SPECIAL INSPECTION — HELICAL PILES

- Verification of:
  - The product manufacturer — Hubbell/CHANCE®
  - Manufacturer’s certification of installers
    - **Certification cards**
  - Product configuration and identification (including catalog numbers)
    - Lead sections, extension sections, foundation brackets/pile caps
    - As specified in the construction documents.
  - Installation equipment used.
  - Written installation procedures.
SPECIAL INSPECTION — HELICAL PILES

• Verification of:
  • Installed helical pile tip embedment
  • Effective torsional resistance
    • Based on helix configuration and application
  • Within limits specified in the foundation design documentation.

• Inclination and horizontal position/location of helical piles.
• Tightness of all bolts/threaded rods.
• Verification of new construction pile cap plate in full contact with the top of pile shaft.
• Verify the compliance of the installation with the approved construction documents.

• Both minimum **tip embedment** and minimum effective **torsional resistance termination criteria** must be met before installation ceases, unless one of the following issues arises:
  • Continuing the installation would pose a safety concern.
  • Continuing the installation would cause the Maximum Installation Torque rating of the pile to be exceeded.
  • Continuing the installation would cause the maximum tip embedment limit (if any) to be exceeded.
SPECIAL INSPECTION — HELICAL PILES

- Material checks (mill certs. and galvanizing thickness)
  - Optional – not always required
- Calibration of torque indicators or motors
  - How is torque being measured?
  - How was torque measuring device calibrated?
  - Date of calibration
- Pile spacing
- Rate of helical pile penetration (inches per rev)
- Installation rate (rpm)
- Installation Log requirements
4.2.2.2. Field Review

(1) A field review shall be carried out by the designer or by another suitably qualified person to ascertain that the subsurface conditions are consistent with the design and that construction is carried out in accordance with the design and good engineering practice.

(2) The review required in Sentence (1) shall be carried out,

(a) on a continuous basis,

   (i) during the construction of all deep foundation units with all pertinent information recorded for each foundation unit,
   (ii) during the installation and removal of retaining structures and related backfilling operations, and
   (iii) during the placement of engineered fills that are to be used to support the foundation units, and

(b) as required, unless otherwise directed by the chief building official,

   (i) in the construction of all shallow foundation units, and
   (ii) in excavating, dewatering and other related works.
• New, Unused Mill Direct Prime Structural Grade
• Mill traceable steel
• Building Code evaluation reports (US & Canada)
• True helical form
• Coupling Strength Equal to Shaft
• Factory certification (CHANCE University)
  • On-line Training
  • Field Training by Authorized Distributors
  • Penetration rate (approximately one helix [3"] pitch per revolution)
  • Installation rate (5 to 20 rpm)
  • Crowd (down pressure)
• Previous experience
1. Before Installation
2. During Installation
3. After Installation
BEFORE INSTALLATION

- Verify Manufacturer
- Verify Installer Certification
- Be Familiar with Project Plans and Specifications
- Check if Products Meet Project Specifications
  - Correct Sizes & Styles of Leads
  - Correct Sizes, Length & Styles of Extensions
  - New Constr. Or Fdn. Repair Brackets?
CHECK MATERIAL STAMPS & LABELS

Lead Section

Helix Plate

Extension Section
There are two rows of numbers and letters stamped on the shaft.

Lead Section Example: (stamped under drilled hole)
Extension Example: C403 (stamped on one side)

N382 (stamped at 90° to first side)
CHANCE® SQUARE SHAFT MATERIAL IDENTIFICATION

Material | Code | Product
--- | --- | ---
C4 | TT64 | SS5
C6 | TT76 | SS150, 175, 200, 225

Material: C403, Steel Supplier: N382, Year: Material, Heat Number: Supplier
CHECK MATERIAL STAMPS & LABELS

ESR-2794 Building Code Label

Product Label

HUBBELL POWER SYSTEMS, INC.
CHANCE® Helical Pile
CCMC 13193-R
Heat Number

Date
• Meet Product Specification Requirements?

• Common Problems
  • Undersized equipment
  • Not enough power to provide required torque
  • Not heavy enough

• Proper Equipment to Measure Installation Torque?

