SLOVENSKI STANDARD
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Zaļ asne konstrukcije- Ġotori ï Varnost

Temporary structures - Tents - Safety

Fliegende Bauten - Zelte - Sicherheit

Structures temporaires - Tentes - Sécurité

Ta slovenski standard je istoveten z: EN 13782:2005

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91.040.99 Druge stavbe Other buildings

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Temporary structures - Tents - Safety

Structures temporaires - Tentes - Sécurité

Fliegende Bauten - Zelte - Sicherheit

This European Standard was approved by CEN on 19 October 2005.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard (EN 13782:200:2005) has been prepared by Technical Committee CEN /TC 152, "Fairground and amusement park machinery and structures - Safety", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by May 2006, and conflicting national standards shall be withdrawn at the latest by May 2006.

Within the framework of its programme of work, CEN/TC 152 requested the WG 2 "Tents" to prepare a European Standard dealing with the safety of tents installed in fairground and amusement parks.

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

Introduction

The object of this European Standard is to provide safety requirements for tents. The safety requirements are aimed to safe-guard persons and objects against damage caused by design, manufacturing and operation of these structures.

These guidelines have been drawn up according to past experience and risk analysis.

Existing national rules concerning health and safety of workers remain untouched.

1 Scope

This European Standard specifies safety requirements which need to be observed at design, calculation, manufacture, installation, maintenance, operation, examination and testing of mobile, temporary installed tents more than 50 m^2 ground area. For tents less than 50 m^2 ground area, it is not necessary to produce the tent book (see Clause 14) and the producer will provide a documentation concerning the burning behaviour of the fabrics and the stability of the structure.

Two tents can be considered as two tents if the distance between them is more than 5 m except otherwise agreed.

These tents are intended to be installed and dismounted repeatedly without loss of substance, temporarily as well as on short term or long-term basis at any places, and multiple purposes.

A simplified calculation for tents with a maximum space of 12 m and a maximum capacity of 300 people is allowed for traditional pole and rope tents.

The field of application of this European Standard covers all kind of temporary covered structures.

Tents erected for a temporary period and dismantled for use elsewhere in fairgrounds and amusement parks are covered by this European Standard.

The content of this European Standard collects the different existing national regulations and guidelines as far as possible.

2 Normative references

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

EN 818 (all parts), *Short link chain for lifting purposes — Safety*

EN 1677-2, *Components for slings — Safety — Part 2: Forged steel lifting hooks with latch, Grade 8*

EN 1677-5, *Components for slings — Safety — Part 5: Forged steel lifting hooks with latch — Grade 4*

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

EN 1991-1-2, *Eurocode 1: Actions on structures — Part 1-2: General actions — Actions on structures exposed to fire*

EN 1991-1-3, *Eurocode 1 — Actions on structures — Part 1-3: General actions — Snow loads*

EN 1991-1-4: *Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions*

EN 1997-1, *Eurocode 7: Geotechnical design - Part 1: General rules*

EN 10204:2004, *Metallic products — Types of inspection documents*

EN 12385-1, *Steel wire ropes — Safety — Part 1: General requirements*

EN 12385-2, *Steel wire ropes — Safety — Part 2: Definitions, designation and classification*

EN 12385-3, *Steel wire ropes — Safety — Part 3: Information for use and maintenance*

EN 12385-4, *Steel wire ropes — Safety — Part 4: Stranded ropes for general lifting applications*

EN 12385-5, *Steel wire ropes — Safety — Part 5: Stranded ropes for lifts*

EN 12385-6, *Steel wire ropes — Safety — Part 6: Stranded ropes for mine shafts*

EN 12385-7, *Steel wire ropes — Safety — Part 7: Locked coil ropes for mine shafts*

EN 12385-8, *Steel wire ropes — Safety — Part 8: Stranded hauling and carrying-hauling ropes for cableway installations designed to carry persons*

EN 12385-9, *Steel wire ropes — Safety — Part 9: Locked coil carrying ropes for cableway installations designed to carry persons*

