

Unbound and hydraulically bound mixtures —

Part 52: Method for the manufacture of
test specimens of hydraulically bound
mixtures using vibrocompression

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/4, Cementitious bound materials, unbound granular materials, waste materials and marginal materials, which has the responsibility to:

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 8, an inside back cover and a back cover.

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English version

Unbound and hydraulically bound mixtures - Part 52: Method for
the manufacture of test specimens of hydraulically bound
mixtures using vibrocompression

Mélanges traités et mélanges non traités aux liants
hydrauliques - Partie 52: Méthode de confection par
vibrocompression des éprouvettes de matériaux traités aux
liants hydrauliques

Ungebundene und hydraulisch gebundene Gemische - Teil
52: Verfahren zur Herstellung von Probekörpern von
hydraulisch gebundenen Gemischen durch Vibro-Druck
(Rütteln und Druck)

This European Standard was approved by CEN on 12 November 2004.

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Contents

	Page
Foreword.....	3
1 Scope	5
2 Terms and definitions	5
3 Principle.....	5
4 Dimensions of the specimens.....	5
5 Apparatus	6
6 Procedure	7
7 Storage.....	8
8 Test report	8

Foreword

This document (EN 13286-52:2004) 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of an identical text or by endorsement, at the latest by June 2005, and conflicting national standards shall be withdrawn at the latest by June 2005.

This document is one of a series of documents as listed below.

EN 13286-1, <i>Unbound and hydraulically bound mixtures density and water content</i>	<i>Part 1: Test methods for laboratory reference density and water content</i> <i>Introduction, general requirements and sampling</i>
EN 13286-2, <i>Unbound and hydraulically bound mixtures density and water content</i>	<i>Part 2: Test methods for the determination of the laboratory reference density and water content</i> <i>Proctor compaction</i>
EN 13286-3, <i>Unbound and hydraulically bound mixtures density and water content</i>	<i>Part 3: Test methods for laboratory reference density and water content</i> <i>Vibrocompression with controlled parameters</i>
EN 13286-4, <i>Unbound and hydraulically bound mixtures density and water content</i>	<i>Part 4: Test methods for laboratory reference density and water content</i> <i>Vibrating hammer</i>
EN 13286-5, <i>Unbound and hydraulically bound mixtures density and water content</i>	<i>Part 5: Test methods for laboratory reference density and water content</i> <i>Vibrating table</i>
EN 13286-7, <i>Unbound and hydraulically bound mixtures</i>	<i>Part 7: Cyclic load triaxial test for unbound mixtures</i>
EN 13286-40, <i>Unbound and hydraulically bound mixtures direct tensile strength of hydraulically bound mixtures</i>	<i>Part 40: Test method for the determination of the direct tensile strength of hydraulically bound mixtures</i>
EN 13286-41, <i>Unbound and hydraulically bound mixtures compressive strength of hydraulically bound mixtures</i>	<i>Part 41: Test method for the determination of the compressive strength of hydraulically bound mixtures</i>
EN 13286-42, <i>Unbound and hydraulically bound mixtures indirect tensile strength of hydraulically bound mixtures</i>	<i>Part 42: Test method for the determination of the indirect tensile strength of hydraulically bound mixtures</i>
EN 13286-43, <i>Unbound and hydraulically bound mixtures modulus of elasticity of hydraulically bound mixtures</i>	<i>Part 43: Test method for the determination of the modulus of elasticity of hydraulically bound mixtures</i>
EN 13286-44, <i>Unbound and hydraulically bound mixtures alpha coefficient of vitrified blast furnace slag</i>	<i>Part 44: Test method for the determination of the alpha coefficient of vitrified blast furnace slag</i>
EN 13286-45, <i>Unbound and hydraulically bound mixtures workability period of hydraulically bound mixtures</i>	<i>Part 45: Test method for the determination of the workability period of hydraulically bound mixtures</i>
EN 13286-46, <i>Unbound and hydraulically bound mixtures moisture condition value</i>	<i>Part 46: Test method for the determination of the moisture condition value</i>
EN 13286-47, <i>Unbound and hydraulically bound mixtures California bearing ratio, immediate bearing index and linear swelling</i>	<i>Part 47: Test method for the determination of California bearing ratio, immediate bearing index and linear swelling</i>

EN 13286-52:2004 (E)

prEN 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*

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1 Scope

This document specifies a test method for making specimens of hydraulically bound mixture to a predetermined density and water content by vibrocompression compaction.

