



Evaluation Report CCMC 13193-R CHANCE Type SS175 HELICAL PILE

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1. Opinion

It is the opinion of the Canadian Construction Materials Centre (CCMC) that “Chance Type SS175 Helical Pile,” when used as an auger-installed steel pile in a foundation system in accordance with the conditions and limitations stated in Section 3 of this Report, complies with the National Building Code of Canada 2015:

- Clause 1.2.1.1.(1)(b) of Division A, as an alternative solution that achieves at least the minimum level of performance required by Division B in the areas defined by the objectives and functional statements attributed to the following applicable acceptable solutions:
 - Clause 4.2.3.8.(1)(e), Steel Piles
 - Sentence 4.2.3.10.(1), Corrosion of Steel
 - Sentence 4.2.4.1.(1), Design Basis
 - Subclause 9.4.1.1.(1)(c)(i), General (Structural Requirements)

This opinion is based on CCMC’s evaluation of the technical evidence in Section 4 provided by the Report Holder.

Ruling No. 07-08-166 (13193-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 2007-03-20 (revised on 2017-01-10) 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.

2. Description

The product is an earth anchor constructed of helical-shaped, circular steel blades welded to a steel shaft. The blades are constructed as a helix with a carefully controlled pitch. The blades are available in diameters of 203 mm, 254 mm, 305 mm, and 356 mm. The anchors come with one, two, three, or four helical blades. The spacing between the 203-mm and 254-mm blades is 610 mm; the spacing between the 254-mm and 305-mm blades is 760 mm, and the spacing between the 305-mm and 356-mm blades is 914 mm. The diameter and number of blades are chosen based on the bearing capacity of the soil and the load that the auger-installed steel pile is designed to support. The central shaft transmits torque during installation and transfers axial loads to the helical blades. The central shaft also provides most of the resistance to lateral loading. The shaft is a 44.5-mm square solid steel bar. The foundation system comes with other accessories, such as support plates to anchor the pile to the building structure, extension shafts, and connectors.

The steel shaft, blades and accessories that make up the product have a galvanic coating and conform to CAN/CSA-G40.21-98, “General Requirements for Rolled or Welded Structural Quality Steel/Structural Quality Steel.”

Figure 1 shows a typical steel pile with three helical bearing plates.

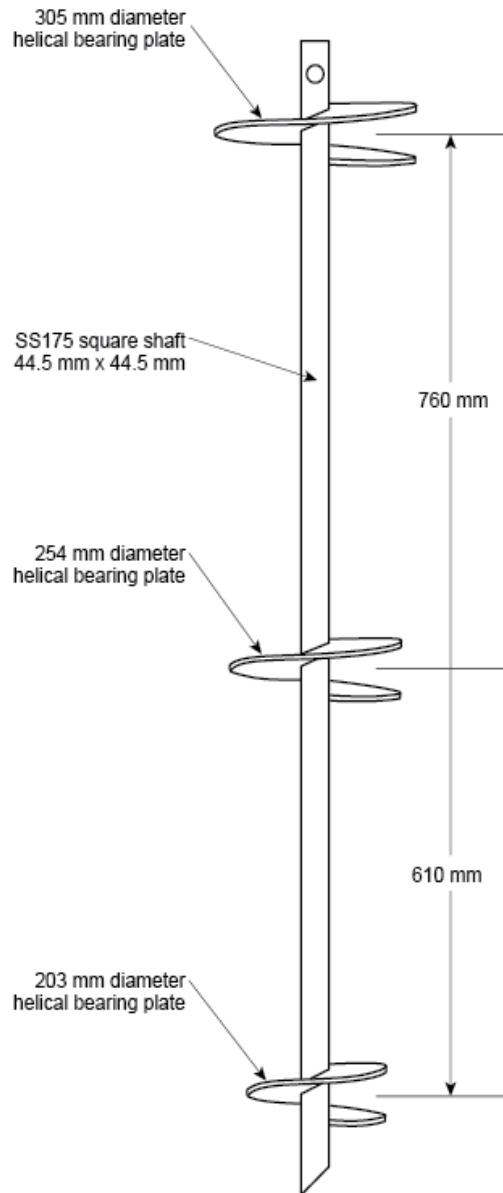


Figure 1. “Chance Type SS175 Helical Pile”

3. Conditions and Limitations

CCMC’s compliance opinion in Section 1 is bound by the “Chance Type SS175 Helical Pile” being used in accordance with the conditions and limitations set out below.

