



SLOVENSKI STANDARD
SIST EN 1423:1999

01-november-1999

A UHYf]U]`nUcnbU Yj Ub^Yj cn]ý UË`A UHYf]U]`nUdcg]dUb^YË`GHY`YbY`fc[`]WZ
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Road marking materials - Drop on materials - Glass beads, antiskid aggregates and mixtures of the two

Straßenmarkierungsmaterialien - Nachstreumittel - Glasperlen, Griffigkeitsmittel und Nachstreugemische

Produits de marquage routier - Produits de saupoudrage - Microbilles de verre, granulats antidérapants et mélange de ces deux composants

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ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

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English version

Road marking materials - Drop on materials - Glass beads, antiskid aggregates and mixtures of the two

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Straßenmarkierungsmaterialien - Nachstreumittel - Glasperlen, Griffigkeitsmittel und Nachstreugemische

This European Standard was approved by CEN on 1997-06-20. 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 Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 226 "Road equipment", the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by February 1998, and conflicting national standards shall be withdrawn at the latest by February 1998.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This European Standard specifies the requirements for laboratory tests (production control) and qualification procedures for the following drop on materials used in road markings.

These materials are dropped on to paints, thermoplastics, cold plastics and any other marking product applied in a liquid state, immediately after application to the road surface.

The requirements taken into consideration in this standard are :

- glass beads : granulometry, refractive index of the glass, chemical resistance, quality, surface treatments ;
- antiskid aggregates : granulometry, chemical characteristics, friability, colour ;
- mixtures of glass beads and antiskid aggregates; and the requirements for both components.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the 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 in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

| | |
|---------------|--|
| ISO 565 | Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet - Nominal sizes of openings |
| ISO 787-9 | General methods of test for pigments and extenders - Part 9 : Determination of pH value of an aqueous suspension |
| ISO 2591-1 | Test sieving - Part 1 : Methods using test sieves of woven wire cloth and perforated metal plate |
| ISO 7724-2 | Paints and varnishes - Colorimetry - Part 2 : Colour measurement |
| ISO/CIE 10526 | CIE Standard colorimetric illuminants |

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3 Definitions

For the purpose of this standard, the following definitions apply :

3.1 glass bead

Transparent spherical glass particle, used to provide night visibility for the road markings by retroreflecting the incident headlight beams of a vehicle towards the driver.

3.2 antiskid aggregate

Hard grain of natural or artificial origin, used to provide antiskid qualities for the road markings.

3.3 intermediate bulk container (IBC)

Container with a capacity of up to 1000 kg, used as an intermediate solution in between bags and tins (25 kg to 50 kg) and bulk transport.

4 Requirements for glass beads

4.1 Granulometry

The granulometry of the glass beads shall be described giving the minimum and the maximum percentages by mass of the cumulative retained glass beads on metal wire cloth test sieves: ISO 565 - Sizes R 40/3 using the test sieving procedure defined in ISO 2591-1.

For a period of 5 years after the date of publication of this European Standard existing national standard granulometries can be used, even if they use sieves other than those defined in ISO 565 - Sizes R 40/3. Thereafter, granulometries shall be described by selecting sieves in accordance with the following rules (also see table 1) :

- the upper safety sieve shall retain less than 0 % to 2 % of the total mass of the glass beads ;
- the upper nominal sieve shall retain 0 % to 10 % of the beads ;
- if necessary, intermediate sieves shall be added to limit the ratio between the nominal sizes of openings of two successive sieves to a maximum of 1,7 : 1 ;
- for each of the intermediate sieves, the range by mass between the minimum N_1 % and the maximum N_2 % of the cumulative retained percentages shall be not more than 40 % ($N_2 - N_1 \leq 40$) ;
- the lower nominal sieve shall retain 95 % to 100 % of the beads.

Table 1 : Selecting sieves for glass beads
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| Sieves ISO 565 R 40/3 | Cumulative retained mass % |
|-----------------------|----------------------------|
| upper safety | 0 to 2 |
| upper nominal | 0 to 10 |
| intermediate | N_1 to N_2 |
| lower nominal | 95 to 100 |

Examples of the interpretation of the rules to specify the granulometry of glass beads are given in table 2 and table 3.

