WOOD PRESERVATION IN EUROPE : DEVELOPMENT OF STANDARDS FOR PRESERVATIVES AND TREATED WOOD.

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SUMMARY

The development of common Standards in Europe for wood preservatives and treated wood has been accelerated dramatically in the last 3 years in response to the demands of European Directives for technical specifications needed to define fitness for free trade within the Single European market, due to come into effect on 31 December 1992. European Technical Committee CEN/TC38 has currently 11 Working Groups developing 21 new Standards to complement the 16 others already in place. The most critical Standards for wood preservatives and treated wood are respectively prEN599 (Effectiveness of preservatives) and prEN351 (Preservative-treated wood). Performance requirements will be defined in relation to 5 Hazard Classes which are described on the basis of the normally prevailing moisture relations and the biological agencies occurring in service. Demonstration of compliance will make use of the CE mark which is the manufacturer's assurance of compliance with the relevant requirements. Wood preservative products not applied as conventional fluid systems are not currently covered by the CEN

Standards and will need to be certified as fit for purpose by a different process, the most prominent of which is likely to be the European Technical Approval.

1 INTRODUCTION

The process of developing harmonised Standards for wood preservation across Europe is not new and the earliest common Standard was EN20 first adopted early in the 1970's, which defined a method of test for determining the preventive efficacy of preservatives against Lyctus powder post beetle. By the end of 1990 some 16 common Standards had been published relating to wood preservation (Table 1). The procedure for coming together to negotiate common Standards has been based on the European Standardisation Organisation (CEN) which embraced from an early stage, non-European Community countries including those constituting the separate affiliation of EFTA (European Free Trade Association). The whole process of developing common European Standards has now become much more important and also much more urgent because of the imminence of the so-called 'Single European Market'. This will create a free trade area of some 340 million consumers and is due to come into effect on 31 December 1992.

The creation by the European Community (EC) of a single open trading market in Europe has been an ideal and an objective since the original Treaty of Rome in 1957. Many procedural and technical obstacles

prevented the realisation of the objective until the Single European Act came into force on 1 July 1987. This is the Agreement under which all member States have agreed to enact on an individual national basis, the legislation required to create the single market by 31 December 1992. The Act specifies a timetable for the drafting, adoption and incorporation into national legislation of a series of nearly 300 European Directives, the legal instruments by which the EC lays down its common requirements.

The most important Directive so far as wood preservation interests are concerned is the Construction Products Directive (CPD). National legislation had to be in place to give effect to the Directive by 27 June 1991 and the UK was one of the first member States to comply by implementing the Construction Products Regulations which came into force on 27 December 1991.. In simple terms the Directive lays down six essential requirements for a construction and requires that products which enable the construction to satisfy the relevant essential requirements be deemed fit to trade and be allowed onto the market in all member States without regulatory or technical barriers and without having to undergo further testing or re-certification to meet national or local requirements.

The essential requirements are :

- mechanical resistance and stability
- safety in case of fire
- hygiene, health and the environment
- safety in use

- protection against noise
- energy econony and heat retention

In principle, products will be deemed to satisfy the individual essential requirements if they conform to 'approved technical specifications'. In the main 'approved technical specifications' will be Harmonised European Standards but where these do not exist, two alternative procedures can apply, the European Technical Approval (issued by an appropriately designated body) and Non-Harmonised Technical Specifications recognised by the EC.

In the case of wood preservatives and treated wood, the European Commission has given a mandate to the CEN to prepare technical specifications in the form of European Standards. Accordingly the scope of the CEN Technical Committee responsible for developing biological methods of test was extended in 1988 to cover work on the durability of wood and wood products (TC38)and it was re-organised into a series of Working Groups.

It has to be noted that the mandate to CEN/TC38 concentrates on matters which relate only to essential requirement 1 covering mechanical resistance and stability. Wood preservatives can impact also on essential requirement 3 (ER3) which requires that the works are built in such a way that they will not adversely affect hygiene, health and the environment, in particular by giving off toxic gases or releasing dangerous particles or gases into the air. Details of how compliance can be achieved and demonstrated has yet to be clarified. The Standing

Committee issues 'Interpretative Documents' on all the essential requirements but that for ER3 only explains the requirement itself in greater detail. Until such time as guidance is issued on how wood preservatives and treated wood can comply with essential requirement 3, there is concern that this aspect of performance could become a serious obstacle to the implementation of free trade in practice.

2 CEN TECHNICAL COMMITTEE CEN/TC38

2.1 Programme

The Committee is organised into a series of Working Groups each with a specific task. However in principle the programme can be considered as having two main objectives :

- to draft performance Standards defining the minimum levels of effectiveness necessary for satisfactory performance of preservatives and treated wood in service, and
- to draft the methods of test required to define compliance with the preservative performance Standards.

A list of the present Working Groups is given in Table 2 and the Schedule of new methods being developed is given in Table 3.

The most technically complex tasks are those delegated to Working Groups 1 to 4 where the performance Standards are being drafted. Difficulties arise here not only because of the technical complexities of the subject but also because of the sometimes very different historical traditions, practices and philosophies which have become established in the different member States.

2.2 Performance Standards

2.2.1 Working Group 1 (WG1) has the task of defining the risks of biological attack against which wood and wood products must be resistant or preservatives must be effective. It has addressed this by adopting the principle of defining so-called Hazard Classes (Table 4) which can then be used to classify any given service situation. The Hazard Classes are defined in terms of a combination of the normally expected regime of moisture conditions and the biological agencies likely to be encountered under such conditions. Five Classes have been adopted, two to cover protected situations (chiefly interiors), one to cover exterior protected situations and two to cover ground and water contact including the sea. The scheme recognises that whilst classes of moisture are comparatively easy to specify and will have relevance throughout the whole of the European area, some biological agencies are peculiar not only to particular moisture conditions but also to particular geographical or climatic regions. The draft Standards from WG1 were issued for public comment during 1991 as prEN 335 Pts 1 and 2, and Part 3 dealing with wood-based panels will be issued early in 1992.

