BS EN 13108-3:2016

BSI Standards Publication

Bituminous mixtures — Material specifications

Part 3: Soft Asphalt

bsi.

National foreword

This British Standard is the UK implementation of EN 13108-3:2016. It supersedes BS EN 13108-3:2006 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/510/1, Asphalt products.

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.

Published by BSI Standards Limited 2016

ISBN 978 0 580 82050 2

ICS 93.080.20

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 June 2016.

Amendments/corrigenda issued since publication

Date	Text affected

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13108-3

June 2016

ICS 93.080.20

Supersedes EN 13108-3:2006

English Version

Bituminous mixtures - Material specifications - Part 3: Soft Asphalt

Mélanges bitumineux - Spécifications des matériaux - Partie 3: Soft Asphalt

Asphaltmischgut - Mischgutanforderungen - Teil 3: Softasphalt

This European Standard was approved by CEN on 27 February 2016.

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-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword

This document (EN 13108-3:2016) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

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 2016, and conflicting national standards shall be withdrawn at the latest by March 2018.

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 13108-3:2006.

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 Regulation (EU) No 305/2011 for construction products (CPR).

For relationship with Regulation (EU) No 305/2011, see informative Annex ZA which is an integral part of this document.

Compared with EN 13108-3:2006, the following changes have been made:

a) possibility to define specific conditions in documents related to the application of the product;

b) CPR reference and new Annex ZA according CPR rules.

This European Standard is one of a series as listed below:

— EN 13108-1, *Bituminous mixtures — Material specifications — Part 1: Asphalt Concrete*

— EN 13108-2, *Bituminous mixtures — Material specifications — Part 2: Asphalt Concrete for Very Thin Layers (BBTM)*

— EN 13108-3, *Bituminous mixtures — Material specifications — Part 3: Soft Asphalt*

— EN 13108-4, *Bituminous mixtures — Material specifications — Part 4: Hot Rolled Asphalt*

— EN 13108-5, *Bituminous mixtures — Material specifications — Part 5: Stone Mastic Asphalt*

— EN 13108-6, *Bituminous mixtures — Material specifications — Part 6: Mastic Asphalt*

— EN 13108-7, *Bituminous mixtures — Material specifications — Part 7: Porous Asphalt*

— EN 13108-8, *Bituminous mixtures — Material specifications — Part 8: Reclaimed Asphalt*

— EN 13108-9, *Bituminous mixtures — Material specifications — Part 9: Asphalt for Ultra-Thin Layer (AUTL)*

— EN 13108-20, *Bituminous mixtures — Material specifications — Part 20: Type Testing*

— EN 13108-21, *Bituminous mixtures — Material specifications — Part 21: Factory Production Control*

Annex A (normative) details the calculation of the viscosity, penetration or the softening point in mixtures containing reclaimed asphalt from the viscosity, penetrations or softening points of the added binder and the recovered binder from the reclaimed asphalt.

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

Introduction

The aim of this European Standard is to enable specification of Soft Asphalt mixtures on a performance basis. In general, however, there are currently more empirical tests available to describe the mixtures. Depending on the experience with the combination of requirements in this European Standard more or less degrees of freedom for the producer may be given.

This European Standard covers a large variety of materials for different applications, traffic and climate conditions. EN 13108-3 gives properties and listings of possible categories. It has to accommodate the road industry for all of Europe. For this reason the menu approach for properties has been chosen. The tables represent categories that are required all over Europe. For this reason numerical values in tables do not always obey statistical rules. Based on conditions of use specific properties and categories may be defined in documents related to the application of the product. The categories defined in those documents need to take into account the reproducibility of the test when this is given in the appropriate test method.

Care should be taken to only select those tests which are relevant to the application of the Soft Asphalt and the use of the pavement and to avoid a combination of potentially conflicting requirements.

1 Scope

This European Standard specifies requirements for mixtures of the mix group Soft Asphalt for use on low volume roads and roads with low stability. Soft Asphalt is used for surface courses, regulating courses and bases in colder climates.

The mixtures of the mix group Soft Asphalt are produced on the basis of hot bitumen. Mixtures utilizing bitumen emulsion and bituminous materials based on *in situ* recycling are not covered by this standard.

This European Standard includes requirements for the selection of the constituent materials. It is designed to be read in conjunction with EN 13108-20 and EN 13108-21.

2 Normative references

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

EN 1097–6:2013, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

EN 1426, *Bitumen and bituminous binders — Determination of needle penetration*

EN 1427, *Bitumen and bituminous binders — Determination of the softening point — Ring and Ball method*

EN 12591, *Bitumen and bituminous binders — Specifications for paving grade bitumens*

EN 12595, *Bitumen and bituminous binders — Determination of kinematic viscosity*

EN 12596, *Bitumen and bituminous binders — Determination of dynamic viscosity by vacuum capillary*

EN 12697-3, *Bituminous mixtures — Test methods for hot mix asphalt — Part 3: Bitumen recovery: Rotary evaporator*

EN 12697-4, *Bituminous mixtures — Test methods — Part 4: Bitumen recovery: Fractionating column*

EN 12697-8, *Bituminous mixtures — Test methods for hot mix asphalt — Part 8: Determination of void characteristics of bituminous specimens*

EN 12697-12, *Bituminous mixtures — Test methods for hot mix asphalt — Part 12: Determination of the water sensitivity of bituminous specimens*

EN 12697-13, *Bituminous mixtures — Test methods for hot mix asphalt — Part 13: Temperature measurement*

EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*

EN 13108-8, *Bituminous mixtures — Material specifications — Part 8: Reclaimed asphalt*

EN 13108-20:2016, *Bituminous mixtures — Material specifications — Part 20: Type Testing*

EN 13108-21, *Bituminous mixtures — Material specifications — Part 21: Factory Production Control*

EN 13501-1:2007+A1:2009, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

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

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.1.1
pavement
structure, composed of one or more courses, to assist the passage of traffic over terrain

3.1.2
layer
element of a pavement laid in a single operation

3.1.3
course
element of a pavement constructed with a single material

Note 1 to entry: A course can be laid in one or more layers.

