



GREENWAY® NEO

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GREENWAY® NEO



GREENWAY® NEO is a concentrated antifreeze heat transfer fluid, based on 1,3-propanediol and corrosion inhibitors, for refrigeration, air conditioning, and fire extinguishing system circuits, as well as under-floor heating/cooling circuits.

Once diluted with water, **GREENWAY® NEO** provides excellent protection against freezing and gives enhanced protection against the corrosion of metals in various circuits of different designs (steel, aluminium, copper, brass, solder, etc.). It also prevents sludge from forming inside the circuits.

The green colour of **GREENWAY® NEO** makes it easily identifiable.

Non contractual photo.

The formulation of **GREENWAY® NEO** is free of Borax, a Toxic additive classified as per the 30th European ATP (Adaptation to Technical Progress).

1,3 Propanediol, comes from renewable plant-based materials, and has the advantage of a lower viscosity than that of Mono-Propylene Glycol which is conventionally used as this type of fluid.

Its formulation was developed to provide excellent compatibility with hard water without the risk of inhibition system precipitate. However, dilution with demineralised water is preferable to avoid scaling.

The corrosion inhibitor technology used in **GREENWAY® NEO** is organic, based on neutralised carboxylic acids, without phosphates, sodium borate, nitrites or amines. These anti-corrosion agents provide long lasting protection.

GREENWAY® NEO is bacteriostatic from a concentration of 30% by volume and therefore prevents bacterial growth in a circuit.

GREENWAY® NEO is, **authorised by the French health administration (Direction Générale de la Santé), according to the directives of the French regulatory agency ANSES (formerly AFSSA)**, as a heat transfer fluid for thermal processing in simple exchange systems for sanitary water production up to a maximum concentration of 70% of the volume.

GREENWAY® NEO is also **approved by Belgaqua**, (the Belgian federation in the water sector), according to the standard NBN-EN 1717 as a fluid category 3.

A verification of the concentration of **GREENWAY® NEO** is recommended during maintenance operations at least every 12 months, to ensure it remains fully functional.

GREENWAY® NEO is recorded as HT2 category on the list of NSF Nonfood Compounds for use in food premises as a coolant with no food contact.

GREENWAY® NEO demonstrated an "intrinsic ultimate biodegradability without pre-adaptation " and is further evidence of an " intrinsic primary biodegradability " according to OECD criteria extrapolated to a finished product. For this analysis, **GREENWAY® NEO** biodegradation was observed from 90% to 100% in 28 days.



1. PHYSICAL AND CHEMICAL PROPERTIES OF GREENWAY® NEO

Appearance	green liquid
Density at 20°C (AFNOR NF R 15-602-1 / ASTM D 1122).....	1.060 ± 0.002 kg/dm ³
pH (AFNOR NF T 90 008 / ASTM D 1287)	
at 50% by volume in water	8.3 to 8.8
at 33% by volume in water	8.0 to 8.5
Alkaline Reserve (AFNOR NF T 78-101 / ASTM D 1121)	
(ml HCl N/10 for 10 ml of GREENWAY® NEO)	≥ 4 ml
Freezing point °C (AFNOR NF T 78-102 / ASTM D 1177)	
at 33 % by volume in water	- 13 ± 2°C
at 50 % by volume in water	- 27 ± 2°C
Boiling point °C (AFNOR R 15-602-4 / ASTM D 1120)	
at atmospheric pressure	144 ± 2°C

2. PHYSICAL AND CHEMICAL PROPERTIES OF AQUEOUS SOLUTIONS OF GREENWAY® NEO

GREENWAY® NEO is miscible with water in all proportions.

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

The freezing points of aqueous solutions of GREENWAY® NEO shown below correspond to the

formation of a crystalline mix and not a compact mass.

GREENWAY® NEO concentration (as a % of volume)	15	20	25	30	35	40	45	50	55	60	65	70
Freezing point in °C ± 2	- 5	- 6	- 9	- 11	- 14	- 17	- 22	- 27	- 31	- 39	-47	-55

Relevant standards: AFNOR NF T 78-102 / ASTM D 1177

N.B.: in addition to freezing protection, we recommend using solutions of GREENWAY® NEO with a concentration of at least 33% to obtain optimal corrosion protection.

Freezing points are however subject to variation due to super-cooling phenomena which may occur.

temperatures below 0°C, it is essential that the viscosity is taken into consideration for calculating the pressure loss.

When used as a transfer fluid and particularly at

**Conservation of the antifreeze / anti-corrosion power of aqueous solutions**

The loss of GREENWAY® 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 solutions is maintained where there is no leakage.

