
Bitumen in bitumenska veziva - Okvir za specificiranje rezanih in fluksiranih bitumenskih veziv

Bitumen and bituminous binders - Framework for specifying cut-back and fluxed bituminous binders

Bitumen und bitumenhaltige Bindemittel - Rahmenwerk für die Spezifizierung von verschnittenen und gefluxten bitumenhaltigen Bindemitteln

Bitumes et liants bitumineux - Cadre de spécifications pour les liants bitumineux fluidifiés et fluxés

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75.140	Voski, bitumni in drugi naftni proizvodi	Waxes, bituminous materials and other petroleum products
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Foreword

This document (EN 15322:2009) 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of an identical text or by endorsement, at the latest by February 2010, and conflicting national standards shall be withdrawn at the latest by January 2011.

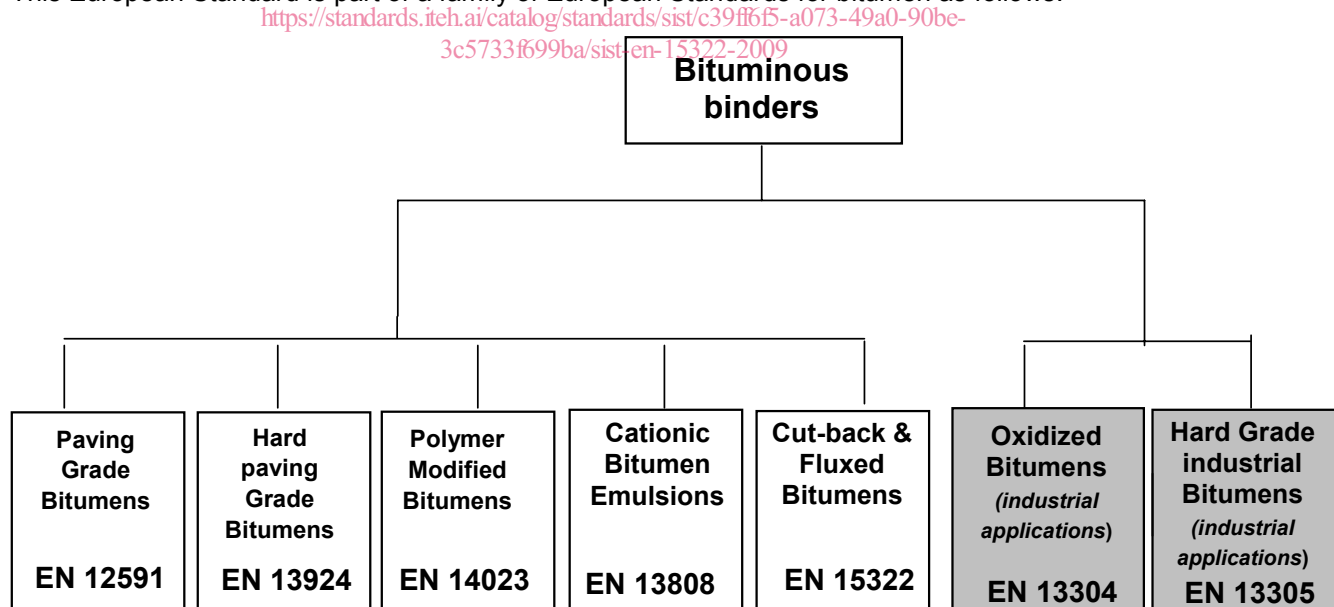
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This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Construction Product Directive 89/106/EEC.

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

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

This European Standard is part of a family of European Standards for bitumen as follows:



NOTE Industrial applications are not covered by mandate M/124.

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1 Scope

This document provides a framework for specifying cut-back and fluxed bituminous binders which are suitable for the use in the construction and maintenance of roads, airfields and other paved areas.

This document applies to un-modified and polymer modified bituminous cut-back and fluxed materials.

