Heat transfer fluits

NEUTRAGEL® NEO

Non contractual photo

NEUTRAGEL® NEO, is a concentrated antifreeze based on Mono Ethylene Glycol and corrosion inhibitors. It is a heat transfer fluid designed for refrigeration installations working at low temperatures and for central heating systems. It is however not authorized for use in single exchange domestic water production systems.

When **NEUTRAGEL® NEO** is diluted with water the resulting fluid provides excellent protection against freezing and gives enhanced protection against metal corrosion in various types of circuits (steel, aluminium, copper, brass, soldered, etc.). This protection has been confirmed by numerous static and dynamic heat tests.

The **NEUTRAGEL® NEO** formula is free of Borax, an additive classified as toxic following the 30th European ATP (Adaptation to Technical Progress).

The anti-corrosion inhibition technology used in **NEUTRAGEL® NEO** is organic, based on neutralised carboxylic acids, without phosphates, nitrites or amines. The active agents contribute to a longer lifespan and protect against corrosion.

Its formulation has been developed to ensure excellent compatibility with hard water, avoiding the risk of precipitation from inhibition systems. However, dilution with demineralised water is preferable to prevent scaling.

In addition, the stability of the inhibitor formula considerably reduces potential deposits caused by corrosion and alteration of the chemical composition.

It is advisable to verify the **NEUTRAGEL® NEO** concentration during maintenance operations (at least once a year).

NEUTRAGEL® NEO's colouring* makes it immediately identifiable.

1. Characteristics of NEUTRAGEL® NEO aqueous solutions

Characteristics	Method	Specification
Appearance	Visual	Red liquid
Freezing point °C : 33 % by volume in water 50 % by volume in water	AFNOR NF T 78-102 / ASTM D 1177	 -18 ± 2°C -37 ± 2°C
Density	AFNOR NF R 15-602-1 / ASTM D 1122	1.17 ± 0.003 kg/dm³
pH : at 33% volume	AFNOR NF T 90 008 / ASTM D 1287	7.5 to 8.5
Alkaline reserve (ml HCl N/10 for 10 ml of **NEUTRAGEL®NEO**)	AFNOR NF T 78-101 / ASTM D 1121	≥ 4 ml
Boiling point °C at atmospheric pressure	AFNOR R 15-602-4 / ASTM D 1120	172 ± 2°C

2. Physiochemical properties of NEUTRAGEL® NEO aqueous solutions

2.1. Freezing point of NEUTRAGEL® NEO aqueous solutions (in °C)

NEUTRAGEL® NEO concentration (% by volume)	Freezing point* in °C ± 2	Boiling point in °C ± 2
30%	-16	103
35%	-20	104
40%	-25	105
45%	-30	107
50%	-37	108
55%	-45	110

* The freezing points indicated correspond to the formation of a crystalline mixture.
Normative references AFNOR NF T 78-102 / ASTM D 1177.

NB The use of NEUTRAGEL® NEO solutions concentrated at a minimum of 33% is recommended to achieve optimal protection against corrosion.

Freezing points are subject to variation due to supercooling phenomena that may occur. When used as a transfer fluid, particularly at sub-zero temperatures, it is essential to take viscosity into account when calculating pressure drops.

2.2. Conservation of the antifreeze / anti-corrosion properties of aqueous solutions

The loss of **NEUTRAGEL® NEO** from aqueous solutions even when brought to the boiling point, is virtually nil due to its low volatility and because it does not form an azeotrope with water.

As the installations are generally closed-circuit systems, water cannot evaporate and the antifreeze power of the aqueous solution is maintained where there is no leakage.

When used in older installations with an open expansion tank, it is advised to check the pressure gauge and add water if necessary, when checking the **NEUTRAGEL® NEO** concentration by measuring the density.

In all cases, it is advisable, to check the concentration of **NEUTRAGEL® NEO** at least once a year, by measuring the density of the heat transfer fluid at 20°C using a suitable hydrometer or by checking its freezing point by using a suitable refractometer.

It is essential to check the pH of the water in the circuit, the external corrosion of the pipes and identify any areas of poor circulation or potential blocking of valves.

