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Series 4  
Série des 4

## WITHDRAWAL

March 2019

### Selected standards in the series Textiles

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Mars 2019

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### Textile test methods

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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)

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**No. 22-2004**

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**N° 57-M90**

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**CAN/CGSB-4.2**

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## **Textile test methods**

### **Bursting strength — Diaphragm pressure test**

ICS 59.080.30



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NATIONAL STANDARD OF CANADA

**CAN/CGSB-4.2**  
**No. 11.1-94**

Supersedes CAN/CGSB-4.2  
No. 11.1-M88  
Extended  
June 2000  
Reaffirmed  
October 2013

# **Textile test methods**

## **Bursting strength — Diaphragm pressure test**

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

Prepared by the

**Canadian General Standards Board** 

Approved by the



**Standards Council of Canada**  
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**CAN/CGSB-4.2**  
**No. 11.1-94**

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**Preface to the National Standard of Canada**

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

**FOREWORD**

This method is technically equivalent to ASTM D3786-87, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method. A new edition of ASTM D3786 has been published in 2013.

- 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](mailto:ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca). Web site [www.tpsgc-pwgsc.gc.ca/ongc-cgsb](http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb).

 Ottawa Canada K1A 1G6	TEXTILE TEST METHODS	CAN/CGSB-4.2
	BURSTING STRENGTH — DIAPHRAGM PRESSURE TEST	No. 11.1-94

Supersedes CAN/CGSB-4.2  
No. 11.1-M88  
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## FOREWORD

This method is technically equivalent to ASTM D 3786-87, Test Method for Hydraulic Bursting Strength of Knitted Goods and Nonwoven Fabrics: Diaphragm Bursting Strength Tester Method.

### 1. PURPOSE AND SCOPE

- 1.1 This method determines the bursting strength of knitted and other nonwoven fabrics by the diaphragm pressure procedure. Although it may also be used with woven fabrics, it should be noted that for such materials it is the breaking strength of the less extensible set of yarns that governs the value of bursting strength observed. The extensibility of the diaphragm limits the use of this procedure to materials less extensible than the diaphragm itself.
- 1.2 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 existing applicable regulatory requirements prior to its use.

### 2. PRINCIPLE

- 2.1 A fixed area of fabric is subjected to pressure on one side through a diaphragm, and the pressure is gradually increased until the fabric is ruptured.

### 3. APPLICABLE PUBLICATIONS

- 3.1 The following publications are applicable to 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.

- 3.2 Reference to the above publications is to the latest issues, unless otherwise specified by the authority applying this method. The source of these publications is shown in the Notes section.

### 4. DEFINITION

- 4.1 **Bursting strength diaphragm pressure test:** the maximum fluid pressure applied to a circular specimen in distending it to rupture.

## 5. APPARATUS AND MATERIALS

- 5.1 **Hydraulic Diaphragm Bursting Tester (Note 1):** a testing machine that meets the requirements of par. 5.1.1 through 5.1.4. In cases of dispute, a motor-driven tester shall be used unless the purchaser and the supplier agree otherwise.
- 5.1.1 **Clamps:** for firmly and uniformly securing the test specimen between two annular, plane, parallel, and preferably stainless steel surfaces, without slippage during the test. Use sufficient pressure to effect the practicable minimization of slippage.
- 5.1.1.1 The upper and lower clamping surfaces shall have a circular opening at least 75 mm in diameter and coaxial apertures of  $31 \pm 0.75$  mm in diameter. The surfaces of the clamps between which the specimen is placed shall have concentric grooves around the edge of the aperture. The grooves shall be spaced not less than 0.8 mm apart and shall be of a depth not less than 0.015 mm. The surfaces of the clamps shall be metallic and any edge which might cause a cutting action shall be rounded to a radius of not more than 0.4 mm (Note 2).
- 5.1.1.2 The lower clamp shall be integral with the chamber in which a screw shall operate to force a liquid pressure medium at a uniform rate of  $95 \pm 5$  mL/min or  $170 \pm 15$  mL/min against the rubber diaphragm.
- 5.1.2 **Diaphragm:** a diaphragm of moulded synthetic rubber,  $1.80 \pm 0.05$  mm in thickness with reinforced centre, clamped between the lower clamping plate and the rest of the apparatus so that before the diaphragm is stretched by pressure underneath it, the centre of its upper surface is below the plane of the clamping surface. The pressure required to raise the free surface of the diaphragm plane shall be  $30 \pm 5$  kPa. This pressure shall be checked no more than one month prior to use of the equipment. The extensibility of the diaphragm should be tested using a bridge gauge, this test being carried out with the clamping ring removed. The diaphragm should be inspected frequently for permanent distortion and renewed if necessary.
- 5.1.3 **Pressure gauge:** a maximum-reading pressure gauge of the Bourdon type of appropriate capacity graduated in kilopascals and accurate throughout the entire range of its scale to within a value of 1% of its maximum capacity. The capacity of the gauge shall be such that the individual readings will be not less than 25% nor more than 75% of the total capacity of the gauge.
- 5.1.4 **Hydraulic pressure system:** a means of applying controlled increasing hydrostatic pressure to the underside of the diaphragm until the specimen bursts through a fluid displaced at the rate of  $95 \pm 5$  mL/min or  $170 \pm 15$  mL/min. The fluid is displaced by a piston in the pressure chamber of the apparatus. The recommended chamber fluid is USP chemically pure 96% glycerin (Note 3). The hydraulic system including the gauges shall be mounted so as to be free of externally induced vibrations. Means shall be provided at the instant of rupture of the specimen for stopping any further application of the loading pressure and for holding unchanged the contents of the pressure chamber until the total bursting pressure and the pressure required to inflate the diaphragm indicated on the gauge have been recorded.
- 5.2 **Aluminum foil for validation of tester:** pieces of pretested aluminum sheet having a known bursting strength in the range of the gauges to be validated (Note 4).
- 5.3 **Neutral nonionic wetting agent**

