

# Data sheet

revised on 29.03.2023  
innovatek Protect IP Color



## Data sheet

Properties and technical information

**innovatek Protect IP Color**

## Quality control

The data are average values at the time of printing of this technical information. They do not have the status of a product specification. Specified characteristic values are part of a separate product specification.

## Properties

Protect IP Color coolant is a clear, blue/green coloured and almost odorless liquid based on ethylene glycol. Protect IP is miscible with water in any ratio. Depending on the concentration, Protect IP water mixtures provide frost protection down to -50 °C and impart optimum service life to the equipment to be protected. Mixtures of Protect IP and water do not segregate. The corrosion inhibitor content in Protect IP provides long-lasting, reliable protection against corrosion, aging and incrustation for all metal materials commonly used in cooling systems - even in mixed installations. The coolant also offers excellent hot temperature stability and prevents harmful deposits on the hot metal surfaces (up to 200 °C) at high heating surface loads (up to approx. 40 W/cm<sup>2</sup>). It thus helps to prevent overheating on heat transfer surfaces and deposits in the circulation system. Protect IP contains **no borax, no nitrite, no phosphate and no amine**.

Appearance	Clearer liquid	
Boiling point	above 170 °C	ASTM D 1120
Pour point	below -17 °C	DIN ISO 3016
Density (20 °C)	1.125 g/cm <sup>3</sup>	DIN 51757/ASTM D 4052
Refractive index	1.432 – 1.434	DIN 51423
Viscosity (20 °C)	20 – 30 mm <sup>2</sup> /s	DIN 51562
pH value conc. (20 °C)	8 – 8.5	ASTM D 1287
pH value 1:2 with neutral distilled water	7 – 8.5	ASTM D 1287
Alkali reserve	> 10 ml 0,1 n HCl	ASTM D 1121
Flash point	above 100 °C	DIN ISO 2592
Water content	less than 4.0 %	ASTM D 1123/DIN 51777

## Mixability

Attention. In case of use, no further additives, colors or further additives are permitted. Only use Protect IP in the intended mixing ratio with distilled water. In particular, the addition of colorants may completely cancel out the corrosion protection.

## Application

Add Protect IP in concentrations of at least 25% by volume to the water (min. drinking water quality with max. 100 mg/kg Cl, better distilled water). If more than 58 vol.% Protect IP is added, the frost and corrosion protection deteriorates.

## Thermal stability

Continuous temperatures of more than 140 °C lead to premature aging. However, short-term excesses (140 °C to 200 °C) do not pose a problem, provided that the coolant is subsequently cooled down again. At temperatures above 200 °C, a slow chemical change of the heat transfer fluid begins, which can endanger the operational safety of the system. Corrosion test according to ASTM D 1384 [American Society for Testing and Materials].

## Conductivity

The coolant prevents electrochemical corrosion and thus actively suppresses the corrosion current. Due to this, the determination of a conductivity does not make sense, as the conductivity value would continuously change and decrease in the case of a measurement. The suppression of the corrosion current is achieved by the accumulation of the contained inhibitors on the metallic components in the cooling system. This effect usually takes some time, which results in the continuous lowering of the conductance. This accumulation also occurs at the electrodes of the conductivity meter during a measurement. Monitoring and measurement of the conductance is therefore not necessary.

## Average weight change in g/m²

Material	Protect IP (30 %; ASTM D 1384)
Copper (Sf Cu)	- 0.1
Soft solder (L SN 30)	- 0.1
Brass (Ms 63)	+/- 0.0
Grey cast iron (GG 26)	+/- 0.0
Steel (HI)	+/- 0.0
Cast aluminum (G AlSi6Cu 4)	- 0.4

The excellent anticorrosive properties of Protect IP water mixtures are also demonstrated in hot temperature corrosion tests with the materials GG 25 and G-AlSi10Mg under flow and heat transfer conditions at heat flux densities up to 40 W/cm². For reasons of corrosion resistance, the application concentration of Protect IP should not fall below 25 % (V/V). This corresponds to a frost protection of -12,3 °C. At concentrations of less than 20 % (V/V) Protect IP, there is a risk of corrosion due to underinhibition.

If Protect IP is filled into old systems that were previously operated with water only, the following instructions must be observed:

The corrosion present in old systems very much increases the surface with which the heat transfer fluid is in contact and thus additionally binds the inhibitors contained in Protect IP. This can impair corrosion protection, especially at lower application concentrations. Therefore, such systems should be rinsed as carefully as possible before filling. Systems that are only temporarily operated with Protect IP must be rinsed thoroughly several times after emptying with water in order to reliably remove product residues. Any product residues can lead to increased corrosion if necessary. Protect IP water mixtures do not attack the usual sealing materials used in coolers. Based on our own tests and experience as well as literature data, the sealing compounds, elastomers and plastics listed in the following table are resistant to Protect IP water mixtures:

• Sealing compounds	e.g. of the trade names Fermit, Fermitol, hemp
• Butyl rubber	IIR
• Polychlorobutadiene rubber	CR
• Ethylene propylene diene rubber	EPDM
• Fluorocarbon elastomer	FPM
• Natural rubber (up to 80 °C)	NR
• Nitrite rubber	NBR
• Polyacetate	POM
• Polyamide (up to 115 °C)	PA
• Polybutene	PB
• Polyethylene, soft, hard	LDPE, HDPE
• Polyethylene cross-linked	VPE
• Polypropylene	PP
• Polytetrafluoroethylene	PTFE
• Polyvinyl chloride	PVC
• Silicone rubber	Si
• Styrene butadiene rubber (up to 100 °C)	SBR
• Unsaturated polyester resins	UP

Phenolic, urea formaldehyde resins, soft PVC and polyurethane elastomers are not resistant. [Soft PVC only conditionally, discharge of plasticizer with subsequent hardening].

Before using elastomers, it should be noted that the service properties of these materials are determined not only by the properties of the starting rubber (e.g. EPDM), but also by the type and quantity of additives and by the manufacturing conditions during vulcanization. A suitability test with the Protect IP/water mixture before first use is therefore recommended. This applies in particular

to elastomers intended as materials for diaphragms of pressure compensation vessels to DIN 4807. The following have proven resistant to hot Protect IP/water mixtures: up to 160 °C seals based on 70 EPDM 281 and up to 200 °C: flat seals such as Reinz AFM 34 or Centellen 3820 based on aramid/special NBR.

