Intent & Objectives

- Intended for JPA jurisdictions, but open to all
  - Some material will be program-specific
- Assumes a working knowledge of the MSFC and its application
  - Not a basic-level class
- Please ask questions
  - Cliché: “There’s no such thing as a stupid question.”
- Breaks
  - We’ll take 10 minutes around 10:00 am.
Intent & Objectives

- Content will primarily focus on
  - School inspections statute (§299F.47) and the SFMD inspection program
  - Provisions specific to Group E occupancies
  - SFMD school inspection policies and guidelines
  - Code changes in the 2020 MSFC affecting Group E
  - Commonly overlooked provisions
  - Commonly misunderstood provisions
  - Unique conditions found in schools
  - Common questions the SFMD school team and code team receive
§299F.47

− Passed by the legislature in 1990
− Mandates the State Fire Marshal to inspect all public and public-charter schools once every three years
− Allows local jurisdictions to inspect schools on behalf of the SFMD only if they were conducting comprehensive school inspections from 1987 through 1990
  o There are 13 local jurisdictions authorized to conduct their own school inspections
− All variances must be approved by the State Fire Marshal
Local school inspection contract jurisdictions: (13)

- Bloomington
- Brooklyn Park
- Duluth
- Hastings
- Hopkins
- Maple Grove
- North St. Paul
- Owatonna
- St. Paul
- West St. Paul
- South St. Paul
- White Bear Lake
- Woodbury
Substantial Compliance with the Minnesota State Fire Code

Minnesota Rules, chapter 7511:

- Effective date of March 31, 2020
- Adopted via the Administrative Procedures Act, M.S.§ chapter 14
  - Public comment period
  - Overseen by an administrative law judge
- Violations are considered a misdemeanor
Mandates inspection of all public school buildings used for K-12 *educational purposes*

- Examples of school district buildings not inspected under §299F.47
  - Sporting facilities
  - Bus garages
  - District offices
  - ECFE, preschool and child care centers
  - Community education centers
School Inspections Statute

Inspection fees

- Allowed to assess a fee of $0.014 per square foot of building area inspected
  - Fee includes two follow-up inspections or on-site consultations
    - Additional follow-up inspections or on-site consultations are assessed a fee of $0.005 per square foot
School Inspections Statute

Inspection fee examples

- 60,000 ft² elementary school: $840.00
- 250,000 ft² high school: $3,500.00
School Inspections Statute §299F.47

Scope of inspections under §299F.47

- Intent is to conduct a comprehensive and complete inspection of the entire school facility
  - Exceptions
    - Areas where state mandated testing is occurring
    - Where access is not available at the time of inspection
      - Note any no-access areas on the report to inspect during the follow-up inspection
School Inspections Statute §299F.47

Inspection reports from JPA jurisdictions

Email a copy of school inspection reports to: fm.city.inspections@state.mn.us
SFMD School Inspection Program
Inspection numbers for 2020

- 548 primary inspections
- 545 follow-up inspections
- 4,504 violations cited
- Average 8 violations per inspection
Minnesota School Fire Data - Then vs Now

School Fires in Minnesota (1990-1994)
Average 90 Fires Annually

School Fires in Minnesota (2016-2020)
Average of 38 Fires Annually

2016-2020: a school fire occurs in Minnesota every 9.5 days on average
Minnesota schools fire rate

- Fire occurrences have dropped by 58% since the start of the school inspection program
- The fire rate in MN is ~30% below the national average
Minnesota School Fire Data

Minnesota school fire loss (2011-2020)

- Total fire loss over last 10 years: $28.4 million
- Average annual fire loss: $2.8 million
Per Statute §326B.107

- DLI/CCLD is the building code AHJ for any public and charter school project of $100,000 or more
  - CCLD may delegate this plan review and/or inspection authority to the local building official
• CCLD does *not* review for fire apparatus access roads or fire protection water supply
McGinty’s Top 6 Fire Safety Priorities

- Means of Egress
- Interior Finish
- Vertical openings
- Opening protectives
- Fire Sprinkler Systems
- Fire Alarm Systems
Emergency Planning
Fire safety and evacuation plans

- Content requirements per Section 404.2

**Often missing:**

- Detailed floor plans and site plans
- Specific staff duty assignments and alternates
- Evacuation procedures when:
  - Outside of school hours
  - In-between class periods
  - Lunch or assembly
Emergency Planning

Schools must develop an evacuation plan for those requiring assistance.

ADA Fed. Court Ruling issued in 2004

- Plans must be included in the student’s IEP (Individualized Education Program)
- Considered private data

Evacuation of Mobility Impaired Students

As a life-safety feature, many elevators are required to be automatically recalled to the ground floor and remain unavailable when fire conditions are detected within an elevator lobby, hoistway or equipment room. Because of this, the potential exists for mobility impaired occupants to be located on floor levels where the only available evacuation route would require ascending or descending stairs. This document provides guidance and reference materials for schools to consider when developing fire safety and evacuation plans for the mobility impaired.
Emergency Planning

Lockdown plans

- Must be approved by the code official
- Minimum content requirements per 404.2.3.1
- Intent?
  - Fire code officials are not responsible for developing lockdown plans
  - Ensure that lockdown plans do not conflict with fire and life-safety provisions of the MSFC
  - Plans do not create additional hazards or unintended consequences

Section 404.2.3
Crisis Management Policy M.S. §121A.035

- MDE is requesting inspectors verify that public schools have a written crisis management policy
  - Fire code officials have no authority to issue orders, but
  - If no plans, advise and refer to HSEM/School Safety Center for emergency operations planning (EOP) resources
    - EOP self-assessment checklist
    - EOP plan development guide
Emergency Planning

