

Glysofor N - Specification

Product features

Glysofor N is an environmentally-friendly antifreeze concentrate based on monoethylene glycol, corrosion inhibitors, and stabilisers.

It may be used universally as an antifreeze, corrosion protection agent, and heat transfer medium or cooling transfer medium (cooling brine) in heating and cooling systems.

The product is a preferred heat transfer fluid in geothermal energy systems.

Glysofor N optimally prevents frost damage, corrosion, deposits, sludge accumulation, and bio-films.

Glysofor N is completely free of nitrites, amines, phosphates, silicates, and borates.

It is biodegradable and environmentally friendly.

Both as a concentrate and diluted, Glysofor N is classed in the lowest water pollution class, WGK 1.

Glysofor N exhibits long-term resistance to the formation of bio-films, rot, and resistance to microbiological decomposition, which avoids deposition and sludge accumulation.

Homogeneous Glysofor N/water mixtures do not separate, which ensures continuous frost resistance.

This guarantees year-round, long-term, low-maintenance operation of systems filled with Glysofor N.

Heat transfer, frost and corrosion protection agent

Basis: Monoethylene glycol

Operating temperature: -50 to +150 °C

Optimized thermal conductivities and viscosities

Free of nitrites, phosphates, amines, borates and silicates

Universally useable

Areas of application: Heating and refrigeration systems, heat pumps, frost endangered liquid-carrying systems

Glysofor N is a preferred product in e-mobility. It is used both in the cooling circuits of charging stations and in the cooling systems of e-vehicles.

Product data

Chemical name	Ethylene glycol (monoethylene glycol), aqua dest., anti-corrosion additive
Appearance	Pink liquid
Packaging	Canisters / barrels / IBCs / tank vehicles
ADR	Kl 0 number
EC-No.	2034733
CAS-No.	107 - 21 - 1
WGK	1
Applied concentration:	At least 20 Vol% (Frost protection up to approx. -9 °C)
Operating temperature range:	-50 to +150 °C
Areas of application:	Heating and cooling systems, heat recovery plants, heat pumps and other liquid-carrying systems
Density (20 °C)	1,12 g/cm³
pH-value	7,3 - 8,3
Boiling point (1013 mbar)	approx. 197 °C
Vapour pressure (20 °C)	0,053 mbar
Specific heat (20 °C)	2,35 kJ/kg K
Thermal conductivity (20 °C)	0,29 W/m K
Dynamic viscosity (20 °C)	21 mPa s

Heat transfer medium

In heat pump systems, heat recovery plants, industrial plants, downhole heat exchangers, or water circuits, Glysofor N is used as a heat carrier fluid. This guarantees the heat transfer of previously generated or excess heat to a heat consumer that makes this heat useful. The high boiling point of Glysofor N (approx. 200 °C) prevents evaporation losses. In case geo-thermal heat is used, Glysofor N transports the heat absorbed in the downhole heat exchangers at the earth's surface and releases them to a heating system in connection with a heating pump. Glysofor N is able to function simultaneously as a cooling medium, which guarantees optimal heat removal at the same time as cooling.

Cooling brine / cooling medium

In industrial cooling systems, Glysofor N is used as a cooling brine. Glysofor N is used to transfer cold from a central refrigeration system to different cooling consumers. Typical application areas are air-conditioning systems or cooling equipment in industrial and production facilities. Thanks to the excellent ability of Glysofor N to lower the freezing point, refrigeration and deep freeze systems can be safely operated at sub-zero temperatures at low as -50 °C.

Antifreeze

Using glycol (monoethylene glycol), Glysofor N significantly lowers the freezing point of water and prevents fluid from freezing, e.g. in heating systems or cooling systems. With Glysofor N, heating systems can be temporarily switched off, even in frost conditions, while however remaining ready for operation at any time. In temporarily used facilities like sports halls, weekend homes, churches, schools, or events spaces, it can lead to a significant reduction in the used of fuels. Glysofor N reliably avoids frost damage to the system caused by bursting effects.

Glysofor N – active content (volume)	Frost protection up to °C
20 %	-9
25 %	-12
30 %	-16
35 %	-20
40 %	-25
45 %	-31
50 %	-38
55 %	-45
58 %	-51

Corrosion protection

Glysofor N contains a complex combination of corrosion inhibitors which optimally protect metals from corrosion. This anticorrosive protection can be used for all important metals that are usually used in heating engineering. Installations made of copper, brass, solder, grey iron, aluminium, steel and iron are optimally protected, even if they are used in multi-metal installations.

Application

Preparation: Before the plant is filled for the first time, it should be tested for leaks. For this purpose, the plant should initially be filled with chloride-free water in the amount specified by the plant manufacturer, so that if any leakage occurs, no frost protection agent will be released accidentally. If the capacity of the plant is not known, the filling in of water must be closely monitored in order to simultaneously determine the exact capacity (via the water meter, where necessary). Determining the capacity proves helpful for calculating and adjusting the desired frost protection value. If it is not possible to test the plant using water (e.g. due to low temperatures), the plant should be observed during the filling process as far as possible.

Filling: If the capacity of the plant is not known, the required quantity of Glysofor N can be calculated using the table below. In order to ensure an ideal distribution, the system should first be filled with approx. 50% of the required quantity of water, followed by the entire required quantity of Glysofor L and finally the remaining quantity of water.

Refilling: If the system needs to be refilled, and the required refilling quantity is not known, an estimated quantity of Glysofor N is premixed, proportional to the desired level of frost protection. The premixed Glysofor N /water mixture is then filled into the system.

Testing the frost protection: After the system has been filled, a several hours long circulation should take place (overnight, if possible). The Glysofor N concentration can be determined by means of the specific density of the Glysofor N/water mixture. The values listed in the table below represent the weight in grams per litre. The frost protection value setting is determined based on the temperatures that can be expected in that region. In order to ensure reliable frost protection at all times, we recommend a 5 to 10 % higher setting for this value.

