

Bitumen and bituminous binders — Framework specification for polymer modified bitumens

The European Standard EN 14023:2005 has the status of a
British Standard

ICS 93.080.20

National foreword

This British Standard is the official English language version of EN 14023:2005.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/19, Bitumen and related products, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Guidance for use of BS EN 14023 in the UK

The following guidance on the implementation of BS EN 14023:2005 is intended for producers, users and specifiers of pre-blended polymer modified bitumens (PMBs) for use in products for the construction and maintenance of roads and airfields in the UK. BS EN 14023:2005 is principally applicable to PMBs used in hot mix asphalt and to the base PMBs used to produce bitumen emulsions, or cut-back/fluxed bitumens for use in cold/warm mix asphalt, surface dressing binders and bond coats.

The Standard

BS EN 14023:2005 is a framework of “classes” for the different characteristics that may need to be specified. It brings together (harmonizes) in one specification the diverse and contrasting specifications and/or practices that existed throughout the countries of the EU at the start of the harmonization process. Due to the differing climates, traffic loadings and working practices that exist throughout Europe it has not been possible to produce a prescriptive specification. Not every characteristic will be required in every country and selections from the tables within BS EN 14023:2005 will be made based on experience, existing regulations and working practices in each country.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iii, a blank page, the EN title page, pages 2 to 24, an inside back cover and a back cover.

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In theory, any sensible combination of classes may be selected, however without guidance, the implementation of BS EN 14023:2005 may cause confusion. This is not a performance-related specification, but it has resulted in a set of harmonized test methods for use throughout Europe. The standard contains classes for various empirical characteristics which enable suppliers to categorize their PMB in a systematic, harmonized way. The classes are not necessarily relevant to performance in some applications nor would necessarily provide enhanced performance in specific applications.

Implementation

In the UK, there has not previously been a national specification for polymer modified binders. The vast majority of PMBs have been proprietary binders, which have been developed with specific applications in mind using the PMB supplier's chosen technology(ies) to enhance performance. Asphalt/emulsion/cutback producers have traditionally selected a particular PMB in order to achieve the required end-performance of their product in the most cost effective manner.

In the UK, it is recommended that the classification of polymer modified binders in accordance with this standard and their characteristics required to meet the performance requirements of the resulting asphalts, surface dressing binders or bond coats are agreed between the bitumen supplier and asphalt/emulsion/cutback manufacturer. An example of a typical specification would be as follows:

“Polymer modified binders shall conform to the requirements of BS EN 14023:2005 and their characteristics shall be agreed by the supplier and purchaser.”

The great majority of products in the UK that use PMBs have traditionally demonstrated performance enhancement via a product approval scheme, such as the Highway Authorities Product Approval Scheme (HAPAS), or by conformance with performance-related specifications for asphalt in, for example, the Specification for Highway Works (SHW) or by a history of successful use. These practices have served the UK industry successfully for many years and it is expected that they will continue for products containing PMB, supplemented by the introduction and use of European performance-related specifications for the end products.

If conventional, empirical characteristics for PMBs are specified without assessment of the final product performance, there is a possibility that the product containing the PMB will not perform satisfactorily and/or be cost effective.

BS EN 14023:2005 also indicates a new system for the nomenclature of PMBs. This comprises the penetration range and the minimum softening point; for example, a PMB with a penetration range of 45 to 80 (class 4) and a minimum softening point of 60°C (class 6) would be described as a PMB 45/80-60.

NOTE It is possible for a supplier to have two different PMBs with the same penetration range and softening point class for different applications and with different performance. It should therefore be noted that brand names for proprietary PMBs will continue to be used. However, for regulatory and CE marking purposes, PMB suppliers should also state the nomenclature for their binders in accordance with BS EN 14023:2005 on the relevant technical information sheets and delivery documentation.

Characteristics and related test methods

BS EN 14023:2005 covers the characteristics that may be called up in PMB specifications under three categories, as follows.

“Essential requirements”

Table 1 of BS EN 14023:2005 contains the “essential requirements”, which in CEN terminology means those characteristics that are included in the CEN “CPD” mandate M124; it is mandatory that they are addressed when producing a specification from the standard.

PMB suppliers should state for each of their PMBs, the class for each appropriate characteristic. The information is required for “CE marking” purposes and should appear on the CE mark. This information should also appear on the technical information sheets provided by the PMB supplier.

“Technical requirements”

Table 2 of BS EN 14023:2005 contains “technical requirements”, which are characteristics that are non-mandated by CEN, but have been found useful in some countries to describe PMB. This information should appear in the technical information sheets from the suppliers but not on the CE mark.