As a result of the low surface tension of Protect IP/water mixtures, leaks may occur on a case-by-case basis when using sealing tapes made of polytetrafluoroethylene (PTFE). Similarly, after adding Protect IP to cooling systems, existing minor leaks may become visible due to the better wetting ability of Protect IP water mixtures. If retightening the seals does not remedy a leak, the circuit system must be drained. The seals must be replaced and the proper execution of the connections must be checked.

It is important that all renewed (new) seals (connections) are tightened after recommissioning as well as during initial operation. For filling, Protect IP must be completely mixed with water before filling.

It is advisable to check the content of Protect IP after filling the system. This can be done by spinning the density using a hydrometer. Cylinder and spindle must be matched so that the spindle can move freely.

The content of Protect IP can also be determined using a refractometer by measuring the refractive index. Density and refractive index of Protect IP water mixtures:

The frost protection specifications refer to the display on commercially available antifreeze testers for motor vehicles.

Vol.-% Protect IP	Density at 20 °C g/cm <sup>3</sup>	Refractive index n <sup>2</sup> ...	Frost protection °C
20	1.029	1.3545	- 9.0
25	1.037	1.3599	- 12.3
30	1.044	1.3653	- 16.1
35	1.052	1.3707	- 20.4
40	1.059	1.3762	- 25.2
45	1.066	1.3816	- 30.8
50	1.073	1.3868	- 37.6
55	1.079	1.3918	- 45.4
58	1.082	1.3947	- 51.0

The special properties of Protect IP require compliance with the following application guidelines if long-term protection for the plant is to be achieved. The systems must be designed as closed systems, since the inhibitors of Protect IP would be consumed more quickly by access of atmospheric oxygen. Important! Increased chloride contents (e.g. salts) can cause corrosion damage in the heat transfer medium (limit value 100mg/l). Only hoses with low oxygen diffusion should be used as flexible connecting elements. Restriction: there must be no zinc or galvanized components in the circuit, as zinc can be dissolved by water/Protect IP mixtures. It must be ensured that no external electrical potentials are present between system parts that are in contact with Protect IP solution (risk of corrosion).

All lines must be laid in such a way that no circulation problems can occur due to gas cushions or deposits.

During assembly and before filling, the equipment and its components must be protected against the ingress of dirt and water. After initial installation, internal cleaning (flushing) should be carried out to remove solids (metal chips, flux, packaging residues, etc.) and assembly aids. After filling, make sure that there are no more air pockets (e.g. in the radiator) in the system, with the exception of the expansion tank. After the first filling and commissioning, but after 14 days at the latest, the installed strainers (if any) must be cleaned so that the free flow for the heat transfer medium is not impaired. In case of losses due to leakage or after withdrawal, Protect IP concentrate mixed with drinking water (better: distilled water) must be refilled as an aqueous Protect IP solution according to the concentration already filled in. In case of doubt, determine the content of Protect IP.

## **Storage stability**

Protect IP can be stored in airtight containers for at least three (3) years. Storage in galvanized containers is not recommended as zinc is dissolved by water-glycol mixtures.

## **Packaging**

Protect IP is supplied in bottles.

## **Disposal**

After spillage or leakage, Protect IP must be taken up with liquid-binding material and disposed of in accordance with regulations.

## **Ecology**

Protect IP is easily biodegradable. When properly introduced into adapted biological sewage treatment plants, no disturbance of the degradation activity of the activated sludge is to be expected.

## **Safety**

Protect IP must not be used in plants where a transfer of the heat transfer fluid into food or drinking water cannot be completely excluded. Protect IP is unsuitable for such applications!

## **Handling**

When handling Protect IP, the precautionary and hygienic measures necessary for handling chemicals as well as the When handling Protect IP, the precautionary and industrial hygiene measures required for handling chemicals and the information and notes contained in our safety data sheet must be carefully observed.

