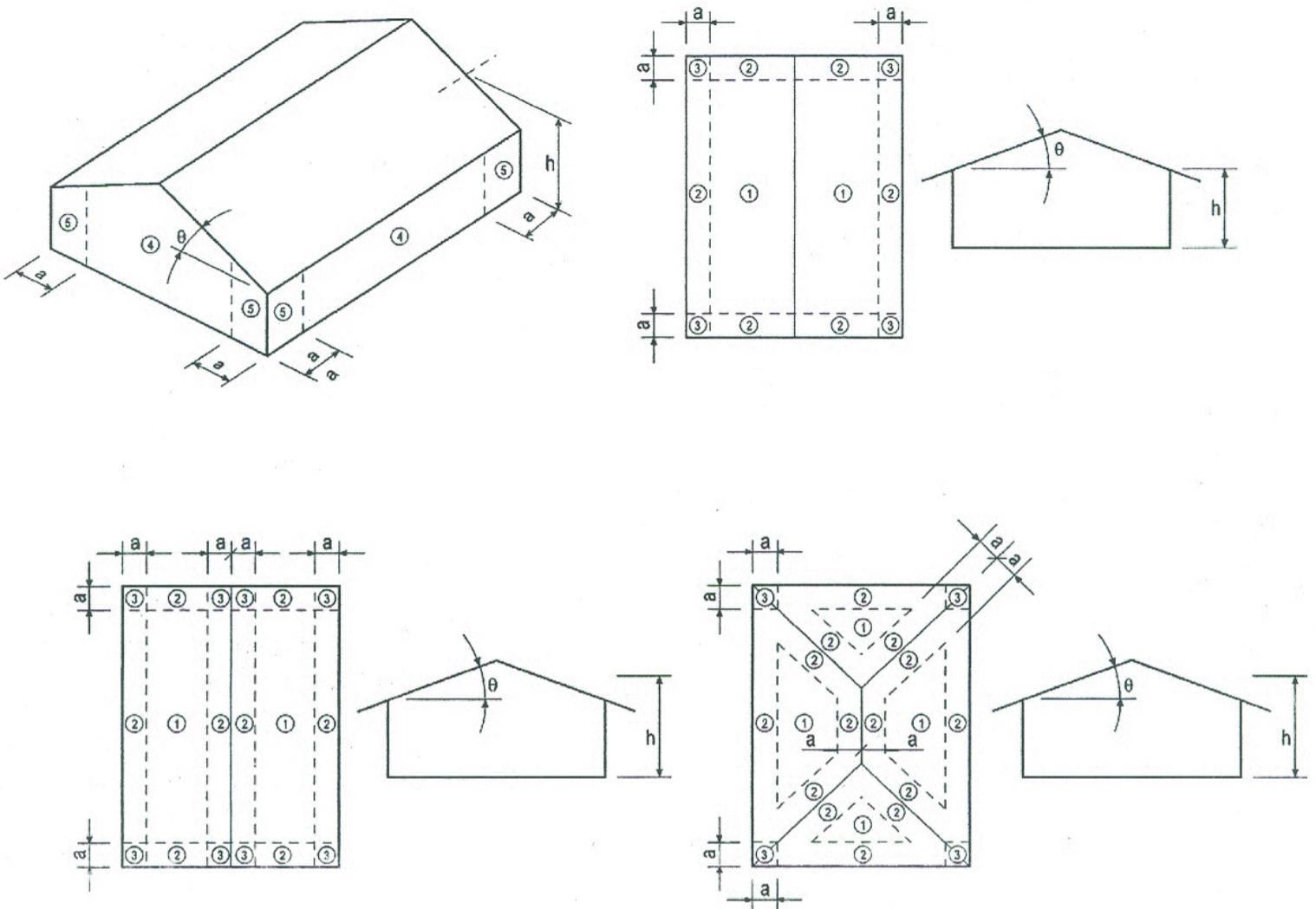


**780 FIGURE 5301.2(8)  
COMPONENT AND CLADDING PRESSURE ZONES**



For SI: 1 foot = 304.8 mm, 1 degree = 0.009 rad.  
NOTE: a = 4 feet in all cases

**Exception:** Wood structural panels with a minimum thickness of  $\frac{7}{16}$  inch (11.1 mm) and a maximum span of eight feet (2438 mm) shall be permitted for opening protection in one- and two-story buildings. Panels shall be precut to cover the glazed openings with attachment hardware provided. Attachments shall be provided in accordance with 780 CMR Table 5301.2.1.2 or shall be designed to resist the components and cladding loads determined in accordance with the provisions of the *International Building Code but utilizing the wind loads set forth in 780 CMR 53.00.*

**780 CMR TABLE 5301.2.1.2  
WINDBORNE DEBRIS PROTECTION  
FASTENING SCHEDULE FOR WOOD  
STRUCTURAL PANELS<sup>a,b,c</sup>**

FASTENER TYPE	FASTENER SPACING		
	Panel span ≤ 4 foot	4 foot < panel span ≤ 6 foot	6 foot < panel span ≤ 8 foot
2½" # 6 Wood screws	16"	12"	9"
2½" # 8 Wood screws	16"	16"	12"

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 pound = 0.454 kg, 1 mile per hour = 1.609 km/h.

- a. This table is based on 130 mph wind speeds and a 33-foot mean roof height.
- b. Fasteners shall be installed at opposing ends of the wood structural panel.
- c. Where screws are attached to masonry or masonry/stucco, they shall be attached utilizing vibration-resistant anchors having a minimum ultimate resistant anchors having a minimum ultimate withdrawal capacity of 490 pounds.

**5301.2.1.3 Wind Speed Conversion.** When referenced documents are based on fastest mile wind speeds, the three second gust wind velocities of 780 CMR Table 5301.2(4) shall be converted to fastest mile wind velocities using 780 CMR Table 5301.2.1.3.

**5301.2.1.4 Exposure Category.** For each wind direction considered, an exposure category that adequately reflects the characteristics of ground surface irregularities shall be determined for the site at which the building or structure is to be constructed. For a site located in the transition zone between categories, the category resulting in the largest wind forces shall apply. Account shall be taken of variations in ground surface roughness

## THE MASSACHUSETTS STATE BUILDING CODE

that arise from natural topography and vegetation as well as from constructed features. For any given wind direction, the exposure in which a specific building or other structure is sited shall be assessed as being one of the following categories:

1. **Exposure A.** Large city centers with at least 50% of the buildings having a height in excess of 70 feet (21 336mm). Use of this exposure category shall be limited to those areas for which terrain representative of Exposure A prevails in the upwind direction for a distance of at least 0.5 mile (0.8 km) or ten times the height of the building or other structure, whichever is greater. Possible channeling effects or increased velocity pressures due to the building or structure being located in the wake of adjacent buildings shall be taken into account.
2. **Exposure B.** Urban and suburban areas, wooded areas, or other terrain with numerous closely spaced obstructions having the size of single-family dwellings or larger. Exposure B shall be assumed unless the site meets the definition of another type exposure.
3. **Exposure C.** Open terrain with scattered obstructions, including surface undulations or other irregularities, having heights generally less than 30 feet (9144 mm) extending more than 1,500 feet (457 m) from the building site in any quadrant. This exposure shall also apply to any building located within Exposure B type terrain where the building is directly adjacent to open areas of Exposure C type terrain in any quadrant for a distance of more than 600 feet (183 m). This category includes flat open country, grasslands and shorelines in hurricane prone regions.
4. **Exposure D.** Flat, unobstructed areas exposed to wind flowing over open water (excluding shorelines in hurricane prone regions) for a distance of at least one mile (1.61 km). Shore-lines in Exposure D include inland waterways, the Great Lakes and coastal areas of California, Oregon, Washington and Alaska. This exposure shall apply only to those buildings and other structures exposed to the wind coming from over the water. Exposure D extends inland from the shore-line a distance of 1,500 feet (457 m) or ten times the height of the building or structure, whichever is greater.

**5301.2.2 Seismic Provisions. Reserved.**

**5301.2.3 Snow Loads.** Wood framed construction, cold-formed steel framed construction and masonry and concrete construction in regions with ground snow loads 70 psf (3.35 kN/m<sup>2</sup>) or less, shall be in accordance with Chapters 55, 56 and 58. Buildings in regions with ground snow loads

greater than 70 psf (3.35 kN/m<sup>2</sup>) shall be designed in accordance with accepted engineering practice.

**5301.2.4 Floodplain Construction.** Buildings and structures constructed in flood hazard areas (including A or V Zones) as established by *FEMA Flood Insurance Rate Maps* shall be designed and constructed in accordance with 780 CMR 5323.

**5301.3 Story Height.** Buildings constructed in accordance with these provisions shall be limited to story heights of not more than the following:

1. For wood wall framing, the laterally unsupported bearing wall stud height permitted by 780 CMR Table 5602.3(5) plus a height of floor framing not to exceed 16 inches.

**Exception:** For wood framed wall buildings with bracing in accordance with 780 CMR Table 5602.10.1, the wall stud clear height used to determine the maximum permitted story height may be increased to 12 feet without requiring an engineered design for the building wind force resisting systems provided that the length of bracing required by 780 CMR Table 5602.10.1 is increased by multiplying by a factor of 1.20. Wall studs are still subject to the requirements of 780 CMR 5301.

2. For steel wall framing, a stud height of ten feet, plus a height of floor framing not to exceed 16 inches.
3. For masonry walls, a maximum bearing wall clear height of 12 feet plus a height of floor framing not to exceed 16 inches.

**Exception:** An additional eight feet is permitted for gable end walls.

4. For insulating concrete form walls, the maximum bearing wall height per story as permitted by 780 CMR 5611 tables plus a height of floor framing not to exceed 16 inches.

Individual walls or walls studs shall be permitted to exceed these limits as permitted by 780 CMR 56.00 provisions, provided story heights are not exceeded. An engineered design, *provided by a Massachusetts-registered professional engineer or architect* shall be provided for the wall or wall framing members when they exceed the limits of 780 CMR 56.00. Where the story height limits are exceeded, an engineered design shall be provided *addressing* the overall wind force resisting systems *and utilizing the wind loads of 780 CMR 51.00 through 99.00.*

**5301.4 Dead Load.** The actual weights of materials and construction shall be used for determining dead load with consideration for the dead load of fixed service equipment.

