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Fleksible membraner til fugtisolering – Forstærket tagpap – Definitioner og karakteristika

Flexible sheets for waterproofing – Reinforced bitumen sheets for roof waterproofing – Definitions and characteristics

DANSK STANDARD
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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English Version

Flexible sheets for waterproofing - Reinforced bitumen sheets for roof waterproofing - Definitions and characteristics

Feuilles souples d'étanchéité - Feuilles bitumineuses armées pour l'étanchéité de toiture - Définitions et caractéristiques

Abdichtungsbahnen - Bitumenbahnen mit Trägereinlage für Dachabdichtungen - Definitionen und Eigenschaften

This European Standard was approved by CEN on 30 July 2004 and includes Amendment 1 approved by CEN on 5 October 2006 and Amendment 2 approved by CEN on 12 June 2009.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Foreword

This document (EN 13707:2004+A2:2009) has been prepared by Technical Committee CEN/TC 254 “Flexible sheets for waterproofing”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

This document includes Amendment 1, approved by CEN on 2006-10-05 and Amendment 2, approved by CEN on 2009-06-12.

This document supersedes EN 13707:2004.

The start and finish of text introduced or altered by amendment is indicated in the text by tags ▌A1〉 〈A1▌ and ▌A2〉 〈A2▌.

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), see informative Annex ZA, which is an integral part of this document.

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 United Kingdom.

1 Scope

This document specifies definitions and characteristics for flexible reinforced bitumen sheets for which the intended use is roofing. This covers sheets used as top layers, intermediate layers and underlayers. It does not cover reinforced bitumen sheets for waterproofing used as underlays for discontinuous roofing.

It does not cover waterproofing sheets which are intended to be used fully bonded under bituminous products (e.g. asphalt) directly applied at high temperature, specified by prEN 14695.

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 1107-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for roof waterproofing — Determination of dimensional stability*

EN 1108, *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of form stability under cyclical temperature changes*

EN 1109, *Flexible sheets for waterproofing — Bitumen sheets for roof waterproofing — Determination of flexibility at low temperature*

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

EN 1296, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roofing — Method of artificial ageing by long term exposure to elevated temperature*

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 1848-1, *Flexible sheets for waterproofing — Determination of length, width and straightness — Part 1: Bitumen sheets for roof waterproofing*

EN 1849-1, *Flexible sheets for waterproofing — Determination of thickness and mass per unit area — Part 1: Bitumen sheets for roof waterproofing*

EN 1850-1, *Flexible sheets for waterproofing — Determination of visible defects — Part 1: Bitumen sheets for roof waterproofing*

EN 1928:2000, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness*

EN 1931, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of water vapour transmission properties*

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 12316-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for roof waterproofing — Determination of peel resistance of joints*

EN 12317-1, *Flexible sheets for waterproofing — Part 1: Bitumen sheets for roof waterproofing — Determination of shear resistance of joints*

EN 12691, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to impact*

EN 12730:2001, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to static loading*

EN 13416:2001, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Rules for sampling*

EN 13501-1:2002, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

〉A1〈 EN 13501-5, *Fire classification of construction products and building elements — Part 5: Classification using data from external fire exposure to roofs tests* 〉A1〈

EN 13897, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of watertightness after stretching at low temperature*

prEN 13948, *Flexible sheets for waterproofing — Bitumen, plastic and rubber sheets for roof waterproofing — Determination of resistance to root penetration*

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 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 13416:2001 and the following apply.

3.1
waterproofing
action to prevent the passage of water from one plane to another

3.2
waterproofing system
assembly of one or more layers of roofing sheet in its applied and jointed form, which has certain performance characteristics, to be assessed as a whole

NOTE 1 Where only one layer is used this is usually referred to as a single layer system.

NOTE 2 A bituminous roofing system is formed on site by connecting and sealing one or more superimposed layers of bitumen sheets to form a single composite waterproof layer for use over flat, pitched or vertical surfaces according to building application requirements.

3.3
roofing
waterproofing used in the roof of a building including roofs used for parking of vehicles and for roof gardens

NOTE Waterproofing sheets which are intended to be fully bonded and bituminous products directly applied at high temperature are specified by the European Standard on flexible reinforced bitumen sheets for concrete bridge decks and other concrete surfaces trafficable by vehicles (see prEN 14695 ([6])).

