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Series 4

Série des 4

WITHDRAWAL

March 2019

Selected standards in the series Textiles

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RETRAIT

Mars 2019

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CAN/CGSB-4.2

Textile test methods

No. 0-2001

Moisture regain values, SI units used in CAN/CGSB-4.2 and fibre, yarn, fabric, garment and carpet properties (ICS 59.080.01)

No. 1-M87

Precision and accuracy of measurements (ICS 59.080.01)

No. 2-M88

Conditioning textile materials for testing (ICS 59.080.01)

No. 3-M88

Determination of moisture in textiles (ICS 59.080.01)

No. 5.1-M90

Unit mass of fabrics (ICS 59.080.30)

No. 9.1-M90

Breaking strength of fabrics — Strip method — Constant-time-to-break principle (ICS 59.080.30)

CAN/CGSB-4.2

Méthodes pour épreuves textiles

Nº 0-2001

Valeurs de reprise d'humidité, unités SI utilisées dans CAN/CGSB-4.2 et propriétés des fibres, fils, tissus, articles d'habillement et tapis (ICS 59.080.01)

Nº 1-M87

Précision et exactitude des mesures (ICS 59.080.01)

Nº 2-M88

Conditionnement des textiles pour fins d'essais (ICS 59.080.01)

Nº 3-M88

Détermination de l'humidité dans les textiles (ICS 59.080.01)

Nº 5.1-M90

Masse des tissus (ICS 59.080.30)

Nº 9.1-M90

Résistance à la rupture des tissus — Méthodes des bandes effilochées — Principe de rupture à temps constant (ICS 59.080.30)

No. 11.1-94

Bursting strength — Diaphragm pressure test (ICS 59.080.30)

Nº 11.1-94

Résistance à l'éclatement — Essai à l'éclatomètre à membrane (ICS 59.080.30)

No. 11.2-M89

Bursting strength — Ball burst test (ICS 59.080.30)

Nº 11.2-M89

Résistance à l'éclatement — Essai d'éclatement à la bille (ICS 59.080.30)

No. 15-2003

Non-fibrous materials on textiles (ICS 59.080.01)

Nº 15-2003

Matières non fibreuses sur les textiles (ICS 59.080.01)

No. 19.1-2004

Colourfastness to washing — Accelerated test — Launder-Ometer (ICS 59.080.01)

Nº 19.1-2004

Solidité de la couleur au lavage — Essai de vieillissement accéléré — Appareil Launder-Ometer (ICS 59.080.01)

No. 20-M89

Colourfastness to water (ICS 59.080.01)

Nº 20-M89

Solidité de la couleur à l'eau (ICS 59.080.01)

No. 21-M90

Colourfastness to sea water (ICS 59.080.01)

Nº 21-M90

Solidité de la couleur à l'eau de mer (ICS 59.080.01)

No. 22-2004

Colourfastness to rubbing (crocking) (ICS 59.080.01)

Nº 22-2004

Solidité de la couleur au frottement (Dégorgement par frottement) (ICS 59.080.01)

No. 24-2002

Colourfastness and dimensional change in commercial laundering (ICS 59.080.01)

Nº 24-2002

Solidité de la couleur et changement dimensionnel au blanchissage commercial (ICS 59.080.01)

No. 25.1-97

Dimensional change in wetting (ICS 59.080.01)

Nº 25.1-97

Variation dimensionnelle au trempage dans l'eau (ICS 59.080.01)

No. 33-94

Methods of pressing (ICS 59.080.30)

Nº 33-94

Méthodes de pressage (ICS 59.080.30)

No. 36-M89

Air permeability (ICS 59.080.01)

Nº 36-M89

Perméabilité à l'air (ICS 59.080.01)

No. 57-M90

Determination of maximum safe ironing temperature (ICS 59.080.01)

Nº 57-M90

Détermination de la température maximale de repassage (ICS 59.080.01)

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Canadian General Standards Board
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CAN/CGSB-4.2
No. 15-2003

Supersedes CAN/CGSB-4.2
No. 15-95
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November 2013

Textile test methods

Non-fibrous materials on textiles

ICS 59.080.01

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NATIONAL STANDARD OF CANADA

CAN/CGSB-4.2
No. 15-2003

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No. 15-95
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Textile test methods

Non-fibrous materials on textiles

CETTE NORME NATIONALE DU CANADA EST DISPONIBLE EN VERSIONS FRANÇAISE ET ANGLAISE.

