

BS EN ISO 32100:2010



BSI Standards Publication

**Rubber- or plastics-
coated fabrics — Physical
and mechanical tests —
Determination of flex
resistance by the flexometer
method (ISO 32100:2010)**

bsi.

...making excellence a habit.™

National foreword

This British Standard is the UK implementation of EN ISO 32100:2010.

The UK participation in its preparation was entrusted to Technical Committee TCI/69, Footwear, leather and coated fabrics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© BSI 2011

ISBN 978 0 580 67540 9

ICS 59.080.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 January 2011.

Amendments issued since publication

Date	Text affected
------	---------------

ICS 59.080.40

English Version

Rubber- or plastics-coated fabrics - Physical and mechanical tests - Determination of flex resistance by the flexometer method (ISO 32100:2010)

Supports textiles revêtus de caoutchouc ou de plastique - Essais physiques et mécaniques - Détermination de la résistance à la flexion à l'aide d'un flexomètre (ISO 32100:2010)

Mit Kautschuk oder Kunststoff beschichtete Textilien - Physikalische und mechanische Prüfungen - Bestimmung der Dauerbiegefestigkeit nach dem Flexometer-Verfahren (ISO 32100:2010)

This European Standard was approved by CEN on 10 December 2010.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: Avenue Marnix 17, B-1000 Brussels

Foreword

This document (EN ISO 32100:2010) has been prepared by Technical Committee CEN/TC 248 "Textiles and textile products", the secretariat of which is held by BSI, in collaboration with Technical Committee ISO/TC 45 "Rubber and rubber products".

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by June 2011, and conflicting national standards shall be withdrawn at the latest by June 2011.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Principle	2
5 Apparatus	2
6 Test specimens	4
6.1 Sampling	4
6.2 Number of test specimens	5
6.3 Conditioning of the test specimens	5
7 Procedure	5
8 Expression of results	10
9 Test report	10
Annex A (normative) Important clarifications	12
Bibliography	13

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 32100 was prepared by the European Committee for Standardization (CEN) in collaboration with ISO Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 4, *Products (other than hoses)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

Rubber- or plastics-coated fabrics — Physical and mechanical tests — Determination of flex resistance by the flexometer method

1 Scope

This International Standard specifies a test method for determining the flex resistance of rubber- or plastics-coated fabrics in the folded condition. The test method is applicable only to products which can be clamped in the test apparatus used and to products with which the fold made in the test specimen can be caused to move back and forth along the specimen during the test.

The appearance of the test specimen, after completion of either the flex number (see 3.1) or a specified number of flex cycles, is taken as a measure of the flex resistance in the folded condition.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3, *Preferred numbers — Series of preferred numbers*

ISO 2231:1989, *Rubber- or plastics-coated fabrics — Standard atmospheres for conditioning and testing*

ISO 2768-1, *General tolerances — Part 1: Tolerances for linear and angular dimensions without individual tolerance indications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

flex number

number (agreed between the interested parties) of flex cycles to which the test specimen is subjected, the specimen being subsequently examined using a magnifying lens with $\times 6$ magnification to determine whether any damage or other visible change is observable

3.2

flex cycle

cycle comprising one forward and one backward (i.e. a complete to-and-fro) movement of the moveable clamp of the test apparatus

4 Principle

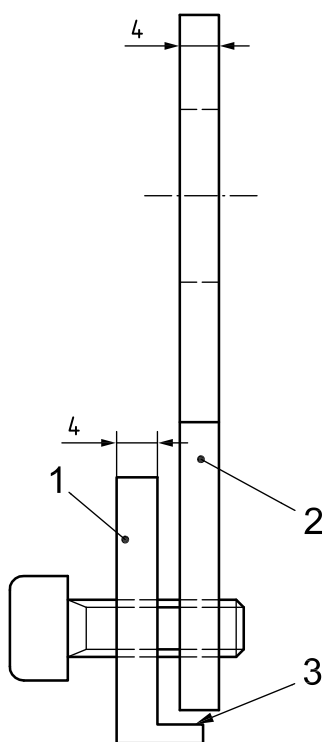
One end of a test piece is folded with the surface to be tested facing inwards and clamped in an upper (moveable) clamp and the other end of the test piece is folded with the surface to be tested facing outwards and clamped in a lower (fixed) clamp. The upper clamp is then moved in such a way that the fold is caused to run along the test piece. The test piece is examined periodically for damage or any other visible change.