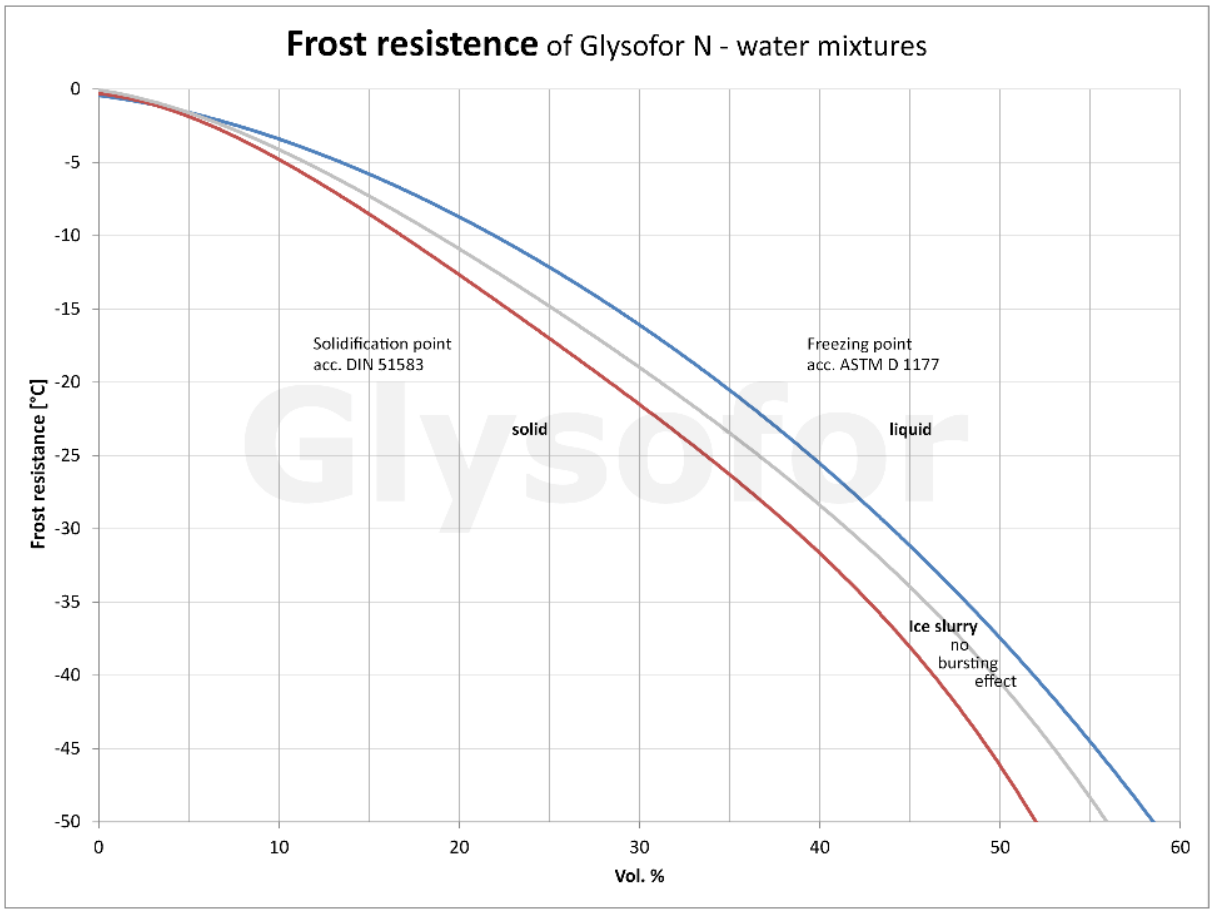
Application guidelines

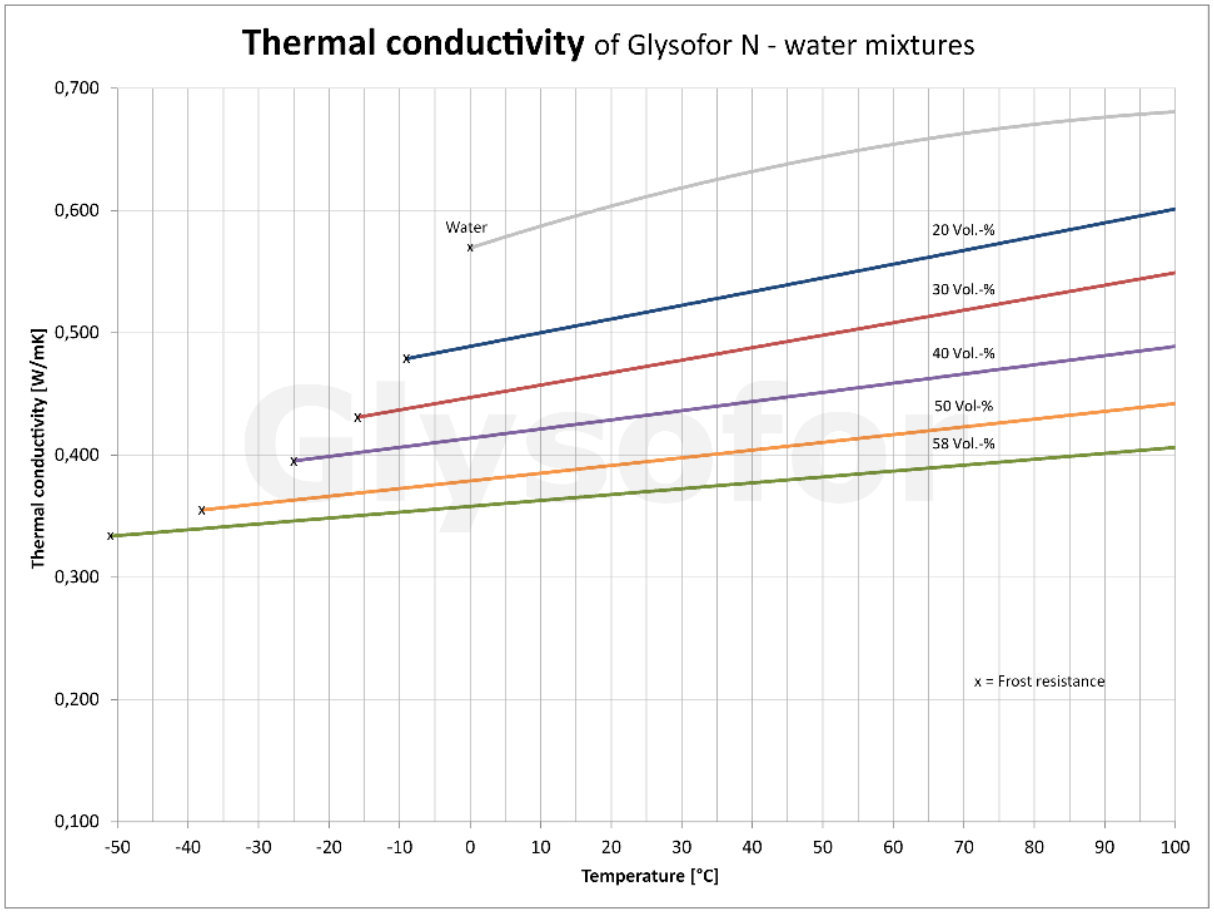
Galvanised components are to be avoided, as zinc is generally volatile with glycol and products which contain glycol. The water that is used for producing the solution should have a maximum hardness of 25 °dH and a maximum chloride content of 100 mg/l. Generally, tap water fulfils these requirements. Pipe connections are to be made of hard solder and chloride-containing flux materials are to be avoided or are to be removed completely by flushing after usage. Scalings on copper components, metal swarf and contaminations are to be removed completely before the plant is filled. Plants that are to be operated with Glysofor must not be in contact with any external electrical potential. When installing the plant, it must be ensured that the future operation is not interrupted by circulatory disturbances caused by air cushions or debris. Plants that are operated with Glycogard must be installed as closed systems and are to be filled completely and vented directly after the pressure test is carried out. Gas and air cushions are to be removed immediately. Breathers are to be applied in such a way that they keep the system free from air and oxygen at all times and that, in the case of low pressure, no air can be sucked in. If an existing plant is to be filled with Glysofor, the corrosion status should be checked beforehand. Before a system that is damaged by corrosion is filled, it must be completely reconstructed. In order to ensure a sufficient level of functionality and frost protection at all times, the condition and concentration of Glysofor N should be tested at least once per year. This is particularly advisable if work has been carried out on the operated system or the liquid has been refilled. Overheating must be strictly avoided, as this can lead to damage and the premature ageing of Glysofor N.

