



FRIOGEL® NEO



Non contractual photo.

Based on Mono Propylene Glycol and corrosion inhibitors, FRIOGEL® NEO is a concentrated or ready-to-use antifreeze heat transfer fluid for low temperature refrigeration systems and food industry.

FRIOGEL® NEO provides excellent protection against freezing and gives enhanced protection against metal corrosion in various circuit types; old and new (steel, aluminium, copper, brass, solder, etc). This protection has been confirmed by numerous static and dynamic tests.

The FRIOGEL® NEO formula is free of Borax, component recently classified as toxic following the 30th European Adaptation to Technical Progress.

The anti-corrosion inhibition technology used in FRIOGEL® NEO is organic, based on neutralised carboxylic acids, without phosphates, nitrites or amines. These anti-corrosion agents provide a long-lasting protection.

Its exclusive formula ensures excellent hard water stability without risking precipitation of inhibition systems. However, the use of demineralised water for dilution is recommended to avoid scale.

The risks of medium-term deposits due to corrosion of the installation and the alteration of chemical compounds are considerably reduced by the stability of the inhibition formula.

To avoid any risk of clogging, a check of the FRIOGEL® NEO concentration is recommended during maintenance operations (at least once a year).

The red colouring of FRIOGEL® NEO makes it immediately identifiable.

A formula without organoleptic compounds. In France FRIOGEL® NEO is not intended for use in installations used for the thermal treatment of water intended for human consumption (according to French decree of 14 January 2019).



1. 1. PHYSICOCHEMICAL PROPERTIES OF FRIOGEL® NEO

Appearance	red liquid
Density (AFNOR NF R 15-602-1 / ASTM D 1122).....	1.053 ± 0.002 kg/dm ³
pH (AFNOR NF T 90 008 / ASTM D 1287)	
at 50 % by volume in water	7.7 to 8.7
at 33 % by volume in water.....	7.5 to 8.5
Alkaline reserve (AFNOR NF T 78-101 / ASTM D 1121)	
(ml HCl N/10 for 10 ml of FRIOGEL® NEO)	>= 7 ml
Freezing point °C (AFNOR NF T 78-102 / ASTM D 1177)	
33 % in volume in water	- 15 ± 2°C
50 % in volume in water	- 32 ± 2°C
Boiling point °C (AFNOR R 15-602-4 / ASTM D 1120)	
At atmospheric pressure	139 ± 2°C

2. PHYSICOCHEMICAL PROPERTIES OF FRIOGEL® NEO WATER SOLUTIONS

FRIOGEL® NEO is miscible with water in all proportions.

2.1. Freezing point of water solutions of Friogel® NEO (in °C)

The freezing points of water solutions of FRIOGEL® NEO given below correspond to the

formation of a crystalline mixture and not to a measurement in compact mass.

Concentration of FRIOGEL® NEO (% by volume)	15	20	25	30	35	40	45	50	55	60
Freezing point in °C ± 2	- 5	- 7	- 10	- 13	- 17	- 22	- 27	- 32	- 39	- 45

Normative references : AFNOR NF T 78-102 / ASTM D 1177

NB: apart from the protection against frost, we recommend using FRIOGEL® NEO concentrated solution at a minimum of 33% to have optimal protection against corrosion.

The freezing points are always subject to variation because of the phenomena of supercooling that they can produce.

In actual fact, the viscosities of solutions with a Mono Propylene Glycol base are much higher than the solutions with a Mono Ethylene Glycol base, especially when approaching the freezing point.

To be used as a transfer fluid and especially in negative temperatures, it is absolutely essential to take into account the viscosity to calculate the charge loss.



Maintaining anti-frost / anti-corrosion ability of water solutions

The loss of FRIOGEL® NEO from water solutions, even at their boiling temperatures, are practically zero due to their low volatility and because they do not form azeotropes in water.

As the installations are generally closed circuits, the water cannot evaporate, and the anti-freeze power of the water solution is strongly maintained where there is no leakage.

If used in the old installations with expansion tanks, exposed to the open air, it is advised to check the pressure manometer and, if necessary, to reintroduce water in the installation whilst checking the FRIOGEL® NEO concentration per mass volume.

It is, in any event, always advisable, at least once a year, to check the concentration of the FRIOGEL® NEO solution at a temperature of 20°C by measuring its density using a suitable hydrometer or by checking its freezing point using a suitable refractometer.

It is absolutely essential to check the pH of the water of the circuit, the exterior corrosion of the pipes and the identification of the areas of bad circulation or the blockage of the valves.

