

ThermoSol

NON TOXIC ANTIFREEZE FOR HIGH TEMPERATURES INSTALLATIONS

Description and applications:

ThermoSol is a transparent red liquid. It is safe to handle as it is composed of not toxic high molecular weight glycol.

ThermoSol is based on specially selected high boiling temperature glycols with:

- ✓ Superior cracking stability to high temperatures.
- ✓ Boiling point above 270°C to atmospheric pressure. Glycols do not boil in stagnation situations in solar systems maintaining dissolved the package of additives, without plugging the pipes.
- ✓ Physiologically harmless.
- ✓ Biodegradable.

ThermoSol meets with European quality specifications and standards.

The product is presented ready to use. Do not dilute because its properties would not be guaranteed.

Other advantages of **ThermoSol**:

- ✓ It maintains cooling circuits in perfect condition for longer periods of time than conventional products due to its 100% organic additives.
- ✓ It optimises heat transference and so enhances the performance of the installations.
- ✓ It protects from corrosion: aluminium, copper, brass, steel and cast iron.
- ✓ Its red colour helps to detect leaks.
- ✓ Silicate free product, avoid plugging issues, longer stock time.
- ✓ Nitrite, Nitrate, Amine, Phosphate and Borax free product. Better for environment and safer manipulation.

Technical Data:

Appearance	Transparent Red Liquid
Glycols Content	50 % P/P
pH (20°C)	8,0 – 9,5
Boiling Point ¹	125°C
Protection Temperature	-28 °C
Density (20°C)	1,07-1,09 g/ml
Viscosity (20°C)	4,19 mPa s
Specific Heat Capacity (20°C)	3,34 KJ/KgK
Thermal Conductivity (20°C)	0,395 W/mK

Data has been gathered in specific bibliography and proprietary tests. It is not part, necessarily, of the technical specifications.

Corrosion Table:

Mixtures of high glycols and water are more corrosive than pure water so additives should be used in order to ensure the integrity of the circuit.

The following table shows the effectiveness of mixtures *ThermoSol* in inhibiting corrosion according to ASTM D 1384. For a comparative purpose results for water and propylene glycol alone are presented.

Material	<i>ThermoSol</i>	Propylene Glycol (50% v/v)	Water
Copper	-0,15	-1,2	-1,0
Solder	-0,36	-136	-11
Brass	0,33	-2,5	-1,0
Steel	0,40	-225	-76
Cast Iron	2,09	-92	-192
Aluminum	-0,68	-68	-32

The results above are an average change in weight of coupons in g/m². A positive number indicates an increase in weight due to the formation of a stable protective layer on the metal's surface.

¹ Calculation pressure: 2 bar.



Test description:

ASTM D 1384:

In this test method, specimens of metals typical of those present in engine cooling systems are totally immersed in aerated engine coolant solutions with corrosive water for 336 h at 88°C (190°F). The corrosion inhibitive properties of the test solution are evaluated on the basis of the weight changes incurred by the specimens. Each test is run in triplicate, and the average weight change is determined for each metal.

Compatibility table:

ThermoSol is compatible with the usual materials of cooling circuits. The next table shows plastics, sealants and elastomers compatible with the product. Data has been gathered in specific bibliography and proprietary tests.

Thermosol Compatibility Chart			
Material	25°C	80°C	160°C
Adiprene™ L-100	OK	NR	NR
Black Rubber 3773	OK	NR	NR
Buna N (o 25)	OK	OK	--
Buna S	OK	Acceptable	NR
Butyl Rubber	OK	OK	--
Compressed Asbestos	OK	OK	Acceptable
EPDM	OK	OK	OK
EPR Rubber	OK	OK	OK
Hycar™ D-24	OK	Acceptable	--
Hypalon™	OK	NR	NR
Kalrez™	OK	OK	OK
Natural Rubber Gum	OK	NR	NR
Neoprene 7797	OK	Acceptable	--
Red Rubber 107	OK	NR	NR
Saraloy™ 300	OK	NR	NR
Silicone Nº 65	OK	OK	--
Thiokol™ 3060	OK	NR	NR
Viton™ A	OK	OK	NR
<i>OK: Recommended</i>		<i>NR: No Recommended</i>	<i>--: No data</i>

Phenolic resins, plasticized PVC and polyurethane elastomers are not compatible with ThermoSol.

