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

Durability of reaction to fire performances - Classes of fire retardant treated wood-based product in interior and exterior end use applications

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

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

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ICS 71.100.50

English Version

Durability of reaction to fire performance - Classes of fire-retardant treated wood-based product 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

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

This Technical Specification (CEN/TS) was approved by CEN on 14 February 2012 for provisional application.

The period of validity of this CEN/TS is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the CEN/TS can be converted into a European Standard.

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CEN/TS 15912:2012 (E)**Foreword**

This document (CEN/TS 15912:2012) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, the secretariat of which is held by AFNOR.

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Introduction

Fire-retardant treatments may considerably improve the reaction to fire properties of wood and wood-based products and these may result in wood having the highest fire-resisting characteristics achievable with any combustible product. However, the reaction to fire performance may be reduced by exposure to wet and/or humid conditions [1] and the ability of treatments to continue to perform even when exposed to these conditions needs to be demonstrated.

Two aspects of fire durability of the fire-retardant treatment of wood-based 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 crystallisation on the product surface. These hygroscopic properties of the treated wood-based 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.

The Technical Specification is based on a Nordtest standard [15] and on experience from North America [7] [12].

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CEN/TS 15912:2012 (E)**1 Scope**

This European Technical Specification describes the characteristics which fire-retardant treated wood products should exhibit so that their fire-retardant properties persist undiminished throughout the desired service life in the anticipated conditions of use.

The Technical Specification prescribes the classification requirements for the durability of the reaction to fire performance of fire-retardant treated wood-based products to be used in interior and exterior end use conditions. The products initially need to meet required reaction to fire classification. For interior and exterior use, limited hygroscopicity needs to be verified. In addition, products for exterior use needs to meet the minimum durability of reaction to fire performance requirements specific to the end use.

The requirements are applicable for fire-retardant treated (applied by penetrating and superficial processes or with film forming or intumescent fire-retardant coatings) solid wood and wood-based products and wood-based products in which the fire-retardant is incorporated during manufacture. The fire-retardant treated products may be coated with an ordinary paint.

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

Paints, coatings and varnishes intended to improve the reaction to fire performance of a construction product when incorporated in the works, i.e. a building, are covered by ETAG 028 [19].

This Technical Specification may be used as a basis for an approval system.

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

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

3 Terms and definitions

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

3.1**durability of reaction to fire performance**

DRF

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

- **DRF Class ST** for short term use (e.g. less than one year); no durability performance shall be verified;
- **DRF Class INT1** for permanent use in interior applications, service class 1 (e.g. wall and ceiling products);

- **DRF Class INT2** for permanent use in interior applications and certain protected exterior 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)

3.2 service classes

3.2.1 dry condition

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

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

3.2.2 humid condition

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

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

3.3 ordinary paint

non-fire retardant paint

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4 Symbols

The symbols for DRF Classes ST, INT1, INT2 and EXT are the followings:

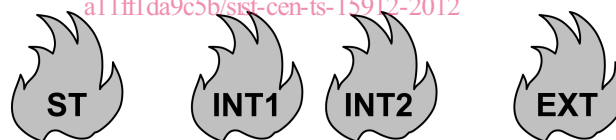


Figure 1 — Proposed symbols for classes

5 Requirements

5.1 Wood-based 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. Remaining fire-retardant chemicals in terms of kg/m^3 of the final wood-based product, or in terms of kg/m^2 for surface treated products, shall be specified. Values shall be given for products conditioned at (50 ± 5) % relative humidity at (23 ± 2) °C (as for fire testing).

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

- type of maintenance;
- interval of maintenance;
- time until to the first maintenance/recoating (if relevant);

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— 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.

NOTE The maintained fire performance of a coated product (with an ordinary paint) may be verified by fire testing e.g. in the cone calorimeter.

Verification of DRF Class EXT is valid for thicker wood-based 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 have to fulfil a specified fire performance according to a recognised reaction to fire standard. Relevant systems are, for instance, the European reaction to fire classification system according to EN 13501-1 and for products which are not used in construction, the IMO Code FTP [2].

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 A.2, or a similar accelerated test procedure, e.g. 5 months exposure in A.3, or natural weathering according to EN 927-3, or at relevant and specified outdoor conditions for at least 5 years.

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

NOTE 2 For the accelerated weathering, it is also essential that the exposed samples are large enough to fulfil the cutting requirements in 5.2.2.2.2 and A.2.