5 Apparatus

The test rig consists of a moveable upper clamp as shown in Figure 1 to Figure 3 and a fixed lower clamp as shown in Figure 4.

Both clamps shall lie in the same plane. The moveable clamp shall be pivoted so that it can be driven to swivel through $22,5^\circ$ about pivot point A. During the test, the moveable clamp shall be swivelled at a frequency of (100 ± 5) swivels per minute using a motor drive. It shall also be possible to swivel the clamp by hand. With the two clamps aligned in the same plane, the distance between the upper edge of the lower clamp and the flange (3) on the front plate of the upper clamp shall be 25 mm (see Figure 1 and Figure 8).

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

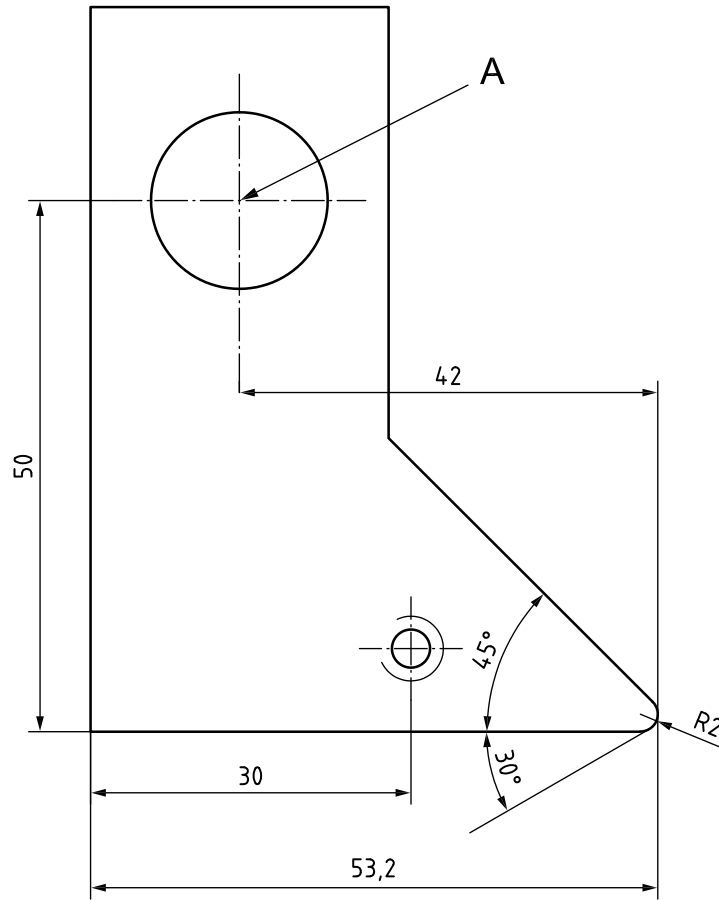


Key

- 1 front plate
- 2 back plate
- 3 flange on front plate

Figure 1 — Upper (moveable) clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m



Key

A pivot point

Figure 2 — Back plate (Ref. No. 2 in Figure 1) of upper clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

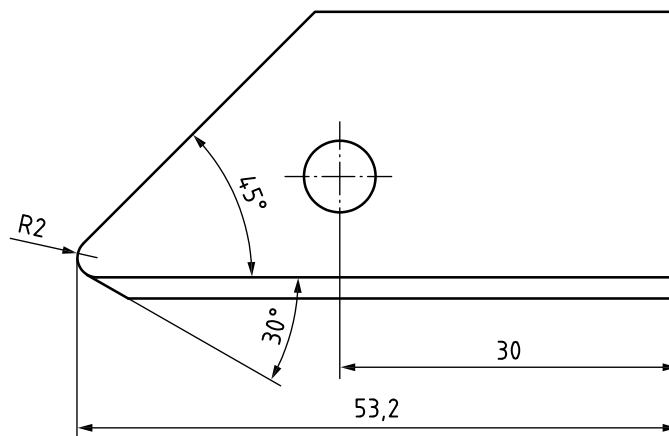


Figure 3 — Front plate (Ref. No. 1 in Figure 1) of upper clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

