CCMC CANADIAN CODE COMPLIANCE EVALUATION

CCMC EVALUATION

CCMC 13675-R

CCMC Canadian code compliance evaluation

CCMC number:	13675-R
Status:	Active
Issue date:	2014-07-10
Modified date:	2023-04-17
Evaluation holder:	**GoliathTech Inc.** 477 Boulevard Poirier Magog QC J1X 7L1 Canada Website: www.goliathtechpiles.com Telephone: 819-843-4777 / 1-855-743-4777 Email: info@goliathtechpiles.com
Product name:	GoliathTech screw pile
Compliance:	NBC 2015, OBC
Criteria:	CCMC-TG-316615.13-15A "CCMC Technical Guide for Augered-Installed Steel Piles"

In most jurisdictions this document is sufficient evidence for approval by Canadian authorities.
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Compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated product, when used as an auger-installed steel pile in a foundation system in accordance with the conditions and limitations stated in this evaluation, complies with the following code:

National Building Code of Canada 2015

Code provision	Solution type
4.2.3.8.(1)(e) CSA G40.21, "Structural Quality Steel."	Acceptable
4.2.3.10.(1) Where conditions are corrosive to steel, ...	Acceptable
4.2.4.1.(1) The design of foundations, excavations a ...	Acceptable
9.4.1.1.(1)(c)(i) Part 9, or	Acceptable

Ontario Building Code

Ruling No. 16-07-337 (13675-R) authorizing the use of this product in Ontario, subject to the terms and conditions contained in the Ruling, was made by the Minister of Municipal Affairs and Housing on 2016-11-25 pursuant to s.29 of the Building Code Act, 1992 (see Ruling for terms and conditions). This Ruling is subject to periodic revisions and updates.

The above opinion(s) is/are based on the evaluation by the CCMC of technical evidence provided by the evaluation holder, and is bound by the stated conditions and limitations. For the benefit of the user, a summary of the technical information that forms the basis of this evaluation has been included.

Product information

Product name

GoliathTech screw pile

Product description

The product is an earth anchor constructed of helical-shaped circular steel blades that are welded to a steel shaft. The blades are constructed as a helix with a carefully controlled pitch.

The anchor type and blade diameter are chosen based on the bearing capacity of the soil and the load the auger-installed steel pile is designed to support. The central shaft is used to transmit torque during installation and to transfer axial loads to the helical plates. The foundation system comes with various other accessories, such as support plates to adapt to the building structure, extension shafts and connectors.

- The steel plates and accessories conform to CSA G40.21 50W, “General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steel,” 350 MPa.
- The steel tubes conform to ASTM A 500/A 500M-13, “Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes,” Grade C, 320 MPa.

Table 1. Anchor types

Type	Exterior pile shaft diameter	Pile wall thickness	Available helical blade diameter	Helical blade thickness
Pile 1 7/8 in.	48 mm / 1.875 in.	3.9 mm / 0.154 in.	From 228 mm / 8 in. to 431 mm / 17 in.	9.5 mm / 0.375 in.
Pile 2 3/8 in.	60 mm / 2.375 in.	3.9 mm / 0.154 in.	From 228 mm / 9 in. to 431 mm / 17 in.	9.5 mm / 0.375 in.
			482 mm / 19 in.	12.7 mm / 0.500 in.
Pile 2 7/8 in.	73 mm / 2.875 in.	6.3 mm / 0.250 in.	From 228 mm / 9 in. to 431 mm / 17 in.	9.5 mm / 0.375 in.
			From 482 mm / 19 in. to 787 mm / 31 in.	12.7 mm / 0.500 in.
Pile 3 1/2 in.	89 mm / 3.5 in.	6.3 mm / 0.250 in.	From 228 mm / 9 in. to 431 mm / 17 in.	9.5 mm / 0.375 in.
			From 482 mm / 19 in. to 787 mm / 31 in.	12.7 mm / 0.500 in.

Figure 1 below shows a typical steel pile with a single helical blade.