3.1.4
surface course
upper course of the pavement, which is in contact with the traffic

3.1.5
regulating course
course of variable thickness applied to an existing course or surface to provide the necessary profile for a further course of consistent thickness

3.1.6
base
main structural element of a pavement

Note 1 to entry: The base can be laid in one or more courses, described as “upper” base, “lower” base.

3.1.7
asphalt
homogenous mixture of coarse and fine aggregates, filler aggregate and bituminous binder which is used in the construction of a pavement

Note 1 to entry: The asphalt can include one or more additives to enhance the laying characteristics, performance or appearance of the mixture.

3.1.8
Soft Asphalt
asphalt in which the aggregate particles are continuously graded or open-graded to form an interlocking structure with soft bitumen grades not harder than 250/330

3.1.9
mix formulation
composition of a single mixture expressed as a target composition

Note 1 to entry: A target composition is expressed in two ways (see 3.1.10 and 3.1.11).

3.1.10
input target composition
expression of a mix formulation in terms of the constituent materials, the grading curve and the percentage of bitumen added to the mixture

Note 1 to entry: This will usually be the result of a laboratory mix design and validation.

3.1.11
output target composition
expression of a mix formulation in terms of the constituent materials and the mid point grading and soluble binder content to be found on analysis

Note 1 to entry: This will usually be the result of a production validation.

3.1.12
additive
constituent material that can be added in small quantities to influence specific properties of the mixture

Note 1 to entry: For example additives are used to influence the affinity of binder to aggregate, and the mechanical properties when using inorganic and organic fibres and polymers. They are also used to influence the colour of the mixture.

3.1.13
conflicting requirements
combination of requirements or properties which are impracticable to fulfil in their entirety

Note 1 to entry: This can occur by combining specific requirements for the composition and constituent materials together with more performance related tests. These are also relevant when two or more performance or test parameters are selected which measure similar properties using conflicting test methods resulting in a lack of clarity and consistency in the characteristics of the mixture.

3.1.14
premixed binder
bitumen which is blended on the site of the asphalt mixing plant, with an additive before or during the addition of the binder to the plant mixer, which in the case of a continuous plant, will be before or during the delivery of the binder to the mixing zone of the drier drum

3.1.15
category
defined level of a property of an asphalt mixture

Note 1 to entry: The designation of a category is expressed with a symbol and a numerical value representing the level.

EXAMPLE $B_{\text{min } 4,0}$ means that the minimum binder content shall be 4,0 %.

Note 2 to entry: Defined categories for each property are listed in EN 13108–3.

3.1.16
class
range of levels defined by a minimum and a maximum value

3.2 Symbols and abbreviations

SA general designation of Soft Asphalt;

SA *D* designation of Soft Asphalt followed by an indication of *D*, the upper sieve size of the aggregate in the mixture, in millimetres (mm).

EXAMPLE SA 16 Soft Asphalt with upper sieve size of 16 mm.

d dense (continuously) graded aggregate;

o open graded aggregate.

4 Requirements for constituent materials

4.1 General

Only constituent materials with established suitability shall be used. For all constituent materials information on the relevant properties shall be made available.

The establishment of suitability shall result from one or more of the following:

— European Standard,

— European Technical Assessment,

— Specifications for materials based on a demonstrable history of satisfactory use in asphalt. Evidence shall be based on research and/or the evidence of satisfactory practical use. In documents related to the application of the product details for the assessment of this proof may be defined.

There can be technical limitations regarding the future recycling possibilities. Also traceability of the nature of constituent materials can affect the potential for future recycling.

4.2 Binder

4.2.1 General

The binder shall be a paving grade bitumen and shall conform to EN 12591. Premix binders and other bituminous binders that are not covered by EN 12591 can be used provided that information is given as stated in 4.1, and that the base bitumen is conforming to EN 12591. The use of these binders may be defined in documents related to the application of the product.

4.2.2 Selection of binder

4.2.2.1 General

Depending on the conditions of use, the type and grade of bitumen may be defined in documents related to the application of the product.

The bitumen shall be selected from the grades between 250/330 and 650/900 or between V1500 and V12000 inclusively.

When an additive is used to lower the production temperature of the Soft Asphalt and thereby changes relevant properties of the binder at temperatures representative for the climatic conditions in the place

of use, evidence shall be provided to show what the influence of the additive is on the performance of the mix. This proof shall be based on research or evidence of satisfactory performance according to 4.1.

4.2.2.2 Mixtures with reclaimed asphalt

When using more than 10 % by mass of the total mixture of reclaimed asphalt from mixtures in which mainly paving grade bitumen has been used and when the binder added to the mixture is a paving grade bitumen and the grade of the bitumen is selected, the following requirement may be defined in documents related to the application of the product.

The viscosity and/or the softening point and/or the penetration of the binder in the resulting mixture, calculated from the viscosity and/or the softening point and or the penetration of the added binder and the recovered binder from the reclaimed asphalt, shall meet the viscosity and/or softening point and/or penetration requirements of the specified grade. The calculation shall be performed according to Annex A (normative). In some cases the binder of the reclaimed asphalt can be so hardened that a very soft bitumen shall be chosen to fulfil these requirements. In such cases an alternative grade to that calculated according to Annex A (normative) may be defined.