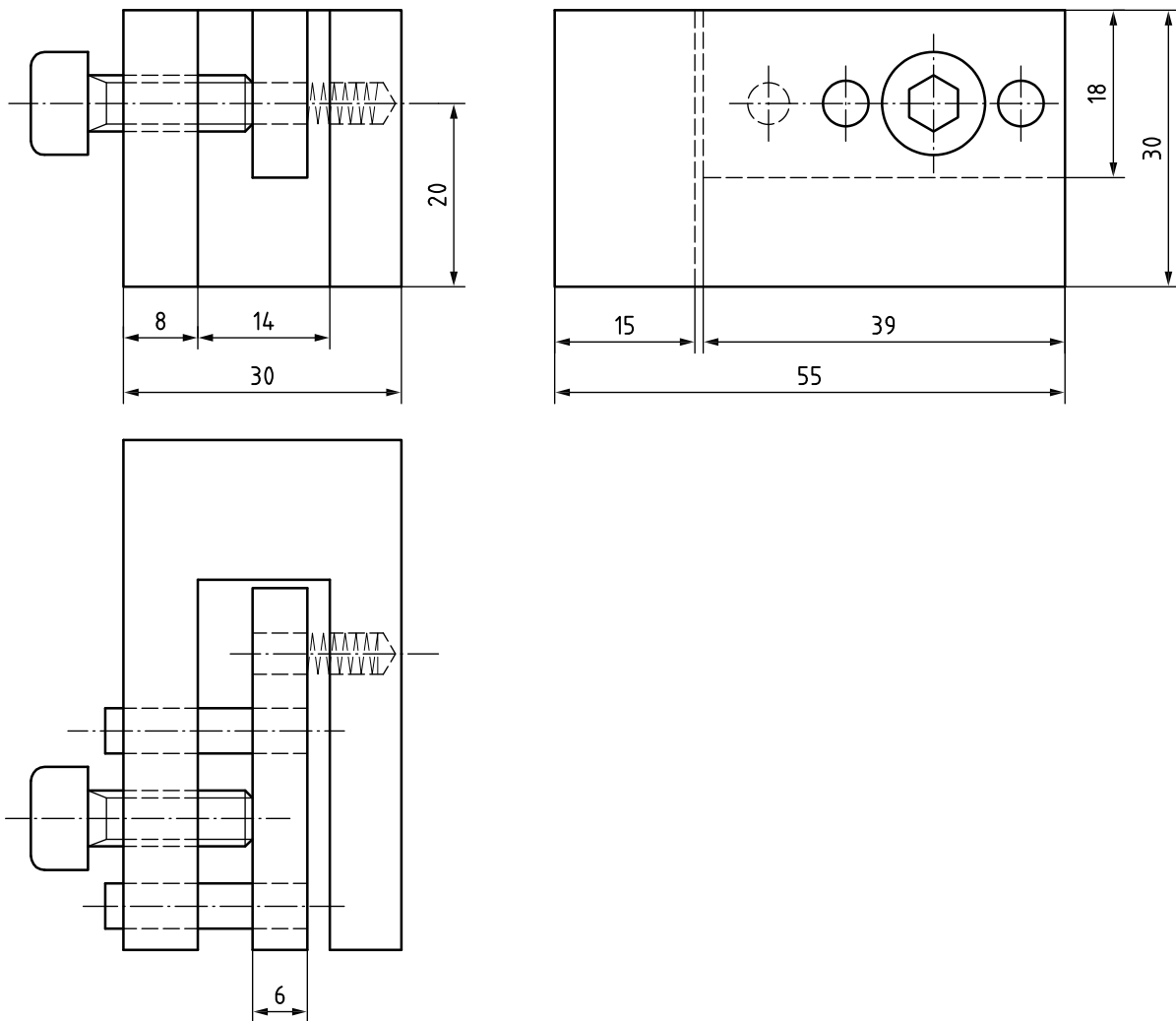


Figure 4 — Lower (fixed) clamp

6 Test specimens

6.1 Sampling

From the product to be tested, take test specimens either of dimensions 70 mm × 45 mm or, in certain cases as described in 7.3, in accordance with Figure 5.

