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**Izvedba jeklenih in aluminijastih konstrukcij - 4. del: Tehnične zahteve za tankostenske, hladno oblikovane jeklene elemente in konstrukcijske elemente kot del strešnih, stropnih, talnih in stenskih konstrukcij**

Execution of steel structures and aluminium structures - Part 4: Technical requirements for thin-gauge, cold-formed steel elements and structures for roof, ceiling, floor and wall applications

Ausführung von Stahltragwerken und Aluminiumtragwerken - Teil 4: Technische Anforderungen an tragende, dünnwandige, kaltgeformte Bauelemente und Bauteile für Dach-, Decken-, Boden- und Wandanwendungen aus Stahl

Exécution des structures en acier et des structures en aluminium - Partie 4: Exigences techniques pour éléments et structures en profilés minces en acier formés à froid, pour applications en toiture, plafond, mur et plancher

**Ta slovenski standard je istoveten z: prEN 1090-4**

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**Execution of steel structures and aluminium structures - Part 4:  
Technical requirements for thin-gauge, cold-formed steel  
elements and structures for roof, ceiling, floor and wall  
applications**

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## Foreword

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This document is currently submitted to the CEN Enquiry.

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## 1 Scope

This European Standard defines the requirements for the manufacture of thin-gauge cold-formed steel 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 structural classes I and II according to EN 1993-1-3 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 1993-1-3 are also covered by this part. Perforated and micro profiled sheeting are also covered by this part.

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

Welded sections are excluded from this part and are covered by EN 1090-2.

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.

Steel profiled sheeting for composite floors are covered by this standard. 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
- decking for which thin-gauge structural elements are used as permanent formwork for concrete floors or floors with other materials.



