

Tests for mechanical and physical properties of aggregates —

Part 8: Determination of the polished stone value

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The UK participation in its preparation was entrusted by Technical Committee B/502, Aggregates, to Subcommittee B/502/6, Test methods, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 30, an inside back cover and a back cover.

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granulats - Partie 8: Détermination du coefficient de polissage
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Prüfverfahren für mechanische und physikalische
Eigenschaften von Gesteinskörnungen - Teil 8: Bestimmung
des Polierwertes

This European Standard was approved by CEN on 29 October 1999.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by June 2000, and conflicting national standards shall be withdrawn at the latest by June 2000.

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 13179:1998	Tests for filler aggregate used in bituminous mixtures

The other parts of EN 1097 will be:

- 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 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 9: Determination of the resistance to wear by abrasion from studded tyres: Nordic test
- Part 10: Water suction height

In this standard annexes A, B, C and D are normative and annexes E and F are informative.

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.

1 Scope

This European Standard specifies the method for determining the polished stone value (PSV) of a coarse aggregate used in road surfacings. An optional method for the determination of the aggregate abrasion value (AAV) which gives a measure of the resistance of aggregate to surface wear by abrasion under traffic is specified in annex A.

NOTE The AAV method should be used when particular types of skid resistant aggregates (typically those with a PSV of 60 or greater), which can be susceptible to abrasion under traffic, are required.

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.

EN 932-2	Tests for general properties of aggregates – Part 2: Methods for reducing laboratory samples
EN 932-3	Tests for general properties of aggregates - Part 3: Procedure and terminology for simplified petrographic description
prEN 932-5:1995	Tests for general properties of aggregates - Part 5: Common equipment and calibration
EN 933-3	Tests for geometrical properties of aggregates - Part 3: Determination of particle shape – Flakiness index
prEN 1097-6:1997	Tests for mechanical and physical properties of aggregates - Part 6: Determination of particle density and water absorption
ISO 48	Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)
ISO 4662	Rubber - Determination of rebound resilience of vulcanizates
ISO 7619	Rubber - Determination of indentation hardness by means of pocket hardness meters

3 Definitions

For the purposes of this standard the following 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

batch

production quantity, a delivery quantity, a partial delivery quantity (railway wagon-load, lorry-load, ship's cargo) or a stockpile produced at one time under conditions that are presumed uniform

NOTE With a continuous process the quantity produced during an agreed period is treated as a batch.

3.3

laboratory sample

reduced sample derived from a bulk sample for laboratory testing

3.4

subsample

sample obtained by means of a sample reduction procedure

3.5

test portion

sample used as a whole in a single test

4 Principle

PSV is a measure of the resistance of coarse aggregate to the polishing action of vehicle tyres under conditions similar to those occurring on the surface of a road.

The test is carried out on aggregate passing a 10 mm sieve and retained on a 7,2 mm grid sieve, and is in two parts:

- a) test specimens are subjected to a polishing action in an accelerated polishing machine;
- b) the state of polish reached by each specimen is measured by means of a friction test. The PSV is then calculated from the friction determinations.

5 Sampling

The sample submitted to the laboratory for the test shall be obtained from a batch of normal production from the source.

Aggregate that has been freshly produced in the laboratory or has been recovered from bituminous mixtures can give misleading results and shall not be used for conformity testing.

6 Materials

6.1 General Detailed requirements for the control of materials are specified in annex B.

6.2 Natural corn emery, complying with the grading specified in table 1. This shall be used only once.

Table 1 – Grading requirements for corn emery

Nominal width of sieve aperture mm	Total passing %
0,600	98 to 100
0,500	70 to 100
0,425	30 to 90
0,355	0 to 30
0,300	0 to 5

6.3 Air-floated or water-washed natural emery flour, all of which passes a 0,050 mm test sieve. This shall be used only once.

NOTE Corundum emery flour with the following characteristics has been found to be suitable:

- a) at least 50 % Al_2O_3 content;
- b) particle density of at least $3,5 \text{ Mg/m}^3$;
- c) particle size distribution (by air jet sieving) as given in table 2.

