BS EN 544:2011

BSI Standards Publication

Bitumen shingles with mineral and/or synthetic reinforcements — Product specification and test methods

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National foreword

This British Standard is the UK implementation of EN 544:2011. It supersedes BS EN 544:2005 which is withdrawn.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.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Bitumen shingles with mineral and/or synthetic reinforcements - Product specification and test methods

Bardeaux bitumés avec armature minérale et/ou synthétique - Spécifications des produits et méthodes d'essai

Bitumenschindeln mit mineralhaltiger Einlage und/oder Kunststoffeinlage - Produktspezifikation und Prüfverfahren

This European Standard was approved by CEN on 26 May 2011.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 544:2011) 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of an identical text or by endorsement, at the latest by December 2011, and conflicting national standards shall be withdrawn at the latest by March 2013.

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

This document supersedes EN 544:2005.

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

For relationship with EU Directive(s) 89/106/EEC, see informative Annex ZA, which is an integral part of this document.

Annex C provides details of significant technical changes between this European Standard and the previous edition.

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, 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

The performance of a roof covering manufactured from these products depends not only on the properties of the product as specified in this European Standard, but also on the design, application and performance of the roof considered as a whole, in conjunction with the environment and conditions of use.

1 Scope

This European Standard specifies the properties, performance and methods of test of the finished bitumen shingles prior to them being laid on the roof.

It also includes rules for marking, labelling and provides a clause for evaluation of conformity.

This European Standard does not include design requirements, installation techniques and roof system performance.

This European Standard applies to bitumen shingles where the watertightness of the system is ensured by overlapping, by different adhesive systems or a combination of these, according to manufacturer's installation instructions, intended to be laid as covering for pitched roofs and/or wall cladding.

This European Standard applies only to bitumen shingles with a mineral reinforcement, synthetic reinforcement or a mixture of the two.

In case of multilayer shingles each layer need to have the same type of reinforcement and same type of coating (ref. to Clause 8).

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 1110, *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of flow resistance at elevated temperature*

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

EN 1297, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Method of artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water*

EN 12039, *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of adhesion of granules*

EN 12310-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for waterproofing — Determination of resistance to tearing (nail shank)*

EN 12311-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for roof waterproofing — Determination of tensile properties*

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

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

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

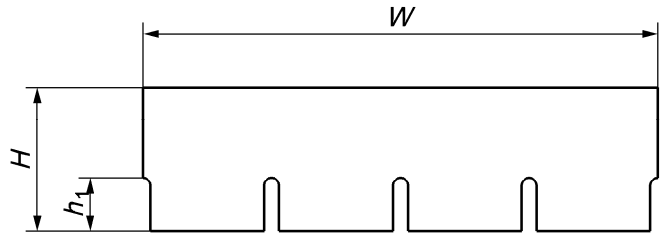
3.1
shingle
reinforced flat bitumen material, of a global rectangular shape, of width *W* and height *H*, having or not bitumen adhesive points or areas

NOTE 1 This material can have a solid part and several tabs.

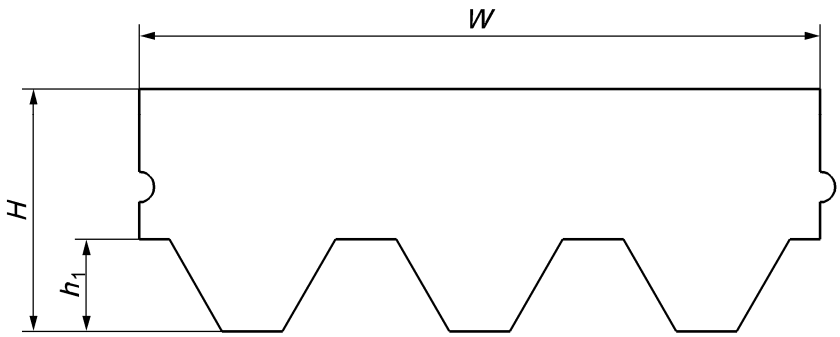
NOTE 2 These tabs can be rectangular and separated by slits of height h1 (see Figure 1).

NOTE 3 This material can be composed out of one layer (monolayer shingle) or several layer (multilayer or laminated shingles).

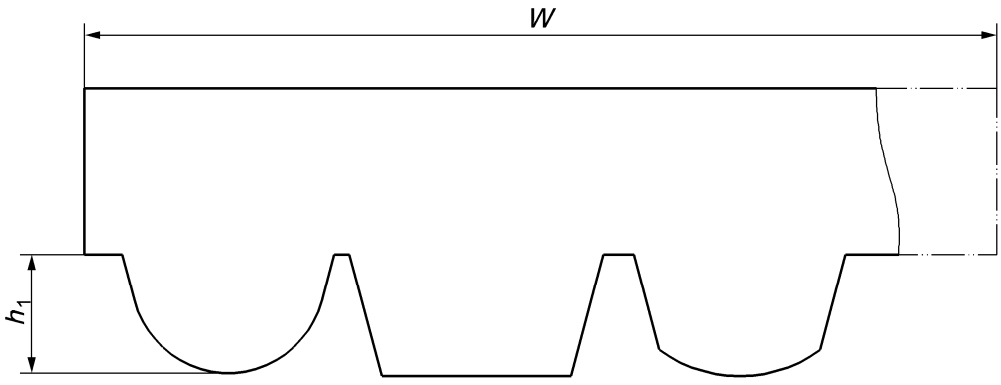
NOTE 4 In case of multilayer shingles, the layers are bonded by an adhesive and the overlapping of the lower layer by the upper layer in the visible part will amount to a minimum of 40 %.



