

Methods of test for

Flammability of vertically oriented textile fabrics and fabric assemblies subjected to a small igniting flame

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Foreword

The methods of test given in this standard will supersede those given in BS 2963 “*Tests for the flammability of fabrics*” and BS 3119 “*Methods of test for flameproof materials*” and have been prepared following a comprehensive research programme and a series of inter-laboratory trials. BS 2963 and BS 3119 will be withdrawn in due course. A background paper giving some details of the research project and the inter-laboratory trials was published in the February 1975 issue of “Textile Institute and Industry”. A second paper giving information on the interpretation and application of the methods is given in the September 1976 issue of the same journal.

Attention is drawn to these background papers, to Appendix A, which gives notes to users of the standard including the relationship between the tests, and to Appendix B, which gives information on the setting of performance levels.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 18, an inside back cover 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.

Section 1. General

1 Scope

This British Standard specifies test methods for observing and measuring aspects of the flammability (when subjected to a small igniting flame) of vertically oriented textile fabrics, specimens being either a single layer or an assembly of two or more layers. These aspects are relevant to apparel fabrics and to those textile fabrics which will be held loosely in an essentially vertical position, for example curtains drapes.

The results may not apply to situations where there is restricted air supply or prolonged exposure to large sources of intense heat as in a conflagration.

NOTE The scope has been limited to those fabric end uses tested in inter-laboratory trials but the tests may be used to assess the behaviour of fabrics or assemblies intended for other end uses, provided that the information gained is understood to relate to the fabric or assembly only.

2 References

The titles of the publications referred to in this standard are listed on the inside back cover.

3 Definitions

For the purposes of this British Standard the following definitions apply.

3.1 ignition

flaming of the specimen for a period of 1 s or more after extinguishing of the butane flame, unless otherwise specified in performance requirements

3.2 glowing

combustion of a material in the solid phase with emission of light from the surface

3.3 flaming debris

material separating from the specimen during the test procedure and falling below the initial lower edge of the specimen and continuing to flame as it falls

3.4 hole

a break in the fabric at least 2 mm × 2 mm in size caused by glowing or flaming. If the hole is crossed by any material it should be described as discontinuous

3.5 duration of flaming

time for which the supported specimen continues to flame after extinction of the butane flame. This measurement is only made when the flaming ceases due to the behaviour of the fabric and not because flame has reached the edge of the specimen

3.6 duration of afterglow

time for which the specimen continues to glow after extinction of flaming or of the igniting flame, whichever is the later. This measurement is only made when glowing ceases due to the behaviour of the fabric and not because glowing has reached an edge of the specimen, other than the lower edge

3.7 flame application time

the time for which the igniting flame is applied to the specimen, controlled to an accuracy of ± 0.2 s for times up to 8 s and ± 0.5 s for times of 10 s or more

3.8 minimum ignition time

the minimum flame application time required to cause ignition

Section 2. Information common to methods 1, 2 and 3

4 Conditioning and testing

4.1 Conditioning and testing atmospheres. An atmosphere having a temperature of 15 °C to 25 °C and relative humidity 55 % to 65 % shall be used for the conditioning of specimens. For testing, an atmosphere substantially free from draughts and having a temperature of 15 °C to 30 °C and relative humidity 20 % to 65 % shall be used.

4.2 Conditioning and testing of specimens. Subject the specimens to be tested to the atmosphere for conditioning for 24 h. If the test is not carried out immediately after conditioning, place the specimen in a sealed container until the start of the test. Begin testing each specimen within 3 min of removing it from either the conditioning atmosphere or the container.

5 Health and safety of operators

There is a considerable risk with these tests and suitable precautions should be taken. Between tests, the atmosphere of the testing-room, which should be of adequate dimensions to avoid endangering the health of operators, should be cleared of smoke and fumes by an extractor fan or other means of ventilation. It should be ensured that the desired atmosphere for testing is restored.

6 Apparatus

A general arrangement of the test apparatus is given in Figure 1 which shows the test 3 pin frame in position.

The following apparatus is required.

