



SLOVENSKI STANDARD
SIST EN 13197:2011+A1:2014
01-julij-2014

Nadomešča:
SIST EN 13197:2011

Materiali za označevanje vozišča - Vrtljiva plošča za simulacijo obrabe

Road marking materials - Wear simulator Turntable

Straßenmarkierungsmaterialien - Verschleißsimulator

Produits de marquage routier - Simulateur d'usure tournant

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ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

SIST EN 13197:2011+A1:2014 **en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13197:2011+A1

April 2014

ICS 93.080.20

Supersedes EN 13197:2011

English Version

Road marking materials - Wear simulator Turntable

Produits de marquage routier - Simulateur d'usure tournant

Straßenmarkierungsmaterialien - Verschleißsimulator

This European Standard was approved by CEN on 22 April 2011 and includes Amendment 1 approved by CEN on 13 March 2014.

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Foreword

This document (EN 13197:2011+A1:2014) has been prepared by Technical Committee CEN/TC 226 "Road equipment", the secretariat of which is held by AFNOR.

A1 This document **A1** shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2014, and conflicting national standards shall be withdrawn at the latest by October 2014.

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 includes Amendment 1 approved by CEN on 13 March 2014.

This document supersedes **A1** EN 13197:2011 **A1**.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** **A1**.

The Annex A of this European Standard is normative and Annexes B to E are informative.

A1 The former edition, EN 13197:2011, was **A1** one of a package of inter-related European Standards with a common date of withdrawal (dow) fixed on December 2011 (*including the request of an extension for the co-existence period*):

- EN 1790, *Road marking materials — Preformed road markings*,
- EN 1824, *Road marking materials — Road trials*,
- EN 1871, *Road marking materials — Paint, thermoplastic and cold plastic materials — Specifications*,
- EN 12802, *Road marking materials — Laboratory methods for identification*,
- EN 13197, *Road marking materials — Wear simulator Turntable*
- EN 13212, *Road marking materials — Requirements for factory production control*,
- EN 13459, *Road marking materials — Sampling and testing*.

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, 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.

EN 13197:2011+A1:2014 (E)**1 Scope**

A1 This European Standard **A1** specifies the requirements for wear simulator test for road marking materials intended for use in both permanent and temporary road markings including those with increased retroreflection under wet and rain conditions, without road studs.

It gives description for the equipment and for test plate's characteristics; it also gives description for the test method involving road marking materials application, test conditions during wear test, parameters to be measured, frequency of the measurements and expression of the results as a test report.

This document gives also the requirements to be followed when the test is to be used for CE marking purposes.

2 Normative references

A1 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. **A1**

EN 1436, *Road marking materials — Road marking performance for road users*

A1 *deleted text* **A1**

EN 13036-1, *Road and airfield surface characteristics — Test methods — Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

3 Terms and definitions

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

3.1**support angle**

angle between a plane perpendicular to the axle of the loading wheel and the vertical

3.2**steering angle**

angle between a plane perpendicular to the axle of the loading wheel and a plane tangential to the movement of the loaded wheel relative to the test plates

3.3**wheel passages (wp)**

number of loading wheels that have passed over a test plate

3.4**measurement area**

summary of those areas of all the test plates of one tested product that are subject to wheel passages, which makes it possible to determine the required measurements

3.5**control plate**

test plate of a standard material and with a standard road marking material included in each test run for indication of correct procedure

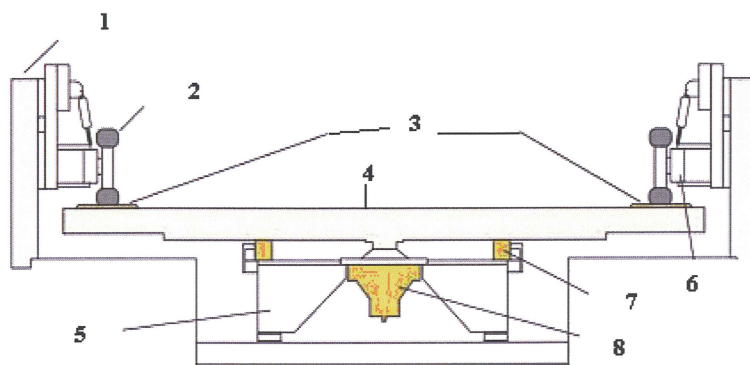
3.6**rolling line**

circumferential line characterised by the central line of the contact area of loading tyre

