BS EN 508-1:2014

BSI Standards Publication

Roofing and cladding products from metal sheet — Specification for self-supporting of steel, aluminium or stainless steel sheet

Part 1: Steel

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National foreword

This British Standard is the UK implementation of EN 508-1:2014. It supersedes BS EN 508-1:2008 which is withdrawn.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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Roofing and cladding products from metal sheet - Specification for self-supporting of steel, aluminium or stainless steel sheet - Part 1: Steel

Produits de couverture et de bardage en tôle métallique - Spécification pour les produits autoportants en tôles d'acier, d'aluminium ou d'acier inoxydable - Partie 1: Acier

Dachdeckungs- und Wandbekleidungsprodukte aus Metallblech - Spezifikation für selbsttragende Dachdeckungsprodukte aus Stahlblech, Aluminiumblech oder nichtrostendem Stahlblech - Teil 1: Stahl

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 508-1:2014) 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of an identical text or by endorsement, at the latest by November 2014 and conflicting national standards shall be withdrawn at the latest by November 2014.

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 508-1:2008.

EN 508 *Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet* consists of the following parts:

— *Part 1: Steel*

— *Part 2: Aluminium*

— *Part 3: Stainless steel*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 European Standard in the CEN framework of standards concerning roofing products of metal.

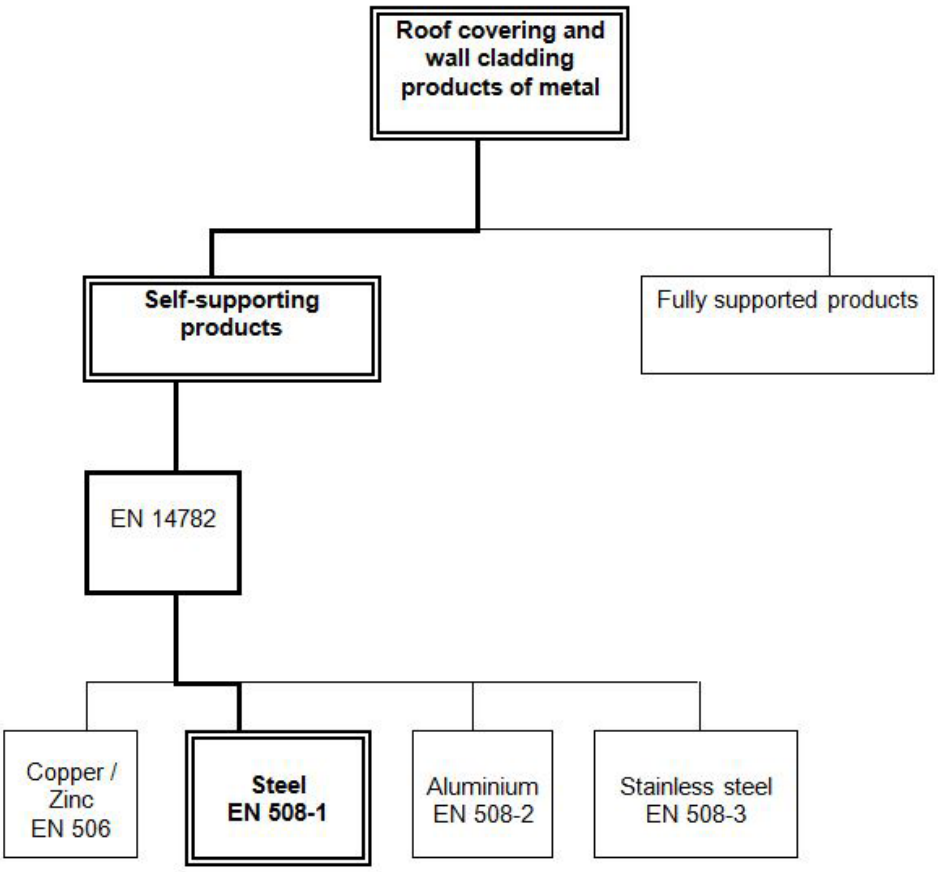


Figure 1 — Framework of standards

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

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

1 Scope

This part of EN 508 specifies requirements for self-supporting roofing, covering, wall cladding, lining, liner trays and tiles products for discontinuous laying made from metallic coated steel sheet with or without additional organic coatings. Sheets intended to be used with insulation and membranes are also covered.

This European Standard establishes general characteristics, definitions, classifications 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 when purchased before they are despatched from the factory. It specifies the requirements for products which enable them to meet all normal service conditions.

This European Standard applies to all discontinuously laid self-supporting external profiled sheets for roofing covering, wall cladding, lining and liner trays with the exception of tiles with a surface area less than 1 m^2 and produced by stamping. These profiled sheets are designed to keep wind, rain and snow out of the building and to transfer any resultant loads and infrequent maintenance loads to the structure.

This European Standard does not cover products for structural purposes, i.e. it does cover products used in constructions of Class III (according to EN 1993-1-3), it does not cover products used in constructions of Classes I and II (according to EN 1993-1-3) 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).

No requirements for supporting construction, design of roof, cladding, lining, tile system and execution of connections and flashings are included.

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 10143, *Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape*

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

EN 10346, *Continuously hot-dip coated steel flat products - Technical delivery conditions*

EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements*

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

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

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

3 Terms, definitions, symbols and abbreviations

For the purposes of this document, the terms and definitions given in EN 10169:2010+A1:2012 and the following apply.

3.1 General

3.1.1
self-supporting product
product which will, by virtue of its material and shape, support all applied loadings (e.g. snow, wind, foot traffic, insulation, membrane) and transmit these loadings to spaced structural supports

3.2 Materials

3.2.1
hot-dip zinc coated steel sheet (type Z)
product obtained by continuously hot-dip zinc coating cold reduced strips of either low carbon steel for cold forming or steel of structural quality

Note 1 to entry: For steel of structural quality, see EN 10346.

3.2.2
hot-dip 5 % Al-Zn coated steel sheet (type ZA)
product obtained by continuously hot-dip coating cold reduced strips of low carbon steel for cold forming or steel of structural quality on a production line using an alloy consisting of zinc and approximately 5 % aluminium (nominal percentage by mass)

Note 1 to entry: For steel of structural quality, see EN 10346.

3.2.3
hot-dip 55 % Al-Zn coated steel sheet (type AZ)
product obtained by continuously hot-dip coating cold reduced strips of low carbon steel for cold forming or steel of structural quality on a production line using an alloy consisting of:

— 55 % aluminium (nominal percentage by mass);

— 1,6 % silicon (nominal percentage by mass);

— and the balance zinc

Note 1 to entry: For steel of structural quality, see EN 10346.

3.2.4
hot-dip aluminium coated steel sheet (type A)
product obtained by continuously hot-dip aluminium coating cold reduced strips of low carbon steel for cold forming steel or steel of structural quality on a production line

Note 1 to entry: See Annex A.

3.2.5
organic coated steel sheet
product obtained by factory application of paint by roller or spray processes, or factory application of laminated organic film, on substrates of type Z, type ZA, type AZ or type A coated steel sheet

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

3.2.6
multilayer coated steel sheet
product obtained by continuously coating on both sides hot-dip zinc coated cold reduced strips of low carbon steel for cold forming or steel of structural quality with one or multiple applications of thermoplastic asphalt compounds (minimum thickness 1,5 mm) and subsequent lamination of a metal foil with or without decorative painting

Note 1 to entry: See Annex B.

3.3 Profile definitions

3.3.1
trapezoidal profiled sheet
self-supporting sheet which is designed to allow it to be side and end lapped, the crowns of which may be rounded and, in addition, the crowns, webs and valleys may be stiffened

Note 1 to entry: See Figures 2 to 5.

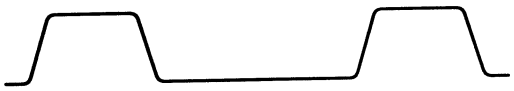


Figure 2 — Part of typical trapezoidal profile

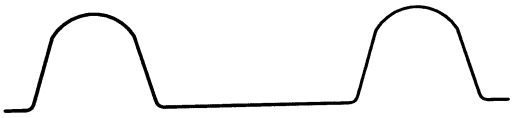


Figure 3 — Part of typical trapezoidal profile with rounded crowns

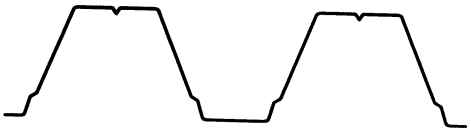


Figure 4 — Part of typical trapezoidal profile with stiffened crown and web

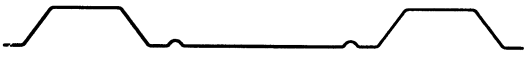


Figure 5 — Part of typical trapezoidal profile with stiffened valley

3.3.2
sinusoidal profiled sheet
self-supporting sheet which is designed to allow it to be side and end lapped, comprising a series of arc shaped crowns and valleys interconnected with tangential webs

Note 1 to entry: See Figure 6.

Figure 6 — Part of typical sinusoidal profiled sheet

3.3.3
standing seam and concealed fix sheet
self-supporting sheet profiled in such a way that the fixings are hidden within the construction and are not exposed to the weather

Note 1 to entry: The profile shape is designed to allow the formation of side laps on site.

Note 2 to entry: As these types of roof covering products are used in proprietary roofing or cladding systems, no structural requirements are given within this part of EN 508.

Note 3 to entry: See Figures 7 and 8.

Note 4 to entry: These products are normally designed by testing.

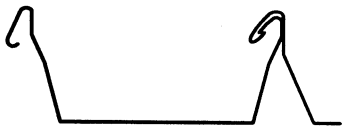


Figure 7 — Typical standing seam profile

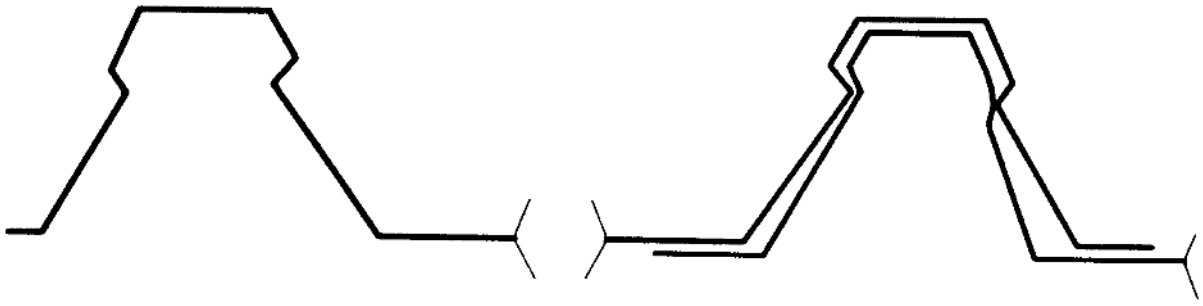


Figure 8 — Typical concealed fix profile

3.3.4
tile profiles
parts of typical tile profiled sheets that can allow the sheet to be side and/or end lapped

Note 1 to entry: The tile profile may include transverse steps.

