

F Unýjf YbU'i dcfUWUfYni `Hlrcj `dfYg_i gcj `dcjYfby'cXdcfbcgHj`!BYbcg]bY'ghYbY!') " XY.`GhYbY]n`_cj]bg_] \ `gYbXj] `dUbYcj

Extended application of results from fire resistance tests - Non-loadbearing walls - Part 5: Metal sandwich panel construction

Erweiterter Anwendungsbereich der Ergebnisse von Feuerwiderstandsprüfungen - Nichttragende Wände Teil 5: Sandwichelemente in Metallbauweise

Application étendue des résultats d'essais de résistance au feu - Murs non porteurs - Partie 5 : Panneaux sandwich métalliques pour la construction

<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>

Ta slovenski standard je istoveten z: EN 15254-5:2009

ICS:

13.220.50	Požarna odpornost gradbenih materialov in elementov	Fire-resistance of building materials and elements
91.060.10	Stene. Predelne stene. Fasade	Walls. Partitions. Facades

SIST EN 15254-5:2010**en,de**

iTeh STANDARD PREVIEW (standards.iteh.ai)

SIST EN 15254-5:2010

<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15254-5

November 2009

ICS 13.220.50; 91.060.10

English Version

Extended application of results from fire resistance tests - Non-loadbearing walls - Part 5: Metal sandwich panel construction

Application étendue des résultats d'essais de résistance au feu - Murs non porteurs - Partie 5 : Panneaux sandwichs métalliques pour la construction

Erweiterter Anwendungsbereich der Ergebnisse von Feuerwiderstandsprüfungen - Nichttragende Wände - Teil 5: Sandwichelemente in Metallbauweise

This European Standard was approved by CEN on 5 October 2009.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

This European Standard exists 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 CEN Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

[SIST EN 15254-5:2010](https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010)

<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword	3
1 Scope	4
2 Normative references	4
3 Terms and definitions, symbols and abbreviations	4
3.1 Terms and definitions	4
3.2 Symbols and abbreviations	5
4 Establishing the field of extended application	6
4.1 General	6
4.2 Assumptions in the extended application	6
4.3 Assumed structural behaviour of a sandwich panel in fire	7
5 Rules for extended applications of the tested product	7
5.1 General	7
5.2 Variations in the materials of the product	9
5.2.1 General	9
5.2.2 Variations in the metal sheets	10
5.2.3 Variations in the adhesive	11
5.2.4 Variations in the core material	11
5.3 Variations in the construction	12
5.3.1 Variations in span length	12
5.3.2 Variations in the panel thickness	13
5.3.3 Variations in the joint construction	13
5.3.4 Variations in the boundary conditions and fixing system	13
5.3.5 Length and height of wall construction	13
5.4 Interaction between the factor influences	13
5.5 Support structure	14
5.6 Heating conditions	14
6 Small scale tests and calculation methods	14
6.1 Small scale tests	14
6.2 Calculation methods	14
6.2.1 General	14
6.2.2 Calculation of strength properties	14
6.3 Additional measurements to be carried out in the reference test	15
7 Report of the extended application analysis	15
Annex A (informative) Typical behaviour of a metal faced sandwich panel wall when exposed to fire	16
Annex B (normative) Evaluation of extension of span length	17
Bibliography	20

Foreword

This document (EN 15254-5:2009) has been prepared by Technical Committee CEN/TC 127 "Fire safety in buildings", the secretariat of which is held by BSI.

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 May 2010, and conflicting national standards shall be withdrawn at the latest by May 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

This standard is currently composed of the following parts:

- EN 15254-2, *Extended application of results from fire resistance tests — Non-loadbearing walls — Part 2: Masonry and Gypsum Blocks*
- EN 15254-4, *Extended application of results from fire resistance tests — Non-loadbearing walls — Part 4: Glazed constructions*
- EN 15254-5, *Extended application of results from fire resistance tests — Non-loadbearing walls — Part 5: Metal sandwich panel construction*
- prEN 15254-7, *Extended application of results from fire resistance tests — Non-loadbearing walls — Part 7: Non-load bearing sandwich panels — Ceilings*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

EN 15254-5:2009 (E)**1 Scope**

This part of EN 15254 defines rules for extended applications, provides guidance, and, where appropriate, defines procedures, for variations of certain parameters and factors associated with the design of internal and external non-loadbearing walls constructed of metal sandwich panels and that have been tested in accordance with EN 1364-1.

