

SKID RESISTANCE TESTER



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CHAPTER 1: GENERAL INFORMATION

1.1 WARNINGS

Users: Forwarder - Operators - Maintenance Workers - Wrecker

The manufacturer does not accept any responsibility for direct or indirect damage to people, things or animals and use of the appliance in different conditions from those foreseen. The manufacturer reserves the right to make changes to the documentary information or to the appliance without advance notice.

Check the machine responds to the standards in force in the state in which it has been installed. All operations necessary for maintaining machine efficiency before and throughout use are the operator's responsibility. CAREFULLY read the entire manual before operating the machine. It is vital to know the information and limitations contained in this manual for correct machine use by the operator. Interventions are only permitted if the operator is accordingly competent and trained. The operator must be knowledgeable about machine operations and mechanisms. The purchaser must ensure that operators are trained and aware of all the information and clarifications in the supplied documentation. Even with such certainty the operator or user must be informed and therefore aware of potential risks when operating the machine.

Safety, reliability and optimum performance is guaranteed when using original parts.

Any tampering or modifying of the appliance (electrical, mechanical or other) which has not been previously authorised in writing by the manufacturer is considered abusive and disclaims the constructor from any responsibility for any resulting damage.

All necessary operations to maintain the efficiency of the machine before and throughout use are the responsibility for any resulting damage. All necessary operations to maintain the efficiency of the machine before and throughout use are the responsibility of the user. The manual includes "WARNING" and "DANGER" indications in relevant chapters. These indications are shown with the words "DANGER" or "WARNING" in bold font and uppercase to make them highly visible.

"WARNING" indicates that machine damage could be caused should indications be ignored. "DANGER" indicates that machine damage and/or injury to the worker could be caused should indications be ignored.

CHAPTER 2: GENERAL STANDARDS

2.1 GENERAL STANDARDS

THE USE, TRAN<mark>SPO</mark>RTATION, INSTALLATION, MAINTENANCE, DEMOLITION AND DISPOSAL OF THE APPLIANCE ARE ONLY PERMITTED TO "QUALIFIED PERSONNEL". THE MANUAL IS EXCLUSIVELY AIMED AT "QUALIFIED PERSONNEL" AND CONTAINS THE NECESSARY INFORMATION FOR MACHINE USE.

"QUALIFIED PERSONNEL" means people who, due to their training, experience and education as well as knowledge of the relevant standards, limitations and measures, have been authorised by the "PLANT SAFETY MANAGER" to carry out any necessary activity and are able to recognise and avoid any possible danger.

The manufacturer recommends that the instructions, procedures and recommendations in this manual and the work safety legislation in force be scrupulously adhered to even with the use of appropriate protection devices (whether individual or part of the machine).

Knowledge and respect of the instructions, safety warnings and danger in this manual are all necessary for installation, operation, management and machine maintenance with a minimal risk.

The PLANT SAFETY MANAGER has the following responsibilities and duties:

 To know the machine functions, its commands, safety and protection devices, possible dangers of use and all the information in this manual in detail. This knowledge can only be gleaned from detailed reading of this manual.

- To know the safety legislation in force in detail in order to operate the machine
- To recognise the QUALIFIED PERSONNEL for transportation, handling, installation, use, maintenance, disposal, etc.
- Correctly train and educate the QUALIFIED PERSONNEL before allowing them access to the machine. The personnel must also be exhaustively trained with regards to the machine's protection devices.
- Ensure the machine's safety devices are not tampered with or removed and are checked on a daily basis. Provide the operator appropriate individual protection devices according to the laws in force.

The constructor is available for clarification, assistance and training ad declines all responsibility for damage to things or people resulting from improper, incorrect and negligent use by trained/untrained personnel.

2.2 MACHINE SAFETY DEVICES AND PROTECTION

DEFINITION: Protections are all the safety measures that consist of the use of specific technical means (repairs, safety devices) to protect people from dangers which cannot be limited reasonably in design.



Tampering with the protections or any appliance modification could cause risks to users or other exposed people.