**5301.5 Live Load.** The minimum uniformly distributed live load shall be as provided in 780 CMR Table 5301.5.

**780 CMR TABLE 5301.2.1.3  
EQUIVALENT BASIC WIND SPEEDS<sup>a</sup>**

3-second gust	85	90	100	105	110	120	125	130	140	145	150	160	170
Fastest mile	70	75	80	85	90	100	105	110	120	125	130	140	150

For SI: 1 mile per hour = 1.609 km/h.

a. Linear interpolation is permitted

**5301.6 Roof Load.** Roof shall be designed for the live load indicated in 780 CMR Table 5301.6 or the snow load *based on the Massachusetts Ground Snow Load 780 CMR Table 5301.2(5)*, whichever is greater.

**5301.7 Deflection.** The allowable deflection of any structural member under the live load listed in 780 CMR 5301.5 and 5301.6 shall not exceed the values in 780 CMR Table 5301.7.

**780 CMR TABLE 5301.5  
MINIMUM UNIFORMLY DISTRIBUTED  
LIVE LOADS  
(in pounds per square foot)**

USE	LIVE LOAD
Attics with storage <sup>b</sup>	20
Attics without storage <sup>b</sup>	10
Decks <sup>c</sup>	40
Exterior balconies	60
Fire escapes	40
Guardrails and handrails <sup>d</sup>	200
Guardrails in-fill components <sup>f</sup>	50
Passenger vehicle garages <sup>a</sup>	50 <sup>a</sup>
Rooms other than sleeping rooms	40
Sleeping rooms	30
Stairs	40 <sup>c</sup>

For SI: 1 pound per square foot = 0.0479 kN/m<sup>2</sup>, 1 square inch = 645 mm<sup>2</sup>, 1 pound = 4.45 N.

- a. Elevated garage floors shall be capable of supporting a 2,000-pound load applied over a 20-square-inch area.
- b. No storage with roof slope not over three units in 12 units.
- c. Individual stair treads shall be designed for the uniformly distributed live load or a 300-pound concentrated load acting over an area of four square inches, whichever produces the greater stresses.
- d. A single concentrated load applied in any direction at any point along the top.
- e. See 780 CMR 5502.2.1 for decks attached to exterior walls.
- f. Guard in-fill components (all those except the handrail), balusters and panel fillers shall be designed to withstand a horizontally applied normal load of 50 pounds on an area equal to one square foot. This load need not be assumed to act concurrently with any other live load requirement.

**780 CMR TABLE 5301.6  
MINIMUM ROOF LIVE LOADS IN  
POUNDS-FORCE PER SQUARE FOOT OF  
HORIZONTAL PROJECTION**

ROOF SLOPE	TRIBUTARY LOADED AREA IN SQUARE FEET FOR ANY STRUCTURAL MEMBER		
	0 to 200	201 to 600	Over 600
Flat or rise less than 4 inches per foot (1:3)	20	16	12
Rise 4 inches per foot (1:3) to less than 12 inches per foot (1:1)	16	14	12
Rise 12 inches per foot (1:1) and greater	12	12	12

For SI: 1 square foot = 0.0929 m<sup>2</sup>, 1 pound per square foot = 0.0479 kN/m<sup>2</sup>, 1 inch per foot = 0.0833 mm/m.

**780 CMR TABLE 5301.7  
ALLOWABLE DEFLECTION OF  
STRUCTURAL MEMBERS<sup>a,b,c</sup>**

STRUCTURAL MEMBER	ALLOWABLE DEFLECTION
Rafters having slopes greater than 3/12 with no finished ceiling attached to rafters	L/180
Interior walls and partitions	H/180
Floors and plastered ceilings	L/360
All other structural members	L/240
Exterior walls with plaster or stucco finish	H/360
Exterior walls—wind loads <sup>a</sup> with brittle finishes	L/240
Exterior walls—wind loads <sup>a</sup> with flexible finishes	L/120

Note: L = span length, H = span height.

- a. The wind load shall be permitted to be taken as 0.7 times the Component and Cladding loads for the purpose of the determining deflection limits herein.
- b. For cantilever members, L shall be taken as twice the length of the cantilever.
- c. For aluminum structural members or panels used in roofs or walls of sun-room additions or patio covers, not supporting edge of glass or sandwich panels, the total load deflection shall not exceed L/60. For sandwich panels used in roofs or walls of sunroom additions or patio covers, the total load deflection shall not exceed L/120.

## THE MASSACHUSETTS STATE BUILDING CODE

**5301.8 Nominal Sizes.** For the purposes of 780 CMR 51.00 through 99.00, where dimensions of lumber are specified, they shall be deemed to be nominal dimensions unless specifically designated as actual dimensions.

**780 CMR 5302 LOCATION ON LOT**

**5302.1 Exterior Walls.** Exterior walls with a fire separation distance less than three feet (914 mm) shall have not less than a one-hour fire-resistive rating with exposure from both sides. Projections shall not extend to a point closer than two feet (610 mm) from the line used to determine the fire separation distance.

**Exception:** Detached garages accessory to a dwelling located within two feet of a lot line may have roof eave projections not exceeding four inches *unless precluded by zoning bylaws.*

Projections extending into the fire separation distance shall have not less than one-hour fire-resistive construction on the underside. The above provisions shall not apply to walls which are perpendicular to the line used to determine the fire separation distance.

**Exception:** Tool and storage sheds, playhouses and similar structures exempted from permits by 780 CMR 5105.2 are not required to provide wall protection based on location on the lot. Projections beyond the exterior wall shall not extend over the lot line *or otherwise conflict with zoning bylaw requirements.*

**5302.2 Openings.** Openings shall not be permitted in the exterior wall of a dwelling or accessory building with a fire separation distance less than three feet (914 mm). This distance shall be measured perpendicular to the line used to determine the fire separation distance.

**Exceptions:**

1. Openings shall be permitted in walls that are perpendicular to the line used to determine the fire separation distance.
2. Foundation vents installed in compliance with 780 CMR 51.00 through 99.00 are permitted.

**5302.3 Penetrations.** Penetrations located in the exterior wall of a dwelling with a fire separation distance less than three feet (914 mm) shall be protected in accordance with 780 CMR 5317.3.

**Exception:** Penetrations shall be permitted in walls that are perpendicular to the line used to determine the fire separation distance.

**780 CMR 5303 LIGHT, VENTILATION AND HEATING**

**5303.1 Habitable Rooms.** All habitable rooms shall be provided with aggregate glazing area of not less

than 8% of the floor area of such rooms. Natural ventilation shall be through windows, doors, louvers or other approved openings to the outdoor air. Such openings shall be provided with ready access or shall otherwise be readily controllable by the building occupants. The minimum openable area to the outdoors shall be 4% of the floor area being ventilated.

**Exceptions:**

1. The glazed areas need not be openable where the opening is not required by 780 CMR 5310 and an approved mechanical ventilation system is provided capable of producing 0.35 air change per hour in the room or a whole-house mechanical ventilation system is installed capable of supplying outdoor ventilation air of 15 cubic feet per minute (cfm) (7.08 L/s) per occupant computed on the basis of two occupants for the first bedroom and one occupant for each additional bedroom.
2. The glazed areas need not be provided in rooms where 780 CMR 5303.1 Exception 1 is satisfied and artificial light is provided capable of producing an average illumination of six footcandles (6.46 lux) over the area of the room at a height of 30 inches (762 mm) above the floor level.

**5303.2 Adjoining Rooms.** For the purpose of determining light and ventilation requirements, any room shall be considered as a portion of an adjoining room when at least  $\frac{1}{2}$  of the area of the common wall is open and unobstructed and provides an opening of not less than  $\frac{1}{10}$  of the floor area of the interior room but not less than 25 square feet (2.32 m<sup>2</sup>).

**Exception:** Openings required for light and/or ventilation shall be permitted to open into a thermally isolated sunroom addition or patio cover, provided that there is an openable area between the adjoining room and the sunroom addition or patio cover of not less than  $\frac{1}{10}$  of the floor area of the interior room but not less than 20 square feet (1.86 m<sup>2</sup>). The minimum openable area to the outdoors shall be based upon the total floor area being ventilated.

**5303.3 Bathrooms.** Bathrooms, water closet compartments and other similar rooms shall be provided with aggregate glazing area in windows of not less than three square feet (0.279 m<sup>2</sup>),  $\frac{1}{2}$  of which must be openable.

**Exception:** The glazed areas shall not be required where artificial light and a mechanical ventilation system are provided. The minimum ventilation rates shall be 50 cfm (23.6 L/s) for intermittent ventilation or 20 cfm (9.4 L/s) for continuous ventilation. Ventilation air from the space shall be exhausted directly to the outside.

**Notes: Mechanical ventilation of bathrooms containing a shower or bathtub is required at the ventilation rates noted in 780 CMR 5303.3 Exception.**

**Exhaust fans are not required by 780 CMR 51.00 through 99.00 in half-bathrooms. (For the purposes of 780 CMR 5303, half-bathrooms are defined as those bathrooms that contain only a toilet and sink.)**

**Massachusetts State Sanitary Code 105 CMR and/or Massachusetts Fuel Gas and Plumbing Code 248 CMR may require exhaust fans.**

**5303.4 Opening Location.** Outdoor intake and exhaust openings shall be located in accordance with 780 CMR 5303.4.1 and 5303.4.2.

**5303.4.1 Intake Openings.** Mechanical and gravity outdoor air intake openings shall be located a minimum of ten feet (3048 mm) from any hazardous or noxious contaminant, such as vents, chimneys, plumbing vents, streets, alleys, parking lots and loading docks, except as otherwise specified in 780 CMR 51.00 through 99.00. Where a source of contaminant is located within ten feet (3048 mm) of an intake opening, such opening shall be located a minimum of two feet (610 mm) below the contaminant source.

