Skid Tester
AG190

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User Guide
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1. INTRODUCTION

The Pendulum Tester was designed by Percy Sigler in the 40's and developed at the UK Transport Research Laboratory in 1960's. Originally designed to test road surfaces, but other uses have evolved, and new applications are still emerging.

The apparatus measures the skid resistance between a rubber slider (mounted on the end of a pendulum arm) and the test surface.

Applications now include: -

- Road surface testing
- Testing of new road surface materials under development
- Testing of aggregates in the PSV (Polished Stone Value) Test
- Testing of floors and pedestrian walkways
- Flooring materials product development
- Accident investigations, both traffic and pedestrian
- Litigation investigations
- Testing of pavers, in the Flat Bed Polisher

The Skid Tester has several alternative names:-

- British Pendulum Tester
- Pendulum Tester
- Pendulum Skid Tester
- Pendulum Skid Resistance Tester
- Skid Resistance Tester
- Portable Skid Resistance Tester
- Portable Pendulum Skid Resistance Tester

2. GENERAL INFORMATION

2.1 Setting the tester

1. Attach the rear foot securely to the main frame.

2. Attach the arm to the rotating head, tighten the adapter nut using the supplied c spanner after locating the arm in the catch.

3. Set the base level by means of the spirit level and the three levelling screws on the base frame.

4. Raise the head so that the pendulum arm swings clear of the surface. Movement of the head of the tester, carrying the swinging arm, graduated scale, pointer, and release mechanism, is controlled by an adjustment screw ‘B’ on the column head.

5. With the pendulum arm free and hanging vertically, set the pointer stop screw so that the pointer is hanging vertically in line with the pendulum arm. Check the zero setting. This is done by first raising the swinging arm to the horizontal release position, on the right hand side of the apparatus. In this position it is automatically locked in the release catch. The pointer is then brought round to its stop in line with the pendulum arm. The pendulum arm is released by pressing button C. The pointer is carried with the pendulum arm on the forward swing only. Catch the pendulum arm on its return swing, and note the pointer reading. Return the arm to the release position. Correct the zero setting as necessary by adjustment of the friction rings D. If the pointer has swung past the zero position, rings D are screwed up a little more tightly. If it has not reached zero the rings should be unscrewed a little.

6. With the pendulum arm free, and hanging vertically, place the spacer, which will be found attached to a chain on the base of the vertical column, under the lifting handle setting-screw to raise the slider. Lower the head of the tester using knobs A and B so that the slider just touches the test surface, and clamp in position with knob A. Remove the spacer.

7. Check the sliding length of the conditioned rubber slider over the surface under test, by gently lowering the pendulum arm until the slider just touches the surface first on one side and then on the other side of the vertical. The sliding length is the distance between the two points where the sliding edge of the rubber touches the test surface. (To prevent undue wear of the slider when moving the pendulum arm through the arc of contact, the slider should be raised off the test surface by means of the lifting handle.) If necessary adjust to the correct length by raising or lowering the head slightly. When the apparatus is set correctly the sliding length, measured on the scales provided, should be between 125 and 127 mm for a road test, and 76 mm for a laboratory test.

8. Place pendulum arm in its release position. The apparatus is now set ready for operation.

2.2 Method of use

1. Wet the test surface and slider, using distilled water unless carrying out a dry test.

2. Bring pointer round to its stop. Release the pendulum arm by pressing button C and catch it on its return swing, before the slider strikes the road surface. Note the reading indicated by the pointer.

3. Return the arm and pointer to the release position, keeping the slider clear of the test surface in this operation by means of the lifting handle. Repeat swings, spreading the water over the contact area with a spray, between each swing (unless dry testing). Record the readings as required by the standard used.

4. Raise the head of the tester so that it swings clear of the surface again and check the free swing for zero error.

2.3 Sliders

DESCRIPTION	NAME	SLIDER USAGE
TRRL 3″	**SLIDER 55**	**Road surfaces, surfaces rougher than normal floors**
TRRL 1.25″	**SLIDER 55**	**PSV Test**
FOUR S†	**SLIDER 96**	**Internal floors**
CEN	**CEN**	**Some European standards**

Leather Slider

This slider is rarely used. Different sliders should be used for wet and dry testing.

† Standard simulated shoe sole.

2.4 Slider Rubber Specifications

Four S Rubber

Temperature °C	5	23	40
Lüpke resilience	21±2	24±2	28±2
IRHD hardness		96+-2	

TRRL Rubber

Temperature °C	0	10	20	30	40
Lüpke resilience	43-49	58-65	66-73	71-77	74-79
IRHD hardness	55±5	55±5	55±5	55±5	55±5

CEN Rubber

Temperature °C	0	10	20	30	40
Lüpke resilience	43-49	58-65	66-73	71-77	74-79
IRHD hardness	53-65	53-65	53-65	53-65	53-65

2.5 Slider Rubber Storage

Sliders can be stored up to two years if they are kept in a cool dark and constant environment, preferably below 15°C.

2.6 Slider Preparation

Slider condition is important and should be carried out in accordance with the standard used. See page 6, 14, 17.

NOTE: The operator should ensure they are testing in accordance with the relevant standard. The main variation being slider type, slider conditioning and recording of results obtained.
The operator should be aware of possible causes of error, see page 20 & 21.

3. Testing road surfaces

3.1 Method of use

The following is based on Road Note 27. Road surface testing has historically been carried out in accordance with Road Note 27. However a recent standard has been published BS EN 13036-4 Road and airfield surface characteristics – test method which may contain information that supersedes that given in road note 27.

1. Inspect the road and choose the section to be tested.

2. Set the apparatus on the road surface in the track to be tested, so that normally the slider swings in the direction of the traffic. On surfaces bearing a regular pattern such as ridged or brushed concrete, tests should be made with the conditioned slider operating at 80 ° to the ridges. Take the mean of five readings, as above, at each of five locations in the test track (usually the near side wheel-track) spaced at approximately 5 to 10 metre intervals along the length under test. The mean of these readings gives a representative value of the skidding resistance of the road. Condition the slider by swinging it five times across the dry road surface.

3. The slipperiness of some roads varies considerably across the width of the road and sometimes the crown of the road is the most slippery part. Where this is suspected, tests should also be made on the crown of the road.

3.2 Gradients

The instrument is capable of testing on steep gradients, and in the presence of considerable crossfall.

