

Code of practice for

Preservation of timber

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Committees responsible for this British Standard

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- British Railways Board
- British Tar Industry Association
- British Wood Preserving Association
- British Woodworking Federation
- Department of the Environment (Property Services Agency)
- Department of the Environment (Building Research Establishment)
- Fibre Building Board Organization (FIDOR)
- Forestry Commission
- Timber Growers' United Kingdom
- Timber Research and Development Association
- Timber Trade Federation

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Foreword

This British Standard has been prepared under the direction of the Timber Standards Policy Committee. BS 5589 was first published in 1978 and amended in 1982 to include a new section on timber for use in buildings in termite infested areas. This revision has been prepared to bring the standard up to date. It includes a new section on timber for use in timber frame housing. This revision of BS 5589 supersedes BS 5589:1978 which is withdrawn.

In this edition a general introductory section is followed by seven sections, each of which deals with an area of use for timber. As the need arises, consideration will be given to the inclusion of further sections dealing with other specific end-uses. For many of these uses there exist or are planned product specifications in which detailed attention is given to structural and manufacturing considerations but in which often only brief consideration can be given to requirements for durability or preservation. In most cases, this British Standard considers these latter requirements in more detail and has tried to obtain more uniformity between them. It is hoped that as new or revised product specifications are prepared, they will make full reference to the appropriate sections of this British Standard.

In this revision, the concept of desired service life for a component has been retained to enable a specifier or user to make a choice of performance requirement. Alternative treatments can then be selected to achieve the desired life on the basis of cost and availability. The figures used to categorize desired service life relate solely to protection against biodegradation and have to be considered together with the aspects of design, maintenance and service environment which all contribute to the actual service life of a component. Clause 3 of this British Standard explains the basis on which service lives were selected. This basis sometimes differs from that used, either implicitly or explicitly, in certain other British Standards, e.g. for farm buildings where considerations such as building financing may be involved. Clause 3 also includes reference to the proposed European method of classifying decay risk. This classification is introduced in readiness for the intended harmonization of approvals for wood preservatives and preserved wood with the European Economic Community (EEC).

Technical Committee 38 "Durability of wood and wood-based products" of the European Committee for Standardization (CEN) has just commenced work, under a mandate from the Commission of the European Economic Community (EEC), on the classification of biological hazards and durability of timber, performance of treated timber, and the performance testing of preservatives. With the publication of European Standards arising from this work, this British Standard will be amended, revised or withdrawn so as to remove any conflicting aspects.

BS 5268-5 deals primarily with the requirements for preservative treatment of timber used structurally in buildings.

Users of the product specifications referred to in this British Standard are advised to consider the desirability of third party certification of product conformity with those product specifications based on testing and continuing surveillance, which may be coupled with assessment of a supplier's quality systems against the appropriate Part of BS 5750. Enquiries as to the availability of third party certification schemes in these cases will be forwarded by BSI to the Association of Certification Bodies. If a third party certification scheme does not already exist, users should consider approaching an appropriate body from the list of Association members.

Users of this British Standard are advised to consider the desirability of assessment and registration of a supplier's quality systems against the appropriate Part of BS 5750 by a third party certification body.

Reference was made in the first edition to a series of specifications published by the British Wood Preserving Association (BWPA). The majority of these have now been published as British Standards, but a British Standard relating to the use of boron as a wood preservative remains to be prepared. Reference has therefore again been made to a BWPA publication following its consideration by the responsible committee.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to vi, pages 1 to 30, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Section 1. General introduction

1 Scope

This British Standard gives recommendations for the preservative pretreatment of timber to provide protection against biodegradation in certain specified end-use situations in the UK¹⁾. It recommends preservatives, processes and treatment levels suited to the hazards encountered in use and takes into account the natural durability and treatability of the timber employed. It does not deal with treatments regarded as remedial in nature, with those applied in situ, nor with those primarily designed to influence the performance of timber in fire.

The preservative treatment of structural timbers, particularly those in buildings, is described in BS 5268-5.

NOTE The titles of the publications referred to in this standard are listed on the inside back cover.

2 Use of this code

This standard is part of a group of British Standards dealing with the preservative pretreatment of timber. BS 1282 forms an introduction to the subject; it gives general information on the biological hazards to which timber may be exposed, types of preservative and their properties and the methods of treatment by which they can be applied.

