

Aggregates for railway ballast

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BSi
British Standards

National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/502, Aggregates, to Subcommittee B/502/4, Hydraulic bound and unbound aggregates, which has the responsibility to:

- aid enquirers to understand the text;
- 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.

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Aggregates for railway ballast

Granulats pour ballasts de voies ferrées

Gesteinskörnungen für Gleisschotter

This European Standard was approved by CEN on 7 November 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document EN 13450:2002 has been prepared by Technical Committee CEN /TC 154, "Aggregates", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2004.

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.

Requirements for other end uses of aggregates will be specified in the following European Standards:

- EN 12620 *Aggregates for concrete.*
- EN 13043 *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas.*
- EN 13055-1 *Lightweight aggregates - Part 1: Lightweight aggregates for concrete, mortar and grout.*
- prEN 13055-2 *Lightweight aggregates - Part 2: Lightweight aggregates for bituminous mixtures and surface treatments and for bound and unbound applications, excluding concrete, mortar and grout.*
- EN 13139 *Aggregates for mortar.*
- EN 13242 *Aggregates for unbound and hydraulically bound materials for use in civil engineering work and road construction.*
- EN 13383-1 *Armourstone - Part 1: specification.*

Annexes A, B and H are informative and annexes C, D, E, F, G and I are normative.

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, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies the properties of aggregates obtained by processing natural or manufactured materials or recycled crushed unbound aggregates for use in construction of railway track. For the purposes of this standard, the aggregate is referred to as railway ballast.

It provides for the evaluation of conformity of the products to this European Standard.

NOTE The requirements in this European Standard are based upon experience with aggregate types with an established pattern of use. Care should be taken when considering the use of aggregates from sources with no such pattern of use, e.g., recycled aggregates and aggregates arising from certain industrial by-products. Such aggregates, that should comply with all the requirements of this European Standard, could have other characteristics not included in Mandate M 125 (as amended) that do not apply to the generality of aggregate types with an established pattern of use and when required, provisions valid at the place of use can be used to assess their suitability.

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 (including amendments).

- EN 932-1:1996, *Tests for general properties of aggregates — Part 1: Methods for sampling.*
- EN 932-2, *Tests for general properties of aggregates — Part 2: Methods for reducing laboratory samples.*
- EN 932-3, *Tests for general properties of aggregates — Part 3: Procedure and terminology for simplified petrographic description.*
- EN 932-5, *Tests for general properties of aggregates — Part 5: Common equipment and calibration.*
- EN 933-1:1997, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution - Sieving method.*
- EN 933-3, *Tests for geometrical properties of aggregates — Part 3: Determination of particle shape - Flakiness index.*
- EN 933-4, *Tests for geometrical properties of aggregates — Part 4: Determination of particle shape - Shape index.*
- EN 1097-1:1996, *Tests for mechanical and physical properties of aggregates - Part 1: Determination of the resistance to wear (micro-Deval).*
- EN 1097-2:1998, *Tests for mechanical and physical properties of aggregates — Part 2: Methods for the determination of resistance to fragmentation.*
- EN 1097-6:2000, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption.*
- EN 1367-1:1999, *Tests for thermal and weathering properties of aggregates — Part 1: Determination of resistance to freezing and thawing.*
- EN 1367-2:1998, *Tests for thermal and weathering properties of aggregates — Part 2: Magnesium sulfate test.*
- EN 1367-3, *Tests for thermal and weathering properties of aggregates — Part 3: Boiling test for "Sonnenbrand basalt".*

3 Terms and definitions

For the purposes of this European Standard the following terms and definitions apply.

3.1

aggregate

granular material used in construction. Aggregate may be natural, manufactured or re-cycled

3.2

railway ballast

aggregate where 100 % of the surface of the particles can be described as totally crushed used in the construction of railway track

3.3

natural railway ballast

aggregate for railway ballast from mineral sources which have been subjected to nothing more than mechanical processing

3.4

manufactured railway ballast

railway ballast (of mineral origin) resulting from an industrial process involving thermal or other modifications

3.5

recycled railway ballast

railway ballast resulting from the processing of previously used railway ballast

3.6

railway ballast size

designation of railway ballast in terms of lower (d) and upper (D) sieve sizes. This designation accepts the presence of some particles which will be retained on the upper sieve (oversize) and some will pass the lower sieve (undersize)

3.7

fine particles

particle size fraction of railway ballast which passes the 0,5 mm sieve

3.8

fines

particle size fraction of railway ballast which passes the 0,063 mm sieve

3.9

category

level of a property of an aggregate expressed as a range of values or a limiting value

NOTE There is no relationship between the categories of different properties.

4 Sampling

Sampling shall be carried out in accordance with EN 932-1.

NOTE 1 Advice on sampling from a wagon or the track at the laying site is given in annex A.

NOTE 2 Guidance on interpretation of results when samples of railway ballast have been taken from railway wagon or out of track is given in annex B.

5 Production

Natural railway ballast shall be produced without blending material from different geological sources.

6 Geometrical requirements

6.1 General

The necessity for testing and declaring all properties specified in this clause shall be limited according to the particular application at end use or origin of the aggregate. When required, the tests specified shall be carried out to determine appropriate properties.

NOTE 1 When the value of a property is required but not defined by specified limits the value should be declared by the producer as an XX_{Declared} category, e.g., in Table 4 a value of flakiness index of say 40 corresponds to Fl_{40} (Declared value).

NOTE 2 When a property is not required, a "No requirement" category can be used.

NOTE 3 Guidance on selection of appropriate categories for specific applications can be found in national provisions in the place of use of the railway ballast.

6.2 Railway ballast size

Railway ballast size shall be designated by a pair of sieve sizes in millimetre with d as the lower limit designation sieve and D as the upper limit designation sieve between which most of the particle size distribution lies.

For railway ballast D is 50 mm or 63 mm and d is 31,5 mm.

6.3 Grading

The grading of the railway ballast determined in accordance with EN 933-1 shall be declared in accordance with the relevant category specified in Table 1.

Table 1 — Categories for grading

Sieve size mm	Railway ballast size 31,5 mm to 50 mm			Railway ballast size 31,5 mm to 63 mm		
	Percentage passing by mass					
	Grading category					
	A	B	C	D	E	F
80	100	100	100	100	100	100
63	100	97 to 100	95 to 100	97 to 99	95 to 99	93 to 99
50	70 to 99	70 to 99	70 to 99	65 to 99	55 to 99	45 to 70
40	30 to 65	30 to 70	25 to 75	30 to 65	25 to 75	15 to 40
31,5	1 to 25	1 to 25	1 to 25	1 to 25	1 to 25	0 to 7
22,4	0 to 3	0 to 3	0 to 3	0 to 3	0 to 3	0 to 7
31,5 to 50	≥ 50	≥ 50	≥ 50	-	-	-
31,5 to 63	-	-	-	≥ 50	≥ 50	≥ 85

NOTE 1 The requirement for passing the 22,4 mm sieve applies to railway ballast sampled at the place of production.

