

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

## Part 2: Aluminium

ICS 91.060.20

# National foreword

This British Standard is the UK implementation of EN 508-2:2008. It supersedes BS EN 508-2:2000 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/542/5, Sheet roof and wall coverings.

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 self-supporting products of steel, aluminium or stainless steel sheet -  
Part 2: Aluminium

Produits de couverture en tôle métallique - Spécification  
pour les plaques de couverture en tôle d'acier, d'aluminium  
ou d'acier inoxydable - Partie 2 : Aluminium

Dachdeckungsprodukte aus Metallblech - Spezifikation für  
selbsttragende Bedachungselemente aus Stahlblech,  
Aluminiumblech oder nichtrostendem Stahlblech - Teil 2:  
Aluminium

This European Standard was approved by CEN on 30 May 2008.

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## **Foreword**

This document (EN 508-2:2008) has been prepared by Technical Committee CEN/TC 128 “Roof covering 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of an identical text or by endorsement, at the latest by January 2009, and conflicting national standards shall be withdrawn at the latest by January 2009.

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 508-2:2000.

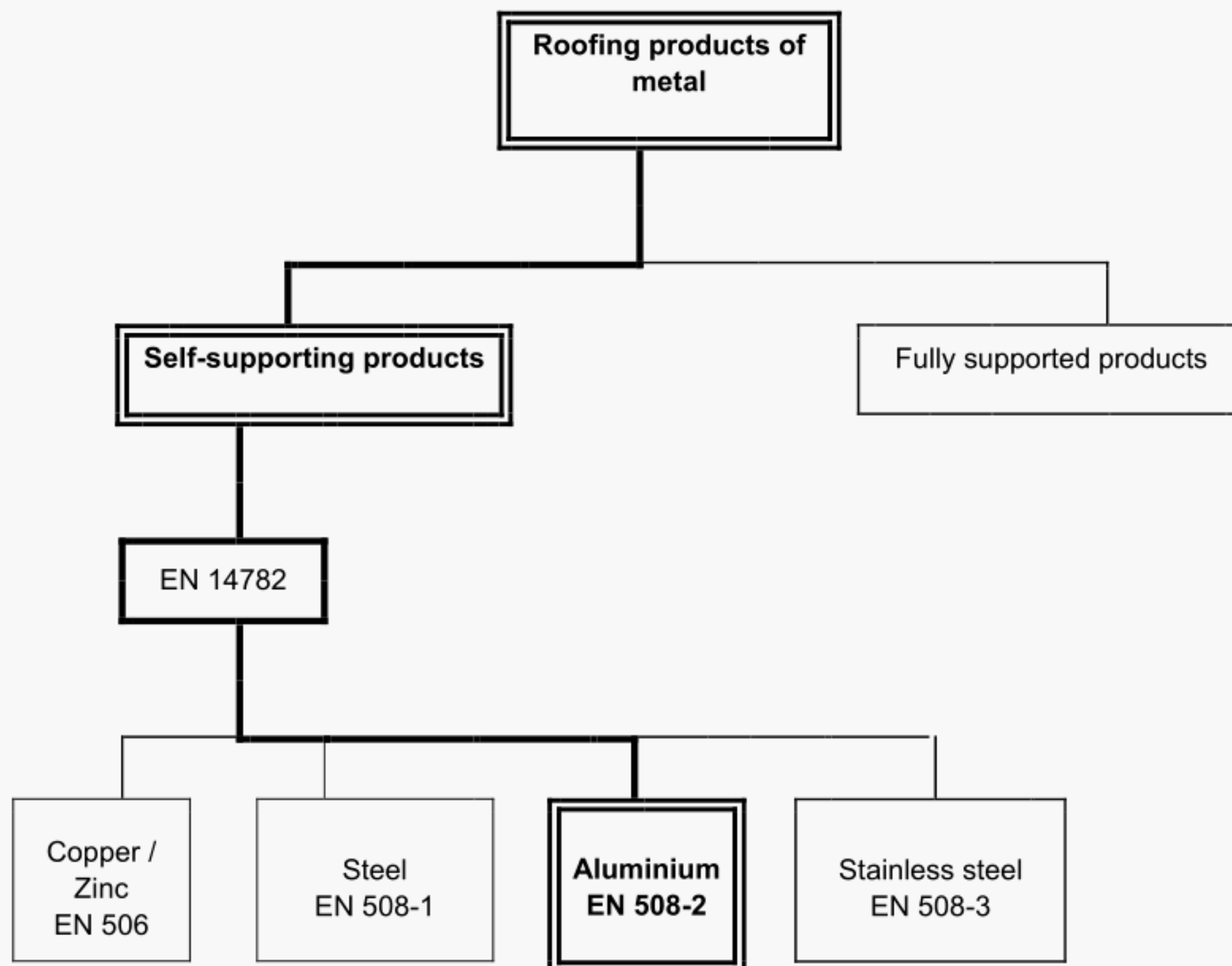
EN 508 *Roofing products from metal sheet - Specification for self-supporting products of steel, aluminium or stainless steel sheet* consists of the following parts:

- *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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

## 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 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 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 products for discontinuous laying made from aluminium sheet with or without additional organic coatings.

The 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 before they are despatched from the factory. It specifies the requirements for products which enable them to meet all normal service conditions.

The standard applies to all discontinuously laid self-supporting external profiled sheets for roofing. These profiled roof 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.

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

## **2 Normative references**

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

EN 485-4, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 4: Tolerances on shape and dimensions for cold-rolled products.*

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

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

For the purposes of this document, the following terms and definitions 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), and transmit these loadings to spaced structural supports

### **3.2 Material definitions**

#### **3.2.1**

##### **aluminium**

unalloyed aluminium or aluminium

#### **3.2.2**

##### **unalloyed aluminium**

metal with a minimum content of 99,0% by mass of aluminium and with content by mass of any other element within the following limits :

— a total content of iron and silicon not greater than 1,0% ;



- a content of any other element not greater than 0,10% except for copper which can have a content of up to 0,20% provided that neither the chromium nor the manganese content exceeds 0,05%.

### 3.2.3

#### **aluminium alloy**

alloy in which aluminium predominates by mass overreach of the other elements and which is not covered by the definition of unalloyed aluminium

### 3.2.4

#### **temper**

material conditions after a production stage, for example mechanical treatment and/or heat treatment, intended to give the material physical and/or metallurgical properties

### 3.2.5

#### **organic coated aluminium sheet**

painted, post coated, laminated or coil coated (continuously organic coated) aluminium on one or on both sides

## 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, web and valley may be stiffened

NOTE See Figures 2, 3, 4 and 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 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 See Figures 7 and 8.

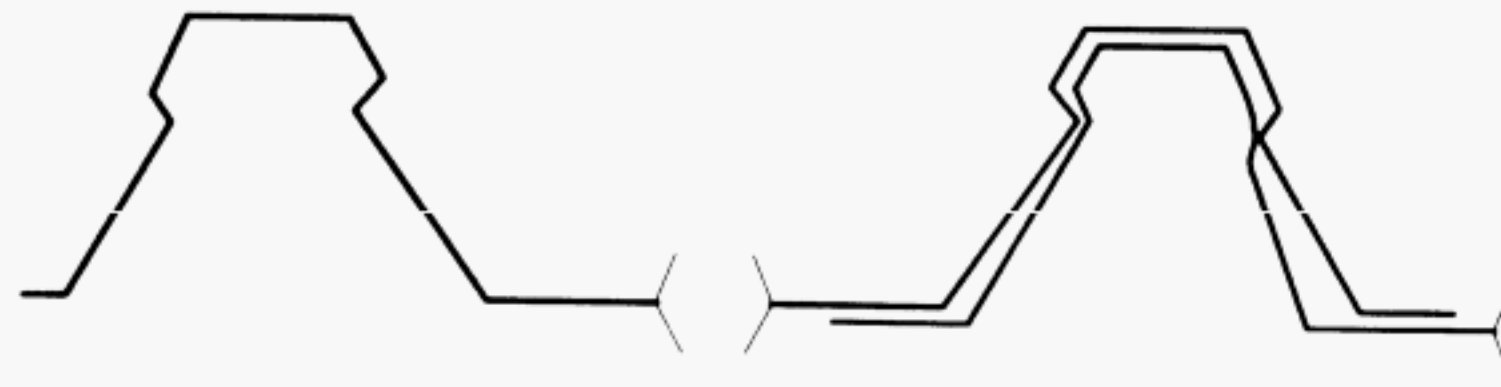
NOTE 2 The profile shape is designed to allow the formation of side laps on site.

NOTE 3 As these types of roof covering products are used in proprietary roofing systems, no structural requirements are given within this standard.

NOTE 4 These products are normally designed by testing.



Figure 7 — Typical standing seam profile



**Figure 8 — Typical concealed fix profile**

### 3.3.4 tile profiles

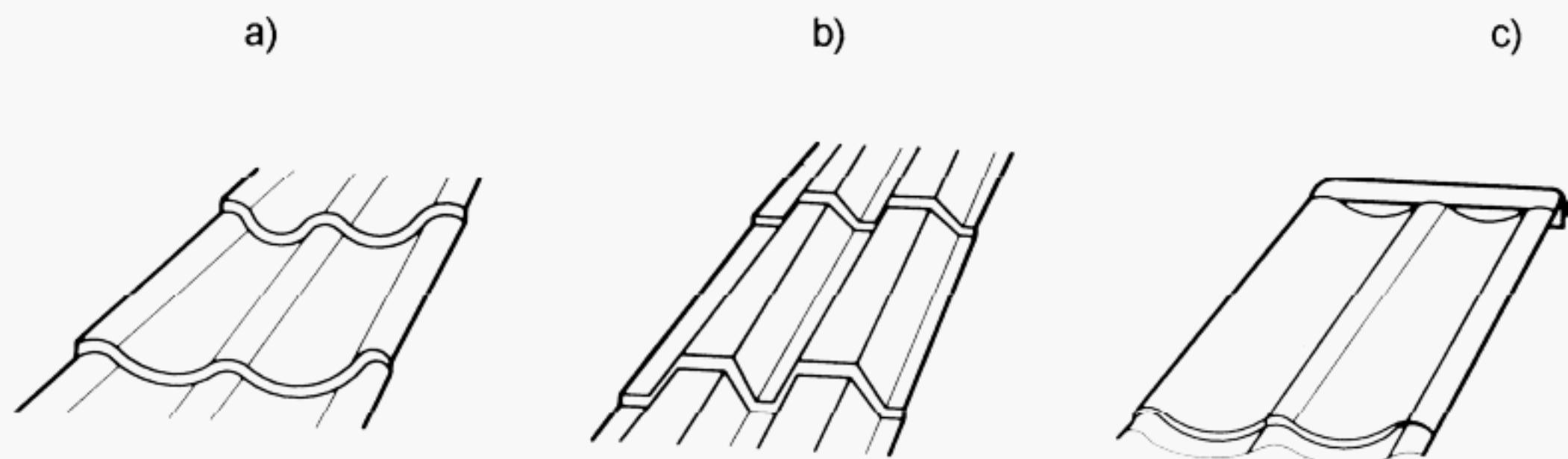
parts of typical tile profiled sheets that can allow the sheet to be side and/or end lapped

NOTE 1 See figures 9a, 9b and 9c.

NOTE 2 The tile profiles may include transverse steps.

NOTE 3 As these types of roof covering products are used in proprietary systems no structural requirements are given within this part of EN 508.

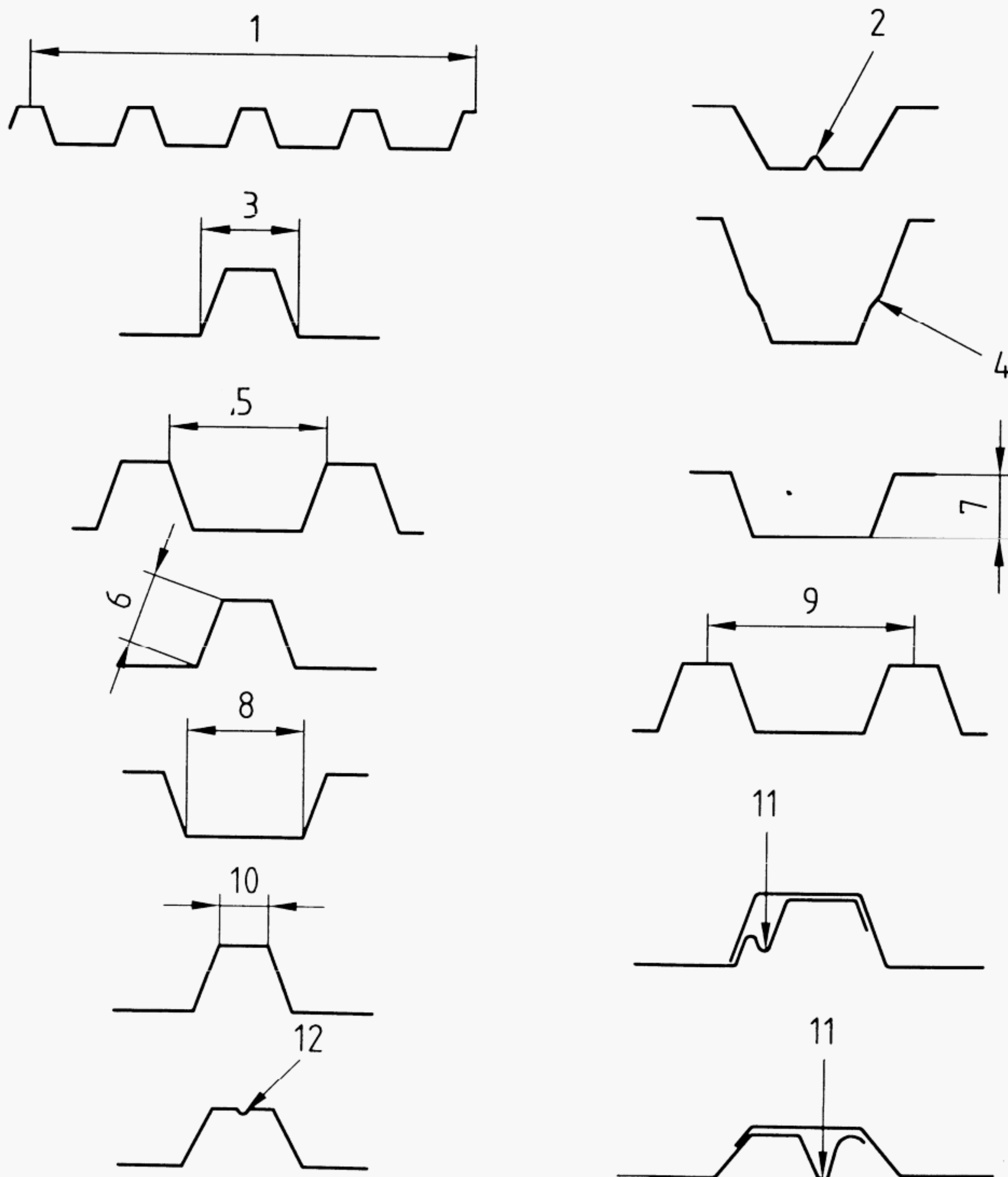
NOTE 4 These products are normally designed by testing.



