



# SLOVENSKI STANDARD

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### Hidravlična veziva za ceste - 1. del: Hidravlična veziva za ceste, ki se hitro strjujejo - Sestava, zahteve in merila skladnosti

Hydraulic road binders - Part 1: Rapid hardening hydraulic road binders - Composition, specifications and conformity criteria

Hydraulische Tragschichtbinder - Teil 1: Schnell erhärtende hydraulische Tragschichtbinder - Zusammensetzung, Anforderungen und Konformitätskriterien

Liants hydrauliques routiers - Partie 1: Liants hydrauliques routiers à durcissement rapide - Composition, spécifications et critères de conformité

Ta slovenski standard je istoveten z: **EN 13282-1:2013**

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#### **ICS:**

93.080.20      Materiali za gradnjo cest      Road construction materials

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## Hydraulic road binders - Part 1: Rapid hardening hydraulic road binders - Composition, specifications and conformity criteria

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This European Standard was approved by CEN on 20 October 2012.

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## Foreword

This document (EN 13282-1:2013) has been prepared by Technical Committee CEN/TC 51 "Cement and building limes", the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

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 and EN 13282-2<sup>1)</sup> supersede ENV 13282:2000.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU directive(s), see informative Annex ZA, which is an integral part of this European Standard.

This European Standard, EN 13282, *Hydraulic road binders* consists of the following parts:

- *Part 1: Rapid hardening hydraulic road binders — Composition, specifications and conformity criteria*
- *Part 2: Normal hardening hydraulic road binders — Composition, specifications and conformity criteria*
- *Part 3: Conformity evaluation* ([standards.iteh.ai](http://standards.iteh.ai))

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.

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1) To be published.

**EN 13282-1:2013 (E)****Introduction**

Depending on the local experience and availability of products and materials, different binders are used for road bases and sub-bases, capping layers, soil treatment (soil stabilisation and improvement) in Europe. These include cements conforming to EN 197-1, building limes conforming to EN 459-1 and hydraulic road binders presently defined in existing national standards or national technical approvals.

Hydraulic road binders are finished products, produced in a factory and supplied ready for use. They are differentiated according to their strength development in rapid hardening hydraulic road binders, specified in this part of this European Standard and normal hardening hydraulic road binders, specified in prEN 13282-2. Part 3 of EN 13282 defines the conformity evaluation procedure for hydraulic road binders according to this standard.

Binders obtained through mixing of their constituents on site are not covered by this European Standard.

Cements, masonry cements and building limes are also outside the scope of this European Standard, as they are defined in specific European Standards.

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## 1 Scope

This European Standard defines and gives the specifications for rapid hardening hydraulic road binders, produced in a factory and supplied ready for treatment of materials for bases, sub-bases and capping layers as well as earthworks, in road, railway, airport and other types of infrastructure.

It includes the mechanical, physical and chemical requirements and the classification of these binders based on their compressive strength at 7 days and 28 days. It also includes the conformity criteria and evaluation procedures to be applied by the manufacturer.

## 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 196-1, *Methods of testing cement — Part 1: Determination of strength*

EN 196-2, *Methods of testing cement — Part 2: Chemical analysis of cement*

EN 196-3, *Methods of testing cement — Part 3: Determination of setting times and soundness*

EN 196-6, *Methods of testing cement — Part 6: Determination of fineness*

EN 196-7, *Methods of testing cement — Part 7: Methods of taking and preparing samples of cement*

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 459-2, *Building lime — Part 2: Test methods*

EN 13282-3:2013, *Hydraulic road binders — Part 3: Conformity evaluation*

ISO 10694, *Soil quality — Determination of organic and total carbon after dry combustion (elementary analysis)*

## 3 Terms and definitions

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

### 3.1

#### **autocontrol testing**

continual testing by the manufacturer of rapid hardening hydraulic road binder spot samples taken at the point(s) of release from the factory/depot

### 3.2

#### **control period**

period of production and dispatch identified for the evaluation of the autocontrol test results

### 3.3

#### **characteristic value**

value of a required mechanical, physical or chemical property outside of which lies a specified percentage, the percentile  $P_k$ , of all the values of the population

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**3.4 specified characteristic value**  
characteristic value of a mechanical, physical or chemical property which in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

**3.5 single result limit value**  
value of a mechanical, physical or chemical property which – for any single test result – in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

**3.6 allowable probability of acceptance CR**  
for a given sampling plan, the allowed probability of acceptance of a rapid hardening hydraulic road binder with a characteristic value outside the specified characteristic value

**4 Hydraulic road binder****4.1 General**

A hydraulic binder, when mixed with water, hardens both in the air and under water and remains solid, even under water.

