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BSI Standards Publication

Durability of wood and wood-based products — Use classes: definitions, application to solid wood and wood-based products

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National foreword

This British Standard is the UK implementation of EN 335:2013. It supersedes BS EN 335-1:2006 and BS EN 335-2:2006 and BS EN 335-3:1996 which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/515, Wood preservation.

A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Durability of wood and wood-based products - Use classes: definitions, application to solid wood and wood-based products

Durabilité du bois et des matériaux à base de bois - Classes d'emploi: définitions, application au bois massif et aux matériaux à base de bois

Dauerhaftigkeit von Holz und Holzprodukten - Gebrauchsklassen: Definitionen, Anwendung bei Vollholz und Holzprodukten

This European Standard was approved by CEN on 5 February 2013.

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Foreword

This document (EN 335:2013) has been prepared by Technical Committee CEN/TC 38 “Durability of wood and wood-based products”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 335-3:1995, EN 335-1:2006 and EN 335-2:2006.

Compared to EN 335, parts 1 to 3, the main modifications are as follows:

1) the former three parts of EN 335 have been combined;

2) the subclasses 3.1 and 3.2 have been redefined;

3) the subdivision of use class 4 has been omitted.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

This standard gives general definitions of use classes for different service situations and is relevant to solid wood and wood-based products.

This standard gives information on the biological agents that can attack wood and wood-based products in defined situations.

The possibility of alignment between the three service classes of Eurocode 5 (EN 1995-1-1) and the five use classes of EN 335 has been carefully studied. It is important to note that the two systems use different criteria to achieve different results.

Annex A gives guidance on relationships between use classes and service classes.

Annex B gives additional information for the assignment of use classes.

Annex C gives information on biological agents.

1 Scope

This European Standard is applicable to solid wood and wood-based products.

This European Standard defines five use classes that represent different service situations to which wood and wood-based products can be exposed. This standard also indicates the biological agents relevant to each situation.

A use class is not a performance class and does not give guidance for how long wood and wood-based product will last in service.

2 Normative references

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

EN 1001-2:2005, *Durability of wood and wood-based products — Terminology — Part 2:Vocabulary*

EN 1995-1-1, *Eurocode 5 — Design of timber structures — Part 1-1: General — Common rules and rules for buildings*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1001-2:2005 and the following apply.

3.1
service situation
situation of exposure of the wood element in use

3.2
wood-based product
any products containing wood

Note 1 to entry: For instance solid wood panel, laminated veneer lumber (LVL), plywood, oriented strand board (OSB), resin-bonded particleboard, cement-bonded particleboard or fibreboard, modified wood are wood-based products.

4 Use classes: application to wood and wood-based products

4.1 General

The differences between the use classes are based on differences in environment exposures that can make the wood or wood-based products susceptible to biological deterioration.

NOTE Border line and extreme cases of use of wood and wood-based products exist. This can cause the assignment of a use class that differs from that defined in this standard (see Annex B).

4.2 Use class 1 (UC 1)

Situations in which the wood or wood-based product is inside a construction, not exposed to the weather and wetting.

The attack by disfiguring fungi or wood-destroying fungi is insignificant and always accidental.

Attack by wood-boring insects, including termites, is possible although the frequency and importance of the insect occurrence depends on the geographical region[1)].

4.3 Use class 2 (UC 2)

Situations in which the wood or wood-based product is under cover and not exposed to the weather (particularly rain and driven rain) but where occasional, but not persistent, wetting can occur.

In this use class, condensation of water on the surface of wood and wood-based products may occur.

Attack by disfiguring fungi and wood-destroying fungi is possible.

Attack by wood-boring insects, including termites, is possible although the frequency and importance of the insect risk depends on the geographical region[1)].

4.4 Use class 3 (UC 3)

4.4.1 General

Situations in which the wood or wood-based product is above ground and exposed to the weather (particularly rain).

Attack by disfiguring fungi and wood-destroying fungi is possible.

Attack by wood-boring insects, including termites, is possible although the frequency and importance of the insect risk depends on the geographical region[1)].

A large variety of in-use situations exists and, when relevant, use class 3 may be divided into two sub-classes use class 3.1 and use class 3.2.

