DRAFT FOR DEVELOPMENT

DD CEN/TS
12037:2003

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

ICS 71.100.50

BSI
British Standards

National foreword

This Draft for Development is the official English language version of CEN/TS 12037:2003 and supersedes DD ENV 12037:1996.

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 there is insufficient experience in use of the test method. 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 committee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled "International Standards Correspondence Index", or by using the "Search" facility of the *BSI Electronic Catalogue* or of British Standards Online.

This Draft for Development was published under the authority of the Standards Policy and Strategy Committee on 17 February 2004

Summary of pages

This document comprises a front cover, an inside front cover, the CEN/TS title page, pages 2 to 30, an inside back cover and a back cover.

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Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 43448 6

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CEN/TS 12037

December 2003

ICS 71.100.50

Superscedes ENV 12037:1996

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)

This Technical Specification (CEN/TS) was approved by CEN on 8 October 2003 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.

CEN members are required to announce the existence of this CEN/TS in the same way as for an EN and to make the CEN/TS available. It is permissible to keep conflicting national standards in force (in parallel to the CEN/TS) until the final decision about the possible conversion of the CEN/TS into an EN is reached.

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Ref. No. CEN/TS 12037:2003 E

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Foreword

This document (CEN/TS 12037:2003) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and wood-based products”, the secretariat of which is held by AFNOR.

This document supersedes ENV 12037:1996.

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

Introduction

The main objective of the method is to evaluate the relative effectiveness of the preservative, applied to jointed specimens of Scots pine sapwood by a treatment method relevant to its intended practical use and as such does not necessarily accelerate decay but reflects probable performance in service.

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

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 for untreated control lap-joints, the relative protective effectiveness of the preservative under test can be evaluated.

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

1 Scope

This Technical Specification 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.

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 and/or – optional – the development of disfiguring organisms in wood and, where suitable, in wood-based products.

NOTE 1 The method may also be used to test other treated wood species and naturally durable timbers. It may be adapted for testing the field performance of other wood based systems and treatments designed to enhance durability, for example treated or untreated wood based composites, timber treated with non-biocidal systems, chemically modified or heat treated timber.

NOTE 2 Although the test is used to assess decay, it is possible to use the method to additionally assess stain or each separately when relevant.

2 Normative reference

This Technical Specification 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 Technical Specification only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 212, *Wood preservatives — Guide to sampling and preparation for analysis of wood preservatives and treated timber.*

3 Definitions, symbols and abbreviations

3.1 Definitions

For the purposes of this Technical Specification, the following definitions, symbols and abbreviations 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
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.

3.1.5
representative sample
sample having its physical or chemical characteristics identical with the volumetric average characteristics of the total volume being sampled (see EN 212)

3.1.6
supplier
sponsor of the test

3.1.7
target retention
retention recommended by the supplier

3.1.8
application rate
amount of preservative product per square metre to be applied in superficial processes recommended by the supplier

3.2 Symbols and abbreviations

3.2.1
V^{nUD}
nominal median rating for the upper side of the lap-joints for sets of replicates at the assessment of the extent of decay

3.2.2
V^{nLD}
nominal median rating for the lower side of the lap-joints for sets of replicates at the assessment of the extent of decay

3.2.3
V^{nJD}
nominal median rating for surfaces within the joint areas of the lap-joints for sets of replicates at the assessment of the extent of decay

NOTE For symbols for the optional assessment of attack by staining fungi see Annex C.

4 Principle

Jointed specimens (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 microbiological 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 from untreated specimens to assess relative effectiveness.

5 Materials

5.1 Test specimens

5.1.1 Wood species

The reference species is Scots pine (*Pinus sylvestris* Linnaeus)

NOTE Additional tests may be carried out using other species.

5.1.2 Quality of wood

The wood shall be free from visible cracks, stain, decay, insect damage and other defects. Some knots are permitted. 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. Use wood without reaction wood or juvenile wood.

5.1.3 Provision of test specimens

The longitudinal faces shall be parallel to the direction of the grain. The annual rings shall have a contact angle of not greater than 10 ° to the broad faces of the test specimens. Make transverse cuts, neatly to give sharp edges and a fine-sawn finish to the end-grain surfaces.

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

NOTE 1 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.

Wood from at least three trees shall be used and evenly distributed among the different groups of lap-joints.

Condition in a conditioning chamber (see 6.2) 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 6.1) and planning (see Figure 1). From the lap-joints subsequently machined from a single length of timber, not more than one shall be included in each set of replicates (see 5.1.5).

