

## **Formulating supplementary compliance criteria for locally produced concrete**

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### **Abstract:**

Recent developments in concrete manufacturing technologies have significantly influenced the properties of concrete. However, the existing information on the properties of locally produced concrete is not sufficient to ascertain the quality of the finished concrete product. Thus, there is a need to develop a data base on the properties of concrete produced utilizing the local aggregates. This data base could be utilized to develop compliance criteria.

This is the final report of a research study was conducted by the Research Institute at King Fahd University of Petroleum and Minerals (KFUPM/RI) for Saudi ARAMCO. The objective of the study was to formulate compliance criteria for concrete produced using local aggregates. The developed compliance criteria are to be utilized for quality control purposes by Saudi ARAMCO in its construction projects.

Concrete specimens were prepared with varying mix design parameters, such as water to cementitious materials ratio of 0.35, 0.40, and 0.45, cementitious materials content of 300, 350 and 400 kg/m<sup>3</sup>, Type V, Type I, and silica fume cements, and Abu-Hadriya and Riyadh road aggregates. The concrete specimens were cured under both laboratory and field conditions. They were tested to evaluate their mechanical properties, such as compressive strength and pulse velocity. The durability characteristics, such as water absorption, depth of water penetration, chloride permeability and coefficient of chloride diffusion, of the concrete specimens were also evaluated.

The data developed in this study were statistically analyzed to develop mathematical relationships between the mix design parameters and the mechanical properties and durability characteristics. Also, correlations were developed between compressive strength and the durability characteristics. The mathematical relationships so developed are expected to assist Saudi ARAMCO engineers in their day to day quality assurance/quality control work.