

Comparative study of concrete panels' fire resistance

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Abstract

There is still a concern regarding concrete structures' fire safety, mostly due to the occurrence of concrete spalling. Although many tests have already been carried out, there is no clear definition about the parameters of the factors that influence its occurrence. This paper aimed to compare three different types of concrete panels, with dimensions of 300 x 315 x 10 cm (124.0 x 39.4 x 3.9 in.), composed of reinforced concrete (RC), prestressed concrete, and polypropylene microfiber RC. The panels were exposed to the standard fire curve based on ISO 834, aged 28 days, measuring the temperatures in panels' surfaces. Prestressed concrete panels experienced explosive spalling 18 minutes after the test began. RC panels and the panels with polypropylene microfiber addition maintained their integrity and structural stability for 240 minutes, failing in the thermal insulation criteria at 210 and 140 minutes, respectively. Although polypropylene microfiber concrete panels presented no spalling of concrete, conventional concrete panels attended the standardized criteria for a longer period due to its better thermal insulation.

Keywords

Concrete Panels, Concrete Spalling, Fire Safety, Polypropylene Microfibers, Precast Concrete Panels, Prestressed concrete.