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Wood preservatives — Artificial weathering of treated wood prior to biological testing — UV-radiation and water-spraying procedure

ICS 71.100.50

British Standards

National foreword

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Wood preservatives - Artificial weathering of treated wood prior to biological testing - UV-radiation and water-spraying procedure

Produits de préservation du bois - Exposition artificielle aux intempéries des bois traités avant essais biologiques - Epreuves de rayonnement UV et de pulvérisation d'eau

Holzschutzmittel - Künstliche Bewitterung von behandeltem Holz vor biologischen Prüfungen - Beanspruchung mit UV-Strahlung und Wassersprühen

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Contents

Foreword

This document (CEN/TR 15046:2005) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and derived materials”, the secretariat of which is held by AFNOR.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Report: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This document is based on the results of the S.M.T. Project: F.A.C.T, SMT 4 CT 96 2135 and in particular in accordance with the findings of Task 1 which consisted of a study of artificial weathering techniques for the conditioning of treated test blocks prior to biological test. (see the summary of the research in CEN/TR 14723)

1 Scope

This document specifies a method for the artificial weathering of test specimens of treated wood, which are used in the testing of the biological efficacy of wood preservatives.

This method is applicable to:

a) the pre-conditioning of test specimens prior to their being subjected to a biological test; or

b) assessment of loss of effectiveness by comparing the performance in a biological test of treated test specimens subjected to this procedure with others that have not undergone any artificial weathering procedure.

NOTE The method can also be used for pre-conditioning of wood-based panel products, which may or may not have received preservative treatment.

2 Principle

Artificial weathering for a specified period in a device providing UV-radiation and spraying of demineralised water, of test specimens that have been prepared for biological testing of the efficacy of a wood preservative against fungi or insects, using the appropriate standard methods.

3 Material and apparatus

3.1 Material

3.1.1 Water, demineralised.

NOTE For example water conforming to the grade 3 specified in EN ISO 3696 may be used.

3.1.2 End-sealing material, according to the specifications recommended in the standard test method to be applied after the artificial weathering.

3.2 Apparatus

3.2.1 Test chamber

The test chamber is made from corrosion resistant material in which are housed the lamps, a heated water tray, spray nozzles and test specimen racks.

3.2.1.1 Lamps

The UV lamp emits UV light from a low pressure mercury arc. The required spectral distribution is achieved by a careful selection of the type of phosphor coating on the inner surface of the lamp and the nature of the glass used in the construction of the tubes.

Unless otherwise specified or mutually agreed the lamp shall be of the following type:

Lamp, commonly called UVA 340, has a peak emission at 340 nm and the relative spectral irradiance is given in Table 1.

Table 1 — Relative spectral irradiance of lamp

Wavelength nm	Relative spectral irradiance[a] %
270 < λ ≤ 400	100
λ ≤ 270	0
270 < λ ≤ 280	0
280 < λ ≤ 300	0
300 < λ ≤ 320	7,8 ± 0,8
320 < λ ≤ 340	29,6 ± 3,0
340 < λ ≤ 360	34,4 ± 3,4
360 < λ ≤ 380	20,9 ± 2,1
380 < λ ≤ 400	7,3 ± 0,7

[a] The spectral irradiance between 270 nm and 400 nm is defined as 100 %.

3.2.1.2 Device for wetting the test specimens

The test specimens shall be wetted by spray of water. To prevent spotting on to the test specimens water demineralised (3.1.1) shall be used.

The spray water shall not be used in a circulation system.

Note A spraying device could be capable to spray about 3 l/min. Intermittent spray, e.g. 5 s spray followed by 15 s rest should be programmable to save water.

3.2.1.3 Black panel thermometer

Set the apparatus to operate at the specified parameters, and the temperature shall be monitored by a remote sensor attached to the black panel. The black panel thermometer shall be exposed to the same exposure conditions as the specimens. The black panel thermometer shall be calibrated in accordance with the manufacturer's recommendations.

3.2.1.4 Irradiance control

Apparatus equipped with an irradiance control system shall be calibrated in accordance with the manufacturer's recommendations.

Lamps in apparatus without irradiance control system need to be rotated and replaced in accordance with the manufacturer's recommendations to compensate for lamp ageing.

3.2.2 Test specimens holder

The test specimens holder shall be of stainless steel. They shall guarantee a sufficient distance between the test specimens and the holder sheet in order not to hinder the runoff of the spray water and a fixed distance to the UV- lamps.