2.2.2 Working Group 2 (WG2) has the task of addressing the natural durability of wood and wood-based products and defining levels of durability which are adequate without enhancement and, by difference, defining which species or types of wood require preservative treatment in order to give satisfactory performance in particular Hazard Classes. WG2 has prepared a scheme for defining classes of natural durability with general guidelines on methods of test for classifying resistance against the relevant biological agencies. It has completed a listing of the essential durability characteristics of the timber species currently anticipated as being likely to be important commercially and it is at an advanced stage in defining the minimum levels of durability required for each Hazard Class. Draft standards were issued for public comment during 1991 as prEN 335 Pts 1 and 2, and prEN 460.

2.2.3 Working Group 3 (WG3) is charged with drafting specifications for preservative treated wood. The approach adopted is not one of defining treatment requirements by commodities, as this is expected and intended to be a matter for individual specifiers under the principles of the Construction Products Directive. The approach has been to define penetration classes (Table 5) and retention requirements based on the minimum effective levels of preservatives derived from the performance Standards for preservatives being drafted by Working Group 4 (Table 6). Thus WG3 is drafting results-type specifications to which commodity specifiers can refer to prescribe treatments for particular

commodities in particular Hazard Classes. The Standards will also define the basis for sampling treated wood and for the labelling requirements which will describe clearly the suitability of the treatment for a given Hazard Class or Classes together with the specific pests against which the treatment is claimed to be effective (Table 7). The draft Standards have been under public scrutiny during 1991 as prEN 351 Pts 1 and 2.

2.2.4 Working Group 4 (WG4) is developing the performance Standards for wood preservatives themselves. At present the draft Standards only relate to preservatives applied as fluids. Other types of product are expected to rely on European Technical Approvals unless and until performance Standards are defined specifically for them. In order for a preservative to be claimed as suitable for use in any given Hazard Class, the present approach for fluid-type products is to define the minimum testing requirements and the performance levels necessary in test against the relevant biological agencies. It is also the responsibility of WG4 to define the requirements for resistance to the principal climatic/environmental stresses that may affect the adequacy of the preservative in service. WG4 therefore has the extremely complex task of rationalising into an unambiguous specification,(i) the various methods of applying preservative fluids, (ii) the minimum number of tests against the minimum number of specific insect and fungal pests, (iii) the appropriate minimum level of preconditioning (for example resistance to a level of leaching and evaporative ageing relevant to each Hazard Class), and (iv) a basis for deriving from the results of

biological laboratory and field tests, a specific quantitative value which can be incorporated with confidence into treatment specifications of WG3 to provide a minimum target retention suitable for service conditions.

Examples of the way the specification of requirements are being framed are given in Tables 8 and 9 for Hazard Classes 1 and 4 respectively. From these it can be seen that there are to be minimum test requirements in each case, with additional efficacy options against insects or other fungal pests, depending upon the requirements defined by the specifier. These options are part of the reason for the inevitable complexity of the scheme but at this stage it is considered that this approach is essential if over-specification of pesticides is to be avoided. It cannot be acceptable, for example, to require all products to have specific insecticidal effectiveness (especially against termites) where no such risks exist. Equally it cannot be acceptable to require the same quantity of fungicide or levels of effectiveness as might be needed in a high hazard class (eg HC4 and 5) as for a lower risk class (such as HC2 or 3). Similarly it is not acceptable to require a possibly higher concentration of fungicides or additional ones to control disfiguring blue stain fungi, where either there is no risk or where disfigurement is not important.

The Standard will also specify the information to be required in the labelling of preservatives so that they can clearly display the Hazard Classes for which they are suitable, the specific pests against which they claim effectiveness, any limitations specific to particular timber

species and the minimum application amounts (Table 10). The draft Standard is expected to be issued for public comment as prEN 599 Pts 1 and 2 in the second half of 1992.

2.3 Methods of Test

2.3.1 New requirements : Drafting of the performance Standards has revealed where amendments are required in existing Standardised methodologies as well as where new methods of test are required for particular combinations of biological pest, method of applying the preservative fluid and Hazard Class. It has also become clear that if predictions of likely performance in service are to be sufficiently reliable, it is essential that either greater reliance is placed on results from long-term field tests or a wider range of more relevant pre-conditioning tests is required.

Working Groups 5 to 11 are all concerned with specific biological and chemical pre-conditioning methods of test (Tables 2 and 3). Some of these relate to methods being considered long before the new needs under the CPD became priority. In fact WG6 is specifically concerned with improvements in the laboratory method for testing eradicant fluids against House Longhorn Beetle and as such is not of relevance to the CPD.

2.3.2 Working Group 5: This Group was constituted to examine the options and technical requirements for a field method of test for

preservatives applied to wood which is to be exposed above ground in situations defined in Hazard Class 3. A number of different viewpoints and philosophies exist among the member states but eventually it was accepted that the so-called L-joint method (Figure 1) should form the basis for the immediate priority. However differences in views led to its scope being limited to preservatives intended for timber components which are to be protected by paint or some other, similar physical coating. The draft Standard has been published for public comment as prEN 330 but final adoption will depend on the outcome of the vote due to be announced at the end of 1991. Further approaches to 'out of ground testing' will be the subject of continuing debate within TC38.

2.3.3 Working Group 6: As indicated above, this Working Group is preparing a revised and improved method of test for fluids applied to eradicate House Longhorn Beetle. The existing method (EN22) has limitations in requiring large test blocks which are increasingly expensive and difficult to prepare because of the Cross-sectional depth of sapwood specified. More importantly results have sometimes proved more variable and less inconsistent than originally expected. The new method intends to use smaller, 2-part blocks with larvae inserted more precisely into pre-machined slots at consistent depths from the surface which receives the treatment (Figure 2). The method is still the subject of proving trials and is not expected to be published until later in 1992.

2.3.4 Working Group 7: This Working Group is concerned with developing a common method of test for establishing the inherent resistance of

plywoods to fungal decay. It has a programme of co-operative tests in which different ways of exposing the test pieces to the fungi are being compared together with different criteria for monitoring quantitatively the extent of decay. The alternative exposure systems involve fungal cultures established in either a sterile soil or a 'vermiculite'-type medium and mass loss is being compared with 'screw-withdrawl' as criteria for quantifying resistance to attack. Among many important test parameters under consideration are issues of residual fungitoxic volatiles from the adhesives, control of the moisture content of the test samples, sealing of sample edges and strains of test fungi. A draft for public comment is not expected until well into 1992.

