Corridor Construction and Protection of Corridor Ventilation Systems

PART ONE OF TWO

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Because corridors serve such an important part of many means of egress systems, it is important to assure that they are properly constructed and protected. Roughly three-quarters of fire deaths are related to smoke, so it is imperative that building occupants be provided with a relatively smoke-free egress route. That is why the details of corridor construction and opening protection requirements differ somewhat from what is typically required for fire-resistive assemblies.

Following is an in-depth look at the corridor construction details under the 2006 *International Building Code* (IBC). The concluding part of this article, which will appear in the next issue of *Building Safety Journal*, will focus on the protection of corridor ventilation systems.

Construction Details

Corridors required to have a fire resistive rating by Section 1017 and Table 1017.1 of the 2006 IBC must be constructed using fire partitions that comply with Section 708. Generally, fire-resistive-rated corridors are required—per Table 1017.1 and Section 708.3—to be constructed with fire partitions that have not less than a 1-hour fire-resistive rating. An exception is corridors that serve an occupant load greater than ten in a sprinklered Group R occupancy, which can be constructed with a ½-hour fire-resistance rating. The basic details of the construction requirements are the same, but unless there is a specific difference, the details and figures provided are based upon a 1-hour fire-resistive rating.

Section 708.4 provides the bulk of the actual construction requirements. Figure 1(a) and Figure 1(b) represent the basic requirements given in the first sentence of Section 708.4: "Fire

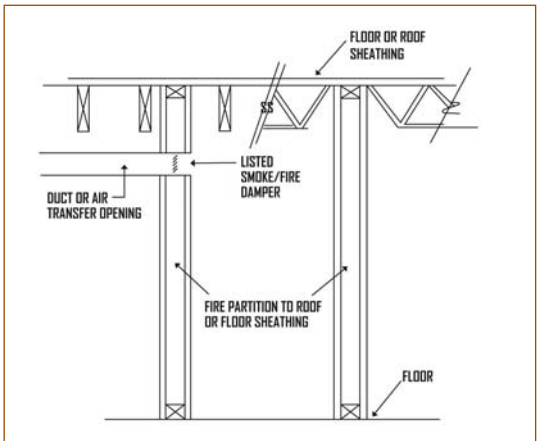

Figure 1(a). Fire partitions extending from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above.

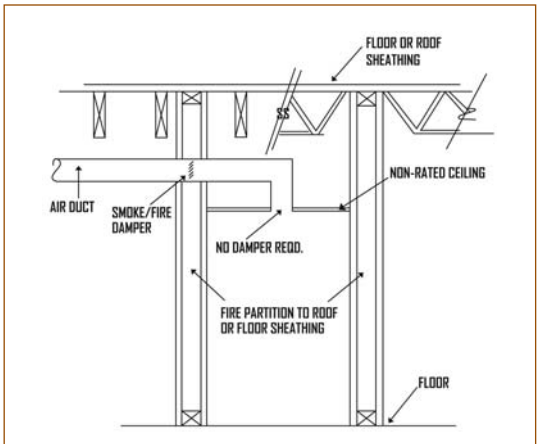

Figure 1(b). IBC Section 708.4 permits corridors to have non-fire-resistive-rated ceilings.

partitions shall extend from the top of the foundation or floor/ceiling assembly below to the underside of the floor or roof sheathing, slab or deck above [. . .].” This option differs from what some legacy code users are familiar with because it permits the corridor to have a non-fire-resistive-rated ceiling, but is an acceptable method of construction because the purpose of the corridor is to protect the egress system from fire or smoke that occurs within adjacent spaces. Note that the IBC’s corridor construction requirements are not generally intended to provide protection from fire or smoke on a different level; threats on other floors are addressed by requirements for shafts and horizontal assemblies given elsewhere in the code.

A second option for corridor enclosure is provided in the conclusion of the same sentence: “[. . .] or to the fire-resistance-rated floor/ceiling or roof/ceiling assembly above.” Exercising this option imposes an additional requirement for fire-blocking or draft-stopping in areas of combustible construction, as illustrated in Figure 2.

A third option for corridor construction is provided in Section 708.4, Exception 2. Under this option, the corridor ceiling must be constructed “as required” for a 1-hour fire-resistance rated floor or roof system. A true 1-hour fire-resistive horizontal assembly where the floor and ceiling are tested together is not required, just the ceiling portion.

