BRITISH STANDARD

BS EN
14782:2006

Self-supporting metal sheet for roofing, external cladding and internal lining — Product specification and requirements

The European Standard EN 14782:2006 has the status of a British Standard

ICS 77.140.50; 77.150.01; 91.060.10; 91.060.20

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 14782:2006.

The UK participation in its preparation was entrusted by Technical Committee B/542, Roofing and cladding products for discontinuous laying, to Subcommittee B/542/5, Sheet roof and wall coverings, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

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EUROPEAN STANDARD

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EN 14782

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English Version

Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements

Plaques métalliques autoportantes pour couverture, bardages extérieur et intérieur et cloisons - Spécification de produit et exigences

Selbsttragende Dachdeckungs- und Wandbekleidungselemente für die Innen- und Außenanwendung aus Metallblech - Produktspezifikation und Anforderungen

This European Standard was approved by CEN on 28 November 2005.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 14782:2005) 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 IBN.

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 July 2006, and conflicting national standards shall be withdrawn at the latest by July 2006.

This European Standard 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).

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

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, 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.

1 Scope

This European Standard specifies the terminology, requirements and test methods for factory made self-supporting metal sheets and tiles (for non-structural applications) delivered in the form of manufactured pieces for roofing and wall cladding and lining.

This standard also covers ceiling (including internal metal sheet) and soffit applications and cassettes (see Figure 1).

This standard covers self-supporting copper, zinc, steel, aluminium and stainless steel sheet with or without coatings, e.g. metallic, organic, inorganic or multi-layer (see Annex A). A moisture retaining layer intended to reduce the fall of droplets coming from condensation may be present on the reverse side of the product.

This standard also includes rules for marking, labelling and evaluation of conformity.

This standard does not cover products for structural purposes, i.e. it does not cover products intended to contribute to the global or partial stability of the building structure by providing racking resistance or resistance to permanent static loads (excluding self-weight of the metal sheet).

Requirements concerning acoustical and thermal insulation properties are not considered in this standard.

This standard does not include calculation or design requirements with regards to the works, installation techniques or the performance of the installed products.

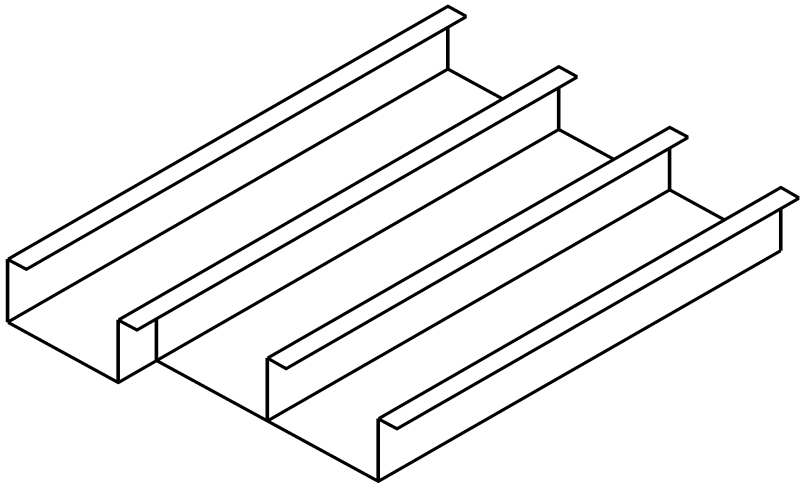


Figure 1 – Illustration of a cassette

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 506:2000, *Roofing products from metal sheet - Specification for self-supporting products of copper or zinc sheet*

EN 508-1:2000, *Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet - Part 1: Steel*

EN 508-2:2000, *Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet - Part 2: Aluminium*

EN 508-3:2000, *Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet - Part 3: Stainless steel*

ENV 1187, *Test methods for external fire exposure to roofs*

EN 1427, *Bitumen and bituminous binders - Determination of softening point - Ring and Ball method*

EN 10002-1, *Metallic materials - Tensile testing - Part 1: Method of test at ambient temperature*

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*

EN 10204, *Metallic products - Types of inspection documents*

EN 10326, *Continuously hot-dip coated strip and sheet of structural steels - Technical delivery conditions*

EN 13162, *Thermal insulation products for buildings - Factory made mineral wool (MW) products – Specification*

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

EN 13501-5, *Fire classification of construction products and building elements - Part 5: Classification using data from external fire exposure to roof tests*

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

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

EN ISO 6988, *Metallic and other non-organic coatings - Sulfur dioxide test with general condensation of moisture (ISO 6988:1985)*

EN ISO 9001:2000*, Quality management systems - Requirements (ISO 9001:2000)*

EN ISO 11925-2, *Reaction to fire tests - Ignitability of building products subjected to direct impingement of flame - Part 2: Single-flame source test (ISO 11925-2:2002)*

ISO 9227, *Corrosion tests in artificial atmospheres - Salt spray tests*

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 506:2000, EN 508-1:2000, EN 508-2:2000 and EN 508-3:2000 and the following apply.

3.1
base material
coated or non-coated flat sheet or strip (coil) of metal used for the production of a finished product according to this standard

4 Requirements

4.1 Materials

The materials for the self-supporting metal sheets specified in this European Standard shall be in accordance with the relevant material standards listed in EN 506, EN 508-1, EN 508-2 and EN 508-3.

4.2 Nominal thickness

The nominal thickness of the self-supporting metal sheet (excluding any organic, inorganic or multi-layer coating), as defined in the relevant material standards listed in EN 506, EN 508-1, EN 508-2 and EN 508-3, shall be equal to or greater than the values given in Table 1.

Table 1 — Minimum nominal values of thickness of self-supporting metal sheet excluding any organic, inorganic or multi-layer coating

Type of metal	Specified minimum nominal thickness [a] in mm
Aluminium	0,6 for roofing applications 0,4 for other applications
Copper	0,5
Stainless steel	0,4
Steel	0,4
Zinc	0,6
[a] Member States of use may require greater thickness than the value shown.	

4.3 Mechanical resistance

NOTE The suitability of a sheet for a given application should be determined by calculation or testing according to the specification applicable in the country of use, including the standards implementing the relevant European Standards.

4.3.1 General

The mechanical resistance shall be defined from the following aspects:

a) intended use, i.e. roof, wall, soffit, ceiling;

b) type of metal, i.e. aluminium, copper, stainless steel, steel, zinc;

c) nominal thickness of the metal sheet considering where applicable the class of tolerances as defined in EN 506, EN 508-1, EN 508-2 or EN 508-3;

d) grade of metal in relation to its mechanical properties;

e) geometry of the product cross-section;

f) dimensional tolerances (see 4.7);

g) resistance of the roofing products to concentrated forces (see 4.3.2).

4.3.2 Resistance of roofing products to concentrated forces

The resistance of roofing products to concentrated forces shall be evaluated according to Annex B when subject to regulatory requirements and may be evaluated when not subjected to such requirements.

This requirement does not apply for ceiling and soffit products, internal lining and external cladding and cassettes.

Products intended for use at a span less than or equal to 400 mm, e.g. some tile profiles, are deemed to satisfy this requirement without the need for testing.

NOTE In this case, the support structure will determine the resistance to imposed forces.

4.4 Water permeability

As long as these products have no holes (as defects), they are water impermeable.

Where required, the absence of holes shall be checked by visual inspection of the finished product.

4.5 Vapour and air permeability

As long as these products have no holes (as defects), they are air and vapour impermeable.

Where required, the absence of holes shall be checked by visual inspection of the finished product.

4.6 Dimensional change

The thermal expansion shall be taken into account in the change of dimensions of the product, where this change may have an effect on the performance of the product, by stating the appropriate thermal expansion coefficient.

The following thermal expansion coefficient shall be used:

— Aluminium: $24 \times 10^{-6}\ K^{-1}$;

— Copper: $16{,}8 \times 10^{-6}\ K^{-1}$;

— Stainless steel: $10{,}0 \times 10^{-6}\ K^{-1}$ – $17{,}0 \times 10^{-6}\ K^{-1}$, depending on the grade, see EN 10088-1;

— Steel: $12 \times 10^{-6}\ K^{-1}$;

— Zinc: $22 \times 10^{-6}\ K^{-1}$;

unless the manufacturer demonstrates by appropriate means that more accurate values are applicable.