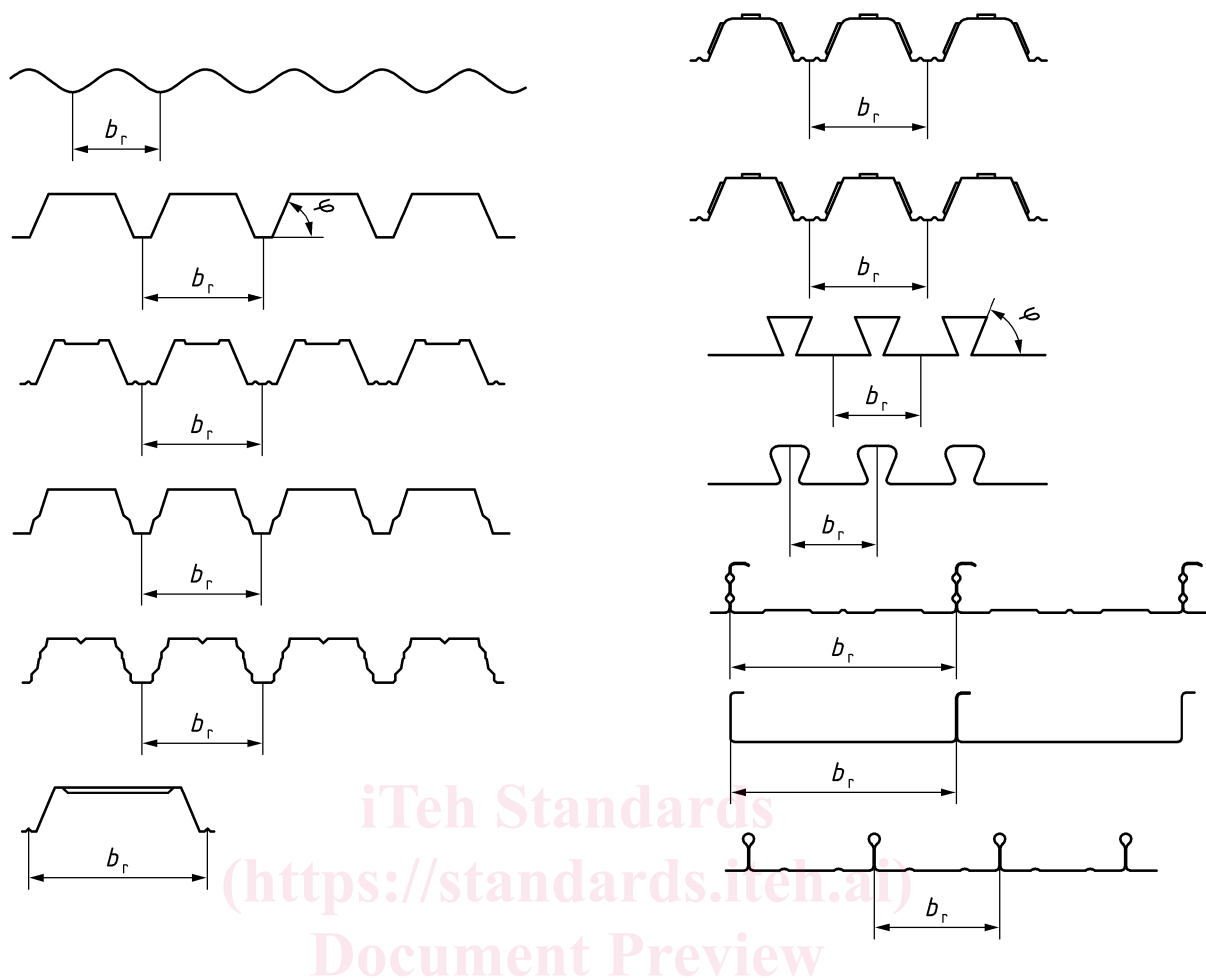


Figure 1 — Examples of profile shapes

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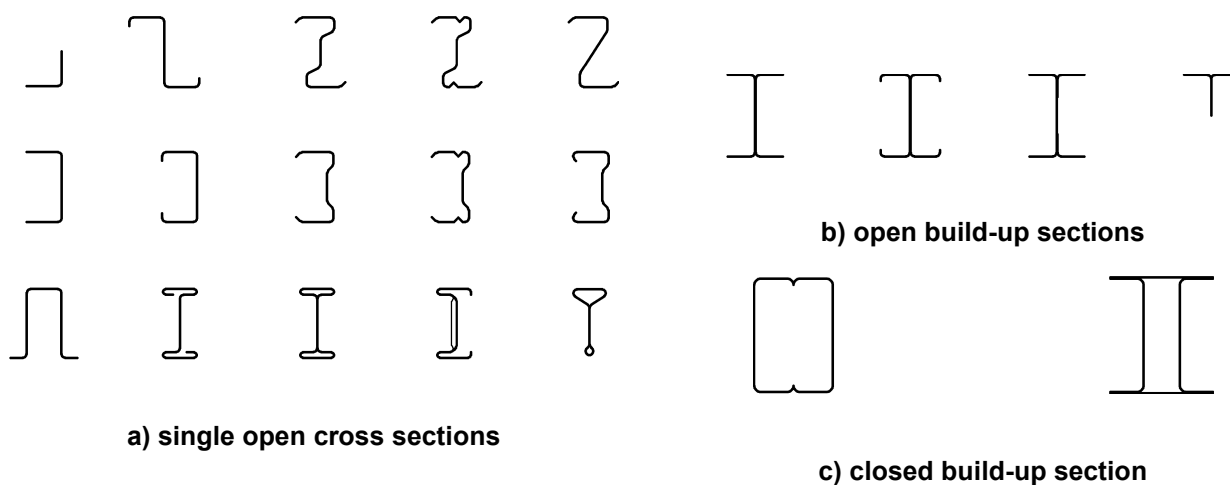
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Figure 2 — Examples of linear profile cross sections

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

EN ISO 1461, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods*

EN 1990, *Eurocode: Basis of structural design*

EN 1991-1-1, *Eurocode 1: Actions on structures — Part 1-1: General actions — Densities, self-weight, 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 1991-1-5, *Eurocode 1: Actions on structures — Part 1-5: General actions — Thermal actions*

EN 1991-1-6, *Eurocode 1: Actions on structures — Part 1-6: General actions, Actions during execution*

EN 1991-1-7, *Eurocode 1: Actions on structures — Part 1-7: General actions — Accidental actions*

EN 1993-1-3, *Eurocode 3: Design of steel structures — Part 1-3: General rules — Supplementary rules for cold-formed members and sheeting*

EN 1993-1-4, *Eurocode 3: Design of steel structures — Part 1-4: General rules — Supplementary rules for stainless steels*

EN 1993-1-5, *Eurocode 3: Design of steel structures — Part 1-5: Plated structural elements*

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

EN ISO 2081, *Metallic and other inorganic coatings — Electroplated coatings of zinc with supplementary treatments on iron or steel*