On gradients the usual procedure is followed, and although the sliding length is then slightly displaced from the central position there is no change from the normal load between slider and test surface and no appreciable change in speed of sliding. Thus the instrument tests correctly whether testing uphill or downhill. The levelling adjustment is sufficient for testing on gradients of up to 1 in 10 (5.7°). Steeper gradients can be tested by inserting a spacer under one levelling screw.

3.3 Factors affecting results

Like all skidding machines, the portable tester can only be used to the best advantage with a full knowledge of the factors influencing skidding resistance. Results must be interpreted with due consideration for all conditions at the time of the tests. The main factors influencing skid resistance are outlined here.

The quantity measured with the portable tester has been termed ‘skid resistance’ and is intended to correlate with the performance of a vehicle with patterned tyres braking with locked wheels on a wet road at 50 km/h.

The order of merit of road surfaces can change substantially between 50 and 130 km/h. Thus skid resistance values, which represent the 50 km/h value, cannot alone be expected to give an indication of high speed performance. The fall-off in

skidding resistance with increased speed on wet roads depends on the roughness of the surface micro-texture, and is considerably less on rough surfaces than on smooth ones. If the tester is used on high-speed roads, an additional criterion indicating texture is required.

Because the portable tester indicates the performance of patterned tyres at relatively low speeds, it is important to record the surface texture or appearance of each road surface tested. On roads where speeds are low it is sufficient to classify the texture from visual inspection.

Table 1

Suggested minimum skid resistance values (wet conditions)

Category	Type of Site	Value
A	Difficult sites such as:- (I) Roundabouts (ii) Bends with radius less than 150 m on unrestricted roads (iii) Gradients, 1 in 20 or steeper, of lengths > 100 m (iv) Approaches to traffic lights on unrestricted roads	65
B	Motorways, trunk and class 1 roads and heavily trafficked roads in urban areas (carrying more than 2000 vehicles per day)	55
C	All other sites	45

Rough textured surfaces where tyre tread pattern would have a negligible effect. Smooth and patterned tyres would generally be equally effective on these surfaces.

Medium textured surfaces where some tread pattern effect would exist. Vehicles having smooth tyres would experience a skidding resistance slightly lower than the value indicated by the tester.

Smooth-textured surfaces where the effects of tread pattern may be large.

(i) On roads where speeds are high, a simple measure of surface texture, the ‘texture depth’, may be determined by the ‘sand patch’ method. A known volume of fine sand is poured in a heap on the road, and spread to form a circular patch so the small valleys on the road are filled to the level of the peaks. The ‘texture depth’ is the ratio of the volume of sand to the area of the patch (calculated from the measured radius).

.(ii) In general the skidding resistance of wet roads is higher in winter than in summer. The magnitude of the variation depends upon:-

(a) road layout and traffic conditions

(b) road surface characteristics

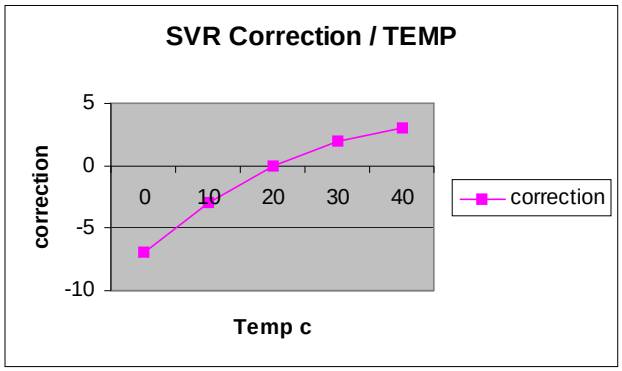
(c) the weather

It varies considerably from one road to another, so that it is not possible to predict the skidding resistance at one time of year from a single measurement made at another time. It is also important to note that roads with satisfactory values in winter (especially in December, January and February) may prove slippery during the summer. The date of the test should therefore always be recorded.

(iii) The effect of temperature on rubber resilience exerts a perceptible influence in all skidding resistance measurements; it shows itself as a fall on skidding resistance as the temperature rises. In addition, the magnitude of the variation of skidding resistance with temperature varies considerably from road to road, mainly because of the changes in road surface texture. The effects of temperature only becomes important for tests made at temperatures below 10° C, and then its main use is to give a more accurate assessment of the skidding resistance which the road is likely to offer to the tyres of vehicles, since they are likely to be running at temperatures rather higher than that of the slider rubber on the portable tester.

To help with interpreting results, the temperature of the water lying on the road immediately after the test should be recorded. It must be stressed, however, that the change in state of polish of road surfaces throughout the year is a much bigger factor determining changes in 'skid-resistance' than is the change in temperature. The latter accounts for about one-quarter of the total change in 'skid-resistance', which is primarily due to real and reversible changes in the road surface.

(iv) Owing to variations in skidding resistance across the width of the road, care should be taken in choosing the track to be tested; the actual position should be recorded for future reference.



(v) Forms for recording data are attached.

3.4 Texture depth - sand patch method

Apparatus and material

1. Dividers to measure 20 cm. Radius
2. Millimetre rule
3. Cylinder approximately 200 cc. in volume.
4. Flat wooden disk of 6.5 cm diameter, with a hard rubber disc of 1.5 mm thickness, of the same diameter stuck to one face. A handle should be fixed to the wooden face.
5. A 250 cc plastic container to hold sand.
6. A soft hand brush.
7. Sand, which will pass a No 52 BS sieve and be retained on a No. 100 BS sieve. Natural sand with a round particle shape should be used.

Test procedure

The surface to be measured must be dry and should be first swept with a soft brush.

Fill the cylinder with sand. When full, gently tap the base of the cylinder three times on the road surface, and then top up and level the top with a straight edge.

Pour the sand in a heap on the surface to be tested.

In windy conditions use a tyre to surround the sand.

Spread the sand over the surface, using the disc in a circular motion, levelling the sand into a circular pattern.

Measure the radius of the patch (using dividers).

Make a number of tests parallel to the kerb.

