
Razvedrilna tehnologija - Stroji za odre in druge prireditvene prostore - Varnostne zahteve in pregledi

Entertainment technology - Machinery for stages and other production areas - Safety requirements and inspections

Veranstaltungstechnik - Maschinen für Bühnen und andere Produktionsbereiche - Sicherheitstechnische Anforderungen und Prüfungen

Technologies du spectacle - Machinerie pour scènes et autres zones de production - Exigences et inspections relatives à la sécurité

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Ta slovenski standard je istoveten z: EN 17206:2020

ICS:

97.200.10	Gledališka, odrska in studijska oprema ter delovne postaje	Theatre, stage and studio equipment
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 17206

May 2020

ICS 97.200.10

Supersedes CWA 15902-1:2008

English Version

**Entertainment technology - Machinery for stages and
other production areas - Safety requirements and
inspections**

Technologies du spectacle - Machinerie pour scènes et
autres zones de production - Exigences et inspections
relatives à la sécurité

Veranstaltungstechnik - Maschinen für Bühnen und
andere Produktionsbereiche - Sicherheitstechnische
Anforderungen und Prüfungen

This European Standard was approved by CEN on 7 March 2020.

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European foreword

This document (EN 17206:2020) has been prepared by Technical Committee CEN/TC 433 “Entertainment Technology – Machinery, equipment and installations”, the secretariat of which is held by DIN.

This 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of an identical text or by endorsement, at the latest by November 2020, and conflicting national standards shall be withdrawn at the latest by November 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes CWA 15902-1:2008.

This document differs from CWA 15902-1:2008 mainly as follows:

- a) evaluated and revised according to new European standards, Directives and Regulations;
- b) terms and definitions have been revised;
- c) updated examples and informative annexes;
- d) standard revised editorially.

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

Introduction

The purpose of this document is to produce European specifications for the design, manufacture and installation of lifting and load bearing equipment within the entertainment industry. Apart from the Machinery Directive, the Council Directive 2009/104/EC of 16 September 2009 concerning the minimum safety and health requirements for the use of work equipment by workers at work states in Annex II:

“3.1.3.

Measures must be taken to ensure that workers are not present under suspended loads, unless such presence is required for the effective operation of the work

Loads may not be moved above unprotected workplaces usually occupied by workers.

Where that is the case, if work cannot be carried out properly any other way, appropriate procedures must be laid down and applied.”

This document considers situations that give rise to danger, such as moving or holding scenery or equipment:

- a) over persons and/or unprotected areas;
- b) in areas with low light conditions, limited visibility, for example while using stage fog and other masking effects.

These situations apply not only during performances, but also during rehearsals, technical set-up, preparations, installations and other situations. This document covers these hazards and suggests appropriate procedures to maintain safety.

Machinery installations are all technical installations and equipment used for operations in stage and production facilities in the entertainment industry. Such installations are used to lift, lower, suspend and carry loads (e.g. scenery, traverse systems, or lighting, film/video and sound equipment). They can also be used to move persons, and persons can stand under such equipment while the loads are at rest or in motion.

“Stages” are, for example, staging facilities and production areas in theatres, multipurpose halls, studios, production facilities for film, television or radio, concert halls, congress centres, schools, exhibition centres, trade-fair centres, museums, discotheques, amusement parks, sports facilities and open-air-theatres.

“Events” are, for example, concerts, shows, congresses, exhibitions, presentations, demonstrations, film or television recordings, etc.

This document considers permanently and temporarily installed lifting and movement equipment for stages and production areas within the entertainment industry.

This document does not consider the design or control of fire curtains.

Typical applications of this document include but are not limited to the following:

- acoustic doors;
- auditorium elevators;
- compensating elevators;
- cycloramas;
- fly bar systems (manual and motor driven);

- lighting bars;
- movable lighting towers;
- movable proscenium arches;
- orchestra elevators;
- performer flying systems;
- point hoists;
- revolving stages and turntables;
- scenery storage elevators;
- side stage and rear stage shutters;
- stage elevators;
- stage wagons;
- tiltable stage floors;
- trap elevators.

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1 Scope

This document applies to machinery, machinery installations and machinery control systems used in places of assembly and in staging and production facilities for events and theatrical productions (stage machinery, for short). Such facilities include: theatres, multi-purpose halls, exhibition halls; film, television and radio studios; concert halls, schools, bars, discotheques, open-air stages and other rooms for shows and events.

The document applies to machinery installations with guided or unguided loads.

This document covers machinery used in the entertainment industry including machinery that is excluded from the Machinery Directive (2006/42/EC) specifically Article 1, 2(j) which excludes “*machinery intended to move performers during artistic performances*”.

This machinery includes controls, electrical and electronic control systems, electrical and electronic equipment, hydraulic and pneumatic power supplies.

