

# **Durability and thermal incompatibility of concrete constituents made from local materials in the Arabian Gulf Countries.**

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## **Abstract**

In the Gulf, predominantly limestone coarse aggregate is used which has a low coefficient of thermal expansion compared to that of cement paste. The combination of widely spread use of limestone coarse aggregates and the extreme seasonal temperature changes of this region results in unequal temperature volume changes in concrete and its components which cause internal stresses and cracks.

This study attempts to separate and assess the effect of temperature variations on durability of concrete made from local material in the Gulf region. Limestone rocks, Portland cement Type I, potable water, and dune sand were used in concrete mixes of this study.

The effect of thermal incompatibility of concrete components on durability was studied for a period of seven months by measuring permeability, pulse velocity, compressive strength, and flexural strength of heat cycled specimens concrete and its components. Coefficients of thermal expansion of concrete and its components were determined experimentally in the laboratory. Results showed internal deterioration of concrete when subjected to the simulated climatic conditions of this region, due to differential thermal strains of coarse aggregate and cement paste.