
Izolacijske sendvič plošče z obojestranskim kovinskim oplaščenjem - Tovarniško izdelani proizvodi - Specifikacije - 2. del: Konstrukcijska uporaba - Pritrditev in možna uporaba za stabilizacijo posameznih konstrukcijskih elementov

Double skin metal faced insulating panels - Factory made products - Specifications - Part 2: Structural applications - Fixings and potential uses of stabilization of individual structural elements

Sandwich-Elemente mit beidseitigen Metalldeckschichten - Werkmäßig hergestellte Produkte - Spezifikationen - Teil 2: Tragende Anwendungen - Befestigungen und mögliche Nutzung zur Stabilisierung von einzelnen tragenden Bauteilen

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Panneaux sandwichés, isolants, double peau métalliques - Produits manufacturés - Spécifications - Partie 2: Applications structurelles - Assemblages et utilisation potentielle pour stabilisation d'éléments structurels individuels

Ta slovenski standard je istoveten z: prEN 14509-2

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| 91.100.60 | Materiali za toplotno in zvočno izolacijo | Thermal and sound insulating materials |
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Double skin metal faced insulating panels - Factory made products - Specifications - Part 2: Structural applications - Fixings and potential uses of stabilization of individual structural elements

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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 128.

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European foreword

This document (prEN 14509-2:2017) 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 has been prepared under a standardisation request given to CEN by the European Commission and the European Free Trade Association, and supports basic works requirements of EU Regulation.

For relationship with EU Regulation, see informative Annex ZA, which is an integral part of this document.

Data obtained from earlier tests in accordance to EN 14509:2006 and 2013 may be used for obtaining the declared data providing that they do not change significantly.

This European Standard (EN 14509-2) gives the basic rules for use of structural sandwich panels for structural applications including fixing of panels. The clarification of which application is structural needs to be given by national provisions. The stabilization parameters needed to contribute to stabilization of individual structural elements (supporting structure) as defined as structural class II according to EN 1993-1-3. Sandwich panels fulfilling requirements for applications for structural class II are seemed to fulfill also applications for structural class III according to EN 1993-1-3.

In EN 14509 (covering panels used as self-supporting) the rules for declaring the basic panel properties that are common for all applications (use as self-supporting and/or structural) are given.

NOTE 1 In future EN 14509 will become EN 14509-1.

NOTE 2 In future EN 14509-3 will specify sandwich panels used for contribution to overall strength and stabilization of buildings (structural class I according to EN 1993-1-3) and as axially loaded panels.

prEN 14509-2:2017 (E)**1 Scope**

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

- a) roofs and roof cladding (e.g. for refurbishment);
- b) external walls and wall cladding (e.g. on brick walls for refurbishment or sandwich panels on liner trays);
- c) walls (including partitions) and ceilings within the building envelope.

It is essential that structural double skin metal faced insulating sandwich panels according to this European Standard (EN 14509-2) fulfil the requirements of EN 14509.

This European Standard (EN 14509-2) gives the basic rule for use of structural sandwich panels for structural applications including fixing of panels. The clarification of which application is structural needs to be given by national provisions. The stabilization parameters needed to contribute to stabilization of individual structural elements (supporting structure) as defined as structural class II according to EN 1993-1-3 are included.

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

NOTE Polyurethane (PUR) includes polyisocyanurate (PIR).

Due to durability performance reason coated face material of steel is used only (both organic and metallic coating). Uncoated steel is not used as face material.

Panels with edge details that utilise different materials from the main insulating core are included in this European Standard if there is no influence on mechanical performance of the panel.

Panels used in cold store applications are included in this European Standard. Panels, put on the market as a component of a cold storage room, building and/or building envelope kit are covered by ETA-Guideline 021 "Cold storage premises kits".

When manufactured in accordance with this European Standard and if satisfying the type testing and FPC criteria the panels can be considered as impermeable to water. The water permeability of the assembly is a function of its installation and is only relevant to the joints and fixings.

This European Standard does not cover the following:

- d) sandwich panels with a declared thermal conductivity for the insulating core greater than defined in the relevant harmonized European Standards for insulation materials;
- e) products consisting of two or more clearly defined layers of different insulating core materials (multi-layered);
- f) curved panels;
- g) perforated panels;
- h) hidden fixings under permanent tension load, e.g. for ceilings;
- i) special type of fasteners such as "T" support for ceiling, threaded rods with clamps for wall, omega and clamps for wall and ceiling, injected joint with flashing and threaded rods for wall and ceiling.

