



## FRIOGEL® NEO



Non contractual picture

**FRIOGEL® NEO**, a concentrated antifreeze based on Mono Propylene Glycol and corrosion inhibitors, is a heat transfer fluid designed for use in refrigeration and air conditioning systems where the operating temperature may fall below freezing. It is particularly suited for use in food factories.

When **FRIOGEL® NEO** is diluted in water, the resulting liquid cooling agent provides effective protection against freezing and gives reinforced protection against metal corrosion in old 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 contains no Borax, an additive now classified as toxic by the 30<sup>th</sup> ATP (Adaptation to Technical Progress) and listed as a SVHC by the European Chemical Agency under REACH.

The anti-corrosion inhibitor technology used in **FRIOGEL® NEO** is organic, based on neutralized carboxylic acid, without phosphate, nitrite and amine. The active agents contribute to a longer lifespan and protect against corrosion.

The **FRIOGEL® NEO** formula is **authorised by the French Superior Council for Public Hygiene, advised by AFSSA (French Agency for Food Safety)**, as a heat transfer fluid for single exchange domestic water production systems since it does not present any particular health risks for a maximum concentration of 60% of the total volume.

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

On the other hand, the stability of the inhibited formula considerably reduces deposits caused by corrosion and alteration of the chemical composition.

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

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



1. PHYSICOCHEMICAL PROPERTIES OF FRIOGEL® NEO\*

Appearance ..... red liquid

Density at 20°C (AFNOR NF R 15-602-1)..... 1.053 ± 0.002 kg/dm<sup>3</sup>

pH (AFNOR NF T 78-103)      at 50% volume in water ..... 7.5 to 9  
    at 33% in volume in water ..... 7.5 to 9

Alkaline reserve (AFNOR NF T 78-101)  
 (ml HCl N/10 for 10 ml of FRIOGEL® NEO) ..... >=4 ml

Freezing point °C (AFNOR NF T 78-102)  
 33% in volume in water ..... - 15 ± 2°C  
 50 % in volume in water ..... - 32 ± 2°C

Boiling point °C (AFNOR R 15-602-4)  
 at atmospheric pressure ..... 139 ± 2°C

Flashpoint °C (ASTM D 93) ..... > 100°C

2. Physicochemical properties FRIOGEL® NEO water solutions

FRIOGEL® NEO is miscible in all proportions with water.

2.1. Freezing point (AFNOR NF T 78-102)

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 (% 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

N.B. apart from the protection against freezing, we advise you to use FRIOGEL® NEO at a minimum concentration of 33% to obtain optimal protection against corrosion.

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

To use as a transfer fluid and especially at temperatures below 0°C, it is absolutely essential to take into account the viscosity to calculate the charge loss.

It should be noted that, the viscosities of solutions with a Mono Propylene Glycol base are much higher than solutions with a Mono Ethylene Glycol base, especially when approaching the freezing point.



## Maintaining anti-freeze / anti-corrosion ability of water solutions

The loss of **FRIOGEL® NEO** from water solutions, even at their boiling temperatures, are practically zero due 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 old installations with expansion tanks, exposed to the open air, it is advised to check the pressure manometer and if necessary, to reintroduce water into 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 **FRIOGEL® NEO** in the mixture at a density of 20°C by using a suitable hydrometer or by checking its freezing point by using a suitable refractometer.

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

### 2.2. Density of water solutions of **FRIOGEL®** at 20°C

Concentration <b>FRIOGEL® NEO</b> (% in 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

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**

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

**24. Kinematic viscosity of water solutions of FRIOGEL® NEO (centistokes cSt)\***

FRIOGEL® NEO concentration (% in volume)	25	30	35	40	45	50						
Temperature °C	FROST ZONE											
- 30												206,7
- 20										44,3	60,8	83,1
- 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

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

FRIOGEL® NEO concentration (% in volume)	25	30	35	40	45	50						
Temperature °C	FROST ZONE											
- 30												3,4
- 20										3,6	3,5	3,4
- 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

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

FRIOGEL® NEO Concentration (% in volume)	25	30	35	40	45	50						
Temperature °C	FROST ZONE											
- 30												0,39
- 20										0,41	0,40	0,39
- 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

**2.7. Refractive index of water solutions of FRIOGEL® NEO at 20°C**

FRIOGEL® NEO concentration (% in volume)	Refractive index
30	1,3662
40	1,3776
50	1,3872
60	1,3947
70	1,4011
80	1,4050

**2.8. Protection of metals provided by FRIOGEL® NEO in water solutions (NF R 15-602-7)**

These tests were performed according to the method defined by the NF R 15-602-7 standard on 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 NF R 15-601 standard for cooling liquids.

Metals	Mass loss (mg / test tube)	Limits of the NF R 15-601 standard
Copper	± 2	- 5 <= <= +5
Soldering	± 4	- 5 <= <= +5
Brass	± 2	- 5 <= <= +5
Steel	± 1	- 2,5 <= <= +2,5
Cast iron	± 2	- 4 <= <= +4
Aluminium	± 8	- 10 <= <= +20

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

**3. CHARGE LOSS**

As regards the use of an anti-freeze 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 charge loss

## 4. RECOMMENDATIONS FOR USE

### 4.1. Cleaning the installation

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

Glycol solutions display a high wetting power and are able to remove pre-existing deposits (e.g. rust, etc.) which will generate sludge.

Cleaning 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;

- carefully and adequately 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 each time it has been cleaned.

Please note: If there are tartar deposits on the installation and it is seriously oxidised with scale, it is advisable to first treat the circulation with a solution of "**désoxydant 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.

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### 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 solution of glycol & water have a wetting power greater than only 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.).

When filling the installation, it may be necessary to tighten the joints to prevent seepage.

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

In all cases, 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 components 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 the 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

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