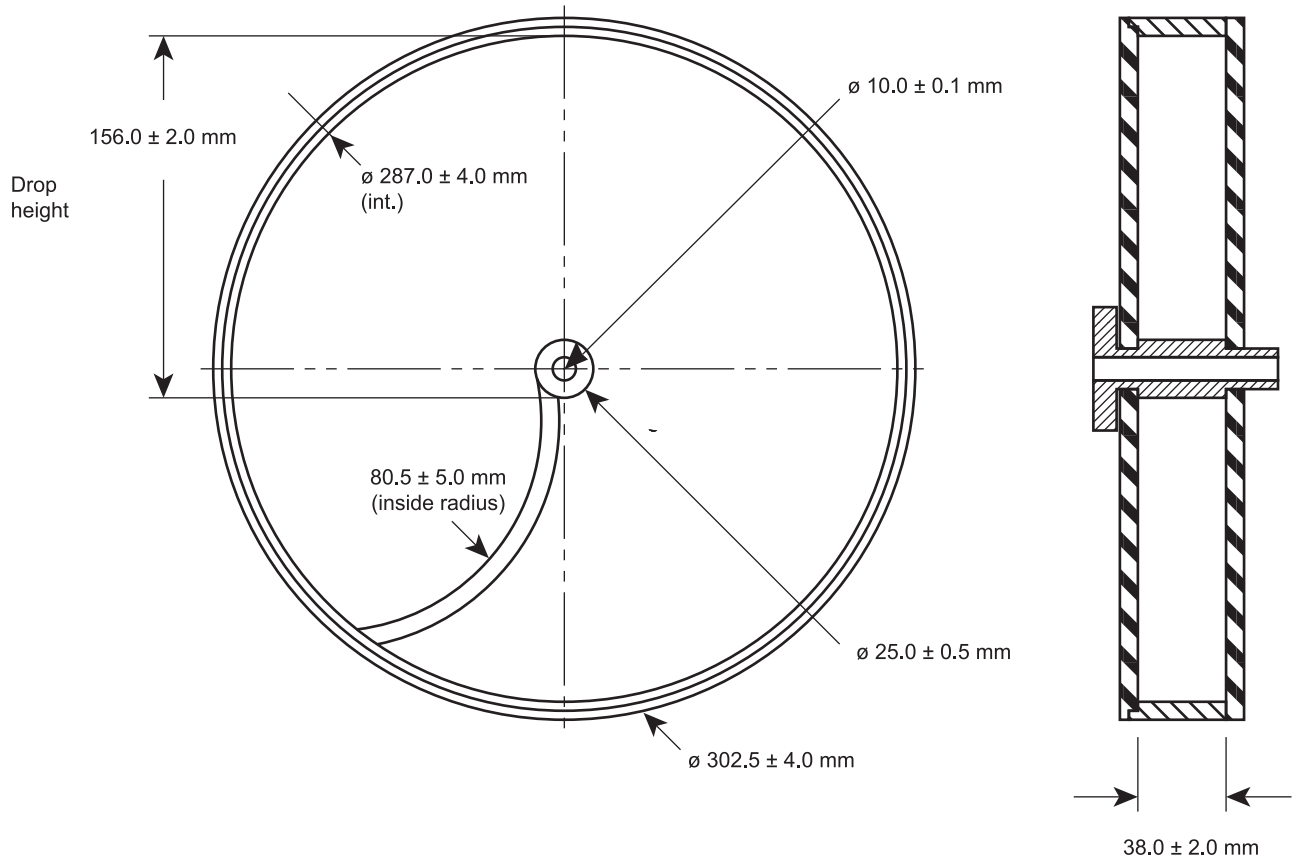

Figure 2.9.7.-1. – *Tablet friability apparatus*

maximum loss of mass (obtained from a single test or from the mean of 3 tests) not greater than 1.0 per cent is considered acceptable for most products.

If tablet size or shape causes irregular tumbling, adjust the drum base so that the base forms an angle of about 10° with the horizontal and the tablets no longer bind together when lying next to each other, which prevents them from falling freely.

Effervescent tablets and chewable tablets may have different specifications as far as friability is concerned. In the case of hygroscopic tablets, a humidity-controlled environment is required for testing.

A drum with dual scooping projections, or apparatus with more than one drum, for the running of multiple samples at one time, are also permitted.

OPERATING PROCEDURE

Place the tablet between the jaws, taking into account, where applicable, the shape, the break-mark and the inscription; for each measurement orient the tablet in the same way with respect to the direction of application of the force. Carry out the measurement on 10 tablets, taking care that all fragments of tablets have been removed before each determination.

