BS EN 13808:2013

BSI Standards Publication

Bitumen and bituminous binders — Framework for specifying cationic bituminous emulsions

National foreword

This British Standard is the UK implementation of EN 13808:2013. It supersedes BS EN 13808:2005 which is withdrawn. Together with BS EN 15322:2013, it also supersedes BS EN 14733:2005+A1:2010, which is withdrawn.

National Annex NA at the end of this document provides additional guidance for the use of BS EN 13808:2013 in the UK. National Annex NB contains an example specification framework in accordance with BS EN 13808:2013.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/19, Bitumen and related products.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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EUROPEAN STANDARD

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EN 13808

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English Version

Bitumen and bituminous binders - Framework for specifying cationic bituminous emulsions

Bitumes et liants bitumineux - Cadre de spécifications pour les émulsions cationiques de liants bitumineux

Bitumen und bitumenhaltige Bindemittel - Rahmenwerk für die Spezifizierung kationischer Bitumenemulsionen

This European Standard was approved by CEN on 14 March 2013.

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.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 13808:2013) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2013, and conflicting national standards shall be withdrawn at the latest by May 2014.

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

This document supersedes EN 13808:2005, EN 14733:2005+A1:2010.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports basic work requirements of the EU Regulation.

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

The main technical changes brought to EN 13808 are as follows:

— introduction of additional characteristics and revision of performance classes for cationic bituminous emulsions (Table 2);

— consideration of the characteristics of the residual binder by distillation (Tables 3 and 4);

— possibility to assess durability on either a stabilised binder (stage 1 of durability) or on a stabilised and PAV aged binder (stage 2 of durability) or on both types of binders (Tables 3 and 4);

— rewriting of Clause 6 (Assessment and Verification of the Constancy of Performance - AVCP) and Annex ZA in accordance with the requirements of Regulation (EU) 305/2011 (Construction Products Regulation-CPR);

— incorporation of the clauses on AVCP previously covered by EN 14733:2005+A1:2010.

This standard is part of a family of European Standards for bitumens as follows:

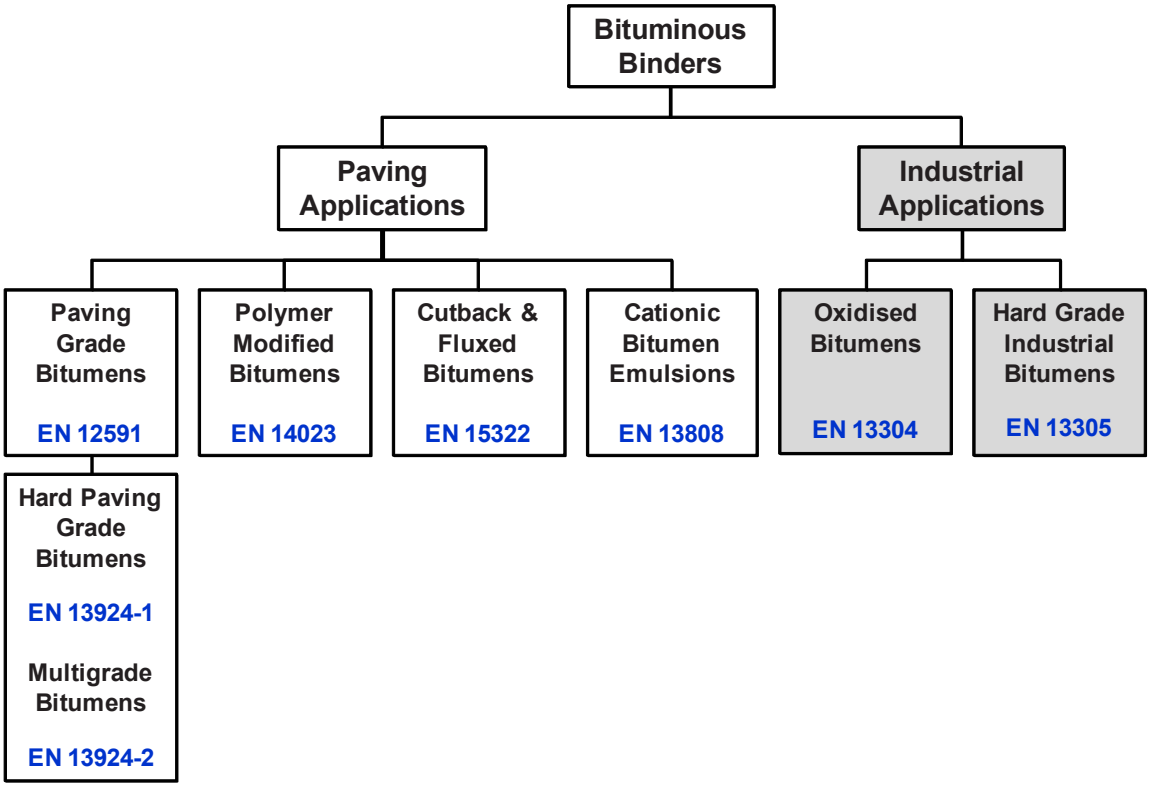

Figure 1 — European Standards for bitumens

According to the CEN-CENELEC Internal Regulations, the national standards organisations 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.

1 Scope

This European Standard specifies the requirements for performance characteristics of cationic bituminous emulsion classes which are suitable for use in the construction and maintenance of roads, airfields and other paved areas.

This European Standard applies to emulsions of bitumen, or of fluxed bitumen, or of cut back bitumen and to emulsions of polymer modified bitumen, or of polymer modified fluxed bitumen, or of polymer modified cut-back bitumen, which also includes latex modified bituminous emulsions.

Within Europe several types of cationic bituminous emulsions are used. Depending on traditional practices, different binder contents may be used for the same purpose. When designing a specification for a particular application, care should be taken to make class selections which are compatible and realistic.

NOTE For the purposes of this European Standard, the term "% (*m/m*)" is used to represent the mass fraction.

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 58, *Bitumen and bituminous binders — Sampling bituminous binders*

EN 1425, *Bitumen and bituminous binders — Characterization of perceptible properties*

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 1428, *Bitumen and bituminous binders — Determination of water content in bitumen emulsions — Azeotropic distillation method*

EN 1429, *Bitumen and bituminous binders — Determination of residue on sieving of bituminous emulsions, and determination of storage stability by sieving*

EN 1430, *Bitumen and bituminous binders — Determination of particle polarity of bituminous emulsions*

EN 1431, *Bitumen and bituminous binders — Determination of residual binder and oil distillate from bitumen emulsions by distillation*

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

EN 12593, *Bitumen and bituminous binders — Determination of the Fraass breaking point*

EN 12594, *Bitumen and bituminous binders — Preparation of test samples*

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

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

EN 12597, *Bitumen and bituminous binders — Terminology*

EN 12846-1, *Bitumen and bituminous binders — Determination of efflux time by the efflux viscometer — Part 1: Bituminous emulsions*

EN 12846-2, *Bitumen and bituminous binders — Determination of efflux time by the efflux viscometer — Part 2: Cut-back and fluxed bituminous binders*

EN 12847, *Bitumen and bituminous binders — Determination of settling tendency of bituminous emulsions*

EN 12848, *Bitumen and bituminous binders — Determination of mixing stability with cement of bituminous emulsions*

EN 12849, *Bitumen and bituminous binders — Determination of penetration power of bituminous emulsions*

EN 12850, *Bitumen and bituminous binders — Determination of the pH value of bituminous emulsions*

EN 13074-1, *Bitumen and bituminous binders — Recovery of binder from bituminous emulsion or cut-back or fluxed bituminous binders – Part 1: Recovery by evaporation*

EN 13074-2, *Bitumen and bituminous binders — Recovery of binder from bituminous emulsion or cut-back or fluxed bituminous binders – Part 2: Stabilisation after recovery by evaporation*

EN 13075-1, *Bitumen and bituminous binders — Determination of breaking behaviour — Part 1: Determination of breaking value of cationic bituminous emulsions, mineral filler method*

EN 13075-2, *Bitumen and bituminous binders — Determination of breaking behaviour — Part 2: Determination of fines mixing time of cationic bituminous emulsions*

EN 13302, *Bitumen and bituminous binders — Determination of dynamic viscosity of bituminous binder using a rotating spindle apparatus*

EN 13398, *Bitumen and bituminous binders — Determination of the elastic recovery of modified bitumen*

EN 13587, *Bitumen and bituminous binders — Determination of the tensile properties of bituminous binders by the tensile test method*

EN 13588, *Bitumen and bituminous binders — Determination of cohesion of bituminous binders with pendulum test*

EN 13589, *Bitumen and bituminous binders — Determination of the tensile properties of modified bitumen by the force ductility method*

EN 13614, *Bitumen and bituminous binders — Determination of adhesivity of bituminous emulsions by water immersion test*

EN 13703, *Bitumen and bituminous binders — Determination of deformation energy*

EN 13924, *Bitumen and bituminous binders — Specifications for hard paving grade bitumens*

EN 14023, *Bitumen and bituminous binders — Specification framework for polymer modified bitumens*

EN 14769, *Bitumen and bituminous binders — Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)*

EN 16345 *Bitumen and bituminous binders — Determination of efflux time of bituminous emulsions using the Redwood No. II Viscometer*

EN ISO 3405, *Petroleum products — Determination of distillation characteristics at atmospheric pressure (ISO 3405)*

EN ISO 3675, *Crude petroleum and liquid petroleum products — Laboratory determination of density — Hydrometer method (ISO 3675)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12597 apply.

