Clothing UPF Standards

If you are working with a clothing vendor to select and purchase UPF work clothing, ask if the products have been UPF tested and if you can receive a copy of the test results. If the vendor is unable to tell you the UPF of a shirt that you're interested in acquiring for your employees, you can ask them to have it tested or you can have it tested yourself.

Here are some of the labs that do UPF testing on fabrics and clothing:

UPF Testing Labs

Solar Light
https://solarlight.com/product/ultraviolet-protection-factor-upf-testing/

Florida Suncare Testing, Inc.
http://flsuncaretesting.com/upftestingfabric.html

Precision Testing Laboratories
https://www.precisiontesting.com/textile-apparel-testing/

ATSKO, Inc.
http://www.atsko.com/uv-testing/

UPF Testing Standards

What are the U.S. standards for the preparation, UV testing, and labeling sun protective clothing?

American Society for Testing Materials (ASTM) standards D6544 and D6603 combine with American Association of Textile Chemists and Colorists (AATCC) 183 to form the most stringent UV -protective clothing standard in the world. ASTM D6544, a voluntary standard, is unique among the world's UV textile documents. It ensures that the UV protection claimed on labels reflects the least or lowest degree of protection during the use-life of the garment rather than the degree of protection when the garment is new. ASTM D6544 asks fabrics manufactures making a claim of sun protectiveness to undergo 40 simulated launderings, to be exposed to 100 fading units of simulated sunlight, and if intended for swimsuits, to be exposed to chlorinated water prior to UV -transmission testing with AATCC 183. AATCC 183 is the U.S. gold standard for determining the UPF and percent UVA/UVB blocked by a fabric or garment. D6603 requires fabrics to be labeled with a UPF value between 15 and 50+ and a classification category similar to those used in Australia and New Zealand.

Are sun protective fabrics and clothing regulated by the government?

No. Fabrics, clothing and hats are not regulated by the U.S. Food and Drug Administration or any other government agency. However, the Federal Trade Commission monitors sun protective claims and the industry encourages textile and clothing manufacturers and marketers to self-regulate and adopt the U.S. standards.

Other Resources

Below are some websites and published research articles for more information. The first website is from Australia, but it is quite informative. They lead the world in sun protective clothing.

Websites

Clothing and Fabric Testing
Australian Radiation Protection and Nuclear Safety Agency
Australian Radiation Protection and Nuclear Safety Agency, Australian Government;
https://www.arpansa.gov.au/our-services/testing-and-calibration/ultraviolet-radiation-testing/fabric-testing

AATCC New Tools for Testing Fabrics, 2017
American Association of Textile Chemists and Colorists
www.aatcc.org
https://crs.ul.com/en/news-events/aatcc-launches-new-tools-testing-uv-protective-fabrics/

Ultraviolet Absorbers for Sun Protective Cotton
World Textile Information Network
http://www.wtin.com

Published Research Articles

In vitro assessment of the broad-spectrum ultraviolet protection of clothing.
Ellinor Q. Coyne, Michael K. Lichtman, Julie Simons, Ajoy K. Sarkar, Thomas M. Runger Journal of the American Academy of Dermatology. 2018 Aug;79(2):373-375.

In-vitro analysis of the effect of constructional parameters and dye class on the UV protection property of cotton knitted fabrics.
Chi-wai Kan, Chui-ha Au
PLoS One. 2015;10(7):e0133416.
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4519329/

UV radiation transmittance: regular clothing versus sun-protective clothing.
Kenneth Bielinski, Nolan Bielinski Cutis. 2014 Sept;94(3):135-138.
https://www.mdedge.com/dermatology/article/87059/aesthetic-dermatology/uv-radiation-transmittance-regularclothing-ver

Controlling adverse and beneficial effects of solar UV radiation by wearing suitable clothes – spectral transmission of different kinds of fabrics.
Piotr S. Cobolweski, Janusz W. Krzyscin, Janusz Jaroslawski, Jakub Wink, Aleksandra Lesiak, Joanna Narbutt Journal of Photochemistry and Photobiology B: Biology. 2014 Nov;140:105-110.

A study on ultraviolet protection of 100% cotton knitted fabric: effect of fabric parameters.
C.W. Kan
Scientific World Journal. 2014;2014:506049. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4053584/

Effect of weave, structural parameters and ultraviolet absorbers on in vitro protection factor of bleached cotton woven fabrics.
Abhijit Majumdar, Vijay Kumar Kothari, Achintya Kumar Mondal, Piyali Hatua Photodermatology, Phtoimmunology & Photomedicine. 2012 Apr;28(2):58-67.

What level of protection can be obtained using sun protective clothing? Determining effectiveness using an in vitro method.
S. Ghazi, C. Couteau, L.J.M. Coiffard
International Journal of Pharmaceutics. 2010 Sept;397(1-2):144-146.

UV Radiation Protective Clothing
Biswa Ranjan Das
The Open Textile Journal. 2010; 3: 14-21.
https://pdfs.semanticscholar.org/5601/7c3211a82cf0cf839c97fcca1fc5f680004c.pdf

Laboratory and Outdoor Assessment of UV Protection Offered by Flax and Hemp Fabrics Dyed with Natural Dyes
Daniele Grifoni, Laura Bacci, Gaetano Zipoli, Guilia Carreras, Silvia Baronti, Francesco Sabatini
Photochemistry and Photobiology. 2009 Jan-Feb; 85(1):313-320.
https://onlinelibrary.wiley.com/doi/epdf/10.1111/j.1751-1097.2008.00439.x

An Evaluation of UV Protection Imparted by Cotton Fabrics Dyed With Natural Colorants
Ajoy K. Sarkar
BMC Dermatology. 2004 Oct 27; 4(15). https://www.ncbi.nlm.nih.gov/pmc/articles/PMC526772/

Revolutionary Advances in Sun-Protective Clothing—An Essential Step in Eliminating Skin Cancer in our World
Richard Edlich, Mary Jude Cox, Daniel G. Becker, Jed H. Horowitz, Larry S. Nichter, L.D. Britt, William C. Lineaweaver, et al. Journal of Long-Term Effects of Medical Implants. 2004; 14(2):95-106.

Clothing as Solar Radiation Protection
J.M. Menter, K.L. Hatch, P. Elsner, K. Hatch, W. Wigger-Alberti
Current Problems in Dermatology. 2003; 31:50-63

Protection against solar ultraviolet radiation
Peter H. Gies, Colin R. Roy, Simon Toomey, Alan McLennan
Mutation Research. 1998 Nov 9; 422(1):15-22