The principles in this document also apply to machinery installations based on new technologies or specially designed installations which are not expressly mentioned here but which nevertheless operate in a similar manner or are meant for similar purposes to the equipment listed above.

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 818-1, *Short link chain for lifting purposes — Safety — Part 1: General conditions of acceptance*

EN 818-7, *Short link chain for lifting purposes — Safety — Part 7: Fine tolerance hoist chain, Grade T (Types T, DAT and DT)*
<https://standards.iteh.ai/catalog/standards/sist/76961a90-aa9b-49a7-9902-5549f0bd9a0/sist-en-17206-2020>

EN 1090-2, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

EN 1090-3, *Execution of steel structures and aluminium structures — Part 3: Technical requirements for aluminium structures*

EN 1993-1-10, *Eurocode 3: Design of steel structures — Part 1-10: Material toughness and through-thickness properties*

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

EN 10204, *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 12385-4, *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 13411 (all parts), *Terminations for steel wire ropes — Safety*

EN 13480-3, *Metallic industrial piping — Part 3: Design and calculation*

- EN 14492-1, *Cranes — Power driven winches and hoists — Part 1: Power driven winches*
- EN 14492-2:2019, *Cranes — Power driven winches and hoists — Part 2: Power driven hoists*
- EN 60034-1, *Rotating electrical machines — Part 1: Rating and performance (IEC 60034-1)*
- EN 60204-1:2018, *Safety of machinery — Electrical equipment of machines — Part 1: General requirements (IEC 60204-1:2016)*
- EN 60204-32:2008, *Safety of machinery — Electrical equipment of machines — Part 32: Requirements for hoisting machines (IEC 60204-32:2008)*
- EN 60947-4-1, *Low-voltage switchgear and controlgear — Part 4-1: Contactors and motor-starters — Electromechanical contactors and motor-starters (IEC 60947-4-1)*
- EN 60947-5-1, *Low-voltage switchgear and controlgear — Part 5-1: Control circuit devices and switching elements — Electromechanical control circuit devices (IEC 60947-5-1)*
- EN 61000-6-2, *Electromagnetic compatibility (EMC) — Part 6-2: Generic standards — Immunity for industrial environments (IEC 61000-6-2)*
- EN 61000-6-4, *Electromagnetic compatibility (EMC) — Part 6-4: Generic standards — Emission standard for industrial environments (IEC 61000-6-4)*
- EN 61326-3-1, *Electrical equipment for measurement, control and laboratory use — EMC requirements — Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety) — General industrial applications*
- EN 61439-1, *Low-voltage switchgear and controlgear assemblies — Part 1: General rules (IEC 61439-1)*
- EN 61508 (all parts), *Functional safety of electrical/electronic/programmable electronic safety-related systems (IEC 61508)*
- EN 62061:2005, *Safety of machinery — Functional safety of safety-related electrical, electronic and programmable electronic control systems (IEC 62061:2005)*
- EN 81346-1, *Industrial systems, installations and equipment and industrial products — Structuring principles and reference designations — Part 1: Basic rules (IEC 81346-1)*
- EN 82079-1, *Preparation of instructions for use — Structuring, content and presentation — Part 1: General principles and detailed requirements (IEC/IEEE 82079-1)*
- EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*
- EN ISO 13849-1:2015, *Safety of machinery — Safety-related parts of control systems — Part 1: General principles for design (ISO 13849-1:2015)*
- EN ISO 13849-2, *Safety of machinery — Safety-related parts of control systems — Part 2: Validation (ISO 13849-2)*
- EN ISO 13850, *Safety of machinery — Emergency stop function — Principles for design (ISO 13850)*

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EN ISO 13854, *Safety of machinery — Minimum gaps to avoid crushing of parts of the human body (ISO 13854)*

EN ISO 13857, *Safety of machinery — Safety distances to prevent hazard zones being reached by upper and lower limbs (ISO 13857)*

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 <https://www.iso.org/obp/ui>

3.1 General terms**3.1.1****competent person**

person with sufficient practical and theoretical knowledge and experience to carry out the person's duties, and who is aware of the limits of the person's competency, expertise and knowledge

3.1.2**drive system**

part of a load bearing machine that executes movement and holding of the load and which converts energy into movement

Note 1 to entry: See Figure 2 c), Figure 3 c) and Figure 4 c).

3.1.3**emergency stop****emergency stop function****E-stop**

function which is intended to

- avert arising or reduce existing hazards to persons, damage to machinery or to work in progress, and
- be initiated by a single human action

Note 1 to entry: ISO 13850 gives detailed provisions.

[SOURCE: EN ISO 12100:2010, 3.40 – modified: Term “E-Stop” added]

3.1.4**failure**

termination of the ability of an item to perform a required function

Note 1 to entry: After failure the item has a fault.

Note 2 to entry: “Failure” is an event, as distinguished from “fault”, which is a state.

