



SLOVENSKI STANDARD

SIST EN 13398:2018

01-februar-2018

Nadomešča:
SIST EN 13398:2010

Bitumen in bitumenska veziva - Določevanje elastičnega povratka modificiranih bitumnov

Bitumen and bituminous binders - Determination of the elastic recovery of modified bitumen

Bitumen und bitumenhaltige Bindemittel - Bestimmung der elastischen Rückstellung von modifiziertem Bitumen

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Bitumes et liants bitumineux - Détermination du retour élastique des bitumes modifiés

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Ta slovenski standard je istoveten z: **EN 13398:2017**

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

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en,fr,de

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EUROPEAN STANDARD

EN 13398

NORME EUROPÉENNE

EUROPÄISCHE NORM

December 2017

ICS 75.140; 91.100.50

Supersedes EN 13398:2010

English Version

Bitumen and bituminous binders - Determination of the elastic recovery of modified bitumen

Bitumes et liants bitumineux - Détermination du retour élastique des bitumes modifiés

Bitumen und bitumenhaltige Bindemittel - Bestimmung der elastischen Rückstellung von modifiziertem Bitumen

This European Standard was approved by CEN on 15 October 2017.

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

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



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

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European foreword

This document (EN 13398:2017) 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 June 2018, and conflicting national standards shall be withdrawn at the latest by June 2018.

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

This document supersedes EN 13398:2010.

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

Compared to EN 13398:2010, the major changes in the present standard are:

- Incorrect reference to ISO 5725 for rounding off values removed from Clause 2 and 9;
- the possibility of alternative measuring conditions are now mentioned in Clause 4 Principle;
- reference to ASTM D113 has been deleted in 5.1 and Bibliography;
- in 6.3 the maximum temperature for the pre-heating of moulds is linked to the softening point (ring and ball) of the specimen or to 70 °C if softening point (ring and ball) is not known;
- Clause 11 Other test conditions is now part of Clause 4 Principle;
- several test methods are now referenced in the Bibliography.

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, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies a method for the determination of the elastic recovery of bituminous binders in a ductilometer at the test temperature (typically 25 °C or 10 °C; other temperatures can be used).

It is especially applicable to bituminous binders modified with thermoplastic elastomers, but can also be used with other bituminous binders which generate only small recovery.

WARNING — The use of this European Standard may involve hazardous materials, operations and equipment. This European standard does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this European standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

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, *Bitumen and bituminous binders - Sampling bituminous binders*

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

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

3 Terms and definitions

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

3.1

bitumen thread

test specimen of moulded bitumen, when stretched

3.2

half-threads

two pieces obtained when a bitumen specimen has been stretched to a thread and then cut in the middle

3.3

elastic recovery

R_E

expressed as a percentage of the distance between the ends of the half-threads, which has developed 30 min after cutting relative to the elongation length, which is in general 200 mm

4 Principle

A bituminous binder specimen is stretched at the test temperature and a constant rate of 50 mm/min to a predetermined elongation (200 mm). The bitumen thread thus produced is cut in the middle to obtain two half-threads. After a predetermined time of 30 min for recovery has elapsed, the shortening of the half-threads is measured and expressed as the percentage of the elongation length. Although this procedure is typically performed at a test temperature of 25 °C or 10 °C, it may be useful to perform it at different temperatures, especially for soft or highly modified binders. If the sample breaks before reaching 200 mm (premature break), the length at break and its elastic recovery shall be measured and then the results can be considered valid.

5 Apparatus

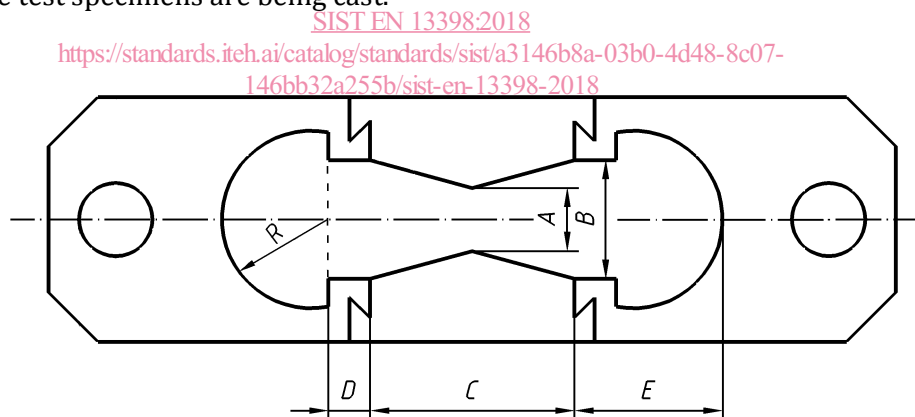
Usual laboratory apparatus and glassware, together with the following:

5.1 Specimen moulding equipment

The moulds shall be made of metal, shall consist of two halves, and shall have the dimensions given in Figure 1.

The ends for the moulds are known as clips and are similar to those specified in EN 13589. The inner radius R of the clips should be of $(15,5 \pm 0,7)$ mm, the opening width B ($20,0 \pm 0,2$) mm and the inner length of the clips $E (= R + D)$ should be $(22,8 \pm 0,9)$ mm (see Figure 1).