**Figure 9 — Typical tile profiles**

## 3.4 Product geometry

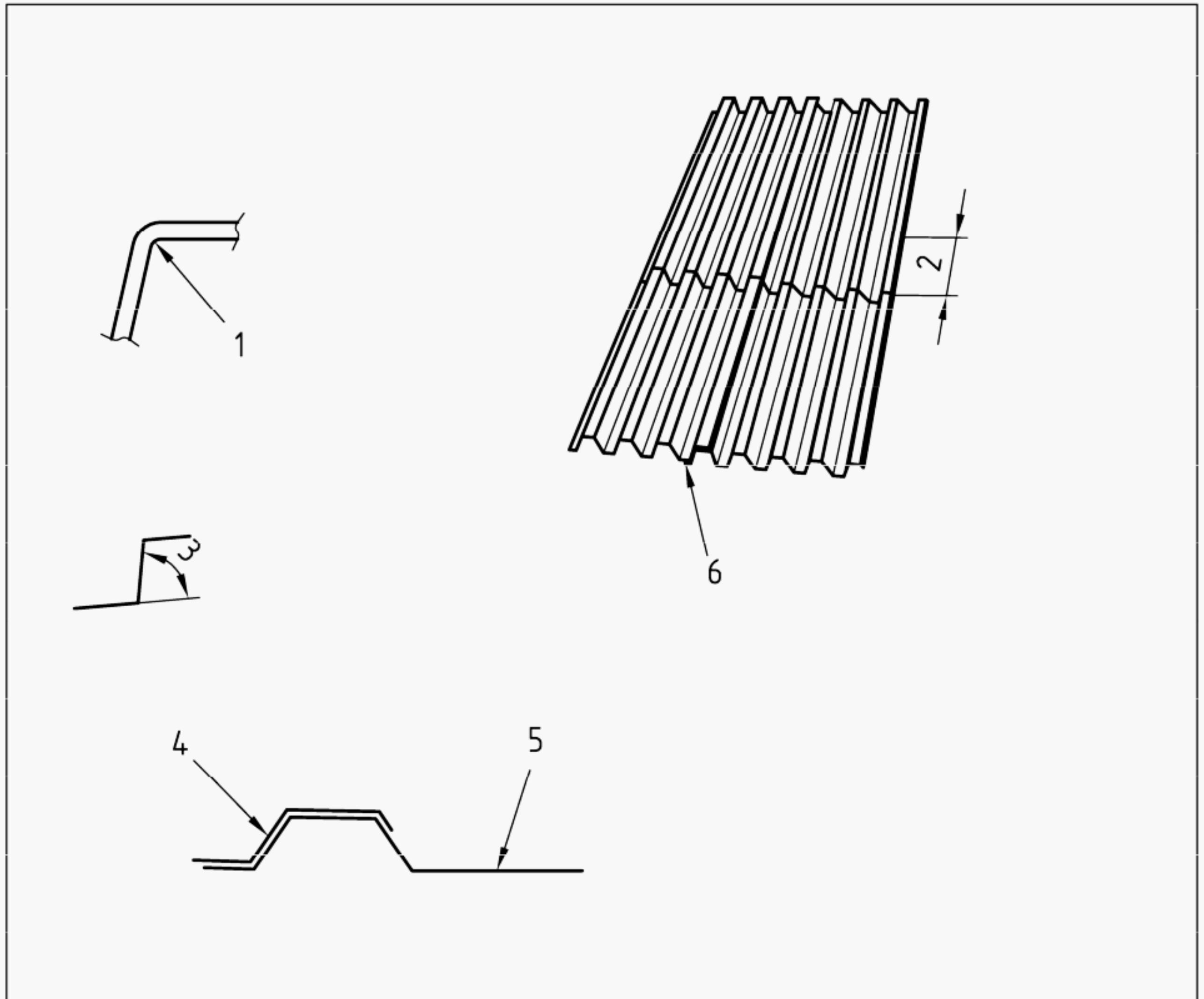
NOTE The names for various parts of typical trapezoidal profiled sheets are given in Figures 10a and 10b, with additional definitions for sinusoidal profiles in Figure 11 and tile profiles in Figure 12.



# 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



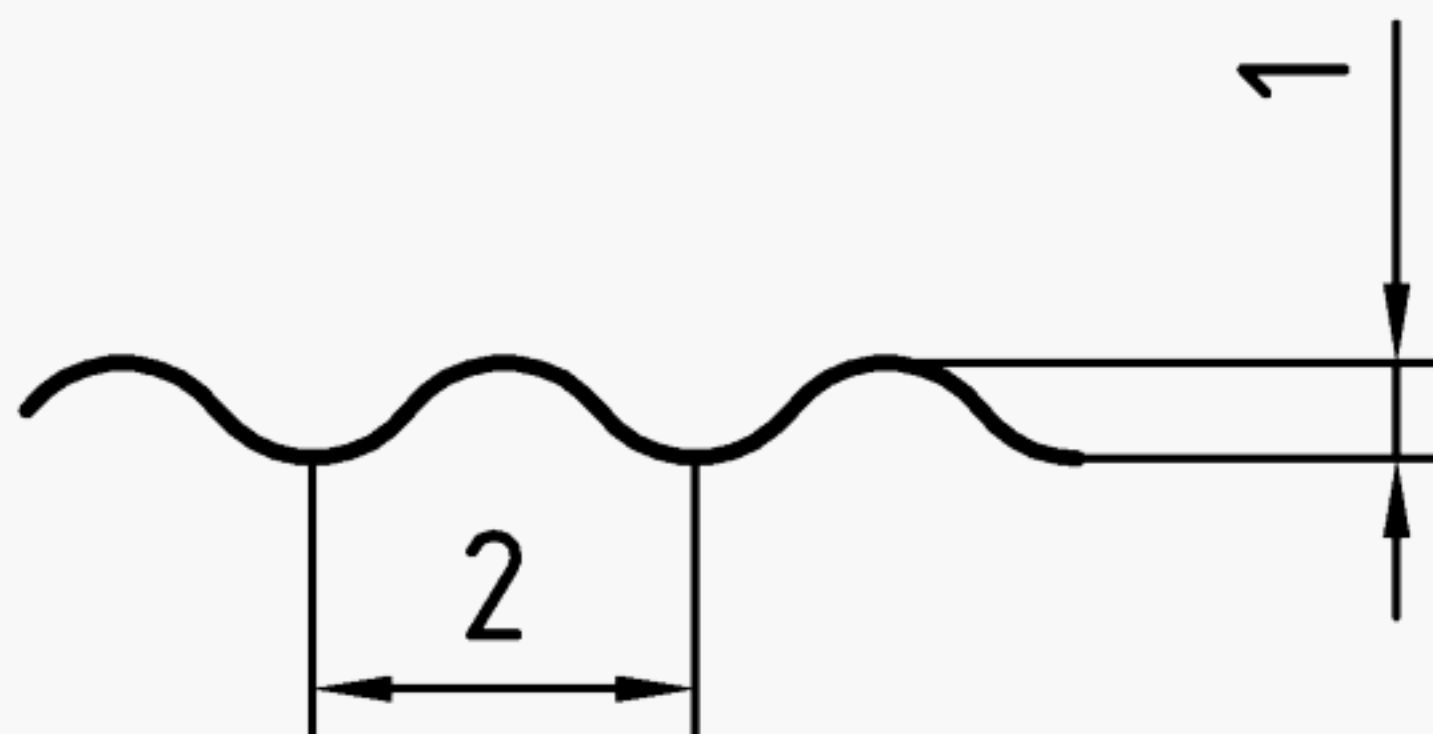
# Key

- 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

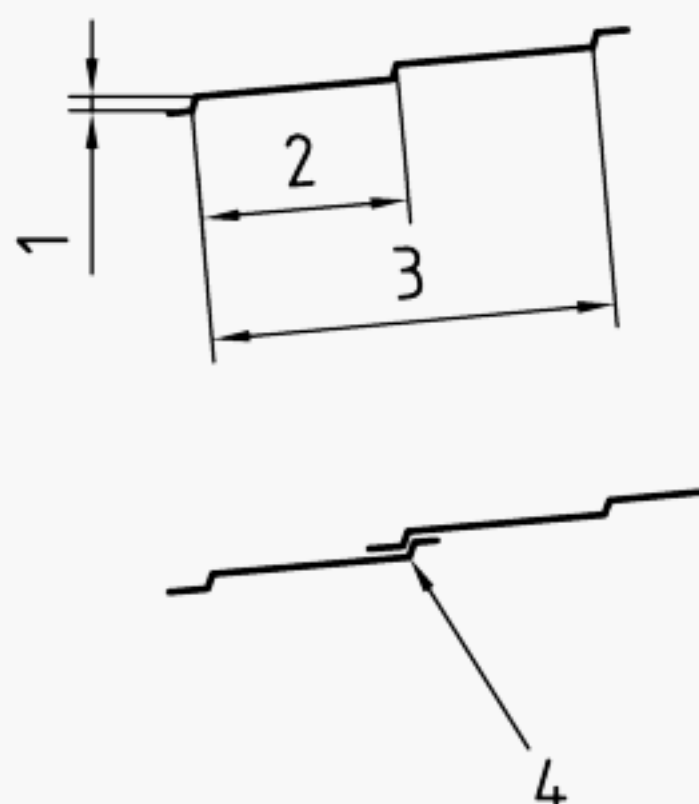




#### Key

- 1 Depth
- 2 Pitch

Figure 10 — 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 11 — Definitions of the parts of typical tile

### 3.5 Symbols and abbreviations

AA	The symbols for aluminium sheets are the alloy symbols as in 4.2.1
H	Aluminium temper symbol
AY	Acrylic paint coating
SP	Polyester paint coating
SP-SI	Silicone-modified polyester paint coating

PVDF	Polyvinylidene fluoride paint coating
PVF(F)	Polyvinyl fluoride film coating
SP-PA	Polyamid-modified polyester paint coating
PUR	Polyurethane paint coating
PUR-PA	Polyamide-modified polyurethane paint coating
AK	Alkyd paint coating
EP	Epoxy paint coating for use within a building

## **4 Requirements**

### **4.1 General**

The product shall be manufactured from materials complying with clause 4.2.

NOTE 1 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 2 The symbols and abbreviations to be used to designate the aluminium alloy, the type and thickness of the organic 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<sup>1)</sup>.

### **4.2 Materials**

#### **4.2.1 Aluminium**

Aluminium alloys given in Table 1 are suitable provided that their properties conform to the values given in the relevant material standards (e.g. EN 485-2, EN 573-3).

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<sup>1)</sup>E.g. quality management system based on EN ISO 9001.

**Table 1 — Alloys of aluminium**

Numerical designation	Designation based on chemical symbol
EN AW-3003	EN AW-Al Mn1Cu
EN AW-3004	EN AW-Al Mn1Mg1
EN AW-3005	EN AW-Al Mn1Mg0,5
EN AW-3103	EN AW-Al Mn1
EN AW-3105	EN AW-Al Mn0,5Mg0,5
EN AW-4015	EN AW-Al Si2Mn
EN AW-4016	EN AW-Al Si2MnZn
EN AW-4017	EN AW-Al Si1MnCu
EN AW-5005	EN AW-Al Mg1(B)
EN AW-5052	EN AW-Al Mg2,5
EN AW-5251	EN AW-Al Mg2
EN AW-5754	EN AW-Al Mg3
EN AW-8011 A	EN AW-Al Fe Si (A) <sup>a</sup>
<sup>a</sup> Only with organic coatings on both surfaces.	