When used in older installations with an open-air expansion tank, it is recommended to monitor the pressure gauge and add water if necessary when checking the concentration of GREENWAY® NEO by density.

In all cases, it is advisable to check the concentration of the GREENWAY® NEO mixture, at least once a year, by measuring its density at 20°C using a suitable hydrometer or by checking its freezing point using an appropriate refractometer

It is essential to check the pH of the fluid, exterior corrosion of pipework, and identify areas of poor circulation or any blocking of valves.

2.2. Density of aqueous solutions of GREENWAY® NEO at 20°C (in kg/m³)

GREENWAY® NEO concentration (as a % of volume)	Density of the solution kg/dm ³
20	1.014
25	1.018
30	1.023
35	1.026
40	1.030
45	1.034
50	1.038
55	1.042
60	1.044
65	1.048
70	1.050

Relevant standards: AFNOR NF R 15-602-1 / ASTM D 1122

Densities read on the scale of a suitable hydrometer more or less match the density indicated at 20°C. A thermometric correction will need to be used below and above this temperature.

2.3. Boiling points of aqueous solutions of GREENWAY® NEO (in °C)

GREENWAY® NEO concentration (as a % of volume)	20	30	40	50	60	70
Boiling point (in °C)	101	102	103	104	106	109

Relevant standards: AFNOR NF R 15-602-4 / ASTM D 1120



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

GREENWAY® NEO concentration (as a % of volume)	30	40	50	55	60	65	70							
Temperature in °C	FREEZING ZONE													
-50														1.079
-40													1.072	1.074
-30											1.066	1.066	1.070	1.072
-20										1.059	1.062	1.064	1.068	1.070
-10	1.035	1.042	1.053	1.056	1.058	1.062	1.064							
0	1.030	1.037	1.048	1.051	1.053	1.057	1.059							
10	1.025	1.032	1.043	1.046	1.048	1.052	1.054							
20	1.023	1.030	1.038	1.042	1.044	1.048	1.050							
30	1.020	1.026	1.033	1.037	1.039	1.043	1.045							
40	1.017	1.023	1.029	1.032	1.036	1.040	1.042							
50	1.014	1.020	1.027	1.031	1.033	1.037	1.039							
60	1.011	1.017	1.024	1.028	1.030	1.034	1.036							
70	1.008	1.014	1.021	1.025	1.027	1.031	1.033							
80	1.005	1.011	1.018	1.022	1.024	1.028	1.030							
90	1.001	1.007	1.014	1.018	1.020	1.024	1.026							
100	0.998	1.004	1.011	1.015	1.017	1.021	1.023							

Bibliographic data provided for information purposes.

2.5. Kinematic viscosity of aqueous solutions of GREENWAY® NEO (incSt)*

GREENWAY® NEO concentration (as a % of volume)	30	40	50	55	60	65	70							
Temperature in °C	FREEZING ZONE													
-50														5495.0
-40													878.3	2180.0
-30											162.4	201.1	250.3	608.2
-20										40.2	56.9	71.2	88.9	204.4
-10	10.8	15.1	21.3	24.9	31.8	39.9	81.8							
0	5.9	8.3	12.0	13.1	17.2	21.8	36.4							
10	3.6	5.1	7.6	8.7	11.8	15.2	19.8							
20	2.3	3.2	4.7	5.7	7.1	8.8	11.0							
30	1.6	2.2	3.3	4.3	6.1	6.4	6.8							
40	1.2	1.6	2.4	3.0	4.1	4.3	4.5							
50	0.9	1.3	2.0	2.5	3.0	3.1	3.2							
60	0.8	1.1	1.5	1.8	2.2	2.2	2.3							
70	0.6	0.8	1.2	1.5	1.7	1.8	1.8							
80	0.5	0.7	1.0	1.2	1.4	1.4	1.4							
90	0.4	0.6	0.8	1.0	1.1	1.1	1.1							
100	0.4	0.5	0.8	0.9	1.0	1.0	1.0							

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

GREENWAY® NEO concentration (as a % of volume)	30	40	50	55	60	65	70							
Temperature in °C	FREEZING ZONE													
-50														2,76
-40													2,95	2,84
-30											3,22	3,11	3,00	2,89
-20										3,37	3,26	3,15	3,05	2,94
-10	3,83	3,62	3,40	3,30	3,20	3,09	2,99							
0	3,85	3,65	3,44	3,34	3,24	3,14	3,04							
10	3,87	3,68	3,47	3,38	3,28	3,19	3,09							
20	3,89	3,70	3,51	3,42	3,33	3,23	3,14							
30	3,93	3,73	3,54	3,45	3,35	3,26	3,17							
40	3,95	3,76	3,56	3,47	3,37	3,28	3,19							
50	3,97	3,78	3,58	3,49	3,39	3,30	3,20							
60	3,99	3,80	3,60	3,51	3,41	3,32	3,22							
70	4,01	3,82	3,62	3,53	3,43	3,34	3,24							
80	4,04	3,84	3,64	3,55	3,45	3,35	3,26							
90	4,07	3,87	3,67	3,58	3,48	3,38	3,28							
100	4,09	3,89	3,69	3,60	3,50	3,40	3,30							

