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**Earthworks –
Part 4: Soil treatment with lime and/or hydraulic binders;
English version EN 16907-4:2018,
English translation of DIN EN 16907-4:2019-04**

Erdarbeiten –
Teil 4: Bodenbehandlung mit Kalk und/oder hydraulischen Bindemitteln;
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Terrassements –
Partie 4: Traitement des sols à la chaux et/ou aux liants hydrauliques;
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English Version

Earthworks - Part 4: Soil treatment with lime and/or hydraulic binders

Terrassements - Partie 4: Traitement des sols à la chaux et/ou aux liants hydrauliques

Erdarbeiten - Teil 4: Bodenbehandlung mit Kalk und/oder hydraulischen Bindemitteln

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Contents

Page

European foreword.....	6
Introduction	7
1 Scope	9
2 Normative references	9
3 Terms and definitions	11
4 Symbols and abbreviations	14
5 Constituents	15
5.1 Materials.....	15
5.1.1 General.....	15
5.1.2 Natural soils and processed aggregates.....	15
5.1.3 Low strength, intermediate strength and high strength rocks, and chalk.....	15
5.1.4 Recycled materials.....	15
5.1.5 Artificial materials.....	15
5.2 Binders.....	15
5.2.1 Cement	15
5.2.2 Fly ash.....	16
5.2.3 Slag	16
5.2.4 Hydraulic road binder	16
5.2.5 Lime.....	16
5.2.6 Blends.....	16
5.3 Water	16
5.4 Other constituents	16
6 Mixtures.....	16
6.1 General.....	16
6.2 Proportioning.....	16
7 Laboratory testing methodology	17
7.1 General.....	17
7.2 Identification tests.....	17
7.2.1 Identification of the materials to be treated	17
7.2.2 Identification of the binders	17
7.3 Feasibility of treatment	17
7.4 Workability period.....	18
7.5 Characteristics for execution.....	18
7.5.1 Improvement.....	18
7.5.2 Stabilization	18
7.6 Mechanical performance.....	19
7.6.1 Curing conditions.....	19
7.6.2 Resistance to water	19
7.6.3 Strength for direct construction trafficking.....	19
7.6.4 Resistance to frost.....	19
7.6.5 Performance classification testing	19
7.6.6 Other performance tests.....	20
7.7 Preparation of the specimens.....	20
7.7.1 Particle size of the material.....	20

7.7.2	Production of the mixtures	20
7.7.3	Dimensions of the specimens.....	20
7.7.4	Compaction procedures	20
7.7.5	Curing.....	21
7.8	Content of the laboratory studies	21
7.8.1	General	21
7.8.2	Identification of the constituents.....	21
7.8.3	Improvement.....	21
7.8.4	Stabilization.....	21
7.9	Laboratory testing report.....	22
8	Performance classification of the mixtures	23
8.1	General	23
8.2	Improvement.....	23
8.2.1	General	23
8.2.2	Immediate bearing index.....	24
8.2.3	Moisture condition value	24
8.2.4	Degree of compaction.....	24
8.2.5	Swelling	25
8.3	Stabilization.....	25
8.3.1	Requirements for the fresh mixture	25
8.3.2	Laboratory mechanical performance classification	28
8.3.3	Resistance to water	32
8.3.4	Strength for direct construction trafficking.....	34
8.3.5	Resistance to frost	34
8.3.6	Other performance.....	34
9	Execution and control	34
9.1	Introduction.....	34
9.1.1	General	34
9.1.2	Prerequisites.....	34
9.2	Preliminary engineering check	35
9.2.1	General	35
9.2.2	Site investigation	35
9.2.3	Sulfide, sulfate, organic matter and other deleterious materials	35
9.2.4	Influential parameters.....	36
9.2.5	Prior laboratory testing	36
9.3	Binders	36
9.4	Soil treatment plant types	36
9.5	Soil improvement	37
9.5.1	General	37
9.5.2	Materials suitable for improvement.....	37
9.5.3	Improvement during excavation	37
9.5.4	Improvement in fill area	37
9.5.5	Binder spreading	37
9.5.6	<i>In situ</i> mixing.....	38
9.5.7	Compaction	38
9.5.8	Protection of the works	38
9.5.9	Climatic considerations.....	38
9.6	Soil stabilization.....	38
9.6.1	General	38
9.6.2	Material suitable for stabilization	39
9.6.3	Soil preparation	39
9.6.4	Stabilization processes for capping and embankment	40

9.6.5	Other applications	42
9.6.6	Layer Interface and organization of the work	42
9.7	Testing and Compliance.....	43
9.7.1	Specification.....	43
9.7.2	Compliance tests and records.....	43
9.7.3	Completion reports	45
9.8	Climatic and practical considerations	46
Annex A (informative) Production of test specimens for treated materials		47
A.1	Introduction	47
A.2	Sampling.....	47
A.3	Water content.....	47
A.4	Maximum size of the particles.....	47
A.5	Treatment.....	48
A.6	Mellowing and compaction of the treated material in the specimen mould	49
A.7	Curing and storage.....	49
A.8	Removing sample from the mould.....	50
A.9	Reporting	51
Annex B (informative) Loading speed for the strength and modulus tests		52
Annex C (informative) Non destructive seismic test method for mechanical performance		54
C.1	Introduction	54
C.2	Scope	54
C.3	Test apparatus.....	54
C.4	Definitions and theoretical approach.....	55
C.5	Principle of test method	56
C.6	Significance and use	56
C.7	Measurement.....	57
C.8	References	59
Annex D (informative) Example of evaluation of performance variability of treated soil as a result of variation during implementation Binder percentage adjustment and method for compensating it		60
Annex E (informative) Examples of age of classification and curing regimes for mechanical performance of treated materials for earthworks		62
Annex F (informative) Other performance characteristics for treated materials.....		63
Annex G (informative) Field and laboratory identifications of common sulfide and sulfate minerals.....		64
G.1	Field Identification	64
G.2	Laboratory Identification.....	64
G.3	References	65
Annex H (informative) Soil Treatment Plant Types		66