Calculation of Texture Depth

See attached table

Formula

V = volume of cylinder

R = radius of patch

TD = texture depth

$$TD = \frac{V}{\pi R^2}$$

Sand patch texture depth calculations

Volume of Cylinder	Radius of Patch	Texture Depth	Volume of Cylinder	Radius of Patch	Texture Depth	Volume of Cylinder	Radius of Patch	Texture Depth
251.3	5.1	3.08	251.3	9.4	0.91	251.3	13.7	0.43
251.3	5.2	2.96	251.3	9.5	0.89	251.3	13.8	0.42
251.3	5.3	2.85	251.3	9.6	0.87	251.3	13.9	0.41
251.3	5.4	2.74	251.3	9.7	0.85	251.3	14.0	0.41
251.3	5.5	2.64	251.3	9.8	0.83	251.3	14.1	0.40
251.3	5.6	2.55	251.3	9.9	0.82	251.3	14.2	0.40
251.3	5.7	2.46	251.3	10.0	0.80	251.3	14.3	0.39
251.3	5.8	2.38	251.3	10.1	0.78	251.3	14.4	0.39
251.3	5.9	2.30	251.3	10.2	0.77	251.3	14.5	0.38
251.3	6.0	2.22	251.3	10.3	0.75	251.3	14.6	0.38
251.3	6.1	2.15	251.3	10.4	0.74	251.3	14.7	0.37
251.3	6.2	2.08	251.3	10.5	0.73	251.3	14.8	0.37
251.3	6.3	2.02	251.3	10.6	0.71	251.3	14.9	0.36
251.3	6.4	1.95	251.3	10.7	0.70	251.3	15.0	0.36
251.3	6.5	1.89	251.3	10.8	0.69	251.3	15.1	0.35
251.3	6.6	1.84	251.3	10.9	0.67	251.3	15.2	0.35
251.3	6.7	1.78	251.3	11.0	0.66	251.3	15.3	0.34
251.3	6.8	1.73	251.3	11.1	0.65	251.3	15.4	0.34
251.3	6.9	1.68	251.3	11.2	0.64	251.3	15.5	0.33
251.3	7.0	1.63	251.3	11.3	0.63	251.3	15.6	0.33
251.3	7.1	1.59	251.3	11.4	0.62	251.3	15.7	0.32
251.3	7.2	1.54	251.3	11.5	0.60	251.3	15.8	0.32
251.3	7.3	1.50	251.3	11.6	0.59	251.3	15.9	0.32
251.3	7.4	1.46	251.3	11.7	0.58	251.3	16.0	0.31
251.3	7.5	1.42	251.3	11.8	0.57	251.3	16.1	0.31
251.3	7.6	1.38	251.3	11.9	0.56	251.3	16.2	0.30
251.3	7.7	1.35	251.3	12.0	0.56	251.3	16.3	0.30
251.3	7.8	1.31	251.3	12.1	0.55	251.3	16.4	0.30
251.3	7.9	1.28	251.3	12.2	0.54	251.3	16.5	0.29
251.3	8.0	1.25	251.3	12.3	0.53	251.3	16.6	0.29
251.3	8.1	1.22	251.3	12.4	0.52	251.3	16.7	0.29
251.3	8.2	1.19	251.3	12.5	0.51	251.3	16.8	0.28
251.3	8.3	1.16	251.3	12.6	0.50	251.3	16.9	0.28
251.3	8.4	1.13	251.3	12.7	0.50	251.3	17.0	0.28
251.3	8.5	1.11	251.3	12.8	0.49	251.3	17.1	0.27
251.3	8.6	1.08	251.3	12.9	0.48	251.3	17.2	0.27
251.3	8.7	1.06	251.3	13.0	0.47	251.3	17.3	0.27
251.3	8.8	1.03	251.3	13.1	0.47	251.3	17.4	0.26
251.3	8.9	1.01	251.3	13.2	0.46	251.3	17.5	0.26
251.3	9.0	0.99	251.3	13.3	0.45	251.3	17.6	0.26
251.3	9.1	0.97	251.3	13.4	0.45	251.3	17.7	0.26
251.3	9.2	0.95	251.3	13.5	0.44	251.3	17.8	0.25
251.3	9.3	0.92	251.3	13.6	0.43	251.3	17.9	0.25
						251.3	18.0	0.25

4. Floor Testing

4.1 Instruments Used

Skid Tester (Pendulum Tester)

Rank Taylor Hobson Surtronic 10 Roughness meter

4.2 Selection of a Test Site

A wide variety of conditions of use should be included. For example, a doorway subjected to heavy traffic, an area close to a source of contamination such as a vending machine, and finally a little used area in a corner or behind a door.

If there has been an accident then results relating to the accident site are best obtained within as short a time as possible, and preferably before any cleaning has been carried out. Where this is not possible, it must be clearly stated in the report that conditions at the test site may not be the same as those which existed at the time of the accident.

4.3 Test Procedure

The test should be carried in accordance with the standard or guide lines used. (See page 29 & 30)

4.4 Interpretation of results

The presently accepted test limits when using a Four S rubber slider presented in Table 1, are those recommended by the UK Slip Resistance Group.

Table 1

Classification of flooring. Four S rubber.

High	25 and below
Moderate	25 to 35
Low	35 to 65
Extremely Low	65 and above

The Slip Resistance of the floor for able-bodied pedestrians, when tested with the Pendulum and Four S rubber, can be interpreted using Table 1 (with some consideration of roughness as stated later in the text). A high dry pendulum result will often be associated with a low wet result, but in extreme cases, a low dry result can be lower than the corresponding wet result.

In borderline regions Rtm roughness is an important and perhaps a dominating factor.

4.5 Roughness Measurements

Roughness can bring about an improvement in slip resistance in wet conditions. Irregularities can bite through and break up a water film, establishing contact with the shoe sole or heel. In this regard peaks are more helpful than troughs.

The measurement of the various aspects of surface roughness is complex, but it has been established empirically that a measure of peak to trough roughness (Rtm or Rz DIN roughness) is itself a useful guide to slip resistance.

Research has suggested that hard floors need to have a higher Rtm roughness than polymeric floors for the same degree of safety in wet conditions, but whatever flooring material is used an Rtm roughness value of at least 10 µm is needed. In circumstances where wetness is normal or expected, this figure may need to be significantly increased. High pendulum and roughness readings generally indicate a satisfactory floor. Conversely low pendulum and roughness readings indicate an unsatisfactory floor when wet.

Allowance for surface texture is made by taking measurements in three different directions.

4.6 Rough Concrete and Coarse Pavers

The standard TRRL Rubber is an appropriate choice of slider material and readings obtained may be interpreted according to the following table.

Table 2.

