

# ENJOY THE SUN SAFELY - TEXTILE UV PROTECTION



## NATURAL UV RADIATION

Sunlight is important for human health. The body needs it to form vitamin D, for example, which is important for bone structure. At the same time, ultraviolet rays contained in sunlight pose a major stress and risk potential for the skin.

Due to the change in the way people are spending their leisure time, dermatologists are recording a significant increase in the number of skin cancer cases worldwide. Based on latest estimates, experts anticipate well over 200,000 new cases of skin cancer each year in Germany alone.

Dermatologists therefore warn against excessive sun exposure and call for prevention by means of suitable clothing and sun protective textiles. This is particularly important for children, as their skin is still extremely thin and only develops full protective mechanisms against harmful UV radiation from around the age of 15. But it is also extremely sensible for the people who spend a lot of time outdoors in their line of work, such as construction workers and road workers or gardeners to use textile sun protection.

### IMPRINT

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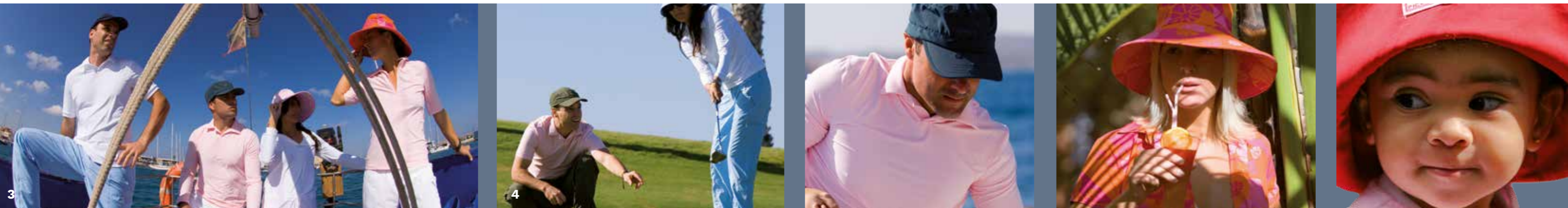
### IMAGE SOURCES

- hyphen GmbH
- Hohenstein
- PICKAPOOH Hats & More



- 1 Given the same length of exposure to the sun, wrinkling occurs significantly earlier with skin types I and II than with types III and V.
- 2 The risk of skin cancer is also considerably higher for skin types I and II.





### ULTRAVIOLET PROTECTION FACTOR (UPF)

- 3 For spare time activities in the sun it is important to know the intrinsic protection time of the skin.
- 4 Textile materials as for example a long-sleeved T-Shirt with a UPF of 20 extends the possible stay in the sun without risking damage to the skin by a factor of 20.

The UV protection factor states how long the covered skin area with textiles can be exposed to the sun without suffering skin damage. The Ultraviolet Protection Factor (UPF) is comparable to the sun protection factor of sunscreen (SPF). In both cases, the basis for calculations is what is known as the intrinsic protection time of the skin, which can vary considerably depending on the individual skin type.

The skin of someone of skin type I with red or blond hair, blue eyes and a very fair complexion has an intrinsic protection time of approximately five to ten minutes. If they are exposed to the burning sun for longer than this without protection, they risk harmful sunburn.

When protected by a textile material with a UPF of 20, for example, this area can extend the length of time to stay in the sun by a factor of 20, in other words, up to a maximum of 1.5 to 3 hours (20 x 5 min = 100 min to 20 x 10 min = 200 min), without risking damage to their skin.

UV protection	UV protection factor
UV protective clothing (according to UV STANDARD 801)	20 – 80
Tightly woven cotton clothing (according to UV STANDARD 801)	approx. 20
Sunscreen when applied correctly (here: SPF)	1 – 30
Lightly woven cotton clothing (according to UV STANDARD 801)	approx. 2 – 10
Shade under a tree	approx. 5 – 15
Shade under a sunshade (without special UV protection)	approx. 15
Shade under a sunshade (with special UV protection)	40 – 80

### SKIN TYPES

Not every type of skin reacts in the same way when exposed to the sun. Dermatologists therefore make a distinction between six skin types with different intrinsic protection times. Skin type 5 and 6 normally do not get sunburnt and are thus not mentioned here.

