

Preservation of timber — Recommendations

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Committees responsible for this British Standard

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- American Softwoods Association
- Association of Consulting Scientists
- British Wood Preserving and Damp-proofing Association
- British Woodworking Federation
- Chemical Industries Association
- Creosote Council
- DTI — represented by Building Research Establishment
- Forestry Commission
- Timber Trade Federation
- Co-opted members

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Foreword

This British Standard has been prepared by Technical Committee B/515/3. It supersedes DD 239:1998 which is withdrawn.

The start and finish of text introduced or altered by Amendment No. 1 is indicated in the text by tags **A1** **A1**.

This British Standard provides recommendations for specifying timber treated with preservatives conforming to BS EN 599-1, using the penetration and retention terminology given in BS EN 351-1, to give a desired service life in the selected use class as defined in BS EN 335-1. It should be used together with BS 1282, and the new British Standards BS EN 599-1, BS EN 351-1 and BS EN 335-1, which give guidance on the selection of appropriate wood preservatives and the methods of treating timber, including preparation of timber for treatment. This British Standard does not include precise treatment parameters to achieve the recommended penetrations and retentions; it is the responsibility of the treater to use an appropriate treatment schedule to achieve the recommended values.

This British Standard was initially issued as a Draft for Development (DD 239) so that information and experience from its practical application could be obtained. The Draft for Development was reviewed just over 2 years after its publication. On the basis of the comments and experience received, the responsible BSI committee has converted it into this British Standard although it is recognized that the figures in Table 4, Table 5, Table 6, Table 7, Table 8 and Table 9 will have to be applied with pragmatism and flexibility.

BS 5268-5 and BS 5589 also cover preservation of timber. They concern the use of wood preservatives covered by BS 144, BS 4072 and BS 5707. In BS 5268-5 and BS 5589 treatment processes are described in terms of preparation of the timber for treatment and the precise treatment process to achieve a specific performance in particular service environments. By contrast, this British Standard describes the results of treatment to be achieved, in terms of penetration of preservative, and retention in the analytical zone.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 21 and a back cover.

Introduction

This British Standard is one of a group of documents dealing with the preservative treatment of timber. It has been prepared to provide information for the specifier or purchaser of treated timber, relevant to the United Kingdom, based on the principles given in the new British Standards BS EN 599-1, BS EN 351-1, and BS EN 335-1, prepared by the European Committee for Standardization (CEN) in reaction to the Construction Products Directive [1].

This British Standard provides guidance for the treatment of timber with wood preservatives. It gives recommendations for the use of traditional wood preservatives previously widely used in the UK, for example creosote (as described by BS 144) and copper/chromium/arsenic (CCA) preservatives (as described by BS 4072), as well as wood preservatives which have been developed according to European Standards and tested according to BS EN 599-1.

Traditionally, preservative treatments in the UK have been based on process specifications in order to achieve overall charge retentions of the preservative products in accordance with BS 5589.

In the preparation of this British Standard, it has been the intention to maintain these traditional preservative practices but to define the treatment as a results-based specification, recommending the level of penetration and a retention in the analytical zone, according to the environment in which the timber is placed.

These penetration and retention values have been calculated through evaluation of current commercial treatments of various softwood species, by treatment processes defined in BS 144, BS 4072 and BS 5707. These values are listed in the tables in Clause 4 (Table 4, Table 5, Table 6 and Table 7). In addition, experience gained in the UK has been used to provide guidance on the requirements of penetration and retention for preservatives tested according to current European Standards (BS EN 599-1, BS EN 351-1 and BS EN 335-1).

NOTE Further information on levels of treatment is given in 4.2.

1 Scope

This British Standard gives recommendations and guidance for the preservative treatment of timber to provide protection against biodeterioration in certain specified end-use situations in the United Kingdom. It recommends levels of penetration and retention of preservative, from the classes defined in BS EN 351-1, for different timber components and takes into account the natural durability and treatability of the timber employed, the biological A_1 use A_1 class and the desired service life. It also provides guidance on establishing whether a specified level of treatment has been achieved.

This British Standard applies only to solid wood, including glued laminated timber. It does not apply to panel products, as no European Standards have been published on the preservation of these products.

This British Standard does not apply to treatments regarded as remedial in nature or to those primarily designed to influence the performance of timber in fire.

