

Effects of Particle Size Distribution on Mechanical Strength and Physical Properties in Engineered Quartz Stone

Authors : Esra Arici, Duygu Olmez, Murat Ozkan, Nurcan Topcu, Furkan Capraz, Gokhan Deniz, Arman Altinyay

Abstract : Engineered quartz stone is a composite material comprising approximately 90 wt.% fine quartz aggregate with a variety of particle size ranges and 10 wt.% unsaturated polyester resin (UPR). In this study, the objective is to investigate the influence of particle size distribution on mechanical strength and physical properties of the engineered stone slabs. For this purpose, granular quartz with two particle size ranges of 63-200 μm and 100-300 μm were used individually and mixed with a difference in ratios of mixing. The void volume of each granular packing was measured in order to define the amount of filler; quartz powder with the size of less than 38 μm , and UPR required filling inter-particle spaces. Test slabs were prepared using vibration-compression under vacuum. The study reports that both impact strength and flexural strength of samples increased as the mix ratio of the particle size range of 63-200 μm increased. On the other hand, the values of water absorption rate, apparent density and abrasion resistance were not affected by the particle size distribution owing to vacuum compaction. It is found that increasing the mix ratio of the particle size range of 63-200 μm caused the higher porosity. This led to increasing in the amount of the binder paste needed. It is also observed that homogeneity in the slabs was improved with the particle size range of 63-200 μm .

Keywords : engineered quartz stone, fine quartz aggregate, granular packing, mechanical strength, particle size distribution, physical properties.

Conference Title : ICMCM 2019 : International Conference on Mechanics of Composite Materials

Conference Location : Barcelona, Spain

Conference Dates : December 16-17, 2019