NOTE The choice for this specification depends on the choice of requirements with in this European Standard. For more performance designed mixes there might be no need to apply the viscosity requirement and/or softening point rule. However, the viscosity requirement or softening point rule is only valid for paving grade bitumen.

4.3 Aggregates

4.3.1 Coarse aggregate

Coarse aggregate shall conform to EN 13043 as appropriate for the intended use.

4.3.2 Fine aggregate

Fine aggregate shall conform to EN 13043 as appropriate for the intended use.

4.3.3 All-in aggregates

All-in aggregate shall conform to EN 13043 as appropriate for the intended use.

4.3.4 Added filler

Added filler shall conform to EN 13043 as appropriate for the intended use and may include materials such as cement, limestone and hydrated lime. Based on the experience in the place of use the type and amount of added filler may be defined in documents related to the application of the product.

NOTE The expression "as appropriate for the intended use" in 4.3.1 to 4.3.4 means that the selection of the requirements and the particular category depends on a number of conditions. These conditions include traffic density, climatic conditions, the construction of the course in which the mixture will be used and economic considerations.

4.4 Reclaimed asphalt

The use and the amount of reclaimed asphalt and the mix group and/or the courses from which the reclaimed asphalt has been or will be derived may be defined in documents related to the application of the product.

The properties of reclaimed asphalt declared in accordance with EN 13108-8 shall conform to requirements that may be selected appropriate for the intended use.

NOTE The expression "appropriate for the intended use" means that the selection of the requirements and the particular category depends on a number of conditions. These conditions include traffic density, climatic conditions, the construction of the course in which the mixture will be used, and economic considerations.

The upper sieve size *D* of the aggregate in the reclaimed asphalt shall not exceed the upper sieve size *D* of the mixture. The aggregate properties of the reclaimed asphalt or of the mixed aggregates from the reclaimed asphalt with the other aggregates shall fulfil the requirements for aggregate defined in documents related to the application of the mixture.

When required, the amount of reclaimed asphalt, the mix group and/or the courses from which the reclaimed asphalt has been or will be derived shall be declared in the Type Test report.

4.5 Additives

The nature and properties of all additives shall be declared and they shall conform to the requirements referred to in 4.1. For specific applications and based on the experience in the place of use the amount of additives may be defined in documents related to the application of the product.

NOTE Chemical and organic additives can be used for example, to reduce production temperatures by influencing the viscosity of the binder. This might have an effect on other relevant mixture properties.

5 Requirements for the mixture

5.1 General

The mix formulation shall be declared in the Type Test report according to EN 13108-20, including:

— the target percentages passing the specified sieves; the target grading shall be declared for the sieves called up in Tables 1 to 10 where appropriate;

— the target binder content and where relevant, the binder content from reclaimed asphalt;

— and the percentage(s) of additive(s).

The target binder content comprises the total of added binder (including any additives in solution in the binder) and binder in reclaimed asphalt.

At the target composition the mixture shall conform to the specified requirements in accordance with this European Standard.

The test results in accordance with EN 13108-20:2016, 7.5, shall be made available.

5.2 Composition, grading and binder content

5.2.1 Composition

The grading shall be expressed in percentages by mass of total aggregate. The binder and additive content shall be expressed in percentages by mass of the total mixture. The percentages passing the sieves, with the exception of the sieve 0,063 mm shall be expressed to 1 %. The binder content, the percentage passing sieve 0,063 mm and any additive content shall be expressed to 0,1 %. Where appropriate the additive content shall be expressed to 0,01 %.

5.2.2 Grading

The requirements for the grading shall be expressed in terms of maximum and minimum values for the percentages passing the characteristic sieves called up in Tables 1 to 10.

The sieves are selected from the following sieves:

— basic sieve set plus set 1: 4 mm; 5,6 mm; 8 mm; 11,2 mm; 16 mm; 22,4 mm, 31,5 mm, 45 mm;

— basic sieve set plus set 2: 4 mm; 6,3 mm; 8 mm; 10 mm; 12,5 mm; 14 mm; 16 mm; 20 mm, 31,5 mm, 40 mm.

A combination of sieve sizes from set 1 and set 2 is not permissible. Tables 1 to 10 specify the overall grading limits for Soft Asphalt. The target composition of the mixture shall be within these limits.

5.2.3 Minimum binder content

Tables 1 to 10 specify the binder limits for Soft Asphalt. The target composition of the mixture shall be within these limits.

The selected minimum binder content shall be expressed as $B_{\mathrm{min}x}$ where x is the minimum binder content in %.

The minimum binder content of the mixture shall be corrected by multiplying by the factor

$$\alpha = \frac{2{,}650}{\rho} \tag{1}$$

where

ρ is the weighted mean of the particle density of the aggregates at the target grading, in megagrams per cubic metre (Mg/m^3), determined according to the appropriate clause or annex of EN 1097–6.

The appropriate particle density according to EN 1097-6 shall be declared in the type test report.

NOTE For normal weight aggregates with water absorption less than about 1,5 % the pre-dried particle density method as defined in EN 1097–6:2013, Annex A, is applicable for aggregates passing the 63 mm test sieve and retained on the 0,063 mm test sieve. EN 1097–6:2013, Annex G, is applicable to aggregates passing the 31,5 mm test sieve including the 0/0,063 mm size fraction.

Based on experience in the place of use for certain specific aggregates with particular granulometric characteristics the corrected minimum binder content may be adjusted appropriately. The adjustment shall be defined in documents related to the application of the product.

