Australian Standard®

Methods of testing soils for engineering purposes

Method 3.1.2: Soil classification tests—Determination of the liquid limit of a soil—One point Casagrande method (subsidiary method)

1 SCOPE This method covers the determination of the liquid limit of a soil, i.e. the moisture content at which a soil passes from the plastic to the liquid state. The method is a rapid method since it involves taking only one measurement of the moisture content. This method is applicable only to cohesive fine-grained soils. The method may also be used on a sample of soil in its natural state (see Notes 1 and 2).

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

1289		Methods of testing soils for engineering purposes
1289.1	Method 1:	Preparation of disturbed soil samples for testing
1289.2.1.1	Method 2.1.1:	Soil moisture content tests—Determination of the moisture content of a soil—Oven drying method (standard method)
1289.2.1.4	Method 2.1.4:	Soil moisture content tests—Determination of the moisture content of a soil—Microwave-oven drying method (subsidiary method)
1289.2.1.5	Method 2.1.5:	Soil moisture content tests—Determination of the moisture content of a soil—Infrared lights method (subsidiary method)
1289.3.1.1	Method 3.1.1:	Soil classification tests—Determination of the liquid limit of a soil—Four point Casagrande method
1289.B3.1	Method B3.1:	Soil moisture content tests—Establishment of correlation between a subsidiary method of moisture content determination and the standard method AS 1289.2.1.1

BS

903	Methods of testing vulcanized rubber
Part A26:	Determination of hardness

3 APPARATUS The following apparatus is required:

(a) A thick, flat, rigid mixing plate of suitable size made of non-absorbent material.

(b) Mixing bowl of convenient size with a suitable close-fitting lid.

(c) Palette knives of convenient size, e.g. having a blade 200 mm long and 30 mm wide.

(d) Liquid limit apparatus conforming in the essential details to the device illustrated in Figure 1 of AS 1289.3.1.1 (see Note 3).

(e) A grooving tool and gauge similar in essential details to that illustrated in Figure 2 or Figure 3 of AS 1289.3.1.1.

(f) A wash bottle or beaker containing potable water (see Note 4).

4 ADJUSTMENT OF APPARATUS The apparatus shall be adjusted as follows:

(a) Inspect the liquid limit apparatus to determine that the device is clean and dry and in good working order, also that the cup falls freely, and the total side-to-side play at the hinge, when measured at the front of the bowl, does not exceed 3 mm.

(b) Inspect the grooving tool to determine that it is clean and dry and that the width of the tip of the tool does not exceed 2.5 mm (see Note 5).

(c) Adjust the height to which the cup of the liquid limit device is lifted so that when the cup is raised to its maximum height the 10 mm gauge will only just pass between it and the base.

5 PROCEDURE The procedure shall be as follows:

(a) Obtain a sample of at least 250 g from the material passing the 425 μm sieve which has been prepared in accordance with AS 1289.1 (see Note 6), then proceed as follows:

(i) Record the method of preparation (see Note 1).

(ii) Place the sample in the mixing bowl or on the mixing plate and thoroughly mix with the water using the palette knives and adding the water in increments.

(iii) Thoroughly mix each increment of the water into the soil.

(iv) Continue adding water and mixing until the soil becomes a thick homogeneous paste (see Note 7).

(v) Cover the soil and allow to cure for at least 12 h at room temperature (see Notes 7 and 8).

(b) Thoroughly remix the cured soil on the mixing plate, or in the bowl, for at least 1 min.

(c) Place a portion of the soil-water mixture in the cup with the cup resting on the base and proceed as follows:

(i) Level off the mixture parallel to the base to give a depth of soil in the cup of about, but no greater than, 10 mm. Hold the grooving tool normal to the surface of the cup, with the chamfered edge facing in the direction of movement and divide the soil by drawing the grooving tool along the diameter through the centre-line of the hinge.

(ii) Check to see that the underside of the bowl and the top of the rubber block of the liquid limit device are free of soil and water.

(iii) Turn the crank at the rate of 2 r/s so that the cup is lifted and dropped until the two parts of the soil come into contact along the bottom of the groove for a distance of 10 mm.

(iv) Record the number of blows at which this occurs. If the number of blows is between 15 and 35 (see Note 9) proceed as below; if not, add water, or dry in air, as appropriate, and remix for about 3 min and repeat Step (c) until this condition is obtained.

(d) Return the soil to the bowl or mixing plates and re-mix thoroughly for at least 30 s. Clean and dry the cup of the machine and the grooving tool.

(e) Repeat Steps (c) and (d) until the difference between the number of blows for closure in two consecutive tests is not greater than one (see Notes 10 and 11). Record the number of blows after the second satisfactory test.

(f) Remove a quantity of soil (about 10 g) with a spatula from the portions of the sample that have just flowed together and determine its moisture content in accordance with AS 1289.2.1.1 (see Notes 12 and 13).