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Hidravlično vezane zmesi - Specifikacije - 15. del: Stabiliziranje zemljin s hidravličnimi vezivi

iTeh STANDARD PREVIEW

Hydraulically bound mixtures - Specifications - Part 15: Hydraulically stabilized soils

Hydraulisch gebundene Gemische - Anforderungen - Teil 15: Hydraulische Bodenstabilisierungen

Mélanges traités aux liants hydrauliques - Spécifications - Partie 15: Sols traités aux liants hydrauliques

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EUROPEAN STANDARD

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English Version

Hydraulically bound mixtures - Specifications - Part 15: Hydraulically stabilized soils

Mélanges traités aux liants hydrauliques -
Spécifications - Partie 15: Sols traités aux liants
hydrauliques

Hydraulisch gebundene Gemische - Anforderungen -
Teil 15: Bodenverfestigung mit hydraulischen
Bindemitteln

This European Standard was approved by CEN on 5 September 2015.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EN 14227-15:2015 (E)**European foreword**

This document (EN 14227-15:2015) 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of an identical text or by endorsement, at the latest by May 2016, and conflicting national standards shall be withdrawn at the latest by May 2016.

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 14227-10:2006, EN 14227-11:2006 (only the sections that cover stabilization), EN 14227-12:2006, EN 14227-13:2006 and EN 14227-14:2006.

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

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

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

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

EN 14227-15, *Hydraulically bound mixtures — Specifications — Part 15: Hydraulically stabilized soils.*

Compared with EN 14227-10:2006 to EN 14227-14:2006, the following change has been made:

— These parts have been merged.

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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

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

This European Standard covers the stabilization of soils using one or a combination of: cement, fly ash, hydraulic road binder, lime and blast-furnace slag.

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

EN 459-1, *Building lime — Part 1: Definitions, specifications and conformity criteria*

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

EN 13282 (all parts), *Hydraulic road binders*

EN 13286-2, *Unbound and hydraulically bound mixtures — Part 2: Test methods for 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 13286-45, *Unbound and hydraulically bound mixtures — Part 45: Test method for the determination of the workability period of hydraulically bound mixtures*

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

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

EN 13286-48, *Unbound and hydraulically bound mixtures — Part 48: Test method for the determination of 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 using vibrating hammer compaction*

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

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

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

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

EN 15167-1, *Ground granulated blast furnace slag for use in concrete, mortar and grout — Part 1: Definitions, specifications and conformity criteria*

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3 Terms and definitions

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

3.1**hydraulically stabilized soil**

stabilized mixture of soil and water that sets and hardens by hydraulic reaction

3.2**soil**

natural, artificial or recycled material or any combination of these

3.3**slenderness ratio**

height to diameter ratio of the specimen

4 Symbols and abbreviated terms

For the purposes of this document, the following symbols and abbreviated terms 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 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 Cement

Cement shall conform to EN 197-1 or to a European Assessment Document.

5.2 Fly ash

Fly ash shall be siliceous or calcareous fly ash conforming to EN 14227-4.

NOTE Siliceous fly ash is a pozzolan and requires lime or a source of lime (e.g. cement) to produce a hydraulic reaction.

5.3 Blast-furnace slag

Blast-furnace slag shall be either ground granulated blast-furnace slag conforming to EN 15167-1 or partially-ground granulated blast-furnace slag conforming to EN 14227-2.

NOTE Other constituents are normally necessary to enhance the hydraulic reactivity of slag.

5.4 Hydraulic road binder

Hydraulic road binder shall conform to EN 13282 (all parts) or to a European Assessment Document.

5.5 Lime

Lime shall be air lime conforming to EN 459-1, in form of quick lime or hydrated lime or lime slurry.

5.6 Soil

Not less than 95 % of the soil shall pass the selected sieve from Table 1 when tested using wet sieving to EN 933-1.

Table 1 — Selected sieve

Sieve mm	Category
6,3	S _{6,3}
20	S ₂₀
31,5	S _{31,5}
63	S ₆₃
Declared Value	S _{DV}
No Requirement	S _{NR}

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

NOTE 1 Some type of soils may be pre-treated to adjust moisture content and/or flocculate clays, for example with lime.

NOTE 2 Organic matter can reduce or prevent the setting and hardening process. Laboratory mixture design work will determine whether soil containing organic matter can be accommodated. The amount of organic matter that can be accommodated depends on the type of organic matter.

NOTE 3 Soil containing or suspected of containing sulfur, sulfide or sulfate 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 material with the potential to cause swelling can be accommodated.

5.7 Water

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

5.8 Other constituents

Other constituents include aggregate, gypsum or other materials that are either necessary for or improve hydraulic reaction and or improve workability, traffickability or performance.

6 Mixture

6.1 General

The mixture shall comprise constituents specified in Clause 5.

In the case of constituents added at different times to the soils (for example treatment with lime followed by the addition of another constituent), the time interval in the laboratory between the respective additions shall be reported.

6.2 Proportioning and dry density

The proportioning of the constituents including water content, expressed as percentages by dry mass of the total dry mass of the mixture, and the dry density of the mixture, shall be declared.

The declared proportions shall be based on the laboratory mixture design.

7 Requirements for the fresh mixture

7.1 Water content

When required, the water content of the mixture shall comply with the selected category from Table 2.

The water content shall be selected to permit compaction on site by rolling and to optimize the mechanical performance of the mixture. The water content shall be determined by a method in conformity with EN 13286-2, EN 13286-3, EN 13286-4 and EN 13286-5 and limits set that give a workable range on site compatible with the compaction and desired performance of the mixture.

Table 2 — Minimum water content categories

Minimum water content	Category
0,9 optimum water content of the mixture determined in accordance with the selected method of compaction from EN 13286-2, EN 13286-3, EN 13286-4 and EN 13286-5	$W_{0,9}$
0,95 optimum water content of the mixture determined in accordance with the selected method of compaction from EN 13286-2, EN 13286-3, EN 13286-4 and EN 13286-5	$W_{0,95}$
The optimum water content of the mixture determined in accordance with the selected method of compaction from EN 13286-2, EN 13286-3, EN 13286-4 and EN 13286-5	$W_{1,0}$
1,05 optimum water content of the mixture determined in accordance with the selected method of compaction from EN 13286-2, EN 13286-3, EN 13286-4 and EN 13286-5	$W_{1,05}$
Declared value	W_{DV}

7.2 Degree of pulverization

When required, the degree of pulverization of the mixture, determined in accordance with EN 13286-48, shall conform to one of the categories in Table 3.

Table 3 — Degree of pulverization

Degree of pulverization	Category
$\geq 30 \%$	P_{30}
$\geq 40 \%$	P_{40}
$\geq 50 \%$	P_{50}
$\geq 60 \%$	P_{60}
Declared value	P_{DV}

7.3 Immediate bearing index

When required, the immediate bearing index of the mixture at the declared water content, determined in accordance with EN 13286-47, shall conform to one of the categories in Table 4.