Temper shall be chosen so that the ultimate tensile strength is not lower than 150 MPa.

NOTE Alloy and temper are chosen to give corrosion resistance, strength and formability. Specification of alloy, temper and coating finish should be agreed between purchaser and supplier at the time of ordering.

Tolerances on shape and dimensions shall be in accordance with EN 485-4.

#### 4.2.2 Organic coatings

The main external weather resistant organic coatings suitable for application to aluminium substrates are given in Table 2.

**Table 2 — Factory applied organic coatings**

Type of coating		Designation	Remarks
Factory applied coatings	Acrylic	AY	With proper primers
	Polyester	SP	
	Silicone-modified polyester	SP-SI	
	Polyvinylidene fluoride	PVDF	
	Polyamide-modified polyurethane	PUR-PA	
	Polyurethane	PUR	
	Polyamide-modified polyester	SP-PA	
	Alkyd	AK	
	Epoxy	EP	Only within buildings
Factory applied laminated film	Polyvinyl fluoride	PVF(F)	

NOTE 1 Aluminium sheet is used either without coating or with organic coatings mainly for aesthetic reasons.

NOTE 2 It should be noted that different coating systems behave in different ways under various climatic conditions. The primer and/or adhesive should be chosen taking into account which type of substrate, pretreatment and top coat are used.

Reverse side painting or coating is used if being required for handling and storage reasons as well as for corrosion protection in some installation conditions.

Performance and test methods for coil coated aluminium shall be in accordance with EN 1396.

NOTE 3 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 shall resist the design loads from snow, wind and maintenance. These loads shall be factored such that they will not impair the performance of the roof.

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

### **4.3.2 Calculation and tests 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 where the product is to be used.

NOTE 1 For calculation and testing either national regulations or EN 1999-1-4 may be used.

NOTE 2 Calculation and test methods referred to in this EN 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 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 10 mm from the edges in accordance with EN 485-4.

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

- class 1: full minus nominal normal tolerance according to EN 485-4;
- class 2: 1/2 minus nominal normal tolerance according to EN 485-4;
- class 3: zero minus tolerance.

NOTE 1 For products of class 3, mechanical resistance is calculated using the minimum thickness of the aluminium 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 sheet**

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

#### **4.3.5 Safety in case of fire**

Until the withdrawal of national technical specifications, products coated with organic coatings shall comply with these specifications.

NOTE 1 The withdrawal of national technical specifications will occur in the European Union at the end of the transitional period of EN 14782.

NOTE 2 Aluminium is non-combustible. It will not burn and will not support combustion. Its melting point is approximately 630 °C, so it will melt in an intense fire. It is essential that the effect of a fire is evaluated after studying the whole structure.

### **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 Surface properties**

Test methods for surface properties are given in EN 1396.

#### **5.3 Structural properties**

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

The performance of the product under concentrated load shall be quoted by the manufacturer with reference to the method used to determine the results.

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.

Methods for testing the strength under concentrated load are not yet available on a European level. Information on national standards is given in Annex C. Rules for installation are given in some national codes.

### **6 Designation**

Products covered by this part of EN 508 shall be designated as follows:

- 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;
- length of step (only for tiles).



EXAMPLE      Profile 45, thickness 0,7 mm, class 1;  
  
length 4200 mm; EN AW-3103, H18  
  
Side 1: PVDF 25 µm colour RAL 24  
  
Side 2: AY 25 µm colour RAL 10  
  
EN 508-2

## **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;
- product designation (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.

NOTE 1      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 package 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 2      Moisture, in particular condensation inside packages, can lead to the formation of stains (e.g. black marks), and if there is prolonged contact with moisture, can cause aesthetic change.

During transportation, dark spots can appear on light surfaces as a result of friction in contact with uncoated aluminium when packing allows movement between neighbouring surfaces.

NOTE 3      If severe service conditions are expected during transportation, storage or processing, the product can 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 (normative)

### Dimensional tolerances

#### A.1 Tolerances for trapezoidal sheets

##### A.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 on one building.

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

The following values are defined with tolerances:

- A.1.2 Depth of profile ( $h$ )
- A.1.3 Depth of stiffeners
- A.1.4 Pitch
- A.1.5 Width of crown and valley ( $b_1, b_2$ )
- A.1.6 Cover width ( $w$ )
- A.1.7 Radius of bends ( $r$ )
- A.1.8 Deviation from straightness ( $\delta$ )
- A.1.9 Deviation from squareness ( $s$ )
- A.1.10 Length ( $l$ )
- A.1.11 Deviation of side lap ( $D$ )
- A.1.12 Curve radii and angles

##### A.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 A.1), at 200 mm from the sheet end.

#### Depth of profile

#### Tolerance

$h \leq 50$  mm

$\pm 1$  mm

$50 \text{ mm} < h \leq 100$  mm

$\pm 1,5$  mm

$h > 100$  mm

$\pm 2$  mm

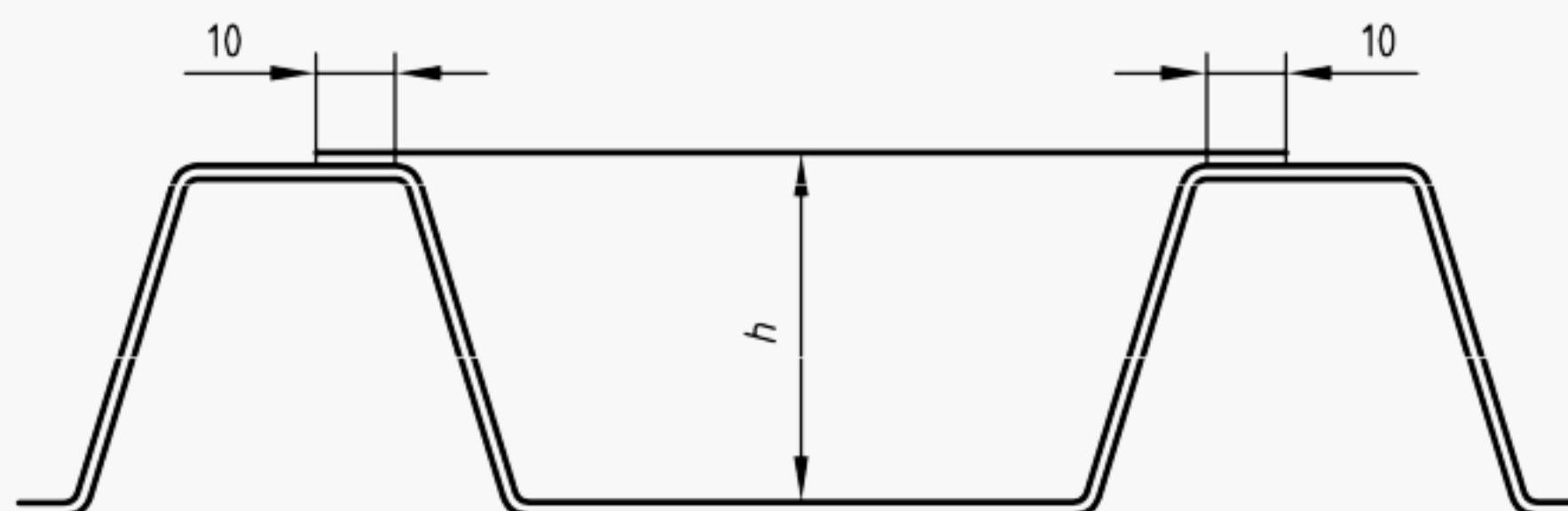


Figure A.1 — Depth of profile

#### A.1.3 Depth of stiffeners

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

Tolerances:  $\pm 1$  mm

#### A.1.4 Pitch

The pitch of the profile (see Figure A.2) shall be the distance between the centre of adjacent ribs, measured at 200 mm from sheet ends.

#### Depth of profile

#### Tolerance

$h \leq 50$  mm

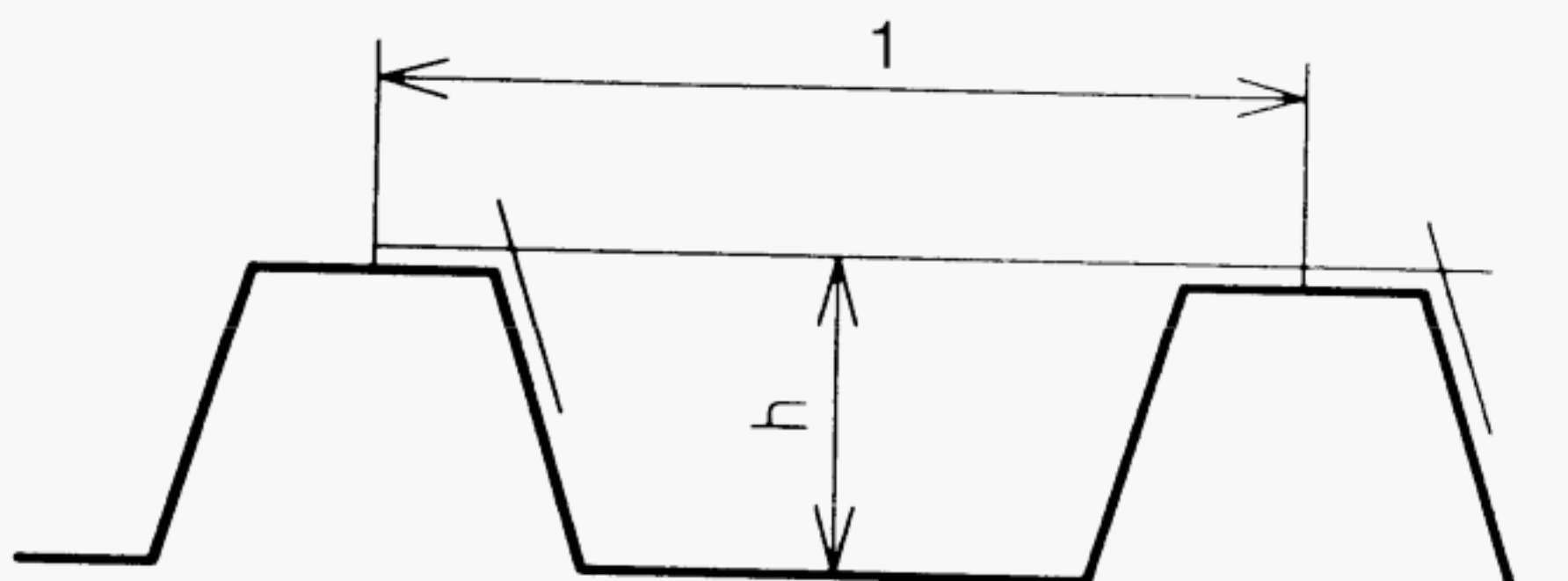
$\pm 2$  mm

$50 \text{ mm} < h \leq 100$  mm

$\pm 3$  mm

$h > 100$  mm

$\pm 4$  mm



#### Key

1 Pitch

Figure A.2 — Pitch

### A.1.5 Widths of crown and valley

The widths of a crown ( $b_1$ ) and valley ( $b_2$ ) (see Figure A.3) shall be measured at 200 mm from the sheet ends.

