Australian Standard®

Methods for sampling and testing aggregates
Method 42: Pendulum friction test

1 SCOPE

This Standard sets out the method for determining the friction value of a surface using the pendulum friction tester on test specimens prepared from naturally occurring or artificially produced materials which are intended for use as roadway pavement surfacing material.

NOTE: The apparatus and procedure in this Standard may be used to evaluate aggregate specimens prepared on the vertical road-wheel machine (refer to AS 1141.40) and the horizontal bed machine (refer to AS 1141.41).

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1141	Methods for sampling and testing aggregates
1141.40	Method 40: Polished aggregate friction value—Vertical road-wheel machine
1141.41	Method 41: Polished aggregate friction value—Horizontal bed machine

ISO

48	Rubber, vulcanized or thermoplastic—Determination of hardness (hardness between 10 IRHD and 100 IRHD)
4662	Rubber, vulcanized or thermoplastic—Determination of rebound resilience

3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

3.1 Conditioning specimen

A reference specimen with a friction value in the range 48 to 54. It is used to condition new rubber sliders for use in the friction tester.

NOTES:

1 Panmure reference specimens from a previous test run may be used.

2 Panmure aggregate will meet the requirements of this definition.

3.2 Friction tester control specimens

A set of previously polished and tested specimens, covering a range of friction values from 35 to 65, used to verify the results obtained from the pendulum friction tester.

3.3 Friction value

The value obtained when a material is tested using the pendulum friction tester corrected for temperature and for experimental errors using reference specimens.

3.4 Reference material

Material from a specified source for which the unpolished and polished friction values are known (refer to Appendix A of AS 1141.40 or Appendix A of AS 1141.41).

© Standards Australia

STANDARDS Australia Documents Document Sharing Hub

Full document details: AS 1141.42-2017

3.5 Reference specimens

Specimens incorporating reference material that is prepared in the same manner as the test specimens. Reference specimens are included in each test run and are polished and tested at the same time as the test specimens. Their main functions are to indicate whether the polishing and testing procedures have been correctly carried out and for use as conditioning specimens.

4 APPARATUS

4.1 Pendulum friction tester

A tester with an auxiliary scale constructed in accordance with details available from the ARRB (Australian Road Research Board) (see Figure 1). All bearings and working parts of the instrument shall be enclosed as far as possible, and all materials used shall be suitably treated to prevent corrosion under wet conditions.

The tester shall be used and stored in a dust-free environment that is not subject to large temperature variations.

The pendulum friction tester shall be calibrated to ensure compliance with the following requirements at intervals not exceeding two years or when results obtained from the set of friction tester control specimens vary from the established values by more than three units.

The tester shall incorporate the following:

(a) A spring-loaded rubber slider of the mass, size and shape specified in Clause 4.2 and mounted on the end of a pendulum arm so that the sliding edge is 515 ±2 mm from the axis of suspension.

The slider shall be mounted on an axis set at an angle of 25 ±1° to the horizontal when the pendulum is at the lowest point of its swing, so that only the rear edge of the slider contacts the test surface. The slider can turn about its axis without obstruction to follow unevenness of the surface.

The slider shall be spring-loaded against the test surface and the nominal static force on the slider is set during calibration.

(b) Means for levelling the instrument.

(c) Means for raising and lowering the axis of suspension of the pendulum so that the slider can—

(i) swing clear of the surface of the specimen; and

(ii) be set to slide over a fixed length of surface.

(d) Means for holding and releasing the pendulum arm so that it falls freely from a horizontal position.

(e) The mass of the swinging arm including the slider shall be 1.50 ±0.03 kg with the centre of gravity lying on the axis of the arm at a distance of 410 ±5 mm from the centre of suspension.

(f) A pointer balanced about the axis of suspension, indicating the position of the pendulum arm throughout its forward swing and moving over the circular scale attached to the instrument. The mass of the pointer, excluding felt friction washers, shall be not more than 85 g and the friction in the pointer mechanism shall be adjustable so that, with the pendulum arm swinging freely from a horizontal position, the outward tip of the pointer may be brought to rest on the forward swing of the arm at a point 10 mm below the horizontal, the point corresponding to the zero position on the attached circular scale.

© Standards Australia www.standards.org.au

Documents Document Sharing Hub

Full document details: AS 1141.42-2017

(g) A device for rigidly locating the specimens shall be provided so that—

(i) the specimen is bisected by a vertical plane perpendicular to the frame of the instrument and passing through the axis of suspension of the pendulum;

(ii) the slider and pendulum will pass over the specimen in the direction of the traffic; and

NOTE: For specimens prepared in accordance with AS 1141.40 or AS 1141.41 this is against the direction of the arrow.

(iii) the full width of the rubber slider will come into contact only with the polished area of the specimen over the full contact length.