NOTE In the United Kingdom, only preservatives approved under the Control of Pesticides Regulations 1986 [2] are permitted for the treatment of timber.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

BS 144:1997, *Specification for coal tar creosote for wood preservation*

BS 1282, *Wood preservatives — Guidance on choice, use and application*

BS 4072, *Copper/chromium/arsenic preparations for wood preservation*

BS 5707, *Specification for preparations of wood preservatives in organic solvents*

A_1 BS EN 335-1:2006, *Durability of wood and wood-based products — Definitions of use classes — Part 1: General A_1*

BS EN 350-1:1994, *Durability of wood and wood-based products — Natural durability of solid wood — Part 1: Guide to the principles of testing and classification of the natural durability of wood*

BS EN 350-2:1994, *Durability of wood and wood-based products — Natural durability of solid wood — Part 2: Guide to natural durability and treatability of selected wood species of importance in Europe*

BS EN 351-1:1996, *Durability of wood and wood-based products — Preservative treated solid wood — Part 1: Classification of preservative penetration and retention*

BS EN 599-1:1997, *Durability of wood and wood-based products — Performance of preservatives as determined by biological tests — Part 1: Specification according to hazard class*

BS EN 1001-2:2006, *Durability of wood and wood-based products — Terminology — Part 2: Vocabulary*

BS EN 13991, *Derivatives from coal pyrolysis — Coal tar based oils: creosotes — Specifications and test methods*

3 Terms and definitions

For the purposes of this British Standard the terms and definitions given in BS EN 351-1 and the following apply.

3.1

preservative penetration

minimum depth to which the active ingredients of the preservative formulation penetrate the wood

NOTE This penetration is determined from measurements obtained from samples of treated timber taken at random from the batch under examination. The number of samples to be taken is decided either through an agreed scheme between the purchaser and producer or according to ISO 2859-1.

BS EN 351-1 requires that the AQL (see 3.5) for the maximum number of non-conforming units in a batch, does not exceed 10 % for permeable timbers and 25 % for resistant timbers. However, lower percentages for non-conforming units may be agreed between the purchaser and the producer.

3.2

preservative retention

minimum amount of preservative required to be present in the analytical zones of the pieces sampled in a charge of treated timber

3.3

critical value (CV)

highest biological reference value derived from biological tests carried out in accordance with BS EN 599-1 for any given A_1 use A_1 class, to be used as the basis for specifying loadings in the analytical zone of treated timber in the A_1 use A_1 class for which the preservative has been tested

3.4

interim critical value

amount of preservative product derived from commercial experience and other data, used as the critical value (see 3.3) during the period of six years following the publication of BS EN 599-1:1997

NOTE The interim critical value is relevant for preservatives currently in use as specified in BS 144, BS 4072, BS 5707, and boron diffusion and aqueous boron treatment of dry timber, as defined in the A_1 WPA A_1 Manual [3].

3.5

acceptable quality level (AQL)

percentage of units in a charge which are allowed to fall below the specified penetration requirement without causing the charge to be non-compliant

NOTE Sampling needs to be conducted and interpreted statistically as outlined in BS EN 351 because an acceptable AQL of 10 % does not mean that the treated charge is necessarily rejected if more than 1 in 10 of the units removed for sampling does not meet the penetration recommendations.

4 Recommendations

4.1 Factors affecting choice of preservative treatment

4.1.1 General

In deriving a specification that will ensure that the required durability of a timber component is achieved, all the recommendations in this British Standard should be addressed. The position and structural importance of the component within the building, and the ease of replacement or maintenance can be indicated by service factors (see Table 1). These factors summarize the need to specify a preservative treatment or a class of natural durability based upon safety and economic considerations.

The service environment of the component, defined using the A_1 use A_1 class system, dictates the type of preservative to be used. The need for treatment and the most appropriate method of treatment depends upon the desired service life of the component within the A_1 use A_1 class and the natural durability of the selected timber.

NOTE These considerations are explained in more detail in 4.1.2, 4.1.3, 4.1.4, 4.1.5 and 4.1.6 where references to Table 2 (for natural durability), Table 3 and Table 4, Table 5, Table 6, Table 7, Table 8 and Table 9 (for preservation with various preservatives) are included. Table 4, Table 5 and Table 6 give recommendations for preservatives covered by existing British Standards, Table 7 and Table 8 give recommendations for other preservatives covered by the A_1 WPA A_1 Manual [3]. Table 9 gives recommendations for preservatives tested according to BS EN 599-1 requirements.

As this British Standard recommends levels of penetration and retention necessary to give the service lives indicated in Table 4, Table 5, Table 6, Table 7, Table 8 and Table 9, processors should ensure that the process used achieves the required penetration and loadings. They should also be aware that timbers might not be sufficiently amenable to treatment for all end uses.

4.1.2 Components

Natural durability recommendations for timber components should be applied in accordance with Table 2. Column 1 of Table 2 lists timber components in broad groups which can be related to different service environments. Where a particular component is not listed in column 1 of Table 2 reference should be made to Annex A for more detailed guidance.