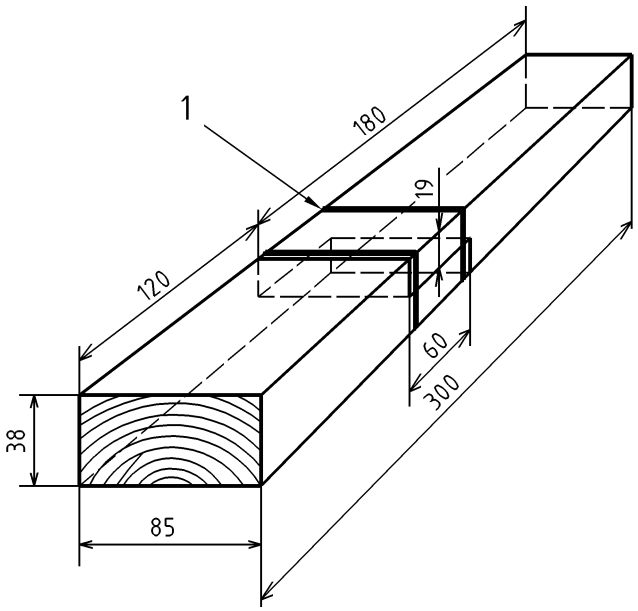
NOTE 2 A moisture meter of the two-pronged electrical conductivity type is suitable for assessing moisture content.

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 (6.2) until required for treating.

Dimensions in millimetres



Key

1 Cable strap

Figure 1 — Lap-joint

NOTE The lap-joint members are held together by two cable straps (6.7). The lap-joint is shown without the weatherproof end seal.

5.1.4 Dimensions and density of test specimens

The dimensions of each lap-joint at (12 2) % (m/m) moisture content shall be (300 2) mm (85 1) mm (38 1) mm with an overlapping close fitting part at mid-length of (60 1) mm (see Figure 1).

The wood shall have 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.

In a batch of specimens to be treated, the density of an individual is permitted to differ from the mean value of the batch by 10 %. This tolerance is increased to 20 % for the untreated specimens. The mean density of the treated specimens used for the test shall be recorded in the test report.

5.1.5 Number of lap-joints

Prepare at least 10 lap-joints for each combination of test parameters [wood species (see 5.1.1), test preservative (see clause 7), retention level or application rate (see 8.3), and untreated control (see clause 10)].

NOTE It is normally necessary to treat a higher number of lap-joints so that the required number can be selected after treatment (see 8.2) and the inclusion of "abnormal" joints avoided. Optionally extra lap-joints may be prepared for chemical analyses during exposure.

5.1.6 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 the lower side of each lap-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.

5.2 End-seal compounds

5.2.1 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 (5.2.2) may be used.

5.2.2 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.

6 Apparatus and equipment

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

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

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

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

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

6.6 Labels and fixing pins, both long-lasting, inert (see 5.2.6) and corrosion resistant with similar fixing pins.

6.7 Fixing material : 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.

Alternatively custom designed stainless steel metal clips may be used. A suitable clip design is shown in Figure 2.

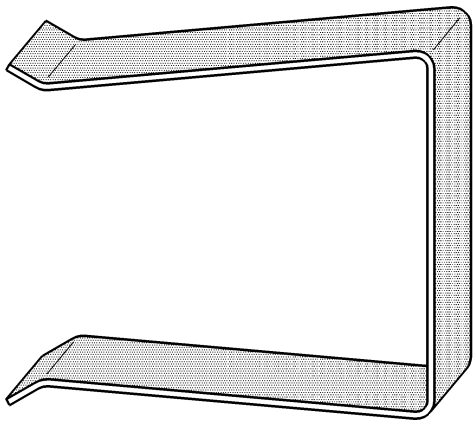
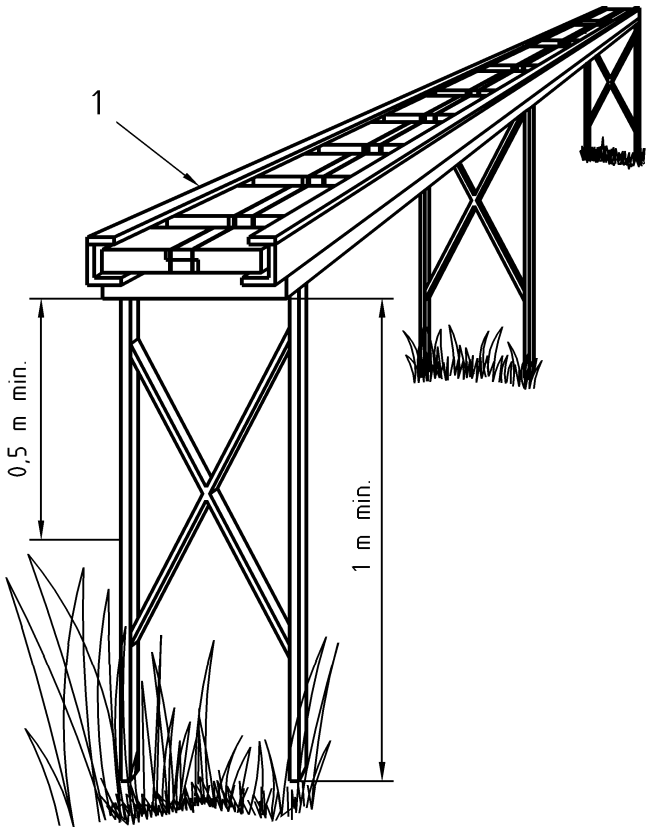


