Technical Information

TYFOCOR® G-LS

Frost Protection –28 °C

Ready-to-Use Vaporizable Special Heat Transfer Fluid
Based on 1,2-Propylene Glycol with Glass Protection,
for Use in Solar Heating Installations

TYFOROP Chemie GmbH

Applications for TYFO products

Renewable energy

Thermal solar systems place high demands on the properties of heat transfer fluids. Both during cold winter nights and under the hot midday sun — you need your solar system to work reliably, year in and year out. Our products make sure your solar thermal fluid remains liquid and pumpable all the way down to –30 °C while resisting breakdown up to 200 °C. Since there is always a possibility of leakage causing contamination of the hot water supply, solar thermal fluids must not present a health risk. That's why they are formulated with non-toxic propylene glycol. Heat transfer fluids for geothermal systems have it easier in comparison. Here, the main objective is to ensure that heat is transferred from the earth to the heat pump even when temperatures are below freezing, all the while protecting the system's components against corrosion. We also provide specialized products for drinking water protection zones and other areas that fall under special regulations.

Products: TYFOCOR®, GE, L, L-eco®, LS®, G-LS, HTL, LG

HVAC

Central air-conditioning systems in large buildings provide heat in the winter and cooling in the summer. To accomplish this, the heat transfer fluid in the central air-conditioning system is either heated or cooled and then transported to the heat exchangers in the individual rooms through piping. The heat transfer fluid used has to live up to all the demands placed on it regarding heat transfer and corrosion protection over an extended period of time and under both high and low temperatures. Even in buildings at remote locations which are not heated the entire winter through, our products prevent the heating system from freezing and thus ensure a long, trouble-free service life.

Products: TYFOCOR®, GE, L, L-eco®

Refrigeration

A number of technical processes require rapidly cooling equipment or components to very low temperatures. To achieve this, products are required which not only have good thermal transfer and corrosion inhibiting properties, but which also possess very low viscosities across the entire temperature range. This is the only way to ensure sufficient flow with rapid and efficient heat transfer.

Products:
TYFOCOR®, L, L-eco® | **TYFO**XIT® 1.15–1.25, F15–50

Food & Beverage

Wherever you look — refrigerated cases in the supermarket or steps during food and beverage processing: Excess heat has to be removed quickly and products need to be kept at consistently low temperatures to maintain shelf life. For use in the food and beverage industry, our products need to possess an additional quality beyond their technical specifications: they must be absolutely non-toxic. This is an important prerequisite to ensure that spills and even small leaks cannot lead to foods being contaminated with potentially hazardous substances.

Products: TYFOCOR® L, L-eco® | **TYFO**XIT® 1.15–1.25, F15–50

Characteristics of TYFOCOR® G-LS

Chemical composition	1,2-propylene glycol, water, and inhibitors	
Appearance	clear, violet coloured liquid	
Density (20 °C)	1.032–1.035 g/cm³	ASTM D 1122
Refraction nD20	1.380–1.384	DIN 51757
pH value	9.0–10.5	ASTM D 1287
Alkali reserve	> 12 ml 0.1 m HCl	ASTM D 1121
Viscosity (20 °C)	4.5–5.5 mm²/s	DIN 51562
Boiling point	102–105 °C	ASTM D 1120
Flash point	none	DIN 51376
Water content	55–58 %	DIN 51777
Frost protection	–28 °C	ASTM D 1177

The above data represent average values that were valid at the time when this Technical Information Bulletin went into print. They do not have the status of a product specification. Specified values are the subject of a special leaflet.

Properties

TYFOCOR® **G-LS** is a clear, violet liquid with a faint odour, based on physiologically unobjectionable 1,2-propylene glycol, and water. It has been designed especially for utilisation as a heat transfer fluid in solar systems running under elevated thermal conditions (vacuum tube collectors).

The corrosion inhibitors contained in **TYFO**COR® **G-LS** reliably protect the materials normally used in solar installations against corrosion, ageing and deposits over long periods. **TYFO**COR® **G-LS** prevents the surfaces of heat exchangers from becoming fouled, and ensures consistently high thermal efficiency of the solar system.

