Government of Canada
Gouvernement du Canada

Canadian General Standards Board
Office des normes générales du Canada

CAN/CGSB-138.1-2019
Reaffirmed May 2024
Supersedes CAN/CGSB-138.1-96

Fabric for chain link fence

Canadian General Standards Board CGSB

Canada

Experience and excellence
Expérience et excellence
CGSB ONGC

Canadian General Standards Board statement

The CANADIAN GENERAL STANDARDS BOARD (CGSB), under whose auspices this standard has been developed, is a government directorate within Public Services and Procurement 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 CGSB develops and offers as National Standards of Canada conform to the requirements and guidance established for this purpose by the Standards Council of Canada. In addition to standards it publishes as National Standards of Canada, CGSB may produce other deliverables that meet particular needs, in response to requests from a variety of sources in both the public and private sectors. CGSB standards and CGSB's 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's standards are subject to review and revision to ensure that they keep abreast of technological progress. CGSB will review and publish this standard on a schedule not to exceed five years from 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 may be issued as amendments or as new editions of standards.

An up-to-date listing of CGSB's standards, including details on latest issues and amendments, is found in the CGSB Catalogue at the following Web site, http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html, 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 or service against this standard may require the use of materials and/or equipment that could be hazardous. This standard 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 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.

For enforcement purposes, standards shall be considered published the final day of the month of their publication date.

Contact the Canadian General Standards Board

To obtain information on CGSB, its services and standards or to obtain CGSB publications, please contact us:

web — http://www.tpsgc-pwgsc.gc.ca/ongc-cgsb/index-eng.html

e-mail — ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca

telephone — 1-800-665-2472

mail — Canadian General Standards Board
140 O'Connor Street, Tower East
Ottawa, Ontario Canada K1A 0S5

Standards Council of Canada statement

A National Standard of Canada is a standard developed by a Standards Council of Canada (SCC) accredited Standards Development Organization, in compliance with requirements and guidance set out by SCC. More information on National Standards of Canada can be found at www.scc.ca.

SCC is a Crown corporation within the portfolio of Innovation, Science and Economic Development (ISED) Canada. With the goal of enhancing Canada's economic competitiveness and social well-being, SCC leads and facilitates the development and use of national and international standards. SCC also coordinates Canadian participation in standards development, and identifies strategies to advance Canadian standardization efforts.

Accreditation services are provided by SCC to various customers, including product certifiers, testing laboratories, and standards development organizations. A list of SCC programs and accredited bodies is publicly available at www.scc.ca.

NATIONAL STANDARD OF CANADA

CAN/CGSB-138.1-2019
Reaffirmed May 2024

Supersedes CAN/CGSB-138.1-96

Fabric for chain link fence

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

ICS 91.090

Published May 2024 by the
Canadian General Standards Board
Ottawa, Ontario K1A 0S5

CANADIAN GENERAL STANDARDS BOARD

Standards Committee on Wire Fencing

(Voting membership at date of ballot)

Chair

Christina Marra	Roma Fence Group of Companies Ltd. (User)

General interest category

Keith Dyer	Consultant ─ Independent
Martin McCooey	Canadian Fence Industry Association

Producer category

Alexandre Gravel	Nova Steel Inc.
Andre Berner	Protin Imports Ltd.
Anthony Turco	Metro Fence and Fittings Ltd.
Cameron LeSauvage	Master Halco Corp.
Collin Rowe	Phoenix Fence Corp.
Joe Leone	Shield Fence and Wire Products Inc.
Pamela McCracken	Tree Island Steel Ltd.
Robert J. Tower	Del Metals
Tom Legerski	Ameristar Perimeter Security

User category

Brianne Davis-Meldrum	Davis Fences
Cathie Hofstetter	McGowan Fence & Supply Ltd.
John Christiaanse	Defence Construction Canada
Keith Robinson	Dialog
Ken Scherk	Steelguard Fence Ltd.
Mike Pearsall	Ministry of Transportation of Ontario
Nick Bratkowski	Raybern Erectors Ltd.
Stephen Chang	Public Services and Procurement Canada ─ Ontario Region
Tim Roche	Provincial Fence Products Ltd.

Committee Manager (non-voting)

Astrid Lozano	Canadian General Standards Board

Translation of this National Standard of Canada was conducted by the Government of Canada.

