Hazardous Materials In The Fire Codes

Ooops! It’s Too Late Now!

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Fire and Building Codes In Wisconsin

- Building Code SPS 360-365 – Applies to the design and construction of public buildings and places of employment
- Adopts the 2006 International Building Code as the base building code.
- 361.03(6) – Local ordinances
- 361.03(14) – International Fire Code – Specific chapters (most) apply to design and construction

Wisconsin Fire Codes

- SPS 314 – Administration and enforcement provisions.
- SPS 314 – Adopts NFPA 1 as the base fire code for the state.
- SPS 314 – Allows municipalities to use the International Fire Code (IFC) in lieu of NFPA 1.
- Limits the scope of the fire codes to use, operations and maintenance.

Applicability

- Design, build, remodel, alter, change use – See the IBC, IFC and SPS 360-65.
- Use, operate or maintain – See the IFC or NFPA 1.
A Story To Share . . .

The “reagent” and “waste” storage room.

Hazardous Materials

- Manufacturing, Processing, Generation, or Storage of materials
- Physical or Health Hazard

IBC Hazardous Use Requirements

- Section 307
- Section 414
- Section 415
Hazardous Materials

- Quantities in excess of Tables 307.7(1) and 307.7(2)
- Chapter 3 defines and quantifies the H Occupancies
- Chapter 4 specifies the requirements
- Group M and Group S are permitted to exceed tables 307.7 (1) and (2)

IBC Section 307

- Hazmat definitions
- Quantity limit tables
- Group H occupancy criteria
- Many exceptions (307.9)

H Occupancy Decisions

- MSDS
- Table 307.7(1)
- Definitions
- Quantities
- Section 307.9 lists 15 exceptions that allow hazardous materials in occupancies without an H classification
Starting The Hazmat Decision Process
• Chemicals received?
• Chemicals processed?
  – Open system?
  – Closed system?
  – Pressurized processes?
  – Storage method?
• Quantity of chemicals?
• Chemicals shipped?

Control Areas Or An H Occupancy Classification
• If the quantities are below the Maximum Allowable Quantities, then the chemical(s) may be permitted without a special occupancy classification.
• If the number and location of control areas are within the limits of the code, then the chemicals may be permitted without a special occupancy classification.
However, . . .

• . . . if the quantities exceed the MAQ and limit on control areas can’t be met, then the facility must be designed to meet the requirements for an H Occupancy.
• Once designed and constructed to meet the requirements of an H Occupancy, then chemicals are not limited.

The Dreaded “H” Occupancy

• Chemicals used, processed, handled or stored require consideration.
• Remember, on-site chemicals do not necessarily mean an H occupancy classification.
• Ask questions! Qualify and quantify the on-site chemicals.
• Plan for the future.
• Apply the tables.

Q: Why Avoid the “H”?  
A: $$$$$

• Height and areas limitations.
• Restrictive class of construction provisions.
• Hazard detection systems may be required.
• Must design systems to prevent a physical or health hazard.
• Must construct systems to manage the consequences and impact of a release or failure.
H Occupancy Requirements

• Location on property and minimum distance to the property line.
• Buildings with H-1, H-2 or H-3 occupancies can not be used for another purpose, shall not exceed 1 story and basements or under floor spaces are prohibited.
• HPM facilities(H-5) have specialized requirements and quantity limits

H Occupancy Requirements (cont.)

• Smoke and Heat Vents
• Ventilation
• Explosion Control and Venting
• Detached Storage
• Building Separation Distances
• Fire Suppression Systems
• IFC References

The Road To “H”

“H”

“H” Avoidance

No Hazardous Materials
H Avoidance

- Table 307(1) and (2)
- Footnote increases
- Control area multiplier
- Example:
  - 30 gallons of Class 1A flammable liquids
  - 100% increase for sprinklers = 60 gallons
  - Up to four control areas = 240 gallons

Hazardous Materials

- Know and use the code to your advantage
- Table footnotes may increase the allowable quantities: 100% increase for sprinklers and 100% increase for cabinets
- IFC Appendix E: Hazard Categories
- IFC Appendix F: Hazard Ranking

IBC Section 414 – Control Areas and ALL H Uses

- Technical support
- Control areas
- Ventilation requirements
- Hazmat system design
- Explosion control
- Monitoring requirements
- Mercantile and storage uses
- Standby and emergency power
- Spill control and containment
- Weather protection structures
- Alarm requirements
Control Areas

• Spaces within a building where quantities at or below the MAQ are stored, dispensed, used or handled.
• Increases (accumulative) in table footnotes
• Retail and wholesale exceptions may apply

Control Areas (cont.)