The manufacturer does not assume any responsibility for direct or in direct damage to people, things or animals following tampering with the protections.

PASSIVE SAFETY DEVICES

Passive safety devices are the devices or solutions which eliminate or reduce the risks to the operator without any active intervention by the operator.

ACTIVE SAGETY DEVICES

Active safety devices are the devices or solutions which eliminate or reduce the risks to the operator and require active and conscious intervention by the operator for the preventive action to be carried out.

2.3 DANGEROUS ZONE

"DANGEROUS ZONE" indicates any zone inside or in the proximity of the appliance in which a person is exposed to the risk of injury or damage to health.

There are residual risks for the operator during some procedures of machine use. Such risks can be eliminated according to the elementary work and behavioural regulations or more specifically according to the procedures mentioned in this manual by adopting the individual protection devices mentioned.

GENERAL STANDARDS

- Before regular use of the instrument it is important to check it is in correct working conditions and that its parts are not defective or worn. Carry out any necessary maintenance operations.
- Be careful of electric shocks for direct and indirect contact caused by unforeseen damage to the electrical system
- Do not subject the appliance to strong impact
- Do not expose the appliance to welding sparks or extreme temperatures
- Do not allow the appliance to come into contact with corrosive substances
- Do not wash the appliance with jets or water

DURING USE

- In order to ensure operator safety do not touch any part of the instrument during the test and use the appropriate Individual Protection Devices.
- Manufacturing products can present health risks to the operator. As a precaution do not breathe the steam and avoid contact with eyes and skin.

TRANSPORATION

- Ensure the equipment is correctly supported at the lifting point and that the machine does not slip.
- Do not remain in direct line with the application of force and do not allow personnel where there are loads that cannot be adequately supported by mechanical means.

RISK OR DANGER	SUGGESTED SAFETY DEVICES
Hand or Limb Crushing	Reinforced Gloves
Scratch – Cut	Reinforced Gloves
Steam Ejection	Suit and Gloves

CHAPTER 3: INSTALLATION INSTRUCTIONS

3.1 TRANSPORTATION AND MOVEMENT

The instructions included in this section must be followed during the transportation phases and during:

- The storage of the appliance
- The first installation
- The reallocation of the equipment

The instrument is usually sent and delivered in an appropriate transportation case.



In order to avoid irreparable machine damage, move with care, do not overturn, protect from rain, do not stack, protect the packaging and its contents from bumps and sources of heat. The appliance must be stored and conserved in the original packaging and in a closed environment, protected from atmospheric agents. Water and humidity may oxidize some parts of the equipment, damaging them irreversibly.

3.2 PACKAGING REMOVAL



After removing the packaging check the machine is complete and that there are no visibly damaged parts. DO NOT USE THE MACHINE and refer to the constructor when in doubt.

The components used for packaging (plastic, polystyrene, nails, screws, wood etc) must be kept out of reach of children as they are sources of danger. These components should be placed in the appropriate containers. In order to avoid bumps and overturn adopt the normal and logical precautions. Before disposing of the packaging check all machine components such as accessories, utensils, instructions, documents etc have been removed.

3.3 LOCATION

The equipment must be placed in an ideal position and environment for the use it has been conceived for) laboratory use and protected from atmospheric agents) and that the machine is placed by a qualified operator.

ALLOWD TEMPERATUE ALLOWED RELATIVE HUMIDITY MAXIMUN HEIGHT OVER SEA LEVEL From +5C to +40C From 30% to 70% 1000m

General Advice

The machine must be installed in an area which allows ease of access to all parts so that maintenance may be carried out.

- Unauthorised people and objects which could be potential sources of danger must not be permitted in the area surrounding the machine
- The instrument must be placed on a support bench in order to be able to work at eye level for the laboratory test or at ground level for tests on site.