A hydraulic road binder is a factory produced hydraulic binder, supplied ready for use, having properties specifically suitable for treatment of materials for bases, sub-bases and capping layers as well as earthworks, in road, railway, airport and other types of infrastructures.

NOTE 1 Hydraulic road binders are not only used for road construction but this general designation will be used for a better understanding in this document.

A hydraulic road binder consists of a powder made from a blend of different constituents and statistically homogeneous in composition. A high degree of uniformity in all properties shall be obtained through continuous mass production processes.

NOTE 2 Continuous production refers to the process, the definition of the product, its composition and properties but does not imply a 24 h production.

**4.2 Rapid hardening hydraulic road binder**

A rapid hardening hydraulic road binder is a hydraulic road binder which conforms to the requirements for strength at 7 days and 28 days, fineness, initial setting time, soundness, sulfate content and composition, as given in Clause 7.

**5 Constituents****5.1 Main constituents**

The main constituents of a rapid hardening hydraulic road binder are those in a proportion exceeding 10 % by mass. They shall be selected from the following list:

- a) constituents defined as main constituents in EN 197-1:
- 1) Portland cement clinker (K);
  - 2) granulated blastfurnace slag (S);
  - 3) pozzolanic materials: natural pozzolana (P) and natural calcined pozzolana (Q);
  - 4) fly ash: siliceous fly ash (V) and calcareous fly ash (W);



- 5) burnt shale (T);
- 6) limestone (L, LL);

b) hydrated calcium lime (CL-S) and natural hydraulic lime (NHL) which conform to EN 459-1.

The loss on ignition of fly ash, determined in accordance with EN 196-2, but using an ignition time of 1 h, or the content of unburnt carbon, determined in accordance with ISO 10694, shall not exceed 9,0 % by mass.

## 5.2 Minor additional constituents

Minor additional constituents may be added in a proportion not exceeding 10 % by mass in total.

Minor additional constituents are specially selected, inorganic natural mineral materials, inorganic mineral materials derived from the clinker or calcium lime production process, or constituents as specified in 5.1 unless they are included as main constituents which, after appropriate preparation and on account of their particle size distribution, improve the physical properties of the binder (such as workability or water retention). They can be inert or have slightly hydraulic, latent hydraulic or pozzolanic properties. However, no requirements are set for them in this respect.

Minor additional constituents shall be correctly prepared, i.e. selected, homogenised, dried and comminuted depending on their state of production or delivery.

Minor additional constituents shall not impair the properties of the binder.

## 5.3 Calcium sulfate (Cs)

Calcium sulfate, gypsum, hemihydrate or anhydrite (natural or artificial) or any mixture of them may be added to the other constituents of the rapid hardening hydraulic road binder during its manufacture.

## 5.4 Additives

Additives, for the purpose of this European Standard, are constituents not covered in 5.1 to 5.3 which are added to improve the manufacture or the properties of the rapid hardening hydraulic road binder.

The total quantity of additives on dry basis should not exceed 1 % by mass of the binder.

A total content of additives greater than 1 % by mass is permitted provided that quantity and function of each of them are stated on the packaging and/or on the delivery note.

Additives shall not impair the properties of the rapid hardening hydraulic road binder.

## 6 Classification

Rapid hardening hydraulic road binders are designated by the letter E followed by a number, representing the strength class.

The strength class of a rapid hardening hydraulic road binder shall be determined by the compressive strength at 7 days and 28 days tested in accordance with EN 196-1.

Three strength classes are defined in Table 1: E 2, E 3 and E 4 (see 7.1). For class E 4, a sub-class indicated as E 4-RS and representing rapid setting rapid hardening hydraulic road binders is defined.

NOTE 1 An E 1 class is not included in this European Standard in order to be consistent with the strength classes defined in prEN 13282-2.

NOTE 2 Strength classes are incorporated for the purpose of classifying product performance and carrying out attestation of conformity and are not related to the mechanical performance of soils or other materials treated with rapid hardening hydraulic road binders.

