



# Building Policy

## *Membrane Penetrations*

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### Background

In construction that requires fire-rated floor/ceiling, roof/ceiling, and/or wall assemblies, it is common to see mechanical, lighting, and/or elements installed within the rated assembly. The rating of the assembly can be maintained by installing the penetrating elements in a furred-out wall or soffit, but there may not always be the space to do so. International Building Code (IBC) Section 714 provides several code-compliant solutions for creating membrane penetrations. Often, the preferred method of construction is to encase the penetrating element in gypsum board. This policy allows for elements to be installed within the assembly framing under certain conditions where they are encased by gypsum board or where ventilations ducts are encased in a listed duct wrap.

### Rated Floor/Ceiling and Floor/Roof Assemblies

Where the floor/ceiling assembly has a fire-resistance rating of not more than one hour, the rating of the floor/ceiling is considered as maintained where the penetrating element is in conformance with the items below.

Where a duct for exhaust or outdoor air penetrates into a floor ceiling assembly through the top plate(s) of a wall, additional protection may not be required. IBC 717.6.2 Number 2 Exception 2 states no additional protection is needed when these ducts are contained within a wall cavity, do not pass through other dwelling units or tenant spaces, and the penetration is protected per IBC 714.5.2. Where these ducts penetrate the wall below, the penetration must be protected in accordance with IBC 717 and 714.

### Encased in Gypsum board.

1. The element is completely separated from the remainder of the floor assembly by **one** of the following:
  - a. The same construction as the bottom membrane of the floor assembly, or
  - b. Two (2) layers of Type X gypsum board (if Item 2.a is not available)
2. Any penetrations through the encasement into the floor assembly are **protected** by a listed membrane firestopping system, damper, or other approved method(s).
3. The penetration is within a **single** bay, and joists are **spaced** no more than 24 inches on center or spaced in accordance with the listed assembly.

### Ventilation Ducts Wrapped in a listed Fire Wrap

1. Where the penetrating element is a ventilation duct, the duct is permitted to penetrate the rated floor/ceiling assembly when encased in a listed fire wrap. The fire wrap is required to meet the applicable standard and be installed per the listed assembly which includes the required duct support.
2. A listed firestop assembly meeting ASTM E814 or UL 1479 is required at all locations where a fire-wrapped duct penetrates a rated assembly.

### Rated Wall Assemblies

Where the wall assembly has a fire-resistance rating of not more than one hour, the rating of the assembly is considered as maintained where the penetrating element is in conformance with the items below.

#### Encased in Gypsum board.

1. The element is completely separated from the remaining of the floor assembly by **one** of the following:
  - a. The same construction as the penetrated membrane of the wall assembly, or
  - b. Two (2) layers of Type X gypsum board (if Item 2.a is not available)
2. Penetrations through the encasement into the wall assembly are **protected** by a listed firestopping system, damper, or other approved method(s).
3. The penetration is within a **single** stud bay, and studs are **spaced** no more than 24 inches on center or spaced in accordance with the listed assembly.

### Ventilation Ducts Wrapped in a listed Fire Wrap

1. Where the penetrating element is a ventilation duct, the duct is permitted to penetrate the rated floor/ceiling assembly when encased in a listed fire wrap. The fire wrap is required to meet the applicable standard and be installed per the listed assembly which includes the required duct support.
2. A listed firestop assembly meeting ASTM E814 or UL 1479 is required at all locations where a fire-wrapped duct penetrates a rated assembly.

### Assemblies Rated for Construction Type Only

In some cases, a wall or ceiling assembly is only required to be rated based on IBC Table 601 for type of construction. In this case, the fire-resistance rating is required to protect the structural integrity of the assembly, not to restrict the passage of fire. When using a membrane system, such as gypsum board, to provide the rating, the penetration or opening must be protected to maintain the assembly. Openings and penetrations in these assemblies shall be protected in the same manner as typical fire barriers, though there is no requirement to protect the passing of fire through the assembly. Membrane penetrations shall be in accordance with IBC 714.4.2.

Signature Gregg Schrader

Gregory H. Schrader, PE, SE, Building Official

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Attachments

Supersedes:



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