Table 2 : Fine grading

| Sieves ISO 565 R 40/3 μm | Cumulative retained mass % |
|--|-------------------------------|
| 500 | 0 to 2 |
| 425 | 0 to 10 |
| 250 | 20 to 60 |
| 150 | 60 to 95 |
| 90 | 95 to 100 |

Table 3 : Medium grading

| Sieves ISO 565 R 40/3 μm | Cumulative retained mass % |
|--|-------------------------------|
| 710 | 0 to 2 |
| 600 | 0 to 10 |
| 355 | 30 to 70 |
| 212 | 70 to 100 |
| 125 | 95 to 100 |

The granulometry of the glass beads shall be determined in accordance with ISO 2591-1.

4.2 Refractive index

The refractive index n of the glass beads, when determined in accordance with annex A, shall conform to the following classes:

Class A : $n \geq 1,5$;

Class B : $n \geq 1,7$;

Class C : $n \geq 1,9$.

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4.3 Resistance to water, hydrochloric acid, calcium chloride and sodium sulfide

When tested in accordance with annex B, glass beads shall not develop any surface haze or dulling when in contact with any of the following : water, hydrochloric acid, calcium chloride and sodium sulfide.

4.4 Quality requirements

When tested in accordance with annex D, glass beads with imperfections as described in annex C, shall be considered defective.

Taking into consideration only one defect per bead, the maximum weighted percentage of defective beads shall be 20 % for beads with a diameter lower than 1 mm and 30 % for beads with a diameter equal to or greater than 1 mm, in both cases including a maximum of 3 % of grains and foreign particles (see table 4). If a granulometry includes beads with diameters lower than 1 mm and diameters equal to or greater than 1 mm they shall be separated by means of a sieve with nominal sizes of openings of 1 mm and checked separately.

Table 4 : Maximum weighted percentage of defective glass beads

| Diameter of glass beads mm | Maximum weighted percentage of defective glass beads % | Maximum weighted percentage of grains and foreign particles % |
|-------------------------------|---|--|
| < 1 | 20 | 3 |
| ≥ 1 | 30 | 3 |

4.5 Surface treatments of the glass beads

Special coatings may be applied to the surface of the glass beads to enhance their properties

4.5.1 Moisture proof coatings

When the manufacturer states the presence of a moisture proof coating the glass beads shall be tested in accordance with annex E. When procedure A of annex E is used 80 % of the glass beads shall pass the test showing the presence of the moisture proof coating. When procedure B of annex E is used the glass beads shall pass the test without any flow stoppage. When procedure A fails procedure B shall be used.

4.5.2 Floatation coatings

When the manufacturer states the presence of a floatation coating the glass beads shall be tested in accordance with annex F. When it is agreed between the supplier of the glass beads and the specifying authority that annex F is not applicable, then an alternative test method shall be agreed between them.

4.5.3 Adhesion coating

When the manufacturer states the presence of an adhesion coating it shall be proved by testing the glass beads in accordance with a test method agreed between the supplier of the glass beads and the specifying authority.

4.5.4 Other coatings

When the manufacturer states the presence of a coating, other than those in 4.5.1, 4.5.2 and 4.5.3, it shall be proved by testing the glass beads in accordance with a test method agreed between the supplier of the glass beads and the specifying authority.

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5 Requirements for antiskid aggregates

5.1 Chemical characteristics

When tested in accordance with ISO 787-9 the pH value of the antiskid aggregates shall be not less than 5 and not greater than 9.

5.2 Friability index

The friability index of the antiskid aggregates shall be determined in accordance with annex G. The value of the friability index shall be indicated in the data sheet of the product.

NOTE : Example : for cristobalite the maximum friability index is 20 % .

5.3 Colour co-ordinates and luminance factor

If the antiskid aggregate is not transparent, the chromaticity co-ordinates and the luminance factor shall be determined in accordance with ISO 7724-2. The chromaticity co-ordinates shall lie inside the region defined by the corner points given in table 5 and the luminance factor β shall be greater than 0,70 :

Table 5 : Corner points of the chromaticity regions for non transparent antiskid aggregates

| Corner point No. | 1 | 2 | 3 | 4 |
|------------------|-------|-------|-------|-------|
| x | 0,355 | 0,305 | 0,285 | 0,335 |
| y | 0,355 | 0,305 | 0,325 | 0,375 |

NOTE : Sample preparation ; since the grains of the antiskid aggregates are not fine enough to form a tablet when pressed without a binder, as done for the barium sulfate reflectance standard in accordance with ISO 7724-2, the antiskid aggregates are pressed as for the BaSO₄ standard in ISO 7724-2 ; but after removing the glass the material is kept in the container with the uncovered surface upward in a horizontal position for illumination and observation.

