

Materials and Conformity

August 2007

The process of implementation of European Standard Specifications (EN's) for asphalt in the UK is well underway and the BSI Committee and Working Party responsible for drafting guidance on implementation and supporting Standards have been working hard to ensure that the EN's are made easy to understand and use. The whole package of European

Specifications and Test Methods for asphalt, together with the National Guidance Documents and revised standard for asphalt laying will be implemented on **1 January 2008.**

The fundamental aim of the implementation process is to ensure that, as far as possible, traditional UK asphalt mixtures are retained unchanged. However, the implementation process will result in a number of changes to the way in which asphalt materials are specified and, more specifically, in the way in which the materials are described and designated.

The Standards

Asphalt materials have traditionally been specified in the UK by British Standards BS 594 for Hot Rolled Asphalt, BS 4987 for Coated Macadam and BS 1447 for Mastic Asphalt. These Standards will be withdrawn in favour of the BS EN 13108 series, which currently incorporates seven material specifications, one constituent material specification and two standards relating to Evaluation of Conformity.

Table 1 highlights the BS EN 13108 family of standards and their relevance to UK implementation.

Table 1

EN 13108 Part	Relates to	Relevance to UK
1	Asphalt concrete	Major importance includes coated macadams, DBM, HDM etc.
2	Asphalt concrete for very thin layers	Important but in practice thin surfacings will be dealt with by BBA HAPAS system certification
3	Soft asphalt	No relevance soft asphalt is not used in the UK
4	Hot rolled asphalt	Major importance covers all HRA
5	Stone mastic asphalt	Important for 'specified' SMA although most SMA type thin surfacings will be covered by BBA HAPAS certification.
6	Mastic asphalt	Important but guidance to be provided by Mastic Asphalt Council
7	Porous asphalt	Limited relevance because of dwindling use of porous asphalt on highways
8	Reclaimed asphalt	Important for classification of reclaimed asphalt when used as a constituent material in fresh asphalt
20	Initial Type Testing	Very important in relation to determination of material properties and declaration of compliance
21	Factory production control	Very important in relation to quality assurance and declaration of conformity



The National Guidance Document on the use of BS EN 13108 is published by BSI as Published Document PD 6691 and has been drafted to contain all the relevant information required for specifying and producing asphalt materials. This includes guidance on constituent materials, performance classes for specified mixture characteristics e.g. temperature, void content, stiffness etc., as well as a series of Appendices containing example specifications for 'traditionally' specified UK asphalt materials. The materials which are explicitly considered in PD 6691 in view of their importance in the UK are: Asphalt Concrete, Hot Rolled Asphalt, and Stone Mastic Asphalt.

PD 6691 will be of as much, if not more, relevance to specifiers and producers of asphalt as the material EN's themselves.

A second BSI Published Document, PD 6692, provides guidance on the use of the EN Test Methods for asphalt which are called up by BS EN 13108.

The conformity requirements of FPC and Type Testing have been integrated into Sector Scheme 14.

The Materials

While the intention is that implementation of the EN13108 series **will not significantly change the mixtures themselves**, there are some necessary changes to be adopted, notably in product descriptions and mixture nomenclature. Product descriptions are broken down to identify the mixture type, maximum (nominal) aggregate size, the pavement layer in which it is used, and the binder grade used in the mixture, as indicated in Table 2 above.

Table 2

Mixture type	Size	Pavement layer	Bitumen grade e.g. 40/60
AC	D	base/bin/surf	binder (xx/yy)
HRA	grading designation	base/bin/reg/surf	binder (xx/yy)
SMA	D	base/bin/reg/surf	binder (xx/yy)

Key		
AC	denotes	Asphalt Concrete
HRA	denotes	Hot Rolled Asphalt
SMA	denotes	Stone Mastic Asphalt
D	denotes	aggregate size
base	denotes	base (course)
bin	denotes	binder course
reg	denotes	regulating course (for HRA and SMA)
surf	denotes	surface course
binder	denotes	full bitumen grade designation

PD 6691 retains some of the traditional BS nomenclature including additional mixture descriptors for Asphalt Concrete that better describe the grading or texture of many of those (macadam-type) materials i.e. dense, open, medium (graded), heavy duty etc., and in the case of HRA, the mixture designations have reverted to those used in BS594 before the 2003 revision, removing the % descriptor. For all materials, the "bottom-end" sieve has been removed from material descriptions.

The full range of material options recommended in PD 6691 is shown in Table 3 opposite. Materials shown in **bold** are preferred mixtures as highlighted in BS 4987 & 594.

