



SLOVENSKI STANDARD SIST EN 1097-9:1999

01-oktober-1999

DfYg_i gj'a Y Ubg_l]b`Zn] Ub] `Uglbcgh]U fY[Urcj !'- "XY. 8c`c Yj Ub^Y
cXdcfbcgh]dfch]cVfUV]nUfUX][i a ^Yy] _E BcfX]g_]dfYg_i g

Tests for mechanical and physical properties of aggregate - 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

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

Ta slovenski standard je istoveten z: EN 1097-9:1998

ICS:

91.100.15 Mineralni materiali in izdelki Mineral materials and products

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en

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EUROPEAN STANDARD
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ICS 91.100.20

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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

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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 25 March 1998.

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 Central Secretariat 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 Central Secretariat 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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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

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SLOVENIJE ZA KVALITETO
Ljubljana, 2019



Foreword

This European Standard has been prepared by Technical Committee CEN/TC 154 "Aggregates", the secretariat of which is held by BSI.

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

This standard forms part of a series of tests for mechanical and physical properties of aggregates. Test methods for other properties of aggregates will be covered by Parts of 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
prEN 13179	Tests for filler aggregate used in bituminous bound fillers

The other parts of EN 1097 will be:

EN 1097-1	Tests for mechanical and physical properties of aggregates Part 1: Determination of the resistance to wear (micro-Deval)
prEN 1097-2	Tests for mechanical and physical properties of aggregates Part 2: Methods for the determination of resistance to fragmentation
prEN 1097-3	Tests for mechanical and physical properties of aggregates Part 3: Determination of loose bulk density and voids
prEN 1097-4	Tests for mechanical and physical properties of aggregates Part 4: Determination of the voids of dry compacted filler
prEN 1097-5	Tests for mechanical and physical properties of aggregates Part 5: Determination of the water content by drying in a ventilated oven
prEN 1097-6	Tests for mechanical and physical properties of aggregates Part 6: Determination of particle density and water absorption
prEN 1097-7	Tests for mechanical and physical properties of aggregates Part 7: Determination of the particle density of filler - Pyknometer method
prEN 1097-8	Tests for mechanical and physical properties of aggregates Part 8: Determination of the polished stone value
prEN 1097-10	Tests for mechanical and physical properties of aggregates Part 10: Water suction height

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 October 1998, and conflicting national standards shall be withdrawn at the latest by December 1999.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies the test procedure for the simulation of the abrasive action of studded tyres on coarse aggregates used in a surface layer.

The test is applicable to crushed and uncrushed natural and artificial aggregates with a size fraction of 11,2 mm to 16,0 mm.

NOTE: Deviations from this size range will not give consistent results.

2 Normative references

This European Standard incorporates by dated or by 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.

prEN 932-2	Tests for general properties of aggregates Part 2: Methods for reducing laboratory samples
prEN 932-5	Tests for general properties of aggregates Part 5: Common equipment and calibration
EN 933-1:1997	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
prEN 1097-6	Tests for mechanical and physical properties of aggregates Part 6: Determination of particle density and water absorption
ISO 683-14:1992	Heat-treatable steels, alloy steels and free-cutting steels Part 14: Hot-rolled steels for quenched and tempered springs
ISO 2604-2:1975	Steel products for pressure purposes - Quality requirements - Part 2: Wrought seamless tubes
ISO 3290:1975	Rolling bearings - Bearing parts - Balls for rolling bearings
ISO 3310:1990	Test sieves - Technical requirements and testing
ISO 4788 : 1980	Laboratory glassware - Graduated measuring cylinders
ISO 5725:1986	Precision of test methods - Determination of repeatability and reproducibility by inter-laboratory tests

3 Definitions

For the purposes of this standard, the following definitions apply:

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

3.2 laboratory sample: A reduced sample derived from a bulk sample for laboratory testing.

3.3 constant mass: Successive weighings after drying at least 1 h apart not differing by more than 0,1 %.

NOTE: 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.

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5 Apparatus

Unless otherwise stated, all apparatus shall conform to the general requirements of prEN 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 - 8 mm - 11,2 mm - 14,0 mm - 16,0 mm conforming to EN 933-2.

