SLOVENSKI STANDARD
SIST EN 1097-9:2014

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Preskusi mehanskih in fizikalnih lastnosti agregatov - 9. del: Ugotavljanje odpornosti proti obrabi zaradi gum ježevk - Nordijski preskus

Tests for mechanical and physical properties of aggregates - Part 9: Determination of the resistance to wear by abrasion from studded tyres - Nordic test

Prüfverfahren für mechanische und physikalische Eigenschaften von Gesteinskörnungen - Teil 9: Bestimmung des Widerstandes gegen Verschleiß durch Spikereifen - Nordische Prüfung

Essais pour déterminer les propriétés mécaniques et physiques des granulats - Partie 9: Méthode pour la détermination dela résistance à l'usure par abrasion provoquée par les pneusà crampons - Essai scandinave

Ta slovenski standard je istoveten z: **EN 1097-9:2014**

ICS:

91.100.15	Mineralni materiali in izdelki	Mineral materials and products

SIST EN 1097-9:2014 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1097-9

January 2014

ICS 91.100.15

Supersedes EN 1097-9:1998

English Version

Tests for mechanical and physical properties of aggregates - Part 9: Determination of the resistance to wear by abrasion from studded tyres - Nordic test

Essais pour déterminer les propriétés mécaniques et physiques des granulats - Partie 9: Détermination de la résistance à l'usure par abrasion provoquée par les pneus à crampons - Essai scandinave

Prüfverfahren für mechanische und physikalische Eigenschaften von Gesteinskörnungen - Teil 9: Bestimmung des Widerstandes gegen Verschleiß durch Spikereifen - Nordische Prüfung

This European Standard was approved by CEN on 3 November 2013.

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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.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (EN 1097-9:2014) has been prepared by Technical Committee CEN/TC 154 “Aggregates”, the secretariat of which is held by BSI.

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 July 2014 and conflicting national standards shall be withdrawn at the latest by July 2014.

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

This document supersedes EN 1097-9:1998.

The main technical changes compared to EN 1097-9:1998 are the following:

1) Scope: rewritten to allow the use of other methods under precise conditions;

5) Apparatus: Possibility to use other suitable equipment for drying aggregates than the prescribed ventilated oven. Steel quality has been updated;

6) Preparation of test specimens: rewritten (*Mass of test portion:* Formula revised, *Loading the drum:* Order changed);

8) Calculation and expression of results: the re-testing criteria has been amended and supplemented with Dixon test guidelines;

9) Test report: required and optional data have harmonized according to document CEN/TC 154/SC 6 – N 1120.

The test procedure specified in this European Standard has been developed in Finland, Norway and Sweden where studded tyres are frequently used during cold seasons.

This European Standard forms part of a series of tests for mechanical and physical properties of aggregates. Test methods for other properties of aggregates are covered by the following European Standards:

EN 932, *Tests for general properties of aggregates*

EN 933, *Tests for geometrical properties of aggregates*

EN 1367, *Tests for thermal and weathering properties of aggregates*

EN 1744, *Tests for chemical properties of aggregates*

EN 13179, *Tests for filler aggregate used in bituminous mixtures*

EN 1097, *Tests for mechanical and physical properties of aggregates,* consists of the following parts:

— *Part 1: Determination of the resistance to wear (micro-Deval)*

— *Part 2: Methods for the determination of resistance to fragmentation*

— *Part 3: Determination of loose bulk density and voids*

— *Part 4: Determination of the voids of dry compacted filler*

— *Part 5: Determination of the water content by drying in a ventilated oven*

— *Part 6: Determination of particle density and water absorption*

— *Part 7: Determination of the particle density of filler — Pyknometer method*

— *Part 8: Determination of the polished stone value*

— *Part 10: Water suction height*

— *Part 11: Determination of compressibility and confined compressive strength of lightweight aggregates*

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

1 Scope

This European Standard describes the reference method, used for type testing and in case of dispute, for determination of the resistance of coarse aggregate to wear by abrasion from studded tyres. For other purposes, in particular factory production control, other methods may be used, provided that an appropriate working relationship with the reference method has been established.

The test is applicable to aggregates with a size fraction of 11,2 mm to 16 mm.

NOTE An alternative size fraction 8/11,2 mm for different end uses is given in Annex A.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 932-2:1999, *Tests for general properties of aggregates - Part 2: Methods for reducing laboratory samples*

EN 932-5, *Tests for general properties of aggregates - Part 5: Common equipment and calibration*

EN 933-1, *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method*

EN 933-2, *Tests for geometrical properties of aggregates - Part 2: Determination of particle size distribution - Test sieves, nominal size of apertures*

EN 1097-6:2013, *Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption*

EN ISO 4788, *Laboratory glassware - Graduated measuring cylinders (ISO 4788)*

ISO 3290-1, *Rolling bearings — Balls — Part 1: Steel balls*

ISO 9329-4, *Seamless steel tubes for pressure purposes — Technical delivery conditions — Part 4: Austenitic stainless steels*

3 Terms and definitions

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

3.1
test specimen
sample used in a single determination when a test method requires more than one determination of a property

3.2
laboratory sample
sample intended for laboratory testing

3.3
constant mass
mass determined after successive weighings at least 1 h apart not differing by more than 0,1 %

Note 1 to entry: In many cases constant mass can be achieved after a test specimen has been dried for a pre-determined period in a specified oven at (110 ± 5) °C. Test laboratories can determine the time required to achieve constant mass for specific types and sizes of sample dependent upon the drying capacity of the oven used.