3.4
roofing sheet
factory made flexible sheet including any carriers, facings, surface texture and/or backing

3.5
carrier
material incorporated into or onto the factory-made roofing sheet to ensure its stability and/or mechanical resistance

3.6
backing
material incorporated onto the factory-made roofing sheet without a permanent mechanical function

3.7
surfacing
material applied on one or both sides of roofing sheets, either as a permanent light surface protection against weathering on the upper surface or as an anti-sticking substance of the roofing sheets

3.8
batch
amount of product manufactured to the same specification within a maximum period of 24 h

3.9
manufacturer's limiting value (MLV)
value stated by the manufacturer to be met during testing. The manufacturer's limiting value can be a minimum or a maximum value according to statements made under product characteristics of this document

3.10
manufacturer's declared value (MDV)
value declared by the manufacturer accompanied by a declared tolerance

3.11
reinforced bitumen sheet
factory made flexible layer of bitumen with internal or external incorporation of one or more carriers, supplied in roll form ready for use

3.12
oxidized bitumen
straight run petroleum bitumen or a fluxed bitumen which has been hardened and rendered less temperature susceptible by blowing with air at high temperature with or without the use of a catalyst

3.13
elastomeric bitumen
petroleum bitumen and/or oxidized bitumen modified by the addition of thermo-plastic rubbers

3.14
plastomeric bitumen
petroleum bitumen and/or oxidized bitumen modified by the addition of polyolefin or polyolefin copolymer compound

3.15
sampling
procedure used to select or constitute a sample

3.16
sample
sheet from which a test piece is taken

3.17
test piece
part of the sample from which test specimens are taken

3.18
test specimen
piece of precise dimensions taken from the test piece

4 System-related characteristics

System-related characteristics with respect to multilayer systems, sheets for single layer application, mechanically fastened systems and roof gardens or under heavy protection are given in Annex A.

5 Product characteristics

5.1 General

5.1.1 Where a tolerance is limited by this standard it does not have to be declared by the manufacturer.

5.1.2 When tested for purposes other than initial type testing or factory production control, the tests to determine product characteristics indicated in this standard shall be started within 1 month of delivery from the manufacturer.

5.2 Characteristics

5.2.1 Visible defects

The product shall be free of visible defects, as determined in accordance with EN 1850-1.

5.2.2 Dimensions, tolerances and mass per unit area

The length, width and straightness of the sheet shall be determined in accordance with EN 1848-1. The length and width shall not be shorter than the manufacturer's limiting value. The maximum deviation from straightness shall not exceed 20 mm per 10 m length or in proportion for other lengths (e.g. 10 mm per 5 m length).

Where a product is specified by mass per unit area, it shall be measured in accordance with EN 1849-1, except that the sample shall be 100 mm × 100 mm, and the results shall lie within the declared tolerance of the manufacturer's declared value.

Where a product is specified by thickness, it shall be measured in accordance with EN 1849-1 and the results shall lie within the declared tolerance of the manufacturer's declared value.

Where sheets with incorporated mineral protection are specified by thickness, the measurement of thickness may be carried out on the granule-free selvedge. This shall be declared in the report.

5.2.3 Watertightness

The watertightness shall be determined in accordance with EN 1928:2000 using method A or B at an applied water pressure of 10 kPa (0,1 bar) and shall give a pass result.

5.2.4 Effects of water

Not specified.

NOTE Experience has shown that water has little or no effect upon the in-service performance of reinforced bitumen sheets. See also Annex C.

5.2.5 Fire performance

5.2.5.1 External fire performance

Where the manufacturer wishes to declare external fire performance (e.g. when subject to regulatory requirements), the product shall be tested and classified in accordance with [A1] EN 13501-5 [A1]. Where the defined system meets the deemed to satisfy criteria[1] no testing is required.

[A2] *deleted text* [A2]

5.2.5.2 Reaction to fire

Where required, the product shall be tested and classified in accordance with EN 13501-1:2002, Table 1. When tested according to EN ISO 11925-2, the products shall be tested under conditions of surface flame attack.

NOTE It is currently considered that the Euroclasses Classification system at Classes D and above requires investigation to determine its appropriateness to the products covered by this document (the SBI test may be inappropriate for products covered by the standard). Pending results of such an investigation and discussions in the Fire Regulators Group, products covered by this document are tested to EN ISO 11925-2. If and when a new fire test scenario and test method are developed for the products, this document will be amended to refer to them.

[A2] Reaction to fire is by definition a product test, as distinct from Resistance to fire, which is a system test. Therefore, it is considered important to provide guidance in order to reduce the number of tests required.

