

Execution of special geotechnical works - Displacement
piles

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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ICS 93.020

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English Version

Execution of special geotechnical works - Displacement piles

Exécution des travaux géotechniques spéciaux - Pieux
avec refoulement du sol

Ausführung von Arbeiten im Spezialtiefbau -
Verdrängungspfähle

This European Standard was approved by CEN on 12 March 2015.

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Foreword

This document (EN 12699:2015) has been prepared by Technical Committee CEN/TC 288 "Execution of special geotechnical works", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12699:2000.

The technical changes in comparison to EN 12699:2000 are:

- driven piles independent of dimension are included;
- sections describing concrete and testing have been minimised.

The document has been prepared to stand alongside EN 1997 (all parts), *Eurocode 7: Geotechnical design*. Clause 7 covers design aspects of piles.

Annex A and Annex B are informative.

According to the CEN/CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

1.1 This European Standard establishes general principles for the execution of displacement piles, that means piles which are installed in the ground without excavation or removal of material from the ground except for limiting heave and/or limiting vibration as well as removal of obstructions or to assist penetration.

Piles are driven into the ground using impact, vibration, pressing, screwing or a combination of these methods.

1.2 The material of displacement piles covered by this European Standard can be:

- steel;
- cast iron;
- concrete, mortar;
- timber;
- grout;
- combination of above.

1.3 This European Standard covers prefabricated, cast *in situ*, or a combination of these methods to form displacement piles of regular shape.

Examples are given in Figure A.2 and Figure A.3.

1.4 Displacement piles may be installed in soils enhanced by ground improvement techniques. The ground improvement can be executed before, at the same time or after installation of the piles.

1.5 Other than practical considerations there are for the purpose of this European Standard no limitations regarding cross section dimensions, shaft or base enlargements, length or rake.

1.6 The provisions of this European Standard apply to:

- single piles;
- pile groups;
- concrete sheet piles.

1.7 Columns constructed by ground improvement techniques (such as mixed *in situ* columns, jet grouting, compaction grouting, vibro flotation, stone columns) are not covered by this European Standard. Bored piles are covered in EN 1536. Steel and timber sheet pile walls are covered in EN 12063. Micropiles are covered in EN 14199.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 206:2013, *Concrete - Specification, performance, production and conformity*

EN 1090-2, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

EN 1990, *Eurocode - Basis of structural design*

EN 1991 (all parts), *Eurocode 1: Actions on structures*

EN 1992 (all parts), *Eurocode 2: Design of concrete structures*

EN 1993 (all parts), *Eurocode 3: Design of steel structures*

EN 1994 (all parts), *Eurocode 4: Design of composite steel and concrete structures*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1996 (all parts), *Eurocode 6 — Design of masonry structures*

EN 1997-1, *Eurocode 7: Geotechnical design - Part 1: General rules*

EN 1997-2, *Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing*

EN 1998 (all parts), *Eurocode 8 — Design of structures for earthquake resistance*

EN 1999 (all parts), *Eurocode 9 — Design of aluminium structures*

EN 10025 (all parts), *Hot-rolled products of non-alloy structural steels*

EN 10080, *Steel for the reinforcement of concrete - Weldable reinforcing steel - General*

EN 10083-1, *Steels for quenching and tempering - Part 1: General technical delivery conditions*

EN 10083-2, *Steels for quenching and tempering - Part 2: Technical delivery conditions for non alloy steels*

EN 10083-3, *Steels for quenching and tempering - Part 3: Technical delivery conditions for alloy steels*

EN 10210 (all parts), *Hot finished structural hollow sections of non-alloy and fine grain structural steels*

EN 10219 (all parts), *Cold formed welded structural hollow sections of non-alloy and fine grain steels*

EN 10248 (all parts), *Hot rolled sheet piling of non alloy steels*

EN 10249 (all parts) *Cold formed sheet piling of non alloy steels*

EN 12794, *Precast concrete products — Foundation piles*

EN 13670, *Execution of concrete structures*

EN 16228 (all parts), *Drilling and foundation equipment — Safety*

EN ISO 2560, *Welding consumables - Covered electrodes for manual metal arc welding of non-alloy and fine grain steels - Classification (ISO 2560)*

EN ISO 4063, *Welding and allied processes - Nomenclature of processes and reference numbers (ISO 4063)*

EN ISO 5817, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817)*

EN ISO 9606-1, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1)*

EN ISO 9692-1, *Welding and allied processes - Types of joint preparation - Part 1: Manual metal arc welding, gas-shielded metal arc welding, gas welding, TIG welding and beam welding of steels (ISO 9692-1)*

EN ISO 9692-2, *Welding and allied processes - Joint preparation - Part 2: Submerged arc welding of steels (ISO 9692-2)*

EN ISO 11960, *Petroleum and natural gas industries - Steel pipes for use as casing or tubing for wells (ISO 11960)*

EN ISO 14341, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341)*

EN ISO 17660-1, *Welding - Welding of reinforcing steel - Part 1: Load-bearing welded joints (ISO 17660-1)*

EN ISO 18276, *Welding consumables - Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high-strength steels - Classification (ISO 18276)*

prEN ISO 22477-1:2006, *Geotechnical investigation and testing — Testing of geotechnical structures — Part 1: Pile load test by static axially loaded compression (ISO/DIS 22477-1:2005)*

prEN ISO 22477-10:2014, *Geotechnical investigation and testing — Testing of geotechnical structures — Part 10: Testing of piles: rapid load testing (ISO/DIS 22477-10:2014)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1

displacement pile

fr: pieu avec refoulement du sol

de: Verdrängungspfahl

pile which is installed in the ground without excavation or removal of material from the ground except for limiting heave and/or limiting vibration as well as removal of obstructions or to assist penetration

3.2

prefabricated pile

fr: pieu préfabriqué

de: Fertigpfahl

pile or pile element which is manufactured in a single unit or in pile segments before installation

3.3

cast in situ displacement pile

fr: pieu exécuté en place

de: Ortbetonverdrängungspfahl

pile installed by driving a closed ended concrete shell or permanent or temporary casing, and filling the hole so formed with plain or reinforced concrete, grout or mortar

3.4

combined pile

fr: pieu mixte

de: zusammengesetzter Pfahl

pile made up of two or more types or sizes of piles joined together

Note 1 to entry: The connection between the components is designed to transmit axial load and bending and to prevent separation during and after construction. See Figure A.8.