



DPC: 21/30441249 DC

BSI Group Headquarters

389 Chiswick High Road London W4 4AL

Tel: +44 (0)20 8996 9000

Fax: +44 (0)20 8996 7400

www.bsigroup.com

Date: 22 July 2021

Origin: European

Latest date for receipt of comments: 30 August 2021

Project No. 2018/02560

Responsible committee: PH/3/1 General Personal Protective Equipment

Interested committees:

Title: Draft BS EN 17487 Protective clothing - Garments with permethrin as-treated articles supporting the protection against tick bites.

Please notify the secretary if you are aware of any keywords that might assist in classifying or identifying the standard or if the content of this standard

- i) has any issues related to 3rd party IPR, patent or copyright
- ii) affects other national standard(s)
- iii) requires additional national guidance or information

WARNING: THIS IS A DRAFT AND MUST NOT BE REGARDED OR USED AS A BRITISH STANDARD. THIS DRAFT IS NOT CURRENT BEYOND 30 August 2021

This draft is issued to allow comments from interested parties; all comments will be given consideration prior to publication. No acknowledgement will normally be sent. **See overleaf for information on the submission of comments.**

No copying is allowed, in any form, without prior written permission from BSI except as permitted under the Copyright, Designs and Patent Act 1988 or for circulation within a nominating organization for briefing purposes. Electronic circulation is limited to dissemination by e-mail within such an organization by committee members.

Further copies of this draft may be purchased from BSI Shop <http://shop.bsigroup.com> or from BSI Customer Services, Tel: +44(0) 20 8996 9001 or email cservices@bsigroup.com. British, International and foreign standards are also available from BSI Customer Services.

Information on the co-operating organizations represented on the committees referenced above may be obtained from <https://standardsdevelopment.bsigroup.com/>.

Responsible Committee Secretary: Ms Maggie Niewiarowska (BSI)

Direct tel:

E-mail: maggie.niewiarowska@bsigroup.com

Full document details: 21/30441249 DC

Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
------------------	------------------------

1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/Figure/ Table/Note	Type of comment	Commend (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	

English Version

Protective clothing - Garments with permethrin as-treated articles supporting the protection against tick bites

Habillement de protection - Vêtements de protection traités à la perméthrine pour la protection contre les morsures de tiques

Schutzkleidung - Mit Permethrin behandelte Schutzkleidungsstücke zum Schutz gegen Zeckenbisse

This draft European Standard is submitted to CEN members for second enquiry. It has been drawn up by the Technical Committee CEN/TC 162.

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Performance requirements.....	9
4.1 General.....	9
4.1.1 Introduction	9
4.1.2 Size designation and fit.....	9
4.1.3 Pockets and flap closures.....	9
4.1.4 Closures and seams	10
4.2 Innocuousness.....	10
4.2.1 General.....	10
4.2.2 Permethrin transition	10
4.3 Design	10
4.4 General technical requirements.....	11
4.5 Permethrin requirements.....	11
4.6 Requirements for biological activity (bio-activity) against ticks	11
4.7 Mechanical properties considering fabric strength	11
4.8 Sampling and pre-treatment.....	11
4.8.1 Sampling for selecting a fabric specific method for determining permethrin content	11
4.8.2 Sampling for determining the specific weight of the fabric.....	12
4.8.3 Sampling for determining the homogeneity and the average permethrin content.....	12
4.8.4 Pre-treatment and sampling for bio-activity testing	12
5 Marking in garments.....	12
6 Information supplied by the manufacturer.....	13
Annex A (normative) Performance level.....	14
A.1 Requirements for permethrin content in fabrics.....	14
A.2 Requirements for safeguarding user health	14
A.3 Bio-activity	14
Annex B (normative) Laundering procedure for testing permethrin transition for innocuousness purposes	15
B.1 Washing for preparation of fabrics for testing.....	15
Annex C (normative) Measuring permethrin content in fabric.....	16
C.1 Introduction	16
C.2 Selecting a fabric specific method for determining permethrin content	16
C.3 Determining the specific weight.....	17
C.4 Determining the homogeneity and the average permethrin content.....	17
Annex D (normative) Bio-activity testing.....	19