- When the product is installed as a deep helical foundation system in undisturbed soil, such as granular soil, silt, and some clays, there is a direct relationship between the applied torque and the allowable compressive and tensile loads. Table 3.1 indicates the allowable compressive and tensile loads as a function of the applied torque.
- When the auger-installed steel pile is installed in disturbed or sensitive soil, such as uncontrolled fill and sensitive clays, the relationship between the applied torque and the allowable compressive and tensile loads is not as predictable as when the steel pile is installed in undisturbed soil. When it is installed in disturbed or sensitive soils, the allowable compressive and tensile loads must be confirmed by on-site load tests. These load tests are required if the allowable loads need to be greater than those stated in Table 3.1.
- 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 structural engineer skilled in such design and licensed to practice 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.
- In all cases, the geotechnical engineer must provide a certificate attesting to the conformity of the installation and the allowable

loads for the piles.

- The installation of the auger-installed steel pile must be carried out in accordance with 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 applied downward pressure (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), compressive (bearing), or a combination thereof. Helical anchors can be installed quickly in a wide variety of soil formations using a variety of readily available equipment. They are ready for loading immediately after installation.
- In case of tensile or uplift forces, appropriate details at the connection between the pile and structure must be carried out by a registered professional engineer licensed to practice under the appropriate provincial or territorial legislation.
- 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 (ASTM A 123/A 123M-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 CCMC.
- Installers of the proposed auger-installed steel piles must be certified by Hubbell Power Systems, Inc. Using approved equipment, the installer must follow the manufacturer’s installation instructions and the conditions and limitations specified in this Report. Each installer must carry a certification card bearing their signature.
- Each proposed auger-installed steel pile must be identified with a label containing the following information:
 - the manufacturer’s identification; and
 - the phrase “CCMC 13193-R.”
- 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.

Table 3.1 Allowable Compressive and Tensile Loads for the Proposed Auger-installed Steel Pile⁽¹⁾⁽²⁾⁽³⁾

Applied Torque		Allowable Loads			
		Compression		Tension	
N·m	lbf	kN	lbs	kN	lb
678	500	11.2	2 500	8.8	2 000
1 356	1 000	22.4	5 000	17.6	4 000
2 034	1 500	33.6	7 500	26.4	6 000
2 712	2 000	44.7	10 000	35.3	8 000
3 390	2 500	55.9	12 500	44.1	10 000
4 068	3 000	67.1	15 000	52.9	12 000
4 746	3 500	78.3	17 500	61.7	14 000
5 424	4 000	89.5	20 000	70.5	16 000
6 102	4 500	100.7	22 500	79.3	18 000
6 780	5 000	111.9	25 000	88.1	20 000
7 458	5 500	123.1	27 500	97.0	22 000
8 136	6 000	134.2	30 000	105.8	24 000
8 814	6 500	145.4	32 500	114.6	26 000
9 492	7 000	156.6	35 000	123.4	28 000
10 170	7 500	167.8	37 500	132.2	30 000
10 848	8 000	179.0	40 000	141.0	32 000
11 526	8 500	190.2	42 500	149.8	34 000
12 204	9 000	201.4	45 000	158.7	36 000
12 882	9 500	212.6	47 500	167.5	38 000
13 560	10 000	223.7	50 000	176.3	40 000

Notes to Table 3.1:

- (1) The allowable loads identified in this table are only valid when the product is installed in undisturbed soils, such as granular soil, silt and some clays. Special attention is required when the auger-installed steel piles are installed in recently backfilled sites or in disturbed or sensitive soils, such as uncontrolled fill and sensitive clays. In these cases, Table 3.1 does not apply and the allowable loads need to be determined by on-site confirmatory testing.
 - (2) The allowable loads for uplift (tension) stated in Table 3.1 are applicable to deep helical foundation systems. A deep helical foundation system is a system whose top helix is embedded at a depth of at least seven times its diameter.
 - (3) For shallow helical foundation systems, i.e., where the embedment depth is less than seven times the diameter of the top helix, a larger safety factor should be used. It is recommended to use a safety factor of three in order to determine the allowable uplift (tension) load. In addition, a pile load test may be necessary to determine the uplift (tension) capacity of the helical foundation system.
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4. Technical Evidence

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

4.1 Performance Requirements

The proposed auger-installed steel piles were tested in accordance with ASTM D 1143-81, "Standard Test Method for Piles Under Static Axial Compressive Load," ASTM D 3689-90, "Standard Test Method for Individual Piles Under Static Axial Tensile Load," and ASTM D 3966-90, "Standard Test Method for Piles Under Lateral Loads."

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