TECHNICAL DATA SHEET (TDS) AND INSTRUCTIONS FOR USE

METOX ANTIFROZEN N

Heat Transfer Fluid

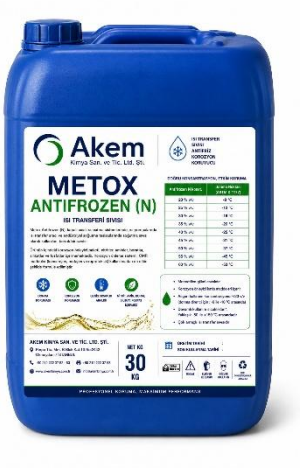
Freeze and corrosion protection for refrigeration, heat pumps, hot water heating, air conditioning, heat recovery, railway vehicles, leak detection and wind turbines

Product Description

Metox Antifrozen (N) is a clear liquid used as a heat transfer medium in closed hot water heating systems and heat pumps, and as a coolant in industrial refrigeration installations. Its corrosion inhibitor package is free of nitrites, amines, borates, silicates and phosphates. The corrosion protection system has been formulated for maximum effectiveness without the use of CMR substances (carcinogenic, mutagenic and reprotoxic).

Features and Benefits

- **Based on monoethylene glycol**
- **Contains corrosion inhibitors:** free of nitrites, amines, borates, silicates and phosphates.
- **No CMR substances:** the corrosion protection system is formulated without carcinogenic, mutagenic or reprotoxic substances.
- **Minimum use concentration:** 20% by volume (freeze protection −9 to −10 °C)
- **Continuous service temperature:** approx. −50 to +150 °C
- **Multi-purpose** heat transfer fluid.



30 kg drum

Packaging

Metox Antifrozen (N) is supplied in 25 kg and 30 kg drums and 1,000 kg IBC containers.

Storage

- Metox Antifrozen (N) should be stored indoors in its original, tightly closed packaging in a dry place.
- Protect from direct sunlight and excessive heat.
- Keep containers upright and out of reach of unauthorised persons; keep lids closed when not in use.

Areas of Use

- Closed hot water heating, underfloor heating and heat recovery systems
- External circuits of heat pump systems
- Industrial refrigeration, air conditioning, railway vehicles and wind turbines
- Leak detection fluid in double-walled tanks

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Technical Properties

Property	Unit	Value
Density at 20 °C (DIN 51757)	g/cm³	approx. 1.11
Refractive index at 20 °C (DIN 51423-2)	–	approx. 1.434
pH (N : water = 1:2, DIN 51369)	–	approx. 8.5
Reserve alkalinity (ASTM D 1121)	ml 0.1 M HCl	min. 4
Boiling point at 1013 mbar (ASTM D 1120)	°C	approx. 166
Freezing point (DIN 51583)	°C	approx. −40
Kinematic viscosity at 20 °C (DIN 51562)	mm²/s	approx. 20
Surface tension at 20 °C (1:2, ASTM D 1331)	mN/m	approx. 34
Specific electrical conductivity at 25 °C (1:2)	µS/cm	approx. 2,800
Specific heat at 20 °C	kJ/kg·K	approx. 2.4
Thermal conductivity at 20 °C	W/m·K	approx. 0.29
Colour	–	Please consult us for colour options.

The quality system certified to DIN EN ISO 9001 covers production and quality control. The technical data characterise the product; they are taken from our own measurements or from the literature and do not form part of the delivery specification. A product specification can be supplied on request.

Freezing point table

Metox Antifrozen (N), % by vol.	Water, % by vol.	Freezing point, °C
20	80	-9
25	75	-12
30	70	-16
35	65	-20
40	60	-25
45	55	-31
50	50	-37
55	45	-45
60	40	-53

Values are approximate; test method ASTM D 1177 / DIN 51583. Minimum use concentration: 20% by volume.

Information on Fields of Application

Metox Antifrozen (N) has been developed for use as a heat transfer and cooling medium. Its antifreeze function is based on monoethylene glycol, whose boiling point of approx. 198 °C prevents losses through evaporation.

Hot water heating systems

The advantage of using Metox Antifrozen (N) in closed hot water heating systems is that the whole system or part of it can be shut down even at temperatures below 0 °C and restarted without problems. This gives considerable fuel savings in buildings that are not heated continuously (holiday homes, schools, public institutions, offices, mosques). Freeze protection down to −20 °C is usually sufficient even if part of the pipework is installed on outer walls. The product has also proven itself in

underfloor heating systems with plastic pipes; for plastic pipes without an oxygen barrier a minimum of 25% by volume is recommended.

