DRAFT FOR DEVELOPMENT

DD CEN/TS
15397:2006

Wood preservatives — Method for natural preconditioning out of ground contact of treated wood specimens prior to biological laboratory test

ICS 71.100.50

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National foreword

This Draft for Development is the official English language version of CEN/TS 15397:2006.

This publication is not to be regarded as a British Standard.

It is being issued in the Draft for Development series of publications and is of a provisional nature because the Technical Committee need some time to collect the data in this relatively new area of technology. It should be applied on this provisional basis, so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European standard. A review of this publication will be initiated 2 years after its publication by the European organization so that a decision can be taken on its status at the end of its 3-year life. Notification of the start of the review period will be made in an announcement in the appropriate issue of *Update Standards*.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European standard, to extend the life of the Technical Specification or to withdraw it. Comments should be sent in writing to the Secretary of BSI Technical Committee B/515, Wood preservation, at British Standards House, 389 Chiswick High Road, London W4 4AL, giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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Summary of pages

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TECHNICAL SPECIFICATION

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CEN/TS 15397

May 2006

ICS 71.100.50

English Version

Wood preservatives - Method for natural preconditioning out of ground contact of treated wood specimens prior to biological laboratory test

Produits de préservation du bois - Méthode de préconditionnement naturel d'éprouvettes de bois traité, sans contact avec le sol, avant essai biologique en laboratoire

Holzschutzmittel - Verfahren zur natürlichen Vorkonditionierung ohne Erdkontakt für behandelte Holz-Prüfkörper vor biologischer Laborprüfung

This Technical Specification (CEN/TS) was approved by CEN on 11 March 2006 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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Foreword

This Technical Specification (CEN/TS 15397:2006) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and wood-based products”, 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 CEN Technical Specification: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

For use of class 3 according to EN ISO 335-1 field tests, like those described in EN 330 and ENV 12037, are a valuable means of studying the performance of a wood preservative. However, they are questionable as a basis of approvals of wood preservatives for some reasons:

The abiotic factors of outdoor exposure, such as wind, temperatures, UV radiation and rain can in combination with biotic factors change or depreciate the applied wood preservative to such an extent as to allow decay. A low frequency of precipitation and the duration of temperatures below or slightly above the freezing point can, however, in some areas of Europe hinder the development of fungi and a resulting visible deterioration. Likewise the effectiveness against wood-boring beetles can also be reduced although infestation of the timber can not occur because the weather conditions in a particular field will not promote cracking of the timber - a prerequisite for oviposition of for instance the house longhorn beetle. Furthermore under natural conditions fungal attack and insect infestation can be quite accidental, leading to remarkable variations and therefore possible misinterpretations of the test results.

Therefore - in a project supported by the Commission of the European Communities [1] to preclude such disadvantages - a method was developed and tested with a number of the most commonly used wood preservatives. In this method the treated wood specimens were exposed without soil contact to the natural abiotic and biotic ageing factors, the complexity of which cannot - or only incompletely - be simulated with the available artificial ageing methods EN 73 and EN 84. After defined periods of outdoor exposure, attack of wood-destroying fungi and/or insects were examined under controlled laboratory conditions according to the relevant European Standards. The applicability of this principle to a number of typical European climates was confirmed in a further project also supported by the Commission of the European Communities[2]. With some amendments to the method used in the projects, this document is based on this principle.

1 Scope

This CEN Technical Specification specifies a method of natural preconditioning for wood specimens treated with a wood preservative either by penetrating processes or by surface application that can be used in conjunction with existing European Standards on testing of the preventive action of wood preservatives against basidiomycetes and/or insects.

2 Normative references

Not applicable

3 Principle

Wood test specimens treated with a wood preservative according to relevant biological test methods are exposed to natural outdoor conditions in a test field. The test specimens are fixed on a rack facing the prevailing weather under 45°. If brush treatment, dipping, steeping or double vacuum treatment is recommended, instead of the test specimens described in the relevant European Standards, end-sealed wood stakes with a cross section equal to the cross section of the test specimens in the relevant test methods can be used. After different periods of outdoor exposure the standard test specimens and end-sealed test specimens derived from the stakes by cutting to a length of 50 mm are exposed to biological laboratory tests as for instance those described in EN 46-1,EN 46-2, EN 47, EN 113 or ENV 839 respectively.

