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Preservative treatment for timber – a guide to specification

As a renewable material wood is a valuable resource for the manufacture of sustainable building products. Extending service lives of these products can avoid costs associated with their replacement over the lifetime of a building and reduce environmental impact. Wood preservatives are used to protect susceptible timbers and wood-based products against wood-destroying organisms such as fungi and insects.

This Wood Information Sheet (WIS) guides the specifier through the processes of

- deciding whether a preservative treatment is required to protect a timber product
- specifying where a treatment is required
- specifying an appropriate treatment to ensure that a timber component is fit for purpose with regards to its durability.

This WIS also advises specifiers about:

- sourcing an appropriate treatment specification
- documentation that should accompany preservative-treated wood when purchased and delivered
- storage of treated wood and handling on site
- how preservative-treated wood interacts with other materials.

This WIS is an overview of the subject with signposts to more detailed sources that are listed at the end.

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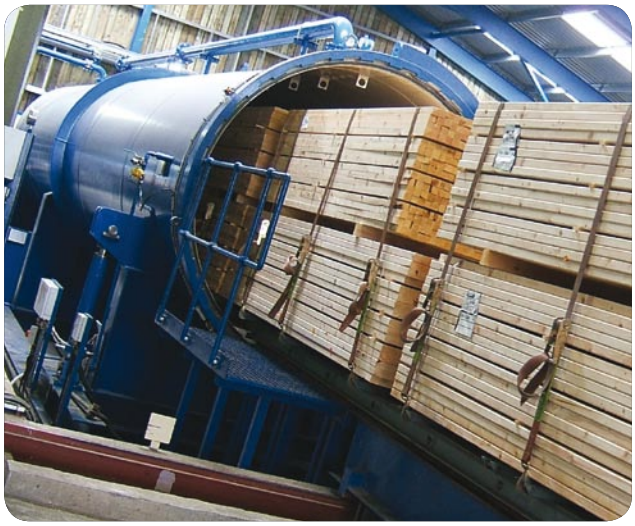

Figure 1: High-pressure treatment process
Photo: Lonza Wood Protection

Key points

- Consider whether treatment is needed by reference to service factor and the natural durability of the heartwood provided the timber component is free of sapwood.
- Consider the required service life of the timber component and assess the risk for the service conditions changing over the service life.
- Ensure that the component is finished before treatment using an appropriate preservative at a level suitable for the components intended use. Model specification clauses are available from NBS, the Wood Protection Association and suppliers of preservative treatments.
- Where minor post treatment cross-cutting, drilling or notching is unavoidable, this area must be re-treated by liberal brush coating of a preservative recommended by the supplier of the preservative treatment used.
- Understand the interaction of treated wood with other materials to avoid risks of premature corrosion of flashings and fixings, and appropriate performance of putties, adhesives and coatings. This information is available from preservative manufacturers.
- Good design and a specification for maintenance of wood components are also important to achieve the desired service life from a treated wood component.

Key Standard and guide for specifiers

BS 8417 Preservation of wood. Code of practice [1] is the key Standard for preservation. It provides guidance on the treatment of solid wood and glued laminated timber (glulam) for use in the UK.

The Manual: Industrial Wood Preservation [2], published by The Wood Protection Association (WPA), advises on specific treatments, according to use class, and includes model specifications.

Wood-based panels and engineered wood products

BS 8417 does not contain any information regarding the treatment of wood-based panel products or engineered wood products. However, WPA's *Manual: Industrial Wood Preservation* includes Commodity Specification C11: Preservative treatment of wood-based board and engineered wood products

When used outdoors, the performance of most plywood will be compromised unless suitable preservative treatment and/or relevant surface and edge coating is applied and the panels are properly maintained and installed. Consult suppliers about service life and recommended protection.

Factors influencing wood decay and the need for preservative treatment

Consider the following parameters when judging the need for preservative treatment, the type and level of treatment required:

- the in-service conditions
- service factors
- desired service life
- the natural durability of timber species.

The in-service conditions

The first step is to understand the in-service conditions for any wood component, which provides information on exposure to wetting and decay agents. Table 1 of *BS EN 335-1 Durability of wood and wood-based products. Definitions of use classes. General* [3] defines five use classes, together with the occurrence of biological agents in each use class.

