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Note: This document is applicable to the products manufactured in Yokogawa Electric China Co., Ltd.

1. Purpose

This document describes the coating procedure for the vortex flowmeter.

2. Target model

Vortex Flowmeter VY Series (VY and VY4A)

3. Coating specifications

3.1 Coating area

The surface of housing of transmitter case, terminal box, and cover (integral flowmeter, remote sensor, and remote transmitter) is applicable.

In general, the surface of meter body is not coated. If coating of meter body is required, special order is available.

3.2 Specifications

| | | (1)Polyester resin powder coating (Standard Material with Standard Coating: code -1) | (2)Epoxy and polyurethane resin solvent coating (*1) (Standard Material with Rugged Coating: code -2) | Reference standard | |
|-----------------|---------------------|--|--|----------------------|-------|
| | | | | JIS (ISO) | ASTM |
| Coating | | Standard coating, Housing/Coating code -1: Powder coating, Heating and Drying | Rugged coating, Housing/Coating code -2: Solvent spraying coating, Heating and Drying | — | — |
| Color | | Mint green (Munsell 5.6BG 3.3/2.9 equivalent) | | — | — |
| Material | | Polyester resin | Epoxy resin type primer (1st and 2nd under coating), Polyurethane resin paint (final coating) | — | — |
| Layer thickness | | Total: 50 to 140 μm | 1st under coating: 40 to 50 μm 2nd under coating: 40 to 50 μm Final coating: 20 to 50 μm Total: 100 to 150 μm | — | — |
| Gloss | | Standard coating, Housing/Coating code -1: Gs70 | Rugged coating, Housing/Coating code -2: Gs90 | — | — |
| Evaluation test | Adhesion test | 0 μm < Coating thickness ≤ 60 μm: -> Cross-cut adhesion test: 1mm width (Sampling QTY: 100) 60 μm < Coating thickness ≤ 120 μm: -> Cross-cut adhesion test: 2mm width (Sampling QTY: 25) Result: No "Come Off" | | K5600-5-6 (ISO 2409) | D3359 |
| | Sun test | Sunshine Weather Meter 500h Result: Change in Gloss: 20% or smaller | | B7753, K5982(*2) | — |
| | Chemical resistance | 5% H ₂ SO ₄ Solution immersion 200h Result: No Blister 5% NaOH Solution immersion 200h Result: No Blister | | — | — |
| | Salt spray test | Spraying of 5% NaCl solution (35°C, 1000 h) Result: No blister, No peeling (3 mm around the scratch is outside the scope of the test.) | Spraying of 5% NaCl solution (35°C, 2000 h) | K5600-7-1 (ISO 7253) | B117 |

*1: This is composite coating in order to enhance performance: salt/ alkali/ corrosion atmosphere/ acid resistance.

*2: Refer to JIS K5981 for the conditions which is not described on JIS B7753. For water injection condition, pressure is 0.1 MPa and flow rate is 0.53 ± 0.10 L/min.

4. Procedure

4.1 Preprocessing (rinse and chemical conversion coating)

The processes of alkaline degreasing, water rinse, and chromate coating are conducted before coating.

4.2 Coating

(1) Polyester resin powder coating (Standard Material with Standard Coating: code -1)

| Process No. | Process | Treatment / Paint material | Condition |
|-------------|----------------|----------------------------|------------------------------------|
| 1 | Powder coating | Polyester resin | Thickness: 50 to 140 μm |
| 2 | Baking drying | — | 180°C, 20 min |

(2) Epoxy and polyurethane resin solvent coating (Standard Material with Rugged Coating: code -2)

| Process No. | Process | Treatment / Paint material | Condition |
|-------------|--------------------|----------------------------|---|
| 1 | 1st under coating | Epoxy resin type primer | Thickness: 40 to 50 μm |
| 2 | Forced drying | — | 80 \pm 10°C, 15 to 30 min |
| 3 | Surface roughening | — | Sand paper #400 |
| 4 | 2nd under coating | Epoxy resin type primer | Thickness: 40 to 50 μm |
| 5 | Forced drying | — | 80 \pm 10°C, 15 to 30 min |
| 6 | Final coating | Polyurethane resin paint | Thickness: 20 to 50 μm (Total thickness: 100 to 150 μm) |
| 7 | Forced drying | — | 80 \pm 10°C, 15 to 30 min |

4.3 Inspection

| NO. | Inspection/ test name | Test frequency | Test method | Details | Judgment |
|-----|--------------------------|--------------------|---|--|---|
| 1 | Visual inspection | All products | Visual test | Check for scratch, peeling, stain etc. | Limit sample |
| 2 | Masking inspection | All products | Visual test | Confirm masking condition | No residual coating, no deposited coating |
| 3 | Coating thickness test | One test piece/day | Film thickness gauges | Measure thickness using film thickness gauge | Within the range of the prescribed tolerance |
| 4 | Color difference test | One test piece/day | Visual test | Color sample | No color difference |
| 5 | Glossiness test | One test piece/day | Glossiness checker | Measure glossiness using glossiness checker | Within $\pm 5\%$ of the prescribed value |
| 6 | Adhesion test | One test piece/day | Cross-cut adhesion test JIS K 5600-5-6 (ISO 2409) | See Note below for the test procedure. | No peeling for all grids |
| 7 | Hardness test | One test piece/day | Pencil hardness test JIS K 5600-5-4 (ISO 15184) | Pencil method | Hardness grade: H or more No damage after scratching with nail |

Note: Adhesion test is conducted by the following three steps for inspection.

- Make the grids using utility knife;
 - 1-(1) Polyester resin powder coating
(Standard Material with Standard Coating: Housing/coating code -1)----- 25 pcs of grid (2x2 mm)
 - 1-(2) Epoxy and polyurethane resin solvent coating
(Standard Material with Rugged Coating: Housing/coating code -2)----- 25 pcs of grid (2x2 mm)
- Stick adhesive tape on the grids by finger press.
- Peel off the tape.