Tolerances:  $\begin{smallmatrix} +2 \\ -1 \end{smallmatrix}$  mm

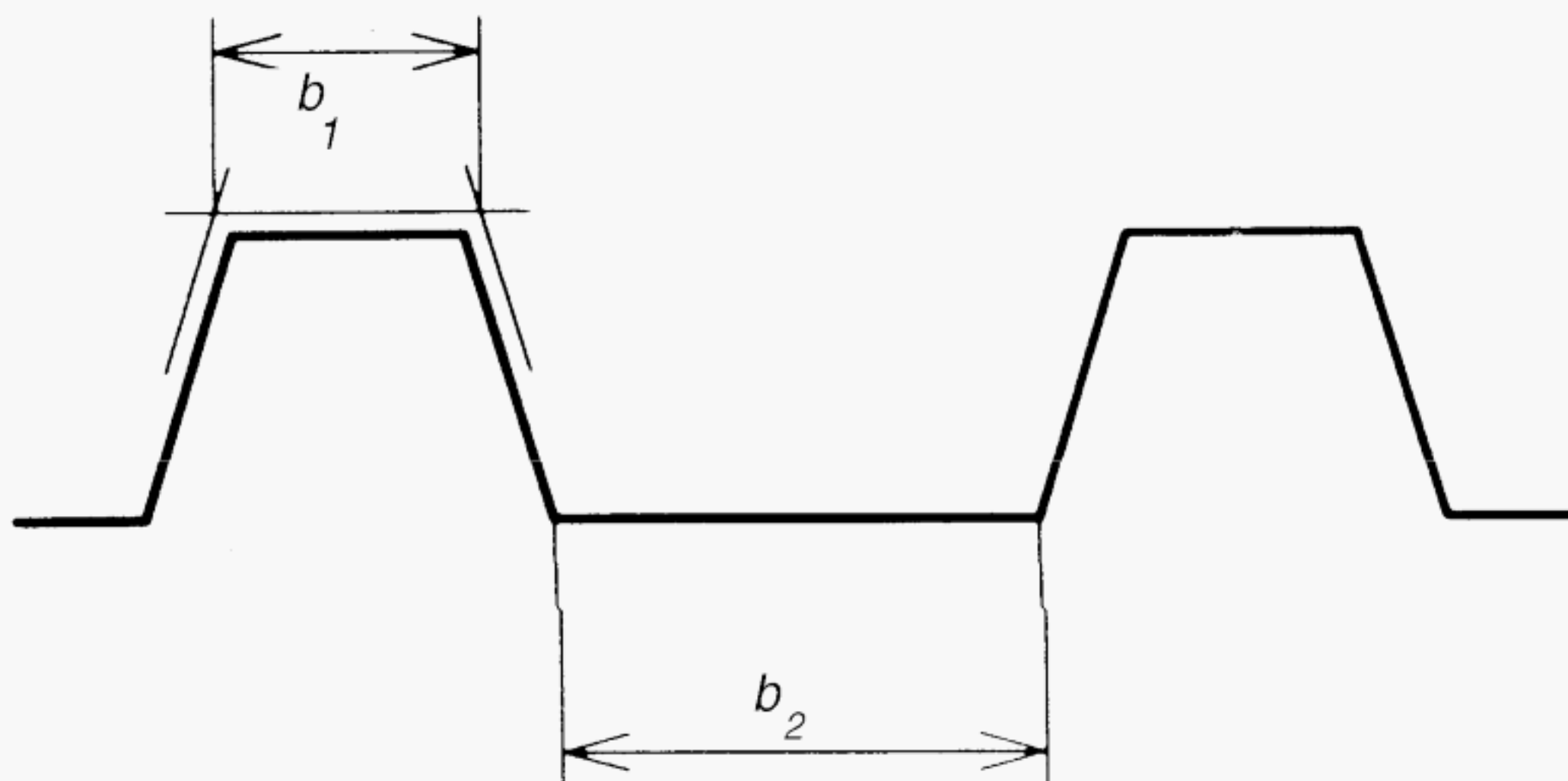


Figure A.3 — Widths of crown and valley

### A.1.6 Cover width

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

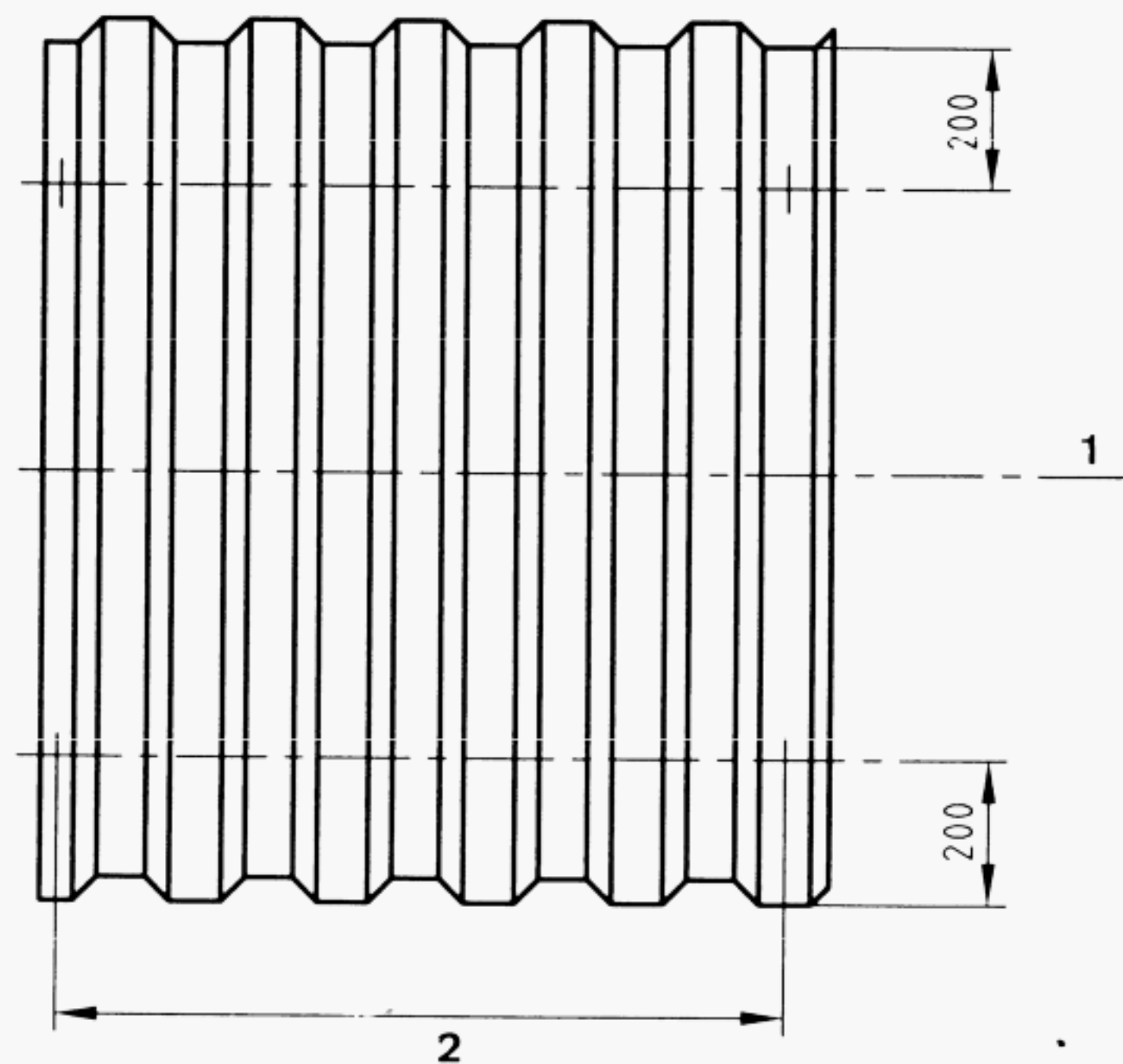
Measurements of cover width  $w_1$  and  $w_2$  shall be taken at a distance of 200 mm from the sheet ends as shown in Figure A.4. Both measurements shall be within the specified tolerance selected for the appropriate sheet profile depth ( $h$ ).

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.  $\frac{w_1 + w_2}{2}$ ).

### Depth of profile Tolerance

$h \leq 50 \text{ mm}$	$\pm 5 \text{ mm}$
$h > 50 \text{ mm}$	$\pm \frac{h}{10}$ , maximum 15 mm.

NOTE  $h$  is the nominal profile depth (see A.1.2).



### Key

- 1 Centre line of sheet
- 2 Cover width ( $w$ )

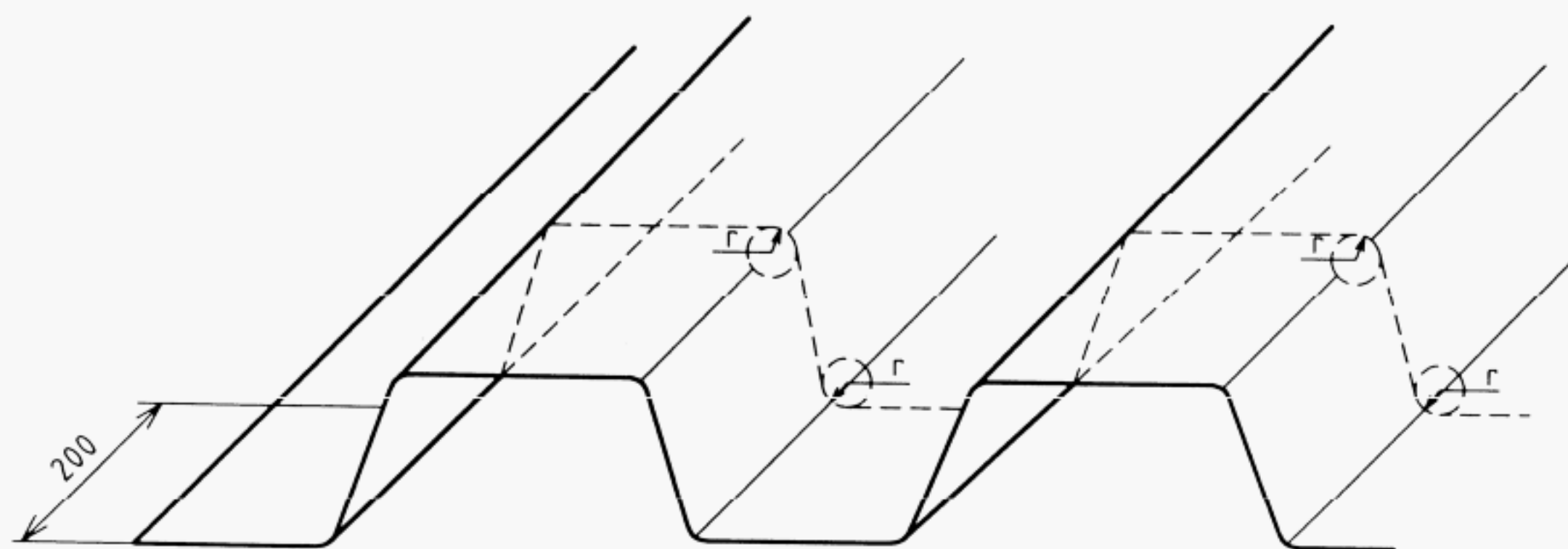
Figure A.4 — Cover width

### A.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 A.5.

Tolerances:  $+2,0$   
 $0$  mm





**Key**

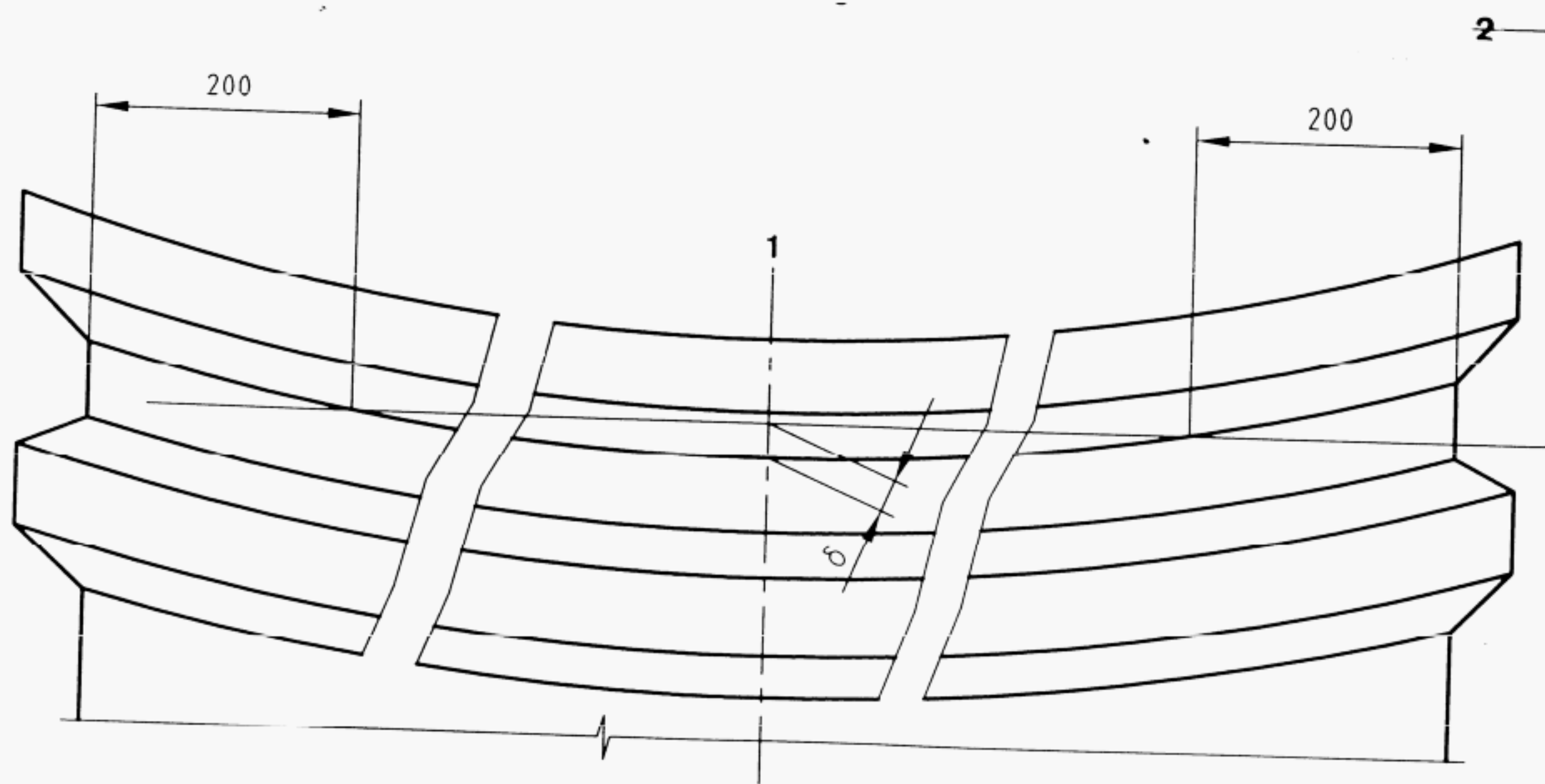
$r$  Inside radius

**Figure A.5 — Radius of bends**

**A.1.8 Deviation from straightness**

The deviation of straightness from the theoretical straight line shall be defined as the dimension  $\delta$  in Figure A.6.

Tolerance: 2,0 mm/m of sheet length, not exceeding 10 mm.