Figure 2 — Suitable clip fabricated out of stainless steel to hold lap-joint in place

NOTE Two clips are needed per test assembly.

6.8 Exposure rack, (see Figure 3) 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 3). The test specimens 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 (see Figure 4).



Key

1 Test samples

Figure 3 — Example of an exposure rack (6.8)

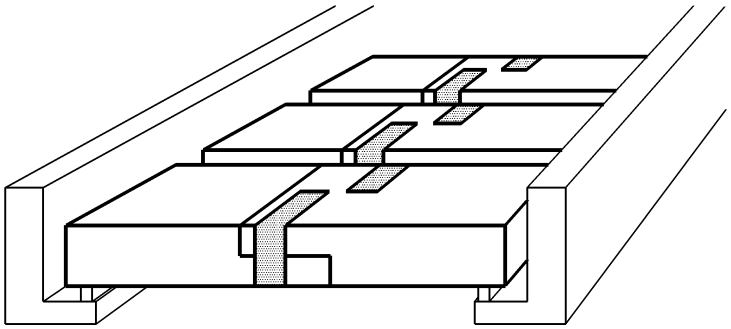


Figure 4 — Example of a suitable arrangement of lap-joints on a rack (6.8)

NOTE The samples shall be separated from each other by a minimum of 5 mm. Test samples shall also be separated from the rack with a spacer manufactured from an inert, durable material with a cross section of a minimum 5mm 5mm to a maximum 10mm 10mm.

7 Sample of preservative

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

Samples shall be stored and handled in accordance with any written requirements from the supplier including the product safety data sheet.

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

8 Test lap-joints

8.1 Initial end sealing

For each joint member, seal the end grain surface remote from the joint area twice with a preservative resistant end seal (5.3.1) ; allow to dry.

8.2 Treating process

The preservative treatment is carried out 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 When using a penetrating treatment 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 retention 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 $\sqrt{2}$. Accordingly when using a superficial treatment process it is preferable to test at more than one application rate of the active ingredients, ideally three, ranged about that thought to be appropriate for out of ground contact use.

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.

8.3 Retention of preservative

Calculate the uptake of preservative solution for each member and express the retention in kilograms of preservative product as supplied for the test per cubic metre of wood for penetrating and/or vacuum treatment processes and in grams per square metre (solid products or concentrates) or millilitres per square metre (ready to use products) 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 retention in grams per square metre (solid products or concentrates) or millilitres per square metre (ready to use products) is preferable.

Reject lap-joints where any member has a retention deviating by more than 15 % from the median and substitute an appropriate alternative (see 5.1.5) which falls within this range. For superficial application processes, report any deviation from the application rate calculated before treatment.

8.4 Post-treatment handling of the test lap-joints

8.4.1 Conditioning

The recommendations of the supplier shall be followed.

If no recommendations are given by the supplier, dry the treated lap-joint members in a well-ventilated covered area protected from rain and frost. Ensure free ventilation by storing the members horizontally on supporting rods of a material that does not react with the preservative, for example, glass for organic solvent based preservatives.

8.4.2 Final end sealing (prior to exposure)

For each joint member, seal the end grain surface remote from the joint area with the weatherproof end seal (5.3.2) and carry it over 2 mm to 3 mm onto the lateral surfaces to provide a complete seal. If necessary remove the initial sealing.

8.4.3 Labelling

Fix permanent labels (6.6) to both of the members well away from the joint area.

8.4.4 Assembling lap-joints

Prior to exposure, fix together the two joint members of each lap-joint using two cable straps or two stainless steel metal clips (6.7) (see Figure 1).

9 Untreated control lap-joints

A series of at least 10 untreated control lap-joints of *Pinus sylvestris* sapwood shall be installed at the exposure site at the start of every experiment or group of experiments. The control lap-joints shall be prepared, sealed, stored and handled in the same way as treated lap-joints before installation.

