

C-27: Mechanical properties of ferrocement for water tank design

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In Sri Lanka, ferrocement is generally used in construction of water tanks smaller than 45m^3 . All construction is generally carried out according to past experience. A single layer of woven mesh is generally used as reinforcement with the water, cement, sand ratio of 0.5 : 1.0 : 3.0 and wall thickness of 40mm. There is a necessity of designing larger capacity water tanks.

To design water tanks, the primary requirement is to know the mechanical properties of ferrocement. Water, cement, sand mix proportions of 0.5 : 1.0 : 1.5

suggested by American Concrete Institute (ACI), and 0.5 : 1.0 : 3.0 which is generally used in Sri Lanka were selected for this research. Hexagonal, Welded and Woven type of meshes were used as reinforcing steel. Specimens were prepared having single and double layers of mesh.

Strength properties are higher for ACI mix proportion and increase with the amount of steel. Woven mesh exhibits maximum tensile and flexural strength properties. Compressive strength does not depend on amount of reinforcing steel. Since woven mesh gives superior results than all other mesh types, it could be used effectively in construction of ferrocement water tanks.

Maximum design hoop stress was calculated for the ferrocement water tanks of capacity 45m³, 75m³ and 100m³ having standard dimensions. Woven single mesh with mix proportion 0.5 : 1.0 : 3.0 can be used for 45m³ water tanks while 0.5 : 1.0 : 1.5 can be used for all 3 capacities. Woven double mesh with mix proportion 0.5 : 1.0 : 3.0 can be used for 75m³ tanks. Further, in these water tanks the calculated crack widths are smaller than 0.1mm which is allowed by ACI for ferrocement water tanks.