Table 1 of *BS 8417* extends this list of use classes, describing typical service situations. Table 7 of WPA's *Manual: Industrial Wood Preservation* is similar but with more detailed guidance.

The assignment of a use class to a component assumes good design and maintenance of the construction. However, it is important to consider the conditions that could arise during the service life of the component, which would result in unexpected wetting of the timber. For example, design faults, condensation, failure of other materials, poor workmanship or lack of maintenance may suggest assigning a more-severe use class.

Effect of moisture

Timber must be damp (with a moisture content of exceeding 20%) for fungal decay to occur. Therefore, timber of any species that is maintained in dry conditions (use class 1) will remain sound (free from fungal decay).

However, for timber components exposed in use classes 2 to 5 (where they 'wet-up'), the life of timber components can be extended considerably by the designer's attention to detail, for example, by protecting against excessive wetting and avoiding moisture build-up. TRADA Technology's *WIS 4-28: Durability by design* [4] offers guidance.

Insect attack

In use class 1, the only hazard is insect attack. But insects can also affect durability in higher use classes. The consequences of attack are slow to manifest in most cases, but take account of the risk over the lifetime of a component. Certain insect species, such as the house longhorn beetle, present a more serious short-term risk which is dealt with in UK Building Regulations (Approved Document A in England and Wales. The potential of this risk increasing in the UK, due to climate change, is not yet evident. TRADA Technology's *WIS 2/3-32: Fungi and insect pests in timber* [5] outlines the more important types of fungi and insects which can affect timber.

Service factors

Table 2 of *BS 8417* lists service factors, based on safety and economic considerations, ranging from A (negligible risk, preservation unnecessary) to D (high risk, preservation is essential). Table 8 of WPA's *Manual: Industrial Wood Preservation* is similar.

Take account of the service factor when deciding what level of protection is needed. Protection would be by either selecting a naturally durable species of timber or by treating with a preservative.

Desired service life

Table 3 of BS 8417 specifies the natural durability classes for service lives of 15, 30 and 60 years, according to components and use classes. See *Natural durability* (below) for definitions of classes. Table 9 of WPA's *Manual: Industrial Wood Preservation* is similar.

The desired service life of any timber product assumes good design and maintenance of the construction.

Natural durability

Timber species vary in their resistance to attack by wood destroying fungi and insects. *BS EN 350-2 Durability of wood and wood-based products. Natural durability of solid wood. Guide to natural durability and treatability of selected wood species of importance in Europe* [6] lists many of the timbers of commercial importance in Europe and assigns them to natural durability classes against decay agents. There are five durability classes from 1 (very durable) to 5 (not durable). These classes refer to the heartwood and resistance to fungal decay.

The sapwood is always considered as durability class 5 unless specific information is available. If timber species contain a high percentage of sapwood, or if it is difficult to distinguish sapwood from heartwood, then preservative treatment may be warranted. Many of the naturally durable timber species originate in the tropics and may not be available certified. In these cases, it may be more appropriate to specify a less-durable certified timber with preservative treatment.

If the heartwood of a timber has sufficient natural durability it can be used without preservative treatment even where a recognised biological hazard exists. Table 3 of *BS 8417* contains guidance on whether a timber's natural durability alone is appropriate for the specified use class. Further advice on whether 15, 30 or 60 years' desired service life can be achieved, using natural durability of heartwood for different components, is contained in *BS 8417* and BRE's *Digest 429: Timbers: their natural durability and resistance to preservative treatment* [7].

BS EN 350-2 also classifies resistance to insect attack (rated as durable or susceptible) and resistance to attack by termites or marine borers (rated as durable, moderately durable or susceptible).

Specifying an appropriate preservative treatment

Preservatives suitable for use

In the UK wood preservative products are approved under the Control of Pesticides Regulations 1986 (COPR, as amended) or the Biocidal Products Regulations 2001 (BPR, as amended). The applicability of these pieces of legislation is governed by the status of the active substances under the EU review as part of the Biocidal Products Directive (98/8/EC).

On 1st Sept 2013 the Biocidal Products Directive (BPD) will be replaced by the Biocidal Products Regulation (528/2012) which will apply directly in all member states. Approvals under COPR will transition to those under this new legislation.

