BS EN 16653:2015

BSI Standards Publication

# Rubber or plastics-coated fabrics — Determination of stitch tear resistance (using a needle) — Test method

bsi.

...making excellence a habit.™

**National foreword**

This British Standard is the UK implementation of EN 16653:2015.

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.


Published by BSI Standards Limited 2015

ISBN 978 0 580 80023 8

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 March 2015.

**Amendments/corrigenda issued since publication**

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

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 16653

March 2015

ICS 59.080.40

English Version

# Rubber or plastics-coated fabrics - Determination of stitch tear resistance (using a needle) - Test method

Supports textiles revêtus de caoutchouc ou de plastique - Détermination de la résistance au déchirement au point de couture (à l'aide d'une aiguille) - Méthode d'essai

Mit Kautschuk oder Kunststoff beschichtete Textilien - Bestimmung des Stichausreißwiderstands (unter Verwendung einer Nadel) - Prüfverfahren

This European Standard was approved by CEN on 7 February 2015.



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

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**



Ref. No. EN 16653:2015 E

## Contents

Page

# Foreword

This document (EN 16653:2015) has been prepared by Technical Committee CEN/TC 248 “Textiles and textile products”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by September 2015 and conflicting national standards shall be withdrawn at the latest by September 2015.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This European Standard specifies a method for the determination of the resistance of the seams of rubber or plastic-coated fabrics against tearing out a needle perpendicular to the stitching direction. This resistance is characterized by determining the stitch tear force.

## 2 Normative references

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

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

EN ISO 2286-3, *Rubber- or plastics-coated fabrics — Determination of roll characteristics — Part 3: Method for determination of thickness (ISO 2286-3)*

EN ISO 7500-1, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1)*

EN ISO 10012, *Measurement management systems — Requirements for measurement processes and measuring equipment (ISO 10012)*

## 3 Terms and definitions

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

**3.1**
**stitch tear resistance**
resistance to pull a needle from a sample perpendicular to the stitching direction

**3.2**
**stitch tear force**
stitch tear resistance, recorded as the maximum tearing force

**3.3**
**stitch tear strength**
stitch tear force divided by the thickness

## 4 Test apparatus and materials

The following test apparatus and materials shall be used:

### 4.1 CRE machine.

Metrological confirmation system of the tensile-testing machine shall be in accordance with EN ISO 10012.

The constant-rate-of-extension (CRE) machine shall have the general characteristics given in 4.1.1 to 4.1.4.

**4.1.1** The tensile-testing machine shall be provided with means for indicating or recording the force applied to the test specimen. Under conditions of use, the accuracy of the apparatus shall be class 1 of EN ISO 7500-1. The error of the indicated or recorded maximum force at any point in the range in which the machine is used shall not exceed ± 1 %.

**4.1.2** If a class 2 tensile-testing machine according to EN ISO 7500-1 is to be used, this shall be stated in the test report.

**4.1.3** If recording of force is obtained by means of data acquisition boards and software, the frequency of data collection shall be at least eight per second.

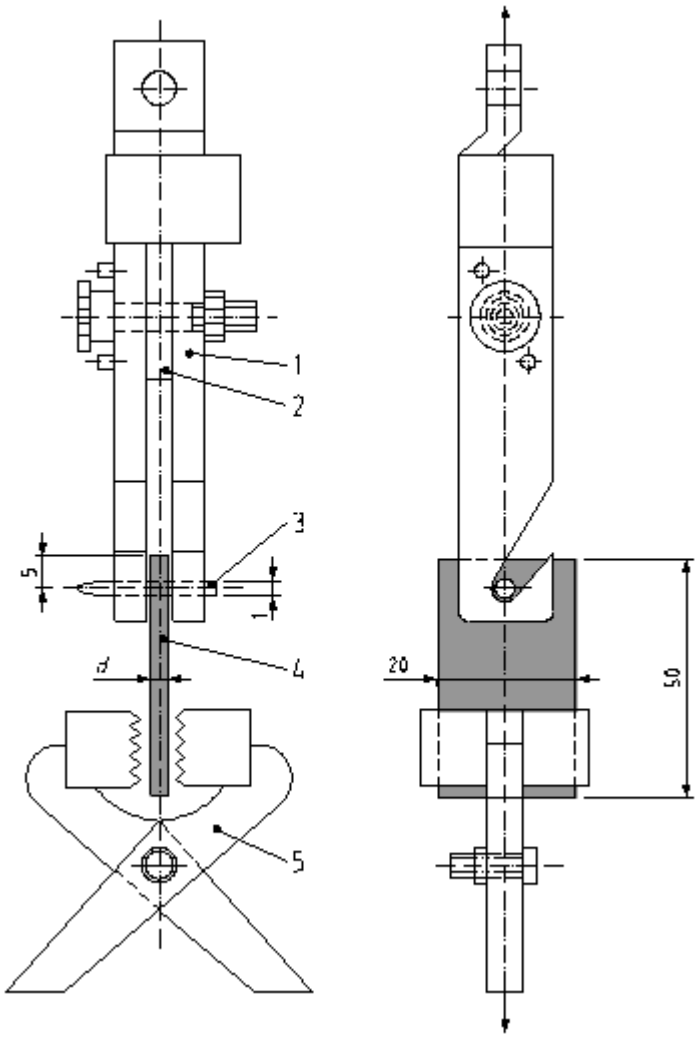
**4.1.4** The machine shall be capable of constant rate of extension of (100 ± 10) mm/min.