2 Normative references

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

EN 58, *Bitumen and bituminous binders – Sampling bituminous binders*

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

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

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

EN 12592, *Bitumen and bituminous binders – Determination of solubility*

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*

prEN 12846-2:2008, *Bitumen and bituminous binders – Determination of the efflux time by the efflux viscometer – Part 2: Cut-back and fluxed bituminous binders*

prEN 13074-1:2008, *Bitumen and bituminous binders – Recovery of binder from bituminous emulsion or cut-back or fluxed bitumen by evaporation*

prEN 13074-2:2008, *Bitumen and bituminous binders – Stabilisation of binder from bituminous emulsion or cut-back or fluxed bitumen after recovery*

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

EN 13358, *Bitumen and bituminous binders – Determination of the distillation characteristics of petroleum cut-back bitumen products*

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 13703, *Bitumen and bituminous binders – Determination of deformation energy*

EN 14023, *Bitumen and bituminous binders – Framework specification for polymer modified bitumens*

EN 14733, *Bitumen and bituminous binders – Bituminous emulsions, fluxed and cut-back bitumen factory production control*

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

EN 15626, *Bitumen and bituminous binders – Determination of adhesivity of cut-back and fluxed bituminous binders by water immersion test – Aggregate method*

EN ISO 2592, *Determination of flash and fire points – Cleveland open cup method (ISO 2592:2000)*

EN ISO 2719, *Determination of flash point – Pensky-Martens closed cup method (ISO 2719:2002)*

EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2008)*

EN ISO 13736, *Determination of flash point – Abel closed cup method (ISO 13736:2008)*

3 Terms and definitions

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

3.1

mineral flux

flux which may be of carbochemical, petrochemical or petroleum origin or a mixture of those

3.2

vegetal flux

type of bio-flux derived exclusively from plant based (vegetal) product

4 Abbreviation terms

Abbreviation terms, providing an expression in letters and numbers (standard designations), are used to describe important characteristics of cut-back and fluxed bituminous binders i.e. viscosity, type of binder and setting ability and shall be in accordance with Table 1.

Denomination of cut-back and fluxed bituminous binders is set as follows:

- 2 letters, describing the type of flux, i.e. Fm for mineral flux and Fv for vegetal flux;
- 1 digit, corresponding to the viscosity class from Table 3 determined either by efflux time for low and medium viscosity products or by dynamic viscosity for high viscosity products;
- 1 or 2 letters, describing the type of base binder, i.e. B standing for unmodified binder and BP standing for polymer modified binder (see Note b in Table 1);
- 1 digit, corresponding to the classes of setting ability from Table 3. Setting ability for Fm type is based on distillation (EN 13358), as strength development is dependant upon volatilisation of light oils. For Fv type materials, strength development involves a chemical change and not loss of volatiles, so the measure is based on softening point of recovered binder according to prEN 13074-1:2008 (Subclause 7.3). The test method (distillation or softening point) to which the digit refers is thus identified by the two letters (Fm or Fv) which indicate the type of flux.

Examples of abbreviations terms for cut-back and fluxed bituminous binders are mentioned in Annex A.

Table 1 — Denomination of the abbreviation terms

Position of character (letter/digit)	Letter/digit	Denomination	Supporting document
1 and 2	Fm ^a	Mineral oil fluxed bitumen or cut-back bitumen	EN 12597
	Fv ^a	Vegetable oil fluxed bitumen	
3	from Class 2 to Class 4	Viscosity class	prEN 12846-2 (Efflux time)
	from Class 5 to Class 7		EN 13302 (Dynamic viscosity)
4 and 5 (if appropriate)	B	Indication of the binder type Paving grade bitumen	EN 12591
	P	Addition of polymer ^b	EN 14023 ^b
5 or 6	Setting ability of Fm types		
	from Class 2 to Class 6	% of total distillate distilling at 225 °C	EN 13358
	Setting ability of Fv types		
	from Class 2 to Class 7	R&B softening point on recovered binder	EN 1427 prEN 13074-1:2008 (Subclause 7.3)
<p>a F has been used for both cut-back and fluxed bitumens to avoid confusion as C has been used already to designate cationic bitumen emulsions.</p> <p>b May be prepared using polymer modified bitumen (EN 14023) or by addition of polymer to the cut-back or fluxed bituminous material.</p>			

The following abbreviation terms are used in the specification tables of this European standard (see Table 3, Table 4 and Table 5):

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.

TBR for "To Be Reported": this class shall mean that the manufacturer is invited, but not required, to provide information, regarding performance characteristics, with the product.

NOTE The reported values (TBR) are intended to be used for future development of specifications.

