

BRITISH STANDARD

BS EN
1423:1998
*Incorporating
Amendment No. 1*

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

The European Standard EN 1423:1997, with the incorporation of amendment A1:2003, has the status of a British Standard

ICS 93.080.20

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/509, Road equipment, to Subcommittee B/509/2, Horizontal road markings and road studs, which has the responsibility to:

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- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This standard partially supersedes BS 6088:1981 which will be declared obsolescent on the publication of this standard. The declaration of obsolescence does not affect the current kitemark certification scheme for road marking products.

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Summary of pages

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English version

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

(includes Amendment A1:2003)

Produits de marquage routier — Produits de saupoudrage — Microbilles de verre, granulats antidérapants et mélange de ces deux composants (inclut l'amendement A1:2003)

Straßenmarkierungsmaterialien — Nachstreumittel — Markierungs-Glasperlen, Griffmittelsmittel und Nachstreugemische (enthält Änderung A1:2003)

This European Standard was approved by CEN on 1997-06-20, Amendment A1 was approved by CEN on 2003-05-02. 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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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 document has been prepared under a mandate given to CEN by the European Commission and the Free Trade Association and support essential requirements of EU Directive(s).

For relationship with the Construction Products Directive (89/106/EEC) see informative Annex ZA, which is an integral part of this document.

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.

Twelve (12) months after the date of publication of the harmonised part of this European standard (Annex ZA) in the Official Journal of the European Communities (which follows its availability and notification to the European Commission by CEN/CENELEC), compliance with all the provisions of the Construction Products Directive (CE-marking) becomes compulsory for all products falling within the scope of this European standard that are placed on the EEA market.

Foreword to amendment A1

This document (EN 1423:1997/A1:2003) 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 January 2004, and conflicting national standards shall be withdrawn at the latest by April 2005.

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 EU Directive(s).

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

This amendment is included in a package with EN 1463-1:1997/prA1 and EN 13212:2001, with a common DOW fixed on 2003-09-30.

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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 7879, *General methods of test for pigments and extenders — Part 9: Determination of pH value of an aqueous suspension*

ISO 25911, *Test sieving — Part 1: Methods using test sieves of woven wire cloth and perforated metal plate*

ISO 77242, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*

ISO/CIE 10526, *CIE Standard colorimetric illuminants*

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.

(A) Granulometries shall be described by selecting sieves in accordance with the following rules (see Table 1): (A)

- 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

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: $n \geq 1,9$.

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

A) When tested in accordance with Annex D (reference method), glass beads with imperfections as described in Annex C, shall be considered defective. **A)**

A) Using the reference method, and taking **A)** 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 ¹⁾ %	Maximum weighted percentage of grains and foreign particles %
<1	20	3
≥ 1	30	3

A)
¹⁾ 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) of EN 1423:1997 shall be always considered as the reference test method. **A)**

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.

5 Requirements for antiskid aggregates

5.1 Chemical characteristics

EN) 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. A1

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

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.

EN) 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. Thereafter, granulometries shall be described by selecting sieves in accordance with the following rules (also see Table 1): A1

- 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 %
1 000	0 to 2
710	0 to 10
425	0 to 25
250	40 to 80
150	95 to 100
90	99 to 100

Table 8 — Medium grading

Sieves ISO 565 R 40/3 µm	Cumulative retained mass %
1 180	0 to 2
1 000	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 1 000 mm to 1 200 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.

~~(A) Text deleted (A)~~

Annex A (normative)

Test method to determine the refractive index of the glass beads

The method used to determine the refractive index of glass beads is immersion with oblique illumination. This technique, known as the Shröber van der Kolk method, only applies to isotropic or to monorefracting bodies, as is the case where glass beads are concerned.

A.1 Principle

Viewed under the microscope, transparent solids which are immersed in a liquid give an image bounded by dark or luminous bands. The appearance will vary, depending upon the difference between the refractive indices of the two bodies, according to their dispersing capacity and illumination.

Under axial lighting conditions index differences are perceptible; but they become considerably more pronounced under oblique lighting, due to the fact that under such conditions the bands become sharper on one side than on the other. Their position is determined by the direction of the incident beam and by the difference between the index of the solid under examination and that of the liquid in which it is immersed.

Figure A.1 provides an illustration of the technique used for determination of the refractive index by immersion with oblique illumination.

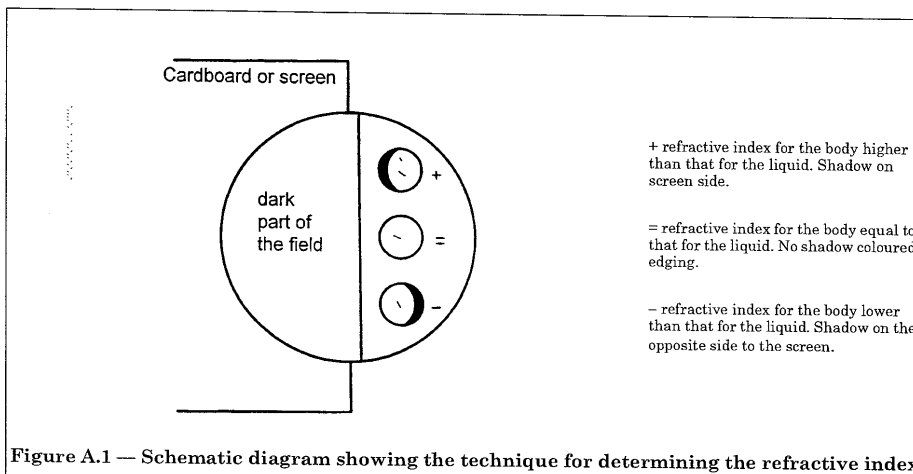


Figure A.1 — Schematic diagram showing the technique for determining the refractive index

A.2.1 Microscope

The microscope used in this procedure should be of a conventional type, of a design which affords the user access to the area between the light source and the condenser.

The microscope shall be fitted with a 10× or 15× magnification lens and with a 6× or 8× magnification eye piece.

The phenomena do not appear clearly unless the condenser is turned to the maximum setting with the iris at full aperture and using an average magnification (20× diameter).

A.2.2 Liquids with known refractive index

In order to obtain liquid scales graduate indices, either pure bodies with known constants may be used or, alternatively, mixtures.

- Vaseline oil	1,470
- 1-iodopropane	1,505
- cedar oil	1,510
- methyl salicylate	1,530
- bromobenzene	1,560
- diphenylethylene	1,610
- monobromonaphthalene	1,658
- diiodomethane	1,755
- methylene iodide	1,800
- arsenic tribromide	2,000

Refractive indices may be checked by the use of an Abbe refractometer, with the temperature corrected to 23 °C.

A.3 Procedure

Take the glass beads and place them on the concave slide, then immerse them in a liquid with a known refractive index:

- place the concave slide in the specimen holder of the microscope;
- turn the condenser to the maximum setting;
- open the iris to the full aperture;
- light the specimen from below;
- slip the board with the straight edges in below the condenser, so as to obscure half of the field visible through the eye piece, which will give angled illumination of the remaining visible part of the field;
- observe the glass beads in the illuminated area of the field in view through the eye piece;
- compare observations with the diagram in Figure A.1;
- depending upon the conclusions reached, repeat the above procedure and continue to repeat this procedure, using liquids with different refractive indices, until a liquid is found with a refractive index identical to that of the glass beads; or until two liquids are found with close refractive indices, as listed in A.2.2, which sandwich the index for the glass beads.

