SLOVENSKI STANDARD
oSIST prEN 1090-5:2015

01-januar-2015

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

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

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

Exécution des structures en acier et des structures en aluminium - Partie 5 : Exigences techniques pour éléments minces en aluminium formés à froid et structure de toiture, plafond, applications pour mur et plancher

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ICS:

91.080.10	Kovinske konstrukcije	Metal structures

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

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This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 135.

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

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Foreword

This document (prEN 1090-5:2014) 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 document is currently submitted to the CEN Enquiry.

1 Scope

This European Standard defines the requirements for the manufacture of thin-gauge cold-formed elements, the execution of structures made from such elements (e.g. roofs, coverings, walls, floors, ceilings) under predominately static loading conditions and their documentation. It does cover products of construction class I and II according to EN 1999-1-4 used in structures.

Thin-gauge structural elements are understood here to mean profiled sheeting, such as trapezoidal, sinusoidal, liner trays or cassette profiles (Figure 1) or linear profile cross sections, (Figure 2), that are produced by cold forming and have thicknesses not greater than 4 mm. Closed build-up sections of thicknesses not greater than 3 mm, as defined in EN 1999-1-1 and -4 are also covered by this part. Perforated and micro profiled sheeting are also covered by this part.

For closed build-up sections (Figure 2b) of thicknesses greater than 3 mm the execution provisions of EN 1090-3 apply.

Welded sections are excluded from this part and are covered by EN 1090-3.

This European 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.

This European Standard combined with EN 1090-4 covers combined steel and aluminium structural elements, e.g. liner trays made of steel, stiffened by profiles made of aluminium.

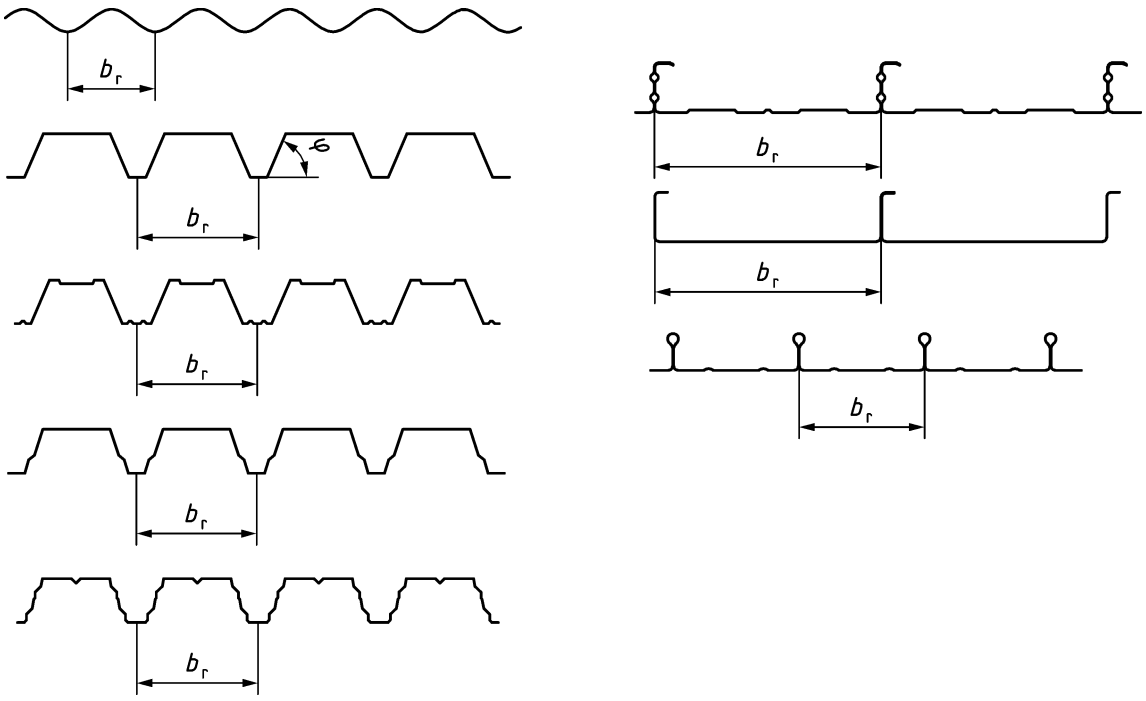
Other composite structural elements where the interaction between dissimilar materials are an integral part of the structural behaviour such as sandwich panels and composite floors are not covered by this standard.

NOTE 1 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 thin-gauge 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 thin-gauge structural elements, or

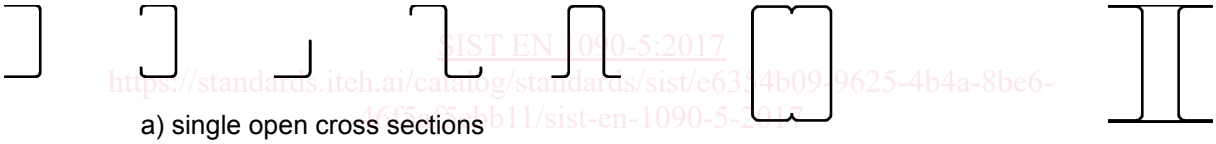
— suspended ceilings for interior fitting or coverage of tunnels.