4 Abbreviated terms

Abbreviated terms, providing an expression in letters and numbers, are used to describe important characteristics of cationic bituminous emulsions, i.e. emulsion polarity, binder content, binder type, binder designation, type of flux, amount of flux and breaking value and shall be in accordance with Table 1. National guidance documents may define additional abbreviated terms to indicate the intended use(s) for the emulsion.

Table 1 — Denomination of the abbreviated terms

Position	Characters	Denomination	Supporting European Standard	
Compulsory abbreviated terms				
1	C	Cationic bituminous emulsion	EN 1430[a]	(particle polarity)
2 and 3	2-digit number	Nominal binder content in % (*m/m)* or Residual binder content in % (*m/m)*	EN 1428 or EN 1431 or EN 1431	(by water content or by residual binder + oil distillate) or (residual binder after distillation of water and oil)
4 or	B	Indication of binder type Paving grade bitumen	EN 12591	(specification for paving grade bitumen)
4 and 5	P	Addition of polymers	EN 14023 or polymer can be added before, during or after emulsifying	
5 or 6	F	Addition of more than 3 % (*m/m)* of flux, based on emulsion	The type of flux may be indicated (optional) by replacing the letter F by either Fm (mineral flux) or Fv (vegetal flux)	
5 or 6 or 7	2 to 10	Class of breaking behaviour	EN 13808	(Table 2)
Voluntary abbreviated terms				
6 or 7 or 8		Abbreviated designation of the bituminous base binder	EN 12591 or EN 14023 or EN 13924	(designation according to the prescriptions of the relevant product standard)

[a] A distinct acidic pH value according to EN 12850 can be seen as an indicator for the cationic nature of bituminous emulsions. In case of doubt, EN 1430 shall be used.

NOTE Examples for abbreviated terms of bituminous emulsions are given in Annex A.

The following abbreviations are used in the specification tables of this European Standard (see Table 2, Table 3 and Table 4):

— NR for "No Requirement": this class has been included to accommodate countries where the characteristic, for a given intended use, is not subject to regulatory requirements; i.e. when there are no regulations for the property/characteristic in the territory of intended use.

— DV for "Declared Value": this class shall mean that the manufacturer is required to provide a value or value range with the product.

5 Requirements and test methods

5.1 General

This European Standard is a framework of specifications and classes for properties of cationic bituminous emulsions which are chosen from Table 2, Table 3 and Table 4.

NOTE 1 The list of properties has been set up considering the existing regulations.

The properties in Table 2 characterise the emulsion. Table 3 and Table 4 define the properties and performance classes applicable to the residual binders obtained after distillation, recovery, stabilisation and ageing procedures.

In specifying an emulsion, the appropriate class for each technical requirement shall be selected in turn from the classes given in Table 2, Table 3 and Table 4. When tested by the methods given in a table, the various grades shall conform to the limits specified in that table.

The selection of classes for all requirements shall be made to avoid unworkable combinations.

NOTE 2 Tables 2 to 4 apply to emulsions specified in all countries. Each country will then have a particular selection of specifications, which are covered in Tables 2, 3 and 4. It is useful for each country to publish in a national guidance document for each application, their requirements from the tables. The appropriate class for each technical requirement of application is selected in turn and the selection of classes will be made on a regional basis, in order to avoid unworkable combinations. An example of a typical specification for a C 69 BP 2 emulsion is presented in Annex B.

5.2 Properties of the emulsion (Table 2)

5.2.1 Binder content

Binder content shall be determined by water content according to the procedure specified in EN 1428 or as the sum of the residual bituminous binder and oil distillate obtained according to the procedure specified in EN 1431.

Alternatives methods can be used if a correlation to these methods can be proven. In case of dispute, EN 1428 or EN 1431 shall be used.

5.2.2 Breaking behaviour

There are three possible methods for determining the breaking behaviour. It is compulsory to declare a performance class according to one of these methods.

NOTE EN 13075-1 could be used for fast and medium curing emulsions. EN 13075-2 or EN 12848 could be used for slow setting and over-stabilised emulsions.

5.2.3 Residue on sieving – 0,5 mm sieve

The procedure specified in EN 1429 shall be used.

5.2.4 Viscosity

Efflux time according to the procedure specified in EN 12846-1 or dynamic viscosity according to the procedure specified in EN 13302 shall be used to characterise the behaviour of the emulsion after spraying (surface dressing or tack coat applications) or during mixing with aggregates (coating applications).

5.2.5 Water effect on binder adhesion

Adhesivity shall be checked with one or several reference aggregates according to the procedure specified in EN 13614. When declaring performance, the nature of the reference aggregate which has been used shall be indicated.

5.2.6 Penetration power

Penetration power characterises the ability of an emulsion to penetrate a substrate. The procedure specified in EN 12849 shall be used.

5.2.7 Oil distillate content

The oil distillate content shall be determined according to the procedure specified in EN 1431.

5.2.8 Residue on sieving – 0,16 mm sieve

The procedure specified in EN 1429 shall be used.

5.2.9 Efflux time at 85 °C

Efflux time at 85 °C according to the procedure specified in EN 16345 shall be used to characterise viscosity at a temperature close to possible spraying conditions. It applies only to spraying applications.

NOTE The method specified in EN 16345 is only suitable for viscous, high bitumen (> 65 %) content emulsions.

5.2.10 Storage stability by sieving

The procedure specified in EN 1429 shall be used. It characterises the ability of a bituminous emulsion not to form coarse particles (> 0,5 mm) within 7 d of storage.

5.2.11 Settling tendency

The procedure specified in EN 12847 shall be used. It characterises the difference in water content of the top layer and the bottom layer of a prescribed volume of sample after 7 days of storage.

NOTE Storage stability is a different concept than settling tendency. Although both phenomena are often linked, an emulsion may settle without modification of particle size distribution (no coalescence of emulsion droplets).

5.3 Residual, recovered, stabilised and aged binders from cationic bituminous emulsions (Table 3)

5.3.1 Residual binder by distillation

Residual binder by distillation refers to the binder obtained as a result of the distillation procedure specified in EN 1431 (residual binder after extraction of water and oil distillate).

5.3.2 Recovered binder

Recovered binder refers to the binder obtained according to the procedure specified in EN 13074-1. The recovered binder is deemed to represent the binder obtained immediately after the breaking of the emulsion (coalescence of the binder and elimination of the water). The recovered binder can be replaced by the bituminous phase of the emulsion, i.e. the bituminous binder and added flux, which has been used to manufacture the emulsion. In the event of dispute, the recovered binder shall be used. When declaring performance for the recovered binder, the type of binder which has been used shall be indicated.

5.3.3 Binders to be considered for the assessment of durability

5.3.3.1 Stabilised binder

Stabilised binder refers to the binder obtained according to the procedure specified in EN 13074-1 followed by EN 13074-2.

5.3.3.2 Aged binder

Aged binder refers to the binder obtained according to the procedure specified in EN 13074-1 followed by EN 13074-2 and EN 14769 (65 h at 85 °C).The binder to be used for the ageing procedure according to EN 14769 can be replaced by the residual binder by distillation obtained according to the procedure specified in EN 1431. In the event of dispute, the tests on the binder obtained according to the procedure specified in EN 13074-1 followed by EN 13074-2 and EN 14769 shall be used. When declaring performance for the aged binder, the type of binder used for the EN 14769 ageing procedure shall be indicated.

5.4 Properties of residual, recovered, stabilised and aged binders from cationic bituminous emulsions (Table 4)

5.4.1 Consistency at intermediate service temperature

Consistency at intermediate service temperature shall be assessed according to the procedure specified in EN 1426 (needle penetration). The temperature for the test is dependent on the consistency of the binder. The

penetration test shall be performed at 25 °C when the binder has a penetration smaller than or equal to (330 x 0,1) mm. If the penetration at 25 °C is greater than (330 x 0,1) mm, the test shall be performed at 15 °C.

5.4.2 Consistency at elevated service temperature

The test method is dependent on the consistency of the binder. If penetration at 25 °C is smaller than or equal to (330 x 0,1) mm, consistency at elevated temperature shall be assessed according to the procedure specified in EN 1427 (softening point). If penetration at 25 °C is greater than (330 x 0,1) mm, consistency at elevated service temperature shall be assessed either by dynamic viscosity at 60 °C (procedure specified in EN 12596 or EN 13302) or kinematic viscosity at 60 °C (procedure specified in EN 12595).

5.4.3 Cohesion (for modified binders only)

The cohesion of binders from polymer modified emulsions which are used for surface dressings shall be determined according to the procedure specified in EN 13588. For binders used in other applications the method used shall be any one of EN 13587, EN 13588 or EN 13589 as defined in Table 4.

5.4.4 Brittleness at low service temperature

Brittleness at low service temperature shall be determined according to the procedure specified in EN 12593 (Fraass breaking point).

5.4.5 Elastic recovery (for modified binders only)

Elastic recovery, typically for elastomer modified binders, shall be determined according to the procedure specified in EN 13398. The test shall be performed at 25 °C or 10 °C depending on the consistency and degree of modification of the binder.