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

3 Terms and definitions

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

3.1
tent
mobile, temporary installed structure enclosured or open building i.e.: marquee, hangar, tent-hall, booth, grandstand-cover

3.1.1
tent with primary load-bearing structure
tent with load bearing support structured and enclosuring elements

3.1.2
membrane tent
tent with a load bearing pre-stressed textile structure with double curved shape, supported by mast and/or cable system

3.1.3
traditional pole tent
tent with centre poles, and extensive use is made of guying to stabilise the fabric covering

3.2
initial approval
design and calculation review, verification, examinations and tests executed before granting a permit for tent operation

3.3
modification
any alteration of a tent, including the introduction of a safety critical component or a substitution of a safety critical component which results in a departure from the original design specification

3.4
repair
restoration of safety critical components or safety critical assemblies back to the original specification by the mending of worn, damaged or decayed parts

3.5
maintenance
replacement or replenishment of components which are designed to be replaced at specified intervals

4 General requirements for design, analysis and examination

4.1 Design documents

The design documents shall include information for the verification of the stability, resistance and operating safety, especially a description of the construction and operation, the stability verification and design drawings as well as relevant documents concerning the burning behaviour.

The documents shall include all the possible configurations of the tent.

4.2 Description of construction and operation

The tent in particular its design and utilisation and its static system shall be explained in this description.

The description shall include details of the particular features of the tents and of any alternative modes of installation which may exist, also details of the main dimensions, limitations, design particulars and materials.

4.3 Construction drawings

These shall exist for all sub assemblies and individual components, the fracture or failure of which might endanger, the stability or operating safety of the tent.

The construction drawings shall feature all the dimensions and cross section values required for testing and approval, also details of materials, structural components, fasteners and connectors.

The construction plans shall comprise the following:

- general drawings in plan view, elevation and sections, to one of the following scales, i.e., 1:100, 1:50 or 1:20. If clearness and readability does not suffice other scales shall be used;

- detail drawings relating to all the structural subassemblies not clearly discernible on the general drawings, also detail plans of connections and of individual items of structural nature which are likely to affect the safety of the tent and of its operation, drawn to a larger scale.

5 Principles of numerical analysis

5.1 Verification

5.1.1. In general, if subsequently not determined differently, the verification shall follow the relevant Part of Eurocode 1 and shall comprise:

- limit states analysis (according to theory of 1st or 2nd order);
- stability limit states analysis, i.e. bar buckling plate and shell buckling;
- if required, verification of deformation limit states;
- verification of safety against overturning, sliding and lifting off.

5.1.2 The above mentioned verification shall include the following details, amongst others:

- design loads, taking into account the possible operating conditions or installations alternatives. Special loads imposed during erection should be recognised;
- information concerning material and components;
- main dimensions and cross section values of all load bearing structural components;

— determination of the most unfavourable stresses and details relating to the strength of the load bearing structural components and of the fasteners. If calculation seems not sufficient to evaluate limit states of assemblies the analysis may be substituted by testing at an independent testing body. There, the testing body shall commit the appropriate number of tests, samples, the testing procedure, the reporting etc., according to the relevant EN standards or, in absence, to agreements by parts;

— details of elastic deformations (flexure, torsion), in as much as such details affect the serviceability or operating safety of the tent;

— details of those components which require special examination and inspection.

5.2 Selection of textile materials

5.2.1 General

All materials shall comply with EN standards, if EN standards are not available, the suitability of these materials shall be proved by other means (i.e. by International Standards or tests). Where structural joints are to be welded, the designer shall give special consideration in accordance with EN standards to the weldability of the selected material.

The main characteristics of fabric shall be defined and proved by test regarding the following specifications:

— nature of textile and coating;

— total weight;

— tensile strength at 23 °C (average and characteristics values) and at 70 °C (average values);

— tear strength;

— adhesion;

— burning behaviour.

The supplier certification shall be proved for polyester and polyvinylchloride fabrics. After five years tensile strength shall be not less than 70 % of initial value. This value has to be attested by the manufacturer of the fabric.

