

Methods of test for

Footwear and footwear materials —

Part 1: Adhesives —

Section 1.2 Resistance of adhesive joints to peeling

NOTE It is recommended that this Section should be read in conjunction with BS 5131-0, published separately.

Confirmed January 2011

NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW



Document Sharing Hub

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Textiles and Clothing Standards Policy Committee (TCM/-) to Technical Committee TCM/39, upon which the following bodies were represented:

- British Footwear Manufacturers' Federation
- British Leather Confederation
- British Rubber Manufacturers' Association
- British Steel plc
- Consumer Standards Advisory Committee of BSI
- Cork Industry Federation
- Footwear Components Federation
- Footwear Distributors' Federation
- Institute of Trading Standards Administration
- Iron and Steel Trades Confederation
- Lancashire Footwear Manufacturers' Association
- Mail Order Traders' Association of Great Britain
- Ministry of Defence
- National Union of Footwear, Leather and Allied Trades
- Office of Fair Trading
- SATRA Footwear Technology Centre

The following bodies were also represented in the drafting of the standard, through subcommittees and panels:

- British Adhesives and Sealants Association
- British Paper and Board Industry Federation
- British Plastics Federation
- Multiple Shoe Retailers' Association
- RAPRA Technology Ltd.

This British Standard, having been prepared under the direction of the Textiles and Clothing Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 30 April 1991

© BSI 10-1999

First published as BS 5131-1.1.2 August 1976
Second edition April 1991

The following BSI references relate to the work on this standard:
Committee reference TCM/39
Draft for comment 89/36217 DC

ISBN 0 580 19189 3

Amendments issued since publication

Amd. No.	Date	Comments

Contents

	Page
Committees responsible	Inside front cover
Foreword	ii
1 Scope	1
2 Principle	1
3 Apparatus	1
4 Preparation and bonding of test assemblies	1
5 Conditioning	1
6 Cutting of test specimens	1
7 Procedure	2
8 Additional tests	6
9 Expression of results	6
10 Test report	7
Figure 1 — Test specimen (cut from test assembly prepared as described in BS 5131-1.3 or prepared by indirect bonding as described in BS 5131-1.7)	2
Figure 2 — Test assembly prepared by direct bonding as described in BS 5131-1.7	3
Figure 3 — Test specimen (cut from test assembly prepared by direct bonding as described in BS 5131-1.7)	4
Figure 4 — Types of bond failure	5
Figure 5 — Example of a typical graph of peeling force against extension which includes an initial peak	6
Publication(s) referred to	Inside back cover

Foreword

This Section of BS 5131 has been prepared under the direction of the Textiles and Clothing Standards Policy Committee. It supersedes BS 5131-1.1.2:1976, which is withdrawn.

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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

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

1 Scope

This Section of BS 5131 describes a method for measuring the strength, in terms of resistance to peeling, of a bond between two sheet materials that have been bonded together. The method is applicable to a great variety of combinations of upper materials, soling materials and adhesives, where at least one of the adherends is flexible.

NOTE 1 The purpose of the method is to test joints rather than to compare adhesives. As a consequence, unlike BS 5131-1.1, no recommendations are given concerning appropriate adherends. In BS 5131-1.1 the two adherends are subjected to a constant separating force, and therefore in principle the test specimen may remain intact. In this Section, the two adherends are pulled apart at a constant rate; the test specimen will inevitably fail, and it is the forces required to cause the test specimen to fail and the nature of the failure that are under investigation. This test is more destructive in its philosophy than the test described in BS 5131-1.1. In BS 5131-1.1 the failures (e.g. cohesive failure of the adhesive layer, or failure of adhesion to one adherend) are associated with the adhesive. In this Section, however, alternative types of failure which may take place within the adherend are described.

NOTE 2 For the peel bond strength of specimens cut from made-up footwear see BS 5131-5.4.

NOTE 3 The titles of the publications referred to in this standard are listed on the inside back cover.

2 Principle

The two adherends of a bonded assembly are peeled apart by forces acting at an angle of 180° to each other. The peel angle depends on the flexibility of the adherends. The peeling force is recorded continuously and the mean peeling force is calculated.

3 Apparatus¹⁾

3.1 Conditioning cabinet or room, maintaining an atmosphere at a preferred condition of $20 \pm 2^\circ\text{C}$ and $65 \pm 2\%$ r.h., or an allowed condition of $23 \pm 2^\circ\text{C}$ and $50 \pm 5\%$ r.h.

NOTE The conditioning atmosphere for footwear and footwear materials is normally 20°C and 65% r.h., whereas the conditioning atmosphere for adhesives is normally 23°C and 50% r.h.

3.2 Tensile testing machine, of low inertia, with a constant rate of extension, with continuous recording and with a jaw separation rate of $100 \pm 20\text{ mm/min}$.

3.3 Cutting device, suitable for cutting test assemblies into test specimens, which neither compresses nor tends to split the layers of the test assembly at the edges produced by cutting.

NOTE A rotary disc cutter or a sharp hand knife, for example, is a suitable tool. A press knife is not suitable because of the large compression force that it applies to the test assembly.

4 Preparation and bonding of test assemblies

Prepare the materials and bond the test assemblies, incorporating a paper or tape insert, as described in BS 5131-1.7 for hot melt adhesive bonds and as described in BS 5131-1.3 for all other types of bond. Produce test assemblies of sufficient size and number so as to enable four or eight test specimens (see clauses 5 and 8) to be prepared.

5 Conditioning

Between bonding the test assemblies and cutting them into test specimens, store the test assemblies in the conditioning cabinet or room (3.1).

In cases where it is known that the bond is formed rapidly within a short period of time, after which there is no change in the bond, condition one set of test assemblies for a period of $48 \pm 4\text{ h}$. In other cases, condition one set of test assemblies for a period of $48 \pm 4\text{ h}$ and a second set of test assemblies for a period of $14 \pm 2\text{ days}$ so that any change in bond strength due to changes in the adhesive (e.g. increased curing or crystallization) may be assessed.

NOTE By determining the bond strength after various conditioning periods, any change in the bond strength due to changes in the adhesive (e.g. increased curing or crystallization) may be assessed.

6 Cutting of test specimens

At the end of the conditioning period (see clause 5), cut one set of test assemblies into four test specimens using the cutting device (3.3) as follows.

- Where the test assemblies have been prepared as described in BS 5131-1.3 or prepared by indirect bonding as described in BS 5131-1.7, cut test specimens $30.0 \pm 0.5\text{ mm}$ by approximately 50 mm , discarding two marginal strips approximately 5 mm wide if the test assemblies are approximately 70 mm wide. A test specimen is shown in Figure 1.
- Where the test assemblies have been prepared by indirect bonding as described in BS 5131-1.7, cut test specimens as in item a) (preferred) and illustrated in Figure 1, or cut test specimens $20.0 \pm 0.5\text{ mm}$ by approximately 50 mm (allowed).

NOTE Recent developments relating to indirect bonding using hot melt adhesives are such that in some cases it may be difficult or inconvenient to prepare test assemblies wide enough to produce test specimens 30 mm wide. In such cases, the allowed test specimen is as illustrated in Figure 1 except that the width is $20.0 \pm 0.5\text{ mm}$ instead of $30.0 \pm 0.5\text{ mm}$.

¹⁾ For information on the availability of suitable apparatus to perform this test, apply to Enquiry Section, BSI, Linford Wood, Milton Keynes, MK14 6LE, quoting the number of this standard and the clause number referring to the items concerned. Enclose a stamped addressed envelope for reply.