This procedure does not apply when fully automated equipment is used.

EXPRESSION OF RESULTS

Express the results as the mean, minimum and maximum values of the forces measured, all expressed in newtons.

Indicate the type of apparatus and, where applicable, the orientation of the tablets.

01/2008:20908

2.9.8. RESISTANCE TO CRUSHING OF TABLETS

This test is intended to determine, under defined conditions, the resistance to crushing of tablets, measured by the force needed to disrupt them by crushing.

APPARATUS

The apparatus consists of 2 jaws facing each other, one of which moves towards the other. The flat surfaces of the jaws are perpendicular to the direction of movement. The crushing surfaces of the jaws are flat and larger than the zone of contact with the tablet. The apparatus is calibrated using a system with a precision of 1 newton.

07/2008:20909

2.9.9. MEASUREMENT OF CONSISTENCY BY PENETROMETRY

This test is intended to measure, under determined and validated conditions, the penetration of an object into the product to be examined in a container with a specified shape and size.

APPARATUS

The apparatus consists of a penetrometer made up of a stand and a penetrating object. A suitable apparatus is shown in Figure 2.9.9.-1.

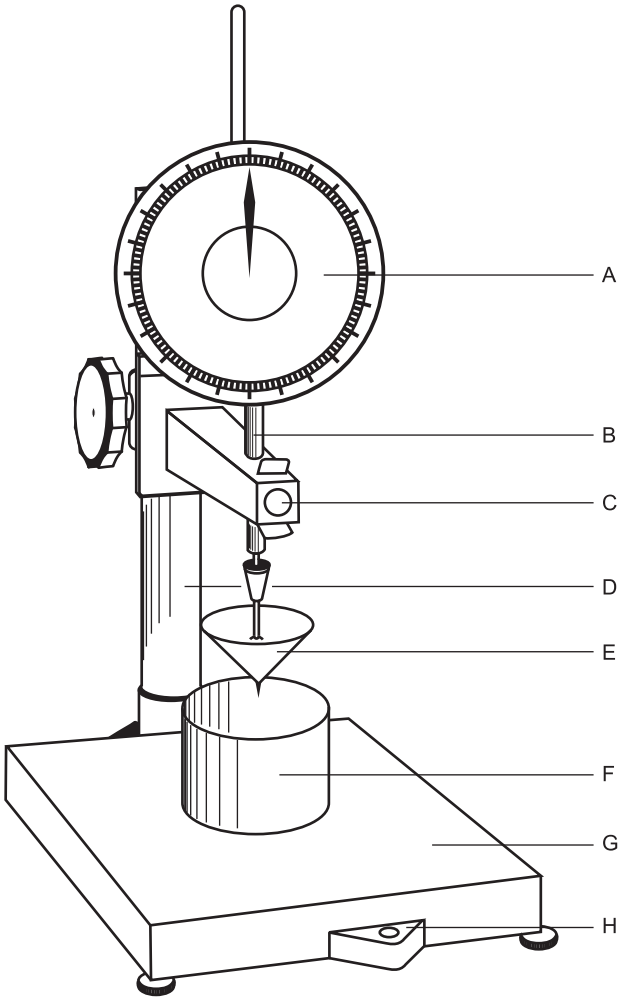

Figure 2.9.9.-1. – *Penetrometer*

A. Scale showing the depth of penetration, graduated in tenths of millimetres.
B. Vertical shaft to maintain and guide the penetrating object.
C. Device to retain and to release the penetrating object automatically and for a constant time.
D. Device to ensure that the penetrating object is vertical and that the base is horizontal.
E. Penetrating object (see Figures 2.9.9.-2 and 3).
F. Container.
G. Horizontal base.
H. Control for the horizontal base.

The stand is made up of:
- a vertical shaft to maintain and guide the penetrating object;
- a horizontal base;
- a device to ensure that the penetrating object is vertical;
- a device to check that the base is horizontal;
- a device to retain and release the penetrating object;
- a scale showing the depth of penetration, graduated in tenths of a millimetre.

The penetrating object, made of a suitable material, has a smooth surface, and is characterised by its shape, size and mass (*m*).

Suitable penetrating objects are shown in Figures 2.9.9.-2 and 2.9.9.-3.

PROCEDURE

Prepare the test samples according to one of the following procedures.