Dimensions in millimetres

General tolerances in accordance with ISO 2768-1, tolerance class m

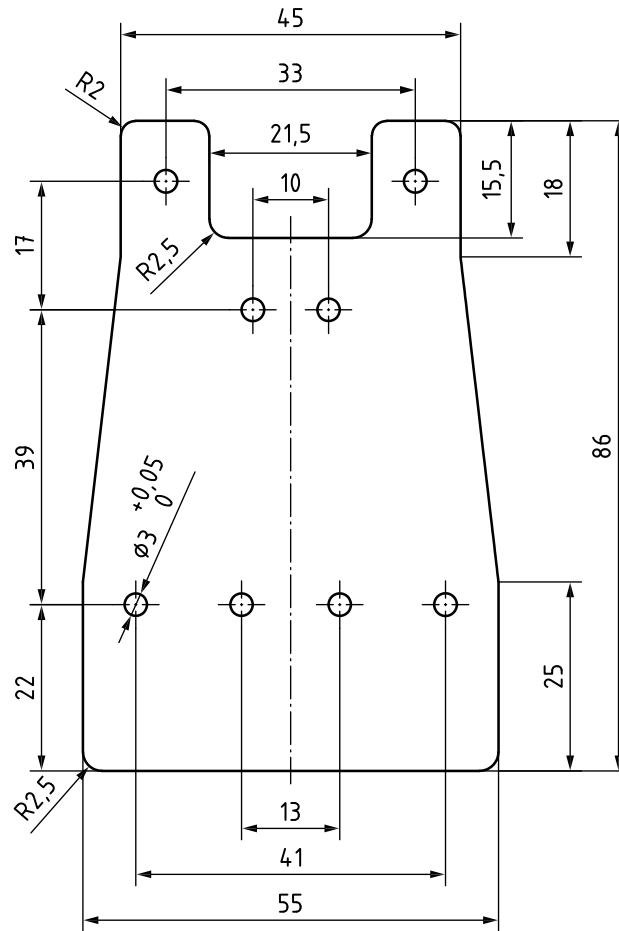


Figure 5 — Test specimen for special cases (see 7.3)

6.2 Number of test specimens

Cut at least three test specimens from the sheet longitudinal to the direction of manufacture and at least another three test specimens perpendicular to the direction of manufacture.

6.3 Conditioning of the test specimens

Prior to testing, condition the test specimens in standard atmosphere B as defined in ISO 2231:1989 (23 °C and 50 % r.h.) for the length of time specified in ISO 2231:1989.

7 Procedure

7.1 Unless otherwise specified, carry out the test in standard atmosphere B as defined in ISO 2231:1989. Fold a conditioned test specimen (see 6.3) along its longitudinal axis with the surface to be evaluated facing inwards and the longer edges flush with each other. Then, clamp the folded test specimen horizontally in the upper (moveable) clamp, which shall be in the same plane as the lower (fixed) clamp, so that the specimen is adjacent to the clamp bolt and supported on the flange on the front plate (see Figure 6). Fold the free end of the test specimen outwards over the inclined edges of the moveable clamp so that the specimen surface to be evaluated is now facing outwards (see Figure 7). Hold the corners together and clamp them in the lower (fixed) clamp with the fold vertical and without producing any tensile strain in the specimen (see Figure 8).