A.4 Expression of the results

Show the index found, or the indices for the two liquids on either side of the index for the test subjects, specifying the temperature at which the test was carried out and quoting references for the glass beads which have been examined.

Annex B (normative)

Test methods to determine the resistance of the glass beads to the effects of water, hydrochloric acid, calcium chloride and sodium sulfide

Samples taken for testing shall be weighed on scales with an accuracy of 0,1 g.

B.1 Resistance to the effects of water

In a distillation flask fitted with a glass tube at the top, this tube to serve as a reflux condenser, boil $10\text{ g} \pm 0,1\text{ g}$ of glass beads for $60\text{ min} \pm 10\text{ s}$ in $100\text{ g} \pm 1\text{ g}$ of CO_2 free water. After the test objects have been boiled for the required period, filter the glass beads, cool the liquid to room temperature and then add two drops of phenolphthalein solution as an indicator.

Using a 0,01 mol/l solution of hydrochloric acid, titrate the liquid until the phenolphthalein changes colour. A blank test shall be carried out in parallel.

Note any changes which appear in the surface using the microscope at an enlargement of between 20 \times and 50 \times ; note also the quantity of 0,01 mol/l HCl also the quantity of 0,01 mol/l HCl used.

B.2 Resistance to the effects of hydrochloric acid

Immerse $10\text{ g} \pm 0,1\text{ g}$ of glass beads in $100\text{ ml} \pm 0,1\text{ ml}$ of dilute hydrochloric acid solution, buffered to give a pH of 5,0 to 5,3, for 90 h at a temperature of $20\text{ }^\circ\text{C} \pm 3\text{ }^\circ\text{C}$.

With the help of a microscope with 20 \times to 50 \times magnification, note any changes which may have appeared on the surface after the glass beads have been rinsed in distilled water and dried.

B.3 Resistance to the effects of calcium chloride

Immerse $10\text{ g} \pm 0,1\text{ g}$ of glass beads in $100\text{ ml} \pm 0,1\text{ ml}$ of a normal solution of calcium chloride for 3 h at a temperature of $20\text{ }^\circ\text{C} \pm 3\text{ }^\circ\text{C}$.

With the help of a microscope with 20 \times to 50 \times magnification note any changes which may have appeared on the surface after the glass beads have been rinsed in distilled water and dried.

B.4 Resistance to the effects of sodium sulfide

B.4.1 Apparatus and reagents

- microscope, with minimum magnification of 10;
- 50 ml bottle with a glass stopper;
- distilled water;
- Na_2S a saturated solution of sodium sulphide in distilled water at $20\text{ }^\circ\text{C}$ with the addition of 2,0 % anionic wetting agent Na_2CO_3

B.4.2 Procedure

Take $10\text{ g} \pm 0,1\text{ g}$ of glass beads from a representative sample.

Place the glass beads in a stoppered bottle and cover with the solution containing the sodium sulfide and allow to stand for 1 h. Pour off the solution containing the sodium sulfide and rinse three times with distilled water.

Dry the glass beads in an oven at $100\text{ }^\circ\text{C} \pm 5\text{ }^\circ\text{C}$ and, using the microscope, compare these with an untreated sample.

B.4.3 Results

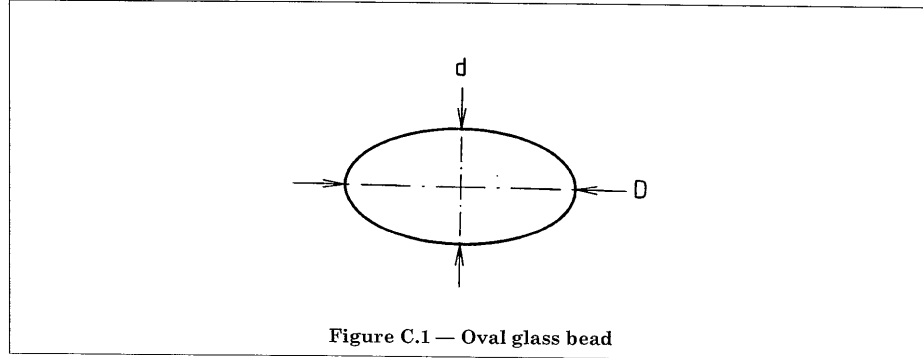
When compared with an untreated sample the glass beads shall not be darker.

Annex C (normative)

Glass bead imperfections

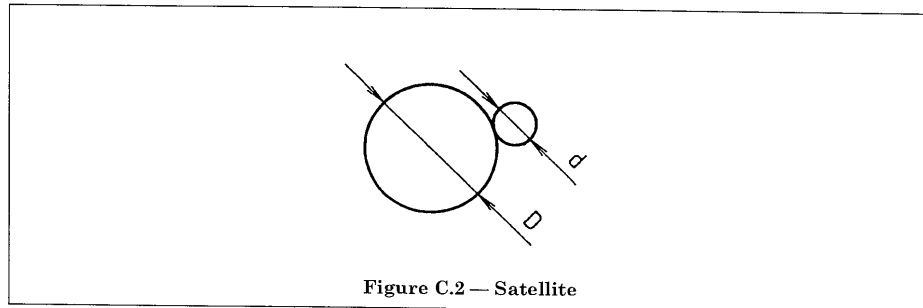
C.1 Oval glass beads (see Figure C.1)

When the ratio of the major diameter D to the minor diameter d is greater than 1,3 ($D/d > 1,3$), the oval glass bead is considered defective.



C.2 Satellites (see Figure C.2)

When a glass bead supports more than two smaller glass beads, called satellites, or when, in the case of two satellites, the ratio of the diameter d of the major of them to the diameter D of the supporting glass bead is greater than 0,25 ($d/D > 0,25$), the glass bead is considered defective.



C.3 Tear shaped glass beads (see Figure C.3)

When the ratio of the major dimension L to the minor dimension l is greater than 1,3 ($L/l > 1,3$), the glass bead is considered defective.

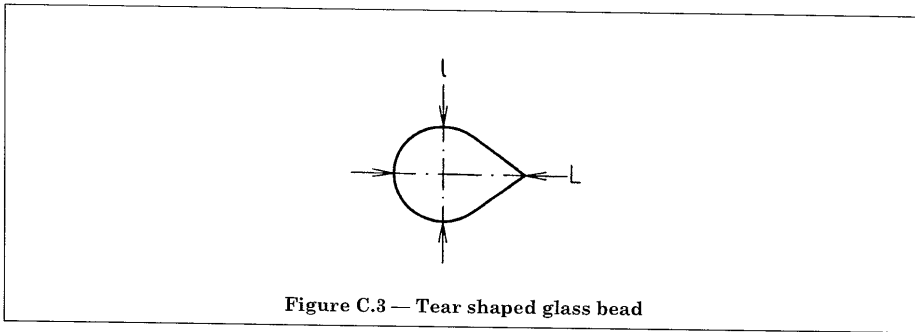


Figure C.3 — Tear shaped glass bead

C.4 Glass beads fused together (see Figure C.4)

When the ratio of the major dimension D_2 to the minor dimensions D_1 is greater than 1,3 ($D_2/D_1 > 1,3$), the particle is considered a defective glass bead.

