Government of Canada | Gouvernement du Canada

Canadian General Standards Board | Office des normes générales du Canada

Series 4

Série des 4

WITHDRAWAL

March 2019

Selected standards in the series Textiles

These National Standards of Canada are hereby withdrawn as information contained therein may no longer represent the most current, reliable, and/or available information on these subjects.

The Standards Council of Canada requires that accredited Standards Development Organizations, such as the CGSB, regularly review a consensus Standard to determine whether to re-approve, revise or withdraw. The review cycle is normally five years from the publication date of the latest edition of the Standard. CGSB retains the right to develop new editions.

The information contained in these Standards was originally developed pursuant to a voluntary standards development initiative of the CGSB. The information contained therein may no longer represent the most current, reliable, and/or available information on these subjects. CGSB hereby disclaims any and all claims, representation or warranty of scientific validity, or technical accuracy implied or expressed respecting the information therein contained. The CGSB shall not take responsibility nor be held liable for any errors, omissions, inaccuracies or any other liabilities that may arise from the provision or subsequent use of such information.

RETRAIT

Mars 2019

Sélection de normes de la série Textiles

Ces Normes nationales du Canada sont retirées par le présent avis car l'information contenue peut ne plus représenter l'information disponible et/ou l'information la plus actuelle ou la plus fiable à ce sujet.

Le Conseil canadien des normes exige que les organismes accrédités d'élaboration de normes, tel que l'ONGC, effectue régulièrement un examen des normes consensuelles afin de déterminer s'il y a lieu d'en renouveler l'approbation, de les réviser ou de les retirer. Le cycle d'examen d'une norme est généralement de cinq ans à partir de la date de publication de la dernière édition de celle-ci. L'ONGC se réserve le droit d'élaborer de nouvelles éditions.

L'information contenue dans ces normes a été élaborée initialement en vertu d'une initiative volontaire d'élaboration de normes de l'ONGC. Elle peut ne plus représenter l'information disponible et/ou l'information la plus actuelle ou la plus fiable à ce sujet. L'ONGC décline par la présente toute responsabilité à l'égard de toute affirmation, déclaration ou garantie de validité scientifique ou d'exactitude technique implicite ou explicite relative à l'information contenue dans ces normes. L'ONGC n'assumera aucune responsabilité et ne sera pas tenu responsable quant à toute erreur, omission, inexactitude ou autre conséquence pouvant découler de la fourniture ou de l'utilisation subséquente de cette information.

Copies of withdrawn standards are available from the CGSB Sales Centre by telephone at 819-956-0425 or 1-800-665-2472, by fax at 819-956-5740, by Internet at www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html, by e-mail at ncr.CGSB-ONGC@tpsgc-pwgsc.gc.ca or by mail at Sales Centre, Canadian General Standards Board, 11 Laurier Street, Gatineau, Canada K1A 1G6.

Des copies des normes retirées peuvent être obtenues auprès du Centre des ventes de l'ONGC. Il suffit d'en faire la demande par téléphone au 819-956-0425 ou 1-800-665-2472, par télécopieur au 819-956-5740, par Internet à : www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-fra.html, par courriel à ncr.CGSB-ONGC@tpsgc-pwgsc.gc.ca, ou par courrier adressé au Centre des ventes, Office des normes générales du Canada, 11, rue Laurier, Gatineau, Canada K1A 1G6.

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)

Government of Canada
Gouvernement du Canada

Canadian General Standards Board
Office des normes générales du Canada

CAN/CGSB-4.2
No. 24-2002

Supersedes CAN/CGSB-4.2
No. 24-M91, No. 24.2-M91
and No. 34-M89
Reaffirmed
November 2013

Textile test methods

Colourfastness and dimensional change in commercial laundering

ICS 59.080.01

Standards Council of Canada
Conseil canadien des normes

National Standard of Canada

Canada

Experience and excellence
Expérience et excellence
CGSB ONGC

The CANADIAN GENERAL STANDARDS BOARD (CGSB), under whose auspices this standard has been developed, is a government agency within Public Works and Government Services Canada. CGSB is engaged in the production of voluntary standards in a wide range of subject areas through the media of standards committees and the consensus process. The standards committees are composed of representatives of relevant interests including producers, consumers and other users, retailers, governments, educational institutions, technical, professional and trade societies, and research and testing organizations. Any given standard is developed on the consensus of views expressed by such representatives.

CGSB has been accredited by the Standards Council of Canada as a national standards-development organization. The standards that it develops and offers as National Standards of Canada conform to the criteria and procedures established for this purpose by the Standards Council of Canada. In addition to standards it publishes as National Standards of Canada, CGSB produces standards to meet particular needs, in response to requests from a variety of sources in both the public and private sectors. Both CGSB standards and CGSB national standards are developed in conformance with the policies described in the CGSB Policy and Procedures Manual for the Development and Maintenance of Standards.

