



TESTEX®

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Swiss textile testing
and certification



UV Standard 801



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, the ultraviolet rays contained in sunlight are potentially a source of severe stress and risk 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. In Switzerland alone, experts anticipate well over 10,000 new cases of skin cancer each year, based on latest estimates.

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

Ultraviolet Protection Factor (UPF)

UV protection	UV or SPF protection factor
UV protective clothing (acc. to UV Standard 801)	20-80
Tightly woven cotton clothing (acc. to UV Standard 801)	approx. 20
Sunscreen when applied correctly (SPF)	0-30
Lightly woven cotton clothing (acc. to UV Standard 801)	approx. 10
Shade under a tree	approx. 5-15
Shade under a sunshade (without special UV protection)	approx. 5

The UV protection factor (UPF) states how much longer someone using sun-protective textiles or wearing UV-protective clothing can stay out in the sun without suffering damage to their skin. It is comparable to the sun protection factor of sunscreens (SPF). In both cases, the basis for calculation 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 blonde 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, this individual can extend the length of time spent in the sun by a factor of 20, in other words, up to a maximum of 1,5 to 3,5 hours (20 x 5 min = 100 min to 20 x 10 min = 200 min), without risking skin damage.

Skin types

Not every type of skin reacts in the same way when exposed to the sun. Dermatologists therefore make a distinction between five skin types with different intrinsic protection times.

Skin type	Description	Sunburn	Tanning	Skin's intrinsic protection time	Textile Protection (UPF 20)
I	Skin: extremely light, pale Freckles: profuse Hair: reddish Eyes: green, blue, rarely brown	Always burns, painful	Never tans; white after 1 - 2 days, skin peels	5-10 minutes	100-200 minutes
II	Skin: slightly darker than type I Freckles: rare Hair: blonde to brown Eyes: blue, green, grey	Generally burns, painful	Rarely tans, skin peels	10-20 minutes	200-400 minutes
III	Skin: light brown Freckles: none Hair: dark blonde, brown Eyes: grey, brown	Occasionally burns, moderate	Tans well	20-30 minutes	400-600 minutes
IV	Skin: brown Freckles: none Hair: dark brown, black Eyes: brown	Rarely burns	Tans quickly and deeply	approx. 45 minutes	approx. 900 minutes
V	Skin: dark brown, black Freckles: none Hair: black Eyes: brown	Rarely burns	Tans quickly and deeply	approx. 60-90 minutes	approx. 1'200 - 1'800 minutes



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 fabric structures are used. UV protection factors (UPF) far above those of the strongest sunscreens (sunblocks) can be achieved.

However, it is not possible to determine how much UV radiation a textile allows to penetrate to the skin simply from looking at and feeling the textile material. Standardised measuring methods and a specialist test, as conducted by the institutions in the International Test Association for Applied UV Protection, of which TESTEX is a member, are therefore required to determine the Ultraviolet Protection Factor (UPF).

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.

The daily UVI forecast is published on the Internet by, amongst others, the Swiss Federal Health Office and the Swiss Meteorological Office at www.uv-index.ch for Switzerland, Europe, the USA and Australia.

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 sand and snow also affect the UVI level.