According to EN ISO 11925-2, the test is required to be undertaken on the exposed surface without any substrate, in one direction only, and the reinforcement has to be stated by the manufacturer as “organic” or “inorganic”.

a) Test results from EN ISO 11925-2 for a product with a given reinforcement and a bituminous compound having a certain percentage of organic content shall apply to the same product having a lower organic content.

b) Test results from EN ISO 11925-2 for a product with a given organic reinforcement and a bituminous compound shall apply to a product having the same bituminous compound and an inorganic reinforcement.

c) Test results from EN ISO 11925-2 for a product with a given reinforcement and bituminous compound, with a thickness of above 2 mm or a mass per unit area of above 2 kg/m², shall apply to any product with the same type of reinforcement and the same type of bituminous compound but lower thickness or mass per unit area, down to a limit of 2 mm or 2 kg/m² respectively.

d) Test results from EN ISO 11925-2 for a product with a given reinforcement and bituminous compound , with a thickness or mass per unit area below 2 mm or 2kg/m², shall apply to any product with the same type of reinforcement and the same type of bituminous compound but with higher thickness or mass per unit area, up to a limit of 2 mm or 2 kg/m² respectively. [A2]

[1] See Commission Decision 2000/553/EC [5]

5.2.6 Resistance to hail

Not specified.

NOTE Experience has shown that hail has little or no effect upon the in-service performance of reinforced bitumen sheets.

5.2.7 Watertightness after stretching at low temperature

Where required, the watertightness after stretching at low temperature shall only be determined for mechanically fastened single layer applications in accordance with EN 13897 and the results shall be greater than or equal to the manufacturer's limiting value.

5.2.8 Joint strength

5.2.8.1 The peel resistance of joints shall only be determined for mechanically fastened single layer applications in accordance with EN 12316-1 and the results shall lie within the declared tolerance of the manufacturer's declared value.

5.2.8.2 The shear resistance of joints shall be determined for all single layer applications in accordance with EN 12317-1 and the results shall lie within the declared tolerance of the manufacturer's declared value.

5.2.9 Water vapour properties

If necessary, the moisture resistance factor μ of reinforced bitumen sheets may be determined in accordance with EN 1931. If the factor μ is not determined, a value of 20 000 may be used for calculation purposes.

5.2.10 Tensile properties

The tensile properties shall be determined in accordance with EN 12311-1 and the results (for the longitudinal and transverse directions) shall lie within the declared tolerance of the manufacturer's declared value.

5.2.11 Resistance to impact

〚A2〛 Where required, the resistance to impact shall be determined in accordance with EN 12691 and shall be expressed as the maximum drop height of the puncturing tool in millimetres, which has not caused leakage of the flexible sheet, which shall be greater than or equal to the manufacturer's limiting value.

Products shall be tested in accordance with EN 12691, method A.

Where subject to regulatory requirements or where the manufacturer wishes to make such a declaration, products shall also be tested in accordance with EN 12691, method B.

The method(s) used shall be stated in the product data sheet. 〚A2〛

5.2.12 Resistance to static loading

The resistance to static loading shall be determined in accordance with EN 12730:2001, method A and shall be greater than or equal to the manufacturer's limiting value.

5.2.13 Resistance to tearing (nail shank)

The resistance to tearing (nail shank) shall be determined in accordance with EN 12310-1 and the results shall lie within the declared tolerance of the manufacturer's declared value.

5.2.14 Resistance to root penetration

The resistance to root penetration shall be determined only for products used as root barriers in roof gardens in accordance with prEN 13948 and shall give a pass result.

5.2.15 Dimensional stability

The dimensional stability shall be determined in accordance with EN 1107-1 and shall be less than or equal to the manufacturer's limiting value. This test shall only be carried out on sheets containing organic fibres or synthetic fibres (e.g. jute, hessian, polyester, polyolefines).

5.2.16 Form stability under cyclic temperature change

The form stability under cyclic temperature change shall be determined only for sheets with metal foil surfacing in accordance with EN 1108 and shall be less than or equal to the manufacturer's limiting value.

5.2.17 Flexibility at low temperature (pliability)

The flexibility at low temperature shall be determined in accordance with EN 1109 and shall be less than or equal to the manufacturer's limiting value.

NOTE This test does not give results directly corresponding to the application conditions in practice. Results should only be used to compare products of similar thickness and construction.

〚A2〛 In the case of sheets with the same bituminous compound on both sides and where the reinforcement is placed in the cross section visually closer to the upper surface, the test shall be performed on the bottom face only.

If the upper surface is covered with a non- woven (e.g. tissue, fleece etc.) or metal facing the test shall be performed on the bottom side only.

If the sheet on the upper surface is covered with permanent light surface protection and where the reinforcement is placed in the cross section visually closer to the upper surface the test shall be performed on the bottom side only. 〚A2〛

5.2.18 Flow resistance at elevated temperature

The flow resistance at elevated temperature shall be determined in accordance with EN 1110 and shall be greater than or equal to the manufacturer's limiting value.