NOTE 2 In certain circumstances a 25 mm sieve may be used as an alternative to the 22,4 mm sieve when a tolerance of 0 to 5 would apply (0 to 7 for category F).

6.4 Fine particles

The content of fine particles determined in accordance with EN 933-1 shall be declared in accordance with the relevant category specified in Table 2.

Table 2 — Categories for fine particles content

Sieve size mm	Maximum percentage passing by mass			
	Fine particle category			
	A	B	Declared	C
0,5	0,6	1,0	> 1,0	No requirement
NOTE The requirement applies to railway ballast sampled at the place of production.				

6.5 Fines

The fines content determined in accordance with EN 933-1 shall be declared in accordance with the relevant category specified in Table 3.

When required cleanliness shall be assessed from the fines content. Fines shall be considered non-harmful if the total fines content is less than the relevant category specified in Table 3 in accordance with the provisions valid in the place of use of the aggregate.

Table 3 — Categories for fines content

Sieve size mm	Maximum percentage passing by mass				
	Fines content category				
	A	B	C	Declared	D
0,063	0,5	1,0	1,5	> 1,5	No requirement
NOTE The requirement applies to railway ballast sampled at the place of production.					

6.6 Particle shape

6.6.1 Flakiness index

When required the shape of coarse railway ballast shall be determined in terms of the flakiness index as specified in EN 933-3.

Flakiness index shall be the reference test for the determination of shape of railway ballast. The Flakiness index shall be declared in accordance with the relevant category specified in Table 4.

Table 4 — Categories for maximum values of flakiness index

Flakiness Index	Category <i>FI</i>
≤ 15	FI_{15}
≤ 20	FI_{20}
≤ 35	FI_{35}
> 35	FI_{Declared}
No requirement	FI_{NR}

6.6.2 Shape index

Where required, the shape index of the railway ballast determined in accordance with EN 933-4 shall be declared in accordance with the relevant category specified in Table 5.

Table 5 — Categories for maximum values of shape index

Shape Index	Category <i>SI</i>
≤ 10	SI_{10}
≤ 20	SI_{20}
≤ 30	SI_{30}
5 to 30	$SI_{5/30}$
> 30	SI_{Declared}
No requirement	SI_{NR}

6.7 Particle length

Particle length shall be assessed by measuring with an appropriate gauge or calipers.

NOTE Limits should be selected from the specified range until such a time as there is more data available on aggregate properties related to performance.

When required, the particle length shall be declared in accordance with the relevant category specified in Table 6.

Table 6 — Categories for particle length

Percentage by mass with length ≥ 100 mm in a greater than 40 kg sample					
Particle length category					
A	B	C	D	Declared	E
4	6	8	12	> 12	No requirement

7 Physical requirements

7.1 General

The necessity for testing and declaring all properties specified in this clause shall be limited according to the particular application at end use or origin of the aggregate. When required, the tests specified shall be carried out to determine appropriate properties.

NOTE 1 When the value of a property is required but not defined by specified limits the value should be declared by the producer as an XX_{Declared} category, e.g., in Table 6 a Los Angeles coefficient of say 30 corresponds to $LA_{\text{RB}} 30(\text{Declared value})$.

NOTE 2 When a property is not required, a "No requirement" category can be used.

NOTE 3 Guidance on selection of appropriate categories for specific applications can be found in national provisions in the place of use of the railway ballast.

7.2 Resistance to fragmentation

When required, the resistance to fragmentation of railway ballast (Los Angeles coefficient, LA_{RB} , using the conditions as specified in annex C), determined as specified in EN 1097-2:1998, clause 5, shall be declared in accordance with the relevant category specified in Table 7. The Los Angeles test method shall be the reference test for the determination of resistance to fragmentation of railway ballast.

Table 7 — Categories for maximum values of Los Angeles coefficient

Los Angeles coefficient	Category LA_{RB}
≤ 12	$LA_{\text{RB}} 12$
≤ 14	$LA_{\text{RB}} 14$
≤ 16	$LA_{\text{RB}} 16$
≤ 20	$LA_{\text{RB}} 20$
≤ 24	$LA_{\text{RB}} 24$
> 24	$LA_{\text{RB}} \text{ Declared}$
No requirement	$LA_{\text{RB}} \text{ NR}$

Where required, the impact value of railway ballast (SZ_{RB} , using the conditions as specified in annex D), determined in accordance with EN 1097-2:1998, clause 6, shall be declared in accordance with the relevant category specified in Table 8.

Table 8 — Categories for maximum values of resistance to impact

Impact value %	Category SZ_{RB}
≤ 14	$SZ_{\text{RB}} 14$
≤ 18	$SZ_{\text{RB}} 18$
≤ 22	$SZ_{\text{RB}} 22$
> 22	$SZ_{\text{RB}} \text{ Declared}$
No requirement	$SZ_{\text{RB}} \text{ NR}$

7.3 Resistance to wear

When required, the resistance to wear of railway ballast (micro-Deval coefficient, M_{DE} RB using the conditions as specified in annex E) determined in accordance with EN 1097-1, shall be declared in accordance with the relevant category specified in Table 9.

Table 9 — Categories for maximum values of resistance to wear

micro-Deval coefficient	Category M_{DE} RB
≤ 5	M_{DE} RB 5
≤ 7	M_{DE} RB 7
≤ 11	M_{DE} RB 11
≤ 15	M_{DE} RB 15
> 15	M_{DE} RB Declared
No requirement	M_{DE} RB NR

7.4 Durability

7.4.1 Resistance to freezing and thawing

When required, the durability of railway ballast in terms of freeze/thaw resistance, shall be assessed by either the freeze/thaw test in accordance with EN 1367-1, using the conditions as specified in annex F, or the magnesium sulphate soundness test in accordance with EN 1367-2, using the conditions as specified in annex G and the results declared.

NOTE There is limited experience of the use of either of these tests for assessing the durability of railway ballast. Advice on the applicability of the test methods and of using water absorption as a screening test is given in annex H.

7.4.2 Particle density

When required the particle density shall be determined in accordance with EN 1097-6:2000, annex B and the results declared.

7.4.3 Water absorption

When required the water absorption shall be determined in accordance with EN 1097-6:2000 annex B and the results declared.

7.5 Sonnenbrand

If signs of "Sonnenbrand" are known from a quarry of basalt or closely related rocks qualitative testing shall be carried out in accordance with EN 1367-3 and the results declared.

