

Space Separation for Wood Frame Construction

Introduction

The distance required between risks of wood frame construction to form separate amount subjects is often a topic of discussion within the property insurance industry. Insurers and reinsurers have internal guidelines for what is acceptable space separation, but is there an engineering basis for a single, safe distance between wood frame risks?

We believe there is.

Munich Reinsurance Company of Canada (MROC) recommends a distance of **200 ft. (60 m)** between wood frame risks for them to be considered separate amount subjects, based on the following analysis.

Factors Affecting Severity of Exposure

A fire in one building creates an exposure to adjacent structures by exposing them to heat by radiation and convection, as well as flying brands.

The most important consideration is the severity of the exposing fire. The combustible loading of the occupancy in the exposing building is the main factor in determining the potential severity of the fire.

Other factors contributing to fire severity in the *exposing* building include:

- *Construction of exterior walls and roofs*
Wood frame construction adds to the combustible loading.
- *Width and height of exposing building*
More wall area increases the heat radiating from the fire.

- *Percentage of openings in exposing wall area*
Window openings allow open flames and radiant heat to project through the walls once the glass has broken.
- *Interior finish*
Combustible materials add to the overall combustible loading.
- *Whether or not sprinklers provided*
We assume an unsprinklered risk, or sprinklers impaired in the case of a sprinklered risk, to establish a safe distance for separate amount subjects (i.e. separate fire divisions for PML/MFL purposes).

Another important consideration is the nature of the exposed building. Factors contributing to the severity of exposure in the *exposed* building include:

- *Construction of exterior walls and roofs*
Wood frame construction is an adverse factor in the exposed building. Exterior wall sheathing can vary from brick veneer to siding to exposed wood, with varying degrees of fire resistance and combustibility.
- *Orientation and surface area of exposed exterior walls*
A wall parallel to the exposing building will receive the maximum radiant heat. Buildings positioned on an angle will receive less heat radiation as the distance increases.
- *Percentage of openings in exterior wall area*
Window openings weaken the fire resistance of the wall assembly, resulting in greater heat transfer to the interior.
- *Protection of openings*
Examples are fire doors, wired glass and exposure sprinklers.
- *Interior combustible loading*
Includes occupancy and interior finish.
- *Whether or not building is sprinklered*
We also consider the exposed building to be unsprinklered for the same reasons as noted above for the exposing building.



Other site considerations of note are combustible yard storage between buildings and accessibility for fire-fighting operations. For this analysis, we assume that there is no intervening yard storage or combustible vegetation to consider.

Fire-fighting operations are not considered for reducing the severity of exposure. No credit should be given for town grade (i.e. "protected" and "semi-protected" areas) as this defeats the purpose of relying on distance for establishing separate amount subjects.

Recognized Standards

Two sets of recognized standards were reviewed with respect to space separation for exposure protection: National Fire Protection Association (NFPA) standards and Factory Mutual (FM) data sheets. NFPA's Fire Protection Handbook was consulted (reference document NFPA 80A, *Recommended Practice for Protection of Buildings from Exterior Fire Exposures*) and two FM data sheets: 1-20 *Protection Against Exterior Fire Exposure* and 1-22 *Criteria for Maximum Foreseeable Loss Fire Walls and Space Separation*.

Both standards are very case specific, using the various factors outlined above to reference tables and obtain multipliers in order to calculate the safe separation distance between two buildings of known occupancy, construction, size, protection and orientation.

How then do we determine a single, safe distance between wood frame risks of any description? The answer is to use the worst-case scenario of an exposing building with a high combustible loading and combustible exterior walls with large wall openings. The exposed building is assumed to be similarly arranged.

But what about building dimensions? Fortunately, FM data sheet 1-22 provides a table for conservative MFL space separation between buildings using a standard 20 ft. (6 m) building height and no credit for sprinklers. Table 3 shows a maximum distance of 200 ft.

(60 m) for a high/severe exposure to an exposed building with combustible (wood or asphalt shingles on wood frame) walls. This is considered a reasonable, worst-case approach given the height of most wood frame risks.

Conclusion

The many variables associated with wood frame risks make it difficult to evaluate the space separation required to form a separate fire division or amount subject. We need to apply a reasonably conservative, worst-case scenario between wood frame risks to determine a single distance for the purpose of establishing separate amount subjects.

MROC believes that this process has been well documented by Factory Mutual as outlined above. We therefore recommend a distance of **200 ft. (60 m)** between wood frame risks to be considered separate amount subjects.

This Bulletin has been prepared for the purpose and use of Munich Reinsurance Company of Canada (MROC) and our clients. MROC makes no representation as to, and accepts no responsibility or liability for the accuracy and completeness of the information, estimates and/or opinions expressed herein.

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