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Installation of chain link fence

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CAN/CGSB-138.3-2019

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Installation of chain link fence

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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-138.3-2019 supersedes the 1996 edition.

Changes since the previous edition

- Added imperial units (inches/feet)
- Added second decimal place units in metres
- Added bigger sizes of pipe and depths of the pipe
- Added driven fence for light commercial fence
- Added power fastened ties and the detail on bracing at corners and straining posts

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Installation of chain link fence

1 Scope

This standard applies to the installation of chain link fence used in commercial and industrial applications. It gives the requirements for chain link fence installation in earth, rock, or rock with overburden of earth.

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 addresses provided below were 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 Canadian General Standards Board (CGSB)

CAN/CGSB-138.1 — *Fabric for chain link fence*

CAN/CGSB-138.2 — *Steel framework for chain link fence*

CAN/CGSB-138.4 — *Gates for chain link fence.*

2.1.1 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. E-mail ncr.cgsb-ongc@tpsgc-pwgsc.gc.ca. Web site 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>.

2.2 Canadian Standards Association (CSA)

CAN/CSA G164 — *Hot Dip Galvanizing of Irregularly Shaped Articles* (withdrawn).

2.2.1 Source

The above may be obtained from the Canadian Standards Association Group, 5060 Spectrum Way, Mississauga, ON, Canada L4W 5N6. Telephone 416-747-2496. Fax 416-305-6187. Website: <http://www.csagroup.org>.

2.3 National Research Council of Canada

National Building Code of Canada (latest applicable version).

2.3.1 Source

The above may be obtained from the National Research Council of Canada, Publication Sales, Building M-23A, Ottawa, Ontario K1A 0R6. Telephone 1-800-672-7990 or 1-613-993-2463. Website https://www.nrc-cnrc.gc.ca/eng/publications/codes_centre/2015_national_building_code.html

3 Terms and definitions

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

3.1

bottom rail

tubular or fabricated steel section at bottom of fence between posts following grade.

3.2

bottom tension wire

wire installed between fence posts to provide for attachment of chain link fence fabric.

3.3

brace rail

tubular or fabricated steel section used for bracing terminal posts.

3.4

fence posts

upright tubular or fabricated steel member for supporting fencing material.

3.5

hot rings

special wire ties used to tie chain link fabric to bottom wire and top tension wire.

3.6

line posts

fence posts spaced at regular intervals between terminal posts throughout each stretch of fence.

3.7

terminal posts

fence posts which include corner, end, gate and straining posts, as follows:

3.7.1

corner posts

fence posts positioned at corners and changes of direction greater than ten degrees.

3.7.2

end posts

fence posts positioned at the ends of a stretch of fence.

3.7.3**gate posts**

two fence posts forming a gateway.

3.7.4**straining posts**

fence posts positioned at changes in grade greater than 30°.

3.8**top rail**

a tubular or fabricated steel section continuously joined by means of sleeves or couplings throughout each stretch of fence extending between terminal posts.

3.9**top tension wire**

wire installed between fence posts as an option to the top rail.

3.10**wire ties**

wire that is used to tie chain link fence fabric to line posts, top rails or bottom wires.

4 General requirements

4.1 All material entering into the chain link fence installation shall be of high quality in every respect. All workmanship shall be in accordance with accepted standards of modern engineering practice. Chain link fence fabric covered by this standard shall be in accordance with CAN/CGSB-138.1.

4.2 Chain link fence framework and gate components covered by this standard shall be in accordance with CAN/CGSB-138.2 and CAN/CGSB-138.4 respectively.

4.3 Construction, including material and workmanship, shall be free from any characteristics or defects which may render the installed chain link fence unsuitable for the intended purpose.

4.4 At the completion of the installation, all debris shall be removed from the site. Earth removed from post holes shall be spread over the area adjacent to the fence lines unless disposal is otherwise specified by the authority applying this standard (see clause 7).

5 Detailed requirements

5.1 Line and level

The fence shall be so installed that on completion it is truly on the line as specified (see clause 7). The top of the fence shall follow approximately the profile of the natural ground or the grade levels as specified (see clause 7).

5.2 Terminal posts

The location of terminal posts, comprising end, gate, corner and straining posts, shall be as specified (see clause 7). A corner post shall be installed at changes of direction greater than ten degrees. A straining post shall be installed at changes in grade greater than 30°. Straining posts shall be spaced no greater than 150 m (500 ft) apart, equally spaced on long runs to assure equal tension of fabric.

