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**Izvedba jeklenih in aluminijastih konstrukcij - 5. del: Tehnične zahteve za hladno oblikovane konstrukcijske aluminijaste elemente in hladno oblikovane elemente kot del strešnih, stropnih, talnih in stenskih konstrukcij**

Execution of steel structures and aluminium structures - Part 5: Technical requirements for cold-formed structural aluminium elements and cold-formed structures for roof, ceiling, floor and wall applications

Ausführung von Stahltragwerken und Aluminiumtragwerken - Teil 5: Technische Anforderungen an tragende, kaltgeformte Bauelemente aus Aluminium und tragende, kaltgeformte Bauteile für Dach-, Decken-, Boden- und Wandanwendungen

Exécution des structures en acier et des structures en aluminium - Partie 5 : Exigences techniques pour éléments en aluminium formés à froid et structures formées à froid pour applications en toiture, plafond, paroi verticale et plancher

**Ta slovenski standard je istoveten z: EN 1090-5:2017**

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91.080.13	Jeklene konstrukcije	Steel structures
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## Execution of steel structures and aluminium structures - Part 5: Technical requirements for cold-formed structural aluminium elements and cold-formed structures for roof, ceiling, floor and wall applications

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This European Standard was approved by CEN on 6 February 2017.

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## EN 1090-5:2017 (E)

## European foreword

This document (EN 1090-5:2017) has been prepared by Technical Committee CEN/TC 135 “Execution of steel structures and aluminium structures”, the secretariat of which is held by SN.

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of an identical text or by endorsement, at the latest by September 2017, and conflicting national standards shall be withdrawn at the latest by September 2017.

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 is part of the EN 1090 series, which comprises the following parts:

- EN 1090-1, *Execution of steel structures and aluminium structures - Part 1: Assessment and verification of constancy of performance for structural components*
- 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 1090-4, *Execution of steel structures and aluminium structures - Part 4: Technical requirements for cold-formed structural steel elements and cold-formed structures for roof, ceiling, floor and wall applications*
- EN 1090-5, *Execution of steel structures and aluminium structures - Part 5: Technical requirements for cold-formed structural aluminium elements and cold-formed structures for roof, ceiling, floor and wall applications*

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



## 1 Scope

This European Standard specifies requirements for the execution i.e. the manufacture and the installation of cold-formed structural aluminium components made from profiled sheeting for roof, ceiling, floor and wall applications under predominately static loading conditions or seismic loading conditions and their documentation. It does cover products of structural class I and II according to EN 1999-1-4 used in structures.

Structural elements are understood here to mean profiled sheeting, such as trapezoidal, sinusoidal, liner trays or cassette profiles (Figure 1), that are produced by cold forming. Perforated and micro profiled sheeting are also covered by this part.

Welded sections are excluded from this part and are covered by EN 1090-3 except seal welding in low-stress areas.

This standard also covers spacer constructions between the outer and inner or upper and lower skins as well as supporting members for roofs, walls and ceilings made from cold-formed profiled sheeting and the connections and attachments of the afore mentioned elements as long as they are involved in load transfer, it also covers connections and attachments of these elements.

A combination of steel and aluminium structural elements are permitted, e.g. liner trays made of steel, stiffened by profiles made of aluminium. In this case, EN 1090-4 and this document apply.

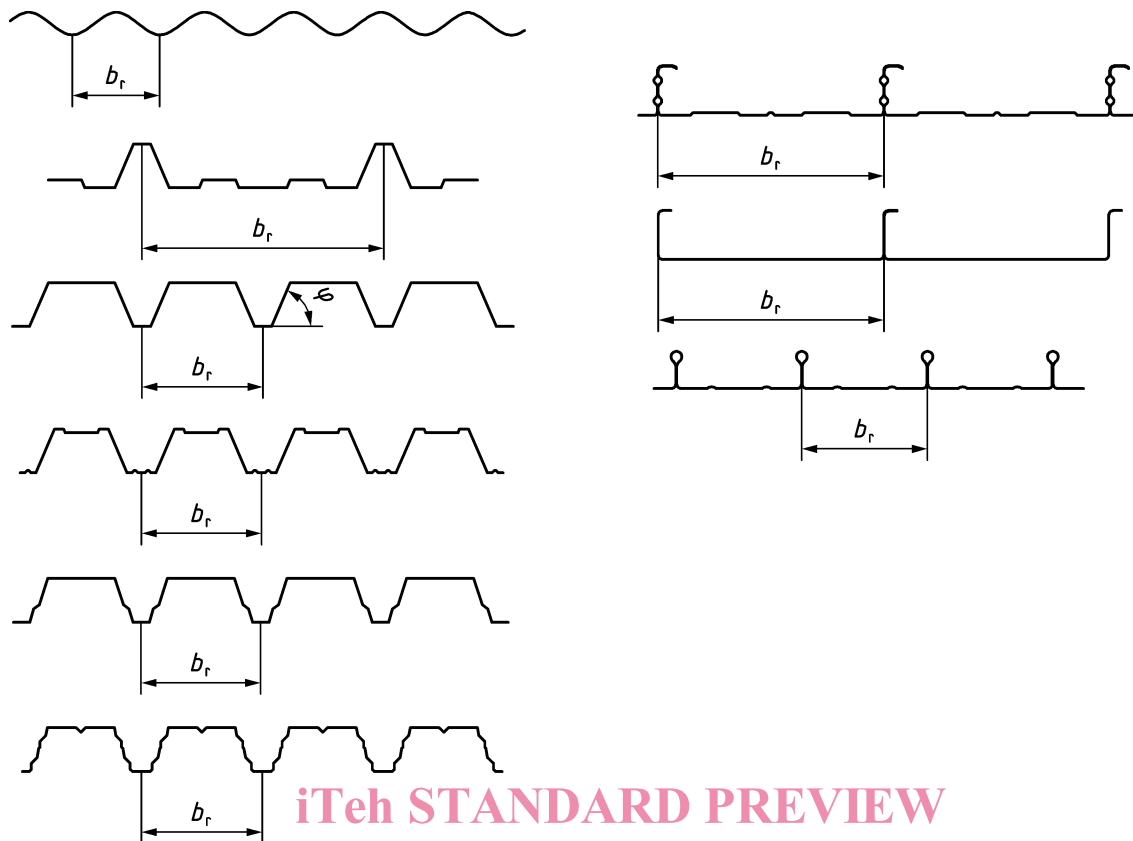
Composite structural elements where the interaction between dissimilar materials are an integral part of the structural behaviour such as sandwich panels and composite floors are not covered by this standard.

