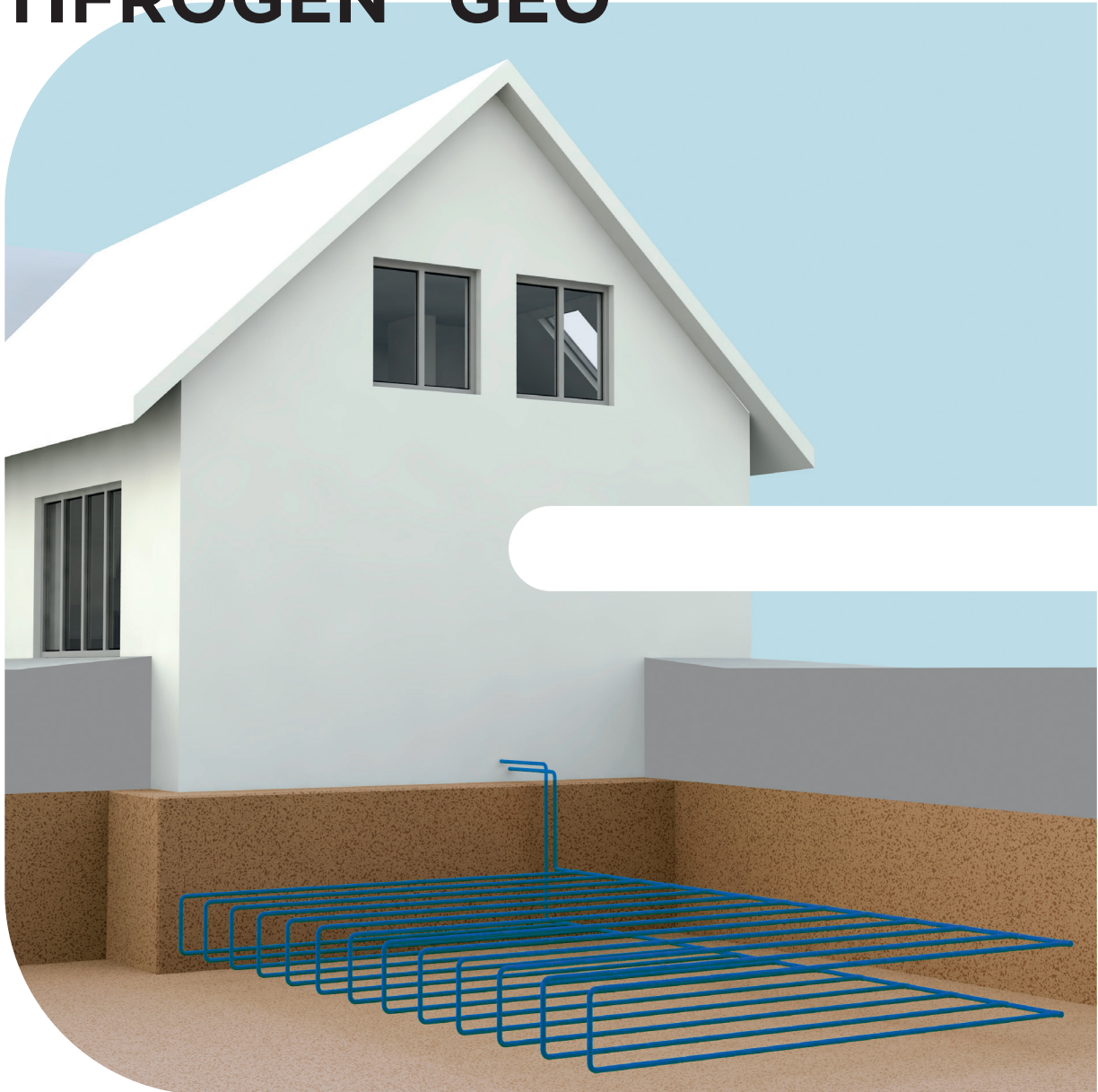


Heat transfer fluid for geothermal systems **ANTIFROGEN® GEO**



ANTIFROGEN® GEO

HEAT TRANSFER FLUID FOR GEOTHERMAL APPLICATIONS

Our specific solution to the requirements of heat transfer fluids in shallow geothermal energy: Antifrogen® GEO. The safe operation of geothermal systems is only possible by selecting the correct heat transfer fluid. Antifrogen® GEO is a concentrate based on monoethylene glycol. The product, with its specially developed formulation offers long-lasting protection against frost, corrosion and limescale.

The water mixtures have neither a flash point nor a fire point in the concentration range prescribed. Thus, there is no risk of fire in contrast to alcohol-based fluids. The product is offered in three standard usage concentrations/frost resistances:

- 25 % v/v / -10 °C
- 33 % v/v / -15 °C
- 40 % v/v / -21 °C

PRODUCT CHARACTERISTICS

Based on: _____ Monoethylene glycol
Appearance (20 °C): _____ clear blue liquid
Density (20 °C, DIN 51757) _____ 1.104 g/cm³
Refractive index (20 °C, DIN 51423 Part 2): _____ 1.4207
Minimum usage concentration: _____ 25 % v/v in water
(chloride content < 100 ppm, water hardness 0°–25° GH)
Permanent usage temperatures: _____ -21 to +40 °C

Antifrogen® GEO is readily biodegradable and classified as non-toxic to aquatic organisms (WHC 1). The product meets our standards for sustainability and responsible action.

Antifrogen® GEO is inhibited without the use of nitrites, amines, borates, phosphates and silicates. It contains neither CMR substances (carcinogenic, mutagenic and reprotoxic) nor other restricted substances in accordance with EC Directive 2011/65/EU, Article 4 §1 (such as lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers).

Antifrogen® GEO Blue is harmful if swallowed (Cat. 4) and therefore not suitable for pharmaceutical or food applications. However, the use of Antifrogen® L can be recommended for these applications.

CORROSION PROTECTION

To determine the effectiveness of the corrosion inhibitors in heat transfer fluids, the ASTM D 1384 method has been established as a standardized test for various metals and alloys. The minor weight loss of the metals and alloys tested confirms the suitability for long-term usage. Antifrogen® GEO shows reliable protection of the metals in particular when compared to conventional fluids.

METAL	MEG ^a 336 h	ANTIFROGEN® GEO ^b 336 h	LIMITS ^c 336 h
Copper	-2.8	-0.2	3.6
Soft solder (WL 30)	-135	-2.2	11.2
Brass (MS 63)	-7.6	-0.2	3.6
Steel (C15)	-152	-0.1	3.6
Grey iron (GG 22)	-273	-0.2	3.5
Cast aluminum (AlSi6Cu3)	-16	-1.4	10.4

Given values correspond to the weight gain/loss of the metal in g/m² (acc. ASTM D 1384, at 88 °C, 6 l/h air)

a Monoethylene glycol (MEG) without inhibitors / ASTM water (1:2 v/v)

b Antifrogen® GEO / ASTM-water (1:2 v/v)

c Limits for ASTM D 1384 according to ASTM D 3306-05 (glycol-based engine coolant for automobiles)

METALS AFTER CORROSION TEST

Antifrogen® GEO
(without dyes)



Standard fluid



Metals (from left to right: copper, soft solder, brass, steel, cast iron, cast aluminum) and heat transfer fluid after corrosion test (according to ASTM D 1384, at 88 °C, 6 l/h of air).

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