Fire evacuation drills

- §299F.30
  - Requires 5 fire evacuation drills per year
  - Applies to both public and private schools
  - Requires occupant evacuation
Emergency Planning

Fire evacuation drills

- MSFC 403.5
  - First drill within the first 10-days of school
  - Conducted at different times of day
  - Designated outdoor assembly points
  - Safe distance from building
  - Locations that do not interfere with fire department operations
  - Class groups separated and students accounted for
Emergency Planning

SFMD Guideline: Delayed and Staged Evacuation

- Delayed evacuation
  - Allows for a delay of the fire alarm occupant notification system via positive alarm sequencing while the source of the alarm is investigated
Positive Alarm Sequence (NFPA 72)
SFMD Guideline: Delayed and Staged Evacuation

- **Staged evacuation**
  - Allows occupant relocation to a separate fire area within the building while the source of the alarm is investigated

- **Evacuation option during severe weather**
  - Allows for staging at exterior exit discharge doors

- **Evacuation drills**
  - Must include training on any alternative evacuation strategies
  - Each drill must also include a complete building evacuation
Electrical Equipment and Wiring
604.5 Extension cords

- Listed and labeled in accordance with UL 817
  - UL 817 Standard for Cord Sets and Power-Supply Cords
- Extension cords marked for indoor use shall not be used outdoors
- Temporary use only up to 90 days
- Used only with portable appliances
- Shall be in good condition without damage
- Grounded when serving grounded appliances
604.5 Extension cords (and flexible cords)

- Shall not be:
  - Affixed to structures
  - Extended through walls, ceilings or floors
  - Extended under doors or floor coverings
  - Subject to physical damage
  - Plugged directly into an approved receptacle, power tap, or multi-plug adapter
  - Cord ampacity shall not be less than that of the attached appliance
Extension Cords and Flexible Cords
Extension Cords and Flexible Cords
Approved Multiplug Adapters

604.4 Multiplug adapters

Multiplug adapters, such as cube adapters, unfused plug strips or any other device not complying with NFPA 70 (NEC) shall be prohibited.

Section 604.4
Approved Multi-plug Adapters

- Relocatable Power Tap Listed to UL 1363
- Flexible cord
- Overcurrent Protection

- Current Tap Listed to UL 498A
- No overcurrent protection
- No cord – direct to receptacle
Relocatable power taps

- Polarized, grounded and equipped with overcurrent protection
- Listed to UL 1363 (or 1449)
- Directly connected to a permanently installed receptacle
- Shall not extend through walls, ceilings, floors, doorways, or under floor coverings
- Shall not be subject to physical damage

Section 604.4
Relocatable Power Taps
Relocatable Power Taps
Relocatable Power Taps

Listed to UL 1363. May also be listed to UL 1449 if equipped with both overcurrent and surge protection.
Multi-plug Electrical Adapters

Current taps

Section 604.4
604.4 “Multiplug adapters, such as cube adapters, unfused plug strips or any other device not complying with NFPA 70 (NEC) shall be prohibited.”

1. **Scope** (from UL 498A)

1.1 These requirements cover current taps and adapters for use in accordance with the National Electrical Code, ANSI/NFPA-70.
Multi-Plug Electrical Adapters

- 15 amp circuit capacity: 1,800w
- Microwave: 900w
- Coffee maker: 800w
- Mini-fridge: 100w

Total watts: 1,800
Electrical equipment, appliances and fixtures

- Shall be tested and listed by an approved agency

Section 604.7
Electrical appliances & fixtures

- Tested and listed by an approved agency
- Installed and operated in accordance with the manufacturer’s instructions
- Cannot be modified to create a hazard
- OSHA website maintains a list of nationally recognized testing laboratories (NRTLs)

Section 604.7
Commercial vs Residential Listings

Electrical appliances & fixtures
- Commercial designation originated to comply with food establishment health codes
  - Ease of cleaning
  - Maintaining specific temps
  - Bacteria resistant materials
Most listings do not differentiate commercial vs. residential

- **Example:** Portable electric space heaters are listed to UL 1278 for use in all ordinary (non-hazardous) locations in accordance with the NEC
“Residential” Appliances in Commercial Bldgs.

School FACS classrooms

Employee breakrooms
The three-prong outlet myth

− “Any electrical device/appliance used in a commercial setting must have a three-prong cord plug.”
  o **False:** *not all devices require a ground connection*
The three-prong outlet myth

- Grounding pins are typically required in:
  - Devices having conductive chassis/housings or exposed parts that could become energized, or
  - Devices intended to be used in wet or damp conditions

- Grounding pins are typically **not** required in:
  - Devices designed with two layers of insulation between the electrical conductors and any conductive surface that could be touched
Electrical Equipment

Decorative/holiday light strings

- Listed to UL 588
  - Temporary use only up to 90 days
- Listed to UL 588, Supplement SD
  - Permanent use
- Listed to UL 2388
  - Rope lighting
  - Permanent use
Decorative Materials and Furnishings
Decorative materials and artificial decorative vegetation

807.1 General (all occupancies)

- Explosive or highly flammable decorative materials or furnishings are prohibited
- Fire retardant coatings in existing buildings to be maintained
- Materials or furnishings must not obstruct egress or its visibility
807.2 Combustible decorative materials*
Suspended fabrics in Group E

- Flame resistant *and* cannot exceed 20% of wall or ceiling surface area
  - Curtains
  - Draperies
  - Films, and
  - Similar suspended materials
Decorative Materials and Furnishings

Decorative Materials are not by definition:

- Educational materials displayed in an approved manner
- Ordinary window shades
- Interior finish surface coverings (e.g. wallpaper)
Decorative Materials and Furnishings
Decorative Materials and Furnishings
Exceptions to the 20% coverage limitation for suspended fabrics

- **Group A auditorium** surface area coverage limits
  - New: up to 75% where sprinklered
  - Existing: no limits
- **In all occupancies**, the 20% coverage limits do not apply to window coverings

Section 807.2
Decorative Materials and Furnishings

Exceptions to the 20% coverage limitation for suspended fabrics

- Suspended fabric partitions in Groups A, B, E, & M
  - No coverage limitations
Classroom artwork and teaching materials in Groups E & I-4

- **Group E**
  - Limited to 50% of the aggregate wall area

- **Group I-4**
  - Limited to 50% of the specific wall area to which they are attached
Decorative Materials and Furnishings

Artwork and teaching materials in Group E & I-4 corridors

- Limited to 20% of the wall area
  - Up to 50% allowed in fully sprinklered buildings

Sections 807.5.2.2 + 807.5.5.2
Personal effects in Group E and I-4 corridors*

- Stored in metal lockers, unless:
  - Sprinkler protected, or
  - Fire alarm system with corridor smoke detection
- Minimum required egress width must be maintained

Section 807.5.2.1 + 807.5.5.1
Decorative Materials and Furnishings

Upholstered furniture in Group E
- Not regulated by the MSFC

Fabric light filters
- Most are flame-resistant
- Installed below the diffuser
Decorative Materials and Furnishings

Foam plastics used for decoration, set design or display in places of assembly

- Maximum heat release rate of 100 kW when tested to UL 1975, or when tested to NFPA 289 using the 20 kW ignition source
Decorative Materials and Furnishings

Foam plastics used for decoration, set design or display in places of assembly

- Exception to UL 1975 or NFPA 289 compliance
  - Individual items up to 1 pound
  - Trim complying with 804.2
Foam plastics used as interior finish require large-scale fire performance testing

- **NFPA 286** Fire Tests for Evaluating Contribution of Wall and Ceiling Finish to Room Fire Growth, or
- **UL 1715** Fire Test of Interior Finish Materials
  - In addition to flame spread and smoke development per ASTM E84 (Table 803.3)
Decorative materials defined as interior finish when:

- Exceeding 10% of the wall or ceiling area, or
- Exceeding 20% in *existing* sprinkler-protected areas

- **Including**
  - Paneling
  - Movable partitions
  - Wall and crash pads
  - Acoustical or decorative panels
Combustible Lockers

- Defined as interior finish
  - **Exception:** Lockers made entirely of wood in areas where a Class C flame-spread rating is required
- If composed of polypropylene or high density polyethylene, must be tested to NFPA 286

**Sections 808.4 + 803.9**
Fire-Resistance-Rated Construction
Corridors

Group E corridors serving more than 30 occupants in non-sprinklered buildings

- Separated with one-hour fire partition construction
  - **Exception** for existing Group E having a monitored fire alarm system with corridor smoke detection
Existing Group E interior vertical openings

- No protection required when connecting 2 stories
- Enclosed with 1-hour fire-resistance rated protection when connecting 3 or more stories
- Up to 5 levels unprotected in fully sprinkled buildings

Section 1103.4
Interior Vertical Openings
Interior Vertical Openings
Interior Vertical Openings
Interior Vertical Openings

EXIT
SECOND FLOOR
FIRST FLOOR
BASEMENT
Incidental Use Areas

Non-sprinklered incidental use areas
- Separated with one-hour fire barrier construction

Sections 701.1 (MBC 509) + 1105.3
Incidental use areas

- Ancillary functions associated with a given occupancy
- Generally pose a greater level of risk to that occupancy
- Limited to uses listed in MBC Table 509
- Shall not be classified as separate occupancies

Sections 701.1 (MBC 509) + 1105.3
Incidental Use Areas

Incidental use areas include

- Shops
- Laboratories containing hazardous materials
- Laundry rooms exceeding 100 square feet
- Boiler or furnace rooms where the largest piece of fuel equipment exceeds 400,000 Btu/hour input

Sections 701.1 (MBC 509) + 1105.3
Required Fire Protection Systems
Portable Fire Extinguishers

Fire extinguisher locations in fully sprinklered Group E – two options:

- General use extinguishers (2-A:10-B:C)
  - Located as necessary to achieve maximum travel distance of 75 feet, or
  - Located in the following areas:
    - Laundry and soiled linen rooms, boiler and furnace rooms, mechanical and electrical rooms, garages, stages, projection booths, shops, laboratories, kitchens, locker rooms, custodial closets, trash-collection rooms, storage rooms greater than 100 square feet, and similar areas.

Section 906.1
Required fire extinguishers based on hazard

- Examples include:
  - Commercial kitchens
  - Spray finishing
  - Laboratories
  - Welding/hot work
  - Flammable/combustible liquid storage
Fire Alarm Systems

Required in new and existing Group E having an occupant load of 50 or more

- Voice/alarm communications system required for *new construction or additions* where occupant load exceeds 100

Section 907.2.3
Fire Alarm Systems

Replacement of fire alarm systems in existing buildings

- See SFMD *Fire Alarms for Educational Occupancies* info-sheet
- Regulated by the MN Conservation Code for Existing Buildings (MCCEB)
Fire Alarm Systems

Replacement of fire alarm systems in existing buildings

- **Summary**
  
  - Replacement panels must be voice/alarm capable
  - Existing notification appliances can remain where compatible
    - Non-compatible devices must be replaced with voice/alarm
    - Newly installed devices must be voice/alarm
Existing buildings undergoing a Level III Alteration

