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STANDARD**

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**Samonosilne izolacijske sendvič plošče z obojestranskim kovinskim  
oplaščanjem - Tovarniško izdelani proizvodi - Specifikacije**

Self-supporting double skin metal faced insulating sandwich panels - Factory  
made products - Specifications

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ICS

English version

## Self-supporting double skin metal faced insulating sandwich panels - Factory made products - Specification

Selbsttragende Sandwich-Dämmelemente mit beidseitiger Metalldeckschicht - Vorgefertigte Produkte - Festlegungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 128.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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## Foreword

This document (prEN 14509) has been prepared by Technical Committee CEN/TC Roof covering products for discontinuous laying and products for wall cladding", the secretariat of which is held by IBN.

This document is currently submitted to the CEN Enquiry.

This draft European Standard has been prepared under mandates M/121 "Internal and external wall and ceiling finishes" and M/122 "Roof coverings, Rooflights, Roof windows and Ancillary products" given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU directives.

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

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of an identical text or by endorsement, at the latest by YY-MM-DD, and conflicting national standards shall be withdrawn at the latest by CCYY-MM-DD.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

This European Standard contains seven annexes:

Annex A (normative) - Testing procedures for material properties

Annex B (normative) – Durability testing procedures

Annex C (normative) – Fire performance tests – additional requirements

Annex D (normative) - Design procedures

Annex E (informative) - Dimensional tolerances

Annex F (normative) - Requirements of Decision 2001/671/EC as regards the external fire performance of roof coverings

Annex ZA (informative) – Clauses of this European Standard addressing the provisions of the Construction Products Directive.

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## 1 Scope

This European Standard specifies requirements for factory made, self-supporting, double skin metal faced insulating sandwich panels, which are intended for discontinuous laying in the following applications:

- a) roofs and roof cladding;
- b) external walls and wall cladding; and
- c) walls (including partitions) and ceilings within the building envelope.

The insulating core materials covered by this European Standard are rigid polyurethane foam; expanded polystyrene foam; extruded polystyrene foam; phenolic foam; and mineral wool.

Products consisting of two or more clearly defined layers of different insulating core materials (Multi-layered) are not covered by this European Standard.

Sandwich panels with an aged thermal conductivity for the insulating core greater than 0,06 W/m.K at 10 °C are not covered by this standard.

Panels with edge details that utilize different materials from the main insulating core, i.e. with PVC extrusions or shaped mineral wool edge details, are included in this European Standard.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 485-2 Aluminium and aluminium alloys — Sheet, strip and plate — Part 2: Mechanical properties

EN 485-4 Aluminium and aluminium alloys — Sheet, strip and plate — Part 4: Tolerances on shape and dimensions for cold-rolled products

EN 508-1 Roofing products from metal sheet — Specification for self supporting products of steel, aluminium, or stainless steel sheet — Part 1: Steel

EN 823 Thermal insulating products for building application – Determination of thickness

EN 826 Thermal insulating products for building application – Compression tests on thermal insulating products

EN 1172 Copper and copper alloys — Sheet and strip for building purposes

prENV 1187 Test Method for External Fire Performance to roofs

EN 1364-1 Fire resistance tests for non-loadbearing elements (walls)

EN 1364-2 Fire resistance tests for non-loadbearing elements — Part 2: Ceilings

EN 1365-2 Fire resistance tests for loadbearing elements — Part 2: Roofs

EN 1396 Aluminium and aluminium alloys — Coil coated sheet and strip for general applications. Specifications

EN 1602 Thermal insulating products for building applications – Determination of apparent density

EN 1603 Thermal insulating products for building applications — Determination of dimensional stability under constant normal laboratory conditions (23 °C: 50 % relative humidity)

EN 1604 Thermal insulating products for building applications — Determination of dimensional stability under specified temperature and humidity conditions)

EN 1607 Thermal insulating products for building application — Determination of tensile strength perpendicular to faces

EN 10002-1 Metallic materials — Tensile testing — Part 1: Method of test.

EN 10088-1 List of stainless steels

EN 10142 Continuously hot-dip zinc coated low carbon steel strip and sheet for cold forming - Technical delivery conditions

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

EN 10147 Continuously hot dip zinc coated structural steel sheet and strip — Technical delivery conditions.

