TECHNICAL METHODS
FOR HIGHWAYS

DRAFT TMH6

Special methods for testing methods

1984

METHOD ST1

MEASUREMENT OF THE TEXTURE DEPTH OF A ROAD SURFACE

1 **SCOPE**

This method describes the procedures for measuring the texture depth of a road surface by spreading a known volume of sand on he surface and measuring the area covered. This is known as the sand-patch method.

2 **APPARATUS**

2.1 A container wit ha known volume, when filled, of approximately 500mℓ or of 250 mℓ.

2.2 A rubber squeegee or a texture depth sledge, as illustrated, together with an object with a mass of approximately 6kg (see Figure ST1/I)

2.3 Measuring tape, 3 m long.

2.4 A chalk line, cord and chalk, or a board measuring 500 x 1 500mm.

2.5 A carpet brush.

2.6 A spatula or straight-edge.

2.7 A supply of sand passing a 0,300 mm sieve and retained on a 0,075 mm sieve.

3. **METHOD**

3.1 **Preparation of site**

Choose a test site which is representative of the section of road to be tested. Avoid oil spills and potholes. Brush the test site free of dust and loose grit.

3.2 **Method using the rubber squeegee**

Chalk two parallel lines, 500 mm apart and approximately 3 m long, using the cord, chalk line or board (see 5.1). Fill the 500 mℓ container with sand, without jarring it to prevent compaciton of the sand, and level it off with a spatula or jarring it to prevent compaction of the sand, and level it off with a spatula or straight-edge (see 5.2). Pour the sand in a zig-zag pattern between the parallel lines. Spread the sand wit the rubber squeegee between the lines to as great a length as possible. The spreading should be done in such a manner that the surface voids are filled without leaving an excess or a continuous layer or sand. Try not to let the last bit of sand tail off but keep the finishing line as straight and regular as possible. Measure the length of the patch covered wit hsand and record it to the nearest 5 mm on a suitable recording sheet.

3.3 **Method using a sand spreading box**

Place the sledge on the selected test spot and weigh it down with the 6 kg mass. Fill the 250 mℓ container with sand, without jarring it to prevent compaction of the sand, and level it off with a spatula or straight-edge (see 5.2). Pour the sand into the box in front of the rubber blades. Slowly pull the box in a straight line along the test section. While pulling, make sure that the sand is being more and less evenly spread in front of the rubber blades to prevent a tail of sand from forming. This is especially important near the end of the run. When all the sand has run out, remove the box and measure the length of the sand patch accurately to the nearest 5 mm (see 5.3). Record the results, together with the width of the sand, on a suitable form.

4 CALCULATIONS

Calculate the texture depth to the nearest 0,01 mm as follows:

$$\text{Texture depth (mm) } T = \frac{a}{1\,000b}$$

Where

A = volume of sand in mℓ

B = area covered in m^2.

5 **NOTES**

5.1 For drawing the lines the board is convenient and much quicker to use than a chalk line and can also be used as a wind-break when pouring and spreading the sand.

5.2 If several tests are to be done in the field, it is more convenient to determine the mass of the known volume of sand in the laboratory and then to weigh off in clean containers as many separate portions as are needed for field work.

5.3 If a tail of sand is formed, the area of the tail should be calculated and added to the area of the rectangular portion of the patch.

METHOD ST2

MEASUREMENT OF THE SKID RESISTANCE OF A ROAD SURFACE BY MEANS OF A PORTABLE PENDULUM SKID RESISTANCE TESTER

1 **SCOPE**

This method describes the procedure for measuring the frictional properties of a road surface using the British Portable Skid Resistance Tester. The test is not reliable on very rough-textured surfaces.

2 **APPARATUS**

2.1 A British Portable Skid Resistance Tester (see Figure ST2/1). The pendulum with slider and slider mount shall have a mass of 1 500 ± 30 g. The distance of the center of gravity of the pendulum from the center of oscillation shall be 411 ± 5 mm. The apparatus shall be capable of vertical adjustments to provide a slider contact path of 125 ± 1,6 mm. The spring and lever arrangement (see Figure ST2/II) has an average normal slide mass between the 76,2-mm-wide slider and the test surface of 2 500 ± 100g, as measured by the calibration procedure given in 3.1 of this method.

2.2 A slider assembly (see Figure ST2/IV).

2.3 A contact path gauge consisting of a thin ruler suitably marked to measure the length of the contact path between 124 and 127 mm or between 75 and 78 mm as required.

2.4 A suitable pan balance and mass pieces (see Figure ST2/IV).

2.5 Miscellaneous equipment such as a container with water, a surface thermometer and a suitable brush.

3 METHOD

3.1 **Calibration of the Pendulum Tester**

Disconnect the pendulum arm with mounted rubber slider and weigh to the nearest 1g.

Determine the center of gravity of the pendulum with mounted rubber slider by placing the pendulum assembly over a knife-edge and experimentally locating the point of balance as shown in Figure ST2/V. The adaptor nut shall be held at the far end of the arm by alight wedge of paper. After the point of balance has been obtained, the position of the balance piece shall be adjusted until the sides of the pendulum foot are horizontal.

