
Bitumen in bitumenska veziva - Okvirna specifikacija za bitumne, modificirane s polimeri

Bitumen and bituminous binders - Specification framework for polymer modified bitumens

Bitumen und bitumenhaltige Bindemittel - Rahmenwerk für die Spezifikation von polymermodifizierten Bitumen

Bitumes et liants bitumineux Cadre de spécifications des bitumes modifiés par des polymères

ITEN STANDARD PREVIEW
(standards.iteh.ai)
<https://standards.iteh.ai/catalog/standards/sist/10e89d6c-e9b6-4d2b-bf99-ebd01854358b/osist-pr-en-14023-2020>

Ta slovenski standard je istoveten z: prEN 14023

ICS:

75.140	Voski, bitumni in drugi naftni proizvodi	Waxes, bituminous materials and other petroleum products
91.100.50	Veziva. Tesnilni materiali	Binders. Sealing materials

oSIST prEN 14023:2020**en,fr,de**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 14023:2020](https://standards.iteh.ai/catalog/standards/sist/10e89d6c-e9b6-4d2b-bf99-cbd01854358b/osist-pren-14023-2020)

<https://standards.iteh.ai/catalog/standards/sist/10e89d6c-e9b6-4d2b-bf99-cbd01854358b/osist-pren-14023-2020>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

DRAFT
prEN 14023

April 2020

ICS 93.080.20

Will supersede EN 14023:2010

English Version

Bitumen and bituminous binders - Specification framework for polymer modified bitumens

Bitumes et liants bitumineux ζ Cadre de spécifications
des bitumes modifiés par des polymères

Bitumen und bitumenhaltige Bindemittel -
Rahmenwerk für die Spezifikation von
polymermodifizierten Bitumen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 336.

If this draft becomes a European Standard, 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.

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

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

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents	Page
European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	8
4 Product characteristics	8
4.1 General	8
4.2 Consistency at intermediate service temperature	8
4.3 Consistency at elevated service temperature	8
4.4 Resistance to flow and deformation	9
4.5 Durability of consistency at low service temperature	9
4.6 Cohesion	9
4.7 Strain recovery	9
4.8 Durability of strain recovery	9
4.9 Viscoelastic behaviour	9
4.10 Durability of viscoelastic behaviour	9
4.11 Temperature sensitivity	10
4.12 Other characteristics	10
4.12.1 Change in mass after short-term ageing	10
4.12.2 Flash point	10
4.12.3 Dynamic viscosity	10
4.12.4 Homogeneity and storage stability	10
4.13 Release of dangerous substances	10
5 Testing, assessment and sampling methods	10
6 Assessment and verification of constancy of performance — AVCP	15
6.1 General	15
6.2 Type testing	15
6.2.1 General	15
6.2.2 Test samples, testing and compliance criteria	16
6.2.3 Test reports	16
6.2.4 Shared other party results	16
6.3 Factory production control (FPC)	17
6.3.1 General	17
6.3.2 Requirements	17
6.3.3 Product specific requirements	20
6.3.4 Initial inspection of factory and of FPC	20
6.3.5 Continuous surveillance of FPC	21
6.3.6 Procedure for modifications	21
6.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity	21
Annex A (informative) Addressing properties of PMB by rheological measurements	23
Annex ZA (informative) Relationship of this European Standard with Regulation (EU) No. 305/2011	27
ZA.1 Scope and relevant characteristics	27

ZA.2	System of Assessment and Verification of Constancy of Performance (AVCP)	28
ZA.3	Assignment of AVCP tasks	28
Bibliography	30

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[oSIST prEN 14023:2020](https://standards.iteh.ai/catalog/standards/sist/10e89d6c-e9b6-4d2b-bf99-cbd01854358b/osist-pren-14023-2020)

<https://standards.iteh.ai/catalog/standards/sist/10e89d6c-e9b6-4d2b-bf99-cbd01854358b/osist-pren-14023-2020>

prEN 14023:2020 (E)

European foreword

This document (prEN 14023:2020) has been prepared by Technical Committee CEN/TC 336 “Bituminous binders”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 14023:2010.

This document has been prepared under a standardization request given to CEN and CENELEC by the European Commission and the European Free Trade Association.

For relationship with Regulation (EU) 305/2011, see informative Annex ZA, which is an integral part of this document.