4 Materials

4.1 End-seal compounds

4.1.1 Preservative resistant end-seal

A material resistant to the penetration of the test preservative solutions.

NOTE Polyvinyl acetate (PVAc) glues have been found to be suitable for many organic solvent formulations. For water-borne formulations the weatherproof end-seal (4.1.2) may be used.

4.1.2 Weatherproof end-seal

A material which prevents water entry as well as microbial infection and remains effective during long term exposure to the weather.

NOTE Two coats of an epoxy-resin/pitch compound have been found to be suitable.

5 Apparatus

5.1 Sawing equipment

A sawing machine capable of producing a fine sawn finish.

5.2 Drilling machine and drills

5.3 Conditioning chamber, well ventilated and controlled at (20 ± 2) °C and (65 ± 5) % relative humidity.

5.4 Ventilated drying oven, capable of being maintained at (103 ± 3) °C.

5.5 Desiccators, with efficient desiccant (silica gel for example).

5.6 Equipment, suitable for carrying out the treatment specified by the supplier.

5.7 Balance, capable of weighing to the nearest 0,01 g.

5.8 Safety equipment and protective clothing, appropriate for the test product, to ensure the safety of the operator.

5.9 System for fixing stakes in the exposure rack: tubular copper rivets, plastic sticks and spiral springs of stainless steel.

5.10 Labels, inert, long-lasting labels and corrosion resisting fixing pins.

5.11 Exposure racks: Aluminium racks (see Figures 1 and 2) that allow test specimens or stakes to face the prevailing weather[1] under 45°, approximately 1 m above ground level.

5.12 Ordinary laboratory equipment.

6 Wood test specimens

6.1 Specimens according to the relevant biological test methods

6.1.1 General

The test specimens and their preparation including treatment and post treatment conditioning are defined in the documents concerning the biological tests to which they are intended to be subjected. The relevant test standards are those standards where the test specimens have the dimensions 15 mm x 25 mm x 50 mm. These include EN 46-1,EN 46-2, EN 47, EN 113 or ENV 839.

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

6.1.2 Number of test specimens

The number of test specimens shall allow the relevant biological tests to be carried out in accordance with the instructions in the appropriate documents, bearing in mind that the natural preconditioning procedure shall be applied both to treated 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 will not be subjected to attack by biological agents after natural preconditioning. These will serve as controls for changes in mass in those tests in which this factor is taken into consideration. One set of control test specimens will be needed for each concentration and period of exposure;

[1] In most of the European areas this would normally be south-west

- untreated control test specimens which, after natural preconditioning, are subjected to the biological tests to check any variation in the behaviour of untreated wood. One single set of test specimens shall be provided for each exposure period;

- control test specimens treated with the solvent or diluent for each period of exposure if necessary.

6.2 Stakes

6.2.1 General

If superficial treatment is recommended by the supplier of the test preservative, stakes can be used as an alternative. If so, the stakes shall have a cross section of (25 ± 0,5) mm x (15 ± 0,5) mm and an appropriate length which can be a multiple of (50 ± 0,5) mm (the length of the test specimens in these include EN 46-1,EN 46-2, EN 47, EN 113 or ENV 839).

6.2.2 Species of wood for stakes

The reference species are the species mentioned in the relevant documents for the subsequent biological laboratory tests.

If no requirements are given, e.g. in the case of intended double vacuum treatment, the reference species are

Scots pine, *Pinus sylvestris* Linnaeus, and

beech (*Fagus sylvatica* Linnaeus).

Additional tests can be undertaken using other species but, if so, this shall be stated in the test report.

6.2.3 Quality of wood

The wood shall be free from visible cracks, stain, decay, insect damage and other defects. The wood shall not have been water-stored, floated, chemically treated or steamed. The wood shall originate from trees preferably felled in winter.

NOTE Wood that has been kiln dried at temperatures below 60 °C may be used.

The Scots pine shall be exclusively sapwood containing little resin and having between 2,5 and 8 annual rings per 10 mm. The proportion of latewood in the annual rings shall not exceed 30 % of the whole.

The beech shall be even-grained, free from tyloses and discoloration. It shall have between two and six annual rings per 10 mm. Use only sound sapwood, straight-grained and without knots.

