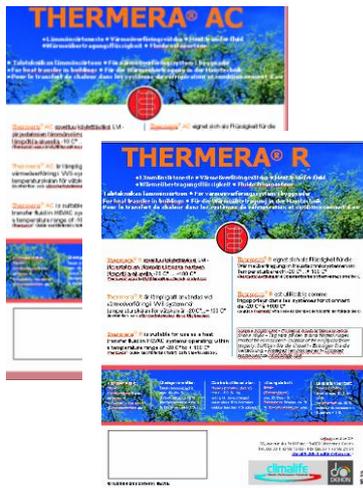




VIN-FP-116/006

THERMERA® AC - THERMERA® R



Non contractual photos

Thermera® is an environmentally friendly heat transfer/secondary refrigerant fluid for heating, ventilation, air conditioning (HVAC) and refrigeration systems.

Made from a betaine base (a natural compound produced when manufacturing sugar), **Thermera®** is non-toxic and meets the demands of HVAC systems in buildings or in a food technology or refrigeration environment.

Thermera® has excellent anti-corrosion properties, interesting viscosities and must be used in closed circuits where the working temperature remains between -20°C and +65°C depending on the formulation.

This product is always supplied in a ready-to-use format and should under no circumstances be diluted.

Available in 2 formulations:

- **Thermera® AC** with frost protection up to -15°C, can be used in circuits with a minimum temperature of up to -10 °C.
- **Thermera® R** with frost protection up to -35°C, can be used in circuits with a minimum temperature of up to -20 °C.

Available in :

- 20 litre cans
- 200 litre barrels
- 970 litre containers



1. PHYSICAL PROPERTIES OF THERMERA®

1.1. Principal characteristics

Appearance	: brown liquid
Relative density at 25°C	: 1,050 at 1,100 kg/m ³
Boiling point (NF R 15-602-4).....	: 105-110°C +/- 2 °C
pH	: between 7 and 9
Flash point	: /
Solubility	: soluble in 160g/100g H ₂ O

(The values shown above have been taken from the specification valid on the date of publication of this product data sheet.)

The maximum continuous operating temperature for all Thermera formulations is +65°C. Above this temperature, betaine degrades slowly, through a degradation process that accelerates above 100°C. The degradation products of betaine are neither corrosive, nor harmful to man or the environment.

1.2. Table of properties

Freezing point of **Thermera® AC**: -15°C
Minimum operating temperature -10°C

Freezing point of **Thermera® R**: -35°C
Minimum operating temperature -20°C

Density kg/m³

Temperature [°C]	Thermera® AC	Thermera® R
-20	-	1,110.0
-15	-	1,108.0
-10	1,076.9	1,106.0
0	1,073.8	1,101.7
15	1,068.5	1,095.2
20	1,066.5	1,092.9
50	1,052.4	1,078.2

Cinematic viscosity (mm²/s)

Temperature [°C]	Thermera® AC	Thermera® R
-20	-	43.0
-15	-	31.7
-10	9.4	24.0
-5	7.5	18.6
0	6.2	14.7
5	5.2	11.9
20	3.2	6.8
40	2.0	3.8

Specific heat capacity (kJ/kgK)

Temperature [°C]	Thermera® AC	Thermera® R
-20	-	2.80
-15	-	2.82
-10	3.11	2.84
-5	3.12	2.86
0	3.13	2.88
5	3.14	2.90
20	3.17	2.95
40	3.21	3.01
60	3.24	3.07
80	3.26	3.12

Conductivity (W/m, °C)

Temperature [°C]	Thermera® AC	Thermera® R
-20	-	0.349
-15	-	0.351
-10	0.404	0.352
-5	0.406	0.354
0	0.408	0.355
5	0.410	0.357
20	0.416	0.361
40	0.424	0.367
60	0.432	0.373
80	0.440	0.379



1.3. Anti corrosion protection of Thermera®

Thermera® is a formulation with additives that protect against corrosion. Corrosion may be defined as the wear placed on a material as the result of an electrochemical phenomenon.

The rate at which the material is worn away, or its “corrosion rate”, is expressed in microns per year ($\mu\text{m}/\text{yr}$) and may be determined by measuring the electrical current generated by the corrosion, or, more directly, by measuring the wear visited on the raw material.