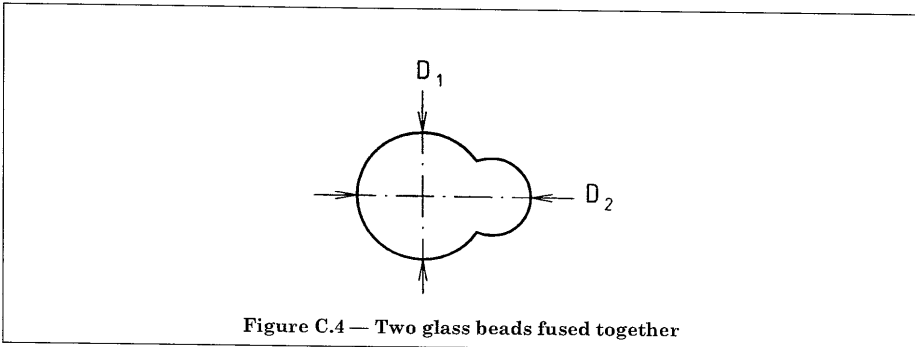


Figure C.4 — Two glass beads fused together

C.5 Roundish glass beads (see Figure C.5)

When the ratio of their major dimension L to the minor dimension l is greater than 1,3 ($L/l > 1,3$), the glass bead is considered defective.

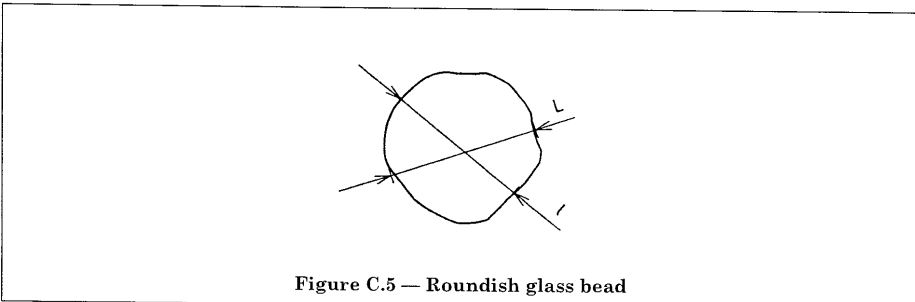


Figure C.5 — Roundish glass bead

C.6 Opaque glass beads (see Figure C.6)

Opaque glass beads are always considered defective.

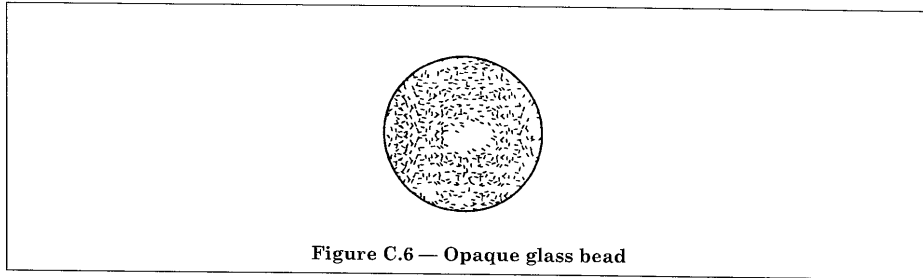


Figure C.6 — Opaque glass bead

C.7 Milky glass beads (see Figure C.7)

The milky appearance is due to gaseous inclusions in part of in the whole volume of the bead. Milky glass beads are always considered defective.

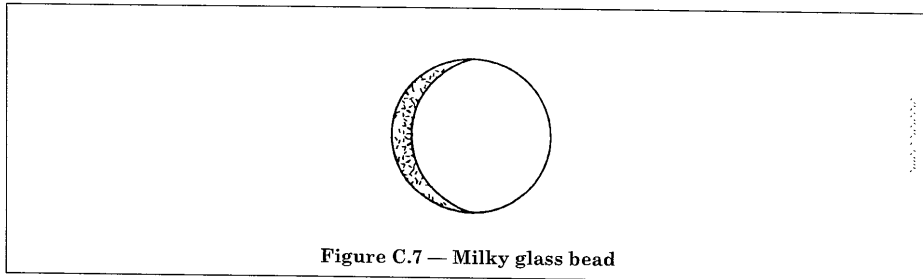


Figure C.7 — Milky glass bead

C.8 Gas inclusions (see Figure C.8)

A) When the ratio of the sum of the projected area of the bubbles inside a glass bead Σs_i to the projected area of the glass bead S is greater than 0.25 ($\Sigma s_i/S > 0,25$), the glass bead is considered defective. **A)**

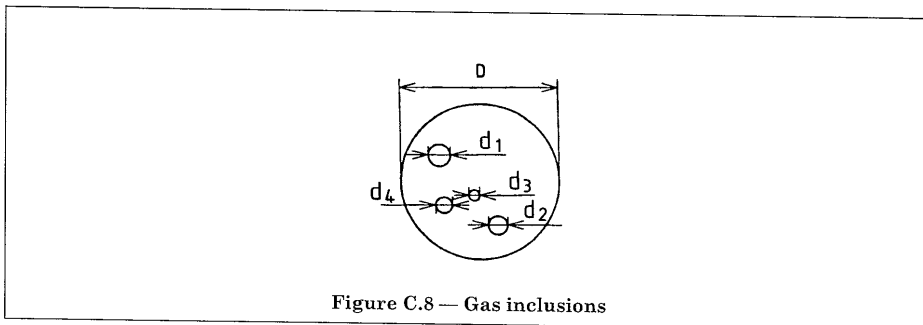
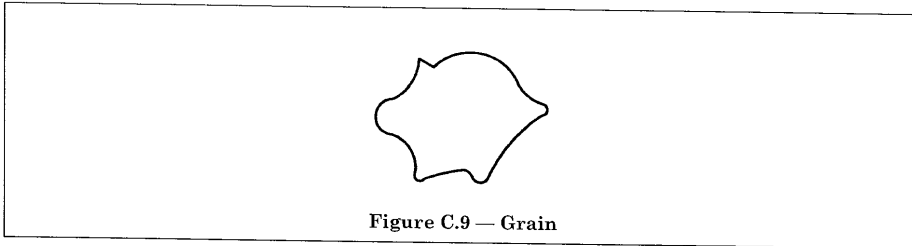


Figure C.8 — Gas inclusions

C.9 Grains (see Figure C.9)

Glass particles which present one or more sharp angles.



C.10 Foreign particles

Particles which are not composed of glass.

Annex D (normative)

Test method to determine the quality of the glass beads

D.1 Procedure

In a representative sample, the determination of the percentage of defective glass beads shall be made using the fraction quantities retained on each sieve after the granulometric analysis carried out in conformity with ISO 565 and ISO 2591-1; the residue of the last sieving shall not be deemed to constitute a fraction. The study of the defects of the glass beads shall be made using an optical device with a magnification which results in the glass beads having an apparent diameter of 4 mm to 5 mm in its visual field.

The glass beads collected from a sieve (e.g. 300 μm) shall be homogenized by passing them at least five times through a small divider, after which a small sample shall be prepared (approximately 0,5 g) by repeated division.

This sample is then passed in its entirety through a sieve with a mesh size very slightly larger than that of the sieve from which the refuse material was collected (e.g. a 500 μm mesh where the refuse material was left by a sieve with a 300 μm mesh) on to a transparent adhesive strip with a width of 20 mm or less and with a length equal to the diameter of the sieve. Any glass beads which are not held on the strip shall be gathered and repositioned until all have been affixed to the adhesive strip. Where there is an excess, a fresh sample shall be prepared and a fresh adhesive strip shall be made up. It is recommended that the glass beads be laid without rolling them, thus avoiding separation of the spherical glass beads from the remainder.

