AS/NZS 4399:2017

Australian/New Zealand Standard

Sun protective clothing—Evaluation and classification

Superseding AS/NZS 4399:1996

AS/NZS 4399:2017

This joint Australian/New Zealand standard was prepared by joint Technical Committee TX-021, Sun Protective Clothing. It was approved on behalf of the Council of Standards Australia on 7 July 2017 and by the New Zealand Standards Approval Board on 2 August 2017.

This standard was published on 7 September 2017.

The following are represented on Committee TX-021:

Australian Fire and Emergency Services Authorities Council
Australian Radiation Protection and Nuclear Safety Agency
Cancer Council Australia
Cancer Society of New Zealand
Consumers Federation of Australia
Measurements Standards Laboratory of New Zealand
National Retail Association
James Cook University
University of New South Wales

Keeping standards up to date

Standards are living documents which reflect progress in science, technology, and systems. To maintain their currency, all standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued. Standards may also be withdrawn. It is important that readers assure themselves they are using a current standard, which should include any amendments which may have been published since the standard was purchased.

Detailed information about joint Australian/New Zealand standards can be found by visiting the standards webshop in Australia at www.saiglobal.com or Standards New Zealand's website at www.standards.govt.nz.

For more frequent listings or notification of revisions, amendments, and withdrawals, Standards Australia and Standards New Zealand offer a number of update options. For information about these services, users should contact their respective national standards organisation.

We also welcome suggestions for improvement in our standards, and especially encourage readers to notify us immediately of any apparent inaccuracies or ambiguities. Please address your comments to either the Chief Executive of Standards Australia or the New Zealand Standards Executive at the address shown on the title page.

This standard was issued in draft form for comment as DR AS/NZS 4399:2017

Australian/New Zealand Standard

Sun protective clothing—Evaluation and classification

First published as AS/NZS 4399:1996.
Second edition 2017.

Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN (Print) 978-1-77673-115-2
ISBN (PDF) 978-1-77673-116-9

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TX-021 Sun Protective Clothing, to supersede AS/NZS 4399:1996.

This Standard is intended to provide information to the consumer about the relative sun protection capabilities of materials and items of clothing. This information is provided to the consumer in the form of a labelling scheme based on an objective, reproducible in vitro test method. This Standard is applicable to all materials and clothing claiming a UPF rating. Sun protection offered by synthetic shade cloth, sunscreens, sunglasses and eye protectors is the subject of other Standards.

The major changes in this edition are as follows:

(a) Introduction of a minimum level of body coverage required for clothing to display or claim a UPF rating.

(b) A revised UPF classification scheme.

(c) Introduction of minimum requirements for specified items of clothing including hats and gloves.

The term ‘normative’ has been used in this Standard to define the application of the appendices to which it applies. A ‘normative’ appendix is an integral part of a Standard.

CONTENTS

Page

FOREWORD

Australia and New Zealand experience the highest rates of skin cancer in the world. As a result, substantial effort has been invested in ensuring sun protective measures are readily available for and easily adopted by the Australian and New Zealand public.

There is scientific evidence to indicate that skin cancer risk can be meaningfully reduced by ensuring that a greater proportion of the body surface is routinely covered by clothing, particularly during childhood (Harrison et al, 2005, 2010 and Smith et al 2013).

Therefore, this revision adds a new requirement by specifying the amount of body surface that an item of clothing needs to cover in order to be allowed to make a UPF claim. It explicitly excludes the manufacturers of brief clothing items, such as bikini swimwear, from making any sun protection claims regardless of the UPF rating of the material that the bikini is made from.

The Standard does not seek to prescribe the ideal level of body coverage to ensure 100% coverage or sun protection. Furthermore, it does not address the issue of UVR exposure that achieves an ideal balance between skin cancer prevention and vitamin D production, as this issue is considered outside the scope of this Standard.

It is not the intention of this Standard to inhibit innovation. However, clothing which does not cover significant areas of exposed skin, should not be considered as sun protective clothing in the general sense, although the material itself may block UVR.

