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Testing methods for pervious concrete —

Part 1:
Infiltration rate

Méthodes d'essai pour ciments perméables —

Partie 1: Taux d'infiltration

Reference number
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Contents

Page

Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 71, *Concrete, reinforced concrete and prestressed concrete*, Subcommittee SC 1, *Test methods for concrete*.

ISO 17785 consists of the following parts, under the general title *Testing methods for pervious concrete*:

— *Part 1: Infiltration·rate*

Testing methods for pervious concrete —

Part 1: Infiltration rate

1 Scope

This part of ISO 17785 specifies the procedure for testing the surface infiltration rate of hardened pervious concrete pavement specimens in the laboratory. It is not a method for measuring the permeability of pervious concrete. The specimens can be either prepared in the laboratory or cored from field placements, but not representing field conditions. This part of ISO 17785 also specifies procedures to make and cure hardened pervious concrete samples in the laboratory.

2 Terms and definitions

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

3.1
infiltration rate
water flow rate per area per time through pervious concrete

3.2
pervious concrete
concrete which has interconnected voids that allow for water flow through them

Note 1 to entry: Pervious concrete for pavement is usually made with little or no fine aggregate and contains narrowly graded coarse aggregate typically with the nominal maximum size of 10 mm. The nominal size can be less or more, but the nominal maximum size is 25 mm.

3.3
pre-wet
wetting specimens before test representing field conditions with antecedent precipitation

Note 1 to entry: This pre-wet condition typically represents the condition of the minimum flow rate.

3 Symbols

K infiltration rate (mm/s)

W volume of infiltrated water (mm^3)

A cross-sectional area of specimen (mm^2)

t time required for measured volume of water to infiltrate the concrete (s)

4 Principle

The test specimens are pre-wetted before the first test. A given amount of water is poured into the specimen and the time for the water to infiltrate is measured.

5 Apparatus

5.1 General

The apparatus shall consist of:

a) Apparatus for making the specimen in the laboratory as noted herein — or receipt of a core from the field.

b) Equipment for preparing and measuring the test specimens.

5.2 Apparatus for making the specimen

5.2.1 Balance -— A balance or scale accurate to 5 g.

5.2.2 Scoop — Of a size large enough so each amount of pervious concrete obtained from the sampling receptacle is representative and small enough so that the concrete is not spilled during placement in the measure.

5.2.3 Mould — A cylindrical container made of steel or other suitable material with an inside diameter of minimum 100 mm with a height of minimum 100 mm. The mould shall be made of non-absorbent material which does not react with cement paste and their internal surface shall have a smooth finish (see Note). The moulds shall be substantial enough to hold their form without distortion and shall be substantially leak-proof. Measure and record the inner diameter of the mould to the nearest 1 mm.

NOTE Materials that have been found to be suitable include steel, aluminium, rigid plastic, and PVC.

5.2.4 Coring machine — Machines to obtain cylindrical cores minimum 100 mm diameter by minimum 100 mm high.

5.2.5 Shrink wrap — Heat shrink plastic film (see Note). Shrink wrap shall be made of non-absorbent material which does not react with cement paste.

NOTE Shrink wrap materials are made of polymer plastic film. When heat is applied the plastic wrap shrinks tightly around the specimen.

5.3 Apparatus for testing infiltration rate

5.3.1 Water container — A cylindrical container typically made of plastic having a volume of at least 2000 ml, and from which water may be easily poured at a controlled rate into the funnel.

5.3.2 Funnel — Watertight and sufficiently rigid to frame (see Figure 1). The funnel shall have a capacity of 200 ml.

5.3.3 Stopwatch or clock — Accurate to 0,1 s.

5.3.4 Water — Potable water.

5.3.5 Heat gun — Air heating system to fully wrap the specimens by heating the shrink wrap.

6 Sampling

The test shall be performed with a minimum of three similar specimens. The specimens shall be made based on the specifications applicable to the project and area of construction.

7 Procedure

7.1 Making the test specimen in the laboratory —A test specimen shall have a minimum diameter of 10 0mm. There are two options for preparing the specimen, one with the specimen having a vertical porosity distribution representative of a field placement, and one with a more even porosity in the vertical direction.

7.1.1 For the test specimen with a typical porosity distribution, the concrete shall be poured in one lift and consolidated with a rod by rammer. After consolidation is complete, the side of the mould is lightly tapped with a wooden or plastic hammer to remove foam generated by the compaction rod.

