

# DEMYSTIFYING TABER ABRASION

## What it can and can't teach us

Taber Abrasion results have long been reported in marketing materials for turnout gear outer shell fabrics. It should be clarified that while Taber Abrasion results may have some limited utility in benchmarking baseline performance, extreme caution should be taken when attempting to compare results of various fabrics. Before deciding what Taber Abrasion might teach us about turnout gear fabric durability, it is important to understand clearly the details of the particular ASTM Standard.

### TYPE OF STANDARD

The most commonly referenced ASTM Standard pertaining to Taber Abrasion is ASTM D3884-09(2013), Standard Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method).

### NOT RECOMMENDED FOR FABRIC PERFORMANCE EVALUATION

Standard Guide ASTM D3884 includes a Significance and Use section, which presents appropriate comments on the limitations of its use. The Significance and Use section of ASTM D3884 lists several warnings about variability of Taber abrasion, and of abrasion testing in general. It further recommends that actual end-use trials must be conducted to assess actual abrasion resistance. The Significance and Use section concludes that "because of the conditions mentioned above, technicians frequently fail to get good agreement between results obtained on the same type of testing instrument both within and between laboratories, and the precision of these test methods is uncertain.

**“ This test method is accordingly not recommended for acceptance testing in contractual agreements between purchaser and supplier because of the poor between-laboratory precision of the test method ”**

*Standard Test Method for Abrasion Resistance of Textile Fabrics (Rotary Platform, Double-Head Method), page 2, section 5.11.*

### APPLICABILITY TO TURNOUT OUTER SHELLS: Why the test is not recommended.

#### MORE THAN 100% VARIABILITY IN TESTING RESULTS

In light of these warnings, PBI Performance Products has conducted in-house variability studies on turnout gear outer shell fabrics using ASTM D3884 with H18 abradant wheels and 500g head weights. That study employed a single test operator, a single instrument, and samples taken from adjacent parts of a single roll of fabric. Eight different sets of H18 wheels were used and yielded results varying by greater than 100% from lowest to highest cycles-to-first-hole values.

#### UNLIKELY EXPOSURE CONDITIONS

Even if this procedure was consistent, the exposure is unlikely in the field. Turnout gear is used in constantly changing environments, and it's very unlikely to have the same continuous circular abrasion in the same spot, with the same fixed pressure. In addition, areas of the gear that are most likely to be exposed to high abrasion tend to be protected by a reinforcement fabric built to serve that specific role. Because of the questionable application and variability of this Standard Guide, PBI Performance Products does not recommend ranking products' durability based on results from Taber Abrasion.

#### DOES NOT EQUATE TO FIELD PERFORMANCE

Despite the variability, however, PBI Performance Products does employ the Taber Abrasion test to benchmark performance suitable to provide abrasion durability for the expected life of turnout gear. Our historical data suggests that any fabric providing at least 350-450 cycles to first hole using H18, 500g parameters will provide abrasion durability for the expected life of turnout gear. However, as an example, we have no evidence to suggest that a fabric with a Taber Abrasion result of 500 cycles to first hole will exhibit in-field abrasion durability issues twice as fast as a fabric with 1,000 cycles to first hole.

ABRASION TEST OF SAME FABRIC at 400 CYCLES

DIFFERENT LABS DIFFERENT RESULTS



PBI LAB RESULTS



TENCATE LAB RESULTS