

® Antifrogen N

Antifreeze and corrosion inhibitor for cooling, solar and heat pump systems and also for warm-water heating systems

Antifrogen N is a clear liquid which has been tinted a pale yellow. It serves as a heat exchange medium in solar and heat pump systems and hot-water heating systems and is also used as a coolant in industrial refrigeration plants.

It complies with the requirements of DIN 4757, Part 1, for solar heating systems with water or aqueous mixtures as the heat transfer medium.

Technical data

Boiling range at 1013 mbar (ASTM D 1120)	°C	~ 170
Density at 20°C* (DIN 51757)	g/cm ³	1.138–1.144
Refractive index n_D at 20°C* (DIN 51423)		1.435–1.437
Pour point (DIN 51583)	°C	~ -70
Viscosity, kinematic, at 20°C (DIN 51562)	mm ² /s	26–29
Surface tension at 20°C (Antifrogen N:water = 1:2) (ASTM D 1331)	mN/m	49
Specific electrical conductivity at 20°C (Antifrogen N:water = 1:2)	µS/cm	3900
Specific heat at 20°C	kJ/kg · K	2.3
Thermal conductivity at 20°C	W/mK	0.29
pH* (Antifrogen N:water = 1:2) (DIN 19261)		7.8–8.3
Residual alkalinity* (ASTM D 1121)	ml c (HCl) 0.1 m	at least 25

* = Delivery specification

The other technical data originate from the literature and in-house measurements. They do not form part of the delivery specification.

Uses

Antifrogen N has been developed for use as a heat exchange medium and refrigerant medium. Its anti-freeze action is based on ethylene glycol, which has a high boiling point of about 198°C and prevents evaporation losses. The frost resistance is determined by the mixing ratio with water. The frost resistance curve on page 10 shows that below a frost resistance of -20°C, Antifrogen N/water mixtures which have solidified have no bursting effect, since an ice slurry is formed when they are cooled to below the crystallization point. Mixtures of Antifrogen N and water do not undergo phase separation. The antifreeze properties of the mixture remain unchanged even after many years of use – provided that the Antifrogen N concentration remains constant.

Compared with those of ordinary tap water, the critical heat transition coefficients of systems containing the recommended additions of Antifrogen N differ only slightly if the heat is transferred via surface heating elements to the ambient air. Under such conditions, the transferable quantity of heat of an Antifrogen N/water mixture is almost equal to that of water alone, so that it is not necessary to modify the exchanger surfaces. In contrast when the heat is exchanged between two liquid media, the quantity of heat which can be transferred decreases as the Antifrogen N content increases, so that the exchanger surface must be increased according to the altered values. Since Antifrogen N-water mixtures have a higher viscosity and density, a higher pressure drop must be expected on passage through pipelines etc. Graphs of the relative heat transmission coefficient and the relative pressure loss – in comparison with pure water – are particularly useful for estimating the amount of additives. These curves and other physical data are to be found in the Appendix.

Antifrogen N contains corrosion inhibitors which provide long-term protection of the metals in cooling and heating systems, including those in combined installations and also prevents the build-up of scale.

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