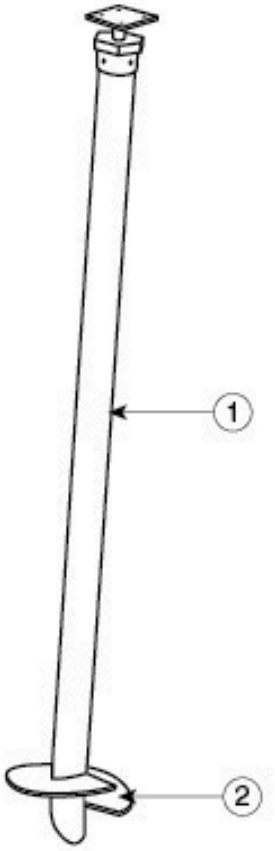

Figure 1. GoliathTech Inc.

1. Tube
2. Helical blade

Manufacturing plant

This evaluation is valid only for products produced at the following plant:

Product name	Manufacturing plant
	Magog, QC, CA
GoliathTech screw pile	✓

✓ Indicates that the product from this manufacturing facility has been evaluated by the CCMC

Conditions and limitations

The CCMC's compliance opinion is bound by this product being used in accordance with the conditions and limitations set out below.

- The product under this evaluation is intended to be used as a foundation system to support the following types of construction:
  - Single storey residential buildings within the scope of Part 9 of NBC 2015;
  - Accessory buildings such as sheds, gazebos, sunrooms, carports, and decks/porches within the scope of Part 9 of NBC 2015.

  Other applications are beyond the scope of this evaluation, wherein a professional engineer skilled in such design and licensed to practice under the appropriate provincial or territorial legislation must determine the pile capacity and other design parameters.

- The product may be used as part of a foundation system to support various constructions, provided that it is installed according to the manufacturer's current instructions and within the scope of this Report.
- When the product is installed in granular soil or silt, there is a direct relationship between the applied torque and the allowable compressive and tensile loads. The Allowable compressive and tensile loads for the proposed auger-installed pile in granular soil or silt table indicates the allowable compressive and tensile loads as a function of the applied torque.
- When the auger-installed steel pile is installed with granular material that exceeds 200 mm in diameter, the relationship between the applied torque and the allowable compressive and tensile loads is not as predictable. When it is installed in such soils, the allowable compressive and tensile loads have to be confirmed by on-site load tests. These load tests are also required if the allowable loads need to be greater than those stated in the Allowable compressive and tensile loads for the proposed auger-installed pile in granular soil or silt table and the Allowable compressive and tensile loads for the proposed auger-installed pile in cohesive soil table. The tests need to be conducted under the direct supervision of a professional geotechnical engineer, skilled in such design and licensed to practise under the appropriate provincial or territorial legislation.
- In all cases, a registered professional engineer skilled in such design and licensed to practise under the appropriate provincial or territorial legislation must determine the number and spacing of the auger-installed steel piles required to carry all the loads. A certificate attesting to the conformity of the installation and the allowable loads for the piles must be provided.
- The installation of the auger-installed steel pile must be carried out as per the manufacturer's instructions. The anchors must be screwed into the ground to below the frost line using mechanized equipment. The anchor is rotated into the ground with sufficient applied downward pressure (crowd) to advance the anchor one pitch distance per revolution. The anchor is advanced until the applied torque value attains a specified value. Extensions are added to the central shaft as needed. The applied loads may be tensile (uplift), or compressive (bearing). Helical anchors are rapidly installed in a wide variety of soil formations using a variety of readily available equipment. They are immediately ready for loading after installation.
- Where conditions (soil and environmental) are determined to be corrosive to steel, protection of the steel shall be provided. The determination of the presence of corrosive conditions and the specification of the corrosion protection shall be carried out by a registered professional engineer licensed to practise under the appropriate provincial or territorial legislation. If the determination of the presence of corrosive conditions is not completed before installation, the product, including all its accessories, is required to be hot-dipped galvanized, meeting the requirements of CAN/CSA-G164 (ASTM A123/A123M-17) with a minimum thickness of 610 g/m^2, or another

method that provides an equivalent level of protection and abrasion resistance deemed acceptable by the CCMC.

- The installer of the proposed auger-installed steel piles must be certified by GoliathTech Inc. Using approved equipment, the installer must follow the manufacturer's installation instructions and the uses and limitations specified in this Report. Each installer must carry a certification card bearing their signature and photograph.
- Each auger-installed steel pile must be identified with a label containing the manufacturer's identification and "CCMC 13675-R."

