

# TYFOCOR<sup>®</sup> HTL

**Frost Protection -35 °C**

Nitrite-Free, Ready-to-Use Heat Transfer Fluid Based on  
Non-Toxic Glycols, Especially for Utilization in Solar  
Heating Equipment under Elevated Thermal Conditions



## Characteristics of TYFOCOR® HTL

Chemical composition	1,2-propylene glycol, polyglycol, water, and inhibitors	
Appearance	Clear liquid without solid extraneous material. Color: blue-green	
Density (20 °C)	1.0525–1.0555 g/cm <sup>3</sup>	ASTM D 1122
Refractive index (20 °C)	1.3930–1.3955	DIN 51757
pH value (20 °C)	7.5–8.5	ASTM D 1287
Alkali reserve	min. 9 ml 0.1 n HCl	ASTM D 1121
Viscosity	6.5–8.0 mm <sup>2</sup> /s	DIN 51562
Boiling point	107 °C	ASTM D 1120
Flash point	none	DIN 51376
Content of water	approx. 50 %	DIN 51777
Frost resistance	down to –35 °C	ASTM D 1177

Above mentioned average data are typical and representative of the product. They do not possess the significance of a product specification. Specified characteristic values are part of a particular product specification.

## Properties

**TYFOCOR® HTL** is a clear, blue-green colored liquid with a faint odour and is based on 1,2-propylene glycol and polyethylene glycol.

The corrosion inhibitors contained in **TYFOCOR® HTL** reliably protect the metals normally used in solar collectors and other heating equipment against corrosion, ageing and deposits over long periods. Static temperatures higher than 200 °C casually may cause formation of decomposition products. In this case, the combination of selected glycols and inhibitors prevents the solar installation from breakdown if the customer holds to the application guidelines given below.

**TYFOCOR® HTL** does not contain any nitrites, phosphates or amines.

## Application

**TYFOCOR® HTL** is utilizable for solar heating equipment with high stagnation temperatures (evacuated tubular collectors).

## Temperature stability in solar heating equipment

**TYFOCOR® HTL** should be exposed to temperatures higher than 170 °C only for short periods of time. Sustained exposure to temperatures higher than 200 °C causes chemical change (e.g. darkening, decomposition), and therefore the heat transfer fluid may age prematurely. In order to keep the temperature strain of **TYFOCOR® HTL** as low as possible under static conditions, we recommend that the capacity of the expansion tanks should be sufficient to ensure that all of the heat transfer fluid can drain out of the solar collectors. It should be ensured that during stagnation operation of the solar equipment discharge of **TYFOCOR® HTL** into the collectors will be interrupted when a fluid temperature of more than 170 °C is reached.

## Corrosion tests

according to ASTM D 1384:

Metals or alloys		Average change in weight of coupons
Copper	(SF Cu)	±0.1 g/m <sup>2</sup>
Soft solder	(L Sn 30)	±0.2 g/m <sup>2</sup>
Brass	(MS 63)	±0.1 g/m <sup>2</sup>
Steel	(HI)	±0.1 g/m <sup>2</sup>
Cast Iron	(GG 26)	±0.2 g/m <sup>2</sup>
Cast Aluminium	(G-ALSi6Cu4)	±0.2 g/m <sup>2</sup>

## Elastomer resistance

**TYFOCOR® HTL** does not attack the sealants normally used in heating systems. The following list of sealants, elastomers and plastics that are resistant to **TYFOCOR® HTL** has been compiled from experimental results, experience, and the literature.

Examples of sealants are Fermit® and Fermitol® (registered trademarks of Nissen & Volk GmbH, Hamburg), and hemp

Butyl rubber	IIR
Chloroprene	CR
Ethylene propylene-diene-rubber	EPDM
Fluorocarbon elastomers	FPM
Nitrile rubber	NBR
Nylon at temperatures up to 115 °C	PA
Polyethylene, soft/hard	PE-LD/PE-HD
Polyethylene, cross-linked	VPE
Polypropylene	PP
Polytetrafluoroethylene	PTFE
Polyvinyl chloride, rigid	PVC h
Styrene-butadiene-rubber at temperatures up to 100 °C	SBR
Unsaturated polyester resins	UP

Phenolic and urea resins, plasticized PVC, and polyurethane elastomers are not resistant.

