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Standards Board

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générales du Canada

CAN/CGSB-155.23-97

ICS 13.340.10

WITHDRAWAL

May 2014

Recommended practices for the provision and use of fireline workwear for forest firefighters

This National Standard of Canada is hereby withdrawn. It has been determined that the performance requirements for the product are covered in CAN/CGSB-155.22-2014.

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RETRAIT

Mai 2014

Recommandations visant la fourniture et l'utilisation des vêtements de travail portés par les sapeurs-pompiers forestiers à la ligne de feu

Cette Norme nationale du Canada est retirée par le présent avis. Il a été déterminé que les exigences de rendement du produit font l'objet de la norme CAN/CGSB-155.22-2014.

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CANADIAN GENERAL
STANDARDS BOARD

RECOMMENDED PRACTICES FOR THE
PROVISION AND USE OF FIRELINE
WORKWEAR FOR FOREST
FIREFIGHTERS

OFFICE DES NORMES
GÉNÉRALES DU CANADA

RECOMMANDATIONS VISANT LA
FOURNITURE ET L'UTILISATION DES
VÊTEMENTS DE TRAVAIL PORTÉS PAR LES
SAPEURS-POMPIERS FORESTIERS À LA
LIGNE DE FEU

2. REFERENCED PUBLICATIONS

Delete the following reference in par. 2.1.1:

2.1.1 CAN/CGSB-4.2 - Textile Test Methods:

No. 12.2 - Tearing Strength - Trapezoid
Method

4. CONSIDERATIONS FOR THE SELECTION
OF FIRELINE WORKWEAR

4.2 Additional Selection Criteria

4.2.2.2 Delete this paragraph.

4.2.2.3 Delete this paragraph.

4.2.2.6 Delete this paragraph.

9. NOTES

9.2 Sources of Referenced and Related
Publications

Change par. 9.2.1 to read:

9.2.1 The publications referred to in par. 2.1.1 may be
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Change par. 9.2.2 to read:

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IHS Canada, 240 Catherine Street, Suite 305,
Ottawa, Ontario K2P 2G8. Telephone (613)
237-4250 or (800) 854-7179.
Fax (613) 237-4251.

PUBLICATIONS DE RÉFÉRENCE

Supprimer la référence suivante de l'al. 2.1.1:

CAN/CGSB-4.2 - Méthodes pour épreuves textiles:

N° 12.2 - Résistance à la déchirure - Méthode
trapézoïdale

FACTEURS À CONSIDÉRER LORS DE LA
SÉLECTION DES VÊTEMENTS DE TRAVAIL
PORTÉS À LA LIGNE DE FEU

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Les publications mentionnées à l'al. 2.1.2 sont diffusées
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Canadian
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CAN/CGSB-155.23-97

Recommended Practices for the Provision and Use of Fireline Workwear for Forest Firefighters

National Standard of Canada

Canada



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RECOMMENDED PRACTICES FOR THE PROVISION AND USE OF FIRELINE WORKWEAR FOR FOREST FIREFIGHTERS

Prepared by the
Canadian General Standards Board 

Approved by the
Standards Council of Canada 

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CANADIAN GENERAL STANDARDS BOARD

**RECOMMENDED PRACTICES FOR THE PROVISION AND USE OF
FIRELINE WORKWEAR FOR FOREST FIREFIGHTERS**

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CANADIAN GENERAL STANDARDS BOARD

RECOMMENDED PRACTICES FOR THE PROVISION AND USE OF FIRELINE WORKWEAR FOR FOREST FIREFIGHTERS

CAN/CGSB-155.23 (Recommended Practices for the Provision and Use of Fireline Workwear for Forest Firefighters) is not a mandatory part of CAN/CGSB-155.22 (Fireline Workwear for Forest Firefighters).