- Fire alarm system must be upgraded to voice/alarm
  - **Level 3 Alteration**: where the work area exceeds 50 percent of the building area. (MCCEB 604.1)
Fire Alarm Systems

Buildings with mixed notification schemes

- There must be a pronounced and defined audible separation between the existing notification appliances and any new or replaced voice/alarm communication devices so that the voice/alarm is not acoustically obscured by existing notification appliances.
Fire Alarm Systems

Intervening room smoke detection in non-sprinklered Group E

- Rooms having more than 10 occupants with a single means of egress through an adjoining room;
  - Smoke detection required throughout the common atmosphere through which egress passes

Section 903.2.3.2
Fire Alarm Systems

Manual fire alarm boxes (a.k.a. pull stations) in Group E, two options:

- Required at each building exit per 907.4.2, or
- In fully sprinklered buildings or buildings with fire alarm systems having corridor smoke detection:
  • One pull station in a main office, and
  • One pull station in a custodial area

Section 903.2.3.1
Fire Sprinkler Systems

Required in new Group E where any of the following apply:

- Fire area exceeding 12,000 ft²
- Fire area located on any level other than the level of exit discharge
  - Exception: Levels below the LED where each classroom has an exterior exit door at the LED
- Fire area has an occupant load of 300 or more

Section 903.2.3
Fire Sprinkler Systems

Required in existing Group E basements with student occupancy

- **Condition #1**
  - Basement exceeds 2,500 ft\(^2\), and
  - Does not have 20 ft\(^2\) of exterior opening(s) located every 50 lineal feet, or fraction thereof, on at least one side
    - Opening dimensions of at least 30 inches
Section 1103.5.3

AUTOMATIC SPRINKLER PROTECTION NOT REQUIRED

30” MIN. DIMENSION, MIN. 20 SQ.FT. COMBINED

2800 sq.ft. basement

40’

70’

basement
Fire Sprinkler Systems

1103.5.3 Basement access or sprinkler protection
Fire Sprinkler Systems

Required in existing Group E basements with student occupancy

- Condition #2
  - Basement exceeds 2,500 ft$^2$, and
  - Where any portion of the basement is located more than 75 feet from required openings
Section 1103.5.3

- Over 75 feet from required opening

3,200 sq.ft. basement

AUTOMATIC SPRINKLER PROTECTION REQUIRED

30” MIN. DIMENSION, MIN. 20 SQ.FT. COMBINED
Inspection of Group E Occupancies for JPA Jurisdictions – Part 2

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School Inspections
Code Development Coordinator
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651-769-7784

MINNESOTA STATE FIRE MARSHAL DIVISION
445 Minnesota Street; Suite 145 Saint Paul, MN 55101
SECTION 915: CARBON MONOXIDE DETECTION*

• Applies to new construction only

• Provisions are categorized by conditions
  
  – Classrooms that contain a fuel-burning appliance
  – Classrooms that are served by a fuel-burning forced air furnace
  – Buildings containing fuel-fired appliances outside of classrooms
  – Buildings containing classrooms and have attached garages
SECTION 915: CARBON MONOXIDE DETECTION*

- Where CO detection is provided, a CO detection system per NFPA 720 (2015) is required
  - CO alarms are not permitted except in dwelling and sleeping units

CO alarms are for residential use only

Section 915.4.3 + 915.5.1
Condition #1: Classrooms that contain a fuel-burning appliance
- CO detection required in classrooms

Condition #2: Classrooms served by a fuel-fired forced-air furnace
- CO detection required in classrooms, OR
- A CO detector is provided in the first room or area served by each main duct leaving the furnace, and the carbon monoxide alarm signals are automatically transmitted to an approved location
Condition #3: Buildings that contain fuel-fired appliances outside of classrooms

- CO detection required in classrooms
- Exceptions:
  1. Where there are no communicating openings between the fuel-burning appliance and the classrooms
  2. Where a CO detector is provided in an approved location between the fuel-burning appliance and the classrooms
  3. Where a CO detector is provided on the ceiling of the room containing the fuel-burning appliance
Condition #4: Buildings containing classrooms and have attached garages

- CO detection required in classrooms

- Exceptions:
  1. No communicating openings between building and attached garage
  2. Classrooms located more than one story above or below the garage
  3. Garage connects to building through an open-ended corridor
  4. Where a carbon monoxide detector is provided in an approved location between garage-to-building communicating openings
Carbon Monoxide Detection in Group E

Condition #4: Buildings containing classrooms and have attached garages

- Exempt garages include:
  - Open parking garages per MBC 406.5
  - Enclosed parking garage per MBC 406.6
Carbon Monoxide Detection in Group E

Alarm signal notification in Group E

− Alarm signals to be transmitted to an onsite location staffed by school personnel
  
  o Exception: Alarm transmission to an onsite staffed location not required for Group E having an occupant load of 30 or less
Carbon Monoxide Detection in Group E

SFMD Policy for CO detection in Group E not having, or required to have, a fire alarm system

- CO alarms may be used in Group E classrooms in lieu of a detection system as permitted under MSFC 104.8 – Modifications.
  - Listed to UL 2034
  - Primary power from the building’s wiring where served by a commercial source and equipped with battery backup
SFMD Policy for CO detection in Group E not having, or required to have, a fire alarm system

- CO alarms complying with the requirements of MSFC 915.4.1 and 915.4.2 are **installed in every room or area providing care or instruction**
- The required fire safety plan includes manufacturer information regarding the testing, inspection and maintenance of CO alarms
- Document terms of policy
Means of Egress
Conditions requiring a second means of egress in Group E

