# TEST REPORT

Electrostatics
Standard test methods for specific applications
Electrical resistance of floor coverings and installed floors

| | |
|---|---|
| **Report Reference No**.: | 313963TRFEnvEx |
| Tested by (name, function and signature): | M. Grassi (Project Handler) |
| Approved by (name, function and signature): | R. Spanevello (Verifier) |
| Date of issue: | 2016-09-30 |

| | |
|---|---|
| **Testing Laboratory**: | **Nemko Spa.** |
| Address: | Via del Carroccio 4<br>I – 20853 Biassono (MB) |
| Testing location/ address: | Nemko Spa., Via del Carroccio 4 I - 20853 Biassono (MB) |
| **Applicant's name**: | **PPG Univer Spa** |
| Address: | Via Monte Rosa, 7 – 28010 Cavallirio (NO) – Italy |
| **Test specification:** | |
| Standard: | EN 61340-4-1: 2004 |
| Non-standard test method: | N/A |
| **Test Report Form No**.: | TRF EN 60068-2-ENV |
| TRF Originator: | Nemko S.p.A. |
| Master TRF: | 2016-05 |



| | |
|---|---|
| **Test item description:** | **Conductive paint** |
| Trade Mark: | PPG Univer Spa |
| Manufacturer: | PPG Univer Spa |
| Model/Type reference: | Epofloor antistatico |

| Test Report No. : | 313963TRFEnvEx |
|---|---|

| Short description of the EuT | Copy of marking plate |
|---|---|
| Conductive paint | Not provided |

| | |
|---|---|
| Number of tested samples: | 5 |
| Serial number: | 313963 1/6, 313963 2/6, 313963 4/6, 313963 5/6, 313963 6/6 (assigned by Nemko Spa) |
| Brand | PPG Univer |
| Manufacturer | PPG Univer Spa |
| Model | Epofloor antistatico |
| Manufacturer year | Not provided |
| Ratings | Not provided |
| Accessories and detachable parts included/ Mounted tool: | The E.U.T. is composed by a single unit, accessories as supplied in the appliance (EuT tested in the configuration supplied by manufacturer). |
| Other options included: | None |
| **Testing** | |
| Date of receipt of test sample: | 2016-09-19 |
| Testing commenced on: | 2016-09-27 |
| Testing concluded on: | 2016-09-29 |

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

| **Test Result** according to the customer criteria of acceptance in § 4.4: | **N/A** |
|---|---|

| PROJECT HISTORY | | |
|---|---|---|
| **Report number** | **Modification to the report / comments** | **Date** |
| 313963TRFEnvEx | First release | 2016-09-30 |
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| **REMARKS** | | |
| | | |

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# 1 TEST PERFORMED

The following test(s) are performed for qualification purpose, according to EN 61340-4-1:

- Point-to-point resistance (see §5.1.3)
- Vertical resistance (see §5.1.4)
- Resistance to ground (see §5.1.5)

# 2 TEST STANDARDS AND PROCEDURES

- **NEMKO WM L0177:**
  General routines for using instruments at Nemko
- **NEMKO WM L1002:**
  Measurement Uncertainty - Policy and Statement
- **EN 61340-4-1:2004**
  Electrostatics – Part 4-1: Standard test methods for specific applications – Electrical resistance of fllor coverings and installed floors

# 3 GENERAL REMARKS

## 3.1 Environmental conditions

Unless different values are declared in the test case, following ambient conditions apply for the tests:

Ambient Temperature: 21 - 25° C
Relative Humidity: 9 - 15 %
Atmospheric pressure: 980 - 1060 hPa

## 3.2 Measurement uncertainty

The measurement uncertainty was calculated for all measurements listed in this test report according to Nemko Spa Technical Procedure WM L1002 and is documented in the quality system acc. to EN 17025. The manufacturer has the sole responsibility of continued compliance of the device.
Hereafter the best measurement capability for Nemko Spa laboratory is reported:

| Test | Range | Measurement uncertainty |
|---|---|---|
| Temperature | -70 ÷ 180 °C | 1,8 °C |
| Relative Humidity | 10 ÷ 98 % | 6 % |
| Resistance | 100 mΩ ÷ 10 MΩ | 2 % |
| AC/DC Voltage | 10 mV ÷ 1000 V; 0 ÷ 5 kHz | 1,5 % |
| AC/DC Current | 0,1 mA ÷ 5 A; 0 ÷ 1 kHz | 1,5 % |
| Time | 10 ms ÷ 100 s | 1 % |
| Length | 0 ÷ 200 mm | 0,08 mm |
| | 0,2 ÷ 8 m | 1 % |

