Ref. CA.37/03.14/V2/ EN

GREENWAY® NEO

Non-contractual photo.

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 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.

The green colour of **GREENWAY® NEO** allows immediate identification.

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/dm3

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

Flash point °C (ASTM D 93) ..... >100°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.

When used as a transfer fluid and particularly at temperatures below 0°C, it is essential that the viscosity is taken into consideration for calculating the pressure loss.

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/m^3)

GREENWAY® NEO concentration (as a % of volume)	Density of the solution kg/dm3
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							
-50	FREEZING ZONE						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 (in cSt)*

GREENWAY® NEO concentration (as a % of volume)	30	40	50	55	60	65	70
Temperature in °C							
-50	FREEZING ZONE						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

Bibliographic data provided for information purposes.

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							
-50	FREEZING ZONE						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

Bibliographic data provided for information purposes

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							
-50	FREEZING ZONE						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

Bibliographic data provided for information purposes

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.

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.

** Marketed by Climalife.*

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.

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.