- **Design occupant load** of 50 or more occupants
- **Actual occupant load** of 50 or more occupants
- **Common path of egress travel** exceeding 75 feet
- **Dead-end corridor** exceeding 50 feet
- **Exit travel** distance exceeding:
  - 200 feet (sprinklered)
  - 250 feet (non-sprinklered)

Section 1006.2.2.4
Common use area occupant load factors in Group E

- **Classrooms:** 20 ft²/person (net)
- **Shops/labs/vocational:** 50 ft²/person (net)
- **Library stack areas:** 100 ft²/person (gross)
- **Library reading areas:** 50 ft²/person (net)
- **Day Care/Pre-School:** 35 ft²/person (net)
- **Choir room:** 20 ft²/person (net)
- **Band room:** 20 ft²/person (net)

Table 1004.5
A second means of egress is required for the following room sizes or when the actual number of occupants is 50 or more

- **Classrooms**: 1,000 ft² (net)
- **Shops/labs/vocational**: 2,500 ft² (net)
- **Library stack areas**: 5,000 ft² (gross)
- **Library reading areas**: 2,500 ft² (net)
- **Day Care/Pre-School**: 1,750 ft² (net)
- **Choir room**: 1,000 ft² (net)
- **Band room**: 1,000 ft² (net)
Media Center Occupant Load

- 100 ft²/occupant (gross)
- 50 ft²/occupant (net)
Basics of Egress in Group E

1006.2.2.4 Group E and I-4 means of egress*

- A second means of egress is required from rooms or areas providing care for more than 10 children who under 30 months of age
An area serving 50 or more occupants must have access to at least two exits or exit access doorways.

Classroom
20 occupants

Common path of egress travel not to exceed 75 feet

Classroom
40 occupants

Classroom
20 occupants

30’ to main corridor
Corridor obstructions and maintaining egress width

- Minimum corridor widths in Group E:
  - Serving 100 or more: **72 inches**
  - Serving under 100: **44 inches**
  - Existing: **36 inches** *
  - And not less than required based on occupant load per Section 1005.3 (0.2 inches x number of occupants served)

Sections 1020.2 + 1020.3 + 1004.17.3
Means of Egress Maintenance
Means of Egress Maintenance
SpecialExitingProvisionsforYoungerStudentsinSchoolBuildings

Minnesota Statutes, §123B.51, subdivision 7

- Regulates which floor levels can be occupied by younger students
  - 2nd grade and younger
- Statutory provision adopted into MN rule via MBC Section 429.2
- In turn, MSFC 1001.3 references the MBC
  - These provisions apply to both new and existing Group E school buildings

Section 1001.3
Summary of MBC 429.2

- Younger students defined for purposes of this section include 2\textsuperscript{nd} grade and younger
  - Includes preschool, latchkey, day care, early childhood family education, teen parent, or other programs conducted in the building
- Second-grade students can be located on the LED or one level above the LED without any special provisions
Special Exiting Provisions for Younger Students in School Buildings

Section 1001.3
Special Exiting Provisions for Younger Students in School Buildings

Summary of MBC 429.2

- Second-grade students can be located on the LED or one level above the LED without any special provisions
- **Younger children may be located on any level below the 4th story, where:**
  - The building is fully sprinklered **AND**
  - Provided with a fire alarm system including corridor (egress system) smoke detection

Section 1001.3
Special Exiting Provisions for Younger Students in School Buildings

Summary of MBC 429.2

- Younger students may be located on any level, where:
  - Younger students are provided with independent exiting separate from older students, **AND**
  - The building is fully sprinklered **OR** provided with a fire alarm system including corridor (egress system) smoke detection

Section 1001.3
Special Exiting Provisions for Younger Students in School Buildings

Summary of MBC 429.2

- Temporary use of accessory spaces located one level above or below the LED is permitted where:
  - The building is fully sprinklered, OR
  - Provided with a fire alarm system including corridor (egress system) smoke detection

- Accessory spaces for temporary use include:
  - Gymnasiums, cafeterias, media centers, auditoriums, libraries, and band and choir rooms, and similar areas.

Section 1001.3
Special Exiting Provisions for Younger Students in School Buildings

Minnesota Department of Public Safety
State Fire Marshal Division

- Information sheet available on the SFMD website
  - Includes a quick-reference matrix

Section 1001.3
Door control systems allowed by code

- Access control
  - Sensor release of electrically locked egress doors
  - Hardware release of electrically locked egress doors
- Delayed Egress
  - Not allowed where serving assembly areas
- Special detention arrangements
- Controlled egress doors
  - Not allowed in Group E*

Sections 1010.1.9 + 1010.1.11
Door Control Systems

Sensor release of electrically locked egress doors

- Motion Sensor – Releases Magnetic Lock
- Magnetic Locking Device
Door Control Systems

Sensor release of electrically locked egress doors, summary

- Door releases for egress on:
  - Motion sensor on egress side of the door
  - Fire alarm activation or sprinkler water-flow
  - Manual override switch (button) installed within 5 feet of the door
    - Switch is wired to directly interrupt power to the locking device
  - Loss of power to the system
- Locking system units listed to UL 294 – *Standard for Access Control System Units*
Door Control Systems

Hardware release of electrically locked egress doors, summary

- Door releases for egress on:
  - Listed request-to-exit (RX) door hardware
  - Loss of power to the system
- Interconnection to fire protection systems is *not* required
- Locking system units listed to UL 294

Section 1010.1.9.10
Door Control Systems

Delayed egress doors
Door Control Systems

Delayed egress doors, summary

- Allows for a 15-second delay before egress is permitted
- Irreversible unlocking process begins with 15 lbs. force applied for 1 second
- Local alarm sounds at door
- Door releases in 15 seconds (30 seconds where approved)
  - Manual reset only
- Prohibited where the means of egress serves an assembly use area
Door Control Systems

