

Title: Effects of the granulate incorporation in the asphalt pavements recycled with emulsion using the gyratory compactor

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The pavement recycling can be done in two different ways: the hot recycling and the cold recycling. The two options are very interesting and for this reason they are doing so many studies to determine their mechanic properties and how to solve their possible defects against the traditional techniques. Both systems are a good alternative because they have lots of advantages in front of the traditional systems, in special those that refers to the decrease of the environmental impact.

Actually doesn't exist an accepted and a standard worldwide method for the cold recycled mix design when it is use asphalt emulsion as recycled additive. The study of these mixes are having been done in so many countries because its normal used will become a great benefit ecologically and economically.

This work has two very different parts where are done two different studies with an objective each one:

- Firstly is done a compaction study of the mix. In this study will analyse the emulsion contents influence and the mix composition, what means, the mix granulated in working facilities, cohesion, compaction and mechanics properties, densities and indirect tensile, of the material. It will be studied three types of mix with different quantity and type of granulate material;

- mix 1: 20% grains 12,5/20 mm + 80% de RAP 100% through 12,5mm.
- mix 2: 20% grains 0/5mm + 80% de RAP 100% through 20mm
- mix 3: 100% RAP through 20 mm.

- At last it will be done a compaction process study using the gyratory compactor. Actually, this technique is being utilized for lots of countries but it hasn't got so spreading. The gyratory utilization is because the mix process is similar to the process that it happens in situ. The finality of this study is to define the compaction parameters which will achieve similar densities as it is done in the reality. The current rules will be analyse.

The finally conclusions depend on the heterogeneous of the principal component. The component that we are talking about is the RAP. We can observe that in most of the mixes present discontinuity results. These discontinuities depend if they are grains in the broken directrix and if they are well covered with the emulsion. The facts that influence in the mix properties are the granulate and the emulsion content: The mix 2 (20% grains 0/5mm + 80% RAP 100% through 20mm) were the fines occupy the wholes that leaved the RAP. While the emulsion content that gives a higher density is the 3,5% although t it doesn't give the best shear stress.

In the compaction process study using the gyratory compactor the parameters to define are the vertical press and the angle that the gyratory compactor piston does to the material. After analysing the results of the static compaction and connecting with the result obtained of the reality, PARAMIX project, if it compares to the results obtained with the gyratory compactor with the same conditions (granulate and % ECL2) it can be deduced that the results in situ are higher than the laboratory results. Principally will focus the analysis to bring near the real densities, because is the fact that more disagree with the results obtained with the gyratory compactor respect the results obtained in situ. The vertical press is not a determinate fact in any of the subjects of study, for this reason it is advise to not to change what it says the current rules. On the other hand, the angle variations produce enormous changes in the different properties and they achieve better results as the angle is bigger. In conclusion it's advised to increase the angle till 2,0° and to maintain the vertical press.