7.1.2 For the test specimen with a more even porosity in the vertical direction, the concrete shall be poured in lifts and consolidated with a rod by rammer after each lift. For specimens with a diameter of 100 mm and height of 200 mm, there shall be three lifts. After consolidation is complete, the side of the mould is lightly tapped with a wooden or plastic hammer to remove foam generated by the compaction rod.

7.1.3 The specimens shall be immediately covered after consolidation.

7.1.4 Curing — The specimens shall remain in the covered mould and the mould shall be removed after a minimum curing period of 7 days.

7.2 Obtaining test specimen from the field – Cut cores the full depth of the pervious concrete slab. Cores are at a minimum 100 mm in diameter.

7.3 Wrapping — Wrap the specimen with three layers of shrink wrap and tape the vertical seam full length. Trim the wrap even with the bottom of specimen and leave at least a 50 mm lip on the top to hold the minimal head.

7.4 Heating shrink wrap — Heat the wrap with a heat gun to tighten the wrap on the vertical surface of the sample. This should prevent the flow of water between the wrap and the exterior of the sample. Do not heat the top 50 mm lip. The inner surface of the wrap shall be marked or scored with two lines at a distance of 15 mm and 25 mm from the top of the sample.

7.5 Pre-wetting — Place the specimen upright in the funnel to allow to freely flow out of the bottom. Pour water into the specimen at a rate sufficient to maintain a head between the two marked lines. Use a total of 1000 ml of water for 100 mm diameter specimens.

7.6 Pour the water into the specimen at a rate sufficient to maintain a head between the two marked lines and until the measured amount of water has been used. Begin timing as soon as the water impacts the pervious concrete surface. Stop timing when free water is no longer present on the pervious surface. The test shall be started within 5min after the completion of the pre-wetting. Record the amount of water (2000 ml for 100 mm diameter specimens) to the nearest 10 ml. Record the testing duration (t) to the nearest 0,1 s.

8 Calculation

The infiltration rate shall be calculated as follows:

$$k = \frac{W}{A \cdot t} \qquad (1)$$

9 Test report

In the event of a report being prepared, the following information shall be included:

a) Identification of the sample;

b) Identification of the specimen;

c) Information whether specimens are made in the laboratory or received as a core from the field;

d) Details on how the specimen was prepared and cured in the laboratory;

e) Specimen dimensions and density (both designed and measured);

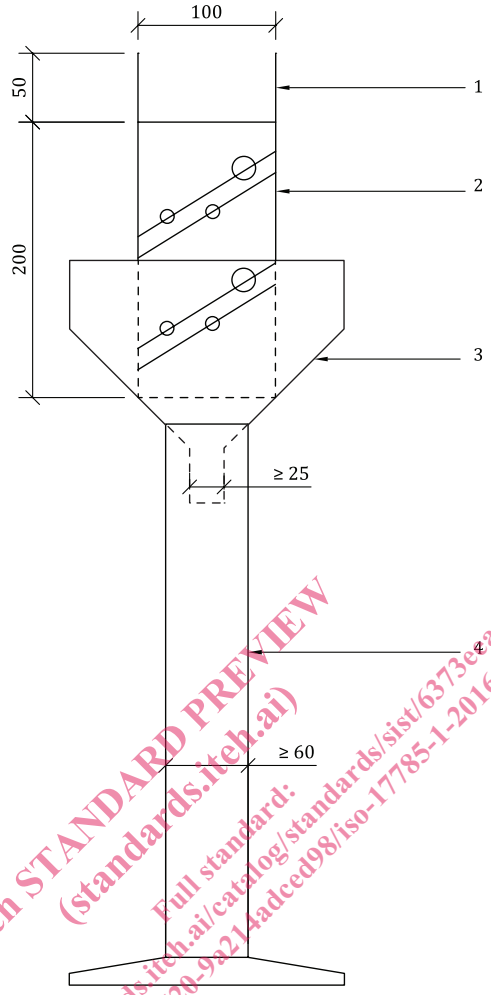
f) Age of specimen at test;

g) Volume of water poured onto the specimen during test (mm^3);

h) Time required for the measured amount of water to infiltrate into the concrete (s);

i) Infiltration rate (mm/s).

Dimensions in millimeters



Key

1 shrink wrap
2 test specimen
3 funnel
4 graduated cylinder

Figure 1 — Test setup and dimensions