NOTE "Sonnenbrand" is a type of rock decay that can be present in some basalts and manifests itself under the influence of atmospheric conditions. It starts with the appearance of grey/white coloured spots. Usually hairline cracks are generated radiating out from the spots and interconnecting them. This reduces the strength of the mineral fabric, and as a result the rock decays to small particles. Depending on the source this process can take place within months of extraction or extend over several decades. In exceptional cases a rapid decay results in the formation of large cracks and the breaking of aggregate particles.

8 Harmful components

Railway ballast shall not contain other components or matter than specified in this standard.

9 Evaluation of conformity

9.1 General

The producer shall undertake initial type tests (see 9.2) and Factory Production Control (see annex I) to ensure that the product conforms to this European Standard and to declared values as appropriate.

9.2 Initial type tests

Initial type tests relevant to the intended end use shall be carried out to check compliance with specified requirements in the following circumstances:

- a) a new source of aggregates is to be used.
- b) there is a major change in the nature of the raw materials or in the processing conditions which may affect the properties of the aggregates.

The results of the initial tests shall be documented as the starting point of the factory production control for that material. This shall particularly include the identification of any components likely to emit radiation above normal background levels, any components likely to release polyaromatic carbons or other dangerous substances. If the content of any of these components exceeds the limits in force according to the provisions valid in the place of use of the railway ballast, the results of the initial tests shall be declared

9.3 Factory production control

The producer shall have in place a system of factory production control that complies with the requirements of annex I.

The records held by the producer shall indicate what quality control procedures are in operation during the production of the aggregate.

NOTE 1 The form of control applied to any aggregate depends upon its intended use and the regulations relating to that use.

NOTE 2 For inspection purposes only, railway ballast can be sampled from the track in accordance with annex A.

10 Designation and description

10.1 Designation

Railway ballast shall be identified in the following terms:

- a) source - if the material has been re-handled in a depot both source and depot shall be given;
- b) a simple indication of the petrographic type (see EN 932-3);
- c) railway ballast size;
- d) where required a producer's code to relate the designation to the description;
- e) any additional information needed to identify the particular railway ballast aggregate.

10.2 Essential information for the description of a railway ballast aggregate

Only the items a) to c) in 10.1 are essential descriptions of a railway ballast aggregate. The necessity for other information depends on the situation and end use.

NOTE The purchaser should inform the supplier at the time of order of any special requirements associated with a particular end use.

11 Marking and labelling

The delivery ticket shall contain at least the following information:

- a) designation;
- b) date of despatch;
- c) serial number of the ticket;
- d) the number of this European Standard.

NOTE It can be a requirement of the supply agreement to have additional information included on the delivery ticket.

Annex A (informative)

Sampling railway ballast at the construction site either from a railway wagon or from the track

A.1 Introduction

It is intended that for compliance purposes railway ballast should be sampled only at the place of production. The specification limits contained within this standard are based on the testing of samples taken at this location. The method of sampling should be as specified in EN 932-1.

However there will be occasions when it will be necessary to take a sample of railway ballast at the time of delivery or from the track. Reasons can include to check if degradation has occurred during transport or to investigate a particular track problem. In such situations one of the following sampling procedures should be adopted.

A.2 Sampling railway ballast from a railway wagon

A.2.1 Sampling of railway ballast at a construction site should be carried out in accordance with the principles and definitions specified in EN 932-1.

A.2.2 Sampling should only be carried from a fully loaded wagon by use of a sampling box (see EN 932-1:1996, Figure 5) of inner dimensions length 700 mm, width 450 mm and height 250 mm.

A.2.3 All the increments for one bulk sample should be taken from one wagon and from one discharge opening (slide or conveyor belt) of that wagon.

A.2.4 A minimum of four increments should be taken.

A.2.5 The first increment should be taken about 10 s after the commencement of unloading, the last increment about 10 s before the end of unloading and intermediate increments at regular intervals in between the first and last.

A.2.6 The discharge opening should be completely open at the time of sampling.

A.2.7 The wagon should move at walking pace (about 3 km/h) over the sampling box.

A.2.8 The contents of one sample box should constitute one increment.

A.2.9 The increments should be mixed together to form a bulk sample on a clean flat surface or on a thick tear resistant plastic sheet.

A.2.10 The bulk sample should be split into the required number of subsamples in accordance with EN 932-1.

A.3 Sampling railway ballast from track without use of a steel frame

A.3.1 The bulk sample should consist of one or more spaces between sleepers.

A.3.2 If it is required to sample railway ballast from more than one space between sleepers then the first, fourth and then every third space should be sampled.

A.3.3 The railway ballast should be removed completely first by using a ballast fork and then a small shovel or similar.

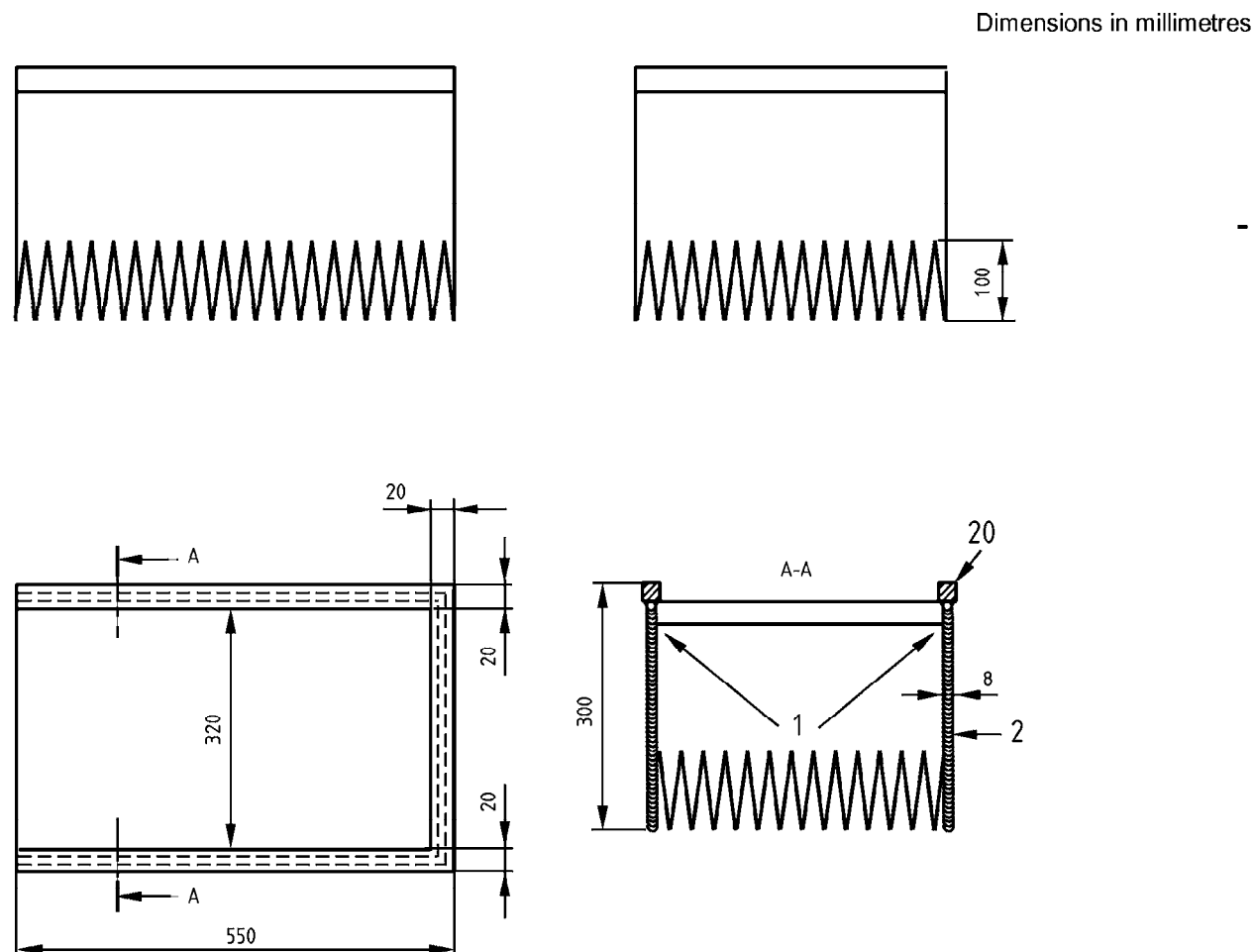
A.3.4 The railway ballast should be removed down to the bottom of the railway ballast layer. Care should be taken to ensure that no damage is caused to the formation or the protective layer and that no particles originating from them are included in the sample.

