

Bituminous mixtures — Material specifications — Part 8: Reclaimed asphalt

Asphalt — Anforderungen — Teil 8: Ausbauasphalt

Mélanges bitumineux — Spécification des matériaux — Partie 8 : Enrobés recyclés

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Foreword

This European Standard (EN 13108-8:2012) 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of an identical text or by endorsement, at the latest by April 2006, and conflicting national standards shall be withdrawn at the latest by January 2008.

This European Standard replaces EN 13108-8:2005.

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.*

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 layers*

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

EN 13108-21, *Bituminous mixtures — Material specifications — Part 21: Factory production control.*

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, 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, Turkey and the United Kingdom.

Introduction

The increasing use of recycling in asphalt production makes it necessary to specify reclaimed asphalt sold 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 shall 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 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 the binder content,

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 is not covered by this Standard and will need to be considered under Member State Environmental Regulations.

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 932-1, *Test for general properties of aggregates – Part 1: Methods for sampling*

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 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 method for hot mix asphalt – 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 for hot mix asphalt – Part 4: Bitumen recovery: Fractionating column*

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

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

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

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

3.1.1

asphalt

mixture of aggregates and bituminous binder.

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 or surplus production. These materials will require assessment and often processing before being suitable as a constituent material.

**3.1.3
reclaimed asphalt**

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: 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 of the final asphalt mixture are observed.

NOTE 1: The latter is also called the "general" feedstock, while the former may need additional description by the manufacturer.

NOTE 2: When the properties of the reclaimed asphalt in the general feedstock change in 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 requests a new Type Test.

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. 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:

- $M/1,4$, where M is the smallest sieve with 100 % passing

and

- smallest sieve with 85 % passing.

**3.2.2
U particle size of reclaimed asphalt**

Smallest sieve size in mm through which 100 % of the asphalt particles pass.

**3.2.3
U RA d/D size designation of the reclaimed asphalt**

Reclaimed asphalt shall be designated by the abbreviation RA, preceded by the asphalt particle size designation U and followed by the aggregate size designation d/D mm

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 are divided in two groups:

Group 1 materials such as:

- cement concrete, including cement concrete products;
- bricks;
- sub base material (excluding natural aggregate);
- cement mortar;
- metal;

and Group 2 materials such as:

- synthetic materials;
- wood;
- plastics.

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

Category F1- content of group 1 material not greater than 1 %, content of group 2 material not greater than 0,1 %;

Category F5- content of group 1 material not greater than 5 %, content of group 2 material not greater than 0,1 %;

Category Fdec- content and nature of all foreign matter declared.

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 or if the reclaimed asphalt in the feedstock contains a modifier additive. Reclaimed asphalt contaminated with coal tar is not covered by this Standard and will need to be considered under Member State Environmental Regulations.

4.2.2 Binder properties

If necessary (see Note), either the mean penetration, the mean softening point or the mean viscosity of the binder of the samples according to 5.4.3 shall be documented and declared as either fixed or declared categories as described below.

NOTE The recovery of bitumen involves the use of potentially harmful solvents and should be limited to the minimum essential frequency.

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 with EN 12596.

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

- reclaimed asphalt shall be categorised as P_{15} if the penetration of the binder of each of the samples according to 5.4.3 is at least $10 \times 0,1$ mm and the mean penetration of all of the samples is at least $15 \times 0,1$ mm, or
- reclaimed asphalt shall be categorised as S_{70} if the softening point of the binder of each of the samples according to 5.4.3 is no greater than 77 °C and the mean softening point of all of the samples is no greater than 70 °C, or
- either the mean penetration values or the mean softening points from all samples according to 5.4.3 shall be declared as category P_{dec} or S_{dec} , or
- 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.

Reclaimed asphalt contaminated with coal tar is not covered by this Standard and will need to be considered under Member State Environmental Regulations.

4.3 Aggregate grading and D

The mean grading of the aggregate from the samples according to 5.4.3 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.

4.4 Binder content

The mean binder content of the samples of the feedstock according to 5.4.3 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 5.4.3 shall be documented and declared.

U shall be determined according to 3.2.2 and to EN 12697-2.

5 Description of the feedstock

5.1 Source of reclaimed asphalt

If necessary, the mix group(s) and/or course(s) of the reclaimed asphalt from which the feedstock has been derived shall be declared.

5.2 Type and properties of aggregate

If necessary, the types of the aggregates shall be declared.

If necessary, 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.

5.3 Homogeneity

If necessary, 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 required number of test results according to 5.4.3.

5.4 Sampling and Testing

5.4.1 Feedstock

The feedstock quantity shall be defined.

5.4.2 Sampling

Sampling shall be carried out on sample increments as defined in EN 932-1 but without homogenisation into a bulk sample. .

5.4.3 Test frequency and number of samples (n)

The test frequency to determine the number of samples (n) for the testing according 5.4.4 shall be taken from table 1, with level Z being the minimum test frequency under all circumstances.

NOTE: The level should take into account the source of the reclaimed asphalt, its intended use (courses and type) and the intended addition percentage.

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.

5.4.4 Testing

The number of samples (*n*) shall be tested for determining the conformity with section 4 and, if necessary, for describing the feedstock according to 5.3.

The required minimum or maximum and/or mean values or ranges shall be determined.

5.5 Stock control

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

6 Identification

For the case of the sale 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:

- supplier;
- designation;
- date and time of delivery;
- unique identification to enable traceability to
 - the declaration of properties,
 - the level of testing and
 - the identification of the feedstock.