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CAN/CGSB-4.2
No. 15-2003

Supersedes CAN/CGSB-4.2
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Preface to the National Standard of Canada

This National Standard of Canada has been reaffirmed by the CGSB Committee on Textile Test Methods and Terminology. Editorial changes have been made by the correction of the following paragraph:

10.2 **Source of Referenced Publications** — The publications referred to in par. 3.1.1 may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, Canada K1A 1G6. Telephone 819-956-0425 or 1-800-665-2472. Fax 819-956-5740. E-mail ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site www.tpsgc-pwgsc.gc.ca/ongc-cgsb.

National Standard of Canada

CGSB Gatineau Canada K1A 1G6	**TEXTILE TEST METHODS**	**CAN/CGSB-4.2**
	Non-fibrous Materials on Textiles	**No. 15-2003**

Supersedes CAN/CGSB-4.2
No. 15-95
Reaffirmed
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1. PURPOSE AND SCOPE

1.1 This method is intended for the removal and quantitative determination of certain types of non-fibrous materials that may be present on textiles.

1.2 Owing to the wide variety of substances that may be added to textile materials during manufacture, and to the difficulty of removing some of them, this method does not provide procedures for the removal of all types of non-fibrous materials. The removal of certain finishes may require the exercise of considerable chemical resources. In general, each fabric to be analysed for content of non-fibrous materials should be considered on an individual basis.

1.3 The types of fibres and the types of finishes present on a textile material will determine the procedures to be used.

1.4 Although the identification of non-fibrous materials does not come within the scope of this method, reference may be made to the bibliography given in the Notes section.

1.5 The testing and evaluation of a product against this method 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 method 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. In general, work with solvents should be done in an appropriate fume hood.

2. PRINCIPLE

2.1 The amount of non-fibrous materials, removed by the prescribed procedures, is determined on a specimen of known mass.

3. REFERENCED PUBLICATIONS

3.1 The following publications are referenced in this method:

3.1.1 Canadian General Standards Board (CGSB)

CAN/CGSB-4.2 — Textile Test Methods:

No. 1 — Precision and Accuracy of Measurements

No. 2 — Conditioning Textile Materials for Testing

No. 3 — Determination of Moisture in Textiles.

3.2 A dated reference in this method is to the issue specified. An undated reference in this method is to the latest issue, unless otherwise specified by the authority applying this method. The sources are given in the Notes section.

4. APPARATUS

4.1 **Soxhlet extractor**.

4.2 **Glassware:** ground glass-stoppered weighing bottles, beakers, volumetric pipettes and flasks.

4.3 **Desiccator:** containing anhydrous silica gel, calcium sulphate or equally effective dehydrating agent.

4.4 **Analytical balance:** capable of weighing to 0.0001 g.

4.5 **Water bath:** capable of controlling temperature to ±2°C.

4.6 **Ventilated oven:** capable of maintaining a temperature of 105 to 110°C.

4.7 **Disposable aluminium weighing dishes**.

5. REAGENTS

5.1 **Amylolytic enzyme (amylase) preparation**,[1] such as:

Rapidase XC or 720

Taka-Therm

Termamyl 120L.

5.2 **Organic solvents** (reagent grade) such as:

Acetone

o-Dichlorobenzene

Dimethylformamide

Ethanol

Hexane

Methanol

Petroleum ether

Tetrahydrofuran

1,1,1-Trichloroethane

Toluene

5.3 **Solutions**

5.3.1 **0.15 mol/L Acetic acid:** prepared by adding 8.6 mL glacial acetic acid to distilled water and diluting to 1 L.