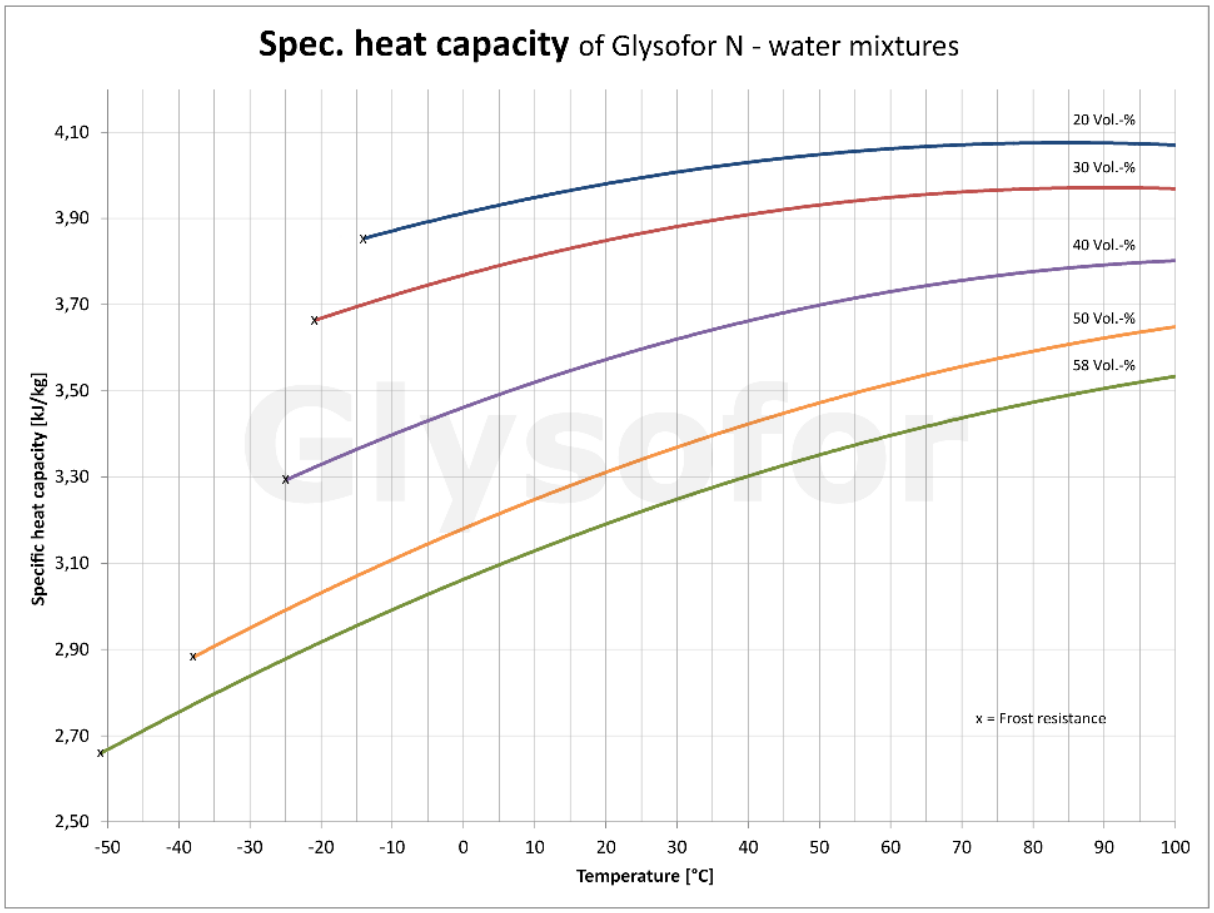
Technical data

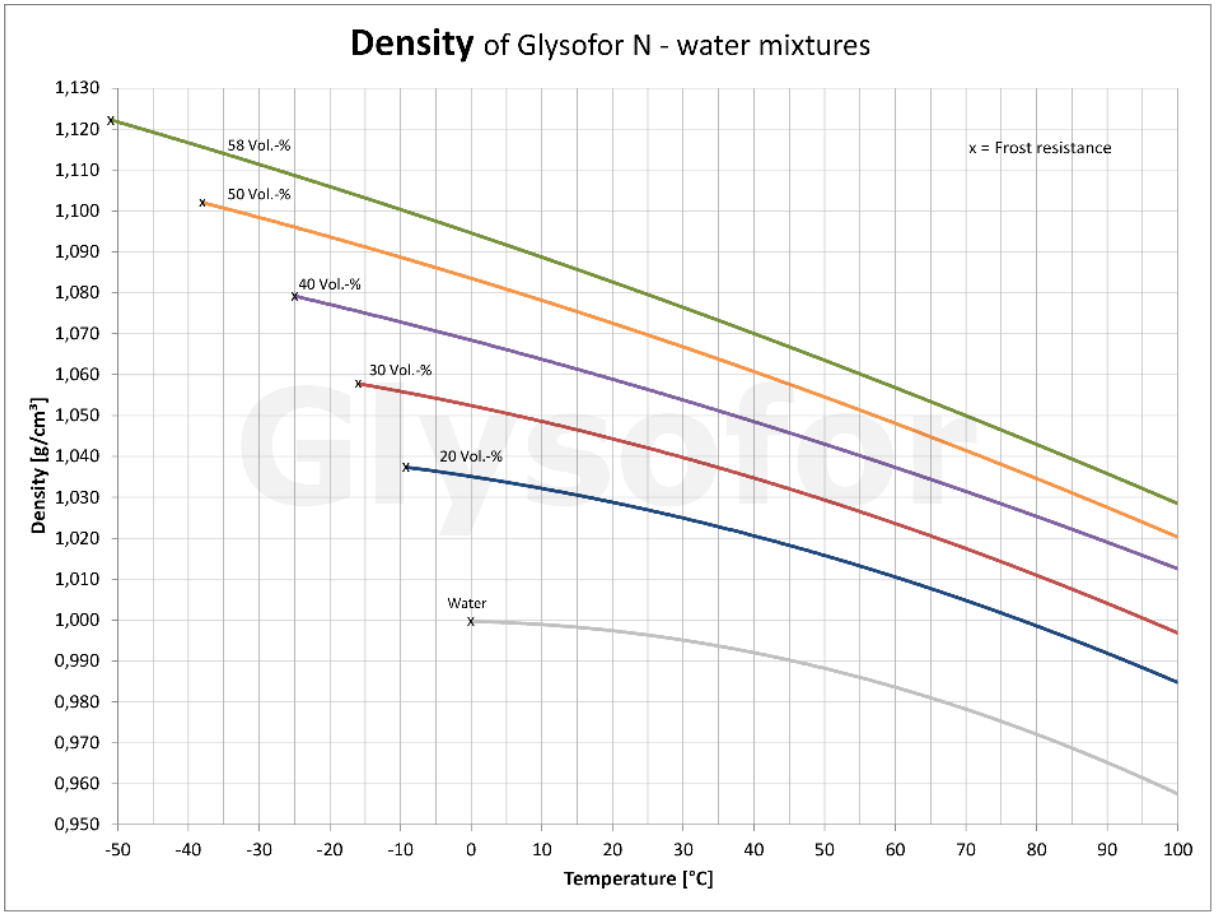
Concentrate [Vol.%]	Frost resistance [°C]	Temp. [°C]	Thermal conductivity [W/m K]	Spec. heat capacity [kJ/kg K]	Density [g/cm³]	Kinemat. viscosity [mm²/s]	Cub. Expansion coefficient [K⁻¹]	Rel. Pressure drop factor [Factor]
		0	0,490	3,92	1,035	3,34	0,00021	1,28
		10	0,501	3,96	1,032	2,44	0,00028	1,16
		20	0,512	3,99	1,029	1,82	0,00034	1,07
		30	0,523	4,02	1,025	1,40	0,00039	1,00
		40	0,535	4,04	1,021	1,11	0,00045	0,95
20	-9	50	0,546	4,06	1,016	0,90	0,00050	0,90
		60	0,557	4,07	1,010	0,75	0,00055	0,87
		70	0,568	4,08	1,005	0,64	0,00059	0,84
		80	0,580	4,08	0,998	0,57	0,00063	0,81
		90	0,591	4,09	0,992	0,51	0,00067	0,78
		100	0,602	4,08	0,985	0,47	0,00071	0,76
		-10	0,458	3,82	1,046	5,51	0,00022	1,49
		0	0,469	3,86	1,044	3,86	0,00027	1,34
		10	0,479	3,90	1,040	2,38	0,00033	1,22
		20	0,490	3,93	1,037	2,06	0,00038	1,13
		30	0,501	3,96	1,032	1,57	0,00043	1,05
		40	0,511	3,99	1,028	1,23	0,00047	1,00
25	-12	50	0,522	4,01	1,022	0,99	0,00052	0,94
		60	0,533	4,02	1,017	0,82	0,00056	0,90
		70	0,544	4,04	1,011	0,70	0,00061	0,87
		80	0,554	4,04	1,004	0,62	0,00065	0,83
		90	0,565	4,04	0,998	0,56	0,00069	0,80
		100	0,576	4,04	0,990	0,51	0,00072	0,77
		-10	0,438	3,73	1,056	6,43	0,00028	1,58
		0	0,448	3,78	1,052	4,45	0,00033	1,39
		10	0,458	3,82	1,049	3,17	0,00037	1,28
		20	0,468	3,86	1,044	2,33	0,00041	1,18
		30	0,479	3,89	1,040	1,76	0,00045	1,10
		40	0,489	3,92	1,035	1,37	0,00049	1,04
30	-16	50	0,499	3,94	1,029	1,10	0,00053	0,98
		60	0,509	3,96	1,024	0,90	0,00057	0,93
		70	0,519	3,97	1,017	0,77	0,00061	0,89
		80	0,530	3,98	1,011	0,67	0,00064	0,85
		90	0,540	3,98	1,004	0,61	0,00068	0,82
