



Cocoon Protective Cover with Static Dissipation Performance Specification (Product Code C6-210HT)

For aircraft, ground vehicles, ground support equipment, armaments munitions and critical parts

1.0 Cocoon Protective Cover Performance Specification

Cocoon Protective Cover technical performance is printed in blue. All testing has been performed by New World Textile Testing Laboratory, Fall River, Massachusetts. New World is a QLL US Government approved laboratory testing facility. New world has executed all specified test methods detailed in the document.

1.1 Intent

Demonstrate Cocoon's Protective Cover Performance and Specifications (product code 210HT)

As the result of the Cocoon Cover demonstrated performance, the protective covers will deliver the following benefits:

Provide protection for critical assets from water / moisture based corrosion; from sand, dust and microbial contaminates; from salt and sulfur based pollutants, from Ultra Violet light degradation, and from the creation of micro climates (greenhouse effect that amplifies corrosion).

Covers are soldier friendly to assure use and protection. This is defined as light weight, packable, rapidly installed and removed, (prior characteristics in all weather extremes), field repairable and cleanable with soap and water.

Covers are durable in harsh environments and when used aggressively by soldiers for hundreds of use cycles and will last 36 months before requiring replacement.

1.2 Cocoon Protective Cover Performance Technical Properties / Specifications

1.2.1 The cover must not allow water to penetrate the fabric material for the life of the cover (avoid water penetration and pooling to avoid metal corrosion / oxidation) (Property 1.0, 3.0)

1.2.2 The cover must allow moisture to escape; never trapping water or moisture underneath the cover creating a Green House Effect or micro climate. (Avoid the buildup of moisture laden air under the cover that by itself will cause condensation and corrosion; and when combined with trapped contaminates and heat will significantly accelerate corrosion damage). (Property 1.1, 1.2)

1.2.3. The cover must prevent small particles and contaminants (down to the 1 micron size experienced in Iraq/Afghanistan) from penetrating the cover. The cover material must effectively filter out sand, dust, dirt and the sulfurs and salts the particles carry. (Avoid the contamination of equipment that will cause abrasion based degradation, and carry salt and sulfur contaminants that will speed up corrosion especially in critical electronic equipment).(Property 1.3)

1.2.4 The cover fabric material should not leach out any materials that will add to the corrosion problem (i.e. hydrocarbons, polymers, salts and other residues)

Cocoon Covers do not contain VCI or desiccants and therefore do not have material that will leach out during use or with washing. Therefore our covers will not add to the corrosion problem by either contaminating a surface or attracting contaminants (i.e. sand, dust, dirt, sulfurs and salts).

1.2.5 The Interior surface of the cover must not directly or indirectly (by trapping particles) scratch Plexiglas Windscreens.

The interior surface of Cocoon Covers is a mono-filament tricot that is inherently smooth and will not hold fine particles, such as sand, and therefore, will not cause scratches to Plexiglas.

1.2.6 The cover materials must have the ability to discharge any electro-static charges that may be accumulated during use. This is required to protect sensitive electronics, munitions, and areas where volatile hydrocarbons may be encountered. (Property 1.4)

Table 1.0 Cocoon Protective Cover Performance ... Technical Properties / Specifications

Property	Benefit	Test Method	Cocoon Performance Average
1.0 Waterproof	Ability to protect against water penetration, rain, flooding, etc.	ISO 811	Greater than 10 meter column of water
1.1 Air Permeability	Ability to allow moisture and heat to escape from under a cover.	ASTM D737	0.16 cfm. / sq. ft. / min
1.2 Moisture Vapor Transmission Rate (MVTR) Alternate test method:	Ability to allow moisture to escape from under a cover.	ISO 15496 ASTM E96	6400 g / m² / 24 hours 3500 g / m² / 24 hours
1.3 Filtration Efficiency	Ability to protect against sand, dust and contaminants / pollution	ASHRAE 52.2	Greater than 99.5 % rejection of particles .3 microns or larger
1.4 ESD Electro-static discharge	Ability to rapidly / continuously discharge any static charges experienced by the protective cover.	Fed-Std. 191A, T.M. 5931 (front and back) (As manufactured and after 20 washes)	As manufactured ... discharge of 5000 volt charge achieved in an avg. of 0.1 sec After 20 washes ... discharge of 5000 volt charge achieved in an avg. of 0.1 sec.