6.1 A *testing room* equipped with an extractor fan or other means of ventilation and capable of providing the atmosphere for testing defined in clause 4. It is strongly recommended that the testing room be divided into two parts, the inner one for carrying out the tests being of a minimum volume of 4 m³ and of a minimum height of 2 m and easily viewed from the outer part in which control equipment would be situated.

6.2 A *supply of commercial butane* complying with the requirements of BS 4250.

6.3 A *horizontal-tube burner*¹⁾ of 3 mm bore and with the dimensions as shown in Figure 2. The axis of the burner shall be located 18 mm above the level of the bottom row of pins on the frames specified in 6.4. The burner shall be equipped with means for controlling the rate of gas flow and may also be equipped with means for igniting the gas by an electric spark and for automatically governing the duration of gas flow.

6.4 A *test frame* with horizontal pins round each edge at 50 mm intervals, each at such pins being 50 mm projecting length × 1.83 mm diameter with a stub 7 mm from the tip (see Figure 3). The frame dimensions shall be as specified in the appropriate clauses of this standard.

6.5 A *mounting frame* for supporting the test frame.

6.6 A *timer* designed to start (preferably automatically) at the end of the flame application time, fitted with a manual stop button and operating to an accuracy of 0.2 s or better.

6.7 Additional apparatus as specified in the appropriate clauses of this standard.

7 Control of flame size

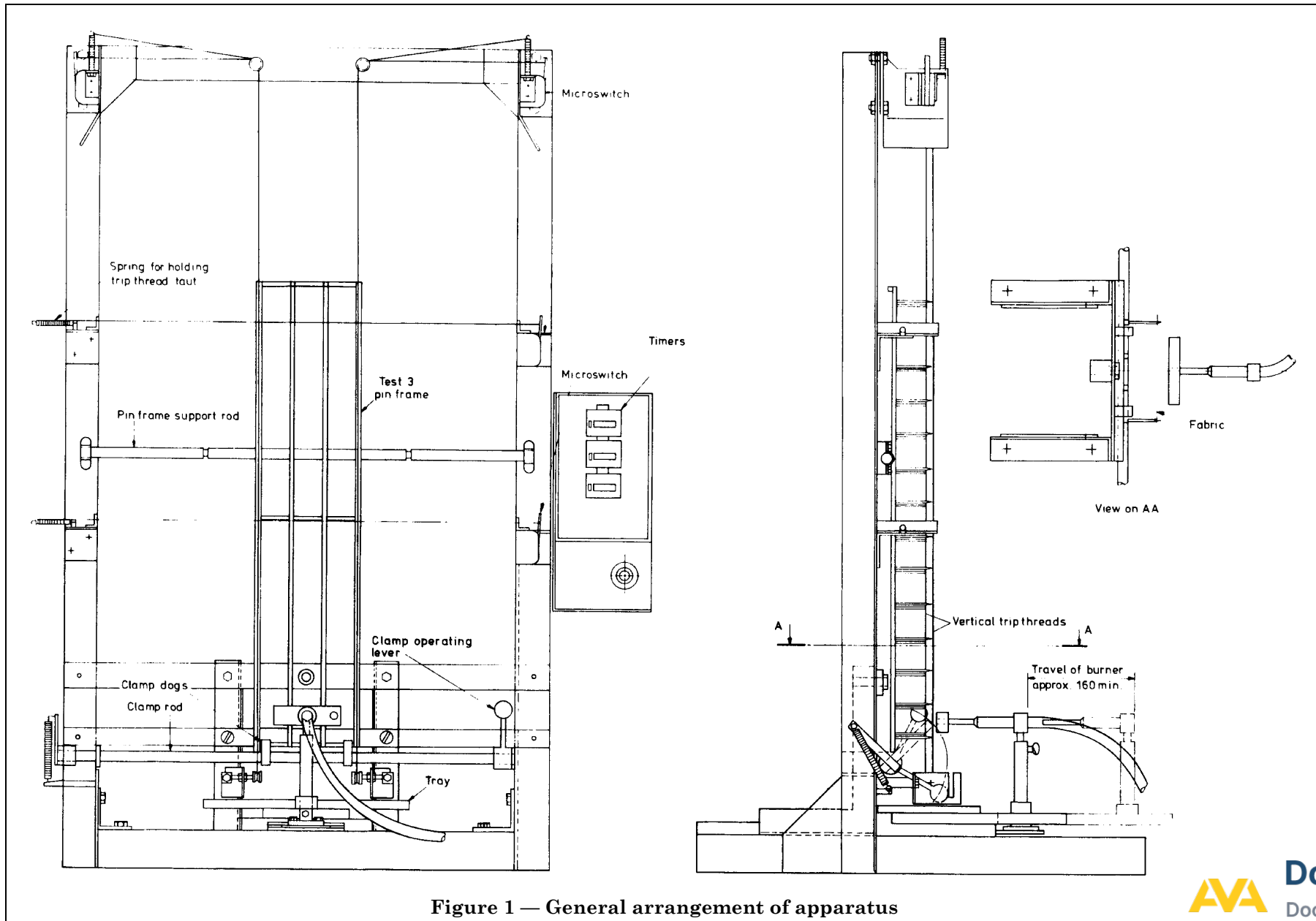
Control the rate of flow of butane so that, with the burner tube vertical, the height of the flame is 45 ± 2 mm. Then verify that, with the burner tube horizontal, the horizontal reach of the flame is 23 ± 2 mm. Extinguish the flame and then return the burner to its horizontal position as shown in Figure 3. Ensure that the horizontal distance from the end of the burner to the nearest face of the fabric is 17 ± 1 mm (see Figure 3). This can be achieved, for example, by means of a wire spacer attached to the burner with subsequent use of a mechanical stop device.