Condition of Flooring - T.R.R.L rubber

High	Below 19
Moderate	20 to 39
Low	40 to 74
Extremely Low	75 and above

4.7 Profiled Floors

Floors used in wet areas, such as swimming pool surrounds are often profiled. The profiling serves two purposes, firstly it helps to drain water away and secondly, it enables soft-shoe sole/heel materials or bare feet to deform and to obtain a better grip.

While, in general, profiled floors in wet conditions are safer than flat floors, this is not universally the case. Some profiled floors with rounded corners on the profiling and no degree of surface roughness can be very slippery in wet conditions. Direct measurement of friction on profiled surfaces is more difficult than on flat surfaces.

Results depend on the size of the raised profile areas and the ratio of high to low areas (distance apart of raised blocks). Nevertheless, although pendulum results on profiled floors can be misleading, low pendulum readings in wet conditions on a profiled floor give cause for concern. When coupled with low roughness readings on the upper surfaces this combination of factors may indicate a slippery surface.

4.8 Slider Preparation

Prepare the slider in accordance with the standard used

Unless otherwise stated, the working edges of a new slider shall be prepared by passing them ten times across 400 grade resin bonded paper, conforming to BS 871 and then ten times across 3M Pink Polishing Paper, using the matt surface.

The bevel on the working edge shall not exceed 4 mm.

The rubber shall be free from contamination, e.g. abrasive or oil.

Sliders shall be stored in the dark at a temperature of 20 °C or less. (Preferably 15° C).

For testing smooth surfaces, e.g. floors, the sliding edge shall be maintained in a smooth polished state by the use of the polishing paper as described or, where the surface has become damaged , by the use of 400 grade paper first.

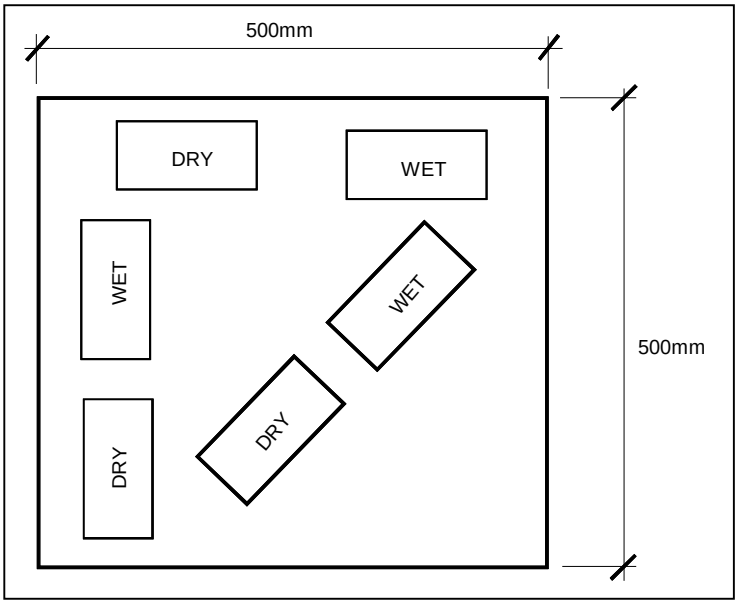
For testing rough surfaces, e.g. roads or pavements, the use of 3M Pink Polishing Paper is not required.

NOTE. The paper for preparing the slider shall be firmly attached at its leading edge to a smooth rigid backing surface (floated glass) for this operation.

4.9 Test Areas

At least six test areas 150 mm x 100 mm or greater are required to accommodate wet and dry measurements.

Each test area should be used only once.



4.10 Dry and Wet Testing

The procedure is identical for dry and wet testing except that in dry testing the test surface and slider should be thoroughly dried. Even a small amount of water can effect test results.

When testing a floor surface in the as found condition the slider should be cleaned between each test swing.

It should be noted that the first swing could partially clean the surface, there by affecting the following readings.

4.11 Laboratory testing of flooring materials

Testing should be carried out in accordance with the relevant standard or guidelines.

Use the following cleaning procedure or other agreed with the customer.

Wipe all flooring materials received for testing in the laboratory, with a clean, dry paper towel to remove all dust prior to testing.

Prior to testing, place all flooring material on a clean flat bench. Cover with tissue and then condition at 23±2 °C and ambient humidity for at least 16 hours before testing takes place.

It is necessary that at the time of testing the flooring material is flat and securely fixed so as to avoid movement of the sample during testing.

We can supply a base plate and sample holder to accommodate tiles 200sq or 500sq.

5. PSV / PPV Testing

5.1 Method of use

The PSV test is usually carried out to BS EN 1097-8 which is replacing BS812:114

The base plate, sample holder, 1¼'' TRL slider (conditioned), 'F' scale and Criggion sample are required to test the polished samples.

Place the tester on the Base plate and level the machine using the levelling screws.

Using the height adjustment knob raise the arm so it can swing clear of the sample.

Check the pointer and arm are parallel, the pointer tip should line up with the line on the bottom of the scale plate when the pointer is against the pointer stop and the arm is in the vertical position.

Zero the pointer by placing the arm into the catch (horizontal position) and turn the pointer until it hits the pointer stop screw. Press the release button to allow the arm to swing remembering to catch the arm on the return swinging motion.
If the pointer does not come to rest at the zero position adjust by turning the two friction disc adjustment rings.

Check the slider swings across the sample and is parallel. Adjust by repositioning levelling feet location blocks.

Adjust the height of arm so that the slider tip is in contact with the sample for a distance of 76mm horizontally. The sample holder should be marked with lines 76mm apart to assist. Wet the surface of the sample and slider with plenty of clean water release the arm from the catch position.

5.2 PSV Test Slider preparation

Slider preparation should be carried out in accordance with the standard used.

We can supply a Criggion sample for calibration / slider conditioning purposes.(SRV 58 to 66).

Before using a new slider swing it 5 times over the dry surface of the Criggion sample and then 20 times over its wetted surface.

Before measuring the set of specimens polished on a test run, ensure the performance of the slider by testing on the Criggion sample of known value. (Not the Criggion sample used for slider conditioning).

6. Appendix

6.1 Scale calculations

The scale engraved on the skid tester has been in use for many years. It has often been described as an arbitrary one without mathematical basis, which is not correct.