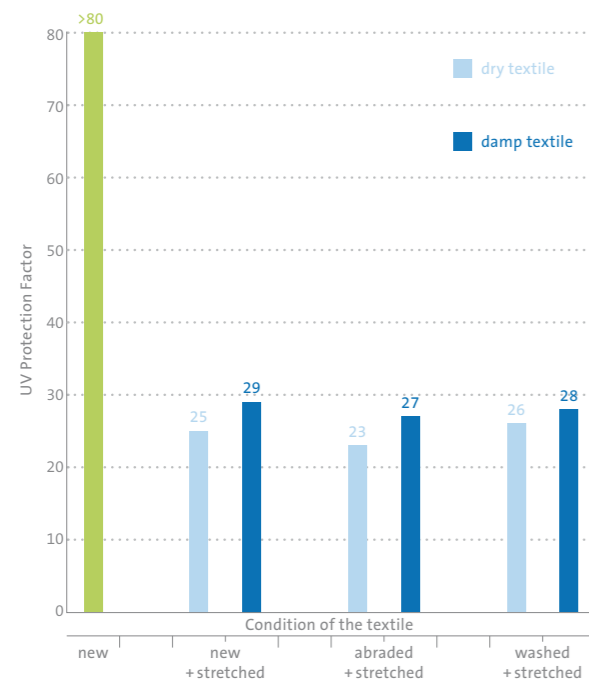
UV-Index skin	Children's	Skin type I	Skin type II	Skin type III	Skin type IV	Skin type V
3 - 4	UPF 20	UPF 20	UPF 15	UPF 10	UPF 5 - 10	UPF 5
5 - 6	UPF 20 - 40	UPF 20 - 40	UPF 20 - 40	UPF 20	UPF 10	UPF 5 - 10
7 - 8	UPF 60 - 80	UPF 60 - 80	UPF 40 - 60	UPF 40	UPF 20	UPF 10
9 and above	UPF 80	UPF 80	UPF 60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

Measuring methods for determining the UV Protection Factor UPF

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. In the case of clothing, the stretching of a fabric during wear, moisture from perspiration or sea water and wear during use all affect the UPF. The protection time is reduced on average by about a third as a result of these conditions, and this must also be reflected in the UPF rating indicated (see diagram below) to avoid putting the wearer at risk.

TESTEX, as a member of the International Test Association for Applied UV Protection, recommends measuring the UPF according to UV Standard 801 for all types of clothing. This is based on the worst case scenario for wearing conditions. The test therefore includes washing the textile material and measuring it while damp and stretched in a specified manner (see right).

MEASURING THE UV PROTECTION FACTOR OF A POLYAMIDE/SPANDEX SWIMSUIT UNDER ACTUAL WEARING CONDITIONS



When determining the UPF, a maximum radiation intensity 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 4399:1996), however, measurements are only made on new textile materials in an unstretched and dry condition. This test is also based on the solar spectrum in Melbourne, Australia, on 1 January.

Since this measuring process does not take account of the special circumstances where clothing is being worn, it is not possible to calculate a reliable sun protection factor for clothing, but only for indoor and outdoor sun-screening textiles on buildings, or for parasols and awnings.



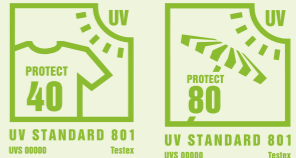

Here the UV protection factor of textiles is also being measured when elongated in a stretching device.



The mechanical stress on textiles is simulated with the "Martindale Abrasion Tester".

Since the solar spectrum in the northern hemisphere is different from that in Australia, the measuring method used in [European standard EN 13758-1](#) is based on the solar spectrum in Albuquerque in New Mexico, USA, which is more or less similar to that of southern Europe. Otherwise the test conditions of AS/NZS

4399:1996 apply, i.e. the UPF is calculated using new, unstretched and dry textiles. This measuring method is also not entirely suitable for clothing, since the figures produced again disregard normal wearing behaviour, and so do not give reliable values for the textile's conditions of use.

Test method	Special features	Recommended test method for:	Award of test label
UV Standard 801	Measurements carried out on stretched, wet textiles which display mechanical wear as a result of wear and textile care. Based on maximum UV radiation and the most sensitive skin type. The solar spectrum in Australia is simulated.	Beach- and swimwear, workwear, sportswear, headgear, summer clothing, uniforms etc. Awnings, sunshades, roller blinds	
AS/NZS 4399:1996	Measurements made on unstretched, dry textiles when new. The solar spectrum in Australia is simulated during measurements. Only qualified suitability for clothing.	Awnings, sunshades, roller blinds	
EN 13758-1	Measurements made on unstretched, dry textiles when new. The solar spectrum in Albuquerque (New Mexico/USA), which corresponds to that in Southern Europe, is simulated during measurements. Only qualified suitability for clothing.	Awnings, sunshades, roller blinds	

For further information go to www.uvstandard801.com or contact us by e-mail at: zuerich@testex.com.

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