Note 2 to entry: As these types of roof covering or cladding products are used in proprietary systems no structural requirements are given within this part of EN 508.

Note 3 to entry: See Figure 9 a), b) and c).

Note 4 to entry: These products are normally designed by testing.

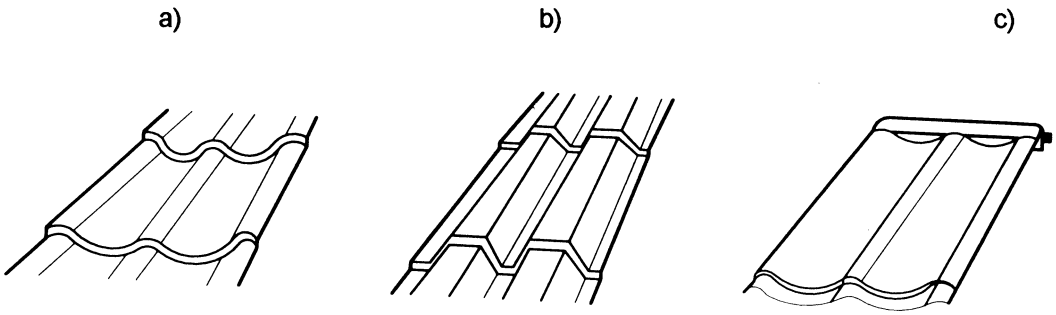
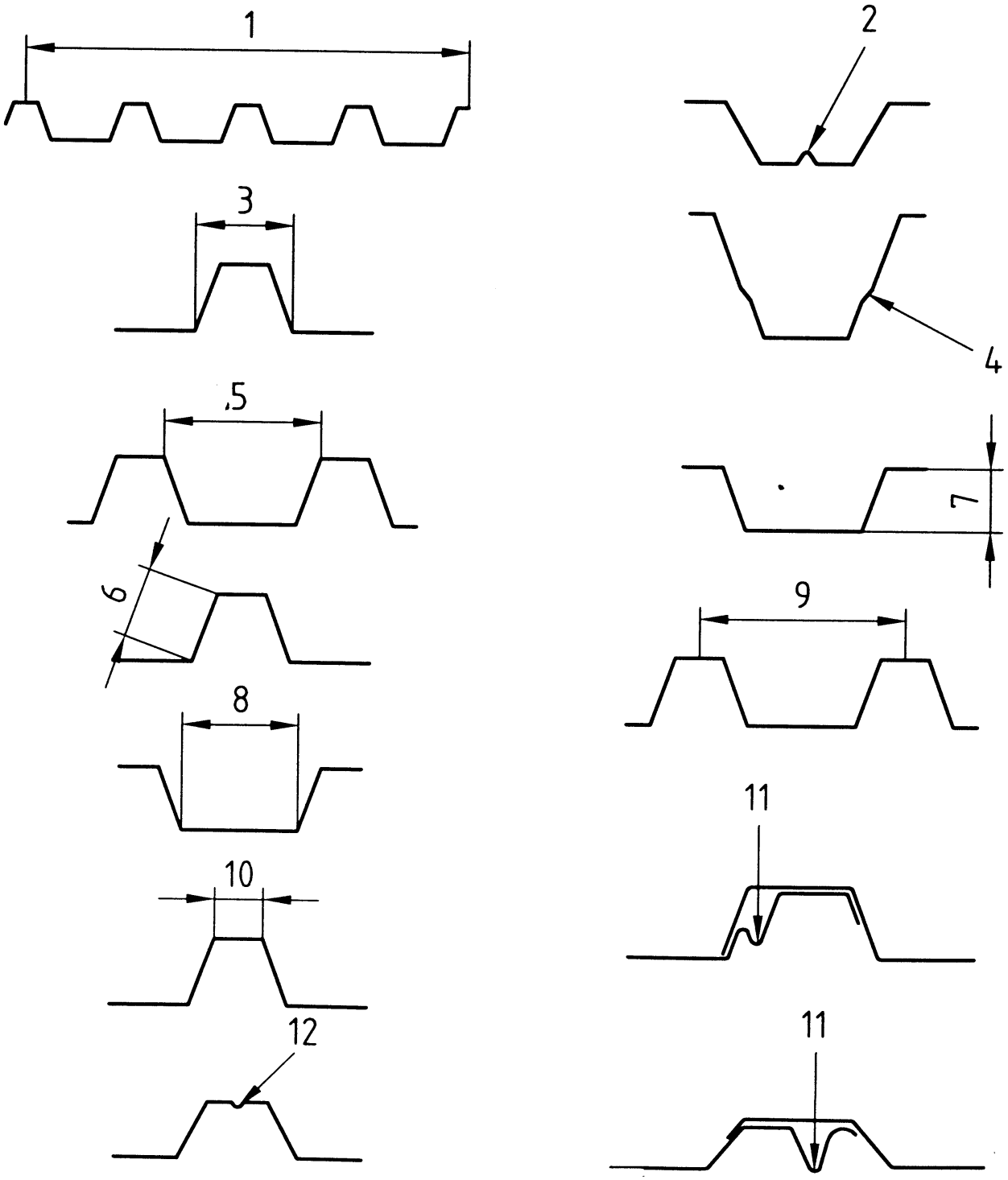


Figure 9 — Typical tile profiles

3.4 Product geometry

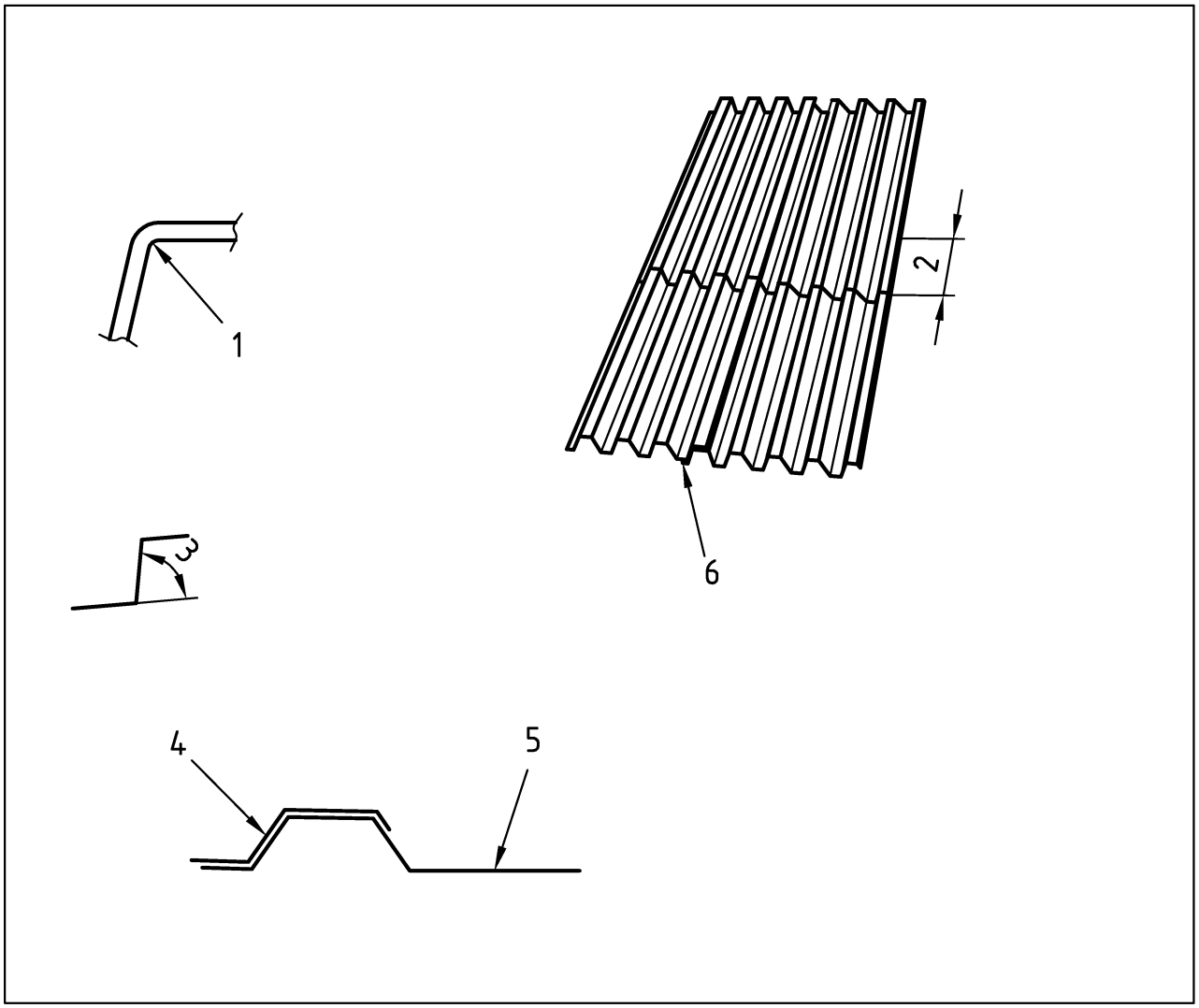
NOTE The names for various parts of typical trapezoidal profiled sheets are given in Figure 10 a) and b), with additional definitions for sinusoidal profiles in Figure 11 and tile profiles in Figure 12.



Key

1	cover width	7	depth
2	valley stiffener	8	valley
3	rib	9	pitch
4	web stiffener	10	crown
5	trough	11	drainage groove
6	web	12	crown stiffener

a) Definitions of the parts of typical trapezoidal profiled sheets

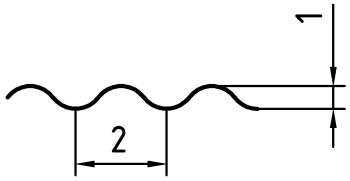


Key

1 bend radius
2 end lap
3 web angle
4 overlap
5 underlap
6 side lap in principle the same on tiles

b) Definitions of the parts of typical trapezoidal profiled sheets

Figure 10 — Definitions of the parts of typical profiled sheets

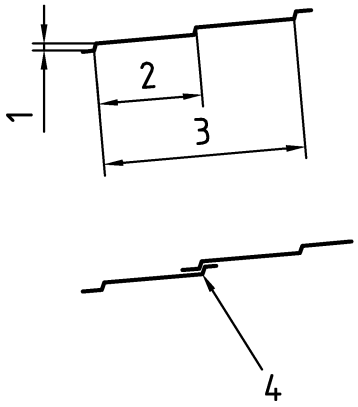


Key

1 depth

2 pitch

Figure 11 — Definitions of the parts of typical sinusoidal profiled sheets



Key

1 height of the step

2 length of the step

3 number of steps

4 end lap

Figure 12 — Definitions of the parts of typical tile

3.5 Symbols and abbreviations

Z	Hot-dip zinc coated steel
ZA	Hot-dip zinc/aluminium coated steel
AZ	Hot-dip aluminium/zinc coated steel
A	Hot-dip aluminium coated steel
ML	Multilayer coated steel
AY	Acrylic paint coating
SP	Polyester paint coating
SP-PI	Silicone-modified polyester paint coating
HDP	High durable polyester

PVDF Polyvinylideenfluoride paint coating

PVC(P) Polyvinylchloride (plastisol) coating, applied by coil coating process

PUR Polyurethane paint coating

PUR-PA Polyurethane-modified polyester paint coating

SP-PA Polyamide-modified polyester paint coating

PVC(F) Polyvinylchloride (plastisol) film coating

PVF(F) Polyvinylfluoride film coating

PE(F) Polyethylene film coating

PET(F) Polyethylene terephthalate film coating

PP(F) Polypropylene film coating

EXAMPLES

Z275 PVDF PVDF paint coating, applied to steel sheet with hot-dip zinc coating. Nominal zinc coating mass 275 g/m^2 total, both sides.

