

SurTec® 402 A

E6-Etching Additive

Properties

- alkaline liquid
- free of nitrate, nitrite, chlorate and chloride
- produces a brilliant E6 finish surface on aluminium and aluminium alloys
- perfectly suited for the levelling and compensation of pressing marks
- no formation of aluminium stone even in case of high aluminium concentration
- environmentally friendly

Application

make-up value:	30-45 g/l
temperature:	50-60 °C
application time:	10-20 min
aluminium content:	120-180 g/l
agitation:	essential: bath circulation by compressed air
tank material:	heatable steel tanks (alloy ST 35), stainless steel or polypropylene (PP)
heating:	required, out of alkaline resistant material
exhaust:	required for worker's protection
filtration:	not necessary
hints:	Energy saving instructions: to avoid losses of heat and thus energy, it is recommended to insulate the outer bath walls of the tank. Additional cooling will be necessary if you are operating at full capacity (work piece flow). This can be done by steel radiators filled with cold water. These water can also be used for the rinsing baths. For the highly concentrated alkaline solutions heatable steel tanks can be used.

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value (conc.)
SurTec 402 A	liquid, colourless-yellowish	1.180 (1.16-1.20)	12.2 (11.8-12.6)

Maintenance and Analysis

Replenish the bath solution from time to time by adding caustic soda and SurTec 402 A to the set point according to the aluminium content. Analyse the concentration of SurTec 402 A 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.

Sodium Hydroxide (NaOH) and Aluminium – Analysis by Titration

reagents: 1 mol/l hydrochloric acid (= 1 N)
potassium fluoride solution (KF solution, 35 %)
indicator: phenolphthalein solution (0.1 % in 70 % ethanol)

- procedure:
1. Pipette 10 ml bath sample into a 100 ml measuring flask.
 2. Fill up the measuring flask with deionised water and mix thoroughly.
 3. Pipette 50 ml of this dilution into a 300 ml Erlenmeyer flask and add 100 ml deionised water.
 4. Add 3-4 drops of indicator solution (colour change to pink).
 5. Titrate with 1 mol/l hydrochloric acid to colourless (white).
= consumption **A** (ml)
 6. Add 70 ml potassium fluoride solution (colour change to pink).
 7. Refill the burette with 1 mol/l hydrochloric acid up to zero.
 8. Titrate again from pink to colourless.
= consumption **B** (ml)
 9. For checking the end-point of the titration add another 5 ml of the potassium fluoride solution. When the colour of the solution remains colourless the titration is finished. If the colour turns to pink again, titrate once again to colourless.

calculation: (consumption **A** in ml - 1/3 consumption **B** in ml) · 8 = g/l NaOH
consumption **B** in ml · 2 = g/l aluminium

