

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

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

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 Material 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 30 November 1990

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Foreword

This Part of BS 598 has been prepared under the direction of the Road Engineering Standards Policy Committee.

This Part of BS 598 includes methods for measuring the texture depth of finished surfaces of bituminous materials. It includes for the first time in a British Standard the technique developed using laser beams for the rapid, contactless, determination of surface texture. It also repeats, with minor additions and amendments, the sand-patch method described in clause 7 of BS 598-3:1985, which is deleted by amendment.

BS 598-2 and the remainder of BS 598-3 are also being revised and it is the intention to publish each of the tests or collection of related tests in these Parts as separate Parts of BS 598.

It is recommended that the laser texture meter be used primarily as a monitoring device for rapid assessment but that in any case of dispute or doubt the sand-patch method be used.

It has been assumed in the drafting of this Part of BS 598 that the execution of its provisions is entrusted to appropriately experienced people.

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 12, 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 598 describes methods of measuring the texture depth of surfaces of bituminous materials used for roads and other paved areas. Two methods are given, one using a contactless laser beam sensor system, the other using a fixed volume of sand spread on the road surface (the sand-patch method). The laser texture meter method gives numerically different results to the sand-patch method and should not be confused with it or be numerically related to it. The sand-patch method may be used on any type of surface but, for the present, the use of the laser texture meter method is confined to newly laid chipped rolled asphalt wearing courses.

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 following definitions apply.

2.1

sand-patch texture depth

a measurement of the average depth of the road surface macro-texture below the general level of the peaks as determined by the sand-patch method¹⁾

2.2

sensor-measured texture depth (SMTD)

a measurement of the road surface macro-texture as determined by the laser texture meter from the standard deviation of a series of height measurements from the road surface made by a contactless sensor mounted in the meter²⁾

2.3

drop-out percentage (DO %)

the proportion of the series of height measurements which the receiver fails to detect, expressed as a percentage

2.4

test result

the value of a characteristic determined by carrying out a specified test method

2.5

repeatability conditions

conditions where mutually independent results are obtained with the same method on a single test section by the same operator using the same equipment within short intervals of time

2.6

repeatability value (r)

the value below which the absolute difference between two single test results obtained under repeatability conditions may be expected to lie with a probability of 95 %

NOTE For brevity, in this Part of BS 598 “repeatability value” is shortened to “repeatability”, “ r ”, or where the context makes it clear that it is the values that are referred to.

2.7

reproducibility conditions

conditions where test results are obtained with the same method on a single test section with different operators using different equipment

2.8

reproducibility value (R)

the value below which the absolute difference between two single test results obtained under reproducibility conditions may be expected to lie with a probability of 95 %

NOTE For brevity in this Part of BS 598 “reproducibility value” is shortened to “reproducibility”, or “ R ”, where the context makes it clear that it is the values that are referred to.

3 Determination of texture depth by laser texture meter

3.1 Principle

The meter and the method described in this clause have been designed for the purpose of determining texture depth of chipped rolled asphalt surfacings. The applicability of the meter to other types of surfacing and the possible need to modify the method of test for them has yet to be fully evaluated.

NOTE The texture meter used in this method should not be confused with the high speed texture meter which has been specially designed for the monitoring of road networks.

The principle of the meter is that the infra-red light from a rapidly pulsed laser is projected on to the road surface and the reflected light from the spot so formed is focused by a receiving lens on to an array of photosensitive diodes (see Figure 1). The position of the diode receiving most light gives a measure of the distance to the road surface at that instant and the depth of the texture is computed from a series of such measurements as the meter is propelled along the road surface. The meter used in this standard is controlled by a microcomputer system and is wheeled and operated by hand. It prints the average sensor-measured texture depth (SMTD) for each completed 10 m measured, together with an overall average for each 50 m length.

¹⁾ See clause 4.

²⁾ See clause 3.

3.2 Apparatus

3.2.1 TRRL laser texture meter

The meter shall be manufactured to the design of the Transport and Road Research Laboratory³⁾ (see Figure 2) complete with the manufacturer's operating instructions and appropriate battery charger, paper rolls and inked ribbons for the integral printer and a sensitivity check mat⁴⁾. Guidance on the installation and maintenance of the meter is given in appendices B and C.

