GLACELF AUTO SUPRA is a “very long life” antifreeze based on high purity monoethylene glycol and organic corrosion inhibitors, a product of the latest research into the protection of materials in a corrosive environment (the technology is protected by a number of patents).

GLACELF AUTO SUPRA antifreeze, when mixed with an appropriate quantity of water, becomes a coolant fluid recommended for all internal combustion engines in cars and vans, trucks, construction machinery and agricultural tractors.

In accordance with French Decree No. 95-326 of 20th March 1995 concerning the distribution of certain substances containing monoethylene glycol, GLACELF AUTO SUPRA contains a bittering agent to give it a bitter taste as a guarantee against accidental ingestion by children or users.

In our range of antifreezes, GLACELF AUTO SUPRA is the top-of-the-range product.

APPLICATIONS

GLACELF AUTO SUPRA is diluted in demineralised water (< 8°F) to form a permanent coolant fluid that can be used throughout the year.

- To obtain a coolant perfectly mixed, it is recommended to mix mechanically the antifreeze with the water.
- Protection against freezing depends upon the proportions of GLACELF AUTO SUPRA in the water.

<table>
<thead>
<tr>
<th>Minimum 33%</th>
<th>Temperature at which crystals first appear, °C, (NF T 78 102)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>% by vol. of GLACELF AUTO SUPRA</td>
</tr>
<tr>
<td>Maximum 70%</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>-20</td>
</tr>
</tbody>
</table>

These are mean values provided for indicative purposes only

- It is recommended that at least 30% of the final solution should be GLACELF AUTO SUPRA.
- Maximum protection against freezing is obtained at 68%.
- Do not use in proportions above 70%
- GLACELF AUTO SUPRA is entirely safe to use in all cast iron or aluminium engines and in cooling systems containing aluminium or copper alloy radiators.
- GLACELF AUTO SUPRA is especially recommended for high technology engines where it is important to protect aluminium at high temperature.

High temperature protection of aluminium

- During intensive fleet testing, GLACELF AUTO SUPRA –37°C demonstrated superior protection:
  - over at least 650,000 km (8000 hours) when used in trucks
  - over at least 250,000 km (2000 hours) when used in cars.
The function of a coolant fluid

- In a petrol or diesel engine, some 30 to 40% of the heat produced in combustion is not converted into notion power and has to be dissipated. An engine’s cooling system must be capable of removing this excess heat together with that due to friction of the moving parts. The coolant fluid cools the different parts of the engine by heat transfer and then gives up heat in the radiator. Running an engine without coolant for only a few minutes is sufficient to cause piston seizing and cracks in the cylinder head owing to heat not being removed.

Organic inhibitors not consumed

- The electrochemical action of the organic inhibitors, never consumed during the drain period, extends material life and guarantees a maximum cooling of the engine.

No formation of deposits surfaces left clean

- Heat transfer in diluted GLACELF AUTO SUPRA remains optimised because its wholly organic additives are free of the film-producing and oxidising substances (which themselves form deposits) used in conventional technology coolants.

Longer life

- Since the additives are not used up and no deposits are formed, the user of GLACELF AUTO SUPRA benefits from improved reliability and reduced maintenance.

Non-toxic additives

- GLACELF AUTO SUPRA contains no silicates, phosphates, chromates, nitrites or boron. All coolants based upon monoethylene glycol are regarded as special industrial wastes and must be disposed of in approved centres for environmental reasons.

Long-term protection against all forms of corrosion

- It is recommended that the coolant fluid should be replaced every 5 years or at the mileage limits given above.

**SPECIFICATIONS**

- GLACELF AUTO SUPRA meets the international specifications for antifreezes as well as those of major manufacturers.