For the purpose 780 CMR 5303, the exhaust from dwelling unit toilet rooms, bathrooms and kitchens shall not be considered as hazardous or noxious.

**5303.4.2 Exhaust Openings.** Outside exhaust openings shall be located so as not to create a nuisance. Exhaust air shall not be directed onto walkways.

**5303.5 Outside Opening Protection.** Air exhaust and intake openings that terminate outdoors shall be protected with corrosion-resistant screens, louvers or grilles having a minimum opening size of ¼ inch (6.4 mm) and a maximum opening size of ½ inch (12.7 mm), in any dimension. Openings shall be protected against local weather conditions. Outdoor air exhaust and intake openings shall meet the provisions for exterior wall opening protectives in accordance with 780 CMR 51.00 through 99.00.

**5303.6 Stairway Illumination.** All interior and exterior stairways shall be provided with *an artificial light source* to illuminate the stairs, including the landings and treads.

**Such artificial light source shall comply with all applicable requirements of 527 CMR 12.**

**5303.6.1 Light Activation.** The control for activation of the required interior stairway lighting shall conform to the requirements of 527 CMR 12.

**5303.7 Required Glazed Openings.** Required glazed openings shall open directly onto a street or public alley, or a yard or court located on the same lot as the building.

**5303.7.1 Roofed Porches.** Required glazed openings may face into a roofed porch where the porch abuts a street, yard or court and the longer side of the porch is at least 65% open and unobstructed and the ceiling height is not less than seven feet (2134 mm).

**5303.8 Required Heating.** Refer to 105 CMR 410.000 when applicable to rental property.

#### 780 CMR 5304 MINIMUM ROOM AREAS

**5304.1 Minimum Area.** Every dwelling unit shall have at least one habitable room that shall have not less than *150 square* feet of gross floor area.

**5304.2 Other Rooms.** Other habitable rooms shall have a floor area of not less than 70 square feet (6.5 m<sup>2</sup>).

**Exception:** Kitchens.

**5304.3 Minimum Dimensions.** Habitable rooms shall not be less than seven feet (2134 mm) in any horizontal dimension.

**Exception:** Kitchens.

**5304.4 Height Effect on Room Area.** Portions of a room with a sloping ceiling measuring less than five feet (1524 mm) or a furred ceiling measuring less than seven feet (2134 mm) from the finished floor to the finished ceiling shall not be considered as contributing to the minimum required habitable area for that room.

#### 780 CMR 5305 CEILING HEIGHT

**5305.1 Minimum Height.** Habitable rooms, hallways, corridors, bathrooms, toilet rooms, laundry rooms and basements shall have a ceiling height of not less than seven feet (2134 mm). The required height shall be measured from the finish floor to the lowest projection from the ceiling.

##### Exceptions:

1. Beams and girders spaced not less than four feet (1219 mm) on center may project not more than six inches (152 mm) below the required ceiling height.
2. Ceilings in basements without habitable spaces may project to within six feet, eight inches (2032 mm) of the finished floor; and beams, girders, ducts or other obstructions may project to within six feet, four inches (1931 mm) of the finished floor.
3. Not more than 50% of the required floor area of a room or space is permitted to have a sloped ceiling less than seven feet (2134 mm) in height with no portion of the required floor area less than five feet (1524 mm) in height.
4. Bathrooms shall have a minimum ceiling height of six feet eight inches (2036 mm) over the fixture and at the front clearance area for fixtures.

## THE MASSACHUSETTS STATE BUILDING CODE

A shower or tub equipped with a showerhead shall have a minimum ceiling height of six feet eight inches (2036 mm) above a minimum area 30 inches (762 mm) by 30 inches (762 mm) at the showerhead.

### 780 CMR 5306 SANITATION AND ELECTRICAL REQUIREMENTS

*(Where applicable, refer to 248 CMR and/or 310 CMR 15.00 Title 5 and/or 105 CMR Chapter V and/or 527 CMR 12).*

**5306.1 Toilet Facilities.** Every dwelling unit shall be provided with a water closet, lavatory, and a bathtub or shower *conforming to the applicable requirements of 248 CMR (the Massachusetts Fuel Gas and Plumbing Code).*

**5306.2 Kitchen.** Each dwelling unit shall be provided with a kitchen area and every kitchen area shall be provided with a sink *conforming to the applicable requirements of 248 CMR (the Massachusetts Fuel Gas and Plumbing Code).*

**5306.3 Sewage Disposal.** All plumbing fixtures shall be connected to a sanitary sewer or to an approved private sewage disposal system.

**5306.4 Water Supply to Fixtures.** All plumbing fixtures shall be connected to an approved water supply. Kitchen sinks, lavatories, bathtubs, showers, bidets, laundry tubs and washing machine outlets shall be provided with hot and cold water; *all such requirements conforming to the applicable requirements of 248 CMR (the Massachusetts Fuel Gas and Plumbing Code).*

**5306.5 Electrical Code.** See 527 CMR 12.

### 780 CMR 5307 TOILET, BATH AND SHOWER SPACES

**5307.1 Space Required.** Fixtures shall be spaced as *required by the applicable requirements of 248 CMR (the Massachusetts Fuel Gas and Plumbing Code)*

**5307.2 Bathtub and Shower Spaces.** Bathtub and shower floors and walls above bathtubs with installed shower heads and in shower compartments shall be finished with a nonabsorbent surface. Such wall surfaces shall extend to a height of not less than six feet (1829 mm) above the floor *(also see 248 CMR).*

### SECTION 5308 GLAZING

**5308.1 Identification.** Except as indicated in 780 CMR 5308.1.1, *and as required by CPSC 16 CFR (Code of Federal Regulations); 1201 and M.G.L. c. 143, §§ 3t, 3U and 3T*, each pane of glazing installed in hazardous locations as defined in 780 CMR 5308.4 shall be provided with a manufacturer's, *fabricator's* or installer's label, designating

the type and thickness of glass and the safety glazing standard with which it complies, which is visible in the final installation. The label shall be acid etched, sandblasted, ceramic-fired, embossed mark, or shall be of a type which once applied cannot be removed without being destroyed.

*Note: also refer to 780 CMR 61.00 relative to the National Fenestration Rating Council (NFRC) listing.*

#### Exceptions:

1. For other than tempered glass, labels may be omitted provided the building official approves the use of a certificate, affidavit or other evidence confirming compliance with 780 CMR 51.00 through 99.00.
2. Tempered spandrel glass may be identified by the manufacturer with a removable paper label.

**5308.1.1 Identification of Multipane Assemblies.** Multi-pane assemblies having individual panes not exceeding one square foot (0.09 m<sup>2</sup>) in exposed area shall have at least one pane in the assembly identified in accordance with 780 CMR 5308.1. All other panes in the assembly shall be labeled "16 CFR 1201."

**5308.2 Louvered Windows or Jalousies.** Regular, float, wired or patterned glass in jalousies and louvered windows shall be no thinner than nominal  $\frac{3}{16}$  inch (4.76 mm) and no longer than 48 inches (1219 mm). Exposed glass edges shall be smooth.

**5308.2.1 Wired Glass Prohibited.** Wired glass with wire exposed on longitudinal edges shall not be used in jalousies or louvered windows.

**5308.3 Human Impact Loads.** Individual glazed areas including glass mirrors in hazardous locations such as those indicated as defined in 780 CMR 5308.4 shall pass the test requirements of CPSC 16 CFR, Part 1201. Glazing shall comply with the CPSC 16 CFR, Part 1201 criteria for Category I or Category II as indicated in 780 CMR Table 5308.3.

#### Exceptions:

1. Polished wired glass for use in fire doors and other fire resistant locations shall comply with ANSI Z97. 1.
2. Louvered windows and jalousies shall comply with 780 CMR 5308.2.

**5308.4 Hazardous Locations.** *The following locations, as established by M.G.L. c. 143, § 3T and as specified in 780 CMR 5308, shall be considered specific hazardous locations for the purposes of glazing:*

1. Glazing in swinging doors except jalousies.
2. Glazing in fixed and sliding panels of sliding door assemblies and panels in sliding and bifold closet door assemblies.
3. Glazing in storm doors.
4. Glazing in all unframed swinging doors.

**780 CMR TABLE 5308.3**  
**MINIMUM CATEGORY CLASSIFICATION OF GLAZING**

EXPOSED SURFACE AREA OF ONE SIDE OF ONE LITE	GLAZING IN STORM OR COMBINATION DOORS (Category Class)	GLAZING IN DOORS (Category Class)	GLAZED PANELS REGULATED BY 780 CMR 5308.4.7. (Category Class)	GLAZED PANELS REGULATED BY 780 CMR 5308.4.6. (Category Class)	GLAZING IN DOORS AND ENCLOSURES REGULATED BY 780 CMR 5308.4.5. (Category Class)	SLIDING GLASS DOORS PATIO TYPE (Category Class)
9 sq. ft. or less	I	I	NR <sup>a</sup>	I	II	II
More than 9 sq. ft	II	II	II	II	II	II

For SI: 1 square foot = 0.0929 m<sup>2</sup>.

<sup>a</sup>NR means "No Requirement."

5. Glazing in doors and enclosures for hot tubs, whirlpools, saunas, steam rooms, bathtubs and showers. Glazing in any part of a building wall enclosing these compartments where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) measured vertically above any standing or walking surface.

6. Glazing, in an individual fixed or operable panel adjacent to a door where the nearest vertical edge is within a 24-inch (610 mm) arc of the door in a closed position and whose bottom edge is less than 60 inches (1524 mm) above the floor or walking surface.

7. Glazing in an individual fixed or operable panel, other than those locations described in 780 CMR 5308.4.5 and 6, that meets all of the following conditions:

7.1. Exposed area of an individual pane greater than nine square feet (0.836 m<sup>2</sup>).

7.2. Bottom edge less than 18 inches (457 mm) above the floor.

7.3. Top edge greater than 36 inches (914 mm) above the floor.

7.4. One or more walking surfaces within 36 inches (914 mm) horizontally of the glazing.

8. All glazing in railings regardless of an area or height above a walking surface. Included are structural baluster panels and nonstructural in-fill panels.

