

# Heat Transfer Medium Liquids

**coracon**<sup>®</sup>

International trade mark of Aqua Concept GmbH



## Optimal Safety in Solar Heating Systems



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- **Optimal Heat Transmission**
- **Optimal Corrosion Protection**
- **Environmental Friendliness**

## Product Overview CORACON Solar Fluids

application	flat plate collector / vacuum tubes	high temperatur vaccum tubes
<b>Specification</b>		
<b>Concentrate</b>	SOL 5 › 30 %	
<b>Ready mix</b>	SOL 5 F 100%	SOL 5 HF 100%

# General Information

## Solar Fluids

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CORACON solar fluids were developed to be used in solar collectors as a heat transfer medium and do several tasks simultaneously:

- Antifreeze at low temperatures
- Corrosion protection for even mixed installations
- Good transfer of solar heat into the heat accumulator

When selecting circulation pumps, please ensure that they can be safely operated with antifreeze agents.

Before filling, the systems should be rinsed with water and the impermeability of all connections should be checked manually.

After checking, the system should be filled immediately with the CORACON SOL 5 products and deaerated - no air cushions!

Galvanised system components should be avoided, because zinc is corroded by glycols.

In the event of leakages, only refill the same product. Never use different solar fluids in the same system.

Experience shows that CORACON SOL products can be used for several years. However, the concentration (frost protection) should be checked once a year.

When using one of the solar products for the first time in an existing solar heating system, please wash the system first with water.

# Product Information

## CORACON SOL 5

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### General Characteristics

CORACON SOL 5 is a **concentrate** and has been developed as an **environmentally friendly** heat transfer and antifreeze agent for **solar heating systems**.

CORACON SOL 5 is characterised by optimal anti-corrosion protection of all metals used in the system, even copper and aluminium, and furthermore prevents the buildup of dust, dirt and other contaminants.

With its positive ecological and physiological rating, CORACON SOL 5 is suitable for all commercial and private systems.

CORACON SOL 5 contains no nitrites, phosphates or amines. Sealing agents are not corroded by either the concentrate or its dilutions. It can be mixed with any amount of water. CORACON SOL 5 is not a hazardous material.

### Special Features

- **Contains no nitrites, phosphates or secondary amines, free of borate**
- **Biodegradable**
- Colour: Clear, slightly yellowish
- Antifreeze base: 1,2-Propanediol
- Specific weight: 1.05 g/ml DIN 51757
- pH value (1:1 with neut. water): 7.5 - 8.5 ASTM-D 1287
- Viscosity at 20 °C: 70 mm<sup>2</sup>/s
- Heat conductivity (at 20°C): 0.22 W/m x K
- Alkalinity reserve: 9,5 ml 0,1 HCL at 50% dosage
- Boiling point (°C): > 150 ASTM-D 1120
- Flashpoint (°C): > 100 ASTM-D 51758
- Not a hazardous material - water hazard class 1

### Release

Approved in connection with

- HyLife™ Solar from SapaPrecisionTubing (Prev. HYDRO Aluminium PrecisionTubing)
- Standard Metallwerke

### Dosage and frost protection values

Minimum frost protection	Maximum frost protection	Water in Vol-%	CORACON SOL 5 in Vol-%
- 15 °C	- 20 °C	65	35
- 19 °C	- 26 °C	60	40
- 28 °C	- 36 °C	50	50

# Instructions for Use

## CORACON SOL 5

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### Piping

The system must be free of impurities and other liquids (rinse out with water if necessary). There should not be any accumulations on the metal surfaces.

### Compatibility with Sealing Materials

CORACON SOL 5 do not corrode the usual seals used in heating construction

### Water Requirements

As a general rule it's commended to add only desalted or demineralised water. If not it's possible that deposits appear in the solar system because of the salts and minerals in the water.

### Environment and Safety

When handling CORACON SOL 5, please observe the generally applicable safety precautions. Further information and tips can be found in the Safety Data Sheet.

### Recommended Use

The systems must comply with DIN standard 4757, Part 1 and be designed as closed systems, because there should not be any atmospheric oxygen in the system.

The optimal operating temperature is between -30°C and 170°C. We therefore recommend an application concentration of 50% CORACON SOL 5 and 50% water. For corrosion resistance, the product concentration should be at least 35 vol.%.

For solar heating devices with constant temperatures of more than 170°C, we recommend that you install sufficiently large expansion tanks so that the heat transfer fluid can flow out of the collectors.

# Advices to use CORACON SOL 5

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## Corrosion control

The following table shows the effect of the corrosion control of **CORACON SOL 5** and **CORACON SOL 5F**. Test of corrosion according to ASTM D 1384. Change in weight in g/m<sup>2</sup>.

material	SOL 5F / SOL 5 50%-ig [g/m <sup>2</sup> ]	SOL 5F / SOL 5 50%-ig (in short term heated to 220°C) [g/m <sup>2</sup> ]	max. permitted value lt. ASTM D 1384 [g/m <sup>2</sup> ]
Copper	0,1	0,4	3,6
Brass	0,7	0,4	3,6
Soft loder	0,9	1,2	10,9
Steel	0,0	-0,2	3,6
Gray Iron	-0,8	-0,7	3,3
Aluminium	-0,4	0,0	10,0

CORACON SOL 5					
Article No.	On request	421 933	421 931	421 932	On request
Quantity	5 l	10 l / 10,5 kg	20 l / 21 kg	30 l / 31,5 kg	200 l / 210 kg
Packaging	Plastic bottle	Plastic canister	Plastic canister	Plastic canister	Plastic barrel

### General Characteristics

CORACON SOL 5F is an **environmentally friendly, ready-to-use** heat transfer medium and antifreeze agent for flat-plate collectors and vacuum tube solar heating systems. The product can also be used as a heat transfer fluid in heat pump systems.

CORACON SOL 5F is characterised by optimal anti-corrosion protection of all metals used in the system and furthermore prevents the buildup of dust, dirt and other contaminants.

CORACON SOL 5F contains no nitrites, phosphates or amines. Sealing agents are not corroded by either the concentrate or its dilutions. CORACON SOL 5F is not a hazardous material.

### Special Features

- Contains no nitrites, phosphates, secondary amines or borates
- **Biodegradable**
- Colour: stained red
- **Frost protection: min. -28°C**
- Antifreeze base: 1.2-Propanediol
- Specific weight: 1.04 g/ml DIN 51757
- pH value: approx. 8.0 ASTM-D 1287
- Viscosity at 20 °C: 5.8 mm<sup>2</sup>/s
- Heat conductivity (at 20°C): 0.40 W/m\*K
- Reserve alkalinity: 9,5 ml 0,1 HCL
- Boiling point (°C): > 103 ASTM-D 1120
- Flashpoint (°C): > 100 ASTM-D 51758
- Not a hazardous material - water hazard class 1

### Corrosion control

The following table shows the effect of corrosion control of CORACON SOL 5F. Corrosion test similar to ASTM D 1384. Gewichtsänderungen in g/m<sup>2</sup>

material	SOL 5F / SOL 5 50%-ig [g/m <sup>2</sup> ]	SOL 5F / SOL 5 50%-ig (in short term heated to 220°C) [g/m <sup>2</sup> ]	max. permitted value lt. ASTM D 1384 [g/m <sup>2</sup> ]
Copper	0,1	0,4	3,6
Brass	0,7	0,4	3,6
Soft loder	0,9	1,2	10,9
Steel	0,0	-0,2	3,6
Gray Iron	-0,8	-0,7	3,3
Aluminium	-0,4	0,0	10,0

# Instructions for Use CORACON SOL 5F

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## Piping

The system must be free of impurities and other liquids (rinse out with water if necessary). There should not be any accumulations on the metal surfaces.