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 508-1:2014, *Roofing and cladding products from metal sheet — Specification for self-supporting of steel, aluminium or stainless steel sheet — Part 1: Steel*

EN 1090-2:2008+A1:2011, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

prEN 1090-4:2015, *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 1990:2002, *Eurocode — Basis of structural design*

EN 1993-1-3:2006, *Eurocode 3 — Design of steel structures — Part 1-3: General rules — Supplementary rules for cold-formed members and sheeting*

EN 1993-1-4:2006, *Eurocode 3 — Design of steel structures — Part 1-4: General rules — Supplementary rules for stainless steels*

EN 10152:2017, *Electrolytically zinc coated cold rolled steel flat products for cold forming — Technical delivery conditions*

EN 10169:2010+A1:2012, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*

EN 10204:2004, *Metallic products — Types of inspection documents*

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

EN 13523-1:2017, *Coil coated metals — Test methods — Part 1: Film thickness*

EN 13523-6:2002, *Coil coated metals — Test methods — Part 6: Adhesion after indentation (cupping test)*

EN 13523-7:2014, *Coil coated metals — Test methods — Part 7: Resistance to cracking on bending (T-bend test)*

EN 13523-8:2017, *Coil coated metals — Test methods — Part 8: Resistance to salt spray (fog)*

EN 13523-10:2017, *Coil coated metals — Test methods - Part 10: Resistance to fluorescent UV radiation and water condensation*

EN 13523-19:2011, *Coil coated metals — Test methods — Part 19: Panel design and method of atmospheric exposure testing*

EN 13523-21:2017, *Coil coated metals — Test methods — Part 21: Evaluation of outdoor exposed panels*

EN 13523-26:2014, *Coil coated metals — Test methods — Part 26: Resistance to condensation of water*

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EN 14509:2013¹, *Self-supporting double skin metal faced insulating panels — Factory made products — Specifications*

EN ISO 1461:2009, *Hot dip galvanized coatings on fabricated iron and steel articles — Specifications and test methods (ISO 1461:2009)*

EN ISO 2081:2008, *Metallic and other inorganic coatings — Electroplated coatings of zinc with supplementary treatments on iron or steel (ISO 2081:2008)*

EN ISO 2409:2013, *Paints and varnishes — Cross-cut test (ISO 2409:2013)*

EN ISO 2808:2007, *Paints and varnishes — Determination of film thickness (ISO 2808:2007)*

EN ISO 2810:2004, *Paints and varnishes — Natural weathering of coatings — Exposure and assessment (ISO 2810:2004)*

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 4628-3:2016, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting (ISO 4628-3:2016)*

EN ISO 4628-4:2016, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking (ISO 4628-4:2016)*

EN ISO 4628-5:2016, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking (ISO 4628-5:2016)*

EN ISO 4628-8:2012, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect (ISO 4628-8:2012)*

EN ISO 4892-2:2013, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps (ISO 4892-2:2013)*

EN ISO 4892-3:2016, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps (ISO 4892-3:2016)*

EN ISO 6270-1:2001, *Paints and varnishes — Determination of resistance to humidity — Part 1: Continuous condensation (ISO 6270-1:1998)*

EN ISO 9227:2017, *Corrosion tests in artificial atmospheres — Salt spray tests (ISO 9227:2017)*

EN ISO 12944-2:1998, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 2: Classification of environments (ISO 12944-2:1998)*

EN ISO 12944-4:1998, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 4: Types of surface and surface preparation (ISO 12944-4:1998)*

¹ EN 14509 will be replaced by EN 14509-1.

EN ISO 12944-6:1998, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 6: Laboratory performance test methods (ISO 12944-6:1998)*

EN ISO 12944-7:1998, *Paints and varnishes — Corrosion protection of steel structures by protective paint systems — Part 7: Execution and supervision of paint work (ISO 12944-7:1998)*

EN ISO 17872:2007, *Paints and varnishes — Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing (ISO 17872:2007)*

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 and definitions

For the purposes of this document, the terms and definitions given in EN 14509 and the following apply.

3.1

fastener

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

3.2

fixing

mechanical connection between the structural 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 only covering failure modes in the panel, not failure modes in fastener or supporting structure.

