN 51757
Refractive index n <sub>D20</sub>	---	ca. 1.433	DIN 51423
pH value, 1:2 in water	---	ca. 8.0	DIN 51369
Reserve alkalinity	ml 0.1 M HCl	ca. 4.5	ASTM D 1121
Boiling point (1,013 mbar)	°C	ca. 155	ASTM D 1120
Kinematic viscosity (20 °C)	mm <sup>2</sup> /s	ca. 61.9	DIN 51562-1
Specific heat (20 °C)	kJ/(kg*K)	ca. 2,54	--- (calculated)
Thermal conductivity (20 °C)	W/(m*K)	ca. 0.21	--- (calculated)
Specific electrical conductivity (25 °C), 1:2 in water	μS/cm	ca. 1,600	DIN EN 27888

## Corrosion protection

The inhibitor system in Coolex<sup>®</sup> L protects all commonly used metals in technical systems effectively and sustainably from corrosion.

The following table shows the corrosion performance (**weight loss in g/m<sup>2</sup>**) according to ASTM D 1384<sup>1</sup>.

Material	Coolex <sup>®</sup> L 25 % v/v	Coolex <sup>®</sup> L 33 % v/v	Pure MPG <sup>2</sup> without inhibitors 33 % v/v	ASTM limit <sup>3</sup> at 33 % v/v
Copper	-0.1	-0.1	-2.5	-3.6
Soft solder	-0.3	-0.1	-140	-10.9
Brass	-0.2	-0.2	-7.0	-3.6
Steel	-0.3	-0.1	-158	-3.6
Cast iron	±0	-0.1	-265	-3.3
Cast aluminium	-1.1	-0.5	-18	-10.0

<sup>1</sup> Modified ASTM D 1384 test: Instead of using the standard ASTM concentration of 33 % v/v, the usage concentration was reduced to the minimum of only 25 % v/v. The reduced concentration intensifies the standard significantly.

The analyses were executed by an independent, certified and accredited laboratory.

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

<sup>2</sup> For comparison.

<sup>3</sup> 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<sup>®</sup> L can be diluted with water in any concentration. Though, the minimum usage concentration of 25 % v/v must not be lowered. The desired frost protection can be adjusted by means of the following table.

**Coolex<sup>®</sup> L should be used as a mixture with water only. The minimum usage concentration of Coolex<sup>®</sup> L is 25 % v/v.** This concentration represents a frost protection (= crystallization point) of approx. -10 °C.

Usage concentration and frost protection:

Coolex <sup>®</sup> L/water mixture	Concentration of Coolex <sup>®</sup> L % m/m	Frost protection		Density [g/cm <sup>3</sup> ]
		Crystallization point (ASTM D 1177)	Solidifying point (DIN ISO 3016)	
25 % v/v	25.79	approx. -10 °C	approx. -14 °C	approx. 1.021
32 % v/v	32.92	approx. -15 °C	approx. -20 °C	approx. 1.027
35 % v/v	35.96	approx. -18 °C	approx. -24 °C	approx. 1.029
38 % v/v	38.99	approx. -20 °C	approx. -27 °C	approx. 1.032
43 % v/v	44.03	approx. -25 °C	approx. -33 °C	approx. 1.035
50 % v/v	51.05	approx. -32 °C	approx. -43 °C	approx. 1.039

Mixtures with Coolex<sup>®</sup> L concentrations above 60 % v/v are not reasonable since the frost protection is decreasing at concentrations higher than 60 % v/v (exceeding the Eutectic Point of the mixture).

The frost resistance of Coolex<sup>®</sup> L/water mixtures can be determined with an antifreeze tester or a refractometer.

Both instruments can be obtained at GHC – please contact us!

### Application fields

Coolex<sup>®</sup> L/water mixtures are applied mostly in the food or pharmaceutical industry, e.g. heating/cooling circuits in breweries, as a cooling fluid for chemical reactions/processes in the chemical and pharmaceutical industry or in solar panels. Generally, the heat transfer fluid is universally applicable in all common heating and cooling systems, though, we recommend Coolex<sup>®</sup> N/water mixtures for any non-food application since they offer in comparison the better physical properties.

### Application notes

- Coolex<sup>®</sup> L must always be diluted with water homogeneously. Homogeneous Coolex<sup>®</sup> L/water mixtures do not separate anymore – even after years of application.
- For diluting Coolex<sup>®</sup> L only water with a chloride concentration below 100 ppm must be used. Ideally, de-ionized water is used only.  
Factory-made Coolex<sup>®</sup> L/water mixtures are made with de-ionized water only – to offer optimal water quality.
- The minimum usage concentration of Coolex<sup>®</sup> L/water mixtures is 25 % v/v. This represents a frost resistance (crystallization point) of approx. -10 °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“.