EN 10169-1 Continuously organic coated (coil coated) steel flat products — Part I: General information

EN 10204 Metallic products: Types of inspection documents

EN 10214 Continuously hot-dip zinc-aluminium (ZA) coated steel sheet and strip Technical delivery conditions

EN 10215 Continuously hot-dip aluminium-zinc (AZ) coated steel sheet and strip Technical delivery conditions

EN 10259 Cold-rolled stainless steel wide strip and plate/sheet — Tolerances on dimensions and shape

EN 12085 Thermal insulating products for building application — Determination of linear dimensions of test specimens

EN 12114 Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method

EN 12865 Hygrothermal performance of building components and building elements - Determination of the resistance of external wall systems to driving rain under pulsating air pressure

EN 13162 Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification

EN 13163 Thermal insulation products for buildings — Factory made products of expanded polystyrene (EPS) — Specification

EN 13164 Thermal insulation products for buildings — Factory made products of extruded polystyrene (XPS) — Specification

EN 13165 Thermal insulation products for buildings — Factory made rigid polyurethane foam (PUR) products — Specification

EN 13166 Thermal insulation products for buildings — Factory made products of phenolic foam (PF) — Specification

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

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prEN 13501-2 Fire classification of construction products and building elements — Part 2: Classification using test data from fire resistance tests

prEN 13501-5 Fire classification of construction products and building elements — Part 5: Classification using test data from external fire exposure to roof tests

EN 13823 Reaction to fire tests for building products — Building products excluding floorings exposed to thermal attack by a single burning item

prEN 14135 Fire resistance test for non-loadbearing elements — Coverings – determination of fire protection ability

EN 20354 Acoustics — Measurement of sound absorption in a reverberation room

ENV 1991 Eurocode 1. Basis of design and actions on structures

EURONORM 153<sup>1)</sup>, Hot-dip terne (lead-alloy) coated cold-reduced carbon steel flat rolled products of commercial and drawing qualities — Technical delivery conditions

EN ISO 140-3 Acoustics — Measurement of sound insulation in buildings and of building elements — Part 3: Laboratory measurements of airborne sound insulation of building elements

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

EN ISO 1182 Reaction to fire tests for building products – Non-combustibility test

EN ISO 1716 Reaction to fire tests for building products – Determination of gross calorific value

EN ISO 6946 Building components and building elements - Thermal resistance and thermal transmittance. Calculation method

EN ISO 9001 Quality systems - Model for quality assurance in design, development, production, installation and servicing

EN ISO 9002 Quality systems - Model for quality assurance in production, installation and servicing

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

EN ISO 11925-2 Reaction to fire tests for building products — Part 2. Ignitability when subject to direct impingement of flame

ISO 12491 Statistical methods for quality control of building materials and components

UEAtc M.O.A.T. No 59:1996, Assessment of installations using sandwich panels with a CFC-free polyurethane foam core

### 3 Terms and definitions

For the purposes of this European Standard, the following definitions apply:

#### 3.1 auto-adhesive

adhesive bond occurring automatically as part of the foaming process

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<sup>1)</sup> until transformed into a European Standard (EN).



### 3.2 **bond bonding**

adhesive agent that firmly connects the faces to the core

NOTE The adhesive agent is an adhesive (adhesive bonding) when the core consists of lamellae or slabstock. However when using PUR or PF foam as the core material, the bond may be formed automatically (auto-adhesive bonding) when the core is foamed between the faces during the manufacturing process.

### 3.3 **ceiling accessible ceiling**

covering over an internal area which because of the composite action of the panel is self-supporting and load bearing

### 3.4 **core**

layer of material, having thermally insulating properties, which is bonded between two metal faces

### 3.5 **durability**

ability of the panel to withstand the climatic effects and consequent decrease of mechanical strength with time caused by environmental factors such as temperature, humidity, freeze-thaw cycles and their various combinations

### 3.6 **edge longitudinal edge**

side of the panel where adjacent panels join together in the same plane

### 3.7 **face facing**

non-perforated, flat, lightly profiled or profiled thin metal sheet firmly bonded to the core.

### 3.8 **flat facing**

facing without any rolled or pressed profile, or raised strengthening rib

### 3.9 **joint**

interface between two panels where the meeting edges have been designed to allow the panels to join together in the same plane.

NOTE 1 The joint may incorporate interlocking parts that enhance the mechanical properties of the system as well as improving the thermal, acoustic and fire performance and restricting air movement.

NOTE 2 The term 'joint' does not refer to a junction between cut panels or a junction where the panels are not installed in the same plane.