6.2.4 Provision of stakes

Prepare planed strips having a cross-section of (25 ± 0,5) mm x (15 ± 0,5) mm removing a minimum of 2 mm from any surfaces exposed during drying. The longitudinal faces shall be parallel to the direction of the grain. The annual rings shall run in a direction specified in the European Standards to be used after the natural preconditioning periods. Make transverse cuts, neatly to give sharp edges and a fine-sawn finish to the end-grain surfaces, to give test longitudinal dimensions specified in 6.2.5.

Avoid using stakes directly from the butt or crown of the tree.

The stakes required for one test shall originate from a minimum of three lots, each from a different tree, and at random from within each of these lots.

6.2.5 Dimensions of stakes

The nominal dimensions of each test specimen measured at 12 % moisture content shall be (y $\pm$ 0,5 mm x (25 $\pm$ 0,5) mm x (15 $\pm$ 0,5) mm, where y is a multiple of 50 mm + saw-cuts + 40 mm (see 11.3).

NOTE A moisture meter of the two-pronged electrical conductivity type is suitable for assessing moisture content.

Check the size of each stake to determine the actual area to be treated. Allow for any possible encroachment of the end sealing compound on to the longitudinal faces of the test specimens.

6.2.6 Number of stakes

The number of stakes depends on the number of test specimens that shall be derived from them according to the European Standards to be used after the natural preconditioning periods plus the number of test specimens$_{mc}$ for the moisture factor [F_{odm}] (see 6.2.7).

The number of those test specimens shall allow the relevant biological tests to be carried out in accordance with the instructions in the appropriate documents, bearing in mind that the natural preconditioning 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 will not be subjected to attack by biological agents after natural preconditioning. These will serve as controls for changes in mass in those tests in which these factors are taken into consideration. One set of control test specimens will be needed for each concentration and period of exposure;

- untreated control test specimens which, after natural preconditioning, are subjected to the biological tests to check any variation in the behaviour of untreated wood. One single set of test specimens shall be provided for each exposure period;

- control test specimens treated with the solvent or diluent for each period of exposure if necessary;

- control test specimens [specimens$_{mc}$, see 6.2.7] necessary for determining the moisture-factor [F_{odm}] for the calculation of the theoretical oven dry mass of the test specimens derived from the stakes.

Use a minimum of three stakes (one from each lot) for each combination of preservative concentration, untreated controls, controls treated with the solvent or diluent, species of wood and duration of natural preconditioning.

6.2.7 Number of specimens$_{mc}$ for the moisture factor [F_{odm}]

If the minimal number of stakes for each combination of preservative concentration, untreated controls, controls treated with the solvent or diluent, species of wood and duration of natural preconditioning is three, the number of test specimens$_{mc}$ for the calculation of the oven dry mass of the test specimens in test shall be at least one of each stake. If more than the minimal number of stakes is necessary for this combination, the number of test specimens$_{mc}$ shall be at least five of each lot of stakes (6.2.4) used for the test and originating from different stakes of these lots.

6.2.8 Preparation of the stakes prior to treatment

6.2.8.1 Conditioning the test specimens prior to sealing

Allow the stakes to reach equilibrium moisture content in the conditioning chamber (see 5.3).

6.2.8.2 End-sealing before treatment

Seal the transverse surfaces of the stakes with the preservative resistant end-seal (see 4.1.1); allow to dry.

6.2.9 Treatment

Treat the longitudinal surfaces of the stakes one day after end- sealing. The nominal amount of wood preservative is either applied by brushing, pipetting, dipping or steeping as specified in the relevant European Standards on wood preservatives.

6.2.10 Post treatment conditioning

Allow the stakes to be conditioned in the conditioning chamber (5.3) according to the requirements for the conditioning of test specimens after treatment of the relevant European Standards to be used subsequent the natural preconditioning periods.

6.2.11 Untreated control stakes

A series of at least three untreated control stakes of Scots pine sapwood (one from each lot) per each preservative and each exposure time shall be exposed at test field. The control stakes shall be prepared, stored, conditioned, end-sealed and handled in the same way as the treated stakes before exposure.

