

CCMC 13556-R

CCMC Canadian code compliance evaluation

CCMC number:	13556-R
Status:	Active
Issue date:	2011-11-07
Modified date:	2023-04-17
Evaluation holder:	<p>Supportworks, Inc. 11850 Valley Ridge Drive Papillion NE 68046 United States Website: www.supportworks.com Telephone: 1-800-281-8545 Email: JKortan@supportworks.com</p>
Product name:	Supportworks® Helical Foundation Systems and Devices
Code compliance:	NBC 2015, OBC
Evaluation requirements:	CCMC-TG-316615.13-15A "CCMC Technical Guide for Augered-Installed Steel Piles"

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Code 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."	<u>Acceptable</u>
4.2.3.10.(1) Where conditions are corrosive to steel, ...	<u>Acceptable</u>
4.2.4.1.(1) The design of foundations, excavations a ...	<u>Acceptable</u>
9.4.1.1.(1)(c)(i) Part 9, or	<u>Acceptable</u>

Ontario Building Code

Ruling No. 12-05-275 (13556-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 2012-05-17 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 is 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

Supportworks

Helical Foundation Systems and Devices

Product description

The shaft is manufactured into lead sections with helical plates and extension sections either with helical plates (helical extension) or without helical plates (plain extension). Lead sections are available in lengths of 1 524 mm, 2 134 mm or 3 048 mm and extension sections are available in net lengths of 762 mm, 1 372 mm, 1 981 mm or 2 896 mm. The leads and extensions are connected together with a welded coupling and two bolts. One or more blades, up to a maximum of four blades, can be used for the lead sections. The coupling compression capacity is designed for end-to-end contact of the shaft sections. The helical pile central shaft consists of a pipe with an outside diameter of 73 mm and a 7.0-mm wall. The welded coupling consists of a tube with an outside diameter of 89 mm and a 7.1-mm wall thickness. The pile sections are coupled together with two 19.1-mm diameter bolts and nuts. The bolts and nuts are zinc-coated in accordance with ASTM A 153/A 153M-09, "Zinc Coating (Hot-Dip) on Iron and Steel Hardware."

The helical plates are cut into a circular shape from 9.4-mm-thick steel plates and are formed into a true helix shape with outer diameters of 203 mm, 254 mm, 305 mm or 356 mm and are welded to the shaft lead and extension sections. [Figure 1](#) shows a diagram of the product.

The steel shaft, blades and accessories for the product conform to CSA G40.21-04(R2009), "Structural Quality Steel," while their galvanic coating with a minimum thickness of 610 g/m² meets the requirements of CAN/CSA-G164-M92(R2003), "Hot Dip Galvanizing of Irregularly Shaped Articles."

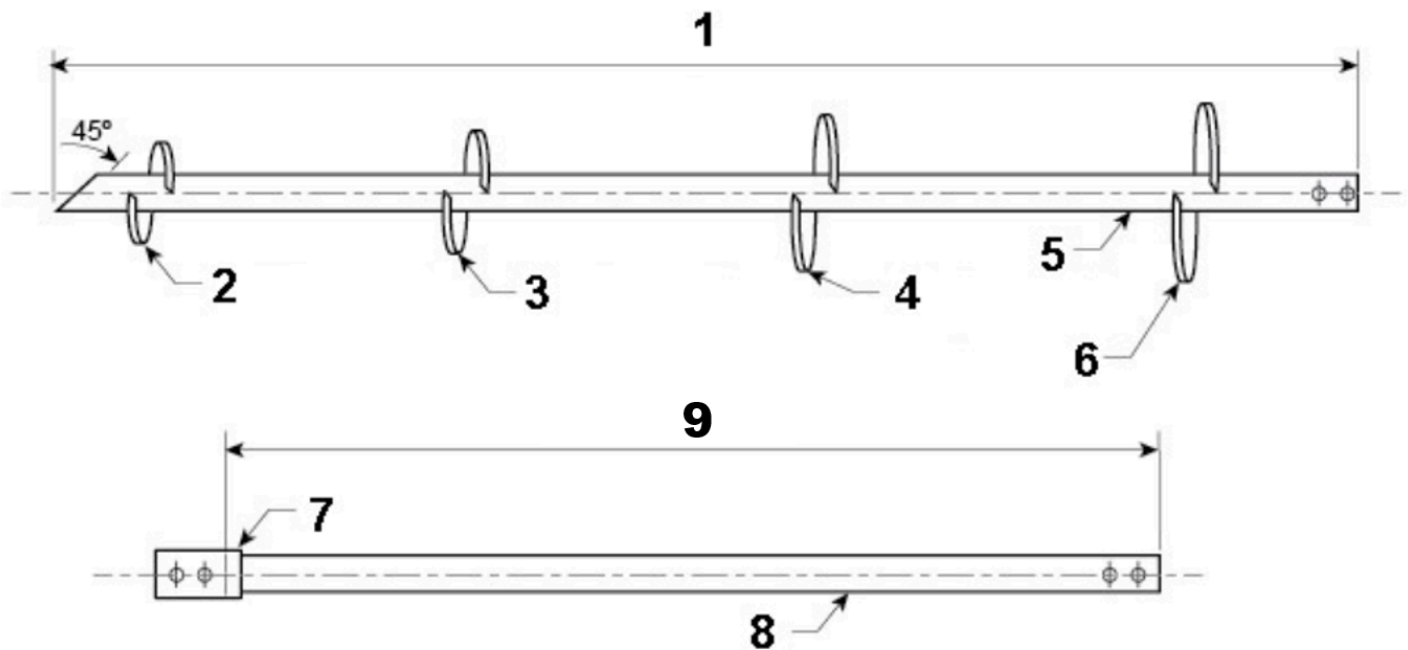


Figure 1. General diagram of the product

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1. Shaft length
2. Helix diameter "A"
3. Helix diameter "B"
4. Helix diameter "C"
5. Pile shaft
6. Helix diameter "D"
7. Coupler
8. Pile shaft
9. Net shaft length