Reconnect the pendulum to the tester. With the knurled bearing cap removed, measure the distance from the center of oscillation (center of bearing nut) to he point of balance (center of gravity). This distance shall be measured to the nearest 1 mm.

Clamp the pendulum to a holder attached to the scale plate of the tester placed and leveled on a tripod as shown in Figure ST2/IV. Insert the spacer under the adjusting screw of the lifting handle. Adjust the pan balance with a bearing assembly on one pan, and tare mass pieces and an empty measuring cylinder on bearing assembly may be a "ladder" bearing with a rigid, freemoving top plate or a similar arrangement so that no horizontal loads are introduced while measuring the vertical slider load. The pendulum, with a slider, shall be lowered with the vertical height knobs of the tester until the slider is approximately 0,25mm from the top surface of the bearing assembly. Lock the tester at this vertical height and removet he spacer. This will cause an imbalance which must be partially compensated for by adding mass pieces to the opposite pan to bring the pointer to within approximately 200 g of the center scale reading. To complete the balancing procedure, the pointer is returned to the center scale reading by adding water slowly to the graduated cylinder until the balance is at the center of the scale.

Empty the cylinder and repeat the balancing procedure two more times. If smooth and consistent readings cannot be obtained, it may be necessary to move the pans of the balance up and down to activate the spring. If the measurements of the slider mass are still irregular after the spring has been activiated, remove the side and bottom panels of the pendulum foot and inspect for cleanliness of the bearing surfaces and knife-edges (see Figure ST2/II). Clean if necessary and determine the slider load.

Record the average mass required to raise the slider so that the balance pointer is at the center of its scale. IF the average slider mass between the 76,2 mm wide slider and then pan balance is not within the range 2 500 ± 100 g, adjust the spring tension nut (see Fig. ST2/II) and re-determine the slider mass.

3.2 **Preparation and testing on the road**

3.2.1 **Preparation of apparatus**

3.2.1.1 Levelling

Level the instrument accurately on the test spot by turning the leveling screws until the bubble is centred in the spirit level (see 5.3)

3.2.1.2 Zero adjustment

Loosen the locking knob (directly behind the pendulum pivot) and raise the pendulum mechanism. Turn the vertical height control knobs at the center of the tester to allow the slider to swing free of the test surface. Tighten the locking knob firmly. With the pendulum in the release position, rotate the drag pointer anti-clockwise until it comes to rest against the adjustment screw on the pendulum arm. Release the pendulum by pressing the release button and note the pointer reading. If the reading is not zero, loosen the locking ring, rotate the friction ring on the bearing spindle slightly, and lock again.

Repeat the test and adjust the friction ring until the pendulum swing carries the pointer to the zero reading.

3.2.1.3 Slide length adjustment

With the pendulum hanging free, place the spacer under the adjusting screw of the lifting handle. Lower the pendulum so that the edge of the slider just touches the surface. Lock the pendulum head firmly, riase the lifting handle and remove the spacer.

Raise the slider using the lifting handle, move the pendulum to the right, lower the slider and allow the pendulum to move slowly to the left until the edge of the slider touches the surface. Place the contact path gauge beside the slider and parallel to the direction of swing to measure the length of the contact path. Note the position of the slider edge on the guage. The contact path is the distance between the first and second markings on the gauge. If the length of the contact path is not between 124 and 127 mm on a flat surface, adjust by using the vertical height adjustment knob. Place the pendulum in the release position and rotate the drag pointer anti-clockwise until it comes to rest against the adjustment screw on the pendulum arm.

3.2.2 **Measurement of skid resistance**

Clean all loose material from the test area with a brush. Thoroughly wet the test area with water. Execute one swing but do not record the reading. Always catch the pendulum during the early portion of its return swing. While returning the pendulum to its starting position, raise the slider using its lifting handle to prevent contact between the slider and the test surface. Prior to each swing, the pointer should be returned until it rests against the adjustment screw.

Without delay, make four more swings, rewetting the test area each time, and record the readings.

Recheck the slide contact length in accordance with 3.2.1.3.

Record the readings to the nearest whole number, together with the surface temperature, on a suitable data sheet.

4 CALCULATIONS

Calculate the average of the four readings for each test spot and report as the British Portable (Tester) Number (BPN) for the particular test spot.

5 **NOTES**

5.1 New sliders shall be conditions prior to use by making ten swings on no. 60 grade silicone cloth or equivalent material under dry conditions. The swing shall be made with the tester adjusted as described in paragraph 3.

5.2 Wear on the striking edge of the slider shall not exceed 3,2mm in the plane of the slider or 1,6 mm vertical to it (see Figure ST2/III).

5.3 Field test surfaces shall BE FREE OF LOOSE PARTICLES AND FLUSHED WITH CLEAN WATER. The test surface does not have to be horizontal, provided that the instrument can be leveled in a working position using only the leveling screws and that the pendulum head will clear the surface.

REFERENCES

1 Giles, C G, SABEY, B E AND CARDEN, K W F. Development and performance of the Portable Skid Resistance Tester. Road Research Technical Paper No. 66, UK Road Research Laboratory, 1964.