



SLOVENSKI STANDARD
oSIST prEN 17879:2022
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Strukture dogodkov - Varnostne zahteve

Event structures - Safety requirements

Event-Strukturen - Sicherheit

Structures événementielles - Exigences de sécurité

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91.040.99	Druge stavbe	Other buildings
97.200.10	Gledališka, odrska in studijska oprema ter delovne postaje	Theatre, stage and studio equipment

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Event structures - Safety requirements

Structures événementielles - Exigences de sécurité

Event-Strukturen - Sicherheit

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17879:2022) 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.

This document is currently submitted to the CEN Enquiry.

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Introduction

The object of this document is to provide safety requirements for event structures. Examples of event structures covered by this document are, but not limited to, stage roofs, stage walls, stage platforms, support structures for entertainment technology equipment, technical accommodations, raised platforms for public, bespoke structures. These safety requirements are aimed to safe-guard persons and objects against damage caused by design, manufacturing and operation of these structures.

These safety requirements have been drawn up according to past experience and risk analysis. Existing national rules concerning health and safety of workers remain untouched.

This document does not cover:

- Spectator facilities – EN 13200-series
- Temporary structure – Tents – safety by EN 13782
- Fairground and amusement park machinery and structures as per EN 13814 series
- Temporary works equipment covered by CEN/TC 53
- Inflatable play equipment-safety requirements and test methods as per EN 1460
- Entertainment Technology as described by CEN/TC 433
- Entertainment Technology – EN 17206 lifting and loadbearing equipment for stages and other production areas within the entertainment industry

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1 Scope

This document specifies the minimum requirements necessary to ensure the safe design, calculation, manufacture, assembly, operation, disassembly, inspection and maintenance of the following, but not limited to: indoor and outdoor structures e.g. Stage roofs, stage floors, follow spot towers, PA towers, LED support structures, one-off event structures, hospitality structures, temporary spectator facilities. The above hereafter called event structures which are intended to be installed and dismantled specifically for an event.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1090 (all parts), *Execution of steel structures and aluminium structures*

EN 1990:2002, *Eurocode - Basis of structural design*

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 1993-1-1:2005, *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings*

EN 1993-1-8, *Eurocode 3: Design of steel structures - Part 1-8: Design of joints*

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

EN 1999-1-1:2007, *Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules*

EN 12811-1, *Temporary works equipment - Part 1: Scaffolds - Performance requirements and general design*

EN 13200-6, *Spectator facilities - Part 6: Demountable stands*

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

EN 13782, *Temporary structure - Tents - Safety*

EN 15619, *Rubber or plastic coated fabrics - Safety of temporary structures (tents) - Specification for coated fabrics intended for tents and related structures*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

active viewing zone

part of the viewing platform where a crowd can congregate and has a clear line of sight to the external focus point

Note 1 to entry: The minimum depth of an active viewing zone is 1m.

3.2

analysis of use

documented assessment of the use of a structure or a part of it in order to determine the necessary safety requirements, maximum loads, etc

Note 1 to entry: Examples are, but not limited to; extremely heavy scenery, excessive point loads, moving objects, performance areas with guaranteed low loads, etc.

3.3

approval

confirmation by a qualified person that the examination has been carried out with a positive result

Note 1 to entry: The qualified person shall be an independent expert, whose qualification could be defined by national regulations.

3.4

depending action

action that cannot be considered without the presence of another action

Note 1 to entry: Example; if wind load on a video screen is part of a load combination, the weight of the screen should also be taken in account.

3.5

event structure

structure to be set-up for no more than 90 days to be used for events

Note 1 to entry: For the purpose of readability throughout this standard the “term” structure refers to an event structure unless otherwise stated.

3.6

event

public or private occasion at which visitors are present

Note 1 to entry: Examples are, but not limited to: artistic performances, product presentations, theatre shows, concerts, festivals, exhibitions, parties, meetings.

3.7

examination

comparison of the technical documentation and the set-up event structure

3.8**exclusive action**

action that cannot occur in combination with another (specific) action

Note 1 to entry: As an example; wind loads from the front and the back should not be taken in account in the same load combination.

3.9**external focus point**

place outside of the structure such as a sport event or (music) performance causing the risk of public gathering on active viewing zone of platform for viewing

3.10**guardrail**

physical barrier to protect persons from falling off raised areas (e.g. stages or platforms)

3.11**handrail**

upper horizontal ledger of the guardrail

3.12**initial approval**

design and calculation review, verification, examinations and tests necessary for event structure operation

3.13**inspection**

visual check for intactness of all components of an event structure carried out by a competent person

3.14**maintenance**

measures to ensure the intactness of all components of an event structure following the instructions given in the technical documentation

Note 1 to entry: Examples of maintenance are adjustment, cleaning, regular replacement etc.

3.15**modification**

any alteration of an event structure which results in a departure from the original design specification

3.16**one-off event structure**

event structure designed to be used for one specific event only

3.17**Operational Management Plan (OMP)**

written compilation of all measures to be taken to provide safe operation of an event structure including set-up, operation, and dismantling

3.18**Operational Wind Speed (OWS)**

shall be noticed as a maximum allowable 3 second gust wind speed

prEN 17879:2022 (E)**3.19****point load**

vertical load of at least 1,5 kN with a square contact area with a side length of 50 mm in the most unfavourable position shall be assumed

3.20**repair**

restorations of worn, damaged or decayed parts back to the original design specification

3.21**roof system**

event structure covering a stage or spectator facilities in order to shelter performers, equipment and public from weather conditions

3.22**stage**

raised platform intended to be used for performing and to support equipment

3.23**set-up**

assembling of an event structure on site

3.24**service area**

area where publicly accessible utilities are found including toilets, first aid, cafeterias, souvenirs shop, including passages, concourses, ramps and stairs between the viewing area and the external area

3.25**sightline**

line joining the eye of a spectator and the point of interest on the activity area without optical interruption

3.26**temporary (grand)stand**

temporary, tiered structure providing a viewing area, set-up with the intention to provide a sightline for every spectator on the structure by having just one row of standing or seated spectators per tier

3.27**temporary spectator facility**

structure accessible for visitors of the event, possibly also providing area(s) designated for spectators to congregation/dance/interact without having a sightline

Note 1 to entry: This includes structures in service areas, where public accessible utilities are found.