4 Wear simulator facility

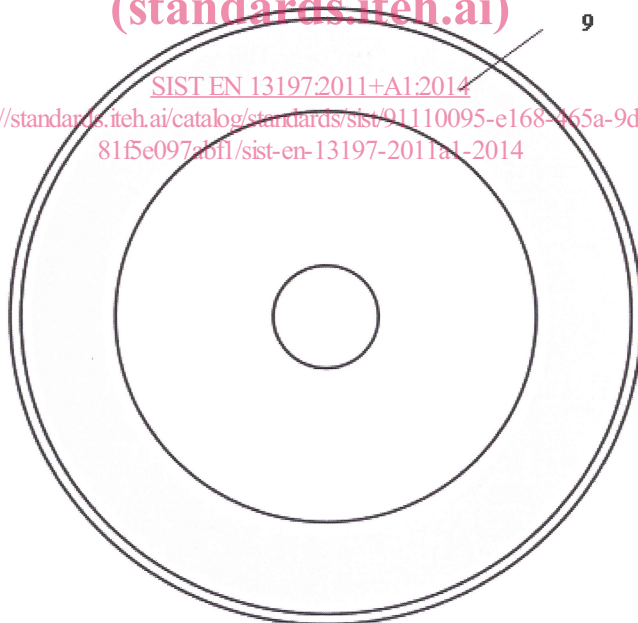
4.1 Turntable

The mobile part of the wear simulator consists of a turntable with an external diameter of 6,4 m comprising a number of running wheels with loaded axles, a number of test plates mounted in a plane and driving mechanism capable of a relative movement, in which the wheel(s) overrun the test plates repeatedly. The rotation can be done in both directions (see Figure 1) at a tangential speed up to a maximum of 120 km/h.



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Key

- | | |
|------------------------------|-----------------------------|
| 1 wheel stations | 6 wheel suspension |
| 2 test tyre | 7 bearing |
| 3 road marking samples | 8 electric/hydraulic engine |
| 4 turntable diameter 6,40 | 9 samples, test surface |
| 5 turntable bearing assembly | |

Figure 1 — Scheme of the wear simulator

EN 13197:2011+A1:2014 (E)**4.2 Test plates housing****4.2.1 General**

The turntable's rim is provided with a number of housings to fix the test plates. These housings shall comply with the following requirements.

4.2.2 Dimensions

They have to be sufficient to allow the use of the appropriate measurement equipment. The minimum required dimension on the parallel direction to the movement of the loading wheels is 190 mm, although the use of some commercial measuring equipment requires longer distances.

4.2.3 Location

All of them shall be fixed at a position in the rim to provide a rolling-line defined by a diameter of $585 \text{ cm} \pm 5 \text{ cm}$ measured by the central line of the contact area of tyre. The layout shall guarantee that the location of the test plates has no influence in the results.

4.2.4 Fixation system

The fixation of the test plates allows

- the top of the test plates to be at the same level that the housing external part to avoid create jumping,
- a uniform rolling surface without skidding or vibration and
- an absolute immobility of the test plates on their housings.

4.3 Cleaning system

The wear simulator shall have appropriate equipment in order to eliminate effectively and in a few wheel passages the particles that, potentially, could leave the film and to keep the tyres clean and cool; they may be:

- brushes;
- jet air;
- vacuum cleaner;
- water and air atomizers;
- others.

NOTE 1 During the wearing process, some components of the road marking materials (mainly particles of drop-on materials) may leave the film and, if not removed, may adhere the tyres and cause an additional and uncontrolled wear. This effect may be especially serious when the materials under test are thermoplastics and the tyres, if not sufficient cool and clean, may become tacky as consequence of the adherence of thermoplastic binder.

NOTE 2 The test method may also specify additional cleaning possibilities such as to include an initial short cycle with the aim of removing in a first stage the particles badly adhered to the applied road marking and the possibility of allowing the tyres to wheel passages the road marking and the pavement (test plates without road marking material) alternatively.

4.4 Water dispenser

The wear simulator shall have a water dispenser able to add water over the test plates.

4.5 Test room

The wear simulator is located into a test room isolated and air-conditioned.

4.6 Wheels

4.6.1 General

Stress load is created by the effect of a number of wheels rolling over the test plates. The stress load depends on the number of wheels, on the type of tyres, on the load itself, on the inflate pressure, on the support and steering angles and on the alignment.

4.6.2 Number of wheels

The reference stress load shall be created by the effect of two pairs of wheels. Different numbers of wheels can be used, provided that they correlate with the results obtain with the reference stress load.

NOTE Wheels of the same pair are located in opposite position.

4.6.3 Type of tyres

The approval of the specific commercial tyres shall be done by submitting the control plate (see 7.3) to a real run test, using the wheels to be tested, up to a minimum traffic class of P6 (see 8.5.3, Table 4). The tyres shall be approved if the result on the control plate does not deviate from the known and controlled characteristics in excess of the percentages listed in 8.3.