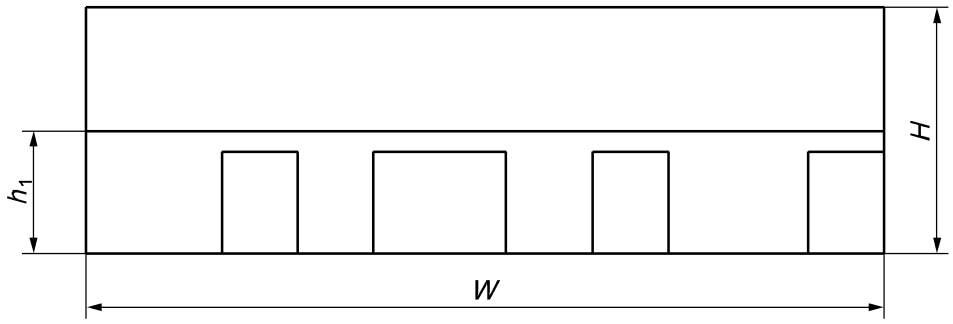
a) example of monolayer shingle



b) example of monolayer shingle



c) example of monolayer shingle



d) Example of multilayer shingle

Key

H height
W width
h_1 height of slits

Figure 1 — Different shapes of shingles

3.2
tab
part of the flat material separated by slits and intended to be visible on the roof

3.3
slit
gap separating the tabs

3.4
reinforcement
substance incorporated into the bitumen material ensuring its dimensional stability and mechanical resistance

3.5
impregnation
saturation of the reinforcement by bitumen

3.6
mass of bitumen
bitumen or modified bitumen (in general all material soluble in the test described in 6.2) used for impregnation, coating and adhesive if any

3.7
upperside surfacing
factory-applied protection of the face of the material exposed to the weather provided by, for example, mineral granules, flakes of slate or a metal foil

3.8
underside surfacing
factory-applied protection of the concealed underside of the material, either continuous or discontinuous, by means of sand, talc, paper, plastic film or any other material

3.9 Adhesive system
3.9.1
adhesive point; strip
point, or continuous or discontinuous strip, intended to ensure the adhesion of the tabs after installation on the roof

3.9.2
self adhesive area
self-adhesive area intended to ensure adhesion of the tabs to the lower course of shingles to contribute to water tightness

3.10
protection strip
plastic film or non-adhesive paper intended to prevent the self-adhesive points or areas from sticking prior to being laid on the roof

3.11
guiding tab or cuts
small extension/indentations or cuts at the edge of the shingle to allow for proper alignment during application

3.12
blister
elevation of the surface of varied contour and dimensions, with a cavity beneath it

3.13
production batch
amount of product manufactured to the same specification within a maximum period of 24 h for each production line

3.14
(MLV) manufacturer's limiting value
value stated by the manufacturer to be met during testing

NOTE The manufacturer's limiting value can be a minimum or a maximum value according to statements made under product characteristics of this European Standard.

4 Requirements

4.1 Materials

4.1.1 Mass of bitumen

When measured according to 6.2, the minimum mass of bitumen shall be 1 300 g/m^2, in case of monolayer shingle and 1 500 g/m² in case of multilayer shingle.

4.1.2 Upperside surfacing

The upperside surfacing shall be continuous, adhered to the bitumen and shall not reveal any bitumen which might spoil the appearance and durability of the product.

This upperside surfacing shall protect the bitumen from UV radiation.

4.1.3 Underside surfacing

Underside surfacing shall be such that the shingles may be removed individually from their packaging without being damaged.

4.2 Geometrical properties

4.2.1 Shapes

The overall dimensions ignoring any guiding tabs and indents, when measured according to 6.3, shall be as follows:

— Width *W* : maximum 1 200 mm;

— Height *H* : minimum 250 mm.

The tolerances on dimensions *W* and *H* (see Figure 1) declared by the manufacturers, measured in accordance with 6.3.2 and 6.3.3, shall be:

— ± 3 mm on width *W*;

— ± 3 mm on height *H*.

4.2.2 Surface of overlapping

The minimum surface of overlapping of multilayer shingles in the visible part should be 40 %.

4.3 Mechanical properties

4.3.1 Tensile strength

Measured under the test conditions described in 6.4.1, the minimum tensile strength shall be as shown in Table 1.

Table 1 — Minimum tensile strength

In the direction of the shingle width or direction of fabrication	600 N / 50 mm
In the direction of the shingle height or perpendicular to the direction of fabrication	400 N / 50 mm

4.3.2 Nail shank tear resistance

Measured under the test conditions described in 6.4.2, the minimum value of the tear resistance shall be 100 N.

This requirement only applies to materials intended to be nailed.

4.4 Durability

4.4.1 Water absorption

Measured under the test conditions described in 6.4.3, the increase in mass shall be less than 2 % for each test piece.

4.4.2 Resistance to UV radiation

Measured under the test conditions described in 6.4.4, there shall be no cracking or fissuring.

4.4.3 Resistance to blistering

Resistance to blistering test is only relevant for shingles with other reinforcement than type 3, type 4, type 6 or type 7 (see 8.1).

Measured under the test conditions described in 6.4.5, there shall not be any blisters on the shingle surface.

4.4.4 Flow resistance at elevated temperature

Measured under the test conditions described in 6.4.6, the flow resistance shall be less than or equal to 2 mm for each test piece.

4.4.5 Adhesion of mineral granules or flakes of slate

Where the top surface of the shingle is protected with embedded mineral granules, the granule adhesion shall be determined in accordance with 6.4.7.

Each value shall be below the manufacturer's limited value (maximum value) and shall not exceed 2,5 g.

4.4.6 Resistance to peeling for metal-surfaced shingles

Measured under the test conditions described in 6.4.8, the resistance shall be at least 0,2 N/mm for each test piece.

4.5 Fire performance

4.5.1 Reaction to fire

This characteristic shall be declared when subject to regulatory requirements, and may be declared otherwise. When required, the reaction to fire shall be evaluated according to 6.5.1.

Reaction to fire shall be declared as either:

a) classification after testing in accordance with EN 13501-1;

b) Class F where the intended end use is not subject to regulatory requirements.

When results from EN 13501-1 are declared, the system for which the results apply shall be described in full.

4.5.2 External fire performance

This characteristic shall be declared when subject to regulatory requirements, and may be declared otherwise. When required, the external fire performance shall be evaluated according to 6.5.2.

External fire shall be declared as either:

a) after testing in accordance with ENV 1187, the classification in accordance with EN 13501-5;

b) deemed to satisfy without testing;

c) Class F_{ROOF} where the intended end use is not subject to regulatory requirements.

