



Premium engine coolant concentrate  
for modern high-performance engines

Technical Information

**FROSTOX<sup>®</sup> HT12<sup>®</sup>**

**HAERTOL**  
Chemie GmbH



## Characteristics of FROSTOX® HT12® Concentrate

<b>Boiling point</b>	> 165 °C	ASTM D 1120
<b>Pour point</b>	< -15 °C	DIN ISO 3016
<b>Density (20 °C)</b>	1.123–1.128 g/cm <sup>3</sup>	DIN 51757
<b>Viscosity (20 °C)</b>	24–28 mm <sup>2</sup> /s	DIN 51562
<b>Refraction nD20</b>	1.430–1.436	DIN 51423
<b>pH value (20 °C)</b>		
• <b>Concentrate</b>	8.0–8.5	ASTM D 1287
• <b>33 vol. %</b>	8.3–8.5	ASTM D 1287
<b>Water content</b>	max. 4 %	DIN 51777
<b>Flash point</b>	> 100 °C	DIN 51758
<b>Reserve alkalinity</b>	> 10 ml 0.1 m HCl	ASTM D 1121

The above data represent average values that were valid 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

**FROSTOX® HT12®** is the most advanced monoethylene-glycol-based premium antifreeze concentrate in the **FROSTOX®** series. The underlying Si-OAT corrosion protection technology contains no monocarboxylic acids and fulfils the requirements of state-of-the-art high-performance engines in terms of thermal stress, long-term stability, and long-term corrosion protection in a special manner. **FROSTOX® HT12®** contains no nitrites, amines, phosphates, molybdates, or borates. The high levels of silicate stability and tolerance with respect to flux residues are particular highlights.

## Application concentration:

It is recommended that **FROSTOX® HT12®** be used at a mixture ratio of 40 % (v/v) to 55 % (v/v); a mixture ratio of 50 % (v/v) is generally used. In cases of more than 58 % (v/v), frost protection is reduced. A mixture with potable water or mixed water (addition of DI water) containing the following limit values is recommended:

<b>pH value</b>	pH scale	6.0 - 8.0
<b>Hardness of water</b>	°dH	< 20
<b>Calcium</b>	mg/l	< 60
<b>Chloride</b>	mg/l	< 40
<b>Sulphate</b>	mg/l	< 50
<b>Fluoride</b>	mg/l	< 50

## Approvals

**FROSTOX® HT12®** has the following approval codes:

- VW TL 774L (G12evo)
- BMW LC18
- MAN 324 SiOAT evo

## Anticorrosion effect

**FROSTOX® HT12®** meets all requirements of ASTM D3306 – especially the corrosion tests according to ASTM D1384 and ASTM D4340, as well as many other tests.

ASTM D 1384 **FROSTOX® HT12®** 50 % (v/v) DI water:

Material		Average change of weight
Copper	(SF Cu)	-0.1 g/m <sup>2</sup>
Soft solder	(L Sn 30)	-0.1 g/m <sup>2</sup>
Brass	(MS 63)	±0.0 g/m <sup>2</sup>
Steel	(HI)	±0.0 g/m <sup>2</sup>
Cast iron	(GG 26)	±0.0 g/m <sup>2</sup>
Cast aluminium	(G-ALSi6Cu4)	-0.4 g/m <sup>2</sup>

ASTM D 4340 **FROSTOX® HT12®** 25% (v/v) DI water with NaCl:  
Weight loss: 0.5 mg/cm<sup>2</sup>/week

ASTM D 2570 **FROSTOX® HT12®**

Material	Average change of weight	Limit value
Copper	1 mg	20 mg
Soft solder	2 mg	60 mg
Brass	1 mg	20 mg
Steel	1 mg	20 mg
Cast iron	1 mg	20 mg
Cast aluminium	2 mg	60 mg

ASTM D 2809 **FROSTOX® HT12®**:

Pump rating: 10 (requirement min. 8)

ASTM D 1882 paint compatibility:

**FROSTOX® HT12®** is not aggressive towards lacquers.

ASTM D 1881 foam test:

**FROSTOX® HT12®** does not foam under the conditions of ASTM D 1881.

## Compatibility with sealing materials

**FROSTOX® HT12®** is generally compatible with the following types of material:

- FKM
- HNBR
- EPDM
- PP
- PA-GF
- VMQ

This list does not guarantee compatibility with all existing products in these classes. It is recommended that the products intended for use should be tested beforehand. As **FROSTOX® HT12®** is based on ethylene glycol, materials sensitive to alcohol (e.g. PU and soft PVC) should not be used.

