

Hydraulically bound mixtures — Specifications —

Part 12: Soil treated by slag

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National foreword

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Contents

Page

Foreword.....	3
1 Scope	4
2 Normative references	4
3 Terms and definitions	5
4 Symbols and abbreviated terms	5
5 Constituents.....	6
5.1 Ground or partially ground granulated blast furnace slag.....	6
5.2 Soil	6
5.3 Water	6
5.4 Other constituents	6
6 Mixture	7
6.1 General.....	7
6.2 Proportioning and dry density	7
7 Requirements for the fresh mixture.....	7
7.1 Water content.....	7
7.2 Degree of pulverization	7
7.3 Immediate bearing index.....	8
7.4 Moisture condition value	8
8 Laboratory mechanical performance classification.....	8
8.1 General.....	8
8.2 Classification by California bearing ratio.....	9
8.3 Classification by compressive strength.....	9
8.4 Classification by R_t , E	10
8.4.1 General.....	10
8.4.2 Method by direct tensile testing.....	10
8.4.3 Method by indirect tensile testing.....	10
8.4.4 Method by indirect tensile and compression testing.....	11
9 Resistance to water and other requirements for the mixture	11
9.1 Resistance to water	11
9.1.1 General.....	11
9.1.2 Strength after immersion in water	11
9.1.3 Linear swelling after soaking in water.....	12
9.1.4 Volumetric swelling after immersion in water	12
9.2 Strength at trafficking	12
9.3 Resistance to frost.....	12
10 Production control.....	12
11 Designation and description	13
12 Marking and labelling	13
Annex A (informative) Examples of 'age of classification' and curing regimes for R_c , R_t and E testing of treated soils including resistance to water testing by full immersion in water	15
Annex B (informative) Production control for hydraulically treated mixtures.....	16
Bibliography.....	22

Foreword

This European Standard (EN 14227-12:2006) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

This European Standard is one of a series of standards for hydraulically bound mixtures:

EN 14227-1, *Hydraulically bound mixtures — Specifications — Part 1: Cement bound granular mixtures.*

EN 14227-2, *Hydraulically bound mixtures — Specifications — Part 2: Slag bound mixtures.*

EN 14227-3, *Hydraulically bound mixtures — Specifications — Part 3: Fly ash bound mixtures.*

EN 14227-4, *Hydraulically bound mixtures — Specifications — Part 4: Fly ash for hydraulically bound mixtures.*

EN 14227-5, *Hydraulically bound mixtures — Specifications — Part 5: Hydraulic road binder bound mixtures.*

EN 14227-10, *Hydraulically bound mixtures — Specifications — Part 10: Soil treated by cement.*

EN 14227-11, *Hydraulically bound mixtures — Specifications — Part 11: Soil treated by lime.*

EN 14227-12, *Hydraulically bound mixtures — Specifications — Part 12: Soil treated by slag.*

EN 14227-13, *Hydraulically bound mixtures — Specifications — Part 13: Soil treated by hydraulic road binder.*

EN 14227-14, *Hydraulically bound mixtures — Specifications — Part 14: Soil treated by fly ash.*

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

1 Scope

This European Standard specifies soils treated by slag for roads, airfields and other trafficked areas and specifies the requirements for their constituents, composition and laboratory performance classification.

In this European Standard slag refers to granulated blast furnace slag, generally ground or partially ground, complying with EN 14227-2.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 197-1, *Cement — Part 1: Composition, specifications and conformity criteria for common cements*

EN 933-1, *Test for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 13286-2, *Unbound and hydraulically bound mixtures — Part 2: Test methods for the determination of the laboratory reference density and water content — Proctor compaction*

EN 13286-3, *Unbound and hydraulically bound mixtures — Part 3: Test methods for laboratory reference density and water content — Vibrocompression with controlled parameters*

EN 13286-4, *Unbound and hydraulically bound mixtures — Part 4: Test methods for laboratory reference density and water content — Vibrating hammer*

EN 13286-5, *Unbound and hydraulically bound mixtures — Part 5: Test methods for laboratory reference density and water content — Vibrating table*

EN 13286-40, *Unbound and hydraulically bound mixtures — Part 40: Test method for the determination of the direct tensile strength of hydraulically bound mixtures*

EN 13286-41, *Unbound and hydraulically bound mixtures — Part 41: Test method for the determination of the compressive strength of hydraulically bound mixtures*

EN 13286-42, *Unbound and hydraulically bound mixtures — Part 42: Test method for the determination of the indirect tensile strength of hydraulically bound mixtures*

EN 13286-43, *Unbound and hydraulically bound mixtures — Part 43: Test method for the determination of the modulus of elasticity of hydraulically bound mixtures*