5.3.2 **0.1 mol/L Hydrochloric acid:** prepared by adding slowly 8.3 mL hydrochloric acid (assay 38%) to distilled water and diluting to 1 L.

5.3.3 **1% (w/v) Hydrofluoric acid:** prepared by adding slowly 17.5 m hydrofluoric acid (assay 49%) to distilled water and diluting to 1 L.

5.3.4 **0.1 mol/L Oxalic acid solution:** prepared by dissolving 12.6 g of oxalic acid dihydrate in distilled water and diluting to 1 L.

5.3.5 **2% (w/v) Sodium carbonate solution:** prepared by dissolving 20 g of sodium carbonate in distilled water and diluting to 1 L.

5.3.6 **5% (w/v) Urea** and **1.5% (w/v) Phosphoric acid solution:** prepared by adding slowly 10 mL of phosphoric acid (assay 88%) to distilled water, dissolving 50 g urea in the diluted acid, and diluting to 1 L.

6. TEST SPECIMENS

6.1 Two specimens of not less than 5 g each shall be taken for testing.[2] Care shall be taken to prevent loss of fibres from the specimens during the test. In the case of woven fabrics, this is best done by ravelling out several yarns along

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[1] *The preparation is available from Bayer, 77 Belfield Road, Toronto, Ontario, M9W 1G6. Telephone (416) 248-0771.*

[2] *If the precision with which the percentage of the non-fibrous materials to be measured is specified, refer to CAN/CGSB-4.2 No. 1 for procedures to determine the number of specimens to be taken.*

each edge. Where loose material or yarns are being tested, place them in a cellulose thimble to prevent the loss of fibre.

6.2 If it is intended to carry out further tests on the specimens after removal of non-fibrous materials, it may be necessary to use larger specimens.

7. PROCEDURES

7.1 The procedures given in par. 7.3 to 7.8 require that the specimen be oven-dried to constant mass at 105 to 110°C according to CAN/CGSB-4.2 No. 3 (oven-dry basis) or conditioned to constant mass according to CAN/CGSB-4.2 No. 2 (conditioned basis). However, when a textile contains, or is suspected of containing, low-boiling non-fibrous material(s) that may become volatile at 105 to 110°C, the specimens ***must*** be conditioned, according to CAN/CGSB-4.2 No. 2, rather than oven-dried at 105 to 110°C.

7.2 **Preliminary Determination of the Presence of Low Boiling Non-fibrous Materials**

7.2.1 Extract two or more 5 g specimens with solvent for 2 h in a Soxhlet extractor (minimum of 12 syphonings). Transfer the solvent from the flask of the Soxhlet apparatus to a tarred weighing bottle and evaporate the solvent at temperature not over 40°C until there is no appreciable mass change in 10 min. Heat the residue in an oven at 105 to 110°C for 30 min, cool it, and determine its mass. If there is no appreciable[3] loss in mass due to oven heating, low boiling ingredients are not present in significant amounts.

7.2.2 If more than one of the procedures given in par. 7.3 to 7.8 is to be used, the intermediate mass determinations may be omitted unless the content removed by the individual procedure is required.

7.2.3 If more than one of the procedures given in par. 7.3 to 7.8 is carried out on a single specimen, the second and successive procedures may produce different content values than would be the case if the same procedure were carried out on a specimen that had not undergone the previous procedure(s).

7.3 **Removal of Water Soluble Materials by Aqueous Treatment** — Oven-dry or condition each specimen to constant mass (par. 7.1). Immerse the specimens and thoroughly wet them in distilled water at 50°C using a liquid/fabric ratio of approximately 100:1. Agitate the specimens by occasional stirring with a glass rod, or by mechanical means. After the specimens have been immersed for 30 min, thoroughly rinse them in fresh portions of distilled water at 30°C and oven-dry or condition them to constant mass.