		100	0,550	3,98	0,997	0,56	0,00071	0,79
		-20	0,414	3,52	1,068	12,49	0,00030	1,84
		-10	0,423	3,58	1,064	8,18	0,00034	1,62
		0	0,431	3,64	1,061	5,48	0,00037	1,44
		10	0,440	3,69	1,056	3,79	0,00041	1,32
		20	0,449	3,73	1,052	2,71	0,00044	1,22
		30	0,458	3,76	1,047	2,00	0,00047	1,13
35	-20	40	0,466	3,81	1,042	1,53	0,00050	1,06
		50	0,475	3,84	1,036	1,20	0,00053	1,00
		60	0,484	3,86	1,030	0,98	0,00056	0,95
		70	0,493	3,88	1,024	0,83	0,00059	0,91
		80	0,501	3,89	1,018	0,72	0,00062	0,87
		90	0,510	3,90	1,012	0,65	0,00065	0,83
		100	0,519	3,91	1,005	0,60	0,00067	0,80
		-20	0,400	3,34	1,077	17,09	0,00036	1,91
		-10	0,407	3,41	1,073	10,59	0,00038	1,67
		0	0,415	3,47	1,068	6,84	0,00041	1,49
		10	0,422	3,53	1,064	4,57	0,00044	1,37
		20	0,430	3,58	1,059	3,18	0,00046	1,27
		30	0,437	3,63	1,054	2,30	0,00048	1,17
40	-25	40	0,445	3,67	1,049	1,72	0,00051	1,09
		50	0,452	3,71	1,043	1,33	0,00056	1,03
		60	0,460	3,74	1,037	1,07	0,00058	0,98
		70	0,467	3,77	1,031	0,90	0,00062	0,93
		80	0,475	3,79	1,025	0,78	0,00065	0,89
		90	0,482	3,80	1,019	0,71	0,00068	0,85
		100	0,490	3,81	1,013	0,66	0,00072	0,82
		-30	0,376	3,09	1,090	38,99	0,00039	
		-20	0,383	3,18	1,085	21,09	0,00041	1,98
		-10	0,390	3,25	1,081	12,29	0,00043	1,73
		0	0,397	3,32	1,076	7,74	0,00044	1,55
		10	0,404	3,39	1,071	5,15	0,00046	1,41
		20	0,411	3,45	1,066	3,61	0,00048	1,31
		30	0,417	3,50	1,060	2,63	0,00050	1,21
45	-31	40	0,424	3,55	1,055	1,99	0,00053	1,13
		50	0,431	3,60	1,049	1,55	0,00055	1,06
		60	0,438	3,64	1,043	1,25	0,00058	1,01
		70	0,445	3,67	1,037	1,04	0,00060	0,96
		80	0,452	3,70	1,030	0,90	0,00063	0,92
		90	0,459	3,72	1,024	0,79	0,00065	0,88
		100	0,466	3,74	1,017	0,73	0,00068	0,84