Zinc is not compatible with glycols or their mixtures with water, avoid zinc or galvanized reservoirs.



Filling the installation:

After pressure testing, which also affords an opportunity to determine the volume of the system from the amount of water used (water meter), the system should be drained and then filled immediately with the antifreeze. Air pockets are to eliminate immediately.

Before filling the systems should be flushed with water to remove traces of flux, especially when chlorine containing flux has been used.

After draining the circuit of old antifreeze, it should be flushed with water in order to clean possible deposits and particles before filling with *ThermoSol*. The product's useful life will be reduced if the system is already corroded. If corrosion is detected, corrective action should be taken before filling up the circuit.

Mixtures with other kind of antifreeze should be avoided for possible incompatibilities which would reduce the useful life of the product. For specific compatibilities you can contact our technical department: please email carpemar@carpemar.com

Long-term no-load operation of the system should be avoided because this can adversely affect the stability of the heat transfer medium and considerably reduce its service life.

ThermoSol is stable for at least two years in regular stocks conditions in original airtight containers.

Equipment must not be fitted with galvanized heat exchangers, heat reservoirs, tanks or pipes, because glycols can corrode zinc.

The minor surface tension of *ThermoSol* compared with water may make minor damage due to corrosion more apparent.

Heat Resistance:

Permanent usage temperatures: between -28°C to 190°C.

Sustained temperatures higher than 200°C cause premature ageing of *ThermoSol*. For solar thermal systems with stagnation temperatures above 200°C it is thus recommended to choose expansion vessels of sufficient size to ensure that the solar antifreeze will be taken up completely in case of stagnation.

Temperatures above 200°C lead to slow alteration of the chemical properties of antifreeze fluid, with the result that the reliability of operation of the system may be endangered.



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In the case of not-closed systems or the insert of oxygen (e.g. via valves) the maximum usage temperature is lower.

Precautions:

ThermoSol is a non flammable, non corrosive product, so no special precautions are required. In any case good industrial practices are recommendable.

Avoid contact with eyes, in case of splashing flush with running water for at least 10 minutes. Do not eat or drink, keep away of children.

Store in a clean and well-ventilated place. Tightly sealed containers are recommended in order to maintain the properties of the product.

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T ^a (°C)	Densidad (Kg/m3)
-20	1108
-10	1099
0	1091
10	1084
20	1077
30	1070
40	1063
50	1057
60	1049
70	1042
80	1034
90	1026
100	1018
110	1009
120	1000
130	991
140	982
150	973
160	965
170	956
180	949

T ^a (°C)	Cp (KJ/KgK)
-20	3,21
-10	3,24
0	3,27
10	3,31
20	3,34
30	3,38
40	3,41
50	3,45
60	3,49
70	3,53
80	3,57
90	3,61
100	3,65
110	3,69
120	3,74
130	3,78
140	3,83
150	3,87
160	3,92
170	3,97
180	4,02

T ^a (°C)	Thermal Cond. (W/mK)
-20	0,393
-10	0,394
0	0,394
10	0,395
20	0,395
30	0,396
40	0,396
50	0,397
60	0,398
70	0,398
80	0,399
90	0,399
100	0,400
110	0,400
120	0,401
130	0,402
140	0,402
150	0,403
160	0,403
170	0,404
180	0,404

T ^a (°C)	Viscosity (mPas)
-20	17,36
-10	12,30
0	8,62
10	6,00
20	4,19
30	2,96
40	2,16
50	1,63
60	1,29
70	1,06
80	0,89
90	0,74
100	0,62
110	0,51
120	0,41
130	0,35
140	0,31
150	0,29
160	0,29
170	0,26
180	0,17

The information contained in this document is based on our current knowledge and experience. This information is presented for good use of the products and it is not part, necessarily, of the technical specifications.

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.