



BERGERON PROTECTIVE CLOTHING

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Leather Reinforcements for Protective Clothing



Bergeron Information Station

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Overview - Nature's Reinforcing Material

Unlike some manufacturers, Globe views leather as a true miracle material for the firefighter, based on extensive testing cycles in the Globe lab over several years. Leather is unique. It has a physical structure composed of millions of coil-like molecules built into tiny fibrous strands. These strands are twisted together to form bundles which interweave themselves into a 3-dimensional configuration. The bundles, in turn, form an intricate, dense, fiber network with innumerable interlocks providing no easy path for a tear to follow. The result is leather's very high tensile strength. Synthetic fibers are manufactured with threads running in an orderly manner in both the warp (W) and fill (F) directions. Tear strength is directly affected by the total number of threads, which frequently form a path of least resistance. A tear, once started, follows the path of least resistance. The Tear Strength Chart below illustrates this.

TEAR STRENGTH			
MATERIAL	NFPA REQUIREMENT	WARP	FILL
7.5 oz. NOMEX®	22 lbs.	55.8	33.7
7.5 oz. Pbi®	22 lbs.	49.0	41.7
ADVANCE®	22 lbs.	42.5	29.6
LEATHER	None	35.8 lbs.	

Leather, More Flame Resistant

NFPA 1971, 1997 Revision, included leather in its flame resistance requirement. This testing was not new to Globe, since our lab routinely performs QC and flame tests on all incoming fabrics, including leather used as a Globe turnout reinforcement. The NFPA Flame Test is based on Federal Test Method Standard No. 191A, Method 5903, Flame Resistance of cloth, and subjects the material to a 12-second vertical flame exposure, followed by after flame and char length measurements. Five samples are tested in both Warp and Fill directions with a 4" maximum char length and 2-second maximum after flame allowed. The readings below are normal averages.

FLAME RESISTANCE			
MATERIAL	WARP	FILL	AFTER FLAME
7.5 oz. NOMEX®	3.2"	2.8"	< 1 second
7.5 oz. Pbi®	.6"	.6"	0 seconds
ADVANCE®	.9"	.6"	< 1 second
LEATHER	.4"	.5"	< 1 second

Leather, More Thermal Resistant

Southern Mills and North Carolina State University School of Textiles, who perform the majority of Globe's TPP testing, both agree that leather alone can yield a TPP rating of 35 as required by NFPA. (Note: leather comes in different grades and weights; the results above are based on the premium quality that Globe offers as standard.) Since TPP testing is essentially a function of thickness, leather's superior thermal resistance due to its greater density is obvious. On this sometimes controversial issue, third party testing shows, and Globe concurs, that leather provides more thermal protection than a single layer of any Outer Shell fabric offered today.

Leather, More Puncture Resistant

If you have access to any old John Wayne westerns in the station house, there's another lesson to be learned about leather - its high puncture and abrasion resistance - whether the wearer is in the saddle herding cattle or in a physical encounter in the local saloon. Its unique structure, the random weaving of thousands of fibers, renders it more puncture and abrasion resistant than any synthetic textile available for protective clothing today. Why do you suppose most good gloves are leather? Or why motorcycle racers insist on leather outer clothing?

Leather, More Chemical Resistant

The process of tanning converts the raw collagen fibers of a hide into a uniform product that is not susceptible to rotting and less prone to attack from mildew or bacteria. In fact, many of the tanning chemicals significantly enhance leather's natural properties - its dimensional stability, resistance to abrasion, chemicals and heat. Tanning significantly improves leather's ability to flex innumerable times without breaking, to endure repeated wetting and drying. And since leather is a protein fiber rather than a synthetic, it appears to resist contamination more than any man made materials. A general rule to follow is that any chemical disinfectant that's safe for

materials used in firefighter turnouts will be equally safe for disinfecting leather.

Leather, More Abrasion Resistant

Perhaps the most important attribute of leather as a component of firefighter turnouts is its superb abrasion resistance, markedly higher than any turnout material available today for reinforcing material in knees, cuffs, elbows and shoulders. Leather simply lasts longer, as Taber Abrasion Resistance below shows.

ABRASION RESISTANCE Tested on a Taber Abraser, Model 503 Standard Abrasion Tester using H-18 Calibrate wheels, 1000 gram load, vacuum level 100	
MATERIAL	CYCLES TO BREAK
7.5 oz. Pbi®	400 - 450 Range
7.5 oz. NOMEX®	400 - 450 Range
7.5 oz. MILLENIA®	500 - 600 Range
ADVANCE®	400 - 450 Range
ARASHIELD®	3,000+
LEATHER	After 10,000 - No Break

Globe has consistently subjected leather to laboratory tests in its own lab as well as closely monitoring ongoing testing elsewhere. Additionally, we have consulted with leather suppliers and independent labs such as the University of Cincinnati, Department of Basic Science in Tanning Research, and we will gladly share our findings with you upon your request. These and other authorities validate our claims on the superiority of leather as a garment reinforcement for body areas most prone to wear.