An important point to note is that the performance of elastomers such as EPDM is determined by the nature and amount of the constituent additives and the vulcanization conditions, as well as the properties of the rubber itself. For this reason, we would recommend testing the resistance of these elastomers to **TYFOCOR® HTL** before they are put into service for the first time. This applies particularly to elastomers intended as membranes for expansion tanks as described in DIN 4807.

Gaskets made from Aramid and special NBR, such as Centellen 3820\*, and elastomer gaskets up to 180 °C made from 70 EPDM 281\*\* have been shown to be resistant to hot **TYFOCOR® HTL**.

\* Hecker Werke GmbH & Co., D-71093 Weil im Schönbuch

\*\* C. Freudenberg Dichtungs- u. Schwingungstechnik, Pf 100363, D-69465 Weinheim

## Application guidelines

In view of the specific properties of **TYFOCOR® HTL**, the following instructions must be adhered to for ensuring long-term protection.

- 1.** Solar heating equipment must be designed as a closed circuit, because exposure to atmospheric oxygen causes the inhibitors in **TYFOCOR® HTL** to be consumed more rapidly.
- 2.** Flexible-membrane expansion tanks must conform to DIN 4807.
- 3.** The use of soft solder on joints is admissible, but silver or copper brazing solders are to be utilized preferably. Fluxes must not contain any chlorides.
- 4.** The only flexible connections that are permissible are hoses, preferably metal, that do not permit the diffusion of oxygen.
- 5.** Equipment must not be fitted with galvanised heat exchangers, heat reservoirs, tanks or pipes, because glycol/water mixtures can corrode zinc.
- 6.** It must be ensured that no external voltages are applied between items of equipment that come into contact with **TYFOCOR® HTL**, as otherwise corrosion may occur.
- 7.** The layout of the tubes must ensure that circulation cannot be disturbed by gas pockets or deposits.
- 8.** The level of the heat transfer liquid must never be allowed to fall below the highest point in the system.
- 9.** Dirt and water must not be allowed to enter the installation or its components during assembly and before filling. After assembly has been completed and the connections have been soldered, the system must be flushed to remove any foreign matter (swarf, fluxes, etc.) and assembly aids. For reason of corrosion protection, the water must be removed completely after the cleansing process has been finished. The system should then be filled by the heat transfer fluid immediately.
- 10.** It must be ensured that no air pockets remain in the installation after it has been filled. It is essential to eliminate gas pockets, because a vacuum would be formed if they collapsed following a drop in temperature, and this would cause air to be sucked into the system.
- 11.** In order to ensure that there are no obstructions to the flow of the heat transfer liquid, the in-circuit filters must be cleaned within 14 days, at the latest, after the equipment has been filled with heat transfer fluid and put into operation for the first time.
- 12.** If losses occur due to leakage or discharge, the system must be topped up with **TYFOCOR® HTL**.

## Shelf life

**TYFOCOR® HTL** has a shelf life of at least three years in airtight containers. It must not be stored in galvanised containers, due to reasons of corrosion protection.

## Packaging

**TYFOCOR® HTL** is supplied in 200 l non-returnable drums, in 30 l, 20 l, and 10 l non-returnable cans.

## Safety Data Sheet

A Safety Data Sheet has been drawn up for **TYFOCOR® HTL** in accordance with EEC Directives 91/155/EEC and 2001/58/EEC, resp.

## Disposal

**TYFOCOR® HTL** spills must be taken up with an absorbent binder and disposed of in accordance with the regulations. **TYFOCOR® HTL** can be disposed of by special treatment, e.g. combustion in an authorized incinerator, in accordance with local authority regulations. Regulations on waste avoidance and disposal must be observed.