New tyres shall be used for each test.

NOTE 1 For the selection of the tyres the following aspects are recommended:

- dimensions: The tyres will have a commercial size of 205/60, able to give an homogeneous rolled width of, at least, 150 mm.
- A1 *deleted text* A1
- nature: specific commercial tyres.

NOTE 2 Manufacturers are continuously modifying both the nature and the pattern of the commercial tyres; therefore, it is not advisable to establish any specification.

4.6.4 Wheel load

The wheel load on the turntable may range between 0 N and 4 000 N.

4.6.5 Inflate pressure

The inflate pressure may range between 0 and 0,3 MPa.

4.6.6 Steering and support angles

A1 The fixation system of the wheels has to allow the adjustment of the steering angle with a tolerance of $\pm 10'$ and the support angle with a tolerance of maximum $\pm 1^\circ$. A1

NOTE The steering angle can considerably influence the amount of abrasion of the marking material. The support angle influences in case of differenced diameters and velocities between inside and outside the tyres the nature of abrasion pattern.

EN 13197:2011+A1:2014 (E)**4.6.7 Alignment**

The fixation system of the wheels has to allow small adjustments in the alignment in order to compensate the effects of different tyre's patterns.

NOTE Some patterns of the commercial tyres may cause – when the wheels are aligned – the presence of some narrow lines with lower abrasion. This effect may be compensated with slight changes on the alignment.

4.7 Measurements in relation to equipment

The following parameters shall be measured, controlled and recorded:

- date and time;
- turntable speed;
- turning direction;
- room temperature;
- test plate surface temperature;
- load per wheel;
- number of wheel passages (wp);
- steering angle;
- support angle;
- inflate pressure.

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The laboratory shall have available the necessary equipment and procedures to ensure the traceability of the measurements.

5 Test plates**5.1 General**

The road marking materials to be tested in the wear simulator have to be applied on test plates. The results are highly dependent on the substrate: roughness but also on the nature and size (for a reliable result a minimum surface of road marking material has to be tested).

5.2 Substrate nature

The body of test plates shall be manufactured with materials of sufficient rigidity so that the surface texture is not modified during the test process and so that it can be handled without obvious bending or breaking up at temperatures up to 50 °C.

When other than a bituminous material is used for manufacturing the test plates the surface shall be coated with approximately 50 g/m² of bitumen Type B 70/100 or similar. The bitumen may be applied in one or more coating of diluted bitumen in such a way that enough adherence of the bitumen to the substrate is achieved.

5.3 Roughness

The roughness of the test plate surfaces, measured as texture depth in accordance with the method described in EN 13036-1, shall comply with some of the classes listed in Table 1.

For CE marking purposes only classes RG1 and RG2 shall be used. The classes RG3 and RG4 are only for research purposes.

Table 1 — Classes of roughness

Class of roughness	Texture depth in mm according to EN 13036-1
RG1	$\leq 0,6$
RG2	$> 0,60$ and $\leq 0,90$
RG3	$> 0,90$ and $\leq 1,20$
RG4	$> 1,20$

NOTE 1 For practical purposes a value in the middle of the classes should be chosen.

A sample of test plates shall be submitted periodically to the test process in order to determine if after the test process they are still in the same class of roughness.

NOTE 2 Sometimes, to stabilise the texture of the test plates it is convenient to submit them to a preparatory wheel passages process.

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5.4 Size (useful surface)

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The size of the test plates shall be sufficient both for the complete contact area of the tyre to roll over and for the necessary measurements to be performed allowing the use of the appropriate measurement equipment.

For testing a road marking material, the necessary number of test plates to complete a measurement area of, at least, 800 cm² shall be used.

NOTE The longer are the test plates (in one piece) the more reliable are the photometric measurements particularly for night-time visibility under wet and rain conditions. Test plates of 45 cm have shown good performance in these cases.

6 Sampling

When samples are required for identification purposes, each road marking material, all components of a multiple component material, and drop-on materials shall be taken into account.

NOTE 1 For certification purposes sampling shall be done by the test laboratory.

NOTE 2 The participants can agree to include further specifications for sampling, such as quantities to sample.

7 Preparation of samples (application on the test plates)

7.1 General

The test results depend on various factors related to the application of the road marking materials, mainly on the application instructions (type of application and quantities applied) on the direction of application (in relation to the wearing process and the direction of measurements) and on the drying or hardening conditions (conditioning).

A particular case is the preparation of a sample as a reference or control plate.