The simplest explanation is that the scale is the co-efficient of friction times 100. However this explanation is not strictly correct. There are a number of small differences between COF x 100 and BPN (British pendulum number), and a major difference's are due to the coupling effect when the slider edge strikes the test surface and the load used to tension the spring being less than the slider tip load. It was originally intended these loads would be the same. For a more detailed analysis of this factor see Reference No 1 – Technical Paper No 66. And procedure for checking the calibration of RRL portable skid resistance testers B E Sabey.

COF x 100 to PV Conversion Table

COF x 100	SRV (BPN)
1	1
2	2
3	3
4	4
5	5
6	6
7	7
8	8
9	9
10	10
11	11
12	12
13	13
14	14
15	15
16	16
17	17
18	18
19	19
20	20
21	21
22	22
23	23
24	24
25	25
26	26
27	27
28	28
29	29
30	30
31	31
32	32
33	32
34	33
35	34
36	35
37	36
38	37
39	38
40	39
41	39
42	40
43	41
44	42
45	43
46	44
47	44
48	45
49	46
50	47

COF x 100	SRV(BPN)
51	48
52	48
53	49
54	50
55	51
56	51
57	52
58	53
59	54
60	55
61	55
62	56
63	57
64	58
65	58
66	59
67	60
68	60
69	61
70	62
71	63
72	63
73	64
74	65
75	65
76	66
77	67
78	68
79	68
80	69
81	70
82	70
83	71
84	72
85	72
86	73
87	74
88	74
89	75
90	76
91	76
92	77
93	77
94	78
95	79
96	79
97	80
98	81
99	81
100	82

6.2 Routine Maintenance / Guide Lines

Possible faults :-

1. **The arm does not release from the catch block freely.**
Ensure when attaching the arm to the skid tester the arm is located in the catch block before final tightening of the adapter nut.
If this does not correct the problem adjust the catch position. Ensure the arm is tightly fixed to the rotating head. Slacken off the catch using supplied Allen key and offer the arm up to the catch block, position the catch in the catch block and retighten the catch so that on release of the arm the catch does not rub against the catch block.

2. **Arm does not swing parallel to the main frame**.
Using the supplied Allen key slacken-off the two cotter pins at the rear of the machine and turn the body of the machine as required. Measure the distance from the front of the foot to the frame, in three different positions of the swing. They should be constant. Retighten the cotter pins.

3.**The pointer is bent.**
Using a spirit level check the pointer is vertical and that the tip is directly below the centre of rotation of the pointer/arm. The skid tester has an engraved line on the scale plate to assist. If necessary adjust the pointer to align with the mark and recheck that the arm and pointer are parallel. (As item 5)

4. **The foot is not square to the main frame**.
Using the supplied Allen key slacken-off the clamping ring under the adapter nut on the arm's shaft. Turn the foot until the foot is parallel to the base and re-tighten the clamping ring.

5. **The pointer is not parallel to the arm**.
Level the machine. With the arm hanging vertically and the pointer against the pointer stop located on the rotating head, check the pointer tip is in line with the engraved line on the scale plate. If not adjust the pointer tip position by turning the pointer stop screw until the pointer tip lines up with the engraved line.

6. **Pointer does not reach zero**
Check the items listed above, if they are not the cause of the problem, remove the pointer and clean the bearing surfaces. Using a light oil sparingly lubricate the felt washers and shaft that the pointer turns on. Check the bearings in the rotating head housing are turning freely, lubricate if necessary .

7. **Results are lower than expected**
Check the above items. Check the lifting handle adjustment screw has not been over tightened. There should be a small amount of play between the screw tip and foot body.
Over time the bearings in the foot can become contaminated with dirt / grit and may need flushing out using white spirit or similar.
Check the pressure disk abutting the felt washer on the pointer is fixed and not free to rotate.
When oiling or cleaning ensure no spillage can occur after re-assembly, which could cause contamination of the test surface and slider.

Before commencing any maintenance work to correct a suspected faulty machine check the following :-

Is the machine level?
Is the pointer bent?
Is the pointer parallel to the arm?
Has the machine been zeroed?
Is the correct scale being used?
Is the sliding length correct?
Is the slider the correct type and is it conditioned?
Is there any surface contamination?
Is water being used between test swings?
Do results need adjusting for temperature?

Further tests as carried out in the calibration procedure are explained in the calibration rig operating instructions. (S892)

6.3 Check Testing of Skid Tester Using Float Glass and Pink Polishing Paper

1. Introduction

   The following procedure will enable a user to carry a periodic check of the condition of the machine and slider before use. If the values obtained are outside the limits given below, this is an indication of a fault with the machine and/or slider, which should be investigated.

2. Equipment

   Dedicated conditioned 3" Four S or TRRL slider.

   Two dedicated sheets of float glass, 300 x 300 mm, with one face of each suitably labelled as the test surface. One sheet is used as a test surface, the other is used to attach a sheet of Pink Polishing Paper.

   A supply of 3M Pink Polishing Paper. The matt side is the test surface.

3. Before testing clean the float glass test surface with water, followed by methylated spirits or methanol, then dry using a dry lint free cloth.

4. Condition all equipment including the skid tester for 16 hours at 23 ± 2 ° C.

5. Set up the skid tester on a firm horizontal surface.

6. Ensure the test samples are positioned securely.

7. Condition the rubber slider by making 10 swings across the wetted Pink Polishing Paper.

8. Using the recommended operating procedure, see Skid Tester Operating Instructions, and using either of the sliders described above, determine the skid resistance of each of the test surfaces, float glass and Pink Polishing Paper.

9. Check the values obtained are within the ranges below when using a 3" slider, 125-127 slide length, at 23± 2, read from the main scale.

	Four S	TRRL
Float Glass	7 ± 3	8 ± 2
Pink Polishing Paper	65 ± 3	57 ±2

6.4 Calibration

When manufactured machines are calibrated and a certificate issued.

Under conditions of normal use a skid tester will continue to operate correctly for several years. However mechanical damage, difficult to identify often causes machines to produce inaccurate results.

The standards recommend annual calibration. To send a machine back to the UK is both an expensive and lengthy business. There is available a calibration rig, together with a calibration procedure. This system will enable a laboratory outside the UK to carry out calibration checks for users in the same country.