Table 3

Material description	EN 13108 designation	Bitumen Grade options
Asphalt concrete mixtures complying with EN 13108-1		
4mm Fine graded surface course	AC 4 fine surf	160/220 250/330
6mm Medium graded surface course	AC 6 med surf	160/220 250/330
6mm Dense surface course	AC 6 dense surf	70/100 100/150 160/220 250/330
10 mm Open graded surface course	AC 10 open surf	160/220 250/330
10mm Close graded surface course	AC 10 close surf	70/100 100/150 160/220 250/330
14mm Open graded surface course	AC 14 open surf	160/220 250/330
14mm Close graded surface course	AC 14 close surf	70/100 100/150 160/220 250/330
20mm Open graded binder course	AC 20 open bin	160/220 250/330
20mm Dense, heavy duty and high modulus binder course	AC 20 dense bin	40/60 70/100 100/150 160/220
	AC 20 HDM bin	40/60
	AC 20 HMB bin	30/45
32mm Dense, heavy duty and high modulus binder course	AC 32 dense bin	40/60 70/100 100/150 160/220
	AC 32 HDM bin	40/60
	AC 32 HMB bin	30/45
32mm Dense, heavy duty and high modulus base	AC 32 dense base	40/60 70/100 100/150 160/220
	AC 32 HDM base	40/60
	AC 32 HMB base	30/45
10mm EME2	AC 10 EME2 base/bin	} 10/20 15/25
14mm EME2	AC 14 EME2 base/bin	} 10/20 15/25
20mm EME2	AC 20 EME2 base/bin	} 10/20 15/25

Table 3.continued

Material description	EN 13108 designation	Bitumen Grade options	
Hot Rolled Asphalt mixtures complying with EN 13108-4			
HRA 50% 10mm for regulating or binder course	HRA 50/10 reg HRA 50/10 bin	30/45 40/60 70/100 100/150	
HRA 50% 14mm for regulating or binder course	HRA 50/14 reg HRA 50/14 bin		
HRA 50% 20mm for base or binder course	HRA 50/20 base HRA 50/20 bin		
HRA 60% 20mm for base or binder course	HRA 60/20 base HRA 60/20 bin		
HRA 60% 32mm for base or binder course	HRA 60/32 base HRA 60/32 bin		
HRA 0% 2mm Type F Surface Course (Sand carpet)	HRA 0/2 F surf	30/45 40/60 70/100 100/150	
HRA 15% 10mm Type F Surface Course	HRA 15/10 F surf		
HRA 30% 10mm Type F Surface Course	HRA 30/10 F surf		
HRA 55% 10mm Type F Surface Course	HRA 55/10 F surf		
HRA 30% 14mm Type F Surface Course	HRA 30/14 F surf		
HRA 35% 14mm Type F Surface Course	HRA 35/14 F surf		
HRA 55% 14mm Type F Surface Course	HRA 55/14 F surf	30/45 40/60 70/100 100/150	
HRA 0% 2mm Type C Surface Course (Sand carpet)	HRA 0/2 C surf		
HRA 55% 10mm Type C Surface Course	HRA 55/10 C surf		
HRA 30% 14mm Type C Surface Course	HRA 30/14 C surf		
HRA 35% 14mm Type C Surface Course	HRA 35/14 C surf		
HRA 55% 14mm Type C Surface Course	HRA 55/14 C surf	40/60 70/100 100/150	
Stone Mastic Asphalt surface course mixtures complying with EN 13108-5			
6mm SMA Surface Course	SMA 6 surf		40/60 70/100 100/150
10mm SMA Surface Course	SMA 10 surf		
14mm SMA Surface Course	SMA 14 surf		
Other Stone Mastic Asphalt mixtures complying with EN 13108-5			
6mm SMA for regulating	SMA 6 reg	40/60 70/100 100/150	
10mm SMA for regulating	SMA 10 reg		
14mm SMA for regulating or binder course	SMA 14 reg/bin		
20mm SMA for regulating or binder course	SMA 20 reg/bin		

'Preferred' options highlighted in bold.

Combining the designation in column 2 with the binder grade in column 3 gives the minimum recommended product description.

NOTE: PSV will also be included in the product description where specified.

One of the most fundamental changes from the previous British Standards is the move within the EN's from an empirical/recipe specification to a declared 'target plus tolerance' approach. This is similar to the approach used in SHW Clause 929 and permits a wider degree of freedom for producers to design materials for performance rather than be constrained by a strict compliance recipe.

Evaluation of Conformity

The evaluation and demonstration of the conformity of asphalt mixtures with the requirements of the European asphalt standards is covered by two standards in the EN 13108 series:

- BS EN 13108 - 20 Type Testing
- BS EN 13108 - 21 Factory Production Control

They spell out, in some detail, the obligations of a producer of asphalt, in order to make a declaration that the material conforms to a particular specification drawn from one of the EN 13108 standards. **The requirements apply, and are identical, whether or not CE Marking is to be applied.**

Initial Type Testing

Initial Type Testing (ITT) is a procedure in which a given mix formulation (**target** composition and set of constituents) is put through a series of tests to prove that it complies with the detailed specification requirements, in particular any performance related properties, with which conformity is being claimed. Every detail and property has to be validated - even for simple recipe mixtures,

although here of course there will be fewer requirements to demonstrate. This is similar to a combination of a technical file, a mix design report and/or a job standard mix trial report.