Table 1 — Composition of Soft Asphalt (SA), Type A — basic sieve set plus set 1

Dd/o	4*d*	6*d*	8*d*	11*d*	16*d*	5*o*	8*o*	11*o*	16*o*
Sieve mm	**Percentage passing by mass**								
22,4	–	–	–	–	100	–	–	–	100
16	–	–	–	100	90 to 100	–	–	100	90 to 100
11,2	–	–	100	90 to100	≤ 85	–	100	90 to 100	≤ 90
8	–	100	90 to 100	≤ 85	–	100	90 to 100	≤ 90	–
5,6	100	90 to 100	≤ 85	–	–	90 to 100	35 to 60	30 to 50	25 to 45
4	90 to 100	≤ 90	–	–	–	–	–	–	–
2	–	50 to 65	40 to 55	30 to 45	25 to 38	≤ 40	18 to 35	15 to 30	≤ 25
1	≤ 85	–	–	–	–	–	–	–	–
0,063	7,0 to 25,0	6,0 to 14,0	5,0 to 12,0	4,0 to 12,0	3,0 to 12,0	2,0 to 12,0	2,0 to 12,0	2,0 to 12,0	2,0 to 12,0
Bitumen grade	**Minimum binder content in percentage of total mass**								
650/900	6,0	5,5	5,0	4,4	4,0	4,8	4,8	4,8	4,8
500/650									
330/430									
250/330									

Table 2 — Composition of Soft Asphalt (SA), Type A — basic sieve set plus set 2

Dd/o	4*d*	6*d*	8*d*	10*d*	14*d*	6*o*	8*o*	10*o*	14*o*
Sieve mm	**Percentage passing by mass**								
20	–	–	–	–	100	–	–	–	100
14	–	–	–	100	90 to100	–	–	100	90 to 100
10	–	–	100	90 to 100	≤ 85	–	100	90 to 100	≤ 90
8	–	100	90 to 100	≤ 85	–	100	90 to 100	≤ 90	–
6,3	100	90 to 100	≤ 85	–	–	90 to 100	35 to 60	30 to 50	25 to 45
4	90 to 100	≤ 85	–	–	–	–	–	–	–
2	–	50 to 65	40 to 55	30 to 45	25 to 38	≤ 40	18 to 35	15 to 30	≤ 25
1	≤ 85	–	–	–	–	–	–	–	–
0,5	–	20 to 40	20 to 35	15 to 30	10 to 25	–	–	–	–
0,063	7,0 to 25,0	6,0 to 14,0	5,0 to 12,0	4,0 to 12,0	3,0 to 12,0	2,0 to 12,0	2,0 to 12,0	2,0 to 12,0	2,0 to 12,0
Bitumen grade	**Minimum binder content percentage of total mass**								
650/900	6,0	5,5	5,0	4,4	4,0	4,8	4,8	4,8	4,8
500/650									
330/430									
250/330									

Table 3 — Composition of Soft Asphalt (SA), Type B — basic sieve set plus set 1

Dd/*o*	11*d*	16*d*	11*o*	16*o*
Sieve mm	**Percentage passing by mass**			
22,4	–	100	–	100
16	100	90 to 100	100	90 to 100
11,2	85 to 99	69 to 91	85 to 99	69 to 88
8	68 to 85	55 to 80	65 to 83	53 to 75
5,6	56 to 75	–	56 to 75	–
2	34 to 54	25 to 47	35 to 54	23 to 42
0,5	16 to 33	12 to 27	17 to 30	11 to 23
0,063	4,0 to 8,0	3,0 to 8,0	4,0 to 8,0	3,0 to 8,0
Bitumen grade	**Binder content in percentage of total mass**			
V1500	–	–	3,4 to 3,9	3,2 to 3,8
V3000	–	–		
650/900	4,2 to 4,7	4,0 to 4,6	–	–
500/650			–	–
330/430			–	–
250/330	4,3 to 4,8	4,2 to 4,8	-	-

Table 4 — Composition of Soft Asphalt (SA), Type B — basic sieve set plus set 2

Dd/*o*	10*d*	14*d*	10*o*	14*o*
Sieve mm	**Percentage passing by mass**			
20	–	100	–	100
14	100	90 to 100	100	90 to 100
10	85 to 99	69 to 91	85 to 99	69 to 88
8	68 to 85	55 to 80	65 to 83	53 to 75
6,3	56 to 75	–	56 to 75	–
2	34 to 54	25 to 47	35,0 to 54	23 to 42
0,5	16 to 33	12 to 27	17 to 30	11 to 23
0,063	4,0 to 8,0	3,0 to 8,0	4,0 to 8,0	3,0 to 8,0
Bitumen grade	**Binder content in percentage of total mass**			
V1500	–	–	3,4 to 3,9	3,2 to 3,8
V3000	–	–		
650/900	4,2 to 4,7	4,0 to 4,6	–	–
500/650			–	–
330/430			–	–
250/330	4,3 to 4,8	4,2 to 4,8	–	–

Table 5 — Composition of Soft Asphalt (SA), Type C — basic sieve set plus set 1

Dd	8*d*	11*d*	16*d*
Sieve mm	**Percentage passing by mass**		
22,4	–	–	100
16	–	100	86 to 99
11,2	100	90 to 99	66 to 95
8	90 to 99	68 to 91	–
4	56 to 82	48 to 72	34 to 58
2	36 to 58	34 to 52	21 to 41
1	27 to 43	26 to 41	13 to 29
0,25	14 to 25	12 to 22	4 to 12
0,063	4,0 to 13,0	3,0 to 9,0	2,0 to 8,0
Bitumen grade	**Minimum binder content of total mass**		
V1500	5,0	4,7	4,5
V3000			
V6000			
V12000			