4.7 Dimensional tolerances

The dimensional tolerances specified for roof covering products in the applicable standard from the following: EN 506, EN 508-1, EN 508-2 and EN 508-3, shall not be exceeded.

For other products, the tolerances declared shall be appropriate, due account being taken of any national provisions in the country of use.

4.8 Durability

The manufacturer shall state the type, thickness and grade of metal and, if appropriate, type and thickness (or mass) and/or category of any coating(s) to enable users to select products which may be expected to provide the required durability of the product having regard to the expected environment and/or exposure conditions and feasibility of maintenance.

Where this is not appropriate, the durability of the product shall be determined in accordance with the technical specifications valid in the country of use.

4.9 External fire performance

Where the manufacturer wishes to make a declaration (e.g. when subject to regulatory requirements), the external fire performance of the products specified in this European Standard shall either be declared according to the provisions of 5.1 or be declared as Class F_{ROOF}.

4.10 Reaction to fire

Where the manufacturer wishes to make a declaration (e.g. when subject to regulatory requirements), the reaction to fire performance of the products specified in this European Standard shall either be declared according to the provisions of 5.2 or be declared as Class F.

4.11 Release of regulated dangerous substances

Where the manufacturer wishes to make a declaration (e.g. when subject to regulatory requirements), the release of regulated dangerous substances of the products specified in this European Standard shall be declared according to the provisions of 5.3.

5 Testing, assessment and sampling methods

5.1 External fire performance for roof covering products

5.1.1 Products deemed to satisfy the requirements for external fire performance

Products covered by this European Standard are considered "deemed to satisfy without the need for testing" in relation to the requirements for external fire performance provided that they meet the definitions given in Commission Decision 2000/553/EC [1], i.e. flat or profiled[1)] metal sheets of nominal thickness $\geq$ 0,4 mm with any external coating which is inorganic or has a gross calorific value, PCS $\leq$ 4,0 MJ/m^2 or a mass $\leq$ 200 g/m^2.

NOTE Individual Member States may have "deemed to satisfy" lists which go beyond the list given in the Commission Decision 2000/553/EC.

1) In this standard, the word "profiled" refers to the shape of the product and not the way it is manufactured.

5.1.2 Products classified without the need for further testing (CWFT option)

The following products are considered to be classified in classes $B_{ROOF(t1)}$, $B_{ROOF(t2)}$ and $B_{ROOF(t3)}$ without further testing in accordance with Commission Decision 2005/403/EC: profiled steel sheets, flat steel sheets or panels of coil coated galvanised or zinc-aluminium alloy coated steel of metal thickness ≥ 0,40 mm with an organic external (weather side) coating and, optionally, a reverse (internal) side organic coating. The external coating is of a liquid-applied Plastisol paint of maximum nominal dry film thickness 0,200 mm, a PCS of not greater than 8,0 MJ/m^2 and a maximum dry mass of 330 g/m^2. The reverse side organic coating (if any) shall have a PCS of not greater than 4,0 MJ/m^2 and a maximum dry mass of 200 g/m^2.

5.1.3 Other products

Products not meeting the definitions as given in 5.1.1 or 5.1.2 shall be tested in accordance with the relevant method(s) in ENV 1187 and classified in accordance with EN 13501-5.

The products to be tested shall be installed, in addition to the general provisions given in ENV 1187, in a manner representative of their intended use.

5.2 Reaction to fire

5.2.1 Products satisfying the requirements for reaction to fire Class A1 without the need for testing

Non-organically coated products are considered to satisfy the requirements for performance Class A1 of the characteristic reaction to fire in accordance with the provisions of EC Decision 96/603, as amended, without the need for testing.

5.2.2 Products classified without the need for further testing (CWFT option)

Products with a polyester coating having a maximum nominal thickness of 25 μm and a PCS up to 1 MJ/m^2 (included) or a mass ≤ 70 g/m^2 are considered to satisfy the requirements for reaction to fire performance Class A1 without further testing in accordance with the relevant Commission Decision.

Products with a plastisol coating having a maximum nominal thickness of 200 μm and a PCS up to 7 MJ/m^2 (included) or a mass ≤ 300 g/m^2 are considered to satisfy the requirements for reaction to fire performance Class C-s3,d0 without further testing in accordance with the relevant Commission Decision.

5.2.3 Other products

Products not complying with the provisions of 5.2.1 or 5.2.2 shall be tested and classified in accordance with EN 13501-1.

When testing in accordance with the SBI test, the product shall be mounted according to Annex C.

5.3 Release of regulated dangerous substances

For products sold within the European Economic Area, see Annex ZA.

Products sold outside the European Economic Area shall conform to the relevant regulatory requirements on regulated dangerous substances valid in the country of use of the product.

6 Evaluation of conformity

6.1 General

The conformity of the products covered by this European Standard with the requirements of this standard and with the declared values (including classes) shall be demonstrated by:

— initial type testing comprising tests or other means of assessment;

— factory production control by the manufacturer.

For the purposes of testing, the products may be grouped into families where it is considered that the results for a given characteristic from any one product in the family are representative of all other products within that same family.

NOTE A family may be formed for only one characteristic or more than one characteristic. Products within one family for one characteristic may or may not be within the same family in respect of other characteristics.

6.2 Initial type testing (ITT)

6.2.1 General

Initial type testing shall be performed to show conformity with this standard.

Tests or assessments previously performed in accordance with the provisions of this standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account to reduce the number of checks. In addition, initial type testing shall be performed at the beginning of the production of a new product type (unless a member of the same family) or at the beginning of a new method of production (where this may affect the stated properties) on the profile machine and/or the product itself.

Where the finished product manufacturer buys a base material whose characteristics have already been determined in accordance with the provisions of this standard and are declared by the base material supplier (e.g. following an inspection document conforming to EN 10204), these characteristics need not be reassessed in order to demonstrate conformity with this standard, provided that the production process for the finished product does not change these characteristics in an unfavourable way. ITT for the characteristics of the finished product related to the characteristics of the base material itself is given in Table 2 and may be assessed either by the base material supplier or the roofing/cladding product manufacturer. ITT for the other product characteristics is given in Table 3.

NOTE The profile process can increase locally the yield strength of the metal. Where the manufacturer uses this fact to claim a higher yield strength for the finished product, an initial type test will be required.

The base material may be presumed to have the performances stated of them by their supplier, although this does not replace the responsibility on the finished product manufacturer to ensure that only a base material having the correct values of characteristics to allow the finished roofing or cladding product to meet the requirements of this standard are used.

All characteristics in Clause 4 shall be subject to initial type testing, with the following exceptions:

— external fire performance when using the CWFT option, in accordance with 5.1.2 or when deemed to satisfy, in accordance with 5.1.1 (although measurement may be required to ensure that the product meets the definitions required for CWFT and deemed to satisfy),

— reaction to fire when using the CWFT option (although measurement may be required to ensure that the product meets the definition required for CWFT), in accordance with 5.2.2, or when deemed to satisfy Class A1, in accordance with 5.2.1,

— release of regulated substances may be assessed indirectly by controlling the content of the substance concerned.

Whenever a change occurs in the product, the base material or supplier of the components, or the production process (subject to the definition of a family), which could change significantly one or more of the characteristics, the type tests shall be repeated for the appropriate characteristic(s).

The results of all type tests shall be recorded and held by the manufacturer for at least 10 years after the end of production of the product to which they apply.

Table 2 — Test methods, number of specimens and conformity criteria for initial type testing of base material

Characteristic	Requirement clause	Test method	Minimum number of specimens		Compliance criteria and specific conditions
			Without base material manufacturer's inspection document [c] and/or traceability system [d]	With base material manufacturer's inspection document [c] and traceability system [e]	
Quality of the metal [a]	4.1	Visual inspection	1	1[b]	Manufacturer's declaration
Thickness	4.2	See 4.2	3	1[b]	Within the manufacturer's stated tolerance
Mechanical resistance Yield strength/grade of metal	4.3.1	EN 10002-1	3	1[b]	Manufacturer's declaration
Dimensional change	4.6	–	–	–	Manufacturer's declaration
Durability/quality of the coating	4.8	See 4.8	–	-	Declaration or compliance with appropriate national technical specification
Release of regulated dangerous substances	4.11	–	–	b	As appropriate when national provisions exist

[a] This concerns the quality of the base material (no pin-holes, micro holes, pits craters, etc.).