Technical information

This evaluation is based on demonstrated conformance with the following criteria:

Criteria number	Criteria name
CCMC-TG-316615.13-15A	CCMC Technical Guide for Augered-Installed Steel Piles

Performance requirements

The proposed auger-installed steel piles were tested to:

- ASTM D 1143/D 1143M-07(2013), “Standard Test Methods for Deep Foundations Under Static Axial Compressive Load,”
- ASTM D 3689/D 3689M-07(2013) e1, “Standard Test Methods for Deep Foundations Under Static Axial Tensile Load,” and

Testing was conducted at various sites that included granular and cohesive soils. A series of 51 tests were performed. The intent of the testing was to determine a correlation between the torque applied during installation and the allowable loads.

- In the **granular and silt-based soil** there was a good correlation between the torque applied during installation and the allowable loads. For the compressive loads noted in the table below, the factor of safety varied from 2.0 to 3.0. For the tensile loads, the factor of safety varied from 2.0 to 2.7.
- In the **cohesive soil** there was a good correlation between the torque applied during installation and the allowable loads. A factor of safety of 2.0 was used.
- For lateral loads in each soil condition, no correlation was possible.

Table 2. Allowable compressive and tensile loads for the proposed auger-installed pile in granular soil or silt (1)

Applied torque		Allowable load			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
678	**500**	20	4 500	12	2 700
1 017	**750**	23	5 175	15	3 375
1 356	**1 000**	27	6 075	18	4 050
1 695	**1 250**	30	6 750	20	4 500
2 034	**1 500**	33	7 425	23	5 175
2 373	**1 750**	37	8 325	26	5 850
2 712	**2 000**	40	9 000	29	6 252
3 051	**2 250**	44	9 900	32	7 200
3 390	**2 500**	47	10 575	34	7 650

Applied torque		Allowable load			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
3 728	**2 750**	51	11 475	37	8 325
4 067	**3 000**	54	12 150	40	9 000
4 406	**3 250**	57	12 825	42	9 450
4 745	**3 500**	61	13 725	45	10 125
5 084	**3 750**	64	14 400	48	10 800
5 423	**4 000**	68	15 300	51	11 475
5 762	**4 250**	71	15 975	54	12 150
6 101	**4 500**	74	16 650	57	12 825
6 440	**4 750**	78	17 550	59	13 275
6 779	**5 000**	81	18 225	62	13 950
5 457	**5 500**	88	19 800	67	15 075
8 135	**6 000**	95	21 375	72	16 200

Note:

1 The allowable loads identified in this table are only valid when the product is installed in granular soil or silt. The applied torque is the average of the values attained within the last 600 mm of installation. Special attention is required when the auger-installed steel piles are installed in a recently backfilled site or where the granular material exceeds 200 mm in diameter or in cohesive soils. In these cases, this table does not apply and the allowable loads need to be determined by on-site confirmatory testing.

Table 3. Allowable compressive and tensile loads for the proposed auger-installed pile in cohesive soil (1)

Applied torque		Allowable load			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
1 017	**750**	7	1 574	3	674
1 356	**1 000**	10	2 248	5	1 124
1 695	**1 250**	13	2 922	8	1 798
2 034	**1 500**	16	3 579	11	2 473
2 373	**1 750**	20	4 496	14	3 147

Applied torque		Allowable load			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
2 712	**2 000**	23	5 171	16	3 597
3 051	**2 250**	26	5 845	19	4 271
3 390	**2 500**	29	6 519	22	4 946
3 728	**2 750**	33	7 419	24	5 395
4 067	**3 000**	36	8 093	27	6 070
4 406	**3 250**	39	8 767	30	6 744
4 745	**3 500**	42	9 442	33	7 419
5 084	**3 750**	45	10 116	35	7 868
5 423	**4 000**	49	11 015	38	8 543
5 762	**4 250**	52	11 690	41	9 217
6 101	**4 500**	55	12 364	44	9 891

Note:

1 The allowable loads identified in this table are only valid when the product is installed in cohesive soil. The applied torque is the average of the values attained within the last 50 cm of installation. Special attention is required when the auger-installed steel piles are installed in a recently backfilled site or where the granular material exceeds 200 mm in diameter. In these cases, this table does not apply and the allowable loads need to be determined by on-site confirmatory testing.

Administrative information

Use of Canadian Construction Materials Centre (CCMC) assessments

This assessment must be read in the context of the entire CCMC Registry of Product Assessments, any applicable building code or by-law requirements, and/or any other regulatory requirements (for example, the Canada Consumer Product Safety Act, the Canadian Environmental Protection Act, etc.).