Table 2 — Specification framework for cationic bituminous emulsions — Properties of the emulsion

			Performance Classes for the technical requirements of cationic bituminous emulsions												
Technical requirements	**Document**	**Unit**	**Class 0**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**	**Class 12**
Binder content	EN 1428[a] or EN 1431[b]	% (m/m)			< 38	38 to 42	48 to 52	53 to 57	58 to 62	63 to 67	65 to 69	67 to 71	≥ 69	≥ 71	
or Residual binder after distillation [c]	EN 1431	% (m/m)			< 38 (C35)	≥ 38 (C40)	≥ 48 (C50)	≥ 53 (C55)	≥ 58 (C60)	≥ 63 (C65)	≥ 65 (C67)	≥ 67 (C69)	≥ 69 (C70)	≥ 71 (C72)	
Breaking behaviour															
Breaking value (Forshammer filler)	EN 13075-1	None			< 110	70 to 155	110 to 195	> 170	-	-	-	-	-	-	
or Fines mixing time	EN 13075-2	s			-	-	-	-	> 90	≥ 180	≥ 300	-	-	-	
or Mixing stability with cement	EN 12848	g			-	-	-	-	-	-	-	> 2	≤ 2	-	
Residue on sieving - 0,5 mm sieve	EN 1429	% (m/m)			≤ 0,1	≤ 0,2	≤ 0,5	-	-	-	-	-	-	-	
Viscosity															
Efflux time 2 mm at 40 °C	EN 12846-1	s	NR		≤ 20	15 to 70	40 to 130	-	-	-	-	-	-	-	
or Efflux time 4 mm at 40 °C	EN 12846-1	s	NR		-	-	-	5 to 70	40 to 100	-	-	-	-	-	
or Efflux time 4 mm at 50 °C	EN 12846-1	s	NR		-	-	-	-	-	5 to 30	≥ 25	-	-	-	
or Dynamic viscosity at 40 °C [d]	EN 13302	m Pa.s	NR		-	-	-	-	-	-	-	≤ 30	20 to 300	100 to 1 000	> 1 000
Adhesivity with reference aggregate	EN 13614	None	NR		≥ 75	≥ 90	-	-	-	-	-	-	-	-	
Penetration power	EN 12849	Min	NR	DV	-	-	-	-	-	-	-	-	-	-	
Oil distillate content[e]	EN 1431	% (m/m)	NR		≤ 2,0	≤ 3,0	≤ 5,0	≤ 8,0	≤ 10,0	5 to 15	> 15	-	-	-	
Residue on sieving - 0,16 mm sieve	EN 1429	% (m/m)	NR		≤ 0,25	≤ 0,5	-	-	-	-	-	-	-	-	
Efflux time at 85 °C	EN 16345	s	NR		25 to 45	20 to 100	-	-	-	-	-	-	-	-	
Storage stability by sieving (7 days storage) – 0,5 mm sieve	EN 1429	% (m/m)	NR		≤ 0,1	≤ 0,2	≤ 0,5	-	-	-	-	-	-	-	
Settling tendency (7 days storage)	EN 12847	% (m/m)	NR		≤ 5	≤ 10	-	-	-	-	-	-	-	-	

a The binder content of an emulsion determined by the method described in EN 1428 shall be defined as [100 - water content].

b The binder content of the emulsion determined by the distillation method described in EN 1431 shall be defined as [per cent by mass of the residual binder + per cent by mass of oil distillate].

Alternatives methods may be used for the determination of binder content if a correlation to the prescribed methods can be proven. In case of dispute, EN 1428 or EN 1431 shall be used.

c The residual binder after distillation determined by the distillation method described in EN 1431 is the binder residue from a bituminous emulsion after distillation of water and oil distillate.

d Dynamic viscosity shall be determined at a shear rate of 50 s^{-1}. In the case where the shear rate of 50 s^{-1} does not produce the level of accuracy specified by EN 13302, another shear rate can be used. The adopted shear rate shall be mentioned in the test report.

e The per cent by mass of oil distillate can be determined on bulk quantities of flux following the determination of density by EN ISO 3838 and the determination of per cent by volume of distillate obtained by EN 1431.

Some high viscosity, polymer modified cationic bituminous emulsions are not stable and/or are difficult to handle at room temperature. Consequently, it is recommended that these emulsions be stored above 50 °C following sampling and prior to testing. In addition, it is recommended that laboratory tests are carried out on polymer modified emulsions within a period which is consistent with their stability.

NOTE For CE marking see Annex ZA considering the grey shaded boxes for the essential characteristics.

Table 3 — Specification framework for cationic bituminous emulsions — Properties of residual, recovered, stabilised and aged binders

Technical requirements	Residual binder by distillation (5.3.1)	Recovered binder (5.3.2)	Durability - Stage 1 Stabilised binder (5.3.3.1)	Durability - Stage 2 Aged binder (5.3.3.2)
	Binder obtained after extraction of water and oil distillate following EN 1431	Binder recovered by evaporation following EN 13074-1	Binder recovered by evaporation (EN 13074-1) and subjected to stabilisation (EN 13074-2)	Binder recovered by evaporation (EN 13074-1) and subjected to stabilisation (EN 13074-2) and ageing (EN 14769) [a]
Consistency at intermediate service temperature [b]	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4
Consistency at elevated service temperature [b]	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4
Cohesion (modified binders only) [b]	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4
Brittleness at low service temperature (Fraass breaking point)	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4
Elastic recovery at 10 °C (for elastomeric polymer binders)	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4
Elastic recovery at 25 °C (for elastomeric polymer binders)	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4	NR (Class 0) or performance classes given in Table 4

[a] The test conditions to be retained for the PAV ageing procedure following EN 14769 are a temperature of 85 °C and a duration of 65 h.

[b] The property shall be assessed on at least one of the residual, recovered, stabilised or aged binder..

NOTE For CE marking see Annex ZA considering the grey shaded boxes for the essential characteristics.

Table 4 — Specification framework for the technical requirements and performance classes for residual, recovered, stabilised and aged binders from cationic bituminous emulsions

			Performance Classes for the technical requirements of cationic bituminous emulsions										
Technical requirements	**Document**	**Unit**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**
Consistency at intermediate service temperature													
Penetration at 25 °C[a]	EN 1426	0,1 mm	DV	≤ 50	≤ 100	≤ 150	≤ 220	≤ 270	≤ 330	-	-	-	-
or Penetration at 15 °C[a]	EN 1426	0,1 mm	DV	-	-	-	-	-	-	90 to 170	140 to 260	180 to 360	-
Consistency at elevated service temperature													
Softening Point [b]	EN 1427	°C	DV	≥ 60	≥ 55	≥ 50	≥ 46	≥ 43	≥ 39	≥ 35	< 35	-	-
or Dynamic viscosity at 60 °C[b]	EN 12596 or EN 13302	Pa·s	DV	≥ 18	≥ 12	≥ 7	≥ 4,5	< 4,5	-	-	-	-	-
or Kinematic viscosity at 60 °C[b]	EN 12595	mm²/s	DV	≥ 16 000	≥ 8 000	≥ 6 000	≥ 4 000	≥ 2 000	< 2 000	-	-	-	-
Cohesion (modified binders only)													
Cohesion energy by tensile test (100 mm/min traction)[c]	EN 13587 EN 13703	J/cm²	DV	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 2 at 10 °C	≥ 1 at 10 °C	≥ 0,5 at 10 °C	≥ 1 at 15 °C	≥ 0,5 at 15 °C	≥ 0,5 at 20 °C	≥ 0,5 at 25 °C
or Cohesion energy by force ductility (50 mm/min traction)[c]	EN 13589 EN 13703	J/cm²	DV	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 0,5 at 5 °C	≥ 2 at 10 °C	≥ 1 at 10 °C	≥ 0,5 at 10 °C	≥ 0,5 at 15 °C	≥ 0,5 at 20 °C	-
or Cohesion by pendulum test[c]	EN 13588	J/cm²	DV	≥ 1,4	≥ 1,2	≥ 1,0	≥ 0,7	≥ 0,5	-	-	-	-	-
Brittleness at low service temperature (Fraass breaking point)	EN 12593	°C	DV	≤ -25	≤ -20	≤ -15	≤ -10	≤ -5	≤ 0	≤ 5	-	-	-
Elastic recovery at 10 °C (for elastomeric polymer binders)	EN 13398	%	DV	≥ 75	≥ 50	-	-	-	-	-	-	-	-
Elastic recovery at 25 °C (for elastomeric polymer binders)	EN 13398	%	DV	-	-	≥ 75	≥ 50	-	-	-	-	-	-

[a] The consistency at an intermediate service temperature shall be measured by the determination of penetration according to EN 1426, at 25 °C or 15 °C depending on its consistency (5.4.1).

[b] The consistency at elevated service temperatures shall be measured either by the determination of the ring and ball softening point according to EN 1427, or by the determination of dynamic viscosity according to EN 13302 or vacuum capillary method according to EN 12596, or by the determination of kinematic viscosity according to EN 12595 (5.4.2).

[c] One cohesion method shall be chosen based on end application. The cohesion of residual binders from polymer modified emulsions which are used for surface dressings shall be determined in accordance with EN 13588. For binders used in other applications the method used shall be any one of EN 13587, EN 13589 or EN 13588 (5.4.3).

NOTE For CE marking see Annex ZA considering the grey shaded boxes for the essential characteristics.

5.5 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonised test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

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

6 Assessment and verification of constancy of performance - AVCP

6.1 General

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

— determination of the product type,

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

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).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of existing data, CWFT-“classified without further testing” and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the manufacturer's products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

— at the beginning of the production of a new or modified cationic bituminous emulsions (unless a member of the same product range); or

— at the beginning of a new or modified method of production (where this may affect the stated properties); or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the cationic bituminous emulsions design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonised European specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the cationic bituminous emulsions manufacturer to ensure that the cationic bituminous emulsions as a whole are correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

Sampling shall be carried out in accordance with EN 58 and sample preparation shall be carried out in accordance with EN 12594. The assessment methods and compliance criteria to be observed are the same as those listed within Table 7 (6.3.2.6).