In order to maintain its specific properties, **TYFO**COR® **G-LS** must not be mixed with other heat transfer fluids, and must never be diluted by water. If leakages or other losses occur, the heat transfer fluid in the system must be replenished with **TYFO**COR® **G-LS** only.

Application

TYFOCOR® **G-LS** is utilisable for solar systems with high stagnation temperatures, if following instructions are properly observed:

It must be ensured that all of the heat transfer fluid can drain out of the solar collectors into the — sufficiently dimensioned — expansion tanks when the maximum static temperature is reached, and thus the collectors remain completely empty.

TYFOCOR® **G-LS** must not be exposed to sustained temperatures higher than 170 °C. Temperatures higher than 200 °C lead to slow thermal decomposition of propylene glycol, which is indicated by darkening of the fluid. The lifetime of the medium may be strongly decreased in this case.

Anticorrosion effect

TYFOCOR® **G-LS**'s anticorrosive effect is evident from the following table:

Corrosion test acc. ASTM D 1384 (American Society for Testing and Materials).

Material		Average change of weight
Copper	(SF Cu)	–2.0 g/m²
Soft solder	(L Sn 30)	–6.0 g/m²
Brass	(MS 63)	–4.0 g/m²
Steel	(HI)	–0.1 g/m²
Cast Iron	(GG 26)	–0.2 g/m²
Cast Aluminium	(G-AlSi6Cu4)	–0.3 g/m²

Compatibility with sealing materials

TYFOCOR® **G-LS** does not attack the sealants normally used in solar materials systems. The following list of sealants, elastomers and plastics that are resistant to **TYFO**COR® **G-LS** 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 below 150 °C	EPDM
Fluorocarbon elastomers	FPM
Natural rubber below 80 °C	NR
Nitrile rubber	NBR
Polyacetal	POM
Polyamides below 115 °C	PA
Polybutene	PB
Polyethylene, soft, hard	PE-LD, PE-HD
Polyethylene, crosslinked	PE-X
Polypropylene	PP
Polytetrafluoroethylene	PTFE
Polyvinylchloride, rigid	PVC h
Styrene butadiene rubber below 100 °C	SBR
Unsaturated polyester resins	UP

Phenolic and urea formaldehyde resins, plasticised 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 vulcanisation conditions, as well as the properties of the rubber itself. For this reason, we would recommend testing the resistance of these elastomers to **TYFO**COR® **G-LS** 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 that have proved to be resistant to hot **TYFO**COR® **G-LS** are: up to 160 °C: elastomer gaskets made from 70 EPDM 281*, and up to 200 °C: flat gaskets such as REINZ-AFM 34** or Centellen 3820***, basing on aramide/special-NBR.

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

** REINZ-Dichtungs-GmbH, Postfach 1909, D-89229 Neu-Ulm

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

Application guidelines

In view of the specific properties of **TYFO**COR® **G-LS**, the following instructions must be adhered to for ensuring long-term protection.

1. Solar heating equipment must be designed as closed circuits, because entry of atmospheric oxygen leads to premature ageing and consequently reduces the life-span of the heat transfer fluid.

2. Flexible-membrane expansion tanks must conform to DIN 4807.

3. Silver or copper brazing solders are to be utilised preferably on joints. Fluxes used in combination with soft solder usually contain chlorides. Their residues must be removed by thorough flushing of the system, because otherwise increased chloride concentration in the heat transfer fluid may lead to corrosion.

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 zinc is detached by 1,2-propylene glycol.

6. Chemically speaking, **TYFO**COR® **G-LS** is largely inert, but it is important to ensure that the manufacturer's recommendations state that all the seals and connectors used in solar heating equipment are resistant up to the maximum temperature of the medium.

7. Scaling on copper or copper alloys must be removed, because it can be detached by hot propylene glycol/water mixtures.

8. It must be ensured that no external voltages are applied between parts of the equipment that come into contact with **TYFO**COR® **G-LS**, as otherwise corrosion may occur.

