AS 4399:2020

Australian STANDARD®

Sun protective clothing — Evaluation and classification

STANDARDS Australia

AS 4399:2020

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The following are represented on Committee TX-021:

Australian Fashion Council
Australian Radiation Protection and Nuclear Safety Agency
Cancer Council Australia
Consumers' Federation of Australia
National Retail Association
Queensland University of Technology
University of New South Wales
University of Southern Queensland

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Originated as AS/NZS 4399:1996.
Previous edition 2017.
Revised and redesignated as AS 4399:2020.

Preface

This Standard was prepared by the Australian members of the joint Standards Australia/Standards New Zealand Committee TX-021, Sun Protective Clothing, to supersede AS/NZS 4399:2017.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

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 based on an objective, reproducible *in vitro* test method. 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 a UPF rating.

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 not covered in this Standard.

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) Revision of the UPF classification scheme.

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

The term “normative” is used in Standards to define the application of the appendices to which it applies. A “normative” appendix is an integral part of a Standard.

Contents

Introduction

Australia experiences one of 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 public.

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

Therefore, this revision adds a new requirement by specifying the minimum amount of body coverage required in order to permit a UPF claim to be made. 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.

This Standard does not seek to prescribe the ideal level of body coverage to ensure 100 % sun protection. Furthermore, it does not address the issue of ultraviolet radiation (UVR) exposure that achieves an ideal balance between skin cancer prevention and vitamin D production as this issue is 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 a SPF value is an *in vivo* one, using the start of a sunburn on human skin as an end point, and the procedure is given in AS/NZS 2604. 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., 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 rated 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 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 or knit structure 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.

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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 ultraviolet protection factor (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. This Standard specifies the minimum amount of body coverage by an item of clothing in order to be allowed to make a UPF claim.

This Standard excludes the following:

(a) Sunglasses.

(b) Sunscreen products for topical application to human skin.

(c) Materials for architectural or horticultural use such as shade cloth.

(d) Items which offer protection at a distance from the skin such as shade structures.

(e) Protection from UVR from sources other than the sun.

In this Standard, any reference made to UVR refers exclusively to solar UVR.

NOTE 1 For sunscreen requirements, refer to AS/NZS 2604.

NOTE 2 For sunglasses requirements, refer to AS/NZS 1067.1 and AS 1067.2.

NOTE 3 For shade fabric requirements, refer to AS 4174.

NOTE 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 (refer to AS 4174).

2 Normative references

There are no normative references in this document.

NOTE Documents for informative purposes are listed in the Bibliography.

3 Terms and definitions

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

3.1
elbow
joint situated between the upper arm (humerus) and the forearm (primarily connected to the ulna)

Note 1 to entry: See Figure 1.

3.2
erythema
start of a sunburn for people with the most sun-sensitive skin type