10 Exposure test site

10.1 Selection of test site

Select a test site producing use class 3 conditions conducive to decay.

10.2 Installation of the lap-joints at the test site

The total number of lap-joints used in the test shall be placed randomly on the exposure rack (6.8) with the pith face downwards. The lap-joints shall be separated from each-other by a minimum of 5 mm and shall be fixed in such a way that movement during exposure as a result of changes in moisture content is not restricted (see Figure 4).

11 Inspections

The lap-joints shall be inspected at one year intervals.

First a visual inspection shall be carried out by examining the condition of all external surfaces. Next, each lap-joint shall be taken apart and the condition of joint areas inspected. Using a blunt pointed instrument gentle probing is then carried out on all surfaces to reveal softened areas. Both the condition of the surfaces and of the joint areas are recorded using the rating scale given in 12.2.

Each lap-joint shall then be re-assembled and returned to the exposure racks from which it was removed.

NOTE 1 For more detailed information about the course of degradation it may be preferable to inspect the lap-joints at shorter intervals than one year, for instance every six months.

NOTE 2 If the lap-joint method is also used for testing the preventive efficacy of preservatives against wood staining fungi, inspections should be made at least every six months. In this case the rating scale given in Annex C should be used.

12 Assessment

The grading system shown in Table 1 shall be used to assess the extent of decay of the lap-joints. Observations shall be made separately on the upper side and the lower side of the lap-joints and on the surfaces within the joint area exposed by dismantling the joint. Three ratings, UD (upper side : decay), LD (lower side : decay) JD (joint area : decay), shall be recorded for each lap-joint. The lap-joints shall be assessed in moist condition. If the surfaces are dry at the date of assessment, they shall be moistened by gentle spraying with tap water.

Table 1 — Grading system for decay

Rating	Description	Definition
0	Sound	No evidence of decay.
1	Slight attack	Visible signs of decay, but no significant softening or weakening of the wood.
2	Moderate attack	Areas of decay (softened, weakened wood); typically not more than 3 cm^2 and to a depth of 2 to 3 mm.
2 +	Moderate attack +	Approaching 3, severe attack
3	Severe attack	Marked softening and weakening of the wood typical of fungal decay; distinctly more than 3 cm^2 affected and to a depth of 3 or 5 mm or 5 to 10 mm over a few cm^2.
3 +	Severe attack +	Approaching 4, failure
4	Failure	Very severe and extensive rot, joint member(s) often capable of being easily broken.
NOTE 1 Discoloration obviously due to the attack of wood destroying Basidiomycetes and / or soft rot fungi shall be recorded and mentioned in the test report. If recommended by the sponsor of the test discoloration due to staining fungi should be rated according to Annex C, Table C.1. NOTE 2 Due to physico-chemical lignin degradation defibration of the wood cells may occur at the upper surface of the lap-joints. Together with checks originating from differing wood moisture contents in different layers of the specimens their upper surface may be softened, especially when the lap-joints are wet. This has to be distinguished carefully from fungal decay. NOTE 3 In certain climatic areas with predominantly high relative humidity and frequent precipitation soft rot may occur in a thin layer of the upper surface, leading to softening of this layer.		

At each assessment, the three decay ratings for each test lap-joint and control lap-joint shall be reported. An example of a report table for use at the assessments is given in Annex B (see Table B.5).

Nominal median decay ratings shall be calculated for the upper sides (V^{nUD}) and the lower sides (V^{nLD}) and the joint surfaces (V^{nJD}) for each set of replicates. For each set minimum and maximum values have to be reported. Each lap-joint shall be a unit. A specimen has failed when the rating has reached 4.

NOTE 1 A set of replicates consists of at least 10 lap-joints (see 5.1.5).

NOTE 2 In addition to the grading according to Table 1, a general description of the appearance of all lap-joints of each set of replicates should be given with reference to decay type, blue stain, mould growth, change in colour, insect attack (including wasp damage), lichens, algae and defibration at the upper surfaces. The general description should also inform on the main tendencies of the test results, for instance if it was a systematic occurrence of the decay to one type of surface of the lap-joints.

13 Duration of the test

The test shall run for a minimum period of five years.

14 Validity of test

If the nominal median rating for the joint surfaces (V^{nJD}) of the untreated control replicates is less than 3.0 after five years, the test shall be continued until a minimum value of 3.0 is achieved.

NOTE 1 It is recommended that the test should continue until all untreated specimens have failed. When all lap-joints in a set of replicates have failed (clause 13) the mean service life in years of the lap-joints in a set may be calculated.

NOTE 2 Due to climatic factors the progress of decay even in the untreated control lap-joints can vary significantly not only at different latitudes but also in different areas at the same latitude.

