BRITISH STANDARD

BS 812-114: 1989

Testing aggregates —

Part 114: Method for determination of the polished-stone value

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Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Cement, Gypsum, Aggregates and Quarry Products Standards Policy Committee (CAB/-) to Technical Committee CAB/2, upon which the following bodies were represented:

Aggregate Concrete Block Association
Association of Consulting Engineers
Association of Consulting Scientists
Association of Lightweight Aggregate Manufacturers
Brick Development Association
British Aggregate Construction Materials Industries
British Cement Association
British Ceramic Research Ltd.
British Civil Engineering Test Equipment Manufacturers' Association
British Geological Sciences
British Precast Concrete Federation Ltd.
British Ready Mixed Concrete Association
British Steel Industry
Building Employers' Confederation
Calcium Silicate Brick Association Ltd.
Chartered Institute of Building
Concrete Society
County Surveyor's Society
Department of the Environment (Property Services Agency)
Department of the Environment (Building Research Establishment)
Department of Transport (Highways)
Department of Transport (Transport and Road Research Laboratory)
Electricity Supply Industry in England and Wales
Federation of Civil Engineering Contractors
Institute of Concrete Technology
Institution of Civil Engineers
Institution of Highways and Transportation
Institution of Structural Engineers
Institution of Water and Environmental Management (IWEM)
Mortar Producers' Association Ltd.
Sand and Gravel Association Ltd.
Society of Chemical Industry

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The following BSI references relate to the work on this standard:
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Amd. No.	Date of issue	Comments

Contents

Foreword

This Part of BS 812 has been prepared under the direction of the Cement, Gypsum, Aggregates and Quarry Products Standards Policy Committee. It is a revision of clause **10** of BS 812-3:1975, for the determination of the polished-stone value of an aggregate. It is also a revision of the alternative method for determining the polished-stone value described in clause **11** of Amendment No. 2 to BS 812-3:1975, which was published in March 1983. The method in this new Part 114 supersedes those described in clause **10** and clause **11**, both of which are now withdrawn. The remainder of BS 812-3 is also being revised and it is intended to issue further separate Parts or Sections of the standard.

This test method for determining the polished-stone value is basically that described in clause **11** of BS 812-3:1975. The main changes are as follows.

a) The procedure for mounting the aggregate in a sand cement mortar is no longer described; only the resin mounting method is to be used.

b) The previous method determined an average value from four specimens conditioned on one test run. The revised method requires the conditioning of four specimens in two pairs on two separate test runs.

It is intended that other British Standards on aggregates should call up BS 812 test methods as the basis for compliance. Nevertheless it is not intended that all aggregates will be subjected regularly to all the listed tests. Specifications in other standards should call up only relevant test methods. Some of the tests specified in other Parts of this standard are of limited application and advice on the use of simpler quantitative tests is given, for example, when they can be used for a preliminary sorting of aggregates to see whether more precise and expensive testing is justified.

Reference should be made to BS 812-101:1984 for general guidance on testing aggregates, precision of test methods and variance arising from sampling errors.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This Part of BS 812 describes the method for determining the polished-stone value (PSV) of an aggregate.

NOTE The titles of the publications referred to in this standard are listed on Inside back cover.

2 Definitions

For the purposes of this Part of BS 812, the definitions given in BS 812-101 and BS 812-102 apply.

3 Principle

The polished-stone value gives a measure of the resistance of roadstone to the polishing action of vehicle tyres under conditions similar to those occurring on the surface of a road. Where the surface of a road consists largely of roadstone the state of polish of the sample will be one of the main factors affecting the resistance of the surface to skidding. The actual relationship between PSV and skidding resistance will vary with the traffic conditions, type of surfacing and other factors. All factors together with the reproducibility of the test should be taken into account when drawing up specifications for road-works which include test limits for PSV. The test is in two parts.

a) *First part*. Samples of stone are subjected to a polishing action in an accelerated polishing machine.

b) *Second part*. The state of polish reached by each sample is measured by means of a friction test and is expressed as a laboratory-determined PSV.

4 Sampling[1)]

The sample used in the laboratory for the test shall be taken in accordance with clause **5** of BS 812-102:1984. The sample shall be taken from the normal run of production from the plant.