5.2.19 Artificial ageing behaviour

5.2.19.1 Top layers and single layers with permanent light surface protection

In order to verify the artificial ageing behaviour of the product, characteristics shall be determined before and after exposure in accordance with EN 1296 for a period of 12 weeks. The relevant characteristics are the flexibility at low temperature or the flow resistance at elevated temperature. The flexibility at low temperature shall be determined in accordance with EN 1109 (see 5.2.17) and the results shall lie within the declared tolerance of the manufacturer’s declared value. The flow resistance at elevated temperature shall be determined in accordance with EN 1110 (see 5.2.18) and the results shall lie within the declared tolerance of the manufacturer’s declared value.

NOTE 1 The purpose of testing in accordance to EN 1296 is to characterize the long-term thermal stability of elastomeric or plastomeric bitumen. The test does not give results corresponding to the service conditions in practice. Results should only be used to compare products of similar thickness, construction and composition, and they cannot be used for general durability classification. The chosen exposure duration for artificial ageing in accordance to EN 1296 has no relevance to a real product lifetime.

NOTE 2 When reinforced oxidized bitumen roofing sheets are tested as described in this sub-clause they become brittle and have poor low temperature flexibility. However, experience shows that when they are reinforced and protected properly, they perform satisfactorily in the long term.

5.2.19.2 Top layers and single layers without surface protection

Materials used as top layers without permanent surface protection (e.g. mineral granules, metal foil, gravel or any additional protection) shall be tested in addition to EN 1296 according to 5.2.19.1 by the method for artificial ageing by long-term exposure to the combination of UV radiation, elevated temperature and water in accordance with EN 1297 for a period of 1 000 h UV exposure and evaluated for visual defects in accordance with EN 1850-1.

5.2.19.3 Top layers with permanent heavy surface protection, underlayers and intermediate layers

Top layers with permanent heavy surface protection (e.g. with loose-fill gravel), underlayers and intermediate layers are not subject to testing of artificial ageing behaviour.

5.2.20 Adhesion of granules

Where the top surface of the sheet is protected with incorporated mineral granules the granule adhesion shall be determined in accordance with EN 12039 and the results shall lie within the declared tolerance of the manufacturer's declared value and shall not exceed 30 % by mass of granules.

5.3 Dangerous substances

For products placed on the market within the European Economic Area see ZA.1. Outside the EEA products shall conform to any applicable provisions related to dangerous substances valid in the place of use.

Bitumen sheets covered by this standard shall not contain asbestos or coal tar constituents. The manufacturer shall disclose on the product wrapper and in the health and safety data sheets the use of any additive or constituent considered hazardous.

NOTE See also [3] and [4].

6 Evaluation of conformity

6.1 General

The compliance of the product with the requirements of this document and with the stated values (including classes) shall be demonstrated by:

— initial type testing;

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

For the purposes of testing, products may be grouped into families, where it is considered that the selected property is common to all products within that family.

6.2 Initial type testing

6.2.1 General

Initial type testing shall be performed to show conformity with this document. Tests previously performed in accordance with the provisions of this document (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 product type (unless a member of the same family) or at the beginning of a new method of production (where this may affect the stated properties).

All characteristics in Clause 5 shall be subject to initial type testing, where relevant.

Whenever a change occurs in the product design, the raw material or 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 initial type tests shall be performed for the appropriate characteristic(s).

6.2.2 Sampling

Samples shall be taken according to EN 13416. The minimum number of tests to show compliance for type testing shall be one for all characteristics.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an 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.

An FPC system conforming with the requirements of EN ISO 9001, and made specific to the requirements of this 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.

6.3.2 Frequency of testing

Minimum frequencies of testing for factory production control are shown in Table B.1.

7 Product data sheet

The characteristics of the product, determined in accordance with the test methods specified in this document, shall be listed in a technical data sheet. The technical data sheet shall also give the following information:

a) product trade name and manufacturer's name;

b) origin/source of manufacture or traceable code;

c) method of application;

d) results of tests (see also Table A.1) according to intended end use system where relevant;

e) certification mark, if any;

f) consumer information, e.g. restrictions concerning use and storage and safety precautions during installation and disposal;

g) description of the product (e.g. type and number of carriers, type of coating, mass or thickness, type of surfacing).

An example of a product data sheet is shown in Annex D.

8 Marking, labelling and packaging

The following information shall be indicated on each roll and/or in the accompanying technical or commercial documentation:

a) production date or identification number;

b) product trade name;

c) length and width;

d) thickness or mass;

e) labelling according to national regulations related to dangerous substances and/or health and safety.

A2 NOTE Where ZA.3 covers the same information as required by this clause, the requirements of this clause are met. A2

Annex A
(normative)

Applicability of characteristics

Table A.1 gives the characteristics to be tested depending on the roofing system.