## Storage stability

**FROSTOX® HT12®** has a shelf life of at least five years in air-tight containers. It must not be stored in galvanised containers.

## Delivery form and packaging

**FROSTOX® HT12®** is available as a concentrate or as a ready mix (50 % (v/v)) according to customer specifications, supplied in road tankers, in 1,000-litre IBCs, in 200- or 60-litre drums, and in non-returnable 20- or 5-litre PE canisters as well as 1-litre PE bottles.

The packaging possible is dependent on the order volume.

## Density of FROSTOX® HT12®/water mixtures [kg/m<sup>3</sup>]

as a function of temperature and concentration

T [°C]	35 vol. %	40 vol. %	45 vol. %	50 vol. %	55 vol. %	58 vol. %
120	991	999	1002	1003	1008	1012
110	998	1006	1010	1012	1017	1020
100	1005	1013	1017	1020	1025	1028
90	1012	1019	1024	1027	1033	1036
80	1018	1025	1030	1035	1040	1043
70	1024	1031	1037	1042	1047	1050
60	1030	1037	1043	1048	1054	1057
50	1036	1043	1049	1055	1060	1064
40	1042	1049	1055	1061	1067	1070
30	1047	1054	1060	1067	1073	1076
20	1052	1059	1066	1072	1079	1083
10	1056	1064	1071	1078	1085	1089
0	1061	1068	1076	1083	1090	1094
-10	1064	1073	1081	1088	1096	1100
-20	1068	1077	1085	1094	1101	1106
-30	-	-	1090	1099	1107	1111
-40	-	-	-	-	1112	1117
-50	-	-	-	-	-	1122

## Specific heat capacity of FROSTOX® HT12®/water mixtures [kJ/kg·K]

as a function of temperature and concentration

T [°C]	20 vol. %	25 vol. %	30 vol. %	35 vol. %	40 vol. %	45 vol. %	50 vol. %	55 vol. %	58 vol. %
120	4.05	4.01	3.96	3.89	3.81	3.76	3.68	3.61	3.57
110	4.06	4.03	3.97	3.89	3.81	3.75	3.67	3.59	3.56
100	4.07	4.03	3.97	3.90	3.80	3.73	3.65	3.57	3.53
90	4.08	4.03	3.97	3.89	3.79	3.71	3.62	3.54	3.51
80	4.07	4.03	3.97	3.88	3.78	3.69	3.59	3.51	3.47
70	4.07	4.03	3.96	3.87	3.76	3.66	3.56	3.48	3.44
60	4.06	4.01	3.95	3.85	3.73	3.63	3.52	3.44	3.40
50	4.05	4.00	3.93	3.83	3.70	3.59	3.47	3.39	3.35
40	4.03	3.98	3.91	3.80	3.66	3.54	3.42	3.34	3.30
30	4.01	3.95	3.88	3.75	3.62	3.49	3.37	3.29	3.25
20	3.98	3.92	3.85	3.72	3.57	3.44	3.31	3.23	3.19
10	3.95	3.89	3.81	3.68	3.52	3.38	3.25	3.17	3.13
0	3.91	3.85	3.77	3.63	3.46	3.31	3.18	3.10	3.06
-10	-	3.81	3.72	3.57	3.40	3.24	3.11	3.03	2.99
-20	-	-	-	3.51	3.33	3.17	3.03	2.95	2.92
-30	-	-	-	-	-	3.08	2.95	2.87	2.84
-40	-	-	-	-	-	-	-	2.79	2.75
-50	-	-	-	-	-	-	-	-	2.67

## Thermal conductivity of FROSTOX® HT12®/water mixtures [W/m·K]

as a function of temperature and concentration

T [°C]	35 vol. %	40 vol. %	45 vol. %	50 vol. %	55 vol. %	58 vol. %
120	0.535	0.504	0.479	0.454	0.430	0.416
110	0.527	0.496	0.472	0.448	0.425	0.411
100	0.518	0.489	0.465	0.442	0.419	0.406
90	0.509	0.481	0.458	0.436	0.414	0.401
80	0.500	0.474	0.451	0.429	0.409	0.397
70	0.492	0.466	0.444	0.423	0.403	0.392
60	0.483	0.459	0.437	0.417	0.398	0.387
50	0.474	0.451	0.430	0.410	0.392	0.382
40	0.465	0.444	0.423	0.404	0.387	0.377
30	0.57	0.436	0.416	0.398	0.382	0.372
20	0.448	0.429	0.410	0.391	0.376	0.368
10	0.439	0.421	0.403	0.385	0.371	0.363
0	0.430	0.414	0.396	0.379	0.366	0.358
-10	0.422	0.406	0.389	0.373	0.360	0.353
-20	0.413	0.399	0.382	0.366	0.355	0.348
-30	-	-	0.375	0.360	0.349	0.344
-40	-	-	-	-	0.344	0.339
-50	-	-	-	-	-	0.334