NOTE It is recommended that the vertical flame height and horizontal reach of the flame should be checked, and if necessary adjusted, at least once per day.

8 Room ventilation

Before any specimen is tested, ventilate the testing room or inner part of a divided room, if present, to ensure adequate oxygen supplies for the test, then allow adequate time for air movement to cease after stopping fans or other means of ventilation.

¹⁾ A burner complying with the requirements of this standard is available from James H. Heal & Co. Ltd., Richmond Works, Halifax, West Yorkshire, HX3 6EP and from Shirley Institute, Didsbury, Manchester, M20 8RX.



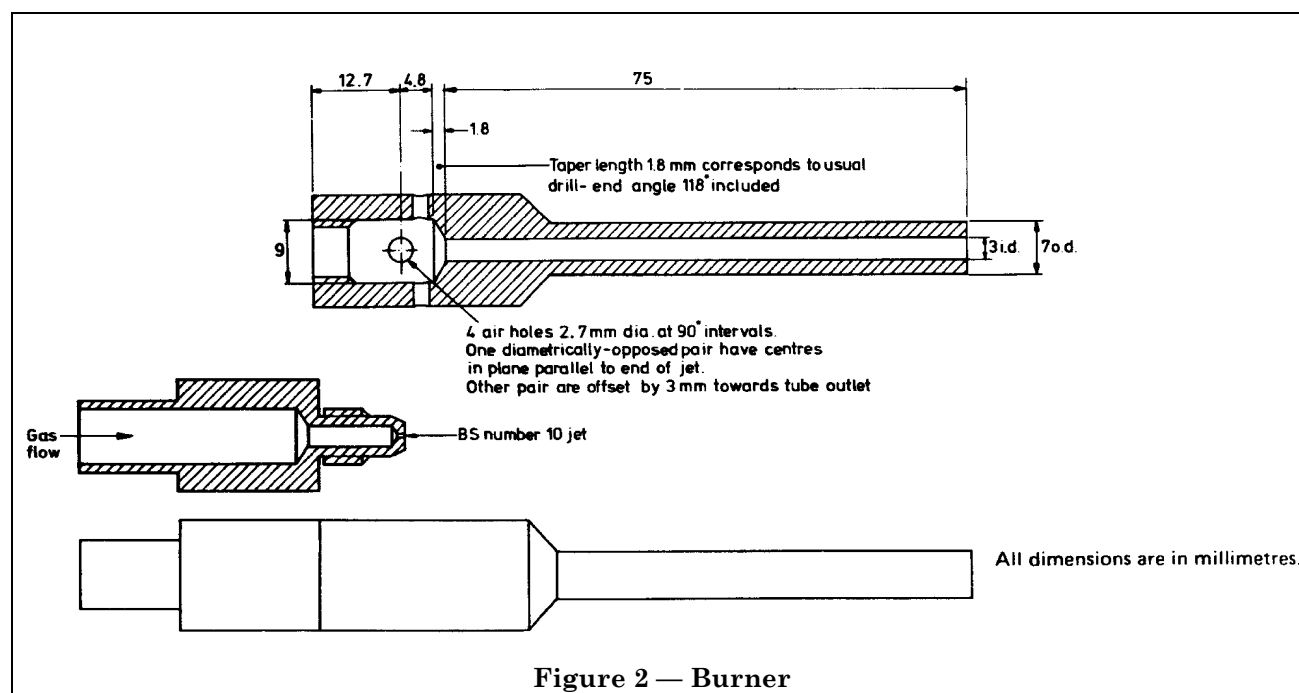


Figure 2 — Burner

Section 3. Methods of test

9 Test 1