CGSB standards are subject to review and revision to ensure that they keep abreast of technological progress. CGSB will initiate the review of this standard within five years of the date of publication. Suggestions for their improvement, which are always welcome, should be brought to the notice of the standards committees concerned. Changes to standards are issued either as separate amendment sheets or in new editions of standards.

An up-to-date listing of CGSB standards, including details on latest issues and amendments, and ordering instructions, is found in the CGSB Catalogue at our Web site — www.tpsgc-pwgsc.gc.ca/ongc-cgsb along with more information about CGSB products and services.

Although the intended primary application of this standard is stated in its Scope, it is important to note that it remains the responsibility of the users of the standard to judge its suitability for their particular purpose.

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. CGSB neither assumes nor accepts any responsibility for any injury or damage that may occur during or as the result of tests, wherever performed.

Attention is drawn to the possibility that some of the elements of this Canadian standard may be the subject of patent rights. CGSB shall not be held responsible for identifying any or all such patent rights. Users of this standard are expressly advised that determination of the validity of any such patent rights is entirely their own responsibility.

Further information on CGSB and its services and standards may be obtained from:

The Manager
Standards Division
Canadian General Standards Board
Gatineau, Canada
K1A 1G6

The Standards Council of Canada (SCC) is the coordinating body of the Canadian standardization network, which is composed of people and organizations involved in the development, promotion and implementation of standards. Through the collaborative efforts of Canadian standardization network members, standardization is helping to advance the social and economic well-being of Canada and to safeguard the health and safety of Canadians. The network's efforts are overseen by SCC. The principal objectives of SCC are to foster and promote voluntary standardization as a means of advancing the national economy, supporting sustainable development, benefiting the health, safety and welfare of workers and the public, assisting and protecting the consumer, facilitating domestic and international trade, and furthering international cooperation in relation to standardization.

An important facet of the Canadian standards development system is the use of the following principles: consensus; equal access and effective participation by concerned interests; respect for diverse interests and identification of those who should be afforded access to provide the needed balance of interests; mechanism for dispute resolution; openness and transparency; open access by interested parties to the procedures guiding the standards development process; clarity with respect to the processes; and Canadian interest consideration as the initial basis for the development of standards. A National Standard of Canada (NSC) is a standard prepared or reviewed by an SCC-accredited SDO and approved by the SCC according to NSC approval requirements. Approval does not refer to the technical content of the standard, as this remains the responsibility of the SDO. An NSC reflects a consensus of a number of capable individuals whose collective interests provide, to the greatest practicable extent, a balance of representation of general interests, producers, regulators, users (including consumers) and others with relevant interests, as may be appropriate to the subject at hand. NSCs are intended to make a significant and timely contribution to the Canadian interest.

Those who have a need to apply standards are encouraged to use NSCs. These standards are subject to periodic review. Users of NSCs are cautioned to obtain the latest edition from the SDO that publishes the standard.

The responsibility for approving standards as NSCs rests with:

Standards Council of Canada
270 Albert Street, Suite 200
Ottawa, Ontario K1P 6N7, CANADA

NATIONAL STANDARD OF CANADA

CAN/CGSB-4.2
No. 24-2002

Supersedes CAN/CGSB-4.2
No. 24-M91, No. 24.2-M91
and No. 34-M89
Reaffirmed
November 2013

Textile test methods

Colourfastness and dimensional change in commercial laundering

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

Prepared by the
Canadian General Standards Board CGSB

Approved by the
Standards Council of Canada
Conseil canadien des normes

Published July 2002 by the
Canadian General Standards Board
Gatineau, Canada K1A 1G6

CANADIAN GENERAL STANDARDS BOARD

Committee on Textile Test Methods and Terminology

(Voting membership at date of reaffirmation)

General interest category

Batcheller, J.	University of Alberta
Carrick, D.	Consultant
Davie, N.	Consultant
Liu, S.	University of Manitoba
Man, T.M.	Consultant
Tait, C.	National Defence/DSSPM

Producer category

Adam, C.	Tencate Protective Fabrics Canada
Boivin, D.	E.I. DuPont Co.
Lawson, L.	Davey Textile Solutions
Leblanc, J.-M.	Marv Holland Apparel Ltd.
Schumann, E.	Lincoln Fabrics Ltd.
Taylor, V.	Invista (Canada) Co.

Regulator category

Andersson, C.	Health Canada

User category

Bourget, S.	National Defence/QETE
D'Entremont, E.	Royal Canadian Mounted Police
Izquierdo, V.	Textile Technologies Centre
Kohli, G.	Sears Canada Inc.
Larsen, A.-L.	Exova Group Ltd.
Litva, M.	Canada Border Services Agency
MacLeod, J.	Public Works and Government Services Canada
Tebbs, C.	International Drycleaners Congress

Secretary (non-voting)

Grabowski, M.	Canadian General Standards Board

Acknowledgment is made for the translation of this National Standard of Canada by the Translation Bureau of Public Works and Government Services Canada.