EN ISO 2409, *Paints and varnishes — Cross-cut test*

EN ISO 2808, *Paints and varnishes — Determination of film thickness*

EN ISO 2810, *Paints and varnishes — Natural weathering of coatings — Exposure and assessment*

EN ISO 3506, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 1: Bolts, screws and studs*

EN ISO 3506, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 2: Nuts*

EN ISO 3506, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 3: Set screws and similar fasteners not under tensile stress*

EN ISO 3506, *Mechanical properties of corrosion-resistant stainless steel fasteners — Part 4: Tapping screws*

EN ISO 4042, *Fasteners — Electroplated coatings*

EN ISO 6270-1, *Paints and varnishes — Determination of resistance to humidity — Part 1: Continuous condensation*

EN ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

EN 10088-4, *Stainless steels — Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes*

EN 10143, *Continuously hot-dip coated steel sheet and strip — Tolerances on dimensions and shape*

EN 10152, *Electrolytically zinc coated cold rolled steel flat products for cold forming — Technical delivery conditions*

EN 10162, *Cold-rolled steel sections — Technical delivery conditions — Dimensional and cross-sectional tolerances*

EN 10169, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*

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

EN 10346, *Continuously hot-dip coated steel flat products — Technical delivery conditions*

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*

EN ISO 12944-2, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 2: Classification of environments*

EN ISO 12944-4, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 4: Types of surface and surface preparation*

EN ISO 12944-6, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 6: Laboratory performance test methods*

EN ISO 12944-7, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 7: Execution and supervision of paint work*

EN 13523-1, *Coil coated metals — Test methods — Part 1: Film thickness*

EN 13523-6, *Coil coated metals — Test methods — Part 6: Adhesion after indentation (cupping test)*

EN 13523-7, *Coil coated metals — Test methods — Part 7: Resistance to cracking on bending (T-bend test)*

EN 13523-8, *Coil coated metals — Test methods — Part 8: Resistance to salt spray (fog)*

EN 14713-1, *Zinc coatings — Guidelines and recommendations for the protection against corrosion of iron and steel in structures — Part 1: General principles of design and corrosion resistance (ISO 14713-1)*

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

EN 14783, *Fully supported metal sheet and strip for roofing, external cladding and internal lining — Product specification and requirements*

EN ISO 17872, *Paints and varnishes — Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing*

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

ASTM D 5796, *Standard Test Method for Measurement of Dry Film Thickness of Thin Film Coil-Coated Systems by Destructive Means Using a Boring Device*

### **3 Terms, definitions and symbols, abbreviations**

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

#### **3.1 Terms, 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**

##### **anti-sag bars**

elements fixed between structural elements to provide restraint for positional, torsional, torsional flexural buckling of the structural element

##### **3.1.3**

##### **apex tie**

special restraint used across the two parallel runs of purlins either side of the apex on a duo pitch roof

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##### **3.1.4**

##### **attachment cleats**

attach the structural elements to their supports or to connect two or more structural elements together

##### **3.1.5**

##### **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

##### **3.1.6**

##### **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

##### **3.1.7**

##### **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**

##### **3.1.8**

##### **component l**

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

**3.1.9****component II**

second component of a connection (usually the supporting member)

**3.1.10****counter formed hole**

surround of a punched hole, formed to create a conical depression to fit a counter sunk headed bolt

**3.1.11****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

**3.1.12****envelope elements**

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

**3.1.13****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

**3.1.14****edge trims**

are load-bearing flashings around a perimeter of a composite steel deck to retain the wet concrete during casting

**3.1.15****knee brace restraint**

structural element fixed between an inner flange of the main support of the purlin or side rail and the purlin or side rail to provide positional, torsional flexural buckling restraint of the main support member

**3.1.16****flashings**

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

**3.1.17****layout drawings**

showing the position of structural components and execution details.

**3.1.18****liner**

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

**3.1.19****rafter**

(stanchion braces, knee braces) compression or tie braces used to connect the inner flange of a rafter, beam or stanchions to a purlin or rail to provide restraint to the inner flange

**3.1.20****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

**prEN 1090-4:2014 (E)****3.1.21****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.

**3.1.22****structural cold formed components**

load-bearing element made from thin-gauge steel sheets.

**3.1.23****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

**3.1.24****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,  $\Omega$  or  $\Pi$  shape.

**3.1.25****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

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