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CAN/CGSB-4.2 No. 58-2019

Supersedes CAN/CGSB-4.2 No. 58-2004



Textile test methods

Dimensional change in domestic laundering of textiles

Canadian General Standards Board **CGSB**



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mail — Canadian General Standards Board
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K1A 1G6

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Dimensional change in domestic laundering of textiles

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

This National Standard of Canada CAN/CGSB-4.2 No. 58-2019 supersedes the 2004 edition.

Changes since the previous edition

- This standard specifies the use of a standardized washing machine intended for laboratory use rather than the use of a domestic washing machine.
- Six washing procedures are specified rather than seven.
- Five drying procedures are specified rather than six.
- One restoration procedure is specified rather than three.
- Standard reference detergents have been specified for consistency in washing procedures.
- Referenced Publications have been updated.

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Introduction

There have been significant advances in washing machine technologies since the previous version of this standard. The types of washing machines now available to consumers are greater than ever, ranging from traditional top loading agitator models to the latest innovations in high efficiency machines, each machine offering a variety of washing cycles.

This new edition of CAN/CGSB-4.2 No. 58 is a significant departure from previous versions in that it no longer specifies the use of a domestic washing machine. As washing machines continue to evolve, so must the equipment parameters specified in laundering standards. Given the rate at which washing machines have been changing, it is nearly impossible to specify equipment parameters that will remain relevant for long. It has become challenging for testing laboratories to consistently source washing machines that meet specific machine parameters. This standard now specifies the use of a standardized washing machine intended for laboratory use.

During the development of this standard, a comparative study was conducted by committee members to determine if a correlation exists between the performance of the legacy domestic washing machine and two standardized laboratory washing machines. The final report detailing the results of the comparative study was unavailable at the time of publication of this standard.¹

Finally, it is acknowledged that the laundering procedures included in this standard are sometimes referenced for the “pre-treatment” of textiles prior to conducting other tests. For instance, a textile may need to be laundered a specific number of times prior to flammability testing. End users are cautioned that the scope of this standard is strictly for the determination of dimensional stability. This standard does not give consideration to aspects of the laundering process that may affect the performance of textiles, such as the presence of detergent residues.

¹ At the time of publication of this standard, it is unknown whether the results obtained from the three types of washing machines are comparable. Once available, results from the comparative study conducted by committee members may be obtained from the Canadian General Standards Board (see 3.1.1).

Textile test methods

Dimensional change in domestic laundering of textiles

1 Scope

This method determines the dimensional change of fabrics or garments, likely to occur in domestic laundering. A fabric specimen or garment is subjected to an appropriate combination of specified washing, drying and restoration procedures.

This method contains six washing, five drying and one restoration procedure as listed below:

Washing procedures

- 1 – 30 °C, low mechanical action, synthetic detergent
- 2 – 30 °C, moderate mechanical action, synthetic detergent
- 3 – 40 °C, low mechanical action, synthetic detergent
- 4 – 40 °C, moderate mechanical action, synthetic detergent
- 5 – 50 °C, moderate mechanical action, synthetic detergent
- 6 – 60 °C, moderate mechanical action, synthetic detergent

Other temperatures may be used and are reported.

Drying procedures

- A – Drip dry
- B – Flat dry
- C – Line dry
- D1 – Tumble dry normal
- D2 – Tumble dry permanent press
- D3 – Tumble dry delicate
- E – Tumble dry without heat

Restoration procedure

- I – Hand iron.

Before using this method, the combination of procedures suitable for the particular item to be tested will be selected to arrive at the appropriate test. A complete test consists of a washing, drying and, if necessary, a restoration procedure.

EXAMPLE Test 1.D2.I means that the fabric specimen or garment has been washed at 30 °C with low mechanical action, tumble dried using permanent press setting and restored by hand iron.

The final result obtained will depend upon the choice of test conditions as well as the number of laundering cycles conducted.

A laundering cycle consists of both a washing procedure and a drying procedure. The number of laundering cycles to be conducted will be specified by the end user.

This method is suitable for use with woven or knitted fabrics and also with garments and other textile articles. This method is also applicable to certain nonwoven fabrics. For nonwovens, the principal directions of measurement will be machine direction and cross direction (perpendicular to the machine direction).

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 will 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 may be used to determine dimensional change.

Safety

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.

Units of measure

Quantities and dimensions in this standard are given in SI units.

