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Bituminous mixtures - Material specifications - Part 1: Asphalt Concrete

Mélanges bitumineux - Spécifications des matériaux -
Partie 1: Enrobés bitumineux

Asphaltmischgut - Mischgutanforderungen - Teil 1:
Asphaltbeton

This European Standard was approved by CEN on 12 October 2005.

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

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 Central Secretariat has the same status as the official versions.

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Foreword

This European Standard (EN 13108-1:2006) has been prepared by Technical Committee CEN/TC 227 "Road materials", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by January 2008.

This European Standard 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 European Standard.

This European Standard is one of a series of standards as listed below:

EN 13108-1, *Bituminous mixtures — Material specifications — Part 1: Asphalt Concrete.*

EN 13108-2, *Bituminous mixtures — Material specifications — Part 2: Asphalt Concrete for very thin layers.*

EN 13108-3, *Bituminous mixtures — Material specifications — Part 3: Soft Asphalt.*

EN 13108-4, *Bituminous mixtures — Material specifications — Part 4: Hot Rolled Asphalt.*

EN 13108-5, *Bituminous mixtures — Material specifications — Part 5: Stone Mastic Asphalt.*

EN 13108-6, *Bituminous mixtures — Material specifications — Part 6: Mastic Asphalt.*

EN 13108-7, *Bituminous mixtures — Material specifications — Part 7: Porous Asphalt.*

EN 13108-8, *Bituminous mixtures — Material specifications — Part 8: Reclaimed asphalt.*

EN 13108-20, *Bituminous mixtures — Material specifications — Part 20: Type Testing.*

EN 13108-21, *Bituminous mixtures — Material specifications — Part 21: Factory Production Control.*

No existing European Standard is superseded.

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

Introduction

The ultimate aim is to specify Asphalt Concrete in terms of fundamental, performance based properties. However given the differences in knowledge and experience with fundamental specifications for this mix type in Europe, it is not possible to choose only the fundamental approach.

This European Standard therefore provides two ways of specifying Asphalt Concrete:

- The first, or empirical approach specifies Asphalt Concrete in terms of compositional recipes and requirements for constituent materials with additional requirements based on performance related tests. These requirements are in 5.2 and 5.3.
- The second, or fundamental approach specifies Asphalt Concrete in terms of performance-based requirements linked to limited prescription of composition and constituent materials, offering a greater degree of freedom. These requirements can be found in 5.2 and 5.4.

It is envisaged that, as users gain experience with performance based testing, there will be a shift towards greater use of the fundamental approach to specification.

Asphalt Concrete is used for surface courses, binder courses regulating courses, and bases.

1 Scope

This European Standard specifies requirements for mixtures of the mix group Asphalt Concrete for use on roads, airfields and other trafficked areas.

NOTE A mixture specification derived from this Standard can be used either to declare the conformity of a mixture with known requirements or to make known what those requirements are.

This European Standard includes requirements for the selection of the constituent materials. It is designed to be read in conjunction with EN 13108-20 and EN 13108-21.

Asphalt Concrete mixtures with chemical modified binders not covered by EN 14023 are not covered by this European Standard.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1097-6, *Tests for mechanical and physical properties of aggregates — Part 6: Determination of particle density and water absorption*

EN 1426, *Bitumen and bituminous binders — Determination of needle penetration*

EN 1427, *Bitumen and bituminous binders — Determination of softening point — Ring and ball method*

EN 12591, *Bitumen and bituminous binders — Specifications for paving grade bitumens*

EN 12697-3, *Bituminous mixtures — Test methods for hot mix asphalt — Part 3: Bitumen recovery: Rotary evaporator*

EN 12697-4, *Bituminous mixtures — Test methods for hot mix asphalt — Part 4: Bitumen recovery: Fractionating column*

EN 12697-13, *Bituminous mixtures — Test methods for hot mix asphalt — Part 13: Temperature measurement*

EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*

EN 13108-4:2005, *Bituminous mixtures — Material specifications — Part 4: Hot Rolled Asphalt*

EN 13108-8, *Bituminous mixtures — Material specifications — Part 8: Reclaimed asphalt*

EN 13108-20:2005, *Bituminous mixtures — Material specifications — Part 20: Type Testing*

EN 13108-21:2005, *Bituminous mixtures — Material specifications — Part 21: Factory Production Control*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

prEN 13924, *Bitumen and bituminous binders — Specifications for hard paving grade bitumens*

EN 14023, *Bitumen and bituminous binders — Specifications for polymer modified bitumens*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.1.1

pavement

structure, composed of one or more courses, to assist the passage of traffic over terrain

3.1.2

layer

element of a pavement laid in a single operation

3.1.3

course

structural element of a pavement constructed with a single material. A course may be laid in one or more layers

3.1.4

surface course

upper course of the pavement, which is in contact with the traffic

3.1.5

binder course

part of the pavement between the surface course and the base

3.1.6

regulating course

course of variable thickness applied to an existing course or surface to provide the necessary profile for a further course of consistent thickness

3.1.7

base

main structural element of a pavement. The base may be laid in one or more courses, described as “upper” base, “lower” base etc.

3.1.8

Asphalt Concrete

asphalt in which the aggregate particles are continuously graded or gap-graded to form an interlocking structure

3.1.9

mix formulation

composition of a single mixture expressed as a target composition

NOTE A target composition may be expressed in two ways (see 3.1.10 and 3.1.11).

3.1.10

input target composition

expression of a mix formulation in terms of the constituent materials, the grading curve and the percentage of bitumen added to the mixture

NOTE This will usually be the result of a laboratory mix design and validation.

3.1.11

output target composition

expression of a mix formulation in terms of the constituent materials and the mid point grading and soluble binder content to be found on analysis

NOTE This will usually be the result of a production validation.

3.1.12

additive

constituent material, which can be added in small quantities to the mixture, e.g. inorganic or organic fibres or polymers, to influence the mechanical properties, the workability or the colour of the mixture

3.1.13

performance-based requirement

requirement for a fundamental engineering property (e.g. stiffness, fatigue properties) that predicts performance and appears in primary performance prediction relationships

3.1.14

performance-related requirement

requirement for a characteristic (e.g. wheel tracking properties, Marshall properties) that has been found to correlate with a fundamental engineering property that predicts performance

3.1.15

empirical specification

combination of requirements for composition and constituent materials together with performance-related requirements

3.1.16

fundamental specification

combination of performance-based requirements together with limited requirements for composition and constituent materials, with more degrees of freedom than for an empirical specification

NOTE In practice some characteristics will be performance-related.

3.2 Symbols and abbreviations

AC Asphalt Concrete

D upper sieve size of the aggregate in the mixture, in millimetres (mm)

4 Requirements for constituent materials

4.1 General

Only constituent materials with established suitability shall be used.

The establishment of suitability shall result from one or more of the following:

- European Standard;
- European Technical Approval;
- specifications for materials based on a demonstrable history of satisfactory use in asphalt. Evidence shall be provided on their suitability. This evidence may be based on research combined with evidence from practice.

