BS EN 502:2013

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Roofing products from metal sheet — Specification for fully supported roofing products of stainless steel sheet

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National foreword

This British Standard is the UK implementation of EN 502:2013. It supersedes BS EN 502:2000, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/542/6, Corrugated sheeting materials.

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

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English Version

Roofing products from metal sheet - Specification for fully supported roofing products of stainless steel sheet

Produits de couverture en tôle métallique - Spécification pour les produits de couverture en feuille d'acier inoxydable totalement supportés

Dachdeckungsprodukte aus Metallblech - Spezifikation für vollflächig unterstützte Dachdeckungsprodukte aus nichtrostendem Stahlblech

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Foreword

This document (EN 502:2013) has been prepared by Technical Committee CEN/TC 128 "Roof covering products for discontinuous laying and products for wall cladding", the secretariat of which is held by NBN.

This 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

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 supersedes EN 502:1999.

In comparison to the previous edition, the following sections have been changed: Table 1, Annex A and Annex B.

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

Introduction

Figure 1 indicates the position of this standard in the CEN framework of standards concerning roofing products of metal.

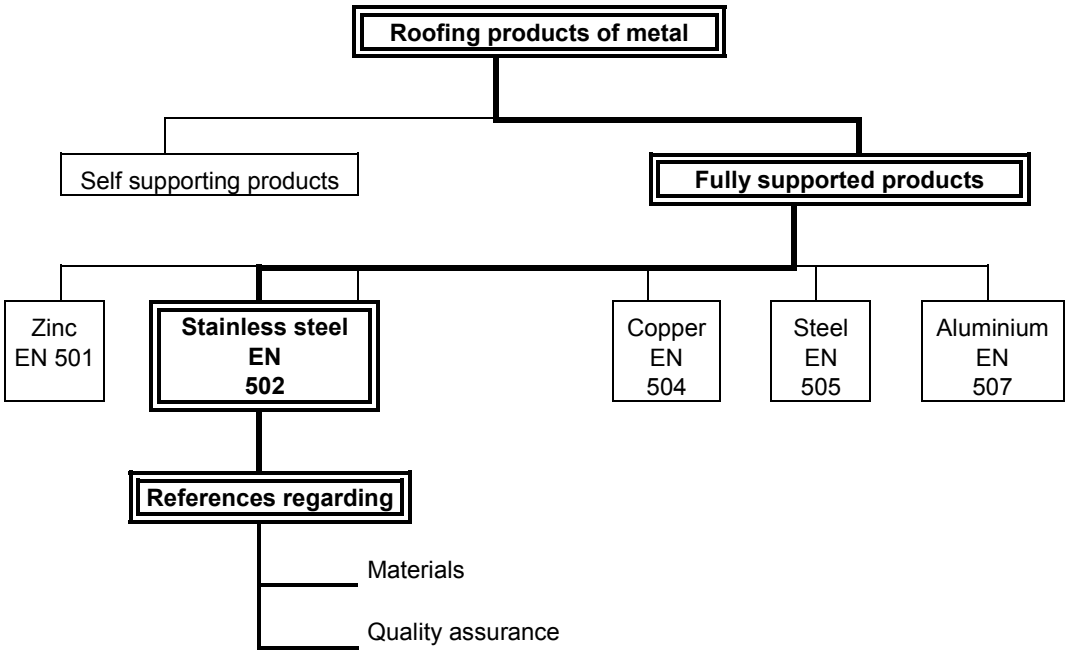

Figure 1 — Framework of standards

In this European Standard, the performance of the product has been defined in terms of a number of type tests.

The performance of a roof constructed with these products depends not only on the properties of the product as it is required by this standard, but also on the design, construction and performance of the roof in relation to the environment and conditions of use.

1 Scope

This European Standard specifies requirements for roofing products used for assembly into coverings for pitched roofs, made from stainless steel, terne coated, tin coated or organic coated stainless steel sheet.

The European Standard establishes general characteristics, definitions and labelling for the products, together with requirements for the materials from which the products can be manufactured. It is intended to be used either by manufacturers to ensure that their products comply with the requirements or by purchasers to verify that the products comply before they are despatched from the factory. It specifies the requirements for products which enable them to meet all normal service conditions. Products can be prefabricated or semiformed products as well as strip, coil and sheet for on-site-formed applications (e.g. standing seam roofs, roll cap).