The reported expanded uncertainty of measurement is stated as standard uncertainty multiplied by the coverage factor $k$ = 2 which has been derived from assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95%.

# 4 EQUIPMENT UNDER TEST

## 4.1 Power supply system utilised

Not supplied. The equipment is a conductive paint.

## 4.2 EUT operation mode:

All tests have been performed with the samples lying horizontally.
Before testing, the samples were conditioned in climatic chamber for 48 h in climatic chamber whit a temperature of 23°C and a relative humidity of 12%.

## 4.3 EuT configuration:

The EUT has been tested as provided by customer.
Two specimens with dimensions 1200 mm ± 500 mm by 500 mm ± 50 mm (for point-to point and resistance to ground measurements) and three specimens of dimensions 500 mm ± 50 mm square (for vertical resistance).
The conductive paint samples were applied on drywall pieces.

## 4.4 Acceptance Criteria

N/A

# 5 TEST CONDITIONS AND RESULTS

## 5.1 Resistance measurements

Instruments used: see section 6.

### 5.1.1 Description of the test location

Test location: Nemko Spa

### 5.1.2 Photo documentation of the test set-up


Fig.1: The equipment and the two measuring electrodes used for the tests

Fig.2: The measuring electrodes positioning on the specimen during the measurement

### 5.1.3 Test according to EN 61340-4-1 §9.2 – Point-to point resistance:

The test specimen with its use-surface uppermost is placed on insulating plate. The two measuring electrodes are placed on the sample at 300 mm distance centre to centre for the first measure, then 100 mm centre to centre for the other measurements. A total of six measurements per specimen shall be made, with the electrodes no closer than 100 mm from any previous measurement position.

5.1.3.1 Test Results

Set voltage : 10 V
Sample: 313963 5/6
Duration measurement: 15 s

| Distance centre-to-centre | Resistance |
|---|---|
| **300 mm** | 4,26 x $10^4$ Ω |
| **100 mm** | 2,54 x $10^4$ Ω |
| **100 mm** | 2,66 x $10^4$ Ω |
| **100 mm** | 2,33 x $10^4$ Ω |
| **100 mm** | 2,57 x $10^4$ Ω |
| **100 mm** | 2,48 x $10^4$ Ω |
| **Geometric mean** | 2,74 x $10^4$ Ω |

Set voltage : 10 V
Sample: 313963 4/6
Duration measurement: 15 s

| Distance centre-to-centre | Resistance |
|---|---|
| **300 mm** | 3,13 x $10^4$ Ω |
| **100 mm** | 2,26 x $10^4$ Ω |
| **100 mm** | 1,84 x $10^4$ Ω |
| **100 mm** | 1,47 x $10^4$ Ω |
| **100 mm** | 2,23 x $10^4$ Ω |
| **100 mm** | 2,22 x $10^4$ Ω |
| **Geometric mean** | 2,14 x $10^4$ Ω |

**Remarks and/or Deviations:** None.

### 5.1.4 Test according to EN 61340-4-1 §9.3 – Vertical resistance:

The specimen is placed on a stainless steel plate (counter-electrode), which is placed on the insulating plate. One measuring electrode is place on the test specimen with its centre no closer than 100 mm to the specimen's edges. The counter-electrode is connected to the resistance measuring apparatus. A total of six measurements per specimen shall be made, with the electrodes no closer than 100 mm from any previous measurement position.

