



Explanatory notes for Ultraviolet Protection Factor (UPF) report/Certificate of Analysis

At ARPANSA, UPF testing is carried out in accordance with the Australian Standard *AS4399:2020* (the Standard'). The ARPANSA UPF Testing Service is a NATA-accredited laboratory. These notes are intended as a guide to interpreting ARPANSA UPF test report (the term test report and Certificate of Analysis are used interchangeably). Each major heading corresponds to a section of the UPF report. Beneath each heading is a brief explanation of the important information presented in that section of the report. The 'Additional Information' section defines some terms that may appear on UPF test reports and provides extra information that may be useful when interpreting reports.

A note about the previous standard

UPF testing to the 2017 edition of the Standard, Australian/New Zealand Standard *AS/NZS4399:2017 Sun protective clothing – Evaluation and classification*, is by request only as the 2017 edition has been superseded by the 2020 edition in Australia.

Sampling

The results reflect the sample tested by the laboratory. In order to achieve meaningful results, the sample tested must be representative of the material that is being used to make the products. Many materials show significant batch-to-batch variation in UPF rating, and materials of similar specification from different manufacturers can show large variations. To ensure products are correctly labelled with an accurate UPF rating, the material tested should be the actual production material.

Client Information

Analysed for: The name of the client that the analysis was performed for.

ARPANSA Reference: A unique code identifying this test report. Please quote this code if you have any questions about the test report.

Analysis Date: The date the sample was tested.

Sample Information

Sample Weight: The weight (mass) of the test sample is measured and reported here, if applicable (generally weights are reported for fabrics but not for garments). Weights are reported in grams per square meter (gsm), to an accuracy of ± 1 gram.

Instrumentation: The type of instrument used to perform the analysis.

Description: Description of the sample analysed. This includes the material colour and type, and any other relevant information provided such as manufacturer, quality, batch and weight.

UV Transmittance Characteristics

The graph shows the average of the measured transmittances. Please refer below for more information regarding transmittances.

Protection Factor Results

Number of Specimens Analysed: This shows how many UPF measurements (or scans) were made on the test sample. For variable samples more scans may be performed.

Mean UVA Transmittance: This is the average UVA radiation passing through the test specimens.

Mean UVB Transmittance: This is the average UVB radiation passing through the test specimens.

Mean UPF: This is the average of UPF values across all specimens analysed.

Standard Deviation: This indicates how much variation in UPF rating there is across the surface of the material. For the same sample, the lower the number, the more consistent the UPF is across the material.

Rated UPF: This is the UPF rating assigned to the material tested. In both the 2017 and 2020 versions of the Standard, the UPF ratings are 15, 30, 50, and 50+.

Protection Category or UPF Classification: Material will be assigned a Protection Category (for test reports done to the AS/NZS4399:2017) or a UPF Classification (for test reports done to the AS4399:2020). There are 3 classifications: Minimum (UPF of 15), Good (UPF of 30), and Excellent (UPF of 50 and 50+).

Statistical Uncertainties

Total Measurement Uncertainty: This is a measure of the total uncertainty (Standard Error of the Mean), which is the Standard Deviation adjusted for the number of specimens analysed.

Coverage factor (99% confidence): Known as *t-variate* in the Standard. This is a statistical value used in calculation of the Standard Error of the Mean, calculated at the 99% confidence level.

Review of Results

In this section the effectiveness of the material for sun protection is described. There may also be observations about the test samples, test results or products tested.

Material Sample

For positive identification, an image of the material tested, or an image of the product, is attached to the report.

Signatures

Every page of the report is signed by the technician who performed the analysis and by an approved signatory.

Additional Information

UVA: Ultraviolet radiation in the region 315 nanometres to 400 nanometres.

UVB: Ultraviolet radiation in the region 290 nanometres to 315 nanometres.

How UPF ratings are calculated:

1. The transmission of ultraviolet through the material is determined using a calibrated ultraviolet transmission analyser. Measurements are made on at least 4 specimens.
2. The UPF result for each measurement is calculated.
3. The separate UPF values are averaged to determine the mean UPF.
4. The standard deviation is calculated.
5. The standard error is calculated.
6. The standard error is subtracted from the mean UPF to obtain the rated UPF.
7. The rated UPF is rounded down to the nearest UPF rating of 15, 30, 50, or 50+ (if the value is 55 or greater, for the 2020 edition of the Standard). Rated UPF also determines the Protection Category or UPF Classification assigned to the material.

Reporting of high results: If the calculated UPF rating is over 300 then ARPANSA reports it as ">300" (greater than 300). In this case the Standard Deviation and Standard Error are not applicable and are not reported.

Transmittance vs. Transmission: The Standard stipulates that UVA and UVB radiation passing through the test sample is reported as transmittance. The transmittance scale is from 0 to 1. A more familiar unit is transmission which has a scale from 0% to 100%. To convert from transmittance to transmission, multiply the transmittance value by 100.

If you have any questions about ARPANSA UPF test reports, please contact ARPANSA Ultraviolet Radiation Services on +61 3 9433 2309, or at uvr-services@arpansa.gov.au.

For further information about sun protection, sun protective materials and UPF testing, refer to www.arpansa.gov.au/uv

ARPANSA Ultraviolet Radiation Services

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