The European Standard applies to all discontinuously laid and fully supported roofing products made of stainless steel sheet. No requirements for application (e.g. methods of fixing, supporting construction, design of roof system, execution of connections and flashings) are included.

NOTE The standard deals partly with flat products, partly with formed (prefabricated) products. Requirements for preformed self-supporting roofing products are given in EN 508-3.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10079:2007, *Definition of steel products*

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

EN 10088-4, *Stainless steels — Part 4 : Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for construction purposes*

EN 10202, *Cold reduced tinmill products — Electrolytic tinplate and electrolytic chromium/chromium oxide coated steel*

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

EN ISO 7438, *Metallic materials — Bend test (ISO 7438)*

EN ISO 9445-2, *Continuously cold-rolled stainless steel — Tolerances on dimensions and form — Part 2: Wide strip and plate/sheet (ISO 9445-2)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 10079:2007 and the following apply.

3.1.1
stainless steel
steel with at least a content of 10,5 % chromium and maximum 1,2 % carbon

Note 1 to entry: For roofing products the stainless steels grades are:

— ferritic,

— austenitic with or without molybdenum;

— austenitic-ferritic (duplex), and;

— higher alloyed grades.

3.1.2
terne coated stainless steel
stainless steel continuously hot-dip coated with a lead-tin alloy

3.1.3
tin coated stainless steel
stainless steel continuously coated with tin by electrodeposition

3.1.4
organic coated stainless steel
stainless steel or terne coated stainless steel or tin coated stainless steel which is continuously (factory) painted by roller or spray process

Note 1 to entry: EN 10169 refers to this type of coated steel.

3.1.5
fully supported
installation conditions such, that the bottom flat portions of the product are supported by a continuous construction

3.2 Symbols and abbreviations

The symbols and abbreviations which shall be used for the designation of the steel grades and where applicable of coatings are listed in the respective material standards mentioned in Clause 2.

4 Requirements

4.1 General

The product shall be manufactured from materials complying with 4.2.

The supplier of the materials is responsible for carrying out the tests necessary to verify that the materials supplied to the manufacturer comply with the requirements and should provide appropriate inspection documents (according to EN 10204) on request.

NOTE The symbols and abbreviations that are used to designate the steel grade, the type and mass of the metallic coating are those of the standards referred to in EN 10027-1.

A permanent quality control system shall be adopted by the manufacturer.[1)]

1) For example, a Quality Management System based on EN ISO 9000.

4.2 Materials

4.2.1 Grades

The grades of stainless steel shall be selected depending on the corrosion conditions of the local environment, durability requirements and aesthetic considerations.

NOTE The most commonly used grades are listed in Table 1.

Table 1 — Grades

Steel grade	Steel designation	
	Steel name	Steel number
Ferritic with organic coating	X6Cr13	1.4000
Ferritic with or without organic coating	X6Cr17	1.4016
	X6CrMo17-1	1.4113
	X3CrTi17	1.4510
	X2CrTiNb18	1.4509
	X6CrMoNb17-1	1.4526
	X2CrMoTi18-2	1.4521
Austenitic with or without organic coating	X5CrNi18-10	1.4301
	X2CrNi18-9	1.4307
Austenitic/Molybdenum with or without organic coating	X5CrNiMo17-12-2	1.4401

4.2.2 Chemical composition

The chemical compositions of stainless steel shall be in accordance with EN 10088-4.

4.2.3 Physical properties

The physical properties for stainless steel shall be in accordance with EN 10088-1.

NOTE Some physical properties are given, for information, in Annex A.

4.2.4 Surface finishes of stainless steel

All normal stainless steel finishes can be used including bright finish, 2B in accordance with EN 10088-4, dull finish, 2D in accordance with EN 10088-4 or other low reflective finishes.

4.2.5 Hot-dip terne coated stainless steel

4.2.5.1 Coating

For the coating properties, one should refer to the existing national standards or to an agreement between the parties.

The minimum tin content of the alloy shall be 8 % by mass.

4.2.5.2 Coating mass

The nominal coating mass shall be the total mass of both surfaces expressed in g/m².

The nominal coating mass shall be ≥ 20 g/m². The minimum values of the coating mass shall be respectively 20 g/m² and 15 g/m² when determined by a triple spot test or a single spot test.

