



SLOVENSKI STANDARD
SIST EN 12350-10:2010
01-december-2010

Preskušanje svežega betona - 10. del: Samozgoščevalni beton - Preskus z L-zabojem

Testing fresh concrete - Part 10: Self-compacting concrete - L box test

Prüfung von Frischbeton - Teil 10: Selbstverdichtender Beton - L-Kasten-Versuch

Essai pour béton frais - Partie 10: Béton auto-plaçant - Essai à la boîte en L

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ICS:

91.100.30	Beton in betonski izdelki	Concrete and concrete products
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 12350-10

July 2010

ICS 91.100.30

English Version

Testing fresh concrete - Part 10: Self-compacting concrete - L box test

Essai pour béton frais - Partie 10: Béton auto-plaçant -
Essai à la boîte en L

Prüfung von Frischbeton - Teil 10: Selbstverdichtender
Beton - L-Kasten-Versuch

This European Standard was approved by CEN on 20 June 2010.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, 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.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 12350-10:2010) has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", 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of an identical text or by endorsement, at the latest by January 2011, and conflicting national standards shall be withdrawn at the latest by January 2011.

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 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).

This standard is based on the results from the EU-project "Testing-SCC" under the 5th Frame Programme (GRD2-2000-30024/G6RD-CT-2001-00580).

Owing to its significant advantages in the improvement of construction quality and working environment, self-compacting concrete (SCC) has been widely accepted by the construction owners. The use of SCC in practical concrete construction is steadily increasing. Since SCC has to give satisfactory in-situ properties (perfect filling of the mould and embedment of the reinforcement, homogeneity and full compaction) without vibration, the proper methods for testing the fresh SCC are very important. These should address three key properties: filling ability, passing ability and resistance to segregation. It is desirable, especially in the case of new constituents or new concrete compositions, to test the consistence of fresh SCC before casting in place.

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A number of test methods including this test are available for testing fresh SCC. Most of the commonly used test methods were evaluated in the recently closed EU-project "Testing-SCC" under the 5th Frame Programme (GRD2-2000-30024/G6RD-CT-2001-00580). According to the results from this EU project, it seems no single test method can completely cover all three key properties. Nevertheless any test method should at least be correlated to the practical situation and give consistent results in order to provide reliable data for judgment of concrete consistence.

This standard is one of a series concerned with testing fresh concrete.

EN 12350, *Testing fresh concrete*, consists of the following parts:

- *Part 1: Sampling*
- *Part 2: Slump-test*
- *Part 3: Vebe test*
- *Part 4: Degree of compactability*
- *Part 5: Flow table test*
- *Part 6: Density*
- *Part 7: Air content — Pressure methods*
- *Part 8: Self-compacting concrete — Slump-flow test*

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- *Part 9: Self-compacting concrete — V-funnel test*
- *Part 10: Self-compacting concrete — L box test*
- *Part 11: Self-compacting concrete — Sieve segregation test*
- *Part 12: Self-compacting concrete — J-ring test*

CAUTION — When cement is mixed with water, alkali is released. Take precautions to avoid dry cement entering the eyes, mouth and nose whilst mixing concrete. Prevent skin contact with wet cement or concrete by wearing suitable protective clothing. If cement or concrete enters the eye, immediately wash it out thoroughly with clean water and seek medical treatment without delay. Wash wet concrete off the skin immediately.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies the procedure for determining the passing ability ratio for self-compacting concrete using the L box test.

2 Normative references

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

EN 12350-1, *Testing fresh concrete — Part 1: Sampling*

3 Principle

The L box test is used to assess the passing ability of self-compacting concrete to flow through tight openings including spaces between reinforcing bars and other obstructions without segregation or blocking. There are two variations; the two bar test and the three bar test. The three bar test simulates more congested reinforcement.

A measured volume of fresh concrete is allowed to flow horizontally through the gaps between vertical, smooth reinforcing bars. The heights of the concrete in the vertical section (H_1) and at the end of the horizontal section (H_2), see Figure 1, are measured and the ratio H_2/H_1 determined. This ratio is a measure of the passing or blocking behaviour of SCC.