NOTE The structures covered in this standard can be for example

- single- or multi-skin roofs, whereby the load-bearing structure (lower skin) as well as the actual roof covering (upper skin) or both consist of structural elements;
- single- or multi-skin walls, whereby the load-bearing structure (inner skin) as well as the actual cladding (outer skin) or both consist of structural elements; or
- suspended ceilings for interior fitting.

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Figure 1 — Examples of profiled sheets

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## 2 Normative references

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

EN 508-2, *Roofing products from metal sheet — Specification for self-supporting products of steel, aluminium or stainless steel sheet — Part 2: Aluminium*

EN 1090-1, *Execution of steel structures and aluminium structures — Part 1: Requirements for conformity assessment of structural elements*

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

CEN/TS 1187, *Test methods for external fire exposure to roofs*

EN 1995-1 (all parts), *Eurocode 5: Design of timber structures — Part 1-1: General — Common rules and rules for buildings*

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

EN 1999-1-4, *Eurocode 9 — Design of aluminium structures — Part 1-4: Cold-formed structural sheeting*

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

EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roofs tests*

EN 62305-3:2011, *Protection against lightning — Part 3: Physical damage to structures and life hazard (IEC 62305-3:2010)*

EN ISO 376, *Metallic materials — Calibration of force-proving instruments used for the verification of uniaxial testing machines (ISO 376)*

EN ISO 717-1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation (ISO 717-1)*

EN ISO 11654, *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption (ISO 11654)*

### 3 Terms, definitions, symbols and abbreviations

#### 3.1 Terms, definitions

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

##### 3.1.1

##### **ancillary**

additional component e.g. as part of a purlin and rail system required to make the system function

##### 3.1.2

##### **cassette profile**

roll formed, press-braked or folded structural elements with or without stiffeners used as substructures for walls and roofs with a bigger variety in cross sections than liner trays

##### 3.1.3

##### **cleat**

connection bracket used to connect purlins and rails to the main steel frame such as a connector for attaching cold formed sections to each other – e.g. as in forming window or door openings

##### 3.1.4

##### **continuity sleeve**

sleeve that connects two structural elements together and provide a continuous or semi continuous moment resistant joint

##### 3.1.5

##### **component I**

component (usually the sheeting) that is facing the head of the fastener (the swage head in the case of blind rivets)

##### 3.1.6

##### **component II**

second component of a connection (usually the supporting member)

##### 3.1.7

##### **decking**

load bearing sheet to support e.g. insulation and outer skin

**EN 1090-5:2017 (E)****3.1.8****edge stiffener**

supporting plate or profile at the longitudinal edge of a laying area to replace the missing neighbored sheeting and stiffen the free edge

**3.1.9****fastening**

fastener and, the process of fastening and the final connected components

**3.1.10****flashing**

non-load-bearing element, for example accessories and coverings in the areas of the skirting, eaves, gable end, ridge and corners

**3.1.11****layout drawing**

drawing showing the position of structural aluminium components and execution details

**3.1.12****liner**

inner sheet of a double skin system

**3.1.13****penetration**

opening in the decking executed on work-site to allow installation equipment to pass through

**3.1.14****restraint**

member transverse between two parallel runs of purlin or rail to provide structural restraint to the members – dependent on the system that can be positional or rotational restraint to the sections

**3.1.15****saddle washer**

oversized gasket that is adapted to the respective profile shape, which is made of aluminium, steel or stainless steel with an elastomeric or foamed sealant bonded to it

Note 1 to entry: The corrosion protection is adapted to that of the profiled sheeting.