4.2.6 Tin coated stainless steel

4.2.6.1 Coating

The coating shall be homogeneous and shall not present any discontinuities which could impair the use of the product.

After a bend test carried out in accordance with EN ISO 7438 with a bend angle of 180° and a diameter of the mandrel equal to 1*t* (*t* thickness of the product), there shall be no peeling of the coating.

4.2.6.2 Coating mass

The nominal coating mass shall be the total mass of both surfaces expressed g/m².

The nominal coating mass shall be ≥ 10 g/m². The minimum values of the coating mass shall be respectively 10 g/m² and 8 g/m² when determined by a triple spot test or a single spot test.

4.2.7 Organic coated stainless steel

The main organic coatings suitable for application to stainless steel substrates are given in Table 2.

NOTE Further information is given in EN 10169.

Organic coatings shall be selected dependent upon the processing and service conditions, including specific climatic conditions.

Table 2 — Organic coatings and specified minimum thicknesses

Coating	Symbol	Number of layers per side [a]	Minimum permitted nominal coating thickness in µm per side
Polyester	SP	2	25
Silicone-modified polyester	SP-SI	2	25
Polyurethane	PUR	2	25
Polyvinylidene fluoride	PVDF	2, 3, 4	25
Polyvinyl chloride (Plastisol)	PVC(P)	2	80
[a] Including primer but excluding protective films.			

4.3 Products

4.3.1 Mechanical properties

Mechanical properties shall be in accordance with EN 10088-4.

The minimum values for relevant mechanical properties at 20° C for test pieces with a gauge length of 80 mm and a width of 20 mm shall be as given in Table 3.

Table 3 — Relevant mechanical properties

Grade	Yield strength $R_{p0,2}$ MPa min.	Tensile strength R_m MPa min.	Elongation A_{80} % min.
Ferritic	250	400	19
Austenitic	230	450	40
Austenitic/molybdenum	240	550	40

4.3.2 Dimensions and tolerances of flat products

The minimum nominal thickness shall be 0,4 mm excluding coating. Dimensional tolerances shall be as given in Table 4.

Normal thicknesses are 0,4 mm, 0,5 mm, 0,8 mm, excluding coating and normal widths are in the range of 450 mm to 1 250 mm. It is recommended that thickness and width are selected dependent upon processing and service conditions.

Table 4 — Dimensional tolerances

Tolerance on thickness	Tolerance on width	Tolerance on length (ℓ) for sheets and cut lengths
Normal tolerances as defined in EN ISO 9445-2 (see Table 5)	$^{0}_{+2}$ mm	$\ell \leq 2\text{m}: {}^{0}_{+5}\text{mm}$ $\ell > 2\text{m}: {}^{-2}_{+\ell/400}\text{mm}$

Table 5 — Normal tolerances on nominal thickness

Dimensions in millimetres

Nominal thickness		Normal tolerances for a nominal width *w* of		
≥	<	$w \leq 1\,000$	$1\,000 < w \leq 1\,300$	$1\,300 < w \leq 2\,100$
0,30	0,50	± 0,04	± 0,04	-
0,50	0,60	± 0,045	± 0,05	-
0,60	0,80	± 0,05	± 0,05	-
0,80	1,00	± 0,055	± 0,06	± 0,07

4.3.3 Formed (prefabricated) products

4.3.3.1 General

Formed (prefabricated) products shall be classified as follows:

a) those to be joined by on-site folding processes; and

b) those to be joined without on-site folding processes.

4.3.3.2 Products with on-site folded joints

The shape and the tolerances of products with on-site folded joints shall be agreed at the time of ordering depending on the application.

NOTE They depend especially on the technical and architectural requirements and on the folding machines and other equipments used.

4.3.3.3 Products without on-site folded joints

Depending on dimensional requirements for fixing and fabrication, manufacturing tolerances for the formed product shall be agreed at the time of ordering.

4.3.4 Safety in case of fire

Until appropriate European Standards are published, products coated with organic coatings shall comply with national building regulations regarding fire properties.

NOTE 1 All products referred to in this standard are resistant against sparks and heat radiation.

NOTE 2 All products referred to in this standard without organic coating are incombustible.

5 Sampling and test methods

5.1 Flat products

Sampling and test methods shall be in accordance with EN 10088-4, except:

— for tin coated stainless steel for which EN 10202 shall be applied,

— for hot-dip terne coated stainless steels for which the existing national standards or an agreement between the parties shall be applied.