The specimen thus prepared shall be examined in the following manner under the optical device. In order to make the examination easier, the adhesive strip holding the glass beads may be cut into pieces, all of which shall be treated under exactly the same conditions:

— the minimum requirement for assessment of the number of defective glass beads shall be the observation of 600 glass beads per sieve, obtained from at least six different areas spread evenly over the whole surface of the adhesive strip (or the whole collection of pieces) on which the glass beads have been placed. In the case of the sieve associated with the highest amount of retained material, the following two additional conditions shall also be fulfilled:

- 1) each area shall contain not less than 100 glass beads. Where this is not the case, a number of adjoining areas shall be assembled in order to satisfy the criterion;
- 2) the difference between the highest and the lowest number of defective glass beads for the various areas containing no less than 100 glass beads (a single area or adjoining areas which have been assembled) shall not exceed 20 in absolute terms. If this criterion cannot be satisfied, another adhesive strip shall be prepared.

EXAMPLE:

- area 1: 17 defective glass beads in 108 glass beads;
- area 2: 21 defective glass beads in 119 glass beads;
- area 3: 18 defective glass beads in 103 glass beads;
- area 4: 23 defective glass beads in 141 glass beads;
- area 5: 16 defective glass beads in 123 glass beads;
- area 6: 27 defective glass beads in 106 glass beads.

The range between the extreme number of defective glass beads is: $27 - 16 = 11$.

- only those glass beads which are entirely located in the visual field are examined;
- first of all, count all the glass beads present in the visual field, and then all the glass beads which feature at least one of the imperfections referred to in 4.4 and defined in Annex C.

Where examination is made by screen projection, the glass beads shall be immersed totally in a liquid with a refractive index close to that of glass in order to highlight any gas inclusions, amongst other defects.

NOTE Where direct examination is made using stereoscopic microscopy, it may assist if an eye piece with a grid is used and if the areas studied are restricted to about 20 glass beads at a time.

D.2 Results of counting

Sieving a representative sample of a glass bead granulometry through its n specific sieves, the total weighted percentage of the defective glass beads shall be calculated using the following equation:

$$W = \frac{M_1 D_1 + M_2 D_2 + M_n D_n}{M_1 + M_2 + M_n}$$

where

W is the total weighted percentage of defective glass beads;

M_1 is the percentage by mass of the glass beads retained on each of the n sieves;

D_1 is the arithmetic mean of the percentage by number of the defective glass beads counted on five or more samples properly taken from the glass beads retained on each of the n sieves.

The total weighted percentage of grains and foreign particles shall be calculated in the same manner.

Results of counting are presented in conformity with Table D.1 as an example for a granulometry ranging from 125 μm to 600 μm .

Table D.1 — Example for presenting the results of counting with opening of sieves (600 μm to 125 μm)

Opening of the sieves μm	Retained percentage on the sieves M_1 %	Percentage of defective glass beads on the different areas						Arithmetic mean of the percentage D_1 %	Weighted percentage of defective beads ¹⁾ %
		n1	n2	n3	n4	n5	n6		
600	6,2	31	27	36	28	25	30	29,5	1,87
500	30,3	24	28	17	23	22	19	22,2	6,87
300	24,1	16	21	23	18	19	15	18,7	4,60
250	19,1	14	17	11	13	15	15	14,2	2,76
125	18,2	9	11	8	10	11	9	9,7	1,80
125	2,1								
Total weighted percentages of defective glass bead									17,90
¹⁾ The values in this column are calculated as shown below for the first row. $1,87 = \frac{6,2 \times 29,5}{97,9}$ with $97,9 = (6,2 + 30,3 + 24,1 + 19,1 + 18,2)$									

Annex E (normative)

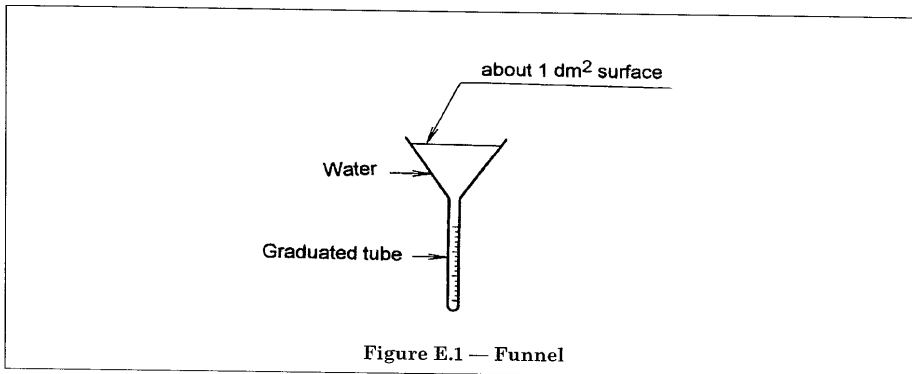
Test method to determine the presence of the moisture-proof coating

E.1 Procedure A

Procedure A shall be used when a quick indication is required.

The percentage of moisture-proofed glass beads is checked in accordance with the following test method.

For this test, 1 ml of glass beads is required, measured using a tube with an inside diameter ranging from 2 mm to 5 mm and which is graduated in 1/20 ml.



The glass beads are sprinkled from a height of 5 mm onto a roughly 1 dm² still water surface lying in a funnel equipped with a graduated tube whose inside diameter ranges from 2 mm to 5 mm and which is graduated in 1/20 ml from its sealed base.

Ensure that:

- the inner wall of the container above the water is dry;
- the surface of the water is still;
- the glass beads do not fall on top of one another.

Results

With V being the volume in millilitres of glass beads collected in the tube 5 min after sprinkling, the percentage of moisture-proofed glass beads is equal to: $(1-V) \times 100$.

WARNING ever put glass beads which have not been moisture-proofed into a container previously used to hold moisture-proofed glass beads or the moisture-proofing agent.

E.2 Procedure B

Procedure B shall be used when precise results are required.

E.2.1 Apparatus

- a funnel 120 mm deep, with a top diameter of 150 mm and a 6,25 mm inside diameter stem;
- a washed cotton bag with 48 × 48 thread count (size approximately 450 mm × 250 mm);
- a bucket with a minimum capacity of 4 l filled with clear water at room temperature;
- a 500 ml beaker.

E.2.2 Procedure

Using the glass beads taken from a representative sample (see Clause 7) check the mass, which should be approximately 400 g.

Turn the cotton bag (see E.2.1) inside out and pour in the sample.

Immerse the bag containing the test sample in the bucket of water for 30 s or until the bag is completely immersed, whichever is the longer.

Remove the bag and sample from the water and squeeze the excess water out of the bag by twisting the neck of the bag. With the neck of the bag still twisted tight, hang the bag up to drain at room temperature for 2 h.

At the end of the 2 h period, mix the sample thoroughly by releasing the tension on the neck of the bag and shaking it, thus loosening the beads from the bottom and sides of the bag.

Transfer the sample to a clean dry funnel (see E.2.1 and Figure E.1). The entire sample should flow through the funnel without stoppage. Failure to flow shall be considered as failure to pass the test.

If the result is as described above as flowing without stoppage, the glass beads shall pass the test.