This code has been written primarily for specifiers and users of treated timber, and is concerned with those aspects of the preservative treatment that affect the end-use of the treated product.

Section 1 covers matters common to all the uses dealt with in the other sections. In these other sections specific recommendations are given for the treatment for individual end-uses. In most cases a choice of treatment is offered and the level at which each should be applied is recommended.

To specify a treatment using this British Standard it is essential to cite both the relevant section for the proposed end-use and the desired service life. In addition, the required preservative and process should be specified in accordance with the relevant section of this standard. In the choice of the preservative it is necessary to take into account factors such as the timber species to be treated, the need for subsequent painting or glueing, etc.

Those aspects of preservative treatment which are principally the concern of the preservative manufacturer and treater are dealt with by a group of British Standard preservative and processing specifications. These cover the chemical compositions of the preservatives and give details of the processes involved in their application. In most cases, however, they leave the specifier to choose the intensity of the treatment applied²⁾.

Table 1 gives a list of processes and relevant British Standard specifications.

3 Performance ratings

3.1 General

The organisms that can attack wood and conditions under which the wood becomes degraded are discussed in BS 1282.

If timber becomes wet and remains wet, e.g. moisture content exceeds 20 %, then eventually it is likely to decay. The rate at which this decay occurs is related to the inherent durability of the timber, i.e. the degree to which it possesses a natural resistance to decay. The durability of heartwood varies with species; the heartwood of some species possesses a resistance to decay which renders the process extremely slow, while the heartwood of others, and the sapwood of all species, possess little resistance. Timbers in this latter group, with little natural durability, require preservative protection when used under wet conditions.

The incidence of insect attack in the UK is sporadic since it depends on the introduction of the adult insects. Where attack may cause serious damage, as in the case of *Hylotrupes bajulus*, then preservative treatment is essential³⁾.

3.2 Service environments

The proposed end-use of the timber may be such that:

- a) the timber is constantly exposed to adverse conditions;
- b) the exposure to adverse conditions is intermittent;
- c) the exposure to adverse conditions is accidental.

¹⁾ Section seven deals with the preservation of timber for use overseas in termite infested areas.

²⁾ In the past it was the usual practice to combine into a single British Standard the requirements for the composition of a type of preservative together with information on processing and the recommended level of treatment for specific uses. For an interim period recommended levels of treatment will be found both in these older standards and in the newer standards for particular commodities.

³⁾ See The Building Regulations 1985.

Table 1 — Schedule of preservative processes applicable to this British Standard

Preservative and process	Essential parameters for specification according to end-use
Creosote (tar oil) pressure process	Creosote complying with BS 144-1 ^a applied in accordance with BS 144-2 ^b and the treatment cycle details given in this British Standard for the required end-use
Creosote immersion process	Creosote complying with BS 144-1 ^a applied by complete submersion giving the immersion period required
Creosote hot-and-cold open tank process	Creosote complying with BS 144-1 ^a applied in accordance with BS 144-2 ^b with or without reheating
Copper/chromium/arsenic (CCA) full-cell process	CCA complying with BS 4072-1 applied in accordance with BS 4072-2 and the treatment cycle details given in this British Standard for the required end-use
Organic solvent (OS) double vacuum process	OS preservative complying with BS 5707-1 and applied in accordance with BS 5707-3 and the treatment cycle details given in this British Standard for the required end-use
Organic solvent (OS) immersion process	OS preservative complying with BS 5707-1 applied in accordance with BS 5707-3 and the treatment cycle details given in this British Standard for the required end-use
Pentachlorophenol (PCP) in heavy oil ^c double vacuum process	PCP in heavy oil ^c complying with BS 5707-2 applied in accordance with BS 5707-3 and the treatment cycle details given in this British Standard for the required end-use
Boron diffusion process	Timber treated with <i>disodium</i> octaborate in accordance with the methods specified in BWPA Manual 1986
^a In preparation. Pending publication, reference should be made to BS 144 and BS 3051.	
^b In preparation. Pending publication, reference should be made to BS 913.	
^c The reference to heavy oil applies to the boiling range of the solvent given in BS 5707-2.	

