

Screw Pile Specification

1.0 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.

2.0 REFERENCE DOCUMENTS

Primarily

- AS 2159 (1995) 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) Design of concrete structures
- NZS 3104 (2003) Concrete Production
- NZS 3404 (1997) 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/MM4

3.0 MATERIALS

3.1 Circular Hollow Section

The selected CHS shall comply with AS 1163 (1991) Structural Steel Hollow Sections and API5L Standards. Manufacturers and rolling mill certificates shall be made available for QA records.

3.2 Steel Helices

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

3.3 Concrete

In fill concrete to all piles shall be 30 MPa grade produced in accordance with NZS 3104.

3.4 Pile toe end plugs

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

4.0 PILE DESIGN

4.1 General

Pile design shall comply with AS 2159 – 1995 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.

4.2 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.

4.3 Welding

The welds to the helices shall be designed as Special Purpose Category and performed by a certified 4711 welder, in accordance with NZ 1554.1 [2004] using 480 MPa grade material suitable for seismic conditions.

4.4 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.

4.5 Design Life

Design life shall be 50 years, in accordance with the New Zealand Building Code. For unprotected steel, the sacrificial pile corrosion rate shall be in accordance AS 2159-1995 or Table 6.3 or 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.

4.6 Infill Concrete

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.

4.7 Reinforcement

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

4.8 Certification

The Piling Contractor shall provide a Design Producer Statement [PS1] to sign off the pile design.

5.0 **MANUFACTURE**

5.1 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 NZS4711 certified welder

5.2 Weld Material

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

5.3 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.

6.0 **LOAD TESTING**

6.1 Procedure

Static Load Testing shall be performed to verify initial design in accordance with AS 2159 - 1995 – Section 8 Testing. Static load testing is an option provided in AS 2159 – 1995.

6.2 Test Acceptance

Pile design accepted in accordance with AS 2159 - 1995 – Section 8.5.6 Table 8.2, with amended settlement criteria as being 10% of pile diameter, conducted under agreed loading schedule, and consultation with the Structural Engineer.

7.0 INSTALLATION

7.1 General

Pile installation shall comply with AS 2159 – 1995.

7.2 Positional Tolerance

Positional tolerance to be in accordance with AS 2159 – 1995: 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”.

7.3 On site welded joints

All on site welded joints are to be in accordance with AS 1554.1, to be performed an NZS4711 certified welder. Welds shall be MPI tested at a rate of 1 in 100 welds with all welds visually inspected.

7.4 Installation Records

Installation records shall include the following

- Contract
- Pile Reference number
- Shaft and helix dimensions.
- Installation pressures
- Length of pile
- Date of installation

7.5 Cut off level

Pile to be trimmed to nominated cut-off level in accordance with AS 2159 – 1995.

7.6 Concrete

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

7.7 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.

7.8 Certification

Piling contractor shall provide a Construction Producer Statement [PS3].