

## **STIFFNESS AND COMPLEX MODULUS OF COLD RECYCLED MIXES WITH DIFFERENT BINDER COMBINATIONS**

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### *ABSTRACT*

Standard design for cold recycled asphalt mixes specifies the use of bituminous emulsions, foamed bitumen or hydraulic binders (cement, lime etc.). In Central European countries, often the combination of cement and bituminous binder is used as the most preferable solution because of increased bearing capacity which can be provided by the final structural layer similarly to cement stabilized materials. For this reason it is expected that strength properties as well as stiffness are improved, nevertheless the strain-related behaviour explained usually by stiffness modulus, resilient modulus or complex modulus is not largely assessed. During the experimental study, cold recycled mixtures with bituminous emulsion and foamed bitumen have been designed. In both cases the same reclaimed asphalt material was used. The mixes were then produced also with 1 % and 3 % cement by mass of the cold recycled mix. For all mixes, stiffness was assessed by the repeated indirect tensile stress test (IT-CY) evaluating different curing periods. It has been found that the stiffness values are raised depending on the duration of curing. Further it was clearly confirmed and demonstrated that increase is strongly subject to the content of cement in the cold recycled mix. In parallel the evaluated mix design options were compared to the trends which have been found for results of indirect tensile strength (ITS) test. Since the main objective of this paper is to compare stiffness and dynamic complex modulus, testing has been done for selected mixes using the four-point beam test (4PB-PR). The focus was oriented on possible correlations and comparability of values gained by these two tests characterizing the strain behaviour of the material. It was further expected to get some verification of suitability for 4PB-PR since being a more advanced test providing broader information about the material behaviour.