



DEPARTMENT OF PUBLIC SAFETY AND CORRECTIONS

Public Safety Services



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STATE FIRE MARSHAL

**INTERPRETIVE MEMORANDUM 2002 - 13**

To: Licensed Architects  
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Licensed Sprinkler Contractors  
Licensed Fire Alarm Contractors  
Licensed Fire Suppression Contractors  
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Stephen Gogreve, Manager of Inspections/Arson  
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From: Jean Carter, Architect Supervisor  
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Cindy Obier, Architect Supervisor  
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Approved by: Mark Gates,  
Deputy Assistant Secretary

Date: July 29, 2002

**Re: Combustible Structural Members Penetrating Fire Barrier Wall Assemblies**

This memo addresses solid structural wood members such as rafters, floor joists and trusses penetrating fire rated wall assemblies having wood framed walls and gypsum board finishes. Typical conditions are illustrated by the exhibits attached.

The Life Safety Code requires fire barriers and other life safety features to fulfill the objectives outlined by NFPA 101:4.2. NFPA 101:4.2 states that a structure shall be designed, constructed, and maintained to protect occupants who are not intimate with the initial fire development for the time needed to evacuate, relocate or defend in place. Structural integrity shall be maintained for the time needed to evacuate, relocate, or defend in place those occupants who are not intimate with the initial fire development

NFPA 221:3.2 states that a fire barrier wall shall extend from the foundation or floor below to the underside of the roof or floor deck above. Any voids or gaps created by the meeting of the wall and floor below and the underside of the roof or floor deck above shall be filled with an approved material with a fire resistance rating at least equal to that of the fire barrier.

Exception: The fire barrier wall shall be permitted to terminate at the underside of an individually protected structural member in the same plane. The structural member shall have a fire

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resistance rating of not less than that required for the fire barrier wall and shall prevent the passage of flame and hot gases.

This office observes that the roof or floor deck wall termination points may be combustible.

Chapter 6 of NFPA 221 provides requirements for fire resistant wall assembly penetrations by pipes, raceway, cables, heating, ventilating and air conditioning systems, piping or duct-work for high hazard materials. That section does not address structural members penetrating fire resistant walls.

The USDA *Wood Handbook* provides empirical equations for various wood species' charring rates. Based on those calculations, this office determines that a nominal 2" southern pine member will char lengthwise at a rate of 3.66 inches per hour.

This office often refers to the Standard Building Code for guidance. Standard Building Code, Section 709.6.3.4 states, "Where minimum 1-hour fire resistance is required, connectors and fasteners shall be protected from fire exposure by 1½ inches (38mm) of wood, or other approved covering for a one-hour rating."

The annular space formed by the penetrating member at the fire barrier wall and the sealant used is a consideration. Any sealant used must be capable of adhering to both the wall and penetrating structural member. The structural wood member's degree of deflection would also be required to match the sealant's dynamic or static characteristics.

After a review of the information provided, this office determines that solid structural wood members penetrating fire resistant fire barriers will be evaluated on a case-by-case basis for acceptance in providing one-hour fire resistance fire barrier walls by using the following criteria:

1. Solid wood members must have a minimum 1½ inch cross section and walls must be a minimum four inch thickness.
2. The sealant manufacturer's engineering judgement stating the maximum allowed annular space and compatible adherence characteristics shall be required.
3. The building designer or owner shall document the sealant suitability for the dynamic or static condition anticipated.

This determination is based on the judgement that a minimum 1½ thick structural wood member will char or burn at a rate comparable to or even slower than wood flooring or roofing material. The life safety objectives specified by NFPA 101:4.2 are not compromised by such installations.

This memo does not apply to fire walls which are required to be independently structurally stable during a fire event.