[b] In this case, the finished product manufacturer shall verify that the inspection document in accordance with EN 10204 indicates that the base material (e.g. coils, sheets) has the characteristics that he needs to produce the finished product.

[c] In accordance with EN 10204.

[d] These tests shall be done by the finished product manufacturer.

[e] These additional tests shall be done by the finished product manufacturer.

Table 3 — Test methods, number of specimens and conformity criteria for initial type testing of the finished product

Characteristic	Requirement clause	Test method	Minimum number of specimens	Compliance criteria and specific conditions
Mechanical resistance Resistance to concentrated forces [a]	4.3	Annex B	See B.5	All test results ≥ manufacturer's stated value: a span compatible with a force of 1,2 kN
Water permeability	4.4	Visual assessment	Random	Pass
Dimensional tolerances	4.7	EN 506, EN 508-1, EN 508-2 or EN 508-3 [c]	3	Less than or equal to defined maxima
External fire performance [a]	4.9 [b]	ENV 1187	See EN 13501-5	Classification in accordance with EN 13501-5
Reaction to fire	4.10 [b]	EN 13501-1 and Annex C	See EN 13501-1	Classification in accordance with EN 13501-1

[a] Applies only to roofing products.

[b] For products requiring testing.

[c] These standards only apply to roofing products. For other products, refer to 4.7.

6.2.2 Sampling for ITT

The choice of the method of sampling shall be as defined in a) or b) below, as appropriate.

a) Random sampling

Whenever practicable, the random sampling method shall be used, in which every base material or finished product of the same type in a delivery batch has an equal chance of being selected for the sample. The required numbers of specimens shall be selected from a batch at random, without any consideration given to the condition or quality of the selected specimens.

b) Representative sampling

When random sampling is impracticable, e.g. when the products form a large stack or stacks with ready access to only a limited number of products, a representative sampling procedure shall be used.

6.3 Factory production control (FPC)

6.3.1 General

The base material manufacturer shall establish, document and maintain a FPC system to ensure that the products placed on the market conform to the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control base material and other incoming materials or components, equipment, the production process and the product.

If the finished product manufacturer buys base materials whose characteristics have already been determined in accordance with the provisions of this standard, and are declared by the base material supplier (e.g. following an inspection document conforming to EN 10204), the finished product manufacturer's system requires only a document check to ensure that the characteristics meet the product manufacturer's specifications, provided that the production process for the finished product does not change in an unfavourable way these characteristics.

Products whose characteristics have not already been determined and finished products, for which the production process changes characteristics in an unfavourable way, shall be evaluated in accordance with Table 4.

Table 4 — Test methods, number of specimens and conformity criteria for FPC of base material

Characteristic	Requirement clause	Test method	Minimum number of specimens per batch		Compliance criteria and specific conditions
			Without base material manufacturer's inspection document [C] and/or traceability system	With base material manufacturer's inspection document [C] and traceability system	
Quality of the metal [a]	4.1	Visual assessment	1	0[b]	Manufacturer's declaration
Thickness	4.2	See 4.2	2	1[b]	All tests within the manufacturer's stated tolerance
Mechanical resistance Yield strength/grade of metal	4.3	EN 10002-1	1	0[b]	All test results ≥ manufacturer's stated value
Dimensional change	4.6	-	–	–	No testing
Durability/quality of the coating	4.8	See 4.8	0	0[b]	Declaration or compliance with appropriate national technical specification
Release of regulated dangerous substances	4.11	–	–	–	As appropriate when National provisions exist

[a] This concerns the quality of the base material (no pin-holes micro holes, pits, etc.).

[b] In this case, the finished product manufacturer shall verify that the inspection document in accordance with EN 10204 indicates that the base material (e.g. coils, sheets) has the characteristics that he needs to produce the finished product.

[C] In accordance with EN 10204.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked.

6.3.2 General requirements

It is essential that the FPC system fulfils the requirements as described in the following clauses of EN ISO 9001:2000:

— 4.2 (except 4.2.1 a));

— 5.1 e), 5.5.1, 5.5.2;

— Clause 6;

— 7.1 (except 7.1 a)), 7.2.3 c), 7.4, 7.5, 7.6;

— 8.2.3, 8.2.4, 8.3, 8.5.2.

The FPC system may be part of a Quality Management system, e.g. in accordance with EN ISO 9001.

The FPC system shall:

— address this European Standard; and

— ensure that the components placed on the market conform with the stated performance characteristics;

— comply with the requirements for the characteristics of the finished products related to the characteristics of the base material itself, as given in Table 4 (also applies to the FPC system of the base material supplier);

— comply with the requirements for the other product characteristics as given in Table 5.

Table 5 — Test methods, number of specimens and conformity criteria for FPC of the finished product

Characteristic	Requirement clause	Test method	Minimum number of specimens	Compliance criteria and specific conditions
Mechanical resistance Resistance to concentrated forces	4.3	Annex B	1 per year [a]	All test results ≥ manufacturer's stated value
Dimensional tolerances: Initial set up of the manufacturing machines	4.7	See 4.7	At each change of profile or material [b,c,d]	All test results within the manufacturer's tolerances
Dimensional tolerances: Length and other characteristics Checking of the product	4.7	See 4.7	At each change of profile or material and each shift [c]	All test results within the manufacturer's tolerances
Water permeability	4.4	Visual inspections	Continuous	Pass
External fire performance	4.9	–	– [e]	To ensure production remains representative of ITT samples
Reaction to fire	4.10	–	– [e]	To ensure production remains representative of ITT samples

[a] No testing required for a given profile if the physical dimensions of the product are subject to regular checking.

[b] The profile shall be checked directly on the machine at the beginning of each production run and/or new shift. The following geometrical characteristics shall be checked directly on the machine at the beginning of each run: the height of the ribs, the radius of the profile, the position of the stiffeners, the distance between two consecutives ribs, the height of stiffeners of any flat part, webs, the width of the flat part and the cut angle of the sheet do not need to be checked.

[c] In the case of a profile machine producing the same profile continuously, a minimum of 2 checks per year shall be made.

[d] This checking does not apply to the length of the sheet, the contraction or bulging, the deviation from straightness, the profiled edge or the ripple of the side lap.

[e] No direct testing of these characteristics is needed. However, the manufacturer shall check, with a frequency, to be defined in the FPC manual, sufficient to ensure that ITT results remain applicable to all products. When using CWFT or deemed-to-satisfy, indirect checks of product parameters may be needed.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded and retained for the period specified in the manufacturer's FPC procedures. The results of all FPC tests shall be recorded and held by the manufacturer for at least 10 years.

7 Designation

The roof covering products shall be designated according to the following standards EN 506, EN 508-1, EN 508-2 or EN 508-3, as relevant.

NOTE For other products, the provisions in the above mentioned standards may be applied.

8 Product marking

The roof covering products shall be marked according to the relevant following standards EN 506, EN 508-1, EN 508-2 or EN 508-3, as relevant.

Where Clause ZA.3 covers the same information as this clause the requirements of this clause are met.

NOTE For other products, the provisions in the above mentioned standards may be applied.

Annex A
(normative)

Multilayer coated steel sheet

A.1 General

Multilayer coated steel sheet shall be obtained by continuously coating on both sides hot-dip metal-coated structural steel with one or multiple applications of thermoplastic bituminous compounds and subsequent lamination of a metal foil or plastics film, with or without further coatings.

NOTE The common coating materials used for multilayer coated steel sheet are:

— bitumen to which additives and fillers have generally been added;

— embossed aluminium foil with or without paint or plastics film;

— embossed copper foil with or without plastics film;

— embossed stainless steel with or without plastics film;

— plastics film with or without paint or metal foil.

External coatings shall overlap with each other to wrap the lateral edges.

A.2 Substrate material

The base material for multilayer coated steel products shall be a continuously hot-dip metal-coated steel of structural quality conforming to EN 10326 or EN 508-1.

NOTE EN 10142:2000 and EN 10147:2000 have been replaced respectively by EN 10327 and EN 10326.

