



**SLOVENSKI STANDARD**  
**SIST EN 12697-20:2004**  
**01-junij-2004**

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Bituminous mixtures - Test methods for hot mix asphalt - Part 20: Indentation using cube or Marshall specimens

Asphalt - Prüfverfahren für Heißasphalt - Teil 20: Eindringversuch an Würfeln oder Marshall-Probekörpern

Mélanges bitumineux - Méthodes d'essai pour mélange hydrocarboné a chaud - Partie 20: Essai d'indentation sur cubes ou éprouvettes Marshall

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 12697-20**

December 2003

ICS 93.080.20

English version

## Bituminous mixtures - Test methods for hot mix asphalt - Part 20: Indentation using cube or Marshall specimens

Mélanges bitumineux - Méthodes d'essai pour mélange  
hydrocarboné à chaud - Partie 20: Essai d'indentation sur  
cubes ou sur éprouvettes Marshall

Asphalt - Prüfverfahren für Heiasphalt - Teil 20:  
Eindringversuch an Wfeln oder Marshall-Probekrpern

This European Standard was approved by CEN on 3 November 2003.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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EUROPÄISCHES KOMITEE FR NORMUNG

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## Foreword

This document (EN 12697-20:2003) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

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 2004, and conflicting national standards shall be withdrawn at the latest by August 2005.

This European Standard is one of a series of standards as listed below:

EN 12697-1, *Bituminous mixtures — Test methods for hot mix asphalt — Part 1: Soluble binder content.*

EN 12697-2, *Bituminous mixtures — Test methods for hot mix asphalt — Part 2: Determination of particle size distribution.*

EN 12697-3, *Bituminous mixtures — Test methods for hot mix asphalt — Part 3: Bitumen recovery: Rotary evaporator.*

EN 12697-4, *Bituminous mixtures — Test methods for hot mix asphalt — Part 4: Bitumen recovery: Fractionating column.*

EN 12697-5, *Bituminous mixtures — Test methods for hot mix asphalt — Part 5: Determination of the maximum density.*

EN 12697-6, *Bituminous mixtures — Test methods for hot mix asphalt — Part 6: Determination of bulk density of bituminous specimens.*

EN 12697-7, *Bituminous mixtures — Test methods for hot mix asphalt — Part 7: Determination of bulk density of bituminous specimens by gamma rays.*

EN 12697-8, *Bituminous mixtures — Test methods for hot mix asphalt — Part 8: Determination of void characteristics of bituminous specimens.*

EN 12697-9, *Bituminous mixtures — Test methods for hot mix asphalt — Part 9: Determination of the reference density.*

EN 12697-10, *Bituminous mixtures — Test methods for hot mix asphalt — Part 10: Compactibility.*

EN 12697-11, *Bituminous mixtures — Test methods for hot mix asphalt — Part 11: Determination of the affinity between aggregate and bitumen.*

EN 12697-12, *Bituminous mixtures — Test methods for hot mix asphalt — Part 12: Determination of the water sensitivity of bituminous specimens*

EN 12697-13, *Bituminous mixtures — Test methods for hot mix asphalt — Part 13: Temperature measurement.*

EN 12697-14, *Bituminous mixtures — Test methods for hot mix asphalt — Part 14: Water content.*

EN 12697-15, *Bituminous mixtures — Test methods for hot mix asphalt — Part 15: Determination of the segregation sensitivity.*

prEN 12697-16, *Bituminous mixtures — Test methods for hot mix asphalt — Part 16: Abrasion by studded tyres.*

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prEN 12697-17, *Bituminous mixtures — Test methods for hot mix asphalt — Part 17: Partial loss of porous asphalt specimen.*

prEN 12697-18, *Bituminous mixtures — Test methods for hot mix asphalt — Part 18: Binder drainage from porous asphalt.*

prEN 12697-19, *Bituminous mixtures — Test methods for hot mix asphalt — Part 19: Permeability of specimen.*

EN 12697-20, *Bituminous mixtures — Test methods for hot mix asphalt — Part 20: Indentation using cube or Marshall specimen.*

prEN 12697-21, *Bituminous mixtures — Test methods for hot mix asphalt — Part 21: Indentation using plate specimens.*

prEN 12697-22, *Bituminous mixtures — Test methods for hot mix asphalt — Part 22: Wheel tracking.*

