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**Geosynthetics — Procedure for
simulating damage under interlocking-
concrete-block pavement by the roller
compactor method**

*Géosynthétiques — Mode opératoire pour simuler l'endommagement
sous un revêtement en pavés béton autobloquants par la méthode du
compacteur à rouleau*



Reference number
ISO/TS 19708:2007(E)

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An ISO/PAS or ISO/TS is reviewed after three years in order to decide whether it will be confirmed for a further three years, revised to become an International Standard, or withdrawn. If the ISO/PAS or ISO/TS is confirmed, it is reviewed again after a further three years, at which time it must either be transformed into an International Standard or be withdrawn.

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ISO/TS 19708 was prepared by Technical Committee ISO/TC 221, *Geosynthetics*.

Geosynthetics — Procedure for simulating damage under interlocking-concrete-block pavement by the roller compactor method

1 Scope

This Technical Specification specifies a test method for the determination, using a roller compactor for bituminous mixtures, of the damage to a geosynthetic used as a separator in interlocking-concrete-block pavements. The geosynthetic is placed between a cushion-sand course and a base coarse material. The roller compactor simulates highway traffic load and pedestrian load. After the roller compactor test, the cushion sand retained is determined.

This Technical Specification can be used for selecting a geosynthetic.

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.

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 9862, *Geosynthetics — Sampling and preparation of test specimens*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 7619-1, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 1: Durometer method (Shore hardness)*

ISO 7619-2, *Rubber, vulcanized or thermoplastic — Determination of indentation hardness — Part 2: IRHD pocket meter method*

EN 1097-2, *Tests for mechanical and physical properties of aggregates — Part 2: Methods for the determination of resistance to fragmentation*

EN 12697-33, *Bituminous mixtures — Test methods for hot mix asphalt — Part 33: Specimen prepared by roller compactor*

3 Terms and definitions

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

3.1

line pressure

pressure defined as the value of total loading force over a part of roller width contacting the surface of an interlocking-concrete-block pavement area

NOTE The interlocking-concrete-block pavement area means the area of mould surface covered with interlocking concrete blocks and the joint sand.

3.2
rolling height

height of the roller centre portion at its origin defined as the top surface of interlocking concrete pavement block

3.3
retained sand index

ratio of the mass of the retained sand to the initial total mass of the sand in a cushion course after damage of the geosynthetic under load

NOTE The retained sand index is expressed as a percentage.

4 Principle

A geosynthetic specimen is placed between two layers of aggregate and sand. Specified loads are indirectly imposed on the specimen for a specified number of times. The masses of sand passing through the damaged geosynthetic into the base material and the sand retained above and within the geosynthetic are registered. After the specimen has been taken out of the testing machine, damage is observed visually.

The test results are expressed as the retained sand index (as a percentage). The results of the visual observation of the specimens are also reported.

5 Test specimens

5.1 Sampling

Geosynthetic specimens shall be sampled in accordance with ISO 9862.

5.2 Number and dimensions of specimens

Specimens with dimensions of 520 mm × 1 040 mm shall be cut out of the samples. Each specimen shall be cut into secondary specimens with dimensions of 520 mm × 520 mm. Six secondary specimens shall be used for damage tests, and the others may be used for reference tests. For other reference tests, appropriate dimensions shall be specified. Specimens should be tested in the longitudinal direction only.

6 Conditioning

The test specimens shall be conditioned in the standard atmosphere for testing (20 ± 2) °C at (65 ± 5) % RH, as defined in ISO 554.

The specimens can be considered to have been conditioned when the change in mass in successive weightings, made at intervals of not less than 2 h, does not exceed 0,25 % of the mass of the test specimen.