A.3 Specific requirements

A.3.1 Minimum nominal values of thickness

The minimum nominal values of thickness shall be as follows:

— finished product total thickness: (2,4 ± 0,2) mm;

— aluminium foil: (50 ± 5) μm;

— aluminium foil with plastics film: (50 ± 10) μm;

— copper and stainless steel foils: (40 ± 5) μm;

— plastics film: (8 ± 2) μm.

A.3.2 Bituminous coating specification

The softening point of the bituminous coating, determined according to EN 1427, shall be at least 90 °C.

A.3.3 Durability

The multilayer coated steel sheet shall be tested in accordance with EN ISO 6270-1 (Resistance to humidity), EN ISO 6988 (Resistance to sulphur dioxide) and ISO 9227 (Salt spray test).

A.4 Freedom from defects

The multilayer coated steel sheet shall be manufactured such that all layers adhere without blistering or peeling.

When subjected to visual inspection without magnification, the top side coating shall be free from visible cracks.

Annex B
(normative)

Determination of resistance to concentrated forces

B.1 Principle

The aim of this test method is to determine the resistance to concentrated force of profiled sheet for roofing products, in accordance with 4.3.2.

NOTE 1 Products used for the following applications are excluded from the need to test: wall cladding and internal lining, ceilings, cassettes and soffits.

NOTE 2 The test method is not suitable for products intended for use at spans less than or equal to 400 mm where the support structure will determine the resistance to imposed forces, e.g. some tile profiles.

The test shall be carried out on a single profiled sheet of full width. The tested span shall be the largest quoted as suitable for use on a roof by the profiled sheet manufacturer.

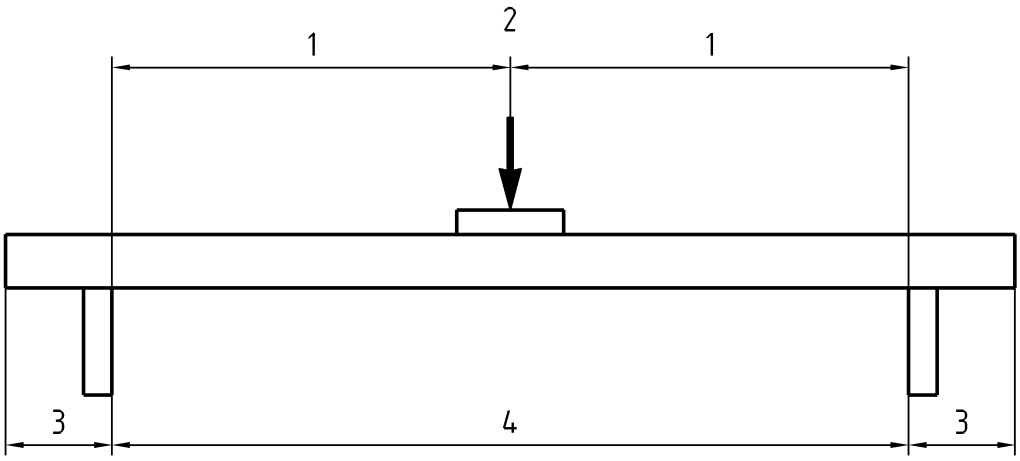
Profiled sheets shall resist a concentrated force of 1,2 kN applied at mid-span near the centre line of the sheet.

NOTE 3 Member States may have regulations which require safety factors to increase the minimum force.

B.2 Test spans

Support the profiled sheeting under test by rigid flat supports at least 50 mm wide at the maximum span intended by the manufacturer for the profiled sheet when used on a roof. The profiled sheet shall not be fixed to the supports.

Measure the span, defined by the distance between sides of the supports to an accuracy of $\pm$ 3 mm, as shown in Figure B.1. The maximum length of profiled sheet extending past the supports shall be 300 mm at both ends.



Key

1 Half span
2 Applied force
3 Maximum overhang of sheet 300 mm
4 Span length between sides of the supports

Figure B.1 – Test layout and measurement of the span

B.3 Test sheets

Test a single sheet without any additional side support.

The yield strength and the thickness of the specimens shall be measured after test.

B.4 Test procedure

A force increasing to 1,2 kN $^{+0,1}_{0}$ kN shall be applied. The force shall be applied through a flat timber block measuring 125 mm x 125 mm x 80 mm minimum thickness. The thickness of the block shall exceed the nominal profile depth by at least 15 mm.

In order to avoid local stress, a layer of rubber of Shore hardness A 20-30 determined according to EN ISO 868, 10 to 15 mm thick, may be placed between the timber block and the test metal sheet.

Profiled sheets with a rib along the centre line shall be tested with the force applied through a bridge to timber blocks in the troughs on either side of the rib. The timber blocks shall be 125 mm long x 125 mm wide unless the profile trough is less than 130 mm wide. Where the trough width is less than 130 mm the width of the block shall be equal to the trough width minus 5 mm.

Profiled sheets with a trough width exceeding 130 mm shall be tested with the force applied to the trough at the centre line, (see Figure B.2). The height of the timber blocks shall be at least 15 mm greater than the height of the rib.

Tile profiles with steps and sinusoidal profiled sheets shall be tested with timber blocks shaped to the nominal profile radius and/or step.

When loading with a mechanical or hydraulic actuator, a ball joint or other means to ensure the timber block remains parallel to the surface of the test metal sheet shall be used.

The test force shall be gradually applied (not dropped) at a mean rate of (150 ± 50) N/s. The force applied shall be measured to an accuracy of ± 25 N. Record the maximum force supported without global collapse to the test sheet and the mean rate of increasing force from the time when the imposed load starts to increase until the time when the maximum force supported by the profiled sheet is applied.

NOTE The test force applied may reach a peak and then reduce before increasing again, the maximum force supported without global collapse by the profiled sheets should be recorded.

The recorded maximum force applied shall include the weight of the timber block and other test components supported by the test metal sheet, plus the maximum measured applied force. Remove the applied force and record any observations.

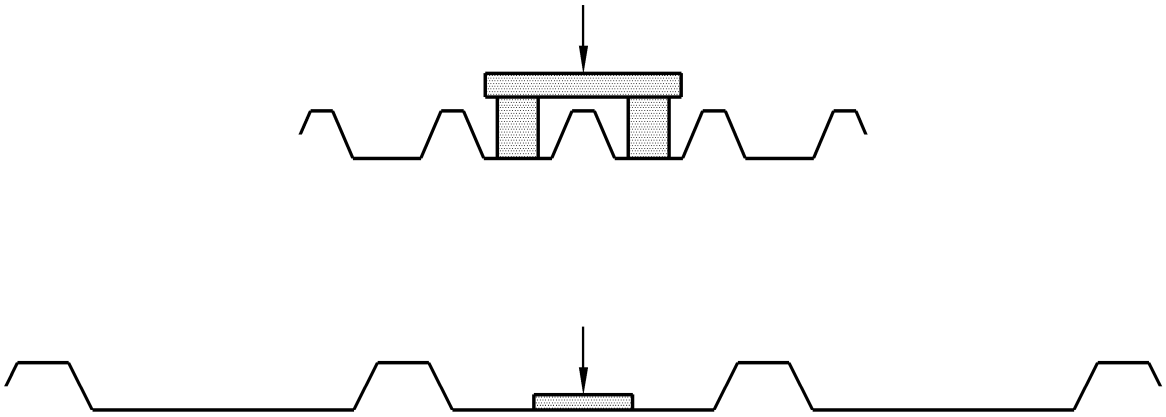


Figure B.2 – Application of the concentrated force

B.5 Number of tests and analysis of results

A minimum of one test shall be made on a sheet profiled from the thinnest metal and nominal grade of yield stress, intended by the manufacturer for the profiled sheet when used on a roof. The span to be tested may be determined from previous experience or by pre-testing.

NOTE 1 Where the test sheet fails to resist the concentrated force of 1,2 kN, the manufacturer should re-test at reduced span length.

The thickness of the test sheet shall be determined as the mean thickness (t_a) in millimetres, determined from measurements at three points across its width excluding the thickness of any organic coating, i.e. one measurement near the centre and one near both sides of the sheet. All three measurements shall not deviate more than ± 5 % of the nominal sheet thickness, t_n. If this limit is exceeded the sheet shall be rejected.

