

Fire Behaviour of TMT

Normative Bases and Requirements

Fire behaviour as a principal property of construction products is well defined by building law (EU Construction Products Regulation, building regulations as adopted by the individual states). On the European level, the normative basis is EN 13501-1 "Fire classification of construction products and building elements. Classification using data from reaction to fire tests". The most important test standards are the EN ISO 11925-2 (Ignitability in a single-flame source test), the DIN EN 13823 (Single burning item (SBI) test) or for flooring the EN ISO 9239-1 (Radiant panel test). The (still) applicable German standards for determining and evaluating the fire behaviour of are DIN 4102-1 et seq.

In European classification, construction products class B2 "normally flammable" acc. to DIN 4102-1, which applies to common construction timber, is subdivided into Classes D and E. While testing for Classes E or B2, respectively, merely focuses on flammability, the SBI Test and Radiant Panel Test also take into consideration the energy release or critical heat flow as well as the respective emission of smoke. The products are classified following the European fire classification acc. to EN 13501-1 within the scope of the CE marking of sawn construction timber acc. to EN 14081-1.

The requirements of the fire behaviour of construction products and hence of TMT derive in particular from the building regulations as adopted by the federal states and directly depend on the specific use or building project. If requirements exist, fire behaviour testing is compulsory for the individual case.

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TMT as technically modified timber cannot a priori be classified like native timber can. The modification process has different effects on fire behaviour. For example, the degradation of substances contained in the timber (e.g., resins, terpenes) has a rather inhibiting effect, while the reduction of wood moisture rather promotes fire behaviour. Since this – as do other properties, too – depends on the wood species and on the method of treatment, the specific TMT or construction parts must be subjected to fire testing. Up to now, there have merely been results of single-case investigations of an orientating character since no special requirements exist regarding the purposes of application. Individual investigations have shown that, with view of its flammability, TMT behaves like natural wood. However, what needs to be borne in mind is its modified smouldering fire behaviour. In that respect, there is no specific or generally acknowledged test method yet. But smouldering fire behaviour is taken into account and evaluated in SBI or Radiant Panel testing. Subject to specific testing, ascribing TMT to European construction products class E or German construction products class B2 should be sensible.

Classification

For assessing the fire behaviour of TMT, it can provisionally be classified, without any further testing, acc. to EN 14081-1:2011-05, Annex C. In accordance to that, timber used for load-bearing purposes of fire behaviour class or Euroclass D-s2 can be graded d0, if its mean raw density is at least 350 kg/m³ and its thickness at least 22. However, this applies only to the wood species listed there (Table B.1).

For the provisional classification without testing, also DIN 4102-4:1994-03 "Fire behaviour of building materials and building components" can be adopted. Acc. to Section 2.3.2, timber can be graded as Building Material Class B2 "combustible, normally flammable" if its raw density is at least 400 kg/m³ and its thickness more than 2 mm or its raw density is at least 230 kg/m³ and its thickness more than 5 mm.

Bibliography

- DIN 4102:1998: Fire behaviour of building materials and elements – Part 1: Building materials; terms, requirements and testing
- EN ISO 9239-1:2010: Reaction to fire tests for floorings – Part 1: Determination of the burning behaviour using a radiant heat source (ISO 9239-1:2010);
- EN ISO 11925-2:2010: Reaction to fire tests – Ignitability of products subjected to direct impingement of flame – Part 2: Single-flame source test
- EN 13501-1:2007+A1:2009: Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests
- EN 14081-1:2005+A1:2011: Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements

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