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**DRAFT**  
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English Version

## Coil coated metals - Test methods - Part 10: Resistance to fluorescent UV radiation and water condensation

Tôles prélaquées - Méthodes d'essai - Partie 10 :  
Résistance à un rayonnement UV fluorescent et à la  
condensation de l'eau

Bandbeschichtete Metalle - Prüfverfahren - Teil 10:  
Beständigkeit gegen UV-Strahlung mit  
Leuchtstofflampen und Kondensation von Wasser

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## European foreword

This document (prEN 13523-10:2015) has been prepared by Technical Committee CEN/TC 139 “Paints and varnishes”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13523-10:2010.

The main changes are:

- a) a reference to EN 13523-0 concerning conditioning of the test panels was added;
- b) the principle clause for methods A and B have been stated more precisely;
- c) the number of measurements has been added to methods C and D;
- d) the text has been editorially revised and the normative references have been updated.

The EN 13523 series, *Coil coated metals — Test methods*, consists of the following parts:

- *Part 0: General introduction;*
- *Part 1: Film thickness;*
- *Part 2: Gloss;*
- *Part 3: Colour difference — Instrumental comparison;* [017](https://standards.iteh.ai/catalog/standards/sist/471ad199-a585-4202-81a3-c0bfd53ccf95/sist-en-13523-10-2017)
- *Part 4: Pencil hardness;*
- *Part 5: Resistance to rapid deformation (impact test);*
- *Part 6: Adhesion after indentation (cupping test);*
- *Part 7: Resistance to cracking on bending (T-bend test);*
- *Part 8: Resistance to salt spray (fog);*
- *Part 9: Resistance to water immersion;*
- *Part 10: Resistance to fluorescent UV radiation and water condensation;*
- *Part 11: Resistance to solvents (rubbing test);*
- *Part 12: Resistance to scratching;*
- *Part 13: Resistance to accelerated ageing by the use of heat;*
- *Part 14: Chalking (Helmen method);*
- *Part 15: Metamerism;*

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- *Part 16: Resistance to abrasion;*
- *Part 17: Adhesion of strippable films;*
- *Part 18: Resistance to staining;*
- *Part 19: Panel design and method of atmospheric exposure testing;*
- *Part 20: Foam adhesion;*
- *Part 21: Evaluation of outdoor exposed panels;*
- *Part 22: Colour difference — Visual comparison;*
- *Part 23: Resistance to humid atmospheres containing sulfur dioxide;*
- *Part 24: Resistance to blocking and pressure marking;*
- *Part 25: Resistance to humidity;*
- *Part 26: Resistance to condensation of water;*
- *Part 27: Resistance to humid poultice (Cataplasm test);*
- *Part 29: Resistance to environmental soiling (Dirt pick-up and striping).*

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## 1 Scope

This part of the EN 13523 series specifies the basic principles and procedure for determining the resistance of an organic coating on a metallic substrate (coil coating) to a combination of fluorescent UV radiation, and water condensation and temperature under controlled conditions.

**Due to varied conditions which occur during natural weathering and the extreme nature of accelerated testing, correlation between the two cannot be expected.**

Not all organic coatings will perform on an equal basis but a degree of correlation between the same generic type might be observed.

## 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13523-0, *Coil coated metals - Test methods - Part 0: General introduction*

EN 13523-2, *Coil coated metals - Test methods - Part 2: Gloss*

EN 13523-3, *Coil coated metals - Test methods - Part 3: Colour difference - Instrumental comparison*

EN 13523-14, *Coil coated metals - Test methods - Part 14: Chalking (Helmen method)*

EN 13523-22, *Coil coated metals - Test methods - Part 22: Colour difference - Visual comparison*

EN ISO 16474-3, *Paints and varnishes - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 16474-3:2013)*

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## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13523-0 apply.

## 4 Principle

The coating is exposed in a cyclic manner to UV radiation, condensation of water and temperature under controlled conditions.

One of two types of fluorescent UV lamps, UVA-340 or UVB-313, is used.

After exposure to UV radiation under controlled conditions, chalking and changes in gloss and colour are assessed.

## 5 Apparatus and materials

Ordinary laboratory apparatus and glassware, together with the following.

### 5.1 Test chamber.

The test chamber shall be constructed of corrosion resistant materials. Enclosed within the test chamber shall be eight fluorescent lamps (5.2), a heater pan, racks for test specimens, and provisions for indicating and controlling operating times and temperatures.