6.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the cationic bituminous emulsion to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured according to the same design (e.g. same formulation) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

  — ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

  — keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

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 comply with the declared performance of the 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.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the characteristics.

In case the manufacturer has used shared product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organising the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organisation shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel who manage, perform or verify work affecting product constancy, shall be defined. This applies in particular to personnel who need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory, the manufacturer may delegate the action to a person having the necessary authority to:

a) identify procedures to demonstrate constancy of performance of the product at appropriate stages;

b) identify and record any instance of non-constancy;

c) identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product.

This involves:

d) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

e) the effective implementation of these procedures and instructions;

f) the recording of these operations and their results;

g) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

Manufacturers having an FPC system, which complies with EN ISO 9001 and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the EU Regulation 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria. The frequency of such calibration shall comply with the requirements of Table 5.

Table 5 — Factory calibration requirements

Production item	Inspection/test	Purpose	Minimum frequency
Weighing equipment	Testing of weighing accuracy	To ensure accuracy within Quality Plan requirements	a) On installation[a] b) Annually c) In case of doubt
Admixture dispensers	Organoleptic inspection	To ascertain that the dispenser is functioning correctly	First batch of the day containing admixture
	Test for accuracy	To ensure accuracy within Quality Plan requirements	a) On installation[a] b) Annually c) In case of doubt
Flow meters	Comparison of the actual amount with the metered amount by reconciliation	To ensure accuracy within Quality Plan requirements	a) On installation[a] b) Annually c) In case of doubt
pH-meter(s) [b]	Calibration	To ensure accuracy	a) On installation[a] b) Annually c) In case of doubt
Batching system (on batch factories)	Comparison of actual quantity of constituents in the batch with the intended quantity using the method prescribed in the Quality Plan	To ascertain the batching accuracy is in accordance with the Quality Plan	a) On installation[a] b) Annually c) In case of doubt
Proportioning system (in continuous factories)	Comparison of actual mass in a measured period of time with the intended mass using the method prescribed in the Quality Plan	To ascertain the accuracy in accordance with the Quality Plan	a) On installation[a] b) Annually c) In case of doubt
Temperature monitoring equipment	Test of accuracy	To ensure correct temperatures are recorded	a) On installation[a] b) Annually c) In case of doubt

[a] Or after comprehensive repair.

[b] In case plant is fitted out with pH-meter(s) being part of the process control equipment (in-line or batch control).

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

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

Incoming constituent materials shall be inspected and tested using procedures detailed in the Quality Plan and to a schedule complying with the requirements of this clause. Results of tests carried out by the supplier may be used if the supplier's quality plan is called up in the producer's Quality Plan.

The required inspections of materials in storage shall be maintained to establish that no deterioration has occurred.

Detailed requirements shall be as described in Table 6.

Supply of materials under a system complying with the requirements of EN ISO 9001 and made specific to the product shall be deemed to satisfy the requirements of this clause.

Table 6 — Supplied materials: tests, frequencies and specifications (to be carried out by the manufacturer of a bituminous emulsion)

Constituents	Control/Test	Test standards	Specifications	Minimum Frequency
1 Bitumen	Inspection of delivery ticket and results [a] of the test certificate			1/delivery
	Penetration or viscosity [b]	EN 1426 or EN 12596 or EN 12595	Product standard or Internal Specifications	1/2 weeks or 1/300 t (the most onerous) or 1/ship consignment.
	Softening point [b]	EN 1427	Product standard or Internal Specifications	1/2 weeks or 1/300 t (the most onerous) or 1/ship consignment.
2 Flux	Inspection of delivery ticket and results [a] of the test certificate		Product standard or Manufacturer Specifications	1/delivery
	Density [c]	EN ISO 3675	Product standard or Manufacturer Specifications	1/year
	If fluxed bitumen: viscosity [c]	EN 12846-2 or EN 13302	Product standard or Manufacturer specifications	1/year
	Distillation [c]	EN ISO 3405 [d]	Internal Specifications	1/year
	Specific requirements [e]		Internal Specifications	As defined in Quality Plan
3 Water	Specific requirements [e]		Internal Specifications	As defined in Quality Plan
4 Emulsifiers	Inspection of delivery ticket and results [a] of the test certificate		Manufacturer Specifications	1/delivery
	Specific requirements [e]		Internal Specifications	As defined in Quality Plan
5 Acids	Inspection of delivery ticket and results [a] of the test certificate		Manufacturer Specifications	1/delivery
	Specific requirements [e]		Internal Specifications	As defined in Quality Plan
6 Other additives	Inspection of delivery ticket and results [a] of the test certificate		Manufacturer Specifications	1/delivery
	Specific requirements [e]		Internal Specifications	As defined in Quality Plan

[a] To be decided by supplier and emulsion manufacturer.

[b] Results supplied by the bitumen supplier shall be acceptable if the delivered product is CE marked.

[c] Test certificates from an approved supplier are acceptable.

[d] If appropriate to flux composition.

[e] If the nature of the constituent product (type of flux, quality of available water, type of emulsifier, acid or other additive) requires specific controls to be performed, those shall be defined, together with the applicable frequency, by the producer and documented in the Quality Plan. Test certificates from an approved supplier are acceptable.

6.3.2.4 Traceability and marking

Individual product batches shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Control during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.6 Product testing and evaluation

6.3.2.6.1 General

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.2.6.2 Definition of a batch

There are two possible definitions of a batch, depending on the production scheme and the production parameters.

a) The quantity of product produced and stored in one tank once the production run into that tank has been completed. The batch is considered to remain the same as long as no new production has been added.

   In this case, factory production control shall be performed on samples taken from the constituted batch.

b) The maximum amount of a given product which may be produced without testing of a production sample. The frequency of testing shall however not be less than one control every 200 tonnes or monthly whilst producing, whichever is more frequent (if product is produced).

   In this case, the taking and testing of a “batch control sample” shall be defined in the Factory Quality Control Plan and may depend on the specific production and control process. An adequate control and registration of product composition and process parameters, together with a proper calibration scheme of the corresponding equipment, shall be available.

   In the case of products which are usually produced in small quantities, it is recommended to systematically sample and test the first monthly production run.

6.3.2.6.3 Tests and frequencies

The finished products shall be inspected and tested using procedures detailed in the Quality Plan and to a schedule complying with the requirements of Table 7.

Table 7 — Test and frequencies

	Product	Control/Test	Test standards [a]	Specifications	Minimum Frequency
1	Manufactured emulsion	Perceptible properties	EN 1425	Internal specifications	1/batch [b]
		Temperature		Internal specifications	As required in the manufacturing Process Control
		Binder content by water content or distillation or residual binder content	EN 1428 EN 1431	EN 13808 and National application document where applicable [c]	1/batch [b]
		Breaking value Mineral filler method or Fines mixing time or Mixing stability with cement (as appropriate)	EN 13075-1 or EN 13075-2 or EN 12848	EN 13808 and National application document where applicable [c]	minimum: 1/3 batches [b] /product
		Residue on sieving – 0,5 mm sieve	EN 1429	EN 13808 and National application document where applicable [c]	1/batch [b]
		pH	EN 12850	Internal specifications	1/batch [b]
		Efflux time or Dynamic viscosity (as appropriate)	EN 12846-1 or EN 13302	EN 13808 and National application document where applicable [c]	1/batch [b]
		Adhesivity with reference aggregate	EN 13614	EN 13808 and National application document where applicable [c]	1/year/product
		Penetration power	EN 12849	EN 13808 and National application document where applicable [c]	minimum: 1/3 batches /product [b]
		Oil distillate content	EN 1431	EN 13808 and National application document where applicable [c]	1/batch [b]
		Residue on sieving – 0,16 mm sieve	EN 1429	EN 13808 and National application document where applicable [c]	1/batch [b]
		Efflux time at 85 °C	EN 16345	EN 13808 and National application document where applicable [c]	1/batch [b]
		Storage stability by sieving (after 7 days of storage) 0,5 mm sieve	EN 1429	EN 13808 and National application document where applicable [c]	1/year/product
		Settling tendency (after 7 days of storage)	EN 12847	EN 13808 and National application document where applicable [c]	1/year/product

Table 7 — Test and frequencies *(continued)*

	Product	Control/Test	Test standards [a]	Specifications	Minimum Frequency
2	Residual Binder (EN 1431) (5.3.1) and/or Recovered Binder (EN 13074-1) (5.3.2) and/or Stabilised binder (EN 13074-1 + EN 13074-2) (5.3.3.1) and/or Aged binder (EN 13074-1 + EN 13074-2 + EN 14769) (5.3.3.2)	Consistency at intermediate service temperature: Penetration at 25 °C or 15 °C	EN 1426	EN 13808 and National application document where applicable [c]	1/year/product
		Consistency at elevated service temperature Softening Point or Viscosity (as appropriate)	EN 1427 or EN 12596 or EN 13302 or EN 12595	EN 13808 and National application document where applicable [c]	1/year/product
		Cohesion (for modified binders)	EN 13587 / EN 13703 or EN 13589 / EN 13703 or EN 13588	EN 13808 and National application document where applicable [c]	1/year/product
		Brittleness at low service temperature Fraass breaking point	EN 12593	EN 13808 and National application document where applicable [c]	1/year/product
		Elastic recovery at 10 °C and/or 25 °C (for modified binders)	EN 13398	EN 13808 and National application document where applicable [c]	1/year/product
3	Suitability of delivery vehicles	Cleanliness and general state	–	–	As defined in Quality Plan

[a] The use of alternative tests may be appropriate where it can be demonstrated that there is a correlation with the European Standards. However, in cases of disputes, the European Standards shall be used.

