

Some Variations in Petrography of South African Karoo Dolerites and the Effects Thereof on Aggregate Properties

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Abstract

The Karoo Dolerite Suite in South Africa is an important source of road construction aggregates both as natural gravel aggregate and as a crushed rock aggregate. The reason for this is the wide distribution of the suite throughout the Karoo Supergroup, which is generally lacking in quality aggregate lithologies. The Karoo Dolerite Suite can however, despite being a single geological unit, be of significantly variable petrography mainly due to the very large area (>500,000 km²) and wide variety of lithologies into which these hypabyssal rocks were intruded. The nature of relatively small hypabyssal intrusions also leads to significant variations in texture and primary and secondary mineralogy within one intrusion. Material prospecting campaigns tend to underestimate such variations due to the fact that all intrusions are assigned to this one geological unit. Such generalizations result in inadequate sampling and subsequent inadequate characterization of potential source materials. This paper discusses the differences in petrography of eight different quarries located in different country rock lithologies and in a variety of climatic regions ranging from arid to moist sub-humid. The observed differences are not linked to variations in intrusion settings (primary variations) or climatic regions (secondary variations). The significance of the observed variations on the properties and performance of the aggregates is however high as illustrated in case studies of some inadequately characterized aggregates that have been utilized only to become problem materials.

Keywords:

Aggregate- Petrology-Variability- Properties-Performance