FRICTION TEST RESULTS - ROAD/FLOOR SURVEY

Company - Magnatest	Date - 14 August 1997
	Operator - B Hines
Test No 4711	

LOCATION	Test Result								Mean	Temp Air	Temp Surf
Kingsholm Factory											
Floor No 1	36	37	36	36	36	36	35	35	36	18	11
Floor No 2	40	38	39	38	38	37	37	37	37	19	10
Floor No 3	26	27	26	26	25	25	25	25	25	23	12

Notes

IMPACT
IMPACT
IMPACT

Polished Stone Value - Friction Test Results

Test No	64

Date	02/03/98

Run A

Time	Coarse	Fine
On	0	0
Off	3.00.10	3.00.05
Counter	114791	
Feed Rate (g/m)	29.0	2.7

Run B

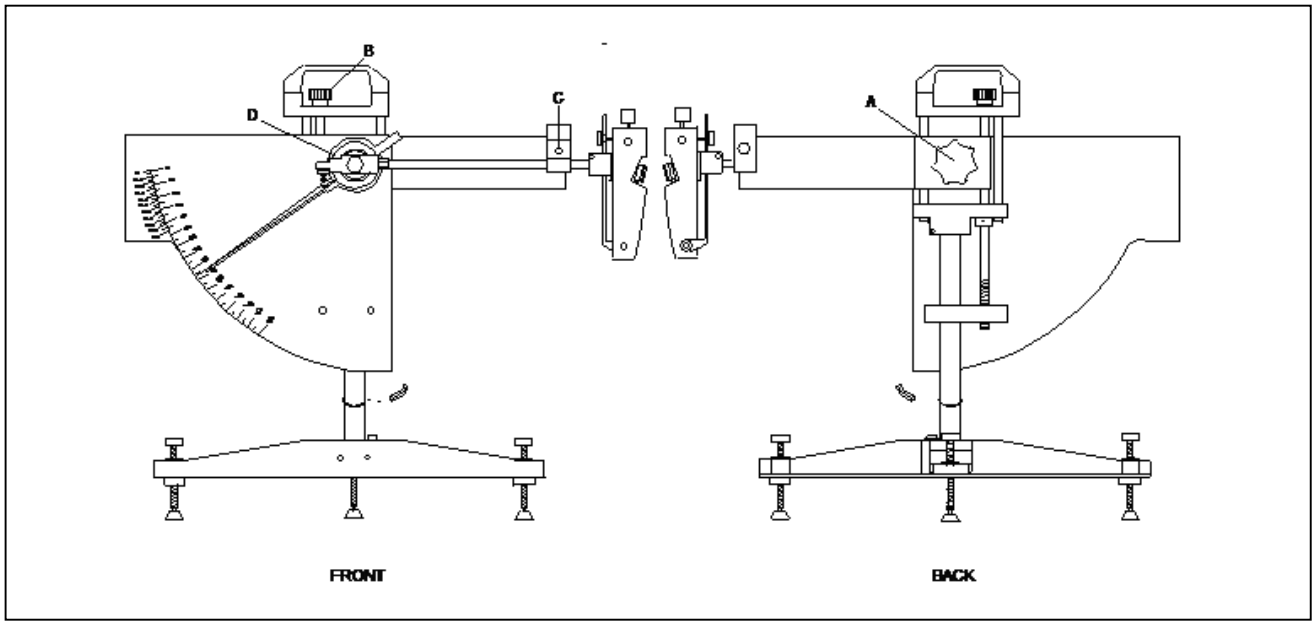
Time	Coarse	Fine
On	0	
Off	3.00.08	3.00.01
Counter	114990	
Feed Rate (g/m)	26.0	2.8

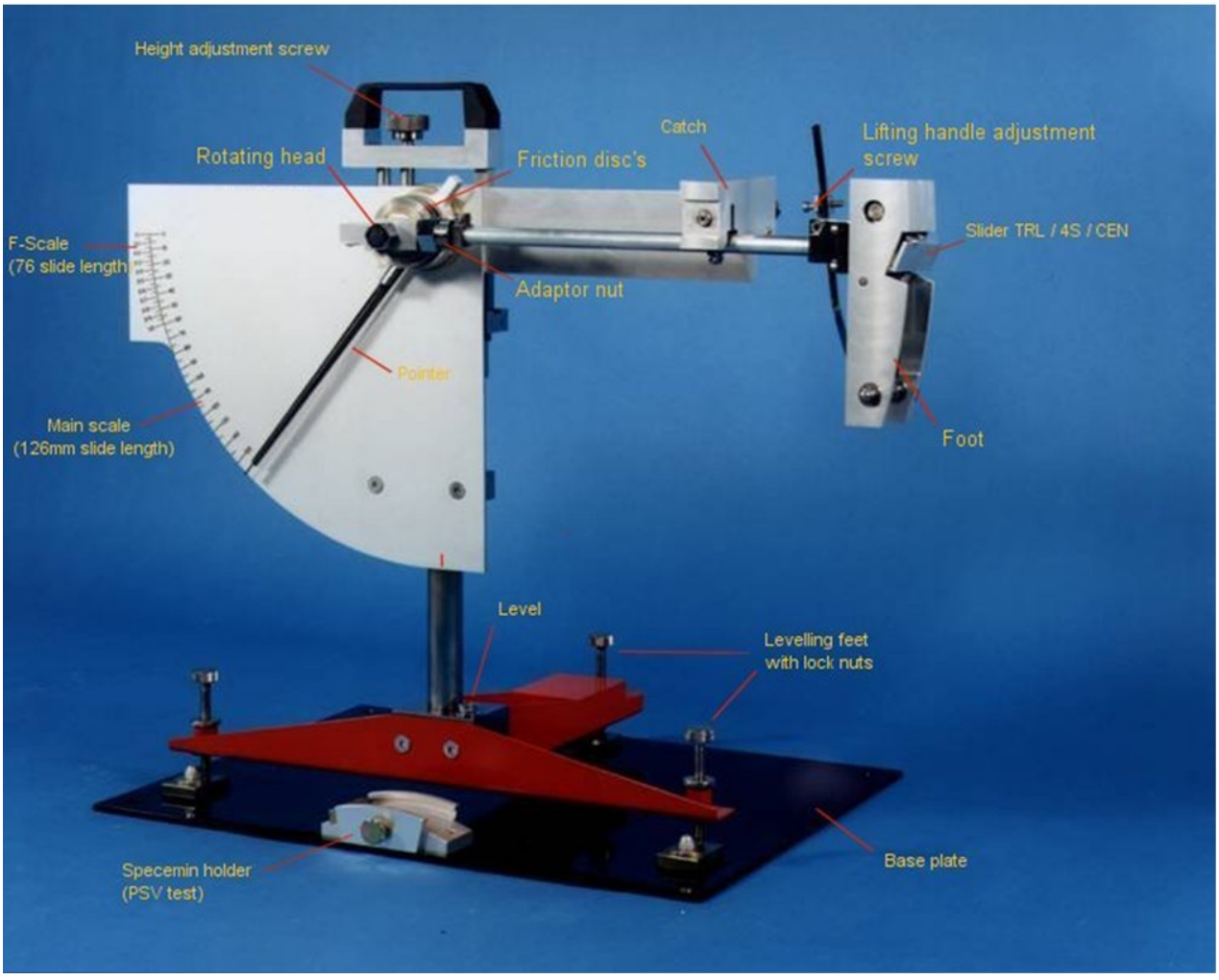
Specimen	Test Result					Mean	Test Result					Mean
Criggion	62	60	58	58	58	58.0	60	59	58	57	58	57.3
1	64	62	60	60	60	60.0	62	61	59	60	60	59.7
2	64	63	60	60	60	60.0	64	63	60	60	60	60.0
3	55	54	50	51	51	50.7	54	53	51	51	52	51.3
4	54	53	50	51	52	50.3	54	53	51	51	50	50.7
5	54	53	51	51	51	51.0	51	50	49	49	50	49.7
6	54	53	50	50	50	50.0	52	51	50	50	50	50.0
7	70	69	69	68	68	68.3	70	69	68	68	68	68.0
8	70	70	70	69	70	69.7	69	69	68	67	68	67.7
9	63	64	61	61	61	61.0	64	63	63	62	62	62.3
10	64	64	63	62	62	62.3	65	63	62	62	62	62.0
11	45	45	43	43	43	43.0	44	43	41	41	42	41.3
12	46	45	42	43	43	42.7	44	43	42	41	42	41.7
13 Control	53	52	50	50	50	50.0	53	52	50	50	50	50.0
14 Control	50	52	50	50	51	50.3	54	53	51	51	51	51.0
						50.5						50.5