9. The layout of the tubes must ensure that circulation cannot be disturbed by gas pockets or deposits.

10. The level of the heat transfer fluid must never be allowed to fall below the highest point in the system.

11. It must be ensured that no air pockets remain in the installation after it has been filled.

12. Dirt and water must not be allowed to enter the installation or its components during assembly and before filling. After assembly has been completed, the system must be flushed to remove any foreign matter (swarf, scale, packaging residues, sawdust, etc.) and material used in assembly.

13. In order to ensure that there are no obstructions to the flow of the heat transfer fluid, the in-circuit filters must be cleaned within 14 days, at the latest, after the system has been filled with the medium and put into operation for the first time.

14. If losses occur due to leakage or take-out, the heat transfer fluid in the system must be replenished with **TYFO**COR® **G-LS** only. Do not top up with water!

Packaging

TYFOCOR® **G-LS** is supplied in 10 l, 20 l, and 30 l non-returnable plastic cans, in 200 l non-returnable drums, and in road-tankers.

Safety

TYFOCOR® **G-LS** contains 1,2-propylene glycol and is not subject to labelling according to the regulations of the European Union.

Safety Data Sheet

A Safety Data Sheet has been compiled for **TYFO**COR® **G-LS** in accordance with EEC Directives 91/155/EEC and 2001/58/EEC, resp.