In addition to laboratory testing or approval of constituents, Type Testing will include assessment of properties of plant mixed materials laid in trials, following protocols laid out in the new Standard for Asphalt Laying and Compaction: BS594987. Properties such as insitu air voids, resistance to permanent deformation and stiffness can be determined from materials extracted from trial strips.

The result of a Type Testing procedure is a Type Test Report. This is a formal document which relates only to the formulation which has been tested and is required as proof that that formulation complies with the relevant specification detail. The Type Testing is mixture specific, i.e. the same mixture can be produced on a number of plants.

Factory Production Control

Factory Production Control (FPC) is, in essence, a schedule for a quality system to ensure that, at the asphalt plant, a mix formulation which has already been Type Tested is manufactured consistently in conformity with requirements such as temperature and that the composition of the mixed material is within certain **tolerances** of the target. It does not include requirements for measuring performance related properties of the asphalt other than a requirement that the validation carried out under initial Type Testing should be repeated at least at five yearly intervals. It is **very similar in concept and in content, to the Sector Scheme 14 Schedule and will replace most of**

the detailed requirements in an updated Sector 14 document.

Operating Compliance Level (OCL)

EN 13108-21 FPC uses a measure of conformity known as Operating Compliance Level. This is based on the 'Q value' which has been used in the Sector 14 Scheme but there are minor differences in the method of calculation.

In FPC, as in Sector 14, an increase in the incidence of non-conforming test results, expressed as OCL, requires an increase in test frequency. This has the aim of managing the risk of non-conformity by concentrating testing on where there are likely to be problems, penalising poor performance and rewarding high conformity.

OCL is determined from the number of non-conforming test results in the last 32 as follows:

Non - conformities	OCL
0 - 2	A
3 - 6	B
> 6	C

EN 13108-21 gives three levels of testing frequency, designated X, Y and Z. Level Z is the minimum regulatory level required for CE Marking with levels X and Y as higher 'voluntary' levels. In the UK and in Sector 14 Level X will be used for surface courses and Level Y for base and binder courses.

In the unlikely event of 8 non-conforming results in the last 32 drastic corrective action

is triggered.

EN 13108-21 FPC also requires the monitoring of the mean deviation from the target of certain key analysis parameters, including binder content. This is to ensure that mixtures are produced as close as possible in composition to the mixture which was evaluated in Type Testing.

If any of these mean deviations exceeds prescribed tolerances the OCL is marked down by one level thereby triggering a need for increased test frequency.

CE Marking

In simple terms, a mixture is in conformity with the European Standard if there is a valid Type Test (and Report) for the particular mix composition covering all of the declared requirements **and** if it is produced at a plant operating in compliance with the requirements of Factory Production Control. If these elements are assessed and approved by competent Notified Bodies, then the producer will be free to affix the CE mark to the documentation associated with the materials. It is not anticipated that the CE mark and

supporting documentation will be affixed to all delivery tickets, but details of where customers can obtain that information will be provided.



By specifying a CE marked product clients will be provided with a greater degree of assurance that the materials have been fully assessed in terms of the declared performance as well as being quality controlled during production. This will minimize the amount and duration of assessment procedures necessary before and during contract works.

This Bulletin is intended only as a brief guide and to provide familiarisation with the revised terminology for asphalt mixtures and an introduction to the EN 13108 procedures for evaluation of conformity of asphalt materials with a view to CE marking of products. For the full detail of mixture and conformity requirements, readers should consult the appropriate Standard(s) and the guidance found in PD 6691. Further Bulletins in this series cover other aspects of the

implementation process and are available in the Asphalt and Surfacing section of the QPA website (www.qpa.org).

The UK asphalt industry and highway authority organisations will be working hard to ensure that during 2007 all in the UK having dealings with asphalt are brought fully up to speed with the new standards and that all documents that call up asphalt specifications and test methods are amended, as necessary, to ensure the smoothest possible implementation of them on 1 January 2008.

References:

- BS EN 13108 Parts 1-8, 20 & 21: Bituminous Mixtures - Material specifications
- PD 6691: Asphalt. Guidance on the use of BS EN 13108 'Bituminous Mixtures - Material specifications'.
- PD 6692: Asphalt. Guidance on the use of BS EN 12697 'Bituminous mixtures. Test methods for hot mix asphalt'.
- QPA Information Sheets - Developments on European Standards for Asphalt Bulletins 1 - 3



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