5.4 Granulometry

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In order to be effective, the fraction of the particles smaller than 90 μm shall be less than 1 % by mass. The granulometry of the antiskid aggregates shall be described giving the minimum and the maximum percentages by mass of the cumulative retained particles on metal wire cloth test sieves ISO 565 - sizes R 40/3 using the test sieving procedure defined in ISO 2591-1.

For a period of 5 years after the date of publication of this standard existing national standard granulometries can be used, even if they use sieves other than those defined in ISO 565 - sizes R 40/3. Thereafter, granulometries shall be described by selecting sieves in accordance with the following rules (also see table 6):

- the upper safety sieve shall retain less than 2 % of the total mass of the antiskid aggregates ;
- the upper nominal sieve shall retain 0 % to 10 % of the aggregates ;

- if necessary, intermediate sieves shall be added to limit the ratio between the nominal sizes of openings of two successive sieves to a maximum of 1,7 to 1 ;
- for each of the intermediate sieves, the range by mass between the minimum N_1 % and the maximum N_2 % of the cumulative retained percentages shall be not more than 40 % ($N_2 - N_1 \leq 40$) ;
- the lower nominal sieve shall retain 95 % to 100 % of the aggregates ;
- the lower safety sieve shall retain 99 % to 100 % of the aggregates.

Table 6 : Selecting sieves for aggregates

| Sieves ISO 565 R 40/3 | Cumulative retained mass % |
|--------------------------|-------------------------------|
| upper safety | 0 to 2 |
| upper nominal | 0 to 10 |
| intermediate | N_1 to N_2 |
| lower nominal | 95 to 100 |
| lower safety | 99 to 100 |

Examples of the interpretation of the rules to specify the granulometry of the antiskid aggregates are given in table 7 and table 8.

Table 7 : Fine grading

| Sieves ISO 565 R 40/3 μm | Cumulative retained mass % |
|---|-------------------------------|
| 1000 | 0 to 2 |
| 710 | 0 to 10 |
| 425 | 0 to 25 |
| 250 | 40 to 80 |
| 150 | 95 to 100 |
| 90 | 99 to 100 |

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Table 8 : Medium grading
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| Sieves ISO 565 R 40/3 μm | Cumulative retained mass % |
|---|-------------------------------|
| 1180 | 0 to 2 |
| 1000 | 0 to 10 |
| 600 | 10 to 50 |
| 355 | 50 to 80 |
| 212 | 85 to 100 |
| 150 | 95 to 100 |
| 90 | 99 to 100 |

6 Mixture of glass beads and antiskid aggregate

In a mixture of glass beads and antiskid aggregates the glass beads shall conform to clause 4 and the antiskid aggregates shall conform to clause 5. The tests on the glass beads and the antiskid aggregates to be incorporated in mixtures shall be conducted separately before mixing.

7 Sampling

In order to test glass beads, antiskid aggregates and mixtures of them a representative sample of the material to be tested shall be taken as follows.

The drop on material sample shall be taken from at least three bags or one Intermediate Bulk Container (IBC).

When M , in kilograms, is the mass of the drop on material to be tested, at least 1,5 kg of the material shall be taken by inserting an appropriate probe in the full height of a certain number 'S' of bags, or inserting the probe S times in the whole height of an IBC. The probe shall be driven to the bottom of the bags, in an upright position; or into the IBC containing the material to be tested.

S is calculated by the formula : $S = \sqrt{M / 150}$; and it shall be rounded up to the next higher unit.

A representative sample shall be obtained by mixing the material taken with the S insertions of the probe in the bags. The representative sample shall be split by means of a 1/1 splitter in the number of samples necessary for the tests.

NOTE : A test probe can be constructed from a tube of 28 mm to 34 mm diameter and 1000 mm to 1200 mm in length. The end of the probe which reaches the bottom of the bag should be fitted with a plugging system. After penetration of the probe to the full depth of the bag, the plug is inserted and the probe removed. The contents of the probe represent a single sample of the material to be tested.

8 Marking

Each container shall be clearly marked in accordance with the European specifications.

The manufacturer of the drop on materials shall make available at least the following information :

- number and year of this European Standard, EN 1423 : 1997 ;
- identification of the product and of the manufacturer ;
- the batch number and the production date ;
- the presence of a coating and its intended use ;
- the net mass ;
- the upper and the lower nominal sieves of the granulometry ;
- in a mixture of glass beads and antiskid aggregates, the proportions of the components.