Preface

This National Standard of Canada CAN/CGSB-138.1-2019 has been reaffirmed by the Committee on Wire Fencing in May 2024.

The following definitions apply in understanding how to implement this National Standard of Canada:

- "shall" indicates a **requirement**;
- "should" indicates a **recommendation**;
- "may" is used to indicate that something is **permitted**;
- "can" is used to indicate that something is **possible**, for example, that an organization is able to do something.

Notes accompanying clauses do not include requirements or alternative requirements. The purpose of a note accompanying a clause is to separate explanatory or informative material from the text. Annexes are designated normative (mandatory) or informative (non-mandatory) to define their application.

Contents

Page

Tables

Fabric for chain link fence

1 Scope

This standard gives the requirements for various properties of chain link fence fabric used in commercial and industrial applications.

Some quantities and dimensions used in this standard are given in SI units with imperial equivalents shown in brackets where appropriate.

All imperial measurements are industry standard nominal measurements. All metric references are closest conversions to industry standard. The imperial units are regarded as being official in the event of dispute.

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 existing applicable regulatory requirements prior to its use.

2 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 contact information provided below was valid at the date of publication of this standard.

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 standard. A dated reference is to the specified revision or edition of the reference or document in question.

2.1 ASTM International

Annual Book of ASTM Standards (see Annex A)

2.1.1 Contact information

The above may be obtained from ASTM International. Telephone: 1-877-909-2786. Web site: https://www.astm.org. They can also be obtained from Standards Store by Accuris. Telephone: 613-237-4250 or 1-800-267-8220. Web site: https://global.ihs.com.

3 Terms and definitions

For the purposes of this National Standard of Canada, the following terms and definitions apply.

3.1
chain link fence fabric
fencing material made from wire helically wound and interwoven in such a manner as to provide a continuous mesh without knots or ties except in the form of knuckling or twisting of the ends of the wires to form the selvage of the fabric.

3.2
knuckling
type of selvage obtained by interlocking adjacent wire ends, in pairs, and then bending the wire ends back into a closed loop.

3.3
twisting
type of selvage obtained by twisting adjacent wire ends together, in pairs, in a close helix of 1-1/2 machine turns, which is equivalent to three full twists. The wire ends beyond the twist shall be at least 6 mm long.

4 Classification

4.1 The fence fabric shall be supplied in the following types, classes, gauges and grades (coating weights) as shown in Table 1 and shall be as specified (see 9.1).

Table 1 — Classification of fabric

Type	Class	Gauge	Grade (Coating weight)
1. Steel fabric	A. Zinc-coated galvanized before weaving	Heavy 6 ga	Grade 1: 1.2 oz[a] Grade 2: 1.6 oz[a] Grade 3: 2.0 oz[a]
		Medium 9 ga	
		Light 11 ga	
	B. Vinyl-coated	Heavy 6 ga	NA
		Medium 9 ga	
		Light 11 ga	
2. Aluminum alloy fabric	NA	Heavy 6 ga	NA
		Medium 9 ga	

[a] See 6.1.2

5 General requirements

5.1 Materials and workmanship

5.1.1 Materials used for the construction of chain link fence fabric shall be produced by methods recognized as good commercial practice.

5.1.2 The fabric shall be of uniform quality and condition, and shall be free from any defects or imperfections that might adversely affect its serviceability and appearance.

5.1.3 The base metal shall be of such quality and purity that when drawn to the size of wire specified, the finished fence fabric shall be uniform and have the properties and characteristics as detailed in this standard.

5.2 Manufacturing progress characteristics

5.2.1 Type 1, Class A

Fabric that is zinc-coated before weaving may be made from either electrolytically or hot-dip galvanized wire.

5.2.2 Type 1, Class B

Fabric that is vinyl-coated shall be made from galvanized steel wire that meets the requirements of this standard. The fabric shall be vinyl-coated before weaving by a thermal extrusion or fusion process.

5.2.3 Gauge of fabric

The gauge of fabric is designated according to the diameter of the coated wire.

6 Detailed requirements

6.1 Type 1, class A ─ Zinc-coated steel fabric

6.1.1 Zinc

The slab zinc used for coating shall conform to ASTM B6.

6.1.2. Grade (coating weight)

The weight of coating (mass per unit area of the zinc) shall be as determined in 8.2.1.