A.3.5 The increments should be mixed together to form a bulk sample on clean, flat surface or on thick tear-resistant plastic sheet.

A.3.6 The bulk sample should be split into the required number of subsamples, in accordance with EN 932-1.

A.4 Sampling railway ballast from track using a steel frame

A.4.1 A steel frame serrated at its lower edge, as shown in Figure A.1, can be used for railway ballast sampling from the track.



Key

- 1 Welding seam
- 2 Steel plate

Figure A.1 - Frame for sampling railway ballast

A.4.2 The sampling procedure should be as described in A.3 except that at each space between sleepers from which it is required to take a sample, the steel frame should be driven into the railway ballast using a sledge hammer. The steel frame should be driven between concrete sleepers without damaging the sleepers.

A.4.3 Railway ballast should be removed first with a ballast fork and the frame then driven deeper into the railway ballast. Removal of the bottom layer of railway ballast should be with a small shovel or similar. Care should be taken to ensure that no damage is caused to the formation or the protective layer and that no particles originating from them are included in the sample.

A.4.4 The increments should be mixed together to form a bulk sample on a clean, flat surface or thick tear-resistant plastic sheet.

A.4.5 The bulk sample should be split into the required number of subsamples, in accordance with EN 932-1.

Annex B

(informative)

Guidance on interpretation of results when samples of railway ballast have been taken from railway wagon or from track

B.1 For assessment of compliance with specification samples should be taken at the place of production in accordance with EN 932-1, tested in accordance with the test methods detailed in this standard and compared with the appropriate specified values.

B.2 There will however be some occasions when samples are taken from a railway wagon or from the track. In such cases the same test methods and appropriate specified values should apply with the exception of certain test methods which can be used to assess if degradation of the railway ballast has occurred in transport.

B.3 For these tests, the results obtained from samples taken from a railway wagon or from the track should be compared with the limits given in Table B.1 and provided these are not exceeded the degradation of the railway ballast during transport or by attrition may be considered acceptable.

B.4 Results of sample, which are taken from the railway track before tamping, are for information purposes and to form the basis of discussion between the supplier and the customer.

Table B.1 — Degradation of railway ballast during transport

Test clause	Description	Category		
		A	B	C
6.2	Maximum percentage by mass passing 22,4 mm sieve	5	7	No requirement

Annex C (normative)

Conditions to be applied to the test procedure specified in EN 1097-2 for testing the Los Angeles coefficient of railway ballast (see 7.2)

C.1 General

The test shall be carried out as specified in EN 1097-2:1998, clauses 4 and 5, for the determination of resistance to fragmentation by the Los Angeles test method with the following conditions of use applied to the procedures.

C.2 Sieves

Under EN 1097-2:1998, 4.1.1 and Table 1, for the Los Angeles test the 10 mm, 11,2 mm (or 12,5 mm) and 14 mm sieve sizes shall be replaced by 31,5 mm, 40 mm and 50 mm sieve sizes.

C.3 Ball load

Under EN 1097-2:1998, 4.2.2.2, the ball load consisting of 11 spherical steel balls of total load between 4690 g and 4860 g shall be replaced by a ball load consisting of 12 balls of total load (5210 ± 90) g.

C.4 Preparation of the sample for testing

Replace EN 1097-2:1998, 5.2, with the following.

The mass of the sample sent to the laboratory shall have at least 15 kg of particles in the 31,5 mm to 50 mm size range.

Sieve the laboratory sample using the 31,5 mm, 40 mm and 50 mm test sieves to give separate fractions in the ranges 31,5 mm to 40 mm and 40 mm to 50 mm. Wash each fraction separately, in accordance with EN 933-1:1997, 7.1, and dry them in the oven at (110 ± 5) °C to constant mass. Allow the fractions to cool to ambient temperature.

Reduce the mass of each size fraction as specified in EN 932-2 so that each has a mass of $(5\,000 \pm 50)$ g. Combine the two reduced fractions to produce a test portion with a total dry mass of $(10\,000 \pm 100)$ g.

C.5 Test procedure

Under EN 1097-2:1998, 5.3, the machine shall be rotated for 1000 revolutions instead of 500 revolutions at a speed of 31 min^{-1} to 33 min^{-1} .

C.6 Calculation and expression of results

Under EN 1097-2:1998, 5.4, replace the equation:

$$LA = \frac{5\,000 - m}{50}$$

by the following equation:

$$LA_{RB} = \frac{10\,000 - m}{100}$$

C.7 Test report

Report that the test procedure was carried out in accordance with EN 1097-2:1998, clauses 4 and 5, applying the conditions of use as specified in this annex.

Annex D
(normative)

**Conditions to be applied to the test procedure specified in EN 1097-2
for testing the impact value of railway ballast (see 7.2)**

D.1 General

The test shall be carried out as specified in EN 1097-2:1998, clauses 4 and 6, for the determination of resistance to fragmentation by the impact test method with the following conditions of use applied to the procedures.