• Proper Equipment for Pile Handling?
EQUIPMENT MUST MATCH PROJECT
INSPECTOR’S EQUIPMENT LIST

1. Plans & Specifications
2. Tape Measures (25’-0 & 100’-0)
3. Clipboard & Installation Sheets
4. Digital Camera
5. Watch or Stopwatch
6. Calculator
7. Cell Phone
8. Small Hand Level
9. Personal Safety Equipment
• Observe Field Operations
• Ensure Proper Pile Installation
  • RPM
  • Rate of Penetration
  • Connections
  • Inclination and Horizontal Position/Location of Piles
  • Torque Measurement and Documentation
  • Pile Tip Depth
Direct – Torque measured with in-line

CHANCE Torque Indicator

PRO-DIG Torque Indicator
Indirect Torque Measurement
Measure Hydraulic Pressure
Shear Pin Method
CONNECTIONS

Pipe Shaft

Square Shaft

Check Bolt Torque
OBSERVATIONS & RECORDS

1. Foreman
2. Pile Location
3. Helix Pile Configuration, Shaft Style, Size
4. Installation Equipment
5. Torque Drive Head Model
6. Torque Indicator Model and S/N
7. Type, Size & Length of Extension Sections
8. Torque each 1’-0 prior to termination
9. Installation Start/Stop Time
10. Problems
TERMINATION CRITERIA

• Both Minimum Tip Embedment and Minimum Effective Torque Must be Met
• Exceptions:
  • Continuing Installation is a Safety Concern
  • Maximum Installation Torque Rating of the Pile Exceeded
  • Maximum Tip Embedment (if any) to be Exceeded
• Pile Cap/Repair Bracket Mount
  • Flush Mount/Direct Contact with Foundation
Measuring Grout Volume

Install the assembly measuring and recording the quantity of grout “Pulled-Down”. As a minimum, you must measure the volume of grout added for each extension installed. After measuring the “grout-drop”, add grout to fill the reservoir again and take a new measurement. This will maintain hydrostatic head on the grout column. Monitoring grout flow is the best method to ensure grout column integrity.
The grout flow should be consistent from top to bottom. It is not uncommon for the grout column diameter to be 1/2 to 3/4 inches (12 to 19 mm) smaller than the displacement element. Also, as the helical pile is installed deeper, the increase in static pressure (or pressure head) causes the grout column diameter to increase gradually.

**Special Note** - Grout must remain flowable throughout the installation. If the grout flow slows down or stops, corrective action must be taken. This may require the removal of the grouted shaft helical pile and restarting the process.
• Following the grouted pile installation, the reservoir can be removed and reused on the next grouted pile installation

• The pile is attached to the structure in the usual way with either a New Construction Bracket or a Remedial Repair Bracket

• If using a remedial repair bracket, the grout must set a minimum of 4 days before any load is applied
## HELICAL PULLDOWN™ Micropile Installation Log

<table>
<thead>
<tr>
<th>Micropile Installation</th>
<th>Depth (feet)</th>
<th>Torque (ft-lb)</th>
<th>Grout Flow (volume/shaft length)</th>
<th>Depth (feet)</th>
<th>Torque (ft-lb)</th>
<th>Grout Flow (volume/shaft length)</th>
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**Pot-Life** - or working time is a very important property.

The consistency of the grout must remain flowable throughout the installation. Pot-life is a function of ambient temperature and concrete admixtures (i.e. plasticizers, retarders, etc.).

The higher the ambient temperature, the shorter the pot-life. Roughly, for each 14 °F (8 °C) change in grout temperature from 70 °F (21 °C), the pot life halves (hotter) or doubles (colder).

For example, a two-hour pot life at 70 °F (21 °C) has a 30 minute pot-life at 98 °F (37 °C).

Good estimates of grouted pile installation rates should be made and the grout pot-life should exceed that by 50% in the winter and 100% in the summer.
• Project Field Report
• Daily Reports
• Individual Installation Logs
• Documentation of Any Installation Problems
• Calibration of Torque Equipment
• Results of Load Test
INSTALLATION RECORDS

- Could be on preprinted form:
- Address and/or project number
- Description of pile installed
- Installation equipment
- Reference elevation
- Plus
- Depth installed (from referenced elevation)
- Location of pile
- Torque vs. Depth (Effective torque)
- Person responsible
Approximate Helical Pile Locations
## Installation Log (sample)

### RD400-227 Test Per #1

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**Remarks:**
- For use in forensic test

**Final Torque (ft-lb):** 750
**Final Torque (rpm):** 7800
**Final Depth:** 10'