Manufacturing plants

This evaluation is limited to products produced at the following plants:

Product name	Manufacturing plants	
	Columbus, NE, US	Omaha, NE, US
Supportworks® Helical Foundation Systems and Devices	☑	☑

☑ 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 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 Evaluation Report.
- When the product is installed in undisturbed or uniformly placed and well-engineered fill soils there is a direct relationship between the applied torque and the allowable compressive and tensile load. The Allowable compressive and tensile loads for the product table indicates the allowable compressive and tensile loads as a function of the applied torque ⁽¹⁾.
- When the auger-installed steel pile is installed in bedrock, the relationship between the applied torque and the allowable compressive and tensile load is not predictable. As a result, 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 product table. The tests must 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 using mechanized equipment. The anchor must be rotated into the ground with sufficient pressure applied downward (crowd) to advance the anchor one pitch distance per revolution. The anchor must be advanced until the applied torque value attains a specified value. Extensions must be added to the central shaft as needed. The applied loads may be tensile (uplift) or compressive (bearing). 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/m², or another method that provides an equivalent level of protection and abrasion resistance deemed acceptable by the CCMC.

- To be permitted to install auger-installed steel piles for the product, the installer must be certified by Foundation Supportworks®. Using approved equipment, the installer must meet the uses and limitations specified in this Report. Each installer must carry a manufacturer approved card bearing their signature and photograph.
- Each auger-installed steel pile for the product must be identified with a label containing the following information: manufacturer's identification and the phrase "CCMC 13556-R."

Note:

1 For additional information and system capacity tables, refer to Foundation Supportworks® Technical Manual dated July 2014.

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 product's auger-installed steel piles were tested in accordance with:

- ASTM D 1143/D 1143M-07e1, "Standard Test Methods for Deep Foundations Under Static Axial Compressive Load," and
- ASTM D 3689-07, "Standard Test Methods for Deep Foundations Under Static Axial Tensile Load."

Testing was conducted on two different sites: the first had bedrock and clay soil and the second had only bedrock and sand soil. A series of 16 tests were performed at the two sites, 8 tension tests and 8 compression tests. The intent of the testing was to determine a correlation between the torque applied during installation and the allowable loads.

In both cases (compression and tension), the load tests for test piles founded in bedrock did not always provide adequate correlation to the actual maximum capacities for piles installed in bedrock. Based on this result, correlation should only be applied to piles installed in undisturbed soils or uniformly placed and well-engineered fill soils. The correlation may not be applicable in uncontrolled fill situations. In such conditions it will be necessary to perform load tests to determine the capacity of the piles.

The correlation between the torque applied during installation and the allowable loads for compressive and tensile loads is noted in the table below. The factor of safety used was 2.0.

Table 1. Allowable compressive and tensile loads for the product ⁽¹⁾

Applied torque		Torque correlated allowable soil capacity			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
678	500	10	2 250	10	2 250
1 356	1 000	20	4 500	20	4 500
2 034	1 500	30	6 750	30	6 750
2 712	2 000	40	9 000	40	9 000
3 390	2 500	50	11 250	50	11 250
4 067	3 000	60	13 500	60	13 500
4 745	3 500	70	15 750	-	-
5 423	4 000	80	18 000	-	-
6 101	4 500	90	20 250	-	-

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Applied torque		Torque correlated allowable soil capacity			
		Compression		Tension	
N·m	(lbf·ft.)	kN	(lb)	kN	(lb)
6 779	5 000	100	22 500	-	-

Note:

- 1 The allowable loads identified in this table are only valid when the product is installed in undisturbed or uniformly placed and well-engineered fill soils. Special attention is required when the auger-installed steel piles are installed in recently backfilled sites or in bedrock soils. In these cases, the table above does not apply and the allowable loads must be determined by on-site confirmatory testing.

Administrative information

Disclaimer

This evaluation is issued by the Canadian Construction Materials Centre (CCMC), a part of the Construction Research Centre at the National Research Council of Canada (NRC). The evaluation must be read in the context of the entire [CCMC Registry of Product Assessments](#) and the legislated applicable building code in effect.

The CCMC was established in 1988 on behalf of the applicable regulator (i.e., the provinces and territories) to ensure—through assessment—conformity of alternative and acceptable solutions to regional building codes as determined by the local authority having jurisdiction (AHJ) as part of the issuance of a building permit.

It is the responsibility of the local AHJs, design professionals, and specifiers to confirm that the evaluation is current and has not been withdrawn or superseded by a later issue. Please refer to [the website](#) or contact:

Canadian Construction Materials Centre

Construction Research Centre
National Research Council of Canada
1200 Montreal Road
Ottawa, Ontario, K1A 0R6
Telephone: 613-993-6189
Fax: 613-952-0268

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Language

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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.

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(Alliance of Canadian Building Official Associations (ACBOA))

First Nations National Building Officers Association (FNNBOA)



(First Nations National Building Officers Association (FNNBOA))

Canadian Home Builders' Association (CHBA)



(Canadian Home Builders' Association (CHBA))

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(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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