• Table 414.2.3 limits the number of control areas per floor
• Up to four control areas per floor
• Fire barriers are required for control areas with ratings of 1 or 2 hours
• % reductions based on number of stories

<table>
<thead>
<tr>
<th>FLOOR LEVEL</th>
<th>PERCENTAGE OF ALLOWABLE QUANTITY PER CONTROL AREA</th>
<th>NUMBER OF CONTROL AREAS PER FLOOR</th>
<th>FIRE RESISTANCE RATING FOR FIRE BARRIERS IN HOURS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Above grade</td>
<td>75</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>50</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Lower than 2</td>
<td>1</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Below grade</td>
<td>75</td>
<td>3</td>
<td>1</td>
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<tr>
<td></td>
<td>50</td>
<td>2</td>
<td>2</td>
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<tr>
<td></td>
<td>Lower than 2</td>
<td>1</td>
<td>Not Applicable</td>
</tr>
</tbody>
</table>

Note: Table 2703.8.2.2 Design and Number of Control Areas

a. Percentages shall be of the maximum allowable quantity per control area shown in Tables 2703.1.1(1) and 2703.1.1(2), with all increases allowed in the footnotes of those tables.
b. There shall be a maximum of two control areas per floor in Group M occupancies and in buildings or portions of buildings having Group S occupancies with storage conditions and quantities in accordance with Section 2703.11.
c. Fire barriers shall include walls and floors as necessary to provide separation from other portions of the building.
Control Area - Multiple Stories

Once Upon A Time . . .

The furniture manufacturer with a flammable spray process, . . .

Hazardous Materials In Group M Display and Storage Areas and Group S Storage Areas

• Section 414.2.
• Quantities are permitted to exceed table 307.7.1(1) and 307.1.(2)
IBC Section 415 – H1, H2, H3, H4 and H5

• More definitions
• Location of H uses on the property
• Construction requirements
  ▪ detached buildings
  ▪ number of story limitations
  ▪ smoke and heat vents
  ▪ separation from other uses
• Special requirements for
  ▪ flammable and combustible liquids
  ▪ LP-gas distribution
  ▪ semiconductor manufacturing

Section 416 – Application Of Flammable Finishes

• Due to the atomization of the flammable liquid, the flash point and/or explosive range is reached almost immediately
• Manage the hazard by introducing fresh air
Section 417 – 420

- 417 – Drying Rooms
- 418 – Organic Coatings
- 419 – Group I-1, R-1, R-2, R-3
- 420 – Hydrogen Cutoff Rooms

IBC To IFC References

- More than 100 specific IFC sections are direct references from the IBC and IMC
- Companion codes
- Developed by the International Code Council

Scope of the IFC and NFPA 1

- Design, Construction, Use, Operations and Maintenance
- Structures, Materials or Devices, Processes, Premises
- Hazards of Fire and Explosions
- People, Places and the Environment.
Hazardous Materials

• General Provisions
• Aerosols
• Compressed Gases
• Flammable and Combustible Liquids
• Oxidizers
• Various Chemicals with Specific Hazards and Requirements

Hazardous Materials and the IBC/IFC “Simply Stated”

• Know the exceptions
• Know what is permitted
• Most occupancies with hazardous materials are not Group H
• Know the chemicals and quantities
• Learn to read a MSDS
• Watch for footnotes and exceptions

Definitions

• IBC Chapters 2, 3 and 4
• IFC Chapters 2, 27 and hazard specific chapters.
Management Plan

- Storage and use areas
- Product-conveying piping containing liquids or gases, other than utility-owned fuel gas lines and low-pressure fuel gas lines
- Locations of emergency isolation and mitigation valves and devices
- On and off positions of valves for valves that are of the self-indicating type
- Storage plan that is legible and drawn approximately to scale showing the intended storage arrangement

Hazardous Materials Management Plan

Hazardous Materials Inventory Statement

- List of all on-site chemicals
- Maximum amount of each material stored or used in each area
- Range of container sizes
- MSDS
Identification Signs

Indoor Storage

General Provisions

- Hazardous materials storage cabinets
- Gas cabinets
- Handling and transportation
- Outdoor control areas
Storage

- Spill control
- Secondary containment
- Ventilation
- Incompatible materials
- Explosion control
- Fire suppression and detection systems

Use, Dispensing and Handling

- Incompatible materials
- Spill control and secondary containment
- Stand-by and emergency power
- Fire extinguishing systems
- Ventilation
- Open systems
- Closed systems
- Handling

Outside Hazardous Materials Storage
Outside Hazardous Materials Storage

Specific Hazard Chapters

- Aerosols
- Combustible fibers
- Compressed gases
- Corrosive materials
- Cryogenic fluids
- Explosives and fireworks
- LPG
- Organic peroxides
- Flammable and combustible liquids
- Flammable gases and flammable cryogenic fluids
- Flammable solids
- Highly toxic and toxic materials
- Oxidizers and oxidizing agents
Summary

- Plan for the future.
- Pick-up the phone and ask questions.
- Make sure your design professional has applicable experience.
- Get to know your local first responders and their capabilities.

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