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Influence of the Mineralogical Composition and Textural Properties on the Quality of Coarse Aggregates

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To evaluate the influence of the petrographic variables on the quality of coarse aggregates consisting of granitoid (granite to tonalite) rocks, 17 samples selected from the Swedish part of the Baltic Shield have been studied concerning their petrographic properties, for example, mineral composition, grain size, grain boundaries, and the frequency of micro-cracks. All of the samples selected also have been studied in mechanical tests used to evaluate the quality of aggregates in Sweden. The quality has been determined by means of flakiness, impact value, abrasion value I, and abrasion value II. An analysis of the influence of the mineral composition and textural properties on the aggregate quality has been performed using statistical correlation and linear models. The results indicate that an increasing content of feldspar negatively influences the strength against impact, while an increasing content of mica (tested to 35 vol.%) combined with a diminishing grain size and more irregular grain boundaries has a positive influence on the resistance of granitoids to mechanical impact. Abrasion value II seems to be mainly influenced negatively by an increasing frequency of micro-cracks. The practical implementation of the results is suggested.

Keywords: Aggregates, Rock Material,; Image Analysis of Microscopic Images; Mechanical Properties