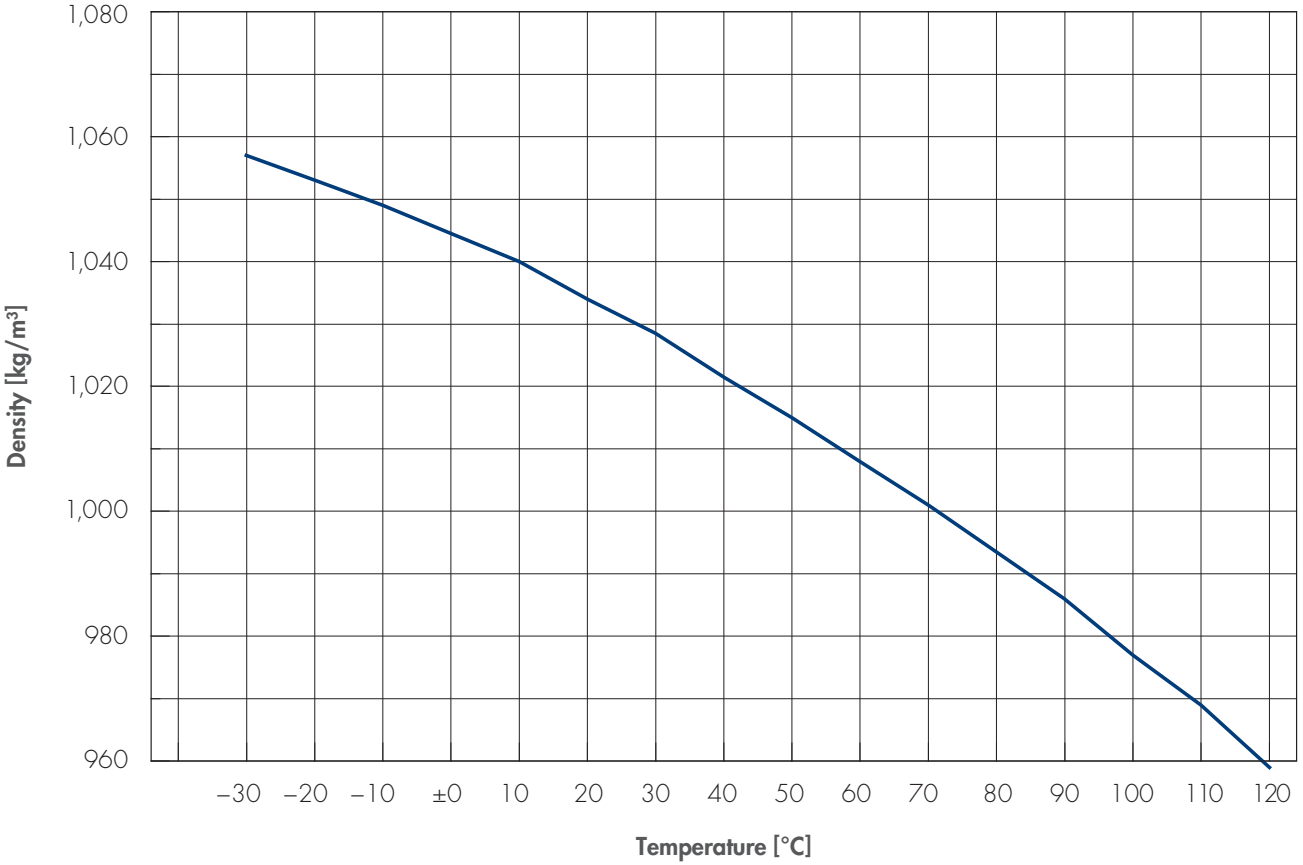
Handling

The usual safety and industrial hygiene measures relating to chemicals and flammable liquids, and the information and instructions given in our Safety Data Sheet must be observed in handling **TYFO**COR® **G-LS**.