4 Apparatus

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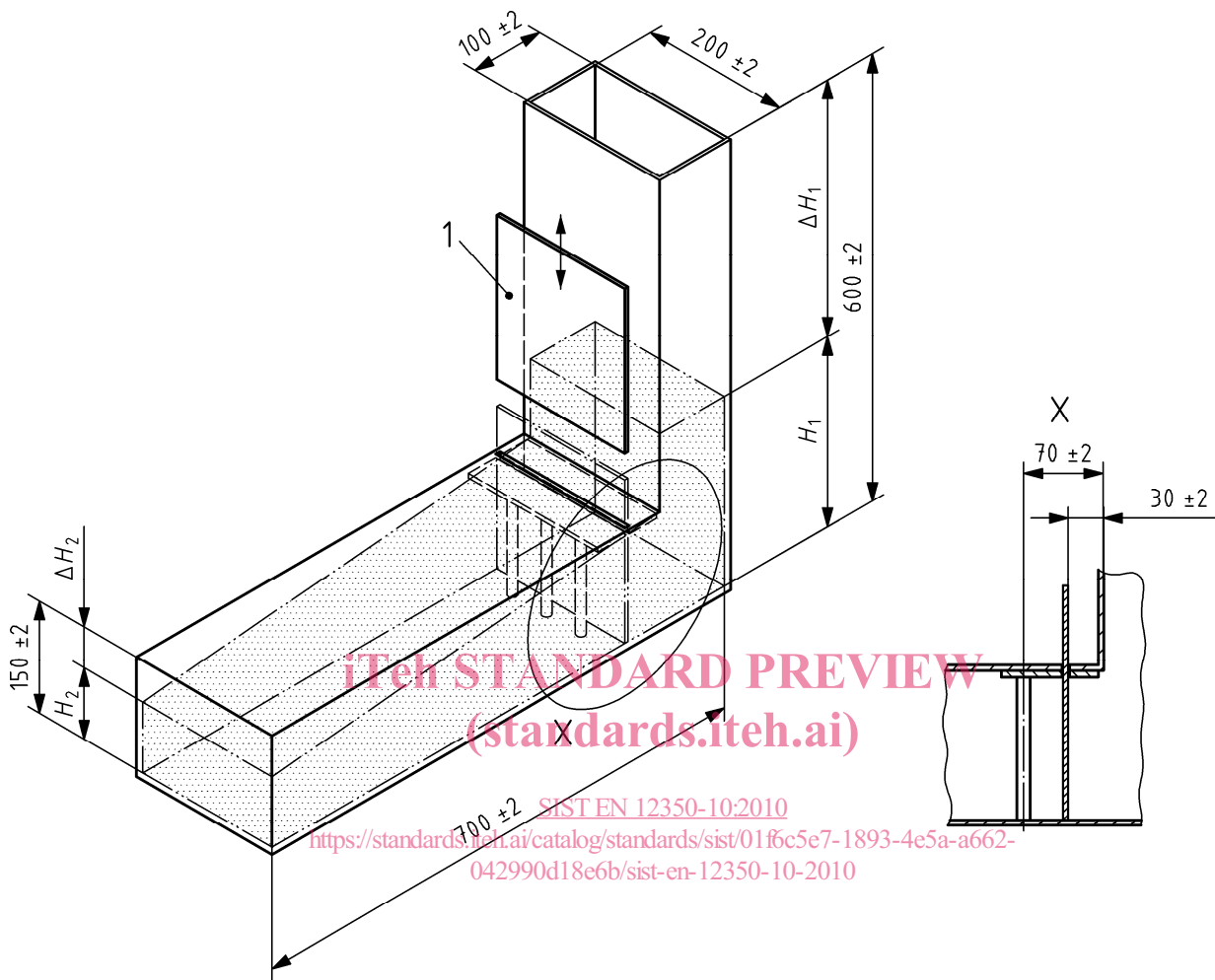
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4.1 L box, having the general arrangement and internal dimensions as shown in Figure 1.

The L box shall be of rigid construction with surfaces that are smooth, flat and not readily attacked by cement paste or be liable to rusting. The vertical hopper may be removable for ease of cleaning.

