

# The Impact of Varying Ratios of Water-to-Cement Content on the Fresh and Strength Properties of Self-Compacting Concrete

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## ABSTRACT

The performance requirements for structural components are becoming more sophisticated and varied in recent years. Self-compacting concrete (SCC) is a highly flowable mixture that can be placed without vibrations in structural elements with congested reinforcing. The development of SCC must achieve an appropriate balance between deformability and stability. Additionally, stability is influenced by the material properties and mix proportions, necessitating the development of a technique for SCC mixture design. However, techniques for mix design and testing are continually evolving. Mix design criteria primarily concern the type and quantity of constituents in the SCC mixture. The dose adjustment of the water to cement ratio is a critical property in proportioning SCC mixes. This research aims to examine the influence of different water to cement ratios (0.32, 0.34, and 0.36) with other consistent ratios using locally available ingredients in the SCC mixture. Also, in this study several fresh properties of SCC were examined in accordance with the European Federation of National Associations Representing for Concrete (EFNARC). Moreover, this study presents the findings and discussion of an experiment conducted to test the influence of water to cement ratios on fresh, and mechanical properties of SCC at 7, 14, 28 days of curing. The findings of the tests for fresh SCC properties are in the range of the standard limit. The strength properties were improved in the lower water to cement ratio. The increase in the water to cement ratio shows a decrease in the strength properties. In addition, the ratio of water to cement affects the properties of the hardened material, while a higher water-to-cement percentage leads to an increase in flow, which may be attributed to the use of superplasticizer.

## KEYWORDS

Self-Compacting Concrete, Mix Design, Fresh properties, Mechanical properties, Water to Cement Ratio.

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