Table A.1 — Roofing system-related characteristics

Sub-clause in this document	Testing for		A2 Multilayer system without permanent heavy surface protection (e.g. ballast) … A2		Sheets for single layer applications	A2 Sheets for roof gardens or sheets under permanent heavy surface protection (e.g. ballast) … A2
			Underlay and intermediate layer	Top layer		
5.2.1	Visible defects		+	+	+	+
5.2.2	Dimensions		+	+	+	+
5.2.3	Watertightness		+	+	+	+
5.2.5.1	External fire performance		+ a	+ a	+ a	–
5.2.5.2	Reaction to fire		+	+	+	+
5.2.7	Watertightness after stretching		–	–	+ b	–
5.2.8.1	Peel resistance		–	–	+ b	–
5.2.8.2	Shear resistance		–	–	+	+
5.2.9	Water vapour properties		– g	– g	– g	– g
5.2.10	Tensile properties		+	+	+	+
5.2.11	Resistance to impact		–	–	+	+
5.2.12	Resistance to static loading		–	–	+	+
5.2.13	Resistance to tearing (nail shank)		+ f	+ f	+ f	–
5.2.14	Resistance to root penetration		–	–	–	+ d
5.2.15	Dimensional stability		–	+	+	+
5.2.16	Form stability under cyclic temperature change		–	+ c	+ c	–
5.2.17	Flexibility at low temperature		+	+	+	+
5.2.18	Flow resistance at elevated temperature		+	+	+	+
5.2.19	Artificial ageing behaviour	EN 1296	–	+	+	–
		EN 1297	–	+ e	+ e	–
5.2.20	Adhesion of granules		–	+	+	–

a system testing, to be performed where regulations require

b mechanically fastened system

c only for metal surfaced sheets

d only for root barriers in roof gardens

e without surface protection

f mechanically fastened layer

g determination according to EN 1931 or value of 20 000 may be used, see details in Clause 5.2.9

\+ necessary; – not necessary

Annex B
(normative)

Frequencies of testing for factory production control

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

Table B.1 — Frequencies of testing for factory production control

Product characteristic	Clause	Minimum frequencies of testing per			
		batch	week	month	year
Visible defects	5.2.1	1			
Length and width	5.2.2	1			
Straightness	5.2.2		1		
Mass per unit area or thickness	5.2.2	1			
Watertightness	5.2.3	$_{0}$ a, k			
External fire performance	5.2.5.1	$_{0}$ a, b, k			
Reaction to fire	5.2.5.2	$_{0}$ a, k			
Watertightness after stretching at low temperature	5.2.7				$_{1}$ h
Joint strength (peel resistance)	5.2.8.1	$_{0}$ a, h, k			
Joint strength (shear resistance)	5.2.8.2	$_{0}$ a, d, k			
Water vapour properties	5.2.9	$_{0}$ a,k			
Tensile properties	5.2.10			$_{1}$ c	
Resistance to impact	5.2.11	$_{0}$ a, k			
Resistance to static loading	5.2.12	$_{0}$ a, k			
Resistance to tearing (nail shank)	5.2.13				$_{1}$ c, e
Resistance to root penetration	5.2.14	$_{0}$ a, b, k			
Dimensional stability	5.2.15				$_{2}$ c
Form stability under cyclic temperature change	5.2.16				$_{1}$ i
Flexibility at low temperature (pliability)	5.2.17		$_{1}$ f, k		
Flow resistance at elevated temperature	5.2.18		$_{1}$ f, k		
Artificial ageing behaviour	5.2.19	$_{0}$ a, k			
Adhesion of granules	5.2.20			$_{1}$ g	

a Initial type testing.

b System test.

c In the case where a manufacturer is continuously producing numerous different sheets 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 sheets.

d Initial type testing only for single layer application.

e Only for applications with mechanical fastening.

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

Table B.1 (*concluded*)

g	In the case where a manufacturer is continuously producing numerous differently reinforced sheets with incorporated mineral protection or surfacing, whilst using the same type of coating, the frequency for this test may be considered on the total number of these different sheets.
h	Only for single layer applications with mechanical fastening.
i	Only for sheets with metal foil.
k	Control of the product is required, either by direct testing or by indirect control.
[A2] If a manufacturer uses for FPC indirect control the correlation to the direct test should have been established. [A2]	

Annex C
(informative)

Information about chemical resistance

Table C.1 describes the chemical resistance in contact with common substances.