To designate clothing which provides inadequate skin coverage as sun protective is misleading. Clothing of such design is therefore excluded from the scope of this Standard.

In determining the test method, and thus the rating system given in this Standard, the Committee considered the relative merits of *in vivo* (direct testing in humans) and *in vitro* (laboratory-based) test methods, and the relationship between sunglasses and sun protective materials (which are inert products) and sunscreens (where there may be an interaction such as bioactivation, or a variability in the sunscreen film thickness because of the uneven application onto the skin surface). Many consumers will be familiar with the term ‘sun protection factor’ (SPF) which is used to rate sunscreens. The test method used to determine an SPF value is an *in vivo* one, using the start of a sunburn on human skin as an endpoint, and the procedure is given in AS/NZS 2604, *Sunscreen products—Evaluation and classification*. However, the term ‘ultraviolet protection factor’ (UPF) is used in this Standard to rate sun protective materials and clothing, and it is based on an *in vitro* test method (Gies et al, Health Phys., 1994). The UPF measurement is a relative ranking of the sun protective capabilities of a material. The UPF is not related to the development of redness in human skin due to excessive sun exposure.

The test method given in this Standard is intended for determining the UPF of an unstretched, dry material. It is expected that some materials will have a lower UPF rating when wet, and that the amount of protection offered by knitted materials is likely to vary according to how much they are stretched. Research to identify these variables is currently underway, but the relevant variables for a wet test procedure and a stretched test procedure are not yet known.

It is also noted that loose clothing provides better protection from solar UVR than tight fitting clothing (tight enough to stretch material) and that dark colours generally offer better sun protection than light colours. The sun protection afforded by clothing is also influenced by the weave and knit of the material, with denser construction blocking more UVR. It is recommended that a high SPF sunscreen product be applied to any exposed areas of the skin not protected by clothing.

STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Sun protective clothing—Evaluation and classification

1 SCOPE

This Standard sets out procedures for determining the performance of materials and items of clothing that are worn in close proximity to the skin to provide protection against solar ultraviolet radiation (UVR). The sun protective capability of materials and clothing is described in terms of their UPF, which is based on an objective, reproducible test conducted on the material. This information is provided to the consumer in the form of a labelling scheme.

This Standard applies to all materials and items of clothing seeking to claim a UPF rating. All such clothing needs to be designed in a manner that supports the concept of minimal skin exposure. Thus, this Standard specifies the amount of body surface that an item of clothing needs to cover in order to be allowed to make a UPF claim.

This Standard excludes sunglasses, sunscreen products for topical application to human skin, materials for architectural or horticultural use such as shade cloth, and items which offer protection at a distance from the skin such as shade structures. It also does not cover protection from UVR from sources other than the sun. Thus, any reference made to UVR in this Standard refers exclusively to solar UVR.

NOTES:

1 Requirements for sunscreens are specified in AS/NZS 2604.

2 Requirements for sunglasses are given in AS 1067 (series).

3 Requirements for shade cloth are given in AS 4174.

4 Products such as umbrellas and shade structures which are not in close proximity to the skin will provide a lesser degree of protection than would be indicated by the rating of the material from which the product is made, because of the amount of scattered radiation that could enter from around the edges of the product. The amount of this radiation will vary with the area of the product, and the distance of the product from the body. This Standard is therefore not appropriate for evaluating such items.

2 OBJECTIVE

This Standard is intended to provide guidance regarding the information communicated to the consumer on UPF labels and/or swing tags about the relative sun protective capability of material and items of clothing. This information is intended to assist the consumer in the selection of those items which best suit their need for sun protection. This Standard also specifies the minimum level of body coverage that an item of clothing needs to achieve in order to legitimately display or claim an UPF rating.

3 DEFINITIONS AND ABBREVIATIONS

For the purpose of this Standard, the definitions below apply.

3.1 Elbow

The joint situated between the upper arm (humerus) and the forearm (primarily connected to the ulna) as shown in Figure 1.

3.2 Erythema

The start of a sunburn for people with the most sun-sensitive skin type.

AS/NZS 4399:2017 Sun protective clothing - Evaluation and classification