CHAPTER 4: TECHNICAL CHARACTERISTICS





4.1 DIMENSIONS & WEIGHT (CASE INCLUDED)

LENGTH	730mm
WIDTH	730mm
HEIGHT	330mm
WEIGHT	12 kg

CHAPTER 5: TEST SETTING

After removing the appliance from its container proceed as follows:

- 1. Extend the rear arm of the base pedestal and fix it to the main body by closing the appropriate nut.
- 2. Attach the pendulum arm to the rotating head; tighten the ring nut, after clamping it correctly between the arm and head.
- 3. Regulate the level of the instrument by adjusting the instrument level regulation knobs and cheeking the position with the spirit level.
- 4. Place the slider on the slider hub of the oscillating head according to the following procedure:
 - i) Remove the cotter pin and washer attached to the hub
 - ii) Fit the slider on the hub so that it rests against the other washer in contact with the spring
 - iii) Put the removed washer and cotter pin back into position
- 5. Check the pendulum arm rotates freely without touching the surface the instrument is standing on; turn the Height regulation knob with oscillating head and clamp knob to vary the height of the appliance

- 6. With the Pendulum arm vertically and freely suspended but still regulate the Pointer sliding screws so that the pointer is suspended vertically and in position with the test start pointer position notch. Now check the zeroing:
 - i) Firstly lift the pendulum arm until it is blocked horizontally in the stopping device
 - ii) Position the pointer in line with the test start pointer position notch
 - iii) Free the pendulum arm by pressing the unhooking button
 - iv) The pointer is brought forward due to the oscillation of the arm
 - v) Stop the pendulum arm when it returns and take it back to the initial horizontal release position
 - vi) Check the position of the pointer, if it swings further than zero, the friction rings must be tightened more
 - vii) If however the friction rings do not reach zero they must be loosened slightly
- 7. With the pendulum arm vertically and freely suspended, position the spacer plug with chain under the slider lifting handle to lift the slider up. Lower the oscillating head by turning the height regulation knob with oscillating head and clamp knobs until the slider lightly touches the test surface; fix the position by tightening the clamp knobs. Remove the spacer plug with chain.
- 8. Check the length of the rubber slider path of the test surface, turn the oscillating head until the slider lightly touches the test surface. The sliding length is the distance between the point where the slider starts to touch the test surface and the next point where contact ends. (In order to avoid unnecessary war of the slider during the contact arc, it should be lifted from the test surface using the slider lifting handle). If necessary regulate the sliding length by lifting or lowering the oscillating head using the height regulation knob and clamp knob. When the sliding length has been correctly set up it should be between 125 and 127mm for an onsite test and 76mm for laboratory test.
- 9. Position the pendulum arm in the start release position (horizontal) the instrument is now ready to operate.

5.1 HOW TO OPERATE

- 1. Wet the test surface and the slider with distilled water unless it is a dry test.
- 2. Bring the pointer to a vertical position level with the test start notch. Free the pendulum arm by pressing the unhooking button and block its movement when it swings back, before the slider hits the road surface again. Record the reading shown on the pointer.
- 3. Return the pendulum arm and the pointer to the initial position not allowing the slider to drag along the test surface by using the slider lifting handle repeat the swings, spreading water over the contact area with a spray between every swing (unless it is a dry test). Record the readings according to the standards in use.

5.2 SLIDERS

3" Sliders – are used on road surfaces rougher than normal floors 1 ¼" Sliders – are used for the PSV test and laboratory tests

TEMPERATURE	0	10	20	30	40
ʻC					
LUPHE	43-49	58-65	66-73	71-77	74-79
RESILIENCE					
IRHD	55 +/- 5	55 +/- 5	55 +/- 5	55 +/- 5	55 +/- 5
HARDNESS					

Rubber Slider Storage

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

Sliders Preparation

Slider condition is important and the preparation should be carried out in accordance with the standard in force.

IMPORTANT

The operator should ensure the test is being carried out according to the current normative. The main variants are the types of sliders, conditioning of the sliders and results recording. The operator should be aware of all the possible causes of error.

CHAPTER 6: TEST ON ROAD SURFACES

6.1 HOW TO OPERATE

The following is base on the "Road 27" note. Road surface tests are historically based on the: Road 27" note.

