

SurTec® 651 chromitAL®

Trivalent Pretreatment for Aluminium

Properties

- Cr(VI)-free pretreatment for aluminium
- based on trivalent chromium
- powder
- suitable as pretreatment before lacquering, powder coating and gluing
- also works on alloyed and casted aluminium
- easy to handle in immersion, spray and wipe application
- produces an iridescent, faintly blue to tan and visible layer
- heat resistant up to 100 °C with minimal loss in adhesion properties and corrosion resistance

Application

SurTec 651 has to be dissolved in deionised (DI-)water.

make-up values:	<i>spray</i>	<i>immersion</i>
SurTec 651	12 g/l (5-25 g/l)	10 g/l (5-20 g/l)

make-up: Steps for make-up:

1. Before make up, clean the tank thoroughly.
2. For new tanks or new lines, leach with 10 % sulfuric acid, then rinse before use.
3. Fill DI-water into the tank.
4. Add SurTec 651, stirring vigorously.
5. Afterwards, measure the pH-value and adjust to 3.8 if necessary.

temperature:	40 °C	(30-40 °C)
pH-value:	3.8	(3.60-3.95)
	adjust slowly with 5 % sulfuric acid or 1 % sodium hydroxide solution, with constant mixing	
application time:	at 40 °C: 1.5 min	(1-2 min)
	at 30 °C: 2 min	(1-3 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:

Prior to the pretreatment with SurTec 651, the aluminium surface must be cleaned and deoxidized thoroughly. The surface must be water-break free.

It is recommendable to adjust the last rinse before the chromitAL[®] bath to pH 3.5-4, in order to avoid strong pH-variations in the SurTec 651 bath.

After treatment with SurTec 651, the parts have to be rinsed. For best corrosion resistance, a rinsing with deionised water is recommended. For successive lacquering, the last rinse must have a conductivity of less than 30 $\mu\text{S}/\text{cm}$. The drying temperature should not exceed 65 °C at the part's surface.

Treated surfaces with SurTec 651 can be coated immediately after drying or stored as long as they are protected from contamination and temperature extremes. For optimum results, the parts should be coated within 7 days.

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

As a qualitative determination to prove the deposited chromitAL[®]-layer, a spot test is available. The test kit and its description can be demanded separately.

The coating weight of the SurTec 650 chromitAL[®]-layer is approx. 250 mg/m².

Technical Specification

(at 20 °C)	Appearance	Bulk density (kg/l)	pH-value (at 10 g/l)
SurTec 651	powder, green/white	not determined	3.6 (3.5-3.8)

Maintenance and Analysis

Check and adjust the pH-value by using a frequently calibrated pH-meter. Analyse and adjust the concentration of SurTec 651 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 651 – Analysis by Titration

- reagents: sulfuric acid (conc.)
 ammonium peroxodisulfate p. a.
 potassium iodide solution (10 %)
 silver nitrate solution (0.1 mol/l)
 ammonium hydrogen fluoride p. a.
 0.1 N sodium thiosulfate solution
 starch solution (2 %)
- procedure: 1. Pipette 100 ml bath sample into a 250 ml Erlenmeyer flask.
 2. Acidify with 3 ml sulfuric acid.
 3. Add 3 g ammonium peroxodisulfate.
 4. Add 10 ml silver nitrate solution.
 5. Heat up the solution and boil it slightly for 20 min.
 6. Let it cool down to room temperature.
 7. Add a spatula top of ammonium hydrogen fluoride
 8. Add 15 ml potassium iodide solution.
 9. Leave 5 min for reaction.
 10. Add 5 ml starch solution (solution colour turns to blue-black).
 11. Titrate with 0.1 N sodium thiosulfate solution to a colour change
 into a milky light green.
- calculation: consumption in ml · 0.806 = %vol SurTec 651

SurTec 651 – Analysis by AAS

- equipment: atomic absorption spectrometer AAS:
 wave length: 357.9 nm
 slit: 0.7
- reagents: nitric acid (half conc.) p. a.
 chromium standards
- procedure: Prepare a dilution 1:20
1. Pour 5 ml half conc. nitric acid into a 100 ml volumetric flask.
 2. Pipette 5 ml bath sample into the flask and mix it thoroughly.
 3. Wait 5 min before filling up.
 4. Fill up with deionised water and mix it thoroughly (turn it 10 x).
 5. Calibrate the AAS with comparable chromium standards.
 Directly after calibration measure the prepared dilution of the
 sample.
- calculation: Result in ppm · 0.975 = g/l SurTec 651

Ingredients

- trivalent chromium salts
- fluorides

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 per m² surface can be taken as estimated average consumption (included a supposed drag-out of 200 ml/m² at a make-up concentration of 10 g/l):

SurTec 651 2.5-5.5 g

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 651 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 amount should be kept in stock:

SurTec 651 Pretreatment 10 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:

<i>product</i>	<i>hazard designation</i>	<i>water hazard class</i>
SurTec 651	Xn - Harmful	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 SurTec 651 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 SurTec 651 bath
cloudy layer	a) insufficient activation	check the pretreatment and the activation
	b) insufficient agitation in the SurTec 651 bath	evtl. slight bath agitation