6.1.2.1 The grade for zinc-coated fabric before weaving shall be as follows:

a) Grade 1 (1.2 oz): The average mass per unit area of zinc coating shall not be less than 366 g/m^2 (1.2 oz/ft^2) of uncoated wire surface, as determined from the average results of two or more specimens, and not less than 330 g/m^2 (1.08 oz/ft^2) of uncoated wire surface for any individual specimen.

b) Grade 2 (1.6 oz): The average mass per unit area of zinc coating shall not be less than 490 g/m^2 (1.6 oz/ft^2) of uncoated wire surface, as determined from the average results of two or more specimens, and not less than 440 g/m^2 (1.44 oz/ft^2) of uncoated wire surface for any individual specimens.

c) Grade 3 (2.0 oz): The average mass per unit area of zinc coating shall not be less than 610 g/m^2 (2.0 oz/ft^2) of uncoated wire surface, as determined from the average results of two or more specimens, and not less than 550 g/m^2 (1.8 oz/ft^2) of uncoated wire surface for any individual specimens.

6.2 Type 1, class B ─ Vinyl-coated fabric

6.2.1 Zinc

The slab zinc used for coating of the steel core wire shall conform to ASTM B6.

6.2.2 Mass per unit area of core wire coating

The mass per unit area of zinc coating shall be as determined in 8.2.1.

6.2.2.1 The mass per unit area of zinc coating shall not be less than 90 g/m^2 (0.3 oz/ft^2) of uncoated wire surface, as determined from the average of results of two or more specimens, and not less than 80 g/m^2 (0.27 oz/ft^2) of uncoated wire surface for any individual specimen.

6.2.3 Adhesion

The zinc coating shall adhere to the steel wire when tested in accordance with 8.2.2.

6.2.4 Vinyl coating

Vinyl-coated wire used for the manufacture of fence fabric shall be coated before weaving by thermally extruding or fusing vinyl over the zinc-coated core wire. The minimum thickness applicable to coatings on the core wire shall be in accordance with Table 2.

6.2.5 Density

The density of vinyl shall be a maximum of 1.30 g/cm^3, when tested in accordance with ASTM D792.

6.2.6 Hardness

The durometer hardness of extruded vinyl shall be Type A — 93 ± 3 when tested in accordance with ASTM D2240.

6.2.7 Tensile strength and elongation

The tensile strength of extruded vinyl shall be 18 MPa ± 5%, and elongation shall be 275% minimum when tested in accordance with ASTM D412.

Table 2 — Minimum vinyl coating thickness

Gauge	Nominal diameter of vinyl-coated finished wire mm (in.)	Nominal diameter of zinc-coated core wire mm (in.)
Heavy 6 ga	4.88 (0.192)	3.61 (0.142)
Medium 9 ga	3.50 (0.138)	2.41 (0.095)
Light 11 ga	3.00 (0.118)	2.03 (0.080)

6.2.8 Accelerated aging

The vinyl-coated wire shall not crack, craze, or become loose when tested in accordance with 8.2.3.

6.3 Type 2 — Aluminum alloy fabric

6.3.1 Material

The fence fabric of aluminum alloy wire shall conform to the requirements of ASTM B211 in the H18 temper, or of any alloy having equivalent or greater strength and corrosion resistance.

6.4 Types 1 and 2 — Fabric properties

6.4.1 Weave and size

Wire shall be woven throughout in the form of approximately uniform square mesh, having parallel sides and horizontal and vertical diagonals of approximately uniform dimensions. The top and bottom of the fabric shall be knuckled or twisted as specified in 6.4.3. The size of mesh and the height of chain link fence fabric shall be as shown in Tables 3, 4 and 5 and as specified in 9.1. Measurements of diameter, size and height shall be made in accordance with 8.2.4, 8.2.5 and 8.2.6.

6.4.2 Breaking strength

The wire shall meet the minimum breaking strength requirements shown in Tables 3, 4 and 5 when tested in accordance with 8.2.7.