This document is part of a family of European standards for bitumens as follows:

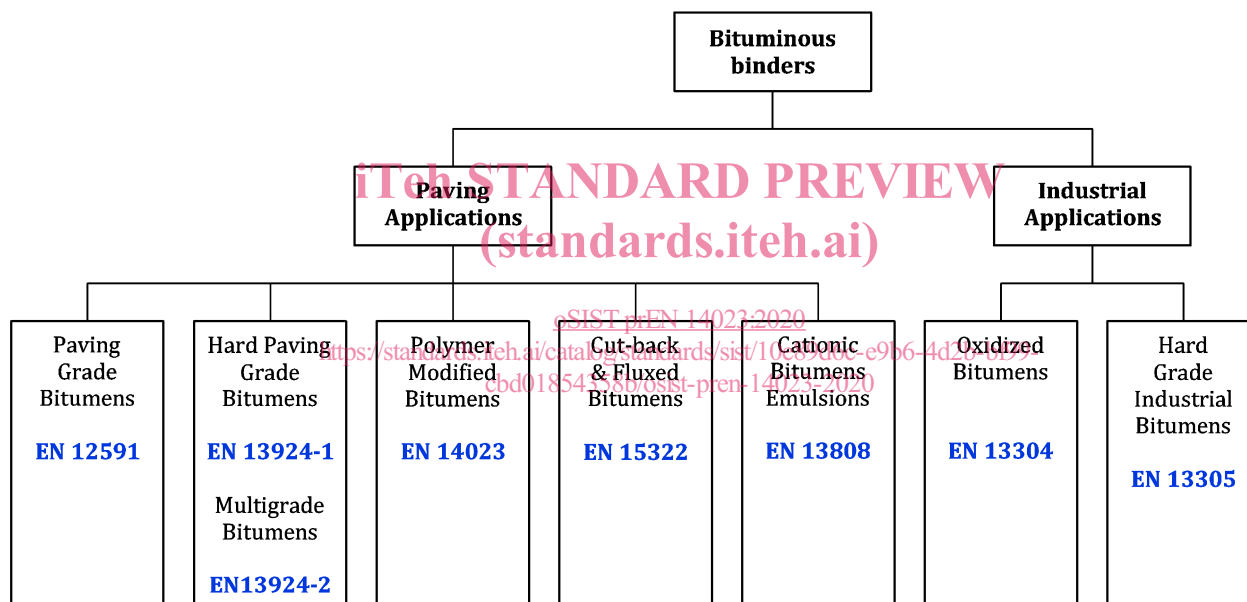


Figure 1 — European standards for Bitumens

Introduction

This document is part of a family of product standards for bitumen and bituminous binders for paving applications.

The general principle adopted in the development of EN 12591 [1], *Bitumen and bituminous binders — Specifications for paving grade bitumens*, was to provide a range of grades suitable for the manufacture of the materials for road construction and maintenance used, and the climatic and traffic conditions encountered, in all the Member States. This document provides a framework for specifying a range of characteristics and applicable test methods suitable for polymer modified bitumens.

It is compulsory for the full specification to be published in all EU and EFTA countries. However, it is permitted for each country to define the most suitable grades and classes.

Changes to the previous version of this document (EN 14023:2010) are:

- updated terminology for essential characteristics referring to draft standardization request;
- display in two tables only;
- addition of three classes for characteristics for soft PMB by needle penetration [EN 1426] at 15 °C;
- addition of the essential characteristics of viscoelastic behaviour, resistance to flow and deformation, temperature sensitivity, and durability of viscoelastic behaviour;
- addition of two classes for characteristic of softening point ring and ball for soft PMB [EN 1427];
- addressing low service temperature characteristics by BBR instead of Fraass Breaking Point, on long term aged instead of fresh binders, and insertion of respective levels;
- change in display of essential characteristics for cohesion by Force Ductility method, addition of three levels for minimum Cohesion Energy, and addition of elongation as declared value;
- addition of three levels for minimum Cohesion Energy by tensile test, and addition of three test temperatures;
- addition of three minimum levels of pendulum test results;
- deletion of characteristics on retained needle penetration and change in softening point ring and ball after short term ageing;
- deletion of plasticity range;
- change of levels for difference in penetration for storage stability;
- deletion of Annex A and Annex B;
- update of Clause 6 and Annex ZA according to current guidance document TF N 548 Rev.1 (for Clause 6) and TF N 687 rev1 (for Annex ZA).

prEN 14023:2020 (E)**1 Scope**

This document provides a framework for specifying a range of characteristics as well as applicable test methods for polymer modified bitumens, which are suitable for use in the construction and maintenance of roads, airfields and other paved areas, together with information on assessment and verification of constancy of performance. Polymer modified bitumen is defined in EN 12597.

This document describes the performance for characteristics of polymer modified bitumens, as shown in Table 1 and Table 2. It gives information for Declaration of Performance, selection of the grades, characteristics and test methods.

This framework covers the following essential characteristics:

- consistency at intermediate service temperature;
- consistency at elevated service temperature;
- viscoelastic behaviour;
- cohesion;
- resistance to flow and deformation;
- temperature sensitivity;
- strain recovery;
- durability of strain recovery;
- durability of consistency at low service temperature;
- durability of viscoelastic behaviour.

iTeh STANDARD PREVIEW
(standards.iteh.ai)

oSIST prEN 14023:2020

<https://standards.iteh.ai/sist/10e89d6c-e9b6-4d2b-bf99-cbd01854358b/osist-pren-14023-2020>

The characteristics of “adhesion” and “setting ability” are addressed 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 [2 to 5], rather than tests on the bitumen itself.

