



Glysofor

Glysofor Solar – Specification

Product features

Glysofor Solar is an environmentally friendly antifreeze concentrate based on propylene glycol, corrosion inhibitors and stabilisers.

Glysofor Solar serves as a frost protection agent, anticorrosive agent and a heat carrier medium in vacuum tube and plate collector solar plants.

Due to its physiological and ecological harmlessness, Glysofor Solar can be used both in the food and beverage sector as well as in pharmaceutically and ecologically sensitive areas of application.

Glysofor Solar meets the requirements of DIN 4757-1 in terms of the harmlessness of solar heat carriers.

Glysofor Solar optimally prevents frost damage, corrosion, debris, accumulation of mud or biofilms. Glysofor Solar is completely free of nitrites, amines, phosphates, silicates and borates. It is biodegradable and environmentally friendly.

Glysofor Solar is delivered as a concentrate and, depending on the desired frost protection value, must be diluted with water. A 1:1 mixture with water can occur as a standard solution, corresponding to a frost resistance of approx. -32 °C.

Glysofor Solar is resistant in the long-term against the formation of biofilms, putrescence and microbiological degradation, thus preventing precipitations and the accumulation of mud.

Environmentally friendly heat carrier medium, frost protection and anticorrosive agent in solar plants

Basis: 1.2 Propylene glycol

Operating temperature: -50 to +180 °C

Complies with DIN 4757 Part 3 and DIN EN 12975 for solar thermal systems

Free of nitrites, phosphates, amines, borates and silicates

Delivered as a concentrate and can be diluted with water

Areas of application: Solar plants / Vacuum tubes and plate collector

Homogenously mixed Glysofor Solar/water mixtures do not separate, thus ensuring constant frost protection.

This guarantees a year-round, long-term and low-maintenance operation of the plants.

Product data

Chemical name	1.2 propylene glycol and higher glycols, anticorrosion additives
Appearance	Green liquid
Packaging	Canisters / barrels / IBCs / tank vehicles
ADR	KI 0 number
CAS-No.	57-55-6
WHC	1
Labelling	---
Applied concentration:	At least 25 Vol% (Frost protection up to approx. -11 °C)
Operating temperature range:	-50 to +180 °C
Areas of application:	Solar plants / Vacuum tubes and plate collector
Density (20 °C)	1,03 - 1,04 g/cm ³
pH-value	7,5 – 8,5
Boiling point (1013 mbar)	approx. 187 °C
Vapour pressure (20 °C)	0,11 mbar
Specific heat (20 °C)	2,49 kJ/kg K
Thermal conductivity (20 °C)	0,20 W/m K
Dynamic viscosity (20 °C)	55 mPa s

Heat carrier medium

When using solar heat, Glysofor Solar transports the heat collected in a solar collector to a heating system. There, the heat is delivered to the corresponding system via a heat exchanger. In this way, drinking water and process water, as well as general heating systems, can be heated in an environmentally friendly and economic way. This can lead to significant fuel savings.

Antifreeze protection

With a glycol (monopropylene glycol) base, Glysofor Solar significantly lowers the freezing point of water, thus preventing the freezing of operating liquids in solar plants. Glysofor Solar ensures that solar systems can be safely operated, even at minus temperatures. If any damage occurs to the system, a simultaneous frost-related explosive effect can be reliably prevented using Glysofor Solar.

Corrosive protection

Glysofor Solar 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 solar installations. Installations made of copper, brass, solder, grey iron, aluminium, steel and iron are optimally protected against corrosive attacks, even if they are used in multi-metal installations.