7 End-sealing prior to exposure

After post treatment conditioning seal the cross sections of all test specimens and stakes treated by superficial treatment methods with the weatherproof end-seal in order to avoid penetration of moisture and micro-organisms via the cross section.

8 Labelling

Before exposure of the test specimens or stakes an identification label (5.10) of suitably inert and long-lasting material shall be affixed to each specimen or stake. If a permanent marker is used instead of the labels, make sure at fixed intervals that the marking is still in good condition.

9 Exposure to natural conditions

9.1 Number of test sites

Although the test is valid using one site it is advantageous to select more than one test site representing markedly different geographic locations.

9.2 Selection of test site

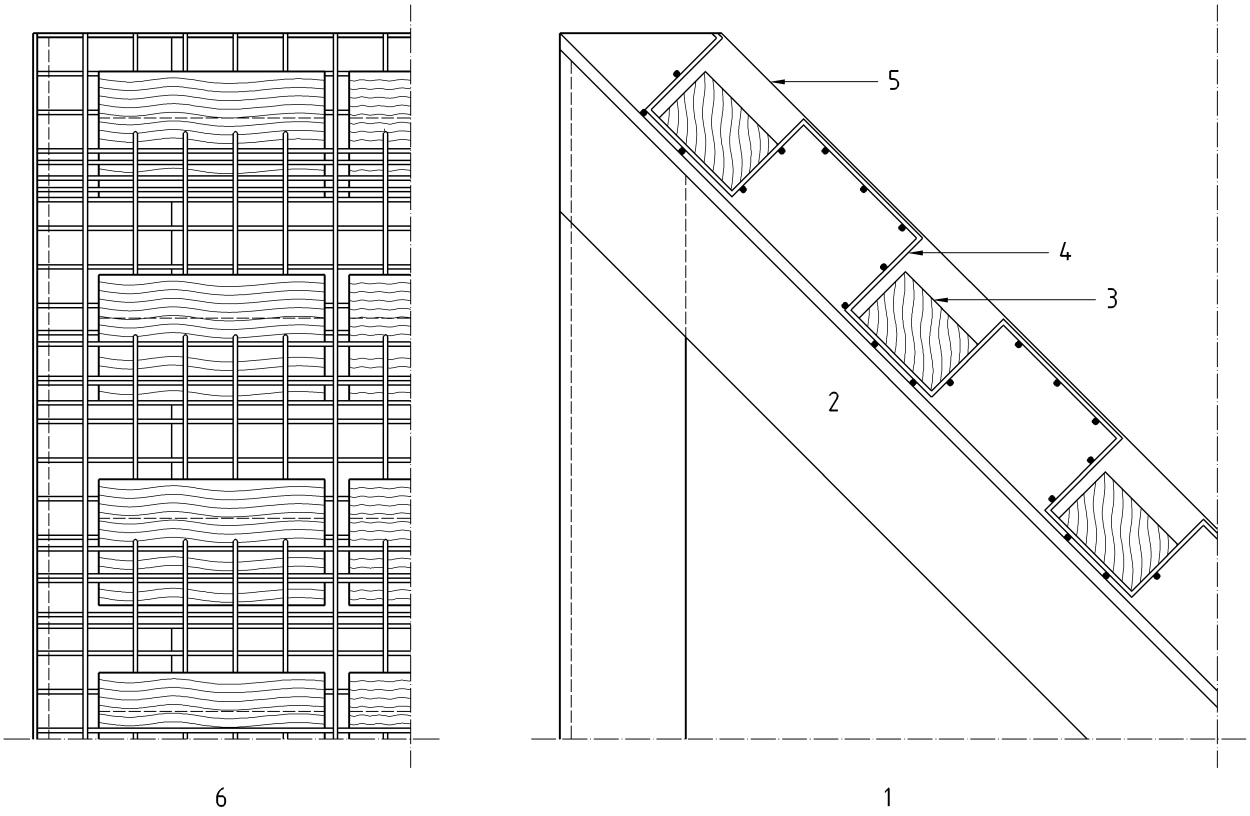
Select an open area free from tall vegetation and extremes of local environmental influences, especially industrial pollution.

9.3 Installation of the test specimens or stakes at the test site

Install the test specimens or stakes at random on the exposure racks facing the prevailing weather under 45°.