- Since Coolex<sup>®</sup> L/water mixtures are based on glycol, they show a much lower surface tension than pure water. This may lead to a dissolution of existing rust layers if an old system is topped up with the heat transfer fluid. Thus, 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<sup>®</sup> L/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. This does not affect the corrosion performance of Coolex<sup>®</sup> L since the corrosion inhibitors 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, which may eventually lead to a leakage. In order to get rid of the deposits, a fine filter can be installed and cleaned regularly (e.g. in a bypass). In practice a mesh size of 100 to 150 µm proved to be adequate for this application.
- Before initial filling 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 refilled as soon as possible (within a few days) in order to prevent a possible corrosion damage.
- Because Coolex<sup>®</sup> L/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 should not to be used since these fluids are more corrosive than pure water.

## Material compatibility

All plastics and elastomers which are compatible with Coolex<sup>®</sup> L/water mixtures are given in the following table:

Nitril rubber	NBR	Polyamide	PA (up to approx. 110 °C) <sup>5</sup>
Olefin rubber	EPDM	Silicone rubber	Si
Nature rubber	NR	Polypropylene	PP
Styrene butadiene rubber	SBR (up to approx. 100 °C) <sup>5</sup>	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

<sup>4</sup> All plastics and elastomers were tested at a temperature of +80 °C. Additionally, please consult the product information of the manufacturers.

<sup>5</sup> Literature values.

Additionally, hemp and PTFE tapes are suitable for pipe thread sealing as well.

## Packaging

Standardly, Coolex<sup>®</sup> L (concentrate) is available in polyethylene containers, steel drums, IBC's (Intermediate Bulk Containers) and road tankers:

Packaging	PE container			PE container 60 liters	Steel drum 216 liters	IBC 1,000 liters	Road tanker 23,000 kg
	10 liters	20 liters	30 liters				
Packing content	10 kg	20 kg	30 kg	60 kg	220 kg	1,000 kg	10,000 bis 23,000 kg
Filling weight Coolex <sup>®</sup> L (concentrate)	AT REQUEST						

Coolex<sup>®</sup> L/water mixtures are available in IBC's (1,000 liters) or road tankers (min. 10,000 kg).

