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oplaščenjem - 3. del: Preskusne metode za ugotavljanje mehanske trdnosti,
fizičnega obnašanja stavb in vzdržljivosti**

Factory-made double skin metal faced insulating sandwich panels - Part 3: Test methods
for determining mechanical strength, building physical behaviour and durability

Werkmäßig hergestellte Sandwich-Elemente mit beidseitigen Metalldeckschichten - Teil
3: Prüfverfahren zur Bestimmung der mechanischen Festigkeit, des bauphysikalischen
Verhaltens und der Dauerhaftigkeit

Panneaux sandwichs isolants à deux parements métalliques manufacturés - Partie 3 :
Méthodes d'essai pour déterminer la résistance mécanique, le comportement physique
des bâtiments et leur durabilité

Ta slovenski standard je istoveten z: prEN 14509-3

ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials
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EUROPEAN STANDARD
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Factory-made double skin metal faced insulating sandwich panels - Part 3: Test methods for determining mechanical strength, building physical behaviour and durability

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prEN 14509-3:2026 (E)**European foreword**

This document (prEN 14509-3:2026) has been prepared by Technical Committee CEN/TC 128 “Roof covering products for discontinuous laying and products for wall cladding”, the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14509:2013.

The main changes with respect to the previous edition are listed in Annex A.

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Introduction

This document replaces Annexes A, B, C and D in EN 14509:2013. The testing procedures for determination of assessment of performance are given in Clauses 4 to 14. The testing procedures for the verification of constancy of performance (FPC) are given in Clause 16.

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1 Scope

This document specifies test methods needed for determination of mechanical strength, building physical behaviour and durability of factory-made double skin metal faced insulating sandwich panels (hereafter sandwich panels) for both self-supporting and structural applications in roofs, in external and internal walls (including partitions) and in ceilings in buildings as well as those in cold store applications.

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 506:2008, *Roofing products of metal sheet — Specification for self-supporting products of copper or zinc sheet*

EN 508-1:2021, *Roofing and cladding products from metal sheet — Specification for self-supporting products of steel, aluminium or stainless steel sheet — Part 1: Steel*

EN ISO 29469:2022, *Thermal insulating products for building applications — Determination of compression behaviour (ISO 29469:2022)*

EN 1363-1:2020, *Fire resistance tests — Part 1: General requirements*

EN 1364-1:2015, *Fire resistance tests for non-loadbearing elements — Part 1: Walls*

EN 1365-2:2014, *Fire resistance tests for loadbearing elements — Part 2: Floors and roofs*

EN 1396:2023, *Aluminium and aluminium alloys — Coil coated sheet and strip for general applications — Specifications*

EN 1607:2013, *Thermal insulating products for building applications — Determination of tensile strength perpendicular to faces*

EN 1990-1:2023+A1:2026, *Eurocode — Basis of structural and geotechnical design — Part 1: New structures*

EN 1993-1-4:2025, *Eurocode 3 — Design of steel structures — Part 1-4: Stainless steel structures*

EN 1999-1-1:2023, *Eurocode 9 — Design of aluminium structures — Part 1-1: General rules*

EN 10169:2022, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*

EN 10346:2015, *Continuously hot-dip coated steel flat products for cold forming — Technical delivery conditions*

EN 12085:2013, *Thermal insulating products for building applications — Determination of linear dimensions of test specimens*

EN 12114:2000, *Thermal performance of buildings — Air permeability of building components and building elements — Laboratory test method*

EN 12865:2001, *Hygrothermal performance of building components and building elements — Determination of the resistance of external wall systems to driving rain under pulsating air pressure*