CAN/CGSB-4.2
No. 24-2002

Supersedes CAN/CGSB-4.2
No. 24-M91, No. 24.2-M91
and No. 34-M89
Reaffirmed
November 2013

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:

11.1 **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 Ottawa Canada K1A 1G6	TEXTILE TEST METHODS	CAN/CGSB-4.2
	Colourfastness and Dimensional Change in Commercial Laundering	No. 24-2002

Supersedes CAN/CGSB-4.2
No. 24-M91, No. 24.2-M91
and No. 34-M89
Reaffirmed
November 2013

1. PURPOSE AND SCOPE

1.1 This method determines the dimensional change and colourfastness of textile fabrics or garments, likely to occur in commercial laundering procedures. The fabric specimen or garment is subjected to an appropriate combination of specified washing, drying and restoration procedures.[1]

1.2 Five washing, five drying and three restoration procedures are included as follows:

1.2.1 ***Washing Procedures***[2]

1 — High temperature (70°C), with bleach

2 — High temperature (60°C), without bleach

3 — Medium temperature (50°C)

4 — Medium temperature (50°C), sensitive fabrics

5 — Low temperature (40°C), sensitive fabrics.

1.2.2 ***Drying Procedures***

A — Drip dry

B — Flat-bed press

C — Flat dry

D — Line dry

E — Tumble dry.

1.2.3 ***Restoration Procedures***

I — Tension presser

II — Knit shrinkage gauge

III — Hand iron.

1.3 Before using this method, the combination of procedures suitable for the particular item to be tested must be selected to arrive at the appropriate test. A complete test consists of a washing, drying and, if necessary, a restoration procedure. For example, Test 3EI means that the textile material has been washed at 50°C with normal mechanical action, and detergent and alkali, dried by tumble drying and restored by tension pressing. The final result obtained will, of course, depend upon the choice of test conditions used.

1.4 The five washing tests specified vary in severity of operating conditions and correspond in their essentials to procedures commonly used in commercial laundering. The five drying procedures specified provide appropriate

[1] *Experience has shown that most relaxation shrinkage occurs in the first wash, two additional washes usually being sufficient to effect complete relaxation shrinkage.*

[2] *Any other combination of temperature, mechanical action, bleach and detergent may be used, but must be reported.*

methods for drying different textile materials. Three procedures are specified for determining the dimensional restorability of materials after washing and drying for those textiles that may be restored by ironing or wearing.

1.5 This method is suitable for use with woven or knitted fabrics and also with garments and other made-up textile articles. This method is also applicable to certain nonwoven fabrics. For nonwovens, the principal directions of measurement shall be machine direction and cross direction (perpendicular to the machine direction). Nonwoven fabrics are not usually subjected to restoration procedures. This method may not be suitable for use with certain types of fabrics such as those of open construction or delicate nature. Mechanical action is the factor most responsible for fabric distortion during washing and this must be considered when choosing the procedure to be used. Where the amount of mechanical action is required to be minimal (e.g., as in hand washing), CAN/CGSB-4.2 No. 25.1 should be used for dimensional change and CAN/CGSB-4.2 No. 19.1 Test No. 1, for colourfastness.

1.6 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 use.

2. PRINCIPLE

2.1 A garment or fabric specimen is washed in a cylindrical reversing washer, extracted, dried and, where necessary, subjected to a dimensional restoration procedure.

2.2 For determining the dimensional change, the reference dimensions marked on the fabric specimens in the length and width directions, or in appropriate locations on garments, are measured before and after laundering, and the percentage dimensional change in each direction is calculated.

2.3 Changes in the colour of the fabric, or component parts of a garment, and staining of attached undyed material are assessed by reference to the grey scales.

3. REFERENCED PUBLICATIONS

3.1 The following publications are referenced in this method:

3.1.1 Canadian General Standards Board (CGSB)

CAN/CGSB-2.115 — Built Powder Laundry Detergent

CAN/CGSB-4.2 — Textile Test Methods:

No. 1 — Precision and Accuracy of Measurements

No. 2 — Conditioning Textile Materials for Testing

No. 19.1 — Colourfastness to Washing — Accelerated Test — Launder-Ometer

No. 25.1 — Dimensional Change in Wetting

No. 46/ISO 105-A02 — Textiles — Tests for Colourfastness — Part A02: Grey Scale for Assessing Change in Colour

No. 47/ISO 105-A03 — Textiles — Tests for Colourfastness — Part A03: Grey Scale for Assessing Staining.

3.2 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 method. The sources are given in the Notes section.

4. APPARATUS AND REAGENTS

4.1 **Washing machine:**[3] of the horizontal cylindrical rotating-cage type, provided with an automatic reversing mechanism and with an integral means of centrifuging. It shall reverse once every 5 to 15 revolutions and shall be

[3] *Suitable equipment is the "Wascato" available from C.J. Laundry System Ltd., 2613 Folkway Drive, Mississauga, Ontario, Canada L5L 2K3, telephone (905) 820-1235, and R.B. Atlas Inc., 9 Canso Road, Rexdale, Ontario, Canada M9W 4L9, telephone (416) 241-4647, fax (416) 241-9008.*

capable of operating at both a normal wash rhythm, where the ratio of the period of agitation to the period of rest lies between 4:1 and 5:1, and at a gentle wash rhythm where the ratio lies between 1:4 and 1:5.