The maximum force may be extrapolated for thicker metal sheets of nominal thickness (t_2) not exceeding 1,75 x t_n using the following equation:

$$F_{t_2} = F_{t_n} \times t_2 / t_n \quad \text{(B.1)}$$

where

F_{t_2} is the maximum force for the nominal thickness t_2;

F_{t_n} is the maximum force corrected to t_n and is equal to the measured maximum force x (t_n/t_a).

NOTE 2 The coefficient 1,75 corresponds to the maximum range of application of the extrapolation.

The yield strength of the tested profiled sheet shall be determined in accordance with EN 10002-1.

The maximum force may be extrapolated for higher yield strength steel metal sheets using the equation:

$$F_{f_{y2}} = F_{f_{yn}} \times f_{y2} / f_{yn} \quad \text{(B.2)}$$

where

$F_{f_{yn}}$ is the maximum force for the specified yield strength, f_{yn}, of the tested sheet;

$F_{f_{y2}}$ is the maximum force for a specified yield strength, f_{y2}, not exceeding 1,15 x f_{yn}.

Other metals may not have accepted correction factors, for these tests the measured yield strength should be quoted.

When a single profiled sheet is tested, to allow for variations in test methods and measurement errors the declared force shall be reduced by a factor of 0,9 applied to the measured force corrected for thickness and yield strength where appropriate.

Declared force kN = (Single measured force corrected to nominal thickness and yield strength) x 0,9 (B.3)

When three or more profiled sheets of similar nominal thickness and yield strength are tested, the mean measured force corrected for thickness and yield strength where appropriate, shall be declared.

Declared force kN = (Mean measured force corrected to nominal thickness and yield strength) x 1,0 (B.4)

B.6 Acceptance criteria

The profile manufacturer shall declare that the designated profile of metal type, nominal thickness and nominal grade of yield strength will support without global collapse a concentrated force of at least 1,2 kN at the declared maximum span determined in accordance with this test method.

B.7 Test report

The manufacturer or independent third party completing the test shall record at least the following information:

a) manufacturer's product name and/or designation;

b) date of test;

c) quality of metal;

d) nominal thickness of product;

e) specified yield strength of metal;

f) span at which product was tested, in mm;

g) maximum force supported without global collapse at the test span;

h) rate of application of the force from point where the imposed force starts to increase until either 1,2 kN has been applied or until the maximum supported force is reached;

i) mean measured thickness of tested product from a minimum of three positions across product width;

j) measured yield strength of metal;

k) force supported without global collapse at the test span corrected to nominal thickness and yield strength in accordance with equations in B.5;

l) confirmation that the test has been completed in accordance with the method defined in this annex .

Annex C
(normative)

Mounting and fixing conditions of the test specimen for reaction to fire testing

C.1 General

The mounting and fixing conditions of test specimens in the SBI test (see EN 13823) shall be as specified in C.2 and as illustrated by Figure C.1. The test conditions for the ignitability test (EN ISO 11925-2) are given in C.2.6.

C.2 Mounting and fixing conditions

C.2.1 General

All metal sheet products, including roofing, ceiling, and cladding products that do not conform to the provisions of 5.2.1 or 5.2.2, shall be tested vertically in the test rig with a vertical overlap joint on the long wing.

The tests shall be carried out on a flat sheet without ribs on the side exposed to the fire.

The dimensions of the specimens shall be as follows:

Short wing Panel size: (500 $\pm$ 5) mm x 1,5 m $\pm$ 5 mm (height) x t

Long wing Panel sizes: a) (220 $\pm$ 5) mm x 1,5 m $\pm$ 5 mm (height) x t

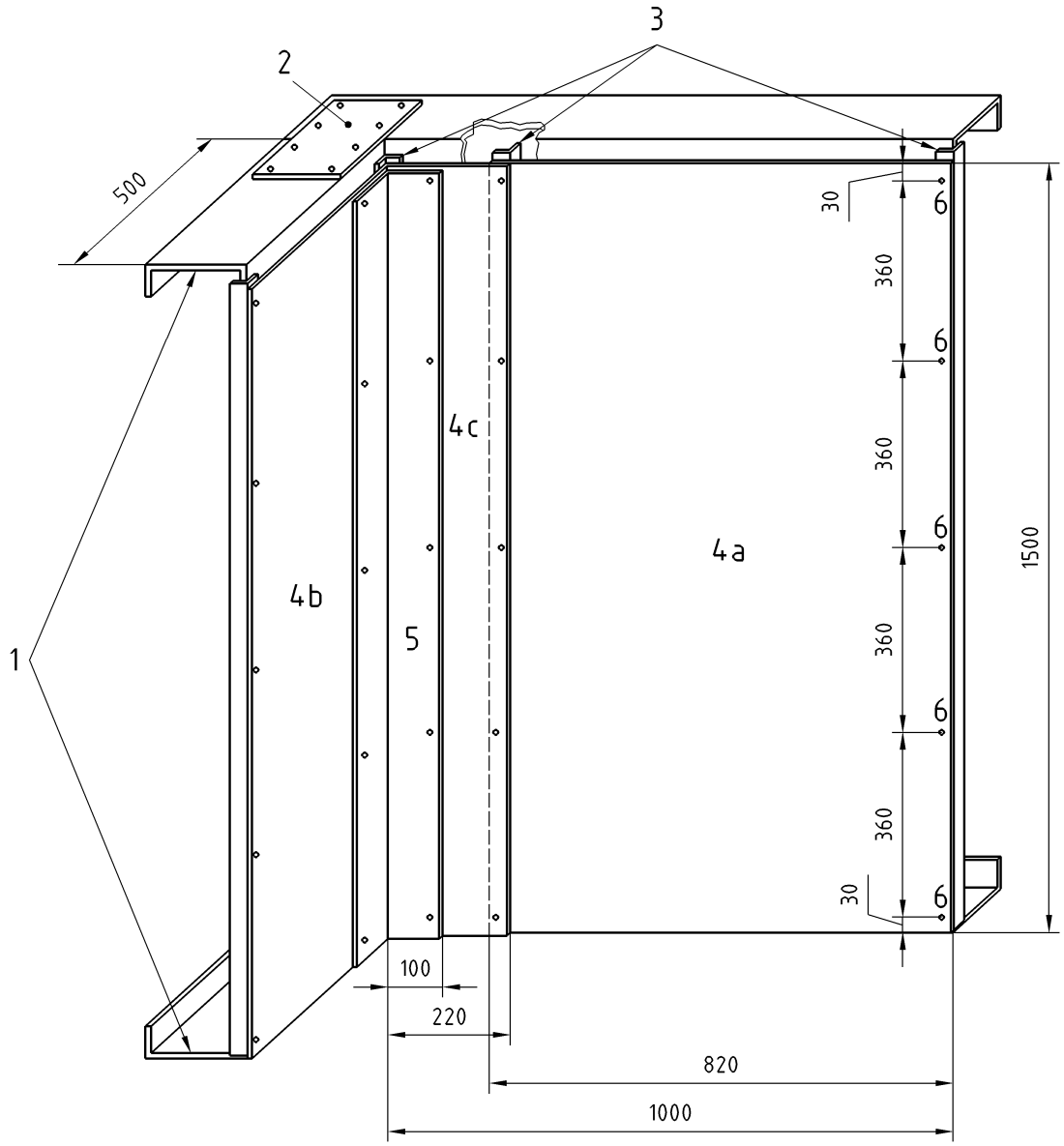
b) (820 $\pm$ 5) mm x 1,5 m $\pm$ 5 mm (height) x t

where t is the metal thickness of the tested sheet.

C.2.2 General configuration

Metal sheets shall be installed and fixed according to EN 13823 in the configuration shown in Figure C.1 and according to C.2.3 to C.2.5.