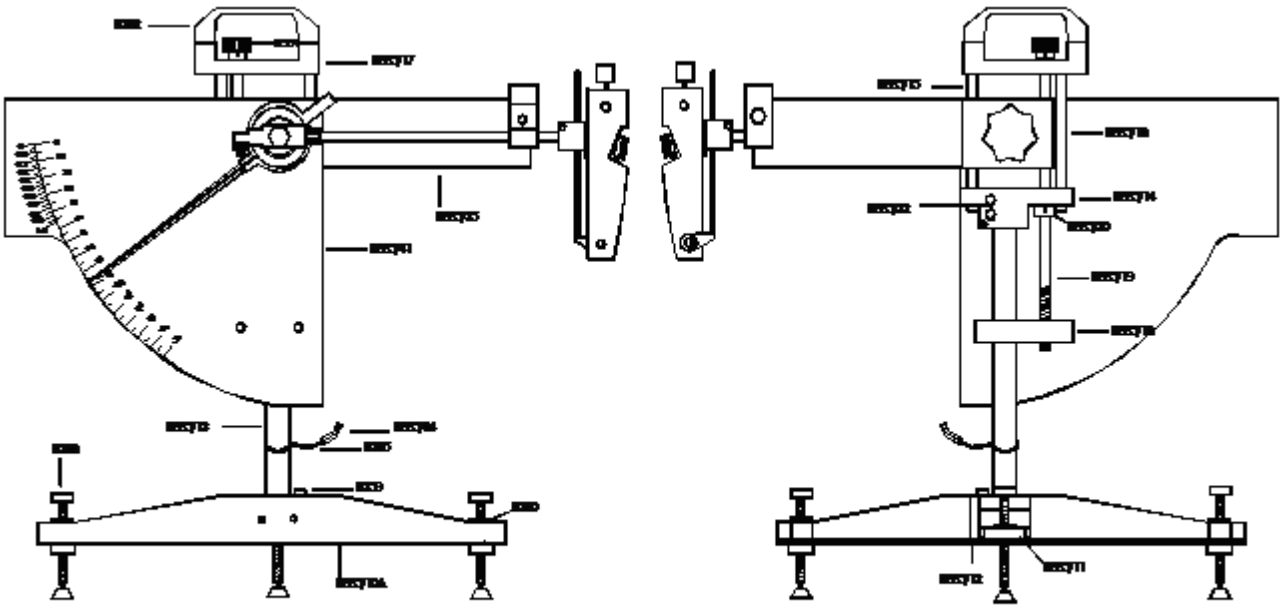
Sample Ref No	Source	Specimen Nos	Mean Test Results (S)	PSV
4236	Holt	1+2	59.9	62
4403	Yeo	3+4	50.8	53
4497	Cwmtyrch	5+6	50.1	52
4537	Clew	7+8	68.4	71
4558	Scargill	9+10	61.9	64
4604	Aberthin	11+12	42.2	44
1475	Control	13+14	50.3 (C)	
P.S.V. = S + 52.5 - C				