Z275 Hot-dip zinc coating, nominal coating mass 275 g/m^2 total, both sides.

ZA255 Hot-dip 5 % Al-Zn alloy-coating, nominal coating mass 255 g/m^2 total, both sides.

AZ185 Hot-dip 55 % Al-Zn alloy-coating, nominal coating mass 185 g/m^2 total, both sides.

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 to be used to designate the steel grade, the type and mass of the metallic coating are those of the standards referred to in Clause 2.

Product testing shall be provided to a defined schedule and carried out by the manufacturer or by an approved body. A permanent quality system shall be adopted by the manufacturer[1)].

4.2 Materials

4.2.1 Materials for roll formed and brake pressed profiles

Material for self-supporting roll formed and brake pressed profiles shall be one of the grades of steel as specified in the appropriate material standard given in Table 1.

1) E.g. quality management system based on EN ISO 9001.

Table 1 — Grades of steel

Standard reference	EN 10346			**See 3.2.4**
Metallic coating	**Zinc**	**5 % Al-Zn**	**55 % Al-Zn**	**Al**
Permitted grades	S220GD+Z [a] S250GD+Z [a] S280GD+Z S320GD+Z S350GD+Z S550GD+Z	S220GD+ZA [a] S250GD+ZA [a] S280GD+ZA S320GD+ZA S350GD+ZA S550GD+ZA	--------- S250GD+AZ [a] S280GD+AZ S320GD+AZ S350GD+AZ S550GD+AZ	see Annex A
[a] Profiled sheets made from these grades may not be permitted for use in some countries.				

4.2.2 Materials for tiles

The steel grades shown in Table 2 shall be used for forming tiles when the grades given in Table 1 are not suitable because the manufacturing process requires specific forming qualities.

Table 2 — Grades of steel

Standard reference	EN 10346		
Metallic coating	**Zinc**	**5 % Al-Zn**	**55 % Al-Zn**
Permitted grades	DX51D+Z DX52D+Z DX53D+Z DX54D+Z	DX51D+ZA DX52D+ZA DX53D+ZA DX54D+ZA	DX51D+AZ DX52D+AZ DX53D+AZ DX54D+AZ

4.2.3 Nominal metallic coating

The minimum nominal metallic coating mass depends on geographic and climatic conditions and shall be chosen from the values specified in EN 10346. The metallic coating mass shall be the sum of the coating masses on both sides, in grams per square metre, measured and with tolerances as specified in the appropriate standard.

NOTE The minimum nominal metallic coating masses specified in some countries in their regulations or codes of practice are listed in Annex C.

4.2.4 Organic coatings

The main external weather resistant organic coatings suitable for application to metallic coated steel substrates are given in Table 3.

Table 3 — Factory applied organic coatings

Type of coating		Designation
Factory applied coatings	Acrylic	AY
	Polyester	SP
	High durable polyester	HDP
	Silicone-modified polyester	SP-SI
	Polyvinylidene fluoride	PVDF
	Polyvinyl chloride (Plastisol)	PVC(P)
	Polyurethane	PUR
	Polyurethane-modified polyester	PUR-PA
	Polyamide-modified polyester	SP-PA
	Multicoat polyvinylidene fluoride	-
	Multicoat polyurethane	-
Factory applied laminated film	Polyvinyl chloride (Plastisol)	PVC(F)
	Polyvinyl fluoride	PVF(F)
	Polyethylene	PE(F)
	Polyethylene terephthalate	PET(F)
	Polypropylene	PP(F)

The reverse side coating should be chosen as appropriate. This is required for handling, storage and for corrosion protection in some conditions.

Performance requirements and test methods for organic coil coated steel sheet and profile are given in EN 10169.

No requirements are given for coatings which are applied after the product is formed. Where appropriate the tests in EN 10169 may be used.

Special coatings or films may be applied to the reverse side to reduce the dripping of moisture caused by condensation.

4.3 Products

4.3.1 Mechanical resistance

The product for roof shall resist the design loads from self weight, eventual insulation, eventual membranes, snow, wind and maintenance loads. These loads shall be factored such that they will not impair the performance of the roof.

NOTE 1 The load level, the levels of safety and permissible deflection are defined in national building regulations.

The product for cladding shall resist the design loads from self weight, eventual insulation, wind. These loads shall be factored such that they will not impair the performance of the cladding.

NOTE 2 The load level, the levels of safety and permissible deflection are defined in national building regulations.

4.3.2 Calculation and test of mechanical resistance

The mechanical performance of the product shall be stated by the manufacturer together with details of how the values were determined in accordance with the national regulations of the country in which the product is to be used.

For calculation and testing either national regulations or EN 1993-1-3 may be used.

Calculation and test methods referred to in this part of EN 508 mainly deal with trapezoidal sheets. Tiles, standing seam sheets and concealed fix sheets are used in proprietary roofing systems; no structural

requirements are given within this European Standard for these products. These products should normally be designed by testing.

4.3.3 Dimensions

4.3.3.1 General

The dimensions of the product shall be fixed in order that the roof constructed with these products can fulfil its functions.

4.3.3.2 Thickness

Measurements of the thickness of manufactured products, such as profiled sheets, shall be made not less than 40 mm from the edges in accordance with EN 10143.

Products shall be classified according to tolerance on nominal thickness as follows:

— Class 1: full minus nominal normal tolerance according to EN 10143;

— Class 2: full minus nominal special tolerance according to EN 10143;

— Class 3: ½ minus nominal normal tolerance in accordance with EN 10143;

— Class 4: zero minus tolerance.

NOTE 1 For products of class 3, mechanical resistance is calculated using the minimum thickness of the steel core guaranteed by the manufacturer.

NOTE 2 National regulations will state the class of product that it will be possible to use.

4.3.4 Dimensional tolerances for the profiled sheets

Tolerances for the profile shape of the product and methods of measurement shall be in accordance with Annex D.

4.3.5 Safety in case of fire

4.3.5.1 Reaction to fire

The performance shall be defined according to the Euroclass system. EN 14782 defines the SBI specimen when required and the direct and extended application rules. The national regulations fix the level of reaction to fire required for each building.

4.3.5.2 Resistance to fire

When required, the performance shall be defined according to the Euroclass system.

NOTE The resistance to fire concerns only the E, I and W classification and does not concern the R-classification.

4.3.5.3 External fire roof performance

When required, the performance shall be defined according to the Euroclass system.

NOTE The external fire roof performance can be Brooft1, Brooft2, Brooft3 or Brooft4.

5 Test methods

5.1 Material properties

Test methods for material properties are given in the appropriate material standards as detailed in 4.2.

5.2 Mechanical properties

The performance of the product under distributed load shall be determined in accordance with 4.3.1 and 4.3.2.

When required (i.e. for roof products), the performance of the product under concentrated load shall be stated by the manufacturer with reference to EN 14782.

NOTE Safety under the load from people and the risk of permanent deformation is dependent on many factors, such as slope of roof, method of installation, etc.

6 Designation

Products covered by this European Standard shall be designated as follows:

— type of use of the product (cladding, roofing…) as stated by the manufacturer;

— type of product according to the designation of the manufacturer;

— European Standard number;

— nominal thickness and thickness class (see 4.3.3.2);

— material (designation of material) (see 3.5 and 4.2);

— length and, in addition for tiles, the length of the step.

EXAMPLE

Profile 45 for cladding, thickness 0,7 mm, class 1; length 4 200 mm; S350GD+ZA 255

Side 1: PVDF 25 µm colour RAL 24

Side 2: AY 25 µm colour RAL 10

EN 508-1

7 Marking, labelling and packaging

7.1 Marking and labelling

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

— name or registered identification of the manufacturer;

— designation of the product (see Clause 6);

— order or manufacturing batch number;

— dimension 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 transport, storage and handling shall be clearly visible on the package.

The packages should be supported by means of battens providing sufficient space to permit good ventilation while avoiding any permanent deformation 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 from tarpaulin over a frame. The frame should allow sufficient space between tarpaulin and packages to allow air to circulate.

NOTE Moisture, in particular condensation inside packages, can lead to the formation of stains (e.g. white rust on zinc and zinc-alloy coatings and black marks on aluminium coatings). If there is prolonged contact with moisture, this can cause damage to the corrosion protection of coatings.

During transportation, dark spots can appear on the hot-dip metallic coated surfaces as a result of friction when packing allows movement between neighbouring surfaces.

If severe service conditions are expected during transportation, storage or processing, the product may be supplied with an additional protection of a temporary, strippable film, wax or oil.

Type, thickness, adhesion properties, formability, tear strength and light fastness should be taken into consideration when choosing protective films. All protective films can be exposed to outdoor weathering for only a limited period without deterioration.

Annex A
(informative)

Aluminium coated steel sheet (type A)

A.1 General

The definition of this type of coating is given in 3.2.4.

In addition to the references given in Clause 2, the following are relevant to this annex.

NF A 36-345 Iron and steel - Aluminium coated sheet - Cut lengths and coils

ASTM A 463/463M-05 Standard Specification for Steel sheet Aluminium Coated

A.2 Specification for roof covering or cladding products

A.2.1 Steel grades

The steel grades given in Table A.1 should be used.

Table A.1 — Steel grades

Steel grade		Yield strength	Tensile strength	Elongation
Steel name	Steel number	R_{eH} N/mm^2 min	R_m N/mm^2 min	$A_{80\ mm}$ % min [a]
S250GD	1.0242	250	330	19
S280GD	1.0244	280	360	18
S320GD	1.0250	320	390	17
S350GD	1.0529	350	420	16

[a] For product thicknesses ≤ 0,7 mm (including aluminium coating) the minimum elongation values ($A_{80\ mm}$) shall be reduced by 2 units.

A.2.2 Coating mass

The coating designation corresponds to the mass in g/m^2 referring to the total mass on both surfaces (see Table A.2).