Note 2 to entry: Saddle washer can be used when attaching profiled sheeting via its top flange.

Note 3 to entry: As an example, a figure of a saddle washer is given in EN 1993-1-3:2006, Table 10.3.

**3.1.16****structural aluminium component**

load-bearing element made from aluminium sheets

**3.1.17****structural element**

part of a structure e.g. profiled sheeting, such as trapezoidal, sinusoidal or cassette profile or linear profile cross section, e.g. with a Z, C,  $\Omega$  or  $\Pi$  shape

**3.1.18****trimmer**

beam around an opening in a floor or roof or wall

### 3.2 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply:

<i>C</i>	corrosivity category
<i>D</i>	edge waviness of the side lap
<i>E</i>	modulus of elasticity
<i>F</i>	force, shear force of the fastener
<i>I</i>	second moment of area
<i>L</i>	span, distance
<i>M</i>	bending moment
<i>R</i>	end support reaction, airborne sound insulation
<i>T</i>	shear flow
<i>V</i>	shear force of the structural aluminium component
<i>a</i>	distance between a fastener and a web of a profiled sheet
<i>b</i>	width, width of spacing strip
<i>d</i>	hole diameter, nominal diameter of the fastener
<i>e</i>	distance of hole from edge, distance between fastener and centre line of flange of profiled sheet distance between fasteners
<i>f</i>	strength, yield stress
<i>h</i>	depth of profile
<i>l</i>	length of double layer
<i>p</i>	distances between holes
<i>r</i>	radius
<i>t</i>	thickness of bare metal of the sheet, hole pitch
$\alpha$	sound absorption
$\Delta$	deviation, tolerance
$\delta$	deviation from straightness
$\varphi$	inclination of the web of a profile

#### Indices

<i>A</i>	end support, centre-to-centre distance of the penetration from the end support or from the point of zero moment
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**EN 1090-5:2017 (E)**

B	internal, intermediate support
I	component 1, profiled sheet
II	component 2, supporting member / Profiled sheet
L	longitudinal edge, left side
N	nominal sheet thickness $B_D + \Delta$
R	rib edge, right side
S	tensile force from constraints due to shear reinforcement shear stiffness
cl	clear span
$f$	width of flange – theoretical requirement used for static calculations
i	ideal distance between supports, equal spacing of points of zero moment
k	cantilever
lim	limit
n	nominal hole diameter obs observed (e.g. result)
r	required, rib
s	stiffener at the web
t	tensile force
u	bottom flange
w	web, weighted value

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**4 Specifications and documentation****4.1 Execution Specification****4.1.1 General**

The necessary information and technical requirements for execution of each part of the works shall be agreed and complete before commencement of execution of that part of the works. There shall be procedures for making alterations to previously agreed execution specification. The execution specification consists of layout drawings and details, based on structural design and shall consider such of the following items as are relevant:

- a) additional information, as listed in Annex F;
- b) execution classes, see 4.1.2;
- c) technical requirements regarding the safety of the works, see 4.2.3 and 9.7;
- d) tolerance classes, see 4.1.4.

NOTE The responsibilities between the parties involved can be regulated by member states.

#### 4.1.2 Execution classes

Four execution classes 1 to 4, denoted EXC1 to EXC4, are given, for which requirement strictness increases from EXC1 to EXC4.

The execution specification shall specify the relevant execution class or classes.

NOTE The requirements for the selection of execution classes are given in EN 1999-1-1.

The list of requirements related to execution classes is given in EN 1090-3.

Sheeting complying with this standard may be used for EXC 1 to 3. In this European Standard there is no differentiation in requirements between execution classes.

#### 4.1.3 Layout drawings

Layout drawings shall be part of the prepared execution specification and are based on structural design.

Layout drawings and assembly instructions shall include the following details and shall be prepared for the execution:

- type and position of the structural elements;
- connection with the supporting member and arrangement of the fasteners;
- intended structural elements with profile designation and manufacturer's name, constituent product, nominal sheet thickness and manufactured length;
- direction of lay of sheeting and special installation sequences;
- statically effective overlapping (moment-resisting connections), if relevant;
- execution tolerances;
- intended fasteners with type designation, type of fastener (saddle, washer, etc.) and other fixing accessories, arrangement and separation distances, special assembly instructions depending on the type of connection, e.g. hole diameters, axial spacings and edge distances;
- type and details of the supporting member for the structural elements, such as material, centre to centre distances and dimensions, the inclination;
- details of the side and end overlappings and edges of the installed area;
- openings in the installed areas, including the necessary framing, e.g. for skylights, smoke and heat extractors and roof drainage, if relevant;
- superstructures or suspensions, e.g. for piping, bunched cables or suspended ceilings, if relevant;
- a label, stating that all structural elements shall be fixed immediately after laying;
- details about any special installation measures, if relevant;
- special devices for installation, if relevant;
- any specific hazards related to construction should be identified;