



Transport
Roads & Maritime
Services

Test method T192

Determination of the texture depth of road surfacing by the TRL mini texture meter

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Revision Summary

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		Reformatted and Revision Summary Added	D.Dash	May 1999
		Date on Test Method Revised to Agree with Date on Revision	D.Dash	Feb 2001
Ed 2/ Rev 0	All	Reformatted RMS template	J Friedrich	October 2012

Note that Roads and Maritime Services is hereafter referred to as 'RMS'.

The most recent revision to Test method T192 (other than minor editorial changes) are indicated by a vertical line in the margin as shown here.

Test method T192

Determination of the texture depth of road surfacing by the TRL mini texture meter

1. Scope

- (a) This test method defines the procedure for the determination of the texture depth of road surfacing by the TRL (Transport Research Laboratory) Mini Texture Meter.
- (b) The Mini Texture Meter gives a relative measure of macro-texture a parameter which affects amongst other variables the surface drainage, skidding resistance at higher vehicle speeds and the noise generated by tyre / road interaction.
- (c) The pavement to be tested should be in a stable condition, i.e. without potholes; excessive rutting and patching, and should not include speed humps. The test section shall be dry and free from dust, dirt, loose chippings or other debris and from obstructions such as raised pavement markings and paint.
- (d) The equipment should not be used on surfacings which have substantial amounts of loose gravel and chippings or which are badly surfaced as this will result in the unit having a bumpy ride, the effect of which will be to distort the measured values. This limitation can be negotiated either by pre-brushing or in the case of bad surfacing, steering the equipment clear of the area.
- (e) The Mini Texture Meter has been designed to operate at a speed range of 3 to 10 kilometres per hour. However, the manufacturer recommends that the equipment be operated at a normal walking speed of 3 to 6 kilometres per hour.
- (f) The values measured represent the macro-texture of a pavement as obtained with the equipment and procedures stated herein and do not necessarily agree or correlate directly with those obtained by other pavement texture measuring methods.
- (g) The Mini Texture Meter has the advantage of providing macro-texture for open graded or porous surfaces which may not be readily obtained by the Sand-patch method.
- (h) This test mandatorily requires adequate traffic control when testing on a trafficked pavement which may be set up as per the *RMS Traffic Control at Work Sites* manual.

2. Definition

Term	Definition
Sand-patch texture depth	(a) The measurement of the macro-texture of a surface as determined by the procedure specified in the Test Method T240. It is a measurement in millimetres of the average depth of the hollows in the surface below the general level of the peaks
Sensor-measured texture depth (SMTD)	(b) Is a measurement of the macro-texture as determined by the Mini Texture Meter. It is a measurement in millimetres of the standard deviation of a series of height measurements made by the non-contact laser sensor mounted in the equipment. Although the SMTD is numerically different from the Sand-patch texture depth, it is directly related to it
Drop-out percentage (DO %)	(c) Is the proportion of lost height measurements occurring during a SMTD determination

3. Apparatus

- (a) *TRL Mini Texture Meter* manufactured to the design of TRL by a licensed TRL manufacturer , together with operating instructions and appropriate battery charger, tyre gauge, and printer paper rolls
- (b) *Sensitivity mat set* manufactured to the design of TRL by a licensed TRL manufacturer. This set consists of a sensitivity strip mounted in a case which provides runners for the wheels of the meter
- (c) The capability of ensuring the *inflation of the pneumatic tyres* on the meter to a pressure of 65 ± 5 kN /m² (10 ± 1 PSI)
- (d) A *thermometer* with a range of -5°C to +100°C capable of determining ambient and pavement surface temperatures
- (e) Personal and vehicular *hazard warning and safety devices*, as required by the governing law and including OH&S requirements

4. Procedure

4.1 Location

- (a) Find out the exact start and end points of the survey, the carriageway and the number of lanes to be tested. If there is any doubt, a check should be made with the client and or the supervisor