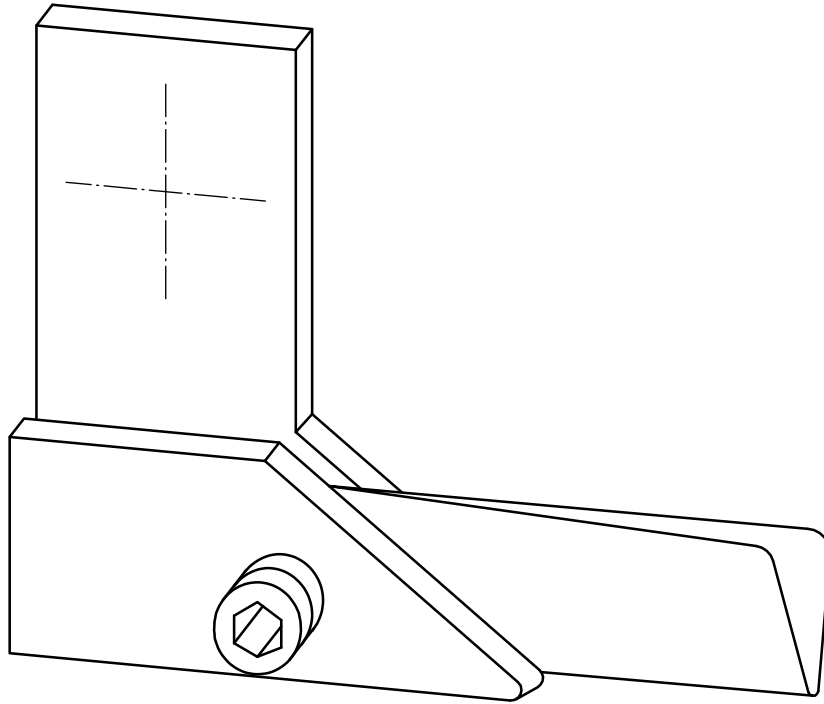


Figure 6 — Test specimen clamped in upper clamp

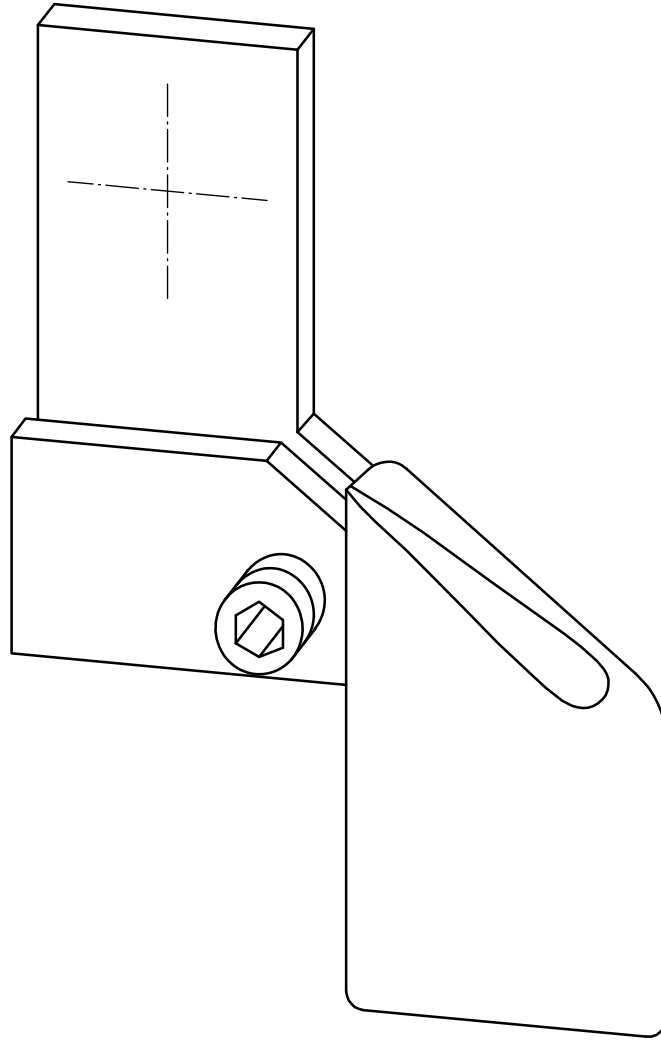


Figure 7 — Test specimen clamped in upper clamp with the free end folded outwards over the sloping edges of the clamp

