SLOVENSKI STANDARD
SIST EN 12846-1:2023

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Bitumen in bitumenska veziva - Določanje viskoznosti z iztočnim viskozimetrom - 1. del: Bitumenske emulzije

Bitumen and bituminous binders - Determination of efflux time by the efflux viscometer - Part 1: Bituminous emulsions

Bitumen und bitumenhaltige Bindemittel - Bestimmung der Ausflusszeit mittels Ausflussviskosimeter - Teil 1: Bitumenemulsionen

Bitumes et liants bitumineux - Détermination du temps d'écoulement à l'aide d'un viscosimètre à écoulement - Partie 1 : Émulsions bitumineuses

Ta slovenski standard je istoveten z: **EN 12846-1:2022**

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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Bitumen and bituminous binders - Determination of efflux time by the efflux viscometer - Part 1: Bituminous emulsions

Bitumes et liants bitumineux - Détermination du temps d'écoulement à l'aide d'un viscosimètre à écoulement - Partie 1 : Émulsions bitumineuses

Bitumen und bitumenhaltige Bindemittel - Bestimmung der Ausflusszeit mittels Ausflussviskosimeter - Teil 1: Bitumenemulsionen

This European Standard was approved by CEN on 21 November 2022.

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European foreword

This document (EN 12846-1:2022) 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of an identical text or by endorsement, at the latest by June 2023, and conflicting national standards shall be withdrawn at the latest by June 2023.

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 12846-1:2011.

EN 12846-1:2022 includes the following significant technical changes with respect to EN 12846-1:2011:

— possibility to use a vegetal oil, requirement on density replaces requirement on viscosity (Clause 5);

— the use of Sa and Sc solutions has been abandoned;

— Figures 1 and 2 have been modified to be in line with the evolution of test equipment (6.1 and 6.2);

— possibility to use alternative working apparatus that meet the requirements of this document, such as for example an integrated block viscometer (6.1);

— mercury stem thermometers are no longer specified as reference thermometers (6.4) and Annex A has been removed;

— emulsion samples, viscometer cups, valves and lids are preconditioned at test temperature to minimize time of presence of the emulsion sample in the viscometer cup (8.3.3 and 8.3.4);

— more accurate description of measurement procedure (8.3);

— introduction in 8.3.9 of the possible use of a balance (alternative method) instead of a receiver (reference method);

— precision data have been re-evaluated based on more comprehensive operational experience (Clause 10).

The EN 12846 series consists of the following parts under the general title *Bitumen and bituminous binders — Determination of efflux time by the efflux viscometer*:

— *Part 1: Bituminous emulsions*;

— *Part 2: Cut-back and fluxed bituminous binders*.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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, 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, Türkiye and the United Kingdom.

1 Scope

This document specifies a method for the determination of the efflux time at 40 °C of bituminous emulsions in seconds using an efflux viscometer. Alternative test temperature is 50 °C.

NOTE The procedure described in this document can also be followed to determine efflux time at other temperatures such as 25 °C.

WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to 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 12594, *Bitumen and bituminous binders — Preparation of test samples*

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

EN ISO 4788:2005, *Laboratory glassware — Graduated measuring cylinders (ISO 4788:2005)*

3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org

3.1
viscosity
internal resistance of a fluid to flow

3.2
efflux time
time needed for a specified volume of a material to flow through a specified orifice at a specified temperature

Note 1 to entry: The efflux time is an indirect measure of the viscosity and is also referred to as “pseudo-viscosity”.

4 Principle

The efflux time of a bituminous emulsion is determined using an efflux viscometer known as the Standard Tar Viscometer (STV), which determines the time of efflux of a 50 ml sample through a 10 mm or a 4 mm or a 2 mm orifice at a specified temperature.

Whatever temperatures or orifice diameters used, the efflux time shall not exceed 600 s. For highly viscous emulsions, EN 13302 shall be used.

5 Reagents and materials

Light mineral or vegetal oil having a density lower or equal to 930 kg/m^3 at 15 °C.

6 Apparatus

Usual laboratory apparatus and glassware, together with the following.

6.1 Efflux viscometer (example of assembled viscometer on Figure 1) consisting essentially of a cup with an orifice in the centre of the base that may be closed by a ball-and-socket valve (Figure 3).

Three forms are required, differing only in the size of the orifice (10 mm, 4 mm and 2 mm). For other dimensions of the cup and the ball valve, see Figure 3 and Table 3. The cup cylinder shall be made of brass. The ball valve should be made of corrosion-resistant metal, with a ball on a rod, a levelling peg attached to the rod and a hemispherical top by means of which the valve may be supported in a vertical position.

The viscometer cups can be equipped with suitable corks or caps for closing the orifices with the ball valve in position (the closing with corks or caps is only required when conditioning the viscometer in a separate bath). The viscometer cups shall be equipped with some means of covering the cups (e.g. lids) to prevent evaporation of water and minimize surface cooling effects. This lid shall not touch the test material when the cup is filled. It is provided with a central hole through which the temperature measuring device can pass and with a groove on one side through which the rod of the valve can pass.

The viscometer-cup holder shall be capable of:

— supporting one or more cups in a vertical position;

— providing a valve support to hold the valve at least 16 mm vertically above the orifice of the cup during efflux of the test material (Figure 2).