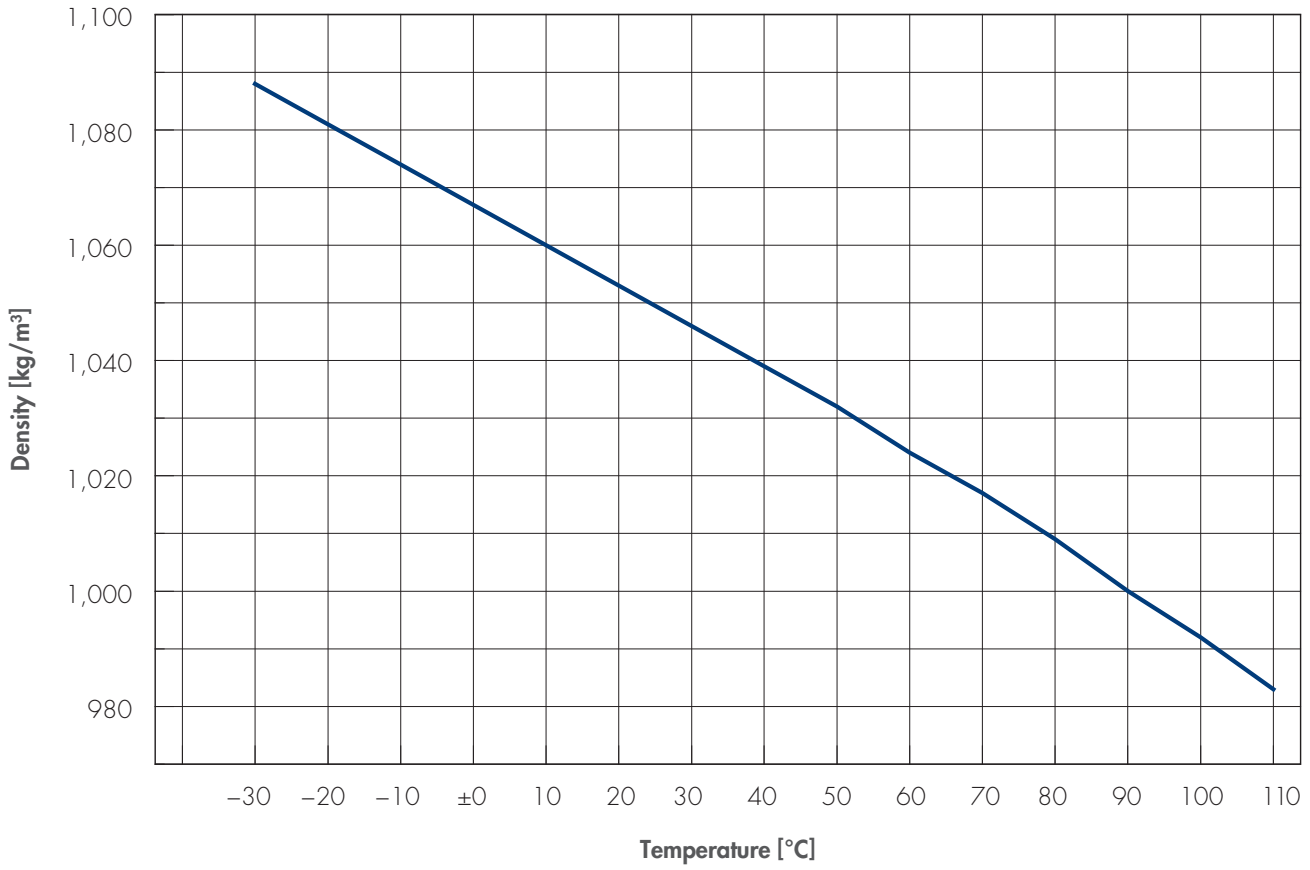
## Ecology

**TYFOCOR® HTL** is biodegradable. It does not impair the efficiency of the activated sludge if it is run with the appropriate care into an acclimated effluent treatment plant.