*Note 1: The Mullen Burst Testers, hand-driven Model LC and motor-driven Model C and Model C-A, and accessories, manufactured by B.F. Perkins & Son, Inc., G.P.O. 366, Chicopee, MA 01021, U.S.A., have been found satisfactory. The motor-driven Model A has been found to be satisfactory for heavyweight fabrics, but may be unsuitable for some lightweight fabrics. Model C and Model A have different pumping rates and different diaphragms; therefore, it is not likely these two machines will give the same result. They are available in Canada from Testing Machines International of Canada Ltd., 6 Ronald Dr., Montreal West, Quebec, Canada H4X 1M8 or Noram Ltd., 103 Gun Ave., Pointe-Claire, Quebec, Canada H9R 3X2.*

*Note 2: Since the clamping mechanism and clamping surfaces are subject to considerable wear and distortion, they should be examined periodically and repaired or replaced when necessary.*

*Note 3: Ethylene glycol may be substituted for the glycerine if desired.*

*Note 4: Standardized aluminum sheets may be obtained from the Pulp and Paper Research Institute of Canada, 570, boul. St. John's, Pointe-Claire (Québec) H9R 3J9, Attention: Calibrations Group. Telephone (514) 630-4100. Fax (514) 630-4134.*

## **6. TEST SPECIMENS**

- 6.1 Each specimen shall be conditioned in accordance with CAN/CGSB-4.2 No. 2 and shall be of such size that its smallest dimension is at least 15 mm greater than the outside diameter of the ring-clamp mechanism of the testing machine. When more than one test is made on the same piece, no portion of the material that has been previously gripped in the ring clamp shall be used for a subsequent test. If the wet bursting strength is required, the specimen shall first be thoroughly wetted out by immersion for at least 1 h in water at 25 to 30°C to which has been added 0.5 g/L of a neutral nonionic wetting agent to facilitate rapid wetting-out of the fabric.
- 6.2 At least ten determinations shall be made on the fabric, the specimens or test areas being so chosen as to be representative of the entire sample. If the precision with which bursting strength is to be measured is specified, refer to CAN/CGSB-4.2 No. 1 to determine the number of test specimens required. If this is not known, at least ten specimens are taken for test.

## **7. VALIDATION OF TESTER**

- 7.1 Check the validation of the tester at least once a month by bursting all specimens from one package of standard aluminum sheet. The average of the indicated bursting resistance for the specimens should be between  $\pm 5\%$  of that marked on the package of pretested aluminum sheet standard.

## **8. PROCEDURE**

### **8.1 Hand-Driven Tester**

- 8.1.1 Insert the conditioned specimen under the tripod, drawing the fabric taut across the plate, and clamp fabric in place by bringing the clamping lever as far to the right as possible.
- 8.1.2 Rotate the hand wheel, clockwise at a uniform speed of 120 rpm until the sample bursts.
- 8.1.3 Stop turning the hand wheel at the instant of rupture of the specimen.
- 8.1.4 In rapid succession do the following: release the clamping lever over the specimen, release the strain on the diaphragm by turning the wheel counterclockwise to its starting position and record the pressure required to inflate the diaphragm (tare pressure). Record the total pressure required to rupture the specimen.
- 8.1.5 If the pressure stops increasing, as indicated by the dial, and the specimen has not broken, push the operating lever to remove the pressure. Record that the stretch of the fabric exceeds the dimensional limitations of the tester. If slippage of the specimen is noted, discard the result and use a new specimen.

### **8.2 Motor-Driven Tester**

- 8.2.1 Insert the conditioned specimen under the tripod, drawing the fabric taut across the plate, and clamp fabric in place by bringing the clamping lever as far to the right as possible.
- 8.2.2 Inflate the diaphragm by moving the operating handle to the left.
- 8.2.3 While the diaphragm is inflating, take hold of the latch that is located below, or to the right, of the operating handle. At the instant of rupture of the specimen, swing the latch as far as it will go to bring the operating handle to an idling (neutral) position (see par. 8.1.5).
- 8.2.4 Immediately release the clamping lever over specimen and two readings will appear on gauge. One is the gross bursting pressure and other diaphragm or tare pressure. Remove the specimen and as quickly as possible note the tare pressure and relieve strain on diaphragm by dropping latch back to normal and throwing operating handle to right or reverse position where it will automatically return to starting point in readiness for the next test.

## **9. CALCULATION**

- 9.1 Calculate the bursting strength of each specimen by subtracting the tare pressure required to inflate the diaphragm from the total pressure required to rupture the specimen.
- 9.2 Calculate the average of all specimens tested.

## 10. REPORT

Report the following information:

- 10.1 The bursting strength of each individual specimen and their average in kilopascals (Note 5).
- 10.2 The rate of fluid displacement in the instrument used.
- 10.3 The number of this method: CAN/CGSB-4.2 No. 11.1-94.

## 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 (613) 941-8703 or 1-800-665-CGSB (Canada only). Fax (613) 941-8705.

Withdrawn

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*Note 5: The average result for the specimens tested is an estimate of the true average for the material under test. A measure of 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.*