

Rehabilitation and Strengthening of Fire – Exposed Concrete Slabs Using Ferrocement Laminates

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ABSTRACT:

Fire is one of the most common accidental loads that might affect or even destruct concrete structures. Once initiated, it rapidly spreads by consuming highly flammable modern furnishing and fittings. The integrity and strength of the materials used in reinforced concrete structures are highly influenced by their exposure to fire. The occurring damage depends on the severity of the fire in terms of the fire temperature and time of exposure. In most cases, the serviceability of the structure is lost and consequently, needs to be repaired or replaced. Replacement may not be feasible in all cases and may be very expensive. The repair of the structure is an efficient solution and may be cost effective to make the structure serviceable. This paper presents a proposed method for strengthening fire-exposed reinforced concrete slabs using ferrocement laminates as a viable alternative to the expensive conventional repair techniques. A series of ten reinforced concrete one-way slab specimens were tested. Nine slabs out of the ten were classified into three groups and exposed to fire at 650 C° for different exposure time, i.e, 30 , 60, and 90 minutes. After exposure to fire, six slabs were rehabilitated by one layer of ferrocement at the tension face. Two different types of reinforcing meshes, expanded or welded wire mesh were encountered in the ferrocement laminate. The experimental results of the slab specimens demonstrate that irrespective of the fire-exposure time or the type of reinforcing meshes, better behavior and load carrying capacity, for all the rehabilitative slabs, could be achieved compared to their original behavior. It was found that ferrocement is an ideal material for the rehabilitation of fire-exposed concrete slabs as it improves crack resistance, allows rapid construction with no heavy machinery, imposes small additional weight and low construction cost.