

SurTec® 433

Stainless Steel Pickling

Properties

- acidic liquid
- ready for use product
- utilisation as a spray, trickling and immersion pickle
- nitric-acid-free, therefore no nitrite or nitrate in the waste water
- treatment of different stainless steel types like martensitic, ferritic and austenitic steels is possible
- removes carefully all tarnish and scale layers from stainless steel surfaces in a single working step
- characterised by long service life, can be used up to an iron content of 120 g/l
- four times longer service life compared to conventional pickling solutions
- no harmful formation of nitrogen oxide gases (NO_x)
- improved health protection

Application

The process SurTec 433 includes the following products:

- SurTec 433 Stainless Steel Pickling is a ready for use product for the make-up
- SurTec 433 A Pickling Conditioner is an acidic liquid product to carry out the reconditioning of SurTec 433 on the basis of self-diagnostic; material attack and cleaning behaviour can be influenced directly
- SurTec 433 N Replenisher is an acidic liquid providing the necessary ingredients, lost by drag-out, for a positive pickling result

make-up values:

SurTec 433	100 %vol
SurTec 433 A	according to analysis
SurTec 433 N	if necessary

application time: 0.5-6 hours

temperature: 20-40°C

tank material: recommended: stainless steel tank lined with polyethylene (PE)

heating: required, made of acid resistant material

exhaust: required for worker's protection

filtration: possible

agitation: air agitation required

hints: A slight red colouration of SurTec 433 is normal and has no influence on the quality to be subsequently achieved.

The material to be processed can be introduced to the bath as a basket product or as an individual product.

Maintenance and Analysis

Compensate drag-out losses by addition of SurTec 433 N.

The removal and cleaning performance of the pickle can be correctively adjusted by the operator through the direct adjustment of the iron(II)-ions to iron(III)-ions ratio. Should the pickling result not be sufficient despite regular replenishment, our service laboratory will be at your disposal. On account of analytical results, customer-specific regeneration concentrates can be formulated whenever necessary.

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 433 – Analysis by Titration

reagents:	1 N caustic soda solution (= 1 mol/l NaOH solution) potassium fluoride (KF, p.a.) indicator: phenolphthalein solution
procedure:	1. Pipette 1 ml bath sample into a 300 ml Erlenmeyer flask. 2. Dilute with deionised water up to 100 ml. 3. Add 3 g of potassium fluoride, mix thoroughly and wait for 2 minutes. 4. Add 5-10 drops of the indicator solution. 5. Titrate with 1 mol/l caustic soda solution until a permanent pink colourisation of the solution.
calculation:	consumption in ml = points SurTec 433
nominal values:	4-6 points: in case of missing bath volume please fill up with SurTec 433 N and water (ratio 1:1)
correction:	> 6 points: add water (per point approx. 150 l water per 1000 l pickling bath) < 4 points: add SurTec 433 N (per missing point approx. 140 l SurTec 433 N per 1000 l pickling bath)

For maintenance of the SurTec 433 pickling bath and for best cleansing results it is necessary to convert the iron(II)-ions emerging with SurTec 433 A into iron(III)-ions. The required quantity of SurTec 433 A can be determined by means of a simple test strip from Merck company (Merckoquant 1.10004).

SurTec 433 A – Analysis by Merckoquant Test Strips

reagents:	Test strips Merckoquant 1.10004
procedure:	1. Pipette 10 ml bath sample into a 100 ml measure flask. 2. Dilute to 100 ml with deionised water and mix. 3. Dip the test strip reaction zone in this dilution for one second. 4. Shake off the excessive liquid from the test strip. 5. After 10 seconds compare the reaction zone with the colour scale, and read the measured value.
calculation:	Measured value read · 10 = mg/l iron(II)-ions Concentration of iron(II)-ions (mg/l) · 0.00154 · bath volume in m ³ = required quantity of SurTec 433 A in litres.

In simple terms, the following table for determination of the required quantity of SurTec 433 A can also be used:

Bath volume	Iron(II) value/ mg/l				
	30	100	250	500	1000
0.5 m ³	0.02	0.08	0.19	0.38	0.77
1.0 m ³	0.05	0.15	0.38	0.77	1.54
1.5 m ³	0.07	0.23	0.58	1.16	2.31
2.0 m ³	0.09	0.31	0.77	1.54	3.08
2.5 m ³	0.12	0.38	0.96	1.92	3.85
3.0 m ³	0.14	0.46	1.16	2.31	4.62
3.5 m ³	0.16	0.54	1.35	2.70	5.39
4.0 m ³	0.18	0.62	1.54	3.08	6.16
4.5 m ³	0.21	0.69	1.73	3.46	6.93
5.0 m ³	0.23	0.77	1.92	3.85	7.70
10 m ³	0.46	1.54	3.85	7.70	15.40
15 m ³	0.69	2.31	5.78	11.55	23.10
20 m ³	0.92	3.08	7.70	15.40	30.80
Bath volume	Replenishment of SurTec 433 A in litres				

In the event of insufficient pickling effect and negative identification of iron(II)-ions, we recommend the analysis of a pickling bath sample in our service laboratory.

With continuation of the pickling treatment and extension of the pickling time the risk of selective attack exists, in which the grain boundaries of the stainless steel are preferably attacked.

Technical Specification

(at 20 °C)	Appearance	Density (g/ml)	pH-value
SurTec 433	liquid, greenish-reddish, clear	1.160 (1.13-1.19)	< 1
SurTec 433 A	liquid, colourless, clear	1.130 (1.11-1.15)	2 (1-3)
SurTec 433 N	liquid, colourless, clear	1.150 (1.12-1.18)	< 1

Ingredients

SurTec 433

- sulfuric acid
- hydrofluoric acid
- iron salts

SurTec 433 A

- peroxide

SurTec 433 N

- sulfuric acid
- hydrofluoric acid

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 can be taken as estimated average consumption:

SurTec 433	50-150 g
SurTec 433 A	not specified
SurTec 433 N	50-150 g

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

SurTec 433	1150 kg (for make-up only)
SurTec 433 A	50 kg
SurTec 433 N	200 kg

Product Safety and Ecology

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

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 433	T - Toxic C - Corrosive	WHC 2
SurTec 433 A	Xn- Harmful	WHC 1
SurTec 433 N	T - Toxic C - Corrosive	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>