DV for "Declared Value": this class shall mean that the manufacturer is required to provide a value or a range of values, or limiting value(s) as part of a regulatory declaration and subsequent regulatory marking.

5 Requirements and test methods

5.1 Properties/characteristics and related test methods

All characteristics of cut-back and fluxed bituminous binders, listed in Table 2, shall be classified in accordance with appropriate classes from Table 3, Table 4 Part A or Table 4 Part B and Table 5.

Table 2 — Requirements and test methods

Requirements	Concerned products	Characteristics and test methods
Viscosity	Fm and Fv types from Table 3	Efflux time prEN 12846-2 or Dynamic viscosity EN 13302
Water effect on binder adhesion		Adhesivity with reference aggregate EN 15626
Setting ability	Fm types from Table 3	Distillation EN 13358 % of total distillate fraction distilling at 225°C
	Fv types from Table 3	Softening point EN 1427 of recovered binder prEN 13074-1:2008 (Subclause 7.3)
Consistency at intermediate service temperature	Residual binder (after stabilisation according to prEN 13074-2) from Table 4	Penetration EN 1426
Consistency at elevated service temperature		As appropriate: Softening point EN 1427 or dynamic viscosity EN 12596 or kinematic viscosity EN 12595
Cohesion (for polymer modified materials only)		As appropriate Pendulum test EN 13588 or Tensile test EN 13587 and EN 13703 or Force ductility EN 13589 and EN 13703
Durability of consistency at intermediate service temperature	Long-term aged binder (after stabilisation according to prEN 13074-2, followed by ageing according to EN 14769) from Table 5	Penetration EN 1426
Durability of consistency at elevated service temperature		As appropriate: Softening point EN 1427 or dynamic viscosity EN 12596 or kinematic viscosity EN 12595
Durability of cohesion (for polymer modified materials only)		As appropriate: Pendulum test EN 13588 or Tensile test EN 13587 and EN 13703 or Force ductility EN 13589 and EN 13703

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For cut-back and fluxed bituminous binders, for each characteristic, the following test methods have been selected.

— Viscosity

Efflux time (prEN 12846-2) is used for low or medium (i.e. Efflux Time 10 mm 40 °C smaller than 500 s) viscosity binders. Dynamic viscosity (EN 13302) is used for high viscosity binders.

— Water effect on binder adhesion

Adhesivity (EN 15626) with reference aggregate is used.

— Setting ability

Distillation (EN 13358) is used for Fm (mineral oil fluxed bitumen or cut-back) grade binders.

Softening point (EN 1427) after recovery (prEN 13074-1:2008, subclause 7.3) is used for Fv (vegetable oil fluxed bitumen) grade binders.

For residual binder after stabilisation (prEN 13074-1 followed by prEN 13074-2) of cut-back and fluxed bituminous binders, for each characteristic, the following test methods have been selected.

— Consistency at intermediate service temperature

The test to be used is the penetration test (EN 1426). The temperature to be used for the test is dependent of the consistency of the stabilised binder. The penetration test shall be performed at 25 °C when stabilised binder has a penetration smaller than or equal to 330 x 0,1 mm, if greater test is performed at 15 °C.

— Consistency at elevated service temperature

The test method to be used is dependent on the consistency of the stabilised binder. If penetration at 25 °C is smaller than or equal to 330 x 0,1 mm, the consistency is carried out by EN 1427. If penetration at 25 °C is greater than 330 x 0,1 mm, the consistency is assessed either by dynamic (EN 12596) or kinematic (EN 12595) viscosity, depending on the consistency of the stabilised binder.

— Cohesion (for modified binders only)

The test method to be used is dependent on intended use of the product. The cohesion of stabilised binder from polymer modified cut-back and fluxed bituminous binders which are used for surface dressings, shall be determined by EN 13588. For binders used in asphalt mixes the test methods given in either EN 13587 or EN 13589 may be used. For binders used in other applications any one of the three methods listed above, EN 13587, EN 13589 or EN 13588, may be used.

For residual binder after stabilisation (prEN 13074-1 followed by prEN 13074-2) and ageing procedure (EN 14769) of cut-back and fluxed bituminous binders, for each characteristic, the following test methods have been selected.

