BRITISH STANDARD

BS 3424-38:1998

Testing coated fabrics —

Part 38: Method 41. Determination of wounded burst strength

ICS 59.080.40

Committees responsible for this British Standard

The preparation of this British Standard was entrusted to Technical Committee TCI/78 Coated fabrics, upon which the following bodies were represented:

British Plastics Federation
British Rubber Manufacturers Association Ltd.
British Textile Technology Group
Fira International
Home Office
Made-up Textiles Association
Ministry of Defence
RAPRA Technology Ltd.
SATRA Technology Centre
Society of British Aerospace Companies Limited
Textile Institute

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The following BSI references relate to the work on this standard:
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Foreword

This British Standard has been prepared by Technical Committee TCI/78.

Textile materials and coated fabrics have traditionally been tested by inserting a cut in the transverse or machine direction of the material in order to produce a specimen that can be mounted in the jaws of a standard tensile testing machine. Upon separation of the jaws, the test specimen is torn apart.

Analysis of the resulting autographic trace has been a cause of dispute about whether it is the highest value of all the maximum peaks on a particular test that is required, the mean of all the maximum peaks, or the lowest value and/or mean of the minimum values attained. In certain cases, a mid-point between the mean of the maximum peaks and the mean of the minimum values may also be required. In practice, many users are not concerned with the actual value of the material but only with the fact that the material has torn.

Another problem with such a test is that the tear propagates in a direction that is not aligned with the direction of application of the force.

The present test is presented as a proposed solution to some of these difficulties, although it is accepted that the test may not find universal 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 3, and a back cover.

1 Scope

This Part of BS 3424 describes a method of test for determining the omnidirectional wounded burst resistance of a coated fabric when subjected to a force exerted by a traversing sphere moving at right angles to the plane of the coated fabric.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of this British Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the publication referred to applies.

BS 5214-1, *Specification for testing machines for rubbers and plastics — Part 1: Tensile, flexural and compression types (constant rate of traverse).*

BS EN ISO 2231, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing.*

3 Principle

A test specimen having a centrally punched hole of 3 mm diameter is placed concentrically in the ring clamp of a ball burst test apparatus. The traversing ball exerts a force on the hole until rupture occurs across the full width of the aperture of the internal ring mechanism (see **4.2**). The maximum force thus exerted is recorded.

4 Apparatus and materials

4.1 *Constant rate tensile testing machine*, capable of maintaining a constant rate of traverse and conforming to Grade B of BS 5214-1.

4.2 *Bursting attachment* (Figure 1 provides an example), such that the test specimen is held securely by a ring mechanism of internal diameter 45 mm $\pm$ 0.5 mm, with the centre of the test specimen pressed against an incompressible ball of 38 mm $\pm$ 0.2 mm diameter. The ball moves at right angles to the plane of the coated fabric at a constant rate of 100 mm/min $\pm$ 10 mm/min.

The clamping surfaces of the upper and lower clamps are grooved concentrically such that the crowns of the grooves of one plate fit the grooves of the other. The grooves are not less than 0.8 mm apart and not less than 0.15 mm deep. The first outer groove of each plate is not less than 3 mm from the outer rim of the plate. Each groove has a radius not less than 0.4 mm and the lower inner edge of the upper clamp and upper inner edge of the lower clamp have radii of 0.5 mm $\pm$ 0.01 mm.

4.3 *Die cutter or punch*, capable of cutting a test specimen with a centrally located clean hole of 3 mm $\pm$ 0.05 mm diameter.

NOTE The specimen and hole are cut in one operation to ensure that the hole is correctly located. Figure 2 provides an example of an arrangement of location pins that can be used to ensure that the hole is centred.

4.4 *Aqueous solution of sodium oleate*, volume fraction of 2 %.

5 Preparation of test specimens

Avoiding the first 50 mm inside each selvedge, select not less than five sub-samples from the sample such that they are representative of its width and length. Each sub-sample shall be approximately square, having sides not less than 20 mm greater than the outside diameter of the coaxial ring clamp.

Using the die cutter or punch (**4.3**), cut test specimens from the sub-samples, with each test specimen having a centrally located hole 3 mm $\pm$ 0.5 mm in diameter.

Mark the warp direction, or in the case of non-woven or knitted fabrics, the machine (length) direction.

6 Conditioning

Condition the test specimens in accordance with BS EN ISO 2231 using an atmosphere of 20 °C $\pm$ 2 °C and 65 % r.h. $\pm$ 5 % r.h.

7 Wet testing

To determine the wet tear strength of the material, immerse each previously prepared test specimen for not less than 1 h at 20 °C in a 2 % volume fraction aqueous solution of sodium oleate (**4.4**) using a liquor ratio of 20:1. Immediately after removal from the water, blot each test specimen between two sheets of absorbent paper and test, as described in clause **8**, within 15 s.

