

FROST PROTECTION FWF-K ANTI-FREEZE CONCENTRATE/FWF-F READY-MIXED ANTI-FREEZE AGENT



FWF-K anti-freeze concentrate and FWF-F ready-mixed anti-freeze agent are environmentally friendly long-term anti-freeze agents on a mono propylene glycol basis. They prevent frost in thermal solar systems and are used as heat transport fluids. Special corrosion inhibitors protect the metal and plastic materials normally used in the construction of such systems, including copper and aluminium, from corrosion as well as the development of coatings and depositions. This helps to maintain the efficiency of the systems. The fluid is food-safe and does not corrode the standard sealing materials used in heating systems.

Important information

- It should be ensured that the circulation pump used is suitable for operation with anti-freeze agents.
- Before filling with water, the system has to be flushed and pressure tested to make sure that all the connections are leak-tight.
- The system has to be filled with anti-freeze agent immediately after pressure testing. Do not allow any air to enter!
- Galvanised system components should be avoided, because zinc is not resistant to glycols.
- Experience has shown that the anti-freeze agent can be stored and used over a period of several years. The concentration (frost resistance) should nevertheless be checked every year.
- Do not top up with water in case of fluid loss. Only use the correct concentration of anti-freeze agent and water to top up the system.
- The corrosion properties of our solar fluid can be checked using the pH value. The pH value should be > 7.5 . Measurement is conducted using pH measuring strips. The solar fluid should be replaced if a lower value is determined.
- The optimum usage temperature is between -30 °C and 170 °C . In case of persistent temperatures over 170 °C , we recommend the installation of compensation vessels to allow the heat transport fluid to flow out of the collectors.
- The heat transport fluid is subject to a gradual chemical change at temperatures above 200 °C , which can threaten the operating safety of the system.
- According to the Ordinance of Hazardous Substances (Gefahrstoffverordnung, GefStoffV), anti-freeze agents are not subject to labelling requirements (see safety data sheet).
- The notes provided in the product information and the safety data sheet regarding use are based on technical experience. The statements are not binding promises of specific properties. The suitability of the product for a particular use has to be tested beforehand.
- The product information does not release the customer from the obligation to perform an incoming goods inspection according to the Commercial Code 377/378 (Handelsgesetzbuch, HGB 377/378).

Water requirements

In case of no-flow temperatures above 200 °C , only desalinated or demineralised water should be used as filling water. If only drinking water is available, the following water hardness upper limits should be observed:

0–10 dGH: Permissible without restriction

> 10 dGH: Soften or mix water to obtain values under 10 dGH

Specifications

Type		FWF-K anti-freeze concentrate	FWF-F ready-mixed anti-freeze agent
Product data			
Appearance		Clear, slightly yellow liquid	Blue dyed liquid
Odour		Virtually odourless	
Basis		1,2-Propandiol; Mono propylene glycol	
Flash point (°C)		> 100 (ASTM-D 51758)	
Boiling point (°C)		> 150 (ASTM-D 1120)	> 103 (ASTM-D 1120)
Density (20 °C)		1.040–1.050 g/cm ³ (DIN 51757)	1.035–1.045 g/cm ³ (DIN 51757)
Frost protection		See dilution table	Up to -28 °C
Thermal conductivity (20 °C)		Approx. 0.22 W/m*K	Approx. 0.40 W/m*K
pH value (20 °C)		7.5–8.5 (ASTM-D 1287) 1:1 with neutr. water	Approx. 8.0 (ASTM-D 1287)
Viscosity (20 °C)		65–75 mm ² /s	Approx. 5.8 mm ² /s
Inhibited		Free of nitrites, secondary amines, phosphates and borates	
Miscibility with other propylene glycol based anti-freeze agents		✓	Only limited

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**Corrosion and material loss rates (g/m²)
(according to ASTM D 1384)**

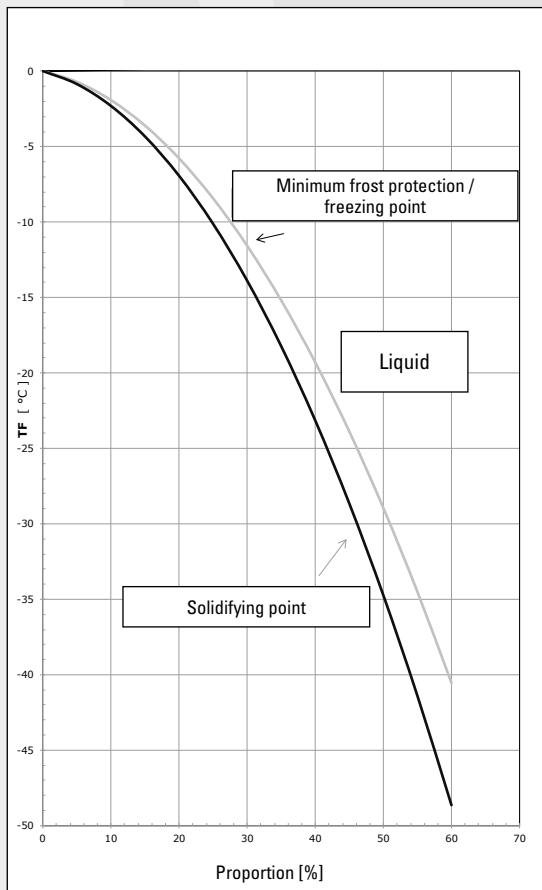
Aluminium	-0.3
Soft solder	1.6
Brass	0.8
Copper	0.8
Steel	-0.1
Grey cast iron	0.9