2.3.5 Working Group 8: WG8 has responsibility for developing an agreed method of test for effectiveness against softrot-inducing microfungi. Fundamentally different techniques have evolved among different member States in Europe, though there is common acceptance of the nature of the organisms against which the tests must be conducted. Differences as to whether to create the challenge by mixing pure cultures of specific fungi (Figure 3) or to use natural populations from an aggressive soil medium (Figure 4) have been largely reconciled by defining a combination of both techniques to provide a potentially even more robust test than either approach on its own. This experimental methodology provides the means for deriving both the 'toxic values' for the test preservative from the first test and, from the second test, graphs of the rates of decay (Figure 5) from which more information about the likely longer term performance of the preservative can be deduced. A draft experimental Standard (ENV) is expected to be

available by the end of 1991.

2.3.6 Working Group 9: The long-established European Standard test for basidiomycete decay fungi (EN113) involves exposing to the test fungi, wood blocks which have been fully vacuum impregnated with the test preservative. This methodology presents difficulties of interpretation when it is used to derive the amounts of a preservative required for surface application processes. Accordingly WG9 has been charged with drafting a preventive method of test against decay fungi for surface applied preservatives. This is yet another field of methodology where different philosophies exist and the WG has been finding it difficult to secure an acceptable common approach.

The technique likely to form the basis of an experimental Standard early in 1992 is based on wood samples large enough to represent the sizes normally subject to treatment in practice, so that the fluid under test can be applied by a realistic application process. The treated samples will then be exposed to colonisation by individual representative decay fungi from one treated face. After a suitable exposure period or after increasing intervals of time, samples will be assessed for the ability of the fungus to breach the treated layer by cross-cutting and examining for the presence of the fungus inside the sample. This will be by visual observation but will include an optional procedure developed at BRE of introducing removable baits (Figure 6) which can be placed onto a basidiomycete-selective growth medium to give a rapid, presence or absence indication of success or failure of the treatment. The methodology will allow the performance of different

preservatives to be assessed in relation to their method of application, in terms of the duration of the period of protection before the treated zone was breached by the fungus.

2.3.7 Working Group 10: This Working Group is concerned with drawing up amendments to existing methodology for testing with Lyctus powder post beetle in order to extend the range of options for applying the preservative in test. The previously published method (EN20) did not allow for full impregnation of the test blocks so now the Standard has been drafted in 2 parts to provide for both surface application (Part 1) and impregnation treatment (Part 2). The Group has also just completed drafting a new curative test for products intended for the eradication of an infestation of Lyctus (EN273).

2.3.8 Working Group 11: The tendency for preservatives to be lost from treated wood by water-leaching or evaporative ageing has great significance for their longer term effectiveness. These factors also impact on aspects of safety in use. Existing European Standard test methods EN73 (evaporative ageing) and EN84 (leaching) provide pre-conditioning procedures for test blocks intended for subsequent biological tests. They do not provide specifically for determination of quantitative losses of the preservative itself. WG11 has been charged with drafting methods which will allow such determinations. Initial drafts have been issued for Committee scrutiny and the public comment stage is expected to follow in mid-1992.

3 COMPLIANCE WITH PERFORMANCE STANDARDS

The way products which conform to the essential requirements of the CPD are expected to be identified and distinguishable, is by carrying the CE mark of conformity. The status of the CE mark is still under discussion but at present it is not mandatory under the CPD. However it can be expected to be the symbol by which specifiers will feel assured their needs have been appropriately met or that their clients interests have been properly protected. Products which carry the CE mark will be deemed fit for their purpose and may not be prevented from having access to the market in any member State for technical reasons. It follows of course, that these provisions apply not only to products traded between member States of the EC but also to products from any country outside the EC wishing to trade into it.

The principle of the CE mark is that it is the manufacturers or producer's statement of his assertion that the product conforms to the relevant essential requirements. It is open to challenge in the courts and falsification is an offence.

Until such time as all the relevant ENs and any other necessary 'approved technical specifications' are in place, existing European national Standards will be deemed to satisfy the essential requirements of the CPD but only within those member States to which the national Standard applies. Thus of course there can be no open market in wood preservatives and treated wood until either all the new ENs are in

place or until the European Technical Approvals option is available.

The CPD specifies 4 routes to demonstrate compliance (or attestation of conformity in EC language) with the relevant technical specification:

- certification by an approved body

- the manufacturer's declaration of conformity plus certification of the production process by an approved body

- the manufacturer's declaration of conformity plus initial type testing by an approved body plus manufacturers production control

- the manufacturer's declaration of conformity plus initial type testing by the manufacturer plus manufacturer's production control

Decisions on the most appropriate route for any given products will be made by reference to the Standing Committee, the highest technical body administering the CPD. It is expected that this will take into account the significance of the product for the particular essential requirement and the complexities of the factory production processes and quality control procedures. The four main criteria which will be considered are:

1) Is the part played by the product with respect to at least one of

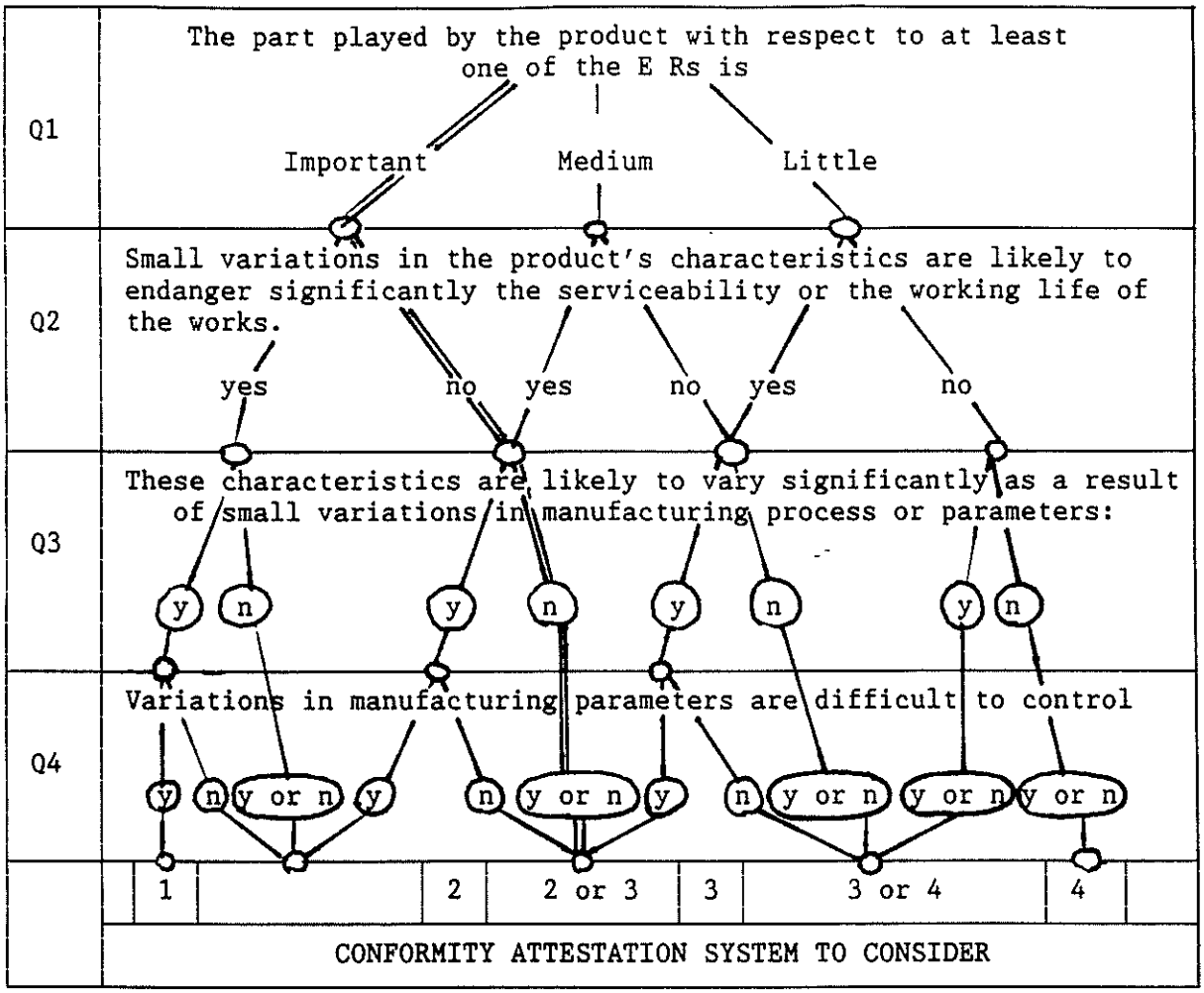
the essential requirements of great, medium or little importance?

2) Are small variations in the characteristics or properties of the product likely to endanger significantly the serviceability and the working life of the work?

3) Are these characteristics or properties likely to vary significantly as a result of small variations in the manufacturing process and in manufacturing parameters?

4) Are such variations in manufacturing parameters difficult to control?

These critical questions can be used to construct a decision tree as follows:



The decision tree thus gives an indication of the likely acceptable route to attestation of conformity for a product. In the case of wood preservatives and treated wood the most appropriate routes would appear to be 2 and 3 if it is assumed that the 4 questions are answered :

1) Influence on essential requirements = important

2) Small variations in product affect performance = No

3) Small variations in process affect product = No

4) Manufacturing process difficult to control = No

However this conclusion will be subject to a decision of the Standing Committee.

4 CONCLUSIONS

The pace of Standardisation in Europe has increased dramatically during 1990 and 1991 in preparation for the opening of the Single European Market on 31 December 1992. The single most important piece of European technical legislation driving the current activity is the Construction Products Directive which, among other things lays down Essential Requirements which have to be met by construction works. The importance of these for wood and wood-based products lies in the fact that such materials will be required to demonstrate that they can enable the works to comply with the essential requirements and are therefore fit to be traded for their stated purpose. European Standard methods of test and performance Standards are to play a critical part in this process and therefore have assumed much greater importance, not just for European companies affected by the single market agreement but for all companies world-wide wishing to trade into Europe. The purpose of this presentation has been to try and make the process of European Standardisation in wood preservatives and prreservative-treated wood more transparent so that it can be used effectively as an aid to free trade and not be seen as an obstacle.

Table 1 European Standard methods of test for wood preservatives (at 1 November 1991)

European Standard No.	Title	British Standard No.
20-1	Wood preservatives-Determination of the protective effectiveness against Lyctus brunneus (Stephens) - Part 1 : Application by Surface treatment (Laboratory method)	BS.5217 : 1975
20-2	Wood preservatives-Determination of the Protective effectiveness against Lyctus brunneus (Stephens) - Part 2: Application by impregnation (Laboratory method)	-
21	Wood preservatives-Determination of the toxic values against Anobium punctatum (De Geer) by lrvoal transfer (Laboratory method)	BS 5218 : 1989
22	Wood preservatives-Determination of eradicative action against Hylotrupes bajulus (Linnaeus) larvae (Laboratory method)	BS 5219 : 1975
46	Wood preservatives-Determination of the preventive action against recently hatched larvae of Hylotrupes bajulus (Linnaeus) (Laboratory method)	BS. 5434 : 1989
47	Wood preservatives-Determination of the toxic values against Hylotrupes bajulus (Linnaeus) Larvae (Laboratory method)	BS.5435 : 1989
48	Wood preservatives-Determination of the eradicant action against Larvae of Anobium punctatum (De Geer) (Laboratory method)	BS.5436 : 1989
49-1	Wood preservatives-Determination of the protective effectiveness against Anobium punctatum (De Geer) by egg-laying and larval survivals. Part 1 : Application by surface treatment	BS.5437 : 1977
49-2	Wood preservatives-Determination of the protective effectiveness against Anobium punctatum (De Geer) by egg-laying and larval survival (Laboratory method). Part 2 : Application by impregnation	

Table 1 (cont.)

