

OPEN FORUM

PROBLEMS AND SOLUTIONS

The comments and opinions expressed herein are those of the contributing author and do not necessarily reflect official PCI policy. Some of the provided answers may have alternate solutions. Reader comments are invited.

Fire Rating Specifications

Q1: A precast producer recently asked if a parking structure could be non-rated as far as fire resistance is concerned?

A1: The answer to this question depends, of course, on the size of the parking structure, and neglecting the possibility that the owner or designer might have stipulated in the specifications that the structure must be fire rated for insurance purposes or other reasons. Ignoring the latter, and also ignoring any area increase for location on the site or sprinkler protection, let's take a look at how the size affects the fire rating. To begin with, let's assume that this is an open parking structure.

To solve the problem, the reader needs to study the accompanying table. This table is found in Chapter 3, Volume 1 of the Uniform Building Code (UBC); note that the same table appears in the International Building Code (IBC). The only non-rated category is the last item in the left-hand column, "Type of construction, II-N." The allowable area is 30,000 sq ft (2790 m²), and the allowable height is eight tiers.

In Section 311.9.5 of the UBC, it states that:

"Open parking garages constructed to heights less than the maximums established by Table 3-H may have individual tier areas exceeding those otherwise permitted, provided

the gross area of the structure does not exceed that permitted for the higher structure."

Using a few simple calculations, the maximum area of a Type II-N (non-rated) structure is 8 x 30,000 or 240,000 sq ft (22320 m²). If the structure is two stories (tiers) high, each tier could be 240,000/2 = 120,000 sq ft (11160 m²). For a three-story structure, each tier could be 240,000/3 = 80,000 sq ft (7440 m²), and so on.

In summary, then, depending on the configuration of the structure being designed, this table determines whether it could be non-rated for fire resistance.

Q2: With reference to the stair connection detail shown on the right-hand page, does the slight exposure of the steel element making the connection have to be fire rated?

A2: The illustration shows how the landing is connected to the wall of a stair shaft. Notice that there is a slight gap between the landing and the wall. Assume that this is a two-hour shaft.

The answer to the question is that the steel element does not have to be fire rated. When a stair shaft is fire rated, it means that the inside of the shaft is being protected from a

Table 3-H. Open parking garages area and height. (Courtesy: International Conference of Building Officials.)

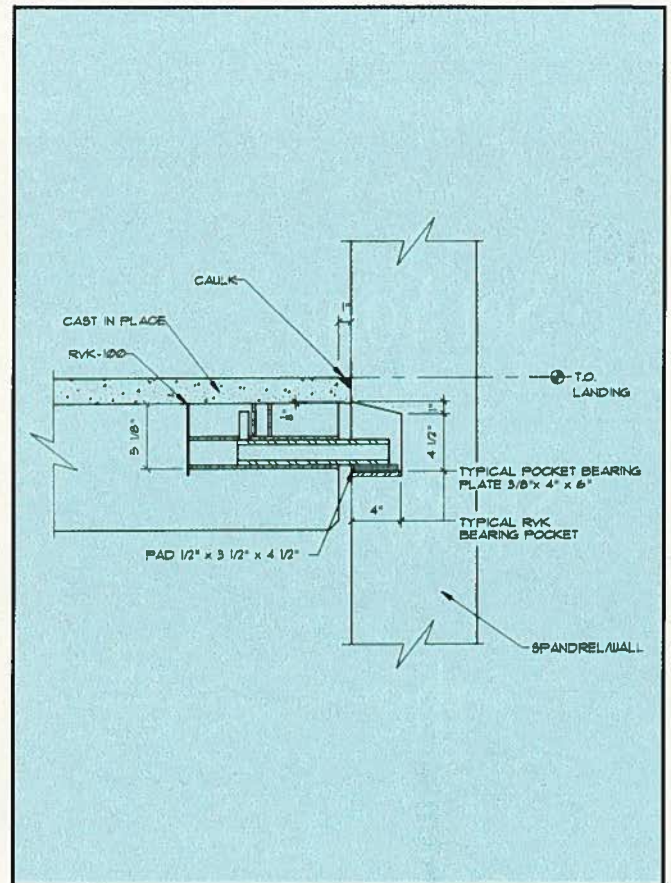
Type of construction	Area per tier (sq ft)	Ramp access	Height (in tiers)	
			Mechanical access	
			Automatic fire-extinguishing system	
			No	Yes
I	Unlimited	Unlimited	Unlimited	Unlimited
II-F.R.	125,000	12 tiers	12 tiers	18 tiers
II One-hour	50,000	10 tiers	10 tiers	15 tiers
II-N	30,000	8 tiers	8 tiers	12 tiers

Note: 1 sq ft = 0.093 m².

fire outside the shaft. The walls of the shaft must be rated for two hours in this case, but nothing inside the shaft need be. The situation is analogous to walking up an unprotected steel stairway inside a stair shaft.

To further reinforce this concept, take a look at the Uniform Building Code (UBC), Chapter 6, of Volume 1. For Types I and II construction (this is for non-combustible construction), look at Section 602 (Type I) and Section 603 (Type II), and specifically those subsections addressing stairway construction. The provisions plainly state that stairway construction shall be "...of reinforced concrete, iron or steel with treads and risers of concrete, iron or steel." That's it! Non-combustible construction, but having no required fire rating. In Type III construction and beyond, the stairway construction may be of "...any material permitted by this code."

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Typical "RVK" detail. (Courtesy: JVI, Inc.).

DISCUSSION NOTE

The Editors welcome discussion of reports and papers published in the PCI JOURNAL. The comments must be confined to the scope of the article being discussed. Please note that discussion of papers appearing in this issue must be received at PCI Headquarters by October 1, 2000.