Table C.1 — Chemical resistance of bitumen

Substance	Concentration %	Temperature ≤ 30 °C	Temperature ≤ 65 °C
Inorganic acids			
Sulphuric acid	< 25	+	+
	≥ 25 and ≤ 95	+	o
	> 95	–	–
Oleum		–	–
Nitric acid	< 10	+	o
	≥ 10 and ≤ 65	o	o
	> 65	–	–
Hydrochloric acid	< 25	+	+
	≥ 25 and ≤ 36	+	o
	> 36	o	–
Organic acids			
Formic acid	40	+	o
Benzoic acid		+	
Butyric acid		–	–
Acetic acid	25	+	+
Oleic acid		–	–
Oxalic acid		+	+
Phenols		–	–
Phthalic acid		+	
Tartric acid	< 25	+	+
	≥ 25	+	
Citric acid		+	+
Inorganic bases			
Ammonium hydroxide		+	+
Potassium hydroxide		+	o
Sodium hydroxide		+	o
Organic bases			
Pyridine and derivatives		–	–
Triethanolamin		+	

Table C.1 (*concluded*)

Substance	Concentration %	Temperature ≤ 30 °C	Temperature ≤ 65 °C
Salt solutions			
Chlorides		+	+
Nitrates		+	+
Sulphates		+	+
Different substances			
Drinking water		+	+
Beer		+	
Glycol		+	+
Molasses		+	+
Sugar		+	+
Soap solution		+	+
Liquid manure		+	
Sewage		o	o

Reaction period 30 days;

Key:

+ stable;

o not stable in all cases – to be checked;

– unstable.

Table C.2 — Chemical resistance of bitumen depending on concentration and reaction period at room temperature

Substance	Concentration %	Solid bitumen for traffic area building				Oxidized bitumen
		Types 20/30 and 35/50				
		6 months	1 year	1,5 years	2 years	5 years
Inorganic acids						
Hydrochloric acid	up to 10	+	o		–	+
	10 to 30	o	o		–	+
Sulphuric acid	up to 10	+		o	–	+
	10 to 50	o	–			+
Nitric acid	10 to 25	–	–			o
	25 to 50	–	–			–
Organic acids						
Lactic acid		–				+
Butyric acid		–				+

Key:

\+ no attack;

0 low attack;

\- strong attack.

Annex D
(informative)

Example of a product data sheet

D.1 General information

— Date and reference of this technical data sheet.

— Product trade name.

— Manufacturer/supplier.

— Origin/source of manufacturing.

— Type of application.

— Method of application.

— Product performance[2)] (see Table D.1).

— Certification mark, where relevant.

— Consumer information[3)],

— Description of the product (e.g. type and number of carriers, type of coating, mass or thickness, type of surfacing).

Table D.1 — Information from testing

Characteristic	Test method/classification	Units	Expression of result[a]	Value or statement[b]
Visible defects	EN 1850-1	–	Visible defects	
Length	EN 1848-1	m	MLV	
Width	EN 1848-1	m	MLV	
Straightness	EN 1848-1	–	Pass	–
Mass per unit area	EN 1849-1	kg/m²	MDV	
Thickness	EN 1849-1	mm	MDV	
Watertightness	EN 1928:2000, Method A or B	–	Pass	–
Watertightness after stretching at low temperature	EN 13897	%	MLV	

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

3) e.g. restrictions concerning use and storage and safety precaution during installation and disposal.

Table D.1 (*concluded*)

Characteristic	Test method/ Classification	Units	Expression of result[a]	Value or statement[b]
External fire performance	ENV 1187	–	In accordance with ▌A1⟩ EN 13501-5 ⟨A1▐	The details of the system(s) which were tested, of which the roofing sheet is a part, shall be given
Reaction to fire	EN 13501-1	–	EN 13501-1 (see NOTE in 5.2.5.2)	
Peel resistance of joint	EN 12316-1	N/50 mm	MDV	
Shear resistance of joint	EN 12317-1	N/50 mm	MDV	
Tensile properties: maximum tensile force	EN 12311-1	N/50 mm	MDV	
Tensile properties: elongation	EN 12311-1	%	MDV	
Resistance to impact	EN 12691	mm	MLV	
Resistance to static loading	EN 12730	Kg	MLV	
Resistance to tearing (nail shank)	EN 12310-1	N	MDV	
Resistance to root penetration	prEN 13948	–	Pass	–
Dimensional stability	EN 1107-1	%	MLV	
Form stability under cyclic temperature change	EN 1108	mm	MLV	
Flexibility at low temperature	EN 1109	°C	MLV	
Flow resistance at elevated temperature	EN 1110	°C	MLV	
Artificial ageing by long term exposure to elevated temperature	EN 1296	See EN 1109 or EN 1110	MDV	
Artificial ageing by long term exposure to the combination of UV radiation, elevated temperature and water	EN 1297	See EN 1850-1	Pass	–
Adhesion of granules	EN 12039	%	MDV	
Water vapour transmission properties	EN 1931	–	μ = MDV or 20 000	

[a] MLV: manufacturer's limiting value according to 3.9; MDV: manufacturer's declared value according to 3.10.

[b] To be completed by the manufacturer.

– not relevant.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives.

