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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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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 sandwiches isolants à deux parements métalliques manufacturés - Produits manufacturés - Spécifications - Partie 2: Applications structurelles - Assemblages et utilisations potentielles pour la stabilisation d'éléments structurels individuels

Ta slovenski standard je istoveten z: **prEN 14509-2**

ICS:

91.100.60	Materiali za toplotno in zvočno izolacijo	Thermal and sound insulating materials

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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 14509-2:2021) 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 standardization request given to CEN by the European Commission and the European Free Trade Association.

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

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Introduction

In prEN 14509-1:2021, the rules for assessment of performance are given for use as self-supporting panels, as this document (prEN 14509-2:2021) is for use as structural panels.

The clarification of which application is self-supporting is given by national provisions.

Sandwich panels fulfilling requirements for applications for structural class II are also deemed to fulfill applications for structural class III according to EN 1993-1-3:2006.

This document includes determination of fixing performance of structural sandwich panels to substructure. The panels are used for both applications where they do not stabilize the supporting structure and also for applications where they stabilize the supporting structure.

NOTE 1 Fixing is covering only the failure modes in panels caused by the fastening. The fastener component or fastening to substructure is not covered by this document.

The stabilization parameters needed to contribute to stabilization of individual structural elements (supporting structure) as defined as structural class II according to EN 1993-1-3:2006 are included.

NOTE 2 The stabilization parameters (e.g. rotational stiffness, lateral restraint) related to the essential characteristic racking resistance, are needed for design of supporting structure.

Methods for the determination of characteristics described in this document are given in prEN 14509-3:2021.

Methods for the fixing of panels and determination of restraining effect on substructures are given in prEN 14509-4:2021.

Design rules and criteria for combing actions and spans are given in prEN 14509-5:2021.

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1 Scope

This document specifies characteristics of factory-made structural double skin metal faced insulating sandwich panels for use in elements for structural applications in roofs, in external and internal walls (including partitions) and in ceilings in buildings (hereafter referred to as structural sandwich panels).

The sandwich panels consist of two faces and insulating core either by using an auto-adhesive bonding technique or by using a separate adhesive layer.

The face materials covered by this document are:

— steel,

— stainless steel,

— aluminium,

NOTE Aluminium covers aluminium alloys.

— copper

The insulating cores covered by this document are:

— rigid polyurethane (PU) (see 3.1.15);

— expanded polystyrene (EPS) (see 3.1.13);

— extruded polystyrene foam (XPS) (see 3.1.14);

— phenolic foam (PF) (see 3.1.12);

— mineral wool (MW) (see 3.1.11).

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For sandwich panels the coating of faces can be either organic and/or metallic coating.

This document specifies procedures for assessment and verification of constancy (AVCP) of performance of characteristics of sandwich panels.

This document does not cover the following:

— sandwich panels used for stabilization purposes having insulation core material of phenolic foam;

— sandwich panels consisting of two or more clearly defined layers of different insulating core materials (multi-layered) or of materials per face;

— curved sandwich panels;

— perforated sandwich panels;

— sandwich panels used as ceilings when fastening is under permanent tension load;

— special type of fastening 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;

— fasteners;

— sandwich panels, placed on the market as a part of clean room kits, conditioning room kits, cold storage room kits and cold storage building envelope and building kits.

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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.

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

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

EN 1999-1-4:2007 [1], *Eurocode 9 - Design of aluminium structures - Part 1-4: Cold-formed structural sheeting*

EN 13501-1:2018, *Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests*

prEN 14509-1:2021, *Self-supporting double skin metal faced insulating panels - Factory made products - Specification*

prEN 14509-3:2021, *Factory made double skin metal faced insulating sandwich panels - Part 3: Test methods for determining mechanical strength, building physical behaviour and durability*

prEN 14509-4:2021, *Factory made double skin metal faced insulating sandwich panels - Part 4: Test methods for fixing of panels and for determining restraining effect on substructure*

prEN 14509-5:2021, *Factory made double skin metal faced insulating sandwich panels - Part 5: Design methods - Determination criteria for combing actions and spans*

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3 Terms, definitions, symbols, subscripts and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms, definitions, symbols, subscripts and abbreviations given in prEN 14509-1:2021 and the following apply.

3.1.1
fastener
component (screw incl. washer, with or without sealant if relevant) used for fixing the panel to the supporting structure

3.1.2
fastening
covers all components of sandwich panel, fastener and supporting structure, for mechanical connection of sandwich panel to supporting structure

[1] As impacted by EN 1999-1-4:2007/A1:2011.

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3.1.3
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.

3.1.4
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 plate

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

3.1.5
load spreading profile
metal component used to distribute the load from the fasteners to the panel

3.1.6
stiffness parameter
stiffening effect on supporting structure given by sandwich panels when fastened to supporting structure

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3.1.7
visible fixing
one or more fasteners in a certain minimum distance to the sandwich panel edges and between themselves (if applicable), visible on the visible side of the face of the sandwich panel, penetrating the inner and the outer surface and the core of the sandwich panel

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3.2 Symbols, subscripts and abbreviations

3.2.1 Symbols

C rotational spring stiffeness

3.2.2 Subscripts

θ compression creep index

3.2.3 Abbreviations

SLS serviceability limit state

ULS ultimate limit state

NOTE In the following Clause 4, the specific requirements will follow the relevant clauses in prEN 14509-1:2021. Where text is similar to prEN 14509-1:2021, only reference to prEN 14509-1:2021 is given.