9.1 Principle. A wide vertical strip of the fabric or assembly is taken, and a specified small butane flame is applied to the face of the strip for prescribed times. The minimum flame application time is found that causes ignition (see clause 3) of the specimen.

9.2 Apparatus. The following apparatus, together with apparatus specified in clause 6, is required.

A rectangular test frame as shown in Figure 4, fitted with two vertical rows of pins 150 mm apart and two horizontal rows of pins 200 mm apart, which can be readily turned through a horizontal axis about its centre. (See also 6.4.)

9.3 Preparation of specimens. Prepare at least six specimens each measuring 220 mm × 170 mm, three with the longer dimension in the length direction of the fabric or assembly, three in the width direction.

9.4 Conditioning of specimens. Condition specimens as described in clause 4.

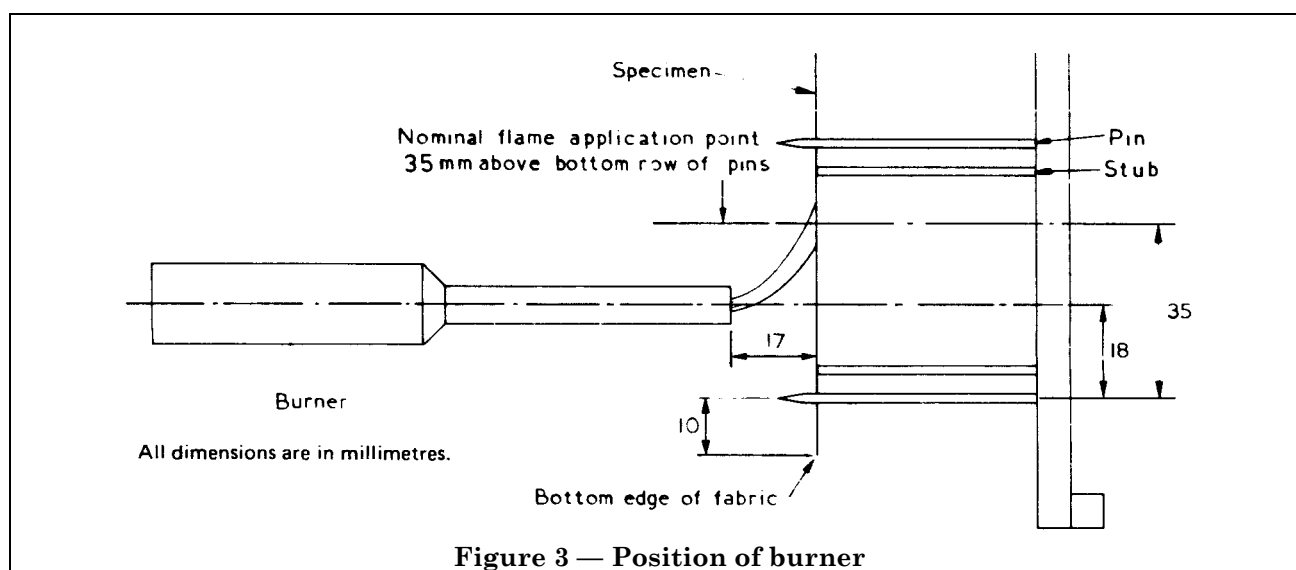


Figure 3 — Position of burner