Antifreeze

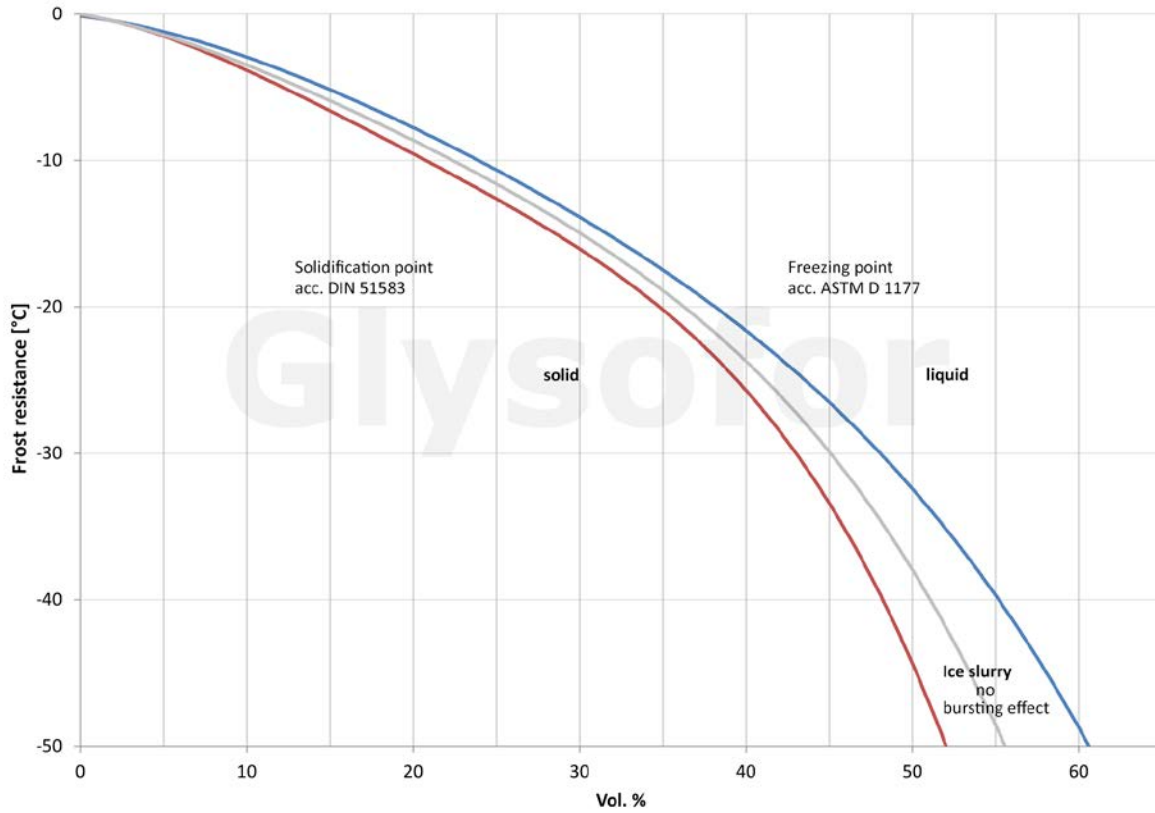
Glysofor Solar – active content (volume)	Frost protection up to °C
25 %	-11
30 %	-14
35 %	-18
40 %	-22
45 %	-26
50 %	-32

Application guidelines

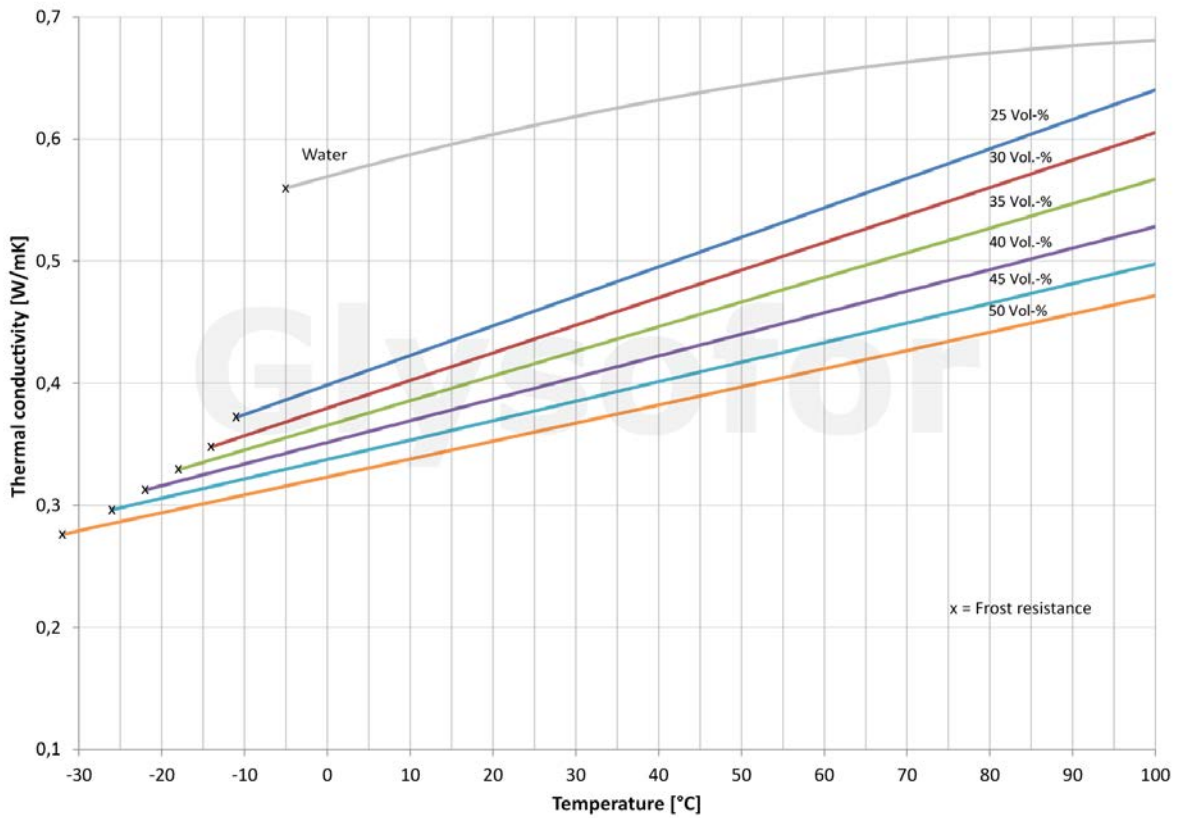
Galvanised components are to be avoided, as zinc is generally volatile with glycol and products which contain glycol. The water that is used for producing the solution should have a maximum hardness of 25 °dH and a maximum chloride content of 100 mg/l. Generally, tap water fulfils these requirements. 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 Solar 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 avoided, as this can lead to damage and the premature ageing of Glysofor Solar.