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under mandate M/102 Flexible sheets for waterproofing (as amended) 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 a presumption of fitness of the bitumen sheets covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the bitumen sheets falling within the scope of this European Standard.

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

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through ▌A2⟩ http://ec.europa.eu/enterprise/construction/internal/dangsub/dangmain_en.htm ⟨A2▐).

The following clauses of this European Standard meet the requirements of the Mandate M/102 and its amendments M/126 and M/130 given under the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to construction products (89/106).

Clauses with reference to the mandate for membranes:

— Clause 1 Scope;

— Clause 2 Normative references regarding tests for mandated characteristics;

— Clause 3 Definitions;

— Clause 5 Product characteristics indicated in Table ZA.1;

— Clause 6 Evaluation of conformity.

Table ZA.1 — Characteristics meeting Mandate M 102 given under CPD

Essential characteristics	Requirement clauses in this EN	Levels and/or classes	Notes
External fire performance	5.2.5.1	Classes in accordance with ⟨A1⟩ EN 13501-5 ⟨A1⟩ or deemed to satisfy	To comply with regulatory requirements
Reaction to fire	5.2.5.2	Classes in accordance with EN 13501-1	See NOTE in 5.2.5.2
Watertightness	5.2.3	–	Threshold value
Tensile strength	5.2.10	–	
Root resistance	5.2.14	–	Only for products used as root barriers in roof gardens
Resistance to static loading	5.2.12	–	
Resistance to impact	5.2.11	–	
Resistance to tearing	5.2.13	–	
Joint strength	5.2.8.1	–	Only for mechanically fastened single layer applications
	5.2.8.2	–	Only for single layer application
Durability	5.2.19.1	–	Top layers with permanent light protection and single layers
	5.2.19.2	–	Top layers and single layers without surface protection
	5.2.19.3	–	Top layers with permanent heavy surface protection, underlayers and intermediate layers
Pliability	5.2.17	–	
Dangerous substances	5.3	–	See relevant note in ZA.1
– means that no classes or levels are given by the mandate.			

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 Member States are not obliged either to determine nor to 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.

ZA.2 Procedure for attestation of conformity

ZA.2.1 Systems of attestation of conformity

The systems of attestation of conformity of bitumen sheets indicated in Table ZA.1, in accordance with the Decision of the Commission as given in annex III of the mandate M/102, are shown in Table ZA.2 for the indicated intended use and relevant classes.

Table ZA.2 — Systems of attestation of conformity

Product	Intended use	Level(s) or class(es)	Attestation of conformity systems[a]
Reinforced bitumen sheets	Roof waterproofing subject to reaction to fire	(A1, A2, B, C)*	1
		(A1, A2, B, C)**, D, E	3
		F	4
	Roof waterproofing subject to external fire performance	⟦A1⟩ EN 13501-5 ⟨A1⟧ for products requiring testing	3
		Class F_{ROOF} products	4
	Roof waterproofing[b]	-	2+

a System 1: See Directive 89/106/EEC (CPD) Annex III.2(i) without audit-testing of samples

System 2+: See CPD Annex III.2.(ii), First possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control

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

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

* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic materials)

** Products/materials not covered by footnote (*)

[b] Because all roofing sheets have a requirement on watertightness, all products covered by this standard come under attestation system 1 or 2+. System 3 and 4 indicate only that the characteristics 'reaction to fire' and/or 'external fire performance' are either tested by a notified test laboratory or are not tested at all.

For products under attestation of conformity system 2+, the characteristics external fire performance and reaction to fire shall be subject to initial type testing by a notified test laboratory under the responsibility of the manufacturer.

For products under attestation of conformity system 2+, for the initial inspection of the factory and of the factory production control (FPC), and for the continuous surveillance, assessment and approval of FPC, parameters related to relevant characteristics of Table ZA.1, in particular watertightness, shall be of interest to the notified FPC certification body.

Initial type testing of the relevant characteristics of Table ZA.1, carried out by the manufacturer, or by a notified test laboratory in the case of reaction to fire and external fire performance, shall be in accordance with the provisions of 6.2. The manufacturer shall operate a factory production control system in accordance with the provisions of 6.3. The systems of attestation of conformity are shown in tabular form in Tables ZA 3.1 and ZA.3.2.