### 3.10 **lamella**

core material consisting of mineral wool fibres that have been cut and orientated perpendicularly to the facings prior to bonding

### 3.11 **lightly profiled facing**

facing with a rolled or pressed profile not exceeding 5 mm in depth

### 3.12 **pre-manufactured pre-formed**

component or material that is supplied to the manufacturer ready for direct incorporation in the sandwich panel

### 3.13 **sandwich panel**

building product consisting of two metal faces positioned on either side of a core that is a rigid thermally insulating material, which is firmly bonded to both faces so that the three components act compositely when under load.

### 3.14 self-supporting panel

panel capable of supporting, by virtue of its materials and shape, its own load and in the case of panels fixed to spaced structural supports all applied loadings (e.g. snow, wind, internal air pressure), and transmitting these loadings to the supports.

### 3.15 shift

period of production during a working day, normally 6 to 8 hours but can be less

### 3.16 side lap

folded area of one or both of the facing materials along the longitudinal edge of the panel which engages with the adjacent panel to form an interlocking or overlapping joint

### 3.17 slabstock

polystyrene, polyurethane or phenolic foam, or mineral wool core material taken from stock prior to bonding between two metal faces, which may be cut to size before bonding

## 4 Symbols and abbreviations

For the purposes of this European Standard the following symbols and abbreviations apply.

*A* cross-sectional area

*B* flexural rigidity, overall width of the panel

*C* ratio

*D* overall depth of the panel, axial rigidity of face sheet, distance

*E* modulus of elasticity

*F* force, load, action

*G* shear modulus, self-weight, permanent action

*H* thickness (panel or specimen)

*I* moment of inertia

*L* span, distance

*M* bending moment

*N* axial compressive force

*Q* variable action

*R* resistance, reflectivity, parameter, tensile strength ( $R_{DUR}$ ,  $R_{24}$ )

*S* shear rigidity, value of a load effect, effect of an action

*T* temperature

*V* shear force

*W* section modulus, width

*b* width of test specimen, width of plate, width of plane part in profile, bowing

<i>d</i>	diameter of screw, depth of face profile or stiffeners, depth of core
<i>e</i>	distance between centroids of faces, base of natural logarithms ( $e = 2,718282$ )
<i>f</i>	strength, yield stress
<i>g</i>	self-weight
<i>h</i>	height of profile, thickness (e.g. glue)
<i>i</i>	index
<i>k</i>	parameter, correction factor
<i>l</i>	length, deviation
<i>m</i>	mass
<i>n</i>	number of tests, number of screws, number of webs
<i>p</i>	pitch of profile
<i>q</i>	live load
<i>r</i>	radius
<i>t</i>	thickness of face sheet
<i>v</i>	variance factor
<i>w</i>	deflection, load, compression, cover width
<i>x, y, z</i>	coordinates
$\alpha$	angle of dispersion, parameter, coefficient of thermal expansion
$\beta$	parameter
$\delta$	deviation
$\phi$	angle
$\gamma$	shear strain, partial safety factor
$\lambda$	thermal conductivity
$\varphi$	creep coefficient
$\mathcal{G}$	parameter
$\theta$	parameter ( $\theta = (\alpha_{F2} T_2 - \alpha_{F1} T_1) / e$ )
$\nu$	Poisson's ratio

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$\sigma$	stress
$\tau$	shear stress
$\psi$	combination coefficient
$\rho$	coefficient

Subscripts

B	bending
C	core
D	declared value ( $R_D$ ), compression ( $E_D$ ), deflection
F	face, action ( $\gamma_F$ )
G	self-weight, permanent load, degree
M	material ( $\gamma_M$ )
N	nominal
Q	variable action
R	resistance
S	sandwich part of the cross-section, stress ( $M_S$ )
T	temperature
Z	tensile ( $E_Z$ )
adj	adjusted
b	bending, elastic extension
c	compression, creep, core
d	design
e	depth between centroids
eff	effective
f	load
i, j	index
k	characteristic value
lin	linear
m	material
n	nominal

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obs	observed (e.g. result)
q	uniform load
s	snow, support ( $L_s$ = support width), stiffeners
t	tension, time
tol	tolerance (normal or special)
tr	traffic ( $C_{tr}$ )
u	ultimate ( $F_u$ )
v	shear
w	wind, web, wrinkling ( $\sigma_w$ ), weighted ( $R_w$ ), deflection
y	yield
x, y, z	coordinates
0	basic value, unit width, time (e.g. $t = 0$ )
1	external face, upper face
2	internal face, lower face
90/90	limit value representing 90 % of production with a confidence level of 90 % ( $R_{90/90}$ )