Table 6 — Composition of Soft Asphalt (SA), Type C — basic sieve set plus set 2

Dd	8*d*	10*d*	14*d*
Sieve mm	**Percentage passing by mass**		
20	–	–	100
14	–	100	86 to 99
10	100	90 to 99	66 to 95
8	90 to 99	68 to 91	–
4	56 to 82	48 to 72	34 to 58
2	36 to 58	34 to 52	21 to 41
1	27 to 43	26 to 41	13 to 29
0,25	14 to 25	12 to 22	4 to 12
0,063	4,0 to 13,0	3,0 to 9,0	2,0 to 8,0
Bitumen grade	**Minimum binder content in percentage of total mass**		
V1500	5,0	4,7	4,5
V3000			
V6000			
V12000			

Table 7 — Composition of Soft Asphalt (SA), Type S — basic sieve set plus set 1

Dd/*o*	11*d*	16*d*	11*o*	16*o*	22*o*
Sieve mm	**Percentage passing by mass**				
45	–	–	–	–	100
31,5	–	100	–	100	98 to 100
22,4	100	98 to 100	100	98 to 100	85 to 99
16	98 to 100	85 to 99	98 to 100	85 to 99	–
11,2	85 to 99	70 to 88	85 to 99	69 to 88	50 to 72
8	70 to 88	–	65 to 86	–	–
4	48 to 66	39 to 58	40 to 62	35 to 57	23 to 44
2	33 to 52	26 to 46	25 to 43	21 to 40	13 to 30
0,5	16 to 31	13 to 28	7 to 18	7 to 16	5 to 13
0,063	3,0 to 6,0	4,0 to 6,0	3,0 to 6,0	3,0 to 6,0	3,0 to 6,0
Bitumen grade	**Binder content in percentage of total mass**				
V1500	–	–	3,1 to 3,7	3,0 to 3,6	2,8 to 3,4
V3000	–	–	3,2 to 3,8	3,1 to 3,7	2,9 to 3,5
V6000	–	–	3,3 to 4,0	3,3 to 4,0	3,0 to 3,8
V12000	4,5 to 5,4	4,3 to 5,2	3,6 to 4,2	3,5 to 4,1	3,3 to 3,9
330/430	5,0 to 5,6	4,8 to 5,4	–	–	–

Table 8 — Composition of Soft Asphalt (SA), Type S — basic sieve set plus set 2

Dd/*o*	10*d*	14*d*	10*o*	14*o*	20*o*
Sieve mm	**Percentage passing by mass**				
40	–	–	–	–	100
31,5	–	100	–	100	98 to 100
20	100	98 to 100	100	98 to 100	85 to 99
14	98 to 100	85 to 99	98 to 100	85 to 99	–
10	85 to 99	70 to 88	85 to 99	69 to 88	50 to 72
8	70 to 88	–	65 to 86	–	–
4	48 to 66	39 to 58	40 to 62	35 to 57	23 to 44
2	33 to 52	26 to 46	25 to 43	21 to 40	13 to 30
0,5	16 to 31	13 to 28	7 to 18	7 to 16	5 to 13
0,063	3,0 to 6,0	4,0 to 6,0	3,0 to 6,0	3,0 to 6,0	3,0 to 6,0
Bitumen grade	**Binder content in percentage of total mass**				
V1500	–	–	3,1 to 3,7	3,0 to 3,6	2,8 to 3,4
V3000	–	–	3,2 to 3,8	3,1 to 3,7	2,9 to 3,5
V6000	–	–	3,3 to 4,0	3,3 to 4,0	3,0 to 3,8
V12000	4,5 to 5,4	4,3 to 5,2	3,6 to 4,2	3,5 to 4,1	3,3 to 3,9
330/430	5,0 to 5,6	4,8 to 5,4	–	–	–

Table 9 — Composition of Soft Asphalt, SA_{base}, Type S — basic sieve set plus set 1

Dd	16*d*	22*d*
Sieve mm	**Percentage passing by mass**	
45	–	100
31,5	100	98 to 100
22,4	98 to 100	85 to 99
16	85 to 99	–
11,2	58 to 88	51 to 74
4	36 to 59	29 to 51
2	26 to 46	20 to 40
0,5	13 to 25	10 to 22
0,063	2,0 to 5,0	2,0 to 5,0
Bitumen grade	**Binder content in percentage of total mass**	
V12000	3,4 to 4,2	3,1 to 4,0
330/430	3,9 to 4,5	3,6 to 4,2

Table 10 — Composition of Soft Asphalt, SA_{base}, Type S — basic sieve set plus set 2

Dd	14*d*	20*d*
Sieve mm	**Percentage passing by mass**	
40	–	100
31,5	100	98 to 100
20	98 to 100	85 to 99
14	85 to 99	–
10	58 to 88	51 to 74
4	36 to 59	20 to 51
2	26 to 46	20 to 40
0,5	13 to 25	10 to 22
0,063	2,0 to 5,0	2,0 to 5,0
Bitumen grade	**Binder content in percentage of total mass**	
V12000	3,4 to 4,2	3,1 to 4,0
330/430	3,9 to 4,5	3,6 to 4,2

5.3 Properties

5.3.1 Specimens

For application of this European Standard specimens shall be in accordance with EN 13108-20:2016, 6.5.

5.3.2 Void content and voids filled with binder

The void content and the voids filled with binder shall comply with the categories selected from Table 11.

The void content and the percentage of voids filled with binder shall be determined in accordance with EN 12697-8 using the conditions defined in EN 13108-20:2016, D.2.

The compaction of test specimens shall be selected from EN 13108-20:2016, Table C.1.