EN 12697-23, *Bituminous mixtures — Test methods for hot mix asphalt — Part 23: Determination of the indirect tensile strength of bituminous specimens.*

prEN 12697-24, *Bituminous mixtures — Test methods for hot mix asphalt — Part 24: Resistance to fatigue.*

prEN 12697-25, *Bituminous mixtures — Test methods for hot mix asphalt — Part 25: Cyclic compression test.*

prEN 12697-26, *Bituminous mixtures — Test methods for hot mix asphalt — Part 26: Stiffness.*

EN 12697-27, *Bituminous mixtures — Test methods for hot mix asphalt — Part 27: Sampling.*

EN 12697-28, *Bituminous mixtures — Test methods for hot mix asphalt — Part 28: Preparation of samples for determining binder content, water content and grading.*

EN 12697-29, *Bituminous mixtures — Test methods for hot mix asphalt — Part 29: Determination of the dimensions of bituminous specimen.*

prEN 12697-30, *Bituminous mixtures — Test methods for hot mix asphalt — Part 30: Specimen preparation, impact compactor.*

prEN 12697-31, *Bituminous mixtures — Test methods for hot mix asphalt — Part 31: Specimen preparation gyratory compactor.*

prEN 12697-32, *Bituminous mixtures — Test methods for hot mix asphalt — Part 32: Laboratory compaction of bituminous mixtures by vibratory compactor.*

EN 12697-33, *Bituminous mixtures — Test methods for hot mix asphalt — Part 33: Specimen prepared by roller compactor.*

prEN 12697-34, *Bituminous mixtures — Test methods for hot mix asphalt — Part 34: Marshall test.*

prEN 12697-35, *Bituminous mixtures — Test methods for hot mix asphalt — Part 35: Laboratory mixing.*

EN 12697-36, *Bituminous mixtures — Test methods for hot mix asphalt — Part 36: Determination of the thickness of a bituminous pavement.*

EN 12697-37, *Bituminous mixtures — Test methods for hot mix asphalt — Part 37: Hot sand test for the adhesivity of binder on precoated chippings for HRA.*

prEN 12697-38, *Bituminous mixtures — Test methods for hot mix asphalt — Part 38: Test equipment and calibration.*

prEN 12697-39, *Bituminous mixtures — Test methods for hot mix asphalt — Part 39: Binder content by ignition.*

prEN 12697-41, *Bituminous mixtures — Test methods for hot mix asphalt — Part 41: Resistance to de-icing fluids.*

prEN 12697-42, *Bituminous mixtures — Test methods for hot mix asphalt — Part 42: Amount of foreign matters in reclaimed asphalt.*

prEN 12697-43, *Bituminous mixtures — Test methods for hot mix asphalt — Part 43: Resistance to fuel.*

prEN 12697-45, *Bituminous mixtures — Test methods for hot mix asphalt — Part 45: Binder drainage – Schellenberg method*

No existing European Standard is superseded.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This European Standard describes a test method for determining the depth of indentation of mastic asphalt and rolled asphalt, when force is applied to them via a cylindrical indenter pin with a circular flat-ended base. This European Standard applies to aggregates of maximum nominal size less or equal to 16 mm.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 12697-27, *Bituminous mixtures — Test methods for hot mix asphalt — Part 27: Sampling.*

prEN 12697-30, *Bituminous mixtures — Test methods for hot mix asphalt — Part 30: Specimen preparation, impact compactor.*

EN 12970, *Mastic asphalt for waterproofing — Definitions, requirements and test methods.*

prEN 13108-6, *Bituminous mixtures — Material specifications — Part 6: Mastic asphalt.*

ISO 48, *Rubber, vulcanized or thermoplastic — Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

## 3 Apparatus

### 3.1 Moulding of test cubes of mastic asphalt

**3.1.1 Cubic mould:** composite metal mould with inside edges  $(70,7 \pm 0,1)$  mm to mould the test cube (see Figure 1).

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- 3.1.2 **Oven** capable of maintaining temperature of  $(250 \pm 10)$  °C.
- 3.1.3 **Hardwood tamper** with a quadratic cross section, edge length about 30 mm.
- 3.1.4 **Spatula** about 30 mm wide.
- 3.1.5 **Mixing bowl** with spoon.
- 3.1.6 **Thermometer** capable to measure 300 °C accurate to 2 °C.
- 3.1.7 **Thermometer** capable to measure 40 °C accurate to 1 °C.
- 3.1.8 **Parting agent** (e.g. glycerine or waxed paper).
- 3.1.9 **Adjustable mould** for the test cube (see Figure 6).