“Adhesion” is addressed by tests carried out on the finished asphalt mixtures.

“Setting ability” is the return of the polymer modified binder to its normal semi-solid state as it returns to ambient temperature; this is a natural result of the cooling of the hot polymer modified bitumen after application and thus not addressed here.

The nomenclature of polymer modified bitumen comprises the nominal penetration range and the minimum softening point, e.g. PMB 45/80-60.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 58:2012, *Bitumen and bituminous binders — Sampling bituminous binders*

EN 1426:2015, *Bitumen and bituminous binders — Determination of needle penetration*

- EN 1427:2015, *Bitumen and bituminous binders — Determination of the softening point — Ring and Ball method*
- EN 12594:2014, *Bitumen and bituminous binders — Preparation of test samples*
- EN 12597:2014, *Bitumen and bituminous binders — Terminology*
- EN 12607-1:2014, *Bitumen and bituminous binders — Determination of the resistance to hardening under influence of heat and air — Part 1: RTFOT method*
- EN 13302:2018, *Bitumen and bituminous binders — Determination of dynamic viscosity of bituminous binder using a rotating spindle apparatus*
- EN 13398:2017, *Bitumen and bituminous binders — Determination of the elastic recovery of modified bitumen*
- EN 13399:2017, *Bitumen and bituminous binders — Determination of storage stability of modified bitumen*
- EN 13587:2016, *Bitumen and bituminous binders — Determination of the tensile properties of bituminous binders by the tensile test method*
- EN 13588:2017, *Bitumen and bituminous binders — Determination of cohesion of bituminous binders with pendulum test*
- EN 13589:2018, *Bitumen and bituminous binders — Determination of the tensile properties of modified bitumen by the force ductility method*
- EN 13702:2018, *Bitumen and bituminous binders — Determination of dynamic viscosity of bitumen and bituminous binders by the cone and plate method*
- EN 14769:2012, *Bitumen and bituminous binders — Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)*
- EN 14770:2012, *Bitumen and bituminous binders — Determination of complex shear modulus and phase angle — Dynamic Shear Rheometer (DSR)*
- EN 14771:2012, *Bitumen and bituminous binders — Determination of the flexural creep stiffness — Bending Beam Rheometer (BBR)*
- EN 16659:2015, *Bitumen and bituminous binders — Multiple stress creep and recovery test (MSCRT)*
- EN ISO 2592:2017, *Petroleum and related products — Determination of flash and fire points — Cleveland open cup method (ISO 2592:2017)*
- EN ISO 2719:2016, *Determination of flash point — Pensky-Martens closed cup method (ISO 2719:2016)*

prEN 14023:2020 (E)**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 12597 and the following apply. ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1**short term ageing**

means the RTFOT (Rolling Thin Film Oven Test) ageing procedure according to EN 12607-1

Note 1 to entry: The main procedure is the RTFOT at 163 °C. For some highly viscous polymer modified bitumens, where the viscosity is too high to provide a moving film, it is not possible to carry out the RTFOT at the reference temperature of 163 °C. In such cases the procedure shall be carried out at 180 °C in accordance with EN 12607-1. The selected conditioning temperature shall be declared.

3.2**long term ageing**

means the RTFOT ageing procedure according to EN 12607-1, followed by the PAV (Pressure Ageing Vessel) ageing procedure, according to EN 14769

Note 1 to entry: EN 14769 allows a wide range of conditions to apply; for the polymer modified binders covered by this standard PAV conditioning should be carried out at $T = 100\text{ °C}$ and for $t = (20\text{ h} \pm 10\text{ min})$.

3.3**DV**

declared value (DV) made available by the supplier of the bituminous binder; DVs are to be considered as typical, single values, and are not intended to be used as requirements or interpreted as limiting values

4 Product characteristics**4.1 General**

European product standards cover a large variety of road materials for different applications, to accommodate local traffic loads and climatic conditions.

This document is a framework of specifications and the appropriate class for each characteristic of polymer modified bitumens is chosen from Table 1 and Table 2.

4.2 Consistency at intermediate service temperature

Consistency at intermediate service temperature for polymer modified bitumens is addressed by the needle penetration in 0,1 mm at 25 °C or 15 °C. The test method is described in EN 1426 and temperatures are selected according to the applicability of the test method, described in the test standard.

4.3 Consistency at elevated service temperature

Consistency at elevated service temperature for polymer modified bitumens is addressed by the softening point ring and ball in °C as described in EN 1427.

