

# TECHNICAL DATA



## DISPARITY AMONG PUBLISHED TPP RESULTS

Since the 1986 Edition of NFPA 1971, Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, the standard has required that all outer shell/moisture barrier/thermal barrier composites used in the manufacture of firefighters' turnout gear be tested for thermal protective performance (TPP) ratings on an annual basis. The required minimum TPP rating for a compliant composite is 35.

TenCate Southern Mills has been running TPP tests for more than 20 years in our own laboratory which is ISO certified and qualified by Underwriters Laboratories to participate in their Client Test Data Program. Southern Mills generates TPP data everyday for a variety of purposes, such as responding to end user/customer requests, monitoring internal quality and supporting new product development. Our TPP database may very well be the largest in the world.

In recognition that all test methods have some measure of inherent variability, Southern Mills has always chosen to report TPP ratings of composites as a range rather than as an absolute value. These ranges are based on repeated testing over the long term and represent many different lots of fabric. A large database minimizes the effect of test method variability and increases confidence in the resulting average.

As a third party certifier, UL® is engaged by component and element manufacturers every year to test the hundreds of possible composites used in the industry. UL's objective in this effort is simply to confirm that each composite meets the NFPA required minimum TPP of 35. Not to compare the thermal performance of materials. As directed by the mandated test method, the average rating of just three specimens is reported. Any test method can occasionally generate an unexpectedly high or low result. For this reason, a single data point has an inherently higher level of variability and, therefore, has the potential to be misleading.

Evidence of how an unexpectedly high test result can lead to inaccurate conclusions can be seen in the table below.

Composite	2007 UL® TPP data		TCSMI TPP data	
	TPP Rating	Number of specimens tested	TPP Rating	Number of specimens tested
Millenia XT™/Crosstech®/Caldura® SL2	40.1	3	35-37	100+
Millenia XT™/Crosstech®/Quantum3D™	36.8	3	38-41	100+
Gemini™/Crosstech®/Caldura® SL2	39.6	3	35-37	100+
Gemini™/Crosstech®/Quantum3D™	38.6	3	38-41	100+

Please see other side for additional information.

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Note that the UL reported TPP on the composite containing Caldura® SL2 is significantly higher than the TPP range published by Southern Mills on the same composite. Without further investigation, one might assume that a composite containing Caldura SL2 would offer more thermal protection than the same composite using Quantum3D™. As shown in our published TPP data which is based on over 100 tests, a composite containing Quantum3D will typically generate a TPP rating 2-4 points higher than the same composite containing Caldura SL2. This is not to suggest that there is anything wrong or inaccurate with the UL test results, only that those results are based upon one test to verify compliance with the required minimum TPP rating. Unfortunately, as illustrated by this example, the unusually high TPP result generated at UL on Caldura SL2 would suggest that it offers more thermal protection than the same outer shell and moisture barrier combined with Quantum3D.

Please be aware that the intent of this document is to simply explain why Southern Mills and the garment manufacturers will continue to promote Quantum3D as **consistently** offering a TPP rating higher than other available composites with similar weight. Not to discredit UL test results. We appreciate that there are many reasons for choosing different thermal barriers and that, in the case of TPP results, the claims concerning various products can appear to be conflicting. As the world's largest supplier of flame resistant fabrics, it is our intent to provide information to assist end users in making informed decisions. And, while this paper is specific to certain composites, it is always preferential to report ranges of TPP data based on a history of data instead of a single data point regardless of the base layers being considered.

To the best of our knowledge, the information contained herein is accurate. However, Southern Mills assumes no liability whatsoever for the accuracy or completeness of the information contained herein. Users of any substance must satisfy themselves by independent investigation.

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