NOTE In the European asphalt industry it is common practice to use additives like inorganic or organic fibres, pigments, waxes etc., which are not covered by a European Standard or ETA. This European Standard allows the use of those materials.

4.2 Binder

4.2.1 General

The binder for empirically and fundamentally specified mixtures shall be paving grade bitumen, modified bitumen or hard grade bitumen. The paving grade bitumen shall conform to EN 12591, the modified bitumen to EN 14023 and the hard grade bitumen to prEN 13924.

The binder in empirically specified mixtures shall conform to 4.2.2.

Natural asphalt conforming to EN 13108-4:2005, Annex B, may be added.

4.2.2 Binder in empirically specified mixtures

4.2.2.1 Selection of binder

The grade of the bitumen, the type and grade of modified bitumen and the amount and category of natural asphalt shall be as specified. In case of a paving grade bitumen the grade shall be selected from the grades between 20/30 and 330/430 inclusively and in case of a hard grade bitumen the grade shall be selected from the grades 10/20 and 15/25.

NOTE 1 Given the wide variety of climates, traffic loads, used materials etc. it can be necessary to select on a regional level specific binders.

When modified bitumen is used to improve properties that are not covered by the empirical specification additional proof shall be provided. This proof shall be delivered through investigation using standards in the EN 12697 series, that the modified bitumen is suitable for improving the desired functional characteristics. The proof may be based on earlier research.

NOTE 2 EN 14023 is a grading system and is only meant to characterise the modified bitumen. The modified bitumen specifications are not functionally based, and it is not possible to combine these specifications with empirical asphalt specifications to demonstrate functional behaviour. The proof required would normally be a Type Testing on a similar mixture incorporating the modified binder showing fulfilment of the relevant property. The grade of the bitumen, the type and grade of the modified bitumen, the grade of the hard grade bitumen and the amount and category of natural asphalt may be selected.

4.2.2.2 Surface courses with reclaimed asphalt

When using more than 10 % by mass of the total mixture of reclaimed asphalt from mixtures in which only paving grade bitumen has been used and when the binder added to the mixture is a paving grade bitumen and the grade of the bitumen is selected, the binder shall conform to the following requirement:

- Penetration or the softening point of the binder in the resulting mixture, calculated from the penetrations or the softening points of the added binder and the recovered binder from the reclaimed asphalt, shall meet the penetration or softening point requirements of the selected grade. The calculation shall be executed according to Annex A. Either the penetration or the softening point requirement shall be selected.

4.2.2.3 Regulating courses, binder courses and bases with reclaimed asphalt

When using more than 20 % by mass of the total mixture of reclaimed asphalt from mixtures in which only paving grade bitumen has been used and when the binder added to the mixture is a paving grade bitumen and the grade of the bitumen is selected, the binder shall conform to the following requirement:

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- Penetration or the softening point of the binder in the resulting mixture, calculated from the penetrations or the softening points of the added binder and the recovered binder from the reclaimed asphalt, shall meet the penetration or softening point requirements of the selected grade. The calculation shall be executed according to Annex A. Either the penetration or the softening point requirement shall be selected.

4.3 Aggregates

4.3.1 Coarse aggregate

Coarse aggregate shall conform to EN 13043 as appropriate for the intended use.

4.3.2 Fine aggregate

Fine aggregate shall conform to EN 13043 as appropriate for the intended use.

For fundamentally specified mixtures the angularity shall not be selected.

4.3.3 All-in aggregates

All-in aggregate shall conform to EN 13043 as appropriate for the intended use.

4.3.4 Added filler

Filler aggregate shall conform to EN 13043 as appropriate for the intended use. The amount of added filler shall be as specified.

For fundamentally specified mixtures, the stiffening properties shall not be selected.

NOTE 1 Filler includes materials as cement and hydrated lime.

NOTE 2 The expression “as appropriate for the intended use” in 4.3.1 to 4.3.4 means that the selection of the requirements and the particular category depends on a number of conditions. These conditions will include traffic density, climatic conditions, the construction of the course in which the mixture will be used, and economic considerations.

4.4 Reclaimed asphalt

The use and the amount of reclaimed asphalt, and the mix group from which the reclaimed asphalt has been or will be derived shall be as specified.

The properties of reclaimed asphalt declared in accordance with EN 13108-8 shall conform to specified requirements appropriate to the intended use.

NOTE The expression “appropriate to the intended use” means that the selection of the requirements and the particular category depends on a number of conditions. These conditions will include traffic density, climatic conditions, the construction of the course in which the mixture will be used, and economic considerations.

The upper sieve size D of the aggregate in the reclaimed asphalt shall not exceed the upper sieve size D of the mixture. The aggregate properties of the reclaimed asphalt shall fulfil the requirements specified for the aggregate for the mixture.

4.5 Additives

The nature and properties of all additives shall be declared and they shall conform to the specifications required in 4.1.

5 Requirements for the mixture

5.1 Empirical or fundamental requirements

5.1.1 Declaration of the target composition

The mix formulation shall be declared and documented.

5.1.2 Empirical requirements

At the target composition the mixture shall fulfil general requirements plus empirical requirements selected from 5.2 and 5.3.

5.1.3 Fundamental requirements

At the target composition the mixture shall fulfil general requirements plus fundamental requirements selected from 5.2 and 5.4.

5.2 General requirements

5.2.1 Composition and grading

5.2.1.1 Composition

The grading shall be expressed in percentages by mass of total aggregate. The binder and additive content shall be expressed in percentages by mass of total mixture. The percentages passing the sieves, with exception of the sieve 0,063 mm shall be expressed to 1 %, the binder content, the percentage passing sieve 0,063 mm and any additive content shall be expressed to 0,1 %.

5.2.1.2 Grading

The sieves to be used shall be either basic sieve set plus set 1 or basic sieve set plus set 2, according to EN 13043.

The requirements for the grading shall be expressed in terms of maximum and minimum values by selection for the percentages passing the sieves 1,4 D , D , 2 mm and 0,063 mm. A combination of sieve sizes from set 1 and set 2 shall not be permissible.

D and the sieves between D and 2 mm shall be selected from the following sieves:

- basic sieve set plus set 1: 4 mm; 5,6 mm; 8 mm; 11,2 mm; 16 mm; 22,4 mm, 31,5 mm;
- basic sieve set plus set 2: 4 mm; 6,3 mm; 8 mm; 10 mm; 12,5 mm; 14 mm; 16 mm; 20 mm, 31,5 mm.

Tables 1 and 2 specify the overall grading limits for Asphalt Concrete. The percentage passing the sieves D ; 2 mm and 0,063 mm of the selected grading envelope shall not exceed the maximum and minimum values indicated in Table 1 or Table 2.