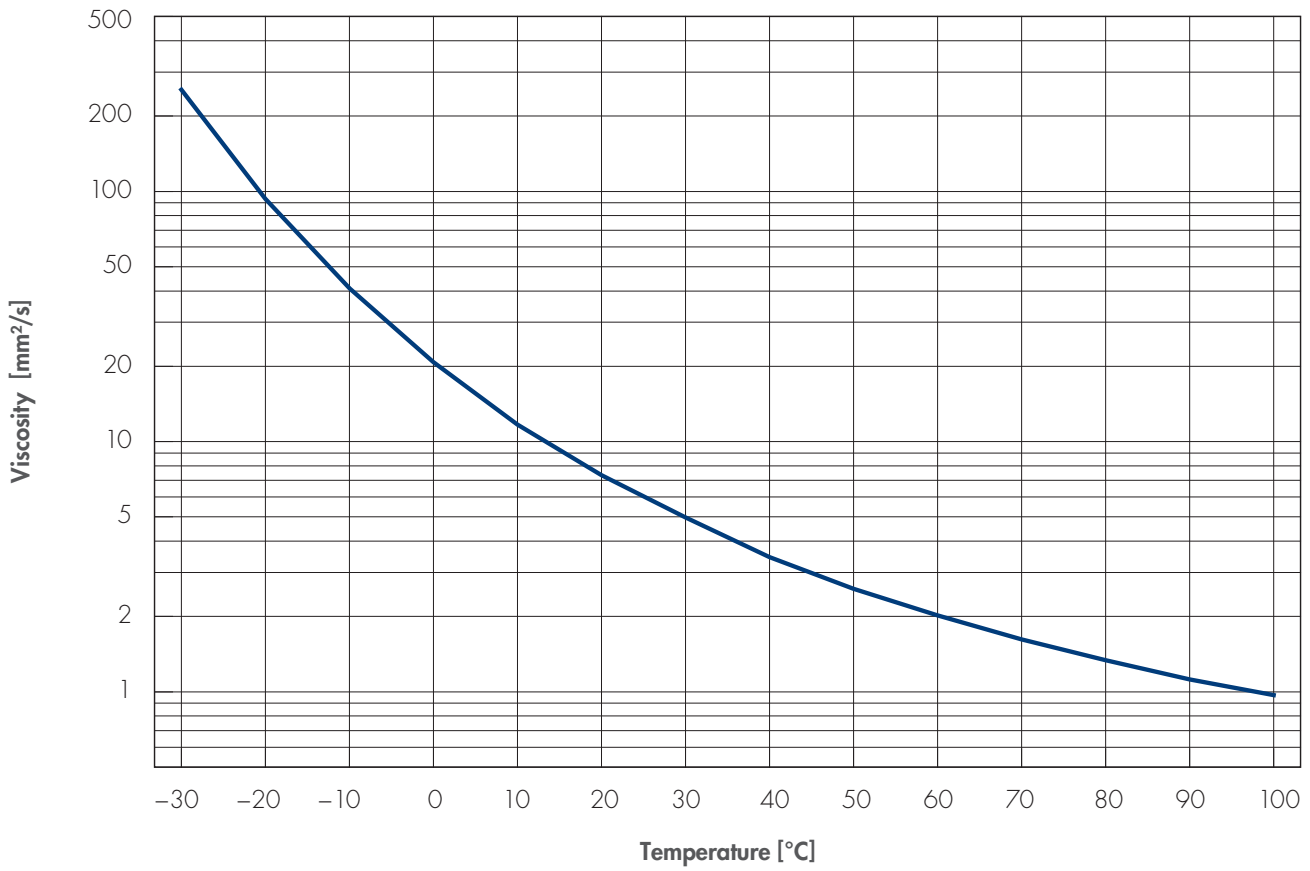
## Handling

The usual safety and industrial hygiene measures relating to chemicals and flammable liquids must be observed in handling **TYFOCOR® HTL**. The information and instructions given in our Safety Data Sheet must be strictly observed.