Timber in the ground, e.g. fence posts or poles, and timber in water quickly acquire and retain a high moisture content, and are thus constantly at risk. Additionally, timber used in sea or brackish water is liable to attack by marine organisms; timbers which have a natural resistance to fungal decay are not necessarily also resistant to marine borers. Timbers used in environments of this kind are constantly exposed to adverse conditions and there is a high risk of early failure of susceptible species unless preventive measures are taken.

When outdoor timbers are not in ground contact, exposure to the weather will cause the moisture content of the wood to fluctuate and there will be periods when fungal decay could develop. Protective coatings such as paints rarely provide complete and permanent protection from water ingress; thus preservative treatment of all susceptible external timbers is advisable.

The exposure of internal timbers to wet conditions may occur because of design faults, condensation, failure of other materials, poor workmanship or lack of maintenance.

In many such instances, should decay occur, the resultant damage may be easy to remedy; but where experience has shown that there is a high risk of decay, or where the resultant damage would be difficult or expensive to repair, or where the associated weakening would endanger life or the integrity of the structure, then preservative treatment is recommended.

The level of preservative treatment recommended depends not only on the risk of attack but also on the expected life of the commodity. In some cases it has been possible to lay down conditions suited to two levels of performance, e.g. fencing timber with desired lives of 20 or 40 years. The performance requirements in the individual commodity specifications are based on timbers and levels of preservation readily available commercially. In special cases where longer lives are required, a higher standard of treatment may be achieved by more severe processing of a restricted number of timber species.

Where risk of attack is intermittent or sporadic in character, the concept of performance for the treated timber has less meaning, since the hazard may or may not present itself and its severity is unlikely to be known in advance. Treatments for commodities in this category are rated, therefore, in terms of period of effectiveness, i.e. the time during which the preservative can be expected to remain in sufficient quantity to provide effective protection.

It is essential to realize that the life cited in a "performance" clause (clauses 12, 22, 30, 37, 44, 52 and 60) of this British Standard is not a guarantee of performance but merely indicates the service life against which the specifications for timber treatment were drawn up, assuming good design and normal conditions of use. It relates solely to the resistance of the timber to biodegradation and it has to be borne in mind that other factors, such as mechanical damage or failure of other elements of the construction, may limit the life of the complete commodity. The lives predicted have in some cases not been established by direct service evidence and therefore may be subject to revision as more experience is gained.

3.3 European hazard categories

It is clear from the considerations in 3.2 that timber in service may be attacked by wood-destroying organisms if certain conditions arise or prevail and that the probability that this might happen can be predicted from an understanding of the environmental conditions that are likely to exist for the various service situations in which timber is used. In other words, different service situations can be associated with a level of risk that fungal decay or insect attack will occur. Thus in a persistently wet environment the chance of fungal attack occurring is higher than in a relatively dry situation. Where the timber will be constantly damp, treatment with an appropriate preservative or the use of a naturally durable timber may be considered essential; where the timber will always be dry, treatment with a preservative or the property of natural durability may be unnecessary. This philosophy has been developed by the European Homologation Committee into a simple rating system employing hazard categories (see Table 2). Thus each timber component in use can be related to a particular hazard category, allowing a common understanding of the preservation requirements for that component within the EEC. Hazard categories are assigned to each section in this British Standard in preparation for the intended harmonization of preservation requirements throughout the EEC.

4 Design considerations

This British Standard is not a design code for timber components or structures. However, detailed design of a structure which includes timber can have such an important influence on the timber's durability that it is essential that the design be considered in conjunction with the possible need for preservative treatment.

In some cases, the risk of timber degradation by biological agents can be minimized by design of the structure concerned. Where a design cannot practically provide acceptable immunity, it will have to be modified and reinforced by the use of naturally durable timbers or timbers treated with preservative. In other situations, such as timber in contact with the ground, or in dock and harbour work, design can do little to reduce the hazard; in these circumstances the use of naturally durable timbers or appropriate preservative treatment is essential if adequate service life is to be achieved.

Where possible, reference is made to other standards dealing with features and details of construction which constitute good practice. Examples of design features to consider are provision of adequate moisture barriers, throating of ledges and cills, adequate ventilation of cavities, provision of damp-proof courses and vapour barriers, attention to the sealing of end-grain and joints and avoidance of water traps.