Table 1 — Overall limits of target composition - basic sieve set plus set 1

<i>D</i>	4	5 (5,6)	8	11 (11,2)	16	22 (22,4)	32 (31,5)
Sieve mm	Passing sieve % by mass						
1,4 <i>D</i> ^a	100	100	100	100	100	100	100
<i>D</i>	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100
2	50 to 85	15 to 72	10 to 72	10 to 60	10 to 50 ^b	10 to 50 ^b	10 to 50
0,063	5,0 to 17,0	2,0 to 15,0	2,0 to 13,0	2,0 to 12,0	0 to 12,0	0 to 11,0	0 to 11,0
^a Where the sieve calculated as 1,4 <i>D</i> is not an exact number in the ISO 565/R 20 series then the next nearest sieve in the set shall be adopted. ^b For application on airfields the maximum percentage passing 2 mm may be increased to 60 %.							

Table 2 — Overall limits of target composition - basic sieve set plus set 2

<i>D</i>	4	6 (6,3)	8	10	12(12,5)	14	16	20	32(31,5)
Sieve mm	Passing sieve % by mass								
1,4 <i>D</i> ^a	100	100	100	100	100	100	100	100	100
<i>D</i>	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100	90 to 100
2	50 to 85	15 to 72	10 to 72	10 to 60	10 to 55	10 to 50 ^b	10 to 50 ^b	10 to 50 ^b	10 to 50
0,063	5,0 to 17,0	2,0 to 15,0	2,0 to 13,0	2,0 to 12,0	2,0 to 12,0	0 to 12,0	0 to 12,0	0 to 11,0	0 to 11,0
^a Where the sieve calculated as 1,4 <i>D</i> is not an exact number in the basic set plus set 2 series then the next nearest sieve in the set shall be adopted. ^b For application on airfields the maximum percentage passing 2 mm may be increased to 60 %.									

5.2.2 Void content

The void content of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall lie between maximum and minimum values selected from the categories for void content in Tables 3 and 4.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The void content shall be determined in accordance with EN 13108-20:2005, D.2.

Table 3 — Maximum void content, V_{\max}

Maximum void content %	Category V_{\max}
2,0	$V_{\max 2}$
2,5	$V_{\max 2,5}$
3,0	$V_{\max 3}$
3,5	$V_{\max 3,5}$
4,0	$V_{\max 4}$
4,5	$V_{\max 4,5}$
5,0	$V_{\max 5}$
5,5	$V_{\max 5,5}$
6,0	$V_{\max 6}$
7,0	$V_{\max 7}$
8,0	$V_{\max 8}$
9,0	$V_{\max 9}$
10,0	$V_{\max 10}$
11,0	$V_{\max 11}$
12,0	$V_{\max 12}$
13,0	$V_{\max 13}$
14,0	$V_{\max 14}$
No requirement	$V_{\max \text{NR}}$

Table 4 — Minimum void content, V_{\min}

Minimum void content %	Category V_{\min}
0,5	$V_{\min 0,5}$
1,0	$V_{\min 1,0}$
1,5	$V_{\min 1,5}$
2,0	$V_{\min 2,0}$
2,5	$V_{\min 2,5}$
3,0	$V_{\min 3,0}$
3,5	$V_{\min 3,5}$
4,0	$V_{\min 4,0}$
4,5	$V_{\min 4,5}$
5,0	$V_{\min 5,0}$
5,5	$V_{\min 5,5}$
6,0	$V_{\min 6,0}$
No requirement	$V_{\min \text{NR}}$

5.2.3 Coating and homogeneity

The material when discharged from the mixer shall be homogenous in appearance with the aggregate completely coated with binder, and there shall be no evidence of balling of fine aggregate.

5.2.4 Water sensitivity

The water sensitivity of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories for the indirect tensile strength ratio, *ITSR*, in Table 5.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The water sensitivity shall be determined according with EN 13108-20:2005, D.3.

Table 5 — Minimum indirect tensile strength ratio, *ITSR*

Minimum indirect tensile strength ratio %	Category <i>ITSR</i>
90	<i>ITSR</i> ₉₀
80	<i>ITSR</i> ₈₀
70	<i>ITSR</i> ₇₀
60	<i>ITSR</i> ₆₀
No requirement	<i>ITSR</i> _{NR}

5.2.5 Resistance to abrasion by studded tyres

The resistance to abrasion by studded tyres of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in Table 6.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The resistance to abrasion by studded tyres shall be determined in accordance with EN 13108-20:2005, D.4.

Table 6 — Maximum abrasion value, Abr_A

Maximum abrasion value ml	Category Abr_A
20	Abr_{A20}
24	Abr_{A24}
28	Abr_{A28}
32	Abr_{A32}
36	Abr_{A36}
40	Abr_{A40}
45	Abr_{A45}
50	Abr_{A50}
55	Abr_{A55}
60	Abr_{A60}
No requirement	Abr_{ANR}

5.2.6 Resistance to permanent deformation

The resistance to permanent deformation of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in one of the Tables 7, 8 or 9.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The range between the upper and lower limits selected shall be 2 % based on compaction degree and 3 % based on void content.

The void content of the specimens shall be specified in accordance with EN 13108-20:2005, D.2.

The resistance to permanent deformation, in terms of wheel tracking shall be determined in accordance with EN 13108-20:2005, D.6.

Table 7 — Resistance to permanent deformation, large size device ^a, maximum proportional rut depth, *P*

Maximum proportional rut depth %	Category <i>P</i>
5,0	<i>P</i> ₅
7,5	<i>P</i> _{7,5}
10,0	<i>P</i> ₁₀
15,0	<i>P</i> ₁₅
20,0	<i>P</i> ₂₀
No requirement	<i>P</i> _{NR}
^a For designed axel loads <13 t.	

Table 8 — Resistance to permanent deformation, small size device procedure B conditioning in air, maximum wheel tracking slope, *WTS*_{AIR}

Maximum wheel tracking slope mm per 10 ³ load cycle	Category <i>WTS</i> _{AIR}
0,03	<i>WTS</i> _{AIR 0,03}
0,05	<i>WTS</i> _{AIR 0,05}
0,07	<i>WTS</i> _{AIR 0,07}
0,10	<i>WTS</i> _{AIR 0,10}
0,15	<i>WTS</i> _{AIR 0,15}
0,30	<i>WTS</i> _{AIR 0,30}
0,40	<i>WTS</i> _{AIR 0,40}
0,50	<i>WTS</i> _{AIR 0,50}
0,60	<i>WTS</i> _{AIR 0,60}
0,80	<i>WTS</i> _{AIR 0,80}
1,00	<i>WTS</i> _{AIR 1,00}
No requirement	<i>WTS</i> _{AIR NR}

Table 9 — Resistance to permanent deformation, small size device procedure B, ^a conditioning in air, maximum proportional rut depth, PRD_{AIR}

Maximum proportional rut depth %	Category PRD_{AIR}
1,0	$PRD_{AIR} 1,0$
1,5	$PRD_{AIR} 1,5$
2,0	$PRD_{AIR} 2,0$
3,0	$PRD_{AIR} 3,0$
5,0	$PRD_{AIR} 5,0$
7,0	$PRD_{AIR} 7,0$
9,0	$PRD_{AIR} 9,0$
No requirement	$PRD_{AIR} NR$
^a For designed axel loads <13 t.	