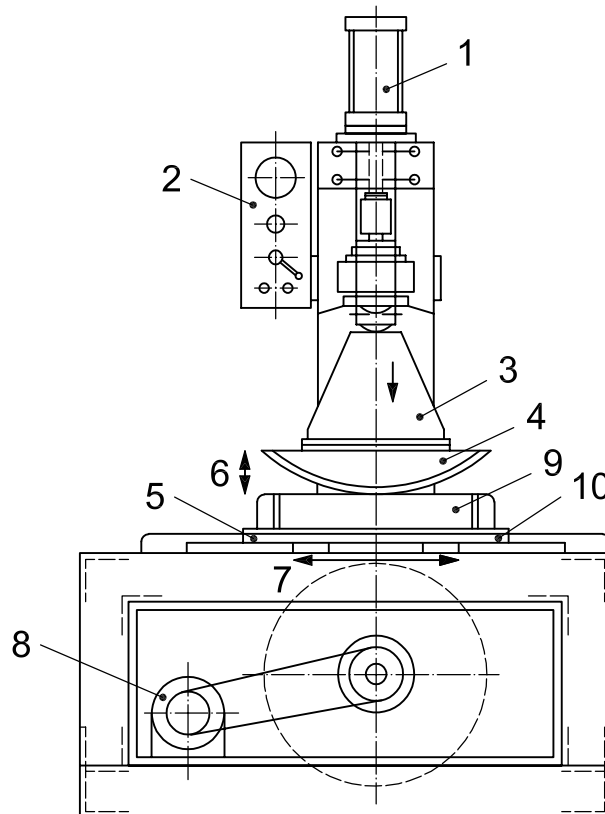
Conditioning and/or testing in standard atmosphere may only be omitted when it can be shown that results obtained for the same specific type of product (both structure and polymer type) are not affected by changes in temperature and humidity exceeding the limits.

7 Apparatus

7.1 Roller compactor

7.1.1 General

As shown in Figure 1, roller compactors have an arc-shaped roller to apply a load to the rolled surface of the bituminous mixture in the mould placed on the table. The table is moved back and forth to compact the bituminous mixture. The roller compactor used shall be such that the line pressure, the rolling velocity, and the number of rolling times can be controlled. The minimum line pressure shall be 30 kN/m.



Key

- 1 pressurizing air cylinder
- 2 control panel
- 3 pressurizing = rolling
- 4 roller
- 5 left-and-right motion stroke
- 6 maximum rolling height
- 7 moving length (stroke)
- 8 motor
- 9 mould
- 10 slide table

Figure 1 — Example of roller compactor

7.1.2 Roller

The radius of the roller shall be between 460 mm and 480 mm. The width of the roller shall be between 400 mm and 500 mm. The moving length (stroke) shall be greater than or equal to 460 mm. The maximum rolling height shall be greater than or equal to 150 mm. The roller shall be capable of applying repeated loads of at least 5 stroke-backstroke cycles/min.

7.1.3 Mould

Figure 2 shows an example of a mould. The mould shall be square with a side length of 500 mm. It shall consist of a bottom board and collars, and be capable of compacting a specimen with a thickness of 130 mm. The collars shall be divided into two or three stages and kept tightened during the tests. The collar of the lowest stage shall be 50 mm thick. The mould shall be made of steel or aluminium. The same number of moulds as the number of tests to be carried out on the day shall be prepared.

