

CM-10/PT SP1 Screw Pile Specification

1.0 INTRODUCTION

1.1 PURPOSE/SCOPE

This specification covers the procurement, design, installation and certification of steel screw piles and shall be read in conjunction with the Piletech Standard Quality Assurance Programme.

1.2 REFERENCE DOCUMENTS

Primarily

- AS 2159 (2009) Piling Design and Installation

Secondarily

- NZS 1554.1 (2004) Structural Steel Welding - Welding Of Steel Structures
- API 5L Ed.44 also 2006 API Specification for line pipe – 5L
- NZS 3101 (1995, 2006) Design of concrete structures
- NZS 3104 (2003) Concrete Production
- NZS 3404 (1997, 2009) Steel Structures
- AS/NZS 4671 (2001) Steel reinforcing materials
- Euro Code No. 4 Steel reinforcement design
- AS/NZS 1170 (2002) Loading Standard
- Hera Report No. 46 October 1998
- The NZ Building Code New Zealand Building Code B1/VM4

2.0 MATERIALS

2.1 Circular Hollow Section

- The selected CHS shall comply with API5L Standards and be a minimum grade of 350MPa.
- Manufacturers and rolling mill certificates shall be made available for QA records.
- Both transverse and longitudinal yield test shall be performed to ensure a minimum of 350MPa.
- Maximum yield strength in any direction shall be no greater than 500MPa.
- Elongation shall be no less than 25%

2.2 Steel Helices

- Helix plate shall be manufactured using 350 Grade plate to NZ1365 – Structural Steelwork.

2.3 Concrete

- Where applicable, in fill concrete to all piles shall be a minimum of 30 MPa grade produced in accordance with NZS 3104.

2.4 Pile toe end plugs

- Pile toe end plugs shall be a minimum of Grade 350 MPa steel plate, in accordance with NZS 1365 Structural Steelwork.

3.0 PILE DESIGN

3.1 General

- Pile design shall comply with AS 2159 – 2009 and The NZ Building Code and all Standards mentioned above.
- The pile design shall take into account all loading conditions, such as but not limited to, gravity, seismic, tension, lateral loads and negative skin friction as provided for in NZS 1170 Loading Standard.

3.2 Helices

- The helix steel grade, diameter, thickness and pitch shall be calculated and designed to suit the applied loads, loading conditions and the specific geotechnical substrata.

3.3 Welding

- The welds to the helices shall be designed as Special Purpose Category and performed by a Certified AS/NZ2980 welder, in accordance with NZ 1554.1 [2004] using 480 MPa grade material suitable for seismic conditions.

3.4 Pile lengths

- The design pile lengths shall be correlated and confirmed with respect to the site specific Geotechnical Report including but not limited to, liquefaction and strata stability.

3.5 Design Life

- Design life shall be a minimum of 50 years, in accordance with the New Zealand Building Code. For unprotected steel, the sacrificial pile corrosion rate shall be in accordance with Hera Report No. 46 – October 1998.
- Alternative methods of corrosion protection that can be considered are galvanising, hot zinc coating or polymer coatings, as samples.

3.6 Infill Concrete

- Where applicable, the full length of all piles shall be filled with 30 MPa pump mix concrete to ensure complete structural integrity, eliminate internal corrosion, and to provide connection to the pile cap and super structure.

3.7 Reinforcement

- Connection reinforcement from pile to pile cap shall be designed in accordance with NZ 3101 and Euro Code 4.

3.8 Certification

- A Chartered Professional Engineer experienced in the design and installation of screw piles shall provide a Design Producer Statement [PS1]

3.9 Liability

- The piling Contractor/Designer shall carry Professional Indemnity Insurance for the sum of \$1 Million

4.0 MANUFACTURE

4.1 Welding

- Helix to CHS welds are to be in accordance with AS 1554.1 Structural Steel Welding – Category SP Welds - to be performed by an AS/NZ2980 certified welder

4.2 Weld Material

- Weld material to be 480 MPa grade materials suitable for seismic conditions.

4.3 Helices

- Helices are to be pressed by suitable equipment to ensure a true helix is formed which meets the following criteria;
 - i. The pitch at the inside and outside of the helix must be equal (+/- 5mm)
 - ii. The gradient of the spiral should be constant
 - iii. Any radial measurement across the helix should be perpendicular to the shaft. (+/- 2%)

4.4 Quality Control

- After the initial quality control programme including weld procedure testing has been satisfied a continuous manufacturing programme of MPI testing should be conducted at a rate of 1 in 100 piles manufactured. All welds shall be visually inspected.

5.0 LOAD TESTING

5.1 Procedure

- Where applicable, Static Load Testing shall be performed to verify initial design and carried out in accordance with AS 2159 - 2009 – Section 8 Testing and the ‘Schedule of Load Test Requirements’.

5.2 Test Acceptance

- Pile design accepted in accordance with AS 2159 - 2009 – Section 8.4.3 Table 8.4.3.1, with amended settlement criteria as being 10% of pile diameter, conducted under agreed loading schedule, and consultation with the Structural Engineer. Any criteria specified in the ‘Schedule of Load Test Requirements’ shall take precedence over the values in Table 8.4.3.1

6.0 INSTALLATION

6.1 General

- Pile installation shall comply with AS 2159 – 2009.

6.2 Positional Tolerance

- Positional tolerance to be in accordance with AS 2159 – 2009: Section 7.2.1. – Tolerances and Defects: Horizontally ± 75 mm. Verticality ± 20 mm and within 4% from the vertical.
- A referencing system shall be utilised for each pile to monitor and determine pile location during installation and as a final “as built record”.

6.3 On site welded joints

- All on site welded joints are to be in accordance with AS 1554.1, to be performed an AS/NZ 2980 certified welder. Welds shall be MPI tested at a rate of 1 in 100 welds with all welds visually inspected.

6.4 Installation Records

- Installation records shall include the following:
 - Contract
 - Pile Reference number
 - Shaft and helix dimensions.
 - Installation pressures
 - Length of pile
 - Date of installation

6.5 Cut off level

- Pile to be trimmed to nominated cut-off level in accordance with AS 2159 – 2009.

6.6 Concrete

- Where applicable, pile CHS shafts shall be completely filled with 30 MPa concrete, using either line or boom pumps to the top of the pile.

6.7 Reinforcing Steel

- Pile to pile cap reinforcing steel to be in accordance with AS/NZS 4671:2001 and Euro Code 4 and placed in the concrete in accordance with the specifications.

6.8 Certification

- Piling contractor shall provide a Construction Producer Statement [PS3].
- The Chartered Professional Engineer responsible for the pile design shall provide a Construction Peer Review Producer Statement [PS4].

7.0 HISTORY

New procedure dated 01/03/2012