PROTECTION OF BUILDINGS FROM EXTERIOR FIRE EXPOSURES

INTRODUCTION

The spread of fire can result from number of factors including the proximity of combustible to the fire and the intensity of the fire. The National Fire Protection Association (NFPA) has a document NFPA 80A that gives guidance on how to determine the separation distances a building should be from another and from storage in the yard.

This Property Risk Consulting Guideline states AXA XL Risk Consulting's position on NFPA 80A because AXA XL Risk Consulting believes they require clarification or changes. To understand AXA XL Risk Consulting's position, this Property Risk Consulting Guideline must be read with a copy of NFPA 80A. The provisions of the NFPA document are not repeated.

NFPA 80A considers exposure fires from:

- Adjacent buildings, where the occupant of the exposed building does not have control over the occupancy, construction or protection of the exposing building.
- Yard storage, both of the occupant and their neighbor.

The spread of fire from one building to another or from yard storage to a building separated by open space could be accomplished by any of the following means:

- Radiation heating, where heat is transferred by energy waves which heat up the building materials, causing them to ignite.
- Convection heating, where heated air passes by the building, causing the building material to heat up and ignite.
- Flying brands, where pieces of the burning building or its contents remain on fire as it is blown onto the adjacent building.

Two types of clearances must be considered. The first is the horizontal separation between two buildings or between a building and yard storage. The second is when the exposing building is lower than the exposed building. For buildings where the height of the exposing building is equal or taller only the horizontal distance has to be calculated.

POSITION

Exposure from Buildings with Equal or Higher Roof Lines

To calculate the horizontal separation required, the percentage of openings, severity and the ratio between the width and height of the exposing building must be determined.

The “Percentage of Openings in Exposing Wall Area” depends upon:

- The ratio of window, door and other openings in the exposing wall.
- The overall area of the wall and the ability of the wall to remain intact for the duration of a fire.

When determining the severity of the exposing building, consider the exposing building as nonsprinklered since there is no control of the sprinkler protection or the sprinkler protection could be impaired. Severity, as indicated in NFPA 80A, takes into consideration fire loading in lbs/ft^2 (kg/m^2) of floor area and average flame spread rating of interior wall and ceiling finishes.

To simplify the severity classification and percentage of openings, use the following guidance when determining the duration and severity: (As defined in NFPA 13 and PRC.12.1.1.0.)

- Light – 1 h duration and Light Hazard and Ordinary Hazard Group 1.
- Moderate – Between 1 h and 3½ h duration and Ordinary Hazard Group 2.
- Severe – Greater than 3½ h duration and Extra Hazard Groups 1 and 2.

Use the length of the exterior wall between end walls and fire walls, fire walls or end walls of the building (see Figure 1) for the width dimension. Use the true height of the exterior wall or the height between floors, if adequately cut-off, for the height dimension.

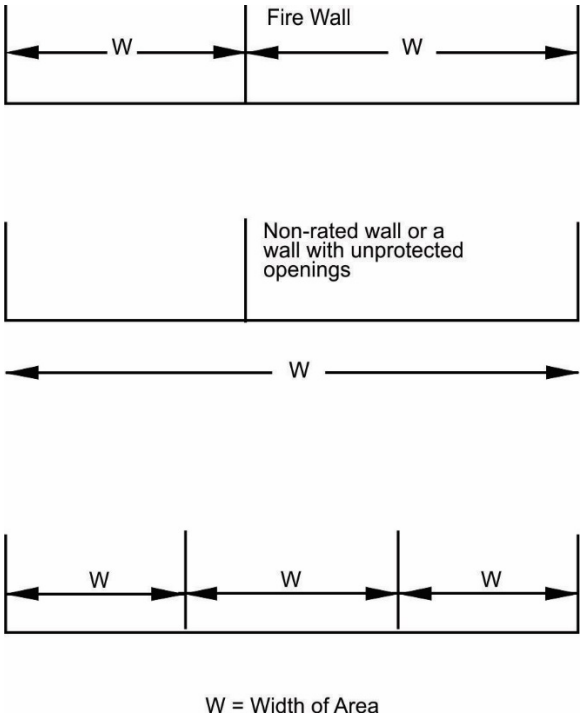

Figure 1. Examples Of Width Dimensions Between End Walls, Fire Walls, And End Walls And Fire Walls.

