SLOVENSKI STANDARD
SIST EN 12591:2009

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Nadomeġļa:
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Bitumen in bitumenska veziva - Specifikacije za cestogradbene bitumne

Bitumen and bituminous binders - Specifications for paving grade bitumens

Bitumen und bitumenhaltige Bindemittel - Anforderungen an Straßenbaubitumen

Bitumes et liants bitumineux - Spécifications des bitumes routiers

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93.080.20	Materiali za gradnjo cest	Road construction materials

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Bitumen and bituminous binders - Specifications for paving grade bitumens

Bitumes et liants bitumineux - Spécifications des bitumes routiers

Bitumen und bitumenhaltige Bindemittel - Anforderungen an Straßenbaubitumen

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 12591:2009) 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of an identical text or by endorsement, at the latest by October 2009, and conflicting national standards shall be withdrawn at the latest by October 2009.

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.

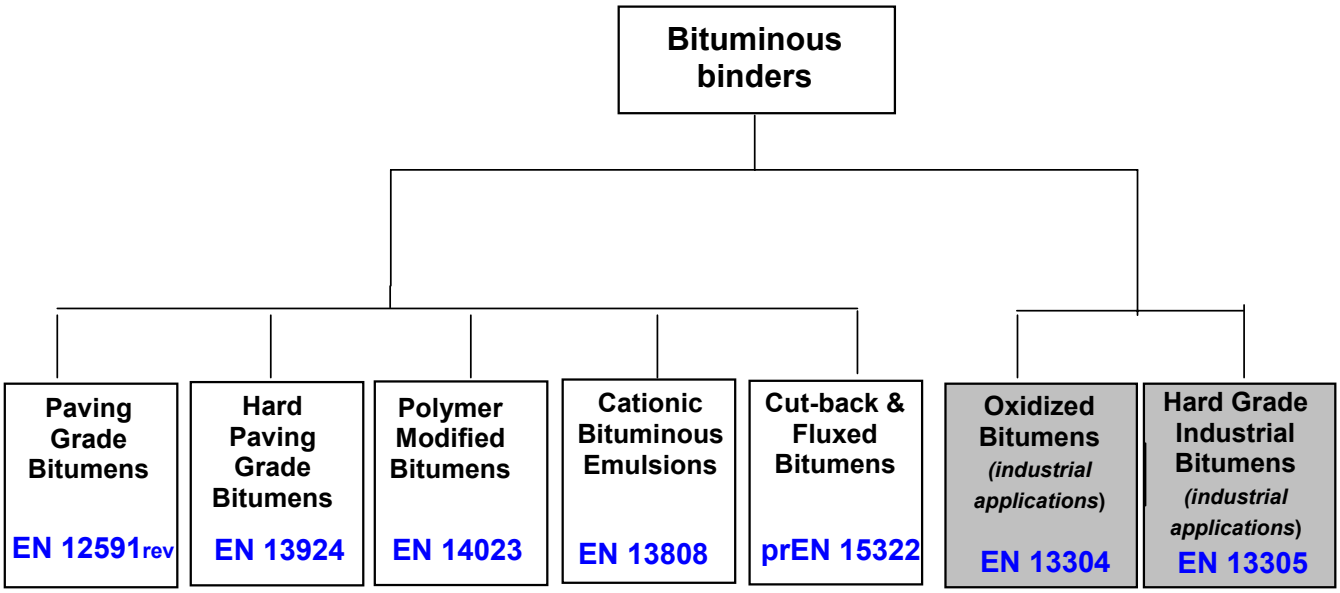
This document supersedes EN 12591:1999.

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.

Introduction

This European Standard describes the performance required for a number of properties of bitumen and bituminous binders, as shown in Table 1 to Table 3 inclusive. Some of the properties are required by regulation in at least one EU or EFTA country (see Table ZA.1.1 and Table ZA.1.2) and some are included only for the benefit of industry to assist specifying appropriate performances for different end uses.

For paving grade bitumen, the testing of the following also gives an indication that its intrinsic cohesive properties are adequate for normal use.

a) Consistency at intermediate service temperature;

b) Consistency at elevated service temperature;

c) Durability of consistency.

The properties of "adhesion" and "setting ability" are indicated by tests used on either the finished asphalt mixtures or on aggregate-bitumen combinations, i.e. EN 12697–1, EN 12697–11, EN 12697–12, EN 12697–26 [1 to 4], rather than tests on the bitumen itself.

This European Standard still consists of specifications based upon traditional test methods. Work programs are being undertaken to evaluate alternative properties and test methods in order to develop new specifications that are more directly performance-related. The progress of those work programmes are reported in CEN/TR 15352 [17], and the results will be considered for future revisions of this European Standard.

1 Scope

This European Standard provides a framework for specifying a range of properties and relevant test methods for bitumens, which are suitable for use in the construction and maintenance of roads, airfields and other paved areas, together with requirements for evaluation of conformity.

This European Standard does not directly address 'cohesion, adhesion and setting ability' (see Introduction).