Dimensions in millimetres
General tolerances in accordance with ISO 2768-1, tolerance class m

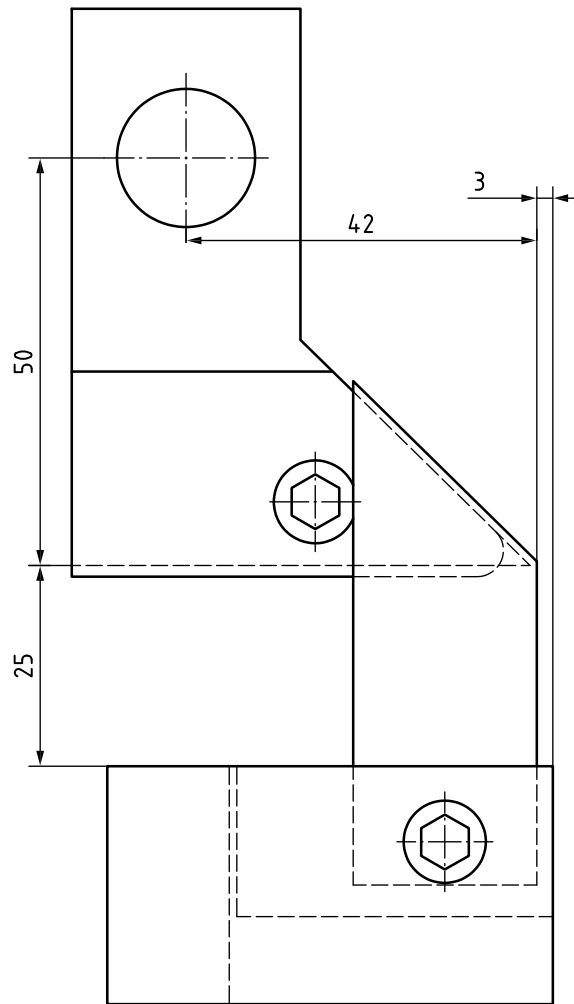


Figure 8 — Test apparatus in starting position with the test specimen clamped in place

7.2 Programme the test rig to carry out either an agreed number of flex cycles (the flex number — see 3.1) or to carry out the test at the intervals recommended in Table 1. Set the upper clamp in motion. During the swivelling motion, the fold shall run up and down along the test specimen (see Figure 9). After completion of the relevant number of flex cycles, check the test specimen for damage or other visible change by examining it under a magnifying lens with $\times 6$ magnification.

NOTE The numbers of flex cycles given in Table 1 are stepped in accordance with the R 10 series specified in ISO 3 (see Annex A).

Table 1 — Preferred intervals, i.e. number of flex cycles completed, at which test specimens should be examined

—	200	315	500	800
1 250	2 000	3 150	5 000	8 000
12 500	20 000	31 500	50 000	80 000
125 000	200 000	315 000	500 000	—