The bar positioning system shall be such that two smooth steel bars of $(12 \pm 0,2)$ mm diameter will provide a gap of (59 ± 1) mm for the two bar test and three smooth steel bars of $(12 \pm 0,2)$ mm diameter will provide a gap of (41 ± 1) mm for the three bar test. The system shall locate the bars in the L box so that they are vertical and equidistant across the width of the box, as shown in Figure 2.

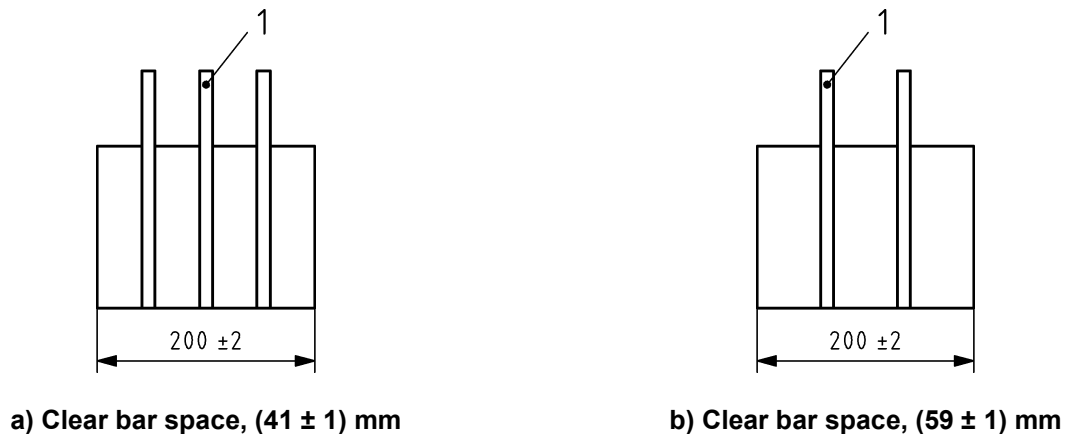
Dimensions in millimetres

**Key**

1 Sliding gate

Figure 1 — Typical general assembly of L box showing required dimensions

Dimensions in millimetres

**Key**1 $12 \pm 0,2$ mm diameter smooth steel bars**Figure 2 — Bar positions in L box**

The surface of any material used in the assemblies shall not be readily attacked by cement paste or be liable to rusting.

4.2 Rule or measuring tape, of minimum length 500 mm and graduated at intervals not exceeding 1 mm, the zero mark being at the extreme end of the rule or measuring tape.

4.3 Containers, to hold the sample and having a total volume not less than 14 l.

4.4 Spirit level, for checking horizontality of base of L box base prior to commencing the test.

4.5 Straight edge, for striking off concrete level with the top of the L box.

5 Test sample

A sample of at least 14 l shall be obtained in accordance with EN 12350-1.

6 Test procedure

Support the L box on a level base and check for horizontality using the spirit level. Clean the L box and dampen immediately prior to testing, but keep free from excess moisture. Close the gate between the vertical and horizontal sections. Pour the concrete from the container(s) into the filling hopper of the L box, without any agitation or mechanical compaction, then strike off the top with the straight edge so that the concrete is level with the top of the vertical section of the L box and allow to stand for (60 ± 10) s. Check the concrete for signs of segregation before and after filling of the L box and report under item 8, d) in a qualitative way, e.g. no indication of segregation, strong indication of segregation.

NOTE Signs of segregation include a layer of cement paste/mortar and segregated coarse aggregate at the top.

Fully open the sliding gate in a smooth continuous action to allow the concrete to flow into the horizontal section. When movement has ceased, measure the drop in height of the level of concrete ΔH_1 to the nearest 1 mm in the vertical section on the gate side of the box at three positions equally spaced across the width of the box. The mean depth of the concrete H_1 is the difference between the height of vertical section and the average of the three readings of ΔH_1 . Record H_1 to the nearest 1 mm. The same procedure is used to calculate the mean depth of the concrete at the end of the horizontal section of the L box H_2 from the