Table A.2 – Coating mass

Coating designation	Triple spot test	Single spot test
A195 [a, b]	195 g/m^2	180 g/m^2
A230 [a]	230 g/m^2	210 g/m^2
A305 [c]	305 g/m^2	275 g/m^2

[a] Sheet with this coating may be used as substrate for organic coil coating.
[b] ASTM designation: Al T2 65.
[c] ASTM designation: Al T2 100.

The density of the coating is approximately 3 000 kg/m^3.

A.2.3 Dimensional tolerances

Dimensional tolerances, other than coating thickness, are given in EN 10143.

Annex B
(normative)

Multilayer coated steel sheet

NOTE The definition of this type of coating is given in 3.2.6.

B.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 plastic 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 plastic film;

— embossed copper foil with or without plastic film;

— embossed stainless steel with or without plastic film;

— plastic film with or without paint or metal foil.

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

B.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 10346 or Annex A.

B.3 Specific requirements

B.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 plastic film: (50 ± 10) µm;

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

— plastic film: (8 ± 2) µm.

B.3.2 Bituminous coating specification

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

B.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 EN ISO 9227 (Salt spray test).

B.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 C
(informative)

Metallic coatings

The minimum metallic coating mass for steel sheet used to form the products specified in this European Standard should be selected according to the values given in Table C.1, Table C.2, Table C.3 and Table C.4 for the country in which they are to be used. Where no value is shown, the country concerned has not declared a minimum to CEN for the purposes of standardization.

Table C.1 — Minimum nominal metallic coating mass for steel sheet without organic coating for exterior applications

Coating types	Type Z	Type ZA	Type AZ	Type A
Standard	EN 10346	EN 10346	EN 10346	-
	Metallic mass, g/m^2 to both sides			
Austria	350	255		
Belgium	350	255	185	
Czech Republic	NR	NR	NR	
Finland	350	300	NR	NR
France	350	255	185	230
Germany	NR	NR	185	NP
Ireland	450		185	
Netherlands			185	
Spain	275		185	230
Sweden	350		185	
United Kingdom	350	NR	185	230
NP = Not permitted by National Regulation. NR = Not recommended without organic coating.				

National application rules should be checked because the coating weight may change according to the end use.

Table C.2 — Minimum nominal metallic coating mass for steel sheet without organic coating for interior applications

Coating types	Type Z	Type ZA	Type AZ	Type A
Standard	EN 10346	EN 10346	EN 10346	**-**
	Metallic mass, g/m^2 to both sides			
Austria	350	255		
Belgium	350	255	185	
Czech Republic	NR	NR	NR	
Finland	350	300	NR	NR
France	180	255	185	230
Germany	NR	NR	185	NP
Ireland	450		185	
Netherlands			185	
Spain	275		185	230
Sweden	350		185	
United Kingdom	350	NR	185	230
NP = Not permitted by National Regulation. NR = Not recommended without organic coating.				

National application rules should be checked because the coating weight may change according to the end use.

Table C.3 — Minimum nominal metallic coating mass for steel sheet with organic coating for exterior applications

Coating types	Type Z	Type ZA	Type AZ	Type A
Standard	EN 10346	EN 10346	EN 10346	**-**
	Metallic mass, g/m^2 to both sides			
Austria	275	255		
Belgium	275	255	150	
Czech Republic	275	255	150	
Denmark	275	255	150	
Finland	275	255	NR	NR
France	225	200	150	195
Germany	275	255	150	
Ireland	275		150	
Netherlands	275	255	150	
Sweden	275		150	
United Kingdom	275	255	150	NP
NP = Not permitted by National Regulation. NR = Not recommended without organic coating.				

National application rules should be checked because the coating weight may change according to the end use.

Table C.4 — Minimum nominal metallic coating mass for steel sheet with organic coating for interior applications

Coating types	Type Z	Type ZA	Type AZ	Type A
Standard	EN 10346	EN 10346	EN 10346	**-**
	Metallic mass, g/m^2 to both sides			
Austria	275	255		
Belgium	275	255	150	
Czech Republic	275	255	150	
Denmark	275	255	150	
Finland	275	255	NR	NR
France	100	200	150	195
Germany	275	255	150	
Ireland	275		150	
Netherlands	275	255	150	
Sweden	275		150	
United Kingdom	275	255	150	NP
NP = Not permitted by National Regulation. NR = Not recommended without organic coating.				

National application rules should be checked because the coating weight may change according to the end use.

Annex D
(normative)

Dimensional tolerances

D.1 Tolerances for trapezoidal sheets

D.1.1 General

The following tolerances shall apply to measurements in the factory, before delivery and shall be corrected for temperature variations to 20 °C where appropriate.

The tolerances are maxima, a roofing system may require smaller tolerances for the sheets to fit together to form a functional roof or cladding on one building.

Methods suitable for the measurement of the values are given in D.4.

The following values are defined with tolerances:

D.1.2 Depth of profile (*h*)

D.1.3 Depth of stiffeners

D.1.4 Pitch

D.1.5 Width of crown and valley (b_1, b_2)

D.1.6 Cover width (*w*)

D.1.7 Radius of bends (*r*)

D.1.8 Deviation from straightness (δ)

D.1.9 Deviation from squareness (*s*)

D.1.10 Length (*l*)

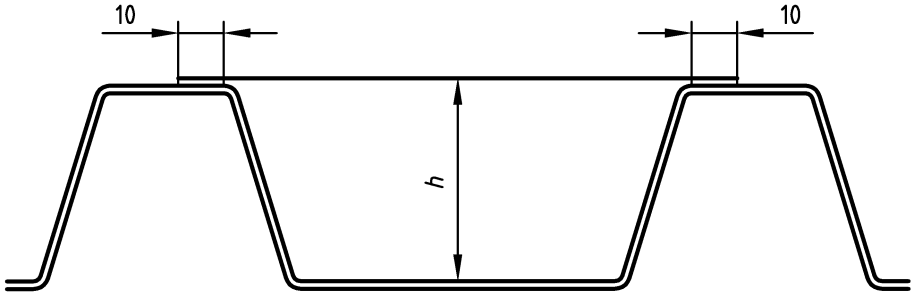
D.1.11 Deviation of side lap (*D*)

D.1.12 Curve radius and angles

D.1.2 Depth of profile

The depth of the profile (*h*) shall be measured as the distance between the crown and valley measured on the same side of the sheet (see Figure D.1), at 200 mm from the sheet end.

Depth of profile (h)	**Tolerance**	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
h ≤ 50 mm	± 1,0 mm	± 1,0 mm
50 mm < h ≤ 100 mm	± 1,5 mm	± 1,5 mm
h > 100 mm	± 2,0 mm	± 2,0 mm



Key

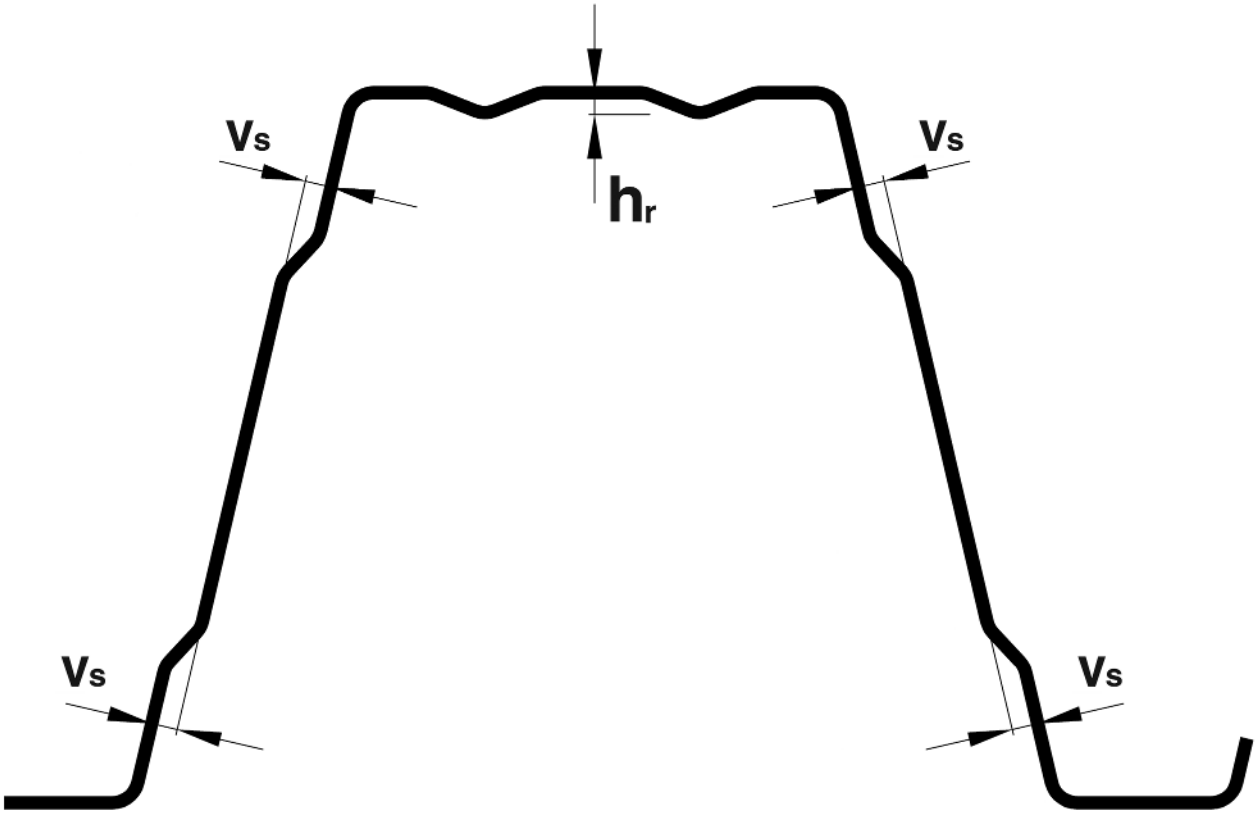
h depth of profile

Figure D.1 — Depth of profile

D.1.3 Depth of stiffeners

The depth of any stiffeners, on crown, valley or web (see Figure D.2) shall be measured on a line across the sheet at 200 mm from the end.