D.2 Sieves

Under EN 1097-2:1998, 4.1.1 and Table 1, the aperture sizes for the impact test shall be 8 mm, 31,5 mm and 40 mm.

D.3 Preparation of the sample for testing

Under EN 1097-2:1998, 6.2:

- a) the laboratory sample shall be a minimum of 10 kg of the particle size fraction 31,5 mm to 40 mm;
- b) the particle size fraction 31,5 mm to 40 mm shall be tested. The mass of each of the three test specimens, in kilograms, shall be $1,05 \times$ the particle density, determined in accordance with EN 1097-6:2000 annex B.

D.4 Test procedure

Under EN 1097-2:1998, 6.3.1:

- a) the hammer shall be lifted up to a height of 420 mm instead of 370 mm;
- b) the test specimen shall be subjected to 20 blows, instead of 10 blows, by the hammer.

Under EN 1097-2:1998, 6.3.3, the crushed test specimen shall be sieved on the 8 mm test sieve only and the mass of the fraction passing determined and expressed to one decimal place as a percentage of the initial mass of the test specimen.

D.5 Test report

Report that the test procedure was carried out in accordance with EN 1097-2:1998, clauses 4 and 6, applying the conditions of use as specified in this annex.

Annex E (normative)

Conditions to be applied to the test procedure specified in EN 1097-1 for determination of the resistance to wear (micro-Deval) of railway ballast (see 7.3)

E.1 General

The test shall be carried out as specified in EN 1097-1 for the determination of resistance to wear (micro-Deval), with the following conditions of use applied to the procedures.

E.2 Sieves

Under EN 1097-1:1996, 5.1.2, the 10 mm, 11,2 mm (or 12,5 mm) and 14 mm sieve sizes shall be replaced by 31,5 mm, 40 mm and 50 mm sieve sizes.

E.3 Hollow drums

Under EN 1097-1:1996, 5.2.1, the internal length of each drum shall be (400 ± 2) mm.

E.4 Abrasive charge

Under EN 1097-1:1996, 5.2.3, the abrasive charge is not required.

E.5 Preparation of the sample for testing

Replace EN 1097-1:1996, clause 6, with the following.

The mass of the sample sent to the laboratory shall have at least 25 kg of particles in the 31,5 mm to 50 mm size fraction. The test portion shall consist of two test specimens.

Sieve the laboratory sample using the 31,5 mm, 40 mm and 50 mm to give the separate size fractions in the ranges 31,5 mm to 40 mm and 40 mm to 50 mm. Wash each fraction separately, in accordance with EN 933-1:1997, 7.1, and dry it in the oven at (110 ± 5) °C to constant mass. Allow the fractions to cool to ambient temperature.

Divide and reduce the mass of the 31,5 mm to 40 mm size fraction as specified in EN 932-2, so as to create two size fractions, each with a mass of $(5\,000 \pm 50)$ g. Repeat for the 40 mm to 50 mm size fraction.

Combine one 31,5 mm to 40 mm size fraction with one 40 mm to 50 mm size fraction to produce a test specimen with a total dry mass of $(10\,000 \pm 100)$ g. Repeat for the second two size fractions.

E.6 Test procedure

The steel ball charge specified in EN 1097-1:1996, clause 7, is not used. Add $(2,0 \pm 0,05)$ l, instead of $(2,5 \pm 0,05)$ l, of water to each drum and rotate the drums for $(14\,000 \pm 10)$ revolutions instead of $(12\,000 \pm 10)$ revolutions.

E.7 Calculation and expression of results

Under EN 1097-1:1996, clause 8, replace the equation:

$$M_{DE} = \frac{500 - m}{5}$$

by the following equation:

$$M_{DE\,RB} = \frac{10\,000 - m}{100}$$

E.8 Test report

Report that the test procedure was carried out in accordance with EN 1097-1, applying the conditions of use as specified in this annex.

Annex F
(normative)

**Conditions to be applied to the test procedure specified in EN 1367-1
for determination of the resistance to freezing and thawing of railway ballast (see 7.4)**

F.1 General

The test shall be carried out as specified in EN 1367-1 for the determination of resistance to freezing and thawing with the following conditions of use applied to the procedures.

F.2 Exposure to freezing under water

Under EN 1367-1:1999, 8.2 subject the samples in the cabinet to a series of 20 freeze-thaw cycles, instead of 10 freeze-thaw cycles.

F.3 Test report

Report that the test procedure was carried out in accordance with EN 1367-1, applying the conditions of use as specified in this annex.

Annex G (normative)

Conditions to be applied to the test procedure specified in EN 1367-2 for the determination of the resistance of railway ballast to the magnesium sulfate test (see 7.4)

G.1 General

The test shall be carried out as specified in EN 1367-2 for the assessment of how railway ballast behaves when subject to a magnesium sulfate test with the following conditions of use applied to the procedures.

G.2 Apparatus

Under EN 1367-2:1998, clause 6:

- a) in EN 1367-2:1998, 6.1, the 10 mm and 14 mm sieve sizes are replaced by 22,4 mm, 31,5 mm, 40 mm and 50 mm sieve sizes;
- b) in EN 1367-2:1998, 6.2, the capacity of the balance of 2 kg , accurate to 0,1 g, is replaced by 20 kg, accurate to 1 g;
- c) in EN 1367-2:1998, 6.3 and Figure 1, the basket shall have a mesh size of 4 mm and its dimensions shall be 260 mm deep with a diameter of 230 mm.

G.3 Reagents

Under EN 1367-2:1998, clause 7, 12 l of saturated solution of magnesium sulfate is required for each test.

G.4 Preparation of test specimens

Under EN 1367-2:1998, clause 8, the two test specimens required shall each have a mass of $(10\,000 \pm 100)$ g consisting of (5000 ± 50) g of the 31,5 mm to 40 mm aggregate size and (5000 ± 50) g of the 40 mm to 50 mm aggregate size.

Under EN 1367-2:1998, 8.3, each test specimen shall be sieved on the 22,4 mm sieve.

G.5 Procedure

Under EN 1367-2:1998, clause 9:

- a) in EN 1367-2:1998, 9.4, the process shall be repeated for 10 cycles;
- b) in EN 1367-2:1998, 9.6, hand sieve on the 22,4 mm sieve.

G.6 Calculation and expression of results

Under EN 1367-2:1998, clause 10, M_2 shall be the mass retained on the 22,4 mm sieve to the nearest 1 g.

G.7 Test report

Report that the test procedure was carried out in accordance with EN 1367-2, applying the conditions of use as specified in this annex.