4.1.1 The machine shall possess a means of maintaining and indicating the temperature. It shall be fitted with a suitable means for determining the amount of water in the cage, e.g. direct visual means or an external glass gauge. The diameter of the cage, which shall be fitted with internal lifters, preferably three or four (three are recommended), shall not be less than 460 mm and not more than 520 mm. The depth of the cage shall not be less than 210 mm. The speed of rotation of the cage shall be between 38 r/min and 52 r/min.

4.2 **Water:** having a hardness of not more than 70 mg/L calcium carbonate.

4.3 **Detergent:** in accordance with CAN/CGSB-2.115.[4 and 5]

4.4 **Bleach:** a solution of sodium hypochlorite of known available-chlorine content and having a pH of not less than 10.0. The solution is preferably diluted to 0.5 to 1.0% available chlorine before addition to the washer.

4.5 **Loading fabric:** additional undyed fabric may be required to give the specified load for the washer. This loading fabric shall consist of undyed fabric similar to that being tested and cut into pieces no larger than 1 m square.[6]

4.6 **Undyed adjacent fabric:** unless otherwise specified, multifibre fabric No. 1 or No. 10 for Procedures 2, 3, 4 and 5 and bleached desized cotton fabric (e.g. 32 × 32 threads/cm) for Procedure 1.[7]

4.7 **Dryer:** of the rotary tumble type having a cylindrical basket approximately 750 mm in diameter and not less than 400 mm in length, rotating at approximately 50 ± 5 r/min, equipped with means for maintaining a drying temperature of 50 to 70°C measured in the exhaust vent as close as possible to the drying cylinder.

4.8 **Hot-head flat-bed press.**[8]

4.9 **Tension presser:**[9] consisting essentially of the following parts:

4.9.1 ***Pressing table,* 350 mm *square:*** with provision for holding two adjacent sides of the specimen in a fixed position and for applying known amounts of tension to the other two sides of the specimen by means of masses acting on movable holding devices, while the specimen is being pressed. The pressing table has a flat upper surface and is rigidly supported so that the surface just makes contact with the specimen when the latter is placed in the apparatus. The surface may be of uncovered nonrusting metal, or other rigid heat-resistant material covered with a flat padding.

4.9.2 ***Metal template:*** with 250 mm square opening and corners cut away, as shown in Figure 1, for marking out the specimen.

4.9.3 ***Holding device:*** for the specimen consisting of rigid metal rods (e.g. 5 mm diameter aluminum rod) slipped through 10 mm hems sewn across the end of each flap. The two rods forming the fixed holding devices are held in position

---

[4] *Products meeting this method are available from Norchem Industries Canada Inc., 950 Michelin, Laval, Quebec, Canada H7L 5C1, telephone (514) 629-3800, fax (514) 629-4355, and Diversey Lever Canada, 2645 Royal Windsor Drive, Clarkson Postal Station, Mississauga, Ontario, Canada L5J 1L1, telephone (905) 822-3511, fax (905) 822-3797. By agreement, another detergent may be used, but the name of the product must be reported in the report section.*

[5] *For sensitive fabrics, an alternate detergent with no builders may be used, but must be reported.*

[6] *A suitable loading fabric is "Polyester Make-Weights" available from R.B. Atlas Inc., 9 Canso Road, Rexdale, Ontario, Canada M9W 4L9. Telephone (416) 241-4647. Fax (416) 241-9008.*

[7] *Multifibre fabric No. 1 or No. 10, and bleached desized cotton fabric, Style 428, may be obtained from Testfabrics Inc., P.O. Drawer O, 200 Blackford Ave., Middlesex, NJ 08846, U.S.A. The fibres contained in this multifibre fabric are: No. 1 — acetate, cotton, nylon, silk, viscose and wool, and No. 10 — acetate, cotton, nylon, polyester, acrylic and wool. Generally, multifibre fabric No. 1 is used if the sample contains any viscose or silk fibres, and No. 10 is used with samples made from other fibres. If a detergent being used is known to contain an optical brightener and/or bleaching agent, a reference sample of the multifibre fabric must be washed in a control dummy load without test specimen.*

[8] *Suitable equipment is available from Calmek Equipment Inc., 6155 Transcanadienne, Saint-Laurent, Quebec, Canada H4T 1S3. Telephone (514) 744-0078. Fax (514) 744-9922.*

[9] *Suitable apparatus is available from Testing Machines International of Canada Ltd., 6 Ronald Drive, Montreal, Quebec, Canada H4X 1M8.*

between pairs of upright posts fastened to each end of two adjacent sides of the pressing table. The rods forming the two movable holding devices are perforated near each end, or fitted with hooks, to accommodate the cords carrying the tensioning masses. The cords pass over pulleys supported by the framework of the pressing table (Figure 2).