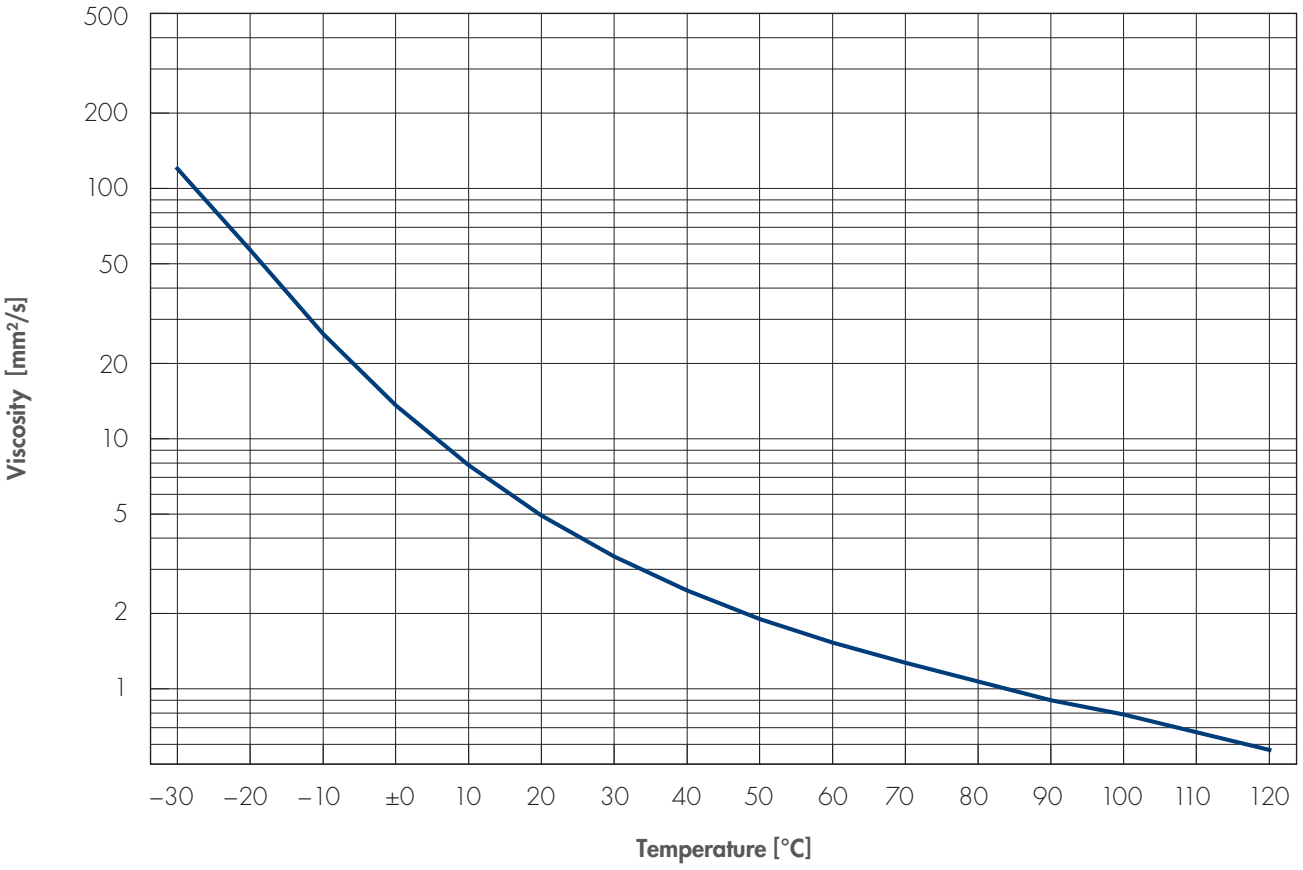
Ecology

TYFOCOR® **G-LS** is classified in water hazard class 1 (low-rate endanger-ing, Germany), acc. Annex 4, VwVwS of 17 May 1999. It is readily biodegradable. It does not impair the efficiency of the activated sludge if it is run with appropriate care into an acclimated effluent treatment plant.

