



SLOVENSKI STANDARD

oSIST prEN 1423:2009

01-februar-2009

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

Straßenmarkierungsmaterialien - Nachstreumittel - Glasperlen, Griffigkeitsmittel, Nachstreugemische

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

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Ta slovenski standard je istoveten z: prEN 1423

ICS:

93.080.20 Materiali za gradnjo cest Road construction materials

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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prEN 1423

September 2008

ICS 93.080.20

Will supersede EN 1423:1997

English Version

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

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

Straßenmarkierungsmaterialien - Nachstreumittel -
Markierungs-Glasperlen, Griffigkeitsmittel,
Nachstreugemische

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 226.

If this draft becomes a European Standard, 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.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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Foreword

This document (prEN 1423:2008) 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 1423:1997.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

For relationship with EC Directive(s), see informative Annex ZA, which is an integral part of this document.

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prEN 1423:2008 (E)**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 bead : raw material nature, chemical composition, granulometry, refractive index of the glass, chemical resistance, quality, surface treatment ;
- antiskid aggregate : chemical characteristics, friability, colour, granulometry ;
- mixture of glass beads and antiskid aggregates : 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.

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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 -
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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 3310-1, Test sieves: Technical requirements and check

EN ISO 5725, Precision of test methods – Determination of repeatability and reproducibility for a standard test method by inter-laboratory test

ISO 7724-2, Paints and varnishes - Colorimetry - Part 2: Colour measurement

ISO/CIE 10526, CIE Standard colorimetric illuminants

EN 12802, Road marking materials – Laboratory methods for identification

EN 13212, Road marking materials – Requirements for the factory production control

3 Definitions

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

3.1 types of drop-on materials

3.1.1 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.

This product is defined by four characteristics: refractive index, quality, granulometry, resistance to chemicals. In addition, surface treatment with its intended use shall be declared by manufacturer (if any).

3.1.2 antiskid aggregate

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

This product is defined by two characteristics: granulometry, friability index. For non-transparent antiskid aggregate only, third characteristic is color co-ordinates and luminance factor.

3.1.3 mixture of glass beads and antiskid aggregates

this product is a combination of here above product criterias and their relative ratio.

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3.2 intermediate bulk container (IBC)

container with a capacity of up to 1300 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 Dangerous substances

In order to check the content of arsenic, lead and antimony, the glass beads shall be tested in accordance with annex I

Each element (As, Pb, Sb) shall be separately classified into one of the three following classes:

- Class 0: NPD
- Class 1: ≤ 1000 ppm
- Class 2: ≤ 200 ppm

4.2 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.

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 2% 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 ;

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- 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

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 - Example 1: 425-90 microns

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

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Table 3 - Example 2: 600-125 microns

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 reference method to determine the granulometry of the glass beads is ISO 2591-1

4.3 Refractive index

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

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

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

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

4.4 Resistance to chemicals : water, hydrochloric acid, calcium chloride and sodium sulphide

The resistance shall be determined in accordance with annex B and 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.

4.5 Quality requirements

The reference method of testing quality is described in annex D; glass beads with imperfections as described in annex C shall be considered defective.

Quality of glass beads = 100% minus total weighted percentage of defective glass beads.

Applying the reference method and taking into consideration only one defect per bead, the maximum weighted percentage of defective beads shall be 20 % 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	20	3

- 1) Checking separately the glass beads with diameters lower than 1mm and diameters equal to or greater than 1mm, the quality of each fraction shall be recorded separately in the results of counting.
- 2) When alternative test methods are used as in Annex H (informative) of this European Standard, the correlated values shall be applied. Method described in annex D (normative) shall be always considered as the reference test method.

4.6 Surface treatments of the glass beads

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

4.6.1 Moisture proof coating

When the manufacturer declares 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.

4.6.2 Floatation coating

When the manufacturer declares the presence of a floatation coating the glass beads shall be tested in accordance with annex F. When procedure of annex F is not applicable, then an alternative test method shall be declared by the manufacturer.

4.6.3 Adhesion coating

When the manufacturer declares the presence of an adhesion coating it shall be proved by testing the glass beads in accordance with a test method declared by the manufacturer.

4.6.4 Other coatings

When the manufacturer declares the presence of a coating, other than those in 4.6.1, 4.6.2 and 4.6.3, it shall be proved by testing the glass beads in accordance with a test method declared by the manufacturer.

5 Requirements for antiskid aggregates

5.1 Chemical characteristics

5.1.1 pH value

The pH value of the antiskid aggregates shall be determined in accordance with ISO 787-9. The pH value shall be not less than 5 and not greater than 11.