4.1.3 A_1 Use class A_1

The A_1 use A_1 class system is a means of defining different service environments in which wood and wood-based products are used. Reference should be made to the classifications defined in detail in BS EN 335-1.

As different biological agencies of timber deterioration occur in different A_1 use A_1 classes, it is essential that timber has a durability appropriate to that A_1 use A_1 class. If durability is achieved by preservative treatment with traditional preservatives the suitability of a product for the treatment of specific commodities should be established from existing specifications in BS 5268-5 and BS 5589. With new preservative types, testing in accordance with BS EN 599-1 should be used to determine the suitability and effective retention of products for use in each A_1 use A_1 class. Column 2 of Table 2 should be used to identify the appropriate A_1 use A_1 class for the components listed.

The allocation of a particular A_1 use A_1 class to a component assumes good design and maintenance of the construction. It should be recognized that if conditions arise during the service life of the component which result in unexpected wetting of the timber, for example as a result of design faults, condensation, failure of other materials, poor workmanship or lack of maintenance, the A_1 use A_1 class assigned to the component can change and therefore the recommendations for preservation can change.

4.1.4 Service factors

In addition to the biological A_1 use class A_1 , service factors exist, based on safety and economic considerations, which the specifier or user of the treated timber should take into account when making a judgement on the need for preservative treatment (see Table 1). The extra costs of pretreatment of the timber component, or the use of naturally durable timbers, should be balanced against the future cost of remedial treatments or replacement of failed components. For example, some timber components have a short service life requirement or are inexpensive to replace. In these circumstances preservation could be considered unnecessary. Alternatively where damage by insects or fungi would be difficult or expensive to repair or where the associated weakening of the timber components would endanger life or the integrity of the structure, then timber of adequate natural durability, or timber with preservative treatment, should be used.

Table 1 describes these service factors based on safety and economic considerations and relates them to the need for preservative treatment or the use of naturally durable timber. The need or justification for preservative treatment in this context is expressed as letters A, B, C and D and incorporated into column 3 of Table 2.

Table 1 — Service factors based on safety and economic considerations

Safety and economic considerations	Need for preservative treatment/natural durability	Service factor code in Table 2
Negligible	Unnecessary	A
Where remedial action or replacement is simple and preservation can be regarded as an insurance against cost of repairs	Optional	B
Where remedial action or replacement would be difficult and expensive	Desirable	C
Where collapse of structures would constitute a serious danger to persons or property	Essential	D

4.1.5 *Desired service life*

The level of preservative treatment recommended depends not only on the risk of attack but also on the expected life of the timber component. In Table 2 and Table 4, Table 5, Table 6, Table 7, Table 8 and Table 9 natural durability classes and preservative recommendations are given for desired service lives of 15 years, 30 years and 60 years.

It is essential to realize that these desired service lives are not guarantees of performance but merely indications of the expectation against which the recommendations for timber treatment are drawn up, assuming good design and normal conditions of use. As they relate solely to the resistance of the timber to biodeterioration, it is essential to bear in mind that other factors, such as mechanical damage or failure of other elements of the construction, could limit the life of the complete commodity. The service lives predicted have in some cases not been established by direct service evidence and therefore could be subject to revision as more experience is gained. The prediction of service life is not precise; users wanting a service life not given in Table 4, Table 5, Table 6, Table 7, Table 8 and Table 9 should cite the recommendations for the next longest service life in the Tables.

4.1.6 *Natural durability of timber*

Different timber species vary in their resistance to attack by wood-destroying organisms such as fungi, insects and marine borers. The most usual method of classifying the natural durability of different timbers is to compare their resistance to attack by wood-destroying fungi when placed in contact with the ground. Reference should be made to BS EN 350-1 which describes methods of classifying natural durability and BS EN 350-2 which lists timbers of commercial importance within Europe together with their natural durability classes. Such a system can be used as the basis for recommending the need for treatment in different service environments, for instance BS EN 460 provides general recommendations based on the European A_1 use A_1 class system.

If the heartwood of a timber has sufficient natural durability it can be used without preservative treatment even where a recognized hazard exists. However, where sapwood is present, the loss of which would render the component unfit for its intended use, preservative treatment should be applied whatever the associated natural durability of the heartwood.

Timbers of high natural durability frequently derive from sources prone to be environmentally vulnerable or fragile. The full implications of specifying particular species of timber should be considered when choosing between the use of a naturally durable timber and a less durable timber with preservative treatment.

The natural durability recommendations for timber components given in Table 2 should be followed. Table 2 includes the class of natural durability deemed to be the minimum necessary to achieve the desired service life without the need for treatment.