- 1. Inspect the road and choose the section to be tested.
- 2. Regulate the instrument on the chosen road surface to be tested so that the slider runs in the direction of the traffic. On regular surfaces such as polished or curved concrete, tests should be carried out with conditioned sliders operating 80 degree from the edge. Determine the average of five readings as previously described in Chapter 5 : 5.1, every one of the five positions on the path (usually the part tread upon by the wheels) distanced by intervals of around 5 to 10 metres along the length of the test. The result of these readings provides a representative value of the resistance to road skidding. Condition the sliders by making them swing five times on the dry surface of the road.
- 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.

6.2 **GRADIENTS**

The instrument is conceived for carrying out tests on steep gradients and on steep road shoulders.

In case of gradients, the usual procedure must be followed and although the sliding length is then slightly displaced from the central position, in situation of normal lad there is no difference 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 space under one levelling screw.

6.3 FACTORS AFFECTING RESULTS

Like all skidding machines the equipment 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 of all conditions at time of the tests. The main factors influencing skid resistance are outlined here.

The value read by the instrument has been named Skid Resistance and refers to the performance of a vehicle with wet braking tyres with locked wheels on a wet surface at a speed of 50km/h.

The order concerning the road surfaces can change substantially between 50 and 130 km/h. Anyway the Skid Resistance values, which represent the 50 km/h value, cannot 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 it 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 equipment 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	SITE CONDITIONS	VALUE
A	 Difficult sites such as: ROUNDABOUTS Bends with radius less than 150m on unrestricted roads Gradients, 1 in 20 or steeper of lengths > 100m Approaches to traffic lights on unrestricted roads 	65
В	Motorways, trunk and class 1 roads and heavily trafficked roads in urban areas (carrying more than 2000 vehicles per day)	55
С	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 that the valued indicated by the tester.

Smooth-texture 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 ration 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 summer than in winter. The magnitude of the variation depends upon:
 - road layout and traffic conditions
 - road surface characteristics
 - the weather

It varies considerably from one road to another so that is not possible to predict the skidding resistance at one time of year from a single measurement made at another time. 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 changes in road surface texture. The effects of temperature only becomes important for tests made at temperatures below 10C 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 (¼) 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 supplied.

CHAPTER 7: TEXTURE DEPTH – SAND PATCH METHOD

7.1 APPARATUS & MATERIALS

Sand Spreading Kit (Available for separate purchase)

7.2 **TEST PROCEDURE**

- i. The surface to be measured must be dry and should be first swept with a soft brush.
- ii. 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 or Steel ruler.
- iii. Pour the sand in a heap on the surface to be tested.
- iv. In windy conditions use a tyre to surround the sand.
- v. Spread the sand over the surface using the disc in a circular motion, levelling the sand into a circular pattern.
- vi. Measure the radius of the patch
- vii. Make a number of tests parallel to the kerb.

7.3 CALCULATION OF TEXTURE DEPTH

See below Table.