5.2.1 Brace rails are recommended at corner, end, gate and straining posts (see Figure 1). Brace rails are required on fences 1.8 m (6 ft) tall and over. Brace rails are installed using rail ends and centre bands at each end.

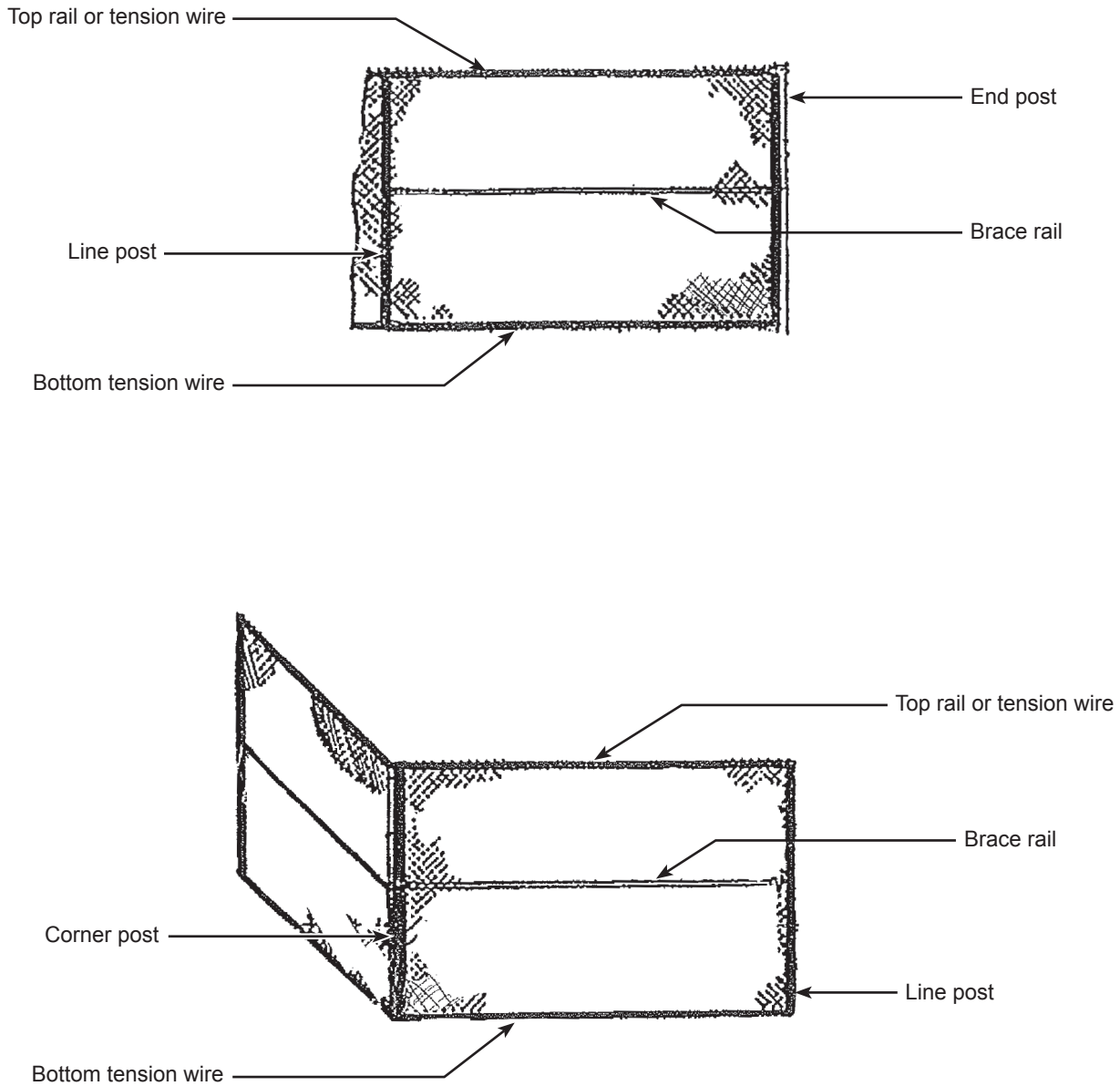


Figure 1 — Application of brace rail and truss rod

5.3 Line posts

Line posts shall be spaced at intervals not to exceed 3.1 m (10 ft) when measured from centre to centre between terminal posts. In determining the post spacing, measurement shall be made parallel to the slope of the natural ground, or grade when specified (see clause 7). All line posts shall be installed in a vertical position.