5.1.2 Dangerous substances

In order to check the content of arsenic, lead and antimony, the glass aggregates shall be tested in accordance with annex I

Each element (As, Pb, Sb) shall be separately classified into one of the following three classes:

- Class 0: NPD
- Class 1: ≤ 1000 ppm
- Class 2: ≤ 200 ppm

5.2 Friability index

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

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

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 sulphate 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

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.

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; this sieve shall not be lower than 90 microns.

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 - Example 3: 710-150 microns

Sieves ISO 565 R 40/3	Cumulative retained mass %
1 mm	0 to 2
710 μm	0 to 10
425 μm	5 to 25
250 μm	40 to 80
150 μm	95 to 100
90 μm	99 to 100

Table 8 - Example 4: 1000-150 microns

Sieves ISO 565 R40/3	Cumulative retained mass %
1,18 mm	0 to 2
1 mm	0 to 10
600 μm	10 to 50
355 μm	50 to 80
212 μm	85 to 100
150 μm	95 to 100
90 μm	99 to 100

6 Mixture of glass beads and antiskid aggregates

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 of this product standard. The tests on the glass beads and the antiskid aggregates to be incorporated in mixtures shall be conducted separately before mixing.

In order to check the relative ratio between glass beads and antiskid aggregates in a mixture, the test method described in annex J shall be used.

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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 bag, in an upright position, or into the IBC containing the material to be tested.

Another possibility to take a representative sample from the S bags is to use a 1/1 splitter.

S is calculated by the formula: $S = M/\sqrt{50}$; 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 or the IBC should be fitted with a plugging system. After penetration of the probe to the full depth of the bag or the IBC, the plug is inserted and the probe removed. The contents of the probe represent a single sample of the material to be tested.

When sampling into the IBC, if the test probe can not go to the full depth of the container, the following alternative method shall be used:

- a quantity of 20kg +/- 1 kg shall be removed from the IBC in a bucket
- the content of the bucket shall be split by means of a 1/1 splitter in the number of samples necessary for the tests.

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8 Evaluation of conformity

8.1 General

The conformity of drop on materials with the requirements of this European Standard and with the declared values shall be demonstrated by:

- initial type testing;
- factory production control by the manufacturer, including product assessment.

The initial type testing shall be performed for each production unit separately and on each distinct granulometry. For the purposes of testing, the drop on materials may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all drop on materials within that same family (a product may be in different families for different characteristics). The only characteristics where the grouping in families are allowed are:

- for glass beads: refractive index and resistance to water, hydrochloric acid, calcium chloride and sodium sulphide
- for antiskid aggregates: friability index; if the antiskid aggregates are not transparent: colour co-ordinates and luminance factor

8.2 Initial type testing (ITT)

8.2.1 General

An initial type test is the complete set of tests or other procedures, in respect of the characteristics to be assessed, determining the performance of samples of products representative of the product type.

Initial type testing shall be performed to show conformity with this European Standard for glass beads, anti-skid aggregates and mixtures being put onto the market and:

- at the beginning of the production of a new or modified glass bead, anti-skid aggregate, a change to the raw material or supplier of the components where this could affect the performance of the product,
- at the beginning of a new or modified method of production.

If ITT is the responsibility of a certification body (e.g. for regulatory marking),

- the certification body is responsible for the sampling for the initial type test of the product;
- the certification body checks if the initial type test is carried out according to the provisions of this standard;
- the manufacturer has to demonstrate that the samples are representative for the product (industrial product);
- the certification body decides if the grouping is acceptable and/or verifies it by testing some samples of the family.

8.2.2 Characteristics

All characteristics in Clauses 4 and 5 shall be subject to initial type testing.

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8.2.3. Sampling, testing and compliance criteria

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Initial type testing shall be performed on samples of products representative for the manufactured products (industrial production, no prototype production on lab scale).

8.2.3.1 Sampling procedure

If Initial type testing is the responsibility of a certification body the certification body (e.g. for regulatory marking) shall evaluate the representativity of the sampled product (comparison with available test result(s) of FPC for this product).

The method of sampling shall be as defined in clause 7 of this European standard.

8.2.3.2 Testing and conformity criteria

For each type of drop-on product the number of characteristics to be assessed shall be in accordance with table 9.

Table 9 – Number of characteristics, number of samples and conformity criteria for initial type testing

Characteristic	Requirement clause	Number of samples /tests by product or family
Refractive index (of the glass beads)	4.3	2 / family ^(*)
Granulometry	4.2 and/or 5.4	1 / product
Quality (proportion of defective glass beads)	4.5	1/ product
Colour co-ordinates (x,y), of non-transparent anti-skid aggregates	5.3	2 / family ^(*)
Luminance factor (β), of non-transparent anti-skid aggregates.	5.3	2 / family ^(*)
Resistance to chemicals (for glass beads)	4.4	2 / family ^(*)
Resistance to fragmentation (for anti-skid aggregates)	5.2	2 / family ^(*)

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(^{*1}) As long as there is only one product in the family only one sample has to be tested for ITT. From 2 products on a second product has to be sampled to carry out an ITT of this characteristic to show the results for this characteristic are representative for all drop on material within this same family. (See clause 8.1 of this standard)

The result of all type tests shall be reported by the certification body and held by the manufacturer for at least 5 years after the last date of production of the product(s) to which they apply.