When results from ENV 1187 are declared, the system for which the results apply shall be described in full as shall the test method (or methods) applied. When declaring deemed to satisfy, the specification of the system for which this applies (i.e. minimum thickness of gravel coverings) shall be stated.

5 Sampling

5.1 General

5.1.1 Cutting of test pieces

The test pieces shall be taken from different shingles chosen at random.

Test pieces are cut using a cutting tool or hollow punch, as far as possible excluding hand-held scissors, avoiding, for some particular tests, self-adhesive areas with their protective film or paper.

5.1.2 Marking of test pieces

Every test piece shall have on its underside:

— reference identifying the batch from which the test sample was taken;

— where appropriate, a reference identifying the direction of cutting, if this is specified in the procedures described below.

5.2 Mass of bitumen

For the measurement of the mass of the bitumen, three test pieces of (100×100) mm² shall be cut from different shingles.

The test pieces shall be cut from the exposed area with adhesive system if any.

In case of multilayer shingles, two test pieces shall be taken one from the monolayer part and one from the multilayer part of the shingles.

5.3 Geometrical tests

5.3.1 Shapes

For the measurement of length and width five different shingles chosen at random shall be taken.

5.3.2 Surface of overlapping of multilayer shingles

To measure the minimum surface of overlapping, take three different shingles chosen at random.

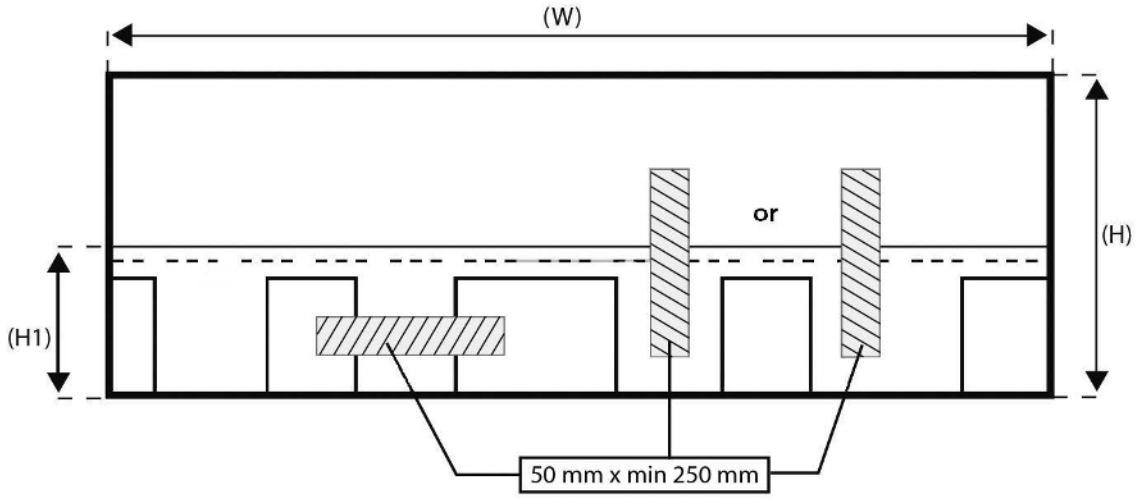
5.4 Tensile strength

For the measurement of the tensile strength, cut two series of test pieces from different shingles:

— five in the direction of width,

— five in the direction of height.

These test pieces shall have dimensions 50 mm $\times$ minimum 250 mm.



Key

H height
W width
h_1 height of slits

Figure 2 — Multilayer shingle

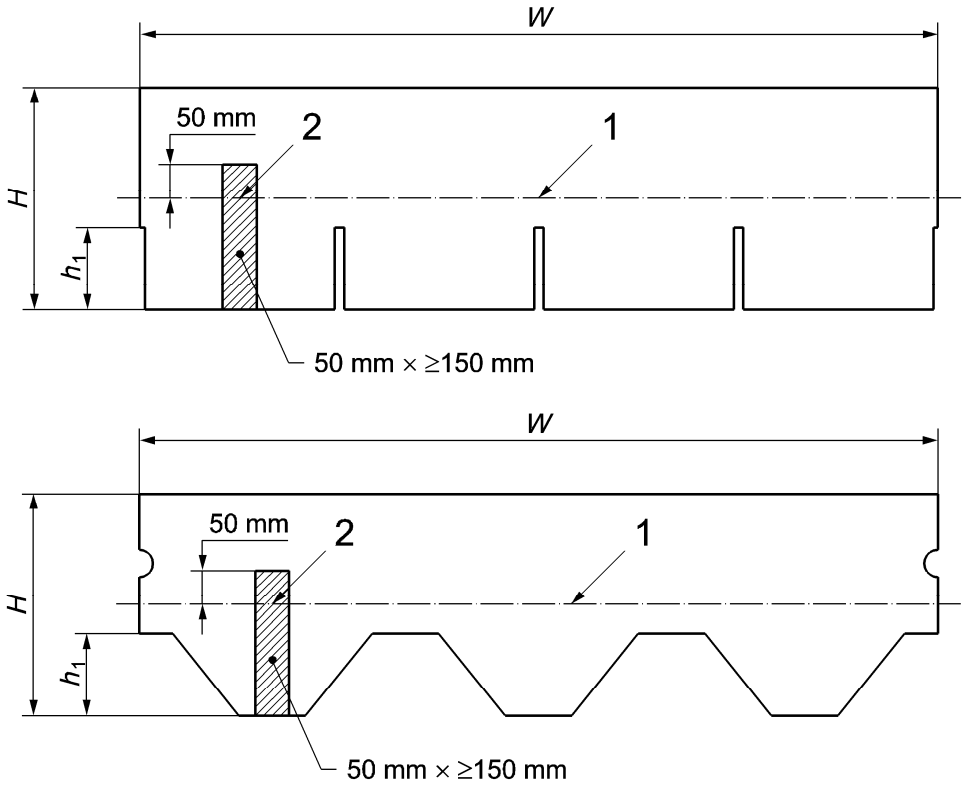
5.5 Nail shank tear resistance

The nail shank tear resistance shall be determined in accordance with EN 12310-1 parallel to the shingle height.