Dimensions in millimetres

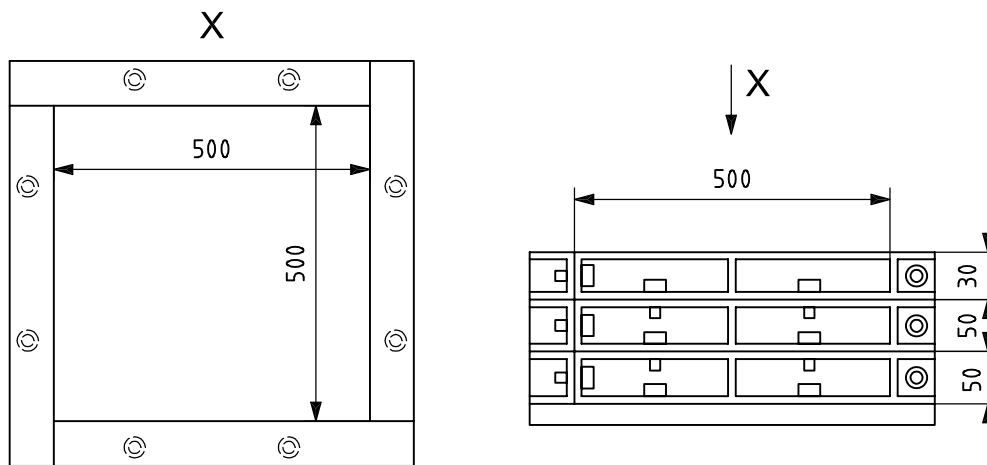


Figure 2 — Example of mould

7.2 Aggregate

Base coarse material (crushed stones) and cushion sand (crushed sand or natural sand) shall be used as the aggregate to cause damage to the specimen, and shall satisfy the following requirements:

- The abrasion loss of the base coarse material shall be measured using the test method specified by EN 1097-2 using the Los Angeles method. It shall be smaller than or equal to 20 %.
- The grain diameter of the base coarse material specified in ISO 3310-1 shall be between 8 mm and 16 mm. The grains shall be washed and properly dried.
- The grain diameter of the cushion sand specified in ISO 3310-1 shall be between 60 µm and 2 mm. The grains shall be washed and properly dried.

New aggregate shall be used for each test. Used aggregate shall not be used again.

7.3 Rubber board

Synthetic rubber boards with a hardness of 84 ± 4 (see ISO 7619-1 and ISO 7619-2) and a thickness of 10 mm shall be used. They shall be cut in accordance with the internal dimensions of the mould.

7.4 Interlocking blocks

Interlocking blocks shall be of two types, one with nominal dimensions of 98 mm width × 198 mm length × 80 mm thickness, and the other with nominal dimensions of 98 mm width × 98 mm length × 80 mm thickness.

8 Test procedure

8.1 Damage protection

Unless otherwise specified, place the rubber board at the bottom of a mould with dimensions of 500 mm width × 500 mm length × 50 mm thickness. Weigh both the initial mass of the base course material and the cushion sand.

Put an appropriate amount of the base coarse material on the rubber board, compact it using a small vibrating tamper, and adjust its height to be level with the upper surface of the mould. The final void ration of the base course material shall appropriately be controlled appropriately at 45 %.

Spread the geosynthetic specimen on the compacted surface of the base coarse material. The longitudinal direction of the geosynthetic is oriented with the principal direction of the roller compactor.

Place an upper mould with a thickness of 80 mm on the lower mould with a thickness of 50 mm, with the geosynthetic specimen between them, and fix the moulds.

Uniformly spread an appropriate amount of the cushion sand and adjust it to a thickness of 20 mm. Pave the interlocking blocks in the herringbone bond pavement pattern (as a default pattern) shown in Figure 3. Other pavement patterns can be used with reference to the patterns of the interlocking blocks of actual construction sites. Scatter the sand uniformly on the surface of the interlocking blocks, and vibrate the mould so that the material is properly grouted in the joint. The final void ration of the cushion sand shall approximately be controlled at 45 %.

Clean the residual material off the surface. Place the mould containing the geosynthetic specimen on the testing machine.

Set the line pressure at 30 kN/m and the rolling velocity at 5 cycles/min stroke/backstroke. Set the moving length at 460 mm. Initiate rolling. The loading shall be applied 25 times. After finishing the test, remove the cushion sand and, being very careful not to damage the geosynthetic, take it out of the mould.

Weigh the base course and cushion sand in the lower mould. Repeat the same procedure a further 5 times, thus processing 6 geosynthetic specimens in total.

8.2 Observation of damage

The degree of damage of the geosynthetic specimen at the end of the test shall be evaluated visually and the number of holes/clacks reported.

