

SurTec® 650 C

chromital® TCP

Properties

- hexavalent chromium free passivation for aluminium
- based on trivalent chromium
- liquid concentrate
- improved corrosion protection on Cu-containing alloys
- also works on alloyed and casted aluminium
- easy to handle in immersion and spray application
- produces an iridescent, blue to grey and visible layer

Application

SurTec 650 C is diluted with deionised (DI-)water.

make-up values:	<i>spray application</i>	<i>immersion application</i>
SurTec 650 C	25 %vol (10-50 %vol)	20 %vol (10-50 %vol)

make-up: Steps for make-up:

1. Before make up clean the tank thoroughly. For new tanks or new liners, leach with 10 % sulfuric acid, then rinse before use.
2. Add deionised water to the calculated amount of SurTec 650 C, stirring vigorously.
3. Measure the pH-value and adjust it to pH 3.9, if necessary.

temperature: 40°C (30-40°C)

pH-value: 3.9 (3.70-3.95)

adjust with 5 % sulfuric acid or 1 % sodium hydroxide solution slowly, while constant mixing

application time: *at 40 °C:* 2 min (1-3 min)
at 30 °C: 4 min (2-6 min)

spraying pressure: 1 bar (0.5-1.5 bar)

agitation: not necessary

tank material: stainless steel or steel with acid and fluoride resistant coating

filtration: necessary (min. 2 circles/h)

heating: necessary; of acid and fluoride resistant material

cooling: not necessary

exhaust: required for worker's protection

hints:

Metallic tank material and goods to be passivated must be electrically isolated from each other.

During storage a slight precipitation may occur which does not impair the quality and the function of the product.

Prior to the passivation with SurTec 650 C the aluminium surface must be cleaned and deoxidized thoroughly. The surface must be water-break free.

Standard procedures for immersion:

For aluminium alloys with < 1 % silicium:

1. mild alkaline degreasing e.g. SurTec 133
2. alkaline etching e.g. SurTec 181
3. deoxidizing e.g. SurTec 495 or SurTec 495 L
4. passivation with SurTec 650 C chromitAL[®]

For aluminium alloys with > 1 % silicium:

1. mild alkaline degreasing e.g. SurTec 133
2. deoxidizing e.g. SurTec 495 or SurTec 495 L
3. passivation with SurTec 650 C chromitAL[®]

Standard procedure for spray:

1. acid degreasing SurTec 478 / SurTec 086
2. passivation with SurTec 650 C chromitAL[®]

Using a silicate containing degreasing, the surface has to be treated with a fluoride containing post-dip.

After passivation with SurTec 650 C chromitAL[®], the parts have to be rinsed. For best corrosion resistance, rinsing with deionised water is recommended. At best, the conductivity of the last rinse should be less than 30 µS/cm. The drying temperature should not exceed 65°C at the part's surface.

Before testing the corrosion resistance of the parts with the salt spray test, the surface has to be stored for 24 hours.

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 650 C	liquid, green, clear-turbid, contingency precipitate	1.010 (1.00-1.02)	3.4 (3-4)

Maintenance and Analysis

Analyse and adjust pH-value by using a frequently calibrated pH-meter. Analyse and adjust the concentration of SurTec 650 C regularly.

Sample Preparation

Take a sample at a homogeneously mixed position. Let it cool down to room temperature. If the sample is turbid, let the turbidity settle down and decant or filter the solution.