Delayed egress doors, summary

- **Fire protection requirements**
  - Sprinklered building (NFPA 13), *OR*
  - Fire alarm system with corridor smoke detection
- Occupants **shall not pass through more than one** delayed egress door before entering an exit
- Emergency lighting required on the egress side of the door
- Door signage: PUSH UNTIL ALARM SOUNDS. DOOR CAN BE OPENED IN 15 SECONDS.
- Locking system units shall be listed to UL 294
Inspection, Testing & Maintenance

Controlled egress doors - not allowed in Group E schools
Controlled egress doors

- Secures the door against egress
  - Requires credentials (key, key-card, passcode, etc.)
- **Not allowed in Group E***
  - Allowed in some stand-alone setting 4 special education facilities when:
    - An alternate method proposal per MN Rule 1300.0110, Subp.13 is submitted to the building official by a licensed architect
    - The proposal meets all requirements of DLI/CCLD Policy PR-08, and
    - Documentation of approval has been provided by the building official
Door Control Systems

Special detention arrangements
Door Control Systems

Special detention arrangements

- Allowed for rooms or areas where a student is temporarily restrained for safety/security
  - School seclusion room (MDE)
- Fire protection requirements
  - Detention room protected with quick-response sprinklers
  - Automatic smoke detection system coverage from the detection room and throughout egress path to the closet exterior exit door
- Door swing in the direction of egress
- Use can be revoked by code official for due cause

Section 1010.1.11
Door Control Systems

Special detention arrangements

- Door must release on:
  - Fire sprinkler water-flow
  - Fire alarm system activation
  - Loss of power to:
    - Locking system, or
    - Fire alarm system
  - Fire alarm system trouble signal
  - Manual switch at approved location

Section 1010.1.11
Special egress devices from the 1998 Uniform Building Code

- Only where approved by the code official
- Fire protection requirements
  - Fully sprinklered building, and
  - Supervised fire alarm system with smoke detection throughout
- Labeled manual release device at door: PULL TO EXIT
  - Releases door within 30 seconds

MN Rule 1300.4900
Door Control Systems

Special egress devices in Group E from the 1998 Uniform Building Code

- Door label: *THIS DOOR WILL UNLOCK UNDER EMERGENCY FIRE CONDITIONS*

- Not allowed on egress doors serving assembly areas without a sensor release on the egress side

MN Rule 1300.4900
Locking in Educational Occupancies

Locking arrangements in educational occupancies*

- Applies to Groups E and B educational occupancies
- Allows classrooms, offices & similar areas to have locking arrangements to prevent entry:
  - Capable of being unlocked from the access side
  - Door is operable for egress per Section 1010.1.9
  - No modifications to panic, fire door, or door closing hardware
  - Remote operation of locks is permitted

Section 1010.1.4.4
Examples of Door Security/Barricade Devices
Locking in Educational Occupancies

Locking arrangements in educational occupancies*

- To comply with 1010.1.9 for door operation, a security or barricade device must:
  - Not require a key, special knowledge or effort
  - Release the door with a single operation
  - Be mounted 34” to 48” above floor level
Locking in Educational Occupancies

Examples of compliant security/barricade devices
Enclosed Outdoor Courtyards

SFMD Policy: Use of courtyards in schools
Enclosed Outdoor Courtyards

SFMD Policy applies where:

- Courtyard is occupied by students and/or staff, and
- Courtyard occupants must egress back through the building
Enclosed Outdoor Courtyards

Condition #1: Courtyards 2,500 ft² or more

- 2 or more exit access doorways
- Door swing in direction of exit travel
- Panic Hardware
- Not lockable from egress side
- Exit signs
- Emergency lighting (if occupied during the evening)
Enclosed Outdoor Courtyards

Condition #2: Courtyards under 2,500 ft²

- Only one exit required
  - Based on an occupant load factor of 50 ft²/person
- Door may have keyed locking hardware where:
  - All areas visible from doors/windows serving courtyard
  - Constant staff supervision (with keys) when occupied
  - Doors unlocked while occupied
  - Doors locked when unoccupied to prevent entry
Enclosed Outdoor Courtyards

New language: 2021 IFC Section 1010.2.4 (item 8)

- Allows courtyard doors to have key locking hardware, where:
  - The occupant load does not exceed 300 per Section 1004.
  - Maximum occupant load is posted
  - Locking device is distinguishable as locked (e.g. indicating-type)
  - Signage: “THIS DOOR TO REMAIN UNLOCKED WHEN THE OUTDOOR AREA IS OCCUPIED.”
New language: 2021 IFC Section 1010.2.4 (item 8)

- Allows courtyard doors to have key locking hardware, where:
  - Weatherproof telephone or two-way communication system installed per 1009.8.1 and 1009.8.2
    - Remote monitoring station or 9-1-1 call center
    - Installed adjacent to at least one required exit access door from the outdoor space
- Courtyard policy will be updated to allow 2021 IFC 1010.2.4 (item 8) via Section 102.8 - Subjects not regulated by this code
Hazardous Operations in Group E
MN Statute §121A.31 – School lab safety guidelines: “Science Safety Checklist”

- Completed and maintained for each science lab
- Summary of required MSFC provisions and MAQs
- Recommendations:
  o NFPA 45 - *Standard on Fire Protection for Laboratories Using Chemicals*
  o List of high risk chemicals (use in limited amounts)
  o List of excessive risk chemicals (exceeds educational value)
School Science Labs

Chemical storage areas

- Room/area secured against unauthorized entry
- MAQs not exceeded
- Stored in approved containers (e.g. original containers)
- Defective containers removed
- All containers must be clearly labeled for content
School Science Labs

