



NEW NON-TOXIC, HIGH-PERFORMANCE HEAT TRANSFER FLUID for heating, ventilation, air-conditioning and refrigeration systems and industrial applications

Thermera®, a new non-toxic, high-performance heat transfer fluid for use in heat-recovery units, air conditioning, heat pumps and industrial applications, has been developed by Fortum Oil & Gas Oy of FIN-06101 Porvoo, Finland. The basis of Thermera® is natural, water-soluble, biodegradable betaine, a by-product of sugar beet processing, which is separated from molasses using a method developed by the world's leading supplier of betaine, Finnfeeds Finland Oy, a subsidiary of Danisco.

Fortum supply two standard grades: Thermera® -15 and Thermera® -35, which are designed for use in closed circuits operating in the temperature ranges -15°C to $+110^{\circ}\text{C}$ and -35°C to $+110^{\circ}\text{C}$ respectively. However, special grades can be produced with the freezing protection customised to meet end-users' requirements. Thermera® thermal performance equals or exceeds that of conventional heat transfer fluids like glycols; life-cycle costs are easily competitive with those of glycols, because used Thermera® is not toxic waste.

Environmentally friendly

Because betaine is a biodegradable product, Thermera® has an extremely low environmental impact and can be disposed of like ordinary waste water, unlike glycol-based heat-transfer fluids which need to be disposed of in a hazardous waste incinerator. The constituents of standard Thermera® grades are 35 or 50 % betaine (trimethylglycine), 64 or 49 % purified water, <1 % corrosion inhibitor, and <1 % odorant.

Corrosion resistance

Additional advantages of Thermera® include excellent cold-flow and anti-corrosion characteristics, which have been further enhanced by the inclusion of environmentally benign additives.

Thorough independent corrosion-rate tests were carried out to establish the speed of change in the metal thickness of pipes and vessels, expressed as micrometers per annum (ASTM 1384 equivalent test). Using a Thermera® -15 solution, it was shown that the corrosion rate for steel and copper was as low as 0,3 µm p.a. (mass loss 0,2 mg).

Thermera is always supplied as a ready-to-use solution in containers according to customer requirements. Local availability of Thermera® and other information can be obtained from thermera@fortum.com

Independent testing

Prior to the launch of Thermera®, independent physical tests were carried out on the product at Lappeenranta University of Technology, stability tests at the University of Jyväskylä, circuit analyses at VTT - The Technical Research Centre of Finland and biochemical analyses at Danisco.

Two Nokia office buildings equipped with ABB Fläkt air-conditioning systems are the largest office sites currently using Thermera®. To date, the most significant user of Thermera® for industrial processes is Finnfeeds Finland's production plant in Naantali, Finland.

In most cases Thermera® can successfully replace conventional heat transfer fluids without the need for changes to operating parameters or the physical dimensions of the heat transfer system. However, all existing fluid should be removed and the pipework rinsed with water before Thermera is used in the system.

10% market share

According to Janne Jokinen, Product Manager at Fortum: "There is no comparable non-toxic alternative to Thermera® currently available, so we expect to achieve at least a 10% share of Finland's heat-transfer market within 2-3 years. But our goal is, of course, to market Thermera® worldwide."

Thermera® has already been patented in the EU, USA, Canada, Japan, China and Russia by Fortum, which is an ISO 9001 certified company.