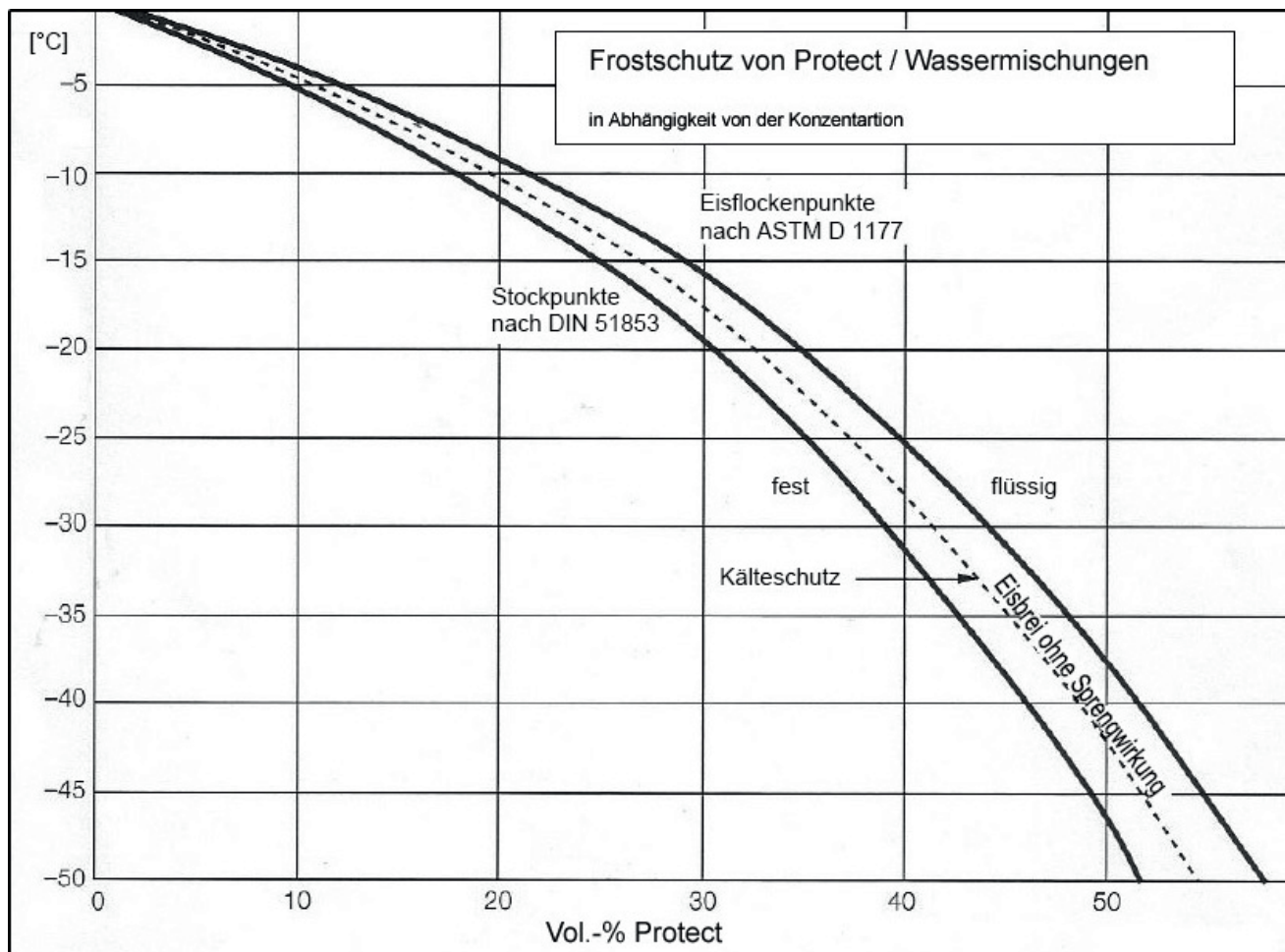
## **Protective measures**

Irritant! Avoid contact with skin. If skin contact nevertheless occurs, rinse with plenty of water. Do not drink.

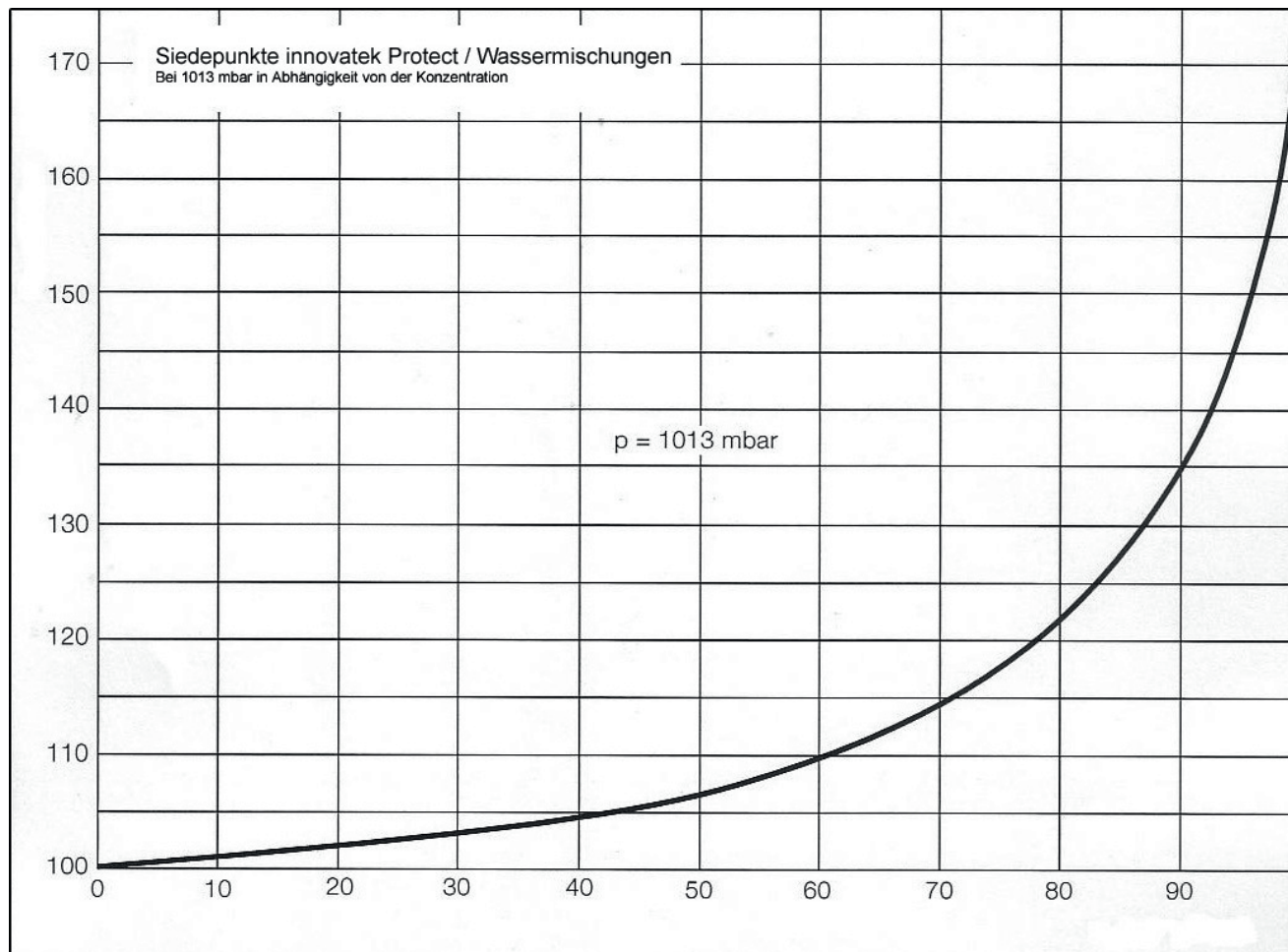
## **Safety data sheet**

A safety data sheet according to EC Directive 91/155/EW is available.