**Key**

1 Centre line of sheet

2 Straight line laid along edge of crown

$\delta$  Displacement of edge of crown from straight line

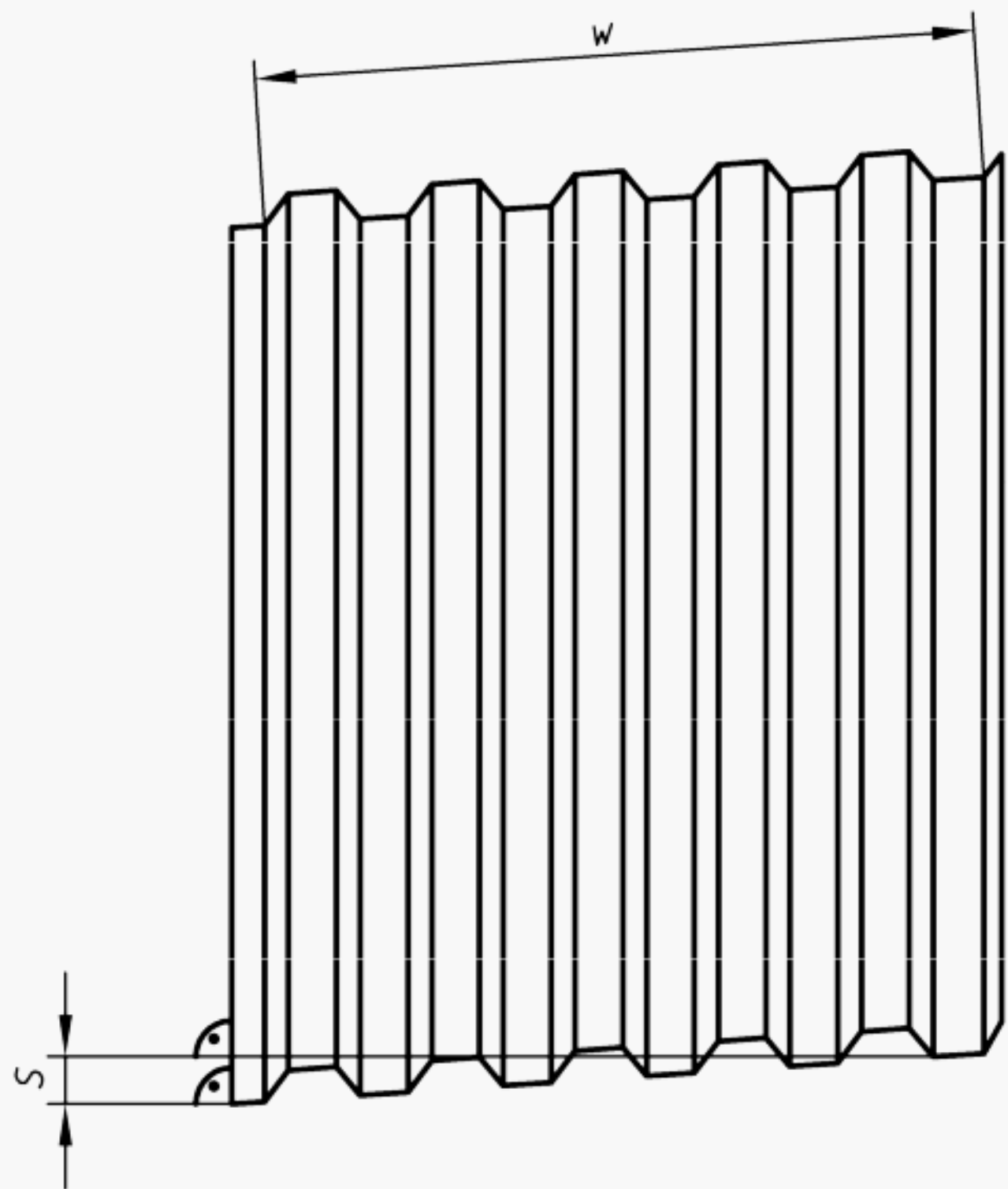
**Figure A.6 — Deviation of straightness**

**A.1.9 Deviation from squareness**

The deviation from squareness of the profiled sheet end shall be defined as the dimension *S* in Figure A.7.

Tolerance:  $S \leq 0,5\%$  of the nominal cover width (*w*).

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



**Figure A.7 — Squareness**

**A.1.10 Length**

The length (*l*) shall be measured along the centre axis of the sheet as shown in Figure A.8.

Length	Tolerance
$l \leq 3000 \text{ mm}$	+10 -5 mm
$l > 3000 \text{ mm}$	+20 -5 mm

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



**Key**

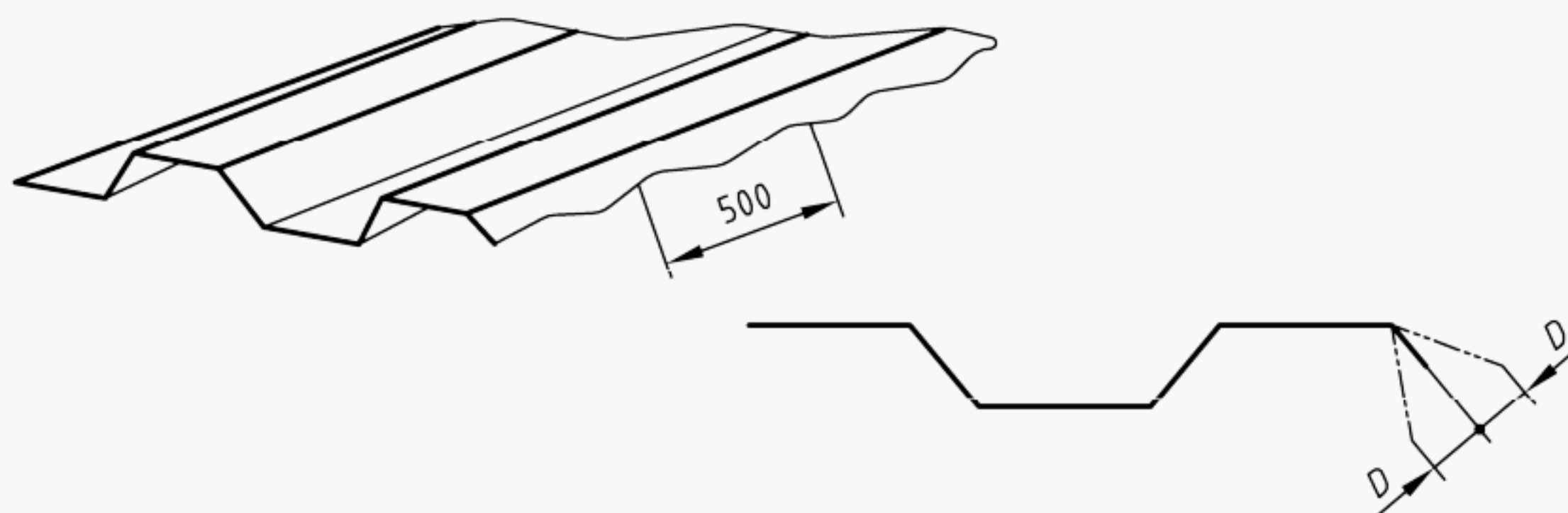
1 Centre axis of sheet (l)

**Figure A.8 — Sheet length**

**A.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 A.9.

Tolerance: Maximum deviation  $D = \pm 2$  mm on a length of 500 mm.



**Figure A.9 — Side lap deviation**

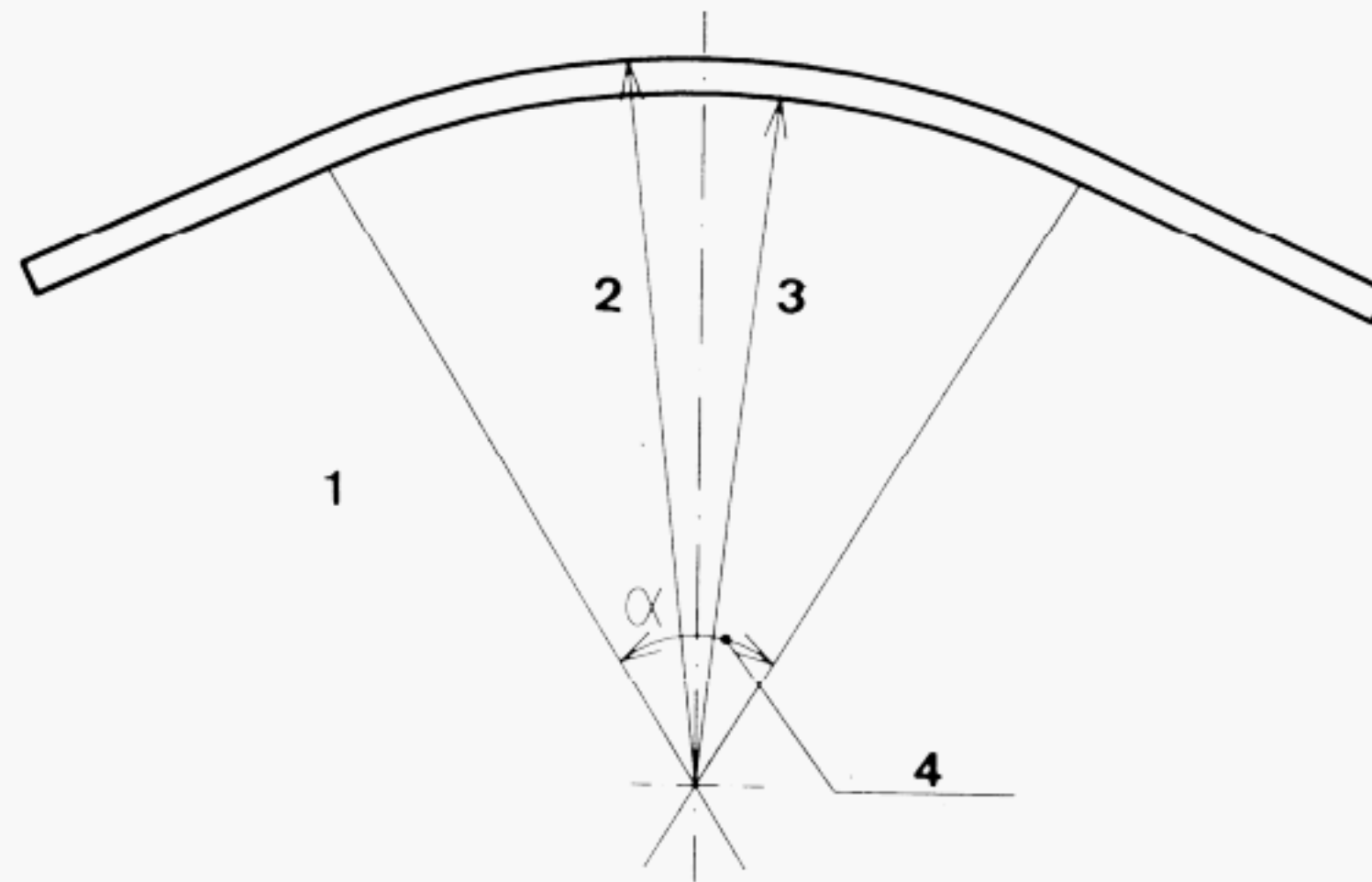
Alternatively to the preceding requirement, it may be agreed that the side lap ripple shall be such that, in the conditions of the test defined in A.4.12, the tongue of the gauge will not completely penetrate between the two sheets when overlapped, 500 mm or more away from the two ends.

**A.1.12 Curve radius and angles**

The radius and angle of curved profiled sheets shall be defined as shown in Figure A.10.

Tolerances for either the internal or the 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 A.10 — Curved sheet**

## **A.2 Tolerances for sinusoidal profiles**

No tolerances for sinusoidal profiles are given in this standard.