It should not be assumed that the use of a naturally durable or preservative treated timber obviates the need for good design and workmanship. The preservative treatments recommended for the various commodities in subsequent sections are complementary to good design and workmanship, not a substitute for it.

5 Means of protection

The recommendations in most of the individual sections of this code provide an option of choosing a timber⁴⁾ with sufficient natural durability (or resistance to insect attack) or a less durable timber which requires preservative protection. If reliance is placed on natural durability alone it should be realized that this is a property of only the heartwood of the timber concerned. The sapwood of all timber is susceptible to decay and, with certain exceptions (notably spruce and other timbers in which heartwood is not distinct), it is only the sapwood that is attacked by wood-boring insects. On the other hand, marine borers can also attack heartwood. For many softwoods and certain hardwoods, the exclusion of sapwood is not a practical proposition.

⁴⁾ Timbers have been named throughout according to their standard names listed in BS 589 and BS 881.

Table 2 — Hazard categories

Hazard category	Risk of fungal decay	Examples
1	Where conditions of use involve negligible risk	Joinery inside dwellings, e.g. stairs and architraves
2	Where there is low risk	Timber in normal pitched roofs; joists in ground floors
3	Where experience has shown there is a high risk	Cladding and external joinery
4	Where there is a continually hazardous environment and unacceptable risk	Fence posts; sleepers; freshwater lockgates
M	As for category 4, but in the marine environment	Marine piling, piers and jetties

If an amount of sapwood is present, the loss of which would render the commodity unfit for its intended use, or where the sapwood is indistinguishable from the heartwood, consideration should be given to the need for preservative treatment. Such consideration should take into account the proposed end-use but disregard the durability rating of the heartwood.

The preservative treatments recommended are restricted to those for which there is a suitable British Standard or BWP (see Table 1) specification and which are available commercially in the UK. All wood preservatives used in the UK have to be approved under the Control of Pesticides Regulations, 1986⁵⁾. The recommendations in this British Standard take into account both the natural durability, in the UK, of the timbers concerned and their treatability as defined in BRE Digest 296. Table 3 is derived from BRE Digest 296 and gives information on the most commonly used timbers. It also gives guidance where available on the treatability of the sapwood of these timbers.

6 Preparation of timber before treatment and handling after treatment

6.1 Before treatment

6.1.1 General. It is essential that timber submitted for preservative treatment is in a suitable condition as in 6.1.2 to 6.1.5.

6.1.2 Condition of timber. The timber should be free from all signs of attack by wood-destroying fungi or insects.

NOTE Timber showing signs of attack by sap-stain fungi or pinhole borers is acceptable, subject to agreement between the interested parties.

As preservative treatment of seasoned timber does not afford protection against deep-seated infection or dote, care should be taken to exclude timber infected with incipient decay.

The surfaces of the timber should be free from extraneous matter, e.g. water, mud, dirt and inner and outer bark. They should also be free from any paint, polish, or other surface finish.

If timber is frozen penetration is limited. Care should be taken not to treat timber in this condition.

6.1.3 Moisture content. It is essential that the moisture content of the timber is at the correct level⁶⁾ for the type of treatment to be received.

For boron diffusion it is essential that the moisture content be greater than 50 %.

Undried timber or timber with a moisture content higher than 28 % may be prepared by the Boulton Process for treatment with creosote as specified in BS 144-2⁷⁾, though extreme caution should be exercised when using this procedure.

All other treatments require the moisture content to be below 28 % throughout the zone to be treated. For creosote and CCA treatment it is essential to dry to this moisture content before treatment, and for certain end-use situations a lower moisture content may be required.

Since organic solvent preservatives do not affect the moisture content of treated wood, commodities should be treated with these preservatives in their final machined state and at the moisture content consistent with their end-use.

Methods for determining moisture content are detailed in, for example, BS 4072-2⁶⁾.

⁵⁾ The Health and Safety Executive is the approving body.

⁶⁾ For poles the moisture content requirements and method of determination are given in BS 1990-1.

⁷⁾ In preparation. Pending publication, reference should be made to BS 913.