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4 Characteristics

4.1 Mechanical resistance

4.1.1 General

Mechanical resistance of the sandwich panels consists of the following proxy characteristics:

- characteristics of metal faces (as specified in 4.1.2)
  - yield strength
  - nominal thickness
  - tolerances of thickness
- shear strength for short term loading (as specified in 4.1.3)
- shear modulus for short term loading (as specified in 4.1.4)
- creep coefficients (not relevant for wall applications) (as specified in 4.1.5)
- compressive strength (as specified in 4.1.6)
- compressive modulus (as specified in 4.1.7)
- shear strength after long-term loading (not relevant for wall applications) (as specified in 4.1.8)
- cross panel tensile strength (as specified in 4.1.9)
- cross panel tensile modulus (as specified in 4.1.10)
- wrinkling strength (as specified in 4.1.11)
- wrinkling strength in elevated temperature (as specified in 4.1.12)
- wrinkling strength over a central support (not relevant for single span panels) (as specified in 4.1.13)
- wrinkling strength over support in elevated temperature (not relevant for single span panels) (as specified in 4.1.14)
- stress distribution parameter k on support (as specified in 4.1.15)

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The values to be expressed shall be given with two significant digits.

4.1.2 Characteristics of metal faces

4.1.2.1 Yield strength

a) Steel faces

4.1.2.1.a For determination of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.a shall apply.

4.1.2.1.b For evaluation of the results of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.b shall apply.

4.1.2.1.c For expression of performance of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.c shall apply.

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b) Stainless steel faces

4.1.2.1.dFor determination of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.d shall apply. Materials shall also fulfil the requirements of EN 1993-1-4:2006, 2.1.2 when used for stabilization purposes.

4.1.2.1.eFor evaluation of the results of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.e shall apply.

4.1.2.1.f For expression of performance of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.f shall apply.

c) Aluminium faces

4.1.2.1.gFor determination of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.g shall apply. Materials shall also fulfil the requirements of EN 1999-1-4:2007[1], 3.2.1 when used for stabilization purposes.

4.1.2.1.hFor evaluation of the results of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.h shall apply.

4.1.2.1.i For expression of performance of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.i shall apply.

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d) Copper faces

4.1.2.1.j For determination of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.j shall apply. Copper cannot be used for stabilization purposes of faces.

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4.1.2.1.kFor evaluation of the results of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.k shall apply.

4.1.2.1.l For expression of performance of yield strength the provisions in prEN 14509-1:2021, 4.1.2.1.l shall apply.

4.1.2.2 Nominal thickness

a) Steel faces

The provisions in prEN 14509-1:2021, 4.1.2.2.a shall apply.

b) Stainless steel faces

The provisions in prEN 14509-1:2021, 4.1.2.2.b shall apply.

c) Aluminium faces

The provisions in prEN 14509-1:2021, 4.1.2.2.c shall apply.

d) Copper faces

The provisions in prEN 14509-1:2021, 4.1.2.2.d shall apply

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4.1.2.3 Tolerances of thickness

a) Steel faces

The provisions in prEN 14509-1:2021, 4.1.2.3.a shall apply.

b) Stainless steel faces

The provisions in prEN 14509-1:2021, 4.1.2.3.b shall apply.

c) Aluminium faces

The provisions in prEN 14509-1:2021, 4.1.2.3.c shall apply.

d) Copper faces

The provisions in prEN 14509-1:2021, 4.1.2.3.d shall apply.

4.1.3 Shear strength (f_{cv}) for short-term loading

4.1.3.1 For the determination of shear strength the provisions in prEN 14509-1:2021, 4.1.3.1 shall apply.

4.1.3.2 For the expression of performance of shear strength the provisions in prEN 14509-1:2021, 4.1.3.2 shall apply.

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4.1.4 Shear modulus (G_c) for short-term loading

4.1.4.1 For the determination of shear modulus, the provisions in prEN 14509-1:2021, 4.1.4.1 shall apply.

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4.1.4.2 For the expression of performance of shear modulus the provisions in prEN 14509-1:2021, 4.1.4.2 shall apply.

4.1.5 Creep coefficient (φ_t)

4.1.5.1 For the determination of creep coefficient the provisions in prEN 14509-1:2021, 4.1.5.1 shall apply.

4.1.5.2 For the expression of performance of creep coefficient the provisions in prEN 14509-1:2021, 4.1.5.2 shall apply.

4.1.6 Compressive strength (f_{cc})

4.1.6.1 For the determination of compressive strength the provisions in prEN 14509-1:2021, 4.1.6.1 shall apply.

4.1.6.2 For the expression of performance of compressive strength the provisions in prEN 14509-1:2021, 4.1.6.2 shall apply.

4.1.7 Compressive modulus (E_{cc})

4.1.7.1 For the determination of compressive modulus the provisions in prEN 14509-1:2021, 4.1.7.1shall apply.