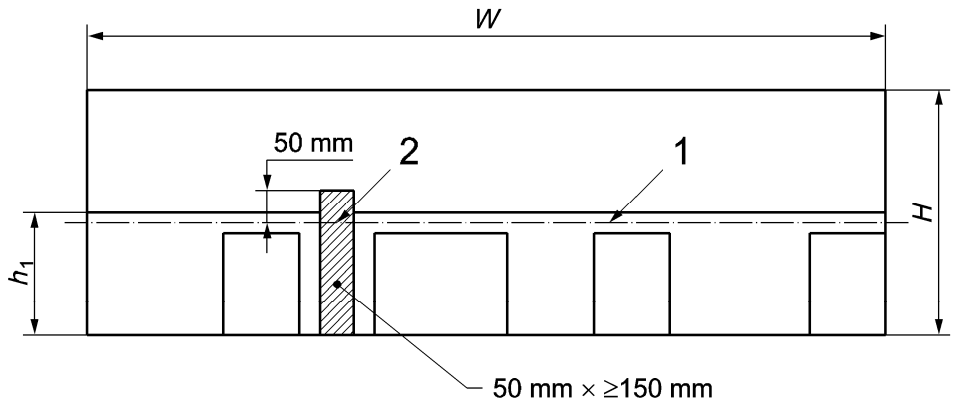
For the measurement of nail shank tear resistance, cut five test pieces from different shingles in direction of height. These test pieces shall have a dimension of 50 mm × minimum 150 mm (50 mm in the direction of width and minimum 150 mm in the direction of height).

The nail position in the test specimen shall be at the vertical height corresponding to the intended nailing position in the manufacturer‘s installation instructions (see Figure 2).

It is essential to apply the nail in the test to the same vertical position as presented in the installation instructions of the product.



a) nail position with single layer shingles



b) nail position with multilayers shingles

Key

1 nailing position according to the instructions given in 5.5
2 nailing of the sample
H height
W width
h_1 height of slits

Figure 3 — Example of cutting the sample for the resistance to tearing (nail shank) test

5.6 Water absorption

For the measurement of water absorption, cut five test pieces of (100 × 100) mm² from five different shingles, without self-adhesive areas, points or protection strips.

5.7 Resistance to UV radiation

For testing of resistance to UV radiation, cut one test piece from the shingle, of minimum 200 mm in the direction of width and minimum 50 mm in the direction of height.

5.8 Blistering

For the measurement of blistering, cut five test pieces of (125 × 225) mm² from different shingles.

5.9 Flow resistance at elevated temperature

For the measurement of flow resistance, cut five test pieces of (100 × 115) mm² from the exposed area of different shingles.

5.10 Adhesion of mineral granules and flakes of slate

For the measurement of the granules and flakes of slate adhesion, cut five test pieces more than (285 × 50) mm² from the area of the shingle which is intended to be exposed on the roof, 10 mm away from the side edges, with the 285 mm dimension being in the direction of shingle width.

If the dimension of the exposed area is not large enough, the test specimen shall be composed of two parts joined together.

In case of multilayer shingles, the test shall be performed on each layer.

5.11 Peeling for metal foil

For the measurement of peeling, cut five test pieces of (100 × 200) mm² from different shingles.

5.12 Fire performance

5.12.1 Reaction to fire

For reaction fire testing sufficient shingles shall be chosen to allow either the test specimen to be prepared or for test pieces to be cut.

5.12.2 External fire performance

For external fire performance sufficient shingles shall be chosen to form the test specimen.

6 Test methods

6.1 Sampling

All sampling shall be in accordance with Clause 5.

6.2 Mass of bitumen

6.2.1 Test conditions

Temperature : (23 ± 2) °C,

relative humidity : (50 ± 20) % RH,

test piece conditioning : minimum 2 h.

6.2.2 Equipment

— Soxhlet extractor or similar,

— balance accurate to ± 0,01 g,

— drying oven at controlled temperature (105 ± 2) °C,

— trichloroethylene, perchloroethylene, methylene chloride, toluene or xylene solvents.

6.2.3 Procedure

The test piece is placed in a container (the test piece may be cut into strips provided that any fragment of material which become detached are recovered and placed in the container) which has been previously dried and weighed (M_1) and provided with a cotton plug or other appropriate closure.

Reweigh the container with the test piece and the closure (M_2) and place in the extractor. Arrange so that the opening fitted with the closure projects beyond the level of the solvent.

Continue the extraction until the solvent is colourless in the extractor.

Remove the container for drying, initially in air (30 min), then in a drying oven controlled at a temperature of (105 ± 2) °C until a constant mass for the sample is achieved (constant mass means that the difference between two consecutive weightings is less than or equal to 0,05 g).

Weigh the container fitted with the closure (M_3).

Repeat this procedure for the two remaining test pieces.

6.2.4 Expression of results

In the extraction test, the following masses are determined for each test piece:

— test piece $M_2 – M_1$,

— mass of bitumen $M_2 – M_3$.

For each test piece, express the final result in grams per square metre. Calculate the arithmetic mean value of the test specimens (three for monolayer and two for multilayer).

6.3 Geometrical properties

6.3.1 Equipment

The equipment shall give a result with an accuracy of at least ± 0,5 mm.

6.3.2 Check on widths

6.3.2.1 Procedure

Widths W_1 and W_2 (see Figure 3) shall be measured.