Note that Figure 3, which illustrates this option, does not depict the ceilings of the adjacent rooms because the exception requires that the “room side” membrane be carried through “to the underside of [. . .] a fire-resistance rated floor or roof above.” This language was carried over from the *Uniform Building Code* (UBC), one of the legacy codes used to develop the IBC, but an important distinction is that the UBC always required a rated ceiling for a corridor while the IBC does not. Therefore, it is our opinion that the code does not intend that the room side membrane must extend to the floor or roof slab or deck of a rated assembly.

Based on the language of the base paragraph of Section 708.4, it would seem permissible that the room side protection may end at “the underside of the floor or roof sheathing, slab or deck above” even if it is a non-rated floor or roof. Rather, the exception is only intended to address the fact that the corridor side membrane is not carried through to the deck. It is important that the ceiling within the corridor provide the continuity to complete the inside corridor enclosure. Also, when the room side membrane of the corridor wall does not extend to the floor or roof slab or deck above, fire-blocking or draft-stopping within or above the corridor walls must be provided per Section 717.

The fourth and final option is given in Section 708.4, Exception 3. Often termed a “tunnel corridor,” this method of construction—

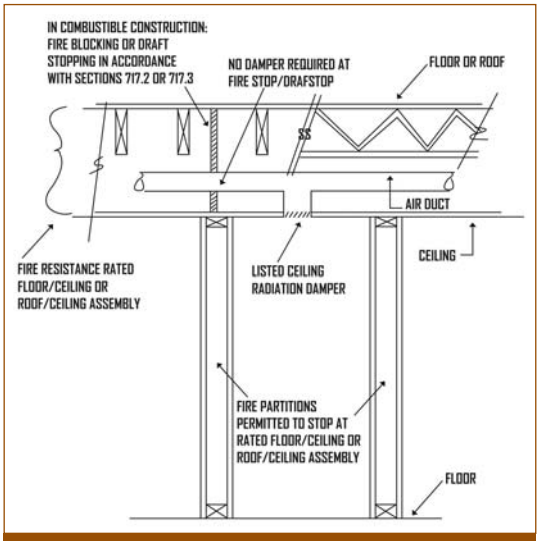

Figure 2. Fire-blocking or draft-stopping is required in situations where fire partitions terminate at the ceiling of a fire-resistance rated floor/ceiling or roof/ceiling assembly.

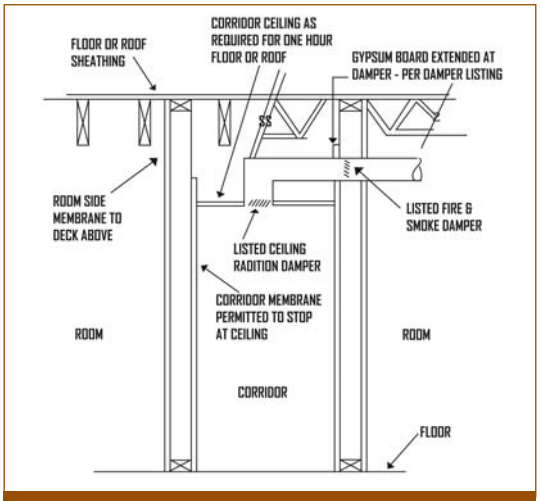

Figure 3. IBC Section 708.4, Exception 2, allows corridor ceilings to be constructed “as required” for a 1-hour fire-resistance rated floor or roof system.

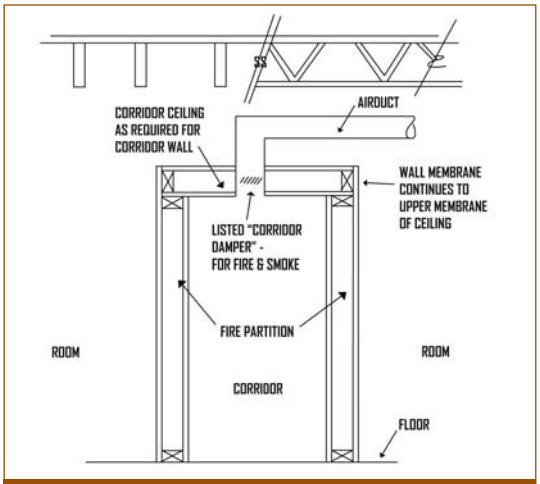

Figure 4. The “tunnel corridor” construction option provided by IBC Section 708.4, Exception 3.

illustrated in Figure 4—is frequently used because of the convenience of not having to carry the walls up into the area occupied by the floor or roof framing members, and also allows duct work and other items to pass over the corridor without requiring any additional protection. This is a significant allowance because although it may not be able to pass a horizontal fire test, the corridor serves its intended purpose by completely separating the means of egress from adjacent spaces and providing a protected path through the space.

