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Predizdelane lesene stopnice - Mehanske preskusne metode

Prefabricated timber stairs - Mechanical test methods

Vorgefertigte Holztreppen - Mechanische Prüfverfahren

Escaliers préfabriqués en bois - Méthodes d'essai mécaniques

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Prefabricated timber stairs - Mechanical test methods

Escaliers préfabriqués en bois - Méthodes d'essai mécaniques

Vorgefertigte Holztreppen - Mechanische Prüfverfahren

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Foreword

This document (CEN/TS 15680:2007) 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

There are a number of methods of evaluating the mechanical performance of stairs. These include:

- testing,

- calculation,

- conventional accepted performance.

All methods have equal validity.

This standard identifies a number of possible test methods which can be used.

1 Scope

This Technical Specification gives test methods for prefabricated timber stairs. These stairs are made from timber and/or wood-based materials.

The methods included in this document can also be used for single components used in stairs (e.g. steps, handrails, balusters, …).

This document does not consider the overall structure design of these elements. Stairs that are designed to contribute to the overall stability of the works or to the strength of the structure are not covered by this standard.

The surfaces of the timber elements may be exposed or covered by finishes.

NOTE 1 Where stairs are supplied with a finish or covering, some basic characteristics will not be covered by this standard and references should be made to the appropriate product standard (e.g. colour fastness of carpet finishes)

NOTE 2 Where the term "stair" is used in this document, it may also apply to individual element or component where appropriate

Tests can be carried out on a complete fully assembled system according to manufacturer installation instructions or on individual components.

A fully assembled stair test cannot be used to evaluate individual components.

There is no particular hierarchy of sequences or the need to carry out all the tests.

NOTE The nature of used tests and elements can be given by national regulations.

2 Normative references

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

EN 1991-1-1, *Eurocode 1 : Actions on structures – Part 1-1:General actions – Densities, self-weight, imposed loads for buildings*

EN 14076 : 2004, *Timber stairs – Terminology*

PrEN 15644 : 2007, *Traditionally designed prefabricated stairs made of solid wood – Specifications and requirements.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14076:2004 and in prEN 15644:2007 apply.

4 Determination of mechanical strength of balusters under static load on prefabricated railing system : handrails or balustrades

4.1 General

This test provides a method to determine mechanical strength under concentrated static load of balusters made also with different materials, being a part of prefabricated railing system, handrails or balustrades.

This test applies to all handrails or balustrades of any material used for their construction, as usually installed and used, according to producer recommendations, in a construction. It does not apply to handrails or balustrades made on site and/or installed with building works.

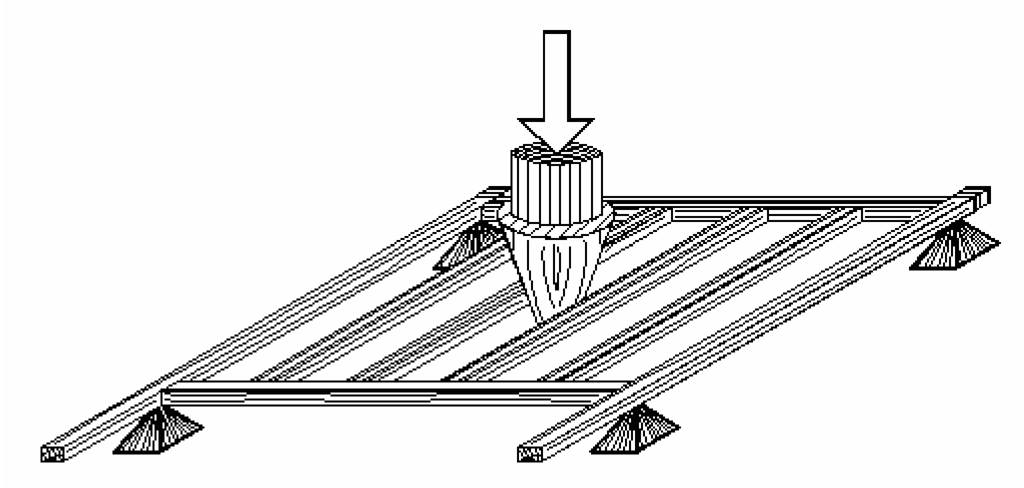
4.2 Principle

Application of a concentrated load on a standardized conical element put between two balusters, checking deformations and possible breaks of these elements and their anchorages.

NOTE The conical element is the concentrated load application device made with rigid material (for wood > 700 kg/m^3), cone-shaped or frustum of cone, with 30° summit angle and base diameter > 200 mm.

4.3 Equipment

4.3.1 A support structure which is composed by rigid frame to fix the components system of, balustrade or handrail , according to producer instruction : such a frame shall allow the installation of different components in horizontal or vertical position (balustrade or handrail), see Figure 1.