This document is appropriate to mixtures, or that part of a mixture, containing aggregate up to a maximum size of 31,5 mm.

This method is not applicable to mixtures with a high proportion of fines.

2 Terms and definitions

For the purposes of this document, the following term and definition applies.

2.1

vibrocompression compaction

method of compaction of a laboratory specimen by the simultaneous application of horizontal vibration and light axial compression

3 Principle

The mixture is placed in a mould of a given volume. The mixture is compacted with a combination of horizontal vibration and vertical axial pressure.

4 Dimensions of the specimens

4.1 Cylindrical specimens

Specimens shall conform to the dimensions given in Table 1.

Table 1 — Dimensions of the specimen

Column	1	2	3
Line	Diameter, d	Height, h	Maximum size of particle permitted in the specimen
	mm	mm	mm
1	100	100 or 200	22,4
2	160	160 or 320	31,5

4.2 Direct tensile test specimens

Specimens for direct tensile test shall have the shape and dimensions in millimetres shown in Figure 1.

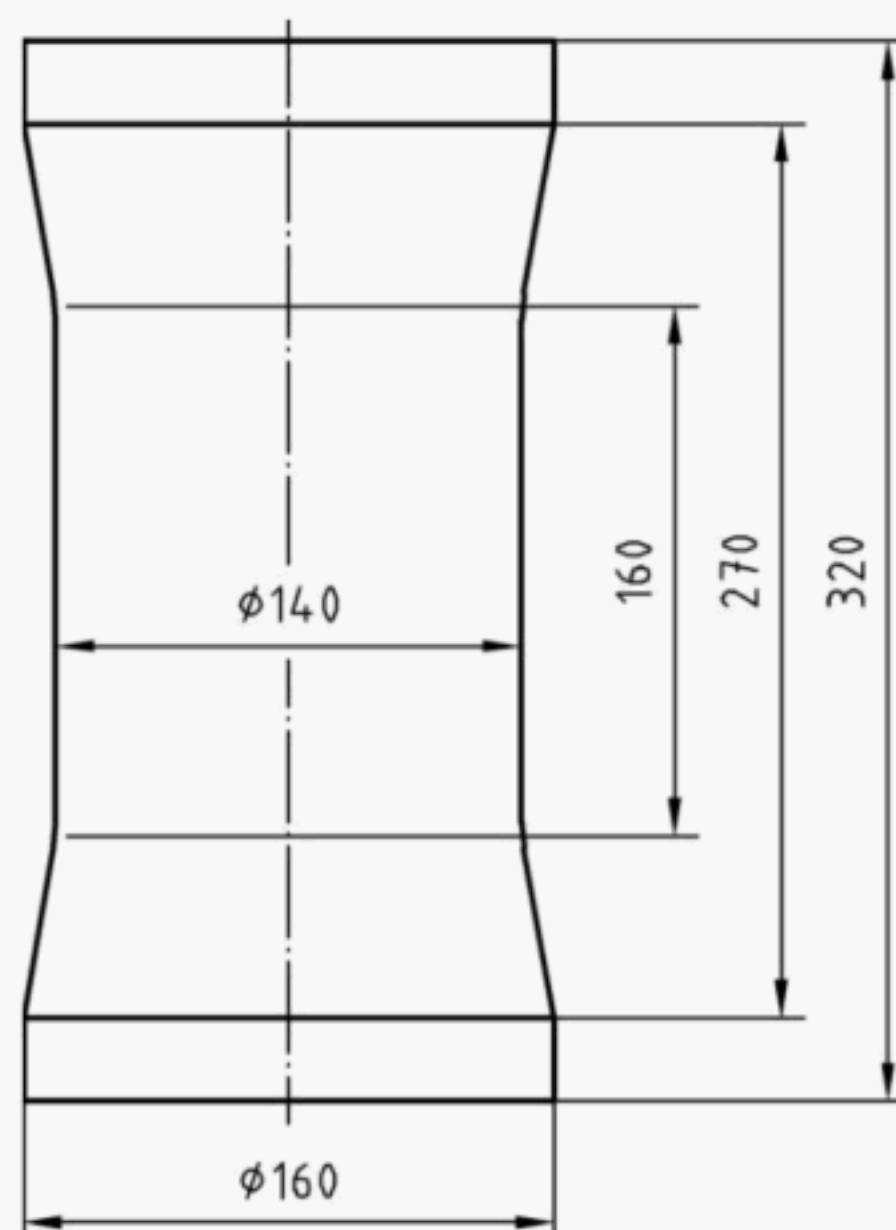


Figure 1 — Shape and dimension of a tensile test specimen

5 Apparatus

5.1 Moulds

5.1.1 Moulds, made from rigid materials, e.g. plastic or similar, with a volume accuracy of $\pm 1,5\%$ of the nominal volume of the specimen.

5.1.2 Moulds shall be tubes to which caps can be attached to cover each end of the specimens after compaction in order to prevent loss of moisture during storage.

5.1.3 Moulds for cylindrical specimens (see Figure 2) shall be cut on one generatrix to allow slight opening of the mould in order to remove the specimen after setting.

5.1.4 Moulds for direct tensile testing shall be capable of producing cylindrical specimens with a cross section shown in Figure 1 and shall be split on two opposite generatrix in order to remove the specimen after setting.

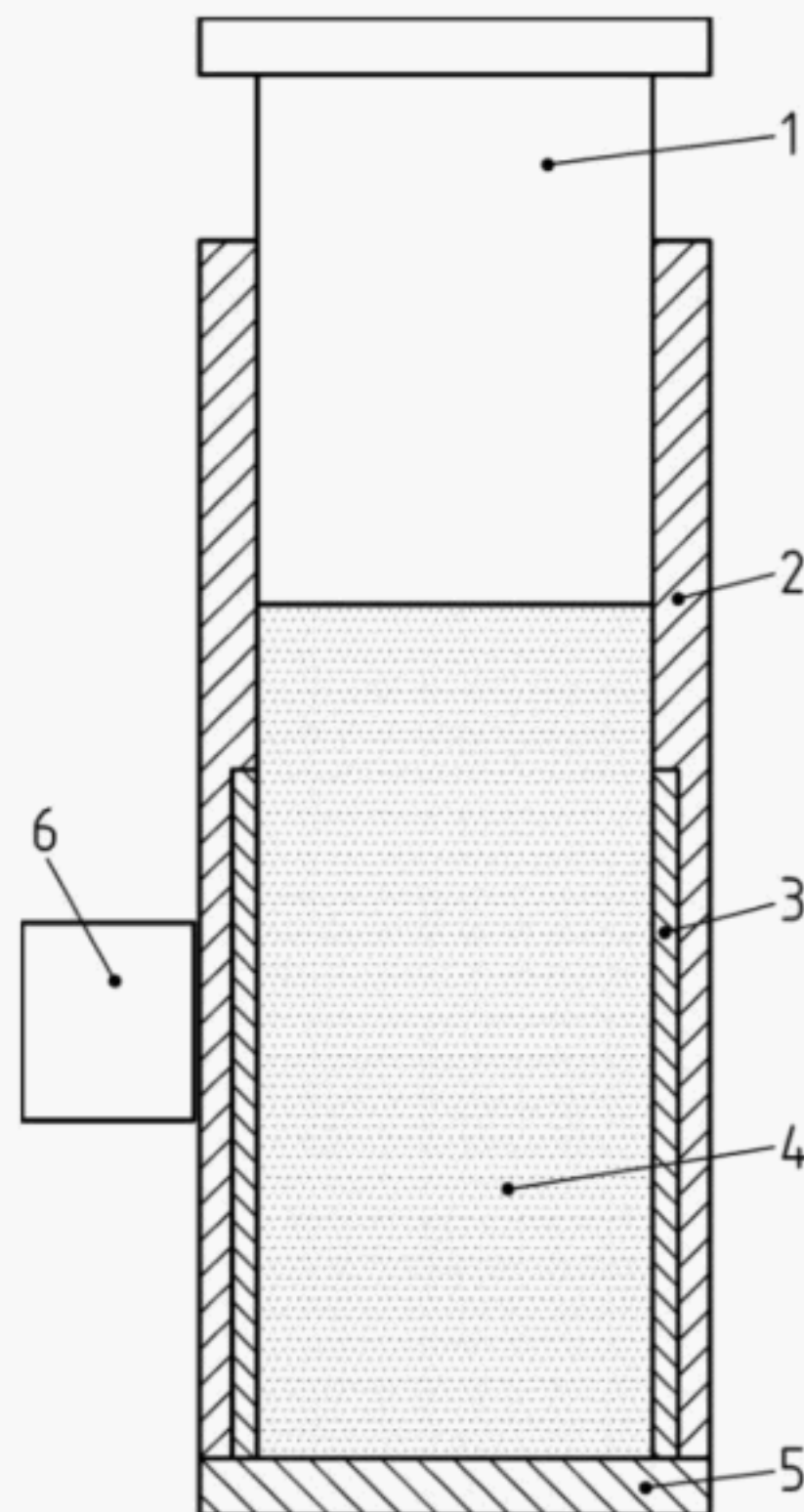
5.2 Compaction apparatus (see Figure 2)