The ceiling of a tunnel corridor does not have to be constructed exactly the same as the walls: any complying corridor wall assembly can be used. For example, the walls may be constructed using a 2 x 4 stud wall but the ceiling may need to use a 2 x 6 assembly in order to span a wider-width corridor. The important thing is not that the wall and ceiling are the same, but that the ceiling is constructed using an assembly that would be permitted to be used for the corridor walls.

The three options for corridor construction given in IBC Section 708.4 allow a wide variety of potential compliance designs while assuring that corridors are effectively separated from adjacent spaces. Section 407.3 provides one other option for constructing corridors, but it is limited to those in Group I-2 occupancies. Under this option the corridor walls are permitted to be constructed as smoke partitions per Section 710, but this leaves many unanswered questions because smoke partitions do not require a fire-resistance rating and many of the provisions of Section 710 only apply "where required elsewhere in the code."

A look at the various requirements given in Section 710 provide some guidance on the wall's intended performance, but unlike fire barriers, which require a fire-resistance rating per Section 709.3 and an air leakage rating when used with a smoke control system per Section 909.5, or even the language in Section 508.2.2.1 regarding incidental use areas about "construction capable of resisting the passage of smoke," the level of performance is not explicitly addressed and therefore debatable. Section 710.2 provides that a smoke partition can be constructed of any "materials permitted by the building type of construction." It is our opinion that gypsum board, wood structural panels, glass, steel panels or any other solid material could be used.

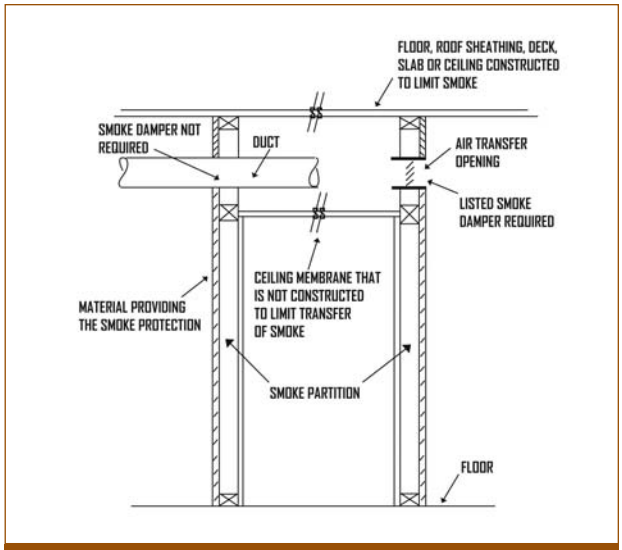

Figure 5a. IBC Section 407.3 provides for corridor walls in Group I-2 occupancies to be constructed as smoke partitions. This example shows the smoke partition material running to the underside of the floor or roof sheathing, deck or slab above.

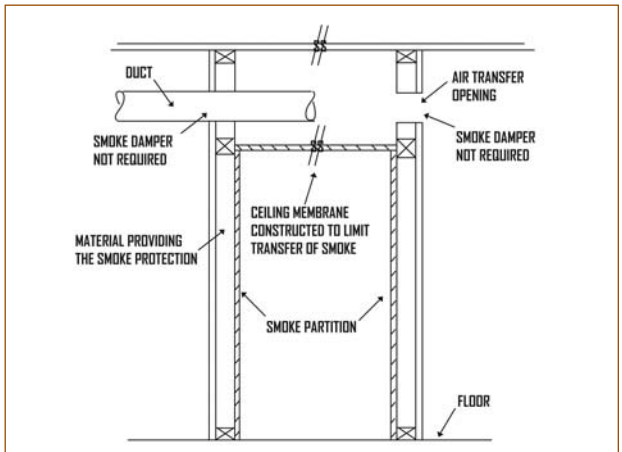

Figure 5b. This example shows the walls as smoke partitions that terminate at the underside of the ceiling above where the ceiling membrane is constructed.

In addition, unlike a fire-resistive rated assembly, which is tested from both sides, the material providing the smoke protection could be installed on only one side. Therefore, the smoke partition could be constructed with the material running "to the underside of the floor or roof sheathing, deck or slab above" or it could be terminated at the "underside of the ceiling above where the ceiling membrane is constructed to limit the transfer of smoke." These two options are illustrated in Figure 5a and Figure 5b, repectively. ◆