NOTE 3 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.

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 [4] [5].

5.2.2.2 Testing for reaction to fire performance**5.2.2.2.1 Generality**

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

5.2.2.2.2 Classification testing

The same test methods as for the initial classification according to 5.2.1 may be used. For testing according to EN 13823, only one replicate may be used for the fire testing after weathering.

5.2.2.2.3 Small scale testing

Alternatively, fire testing may be performed according to ISO 5660-1 (cone calorimeter) at a heat flux 50 kW/m^2 for at least 1 200 s. Conditioning for ISO 5660-1 tests is carried out in the same way as 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.

NOTE 1 This alternative is justified by correlation studies with methods for classification test methods, e.g. [16] [17] [18].

The preparation of small test specimens of fire-retardant treated wood and wood based products are 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 is specified in [3].

NOTE 2 The following conclusions on sampling of wood panelling are given in [3]:

- Specimens should be cut approximately 1 m from the end of the plank;
- Specimens should not have knots in the centre area – knots covered by the frame may be used.

5.3 Durability of reaction to fire performance

5.3.1 General

The following items shall be reported for each DRF class.

5.3.2 DRF Class ST

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

5.3.3 DRF Class INT1

— Reaction to fire class, initial, according to 5.2.1;

— Hygroscopic properties at $(70 \pm 5) \% \text{ RH}$ and $(25 \pm 2) ^\circ\text{C}$ according to A.1. The test shall be carried out with samples uncoated (with an ordinary paint). The equilibrium moisture content shall be $< 20 \%$.

5.3.4 DRF Class INT2

— Reaction to fire class, initial, according to 5.2.1;

— Hygroscopic properties at $(90 \pm 5) \% \text{ RH}$ and $(27 \pm 2) ^\circ\text{C}$ according to A.1. The test shall be carried out with samples uncoated (with an ordinary paint). The equilibrium moisture content shall be $< 28 \%$.

5.3.5 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 A.1. The test shall be carried out with samples uncoated (with an ordinary paint). Equilibrium moisture content shall be $< 28 \%$.

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NOTE 1 Products in DRF Class EXT meet the criteria DRF Class INT1 and INT2, but not vice versa.

NOTE 2 Background information on criteria for reaction to fire performance is available in [16] [17] [18].

Table 1 — Requirements for DRF Classes of fire-retardant wood-based products in interior and exterior end use applications

DRF class		Existing fire requirements	Additional performance requirements at different end use of fire-retardant wood-based products ^a	
	Intended use	Reaction to fire class, initial	Hygroscopic properties ^b	Reaction to fire performance after weather exposure
ST	Short term	Relevant fire class	-	-
INT1	Interior dry applications	Relevant fire class	- Moisture content < 20 % - No exudation of liquid - Minimum visible salt with no increase at surface	-
INT2	Interior humid applications	Relevant fire class	- Moisture content < 28 % - No exudation of liquid - Minimum visible salt with no increase at surface	-
EXT^e	Exterior applications	Relevant fire class	- Moisture content < 28 % - No exudation of liquid - Minimum visible salt with no increase at surface	Maintained reaction to fire performance ^{c, d} after - Accelerated weathering or - Natural weathering or - Other referenced and recognised weathering method Application of specified maintenance may be included.

^a To be fulfilled using product produced in the same way using the same manufacturing process and having a similar retention level as for the reaction to fire performance.

^b For INT1 at (70 ± 5) % RH and (25 ± 2) °C and for INT2 at (90 ± 5) % RH and (27 ± 2) °C according to A.1. Classes INT1, INT2 and EXT are only applicable for product application rates less than or equal to the highest level tested. Wood products treated to higher application rates will be assumed to be Class ST.

^c Criteria for fire testing according to 5.2.2.2.2 after weather exposure:

Class B products: $RHR_{30s\ ave} \leq 150 \text{ kW/m}^2$ during 600s after ignition and THR_{600s} increase < 20 % compared to testing before the weather exposure.

Class C products: $RHR_{30s\ ave} \leq 220 \text{ kW/m}^2$ during 600s after ignition and THR_{600s} increase < 20 % compared to testing before the weather exposure.

For the other methods according to 5.2.2.2.1, the relevant classification criteria shall be used. The same classification level shall be reached.

^d For DRF Class EXT, the Durability of Reaction to Fire performance classification is only valid for the type of coating system (with an ordinary paint) to be verified.

^e 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.