5.2.7 Reaction to fire

If the manufacturer declares a Euroclass for reaction to fire, (i.e. it is subject to regulatory requirements) the Asphalt Concrete shall be tested and classified in accordance with EN 13501-1.

5.2.8 Resistance to fuel for application on airfields

The resistance to fuel of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories good, moderate, poor or no requirement.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The resistance to fuel shall be determined according with EN 13108-20:2005, D.11.

5.2.9 Resistance to de-icing fluid for application on airfields

The resistance to de-icing fluid of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in Table 10.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The resistance to de-icing fluids shall be determined according with EN 13108-20:2005, D.12.

Table 10 — Retained strength, β

Minimum retained strength %	Category β
100	β_{100}
85	β_{85}
70	β_{70}
55	β_{55}
No requirement	β_{NR}

5.2.10 Temperature of the mixture

When using paving grade bitumen, the temperatures of the mixture, measured according to EN 12697-13, shall be within the limits of Table 11. The maximum temperature applies at any place in the plant; the minimum temperature applies at the delivery.

Table 11 — Temperature limits of the mixture

Paving grade of binder	Temperature °C
20/30	160 to 200
30/45	155 to 195
35/50, 40/60	150 to 190
50/70, 70/100	140 to 180
100/150, 160/220	130 to 170
250/330, 330/430	120 to 160

When using modified bitumen or hard grade bitumen or additives, different temperatures may be applicable. These shall then be documented and declared on the CE mark certificate.

5.2.11 Durability

Asphalt Concrete produced in accordance with the requirements of this European Standard may be considered durable for a reasonable working life.

NOTE A reasonable working life within the context of this European Standard is the period of time during which the performance of the works will be maintained at a level compatible with the declared performance of the characteristics.

5.3 Empirical requirements

5.3.1 Composition, grading, binder content and additives

5.3.1.1 General

At the target composition the grading shall conform to 5.3.1.2.

At the target composition the binder content shall conform to 5.3.1.3.

At the target composition the additive content shall conform to 5.3.1.4.

When using reclaimed asphalt from mixtures in which a modified bitumen and/or a modifier additive has been used, and/or the mixture itself contains a modified bitumen or a modifier, the amount of reclaimed asphalt shall not, unless otherwise agreed between client and manufacturer, for surface courses exceed 10 % by the mass of the total mixture and for regulating courses, binder courses and base courses exceed 20 % by the mass of the total mixture. Any agreement made between client and manufacturer shall not be in conflict with national regulatory requirements.

5.3.1.2 Grading

The requirements for the grading of the target composition shall be expressed in terms of a grading envelope by selection of maximum and minimum values for the percentages passing the sieves 1,4 D ; D ; a characteristic coarse sieve, 2 mm, a characteristic fine sieve and 0,063 mm. The grading envelope shall be within the limits (limits included) of Tables 1 or 2. In addition the requirements for the grading envelope may include the percentages passing one optional sieve between D and 2 mm and one optional fine sieve between 2 mm and 0,063 mm. The optional fine sieve shall be selected from the following sieves: 1 mm; 0,5 mm; 0,25 mm and 0,125 mm.

The target composition of the mix shall be within this grading envelope.

The ranges between the maximum and minimum values for the grading envelope shall be selected as a single value within the given limits (both included) from Table 12.

In the case of a fixed target grading meeting the requirements of Table 1 or Table 2 the use of the minimum range values in Table 12 is not required.

Table 12 — Ranges between maximum and minimum values for the selected grading envelope

Sieve mm	Ranges % by mass
D	10
Characteristic coarse sieve	10 to 30 ^a
Optional extra sieve between D and 2	10 to 30 ^a
2	5 to 25 ^a
Characteristic fine	4 to 25 ^a
Optional extra sieve between 2 and 0,063	4 to 25 ^a
0,063	2 to 12 ^a
^a Value to be selected within the given minimum and maximum value (both included).	

5.3.1.3 Binder content

The minimum binder content of the target composition shall be selected from the categories in Table 13. The binder content requirements shall be corrected by multiplying by the factor

$$\alpha = \frac{2,650}{\rho_d} \quad (1)$$

where

ρ_d is the mean particle density of the aggregate, in megagrams per cubic metre (Mg/m^3), determined according to EN 1097-6.

NOTE The binder content includes binder in reclaimed asphalt and natural asphalt when used.

Table 13 — Minimum binder content, B_{\min}

Minimum binder content % by mass	Category B_{\min}
3,0	$B_{\min 3,0}$
3,2	$B_{\min 3,2}$
3,4	$B_{\min 3,4}$
3,6	$B_{\min 3,6}$
3,8	$B_{\min 3,8}$
4,0	$B_{\min 4,0}$
4,2	$B_{\min 4,2}$
4,4	$B_{\min 4,4}$
4,6	$B_{\min 4,6}$
4,8	$B_{\min 4,8}$
5,0	$B_{\min 5,0}$
5,2	$B_{\min 5,2}$
5,4	$B_{\min 5,4}$
5,6	$B_{\min 5,6}$
5,8	$B_{\min 5,8}$
6,0	$B_{\min 6,0}$
6,2	$B_{\min 6,2}$
6,4	$B_{\min 6,4}$
6,6	$B_{\min 6,6}$
6,8	$B_{\min 6,8}$
7,0	$B_{\min 7,0}$
7,2	$B_{\min 7,2}$
7,4	$B_{\min 7,4}$
7,6	$B_{\min 7,6}$
7,8	$B_{\min 7,8}$
8,0	$B_{\min 8,0}$

5.3.1.4 Additives

The requirements for additives shall be expressed in terms of the type and amount of each additive constituent.

5.3.2 Marshall values for application on airfields

The Marshall stability, the Marshall flow and the Marshall quotient, of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected categories in Tables 14, 15, 16 and 17 respectively. For Marshall flow a minimum and maximum value may be selected, the range shall be at least 2.

The Marshall values shall be determined according to EN 13108-20:2005, D.10.

Table 14 — Minimum Marshall stability, S_{\min}

Minimum Marshall stability kN	Category S_{\min}
12,5	$S_{\min 12,5}$
10,0	$S_{\min 10}$
7,5	$S_{\min 7,5}$
5,0	$S_{\min 5,0}$
2,5	$S_{\min 2,5}$
No requirement	$S_{\min NR}$

Table 15 — Maximum Marshall stability, S_{\max}

Maximum Marshall stability kN	Category S_{\max}
15,0	$S_{\max 15}$
12,5	$S_{\max 12,5}$
10,0	$S_{\max 10}$
7,5	$S_{\max 7,5}$
No requirement	$S_{\max NR}$

Table 16 — Marshall flow, F

Marshall flow mm	Category F
1	F_1
1,5	$F_{1,5}$
2	F_2
3	F_3
4	F_4
5	F_5
8	F_8
No requirement	F_{NR}

Table 17 — Minimum Marshall quotient, Q_{min}

Minimum Marshall quotient kN/mm	Category Q_{min}
4,0	Q_{min4}
3,5	$Q_{min3,5}$
3,0	Q_{min3}
2,5	$Q_{min2,5}$
2,0	Q_{min2}
1,5	$Q_{min1,5}$
1,0	Q_{min1}
No requirement	Q_{minNR}

5.3.3 Voids filled with bitumen

The minimum and maximum percentage of voids filled with bitumen of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in Tables 18 and 19.

