HELIOSTAR® AND F2 S2 SOLAR FLUID FOR HELIOSTAR® AND F2 S2 FLAT COLLECTORS R1 SOLAR FLUID FOR R1 PIPE COLLECTOR

TECHNICAL INFORMATION

Roth Heliostar® and F2 S2 solar fluid

Roth Heliostar® and F2 S2 solar fluid concentrate for Roth Heliostar® and F2 S2 flat collectors. In accordance with the amount of antifreeze protection desired, Heliostar® and F2 S2 solar fluid should be diluted with water. Heliostar® and F2 S2 solar fluid is an antifreeze substance composed of propylene glycol (94 %) and protective inhibitors (6 %). Roth Heliostar® and F2 S2 solar fluid is suitable as a heat transfer medium in solar installations as well as in heating and cooling systems. When diluted with water, Roth Heliostar® and F2 S2 solar fluid has a very high heat capacity and at the same time a favourable viscosity, even at low temperatures. Special inhibitors provide solar energy systems in mixed installations (dissimilar metals) with reliable protection against corrosion. Mixtures of Roth Heliostar® and F2 S2 solar fluid and water are compatible with commercially available elastomers such as EPDM rubber, PE and PP. As a rule, no special valve seals or pressure expansion tanks for boilers are required for this reason. Please inquire about special applications! Roth Heliostar® and F2 S2 solar fluid is considered a non-hazardous medium under EU criteria. It can be readily broken down biologically and poses no hazards to water resources. The fluid is free of both nitrites and amines and is only mildly toxic. Nevertheless, care should be taken when working with the substance in order to avoid both skin and eye contact.

Application

Mixing solar fluid

First determine the volume of your solar installation, either by calculation or measuring out the capacity in litres. When doing so, take into account any fluid that might possibly remain in the collector or in different parts of the pipework (e.g. with vertical collector alignment).
Then decide on the level of antifreeze protection required and obtain the corresponding Heliostar® and F2 S2 volume percentage value from the table. Enter the values into the accompanying formula. We recommend a concentration of 40 percent by volume of Heliostar® and F2 S2 for safe operation to -19 °C. Even with colder temperatures, no more than an icy slush with no bursting potential will form at these concentrations. If you have received 10 litres of Heliostar® and F2 S2 in the 25 l canister, simply fill the container with water to obtain a concentration of 40 percent by volume.

Checking antifreeze protection

Use a special antifreeze tester to check the propylene glycol. Car antifreeze testers are generally unsuitable for this purpose because they are calibrated for ethylene glycol.

Heliostar® and F2 S2 volume (in litres) =
solar installation volume (in litres) x Heliostar® and F2 S2 volume %/100

e.g. 10 litres of solar installation volume and 40 percent by volume Heliostar® and F2 S2 =
4 litres of Heliostar® and F2 S2 solar fluid and antifreeze protection to -19 °C.
These 4 litres of Heliostar® and F2 S2 are now diluted with 6 litres of water to make a mixture ready for use.

The physical values of Roth Heliostar® and F2 S2 solar fluid

Characteristics	Specifications according to mixture ratio					
	30 %	40 %	50 %	60 %	70 %	100 %*
Thermal conductivity (W/mK) -10 °C	0.4	0.4	0.4	0.3	0.3	0.2
Thermal conductivity (W/mK) +20 °C	0.5	0.4	0.4	0.3	0.3	0.2
Thermal conductivity (W/mK) +100 °C	0.5	0.4	0.4	0.4	0.3	0.2
Specific heat (kJ/kgK) -10 °C	3.8	3.7	3.5	3.3	3.1	2.3
Specific heat (kJ/kgK) +20 °C	3.9	3.7	3.6	3.4	3.2	2.4
Specific heat (kJ/kgK) +100 °C	4.1	4.0	3.9	3.7	3.6	2.9
Kinematic viscosity (mm^2/s) -10 °C	13.0	22.0	34.0	55.0	90.0	760.0
Kinematic viscosity (mm^2/s) +20 °C	3.1	4.3	6.2	9.0	13.1	70.0
Kinematic viscosity (mm^2/s) +100 °C	0.6	0.7	0.9	1.0	1.3	3.3
Boiling point at 1013 bar (°C)	102.0	103.0	104.0	106.0	108.0	166.0
Density at +20 °C (g/cm^3)	1028.0	1036.0	1043.0	1048.0	1052.0	1055.0
Freezing point (°C)	-12.0	-19.0	-29.0	-44.0	-51.0	-51.0

* Never fill with 100 % antifreeze substance, danger of overloading pump.

Roth R1 solar fluid

Ready-to-use mixture for the Roth R1 pipe collector.

Characteristics

The R1 solar fluid was developed primarily for use in the high temperature range, i.e. for vacuum pipe collectors. It can also be utilised in the flat plate collector range. As is the case with Roth Heliostar® and F2 S2 solar fluid, Roth R1 solar fluid guarantees high rates of efficiency for heat transmission, offers reliable anti-corrosion protection, is completely compatible with plastics and is harmless to humans.

Safety information

In accordance with 91/155/EWG, the same safety regulations apply to R1 as do to Heliostar® and F2 S2 solar fluid.

Application instructions

When using Roth R1 solar fluid, a number of special considerations apply:

- Unlike Heliostar® and F2 S2, Roth R1 solar fluid comes already premixed.

It is not permitted to dilute Roth R1 solar fluid with either other heat transfer medium fluids or with water!

- Solar installations which are filled with Roth R1 solar fluid should not be rinsed or pressure-tested with water beforehand. Any residual water left in the installation would alter the characteristics of R1.
- In the event of fluid loss, e.g. because of leakage, only top up with Roth R1 solar fluid!
- The level of protection against cold provided by the ready-to-use mixture is set ex-works at -28 °C. In principle, testing of the antifreeze is not required because dilution with water is not permissible.
- The density of the Roth R1 solar fluid can be checked with the antifreeze tester and one can thus determe whether dilution with water has in fact taken place. The density must be 1034 g/cm³ at a fluid temperature of 20 °C. If the density is less than this, the solar fluid needs to be replaced because it has possibly been diluted with water.

The physical values of Roth R1 solar fluid

Characteristics	Specifications		
Temperature level	-20 °C	20 °C	100 °C
Thermal conductivity (W/mK)	0.385	0.413	0.470
Specific heat (kJ/kgK)	3.44	3.60	3.92
Kinematic viscosity (mm²/s)	55	5	0.6
Density (g/cm³)	1052	1034	977
Refractive index	-	1.382	-
Flash point	none		
Continuous temperature	maximum 170 °C		
Suitable for solar installations up to a standby temperature	of a maximum of 320 °C		
Protection against cold	to -28 °C		
Water pollution class [WGK] 1 (low level of water pollution) R1 can be broken down biologically.			

Flash point:	—
Continuous temperature:	maximum 170 °C
suitable for solar installations up to standby temperature:	maximum 320 °C
Protection against cold to:	-28 °C

Water pollution class [WGK] 1 (low level of water pollution)
R1 can be broken down biologically.

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