A. Carefully and completely fill 3 containers, without forming air bubbles. Level if necessary to obtain a flat surface. Store the samples at 25 ± 0.5 °C for 24 h, unless otherwise prescribed.

B. Store 3 samples at 25 ± 0.5 °C for 24 h, unless otherwise prescribed. Apply a suitable shear to the samples for 5 min. Carefully and completely fill 3 containers, without forming air bubbles, and level if necessary to obtain a flat surface.

C. Melt 3 samples and carefully and completely fill 3 containers, without forming air bubbles. Store the samples at 25 ± 0.5 °C for 24 h, unless otherwise prescribed.

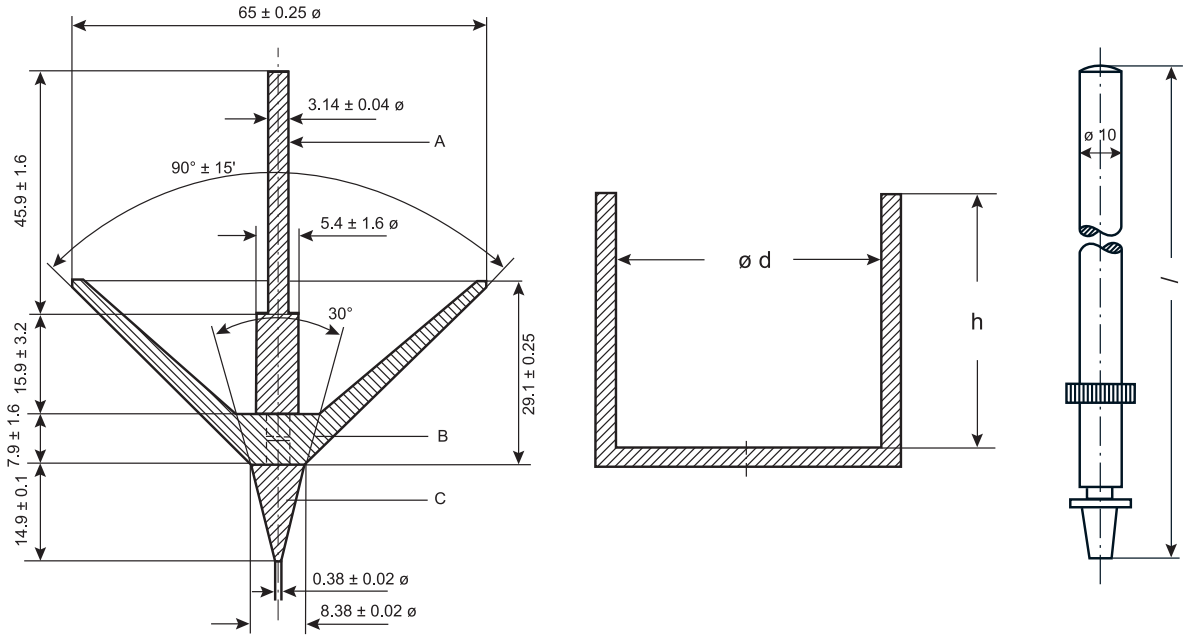

Figure 2.9.9.-2. – *Cone (m = 102.5 ± 0.05 g), suitable container (d = 102 mm or 75 mm; h ≥ 62 mm) and shaft (l = 162 mm; m = 47.5 ± 0.05 g).*
Dimensions in millimetres