NOTE In most of the European areas the prevailing weather would normally come from south-west.

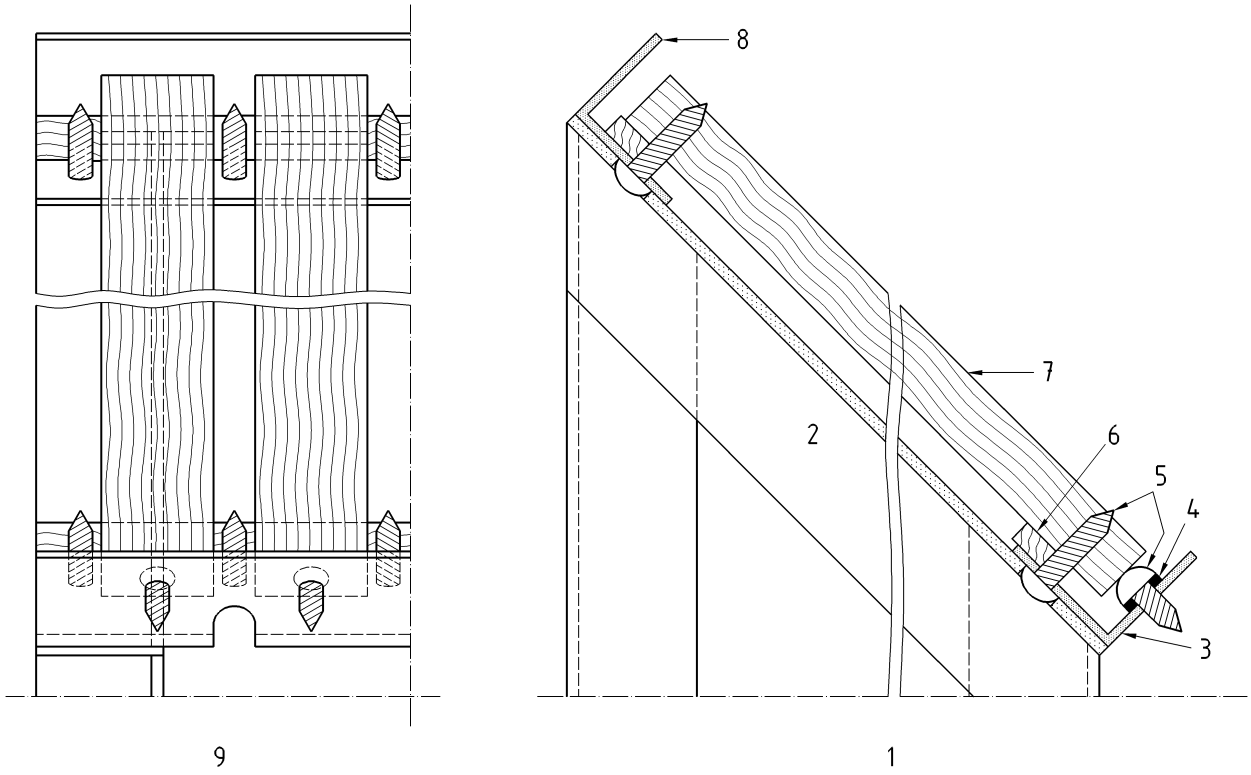
The test specimens or stakes shall be separated from each-other by a minimum of 5 mm and shall be placed in such a way that movement during exposure, as a result of changes in moisture content, is not restricted. Examples of exposure racks are given in Figures 1 and 2.



Key

1 Side elevation
2 Metal frame
3 Wood test specimen
4 Stainless steel wire mesh (mesh min.10 mm)
5 Large-mashed plastic mesh
6 Front view

Figure 1 - Detail of a suitable exposure rack for test specimens according to EN 47 and EN 113



Key

1 Side elevation
2 Metal frame
3 Drainage whole
4 Washer
5 Stainless steel self-tapping screws
6 Spacing pieces
7 Wood test specimen
8 Aluminium or stainless steel profile
9 Front view

Figure 2 - Detail of a suitable exposure rack for stakes (for superficial treatments)

10 Duration of the natural preconditioning procedure

The total duration of the procedure shall be one year. The start and finish dates of the exposure shall be recorded and reported in the test report.

The minimal time of exposure shall be six months in the period between March and October.