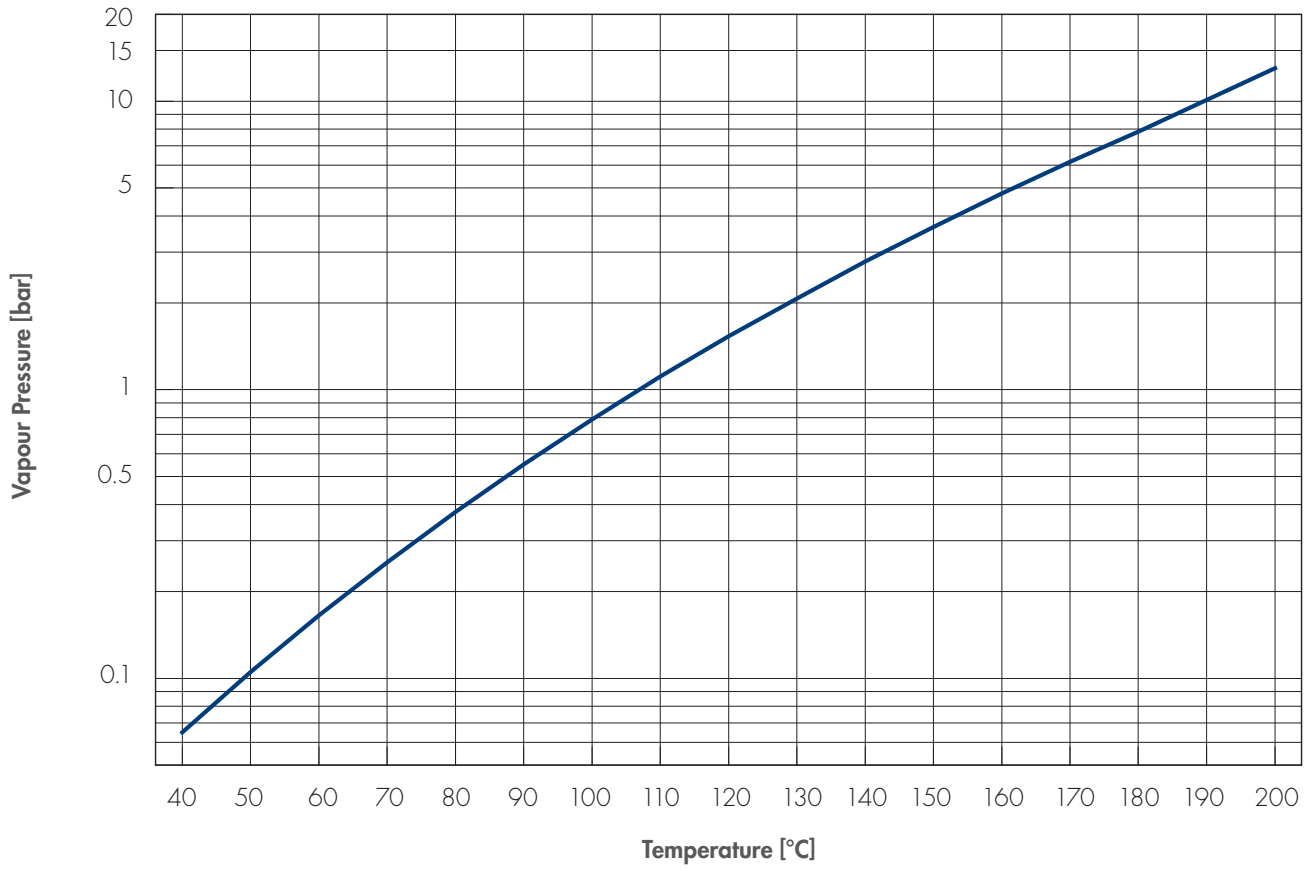
Density of TYFOCOR® HTL



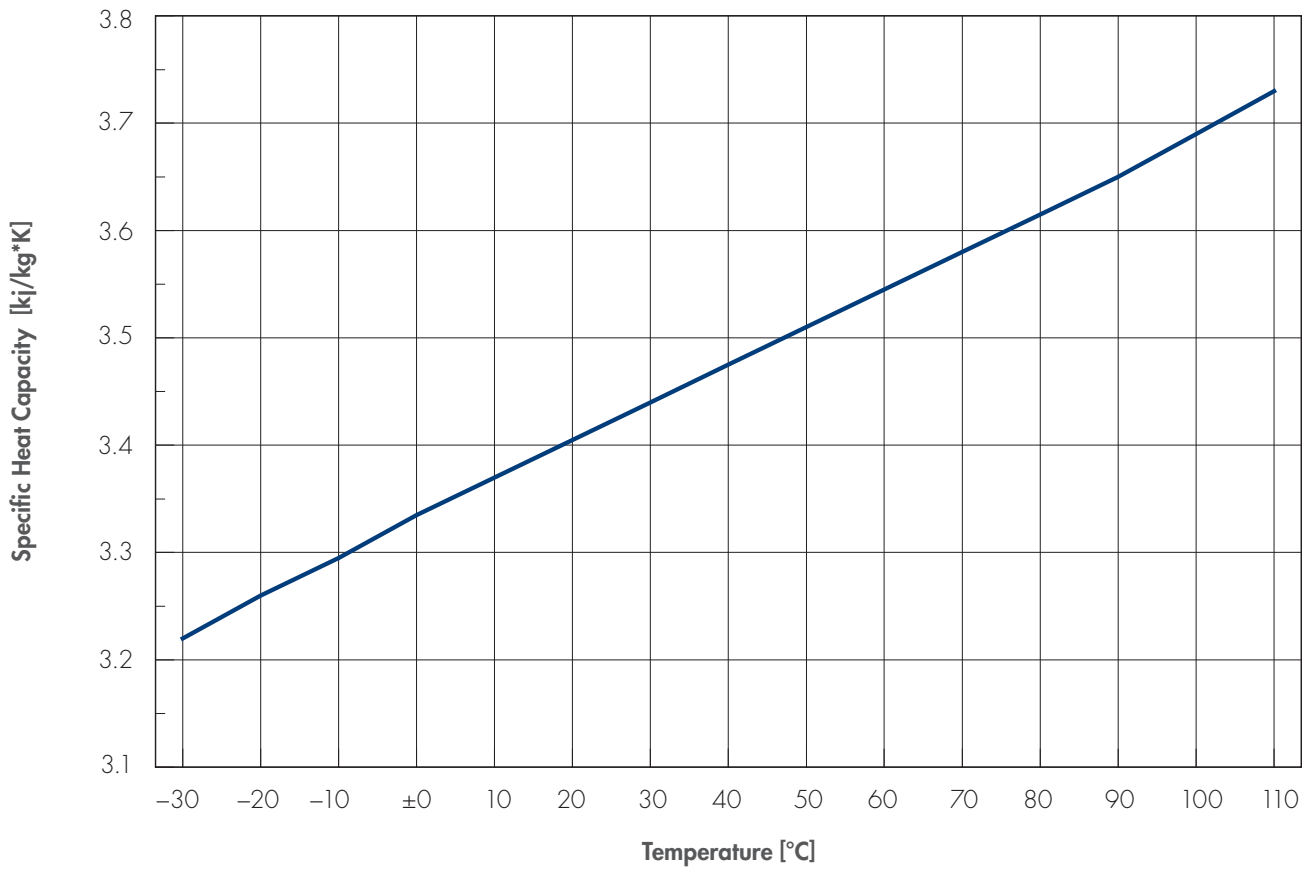