[b] Batch: see definition given in 6.3.2.6.2.

[c] The property has only to be controlled if it has been retained in the National application document: national annex or national guidance document.

6.3.2.7 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the product fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the products or batches not complying shall be isolated and properly identified.

Once the cause for the non-complying product has been removed, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.8 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.9 Handling storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalised and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented, and

b) that the FPC-procedures in accordance with the FPC documentation are followed in practice, and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final testing of the relevant product is performed shall be assessed to verify that the above conditions a) to c) are in place and have been implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.4 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.5 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance and which may be affected by the modification shall be subject to the determination of the product type, as described in 6.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.3.6 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The cationic bituminous emulsions produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities (less than 100 tonnes per year) shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

a) in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

b) on request of the manufacturer, the results of the type assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall be consistent with the requirements under 6.3 and ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

For prototypes, where the intention is to move to series production, the initial inspection of the factory and FPC shall be carried out before the production is already running and/or before the FPC is already in practice. The FPC documentation and the factory shall be assessed.

In the initial assessment of the factory and FPC it shall be verified:

c) that all resources necessary for the achievement of the product characteristics included in this European Standard will be available, and

d) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and

e) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European Standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 6.3 shall apply.

Annex A
(informative)

Examples of abbreviated terms for bituminous emulsions

Table A.1 — Examples of abbreviated terms for bituminous emulsions

Example 1	C 69 B 2 Cationic, nominal binder content 69 %, produced from bitumen, class 2 breaking value, bituminous emulsion.
Example 2	C 65 BP 3 Cationic, nominal binder content 65 %, produced from bitumen, containing polymers, class 3 breaking value, bituminous emulsion.
Example 3	C 69 BF 3 70/100 Cationic, nominal binder content 69 %, produced from bitumen, containing more than 3 % (*m/m*) flux, class 3 breaking value, 70/100 penetration grade bitumen, bituminous emulsion.

Polymers may be added before, during or after emulsification.

Annex B
(informative)

Examples of selected performance classes for a C 69 BP 2 emulsion

The tables given below are for illustration only. The technical specifications of a product are based on the essential characteristics and on voluntary properties, depending on the intended use and on the local climatic conditions. Care should be taken to make class selections which are compatible and realistic.

Table B.1 — Example of selected performance classes for the emulsion from Table 2

Requirement	Selected classes from Table 2
Binder content by water content (EN 1428)	From 67 % to 71 % (Class 9)
Breaking behaviour by breaking value (EN 13075-1)	< 110 (Class 2)
Residue on sieving - 0,5 mm sieve (EN 1429)	≤ 0,1 % (*m/m*) (Class 2)
Viscosity by efflux time - 4 mm at 40 °C (EN 12846-1)	5 s to 70 s (Class 5)
Adhesivity with reference aggregate (EN 13614)	≥ 75 (Class 2)
Penetration power (EN 12849)	NR (Class 0)
Oil distillate content (EN 1431)	≤ 2 % (*m/m*) (Class 2)
Residue on sieving - 0,16 mm sieve (EN 1429)	≤ 0,25 % (*m/m*) (Class 2)
Efflux time at 85 °C (EN 16345)	NR (Class 0)
Storage stability by sieving – 0,5 mm sieve (EN 1429) (7 days storage)	NR (Class 0)
Settling tendency (EN 12847) (7 days storage)	≤ 5 % (*m/m*) (Class 2)

Table B.2 — Example of selected performance classes for binders from the C 69 BP 2 emulsion

Requirement	Residual binder by distillation (EN 1431)	Recovered binder (EN 13074-1)	Durability - Stage 1 Stabilised binder (EN 13074-1 and EN 13074-2)	Durability - Stage 2 Aged binder (EN 13074-1 and EN 13074-2 + EN 14769)
Consistency at intermediate service temperature by penetration at 25 °C (EN 1426)	NR (Class 0)	≤ (150 x 0,1) mm (Class 4)	≤ (100 x 0,01) mm (Class 3)	DV (Class 1)
Consistency at elevated service temperature by Softening Point (EN 1427)	NR (Class 0)	≥ 43 °C (Class 6)	≥ 46 °C (Class 5)	DV (Class 1)
Cohesion energy by pendulum test (EN 13588)	NR (Class 0)	NR (Class 0)	≥ 1,2 J/cm² (Class 3)	NR (Class 0)
Brittleness at low service temperature Fraass breaking point (EN 12593)	NR (Class 0)	≤ -20 °C (Class 3)	≤ -15 °C (Class 4)	DV (Class 1)
Elastic recovery at 10 °C (EN 13398)	NR (Class 0)	NR (Class 0)	NR (Class 0)	NR (Class 0)
Elastic recovery at 25 °C (EN 13398)	NR (Class 0)	≥ 75 % (Class 4)	≥ 50 % (Class 5)	NR (Class 0)

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation 305/2011

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/124, "Road Construction Products" given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in Official Journal of the European Union (OJEU), the clauses of this standard shown in this annex are considered to meet the provisions of the relevant mandate under the EC Regulation 305/2011.

This annex deals with the CE marking of the cationic bituminous emulsions intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for cationic bituminous emulsions and their intended uses

Products:	Cationic bituminous emulsions
Intended uses:	Surface treatment such as surface dressings or slurry systems (slurry seals and micro surfacing), tack coat, patching, repair of potholes, crack sealing, dust palliative, penetration, impregnation, plant mixed or mixed in place cold mixes (for base course, binder course or wearing course), cold recycling and more generally road construction and road maintenance

Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes** [a]
Viscosity	5.2.4	none	Performance Classes in Table 2
Water effect on binder adhesion	5.2.5	none	Performance Classes in Table 2
Breaking behaviour	5.2.2	none	Performance Classes in Table 2
Consistency at intermediate service temperature	5.3.2 and 5.4.1	none	Performance Classes in Table 3 and 4
Consistency at elevated service temperature	5.3.2 and 5.4.2	none	Performance Classes in Table 3 and 4
Cohesion (for modified bituminous emulsions only)	5.3.2 and 5.4.3	none	Performance Classes in Table 3 and 4
Durability of consistency at intermediate service temperature - Stage 1 - Stage 2	5.3.3.1, 5.3.3.2 and 5.4.1	none	Performance Classes in Table 3 and 4

Table ZA.1 — Relevant clauses for cationic bituminous emulsions and their intended uses *(continued)*

Essential Characteristics	Clauses in this and other European Standard(s) related to essential characteristics	Regulatory classes	Notes [a]
Durability of consistency at elevated service temperature - Stage 1 - Stage 2	5.3.3.1, 5.3.3.2 and 5.4.2	none	Performance Classes in Table 3 and 4
Durability of cohesion (for modified bituminous emulsions only) - Stage 1 - Stage 2	5.3.3.1, 5.3.3.2 and 5.4.3	none	Performance Classes in Table 3 and 4
Dangerous regulated substances	5.5	none	
[a] For Class 1 of Table 4 values should be declared.			

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) shall be used for those essential characteristics.

ZA.2 Procedure for AVCP of cationic bituminous emulsions

ZA.2.1 System of AVCP

The AVCP system of cationic bituminous emulsions indicated in Table ZA.1, established by EC Decision 98/601/EC of 13 October 1998 published the 24 October 1998 under OJ L 287 and amended by EC Decision 2001/596/EC of 8 January 2001 published the 2 August 2001 under OJ L 209 is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System of AVCP

Product	Intended use	Level(s) or class(es) of performance	AVCP system
Cationic bituminous emulsions	For road construction and surface treatment of roads	-	2+
System 2+: See EC Regulation 305/2011 (CPR) Annex V, 1.3 including certification of the factory production control by a notified production control certification body on the basis of initial inspection of the manufacturing plant and of factory production control as well as of continuous surveillance, assessment and evaluation of factory production control.			

The AVCP of the cationic bituminous emulsions in Table ZA.1 shall be according to the AVCP procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standards indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3 — Assignment of AVCP tasks for cationic bituminous emulsions under system 2+

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.	6.3
	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.	6.2
	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.	6.2
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 are declared. Documentation of the FPC.	6.3.3
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the intended use, which are declared. Documentation of the FPC.	6.3.4

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the EC Regulation 305/2011:

In case of products under system 2+:

— the determination of the product type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the factory production control and the testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of conformity of the factory production control, issued by the notified production control certification body on the basis of:

  — initial inspection of the manufacturing plant and of factory production control, and

  — continuous surveillance, assessment and evaluation of factory production control.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the EC Regulation 305/2011.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonised standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the specific technical documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

— the intended use or uses for the construction product, in accordance with the applicable harmonised technical specification;

— the list of essential characteristics, as determined in the harmonised technical specification for the declared intended use or uses;

— the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

— where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation, in relation to its essential characteristics. These essential characteristics for which the manufacturer declares the product performance when it is placed on the market, are determined by the Commission. The Commission also determines the threshold levels for the performance in relation to the essential characteristics to be declared;

— the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

— for the listed essential characteristics for which no performance is declared, the letters "NPD" (No Performance Determined).