11 Preparation of test specimens and stakes for biological tests

11.1 Test specimens according to the relevant biological test methods

At the end of each exposure period condition the test specimens in the conditioning chamber (5.3) to reach (12 ± 1) % moisture content.

Repair any deterioration in the end-seal of superficially treated test specimens by applying the end-seal material required in the relevant biological test standards.

Subsequently 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).

11.2 Exposure to the test organisms

Using the procedures for exposing described in the relevant biological standards the test specimens are exposed to the test organisms with the face which was directed to the sky in the test field.

11.3 Stakes

11.3.1 General

At the end of each exposure period a series of treated and untreated stakes is conditioned for at least 4 weeks in the conditioning chamber. The stakes are then cut to segments (50 ± 0,5) mm long with the sawing machine (5.1) leaving out the first 20 mm adjacent to the transverse surfaces. Immediately after cutting the derived test specimens are weighed to the nearest 0,01 g to determine their air-dry masses m_1. The test specimens are then end-sealed with the end-seal material required in the relevant biological test standards leaving the test specimens$_{mc}$ (see 6.2.6 and 6.2.7) unsealed for the determination of the moisture factor (see 11).

The end-sealed test specimens are then ready 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).

11.3.2 Exposure to the test organisms

Using the procedures for exposing described in the relevant biological standards the test specimens derived from the stakes are exposed to the test organisms with the face which was directed to the sky in the test field.

11.3.3 Calculation of the theoretical dry mass of specimens derived from stakes

The oven dry mass of test specimens prior to test is required for instance in EN 113.

Because it is not possible to get the real oven dry masses prior to treatment with the test preservative of test specimens derived from stakes, theoretical oven dry masses have to be calculated as follows:

Dry the test specimens$_{mc}$ (see 6.2.6 and 6.2.7) in a the drying oven (5.4). Allow to cool in desiccators (5.5) and weigh to the nearest 0,01 g.

Calculate the moisture factor F_{odm} for each concentration of the test preservative and for the untreated test specimens derived from the stakes as follows:

$$F_{odm} = \frac{\sum_{1}^{n} 1 - \frac{m_1 - m_0}{m_1}}{n}$$

where

m_1 is the mass of the test specimen after cutting,

m_0 is the mass of the test specimen after oven-drying.

All other test specimens cut from the stakes will be multiplied with the relevant moisture factor to calculate their theoretical initial oven-dry masses.

The mass changes caused by applying an end-sealing to the test specimens can be corrected by calculating a correction factor on the basis of e.g. control test specimens that are exposed in test vessels without test organisms and are oven-dried and weighed at the end of the test as is for instance is the case in EN 113.

12 Reference in the test report

EXAMPLE Quote the natural preconditioning procedure by giving the number of this document (CEN/TS 15397) in the test report for each biological test

Bibliography

[1] Gersonde, M.: Determination of the long-term effectiveness of wood preservatives with and without soil contact by accelerated test methods. R+D Programme “Wood as a renewable Raw Material“ Proceedings of the Seminar on Wood Technology, Munich 14./15. April 1987, p. 19 - 27

[2] Co-normative research on field tests for wood preservatives out of ground contact in conjunction with methods for preconditioning test specimens prior to test. SMT PROJECT: F.A.C.T. SMT4 CT96 2135, Final Report (2001)

[3] EN 73, *Wood preservatives; Accelerated ageing tests of treated wood prior to biological testing - Evaporative ageing procedure*.

[4] EN 84 *,Wood preservatives; Accelerated ageing tests of treated wood prior to biological testing - Leaching procedure*.

[5] EN 46-1,*Wood preservatives - Determination of the preventive action against Hylotrupes bajulus (Linnaeus) - Part 1:Larvicidial effect (Laboratory method).*

[6] EN 46-2,*Wood preservatives - Determination of the preventive action against Hylotrupes bajulus (Linnaeus) Part 1:Ovicidal effect (Laboratory method).*

[7] EN 47, *Wood preservatives - Determination of the toxic values against larvae of Hylotrupes bajulus (Linnaeus) - (Laboratory method).*

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

[9] ENV 839, *Wood preservatives - Determination of the protective effectiveness against wood destroying basidiomycetes - Application by surface treatment.*

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