1. SCOPE

- 1.1 These recommended practices provide guidance for the selection, use, maintenance, retirement, and understanding of the limitations of fireline workwear for protection against the adverse effects to the firefighter's body during forest firefighting.
- 1.2 The use of workwear for protection against the adverse effects of fire to the firefighter's body during forest firefighting should be incorporated into a proper safety program that also utilizes appropriate administrative and engineering controls in addition to proper safe work procedures.
- 1.3 Minimum performance requirements and test methods for garments are specified in CAN/CGSB-155.22 and are not included in this document; however, other considerations regarding selection of workwear when preparing a purchase agreement are included.
- 1.4 Fireline workwear is available from a variety of manufacturers, in a range of items (coveralls [jumpsuits], pants, shirts). Fireline workwear, for a degree of protection against the adverse effects of fire to the firefighter's body during forest firefighting, is made out of a variety of either inherently flame-resistant fabrics or fabrics that have been treated with a flame retardant.
- 1.5 The testing and evaluation of a product against this standard may require the use of materials and/or equipment that could be hazardous. This document does not purport to address all the safety aspects associated with its use. Anyone using this standard has the responsibility to consult the appropriate authorities and to establish appropriate health and safety practices in conjunction with any applicable regulatory requirements prior to its use.

2. REFERENCED PUBLICATIONS

- 2.1 The following publications are referenced in this standard:

- 2.1.1 Canadian General Standards Board (CGSB)

CAN/CGSB-4.2 — Textile Test Methods:

No. 12.2 — Tearing Strength — Trapezoid Method

No. 58 — Colourfastness and Dimensional Change in Domestic Laundering of Textiles

CAN/CGSB-4.157 — Generic Names for Man-Made Fibres

CAN/CGSB-4.175 Part 1/ISO 4880 — Burning Behaviour of Textiles and Textile Products — Vocabulary

CAN/CGSB-4.175 Part 3/ISO 3572 — Textiles — Weaves — Definitions of General Terms and Basic Weaves

CAN/CGSB-4.175 Part 4/ISO 8159 — Textiles — Morphology of Fibres and Yarns — Vocabulary

CAN/CGSB-4.175 Part 6/ISO 9092 — Textiles — Nonwovens — Definition

CAN/CGSB-38.108 — Men's Industrial Coveralls — Dimensions

CAN/CGSB-155.22 — Fireline Workwear for Forest Firefighters.

- 2.1.2 American Society for Testing and Materials (ASTM)

D 123 — Terminology Relating to Textiles

E 808 — Describing Retroreflection

E 810 — Coefficient of Retroreflection of Retroflective Sheeting.

2.1.3 General Services Administration (US)

Federal Standard (Fed. Std.) No. 191A — Textile Test Methods 5931 — Determination of Electrostatic Decay of Fabrics.

2.1.4 Industry Canada

Textile Labelling Act and Regulations

Textile Labelling and Advertising Regulations.

2.2 A reference to a regulation is always to the latest issue. A dated reference is to the issue specified. An undated reference is to the latest issue, unless otherwise specified by the authority applying this standard. The sources are given in the Notes section.

3. GLOSSARY OF TERMS

Note: The terms which appear in CAN/CGSB-155.22, for the most part, are technical in nature and are more easily understood by testing facility staff. The Glossary of Terms section of this document is intended to offer a non-technical explanation. A Supplementary Glossary is included as Appendix A. Technical definitions for many of the terms included here can be found in CAN/CGSB-4.175 (Parts 1, 3, 4, 6), CAN/CGSB-4.157, the Textile Labelling Act, as well as in specific test methods referenced in this standard.

Blend Fabric (Mélange)

A fabric in which two or more textile fibres are combined to produce fabrics with special performance qualities.

Char (Produit de carbonisation)

Carbonaceous residue resulting from pyrolysis or incomplete combustion. Charring is the phenomenon that occurs when a material subjected to fire becomes embrittled as it dries out, shrinks in size, and may break apart when any force or pressure is applied.