8 Procedure

Secure the test specimen in the ring clamps of the apparatus so the punched or cut hole is aligned with the centre-line of the axis of movement of the traversing ball and is in contact with the top of the ball.

Ensure that the force recording mechanism is set at zero and set the machine in motion. Terminate the test when the test specimen has torn and the force has reached its maximum.

Repeat the procedure for the remaining sub-samples.

9 Calculation and expression of results

Calculate the arithmetic mean and standard deviation of the maximum recorded force values.

10 Test report

The test report shall include at least the following details:

a) a description of the coated fabric;

b) the conditioning period;

c) whether the test specimens were tested in the wet state and, if so, the immersion period employed;

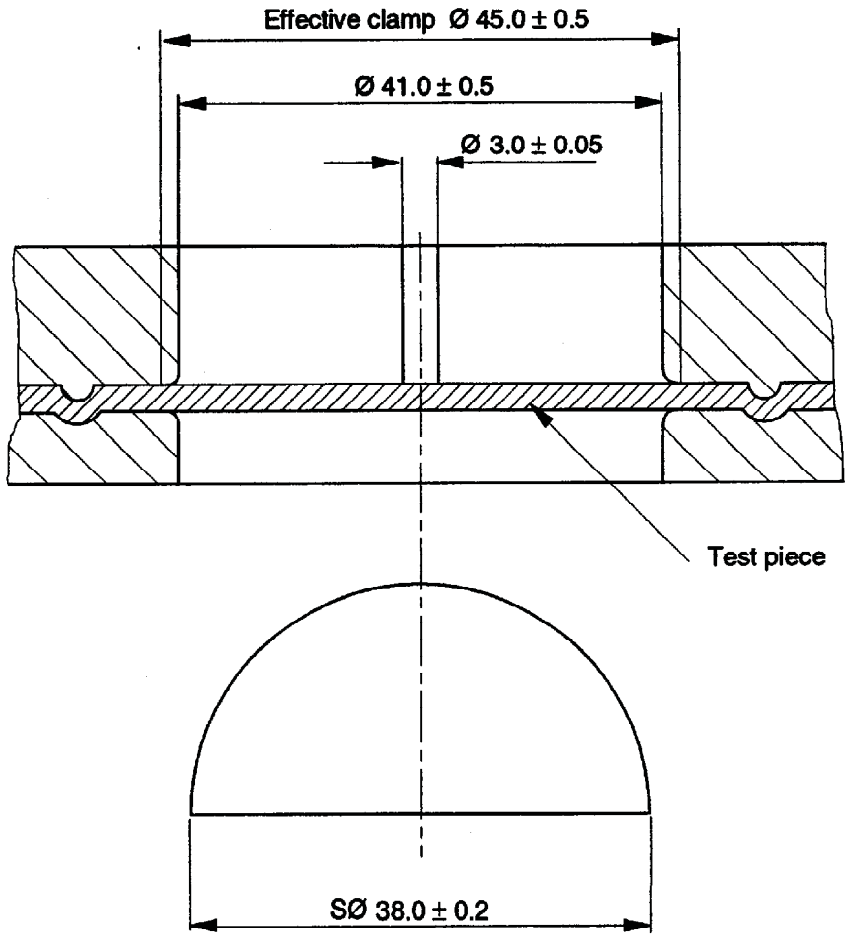
d) the mean tear strength, in newtons, and the standard deviation;

e) an indication of the direction of tearing (see clause 5);

f) the configuration of the test specimen during the test, i.e. side A to ball or side B to ball;

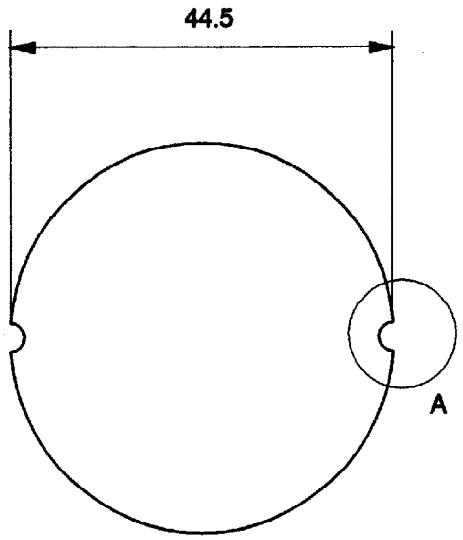
g) reference to this method of test;

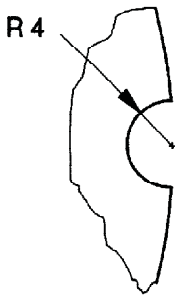
h) any deviation from the specified test conditions.



Dimensions in millimetres

Figure 1 — Example of bursting attachment





Detail A
Semi-circular cut out

Dimensions in millimetres

Figure 2 — Example of location pins

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