The percentage of voids filled with bitumen shall be determined according to EN 13108-20:2005, D.2.

Table 18 — Minimum voids filled with bitumen, VFB_{\min}

Minimum voids filled with bitumen %	Category VFB_{\min}
50	$VFB_{\min 50}$
55	$VFB_{\min 55}$
60	$VFB_{\min 60}$
65	$VFB_{\min 65}$
70	$VFB_{\min 70}$
72	$VFB_{\min 72}$
75	$VFB_{\min 75}$
78	$VFB_{\min 78}$
No requirement	$VFB_{\min NR}$

Table 19 — Maximum voids filled with bitumen, VFB_{\max}

Maximum voids filled with bitumen %	Category VFB_{\max}
50	$VFB_{\max 50}$
53	$VFB_{\max 53}$
56	$VFB_{\max 56}$
59	$VFB_{\max 59}$
62	$VFB_{\max 62}$
65	$VFB_{\max 65}$
68	$VFB_{\max 68}$
71	$VFB_{\max 71}$
74	$VFB_{\max 74}$
77	$VFB_{\max 77}$
80	$VFB_{\max 80}$
83	$VFB_{\max 83}$
86	$VFB_{\max 86}$
89	$VFB_{\max 89}$
93	$VFB_{\max 93}$
97	$VFB_{\max 97}$
No requirement	$VFB_{\max NR}$

5.3.4 Voids in mineral aggregate

The minimum percentage of voids in mineral aggregate of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in Table 20.

The percentage of voids in mineral aggregate shall be determined according to EN 13108-20:2005, D.2 based on the samples prepared and tested according to 5.2.1

Table 20 — Minimum voids in mineral aggregate, VMA_{min}

Minimum voids in mineral aggregate %	Category VMA_{min}
8	VMA_{min8}
10	VMA_{min10}
12	VMA_{min12}
14	VMA_{min14}
16	VMA_{min16}
18	VMA_{min18}
No requirement	VMA_{minNR}

5.3.5 Void content at 10 gyrations

The minimum void content after compaction by 10 gyrations shall be selected from the categories in Table 21.

The minimum void content after 10 gyrations shall be determined in accordance with EN 13108-20:2005, D.2.

Table 21 — Minimum void content at 10 gyrations, $V10G_{min}$

Minimum void content at 10 gyrations %	Category $V10G_{min}$
14,0	$V10G_{min14}$
11,0	$V10G_{min11}$
9,0	$V10G_{min9}$
No requirement	$V10G_{minNR}$

5.3.6 Over-specification

To prevent the duplication of specification of mixtures the following combinations of requirements shall not be recognised as compliant with this European Standard:

- empirical requirements combined with fundamental requirements (see 5.1);
- requirements for voids filled with bitumen (see 5.3.3), for voids in mineral aggregate (see 5.3.4) and for void content at 10 gyrations (see 5.3.5) combined with requirements for resistance to permanent deformation (see 5.2.6);

- Marshall value for application on airfields (see 5.3.2) combined with requirements for resistance to permanent deformation (5.2.6).

5.4 Fundamental requirements

5.4.1 Composition - grading and binder content

5.4.1.1 Grading

At the target composition the grading shall conform to 5.2.1.2.

NOTE Using fundamental requirements imply a less prescriptive way of specifying a composition.

5.4.1.2 Binder content

The minimum binder content shall be 3,0 %.

5.4.2 Stiffness

The stiffness of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall comply with maximum and minimum values selected from the categories in Tables 22 and 23.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1. The range between the upper and lower limits selected shall be 2 % based on compaction degree and 3 % based on void content.

The void content of the specimens shall be specified in accordance with EN 13108-20:2005, D.2.

The stiffness shall be determined in accordance with EN 13108-20:2005, D.8.

Table 22 — Minimum stiffness, S_{\min}

Minimum stiffness MPa	Category S_{\min}
21 000	$S_{\min 21\ 000}$
17 000	$S_{\min 17\ 000}$
14 000	$S_{\min 14\ 000}$
11 000	$S_{\min 11\ 000}$
9 000	$S_{\min 9\ 000}$
7 000	$S_{\min 7\ 000}$
5 500	$S_{\min 5\ 500}$
4 500	$S_{\min 4\ 500}$
3 600	$S_{\min 3\ 600}$
2 800	$S_{\min 2\ 800}$
2 200	$S_{\min 2\ 200}$
1 800	$S_{\min 1\ 800}$
1 500	$S_{\min 1\ 500}$
No requirement	$S_{\min NR}$

Table 23 — Maximum stiffness, S_{\max}

Maximum stiffness MPa	Category S_{\max}
30 000	$S_{\max 30\ 000}$
25 000	$S_{\max 25\ 000}$
21 000	$S_{\max 21\ 000}$
17 000	$S_{\max 17\ 000}$
14 000	$S_{\max 14\ 000}$
11 000	$S_{\max 11\ 000}$
9 000	$S_{\max 9\ 000}$
7 000	$S_{\max 7\ 000}$
No requirement	$S_{\max NR}$

5.4.3 Resistance to permanent deformation in triaxial compression test

The resistance to permanent deformation of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall comply with maximum values selected from the categories in Table 24.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The range between the upper and lower limits selected shall be 2 % based on compaction degree and 3 % based on void content.

The void content of the specimens shall be specified in accordance with EN 13108-20:2005, D.2.

The resistance to permanent deformation, in terms of the creep rate in tri-axial compression, f_c , shall be determined in accordance with EN 13108-20:2005, D.7.

Table 24 — Maximum creep rate, f_{cmax}

Creep rate f_c $\mu\text{m}/\text{m}/\text{n}$	Category f_{cmax}
0,2	$f_{cmax0,2}$
0,4	$f_{cmax0,4}$
0,6	$f_{cmax0,6}$
0,8	$f_{cmax0,8}$
1,0	f_{cmax1}
1,2	$f_{cmax1,2}$
1,4	$f_{cmax1,4}$
1,6	$f_{cmax1,6}$
2	f_{cmax2}
4	f_{cmax4}
6	f_{cmax6}
8	f_{cmax8}
10	f_{cmax10}
12	f_{cmax12}
14	f_{cmax14}
16	f_{cmax16}
No requirement	f_{cmaxNR}

5.4.4 Resistance to fatigue

The resistance to fatigue of specimens prepared in accordance with EN 13108-20:2005, 6.5, shall be selected from the categories in Table 25.

The compaction of test specimens shall be selected from EN 13108-20:2005, Table C.1.

The range between the upper and lower limits selected shall be 2 % based on compaction degree and 3 % based on void content.

The void content of the specimens shall be specified in accordance with EN 13108-20:2005, D.2.