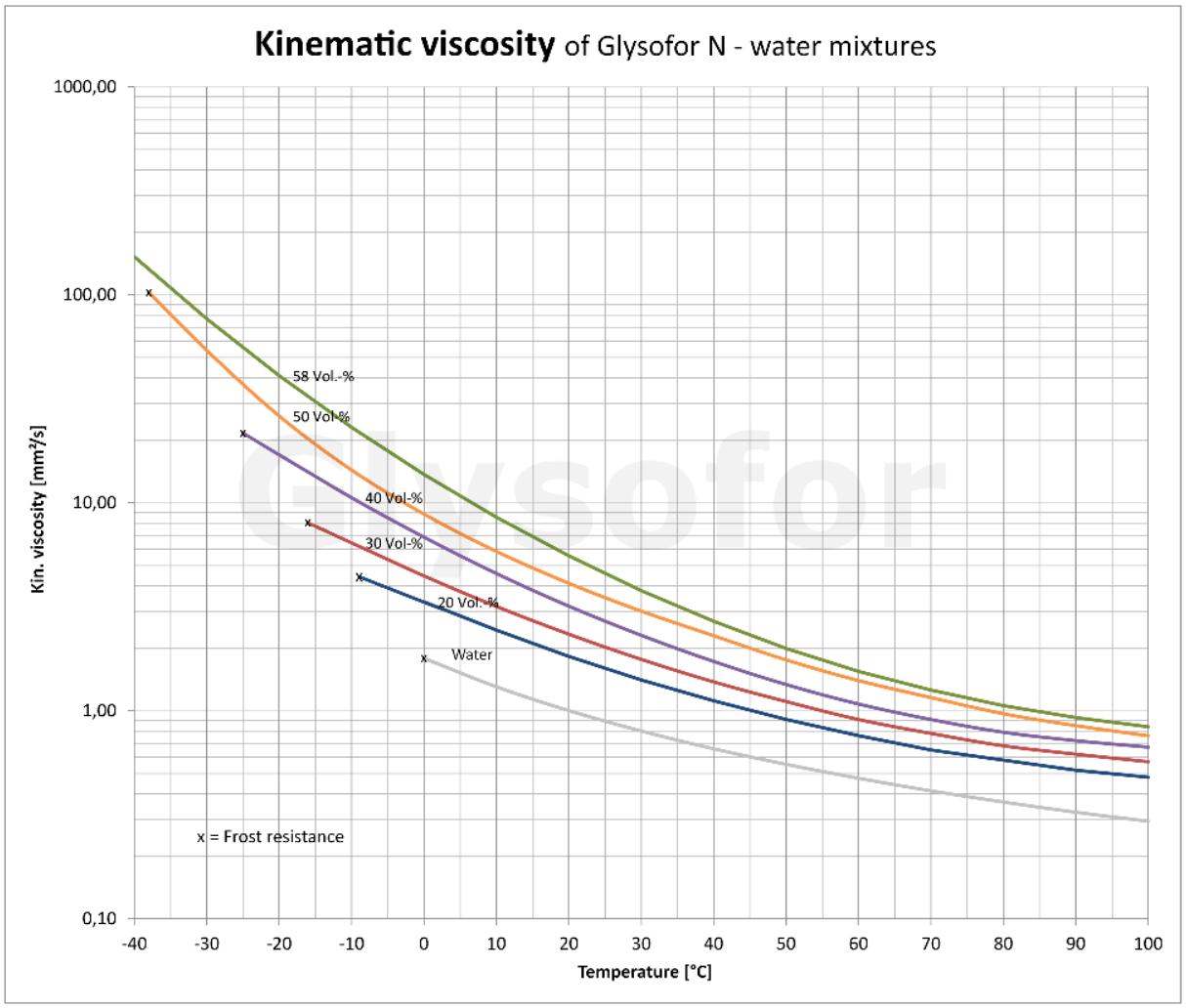
Concentrate [Vol.%]	Frost resistance [°C]	Temp. [°C]	Thermal conductivity [W/m K]	Spec. heat capacity [kJ/kg K]	Density [g/cm³]	Kinemat. viscosity [mm²/s]	Cub. Expansion coefficient [K⁻¹]	Rel. Pressure drop factor [Factor]
50	-38	-30	0,361	2,96	1,099	54,19	0,00045	
		-20	0,367	3,04	1,094	26,19	0,00045	2,05
		-10	0,374	3,12	1,088	14,39	0,00046	1,79
		0	0,380	3,19	1,083	8,83	0,00048	1,60
		10	0,386	3,26	1,078	5,84	0,00049	1,45
		20	0,392	3,32	1,072	4,10	0,00051	1,34
		30	0,399	3,38	1,067	3,01	0,00053	1,25
		40	0,405	3,43	1,061	2,29	0,00056	1,16
		50	0,411	3,48	1,055	1,75	0,00058	1,09
		60	0,418	3,53	1,048	1,39	0,00061	1,04
		70	0,424	3,57	1,042	1,15	0,00064	0,99
		80	0,430	3,60	1,035	0,96	0,00068	0,94
		90	0,437	3,63	1,027	0,84	0,00072	0,90
		100	0,443	3,66	1,020	0,75	0,00073	0,86
55	-45	-40	0,345	2,80	1,112	149,99	0,00047	
		-30	0,350	2,88	1,107	68,29	0,00048	
		-20	0,356	2,96	1,101	34,69	0,00048	2,20
		-10	0,361	3,04	1,096	19,29	0,00049	1,92
		0	0,367	3,11	1,090	11,59	0,00050	1,70
		10	0,372	3,18	1,085	7,36	0,00052	1,54
		20	0,377	3,24	1,079	4,95	0,00054	1,41
		30	0,383	3,30	1,073	3,48	0,00055	1,31
		40	0,388	3,35	1,067	2,54	0,00058	1,21
		50	0,393	3,40	1,060	1,93	0,00060	1,13
		60	0,399	3,45	1,054	1,52	0,00063	1,07
		70	0,404	3,49	1,047	1,24	0,00066	1,01
		80	0,410	3,52	1,040	1,04	0,00069	0,96
		90	0,415	3,55	1,033	0,90	0,00072	0,92
		100	0,420	3,58	1,025	0,80	0,00074	0,87
58	-51	-50	0,335	2,68	1,122		0,00048	
		-40	0,340	2,76	1,117	152,99	0,00049	
		-30	0,345	2,85	1,111	76,99	0,00049	
		-20	0,349	2,93	1,106	40,99	0,00050	2,34
		-10	0,354	3,00	1,100	23,09	0,00051	2,04
		0	0,359	3,07	1,094	13,69	0,00052	1,79
		10	0,364	3,14	1,089	8,53	0,00053	1,63
		20	0,369	3,20	1,083	5,56	0,00055	1,48
		30	0,373	3,26	1,076	3,78	0,00057	1,36
		40	0,378	3,31	1,070	2,69	0,00059	1,26
		50	0,383	3,36	1,064	1,99	0,00061	1,17
		60	0,388	3,41	1,057	1,54	0,00063	1,09
		70	0,393	3,45	1,050	1,25	0,00066	1,03
		80	0,398	3,48	1,043	1,05	0,00069	0,98
		90	0,402	3,52	1,036	0,92	0,00072	0,93
		100	0,407	3,54	1,028	0,83	0,00075	0,89

