Discussion Paper for CEN TC336 (WG1)

Developing a European Standard for Modified Bitumens

EUROPEAN ASPHALT PAVEMENT ASSOCIATION

1. European framework

The general principle adopted in the development of EN 12591, "*Bitumen and bituminous binders - Specifications for paving grade bitumens*", 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. After this, European Standard EN 14023, "*Bitumen and bituminous binders - Specifications for polymer modified bitumen*", extended the range of grades specified in EN 12591, following the wider use of polymer modified binders for road construction and maintenance having improved performances and provided a framework for declaring a range of characteristics with applicable test methods suitable for polymer modified bitumens.

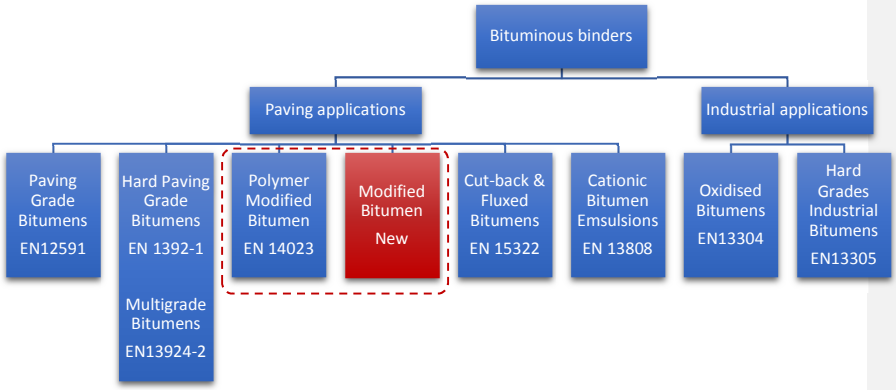
Nowadays, several other types of bitumen modifications have been (or are being) developed and some are even used in some Member States without an existing European Standard. Bitumen modifications, such as waxes, rubber, low temperature modifiers, surfactants, bio-based products, rejuvenators, etc. are being already discussed at CEN. If it is decided to take the path of independent separate standards, a series of documents, would need to be discussed, produced and maintained. In addition, a confusing situation would be generated for producers and suppliers, who would need to manage different standards for a range of products, all of them intended for the same use. As each of them would be ruled by a different standard, comparison between them would be not possible.

In addition, such situation would contradict the principles of EUROBITUME Position Paper, published back in 2002, on the future specification system for bituminous paving binders. One of these principles states that specifications should be based on functional properties and not on chemical composition, while another one describes as "*essential*" avoiding over-specification of bituminous binders, as it brings higher costs without added value. Hence, "*it is not necessary to create a wide range of bitumen*

standards and the description of individual components of asphalt materials must be kept as simple as possible and related to actual performance requirements".

2. EAPA proposal

The EAPA proposal consists of creating a new European Bitumen Standard, which extends the range of bitumen modifications beyond polymer-based. Such a European Standard would be part of the existing family of European Standards for bitumen, as follows:



The proposed European Standard would be closely related to EN 14023, with the possibility, in the future, to even incorporate it and polymer modifications being treated as one of the different types of bitumen modifications included in the proposed Standard.

3. Scope

The proposed European Standard would provide a framework for specifying a range of characteristics with applicable test methods for modified bitumens, which are suitable

for use in the construction and maintenance of roads, airfields and other paved areas, together with requirements for assessment and verification of constancy of performance.

This framework could cover characteristics, such as:

- "homogeneity and storage stability" (maybe addressed by tests, such as EN 13399 Storage stability LAST) and differences in penetration and softening point;
- "flammability (Flash Point) and fume emissions (Volatility) at high mixing temperatures";
- pumpability during mixing process (dynamic viscosity);
- "setting ability" or the return of the polymer modified binder to its normal semi-solid state as it returns to ambient temperature;
- "hardness (including temperature dependency and durability of hardness)";
- "cohesion" and resistance to tangential (shear) forces at intermediate to high service temperature (maybe addressed by test methods, such as EN 13589 "force ductility", EN 13587 "tensile test", EN 13588 "pendulum test" and EN 13703 "deformation energy");
- "adhesion" (maybe addressed by tests used on either the finished asphalt mixtures or on aggregate-bitumen combinations, i.e. EN 12697-1 "Test methods for hot mix asphalt. Soluble binder content", EN 12697-11 "Determination of the affinity between aggregate and bitumen", EN 12697-12 "Determination of the water sensitivity of bituminous specimens", EN 12697-26 "Stiffness", rather than tests on the bitumen itself);

Naformátováno: zvýrazněné

Okomentoval(a): [JF1]: Which test will be proposed for this property?
Does it mean the setting test for cold mixes?