Table 3 — Type 1 class A — Zinc-coated steel fabric — Size and breaking strength

Gauge	Nominal diameter of zinc-coated wire mm (in.)	Permissible variations in diameter of zinc-coated wire ±mm (in.)	Size of mesh diamond (±3 mm) mm (in.)	Height of fence fabric (±25 mm) m[a]	Minimum breaking strength N (lbf)
Heavy 6 ga	4.88 (0.192)	0.13 (0.005)	38 (1-1/2) 50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66, 4.88	9700 (2180)
Medium 9 ga	3.50 (0.138)	0.13 (0.005)	38 (1-1/2) 50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66, 4.88	5000 (1125)
Light 11 ga	3.0 (0.118)	0.13 (0.005)	38 (1-1/2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66	3600 (810)
			50 (2)	0.91, 1.22, 1.52, 1.83	

[a] The following is the conversion for height of fence fabric:
0.91 m – 36 in.; 1.22 m – 48 in.; 1.52 m – 60 in.; 1.83 m – 72 in.; 2.13 m - 84 in.; 2.44 m – 96 in.; 3.05 m – 120 in.; 3.66 m – 144 in.; 4.88 m – 192 in.

Table 4 — Type 1, class B — Vinyl-coated steel fabric — Size and breaking strength

Gauge	Nominal diameter of vinyl-coated finished wire mm (in.)	Permissible variations in diameter of coated wire ±mm (in.)	Size of mesh (±3 mm) mm (in.)	Height of fence fabric (±25 mm) m[a]	Minimum breaking strength[b] N (lbf)
Heavy 6 ga	4.88 (0.192)	0.13 (0.005)	38 (1-1/2) 50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66, 4.88	4225 (950)
Medium 9 ga	3.50 (0.138)	0.13 (0.005)	38 (1-1/2) 50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66, 4.88	1890 (425)
Light 11 ga	3.00 (0.118)	0.13 (0.005)	38 (1-1/2) 50 (2)	0.91, 1.22, 1.52, 1.83	1335 (300)

[a] The following is the conversion for height of fence fabric:
0.91 m – 36 in.; 1.22 m – 48 in.; 1.52 m – 60 in.; 1.83 m – 72 in.; 2.13 m – 84 in.; 2.44 m - 96 in.; 3.05 m – 120 in.; 3.66 m – 144 in.; 4.88 m – 192 in.

[b] Breaking strengths are calculated on core wire equivalent tensile strength of 60 000 psi (min).

Table 5 — Type 2 — Aluminum alloy fabric — Size and breaking strength

Gauge	Nominal diameter of aluminum alloy wire mm (in.)	Permissible variations in diameter of wire ±mm (in.)	Size of mesh (±3 mm) mm (in.)	Height of fence fabric (±25 mm) m[a]	Minimum breaking strength N (lbf)
Heavy 6 ga	4.88 (0.192)	0.13 (0.005)	50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66	5000 (1125)
Medium 9 ga	3.50 (0.138)	0.13 (0.005)	50 (2)	0.91, 1.22, 1.52, 1.83, 2.13, 2.44, 3.05, 3.66	2500 (560)

[a] The following is the conversion for height of fence fabric:
0.91 m – 36 in.; 1.22 m – 48 in.; 1.52 m – 60 in.; 1.83 m – 72 in.; 2.13 m – 84 in.; 2.44 m – 96 in.; 3.05 m - 120 in.; 3.66 m – 144 in.; 4.88 m – 192 in.

6.4.3 Selvage

Heavy and medium fabric 1.524 m (5 ft.) high and under shall be furnished with knuckling at each selvage and fabric over 1.524 m (5 ft.) high shall be furnished with any combination of twisting or knuckling at each selvage (see 9.1). Knuckle twisted is referred to as KT, knuckle knuckle is referred to as KK and twist-twist is referred to as TT.

6.4.4 Standard length of rolls

The standard length of roll shall be 15.24 m ± 1% [50 ft for 9 ga and 11 ga fabric, and 25 ft (7.62 m) for 6 ga fabric] except as otherwise agreed upon at the time of purchase (see 9.1). The length of roll shall be determined as described in 8.2.8.

7 Preparation for delivery

7.1 Marking

Unless otherwise specified (see 9.1), each roll of fabric shall be marked to show:

Type, class, gauge and grade of coating

Nominal size

Nominal length and height of fabric in each roll

Name of the manufacturer.

8 Inspection

8.1 Sampling

Unless otherwise specified (see 9.1), one roll from every 50 rolls or fraction thereof shall be taken at random as a sample for test purposes, and in no case shall less than two samples be tested.