Note 3 to entry: This concept as defined does not apply to items consisting of software only.

Note 4 to entry: In practice the terms “failure” and “fault” are often used synonymously.

[SOURCE: IEV 192-03-01]

3.1.5

fault

state of an item characterized by inability to perform a required function, excluding the inability during preventive maintenance or other planned actions, or due to lack of external resources

Note 1 to entry: A fault is often the result of a failure of the item itself, but can exist without prior failure.

Note 2 to entry: In the field of machinery, the English term “fault” is commonly used in accordance with the definition in IEV 192-04-01, whereas the French term “défaut” and the German term “Fehler” are used rather than the terms “Panne” and “Fehlzustand” that appear in the IEV with this definition.

Note 3 to entry: In practice, the terms “fault” and “failure” are often used synonymously.

[SOURCE: EN ISO 12100:2010, 3.33]

3.1.6

fly bar

fly bar (e.g. bar or truss) having several load bearing lines for lifting, lowering, and suspending loads, with the load being either uniformly distributed or concentrated (point load)

Note 1 to entry: A distinction is made between manually operated flying systems (e.g. manual counterweight systems) and motor-driven systems (e.g. with electric or hydraulic drive).

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3.1.7

hazard

potential source of harm

Note 1 to entry: The term “hazard” can be qualified in order to define its origin (for example, mechanical hazard, electrical hazard) or the nature of the potential harm (for example, electric shock hazard, cutting hazard, toxic hazard, fire hazard).

Note 2 to entry: The hazard envisaged by this definition either

- is permanently present during the intended use of the machine (for example, motion of hazardous moving elements, electric arc during a welding phase, unhealthy posture, noise emission, high temperature), or
- can appear unexpectedly (for example, explosion, crushing hazard as a consequence of an unintended/unexpected start-up, ejection as a consequence of a breakage, fall as a consequence of acceleration/deceleration).

Note 3 to entry: The French term “*phénomène dangereux*” should not be confused with the term “*risque*”, which was sometimes used instead in the past.

[SOURCE: EN ISO 12100:2010, 3.6]

3.1.8

hazard zone

danger zone

space within and/or around machinery in which a person can be exposed to a hazard

EN 17206:2020 (E)**3.1.9****lifting accessory**

component or equipment, allowing the load to be held, which is placed between the lifting machinery and the load or on the load itself, or which is intended to constitute an integral part of the load and which is independently placed on the market

3.1.10**load bearing element**

parts of a machine between the load and the machinery anchor point

3.1.11**load bearing equipment**

assembly of load bearing elements, including the drive mechanism

Note 1 to entry: See Figure 2 b), Figure 3 b) and Figure 4 b).

3.1.12**load carrying device**

part of stage machinery which directly carries the intended load

EXAMPLE Fly bar of a bar hoist, platform of an elevator, truss, hook of a point hoist

Note 1 to entry: For trusses refer to EN 17115.

Note 2 to entry: See Figure 2 d), Figure 3 d) and Figure 4 d).

3.1.13**load securing device**

mechanical device that can bring a load to a defined stop and prevents unintentional movement

EXAMPLE A brake, self-braking worm gear, shut-off valve.

3.1.14**load holding device**

device that prevents unintentional movement of an already stationary load

EXAMPLE Rope lock, locking pin.

3.1.15**machinery installation**

all elements between the load and the machinery anchor point

Note 1 to entry: See Figure 2 a); Figure 3 a); Figure 4 a).

3.1.16**manual counterweight system**

manually operated fly bar moved by means of an operating rope, where the load is fully or partially balanced by counterweights carried in a guided frame connected to the flying bar

3.1.17**rated speed**

maximum speed at which the machine is designed to operate

3.1.18**point hoist**

lifting equipment having one load bearing line for lifting, lowering, and suspending loads

3.1.19**protective measure**

measure intended to achieve risk reduction

3.1.20**risk**

combination of the probability of occurrence of harm and the severity of that harm

3.1.21**safeguard**

guard or protective device

[SOURCE: EN ISO 12100:2010, 3.26]

3.1.22**stage elevator**

part of a horizontal or inclined (tilted) stage, performance area, studio or auditorium floor which can be moved vertically up and/or down, including all necessary drive elements

EXAMPLE 1 Elevator which is a permanent part of the stage, performance area, studio or auditorium floor (e.g. orchestra elevator, single- or double-deck stage elevator, stage compensating elevator, scenery storage elevator or auditorium elevator).

EXAMPLE 2 Elevator which is not a permanent part of the stage, performance area, studio or auditorium floor, which is used primarily for scenic purposes and which normally rests below stage (e.g. stage trap elevator).

Note 1 to entry: A stage elevator at rest can be part of the stage.

3.1.23**stage elevator platform**

part of a stage elevator which supports the load