



## Coffee Break Training - Fire Protection Series

### Building Construction: Hollow Core Concrete Panels

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**Learning Objective:** The student shall be able to describe the construction features of hollow core concrete panels.

Modern building construction techniques rely on cost-effective materials and rapid installation to keep expenses down. One method involves the use of hollow core concrete panels that are cast in a controlled factory environment and transported to the construction site where they are assembled as part of floor or roof systems. They even can be cantilevered as much as 5 ft (1.5 m) to create exterior balconies.

Most slabs are 4 ft (1,220 mm) in nominal width and 8-inches (203 mm) deep and other sizes ranging from 6 to 14 inches (152 to 355 mm) are available for special applications. Hollow core slabs are prestressed with reinforcing metal strands. The load capacity will be a function of the slab thickness, the amount of prestressing provided, and the location of the prestressing strands.

Hollow core slabs can be supported by different structural elements designed to carry the dead and live loads. Precast beams, precast walls, poured concrete beams and walls, masonry walls, insulated concrete forming system walls, wood and steel stud walls, and structural steel beams are all suitable for use with hollow core as load bearing systems.

Hollow core panels are cast with continuous voids to reduce weight and cost. The voids, as shown in today's illustration, can be used to conceal electrical wiring or mechanical ducts. Slabs detailed to distribute heated air through the cores can be used as the thermal mass in a passive solar application.

Underwriters Laboratories (UL) publishes fire ratings for various assemblies. The fire ratings should be considered in determining the slab thickness to be used in preliminary design. The "UL Fire Resistance Directory" includes more than 50 design numbers for hollow core slabs which qualify for ratings of 1, 2, 3, or 4 hours. As an alternative to UL ratings, model codes include prescriptive requirements which can be used to establish fire-endurance ratings. A fire rating is dependent on equivalent thickness for heat transmission, cover over the prestressing strand for strength in a high temperature condition, and end restraint.

A typical 8-inch thick hollow core panel has a 2-hour fire rating. For a higher rating (3 or 4 hour), typically a concrete (or gypsum-based) topping would be applied or a spray-on fire-resistant material can be added to the underside of the panel.

The Precast/Prestressed Concrete Institute (PCI) manual *Design for Fire Resistance of Precast Prestressed Concrete* illustrates the code-accepted practice of rational fire design for precast and prestressed concrete products. Additional information and publications can be obtained from the website: [www.pci.org/publications/index.cfm](http://www.pci.org/publications/index.cfm)



The teardrop-shaped holes above the concrete masonry units represent the end view of a hollow core concrete floor panel.



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