2.3. Table of physical and chemical data

Concentration (Vol %)	Freezing point (°C)	Temperature (°C)	Density (Kg/dm³)	Kinematic viscosity (cSt)	Specific heat (kJ. kg^{-1}.K^{-1})	Thermal conductivity (W.m^{-1}.K^{-1})
25%	-12	-10	1.041	6.3	3.77	0.486
		0	1.040	4.2	3.79	0.492
		10	1.037	2.9	3.80	0.497
		20	1.034	2.1	3.82	0.501
		30	1.030	1.6	3.84	0.506
		40	1.025	1.3	3.85	0.509
		50	1.020	1.0	3.87	0.513
		60	1.014	0.9	3.89	0.516
		70	1.009	0.7	3.90	0.520
		80	1.002	0.6	3.92	0.524
		90	0.996	0.6	3.94	0.529
		100	0.990	0.5	3.96	0.534

Concentration (Vol %)	Freezing point (°C)	Temperature (°C)	Density (Kg/dm³)	Kinematic viscosity (cSt)	Specific heat (kJ. kg⁻¹.K⁻¹)	Thermal conductivity (W.m⁻¹.K⁻¹)
30%	-16	-10	1.050	7.6	3.66	0.472
		0	1.048	4.9	3.68	0.476
		10	1.045	3.4	3.70	0.479
		20	1.041	2.5	3.72	0.481
		30	1.037	1.9	3.74	0.483
		40	1.033	1.5	3.76	0.485
		50	1.027	1.2	3.78	0.487
		60	1.021	1.0	3.80	0.489
		70	1.015	0.8	3.82	0.491
		80	1.009	0.7	3.84	0.494
		90	1.002	0.6	3.86	0.498
		100	0.996	0.6	3.88	0.502
35%	-20	-20	1.059	15.5	3.53	0.456
		-10	1.058	9.2	3.56	0.459
		0	1.055	5.9	3.58	0.460
		10	1.052	4.0	3.60	0.461
		20	1.048	2.8	3.62	0.462
		30	1.043	2.1	3.65	0.462
		40	1.038	1.6	3.67	0.462
		50	1.033	1.3	3.69	0.462
		60	1.027	1.1	3.72	0.463
		70	1.021	0.9	3.74	0.464
		80	1.015	0.8	3.76	0.465
		90	1.009	0.7	3.79	0.468
		100	1.002	0.6	3.81	0.472
40%	-25	-20	1.068	19.2	3.42	0.445
		-10	1.066	11.1	3.45	0.446
		0	1.063	7.0	3.47	0.446
		10	1.059	4.6	3.50	0.445
		20	1.055	3.3	3.53	0.444
		30	1.050	2.4	3.55	0.442
		40	1.044	1.9	3.58	0.441
		50	1.039	1.5	3.60	0.439
		60	1.033	1.2	3.63	0.438
		70	1.026	1.0	3.66	0.438
		80	1.020	0.9	3.68	0.439
		90	1.013	0.8	3.71	0.441
		100	1.007	0.7	3.74	0.444

Concentration (Vol %)	Freezing point (°C)	Temperature (°C)	Density (Kg/dm³)	Kinematic viscosity (cSt)	Specific heat (kJ. kg⁻¹.K⁻¹)	Thermal conductivity (W.m⁻¹.K⁻¹)
45%	-30	-30	1.078	46.3	3.29	0.435
		-20	1.076	23.8	3.31	0.435
		-10	1.074	13.4	3.34	0.434
		0	1.070	8.2	3.37	0.432
		10	1.066	5.4	3.40	0.430
		20	1.061	3.8	3.43	0.427
		30	1.058	2.7	3.46	0.424
		40	1.053	2.1	3.49	0.421
		50	1.047	1.7	3.52	0.419
		60	1.040	1.3	3.55	0.417
		70	1.034	1.1	3.57	0.415
		80	1.028	1.0	3.60	0.415
		90	1.021	0.8	3.63	0.416
		100	1.014	0.8	3.66	0.418
50%	-37	-30	1.087	59.3	3.18	0.426
		-20	1.085	29.5	3.21	0.425
		-10	1.081	16.3	3.24	0.423
		0	1.077	9.8	3.27	0.420
		10	1.073	6.3	3.30	0.416
		20	1.067	4.3	3.33	0.412
		30	1.062	3.1	3.37	0.408
		40	1.056	2.4	3.40	0.404
		50	1.049	1.8	3.43	0.400
		60	1.043	1.5	3.46	0.397
		70	1.037	1.2	3.49	0.395
		80	1.030	1.1	3.53	0.393
		90	1.023	0.9	3.56	0.393
		100	1.017	0.8	3.59	0.394

2.6 Refractive index of aqueous solutions of NEUTRAGEL® NEO at 20°C

Concentration NEUTRAGEL® NEO (% by volume)	Refractive index
30	1.363
40	1.373
50	1.383
60	1.393
70	1.404
80	1.412

2.7 Protection of metals provided by NEUTRAGEL® NEO

These tests were performed on **NEUTRAGEL® NEO** diluted to 33% of volume in synthetically corrosive water. For information, the table shows the performance requirements defined by the NF R 15-601 and ASTM D 3306 standards for coolant liquids.