4.2 Temperature

- (a) Measure and record both air and pavement temperatures *every hour* over which testing is conducted. Additional recording of temperature should be carried out if a different road section is tested within the hour

4.3 Sampling

- (a) Measure the texture by dividing the lane to be tested into sections of 1000 metres. Shorter residual lengths should be regarded as complete sections
- (b) Take measurements on 50 metre lane lengths along the left and right travelled wheelpaths and along a diagonal line from left to right between the two wheelpaths for a newly constructed pavement. The measurement may be restricted to the two wheelpaths only for project specific purposes. A note clearly identifying the method of measurement should be included with the report. To achieve better reproducibility a temporary guide line may be marked on the pavement over which the equipment can be tracked
- (c) Measure the texture in the direction of traffic and do not take measurements within 300 mm of the longitudinal edge of the carriageway
- (d) Care should be taken to avoid sunlight from a low angle illuminating the pavement below the centre of the Mini Texture Meter as this may cause erroneous results

4.4 Preparation for testing

- (a) Assemble the meter according to the manufacturer's instructions
- (b) Ensure that the battery is adequately charged and that the tyres are at the correct pressure (65 ± 5 kN/m²) and free from binder, debris or other material that might prevent their smooth action

4.5 Check sensitivity

On the first occasion the meter is used on any day, check that the sensitivity is correct as stated in *Clause 7.2* and repeat the calibration as necessary to achieve the required sensitivity

4.6 Texture measurement of a 50 metre lane length

- (a) Unless already switched on from an earlier sensitivity check or texture measurement, turn the meter on with the key switch. Confirm that a header serial number, list of programme options is printed concluding with the message 'READY'. If the message 'FAILED' is repeatedly obtained reference should be made to the manufacturer's instructions. Allow the meter to 'warm up' for a period of at least 10 minutes before operation

- (b) Wheel the meter to the start of the 50 metre lane length to be tested and adjust the programme switch to programme 1 (TEXTURE HRA), press and release the trigger switch. Wait for the complete printing of the message 'TEXTURE HRA' followed by the serial number, calibration factor and heading for the results
- (c) Ensure that the printed serial number and calibration factor for HRA agree with those on the calibration certificate. If the calibration factor for the equipment is incorrect, the correct factor must be entered according to the manufacturer's instructions. This is done by switching the meter off and on by the key switch and repeating the procedure from *Clause 6*
- (d) Push the meter along the 50 metre lane length at a steady walking pace which should be within the range of 3 to 6 kilometres per hour. If a measurement is interrupted the result should be ignored and the test repeated from the start of the 50 metre lane length
- (e) Measurements should be printed for each completed 10 metre length together with an average for the full 50 metres. On completion of the 50 metres, depress and release the trigger switch and wait for the message 'READY' before commencing the testing of the next 50 metre lane length from *Clause 6*

Note: The message 'DO% HIGH' or 'DO% LOW' may be printed in the place of one or more of the 10 metre results. These messages refer to drop-out levels and usually occur if the texture is, very deep or very shallow. These messages can also indicate that the sensitivity is incorrectly adjusted (see *Clause 5*) or that the meter needs an overhaul. Higher drop-out levels are more likely when the road is damp.

5. Data Collection and Reporting

Record the results for each 50 metre lane length and calculate the mean of the 20 such results constituting each 1000 metre section of carriageway lane. For sections less than 1000 metres, the mean of all the 50 metre lane lengths shall be averaged. Express the results as sensor-measured texture depths (SMTD's) in mm

6. Test Report

- (a) The report shall affirm that the texture measurement was made in accordance with this Test Method (T192) and shall include the following:
 - (b) Clear identification of the location of each lane length tested
 - (c) The individual SMTD's for each 50 metre lane length comprising each section together with their mean value
 - (d) A copy of the printed output for any 50 metre lane length where the message 'DO% HIGH' or 'DO% LOW' has been printed in place of the 10 metre results, together with clear identification of the location