5.4 Footing design and construction

The basis for any footing design shall be the National Building Code of Canada. The footing (or mechanical device embedded directly in soil) shall be capable of withstanding the specified loadings of terminal and line posts for the type of soil or rock existing at the site where the fence is to be installed. The footing shall have resistance to frost heave and, in general, shall conform to the following requirements:

- a) The depth of footing shall not be less than frost penetration in an average year unless otherwise specified (see clause 7). Footings for corner posts should be 300 mm (12 in.) deeper than for line posts.
- b) There shall be no enlargement of the upper part of the footing. For augered, cylindrical footings, the top 250 mm (10 in.) of concrete may have to be formed to prevent this condition and to provide a smooth surface to break the frost grip of the surface soil.
- c) All materials used in footing construction shall be durable. Concrete shall exhibit a minimum strength of 20 MPa after 28 d. Any embedded steel components shall be hot-dip galvanized in accordance with the requirements of CAN/CSA G164.

5.4.1 Soil footings¹

The procedure followed in constructing soil footings shall require earth-augering the hole, plumbing and setting the post. The post shall be imbedded directly into concrete and no closer than 150 mm (6 in.) from bottom of hole. Figure 2 shows details and dimensions for typical soil footing designs in average soil conditions, based on the use of galvanized steel pipe conforming to CAN/CGSB-138.2 as fence post material. The dimensions shown shall be treated as minimum dimensions unless a detailed soil investigation has been made and footings designed in accordance with the requirements specified in 5.4.

¹ Footing construction is not suitable where the soil is unstable, or in fill that has not been properly consolidated, or in areas subject to unusually severe frost or frost heaving.