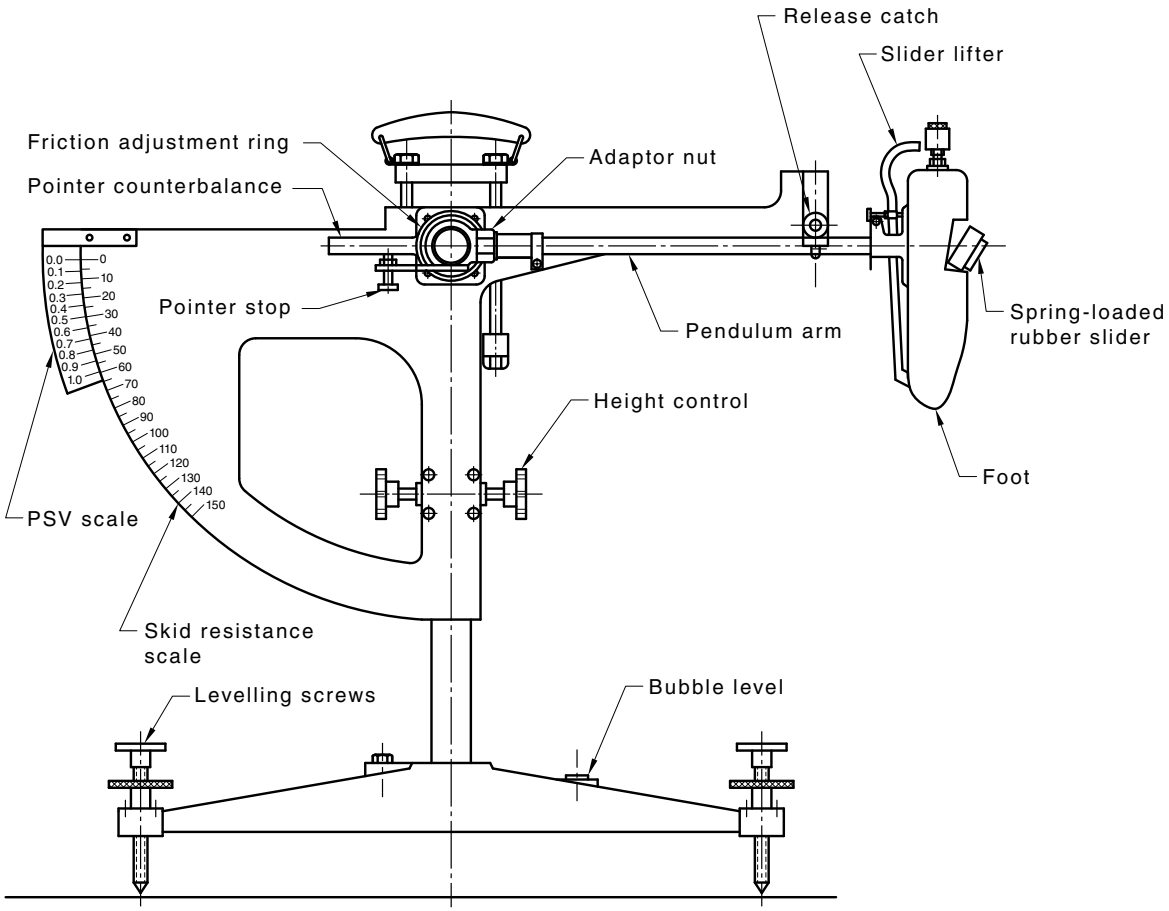


FIGURE 1 PENDULUM FRICTION TESTER

4.2 Rubber sliders

Rubber sliders used in the friction tester shall be 24 ±1 mm deep and 6 ±1 mm thick and rigidly backed with central pivoting axis. The sliding edges shall be square, clean cut and free from contamination. Avoid handling the surface of sliders at all times. The rubber used in the sliders shall comply with the requirements given in Table 1 and the sliders shall have a rigid backing and dimensions and mass as given in Table 2.

When not in use, sliders shall be stored in the dark at a temperature between 10°C and 25°C. They shall be discarded when—

(a) they are more than 12 months old from the date stamped on the slider;

Documents Document Sharing Hub
Full document details: AS 1141.42-2017

(b) they do not comply with the requirements of Table 1; or

(c) when the two available edges of the slider have each been used on a test run.

4.3 Thermometer

The thermometer covering the range of 0°C to 50°C graduated with 1°C or less and with an uncertainty of less than 0.5°C.

4.4 Water spray bottle

Water spray bottle containing clean water at room temperature.

TABLE 1

PROPERTIES OF SLIDER RUBBER

Property	Temperature °C				
	0	10	20	30	40
Resilience percent*	44 to 49	58 to 65	66 to 73	71 to 77	74 to 79
Hardness IRHD†	55 ±5	55 ±5	55 ±5	55 ±5	55 ±5

* Lupke rebound test in accordance with ISO 4662.

† International rubber hardness degrees in accordance with ISO 48.

TABLE 2

SLIDER TYPE AND SCALE

Slide width mm	Mass g	Required contact length range mm	Pendulum test scale used	Unit value
75 ±1	35 ±5	125 to 127	Main scale	As read
32 ±1	20 ±5	75 ±1*	Auxiliary† scale	Reading × 100

* For tests on curved surfaces contact length is measured over an arc.

† The auxiliary scale is marked from 0 to 1.0 and the unit value is the reading multiplied by 100.

5 PREPARATION FOR TESTING

5.1 Adjusting equipment

The equipment shall be adjusted as follows:

(a) Bring the apparatus, the contents of the water spray bottle and the temperature of the room in which friction testing is to be carried out to 23 ±2°C at least 2 h before testing and maintain them at this temperature until testing is completed. Record the room temperature at the time of testing.

(b) Mount the tester on its base and adjust the levelling screws so that the levelling bubble is centred and the tester is appropriately aligned with the specimen.

(c) Install a new rubber slider in position, raise the axis of suspension of the pendulum so that the arm swings freely and adjust the friction rings in the pointer mechanism so that, when the pendulum arm and pointer are released from the right-hand horizontal position, the pointer will zero repeatedly. When using the tester care should be taken not to damage the slider or affect the calibration settings [see Clause 5.2(d)].

© Standards Australia

www.standards.org.au

Documents Document Sharing Hub

Full document details: AS 1141.42-2017