Concentrate [Vol.%]	Frost resistance [°C]	Temp. [°C]	Thermal conductivity [W/m K]	Spec. heat capacity [kJ/kg K]	Density [g/cm ³]	Kinemat. viscosity [mm ² /s]	Cub. Expansion coefficient [K ⁻¹]	Rel. Pressure drop factor [Factor]
25	-11	-10	0,375	3,86	1,032	9,44	0,00014	1,70
		0	0,399	3,89	1,030	5,69	0,00023	1,48
		10	0,424	3,92	1,027	3,69	0,00031	1,31
		20	0,448	3,94	1,023	2,54	0,00038	1,20
		30	0,472	3,96	1,019	1,83	0,00045	1,10
		40	0,496	3,99	1,014	1,40	0,00051	1,04
		50	0,519	4,02	1,009	1,11	0,00056	0,97
		60	0,545	4,04	1,003	0,92	0,00061	0,92
		70	0,569	4,06	0,997	0,78	0,00064	0,88
		80	0,594	4,09	0,990	0,67	0,00067	0,84
		90	0,617	4,12	0,983	0,59	0,0006	0,81
100	0,641	4,14	0,976	0,53	0,00070	0,80		
30	-14	-10	0,358	3,76	1,039	12,09	0,00022	1,74
		0	0,381	3,79	1,036	7,18	0,00030	1,52
		10	0,403	3,82	1,032	4,56	0,00037	1,34
		20	0,425	3,86	1,028	3,08	0,00044	1,23
		30	0,448	3,89	1,023	2,19	0,00051	1,13
		40	0,471	3,92	1,018	1,65	0,00054	1,06
		50	0,494	3,95	1,012	1,29	0,0005	1,00
		60	0,516	3,99	1,006	1,05	0,00063	0,93
		70	0,539	4,02	0,999	0,87	0,00066	0,89
		80	0,562	4,05	0,992	0,75	0,00068	0,85
		90	0,584	4,08	0,985	0,66	0,00060	0,82
100	0,606	4,10	0,978	0,57	0,00073	0,80		
35	-18	-10	0,346	3,67	1,046	16,08	0,00031	1,97
		0	0,367	3,71	1,042	9,05	0,00037	1,66
		10	0,386	3,74	1,038	5,52	0,00043	1,44
		20	0,407	3,77	1,033	3,63	0,00048	1,29
		30	0,427	3,81	1,028	2,53	0,00053	1,18
		40	0,447	3,85	1,022	1,87	0,00056	1,09
		50	0,467	3,88	1,016	1,47	0,00061	1,03
		60	0,488	3,92	1,010	1,19	0,00064	0,97
		70	0,508	3,95	1,003	1,00	0,00067	0,91
		80	0,528	3,99	0,995	0,84	0,00071	0,88
		90	0,548	4,02	0,988	0,73	0,00072	0,85
100	0,568	4,05	0,981	0,62	0,00074	0,83		
40	-22	-20	0,317	3,54	1,057	44,69	0,00037	2,43
		-10	0,335	3,58	1,053	21,38	0,00041	2,01
		0	0,353	3,62	1,048	11,39	0,00044	1,71
		10	0,369	3,65	1,043	6,68	0,00048	1,49
		20	0,388	3,69	1,038	4,26	0,00052	1,33
		30	0,406	3,73	1,032	2,95	0,00055	1,22
		40	0,423	3,77	1,026	2,17	0,00060	1,13
		50	0,441	3,79	1,020	1,68	0,00062	1,06
		60	0,459	3,84	1,013	1,35	0,00065	1,01
		70	0,476	3,88	1,006	1,13	0,00068	0,94
		80	0,493	3,92	0,998	0,94	0,00073	0,91
90	0,512	3,95	0,991	0,81	0,00076	0,88		
100	0,529	3,98	0,984	0,68	0,00077	0,85		
45	-26	-20	0,306	3,43	1,063	60,19	0,00043	2,75
		-10	0,323	3,47	1,058	27,48	0,00046	2,26
		0	0,339	3,51	1,053	14,19	0,00049	1,88
		10	0,355	3,55	1,048	8,12	0,00052	1,67
		20	0,372	3,58	1,042	5,11	0,00056	1,46
		30	0,386	3,63	1,036	3,47	0,00059	1,29
		40	0,402	3,67	1,030	2,54	0,00062	1,20
		50	0,418	3,71	1,023	1,95	0,00065	1,12
		60	0,434	3,75	1,016	1,57	0,00068	1,05
		70	0,449	3,79	1,009	1,28	0,00071	0,98
		80	0,466	3,83	1,001	1,09	0,00074	0,91
90	0,483	3,87	0,994	0,92	0,00077	0,89		
100	0,499	3,91	0,986	0,75	0,00079	0,87		
50	-32	-30	0,278	3,28	1,074	210,98	0,00045	
		-20	0,295	3,32	1,069	80,19	0,00048	2,79
		-10	0,309	3,36	1,064	35,19	0,00051	2,29
		0	0,325	3,39	1,058	17,58	0,00053	1,91
		10	0,339	3,44	1,052	9,82	0,00056	1,70
		20	0,354	3,49	1,046	6,07	0,00058	1,48
		30	0,369	3,53	1,040	4,08	0,00061	1,31
		40	0,384	3,57	1,033	2,95	0,00064	1,22
		50	0,397	3,61	1,026	2,26	0,00067	1,14
		60	0,412	3,65	1,019	1,79	0,00070	1,07
		70	0,427	3,69	1,012	1,48	0,00072	1,01
80	0,442	3,74	1,004	1,23	0,00075	0,93		
90	0,458	3,78	0,996	1,03	0,00077	0,91		
100	0,474	3,82	0,989	0,82	0,00081	0,89		

