

Anodal[®] CS-2/CS-2A Powder

Sealing at room temperature

Anodal CS-2 and **Anodal CS-2A** form a product package which is highly recommended for sealing anodized aluminium at room temperature.

Anodal CS-2 Powder is applied for sealing colourless, colour-anodized, electrolytically coloured and organic-dyed aluminium.

Anodal CS-2 is used for setting fresh baths, while **Anodal CS-2A** is for reinforcing sealing baths that are already in use. Cold sealing has certain important advantages over conventional hot water sealing:

- Very low or no energy costs, since work is done at room temperature
- No interference from clouds of steam
- Shorter treatment times (max. 20 min); fewer production delays
- No sealing smut.

When correctly applied, **Anodal CS-2 Powder** passes currently required tests such as the chromic/phosphoric acid test (ISO 3210), dye spot test (ISO 2143), CASS test, Kesternich test, etc.

Anodal CS-2 Powder is especially recommended for interior aluminium.

1. Properties

Commercial form	greenish, crystalline powder
pH	5.8 ± 0.5 with 5 g/l Anodal CS-2 Powder in demineralized water
Eco toxicological data	see Safety Data Sheet.

2. Application conditions

Concentration	
<i>Setting new baths</i>	5 g/l Anodal CS-2 Powder
<i>Reinforcing sealing baths</i>	Additions of Anodal CS-2A Powder (see section 3.)
Sealing temperature	26 – 30°C
Sealing time	1 min/µm, max. 20 min
pH	5.7 – 6.5

To ensure optimum sealing conditions, the pH should be monitored when setting a fresh bath and during use and if necessary adjusted by additions of caustic soda or acetic (preferably sulphuric) acid, as the case requires.

After sealing, it is recommended to give the material a short rinse.

3. Setting, using and maintaining the sealing bath

Sealing bath tank

Must be of acid-resistant materials, preferably stainless steel.

Water quality

For optimum sealing quality, demineralized water should be used. Softened mains water can also be used, but no sealing suppressants such as phosphate ions, etc. should be present in the water, as these may retard or even prevent the sealing process, i.e. closing of the pores. With mains water, sediment may form in the sealing bath due to mineral salts dissolved in the water. Drying smudges may also occur, even though the surface shows no sealing smut.

Reinforcing with Anodal CS-2A

To obtain optimum results, a concentration level of 4 – 6 g/l **Anodal CS-2 Powder** should be maintained in the sealing bath. This level can be replenished with **Anodal CS-2A**, a product specially developed for this purpose, thus ensuring optimum composition of the active components of the cold sealing bath.

A method of chemical analysis for sealing baths is given in section 5.

A further method consists in determining the sealing quality by means of the weight loss test (ISO 3210), an example of which is given below.

Example

Anodic coating: 15 – 17 µm, undyed
Sealing: 15 min, 28°C, pH 5.8 – 6,0
Storage: 24 h, 21 – 23°C, 40 – 50 % humidity
Product concentration: 5 g/l **Anodal CS-2 Powder**

Sealed surface dm ² in 500 ml bath volume	Weight loss (ISO 3210) mg/dm ²
5	15.0
20	11.9
40	12.8
60	21.7
65	33.7
70*	11.6
85	14.7
90	30.1
95*	11.9
100	14.1

*Bath reinforced with 1.7 g/l **Anodal CS-2A Powder**

Anodal CS-2A must always be added when the bath sample shows a concentration of ≤ 4 g/l **Anodal CS-2**, or when the seal quality is outside the prescribed tolerance limits (weight loss >30 mg/dm²).

With appropriate adaptation, these analysis methods also serve for monitoring and adjusting cold sealing baths which are continuously reinforced, for example, by constant metering of **Anodal CS-2A**. For a given production rate, the described method can be used to determine the correct metering rate of the cold sealing product in a simple manner.

It is important to check the sealing bath quality continually. The time intervals for testing the bath must be adapted to the throughput rate in each case.

Standing time of sealing baths

This depends primarily on the amount of material sealed. The amounts of dragged-in anodizing acid, dyebath residues and rinse water impurities will affect the standing time of the sealing bath.

Dragged-in sulphuric or nitric acid e. g. from the neutralizing bath, or also alkalis, may shift the pH value of the sealing bath.