## Compatibility with Sealing Materials

CORACON SOL 5F does not corrode the usual seals used in heating construction.

## Environment and Safety

When handling CORACON SOL 5F, please observe the generally applicable safety precautions. Further information and tips can be found in the Safety Data Sheet.

## Recommended Use

The systems must comply with DIN standard 4757, Part 1 and be designed as closed systems, because there should not be any atmospheric oxygen in the system.

The optimal operating temperature is between -28°C and 170°C. We recommend application concentrations of 100% CORACON SOL 5F.

For solar heating devices with constant temperatures of more than 170°C, we recommend that you install sufficiently large expansion tanks so that the heat transfer fluid can turn into a vaporous state and flow out of the collectors.

If any fluid is lost, only refill with CORACON SOL 5F. Do NOT REFILL WITH WATER!

## Testing

The solar fluid's anti-corrosion properties can be determined by measuring the pH value. The pH value should be >7.5 and can be determined with the corresponding diagnostic test strip (Prod. No. 492 122). If the pH value is too low, the entire fluid must be replaced.

## Release

Approved in connection with

- HyLife™ Solar from SapaPrecisionTubing (Prev. HYDRO Aluminium PrecisionTubing)
- Standard Metallwerke

CORACON SOL 5 F					
Article No.	On request	421 935	421 936	421 937	421 938
Quantity	5 l	10 l	20 l	30 l	200 l
Packaging	Plastic bottle	Plastic canister	Plastic canister	Plastic canister	Plastic barrel

Aufgrund variierender Betriebsverhältnisse und Materialien schließt Aqua-Concept jede Haftung aus Angaben in dieser Broschüre aus.



### General Characteristics

CORACON SOL 5HF is an **environmentally friendly, ready-to-use** heat transfer medium and antifreeze agent for flat-plate collectors and vacuum tube solar heating systems of the new generation. The temperature range is up to **280°C**.

CORACON SOL 5HF is characterised by optimal anti-corrosion protection of all metals used in the system, **also Aluminium**, and furthermore prevents the buildup of dust, dirt and other contaminants.

With its positive ecological and physiological rating, **CORACON SOL 5HF** is suitable for all commercial and private systems.

CORACON SOL 5HF contains no nitrites, phosphates or amines. Sealing agents are not corroded by either the concentrate or its dilutions.

CORACON SOL 5 HF is not a hazardous material.

### Special features

- **Contains no** nitrites, phosphates, secondary amines or borates

- **Biodegradable**

- Colour: Clear, slightly yellowish

- Minimum antifreeze: **-24°C**

- Maximum antifreeze: **-29°C**

- Antifreeze base: more significant glycols

- Specific weight: 1.01 g/ml

- pH value: approx. 8.0

- Viscosity at 20 °C: 15 mm<sup>2</sup>/s

- Boiling point (°C): > 102

- Flashpoint (°C): > 100

- Not a hazardous material - water hazard class 1

DIN 51757

ASTM-D 1287

ASTM-D 1120

ASTM-D 51758

CORACON SOL 5HF					
Product No.	On request	421940	421941	On request	On request
Quantity	5 l	10 l	20 l	30 l	200 l
Packaging	Plastic Can	Plastic Can	Plastic Can	Plastic Can	Plastic Can

# Gebrauchshinweise CORACON SOL 5HF

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## Piping

The system must be free of impurities and other liquids (rinse out with water if necessary). There should not be any accumulations on the metal surfaces.

## Compatibility with Sealing Materials

CORACON SOL 5HF does not corrode the usual seals used in heating construction.

## Environment and Safety

When handling CORACON SOL 5HF, please observe the generally applicable safety precautions. Further information and tips can be found in the Safety Data Sheet.

## Recommended Use

The systems must comply with DIN standard 4757, Part 1 and be designed as closed systems, because there should not be any atmospheric oxygen in the system.

The optimal operating temperature is between -26°C and 230°C.

For solar heating devices with constant temperatures of more than 230°C, we recommend that you install sufficiently large expansion tanks so that the heat transfer fluid can turn into a vaporous state and flow out of the collectors.

If any fluid is lost, only refill with CORACON SOL 5HF. **Do NOT REFILL WITH WATER!**

## Testing

The solar fluid's anti-corrosion properties can be determined by measuring the pH value. The pH value should be  $>7.5$  and can be determined with the corresponding diagnostic test strip (Prod. No. 492 122). If the pH value is too low, the entire fluid must be replaced.

### General characteristics

**CORACON SOL C** is a ready-made cleaning liquid for thermal solar systems.

The main application field of **CORACON SOL C** is the cleaning the thermal overloaded solar systems, where so-called crackprocesses of glycols came up. The product can be utilised in flat plate collector installations as well as in vacuum tube systems .

The product is colourless, low hygroscopic and high-boiling on a basis of  
 Das Produkt ist farblos, schwach hygroskopisch und hochsiedend auf Basis von Glycolether hergestellt.

### Special characteristics

- Colour: nearly colourless
- Specific weight: 1,05 g/ml
- pH-value: neutral
- Refractive index  $n_D$  with 20°C: 1,438
- Viscosity with 20°C: 7-7,5 mm<sup>2</sup>/s
- Boiling point (°C): > 240 °C
- Flashpoint (°C): ca. 125°C
- Ignition temperature: ca. 215 °C
- Vapour pressure: 0,1 mbar
- Solubility in water: mixable
- Not a hazardous material - water hazard class 1
- Biodegradability: 100% (31d), well degradable

DIN 51757

ASTM-D 1287

DIN 51423

ASTM-D 1120

ASTM-D 51758

CORACON SOL C					
Article No.	On request	On request	421962	421963	On request
Quantity	5 l	10 l	20 kg	200 kg	200 l
Packaging	Plastic bottle	Plastic bottle	Plastic bottle	Barrel	Plastic barrel

# Product information

## CORACON SOL C

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### Utilization

*CORACON SOL C is used in cases when decompositions of heat transfer medium liquids come up caused by common collector overheats. Those decompositions are mostly recognised by the partly black stain as well as by the affected liquid.*

*The Product CORACON SOL C is undiluted funneled into the plants circulation and is left in the plant for ca. 2-4 hours. The circulating pumps should be switched on, so that preferably all affected areas will be scoured out. The collectors should be covered, so that no needless thermal entry follows.*

*When the systems are strong contaminated, the cleaning process has to be repeated – if required.*

*Before the solar circulation is filled again with solar liquid, the cleaning liquid should be let out preferably completely. Still remaining quantities can be blared out with air pressure.*

### Material persistence

*In solar installations different elastomers (EPDM or SBR) are used as sealants. So the temperature of the cleaning liquid should not be higher than 60°C.*