It is the responsibility of the user to confirm that the assessment they are using is current and has not been withdrawn or superseded by a later version on the CCMC Registry of Product Assessments.

Disclaimer

The National Research Council of Canada (NRC) has evaluated only the characteristics of the specific product described herein. The information and opinions in this evaluation are directed to those who have the appropriate degree of experience to use and apply its contents (such as authorities having jurisdiction, design professionals and specifiers). This evaluation is valid when the product is used as part of permitted construction, respecting all conditions and limitations stated in the evaluation, and in accordance with applicable building codes and by-laws.

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Language

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In the case of any discrepancy between the English and French version of this document, the English version shall prevail.

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CCMC recognition

The Canadian Construction Materials Centre (CCMC) assesses compliance with Canadian building, energy and safety codes. We are the only construction code compliance service supported and operated by the Government of Canada. Trusted by over 6,000 regulators across Canada.

> Most Canadian authorities having jurisdiction (AHJs) consider CCMC product assessments acceptable as evidence for product approval.

CCMC assessments are recognized by construction authorities across Canada:

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First Nations National Building Officers Association (FNNBOA)	(First Nations National Building Officers Association (FNNBOA))
Canadian Home Builders' Association (CHBA)	(Canadian Home Builders' Association (CHBA))
Alberta Building Officials Association (ABOA)	(Alberta Building Officials Associations (ABOA))
Saskatchewan Building Officials Association (SBOA)	(Saskatchewan Building Officials Association (SBOA))
Manitoba Building Officials Association (MBOA)	(Manitoba Building Officials Association (MBOA))
Ontario Building Officials Association (OBOA)	(Ontario Building Officials Association (OBOA))
New Brunswick Building Officials Association (NBBOA)	(New Brunswick Building Officials Association (NBBOA))
Nova Scotia Building Officials Association (NSBOA)	(Nova Scotia Building Officials Association (NSBOA))

> The CCMC provides code compliance assessments to Canadian code requirements, consulting nationwide with construction regulators to elicit regional variations in code requirements as well as provincial and local interpretations. Users are advised to review the technical information presented in CCMC assessments when making approval decisions. Learn more about how the CCMC provides a unique service for Canada.

For more information, contact the CCMC by phone at (613) 993-6189 or by email at ccmc@nrc-cnrc.gc.ca

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Code compliance as an acceptable solution

Code Compliance via Acceptable Solutions

> If a building design (e.g. material, component, assembly or system) can be shown to meet all provisions of the applicable **acceptable solutions** in Division B (e.g. it complies with the applicable provisions of a referenced standard), it is deemed to have satisfied the objectives and functional statements linked to those provisions and thus to have complied with that part of the Code.
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(a)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Acceptable Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

CCMC's code compliance opinions

All CCMC evaluation reports are opinions of code compliance established in accordance with the National Building Code of Canada, Subsection 1.2.1. "Compliance with this Code," which requires compliance to be achieved by:

- complying with the applicable acceptable solutions in Division B, or
- using an alternative solution that will achieve at least the minimum level of performance required by Division B in the areas defined by the objective and functional statements attributed to the applicable acceptable solutions.

The CCMC assesses compliance with Canadian building, energy and safety codes, and is trusted by over 6,000 regulators across Canada.

Code compliance as an alternative solution

Code Compliance via Alternative Solutions

> Where a design differs from the acceptable solutions in Division B, then it should be treated as an "**alternative solution**." A proponent of an alternative solution must demonstrate that the alternative solution addresses the same issues as the applicable acceptable solutions in Division B and their attributed objectives and functional statements. However, because the objectives and functional statements are entirely qualitative, demonstrating compliance with them in isolation is not possible. Therefore, Clause 1.2.1.1.(1)(b) identifies the principle that Division B establishes the quantitative performance targets that alternative solutions must meet. In many cases, these targets are not defined very precisely by the acceptable solutions [...] Nevertheless, Clause 1.2.1.1.(1)(b) makes it clear that an effort must be made to demonstrate that an alternative solution will perform as well as a design that would satisfy the applicable acceptable solutions in Division B—not “well enough” but “as well as.”
>
> — **National Building Code of Canada, Sentence A-1.2.1.1.(1)(b)**

The CCMC has determined that compliance with this provision of the Code has been demonstrated as an **Alternative Solution**. The evaluation report provides a summary of the basis of CCMC's compliance opinion.

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