NOTE 1 Earlier models of the meter neither had the facility for entering a calibration factor nor expressed the SMTD result for 50 m to two places of decimals. Such models need to be modified by the licensed manufacturer in order to meet the requirements of this standard. Sensitivity check mats were not issued with these earlier models.

NOTE 2 The apparatus is furnished with several programmes; only programme 1 is appropriate for measurement of surface texture in this standard.

3.2.2 Calibration

Results shall be considered valid only if the meter has been calibrated by the manufacturer (see appendix A) not more than 12 months prior to use. A certificate showing the calibration factor shall be kept available for reference. The calibration factor printed on the recording tape output on the first run shall agree with the factor on the calibration certificate.

3.3 Sensitivity

Testing shall not be commenced until the drop-out percentage differs from the percentage quoted by the manufacturer by not more than three.

NOTE The sensitivity of the meter should be checked in accordance with appendix B not more than 12 h prior to use using the check mat provided.

3.4 Measurement of surface texture

3.4.1 Measure the texture depth as soon as possible after the surface has been laid and before opening to traffic. The track to be tested shall be free from frost, dust, dirt, loose chippings or other debris. Avoid obstructions such as road studs and white lines.

NOTE 1 Care should be taken to avoid sunlight from a low angle illuminating the road below the centre of the meter, when falsely high values may be obtained. If this is believed to be the case a repeat run should be made in the reverse direction.

NOTE 2 Care should be taken when using the meter in conditions where condensation may form on the lens of the meter, distorting the readings, e.g. in warm temperatures on newly rolled asphalt.

NOTE 3 Care should be taken to avoid any build-up of material on the tyres. The tyres should be maintained at the correct pressure and should be in good condition.

3.4.2 Do not take measurements, when free water partially fills the texture or when beads of water are standing on the surface.

3.4.3 Take measurements using programme 1 on successive 50 m lane lengths along the whole of the section tested.

3.5 Procedure for carrying out a single pass

Operate the meter on a diagonal line across the carriageway lane width from left to right in the direction of traffic flow. Never take measurements with either wheel of the apparatus outside the chipped carriageway.

NOTE 1 If possible the diagonal line should be adjusted to avoid crossing joints.

Operate the meter at a speed between 3 km/h and 6 km/h.

NOTE 2 The meter should not be used at speeds less than 3 km/h, as this will result in incomplete sampling. The maximum permissible speed is 6 km/h, as above that speed the number of samples will be reduced and control of the meter will be less positive.

3.6 Calculation and expression of results

Report the results for each 50 m lane length and calculate the mean of the 20 such results constituting each 1 000 m section of carriageway lane. For sections less than 1 000 m average the mean of all the 50 m lane lengths. Express the results as sensor-measured texture depths (SMTDs) in millimetres rounded to the second decimal place.

3.7 Test report

The report shall state that the texture measurement was made in accordance with clause 3 of this Part of BS 598 and shall include the following:

- a) the name and address of the testing organization;
- b) a unique serial number for the test report;
- c) the name of the client;
- d) the serial number, the calibration factor and the sensitivity check mat number of the meter used;
- e) clear identification of the location of each lane length tested;
- f) the individual SMTDs for each 50 m lane length comprising each section together with their mean value;
- g) affirmation that the wearing course tested was clean, dry and untrafficked. Any departure from this condition shall be reported;

³⁾ The design of the apparatus required in 3.2.1 is subject to Crown copyright. The Secretary of State for Transport has agreed with BSI to consider applications through the Transport and Road Research Laboratory for licences to market and manufacture this apparatus on non-exclusive terms in the form of royalty payments. Applicants for licences should apply to the Director, Transport and Road Research Laboratory, Department of Transport, Old Wokingham Road, Crowthorne, RG11 6AU.

⁴⁾ For information on the availability of suitable apparatus apply to Enquiry Section, BSI, Linford Wood, Milton Keynes, MK14 6LE.