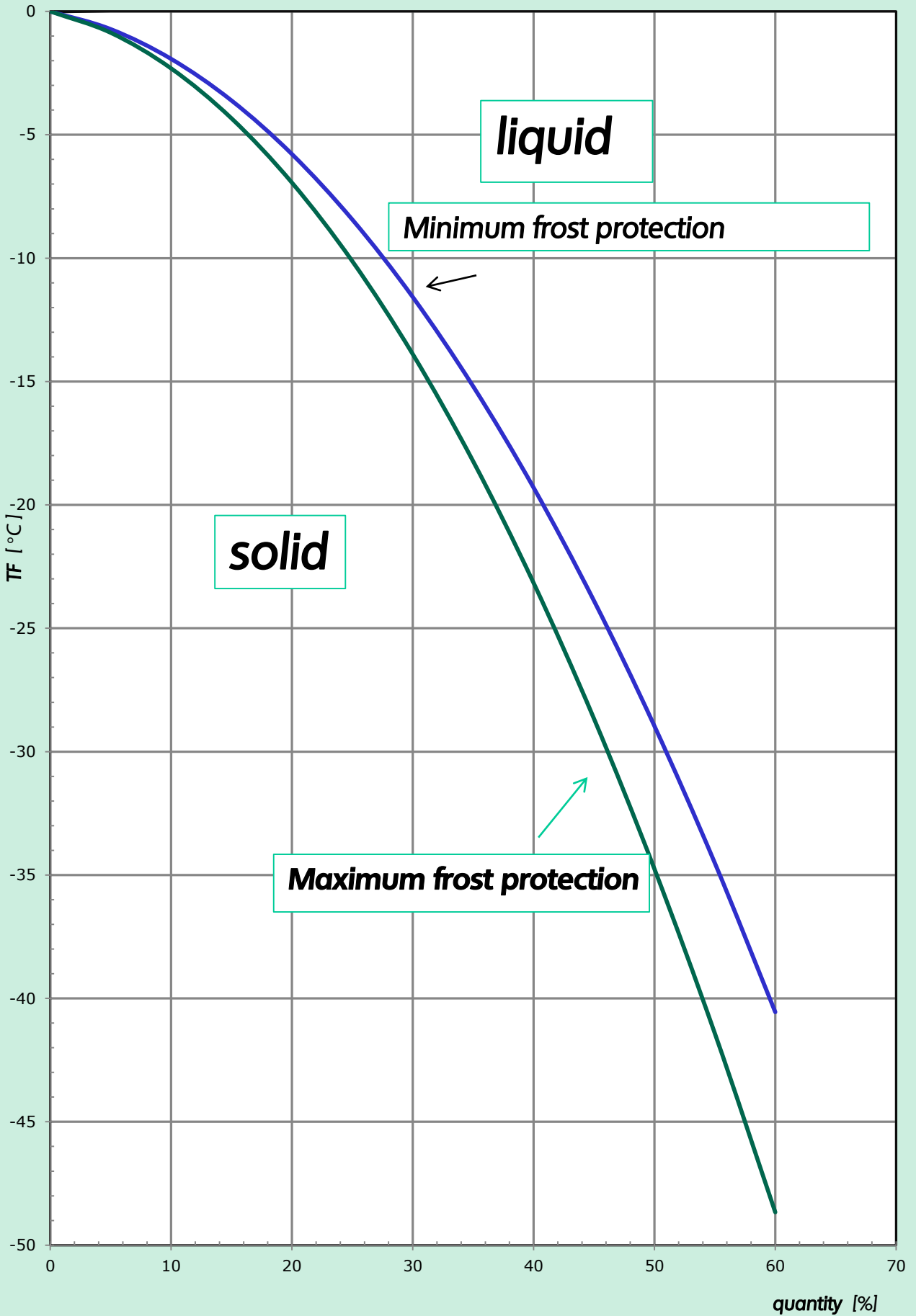
### Disposal

*The waste disposal of used CORACON SOL C has to be take place with due regard to official prescriptions, that also can have local differences.*