NOTE Chippings that have been freshly crushed in the laboratory or recovered from bituminous materials may give misleading results.

5 Apparatus

5.1 *Accelerated polishing machine* (Figure 1), which shall be rigidly mounted on a firm, level base of stone or concrete. It shall include the following.

a) A wheel, referred to as the "road wheel", having a flat periphery. It shall be of such a size and shape as to permit 14 of the specimens described in clause **7** to be clamped on the periphery so as to form a continuous surface of stone particles 45 mm wide and 406 mm in diameter.

b) Means of rotating the road wheel about its own axis at a speed of 320 ± 5 r/min.

c) Two solid rubber-tyred wheels of 200 mm diameter and with a width of 38 mm. These wheels shall be of two colours. A dark-coloured wheel shall be used for the corn emery and a light-coloured wheel for the emery flour. The rubber tyres shall be made according to the Avon Tyre Ltd. compound code 4454 and shall initially have a hardness of 69 ± 3 IRHD (see BS 2719).

NOTE The rubber tyres are obtainable from the suppliers of the accelerated polishing machine.

d) Means of bringing the surface of the appropriate solid rubber-tyred wheel to bear on the road wheel with a total free force of 725 ± 10 N. It 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 and both wheels shall be free to rotate without play in the bearings. The following limits shall be applied:

1) the planes of rotation of the two wheels shall be not more than 20 min of arc out of parallel (1 mm in 200 mm);

NOTE This may be checked by means of a notched straight-edge using the rim of the road wheel as a datum.

2) the planes through the centres of the two wheels shall be not more than 0.8 mm apart.

e) Feed mechanism, dark-coloured for use with the dark-coloured wheel [see c)], to feed the corn emery (see **6.1**) and water at the specified rates (see **9.4**). It shall feed in such a way that the emery and water are continuously and uniformly spread over the surface of the tyre and the specimens where they are in contact. The emery and water shall be fed directly onto the road wheel near the point of contact with the rubber-tyred wheel.

[1)] Where necessary, information on the current sources of supply of any of the apparatus or materials required for this test can be obtained from BSI Enquiry Section, BSI, Linford Wood, Milton Keynes MK14 6LE.