Chemical storage areas

- Incompatible materials must be properly separated where:
  - In containers having a capacity of more than 5 pounds or 0.5 gallon
  - Any amount of compressed gases
- Flammable/combustible liquids in quantities exceeding 10 gallons stored in a flammable liquids cabinet
- Flammable/combustible liquids limited to amounts necessary for demonstration, maintenance or equipment operation
School Science Labs

Emergency gas shut-off vales

- Manual or automatic shut-off valves required for science labs having fuel-gas service
- Valves must be clearly labeled and readily accessible

Section 5003.2.2.1
Indoor LP-Gas storage

- Limited to 2, 1-lb cylinders per control area in buildings frequented by the public
  - Exception for up to 20, 1-lb cylinders for science lab or vocational use

Temporary indoor use of LP-Gas cylinders for demonstration or public exhibition

- Maximum 5-lb cylinder capacity
- 20 feet separation between cylinders

NFPA 58 Table 8.3.1(a) + 6.22.9.1
Industrial and Vocational Shops
Industrial and Vocational Shops

Chapter 8 – Interior Finish, Decorative Materials and Furnishings

Industrial and Vocational Shops

Flammable/combustible spray finishing in Group E

- Must be conducted in a spray finishing room
  - One hour fire-barrier separation
  - Fire sprinkler protection
    - Including both sides of filters and in exhaust plenums and ducts
  - 4-A:40-B fire extinguisher (high hazard location)
  - Mechanical ventilation per the MMC
    - Interlocked with spraying equipment
  - Electrical protection for flammable vapor areas
    - Class 1, Division 1 or Class 2, Division 1 per the NEC

Section 2404
Spray Finishing Room
Section 2404.9

Industrial and Vocational Shops

Limited spraying spaces

- Objects sprayed are limited to 9 square feet in surface area
- Spaying operations are not continuous
- Mechanical ventilation of 6 air changes/hour
- Class 1, Division 2 electrical per NEC within 10 ft. of floor and 20 ft. horizontally of spray space
Dust Collection Systems
Industrial and Vocational Shops

Dust collection systems

- Required for equipment or machinery located inside buildings that generates or emits combustible dust where:
  - Dust-producing equipment requires an aggregate dust collection flow rate of more than 1,500 ft³/min (NFPA 664).

**COMBUSTIBLE DUST.** Finely divided solid material which is 420 microns or less in diameter and which, when dispersed in air in the proper proportions, could be ignited by a flame, spark or other source of ignition. Combustible dust will pass through a U.S. No. 40 standard sieve.

Section 2803.2 + 2204.1 + NFPA 664
Dust collection systems - 1500 ft³/min. flow rate trigger

- **General guidelines**
  - CFM (ft³/min) rating examples
    - Table saws: 350-450
    - Disk sanders: 350
    - Belt & drum sanders: 400-600
    - Planers: 500-900
  - A 1500 CFM flow rate is approximately equal to:
    - Four smaller pieces of equipment, or
    - Two larger pieces of equipment
Dust collection systems

- Deflagration (explosion) venting required for dust collection systems

- **Deflagration venting discharge**
  - Cannot discharge inside buildings
  - Not < 10 feet vertically from window openings and exits in the building
  - Not < 20 feet horizontally from
    - Exits in the building
    - Window openings and exits in adjacent buildings on the same lot and from the lot line

Section 2803.2 + 911.2, items 7-8
Dust collection systems located indoors

- Not prohibited, but deflagration venting must discharge to the exterior at a safe location

Section 911.2, item 8
Industrial and Vocational Shops

Dust collection systems – deflagration venting
Industrial and Vocational Shops

Ducts that convey flammable or combustible components

- Sprinkler protection required for ducts having a cross-sectional area of 75 square inches or greater
  - 10 in. diameter or greater for round ducts

Section 911.2, item 8
Industrial and Vocational Shops

Compressed gas cylinders

- Stored in the upright position (max 45° incline)
- Secured from tipping/falling
- Protective caps in-place when not in use
- MAQ not exceeded

Section 5304.1 + 5303.5.3 + 5303.6
Industrial and Vocational Shops

Compressed gas cylinders

- Clearly labeled with type of gas
- Secured from unauthorized access
- Protected where exposed to physical damage
- Protected from vehicular damage per Section 312

Sections 5304.4 + 5303.5 + 5303.5.2
Compressed gas cylinders in storage or use

- Separated from other incompatible compressed gases by one of the following
  - 20 ft. separation
  - Non-combustible partition extending 18 in. above and to the sides of storage
  - Liquids and solids stored in approved hazmat cabinet
  - Compressed gases stored in approved gas cabinets or exhausted enclosures

Sections 5303.7.1 + 5003.9.8
Compressed gas cylinders in storage or use

- Incompatible materials defined as:

**INCOMPATIBLE MATERIALS.** Materials that, when mixed, have the potential to react in a manner which generates heat, fumes, gases or byproducts which are hazardous to life or property.