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

## **A.3 Tolerances on tiles**

### **A.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 Clause A.4.

The following values are defined with tolerances:

- A.3.2 Depth of tile
- A.3.3 Web angular displacement
- A.3.4 Pitch
- A.3.5 Width of crown and valley
- A.3.6 Cover width
- A.3.7 Radius of bends
- A.3.8 Deviation from straightness
- A.3.9 Deviation from squareness
- A.3.10 Length
- A.3.11 Contraction or bulging

### A.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 A.11

Tolerances:  $\pm 2$  mm

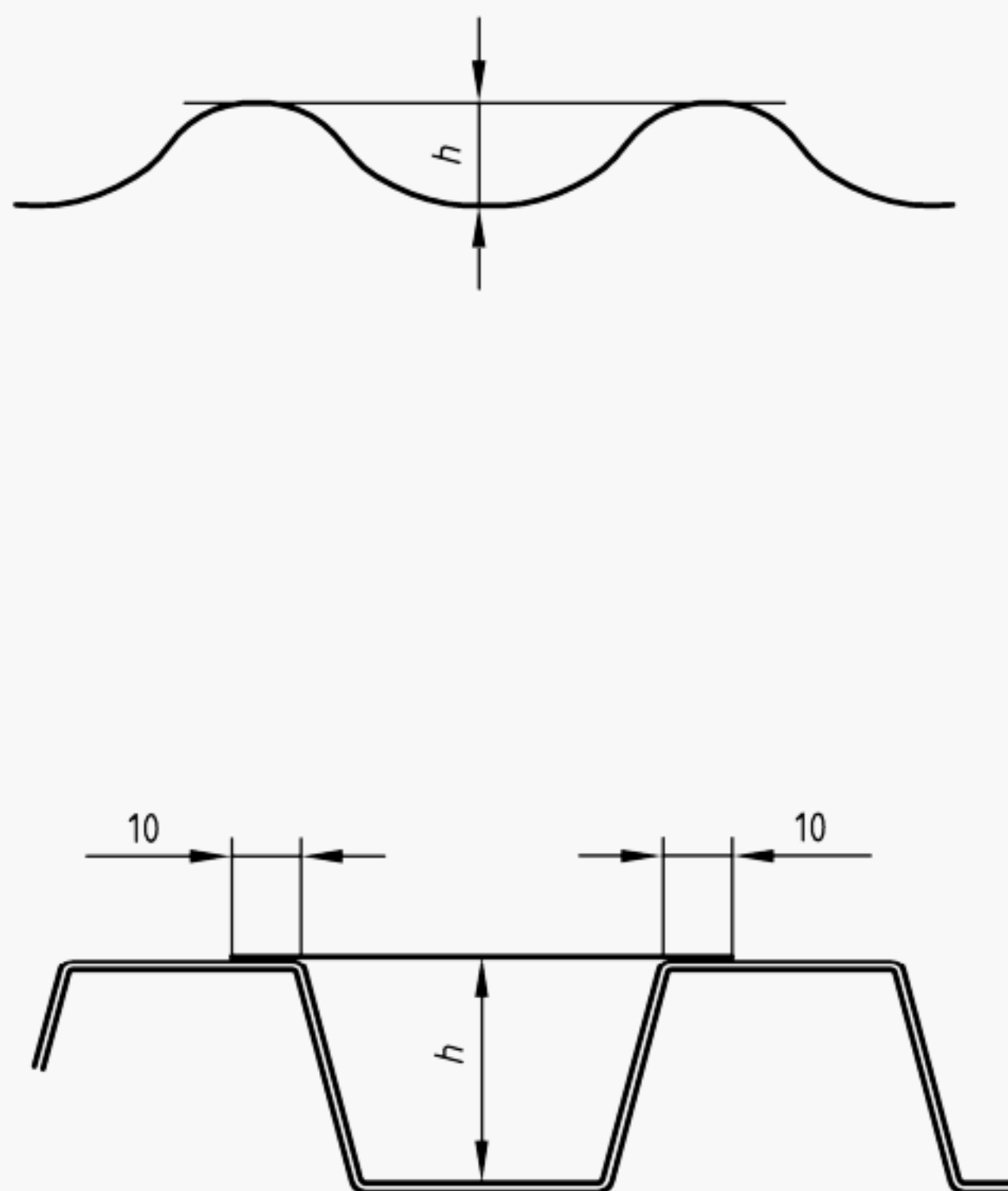


Figure A.11 — Depth of tile



### A.3.3 Web angular displacement (Figure A.12)

Tolerances:  $\pm 2^\circ$



**Key**

$\alpha$  Web angle

Figure A.12 — Web angular displacements

### A.3.4 Pitch

The pitch ( $p$ ) of the profile (see Figure A.13) 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 A.16.

**Depth of profile**

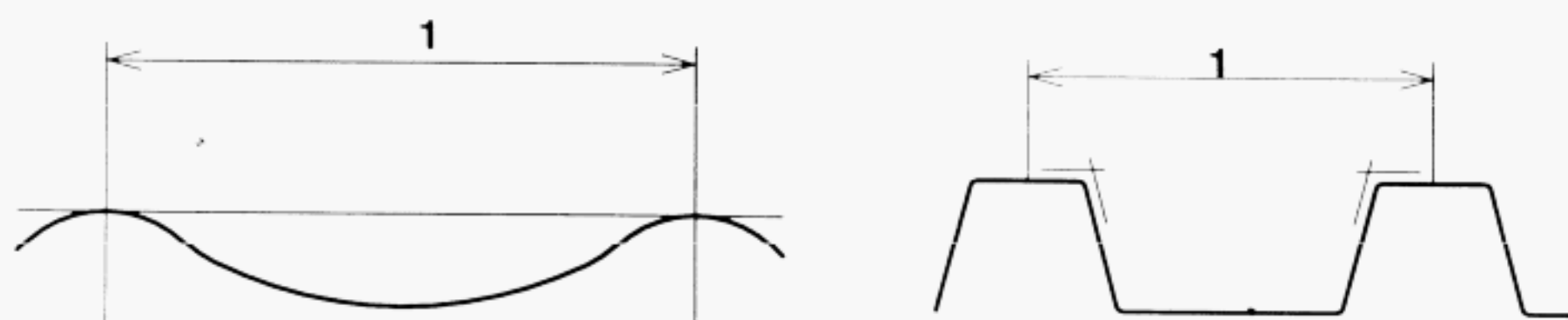
$h \leq 75$  mm

$h > 75$  mm

**Tolerance**

$\pm 1,5$  mm

$\pm 1,5$  mm or 2 % of depth



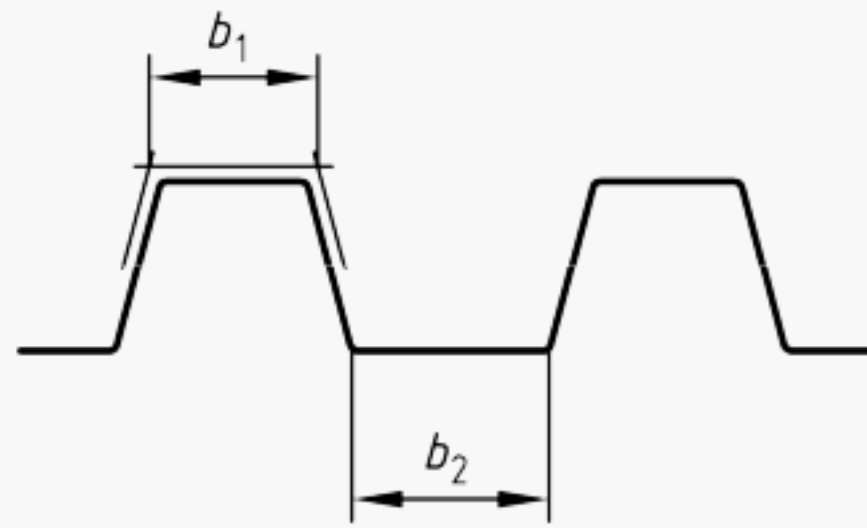
**Key**

1 Pitch

Figure A.13 — Pitch

### A.3.5 Width of crown and valley (Figure A.14)

Tolerances:  $\pm 1$  mm



**Key**

$b_1$  Width of crown

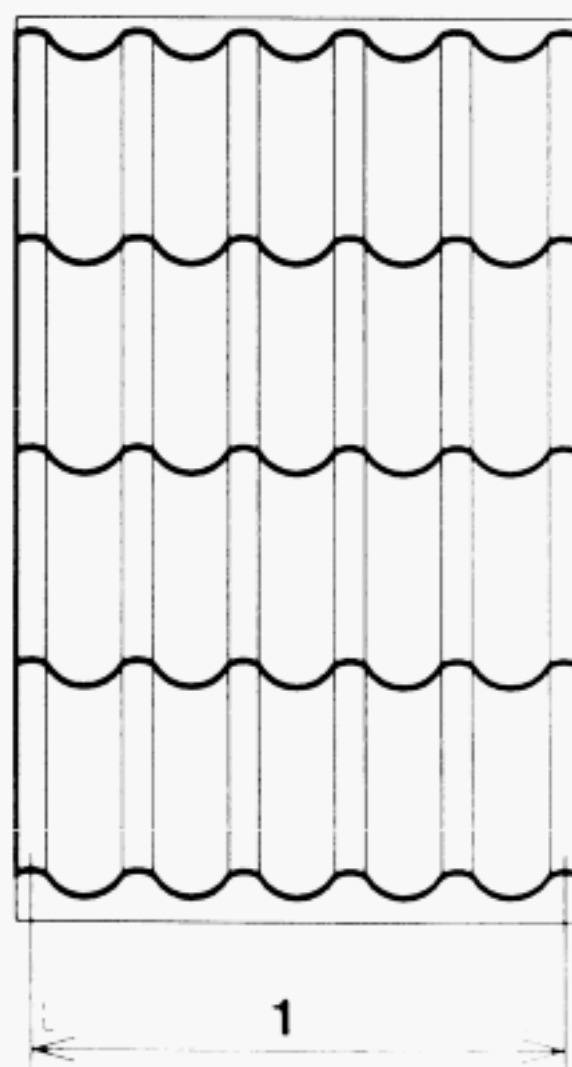
$b_2$  Width of valley

**Figure A.14 — Width of crown and valley**

### A.3.6 Cover width

The nominal cover width ( $w$ ) (see Figure A.15) shall be stated by the manufacturer.

Tolerances:  $\pm 0,5$  % of the nominal cover width.



**Key**

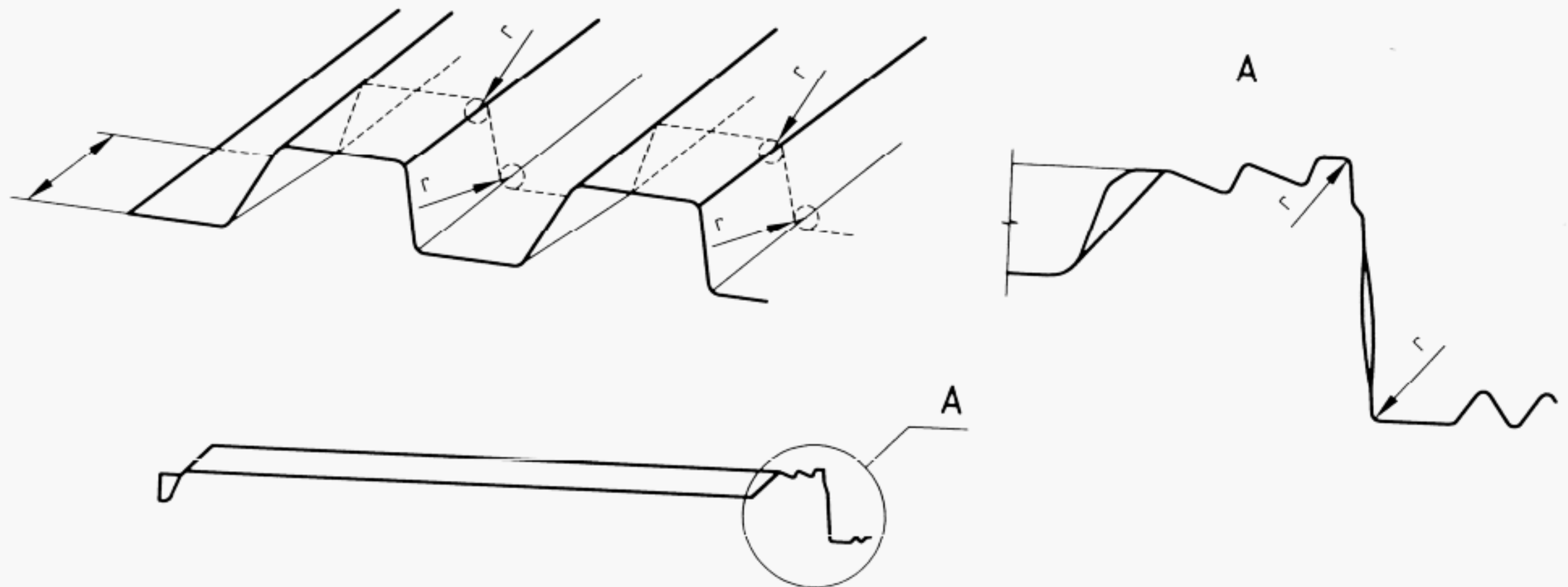
1 Cover width

**Figure A.15 — Cover width**

### A.3.7 Radius of bends

The measurement shall be carried out on the inside radii ( $r$ ) as shown in Figure A.16.