5.2.1 Cylinder, to stiffen the mould and lengthen the top end of the mould to allow introduction of the mixture before compaction.

5.2.2 Plate, to close the bottom of the mould.

5.2.3 Vibrator, to apply a horizontal vibration to the mould and the mixture with a frequency of 100 Hz and an amplitude between 0,8 mm and 1 mm. The vibration shall be sufficient to compact the specimen to the required density within 90 s using a pressure on the mixture not greater than 0,5 MPa.

5.2.4 Piston, to apply an increasing vertical pulse pressure on the mixture during compaction.



Key

- 1 piston
- 2 cylinder to stiffen the mould
- 3 cylinder mould
- 4 mixture to be compacted
- 5 plate to close the bottom of the mould
- 6 vibrator

Figure 2 — Principle of vibrocompression apparatus

6 Procedure

6.1 Place the mould in the cylinder and close the bottom of the apparatus by means of the plate.

6.2 Introduce the mixture into the apparatus.

The mass of the mixture to be introduced into the apparatus shall be measured to an accuracy of $\pm 1\%$ and is given by the following formula:

$$m = \frac{V \rho_d \left(\frac{100}{100 + w} \right)}{1000}$$

where

m is the mass of the mixture to be introduced in the mould, in grams (g);

V is the volume of the specimen, in cubic millimetres (mm³);

ρ_d is the dry density of the specimen, in megagrams per cubic metre (Mg/m³);

w is the water content of the dry mass of the mixture, in percent (%).

6.3 Introduce the piston into the apparatus so that it is contact with the top surface of the uncompacted mixture.

At this stage the mixture is only partially contained within the mould.

6.4 Simultaneously, apply the horizontal vibration to the cylinder and, using the piston, an increasing pulsed vertical pressure axially to the mixture. Stop the compaction when the mixture is completely contained in the mould.

If the time of compaction exceeds 90 s, then modify the target density or the water content of the mixture and repeat the procedure.

6.5 Remove the specimen with its mould after compaction. Ensure that the operation is carried out smoothly. Fit the caps and seal with adhesive tape to prevent loss of moisture from the specimen.

NOTE 1 To facilitate the rearrangement of the aggregate during compaction, only a very light pressure is applied to the mixture for 2/3's the duration of the compaction. For the final 1/3, the pressure is increased to achieve the full compaction.

NOTE 2 The duration of compaction depends on the friction of the aggregate in the mixture and the density to be achieved.

7 Storage

Specimens shall be stored in their moulds with caps attached

vertically,

preventing loss of moisture,

at a temperature within ± 2 °C of the specified temperature,

for the time specified in the relevant mixture document.

8 Test report

The test report shall include the following information:

- a) reference to this document;
- b) type of mixture;
- c) origin of the mixture;
- d) preparation of the mixture where necessary;
- e) mass, water content and dry density of the specimen immediately after compaction;
- f) storage conditions of the specimen;
- g) any deviations from this document as well as any incidents that could have an effect on the result.

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