Table 2 – Particle size distribution (by air jet sieving)

Sieve size mm	% passing
0,050	99 to 100
0,032	75 to 98
0,020	60 to 80

6.4 PSV control stone, from a recognized source, with a mean PSV value in the range 50 to 60.

NOTE 1 At present the only recognized source of PSV control stone is a stock of quartz dolerite aggregate controlled by Transport Research Laboratory (TRL), Old Wokingham Road, Crowthorne, Berkshire RG11 6AU, United Kingdom.

NOTE 2 An alternative source of PSV control stone with a mean PSV value in the range 50 to 60 can be used provided the PSV value has been established in a controlled experiment carried out in at least ten laboratories, by cross testing against the TRL type control stone. In case of dispute, the TRL type control stone should be used.

6.5 Friction tester reference stone, from a recognized source, for conditioning new sliders and checking the friction tester (11.3), with a mean PSV value in the range 60 to 65.

NOTE 1 At present the only recognized source of friction tester reference stone is a stock of olivine basalt aggregate controlled by the Transport Research Laboratory (TRL), Old Wokingham Road, Crowthorne, Berkshire RG11 6AU, United Kingdom.

NOTE 2 An alternative source of friction tester reference stone with a mean PSV value in the range 60 to 65 can be used provided the PSV value has been established in a controlled experiment carried out in at least 10 laboratories, by cross testing against the TRL type friction tester reference stone. In case of dispute, the TRL type friction tester reference stone should be used.

7 Apparatus

7.1 General

All apparatus, unless otherwise stated, shall conform to the general requirements of prEN 932-5:1995. Additional requirements for calibration and control of the accelerated polishing machine and the rubber-tyred wheels are given in annex C.

7.2 Accelerated polishing machine

The polishing machine (see figure 1) shall be mounted on four adjustable levelling feet, placed at the corners and secured on a firm, level base of stone or concrete. It shall include the following:

7.2.1 A wheel, referred to as the “road wheel”, having a flat periphery and clamping arrangements to hold the aggregate specimens shown in figure 2. It shall be of such a size and shape as to permit 14 of the specimens described in clause 8 to be clamped onto the periphery so as to form a surface of aggregate particles (406 ± 3) mm in diameter and bounded by clamping rings $(44,5 \pm 0,5)$ mm apart.

7.2.2 A means of rotating the road wheel about its own axis at a speed of $(320 \pm 5) \text{ min}^{-1}$ under test conditions.

7.2.3 Two solid rubber-tyred wheels of (200 ± 3) mm diameter and with a width of (38 ± 2) mm. These rubber-tyred wheels shall be of two different colours. A dark coloured (coarse) wheel shall be used with the corn emery and a light coloured (fine) wheel shall be used with the emery flour. The rubber tyres shall initially have a hardness of (69 ± 3) IRHD as specified in ISO 7619.

NOTE Both rubber-tyred wheels can be of the same colour provided each is clearly marked as being “coarse” or “fine” as appropriate.

7.2.4 A lever arm and weight to bring the surface of the appropriate solid rubber-tyred wheel to bear on the road wheel with a total free force of (725 ± 10) N. The solid rubber-tyred wheel shall be free to rotate about its own axis, which shall be parallel with the axis of the road wheel, and the plane of rotation of the tyre shall be in line with that of the road wheel.

The machine shall be accurately aligned so that the road wheel and either of the rubber-tyred wheels shall be free to rotate without play in the bearings:

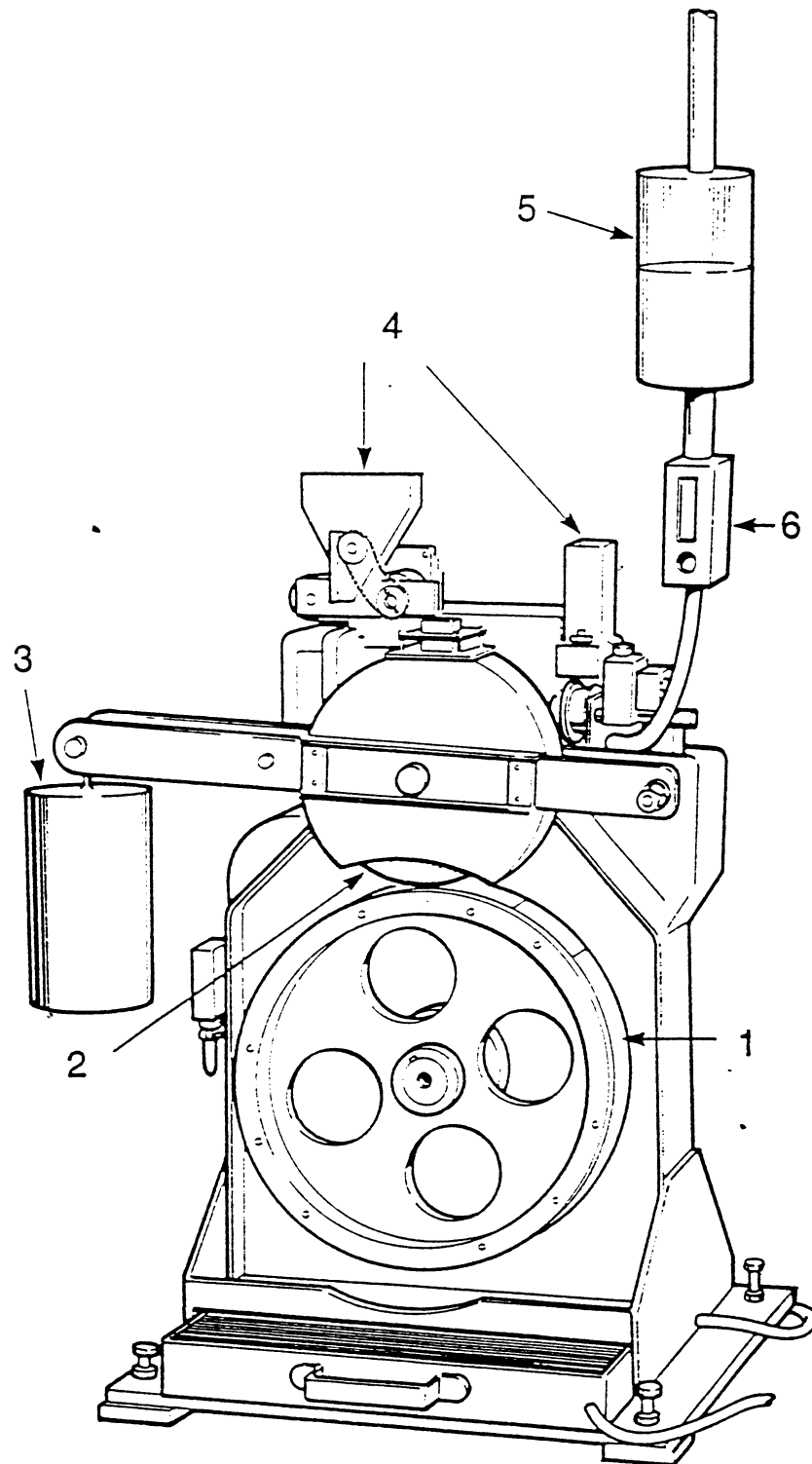
- a) the planes of rotation of the two wheels in use shall be not more than $0,33^\circ$ of arc out of parallel (1 mm in 200 mm);
- b) the planes of rotation through the centres of the two wheels in use shall be not more than 0,8 mm apart.

7.2.5 Feed mechanism, identified as being for use with the dark coloured (coarse) rubber-tyred wheel to feed the corn emery and water at the specified rates. The emery and water shall be fed directly onto the road wheel near the point of contact with the rubber-tyred wheel.

7.2.6 Feed mechanism, identified as being for use with the light-coloured (fine) rubber-tyred wheel (**7.2.3**) to feed the emery flour (**6.1.2**) and water continuously at the specified rates.

7.2.7 A means of ensuring that the rubber-tyred wheels are not left under load when not running, to prevent the risk of the tyre becoming deformed.

NOTE When not in use, the rubber-tyred wheels should be removed from the machine and stored as described in annex C.