Decontamination (Décontamination)

Removal of the contaminant from the workwear clothing by laundering or dry cleaning, to the extent necessary to continue to meet the minimum performance requirements specified in CAN/CGSB-155.22.

Drip (Égoutter)

To run or fall in drops or blobs.

Ease (Aisance)

The size requirements and tolerance of a garment which allows good fit and does not inhibit the natural body movement or the performance of any task.

Fabric Weight (Poids du tissu)

Mass per unit in g/m² or oz/yd².

Fibre (Fibre)

The fibre is the building block on which all textiles are built. Fibres can be made into yarns or nonwoven fabrics. Yarns are then used in the manufacture of fabrics. Fabrics are then cut and sewn so they can be made into garments. Fibres can be distinguished as manufactured fibres or natural fibres.

Manufactured Fibres (Fibres chimiques)

A group of fibres which may be either synthesized from chemical compounds (synthetics) or regenerated from natural components. Examples of synthetic fibres by generic name are: aramid, nylon, and polyester. Examples of regenerated fibres are viscose and other rayons.

Natural Fibres (Fibres naturelles)

This is a group of substances which are (1) animal, (2) mineral or (3) vegetable in origin which can be made into yarn. Examples of natural fibres by generic name are: (1) silk or wool, (2) asbestos and (3) cotton or flax.

Fire (noun) (Feu)

A process of combustion characterized by the emission of heat accompanied by smoke and/or flame.

Fireline Workwear (Vêtements de travail portés à la ligne de feu)

Single layer protective workwear such as, but not limited to, coveralls (also called jumpsuits), trousers and shirts, designed to provide a degree of protection against the adverse effects of fire to the firefighter's body during forest firefighting. Fireline workwear covers the body from the neck to the wrists and feet and may or may not completely cover the neck. It does not include add-on accessories, such as, but not limited to belts, backpacks and external harnesses.

Flame (noun) (Flamme)

A zone of combustion in the gaseous phase with emission of light.

Flame (verb) (Flamber)

To undergo combustion in the gaseous phase with emission of light.

Flame Resistance (Résistance à la flamme)

The property of a material whereby flaming combustion is slowed, terminated or prevented. Flame resistance can be imparted by specific treatment or can be an inherent property of the basic material.

Flame-Retardant Treatment (Ignifugation)

A process or treatment whereby flame resistance characteristics are imparted to a fabric.

Inherently Flame-Resistant Fibre (Fibre essentiellement ininflammable)

Fibres of which the basic generic material is naturally flame-resistant.

Forest Fire (Feu de forêt)

Any wildfire or prescribed fire that is burning in forest areas, grass, or alpine/tundra vegetation. The main types of forest fires are ground fire, surface fire and crown fire.

Generic Name (Nom générique)

A name given to a class of fibres with similar chemical makeup. Examples of generic names for fibres are included in Appendix A — Supplementary Glossary.

Knitted Fabric (Tricot)

A structure produced by interlooping one or more ends of yarn or comparable material. Examples are: jersey, interlock and rib.

Melt (Fondre)

The physical process of changing from solid to liquid by action of heat, as evidenced by flowing or dripping.

Prescribed Fire (Brûlage dirigé)

The knowledgeable application of fire to a specific land area to accomplish predetermined forest management or other land use objectives.

Static Electricity (Électricité statique)

An accumulation of negative or positive charge on the surface of the garment due to inadequate dissipation of electricity. The accumulated static electricity may discharge to materials with a different potential, producing sparks that may have sufficient energy to ignite a flammable gas/vapour mixture.

Thermal Protection/Thermal Protection Performance (TPP) (Degré de protection thermique [DPT])

A measurement of the thermal energy input to a fabric specimen that is required to result in a heat transfer through the specimen sufficient to cause second-degree (partial thickness) burns in human tissue. The higher the TPP, the higher the level of protection provided.

