SLOVENSKI STANDARD
oSIST prEN 13197:2009

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Materiali za oznaļ evanje voziġļ a - Preskus trajnosti z vrtljivo ploġļ o

Road marking materials - Wear simulator Turntable

Straßenmarkierungsmaterialien - Verschleißsimulator

Produits de marquage routier - Simulateurs d'usure

Ta slovenski standard je istoveten z: **prEN 13197**

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English Version

Road marking materials - Wear simulator Turntable

Produits de marquage routier - Simulateur d'usure - Table tournante

Straßenmarkierungsmaterialien - Verschleißsimulator

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Contents

Foreword

This document (prEN 13197:2008) has been prepared by Technical Committee CEN/TC 226 “Road equipment”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 13197:2001.

1 Scope

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

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated into it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

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

EN 1824, *Road marking materials – Road trials*

EN 13459, *Road marking materials – Sampling from storage and testing*

EN 13036-1, *Road and airfield surface characteristics – Test method – Part 1: Measurements of pavement surface macrotexture depth using volumetric patch technique*

3 Terms and definitions

For the purpose of this European Standard 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
is the 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.

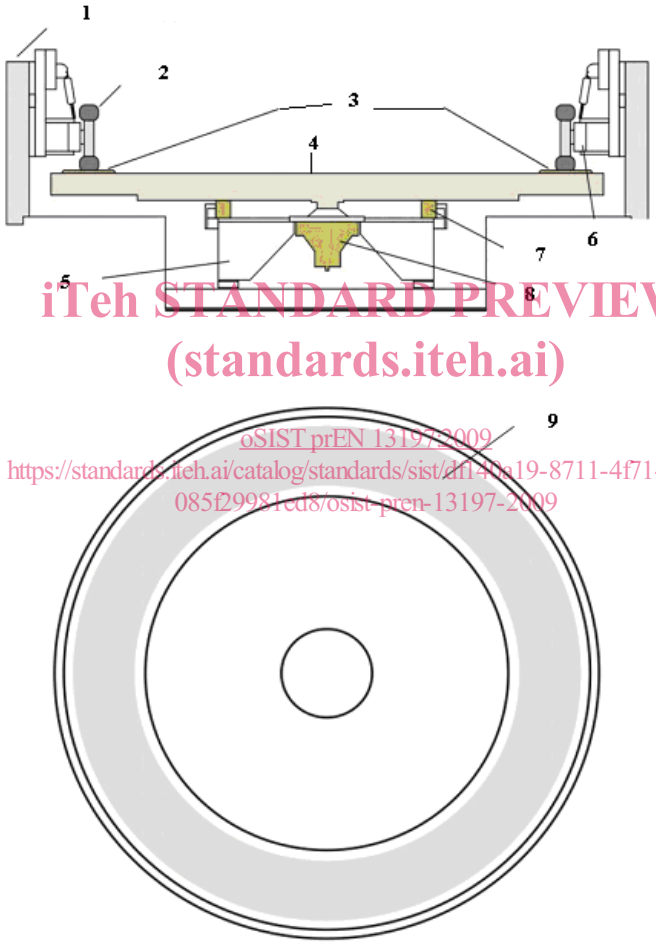
3.5
control plate
test plate of a standard material and with a standard road marking material included in each test run for indication of correct procedure

3.6
rolling line
circumferential line characterised by the central point of the cap 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 between 5 and 90 km/h.



Key:

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

Figure 1 - Scheme of the wear simulator

4.2 Test plates housing

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

4.2.1 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.

4.2.2 Location

All of them shall be fixed at a position in the rim to provide a rolling-line defined by a diameter of 585 cm ± 5 cm measured by the central point in the cap of tyre. The layout must guarantee that the location of the test plates has no influence in the results.

4.2.3 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

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.

4.6.1 Number of wheels

The stress load may be created by the effect of two or four pairs of wheels situated in opposite positions. For CE marking purposes two pairs shall be used.