Table 11 — Void content and voids filled with binder

SA Type	**Grade type**	**Void content %**		**Voids filled with binder %**	
		d	*o*	*D*	*o*
A, B		No requirement	No requirement	No requirement	No requirement
C		4,0 to 9,0	No requirement	50 to 75	No requirement
S		4,0 to 8,0	No requirement	No requirement	No requirement

5.3.3 Water sensitivity

The water sensitivity expressed as an Indirect Tensile Strength Ratio, Compression strength ratio or bonding value shall be determined in accordance with EN 12697-12 using the conditions defined in EN 13108-20:2016, D.3.

The range of categories of water sensitivity of specimens is defined in Table 12.

In documents related to the application of the product, categories for the minimum water sensitivity selected from Table 12 may be defined.

Table 12 — Minimum Water-sensitivity, $ITSR_{min}$ or i/C_{min}

Minimum Water sensitivity %	Category $ITSR_{min}$	Category i/C_{min}
90	$ITSR_{min90}$	i/C_{min90}
80	$ITSR_{min80}$	i/C_{min80}
70	$ITSR_{min70}$	i/C_{min70}
60	$ITSR_{min60}$	i/C_{min60}
No requirement	$ITSR_{minNR}$	i/C_{minNR}

The water sensitivity of specimens of Soft Asphalt mixtures with bitumen between V1500 and V12000 or Soft Asphalt mixtures with undried aggregates shall comply with the category selected from Table 13.

In documents related to the application of the product, categories for the maximum bonding value selected from Table 13 may be defined.

Table 13 — Maximum bonding value, bv_{max}

Maximum bonding value g	Category bv_{max}
1,0	$bv_{max1,0}$
2,0	$bv_{max2,0}$
3,0	$bv_{max3,0}$
No requirement	bv_{maxNR}

5.3.4 Coating and homogeneity

The material when discharged from the mixer shall be homogenous in appearance with the aggregate completely coated with binder, and there shall be no evidence of balling of fine aggregate.

5.3.5 Reaction to fire

Where subject to regulation, the manufacturer shall declare the reaction to fire class according to EN 13501-1:2007+A1:2009, Table 2, according to the test method of EN ISO 11925-2.

5.4 Temperature of the mixture

The maximum temperature requirements are intended to protect the integrity of the mixture. The maximum temperature requirements apply at any place in the plant and shall be declared.

When using paving grade binder, the maximum temperature, measured according to EN 12697-13, shall not exceed the limits given in Tables 14, 15, 16 and 17.

Table 14 — Maximum temperatures for Type A

Bitumen grade	Maximum temperature °C
650/900	155
500/650	155
330/430,250/330	160

Table 15 — Maximum temperatures for Type B

Bitumen grade	Maximum temperature °C
V1500	120
V3000	120
650/900	140
500/650	150
330/430	155
250/330	160

Table 16 — Maximum temperatures for Type C

Bitumen grade	Maximum temperature °C
V1500	105
V3000	110
V6000	120
V12000	130

Table 17 — Maximum temperatures for Type S

Bitumen grade	Maximum temperature °C
V1500	80
V3000	85
V6000	90
V12000	110
330/430	120

When using additives or premixed bitumen different temperatures may be applicable. These shall then be documented and declared.

The minimum temperature of the mixture at delivery shall be declared. Depending on local conditions and for specific application the minimum temperature, measured according to EN 12697-13, may be defined in documents related to the application of the product.

5.5 Regulated dangerous substances

When required, products covered by this standard shall comply with relevant regulations on dangerous substances in force in the intended place of use.

In the absence of International or European test methods, manufacturers shall verify and declare the release of dangerous substances in accordance with provisions applicable in the intended place of use of the product.

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

5.6 Conflicting requirements

The overall quality of a Soft Asphalt mixture can be covered by different combinations of requirements. The selection of requirements and the appropriate values shall be such that conflicting requirements are prevented.

6 Assessment and verification of constancy of performance — AVCP

The compliance of Soft Asphalt with the requirements of this standard and with the performances declared by the manufacturer in the Declaration of Performance (DoP) shall be demonstrated by:

— determination of the product type in accordance with EN 13108-20;

— Factory Production Control by the manufacturer, including product assessment in accordance with EN 13108-21.

The result of the product type determination will, for each relevant requirement, be expressed as a numerical value. The numerical value may be presented as a category as given in the standard, a class or a value declared by the manufacturer.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

For the purpose of Type Testing, Soft Asphalt may be grouped into families as described in EN 13108-20 where it is considered that the selected property or properties is or are common to all the mixtures within that family.

7 Identification

The delivery ticket shall contain at least the following information relating to identification:

— manufacturer and mixing plant;

— mix identification code;

— how to obtain the full details demonstrating conformity with this European Standard;

— designation of the mixture:

SA	D	binder	surf/base/bin	grading designation d or o	Type A, B, C, S

where

SA	is Soft Asphalt;
D	is the maximum aggregate size;
binder	designation of the binder used;
surf	is the surface course;
base	is the base course;
d	is dense graded aggregate as described in Tables 1 to 10;
o	is open graded aggregate as described in Tables 1 to 10;
Type A, B, C, S	as described in Tables 1 to 10.

EXAMPLE SA 16 V12000 surf -d- Type C:

— Soft Asphalt with maximum aggregate size 16 mm with viscosity graded bitumen V12000, for surface course, a dense graded aggregate and Type C.

NOTE Information concerning regulatory marking accompanies the product, but characteristics which are not necessarily part of regulatory marking, could be made available by alternative means.