NOTE Although industrial bitumens are specified according to EN 13305, it should be underlined that paving grade bitumens, specified according to this European Standard, can also be used for industrial applications.

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

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 12607-1, *Bitumen and bituminous binders – Determination of the resistance to hardening under the influence of heat and air – Part 1: RTFOT method*

EN 12607-2, *Bitumen and bituminous binders – Determination of the resistance to hardening under the influence of heat and air – Part 2: TFOT method*

EN 15326, *Bitumen and bituminous binders – Measurement of density and specific gravity – Capillary-stoppered pyknometer 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 4259, *Petroleum products – Determination and application of precision data in relation to methods of test (ISO 4259:2006)*

EN ISO 9001:2000, *Quality management systems – Requirements (ISO 9001:2000)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12597:2000 apply.

4 Sampling

Samples of bulk products shall be taken as described in EN 58.

Test samples shall be taken from the laboratory samples, and prepared for testing, as described in EN 12594.

5 Requirements and test methods

5.1 General

European product standards cover a large variety of road materials for different applications, to accommodate local traffic loads and climatic conditions. This European Standard therefore also covers a large range of bitumens to facilitate the production and application of the designed paving. The variety of production techniques and applications makes it more practical to split bitumens into three separate tables.

The requirements for the properties for a specific grade shall be selected from Table 1A, Table 1B, Table 2A, Table 2B, Table 3A and Table 3B by choosing a column representing the specified values or ranges.

There is a subdivision of properties into two groups in the tables. The properties in Table 1A, Table 2A and Table 3A shall be specified for all paving grade bitumens. They are associated with regulatory or HSE requirements. The properties in Table 1B, Table 2B and Table 3B are required to meet specific regional conditions. They are associated with regulatory or other regional requirements.

Two severity levels for resistance to hardening are stated as alternatives as, under specific conditions, a larger increase in softening point after Rolling Thin Film Oven Test (RTFOT) may be allowed (i.e. Severity level 2) without detrimental effect if this increase is associated with requirements for Fraass breaking point or penetration index (I_p) or both.

NOTE For complementary information on grade selection, see Annex B.

5.2 Properties and related test methods

5.2.1 General

The properties of paving grade bitumens and related test methods shall be in accordance with Table 1A and Table1B, or Table 2A and Table 2B or Table 3A and Table 3B. When tested by the methods given in the Tables, the various paving grades shall conform to the limits specified.

The grades are designated by the nominal penetration or viscosity ranges as appropriate.

5.2.2 Consistency at intermediate service temperature

Consistency at intermediate service temperature shall conform to the requirements for penetration value in Table 1A or Table 2A.

5.2.3 Consistency at elevated service temperature

Consistency at elevated service temperature shall conform to the requirements for softening point in Table 1A (penetration graded), softening point or dynamic viscosity in Table 2A (penetration graded), or kinematic viscosity in Table 3A (kinematic viscosity graded).

5.2.4 Brittleness at low service temperature

Brittleness at low service temperature may be required to meet specific regional conditions in countries susceptible to extreme cold. Where required, paving grade bitumens shall conform to the requirements for Fraass breaking point in Table 1B or Table 2B.

5.2.5 Temperature dependence of consistency

Temperature dependence of consistency may be required to meet specific regional conditions. Where required, paving grade bitumens shall conform to the requirement for dynamic viscosity or penetration index (I_p) or both in Table 1B.

5.2.6 Durability – Resistance to hardening

Durability is demonstrated by compliance with the required surrogate characteristics of “Resistance to hardening”, defined in Table 1A, Table 2A or Table 3B.

Resistance to hardening shall be tested according to the Rolling Thin Film Oven Test (RTFOT) in accordance with EN 12607-1 for binders from Table 1A and Table 2A.

Resistance to hardening shall be tested according to the Thin Film Oven Test (TFOT) in accordance with EN 12607-2 for binders from Table 3A.

5.2.7 Other properties

5.2.7.1 Density

Although requirements for the density of paving grade bitumens are not given in this document, density shall be determined, when necessary, in accordance with EN 15326.

5.2.7.2 Flash point

Flash point shall be determined by the Cleveland open cup method in EN ISO 2592 for binders in Table 1A and by the Pensky-Martens closed cup method, EN ISO 2719, for binders in Table 2A and Table 3A.

NOTE For bitumens in Table 1A, the Pensky-Martens closed cup method may be used to investigate possible contamination but is likely to give lower values than the Cleveland open cup method.

5.3 Release of dangerous regulated substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulations of the member state of destination.

5.4 Precision

The test methods referred to in this document include precision statements when available. In cases of uncertainty, the procedures described in EN ISO 4259 for interpretation of the results based on test method precision shall be used.

