



# Test standard of Performance of Electrodeposit Coating Material KES S-S606B

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## 1. Scope of Application

This standard specifies the test method of performance of electrodeposit coating material used in the surface treating line of painting factory in this company.

## 2. Testing Items

The following table 1 shows the test items.

Table 1

| Test item                                                       | Test method  |
|-----------------------------------------------------------------|--------------|
| Measuring the painting voltage                                  | See item 6.  |
| Measuring the breaking voltage                                  | See item 7.  |
| Measuring the decreased amount by heating                       | See item 8.  |
| Measuring the gel percentage                                    | See item 9.  |
| Measuring the coulomb efficiency                                | See item 10. |
| Throwing power level ( Pipe method )                            | See item 11. |
| Sensitivity of Phosphating ( Sensitivity after grinding )       | See item 12. |
| Sensitivity of Phosphating ( Contaminated level )               | See item 13. |
| Level of current chamber entering                               | See item 14. |
| Foaming level and bubble-removing level                         | See item 15. |
| Level of water mark ( Flowing )                                 | See item 16. |
| Level of water mark ( Spot )                                    | See item 17. |
| Level of stain by drying                                        | See item 18. |
| The second flowability                                          | See item 19. |
| Boiling level                                                   | See item 20. |
| Generating level of gas pinhole                                 | See item 21. |
| Generating level of cratering ( Sensitivity of oil attachment ) | See item 22. |
| Generating level of cratering ( Sensitivity of oil mixing )     | See item 23. |
| Storage stability                                               | See item 24. |

### 3. General Condition of Test

#### 3.1 Basic consideration direction of test condition setting

The experiment shall be done under the same condition as that of painting in the mass production line.

#### 3.2 Test instruments used in test

Use the instruments specified in 3.1 item.

For them, see the 'test instrument' item of each test item.

#### 3.3 Electrodeposit painting equipment

Power shall be adjusted to input voltage of more than 100V, output voltage of 0-500V, output current of 3-5A, ripple within 10% ( Between 50-350V ), and use the single phased electricwave rectification as the rectifying method. This shall be the power, set as you see in fig. 1 and paint.

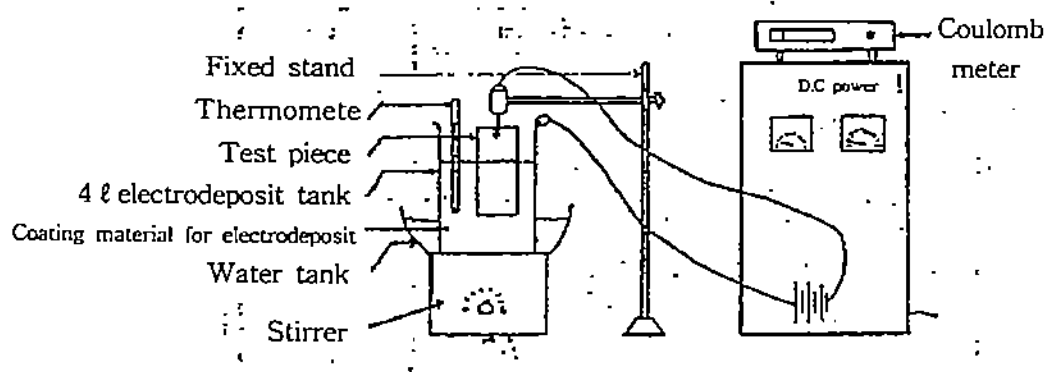


Fig. 1

#### 3.4 Adjustment of test piece

Except for the case of special specification, adjust as table 2.

Table 2

|             | Material                                                      | Surface                                                                                                                                                |
|-------------|---------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------|
| Steel plate | 1 type(scp) Cold rolled steel plate specified by this company | It shall be phosphatic treated according to the specified temperature, density, treatment time, and contaminated material shall not be attached on it. |
|             | Zn-Nickel plating(Plated side) of SCPZN used in the body      |                                                                                                                                                        |
|             | melted Zn-steel plate(Plated side) of SCPM used in the body   |                                                                                                                                                        |

### 3.5 The method of electrodeposit painting

If there is no special specification, in principle, be sure to check special value of coating material before test, and then test according to the method of 3.5(1).

#### (1) General painting method

Adjust at the specified density of 3.5(2), 3.5(3), submerge the test piece used in coating material for electrodeposit for the specified time of 3.5(4), blending it regularly, and Electrodeposit at the voltage specified in 3.5(5).

And then clean by water for 15 seconds according to the method of 3.5(6), dry in the drying furnace under the standard drying condition of 3.5(7), and cool it through natural laying aside.