Formula: V = Volume of cylinder R = Radius of patchTD = Texture depth

 $TD = \frac{V}{TTR_2}$

Texture Radius Texture Volume Radius Texture Volume Radius Volume Depth Depth Depth of of of of of of Patch Cylinder Cylinder Patch Cylinder Patch 251.3 5.1 3.08 251.3 9.4 0.91 251.3 13.7 0.43 5.2 2.96 251.3 251.3 251.3 9.5 0.89 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 2.64 251.3 14.1 251.3 5.5 9.8 0.83 251.3 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 0.77 251.3 10.2 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 1.95 251.3 10.7 0.70 251.3 15.0 6.4 0.36 251.3 6.5 1.89 251.3 10.8 0.69 251.3 15.1 0.35 251.3 251.3 251.3 0.35 1.84 10.9 0.67 15.2 6.6 251.3 6.7 1.78 251.3 11.0 0.66 251.3 15.3 0.34 0.34 251.3 6.8 1.73 251.3 11.1 0.65 251.3 15.4 251.3 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 7.3 251.3 0.59 251.3 15.9 1.50 11.6 0.32 251.3 0.58 251.3 251.3 7.4 1.46 11.7 16.0 0.31 251.3 7.5 1.42 251.3 11.8 0.57 251.3 16.1 0.31 251.3 1.38 251.3 11.9 0.56 251.3 16.2 0.30 7.6 12.0 251.3 7.7 251.3 251.3 1.35 0.56 16.3 0.30 251.3 7.8 1.31 251.3 12.1 0.55 251.3 16.4 0.30 7.9 251.3 12.2 0.54 251.3 1.28 251.3 16.5 0.29 251.3 1.25 12.3 0.53 0.29 8.0 251.3 251.3 16.6 251.3 1.22 251.3 12.4 251.3 8.1 0.52 0.29 16.7 251.3 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 0.27 251.3 251.3 251.3 0.26 8.8 1.03 13.1 0.47 17.4 251.3 8.9 1.01 251.3 13.2 0.46 251.3 17.5 0.26 251.3 0.45 251.3 9.0 0.99 13.3 251.3 17.6 0.26 13.4 9.1 0.97 251.3 0.45 17.7 251.3 251.3 0.26 251.3 9.2 0.95 251.3 13.5 0.44 251.3 17.8 0.25 251.3 251.3 9.3 0.92 251.3 13.6 0.43 17.9 0.25 251.3 18.0 0.25

Sand Patch Texture Depth Calculations

CHAPTER 8: FLOOR TESTING

8.1 INSTUMENTS USED

Swing measurer; Rank Taylor Hobson Surtronic 10 roughness measurer.

8.2 TEST SITE SELECTION

A wide variety of conditions must be considered.

For Example:

Table1

- i. An area or tract subjected to intense traffic
- ii. An area near a source of pollution
- iii. In conclusion an area rarely used such as a corner or behind a road entrance barrier.

If an accident has taken place the results taken in that area will be more accurate if read as quickly as possible and before any form of cleaning has taken place. Where this is not possible, it must be clear from the report that the conditions could be different to those at the time of accident.

8.3 TEST PROCEDURE

The test should be carried in accordance with the standard or guide lines used.

8.4 INTERPRETATION OF RESULTS

The currently accepted test limits when using a Four S Rubber Slider shown in Table 1, are those recommended by the UK Slip Resistance Group.

Table1		
Classification of Flooring	Four S Rubber	
High	25 and below	
Moderate	25 to 35	
Low	35 to 65	
Extremely Low	65 and above	

Soil skid resistance for normal pedestrians when tested with a pendulum measurer and 4S Rubber Sliders can be interpreted using Chart 1 (with some considerations for roughness as explained further on). A result with an extremely dry pendulum will often be associated with lightly wetted result but in extreme cases a barely dry result can be lower than the wet result. In borderline regions Rtm roughness is an important and perhaps a dominating factor.

CHAPTER 9: ROUGNESS MEASURMENTS

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 hell. 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 micron 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.

9.1 ROUGH CONCRETE & COURSE PAVERS

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

Tuble 2	
Condition of Flooring	T.R.R.L. RUBBER
High	19 and below
Moderate	20 to 39
Low	40 to 74
Extremely Low	75 and above

Table 2

9.2 **PROFILED FLOORS**

Floor used in wet areas such as swimming pool surround are often profiled. The profiling serves two purposes:

- i. Helps to drain water away
- ii. 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 of profiled surface 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 skid tester 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.

9.3 SLIDER PREPARATION

Prepare the sliders according to the standards in use. Unless otherwise established the part of new slider contact must be prepared by passing it across a piece of resin paper with a grain of 400 ten times conforming to BS 871 and then ten times across the pink cleaning paper 3M, using the recovered surface. The bevel on the contact surface must not exceed 4mm. The rubber must be free of residue such as abrasives or oils. The sliders must be preserved in the dark at a temperature of 20C or less (optimum 15C). In order to test smooth surfaces such as floors the tip of the sliders must be kept clean and polished by using cleaning paper as previously described or where the surface has been damaged by using resin paper. In order to test rough surfaces such as roads it is not necessary to use pink 3M cleaning paper.