8.1.1 To determine compliance with the requirements of this standard, test specimens for each of the tests specified shall be taken from the outside end of the sample rolls representing the lot.

8.1.2 If any specimen tested fails to meet the requirements of this standard, the roll represented by the specimen shall be rejected and two additional rolls shall be tested, both of which shall meet all the requirements.

8.1.3 Unless otherwise stipulated by the authority applying this standard, alternative tests for mass per unit area of coating when galvanized prior to weaving and for breaking strength made on the wire prior to weaving may be substituted for tests made on the wire from the finished fabric.

8.2 Testing

8.2.1 Mass per unit area of zinc coating (Grade)

8.2.1.1 Determine the mass per unit area of the zinc coating on an individual piece of wire removed from the fabric. This specimen may be of any length over 300 mm (12 in.) and shall include both bends and straight sections, but shall not include knuckles.

8.2.1.2 Determine the mass per unit area of zinc coating in accordance with ASTM A90/M90.

8.2.2 Adhesion of zinc coating

Determine the adhesion of the zinc coating on the wire as follows: Wrap a sample of the wire at least twice in a close helix around a cylindrical mandrel having a diameter four times the nominal wire diameter. (Wrapping speed shall not exceed 15 turns per minute). Then examine, the adherence of the zinc coating to the wire to determine compliance with the stated requirement.

8.2.3 Accelerated aging of vinyl-coated wire

The vinyl used for coating wires shall have a demonstrated ability to withstand exposure for 1000 h without failure at a black panel temperature of 63 °C when tested in accordance with ASTM D1499. The product shall be construed to have failed the test if:

a) The wire fails to withstand a mandrel bend test when subjected to a single bend at -29 °C around a mandrel no larger than ten times the diameter of the wire and exhibits breaks or cracks in the vinyl coating. The mandrel and wire shall be conditioned at -29 °C for at least 1 h.

b) The shrinkage of the vinyl coating is greater than 5 mm/m of wire.

c) There is a significant change in the colour or the gloss of the vinyl surface as determined by visual inspection.

8.2.4 Diameter of wire

Determine the diameter of the coated wire as the average of two readings taken at right angles to each other on the straight portion of the parallel sides of the mesh and measure to the nearest 0.03 mm (0.001 in.).

8.2.5 Size of mesh diamond

Determine the size of the mesh by measuring the minimum clear distance between the wires forming the parallel sides of the mesh.

8.2.6 Height of fabric

Determine the height of the fabric using the overall dimension from the ends of the knuckles or from the knuckle and the twist.

8.2.7 Breaking strength

Determine the conformance to the breaking strength requirement using individual pickets from a section of the fence fabric. The specimens shall be of sufficient length so as to be firmly gripped in the testing machine after straightening. Limit the actual gauge length (distance between jaws) of the specimen to the undeformed length of wire between the two adjacent straightened bends.

8.2.8 Length of a roll

Determine the length of a roll by first unrolling a roll of fabric on a flat surface and exerting tension by appropriate means to remove all slack. The tension applied shall not reduce the actual height of the fabric by more than 5 mm/m (1/4 in./yard) of height or by more than 13 mm (1/2 in.), whichever is less.

9 Options

9.1 The following options shall be specified in the application of this standard:

a) Type, class, gauge and grade (coating weight) of fabric (see 4.1)

b) Size of mesh diamond and height of fabric (see 6.4.1)

c) Whether fabric shall be furnished with knuckle/knuckle, knuckle/twist or twist/twist at each selvage (see 6.4.3).

d) Standard length of roll if other than as specified (see 6.4.4)

e) Marking details, if other than as specified (see 7.1)

f) Sampling, if other than as specified (see 8.1).

9.2 Basis of purchase

Unless otherwise stated in the purchase documents, all samples shall be included in the contract quantity.

Annex A
(normative)

Referenced ASTM International publications (see 2.1)

Annual Book of ASTM Standards

ASTM A90/A90M	Standard Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
ASTM B6	Standard Specification for Zinc
ASTM B211	Standard Specification for Aluminum and Aluminum-Alloy Rolled or Cold Finished Bar, Rod, and Wire
ASTM D412	Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers ─Tension
ASTM D792	Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
ASTM D1499	Standard Practice for Filtered Open-Flame Carbon-Arc Exposures of Plastics
ASTM D2240	Standard Test Method for Rubber Property ─ Durometer Hardness