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AVIS

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SPECIFICATION FOR CLOTH, RIPSTOP, ARAMID/FR RAYON, MULTICAM®

1.0 SCOPE

1.1 Scope

This specification covers the requirements for cloth, ripstop, aramid/fire resistant (FR) rayon with the MULTICAM® camouflage pattern.

Note: It is known that the DEFENDER® M DM 9190 in MULTICAM® material distributed by 1947 LLC (www.1947llc.com) fully meets the requirements within this specification.

1.2 Classification

The fabric must be classified as follows: Cloth, Ripstop, Aramid/FR Rayon, MULTICAM®

1.3 Applicable Documents

The following documents form part of this specification to the extent specified, and are supportive of this specification when referenced; all other document references are to be considered supplemental information only. In the event of a conflict between the documents referenced and the contents of this specification, then the contents of this specification must take precedence:

CAN/CGSB Standards (email: ncr.cgsb-ongc@pwgsc.gc.ca)

- CAN/CGSB-4.2-M Textile Test Methods
- CAN/CGSB-155.20 Workwear for Protection Against Hydrocarbon Flash Fire

FED Standards (Download Documents: <http://assist.daps.dla.mil/quicksearch/>)

- FED-STD-191A Federal Standard for Textile Test Methods

American Association of Textile Chemists and Colorists Standards (www.aatcc.org)

- AATCC Test Method 16 Colourfastness to Light
- AATCC Test Method 116 Colorfastness to Crocking: Rotary Vertical Crockmeter Method

International Standards Organization (ISO) (www.iso.org)

- 12947-2 Textiles - Determination of the Abrasion Resistance of Fabrics by the Martindale Method - Part 2: Determination of Specimen Breakdown

1.4 Order of Precedence

In the event of any inconsistency in contract documents such as contract, specification and sealed patterns, the order of precedence must be contract, specification, and sealed pattern. In the event of a conflict between the text of this specification and the references cited herein, the text of this specification must take precedence. For any inconsistency in technical details between languages, the language of the original document, which in this case is English, must take precedence. Nothing in this document supersedes applicable laws and regulations, unless a specific exemption has been obtained.

2.0 **REQUIREMENTS**

2.1 Fabric Structure

The fabric must be plain weave with reinforcement ribs in both the warp and filling directions. Warp and weft yarns must be prepared from an intimate blend of aramid and FR rayon fibers. The addition of nylon fibers to the intimate blend may be required to impart the required strength and abrasion resistance. The printed cloth must be given a durable oil resistant and water repellent treatment. When tested in accordance with the applicable test methods, the finished fabric must comply with the requirements specified in Table 1.

2.2 Workmanship

The materials covered by this specification must be free of imperfections or blemishes such as may adversely affect its appearance or serviceability. For inspection purposes, imperfections and blemishes must be considered defects when clearly visible at a normal inspection distance of approximately 1 m (3.3 ft) under good, preferably Northern Light, lighting conditions.

2.3 Dyeing and Printing

The cloth(s) must be dyed to a ground shade either matching or approximating Cream 524 and then overprinted with the MULTICAM® camouflage pattern by roller or screen printing in a manner that gives the required degree of colour fastness and a uniform, good penetration of colour in the fibres and fabric as follows:

- (a) When the ground shade is dyed to match Cream 524, the remaining colors are obtained by subsequent printing using six rollers or screens, as appropriate for the Tan 525, Pale Green 526, Olive 527, Dark Green 528, Brown 529 and Dark Brown 530 areas of the pattern;
- (b) When the ground shade is dyed to approximate Cream 524 all seven colors of the camouflage pattern are obtained by subsequent printing using seven rollers or screens to match all seven colors; and
- (c) Resin bonded pigments are not be used.

2.4 Spectral Reflectance

Spectral reflectance data must be obtained from 600 to 860 nanometers (nm) at 20 nm intervals on a spectrophotometer relative to the barium sulfate standard, the preferred white standard. Other white reference materials may be used provided they are calibrated to absolute white, e.g. magnesium oxide or vitrolite tiles. The spectral band width must be less than 26 nm at 860 nm. Reflectance measurements must be made by either the monochromatic or polychromatic mode of operation. When the polychromatic mode of operation is used, the spectrophotometer must operate with the specimen diffusely illuminated with the full emission of a continuous source that simulates either CIE Source A or CIE Source D65.