EN 13286-46, *Unbound and hydraulically bound mixtures — Part 46: Test method for the determination of the moisture condition value*

EN 13286-47, *Unbound and hydraulically bound mixtures — Part 47: Test method for the determination of the California bearing ratio, immediate bearing index and linear swelling*

EN 13286-48, *Unbound and hydraulically bound mixture — Part 48: Test method for the determination of the degree of pulverisation*

EN 13286-49, *Unbound and hydraulically bound mixtures — Part 49: Accelerated swelling test for soil treated by lime and/or hydraulic binder*

EN 13286-50, *Unbound and hydraulically bound mixtures — Part 50: Method for the manufacture of test specimens of hydraulically bound mixtures using Proctor equipment or vibrating table compaction*

EN 13286-51, *Unbound and hydraulically bound mixtures — Part 51: Method for the manufacture of test specimens of hydraulically bound mixtures by vibrating hammer compaction*

EN 13286-52, *Unbound and hydraulically bound mixtures — Part 52: Method for the manufacture of test specimens of hydraulically bound mixtures by vibrocompression*

EN 13286-53, *Unbound and hydraulically bound mixtures — Part 53: Method for the manufacture of test specimens of hydraulically bound mixtures using axial compression*

EN 14227-2, *Hydraulically bound mixtures — Specifications — Part 2: Slag bound mixtures*

EN 14227-11, *Hydraulically bound mixtures — Specifications — Part 11: Soil treated by lime*

3 Terms and definitions

For the purpose of this European Standard, the following terms and definitions apply.

3.1

soil

natural, artificial or recycled material or any combination of these

3.2

slag

granulated or pelletized blast furnace slag, generally ground or partially ground

3.3

soil treated with slag

mixture of soil, slag, other constituents and water, that sets and hardens by hydraulic reaction

3.4

slenderness ratio

height to diameter ratio of the specimen

4 Symbols and abbreviated terms

For the purpose of this European Standard, the following symbols and abbreviations apply.

W is the water content;

P is the pulverization;

IPI is the immediate bearing index;

MCV is the moisture condition value;

CBR is the California bearing ratio, expressed in percent (%);

R is the compressive or tensile strength, expressed in megapascals (MPa);

R_c is the compressive strength, expressed in megapascals (MPa);

R_t is the direct tensile strength, expressed in megapascals (MPa);

- R_{it} is the indirect tensile strength, expressed in megapascals (MPa);
- R_i is the compressive or tensile strength after immersion in water, expressed in megapascals (MPa);
- E is the modulus of elasticity, expressed in megapascals (MPa);
- E_c is the modulus of elasticity E determined in compression, expressed in megapascals (MPa);
- E_t is the modulus of elasticity E determined in direct tension, expressed in megapascals (MPa);
- E_{it} is the modulus of elasticity E determined in indirect tension, expressed in megapascals (MPa);
- I is the 'strength after immersion' ratio;
- LS is the linear swelling of a CBR specimen, expressed in millimetres (mm);
- G_v is the volumetric swelling of a specimen, expressed in percent (%).

5 Constituents

5.1 Ground or partially ground granulated blast furnace slag

Ground or partially ground granulated blast furnace slag shall comply with EN 14227-2.

NOTE Depending on the soil type, it may be possible to use granulated blast furnace slag complying with EN 14227-2 that has not been ground, although the user should be aware that mixtures containing such slag rely for their performance on crushing of the slag between soil particles under rolling which may not be achieved with some soil types.

5.2 Soil

Not less than 95 % of the soil shall pass the 63 mm sieve when tested using wet sieving in conformity with EN 933-1.

The soil shall conform to classification and homogeneity requirements at the place of use.

NOTE 1 Organic matter can delay the setting and hardening process. Laboratory mixture design work will determine whether soil/material containing organic matter can be accommodated. The amount of organic matter that can be accommodated depends on the type of organic matter.

NOTE 2 Soil containing or suspected of containing sulphates can result in expansion of the mixture. Laboratory mixture design work including 'resistance to water testing' in accordance with this European Standard will determine if sulfates or other material with the potential to cause swelling can be accommodated.

5.3 Water

Water shall not contain components that adversely affect the setting, hardening and performance of the mixture.

5.4 Other constituents

Other constituents shall include lime in conformity with EN 14227-11, cement in conformity with EN 197-1, aggregate, gypsum, ground or crushed air-cooled steel slag or other materials that are either necessary for setting and hardening of the mixture or to improve workability, trafficability or performance.

NOTE Other constituents include those that are necessary for the setting and hardening of the slag e.g. a source of lime and or sulfate, and those constituents that are added to improve workability, traffickability and or performance of the mixture e.g. aggregate.