European Standard No.	Title	British Standard No.
73	Wood preservatives-Accelerated ageing tests of treated wood prior to biological testing- Evaporative ageing procedure	BS.5761:Pt1.1989
84	Wood preservatives. Accelerated ageing of treated wood prior to biological testing. Leaching procedure.	BS.5761:Pt.1989
113	Wood preservatives-Determination of toxic values of wood preservatives against wood destroying Basidiomycetes cultured on an agar medium	BS.6009 : 1982
117	Wood preservatives-Determination of toxic values against Reticulitermes santonensis de Feytaud (Laboratory method)	BS.6239 : 1990
118	Wood preservatives-Determination of preventive action against Reticulitermes santonensis de Feytaud (Laboratory method)	BS.6240 : 1990
152-1	Test methods for wood preservatives-Laboratory method for determining the preventive effectivenss of a preservative treatment against blue stain in service - Part 1 : Brushing procedure	BS.7066:Pt1:1990
152-2	Test methods for wood preservatives-Laboratory method for determining the protective effectiveness of a preservative treatment against blue stain in service ... Part 2 : Application by methods other than brushing	BS.7066:Pt2:1990
212	Wood preservatives. Guide to sampling and preparation of wood preservatives and treated timber for analysis	BS.5666:Pt1:1987
252	Field test method for determining the relative protective effectiveness of a wood preservative in ground contact	BS.7282 : 1990

Table 2. Working Groups of CEN Technical Committee TC38

Committee Reference	Title	Date Formed	Convenor
CEN/TC 38	Durability of wood and wood-based products	1962	Mr G Ozanne
CEN/TC 38/WG1	Hazard classes	April 1988	Mr A Demange (France)
CEN/TC 38/WG2	Natural durability	April 1988	Prof. H Willeitner (Germany)
CEN/TC 38/WG3	Performance of treated wood	April 1988	Mr J Jermer (Sweden)
CEN/TC 38/WG4	Performances of preservatives (tests)	April 1988	Dr A F Bravery (United Kingdom)
CEN/TC 38/WG4 Sub-group DISBANDED-HELSINKI 1991	Mild leaching	Feb 1990	Mme Serment (France)
CEN/TC 38/WG5	Field testing out of soil contact	April 1988	Dr J K Carey (United Kingdom)
CEN/TC 38/WG6	Hylotrupes	Oct 1988	Dr Graf (Switzerland)
CEN/TC 38/WG7	Particle board and plywood	Oct 1988	Mrs Kerner (Germany)
CEN/TC 38/WG8	Soft rot	Oct 1988	Mrs Kerner (Germany)
CEN/TC 38/WG9	Preventive efficacy	Oct 1988	Mme D Dirol (France)
CEN/TC 38/WG10	Lyctus	Oct 1988	Mme Serment (France)
CEN/TC 38/WG11	Permanence of biocides in timber	Feb 1988	Dr C R Coggins (United Kingdom)
[CEN/TC 38/CG]	Correspondence Group - Environment and toxicity	Oct 1988	Dr C R Coggins (United Kingdom)

Table 3 Draft European Standard methods of test for wood preservatives and new methods under development (at 1 November 1991)

Provisional No.	Title
prEN 273	Wood preservatives. Determination of the curative action against Lyctus brunneus (Stephens) (Laboratory method)
prEN 275	Test method for determining the protective effectiveness of a preservative against marine borers
prEN 330	Wood preservatives-Field test for determining the relative protective effectiveness of a wood preservative for use under a coating and exposed out of ground contact L-joint method
prEN 335-1	Definition of hazard classes of biological attack - Part 1 : General
prEN 335-2	Definition of hazard classes of biological attack - Part 2 : Solid Wood
prEN 335-3	Definition of hazard classes of biological attack - Part 3 : Wood-based panels
prEN 350-1	Natural durability of wood - Part 1: Principles of testing and classification of the natural durability of wood
prEN 350-2	Natural durability of wood - Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe
prEN 351-1	Preservatives-treated solid wood - Part 1 : Classification of preservative penetration and retention
prEN 351-2	Preservative-treated solid wood - Part 2 : Guidance on sampling for the analysis of preservative-treated wood
prEN 460	Natural durability of wood - Durability classes and hazard classes
prEN599-1	Performance of wood preservatives as determined by biological tests - Part 1. Specification according to hazard classes
prEN599-2	Performance of wood preservatives as determined by biological tests - Part 2. Classification and labelling
prENV	Test for determining the toxic efficacy against soft rotting microfungi and soil inhabiting micro-organisms

prENV	Method of test for determining the relative effectiveness of wood preservatives applied by surface processes
-	Wood-based panels : Resistance to fungal attack
-	Accelerated ageing by simplified leaching
-	Performance of biocides in timber - Part 1. Fixation method in water
-	Performance of biocides in timber - Part 2. Fixation method in air

Table 4 - Hazard class system and occurrence of biological agencies

Hazard classes	General service situations	Description of exposure to wetting in service	Occurrence of biological agencies				Material	
			Fungi	Beetles	Termites	Marine Borers	Solid	Wood-based
1	- Above ground - Covered (dry)	None	-	U[1])	L	-	See EN 335 Part 2	See EN 335 Part 2
2	- Above ground - Covered (risk of wetting	Occasionally	U	U	L	-		
3	- Above ground - Not covered	Frequently	U	U	L	-		
4	In contact	Permanently	U	U	L	-		
5	In salt water	Permanently	U	U	L	U		

U = The agent exists universally throughout the European area.
L = The agent is locally present throughout the European area.

[1]) The risk of attack may be insignificant according to specific service conditions

Table 5. Penetration classes for treated wood with corresponding analytical zones

Penetration class	Penetration requirement	Analytical zone
P1	None	3 mm from lateral faces
P2	Min 3 mm lateral and 40 mm axial of sapwood	3 mm lateral of sapwood
P3	Min 6 mm lateral of sapwood	6 mm lateral of sapwood
P4	Min 6 mm lateral and 50 mm axial of sapwood	6 mm lateral of sapwood
P5	Min 12 mm lateral of sapwood	12 mm lateral of sapwood
P6	For roundwood only. Min 20 mm of sapwood	20 mm of sapwood
P7	Full sapwood	Sapwood
P8	Full sapwood and min 6 mm of exposed heartwood, if the durability of the heartwood is classified in durability classes 3, 4 or 5.	Sapwood and 6 mm of exposed heartwood.