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

5.1.4 Means of washing the sieved sample.

5.1.5 Equipment for reducing the laboratory samples, as specified in prEN 932-2.

5.1.6 Graduated glass measuring cylinder (or cylinders), conforming to ISO 4788:1980, or other means of measuring $(2,00 \pm 0,01)$ 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

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5.2.2 A watertight hollow drum, closed at one end, having an inside diameter of $(206,5 \pm 2,0)$ 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 2604-2:1975, 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, e.g. spring steel conforming to ISO 683-14:1992.

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 (25 ± 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, $(15,0^{+0,1}_{-0,5})$ mm diameter, of hardness between 62 HRC and 65 HRC, as specified in ISO 3290:1975.

NOTE: The diameter of the balls can be checked quickly by passing them over parallel bars 14,5 mm apart.

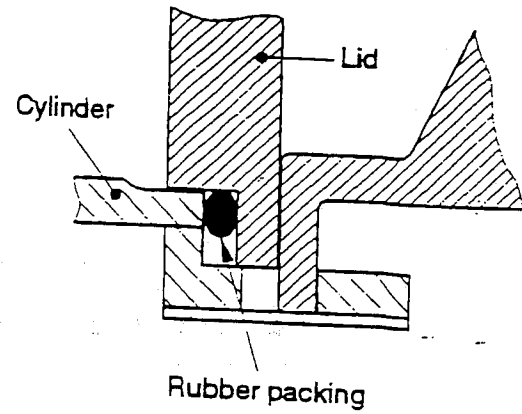
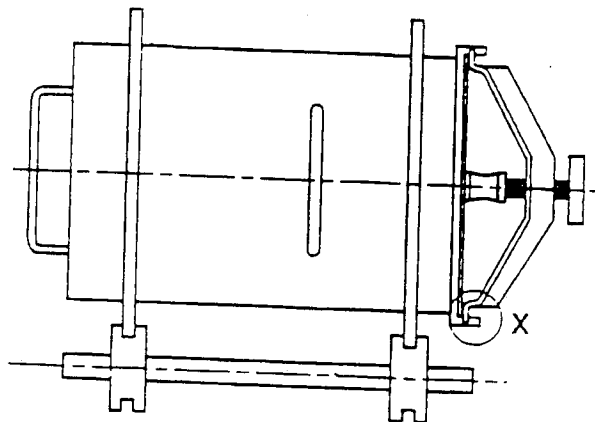
5.2.5 Motor, capable of driving the drum at a regular speed of rotation of (90 ± 3) r/min.

5.2.6 Counter, or other suitable device which automatically stops the rotation after (5400 ± 10) revolutions.

5.2.7 Gauge, (optional) to control minimum ball size, e.g. two parallel bars $(14,6 \pm 0,1)$ mm apart.

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

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



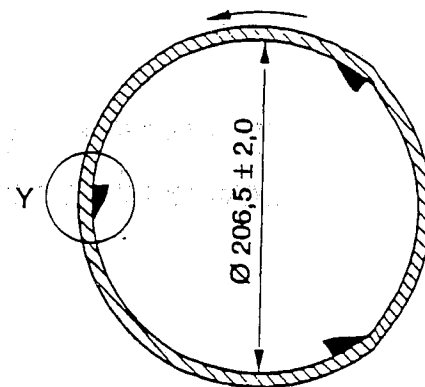
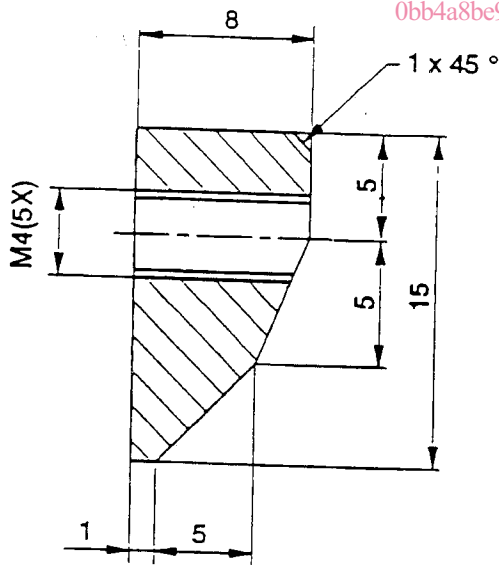
Detail X - Typical lid edge

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Figure 1: Typical testing machine
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Dimensions in millimetres

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Section of the drum with the three ribs

Detail Y. Rib detail before pregrinding

With a tolerance of $\pm 0,5$ mm

Figure 2: The three ribs