7.4 **Removal of Non-fibrous Materials by Solvent Extraction**[4]

7.4.1 Oven-dry or condition each specimen to constant mass (par. 7.1). Extract each specimen with solvent for 2 h in a Soxhlet extractor (minimum of 12 syphonings). Remove it and allow it to air dry. Oven-dry or condition it to constant mass.

7.4.2 Alternatively, extractable matter may be determined by transferring the solvent from the flask of the Soxhlet apparatus to a tarred weighing bottle or aluminium weighing dish, and evaporating the solvent at a temperature not over 40°C, if the non-fibrous material(s) are low boiling, or at a temperature of 105 to 110°C, if the non-fibrous material(s) are not low boiling.

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[3] *Each user depending on the purpose for which the test is made and accuracy required will decide the meaning of "appreciable" and "significant."*

[4] *When the solvent extraction and enzyme treatment procedures are used with unscoured or lightly scoured cotton or flax, the loss in mass obtained includes added sizing materials and all the natural wax, together with a portion of the other natural noncellulosic materials present. The amount of the natural wax and non-cellulosic materials removed is approximately 4% of the final oven-dry mass.*

Typical non-fibrous materials removed by this method are:

Non-fibrous Materials	Solvent
Oils, greases and waxes	Ethyl ether or 1,1,2-trichloro-1,2,2-trifluoroethane[5]
Oils, waxes, softeners, silicones	Hexane
Residual soaps	Ethanol (95%)[6]
Small amounts of unfixed polymers, polyester resins, acrylics, polyurethanes, polyvinyl acetates	1,1,1-Trichloroethane
Unfixed cellulose reactants, organic salts, sulphonated organics	Methanol
Polyvinyl chloride, unvulcanized rubber, acrylic polymers, polyvinyl acetate	Tetrahydrofuran
Ethylene-vinylacetate copolymers, polyethylene, polypropylene	Toluene
Rubber	*o*-Dichlorobenzene
Cellulose acetate	Acetone
Polyurethane	Dimethylformamide
Fixed cellulose reactants, branched starches, inorganic salts	0.1 mol/L Hydrochloric acid

7.5 **Removal of Starch, Size, by Enzyme Treatment**[7] — Oven-dry or condition each specimen to constant mass (par. 7.1). Immerse the specimens in an aqueous solution of the enzyme using the conditions of concentrations, liquid/fabric ratio, temperature and time of immersion recommended by the supplier of the enzyme preparation. Agitate the specimens well in the solution. After the prescribed treatment, rinse the specimens thoroughly with fresh portions of hot distilled water, squeezing them after each rinse, and oven-dry or condition them to constant mass.

7.6 **Removal of Amino-formaldehyde Resin Finishes by Treatment with Urea and Phosphoric Acid** — Oven-dry or condition each specimen to constant mass (par. 7.1). Immerse the specimens in an aqueous solution containing 5% urea and 1.5% phosphoric acid for 1 h at 80°C, using a liquid/fabric ratio of approximately 100:1. Rinse the specimens thoroughly in warm water, neutralise them with water containing a few drops of ammonia, rinse them and oven-dry or condition them to constant mass.

7.7 **Removal of Iron, Chromium and Copper by Treatment with Oxalic Acid and Acetic Acid** — Oven-dry or condition each specimen to constant mass (par. 7.1). Using a liquid/fabric ratio of approximately 100:1, immerse the specimens in 0.1 mol/L oxalic acid solution at 80°C for 15 min with occasional agitation, followed by thorough rinsing. Neutralize the specimens by immersion in water containing a few drops of ammonia, rinse them and oven-dry or condition them to constant mass. Copper is not removed by this treatment but remains in the fabric as the colourless oxalate. It may be removed by immersion with agitation in a 0.15 mol/L acetic acid at 40°C for 15 min followed by thorough rinsing.

7.8 **Removal of Tin Weighting by Treatment with Hydrofluoric Acid** — Oven-dry or condition each specimen to constant mass (par. 7.1). Use lead, high-density polyethylene or other suitable inert equipment. Using a liquid/fabric ratio of approximately 100:1, immerse the specimens in 1% hydrofluoric acid solution at 55°C for 20 min, stir occasionally and follow by immersion in 2% solution of sodium carbonate at 55°C for 20 min. Rinse the specimens in warm water and oven-dry or condition them to constant mass at 105 to 110°C.

