
Trajnost odziva na ogenj - Razredi lesnih proizvodov, obdelanih z zaščitnimi sredstvi proti ognju, za uporabo v notranjih prostorih in na prostem

Durability of reaction to fire performance - Classes of fire-retardant treated wood products in interior and exterior end use applications

Dauerhaftigkeit des Verhaltens bei Brandeinwirkung - Klassen der mit Feuerschutzmitteln behandelten Holzprodukte für Anwendungen im Innen- und Außenbereich

Durabilité des performances de réaction au feu - Classement des produits à base de bois ignifugés pour utilisation finale en intérieur et en extérieur

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13.220.40	Sposobnost vžiga in obnašanje materialov in proizvodov pri gorenju	Ignitability and burning behaviour of materials and products
71.100.50	Kemikalije za zaščito lesa	Wood-protecting chemicals
79.040	Les, hlodovina in žagan les	Wood, sawlogs and sawn timber

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Durability of reaction to fire performance - Classes of fire-retardant treated wood products in interior and exterior end use applications

Durabilité des performances de réaction au feu -
Classement des produits à base de bois ignifugés pour
utilisation finale en intérieur et en extérieur

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Klassen der mit Feuerschutzmitteln behandelten
Holzprodukte für Anwendungen im Innen- und
Außenbereich

This European Standard was approved by CEN on 2 July 2017.

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European foreword

This document (EN 16755:2017) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, 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of an identical text or by endorsement, at the latest by April 2018, and conflicting national standards shall be withdrawn at the latest by April 2018.

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

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Introduction

Fire-retardant treatments may considerably improve the reaction to fire properties of wood products and these may result in wood products having the highest fire performance characteristics achievable with any combustible product. However, the reaction to fire performance may be reduced by exposure to wet and/or humid conditions [11] and the ability of the treated products to continue to perform even when exposed to these conditions needs to be demonstrated.

Two aspects of the reaction to fire durability of fire-retardant wood products need to be considered. One is the risk for high moisture content and migration of the fire-retardant chemicals within the wood product and salt crystallization on the product surface that may fall off and reduce the improved fire properties. These hygroscopic properties of the treated wood product can be evaluated by exposure to high relative humidity.

The other aspect is the risk for decreased fire performance due to loss of the fire-retardant chemicals by leaching in exterior applications, e.g. facade claddings. Maintained fire performance after weathering needs to be verified.

This standard is based on the Technical Specification CEN/TS 15912, on a Nordtest standard [20] and on experience from North America [10, 9].

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1 Scope

This European Standard describes the characteristics for fire-retardant treated wood products.

NOTE 1 It is based on maintaining performance undiminished throughout the desired service life in the anticipated conditions of use.

The European Standard prescribes the classification requirements for the durability of the reaction to fire performance of fire-retardant treated wood products to be used in interior and exterior end use conditions.

This European Standard applies to wood which has been treated during a production process with fire retardant products applied either by a penetration process or by a superficial process, such as with a film forming or intumescent fire retardant coating. It covers fire-retardant treated products that are coated with an ordinary paint.

Mechanical properties and biological durability of fire-retardant treated wood products are not covered by this European Standard.

NOTE 2 This standard can be used for other manufactured wood products.

This standard covers wood products. It doesn't cover wood-based panels.

NOTE 3 Wood based panels for construction are described in EN 13986.

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 927-3, *Paints and varnishes — Coating materials and coating systems for exterior wood — Part 3: Natural weathering test*

EN 927-6, *Paints and varnishes — Coating materials and coating systems for exterior wood — Part 6: Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water*

EN 13238, *Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 13823, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*

ISO 5660-1, *Reaction-to-fire tests — Heat release, smoke production and mass loss rate — Part 1: Heat release rate (cone calorimeter method) and smoke production rate (dynamic measurement)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 service classes

3.1.1

dry condition

DRF INT1

moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air exceeding 65 % only for a few weeks per year

Note 1 to entry: In Eurocode EN 1995–1–1 as Service class 1.

3.1.2

humid condition

DRF INT2

moisture content in the material corresponding to a temperature of 20 °C and a relative humidity of the surrounding air exceeding 85 % only for a few weeks per year

Note 1 to entry: In EN 1995–1–1 defined as Service class 2.

3.2

ordinary paint

non-fire retardant paint

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4 Symbols and abbreviations

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The symbols for DRF Classes INT1, INT2 and EXT are the following ones:



Figure 1 — Proposed symbols for classes

5 Requirements

5.1 Wood products and non-fire-retardant coating systems

The treatment manufacturing process and application rate declared by the producer shall be declared by the manufacturer of the final product. Actual fire-retardant retention shall be expressed in kg/m³ of the final wood product, or in kg/m² for surface treated products. Values shall be given for products conditioned at (50 ± 5)% relative humidity at (23 ± 2) °C (as for fire testing) according to EN 13238.

For products in DRF Classes INT and EXT procedures for maintenance shall be provided by the manufacturers regarding:

- type of maintenance;
- interval of maintenance;

- time until to the first maintenance/recoating (if relevant);
- coating system to be used initially and at maintenance (if relevant).

