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## FRIOGEL® NEO



Non contractual photo

**FRIOGEL® NEO**; a concentrated antifreeze based on Mono Propylene Glycol and corrosion inhibitors, is a heat transfer fluid for low temperature refrigeration systems and food industry.

When **FRIOGEL® NEO** is diluted in water, the resulting liquid cooling agent provides effective protection against freezing and gives re-enforced protection against metal corrosion in the various ancient and new types of circuits (steel, aluminium, copper, brass, soldering, etc.). This protection has been confirmed by numerous static and dynamic heat tests.

The **FRIOGEL® NEO** formula is free of Borax, component recently classified as Toxic following the 30<sup>th</sup> 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.

The **FRIOGEL® NEO** formula is **authorised by the General Directorate of Health, in compliance with the advice from ANSES (formerly AFSSA, the French Agency for Food Sanitary Security)**, as a heat transfer fluid for thermal exchange in single exchange domestic water production systems, up to a maximum concentration of 60% in volume.

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.

On the other hand, the stability of the inhibition formula considerably reduces deposits caused by corrosion and alternation of the chemical compositions.

In order to avoid clogging, it is advisable to verify the **FRIOGEL® NEO** concentration on the occasion of maintenance operations (at least once a year).

**FRIOGEL's® NEO** red colouring makes it immediately identifiable.



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 <sup>3</sup>
pH (AFNOR NF T 90-008/ASTM D 1287) .....	
at 50% by volume in water .....	7,7 à 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 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 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

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 surfusion that they can produce.

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.

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.



### 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/m<sup>3</sup>)

Concentration <b>FRIOGEL® NEO</b> (% by volume)	Solution density kg / dm <sup>3</sup>
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.



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### 2.3. Boiling points of FRIOGEL® NEO water solutions

FRIOGEL® NEO concentration (% by volume)	20	30	40	50	60
Boiling point (°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 / dm<sup>3</sup>)

FRIOGEL® NEO concentration (% by volume)	25	30	35	40	45	50
°C Temperature	FROST ZONE					
- 30						
- 20				1.052	1.056	1.062
- 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

\* bibliography details



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

FRIOGEL® NEO concentration (% by volume)	25	30	35	40	45	50						
°C Temperature	FROST ZONE											
- 30												206.7
- 20												
- 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						

\* bibliography details

**2.6. Specific heat of water solutions of FRIOGEL® NEO (in kJ. kg<sup>-1</sup>.K<sup>-1</sup>)\***

FRIOGEL® NEO concentration (% by volume)	25	30	35	40	45	50						
°C Temperature	FROST ZONE											
- 30												3.4
- 20												
- 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						

\* bibliography details



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**2.7. Thermal conductivity of water solutions of FRIOGEL® NEO (in W.m<sup>-1</sup>.K<sup>-1</sup>)\***

FRIOGEL® NEO Concentration (% by volume)	25	30	35	40	45	50						
°C Temperature	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						

\* bibliography details

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

FRIOGEL® NEO concentration (% by 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.



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## 4. RECOMMENDATIONS FOR USE

### 4.1. Cleaning the installation

It is strongly recommended that the installations be thoroughly cleaned with Dispersant D before filling them with the **FRIOGEL® NEO + WATER** if they contain many deposits and 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.

It is to be done in the following manner:

- make the circuit circulate water for 1 to 2 hours, then drain the installation quickly and fully to the lowest point.
- prepare and put "**dispersant D\***" solution at 20 g/litre of water in the installation
- let the product circulate for at least 2 hours,
- quickly drain the installation to the lowest point;

- adequately and carefully rinse with water until it is clear and the pH is approximately 7 ( $\pm$  0.5). Depending on the state of the circuit, it may be necessary to clean several times.

It is important to drain and carefully rinse with water after every time it has been cleaned.

Please note: If there are tartar deposits on the installation and it is seriously oxidised with scales, it is advisable to first treat the circulation with a solution of "**desoxydant P\***" (deoxidizer P) at approximately 100 g/l of water at 50°C for 2 hours. After it has been drained, follow the treatment with "**dispersant D\***" in the abovementioned manner.

*\* Marketed by Climalife*

### 4.2. Recommendations and putting FRIOGEL® NEO in 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.

For more information, please visit our website:  
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