Dimensions in millimetres



Key

1 Metal channel support (160 x 50 x 2) mm on the bottom and on the top

2 Metal flat sheet to maintain the two channels (minimum thickness 2 mm)

3 Metal corner (30 x 30 x 1,5) mm to maintain the flat sheet along the side and the vertical joint

4 Flat metal sheet thickness *t*: (4a 1500 x 820; 4b 1500 x 500; 4c 1500 x 220) mm

5 Corner metal flashing inside (100 x 100 x *t*) mm

6 Screw or pop rivet, every 360 mm vertically (beginning with 30 mm from the bottom)

Figure C.1 – Illustration of the test arrangement for reaction to fire test according to EN 13823 (SBI) on metal sheet products – assembly and corner detail

C.2.3 Securing the overlap vertical joint

The following principles shall apply when securing the sheets on the long wing:

— overlap between the two sheets along the vertical joint shall be (40 ± 5) mm;

— sheets are in end used conditions, i.e. fixed by using rivets or screw fixings to hold the joint in place;

— distance between two fixings shall not exceed 360 mm;

— fixings shall be placed (30 ± 5) mm from the top and bottom of the specimen, on the flange of the U profile and along the steel corner.

C.2.4 Standard assembly – Steel corner flashings

The two sheets forming the long wing shall be assembled with the joint secured according to C.2.3.

The cut edge of the short wing panel shall be placed against the long wing assembly to form an internal corner so that the vertical joint on the long wing is 200 mm from the internal corner.

The two wings shall then be secured at nominally 90° to each other using internal corner flashings and screws or pop type rivets with a spacing of (360 ± 5) mm (see Figure C.1).

The steel corner flashings shall have the following dimensions: internal flashing (100 ± 5) mm x (100 ± 5) mm with a thickness equal to the sheet thickness, t, of the tested sheet.

The internal corner flashing shall have the same coating as the test sheet specimen or the materials actually employed in the end use conditions.

The cut panel edges at the top and bottom of the specimen shall be maintained by a cold formed steel U which has a section of (50 ± 5) mm x (160 ± 5) mm x (50 ± 5) mm and a thickness of (2 ± 0,1) mm.

The distance of the fixing from the edge shall not exceed 30 mm.

The air gap between the backing board and specimen shall be open.

NOTE The assembly may be prepared and fixed together away from the test chamber. The complete assembly can then be placed on the trolley.

C.2.5 Alternative assembly – Corner flashings and seals

Where required for specific end use applications, alternative corner flashings, e.g. aluminium and plastics, may be used in the EN 13823 test. Seals, i.e. cold store vapour seals which can be applied on site, may also be incorporated into the assembly. The materials used in the tests shall be representative of those used in the end use application.

C.2.6 Test arrangement for reaction to fire test according to EN ISO 11925-2 (Ignitability test)

When this test is carried out in addition to the SBI test, the flame shall be applied either to the end (cut edge) representing all end use applications or to the surface of the specimen for end use applications where the cut edge is protected with site applied metal flashings with a lower or equivalent PCS or combustible mass than the metal sheet tested.

C.3 Direct and extended application of the fire test results according to EN 13823

C.3.1 General

Two main cases of end use conditions exist for flat or profiled or corrugated sheets or for cassettes:

— Case 1: the product laid without insulation behind the face exposed to the fire: single skin system,

— Case 2: the product laid with an insulation behind the face exposed to the fire: double skin system.

Generally, the manufacturer does not know the end use conditions of his products. However, if he wants to put his product on the market in such a way that it can be used for a range of different intended identified end use conditions, he may follow the principles given below.

These principles allow the test results to be applied to a wider range of end use conditions than those tested, using either direct application or extended application. However, the manufacturer does not have to apply these principles if he has only one intended end use condition. In this case, he may have only this end use condition tested without applying direct or extended application.

Similarly, if a builder wants to evaluate the performance of a system made on a work site of products conforming to this standard (e.g. CWFT or deemed to satisfy Class A1 products), he may either have a specific test made of the intended end use conditions or, if he wishes to obtain results which may be applied to a wider range of systems, he may apply the direct and/or extended application principles given below.

C.3.2 gives the direct application rules when the product is used without insulation (single skin system), which allow modifications with respect to the specimen tested following C.2. These modifications are given in Tables C.1 and C.2.

C.3.3 gives the direct application rules when the product is used with an insulation (insulated double skin system). The permitted modification with respect to the system tested are given in Tables C.4 and C.6.

C.3.2 Direct application: Systems with only one metal sheet (single skin system without insulation)

C.3.2.1 Case of steel

The SBI test shall be carried out on the flat sheet.

Results obtained using the test conditions defined in C.2 also apply to the product and end use conditions given in Table C.1.

Table C.1 – Mounting and fixing conditions for coated steel sheet and associated direct application

Parameter	Factors	Validity of the test
Steel facings	Grade of steel sheet	Valid for all grades of steel sheet
	Nominal thickness of steel sheet, t_n	Valid for all nominal thickness greater than or equal to the tested nominal thickness, t_n
	Profile geometry of sheeting: flat or profiled or corrugated or cassettes	Valid for all types of profile with depth of ribs ≤ 165 mm [a]
	Overlap between two successive profiles	Valid for all overlaps between 40 mm and 300 mm
	Horizontal joint	Valid for end use conditions with or without this joint
	Colour	Valid for all colours
	Type of coating	Valid for the tested coating type and where PCS and mass ≤ that of the tested organic coatings
	Fixing for metal flashing	Valid for fixing spacing of 360 mm or less [b]
a This limiting value of 165 mm is related to the testing conditions.		
b The results are also valid for all spacing distances as long as the coated steel sheet is Class A1.		

C.3.2.2 Case of other metals

The SBI test shall be carried out on the flat sheet.

Results obtained using the test conditions defined in C.2 also apply to the product and end use conditions given in Table C.2.

Table C.2 – Mounting and fixing conditions for other metal coated sheet and associated direct application

Factors	Validity of the test
Grade of metal	Valid for all grades of metal sheet
Nominal thickness t_n of metal	Valid for all nominal thickness greater than or equal to the tested nominal thickness, t_n
Profile geometry of sheeting: flat, profiled or corrugated, or cassettes	Valid for the type tested only
Overlap between two successive profiles	Valid for all overlaps between 40 mm and 300 mm
Horizontal joint	Valid for end use conditions with or without this joint
Colour	Valid for all colours
Type of coating	Valid for the tested coating type and where PCS and mass ≤ that of the tested organic coatings
Fixing for metal flashing	Valid for all spacing less than or equal to that tested

C.3.3 Direct application: Systems with two (profiled or flat) coated metal sheets (or one cassette plus one sheet) with an insulation between the two sheets (double skin system)

C.3.3.1 General

In the following, the notion of the critical thermal resistance of the insulation (R_{crit}) is used. This is derived using the thickness of the thermal insulation.

The nature and the quantity of insulation are characterised by the thermal resistance $R = e/\lambda$ (with e (in m) representing the thickness of the insulation and λ (in W/m K) the thermal conductivity of the insulation).

As a function of the nature and the quantity of insulation product that constitute the system, and the type of system itself, a critical thermal resistance denoted R_{crit} of the system is that which may cause a modification of the reaction to fire class obtained for the sheet alone. The value of R_{crit} shall be declared with the class.

C.3.3 and C.3.4 illustrate the principles that may be applied in order to derive direct and extended applications rules (although the rules given in these sub clauses may be applied to other systems than those described).

For other products and or systems, similar principles may be used to derive direct and or extended application rules.

C.3.3.2 Systems with two coated steel sheets (or one coated steel cassette plus one coated steel sheet) and with an insulation of mineral wool or glass wool of thickness 80 mm maximum between the two sheets

The reaction to fire classification of the coated steel sheet (profiled, corrugated or flat, or cassettes) plus an insulation of 80 mm or less is equal to the class level obtained for the flat steel sheet tested following C.2 if:

— the insulation is an unfaced mineral wool complying with EN 13162; either a glass fibre quilt of minimum density 10 kg/m^3 (maximum nominal resin content 5 % by mass) and thickness 80 mm or less (R_{crit} less than or equal to 2 m².K/W), or stone wool of minimum density 25 kg/m^3 (maximum nominal resin content 3,5 % by mass) and thickness 80 mm or less (R_{crit} less than or equal to 1,82 m².K/W);

— for the face exposed to the fire, the coated steel sheet is classified A1 without insulation.

If the above conditions are met, Table C.1 is also valid even if some steel profiles (Z or U) are added between the two sheets.