Key

1: b_R
2: φ

Figure 1 — Examples of profile shapes



a) single open cross sections

b) closed build-up sections

Figure 2 — Examples of linear profile cross sections

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 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*

EN 1995-1-1, *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 12056-1, *Gravity drainage systems inside buildings — Part 1: General and performance requirements*

EN 12056-3, *Gravity drainage systems inside buildings — Part 3: Roof drainage, layout and calculation*

EN ISO 12944-1, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 1: General introduction (ISO 12944-1)*

EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining — Product specification and requirements*

EN 62305-3, *Protection against lightning — Part 3: Physical damage to structures and life hazard*

3 Terms, definitions, symbols and abbreviations

For the purposes of this document the following terms and definitions apply:

3.1 Terms and definitions

3.1.1
ancillaries
additional components e.g. as part of a purlin and rail system required to make the system function

3.1.2
cassette profile
cassette profiles are press-braked or folded structural elements with or without stiffeners used as substructures for walls and roofs with a bigger variety in cross sections as liner trays

3.1.3
cleat
connection bracket used to connect purlins and rails to the main steel frame. Also a cleat can be connector for attaching cold formed section to each other — example 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 joint. Section gauges are sometimes varied along the run of sections to match the applied loads and give economies

3.1.5
component I
component (usually the trapezoidal 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
diagonal ties
component used between parallel structural elements used to transfer the wall dead load to the main supporting columns of the down slope component

3.1.8
envelope elements
roofs and roof cladding, including canopies; external walls and wall cladding, including parapets; walls, including partitions and ceilings within the building envelope

3.1.9
edge stiffener
supporting plate or profile at the longitudinal edge of a laying area to replace the missing neighboured sheeting and stiffen the free edge

3.1.10
flashings
are non-load bearing elements, for example accessories and coverings in the areas of the skirting, eaves, gable end, ridge and corners

3.1.11
layout drawings
showing the position of structural components and execution details

3.1.12
liner
inner sheet of a double skin system only carrying self weight and insulation

3.1.13
restraints
connecting 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

3.1.14
saddle washers
oversized gaskets that are adapted to the respective profile shape. They are made of aluminium, steel or stainless steel with an elastomer or foamed rubber seal bonded to it. Their corrosion protection shall be adapted to that of the profiled sheeting. Saddle washers can be used when attaching profiled sheeting via its top flange.

3.1.15
structural cold formed components
load-bearing element made from thin-gauge steel sheets

3.1.16
web folded cleat
structural element especially a channel section with the flange ends notch away and the web folded at right angles to form a cleat from the web

3.1.17
structural elements
parts of a structure e.g. profiled sheeting, such as trapezoidal, sinusoidal or cassette profiles or linear profile cross sections, e.g. with a Z, C, Ω or Π shape.

3.1.18
thin-gauge
gauge in ranges up to 4 mm

3.2 Symbols and abbreviations

C	corrosivity category
D	edge waviness of the side lap
E	modulus of elasticity
F	force
I	second moment of area
K	shear force of the fastener
L	span, distance
M	bending moment
R	radius; end support reaction
T	shear flow
V	shear force of the structural component
a	distance between fastener and web of profiled sheet
b	width, width of spacing strip
d	hole diameter
d	nominal diameter of the fastener
e	distance of hole from edge, distance between fastener and centre line of flange of profiled sheet distance between fasteners
h	depth of profile
l	length of double layer
p	distances between holes
q	self-weight of the roof including the self-weight of the profile
q_0	α times roof load
r	radius
t	thickness of bare metal of the sheet, hole pitch
Δ	deviation, tolerance
δ	deviation from straightness
φ	inclination of the web of profile

Indices

A centre-to-centre distance of the penetration from the end support or from the point of zero moment

B internal support

D Width of flange — theoretical requirement used for static calculations

G web

I component 1, profiled sheet

II component 2, supporting member

L longitudinal edge, left side

N nominal sheet thickness

Q shear load

R rib edge, right side

S tensile force from constraints due to shear reinforcement shear stiffness

Z tensile force

V thickness of the bare steel measured in the test

a end support

b intermediate support

cl clear span

i ideal distance between supports, equal spacing of points of zero moment

k cantilever

n nominal hole diameter

r required, rib

s stiffener at the web

u bottom flange

α ratio q_0/q

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. 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 if relevant;

b) execution classes, see 4.1.2;

c) technical requirements regarding the safety of the works, see 4.2.3 and 9.6.

4.1.2 Execution classes

As opposed to EN 1090-3 and in line with EN 1090-4 there is no differentiation in requirements between execution classes within this part.

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 fabricator's name, constituent product, nominal sheet thickness and manufactured length

— Direction of lay and special installation sequences

— Statically effective overlapping (moment-resisting connections), if relevant

— Execution tolerances

— Intended fasteners with type designation, type of washer, 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, center to center 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

— Any specific hazards related to construction should be identified

— Details about corrosion protection, e.g. contact surfaces between different metals or between metals and timber, concrete, masonry or plaster, if relevant

— Details about the condition and location of sealant strips, fillers for profiled sheets and special elements, if relevant

— Details about setting-down places for bundles of structural elements on roof areas and floors according to the static calculation

— Details about walkability, if relevant

— Details about weather integrity, if relevant

— Details about fire protection, if relevant

— Details about thermal insulation, if relevant

— Details about acoustics, if relevant

— Details about air tightness, if relevant

Laying areas and parts of laying areas that are intended to act as a diaphragm for the stabilization shall be specially marked in the layout drawings as “diaphragm”.

4.1.4 Geometrical tolerances

Two types of geometrical tolerances are defined in 11:

a) essential tolerances;

b) functional tolerances, with two classes for which requirement strictness increases from class 1 to class 2 (see 11.4).

4.2 Constructor’s Documentation

4.2.1 General

Annex C contains an example of documentation for the installation.

4.2.2 Quality documentation

The following points shall be documented:

a) organization chart and managerial staff responsible for each aspect of the execution;

b) the procedures, methods and work instructions to be applied;

c) an inspection plan specific to the works;

d) a procedure for handling changes and modifications;

e) a procedure for handling of nonconformities, requests for concessions and quality disputes;

f) specified hold-points or requirement to witness inspections or tests, and any consequent access requirements.