nominal values: 75 - 80 g/l caustic soda (NaOH)
120-180 g/l aluminium

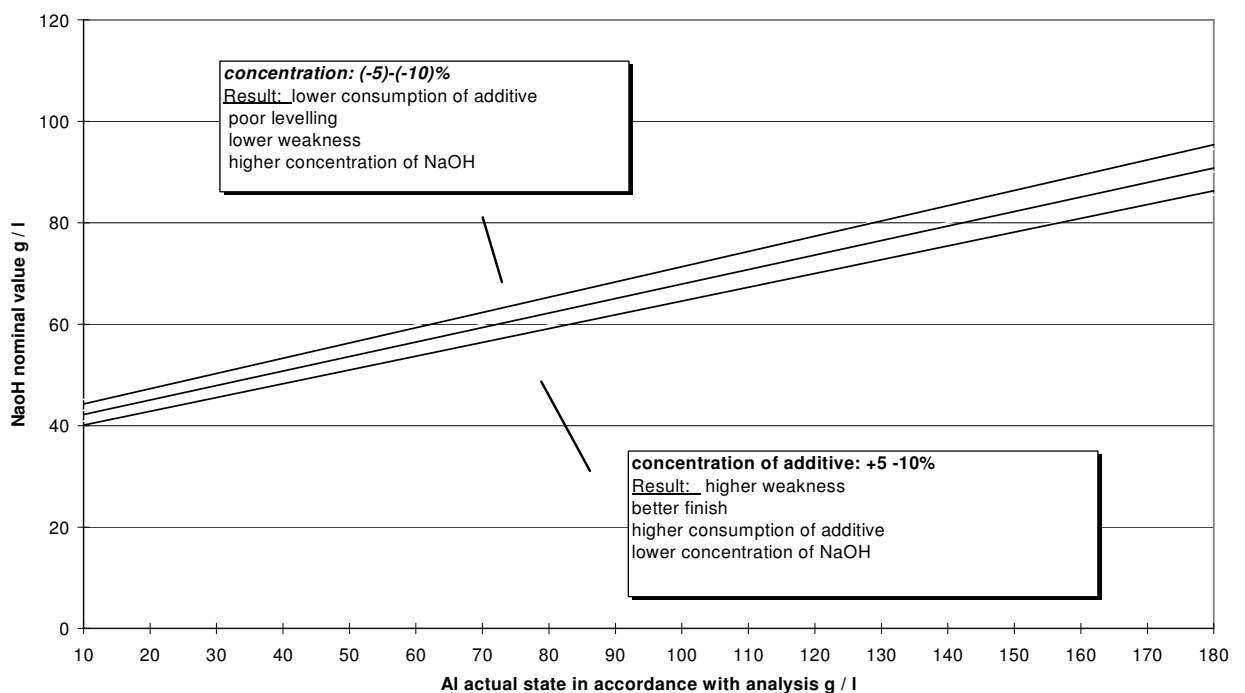


Fig. 1: Nominal caustic soda (NaOH) concentration in etching solution
SurTec 402 A – Analysis by Titration

reagents:	0.1 mol/l sodium thiosulfate solution (= 0.1 N Na ₂ S ₂ O ₃ solution) 1 mol/l hydrochloric acid (= 1 N) hydrochloric acid solution (10 %) indicator: phenolphthalein solution potassium fluoride solution (35 %): dissolve 350 g potassium fluoride (KF) in water, fill up to 1000 ml and neutralise with phenolphthalein indicator solution. potassium iodide solution (10 %): dissolve 10 g potassium iodide (KI) in 100 ml deionised water. sodium periodate solution: dissolve 4.4 g sodium periodate (NaIO ₄) in 200 ml 0.5 mol/l (1 N) sulfuric acid and fill up with deionised water to 1000 ml. starch solution: add 2 g starch to 100 ml water and boil 10 minutes.
procedure:	<ol style="list-style-type: none">1. Pipette 10 ml bath sample into a 100 ml measuring flask.2. Fill up with deionised water and mix thoroughly.3. Transfer 5 ml of this dilution into a 300 ml flat-bottomed flask with grounded glass stopper.4. Add 50 ml DI-water.5. Add some drops of indicator solution.6. Add 15 ml potassium fluoride solution.7. Neutralise the solution with 1 mol/l hydrochloric acid from pink to colourless.8. Add 20 ml sodium periodate solution and close the flask.9. Let the solution react 15 minutes in the dark.10. Then add 20 ml of potassium iodide solution.11. Acidify with 50 ml hydrochloric acid solution (10 %).12. Titrate the brown coloured solution with 0.1 mol/l sodium thiosulfate to light yellow.13. Add some drops of starch solution (colour change to dark blue).14. Continue titrating with 0.1 mol/l thiosulfate solution to colourless. = consumption bath sample (ml)15. The stability of the used chemicals is limited. Therefore check activity and efficiency of the chemicals with the same procedure as described above. Instead of the bath sample add 55 ml water. = blank value (ml)
calculation:	(blank value in ml - consumption bath sample in ml) · 11.3 = g/l SurTec 402 A
nominal values:	30-45 g/l SurTec 402 A

Ingredients

- alkali hydroxide
- complexing agent
- surfactants

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 value can be taken as estimated average consumption:

SurTec 402 A 20 g per m²

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

SurTec 402 A 100 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 402 A	Xi - Irritant	WHC 1

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>

22 December 2010/DK, WT