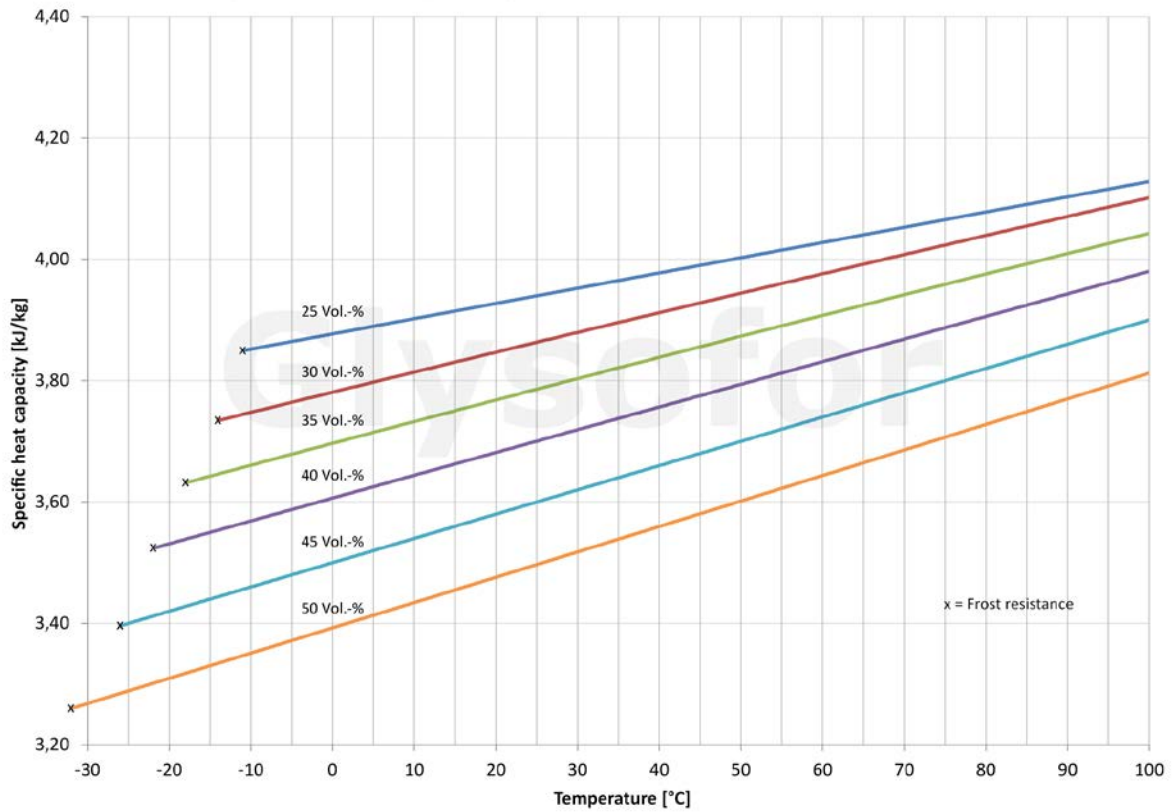
Frost resistance of Glysofor Solar - water mixtures