The use of creosote and timber treated with it were restricted under the REACH Regulations 1907/2006 (as amended) and further restrictions may apply resulting from the review under the BPD.

The supply and use of chromated copper arsonate (CCA) preservatives in the EU was withdrawn from September 2006, including the importation of CCA treated wood. Timber already treated with CCA prior to this date may still be sold and used in accordance with REACH regulations. The WPA can offer further guidance.

Section 2 of WPA's *Manual: Industrial Wood Preservation* lists the approved preservative types, products, suppliers and other information.

Specifying authorities

In addition to the requirements laid down in UK building regulations, there are a number of organisations concerned with the performance of timber commodities that specify requirements for the treatment of timber. These include the housing warranty bodies, such as the National House Building Council (NHBC), and the Highways Agency and British Telecommunications. Their requirements are usually based on British Standards.

Sourcing of an appropriate treatment specification

A range of specifications exist that allow for appropriate preservative treatment of timbers for specific end-uses. These include:

- *NBS Z12 Preservative and Fire Retardant Treatment* [8]
- *BS 8417*
- Commodity Specifications (C1 to C12) in WPA's *Manual: Industrial Wood Preservation*.

Suppliers of preservatives can also assist with specifications.

Figure 2: Low-pressure treatment process
Photo: Lonza Wood Protection

Post-treatment

Documentation that should accompany preservative-treated wood

Treatment certificates provide evidence of the:

- type of preservative applied to timber
- method application
- intended use class of the treated product
- company that applied the treatment.

These certificates provide the customer with evidence of treatment, especially when the treatment does not change the appearance of the wood.

Storage and handling of treated timber on site

Since many applications require timbers to be installed within an appropriate moisture content range (to avoid excessive movement in service) it is important to ensure treated wood is conditioned down to within this range prior to use. The procedure is the same as for kiln-dried untreated wood – stickering wood components under cover at the environmental conditions it will be exposed to on site.

Since metal-based preservative treatments reduce the accuracy of electrical resistance-type moisture meters, the moisture content of wood components can only be measured accurately if insulated probes are driven through the treatment envelope. It is important for the application of finishes and the use of adhesives that wood be conditioned down to appropriate moisture content.

As far as possible all cutting, drilling, profiling and shaping of the timber should be carried out before treatment. Where post-treatment reworking is unavoidable, it should be limited to cross-cutting, boring, drilling or notching. Exposed surfaces should then be given two liberal brush coats of a suitable preservative as recommended by the pre-treatment preservative manufacturer.

Interaction of preservative-treated wood with other materials

In some cases, where wood is used in conjunction with other materials, preservative treatment may compromise the performance of these materials. For example, take care when treating wood components that have been bonded using PVA adhesives, to prevent failure of gluelines.

It is important that only galvanised or stainless steel fixings be used with preservative-treated wood to prevent premature failure of the fixings, due to corrosion.

Acknowledgements

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References

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2. Manual: Industrial Wood Preservation - Specification and Practice, 2nd edition, Wood Protection Association, 2012
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7. Digest 429: Timbers: their natural durability and resistance to preservative treatment, ISBN 1860812090, BRE, 1998
8. Z12 Preservative/ fire retardant treatment, National Building Specification, at www.thenbs.com

About TRADA

The Timber Research and Development Association (TRADA) is an internationally recognised centre of excellence on the specification and use of timber and wood products.

TRADA is a company limited by guarantee and not-for-profit membership-based organisation. TRADA's origins go back over 75 years and its name is synonymous with independence and authority. Its position in the industry is unique with a diverse membership encompassing companies and individuals from around the world and across the entire wood supply chain, from producers, merchants and manufacturers, to architects, engineers and end users.

Our aim

To provide members with the highest quality information on timber and wood products to enable them to maximise the benefits that timber can provide.

What we do

We seek to achieve this aim through active and on-going programmes of information and research. Information is provided through our website, an extensive collection of printed materials and our training courses.

Research is largely driven by the desire to update and improve our information so that it continues to meet our members' needs in the future.

TRADA Technology is contracted by the Timber Research and Development Association to prepare and publish all Wood Information Sheets.

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