EFFECT OF ELEVATED TEMPERATURE ON PUNCHING STRENGTH OF FLAT SLABS IN COMPRESSION SIDE

By

Peter Kamil Fakhry Auob

A Thesis Submitted to the
Faculty of Engineering at Cairo University
in Partial Fulfillment of the
Requirements for the Degree of
MASTER OF SCIENCE
in
Structural Engineering

FACULTY OF ENGINEERING, CAIRO UNIVERSITY
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Title of Thesis:

Effect of elevated temperature on punching strength of flat slabs in compression side

Key Words:

Punching shear; Fire effect; Flat slab; Compressive test; Effect of cooling on concrete

Summary:

An experimental investigation was carried out on normal strength concrete flat slab to study punching strength under the effect of elevated temperature. The experimental investigation conducted on 10 slab-column connection specimens with 8 specimens have been exposed to high temperature for different durations with different concrete covers and different cooling types are represented in the present investigation. The slabs were subjected to elevated temperature 600º c from the electrical furnace, these durations are 2.0 and 3.0 hours.

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ABSTRACT

Reinforced concrete is considered one of the most commonly used building structures in Egypt and the Arab region. However, its cost less than other building structures, such as metal structures. Concrete can be formed to serve the various architectural designs and with high security. Fire is considered one of the serious causes of damage and cause collapse of reinforced concrete structures. Many collapse cases took place in recent years due to fire all over the world. The effect of fire on structural safety is dependent on fire temperature, duration and fire fighting technique. The flat slab construction of systems most commonly used in Egypt and the problems faced by the construction of this system is the possibility of punching-shear for slabs and concrete, especially when exposed to fire with less resistance of reinforced concrete which would lead to the occurrence of punching shear without warning. In this research work the effect of the high temperature on the punching shear of flat slabs is investigated. Experimental study was carried out to examine the effect of high temperature on the behaviour of slab-column connections. In this research the effect of heat duration and thickness of concrete cover were studied. Two methods of cooling the slab were also tested.