Depth of stiffeners	**Tolerance on the depth of stiffeners**	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
h_r v_s	-	$^{+3}_{-1}$ mm $^{+2}_{-0,15 * v_s}$ mm and ≤ 1 mm



Key

h_r depth of crown stiffener

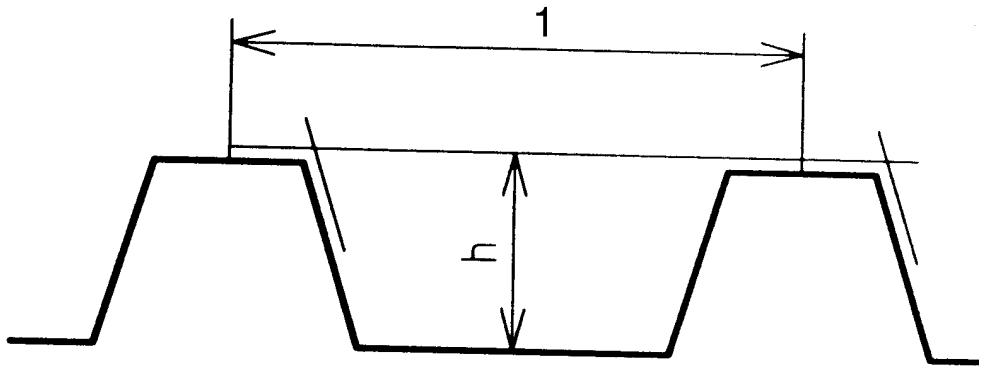
v_s depth of web stiffener

Figure D.2 — Depth of stiffeners

D.1.4 Pitch

The pitch of the profile (see Figure D.3) shall be the distance between the centre of adjacent ribs, measured at 200 mm from sheet ends.

Depth of profile	**Tolerance on the pitch**	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
$h \leq 50$ mm	± 2 mm	No requirement
50 mm < $h \leq 100$ mm	± 3 mm	
h >100 mm	± 4 mm	



Key

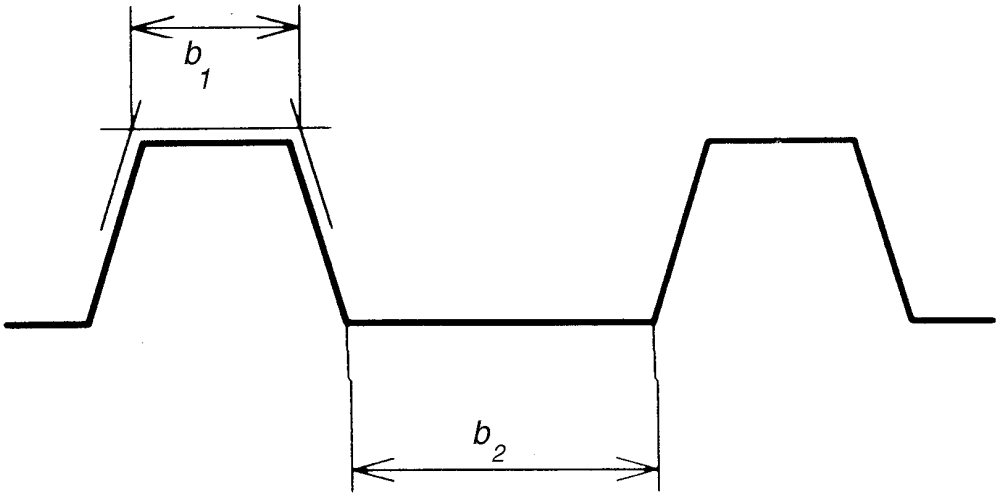
1 pitch

Figure D.3 — Pitch

D.1.5 Widths of crown and valley

The widths of a crown (b_1) and valley (b_2) (see Figure D.4) shall be measured at 200 mm from the sheet ends.

Widths of crown and valley	**Tolerance on widths of crown and valley**	
	Trapezoidal profile and Liner Trays	
	Profiles without stiffeners	**Profiles with stiffeners**
Widths of crown and valley	$^{+2}_{-1}$ mm	$^{+4}_{-1}$ mm



Key

b_1 width of crown

b_2 width of valley

Figure D.4 — Widths of crown and valley

D.1.6 Cover width

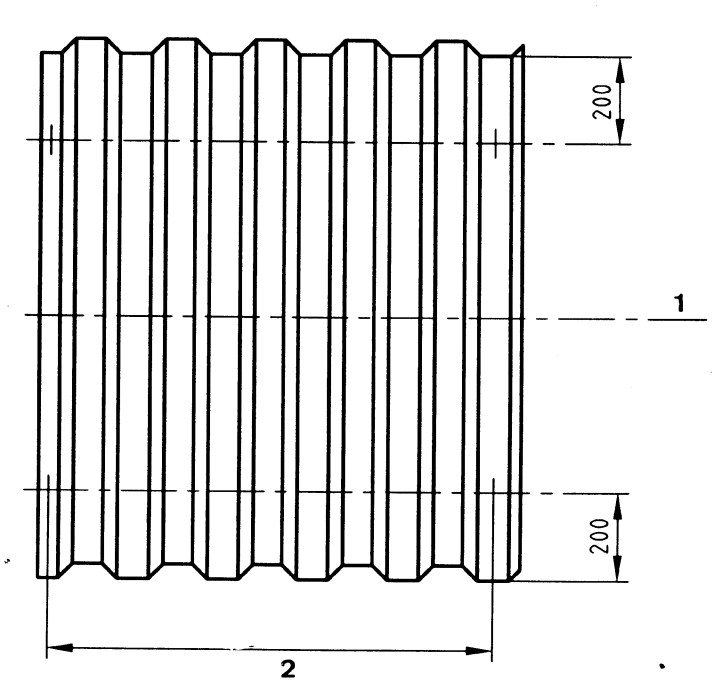
The cover width, *w*, shall be stated by the manufacturer.

Measurements of cover width w_1 and w_2 shall be taken at a distance of 200 mm from the sheet ends as shown in Figure D.5. Both measurements shall be within the specified tolerance selected for the appropriate sheet profile depth (h).

A third measurement w_3 of cover width shall be made across the centre line of the sheet to determine the contraction or bulging of the profile. This w_3 measurement shall be within the stated tolerance referred to the average value for w_1 and w_2 (i.e. $\frac{w_1 + w_2}{2}$).

Cover width	**Tolerance on cover width and limit value for contraction or bulging**		
	Trapezoidal profile		**Liner Trays**
	Profiles without stiffeners	**Profiles with stiffeners**	
Cover width h ≤ 50 mm h > 50 mm	± 5,0 mm ± 0,1 x h and ≤ 15 mm		
Contraction or bulging (w_3)	(w_1 + w_2)/2 – (tolerance on cover width) ≤ w_3 ≤ (w_1 + w_2)/2 + (tolerance on cover width)		-

NOTE *h* is the nominal profile depth (see D.1.2).



Key

1 centre line of sheet

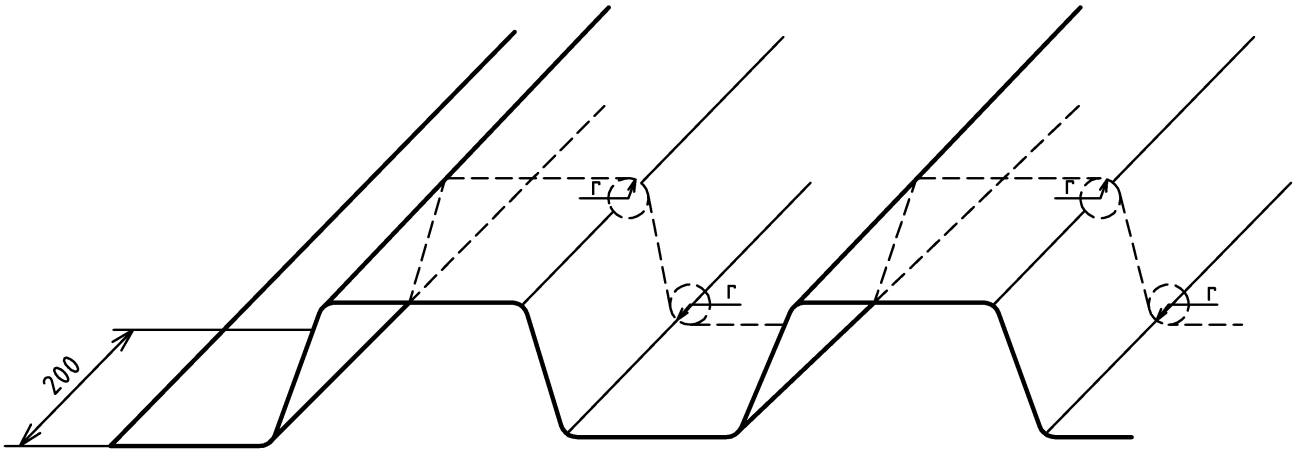
2 cover width (*w*)

Figure D.5 — Cover width

D.1.7 Radius of bends

The measurement shall be carried out on the inside radii at a distance of at 200 mm from one end of the sheet as shown in Figure D.6.

	Tolerance on radius of bends	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
Radius of bends	$^{+2}_{0}$ mm	±2 mm



Key

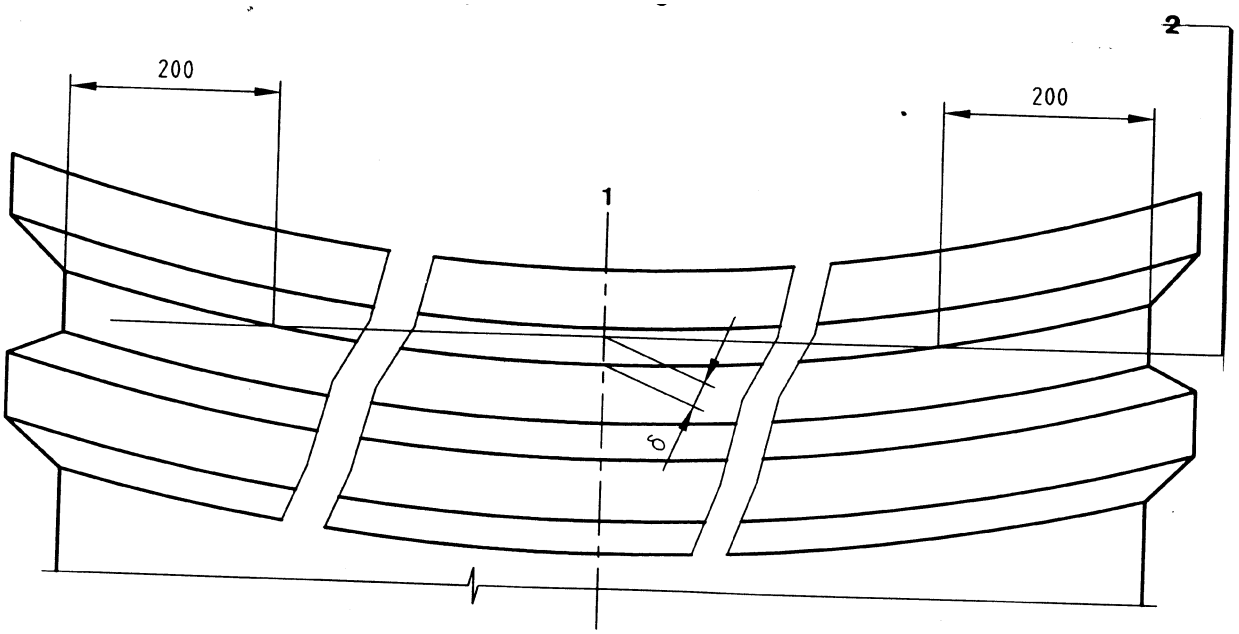
r inside radius

Figure D.6 — Radius of bends

D.1.8 Deviation from straightness

The deviation of straightness from the theoretical straight line shall be defined as the dimension δ in Figure D.7.