9 Calculation

The retained sand index (RSI) that expresses, as a percentage, damage to a geosynthetic specimen is calculated as follows:

$$RSI = [1 - (m_T - m_1) / m_2] \times 100 \tag{1}$$

where

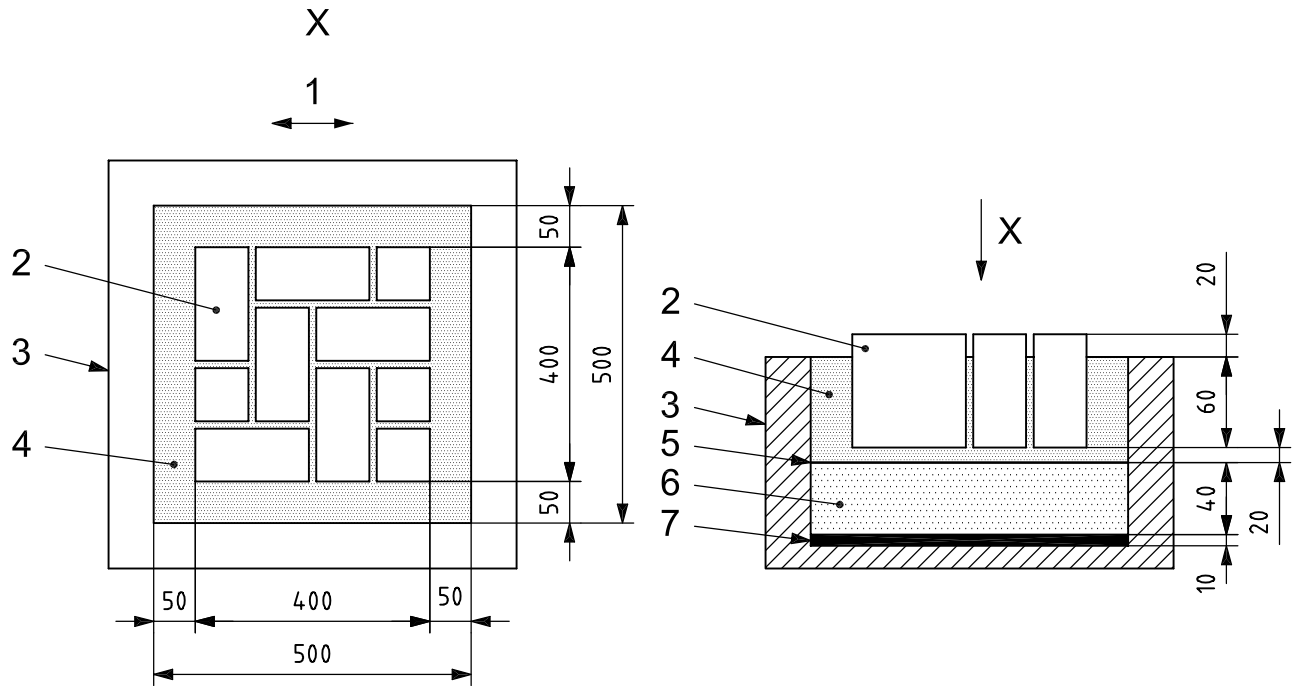
m_1 is the initial mass of the base course material, in grams;

m_2 is the initial mass of cushion sand, in grams;

m_T is the total mass of base course and cushion sand in the lower mould at the end of the test, in grams.

Calculate the average of RSI, and the standard deviation and coefficient of variation for the six geosynthetic specimens.

Dimensions in millimetres



Joint width: approximately 3 mm

Key

- 1 direction of rolling
- 2 interlocking concrete blocks
- 3 mould
- 4 cushion sand
- 5 geosynthetic specimen
- 6 base course materials
- 7 rubber board

Figure 3 — Example of pavement pattern of interlocking concrete blocks

10 Test report

The test report shall include the following information:

- a) a reference to this Technical Specification, i.e. ISO/TS 19708:2007;
- b) the test laboratory, the test operator, and the test date;
- c) details of the apparatus used, including a diagram;
- d) the humidity at which the test was carried out;
- e) the temperature at which the test was carried out;
- f) a description of the geosynthetics;
- g) identification of the sample and the orientation of geosynthetic specimens cut from the material roll or sheet;
- h) the aggregate used in the test;
- i) the mean retained sand index and, if required, the individual values;
- j) if required, the experimental data and calculations for each specimen in tabulated format;
- k) a visual damage report;
- l) any deviations from this procedure;
- m) any unusual behaviour encountered during the test.

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