NOTE In cases when the beads block the funnel when first introduced, it is permissible to tap the funnel stem lightly to initiate the flow.

Annex F (normative)

Test method to determine the presence of floatation coating

NOTE This test method is only valid if the granulometry of the glass beads is between 180 μm and 300 μm .

F.1 Principle

To determine the presence of floatation coating by estimating the percentage of glass beads floating on the surface of xylene or *n*-heptane.

F.2 Apparatus and reagents

- a watch glass or Petri dish 50 mm to 75 mm in diameter;
- a syringe, pipette or eye dropper of 5 ml to 20 ml capacity;
- test sieves conforming with the requirements of ISO 565;
- xylene, of reagent grade;
- *n*-heptane, of reagent grade.

F.3 Procedure

- a) Sieve out from a representative sample (see Clause 7) the fraction passing a 300 μm sieve but retained on a 180 μm sieve.
- b) Spread a monolayer of glass beads onto the clean watch glass and, using the syringe, slowly introduce the xylene at the edge of the watch glass until the liquid is deep enough to allow the beads to float. Care should be taken to avoid agitation of the glass beads whilst the xylene is being added.
- c) Visually estimate the percentage of glass beads floating on the surface of the xylene.
- d) Repeat a) and b) using a new sample of glass beads and using *n*-heptane in place of xylene.

F.4 Results

In order to pass the test the minimum percentage of glass beads floating shall be as in Table F.1.

Table F.1 — Percentages of floating glass beads

Liquid	Minimum percentage floating
Xylene	90 %
<i>n</i> -heptane	75 %

Annex G (normative)**Test method to determine the friability index of the antiskid aggregates****G.1 Purpose**

The purpose of this test method is to specify the procedure for determining the resistance of aggregates to fragmentation.

G.2 Scope

This test method applies to aggregates of natural or artificial origin used in buildings or public works.

G.3 References

Test sieving: the granulometric analysis shall be conducted in accordance with ISO 2591-1.

Statistical consideration: the reproducibility of the test method has been verified following ISO 5725

Precision of test methods — Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests.

G.4 General**G.4.1 Principle**

The test consists of measuring the granulometric variation of aggregates produced in a rotating cylinder under strictly defined conditions by a process of fragmentation using a load in the presence of water.

The representative sample granulometry of the aggregates shall be: 0,2 mm to 2 mm or 0,2 mm to 4 mm.

Aggregates finer than 0,2 mm are not taken into consideration.

G.4.2 The friability index shall be defined by the quantity of material of less than 0,1 mm produced during the test.

If M is the mass of the material subjected to testing and m is the mass of the material of less than 0,1 mm produced during the test, the friability index will be, by definition:

$$F_s = 100 \frac{m}{M}$$

G.5 Apparatus**G.5.1 Standard apparatus**

Equipment necessary for sampling the material and carrying out the granulometric analysis by sieving, together with a set of sieves at least 200 mm in diameter with opening sizes of 0,1, 0,2, 1, 2, 4 and 8 mm.

G.5.2 Special apparatus

Rotating cylinder (micro-Deval apparatus).

An abrasive load consisting of balls of X30 Cr13 stainless steel with diameters:

$$30 \begin{matrix} +0,1 \\ -0,5 \end{matrix} \text{ mm}, 18 \begin{matrix} +0,1 \\ -0,5 \end{matrix} \text{ mm and } (10 \pm 0,5) \text{ mm}$$

G.6 Material to be tested**G.6.1 Obtaining the sample**

The mass of the material sent to the laboratory shall be at least 2 000 g.

The test shall be conducted on a sand of 0,2 mm to 2 mm or 0,2 mm and 4 mm.

G.6.2 Preparing the sample for testing

Prepare the sample for testing as follows:

- sieve the 2 000 g of material, when damp, using the sieves 0,2 mm and 2 mm or of 0,2 mm and 4 mm;
- dry the material in an oven at 105 °C until its mass is constant, that is until successive weighings of the sample separated by 1 h do not differ more than 0,1 %;
- homogenize and weigh a (500 ± 2) g test sample.

Prepare the steel balls used for the load as follows:

- take nine balls 30 mm in diameter, the total mass being (975^{+10}_{-50}) g;
- add 21 balls 18 mm in diameter, the mass being (490^{+10}_{-50}) g;
- complete the load, using balls of 10 mm diameter so that the total mass of the load is $(2\ 500 \pm 4)$ g.

The load wear shall be checked periodically. The 18 mm and 30 mm balls are checked by weighing as a whole and replacing those which are most worn, by separate weighing until the load is again within the tolerances. The 10 mm balls are controlled per lot of 10; below a 34 g lot they shall be replaced by conforming balls.

G.7 Carrying out the test

- Introduce the load into the test cylinder arranged with its opening upward; then insert 500 g of the material prepared in accordance with the requirements of **G.6.1** and **G.6.2**.
- Add 2,5 l of water and replace the cover.
- Rotate the cylinder at a speed of (100 ± 5) min⁻¹ for 1 500 rotations or 15 min.
- Slowly pour all the contents of the tray over two superimposed sieves of 8 mm (to collect the abrasive load) and of 0,1 mm respectively.
- Wash the whole, using a jet of water, until the water runs clear, then remove the 8 mm sieve.
- Dry the 0,1 mm sieve in an oven at 105 °C until the mass is constant.
- Dry sieve the oversize material using the 0,1 mm sieve.
- Weigh all the oversize material on the 0,1 mm sieve. Let this mass be m' .

G.8 Expression of results

The mass m of the material less than 0,1 mm produced during the test, from the initial 500 g is equal to $500 - m'$ ($m = 500 - m'$).

The friability index is therefore:

$$F_s = 100 \times \frac{(500 - m')}{500} = \frac{m}{5}$$

rounded off to the nearest integer.

G.9 Precision

The repeatability (r) and the reproducibility (R) were determined according to the repetition of tests done for each product in 18 laboratories. The interpretation was done according to ISO 5725. The established values between the levels 16 and 38 are as follows:

— for $F_s = 16$: repeatability	$r = 2,0$
reproducibility	$R = 4,2$
— for $F_s = 38$: repeatability	$r = 6,2$
reproducibility	$R = 8,4$

Annex H (informative)

Alternative test methods to determine the quality of glass beads

H.1 Scope

This annex establishes two alternative methods to determine the quality of glass beads. The test method defined in Annex D shall be considered as the reference test method.

These alternative methods incorporate the correlated values to be used, in accordance with the maximum weighted percentage of defective glass beads given in Table 4.

H.2 VISUAL TEST METHOD

H.2.1 Equipment and materials

- A complete series of 1/1 splitters.
- A projector shall be fitted with a $25 \times$ magnification lens placed at a distance which gives an image diameter of between 750 mm and 800 mm onto a screen provided with a 500 mm square screen divided into 25 squares, or an optical magnifying device which allows a glass bead projection of between 50 and 150 units.
- A plane base capsule, between 60 mm and 70 mm in internal diameter or a glass plate with a minimum area of 700 mm².
- A silicone grease or a transparent adhesive tape.
- A liquid with a similar refractive index to that of the glass beads.

H.2.2 Procedure

A representative sample of an approximate mass of 0,3 g shall be prepared by reductions with splitters 1/1.


The representative sample so obtained is placed in the plane base capsule, previously wetted with a thin coat of silicone grease, or on a transparent adhesive tape, distributed uniformly in order to cover completely the square part of the screen with a single thickness of glass beads.