Annex A
(normative)

Calculations of the penetration, the softening point or the viscosity of the binder of a mixture when reclaimed asphalt is used

A.1 General

These calculations shall be applied when paving grade bitumen has been used in the reclaimed asphalt and will be used as added binder. The calculation methods are only valid for paving grade bitumen.

A.2 Calculation of the penetration of the binder of a mixture

Use the following calculation:

$$a \lg pen_1 + b \lg pen_2 = (a + b) \lg pen_{\text{mix}} \quad \text{(A.1)}$$

where

pen_{mix} is the calculated penetration of the binder in the mixture containing reclaimed asphalt;

pen_1 is the penetration of the binder recovered from the reclaimed asphalt;

pen_2 is the penetration of the added binder;

a and b are the portions by mass of the binder from the reclaimed asphalt (a) and from the added binder (b) in the mixture; $a + b = 1$.

EXAMPLE $pen_1 = 20$; $pen_2 = 90$; $a = 0{,}25$ and $b = 0{,}75$

$0{,}25 \lg 20 + 0{,}75 \lg 90 = \lg pen_{\text{mix}}$

$\lg pen_{\text{mix}} = 1{,}790\,94$; therefore $pen_{\text{mix}} = 62$

The recovery of binder from mixtures for testing shall be performed according to EN 12697-3 or EN 12697-4.

The penetrations of the added binder and the recovered binder shall be determined according to EN 1426.

A.3 Calculation of the softening point of the binder of a mixture

Use the following calculation:

$$T_{\text{R\&B mix}} = a \times T_{\text{R\&B 1}} + b \times T_{\text{R\&B2}} \quad \text{(A.2)}$$

where

$T_{\text{R\&Bmix}}$ is the calculated softening point of the binder in the mixture containing reclaimed asphalt;

$T_{R\&B1}$ is the softening point of the binder recovered from the reclaimed asphalt;

$T_{R\&B2}$ is the softening point of the added binder;

a and *b* are the portions by mass of binder from the reclaimed asphalt (*a*) and from the added binder (*b*) in the mixture ; $a + b = 1$.

EXAMPLE $T_{R\&B1} = 62$ °C; $T_{R\&B2} = 48$ °C; $a = 0{,}25$ and $b = 0{,}75$

$T_{R\&Bmix} = 0{,}25 \times 62 + 0{,}75 \times 48 = 51{,}5$ °C

The softening points of the added binder and the recovered binder shall be determined according to EN 1427.

A.4 Calculation of the viscosity of the binder of a mixture

Calculation:

$$a \lg \text{visc}_1 + b \lg \text{visc}_2 = (a + b) \lg \text{visc}_{mix} \quad \text{(A.3)}$$

where

visc_1 is the viscosity of the binder recovered from the reclaimed asphalt;

visc_2 is the viscosity of the added binder;

a and *b* are the portions by mass of the binder from the reclaimed asphalt, a, and from the added binder, *b*, in the mixture; ($a + b = 1$);

visc_{mix} is the calculated viscosity of the binder in the mixture containing reclaimed asphalt.

The viscosities of the recovered and the added binder shall be determined according to EN 12595 or to EN 12596.

EXAMPLE $\text{visc}_1 = 18\,000$ mm^2/s, $\text{visc}_2 = 1\,500$ mm^2/s, $a = 0{,}7$, $b = 0{,}3$

$\lg \text{visc}_{mix} = 0{,}590\,8$, $\text{visc}_{mix} = 7\,900$ mm^2/s

Annex ZA
(informative)

Relationship of this European Standard with Regulation (EU) No. 305/2011

(When applying this standard as a harmonized standard under Regulation (EU) No. 305/2011, manufacturers and Member States are obliged by this regulation to use this annex.)

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under standardization request M124 Road Construction given to CEN and CENELEC by the European Commission (EC) and the European Free Trade Association (EFTA).

When this European Standard is cited in the Official Journal of the European Union (OJEU), under Regulation (EU) No. 305/2011, it shall be possible to use it as a basis for the establishment of the Declaration of Performance (DoP) and the CE marking, from the date of the beginning of the co-existence period as specified in the OJEU.

Regulation (EU) No. 305/2011, as amended, contains provisions for the DoP and the CE marking.

Table ZA.1 — Relevant clauses for Soft Asphalt for use on roads and other trafficked areas

Product: Soft Asphalt **Intended use:** For use on roads and other trafficked areas.			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
Adhesion of binder to aggregate	5.2.2 Target binder content	—	Declared value
	5.3.2 Void content	—	Declared minimum or maximum category, class or numerical value
	5.3.3 Water sensitivity	—	Declared minimum or maximum category or numerical value
	5.4 Temperature of the mixture	—	Declared maximum category and declared minimum value
Stiffness	5.2.2 Target Grading	—	Declared values
	5.2.3 Target binder content	—	Declared value
	5.3.2 Void content	—	Declared minimum or maximum category, class or numerical value
	5.4 Temperature of the mixture	—	Declared maximum category and declared minimum value
Resistance to permanent deformation	5.2.2 Target Grading	—	Declared values
	5.2.3 Target binder content	–	Declared value