Kinematic Viscosity of TYFOCOR® HTL



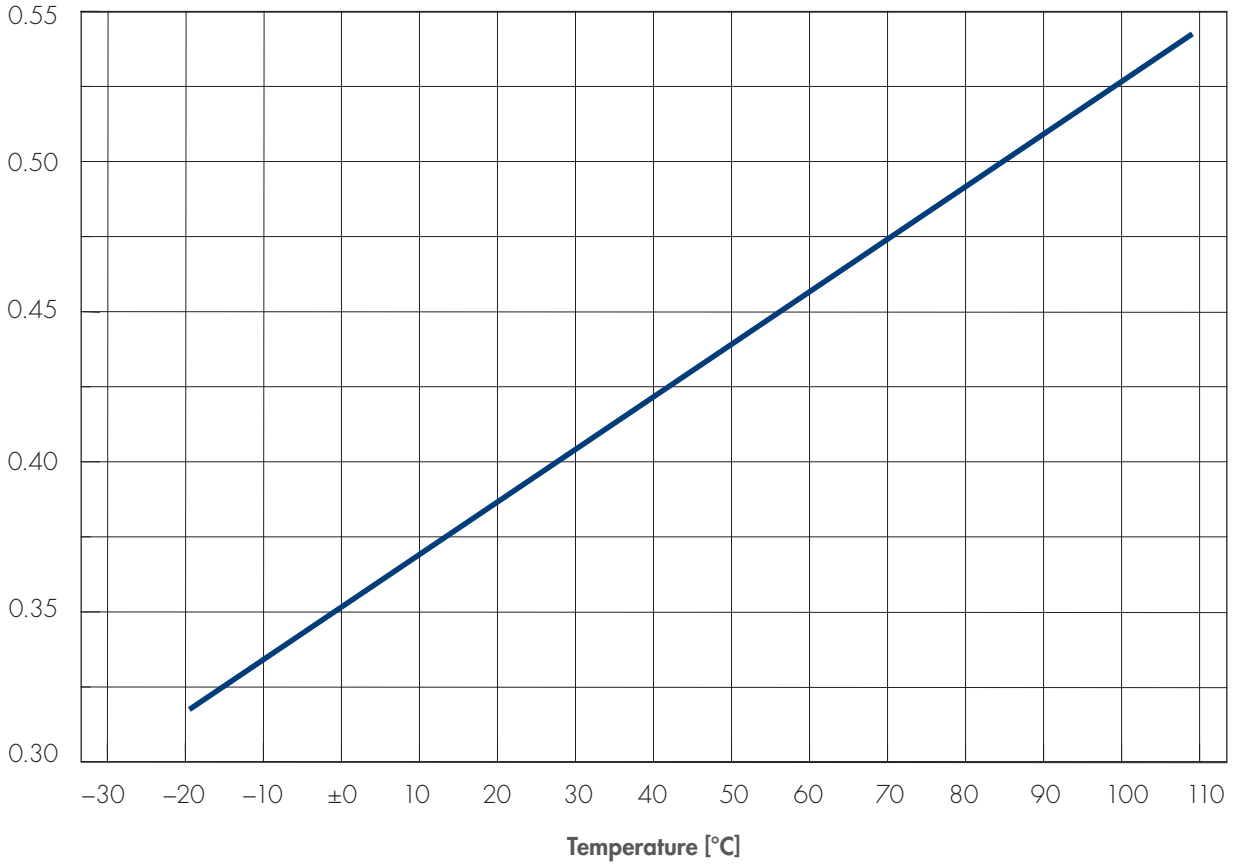
**Vapour Pressure of