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Wood preservatives - Field test method for determining the relative protective effectiveness of a wood preservative exposed out of ground contact - Horizontal lap-joint method

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English version

Wood preservatives - Field test method for determining the relative protective effectiveness of a wood preservative exposed out of ground contact - Horizontal lap-joint method

Produits de préservation du bois - Essais de champ pour déterminer l'efficacité protectrice d'un produit de préservation du bois hors de contact avec le sol - Méthode avec un assemblage à joint superposé

Holzschutzmittel - Freilandversuche zur Bestimmung der relativen Wirksamkeit eines Holzschutzmittels ohne Erdkontakt - Verfahren mit horizontaler Überlappung (Lap-joint)

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Prestandard 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 organisations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

0 Introduction

This European prestandard describes a method of test for wood preservatives that are intended for use in wood to be exposed to the weather out of contact with the ground without the additional protection of a surface coating. It therefore complements the European Standard EN 330, being used in situations where EN 330, a method of test for wood preservatives applied in combination with a coating, is not applicable.

The main objective of the method is to evaluate the relative effectiveness of the preservative, applied to jointed samples of Scots pine sapwood by a treatment method relevant to its intended practical use. Effectiveness is evaluated relative to a reference preservative treatment.

The method is concerned with the protection against decay after exposure to the complete range of micro-organisms occurring under natural conditions. It takes into account also physico-chemical effects of weathering on the performance of the preservative treated wood.

The method is also suitable for other purposes, for example evaluating the effectiveness of a test preservative in timber from different wood species. The method may, with or without modification, be suitable for wood based products and for testing natural durability to wood-destroying fungi.

Since the lap-joints are exposed to natural outdoor conditions during the test period, variations in test conditions from one exposure site to another have to be expected. Differences in climate, especially rainfall, will inevitably influence the general rate of development of decay fungi. However, by comparing the results obtained for the test preservative with those obtained with the reference preservative and with those for untreated control lap-joints, the relative protective effectiveness of the preservative under test can be evaluated.

NOTE : The procedures described in this prestandard are intended to be carried out by suitably trained and/or supervised specialists. Appropriate safety precautions should be observed throughout the use of the prestandard.

1 Scope

This European prestandard specifies a method for determining the relative effectiveness of a wood preservative applied without subsequent surface coating to wood which is to be exposed outdoors out of contact with the ground (i.e. Hazard Class 3. See EN 335-1). The method shall be used in situations where the European Standard EN330, a method of test for wood preservatives applied in combination with a coating, is not applicable and shall be used in order to classify the aggressiveness of the exposure sites.

The method is applicable to the testing of commercial or experimental preservatives applied by techniques appropriate to commercial practice. The method is applicable to chemical products used individually or in combination to prevent the development of decay in wood and, where suitable, in wood-based products. The method may also, after appropriate modification, be used for testing natural durability.

2 Normative references

This European prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European prestandard only when incorporated in it by

amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 212	Wood preservatives - Guide to sampling and preparation of wood preservatives and treated timber for analysis
EN 330	Wood preservatives - Field test method for determining the relative protective effectiveness of a wood preservative for use under a coating and exposed out of ground contact : L-joint method.
EN 335-1	Durability of wood and wood-based products - Definition of hazard classes of biological attack - Part 1 : General

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purpose of this European prestandard the following definitions apply:

3.1.1 active ingredient(s) : Individual chemical compound or compounds included in the wood preservative product to give it specific activity against the particular biological agencies of deterioration.

3.1.2 additional process : Any process or application of a product, as defined by the supplier, designed to improve the effectiveness of the preservative.

3.1.3 penetrating treatment process : Process which includes features or procedures intended to overcome the natural resistance of wood to penetration by a wood preservative product in its ready for use form.

NOTE : Such processes include for example currently practised technologies of diffusion treatments, double-vacuum and vacuum-pressure methods.

3.1.4 representative sample: Sample having its physical or chemical characteristics identical with the volumetric average characteristics of the total volume being sampled (see EN 212).

3.1.5 supplier : The sponsor of the test .

3.1.6 superficial application process : Process which does not include particular features or procedures intended to overcome the natural resistance of wood to penetration by a wood preservative product in its ready for use form.

NOTE : Such processes include for example brush and spray techniques and short-term immersion (dipping) processes in which wood normally has only a few minutes contact time with the preservative.

3.1.7 target retention : Retention recommended by the supplier.

3.2 Symbols and abbreviations

3.2.1 V^{nE} : Nominal mean rating for external surfaces of the lap-joints for sets of replicates at the assessment of the extent of attack of the lap-joints.

4.2.2 V^{nJ} : Nominal mean rating for surfaces within the joint areas of the lap-joints for sets of replicates at the assessment of the extent of attack of the lap-joints.