5.1.4.1 Test Results

Set voltage : 100 V
Sample: 313963 2/6
Time measurement: 15 s

| Distance centre-to-edges | Resistance |
|---|---|
| **≥100 mm** | 1,40x $10^7$ Ω |
| | 1,47 x $10^7$ Ω |
| | 1,45 x $10^7$ Ω |
| | 1,39 x $10^7$ Ω |
| | 1,62 x $10^7$ Ω |
| | 1,33 x $10^7$ Ω |
| **Geometric mean** | 1,44 x $10^7$ Ω |

Set voltage : 10/100 V
Sample: 313963 1/6
Time measurement: 15 s

| Distance centre-to-edges | Resistance |
|---|---|
| **≥100 mm** | 2,48 x $10^7$ Ω |
| | 4,58 x $10^5$ Ω |
| | 1,67 x $10^7$ Ω |
| | 1,32 x $10^6$ Ω |
| | 1,98 x $10^7$ Ω |
| | 1,72 x $10^5$ Ω |
| **Geometric mean** | 2,10 x $10^{6,2}$ Ω* |

Set voltage : 100 V
Sample: 313963 6/6
Time measurement: 15 s

| Distance centre-to-edges | Resistance |
|---|---|
| **≥100 mm** | 3,58 x $10^7$ Ω |
| | 2,03 x $10^7$ Ω |
| | 2,21 x $10^7$ Ω |
| | 3,92 x $10^7$ Ω |
| | 2,89 x $10^7$ Ω |
| | 2,07 x $10^7$ Ω |
| **Geometric mean** | 2,69 x $10^7$ Ω |

**Remarks and/or Deviations:** The set of measurements on sample 313963-1 cannot be considered reliable, the surface of the sample is not uniform and visible scars are present on it.

### 5.1.5 Test according to EN 61340-4-1 §9.4 – Resistance to ground:

The test specimen with its use-surface uppermost is placed on insulating plate. One measuring electrode is placed on the test specimen with ts centre no closer than 100 mm to any of the test specimen's edges. The groundable point is connected to the measuring apparatus. A total of six measurements per specimen shall be made, with the electrodes no closer than 100 mm from any previous measurement position.
At least one measurement per specimen shall be made directly above the groundable point an one measurement per specimen with the electrode positioned 1000 mm from the groundable point.

5.1.5.1 Test Results

Set voltage : 10 V
Sample: 313963 4/6
Duration measurement: 15 s

| Distance centre-to-centre | Resistance |
|---|---|
| **1000 mm** | 1,25 x $10^5$ Ω |
| **0 mm** | 0,90 x $10^5$ Ω |
| **≥100 mm from edges** | 0,98 x $10^5$ Ω |
| | 1,12 x $10^5$ Ω |
| | 1,20 x $10^5$ Ω |
| | 1,21 x $10^5$ Ω |
| **Geometric mean** | 1,02 x $10^5$ Ω |

Set voltage : 10 V
Sample: 313963 5/6
Duration measurement: 15 s

| Distance centre-to-centre | Resistance |
|---|---|
| **1000 mm** | 1,36 x $10^5$ Ω |
| **0 mm** | 0,97 x $10^5$ Ω |
| **≥ 100 mm from edges** | 1,09 x $10^5$ Ω |
| | 1,26 x $10^5$ Ω |
| | 1,02 x $10^5$ Ω |
| | 1,41 x $10^5$ Ω |
| **Geometric mean** | 1,17 x $10^5$ Ω |

**Remarks and/or Deviations:** None.

### 5.1.6 Measurements test results:

| Type of measurement | Resistance (geometric mean) |
|---|---|
| **Point-to-point** | 2,42 x $10^4$ Ω |
| **Vertical** | 1,96 x $10^7$ Ω |
| **Point-to-ground** | 1,09 x $10^5$ Ω |

# 6 TEST EQUIPMENT

| Description | Manufacturer | Model | Serial number |
|---|---|---|---|
| Climatic chamber | Espec | ARS 1100 | 4100000067 |
| Surface resistance measuring apparatus | Charleswater | 99026 | 1420001 |
| Tape measure | Stanley | 5 m | 33-720 |
| Thermo hygrometer | Data Logger | 175 –H2 | 20012247/305 |
| Barometer | MSR Electronic | MSR145B | 330080 |

## 7 PHOTO DOCUMENTATION

- END OF TEST REPORT -