## Protect IP frost protection / water mixtures:

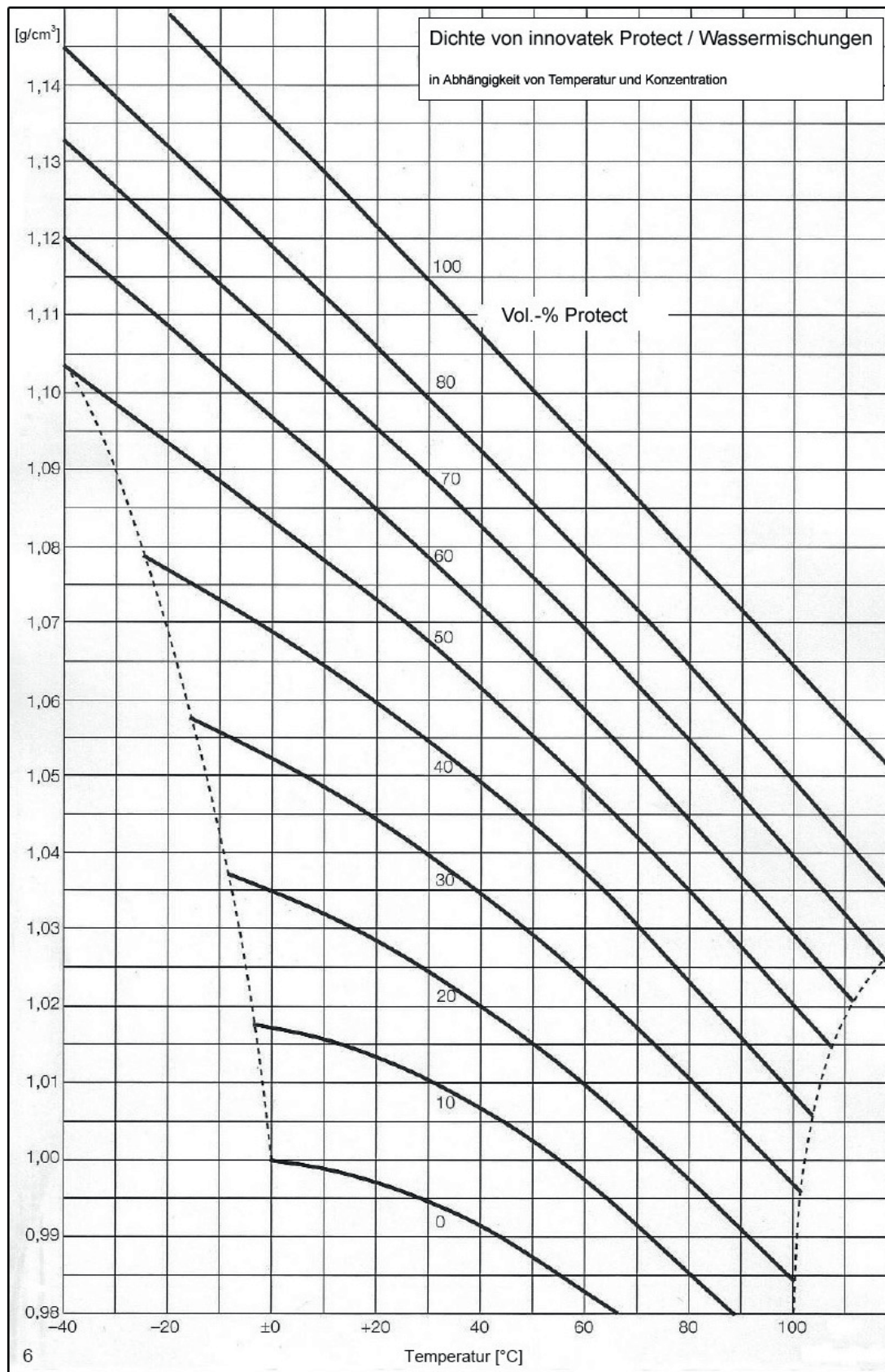


## Boiling points of Protect IP / water mixtures:



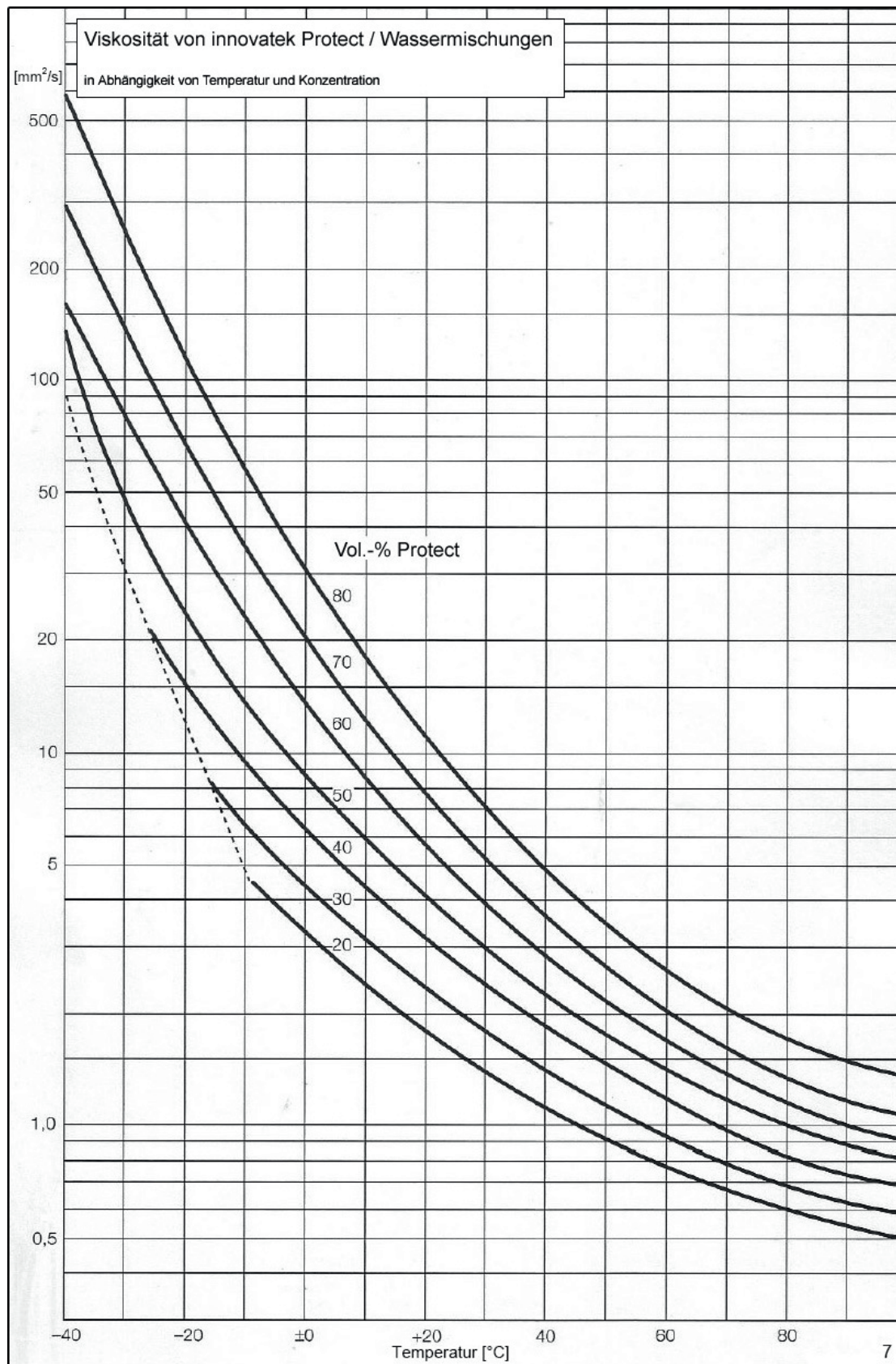


