Sanodal® Deep Black H3LW Paste

Sanodal Deep Black H3LW Paste is a homogeneous dye which is distinguished by outstanding fastness to light, weather and heat.

The main applications for **Sanodal Deep Black H3LW Paste** are:

- dyeing aluminium parts for the electronic and the optics industry, thanks to its above-average heat stability
- dyeing building elements for exterior architectural applications, thanks to its very good light and weather fastness
- production of bluish-grey dyeings for interior applications.

1. Dye-specific data

Shade:	neutral black; steel- grey at low concentrations
Appearance:	black paste
Chemical character:	homogeneous azo metal complex dye
Density (20℃):	1150 g/l
Solubility in water:	miscible
Storage stability:	at least 1 year in closed containers between 0℃ and 50℃
Ecotoxicological data:	see Safety Data Sheet.

2. Application conditions

Applicable amount, dyeing temperature and time

	Concentration	Dyeing temperature	Dyeing time
Grey dyeings Standard layers (12 µm)	0.1 – 2 g/l	25 – 60℃	10 – 20 min
Deep black dyeings Standard layers (12 µm)	10 g/l	55 – 60℃	10 – 20 min
Sanodal layers (25 µm)	10 g/l	55 – 60℃	30 – 40 min

pH:	5.5 ± 0.5
Buffer:	The dyebaths must be buffered with 8 g/l sodium acetate trihydrate + 0.4 ml/l acetic acid for pH 5.6
Water quality:	preferably deionized; dyeing is also possible in tapwater, but this can reduce the service life of the bath
Sealing:	preferably with **Sealing Salt ASL** (one or two stage).

3. Dyebath setting control

3.1 Setting the dyebath

Before using, the content of the barrel has to be stirred in order to homogenize the paste. When preparing the dyebath care must be taken that the dye is well dissolved. The dye can be dissolved in deionized water in a separate container (5 parts water to 1 part dye). This stock solution is then stirred into the dyebath.

3.2 Controlling the dyebath

As usual with the **Sanodal** system, it is recommended to control the dyebath regularly by determining its concentration and activity.

There are three possible ways of correction:

- Reinforcing the bath **or**
- partial renewal of the bath **or**
- complete renewal of the bath.

Reinforcing

The bath must be reinforced at the latest when the actual concentration becomes 10 % lower than required. The bath should also be reinforced when its activity becomes reduced. In this case, it is necessary to add not only the amount of dye that has been consumed but also the amount required to offset the reduced activity of the dyebath, even though this can lead to exceeding the initial concentration at which the dyebath was set.

Partial renewal

This is a variant of reinforcing. Partial renewal of the dyebath is recommended when the actual concentration becomes considerably greater than that at which the dyebath was set, owing to a high content of foreign ions, i.e. when a reduction of the bath activity is observed.

3.3 Service life of the dyebath

When properly controlled and maintained, **Sanodal Deep Black H3LW Paste** dyebaths can be used for months or even years without impairment of their functioning. However, the following points must be observed:

- the dyebath tank or vessel must be made of suitable materials (e.g. stainless steel, stoneware,plastic)
- when the bath is not in use, its pH must be kept at 5.5 – 6 by an occasional addition of acetic or dilute caustic soda solution, to keep “natural ageing” to a minimum
- any foreign materials that may impair the bath’s functioning must be kept away as much as possible.

The service life of the dyebath is reduced

- when phosphate-containing water is used (e.g. chemically softened water)
- when foreign substances are dragged in.

3.4 Ageing of the dyebath

In the course of months or years a dyebath may age, even if it has not been used for dyeing. This can lead to reduced dyeing capacity in spite of constant dye concentration.

This “natural ageing” can be retarded by

- protecting the bath from light and air
- leaving the bath at room temperature when not in use
- checking the pH from time to time and keeping it between 5.5 and 6
- checking the dye concentration and activity after the bath has not been used for some time and – as usual with the Sanodal system – strengthening the bath if necessary.

3.5 Procedure with dragged-in contaminants

Every bath contamination impairs the buildup of the dye to a greater or lesser degree. In order to achieve long bath life and high shade uniformity, contaminants should be avoided as far as possible by thoroughly rinsing the material.