TYFOCOR® HTL**



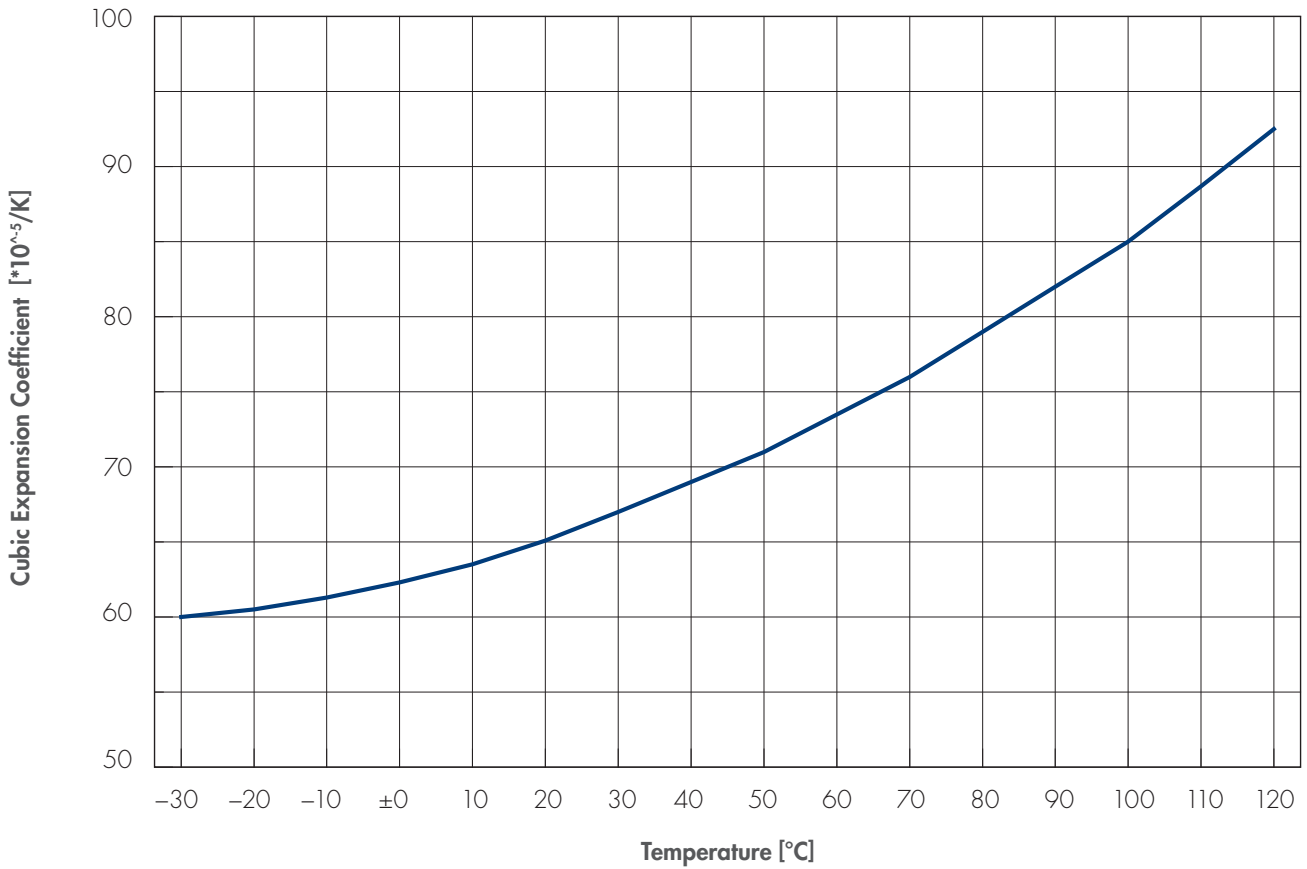
**Specific Heat Capacity of TYFOCOR® HTL**