Regarding the supply of the DoP, article 7 of the EC Regulation 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of EC Regulation 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for a cationic bituminous emulsion

DECLARATION OF PERFORMANCE
No. 001 CPR 2013-07-14

1) Unique identification code of the product type:

Cationic bituminous emulsion - C69 BP2

2) Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

"Trade name"

3) Intended use or uses of the construction product, in accordance with the applicable harmonised technical specification, as foreseen by the manufacturer:

Surface dressing

4) Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,
PO Box 21
B-1050 Brussels, Belgium
Tel. +32987654321
Fax: +32123456789
Email: anyco.sa@provider.be

5) Where applicable, name and contact address of the authorised representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd
Flower Str. 24
West Hamfordshire
UK-589645 United Kingdom
Tel. +44987654321
Fax: +44123456789
e-mail: anyone.ltd@provider.uk

6) System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 2+

7) As it is the declaration of performance concerning a construction product covered by a harmonised standard:

Notified factory production control certification body No. 5678 performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the factory production control.

8) Declared performance

Essential characteristics	Performance	Harmonised technical specification
Viscosity – Efflux time 4 mm – 40 °C	5 s to 70 s (Class 5)	EN 13808 - Table 2 EN 12846-1
Water effect on binder adhesion	≥ 75 (Class 2)	EN 13808 - Table 2 EN 13614 (Reference Aggregate: Quartzite)
Breaking behaviour	< 110 (Class 2)	EN 13808 - Table 2 EN 13075-1
Consistency at intermediate service temperature	≤ (150 x 0,1) mm (Class 4)	EN 13808 - 5.3.2 : Bituminous phase EN 13808 – Table 4 EN 1426
Consistency at elevated service temperature	≥ 43 °C (Class 6)	EN 13808 - 5.3.2 : Bituminous phase EN 13808 - Table 4 EN 1427
Cohesion (for modified bituminous emulsions only)	NPD	EN 13808 - 5.3.2 EN 13808 - Table 3
Durability of consistency at intermediate service temperature		
- Stage 1	≤ (100 x 0,1) mm (Class 3)	EN 13808 - 5.3.3.1 EN 13074-1 + EN 13074-2 EN 13808 - Table 4 EN 1426
- Stage 2	≥ (35 x 0,1) mm (Class 1 – DV)	EN 13808 - 5.3.3.2 EN 13074-1 + EN 13074-2 + EN 14769 EN 13808 - Table 4 EN 1426
Durability of consistency at elevated service temperature		
- Stage 1	≥ 46 °C (Class 5)	EN 13808 –5.3.3.1 EN 13074-1 + EN 13074-2 EN 13808 – Table 4 EN 1427
- Stage 2	≤ 60 °C (Class 1 - DV)	EN 13808 - 5.3.3.2 EN 13074-1 + EN 13074-2 + EN 14769 EN 13808 - Table 4 EN 1427
Durability of cohesion (for modified bituminous emulsions only		
- Stage 1	≥ 1,2 J/cm² (Class 3)	EN 13808 - 5.3.3.1 EN 13074-1 + EN 13074-2 EN 13808 - Table 4 EN 13588
- Stage 2	NPD	EN 13808 - 5.3.3.2 EN 13808 - Table 3
Dangerous regulated substances	NPD	EN 13808 - 5.5

9) The performance of the product identified in points 1) and 2) is in conformity with the declared performance in point 8). This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4).

Signed for and on behalf of the manufacturer by: ..... name and function) .....

……..…… (place and date of issue) (signature) …….....…….....……

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of EC Regulation 765/2008 and shall be affixed visibly, legibly and indelibly to the packaging or with a delivery note or to the accompanying commercial documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed,

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,

— the unique identification code of the product type,

— the reference number of the declaration of performance,

— the level or class of the performance declared,

— the dated reference to the harmonised technical specification applied,

— the identification number of the notified body,

— the intended use as laid down in the harmonised technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 and ZA.2 give examples of the information related to cationic bituminous emulsions.

Figure ZA.1 gives an example of a CE marking with the information to be affixed on a packaging or to be given on a Delivery Note.

Figure ZA.2 gives an example of the CE marking information which shall apply for all types of cationic bituminous emulsions and shall be given on accompanying commercial documents.

CE 01234	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified AVCP certification body*
Any Co Ltd, PO Box 21, B-1050, Brussels, Belgium **13** 00001-CPR-2013/05/12	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 13808:2013 *Cationic bituminous emulsion* *"Trade name" -* ***C69 BP2*** Intended to be used for road surface dressings	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product type* *Intended use of the product as laid down in the European Standard applied*

Figure ZA.1 — Example of CE marking information of products under AVCP system 2+ to be affixed to the packaging or to be given on a Delivery Note

Product designation shall allow an unambiguous tracing to the corresponding CE marking information given on commercial documents.

For a given product, only the relevant intended uses shall be listed.

CE 01234	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified AVCP certification body*
Any Co Ltd, PO Box 21, B-1050, Brussels, Belgium **13** 00001-CPR-2013/05/12	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 13808: 2013 *Cationic bituminous emulsion* *"Trade name" - **C69 BP2*** Intended to be used for road surface dressings	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product type* *Intended use of the product as laid down in the European Standard applied*
EMULSION	
. Viscosity – Efflux time 4mm - 40 °C – EN 12846-1	**5 s to 70** s (Class 5)
. Water effect on binder adhesion – EN 13614 – Quartz.	**≥ 75** (Class 2)
. Breaking behaviour – EN 13075-1	**< 110** (Class 2)
RECOVERED BINDER	
. Consistency at intermediate service temperature – EN 1426	**≤ (150** x 0,1) mm (Class 4)
. Consistency at elevated service temperature – EN 1427	**≥ 43** °C (Class 6)
. Cohesion	**NPD**
STAGE 1 DURABILITY - STABILISED BINDER	
. Consistency at intermediate service temperature – EN 1426	**≤ (100** x 0,1) mm (Class 3)
. Consistency at elevated service temperature – EN 1427	**≥ 46** °C (Class 5)
. Cohesion – EN 13588	**≥ 1,2** J/cm² (Class 3)
STAGE 2 DURABILITY - AGED BINDER	
. Consistency at intermediate service temperature – EN 1426	**≥ (35** x 0,1) mm (DV – Class 1)
. Consistency at elevated service temperature – EN 1427	**≤ 60** °C (DV – Class 1)
. Cohesion	**NPD**
Dangerous substances	**NPD**

Figure ZA.2 — Example of CE marking information of products under AVCP system 2+ to be given on accompanying commercial documents

Product designation shall allow an unambiguous tracing to the corresponding DoP.

For a given product, only the relevant intended uses shall be listed.

For each declared performance, the test method used shall be indicated.

Bibliography

[1] EN ISO 9001, *Quality management systems — Requirements (ISO 9001)*

[2] EN ISO 3838, *Crude petroleum and liquid or solid petroleum products — Determination of density or relative density — Capillary-stoppered pyknometer and graduated bicapillary pyknometer methods (ISO 3838)*

National Annex NA
(informative)

Additional guidance for users in the UK

NA.1 General

This National Annex provides guidance on the use of BS EN 13808:2013, *Bitumen and bituminous binders – Framework for specifying cationic bituminous emulsions*, for use in the construction and maintenance of roads, airfields and other paved areas.

BS EN 13808:2013 revises the 2005 edition of the standard. It gives more details about testing and test properties and introduces new requirements in respect of performance classes. Assessment and verification of constancy of performance (AVCP) replaces evaluation of conformity. The requirements of BS EN 14733:2005+A1:2010 for factory production control (FPC) have been incorporated into this standard.

The specification for anionic bitumen road emulsions is given in BS 434-1:2011.

BS 434-2:2006, *Bitumen road emulsions – Part 2: Code of Practice for the use of cationic bitumen emulsions on roads and other paved areas*, is essential reading in conjunction with BS EN 13808:2013.

NA.2 How to use this Standard

BS EN 13808:2013 provides a framework of classes for the different properties that may need to be specified. It is an attempt to harmonize in one specification the diverse and contrasting specifications that exist throughout the countries of the EU. Due to the differing climates and working practices that exist throughout the EU it has proven impossible to produce a prescriptive specification. Therefore, this framework specification provides a structure that each country can use to define its products.

It is understood that not every property will be required in every country and that selections from the tables within BS EN 13808:2013 will be made based on experience, existing regulations and working practices in each country. In theory, any given combination of classes may be selected. However, this would not be practical as it would lead to an unacceptably large number of different emulsions and, more significantly, the specification of unworkable and unrealistic products. National Annex NB provides an example of appropriate classes for a surface dressing binder.

BS EN 13808:2013 provides a framework for specification at different levels. Table 2 provides a framework for the emulsion as supplied, focusing on the characteristics affecting installation. Table 4 provides a framework for:

- the residual binder by distillation, (i.e. after removal of water and oil distillate),
- the binder as recovered after evaporation of the water via the specified recovery process in accordance with BS EN 13074-1:2011/BS 2000-493:2011, providing an indication of binder behaviour after emulsion break,
- the recovered and stabilized binder, evaporating the volatile fractions,
- the binder after recovery, stabilization and ageing, attempting to provide an indication of how the binder behaviour changes during ageing.

The method for recovery of the binder is not intended to represent the binder at any specific stage during the lifecycle of the product; rather, it provides only a means of comparing the characteristics of one binder with another.

Similarly, the combination of recovery, stabilization and ageing only provides a means of comparison of one binder type with another after a standardized method of artificially ageing a binder has been undertaken. It is not possible to extrapolate to an expression of precise durability, as that will depend on many factors including ambient conditions, the type of process the binder is used in and precise process design. However, there is a provision in Table ZA.1 for the process of assessing durability.