The table below gives an overview on the four skin types at risk. It indicates their intrinsic protection time and the possible extension of the same by wearing a textile with a UPF of 20:

	SKIN TYPE 1	SKIN TYPE 2	SKIN TYPE 3	SKIN TYPE 4
CHARACTERISTICS				
SKIN	very fair-skinned	fair-skinned	light/dark brown	light brown, olive
HAIR	red or blond	blond, brown	light brown, brown	dark brown/black
EYES	blue, rarely brown	blue, green, grey	grey, brown	brown/dark
SUNBURNS	always heavy, aching	mostly heavy, aching	less frequently, moderate	hardly ever
SELF-PROTECTION TIME OF SKIN	5 – 10 minutes	10 – 20 minutes	20 – 30 minutes	40 minutes
PROTECTION BY A TEXTILE WITH A UPF OF 20	100 – 200 minutes	200 – 400 minutes	400 – 600 minutes	800 minutes



## TEXTILE UV PROTECTION

Textiles are intrinsically suited for use as UV protection, as they are able to offer particularly good protection against intense radiation from the sun if suitable materials and constructions are used. UV protection factors (UPF) far above those of the strongest sunscreens (sunblocks) can be achieved.

It is not possible to determine how much UV radiation a textile allows to penetrate the skin simply from looking at and feeling the textile and thereby give a UV protection factor comparable to those used for cosmetic sun screens.

To determine this so-called Ultraviolet Protection Factor (UPF), standardised measuring methods and a specialist test, as offered by the members of the International Testing Association for Applied UV Protection, are required.

## UV INDEX

The intensity of the sun, as well as the individual skin type, is crucial when selecting suitable UV protection. The international UV index (UVI) provides information on the intensity of UV radiation in a specific location. In Germany, for example, UV indices between 5 and 8 are common at midday from May to August.

The UV index is dependent on the time of day, the longitude and latitude, the time of year, ozone levels and cloud cover. Reflections from the sand and snow also affect the UVI level.

The daily UVI forecast is published on the Internet by, amongst others, the Deutscher Wetterdienst [German Meteorological Service] at [www.wettergefahren.de](http://www.wettergefahren.de) and [www.uv-index.de](http://www.uv-index.de) for Germany and Europe.

5 In order to determine the UV protection factor for textile materials, standardised measuring methods and specialist testing is required. Products of tested materials labelled with the UV STANDARD 801 label provide the user with safety!

Recommended ultraviolet protection factor (UPF) by index and skin type

UV index	Children's skin	Skin type I	Skin type II	Skin type III	Skin type IV
3 – 4	UPF 20	UPF 20	UPF 15	UPF 10	UPF 5 – 10
5 – 6	UPF 20 – 40	UPF 20 – 40	UPF 20 – 40	UPF 20	UPF 10
7 – 8	UPF 60 – 80	UPF 60 – 80	UPF 40 – 60	UPF 40	UPF 20
9 and above	UPF 80	UPF 80	UPF 60 – 80	UPF 60	UPF 40



## PERSONAL PROTECTIVE EQUIPMENT

The objective of textile UV protection is the greatest possible protection of consumers against the risk of natural UV radiation. This understanding is reflected within the regulation (EU) no. 2016/425 on personal protective equipment. UV protective clothing is thus classified as personal protective equipment. This makes it to be CE marked and so in addition to proof for UV protection it must fulfill further special requirements. The compliance with these special requirements is not part of the material testing according to UV STANDARD 801.