5 Principle

Jointed samples (lap-joints) consisting of two overlapping parts (joint members) held together mechanically are placed horizontally, out of contact with the ground and exposed to the weather. The lap-joints are dismantled and examined at intervals. The extent of microbioligical attack on the external surfaces and within the joint areas is rated according to a specified rating system. Data for lap-joints treated with the test product are compared with those generated using a reference preservative and untreated samples to assess relative effectiveness.

6 Materials

6.1 Reference preservative

Containing hexabutyldistannoxane (bis(tri-n-butyltin)oxide) as the active ingredient and with the following formulation :

Hexabutyldistannoxane (minimum 95 % (*m/m*) active ingredient)	1 % (*m/m*)
Aliphatic neutral hydrocarbon resin	5 % (*m/m*)
Hydrocarbon solvent (distillation range 160°C to 215°C;aromatic content < 17 % (*m/m*))	94 % (*m/m*)

The hexabutyldistannoxane shall be in the form known as-"stabilized" using either 0,1 % (*m/m*) 2-hydroxypropanoic acid (lactic acid) or 1 % (*m/m*) mercaptoethanoic acid (thioglycollic acid). The chlorine content shall be less than 0,1 % (*m/m*).

The active ingredient varies from the nominal percentage by between + 10 % (*m/m*) relative to the nominal and 0 % (*m/m*) relative to the nominal.

NOTE : In some cases it may be appropriate to compare the performance of the preservatives under test with additional reference preservatives. These reference preservative are listed in Annex A.

6.2 Wood specimens

6.2.1 wood species : Sapwood of *Pinus sylvestris* L. (Scots pine, European redwood) shall be used.

NOTE : Optionally, additional wood species may be chosen.

6.2.2 Selection of timber: Wood from at least two trees shall be used and evenly distributed among the different groups of lap-joints.

6.2.3 Quality of wood : Use wood from winter felled trees.

The wood shall be free from blue stain and shall not have been floated, stored in water or heated above 65°C or treated with chemical agents.

Use sound, straight-grained wood without reaction wood or juvenile wood. Some knots are permitted, (see 6.2.4). Material of a resinous appearance shall be avoided.

In the case of Scots pine use wood showing an average growth rate of 2,5 annual rings per 10 mm to 10 annual rings per 10 mm. The proportion of late wood in the annual rings shall not exceed 30 % by volume.

NOTE 1 : This would give a wood with a density, at 12 % (*m/m*) moisture content, in the range between 400 kg/m^3 and 550 kg/m^3 corresponding to a mass of each joint member ranging of about 190 g to 260 g.

All the wood used in the test shall have been handled and dried in the same way.

NOTE 2 : If additional wood species are used, these should be mentioned in the test report together with their density and the number of annual rings per 10 mm of the timber used for the test specimens.

6.2.4 Preparation of lap-joints : Condition in a conditioning chamber (see 7.2) the timber stock to (12 ± 2) % (*m/m*) moisture content. Prepare lengths of timber with (38 ± 1) mm × (85 ± 1) mm cross section by sawing (see 7.1) and planing with the grain parallel to the long axis and annual rings aligned parallel with the 85 mm side. (see figure 1). From the lap-joints subsequently machined from a single length of timber, not more than one shalll be included in each set of replicates (see 6.2.5).

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

Each lap-joint shall be prepared from a single piece of wood as two members (180 ± 1) mm long and separated by no more than 100 mm, to allow for removal of knots and associated grain aberration, to ensure a tight fit during the test (see figure 1). Within the overlapping part and the adjacent 50 mm there shall be no knots and in the rest of each member there are no more than 3 sound knots, the diameter of which shall not exceed 10 mm.

Machine the joint in a way that after assembly of the two members the pith faces are on the same side of the assembled joint. (see figure 1).

Store the joint members in the conditioning chamber (7.2) until required for treating.

6.2.5 Number of lap-joints : Prepare at least 10 lap-joints for each combination of test parameters [wood species (see 6.2.1), test preservative (see clause 8), retention level (see 9.3), reference preservative (see 6.1) and untreated control (see clause 11)].

NOTE : It is normally necessary to treat a higher number of lap-joints so that the required number can be selected after treatment (see 9.2) and the inclusion of "abnormal" joints avoided. Optionally extra lap-joints may be prepared for chemical analyses during exposure.

6.2.6 Labelling of lap-joints : Individual members of each lap-joint shall be assigned unique identification numbers in such a way that these numbers are retained through all preparation operations. After preservative treatment an identification label or tag of long-lasting material shall be affixed to each joint away from the joint area. The labels shall be of a material which is inert to the wood and the chemicals it contains after treatment and conditioning.