9. Glazing in walls and fences enclosing indoor and outdoor swimming pools, hot tubs and spas where the bottom edge of the glazing is less than 60 inches (1524 mm) above a walking surface and within 60 inches (1524 mm) horizontally of the water's edge. This shall apply to single glazing and all panes in multiple glazing.

10. Glazing adjacent to stairways, landings and ramps within 36 inches (914 mm) horizontally of a walking surface when the exposed surface of the glass is less than 60 inches (1524 mm) above the plane of the adjacent walking surface.

11. Glazing adjacent to stairways within 60 inches (1524 mm) horizontally of the bottom tread of a stairway in any direction when the exposed surface of the glass is less than 60 inches (1524 mm) above the nose of the tread.

**12. Fixed glazed panels adjacent to entrance and exit doors which, because of their location, present a barrier in the normal path traveled by persons going into or out of these buildings, and because of their size and design may be mistaken as means of egress**

**Exception:** The following products, materials and uses are exempt from the above hazardous locations:

1. Openings in doors through which a three-inch (76 mm) sphere is unable to pass.
2. Decorative glass in 780 CMR 5308.4.1., 6. or 7.
3. Glazing in 780 CMR 5308.4.6., when there is an intervening wall or other permanent barrier between the door and the glazing.
4. Glazing in 780 CMR 5308.4.6., in walls perpendicular to the plane of the door in a closed position or where access through the door is to a closet or storage area three feet (914 mm) or less in depth. Glazing in these applications shall comply with 780 CMR 5308.4.7.
5. Glazing in 780 CMR 5308.4.7. and 10., when a protective bar is installed on the accessible side(s) of the glazing 36 inches x two inches (914 mm x 51 mm) above the floor. The bar shall be capable of withstanding a horizontal load of 50 pounds per linear foot (74.5 kg/m) without contacting the glass and be a minimum of 1½ inches (38 mm) in height.
6. Outboard panes in insulating glass units and other multiple glazed panels in 780 CMR 5308.4.7., when the bottom edge of the glass is 25 feet (7620 mm) or more above grade, a roof, walking surface, or other horizontal [within 45 degrees (0.79 rad) of horizontal] surface adjacent to the glass exterior.
7. Louvered windows and jalousies complying with the requirements of 780 CMR 5308.2.
8. Mirrors and other glass panels mounted or hung on a surface that provides a continuous backing support.

## THE MASSACHUSETTS STATE BUILDING CODE

9. Safety glazing in 780 CMR 5308.4.10. and 11. is not required where:

9.1. The side of a stairway, landing or ramp has a guardrail or handrail, including balusters or in-fill panels, complying with the provisions of 780 CMR 1003.3.12 and 1607.7 *Sixth Edition, Massachusetts Building Code*; and

9.2. The plane of the glass is greater than 18 inches (457 mm) from the railing.

**5308.5 Site Built Windows.** Site built windows shall comply with 780 CMR 2404 of the *Sixth Edition, Massachusetts State Building Code but utilizing the wind loads of 780 CMR 51.00 through 99.00; note that seismic design is not required.*

**5308.6 Skylights and Sloped Glazing.** Skylights and sloped glazing shall comply with 780 CMR 5308.6.1 through 5308.6.9.

#### 5308.6.1 Definitions.

##### SKYLIGHTS AND SLOPED GLAZING.

Glass or other transparent or translucent glazing material installed at a slope of more than 15 degrees (0.26 rad) from vertical. Glazing materials in skylights, including unit skylights, solariums, sunrooms, roofs and sloped walls are included in this definition.

**UNIT SKYLIGHT.** A factory assembled, glazed fenestration unit, containing one panel of glazing material, that allows for natural daylighting through an opening in the roof assembly while preserving the weather resistant barrier of the roof.

**5308.6.2 Permitted Materials.** The following types of glazing may be used:

1. Laminated glass with a minimum 0.015-inch (0.38 mm) polyvinyl butyral interlayer for glass panes 16 square feet (1.5 m<sup>2</sup>) or less in area located such that the highest point of the glass is not more than 12 feet (3658 mm) above a walking surface or other accessible area; for higher or larger sizes, the minimum interlayer thickness shall be 0.030 inch (0.76 mm).
2. Fully tempered glass.
3. Heat-strengthened glass.
4. Wired glass.
5. Approved rigid plastics.

**5308.6.3 Screens, General.** For fully tempered or heat-strengthened glass, a retaining screen meeting the requirements of 780 CMR 5308.6.7 shall be installed below the glass, except for fully tempered glass that meets either condition listed in 780 CMR 5308.6.5.

**5308.6.4 Screens with Multiple Glazing.** When the inboard pane is fully tempered, heat-strengthened, or wired glass, a retaining screen meeting the requirements of 780 CMR 5308.6.7

shall be installed below the glass, except for either condition listed in 780 CMR 5308.6.5. All other panes in the multiple glazing may be of any type listed in 780 CMR 5308.6.2.

**5308.6.5 Screens not Required.** Screens shall not be required when fully tempered glass is used as single glazing or the inboard pane in multiple glazing and either of the following conditions are met:

1. Glass area 16 square feet (1.49 m<sup>2</sup>) or less. Highest point of glass not more than 12 feet (3658 mm) above a walking surface or other accessible area, nominal glass thickness not more than <sup>3</sup>/<sub>16</sub> inch (4.76 mm), and (for multiple glazing only) the other pane or panes fully tempered, laminated or wired glass.
2. Glass area greater than 16 square feet (1.49 m<sup>2</sup>). Glass sloped 30 degrees (0.52 rad) or less from vertical, and highest point of glass not more than ten feet (3048 mm) above a walking surface or other accessible area.

**5308.6.6 Glass in Greenhouses.** Any glazing material is permitted to be installed without screening in the sloped areas of greenhouses, provided the greenhouse height at the ridge does not exceed 20 feet (6096 mm) above grade.

**5308.6.7 Screen Characteristics.** The screen and its fastenings shall be capable of supporting twice the weight of the glazing, be firmly and substantially fastened to the framing members, and have a mesh opening of no more than one inch by one inch (25.4 mm by 25.4 mm).

**5308.6.8 Curbs for Skylights.** All unit skylights installed in a roof with a pitch flatter than three units vertical in 12 units horizontal (25% slope) shall be mounted on a curb extending at least four inches (102 mm) above the plane of the roof unless otherwise specified in the manufacturer's installation instructions.

**5308.6.9 Testing and Labeling.** Unit skylights shall be tested by an approved independent laboratory, and bear a label identifying manufacturer, performance grade rating, and approved inspection agency to indicate compliance with the requirements of AAMA/WDMA 101/LS.2/NAFS.

## 780 CMR 5309 GARAGES AND CARPORTS

**5309.1 Opening Protection.** Openings from a private garage directly into a room used for sleeping purposes shall not be permitted. Other openings between the garage and residence shall be equipped with solid wood doors not less than 1<sup>3</sup>/<sub>8</sub> inches (35 mm) in thickness, solid or honeycomb core steel doors not less than 1<sup>3</sup>/<sub>8</sub> inches (35 mm) thick, or 20-minute fire-rated doors.

*All such panel doors shall be labeled with a minimum 20-minute fire-resistance rating.*



*Self-closing devices and fire-resistive-rated door frames are not required. All door openings between the garage floor and the dwelling shall be provided with a raised sill with a minimum height of four inches (102 mm).*

**5309.1.1 Duct Penetration.** Ducts in the garage and ducts penetrating the walls or ceilings separating the dwelling from the garage shall be constructed of a minimum No. 26 gage (0.48 mm) sheet steel or other approved material and shall have no openings into the garage.

**5309.2 Separation Required.** The garage shall be separated from the residence and its attic area by not less than  $\frac{5}{8}$  inch **Type X gypsum board or equivalent (15.9 mm)** gypsum board applied to the garage side. Garages beneath habitable rooms shall be separated from all habitable rooms above by not less than  $\frac{5}{8}$ -inch (15.9 mm) Type X gypsum board or equivalent. Where the separation is a floor-ceiling assembly, the structure supporting the separation shall also be protected by not less than  $\frac{5}{8}$ -inch (15.9 mm) gypsum board or equivalent.

**5309.3 Floor Surface.** Garage floor surfaces shall be of approved noncombustible material.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway. **Concrete floors shall be installed as required by 780 CMR 5506.**

**5309.4 Carports.** Carports shall be open on at least two sides. Carport floor surfaces shall be of approved noncombustible material. Carports not open on at least two sides shall be considered a garage and shall comply with the provisions of 780 CMR 5309 for garages.

**Exception:** Asphalt surfaces shall be permitted at ground level in carports.

The area of floor used for parking of automobiles or other vehicles shall be sloped to facilitate the movement of liquids to a drain or toward the main vehicle entry doorway.

**5309.5 Flood Hazard Areas.** For buildings located in flood hazard areas as established by *the applicable FEMA Flood Insurance Rate Map(s)* garage floors shall be:

1. Elevated to or above the design flood elevation as determined in 780 CMR 5323; or
2. Located below the design flood elevation provided they are at or above grade on all sides, are used solely for parking, building access, or storage, meet the requirements of 780 CMR 5323, and are otherwise constructed in accordance with 780 CMR 51.00 through 99.00.

**5309.6 Automatic Garage door Openers.** Automatic garage door openers, if provided, shall be listed in accordance with UL 325.

## 780 CMR 5310 EMERGENCY ESCAPE AND RESCUE OPENINGS

**5310.1 Emergency Escape and Rescue Required.** Basements with habitable space and every sleeping room shall have at least one openable emergency escape and rescue opening. Where basements contain one or more sleeping rooms, emergency egress and rescue openings shall be required in each sleeping room, but shall not be required in adjoining areas of the basement. Where emergency escape and rescue openings are provided they shall have a sill height of not more than 44 inches (1118 mm) above the floor. Where a door opening having a threshold below the adjacent ground elevation serves as an emergency escape and rescue opening and is provided with a bulkhead enclosure, the bulkhead enclosure shall comply with 780 CMR 5310.3. The net clear opening dimensions required by 780 CMR 5310 shall be obtained by the normal operation of the emergency escape and rescue opening from the inside. Emergency escape and rescue openings with a finished sill height below the adjacent ground elevation shall be provided with a window well in accordance with 780 CMR 5310.2.