## Density of Protect IP / water mixtures:

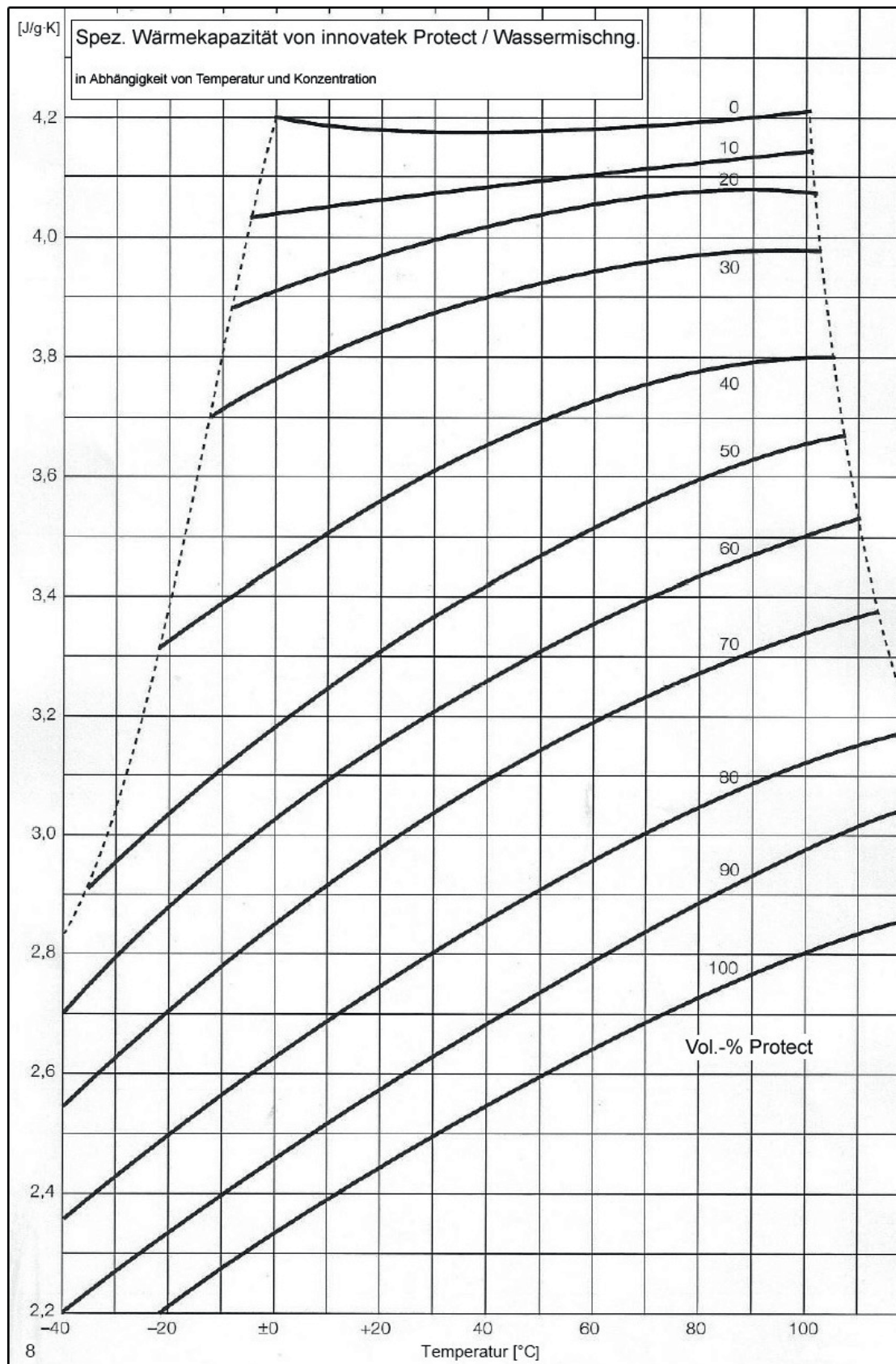




## Viscosity of Protect IP / water mixtures:

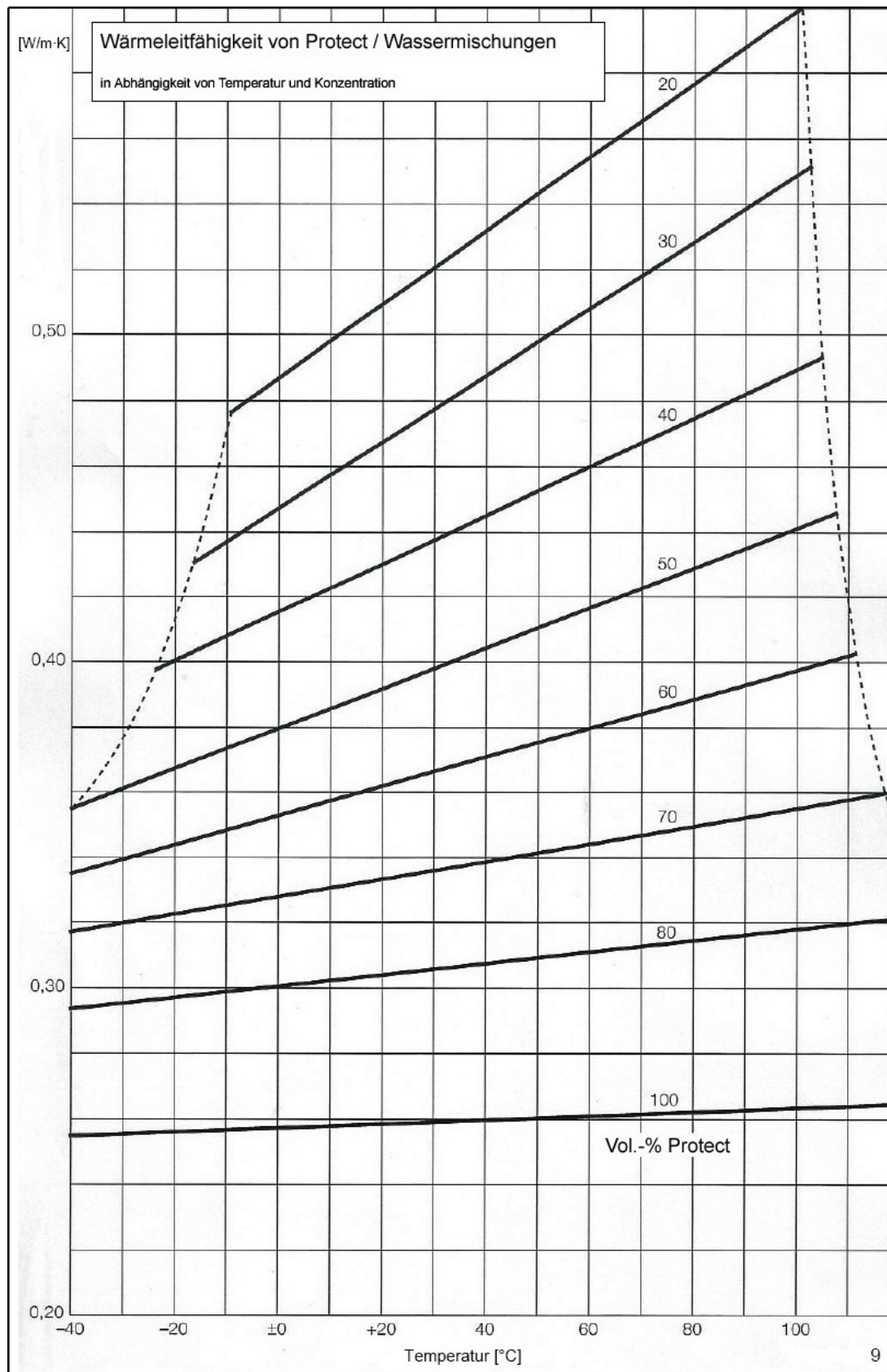


