

Specification for

Ubbelohde apparatus for flow and drop points

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This British Standard, having been approved by the Scientific Glassware and Related Laboratory Apparatus Industry Standards Committee and endorsed by the Chairman of the Chemical Divisional Council, was published under the authority of the General Council on 30 August 1956

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Foreword

This standard makes reference to the following British Standard:

BS 593, *Laboratory thermometers*.

This British Standard was first published in 1940 under the title “*The determination of the flow and drop points of fats and allied substances*,” and at that time only a glass cup was specified. In 1947 an amendment was issued specifying a metal cup as an alternative, but it was pointed out that “it must not be assumed that the glass cups and metal cups may in all circumstances be used indiscriminately”, and experience has shown that the results obtained for a given material may differ significantly according to which type of cup is used.

Similar apparatus and methods of use have been specified both by the Institute of Petroleum and by the British Pharmacopœia Commission. The Institute of Petroleum, however, have decided only to specify the metal cup, and in the 1953 edition of the “British Pharmacopœia” this has been introduced as an alternative to the glass cup. The chief objection to the latter is the difficulty of complying in manufacture with the precise tolerances on dimensions which are essential to secure interchangeability of the parts and reproducible results.

Glass cups strictly complying with the British Standard have, in fact, been very difficult to obtain, and this consideration outweighs the advantage of the glass cup that air bubbles included during filling can be more easily detected. It has therefore been decided to specify only the metal cup in this revision.

In order that the cup should be held firmly in the case and to secure interchangeability, both parts had previously to be made to very close tolerances, with consequent increase in cost. An important change in this edition is the provision on the case of spring clips which grip the cup. The tongues previously specified are not split, but are retained as guides for inserting the cup.

Sleeves complying with the requirements of the 1940 edition of this standard may still be used provided they are fitted with spring clips as specified.

Other changes made in the apparatus specification are of minor importance. The previous edition contained a short section describing the method of use, but enquiries have shown that the precise method of filling and using the cup needs to be specified in detail, and varies according to the type of material which is being tested. It is not possible in this British Standard to specify suitable methods for all materials, but for information and guidance the methods in use for a number of important materials are given in Appendix B.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies a metal cup and ancillary apparatus of the Ubbelohde type for the determination of the flow and drop points of fats and allied substances.

2 Assembly of apparatus

The apparatus shall consist of the following components:

- A. *Metal cup.*
- B. *Thermometer for cup.*
- C. *Sleeve and case.*
- D. *Boiling tube.*
- E. *Cork.*
- F. *Beaker.*
- G. *Stirrer.*
- H. *Heating liquid.*
- I. *Auxiliary thermometer.*
- J. *Stand with clamps.*
- K. *Source of heat.*

The general assembly is shown in Figure 1.

3 Metal cup

The cup shall be made from chromium plated brass, or from other suitable metal which is not affected by the material being tested. The top of the cup and the bottom of the tube forming the orifice shall be smooth, parallel to each other and at right angles to the axis of the cup. The cup shall conform to the dimensions given in Table 1 and Figure 2. The wide part of the cup shall have an approximately hemispherical lower portion, and an internal depth such that when a steel ball 7.00 mm in diameter is placed in the cup, the top of the ball shall be 12.20 ± 0.15 mm above the bottom of the tube forming the orifice. The bottom edge of the orifice shall not be chamfered or radiused.

Table 1 — Dimensions of metal cup

	mm
Internal diameter of wide part	7.50 ± 0.15
External diameter of wide part	$9.99^{+0.00}_{-0.04}$
Internal diameter of orifice	3.15 ± 0.05
External diameter of orifice	5.55 ± 0.05
Overall length	15.2 ± 0.2

4 Thermometer for cup

The thermometer used shall be a 100 mm immersion type selected as required from the ranges specified in Series C of BS 593,¹⁾ and shall comply with the relevant provisions in Table 2 or Table 4 of that British Standard, except in so far as they conflict with the following special requirements:

- a) The diameter of the bulb shall be 3.5 ± 0.15 mm.
- b) The length of the bulb shall be not more than 6 mm.
- c) The stem immediately above the bulb shall have a diameter approximately equal to, but not less than that of the bulb, for a length of at least 26 mm, measured from the bottom of the bulb.
- d) The inscriptions on the thermometer shall be as given in Clause 14.
- e) The thermometer shall be finished with a plain top.

Alternatively, where a particular thermometer is included in the specification to which the product is being tested, then this thermometer shall be used.

5 Sleeve and case

To the lower end of the thermometer the cylindrical metal sleeve [see Figure 3(a)] shall be securely and coaxially cemented.²⁾ To this shall be screwed the metal case (see Figure 4), which shall have two small apertures, one in front and one behind, to act as air vents. The case shall have a rim stop, guide lugs to aid the coaxial insertion of the cup into the case, and spring clips which enable the cup to be retained firmly with its top edge against the stop. The design, dimensions, and method of fixing of the spring clips shown in Figure 4 are not mandatory but are recommended as suitable.

The sleeve shall be fixed to the thermometer in such a position that, when the case is screwed on to the sleeve, the bottom of the thermometer bulb shall be 8.0 ± 0.1 mm below the rim stop, and the thermometer stem shall be coaxial with the sleeve and case.

6 Boiling tube

The boiling tube shall be of glass. Suitable dimensions for it are:

- Overall length 110 mm
- Internal diameter 25 mm

¹⁾ BS 593, "Laboratory thermometers".

²⁾ While it does not form a mandatory part of this standard, it is suggested that the accurate location of the thermometer in the sleeve may be assisted by the use of a metal jig such as is shown in Figure 3(b). The inside of the sleeve may with advantage be roughened to provide a key for the cement. The cement used shall be suitable for the temperatures covered by the thermometer.