FWF-K anti-freeze concentrate dilution table

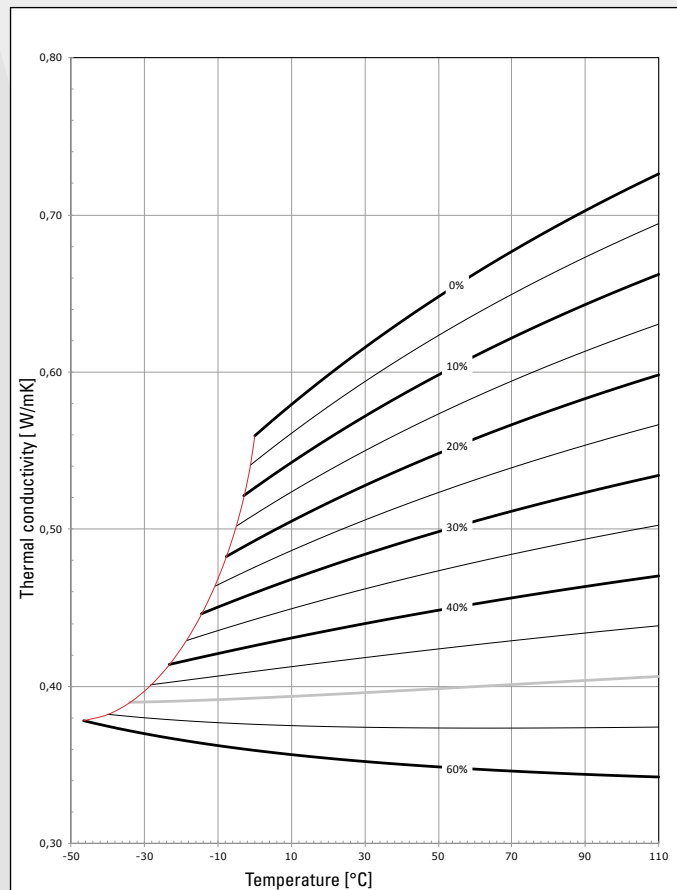
FWF-K anti-freeze concentrate	Water	Frost protection
35 vol %	65 vol %	-15 °C
40 vol %	60 vol %	-19 °C
50 vol %	50 vol %	-28 °C

Notes: FWF-K anti-freeze concentrate is fully miscible with water. In the delivery condition, a frost protection of up to -42°C is provided without segregation. The ready-mix contains a concentration of 42% FWF-K and 58% water! **To ensure corrosion resistance, the minimum concentration of FWF-K should not be less than 35%.**