4.9.4 ***Nonrusting metal plate,* 350 mm *square:*** perforated with approximately 1.5 mm holes for use in drying the specimen.

4.10 **Knit shrinkage gauge:**[8] consisting of a set of 20 mounting pins spaced equidistant from one another around the circumference of a circle. The pins are set in guides in radial slots, each pin being attached to a tensioning member that is driven outwardly in the slot. The springs have an extension of 25 mm at 4.5 ± 0.1 N tension. The tensioning members have a common drive so that the restoration force is applied simultaneously in all directions in the plane of the specimen. The minimum diameter of the pin frame in the collapsed state is 280 mm and the maximum diameter in the freely extended state is 350 mm. The surface of the apparatus in contact with the test specimen is smooth and polished so as to be as friction-free as possible. A marking template is provided.

4.11 **Hand iron.**

4.12 **Measuring scale:** preferably graduated in millimetres.

4.12.1 A premarked device, calibrated to give the percentage of shrinkage or growth, can also be used.

4.13 **Grey scales:** for assessing change in colour and staining in accordance with CAN/CGSB-4.2 No. 46/ISO 105-A02 and No. 47/ISO 105-A03 respectively.

5. TEST SPECIMENS

5.1 **Fabrics** — At least two fabric specimens shall be tested.[10 and 11]

5.1.1 ***Tensionless Pressing*** — When the specimens are not to be restored by the tension presser or the knit shrinkage gauge, cut each specimen at least 600 × 600 mm from areas free from wrinkles and creases. Place the specimens, conditioned in accordance with CAN/CGSB-4.2 No. 2, on a flat surface. Using a permanent marking medium (e.g. indelible ink,[12] sewing thread), suitably mark on each specimen six accurately measured distances at least 450 mm long, three parallel to each of the two principal directions of the fabric (par. 4.12). The three marked distances shall be at least 75 mm apart; no portion of them shall be closer than 75 mm to the specimen edges. Suitably protect the cut edges of fabrics that are likely to fray during washing.

5.1.2 ***Tension Pressing*** — When the specimens are to be restored by the tension presser (par. 8.1), prepare them by the following procedure: take two specimens measuring approximately 500 × 500 mm from fabric previously conditioned in accordance with CAN/CGSB-4.2 No. 2. Place the metal template (par. 4.9.2) on the specimens so that adjacent sides of the 250 mm square are parallel to the warp and weft directions, respectively. Mark reference lines on the fabric at the ends and mid-point of each side of the square using indelible ink or sewing with a thread of contrasting colour. Trace the outline of the metal template on the fabric with indelible ink. Mark warp (or wales) direction on the specimens and sew a 10 mm hem on each side of the specimens. Do not cut out the corners of the specimens until after completion of the washing cycle, to prevent distortion or tearing during washing. Measure the distances between the marked lines on the opposite sides of the square before carrying out the test.

5.1.3 ***Knit Shrinkage Gauge*** — When specimens are to be restored by the knit shrinkage gauge (par. 8.2), prepare them by the following procedure: take two specimens measuring approximately 400 × 400 mm from fabric previously conditioned in accordance with CAN/CGSB-4.2 No. 2. Place the marking template over the centre of the specimens. Trace the 250 mm diameter reference measuring circle and mark the locations of the 20 equidistantly spaced dots, by means of indelible ink.

---

[10] *If the precision of the results is specified, refer to CAN/CGSB-4.2 No. 1 to determine the number of test specimens required. Otherwise two specimens shall be tested.*

[11] *If the size of the specimen to be tested is smaller than specified to perform the tests, pin the specimen to a piece of similar fabric.*

[12] *Marking media suitable for use on light and dark fabrics are obtainable from Marktex Corp., 161 Coolidge Avenue, Englewood, NJ 07631, U.S.A.*

5.2 **Garments and Other Made-up Articles** — When testing a made-up article where it is undesirable to cut specimens, apply accurately measured markings, as long as possible, at appropriate places on the article. If possible, no portion of the measured distances should be within 50 mm of a seam.[9 and 13]

5.3 **Undyed Adjacent Fabric** — To each specimen, sew a piece of test fabric (par. 4.6) measuring 50 × 100 mm (with the longer dimension of multifibre fabric parallel to the fibre bands and the stitching across the bands). Position the test fabric on the specimen at such a location that it will not interfere with subsequent restoration procedures. Remove the multifibre test fabric after the first wash cycle if more than one cycle is being done.

6. WASHING PROCEDURE

6.1 Select the washing procedure to be used from those given in Table 1.[2]

6.2 Determine the mass of the specimens, and add sufficient loading fabric to make a total air-dry material load of the mass shown for the washing procedure selected. Place the material to be washed in the washing machine. If dimensional stability is being determined, not more than half of the wash load shall consist of test specimens. Fill to the designated level with water at the selected temperature, to provide a good running suds having a height of not more than 3 cm at the end of the sudsing cycle. Water of hardness not exceeding 70 mg/L (expressed as calcium carbonate) shall be used.