H.1	General	66
H.2	Binder storage units	66
H.3	Binder spreading units.....	66
H.4	Soil preparation plant.....	67
H.5	<i>In situ</i> mixing plant	67
H.6	Fixed or semi mobile mixing plants.....	69
H.7	Water bowsers.....	71
H.8	Compaction plant.....	71
	Annex I (informative) Treatment sequence and processes	72
	Annex J (informative) Other applications for stabilized materials	78
J.1	General	78
J.2	Filling in narrow places.....	78
J.3	Construction of lower layers in high embankments built with water sensitive soils or evolutive rocks which may be subject to occasional flooding.....	79
J.4	Steepened slopes of embankment.....	79
J.5	Slope repairs.....	80
J.6	Reinforced slopes	80
J.7	Foundations.....	80
J.8	Load transfer platforms	80
J.9	Water retaining structures	81
J.10	Contaminated soils.....	81
	Annex K (informative) Site Stabilization checklist.....	82
	Annex L (informative) Safety considerations	85
L.1	General	85
L.2	Specific protective equipment	85
	Annex M (informative) Climatic and practical considerations	86
M.1	General	86
M.2	Weather.....	86
M.3	Binder dust emission.....	87
M.4	Run off and leachate	88
	Annex N (informative) Method and charts to determine the quantity of lime needed to reach a targeted IPI value.....	89

European foreword

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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 June 2019, and conflicting national standards shall be withdrawn at the latest by June 2019.

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

This document is one of the European Standards within the framework series of EN 16907 on *Earthworks*, as follows:

- *Part 1: Principles and general rules;*
- *Part 2: Classification of materials;*
- *Part 3: Construction procedures;*
- *Part 4: Soil treatment with lime and/or hydraulic binders (this document);*
- *Part 5: Quality control;*
- *Part 6: Land reclamation earthworks using dredged hydraulic fill;*
- *Part 7: Hydraulic placement of extractive waste.*

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Introduction

In the context of the present standard, the treatment of a material designates the operation which consists of mixing, to an agreed specification, the material with a binder, for example lime, or hydraulic binder, or both of them, and optionally with additional water. The objective is to enhance the properties of materials with poor characteristics for use in earth structures. It can also be to enhance properties of materials to enable their use in specific applications (like capping layers, abutment fills, foundations, etc.).

Although the technique has been used for a long time, its application at a large scale, for the construction of earth structures, started in the 1960s. Since then, the technique has seen a substantial increase thanks to its many benefits, among which are:

- enhancement of the mechanical properties of material;
- elimination of lorry movements for disposal of site material;
- reduced lorry movements for importation of construction material;
- reduced noise and nuisance to local residents;
- less wear and tear on the local road network;
- no tipping charges or landfill tax;
- maintained landfill capacity;
- no waste of valuable non-renewable aggregate resources;
- generally reduced construction time and cost.

Once treated properly, the material can be used in embankment, capping layer or any part of the structure, provided it meets the specification of the project.

The treatment products considered in this standard are limited to the following standardized products: cement, fly ash, granulated blast furnace slag, hydraulic road binder and lime.

For the purpose of this standard, these treatment products will be designated as binders.

For the purpose of this standard, cement, granulated blast furnace slag and hydraulic road binder will be designated as hydraulic binders.

Fly ash includes siliceous fly ash and calcareous fly ash. Siliceous fly ash is a material which requires a source of calcium oxide, e.g. lime or cement, to produce a hydraulic reaction. Calcareous fly ash contains calcium oxide and is comparable to a hydraulic binder. For the purpose of this standard, both types of fly ash will be designated as hydraulic binders.

Lime is air lime and has no hydraulic property. For the purpose of this standard, it will be designated as a binder.

Typical uses of the binders are as follows:

- lime is generally used to dry up wet materials, and/or to enhance the performance of cohesive materials;
- hydraulic binders are mainly used to quickly and significantly increase the mechanical performance of non-cohesive materials;

- in presence of cohesive material and depending on the application, lime and hydraulic binder may be used together, in two steps on site, or through a pre-blended form like a hydraulic road binder.

The materials considered in this standard are: soils, weak rocks, intermediate rocks, chalk, recycled materials, artificial materials. They can also be mixes of these different types.

The success of a treatment operation relies upon the respect of specifications as well as of good practices that closely depend on local geological and climatic conditions. Thus, in addition to the requirements of this standard, reference may be made to the guidelines of good practices valid in the place of use. Some of them are included as notes in the standard or in the annexes at the end of this document.