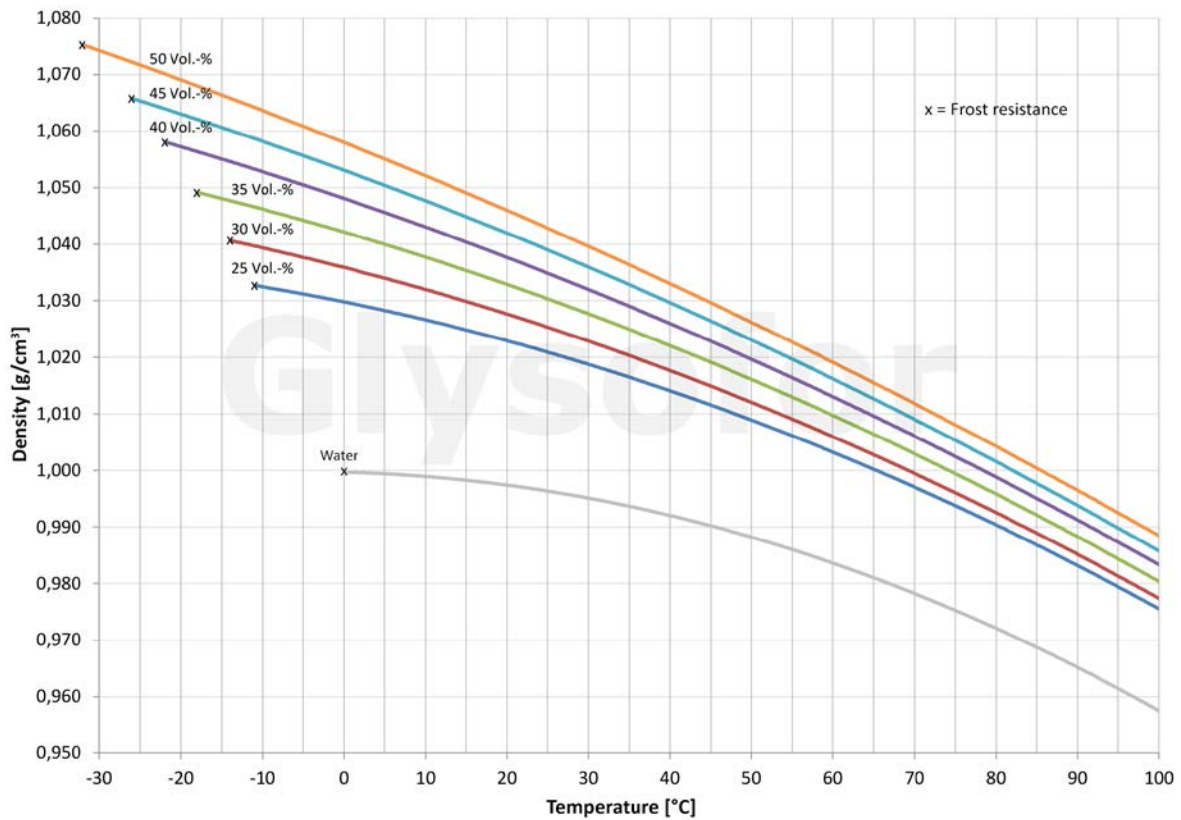
Thermal conductivity of Glysofor Solar - water mixtures