NB: The paper for slider preparation must be attached well to a smooth firm surface (e.g. blown glass) for this operation.

9.4 TEST AREAS

At least six test areas 150mm x 100mm or greater are required to accommodate wet and dry measurements. Each test area should be used only once.

9.5 WET & DRY TESTS

The procedure is the same 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 affect 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.

9.6 FLOOR MATERIAL LABORATORY TESTS

Tests must be carried out according to the guidelines and compliant with standards.

Use the same cleaning procedure or others agreed with the client:

- i. Clean all the floor materials received for the laboratory test with a dry a clean piece of paper in order to remove all the dust.
- ii. Before the test put all materials on the clean flat surface. Cover them with a tissue and regulate the temperature and environmental humidity to 23 +/- 2C for at least 16 hours before the test starts.
- iii. The flooring materials must be level and securely attached at the time of the test in order to avoid sample movements during the test.

CHAPTER 10: PSV/PPV TESTING

10.1 HOW TO OPERATE

The PSV test is usually carried out according to the BS EN 1097-8 procedure which substitutes BS 812:114. In order to test polished samples the base plate sample holder 1 ¹/₄ TRRL sliders (conditioned), the "F" scale and the Criggion sample are necessary. Position the instrument on the base plate and carry out all the preparation as described in Chapter 5. Regulate the height of the Oscillating Head so that the tip of the slider is in contact with the sample for distance of 76mm horizontally. The sample container should be marked with lines at a distance of in order to help. Wet the sample surface and the slider with clean water and release the arm from the holding position.

10.2 SLIDER PREPARATION FOR THE PSV TEST

Slider preparation should be carried out in accordance with the standard used. 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 the Criggion sample of known value. (Not the Criggion sample used for slider conditioning.)

CHAPTER 11: APPENDIX

11.1 SCALE CALCULATION

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 major differences 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. The skid tester was originally intended these lads would be the same. For a more detailed analysis of this factor see Reference No 1 – Technical Paper No66 and procedure for the checking the calibration of RRL portable skid resistance tester B E Sabey

COF x 100 to) PV	CONVERS	ION	TABL	E
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COF x 100	SRV (BPN)	COF x 100	SRV (BPN)
1	1	51	48
2	2	52	48
3	3	53	49
4	4	54	50
5	5	55	51
6	6	56	51
7	7	57	52
8	8	58	53
9	9	59	54
10	10	60	55
11	11	61	55
12	12	62	56
13	13	63	57
14	14	64	58
15	15	65	58
16	16	66	59
17	17	67	60
18	18	68	60
19	19	69	61
20	20	70	62
21	21	71	63
22	22	72	63
23	23	73	64
24	24	74	65
25	25	75	65
26	26	76	66
27	27	77	67
28	28	78	68
29	29	79	68
30	30	80	69
31	31	81	70
32	32	82	70
33	32	83	71
34	33	84	72
35	34	85	72
36	35	86	73
37	36	87	74
38	37	88	74
39	38	89	75
40	39	90	76
41	39	91	76
42	40	92	77
43	41	93	77
44	42	94	78
45	43	95	79
46	44	96	79
47	44	97	80
48	45	98	81
49	46	99	81
50	47	100	82