In case of obtaining a projection of over 150 glass beads, the count of the total number of glass beads is made in three alternate diagonal squares. The obtained number is multiplied by 25 and is divided by 3. In case of obtaining a projection of below 150 glass beads, the counting operation will include the total glass beads in the visual field. The total number of glass beads shall include between 150 and 400.

After that, a second count is made of the number of non-round defective glass beads existing in the whole squared screen, that is to say oval, satellites, tear shaped, fused together, roundish glass beads, grains and foreign particles.

The sample is then covered by the liquid with refraction index similar to glass beads. In these conditions, only the shape of those will be seen, and the glass inclusions will appear as black spots.

A third count is made of the number of round defective glass beads existing in the whole squared screen, that is to say those which present black spots over 25 % of their surface, opaque and milky glass beads.

The defective glass beads will be counted only once although they present several defects. 

H.2.3 Results of counting

The percentage of defective glass beads will be calculated by the formula:

$$Md = (100 \times Nmd)/Nm$$

where

Md is the percentage of defective glass beads;

Nmd is the total number of defective glass beads resulting from the sum obtained in those last two counts;

Nm is the total number of glass beads.

The final result of Md is the average of, at least, three determinations.

H.2.4 Correlated values

When this alternative visual test method is used, the maximum weighted percentage of defective glass beads, as defined in Table 4, shall comply with Table H.1.

Table H.1 — 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	18	3
≥ 1	28	3

H.3 AUTOMATIC TEST METHOD**H.3.1 Principle**

The method is applicable to glass beads with particle diameters of between 0,08 mm and 1 mm used for road marking purposes.

The method relies upon: the optical properties of glass microbeads and defects to visually separate out these elements; and image analysis techniques to determine the percentage of defects of the glass microbeads.

The glass beads spread onto an opaque and shiny adhesive base (tape) are observed using reflected light through a microscope lens.


The glass beads applied onto the adhesive tape constitute the test specimen.

The distinction between the specimen's various elements is governed by the phenomena of specular reflection, diffusion and retro-reflection.

Under these observation conditions:

- the supporting base is reflective;
- the glass beads are both reflective and retro-reflective;
- the defects exhibit the same properties as the glass beads, but are less retro-reflective; they may be diffusive;

The specimen is positioned perpendicularly to the optical axis. This experimental set-up makes it possible to visually separate the glass beads, the defects and the supporting base. In these conditions:

- the observed spherically-shaped glass beads appear grey in colour;
- defects of beads appear darker than spherically-shaped glass beads;
- the supporting base appears white in colour. 

H.3.2 Equipment

The measurement device consists of: an optical component that allows the observation of the test specimen under reflected light, an image-acquisition system, and a software program to coordinate image acquisition and processing

Optical system (see Figure H.1).

As regards both lighting and observation, the optical system is composed of microscope parts.

The selected lens provides for a 2.5× enlargement capacity and a 0,075 digital aperture.

The specimen is placed on a three axis mobile table:

- vertical motion allows focus adjustment;
- longitudinal and transversal motions allow the observation of various parts of the specimen.

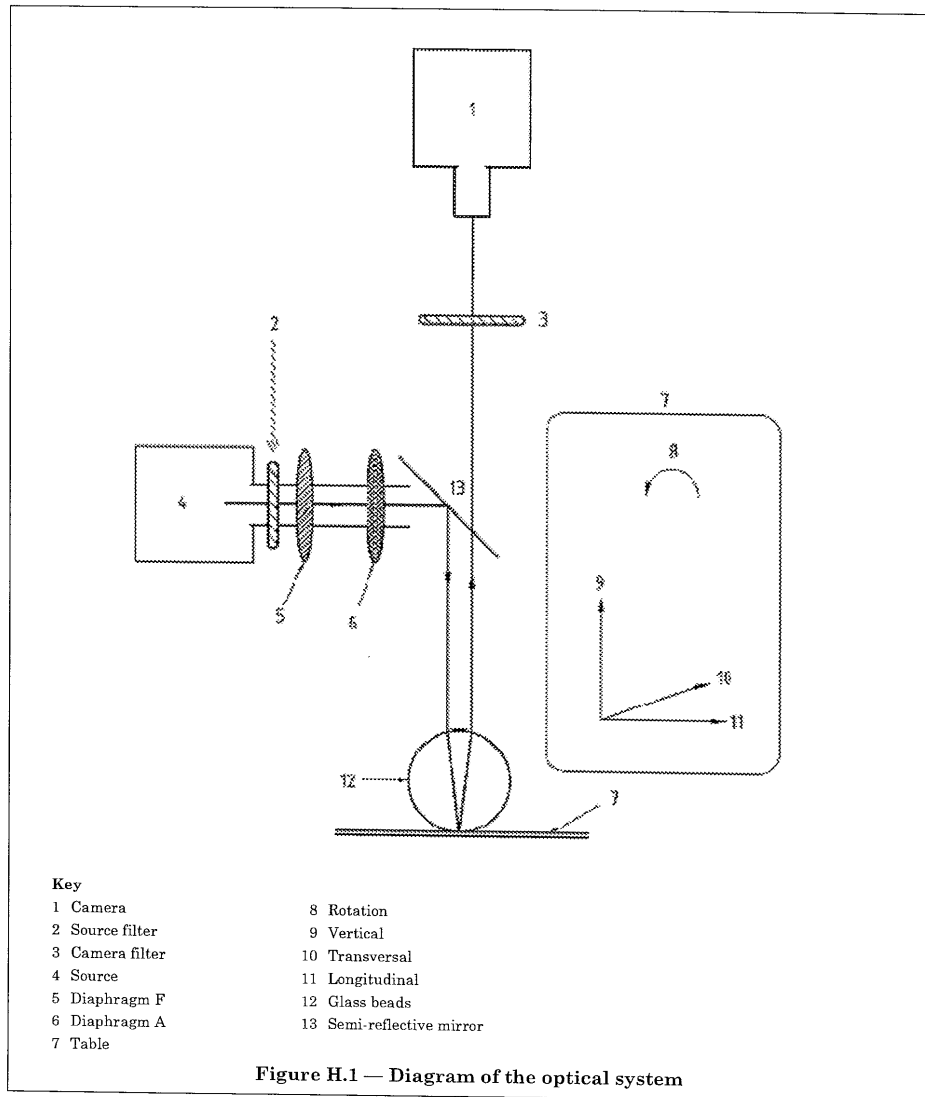
In order to observe the specimen, the table shall be capable of rotating around its longitudinal axis.

The light intensity can be adjusted by means of a system of filters and diaphragms.