**5310.1.1 Minimum Opening Area.** All emergency escape and rescue openings shall have a minimum net clear opening of 5.7 square feet (0.530 m<sup>2</sup>).

### Exceptions:

1. *Grade floor openings shall have a minimum net clear opening of five square feet (0.465 m<sup>2</sup>).*
2. *Double hung windows used for emergency escape shall be permitted to have a net clear opening of 3.3 square feet (0.31 m<sup>2</sup>) provided that at least one operable sash meets the minimum height and width required by 780 CMR 5310.1.2 and 5310.1.3 and operational constraints defined by 780 CMR 5310.1.4.*

**5310.1.2 Minimum Opening Height.** The minimum net clear opening height shall be 24 inches (610 mm).

**5310.1.3 Minimum Opening Width.** The minimum net clear opening width shall be 20 inches (508 mm).

**5310.1.4 Operational Constraints.** Emergency escape and rescue openings shall be operational from the inside of the room without the use of keys or tools.

**5310.2 Window Wells.** The minimum horizontal area of the window well shall be nine square feet (0.84 m<sup>2</sup>), with a minimum horizontal projection and width of 36 inches (914 mm). The area of the window well shall allow the emergency escape and rescue opening to be fully opened.

**Exception** The ladder or steps required by 780 CMR 5310.2.1 shall be permitted to encroach

## THE MASSACHUSETTS STATE BUILDING CODE

a maximum of six inches (152 mm) into the required dimensions of the window well.

**5310.2.1 Ladder and Steps.** Window wells with a vertical depth greater than 44 inches (1118 mm) shall be equipped with a permanently affixed ladder or steps usable with the window in the fully open position. Ladders or steps required by 780 CMR 5310.2.1 shall not be required to comply with 780 CMR 5311.5 and 5311.6. Ladders or rungs shall have an inside width of at least 12 inches (305 mm), shall project at least three inches (76 mm) from the wall and shall be spaced not more than 18 inches (457 mm) on center vertically for the full height of the window well.

**5310.3 Bulkhead Enclosures.** Bulkhead enclosures shall provide direct access to the basement. The bulkhead enclosure with the door panels in the fully open position shall provide the minimum net clear opening required by 780 CMR 5310.1.1. Bulkhead enclosures shall also comply with 780 CMR 5311.5.8.2.

**5310.4 Bars, Grills, Covers and Screens.** Bars, grills, covers, screens or similar devices are permitted to be placed over emergency escape and rescue openings, bulkhead enclosures, or window wells that serve such openings, provided the minimum net clear opening size complies with 780 CMR 5310.1.1 through 5310.1.3, and such devices shall be releasable or removable from the inside without the use of a key, tool or force greater than that which is required for normal operation of the escape and rescue opening. *Also see 527 CMR as referenced in Appendix A.*

## 780 CMR 5311 MEANS OF EGRESS

**5311.1 General.** Stairways, ramps, exterior exit balconies, hallways and doors shall comply with 780 CMR 5311.

### 5311.2 Construction.

**5311.2.1 Attachment.** Required exterior exit balconies, stairs and similar exit facilities shall be positively anchored to the primary structure to resist both vertical and lateral forces. Such attachment shall not be accomplished by use of toenails or nails subject to withdrawal.

**5311.2.2 Under Stair Protection.** Enclosed accessible space under stairs shall have walls, under stair surface and any soffits protected on the enclosed side with ½-inch (12.7 mm) gypsum board.

**5311.3 Hallways.** The minimum width of a hallway shall be not less than three feet (914 mm).

### 5311.4 Doors.

**5311.4.1 Exit Doors Required.** *Egress from all dwelling units shall be by means of two exit doors, remote as possible from each other and leading directly to grade. Such doors*

*shall be provided at the normal level of entry/exit. In addition, all other floors within a dwelling unit shall have at least one means by which a continuous and unobstructed path leads to the exit doors. Such continuous and unobstructed paths shall be by means of stairways, corridors, hallways or combinations thereof.*

*Exception 1: In split-level and raised ranch style layouts, the two separate exit doors required by 780 CMR 5311 are permitted to be located on different levels.*

*Exception 2: Where site topography prevents direct access at two remote locations to grade from the normal level of entry/exit, the two separate exit doors required by 780 CMR 5311.4.1 are permitted to be located on different levels.*

**5311.4.2 Exit Door Types and Sizes.** *The minimum nominal width of at least one of the exit doors required by 780 CMR 5311.4 shall not be less than 36 inches (914 mm) in width and the minimum nominal height shall be 6 feet, eight inches (2032 mm). The 36-inch (914 mm) exit door shall be side-hinged. All other required exit doors and doors leading to or from enclosed stairways, or to interior vestibules shall not be less than 32 inches (813 mm) in nominal width or less than six feet, eight inches (2032 mm) in nominal height and maybe of the sliding or side-hinged type. The 36-inch (914 mm) required exit door shall provide for direct access from the habitable portions of the dwelling to the exterior without requiring travel through a garage. The 32-inch (813 mm) secondary exit door may provide egress through an attached garage, provided that the attached garage is also provided with a 32-inch (813 mm) exit door meeting the requirements of 780 CMR 5311. Side-hinged swinging doors provided to meet these requirements are permitted to swing inward.*

*Other exterior doors, in excess of the two required exit doors, whether side-hinged or sliding-type doors, shall not be required to comply with these minimum dimensions.*

**5311.4.2.1 Interior Doors.** *All doors providing access to habitable rooms shall have a minimum nominal width of 30 inches (762 mm) and a minimum nominal height of six feet, six inches (1981 mm).*

#### **Exceptions:**

- 1. Doors providing access to bathrooms are permitted to be 28 inches (711 mm) in nominal width.*
- 2. Doors providing access to bathrooms in existing buildings are permitted to be 24 inches (610 mm) in nominal width.*

**5311.4.3 Landings at Doors.** There shall be a floor or landing on each side of each exterior door.

**Exceptions:**

1. Where a stairway of two or fewer risers is located on the exterior side of a door, other than the required exit door, a landing is not required for the exterior side of the door.

The floor or landing at the exit door required by 780 CMR 5311.4.1 shall not be more than 1½ inches (38 mm) lower than the top of the threshold. The floor or landing at exterior doors other than the exit door required by 780 CMR 5311.4.1 shall not be required to comply with this requirement but shall have a rise no greater than that permitted in 780 CMR 53 11.5.3.

2. The landing at an exterior doorway shall not be more than 7¾ inches (196 mm) below the top of the threshold, provided the door, other than an exterior storm or screen door does not swing over the landing.

The width of each landing shall not be less than the door served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

**5311.4.4 Type of Lock or Latch.** All egress doors shall be readily openable from the side from which egress is to be made without the use of a key or special knowledge or effort.

**5311.5 Stairways.**

**5311.5.1 Width.** Stairways shall not be less than 36 inches (914 mm) in clear width at all points above the permitted handrail height and below the required headroom height. Handrails shall not project more than 4½ inches (114 mm) on either side of the stairway and the minimum clear width of the stairway at and below the handrail height, including treads and landings, shall not be less than 31½ inches (787 mm) where a handrail is installed on one side and 27 (698 mm) where handrails are provided on both sides.

**Exception:** The width of spiral stairways shall be in accordance with 780 CMR 5311.5.8.

**5311.5.2 Headroom.** The minimum headroom in all parts of the stairway shall not be less than six feet *six* inches (1981 mm) measured vertically from the sloped plane adjoining the tread nosing or from the floor surface of the landing or platform.

**Exception:** *Minimum headroom under a sloped ceiling in an existing building shall be maintained for a minimum width of 36 inches (914 mm) as measured from the side of the stair with the continuous handrail.*

**5311.5.3 Stair treads and risers.**

**5311.5.3.1 Riser Height.** The maximum riser height shall be *8¼ inches (210 mm)*. The riser shall be measured vertically between leading edges of the adjacent treads. The greatest riser height within any flight of stairs shall not exceed the smallest by more than ⅜ inch (9.5 mm).

**5311.5.3.2 Tread Depth.** The minimum tread depth shall be *nine inches (229 mm)*. The tread depth shall be measured horizontally between the vertical planes of the foremost projection of adjacent treads and at a right angle to the tread's leading edge. The greatest tread depth within any flight of stairs shall not exceed the smallest by more than ⅜ inch (9.5 mm). Winder treads shall have a minimum tread depth *equal to the tread depth of the straight run portion of the stairs* measured as above at a point 12 inches (305) mm from the side where the treads are narrower. Winder treads shall have a minimum tread depth of *three inches (76 mm)* at any point. Within any flight of stairs, the greatest winder tread depth at the 12 inch (305 mm) walk line shall not exceed the smallest by more than ⅜ inch (9.5 mm).

**Exception:** *45 degree winders are allowed to go to a minimum of two inches (51 mm) at any point*

**5311.5.3.3 Profile.** *Nosings shall not project more than 1½ inches (38 mm) beyond the face of the riser below. Open risers are permitted, provided that the opening between treads does not permit the passage of a five-inch-diameter (127 mm) sphere.*

**Exceptions:**

1. *A nosing is not required where the tread depth is a minimum of 11 inches (279 mm).*
2. *The opening between adjacent treads is not limited on stairs with a total rise of 30 inches (762 mm) or less.*

**5311.5.4 Landings for Stairways.** There shall be a floor or landing at the top and bottom of each stairway.

**Exception** A floor or landing is not required at the top of an interior flight of stairs, provided a door does not swing over the stairs.

A flight of stairs shall not have a vertical rise greater than 12 feet (3658 mm) between floor levels or landings.

The width of each landing shall not be less than the stairway served. Every landing shall have a minimum dimension of 36 inches (914 mm) measured in the direction of travel.