Operator	T H Jones

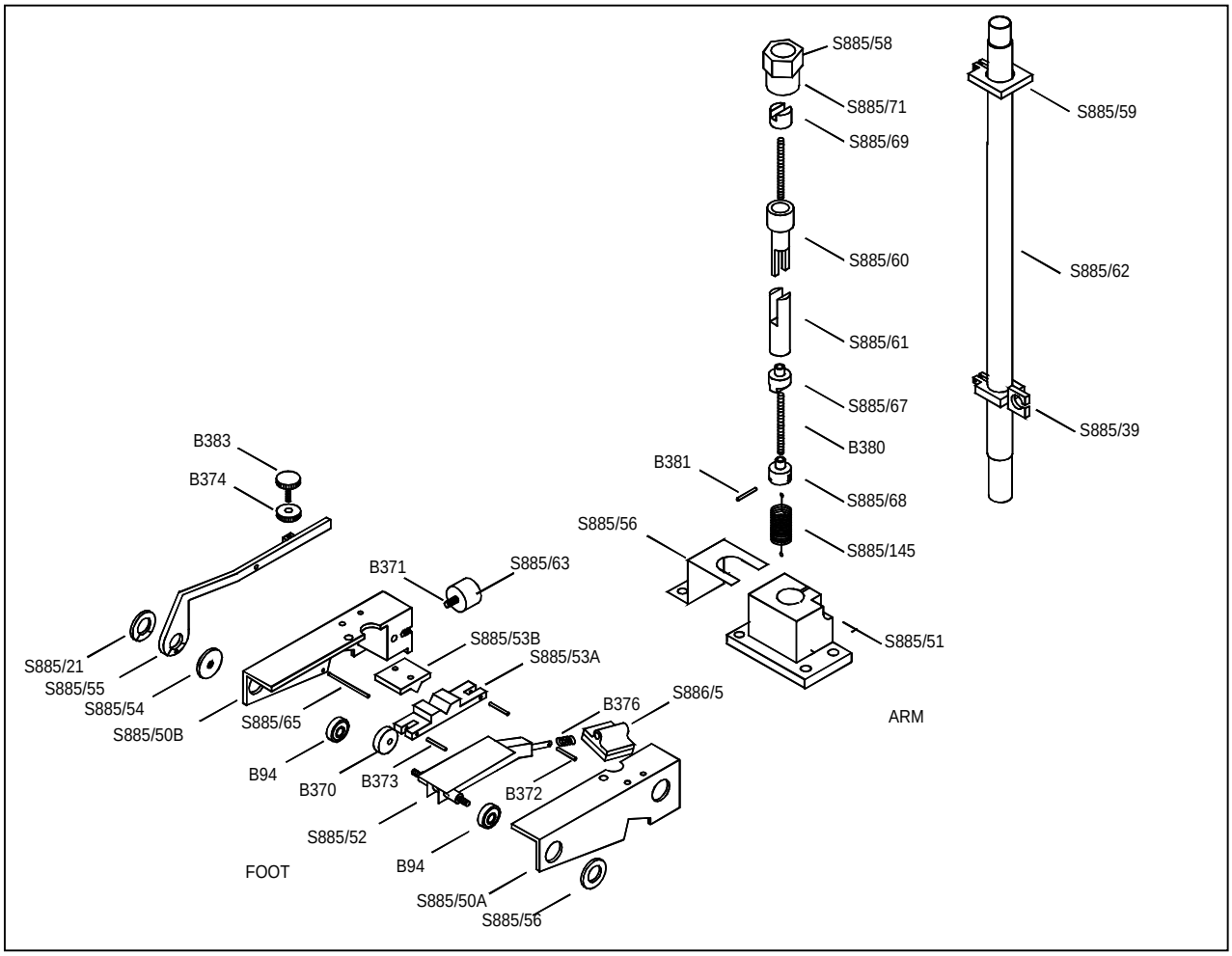
6.7 Identification of parts







FRONT BACK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ARM
S885/59
S885/62
S885/39
B381
S885/56
B383
B374
S885/21
S885/55
S885/54
S885/50B
S885/65
B371
S885/63
S885/53B
S885/53A
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B94
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B94
FOOT
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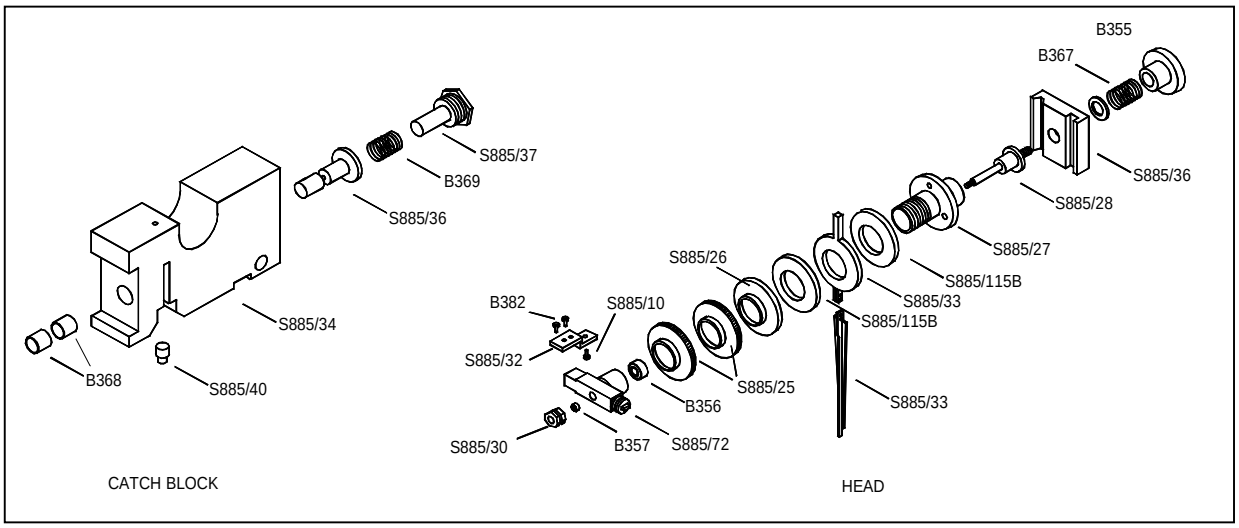
S885/37
B369
S885/36
S885/34
B368
S885/40
CATCH BLOCK
B355
B367
S885/36
S885/28
S885/27
S885/115B
S885/33
S885/115B
S885/26
B382
S885/10
S885/32
S885/25
B356
S885/33
S885/30
B357
S885/72
HEAD

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6.9 Standards

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   Testing Aggregates. Methods for determination of mechanical properties

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   Clay and silicate pavers for flexible pavements Pt. 1 – specification for pavers.

3. BS 7044: 1990 : Section 2.2
   Artificial sports surfaces : person/surface interaction.

4. BS 7188: 1989
   Impact absorbing playground surfaces.

5. BS 7932: 1998
   Method for determination of Polished Paver Value.

6. BS 8204: Part 3 : 1993
   Insite flooring Part 3. Code of practice for polymer modified cementitious flooring.

7. ASTM E303: 93
   Standard test method for measuring the surface frictional properties using the British Pendulum Tester.

8. BS EN 1097-8: 2000
   Tests for mechanical and physical properties of aggregates. Determination of polished stone value

9. DIN 51 097: 1992: Testing of floor coverings. Determination of anti-slip properties. Wet-loaded bare foot areas. Walking method – Ramp test.

10. DIN 51 130: 1992: Testing of floor coverings. Determination of anti-slip properties. Workrooms and work areas with increased risk of slip. Walking method – Ramp test.

11. BS 7976 Pendulum testers

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    Road marking materials

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