6.3 After the last hydroextraction of the washing procedure has been completed, remove the specimens from the machine, taking care that they are neither stretched nor distorted, and dry it by one of the five procedures in Section 7.

7. DRYING PROCEDURE

7.1 Procedure A — Drip Dry

7.1.1 Remove the specimens from the machine and, without extracting the water, suspend them from a line in still air at room temperature, attaching them at two adjacent corners and at the centre of the side, using nonrusting clips, and allow them to dry. The warp or wales direction of the specimens should be vertical. Suspend garments on nonrusting hangers.

7.1.2 Place the specimens on a flat surface and condition them in accordance with CAN/CGSB-4.2 No. 2 for at least 4 h.

7.1.3 Remeasure the marked distances on the specimens and calculate the average dimensional change for the warp and weft (wales and courses) separately, as a percentage of the original measurements. Average the results for the specimens.

7.2 Procedure B — Flat-bed Press

7.2.1 Unfold each damp specimen and place it on the flat bed of the press. Smooth out heavy wrinkles with the hand and lower the head of the press, which has been set at a suitable temperature[14] according to Table 2 for one or more short periods as required to properly dry the specimen.

---

[13] *Although this method is not primarily intended to measure shrinkage of seams, it may be applied to this property. An accurately measured distance should be marked along the seam whose dimensional change is to be measured.*

[14] *The following temperatures may be safely used for ironing fabrics:*

Fabric	*Temperature,* °C
Cotton and linen	200
Polyester, rayon, silk, triacetate, wool	150
Acetate, acrylic, modacrylic, nylon, polypropylene, spandex	110

Temperatures can be measured with a surface pyrometer or other appropriate temperature measuring device.

TABLE 1

Washing Procedures

OPERATION	PROCEDURE				
	1	**2**	**3**	**4**	**5**
Agitation during washing and extraction	normal	normal	normal	gentle	gentle
Total load (kg)	4	4	4	2	2
Washing:					
Suds	detergent and bleach	detergent	detergent	detergent	detergent
Temperature (°C)	70 ± 3	60 ± 3	50 ± 3	50 ± 3	40 ± 3
Liquor level (cm)	10	10	10	13	13
Washing time (min)	12	12	12	8	8
Rinse 1:					
Temperature (°C)	70	60	50	50	40
Liquor level (cm)	13	13	13	13	13
Rinse time (min)	3	3	3	3	3
Spin time (min)	1	1	1	1	1
Rinse 2:					
Temperature (°C)	60	50	50	50	40
Liquor level (cm)	13	13	13	13	13
Rinse time (min)	3	3	3	3	3
Spin time (min)	1	1	1	1	1
Rinse 3:					
Temperature (°C)	50	50	50	50	40
Liquor level (cm)	13	13	13	13	13
Rinse time (min)	2	2	2	2	2
Spin time (min)	1	1	1	1	1
Sour (add sour to give pH 4-5):					
Temperature (°C)	<20	<20	<20	<20	<20
Liquor level (cm)	13	13	13	13	13
Sour time (min)	5	5	5	5	5
Spin time	6	6	6	6	6

7.2.2 If a flat-bed press is not available, the damp specimen may be dried by laying it on a padded ironing board and drying it with a hand iron at a suitable temperature.[14] Heavy wrinkles should first be smoothed out by hand and the specimen should be dried by raising and lowering the iron. Do not slide the iron over the specimen, to avoid distorting the fabric.

7.2.3 Condition and remeasure the specimen in accordance with par. 7.1.2 and 7.1.3.

7.3 **Procedure C — Flat Dry**

7.3.1 Spread the specimens on a smooth horizontal surface, remove the wrinkles by hand without stretching or distorting the specimens, and allow them to dry.

7.3.2 Condition and remeasure the specimens in accordance with par. 7.1.2 and 7.1.3.

7.4 **Procedure D — Line Dry**

7.4.1 Suspend the extracted specimens from a line to dry according to the procedure described in par. 7.1.1.

7.4.2 Condition and remeasure the specimens in accordance with par. 7.1.2 and 7.1.3.

7.5 **Procedure E — Tumble Dry**

7.5.1 Place the specimens and loading fabric (if any) in the tumble dryer set at a temperature suitable for the material being tested, run the dryer until the load is dry, and remove the specimens immediately.

7.5.2 Condition and remeasure the specimens in accordance with par. 7.1.2 and 7.1.3.

TABLE 2

Steam Table Chart

Pressure (kPa)	Temperature (°C)	Heat (kJ/kg)
0	100	2677
69	115	2700
138	126	2717
207	135	2728
276	141	2735
345	148	2745
414	153	2749
483	158	2756
552	162	2761
621	166	2763
690	170	2770
758	173	2773
827	177	2775
896	180	2777
965	183	2780
1034	187	2781

8. RESTORATION PROCEDURES

8.1 Procedure I — Tension Presser

8.1.1 This procedure is applicable to woven fabrics but not to garments.

8.1.2 If, after the specimen has been dried by the appropriate procedure, excessive shrinkage is found in one or both directions of the fabric, the specimen shall, if required, be subjected to the following tension pressing procedure.