**5311.5.5 Stairway Walking Surface.** The walking surface of treads and landings of stairways shall be sloped no steeper than one unit

## THE MASSACHUSETTS STATE BUILDING CODE

vertical in 48 inches horizontal (2% slope).

**5311.5.6 Handrails.** Handrails shall be provided on at least one side of each continuous run of treads or flight with *three* or more risers.

**5311.5.6.1 Height.** Handrail height, measured vertically from the sloped plane adjoining the tread nosing, or finish surface of ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

**5311.5.6.2 Continuity.** Handrails for stairways shall be continuous for the full length of the flight, from a point directly above the top riser of the flight to a point directly above lowest riser of the flight. Handrail ends shall be returned or shall terminate in newel posts or safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inch (38 mm) between the wall and the handrails.

**Exceptions:**

1. Handrails shall be permitted to be interrupted by a newel post at the turn.
2. The use of a volute, turnout, starting easing or starting newel shall be allowed over the lowest tread.

**5311.5.6.3 Handrail Grip Size.** All required handrails shall be of one of the following types or provide equivalent graspability.

1. **Type I.** Handrails with a circular cross section shall have an outside diameter of at least ¼ inches (32 mm) and not greater than *2¾ inches (70 mm)*. If the handrail is not circular it shall have a perimeter dimension of at least four inches (102 mm) and not greater than 6¼ inches (160 mm) with a maximum cross section of dimension of 2¼ inches (57 mm).

2. **Type II.** Handrails with a perimeter greater than 6¼ inches (160 mm) shall provide a graspable finger recess area on both sides of the profile. The finger recess shall begin within a distance of ¾ inch (19 mm) measured vertically from the tallest portion of the profile and achieve a depth of at least 5/16 inch (8 mm) within 7/8 inch (22 mm) below the widest portion of the profile. This required depth shall continue for at least 3/8 inch (10 mm) to a level that is not less than 1¾ inches (45 mm) below the tallest portion of the profile. The minimum width of the handrail above the recess shall be ¼ inches (32 mm) to a maximum of 2¾ inches (70 mm). Edges shall have a minimum radius of 0.01 inches (0.25 mm).

**5311.5.7 Illumination.** All stairs shall be provided with illumination in accordance with 780 CMR 5303.6.

**5311.5.8 Special Stairways.** Circular stairways, spiral stairways, winders and bulkhead enclosure

stairways shall comply with all requirements of 780 CMR 5311.5 except as specified in 780 CMR 5311.5.8.1 and 5311.5.8.2.

**5311.5.8.1 Spiral Stairways.** Spiral stairways are permitted, provided the minimum width shall be 26 inches (660 mm) with each tread having a 7½-inches (190 mm) minimum tread depth at 12 inches from the narrower edge. All treads shall be identical, and the rise shall be no more than 9½ inches (241 mm). A minimum headroom of six feet six inches (1982 mm) shall be provided.

**5311.5.8.2 Bulkhead Enclosure Stairways.** Stairways serving bulkhead enclosures, not part of the required building egress, providing access from the outside grade level to the basement shall be exempt from the requirements of 780 CMR 5311.4.3 and 5311.5 where the maximum height from the basement finished floor level to grade adjacent to the stairway does not exceed eight feet (2438 mm), and the grade level opening to the stairway is covered by a bulkhead enclosure with hinged doors or other approved means.

**5311.6 Ramps.**

**5311.6.1 Maximum Slope.** Ramps *that are part of a means of egress and are attached to a dwelling unit* shall have a maximum slope of one unit vertical in eight units horizontal (12.5%).

**5311.6.2 Landings Required.** A minimum three-foot-by-three-foot (914 mm by 914 mm) landing shall be provided:

1. At the top and bottom of ramps,
2. Where doors open onto ramps,
3. Where ramps change direction.

**5311.6.3 Handrails Required.** Handrails shall be provided on at least one side of all ramps *that are part of a means of egress and are attached to a dwelling unit(s) where the ramp exceeds a slope of one unit vertical in 12 units horizontal (8.33% slope)*.

*Exception: For persons with disabilities, handrails shall be provided on both sides of the ramp when the vertical rise between landings exceeds six inches (152 mm).*

**5311.6.3.1 Height.** Handrail height, measured above the finished surface of the ramp slope, shall be not less than 34 inches (864 mm) and not more than 38 inches (965 mm).

**5311.6.3.2 Handrail Grip Size.** Handrails on ramps shall comply with 780 CMR 5311.5.6.3.

**5311.6.3.3 Continuity.** Handrails where required on ramps shall be continuous for the full length of the ramp. Handrail ends shall be returned or shall terminate in newel posts or

safety terminals. Handrails adjacent to a wall shall have a space of not less than 1½ inches (38 mm) between the wall and the handrails.

### 780 CMR 5312 GUARDS

**5312.1 Guards Required.** Porches, balconies or raised floor surfaces located more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 36 inches (914 mm) in height. Open sides of stairs with a total rise of more than 30 inches (762 mm) above the floor or grade below shall have guards not less than 34 inches (864 mm) in height measured vertically from the nosing of the treads.

Porches and decks which are enclosed with insect screening shall be provided with guards where the walking surface is located more than 30 inches (762 mm) above the floor or grade below.

**5312.2 Guard Opening Limitations.** Required guards on open sides of stairways, raised floor areas, balconies and porches shall have intermediate rails or ornamental closures which do not allow passage of a sphere *five inches (127 mm)* or more in diameter.

#### Exceptions:

1. The triangular openings formed by the riser, tread and bottom rail of a guard at the open side of a stairway are permitted to be of such a size that a sphere six inches (152 mm) cannot pass through.
2. Openings for required guards on the sides of stair treads shall not allow a sphere 5¾ inches (137 mm) to pass through.

### 780 CMR 5313 LIFE SAFETY SYSTEMS

#### 5313.1 Definitions.

**COMBINATION APPLIANCE:** shall mean a combination photoelectric smoke detector and carbon monoxide alarm appliance which is ac powered with battery backup. Such combination appliance shall employ both simulated voice and tone alarms features which clearly distinguishes between carbon monoxide and smoke notification, in accordance with NFPA 720, 5.3.4

**MULTIPLE-STATION ALARM DEVICE.** Two or more single-station devices (smoke or heat detector or carbon monoxide detector) that are capable of interconnection such that actuation of one causes all integral or separate audible alarms to operate

**SINGLE-STATION ALARM DEVICE.** An assembly incorporating the detector (smoke or heat detector or carbon monoxide detector), control equipment and alarm sounding device in one unit that is operated from a power supply either in the unit or obtained at the point of installation.

**SMOKE DETECTOR.** A listed device that senses visible or invisible particles of combustion. Only photoelectric or combination photoelectric/ionization type smoke detectors shall be permitted in Massachusetts

**SYSTEM-TYPE DEVICE.** A device designed to be connected to a fire alarm control unit (panel). Low-power radio transmitting (wireless) systems are included as part of this definition.

#### 5313.2 Household Fire-warning Systems.

**5313.2.1 General.** The household fire-warning system shall be single or multiple station or of the system type and shall consist of smoke detectors and heat detectors as required in 780 CMR 5313.

Where more than 12 smoke alarms (detectors) are installed, system-type devices must be utilized.

**5313.2.2 Listing and Installation Requirements.** All fire detection, notification and protection equipment and devices shall be listed and installed in accordance with the provisions of 780 CMR 5313.2, the manufacturer's instructions, the listing criteria, 527 CMR 12.00 and NFPA 72, as applicable.

**5313.2.3 Interconnection within a Dwelling Unit.** When more than one code-required detector must be installed, the code-required detectors shall be compatible and interconnected in such a manner that the actuation of one detector will activate all of the audible alarms.

**5313.2.4 Audible Alarm Intensity.** All required alarm sounding appliances shall have a minimum rating of 85 dBA at ten feet (3048 mm). Where audible appliances are installed to provide signals for sleeping areas, they shall have a sound level of at least 75 dBA measured at the pillow level in the sleeping area.

**5313.2.5 Power source.** All power sources and wiring must be permanent and in accordance with 527 CMR 12.00.

**5313.2.5.1 Primary Electrical Power for Single-station and Multiple-station Devices.** Power for single- and multiple-station devices shall be supplied from a permanently wired connection directly to an AC primary source of power. All power for AC-powered devices shall be taken from either a dedicated locked branch circuit or a single branch circuit, which also provides other electrical service to a habitable space. The power source shall be on the supply side, ahead of any switches.

**5313.2.5.2 Primary Electrical Power for System-type Household Fire-warning Systems.** System-type household fire-warning systems that include a listed control unit with automatic detectors and occupant notification appliances shall be powered from a permanently wired AC primary power source. Such AC primary power shall be supplied either from a dedicated locked branch circuit or the unswitched portion of a branch circuit also used for power and lighting of a habitable space, in accordance with the requirements of NFPA 72 and 527 CMR 12.00.