Woven Fabric (Tissé)

Woven fabrics consist of interlaced yarns that are perpendicular to each other. Those yarns running lengthwise (parallel to the length of the fabric) are called warp direction yarns. Those yarns running widthwise (across the width of the fabric) are called filling or weft direction yarns. Woven fabrics have a number of textures and appearances based on variations of this perpendicular interlacement of yarns. Examples are: plain weave, twill and sateen.

4. CONSIDERATIONS FOR THE SELECTION OF FIRELINE WORKWEAR

4.1 In addition to the protection or safety factors covered in CAN/CGSB-155.22, the selection of fireline workwear should be based on the evaluation of specific criteria applicable to the particular occupational situation. This evaluation should be determined by safe work procedures, industry standards and occupational health and safety regulations. The evaluation should include consideration of the following parameters:

- a. potential hazards the workers may be exposed to in the course of their duties;
- b. hazard classification of the work area (for example, the presence of other types of hazards, such as chemical);
- c. appearance, comfort, sizing; for example, consult CAN/CGSB-38.108 for sizing samples and size/style requirements;
- d. durability or wear life (for example, UV degradation);
- e. physical demands of the work;
- f. climate;
- g. access to service such as laundering/dry cleaning, repair establishments; and
- h. supplier services (for example, inventory of garments/fabric/fibre, quality assurance level, technical assistance, industry experience).

4.1.1 The relative importance of each of the criteria should be determined before deciding on the optimum combination of fabric/garment properties and performance requirements for a specific job or a combination of duties.

4.2 Additional Selection Criteria

4.2.1 Additional selection criteria which are not covered in CAN/CGSB-155.22, but may be useful in evaluation of workwear could include: visibility trim, comfort, characteristics of fabric labels, emblems and crests, fit, tearing strength, breaking strength of fabric, abrasion resistance, pilling, chemical resistance, dimensional change, colourfastness to sunlight, colourfastness to laundering or dry cleaning, moisture properties, and static electricity properties.

4.2.2 Some recommendations on specific elements follow. As well, see Appendix A — Supplemental Glossary.

4.2.2.1 *General* — It is recommended that the garment be constructed to neither adversely affect its protective characteristics during firefighting, nor contribute to the severity of the burn injury of the wearer.

4.2.2.2 *Visibility Trim — Dimensional Area and Optical Properties* — If visibility trim is added to the garment, the following practices are recommended:

- a. It is recommended that the visibility trim be applied such that it is visible from the front, side and back of the garment. It should be located such that it would be readily visible regardless of posture of the firefighter while not interfering with the firefighting activity. As such, it is recommended that the trim be applied horizontally at the chest level in front, near the hip level at the back and a band encircling the forearm on the sleeve.
- b. Quantitatively, a minimum of 0.19 m² of visibility trim should be visible from the front, 0.19 m² from the back and 0.06 m² should be visible from the side.
- c. The visibility trim applied to each garment should provide a coefficient of luminous intensity (*R*) as defined below. The coefficient of retroreflectivity (CPL) of the trim should be measured for each garment in accordance with ASTM E 810 using the conditions specified in section 6.2 of ASTM E 808. The coefficient of luminous intensity (*R*) shall be calculated for each garment as follows:

$$R = CPL \times A$$

where:

A = total area of the retroreflective material in m²

The trim should have a coefficient of luminous intensity (*R*) of not less than 75.

- d. It is recommended that the visibility trim be of a colour contrasting with the garment fabric colour, such as fluorescent lime yellow.

4.2.2.3 *Visibility Trim — Flame Resistance* — If visibility trim is added to the garment, it shall be tested for flame resistance in accordance with par. 5.1 of CAN/CGSB-155.22, and it shall have an average damaged length of not more than 100 mm, an average afterflame of not more than 2.0 s, and there should be no molten drips. The flame resistance test shall be conducted both before and after five cycles of washing and drying in accordance with CAN/CGSB-4.2 No. 58, Procedure I B.

