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Bituminous mixtures — Material specifications

Part 8: Reclaimed asphalt

bsi.

National foreword

This British Standard is the UK implementation of EN 13108-8:2016. It supersedes BS EN 13108-8:2005 which is withdrawn.

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European foreword

This document (EN 13108-8:2016) 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of an identical text or by endorsement, at the latest by December 2016, and conflicting national standards shall be withdrawn at the latest by March 2018.

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This document supersedes EN 13108-8:2005.

Compared with EN 13108-8:2005, the following changes have been made:

a) update for consistency with other parts of EN 13108 series and CPR requirements;

b) introduction of term "site-won asphalt" and differentiation from feedstock;

c) note exclusion of contaminated materials;

d) new Table 1 for minimum test frequencies for feedstock;

e) enhanced requirements for traceability of delivered feedstock.

This European Standard is one of a series 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 (BBTM)*

— 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 13108-9, *Bituminous mixtures — Material specifications — Part 9: Asphalt for Ultra-Thin Layer (AUTL)*

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

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

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Introduction

The use of recycling in asphalt production makes it necessary to specify reclaimed asphalt as a constituent material in a way similar to that of aggregates and binders. In the asphalt product standards EN 13108-1 up to and including EN 13108-7 and EN 13108-9 the use of reclaimed asphalt is permitted with requirements related to the percentage addition.

Site-won asphalt comprises asphalt taken by milling of asphalt road layers, slabs ripped up from asphalt pavements and asphalt from reject and surplus production.

The processing of site-won asphalt results in reclaimed asphalt, suitable and ready to be used as constituent material for asphalt, after being tested, assessed and classified according to this standard. Reclaimed asphalt (RA) may be used as a constituent material for bituminous mixtures manufactured in an asphalt plant, in accordance with the specifications for those mixtures.

This European Standard contains requirements for reclaimed asphalt with respect to binder and aggregate properties and foreign matter that apply in all cases of usage of reclaimed asphalt. Additionally, this European Standard indicates which properties of the reclaimed asphalt and its constituent materials need to be declared and documented if a description of a feedstock is necessary.

Since the requirements for the asphalt mixtures are the same for mixtures with and without reclaimed asphalt, a set of properties of the reclaimed asphalt are of importance. The particle size and properties of the aggregate, the binder content, the properties of the binder and foreign matter in the reclaimed asphalt are relevant to the quality of the product, i.e. the fresh asphalt in which it is mixed. The level of homogeneity of the material in practice determines the maximum amount of reclaimed asphalt that may be used.

The size of the particles of asphalt in the reclaimed asphalt, which may range from large lumps to finely milled material, is relevant only to the process to be used to mix into the fresh asphalt.

1 Scope

This European Standard specifies requirements for the classification and description of reclaimed asphalt as a constituent material for asphalt mixtures. It is not a standard for compliance.

This European Standard only specifies reclaimed asphalt with bituminous binders, such as: paving grade bitumen, modified bitumen or hard grade bitumen. Reclaimed asphalt contaminated with coal tar or other additives or components above hazardous levels is not covered by this standard and will need to be considered under Member State Environmental, and Health and Safety Regulations.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 932-1, *Tests for general properties of aggregates — Part 1: Methods for sampling*

EN 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

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

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

EN 12596, *Bitumen and bituminous binders — Determination of dynamic viscosity by vacuum capillary*

EN 12697-1, *Bituminous mixtures — Test methods for hot mix asphalt — Part 1: Soluble binder content*

EN 12697-2, *Bituminous mixtures — Test methods — Part 2: Determination of particle size distribution*

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

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

EN 12697-42, *Bituminous mixtures — Test methods for hot mix asphalt — Part 42: Amount of foreign matter in reclaimed asphalt*

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

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purpose of this document, the following terms and definitions apply.

3.1.1
asphalt
homogenous mixture typically of coarse and fine aggregates, filler aggregate and bituminous binder which is used in the construction of a pavement

Note 1 to entry: The asphalt may include one or more additives to enhance the initial laying characteristics, performance or appearance of the mixture, but it is often not possible to identify and differentiate all specific additives in site-won asphalt.

3.1.2
site-won asphalt
the material to be recycled, in the form of milled asphalt road layers or as slabs ripped up from asphalt pavements, or being asphalt from reject, surplus or failing production

Note 1 to entry: These materials will require assessment and often processing before being suitable as a constituent material.

3.1.3
reclaimed asphalt
RA
the processed site-won asphalt, suitable and ready to be used as constituent material for asphalt, after being tested, assessed and classified according to this standard

Note 1 to entry: Processing can include one or more of: milling, crushing, sieving (screening), blending, etc.