Product:	Soft Asphalt		
Intended use:	For use on roads and other trafficked areas.		
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Classes and/or threshold levels**	**Notes**
	5.3.2 Void content	—	Declared minimum or maximum category, class or numerical value
	5.3.2 Voids filled with bitumen	—	Declared minimum or maximum category, class or numerical value
	5.4 Temperature of the mixture	—	Declared maximum category and declared minimum value
Resistance to fatigue	5.2.2 Target Grading	—	Declared values
	5.2.3 Target binder content	—	Declared value
	5.3.2 Void content	—	Declared minimum or maximum category, class or numerical value
	5.4 Temperature of the mixture	—	Declared minimum category or declared minimum value
Skid resistance	5.2.2 Target Grading	—	Declared value
	5.2.3 Target binder content	—	Declared value
	5.3.2 Void content	—	Declared minimum or maximum category, class or numerical value
	5.3.2 Voids filled with bitumen	—	Declared minimum or maximum category, class or numerical value
Resistance to abrasion	5.2.2 Target Grading	—	Declared value
	5.2.3 Target binder content	—	Declared value
Reaction to fire[a]	5.3.5 Fire class	$A1_{fl}$ to F_{fl}	Declared class
Durability of the above characteristics against ageing, weathering, oxidation, wear, ravelling, chemicals, wear of studded tyres, stripping, ...as relevant	All above mentioned requirements are related to durability.	—	
[a] Relevant only for Soft Asphalt intended for uses subject to reaction to fire regulations.			

ZA.2 System of Assessment and Verification of Constancy of Performance (AVCP)

The AVCP systems of Soft Asphalt indicated in Table ZA.1, can be found in the EC legal acts adopted by the EC decision 1998/601/EC of 13 October 1998 (OJ L 287; p. 41) amended by the Commission decision 2001/596/EC of 8 January 2001 (OJ L 209; p. 33).

Micro-enterprises are allowed to treat products under AVCP system 3 covered by this standard in accordance with AVCP system 4, applying this simplified procedure with its conditions, as foreseen in Article 37 of Regulation (EU) No. 305/2011.

ZA.3 Assignment of AVCP tasks

The AVCP systems of Soft Asphalt as provided in Table ZA.1 are defined in Tables ZA.3.1 to ZA.3.3 resulting from application of the clauses of this or other European Standards indicated therein. The content of the tasks assigned to the notified body shall be limited to those essential characteristics, if any, as provided for in Annex III of the relevant standardization request and to those that the manufacturer intends to declare.

Taking into account the AVCP systems defined for the products and the intended uses the following tasks are to be undertaken by the manufacturer and the notified body respectively for the assessment and verification of the constancy of performance of the product.

Table ZA.3.1 — Assignment of AVCP tasks for Soft Asphalt under system 2+ and subject to reaction to fire under system 1

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	EN 13108–21
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared except reaction to fire	EN 13108–20
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	EN 13108–21
Tasks for the notified product certification body	Determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Reaction to fire	EN 13501-11:2007+A1:2009, Table 2 and EN ISO 11925-2
	Initial inspection of manufacturing plant and of FPC	Parameters related to essential characteristic of Table ZA.1, relevant for the intended use which is declared, namely reaction to fire. Documentation of the FPC.	EN 13108–21
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristic of Table ZA.1, relevant for the intended use which is declared, namely reaction to fire. Documentation of FPC	EN 13108–21
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared, except reaction to fire. Documentation of the FPC.	EN 13108–21
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared, except reaction to fire. Documentation of the FPC.	EN 13108–21

Table ZA.3.2 — Assignment of AVCP tasks for Soft Asphalt under system 2+ and subject to reaction to fire under system 3

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared	EN 13108–21
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which are declared except reaction to fire	EN 13108–20
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which are declared	EN 13108–21
Tasks for a notified testing laboratory	Determination of the product-type on the basis of type testing (based on sampling carried out by the manufacturer), type calculation, tabulated values or descriptive documentation of the product	Reaction to fire	EN 13501-11:2007+A1:2009, Table 2 and EN ISO 11925-2
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared. Documentation of the FPC.	EN 13108–21
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared, namely. Documentation of the FPC.	EN 13108–21

Table ZA.3.3 — Assignment of AVCP tasks for Soft Asphalt under system 2+ and subject to reaction to fire under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which is declared	EN 13108–21
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1 relevant for the intended use which is declared	EN 13108–20
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the intended use which is declared	EN 13108–21
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared. Documentation of the FPC.	EN 13108–21
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use which is declared. Documentation of the FPC.	EN 13108–21

This page deliberately left blank

This page deliberately left blank

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards -based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Copyright in BSI publications

All the content in BSI publications, including British Standards, is the property of and copyrighted by BSI or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use.

Save for the provisions below, you may not transfer, share or disseminate any portion of the standard to any other person. You may not adapt, distribute, commercially exploit, or publicly display the standard or any portion thereof in any manner whatsoever without BSI's prior written consent.

Storing and using standards

Standards purchased in soft copy format:

- A British Standard purchased in soft copy format is licensed to a sole named user for personal or internal company use only.
- The standard may be stored on more than 1 device provided that it is accessible by the sole named user only and that only 1 copy is accessed at any one time.
- A single paper copy may be printed for personal or internal company use only.

Standards purchased in hard copy format:

- A British Standard purchased in hard copy format is for personal or internal company use only.
- It may not be further reproduced – in any format – to create an additional copy. This includes scanning of the document.

If you need more than 1 copy of the document, or if you wish to share the document on an internal network, you can save money by choosing a subscription product (see 'Subscriptions').

Reproducing extracts

For permission to reproduce content from BSI publications contact the BSI Copyright & Licensing team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email subscriptions@bsigroup.com.

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Useful Contacts

Customer Services
Tel: +44 345 086 9001
Email (orders): orders@bsigroup.com
Email (enquiries): cservices@bsigroup.com

Subscriptions
Tel: +44 345 086 9001
Email: subscriptions@bsigroup.com

Knowledge Centre
Tel: +44 20 8996 7004
Email: knowledgecentre@bsigroup.com

Copyright & Licensing
Tel: +44 20 8996 7070
Email: copyright@bsigroup.com

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

bsi.