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## 7 Requirements

### 7.1 Mechanical requirements

The compressive strength of rapid hardening hydraulic road binders shall be determined in accordance with EN 196-1, the cement being replaced by the rapid hardening hydraulic road binder.

The prisms shall be produced, stored and tested as specified in EN 196-1, unless otherwise specified below.

The prisms shall be removed from the mould 24 h after preparation and then stored, pending the test, at a relative humidity of not less than 90 %.

Should it not be possible to remove the prisms from the mould at 24 h, it is permitted to remove them at a later age, and this age shall be stated in the test report.

When using moist air storage boxes the prisms shall not be allowed to come into contact with the water poured into the boxes up to a level of about 10 mm. The lid shall close tightly and any felt seals shall be kept damp.

Rapid hardening hydraulic road binders shall conform to the requirements given in Table 1.

**Table 1 — Mechanical requirements given as characteristic values**

Strength class	Compressive strength, in MPa		
	at 7 days	at 28 days	
E 2	≥ 5,0	≥ 12,5	≤ 32,5
E 3	≥ 10,0	≥ 22,5	≤ 42,5
E 4	≥ 16,0	≥ 32,5	≤ 52,5
E 4-RS	≥ 16,0	≥ 32,5	-

### 7.2 Physical requirements

#### 7.2.1 Fineness

The fineness of a rapid hardening hydraulic road binder shall be determined by sieving.

Sieving shall be carried out in accordance with EN 196-6. The sieve residue shall conform to the requirement given in Table 2.

#### 7.2.2 Initial setting time

Initial setting time, determined in accordance with EN 196-3, shall conform to the requirement given in Table 2.

#### 7.2.3 Soundness

Expansion, determined in accordance with EN 196-3, shall conform to the requirement given in Table 2.

Rapid hardening hydraulic road binders containing more than 4,0 % by mass of SO<sub>3</sub> shall, in addition, withstand the cold water test described in EN 459-2. They shall be regarded as unsound if, following storage in water, the two specimens have warping or gapping edge cracks either on their own or in conjunction with crazing.

Table 2 — Physical requirements given as characteristic values

Hydraulic road binder	Fineness residue by mass at 90 µm  %	Initial setting time  min	Soundness (expansion)  mm
E 2 E 3 E 4	≤ 15	≥ 90	≤ 10
E 4-RS	≤ 15	≤ 90	≤ 10

### 7.3 Chemical requirement - Sulfate content

The sulfate content, expressed as the percentage of SO<sub>3</sub> by mass, and determined in accordance with EN 196-2, shall not exceed 4,0 %.

A sulfate content of up to 7,0 % by mass (classes E 4 and E 4-RS) and 9,0 % by mass (classes E 2 and E 3), respectively, is permitted for the following rapid hardening road binders, provided that they meet the requirements in 7.2.3:

- rapid hardening hydraulic road binders containing burnt shale (T) or calcareous fly ash (W), only when most of the sulfate comes from the main constituents;
- rapid hardening hydraulic road binders containing more than 65 % by mass, of granulated blastfurnace slag (S).

A sulfate content of up to 9,0 % by mass (classes E 4 and E 4-RS) and 11,5 % (classes E 2 and E 3), respectively, is permitted for binders containing burnt shale or calcareous fly ash, only when the greater part of the sulfate content comes from the burnt shale or from the calcareous fly ash.

### 7.4 Composition

#### 7.4.1 Declaration of composition

The constituents of a rapid hardening hydraulic road binder, and their average proportion in the finished product, shall be recorded. When requested, the main constituents (5.1) shall be declared by the manufacturer (see Clause 8), as well as the presence of calcium sulfate (5.3) if the sulfate (SO<sub>3</sub>) content of the rapid hardening hydraulic road binder exceeds 4,0 %.

#### 7.4.2 Requirements on composition

The content of Portland cement clinker of rapid hardening hydraulic road binders shall be not less than 20 %.

The composition of a rapid hardening hydraulic road binder shall meet, for all main constituents taken individually, the values documented by the manufacturer and declared if requested (see 7.4.1 and Clause 8) within absolute tolerances given in Table 3.

When SO<sub>3</sub> content exceeds 4,0 %, the notation Cs shall be added in the declaration (see 7.4.1).