Annex H (informative)

Guidance on the freezing and thawing resistance of railway ballast

H.1 General

The susceptibility of railway ballast to damage from freezing and thawing action will depend primarily on climate, end use, petrographic type and on the size distribution of the pores within the aggregate particles. Railway ballast particles are much more susceptible to damage from freeze/thaw because they are not bound with bitumen or cement.

H.1.1 Climate

The severity of any damage will be related to the frequency of freeze thaw cycles, the degrees of freezing and thawing and the degree of saturation of the railway ballast particles.

H.1.2 End Use

Railway ballast will be susceptible to damage from freezing and thawing action under partially or fully saturated environmental conditions or in high humidity situations. The risk of damage is significantly increased where the railway ballast is exposed to seawater or to the action of de-icing salts.

H.1.3 Petrographic type

Freezing and thawing resistance is related to the strength of the railway ballast particles and to the size and distribution of the pores within the particles.

H.2 Testing

Tests that may give an indication of freeze thaw susceptibility include either petrographical examination or one of the physical tests indicated below. Railway ballast complying with the requirements of any one of these tests can be considered freeze-thaw resistant.

H.2.1 Petrographic examination

A petrographic examination of the railway ballast according to the procedure specified in EN 932-3 will give an indication of the presence of weak and/or highly absorptive particles that may be susceptible to damage from freeze-thaw action. Where the presence of such particles is observed or suspected one of the physical tests given below may be used to assess freeze-thaw resistance of the railway ballast.

Susceptible aggregates derived from highly weathered rocks and some conglomerates and breccias can include for example some or all of the following:

Schist, mica schist, phyllite, chalk, marl, shale, fresh porous basalt or particles loosely cemented by clay minerals.

H.2.2 Water absorption

When the water absorption of the railway ballast determined in accordance with EN 1097-6:2000: annex B is not greater than 0,5 % for categories A and B of Table H.1 and 1 % for categories C and D of Table H.1, then the railway ballast can be considered resistant to freeze-thaw attack. However, many satisfactory aggregates have higher absorption values in excess of 4 % while Permian limestones and dolomites and Carboniferous sandstones frequently have absorption values in excess of 2 %, but these materials can still have adequate freeze-thaw resistance.

Railway ballast having water absorption values greater than 0,5 % for categories A and B and 1 % for categories C and D, should be assessed by one of the test methods referred to in H.2.3, as should any railway ballast for which there are concerns as to the resistance to freezing and thawing.

With some aggregate containing a proportion of porous flint aggregate sources the differentiation between satisfactory and unsatisfactory freeze-thaw durability can be better assessed by density measurements rather than water absorption.

H.2.3 Other indicative tests

Either a freeze-thaw test determined in accordance with EN 1367-1, as amended as specified in annex F, or a magnesium sulfate test determined in accordance with EN 1367-2, as amended as specified in annex G, can be applied to assess the freeze-thaw resistance of an aggregate. The magnesium sulfate test is considered most appropriate for situations where the aggregate will be exposed to seawater or de-icing salts.

Dependent on the category derived from Table H.1 then an appropriate value for freeze/thaw resistance or an appropriate magnesium sulfate value may be specified.

NOTE Precise limits cannot be universally fixed until there is further evidence using the test methods for freeze/thaw determination. The limits and/or categories should be established from experience of existing requirements of railway ballast in local satisfactory use, using either a magnesium sulfate test in accordance with EN 1367-2 (as amended by annex G) or a freeze/thaw test in accordance with EN 1367-1 (as amended by annex F). An example of how the limits can be presented is given in Table H.2.

Table H.1 — Freeze-thaw severity category related to climate and end use

Environmental conditions	Climate		
	Mediterranean	Atlantic	Continental ^a
	Category		
Frost free or dry situation	D	D	D
Partial saturation, no salt	D	C	B
Saturated, no salt	D	B	A
Salt (seawater)	C	B	A
^a The Continental category could also apply to Iceland, parts of Scandinavia and to mountainous regions where severe winter weather conditions are experienced.			

Table H.2 — Example of presentation of limits for freeze/thaw value or magnesium sulfate value

Category	Maximum freeze/thaw value % by mass	Maximum magnesium sulfate value % by mass
A		
B		
C		
D		

Annex I (normative)

Factory production control

I.1 Introduction

This annex specifies a factory production control system for aggregates to ensure that they conform to the relevant requirements of this standard.

The performance of the factory production control system shall be assessed according to the principles used in this annex.

I.2 Organization

I.2.1 Responsibility and authority

The responsibility, authority and the interrelation between all personnel who manage, perform and check work affecting quality shall be defined, including personnel who need organizational freedom and authority to:

- a) initiate action to prevent the occurrence of product non-conformity;
- b) identify, record and deal with any product quality deviations.

I.2.2 Management representative for factory production control

For every aggregate producing plant the producer shall appoint a person with appropriate authority to ensure that the requirements given in this annex are implemented and maintained.

I.2.3 Management review

The factory production control system adopted to satisfy the requirements of this annex shall be audited and reviewed at appropriate intervals by management to ensure its continuing suitability and effectiveness. Records of such reviews shall be maintained.

I.3 Control procedures

The producer shall establish and maintain a factory production control manual setting out the procedures by which the requirements for factory production control are satisfied.

I.3.1 Document and data control

Document and data control shall include those documents and data that are relevant to the requirements of this standard covering purchasing, processing, inspection of materials and the factory production control system documents.

A procedure concerning the management of documents and data shall be documented in the production control manual covering procedures and responsibilities for approval, issue, distribution and administration of internal and external documentation and data; and the preparation, issue and recording of changes to documentation.

I.3.2 Sub-contract services

If any part of the operation is sub-contracted by the producer a means of control shall be established. The producer shall retain overall responsibility for any parts of the operation sub-contracted.

1.3.3 Knowledge of the raw material

There shall be documentation detailing the nature of the raw material, its source and where appropriate, one or more maps showing the location and extraction plan.

It is the producer's responsibility to ensure that if any dangerous substances are identified their content does not exceed the limits in force according to the provisions valid in the place of use of the aggregate.

NOTE Most of the dangerous substances defined in Council Directive 76/769/EEC are not usually present in most sources of aggregates of mineral origin. However Note in ZA. 1 of annex ZA is drawn to the attention of the aggregates producer

1.4 Management of production

The factory production control system shall fulfil the following requirements:

- a) there shall be procedures to identify and control the materials;

NOTE These can include procedures for maintaining and adjusting processing equipment, inspection or testing material sampled during processing, modifying the process during bad weather, etc.

- b) there shall be procedures to identify and control any hazardous materials identified in 1.3.3 to ensure that they do not exceed the limits in force according to the provisions valid in the place of use of the aggregate;
- c) there shall be procedures to ensure that material is put into stock in a controlled manner and the storage locations and their contents are identified;
- d) there shall be procedures to ensure that material taken from stock has not deteriorated in such a way that its conformity is compromised;
- e) the product shall be identifiable up to the point of sale as regards source and type.