EN 15254-5 applies for self-supporting, double skin metal faced sandwich panels having an insulating core bonded to both facings as defined in EN 14509.

2 Normative references

The following referenced documents are indispensable for the application 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 1363-1:1999, *Fire resistance tests — Part 1: General requirements*

EN 1364-1:1999, *Fire resistance tests for non-loadbearing elements — Part 1: Walls*

EN 13501-2, *Fire classification of construction products and building elements — Part 2: Classification using data from fire resistance tests, excluding ventilation services*

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

EN 1993-1-2, *Eurocode 3: Design of steel structures — Part 1-2: General rules — Structural fire design*

[SIST EN 15254-5:2010](https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010)

<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>

3 Terms and definitions, symbols and abbreviations**3.1 Terms and definitions**

For the purposes of this document the terms and definitions given in EN 14509:2006, EN 1364-1:1999 and EN 1363-1:1999 together with the following apply.

3.1.1**direct field of application of test results**

outcome of a process (involving the application of defined rules) whereby a test result is deemed to be equally valid for variations in one or more of the product properties and/or intended end-use applications

3.1.2**extended field of application of test results**

outcome of a process (involving the application of defined rules that may incorporate calculation procedures) that predicts, for a variation of a product property and/or its intended end-use application(s), a test result on the basis of one or more test results to the same test standard

3.1.3**factor**

one of the possible variations that may be applied to a parameter

3.1.4**factor influence**

one of the potential causes of a change in the fire resistance due to a factor

3.1.5**fastening****fixing**

device that fastens the panels to a support structure or to the test frame

3.1.6**fixing system**

system consisting of fastenings and possible other means to fasten the panels to a support structure or to the test frame

3.1.7**height of assembly**

for horizontally or vertically installed wall panels the height of the wall in the reference test or in the end-use application

3.1.8**length of assembly**

for horizontally or vertically installed wall panels the length of the wall in the reference test or in the end-use application

3.1.9**reference test**

fire resistance test in accordance with EN 1363-1 and EN 1364-1, and where applicable EN 1363-2, on which the extended application is based and the results of which are used as the main source of data for the extended application

3.1.10**stitching**

device for fixing panels to panels in the longitudinal joint

3.1.11**span length**

centre to centre distance between the supports of a panel and/or intermediate supports to which the sandwich panel is fixed

3.1.12**support structure**

construction onto which the panel wall is fastened in the end-use application

3.1.13**test frame**

frame containing the test construction for the purpose of mounting onto the furnace

3.2 Symbols and abbreviations

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

$F_{t,Ed}$	the tensile load on the fasteners
$F_{v,Ed}$	the shear load on the fasteners
$F_{t,Rd}$	the design tensile load on the fastener at normal temperature
$F_{v,Rd}$	the design shear load on the fastener at normal temperature
L	span length
L_1	distance between midspan of two adjacent panels

EN 15254-5:2009 (E)

L_2	overlap of the metal facing at the panel to panel joint
b	width of panel
c_1	opening in adjacent metal sheet joints at normal room temperature on non exposed side
c_2	opening in adjacent metal sheet joints during the reference test on non exposed side
f_j	deflection of panel to panel joint in the reference test
$f_1 f_2$	deflection of two adjacent panels at midspan in the reference test
g	panel weight per square meter
q	pressure action on the panel in a fire situation
Δc	increase in opening of the metal sheet joint in the reference test
Δf	relative deflection of the joint compared to the adjacent panels in the reference test

4 Establishing the field of extended application**4.1 General**

An extended application analysis is required when the application differs in one or more parameters from the tested one described in the test report and/or in the classification document, and which is not covered by the field of direct application of the classification document.

The extended application of the wall shall be based on the reference fire test results performed according to EN 1364-1 and may be complemented by one or more additional small or full scale tests or by historical data. If historical data are used they shall comply with the rules given in this document.

4.2 Assumptions in the extended application

The following assumptions are considered when evaluating extended applications for sandwich panels:

- The wall is required to possess fire resistance in the end-use condition; relevant classes are given in EN 13501-2;
- The wall is assumed to be exposed on the entire face of one side to the standardised heating conditions given in the EN 1363-1 fire resistance test specification;
- The structure above and below the wall does not deflect vertically during the fire exposure period; this simulates the non-deflecting nature of the test frame which forms part of the furnace test apparatus;

NOTE In reality constructions deflect and this should be taken into account when designing the building and planning the constructional details so that no vertical loads are applied to the wall.