## Kinematic viscosity of FROSTOX® HT12®/water mixtures [mm²/s]

as a function of temperature and concentration

T [°C]	35 vol. %	40 vol. %	45 vol. %	50 vol. %	55 vol. %	58 vol. %
120	0.52	0.57	0.61	0.62	0.67	0.71
110	0.57	0.63	0.67	0.68	0.73	0.77
100	0.61	0.67	0.73	0.76	0.81	0.84
90	0.66	0.72	0.80	0.87	0.91	0.93
80	0.73	0.79	0.91	1.01	1.05	1.06
70	0.84	0.91	1.05	1.20	1.25	1.26
60	0.99	1.08	1.26	1.45	1.53	1.55
50	1.21	1.34	1.56	1.81	1.94	2.00
40	1.54	1.73	2.00	2.30	2.55	2.70
30	2.01	2.31	2.64	3.02	3.49	3.79
20	2.72	3.19	3.62	4.11	4.96	5.57
10	3.80	4.58	5.16	5.85	7.37	8.54
0	5.49	6.85	7.75	8.84	11.6	13.7
-10	8.19	10.6	12.3	14.4	19.3	23.1
-20	12.5	17.1	21.1	26.2	34.7	41.0
-30	-	-	39.0	54.2	68.3	77.0
-40	-	-	-	-	150.0	153.0
-50	-	-	-	-	-	-

## Vapour pressure of FROSTOX® HT12®/water mixtures [bar]

as a function of temperature and concentration

T [°C]	35 vol. %	40 vol. %	45 vol. %	50 vol. %	55 vol. %	58 vol. %
180	8.39	8.06	7.65	7.19	6.73	6.42
170	6.65	6.40	6.07	5.71	5.34	5.10
160	5.20	5.01	4.76	4.48	4.19	4.00
150	4.01	3.87	3.68	3.47	3.24	3.09
140	3.05	2.94	2.80	2.64	2.47	2.36
130	2.28	2.20	2.10	1.98	1.85	1.77
120	1.67	1.62	1.54	1.46	1.37	1.34
110	1.29	1.17	1.11	1.05	0.99	0.94
100	0.85	0.82	0.79	0.74	0.70	0.66
90	0.59	0.57	0.54	0.51	0.48	0.46
80	0.39	0.38	0.36	0.34	0.32	0.31
70	0.26	0.25	0.24	0.22	0.21	0.20
60	0.16	0.16	0.15	0.14	0.13	0.13
50	0.10	0.10	0.09	0.09	0.08	0.08
40	0.06	0.06	0.05	0.05	0.05	0.05
30	0.03	0.03	0.03	0.03	0.03	0.03

## Antifreeze effect of FROSTOX® HT12®/water mixtures

The **freezing point**, colloquially called 'antifreeze', is a measure for the freezing point depression effect of antifreeze fluids. When a given FROSTOX® HT12®/water mixture is cooled down, the freezing point is the temperature at which initial ice crystals begin to form. The resulting ice slurry does not possess any expansive force. Further reduction in temperature causes further thickening of the ice slurry until it solidifies at the **pour point**. It is only below this temperature that there is a risk of the installation bursting. The arithmetic mean value of the freezing point and the pour point is called frost protection. The following table shows the freezing points, frost protection, and pour points of FROSTOX® HT12®/water mixtures as a function of the concentration:

FROSTOX® HT12® Concentrate	Freezing point (acc. ASTM D 1177)	Frost protection (calculated)	Pour point (acc. DIN 51583)
20 vol. %	-9.0 °C	-11.0 °C	-13.0 °C
25 vol. %	-12.3 °C	-14.8 °C	-17.3 °C
30 vol. %	-16.1 °C	-19.1 °C	-22.0 °C
35 vol. %	-20.4 °C	-23.7 °C	-26.9 °C
40 vol. %	-25.2 °C	-28.6 °C	-32.0 °C
45 vol. %	-30.8 °C	-33.4 °C	-37.2 °C
50 vol. %	-37.6 °C	-40.7 °C	-45.2 °C
55 vol. %	-45.4 °C	< -50 °C	< -50 °C
58 vol. %	< -50 °C	< -50 °C	< -50 °C

### Note

The information submitted in this publication is based on our current knowledge and experience. Because 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 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 legislation are observed.