1.5 Inspection and test

1.5.1 General

The producer shall make available all the necessary facilities, equipment and trained personnel to carry out the required inspections and tests.

1.5.2 Equipment

The producer shall be responsible for the control, calibration and maintenance of inspection, measuring and test equipment.

Accuracy and frequency of calibration shall be in accordance with EN 932-5.

Equipment shall be used in accordance with documented procedures.

Equipment shall be uniquely identified.

Calibration records shall be retained.

1.5.3 Frequency and location of inspection, sampling and tests

The production control document shall describe the frequency and nature of inspections. The frequency of sampling and the tests when required shall be carried out for the relevant characteristics specified in Table I.1.

NOTE 1 Test frequencies are generally related to periods of production. A period of production is defined as a full week, month or year of production working days.

NOTE 2 The requirements for factory production control can introduce visual inspection. Any deviations indicated by these inspections can lead to increased test frequencies.

NOTE 3 When the measured value is close to a specified limit the frequency can need to be increased.

NOTE 4 Under special conditions the test frequencies can be decreased below those given in Table I.1.

These conditions could be:

- a) highly automated production equipment;
- b) long-term experience with consistency of special properties;
- c) sources of high conformity;
- d) running a quality management system with exceptional measures for surveillance and monitoring of the production process.

The producer shall prepare a schedule of test frequencies taking into account the minimum requirements of Table I.1.

Reasons for decreasing the test frequencies shall be stated in the factory production control document.

Table I.1 — Minimum test frequencies for general properties

Property		Clause	Test method	Minimum test frequency
1	Grading	6.3	EN 933-1	1 per week
2	Fine particles	6.4	EN 933-1	1 per week
3	Fines	6.5	EN 933-1	1 per week
4	Particle shape	6.6	EN 933-3 EN 933-4	1 per month
5	Particle length	6.7	-	1 per month
6	Resistance to fragmentation - Los Angeles - Impact Value	7.2	EN 1097-2	2 per year
7	Resistance to wear (micro-Deval)	7.3	EN 1097-1	2 per year
8	Resistance to freezing and thawing	7.4.1	EN 1367-1 EN 1367-2	2 per year
9	Particle density	7.4.2	EN 1097-6:2000, annex B	2 per year
10	Water absorption	7.4.3	EN 1097-6:2000, annex B	2 per year
11	Sonnenbrand	7.5	EN 1367-3	2 per year
12	Release of Dangerous substances ^a	1.3.3 1.4	^a	When required and in case of doubt
^a Unless otherwise specified, only when necessary for CE marking purposes (see annex ZA)				

I.6 Records

The results of factory production control shall be recorded including sampling locations, dates and times and product tested with any other relevant information, e.g. weather conditions.

NOTE 1 Some characteristics can be shared by several products, in which case the producer, based on his experience, can find it possible to apply the results of one test to more than one product. This is particularly the case when a product is the combination of two or more different sizes. The intrinsic characteristics cannot change but the particle size distribution or the cleanliness should be checked.

Where the product inspected or tested does not satisfy the requirement laid down in the specification, or if there is an indication that it may not do so, a note shall be made in the records of the steps taken to deal with the situation (e.g. carrying out of a new test and/or measures to correct the production process).

The records required by all the clauses of this annex shall be included.

The records shall be kept for at least the statutory period.

NOTE 2 "Statutory period" is the period of time records are required to be kept in accordance with Regulations applying at the place of production.

1.7 Control of non-conforming product

Following an inspection or test which indicates that a product does not conform the affected material shall be:

- a) reprocessed; or
- b) diverted to another application for which it is suitable; or
- c) rejected and marked as non-conforming.

All cases of non-conformity shall be recorded by the producer, investigated and if necessary corrective action shall be taken.

NOTE Corrective actions can include:

- a) investigation of the cause of non-conformity including an examination of the testing procedure and making any necessary adjustments;
- b) analysis of processes, operations, quality records, service reports and customer complaints to detect and eliminate potential causes of non-conformity;
- c) initiating preventive actions to deal with problems to a level corresponding to the risks encountered;
- d) applying controls to ensure that effective corrective actions are taken;
- e) implementing and recording changes in procedures resulting from corrective action.

1.8 Handling, storage and conditioning in production areas

The producer shall make the necessary arrangements to maintain the quality of the product during handling and storage.

NOTE These arrangements should take account of the following:

- a) contamination of product;
- b) segregation;
- c) cleanliness of handling equipment and stocking areas.

1.9 Transport and packaging

1.9.1 Transport

The producer's factory production control system shall identify the extent of his responsibility in relation to storage and delivery.

NOTE When aggregates are transported in bulk it can be necessary to cover or contain aggregates to reduce contamination.

1.9.2 Packaging

If aggregates are packaged the methods and materials used shall not contaminate or degrade the aggregate to the extent that the properties are significantly changed before the aggregate is removed from the packaging. Any

precautions necessary to achieve this during handling and storage of the packaged aggregate shall be marked on the packaging or accompanying documents.

I.10 Training of personnel

The producer shall establish and maintain procedures for the training of all personnel involved in the factory production system. Appropriate records of training shall be maintained.

Annex ZA (informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

ZA.1 Scope and relevant characteristics

This European Standard and this annex ZA have been prepared under a mandate¹ given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex 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 the aggregates covered by this European Standard for their intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING: Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to aggregates falling within the scope of this annex.

NOTE In addition to any specific clauses relating to dangerous substances contained in this standard there may be other requirements applicable to the products falling within its scope (eg 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. *Note: 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>).*

Table ZA.1 – Scope and relevant requirement clauses

Product: Aggregates obtained by processing natural, manufactured or recycled crushed unbound aggregates as covered by the scope of this standard Intended use(s): Railway ballast for use in construction of railway track			
Essential Characteristics	Requirement clauses in this and/or another standard(s)	Level(s) and/or class(es):	Notes
Particle shape, size and density	6.2 Railway ballast size 6.3 Grading 6.6 Particle shape 7.4.2 Particle density	None None None None	Designation <i>d</i> and <i>D</i> Category Category Declared value
Resistance to fragmentation	7.2 Resistance to fragmentation	None	Category
Resistance to attrition	7.3 Resistance to wear	None	Category
Cleanliness	6.5 Fines content	None	Category

¹ M125 "Aggregates", as amended.