C.3.3.3 Systems with two coated steel sheets (or one coated steel cassette plus one coated steel sheet) and with an insulation in mineral wool or glass wool of thickness less than or equal to 160 mm between the two sheets

C.3.3.3.1 Case where the coating is plastisol 200 µm (PCS ≤ 7 MJ/m², mass ≤ 300 g/m²)

The reaction to fire classification of the plastisol coated steel sheet profiled or corrugated with a maximum thickness of insulation of 160 mm or less is equal to the values given in Table C.3 if:

— the insulation is an unfaced mineral wool complying with EN 13162; either a glass fibre quilt of minimum density 10 kg/m^3 (maximum nominal resin content 5 % by mass) and thickness 160 mm or less, or stone – wool of minimum density 25 kg/m^3 (maximum nominal resin content 3,5 % by mass) and thickness 160 mm;

— the nominal thickness of the plastisol on the exposed face is 200 µm maximum, the PCS is ≤ 7 MJ/m², and the mass is ≤ 300 g/m²;

— the nominal thickness of the coating on the non-exposed face is 15 µm maximum.

Table C.3 – Classification of a steel sheet coated with plastisol 200 µm in a double skin system

Type of steel product	Nominal thickness of the steel sheet	Euroclass
Flat, profiled or corrugated	0,55 mm to 1,0 mm	C-s3,d0

The class in Table C.3 is also applicable in the end use conditions defined in Table C.4 where steel rails (Z or U profiles or spacers) are fixed between the two sheets.

Table C.4 – Mounting and fixing conditions, and associated direct application, for plastisol 200 µm (mass ≤ 300 g/m² and PCS ≤ 7 MJ/m²) in a double skin system

Factor	Validity of the test
Grade of metal	Valid for all grades of metal sheet
Nominal thickness of metal	Valid for the range of nominal thickness defined in Table C.3
Profile geometry of sheeting: flat, profiled or corrugated, or cassettes	Valid for all types of profile with depth of ribs ≤ 165 mm[a]
Overlap between two successive profiles	Valid for all overlaps between 40 mm and 300 mm
Horizontal joint	Valid for end use conditions with or without this joint
Colour	Valid for all colours
Type of coating	Valid for the tested coating type and where PCS and mass ≤ that of the tested organic coatings
Fixing for metal flashing	Valid for all spacing ≤ 360 mm or less [b]

[a] This limiting value of 165 mm is related to the testing conditions.

[b] The results are also valid for all spacing distances as long as the coated steel sheet is Class A1.

C.3.3.3.2 Case where the organic coating has a thickness less than or equal to 25 µm (mass ≤ 70 g/m² and PCS ≤ 1 MJ/m²)

The reaction to fire classification of this coating steel sheet profile with an insulation of 160 mm or less is equal at the values given in Table C.5 if:

— the insulation is an unfaced mineral wool complying with EN 13162; either a glass fibre quilt of minimum density 10 kg/m^3 (maximum nominal resin content 5 % by mass) and thickness 160 mm or less, or stone – wool of minimum density 25 kg/m^3 (maximum nominal resin content 3,5 % by mass) and thickness 160 mm,

— the nominal thickness of the coating on the exposed face is 25 µm maximum and the PCS is ≤ 1 MJ /m², and the mass is ≤ 70 g/m²;

— the nominal thickness of the coating on the non-exposed face is of 15 µm maximum.

Table C.5 – Classification of polyester coating 25 µm (maximum mass ≤ 70 g/m² and PCS ≤ 1 MJ/m²) sheet in a double layer system

Type of steel products	Nominal thickness of the steel sheet	Euroclass
Profiled or corrugated or cassette	Greater than or equal to 0,63 mm	A1

The class in Table C.5 are also applicable in the end use conditions defined in Table C.6 even if some steel rails (Z or U profiles or spacers) are fixed between the two sheets.

Table C.6 – Mounting and fixing conditions, and associated direct application, of Polyester 25 µm (maximum mass 70 g/m² and PCS ≤ 1 MJ/m²) in a double layer system

Factor	Validity of the test
Grade of steel sheet	Valid for all grades of steel sheet
Nominal thickness of steel sheet	Valid for the range of nominal thickness defined in Table C.5
Profile geometry of sheeting: flat, profiled or corrugated, or cassettes	Valid for all types of profile with depth of ribs ≤ 165 mm[a]
Overlap between two successive profiles	Valid for all overlap between 40 mm and 300 mm
Horizontal joint	Valid for end use conditions with or without this joint
Colour	Valid for all colours
Type of coating	Valid for the tested coating type and where PCS and mass ≤ that of the tested organic coatings
Fixing for metal flashing	Valid for fixing spacing of 360 mm or less[b]

[a] This limiting value of 165 mm is related to the testing conditions.

[b] The results are also valid for all spacing distances as long as the coated steel sheet is Class A1.

C.3.4 Extended application: Other insulated systems – General methodology

C.3.4.1 Principle

It can be shown that it is mainly the nature and the quantity of insulation placed behind the coated steel sheet in a system that may change the reaction to fire class obtained when the same product is tested as a single sheet (non-insulated).

Consequently, to cover a range of insulated systems on the basis of one reaction to fire test result on a coated metal sheet, it is necessary to make additional tests on the same coated metal sheet with different thicknesses of insulation to determine the critical thermal resistance of the insulated system.

C.3.4.2 Principle of the insulated test specimens

The test specimens shall be made as defined for metal sheet in C.2 (flat or profiled) but with an insulation placed on to the non-exposed side of the sheet. An additional metal sheet of 0,4 mm minimum thickness shall be fixed on the other side of the insulation on the metal U to provide vertical support.

Specimens shall be made with different thicknesses of insulation to determine R_{act} (thermal resistance of the insulation of the actual system).

If the thickness of insulation is greater than can be tested in SBI apparatus, the test shall use the same type of insulation of less than or equal to 200 mm but with greater thermal resistance to equal the required thermal resistance for the end use application. Alternatively, tests may be performed at thicknesses up to 200 mm. If this demonstrates that an increase of the thickness beyond 200 mm will not change the fire performance, then the result can be extrapolated to greater thicknesses.

C.3.4.3 Determination of the extended application for the actual system

If in the actual system the thermal resistance of the insulation, R_{act}, is less than or equal to the critical thermal resistance R_{crit}, the classification of the metal sheet associated with this insulation will be the classification obtained with the flat metal sheet test in accordance with C.2.

If in the actual system the thermal resistance of the insulation, R_{act}, is greater than the critical thermal resistance R_{crit}, the classification of the metal sheet associated with this insulation will be the classification of the flat metal sheet test in accordance with C.2 but with a lower class (letter and/or smoke level).

NOTE Table C.7 gives values of R_{crit} for two systems in which the product has a different coating.

C.3.4.4 Example values of R_{crit} for some identified coatings on steel sheets

Table C.7 gives an example of values of the critical thermal resistance R_{crit} of incombustible insulation for plastisol and polyester coatings applied on profiled steel sheets derived from available tests.

The conditions of Table C.1 are applicable for an extended application even if some steel rails (Z or U profiles or spacers) are fixed between the two sheets.

In Table C.7, the nominal thickness of the coating on the non-exposed face is 15 µm maximum.

Table C.7 – Example values of R_{crit}

Type of coating on the face exposed to fire	Maximum nominal coating thickness µm	Maximum coating mass g/m²	Maximum coating PCS MJ/m²	Nominal thickness of the steel sheet mm	Limit thickness of the mineral or glass wool insulation mm	Critical thermal resistance R_{crit} (m².K)/W
PVC Plastisol	200	300	7	0,63	160 [a]	4
Polyester	25	70	1	≥ 0,63	160	4

[a] At this thickness, the class letter is unchanged but the smoke sub-class is increased by one.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/121 "Internal and external wall and ceiling finishes" and Mandate M/122 "Roof coverings, rooflights, roof windows and ancillary products" given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard, shown in Tables ZA.1 and ZA.2, meet the requirements of the mandates M/121 and M/122 given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the construction products covered by this annex for their intended uses indicated herein. Reference shall be made to the information accompanying CE marking

WARNING Other requirements and EU directives, not affecting the fitness for intended use, may be applicable to a construction product falling within the scope of this standard.

NOTE 1 In addition to any specific clauses relating to regulated dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on regulated dangerous substances is available at the Construction web site on EUROPA
(accessed through *http///europa.eu.int/comm./enterprise/construction/internal/dangsub/dangmain.htm*).