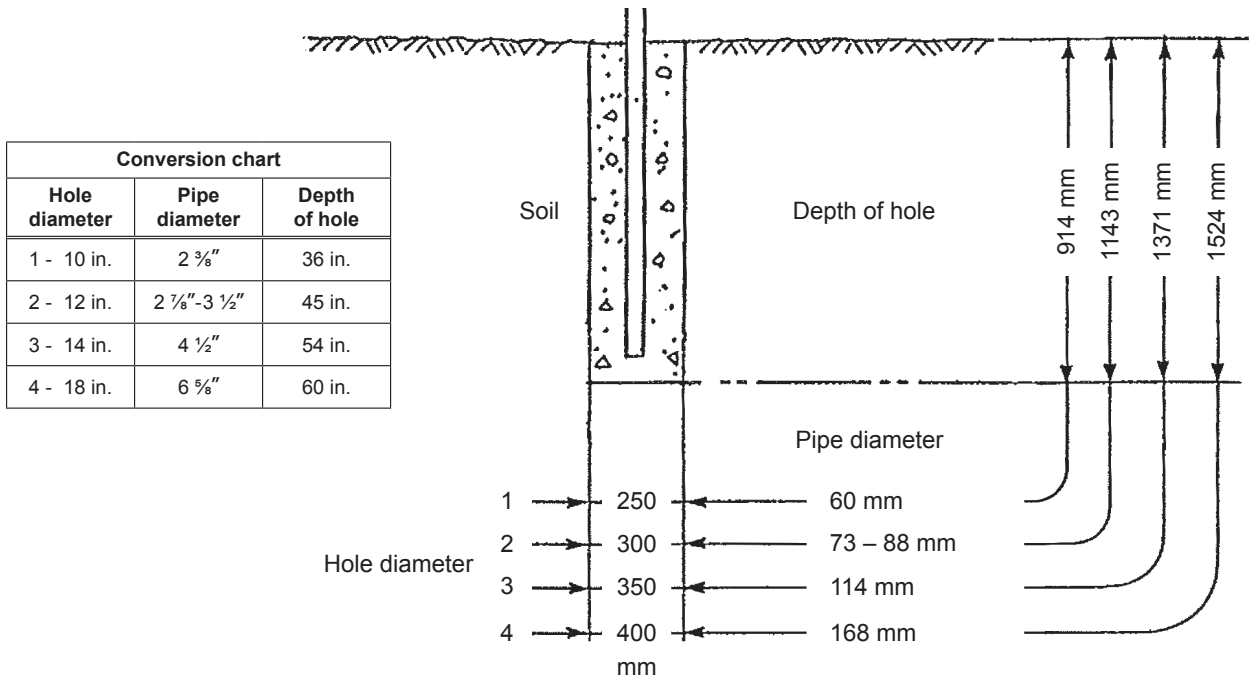


Figure 2 — Footing in average soil conditions

5.4.2 Solid rock footings

Figure 3 shows a typical design of footing in solid rock where there is overburden. Figure 4 shows the footing in solid rock where there is no overburden. In each case, the hole in the solid rock is approximately 25 mm (1 in.) larger than the diameter of the pipe and, after the post has been set and plumbed, the hole is filled with non shrink grout. Other approved grouting materials may be specified (see clause 7).

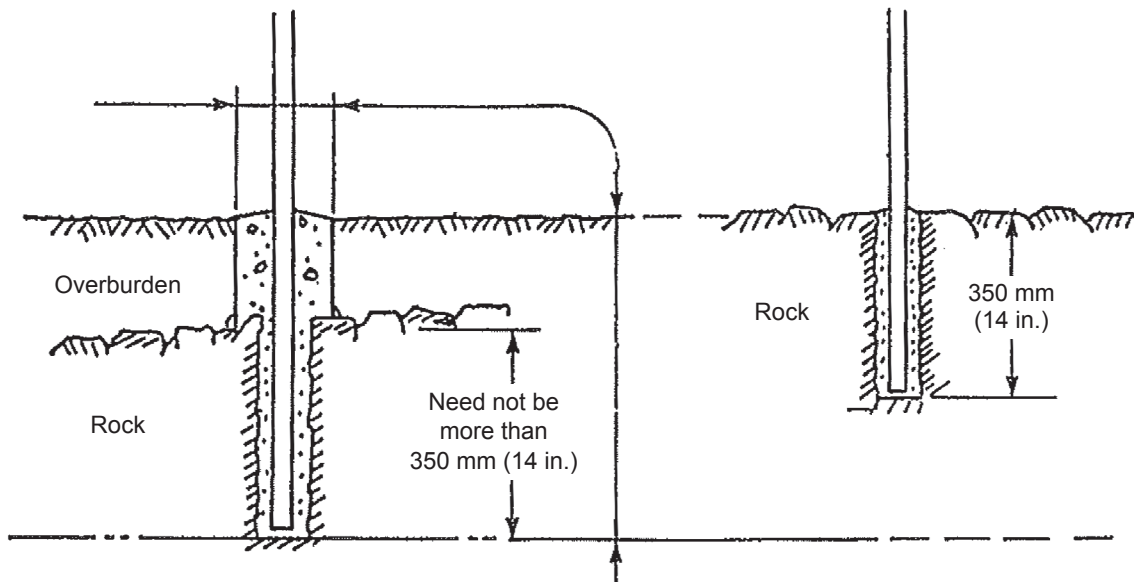


Figure 3 — Footing in partly solid rock

Figure 4 — Footing in solid rock

5.4.3 Mechanically driven posts directly in soil

For use on light commercial applications, where a detailed soil investigation has been made. Based on the use of galvanized steel pipe conforming to CAN/CGSB-138.2 as fence post material. All posts shall be at least 300 mm (12 in.) longer in length depending on soil conditions. Not recommended for corner, end, gate and straining posts. Follow 5.4.1 and 5.4.2 for all terminal posts.

5.5 Post setting

All fence posts shall be plumb and aligned accurately. They may be anchored directly in rock with grout. In such cases and where concrete is not provided between rock level and grade level, the height of fence for design sizing purposes in accordance with CAN/CGSB-138.2 shall be taken as the height above grade plus the distance from grade level to rock level or the overall length of the post whichever is less. Backfill around footings shall be thoroughly stamped in 150 mm (6 in.) layers. Soil unsuitable for consolidation shall not be used. Where earth augering is used, the hole shall be free of water and any loose soil in the bottom of the footing shall be removed and compacted to provide a solid bottom. Posts shall be imbedded directly into concrete and no closer than 150 mm (6 in.) from bottom of hole.

5.5.1 Top rail or top wire and other horizontal rails (e.g. centre and bottom rails) as described in CAN/CGSB-138.2 should be installed using water proof line caps appropriate for each application. Top rail shall be attached with rail ends and centre bands at all terminal posts. Chain link fence located in close proximity to highways should not use top rail or bracing (check with local regulatory bodies). Bottom and top wires should be fastened securely to all terminal posts so wire is taut.