NOTE Decay risk depends on the climatic and other in-use conditions (temperature, RH, rainfall, structural conditions, design details and maintenance provisions).

4.4.2 Sub-class 3.1 (UC 3.1)

In this situation the wood and wood-based products will not remain wet for long periods. Water will not accumulate.

NOTE This may be achieved by, for example, a maintained and suitable coating, or by design or orientation of components to shed water or to dry quickly.

4.4.3 Sub-class 3.2 (UC 3.2)

In this situation the wood and wood-based products will remain wet for long periods. Water may accumulate.

NOTE Components are not designed or orientated to shed water or dry quickly.

4.5 Use class 4 (UC 4)

A situation in which the wood or wood-based product is in direct contact with ground and/or fresh water.

Attack by disfiguring fungi and wood-destroying fungi is possible.

[1)] If national standards do not specify the risk of insect attack, local or national experts should be consulted for advice on the risk of insect attack.

Attack by wood-boring insects, including termites, is possible although the frequency and importance of the insect occurrence depends on the geographical region [1)].

NOTE Wood and wood-based products which are constantly below water level or completely buried and fully saturated by water are not susceptible to be attacked by fungi but may be damaged by bacterial decay.

4.6 Use class 5 (UC 5)

A situation in which the wood or wood-based product is permanently or regularly submerged in salt water (i.e. sea water and brackish water).

Attack by invertebrate marine organisms is the principal problem, particularly in the warmer waters where organisms such as *Limnoria* spp., *Teredo* spp. and Pholads can cause significant damage. Attack by wood-destroying fungi and growth of surface moulds and staining fungi is also possible.

The above water portion of certain components, for example harbour piles, can be exposed to wood-boring insects.

4.7 Summary of use classes for wood and wood-based products

Table 1 — Summary of use classes and relevant attacking biological agents for wood and wood-based products

Use class	General use situation [a]	Occurrence of biological agents [b, c]				
		Disfiguring fungi	Wood-destroying fungi	Beetles	Termites	Marine borers
1	Interior, dry	-	-	U	L	-
2	Interior, or under cover, not exposed to the weather. Possibility of water condensation	U	U	U	L	-
3	Exterior, above ground, exposed to the weather. When sub-divided: **3.1** limited wetting conditions **3.2** prolonged wetting conditions	U	U	U	L	-
4	Exterior in ground contact and/or fresh water	U	U	U	L	-
5	Permanently or regularly submerged in salt water	U[d]	U[d]	U[d]	L[d]	U

U = ubiquitous in Europe and EU territories
L = locally present in Europe and EU territories

[a] Border line and extreme cases of use of wood and wood-based products exist. This can cause the assignment of a use class that differs from that defined in this standard (see Annex B).

[b] It may not be necessary to protect against all biological agents listed as they may not be present or economically significant in all service conditions in all geographic regions, or may not be able to attack some wood-based products due to the specific constitution of the product.

[c] See Annex C.

[d] The above water portion of certain components can be exposed to all of the above biological agents.

Annex A
(informative)

Service classes according to EN 1995-1-1

EN 1995-1-1 defines a set of three service classes which are relevant to a designer when assigning strength values and calculating deformations for timber elements to be used in a construction. These service classes are determined by the wood moisture content corresponding to the humidity and temperature which are expected to prevail in service.

The wood moisture content is also an important factor in biological durability, but the system of service classes in EN 1995-1-1 and the system of use classes in this standard differ in their considerations of the effects of this moisture, and individual classes do not directly align with one another.

Table A.1 gives guidance on the possible corresponding use classes for each of the service classes. Service class definitions in EN 1995-1-1 and use class definitions in this standard should be consulted to ensure correct classification.

Attention of users is drawn to the need to avoid misinterpretation of any numbering system using classes for timber that cannot correspond exactly to the European use classes defined in EN 335.

Specifiers need to work with both systems when designing load bearing structures.

Table A.1 – Service classes and their possible corresponding use classes

Service class according to EN 1995-1-1	Possible corresponding use class according to EN 335:2012
Service class 1	Use class 1
Service class 2	Use class 1 Use class 2 if the component is in a situation where it could be subjected to occasional wetting caused by e.g. condensation
Service class 3	Use class 2 Use class 3 or higher if used externally

Annex B
(informative)

Additional information for the assignment of use classes

If the use class or intended use conditions of a component cannot be accurately determined, or when different parts of the same component are deemed to be in different use classes, decisions should be taken with regard to the more severe of the possible use classes.