15 Test report

The test report shall include :

a) the number of this Technical Specification and date of its publication ;

b) the specific and unique name or code of the preservative tested, with an indication of whether or not the composition has been declared ;

c) the solvent or diluent used ;

d) the wood species and the number of trees used, the density of the wood selected and the drying method used (drying schedule used or type of drying used) ;

e) the number of replicates ;

f) the concentrations tested ;

g) the method and date of treatment with the test preservative ;

h) the method and length of conditioning of the wood specimens ;

i) the individual and mean retention of test preservative in kilograms per cubic metre or grams or ml per square metre as appropriate ;

j) the method and length of drying after treatment with the test preservative and details of post treatment conditioning ;

k) the location (latitude, longitude and elevation) and detailed description of the exposure site(s) including information on temperature and rainfall (precipitation) ;

l) the date of installation of the lap-joints ;

m) the date of each inspection ;

n) the duration of the exposure period ;

o) the grading system used (stain or decay) ;

p) the individual and nominal median decay ratings for the three types of specimens surfaces V^{nUD}, V^{nLD} and V^{nJD} at each inspection. If available, the minimum and mean life for the control lap-joints. Details of the assessment ratings for each lap-joint surfaces V^{nUD}, V^{nLD} and V^{nJD} at each inspection ;

q) if the method was used for testing the efficacy of a wood preservative against staining fungi, the individual and nominal median stain ratings for four types of joint surfaces V^{nUS}, V^{nLS}, V^{nJUS} and V^{nJLS} at each inspection ;

r) the name of the organisation responsible for the report and the date of issue ;

s) the name(s) and signature(s) of the persons responsible ;

t) the date of order, the name and address of the sponsor of the test ;

u) the following :

"The interpretation and practical conclusions that can be drawn from this test report demand a specialised knowledge of the subject of wood preservation and, for this reason, this test report cannot of itself constitute an approval certificate".

v) any deviations from the Technical Specification and any special factors which may have influenced the results.

An example of a test report is given in Annex B.

Annex A
(informative)

Information on an additional test with a reference preservative and on treatment processes

A.1 Additional test with a reference preservative

A.1.1 General

In some cases, it may be appropriate to compare the performance of the preservative under test with a reference preservative.

A.1.2 Reference preservative

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

Hexabutyldistannoxane (minimum 95 % (*m/m*) of 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 is in the form known as "stabilised" using either 0,1 % (*m/m)* 2-hydroxypropanoic acid (lactic acid) or 1 % (*m/m*) mercaptoethanoic acid (thioglycollic acid). The chlorine content is less than 0,1 % (*m/m*)

NOTE In some cases it may be appropriate to compare the performance of the preservatives under test with additional reference preservatives.

A.1.3 Additional reference preservative 1

$CuSO_4 . 5H_2O$ 35 % (*m/m*)

$K_2Cr_2O_7$ 45 % (*m/m*)

$As_2O_5 . 2 H_2O$ 20 % (*m/m*)

NOTE A dry salt retention approximating to 5,3 kg/m^3, when applied by a full-cell process (A.2.7), should be suitable for out of ground contact use.

A.1.4 Additional reference preservative 2

$CuSO_4 . 5H_2O$ 50 % (*m/m*)

$K_2Cr_2O_7$ 48 % (*m/m*)

CrO_3 2 % (*m/m*)

NOTE A dry salt retention approximating to 9,0 kg/m^3, when applied by a full-cell process (A.2.7), should be suitable for out of ground contact use.

A.1.5 Tolerances of variation

Each active ingredient in the wood preservative may vary from the nominal percentage by between + 0 % (*m/m)* and + 10 % (*m/m*) relative to the nominal. The chemical purity of the individual components shall be at least 98% (*m/m*).

A.1.6 Reference lap-joints

For wood species, quality of wood, provision of reference lap-joints, dimensions and labelling of reference lap-joints the recommendations given in 5.2 should be followed.

A.1.6.1 Initial end sealing

For each joint member, the end grain surface remote from the joint area should be sealed twice with a preservative resistant end seal (5.3.1) ; allow to dry.

A.1.6.2 Treating process

At least 10 reference lap-joints (see 5.2.3) of *Pinus sylvestris* sapwood should be prepared. Determine and record the volume and mass of each of the joint members after sealing but before treatment (see 8.2). The reference preservative should be applied using either a dip treatment, brush treatment or a double vacuum process (or for additional reference preservatives, a full-cell process). The method of treatment selected should be appropriate to the preservative system under test. The process parameters should be as follows :

For preservatives intended for superficial treatment :

¾ dip process total immersion 3 min

¾ brushing (150 ± 30) g/m^2 for lateral surfaces ; double the amount for unsealed end grain surfaces

For preservatives intended for penetrating treatment :

¾ double vacuum process initial pressure 70 kPa 3 min

atmospheric pressure 3 min

final pressure 35 kPa 20 min

NOTE 1 Additional reference preservatives listed in A.1.3 and A.1.4 should be applied by a full-cell process (A.2.7).