The resistance to fatigue shall be determined in accordance with EN 13108-20:2005, D.9.

Table 25 — Resistance to fatigue, ϵ_6

Resistance to fatigue microstrain	Category ϵ_6
310	ϵ_{6-310}
260	ϵ_{6-260}
220	ϵ_{6-220}
190	ϵ_{6-190}
160	ϵ_{6-160}
130	ϵ_{6-130}
115	ϵ_{6-115}
100	ϵ_{6-100}
90	ϵ_{6-90}
80	ϵ_{6-80}
70	ϵ_{6-70}
60	ϵ_{6-60}
50	ϵ_{6-50}
No requirement	ϵ_{6-NR}

5.4.5 Over-specification

To prevent duplication of specification of mixtures the following combinations of requirements shall not be recognised as compliant with this European Standard:

- empirical requirements combined with fundamental requirements (see 5.1);
- requirements for the resistance to permanent deformation, specified in 5.2.6 (see also 5.3.6) combined with requirements specified in 5.4.3.

6 Evaluation of conformity

The conformity of Asphalt Concrete to the requirements of this European Standard and with the stated values (including classes) shall be demonstrated by

- Initial Type Testing in accordance with EN 13108-20.

The method of sample preparation shall be selected from EN 13108-20:2005, 6.5.2, 6.5.3a or 6.5.3b.

- Factory Production Control by the manufacturer including product assessment in accordance with EN 13108-21.

For the purpose of Type Testing, Asphalt Concrete may be grouped into families as described in EN 13108-20, where it is considered that the selected property or properties is or are common to all the mixtures within that family.

7 Identification

The delivery ticket shall contain at least the following information relating to identification:

- manufacturer and mixing plant;
- mix identification code;
- designation of the mixture:

AC	D	surf/base/bin	binder
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where

- AC is Asphalt Concrete;
- D is the upper sieve size;
- surf is the surface course;
- base is the base course;
- bin is the binder course;
- binder is the designation of binder used.

EXAMPLE AC 16 surf 70/100

Asphalt Concrete with maximum aggregate size 16 mm for surface course with penetration bitumen 70/100.

- how to obtain the full details demonstrating conformity with this European Standard;
- details of any additives (see 5.3.1.4);
- details of compliance with 5.2.8 and 5.2.9 where requested for specific use on airfields specifications.

NOTE Information concerning regulatory marking accompanies the product (For CE marking and labelling see ZA.3) but characteristics which are not necessarily part of regulatory marking, for example, special requirements for airfields could be made available by alternative means i.e. retained by the dispatching depot if agreed with the client.

Annex A (normative)

Calculations of the penetration or the softening point of the binder of a mixture when reclaimed asphalt is used

A.1 General

These calculations shall only be applied when paving grade bitumen has been used in the reclaimed asphalt and will be used as added binder.

A.2 Calculation of the penetration of the binder of a mixture

Use the following calculation:

$$a \lg pen_1 + b \lg pen_2 = (a + b) \lg pen_{mix} \quad (A.1)$$

where

pen_{mix} is the calculated penetration of the binder in the mixture containing reclaimed asphalt;

pen_1 is the penetration of the binder recovered from the reclaimed asphalt;

pen_2 is the penetration of the added binder;

a and b are the portions by mass of the binder from the reclaimed asphalt (a) and from the added binder (b) in the mixture; $a + b = 1$.

EXAMPLE $pen_1 = 20$; $pen_2 = 90$; $a = 0,25$ and $b = 0,75$
 $0,25 \lg 20 + 0,75 \lg 90 = \lg pen_{mix}$
 $\lg pen_{mix} = 1,790\ 94$; therefore $pen_{mix} = 62$

The recovery of binder from mixtures for testing shall be executed according to EN 12697-3 or EN 12697-4.

The penetrations of the added binder and the recovered binder shall be determined according to EN 1426.

A.3 Calculation of the softening point of the binder of a mixture

Use the following calculation:

$$T_{R\&B\ mix} = a \times T_{R\&B\ 1} + b \times T_{R\&B\ 2} \quad (A.2)$$

where

$T_{R\&Bmix}$ is the calculated softening point of the binder in the mixture containing reclaimed asphalt;

$T_{R\&B1}$ is the softening point of the binder recovered from the reclaimed asphalt;

$T_{R\&B2}$ is the softening point of the added binder;

a and b are the portions by mass of binder from the reclaimed asphalt (a) and from the added binder (b) in the mixture ; $a + b = 1$.

EXAMPLE $T_{R\&B1} = 62\text{ °C}$; $T_{R\&B2} = 48\text{ °C}$; $a = 0,25$ and $b = 0,75$
 $T_{R\&Bmix} = 0,25 \times 62 + 0,75 \times 48 = 51,5\text{ °C}$

The softening points of the added binder and the recovered binder shall be determined according to EN 1427.

Annex ZA (informative)

Relationship between this European Standard and the Essential Requirements of EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M/124 – Road Construction Products – 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 confers a presumption of fitness of the Asphalt Concrete covered by this annex for the 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, may be applicable to the Asphalt Concrete falling within the scope of this European Standard.

NOTE 1 In addition to any specific relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (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.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through <http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm>).

This annex establishes the conditions for the CE marking of the Asphalt Concrete intended for the uses indicated in Table ZA.1 and shows the relevant applicable:

The scope of this annex is defined by Table ZA.1a and Table ZA.1b.

Table ZA.1a — Relevant clauses related to essential characteristics for empirical specification

Product: Asphalt Concrete as covered in the Scope of this European Standard.			
Intended use: For surface courses, binder courses, regulating courses, and bases of roads, and other trafficked areas, whether subject or not to reaction to fire regulations.			
Essential Characteristics	Requirement in this and other European Standard(s)	Levels and/or classes	Notes
Adhesion of binder to aggregate	5.2.2 Void content	None	Categories
	5.3.1.3 Binder content	None	Categories
	5.2.4 Water sensitivity	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
Stiffness	5.2.1.2, 5.3.1.2 Grading	None	Values %
	5.3.1.3 Binder content	None	Categories
	5.2.2 Void content	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
Resistance to permanent deformation	5.2.1.2, 5.3.1.2 Grading	None	Values %
	5.3.1.3 Binder content	None	Categories
	5.2.2 Void content	None	Categories
	5.3.3 Voids filled with bitumen	None	Categories
	5.3.4 Voids in mineral aggregate	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
	5.3.2 Marshall values for application on airfields	None	Categories
5.2.6 Resistance to permanent deformation	None	Categories	
Resistance to fatigue	5.2.2 Void content	None	Categories
	5.2.10 Temperatures of the mixture	None	Threshold value
	5.3.1.3 Binder content	None	Categories
Skid resistance	5.2.1.2, 5.3.1.2 Grading	None	Values %
	5.3.1.3 Binder content	None	Categories
	5.2.2 Void content	None	Categories
Resistance to abrasion	5.2.1.2, 5.3.1.2 Grading	None	Values %
	5.3.1.3 Binder content	None	Categories
	5.2.5 Resistance to abrasion by studded tyres	None	Categories
Reaction to fire ^a	5.2.7	Euroclasses	
Dangerous substances	See note above	None	Substance 'x' less than 'y' ppm
Durability of the above characteristics against ageing, weathering, oxidation, wear, ravelling, chemicals, wear of studded tyres, stripping, as relevant	All above mentioned requirement are related to durability.	None	
^a Relevant only for Asphalt Concrete intended for uses subject to reaction to fire regulations.			
NOTE The manufacturer may wish to declare actual values as well or instead of categories or threshold parameters.			