## Special heat capacity of Protect IP / water mixtures:

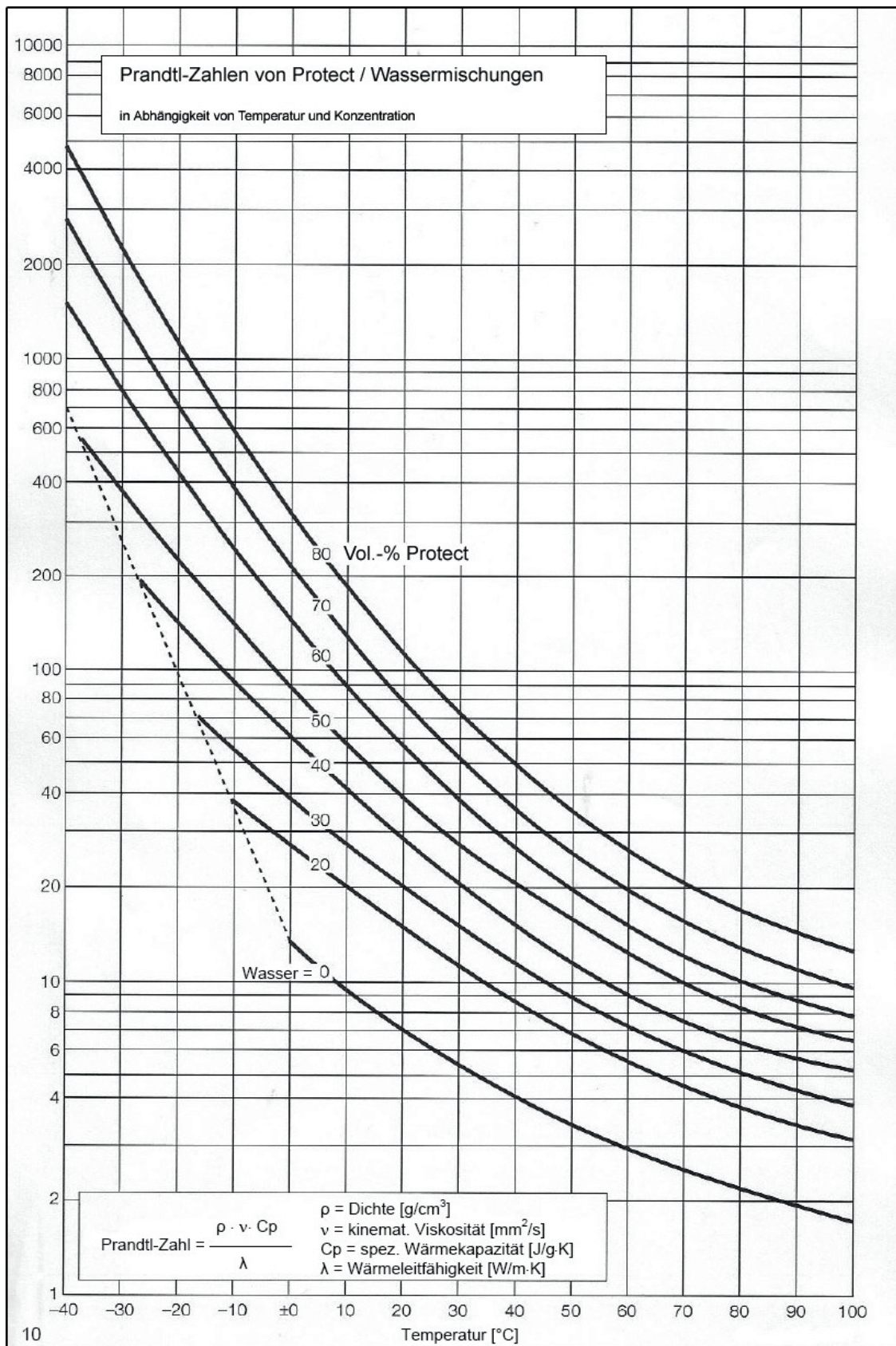




## Thermal conductivity of Protect IP / water mixtures:

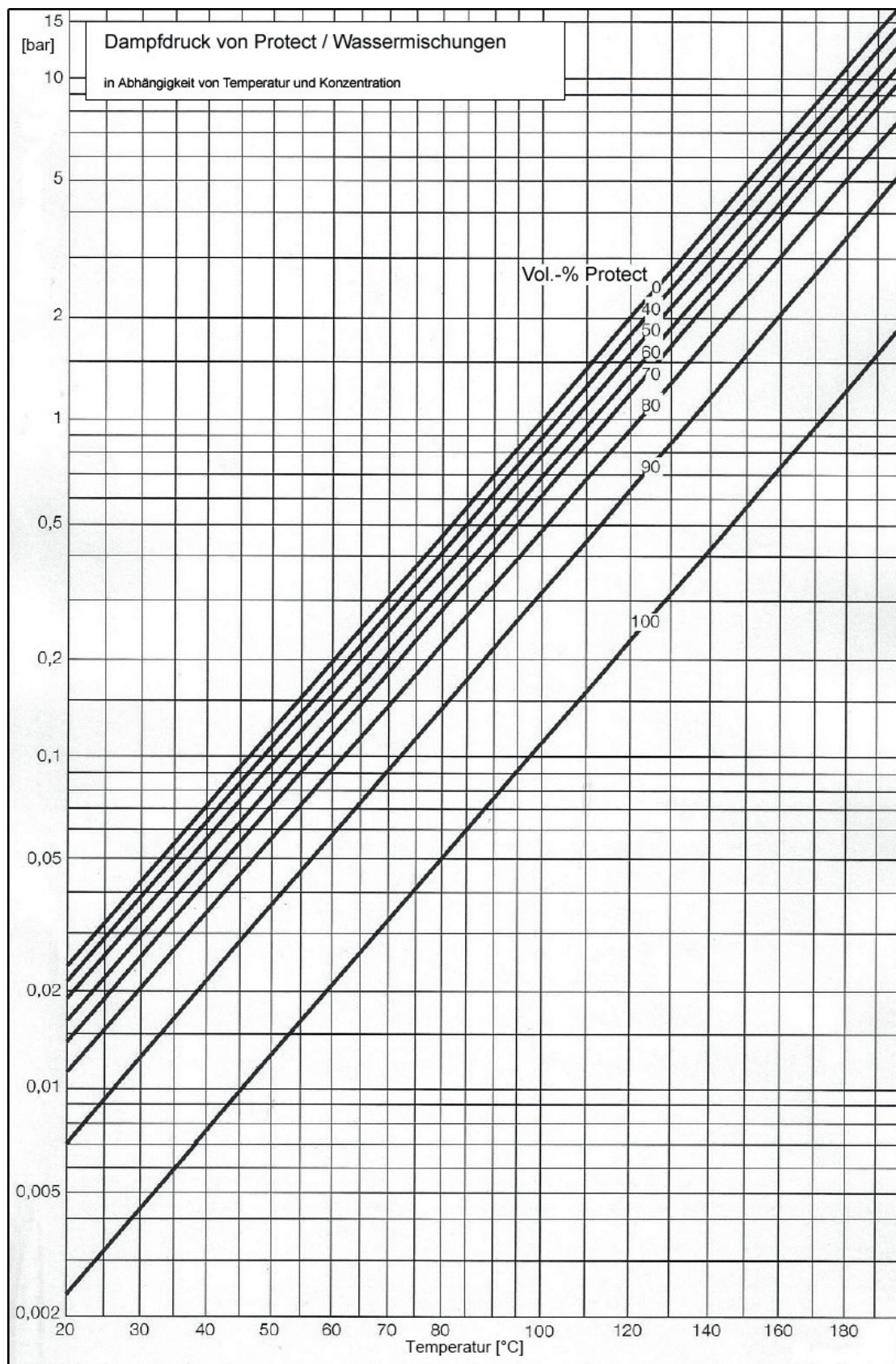