2.2. Density of water solutions of Friogel® NEO at 20°C (in kg/dm³)

Concentration of FRIOGEL® NEO (% by volume)	Solution density kg / dm³
10	1.008
15	1.013
20	1.018
25	1.023
30	1.028
35	1.032
40	1.037
45	1.040
50	1.044
55	1.046
60	1.048

Normative references: AFNOR NF R 15-602-1 / ASTM D 1122

The density read on the scale of a suitable hydrometer corresponds very approximately to the density indicated at 20°C.

Taking into account the weak variations in density of the product within the context of its concentration in water, it is necessary to use a precise hydrometer.

2.3. Boiling points of FRIOGEL® NEO water solutions (in °C)

FRIOGEL® NEO Concentration (% in volume)	20	30	40	50	60
Boiling point (in °C)	103	104	105	106	107

Normative references : AFNOR NF R 15-602-4 / ASTM D 1120



2.4. Density relative to the temperature of FRIOGEL® NEO (in kg/dm³)

Concentration FRIOGEL® NEO (% in volume)	25	30	35	40	45	50						
Temperature in °C	FROST ZONE											
- 30												1.064
- 20											1.052	1.056
- 10	1.030	1.038	1.044	1.050	1.054	1.058						
0	1.029	1.036	1.041	1.047	1.050	1.054						
10	1.026	1.032	1.037	1.042	1.045	1.049						
20	1.023	1.028	1.032	1.037	1.040	1.044						
30	1.017	1.023	1.027	1.032	1.034	1.037						
40	1.012	1.017	1.021	1.025	1.027	1.031						
50	1.006	1.011	1.014	1.019	1.021	1.024						
60	0.999	1.004	1.008	1.012	1.013	1.017						
70	0.992	0.997	1.000	1.004	1.006	1.009						
80	0.985	0.990	0.993	0.997	0.998	1.001						
90	0.977	0.982	0.985	0.989	0.990	0.993						
100	0.970	0.974	0.977	0.981	0.982	0.985						

Bibliographic data provided for information only.

2.5. Cinematic viscosity of water solutions of FRIOGEL® NEO (in cSt)*

Concentration FRIOGEL® NEO (% in volume)	25	30	35	40	45	50						
Temperature in °C	FROST ZONE											
- 30												206.7
- 20											44.3	60.8
- 10	9.7	12.8	16.9	22.3	29.3	38.2						
0	6.0	7.7	9.8	12.4	15.7	19.7						
10	3.9	4.9	6.1	7.5	9.2	11.2						
20	2.8	3.3	4.0	4.9	5.8	6.9						
30	2.0	2.4	2.8	3.3	3.9	4.5						
40	1.5	1.8	2.1	2.4	2.8	3.1						
50	1.2	1.4	1.6	1.8	2.1	2.3						
60	1.0	1.1	1.3	1.4	1.6	1.8						
70	0.8	0.9	1.0	1.2	1.3	1.4						
80	0.7	0.8	0.9	1.0	1.1	1.2						
90	0.6	0.7	0.7	0.8	0.9	1.0						
100	0.5	0.6	0.7	0.7	0.8	0.8						

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2.6. Specific heat of water solutions of FRIOGEL® NEO (in kJ. kg⁻¹.K⁻¹)*

Concentration FRIOGEL® NEO (% by volume)	25	30	35	40	45	50						
Temperature In °C	FROST ZONE											
- 30												3.4
- 20											3.6	3.5
- 10	3.9	3.8	3.7	3.6	3.5	3.4						
0	3.9	3.9	3.8	3.7	3.6	3.5						
10	4.0	3.9	3.8	3.7	3.6	3.5						
20	4.0	3.9	3.8	3.7	3.6	3.5						
30	4.0	3.9	3.8	3.8	3.7	3.6						
40	4.0	3.9	3.9	3.8	3.7	3.6						
50	4.0	3.9	3.9	3.8	3.7	3.7						
60	4.0	4.0	3.9	3.8	3.8	3.7						
70	4.0	4.0	3.9	3.9	3.8	3.7						
80	4.1	4.0	4.0	3.9	3.8	3.8						
90	4.1	4.0	4.0	3.9	3.9	3.8						
100	4.1	4.0	4.0	4.0	3.9	3.8						

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2.7. Thermal conductivity of water solutions of FRIOGEL® NEO (in W.m⁻¹.K⁻¹)*