After draining the previous heat transfer medium, the whole system must be flushed thoroughly with water to remove loose rust particles; flushing also allows the system volume to be read from the water meter. Because the Metox Antifrozen (N)/water mixture has a lower surface tension than water, small leaks caused by earlier corrosion may become apparent after the changeover; if tightening the connections does not help, the mixture in that part of the system must be drained and collected properly, the sealing material renewed and the pipe connections checked.

Heat pump and heat recovery systems

In heat pump systems, Metox Antifrozen (N) is used as the heat transfer medium in the external circuits and transfers heat to the internal circuit of the heat pump. To prevent corrosion, the concentration must not fall below 20% by volume. Metox Antifrozen (N)/water mixtures are also used in heat recovery systems where exposure to frost cannot be ruled out.

Cooling circuits and natural circulation systems

As a cooling medium, the solution must remain liquid at the specified temperature and protect the metal parts against corrosion. Systems previously operated with salt-based coolants must be flushed thoroughly to remove salt and rust particles; if a chloride-rich fluid was used, flushing must be very thorough because residues can impair corrosion protection. If only one secondary circuit is changed over to Metox Antifrozen (N), the two fluids must be kept completely separate; a gasket disc is not a sufficient long-term safeguard. In natural circulation systems the product must be pre-mixed with water.

Leak detection fluid

Metox Antifrozen (N) is used as a leak detection fluid in double-walled tanks together with leak detection equipment. Before use it is diluted in accordance with the official regulations to 35% by volume Metox Antifrozen (N) and 65% tap water.

Instructions for Use

1. When installing the system, use only chloride-free soldering materials.
2. Drain the previous fluid and flush the system thoroughly with water. Check older systems to make sure no rust is present; systems with light rust cannot subsequently be operated corrosion-free.
3. Metox Antifrozen (N) is miscible with water in any ratio; nevertheless, first fill the system with about two thirds of the required water using the circulation pumps, then add Metox Antifrozen (N) and top up with water. Complete mixing is achieved by operating the system and may take several days.
4. After a pressure test, leave the system filled to prevent corrosion at the liquid/air phase boundary; refill drained systems within a few days.
5. In case of leakage, top up only with Metox Antifrozen (N) of the same concentration; do not mix with other products or other antifreeze products.
6. Flush systems used only temporarily (e.g. during winter construction) thoroughly with water several times before refilling.

Freeze protection and use concentration

Freeze protection is determined by the mixing ratio with water and does not change for many years provided the concentration remains constant; no phase separation occurs. At concentrations of 38% by volume or more, no bursting effect occurs at any temperature. As corrosion protection decreases with increasing water content, the concentration must be at least 20% by volume (freeze protection down to −9 to −10 °C); below this there is a risk of bacteria, algae and fungal growth and microbial corrosion.

The water used for dilution must not contain more than 100 mg/kg (ppm) chloride; pay particular attention to this if the system contains aluminium parts. Water with a hardness of 0–25 °dH (deionised, distilled or normal tap water) may be used.

Application	Adequate freeze protection
Hot water heating systems	approx. −10 to −20 °C
External circuits combined with heat pumps	approx. −10 to −15 °C
Other external circuits	approx. −20 to −30 °C
Cooling systems	approx. −10 to −40 °C

Application	Adequate freeze protection
Leak detection fluid	−20 °C

Heat transfer and pressure drop

Where heat is transferred to the atmosphere by radiators, the amount of heat transferred with Metox Antifrozen (N)/water mixtures is almost the same as with water alone and the heat transfer surfaces need not be changed. In liquid/liquid heat transfer, the transferable heat decreases as the product content increases; the heat transfer surface must be enlarged according to the changed k values. As the mixtures have a higher viscosity and density than water, a higher pressure drop must be expected in pipelines.

Material Compatibility

Metox Antifrozen (N) contains corrosion inhibitors that permanently protect metals and prevent scale formation in cooling and heating systems, even in combined systems. Effectiveness is continuously monitored according to the ASTM D 1384 corrosion test (88 °C / 6 l air/h). The table shows the weight change (g/m²) of metals after 336 and 3000 hours in a Metox Antifrozen (N)/water mixture with freeze protection of −20 °C compared with an uninhibited monoethylene glycol (MEG)/water mixture.

Metal	MEG	Antifrozen (N) 336 h	Antifrozen (N) 3000 h	Limit
Copper	−2.8	−0.9	−1.9	10
Soft solder (WL 30)	−135	−0.9	−2.3	30
Brass (MS 63)	−7.6	−0.8	−1.1	10
Steel (C15)	−152	−0.1	−0.5	10
Cast iron (GG 22)	−273	±0	−1.4	10
Cast aluminium (AlSi6Cu3)	−16	−0.3	−1.0	30