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

GREENWAY® NEO concentration (as a % of volume)	30	40	50	55	60	65	70							
Temperature in °C	FREEZING ZONE													
-50														0.326
-40													0.344	0.333
-30											0.368	0.355	0.352	0.340
-20										0.390	0.377	0.363	0.360	0.347
-10	0.458	0.429	0.400	0.386	0.371	0.368	0.354							
0	0.471	0.440	0.409	0.394	0.379	0.376	0.361							
10	0.483	0.451	0.418	0.403	0.387	0.383	0.368							
20	0.495	0.461	0.427	0.411	0.394	0.391	0.374							
30	0.507	0.471	0.436	0.419	0.401	0.398	0.380							
40	0.517	0.481	0.444	0.426	0.408	0.404	0.386							
50	0.527	0.489	0.451	0.433	0.414	0.410	0.392							
60	0.536	0.497	0.458	0.439	0.420	0.416	0.397							
70	0.544	0.504	0.464	0.445	0.425	0.421	0.401							
80	0.551	0.510	0.469	0.449	0.429	0.425	0.405							
90	0.557	0.515	0.473	0.453	0.433	0.429	0.408							
100	0.561	0.519	0.477	0.457	0.436	0.431	0.411							

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2.8. Protection of metals by GREENWAY® NEO in aqueous solution

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

Metals	Weight loss (mg / test piece)	Limits of the standard NF R 15-601	Limits of the standard ASTM D 3306
Copper	± 2	[- 5; +5]	[- 10; +10]
Solder	± 3	[- 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	± 7	[- 10; +20]	[- 30; +30]

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

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

3. PRESSURE LOSS

When using a GREENWAY® NEO solution in a heat transfer circuit at temperatures both above 0°C and in particular below 0°C, it is advisable to take account of the viscosity of the aqueous solution to calculate pressure losses.



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4. RECOMMENDATIONS FOR IMPLEMENTATION

4.1. System cleaning

It is strongly recommended to conduct thorough cleaning of an installation before filling with the GREENWAY® NEO & water mixture, if it contains abundant deposits of metal oxides. We recommend using Dispersant D*.

The procedure is as follows:

- Have water flow through the circuit for 1 to 2 hours, and then quickly and thoroughly drain the installation at the lowest point.
- Prepare and add the "**Dispersant D***" solution at 20 g/litre of water to the system
- let the product circulate for at least 2 hours,
- Quickly drain the installation at the lowest point.

- Carefully and thoroughly rinse with water until the water runs clear and the pH is close to 7 (± 0.5).

Cleaning may sometimes need to be repeated, depending on the state of the circuit.

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

Note: If the installation is scaled and the deposits are highly oxidised, it is advisable to pre-treat with a solution containing about 100 g/l of "**Deoxidiser P***" in water with circulation for 2 hours at 50°C. After draining, continue the treatment with "**Dispersant D***" as per the procedure described above.

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4.2. Recommendations and adding GREENWAY® NEO to the installation.

To ensure proper homogeneity, it is recommended to prepare the mixture prior to adding it to the installation, and to fill using a suitable pump connected to the drain point.

It is advisable, for PDO solutions with greater wetting properties than water alone, to ensure compatibility of the system's seals with this product (particularly porous paper-type seals, hemp, etc.).

When filling an installation, it may be necessary to tighten the seals and joints to prevent any seepage.

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

However, given the diversity of materials encountered in installations (heat exchangers, pipes, seals, etc.), it is advisable to check with component

manufacturers that their products are compatible with propanediol.

GREENWAY® NEO must not be used with galvanized steel.

An annual check on the concentration of **GREENWAY® NEO** is recommended during maintenance operations to ensure the product remains in good condition.

The data provided (viscosity, specific heat, etc.) are intended to assist the user to implement the product. It is the user's responsibility to make any calculation (pressure loss, etc.) required for the proper operation of the installation.

*The information in this article is the fruit of the studies we have conducted and of our experience. It is given in good faith but cannot in any way constitute a guarantee from us, or mean that we accept liability, especially in the case of infringement of third parties or of failure by users of our products to abide with the relevant current regulations.

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