7. Calibration

7.1 Basic Displacement Calibration

- (a) This factory calibration is achieved using a special plinth which controls the position of the trolley relative to the test surface and eliminates vibration from the trigger handle when program 0 is in use
- (b) When program 0 is selected, a pull on the trigger will cause the printer to output a diode number from 1 - 256. Using this facility and very accurately varying the displacement underneath the laser, a series of figures are obtained. With the application of a linear regression, a 'Calibration Factor' is provided which is used by the software during SMTD calculations, thereby relating the results to millimetres of texture depth

7.2 Sensitivity Check

- (a) Switch the meter on with the key switch. A header, serial number, list of programme options should be printed concluding with the message 'READY'. (If the message 'FAILED' is repeatedly given, reference should be made to the operating manual)
- (b) Allow the meter to 'warm up' for a minimum period of 10 minutes

- (c) Ensure that the sensitivity mat is clean and dry and is set out on a firm flat surface
- (d) Position the meter at a starting position on the mat so that it is ready to be pushed forward over the sensitivity strip
- (e) Adjust the programme selector switch to programme 4 (CHECK MAT) and press and release the trigger switch. Wait for the complete printing of the message 'CHECK MAT' followed by the serial number and the heading for the results
- (f) Push the meter steadily along the length of the sensitivity strip until a result is printed followed by the message 'READY'. Return the meter to the starting position, press and release the trigger switch and repeat the measurement until a total of five results are printed
- (g) The DO% for the five results are then averaged and rounded to the nearest whole number. If this average is $40\% \pm 3\%$, the sensitivity is deemed to be correctly adjusted. If the result is beyond the specified range, corrections should be applied as stated in the operations manual. A further sets of five measurements shall be repeated after the correction has been applied until this average is 40 ± 3 per cent

7.3 Dynamic Calibration

The Dynamic calibration of the Mini Texture Meter is to be undertaken by the manufacturer only. However, once the sensitivity has been set, the MTM is then switched to the TEXTURE HRA program and the dynamic calibration factor output checked. This is set at 100 during manufacture and should remain so during the determination of the unfactored machine output.

8. Traffic Control and Safety

- (a) All testing work, if carried out on trafficked sections, shall be performed with adequate traffic control and the type of traffic control needed depends on the specific work site. Compliance of traffic control procedures shall take precedence over operational expediency at all times
- (b) Reference should be made to the relevant traffic control procedures such as RMS's *Traffic Control at Worksites* manual which is based on the Australian Standard 1742.3 - 1985, *Manual of Uniform Traffic Control Devices, Part 3, Traffic Control Devices for Roads*. Judgement is required in ensuring the safe passage of traffic at all times
- (c) All necessary precautions shall be taken beyond those imposed by-laws and regulations to ensure maximum safety of operating personnel and other traffic
- (d) If testing of the site in the normal manner is considered to present danger to the testing staff or the public, the local RTA Office or the police should be consulted. If in the opinion of either, the prevailing conditions are unsafe for testing then the survey shall not proceed
- (e) The Mini Texture Meter uses a class 3B laser diode which emits invisible radiation. As the laser is housed well within the equipment, it may be considered safe during normal operations. However, it is advisable to refer to AS 2211 the Australian Standard on Laser Safety for details on specific hazards from lasers. Appropriate laser safety goggles must be used if there is any danger that laser radiation will enter the eye, for example $\langle M \rangle$, while carrying out maintenance on the equipment

9. References

The above Test Method is based on the following documents:

- (a) *Operating Manual* issued for the TRRL Mini Texture Meter by WDM Limited, England
- (b) Measurement of the Macro-Texture of Roads Part 2: A Study of the TRRL Mini Texture Meter; TRRL, Department of Transport UK, Research Report # 120
- (c) Texture Depth of Coarse Textured Road Surfaces - Test Method T 240
- (d) Australian Standard for Laser Safety - AS 2211