- EN 13162:2012+A1:2015, *Thermal insulation products for buildings — Factory made mineral wool (MW) products — Specification*
- EN 13163:2012+A2:2016, *Thermal insulation products for buildings — Factory made expanded polystyrene (EPS) products — Specification*
- EN 13164:2012+A1:2015, *Thermal insulation products for buildings — Factory made extruded polystyrene foam (XPS) products — Specification*
- EN 13165:2012+A2:2016, *Thermal insulation products for buildings — Factory made rigid polyurethane foam (PU) products — Specification*
- EN 13166:2012+A2:2016, *Thermal insulation products for buildings — Factory made phenolic foam (PF) products — Specification*
- EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*
- EN 13523-3:2024, *Coil coated metals — Test methods — Part 3: Colour difference and metamerism — Instrumental comparison*
- EN 13523-26:2022, *Coil coated metals — Test methods — Part 26: Resistance to condensation of water*
- EN 13823:2020+A1:2022, *Reaction to fire tests for building products — Building products excluding floorings exposed to the thermal attack by a single burning item*
- prEN 14509-5:2026, *Factory made double skin metal faced insulating sandwich panels — Part 5: Design methods. Determination criteria for combing actions and spans*
- EN 15254-5:2018, *Extended application of results from fire resistance tests — Non-loadbearing walls — Part 5: Metal sandwich panel construction*
- EN 15254-7:2018, *Extended application of results from fire resistance tests — Non-loadbearing ceilings — Part 7: Metal sandwich panel construction*
- EN ISO 354:2003, *Acoustics — Measurement of sound absorption in a reverberation room (ISO 354:2003)*
- EN ISO 717-1:2020, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation (ISO 717-1:2020)*
- EN ISO 845:2009, *Cellular plastics and rubbers — Determination of apparent density (ISO 845:2006)*
- EN ISO 4628-2:2016, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2:2016)*
- EN ISO 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature (ISO 6892-1:2019)*
- EN ISO 6946:2017, *Building components and building elements — Thermal resistance and thermal transmittance — Calculation methods (ISO 6946:2017, Corrected version 2021-12)*
- EN ISO 10140-1:2021, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 1: Application rules for specific products (ISO 10140-1:2021)*
- EN ISO 10140-2:2021, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation (ISO 10140-2:2021)*

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EN ISO 10211:2017, *Thermal bridges in building construction — Heat flows and surface temperatures — Detailed calculations (ISO 10211:2017)*

EN ISO 10456:2007, *Building materials and products — Hygrothermal properties -Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)*

EN ISO 11654:1997, *Acoustics — Sound absorbers for use in buildings — Rating of sound absorption (ISO 11654:1997)*

EN ISO 11925-2:2026, *Reaction to fire tests — Ignitability of products subjected to direct impingement of flame — Part 2: Single-flame source test (ISO 11925-2:2026)*

EN ISO 12572:2016, *Hygrothermal performance of building materials and products — Determination of water vapour transmission properties — Cup method (ISO 12572:2016)*

EN ISO 29470:2020, *Thermal insulating products for building applications — Determination of the apparent density (ISO 29470:2020)*

ISO 12491:1997, *Statistical methods for quality control of building materials and components*

CEN/TS 1187:2012, *Test methods for external fire exposure to roofs*

3 Terms, definitions, symbols, subscripts and abbreviations

3.1 Terms and definitions

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

3.1.1

assembly

connected panels with joints as their intrinsic parts

3.1.2

bending moment capacity

maximum bending moment recorded during a test on an individual panel

3.1.3

bending resistance

characteristic value of bending moment capacity determined on the basis of a test series

3.1.4

bond

bonding

adhesion between the face(s) and the core normally provided by an adhesive

3.1.5

auto-adhesive bond

self-adhesion of the core to the face(s) occurring automatically without the use of an adhesive

Note 1 to entry: This technique is used for producing sandwich panels by foaming.

3.1.6

ceiling

covering over an internal area

3.1.7**core**

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

Note 1 to entry: Panels with special edge details in the longitudinal joints may utilize different core materials from the main insulating core (e.g. for improved fire performance) if these edge details have no influence on the mechanical performance of the panel.

3.1.8**mineral wool****MW**

insulating wool produced from molten stone, slag or glass

[SOURCE: EN 13162:2012+A1:2015]

3.1.9**phenolic foam****PF**

rigid cellular foam, the polymer structure of which is made primarily from the polycondensation of phenol, its homologues and/or derivatives, with or without aldehydes or ketones

[SOURCE: EN 13166:2012+A2:2016]

3.1.10**expanded polystyrene****EPS**

rigid cellular plastic material, manufactured by moulding beads or granules of expandable polystyrene or one of its copolymers, with an air filled closed cellular structure

[SOURCE: EN 13163:2012+A2:2016]

3.1.11**extruded polystyrene foam****XPS**

rigid cellular plastics insulation material expanded and extruded with or without a skin, from polystyrene or one of its copolymers and which has a closed cell structure

[SOURCE: EN 13164:2012+A1:2015]

3.1.12**rigid polyurethane****PU**

family of rigid cellular thermoset polymeric insulation products with a substantially closed cell structure including both polymer types based on PIR and PUR

[SOURCE: EN 13165:2012+A2:2016]

3.1.13**durability**

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

prEN 14509-3:2026 (E)**3.1.14****edge****longitudinal edge**

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

3.1.15**face**

flat, lightly profiled or profiled thin metal sheet firmly bonded to the core

3.1.16**flat face**

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

3.1.17**lightly profiled face**

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

3.1.18**profiled face**

face with a rolled or pressed profile exceeding 5 mm in depth

3.1.19**incompletely bonded face**

metal face whose bond to the core is adequate for sandwich action but does not include the entire surface of the core

Note 1 to entry: An example is a trapezoidally profiled face that has voids between the raised profiles and the core.