8.3 Factory Production control (FPC)

The rules for FPC are given in EN 13212.

8.4 Inspection of the factory production control

When required, inspection of the factory and of the factory production control shall be made on the provisions contained in EN 13212 and clause 8.4 of this standard.

8.4.1 Initial inspection of the factory and the Factory Production Control

The initial inspection shall:

- Check that the producer's FPC system complies with all the requirements of this product standard.
- Visit the production unit, review the resources and check the practical application of the system of Factory Production Control.

The certification body shall verify whether all requirements of EN 13212 have been dealt with appropriately in the production control manual and related documents. If this is not the case the certification body will inform the producer of the non-compliances found and request corrective action, including an updated version of the documents if necessary.

During the initial inspection the certification body will investigate whether the documented system is implemented in accordance with the requirements of EN 13212. Items found not to be in compliance are classified as either observations, remarks or non-conformities. These will all be reported to the producer at the end of the initial inspection.

The initial type testing (ITT) is not part of the FPC, but has to be carried out in accordance with the test methods and systems of attestation of conformity described in this standard. (see 8.2.1)

Test results from the FPC shall comply with the requirements of the appropriate part of EN 13212 and the product specification (manufacturer's stated values as referred to in clause ZA.1 of Annex ZA of the relevant product standard). The manufacturer's stated values and a procedure for the evaluation of the test results shall therefore be part of the FPC-system.

Results of production control tests of the drop on material relating to this product standard shall be available at the time of the initial inspection.

Even if one FPC system is used for different production units on one or different sites, all means of production on all sites have to be visited.

Even if there is an ISO 9001 certificate of conformity it's the task of the certification body to verify the quality system covers the requirements of EN 1423 and EN 13212 and to verify the effective implementation.

8.4.2 Continual surveillance of the factory and the factory production control

The Factory Production Control system shall be subject to surveillance as set out below.

Audit of the Factory Production Control system, by visit of the production unit, at least at a minimum frequency of once per year.

Reviews of relevant quality complaints are to be covered as part of the routine audit.

Assessments of modifications to the Factory Production Control system are in accordance with this European Standard.

Checks on the correct application of product marking.

The certification body exercises the surveillance of the FPC on the basis of the requirements of the EN 1423 and EN 13212 and on the basis of the initial inspection of the factory and FPC.

The producer is required to have informed the certification body of any changes in the FPC, including modifications to the factory. Failure to do so may result in a non-compliance being raised by the certification body.

It will be the decision of the certification body whether or not a further inspection visit is necessary at the time of the announcement of any such changes.

The certification body shall inform the producer about the results of all continuous surveillance visits and shall also inform the producer of any non-compliances (observations, remarks or non-conformities) it has raised.

The certification body may decide to carry out further visits if serious deficiencies in the FPC are identified.

Where a non-compliance is identified, it is the responsibility of the producer to investigate the cause of the problem and report to the certification body effective corrective action measures appropriate to the nature of the non-compliance raised.

In the case of non-implementation of suitable corrective action or continuing non-compliance (non-conformities), the certification body shall advise the producer of the action it intends to take.

Even if one FPC system is used for different production units on one or different sites, all means of production on all sites have to be visited.

Even if there is an ISO 9001 certificate of conformity it's the task of the certification body to verify, during the surveillance visit, that the quality system covers the requirements of EN 1423 and EN 13212 and to verify the effective implementation.

9 Marking

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The manufacturer shall provide the following information to accompany the product.

Technical data sheet of the product mentioning the granulometry with all the sieves and specifications as defined in clauses 4.2 and 5.4.

Each packaging of the product shall contain the following identification:

- name or identifying mark of the manufacturer and registered address;
- the last two digits of the year in which the product was manufactured;
- the number of this European standard (i.e. EN 1423)
- description of the product (type of drop on material: glass beads, antiskid aggregates or mixture of glass beads and antiskid aggregates and in the last case the proportion of the components;
- the presence of a surface treatment and its intended use
- the batch number
- refractive index
- upper and lower nominal sieves of the granulometry as mentioned on the above mentioned technical data sheet and/or EC Certificate of Conformity (e.g. 600-125).
- Product identification: Name (e.g. commercial name or other unique identification of a granulometry)
- classes of content for arsenic, lead and antimony
- content of the packaging

Where the above information is also required as part of regulatory marking, compliance with the requirement for regulatory marking shall be deemed to satisfy the requirements of this clause without the need for repetition.