## THE MASSACHUSETTS STATE BUILDING CODE

**Exception:** *Wireless systems when installed in accordance with NFPA 72*

**5313.2.5.3 Secondary Electrical Power.** *In addition to required primary electrical power, all household fire-warning systems shall have secondary (standby) power supplied from monitored batteries in accordance with NFPA 72. For fire alarm control units (panels), the panel battery shall serve as the source of secondary electrical power. For wireless systems, the panel battery shall serve as the source of secondary electrical power.*

**5313.2.6 Acceptance Testing.** *When the installation of the household fire-warning system is complete, it shall be subject to a 100% acceptance test in accordance with 780 CMR 5313 and NFPA 72.*

**5313.2.7 Maintenance.** *It shall be the responsibility of the owner, as defined in 780 CMR 52.00, to properly maintain the household fire-warning system in accordance with manufacturer's recommendations and NFPA 72.*

**5313.2.8 Manufactured Homes (Housing).** *The installation of household fire-warning systems for buildings designed and constructed as manufactured homes and/or housing as defined by 24 CFR, Part 5208.2, shall be in accordance with approved methods for such homes and/or housing as defined 24 CFR and as such are not governed by 780 CMR 51.00 through 99.00.*

**5313.2.9 Smoke Detector Required Locations within the dwelling unit.** *Smoke detectors shall be installed in the following locations (also refer to Board of Building Regulations and Standards Official Interpretation No. 49-98):*

1. *In each bedroom (sleeping room).*
2. *Outside each separate bedroom (sleeping room) in the immediate vicinity of the bedroom (sleeping room).*
3. *Near the base of all stairs where such stairs lead to another occupied floor.*
4. *On each additional story of the dwelling, including basements and cellars but not including crawl spaces and unoccupied attics. In dwellings or dwelling units with split levels and without an intervening door between the adjacent levels, a smoke detector installed on the upper level shall suffice for the adjacent lower level, provided that the lower level is less than one full story below the upper level.*
5. *For each 1,200 square feet (111 m<sup>2</sup>) of area or part thereof.*

**5313.2.10 Smoke Detector Required Locations in Common Areas of Two-family Dwellings.** *In addition to the requirements of 780 CMR 5313.1.9.1 through .4., two-family dwellings that contain common areas such as basements, hallways and/or interior stairways that serve both dwelling units, but are not within the*

*dwelling units, shall also be provided with smoke detectors and/or heat detectors, as required, in the following locations:*

1. *Smoke detectors—In all common basements.*
2. *Smoke detectors—In all common hallways.*
3. *Smoke detectors—In all common stairways on each level outside the dwelling unit doorways.*
4. *When common area smoke detectors are of the single/multiple-station type they shall be interconnected with listed compatible heat detectors containing a sounding device within each dwelling unit. Said heat detectors shall be on every level within each dwelling unit and shall meet the audibility requirement of 780 CMR 5313.2 .4.*
5. *When common area smoke detectors are of the system type, there shall be at least one system-type alarm notification device that meets the requirements of 780 CMR 5313.2 .4 on each level within each dwelling unit*
6. *Dwelling unit smoke detectors shall only sound within the dwelling unit.*

**5313.2.11 Photo-electric Smoke Detectors.** *Any smoke detector located within 20 feet (6096 mm) of a kitchen or a bathroom shall be a photo-electric-type smoke detector. Photo-electric-type smoke detectors shall be allowed to be located closer than three feet (914 mm) horizontally from a kitchen or a bathroom door when hallway or other room size restricts detector mounting options.*

**Exception:** *A bathroom not containing a tub, shower, jacuzzi or steam room.*

**5313.2.12 Smoke Detector Placement.** *Photo-electric type smoke detectors and combination photoelectric/ionization type smoke detectors shall be installed in accordance with the manufacturer's specific installation requirements. In the absence of manufacturer's recommendations, smoke detectors shall be mounted on the ceiling at least four inches (102 mm) from a wall or on a wall with the top of the alarm not less than four inches (102 mm) nor more than 12 inches (305 mm) below the ceiling.*

**Exception:** *Smoke detector placement for solid joist or beam construction or for high, sloped, shed or peaked ceilings all shall be in accordance with manufacturer's recommendations and NFPA 72.*

**5313.2.13 Smoke Detector Requirements in Existing Dwellings.** *See 780 CMR 93.*

### **5313.3 Heat Detectors.**

**5313.3.1 Required Heat Detectors.** *A single heat detector listed for the ambient environment shall be installed in:*

1. *Any integral garage (“garage under”) or attached garage to the main house (detached garages do not require a heat detector).*
2. *A new addition attached garage to an existing dwelling shall require a single heat detector installed in the garage in accordance with all applicable criteria of 780 CMR 5313. If the existing house contains a fire detection system that is compatible with the garage heat detector, then said garage heat detector shall be interconnected to the existing dwelling fire detection system. Where the dwelling-proper existing fire detection system is not compatible with the garage heat detector, the garage heat detector shall be connected to a sounder (occupant notification appliance) or compatible heat detector containing a sounding device, located in the dwelling-*

*proper and within 20 feet (6096 mm) of the nearest door to the garage from the dwelling-proper. The required garage heat detector is not required to incorporate audible alarm notification nor is any audible notification device required in the garage.*

*5313.3.2 Heat Detector Placement. For flat-finished ceilings, the single heat detector shall be placed on or near the center of the garage ceiling; for sloped ceilings having a rise to run of greater than one foot in eight feet (305 mm in 2438 mm), the single heat detector shall be placed in the approximate center of the vaulted ceiling but no closer than four inches (102 mm) to any wall.*





**5313.3.3 Heat Detector Interconnection.** *The required single heat detector shall be listed for and required to be interconnected to all smoke detectors of the required household fire alarm system, such that the activation of the heat detector will activate all of the audible alarms of the required household fire alarm system throughout the building. The required heat detector is not required to incorporate audible alarm notification nor is any audible notification device required in the garage.*

**5313.4 Carbon Monoxide Detectors.**

*Note: Also refer to 527 CMR 31.00 and 248 CMR as carbon monoxide detector required locations set forth in 527 CMR 31.00 and 248 CMR must also be satisfied*

**5313.4.1 General.** *Carbon monoxide detectors shall either be: listed, interconnected 120V or shall be part of a listed low-voltage combination system or wireless system as defined in NFPA 720.*

**5313.4.1.1 Secondary power to CO alarms:** *All CO alarms shall have secondary (standby) power supplied from monitored batteries in accordance with NFPA 72. For fire alarm control units (panels), the panel battery shall serve as the source of secondary electrical power. For wireless systems, the panel battery shall serve as the source of secondary electrical power.*

**5313.4.2 Carbon Monoxide Detector Listing and Installation Requirements.** *All carbon monoxide detectors shall be UL 2034 listed or UL 2075 listed, as applicable, and installed in accordance with the provisions of 780 CMR 51.00 through 99.00, the manufacturer's instructions, the listing criteria, 527 CMR 12.00 and NFPA 720. Required carbon monoxide detectors are not required to be interconnected to the required household fire alarm system but, where interconnection is desired, such carbon monoxide detectors shall be compatible with all interconnected fire detection devices and fire alarms shall have precedence over carbon monoxide alarms.*

**5313.4.3 Carbon Monoxide Detector Required Locations.** *One carbon monoxide detector shall be installed on each story of a dwelling unit, including basements and cellars (but not including crawl spaces and uninhabitable attics) in accordance with the manufacturer's instructions and the applicable requirements of NFPA 720. When mounting a carbon monoxide alarm on a story with a bedroom, the alarm, at a minimum, shall be located outside the bedroom. A carbon monoxide alarm shall be installed no more than ten ft. outside any bedroom door – these requirements do not alter the fact that all*

*bedrooms must be equipped with smoke detectors/alarms but if a combination appliance is utilized, note that for CO only purposes a CO alarm is required no more than ten feet from a bedroom door and outside of the bedroom per 527 CMR 31.00.*

**5313.4.4 Alarm Intensity.** *All alarm-sounding appliances shall have a minimum rating of 85 dBA at ten feet (3048 mm).*

**5313.4.5 Maintenance.** *It shall be the responsibility of the owner to properly maintain the carbon monoxide detectors in accordance with the manufacturer's instructions and NFPA 720.*

**5313.5 Sprinklers.**

**5313.5.1 Dwellings Requiring Sprinklers.** *Automatic sprinklers installed in accordance with NFPA 13D shall be installed in one- and two-family dwellings having an aggregate area greater than 14,400 square feet (1338 m<sup>2</sup>), including basements but not including garages and unfinished attics.*

**780 CMR 5314 FOAM PLASTIC**

**5314.1 General.** The provisions of 780 CMR 5314 shall govern the requirements and uses of foam plastic insulation.

**5314.1.1 Surface Burning Characteristics.** Except where otherwise noted in 780 CMR 5314.2, all foam plastic or foam plastic cores in manufactured assemblies used in building construction shall have a flame-spread rating of not more than 75 and shall have a smoke-developed rating of not more than 450 when tested in the maximum thickness intended for use in accordance with ASTM E 84.

**5314.1.2 Thermal Barrier.** Foam plastic, except where otherwise noted, shall be separated from the interior of a building by minimum ½-inch (12.7 mm) gypsum board or an approved finish material equivalent to a thermal barrier to limit the average temperature rise of the unexposed surface to no more than 250°F (121°C) after 15 minutes of fire exposure to the ASTM E 119 standard time temperature curve. The gypsum board shall be installed using a mechanical fastening system in accordance with 780 CMR 5702.3.5. Reliance on adhesives to ensure that the gypsum board will remain in place when exposed to fire shall be prohibited.

**5314.2 Specific Requirements.** The following requirements shall apply to all uses of foam plastic unless specifically approved in accordance with 780 CMR 5314.3 or by other sections of 780 CMR 51.00 through 99.00.

## THE MASSACHUSETTS STATE BUILDING CODE

**5314.2.1 Masonry or Concrete Construction.**

Foam plastics may be used without the thermal barrier described in 780 CMR 5314.1 when the foam plastic is protected by a minimum one-inch (25.4 mm) thickness of masonry or concrete.

**5314.2.2 Roofing.** Foam plastic may be used in a roof-covering assembly without the thermal barrier when the foam is separated from the interior of the building by wood structural panel sheathing in accordance with 780 CMR 5803, not less than  $1\frac{5}{32}$  inch (11.9 mm) in thickness bonded with exterior glue and identified as Exposure 1, with edge supported by blocking or tongue-and-groove joints. The smoke-developed rating shall not be limited.

**5314.2.3 Attics and Crawlspace.** Within attics and crawl-spaces where entry is made only for service of utilities, foam plastics shall be protected against ignition by  $1\frac{1}{2}$ -inch-thick (38 mm) mineral fiber insulation,  $\frac{1}{4}$ -inch-thick (6.4 mm) wood structural panels,  $\frac{3}{8}$ -inch (9.5 mm) particleboard,  $\frac{1}{4}$ -inch (6.4 mm) hardboard,  $\frac{3}{8}$ -inch (9.5 mm) gypsum board, or corrosion-resistant steel having a base metal thickness of 0.016 inch (0.406 mm).