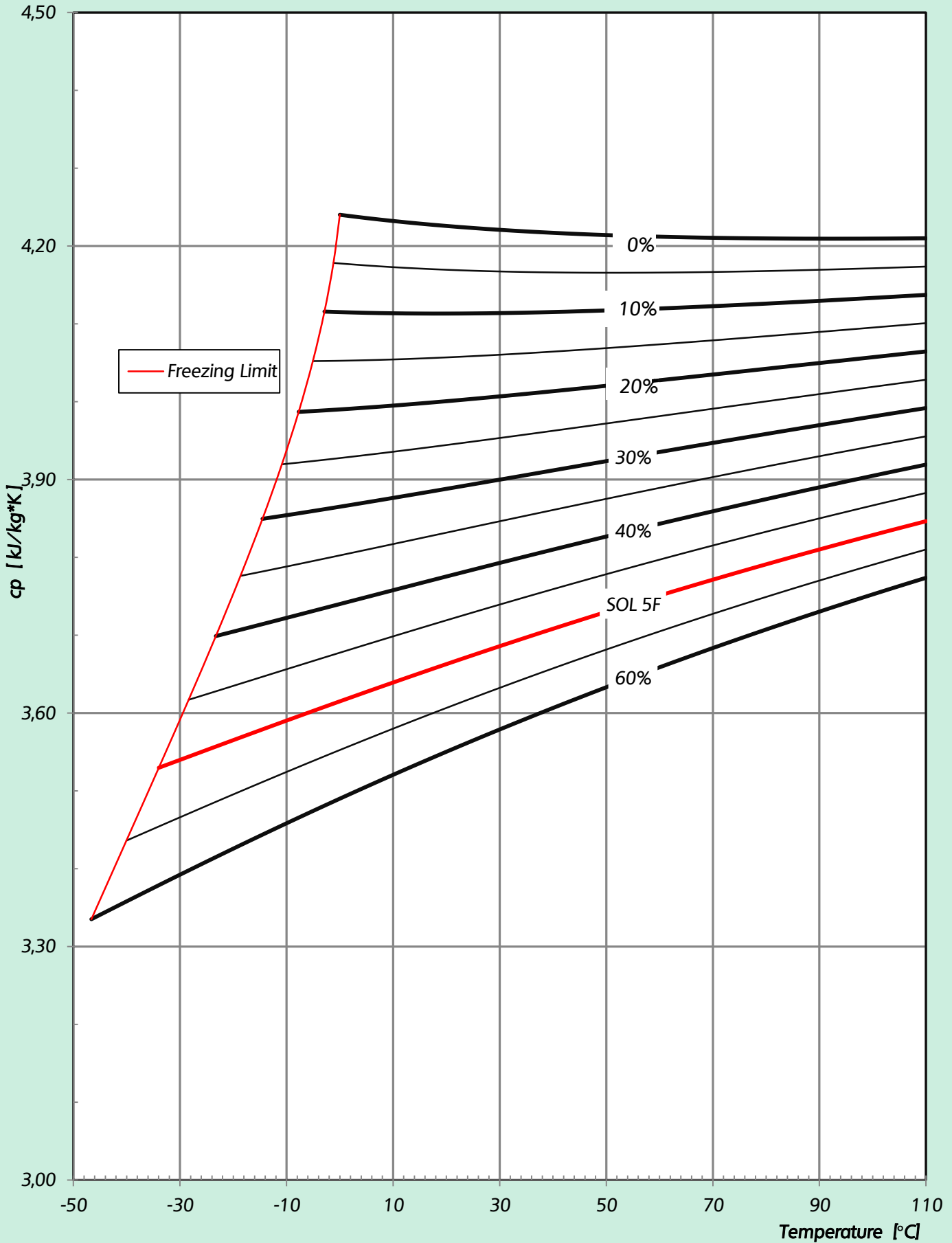
### Safety instructions

*Use rubber gloves and safety goggles. Avoid contact with skin and eyes.*

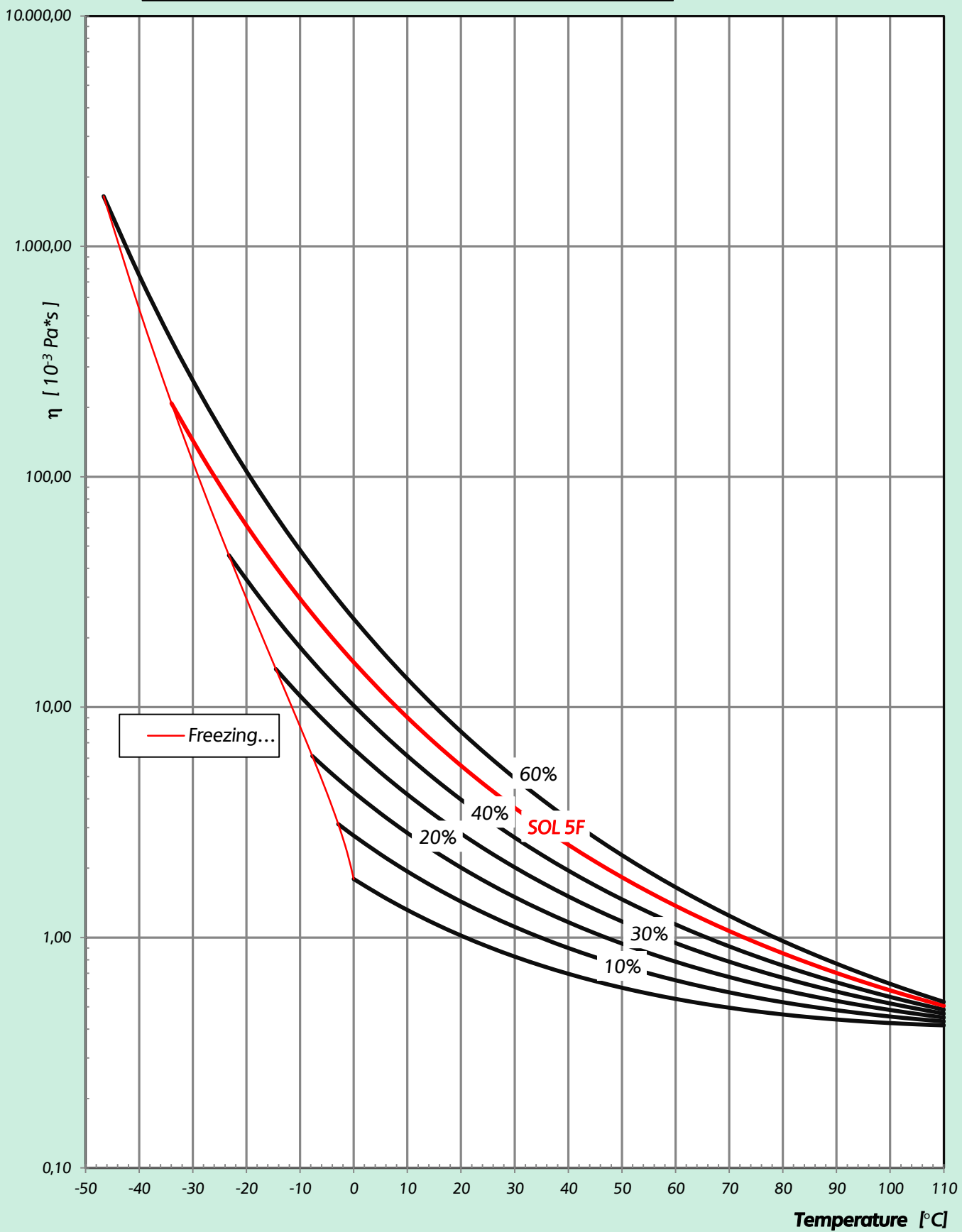
# Frost protection of CORACON SOL 5



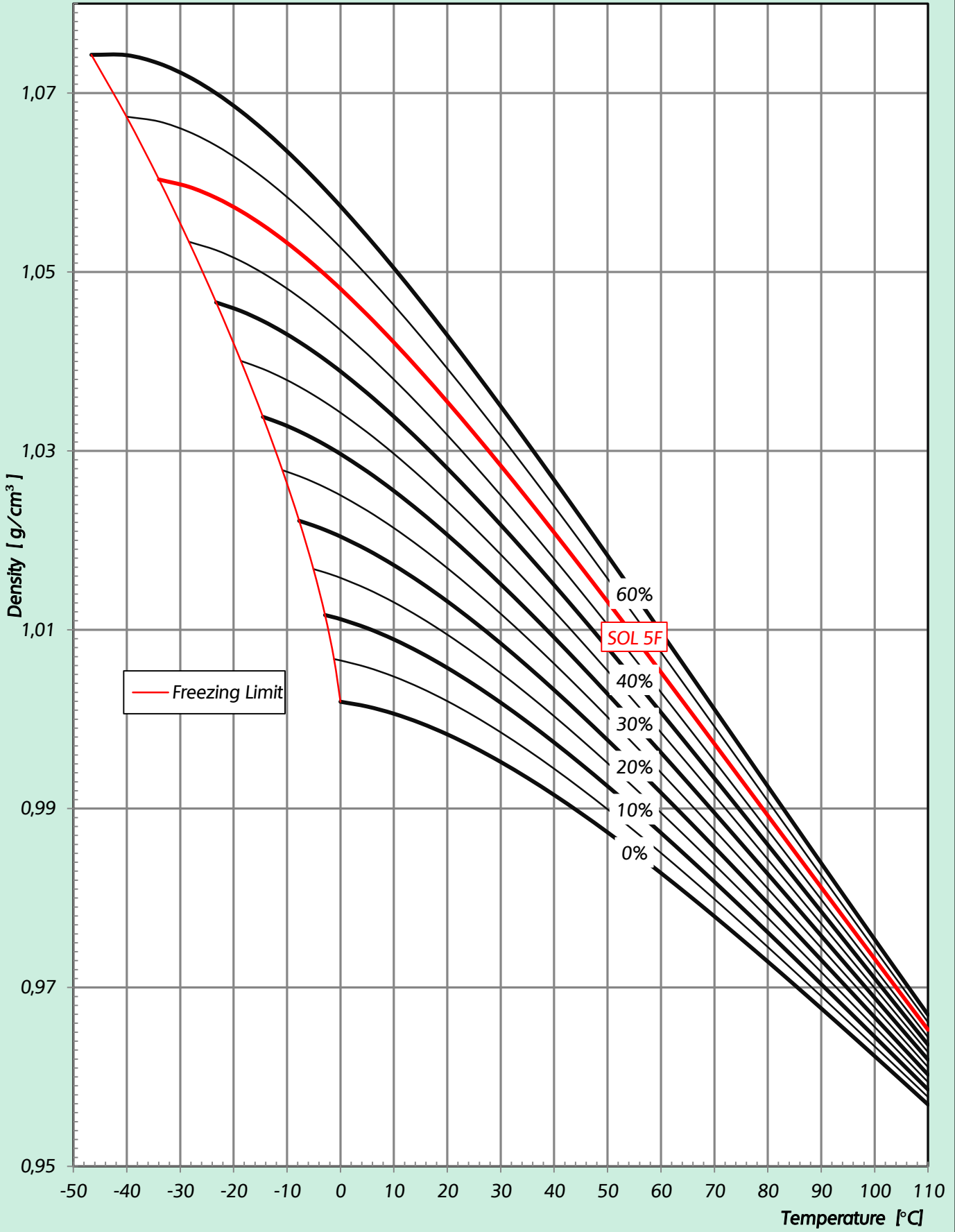
# spec. Thermal capacity of CORACON SOL 5