	Deviation from straightness		
	Trapezoidal profile		**Liner Trays**
	Profiles without stiffeners	**Profiles with stiffeners**	
Deviation from straightness (δ)	2,0 mm/m of sheet length not exceeding 10 mm		no requirement



Key

1 centre line of sheet

2 straight line laid along edge of crown

δ displacement of edge of crown from straight line

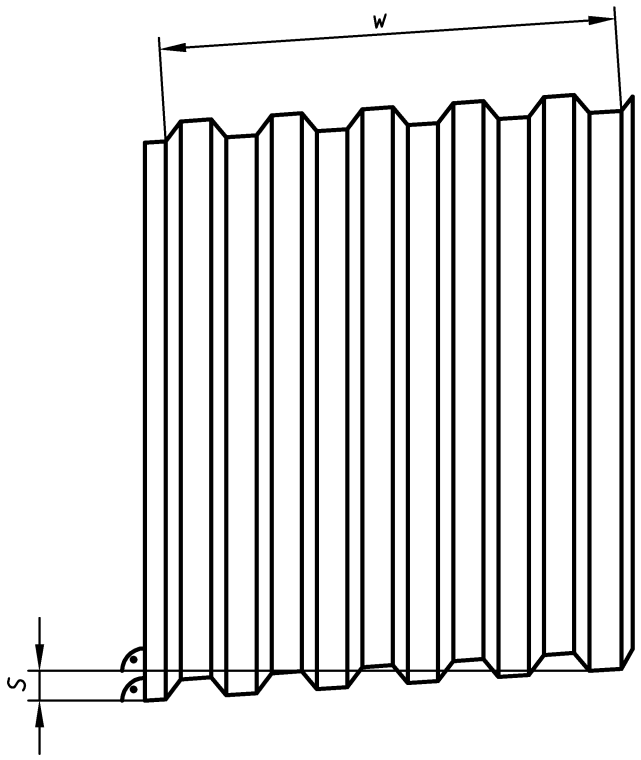
Figure D.7 — Deviation from straightness

D.1.9 Deviation from squareness

The deviation from squareness of the profiled sheet end shall be defined as the dimension *S* in Figure D.8.

	Deviation from squareness		
	Trapezoidal profile		**Liner Trays**
	Profiles without stiffeners	**Profiles with stiffeners**	
Deviation from squareness (S)	≤ 0.005*w	no requirement	no requirement

NOTE The nominal cover width (*w*) is specified in D.1.6.



Key

w nominal cover width

S deviation from squareness

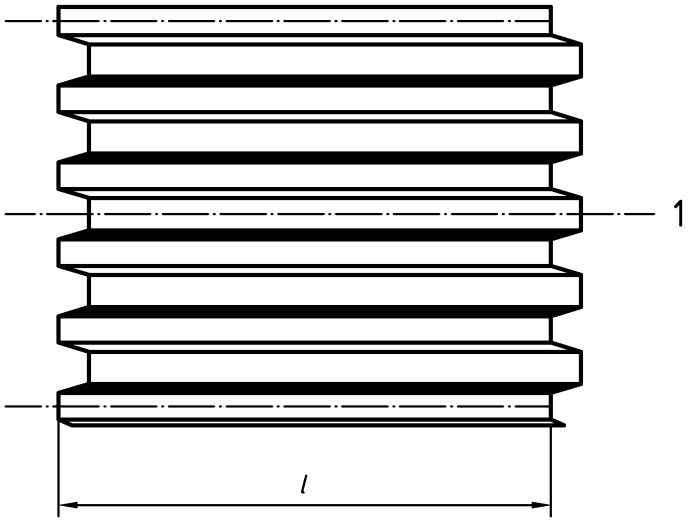
Figure D.8 — Deviation from squareness

D.1.10 Length

The length (*l*) shall be measured along the centre axis of the sheet as shown in Figure D.9.

	Tolerance on length	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
Length of the profile $l \leq 3\,000$ mm $l > 3\,000$ mm	$^{+10}_{-5}$ mm $^{+20}_{-5}$ mm	

Specific requirements may be agreed upon by the manufacturer and the purchaser at the time of ordering.



Key

1 centre axis of sheet

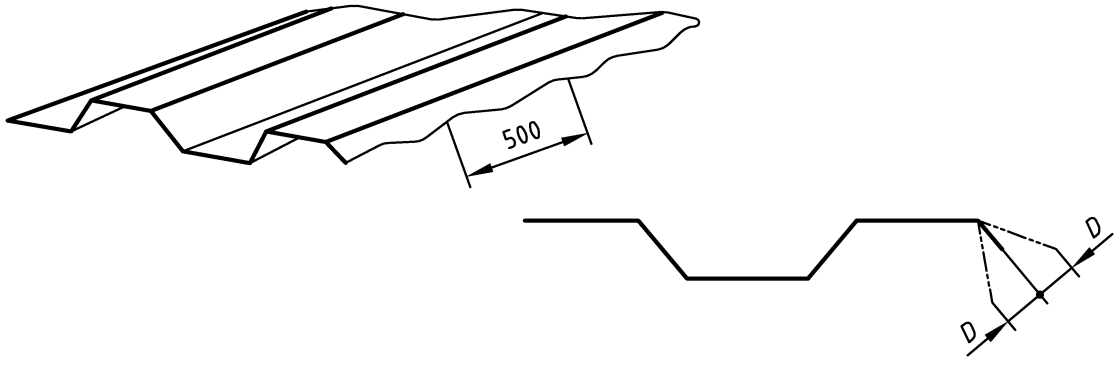
l length

Figure D.9 — Sheet length

D.1.11 Deviation of side lap

The deviation from a straight edge of the sheet side lap shall be defined as dimension *D* in Figure D.10.

	Deviation of side lap	
	Trapezoidal profile and liner trays	
	Profiles without stiffeners	**Profiles with stiffeners**
Deviation of side lap (D)	± 2,0 mm on a length of 500 mm	



Key

D deviation of side lap

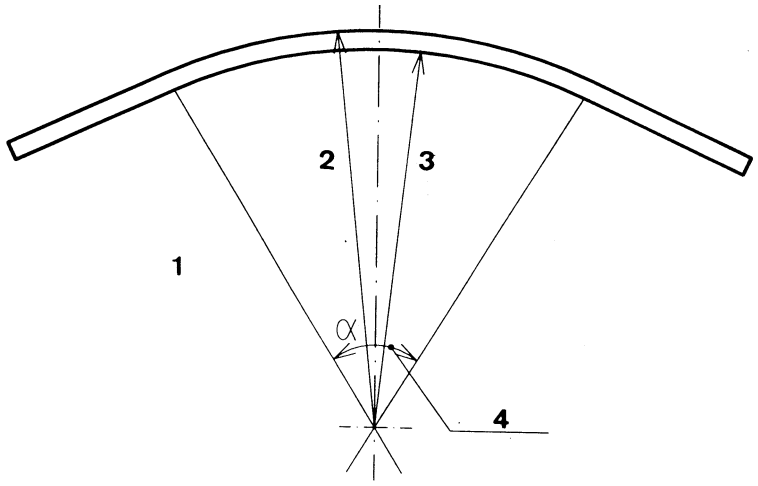
Figure D.10 — Side lap deviation

D.1.12 Curve radius and angles

The radius and angle of curved profiled sheets shall be defined as shown in Figure D.11.

Tolerances for either the internal or external radius and the angle shall be agreed between the supplier and the purchaser at the time of ordering.

NOTE The radius can be measured either to the internal or external surface of the profiled sheet.



Key

1 straight leg (if any)
2 external radius
3 internal radius
4 angle

Figure D.11 — Curved sheet

D.2 Tolerances for sinusoidal profiles

No tolerances for sinusoidal profiles are given in this European Standard.

NOTE Sinusoidal profiles are produced for a wide range of uses in addition to roofing and tolerances can be found in national standards.

D.3 Tolerances on tiles

D.3.1 General

The tolerances are maxima; the producer may give tighter tolerances for the product to fit the system and achieve easy installation. Methods suitable for the measurements of the values are given in D.4.

The following values are defined with tolerances:

D.3.2 Depth of tile

D.3.3 Web angular displacement

D.3.4 Pitch

D.3.5 Width of crown and valley

D.3.6 Cover width

D.3.7 Radius of bends

D.3.8 Deviation from straightness

D.3.9 Deviation from squareness

D.3.10 Length

D.3.11 Contraction or bulging

D.3.2 Depth of tile

The depth of a tile (*h*) shall be defined by the distance between the surfaces of crown and valley measured on the same side of the sheet, see Figure D.12.

Tolerances: ± 2 mm

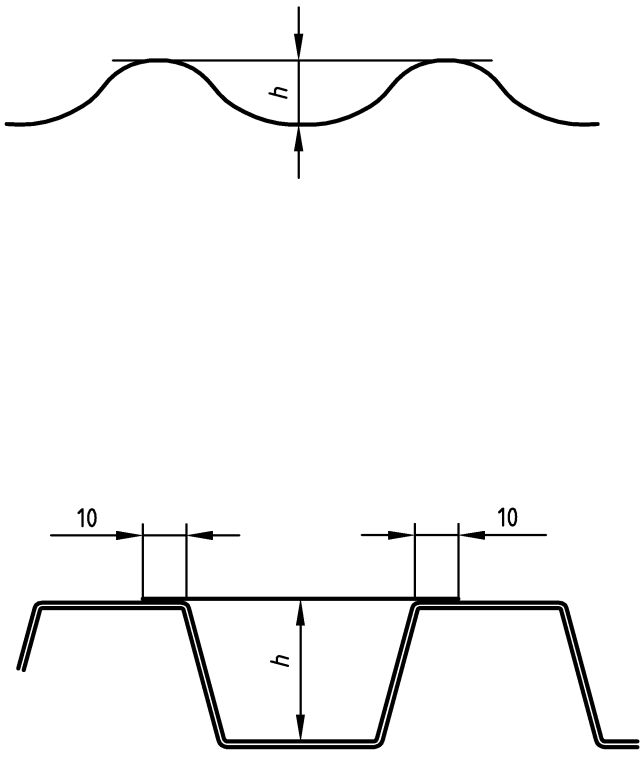
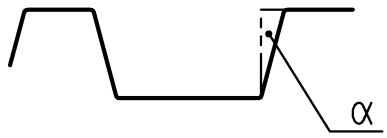


Figure D.12 — Depth of tile

D.3.3 Web angular displacement (Figure D.13)

Tolerances: ± 2°



Key

α web angle

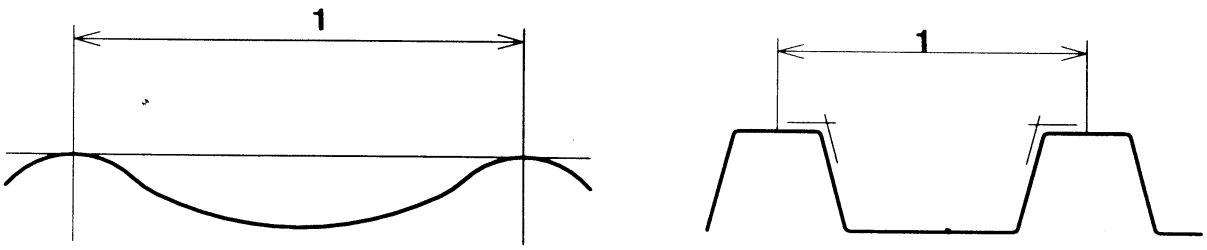
Figure D.13 — Web angular displacements

D.3.4 Pitch

The pitch (*p*) of the profile (see Figure D.14) shall be the distance between the centre of adjacent ribs. Measurements shall be taken on the top surface directly over the step.