8.1.2.1 Cut out the corners of the specimen (par. 5.1.2) and immerse it in water at room temperature until thoroughly wetted. Extract the specimen until its water content is approximately 100% of its dry mass.

8.1.2.2 Place the damp specimen on the bed of the tension presser. Mount the two short flaps in the fixed holding devices and the longer flaps in the movable holding devices.

8.1.2.3 Apply the proper tensioning masses (Table 3) in the warp and weft directions of the fabric. One-half of the total mass should be hung from each pulley and the tension should be applied gradually, the smaller of the two pairs of masses being applied first (Figure 2).

8.1.2.4 Dry the specimen while under tension by placing the 350 mm plate (par. 4.9.4) on the portion of the specimen lying on the pressing table and heating the metal plate by placing on it a hand iron having a temperature suitable for the fabric being restored.[14] Release of steam from the specimen is facilitated by the holes in the metal plate.

8.1.2.5 When the portion of the specimen on the pressing table is dry, release the tension and remove the specimen. Dry the outer flaps of the specimen by raising and lowering a hand iron (at suitable temperature) on them, taking care not to distort the specimen.

8.1.3 Condition and remeasure the specimen in accordance with par. 7.1.2 and 7.1.3.

8.2 Procedure II — Knit Shrinkage Gauge

8.2.1 This procedure is applicable to some knitted fabrics. It is not suitable for use with fabrics that shrink in one direction and stretch more than 2% in the other direction.

8.2.2 After drying the specimen by the appropriate procedure, condition it for at least 4 h in accordance with CAN/CGSB-4.2 No. 2. With the tension on the knit shrinkage gauge fully reduced, mount the specimen on the pins of the gauge, making certain that each pin passes through one of the 20 dots (par. 5.1.3). Operate the hand wheel drive mechanism to bring the tensioning members to their outer extremities at a smooth and uniform rate.

8.2.3 Allow the specimen to remain under tension for 2 min. Then, without releasing the tension, measure the diameter of the reference measuring circle. Take the first measurement parallel to the central wale, and the second and third measurements by pivoting around the centre of the specimen approximately 20 mm on either side of the first. Repeat this procedure beginning with the first measurement parallel to the central course, to obtain three measurements in this direction.

8.2.4 Calculate the average dimensional change in each direction separately.

8.3 Procedure III — Hand Iron

8.3.1 This procedure is the least reproducible of the restoration procedures and is intended primarily for use on garments when neither of the other procedures can be used.

8.3.2 Place the damp garment on a padded ironing board and press until dry with a hand iron having a temperature suitable for the fabric being pressed.[14] A dry garment may be ironed with a steam iron. During pressing, exert only sufficient tension to reshape and restore the garment to its original dimensions.

8.3.3 Condition and remeasure the garment in accordance with par. 7.1.2 and 7.1.3.

TABLE 3

Masses Applied on Tension Presser

Dimensional Change After Drying Shrinkage %	Total Mass Applied kg
>5	2.0
3.5 to 5	1.5
1.5 to 3	0.5
0 to 1	0.25
Any stretch	0.25

9. ASSESSMENT OF COLOURFASTNESS

9.1 Evaluate the change in colour of the test specimens, and the staining of each fibre band of the multifibre fabric, using the appropriate grey scales in accordance with CAN/CGSB-4.2 No. 46/ISO 105-A02 and No. 47/ ISO 105-A03. If the garment contains components of different colours, also evaluate the cross staining of the components.

10. REPORT

Report the following information:

10.1 The complete test procedure used[2] (Arabic numeral for washing procedure, uppercase letter for drying procedure and Roman numeral for restoration procedure, if used — e.g. Test 3EI).

10.2 The average percentage dimensional change for each of the principal directions of the fabric (or garment) to the nearest 0.1% (using a minus sign to indicate shrinkage and a plus sign for stretch), both before and after the restoration procedure where applicable.

10.3 The grey scale ratings for change in colour of the specimens and staining of the undyed adjacent fabric, and for garments any cross staining of components.

10.4 If the detergent used does not meet CAN/CGSB-2.115, the brand name of the detergent used, and whether it contains fluorescent brighteners and/or bleaching agents.

10.5 The ironing or pressing temperature, if applicable.

10.6 The number of this method: CAN/CGSB-4.2 No. 24-2002.

11. NOTES

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

All dimensions are in millimetres.