To enhance resistance to wear and corrosion of the ball and socket valve, the bottom of the cup may be made from a different, corrosion resistant, material and screwed to the brass tube. It is then advised to use the same material, such as for instance phosphor-bronze, for the cup bottom and the ball valve. Wrought nickel alloy with copper or metals NiCu30 in accordance with ISO 9722:1992 [1] are possible materials for the rod of the ball valve.

It is allowed to use working apparatus with other technical solutions that meet the requirements of this document, such as for example an integrated block viscometer, which is a combination of a specific efflux viscometer, thermostating element and temperature controller.

6.2 Viscometer water bath, capable of maintaining the test temperature of 25 °C, 40 °C or 50 °C (8.3.1) constant to within ±0,5 °C. Cups shall be separated from each other and from the walls of the bath by at least 55 mm.

6.3 Separate temperature controlled water bath, capable of maintaining the test temperature (6.2) constant to within ±0,5 °C.

If the water bath is to be used for the preconditioning of the empty cups (8.3.4) or the conditioning of the filled cups (8.3.6), a suitable support shall be provided to maintain the cup(s) in a vertical position. Cups shall be separated from each other and from the walls of the bath by at least 55 mm.

For the preconditioning of emulsion samples (8.3.3) and empty viscometer cups (8.3.4), the water bath may be replaced by an appropriate climatic chamber capable of maintaining the test temperature constant to ±1 °C.

6.4 Temperature measuring devices (combining sensor and reading unit), two, which shall:

— have a range from at least 10 °C to 60 °C;

— have a maximum permissible measurement error of ±0,2 °C or lower;

— have a suitable length so that the measuring tip may be immersed at mid-height of the viscometer water bath, separate water bath and viscometer-cup (8.3.5).

Sensors based on platinum resistance thermometers have been found suitable but other principles are also allowed.

6.5 Receiver, consisting of a 100 ml cylinder with graduations at 20 ml, 25 ml and 75 ml, complying with the requirement Type 1a of EN ISO 4788:2005.

6.6 Timing device, capable of measuring the efflux time with a maximum permissible error of ±0,2 s.

6.7 Balance, optional, having a suitable measuring range and having a maximum permissible error of ±0,2 g within the testing range.

7 Sampling

The material under test shall be sampled in accordance with EN 58 and prepared in accordance with EN 12594.

The test shall be carried out in duplicate.

8 Procedure

8.1 General

Carry out the procedure in laboratory at room temperature between 18 °C to 28 °C.

8.2 Preparation of apparatus

Clean the viscometer cup (6.1) with a suitable solvent, to remove any mark of binder, and thoroughly dry it to remove all traces of solvent. If necessary, rub the interior of the cup and/or clean the orifice. Use soft tissue-paper or some similar material that will not leave particles behind or abrade the metal.

When cleaning, care shall be taken not to damage the orifice.

8.3 Measurement

8.3.1 If the efflux time is unknown, measure it at 40 °C with the 4 mm orifice viscometer cup and refer to Table 1.

According to the efflux time obtained, 3 cases are possible. Choose the diameter of the orifice of the cup as follows:

1) if the efflux time is lower than 5 s, perform another determination at 40 °C with 2 mm orifice;

2) if the efflux time is greater than or equal to 5 s and lower than or equal to 600 s with still a continuous flow, report the value obtained at 40 °C with 4 mm orifice;

3) in case of a non-continuous flow or if the efflux time is greater than 600 s, perform another determination at 50 °C with the 4 mm orifice or at 40 °C with the 10 mm orifice or by means of dynamic viscosity measurement (EN 13302).

Table 1 — Diameter of the orifice of the cup

Orifice size mm	**Efflux time** s	
	Minimum	Maximum
10 or 4 or 2	5	Non continuous flow or 600 s

8.3.2 Condition the viscometer water bath (6.2) and, if used, the separate controlled water bath (6.3), by stirring the water in the bath with the relevant device and check that the temperature is at the required value for the test, maintained within ±0,5 °C.

8.3.3 Precondition the emulsion that has just been sampled and sieved (in accordance with EN 12594) in an appropriate receiver by directly placing this receiver in the separate water bath or into a climatic chamber set to the test temperature for a period of time sufficient to reach the test temperature.

8.3.4 Precondition the empty viscometer-cup, ball valve and lid in either the viscometer water bath (6.2) or the separate water bath or climatic chamber (6.3) for a period of time sufficient to reach the test temperature. If the viscometer-cup is to be filled and maintained within the water bath prior to its transfer into the viscometer (8.3.6), close the lower part of the cup orifice with a cork or cap prior to it's placing into the water bath.

8.3.5 If not already done, suspend the cup up to its rim in the viscometer water bath and start the procedure by placing the ball valve on top of the orifice. Carefully fill the cup with the prepared sample to such a height that the levelling peg on the valve is just immersed when the latter is vertical. Cover the top of the cup for example with a suitable lid. It shall be provided with a central hole and a groove on one side through which the rod of the valve (Figure 3, Key element 2) may be passed into the upper end of the cup. Pass the temperature measuring device (6.4) through the central hole so that its measuring tip is approximately at the geometric centre of the sample. Continue the procedure as from 8.3.7.

8.3.6 Apply the same procedure as in 8.3.5 to additional viscometer-cups that are to be maintained at test temperature in the separate water bath (6.3) while waiting to be tested. Once ready for testing, remove the filled cup from the water bath and place it into the viscometer cup holder.

8.3.7 Check that the sample is still at the required temperature. If not, wait for the minimum time necessary to get again into the tolerance range (±0,5 °C) around the targeted test temperature.