The tested material may only be used and advertised in tailor made clothing when the essential requirements of sun protective objective were fulfilled concerning typically exposed body locations. This is important to note within the context to the fulfillment of the regulation (EU) no. 2016/425 on personal protective equipment. In order to achieve these requirements a correspondingly good material as well as reasonable product design and sufficient manufacturer's information is recommended.

## UV MEASURING METHODS

In order to provide consumers with a reliable **UPF**, the particular requirements to which a sun protective textile is subjected during use must be taken into consideration.

If the cloth will be processed into a garment, the stretching of a fabric during wear, the moisture from perspiration or water and wear during use affect the ultraviolet protection factor. Furthermore the ultraviolet protection factor is also affected during and after care of the textile. The textile material is therefore laundered as part of the test and wet during measurement and stretched in a specified manner (see picture 7).

For shading textiles, the stretching of the fabric, the weather (sun and rain) as well as humidity and if necessary washing will affect the ultraviolet protection factor.

As a result of these conditions, the protection time is drastically reduced (or in the worst case almost completely lost), and this must also be reflected in the UPF rating indicated to avoid putting the wearer at risk (comparison see pictures 8 and 9).

Correspondingly, the members of the International Testing Association for Applied UV Protection, recommend measuring the UV protection factor according to the **UV STANDARD 801** for all types of clothing and shading material. This is always based on the worst-case scenario for wear and use.

6 Personal protective equipment falls under the regulation (EU) no. 2016/425 on personal protective equipment and must be labelled with the CE mark. The label has to be sewn-in.



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7 Tailor made protective clothing may only be CE labelled when essential requirements of sun protective objective are fulfilled concerning typically exposed body locations.



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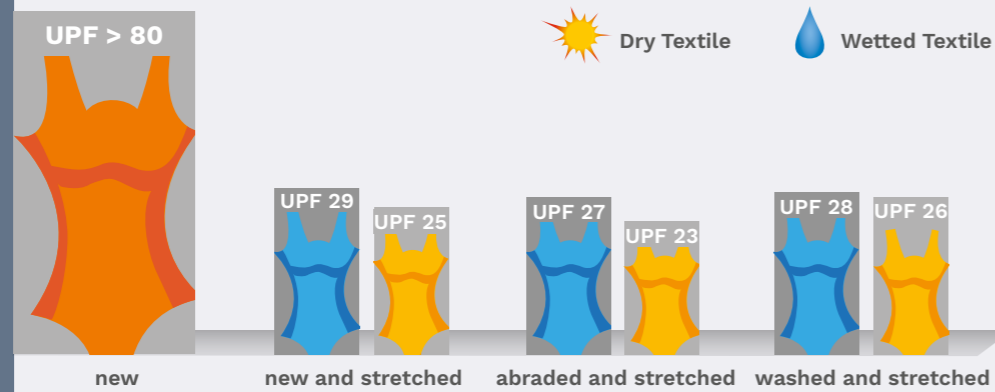


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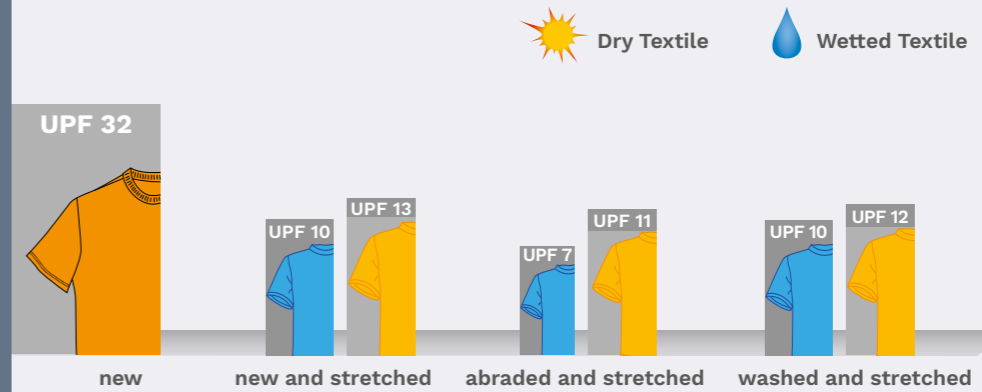
8 The mechanical load of textiles is simulated with the "Martindale Abrasion Tester".