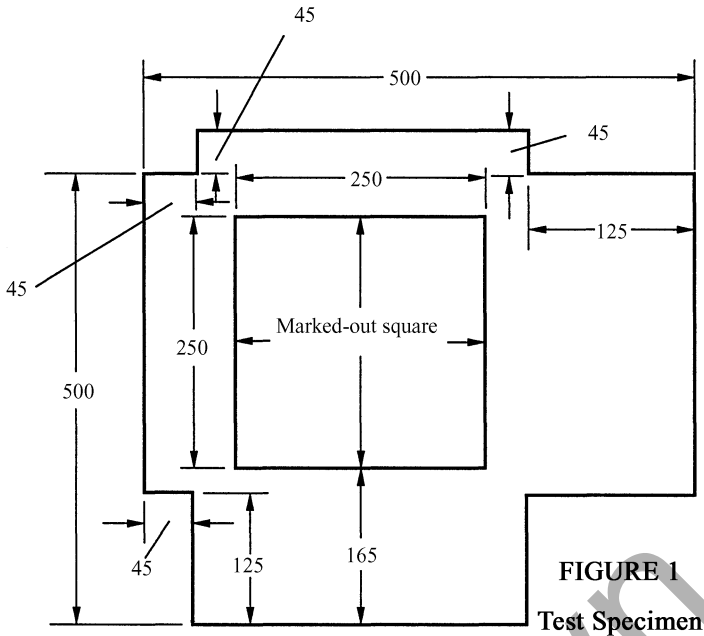

FIGURE 1

Test Specimen

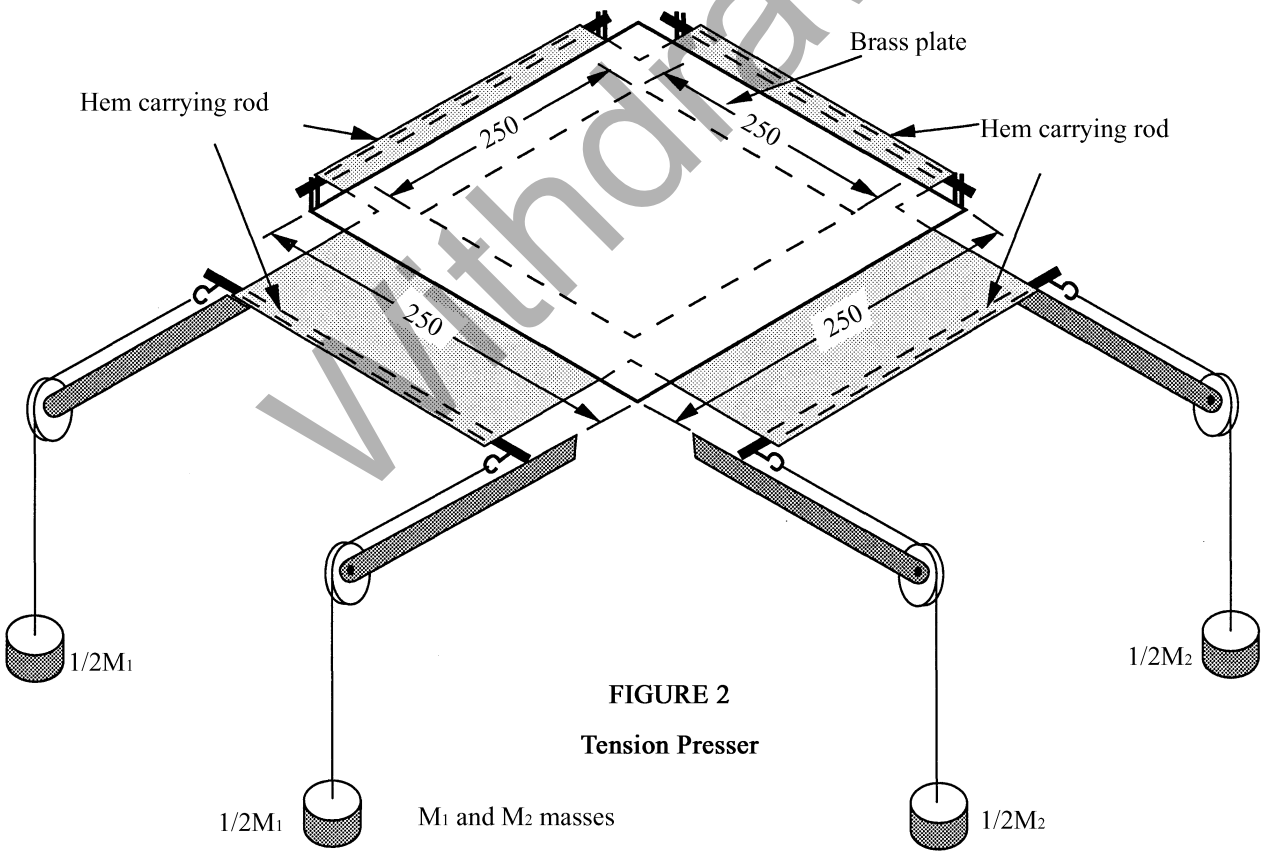

FIGURE 2

Tension Presser