5.2 Formed (prefabricated) products

5.2.1 Sampling

From each delivery of products, the number required for the tests shall be selected in accordance with EN 10088-4.

5.2.2 Testing

5.2.2.1 General

The products shall be supplied with inspection documents to comply with the requirements of this European Standard.

The following information shall be given at the time of ordering:

— type of test (specific or non-specific test, see EN 10204) ;

— type of inspection document, see EN 10204.

5.2.2.2 Test unit

For dimensional tolerances, the test unit shall consist of at least one complete piece of the amount delivered.

If specially agreed at the time of ordering, the test unit may consist of more than one piece.

5.2.2.3 Number of tests

One series of tests shall be carried out per test unit to determine the geometrical characteristics.

6 Designation

Products covered by this standard shall be designated as follows:

— stainless steel, coils or sheets, with the steel designation;

— terne coated stainless steel, coils or sheets, with symbol "+ T" after the steel designation;

— tin coated stainless steel, coils or sheets, with symbol "+ SE" after the steel designation;

— coil coated stainless steel, coils or sheets, with symbol of coating materials after the substrate designation;

— number of this standard (EN 502).

EXAMPLE Roof panel made from tin-coated stainless steel, for fully supported installation:

— Roof panel EN 502-X5CrNi18-10 + SE

7 Marking, labelling and packaging

7.1 Marking and labelling

At least the following information shall be attached to every pack, coil, bundle or delivery unit:

— name or registered identification of the manufacturer;

— designation of the product (see Clause 6);

— coil number;

— order number;

— ordered dimensions and quantity;

— gross mass (kg).

7.2 Packaging and special ordering conditions

The packaging requirements and any special requirements to take account of particular conditions shall be agreed between manufacturer and purchaser at the time of ordering.

7.3 Transport, storage and handling

Any instructions regarding handling or storage shall be clearly visible on package.

For decorative applications, products can be delivered with a protective film.

At delivery, the products should be handled with care to maintain their quality.

The products should be dispatched and stored in conditions which protect them from humidity and condensation.

Moisture, in particular condensation inside packages, can lead to the formation of stains. If there is lengthy contact with humidity, there may be further aesthetic damage of the products.

The packages should be fully supported by means of battens or pallets providing sufficient space to permit good ventilation while avoiding any permanent deformations of the sheets. The packages should be inclined in order to promote drainage.

The packages should be stored under a covered warehouse or under a cover made form tarpaulin over a frame. The frame should allow sufficient space between tarpaulin and packages to allow air to circulate.

Annex A
(informative)

Physical properties

Physical properties relevant to the material grades used are given in Table A.1.

Table A.1 — Relevant physical properties

Steel grade	**Steel number**	**Density** g/cm^3	**Thermal conductivity 20 °C** W/m.K	**Electrical resistivity 20 °C** Σ.mm^2/m	**Average dilatation coefficient 20 °C** 10^{-6} K^{-1}	**Modulus of elasticity 20 °C** kN/mm²
Ferritic	1.4000	7,7	30	0,6	10,5	220
	1.4016		25	0,6	10,0	
	1.4113		25	0,7	10,0	
	1.4510		25	0,6	10,0	
	1.4521		23	0,8	10,4	
	1.4509		25	0,6	10,0	
	1.4526		30	0,7	11,7	
Austenitic	1.4301	7,9	15	0,73	16	200
	1.4307		15	0,73	16,0	
Austenitic/ molybdenum	1.4401	8,0	15	0,75	16,0	200

Annex B
(informative)

A-deviations

A-Deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN-CENELEC national member.

This European Standard does not fall under any Directive of the EU.

In the relevant CEN-CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

Sweden: The following national regulations shall be complied with:

— ordinance AFS 1983 :12 : Work on roofs (§ 17);

— building code BFS 1993 :57,8 :22.

Bibliography

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

[2] EN 10020, *Definition and classification of grades of steel*

[3] EN 10027-1, *Designation systems for steels — Part 1: Steel names*

[4] EN 10169, *Continuously organic coated (coil coated) steel flat products — Technical delivery conditions*

[5] EN ISO 9000, *Quality management systems — Fundamentals and vocabulary (ISO 9000)*

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