Table 1A — Paving grade bitumen specifications for grades from 20 x 0,1 mm to 220 x 0,1 mm penetration — Properties applying to all paving grade bitumen listed in this table

Property	Test method	Unit	20/30	30/45	35/50	40/60	50/70	70/100	100/150	160/220
Penetration at 25 °C	EN 1426	0,1 mm	20 – 30	30 – 45	35 – 50	40 – 60	50 – 70	70 – 100	100 – 150	160 – 220
Softening point	EN 1427	°C	55 – 63	52 – 60	50 – 58	48 – 56	46 – 54	43 – 51	39 – 47	35 – 43
Resistance to hardening at 163 °C	EN 12607-1									
Retained penetration		%	≥ 55	≥ 53	≥ 53	≥ 50	≥ 50	≥ 46	≥ 43	≥ 37
Increase in softening point, - *Severity 1*		°C	≤ 8	≤ 8	≤ 8	≤ 9	≤ 9	≤ 9	≤ 10	≤ 11
or			*or*	*or*	*or*	*or*	*or*	*or*	*or*	*or*
Increase in softening point, - *Severity 2* [a]		°C	≤ 10	≤ 11	≤ 11	≤ 11	≤ 11	≤ 11	≤ 12	≤ 12
Change of mass [b] (absolute value)		%	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,5	≤ 0,8	≤ 0,8	≤ 1,0
Flash point	EN ISO 2592	°C	≥ 240	≥ 240	≥ 240	≥ 230	≥ 230	≥ 230	≥ 230	≥ 220
Solubility	EN 12592	%	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0

[a] When Severity 2 is selected it shall be associated with the requirement for Fraass breaking point or penetration index or both measured on the unaged binder (see Table 1B)

[b] Change in mass can be either positive or negative.

The properties in Table 1A shall be specified for all paving grade bitumens listed in this Table. They are associated with regulatory or HSE requirements and shall be included in all specifications.

Table 1B — Paving grade bitumen specifications for grades from 20 x 0,1 mm to 220 x 0,1 mm penetration - Properties associated with regulatory or other regional requirements

Property	Test method	Unit	20/30	30/45	35/50	40/60	50/70	70/100	100/150	160/220
Penetration index [a]	Annex A [b]	–	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]	- 1,5 to + 0,7 *or* NR [c]
Dynamic viscosity at 60 °C	EN 12596	Pa · s	≥ 440 *or* NR [c]	≥ 260 *or* NR [c]	≥ 225 *or* NR [c]	≥ 175 *or* NR [c]	≥ 145 *or* NR [c]	≥ 90 *or* NR [c]	≥ 55 *or* NR [c]	≥ 30 *or* NR [c]
Fraass breaking point [a]	EN 12593	°C	NR [c]	≤ - 5 *or* NR [c]	≤ - 5 *or* NR [c]	≤ - 7 *or* NR [c]	≤ - 8 *or* NR [c]	≤ - 10 *or* NR [c]	≤ - 12 *or* NR [c]	≤ - 15 *or* NR [c]
Kinematic viscosity at 135 °C	EN 12595	mm^2/s	≥ 530 *or* NR [c]	≥ 400 *or* NR [c]	≥ 370 *or* NR [c]	≥ 325 *or* NR [c]	≥ 295 *or* NR [c]	≥ 230 *or* NR [c]	≥ 175 *or* NR [c]	≥ 135 *or* NR [c]

[a] When Severity 2 is selected it shall be associated with the requirement for Fraass breaking point or penetration index or both measured on the unaged binder.

[b] Reference to normative Annex A in this document dealing with the calculation of penetration index.

[c] NR. No Requirement may be used when there are no regulations or other regional requirements for the property in the territory of intended use.

The properties in Table 1B are required to meet specific regional conditions. They are associated with regulatory or other regional requirements.

Table 2A — Paving grade bitumen specifications for grades from 250 x 0,1 mm to 900 x 0,1 mm penetration - Properties applying to all paving grade bitumen listed in this table

Property	Test method	Unit	250/330	330/430	500/650	650/900
Penetration at 25 °C	EN 1426	0,1 mm	250 – 330	–	–	–
or						
Penetration at 15 °C	EN 1426	0,1 mm	70 – 130	90 – 170	140 – 260	180 – 360
Dynamic viscosity at 60 °C	EN 12596	Pa · s	≥ 18	≥ 12	≥ 7,0	≥ 4,5
or						
Softening point	EN 1427	°C	30 - 38	–	–	–
Resistance to hardening at 163 °C	EN 12607-1					
Viscosity ratio at 60 °C		–	≤ 4,0	≤ 4,0	≤ 4,0	≤ 4,0
or						
Increase in softening point		°C	≤ 11	–	–	–
Change of mass [a] (absolute value)		%	≤ 1,0	≤ 1,0	≤ 1,5	≤ 1,5
Flash point	EN ISO 2719	°C	≥ 180	≥ 180	≥ 180	≥ 180
Solubility	EN 12592	%	≥ 99,0	≥ 99,0	≥ 99,0	≥ 99,0

[a] Change in mass can be either positive or negative.

The properties in Table 2A shall be specified for all paving grade bitumens listed in this table. They are associated with regulatory or HSE requirements and shall be included in all specifications.