Table ZA.1b — Relevant clauses related to essential characteristics for fundamental specification

Product: Asphalt Concrete as covered in the Scope of this European Standard.			
Intended use: For surface courses, binder courses, regulating courses, and bases of roads, and other trafficked areas, whether subject or not to reaction to fire regulations.			
Essential Characteristics	Requirement in this and other European Standard(s)	Levels and/or classes	Notes
Adhesion of binder to aggregate	5.2.2 Void content	None	Categories
	5.2.4 Water sensitivity	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
Stiffness	5.2.1.2 Grading	None	value %
	5.4.1.2 Binder content	None	Categories
	5.2.2 Void content	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
	5.4.2 Stiffness	None	Categories
Resistance to permanent deformation	5.2.1.2 Grading	None	Value %
	5.4.1.2 Binder content	None	Categories
	5.2.2 Void content	None	Categories
	5.2.10 Temperature of the mixture	None	Threshold values
	5.2.6 Resistance to permanent deformation	None	Categories
	5.4.3 Resistance to permanent deformation in triaxial compression test	None	Categories
Resistance to fatigue	5.2.2 Void content	None	Categories
	5.2.10 Temperatures of the mixture	None	Threshold values
	5.4.4 Resistance to fatigue	None	Categories
Skid resistance	5.2.1.2 Grading	None	Values %
	5.4.1.2 Binder content	None	Categories
	5.2.2 Void content	None	Categories
Resistance to abrasion	5.2.1.2 Grading	None	Values %
	5.4.1.2 Binder content	None	Categories
	5.2.5 Resistance to abrasion by studded tyres	None	Categories
Reaction to fire ^a	5.2.7 Reaction to fire	Euroclasses	
Dangerous substances	See note above	None	Substance 'x' less than 'y' ppm
Durability of the above characteristics against ageing, weathering, oxidation, wear, ravelling, chemicals, wear of studded tyres, stripping, as relevant	All above mentioned requirement are related to durability.	None	
^a Relevant only for Asphalt Concrete intended for uses subject to reaction to fire regulations.			
NOTE The manufacturer may wish to declare actual values as well or instead of categories or threshold parameters.			

In order to fulfil the essential characteristics a combination of requirements has to be fulfilled. Nevertheless not all requirements can be combined, see 5.3.4 and 5.3.6 of this European Standard. Where there is a choice of test methods and test conditions the CE mark shall make clear the conditions applied.

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, manufacturers 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 ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure(s) for attestation of conformity of Asphalt Concrete

ZA.2.1 System(s) of attestation of conformity

The system of attestation of conformity of Asphalt Concrete indicated in Table ZA.1, in accordance with the Decision of the Commission 98/601/EC as given in annex 3 of the mandate for "Road construction products", is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es):

Table ZA.2 — System(s) of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es) (reaction to fire)	Attestation of conformity system(s)
Bituminous mixtures	For roads and other trafficked areas		2+
	for uses subject to reaction to fire regulations	(A _{fl} , B _{fl} , C _{fl}) ^a -----	1 ^e
		(A _{fl} , B _{fl} , C _{fl}) ^b -----	3 ^f
		A _{fl} , D _{fl} , E _{fl} , F _{fl} or CWFT ^d	4 ^g
<p>^a Materials for which the reaction to fire performance is susceptible to change during production (In general , those subject to chemical modification, e.g. fire retardants, or where changes of composition may lead to changes in reaction to fire performance).</p> <p>^b Materials for which the reaction to fire performance is not susceptible to change during the production process.</p> <p>^c Materials for class A that according to the Decision 96/603 do not require to be tested for reaction to fire.</p> <p>^d CWFT Classified without further testing (based upon a published Commission Decision).</p> <p>^e System 1: See CPD Annex III.2.(i), without audit-testing of samples.</p> <p>^f System 3: See CPD Annex III.2.(ii), Second possibility.</p> <p>^g System 4: See CPD Annex III.2.(iii), Third possibility.</p>			

The attestation of conformity of the Asphalt Concrete in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3a resulting from application of the of this or other European Standard indicated therein.

Table ZA.3a — Assignment of evaluation of conformity tasks for Asphalt Concrete under system 2+

Tasks		Content of the task	Evaluation of conformity to apply	
Tasks for the manufacturer	Factory Production Control (FPC)	Parameters related to all characteristics of Table ZA.1	EN 13108-21	
	Initial Type Testing	All characteristics of Table ZA.1	EN 13108-20	
	Initial Type Testing by a notified laboratory	Reaction to fire (only where intended to be used in an area subjected to reaction of fire regulations)	5.2.7	
Tasks for the notified body	Certification of FPC on the basis of	Initial inspection of factory and of FPC.	Parameters related to all characteristics of Table ZA.1	EN 13108-21:2006, Annex B

Table ZA.3b — Assignment of evaluation of conformity tasks for Asphalt Concrete under system 1

Tasks		Content of the task	Evaluation of conformity to apply
Tasks under the responsibility of the manufacturer	Factory production control (FPC)	Parameters related to all characteristics of Table ZA.1	EN 13108-21
	Testing of samples taken at the production plant	All characteristics of Table ZA.1	EN 13108-20
	Initial Type Testing by the manufacturer	All characteristics of Table ZA.1 except reaction to fire	EN 13108-20
Tasks under the responsibility of the product certification body	Initial Type Testing	Reaction to fire	5.2.7
	Initial inspection of factory and of FPC	Parameters related to all characteristics of Table ZA.1	EN 13108-21:2006, Annex B
	Continuous surveillance, assessment and approval of FPC	Parameters related to all relevant characteristics of Table ZA.1	EN 13108-21:2006, Annex B

ZA.2.2 EC Certificate and Declaration of conformity

(In case of products with system 1): When compliance with the conditions of this annex is achieved, the certification body shall draw up a certificate of conformity (EC Certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

- name, address and identification number of the certification body;
- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;
- description of the product (type, identification, use, ...);
- provisions to which the product conforms (e.g. Annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);
- conditions and period of validity of the certificate, where applicable;
- name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up a declaration of conformity (EC Declaration of conformity) including the following:

- name and address of the manufacturer, or his authorised representative established in the EEA;
- name and address of the certification body;
- description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;
- provision to which the product conforms (i.e. Annex ZA of this EN);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);
- number of the accompanying EC Certificate of conformity;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

(In case of products under systems 2+) When compliance with the conditions of this annex are achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

- name and address of the manufacturer, 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.);

- 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 manufacturer of his authorised representative.