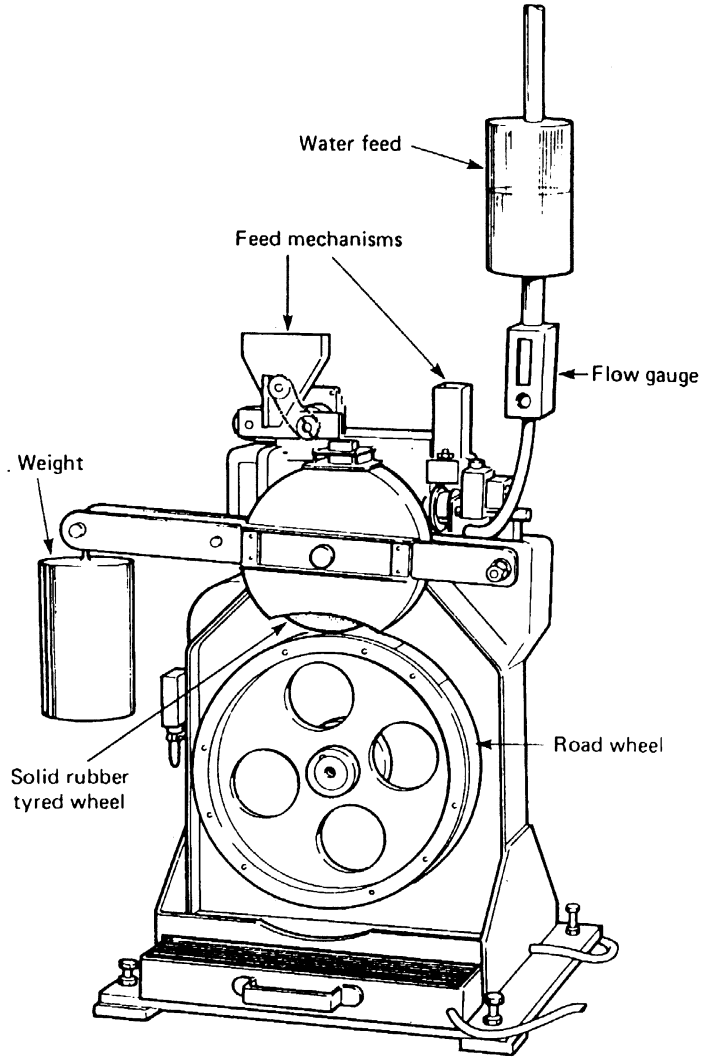


Figure 1 — Accelerated polishing machine

f) Feed mechanism, light-coloured for use with the light-coloured wheel [see c)], to feed the emery flour (see **6.2**) and water at the specified rates (see **9.5**). It shall feed in such a way that the emery flour and water are continuously and uniformly spread over the surface of the tyre and the specimens where they are in contact.

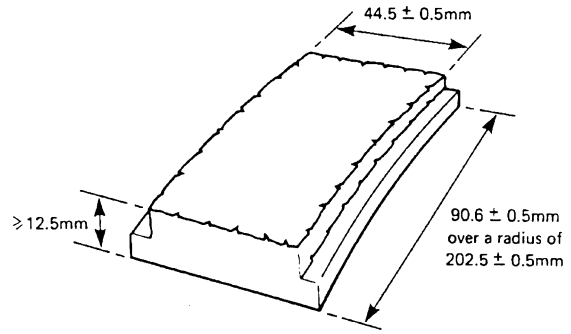
g) A means of ensuring that the solid rubber-tyred wheel is not left under load when not running, to prevent the risk of the tyre becoming deformed.

5.2 Friction tester

5.2.1 *Design*

5.2.1.1 The friction test shall be made with a tester (see Figure 3) manufactured to the design of the Transport and Road Research Laboratory (TRRL)[2)]. All bearings and working parts of the instrument shall be enclosed as far as possible, and all materials used shall be treated to prevent corrosion under wet conditions.

[2)] Transport and Road Research Laboratory, Old Wokingham Road, Crowthorne, Berks RG11 6AU.



Dimensions of Test Specimen

All dimensions are shown in millimetres.

Figure 2 — Roadstone specimen and mould

5.2.1.2 The tester shall have the following features.

a) A spring-loaded rubber slider of the mass, size and shape specified in **5.2.1.3** to **5.2.1.6**. 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.

b) Means for setting the column of the instrument vertical.

c) Means for rigidly locating one of the curved specimens from the accelerated polishing machine with its longer dimension in the track of the pendulum and centrally with respect to the rubber slider and to the axis of suspension of the pendulum.

d) Means for raising and lowering the axis of suspension of the pendulum so that the slider can:

1) swing clear of the surface of the specimen; and

2) be set to slide over a fixed length of flat surface of 126.0 ± 0.5 mm, as near as is visually possible.

e) Means of holding and releasing the pendulum arm so that it falls freely from a horizontal position.

f) A pointer balanced about the axis of suspension, indicating the position of the pendulum arm throughout its forward swing and moving over the circular scale. The mass of the pointer shall be not more than 85 g. The friction in the pointer mechanism shall be adjustable so that, with the pendulum arm swinging freely from a horizontal position, the outward tip of a nominal 300 mm long pointer may be brought to rest on the forward swing of the arm at a point 10 mm below the horizontal.

g) A circular scale calibrated in unit F as described in **5.2.2.1** for curved specimens with 76 mm sliding length.

h) A main scale as detailed in TRRL drawings for a sliding length of 126 mm.

5.2.1.3 The mass of the swinging arm, including the slider, shall be 1.50 ± 0.03 kg. The centre of gravity shall lie on the axis of the arm at a distance of 410 ± 5 mm from the centre of suspension.

5.2.1.4 The slider shall consist of a rubber pad 31.75 ± 0.50 mm wide, 25.4 ± 1.0 mm long (in the direction of swing) and 6.35 ± 0.50 mm thick. This shall be held on a rigid base with a central pivoting axis and the combined mass of slider and base shall be 20 ± 5 g. The slider assembly shall be mounted on the end of the swinging arm in such a way that, when the arm is at the lowest point of its swing with the trailing edge of the slider in contact with the test surface, the plane of the slider is angled at approximately 26° to the horizontal. In this configuration the slider can turn about its axis without obstruction to follow unevenness of the surface as the pendulum swings.

5.2.1.5 The slider shall be spring-loaded against the test surface. The nominal static force on the slider as set by the procedure defined in the equipment's calibration instructions shall be 22.2 ± 0.5 N in its median position; the change in the static force on the slider shall be not greater than 0.2 N per millimetre deflection of the slider.

The resilience and hardness of the slider shall comply with Table 1.

5.2.1.6 The working edges of the slider shall be square and clean-cut, and the rubber free from contamination, by, for example, abrasive or oil. The rubber in the sheet or slider form shall be stored in the dark at a temperature of 15 ± 5 °C.

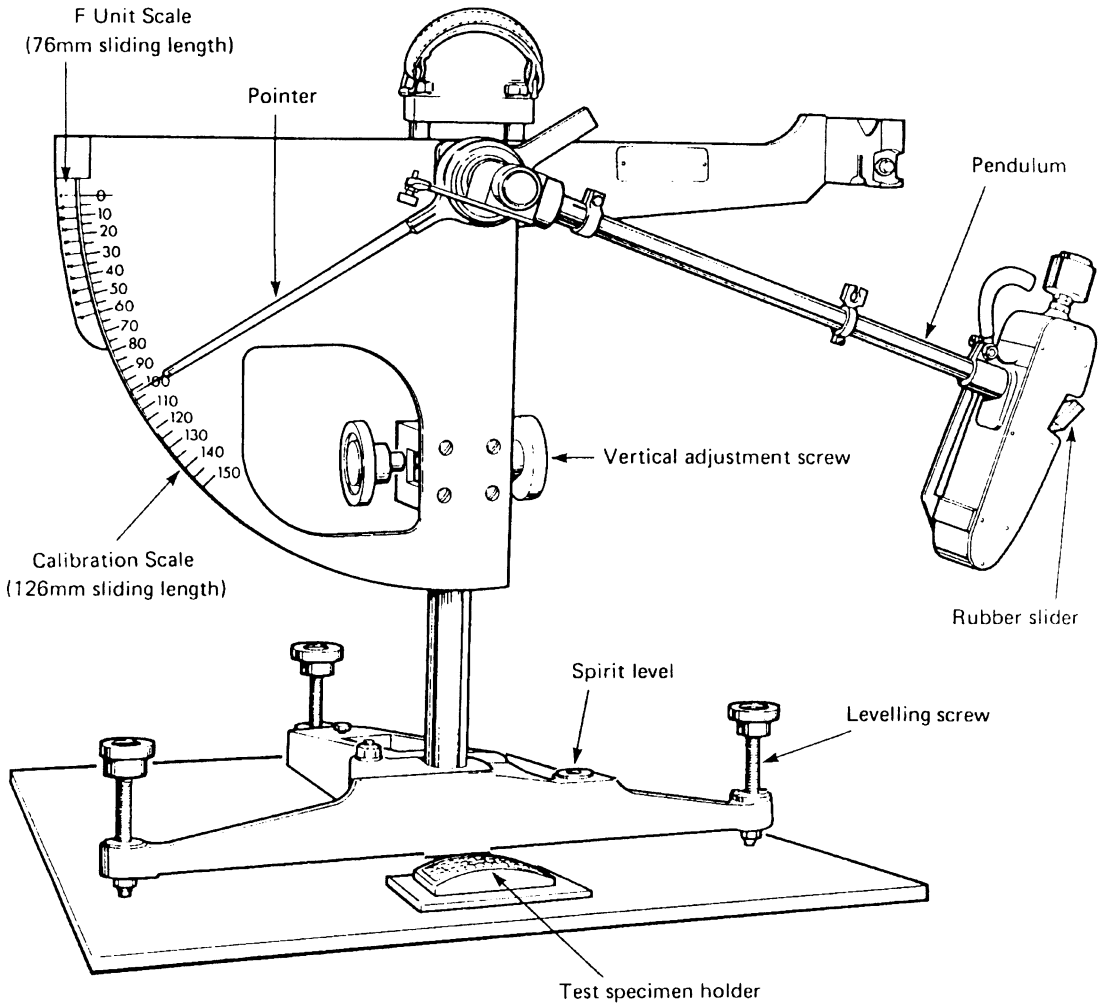


Figure 3 — Friction tester

Table 1 — Properties of the slider

Property	Temperature (°C)				
	0	10	20	30	40
Resilience (%)[a]	43 to 49	58 to 65	66 to 73	71 to 77	74 to 79
Hardness (IRHD)[b]	55 ± 5	55 ± 5	55 ± 5	55 ± 5	55 ± 5

[a] Lüpke rebound test in accordance with BS 903-A8.

[b] International rubber hardness degrees in accordance with BS 903-A26.

5.2.2 ***Calibration of the tester***

5.2.2.1 The calibration of the tester shall be checked at least once a year[3)]. The scale of the instrument when used for this test shall be the unit *F*, where *F* is a measure of the coefficient of friction (× 100), drawn up by means of the following equation:

$$F = \left(\frac{WXZ}{PDP}\right)100$$

where

W is the force exerted by the swinging arm (in N);

X is the distance of the effective centre of gravity of the arm from the centre of oscillation (in mm);

Z is the vertical distance of the edge of the scale below the zero of the scale, which shall be 10 mm below the horizontal when the arm is released to swing freely from the horizontal (in mm);

P is the nominal static force on the slider, as defined in **5.2.1.5** (in N);

D is the sliding distance (in mm);

p is the length of the pointer (in mm).

5.2.2.2 The instrument shall be cross-checked using the sliding length of 126 ± 0.5 mm with the friction tester on the following wetted surfaces using the main scale.

a) A glass plate.

b) Five smooth-looking surfaces having a texture depth less than 0.25 mm and covering a range of at least 25 to 75 units.

c) Five rough-looking surfaces having a texture depth greater than 0.50 mm and covering a range of at least 25 to 75 units.

On these tests no pairs of results obtained with the two instruments on any surface shall differ by more than 3 units. The mean results for the 11 samples shall not differ by more than 1.5 units.

5.4 *Test sieves*, consisting of a 10 mm, square-holed, perforated-plate sieve and woven-wire sieves, of sizes 600 µm, 500 µm, 425 µm, 355 µm, 300 µm, 212 µm.

The test sieves shall comply with BS 410.

A 14 mm to 10 mm slotted flake sorting sieve complying with BS 812-105.1, having a slot width of 7.2 ± 0.1 mm, is also required.

5.5 *Equipment for preparing specimens,* consisting of the following.

a) Release agent or liquid car polish.

b) Cleansing solvent or a mixture of 90 % acetone and 10 % kerosene (by volume).

c) Polyester resin and hardener.

NOTE Crystic resin is suitable.

d) Disposable paper or polypropylene cups for resin-mixing.

e) Clear, flexible plastics sheet of materials, such as acetate or polyethylene.

f) Accurately machined metal moulds for preparing specimens of the dimensions shown in Figure 2.

g) A pair of rigid metal covers having one face plane, the other shaped to the radius (189 mm) of the polishing test mould and slightly larger than the mould.

h) A clamp, such as a 200-mm G-clamp.

i) Two fine-haired brushes of about 3 mm diameter.

j) A stiff bristle brush.

k) A spatula.

6 Materials

6.1 Fresh natural corn emery, complying with Table 2. This shall be used only once.

Table 2 — Grading requirements for corn emery

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

6.2 Air-floated or water-washed emery flour, all of which passes a 53 µm test sieve.

6.3 PSV control stone, from a recognized supplier.

NOTE To improve consistency of the material available, the control stone has been stockpiled. At present the only recognized supplier of material from this stockpile in Great Britain is Wessex Engineering and Metalcraft Co. Ltd., Merchants Barton, Frome, Somerset BA11 1PS.

6.4 Stone for the calibration of the friction tester (see **10.3**).

NOTE This stone may be obtained from the suppliers of the PSV control stone or from Criggion Quarry, Ford, Powys.

[3)] The calibration of the tester is done at BSI Testing, Hemel Hempstead Centre, Maylands Avenue, Hemel Hempstead, Herts HP2 4SQ.

7 Preparation of specimens

7.1 Reduce the laboratory sample obtained in accordance with clause **4**, by the procedure described in clause **6** of BS 812-102:1984 to produce a test portion such that when it is sieved in accordance with **7.2** a minimum of 2 kg is available for preparing the specimens.

7.2 Sieve the test portion so that all the aggregate particles pass the 10 mm test sieve and are retained on the 14 mm to 10 mm flake sorting sieve. The particles shall not be elongated and shall be clean and free from dust.

NOTE The surface texture of the particles which are to be exposed to the polishing action of the tyre should be representative of the average surface texture of the stone. A few particles with a very smooth or very rough surface texture may occur in almost any sample, but these are not to be used in preparing the test specimen.

7.3 Obtain a minimum mass of 1 kg of the PSV control stone by the procedures described in **7.1** and **7.2**.

7.4 Using the procedures described in **7.5** to **7.8** prepare four specimens of each sample and four specimens of the control stone. Each specimen shall consist of between 35 and 50 particles, obtained as described in **7.2** and **7.3**.

7.5 Prepare each specimen by carefully placing the selected particles in a single layer with their flattest surfaces lying on the bottom of the mould. Place them as closely as possible and cover an area of 90.6 mm × 44.5 mm. Then fill the interstices between the particles to approximately three-quarters of their depth with fine sand (all passing a test sieve of 212 μm aperture) and level with the second
fine-haired brush. Lightly coat the exposed internal faces and top edges of the metal moulds with release agent using one of the fine-haired brushes.

7.6 Mix the hardener with the resin in a disposable cup (the exact proportion depends upon the resin used). Fill the mould to overflowing with the mixed resin and float-off the surplus with the spatula without disturbing the main body of the resin.

NOTE 1 When using crystic resin [see note to **5.5** c)], equal or nearly so proportions of the hardener and resin are suitable.
NOTE 2 As an alternative to floating-off, the surplus may be squeezed out. by covering the mould with the plastics sheet and pressing the metal cover on to the sheet.

7.7 When the resin begins to harden (after 5 min to 10 min) trim any excess resin from the edges of the mould with a knife. Press the metal cover to the back of the specimen by means of a clamp or weights to prevent distortion during setting. After the resin has completely set and cooled (about 30 min from mixing), remove the specimen from the mould and remove the loose sand with the stiff bristle brush. After a further 30 min it may be subjected to polishing in accordance with clause **9**. Clean moulds, tools etc. as required with solvent.

7.8 Ensure that when the operations described in **7.4** to **7.7** are completed, the surface of each specimen is flat across the shorter dimension and is curved in the arc of a circle of 406 mm diameter along the longer dimension. Also ensure that each finished specimen presents the natural surface of the stone chipping, with no sharp projecting edges, to the polishing tyre and is not less than 12.5 mm thick. Ensure that the undersurface is the arc of a circle of the same diameter as the periphery of the road wheel of the polishing machine. Reject any specimen with resin exposed at the surface or with disturbed particles.

NOTE The exposed surfaces of the specimens should stand proud of the backing resin.

8 Conditioning of tyre

8.1 Before a new tyre is used on a test, it shall be given a preliminary run with the appropriate abrasive. Use the new tyre as in an actual test but with 12 spare specimens and two control specimens.

NOTE It is essential to use the correct wheel for each abrasive. It is also essential that the test includes the use of the other wheel and appropriate abrasive to comply with the complete test procedure. Specimens from earlier tests are suitable as spare specimens in the preliminary run.

8.2 Following polishing (see clause **9**), friction-test the control specimens in accordance with clause **10** and record the mean result. If the mean result is greater than 55.5 make further preliminary runs using fresh specimens of the control stone. If the result is less than 49.5 or if high values persist, make appropriate corrections to the materials and procedure so as to ensure that the mean value given by the following two specimens of control stone lies in the permitted range 49.5 to 55.5 (see note to **9.5**).

9 Accelerated polishing of specimens

9.1 Carry out the accelerated polishing at a room temperature of 20 ± 5 °C.

9.2 Fourteen specimens are polished during each run, numbered as follows:

two specimens of 1st sample numbered 1 and 2

two specimens of 2nd sample numbered 3 and 4

two specimens of 3rd sample numbered 5 and 6

two specimens of 4th sample numbered 7 and 8

two specimens of 5th sample numbered 9 and 10

two specimens of 6th sample numbered 11 and 12

two specimens of PSV control stone numbered 13 and 14 and then arranged in the following order:

13, 9, 3, 7, 5, 1, 11, 14, 10, 4, 8, 6, 2, 12

9.3 Clamp the 14 specimens in the specified order round the periphery of the road wheel of the polishing machine. Mark the specimens so that the direction of rotation can be determined at a later stage (see **10.4**). The outer surface of the specimens shall form a continuous strip of particles with a periphery of 406 mm diameter, upon which the rubber-tyred wheel can ride freely without bumping or slipping. Fill any gaps with a suitable packing piece level with the remainder of the specimen.

9.4 Bring the road wheel to a speed of 320 ± 5 r/min and bring the dark-coloured wheel to bear on the surface of the specimens with a total force of 725 ± 10 N. Feed the corn emery (see **6.1**) at a rate of 27 ± 7 g/min continuously with water on to the road wheel using the dark-coloured feed mechanism for a period of 3 ± 1 min. Feed the water at a rate just sufficient to carry the corn emery to the wheel; this is approximately the same rate as for the corn emery.

Interrupt the test run at 1 hr ± 5 min and 2 hr ± 5 min to clean out any excess of corn emery which has collected in the base. On completion, i.e. after 3 h, thoroughly clean the machine and specimens by washing so that all trace of the corn emery is removed.

NOTE It is important that the used corn emery is not allowed to make contact with the road wheel.

9.5 Fit the light-coloured wheel and feed mechanism for emery flour. Then operate the machine continuously for a further 3 ± 1 min (see **9.4**), feeding the emery flour (see **6.2**) at a rate of 3 ± 1 g/min continuously with water. Feed the water at twice the rate of the emery flour.

NOTE It is important that the solid rubber-tyred wheel is not left under load at any time other than when the wheel is running, otherwise the tyre may become deformed. It will be necessary to replace the tyres periodically as indicated by excessive wear or by the control stone value moving below the range 49.5 to 55.5. It is essential that any tyre replacement be followed by tyre conditioning in accordance with **8**. Current experience indicates that replacement may be needed after 40 runs, particularly for the dark-coloured (coarse emery) wheel. Low results in the early life of the tyre may suggest excessive polishing due to misalignment of the wheels or the need to recalibrate the friction tester.

9.6 Remove the specimens from the machine and thoroughly wash them in running water to remove all trace of emery flour. Clean the interstices between the stone particles by scrubbing with a bristle brush.

NOTE Any trace of emery flour on or between the stone particles will lower the resut of the friction test.

9.7 After washing, store the specimens face downwards under water at a temperature of 18 °C to 22 °C for 30 min to 2 h. On removal from the water, immediately perform the friction test in accordance with clause **10**. At no time prior to this testing shall the specimen be allowed to dry out.

9.8 Repeat the complete test procedure (see **9.1** to **9.7**) with two further specimens of each sample.

10 Friction test procedure

10.1 Keep the friction test apparatus and slider in a room where the temperature is controlled at 20 ± 2 °C for at least 2 h before the test begins and for the duration of the test.

10.2 Rest the tester upon a firm level surface and adjust the levelling screws so that the column is vertical. Then raise the axis of suspension of the pendulum so that the arm swings freely, and adjust the friction in the pointer mechanism so that when the pendulum arm and pointer are released from the right-hand horizontal position the pointer comes to rest at zero position on the scale. Ensure that the track of the slider is parallel to the long edge of the specimen across the sliding distance.

10.3 Use the following procedure to ensure that the rubber slider is correctly conditioned.

NOTE It is possible to reverse the slider to make use of both edges.

a) Maintain a stock of Criggion specimens for calibration purposes. These shall be made from stone from Criggion Quarry and shall be made and polished as in an actual determination. When tested they shall yield a value in the range 58 to 66. Record the values and air-dry the specimens and store them in a sealed container for future use.

b) Before using a new slider, swing it five times over the dry surface of a polished Criggion specimen following with a further 20 swings on its wetted surface. Keep the Criggion specimen used for this purpose apart from the Criggion calibration specimens tested in c); it may be used repeatedly provided its value (when wet) does not fall below 55.

c) Before measuring the set of specimens polished on each test run, check the performance of the slider by testing a Criggion calibration specimen. Record the resulting value. Additional polishing through repeated testing yields progressively lower values and the control shall be discarded when its value falls below 57. A new control shall then be drawn from the stock. If a check value is more than 2 units lower (or one unit higher) than the last recorded value for the control, discontinue testing and rectify any fault in the instrument or its operation or due to changes in the slider. It is recommended that more than one slider be kept in use to help differentiate between a faulty slider and a defective instrument.

d) Discard any slider that develops excessive burring and scoring through prolonged use.