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3.3

hidden fixing

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

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

3.4

load spreading plate

metal component used to distribute the load from the fasteners to the panel.

3.5

stiffness parameter

the stiffening effect on supporting structure given by sandwich panels when fastened to supporting structure

3.6

structural panel

unless otherwise defined nationally, in the field of this harmonized standard, panels fixed to spaced structural supports, capable of supporting, by virtue of its materials and shape, its self-weight, and all the applied loadings (e.g. snow, wind, internal air pressure, thermal gradient), and transmitting these loadings to the supporting structure and that may be used for the stabilization of its supporting structure

prEN 14509-2:2017 (E)**3.7****visible fixing**

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

4 Symbols and abbreviations**4.1 General**

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

4.2 Symbols

k factor

4.3 Subscripts

adj adjuste

lsp load spreading plate

rep repeated

4.4 Abbreviations

HDG Hot dipped galvanizing

NOTE In the following clauses the specific requirements will follow the relevant clauses in EN 14509. Where text is similar as in EN 14509 only reference to EN 14509 is given.

5 Product characteristics, properties and test methods**5.1 General**

The provisions of EN 14509 apply, if not otherwise specified in this clause.

5.2 Characteristics of metal facings**5.2.1 Steel****5.2.1.1 Steel faces**

The provisions of 5.1.2.1.1 in EN 14509:2013 and EN 10346 apply.

To provide the serviceability for a longer period of time, the steel faces need to be protected against the corrosivity of the environment. Therefore an approved corrosion protection system with a proof of suitability according to Annex B shall be used which fulfils the requirements to withstand the designated corrosivity of the environment of the building.

5.2.1.2 Backface coating

The provisions of 5.1.2.1.2 in EN 14509:2013 apply.

5.2.1.3 Stainless Steel faces

The provisions of 5.1.2.2 in EN 14509:2013 apply. Materials have to fulfil the requirements of EN 1993-1-4 when used for stabilization purposes.

5.2.2 Aluminium

The provisions of 5.1.2.3 in EN 14509:2013 apply. Materials have to fulfil the requirements of EN 1999-1-4 when used for stabilization purposes.

5.2.3 Copper

The provisions of 5.1.2.4 in EN 14509:2013 apply. Copper cannot be used for internal faces for stabilization purposes.

5.3 Characteristics of core materials

5.3.1 Thermal performance

The provisions of 5.1.3.1 in EN 14509:2013 apply.

5.3.2 Thermal stability of core materials

The provisions of 5.1.3.2 in EN 14509:2013 apply.

5.3.3 Adhesives and bonding

The provisions of 5.1.4 in EN 14509:2013 apply.

5.4 Characteristics of fastenings

5.4.1 Characteristics of fasteners

The fasteners used shall be suitable for fastening sandwich panels. Materials used in the fastening shall be suitable for the use in the structure and shall fulfil the requirements for the strength properties and durability. The requirements concern the fastener itself and the possible washer and the sealants. Materials of the fastener shall not cause any corrosion risks to the fastener or the facing. Resistance of the fastener to environmental effects shall be equal or higher than those of the facing. The material of the possible sealants shall fulfil at least the properties of the EPDM rubber. The possible sealants shall guarantee the water tightness of the fastening.

This standard covers only failure modes in the sandwich panel. Failure in fastener and supporting structure has to be checked separately. The strength of the fastener and the strength of the fixing to supporting structure shall be at least of magnitude of the declared values for the tensile resistance and shear resistance of the sandwich panels to be fixed.

The coating and/or material of faces and fastenings shall take into account the expected design life of the building components based on the provisions of EN 1990:2002, Table 2.1.

5.4.2 Characteristics of load spreading plates

The panel manufacturer shall state the material, grade, the geometry and the tolerances of the load spreading plate for a hidden fixing.

5.4.3 Characteristics of sealing washers

The durability of the sealing washer shall be evaluated with 1000h ageing in accordance with EN ISO 4892-2 or EN ISO 4892-3 followed by the evaluation of water tightening ability after the test.

5.5 Characteristics of panels

5.5.1 Mechanical resistance of the panel

5.5.1.1 General

The provisions of 5.2.1.1 in EN 14509:2013 apply.

prEN 14509-2:2017 (E)**5.5.1.2 Shear strength (f_{cv}) and shear modulus (G_c)**

The provisions of 5.2.1.2 in EN 14509:2013 apply.

