STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard

METHODS OF TEST FOR TEXTILES

PART 2—PHYSICAL TESTS

AS 2001.2.8
DETERMINATION OF TEAR RESISTANCE OF WOVEN FABRICS BY THE FALLING-PENDULUM (ELMENDORF) APPARATUS

PREFACE

This edition of this standard was prepared by the Association's Committee on Testing of Textiles. It supersedes AS 2001.2.8—1977—Determination of Tear Resistance of Woven Fabrics by the Falling-Pendulum (Elmendorf) Apparatus.

The standard method for measuring tear resistance of fabrics using the Elmendorf apparatus is similar to that specified in ASTM D 1424-83 Test Method for Tear Resistance of Woven Fabrics by Falling-Pendulum (Elmendorf) Apparatus.

The falling-pendulum (Elmendorf) apparatus operates on a ballistic principle whereas other methods, such as wing-rip or tongue tear determinations operate on a dynamic method.

METHOD

1 SCOPE. This standard sets out the method for determining the average force required to propagate a tear starting from a cut in a fabric, using the falling-pendulum Elmendorf apparatus.

2 APPLICATION. This method is applicable to woven fabrics provided that:

(a) Yarns do not withdraw from the specimen during the test.

(b) Test result is in the range of 20 percent to 60 percent of the capacity of the instrument.

3 REFERENCED DOCUMENTS. The following standard is referred to in this standard:

AS 2001.1 Methods of Test for Textiles— Conditioning Procedures.

4 PRINCIPLE. The average force required to complete a tear in a fabric is determined by measurements of the work carried out in tearing the fabric through a standard distance. The apparatus consists of a sector-shaped pendulum carrying a clamp which is in alignment with a fixed clamp when the pendulum is in the raised starting position with maximum potential energy. A test specimen is fastened in the clamps and the tear is started by a slit cut in the specimen between the clamps. The pendulum is then released and the specimen is torn as the moving jaw moves away from the fixed one. The scale attached to the pendulum is graduated to read the tearing force directly, or a centesimal scale (i.e. a scale of 100 units) may be attached.

5 DEFINITIONS. For the purpose of this standard, the following definitions apply:

5.1 Warp tests—tests in which the warp yarns are torn.

5.2 Weft tests—tests in which the weft yarns are torn.

6. APPARATUS. The following apparatus is required:

(a) *Falling-pendulum Elmendorf apparatus.* The apparatus may have a number of energy ranges obtained by augmenting weights which are fixed to the pendulum and a corresponding scale graduated and figured appropriately for each range in order to provide for a wide range of fabrics, and for convenient scale readings. The apparatus is securely fixed in position to prevent movement during testing. A typical apparatus is described in Appendix A.

(b) *Cutting die or template.* A die or template with the shape and dimensions shown in Fig. 1(a) or for heavy duty models Fig. 1(b).

7 SAMPLE AND TEST SPECIMENS.

7.1 Selection. Representative samples shall be selected according to—

(i) the direction given in the relevant material specification; or

(ii) the procedure agreed upon by the parties interested in the test results.

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7.2 Specimens. Two series of not less than five test specimens shall be cut. One series, for warp tests, shall be prepared with the short dimension of the die parallel to the weft yarns. The other series, for weft tests, shall be prepared with the short dimension of the die parallel to the warp yarns. Where possible, each specimen shall be cut so that no two specimens will involve tearing of the same yarns.

8 PROCEDURE

8.1 Preparation of apparatus. The apparatus shall be prepared as follows:

(a) Check level, zero point, and length to be torn before commencing each set of tests. Make any necessary adjustments, as prescribed in Appendix A, Paragraph A2.

(b) Select the capacity such that the specimens will record a tearing energy between 20 percent and 60 percent of the full scale used (see Table A1).

8.2 Test procedure. Each specimen shall be tested as follows:

(a) Condition and test specimen in the standard atmosphere described in AS 2001.1.

(b) Raise pendulum to the starting position and set pointer against its stop.

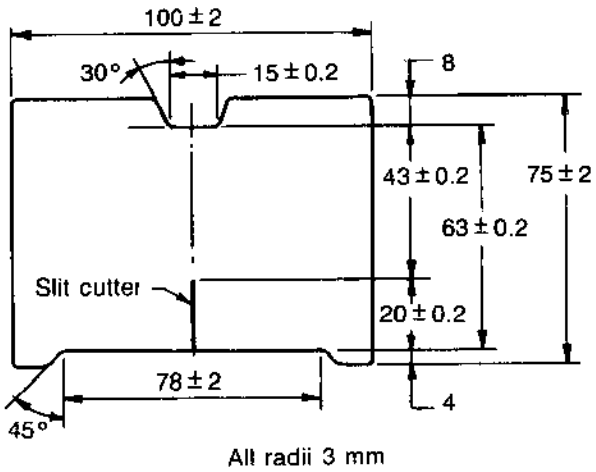
(c) Fasten conditioned specimen securely in the clamps so that it is well centred, with the bottom edge carefully set against the stops, so that the upper edge is parallel with the top of the clamps. If the slit in the specimen has not been cut by the die, use knife blade on the apparatus to cut a slit 20 mm extending from the bottom edge of the specimen. Close clamps using approximately the same pressure on both clamps. The specimen should lie free with its upper area directed towards the pendulum in order to ensure a shearing action.

(d) Depress pendulum stop as far as it will go, thus releasing the pendulum. Hold down the stop until after the tear is completed and catch the pendulum, by hand, or apply instrument braking device (if fitted) on the return swing without disturbing the position of the pointer.

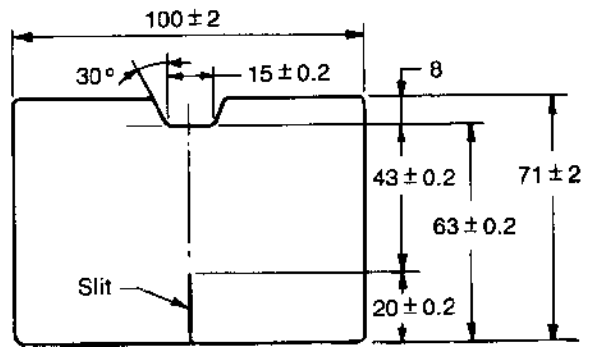
(e) Read scale to the nearest whole scale division for the capacity used.

(f) Reject readings where:

(i) Specimen slips in the clamps.



(a) For instruments with jaw width of up to 80 mm



(b) For instruments with jaw width exceeding 80 mm

DIMENSIONS IN MILLIMETRES

Fig. 1. DIE PATTERN FOR INSTRUMENTS