“Informative characteristics”

Annex B of BS EN 14023:2005 refers to the “informative characteristics”, which are additional characteristics, determined using new test methods that are currently under development. It is anticipated that experience gained with these “informative characteristics” could eventually lead to the development of performance-related PMB specifications in the future.

The “informative characteristics” are not yet ready to be used in specifications. The performance of the end product is unlikely to be determined by the binder characteristics alone, but these additional characteristics could be used for binder selection purposes by the asphalt/emulsion/cutback producer prior to testing of the product.

Evaluation of Conformity

Requirements for “evaluation of conformity” detail the steps which producers need to take in order to demonstrate conformity with the specification. These procedures start with “type testing”, which details the way conformity with all the requirements is determined, and include “factory production control”, which indicates the procedures to be adopted during production to ensure consistent conformity. These procedures need to be followed whether CE marking is being undertaken or not.

Type Testing

All tests detailed in the specification should be carried out as part of the initial evaluation of each PMB; this is called “initial type testing”. In addition, whenever the producer makes a change to the components or manufacturing process, which they expect could make a significant change to the characteristics of the PMB, the relevant tests should be repeated. If the difference requires a change of the class of one or more of the characteristics of the PMB, the user should be informed and, where appropriate, the technical information sheet and binder nomenclature should be amended.

Factory Production Control

PMB suppliers should operate a quality management scheme which covers the FPC requirements in the standard and gives a schedule for the specific type of quality control system. This may be based on the requirements of existing third-party accredited systems, i.e. BS EN ISO 9001.

Attestation of Conformity

Compliance with the requirements in BS EN 14023:2005 for factory production control, initial type testing, ongoing surveillance and accreditation by a notified body, will entitle a supplier to prepare a declaration of conformity for their PMBs. This declaration needs to include information about the PMBs, the supplier and quality assurance. The necessary requirements are detailed in informative Annex ZA of BS EN 14023:2005. The declaration should be available on demand to the user.

CE Marking

After the declaration of conformity, Annex ZA states that suppliers affix a CE mark. Although this will be a requirement—effectively a licence to trade—in most of the European Economic Area (EEA), it is not a legal requirement at the present time in the UK. An example of a CE mark is given in Annex ZA of BS EN 14023:2005. Information from the declaration of conformity is required plus the information that is needed to meet the EC Mandate M/124, i.e. the classes from the “essential requirements” in Table 1.

For the “essential requirements”, class 0 (NPD) and class 1 (TBR) should not be used in the UK. However, as it is possible for two different PMBs to have the same penetration class, suppliers can provide information that shows that their binders meet narrower penetration ranges than appear in Table 1. Information

from Table 2 (“technical requirements”) and Table 3 (“informative characteristics”) should not be shown on the CE mark.

As it is not practical to physically attach the CE mark (logo) to the binder, it is recommended that it should appear on the CE-mark documentation. It should be as shown in the example given in Figure Z.A.1, but can be as small as 10 mm high and can be positioned at any appropriate location. Further information to appear on the CE-mark documentation is the brand name of the PMB and its nomenclature.

It is recommended that all further information indicated in this guidance for the PMB (including narrower ranges of penetration value where declared by the supplier) should appear in the relevant technical information sheet. This should be available on demand to the user.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

English Version

Bitumen and bituminous binders - Framework specification for polymer modified bitumens

Bitumes et liants bitumineux - Cadre de spécifications des
bitumes modifiés par des polymères

Bitumen und bitumenhaltige Bindemittel - Rahmenwerk für
die Spezifikation von polymermodifizierten Bitumen

This European Standard was approved by CEN on 24 February 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.

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



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Foreword

This European Standard (EN 14023:2005) has been prepared by Technical Committee CEN/TC 336 "Bituminous binders", the secretariat of which is held by AFNOR.