- NFPA 55, Table 7.1.10.2 lists incompatible gases based on hazard class

Sections 202 + 5301.1
Asphyxiate Gases & Liquid CO2

5307.2 Asphyxiate gases
- Mechanical ventilation, OR
- Gas detection system

5307.3 Insulated liquid CO2 beverage dispensing systems over 100 lbs.
- Mechanical ventilation, OR
- Gas detection system
Fire Protection Features: Required Inspection, Testing & Maintenance (ITM)
Fire alarm systems
- Inspected/tested annually per NFPA 72 (2016)

CO detection systems
- Inspected/tested annually per NFPA 720 (2015)
Fire sprinkler systems

- Inspected and tested annually by qualified personnel per NFPA 25 (2017)
- Make sure special ITM intervals are completed when required
Fire sprinkler systems

- 5 year intervals
  - Gauges – replaced or tested
  - Sprinklers in harsh environments – replaced or sample tested (e.g. outdoors, corrosive environments)
  - Vales – internal inspection
  - Internal piping assessment
    - Opening a flushing connection at the end of main
    - Removing a sprinkler near the end of a branch line

Section 901.6.1 + NFPA 25
Fire sprinkler systems

- **10 year intervals**
  - Dry sprinklers – replaced or sample-tested
    - (e.g. walk-in freezers, small non-heated areas)

- **20 years**
  - Fast response sprinklers – replaced or sample-tested

- **50 years**
  - Sprinklers replaced or sample tested
    - Repeat testing at 10 year intervals

- **75 years**
  - Sprinklers replaced or sample-tested
    - Repeat at 5 year intervals

Section 901.6.1 + NFPA 25
Fire standpipe systems

- Annual inspection
- Hydrostatic testing every 5 years
- Occupant use hose stations
  - Inspected annually
  - Hydrostatic testing every 5 years
  - May be removed with approval from the fire code official

Section 901.6.1 + NFPA 25
Kitchen Hood Fire Extinguishing Systems

- System required where processes produce grease-laden vapors
- Inspected and tested by qualified personnel every 6 months or after activation (UL 300 systems per NFPA 17A)
  - Annual ITM if water-based (sprinklers)

Section 904.12
Kitchen Hood Systems

- Hoods, grease-removal devices, fans, ducts, etc., inspected annually by qualified personnel
- Cleaning is only required where the inspection finds grease accumulation
- Hoods shall be tagged and records of inspection and cleaning maintained
Other alternative extinguishing systems

- Based on type of system and referenced standard
- E.G. Clean agent systems
  - Annual ITM per NFPA 2001
Emergency lighting equipment

- Monthly activation test (30 second)
- Annual power test (30 minute)
- Records maintained for 3 years

Section 1031.10
Inspection, Testing & Maintenance

No emergency lighting units?
Integral emergency lighting fixtures
Inspection, Testing & Maintenance

Emergency & Standby Power Systems
Emergency & Standby Power Gen-Sets

- ITM per NFPA 110
- Weekly inspections
- Monthly transfer switch test
- Monthly 30-minute load test
- Annual maintenance per manufacturer

Section 1203.4
Emergency & Standby Stored Energy Systems

- Maintained per manufacturer’s instructions and NFPA 111
- Generally includes:
  - Monthly inspection and test
  - Quarterly and/or annual load testing
  - Semiannual transfer switch test

Section 1203.4
Inspection, Testing & Maintenance

Emergency lighting levels and coverage where powered by generator sets or stored energy systems

- Verify lighting levels and coverage areas at least annually
  - Running under load
  - Power outage
- Verify coverage in all required areas
  - Areas requiring 2 or more means of egress

Sections 1008.3 + 1104.5.3
Fire Door Assemblies
Horizontal and vertical sliding and rolling fire doors

- Maintained in operative condition
- Inspected and tested annually by qualified personnel per NFPA 80
- Records of ITM to be maintained
- Non-required assemblies may be decommissioned or removed

Sections 705.2 + 705.2.6
Swinging fire doors

– Must be maintained in operative condition
  o Exempt from annual testing and inspection via state amendment
– Records of ITM to be maintained
– Non-required assemblies may be removed or decommissioned

Section 705.2
Proscenium fire curtains

- Required for stages over 50 feet in height
- Maintained in operative condition
- Inspected annually by qualified personnel per NFPA 80
  - Includes operational training for staff
- Records of ITM to be maintained
Stage smoke and heat vents

- Required for stages over 1000 square feet or 50 feet in height
- Maintained in operative condition
- Inspected and tested annually by qualified personnel per NFPA 204*
- Records of ITM to be maintained

- Recent change made to the national model code (2018 IFC 910.5.1)
  - Annual inspection and testing
  - Operational testing every 5 years

Section 901.5 + 907.10
Inspection, Testing & Maintenance

Owatonna High School Fire: June of 2014
Smoke/heat vents covered over by construction
Inspection, Testing & Maintenance

Documentation of flame resistance for stage curtains and suspended fabrics

- Documentation of flame-resistant treatment within the last 20 years, or
  - Have sample tested per NFPA 705, or
  - Retreat if condition allows, or
  - Purchase new FR curtains
- Maintain records for review
- IFR fabrics are exempt
Periodic ITM is required for any door control system installed on an egress door that:

- Utilizes an electromagnetic lock, or
- Delays or prevents occupant egress

Including:
- Sensor release of electrically locked egress doors
- Door hardware release of electrically locked egress doors
- Delayed egress doors
- Controlled egress doors (not allowed in Group E schools)
- Special detention arrangements
Door control systems (ITM)

- The primary release functions shall be tested monthly for operability
- Fire alarm and sprinkler system interconnects and other failsafe release functions shall be tested at least annually for operability
- Testing shall be done by individuals who can demonstrate knowledge and understanding of the operating components of the door being tested
- Deficiencies shall be corrected without delay
- Written records of inspection and testing shall be kept and available to the fire code official
SFMD School Inspections Webpage

Forms
- School fire drill instructions and recording
- Combination fire, lockdown and tornado drill recording

Information sheets
- Classroom fire safety for teachers*
- LP-Gas powered floor maintenance machines and forklifts

Policies
- Temporary inflated or air supported planetariums
Questions

Website: https://sfm.dps.mn.gov