4.6.2 Type of tyres

For the selection of the tyres the following recommendations shall be followed:

- dimensions: The tyres will have a commercial size of 205/65, able to give an homogeneous rolled width of,

at least, 150mm.
- pattern: symmetric (whenever possible)
- nature: specific commercial tyres

NOTE: Manufacturers are continuously modifying both the nature and the pattern of the commercial tyres for what it is not advisable to establish any specification.
The approval of the specific commercial tyres shall be done by submitting the control plate (see 7.2) to a real run test, using the wheels to be tested, up to a minimum traffic class of P6 (see 8.4.3 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 8.2.
New tyres shall be used for each test

4.6.3 Wheel load

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

4.6.4 Inflate pressure

It may range between 0 and 0,3 Mpa.

4.6.5 Steering and support angles

The fixation system of the wheels has to allow the adjustment of the steering angle with a tolerance of ±10'and the support angle with a tolerance of max. -20'
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.

4.6.6 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

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

5 Test plates

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).

5.1 Substrate nature

The body of test plates shall be manufactured with materials of sufficient rigidity to do not modify the surface texture during the test process and to be able to 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.

5.2 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.

Table 1- Classes of roughness

Class of roughness	texture depth in mm according EN 13036-1
RG1	0,40 ± 0,10
RG2	0,70 ± 0,10
RG3	1,00 ± 0,10
RG4	≥ 1,20

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

5.3 Size (useful surface)

The size of the test plates shall to be sufficient both for the wheels to pass entirely over the plate and for the necessary measurements to be performed allowing the use of the appropriate measurement equipment.
For testing a road marking material, there shall be used the necessary number of test plates to complete a measurement area of, at least, 800 cm².
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

For identification of tested road marking materials and for laboratory tests the necessary samples shall be taken according to EN 13459 from each road marking material, from all of its components in case of a multiple component material, and from drop-on materials.

NOTE 1 For materials used in more than one application, it is sufficient to take samples in connection with one application only.

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)

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.

7.1 Application instructions

The applicant shall specify the application instructions for the road marking system including all needed components and quantities of those, also the type of application.

7.1.1 Type of application

In principal, road marking materials should be applied using the type of application (e.g. spray or extrusion) used in practice.
Other methods of application, appropriate for laboratory conditions, may be used whenever they ensure the required layer thickness or weight and distribution (transversal and longitudinal) and be approved by the manufacturer (applicant).
The method and data of application shall be recorded in an application report.

7.1.2 Quantities applied (rate of application)

The application shall be carried out in such a way that

- The layer thickness and/or the layer weight and
- the quantity of drop on materials remaining on the road marking to be tested.

when measured in accordance with the specifications given in clause 7.5.3 does not differ by more than 10 % from the required quantities specified by the manufacturer.
NOTE: The remaining material on the road marking is relevant for performance information. The consumption may be relevant for cost information and the participating parties may agree its evaluation for this purpose.

7.2 Control plate (reference)

At least one test plate of a standard material and with a standard road marking material shall be included in each test run for indication of correct procedure (control plate).
The control plate is defined for each laboratory including the specifications of the material(s), the application instructions and the results to be achieved under the standard test conditions. If relevant for the intended use, the laboratory may define more than one control plate.
The results of the control plate in each particular test shall be used as an acceptance or rejection criteria for the particular test. The successive results shall be used for determining the repeatability of the test method.

7.3 Test plate orientation (direction of application)

The application on the test plates have to be carried out taking into account that the test plates have to be aligned in the wear simulator so that the road markings are parallel to the movement of the loading wheels relative to the test plates.

7.4 Conditioning

The prepared test plates shall be dried (or to harder) in a conditioned chamber at a temperature of 20° (±5°C) and a relative humidity comprising between 45% and 75%.
Test operation for paints will commence eight days, at the earliest, and twelve days, at the latest, following the application of test samples. The conditioning periode for water-based paints shall be one week more than solvent paints. For other products the minimum conditioning period is 48 hours.
Other conditions, if required for the applicant, shall be possible and reported.

7.5 Measurements in relation to application

7.5.1 Test conditions during application

Road marking materials shall be applied when the air temperature is between +10 °C and + 35 °C and relative humidity is below a maximum of 80 %. The prevailing climatic conditions during application shall be measured and reported.

7.5.2 No pickup-time

When required by the participating parties, the no pickup time shall be measured in conjunction with the application of a road marking material as specified in annex A. This measurement is only applicable for paints and cold plastics.
The No pickup-time shall be reported using the relevant class as in Table2, together with an account of the climatic conditions of the chamber including the ambient temperature, the road surface temperature and the relative air humidity .