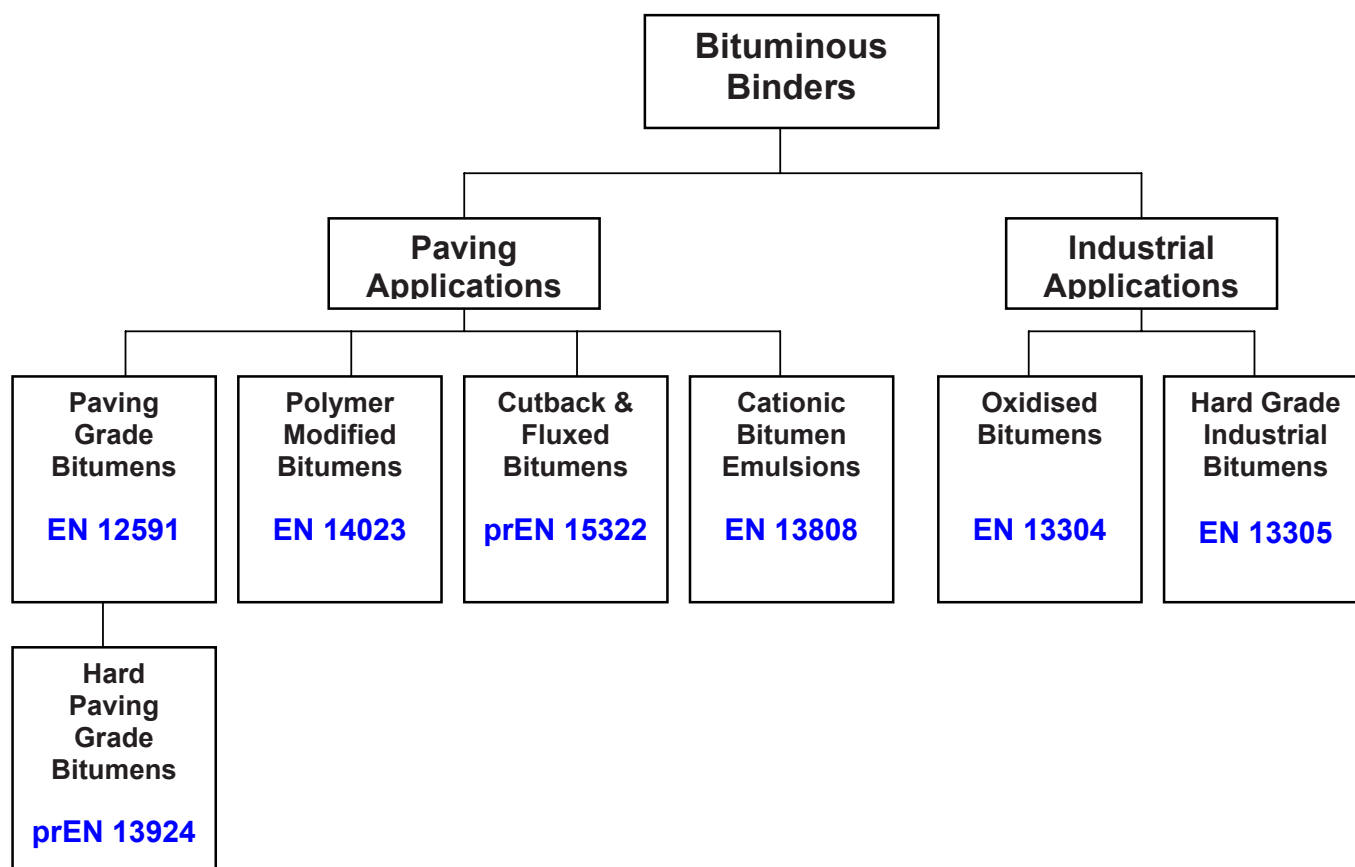
This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2006, and conflicting national standards shall be withdrawn at the latest by April 2006.

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 Construction Products Directive (89/106/EEC).

For relationship with EU Construction Products Directive, see informative Annex ZA, which is an integral part of this document.

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, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

This document is part of a family of documents for bitumens as follows:



Introduction

This European Standard is closely related to EN 12591 [1], *Bitumen and bituminous binders – Specifications for paving grade bitumens*. This introduction gives information on the basis for selection of the grades defined in this European Standard, the status of certain characteristics and test methods, and proposed development of this European Standard.

The general principle adopted in the development of EN 12591 [1] was to provide a range of grades suitable for the manufacture of the materials for road construction and maintenance used, and the climatic and traffic conditions encountered, in all the Member States. This European Standard extends the range of grades specified in EN 12591 [1], following the wider use of modified binders for road construction and maintenance having improved performances.

As with EN 12591 [1], it is compulsory for the full specification to be published in all EU and EATA countries. However, it is permitted for each country to define the most suitable grades and classes.

This document has been based on the various national documents that were in existence when the process started. It is a first step in harmonising the so-called "empirical" specifications and it is intended to evaluate alternative characteristics and test methods to develop new specifications that are more directly performance-related. To this end, work programmes are being undertaken and the results will be considered for a future revision of this document.

Annex B lists informative characteristics which producers of polymer modified bitumens are invited to supply to the client on a voluntary basis. It is hoped that the data so gathered will be of assistance in developing performance-related specifications in the future.