# dyn. Viscosity of CORACON SOL 5

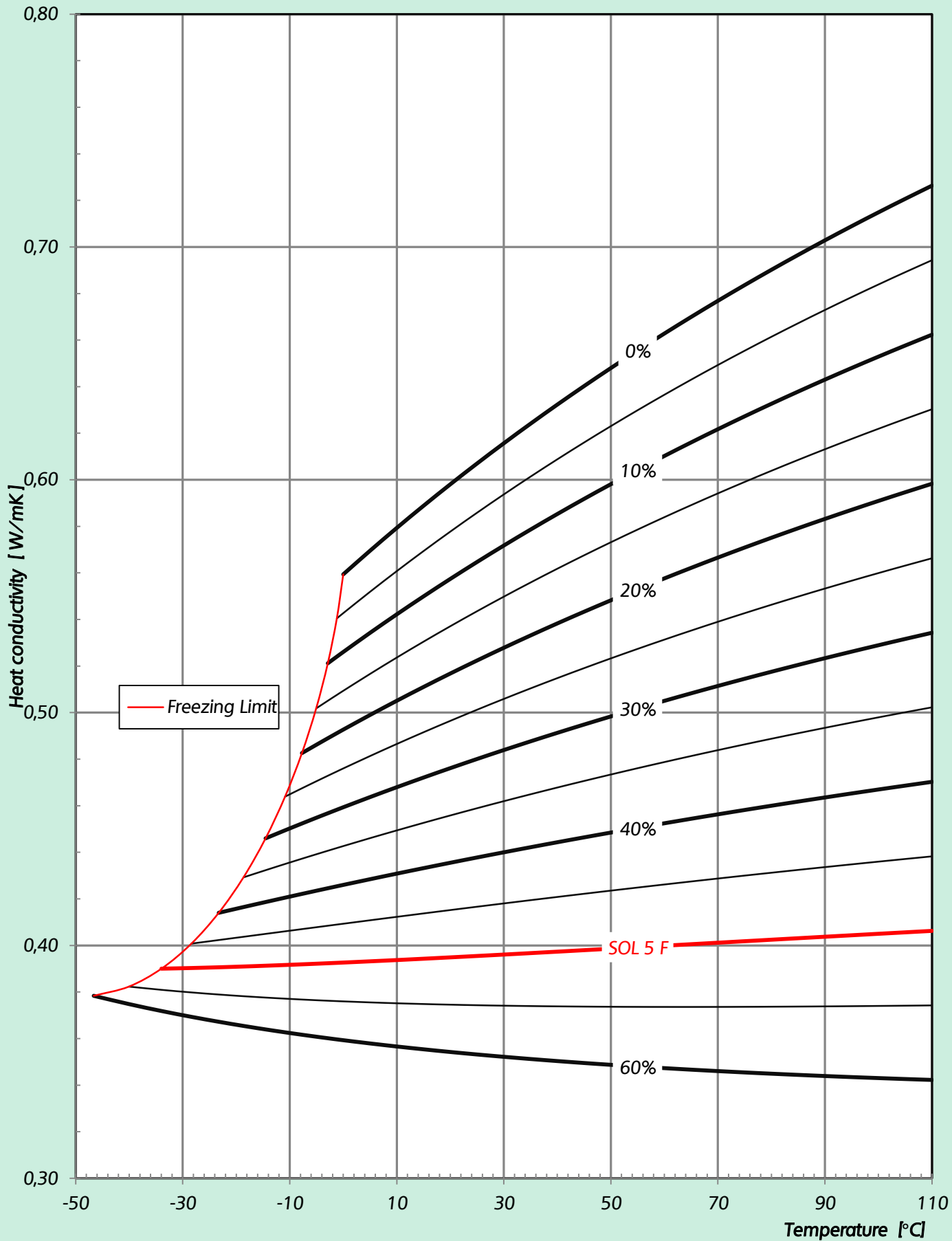


# Density of CORACON SOL 5

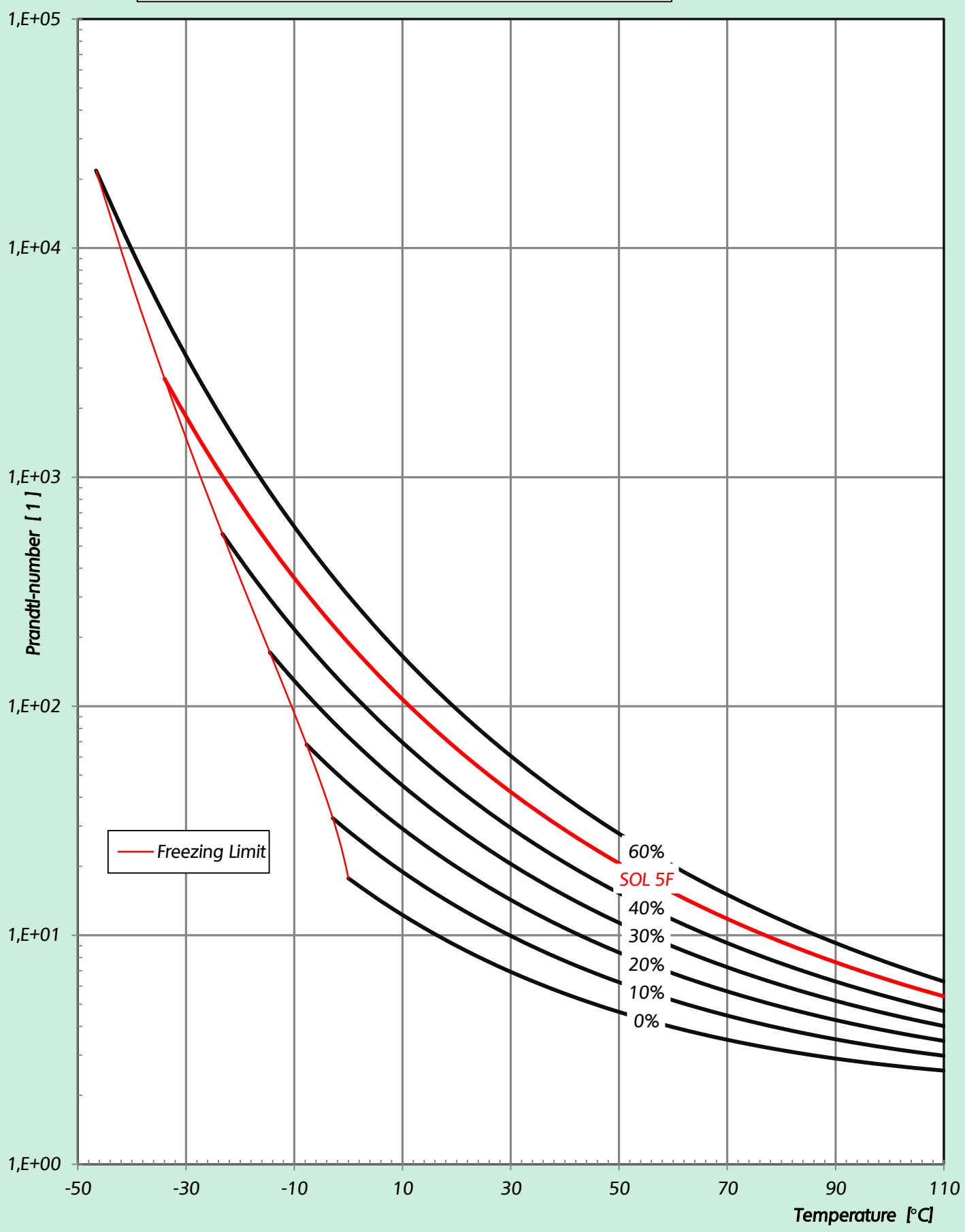




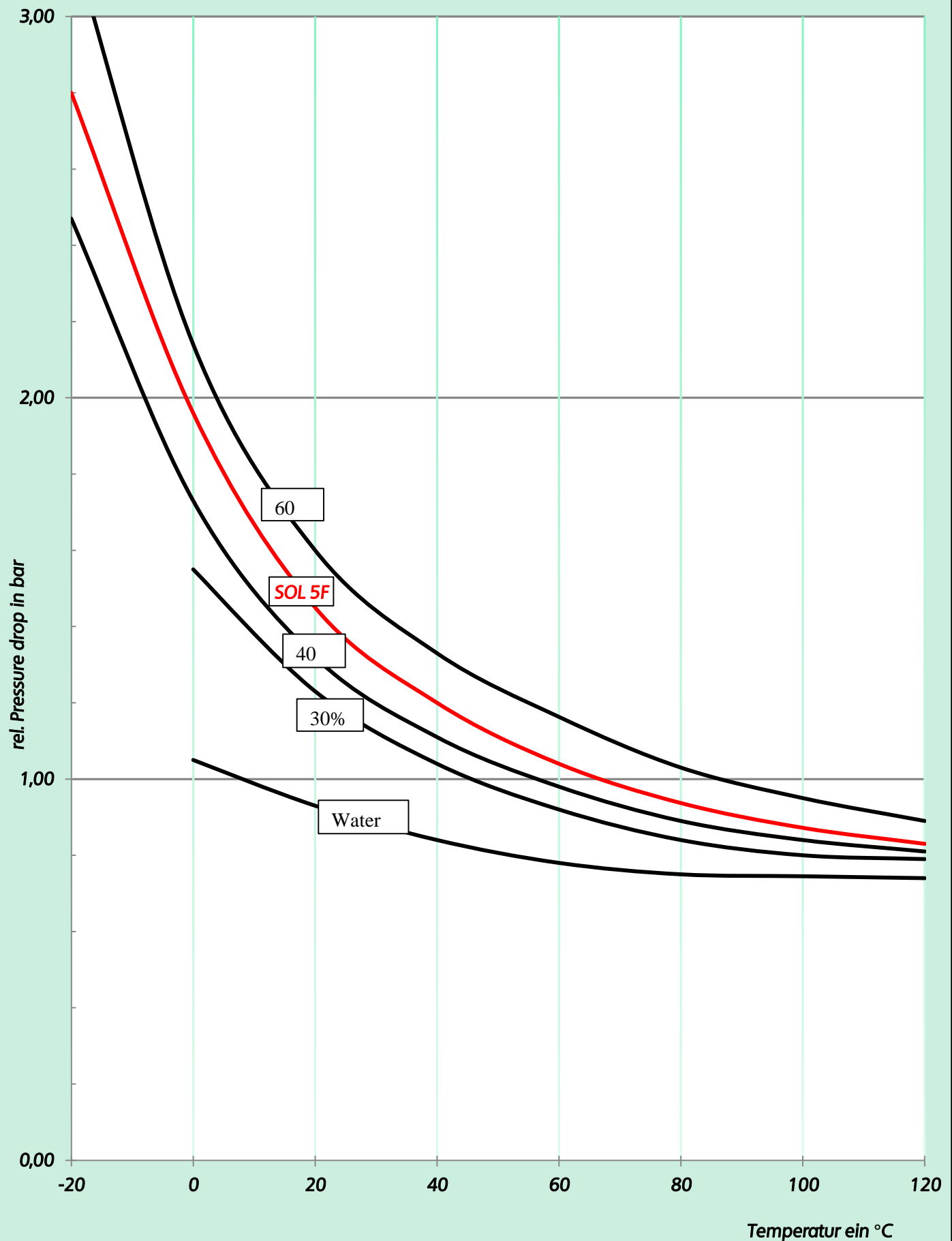
# Heat conductivity of CORACON SOL 5



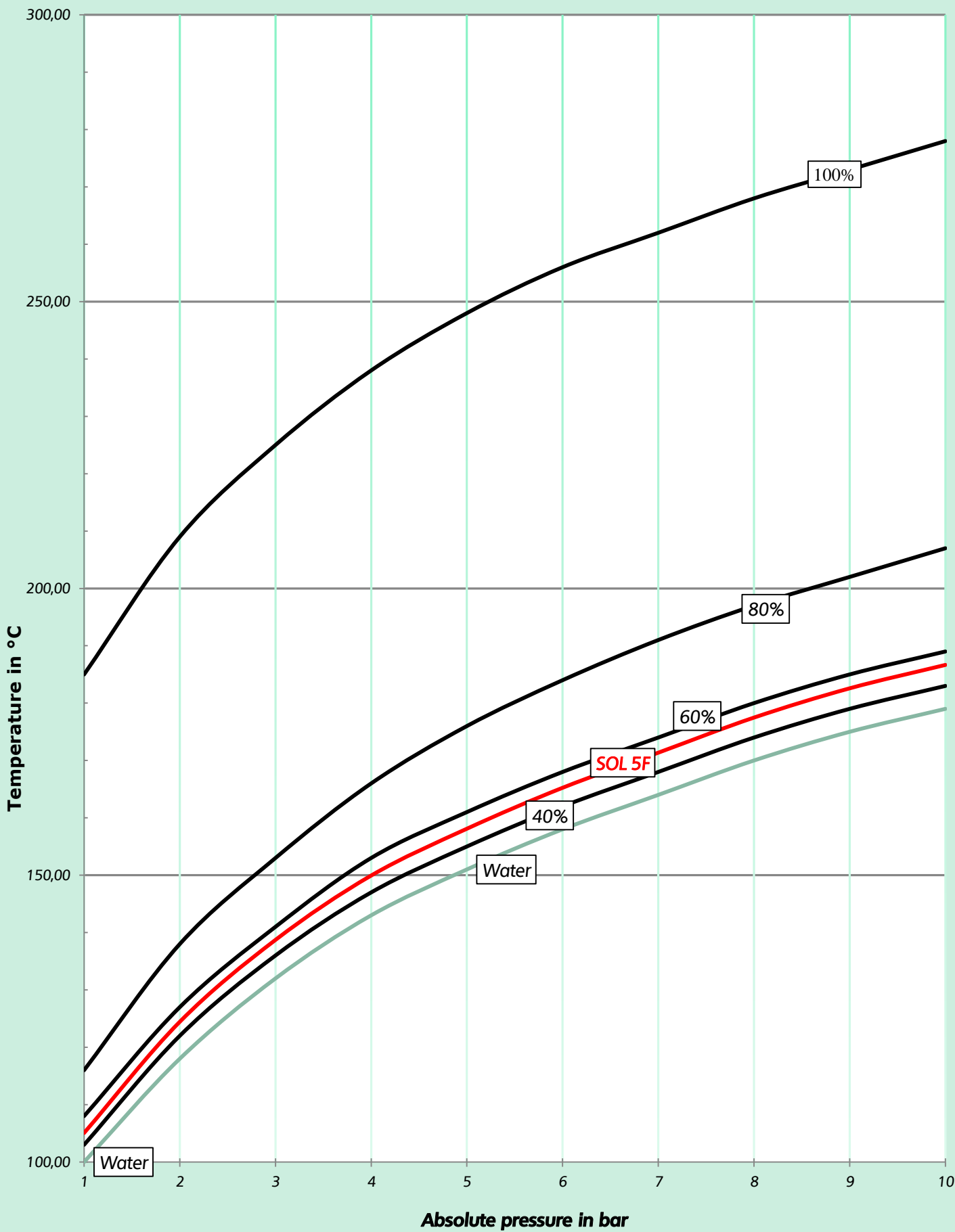
# Prandtl-numbers of CORACON SOL 5



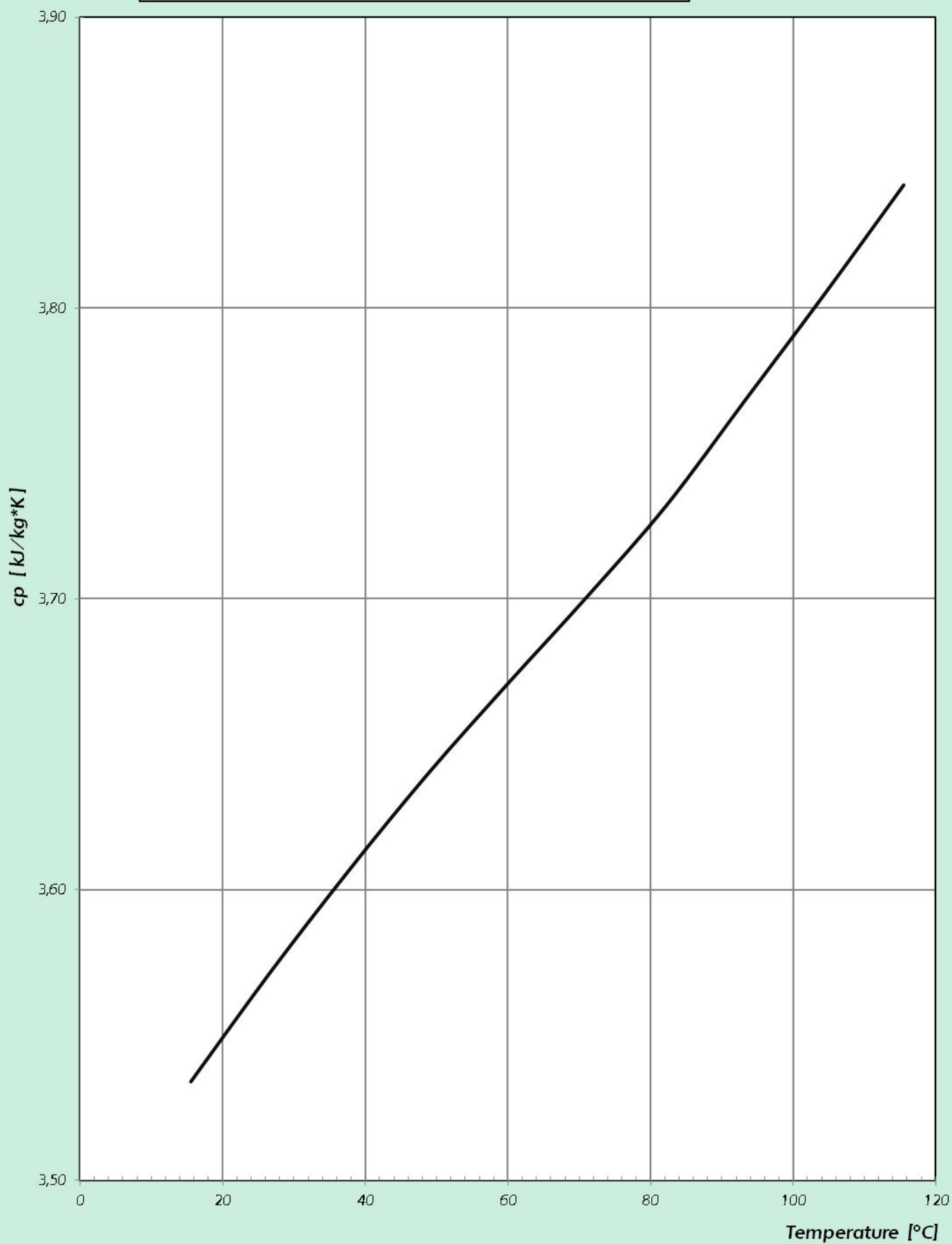
# Pressure drop of CORACON SOL 5



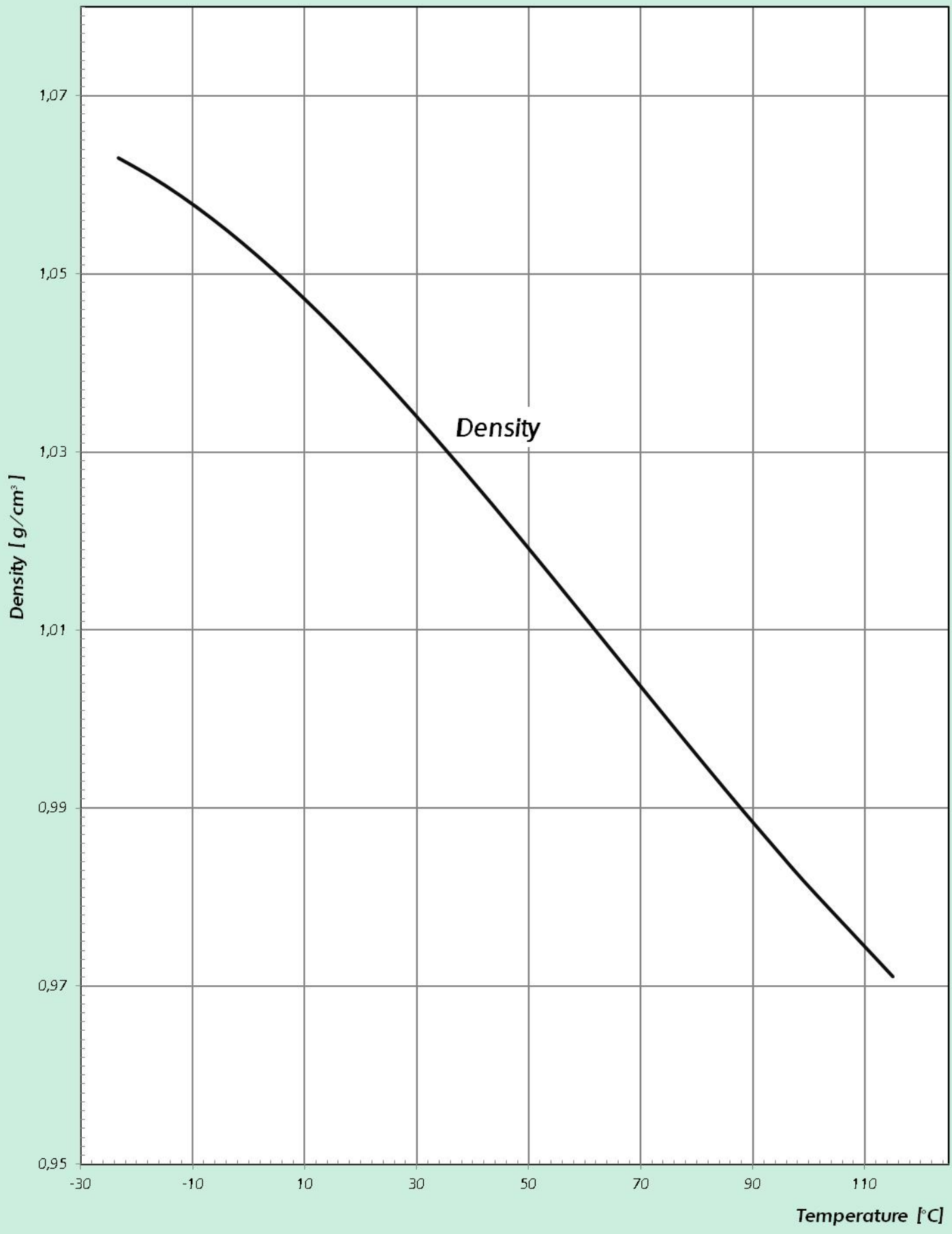
# Vapour pressure of CORACON SOL 5



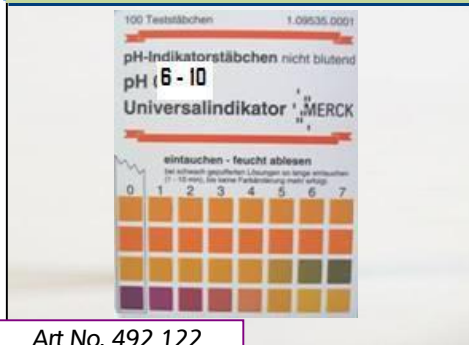
spec. thermal capacity of CORACON SOL 5 HF



# Density of CORACON SOL 5 HF



## pH-value test stripes measurement range 6-10



Art No. 492 122

Test stripes 100 pieces for dipping. Indication of pH-value by colour comparison

## pH-value tester micro pH 2



Art No. D 5510214

Electronic tester for indication the pH-value. Measurement range from 0-14 pH, Exactness  $\pm 0,1$  pH

## Anti-freeze tester Propylene glycol-test



Art No. 421 834

## Water hardness titration box 0,5 – 30 °dH



Art No. D 3100701

Easy and fast method for indicating the water hardness in °dH

## Fillingpump FP 1 for drilling machine

Simple irrigation and fillingsystem of watery glycol mixtures for solar installations and heating systems. The self-priming pump is easily powered by the drill head of the drilling machine. The maximal pressure capacity amounts to ca. 2 bar. Maximal discharge speed of rotation ca. 3.400 U/min. Discharge head ca. 20 metres.