**Thermal Conductivity of TYFOCOR® HTL [W/m·K]**



**Cubic Expansion Coefficient of TYFOCOR® HTL**



**Note**

The information submitted in this publication is based on our current knowledge and experience. In view of the many factors that may affect processing and application these data do not relieve processors of the responsibility of carrying out their own tests and experiments, neither do they imply any legally binding assurance of certain properties or of suitability for a specific purpose. It is the responsibility of those to whom we supply our products to ensure that any proprietary rights and existing laws and legislations are observed.

# The TYFO product range

**TYFOCOR®** is a long-life, corrosion-inhibiting antifreeze based on ethylene glycol for cooling and heating, air-conditioning, heat pump, and under-soil heating systems. It can be supplied as a concentrate or a pre-mixed, ready-to-use product as desired.

**TYFOCOR® GE** is a long-life, corrosion-inhibiting antifreeze based on ethylene glycol specially formulated for use in geothermal heat pump systems, air conditioning units, and under-soil heating. It can be supplied as desired in the form of a concentrate or a pre-mixed, ready-to-use product.

**TYFOCOR® L** is a long-life corrosion-inhibiting antifreeze based on propylene glycol for heating and air-conditioning, solar thermal, and heat pump systems. It is also used as a special food-grade brine by food and beverage manufacturers and is supplied both as a concentrate and a pre-mixed, ready-to-use product.

**TYFOCOR® Leco®** is a long-life corrosion-inhibiting antifreeze based on propylene glycol that covers the same applications as **TYFOCOR® L**. Practically all of the substances contained in the product are derived from 100% renewable resources.

**TYFOCOR® LS®** is a special, ready-to-use, almost completely vaporizable, propylene-glycol-based heat transfer fluid for use in solar systems that are subject to extreme thermal conditions.

**TYFOCOR® G-LS** is a special, ready-to-use, almost completely vaporizable, propylene-glycol-based heat transfer fluid for use in solar systems that are subject to extreme thermal conditions. It contains a glass protection additive that makes it suitable for use in all-glass solar collectors.

**TYFOCOR® HTL** is a special, ready-to-use heat transfer fluid based on non-toxic glycols for use in solar systems that are subject to extreme thermal conditions.

**TYFO-SPEZIAL** is a special, high-performance brine formulated for geothermal heat pumps located in areas subject to special government regulations. Due to its lack of glycols, it does not cause any underground biological oxygen depletion in the event of a leak.

**TYFOXIT® 1.15–1.25** are non-toxic, high-performance, glycol-free secondary coolants based on potassium acetate with very low viscosities for chiller systems with secondary cooling. They are available as concentrates (**TYFOXIT® 1.25**) and ready-to-use mixtures ranging from  $-20\text{ °C}$  (**TYFOXIT® 1.15**) to  $-55\text{ °C}$  (**TYFOXIT® 1.25**).

**TYFOXIT® F15–50** are non-toxic, high-performance, glycol-free, potassium-formate-based secondary coolants with very low viscosities for chiller systems with secondary cooling. They are available as ready-to-use mixtures ranging from  $-15\text{ °C}$  (**TYFOXIT® F15**) to  $-50\text{ °C}$  (**TYFOXIT® F50**).

To learn more about our products, visit [www.tyfo.de](http://www.tyfo.de)





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