The acquisition and processing system comprises:

- a camera fastened to the optical system and a video screen;
- a computer;
- a specialized interface between the camera and the computer. **H.1**

A1



A1

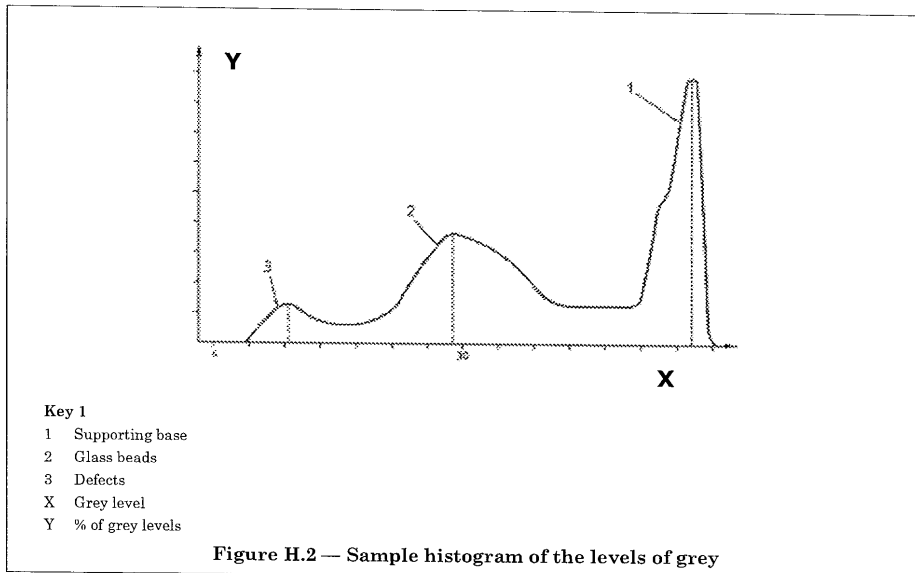
H.3.3 Image analysis

These techniques allow for the automatic separation of those elements displaying different grey levels and then performing the series of calculations necessary to obtain the percentage of defects.

Determination of the percentage of defects in the glass microbeads consists of:

- computing a grey-level histogram of the image (pixels);
- computing the surface area occupied by each category of object (defects/glass beads/ supporting base) in the picture on the basis of the histogram generated.

NOTE The graphic should show enough contrast to enable each category of object to be identified by a peak on the histogram (see Figure H.2)



The normalized histogram of the shades of grey for all of the specimen's pictures exhibits three modes; their separation is performed automatically.

H.3.4 Operating mode**H.3.4.1 Test specimen**

The glass beads coming from a representative sample are applied onto the adhesive part of an opaque and shiny adhesive tape. Its characteristics shall allow for a distinct separation of the various histogram peaks.

In order to preserve the representativity of the specimen under examination in comparison with the overall test sample, the tested products shall correspond with entire fractions obtained at the time of the successive divisions described in Annex D.

This tape shall be perfectly taut and flat.

The particles cannot be superimposed, yet may touch one another. **A1**

A1) H.3.4.2 Conducting measurements

To examine the glass beads, the specimen shall be placed perpendicular to the optical axis under the lens. Ensure that the image being viewed is clearly in focus.

Verify the proper adjustment of both the light source intensity and the contrast by means of controlling the picture histogram: the position of the various peaks shall comply with the calibration characteristics.

Refer to the user's instruction manual regarding how to perform the measurements and interpret the readings.

H.3.4.3 Calibration

The calibration characteristics are specific to each test apparatus and pertain to the position of the peaks of the various elements in the histogram. They shall be controlled on a regular basis by means of reference sample.

H.3.4.4 Number of measurement points

The level of enlargement specified in **H.3.2** enables zones of the specimen to be observed within the range of 3 mm to 4 mm.

The supporting base shall allow observing at least 50 zones (minimum number of zones to be analysed), thus equivalent to roughly 3,000 particles.

Since the breakdown in the various types of glass beads on the adhesive tape is not homogeneous, it becomes essential for the zones analysed to be spread evenly over the entire surface of the specimen.

H.3.4.5 Result of Counting

Result for a given specimen is expressed as average of the results obtained for all zones.

The result corresponds to the following surface area ratio:

$$\text{Percentage of defects} = \frac{\text{Surface area of defects}}{\text{Surface area of defects} + \text{Surface area of glass beads}}$$

H.3.5 Correlated values

When this alternative automatic test method is used, the maximum percentage of defective glass beads, as defined in Table 4, shall comply with Table H.3.

Table H.3 — Maximum percentage of defective glass beads

Diameter of glass beads mm	Maximum percentage of defective glass beads %	Maximum percentage of grains and foreign particles %
<1	30	3

A1

Annex ZA (Informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under mandate M/111 "Circulation Fixtures", as amended by mandate M/132, given to CEN by the European Commission and the European Free Trade Association.

The clauses of the European standard shown in this annex, and/or another standard where relevant, meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of drop on materials for the intended uses indicated herein.

NOTE 1 Other requirements and other EU Directives, not affecting the fitness for intended use may be applicable to the drop on materials falling within the scope of this annex.

NOTE 2 In addition to any specific clauses relating to dangerous substances contained in this European Standard, there may be other requirements applicable to drop on materials (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, **when and where** they apply. An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through <http://europa.eu.int>).

This annex establishes the conditions for the CE-marking of the drop on materials intended for the use indicated in Table ZA.1 and shows the relevant clauses applicable. The scope of this annex is defined by Table ZA.1.

A)

Table ZA.1 — Relevant clauses

Product:		Drop materials – Glass beads, anti-skid aggregates and mixtures of the two	
Intended use(s):		For circulation areas	
Essential characteristics	Requirement clauses in this [and/or another] standard	Mandated level(s) or Class(es)	Notes
Visibility characteristics			
• Refractive index (of the glass beads)	• EN 1423:1997/4.2	None	Threshold level is specified. The refractive index shall comply at least with the requirement for Class A.
• Quality (proportion of defective glass beads)	• EN 1423:1997/4.4		
• Granulometry	• EN 1423:1997/4.1 and/or 5.4		
• Colour co-ordinates (x,y), of non-transparent anti-skid aggregates	• EN 1423:1997/5.3	None	The European Standard establishes rules and limits for the sieves. Pass/fail criteria is specified in Table 5.
• Luminance factor (β), of non-transparent anti-skid aggregates	• EN 1423:1997/5.3		
Durability characteristics			
• Against chemicals (for glass beads)	• EN 1423:1997/4.3	None	Pass/fail criteria is specified.
• Resistance to fragmentation (for anti-skid aggregates)	• EN 1423:1997/5.2		

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these Member States are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "no performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used.

The "no performance determined" (NPD) option may not be used, however, where the essential characteristic being relevant for the intended use of the product is subjected to a threshold level or pass/fail criteria.

ZA.2 Procedure(s) for the attestation of conformity of drop on materials

ZA.2.1 System of attestation of conformity

The system of attestation of conformity for the drop on materials, in accordance with the decision of the Commission of 18 June 1999 (1999/453/EC) which amends Decision 96/579/EC, as given in Annex III of the mandate M111 "Circulation Fixtures", as amended by M/132, is shown in Table ZA.2 for the indicated intended use. [A\)](#)



Table ZA.2 — System of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
— Permanent marking tapes and preformed road markings — Traffic paints, hot applied thermoplastics, cold applied plastics: (with or without anti-skid aggregates) including premixed glass beads — Traffic paints, hot applied thermoplastics, cold applied plastics: (to be used for road marking) put on the market with indications on types and proportions of dropped-on glass beads and/or anti-skid aggregates — Retroreflecting road studs — Drop on materials: glass beads, anti-skid aggregates and mixtures of the two	For circulation areas	None	1
System 1 : See CPD Annex III.2.(i), without audit-testing of samples			

NOTE Despite the fact that this European Standard is limited, in its scope, to drop on materials, in Table ZA.2, the list of mandated products has been copied exactly as it is in mandate M/111 and M/132.

The attestation of conformity of the drop on materials falling within the scope of this European Standard shall be carried out according to the evaluation of conformity procedures indicated in Table ZA.3.