Table 6. Retention classes and minimum wood preservative retention requirements

Retention class	Minimum retention requirement in the analytical zone
R1	Critical value for hazard class 1
R2	Critical value for hazard class 2
R3	Critical value for hazard class 3
R4	Critical value for hazard class 4
R5	Critical value for hazard class 5

Table 7. Example of marking system for treated wood products

CE

Preservative-treated wood according to EN 351-1

Charge No/year:	641/91
Certification body	TI
Preservative:	Wood-Care T28
Penetration class:	P7
Retention class:	R4

Additional wood preservative efficacy:

☐	A	Anobium punctatum
☐	H	Hylotrupes bajulus
☐	L	Lyctus
☒	I	All beetle species
☒	T	Termites
☐	B	Blue stain
☐	M	Mould
☐	C	Coriolus versicolor
☒	F	Field efficacy

Wood-Pres Ltd

Box 8, Pinetown, Woodland

Table 8. Example of the format proposed in pr EN599 for defining the minimum performance criteria in biological test for preservatives intended for Hazard Class 1 (as at 1 November 1991).

Hazard Class Mark	Proposed type of Commercial application	Requirements	Minimum beetle sp tests (1)				Additional/local tests (2)	
			either			or		
			Hylotrupes bajulus (H)	*Anobium punctatum* (A)	*Lyctus brunneus* (L)	for all beetle sp (I)	Termites (T)	Beetle sp (H), (A), (L) or (I)
1	Superficial (4) application	Test type	EN 46	EN 49 (Part 2)	EN 20 (Part 1)	EN 46 or (A) or (L) see (1c)	EN 118	(H), (A), (L) or (I) as required
		Ageing	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)
		Maximum application limit in test (m.a.I)	200 g/m² (dip or pipette)	200 g/m² (dip or pipette)	200 g/m² (dip or pipette)	200 g/m² (dip or pipette)	200 g/m² (13.1) (dip or pipette)	100 g/m² (13.2) (dip or pipette)
		Criterion for Biological reference value (b.r.v.)	100% mortality at end of test	no live larvae at end of test	no live larvae/emerged beetles at end of test	100% mortality at end of test	no damage of rating >2; only one sample = 2	as per requirement for test in (H), (A), (L) or (I)
	Penetrating (5) process	Test type	EN 47	EN 49 (Part 1)	EN 20 (Part 2) (7)	EN 47 or (A) or (L) see (1c)	EN 117	—
		Ageing	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	after EN 73 only (11)	
		Maximum application limit in test (m.a.I.)	(14) m.r.I for E.redwood sapwood	(14) m.r.I for E.redwood sapwood	(14) m.r.I for E.redwood sapwood	(14) m.r.I for E.redwood sapwood	(14) m.r.I for E.redwood sapwood	—
		Criterion for Biological reference value (b.r.v.)	100% mortality (u.t.v.)	no live larvae at end of test (u.t.v.)	no live larvae/emerged beetles at end of test (u.t.v.)	100% mortality (u.t.v.)	no damage of rating >2; only one sample + 2	—
	Both	as for superficial application (6)						

Table 9. Examples of the format proposed in pr EN599 for defining the minimum performance criteria in biological test for preservatives intended for Hazard Class 4 (as at 1 November 1991).

Hazard Class Mark	Proposed type of Commercial application		Minimum Fungal/Field tests			Additional/local tests (2)				
		Requirements	Basidiomycetes	Soft rot	Field tests (3)	Field tests (F)	Mould (M)	Blue stain (B)	(1) Beetle sp tests	Termites (T)
4	(12) Superficial application	Test type	Spray, brush or brief dip not acceptable for Hazard Class 4 (12)							
		Ageing								
		Maximum application limit in test (m.a.l.)								
		Criterion for biological reference value (b.r.v.)								
	(5) Penetrating process	Test type	EN 113 (in *C versicolor* in beech and/or pine (17)	pr EN XXX (10.2)	EN 252 (3.2)	EN 252 (3.2)	✓ (10.1)	If required add Class 2	If required (9) add Class 1 + EN 84	If required (9) add Class 1 + EN 84
		Ageing	EN 73 and EN 84 separately	(10.2)	min 5 years exposure	min 5 years exposure	✓			
		Maximum application limit in test (m.a.l.)	(14) m.r.l. for E. redwood sapwood	(10.2)	up to × 3 as per Standard	up to × 3 as per Standard	✓			
		Criterion for biological reference value (b.r.v.)	(16) m.t.v. most tolerant fungus (inc × *C versicolor*) (17)	(10.2)	after 5 years mean of unrP/0.6 and lnrP/0.14 (19)	after 5 years mean of unrP/0.6 and lnrP/0.14 (19)	✓			

Table 10. Symbols proposed in pr EN599 for classifying and labelling the efficacy of wood preservative products (as at 1 November 1991).

	MARKING CATEGORIES	SYMBOLS				
1	Hazard class efficacy	1	2	3	4	5
2	Application marks					
	● Method — superficial only	⌐¬	⌐¬	⌐¬	—	—
	● m.a.l. — 200 g/m³	200	200	200	200	200
	— 100 g/m³	100	100	100	100	100
	— penetrating only	▽	▽	▽	▽	▽
	— both	▽	▽	▽	—	—
	● Coating necessary	—	—		—	—
	● Timber — hardwood only	🌳	🌳	🌳	🌳	🌳
	— softwood only	🌲	🌲	🌲	🌲	🌲
	— both	🌳🌲	🌳🌲	🌳🌲	🌳🌲	🌳🌲
3	Additional efficacy					
	● *A. punctatum*	A	A	A	A	A
	● *H.bajulus*	H	H	H	H	H
	● *L.brunneus*	L	L	L	L	L
	● all beetle sp.	I	I	I	I	I
	● termites	T	T	T	T	T
	● blue stain	—	B	B	B	B
	● mould	—	M	M	M	M
	● field efficacy	—	—	F	F	F
	● *C. versicolor*	—	—	C	C	C
4	Critical value					
	● g/m²	xx	xx	xx	xx	xx
	● kg/m³	xx	xx	xx	xx	xx