Both halves of a mould shall be kept in place by two diametrically opposed sliding pins. The moulds shall be placed on a base plate, also made of metal, and pressed together by the knurled screw or by a plate whilst the test specimens are being cast.



Key

	Dimension mm	tolerance mm
A	10,0	$\pm 0,2$
B	20,0	$\pm 0,2$
C	30,0	$\pm 0,3$
D	7,3	$\pm 0,5$
$E = R + D$	22,8	$\pm 0,9$
R	15,5	$\pm 0,7$
Thickness	10,0	$\pm 0,1$

Figure 1 — Mould type (normative dimensions, informative design)

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5.2 Ductilometer, consisting of a water bath with a temperature control (5.2.1) and a traction device (5.2.2).

5.2.1 Water bath

The water bath shall be temperature controlled, capable of maintaining the specimen and the attachment device at the specified temperature throughout the test to an accuracy of $\pm 0,5$ °C, provided with means of checking the temperature. The water bath shall allow elongation of the test specimen to at least 200 mm. It shall be designed in such a way that at least two specimens can be tested in parallel. The distance between each mould and between the walls of the water bath shall be at least 10 mm. The water level shall be such that there is at least 25 mm of water above and below the specimen.

Circulation of the bath water via a thermostat and, possibly, additional thermal insulation of the water bath shall guarantee the required test temperature within $\pm 0,5$ °C. Circulation shall be maintained during the test at a reduced rate of approximately 1,5 l/min.

NOTE It may be advisable to direct the water stream at the inlet against a baffle plate to avoid turbulent water flow.

5.2.2 Traction device

The traction device shall allow two specimens to be tested in parallel. The traction plates shall be exactly positioned by a stop switch allowing easy introduction of the pins into the holes of the clips with ease. The drive of the traction device shall be designed in such a way that the combined movement of the pins during the entire test is steady at a constant rate of $(50,0 \pm 2,5)$ mm/min. The drive should be sufficiently powerful to overcome high deformation resistance at the beginning of the test without speed loss.

5.3 Knife or paint scraper, with a straight blade of at least 40 mm length or a plane blade.

5.4 Mould release agent, mixture of glycerine and dextrine or mineral talc, or another commercially available release agent like silicone grease.

NOTE When using a new mould release agent for the first time make sure it does not influence the results by interfering with the bituminous binder.

5.5 Scissors

5.6 Ruler with scale divisions to 1 mm.

5.7 Timing device, with accuracy of 1 s to check the speed of the traction device.

5.8 Thermometer or temperature measuring device, readable to 0,1 °C with an accuracy of 0,1 °C.

6 Preparation of test samples

6.1 General

Ensure that the laboratory sample is representative of the bituminous binder to be analysed, in accordance with EN 58. Ensure that the laboratory sample is homogeneous and non-contaminated. The test samples shall be prepared in accordance with EN 12594.

6.2 Preparation of the moulds

The base plate and the inner walls of the side-pieces shall be applied with a thin coat of the release agent. Assemble the clips and sides on the base plate and arrest them with the knurled screw. Ensure that the specified distance between the sides is achieved (Dimension A on Figure 1).

6.3 Filling and conditioning the moulds

The moulds shall be carefully filled with the bitumen up to the surfaces of the moulds with a meniscus protruding.

It is allowed to preheat the mould up to the temperature of the softening point (ring and ball) of the sample (in accordance with EN 1427) in order to facilitate filling the mould when pouring the sample. If the softening point (ring and ball) is not known it is allowed to pre-heat the moulds to 70 °C maximum.

Keep the moulded specimens for about 1 h at room temperature then remove the excess sample using a heated knife. Reject any specimens exhibiting defects. Place the moulded specimens in the water bath maintained at the test temperature for (90 ± 10) min, before testing.

The time from filling the moulds to the start of stretching shall be kept within (150 ± 10) min.

6.4 Temperature check of the water bath

Check the temperature of the water at the far end of each traction plate close to the pins. The temperature shall not differ by more than $\pm 0,5$ °C from the specified test temperature.

7 Procedure

Once at least two levelled filled moulds have been kept at the test temperature for 90 min, remove the moulds from the base plate and the sides of the moulds and transfer the bitumen specimens to the traction plates. Then stretch the specimens at the test temperature $\pm 0,5$ °C and at a speed of $(50,0 \pm 2,5)$ mm/min up to an elongation of (200 ± 1) mm. Within 10 s of the traction device being halted, cut the bitumen threads in the middle with a pair of scissors, produce two half-threads. (30 ± 1) min after cutting the bitumen threads, use a ruler to measure the lengths between the ends of the half-threads and express them in millimetres.

It is permissible to align the half threads so that they are facing each other.

If the thread of one specimen breaks before the elongation of 200 mm and this is not due to a deficient sample, such as a sample containing an air bubble, the laboratory can calculate the elastic recovery using Formula (1), taking care to use the correct measured values of d and L. The result shall be recorded in the test report together with the elongation achieved stated in Clause 11 d).

NOTE Examples of premature break may occur when testing an aged binder (EN 12607-1, -2 and -3) or a binder recovered from asphalt (EN 12697-3 and -4) or binder recovered from cationic bituminous emulsions which are possibly further stabilized and aged (EN 1431, EN 13074-1 and -2, EN 14769).