### 4.2 Needle.

Either a smooth needle of stainless steel having a diameter of (1,0 ± 0,1) mm and a conical tip or a corresponding piece of spring steel wire having the same diameter, also made of stainless steel and having a conical tip.

### 4.3 Clamping device.

As an example, Figure 1 shows a schematic view of a clamping device. The bearing bushes for the needle shall be parallel and adjustable such that they can be set in accordance with the thickness of the test specimen. The clamping device shall be provided with a suitable safety device which prevents the needle from jumping out.




**Key**

1 supporting bracket
2 spacer
3 steel needle
4 specimen
5 scissor clamp

**Figure 1 — Schematic view of a clamping device**

## 5 Sampling and conditioning

The test specimens to be tested are sampled in the warp and weft directions. For each direction, five test specimens shall be sampled. The test specimens consist of strips with a length of (50 ± 1) mm and a width of (20 ± 1) mm.

All test specimens shall be conditioned for at least 24 h prior to testing in accordance with EN ISO 2231.

The final result shall be based on test specimens of the same type only, and the type shall be indicated in the test report.

## 6 Test method

The test is carried out after conditioning in a standard atmosphere in accordance with EN ISO 2231.

The thickness of the test specimen shall be measured in accordance with EN ISO 2286-3.

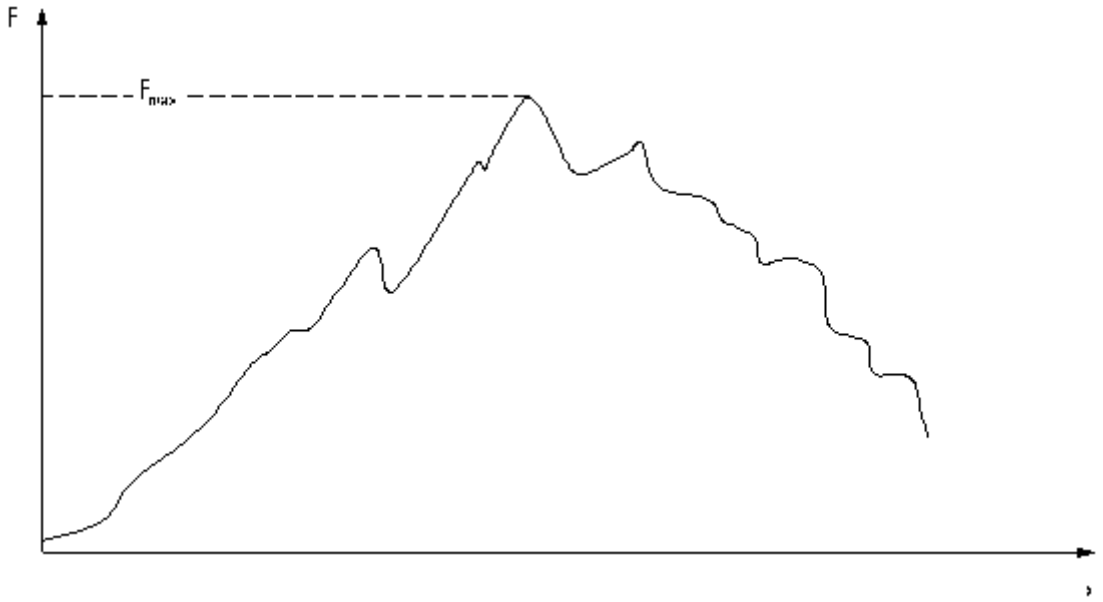
A needle having a diameter of 1 mm (see 4.2) is inserted into the test specimen 5 mm from the edge in the centre of the narrow side (see Figure 1), as perpendicularly as possible, by means of a template. Prior to this, the test specimen shall not have been pierced or punched in any manner.

The needle, which is now held (fixed) inside the test specimen, is placed into the clamping device (see 4.3). The distance between the spacers shall be adjusted such that they just barely touch the test specimen.

The lower end of the test specimen is clamped into the lower jaw (shown as a scissor clamp in Figure 1).

The test specimen is elongated at 100 mm/min.

Record the maximum force, in newtons, which occurs while the needle is being torn out (see Figure 2).




**Key**

$X$ displacement in millimetres

$F$ force in newtons

$F_{max}$ stitch tear force

**Figure 2 — Force displacement diagram for the needle**

# 7 Expression of results

## 7.1 Stitch tear force

The stitch tear force is calculated as the arithmetic mean of the highest individual values ($F_{max}$) of the five test specimens, given for each direction, expressed in N and rounded to the nearest 0,5 N.

## 7.2 Stitch tear strength

If required, the stitch tear strength, expressed in N/mm, is calculated as follows:

$$\text{Stitch tear strength} = \frac{F_{max}}{d}$$

where

$F_{max}$ is the maximum stitch tear force, in newtons;

$d$ is the thickness of the test specimen, in millimetres.

# 8 Test report

The test report shall contain the following information:

a) a reference to this test method;

b) the complete marking of the tested sample, including commercially available types, codes, colours, condition, etc.;

c) the date of the test;

d) the standard atmosphere used;

e) the results in accordance with Clause 7: stitch tear force (7.1) and, if required, stitch tear strength (7.2);

f) any deviation from the given procedure.

*This page deliberately left blank*

# 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



## 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

bsi.

...making excellence a habit.™