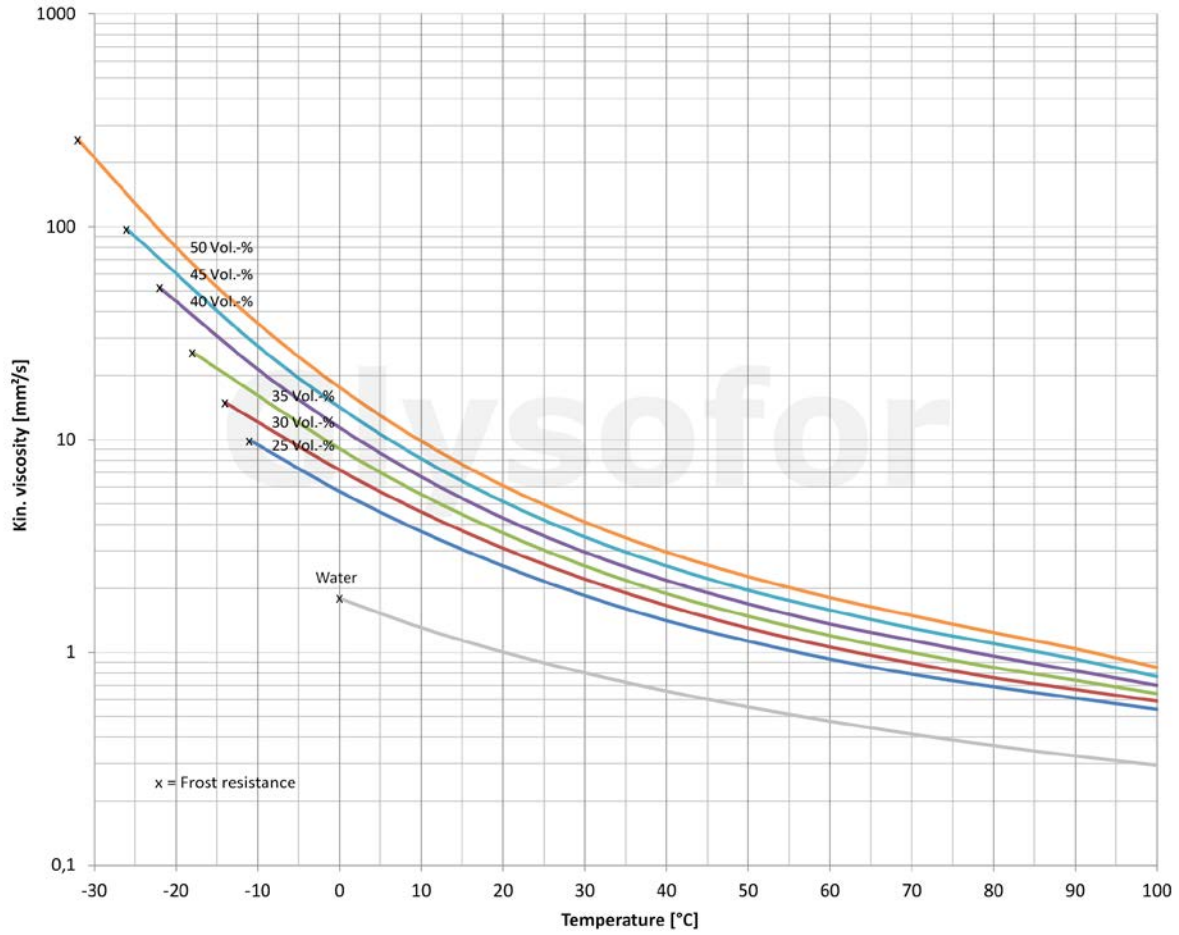
Spec. heat capacity of Glysofor Solar - water mixtures



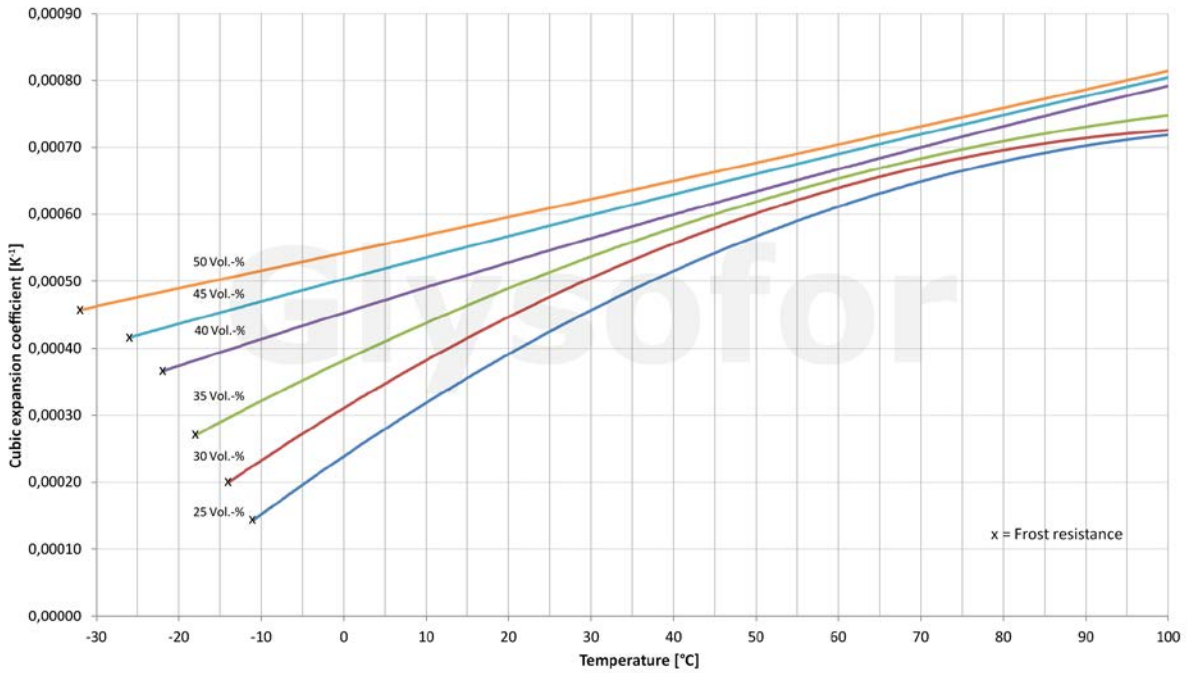
Density of Glysofor Solar - water mixtures