Key :

- | | |
|--------------|----------------------------|
| 1 Road wheel | 2 Solid rubber-tyred wheel |
| 3 Weight | 4 Feed mechanisms |
| 5 Water feed | 6 Flow gauge |

Figure 1 – Typical accelerated polishing machine

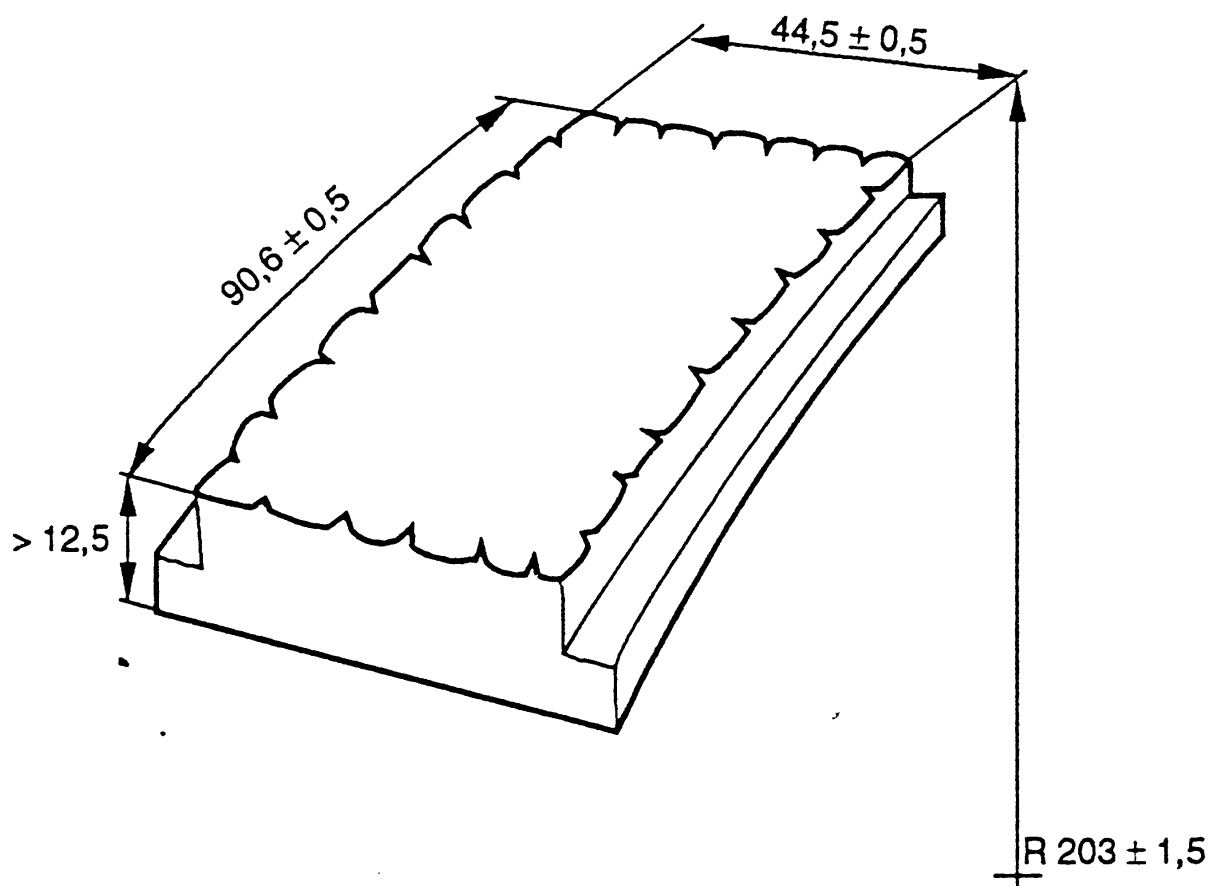


Figure 2 – Test specimen dimensions

7.3 Friction tester

7.3.1 Calibration

Additional requirements for calibration and control of the friction tester, sliders and slider rubber are given in annex D.

7.3.2 Design

The friction test shall be carried out using the equipment shown in figure 3 (see Note). All bearings and working parts shall be enclosed as far as possible, and all materials used shall be treated to prevent corrosion under wet conditions.

NOTE The equipment shown in figure 3 is manufactured to the design of the Transport Research Laboratory (TRL), Old Wokingham Road, Crowthorne, Berkshire RG11 6AU, United Kingdom.

The friction test equipment shall have the following features:

7.3.2.1 A spring-loaded rubber slider of the mass, size and shape as specified in 7.3.2.9. It shall be mounted on the end of a pendulum arm so that the sliding edge is approximately 510 mm from the axis of suspension (11.6).

7.3.2.2 Means for setting the support column of the equipment vertical.