An example of a suitable test specimens holder is given in Annex A.

3.2.3 Deep-freezer controlled at a temperature of (- 18 ± 2)°C.

3.2.4 Conditioning chamber controlled at a temperature of (20 ± 2) °C and (65 ± 5) % relative humidity for conditioning the test specimens.

4 Test specimens

4.1 Definition and origin

The test specimens and their preparation are defined in the standards concerning the biological tests to which they are intended to be subjected.

The artificial weathering procedure shall be carried out at the end of the conditioning period that follows the treatment of the test specimens described in the relevant biological test standard.

4.2 Number of test specimens

The number of test specimens to be artificially weathered shall be as required by the standard describing the relevant biological tests, bearing in mind that the weathering procedure shall be applied both to treated test specimens that are subjected to biological agents and to control test specimens. The control test specimens are of the following kinds:

— treated test specimens that are not be subjected to attack by biological agents after artificial weathering. These will serve as controls for changes in mass in those tests in which this factor is taken into consideration. One set of these control test specimens shall be provided for each concentration;

— untreated control test specimens, which, after artificial weathering, are subjected to the biological tests to check any variation in the behaviour of untreated wood. One set of these control test specimens shall be provided for the whole of one test;

— control test specimens of timber treated with solvent or diluent if necessary.

5 Procedure

5.1 Artificial weathering

Fix the test specimens in the test specimens holders (3.2.2 and Annex A) and insert the test specimens holders in the test chamber (3.2.1).

Expose the test specimens to the weathering programme given in Table 2.

NOTE The weathering procedure should start on a Tuesday.

The given programme lasts 336 h. Repeat the programme twice in continuation, which means to programme the total run of the weathering device to 672 h.

Without switching off the weathering device , at the end of step 19 remove the test specimens holders with the test specimens in place and transfer the whole assembly to the freezer (3.2.3) and leave then there for 24 h (step 20). Transfer the test specimens in their holders to the weathering apparatus. Repeat this procedure at the end of step 23.

The position of the test specimens holders in the device shall be changed through rotation every 7 days.

The UV exposure temperature shall not exceed 50 °C. The corresponding irradiance set point shall not exceed 1,03 W/(m²nm) at 340 nm

The temperature of the dark (conditioning) phase shall not exceed 40 °C.

NOTE The flow of demineralised water should be round about 3 l/min.

Table 2 – Artificial weathering programme

Day		Step N°	Step of the programme	Duration (h:min)	Cycle N°
1	Tuesday	1	UV [a]	24:00	
2	Wednesday	2	Spray [b]	04:00	C_1
		3	Cond [c]	02:00	
		4	Spray	10:00	
		5	Cond	02:00	
		6	Spray	06:00	
	Thursday	7	UV	24:00	
4	Friday	8	Spray	04:00	
		9	Cond	02:00	
		10	Spray	10:00	
		11	Cond	02:00	
		12	Spray	06:00	
5	Saturday	13	UV	23:00	
		14	Cond	01:00	
6	Sunday	15	Spray	04:00	
		16	Cond	02:00	
		17	Spray	10:00	
		18	Cond	02:00	
		19	Spray	06:00	
7	Monday	20	Cond – spe[d]. Meanwhile stored in the freezer	24:00	
8 – 13	Tuesday to Sunday	21	Sub-cycle step 22-23 repeat 72 x	–	C_2
		22	UV	01:42	
		23	Spray	00:18	
14	Monday	24	Cond – spe. Meanwhile stored in the freezer	24:00	
		25	Final step – go to step 1	–	
Programme duration set at 672 h					

[a] UV-light

[b] Spraying of demineralised water

[c] Conditioning no light. In some devices, this step can only be realized with the program step "Cond" (=condensation which means production of dew)

[d] Special conditioning

5.2 Duration of the artificial weathering procedure

The total duration of the artificial weathering shall be 672 h (= 4 weeks).

5.3 Drying

Stand the test specimens in the conditioning chamber (see 3.2.4), on one of their narrow sides on a non-absorbent support of a material which does not react with the treated test specimens and taking care to leave a gap of at least 10 mm between individual test specimens, allowing a free flow of air around the test specimens.

Allow the test specimens to stand for at least two weeks or until constant mass i.e. until two consecutive weighing 24 h apart are the same ± 0,1 g.

5.4 Repairing the end-sealing

In the case of end-sealed cross sections of specimens (e.g. for ENV 839) repair any sealing broken by the artificial weathering procedure. Use the end-sealing material recommended in the respective test standard (see 3.1.2).