D.1	Testing activity of the permethrin in the fabric against ticks	19
Annex E (informative) Rationale.....		21
E.1	Why permethrin?.....	21
E.2	Why use body covering garments that is industrially treated with permethrin?.....	21
E.3	Why is standardization needed for body covering garments with permethrin?	22
E.4	What is known about the uptake of permethrin in the body and the effects of permethrin on human health?	22
E.5	Risks other than permethrin	24
E.6	Why the 100 times standardized launderings are required.....	25
E.7	How to achieve optimal protection?	25
E.8	Washing and drying conditions for users of the garments.....	25
E.9	Additional remarks on labelling	26
E.10	Justification of test choices.....	26
Annex F (informative) Evaluation of the transition of permethrin using a method based on friction on the fabric surface		28
F.1	Introduction.....	28
F.2	Principle of test	28
F.3	Apparatus and materials	28
F.4	Auxiliary materials	28
F.5	Reagents.....	29
F.6	Sampling and preparation of test specimens	29
F.7	Preparation of the sweat solution	29
F.8	Impregnation of the abradant with sweat solution.....	30
F.9	Preparation of the abrasion machine.....	30
F.10	Sample preparation and analysis	30
F.11	Expression of results	31
Annex ZA (informative) Relationship between this European Standard and the essential requirements of Regulation (EU) 2016/425 aimed to be covered		32
Bibliography		33

European foreword

This document (prEN 17487:2021) has been prepared by Technical Committee CEN/TC 162 “Protective clothing including hand and arm protection and lifejackets”, the secretariat of which is held by DIN.

This document is currently submitted to the second CEN Enquiry.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of Regulation (EU) 2016/425 and Regulation (EU) No 528/2012.

For relationship with EU Regulation, see informative Annex ZA, which is an integral part of this document.

Introduction

By preventing tick bites, a range of tick-borne infectious diseases can be prevented. This document refers to protection against all biting stages of the tick *Ixodes ricinus*, hereafter named wood tick, the tick species with the largest occupational and public health relevance in Europe.

The most prevalent disease transmitted by the wood tick is Lyme borreliosis, which can affect the skin, nervous system, joints and heart. In some EU countries, Lyme borreliosis is regarded as an occupational disease. Employers are then obliged to make the best possible effort to prevent occupational diseases among employees. Employees are also obliged to reasonably abide by the measures offered.

The garments help protect people who can come into contact with ticks during their work. Wood ticks lay in ambush in the lower vegetation and cling on to passers-by with whom they come in to contact. They then crawl over skin or clothing to find a site where they can consume a blood meal. The protective effect of the garment against tick bites is primarily determined by the extent to which the garment covers the skin, and this effect will increase as a larger part of the body is covered. It is important here that those body parts (legs, waist, torso and arms) are covered that have contact with vegetation in which ticks can be present (up to a height of 1,5 m). When wearing covering garments without permethrin, ticks are able to crawl over the fabric for minutes up to several hours and reach bare skin to bite. In addition to the protective effect of covering the body, the permethrin on or in the fabric offers extra protection. Ticks that come in contact with permethrin are immobilized, and as a result they are no longer able to reach bare skin and transfer pathogens through a bite. Protection against tick bites can be one of the functions of a garment. Examples of other functions can be maintaining body heat, preventing exposure to UV light, camouflage, preventing skin irritation or injury by plants or working conditions, or representation and recognisability.

The body covering garments can also help other target groups such as volunteers and recreationists (such as hunters) to offer protection against tick bites. However, the choice of using the garments is ideally based on a professional risk assessment which includes exposure to ticks, and factors such as age and pregnancy. Instructions for use and warnings for tick bite risks also apply to these users and it is important that these are provided to these groups by the manufacturers of these garments.

The body covering garment industrially treated with permethrin or made with fabrics based on yarn containing permethrin yarns, or other treated fabrics which can also help to protect against other arthropods that can transmit diseases, such as different tick and mosquito species [6]. However, this document only applies to the protection against bites by the wood tick, and specifically the most relevant developmental stage (nymphs). A detailed description of the requirements is given in Clause 4 of this document.