9 Before measuring the textile is stretched in a specified manner with the aid of a stretching device.

UV Protection Factor of a textile in use made of polyamide/elasthane applying conditions of use



10



UV Protection Factor of a coloured knitted fabric processed to a T-shirt made of cotton applying condition of use

11

## BASICS

When determining the UPF according to **UV STANDARD 801**, a maximum intensity of radiation using the solar spectrum in Melbourne, Australia on 1 January (in other words, at the height of the Australian summer) and the most sensitive skin type are taken as the basis.

Under the **Australian-New Zealand standard AS/NZS 4399**, however, measurements are only taken on new textile materials in an unstretched and dry condition. The test is also based on the solar spectrum in Melbourne, Australia, on 1 January.

The measuring process stipulated in the AS/NZS standard does not take account of the conditions of use neither for clothing fabrics nor for shading textiles, whereby it is not possible to calculate a reliable ultraviolet protection factor.

Since the solar spectrum in the northern hemisphere is different from that in Australia, the system of measurement under the **European standard EN 13758-1** uses the solar spectrum in Albuquerque in New Mexico, USA, which is more or less similar to that of southern Europe. In other regards, the test conditions of AS/NZS 4399 apply, i.e. the UPF is calculated using new, unstretched and dry textiles. This measuring system is also not entirely suitable for consumers, since the figures do not give reliable data for the textile's conditions of use.

In the USA UV testing is performed according to the **American standard AATCC TM 183**.

Similar to the European standard the American standard uses the solar spectrum of Albuquerque, NM. Like the Australian/New Zealand and European standard the fabric is tested in new condition.

Further information can be found at [www.uvstandard801.com](http://www.uvstandard801.com).

## DETERMINATION OF THE UV PROTECTION FACTOR UPF

Test method	Special features	Recommended test method for:	Label
<b>UV STANDARD 801</b> 	<ul style="list-style-type: none"> <li>Measurements carried out on stretched, wet textiles which display mechanical wear as a result of use and textile care respectively have been subjected to artificial weathering.</li> <li>Based on maximum UV radiation and the most sensitive skin type.</li> <li>The solar spectrum in Australia at the height of the Australian summer is simulated.</li> </ul>	<ul style="list-style-type: none"> <li>Clothing fabrics: Bathing wear, beach and swimwear for children, workwear, sportswear, headgear, summer clothing, gardening/outdoor clothing, uniforms etc.</li> <li>Shading textiles: Awnings, sunshades, roller blinds, sun sails, UV beach tents etc.</li> </ul>	
<b>AS/NZS 4399</b> 	<ul style="list-style-type: none"> <li>Measurements taken on unstretched, dry textiles when new.</li> <li>The solar spectrum in Australia is simulated during measurements.</li> </ul>		Private labelling see each member's website.
<b>EN 13758-1</b> 	<ul style="list-style-type: none"> <li>Measurements taken on unstretched, dry textiles when new.</li> <li>The solar spectrum in Albuquerque (New Mexico/USA), which corresponds to that in Southern Europe is simulated during measurements.</li> </ul>		Private labelling see each member's website.
<b>AATCC TM 183</b> 	<ul style="list-style-type: none"> <li>Measurements taken on unstretched, dry textiles.</li> <li>The solar spectrum in Albuquerque (New Mexico/USA), which corresponds to that in Southern Europe is simulated during measurements.</li> </ul>		Private labelling see each member's website.

The informative UV STANDARD 801 hangtag is memorable and says to the consumer at first glance: This is high quality textile material providing reliable safety!

UV STANDARD 801