Concentration FRIOGEL NEO® (% in volume)	25	30	35	40	45	50						
Temperature In °C	FROST ZONE											
- 30												0.39
- 20											0.41	0.40
- 10	0.46	0.45	0.43	0.42	0.40	0.39						
0	0.47	0.45	0.43	0.42	0.40	0.39						
10	0.48	0.46	0.44	0.42	0.40	0.38						
20	0.48	0.46	0.44	0.42	0.40	0.38						
30	0.49	0.47	0.44	0.42	0.40	0.38						
40	0.50	0.47	0.44	0.42	0.40	0.38						
50	0.50	0.47	0.45	0.42	0.40	0.37						
60	0.51	0.48	0.45	0.42	0.40	0.37						
70	0.51	0.48	0.45	0.42	0.40	0.37						
80	0.52	0.49	0.46	0.43	0.40	0.37						
90	0.52	0.49	0.46	0.43	0.40	0.37						
100	0.53	0.50	0.46	0.43	0.40	0.37						

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2.8. Refraction index of water solutions of FRIOGEL® NEO at 20°C

FRIOGEL® NEO concentration (% in volume)	Refraction index
30	1.3662
40	1.3776
50	1.3872
60	1.3947
70	1.4011
80	1.4050

2.9. Protection of metals provided by FRIOGEL® NEO in water solutions

These tests were performed on the FRIOGEL® NEO diluted to 33% of volume in synthetically corrosive water. For your information, we show in the table below the performance requirements defined by the AFNOR NF R 15-601 and ASTM D 3306 standards for cooling liquids.

Metals	Mass loss (mg / test tube)	Limits of the NF R 15-601 standard	Limits of the ASTM D 3306 standard
Copper	± 2	[- 5; +5]	[- 10; +10]
Soldering	± 4	[- 5; +5]	[- 30; +10]
Brass	± 2	[- 5; +5]	[- 10; +10]
Steel	± 1	[- 2.5; +2.5]	[- 10; +10]
Cast iron	± 2	[- 4; +4]	[- 10; +10]
Aluminium	± 8	[- 10; +20]	[- 30; +30]

Reference test method : AFNOR NF R 15-602-7 / ASTM D 1384

*** The data stated in paragraph 2 of this document are merely indicative and do not constitute a sales specification.**

3. PRESSURE LOSS

As regards the use of an anti-frost solution in a circuit of transfer to positive and especially to negative temperatures, it is advisable to take the viscosity of the water solution into account to calculate the pressure loss.



4. RECOMMENDATIONS FOR USE

4.1. Cleaning the installation

It is strongly recommended that the installations be thoroughly cleaned before filling them with the FRIOGEL NEO + water mixture, if they contain many deposits; especially metal oxides with **Dispersant D***.

In fact, glycol solutions have an important wetting power and can shake out the pre-existing deposits (ex: rust...) responsible for sludge creation.

The procedure is as follows :

- circulate water in the circuit for 1 to 2 hours, then completely drain the installation quickly to the lowest point
- prepare then put a 20g/litre of water "Dispersant D*" solution into the system
- let the product circulate for at least 2 hours,
- quickly drain the installation to the lowest point,

- rinse thoroughly with water until the water runs clear and the pH is close to 7 ($\pm 0,5$).

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

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

Please note: if the installation is scaled and heavily oxidised with incrustations, it is advisable to pre-treat with a solution of approximately 100 g/l of **Desoxyclean*** for 2 hours at 50°C.

After draining, follow the treatment with **Dispersant D*** in the above-mentioned manner.

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4.2. Recommendations and putting FRIOGEL[®] NEO into the installation.

To achieve homogeneity, it is advisable to prepare a mixture before putting it into the installation and to fill it by using a suitable pump connected to the point of the outlet.

The solutions of glycol water have a moisture ability more important than only the water and it is advisable to ensure that the joints of the installation are compatible with this product (especially with porous joints of paper, hemp, etc.).

As regards the filling the installation, it may be necessary to tighten the joints and joins with stronger ones to prevent oozing.

In practice, to obtain adequate protection against corrosion, the minimum recommended concentration volume is 33%.

In any event, taking into account the diversity of the materials encountered in the installations, (exchangers, pipes, joints, etc.), it is advisable to check manufacturers' equipment to see whether their parts are compatible with Mono Propylene Glycol.

FRIOGEL[®] NEO may not be used with galvanised steel.

The data stated (viscosity, specific heat, etc.) are meant to help the user in using the product. It lightens his burden of having to make all the calculations (charge loss, etc.) required to make the installation function well.

The information contained in this product sheet is the result of our studies and experience. It is provided in good faith, but should not, under any circumstance, be taken to constitute a guarantee on our part or an assumption of our responsibility. This is particularly the case when third party rights are at stake or in situations where a user of one of our products fails to observe applicable regulations.