In case of long standing times it is therefore recommended to rinse the aluminium sections as thoroughly as possible before sealing, preferably by dipping and spraying.

Continuous processing has an especially positive effect on the freedom from sealing smut and the service life of the bath, i.e. continuous partial replenishment and metering of **Anodal CS-2A**, e.g. with a metering pump.

4. Sealing quality

The values given below were obtained in short-term tests performed under the following conditions:

Material	AlMg 1
Anodization	normal DC sulphuric acid process 195 (± 5) g/l sulphuric acid 5 – 10 g/l aluminium 19°C 15 – 16 V 35 min Coating thickness 15 – 17 µm
Colour:	I colourless II elektrolytic/Sn sulphate, 15 V 3 – 4 min, medium bronze
Sealing:	5 g/l Anodal CS-2 Powder Temperature 28°C ± 1°C Time 15 min pH 5.8- 6.0 (adjusted with caustic soda or acetic acid)
Storage:	24 hours 21 – 23°C, 40 – 50 % humidity 7 days 21 – 23°C, 40 – 50 % humidity.

Weight loss after immersion in chromic/phosphoric acid (ISO 3210)

Anodal CS-2	Storage 24 h, Weight loss mg/dm ²	
	I	II
	12.3	14.1

Admittance Y₂₀ (ISO 2931)

Anodal CS-2	Y ₂₀ , µS			
	24 h storage		7 days storage	
	I	II	I	II
	75	80	45	50

Dye spot test (ISO 2143:

“Estimation of loss of absorbtive power - Dye spot test with prior acid treatment”)

Anodal CS-2	24 h storage, Intensity of the stain	
	I*	I**
	Rating 1	Rating 1

Coating thickness: * 15 – 17 µm ** 24 – 26 µm

Corrosion by SO₂, Kesternich test, 6 cycles (DIN 50018, SFW 2.0S)

Anodal CS-2	7 days storage	
	I	II
	slight attack	slight attack

Corrosion by spray mist containing common salt solution, CASS test", 24 h (ISO 3770: "Metallic coatings - Copper accelerated acetic acid salt test)

Anodal CS-2	7 days storage	
	I	II
	*Rating 9 – 10	*Rating 9 – 10

*according to ISO 4540: “Metallic coatings – Coatings cathodic to the substrate – Rating of electroplated test specimens subjected to corrosion test”.

5. Remarks regarding sealing quality

Tests of the sealed samples show good and reproducible results only after a storage time of 24 hours.

The results also depend heavily on the storage conditions in each case, e. g. humidity and temperature. With long storage times, for example after one week, the results become increasingly better.

A significant improvement can be achieved by a hot water treatment right after the cold sealing process.

We recommend :

2ml/l **Anodal SH-1** or **Anodal SH-2**, 60-80°C, 1-2 min/µm, pH 5.7-6.0

6. Determination of Anodal CS-2/CS-2A in Sealing baths

Reagents

- 0.01 M EDTA (ethylene diamine tetracetic acid, disodium salt)
= 3.72 g/l Komplexon III or Titriplex III.
- Murexide as indicator
In a mortar, mix and grind
1 g murexide (purpuric acid, ammonium salt) and 100 g sodium chloride.
- Ammonia solution ca. 25 %.

Working method

Dilute 5 ml sealing bath solution with 100 ml demineralized water, mix it with 10 ml ammonia solution and add the murexide indicator (a spatula-tipfull, ca. 50 mg). Then titrate with 0.01 M EDTA until the colour changes from yellow-orange to blue-violet.

Calculation

g/l **Anodal CS-2/CS-2A** = consumption ml EDTA x 0.40

Recommend required concentration: 4 – 6 g/l **Anodal CS-2/CS-2A**.

7. Disposal of spent baths

Spent **Anodal CS-2/CS-2A** baths contain effluent polluting metals, particularly nickel and cobalt. Environmental protection in the form of increasingly strict effluent laws require that metals be removed from spent **Anodal CS-2/CS-2A** solutions before these are allowed to flow into mechanical-biological treatment plants or the sewage system.

The method of disposal is described in our Technical Information “**Disposal of spent baths containing Metal salts**”.

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The information and recommendations presented here were compiled with the utmost care, but cannot be extended to cover every possible case. They are intended to serve as non-binding guidelines and must be adapted to the prevailing conditions.