- After delamination of the fire-exposed facing the dead load of the panels is carried by a support structure to which the ends of the panels are attached;
- The support structure has at least the same loadbearing capacity R of the resistance to fire performance as the wall regarding integrity;

- The self weight of the facing and core is calculated from the volume and density of the materials;
- The calculation of the reduction in the strength properties of steel at elevated temperature shall be in accordance with EN 1993-1-2.

4.3 Assumed structural behaviour of a sandwich panel in fire

When one face of a sandwich panel assembly is exposed to fire the following behaviour may be expected. The panel initially bows towards the fire and the ends of the panel can move because of expansion of the fire-exposed face. When delamination of the fire-exposed face occurs the flexural strength of the assembly is lost and, unless both faces are restrained at the ends, the panels can collapse. The fastenings for the ends of the fire-exposed face have to support the dead load of that face whereas the fastenings for the ends of the unexposed face have to support the combined dead load of the face and the core for the entire fire resistance period. Combined fixations (e.g. through fixings) for both faces are also possible.

NOTE Annex A illustrates a typical behaviour of panels.

5 Rules for extended applications of the tested product

5.1 General

When performing extended applications for a tested wall changes can occur either in the materials and/or in the construction. Both are dealt with in this standard. Table 1 and Table 2 list the changes which may or may not be made in an extended application assessment. The rules for the changes are given in 5.2 and 5.3.

SIST EN 15254-5:2010
<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>

Table 1 — Material changes relevant to extended application

Parameter	Factors	Factor influence on performance		Rules
		Integrity E	Insulation I	
Changes in metal facings	Chemical composition of coating	influence	no influence ^a	5.2.2.1
	Change from coated to non coated metal	no influence	influence	5.2.2.1
	Sheet thickness	influence	no influence ^a	Valid up to ± 50 % of tested thickness
	Change from one metal to another	no information	no information	5.2.2.2
	Change in sheet geometry	no information	no information	5.2.2.3
Changes in adhesive	Amount	influence	influence	5.2.3
	Type	influence	no influence ^a	5.2.3
Changes in core material	Type	major influence	major influence	5.2.4
	Change in composition.	major influence	major influence	5.2.4.2 - 5.2.4.6
^a It is understood that when a change in a factor can influence the integrity of a joint, there is a possibility that a change in leakage of hot gases or in joint geometry can also influence the temperature rise near the joint and therefore influence the insulation rating.				

iteh STANDARD PREVIEW
 (standards.iteh.ai)

SIST EN 15254-5:2010

<https://standards.iteh.ai/catalog/standards/sist/4b7af19b-2cfd-4d46-96ba-c1cb02832634/sist-en-15254-5-2010>

Table 2 — Constructional changes relevant to extended application

Parameter	Factors	Factor influence on performance		Rules
		Integrity E	Insulation I	
Span length	Decrease	no influence	no influence ^a	Always valid
	Increase	influence	no influence ^a	5.3.1
Orientation		influence	no influence ^a	Valid for both horizontal and vertical joints between panels but see also Annex B of this standard
Panel width	Decrease	no influence	no influence ^a	Test results valid
	Increase	influence	no influence ^a	Test results valid up to + 20 %
Panel thickness e.g. core thickness		no information	major influence	5.3.2
Joint construction	Type	major influence	major influence	5.3.3
	Stitching decreased	influence	influence	Not allowed
	Stitching increased	influence	influence	5.3.3
	Sealants	influence	influence	5.3.3
Fixing system	Type	major influence	no influence ^a	5.3.4
	Amount decreased	major influence	no influence ^a	5.3.4
	Amount increased	influence	no influence ^a	Valid
	Protection decreased	major influence	influence	5.3.4
	Protection increased	influence	influence	Valid
Length of assembly	Vertical installation	no influence	no influence ^a	5.3.5
	Horizontal installation			See span length 5.3.1
Height of assembly	Vertical installation			See span length 5.3.1
	Horizontal installation	no influence	no influence ^a	5.3.5
Support structure	Changes	no information	no influence ^a	5.5

^a It is understood that when a change in a factor can influence the integrity of a joint, there is a possibility that a change in leakage of hot gases or in joint geometry can also influence the temperature rise near the joint and therefore influence the insulation rating.

5.2 Variations in the materials of the product

5.2.1 General

Sandwich panels consist of three main materials (facing metal sheets, adhesive and core material). In the case of autoadhesively bonded panels the foamed core material also form the adhesive layer during the foaming process.