## Prandtl figures of Protect IP / water mixtures:

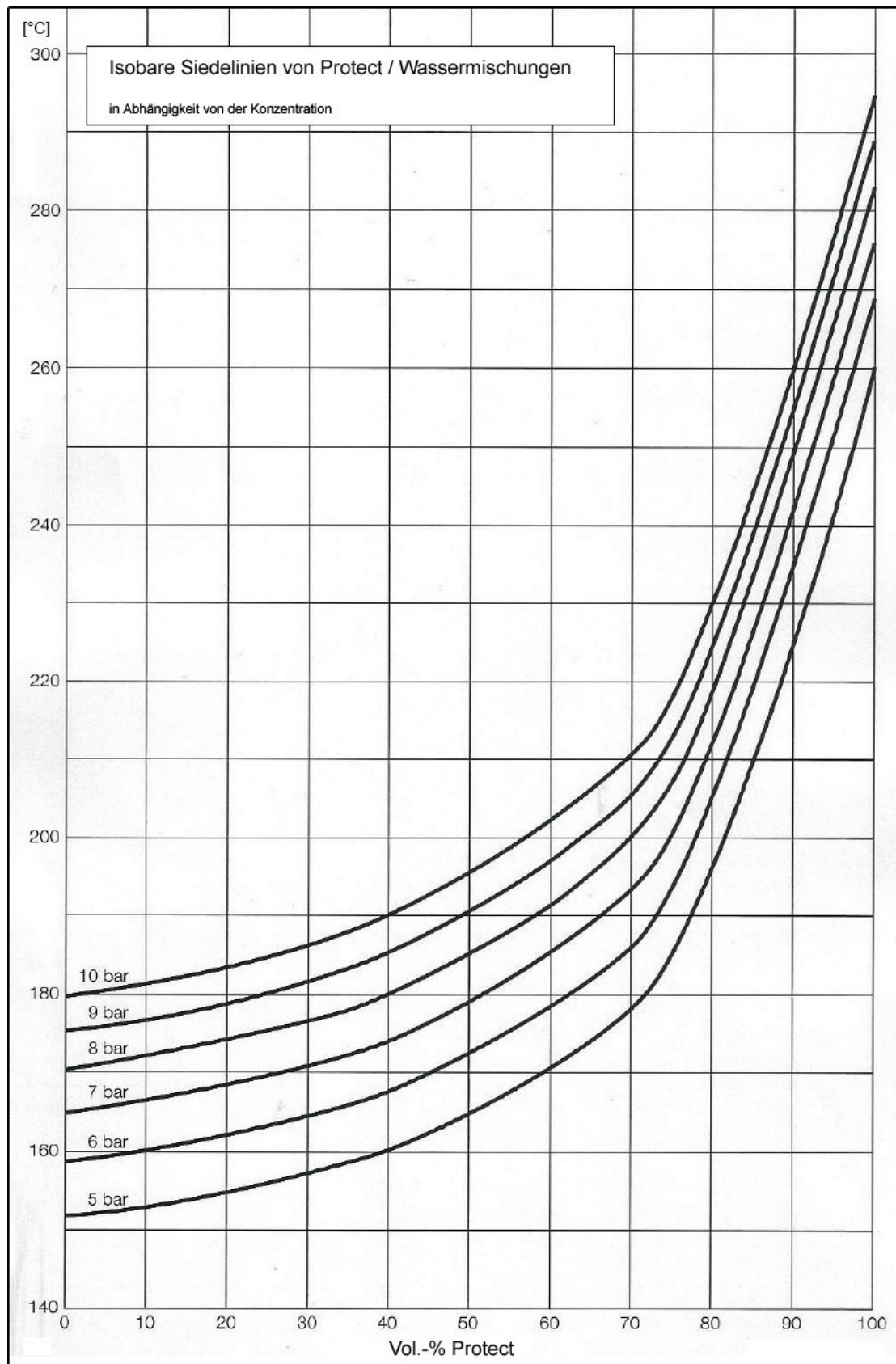




## Vapor pressure of Protect IP / water mixtures:

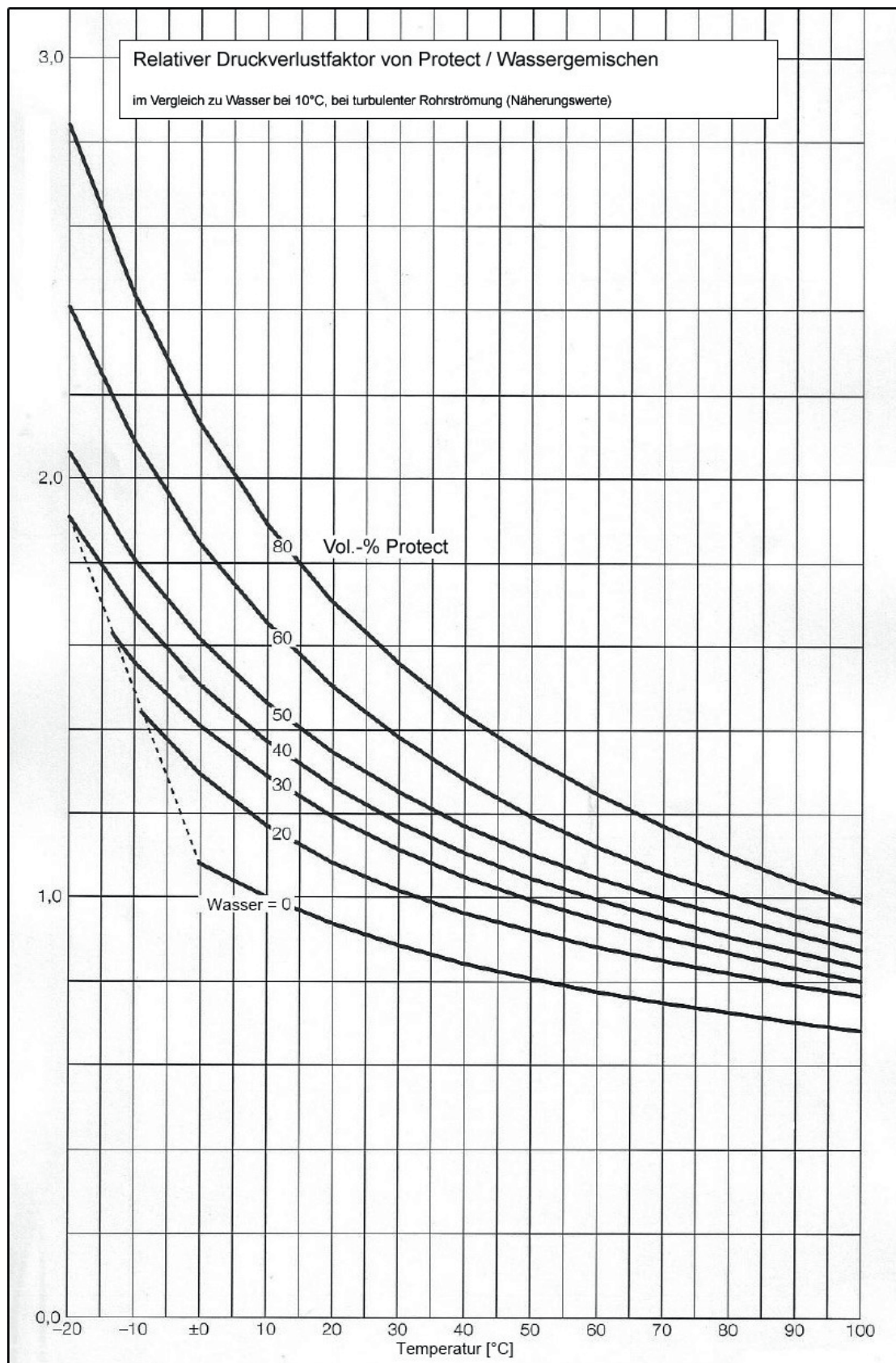


## Isobaric boiling lines from Protect IP / Water mixtures:





## Relative pressure drop factor of Protect IP / water mixtures:



## Cubic expansion coefficient of Protect IP / water mixtures:

