# British Standard

BRITISH STANDARD

BS 598-108: 1990

*Incorporating Amendment No. 1*

# Sampling and examination of bituminous mixtures for roads and other paved areas —

## Part 108: Methods for determination of the condition of the binder on coated chippings and for measurement of the rate of spread of coated chippings

ICS: 75.140; 93.080.20

# Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Road Engineering Standards Policy Committee (RDB/-) to Technical Committee RDB/36 upon which the following bodies were represented:

British Aggregate Construction Materials Industries
British Civil Engineering Test Equipment Manufacturers' Association
British Tar Industry Association
County Surveyor's Society
Department of the Environment (Property Services Agency)
Department of Transport (Highways)
Department of Transport (Transport and Road Research Laboratory)
Institute of Asphalt Technology
Institute of Petroleum
Institution of Civil Engineers
Institution of Highways and Transportation
Mastic Asphalt Council and Employers' Federation
Mastic Asphalt Producers' Association
Refined Bitumen Association Ltd.
Sand and Gravel Association Ltd.
Society of Chemical Industry
Coopted members

This British Standard, having been prepared under the direction of the Road Engineering Standards Policy Committee, was published under the authority of the Board of BSI and comes into effect on 28 September 1990



The following BSI references relate to the work on this standard:
Committee reference RDB/36
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# Contents

# Foreword

This part of BS 598 has been prepared under the direction of the Road Engineering Standards Policy Committee. It is a technically equivalent revision of clauses **5** and **6** of BS 598-3:1985, which are deleted from that part by amendment.

As BS 598 is revised, each of the tests or collection of related tests will be issued as a separate part of this standard. The complete revision will eventually comprise the following parts:

— *Part 100: Methods for sampling for analysis*;

— *Part 101: Preparatory treatment of samples for analysis*;

— *Part 102: Analytical test methods*;

— *Part 103: Method for the recovery of soluble bitumen for examination*;

— *Part 104: Methods of test for the determination of density and compaction*;

— *Part 105: Methods of test for the determination of texture depth*;

— *Part 106: Methods of test for the determination of the stability index of pitch bitumen binders*;

— *Part 107: Method of test for the determination of the composition of design wearing course rolled asphalt*;

— *Part 108: Methods of test for the determination of the conditions of the binder on coated chippings and the rate of spread of coated chippings*;

— *Part 109: Method for the assessment of the compaction performance of a roller and recommended procedures for the measurement of the temperature of bituminous mixtures*.

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**Summary of pages**

This document comprises a front cover, inside front cover, pages i and ii, pages 1 to 4, an inside back cover and a back cover.

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## 1 Scope

This part of BS 598 describes a hot sand test method for determining the condition of the binder on coated chippings and a method for measuring the rate of spread of coated chippings.

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

## 2 Definitions

For the purposes of this part of BS 598 the definitions given in BS 6100 apply.

## 3 Hot sand test for the condition of the binder on coated chippings

### 3.1 Principle

This test is used to ensure that coated chippings to be applied to the surface of wearing-course rolled asphalt have not been overheated to an extent that will prevent their adhesion to the asphalt. The dried coated chippings are immersed in hot sand under specified conditions and the degree of coating by the sand assessed both by weighing and by visual inspection.

NOTE The test should be carried out sufficiently in advance of the laying of the wearing-course asphalt to enable fresh supplies of chippings to be obtained if necessary.

### 3.2 Materials

**3.2.1** ***Sand***

Clean dry silica sand with a rounded particle shape and in accordance with the grading given in Table 1.

**3.2.2** ***Grit***

Clean dry silica grit with a rounded particle shape and in accordance with the grading given in Table 1.

**Table 1 — Grading of sand and grit**

| BS test sieve | % by mass passing | |
|---|---|---|
| | Sand for hot sand test and sand patch test | Grit for hot sand test |
| 2.36 mm | — | 100 |
| 1.18 mm | — | 90 to 100 |
| 600 µm | 100 | 0 to 15 |
| 300 µm | 90 to 100 | — |
| 150 µm | 0 to 15 | — |

### 3.3 Apparatus

**3.3.1** *Oven*, thermostatically contolled at 125 °C to 130 °C.

**3.3.2** *Two metal trays,* minimum size 400 mm × 350 mm × 60 mm deep; a greater number of smaller trays may be used to provide the appropriate area.

**3.3.3** *Thermometer,* to indicate 100 °C to 130 °C, accurate to ± 1 °C.

**3.3.4** *Sieves,* of 10 mm, 6.3 mm and 3.35 mm aperture, with a 300 mm diameter, complying with BS 410.[1)]

**3.3.5** *Tins,* of 5.0 ± 0.5 L capacity, each with a tight fitting lid.

### 3.4 Procedure

Proceed as follows.

a) Fill the trays (**3.3.2**) to a level depth of about 25 mm with the 300 µm to 150 µm clean sand and place in the oven (**3.3.1**) at 125 °C to 130 °C with the thermometer (**3.3.3**) immersed in the sand.

b) Sieve the chippings for 30 s using the 10 mm BS test sieve (**3.3.4**) for 20 mm chippings or the 6.3 mm BS test sieve (**3.3.4**) for 14 mm chippings. Reject those chippings which pass through the sieve.

c) Ensure that the sieved chippings are dry and if necessary dry by heating in the oven (**3.3.1**) at about 60 °C. Weigh the sieved specimen to the nearest gram ($W_1$).

d) Remove one tray from the oven when the sand temperature has reached 125 °C to 130 °C and spread chippings from the sample onto the hot sand until a uniform overall cover is achieved without contact between adjacent chippings. Complete this operation within about 2 min to 3 min to prevent excessive heat losses.

e) Cover the chippings by pouring hot sand from the second tray. Level the sand quickly and replace the tray with chippings in the oven for a minimum of 10 min. Ensure that the final sand temperature is not less than 100 °C.

f) Remove the tray with chippings from the oven, pour the sand and the chippings on the 3.35 mm BS test sieve, and allow the chippings on the sieve to cool for approximately 10 min.

g) Place the cool chippings in the 5.0 L tin (**3.3.5**) half filled with 1.18 mm to 600 µm silica sand. Shake the tin longitudinally a total of 100 cycles in about 60 s with a displacement of about 100 mm.

[1)] Wherever the term "BS test sieve" is used in this standard it should be taken to mean "test sieve complying with BS 410".

h) Resieve the chippings using the 3.35 mm BS test sieve and wash with a strong jet of cold water, drain the chippings, tip onto paper and allow to dry thoroughly[2)].

i) Weigh the sample of chippings ($W_2$) and determine the sand retained on the chippings calculated from $(W_2 - W_1)\ 1\ 000/W_1$ (g/kg).

j) Examine the chippings individually in a good light and reject those having less than half sand-cover and weigh the rejected chippings.

k) Weigh the total chippings to the nearest gram.

### 3.5 Reporting

Report the quality of the chippings as the mass of sand retained per kilogram to the nearest gram and the percentage by mass of chippings rejected to the nearest 0.1 %.

NOTE 1 A sampling rate of one bulk sample every 25 t is recommended.

NOTE 2 Samples should not be taken from surplus chippings swept up from the road after laying and rolling the mixture or from residues of abandoned stockpiles.

NOTE 3 If a marginal result is obtained in the hot sand test after two separate samples have been tested, confirmation may be obtained by taking additional samples and calculating the mean sand mass retained and the mean percentage failing the visual assessment.

NOTE 4 In cases of dispute a minimum of four samples is suggested.

NOTE 5 The sands used in the hot sand test should be changed after testing approximately 20 samples or earlier if obviously contaminated.

## 4 Measurement of the rate of spread of coated chippings

### 4.1 Principle

Three methods are described. In the first, the quantity of chippings for a shoulder-to-shoulder cover for an area is derived. This value is needed to establish the criterion from which the specified rate of spread on the road is calculated. The second and third are used to check whether the specified rate on the road has been achieved.

### 4.2 Method for establishing the rate of spread of chippings to give shoulder-to-shoulder cover

Proceed as follows.

a) Riffle a representative sample of the chippings, taken in accordance with BS 812-102 to provide a sub-sample of about 1 kg for 20 mm nominal size chippings or about 750 g for 14 mm nominal size chippings.

b) Individually place the chippings from the sub-sample in a tray of known area, not smaller than 600 mm × 600 mm with vertical sides about 15 mm to 20 mm high, and individually position the chippings by hand, in a single layer such that there is shoulder-to-shoulder cover.

c) Take further sub-samples and add the chippings to the tray until the area is completely covered.

d) Determine the mass of these chippings to an accuracy of ± 5 g and repeat the test three times.

e) Take the mean of the four results, divide it by the area of the tray, and obtain the rate of spread of chippings per square metre for shoulder-to-shoulder cover.

NOTE The repeatability and reproducibility of the test are 5 % and 8 % respectively.

### 4.3 Measurement of the rate of spread of chippings for mechanical chipping spreaders

**4.3.1** *Apparatus.* The apparatus shall consist of shallow aluminium trays 300 mm square, secured by four short lengths of chain to a metal disc surmounted by a hook and a calibrated spring balance. The scale shall be calibrated in kg/m$^2$ with a range of 4 kg/m$^2$ to 16 kg/m$^2$. At least 10 trays should be available. All trays for use with one spring balance shall be of equal mass.

**4.3.2** *Calibration.* Proceed as follows.

a) Check the calibration of the spring balance on each day of use or more frequently if error is suspected.

b) Carry this out by placing masses of chippings on the tray equivalent to the masses of chippings giving a low and high rate of spread, e.g. 7.5 kg/m$^2$ and 15 kg/m$^2$, and check that the calibration of the spring balance is correct at these two rates.

**4.3.3** *Procedure.* Proceed as follows.

a) Lay five metal trays, in echelon, in front of each half width of the chipping spreader and when the machine has passed over them, hook each tray with its quota of chippings on to and lift by the spring balance and note the rate of spread.

b) Immediately return the chippings on the tray to the vacant area on the road before the roller traverses that area.

c) Repeat this to give 10 readings for each half width of chipping spreader and report the mean of these 10 readings as the rate of spread for each half width.

[2)] Assisted drying using a hot air blower is permitted.

d) Repeat the measurements of the rate of spread:

1) for each new batch of chippings;

2) if visual observation indicates a change in the rate of spread;

3) if the machine is changed; or

4) at the discretion of the purchaser or his representative.

**4.3.4** *Reporting of results*. Report the rate of spread of chippings as the average of each group of 10 results.

### 4.4 Measurement of rate of spread of chippings spread by hand

Determine the rate of spread of chippings from the mass of chippings used and the area of road covered by these chippings.

*blank*

# Publications referred to

BS 410, *Specification for test sieves.*
BS 812, *Testing aggregates.*
BS 812-102, *Methods for sampling.*
BS 6100, *Glossary of building and civil engineering terms.*

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