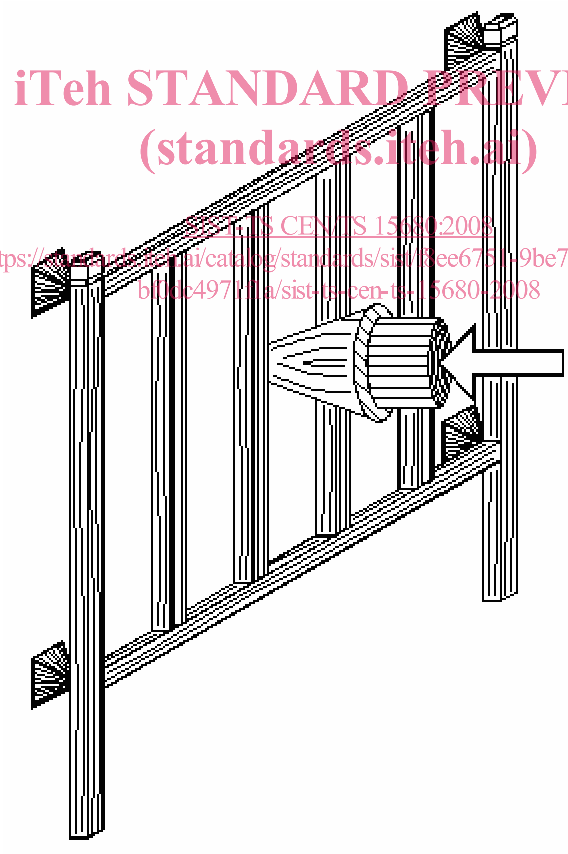


Figure 1 — Example of a support structure

4.3.2 Virtually rigid anchorage system of upper element of handrail or balustrade.

4.3.3 Concentrated load application system including cone-shape or frustum of cone interposed element as above-mentioned

4.4 Conditioning

Temperature and air humidity of the laboratory shall be specified in test report.

4.5 Sampling

For 3 tests, the sampling is composed at least by 6 balusters.

4.6 Procedure

— For individual components, tested system shall be fixed into the support structure;

— The top of the tested element, next to load application point of the balusters, shall be locked, to avoid deformations during load application;

— Put load application system, so that the interposition cone is placed between two balusters on the worst position, typically closest to the half of their height, measured between the lowest and the upper anchorage;

— Apply the load according to tested element's use (see prEN 15644:2007, Table A.3); load application shall be progressive (not less than 5 s) and in direction towards the external side of the balustrade or handrail (see Figure 2) and maintain for 15 minutes ;

— Measure the largest distance between the two balusters, within 2 minutes of load application and at the end of the test or note the damage, if any, at the level checked or done ;

— The test shall be repeated for each sample (at least 3 pairs of balusters).

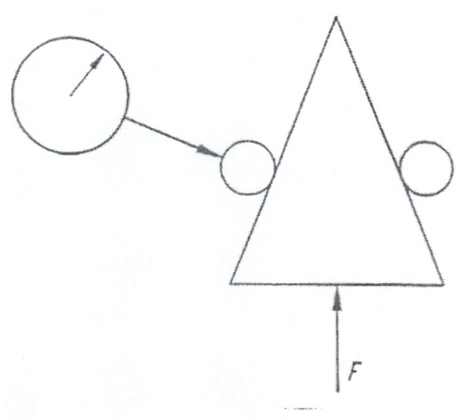


Figure 2 — Example of load application

4.7 Results

At the end of the test, check and record any possible deterioration on tested element which compromise its integrity and it functionality :

— damages of each component of element or relevant anchorage system;

— Specify equipment used;

— Record deformation in each measurement point and the arrow marked under and after loading.

5 Determination of mechanical strength under distributed static load of prefabricated systems : handrails or balustrades

5.1 General

This test provides a method to determine mechanical strength under distributed static loads of prefabricated systems, (handrails or balustrades) as protection for free fall, made by the composition of different components (handrails, balusters, panels and apron linings) made also with different materials.

It applies to all handrails or balustrades of any material used for their construction, as usually installed and used, according to producer recommendations, in a construction. It does not apply to handrails or balustrades made on site and/or installed with building works.

NOTE This test does not apply to the support system (for example newel).

5.2 Principle

Application of a standardized horizontal distributed static load to handrails or balustrades, until rupture or to the minimum load determined in accordance with EN 1991-1-1and its national annexes.

If not specified in national regulation, the material partial safety factor γ_m = 1,5 is to be used for the minimum value of three test. This factor γ_m becomes 1,3 for a 5% fractile (for a confidence level of 75%) of at least 10 tests.

5.3 Equipment

5.3.1 Support structure

This support structure is composed by a rigid frame to fix the component system of the railing, handrail or balustrade, according to producer instructions: such a frame shall allow the installation of different component in horizontal position (handrail or balustrade); the behaviour of tested system with this configuration is comparable to sloping system (railing).

5.3.2 Distributed load application system

Sum of elementary loads applied following the procedure (clause 5.6). Loads system shall be transmitted to handrail and shall not increase the stiffness of tested element.