2 Principle

A fabric specimen or garment is washed in an automatic washing machine and dried by one of the specified procedures and, where necessary, subjected to a restoration procedure.

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

3 Normative references

The following normative documents contain provisions that, through reference in this text, constitute provisions of this National Standard of Canada. The referenced documents may be obtained from the sources noted below.

NOTE The addresses provided below were valid at the date of publication of this method.

An undated reference is to the latest edition or revision of the reference or document in question, unless otherwise specified by the authority applying this method. A dated reference is to the specified revision or edition of the reference or document in question.

3.1 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. 25.1 — *Dimensional change in wetting*.

3.1.1 Source

The above 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. Email: ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site: <http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html>.

It may also be obtained from the Government of Canada Publications, Publishing and Depository Services, Public Services and Procurement Canada, Ottawa, ON, K1A 0S5. Telephone: 1-800-635-7943 or 613-941-5995. Fax: 1-800-565-7757 or 613-954-5779. Email: publications@tpsgc-pwgsc.gc.ca. Website: <http://publications.gc.ca/site/eng/home.html>.

3.2 American Association of Textile Chemists and Colorists (AATCC)

AATCC LP1-2018 — *Home Laundering: Machine Washing*.

3.2.1 Source

The above may be obtained from AATCC, 1 Davis Drive, PO Box 12215, Research Triangle Park, NC 27709-2215, U.S.A. Web site: <https://www.aatcc.org>.

4 Apparatus and reagents

4.1 Washing machine²: top loading type washing machine capable of running the washing procedures specified in Table 1.

4.2 Detergents

4.2.1 AATCC Standard Reference High Efficiency (HE) Detergent.

4.2.2 AATCC 1993 Standard Reference Detergent.

4.2.3 Other detergents may be used and shall be reported.

4.3 Ballast: additional undyed fabric may be required to give the specified load. This ballast shall consist of fabric similar to that being tested and cut into pieces no larger than 1 m².

4.4 Dryer: clothes dryer with a timed cycle and exhaust temperatures conforming to those specified in Table 2.

² Such as Vortex M6 AATCC Monograph Instrument, or equivalent.

³ Specified detergents may be obtained from AATCC Online Services, <https://members.aatcc.org/>.

4.5 Hand iron

4.6 Measuring scale: a ruler graduated in millimetres.

Alternatively, a shrinkage scale may be used.

5 Test specimens

5.1 Fabrics

At least two fabric specimens shall be tested⁴.

5.1.1 Cut each specimen at least 380 × 380 mm from areas free from wrinkles and creases⁵. 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, sewing thread), suitably mark on each specimen six accurately measured distances at least 250 mm long, three parallel to each of the two principal directions of the fabric. The three marked distances shall be at least 75 mm apart and no closer than 60 mm to the specimen edges. Suitably protect the cut edges of fabrics that are likely to fray during washing.

5.2 Garments and other textile articles

When testing a textile 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.^{4 and 6}

6 Washing procedures

6.1 Determine the mass of the specimens, and add sufficient ballast to obtain a total dry mass of 1.8 kg ± 0.1 kg.

6.2 Allow the wash tub to fill with water. Add a sufficient amount of AATCC Standard Reference High Efficiency (HE) Detergent (10-50 mL) or AATCC 1993 Standard Reference Detergent (up to 66 g) to provide good running suds⁷. Allow the washing machine to agitate briefly to dissolve the detergent.

6.3 Place the specimens and the ballast in the washing machine.

6.4 Set the washing machine to wash in accordance with one of the procedures outlined in Table 1.

6.5 Cold water shall be used for the rinse cycle.

6.6 If the specimens are to be drip-dried, stop the washing machine before the final spin cycle and remove the specimens without extracting the water. Otherwise, allow the washing machine to continue until the end of the final spin cycle.

6.7 Remove the specimens from the washing machine, taking care that they are neither stretched nor distorted, and dry them by one of the five procedures described in section 7.

⁴ 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 are to be tested.

⁵ If the size of the specimen to be tested is smaller than specified, it should be pinned to a larger piece of similar fabric for testing.

⁶ 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.

⁷ Water hardness will affect the ability to achieve “reasonably good suds”, thus the quantity of detergent should be adjusted to suit local conditions.

