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Nadomešča:
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Bitumen in bitumenska veziva - Določanje odpornosti proti otrjevanju pod vplivom toplote in zraka - 1. del: Metoda RTFOT

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

Bitumen und bitumenhaltige Bindemittel - Bestimmung der Beständigkeit gegen Verhärtung unter Einfluss von Wärme und Luft - Teil 1: RTFOT-Verfahren

Bitumes et liants bitumineux - Détermination de la résistance au durcissement sous l'effet de la chaleur et de l'air - Partie 1: Méthode RTFOT

Ta slovenski standard je istoveten z: EN 12607-1:2007

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 und bitumenhaltige Bindemittel - Bestimmung der Beständigkeit gegen Verhärtung unter Einfluss von Wärme und Luft - Teil 1: RTFOT-Verfahren

This European Standard was approved by CEN on 3 February 2007.

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Foreword

This document (EN 12607-1:2007) 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of an identical text or by endorsement, at the latest by September 2007, and conflicting national standards shall be withdrawn at the latest by September 2007.

This document supersedes EN 12607-1:1999.

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 Directive(s).

This European standard EN 12607 consists of the following parts under the general title: *Bitumen and bituminous binders – Determination of the resistance to hardening under the influence of heat and air*

Part 1: RTFOT method

Part 2: TFOT method

Part 3: RFT method

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 United Kingdom.

1 Scope

This European Standard specifies a method for measuring the combined effects of heat and air on a thin moving film of bitumen or bituminous binder simulating the hardening that a bituminous binder undergoes during mixing in an asphalt mixing plant.

The method described is not applicable to some modified binders or to those where the viscosity is too high to provide a moving film. The sample may creep out of the glass container and flow on the heating elements of the oven during testing.

The method is referred to as RTFOT, i.e. Rolling Thin Film Oven Test.

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

If there is a likelihood of volatile components being present in a binder, this procedure should not be used. It should not be used for cutback bitumen or bituminous emulsions before these products have been stabilised, e.g. in accordance with EN 14895.

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 1425, *Bitumen and bituminous binders - Characterization of perceptible properties*

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

EN 12596, *Bitumen and bituminous binders - Determination of dynamic viscosity by vacuum capillary*

EN 12735-1, *Copper and copper alloys - Seamless, round copper tubes for air conditioning and refrigeration - Part 1: Tubes for piping systems*

3 Principle

A moving film of bituminous binder is heated in an oven to a specified temperature for a given period of time with a constant supply of air.

The effects of heat and air are determined based on the change in mass (expressed as a percentage) or on the change in the bituminous binder's characteristics such as penetration (EN 1426), softening point (EN 1427) or dynamic viscosity (EN 12596), before and after the period in the oven.

4 Apparatus

Usual laboratory apparatus and glassware, together with the following:

4.1 Oven, parallelepiped, double-walled and electrically heated. The inside dimensions excluding the air plenum shall be as follows:

— height: (340 ± 15) mm;

— width: (405 ± 15) mm;

— depth: (445 ± 15) mm.

The front door shall contain a symmetrically located window of the following dimensions:

— width: (320 ± 15) mm;

— height: (215 ± 15) mm.

This window shall contain two sheets of heat resistant glass separated by an air space. The window shall permit an unobstructed view of the interior of the oven.

The top of the upper heating element shall be (25 ± 9) mm below the oven floor.

The oven shall be ventilated by convection currents of air; the oven shall have air inlets and outlets for the evacuation of hot gases. The air inlets toward the bottom of the oven shall be located so that the air is able to flow around the heating elements and their total open area shall be (15 ± 1) cm². The outlets for the hot gases evacuation shall be located in the upper part of the oven and their total open area shall be (10 ± 1) cm².

The oven shall incorporate an air flow around the side walls and ceiling. The air plenum shall be of uniform thickness (38 ± 3) mm (Figure 1a)). The inside of the oven shall be equipped with a vertical circular aluminium carriage with a diameter of (300 ± 10) mm (Figure 2a)). The horizontal axis of the circular carriage is located (160 ± 10) mm from the upper inside wall of the oven, excluding the air plenum. The carriage shall be provided with suitable openings and spring clips for firmly holding eight glass containers in a horizontal position (Figure 2b)). The carriage shall be mechanically driven by a 20 mm diameter shaft at a speed of (15,0 ± 0,2) r/min. The front surface of the carriage shall be (110 ± 5) mm from the rear inside wall of the oven.

On the upper surface and at the midpoint of the width of the oven and (150 ± 5) mm from the front face of the carriage, a squirrel cage-type fan shall be mounted with an outside diameter of (135 ± 5) mm and a thickness of (75 ± 5) mm and turned at (1 725 ± 100) r/min by an externally mounted motor.

The fan shall be set so that it turns in an opposite direction to its vanes. The air flow characteristics shall be suction from the floor of the oven then flow along the walls in the sheaths fitted for this purpose and exhaust at the upper surface through the fan (Figures 1a) and 1b)).

The oven shall be equipped with a thermostat capable of maintaining a constant temperature to ± 0,5 °C. The corresponding regulation probe shall be situated on the right side of the oven as described in Figure 1 or symmetrically on the left side.

The temperature shall be recorded inside the oven with the reading point (25 ± 5) mm below a horizontal line through the axle of the carriage, (50 ± 5) mm from the inside wall and (115 ± 5) mm from the front face of the carriage. The heating capacity shall be sufficient to bring the oven back to the test temperature within a 10 min period after insertion of the containers.