A)

Table ZA.3 — Assignment of evaluation of conformity tasks (for system 1)

Tasks	Content of the task	Clauses to apply
Tasks for the manufacturer	(1) Factory production control (F.P.C)	All characteristics of Table ZA.1
	(2) Further testing of samples taken at factory	All relevant characteristics of Table ZA.1
Tasks for the notified body	(3) Initial type testing	All characteristics of Table ZA.1
	(4) Initial inspection of factory and of F.P.C	All characteristics of Table ZA.1
	(5) Continuous surveillance, assessment and approval of F.P.C.	All relevant characteristics of Table ZA.1

A manufacturer having a Quality System conforming with EN ISO 9002:1994 or EN ISO 9001:2000 and which addresses the requirements of this annex, is recognised as satisfying the F.P.C requirements specified in Table ZA.3.

Where the drop on materials falling within the scope of this European Standard have previously been tested in accordance with all the relevant requirements herein specified, such tests may be taken into account for initial type testing purposes in order to avoid unnecessary additional testing burden.

ZA.2.2 Certificate and Declaration of Conformity

When compliance with the system of attestation of conformity is achieved, the notified body shall draw up a Certificate of Conformity (EC Certificate of Conformity) with the information indicated below.


The EC Certificate of Conformity shall include the following information:

- name, address and identification number of the notified body;
- name and address of the manufacturer, or his authorised representative established in the EEA and place of production;
- description of the product (type of drop on material: glass beads, anti-skid aggregates or a combination of the two; in addition: a) for anti-skid aggregates, if they are transparent or non transparent; b) in a combination of glass beads and anti-skid aggregates, the proportion of the components);
- the presence of a surface treatment and its intended use;
- provisions to which the product conforms (Annex ZA of this European Standard);
- particular conditions applicable to the use of the product, if any;
- the certificate number;
- conditions and period of validity of the certificate, where applicable, and;
- name of, and position held by, the person empowered to sign the certificate.

This EC Certificate of Conformity entitles the manufacturer to affix the CE marking, as described in ZA.3 of this annex.

In addition, for each product covered by an EC Certificate of Conformity, the manufacturer shall draw up a Declaration of Conformity (EC Declaration of Conformity) including the following information:

- name and address of the manufacturer, or his authorised representative established in the EEA;
- name and address of the notified body;
- description of the product and a copy of the information accompanying the CE marking;
- number of the attached EC Certificate of Conformity and;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

Both documents shall be presented, by supplying with the original documents the corresponding translations, in the official language or languages of the Member State of the EU in which the product is to be used. 

ZA.3 CE marking and labelling

The CE marking shall be affixed visibly, legibly and indelibly, with the form as described in Council Directive 93/68/EC and Council Decision 93/465/EC, and shall be easily accessible to the market surveillance authorities.

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking shall be affixed before the product is placed on the market. The manufacturer, or his authorised representative established within the EEA, may decide when to affix the CE marking depending upon the circumstances of the production process of the product. Where the CE marking is affixed sometime after the manufacture of the product, the validity of the testing carried out during production shall be confirmed.

The CE conformity marking consists exclusively of the letters "CE", in the previously specified form, followed by the identification number of the notified body and then the following additional information:

- 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 the EC certificate of conformity;
- the number and the year of this European Standard (i.e. EN 1423:1997);
- description of the product (type of drop on material: glass beads, anti-skid aggregates or a combination of the two; in addition: a) for anti-skid aggregates, if they are transparent or non transparent; b) in a combination of glass beads and anti-skid aggregates, the proportion of the components);
- the batch number;
- the presence of a surface treatment and its intended use;
- indications to identify the mandated characteristics of the product.

*NOTE This is the name of the manufacturer not the authorised representative established in the EEA. The purpose of this information is to identify the legal entity responsible for the manufacture of the product. The CPD does not require the manufacturer to be established in the EEA nor does it require that a manufacturer from a non-EEA country has an authorised representative established in the EEA.

The CE marking and the accompanying information shall be placed on the packaging of the product. When not possible, such as bulk deliveries, it shall be done on the accompanying commercial documents such as delivery notes.

The identification of the mandated characteristics shall be made as follows:

- | | |
|---|--|
| EN 1423:1997 | — European Standard of reference including the year of publication of the last applicable version; |
| Refractive index (of the glass beads) | — Specify the class of performance according to EN 1423:1997/4.2; |
| Granulometry | — According to the rules established in EN 1423:1997/4.1 and/or 5.4, as appropriate. Specify the upper and lower nominal sieves; |
| Resistance to fragmentation (for anti-skid aggregates) | — Specify the value of the "friability index". |



Ex) In the following examples, a format for the presentation of the CE marking and accompanying information is given:

Table ZA.4 — Example of CE-marking information for glass beads

CE
0123-CPD-0001
AnyCo Ltd, PO Box 21, B-1050
Date of manufacturing: 2001
Notified Body 0123-CPD-0456
EN 1423:1997
Mandated characteristics:
<ul style="list-style-type: none"> • Refractive index: Class A • Granulometry: 600-125µm
Batch 13032001
20 Kg

CE conformity marking, consisting of the "CE"-symbol as given in directive 93/68/EEC.

Identification number of the notified body

Name or identifying mark and registered address of the producer

Last two digits of the year in which the product was manufactured

Number of the EC Certificate of Conformity

Number and year of this European standard

According to EN 1423:1997, as appropriate:

See 4.2

See 4.1

Batch number

Net mass



Table ZA.5 — Example of CE-marking information for a combination of glass beads and anti-skid aggregates

<p>CE</p> <p>0123-CPD-0001</p> <hr/> <p>AnyCo Ltd, PO Box 21, B-1050</p> <p>01</p> <p>0123-CPD-0457</p> <p>EN 1423:1997</p> <p>Mandated characteristics:</p> <ol style="list-style-type: none"> 1. for the glass beads : <ul style="list-style-type: none"> • Refractive index: Class A • Granulometry: 425-90 µm 2. for the anti-skid aggregates : <ul style="list-style-type: none"> • Friability index: 9 • Granulometry: 710-150 µm 3. for the combination of the two : <ul style="list-style-type: none"> • Proportion of the components: 80-20 <p>17152001</p> <p>20 Kg</p>	<p>CE conformity marking, consisting of the "CE" symbol as given in directive 93/68/EEC.</p> <p><i>Identification number of the notified body</i></p> <p><i>Name or identifying mark and registered address of the producer</i></p> <p><i>Last two digits of the year in which the product was manufactured</i></p> <p><i>Number of the EC Certificate of Conformity</i></p> <p><i>Number and year of this European standard</i></p> <p><i>According to EN 1423:1997, as appropriate:</i></p> <p style="padding-left: 40px;"><i>See 4.2</i></p> <p style="padding-left: 40px;"><i>See 4.1</i></p> <p style="padding-left: 40px;"><i>See 5.2</i></p> <p style="padding-left: 40px;"><i>See 5.4</i></p> <p style="padding-left: 40px;"><i>See clause 6</i></p> <p><i>Batch number</i></p> <p><i>Net mass</i></p>
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▣ Bibliography

EN ISO 9002:1994, *Quality systems — Model for quality assurance in production, installation and servicing* (ISO 9002:1994).

EN ISO 9001:2000, *Quality management system — Requirements* (ISO 9001:9000). **▣**