Measurements must be taken on a minimum of two (2) different areas and the data averaged. The measured areas should be at least 15 cm (6 in) away from the selvage. The specimen must be viewed at an angle no greater than 10 degrees from normal, with the specular component included. Specimens must be oriented in different directions during testing. When possible, the specimens tested must not contain the same warp or filling yarns when presented to the sample port. Photometric accuracy of the spectrophotometer must be within 1 percent and wavelength accuracy within 2 nanometers. The diameter for standard aperture size used in the color measurement device must be 9.4869 mm (0.3725 in) or larger. Any color having spectral reflectance values falling outside the limits at four or more of the wavelengths specified must be considered a test failure.

Wavelength, Nanometers (nm)	Cream 524 and Tan 525		Pale Green 526, Olive 527 and Brown 529		Dark Green 528 and Dark Brown 530	
	Min.	Max.	Min.	Max.	Min.	Max.
600	22	44	12	30	3	11
620	24	45	12	30	3	11
640	24	45	12	32	4	12
660	25	45	12	32	4	12
680	28	45	14	34	4	13
700	28	46	14	34	6	16
720	30	48	16	36	6	20
740	32	50	18	36	10	25
760	36	50	20	40	14	30
780	38	52	22	40	18	35
800	40	54	22	42	22	40
820	44	56	24	44	24	42
840	46	57	26	44	27	43
860	48	58	28	46	29	45

Table 1: Finished Cloth Requirements

Property	Test Method	Specified Requirement	Minimum Acceptable	Maximum Acceptable
Mass (g/m ²)	CAN/CGSB 4.2 Test Method 5.1		180	200
Fiber Content	CAN/CGSB 4.2 Test Method 14			65% aramid/polyamide 65% FR rayon 10% nylon 5% carbon antistatic
Woven Fabric Count (yarns per cm)			Warp: 22 Weft: 21	Warp: 24 Weft: 23
Breaking Strength (N)	CAN/CGSB 4.2 Test Method 9.1		Warp: 1000 Weft: 1000	
Tearing Strength (N)	CAN/CGSB 4.2 Test Method 12.1		Warp: 70 Weft: 70	
Abrasion Resistance	ISO 12947-2 (Note 1)		>100,000 cycles no thin areas or holes	
Air Permeability (cm ³ /cm ² /s)	CAN/CGSB 4.2 Test Method 36		10	
Dimensional Stability after 3 wash-dry cycles	CAN/CGSB 4.2 Test Method 58 (III.E3) or CAN/CGSB 4.2 Test Method 24 (3.E.III)			Warp: 3.0% Weft: 3.0%
Colour Fastness to Light (all colours)	CAN/CGSB 4.2 Test Method 16 (Option E)			Grey Scale 3 after 40 AATCC Fading Units
Colourfastness to	CAN/CGSB 4.2			Dry: GS 3

Crocking (all colours)	Test Method 116			Wet: GS 2
Water Resistance (as received)	CAN/CGSB 4.2 Test Method 26.2		80	
Flame Resistance (edge ignition)	CAN/CGSB 4.2 Test Method 27.10			Average damaged length: Warp: 110 mm Weft: 110 mm Average afterflame: 2 .0 sec
Thermal Protective Performance (TPP) with spacer, single layer	CAN/CGSB 4.2 Test Method 78.1	10	9	
Thermal Shrinkage Resistance (at 180°C)	CAN/CGSB- 155.20 Test Method 155.20 Para 7.3.1			10%
Static Decay	FED-STD-191A Test Method 5931 (Note 2)	Fabric must charge to at least $\pm 4000V$; Less than 0.5 seconds overall average time to decay, no single measurement greater than 0.5 seconds		

Note:

1. Abrasion Resistance: Test at 12 kPa to failure. Report number of cycles to failure and condition of specimen at 35,000 and 45,000 cycles.
2. Static Decay: Test at 20°C & 20% RH; Test warp and filling; Charge to +5000V and -5000V; Report results for each direction.