Frost protection curve of concentrate/water mixture

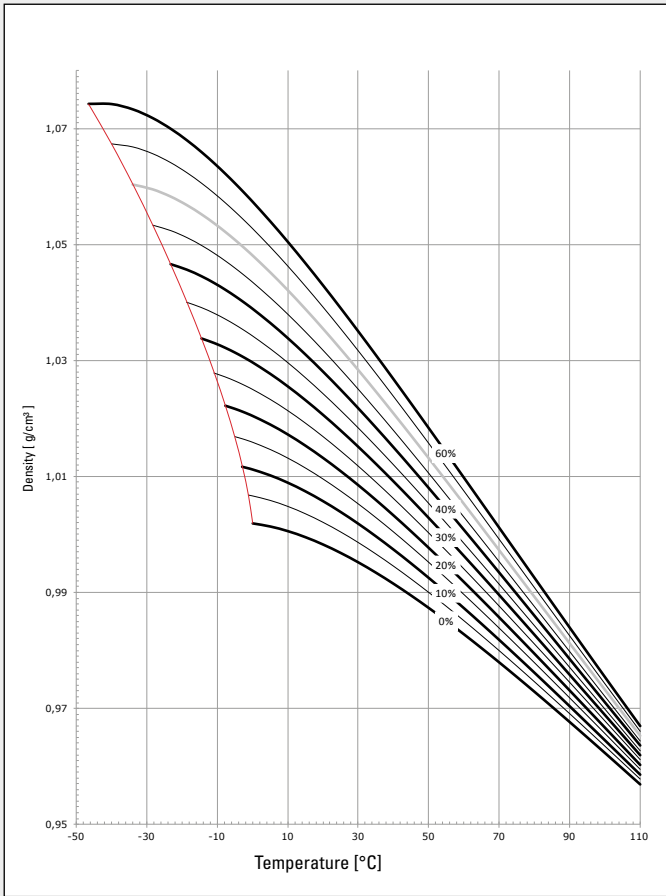


Thermal conductivity of concentrate/water mixture

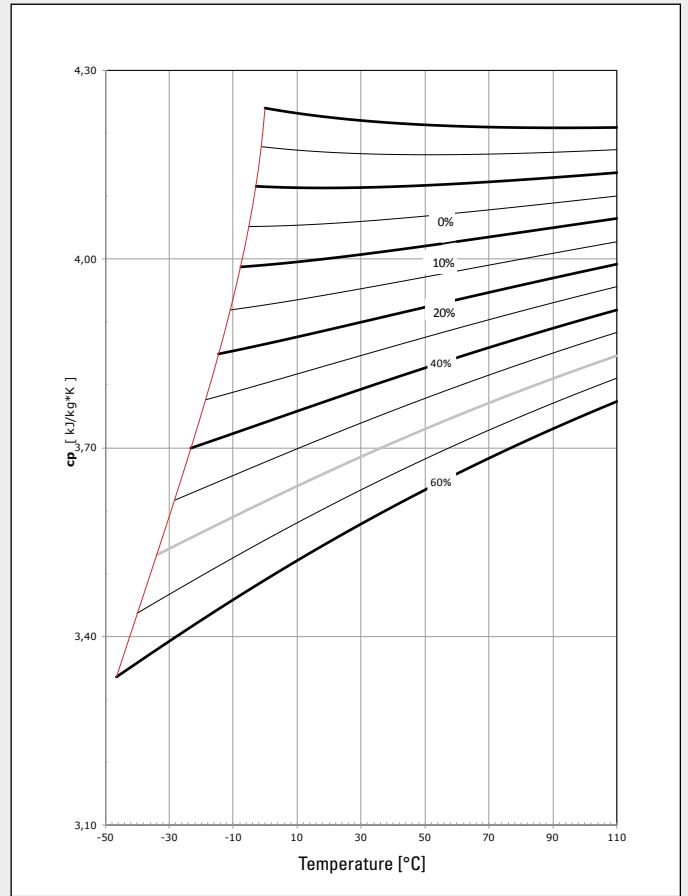


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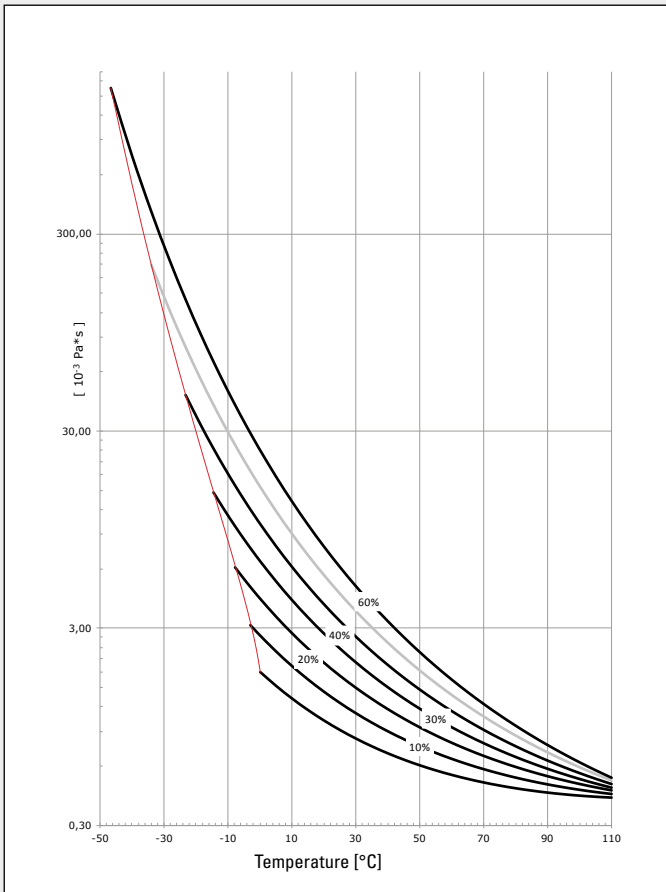
Specific density of concentrate/water mixture



Specific heat capacity of concentrate/water mixture



Dynamic viscosity of FWF-K concentrate/water mixture



Prandtl number of FWF-K concentrate/water mixture