6.3 End-seal compounds

6.3.1 Preservative resistant end-seal : A material resistant to the penetration of the reference and test preservative solutions (or separate materials for each).

NOTE : Polyvinyl acetate (PVAc) glues have been found to be suitable for many organic solvent formulations. For water-borne formulations the weatherproof end-seal (6.3.2) may be used.

6.3.2 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 epoxi-resin/pitch compound have been found to be suitable.

7 Apparatus and equipment

7.1 Wood working equipment, including a saw capable of producing a fine sawn finish.

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

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

7.4 Balance, capable of weighing to the nearest 0,1 g.

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

7.6 Labels and fixing pins, both long-lasting, inert (see 6.2.6) and corrosion resistant with similar fixing pins.

7.7 Cable straps, inert and weather resistant to be used for fixing the two members of each joint together.

NOTE : A suitable material of the straps is clear or white polyamide with a dimension of ca 360 mm × 5 mm. These straps can easily be removed at the inspections and replaced by new straps when joints are returned to the exposure racks.

7.8 Exposure rack, (see figure 2) made of preservative treated wood, aluminium profiles or any other similar durable material and located at least 1 m above ground level and at least 0,5 m above any low vegetation (see figure 2). The test samples shall be separated from the rack by spacing pieces, cross-section, minimum 5 mm × 5 mm, maximum 10 mm × 10 mm, made of a long-lasting weather resistant material, that will not react with timber or treated lap-joints.

8 Identity and sampling of preservative product

8.1 A written declaration of the identity of the product shall be producted to accompany the sample. It shall state :

a) the name or other designation of the preservative product to be tested.

b) the composition of the preservative product to be tested. This shall include where available the chemical designation, the CAS number and the trade or common name of active ingredient(s) together with a generic description of the co-formulants (for example co-solvent, resin) in the preservative product, and the composition in terms of per cent mass/mass of all these ingredients. The sum of the percentages shall be equal to 100 %. A safety sheet of the preservative product shall be provided.

NOTE 1 : Other than for the active ingredients, the supplier is permitted to declare the ingredients under a confidentiality agreement between the parties. In such circumstances the composition, other than active ingredient(s), need be declared in the test report in generic terms only.

c) the result of an analysis and the methology used of the actual sample submitted for test, this shall in every case include analysis for active ingredients. If analysis is carried out under a quality system this shall be stated in the declaration.

NOTE 2 : Analyses should be carried out preferably under a quality system such as EN 45001.

The declaration shall be signed by the supplier or his authorized representative.

8.2 The sample of preservative shall be a representative sample of the product to be tested.

Samples shall be stored and handled in accordance with any written requirements from the supplier.

NOTE : For the sampling of preservatives from bulk supplies, the procedures given in EN 212 should be used.

9 Test lap-joints

9.1 Initial end sealing

For each joint member, seal the end grain surface remote from the joint area twice with a preservative resistant end seal (6.3.1); allow to dry.

9.2 Treating process

The preservative treatment is made after machining and initial end sealing but prior to assembling.

Apply the test preservative to the end-sealed test joint members using the process specified by the supplier.

NOTE 1 : A range of model treatments is given in annex A.

NOTE 2 : For development products it is preferable to test at more than one retention of the active ingredients, ideally three, ranged about that thought to be appropriate for out of ground contact use. The concentration or target retention (X) may be achieved by varying the concentration of active ingredient(s) in the formulation. Alternatively, the parameters of the treatment process can be altered. A suitable range of retentions could be 0.5 X, 1 X and 2 X. A narrower range can be used if the effectiveness of the product is sufficiently well known, for example, a geometrical series with a factor of $\sqrt{2}$.

For all treatments except brushing, determine and record the volume of each of the lap-joint members and its mass to the nearest 0,1 g immediately before treatment. After treatment allow to drain for several minutes or wipe off excess solution from the surface with a cloth. Then reweigh each member immediately and record the mass after treatment.

For brush treatment, calculate the amount of preservative in grams to be applied on each surface of the lap-joint member to correspond to the uptake in grams or millilitres per square metre recommended by the supplier.

NOTE 3 . This can be done by putting the members on the balance one by one and brush them while lying there, surface after surface with enough time in between for the preservative to be soaked up.

Apply double the calculated amount of preservative to the end grain surfaces of the joint area.

9.3 Retention of preservative

Calculate the uptake of preservative solution for each member and express the retention in kilograms of preservative per cubic metre of wood for penetrating and/or vacuum treatment processes and in grams per square metre of wood surface for superficial application processes.

NOTE 1 : For processes resulting in unknown penetration, retention should be expressed in both ways.

NOTE 2 : Although long term immersion is considered as a penetrating process (see EN 599-1), normally the penetration and the uptake of preservative solutions are relatively low. Therefore an expression of retentions in grams per square metre is preferable.