



Evaluation Report CCMC 14039-R Ram Jack Helical Foundation Systems and Devices

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1. Opinion

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

- Clause 1.2.1.1.(1)(b), 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 the CCMC evaluation of the technical evidence in Section 4 provided by the Report Holder.

2. Description

The products consist of lead (shaft) section with helical-shaped blades that come with extension with or without helical blades. The lead section and the corresponding extension consist of a 73 mm or an 89 mm outside diameter steel pipe that has a nominal wall thickness of 5.51 mm or 6.35 mm, respectively.

The lead and extension sections are connected by a solid internally threaded pin and box connection that is welded on the trailing end of the lead section and each end of the extension. Helical-shaped blades that are shop welded to the shaft advance the pile into the soil when rotated. The helical blades are 203 mm, 254 mm, 305 mm or 356 mm in diameter and are 9.5 mm or 12.7 mm thick. The helical blades are pressed using a hydraulic press and die to achieve a 76-mm pitch prior to being welded to the lead (shaft) section.

The lead shaft and extensions are coated with a polyethylene copolymer coating with a minimum coating thickness of 0.46 mm. Figure 1 shows a typical steel pile with a single helix.

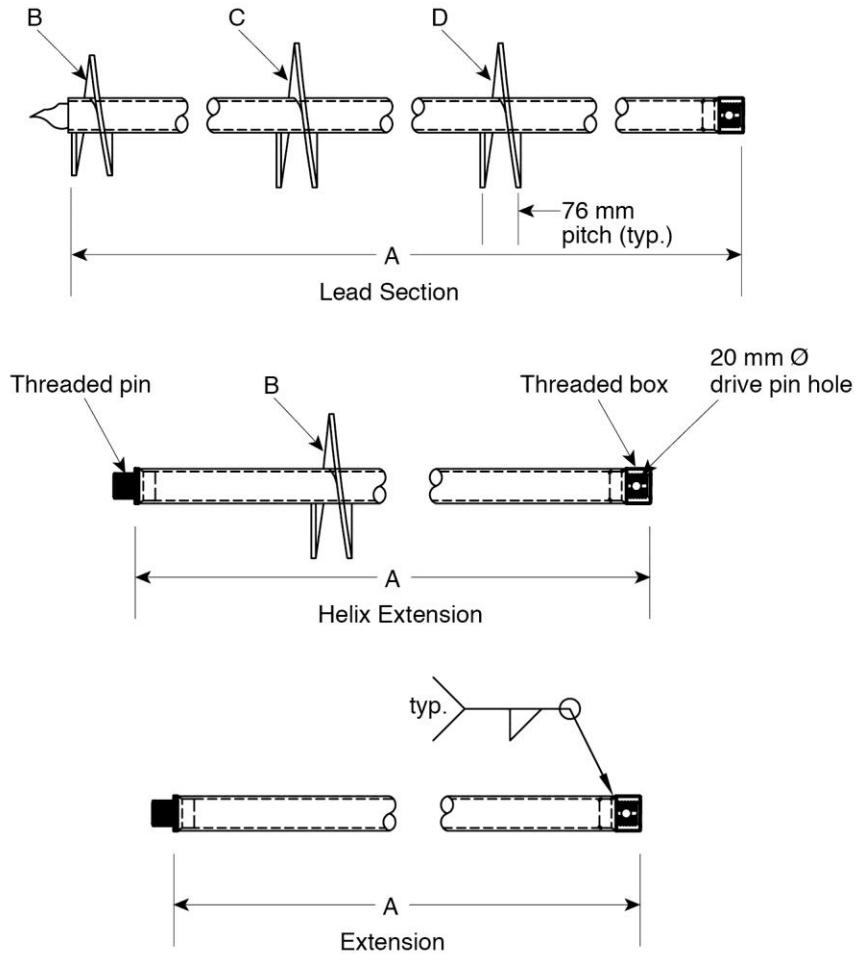


Figure 1. “Ram Jack Helical Foundation Systems and Devices”

1. shaft
2. helical blade

3. Conditions and Limitations

The CCMC compliance opinion in Section 1 is bound by the “Ram Jack Helical Foundation Systems and Devices” being used in accordance with the conditions and limitations set out below:

- 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.
- Where the product is installed in granular soil or silt, there is a direct relationship between the applied torque and the allowable compressive loads, which are indicated in Table 3.1.
- Where the product is installed in a cohesive soil such as clay, the relationship between the applied torque and the allowable compressive load is not predictable; as such, the allowable compressive loads must be confirmed by on-site load tests. These load tests are also required if the allowable loads exceed those stated in Tables 3.1 and 3.2. 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 auger-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.
- All welding is to be done by welders that are certified.