Garments can be treated with permethrin to prevent tick bites. In accordance with the Biocidal Products Regulation (EU) 528/2012, such garments can be regarded either as 'treated articles' (if protection against ticks is part of a set of functionalities such as protection against weather conditions, camouflage, company representation, protection against stinging plants, etc.) or as 'biocides' (if the primary function of the garment is protection against tick bites). This document is applicable to garments to be considered as treated articles only.

The World Health Organization (WHO) states limits to the daily uptake of permethrin by the human body. This document states requirements to ensure that these limits will not be exceeded by wearing the protective garments and to safeguard that the additional protective effect of the permethrin is maintained throughout the lifetime of the garment.

National requirements can be in place in different countries for the maximum permethrin content in consumer products. Collection of relevant data can be helpful for a further assessment for conformity of garments based on this document to those national requirements.

1 Scope

This document specifies requirements for garments that support the protection against tick bites. The document applies to body covering garments (at least covering the torso, arms and legs) where protection against tick bites, which is provided by garments as physical barriers, is reinforced by industrial treatment with the biocide permethrin of the fabrics, fibres or yarns prior to confection. The specified requirements focus on prevention of bites by the nymph stage of the tick *Ixodes ricinus*, which is the most relevant stage and species for public and occupational health in Europe.

This document specifies requirements and the tests for garments containing permethrin to provide sufficient assistance in protection against tick bites, and to be durable and safe for the user.

NOTE 1 Non-permethrin containing garments covering the torso, arms and legs and feet offer some protection against tick bites, but are insufficient under high exposure to ticks, which can crawl over the fabric to reach bare skin and bite. Garments that comply with this document and cover at least torso, arms and legs to counter ticks from crawling over the fabric to reach bare skin and bite thereby provide substantial protection.

NOTE 2 The importance of following manufacturers laundering instructions to prevent early deterioration of the effect of permethrin treatment is stressed throughout the document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

EN ISO 6330:2012, *Textiles — Domestic washing and drying procedures for textile testing (ISO 6330:2012)*

EN ISO 13688:2013, *Protective clothing — General requirements (ISO 13688:2013)*

EN ISO 13934-1:2013, *Textiles — Tensile properties of fabrics — Part 1: Determination of maximum force and elongation at maximum force using the strip method (ISO 13934-1:2013)*

EN ISO 13937-2:2000, *Textiles — Tear properties of fabrics — Part 2: Determination of tear force of trouser-shaped test specimens (Single tear method) (ISO 13937-2:2000)*

EN ISO 13935-2:2014, *Textiles — Seam tensile properties of fabrics and made-up textile articles — Part 2: Determination of maximum force to seam rupture using the grab method (ISO 13935-2:2014)*

EN ISO 13938-1:2019, *Textiles — Bursting properties of fabrics — Part 1: Hydraulic method for determination of bursting strength and bursting distension (ISO 13938-1:2019)*

EN ISO 13938-2:2019, *Textiles — Bursting properties of fabrics — Part 2: Pneumatic method for determination of bursting strength and bursting distension (ISO 13938-2:2019)*

ISO 3801:1977, *Textiles; Woven fabrics; Determination of mass per unit length and mass per unit area*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1

accepted daily intake

ADI

maximal allowed daily body intake of a substance (100 %) before adverse health effects can be expected

Note 1 to entry: In this document, the substance is permethrin.

Note 2 to entry: Based on the definition of the World Health Organization (WHO).

3.2

permethrin bio-activity

degree to which permethrin in the test fabric affects the test animals that came into contact with the fabric in the test assay

Note 1 to entry: This value is determined by the degree to which the animal comes into contact with permethrin.

Note 2 to entry: Bio-activity is not by definition determined by the permethrin concentration in a fabric. It is determined by the availability of permethrin present at contact surfaces of the fabric.

3.3

biocidal product

— any substance or mixture which, in the form in which it is supplied to the user, consists of, contains or generates one or more active substances, with the purpose of destroying, deterring, rendering harmless, preventing the action of, or otherwise exerting a controlling effect on a harmful organism by any means other than mere physical or mechanical action

— any substance or mixture, generated from substances or mixtures which do not themselves fall under the first indent, to be used with the intention of destroying, deterring, rendering harmless, preventing the action of, or otherwise exerting a controlling effect on, any harmful organism by any means other than mere physical or mechanical action

Note 1 to entry: The garments considered in this document are treated articles. A treated article that has a primary biocidal function shall be considered a biocidal product. According to the definitions set by the EU, products treated with permethrin can be considered as biocidal products or treated articles. This consideration could differ per product and depends on the primary function of the product. If the product is primarily intended to control harmful organisms or to prevent harmful effects, then the product is considered a biocide. If the biocidal effect through treatment with permethrin is only an additional property to the basic function(s) of the product, such product / object can be regarded as treated article [2].