3.1.20**fastener**

component (screw incl. washer, with or without sealant if relevant) used for fixing the panel to the supporting structure

3.1.21**fixing**

mechanical connection between the sandwich panel and the supporting structure, typically with one fastener or more fasteners in a visible fixing (through the sandwich panel) or in a hidden fixing (placed in the longitudinal joint of the sandwich panel)

Note 1 to entry: Fixing is covering only the failure modes in sandwich panels caused by the fastening.

3.1.22**hidden fixing**

mechanical connection between the sandwich panel and the supporting structure, placed in the longitudinal joint of adjacent sandwich panels consisting of one or more fasteners (with or without washer) going through or connecting both sheets in a certain arrangement in relation to the sandwich panel geometry, with or without load spreading component

3.1.23**visible fixing**

one or more fasteners in a certain minimum distance to the sandwich panel edges and between themselves (if applicable), visible on the visible side of the face of the sandwich panel, penetrating the inner and the outer face and the core of the sandwich panel

Note 1 to entry: Visible fixings can be covered by flashings after installation.

3.1.24**incompletely bonded panel**

panel in which one or both faces is incompletely bonded

3.1.25**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 to entry: The joint may incorporate interlocking parts that enhance the mechanical properties of the system as well as improve the thermal, acoustic and fire performance and restrict air movement.

Note 2 to entry: 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.

3.1.26**lamella**

core material consisting of mineral wool that has been cut and orientated with the fibres perpendicular to the faces prior to bonding

3.1.27**pre-manufactured****pre-formed**

component or material that is supplied for panel production ready for direct incorporation into the sandwich panel

3.1.28**product family**

group of products produced by one manufacturer for which the assessment results for one or more characteristics from any one product within the range are valid for all other products within this range

3.1.29**sandwich panel**

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

3.1.30**shift**

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

3.1.31**side lap**

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

3.1.32**wrinkling strength**

strength representing the characteristic value of wrinkling stress

3.1.33**wrinkling stress**

stress in the compressed face of a panel undergoing loading in bending at the moment of failure load

prEN 14509-3:2026 (E)**3.2 Symbols, subscripts and abbreviations**

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

3.2.1 Symbols

A	cross-sectional area (may be full width of panel or per unit width)
B	flexural rigidity (may be full width of panel or per unit width), overall width of the panel/specimen,
C	ratio
D	overall thickness of the panel
E	modulus of elasticity
F	force, load, support reaction
G	shear modulus, permanent action
I	moment of inertia
L	span, distance, width of support (L_s)
M	bending moment
N	axial compressive force
Q	variable action
R	resistance, sound reduction index (R_w), reflectivity (R_G), tensile strength (R_{DUR} , R_{24})
S	shear rigidity
T	temperature
U	thermal transmittance, thermal transmittance including the influence of the joints $U_{d,s}$
V	shear force
a	distance apart of clips (6.4)
b	width of test specimen, width of plate, width of ribs/valleys, bowing
d	depth of face profile or stiffeners, depth of core (d_c)

e	distance between centroids of faces, base of natural logarithms ($e = 2,718\ 282$)
f	strength, yield stress, thermal transmittance contribution factor (f_{joint})
h	height of profile, thickness (e.g. glue), thickness of test specimen
k	parameter (4.11.5.2 support reaction capacity), correction factor
l	length, deviation
m	mass
n	number of tests, number of screws, number of webs
p	pitch of profile
q	live load
r	radius
s	length of web (s_{w1})
t	thickness of face sheet
v	variance factor
w	deflection, displacement, compression, cover width
x, y, z	coordinates
α	parameter (4.6.5.4), coefficient of thermal expansion, sound absorption (α_w), ratio (4.4.5.3)
β	parameter (4.6.5.4)
δ	deviation
ϕ	angle
γ	shear strain, partial safety factor
λ	thermal conductivity, λ_{design} (design value), ratio (4.4.5.3)
φ	creep coefficient
σ	wrinkling strength, standard deviation