**The set is made up of:**

**1 x Drilling machine pump**

**1 x SET quick-look coupling system**

**1 x hose at 4,25 meter in 1/2"**



We recommend to cut the provided hose to a length of ca. 2,25m as pressure hose, to a length of 1,20m as flush hose and to a length of 0,80m as suction hose. Then slip over the quick coupling on the hoses and tie up. Then screw the antiadapters onto the corresponding 3/4" connections of the solarstation and slip on the hoses.



With this system it's also easy to funnel our heating protection product CORACON HE 6 as well as CORACON HF 6 in water heatings. For this purpose the pressure hose is not screwed on the solarstation but on the KFA-connection of the boiler.

Article No : 421040



## Determination of frost protection of solar liquids with frost protection measuring devices

### General remarks

You can gauge the frost protection of liquids with glycols with three different measurements methods.

1. Frost protection check (in the sector very common, because it's low-cost, but imprecise)
2. **Refractometer** (measurement about the refraction index, relative exactly)
3. **Aerometer** (densitometry, very exactly)

Most of the solar liquids have the ecofriendly propylene-glycole or the Propylene-glycole. That is why only Glykolheber-Prüfgeräte, that are in conformity with this criterion, are allowed to use

These measurement devices can assess the frost protection for pure Glycol/ Watermixtures relatively correct, but not the mixtures of solar liquids, that contain further inhibitors to protect the solar installations against corrosion and deposits.

The change of density of the liquid caused by that results in a inprecision of the readout of frost protection check.

The correction value for the solar ready mixture **CORACON SOL 5F** is listed in the below-mentioned table.

### CORACON SOL 5F

CORACON SOL 5F	density ( 15°C)	antifreeze readout	real antifreeze
[ Vol. % ]	[g/cm <sup>3</sup> ]	°C	°C
<b>100</b>	<b>1,0417</b>	<b>-22</b>	<b>-28</b>

Therefore 6°C insufficient frost protection are announced on the Glykolhebern.

# Information

## Frost protection check

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**Aerometer:** The measurement with the so-called Aerometer came to light as the most exactly measurement method. With this method the density is determined. In the below-mentioned table the corresponding frost protection value can be read.

### CORACON SOL 5

CORACON SOL 5	Density ( 15°C )	Minimum frost protection
[ Vol. % ]	[g/cm <sup>3</sup> ]	[°C]
30	1,0268	-9
35	1,0318	-15
40	1,0362	-19
45	1,0400	-22
50	1,0434	-32

**Minimum frost protection:** Temperature by which first ice crystals emerge in Glycol-/Watermixtures.

**Cold protection:** Arithmetic average over the minimum and maximum frost protection.

For reasons of corrosion safety you have to observe a minimum concentration of 35 Vol.-% CORACON.



*Our products are not tested on our clients, but lavishly developed with laboratory experiments and check room tests.*



*To these belongs for example a special solar liquid test bed. With this solar liquid test bed different heat transfer liquids can be checked for its temperature stability up to 300°C. All such high temperatures appear for example in directly perfused evacuated tube collectors.*



**CORACON** is a registered brand of Aqua Concept GmbH and develops and sells anti-corrosion and antifreeze products for solar heating systems and engine cooling.

**CORACON** has emerged from BEDIA Filtersysteme/Korrosionsschutzkonzentrate (filter systems/corrosion protection concentrates), which Aqua-Concept took over from BEDIA Motorentchnik (motor engineering) at the end of the year 2000.

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