4.2.2.4 *Fabric Labels, Emblems and Crests*

- a. Fabric labels, emblems and crests should be kept to a minimum on fireline workwear. Exterior crests should be made from Flame-Resistant (FR) fibres. If they are not, they could be a source of injury. Thread used to attach such products should be inherently flame-resistant. If the crest is made from non-FR fibres, the thread used to attach such products should be made from fusible thread, so that the crest will fall off in a fire. Users must tell manufacturers whether or not crests that are to be affixed to workwear are made from FR fibres.
- b. Direct embroidery thread must be made from inherently flame-resistant fibres.
- c. Additional cresting by the wearer is not recommended as it can adversely affect the flame-resistant properties of the garment.

4.2.2.5 *Fit* — The fireline workwear should provide a good functional fit for maximum protection and comfort on the job. Users should be aware that the fit of the garment (that is, too tight or too loose) can have a direct influence on how much protection can be provided by a particular garment.

4.2.2.6 *Tearing Strength* — If tearing strength is specified, it is recommended that the fabric, as received, have a tearing strength of 45 N or greater in both the warp and the weft, with no single result being less than 42 N, when tested in accordance with CAN/CGSB-4.2 No. 12.2 (Trapezoid Method).

5. **USE OF FIRELINE WORKWEAR**

Note: It is recommended that the outermost garment in any protective ensemble be in compliance with CAN/CGSB-155.22. The wearing of a garment that burns, melts or drips over a garment meeting CAN/CGSB-155.22 may negate the protective effects of the protective garment and contribute to the severity of a burn injury.

5.1 For maximum protection, the protective workwear should be worn properly. The collar should be worn closed, and sleeves and cuffs worn down, and secured.

5.2 **WARNING** — Where a hazard exists to the worker, only flame-resistant garments shall be worn over workwear meeting CAN/CGSB-155.22.

5.3 Protective neck, head, hand and foot coverings should be worn if the occupational hazard warrants their use.

5.4 Certain synthetics or synthetic blend garments may not be appropriate for use under fireline workwear, as the transferred heat from a flash fire may cause them to melt. Any garment worn on the inside of the protective garment should have melt-resistant properties.

6. **MAINTENANCE OF FIRELINE WORKWEAR**

6.1 Fireline workwear must be kept clean. Adequate decontamination of fireline workwear, according to the manufacturer's recommendations, by laundering or dry cleaning is imperative in order to maintain flame resistance and thermal protection. Soiling may reduce the protective qualities and increase the risk of second- and third-degree burns. Garments that are contaminated with a significant amount of oily soil or a flammable substance should be decontaminated (or cleaned) to remove the substance.

6.2 Protective garments require frequent cleaning to prevent the build-up of hard to remove stains that could reduce their flame resistance. Pre-treat oily stains by either rubbing liquid detergent or powdered detergent mixed with water into the stain or use a pre-wash product recommended for oily stains. Use a heavy duty liquid or powdered laundry detergent and the hottest water recommended on the garment label. It is harder to remove oily soil with cool wash water.

6.3 Note any laundry precautions on the garment label which will lessen the effectiveness of the flame resistance, in particular:

- a. whether the use of chlorine bleach is advised or should be avoided;
- b. whether a heavy duty soap can be used or laundering must be limited to a heavy duty synthetic detergent.

6.4 Some soaps and detergents can adversely affect the flame-resistant properties of the garment. The user should check with the manufacturer of the garment for appropriate cleaning instructions. Certain petroleum solvents should be avoided as they commonly leave a flammable grease deposit and reduce protective properties.

6.5 Repairs should only be made with components which comply with the original garment's specifications and construction.

7. LIMITATIONS OF FIRELINE WORKWEAR

7.1 The fireline workwear addressed in CAN/CGSB-155.22 and in this document provide a measure of protection against the adverse effects to the firefighter's body during forest firefighting. Protective garments may serve to reduce the severity of burn injury as a result of exposure to a forest fire but may not completely prevent an injury. Garments that continue to burn after a fire incident are hazardous. CAN/CGSB-155.22 was developed to minimize this hazard.