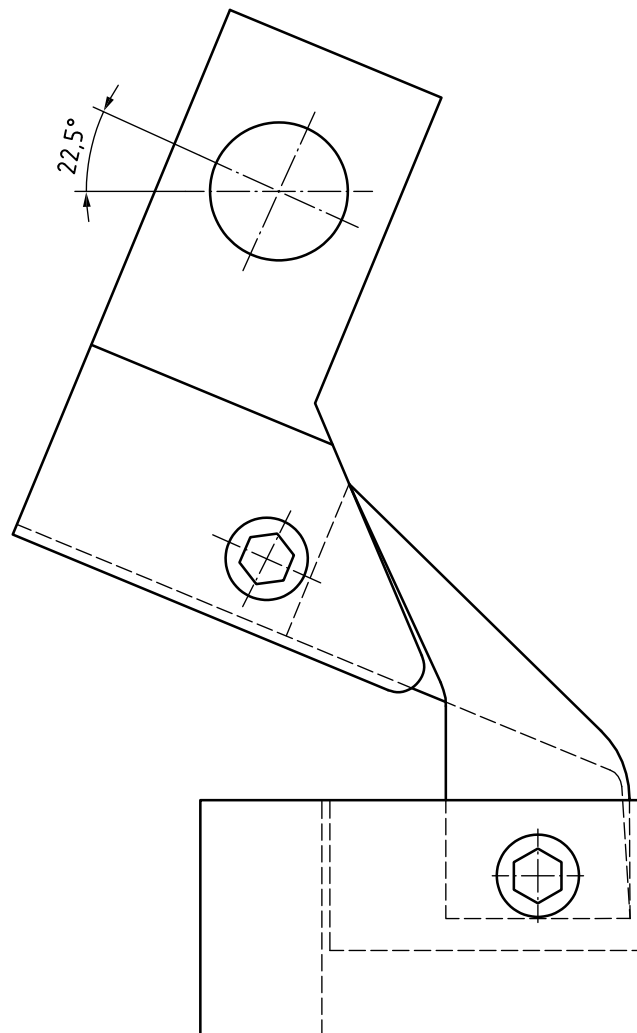


Figure 9 — Test apparatus and test specimen in the fully swivelled position

If testing was carried out at the intervals recommended in Table 1, grade the damage or other visible change observed in accordance with Table 2. If necessary, the moveable clamp may be slowly swivelled manually for the purposes of the examination or the test specimen may be taken out of the test apparatus. In the latter case, the test specimen shall be repositioned in the test apparatus exactly as before (see 7.3).

Table 2 — Grading of the damage/other change

Grade	Degree of change in coated fabric
0	No change.
1	Crazing of the finish detectable only under the magnifying lens. Minor changes in the surface due to greying (stress whitening) and/or creasing.
2	Top layer of coated fabric shows crazing and/or very small tears detectable only under the magnifying lens. With poromerics, no cracks in the poromeric layer detectable even under the magnifying lens. Cracks in the finish and/or minor stress whitening; with poromerics, crazing in the protective coating.
3	Cracks in the base layer or in the poromeric layer, detectable only under the magnifying lens. Cracks in the top or protective layer. Major stress whitening; formation of blisters; separation of layers. Base layer not identical in hue with the other layers.
4	Major cracks in the top or surface layer, and/or cracks in the base or poromeric layer.
5	Coating completely broken; stratum clearly recognizable and/or hole formation.

Continue testing until all the test specimens have been tested.

7.3 During testing, pressure marks might be produced on certain test specimens by the clamps. Some test specimens also increase in length during the test and, if so, must not be stretched tight during reinstallation. In order to ensure exact repositioning, the use of test specimens in accordance with Figure 5 is recommended, in which case the upper and lower clamps will need to be equipped with suitable pins.

7.4 If the test apparatus is shut down for an extended period of time, e.g. overnight, with the test specimen(s) still clamped in the apparatus, the clamps shall be positioned so that the test specimens are not stretched tight.

7.5 When examining wet test specimens, the test apparatus shall be stopped for the absolute minimum time necessary for checking the test specimens.

8 Expression of results

For each test specimen, express the result either as the flex number (i.e. the agreed number of flex cycles to which the specimen was subjected — see 3.1), together with the result of the examination, or as the grade corresponding to the visible appearance of the test specimen after completion of each of the specified numbers of flex cycles which were carried out (see Table 1).

9 Test report

The test report shall include the following information:

- a) a reference to this International Standard;
- b) the type of product tested and its designation;

- c) the number of test specimens tested;
- d) details of the positions in the sample from which the test specimens were taken;
- e) the test conditions used with wet samples, for instance;
- f) the test results:
 - 1) (if testing up to an agreed flex number — see 3.1) the flex number used and whether examination of the test pieces revealed any damage or other visible change,
 - 2) (if the test pieces were graded at intervals as recommended in Table 1) the interval concerned and the grade assigned to each test specimen each time the test piece was examined;
- g) details of any deviations from the procedure specified in this International Standard;
- h) details of any incidents which might have had an influence on the results;
- i) the date of the test.

