

## **FUNDBITS**

Functional Durability-related Bitumen Specification

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| <b>Details</b>       |   |
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### **Project Summary:**

More than 80 % of Europe Road Network is paved with asphalt materials. Energy efficient asphalt pavements can be built by using durable pavement materials in order to avoid or postpone maintenance and rehabilitation works. In order to improve the durability of asphalt materials, performance-based specifications were introduced for relevant asphalt mixtures. The asphalt types consist of aggregate particles in a specific grading and bitumen, the viscoelastic properties of which largely predetermine the mechanical asphalt properties. Although the durability of asphalt mixtures is highly dependant on the properties of the bituminous binder, these are specified based on empirical test procedures (Softening Point Ring and Ball, penetration) which were devised around 100 years ago. It is well known that these test methods do not allow a prediction of asphalt mix performance, particularly for polymer-modified binders which are often used in heavily-loaded asphalt materials. In addition, the ageing of bitumen (which has a crucial effect on binder properties and thus on pavement performance), its durability and recyclability are not taken into account by European specifications in terms of performing functional testing after short- or long-term ageing. To cover these aspects, functional performance-based bitumen test procedures were developed in the past and are widely applied for evaluating the binder's effects on the asphalt mixture's performance. For asphalt mixtures, performance-based specifications were introduced with EN 13108-series in 2006, whilst performance-based bitumen specifications are still not implemented in EN 12591 (paving grade bitumens), EN 14023 (polymer modified bitumens) and EN 13924 (hard paving grade bitumens). In EN 14023 latter, standard specific performance-based test methods are discussed only as for guideline.

During the BitVal-project, an extended study was performed in order to evaluate correlations between bitumen and asphalt mixture properties. Resulting from this research, bitumen characteristics were researched for which good correspondences with performance-based asphalt mixture properties could be found. However, due to a limited number of research results available and discrepancies between the test conditions in both the bitumen and asphalt test procedures, it was too early to draw firm conclusions for specifications from these results.

In the meantime, performance-based asphalt test procedures were applied Europe-wide in order to evaluate the mechanical properties of asphalt mixtures. Since the introduction of performance-based test methods in the EN 12697-series, in particular, parts 12 (water sensitivity), 24 (fatigue), 25 (rutting resistance), 26 (stiffness) and 46 (low-temperature cracking) have harmonised the relevant test methodologies within Europe. In order to find correlations between binder and asphalt mixture properties, a lot of research has been conducted internationally since then which should allow stronger proposals to draft specifications for paving grade and polymer-modified bitumens that will broadly improve the durability, and thus the energy efficiency, of asphalt pavements. Furthermore, asphalt producers who improved the asphalt mixture properties during mix design were also forced to conduct tests on bitumen performance characteristics in order to establish quality control for their products. Therefore, data from the asphalt industry are available which will allow the correlation of asphalt and binder performance-based characteristics to be determined.

In the FunDBITS project this new internationally available data is being reviewed in order to develop performance-based bitumen

In the FunDBitS project, this new internationally available data is being reviewed in order to develop performance-based bitumen characteristics which may be introduced into bitumen specification standards EN 12591, EN 14023 and EN 13924. The found correlations may also be applied for special binder products containing various additives (e.g. waxes or crump rubber). By having all stake-holder parties involved in the project, including national road research laboratories, universities, asphalt industry and bitumen producers, the required discussions on the feasibility of test procedures and the results for the specification will shorten the later discussions in CEN TC336 committee and its working/task groups, in particular CEN TC336 WG1/TG5 'Framework P-R Specification for Bituminous Binders'.

When the next 5-year reviews for the bitumen specification standards are scheduled in 2015, the results of FunDBitS will be available.