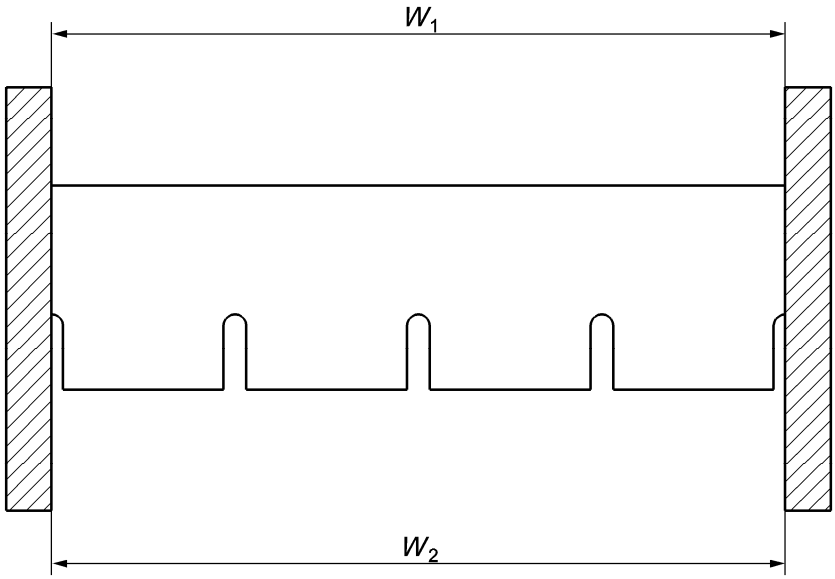


Figure 4 — Check on widths

6.3.2.2 Expression of results

The results shall be expressed as the two individual measurements rounded to the nearest millimetre. Each value shall be compared with the dimensional requirements.

6.3.3 Check on heights

6.3.3.1 Procedure

Heights H_1 and H_2 (see Figure 4) shall be measured.

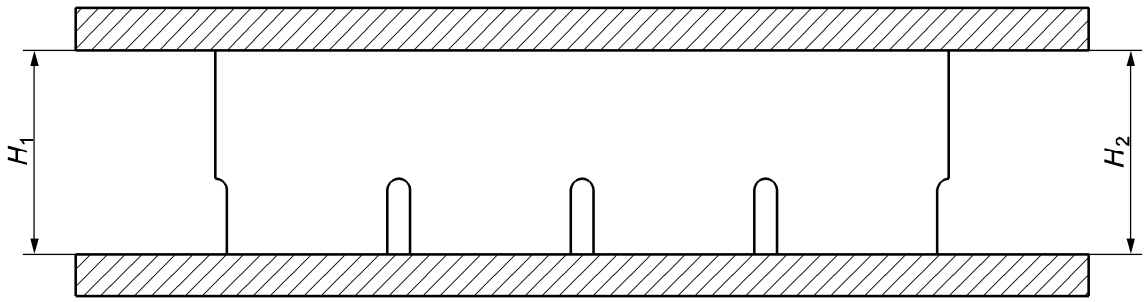


Figure 5 — Check on heights

6.3.3.2 Expression of results

The results shall be expressed as the two individual measurements rounded to the nearest millimetre. Each value shall be compared with the dimensional requirements.

6.3.4 Surface of multilayer overlapping

6.3.4.1 Procedure

The measurement of the value 1 to 4 have to be taken in the middle of the height of the exposed area (X).

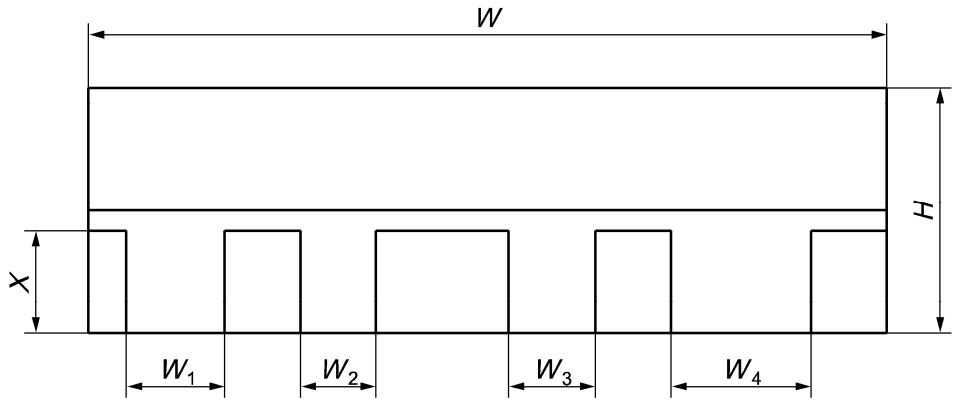


Figure 6 — Measurement

6.3.4.2 Expression of result

The sum of the widths 1 to 4 shall be more than 40 % of (W).

6.4 Mechanical properties

6.4.1 Tensile strength

6.4.1.1 Procedure

The procedure shall be in accordance with EN 12311-1.

6.4.1.2 Expression of results

Record the maximum value at break and the elongation recorded at break for each of the five test pieces in the direction of the width and height.

Calculate the arithmetic mean of the five tests in each direction.

6.4.2 Nail shank tear resistance

6.4.2.1 Test conditions, equipment and procedure

Test conditions, equipment and procedure shall be in accordance with EN 12310-1.

6.4.2.2 Expression of results

Record the maximum resistance force for each test.

Calculate the arithmetic mean of the five tests carried out in the height direction.

NOTE This test does not give results directly corresponding to the application conditions in practice. The total number of nails to bond one shingle and how the nails are applied vary from one product to another.

6.4.3 Water absorption

6.4.3.1 Test conditions and equipment

— Water bath at (23 ± 2) °C,

— ventilated oven at (50 ± 2) °C,

— five laboratory beakers greater than or equal to 100 mm diameter.

6.4.3.2 Procedure

Remove the granules which do not adhere to the test pieces. Weigh each test piece. Place the test pieces in five different laboratory beakers in a vertical position so that the water level is 5 cm above the upper part of the test piece.

Take care to preserve the granules which may have formed a deposit at the bottom of the beaker. They shall be counted in the final weighing.

The test pieces are placed for 6 days in water at (23 ± 2) °C. They are then weighed after the faces have been dried for 1 h in a vertical position hanging freely in a ventilated oven at (50 ± 2) °C.

6.4.3.3 Expression of results

The increase in mass of each of the five test pieces shall be lower than the requirement.

6.4.4 Resistance to UV radiation

6.4.4.1 Test conditions and equipment

Test conditions and equipment shall be in accordance with EN 1297.

6.4.4.2 Procedure

The procedure shall be in accordance with EN 1297 with 60 cycles.

6.4.4.3 Expression of results

The surface appearance shall be observed to determine whether cracking or fissuring has occurred.