4.4 Resistance to flow and deformation

Resistance to flow and deformation for polymer modified bitumens is characterized by non-recoverable creep compliance [kPa^{-1}] and % recovery [%] from MSCRT (Multiple Stress Creep and Recovery Test) according to EN 16659, after short-term ageing.

4.5 Durability of consistency at low service temperature

Durability of consistency at low service temperature for polymer modified bitumens is characterized by $T(S = 300 \text{ MPa})$ in $^{\circ}\text{C}$ and m -value [-] at $T(S = 300 \text{ MPa})$ measured using the BBR (Bending Beam Rheometer) test procedure (EN 14771) after long term ageing.

For details, see also informative Annex A to this document.

4.6 Cohesion

Three different test methods are used to address cohesion of polymer modified bitumens: force ductility, tensile test and pendulum test. It is intended that the most appropriate cohesion test method shall be used, depending on the intended use and application, at the discretion of the manufacturer. The manufacturer shall state the test method used.

Force ductility (EN 13589) and tensile test (EN 13587) may be used for all binders. Force Ductility is expressed in J/cm^2 at a given test temperature and elongation of the test specimen. Tensile test results are expressed in J/cm^2 at a given test temperature.

The pendulum test according to EN 13588 may only be used for binders used for surface dressing, bond coats, slurry-surfacing and micro-surfacing. Test results are expressed in J/cm^2 .

4.7 Strain recovery

Strain recovery may be important for some applications, e.g. on bridge decks, as a characteristic to address other cohesion elements not addressed in 4.6. Strain recovery of polymer modified bitumens is characterized by elastic recovery (EN 13398) in % at 25°C or 10°C . Test temperatures are selected according to the climate conditions at application.

4.8 Durability of strain recovery

Durability of strain recovery of polymer modified bitumens is characterized by elastic recovery (EN 13398) in % at 25°C or 10°C after short-term ageing. Test temperatures are selected according to the climate conditions at application.

4.9 Viscoelastic behaviour

Viscoelastic behaviour is addressed by $T(G^* = 15 \text{ kPa})$ [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for fresh binders, and by $T(G^* = 15 \text{ kPa})$ [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] together with $T(G^* = 5 \text{ MPa})$ [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for short-term aged binders determined according to EN 14770.

For details, see also informative Annex A to this document.

It is recommended to store all raw data from temperature sweep measurements in order to allow other calculations and to prepare future revisions of this document.

4.10 Durability of viscoelastic behaviour

Durability of viscoelastic behaviour is addressed by comparison of $T(G^* = 15 \text{ kPa})$ [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for fresh, short-term aged and long term aged binders and by comparison of $T(G^* = 5 \text{ MPa})$ [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for short-term and long term aged binders determined according to EN 14770.

prEN 14023:2020 (E)

For details, see also informative Annex A to this document.

It is recommended to store all raw data from temperature sweep measurements in order to allow other calculations and to prepare future revisions of this document.

4.11 Temperature sensitivity

Temperature sensitivity is addressed by comparison of T ($G^* = 15$ kPa) [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] to T ($G^* = 5$ MPa) [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for short-term aged binders, and by comparison of T ($G^* = 15$ kPa) [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] to T ($G^* = 5$ MPa) [$^{\circ}\text{C}$] and respective phase angle [$^{\circ}$] for long term aged binders, determined according to EN 14770.

For details, see also informative Annex A to this document.

It is recommended to store all raw data from temperature sweep measurements in order to allow other calculations and to prepare future revisions of this document.

4.12 Other characteristics**4.12.1 Change in mass after short-term ageing**

Change in mass after short-term ageing (RTFOT) according to EN 12607-1 is expressed in %.

4.12.2 Flash point

Flash point [$^{\circ}\text{C}$] shall be determined by the Cleveland open cup method in EN ISO 2592 for normal specification purposes.

The Pensky-Martens closed cup method (see EN ISO 2719) may be used to investigate possible contamination but is likely to give lower values than the Cleveland open cup method.

4.12.3 Dynamic viscosity

Information on dynamic viscosity [$\text{Pa}\cdot\text{s}$] according to EN 13302 may be of assistance for handling of polymer modified binders. The value of dynamic viscosity reported is a typical, single value, and is not intended to be used as a requirement or interpreted as a limiting value.

4.12.4 Homogeneity and storage stability

Homogeneity is necessary for polymer modified bitumens. The tendency of polymer modified bitumens to separate during storage may be assessed by the storage stability test (see EN 13399). If the product does not fulfil the properties in Table 2, that is difference in needle penetration in 0,1 mm according to EN 1426, or difference in softening point in $^{\circ}\text{C}$ according to EN 1427, information shall be given by the supplier regarding storage conditions for the polymer modified bitumens to avoid separation of the components and to ensure the homogeneity of the product.

4.13 Release of dangerous 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 Testing, assessment and sampling methods

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.