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 the lap-joint members to drain for several minutes or wipe off with a cloth excess solution from the surface. Then reweigh each member immediately and record the mass after treatment.

For brush treatment calculate the amount of reference 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 2 This could 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.

A.1.6.3 Retention of reference preservative

Calculate the retention of preservative in accordance with 8.3.

Lap-joints where any member has a retention deviating by more than 15 % from the median should be neglected and an appropriate alternative (see 5.1.5) which falls within this range should be substituted.

A.1.6.4 Post-treatment handling of the reference lap-joints

Treated reference lap-joint members should be dried in a well-ventilated covered area protected from rain and frost until changes in mass are solely associated with changes in the relative humidity of the environment. Ensure free ventilation by storage of members horizontally on supporting rods of a material that does not react with the preservative, for example, glass for organic products.

NOTE If one of the additional reference preservatives listed in this annex is chosen, a fixation period is necessary. The lap-joint members should then first be close-stacked.

A.1.6.5 Exposure

The reference lap-joints should be exposed in the same way as the test lap-joints (see clause 10).

A.1.6.6 Inspections

The reference lap-joints should be inspected parallel to the test lap-joints (see clause 11).

A.1.6.7 Assessment and duration of test

For evaluation of the reference lap-joints an for the duration of test the procedure given in clauses 12 and 13 should be followed.

A.2 Model treatments methods

A.2.1 General

The following treatment methods are given for guidance and shall be regarded as providing model treatment parameters; the double vacuum and dip processes and brush application are those treatments used for the reference preservative (A.1.2).

NOTE The full-cell process should be a suitable method for the application of both additional reference preservatives (A.1.3 and A.1.4).

A.2.2 Brushing

A.2.3 Spraying in a spray tunnel

A.2.4 Dip process

¾ total immersion 3 min.

A.2.5 Steeping

¾ total immersion 24 h.

A.2.6 Double vacuum process

¾ initial pressure 70 kPa 3 min ;

¾ atmospheric pressure 3 min ;

¾ final pressure 35 kPa 20 min.

A.2.7 Full-cell process

¾ initial pressure 20 kPa 30 min ;

¾ pressure 1,35 MPa 60 min.

Annex B
(informative)

Example of a test report

Test of the protective effectiveness of product A 1000 as a wood preservative out of ground contact

Number of Technical Specification	:	CEN/TS 12037:2003
Test product	:	Product A 1000 ; an organic solvent joinery preservative containing 5 % *(m/m)* active ingredient X in hydrocarbon solvent distilling between (153 and 193) °C. The complete composition has been specified (confidential).
Solvent used for the test	:	None.
Concentration(s) tested	:	Preservative used undiluted; see attached analytical certificate of delivered sample of the test product.
Wood species and density	:	Scots pine sapwood from three trees ; average density 500 kg/m^3 at 12% (*m/m*) moisture content.
Drying	:	Timber stacked and dried in the open after sawing.
Number of replicates	:	10 for each combination of test parameters.
Method and length of conditioning of the wood specimens before treatment	:	The joint members were stored in a chamber at 20 °C and 65 % relative humidity for 21 days before treatment
Method and date of treatment with the test product	:	Double vacuum. 2003.05.02.
Mean retention of the test product	:	62,6 kg/m^3. See Table B.1.
Method and length of drying of the wood	:	The treated joint members were allowed to dry specimens after treatment with the test product in a well ventilated room at 20 °C for 30 days.
Exposure site	:	AB Laboratory; on the edge of open country; trees of both hardwood and softwood species not nearer than 300 m. Meteorological data attached.
Date of installation	:	2003.07.27.
Exposure periods and dates of inspection	:	1 yr 2004.06.21 2 yr 2005.06.18 3 yr 2006.07.01 4 yr 2007.06.28 5 yr 2008.06.22

Grading system used	:	See Table B.5
Ratings	:	See Tables. B.2, B.3 and B.4.
Deviation from the Technical Specification	:	None.
Tested for	:	Chemical Company A (Address)
Date of order	:	2003-01-10
Tested by	:	AB Laboratories Ltd (Address)
Test supervised by	:	Dr. A. White (Signature)
Date	:	2008.09.16

NOTE The interpretation and practical conclusions that can be drawn from this test report demand a specialised knowledge of wood preservation and, for this reason, this test report cannot of itself constitute an approval certificate.