NOTE The step is illustrated in Figure D.17.

Depth of profile	**Tolerance**
$h \leq 75$ mm	± 1,5 mm
$h > 75$ mm	± 1,5 mm or 2 % of depth



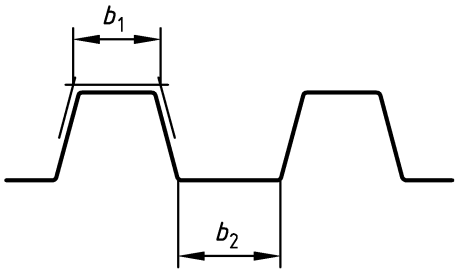
Key

1 pitch

Figure D.14 — Pitch

D.3.5 Width of crown and valley (Figure D.15)

Tolerances: ± 1 mm



Key

b_1 width of crown

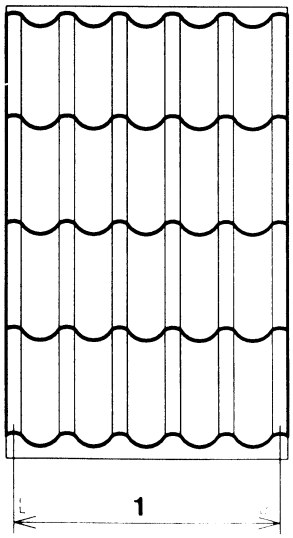
b_2 width of valley

Figure D.15 — Width of crown and valley

D.3.6 Cover width

The nominal cover width (w) (see Figure D.16) shall be stated by the manufacturer.

Tolerances: ± 0,5 % of the nominal cover width.



Key

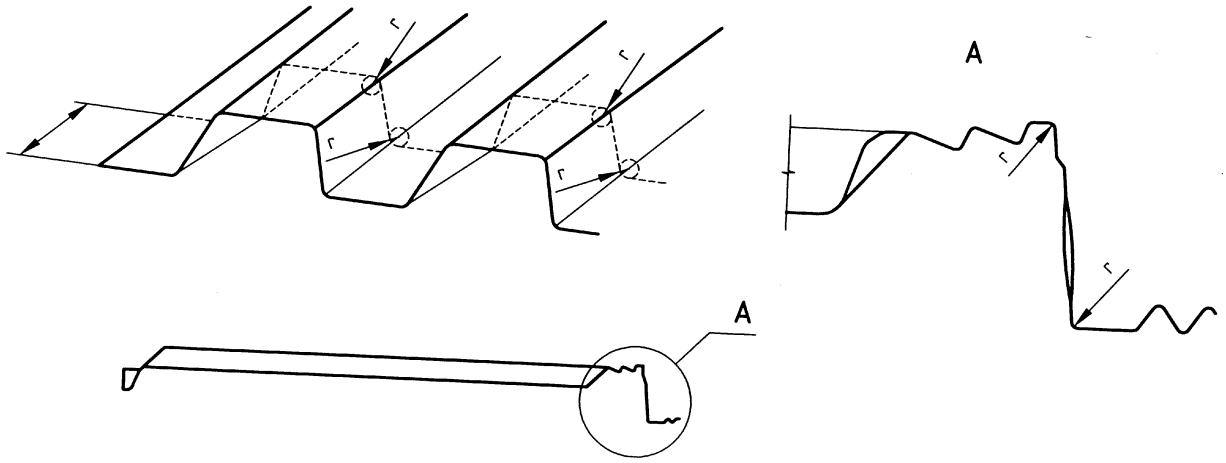
1 cover width

Figure D.16 — Cover width

D.3.7 Radius of bends

The measurement shall be carried out on the inside radii (*r*) as shown in Figure D.17.

Tolerances: ± 1,5 mm



Key

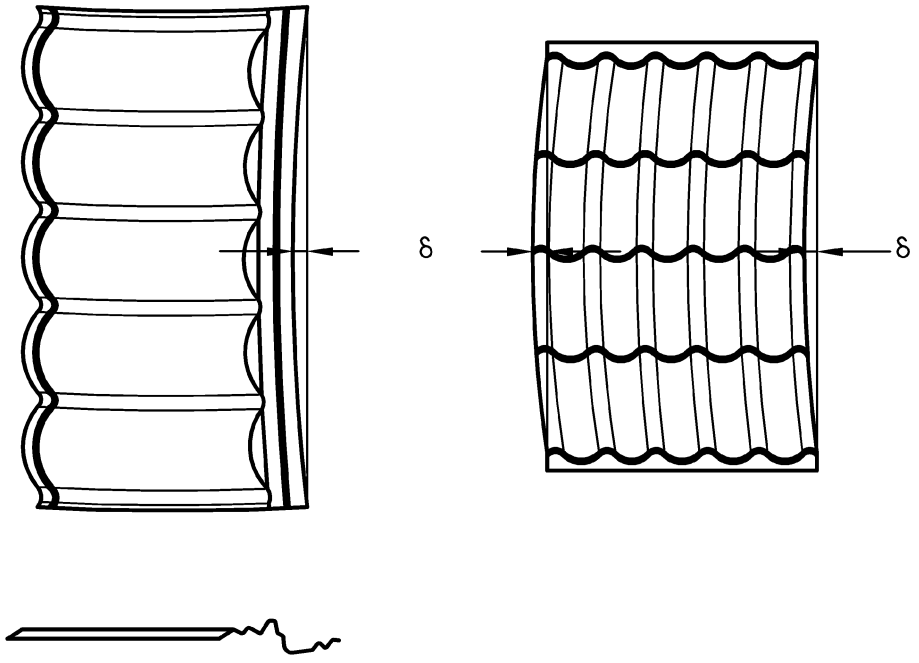
r inside radius

Figure D.17 — Radius of bends

D.3.8 Deviation from straightness

The deviation from straightness or parallel bulging of both edges from the theoretical straight line is defined as the dimension δ in Figure D.18.

Tolerance: $\delta \leq 2$ mm/m, maximum 9 mm on the total length.



Key

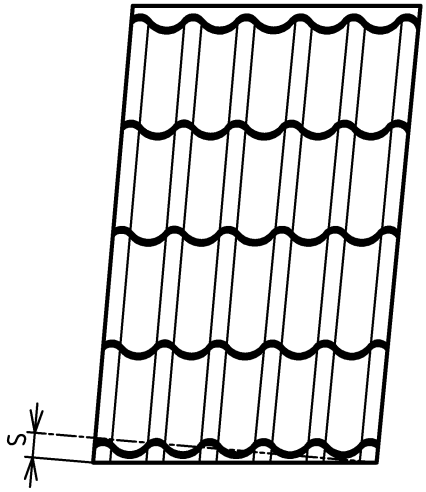
δ deviation from straightness

Figure D.18 — Deviation from straightness

D.3.9 Deviation from squareness

The deviation from squareness of the tile sheet end shall be defined as dimension (*S*) in Figure D.19.

Tolerances: ± 6 mm



Key

S deviation from squareness

Figure D.19 — Deviation from squareness

D.3.10 Length

The length shall be measured along the centre line of the tile.

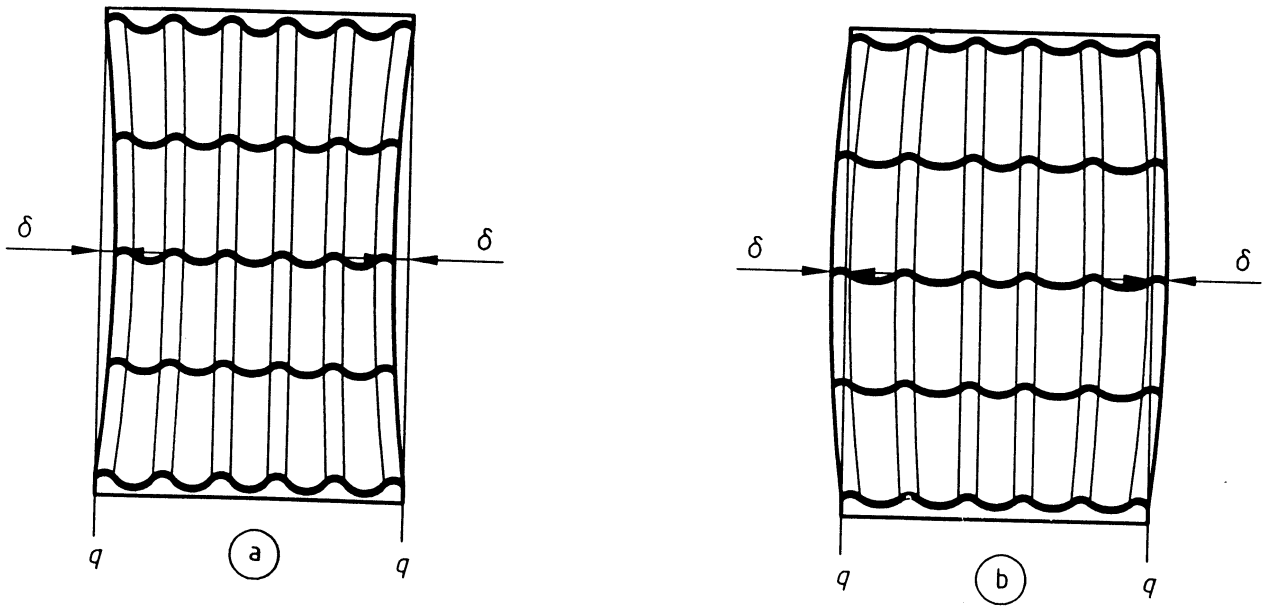
Tolerances: ± 2 mm on each step

± 6 mm on total length of the tile.

D.3.11 Contraction or bulging

Contraction or bulging over the length of the tile sheet from the theoretical straight edge shall be defined as the dimension δ in Figure D.20 a) and b).