SurTec 650 C – Analysis by Titration

- reagents: sodium hydroxide (10 %)
H₂O₂ (30 %)
hydrochloric acid (17 %)
potassium iodide
0.1 N sodium thiosulfate solution
starch solution (1 %)
- procedure:
1. Pipette 100 ml bath sample into a 250 ml Erlenmeyer flask.
 2. Add 20 ml sodium hydroxide solution.
 3. Then add approx. 2 ml H₂O₂ and wait for 5 min without stirring at room temperature.
 4. Cover the beaker with a watch glass and boil the solution for 30-40 min. It is very important to evaporate excessive H₂O₂. (The volume must not evaporate below 50 ml.)
 5. Chill the solution and filter it using a fine-grained filter paper (blue ribbon).
 6. Rinse the filter with approx. 10 ml deionised water. The filtrate has to be clear and free of precipitates.
 7. Add deionised water to the filtrate up to about 100 ml.
 8. Acidify with 40 ml hydrochloric acid (colour change from yellow to orange).
 9. Add about 1 g potassium iodide.
 10. Titrate with 0.1 N sodium thiosulfate solution until the solution is only slightly yellowish.
 11. Then add some starch solution and continue the titration until the blue colour disappears.
- calculation: consumption in ml · 1.613 = %vol SurTec 650 C

SurTec 650 C – Analysis by AAS

- equipment: atomic absorption spectrometer (AAS):
wave length: 357.9 nm
slit: 0.7 nm
- reagents: nitric acid (1:1) p. a.
comparable chromium standards
- procedure: Make an exact dilution of 1:20
1. Pour 5 ml nitric acid (1:1) p. a. into a 100 ml volumetric flask.
 2. Pipette 5 ml bath sample into the flask and mix well.
 3. Wait 5 min before filling up.
 4. Fill up with deionised water and mix well.
 5. Calibrate the AAS with comparable chromium standards and measure the prepared dilution of the sample (in ppm).
 6. In respect to the dilution calculate the concentration of chrome in the bath (in ppm).
- calculation: concentration of chrome in ppm · 0.0974 = %vol SurTec 650 C
- hint: Choose the dilution in order that the measured values are in the linear measurement range of the AAS.

Ingredients

- trivalent chromium salts

Consumption and Stock Keeping

The consumption depends heavily on the drag-out. To determine the exact amounts of drag-out, see [SurTec Technical Letter 11](#).

The following values can be taken as estimated average consumption:

45-55 ml SurTec 650 C concentrate are sufficient for treating 1 m² surface (included a supposed drag-out of 200 ml/m² at a make-up concentration of 20 %vol).

The consumption is depending strongly on further factors:

- the drag-out may be significantly higher for rough surfaces and scooping parts (up to 300 ml/m²)
- at rough surfaces, the effective surface is higher than the part's dimension, so the chemical consumption is higher
- drag-in of alkalinity into the SurTec 650 C bath can lead to precipitations which means additional consumption

In order to prevent delays in the production process, per 1,000 l bath, the following amounts should be kept in stock:

SurTec 650 C chromitAL[®] 500 kg

Product Safety and Ecology

The safety instructions and the instructions for environmental protection have to be followed in order to avoid hazards for people and environment. The Material Safety Data Sheets (according to European legislation) contain explicit details for this.

The following hazard designations and classifications into water hazard classes (WHC) have to be taken into account:

<u>product</u>	<u>hazard designation</u>	<u>water hazard class</u>
SurTec 650 C	-	WHC 2

Warranty

We are responsible for our products in the context of the valid legal regulations. The warranty exclusively accesses for the delivered state of a product. Warranties and claims for damages after the subsequent treatment of our products do not exist. For details please consider our [general terms and conditions](#).

Further Information and Contact

In our forum, you can discuss topics of the surface technology:
<http://forum.SurTec.com/>

If you have any questions concerning the process, please contact your local technical department: <http://SurTec.com/International.html>

Trouble Shooting

problem	possible cause	remedy
removable white residue on the surface	a) pH-value is too high	adjust the pH
	b) temperature is too high	cool down the bath
	c) immersion time is too long	shorten the immersion time
heavy turbidity of the chromitAL [®] bath	a) pH-value is too high	adjust the pH
	b) local overheating	evtl. indirect heater
	c) drag-in of alkalinity, phosphates or hard water	increase the rinsing quality before the chromitAL [®] bath
cloudy layer	a) insufficient activation	check the pre-treatment and the activation
	b) insufficient agitation in the chromitAL [®] bath	evtl. slight bath agitation