EN 14023:2010
The other essential requirements, "adhesion" and "setting ability" are indicated by tests carried out on the finished asphalt mixtures.

ČSN čl. 1 "přilnavost a konsolidace se stanovují zkouškami na asfaltových směsích"

- "stiffness" on short term aged binder (maybe addressed by test methods, such as EN 14770 "DSR");
- "resistance to flow/deformation", including durability of resistance to flow/deformation (maybe addressed by test methods, such as EN 16659 "MSCRT";
- "resistance to fatigue / reflective cracking" on long term aged binder (maybe addressed by test methods, such as EN 14770 "DSR" or TS 15963 "Fracture toughness");
- "resistance to low temperature cracking" on long term aged binder (maybe addressed by test methods, such as EN 12593 "Fraass", EN 13587 "tensile test" at low temperature, EN 14771 "Bending Beam Rheometer (BBR)" and TS 15963 "Fracture toughness" at low temperature)
- "durability" through the comparison of properties before and after being applied short and long term ageing processes;
- Release of regulated dangerous substances;

Okomentoval(a): [JF2]: CEN/TS 15963 : 2014
BITUMEN AND BITUMINOUS BINDERS - DETERMINATION OF THE FRACTURE TOUGHNESS TEMPERATURE BY A THREE POINT BENDING TEST ON A NOTCHED SPECIMEN

Withdrawal was recommended in
CEN TC 336/WG1 in 2018-
What is actual state after meeting of WG in spring 2018?

What is planned - standard fatigue test or LAS test ?

4. Identification and Nomenclature

The nature and properties of all additives shall be declared. The use and the amount of additives and the modification type (Wax modifies, Low Temperature Modified, etc.) may be defined in documents related to the application of the product.

The nomenclature of modified bitumen could comprise a 3-letters code for the type of modification used, the nominal penetration range and the minimum softening point. Example for wax modified bitumen: WMB 45/80-60.

5. Structure of the document

Two feasible approaches are:

5.1 Possible standard structure 1

The document could be divided in two main sections. The first consists on a set of all those common clauses applicable to the whole range of modifications included in the scope of the standard. These are:

- Introduction
- Scope
- Terms and definitions
- Sampling
- Essential characteristics and test methods (only common for all of them)
- Assessment and verification of consistency of performance
    - Type testing
    - Factory production control (FPC)

The second part could include a series of independent clauses or annexes applicable only to specific modifications. Hence, these could complete what was stated in the previous section of common clauses or even add new particular essential characteristics and tests methods to be applied only in the case a given material is used.

Especial care must be taken when defining the core section of common clauses, as some of them might not be relevant for a given particular material. Nevertheless, the

Committee must work to maximise the number of characteristics included in this section and minimise the characteristics included in the particular clauses/annexes.

New modifications, not included in the first version of the Standard can be added in later (systematic or ad-hoc) revisions by simply adding a new clause/annex containing the particularities of the given material.

5.2 Possible standard structure 2:

The document could be simplified by including all the characteristics into the section "Essential characteristics and test methods". This could include common characteristics essential for all types of modified bitumen, as well as extra characteristics only necessary to characterise particular characteristics that are only essential for specific types of modifications. The decision of declaring each characteristic by the value/class or simply "No Performance Determined" would be up to the producer.

In this case, the additional clauses/annexes for each modification could be removed, not being necessary to significantly amend the standard every time there is a new type of modification.

6. Further considerations

CEN TC336 could decide by consensus, which bitumen modifications are included and excluded of the scope of the proposed European Standard, as well as the allocation of essential characteristics either in the section of clauses of common application or in specific annexes/clauses to be applied when a particular material is used. For this, the following principles must be ensured:

1. As stated in the EAPA Position Papers, asphalt is a construction material, which at the end of its service life, can be both 100% reused to produce new asphalt or recycled in other forms of construction products, such as granular materials. In addition, its waterproofing and inert nature makes it a potentially useful material for use in a wide variety of applications involving different types of additives. However, potentially large liabilities may arise from the use of bitumen in applications, where failure of the product or process, might lead to damage to health or the environment. Therefore, materials/additives/modifiers, which compromise the principles of circular economy of asphalt, or involve potential risks to human health and/or environment must not be included in this standard.

Okomentoval(a): [JF3]: O.K. with the principle. But how it will be implemented?

2. The standard must be as universal as possible and open to the widest range of materials possible without endangering previous point.

   Note: It must be taken into consideration that European Standards are not regulatory documents, which allow or prohibit the use of a certain product in a country. Therefore, the simple existence of a European Standard for a given product, does not mean that every country shall use it.