## Ecology and toxicology

Coolex<sup>®</sup> L does not contain any toxic inhibitors and has a good biodegradability. According to VwVwS, both Coolex<sup>®</sup> L 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<sup>®</sup> L are classified in water hazard class 1 (slightly water polluting). Coolex<sup>®</sup> L is environmentally friendly and good biodegradable.
- **CMR free formulation:** Coolex<sup>®</sup> L does not contain any CMR substances (cancerogenic, mutagenic and reprotoxic effects).
- **RoHS:** The Coolex<sup>®</sup> L 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<sup>®</sup> L is a modern, long-living heat transfer fluid based on Organic Acid Technology (**OAT**) with extreme long change intervals.
- **REACH** (Registration, Evaluation, Authorization and Restriction of Chemicals): All substances in Coolex<sup>®</sup> L are registered or pre-registered according to EC Regulation No. 1907/2006.
- Coolex<sup>®</sup> L 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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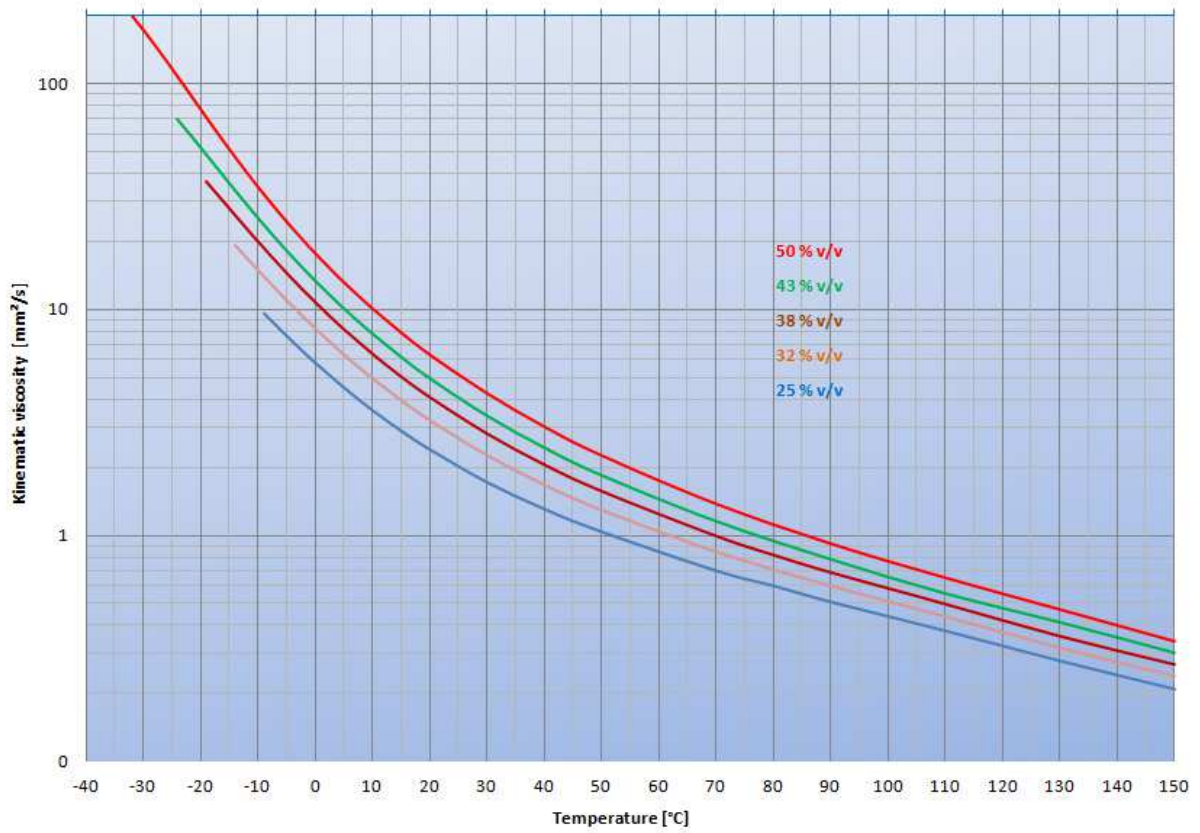
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### Physical data of Coolex® L

Crystallization point [°C]	Concentration [% v/v]	Concentration [% m/m]	Temperature [°C]	Density [kg/m³]	Kinematic viscosity [mm²/s]	Specific heat [kJ/(kg*K)]	Cubic expansion coefficient [*10 <sup>-6</sup> /K]
-10	25	25.79	-5	1028	7.5	3.73	238
			0	1028	5.8	3.73	269
			10	1025	3.6	3.74	328
			20	1021	2.4	3.76	383
			40	1011	1.4	3.79	483
			70	993	0.70	3.84	610
			90	980	0.51	3.88	681
-15	32	32.92	-10	1037	15.6	3.59	338
			-5	1037	11.3	3.59	367
			0	1035	8.2	3.60	396
			20	1027	3.3	3.64	501
			40	1017	1.7	3.68	593
			70	997	0.84	3.75	711
			90	983	0.60	3.80	779
-20	38	38.99	-15	1044	27.9	3.45	337
			-10	1043	20.0	3.47	365
			-5	1042	15.3	3.48	392
			0	1040	11.1	3.49	418
			10	1036	6.4	3.52	468
			20	1032	4.1	3.54	515
			40	1020	2.1	3.59	600
			70	999	1.0	3.67	709
			90	985	0.69	3.73	773
-25	43	44.03	-20	1050	52.5	3.34	311
			-15	1049	36.5	3.35	337
			-5	1047	18.7	3.38	388
			0	1044	14.3	3.40	412
			10	1040	7.9	3.43	458
			20	1035	4.9	3.46	501
			40	1022	2.5	3.52	579
			70	1001	0.84	3.61	681
			90	986	0.78	3.67	741
-32	50	51.05	-30	1058	179	3.17	267
			-25	1058	121	3.18	294
			-15	1056	51.0	3.22	344
			-5	1053	25.0	3.26	390
			0	1050	18.2	3.28	413
			10	1045	10.0	3.32	455
			20	1039	6.3	3.35	495
			40	1025	3.0	3.42	566
			70	1003	1.4	3.53	661
			90	988	0.91	3.60	718

All values given in the table above are calculated with mathematical formulas which base on experimental data (can be provided on request). Small deviations from the real values are unavoidable.

**Coollex® L: Kinematic viscosity [mm<sup>2</sup>/s]**



**Coollex® L: Frost protection (crystallization point / solidifying point) [°C]**