This annex establishes the conditions for CE marking of self supporting metal cladding sheets and tiles and self supporting metal roof sheets and tiles for the uses indicated in Tables ZA.1 and ZA.2 and shows the relevant clauses applicable.

The scope of this annex is defined by Tables ZA.1 and ZA.2 and is the same as Clause 1 of this standard.

Table ZA.1 — Clauses of this European Standard addressing the provisions of the EU Construction Products Directive – Mandate M/121 Internal and external wall and ceiling finishes

Product: Self-supporting metal wall and ceiling sheets and tiles **Intended use:** Internal and external wall and ceiling finishes		
Essential characteristics	**Requirement clauses in this European Standard**	**Mandated level(s) or class(es)**
Water permeability	4.4	
Dimensional change	4.6	
Release of dangerous substances	4.11	
Reaction to fire	4.10	Classes A1 to F
Durability	4.8	

Table ZA.2 — Clauses of this European Standard addressing the provisions of the EU Construction Products Directive – Mandate M/122 Roof coverings

Product: Self-supporting metal roof sheets and tiles **Intended use:** Roof coverings		
Essential characteristics	**Requirement clauses in this European Standard**	**Mandated level(s) or class(es)**
Mechanical resistance	4.3	
Water permeability	4.4	
Dimensional change	4.6	
Release of regulated substances	4.11	
External fire performance	4.9	See EN 13501-5.
Reaction to fire	4.10	Classes A1 to F
Durability	4.8	

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended end use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see Clause ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedures for the attestation of conformity of products

ZA.2.1 Systems of attestation of conformity

For the products and intended uses listed below, the systems of attestation of conformity shall be in accordance with Table ZA.3.

Table ZA.3 — Products, intended uses and attestation of conformity system

Products	Intended use(s)	Level(s) or class(es)	Attestation of conformity systems [b]
Self-supporting metal sheets and metal tiles	Internal and external walls, ceilings and roofs subject to reaction to fire regulations	(A1, A2, B, C, D, E)[a] C[c], F	3 4
	External roofs subject to external fire performance regulations	Products requiring testing (see EN 13501-5) Products "deemed to satisfy"	3 4
	End uses subject to regulatory requirements on regulated dangerous substances	-	3
	End uses other than those above	-	4

a Any product tested for reaction to fire.

b System 3: See CPD Annex III.2.(ii), second possibility; System 4 : See CPD Annex III.2.(ii), third possibility.

c CWFT products.

The attestation of conformity of the self-supporting metal sheets and tiles in Table ZA.1 and Table ZA.2 shall be according to the evaluation of conformity procedures indicated in Table ZA.4 and Table ZA.5 resulting from the application of the clauses of this European Standard indicated therein.

Table ZA.4 — Assignment of evaluation of conformity tasks for system 3

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (F.P.C)	Parameters related to all characteristics of Table ZA.1 and/or Table ZA.2 relevant for the intended use	6.3
	Initial type testing by the manufacturer	All characteristics of Table ZA.1 and/or Table ZA.2 relevant for the intended use other than those shown below	6.2
	Initial type testing by a notified testing laboratory	Reaction to fire (Classes A1, A2, B, C, D, E)[a] External fire performance (only for self-supporting metal sheets and tiles to be used for external roofs subject to external fire performance regulations, and which require testing)	6.2

a Any product tested for reaction to fire.

Table ZA.5 — Assignment of evaluation of conformity tasks for system 4

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)	Parameters related to all characteristics of Table ZA.1 and/or Table ZA.2 relevant for the intended use	6.3
	Initial type testing	All characteristics of Table ZA.1 and/or Table ZA.2 relevant for the intended use, namely water permeability, dimensional change, water vapour permeability and durability	6.2

ZA.2.2 Declaration of conformity

When compliance with the conditions of this annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC declaration of conformity) which authorises the affixing of the CE marking.

This declaration shall include:

— name and address of the manufacturer, of his authorised representative established in the EEA and the place of production;

— description of the product (type, identification, use, …) and a copy of the information accompanying the CE marking;

NOTE Where some of the information required for the declaration is already given in the CE marking information it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this EN) and a reference to ITT report(s) and factory production control records, as appropriate;

— particular conditions applicable to the use of the product (if necessary);

— name and address (or identification number) of the approved laboratory(ies) (only products under system 3);

— name of and position held by the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The declaration shall be in the language(s) accepted in the Member State of use of the product.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown either on the product or on the packaging and the accompanying commercial documentation if this document contains any of the performance characteristics listed below.

The following information on the product and its essential characteristics (Tables ZA.1 or ZA.2) shall accompany the CE marking symbol:

— name or identifying mark of the manufacturer;

— last two digits of the year in which the marking was affixed;

— reference to this European Standard, i.e. EN 14782;

— description of the product: generic name, material and durability provisions, dimensions (thickness mandatory, colour and length optional)

— intended use;

— mechanical resistance, if relevant;

— reaction to fire;

— external fire performance, if relevant.

When products have been tested to evaluate the external fire performance the manufacturer shall specify the end use conditions (type of substrate, type and thickness of insulation, method of fixing, etc.) as given in the test report. The information shall either be provided with the CE marking or by reference to a document held by the manufacturer which contains this information.

When products have been tested to evaluate the reaction to fire performance the manufacturer shall specify the mounting and fixing conditions in relation to the SBI test. The information shall either be provided with the CE marking or by reference to a document held by the manufacturer which contains this information.

The "No performance determined" [NPD] option shall not be used where the characteristic is subject to a threshold level. Otherwise the NPD option (or Class F or F_{ROOF} for reaction to fire and external fire performance) may be used when and where the characteristic for a given intended use is not subject to regulatory requirements.

Figure ZA.1 gives an example of the information to be given with CE marking.

CE	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC.*
AnyCo Ltd, PO Box 21, B-1050	*Name or identifying mark and registered address of the producer*
06	*Last two digits of the year in which the marking was affixed*
EN 14782	*No. of European Standard*
Self-supporting steel sheet to be used for external roof coverings Roof profile 45, thickness 0,7 mm, class 1 – S350GD+Z225 – Side 1: PVDF 25 μm / Side 2: AY 15 μm– EN 508-1 **Reaction to fire:** Class A1 **External fire performance:** Class B_{ROOF} (t1), Class B_{ROOF} (t2) and Class B_{ROOF} (t3) **Resistance to concentrated force:** 1,2kN at 2,8m span	*Description of product* *and* *information on characteristics*

Figure ZA.1 – Example of the information accompanying CE marking, for a product "deemed to satisfy" reaction to fire and external fire performance, and with no regulated substances, and therefore under system 4

In addition to any specific information relating to regulated dangerous substances shown above, the product should also be accompanied, when and where required in the appropriate form, by documentation listing any other legislation on regulated dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogation need not to be mentioned.

Bibliography

[1] Commission Decision of 6 September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings (2000/553/EC).

[2] Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A "No contribution to fire" provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products (1996/603/EC).

[3] Commission Decision of 25 May 2005 establishing the classes of external fire performance of roofs and roof coverings for certain construction products as provided for by Council Directive 89/106/EEC (2005/403/EC).

[4] EN 1172, *Copper and copper alloys - Sheet and strip for building purposes.*

[5] EN 1396, *Aluminium and aluminium alloys - Coil coated sheet and strip for general applications - Specifications.*

[6] EN 10143, *Continuously hot-dip metal coated steel sheet and strip - Tolerances on dimensions and shape.*

[7] EN 10326:2004, *Continuously hot-dip coated strip and sheet of structural steels - Technical delivery conditions*.

[8] EN 10169-1, *Continuously organic coated (coil coated) steel flat products - Part 1: General information (definitions, materials, tolerances, test methods).*

[9] ENV 10169-2, *Continuously organic coated (coil coated) steel flat products - Part 2: Products for building exterior applications.*

[10] EN 10169-3, *Continuously organic coated (coil coated) steel flat products - Part 3: Products for building interior applications.*

[11] EN 10327, *Continuously hot-dip coated strip and sheet of low carbon steels for cold forming - Technical delivery conditions*.

[12] EN ISO 868, *Plastics and ebonite - Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868:2003)*

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