#### Abbreviations

CWFT **Classified Without Further Testing**

EPS **Expanded Polystyrene foam**

FPC **Factory Production Control**

ITT **Initial Type Test**

MW **Mineral Wool**

NPD **No Performance Determined**

PCS **Gross Calorific Potential**

PUR **Rigid PolyUREthane foam** [The abbreviation PUR includes **PolyIsocyanuRate foam (PIR)**

PF **Phenolic foam**

XPS **EXtruded Polystyrene foam**

## 5 Requirements

### 5.1 Requirements for component materials

#### 5.1.1 General

The product shall be manufactured with materials conforming to 5.1.2 to 5.1.6.

#### 5.1.2 Metal facings

##### 5.1.2.1 Steel faces

Steel faces with metallic coatings shall conform to the requirements of the appropriate standard given in Table 1.

Steel faces with other coating systems may be used provided that they meet the minimum requirements in table 1.

**Table 1: Standards for steel with metallic coating**

Metallic coating	European Standard
Zinc	EN 10147 or EN 10142
5% Al-Zn	EN 10214
55% AL-Zn	EN 10215
<p>For steel faces to EN 10142, EN 10214, EN 10215, minimum yield strength of 220 N/mm<sup>2</sup> shall be used for steel with a metallic coating.</p> <p>The minimum nominal metallic coating masses shall be as specified in EN 508-1 or EN 10169-1</p> <p>NOTE If the metal face is bonded over its whole area to a rigid foam core with a closed cell structure, the reverse side metallic coating mass may be reduced to a minimum of 50 g/m<sup>2</sup></p>	

##### 5.1.2.2 Stainless steel faces

The chemical composition of stainless steel faces and their physical properties shall conform to EN 10088-1.

The coating properties of terne coated stainless steel shall conform to EURONORM 153. The nominal coating mass shall be the total mass of both surfaces and shall be at least 20 g/m<sup>2</sup>.

NOTE Not all steels in EN 10088-1 are suitable for sandwich panels

##### 5.1.2.3 Aluminium faces

The chemical composition, temper and the mechanical properties of aluminium shall conform to EN 485-2 or EN 1396

The alloy and temper shall be chosen to give corrosion resistance, strength and formability.

NOTE Not all aluminum alloys covered by EN 485-2 are suitable for sandwich panels.

#### 5.1.2.4 Copper faces

The chemical composition, temper, mechanical properties and thickness tolerances of copper faces shall conform to EN 1172.

NOTE Not all copper facings in EN 1172 are suitable for sandwich panels

#### 5.1.2.5 Organic protective coatings

Organic protective coatings shall be selected according to their durability in the application environment.

For steel: Organic coated steel sheets shall conform to the requirements of EN 10169-1

For aluminium: Organic coated aluminium sheets shall conform to the requirements of EN 1396.

The reverse side coating for all materials shall be chosen as appropriate for bonding to the core material.

#### 5.1.3 Core materials

Tests to determine the thermal resistance for the panel including the core material shall be in accordance with 5.2.3. Conformity requirements for pre-manufactured core components shall be in accordance with 6.3.3.2.

#### 5.1.4 Adhesives and bonding

As the adhesion between the core and the faces of the panel has a fundamental role in the satisfactory performance of the panel, tests to check the adhesion, included in the tests on the panel, shall be in accordance with 5.2.1.6 (performance of tensile bond) and 5.2.4.1 (durability).

#### 5.1.5 Joint components (excluding site-applied sealants)

Components used at the joints between panels, which are manufactured as an integral part of the product (e.g. plastic extrusions and factory-fitted sealants or gaskets), shall, where relevant, be tested as part of the panel assembly.

#### 5.1.6 Release of dangerous substances

For release of dangerous substances for products sold in the European Economic Area, see Annex ZA. Products sold outside the EEA shall satisfy any relevant regulatory provisions valid in the place of use.

### 5.2 Requirements for panels

#### 5.2.1 Mechanical resistance of the panel

##### 5.2.1.1 General

The following mechanical properties of the panel shall be determined in accordance with 5.2 and Annex A and declared by the manufacturer.

- a) The shear strength of the core, in kilopascals (MPa)
- b) The shear modulus of the core, mean and characteristic values, in kilopascals (MPa)
- c) The creep coefficient [roof and ceiling uses only] (numerical value)