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

- name and address of the notified body;
- 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 and certificate 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 manufacturer 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 made available through the accompanying commercial documents e.g. a delivery note.

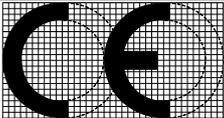
The following information shall accompany the CE marking symbol:

- identification number of the certification body;
- name or identifying mark and registered address of the producer;
- last two digits of the year in which the marking is affixed;
- number of the EC Certificate of conformity or factory production control certificate (if relevant);
- reference to this European Standard;
- description of the product: generic name, material, dimensions, ... and intended use;
- information on the relevant essential characteristics listed in Table ZA.1a and ZA.1b presented as :
- declared values and, where relevant, level or class to declare for each essential characteristic as indicated in "Notes" in Table ZA.1 a and ZA.1b;
- as an alternative, standard designation(s) alone or in combination with declared values as above, 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 in the Member State of destination.

Figures ZA.1a and ZA.1b gives examples of the information to be given on the product, label, packaging and/or commercial documents. Figures ZA.1c gives a shortened example of CE marking for a delivery note.

NOTE 1 This example is based on the principle that a producer is required to put on the CE marking information those requirements that are used in national regulations in the country of destination.

 01234	
AnyCo Ltd, PO Box 21, B-1050 06 01234-CPD-00234	
EN 13108-1 Asphalt Concrete for roads and other trafficked areas AC 16 surf 70/100 euro asphalt plant S24	
General requirements + empirical requirements	
Void content*	
– maximum	$V_{\max 7,0}$ (7,0 %)
– minimum	$V_{\min 2,0}$ (2,0 %)
Minimum voids filled with bitumen*	$VFB_{\min 60}$ (60 %)
Maximum voids filled with bitumen*	$VFB_{\max 83}$ (83 %)
Voids in mineral aggregate*	$VMA_{\min 14}$ (14%)
Voids content after 10 gyrations	$V10G_{\min 9}$ (9,0 %)
Water sensitivity*	$ITSR_{90}$ (90 %)
Resistance to abrasion by studded tyres*: (40 ml)	Abr_{A40}
Reaction to fire	Euroclass Cfl**
Temperature of the mixture	140 °C to 180 °C
Grading (passing)	
22,4 mm sieve	100 %
16 mm sieve	95 %
11,2 mm sieve	88 %
5,6 mm sieve	62 %
2 mm sieve	40 %
0,500 mm sieve	33 %
0,250 mm sieve	22 %
0,063 mm sieve	5,8 %
Binder content	$B_{\min 6,0}$ (6,0 %)
Marshall values*	$S_{\min 10}$ (10,0 kN) 10 kN $P_{\max 15}$ (15,0 kN) F_4 (4 mm) $Q_{\min 2,5}$ (2,5 kN/mm)
Resistance to permanent deformation*	
– large size device: proportional rut depth	P_5 (5,0 %)
-small size device: wheel tracking slope	$WTS_{AIR10,0}$ (10 mm)
small size device: proportional rut depths	$PRD_{AIR9,0}$ (9,0 %)
* Stating test conditions selected in accordance with EN 13108-20.	

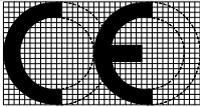
CE conformity marking, consisting of the
“CE”-symbol given in directive 93/68/EEC.
Identification number of the certification body
Name or identifying mark and registered address of the
producer
Last two digits of the year in which the marking was
affixed
Certificate number

No. of European Standard
Description of product
Standard designation
Name of the plant
Mix Identification code

And

Information on regulated characteristics which should
reconcile with Table ZA.1a however, the manufacturer
wish to declare the actual performance value in addition to
the category or class specified in this European Standard.

Figure ZA.1a – Example CE marking information for general requirements plus empirical requirements

 01234	
AnyCo Ltd, PO Box 21, B-1050 06 01234-CPD-00234	
EN 13108-1 Asphalt Concrete for roads and other trafficked areas AC 16 surf 70/100 euro asphalt plant S24	
General requirements + fundamental requirements	
Void content *	
– maximum	$V_{max\ 7}$ (7,0 %)
– minimum	$V_{min\ 2}$ (2,0 %)
Water sensitivity *	$ITSR_{90}$ (90 %)
Resistance to abrasion by studded tyres *	Abr_{A40} (40 ml)
Reaction to fire	Euroclass Cf**
Temperature of the mixture	140 °C to 180 °C
Grading (passing)	
22,4 mm sieve	100 %
16 mm sieve	95 %
11,2 mm sieve	88 %
5,6 mm sieve	62 %
2 mm sieve	40 %
0,500 mm sieve	33 %
0,250 mm sieve	22 %
0,063 mm sieve	5,8 %
Binder content	$B_{min\ 6,0}$ (6,0 %)
Stiffness	
-minimum	$S_{min1\ 800}$ (1 800 MPa)
maximum	$S_{max9\ 000}$ (9 000 Mpa)
Resistance to permanent deformation *	
-large size device: proportional rut depth	P_5 (5,0 %)
-small size device wheel tracking slope (10 mm)	$WTS_{AIR10,0}$
small size device: proportional rut depth	$PRD_{AIR9,0}$ (9,0 %)
*Stating test conditions selected in accordance with EN 13108-20.	

*CE conformity marking, consisting of the
 “CE”-symbol given in directive 93/68/EEC.
 Identification number of the certification body*

*Name or identifying mark and registered address of the
 producer*

*Last two digits of the year in which the marking was
 affixed*

Certificate number

No. of European Standard

Description of product

Standard designation

Name of the plant

Mix Identification code

And

*Information on regulated characteristics which should
 reconcile with Table ZA.1a however, the manufacturer
 may wish to declare the actual performance value in
 addition to the category or class specified in this European
 Standard.*

Figure ZA.1a and ZA.1b — Examples CE marking information, for general requirements plus empirical requirements and general requirements and fundamental requirements

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.

NOTE European legislation without national derogations need not be mentioned.

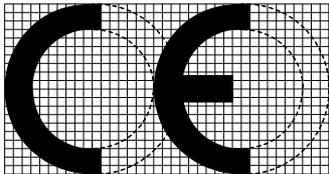
	<p><i>CE conformity marking, consisting of the “CE”-symbol given in directive 93/68/EEC.</i></p> <p><i>Name or identifying mark and registered address of the producer</i></p> <p><i>Last two digits of the year in which the marking was affixed)</i></p>
<p>AnyCo Ltd, PO Box 21, B-1050</p> <p>06</p>	<p><i>No. of European Standard</i></p> <p><i>Description of product</i></p> <p><i>Standard designation</i></p> <p><i>Name of the plant</i></p> <p><i>Mix Identification code</i></p>
<p>EN 13108-1</p> <p>Asphalt Concrete for roads and other trafficked areas</p> <p>AC 16 surf 70/100</p> <p>euro asphalt plant</p> <p>AC24</p>	

Figure ZA.1c — Shortened CE marking for delivery note