Table B.1 — Individual and mean retention of test lap-joints

Product A	
Lap-joint N°	**Retention** kg/m^3
1	65,4
2	64,1
3	59,2
4	64,3
5	59,7
6	61,4
7	62,8
8	63,7
9	66,1
10	59,1
1 ... 10 mean	62,6
Range	59,1 ... 66,1

Table B.2 — Test lap-joints. Individual and nominal median ratings for external surfaces and joint surfaces.

Lap-joint N°	Decay ratings: Upper side surfaces (UD) Exposure period, years					Lower side surfaces (LD) Exposure period, years					Joint surfaces (JD) Exposure period, years				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1	0	0	1	1	2	0	0	0	0	0	0	0	0	0	0
2	0	0	0	0	1	0	0	1	1	1	0	0	0	1	1
3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1
4	0	0	0	0	0	0	0	1	1	1	0	0	0	1	1
5	0	0	1	2	2	0	0	0	1	1	0	0	0	1	2
6	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2
7	0	0	0	1	1	0	0	0	0	1	0	0	0	0	1
8	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
9	0	0	2	3	4	0	0	1	2	4	0	0	1	3	4
10	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
Nominal median V^{nUD}	0	0	0	1	1	V^{nLD} 0	0	0	0,5	0,5	V^{nJD} 0	0	0	0,5	1
Maximum	0	0	2	2	4	0	0	1	2	4	0	0	1	3	4
Minimum	0	0	0	0	0	0	0	0	0,5	0	0	0	0	0	0

NOTE Upper side surfaces were attacked by staining fungi within 1 year. Lichens and defibration due to UV-radiation occurred on the upper surfaces after 2 years.

Table B.3 — Untreated control lap-joints. Individual and nominal mean ratings for external surfaces and joint surfaces.

Lap-joint N°	Decay ratings: Upper side surfaces (UD) Exposure period, years						Lower side surfaces (LD) Exposure period, years						Joint surfaces (JD) Exposure period, years				
	1	2	3	4	5		1	2	3	4	5		1	2	3	4	5
1	0	0	0	0	1		0	0	0	0	1		0	0	0	1	2
2	0	0	1	1	2		0	0	1	1	2		0	0	1	2	3
3	0	0	1	2	3		0	0	1	2	3		0	0	1	2	3
4	0	0	1	1	1		0	0	1	1	1		0	0	1	2	2
5	0	0	1	1	2		0	1	1	1	3		0	0	1	2	3
6	0	0	1	1	2		0	0	1	1	2		0	0	2	2	3
7	0	1	1	1	1		1	1	1	1	1		0	0	1	1	2
8	0	0	1	2	4		0	0	1	1	4		0	1	2	3	4
9	0	0	1	2	4		0	0	1	2	4		0	0	1	3	4
10	0	0	1	1	2		0	0	1	1	2		0	0	2	2	3
Nominal median V^{nUD}	0	0	1	1	2	V^{nLD}	0	0	1	1	2	V^{nJD}	0	0	1	2	3
Maximum	0	1	1	2	4		1	1	1	2	4		0	1	2	3	4
Minimum	0	0	0	0	1		0	0	0	0	1		0	0	0	1	2

NOTE Upper side surfaces were attacked by staining fungi within half a year, lower sides within 1 year. Lichens and defibration due to UV-radiation occurred on the upper surfaces after 2 years. Decay was mainly caused by *Gloeophyllum species*.

Table B.4 — Example of an annual assessment report table.

Lap-joint	Uptake	External surfaces				Joint area			Remarks
		Upper side		Lower side		Upper member	Lower member	Whole joint	
N°	kg/m^3	stain	decay	stain	decay	stain	stain	decay	
Median $V^{n...}$ *									
Maximum									
Minimum									
* V^{nUD}, V^{nLD}, V^{nJD}, V^{nUS}, V^{nLS}, V^{nJUS}, V^{nJLS} or V^{nJD}									

Table B.5 — Decay grading system

Rating	Description	Definition
0	Sound	No evidence of decay.
1	Slight attack	Visible signs of decay, but no significant softening or weakening of the wood.
2	Moderate attack	Areas of decay (softened, weakened wood); typically not more than 3 cm^2 and to a depth of 2 to 3 mm.
2 +	Moderate attack +	Approaching 3, severe attack
3	Severe attack	Marked softening and weakening of the wood typical of fungal decay; distinctly more than 3 cm^2 affected and to a depth of 3 or 5 mm or 5 to 10 mm over a few cm^2.
3 +	Severe attack +	Approaching 4, failure
4	Failure	Very severe and extensive rot, joint member(s) often capable of being easily broken.