#### (2) Specified density

Take out the amount required for the test from the previously adjusted coating material case, adjust the density to pure water more than non-resistance  $3 \times 10^5 \Omega \text{cm}$  (25°C), blending it by the stirrer.

#### (3) Specified temperature

If there is no special regulation, as a rule it shall be  $28 \pm 1^\circ \text{C}$ .

#### (4) Specified treatment time

In principle, it shall be 30 seconds as the rise time 'specified voltage, and then 2 minutes 30seconds, and total 3 minutes, but if you want to change the treatment time, lengthen or shorten the maintained time.

#### (5) Specified treatment voltage

Set the material to be coated in which using coating material can get the originally intentione electrodeposit painting film thickness as the painting volatage. and be sure to check it before test. ( See item 6. )

#### (6) Cleaning with water

If there is no special regulation, as a rule industrial water shall be used.

#### (7) Standard drying condition

Select the drying temperature and time within which using coating material can have the most efficient performance.

#### 4. Reporting Test Result

Based on "Indication" item of each test item, report the test result.

#### 5. Measuring the Special Value of Electrodeposit Coating Material

Before using the coating material used for the test, numerical value of electrodeposit coating material shall be measured and condition of coating material shall be checked. tabel 3 shows the special value of electrodeposit coating material.

Table 3

| Item                             | Unit                   | Test method  |
|----------------------------------|------------------------|--------------|
| Heated remaining amount          | %                      | See item 5.1 |
| PH value                         | —                      | See item 5.2 |
| MEQ                              | %                      | See item 5.3 |
| Conductivity                     | $\mu \Omega/\text{cm}$ | See item 5.4 |
| Lime powder                      | %                      | See item 5.5 |
| Amount of solvent <sup>(1)</sup> | %                      | See item 5.6 |

Note<sup>(1)</sup> For the amount of solvent, indicate its type and its total amount.

#### 5.1 Measuring heated remaining amount

##### 5.1.1 Purpose

- Remove the volatile component of coating material due to heating, and measure the percentage of remaining heated amount from remaining amount.

##### 5.1.2 Testing instrument

- (1) Automatic valance(which can measure up to 1/1000g unit)
- (2) Drying furnace
- (3) Metal plate ( Diameter of 70mm, depth of 10mm )

- (4) Aluminum foil

#### 5.1.3 Test method

- (1) Prepare well mixed, equal sample.
- (2) Weigh the metal plate precisely. ( $W_0$ )
- (3) Put the sample<sup>(2)</sup> into the plate and weigh it precisely and rapidly. ( $W_1$ )
- (4) After the sample spreading on the entire bottom of plate, dry it in the drying furnace at the fixed temperature<sup>(3)</sup> and time.
- (5) Take out the plate including the sample from the drying furnace, and after cool up to the room temperature, weigh precisely. ( $W_2$ )
- (6) Calculation

Heated remaining amount shall be calculated by the following formula.

$$\text{Heated remaining amount(\%)} = \frac{W_2 - W_0}{W_1 - W_0} \times 100$$

Note<sup>(2)</sup> Picking amount of the sample shall be 3g of diluted coating material.

<sup>(3)</sup> Set drying temperature at 105°C, and the drying time at 3 hrs.

## 5.2 Measuring PH value

### 5.2.1 Purpose

Measure acid, alkali level of coating material inside chamber or supply coating, by using the PH gauge.

### 5.2.2 Testing instrument

- (1) Glass electrode PH gauge
- (2) Glass beaker ( 100 -200 ml )

### 5.2.3 Test method

- (1) Prepare standard liquid, neutral phosphate(PH= 7.0), boron chloride(PH=10), fital acid chloride ( PH=4.0 )
- (2) Prepare well mixed, equal sample.
- (3) Check if glass electrode PH gauge is properly prepared according to the treatment specification of maker.
- (4) Adjustment of PH gauge adjust to the standard value near to the PH expected value of the sample.

## (5) Measure of PH value

Wash the electrode with distilled water or post-ionic water, and measure the PH value of the sample.

Measure until 3 continually measured result reaches within  $\pm 0.05$ , and average this value.

## 5.3 Measuring MEQ value

## 5.3.1 Purpose

Measure neutralized acid density ( MEQ-acid ) or base density ( MEQ-base ) of electrodeposit coating material by using the potential difference automatic appropriate equipment.

## 5.3.2 Testing instrument

- (1) potential difference automatic appropriate equipment.
- (2) glass beaker ( 100 ml )
- (3) automatic valance ( Which can measure up 1/1000 g unit )

Remark 0.1N-metanol-quality NaOH specified liquid 0.1N-Hcl specified liquid

The ( Tetra hydro Furan ) sample first grade

## 5.3.3 Test method

- (1) Prepare well mixed, equal sample.
- (2) Pick the sample in 100ml beaker, as you see in Table 4 and weigh precisely.