Table 1 — Wash conditions for top loading type washing machine

Wash procedure	Mechanical action	Washing				Rinse			
		Temp.	Liquor level	Wash time	Agitation	Liquor level	Rinse time	Spin time	Spin speed
		°C	L	min	spm ^a	L	min	min	rpm
1	Low	30 ± 3	72 ± 4	8 ± 1	27 ± 2	57 ± 4	3 ± 1	4 ± 1	500 ± 20
2	Moderate	30 ± 3	72 ± 4	12 ± 1	86 ± 2	57 ± 4	3 ± 1	6 ± 1	660 ± 20
3	Low	40 ± 3	72 ± 4	8 ± 1	27 ± 2	57 ± 4	3 ± 1	4 ± 1	500 ± 20
4	Moderate	40 ± 3	72 ± 4	12 ± 1	86 ± 2	57 ± 4	3 ± 1	6 ± 1	660 ± 20
5	Moderate	50 ± 3	72 ± 4	12 ± 1	86 ± 2	57 ± 4	3 ± 1	6 ± 1	660 ± 20
6	Moderate	60 ± 3	72 ± 4	12 ± 1	86 ± 2	57 ± 4	3 ± 1	6 ± 1	660 ± 20

^a Strokes per minute.

NOTE 1 The data presented in Table 1 is partly sourced from Table 1 of AATCC LP1. Replacement data specific to this CGSB standard is also used as well as additional data parameters specific to this method.

NOTE 2 Table 1 is adapted with modification, with permission, from AATCC LP1-2018, *Home Laundering: Machine Washing*, copyright AATCC, 1 Davis Drive, PO Box 12215, Research Triangle Park, NC 27709-2215, USA. A copy of the complete standard may be obtained from AATCC, www.aatcc.org (see 3.2.1).

7 Drying procedures

7.1 Procedure A — Drip dry

7.1.1 Stop the washing machine before the final spin cycle and remove the specimens without extracting the water. Suspend the specimens from a line in still air at room temperature, attaching them at two adjacent corners and the top edge, 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 until moisture equilibrium is reached.

7.1.3 Measure the marked distances on the specimens to the nearest 1 mm and calculate the average dimensional change for the warp and weft (wales and courses) separately, as a percentage of the original measurements.

7.2 Procedure B — Flat dry

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

7.2.2 Condition and measure the specimens in accordance with 7.1.2 and 7.1.3.

7.3 Procedure C — Line dry

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

7.3.2 Condition and measure the specimens in accordance with 7.1.2 and 7.1.3.

7.4 Procedure D — Tumble dry

7.4.1 Place the specimens and ballast (if any) in the tumble dryer and set the temperature control to generate the correct exhaust temperature as specified in Table 2. Operate the dryer until the load is dry and continue tumbling, with the heat turned off, for the specified amount of time. Remove the specimens immediately.

NOTE A load is considered completely dry when it is dry to the touch and its mass is within 0% and -5% of its starting mass.

Table 2 — Tumble drying conditions

Designation	Exhaust temperature °C	Cool-down min
Normal (D1)	66 ± 5	5-10
Permanent press (D2)	66 ± 5	>10
Delicate (D3)	< 60	5-10

7.4.2 Other drying conditions may be used and shall be reported.

7.4.3 Condition and measure the specimens in accordance with 7.1.2 and 7.1.3.

7.5 Procedure E — Tumble dry without heat

7.5.1 Place the specimens and ballast (if any) in the tumble dryer without heat. Operate the dryer until the load is dry. Remove the specimens immediately.

7.5.2 Condition and measure the specimens in accordance with 7.1.2 and 7.1.3.

8 Restoration procedure

8.1 Hand iron

8.1.1 Press the fabric specimen or garment by raising and lowering the hand iron. To avoid distorting the fabric, do not slide the hand iron over the specimen. Use a temperature suitable for the fabric being pressed⁸.

8.1.2 Condition and measure the specimen in accordance with 7.1.2 and 7.1.3.

⁸ The following temperatures may be safely used for pressing fabrics:

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

9 Report

Report the following information:

- 9.1 the complete test procedure used (Arabic numeral for washing procedure, uppercase letter [with Arabic numeral as required] for drying procedure and Roman numeral for restoration procedure, if used — e.g. Test 1.D2.I);
- 9.2 washing temperature used, if other than those specified;
- 9.3 the type and amount of detergent used;
- 9.4 drying conditions used, if other than those specified;
- 9.5 the ironing temperature, if applicable;
- 9.6 the average percentage dimensional change for each of the principal directions of the specimen 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 hand ironing restoration procedure where applicable;
- 9.7 the number of this method: CAN/CGSB-4.2 No. 58-2019.