

## SilFORT™ TAC2000 Coating

### Description

SilFORT TAC2000 coating is an anti-fog coating applied to transparent polycarbonate (PC) or polymethyl-methacrylate (PMMA) substrates to help prevent the formation of water droplets on a coated surface. This thermally cured two component coating offers a long-lasting anti-fogging effect, along with a high transparency that allows automotive specifications for headlamp and autonomous driving assistance systems to be met.

### Key Features and Typical Benefits

- Excellent anti-fog and anti-drop properties
- Two component coating – base and hardener
- Spray, dip or flow application

### Standard Mixing Ratio for Spray Coating

Application Method	TAC2000 Base A1	Antifog Hardener B1	Solvent	Solids Content [%]
Spray	80 % by weight	20 % by weight	-	Approx. 17

### Typical Physical Properties of Components<sup>(1)</sup>

<b>SiIFORT TAC2000 Base A1</b>	<b>Unit</b>	<b>Value</b>
Physical Form	-	Liquid
Color	-	Pale yellow
Solids Content	%	16
Dynamic Viscosity (@ 25°C)	mPa s	Approx. 18
Density (@ 25°C)	g/cm <sup>3</sup>	Approx. 0.87
Storage Conditions	°C	5°C – 43°C
Shelf Life	Days	365 <sup>(2)</sup>

<b>AF-Hardener B1</b>	<b>Unit</b>	<b>Value</b>
Physical Form	-	Liquid
Color	-	Colorless
Solids Content	%	21
Dynamic Viscosity (@ 25°C)	mPa s	Approx. 4
Density	g/cm <sup>3</sup>	Approx. 0.96
Storage Conditions	°C	5°C – 43°C
Shelf Life	Days	365 <sup>(2)</sup>

(1) Typical properties are average data and are not to be used as or to develop specifications.

(2) From date of manufacturing, in original unopened container.

### Typical Physical Properties after Mixing (Base: Hardener 80:20)

<b>Property</b>	<b>Unit</b>	<b>Value</b>
Physical Form	-	Liquid
Appearance	-	Clear, pale yellow
Solids Content	%	17
Dynamic Viscosity (@ 25°C)	mPa s	Approx. 14
Density	g/cm <sup>3</sup>	Approx. 0.89
Processing Temperature	°C	Below 30
Pot Life below 30°C	Days	5

### Typical Anti-fog Performance<sup>(3)</sup>

Durability Test Method	Test Conditions	Performance
High humidity test	60°C @ 95% rel. humidity – 240 h	Pass
Climate cycle test	-20°C-85°C @ 85% rel. humidity – 120 h	Pass
Condensation test	40°C @ 100% rel. humidity – 240 h	Pass
High heat test (PC substrates)	240 h @ 120°C	Pass

### Typical Anti-fog Performance - Coating Thickness<sup>(4)</sup>

Coating Thickness	Appearance	Initial Anti-fog	Durability
0.5 µm	OK <sup>(5)</sup>	OK	NOK
1 µm			
2 µm			OK
3 µm			
4 µm			
5 µm			
6-9 µm			
> 9 µm	Spray sagging possible		

(3) Note: Typical data on clear PC. Actual results may vary.

(4) Typical data. Actual results may vary and are not to be used as or to develop specifications.

(5) OK: Passes all durability tests (see table "Typical Anti-fog Performance")

### Potential Applications

Exterior automotive devices, such as lenses, sensor covers, housings, etc., that may have stringent requirements for transparency in moist, water-condensing environments.

### General Considerations for Use

Application Methods	Spray, flow, dip (premixed coating)
Reducing solvents <sup>(6)</sup>	Iso-Butanol (CAS#78-83-1)
	2-Butanol (CAS#78-92-2)
	1-Methoxy-2-propanol (CAS#107-98-2)
Application and flash off conditions	22 – 55 % rel. humidity (@ 25°C) 20 – 30 °C >5 minutes <sup>(7)</sup>
Cure	80 – 120 °C 20 – 60 minutes <sup>(8)</sup>
Recommended Film Thickness <sup>(9)</sup>	2 - 9 µm

(6) Other solvents may also be compatible.

(7) Higher flash off temperatures up to 50°C, may reduce the flash off time to approx. 2 minutes

(8) 80°C applies only to PMMA. For details on PC, refer to “Anti-fog properties under various curing conditions” below

(9) Thickness as little as 0.5 µm may be sufficient, depending on performance requirements

The coating area should be well-ventilated, clean and free from dust, with a recommended cleanroom environment in accordance with ISO14644-1, Class 7 or better. If necessary, parts should be washed or wiped clean with isopropanol, a mild detergent solution and clean water rinse or ultrasonic bath followed by a filtered-air blow-off and a final ionized- air blow-off. Coating solution should be filtered continuously or just prior to use through a 1.0 µm absolute gel filter, using a 5 to 10 µm pre-filter. The use of electric or indirect gas-fired ovens is recommended for cure.

The anti-fog coating can be applied to parts by spray, flow or dip coating methods. To adjust coating thickness or optical quality of the surface, the product can be reduced with appropriate solvents before application.

The two components (base and hardener) should be mixed in a ratio of 80:20 with an accuracy of ±5%. The mixed coating should be consumed ideally within 5 days. The pot life can depend on the ambient conditions and the solids level.

### Anti-fog Performance on Polycarbonate under various curing conditions<sup>(10)</sup>

Oven Curing	20 min	30 min	40 min	50 min	60 min
90°C	Reduced performance		Full performance		
100°C	Reduced performance		Full performance		
110°C	Full performance				
120°C	Full performance				

(10) Adhesion and durability performance

### Packaging

Base and hardener are currently available in:

SilFORT TAC2000 Base A1: 16 kg Pail

AF-Hardener B1: 4 kg Pail

### Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

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