10.4 Rigidly locate the first test specimen with its longer dimension lying in the track of the pendulum, and centrally with respect to the rubber slider and to the axis of suspension of the pendulum. Locate it in such a way that the slider of the pendulum will traverse it in the same direction as the specimen travelled in the polishing machine (see **9.3**).

NOTE For this purpose it is advisable to mark one longitudinal edge of each specimen. If this mark is on the side of the specimen furthest from the operator during polishing, it should be nearest to him during friction testing and *vice versa*.

10.5 Adjust the height of the axis of suspension of the pendulum so that in traversing the specimen the rubber slider is in contact with it over the whole width of the slider and over a length of 76.0 mm, as accurately as can be visually gauged. Then wet the surfaces of the specimen and the rubber slider with a copious supply of clean water, being careful not to disturb the slider from its set position. Release the pendulum and pointer from the horizontal position and note the reading of the pointer to the nearest whole number. Perform this operation five times, rewetting the specimen each time, and record the mean of the last three readings to the nearest 0.1 unit.

Test the specimens in the following order:

13, 1, 10, 3, 5, 12, 8, 7, 11, 6, 4, 9, 2, 14

11 Calculations

11.1 Calculate the mean of the recorded values of the two PSV control stone specimens for each test run. Record to the nearest 0.1 unit providing two results for the complete duplicated test cycles.

11.2 If the difference between the two mean values of the PSV control specimens for each test run is greater than **4.7,** the results for the test shall be rejected. If the mean value of the two PSV control specimens for either test run does not lie within the range 49.5 to 55.5 the test results shall be rejected. The whole test procedure shall then be examined and modified as necessary to ensure that these requirements for range and mean are satisfied.

11.3 For satisfactory test runs (see **11.2**) the PSV of each sample shall be calculated as follows.

Calculate the mean value S of the recorded values of the four test specimens (two from each run) and record to the nearest 0.1 unit.

Calculate the mean value C of the recorded values of the four control specimens (two from each run) and record to the nearest 0.1 unit.

Calculate the PSV from the following equation:

$$\text{PSV} = S + 52.5 - C$$

NOTE This equation is valid only for values of C between 49.5 and 55.5

12 Expression of results

Report the polished-stone value to the nearest whole number together with the individual values and means of the test specimens and the control specimens.

13 Precision

Estimates of the repeatability (r) and reproducibility (R_1) of the test for determining the PSV are $r = 3$ and $R_1 = 5$.

NOTE Estimates are $\sqrt{V_r} = 1.2$, $\sqrt{V_L} = 1.1$ and $\sqrt{V}$ specimens = 1.2. These estimates are based on duplicate tests by 11 laboratories at three levels of PSV (averaging 69, 53 and 40).

Uses of precision data are described in clause **5** of BS 812-101:1984.

14 Test report

The test report shall affirm that the PSV was determined in accordance with this Part of BS 812 and whether or not a Certificate of Sampling is available. If available, a copy of the Certificate of Sampling shall be provided. The test report shall contain the following additional information.

a) Sample identification and sample description.

b) The polished-stone value.

c) The mean value recorded for the control stone.

d) The values recorded for the four individual test specimens and the four individual control stone specimens, clearly indicating which specimens relate to which test run.

Publications referred to

BS 410, *Specification for test sieves.*
BS 812, *Testing aggregates.*
BS 812-101, *Guide to sampling and testing aggregates.*
BS 812-102, *Methods for sampling.*
BS 812-105, *Methods for determination of particle shape.*
BS 812-105.1, *Flakiness index.*
BS 903, *Methods of testing vulcanized rubber.*
BS 903-A8, *Determination of rebound resilience.*
BS 903-A26, *Determination of hardness.*
BS 2719, *Methods of use and calibration of pocket type rubber hardness meters.*

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