6 Destination of the test specimens after the artificial weathering procedure

The test specimens are suitable for use in biological tests in accordance with the appropriate standards, commencing from the clause describing the procedure for exposing the test specimens to the test organisms (insects or fungi).

As the test specimens are exposed to the artificial weathering only with one of their broad faces, the exposed faces shall be laid towards the fungi on the culture media (e.g. EN 113 or ENV 839) respectively the insects shall be applied at the exposed faces (e.g. EN 46 or EN 47).

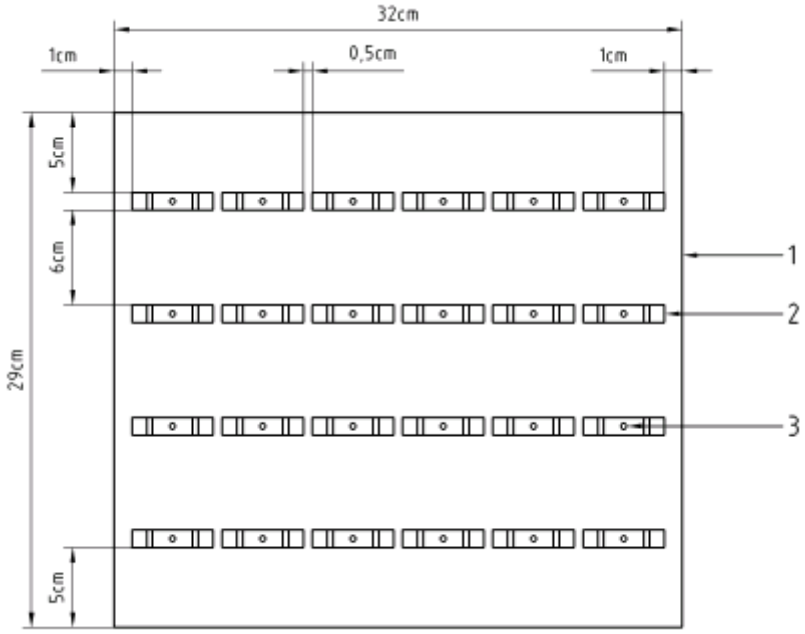
7 Test report

Quote the artificial weathering procedure by giving the number of this document (i.e. CEN/TR 15046) in the test report for each biological test.

Annex A
(informative)

Example of a suitable test specimens holder

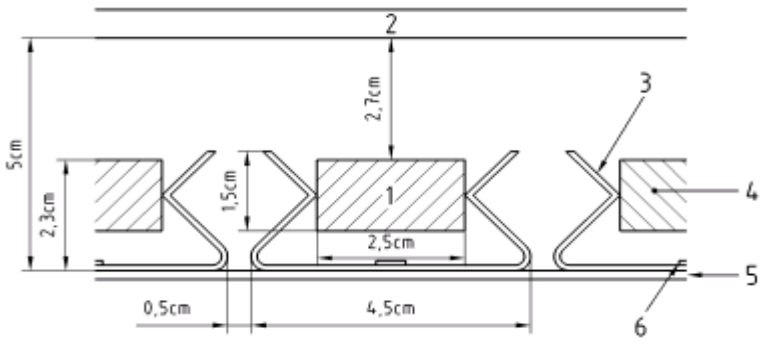
A suitable test specimens holder design is shown in Figures A.1 and A.2.



Key

1 Metal sheet
2 Clamp of spring steel
3 Screw or weld

Figure A.1 – Plan view : Position of clamps (screwed or welded on) on metal sheet



Key

1 Wood
2 Light
3 Clamp of spring steel
4 Test specimen
5 Metal sheet
6 Screw or weld

Figure A.2 – Location of the test specimens within the clamps

Bibliography

EN 46, *Wood preservatives – Determination of the preventive action against recently hatched larvae of Hylotrupes bajulus (Linnaeus) (Laboratory method)*

EN 47, *Wood preservatives – Determination of the toxic values against Hylotrupes bajulus (Linnaeus) larvae (Laboratory method)*

EN 113, *Wood preservatives – Test method for determining the protective effectiveness against wood destroying basidiomycetes - Determination of the toxic values*

ENV 839, *Wood preservatives – Determination of the protective effectiveness against wood destroying basidiomycetes – Application by surface treatment*

CEN/TR 14723:2003, *Durability of wood and wood-based products – Field and accelerated conditioning tests (FACT) for wood preservative out of ground contact.*

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