Example: An 100 ft [30.5 m] long by 25 ft [7.6 m] high exposing building has 25% openings, severe exposure, and a width/height ratio of 4. The guide number from the “Guide Numbers for Minimum Separation Distances” table in NFPA 80A is 2.55.

(2.55 × 25 ft (7.6 m)) + 5 ft (1.5 m) =
68.75 ft (21 m)

Therefore, a 68.75 ft (21 m) separation is required so that additional protection is not required.

Exposing Buildings with a Lower Roof Line

When the exposing building has a concrete or a minimum 1 hr. fire resistance rated roof assembly this section does not apply. For all other roof assemblies, apply the “Minimum Separation Distance for Exposing Buildings with Combustible/Nonrated Roof Assemblies” table from NFPA 80A.

If the exposed building is further away than the separation distance derived from **Exposure from Buildings with Equal or Higher Roof Lines** section and is within the separation distance from “Minimum Separation Distance for Exposing Buildings with Combustible/Nonrated Roof Assemblies,” provide protection starting at the height of the roof line of the exposing building. (See Figure 2.)

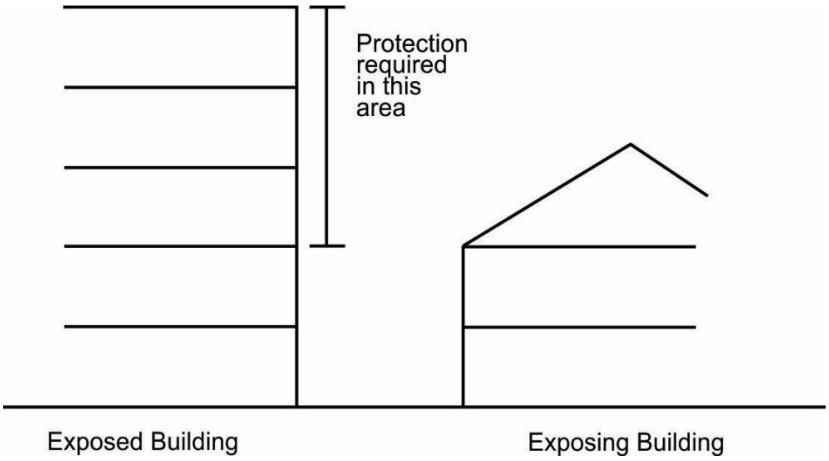

Figure 2. Example Of When The Exposure Protection Should Be Provided When Exposing Building Has A Lower Roof Line.

Means of Protection

Protect buildings with combustible or noncombustible (fire resistance of less than 3 h) walls within the separation distance, from the exposing building. If the building is within one-half of the separation distance provide a blank,- exterior,- 3 h fire-resistive, wall. If the building is beyond one-half the separation distance, replace glass with wired glass and protect all openings and combustible wall areas with an automatic deluge water curtain sprinkler system in accordance with NFPA 13 and PRC.12.1.1.0.

For buildings with fire resistive exterior walls with openings, within the separation distance, protect the walls from the exposing building. If the building is within 5 ft (1.5 m), fill in all openings with equivalent material or protected with 3 h fire rated shutters and doors. If the building is within 10 ft (3 m), protect all openings with 1½ h fire rated shutters and doors. If the building is within one-half of the separation distance, protect all openings with ¾ h fire rated shutters and doors. If the building is beyond one-half of the separation distance, replace glass with wired glass, and protect all openings and combustible wall areas with an automatic deluge water curtain sprinkler system in accordance with NFPA 13 and PRC.12.1.1.0.

DISCUSSION

Walls constructed of corrugated metal on steel will buckle and yield as early as 20 min in a fire depending upon the severity of the occupancy. Walls constructed of masonry blocks with exposed structural steel would not be expected to remain intact during a fire lasting over 3 h.