3.1.4
feedstock of reclaimed asphalt
quantity of reclaimed asphalt (according to 3.1.3) with classified / declared properties, suitable and ready to be used as constituent material for the manufacturing of asphalt mixtures, being either:

— reclaimed asphalt used for a special purpose or reclaimed asphalt from special asphalt mixtures with specific properties (e.g. PSV, aggregate type, etc.); or

— reclaimed asphalt in a stockpile which is added to and used of, on a regular basis, as long as the requirements of Clause 5 and properties of the final asphalt mixture are observed

Note 1 to entry: The latter is also called the “general” feedstock, while the former may need additional description by the manufacturer.

Note 2 to entry: When the properties of the reclaimed asphalt in the general feedstock change to such an extent that the reclaimed asphalt as constituent material is not conforming to the reclaimed asphalt as documented in the Type Test, EN 13108–20 requires a new Type Test.

Note 3 to entry: Feedstocks will have been assessed and they consist only of reclaimed asphalt according to 3.1.3.

3.1.5
aggregate size
designation of the size of the aggregate in the reclaimed asphalt in terms of lower (d) and upper (D) sieve sizes, expressed as d/D

Note 1 to entry: For reclaimed asphalt, d will almost invariably be 0.

3.1.6
particle size of reclaimed asphalt
maximum size of the pieces of asphalt in the reclaimed material, expressed as a sieve size (U)

3.2 Symbols and abbreviations

3.2.1
D
upper sieve size of the aggregate in the reclaimed asphalt
sieve size in mm and the larger of the smallest sieve with 100 % passing divided by 1,4 and the smallest sieve with 85 % passing

3.2.2
U
maximum particle size of reclaimed asphalt
smallest sieve size in millimetres through which 100 % of the asphalt particles pass

3.2.3
U* RA *d*/*D
size designation of the reclaimed asphalt
reclaimed asphalt is designated by the abbreviation RA, preceded by the "maximum particle size of asphalt" (designation *U*) and followed by the aggregate size designation *d*/*D* in millimetres

EXAMPLE 40 RA 0/8 mm: Reclaimed asphalt, of which the aggregate has an upper sieve size of 8 mm and the asphalt particles have a maximum size of 40 mm.

4 Requirements for the feedstock

4.1 Foreign matter

The presence, content and type of any foreign matter, as defined below, shall be documented and the category declared.

The content of foreign matter shall be determined according to EN 12697-42.

Foreign matter comprises materials other than natural aggregate, not derived from asphalt and is divided in two groups:

a) Group 1 materials such as:

   1) cement concrete, including cement concrete products;

   2) bricks;

   3) sub base material (excluding natural aggregate);

   4) cement mortar;

   5) metal; and

b) Group 2 materials such as:

   1) synthetic materials;

   2) wood;

   3) plastics.

The reclaimed asphalt shall be classified in terms of foreign matter content as described below:

— Category F_1 — content of group 1 material not greater than 1 % by mass, content of group 2 material not greater than 0,1 % by mass;

— Category F_5 — content of group 1 material not greater than 5 % by mass, content of group 2 material not greater than 0,1 % by mass;

— Category F_{dec} — content and nature of all foreign matter declared.

In documents related to the application of asphalt products, requirements for the category foreign matter in reclaimed asphalt feedstock may be defined.

4.2 Binder

4.2.1 Type of binder

The type of binder shall be documented and declared when and if any information from either contemporary or earlier investigations is available. This declaration shall indicate whether the binder is mainly a paving grade bitumen, a modified bitumen or a hard grade bitumen. Reclaimed asphalt contaminated with coal tar above hazardous levels is not covered by this standard and will need to be considered under Member State Regulations.

4.2.2 Binder properties

When necessary, the mean penetration, the mean softening point or the mean viscosity of the binder of the samples according to 5.5.3 shall be documented and declared as described below.

The binder shall be recovered according to EN 12697-3 or EN 12697-4.

The penetration shall be determined according to EN 1426.

The softening point shall be determined according to EN 1427.

The viscosity of the binder shall be determined according to EN 12596.

The binder properties shall be declared in one or more of the following ways:

— reclaimed asphalt shall be categorized as P_{15} if the penetration of the binder of each of the samples according to 5.5.3 is equal to or greater than 10 × 0,1 mm and the mean penetration of all of the samples is equal to or greater than 15 × 0,1 mm;

— reclaimed asphalt shall be categorized as S_{70} if the softening point of the binder of each of the samples according to 5.5.3 is equal to or less than 77 °C and the mean softening point of all of the samples is equal to or less than 70 °C;

— either the mean penetration values or the mean softening points from all samples according to 5.5.3 shall be declared as category P_{dec} or S_{dec};

— for reclaimed asphalt to be used in soft asphalt, the mean viscosity at 60 °C shall be declared as V_{dec}.