The oven shall be equipped with an air jet positioned to blow heated air into each container at its lowest point of travel. The air jet shall have an outlet orifice with a diameter of (1,0 ± 0,1) mm connected to a copper tubing (see EN 12735-1) with an external diameter of (8,0 ± 0,1) mm and a length of (7,60 ± 0,05) m. This tube shall be coiled to lie flat on the bottom of the oven and lead to a source of oil-free, dried and dust-free air. The

orifice of the tubing shall be between 5 mm and 10 mm from the opening in the glass container. The air jet shall blow along the main axis of the glass container.

NOTE 1 Activated silica gel treated with an indicator is a satisfactory desiccant for the air.

NOTE 2 The performance of the equipment (particularly the motor rotation speed and the fan rotation speed) should be verified and action should be taken if it does not comply with the requirements stated in this method.

4.2 Flow meter, capable of measuring the airflow at a rate of (4 000 ± 200) ml/min at ambient temperature and pressure.

4.3 Thermometer, solid stem, as specified in Annex A.

Other temperature measuring devices may be used instead of mercury stem thermometers, however, the mercury stem thermometer is the reference device. Therefore, any alternative device employed shall be calibrated to provide the same readings as would be provided by the mercury stem thermometer, recognising and allowing for changed thermal response times compared with the mercury thermometer.

NOTE When measuring and controlling nominally constant temperatures, as in this test method, alternative devices can indicate greater cyclic variations than mercury thermometers, depending on the cycle time of heating and the power of the controlled heat input.

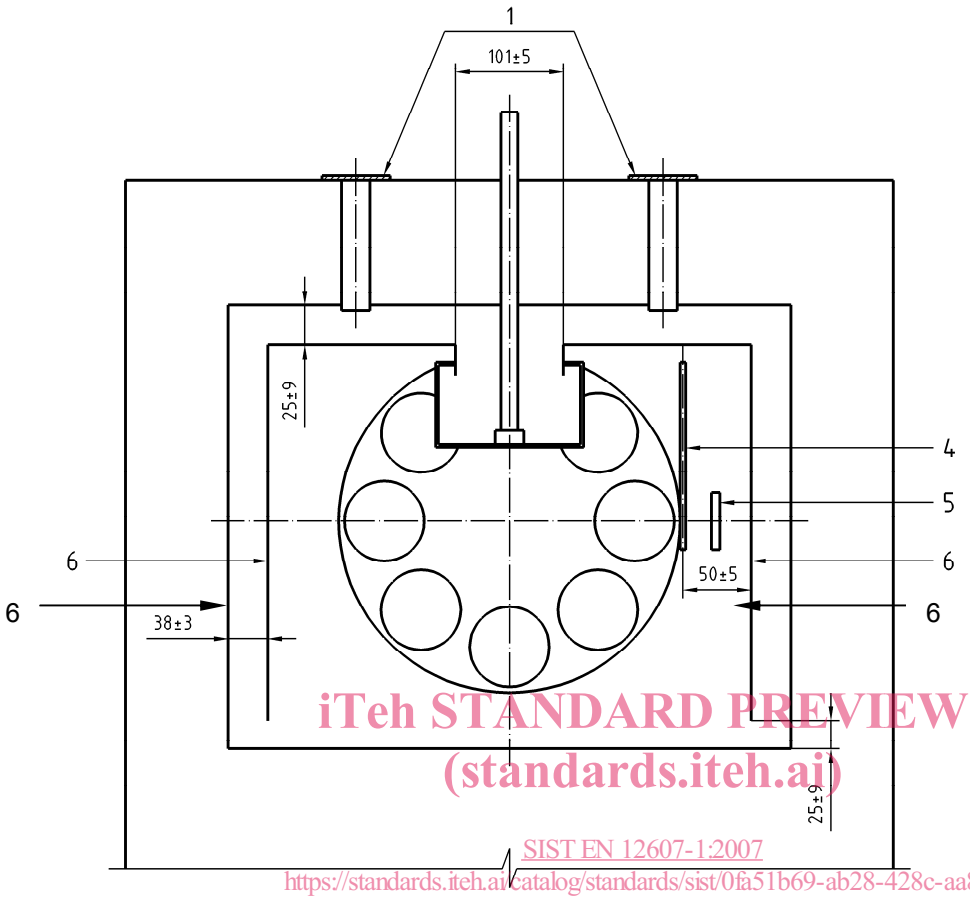
4.4 Glass containers, (in which the sample of bituminous binder is subjected to the test), made of heat-resistant glass conforming to the dimensions shown in Figure 3.

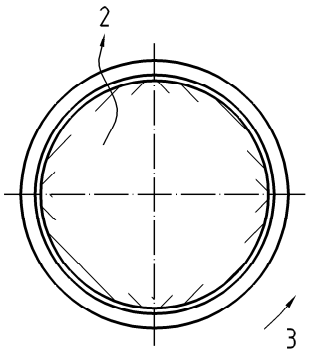
NOTE 1 An outside opening (convex) is more suitable than the standard inside (concave) opening to facilitate the pouring of the hardened bituminous binder.

NOTE 2 A special container with a removable ground-glass stopper (which allows easier cleaning) can be used for non-referee purposes provided all the standardised dimensions are satisfied.

4.5 Balance, accurate to ± 10 mg.

Dimensions in millimetres





Key

1 Upper vents
4 Thermometer
5 Regulation probe
6 Sheaths

Figure 1 a) – Oven (front view)

2 Air flow
3 Direction of rotation

Figure 1 b) – Squirrel cage-type fan (bottom view)

Figure 1 — Oven and squirrel cage-type fan