

# CCMC 14098-R

## CCMC Canadian code compliance evaluation

<b>CCMC number:</b>	14098-R
<b>Status:</b>	Active
<b>Issue date:</b>	2018-05-24
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<b>Evaluation holder:</b>	<p><b>Twist Developments, Contracting and Construction Inc.</b></p> <p>49325 Range Rd. 262 Leduc AB T4X 2H8 Canada Website: <a href="http://www.twistinc.net">www.twistinc.net</a> Telephone: 403-783-5800 Email: <a href="mailto:dwaters@twistinc.net">dwaters@twistinc.net</a></p>
<b>Product names:</b>	<ul style="list-style-type: none"> <li>• Twist Helical Screw Pile SP1</li> <li>• Twist Helical Screw Pile SP2</li> </ul>
<b>Compliance:</b>	NBC 2015, OBC
<b>Criteria:</b>	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.**

[Learn more about CCMC recognition](#) [Look for the trusted CCMC mark on products to verify compliance.](#)

## Compliance opinion

It is the opinion of the Canadian Construction Materials Centre that the evaluated products, when used as a steel pile in a foundation system in accordance with the conditions and limitations stated in this evaluation, comply 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. 19-02-358 (14098-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 2019-01-18 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 names

- Twist Helical Screw Pile SP1
- Twist Helical Screw Pile SP2

## Product description

The product is a helical screw pile constructed of helical-shaped circular steel plates that are welded to a steel shaft. The plates are constructed as a helix with a carefully controlled pitch, similar to the thread on a screw.

The helical piles tested are summarized in the table below.

**Table 1. Specifications of the product**

Product	Outside diameter		Helix diameter × thickness	
	in.	mm	in.	mm
SP1	2.875	73	12 × 0.375	305 × 9.5
SP2	3.5	89	14 × 0.5	356 × 12.7

The pile type and helix diameter are chosen based on the bearing capacity of the soil and the load that the rotary-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 shaft, plates and accessories conform to CSA G40.20-13/G40.21-13, “General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.”

The figure below shows typical steel piles.

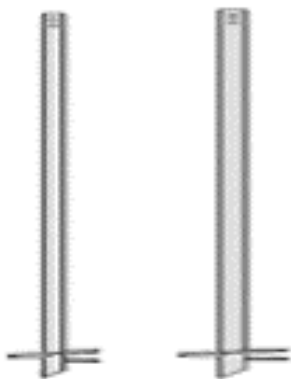


Figure 1. Twist Helical Screw Piles, SP1 and SP2

# Manufacturing plant

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

Product names	Manufacturing plant
	Leduc, AB, CA
Twist Helical Screw Pile SP1	☑
Twist Helical Screw Pile SP2	☑

☑ 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 evaluation.
- The structural application of these products shall be in strict accordance with the allowable load vs. applied torque tables prepared by the University of Alberta, which are reproduced in:
  - Allowable compressive and tensile loads for the SP1 rotary-installed pile in cohesive and cohesion-less soils, and
  - Allowable compressive and tensile loads for the SP2 rotary-installed pile in cohesive and cohesion-less soils.
- When the product is installed in cohesive and cohesion-less soils, there is a direct relationship between the applied torque and the allowable compressive and tensile loads. The tables under Technical information indicate the allowable compressive and tensile loads as a function of the applied torque.
- Load tests are required if the allowable loads need to be greater than those stated in the tables under Technical information. The tests must be conducted under the direct supervision of a professional geotechnical engineer, skilled in such design and licensed to practice under the appropriate provincial or territorial legislation.
- In all cases, a registered professional engineer skilled in such design and licensed to practice under the appropriate provincial or territorial legislation must determine the number and spacing of the rotary-installed steel piles required to carry the load. A certificate attesting to the conformity of the installation and the allowable loads for the piles must be provided.
- The installation of the rotary-installed steel pile must be carried out as per the manufacturer's instructions. The helical piles must be screwed into the ground to below the frost line using mechanized equipment. The helical pile is rotated into the ground with sufficient applied downward pressure to advance the helical pile one pitch-distance per revolution. The helical pile 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). The piles 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 practice 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 or ASTM A123/A123M with a minimum thickness of 610 g/m<sup>2</sup>, or subjected to

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

- The installer of the proposed rotary-installed steel piles must be certified by Twist Developments Inc. using approved equipment. The installer must follow the manufacturer's installation instructions and the uses and limitations specified in this evaluation. Each installer must carry a certification card bearing their signature and photograph.
- The evaluation holder has proprietary interest in this evaluation and any use must be authorized by Twist Developments Inc.
- Each rotary-installed steel pile must be identified with a label that contains the manufacturer's identification and the phrase "CCMC 14098-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

The evaluation holder has submitted technical documentation for the CCMC's evaluation. Testing was conducted at laboratories recognized by the CCMC. The corresponding technical evidence for this product is summarized below.

### Performance Requirements

The rotary-installed steel piles were tested to:

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

Testing was conducted at two different sites selected because they represent typical soil profiles encountered in Canada. A series of tests was performed covering a range of typical sand, and weak-clay to stiff-clay conditions. The intent of the testing was to determine a correlation between the torque applied during installation and the allowable loads. Testing showed a correlation between the torque applied during installation and the allowable loads. For the loads identified in the tables below, the factor of safety applied was 2.0 for compression and 2.5 for tension.

**Table 2. Allowable compressive and tensile loads for the SP1 rotary-installed pile in cohesive and cohesion-less soils**

Applied torque		Allowable loads - compression		Allowable loads - tension	
Nm	lbf	kN	lb	kN	lb
678	500	8.3	1 866	6.1	1 360
1 356	1 000	16.6	3 731	12.1	2 720
2 034	1 500	24.9	5 597	18.2	4 081
2 712	2 000	33.2	7 463	24.2	5 441
3 390	2 500	41.5	9 328	30.3	6 801
4 068	3 000	49.8	11 194	36.3	8 161
4 746	3 500	58.1	13 059	42.4	9 521
5 424	4 000	66.4	14 925	48.4	10 882
6 102	4 500	74.7	16 791	54.5	12 242
6 780	5 000	83	18 656	60.5	13 602
7 458	5 500	91.3	20 522	-	-
8 136	6 000	99.6	22 388	-	-

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**Table 3. Allowable compressive and tensile loads for the SP2 rotary-installed pile in cohesive and cohesion-less soils**

Applied Torque		Allowable loads - compression		Allowable loads - tension	
Nm	lbf	kN	lb	kN	lb
678	500	7.9	1 779	6.9	1 558
1 356	1 000	15.8	3 557	13.9	3 117
2 034	1 500	23.7	5 336	20.8	4 675
2 712	2 000	31.6	7 115	27.7	6 233
3 390	2 500	39.6	8 894	34.7	7 792
4 068	3 000	47.5	10 672	41.6	9 350
4 746	3 500	55.4	12 451	48.5	10 908
5 424	4 000	63.3	14 230	55.5	12 467
6 102	4 500	71.2	16 009	-	-
6 780	5 000	79.1	17 787	-	-
7 458	5 500	87	19 566	-	-
8 136	6 000	94.9	21 345	-	-



# 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

Une version française de ce document est disponible.

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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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(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))

Alberta Building Officials Association (ABOA)



(Alberta Building Officials Associations (ABOA))

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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](mailto:ccmc@nrc-cnrc.gc.ca)

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# Code compliance as an acceptable solution

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## 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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