The lamps shall be in banks of four on either side of the cabinet. Electrical operating conditions for the lamps shall be as given by the manufacturer.

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### 5.2 UV lamps.

Either UVA-340 or UVB-313, as specified in EN ISO 16474-3:

- UVA-340 starting at a wavelength of approximately 300 nm with a peak emission at 340 nm;
- UVB-313 starting at a wavelength of approximately 280 nm with a peak emission at 313 nm.

5.3 Water supply, deionized water.

## 6 Sampling

See EN 13523-0.

## 7 Test panels

See EN 13523-0.

The test specimens shall be flat and about 150 mm × 75 mm in size.

Deviations from the standard methods of panel shape, size, previous working, or conditioning may be agreed between the interested parties.

## 8 Procedure

### 8.1 Exposure

Place the test specimens in racks which are made of inert material. Expose the face of the test specimens parallel to the lamps at a distance of about 50 mm from the nearest surface of the lamp.

If there are empty spaces within the racks fill these with blanks to maintain the conditions within the test chamber.

Repositioning of the specimens during exposure is desirable and might be necessary to ensure uniformity of all exposure stresses.

Cycle the test specimens through periods of 4 h of dry UV exposure at a black panel temperature of  $(60 \pm 3)$  °C, followed by a period of 4 h of water condensation exposure, without radiation, at a black panel temperature of  $(40 \pm 3)$  °C. (One cycle consists of 8 h exposure.)

Arrange the test specimens to allow the condensate to freely run off the surface under gravity.

Conclude the exposure at an agreed time, for example 2 000 h for UVA-340 or 1 000 h for UVB-313, or an agreed number of cycles, for example 250 cycles for UVA-340 or 125 cycles for UVB-313.

Where possible, use an agreed irradiance level, typically 0,89 W/m<sup>2</sup> for UVA-340 or 0,71 W/m<sup>2</sup> for UVB-313.

For safety reasons, it is suggested to remove the test panels during the humidity cycle.

### 8.2 Calibration and maintenance of calibration

Calibration of the UV-lamps depends on the type of weathering apparatus, whether the irradiance level can be set or not.

For apparatus without the possibility to set the irradiance, after every usage of 400 radiation hours, replace one lamp and rotate the others within the bank with the oldest lamp being taken out of service unless otherwise specified by the equipment manufacturer.



For apparatus with irradiance measurement, the apparatus indicates when the radiation sensors need to be calibrated. Carry out the calibration of the radiation sensors according to the method provided by the equipment manufacturer using the calibration equipment. When the irradiance of a lamp falls below the set point, it shall be replaced. This is usually triggered by an alarm on the equipment.

### 8.3 Evaluation of test specimens

At the conclusion of the exposure, evaluate the test specimens for chalking, changes of gloss and colour.

Assess the coating for chalking, change of gloss and change of colour at ambient temperature. For more accurate measurements, as required for instance in case of dispute, the temperature shall be  $(23 \pm 2)$  °C and the relative humidity  $(50 \pm 5)$  %, in accordance with EN 23270.

## 9 Expression of results

The results shall be expressed as comparison between an unexposed test specimen and an exposed test specimen for properties defined in EN 13523-2, EN 13523-3, EN 13523-14 and EN 13523-22, if appropriate in terms of, for example,  $x$  % gloss retention EN 13523-2,  $\Delta E^*b = y$  EN 13523-3,  $z$  chalking EN 13523-14.

## 10 Precision

No precision data are currently available.

## 11 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the product tested;
- b) a reference to this part of the EN 13523 series (EN 13523-10);
- c) the type of UV lamps used;
- d) the duration of exposure in hours (h);
- e) the results of the test, as indicated in Clause 9;
- f) any deviation, by agreement or otherwise, from the test method specified;
- g) the date(s) of the test.

## Bibliography

- [1] EN 1396, *Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications*
- [2] EN 10169, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*
- [3] EN ISO 4892-3, *Plastics - Methods of exposure to laboratory light sources - Part 3: Fluorescent UV lamps (ISO 4892-3:2013)*
- [4] EN 23270, *Paints and varnishes and their raw materials - Temperatures and humidities for conditioning and testing (ISO 3270:1984)*

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