NA.3 Developing a Specification

Since the early 1980s, there has been a significant increase in the quantity and range of polymer modified bitumen emulsions used in the road maintenance industry in the UK. These are supplied as proprietary products, conforming to specifications devised by the supplier or under the auspices of The Highway Authority Product Approval Scheme (HAPAS) [1]. In the absence of a British Standard, the Specification for Highway Works (SHW) [2] and its Notes for Guidance [3] have specified the provision of information on the properties for emulsions for slurry surfacing, surface dressing, bond coats, tack coats and other bituminous sprays. These practices have served the UK industry successfully for many years and the same properties defined in these documents for polymer modified bitumen emulsions can be adopted to comply with BS EN 13808:2013.

It is important to understand that it is not possible to select any combination of classes for a particular product to develop a specification because that specification may be unworkable and/or unrealistic. Indeed, the characteristics specified may actually be detrimental to the actual finished product performance.

It is recommended that the 'No Requirement' (NR) category be selected in all cases where a property is not relevant or an alternative method is used to give the end use requirements.

NA.4 Tables 2 and 4 of BS EN 13808:2013

In the UK, bitumen emulsions will generally be supplied on the basis of agreement between the interested parties. Therefore, it is strongly recommended that the selection of classes for Table 2 is agreed between the installer and the emulsion supplier and for Table 4 between the specifier/designer and the emulsion supplier.

Performance classes are included in Table 4 for the binder from the bituminous emulsion. The properties of the residual binder are not specified in the UK. Recovery by evaporation is the principal method used to characterize the binder test properties.

National Annex NB provides examples of how UK emulsions would fit into the class framework. For some characteristics (e.g. breaking behaviour in Table 2), there is more than one class produced and successfully used in the UK. For this reason, the detail of which class is specified should be agreed between the installer and the supplier.

Table 4 does not specify cohesion levels for binder recovered from unmodified emulsions. However, it should be noted that the Notes for Guidance on the SHW do define such binder for use in surface dressing in terms of cohesion and describe the data to be provided (report and graphical output).

Traditionally, for modified emulsions for surface dressing, the UK has specified cohesion levels for recovered binders for different stress application levels, which are found in the Notes for Guidance on

the SHW. These threshold levels for 'cohesion by pendulum test' (see classes 2 to 6 in Table 4) should be utilized when developing the specification agreed between the specifier and the supplier.

To date, the other requirements in Table 4 have not been specified in the UK. However, it is recommended that class 1 (DV) is adopted for penetration and softening point.

NA.5 Factory production control

Emulsion suppliers should operate a quality management scheme that covers the FPC requirements detailed in 6.3, which provides a schedule for the specific quality control system. This may be based on the requirements of existing third party accredited systems, e.g. BS EN ISO 9001:2008.

Oil distillate content is not determined by the method stated in Table 7 in the UK, but from manufacturing batch records.

There is now provision in Table 7 to test by efflux time at 85 °C in accordance with BS EN 16345:2012/ BS 2000-603:2012 (corresponding to clause D.2 of BS 434-1:2011). However, it should be noted that this test should not be used as a substitute for viscosity as part of the CE marking information (see Table 2). Provision of the results from the FPC testing for inspection by the installer and the specifier/designer should normally remove the need for any of the parties to repeat these tests during the installation process.

NA.6 Assessment and verification of constancy of performance and CE marking

Compliance with the requirements of BS EN 13808:2013 for FPC, initial type testing, ongoing surveillance and accreditation by a Notified Body entitles a supplier to prepare a Declaration of Performance (DoP) for their products. This declaration, which needs to include information about the products, the supplier and quality assurance, enables the supplier to affix a CE mark. The requirements are detailed in informative Annex ZA.

Construction products falling under the scope of the Construction Products Regulation 305/2011 have to have a declaration of their performance as a legal requirement before they can be put on the market. This declaration is demonstrated by the CE marking.

For products conforming to BS EN 13808:2013, a Notified Body will assess the producer's capability to manufacture the product and issue a certificate. This certificate grants the producer permission to affix the CE mark.

It is necessary to identify the key test properties, characterized by class in the product standard. They are based on the essential characteristics but may include voluntary properties, depending on the intended use of the product and the local climatic conditions. Test properties will need to relate to the performance of at least one of the essential characteristics of the product. Care should be taken to make property class selections that are compatible and realistic.

For the purpose of CE marking, key properties from BS EN 13808:2013 may include:

- Properties of the emulsion as supplied:
    1. Breaking behaviour e.g. breaking value (Forshammer filler),
    2. Viscosity (efflux time/dynamic viscosity),
    3. Adhesivity.

- Properties of recovered binder (BS EN 13074-1:201/BS 2000-493:2011), and assessment of durability – Stage 1 stabilized (BS EN 13074-1:201/BS 2000-493:2011 and BS EN 13074-2:2011, BS 2000-542:2011) and/or Stage 2 aged (BS EN 14769:2012, BS 2000-535:2012):
    1. Consistency at intermediate temperature (penetration),
    2. Consistency at elevated temperature e.g. softening point,
    3. Cohesion – modified binders only e.g. by pendulum test.

The manufacturer will need to implement all of the relevant requirements of 6.3, which include making the necessary checks and carrying out the appropriate tests at the required frequency.

The Notified Body makes an initial inspection of the plant to ensure that FPC has been implemented satisfactorily and that the appropriate test properties conform to the requirements (selected classes) of the product standard. The Notified Body is also responsible for continuously monitoring the FPC.

The main task of the DoP, which is drawn up by the manufacturer, is to list the classes of the test properties that are appropriate to the intended use of each product. This will be consistent with the information that follows the CE marking symbol; this information may be included on commercial documents. A shortened CE marking with the minimum amount of information can be affixed on packaging or be given on a Delivery Note. Alternatively, specific reference may be made to where the information may be obtained.

Bibliography to National Annex NA

Standards publications

BS 434-1:2011, *Bitumen road emulsions— Part 1: Specification for anionic bitumen road emulsions*

BS 434-2:2006, *Bitumen road emulsions — Part 2: Code of practice for use of cationic bitumen emulsions for roads and other paved areas*

BS EN 14733:2005+A1:2010, *Bitumen and bituminous binders — Bituminous emulsions, fluxed and cut-back bitumen factory production control*

BS EN ISO 9001:2008, *Quality management systems — Requirements*

Other publications

[1] The Highway Authorities Product Approval Scheme (HAPAS) — www.bbacerts.co.uk/hapas.html

[2] HIGHWAYS AGENCY. *Manual of contract documents for highway works, Volume 1: Specification for Highway Works*, London: TSO
http://www.dft.gov.uk/ha/standards/mchw/vol1/index.htm

[3] HIGHWAYS AGENCY. *Manual of contract documents for highway works, Volume 2: Notes for Guidance on the Specification for Highway Works*, London: TSO
http://www.dft.gov.uk/ha/standards/mchw/vol2/index.htm

National Annex NB
(informative)

Example of emulsion specified in accordance with BS EN 13808:2013

NB.1 General

This National Annex contains an example specification framework of product classes/characteristics in accordance with BS EN 13808:2013.

For a given product, the class for some properties may change through the year, to compensate for ambient conditions; for example, the breaking value of a slurry type emulsion may be different in the height of summer to the late autumn. Similarly, the residual binder after recovery for a surface dressing binder may be softer for material produced late summer than early summer.

The descriptions given in section 4 of BS EN 13808:2013 should be used for delivery tickets, invoicing, type testing reports and CE marking. For product enquiry and order placement, reference should only be made to BS EN 13808:2013 and the intended use with any specific test property requirements.

NB.2 Notes on use

NB.2.1 Table NB.1.1

For some characteristics (e.g. breaking behaviour), there is more than one class produced and successfully used in the UK. For this reason, the detail of which class is specified should be agreed between the installer and the supplier.

NB.2.2 Table NB.1.2

This table specifies the characteristics of the recovered binder; specifiers should take particular note of this information. The details of the classes should be agreed between the specifier and the supplier.

NB.2.3 Table NB.2

Recommendations on test properties are given in table NB.2.

BS EN 13808 provides a framework of classes for the different properties of cationic road emulsions that may be specified as supplied. Surface dressing binders are used hot and the viscosity for these binders may be determined at application temperature (85 °C when tested in accordance with BS EN 16345:2012/ BS 2000-603:2012). Bitumen emulsions can change in viscosity during storage and transit and viscosity at application temperature may be by agreement between the purchaser and supplier, provided that hot binder distributors comply with the method outlined in BS 1707:1989, Appendix A.

Samples of emulsion taken after delivery should be drawn as soon as possible, preferably within 24 hours, and tested within 7 days from the date of drawing. Samples should not be exposed to temperatures below 0 °C.