7.2 Periodically, a selection of garments should be removed from use, inspected and tested to the performance requirements of CAN/CGSB-155.22, so the user can make a decision on continued use or disposal.

8. STATIC ELECTRICITY

8.1 The major static hazard is the body which can store a large static charge. It is imperative that in situations where static electricity poses a significant hazard that the body be grounded regardless of the type of clothing worn. Friction between clothing layers or between clothing and other surfaces can generate static electricity of sufficient energy to ignite combustible atmospheres. It is important to minimize the build-up of static electricity on workwear in order to prevent the clothing from becoming a source of ignition if discharged.

8.2 Workers must be grounded before entering a high-risk area to minimize the possibility of static build-up and discharge.

8.2.1 Workers must also avoid removing garments while in the high risk area.

8.3 At low humidity levels (less than 20%), garments made from either natural fibres (such as cotton or wool) or manufactured fibres (such as aramids and rayon), that rely on water content to dissipate static electricity, are not antistatic. One approach to reduce the static of garments is to use an antistatic treatment during laundering, in keeping with the manufacturer's recommended care procedures. This treatment works by trapping water on the fabric to distribute the static charge through conductivity. The antistatic treatment must be added during each laundering according to the manufacturer's directions. The moisture transport properties of the fabric can also be affected by the antistatic treatment. Users are cautioned to check with the manufacturer of the antistatic treatment to ensure that it does not impart flammable substances to the garment. Over drying in the dryer should also be avoided to minimize static build-up.

8.3.1 An alternative approach is to use garments made of inherently antistatic fibres or other equally efficient conductors. These blended fibres dissipate static charge by induction and are effective regardless of environment conditions where relative humidity is 20% or less.

8.3.2 Test procedures are available for either static decay or surface resistivity. Both test conditions require 20% or less humidity.

9. NOTES

9.1 Related Publications

9.1.1 Peter Clark FRW Handbook.

9.1.2 Glossary of Forest Fire Management Terms, Fourth Edition, NRC, 1987.

9.1.3 NFPA 1977 — Protective Clothing and Equipment for Wildland Fire Fighting.

9.2 Sources of Referenced and Related Publications

- 9.2.1 The publications referred to in par. 2.1.1 may be obtained from the Canadian General Standards Board, Sales Centre, Ottawa, Canada K1A 1G6. Telephone (613) 941-8703 or 1-800-665-CGSB (Canada Only). Fax (613) 941-8705.
- 9.2.2 The publications referred to in par. 2.1.2 may be obtained from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken PA 19428-2959 U.S.A., or from the Standards Council of Canada, Standards Sales Branch, 45 O'Connor Street, Suite 1200, Ottawa, Ontario K1P 6N7. Telephone (613) 238-3222. Fax (613) 995-4564.
- 9.2.3 The publication referred to in par. 2.1.3 may be obtained from the Department of the Navy, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120-5099, U.S.A.
- 9.2.4 The publications referred to in par. 2.1.4 may be obtained from the Canada Communication Group, Publishing, Ottawa, Canada K1A 0S9. Telephone (819) 956-4802. Fax (819) 994-1498.
- 9.2.5 The publication referred to in par. 9.1.1 may be obtained from Peter Clark Associates Inc., P.O. Box 4015, Station South, Edmonton, Alberta T6E 4J5. Telephone (403) 439-2118. E-mail peter.clark@ualberta.ca.
- 9.2.6 The publication referred to in par. 9.1.2 may be obtained from the Canadian Committee on Forest Fire Management, 210-301 Weston Street, Winnipeg, Manitoba R3E 3H4. Telephone (204) 784-2030. Fax (204) 956-2398.
- 9.2.7 The publication referred to in par. 9.1.3 may be obtained from the National Fire Protection Association, One Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, U.S.A. Telephone (617) 770-3000. Fax (617) 770-0700.