5.5.1.3 Creep coefficient (φ_t)

The provisions of 5.2.1.3 in EN 14509:2013 apply.

5.5.1.4 Compressive strength (σ_m) or compressive stress (σ_{10})

The provisions of 5.2.1.4 in EN 14509:2013 apply.

5.5.1.5 Shear strength after long-term loading (f_{cv} long-term)

The provisions of 5.2.1.5 in EN 14509:2013 apply.

5.5.1.6 Cross panel tensile strength (f_{ct})

The provisions of 5.2.1.6 in EN 14509:2013 apply.

5.5.1.7 Bending moment capacity (M_u) and wrinkling stress (σ_w)

The provisions of 5.2.1.7 in EN 14509:2013 apply.

5.5.1.8 Bending moment capacity and wrinkling stress over a central support

The provisions of 5.2.1.8 in EN 14509:2013 apply.

5.5.2 Durability - Corrosion protection of sandwich panel metal faces

Metal faces shall have a proper protection against corrosion according to requirements as defined in Annex B. The requirements are based on prEN 1090-4:2015 and adapted for visible surfaces to be used in sandwich panels. The guidelines for choosing appropriate coatings are given in Annex B. The specification for testing, given in Annex B, applies to the manufacturer of metal sheet and coating layer.

NOTE The durability of the performance of the coatings during the life time of the building, see EN 1990 for structural products, is fundamental. The provisions for the constancy of performance are defined in prEN 1090-4:2015.

5.5.3 Tensile resistance and shear resistance to fixings

The characteristic pull-over tensile resistance and if required the shear resistance of the fixing between the structural sandwich panel and the supporting structure shall be determined in accordance to Annex F and shall be declared in kN. The requirements cover only the failure modes in the panel.

The resistance to cyclic loading of the fixing of the structural sandwich panels is defined by testing according to Annex F. The rules for design of fixing are given in E.2.

Special type of fasteners such as T support for ceiling, threaded rods with clamps for wall, omega and clamps for wall and ceiling, injected joint with flashing and threaded rods for wall and ceiling are excluded.

5.5.4 Material safety factors (γ_M)

The material safety factors for bending moment capacity (or wrinkling stress), shear strength, compression strength and fastening shall be determined in accordance with EN 14509.

The material safety factors of fixings shall be determined according to Annex E.

The standard deviation may be calculated on basis of the increasing amount of data resulting from FPC and can become a part of the manufacturer's documentation.

The material safety factors are based on Type Testing (see EN 14509:2013, A.16.3) but can be determined also to correspond to the level achieved in FPC follow-up.

5.5.5 Stabilization effect of the supporting structure

Where panels are used for stabilization of the supporting structure, the provisions for design of the supporting structure in EN 1993-1-3 apply. The provisions for testing of stiffness parameters are given in Annex G.

5.5.6 Thermal transmittance

The provisions of 5.2.2 in EN 14509:2013 apply.

5.5.7 Durability and other long-term effects

5.5.7.1 Reduction of tensile strength with time as a consequence of ageing (durability)

The provisions of 5.2.3.1 in EN 14509:2013 apply.

5.5.7.2 Resistance to point loads and access loads – ceiling panels and roofs

The provisions of 5.2.3.2 in EN 14509:2013 apply.

5.5.8 Fire characteristics

5.5.8.1 Reaction to fire

The provisions of 5.2.4.1 in EN 14509:2013 apply.

5.5.8.2 Fire resistance

The provisions of 5.2.4.2 in EN 14509:2013, C2.3.3 apply.

5.5.8.3 External fire performance – roofs

The provisions of 5.2.4.3 in EN 14509:2013 apply.

5.5.9 Dimensional tolerances for sandwich panels

The provisions of 5.2.5 in EN 14509:2013 apply.

5.5.10 Water permeability

The provisions of 5.2.6 in EN 14509:2013 apply.

5.5.11 Air permeability

The provisions of 5.2.7 in EN 14509:2013 apply.

5.5.12 Water vapour permeability

The provisions of 5.2.8 in EN 14509:2013 apply.

5.5.13 Airborne sound insulation ($R_w(C;C_{tr})$)

The provisions of 5.2.9 in EN 14509:2013 apply.

5.5.14 Sound absorption (α_w)

The provisions of 5.2.10 in EN 14509:2013 apply.

5.5.15 Dangerous substances

The provisions of 5.2.11 in EN 14509:2013 apply.

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