3.28**user**

person or organization that has the general control of an Event Structure

Note 1 to entry: The user can be a natural or legal person, which is the owner of the event structure or a concessionaire or tenant, to which the owner has given control over the Event structure for a certain time (event time, installation time).

3.29

Wind Management Plan (WMP)

written compilation of all measures to be taken to maintain personal safety and structural safety of the event structure as part of an operational management plan

4 General requirements for design, analysis, documentation and verification

4.1 General

Materials used in event structures shall comply to the specifications defined in the relevant European Standards.

Materials not complying to European Standards may be used if their serviceability has been proven, e.g. by European Technical Approval (ETA) or necessary characteristic data are available.

4.2 Design

4.2.1 Selection of structural materials

Structural materials should be at least fire retardant according to EN 13501-1 class B—S2, D0 or equivalent national standards on fire behaviour.

4.2.2 Selection of covering materials

Rubber and plastic coated fabrics shall comply to EN 15619. A corresponding declaration or certificate shall be provided by the supplier.

For other fabric materials and cladding elements of:

- cotton fabrics;
- synthetic fabrics;
- solid covering and sheeting such as sectional metal sheets, wood or plastic panels and multi components elements.

The following requirements apply:

- fabric materials designated for structural use shall conform to EN standards or, in their absence, to agreement by the parties involved;
- it shall be ensured that the material and the connections specified, provide sufficient resistance against environmental influences and tensile strength to ensure safe and durable performance of the textile cover.

4.2.3 Design Classes

4.2.3.1 Reliability management (RC)

The reliability management shall be RC2 based on Table B.3 of EN 1990:2002.

4.2.3.2 Design working life

As a general rule the design working life shall be 15 years.

4.2.3.3 Consequence classes (CC)

The consequence classes shall be CC2 based on Table B.1 of EN 1990:2002.

prEN 17879:2022 (E)**4.2.4 Durability****4.2.4.1 Execution class (EXC)**

The execution class shall be EXC2 when predominately statically loaded based on Table A.3 of EN 1999-1-1:2007, Table C.1 of EN 1993-1-1:2005 or according to the relevant European Standard.

4.2.4.2 Service Class (SC)

The service class shall be CC2, based on EN 1999-1-1, EN 1993-1-1 or the relevant European Standard.

4.2.4.3 Production class (PC)

The production class shall be PC2, based on EN 1999-1-1, EN 1993-1-1 or the relevant European standard for welded structures.

4.3 Principles of analyses

Analysis shall follow the relevant parts of the Eurocode and shall comprise:

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

Event Structures shall be assumed to be predominantly statically loaded.

4.4 Documentation**4.4.1 Design documents**

The design documents shall include information for the verification of the strength, stability, stiffness, resistance and operational safety, design drawings of the intended configurations and relevant material certificates. See Annex B for a complete list.

4.4.2 Description of construction, assembly and operation

The structures design, utilization, static system and operation shall be described in a document. This shall include all relevant assumptions, limitations, configurations, main dimensions, design particulars and materials.

Instructions for safe assembly and operation shall be provided in a manual or technical documentation.

4.4.3 Construction drawings

Construction drawings shall exist for all assemblies, sub-assemblies and individual components of the event structure. The drawings shall contain all relevant dimensions, cross sections and details of materials needed for analysis and approval.

4.5 Verification

Verification shall, as a minimum, include the following details:

- design loads, taking into account the possible operating conditions or installations alternatives. Special loads imposed during set-up should be recognized;
- equivalent static loads for dynamic impacts;

- 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 calculations are insufficient to evaluate limit states of parts 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 European standards or in absence of the relevant European standards by agreement with the parties involved.

5 Design actions

5.1 General

Actions, loads, design and structural assumptions for load bearing parts of event structures shall be chosen in the following sequence:

- according to the rules of this document;
- to a standard listed in the normative references of this document.

NOTE National regulation can overrule this document or the standards listed in the normative references (e.g. wind, seismic, etc.).

5.2 Permanent actions

For temporary demountable structures, usually a precise assumption of the permanent actions is possible.

Where significant variations can occur (e.g. due to dry or wet conditions of materials) the values Gk_{sup} and Gk_{inf} shall be considered. Elsewhere a single characteristic value Gk is sufficient:

Gk characteristic value of permanent action;

Gk_{sup} upper characteristic value of permanent action;

Gk_{inf} lower characteristic value of permanent action.

Permanent actions are the actual dead loads of the load bearing structure, ballast and cladding.

5.3 Variable actions

5.3.1 General

Variable actions consist of the external loads and imposed loads acting on a structural component or structure and may vary in magnitude, direction and point of application between or during events.

5.3.2 Actions from entertainment technology equipment and decoration objects

Actions resulting from entertainment technology equipment (e.g. lighting fixtures, PA systems, cables, LED screens) and decoration objects shall be considered according to the technical data provided by the relevant manufacturer, supplier, installer or user.

Swinging of objects shall be avoided by suitable structural measures. If this is not possible, the resulting forces shall be considered.