Corrosion rates of **Thermera®** for different materials:

Materials	Water Corrosion rate in $\mu\text{m}/\text{yr}$	Thermera® Corrosion rate in $\mu\text{m}/\text{yr}$	Thermera® Mass loss in mg/cm
Copper	1.6	0.3	0.267
Carbon steel Fe37	68.0	0.3	0.24
Brass	0.9	0.3	0.24
Bronze	1.7	0.3	0.2673
Cast iron	95.0	22.0	15.4
Aluminium	18.0	2.4	0.648
Zinc	Not tested	4.0	2.88

*Test carried out using a **Thermera®** product with a minimum betaine concentration of 35 %. The test method used was method ASTM 1384, at a temperature of 50 °C.*

Additives

Thermera® requires a much smaller concentration of additives than traditional products (less than 1 % - total active ingredients make up less than 0.1 % of the final product) and is a non-corrosive product.

Thermera® is lightly perfumed with a scented substance used in the food industry (less than 1 %).

The anti-corrosion protection provided by **Thermera® AC** is equal in every respect to that provided by **Thermera® R**.



2. RECOMMENDATIONS FOR IMPLEMENTING AND USING THERMERA®

2.1. Usage characteristics

Thermera® is designed for closed circuits and systems. In an open system, some of the water in the formulation could potentially evaporate and alter the concentration of the product. Oxygen could also dissolve in the solution and create corrosion oxygenation (as with all heat transfer fluids.)

It is absolutely not recommended to use heat transfer in an open circuit.

The maximum recommended operating temperature for **Thermera®** products is +65°C.

Above this temperature, betaine begins to become unstable, and certain alterations may take place.

Betaine, which is the principal component of **Thermera®**, prevents the development of microbes in any fluid where its concentration is greater than 20%.

Thermera® offers excellent thermal and microbiological stability and contains very few inhibitors.

2.2. Compatibility with other materials

Thermera® is compatible with the usual materials: copper, carbon steel, brass, tin, cast iron and stainless steel.

It is compatible with elastomers and sealing joints used in conventional systems operating with glycol-based solutions.

We recommend that you use “pressurised” air vent valves (or a gas purger), or at least one manual air vent valve, valves with spherical bodies, and welded and flanged joints. If the system includes filters, these must be cleanable.

Thermera® is compatible with all traditional pumps designed for heat transfer fluids, as long as their joints are glycol-resistant.



2.3. Cleaning the installation

It is highly advisable that the installation is thoroughly cleaned using Dispersant D* before filling with **Thermera®** to remove any metal oxide deposits.

The cleaning procedure is as follows:

- Circulate water in the system for 1 to 2 hours, and then drain the installation quickly and fully to the lowest point
- Prepare and add "Dispersant D*" solution to 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
- Rinse thoroughly with water until it runs clear and the pH is approximately 7 (± 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 deposits on the installation and it is seriously oxidised with scale, it is advisable to first treat the circulation with a solution of "Desoxydant P*" at approximately 100 g/l of water at 50°C for 2 hours.

After it has been emptied, follow the treatment with "Dispersant D*" in the abovementioned manner.

It is important not to leave the installation empty after cleaning and filling with **Thermera®** without delay.

2.4. Introducing Thermera® into the installation

The system must be filled using the lower entry valve so as to best utilise the de-aerating system. The personnel working the installation must know the theoretical volume of the system. If the volume of fluid introduced is much less than the theoretical volume, it is possible that an air bubble, for example, might be found in the system.

First test that the system is working properly and then check the volume of heat transfer fluid.

If there is air in the system, you may need to add more fluid.

If you need to check the condition of the fluid during operation, you should draw the first sample at this point. Any subsequent samples can then be compared to this one.

2.5. Installation controls

To check that the condition of the fluid has not changed, simply draw samples at regular intervals, beginning with one immediately after the installation has been filled, and compare all with the first sample. You should check anti-freeze properties, pH and the condition of any additives.

You should also check for any leakages as part of your follow-up controls. Thermera leakage areas present themselves as light white deposits, consisting non-toxic betaine crystals.

The deposits are not dangerous, and may be wiped off with a damp cloth.

If the system needs to be refilled, add the appropriate **Thermera®**.

Thermera® should be stored in a hermetically sealed container and protected from the weather.

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.