Verification of DRF Class EXT obtained without a coating system (with an ordinary paint) is valid also for the same product coated, provided that the coating does not reduce the reaction to fire performance.

The maintained fire performance of a coated product (with an ordinary paint) may be verified by fire testing according to EN 13823 or ISO 5660-1.

Verification of DRF Class EXT is valid for thicker wood products than verified, but not for thinner.

5.2 Reaction to fire performance

5.2.1 Initial classification for reaction to fire

Classification testing for reaction to fire performance shall be performed. The products shall fulfil a specified fire performance according to a recognized reaction to fire standard. The recognized standards are for construction products EN 13501-1 and for maritime application the IMO Code FTP [12].

5.2.2 Reaction to fire performance before and after accelerated or natural weathering

5.2.2.1 General

Reaction to fire performance before and after weather exposure shall be performed according to 5.2.2.2.

The weather exposure shall be performed according to an accelerated procedure, see Annex B, or according to EN 927-6 or natural weathering according to EN 927-3. If there is a contestation, the reference test method is EN 927-3 with fire testing according to EN 13823 before and after weathering.

For the accelerated weathering, it is essential that the exposed samples are large enough to be fire tested. Thus, minimum width is 100 mm (minimum according to ISO 5660-1).

For the accelerated weathering, it is also essential that the exposed samples are large enough to fulfil the cutting requirements in 5.2.2.2.3 and Annex B.

For the natural weathering, it is essential that the exposed samples are large enough to be fire tested either by European standards or by small scale testing, see 5.2.2.2.2 and 5.2.2.2.3.

It is recommended that the natural weathering according to EN 927-3 is extended for at least one year as specified in EN 927-3, since experience shows that the fire performance may degrade during up to 10 years [21, 20].

For the natural weathering, exposure at 45° slope is recommended.

Natural weathering at relevant conditions for the specific end use is most desirable, but such data are usually not available. It is recommended that a set of the products going through an accelerated weathering procedure is also exposed to natural weathering, in order to gain experience on the relationship between accelerated and natural weathering.

Additional variations of the product, e.g. additional coating systems (with ordinary paints), could preferably be evaluated at the same time. Examples of weathering studies are given in [21, 20].

5.2.2.2 Testing for reaction to fire performance

5.2.2.2.1 General

The reaction to fire performance after weathering shall be tested according to one of the following two procedures:

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5.2.2.2.2 Fire performance testing according to European standards

The preferred test method is the same as for the initial classification according to 5.2.1, i.e. EN 13823. At least one replicate may be used for the fire testing after weathering. The same mounting conditions shall be used for the fire testing before and after weathering.

5.2.2.2.3 Fire performance according to small scale testing

Alternatively, fire testing may be performed in small scale according to the cone calorimeter ISO 5660-1. This alternative is justified by correlation studies with methods for classification test methods of many product, e.g. [21, 22, 23]. Some data on limited correlation are also available [19].

At least three replicates at a heat flux 50 kW/m² for at least 1 200 s shall be tested. Conditioning for ISO 5660-1 tests shall be carried out according to EN 13238.

If this alternative is chosen, testing of the product before weathering is also needed for comparison of the fire performance before and after weathering.

The preparation of small test specimens of fire-retardant treated wood products is very important for the test results obtained, since the amount of fire-retardant chemicals may vary between small samples. This is especially important for impregnated solid wood products. Such specimens shall therefore be cut in order to represent the fire properties of the full wood plank. A suitable procedure as specified in [13] is recommended:

- Specimens should be cut approximately 0,1 m from the end of the plank;
- Specimens should not have knots in the centre area – sound knots covered by the edge frame in the ISO 5660 series may be used.

5.3 Durability of reaction to fire performance

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5.3.1 General

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Three classes for the Durability of Reaction to Fire performance are defined:

- **DRF Class INT1** for permanent use in interior dry applications, service class 1 (e.g. wall and ceiling products);
- **DRF Class INT2** for permanent use in interior humid applications, service class 2 (e.g. wall and ceiling products);
- **DRF Class EXT** for permanent use in exterior applications, service class 3 (e.g. facade claddings, exterior conditions).

The following items shall be reported for each DRF class, see Table 1.

5.3.2 DRF Class INT1

- Reaction to fire class, initial, according to 5.2.1.

5.3.3 DRF Class INT2

- Reaction to fire class, initial, according to 5.2.1.
- Hygroscopic properties at (90 ± 5) % RH and (27 ± 2) °C according to Annex A. The test shall be carried out with samples uncoated (with an ordinary paint). The equilibrium moisture content shall be < 28 %.

5.3.4 DRF Class EXT

- a) Reaction to fire class, initial, according to 5.2.1:
 - 1) initial fire class;
 - 2) maintained fire performance after weathering according to 5.2.2.1 and Table 1.
- b) Hygroscopic properties at $(90 \pm 5) \% \text{ RH}$ and $(27 \pm 2) ^\circ\text{C}$ according to Annex A. The test shall be carried out with samples uncoated (with an ordinary paint). The equilibrium moisture content shall be $< 28 \%$.

Products in DRF Class EXT meet the criteria DRF Class INT1 and INT2, but not vice versa.

NOTE 1 Background information on criteria for reaction to fire performance is available in [21, 22, 23].

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