



Certification Practice Note 10

Guidance on the certification of piling

1.0 Background

- 1.1 Piling is one of a number of techniques often required in poor ground conditions to transfer structure loads to competent strata at depth, and is usually achieved by introducing steel or concrete columnar elements below the primary foundation elements.

With a wide range of piling techniques available the pile type is selected to reflect the environment and the ground conditions present and is normally designed by the specialist contractor who will install them.

- 1.2 The Building (Scotland) Regulations 2004 require in Mandatory Standard 1.1 that the building is designed so that the loadings that are liable to act on it will not lead to:
- a) the collapse of the whole or part of the building
 - b) deformations which would make the building unfit for its intended use, unsafe, or cause damage to other parts of the building or to fittings or to installed equipment, or
 - c) impairment of the stability of any part of another building.

Section 1.1.4 in the Technical Handbook goes on to explain that the foundations of buildings should be designed to sustain and transmit the loadings to the ground in such a manner that there will be no ground movement which will impair the stability of the building or the stability of buildings in the vicinity.

The Certifier must establish compliance of the design of the piles with these fundamental requirements prior to certification.

- 1.3 Piling is a critical element of the building structure and in order to meet the requirements of the Building Regulations it is important to ensure that all such works are fully designed and certified prior to execution on site.

2.0 General Guidance

- 2.1 Piles come in a variety of materials, shapes and sizes, and will be subjected to different loadings depending on a number of factors including:
- a) Building type and scale
 - b) Structural frame and geometry
 - c) Vertical and lateral loadings
 - d) Ground conditions (including geochemical conditions)
 - e) Building environment
 - f) Other relevant factors

- 2.2 Design of the piles is often carried out in two stages, with a preliminary design undertaken by the structural designer based on preliminary discussions with piling specialists, followed by a detailed design provided by the specialist contractor following award of the contract.
- 2.3 Prior to initial selection of the pile type, the structural designer will need to be aware of the particular geotechnical and geo-environmental ground conditions, the loads, the sensitivity of the environment including any adjacent buildings, and other relevant factors.
- 2.4 The Ground Investigation will be key to successful selection and design of the pile type and it is therefore critical to the success of the piling design and construction that the investigation is suitably scoped and executed.
- 2.5 Specification of the piling works is also key to its success. The structural designer will normally adopt a piling specification which incorporates recognised guidance from the Federation of Piling Specialists and/or the Institution of Civil Engineers. All such specifications should acknowledge the requirement for site testing of the completed installation.
- 2.6 The final pile design will often be carried out by a specialist contractor who is expected to provide full design calculations in accordance with a recognised standard for the type of pile that is being proposed. Checking of this design will either be carried out in-house by the specialist or by the engineer.

3.0 Guidance on certification of the piles

- 3.1 In most cases the piling will form part of an initial stage of a warrant application. Planning the process with the structural designer and other members of the design team is crucial to ensure that timings for provision of design information for certification purposes are clearly understood.
- 3.2 Certification of the piling works can only be carried out when the design and detailing to be provided by the specialist subcontractor has been completed and appropriately checked. If this is not available at the time of the warrant submission then the use of the **Schedule 1 – Third party designed details** option will be necessary.
- 3.3 Using the Schedule 1 process is commonplace. In these circumstances, an appropriate performance specification requires to be included with the warrant information (refer also to [Certification Performance Criteria Guidance B1.4](#) for further information). In addition, the Certifier must see that there is sufficient preliminary design to justify the pile type proposed and the foundation/piling layout indicated on the drawings. Unless the design engineer has the necessary expertise it is anticipated that the Certifier will see that there has been a comprehensive dialogue with a specialist experienced in the piling type proposed when undertaking this preliminary design, with clear records showing pile type, loading capacity, pile lengths, required bearing strata, proposed testing arrangements, and other relevant factors.