4 Principle

A sample of a single-sized aggregate, 11,2 mm to 16,0 mm, is rotated together with steel balls and water in a steel drum. Three ribs, which are mounted on the interior of the drum, improve the mixing of the aggregate particles and the steel balls. The contents roll within the drum with an abrading action. After the specified number of revolutions, the contents are removed from the drum and the aggregate portion is sieved on the 2 mm sieve to measure the wear as a percentage loss.

5 Apparatus

Unless otherwise stated, all apparatus shall conform to the general requirements of EN 932-5.

5.1 Standard apparatus

5.1.1 *Balance*, capable of weighing both the test specimen and the charge to an accuracy of 0,1 % of the mass of the test specimen.

5.1.2 *Set of sieves*, 2,0 mm; 11,2 mm; 14,0 mm; 16,0 mm conforming to EN 933-2.

5.1.3 *Guard sieve*, for protecting the 2 mm sieve.

5.1.4 *Ventilated oven*, thermostatically controlled to maintain a temperature of (110 ± 5) °C.

5.1.5 *Means of washing the sieved sample.*

5.1.6 *Equipment for reducing the laboratory samples*, as specified in EN 932-2.

5.1.7 *Graduated glass measuring cylinder (or cylinders)*, conforming to EN ISO 4788, or other means of measuring (2,00 ± 0,01) l of water.

5.2 Special apparatus

5.2.1 *Testing machine*, a typical testing machine is detailed in Figure 1 with essential characteristics as specified in 5.2.2 to 5.2.7

5.2.2 *A watertight hollow drum*, closed at one end, having an inside diameter of (206,5 ± 2,0) mm and an internal length measured from the inside of the base to the inside of the lid of (335 ± 1) mm. The drum shall be made of a seamless steel tube conforming to grade TS 5 of ISO 9329-4, with a minimum wall thickness of 6,0 mm.

The drum shall be closed by a flat lid at least 8 mm thick and fitted with watertight and dust seals. The drum shall rotate on a horizontal axis, e.g. placed on 2 shafts as shown in Figure 1.

5.2.3 *Three ribs*, each with a length of (333 ± 1) mm, shall be equally spaced around the internal circumference of the cylinder. The three ribs shall be removable, having an initial profile as shown in Figure 2, and be made of hard and tough steel

NOTE Spring steel conforming to EN 10089 or ISO 683-14 is suitable.

Each rib shall be rigidly secured to the drum with at least three M4 countersunk fixings.

Before first use, the ribs shall be preground in the drum for (24 ± 1) h using an aggregate with a Nordic abrasion value of not more than 6,0 prepared in accordance with Clause 6. Each rib shall be replaced when, or before, its mass is less than 15,0 g less than its mass before it was preground.

5.2.4 *Abrasive charge*, consisting of ball bearings of (15,0 + 0,1/-0,5) mm diameter, as specified in ISO 3290-1. The hardness shall be between HRC 60 and HRC 67.

NOTE 1 The lower limit deviation of the ball diameter is a working tolerance limit.

NOTE 2 The minimum permissible diameter of the balls can be checked quickly by passing them over the gauge (see 5.2.7).

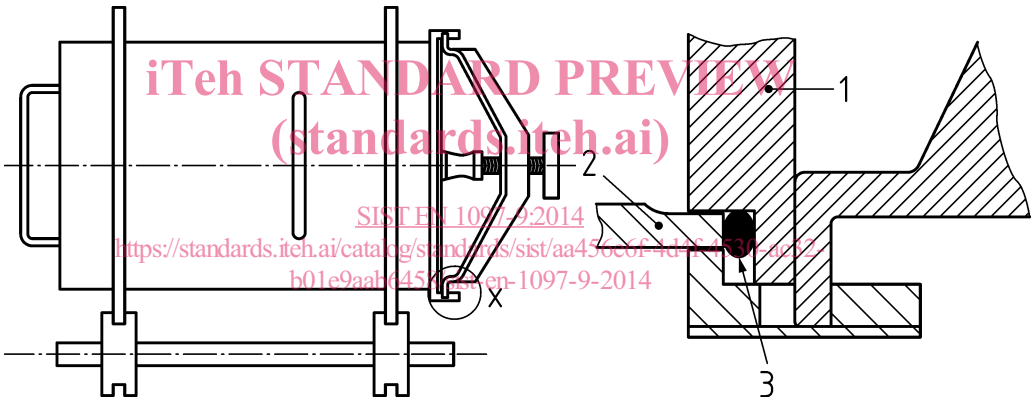
5.2.5 *Motor*, capable of driving the drum at a regular speed of rotation of (90 ± 3) r/min.

5.2.6 *Counter*, or other suitable device which automatically stops the rotation after (5 400 ± 10) revolutions.

5.2.7 *Gauge*, (optional) to control minimum ball size, fitted with slots 14,5 + 0,1/0 mm wide.

5.2.8 *Magnet*, (optional) for removal of the charge from the aggregate test sample after abrasion.

A magnet which is too strong should not be used as the balls can become magnetised.



Detail X – Typical lid edge

Key

1 lid

2 cylinder

3 rubber packing

Figure 1 — Typical testing machine