6.4.5 Resistance to blistering

6.4.5.1 Test conditions and equipment

— Ventilated oven at (80 ± 2) °C,

— water bath at (23 ± 2) °C.

6.4.5.2 Procedure

The test specimens shall be conditioned at (23 ± 2) °C for a minimum of 16 h.

Place the test piece in the oven at 80 °C for (110 ± 3) min and immediately immerse the test piece in the water bath at (23 ± 2) °C for (10 ± 1) min. Repeat these operations for a further three cycles i.e. a total of 8 h. Keep the test piece immersed in water (16 ± 1) h. Perform this heating and immersion three times, i.e. a total of three days.

6.4.5.3 Expression of results

The surface appearance shall be observed to determine whether blistering has occurred.

6.4.6 Flow resistance at elevated temperature

6.4.6.1 Test conditions and equipment

Test conditions and equipment shall be in accordance with EN 1110, the only difference being:

— oven temperature (90 ± 2) °C.

6.4.6.2 Procedure

The procedure shall be in accordance with EN 1110, with the particular test conditions described in 6.4.6.1.

6.4.6.3 Expression of results

The flow resistance shall be expressed in millimetres for each test piece.

6.4.7 Adhesion of mineral granules and flakes of slate

6.4.7.1 Test conditions and equipment

Test conditions and equipment shall be in accordance with EN 12039.

6.4.7.2 Procedure

The procedure shall be in accordance with EN 12039.

6.4.7.3 Expression of results

Determine the loss of granules or flakes of slate: mass in grams.

6.4.8 Resistance to peeling metal foil

6.4.8.1 Test conditions and equipment

Test conditions and equipment shall be in accordance with EN 12311-1. In addition a spatula is needed.

6.4.8.2 Procedure

Start delamination of the metal foil by pushing a hot spatula into the product to a depth of about 20 mm. Continue the delamination of the metal foil with the help of the hot spatula to obtain about 120 mm of delaminated metal foil.

Clamp the delaminated metal foil in one of the grips of the tensile machine.

Clamp the opposite edge without metal foil in the other grip, protecting the grip with paper or similar.

Peel the metal foil off the shingle at 180°.

6.4.8.3 Expression of results

Calculate the arithmetic mean value in N/mm of the peeling force test.

6.5 Fire performance

6.5.1 Reaction to fire

The reaction to fire of bitumen shingles shall be tested and classified in accordance with the provisions of EN 13501-1. Where a specific test method requires it, products shall be mounted and fixed in the test apparatus in a manner representative of the product's intended end use conditions.

6.5.2 External fire performance

The external fire performance of bitumen shingles shall be tested according to one or more of the methods described in ENV 1187 and shall be classified in accordance with the provisions of EN 13501-5. Products shall be mounted and fixed in the test apparatus in a manner representative of the product's intended end use conditions.

7 Evaluation of conformity

7.1 General

The compliance of bitumen shingles with the requirements of this European Standard and with the stated values or classes shall be demonstrated by:

— initial type testing,

— factory production control by the manufacturer, including product assessment.

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

NOTE For example, different shapes and colours could be grouped into the same family in respect of all characteristics except geometrical properties

7.2 Initial type testing (ITT)

Initial type testing shall be performed to demonstrate conformity with this European Standard. Tests previously performed in accordance with the provisions of this European Standard (same product, same characteristic(s), test method, sampling procedure, system of attestation of conformity, etc.) may be taken into account. In addition, initial type testing shall be performed at the beginning of the production of a new shingle type (unless a member of the same family) or at the beginning of a new method of production (where this may affect the stated properties).

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

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

7.3 Factory Production Control (FPC)

7.3.1 General

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

A FPC system conforming with the requirements of EN ISO 9001, and made specific to the requirements of this European Standard, is considered to satisfy the above requirements.

The results of inspections, tests or assessments requiring action shall be recorded, as shall any action taken. The action to be taken when control values or criteria are not met shall be recorded.

7.3.2 Equipment

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

7.3.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their conformity.

7.3.4 Non-conforming products

In the event of any non-conformity of any product, that product shall be placed into quarantine and action taken to rectify the cause of the non-conformity. Products may not subsequently be despatched until the problem has been resolved.

7.3.5 Frequency of testing

The minimum frequency of testing for factory production quality is shown in Table A.1.

7.3.6 Test methods

For factory production control, indirect methods may be used instead of the method described in this European Standard if statistical correlations with the reference test methods, for a manufacturer's products, exist.

8 Designation and marking

8.1 Designation

The code system using types for the identification of the material is described below:

a) types of reinforcement

1) type 3: Glass tissue or grid,

2) type 4: Glass non woven with or without longitudinal reinforcement by films or grid,

3) type 6: Polyester non woven,

4) type 7: Glass/polyester composite non woven,

5) type 9: Other material of type to be specified.

b) types of coating

1) type X: Oxidized bitumen,

2) type E: Elastomer-modified bitumen,

3) type P: Plastomer-modified bitumen,

4) type S: Special mixture bitumen of type to be specified.

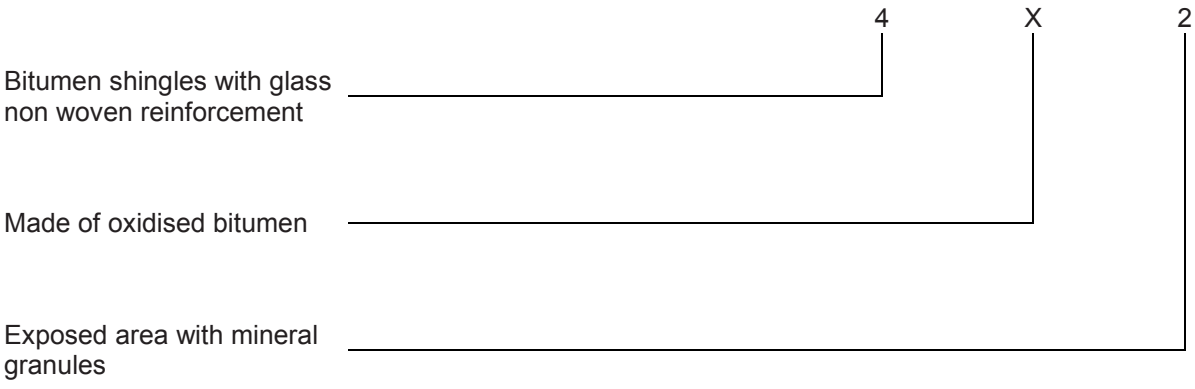
c) types of upperside surfacing of exposed area

The types of upperside surfacing are designated according to Table 2.