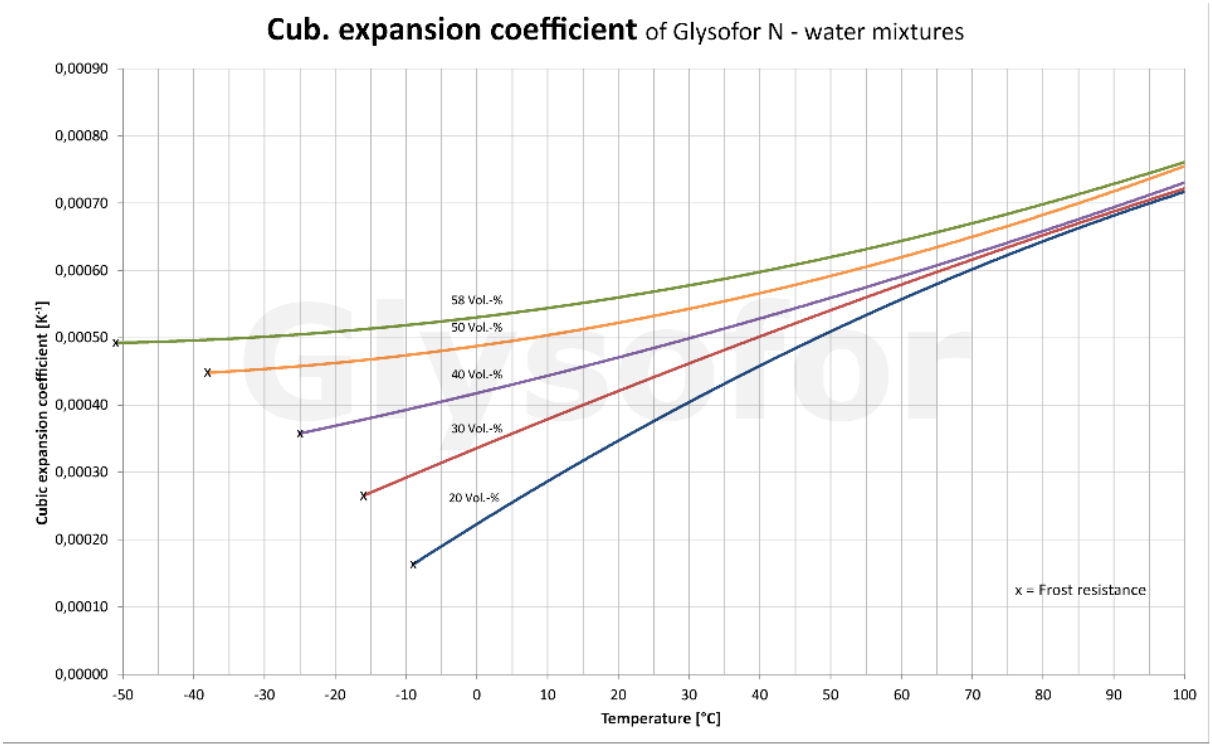

Frost resistance of Glysofor N - water mixtures
Frost resistance [°C]
0
-5
-10
-15
-20
-25
-30
-35
-40
-45
-50
0
10
20
30
40
50
60
Vol. %
Solidification point
acc. DIN 51583
Freezing point
acc. ASTM D 1177
solid
liquid
Ice slurry
no
bursting
effect
Glysofor

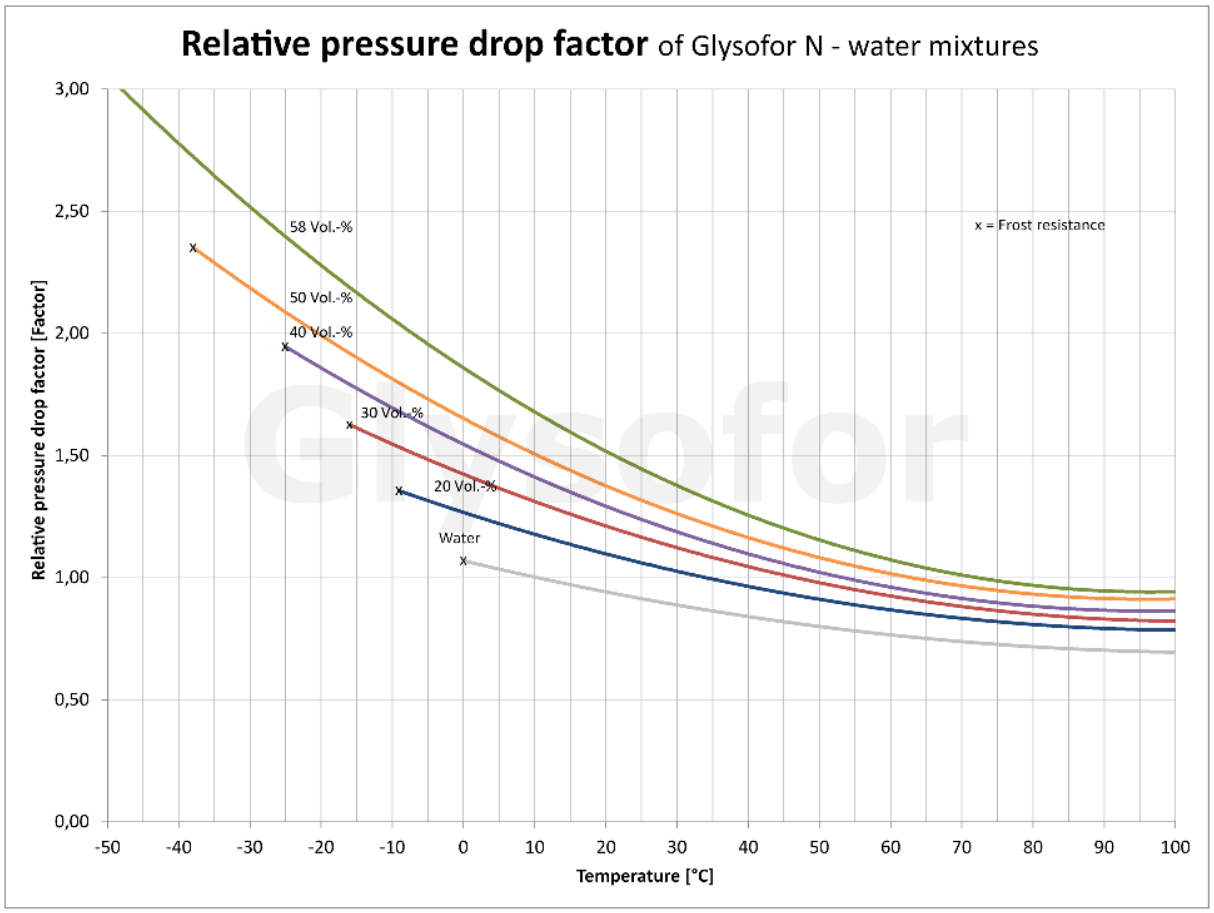

Thermal conductivity of Glysofor N - water mixtures
Thermal conductivity [W/mK]
0,700
0,600
0,500
0,400
0,300
0,200
0,100
-50
-40
-30
-20
-10
0
10
20
30
40
50
60
70
80
90
100
Temperature [°C]
Water
20 Vol.-%
30 Vol.-%
40 Vol.-%
50 Vol-%
58 Vol.-%
x = Frost resistance
Glysofor