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[5] *Other solvents may be substituted only when small errors due to possible hydrolysis of soaps present in textile material are unimportant.*

[6] *Ethanol (95%) will also remove oils and waxes.*

[7] *Besides removing starch-type sizes, the procedure will also remove glue or gelatin sizes unless these are present in large amounts. In the latter case, it is advisable to repeat the procedure using a suitable preparation of a proteolytic enzyme, following the manufacturer's directions for its use. This method will not completely remove resin-bound starch-type sizes.*

8. CALCULATIONS

8.1 **Oven-dry Basis:**

$$\frac{a-b}{a} \times 100$$

where:

a = oven-dry mass of specimen before extraction

b = oven-dry mass of specimen after extraction

Alternately, the dry mass of the solvent-extracted non-fibrous material (residue after evaporation) may be used:

$$\frac{e}{a} \times 100 \qquad \text{(A)}$$

where:

e = oven-dry mass of the solvent-extracted non-fibrous material

$$\frac{g}{b-g} \times 100 \qquad \text{(B)}$$

where:

g = the air-dried mass of the solvent-extracted non-fibrous material

b = oven-dry mass of specimen after extraction

8.2 **Conditioned Basis:**

$$\frac{c-d}{c} \times 100$$

where:

c = conditioned mass of specimen before extraction

d = conditioned mass of specimen after extraction

Alternately, the dry mass of the solvent-extracted non-fibrous material (residue after evaporation) may be used:

$$\frac{g}{c} \times 100$$

where:

g = the air-dried mass of the extracted non-fibrous material

c = conditioned mass of specimen before extraction

9. REPORT

Note the following information:

9.1 The average percentage of non-fibrous materials removed[8] and the basis (oven-dry or conditioned) on which the results are calculated (refer to section 8 of this method).

9.2 The procedure(s) used to remove non-fibrous materials.

[8] *The average result for the specimens tested is an estimate of the true average for the material under test. A measure for the reliability of this estimate can be obtained by determining the confidence interval (CAN/CGSB-4.2 No. 1, par. 6.2) within which the true mean will lie for any given probability.*

9.3 The reagents used.

9.4 The number of this method: CAN/CGSB-4.2 No. 15-2003.

10. NOTES

10.1 The following is a bibliography of methods used for the identification of non-fibrous materials:

(1) Textile Laboratory Manual, Volume 2, Resins and Finishes, W. Garner, 3rd edition, Heywood Books, London, U.K., 1966.

(2) Identification of Textile Additives and Finishes, Infrared Bulletin No. 35 (1973), Perkin-Elmer Instrument Division, Norwalk, CT 06856, U.S.A.

(3) Identification of Textile Finishes, Ray Krammes and Charles Maresh, Am. Dyestuff Reporter. 42, 317-326, May 1953. Also published as Textile Finishing Bulletin No. 134 by the American Cyanamid Company, Bound Brook, N.J., U.S.A.

(4) An Identification Scheme for Textile Finishing Agents on the Fibre, C.H. Giles and E. Waters, J. Text Inst. 42, 909-932, 1951.

(5) Qualitative Analysis of Textile Processing Agents, Herman B. Goldstein, Am. Dyestuff Reporter. 36, 629-640, 1947.

(6) Technical Manual of the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709, U.S.A. Test Method 94, Finishes in Textiles: Identification.

(7) Technical Report ISO/TR 5090:1977, Textiles — Methods for the removal of non-fibrous matter prior to quantitative analysis of fibre mixtures.

10.2 **Source of Referenced Publications** — The publications referred to in par. 3.1.1 may be obtained from the Canadian General Standards Board, Sales Centre, Gatineau, Canada K1A 1G6. Telephone (819) 956-0425 or 1-800-665-2472. Fax (819) 956-5644.