Table 2 — Types of surfacing

Upperside, exposed area	
2	Mineral granules and flakes of slate
8	Metal foil
9	Other material of type to be specified

d) Example



8.2 Marking

The packaging of bitumen shingles shall contain the following information:

a) product trade mark or other symbol used for product recognition,

b) number of this European Standard, i.e. EN 544,

c) type of material,

d) date of manufacture (day, month, year or special code),

e) type of reinforcement, coating and surfacing according to 8.1,

f) existence or not of adhesive system; adhesive points/ stripe or self-adhesive area; multilayer,

g) colour,

h) identification symbol of a third party, if any.

NOTE Where ZA.3 covers the same information as required by this sub-clause, the requirements of this sub-clause are met.

Annex A
(normative)

Frequencies of testing for factory production control

The minimum frequencies of testing for factory production quality control are given in Table A.1.

Table A.1 — Frequencies of testing

Product characteristic	Clause	Minimum frequencies of testing per			
		production batch	week	month	year
Mass of bitumen	6.2			1	
Height and width	6.3	1			
Tensile strength	6.4.1		1 [b]		
Nail shank tear resistance	6.4.2		1 [b]		
Water absorption	6.4.3	0 [a]			
Resistance to UV	6.4.4	0 [a]			
Blistering	6.4.5				1
Flow resistance at elevated temperature	6.4.6			1	
Adhesion of granules and flakes of slate	6.4.7			1 [c]	
Peeling of metal foil	6.4.8			1	
Reaction to fire	6.5.1	0 [a]			
External fire performance	6.5.2	0 [a]			

[a] Indirect control, e.g. of raw materials and the production process, with a frequency sufficient to ensure that the results from initial type testing remains representative for current production. This frequency shall be given in the manufacturer's FPC system documentation.

[b] In the case where a manufacturer is continuously producing numerous different shingles which contain the same carrier (type and mass) and the same type of coating, the frequency of these tests which relate essentially to the carrier, may be considered on the total number of these different shingles.

[c] In the case where a manufacturer is continuously producing numerous differently reinforced shingles and/or shingles which differ only by the presence of incorporated protection, whilst using the same type of coating and having a similar nominal thickness, the frequency for these tests, which relate essentially to the type of coating, may be considered on the total number of these different shingles.

Annex B
(informative)

Example of a product data sheet

B.1 General information

— Date and reference of this technical data sheet,

— product trade name,

— manufacturer / supplier,

— origin / source of manufacturing,

— method of application,

— product performance[1)],

— certification mark where relevant,

— consumer information[2)].

1) See ZA.3 which limits the information to be given in association with CE marking.

2) For example restrictions concerning use and storage and safety precaution during installation and disposal.

B.2 Properties

Table B.1 — Information from testing

Characteristic	Test method in this or other standards	Units	Requirements
Mass of bitumen	6.2	g/m^2	≥ 1 300 g/m^2 for monolayer ≥ 1 500 g/m^2 for multilayer
Height and width	6.3	mm	See 4.2
Tensile properties: Minimum tensile force (width) Minimum tensile force (height)	EN 12311-1	N/50 mm	 ≥ 600 N ≥ 400 N
Nail shank resistance	EN 12310-1	N	≥ 100 N
Water absorption	6.4.3		< 2 %
Resistance to UV radiation	EN 1297		Pass/Fail 60 cycles
Blistering	6.4.5		Pass/Fail
Flow resistance at elevated temperature	EN 1110	mm	≤ 2 mm at 90 °C
Adhesion of granules and flakes of slate	EN 12039	g	MLV (≤ 2,5 g)
Peeling of metal foil	6.4.8	N/mm	≥ 0,2 N/mm
External fire performance	ENV 1187		In accordance with EN 13501-5
Reaction to fire	EN 13823 [1] EN ISO 11925-2 [2]		Euroclasses

Annex C
(informative)

Significant technical changes between this European Standard and the previous edition

Significant technical changes between this European Standard and the previous edition, including its amendment, were made in the following:

a) New clauses, paragraphs, annexes, tables or figures:

   1) Clause 4, 4.2.2,

   2) Clause 6, 6.3.4,

   3) fourth part of Figure 1, Figure 2, third part of Figure 3 and Figure 6.

b) Modified clauses, paragraphs, annexes, tables or figures:

   1) Clause 1, last sentence,

   2) Clause 3, new definition 3.1,

   3) Clause 4, 4.1.1,

   4) Clause 5, 5.2, additional sentence, 5.3 and 5.10, additional sentence,

   5) Clause 6, 6.2.4, modified last sentence,

   6) Clause 8, 8.2, modified bullet f,

   7) Tables B.1, ZA.1.1 and ZA.1.2 modified last column for “mass of bitumen” and “water permeability”.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive (89/106/EEC)

ZA.1 Scope and relevant clauses

This European Standard has been prepared under the Mandates M/121 and M/122 given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers the presumption of fitness of the construction products covered by this European Standard for their intended use.

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

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

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://ec.europa.eu/enterprise/construction/cpd-ds/).

This annex establishes the conditions for the CE marking of shingles intended for the uses indicated in Tables ZA.1.1 and ZA.1.2 and the relevant clauses applicable. This Annex ZA has the same scope as Clause 1 of this standard, and is defined by Tables ZA.1.1 and ZA.1.2.