Table 4 The amount of the sample

|                          | Acid   | Base |
|--------------------------|--------|------|
| Diluted coating material | 10-12g | 3-5g |

- (3) Add about 60ml tetra hydro furan and mix it, blending with the magnetic stirrer.

## (4) Measuring base MEQ

Drop 0.1N-K OH between 8~13 of center shift and stop at the point passes about 0.5 -1.0ml from change point of curve.

## (6) Calculation

Base MEQ, acid MEQ shall be calculated by the following formula.

Total base =  $\text{ml ( 0.1N-Hcl ) consumption} \times 0.1 \times \text{Factor} / \text{amount of the sample(g)} \times \text{NV(\%)} / 100 \times 100$

Total acid =  $\text{ml ( 0.1N-K OH ) consumption} \times 0.1 \times \text{Factor} / \text{amount of the sample(g)} \times \text{NV(\%)} / 100 \times 100$

## 5.4 Measuring conductivity

## 5.4.1 Purpose

Measure the conductivity of electrodeposit coating material ( $\mu \Omega / \text{cm}$ )

## 5.4.2 Testing instrument

- (1) Electronic conductivity gauge
- (2) Glass beaker ( 500ml )

## 5.4.3 Test method

- (1) Prepare well mixed, equal sample.
- (2) Check if electronic conductivity gauge is properly maintained according to the treatment specification.
- (3) Submerge the sample up to more than 15mm from electrode both side of 500ml beaker, and adjust at the specified temperature<sup>(4)</sup>.
- (4) Clean the electrode with pure water, and put it into the sample and measure the conductivity.

Note<sup>(4)</sup> If there is no specification, temperature shall be 25°C.

## 5.5 Measuring lime powder

## 5.5.1 Purpose

Measure the pigment density of coating material in the tank by using the muffle furnace.

## 5.5.2 Testing instrument

- (1) Muffle furnace
- (2) 자체 crucible, crucible tongs
- (3) Drying furnace
- (4) Automatic valance(which can measure up to 1/1000 g unit)
- (5) 데시케이터

## 5.5.3 Test method

- (1) Prepare well mixed, equal sample.
- (2) Measure the heated remaining amount of the sample. (See 5.1.)
- (3) Put the amount of sample of table 5(its heated remaining amount is about 1g) in the crucible with regular weight, and weigh precisely.
- (4) Evaporate and dry the precisely-weighed sample in the drying furnace<sup>(5)</sup>.
- (5) Heat it in the muffle furnace at the temperature of (5) until carbon disappears.
- (6) Continue the heating for 1 hr at the least. And then lay aside and cool the sample contained crucible in the 데시케이터 up to the room temperature, and weigh precisely.
- (7) Calculation

Lime powder shall be calculated by the following formula.

Lime powder(%) = dried remaining amount of the sample/ weight of picked sample(g) × heated remaining amount of the sample ( NV/100 )

Note<sup>(5)</sup> The drying temperature shall be 105℃ and time shall be 3 hrs.

Table 5

|                          | Amount of the sample | Temperature of muffle furnace × Time |
|--------------------------|----------------------|--------------------------------------|
| Diluted coating material | 5g                   | 105℃ × 3Hr + 600℃ × 1Hr              |

## 5.6 Measuring the amount of solvent

## 5.6.1 Purpose

Measure the content of each solvent of electrodeposit coating material.

## 5.6.2 Testing instrument

- (1) Gas chromatograph
- (2) Automatic valance ( Which can measure up to 1/1000 g unit )
- (3) Sample bottle ( 20ml )

Remark Inside standard material cleaning solvent for micro injector(tetra hydro furan reagent first grade, cellusolve acetate reagent first grade, 2-methoxy ethanol reagent special grade)

### 5.6.3 Test method

- (1) Prepare well mixed, equal sample.
- (2) Follow the using order of gas chromatograph instrument.
- (3) Select inside standard material of coating material, and get the relative sentivity of necessary solvent.
- (4) Weigh 20ml sample bottle precisely, and weight the 20 g sample in this sample bottle precisely.
- (5) Weigh 0.2 g inside standard material precisely and add.
- (6) Mix the sample enough.
- (7) The size of the sample shall be  $2\mu\ell$ .
- (8) Clean the micro injector 3-5 times repeatedly.

## 6. Measuring The Painting Voltage

### 6.1 Purpose

Check the necessary voltage required for the film thickness of electrodeposit coating material.

### 6.2 Testing instrument

- (1) Electrodeposit painting equipment ( See 3.3 item. ), flate making drying furnace
- (2) Measuring instrument for film thickness
- (3) Graph paper
- (4) Test piece ( 1 type cold rolled steel plate, see 3.4 item. )