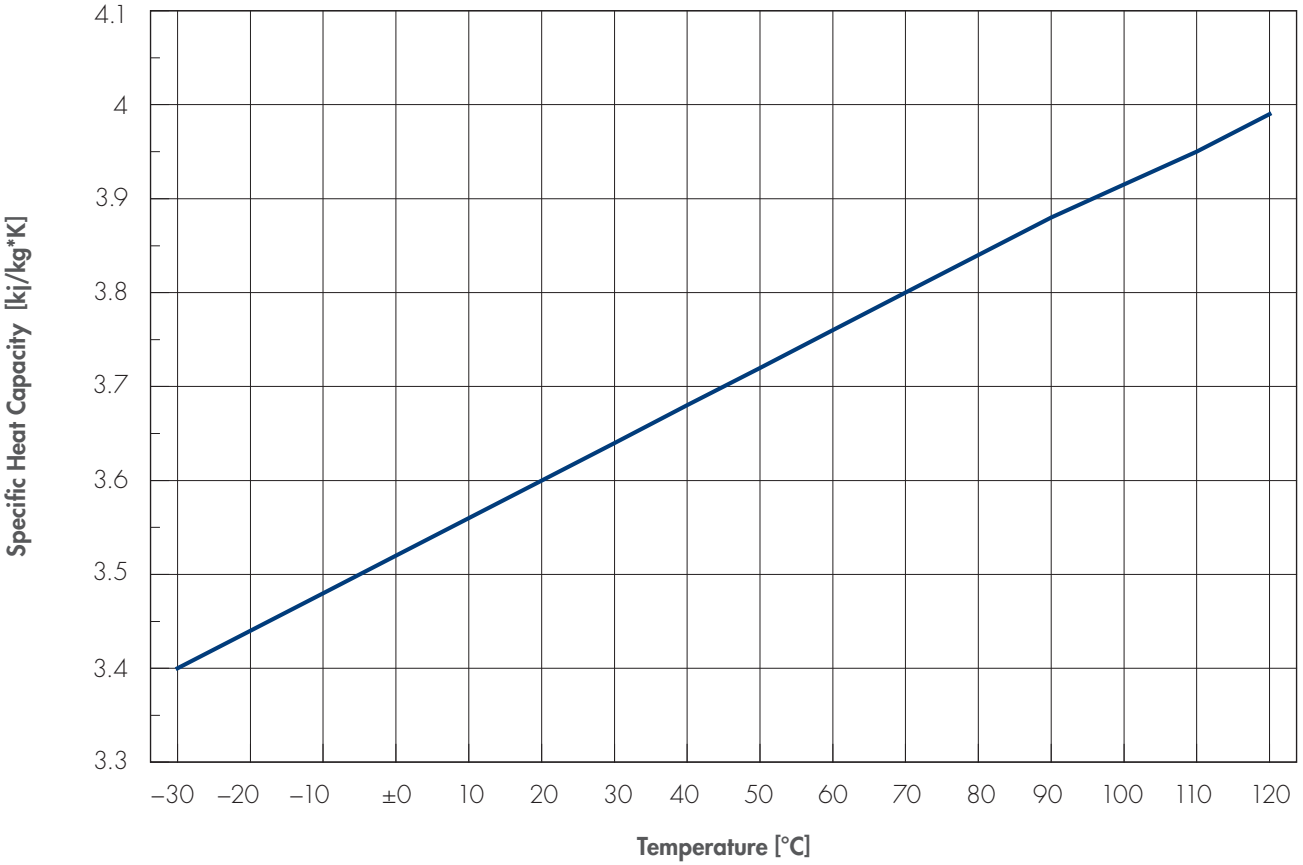
Density of TYFOCOR® G-LS



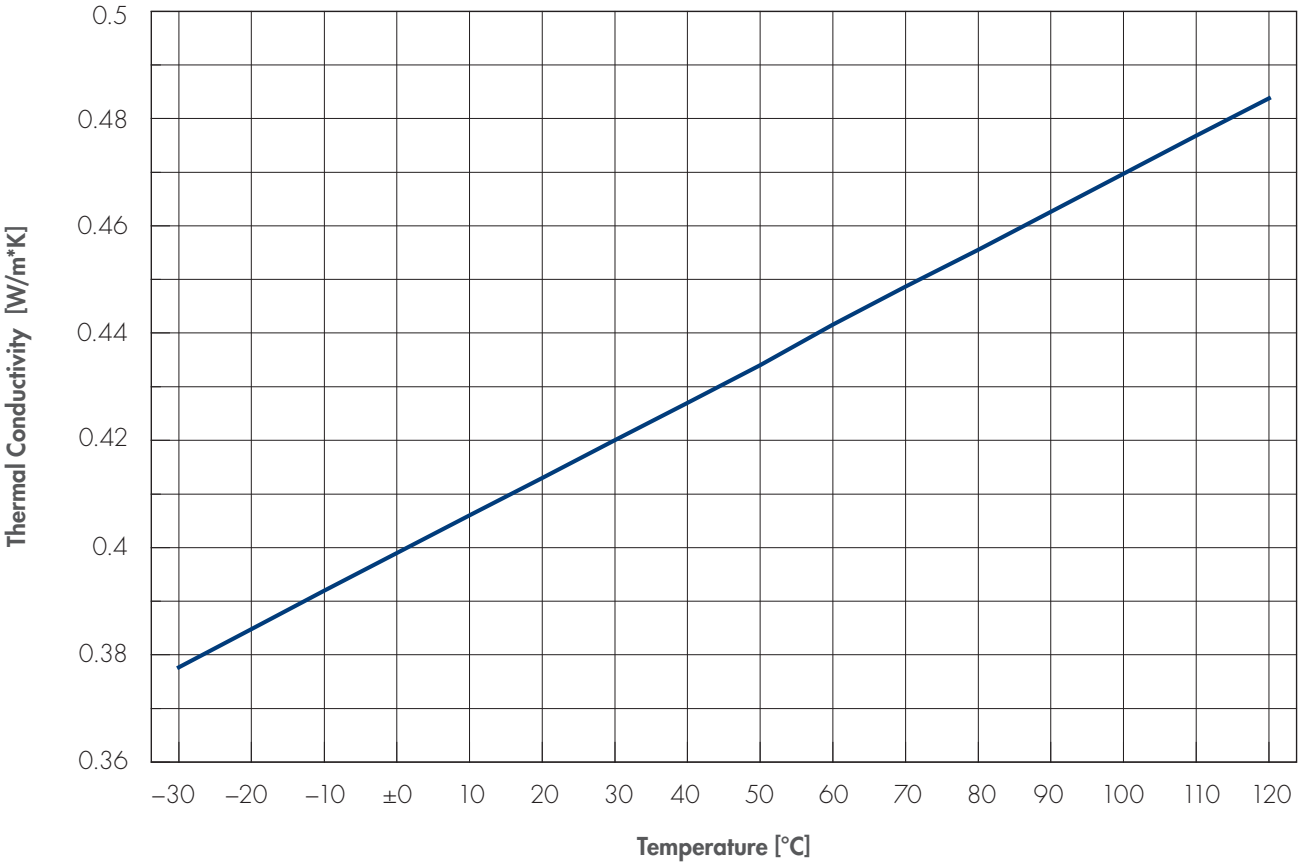
Kinematic Viscosity of TYFOCOR® G-LS



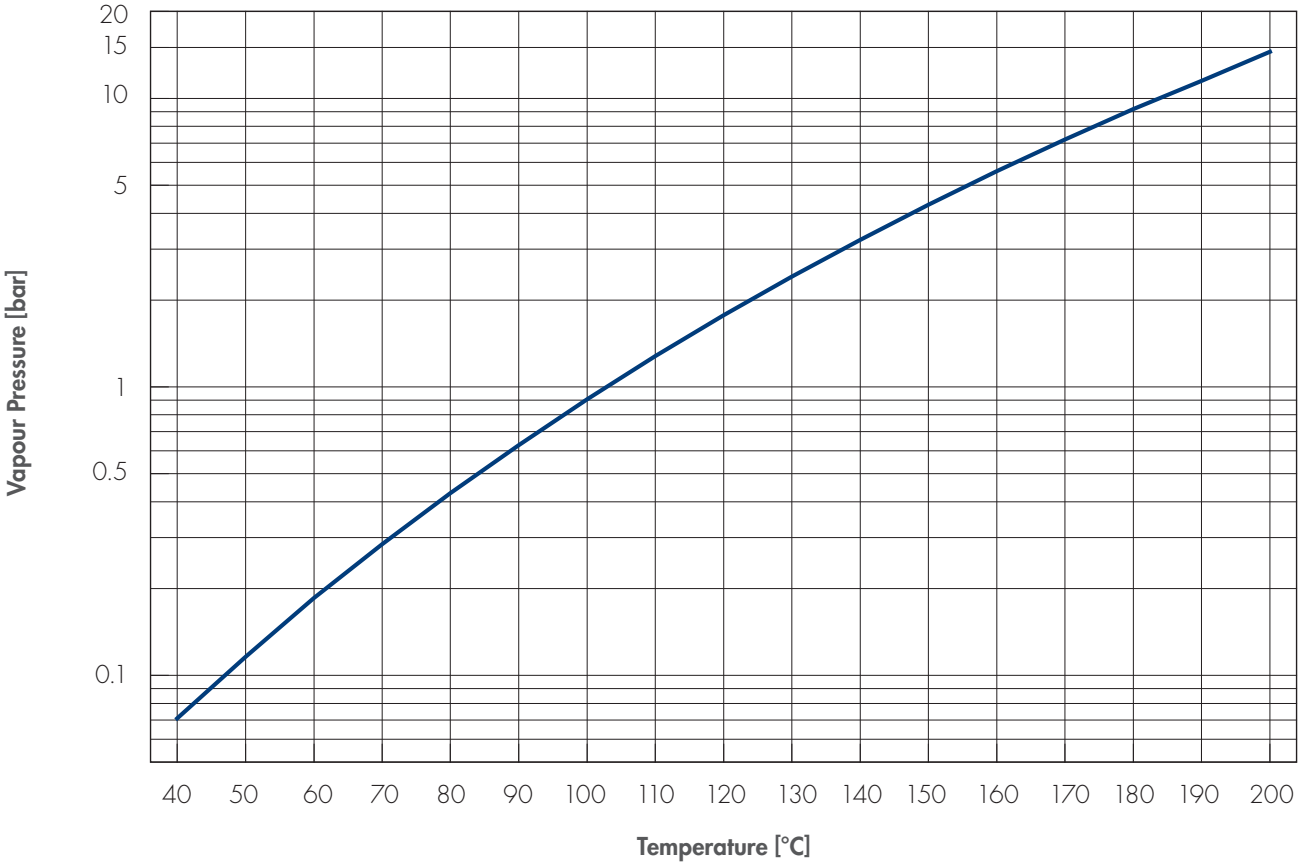
Specific Heat Capacity of TYFOCOR® G-LS



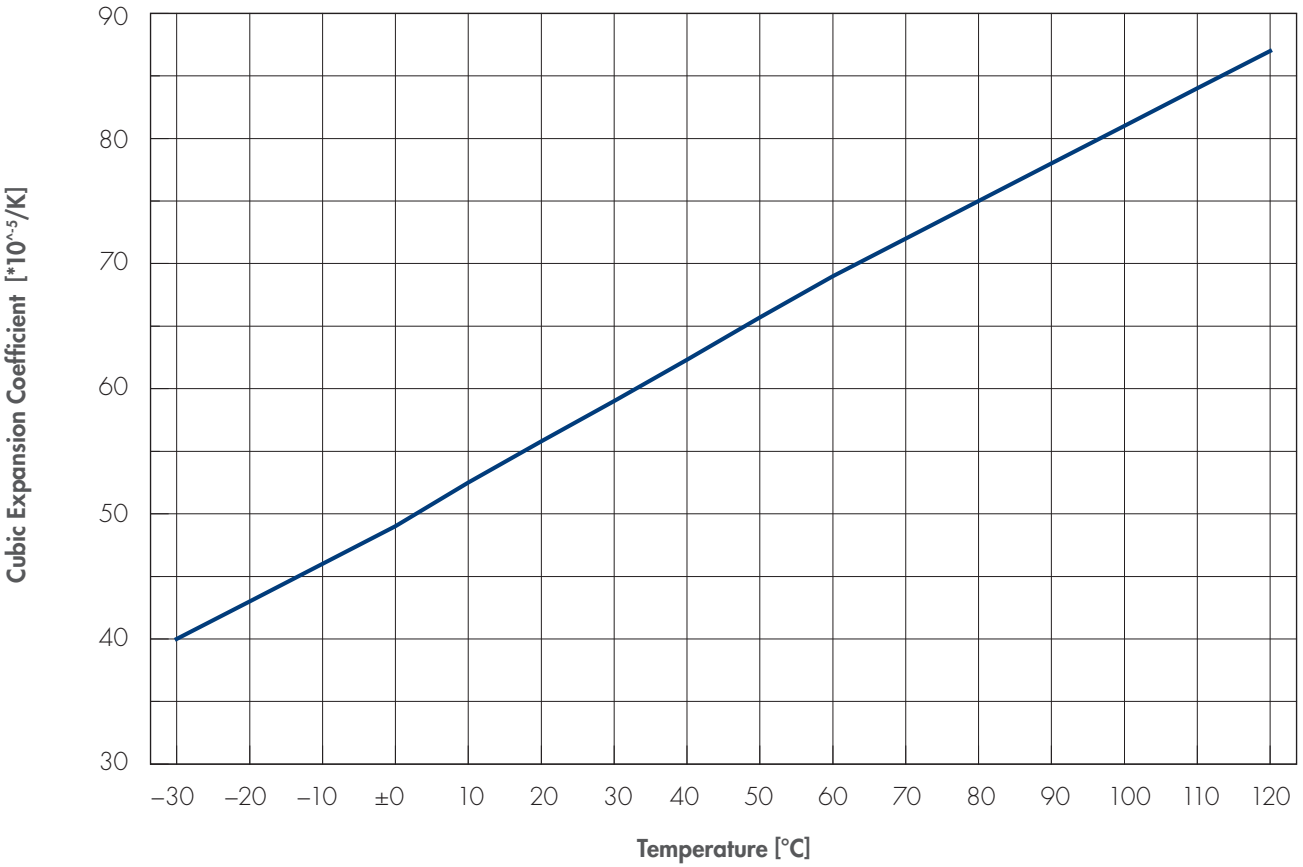
Thermal Conductivity of TYFOCOR® G-LS



Vapour Pressure of TYFOCOR® **G-LS**



Cubic Expansion Coefficient of TYFOCOR® **G-LS**



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® L-eco® is a long-life corrosion-inhibiting antifreeze based on propylene glycol that covers the same applications as **TYFO**COR® 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 (**TYFO**XIT® 1.25) and ready-to-use mixtures ranging from –20 °C (**TYFO**XIT® 1.15) to –55 °C (**TYFO**XIT® 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 °C (**TYFO**XIT® F15) to –50 °C (**TYFO**XIT® F50).

To learn more about our products, visit **www.tyfo.de**

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