Table ZA.3.1 — Assignment of evaluation of conformity tasks for bitumen sheets under system 1

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 relevant characteristics of Table ZA.1	6.3
	Initial type testing by the manufacturer	All relevant characteristics of Table ZA.1 except reaction to fire and external fire performance	6.2
	Initial type testing by a notified test laboratory	External fire performance where testing is required	6.2
Tasks under the responsibility of the product certification body	Initial inspection of factory and of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular reaction to fire and watertightness	6.3
	Continuous surveillance, assessment and approval of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular reaction to fire and watertightness	6.3
	Initial type testing	Reaction to fire Classes (A1, A2, B, C)*	6.2

Table ZA.3.2 — Assignment of evaluation of conformity tasks for bitumen sheets under system 2+

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 relevant characteristics of Table ZA.1	6.3
	Initial type testing by the manufacturer		All relevant characteristics of Table ZA.1 except reaction to fire and external fire performance	6.2
	Initial type testing by a notified test laboratory		Classification – Reaction to fire (A1, A2, B, C)**, D, E (see Note in 5.2.5.2) – External fire performance for products requiring testing	6.2
Tasks for the notified body	Certification of FPC on the basis of	Initial inspection of factory and of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular watertightness	6.3
		Continuous surveillance, assessment and approval of FPC	Parameters related to all relevant characteristics of Table ZA.1, in particular watertightness	6.3

ZA.2.2 EC Certificate and declaration of conformity

When compliance with the conditions of this annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

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

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

— provisions to which the product conforms (i.e. annex ZA of this document);

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

— the number of the accompanying product certificate or factory production control certificate;

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

The declaration shall be accompanied by either a product certificate (products under system 1) or a factory production control certificate (products under system 2+), drawn up by the notified body, which shall contain, in addition to the information above, the following:

— name, address and identification number of the notified body;

— the number of the product certificate or factory production control certificate;

— conditions and period of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

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

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC. The CE marking symbol, the number of the EC product certificate or certificate of factory production control and the information required by Clause 8 (except 8a)) shall be shown on a label attached to the product.

The CE marking symbol shall also appear on the accompanying commercial (technical) documentation, together with the following:

— identification number of the certification body;

— name or identifying mark and registered address of the producer;

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

— the number of the EC product certificate or certificate of factory production control;

— reference to this European Standard;

- a description of the product: the information required by Clause 8 (except 8a)), type of carrier, type of coatings, type of surfacing, and the intended method of installation;
- information on the relevant characteristics in Table ZA.1, namely:
  - values and, where relevant, the class to declare for each relevant characteristic,
  - characteristics against which the “No performance determined” (NPD) option (or Class F for reaction to fire or Class F_{ROOF} for external fire performance) is relevant.

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.

Figure ZA.1 gives an example of the information to be given on the accompanying commercial (technical) documentation.

CE 01234	CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC. Identification number of the certification body
AnyCo Ltd, PO Box 21, B-1050 **04** 01234-CPD-00234	Name or identifying mark and registered address of the producer Last two digits of the year in which the marking was affixed Certificate number
EN 13707 1 m × 5 m × 4 mm, polyester non-woven, elastomeric modified bitumen, fine mineral and polymeric sheeting, torchable only. Top layer, not for single layer application, not for roof gardens. External fire performance: B_{ROOF} (t2) see manufacturer's document XYZ* Reaction to fire: F Tensile strength in longitudinal direction: 700 N/50 mm ± 50 N/50 mm Tensile strength in transverse direction: 500 N/50 mm ± 50 N/50 mm Elongation: 30 % ± 3 % Resistance to static loading: 20 kg Resistance to impact: 〈A2〉 700mm (Method A) 〈A2〉 Tear resistance: 500 N ± 50 N Pliability: –20 °C Durability: –10 °C ± 5 °C Watertightness: Pass Root resistance: NPD	No. of European Standard Description of product and information on regulated characteristics * This document to contain details of the system(s), of which the roofing sheet is a part, which were tested

Figure ZA.1 — Example CE marking information to be given on the accompanying commercial (technical) documentation, for a product in reaction to fire Class F

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] Guidance paper F "Durability and the Construction Products Directive".

[2] Guidance paper D "CE marking under the Construction Products Directive".

[3] Guidance paper H "A harmonized approach to dangerous substances under the Construction Products Directive".

[4] Essential Requirements (ER) n° 3 "Hygiene, health and environmental protection" of the Council Directive of 21 December 1988 on the approximation of laws, regulations and administrative provisions of the Member States relating to constructions products (89/106/EEC).

[5] Commission Decision 2000/553/EC of 6 September 2000 implementing Council Directive 89/106/EEC as regards the external fire performance of roof coverings (notified under document number C (2000) 2266) (Text with EEA relevance) Official Journal L 235, 19/09/2000 p. 0019–0022.

[6] ENV 1187, *Test methods for external fire exposure to roofs.*

[7] prEN 14695, *Flexible sheets for waterproofing — Reinforced bitumen sheets for waterproofing of concrete bridge decks and other concrete surfaces trafficable by vehicles — Definitions and characteristics*

[8] EN ISO 9001, *Quality management systems — Requirements (ISO 9001:2000).*