When the feedstock contains mainly asphalt with other than paving grade bitumen, a declaration shall be made of the type and properties of the binder, based on either contemporary or earlier investigations and information, to enable evaluation of its suitability.

In documents related to the application of asphalt products, requirements for the properties of binder recovered from reclaimed asphalt feedstock may be defined.

4.3 Aggregate grading and *D*

The mean grading of the aggregate from the samples according to 5.5.3 shall be declared.

The grading shall be determined according to EN 12697-2 and expressed in percentages passing the sieves 1,4 *D*; *D*; 2 mm and 0,063 mm and (a) coarse sieve(s) between *D* and 2 mm and (a) sieve(s) between 2 mm and 0,063 mm.

Coarse sieves shall be selected from basic set plus either set 1 or set 2 according to EN 13043.

The fine sieves shall be selected from the sieves 1 mm, 0,5 mm, 0,25 mm and 0,125 mm.

D shall be determined according to 3.2.1.

In documents related to the application of asphalt products, requirements for the aggregate properties of reclaimed asphalt feedstock may be defined.

4.4 Binder content

The mean binder content of the samples of the feedstock according to 5.5 shall be declared.

The binder content shall be determined according to EN 12697-1, including reclaimed asphalt with polymer modified binder.

4.5 Particle size of reclaimed asphalt

The maximum size of the reclaimed asphalt particles U_{RA} of the samples according to 5.5.3 shall be documented and declared.

The particle size of reclaimed asphalt, *U* (3.2.2), shall be determined according to EN 933-1.

5 Description of the feedstock

5.1 General

In documents related to the application of asphalt products, requirements for the description of reclaimed asphalt feedstock may be defined.

5.2 Source of reclaimed asphalt

When required, the mix group(s) of the reclaimed asphalt from which the feedstock has been derived shall be declared.

5.3 Type and properties of aggregate

When required, the types of the aggregates shall be declared.

When required, the appropriate properties shall be documented and declared by selection from the categories for these properties in EN 13043.

The declaration shall be based on either contemporary or earlier investigations and information.

5.4 Homogeneity

When required, the homogeneity of the feedstock shall be declared. The homogeneity of the feedstock shall be determined from the variability of the percentages of coarse and fine aggregates and of fines in the reclaimed asphalt, the binder content of the reclaimed asphalt and either the penetration, the softening point or the viscosity of the binder recovered from the reclaimed asphalt.

When a measure of homogeneity is necessary it shall be expressed as the maximum range or standard deviation of the test results of the required number of test results according to 5.5.3.

5.5 Sampling and Testing

5.5.1 Feedstock

The feedstock quantity shall be defined.

5.5.2 Sampling

Sampling shall be carried out on sample increments as defined in EN 932-1.

5.5.3 Test frequency and number of samples (*n*)

The test frequency to determine the number of samples (*n*) for the testing according to 5.5.4 shall be taken from Table 1, with level Z being the minimum test frequency under all circumstances.

Where (*n*) equals the quantity of feedstock (5.5.1) divided by the test frequency.

The level should take into account the source of the reclaimed asphalt, its intended use (mix group and type) and the intended addition percentage and may be defined in documents relating to the application of asphalt products.

Table 1 — Minimum frequency for testing the reclaimed asphalt

Level	Tonnes/test
X	500
Y	1 000
Z	2 000

The minimum number of samples (*n*) per feedstock shall be 5.

When the reclaimed asphalt is intended for use only at addition percentage of less than 20 % in base and binder courses and a percentage less than 10 % in surface courses, a single sample per feedstock may be specified.

5.5.4 Testing

The number of samples (*n*) shall be tested for determining the properties and requirements necessary in section 4 and, when required, for describing the feedstock according to 5.4.

The minimum or maximum and/or mean values or ranges of properties shall be determined to enable assessment for suitability of use in asphalt products.

5.6 Feedstock control

When putting assessed and/or processed reclaimed asphalt to feedstock, the necessary investigations for documentation and declaration of the feedstock properties shall be implemented.

6 Identification

For the case of the delivery of reclaimed asphalt classified as a constituent material for asphalt to this Standard, the delivery ticket shall contain the following information relating to the identification:

a) supplier;

b) designation;

c) date and time of delivery;

d) unique identification to enable traceability to

   1) the declaration of properties,

   2) the level of testing;

   3) the identification of the feedstock.

Bibliography

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

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

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

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

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

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

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

[8] EN 13108-9, *Bituminous mixtures — Material specifications — Part 9: Asphalt for Ultra-Thin Layer (AUTL)*

[9] EN 13108-20, *Bituminous mixtures — Material specifications — Part 20: Type Testing*

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