Tolerances:  $\pm 1,5$  mm



**Key**

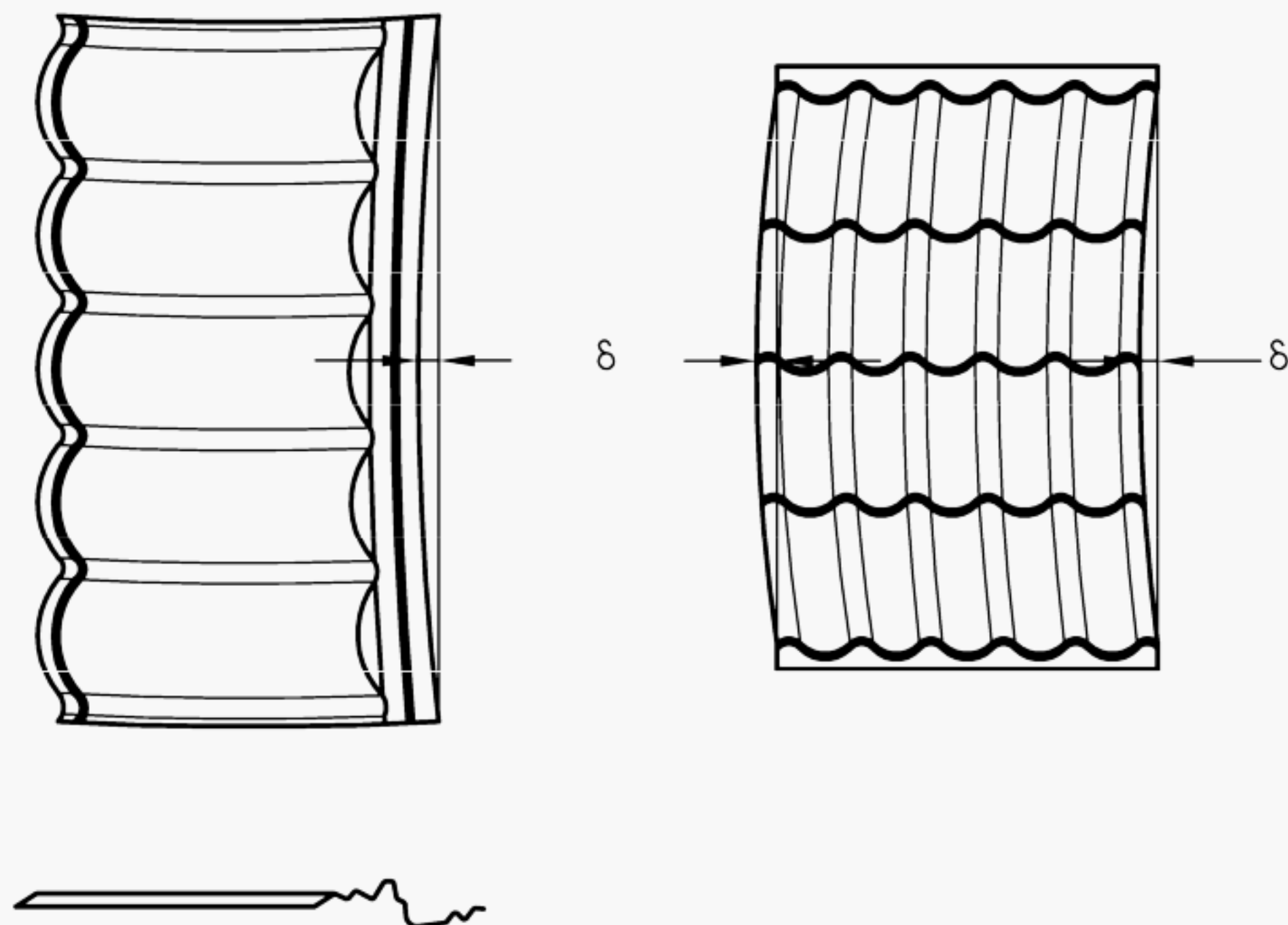
$r$  Inside radius

**Figure A.16 Radius of bends**

**A.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  $\delta$  in Figure A.17.

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



**Figure A.17 Deviation of straightness**

**A.3.9 Deviation from squareness**

The deviation from squareness of the tile sheet end shall be defined as dimension ( $S$ ) in Figure A.18.

Tolerances:  $\pm 6$  mm

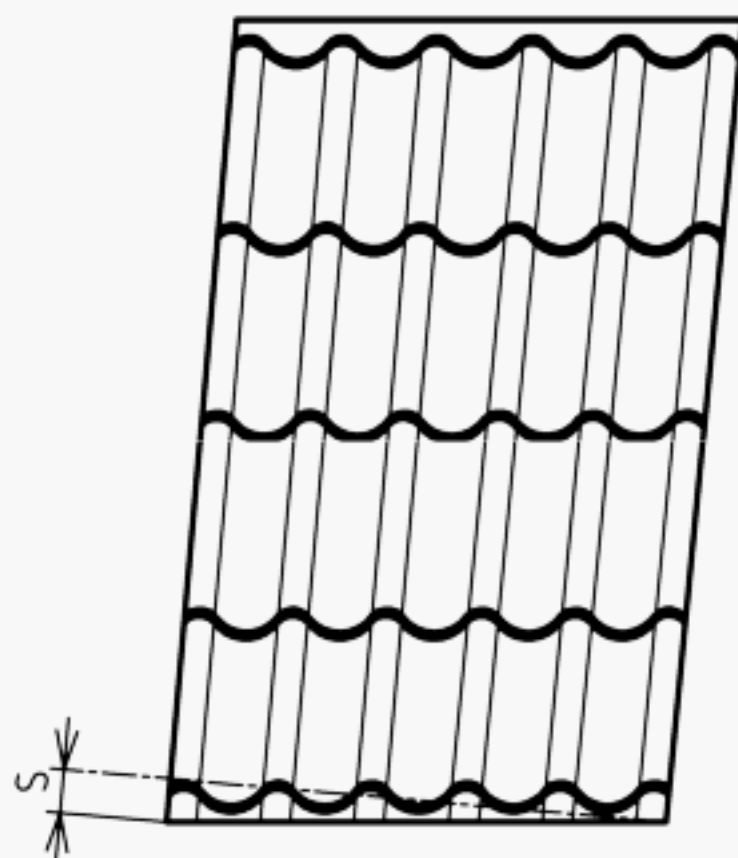


Figure A.18 Deviation from squareness

### A.3.10 Length

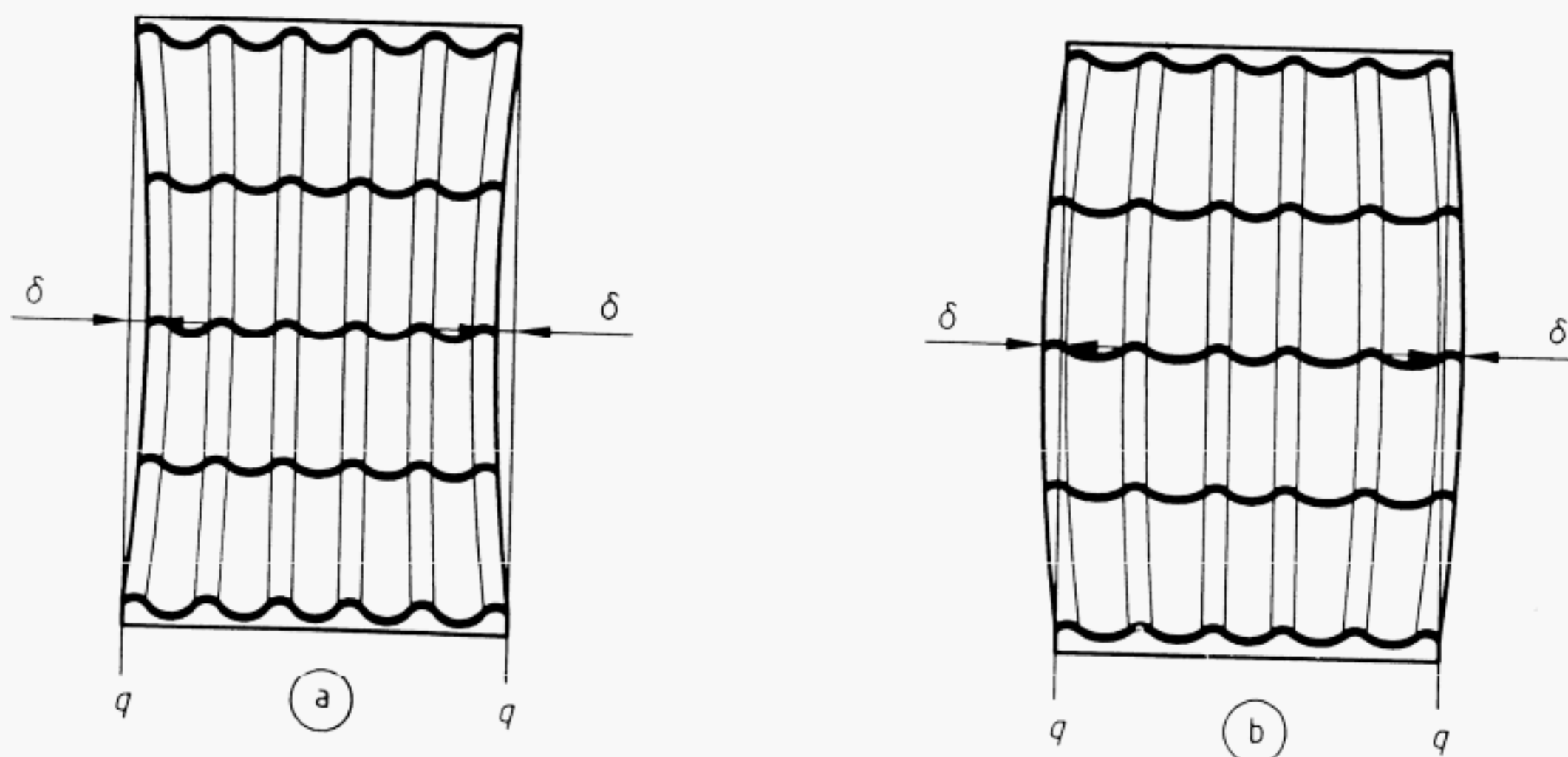
The length shall be measured along the centre line of the tile.

Tolerances:  $\pm 2$  mm on each step  
 $\pm 6$  mm on total length of the tile.

### A.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  $\delta$  in Figures A.19 a) and A.19 b).

Tolerances:  $\pm 2$  mm per metre sheet length with a maximum of 9 mm



#### Key

$q$  Theoretical straight edge  
 $\delta$  Contraction or bulging

Figure A.19 Contraction or bulging

## A.4 Methods for measuring profiles

### A.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.

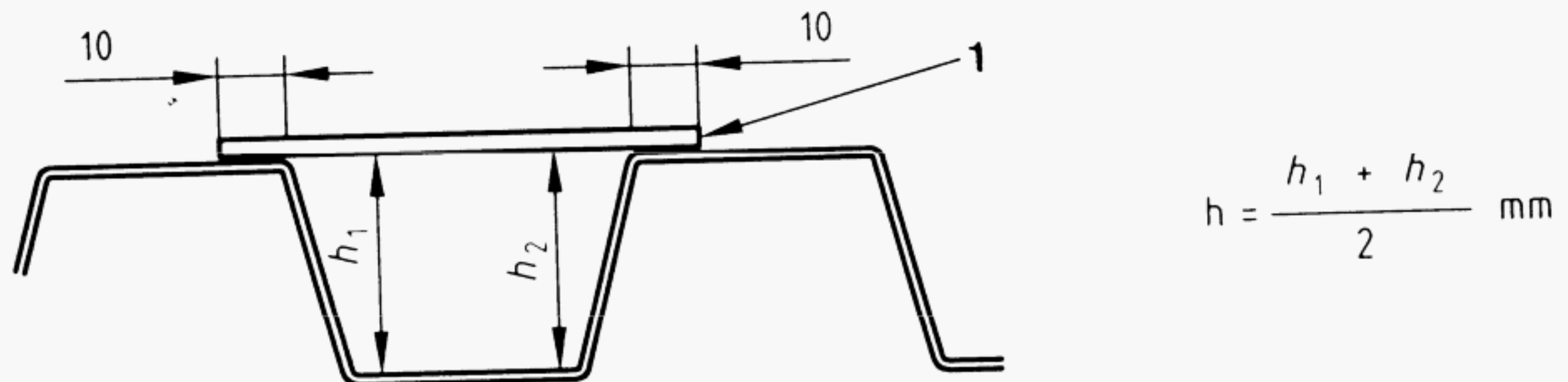
When measurements are taken, the profiled sheet should be placed on at least three equally spaced supports which are on a rigid flat surface.

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 1000 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.

### A.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 A.20. The tolerances in A.1.2 and A.3.2 apply to the average value for each valley.



#### Key

1 Straight bar

$h_1, h_2$  Measured profile depth

Figure A.20 Dimensional check for depth of profile  $h$

### A.4.3 Depth of stiffeners

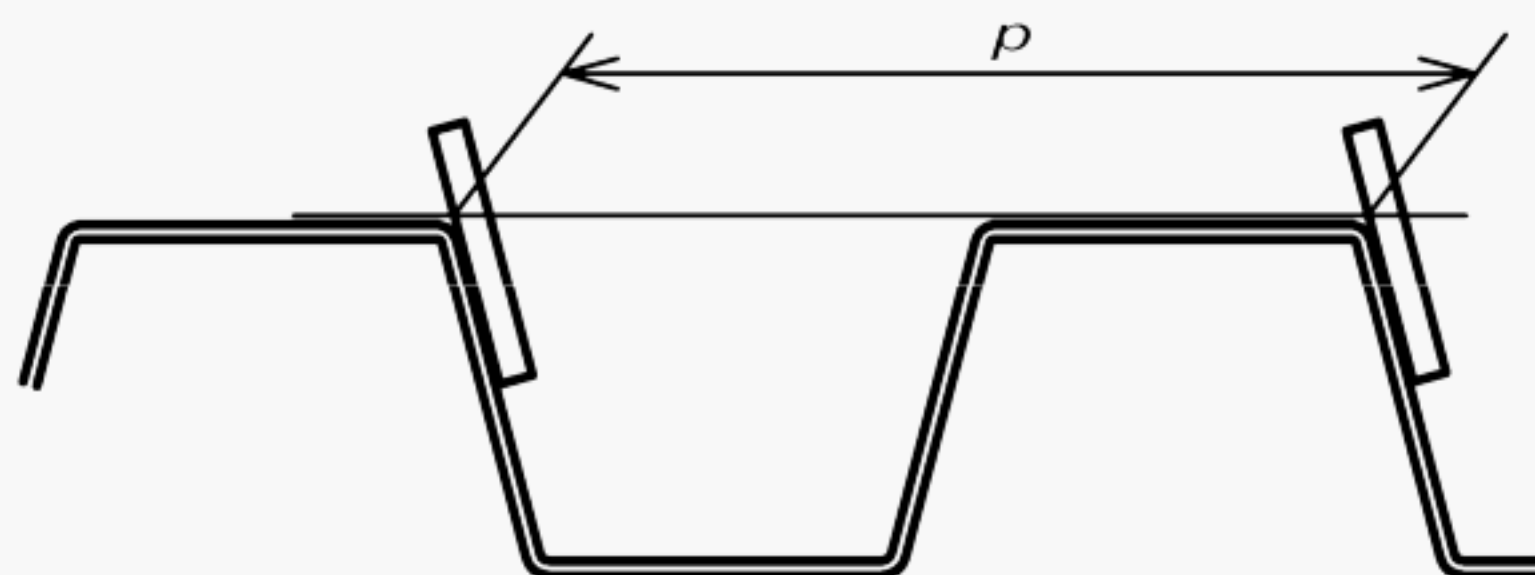
The depth of each stiffener shall be measured on a line across the sheet by means of a template or measuring rule. The tolerance in A.1.3 applies to each stiffener.