3.4 Whether or not the Schedule 1 process is utilised, Certifiers should ensure that the requirements of the [Procedural Guidance on Certification](#) are met. Drawings to be used for the purposes of certification as described on the certificate should include:

- a) Pile general arrangement
- b) Type of pile
- c) Assumed pile size
- d) Commencement level
- e) Cut off level
- f) Design load
- g) Limits of differential settlement
- h) Typical reinforcement details including information showing how the piles are tied to the main foundation elements
- i) Site testing details
- j) Other relevant factors

3.5 In all cases Certifiers should carefully consider whether they are suitably competent to certify such a critical element of the building structure and should avoid over-reliance on the competence of a third party. Certifiers should themselves be sufficiently competent to understand the principles of the piling design(s) presented. In these circumstances it is not anticipated that the Certifier will have specialist knowledge, but it is anticipated that they will have demonstrable experience to be able to determine whether the design complies with the standards. In particular, in the absence of any contractual arrangement between the Approved Body and the specialist Contractor, it would not normally be appropriate to rely on the specialist piling Contractor's experience and competence.

3.6 Certifiers should see that due consideration has been given to the building environment with particular regard to any peripheral structures.

3.7 In all cases the Certifier must be satisfied that the design meets the requirements of Mandatory Standards 1.1 and 1.2.

4.0 Other Specialist Techniques

4.1 Additional guidance which Certifiers should follow for other specialist techniques in addition to the guidance given here is provided in appendices to this document. At the time of publication this includes:

4.2 Appendix A: Certification of Rigid Inclusion Ground Improvement Systems

4.3 Appendix B: Certification of Ground Screw Piling Systems

5.0 Certification Performance Criteria

5.1 Certifiers must retain a detailed record of how compliance with Standards 1.1 and 1.2 was established.

5.2 Certifiers should also refer to the Certification Performance Criteria, which can be found on the SER website.

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Appendix A: Certification of Rigid Inclusion Ground Improvement Systems

- A1.1 SER is aware of the increased use of Rigid Inclusion Ground Improvement Systems as an alternative to conventional piling methods. As it is acceptable in most situations for piling and other ground improvement techniques to be included on Schedule 1, it is considered appropriate that it should be acceptable to also include Rigid Inclusion Ground Improvement Systems under the Schedule 1 piling category.
- A1.2 When using Schedule 1 for these items the following should be noted:
- a) The warrant drawings must include a layout of the inclusions and the loading requirements.
 - b) The layout must be supported by preliminary design calculations or other justification to demonstrate the adequacy of the solution proposed.
 - c) The warrant submission must include a comprehensive performance specification. This may be a standalone document or in the form of notes on the warrant drawings.

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Appendix B: Certification of Ground Screw Piling Systems

- B1.1 SER has become aware of the increased use of Ground Screw piles as an alternative to conventional foundation solutions for residential projects up to two storeys in height.
- B1.2 Certifiers should be aware that for the purposes of certification their approach should be no less onerous as if this were a more traditional piling system.
- B1.3 Prior to certifying, Certifiers should see that an appropriate Ground Investigation has been carried out to a recognised methodology in which the soils testing and narrative are relevant to ground screw piles. Certifiers should also ensure that the design has been carried out by competent persons and checked as appropriate prior to review and certification.
- B1.4 In addition, Certifiers should see that the following factors have been considered in the design:
- a) The reported soil conditions
 - b) The possible impact of frost susceptible shallow soils
 - c) The assessment of load-sharing between piles may need to reflect the absence of rigid spreader foundation at the pile heads
 - d) The environmental conditions and the material specifications
 - e) The site testing requirements, methodology and relevance to the pile type and design
 - f) Long term settlement performance as derived from static load testing
- B1.5 As with other piling techniques, the use of the Schedule 1 process is also permitted here, but Certifiers should be aware of the following:
- a) The warrant drawings must include a layout of the screw piles and the loading requirements.
 - b) The layout must be supported by preliminary design calculations or other justification to demonstrate the adequacy of the ground screws. Notwithstanding the basic design requirements noted above, other justification may include certification from a recognised testing authority which is appropriate to the particular project location, applied loads and ground conditions.
 - c) The warrant submission must include a comprehensive performance specification, including appropriate site testing requirements. This may be a stand-alone document or may be in the form of notes on the warrant drawings.
- B1.6 If the Certifier chooses to rely on the competence of an identified third party, they should consider whether they are competent to certify the project in the first place. If the decision remains to rely on a third party's competence, the party reviewing the screw pile design should do so on behalf of the Approved Body. It would not otherwise be appropriate to rely on the competence of the specialist designer for the purposes of certification of this element as there is no direct contractual relationship between the Approved Body and the Specialist Contractor.
- B1.7 In all cases, Certifiers should maintain suitable records of the certification process which demonstrate that compliance with the Standards has been established.

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