In situations where wood components out of ground contact may permanently accumulate water due to their design, or where deposits of dirt, soil, leaves etc. for a longer period can be expected, it may be necessary to consider that these situations are equivalent to contact with the ground or fresh water.

In interior use situations where high wetting conditions are to be expected, it may be necessary to assign a more severe use class.

Annex C
(informative)

Information on biological agents

C.1 General

Fungi, insects and marine borers affect both wood and wood-based products in different ways. The significance of attack by these agents can be different for solid wood and wood-based products.

The consequence of wood and wood-based products being exposed to service conditions defined by the various use classes will vary depending upon their reactions to different wetting regimes.

C.2 Fungi

C.2.1 General

A wood moisture content of more than 20 % [1)] is usually necessary for the development of fungi.

C.2.2 Wood-destroying fungi

C.2.2.1 Basidiomycete wood-rotting fungi

Fungi responsible for brown rot and white rot.

C.2.2.2 Soft rot fungi

Fungi responsible for a type of rot characterised by surface softening of the wood although they can also cause rot at depth.

These fungi need higher wood moisture content than basidiomycetes to decay wood. They are of special significance for wood in ground contact or in water.

C.2.3 Wood-disfiguring fungi

C.2.3.1 General

Fungi causing blue stain and mould in service.

These fungi are mainly of practical concern in relation to aesthetic appearance. They can degrade decorative and protective coatings.

C.2.3.2 Blue stain fungi

Fungi causing blue to black permanent discoloration of variable intensity and depth mainly in the sapwood of certain wood species. This does not result in appreciable alteration of the mechanical properties but can increase the permeability and the susceptibility to wood-decay fungi.

1) In decay-susceptible solid wood determined according to ISO 3130.

C.2.3.3 Mould fungi

These fungi are evident as spots of various colours on the surface of wood, and develop as a result of high relative humidity or of condensation of water vapour.

These fungi do not significantly alter the mechanical properties of the wood.

These fungi are not specific to wood and can occur on any material with sufficient moisture content.

C.3 Insects

C.3.1 Coleoptera (beetles)

C.3.1.1 General

Flying insects which lay their eggs in wood pores or cracks and which have larvae that feed on the wood.

They occur throughout Europe but the risk of attack varies greatly from high to insignificant. The most important are *Hylotrupes bajulus*, *Anobium punctatum* and *Lyctus brunneus*.

C.3.1.2 *Hylotrupes bajulus* (House longhorn beetle)

This beetle attacks many softwood species and can cause significant structural damage.

This insect occurs throughout Europe, but is of less importance in the north and north-west of Europe. The vitality and longevity of larvae depend principally on ambient temperature and the wood moisture content.

C.3.1.3 *Anobium punctatum* (Common furniture beetle)

This insect attacks the sapwood of most timber species (soft- and hardwoods). The damage caused can extend to the heartwood in some wood species and in some cases can cause significant structural damage. Its presence is particularly noted where damp conditions prevail.

C.3.1.4 *Lyctus brunneus* (Powder post beetle)

This insect attacks the sapwood of certain starch-containing hardwoods.

C.3.1.5 Miscellaneous

Many other wood-destroying beetles exist which are either of lesser or only regional importance, examples of which are *Hesperophanes* spp*, Xestobium rufovillosum, Nicobium* spp. and other *Lyctus* species than *Lyctus brunneus*.

C.3.2 Isoptera (termites)

Termites are social insects and are classified in various families.

Termites are found in Europe only in certain defined geographical areas.

Termites can attack wood, cellulose-based materials and generally any kind of building or other materials which are soft enough to allow their destruction, even if not used as a direct source of food.

C.4 Marine borers

Term applied essentially to marine invertebrates such as *Limnoria* spp., *Teredo* spp. and Pholads which need a certain salinity of water and which hollow out extensive tunnels and cavities in wood.

Bibliography

[1] ISO 3130, *Wood — Determination of moisture content for physical and mechanical tests*

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