Tolerances: ± 2 mm per metre sheet length with a maximum of 9 mm



Key

q theoretical straight edge

δ contraction or bulging

Figure D.20 — Contraction or bulging

D.4 Methods for measuring profiles

D.4.1 General

The measurements shall be made in the factory, before delivery and corrected to a temperature of 20 °C where appropriate.

Measurements of depth of profile depth of stiffeners, pitch, crown, valley and cover width shall be carried out at 200 mm from the profiled sheet end.

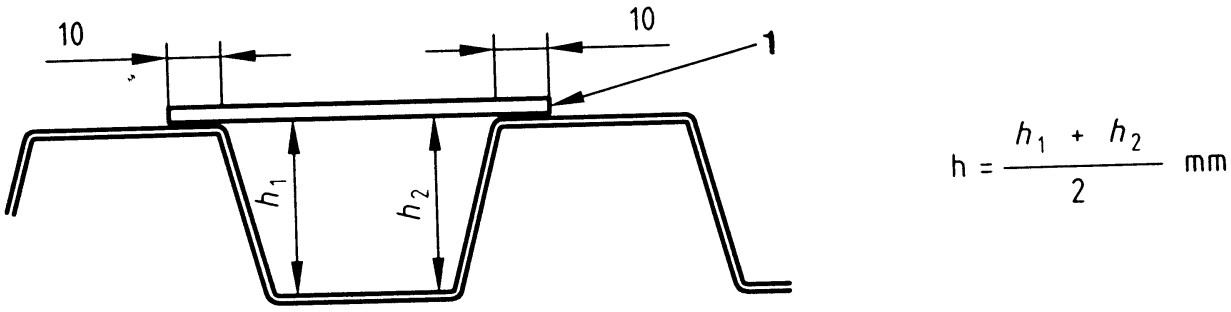
When measurements are taken the profiled sheet should be placed on at least three equally spaced supports which are on a rigid flat surface.

Measurements of distances shall be taken with an instrument capable of taking measurements to an accuracy of at least 0,1 mm for linear measurements up to and including 10 mm, an accuracy of at least 0,5 mm greater than 10 mm and up to and including 1 000 mm and an accuracy of at least 1,0 mm when measuring distances exceeding 1 000 mm. When measuring radii, the instrument shall be capable of taking measurements to an accuracy of at least 0,5 mm.

The following methods shall be used, unless another method has been demonstrated to provide results of the required accuracy.

D.4.2 Depth of profile

The depth of each valley across the sheet shall be measured by means of a template or a measuring rule at both sides of the valley as illustrated in Figure D.21. The tolerances in D.1.2 and D.3.2 apply to the average value for each valley.



Key

1 straight bar

h_1, h_2 measured profile depth

Figure D.21 — Dimensional check for depth of profile *h*

D.4.3 Depth of stiffeners

The depth of each stiffener shall be measured on a line across the sheet by means of a template or measuring rule. The tolerance in D.1.3 applies to each stiffener.

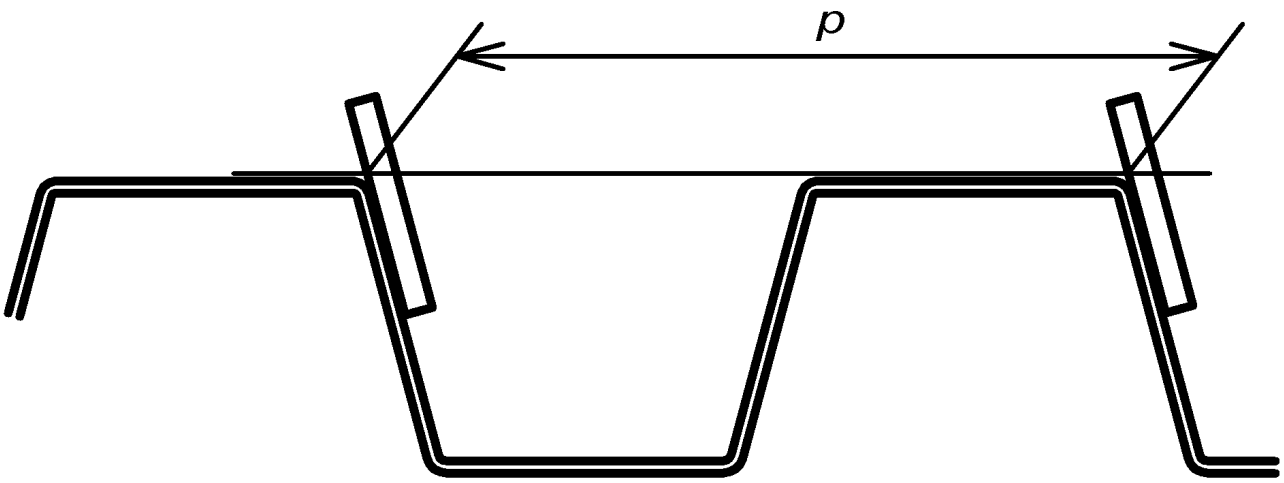
D.4.4 Pitch

The measurements shall be made by one of the following methods, of which a) most closely corresponds to the definition (see 3.4):

a) as the distance measured between two plates placed on the webs, as illustrated in Figure D.22;

b) as the deviation from a template;

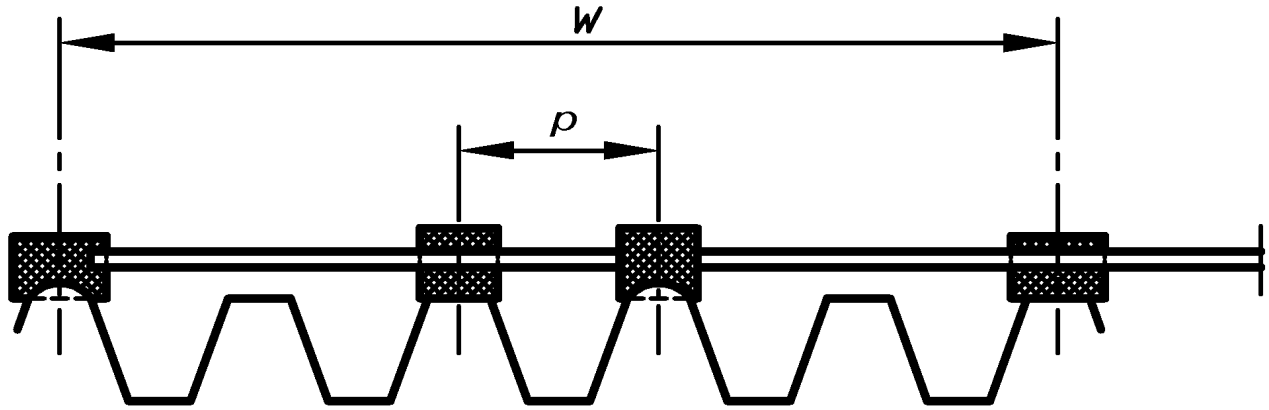
c) by means of a profile gauge as illustrated in Figure D.23.



Key

p pitch

Figure D.22 — Dimensional check for pitch



Key

p pitch

w cover width

Figure D.23 — Dimensional check for pitch *p* and cover width *w* using calibrated gauge

D.4.5 Width of crown and valley

The widths of crowns and valleys shall be measured on a line across the sheet by means of a template or as the distance between two plates placed on the appropriate webs as illustrated for a crown in Figure D.24.

The appropriate tolerance in D.1.4 or D.3.5 applies to each measurement.

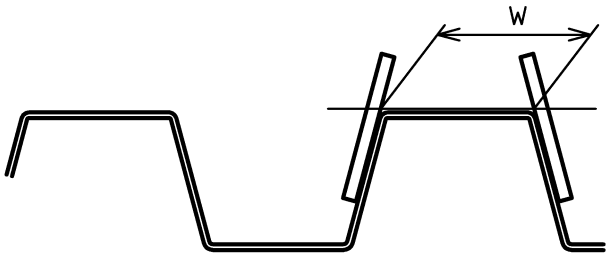


Figure D.24 — Dimensional check for width of crown

D.4.6 Cover width

The cover width of the sheet shall be measured across the sheet at three positions as the distance between two plates placed on the side webs (method analogous to D.4.4) or by means of a gauge as illustrated in Figure D.23.

D.4.7 Radius of bends

The radius of bends shall be measured on the inside of the bend. The appropriate tolerance in D.1.7 and D.3.7 applies to each bend.

D.4.8 Straightness

The straightness of a sheet shall be measured from a thin cord stretched between two points on the same edge at 200 mm from each end of the sheet. The measurement shall be made at the centre of the sheet.

D.4.9 Squareness

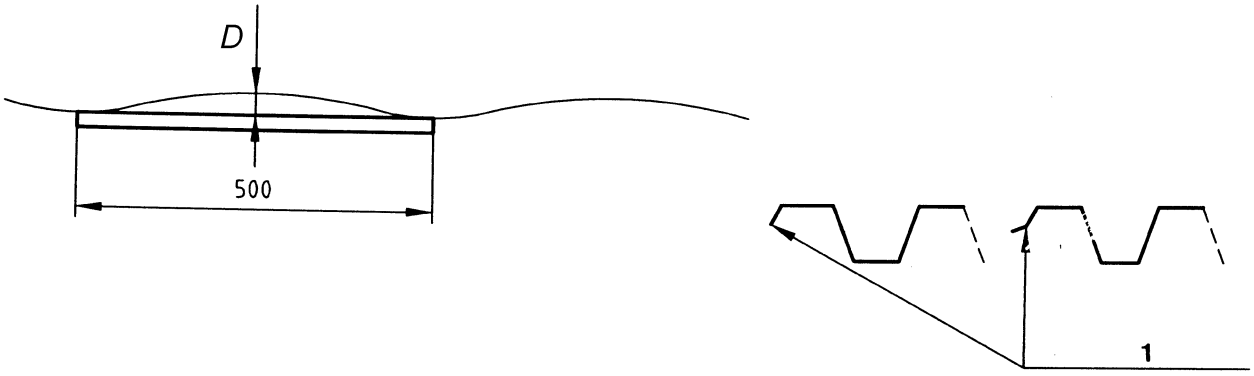
The squareness of a profiled sheet shall be determined as illustrated in Figure D.8 and Figure D.20.

D.4.10 Length

The length shall be measured along the theoretical centre axis of the sheet as illustrated in Figure D.9.

D.4.11 Side laps

The deviation (*D*) of the side lap edge shall be measured as the distance from a 500 mm straight edge as illustrated in Figure D.25.



Key

1 measuring points

D deviation of the side lap edge

Figure D.25 — Dimensional check for deviation of side lap using gauge

Bibliography

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

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

[3] EN 10204, *Metallic products - Types of inspection documents*

[4] EN ISO 9001, *Quality management systems - Requirements (ISO 9001)*

[5] NF A36-345, *Iron and steel. Aluminium coated sheet. Cut lengths and coils*

[6] ASTM A463/463M-05, *Standard Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process*

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