The Importance of MFL Walls

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Objectives

- FM Global’s Philosophy
- Important concepts and definitions
- What is the MFL scenario
- What factors are considered?
- Why is it important to FM Global?
- What do MFL walls look like?
- The protection of openings
FM Global’s Philosophy

- The majority of property loss is preventable
- To evaluate risk, we apply engineering knowledge to event scenarios and try to quantify loss potentials
Important concepts and definitions

• **Capacity** - The largest amount of insurance or reinsurance available from a company or from the market in general. An insurer's capacity to write business is often measured and/or limited by its premium-to-surplus ratio.
Important concepts and definitions

• Highly Protected Risk – a location at which all reasonable physical and human element loss prevention measures have been implemented to protect buildings, equipment and contents from all losses including natural hazards. All needed human element programs have been established, at least 90% of needed sprinklers have been installed and there are no outstanding recommendations with loss expectancies greater than $10,000,000.
Important concepts and definitions

• **Recommendations** – after assessing the risks involved, our engineers advise our customers on possible solutions to minimize or eliminate a hazard

• **Re-insurance** – an amount of risk retained by the ceding insurer for their own account. This amount varies depending on the insurer’s financial strength, policies and the nature of the exposure
Important concepts and definitions

**Normal Loss Expectancy (NLE)** - Represents the largest credible single loss event with all recommendations completed; it is not necessarily the most likely event.
Important concepts and definitions

- **Maximum Foreseeable Loss (MFL)** - the largest loss that may be expected from a single fire (or other insured peril) to any given property taking into consideration the impairment of the fire protection system (on the basis of past experience).

- The impairment of the fire protection system indicates that dependence on control of fire is solely on physical fire barriers and manual fire fighting by the public fire department.
The MFL Scenario

- It’s a complex situation
- Each situation has its own investigation to assess risk quality
- Must have accurate insurable values
  > $400,000,000 on each side of a wall
- The largest loss as a result of an insured event:
  - Except natural hazards
The MFL Scenario

- With active protection systems impaired.
  - Except for fire doors (sometimes)
- With safety devices impaired
- Control of damage is entirely dependent on passive protection:
  - structural integrity.
  - fire-resistance.
  - damage-limiting construction.
  - space separation.
General Motors Livonia, Michigan Before...
During.....
Kmart

• **1,200,000 ft² (111,480 m²)**
  - Distribution Warehouse.
  - Stored everything.
    • Level 3 aerosols palletized to 15 ft (4.6 m).
  - A lot of fire protection.
    • 2 pumps.
      • 0.36/6000 (15/557) or 0.47/3000 (19/279) available.
  - Fire walls created 4 sections.
What factors are considered?

\[
\text{Property Loss} + \text{Business Interruption Loss} + \text{Dependent Time Element Loss} = \text{Maximum Foreseeable Loss}
\]
MFL Limiting Factors

1. MFL Fire Walls
2. Adequate Space Separation
3. Lack of Continuity of Combustibles
4. Fire Service Response
5. Property and Business Interruption Mitigation Capabilities
1. MFL Fire Walls
2. Space Separation
3. Lack of Continuity of Combustibles
Other assumptions

- A public fire department will be available in most cases but its efficiency might be impaired, response delayed, or normal suction sources for hose streams not available.

- Traffic delays, a blocked railway crossing or other obstacle need to be considered.

- Adverse weather or flood conditions introduce severe handicaps to manual firefighting that have to be considered.
Assumptions (continued)

- The MFL scenario should be based on a delayed fire discovery, delayed fire department notification and delayed fire department response.

- Minimal manual fire fighting from the exterior only.
The Importance of MFL
The Importance of MFL

- Protect our surplus
- Determine allowable capacity and policy limits
- Support risk management relationship with clients
What do MFL Walls look like?

- 4-hrs fire resistance needed
- Concrete Masonry Units (CMU) aka concrete block
- Tilt Up Concrete - formed and poured on-site - Fire resistance not based on tests. Based on thickness, aggregate, etc.
- Precast Concrete - fire resistance based on tests - Often insulated or hollow and not solid.
MFL Wall Materials

- Wall must resist heat, impact, hose streams and expansion forces.

- Gypsum board stud walls should be discouraged since they are subject to damage from impact before or during an MFL fire.