— Durability of the consistency at intermediate service temperature

The test to be used is the penetration test (EN 1426). The temperature to be used for the test is dependent of the consistency of the long-term aged binder. The penetration test shall be performed at 25 °C when aged binder has a penetration smaller than or equal to 330 x 0,1 mm, if greater test is performed at 15 °C.

— Durability of the consistency at elevated service temperature

The test method to be used is dependent on the consistency of the long-term aged binder. If penetration at 25 °C is smaller than or equal to 330 x 0,1 mm, the consistency is carried out by EN 1427. If penetration at

25 °C is greater than 330 x 0,1 mm, the consistency is assessed either by dynamic (EN 12596) or kinematic (EN 12595) viscosity, depending on the consistency of the long-term aged binder.

— Durability of cohesion (for modified binders only)

The test method to be used is dependent on intended use of the product. The cohesion of long-term aged binder from polymer modified cut-back and fluxed bituminous binders which are used for surface dressings, shall be determined by EN 13588. For binders used in asphalt mixes the test methods given in either EN 13587 or EN 13589, may be used. For binders used in other applications any one of the three methods listed above, EN 13587, EN 13589 or EN 13588, may be used.

Tables 3 to 5 apply to cut-back and fluxed bituminous binders normally specified.

When specifying a cut-back or a fluxed bituminous binder, the appropriate class for each technical requirement shall be selected. Care should be taken to make class selections which are compatible and realistic.

In particular regarding the viscosity requirement, considering that large viscosity classes are being specified in Table 3, i.e. in Class 2, Class 3 and Class 4, relevant restricted ranges shall be defined by a nominal viscosity $\pm 35\%$, with a minimum of ± 10 s around a mid-point value, within the specified ranges.

NOTE The test procedure for stabilisation and ageing of binders given in Table 4 Part A, Table 4 Part B and Table 5 have not been used previously in Europe. With regard to Table 4 Part A and Table 4 Part B, in order to accumulate a sufficient set of data which will allow values in classes to be confirmed, it is highly recommended to use Class 1 if existing experience does not yet allow to specify actual performance classes (Class 2 to Class 11). For the same reasons, for Table 5, it is also highly recommended to use Class 1 in the case where Class 2 (DV) is not mandatory.

Examples of selected performance classes for cut-back and fluxed bituminous binders are mentioned in Annex B.

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Table 3 — Specification framework for technical requirements and performance classes of cut-back and fluxed bituminous binders

Technical requirements	Standard	Units	Class 0	Class 1 ^a	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Class 9	Class 10
Viscosity													
Efflux time 4 mm 25 °C ^b	prEN 12846-2	s			< 200 ^c								
Efflux time 10 mm 25 °C ^b	prEN 12846-2	s				15 – 500 ^c							
Efflux time 10 mm 40 °C ^b	prEN 12846-2	s					50 – 500 ^c						
Dynamic viscosity at 60 °C ^b	EN 13302	Pa.s						10 - 50	30 - 100	> 80			
Solubility	EN 12592	%	NR ^d	TBR	> 99,0								
Flash Point	EN ISO 13736	°C			≤ 23	> 23	> 35	> 45	> 55				
	EN ISO 2719	°C								> 60	> 65		
	EN ISO 2592	°C										> 160	> 200
Adhesivity with reference aggregate	EN 15626	/	NR ^d	TBR	≥ 75	≥ 90							
Fm grades setting ability by distillation test	EN 13358												
Total distillate at 360 °C		%	NR ^d	TBR	< 5	< 10	< 15	< 20	< 32	< 55			
% of total distillate fraction distilling at 190 °C		%	NR ^d	TBR	< 5	2 - 15	10 - 25	> 20					
% of total distillate fraction distilling at 225 °C		%	NR ^d	TBR	< 15	10 - 25	20 - 40	35 - 60	> 55				
% of total distillate fraction distilling at 260 °C		%	NR ^d	TBR	< 20	15 - 40	35 - 60	> 55					
% of total distillate fraction distilling at 315 °C		%	NR ^d	TBR	< 40	35 - 70	65 - 90	> 85					
Fv grades setting ability by softening point of recovered binder	EN 1427 prEN 13074-1:2008	°C	NR ^d	TBR	≤ 35	> 35	> 39	> 43	> 50	> 55			