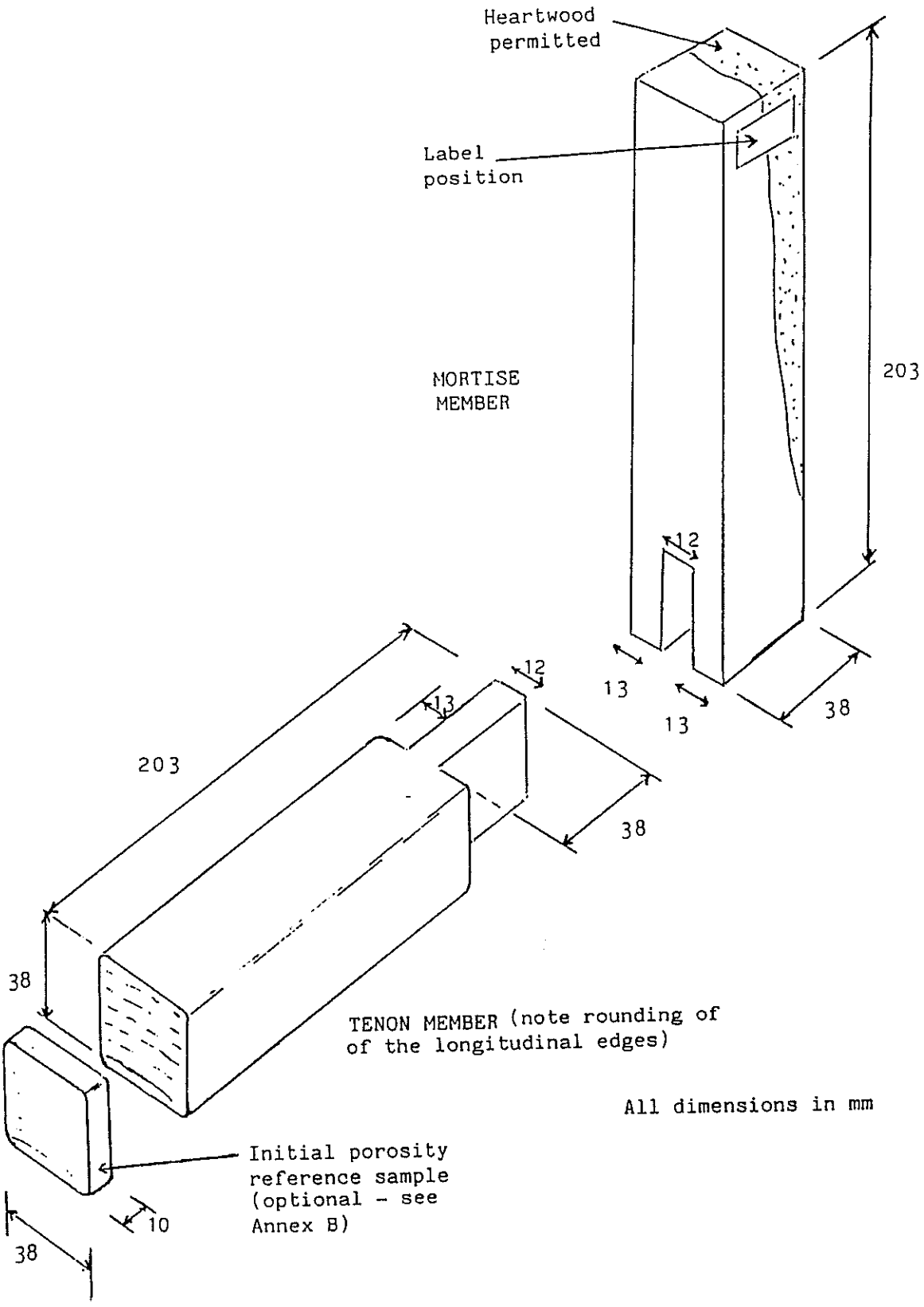
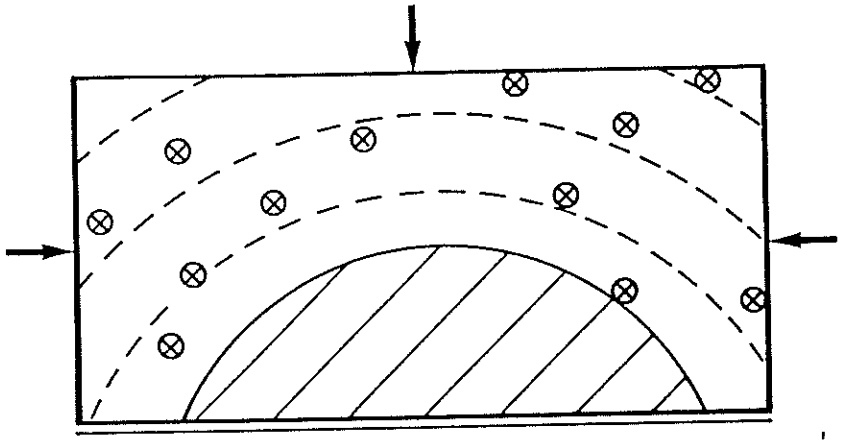
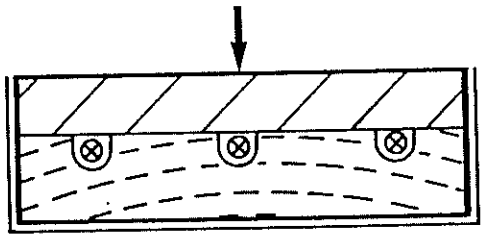


Figure 1: Form and dimensions of L-joint test sample in accordance with prEN330 (as at 1 November 1991)



EN22
(12 larvae/block)



Proposed new method
(10 larvae/block)

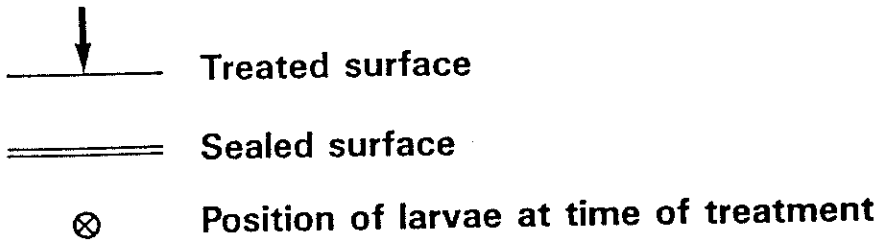


Figure 2: Comparison of existing Hylotrupes eradicant test EN22 and proposed new European standard

Figure 3: Vermiculite exposure system for soft rot microfungi in accordance with test 1 of new experimental European Standard