Metals	Mass loss (mg / test piece)	Limits of standard NF R 15-601	Limits of standard ASTM D 3306
Copper	+/- 2.5	[- 5 ; +5]	[- 10 ; +10]
Soldering	+/- 4.1	[- 5 ; +5]	[- 30 ; +10]
Brass	+/- 1.6	[- 5 ; +5]	[- 10 ; +10]
Steel	+/- 0.4	[- 2.5 ; +2.5]	[- 10 ; +10]
Cast iron	+/- 1.2	[- 4 ; +4]	[- 10 ; +10]
Aluminium	+/- 4.3	[- 10 ; +20]	[- 30 ; +30]

Normative references for test methods : AFNOR NF R 15-602-7 / ASTM D 1384

3. Recommendations for use

When using a heat transfer fluid in a transfer circuit at positive and, above all, negative temperatures, viscosity must be taken into account when calculating pressure drops.

3.1 Compatibility lists (non-exhaustive):

Materials	NEUTRAGEL® NEO
CR (Neoprene)	✓
CSM (Hypalon)	✓
EPDM	✓
FPM (Viton)	✓
NBR (Buna N)	✓
PE_{HD}	✓
PP	✓
PTFE (Teflon)*	✓
PVC	✓
PVDF	✓
TS (Nitrile)	✓
Hemp*	~

**The use of hemp seals and Teflon tape is not prohibited, but they must be fitted perfectly.*

Materials	NEUTRAGEL® NEO
T356 Aluminium (Al/Si)	✓
Cast iron	✓
Hastelloy (Ni alloy)	✓
304 stainless steel	✓
316 stainless steel	✓
Galvenised steel	×
Coated steel	×

✓	= Compatible
~	= Not recommended
×	= Non compatible

4. Cleaning the installation

It is strongly recommended that the installations be thoroughly cleaned using **Dispersant D*** if they contain heavy deposits of metal oxides before filling with the **NEUTRAGEL®NEO**-based heat transfer solution.

Glycol solutions have significant wetting power and can lift off pre-existing deposits in the circuit (e.g. rust) which can form a sludge.

The procedure is as follows :

- Circulate water through the circuit for 1 to 2 hours, then quickly and completely drain the installation at the lowest point.
- Prepare and inject a solution of **Dispersant D*** at 20 g/litre of water into the installation.
- Circulate for at least 2 hours.
- Quickly drain the system at the lowest point.
- Rinse thoroughly and carefully with water until the water runs clear and the pH is close to 7 (Rinse thoroughly and carefully with water until the water runs clear and the pH is close to 7 (± 0.5).

Depending on the condition of the circuit, a second cleaning may sometimes be necessary.

After each cleaning, it is important to drain and rinse thoroughly with water.

N.B. : if the installation is scaled and heavily oxidised with incrustations, it is advisable to circulate a solution of approximately 100 g/l of **Desoxyclean*** in water at 50°C for 2 hours. After draining, continue with the **Dispersant D*** treatment according to the operating mode indicated above.

** Marketed by Climalife.*

4.1 Recommendations and adding NEUTRAGEL® NEO into the system.

In order to achieve good homogeneity, it is recommended to prepare the mixture prior to putting it into the system and to fill the system using a suitable pump connected to the drain point.

Systems containing monoethylene glycol-based antifreeze must comply with current health regulations and, in particular, include a system to prevent any backflow into drinking water (check with your local authorities for current regulations).

As glycol water solutions have a higher wetting power than water alone, it is advisable to check the compatibility of the seals (particularly with porous seals such as paper or tow seals).

After filling a system, it may be necessary to tighten the connections with a higher torque to prevent any seepage.

For optimum corrosion protection, the minimum recommended concentration is 33% by volume.

Given the diversity of materials found in installations (exchangers, pipes, seals, etc.), it is advisable to check with equipment manufacturers that their components are compatible with monoethylene glycol.

Due to their incompatibility, galvanised steels must not be used for components in the network with heat transfer solutions.

The information provided is intended to assist the user in implementing the product. It is the user's responsibility to perform the calculations (power, pressure drop, etc.) necessary for the proper functioning of the installation.