NOTE 1 Discoloration obviously due to the attack of wood destroying Basidiomycetes and / or soft rot fungi shall be recorded and mentioned in the test report. If recommended by the sponsor of the test discoloration due to staining fungi should be rated according to Annex C, Table C.1. Discoloration assumed to be due to physico-chemical effects should be disregarded any time.

NOTE 2 Due to physico-chemical lignin degradation defibration of the wood cells may occur at the upper surface of the lap-joints. Together with checks originating from differing wood moisture contents in different layers of the specimens their upper surface may be softened, especially when the lap-joints are wet. This has to be distinguished carefully from fungal decay.

NOTE 3 In certain climatic areas with predominantly high relative humidity and frequent precipitation soft rot may occur in a thin layer of the upper surface, leading to softening of this layer.

Annex C
(informative)
Determination of the preventive efficacy of a test preservative or components of a test preservative against staining fungi using horizontal lap-joint method

C.1 General

Additional to testing the efficacy of a wood preservative against decay fungi intended for use in wood to be exposed in international use class 3 b (see EN 335-1) the lap joint method allows to evaluate the efficacy of that preservative or components of it against staining fungi. It also allows to test wood preservatives formulated as anti-stain products only.

C.2 Definitions

C.2.1
v^{nUS}
nominal median rating for the upper side of the lap-joints for sets of replicates at the assessment of the extent of attack by staining fungi

C.2.2
v^{nLS}
nominal median rating for the lower side of the lap-joints for sets of replicates at the assessment of the extent of attack by staining fungi

C.2.3
v^{nJUS}
nominal median rating for surfaces within the joint areas of the upper member of the lap-joints for sets of replicates at the assessment of the extent of attack by staining fungi

C.2.4
v^{nJLS}
nominal median rating for surfaces within the joint areas of the lower member of the lap-joints for sets of replicates at the assessment of the extent of attack by staining fungi

C.3 Assessment

The grading system shown in Table C.1 should be used to assess the extent of staining of the lap-joints. Observations shall be made separately on the upper side and the lower side of the lap-joints and on the surfaces of the upper member and the lower member within the joint area exposed by dismantling the joint. Four ratings, US (upper side : staining), BS (lower side: staining), JUS (joint area : staining of upper member), JLS (joint area : staining of lower member), shall be recorded for each lap-joint.

Table C.1 — Grading system for staining

Form	Colour		
	Light	Medium	Dark
Individual spots	1	1	2
Groups of spots/streaks and/or patches of continuous staining	1	2	3
Entire surface area	2	3	3
NOTE 1 Discoloration assumed to be due to physico-chemical effects should be disregarded.			
NOTE 2 Discoloration obviously due to the attack of wood destroying Basidiomycetes and / or soft rot fungi should be distinguished, recorded and mentioned in the test report.			

At each assessment, the four staining ratings for each test lap-joint, reference lap-joint and control lap-joint should be reported. An example of a report table for use at the assessments is given in Annex B.

Nominal median staining ratings should be calculated for the upper sides (V^{nUS}) and the lower sides (V^{nLS}) and the joint surfaces (V^{nJUS} and V^{nJLS}) for each set of replicates. For each set minimum and maximum values should be reported and standard deviation calculated. Each lap-joint should be a unit.

NOTE 1 A set of replicates consists of at least 10 lap-joints (see 5.1.5).

NOTE 2 In addition to the grading according to Table 1, a general description of the appearance of all lap-joints of each set of replicates should be given with reference to decay type, blue stain, mould growth, change in colour, insect attack (including wasp damage), lichens, algae and defibration at the upper surfaces. The general description should also inform on the main tendencies of the test results, for instance if it was a systematic occurrence of discoloration to one type of surface of the lap-joints.

Annex D
(informative)

Test field site

The field site needs to satisfy two critical criteria. The first is that the joints be subjected to sunlight and rainfall to fully stress the preservative. The second is that the micro-climate is conducive to decay. These criteria can be mutually exclusive and so care and experience is needed in selecting the site. A sheltered site with some shade and protected from drying winds is ideal. Natural vegetation rather than artificial surfaces should be selected, to avoid reflected and radiated heat. An ideal micro-climate should give decay rating in the untreated joints of 3 around five years after exposure.

Bibliography

[1] EN 335-1, *Durability of wood and wood-based products Definition of hazard classes of biological attack Part 1 : General*

[2] EN 599-1, *Durability of wood and wood-based products Performance of preventive wood preservatives as determined by biological tests - Part 1 :Specification according to hazard class.*

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