Dimensions in millimetres

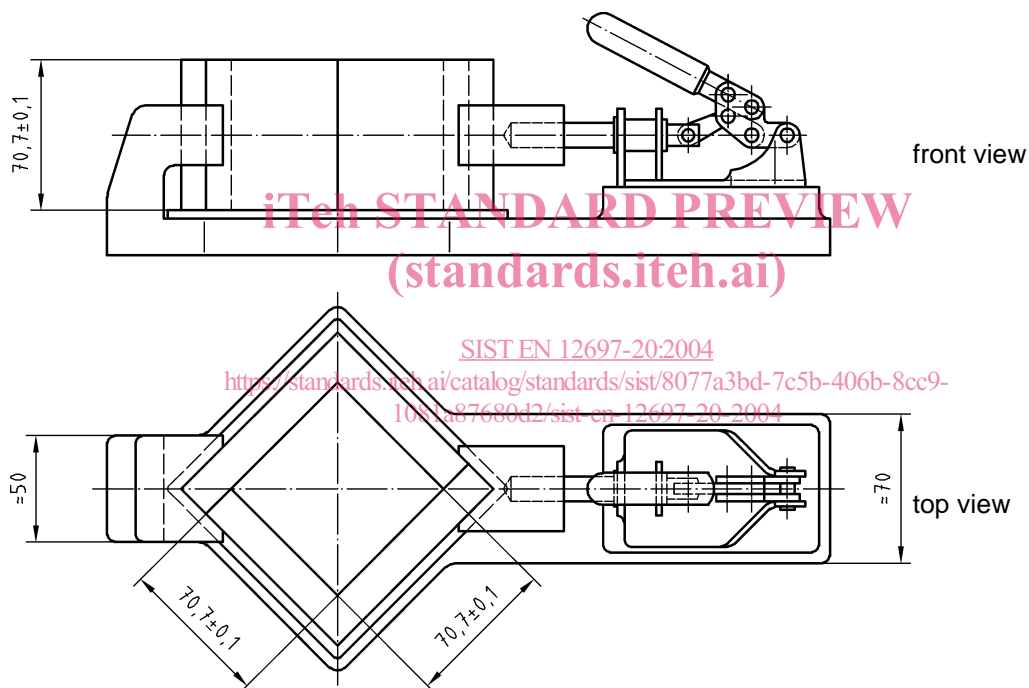


Figure 1 — Example of a mould for the preparation of test cubes

## 3.2 Indentation test apparatus

## 3.2.1 General

Indentation test apparatus (see Figure 2) fitted with an indenter pin and a displacement transducer, suitable for one or two measuring points. Instead of the transducer a dial gauge may also be used. The water bath, as specified in 3.2.2, shall be connected to the indentation test apparatus by means of a secure and watertight connection running from the bed plate, as specified in 3.2.3, through the bath to the base plate of the apparatus. The measuring pin of the displacement transducer shall not be located more than 50 mm from the axis of the guide rod.

The indentation test apparatus shall be set up in such a way that first the preliminary force of  $(25 \pm 1)$  N then the main force of a further 500 N may be applied vertically and without impact to the surface of the specimen.



The apparatus shall be capable of maintaining the total test force of  $(525 \pm 1)$  N constant through out the test. Two ball bearings shall be used to ensure a minimum of friction in the guidance of the indenter pin. With the exception of the ball bearings, all components shall have a clearance of at least 1 mm from the guide rod.

The useful part of the steel indenter pin shall be in the shape of a regular flat ended cylinder with a base area of either  $100 \text{ mm}^2$  or  $500 \text{ mm}^2$  (corresponding to a diameter of  $(11,3 \pm 0,1)$  mm or  $(25,2 \pm 0,1)$  mm) and a length of at least 20 mm (see Figures 3 and 4). The sides and base of the cylinder shall be smoothed to a fine finish. The length and mass of the two indenter pins shall be identical, irrespective of the diameter of the base. The indenter pins shall screw coaxially into the loading cylinder. The thread cut in the bottom of the guide rod shall be at least so long, that the stop rings of the indenter pins with their thread, at least  $(6,5 \pm 0,5)$  mm long, fit snugly against the end face of the guide rod.

If a mechanical dial gauge is used the measuring pin shall be lockable.

The deformation of the apparatus when force is applied or removed shall be less than 0,01 mm.

For indentation test apparatus fitted with two measuring points, this requirement applies analogously to the application and removal of both forces.

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