Annex A (normative)

Important clarifications

This test method is not applicable in cases when, due to the thickness or stiffness, for instance, of the material, no running fold can be produced during the swivelling motion of the upper clamp. The numbers of flex cycles given in Table 2 for evaluating the test specimens are in accordance with the R 10 series specified in ISO 3, which follows a geometric progression. As is generally known, it is not advisable to evaluate the flex resistance of folded specimens using numbers based on an arithmetic progression.

In order to ensure sufficient reproducibility of the measurement results, it is necessary for the dimensions of the various parts of the test apparatus and the speed of the swivelling motion to comply exactly with the specifications given in this International Standard. It is equally important to maintain the standard atmospheric conditions and to clamp the test specimens correctly.

Bibliography

- [1] ISO 5402, *Leather — Physical and mechanical tests — Determination of flex resistance by flexometer method*

British Standards Institution (BSI)

BSI is the national body responsible for preparing British Standards and other standards-related publications, information and services.

BSI is incorporated by Royal Charter. British Standards and other standardization products are published by BSI Standards Limited.

About us

We bring together business, industry, government, consumers, innovators and others to shape their combined experience and expertise into standards-based solutions.

The knowledge embodied in our standards has been carefully assembled in a dependable format and refined through our open consultation process. Organizations of all sizes and across all sectors choose standards to help them achieve their goals.

Information on standards

We can provide you with the knowledge that your organization needs to succeed. Find out more about British Standards by visiting our website at bsigroup.com/standards or contacting our Customer Services team or Knowledge Centre.

Buying standards

You can buy and download PDF versions of BSI publications, including British and adopted European and international standards, through our website at bsigroup.com/shop, where hard copies can also be purchased.

If you need international and foreign standards from other Standards Development Organizations, hard copies can be ordered from our Customer Services team.

Subscriptions

Our range of subscription services are designed to make using standards easier for you. For further information on our subscription products go to bsigroup.com/subscriptions.

With **British Standards Online (BSOL)** you'll have instant access to over 55,000 British and adopted European and international standards from your desktop. It's available 24/7 and is refreshed daily so you'll always be up to date.

You can keep in touch with standards developments and receive substantial discounts on the purchase price of standards, both in single copy and subscription format, by becoming a **BSI Subscribing Member**.

PLUS is an updating service exclusive to BSI Subscribing Members. You will automatically receive the latest hard copy of your standards when they're revised or replaced.

To find out more about becoming a BSI Subscribing Member and the benefits of membership, please visit bsigroup.com/shop.

With a **Multi-User Network Licence (MUNL)** you are able to host standards publications on your intranet. Licences can cover as few or as many users as you wish. With updates supplied as soon as they're available, you can be sure your documentation is current. For further information, email bsmusales@bsigroup.com.

BSI Group Headquarters

389 Chiswick High Road London W4 4AL UK

Revisions

Our British Standards and other publications are updated by amendment or revision.

We continually improve the quality of our products and services to benefit your business. If you find an inaccuracy or ambiguity within a British Standard or other BSI publication please inform the Knowledge Centre.

Copyright

All the data, software and documentation set out in all British Standards and other BSI publications are the property of and copyrighted by BSI, or some person or entity that owns copyright in the information used (such as the international standardization bodies) and has formally licensed such information to BSI for commercial publication and use. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI. Details and advice can be obtained from the Copyright & Licensing Department.

Useful Contacts:

Customer Services

Tel: +44 845 086 9001

Email (orders): orders@bsigroup.com

Email (enquiries): cservices@bsigroup.com

Subscriptions

Tel: +44 845 086 9001

Email: subscriptions@bsigroup.com

Knowledge Centre

Tel: +44 20 8996 7004

Email: knowledgecentre@bsigroup.com

Copyright & Licensing

Tel: +44 20 8996 7070

Email: copyright@bsigroup.com



...making excellence a habit.™