

# SurTec® 698

## Black Chromate for Zinc/Iron

### Properties

- silver-free liquid concentrate
- produces uniform deep black coatings on zinc/iron layers containing > 0.4 % iron
- very good corrosion protection, even after heat treatment
- IMDS-number: 900844

### Application

|                 |  |            |
|-----------------|--|------------|
| make-up value:  | 5 %vol   | (4-6 %vol) |
| temperature:    | room temperature   | (15-30°C)  |
| pH-value:       | 0.9  | (0.8-1.2)  |
|                 | rises with increasing service life;<br>adjust with diluted sulfuric acid or SurTec 698 Concentrate   |            |
| immersion time: | 60 s   | (45-90 s)  |
| tank material:  | acid resistant plastic or steel with plastic coating   |            |
| agitation:      | slow air agitation or rack or barrel movement  |            |
| exhaust:        | recommended in order to avoid Cr(VI) aerosols caused by the slight hydrogen evolution  |            |
| hints:          | For constant quality results, we recommend a partly new make-up in regular intervals:<br><br>At zinc concentrations of more than 20 g/l, dispose 20 % of the bath volume: calculated for the new make-up of 20 % of the bath volume, add 5 %vol SurTec 698 and the missing water. Adjust the pH-value with 50 % sodium hydroxide solution to pH 0.9, if necessary. |            |

recommended process sequence:

1. Zinc/Iron plating SurTec 714
2. Activation in 0.5 %vol nitric acid (technical)
3. Black Chromating SurTec 698, 5 %vol, pH 0.9
4. rinse
5. drying with hot air, minimum 60°C, as short as possible

Between each step, there has to be rinsed. The rinsing methods have to be adapted to the plating line.

### Technical Specification

| (at 20°C)  | Appearance         | Density (g/ml)    | pH-value (conc.) |
|------------|--------------------|-------------------|------------------|
| SurTec 698 | liquid, red, clear | 1.368 (1.33-1.41) | < 1              |

## Maintenance and Analysis

Check the pH-value regularly. Analyse and adjust the concentration of SurTec 698 regularly.

### Sample Preparation

Take the sample at a homogeneously mixed position. If the sample is turbid, let it settle down and decant or filter the solution.

### SurTec 698 – Analysis by Titration

- reagents:            hydrochloric acid (conc.)  
                         potassium iodide  
                         0.1 N sodium thiosulfate solution (= 0.1 mol/l)  
                         starch solution (1 %)
- procedure:            1. Pipette 2 ml bath sample into a 300 ml Erlenmeyer flask.  
                         2. Fill up to 150 ml with deionised water.  
                         3. Add 10 ml conc. hydrochloric acid.  
                         4. Add 2 g potassium iodide.  
                         5. Titrate with 0.1 N sodium thiosulfate solution from brown to light yellow.  
                         6. Add 3 drops of starch solution.  
                         7. Continue titrating until complete discolouration.
- calculation:            consumption in ml (= consumption **A**) · 0.478 = %vol SurTec 698

### Chromium(III) – Analysis by Titration

- reagents:            sodium hydroxide solution (10 %)  
                         H<sub>2</sub>O<sub>2</sub> (30 %)  
                         hydrochloric acid (conc.)  
                         potassium iodide  
                         0.1 N sodium thiosulfate solution (= 0.1 mol/l)  
                         starch solution (1 %)
- procedure:            We recommend a repeat determination because of the low content of Cr(III):
1. Pipette 2 ml bath sample into a 300 ml Erlenmeyer flask.
  2. Dilute with 70 ml deionised water.
  3. Add 10 ml sodium hydroxide solution.
  4. Add 2 ml H<sub>2</sub>O<sub>2</sub>.
  5. Cover the solution with a watch glass and boil it for 30-40 min. It is important to remove excessive H<sub>2</sub>O<sub>2</sub> completely (max. evaporation loss: 40 ml).
  6. Cool down the solution and fill up to approx. 200 ml with deionised water (rinse also the watch glass).
  7. Acidify with 25 ml hydrochloric acid (colour changes to orange).
  8. Add approx. 2 g potassium iodide.
  9. Titrate with 0.1 N sodium thiosulfate until it is slightly yellowish.
  10. Add some drops of starch solution.
  11. Continue titrating to complete discolouration.
- calculation:            consumption in ml = consumption **B**  
                         (consumption **B** - consumption **A**) · 0.867 = g/l Cr(III)

## Zinc – Analysis by Titration

|              |   |
|--------------|---|
| reagents:    | 0.1 mol/l EDTA (Titriplex III, Merck)<br>buffer solution (100 g/l NaOH and 240 ml/l acetic acid (98 %) in deionised water)<br>indicator: xylenol orange tetra sodium salt (mixture of 1 % in KNO <sub>3</sub> )   |
| procedure:   | 1. Pipette 5 ml bath sample into a 250 ml Erlenmeyer flask.<br>2. Add about 100 ml deionised water.<br>3. Add 20 ml buffer solution.<br>4. Add a spatula tip of indicator.<br>5. Titrate with 0.1 M EDTA from red-violet to yellow or to light green (depending on the Cr-III content), or to brown-orange (depending on the iron content). |
| calculation: | consumption in ml · 1.3074 = g/l zinc   |
| correction:  | For each gram zinc further 0.5 %vol SurTec 698 must be added to the desired value.  |
| hint:        | The presence of iron influences the colour change at the end point. At iron concentrations above 0.5 g/l, the colour changes from red-violet no longer to yellow, but more and more to orange or brown-orange. So the endpoint is seen worse.   |

## Ingredients

- chromic acid
- sulfuric acid
- phosphates

## 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](#).

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

SurTec 698                      60 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 698     | T - Toxic<br>N - Dangerous for the environment | WHC 3                     |

## **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>

17 January 2012/DK, MO