Table NB.1.1 – Specification framework for technical requirements and performance classes of cationic bitumen emulsions (intended use – surface dressing)

			Performance Classes for the technical requirements of cationic bituminous emulsions												
Technical requirements	**Document**	**Unit**	**Class 0**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**	**Class 12**
Binder content or Residual binder after distillation[c]	EN 1428[a] or EN 1431[b] EN 1431	% m/m % m/m			< 38 < 38 (C35)	38 to 42 ≥ 38 (C40)	48 to 52 ≥ 48 (C50)	53 to 57 ≥ 53 (C55)	58 to 62 ≥ 58 (C60)	63 to 67 ≥ 63 (C65)	65 to 69 ≥ 65 (C67)	67 to 71[f] ≥ 67 (C69)	≥ 69 ≥ 69 (C70)	≥ 71 ≥ 71 (C72)	
Breaking behaviour															
Breaking value (Forshammer filler)	EN 13075-1	None			< 110[f]	70 to 155[f]	110 to 195	> 170	–	–	–	–	–	–	
or Fines mixing time	EN 13075-2	s			–	–	–	–	> 90	≥ 180	≥ 300	–	–	–	
or Mixing stability with cement	EN 12848	g			–	–	–	–	–	–	–	> 2	£ 2	–	
Residue on sieving – 0,5 mm sieve	EN 1429	% m/m			≤ 0,1	≤ 0,2	≤ 0,5	–	–	–	–	–	–	–	
Viscosity															
Efflux time 2 mm at 40 °C	EN 12846-1	s	NR		≤ 20	15 to 70	40 to 130	–	–	–	–	–	–	–	
or Efflux time 4 mm at 40 °C	EN 12846-1	s	NR		–	–	–	5 to 70[f]	40 to 100	–	–	–	–	–	
or Efflux time 4 mm at 50 °C	EN 12846-1	s	NR		–	–	–	–	–	5 to 30	≥ 25	–	–	–	
or Dynamic viscosity at 40 °C[d]	EN 13302	m Pa.s	NR		–	–	–	–	–	–	–	≤ 30	20 to 300	100 to 1000	> 1000
Adhesivity with reference aggregate	EN 13614	% coating	NR		≥ 75[f]	≥ 90[f]	–	–	–	–	–	–	–	–	
Penetration power	EN 12849	Min	NR	DV	–	–	–	–	–	–	–	–	–	–	
Oil distillate content[e]	EN 1431	% m/m	NR		≤ 2,0[f]	≤ 3,0[f]	≤ 5,0[f]	≤ 8,0	≤ 10,0	5 to 15	> 15	–	–	–	
Residue on sieving – 0,16 mm sieve	EN 1429	% m/m	NR		≤ 0,25	≤ 0,5	–	–	–	–	–	–	–	–	
Efflux time at 85 °C	prEN 16345	s	NR		25 to 45[f]	20 to 100	–	–	–	–	–	–	–	–	
Storage stability by sieving (7 days storage) – 0,5 mm sieve	EN 1429	% m/m	NR		≤ 0,1	≤ 0,2	≤ 0,5	–	–	–	–	–	–	–	
Settling tendency (7 days storage)	EN 12847	% m/m	NR		≤ 5	≤ 10	–	–	–	–	–	–	–	–	

a The binder content of an emulsion determined by the method described in EN 1428 shall be defined as [100 – water content].

b The binder content of the emulsion determined by the distillation method described in EN 1431 shall be defined as [per cent by mass of the residual binder + per cent by mass of oil distillate].

c The residual binder after distillation determined by the distillation method described in EN 1431 is the binder residue from a bituminous emulsion after distillation of water and oil distillate

d Dynamic viscosity shall be determined at a shear rate of 50 s^{-1}.In the case where the shear rate of 50 s^{-1} does not produce the level of accuracy specified by EN 13302, another shear rate can be used. The adopted shear rate shall be mentioned in the test report.

Table NB.1.1 – Specification framework for technical requirements and performance classes of cationic bitumen emulsions (intended use – surface dressing) *(continued)*

e The per cent by mass of oil distillate can be determined on bulk quantities of flux following the determination of density by EN ISO 3838 and the determination of per cent by volume of distillate obtained by EN 1431.

f Refers to the possible performance of unmodified bitumen emulsion.

NOTE 1 To avoid unsuitable and unworkable specifications, it is recommended that actual classes are agreed between the supplier and installer.

NOTE 2 Some high viscosity, polymer modified cationic bituminous emulsions are not stable and/or are difficult to handle at room temperature. Consequently, it is recommended that these emulsions be stored above 50 °C following sampling and prior to testing. In addition it is recommended that laboratory tests are carried out on polymer modified emulsions within a period which is consistent with their stability.

NOTE 3 For CE marking see Annex ZA considering the grey shaded boxes for the essential characteristics.

NOTE 4 Alternatives methods may be used for the determination of binder content if a correlation to the prescribed methods can be proven. In case of dispute, EN 1428 or EN 1431 shall be used.

Table NB.1.2 – Specification framework for technical requirements and performance classes of binders recovered by evaporation from cationic bitumen emulsions (intended use – surface dressing)

			Performance Classes for the technical requirements of cationic bituminous emulsions										
Technical requirements	**Document**	**Unit**	**Class 1**	**Class 2**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Class 9**	**Class 10**	**Class 11**
Consistency at intermediate service temperature													
Penetration at 25 °C[a]	EN 1426	0,1 mm	DV	≤ 50	≤ 100	≤ 150[d]	≤ 220[d]	≤ 270[d]	≤ 330[d]	–	–	–	–
or Penetration at 15 °C[a]	EN 1426	0,1 mm	DV	–	–	–	–	–	–	90 to 170	140 to 260	180 to 360	–
Consistency at elevated service temperature													
Softening Point[b]	EN 1427	°C	DV	≥ 60	≥ 55	≥ 50	≥ 46	≥ 43[d]	≥ 39[d]	≥ 35[d]	< 35[d]	–	–
or Dynamic viscosity at 60 °C[b]	EN 12596 or EN 13302	Pa·s	DV	≥ 18	≥ 12	≥ 7	≥ 4,5	< 4,5	–	–	–	–	–
or Kinematic viscosity at 60 °C[b]	EN 12595	mm^2/s	DV	≥ 16000	≥ 8000	≥ 6000	≥ 4000	≥ 2000	< 2000	–	–	–	–
Cohesion (modified binders only)													
Cohesion energy by tensile test (100 mm/min traction)[c]	EN 13587 EN 13703	J/cm^2	DV	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 2 at 10 °C	≥ 1 at 10 °C	≥ 0,5 at 10 °C	≥ 1 at 15 °C	≥ 0,5 at 15 °C	≥ 0,5 at 20 °C	≥ 0,5 at 25 °C
or Cohesion energy by force ductility (50 mm/min traction)[c]	EN 13589 EN 13703	J/cm^2	DV	≥ 3 at 5 °C	≥ 2 at 5 °C	≥ 1 at 5 °C	≥ 0,5 at 5 °C	≥ 2 at 10 °C	≥ 1 at 10 °C	≥ 0,5 at 10 °C	≥ 0,5 at 15 °C	≥ 0,5 at 20 °C	–
or Cohesion by pendulum test[c]	EN 13588	J/cm^2	DV	≥ 1,4	≥ 1,2	≥ 1,0	≥ 0,7	≥ 0,5	–	–	–	–	–
Brittleness at low service temperature (Fraass breaking point)	EN 12593	°C	DV	≤ –25	≤ –20	≤ –15	≤ –10	≤ –5	≤ 0	≤ 5	–	–	–
Elastic recovery at 10 °C (for elastomeric polymer binders)	EN 13398	%	DV	≥ 75	≥ 50	–	–	–	–	–	–	–	–
Elastic recovery at 25 °C (for elastomeric polymer binders)	EN 13398	%	DV	–	–	≥ 75	≥ 50	–	–	–	–	–	–

a The consistency at an intermediate service temperature shall be measured by the determination of penetration according to EN 1426, at 25 °C or 15 °C depending on its consistency (Clause 5.4.1).

b The consistency at elevated service temperatures shall be measured either by the determination of the ring and ball softening point according to EN 1427, or by the determination of dynamic viscosity according to EN 13302 or vacuum capillary method according to EN 12596, or by the determination of kinematic viscosity according to EN 12595 (Clause 5.4.2).

c One cohesion method shall be chosen based on end application. The cohesion of residual binders from polymer modified emulsions which are used for surface dressings shall be determined in accordance with EN 13588. For binders used in other applications the method used shall be any one of EN 13587, EN 13589 or EN 13588 (Clause 5.4.3)

d Refers to the possible performance of unmodified bitumen emulsion.

NOTE 1 To avoid unsuitable and unworkable specifications, it is recommended that actual classes are agreed between the supplier and specifier/designer.

NOTE 2 Whilst BS EN 13808:2013 does not require cohesion for unmodified recovered binders, it should be noted that clauses NG 919 and NG 922 of the Notes for Guidance on the SHW do define binder recovered from unmodified surface dressing emulsion in terms of cohesion.

NOTE 3 For CE marking see Annex ZA considering the grey shaded boxes for the essential characteristics.

Table NB.2 – General recommendations for specifying cationic bitumen emulsions to BS EN 13808:2013

Performance Criteria for an Intended Use		
Intended use	**Test property to be defined by supplier**	**Test property to be defined by purchaser**
Surface dressing	Breaking value Binder content Viscosity Adhesivity Recovered binder & durability: • Penetration • Softening point • Cohesion by pendulum (modified only)	Viscosity at application temperature (by agreement) Recovered binder: • Cohesion by pendulum (modified only)
Slurry surfacing	Binder content Viscosity Residue on sieving Recovered binder & durability: • Penetration • Softening point • Cohesion (modified only)	Not applicable
Tack and bond coat	Breaking value Binder content Viscosity Residue on sieving Recovered binder & durability: • Penetration • Softening point • Cohesion (modified only)	Recovered binder: • Cohesion (modified only)
Coated stone	Breaking value Binder content Viscosity Residue on sieving Adhesivity	Recovered binder: • Penetration • Softening point
Other uses	To be agreed	

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