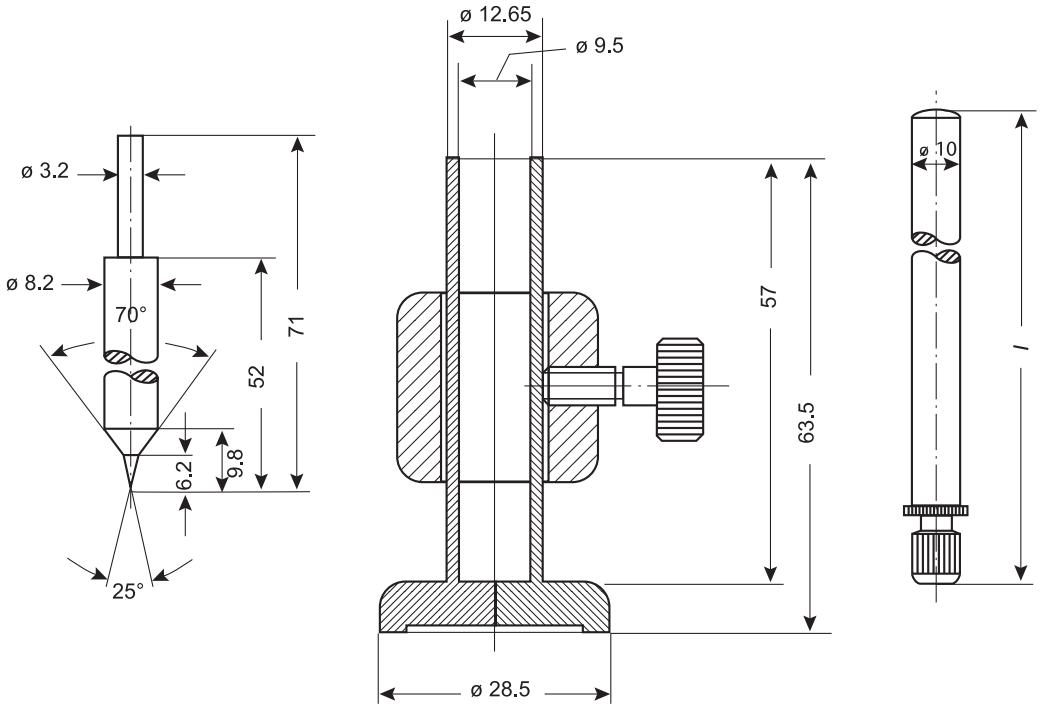

Figure 2.9.9.-3 – *Micro-cone (m = 7.0 g), suitable container and shaft (l = 116 mm; m = 16.8 g)*
Dimensions in millimetres

Determination of penetration. Place the test sample on the base of the penetrometer. Verify that its surface is perpendicular to the vertical axis of the penetrating object. Bring the temperature of the penetrating object to 25 ± 0.5 °C and then adjust its position such that its tip just touches the surface of the sample. Release the penetrating object and hold it free for 5 s. Clamp the penetrating object and measure the depth of penetration. Repeat the test with the 2 remaining containers.

EXPRESSION OF THE RESULTS

The penetration is expressed in tenths of a millimetre as the arithmetic mean of the 3 measurements. If any of the individual results differ from the mean by more than 3 per cent, repeat the test and express the results of the 6 measurements as the mean and the relative standard deviation.

07/2019:20910
corrected 10.0

2.9.10. ETHANOL CONTENT

These methods are intended for the examination of liquid pharmaceutical preparations and their ingredients that contain ethanol.

The ethanol content of a liquid is expressed as the number of volumes of ethanol contained in 100 volumes of the liquid, the volumes being measured at 20 ± 0.1 °C. This is known as the 'percentage of ethanol by volume' (per cent V/V). The content may also be expressed in grams of ethanol per 100 g of the liquid. This is known as the 'percentage of ethanol by mass' (per cent m/m).

METHOD A

Where preparations contain dissolved substances, the dissolved substances must be separated from the ethanol that is to be determined by distillation. Where distillation would distil volatile substances other than ethanol and water, the appropriate precautions are stated in the monograph.

The relation between the density at 20 ± 0.1 °C, the relative density (corrected to vacuum) and the ethanol content of a mixture of water and ethanol is given in the tables of the International Organisation for Legal Metrology (1972), International Recommendation No. 22.

Apparatus. The apparatus (see Figure 2.9.10.-1) consists of a round-bottomed flask (*A*) fitted with a distillation head (*B*) with a steam trap and attached to a vertical condenser (*C*). The latter is fitted at its lower part with a tube (*D*), which carries the distillate into the lower part of a 100 mL or 250 mL volumetric flask. The volumetric flask is immersed in a mixture of ice and water (*E*) during the distillation. A disc having a circular aperture 6 cm in diameter is placed under the flask (*A*) to reduce the risk of charring any dissolved substances.

Method

Pycnometer method/oscillating transducer density meter method. Transfer 25.0 mL of the preparation to be examined, measured at 20 ± 0.1 °C, to the distillation flask. Dilute with 100-150 mL of *distilled water R* and add a few pieces of pumice. Attach the distillation head and condenser. Distil and collect not less than 90 mL of distillate in a 100 mL volumetric flask. Adjust the temperature to 20 ± 0.1 °C and dilute to 100.0 mL with *distilled water R* at 20 ± 0.1 °C. Determine the relative density at 20 ± 0.1 °C using a pycnometer or an oscillating transducer density meter.

The values indicated in Table 2.9.10.-1, column 3, are multiplied by 4 to obtain the percentage of ethanol by volume (*V/V*) contained in the preparation. After calculation of the ethanol content using the table, round off the result to 1 decimal place.