Table 3.1 Allowable Compressive and Tensile Loads of 73-mm Helical Piles¹

Applied Torque		Torque Correlated Allowable Soil Capacity			
N•m	ft-lb	Compression		Tension	
		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
4 068	3 000	60	13 500	60	13 500
4 746	3 500	70	15 750	70	15 750
5 424	4 000	80	18 000	80	18 000
6 102	4 500	90	20 250	90	20 250
6 780	5 000	100	22 500	100	22 500
7 458	5 500	110	24 750	110	24 750
8 136	6 000	120	27 000	120	27 000
8 814	6 500	130	29 250	130	29 250
9 492	7 000	140	31 500	140	31 500
10 170	7 500	150	33 750	150	33 750
10 848	8 000	160	36 000	160	36 000
11 119	8 200	164	36 900	164	36 900

Note to Table 3.1:

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, Table 3.1 does not apply and the allowable loads must be determined by on-site confirmatory testing.

Table 3.2 Allowable Compressive and Tensile Loads of 89-mm Helical Piles¹

Applied Torque		Torque Correlated Allowable Soil Capacity			
		Compression		Tension	
N·m	ft·lb	kN	lb	kN	lb
678	500	8	1 750	8	1 750
1 356	1 000	16	3 500	16	3 500
2 034	1 500	23	5 250	23	5 250
2 712	2 000	31	7 000	31	7 000
3 390	2 500	39	8 750	39	8 750
4 068	3 000	47	10 500	47	10 500
4 746	3 500	54	12 250	54	12 250
5 424	4 000	62	14 000	62	14 000
6 102	4 500	70	15 750	70	15 750
6 780	5 000	78	17 500	78	17 500
7 458	5 500	86	19 250	86	19 250
8 136	6 000	93	21 000	93	21 000
8 814	6 500	101	22 750	101	22 750
9 492	7 000	109	24 500	109	24 500
10 170	7 500	117	26 250	117	26 250
10 848	8 000	125	28 000	125	28 000
11 526	8 500	132	29 750	132	29 750
12 204	9 000	140	31 500	140	31 500
12 882	9 500	148	33 250	148	33 250
13 560	10 000	156	35 000	156	35 000
14 238	10 500	163	36 750	163	36 750
14 916	11 000	171	38 500	171	38 500
15 594	11 500	179	40 250	179	40 250
16 272	12 000	187	42 000	187	42 000
16 950	12 500	195	43 750	195	43 750
17 628	13 000	202	45 500	202	45 500
18 306	13 500	210	47 250	210	47 250
18 984	14 000	218	49 000	218	49 000

Note to Table 3.2:

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, Table 3.2 does not apply and the allowable loads must be determined by on-site confirmatory testing.

- Where the product is installed in soil conditions that are corrosive to steel, adequate protection of the exposed steel must be provided.
- The installer must be certified by Ram Jack Distribution Systems to be permitted to install the product. The installer must follow the manufacturer's installation instructions, use approved equipment, and heed the uses and limitations specified in this Report. Each installer must carry a certification card with their signature and photograph.
- Each product of auger-installed steel pile must be identified with a label containing the manufacturer's identification and the phrase "CCMC 14039-R."

4. Technical Evidence

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

4.1 General

Ram Jack Distribution Systems provides the products in diameters of 73 mm or 89 mm. The piles were tested in accordance with ASTM D 1143-81(1994)e1, "Standard test Method for Piles under Static Axial Compressive Load," and ASTM D 3689-90(R1995), "Standard test Method for Individual Piles Under Static Axial Load." The installation torque is directly used to calculate the allowable bearing capacity of the pile by applying the direct correlation method. For the allowable compressive and tensile loads noted in Tables 3.1 and 3.2, the factor of safety is 2.

The protective coating used on the piles was also tested; it performed well during the tests.

Report Holder

Ram Jack Distribution Systems
13655 County Road 1570
Ada, Oklahoma 74820
USA

Telephone: 580-332-9980

Fax: 580-332-9090

Email: dwillis@ramjack.com

Web: www.ramjack.com

Plant(s)

Ada, Oklahoma, USA

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