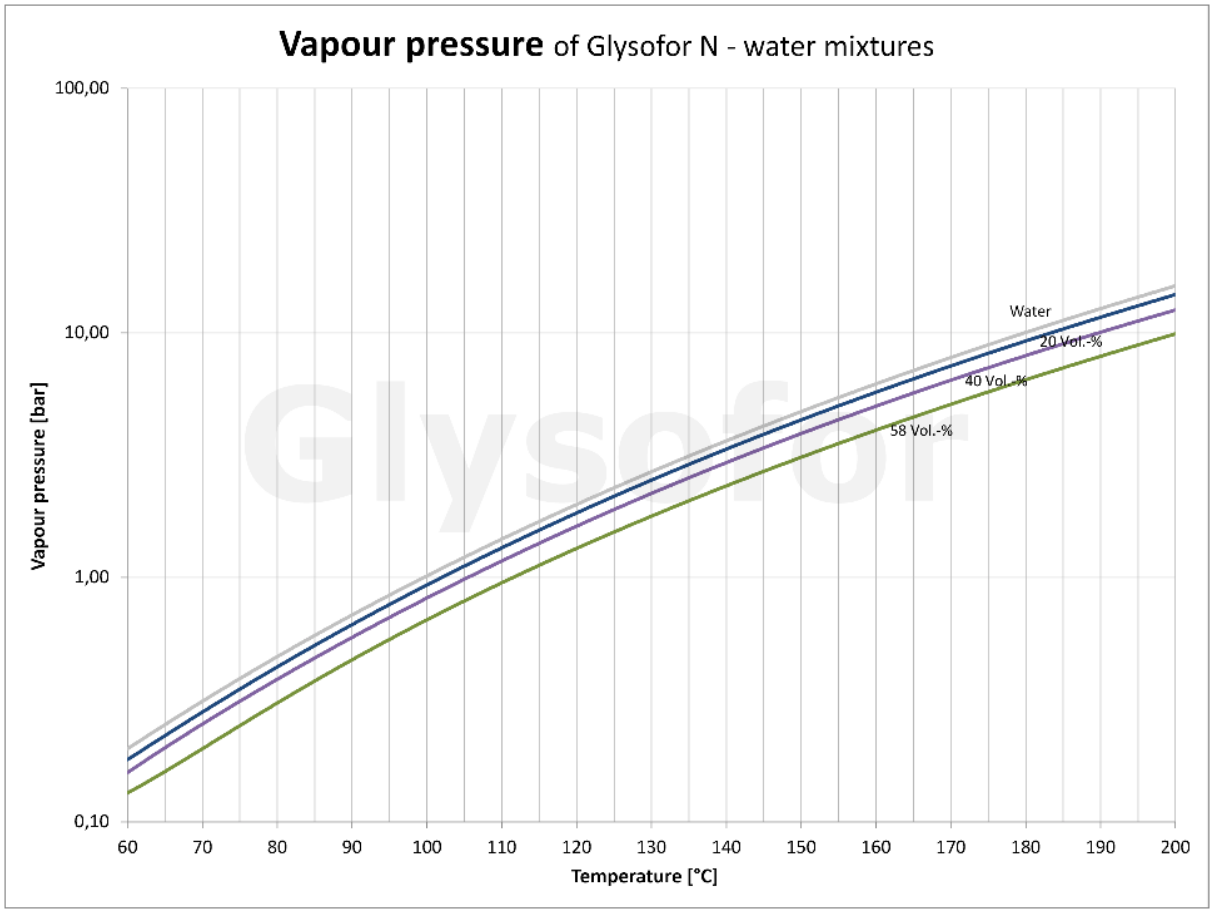

Spec. heat capacity of Glysofor N - water mixtures
Specific heat capacity [kJ/kg]
4,10
3,90
3,70
3,50
3,30
3,10
2,90
2,70
2,50
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature [°C]
20 Vol.-%
30 Vol.-%
40 Vol.-%
50 Vol.-%
58 Vol.-%
x = Frost resistance
Glysofor


Density of Glysofor N - water mixtures
Density [g/cm³]
1,130
1,120
1,110
1,100
1,090
1,080
1,070
1,060
1,050
1,040
1,030
1,020
1,010
1,000
0,990
0,980
0,970
0,960
0,950
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature [°C]
58 Vol.-%
50 Vol.-%
40 Vol.-%
30 Vol.-%
20 Vol.-%
Water
x = Frost resistance
Glysofor


Kinematic viscosity of Glysofor N - water mixtures
1000,00
100,00
10,00
1,00
0,10
Kin. viscosity [mm²/s]
58 Vol.-%
50 Vol.-%
40 Vol.-%
30 Vol.-%
20 Vol.-%
Water
x = Frost resistance
-40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature [°C]


Cub. expansion coefficient of Glysofor N - water mixtures
0,00090
0,00080
0,00070
0,00060
0,00050
0,00040
0,00030
0,00020
0,00010
0,00000
Cubic expansion coefficient [K⁻¹]
58 Vol.-%
50 Vol.-%
40 Vol.-%
30 Vol.-%
20 Vol.-%
x = Frost resistance
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature [°C]


Relative pressure drop factor of Glysofor N - water mixtures
Relative pressure drop factor [Factor]
3,00
2,50
2,00
1,50
1,00
0,50
0,00
-50 -40 -30 -20 -10 0 10 20 30 40 50 60 70 80 90 100
Temperature [°C]
58 Vol.-%
50 Vol.-%
40 Vol.-%
30 Vol.-%
20 Vol.-%
Water
x = Frost resistance
Glysofor


Vapour pressure of Glysofor N - water mixtures
Vapour pressure [bar]
100,00
10,00
1,00
0,10
60 70 80 90 100 110 120 130 140 150 160 170 180 190 200
Temperature [°C]
Water
20 Vol.-%
40 Vol.-%
58 Vol.-%
Glysofor

Other

Pure water/glycol mixtures have very distinctive corrosive properties. You must therefore never use pure water/glycol mixtures without inhibitor equipment. We recommend Glysofor L, based on propylene, for applications in connection with food and the refrigeration or heating of food.

Packaging sizes

- 10 kg canister
- 25 kg canister
- 30 kg canister
- 220 kg barrel
- 1.000 kg IBC
- 24.000 kg tank vehicle

This data relates to the correct and appropriate application of our products, with due consideration of the professional standards and regulations of the area of application. It is for informational purposes only and does not absolve the obligation to carry out the due materials testing upon arrival. The data is based on our current state of knowledge and is not meant to guarantee specific properties. No general or legally binding statement on certain features, in a concrete application, can be derived from the above data. It is meant to describe our products with regard to their composition and offer application advice. Any industrial property rights of third parties and the suitability for a special application purpose are to be observed and verified by the user.

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