- Gypsum board walls may not perform well when subject to prolonged hose streams.
Structural Stability

- Cantilever Walls
- Tied Walls
- Double Walls
- One-way Walls
- 4-hr Fire Resistant Frame
Cantilever MFL Fire Walls

- 30" (0.75m) Parapet
- Roof Covering & Gravel
- Flashing
- Purlin
- Truss
- "H" Column
- Masonry Units Such as Brick Or Concrete Blocks
- Provide Reinforcement
- Footings or Foundations as Required
One-Way Fire Wall

- Flashing
- Slag or Gravel Surface
- Roof Deck Covering
- Transverse Truss or Beam
- Purlin
- Longitudinal Truss or Beam
- Wall Tied to Framing (This Side Only)
- Building Column
- Floor
- Section at Column
Double Fire Wall

3 Hr. Wall

St. Column

Fires!
The protection of openings

- Double, Automatic Closing Doors
- FM Approved
- 3-hour Fire Resistance

FM Approved firestopping materials installed by an FM Approved Firestop Contractor
Fire Doors
Penetrations

- Pipes (etc.) should penetrate the wall no more than 3 ft (1.0 m) above the floor.
- Provide a steel sleeve with a 1 in. (25 mm) clearance around the pipe or conduit, to be filled with an Approved firestop a minimum 3-hour fire rating.
# MAXIMUM FORESEEABLE LOSS

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1.0 SCOPE

This data sheet provides design criteria and guidelines for maximum foreseeable loss (MFL) limiting factors and the protection of openings in MFL limiting factors. Data Sheet 1-23, Fire Barriers and Protection of Openings, addresses non-MFL fire walls, floors, ceilings, and protection of openings used to separate occupancies within the same building.

1.1 Changes

February 2014. Minor editorial changes were made.

October 2013. The following changes were made:

• Revised Section 2.2.2.2.10 on explosion hazard distances.

• Revised penetration and fire stop recommendations based on comments from the Firestop Contractors International Association (FCIA).

• Changed Light/Ordinary occupancy hazard classification to HC-1/HC-2 to be in agreement with Data Sheet 3-26, Fire Protection Water Demand for Non-Storage Sprinklered Properties.

• Revised recommendations on roof drains and scuppers near MFL walls.
2.2.2.10.7 Locate fire-resistive end/angular exposure wall protection on the exterior surface. Do not place siding materials that are combustible or of limited combustibility over them.

2.2.2.11 Pipes, Conduit, Cables, and Ducts Penetrations

2.2.2.11.1 Where penetrations by pipes, conduit, cables, and or ducts, spaces are created for expansion or other joints in the building at top, bottom or in MFL Walls, provide through or membrane penetration or joint firestop materials that when installed to the tested and listed system, become firestop systems that conform to FM 4990, Approval Standard for Firestopping, or equivalent tested assembly.

Where MFL walls have been penetrated by pipes, conduit, cables, and or ducts, or spaces are created for expansion or other joints in the building at top, bottom or in MFL walls, firestop materials should be installed by an FM 4991 Approved Firestop Contractor.

2.2.2.11.2 Feed automatic sprinkler systems on either side of an MFL fire wall independently (Fig. 33) so it is not necessary to penetrate the wall.
2.2.2.11.3 Avoid penetration of MFL fire walls by pipes, conduit, cables, and ducts. Keep any unavoidable penetrations to a minimum and arrange them as outlined below.

A. Position pipes, conduit, and cables (regardless of size) penetrating MFL fire walls to pass through the wall as close as practical to, but no more than 3 ft (1.0 m) above, the finished ground floor level. Provide a steel sleeve with a 1 in. (25 mm) annular clearance around the pipe or conduit, to be filled with an FM Approved fire stop assembly with a minimum 3-hour fire rating. Provide mesh reinforcement in the horizontal joints above and below pipes in concrete block walls, and fill all cores of the concrete block immediately adjacent to pipe penetrations with concrete grout. Do not penetrate the wall with clusters of pipes or conduit. If more than one pipe penetrates the wall in the same area, provide center-to-center spacing of at least three times the largest pipe diameter. **Exception:** The structural aspects of this recommendation do not apply to panel walls in reinforced concrete buildings, providing the frames on both sides of the wall are reinforced concrete. However, FM Approved fire stop materials still need to be used to seal around penetrations.

B. Protect exposed cables with combustible insulation with an FM Approved fire-resistive coating or wrap for at least 3 ft (1.0 m) on each side of the wall, unless a 4-hour fire stop assembly is used.

C. Specify that fire stops be installed by an FM Approved Firestop Contractor whenever possible.
Questions?