SUPPLEMENTARY GLOSSARY

(This appendix is a non-mandatory part of CAN/CGSB-155.23 — Recommended Practices for the Provision and Use of Fireline Workwear for Forest Firefighters.)

Note: The trademarks listed after each term are only intended to provide the reader with examples of products currently on the market. The list of trademarks is not an endorsement of any product or manufacturer, nor is it a guarantee that the products will meet the requirements in CAN/CGSB-155.22.

A1. Abrasion Resistance (Résistance à l'usure)

The resistance to the wearing away of any part of a material by rubbing against another surface. (Based on definition in ASTM D 123.)

A2. Aramid (Aramide)

A long chain synthetic aromatic polyamide in which at least 85% by mass of the amide linkages are attached directly to two aromatic rings and in which imide groups may be substituted for up to 50% of the amide groups; for example, NOMEX®, KEVLAR®.

A3. Breaking Strength (Résistance à la rupture)

The maximum tensile force observed during a test in which the specimen is stretched until it breaks.

A4. Cellulosic Fibres (Fibres cellulosiques)

Fibres composed of cellulose either from natural sources (for example, cotton, flax, jute) or regenerated by manufacturing operations (for example, rayon). Cellulosic fibres are quite flammable in a natural state.

A5. Chemical Resistance (Résistance aux produits chimiques)

The stability demonstrated by a material when exposed to organic compounds such as acids, bases, solvents, oils and oxidizing agents.

A6. Colourfastness (Solidité à la couleur)

Resistance to colour change, that is, the property of a dye to retain its colour when dyed (or printed) textile material is exposed to conditions or agents such as light, perspiration, atmospheric gases, laundering or dry cleaning that may change the colour.

A7. Dimensional Change (Changement dimensionnel)

A generic term for changes in length or width of a fabric specimen subjected to specified conditions. (Taken from ASTM D 123).

A8. Flame-Retardant Treatments for Fabrics (Traitement d'ignifugation des tissus)

Examples include:

- a. PROBAN® (Albright & Wilson trademark)
- b. INDURA® (Westex Inc. trademark)
- c. ZIRPRO® (Wool Foundation, Nominee Company Ltd. trademark)
- d. PYROVATEX® (Ciba-Geigy Corporation trademark)

A9. Inherently Flame-Resistant Fibres (Fibres essentiellement ininflammables)

Examples include:

- a. KEVLAR® (Dupont trademark)
- b. KERMEL® (Rhone-Poulenc trademark)
- c. NOMEX® (Dupont trademark)
- d. PBI® (Hoechst-Celanese trademark).

A10. Moisture Properties (Propriétés hygrométriques)

Some fibres when exposed to the atmosphere pick up some moisture; the quantity varies with the fibre type, temperature and relative humidity. The percentage of moisture is measured at a standard condition for testing textiles (21°C Temperature/65% Relative Humidity).

A11. Pilling (Boulochage)

The entangling of fibres into balls (pills) which alter the appearance and texture of the fabric surface. This change can occur during washing, dry cleaning or in actual use (wearing of the garment). A pill is of such density that light will not penetrate and will cast a shadow.

A12. Protein Fibres (Natural) (Fibres protéiques [naturelles])

Animal fibres (for example, wool, silk) formed from amino acids in various configurations.

A13. Polybenzimidazole (PBI) (Polybenzimidazole [PBI])

A manufactured fibre in which the fibre-forming substance is a long chain aromatic polymer having recurring imidazole groups as an integral part of the polymer chain. PBI® is commonly used in blends with other fabrics such as Kevlar®/PBI.®

A14. Seam Slippage (Glissement de la couture)

In sewn fabrics, the displacement of the fabric yarn parallel and adjacent to the stitch line. (Taken from ASTM D 123.)

A15. Tearing Strength (Résistance à déchirure)

The maximum force observed in the propagation of tear across a fabric.