For the fabrics materials and cladding elements as:

— cotton fabrics;

— synthetic fabrics;

— solid covering and sheeting such as sectional metal sheets, wood or plastic panels and multi components elements.

The following requirements shall be regarded:

— fabric materials designated for structural use shall conform to EN standards or, in absence, to agreement by parts;

— it shall be ensured that the material and the connections specified provides sufficient leaking strength, tear strength to ensure safe and durable performance of the textile cover. The safety factors for structural use of fabrics shall be according to 7.6;

— standards for textile, membrane and inflatable structures.

The applicable standards dealing with burning behaviour are listed in Annex A.

5.2.2 Connections of fabrics

Connections by sewing, welding and adhesives and zips shall conform to standards or shall be tested for their ultimate tear and shear properties. The ageing and environmental influences shall be taken into account by the application of additional safety factors.

Zips shall be tested for their strength to withstand the calculated loads of the structure. Effects of wearing out and influence of UV light on plastic shall be considered.

If suitable structural strength cannot be verified they can only be used in non-safety critical applications. Those for emergency exits shall be easy to use from both sides.

6 Design actions

6.1 General

All the applicable actions shall be taken into account according to EN 1991-1-1, EN 1991-1-2, EN 1991-1-3 and EN 1991-1-4.

Adaptations due to the special utilisation of tents are stated in the following chapters.

6.2 Permanent actions

For tents a very precise assumption of the permanent actions is possible. As far as variation can occur the values Gku and Gki shall be taken into account for assessing the applicable structural response. Elsewhere a single characteristic value Gk is sufficient:

Gk: characteristic value of permanent action;

Gku: upper characteristic value;

Gki: lower characteristic value.

Included in the above category are the actual dead load of the load bearing structure, of the accessories and of the technical equipment required for operation also the claddings, decoration and the like. The influence of dry or wet material conditions shall be recognised (Gku, Gki).

The permanent actions shall be determined according to EN 1991-1-1, EN 1991-1-2, EN 1991-1-3 and EN 1991-1-4.

6.3 Conventional load

The stability shall be checked with a conventional vertical load of 0,1 kN/m^2. This load shall not be combined with other load cases, except self-weight.

6.4 Variable actions

6.4.1 Life loads

6.4.1.1 Universal, public access

p = 3,5 kN/m^2

for floors, stairways, landings, ramps, entrances, exits and the like in facilities (tents, booths).

ρ = 5,0 kN/m

for raised platforms or if particularly dense crowds are anticipated for the above mentioned category.

ρ = 1 kN per step

for stairs, alternatively, an area load in accordance with clauses above, whatever is more unfavourable.

ρ = 1,5 kN/m^2

for seat boards of rows of seats per seat run and for floors between fixed rows of seats, unless higher loads results from the application of area loads (ρ = 3,5 kN/m^2).

6.4.1.2 Not open for public access

ρ = 1,5 kN/m^2

for all floors, platforms, ramps, staircases, catwalks and the like which are walked over by individual persons or 1,5 kN individual load, whatever is more unfavourable.

6.4.1.3 Horizontal imposed loads

The following horizontal imposed loads shall be applied for parapets, fences, railings, wall panels etc.

When bounding floors with public access designed for ρ = 3,5 kN/m^2:

— 0,5 kN/m at hand rail height;

— 0,1 kN/m at intermediate rail height.

When bounding floors with public access designed for ρ = 5,0 kN/m^2:

— 1 kN/m at hand rail height;

— 0,15 kN/m at intermediate rail height.

When bounding floors without public access designed for p = 1,50 kN/ m^2:

— 0,30 kN/m at hand rail height;

— 0,10 kN/m at intermediate rail height.

For horizontal load acting at floor level take 1/10 of vertical load.

6.4.2 Wind loads

6.4.2.1 General

The wind loads shall be based on EN 1991-1-4, assuming that the special nature of the textile covers are taken into account and regarding:

— location;

— duration and period of installation;

— use under supervision of an operator;

— possibilities of protecting and strengthening.