[SOURCE: 528/2012 EU regarding biocidal products regulation, 2018-06-15]

3.4

cytotoxicity

effect of one or more components in a substance on growth of living cells in a cell culture

3.5

sensitization

effect of one or more components in a substance on expression of specific membrane proteins of cells in a cell culture

3.6

cut-off value

minimal effective amount of permethrin per square meter that is required to support protection against tick bites sufficiently

Note 1 to entry: An amount below the cut-off value has adverse effects such as:

- the required contact time between the tick and the fabric is too long, which enables ticks to bite;
- a short immobilisation followed by recovery of the tick;
- insufficiently exposed ticks could show increased bite frequency before taking a blood meal (this was observed in tick species other than the wood tick).

3.7

knock-down time

time between first contact of the test animal with the permethrin-containing fabric, until the inability of the test animal to move (immobilisation)

3.8

permethrin

approved active substance based on synthetic pyrethroïd variant 25:75 cis:trans isomere ratio, non-racemic with CAS number 52645-53-1

3.9

permethrin migration rate

velocity of permethrin molecules migrating through a substrate

3.10

treated article

any substance, mixture or article that has been treated with, or intentionally incorporates, one or more biocides

[SOURCE: EU 528/2012 regarding biocidal products regulation, Article 3, sub Clause 1.a]

3.11

industrially treated

treatment procedure by which fibres, yarns and /or fabrics are treated during production with permethrin on a large and mechanised scale before confection

3.12

permethrin containing yarn

yarn that contains fibres with permethrin either at the outside surface or incorporated inside the fibre (for example by encapsulation)

3.13

partial body protection

protective garment item worn to protect one or more parts of the body, which are particularly exposed to the risk

Note 1 to entry: Partial body protection can be used separately or in combination with other garments to increase the protection level of specific parts of the body. Examples of partial body protection are sleeves and gaiters. For protection against tick bites separate partial body protection items can be combined to achieve at least protection of torso, arms and legs

4 Performance requirements

4.1 General

4.1.1 Introduction

This clause covers the health, technical and maintenance requirements for permethrin containing garments that help to protect against tick bites.

This document is to be applied in conjunction with EN ISO 13688:2013.

4.1.2 Size designation and fit

Garment sizes shall be in accordance with the requirements of EN ISO 13688:2013.

Where protection to the requirements of this document is provided by an outer two piece suit, it shall be determined that, when correctly sized for the wearer, an overlap between the jacket and trousers remains when one standing wearer firstly fully extends both arms above the head and then bends over until the fingertips touch the ground.

Conformity shall be checked by visual inspection including an assessment of fit and physical measuring when the appropriate size of the garment is donned by a wearer. In addition, the wrists, lower arms, and ankles shall also remain covered in an upright position; this shall also apply to one piece suits.

Similar overlap requirements apply for other combinations of garments with the intention to keep the skin of the wearer covered during all activities of his/her profession.

These requirements need to be covered in the manufacturer instructions and/or garment labels.

4.1.3 Pockets and flap closures

Where garments are constructed with pockets, the pockets shall be constructed to the following design:

- a) external opening pockets including pass-through openings shall have a covering flap except for:
 - side pockets below the waist which do not extend more than 10° forward of the side seam;
 - a single rule pocket with an opening not greater than 75 mm placed behind the side seam on one or both legs and measured flat;
- b) all flaps shall be at least 20 mm wider than the opening (at least 10 mm on each side) to prevent the flap from being tucked into the pocket. They shall be stitched down on each side or capable of covering the pocket opening by fastening. Flap materials shall made from permethrin containing fabric. Conformity shall be checked by visual inspection and physical measurement.

These requirements need to be covered in the manufacturer instructions and/or garment labels.