5.6 Chain link fence

The chain link fabric shall be installed on the outside of the fence unless requirements for installation on the inside of the fence is specified (see clause 7). The fabric shall be stretched taut approximately 50 mm (2 in.) above the natural ground or grade level and securely fastened to the terminal posts with steel tension bars and tension bands. The fabric shall be tailored for each span of fence and attached independently at all terminal posts. Fastening to line posts shall be with wire ties, metal bands or clips, or other approved methods, attached at maximum 400 mm (16 in.) intervals. The top edge of the fabric shall be fastened to the top rail with wire ties at intervals not exceeding 600 mm (24 in.). The bottom edge of the fabric shall be fastened to the bottom wire with wire ties, hog rings, or knuckling bottom wire in knuckled selvage, at intervals not exceeding 600 mm (24 in.). Rolls of fabric shall be joined by weaving a single strand of fabric into the ends of the rolls to form a continuous mesh.

5.6.1 Wire ties (see Figure 5)

Posts and rails shall be fastened using manually fastened wire ties or power fastened wire ties (see clause 7).

Manually fastened wire ties shall attach one strand of chain link fabric to the posts and rail by hooking or twisting (two complete turns) one end of the tie to the fabric and tightly wrapping the tie around the post or rail having the remaining end of tie secured to the fence fabric with two twists drawing the tie tight. Power fastened wire ties shall be installed as per manufactures instructions. The end of the tie shall be positioned on post or rail so that it is parallel to the chain link fabric. The end of wire ties shall not protrude beyond the vertical plane of chain link fabric. Ties shall be down tight to posts or rails after twisting.

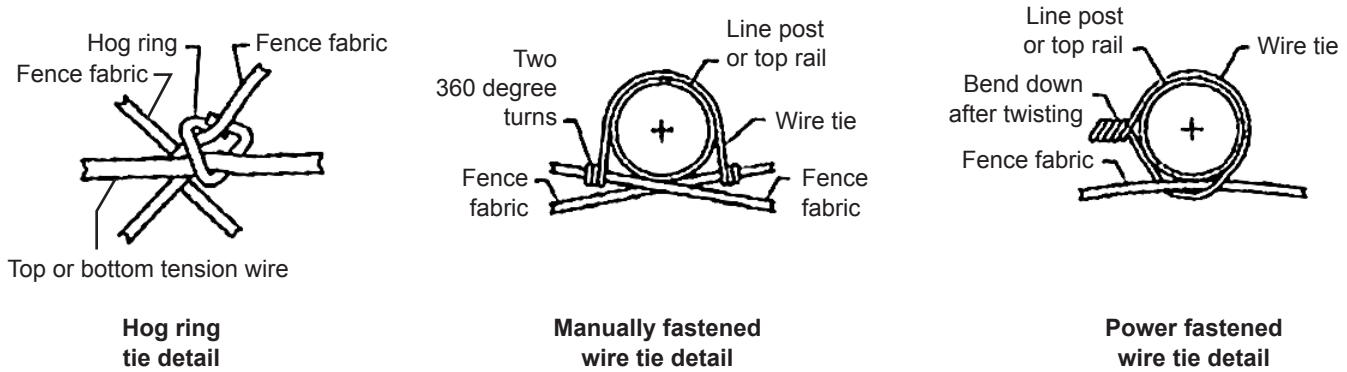


Figure 5 — Tying options

5.7 Barbed wire

For safety reasons and as specified in CAN/CGSB-138.2, barbed wire shall not be installed on fences that are less than 1.8 m (6 ft) in height prior to installation of the barbed wire.

6 Inspection

All parts of the chain link fence installation shall be visually inspected to determine their conformance with the workmanship, design, and dimensional requirements of this standard.

7 Options

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

- a) Requirements for disposal of earth removed from post holes (see 4.4)
- b) Line and level requirements for fence installation (see 5.1)
- c) Grade specification (see 5.1)
- d) Location of terminal posts (see 5.2)
- e) Line post spacing (see 5.3)
- f) Depth of footing (see 5.4 a)
- g) Grouting materials (see 5.4.2)
- h) Requirements for installation of chain link fabric on inside of fence (see 5.6)
- i) Choice of wire ties (see 5.6.1).