Table ZA.1.1 — Relevant clauses for bitumen shingles for roofs

Product: Bitumen shingles **Intended use**: Discontinuously laid roof coverings for buildings			
Essential characteristics	**Requirement clauses in this European Standard**	**Levels and/or classes**	**Notes**
Mechanical resistance:			
– tensile strength (width)	4.3.1	–	Threshold value 600 N/50 mm
– tensile strength (height)	4.3.1	–	Threshold value 400 N/50 mm
– nail shank tear resistance	4.3.2	–	Threshold value 100 N
Reaction to fire	4.5.1	See EN 13501-1	
External fire performance	4.5.2	See EN 13501-5	
Water permeability (and its durability)	4.1.1	–	≥ 1 300 g/m^2 for monolayer ≥ 1 500 g/m^2 for multilayer
Dimensional variation	4.2	–	
Durability of mechanical resistance	4.4.2	–	
Durability of water permeability:			
– flow resistance at elevated temperature	4.4.4	–	Threshold value ≤ 2 mm
– adhesion of the protective finishing	4.4.5 4.4.6	–	MLV (≤ 2,5 g) ≥ 0,2 N/mm
– water absorption	4.4.1	–	< 2 %

Table ZA.1.2 — Relevant clauses for bitumen shingles for external walls

Product: Bitumen shingles **Intended use**: Discontinuously laid external wall finishes for buildings			
Essential characteristics	**Requirement clauses in this European Standard**	**Levels and/or classes**	**Notes**
Reaction to fire	4.5.1	See EN 13501-1	
Water permeability	4.1.1	–	≥ 1 300 g/m^2 for monolayer ≥ 1 500 g/m^2 for multilayer
Resistance to fixing	4.3.2	–	Threshold value 100 N
Durability of water permeability:			
– flow resistance at elevated temperature	4.4.4	–	Threshold value ≤ 2 mm
– adhesion of the protective finishing	4.4.5 4.4.6	–	MLV (≤ 2,5 g) ≥ 0,2 N/mm
– water absorption	4.4.1	–	< 2 %

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

ZA.2 Procedure for the attestation of conformity of bitumen shingles

ZA.2.1 Systems of attestation of conformity

Bitumen shingles for the intended use listed shall follow the system of attestation of conformity shown in Table ZA.2.

The attestation of conformity of the bitumen shingles in Tables ZA.1.1 and ZA.1.2 shall be according to the evaluation of conformity procedures indicated in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this European Standard indicated therein.

Table ZA.2 — Attestation of conformity systems for bitumen shingles

Product	**Intended use**	**Level(s) or class(es)**	**Attestation of conformity systems**
Bitumen shingles	For uses subject to reaction to fire regulations	A1**, A2**, B**, C**, D, E	3
		F	4
	For uses subject to external fire performance regulations [a]	Product requiring testing	3
		F_{ROOF} and products "deemed to satisfy" without testing	4
	For uses subject to regulations in regulated substances	–	3
	For uses other than specified above	–	4

System 3: See CPD Annex III.2.(ii), Second possibility.

System 4: See CPD Annex III.2.(ii), Third possibility.

[a] Does not apply to external wall finishing products.

** Products/materials requiring testing.

Table ZA.3.1 — Assignment of evaluation of conformity tasks for bitumen shingles under system 3

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Tables ZA.1.1 and/or ZA.1.2 relevant for the intended end use	7.3
	Initial type testing by a notified test laboratory	Reaction to fire Classes (A1 to C)**, D and E, external fire performance and release of regulated substances (where relevant)	7.2
	Initial type testing by the manufacturer	All characteristics of Tables ZA.1.1 and/or ZA.1.2 relevant for the intended end use except release of regulated substances and reaction to fire in the classes above	7.2
** See footnote to Table ZA.2.			

Table ZA.3.2 — Assignment of evaluation of conformity tasks for bitumen shingles under system 4

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all-characteristics of Table ZA.1.1 and/or ZA.1.2 relevant for the intended end use	7.3
	Initial type testing by the manufacturer	All characteristics of Tables ZA.1.1 and/or ZA.1.2, relevant for the intended end use, namely: mechanical resistance, water permeability, dimensional variation, resistance to fixings and durability	7.2

ZA.2.2 EC Declaration of conformity

(In case of products under system 3): When compliance with the conditions of this annex is achieved, the manufacturer or this agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of Conformity), which authorises the affixing of the CE marking. This declaration shall include:

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

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

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

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

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions),

— name and address of the notified laboratory(ies),

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

(In case of products under system 4): When compliance with the conditions of this annex is achieved, the manufacturer or this agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of Conformity), which authorises the affixing of the CE marking. This declaration shall include:

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

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

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

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

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions),

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

The above mentioned declaration shall be presented in the language or languages accepted in the Member State in which the product is to be used.

ZA.3 CE marking

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EEC and shall be shown on the packaging and/or on the accompanying commercial documents. The following information shall accompany the CE marking symbol:

a) name and address or identifying mark of the producer/supplier, and

b) last two digits of the year in which the marking was affixed, and

c) number of this European Standard with date of version, i.e. EN 544:2011 and

d) product type and intended use (e.g. bitumen shingles for roof and/or external wall covering and type (see 8.1)), and

e) information on the relevant essential characteristics in Tables ZA.1.1 and/or ZA.1.2:

   1) “nail shank tear resistance NPD“ if the test was not performed,

   2) external fire performance (if relevant), test method(s), and results, and mounting and fixing conditions,

   3) reaction to fire class and sub-class and, if relevant, mounting and fixing conditions.

If the manufacturer wishes to declare a value better than a threshold he may do so. However if he does not wish to do this, he does not need to declare the characteristic.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements. For reaction to fire and external fire performance, the Classes F and F_{ROOF} respectively are used instead of NPD.

Figure ZA.1 gives an example of the information to be given on the packaging and/or on the accompanying commercial documents for shingles intended for both roof and external wall covering, in reaction to fire Class E (i.e. attestation system 3).

CE	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC*
AnyCo Ltd, P.O. Box 21, B-1050 11	*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed*
EN 544:2011 Bitumen shingles for roof and external wall covering Type 4 X 2 External fire performance F_{ROOF} Reaction to fire Class E Adhesion of granules MLV 1,5 g	*Number of this European Standard with date of version* *Product type and intended use* *Information on regulated characteristics*

Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other

legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

Bibliography

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

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

[3] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2008)*

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