The following foreign ions cause interference:

- Al dragged in from the anodizing bath but also produced in the dyebath itself,
- Fe (rust!) component of untreated water and from corrosion of the dyeing tank and fittings if these are of unsuitable material,
- Nitrates from the nitric acid treatment,
- Sulphates from the anodizing bath,
- Phosphates from the (chemically treated) water and the pretreatment baths (degreasing),
- Ni, Co, Sn, Cu from electrolytic dyebaths.

Aluminiun ions are often carried into the dyebath inadvertently, even when the anodized aluminium is rinsed before dyeing. If the pH is too low during dyeing, they may also be formed through partial dissolution of the aluminium oxide coating.

Aluminium ions in the dyebath not only reduce the buildup and cause dye precipitation; they also make it difficult to clear any film formed by partial drying when the aluminium goes into the following rinse water. This may cause bronzing of the dyeings.

The Al content of the dyebath should therefore be kept as low as possible. This can be achieved by thoroughly rinsing the anodized parts before dyeing. Good results are obtained with two-stage rinsing, especially when combined with an intermediate standing rinse bath of deionized water. The pH of the rinse baths should not be lower than 4.

No aluminium, iron, cooper or other metal objects should be left lying in the dyebath.

4. <u>Remarks on application</u>

4.1 Buildup on thin anodic coatings

As a result of its good buildup **Sanodal Deep Black H3LW Paste** is also suitable for dyeing thin coatings.

Coatings of 6 – 8 µm thickness can be dyed as follows:

10 g/l **Sanodal Deep Black H3LW**, 15 min at 60°C, pH 5.5 – 6.0 in deionized water b uffered.

4.2 Suitability for continuous dyeing

Aluminium parts with a coating thickness of 2 – 4 µm can be dyed black continuously as follows:

15 g/l **Sanodal Deep Black H3LW**, 3 min at 70°C, pH 5.5 – 6.0 in deionized water bu ffered.

4.3 Suitability for cold dyeing (20 – 25℃)

With 10 g/l **Sanodal Deep Black H3LW** black dyeings are obtainable under standard conditions (coating thickness 20 µm) for 20 – 30 min, pH 5.5 – 6.0 in deionized water buffered.

4.4 Behaviour of dyeings in the sealing bath

Sealing medium	Behaviour
Deionized water Tap water Sealing Salt ASL addition	bleeding strong bleeding minimal bleeding

4.5 Strippability of dyeings

Unsealed dyeings are virtually unstrippable in diluted nitric or sulphuric acid.
They can be stripped in nitric acid 10 % + potassium permanganate 5 %.
After the treatment in Potassium permanganate, neutralization must be carried out for 1-5 min in a sodium bisulphite 5 % solution.

5. Fastness and other properties of the dyeings

5.1 Lightfastness

Sanodal Deep Black H3LW Paste is distinguished by outstanding lightfastness.

Black dyeings

Layer thickness	ISO 2135, Blue Scale rating
12 µm	> 8
25 µm **(Sanodal)**	> 10

5.2 Heat stability

Dyed test specimens are very stable to heat.
Black dyeings (12 – 15 µm) were tested for 2 h at 250℃. No change was observed.

5.3 Sealing quality

The sealing quality is not influenced by the dye.

5.4 Corrosion resistance

The results of the following tests:

- Cass-Test (ISO 3770, 24 h) and
- Kesternich test (DIN 50018, SFW 2,0 S, 6 cycles)

are excellent and are not negatively influenced by the dye.

6. Disposal of spent dyebaths

Spent dyebaths must be disposed of with **Anodal WT-1 Liquid.** The precipitation method is described in the Technical Information bulletin for **Anodal WT-1 Liquid.**

The table below gives the dosages necessary for precipitating **Sanodal Deep Black H3LW Paste**.

Precipi-tation method	$FeCl_3$ 40 % ml/g dye	Etching lye ml/g dye	Anodal WT-1 Liquid ml/g dye	Residual dye in the filtrate mg/l	Chrome content in the filtrate mg/l	Dye reduction in % related to dyebath concentration
A	1.2	-	0.3	~ 3	< 0.05	> 99.9
B	1.2	-	0.3	~ 110	~ 1.2	> 99.9
C	-	1.2	0.3	~ 70	~ 1.0	> 99.9