- GLACELF AUTO SUPRA is officially approved by the following manufacturers:
  - Daimler Chrysler : MB page 325.3
  - MAN
  - SCANIA
  - SAAB
  - VW, AUDI, SEAT, SKODA, FORD

- GLACELF AUTO SUPRA has been acknowledged as satisfactory for use in their engines by the following manufacturers
  - LEYLAND TRUCKS
  - JAGUAR
  - OPEL-GM
  - RENAULT VI

**CUSTOMER BENEFITS**

**TOTAL LUBRIFIANTS**
16, rue de la République
F- 92800 PUTEAUX

Glacelf Auto Supra
August 2004
MGP/08/04

This antifreeze used in accordance with our recommendations and for the application for which it is intended does not represent a special hazard.
A safety data file conforming to the requirements of current EC legislation is available from your local trade consultant.
GLACELF AUTO SUPRA provides an effective solution to the problems of corrosion affecting all materials used in cooling circuits.

### Laboratory test:
- 250 ml antifreeze*
- 500 ml of corrosive water
- 336 hours
- 6 l/h of air
- 88°C

### Protection of the aluminium water pump against cavitation corrosion and erosion

Optimised physical-chemical characteristics

### Table 1: ASTM D1384 – *in vitro* corrosion test

<table>
<thead>
<tr>
<th>Variation in weight of test piece (mg)</th>
<th>Brass</th>
<th>Copper</th>
<th>Solder</th>
<th>Steel</th>
<th>Cast iron</th>
<th>Aluminium</th>
</tr>
</thead>
<tbody>
<tr>
<td>ASTM D 4985 (max.)</td>
<td>10</td>
<td>10</td>
<td>30</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>ASTM D 3306 (max.)</td>
<td>10</td>
<td>10</td>
<td>30</td>
<td>10</td>
<td>10</td>
<td>30</td>
</tr>
<tr>
<td>GLACELF AUTO SUPRA*</td>
<td>-1.6</td>
<td>-1.9</td>
<td>-0.1</td>
<td>+0.5</td>
<td>+1.4</td>
<td>-4.6</td>
</tr>
</tbody>
</table>

*These are mean values provided for indicative purposes only

Air or gas can enter a circuit in various ways, and then exacerbates the phenomenon of cavitation; also the presence of oxygen in the circuit can affect the performance of corrosion inhibitors.

GLACELF AUTO SUPRA gives excellent protection against cavitation that can perforate liners and cause water pump faults.

In the very severe ASTM D 2809 test on an aluminium water pump – a test of corrosion-erosion caused by cavitation – GLACELF AUTO SUPRA obtained a score of 8/10, required by the ASTM D3306 and D4985 specifications.

- The additives in GLACELF AUTO SUPRA make the coolant chemically neutral (pH 7-8.5), give it a reserve of alkalinity (to neutralise the acids resulting from the combustion gases), resistance to foaming (mainly instability of the foam that might form) and compatibility with hard water (maximum 40°F).

- The coolant fluid obtained by diluting GLACELF AUTO SUPRA is also inert to elastomeric seals and paints. Its additives are stable and remain effective over time

### CHARACTERISTICS

The typical characteristics mentioned represent mean values

<table>
<thead>
<tr>
<th>GLACELF AUTO SUPRA</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Fluorescent orange</td>
</tr>
<tr>
<td>Specific gravity at 15 °C</td>
<td>ASTM D1122</td>
</tr>
<tr>
<td>PH, dilution 50% by vol.</td>
<td>ASTM D1287</td>
</tr>
<tr>
<td>Alkalinity reserve (pH 5.5)</td>
<td>ASTM D 1121</td>
</tr>
<tr>
<td>Temperature at which crystal appear, 50% dilution by volume</td>
<td>ASTM D1177</td>
</tr>
<tr>
<td>Boiling point (undiluted)</td>
<td>ASTM D1120</td>
</tr>
<tr>
<td>Boiling point (diluted)</td>
<td>ASTM D1120</td>
</tr>
</tbody>
</table>

---

TOTAL LUBRIFIANTS  
16, rue de la République  
F- 92800 PUTEAUX  
3/3

Glacelf Auto Supra  
August 2004  
MGP/08/04

This antifreeze used in accordance with our recommendations and for the application for which it is intended does not represent a special hazard. A safety data file conforming to the requirements of current EC legislation is available from your local trade consultant.