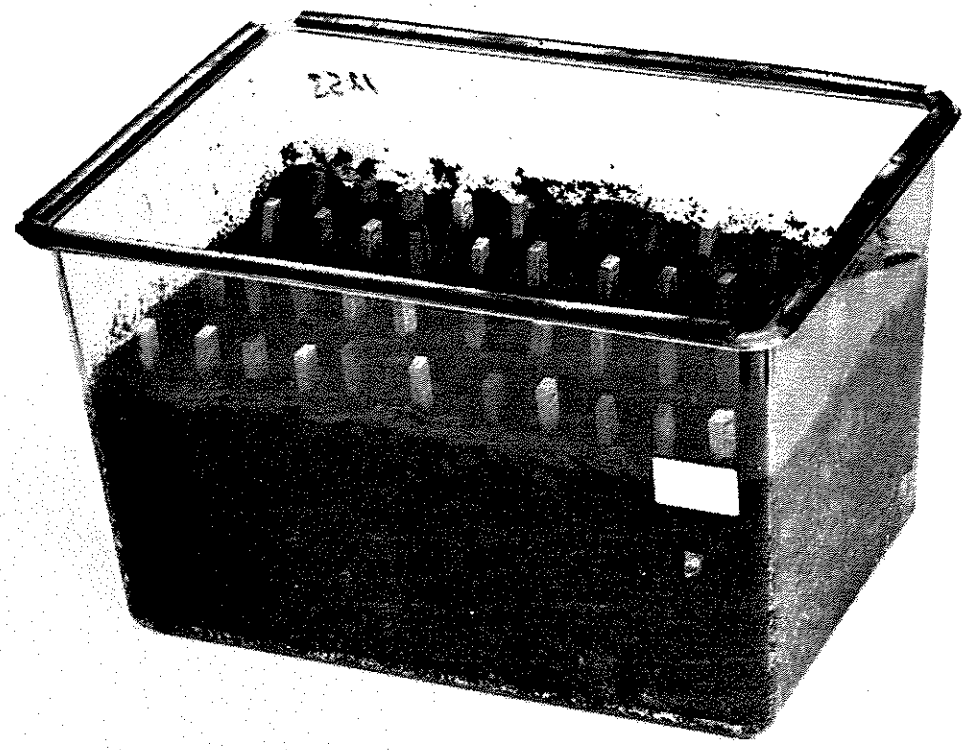


Figure 4: Soil bed exposure system for soft rot microfungi in accordance with test 2 of new experimental European Standard

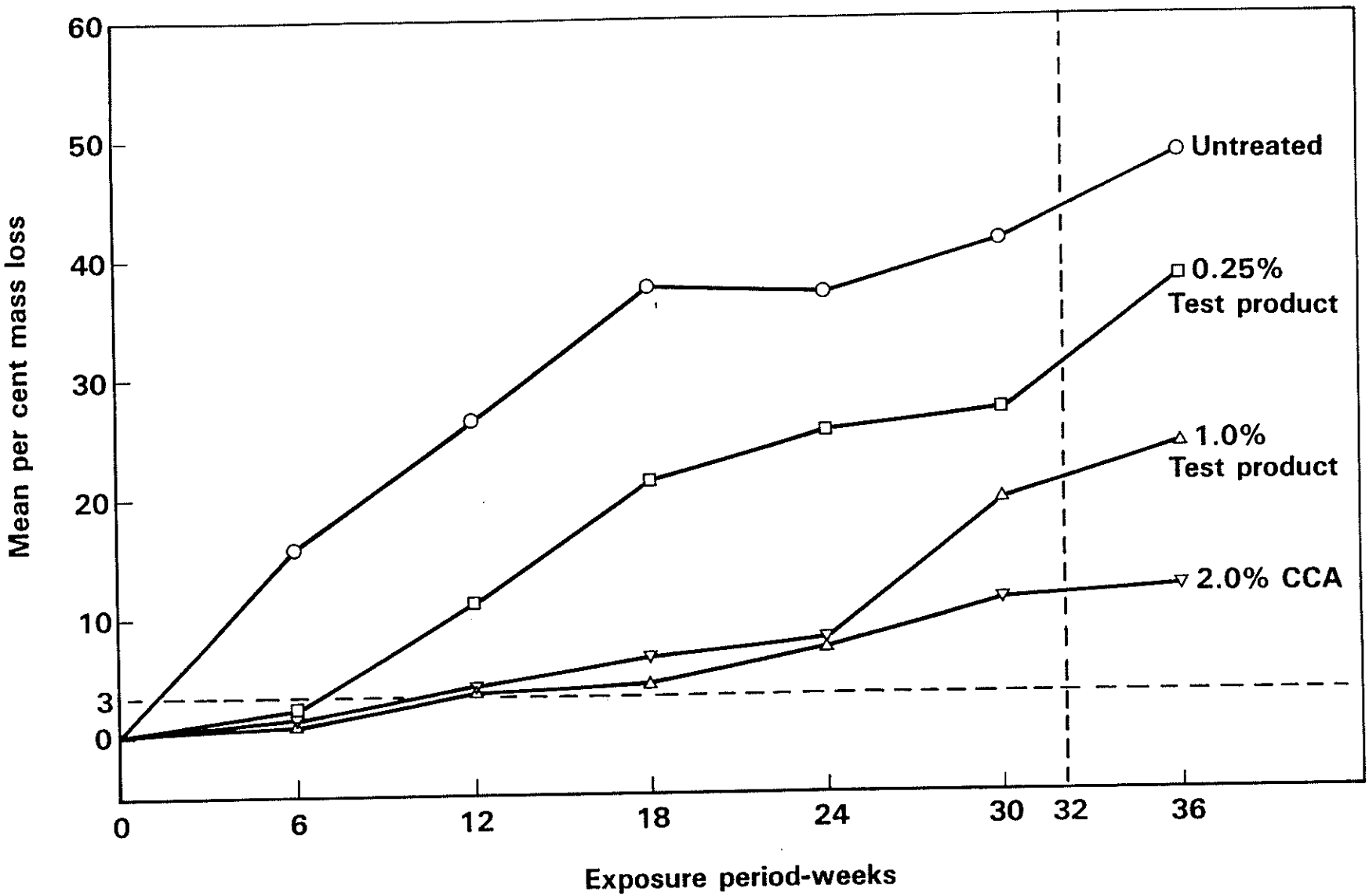


Figure 5: Comparison of rates of decay for different test products with reference preservative in test 2 of new experimental European Standard

Figure 6 BRE Baited test assembly (sawn open) for determining the efficacy of surface applied wood preservative in preventing colonization be decay fungi.