### A.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 A.21;

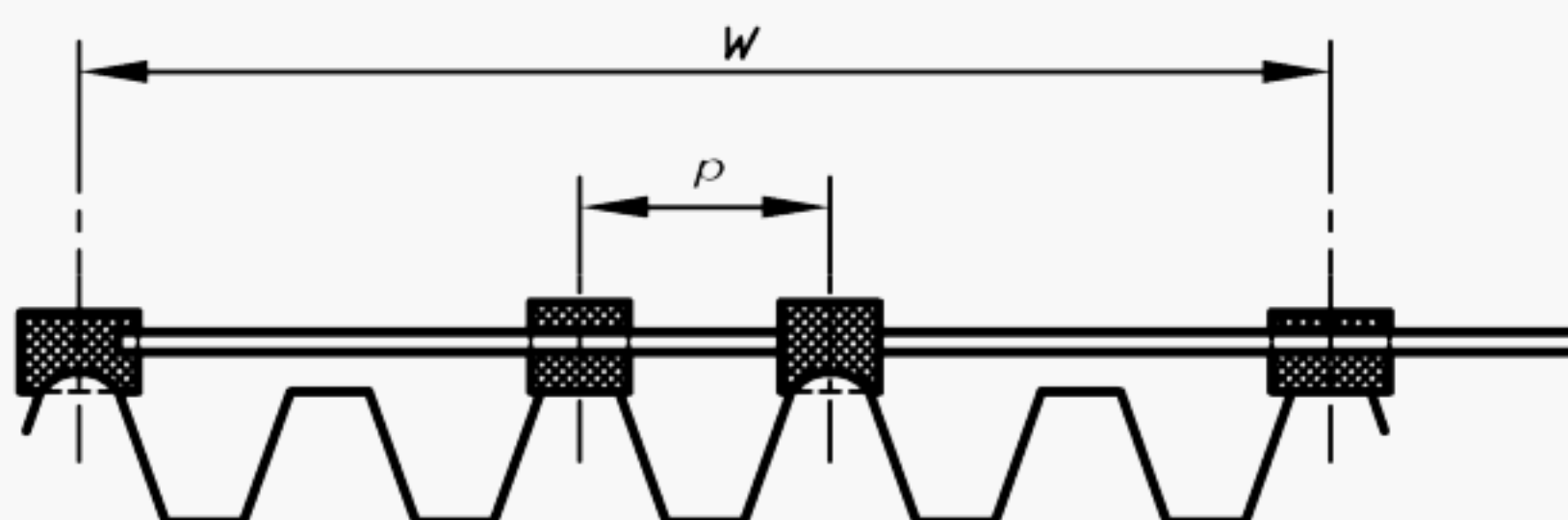
- b) as the deviation from a template;
- c) by means of a profile gauge as illustrated in Figure A.22.



**Key**

$p$  Pitch

**Figure A.21 Dimensional check for pitch**



**Key**

$p$  Pitch

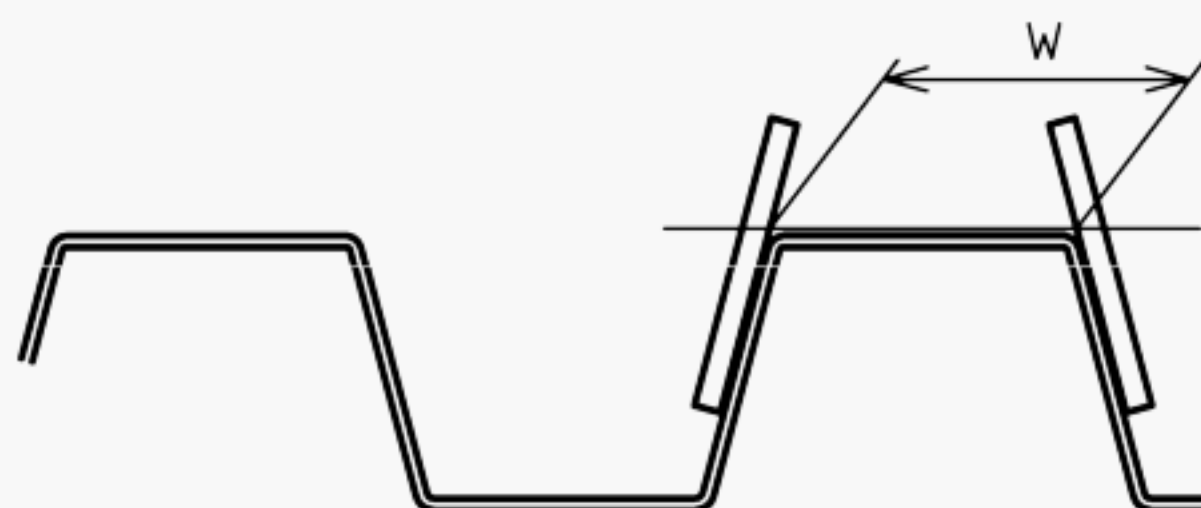
$w$  Cover width

**Figure A.22 Dimensional check for pitch  $p$  and cover width  $w$  using calibrated gauge**

#### A.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 A.23.

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



**Figure A.23 — Dimensional check for width of crown**



#### A.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 A.4.4) or by means of a gauge as illustrated in Figure A.23.

#### A.4.7 Radius of bends

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

#### A.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.

#### A.4.9 Squareness

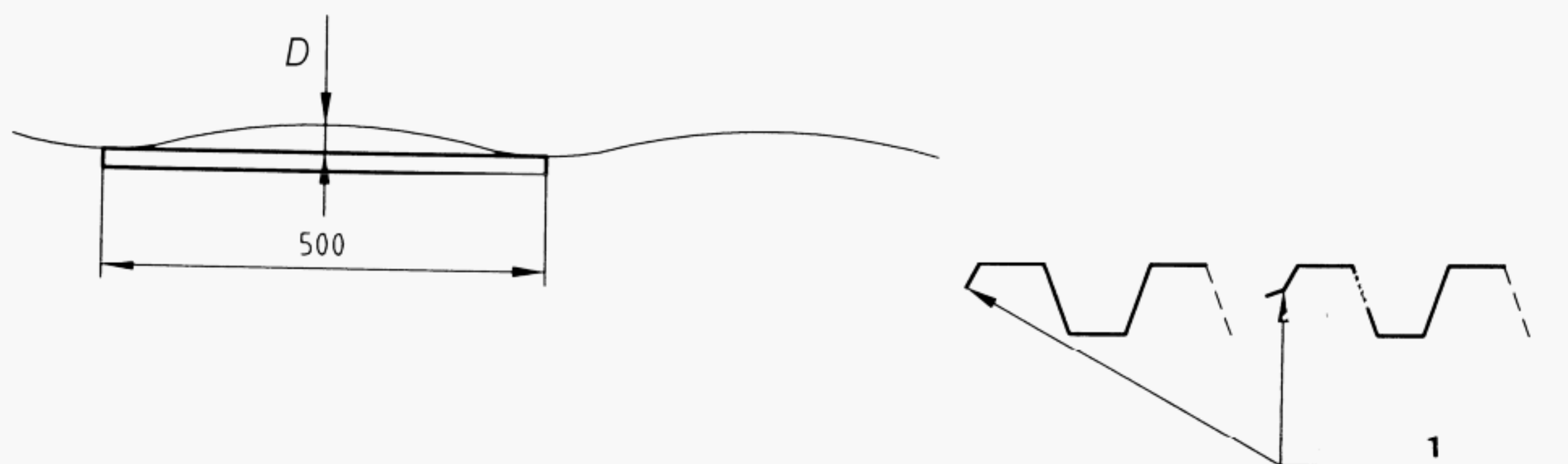
The squareness of a profiled sheet shall be determined as illustrated in Figures A.7 and A.19.

#### A.4.10 Length

The length shall be measured along the theoretical centre axis of the sheet as illustrated in Figure A.8.

#### A.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 A.24.



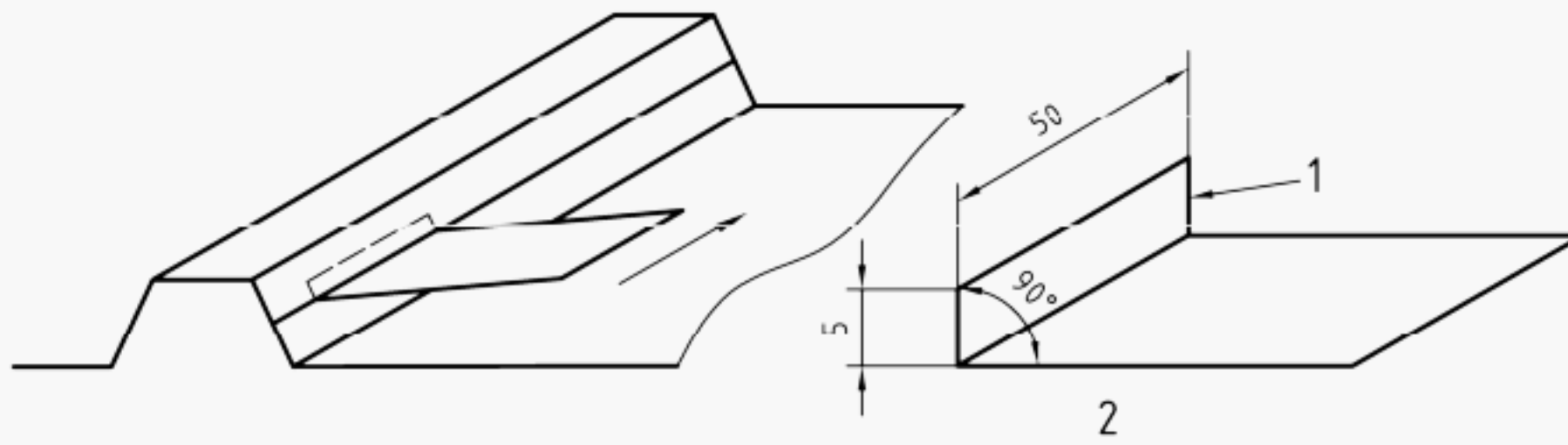
#### Key

- 1 Measuring points
- $D$  Deviation of the side lap edge

Figure A.24 — Dimensional check for deviation of side lap using gauge

#### A.4.12 Side lap ripple

A method to check the side lap ripple consists of trying to insert the tongue of a rigid gauge 1,5 mm thick between the side ribs of two sheets which are overlapped in the normal method of laying on supports located in the same horizontal plane as shown in Figure A.25.



**Key**

- 1 Tongue
- 2 Rigid gauge with a thickness of 1,5 mm

**Figure A.25 — Method of checking edge ripple**

**NOTE** When the side lap includes a stiffening bend (see Figure A.26), the zone covered by the stiffening bend of the side lap is not taken into account; the depth of the gauge tongue should in this case be increased accordingly.



**Key**

- 1 Stiffening bend

**Figure A.26 — Side lap with a stiffening bend**

## **Annex B** (informative)

### **Test methods for concentrated load**

No International Standard test methods for determining concentrated load are available but the following standards may be referred to:

- DIN 18807-7, *Trapezoidal sheeting in buildings - Part 7: Aluminium trapezoidal sheeting and their connexions; determination of load bearing capacity by test;*
- NF P34-503, *Profiled sheeting made of coated or non-coated steel sheet and panels - Bending tests under linear loads and/or under concentrated loads;*
- NT Build 036, *Floor and roof components: Resistance to concentrated static load.*

## **Bibliography**

- [1] EN 485-1, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 1: Technical conditions for inspection and delivery*
- [2] EN 485-2, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*
- [3] EN 515, *Aluminium and aluminium alloys – Wrought products - Temper designations*
- [4] EN 573-3, *Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products*
- [5] EN 1999-1-4, *Eurocode 9 - Design of aluminium structures - Part 1-4: Cold-formed structural sheeting*
- [6] EN 10204, *Metallic products - Types of inspection documents*
- [7] EN 12258-1, *Aluminium and aluminium alloys - Terms and definitions – Part 1: General terms*
- [8] EN 14782, *Self-supporting metal sheet for roofing, external cladding and internal lining - Product specification and requirements*
- [9] EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2000)*
- [10] DIN 18807-7 (see *supra* Annex B)
- [11] NF P34-503 (see *supra* Annex B)
- [12] NT Build 036 (see *supra* Annex B)