CHAPTER 12: IN FUNCTION MAINTENANCE – GUIDE LINES

12.1 COMMON ERRORS

- i. THE PENDULUM ARM does not release freely Ensure the pendulum arm is correctly pared with the Oscillating Head with the appropriate joint and check The Tightening Ring Nut is correctly screwed and tightened. If the problem persists the position of the bracket on The Pendulum Arm must be regulated so that it correctly enters inside the blocking device.
- ii. THE PENDULUM ARM and THE POINTER do not swing parallel to THE PEDESTAL Using an Allen key loosen The Clamp Locking Screws which attach the upper structure of the instrument to The Pedestal; turn the structure so that it is parallel to The Pedestal checking the distances in a number of points from The Pedestal. Tighten The Clamp Locking Screws after regulation.
- iii. THE POINTER is bent Using a spirit level check The Pointer is vertical and that the point is exactly under the centre or rotation of THE Pointer.
- iv. THE POINTER is not parallel to THE PENDULUM ARM Level the instrument. With The Pendulum Arm swinging vertically and The Pointer against its Pointer Sliding Screws hold, check the tip of the pointer is aligned with The Test Start Pointer Position Notch line engraved on the plate of the scale. If this is not so regulate the position of The Pointer by turning The Pointer Sliding Screws until the tip of the pointer is aligned with The Test Start Pointer Position Notch line.
- v. THE POINTER does not reach the Zero Check the above points, if they are not the cause of the problem remove the entire Pointer and clean the supporting surfaces. Using light oil lightly lubricates the felt disks and check The Pointer works. Check the support in the head turns freely, lubricate if necessary.
- vi. The results are lower than the expected ones Check the above points. Check the tightening nut on The Oscillating Head has not been overly tightened. Over time there can be a build up of dirt and debris from the support The Oscillating Head turns on, should this happen it must be cleaned with white spirit or similar. Check The Friction Rings in contact with the felt disc on The Pointer are attached and unable to turn.

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

- Has the instrument been levelled?
- Is the pointer bent?
- Is the pointer parallel to the arm?
- Has the instrument 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 test as carried out in the calibration procedure are explained in the calibration rig operating instructions.

CHAPTER 13: CHECK TESTING OF SKID TESTER USING FLOAT GLASS AND PINK POLISHING PAPER

INTRODUCTION

The following procedure allows the operator to carry out a periodical check of the instrument and sliders before use. If the values obtained are outside the following limits this is a sign of an instrument or slider problem which must be analysed.

EQUIPMENT

- Appropriate conditioned sliders
- Sheet of blown glass (300mm x 300mm) for use as a test surface
- Sheet of blown glass (300mm x 300mm) for use as a support sheet of 3M Pink Cleaning Paper
- 3M Pink Cleaning Paper (the impregnated side is the test surface)
- i. Before testing clean the blown glass surface with water followed by methyl alcohol or similar or methanol, then dry using sterile gauze.
- ii. Condition all the equipment including the instrument for 16 hours to 25 +/- 2C.
- iii. Prepare the instrument on a stable horizontal surface.
- iv. Ensure the sample is securely positioned.
- v. Condition the rubber slider by swinging it 10 times above the dampened Pink Cleaning Paper.
- vi. Following the previously described and advised operation procedure determine the skid resistance of every surface subject to testing or rather the blown glass and Pink Cleaning Paper.
- vii. Check the values are inside the interval indicated below by using sliders of 3" in length with a contact surface of between 125mm-127mm, to 23 +/- 2C reading the main scale.

	Four S	TRRL
Float Glass	7 +/- 3	8 +/- 2
Pink Polishing Paper	65 +/- 3	57 +/- 2

CALIBRATION

In normal conditions of use the instrument will function correctly for some years. Often difficult to identify, mechanical damage will anyway cause inaccurate results. The standards recommend annual calibration.

CHAPTER 14: MAINTENANCE

14.1 ORDINATY MAINTENANCE



Only original spare parts can be used. The manufacturer declines any responsibility for the use of unoriginal parts.

Periodically clean all machine parts and oil the unpainted parts in order to preserve the machine and its efficiency. Avoid the use of solvents which damage paint and parts in synthetic material. After every test check that the appliance parts are not damaged otherwise refer to the Manufacturer. In order to prevent damage or malfunction carry out all inspections and periodic operations listed in the "PERIODICAL INSPECTIONS" and "PERIODICAL OPERATIONS" punctually and correctly.

CAHPTER 15: DECOMISSIONING THE APPLIANCE

15.1 SETTING ASIDE

Carry out all the ordinary maintenance operations. Lubricate the unvarnished parts of the instrument with a film of oil and cover it to protect it from dust.

15.2 DECOMISSIONING THE APPLIANCE

When the instrument is to be no longer used we recommend:

- Making all potentially dangerous sources harmless such as sharp protruding or pointed parts.
- Disassemble the instrument in similar parts and dispose of them according to the current norms.