--	--	--	--

1.3 Cocoon Protective Cover Performance Usability Properties / Specifications

- 1.3.1 The cover must be light weight in both a dry and wet (water saturated) condition to assure ease of use in all weather conditions. In order satisfy the light when wet condition, the material proposed must be hydrophobic. (Example ... Covers vary widely in shape and size. If a helicopter nose cover uses 10-15 sq. yard of material, for ease of use and transport this cover should weigh less than 10 lb dry or wet). (Property 2.0, 2.1)
- 1.3.2 The cover must be flexible for ease of use and be easily packable in attached stuff bags in all conditions (Dry, wet, cold, etc.) (Property 2.2)
- 1.3.3 The cover material must repel common chemicals found in the field (hydraulic oil, jet fuel, gun grease) and be Oleophobic. (Property 2.3)
- 1.3.4 The cover must be machine washable as well as cleanable in the field with common detergents, with and without washing machines and water. (Property 2.4)
- 1.3.5 The cover must be easily repairable in the field without the use of mechanized sewing machines or other powered tools.

Cocoon covers include a nylon adhesive repair system that will not require mechanical stitching (swing machines) or heat guns for bonding.

Table 2.0 Cocoon Protective Cover Performances...Usability Properties / Specification

Property	Benefit	Test Method	Cocoon Performance Average
2.0-Dry Weight	Light weight when dry	ASTM D3776	7.2 oz/sq. yd.
2.1-Wet Weight (hydrophobic)	Light weight when wet / saturated with water	ASTM D3776	Less than 8.0 oz/sq. yd when completely saturated with water
2.2-Flexibility	Usable and packable in all temperature extremes likely to be experienced.	ASTM F392-93 (2000 cycled Gelbo flex at room temp and -40 degrees C	Achieve a PASS
2.3-Holdout Rating on Oil (Oleophobic)	Will repel common oil based materials found in the field.	AATCC118 (min. of 4)	Rating of 5 or better
2.4-Cleaning Performance	Ability to clean with standard detergents	ASTMD2960-05	Achieve a PASS

1.4. Cocoon Protective Cover Performance ... Durability Properties / Specification

- 1.4.1 The cover must withstand UV radiation from desert-like solar radiation. (Property 3.0)

The cover material must maintain it’s core performance features after 1000 hrs of UV exposure (Property 3.0)

1.4.2 The cover material must have adequate strength characteristics to meet the Table 3 requirements below, and must also be resistant to tearing and abrasion. (Property 3.1, 3.2, 3.3, 3.4, 3.5, 3.6)

1.4.3 The cover must have multi-use capability (i.e. rapid installation and removal for 200+ times over the product’s life without requiring replacement).

The cover material and attachment system are designed for everyday use with a life expectancy of 400 on and offs.

1.4.4 The cover material must resist Wind Whipping.

The cover material’s face fabric is High Tenacity Nylon Fabric engineered to withstand wind whipping and out door applications ranging from parachutes, paragliders, hot air balloon, life jackets, tents, hang gliders, and flags.

1.4.5 The cover material must survive through multiple wash cycles without degradation of its material or physical properties and characteristics. (i.e. test results should substantiate positive results after duplicating washing in a field environment and experiencing constant wet / dry cycles during use). (Property 3.7)

Table 3.0 Cocoon Protective Cover Performance ... Durability Properties / Specification

Property	Benefit	Test Method	Cocoon Performance Average
3.0-Accelerated U.V. Radiation Endurance Test	Fabrics must withstand 100% exposure to solar / U.V. radiation in desert like conditions for a minimum of 24 months. Must maintain core performance features at the end of 1000 hrs.	ASTM G154	-PASS at 1000 hrs. -Core Performance Features: 1.Waterproof greater than 10 meter 2.MVTR greater than 4000g/m2/24 hr 3.Abrasion test pass at 200,000 cycles 4. Maintain 50% of all “strength” characteristics (i.e. Tear, Tensile)
3.1-Martindale Abrasion	Fabric will resist abrasion in use	ASTM D4966	300,000 Cycle Pass (no defect formation on surface)
3.2-Tensile Strength MD	Overall Strength	ASTM D5035	Min 185 lb. / in.
3.3-Tensile Strength XD	Overall Strength	ASTM D5035	Min 120 lb. /in.
3.4-Tensile Test Elongation	Overall Strength	ASTM D5035	40.0.%
3.5-Trouser Tear MD	Tear Resistance	ASTM D 2261	12 lb. ft.
3.6-Trouser Tear XD	Tear Resistance	ASTM D 2261	15 lb. ft.

3.7-Wash Test (5 cycles)	Cover to survive multiple exposures to Wet and Dry conditions in use as well as washing in the field	ISO 811	PASS
--------------------------	--	---------	-------------

ISO (International Organization for Standardization)

ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers)

AATCC (American Association of Textile Chemists and Colorists)

ASTM (American Society for Testing and Materials)

NOTE: Equivalent ASTM methods with corresponding (not identical) results may be utilized