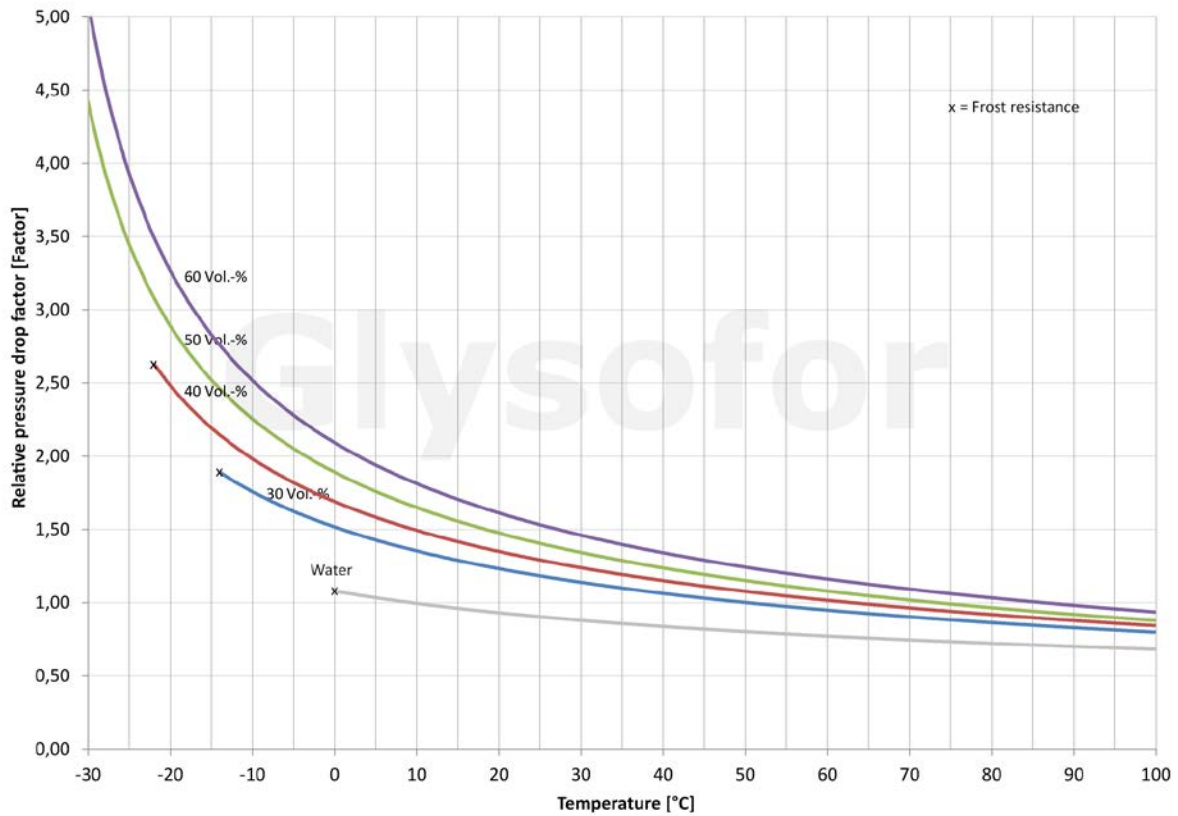
Kinematic viscosity of Glysofor Solar - water mixtures