Table ZA.1 – Scope and relevant requirement clauses *(continued)*

Product: Aggregates obtained by processing natural, manufactured or recycled crushed unbound aggregates as covered by the scope of this standard Intended use(s): Railway ballast for use in construction of railway track			
Release of dangerous substances	NOTE in ZA.1 above I.3.3 Knowledge of the raw material I.4 Management of the production		At the end of paragraph ZA.3
Durability against freeze-thaw	7.4.1 Resistance to freezing and thawing	None	Declared value
Durability against weathering	7.5 Sonnenbrand	None	Declared value

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, producers placing their products on the market of these MSs 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 Clause ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedures for attestation of conformity of aggregates

ZA.2.1 System(s) of attestation of conformity

The systems of attestation of conformity for the aggregates indicated in Table ZA.1, in accordance with the decision of the Commission 98/598/EC of 9 October 1998 as given in annex 3 of the mandate M125 "Aggregates", as amended, is shown in Tables ZA.2a and ZA.2b for the indicated intended use(s):

Table ZA.2a – System(s) of attestation of conformity for aggregates for uses with high safety requirements² (where third party intervention is required)

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Aggregates (Railway ballast)	For use in construction of railway track	-	2+
System 2+: See Directive 89/106/EEC (CPD) Annex III.2.(ii), First possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control			

Table ZA.2b – System(s) of attestation of conformity for aggregates for uses without high safety requirements² where no third party intervention is required

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Aggregates (Railway ballast)	For use in construction of railway track	-	4
System 4: See Directive 89/106/EEC (CPD) Annex III.2.(ii), Third possibility			

The attestation of conformity of the aggregates in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table(s) ZA 3a and Table ZA 3b resulting from application of the clauses of this European Standard indicated therein.

Table ZA.3a – Assignment of evaluation of conformity tasks (for aggregates under system 2+)

Tasks			Coverage of the task	Clauses to apply
Tasks for the producer	Factory production control (F.P.C)		Parameters related to all relevant characteristics of Table ZA.1	9.3
	Initial type testing		All relevant characteristics of Table ZA.1	9.2
Tasks for the notified body	Certification of F.P.C on the basis of	Initial inspection of factory and of F.P.C	Parameters related to all relevant characteristics of Table ZA.1	9.3
		Continuous surveillance, assessment and approval of F.P.C.	Parameters related to all relevant characteristics of Table ZA.1	9.3

² Safety requirements are to be defined by Member States in their national laws, regulations and administrative provisions.

**Table ZA.3b – Assignment of evaluation of conformity tasks
(for aggregates under system 4)**

Tasks		Coverage of the task	Clauses to apply
Tasks for the producer	Factory production control (F.P.C)	Parameters related to all relevant characteristics of Table ZA.1	9.3
	Initial type testing	All relevant characteristics of Table ZA.1	9.2

ZA.2.2 EC Declaration of conformity

For aggregates under system 2+: When compliance with the conditions of this Annex is achieved, and once the notified body has drawn up the certificate mentioned below, the producer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the producer to affix the CE marking. This declaration shall include:

- name and address of the producer, or his authorised representative established in the EEA, and the place of production;
- description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc);
- the number of the accompanying factory production control certificate;
- name of, and position held by, the person empowered to sign the declaration on behalf of the producer or his authorised representative.

The declaration shall be accompanied by a factory production control certificate, drawn up by the notified body, which shall contain, in addition to the information above, the following:

- name and address of the notified body;
- the number of the factory production control certificate;
- conditions and period of validity of the certificate, where applicable;
- name of, and position held by, the person empowered to sign the certificate.

The above mentioned declaration shall be presented in the official language or languages of the Member State in which the product is to be used.

For aggregates under system 4): When compliance with this annex is achieved, the producer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the producer to affix of the CE marking. This declaration shall include:

- name and address of the producer, or his authorised representative established in the EEA, and place of production;
- description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);
- name of, and position held by, the person empowered to sign the declaration on behalf of the producer or of his authorised representative.

The above mentioned declaration shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The producer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the accompanying label, the packaging or on the accompanying commercial documents e.g. a delivery note. The following information shall accompany the CE marking symbol:

- identification number of the certification body (only for products under system 2+);
- name or identifying mark and registered address of the producer;
- the last two digits of the year in which the marking is affixed;
- number of the certificate of factory production control (only for products under system 2+);
- reference to this European Standard;
- description of the product: generic name, material, dimensions, ... and intended use;
- information on the relevant essential characteristics in Table ZA.1;
- - declared values and, where relevant, level or class/category (including "pass" for pass/fail requirements, where necessary) to declare for each essential characteristic as indicated in "Notes" in Table ZA.1; and
- -"no performance determined" for characteristics where this is relevant.

The "No performance determined" (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements.

NOTE European legislation without national derogations need not be mentioned.

Figures ZA.1 and ZA.2 give examples of the information to be given on the label, packaging and/or commercial documents.


			CE conformity marking, consisting of the "CE" symbol given in directive 93/68/EEC.
01234			Identification number of the inspection body
Any Co Ltd, PO Box 21, B-1050			Name or identifying mark and registered address of the producer
02			Last two digits of the year in which the marking was affixed
0123-CPD-6456			Number of the EC certificate
EN 13450			No. of European Standard
Aggregates for railway ballast			Description of product and
Particle shape	Category	(e.g. F1,5)	information on product and on regulated characteristics
Particle size	Designation	(d & D) &	
	Category	(e.g., B)	
Particle density	Declared value	(Mg/m ³)	
Resistance to fragmentation	Category	(e.g., LA _{10/18})	
Resistance to attrition	Category	(e.g., M ₂₅ RS 6)	
Cleanliness	Category	(e.g., B)	
Release of dangerous substances	e.g Substance X: 0,2 µm ³		
Durability against freeze-thaw	Declared value	(F or MS)	
Durability against weathering	Declared value	(SB)	

Figure ZA.1— Example of CE marking information for aggregates for railway ballast under system 2+

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.


			<i>CE conformity marking, consisting of the "CE"-symbol given in directive 93/68/EEC.</i>
Any Co Ltd, PO Box 21, B-1050			<i>Name or identifying mark and registered address of the producer</i>
02			<i>Last two digits of the year in which the marking was affixed</i>
EN 13450			<i>No. of European Standard</i>
Aggregates for railway ballast			<i>Description of product and</i>
			<i>information on product and on regulated characteristics</i>
Particle shape	Category	(e.g. Fl_{15})	
Particle size	Designation	(d & D) &	
	Category	(e.g., B)	
Particle density	Declared value	(Mg/m^3)	
Resistance to fragmentation	Category	(e.g., LA_{RB18})	
Resistance to attrition	Category	(e.g., $M_{DERB} 5$)	
Cleanliness	Category	(e.g., B)	
Release of dangerous substances	e.g Substance X: $0,2 \mu m^3$		
Durability against freeze-thaw	Declared value	(F or MS)	
Durability against weathering	Declared value	(SB)	

Figure ZA.2— Example of CE marking information for aggregates for railway ballast under system 4

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

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