Coffee Break Training - Fire Protection Series

Building Construction: Penetrations of Vertical Exit Enclosures

No. FP-2012-18 May 1, 2012

Learning Objective: *The student shall be able to identify the requirements for protecting penetrations in vertical exit enclosures.*

At first glance, today's picture may be a common sight to those who travel a lot and spend time in hotels and motels. The photograph illustrates fire sprinkler risers and drains inside a fire-resistive-rated exit stair enclosure.

A closer look, however, reveals a potentially significant problem with the integrity of the fire-resistive construction and its ability to protect evacuees from fire or other products of combustion.

The vertical pipe at the right-hand side of the picture is a plastic drain pipe from an upstairs bathroom. It penetrates the fire-resistive construction of the gypsum wallboard, then runs into a large hole in a concrete masonry unit shaft. The openings allow unrestrained air movement from the shaft into the stair enclosure, providing a path for dangerous fire products.

The walls of this fire-rated exit stair enclosure have been compromised by a plastic drain, waste, and vent pipe.

Vertical exit enclosures are intended to provide a continuous and unobstructed protected path to the exit discharge. Exit enclosures are required to have a minimum fire-resistance rating of 1-hour when protecting stairs less than four stories in height and 2-hour fire resistance when protecting stairs four or more stories in height. Exit enclosures should not be used for any purpose other than a means of egress and especially not as a shaft for utilities.

Penetrations into and openings through an exit enclosure are prohibited by the model building codes, except for required exit doors, equipment, and ductwork needed for smoke control pressurization, sprinklers and standpipes, electrical raceways for fire department communications systems, and electrical raceways for power and lights serving the enclosure.

Any of these permitted penetrations are required to be protected by through-penetration firestop systems that provide an equivalent level of fire resistance to the construction materials. These firestop systems must be approved by the code official and should be tested in accordance with national standards. (See Coffee Break Training 2005-3 for an explanation of through-penetration firestop systems.)

For additional information, refer to *International Building Code*, Chapters 7 and 10, or National Fire Protection Association (NFPA) 5000, *Building Construction and Safety Code®*, Chapters 8 and 11.