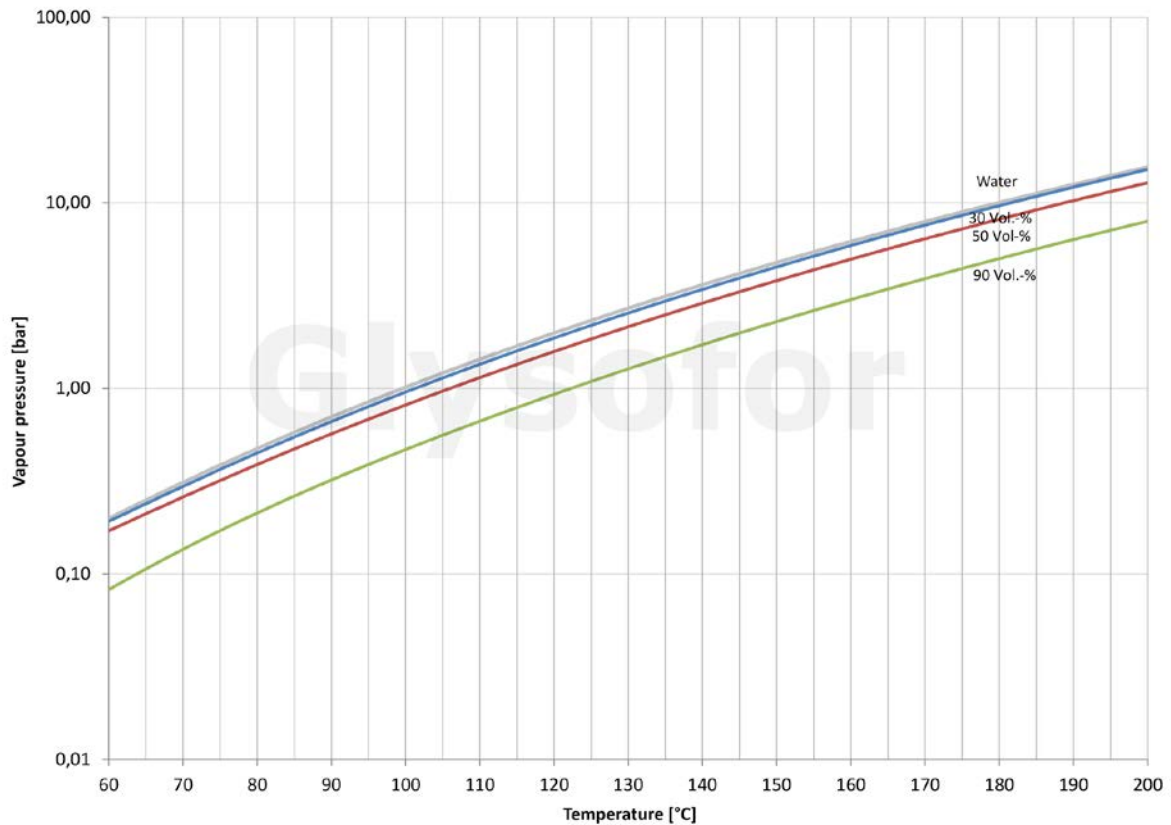
Cub. expansion coefficient of Glysofor Solar - water mixtures



Relative pressure drop factor of Glysofor Solar - water mixtures



Vapour pressure of Glysofor Solar - water mixtures



Other

Pure water/glycol mixtures have very distinctive corrosive properties. You must therefore never use pure water/glycol mixtures without inhibitor equipment. In order for the included corrosion inhibitors to be fully effective, the Glysofor Solar must have at least a 25 vol.% concentration; this corresponds to frost protection of up to – 10 degrees Celsius. Our products Glysofor N and Glysofor L are available for other areas of application.

Packaging sizes

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

As per the valid national and international classification guidelines, Glysofor Solar is not a hazardous substance. There is no toxic effect from the concentrate, nor from its dilution. The product is odourless and dermatologically safe. No irritation occurs that can lead to inflammation of the skin or mucous membrane.

Glysofor Solar is free of nitrites, phosphates, borates and amines. The raw materials contained in this product possess the highest possible degree of purity. Glysofor Solar is formulated on a 1.2 propylene glycol base, which fulfils the requirements of the DAB as well as the European Pharmacopoeia and the US Pharmacopeia. As an additive, 1.2 propylene glycol has been approved as per the Ordinance on Additives in Foodstuffs (effective 10/07/1984) as a solvent and extraction agent (BGB1.I S897, Enc. 2, List 9). In the USA, propylene glycol is categorised as a generally harmless food additive (Federal Register, Effective 01/04/1985, § 184.1666). Glysofor Solar is readily biodegradable.

Glysofor Solar is classified in the lowest water pollution class WPC 1 (slightly hazardous to water). No workplace-related safety measures are necessary when handling this product. Glysofor Solar is non-flammable; it has not been classified in one of the hazard classes for flammable liquids. Glysofor Solar is not subject to labelling and not considered a hazardous substance in the national / international transport regulations. The delivery container consists of homogeneous PE and can be recycled after use. The product should be stored in a sealed state at all times. Due to the existing, extremely high level of purity, the product should not be decanted or contaminated with other substances.

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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