**5314.2.4 Foam-filled Doors.** Foam-filled doors are exempt from the requirements of 780 CMR 5314.1.

**5314.2.5 Siding Backer Board.** Foam plastic board of not more than  $\frac{1}{2}$ -inch (12.7 mm) thickness may be used as siding backer board when separated from interior spaces by not less than two inches (51 mm) of mineral fiber insulation or  $\frac{1}{2}$ -inch (12.7 mm) gypsum wallboard or installed over existing exterior wall finish in conjunction with re-siding, providing the plastic board does not have a potential heat of more than 2,000 Btu per square foot (22 720 kJ/m<sup>2</sup>) when tested in accordance with NFPA 259.

**5314.2.6 Interior trim.** Foam plastic trim defined as picture molds, chair rails, baseboards, handrails, ceiling beams, door trim and window trim may be installed, provided:

1. The minimum density is 20 pounds per cubic foot (3.14 kg/m<sup>3</sup>).
2. The maximum thickness of the trim is 0.5 inch (12.7 mm) and the maximum width is four inches (102 mm).
3. The trim constitutes no more than 10% of the area of any wall or ceiling.
4. The flame-spread rating does not exceed 75 when tested per ASTM E 84. The smoke-developed rating is not limited.

**5314.2.7 Sill Plates and Headers.** Foam plastic shall be permitted to be spray applied to a sill plate and header without thermal barrier subject to all of the following:

1. The maximum thickness of the foam plastic shall be  $3\frac{1}{4}$  inches (82.6 mm).
2. The density of the foam plastic shall be in the range of 1.5 to 2.0 pcf (24 to 32 kg/m<sup>3</sup>).
3. The foam plastic shall have a flame spread index of 25 or less and an accompanying smoke developed index of 450 or less when tested in accordance with ASTM E84.

**5314.3 Specific Approval.** Plastic foam not meeting the requirements of 780 CMR 5314.1 and 5314.2 may be specifically approved on the basis of one of the following approved tests: ASTM E 84, FM 4880, UL 1040, NFPA 286, ASTM E 152, or UL 1715, or fire tests related to actual end-use configurations. The specific approval may be based on the end use, quantity, location and similar considerations where such tests would not be applicable or practical.

**5314.4 Interior finish.** Foam plastics that are used as interior finish shall also meet the flame-spread requirements for interior finish.

**5314.5 Termite damage.** The use of foam plastics in areas of "very heavy" termite infestation probability shall be in accordance with 780 CMR 5320.4.

## 780 CMR 5315 FLAME SPREAD AND SMOKE DENSITY

**5315.1 Wall and Ceiling.** Wall and ceiling finishes shall have a flame-spread classification of not greater than 200.

**Exception:** Flame-spread requirements for finishes shall not apply to trim defined as picture molds, chair rails, baseboards and handrails; to doors and windows or their frames; or to materials that are less than  $\frac{1}{28}$  inch (0.907 mm) in thickness cemented to the surface of walls or ceilings if these materials have a flame-spread characteristic no greater than paper of this thickness cemented to a noncombustible backing.

**5315.2 Smoke-developed Index.** Wall and ceiling finishes shall have a smoke-developed index of not greater than 450.

**5315.3 Testing.** Tests shall be made in accordance with ASTM E 84.

**5315.4 Alternate Test Method.** As an alternate to having a flame-spread classification of not greater than 200 and a smoke developed index of not greater than 450 when tested in accordance with ASTM E 84, wall and ceiling finishes, other than textiles, shall be permitted to be tested in accordance with NFPA 286. Materials tested in accordance with NFPA 286 shall meet the following criteria:

During the 40 kW exposure, the interior finish shall comply with 780 CMR 5315.4.1. During the 160 kW exposure, the interior finish shall comply

with 780 CMR 5315.4.2. During the entire test, the interior finish shall comply with 780 CMR 5315.4.3

1. During the 40 kW exposure, flames shall not spread to the ceiling.
2. During the 160 kW exposure, the interior finish shall comply with the following:
  - 2.1. Flame shall not spread to the outer extremity of the sample on any wall or ceiling.
  - 2.2. Flashover, as defined in NFPA 286, shall not occur.
3. The total smoke released throughout the NFPA 286 test shall not exceed 1,000 m<sup>2</sup>.

#### 780 CMR 5316 INSULATION

(also see 780 CMR 61.00 as such relates to energy conservation requirements)

**5316.1 Insulation.** Insulation materials, including facings, such as vapor retarders or vapor permeable membranes installed within floor-ceiling assemblies, roof-ceiling assemblies, wall assemblies, crawl spaces and attics shall have a flame-spread index not to exceed 25 with an accompanying smoke-developed index not to exceed 450 when tested in accordance with ASTM E 84.

##### Exceptions:

1. When such materials are installed in concealed spaces, the flame-spread and smoke-developed limitations do not apply to the facings, provided that the facing is installed in substantial contact with the unexposed surface of the ceiling, floor or wall finish.
2. Cellulose loose-fill insulation, which is not spray applied, complying with the requirements of 780 CMR 5316.3, shall only be required to meet the smoke-developed index of not more than 450.

**5316.2 Loose-fill Insulation.** Loose-fill insulation materials that cannot be mounted in the ASTM E 84 apparatus without a screen or artificial supports shall have a flame-spread rating not to exceed 25 with an accompanying smoke-developed factor not to exceed 450 when tested in accordance with CAN/ULC-S 102.2.

**Exception:** Cellulose loose-fill insulation shall not be required to comply with this test method provided that such insulation complies with the requirements of 780 CMR 5316.3.

**5316.3 Cellulose Loose-fill Insulation.** Cellulose loose-fill insulation shall comply with CPSC 16 CFR, Parts 1209 and 1404. Each package of such insulating material shall be clearly labeled in accordance with CPSC 16 CFR, Parts 1209 and 1404.

**5316.4 Exposed Attic Insulation.** All exposed insulation materials installed on attic floors shall have a critical radiant flux not less than 0.12 watt per

square centimeter.

**5316.5 Testing.** Tests for critical radiant flux shall be made in accordance with ASTM E 970.

#### 780 CMR 5317 DWELLING UNIT SEPARATION

**5317.1 Two-family Dwellings.** Dwelling units in two-family dwellings shall be separated from each other by wall and/or floor assemblies having not less than one-hour fire-resistance rating when tested in accordance with ASTM E 119. Fire-resistance-rated floor-ceiling and wall assemblies shall extend to and be tight against the exterior wall, and wall assemblies shall extend to the underside of the roof sheathing.

**Exception:** A fire resistance rating of ½ hour shall be permitted in buildings equipped throughout with an automatic sprinkler system installed in accordance with NFPA 13.

**5317.1.1 Supporting Construction.** When floor assemblies are required to be fire-resistance-rated by 780 CMR 5317.1, the supporting construction of such assemblies shall have an equal or greater fire-resistive rating.

**5317.2 Townhouses.** *For other than one- and two-family dwellings, refer to all applicable construction requirements of the Sixth Edition, Massachusetts State Building Code while utilizing the wind and snow loading of 780 CMR.*

**5317.3 Rated Penetrations.** Penetrations of wall or floor/ceiling assemblies required to be fire-resistance-rated in accordance with 780 CMR 5317.1 or 5317.2 shall be protected in accordance with 780 CMR 5317.3.

**5317.3.1 Through Penetrations.** Through penetrations of fire-resistance-rated wall or floor assemblies shall comply with 780 CMR 5317.3.1.1 or 5317.3.1.2.

**Exception:** Where the penetrating items are steel, ferrous or copper pipes or steel conduits, the annular space shall be permitted to be protected as follows:

1. In concrete or masonry wall or floor assemblies where the penetrating item is a maximum six inches (152 mm) nominal diameter and the opening is a maximum 144 square inches (92 900 mm<sup>2</sup>), concrete, grout or mortar shall be permitted where installed to the full thickness of the wall or floor assembly or the thickness required to maintain the fire-resistance rating.
2. The material used to fill the annular space shall prevent the passage of flame and hot gases sufficient to ignite cotton waste where subjected to ASTM E 119 time temperature fire conditions under a minimum positive pressure differential of 0.01 inch of

## THE MASSACHUSETTS STATE BUILDING CODE

water (3 Pa) at the location of the penetration for the time period equivalent to the fire-resistance rating of the construction penetrated.

**5317.3.1.1 Fire-resistance-rated Assembly.** Penetrations shall be installed as tested in the approved fire-resistance-rated assembly.

**5317.3.1.2 Penetration Firestop System.** Penetrations shall be protected by an approved penetration firestop system installed as tested in accordance with ASTM E 814 or UL 1479, with a minimum positive pressure differential of 0.01 inch of water (3 Pa) and shall have an F rating of not less than the required fire-resistance rating of the wall or floor/ceiling assembly penetrated.

**5317.3.2 Membrane Penetrations.** Membrane penetrations shall comply with 780 CMR 5317.3.1. Where walls are required to have a minimum one-hour fire resistance rating, recessed light fixtures shall be so installed such that the required fire resistance will not be reduced.

**Exceptions:**

1. Steel electrical boxes that do not exceed 16 square inches (0.0103m<sup>2</sup>) in area provided the total area of such openings does not exceed 100 square inches (0.0645 m<sup>2</sup> for any 100 square feet (9.29 m<sup>2</sup>) of wall area. Outlet boxes on opposite sides of the wall shall be separated as follows:
  - 1.1. By a horizontal distance of not less than 24 inches (610 mm);
  - 1.2. By a horizontal distance of not less than the depth of the wall cavity when the wall cavity is filled with cellulose loose-fill, rockwool or slag mineral wool insulation;
  - 1.3. By solid fire blocking in accordance with 780 CMR 5602.8.1;
  - 1.4. By protecting both outlet boxes by listed putty pads; or
  - 1.5. By other listed materials and methods.
2. Membrane penetrations for listed electrical outlet boxes of any materials are permitted provided such boxes have been tested for use in fire resistance-rated assemblies and are installed in accordance with the instructions included in the listing. Outlet boxes on opposite sides of the wall shall be separated as follows:
  - 2.1. By a horizontal distance of not less than 24 inches (610 mm);
  - 2.2. By solid fire-blocking in accordance with 780 CMR 5602.8;
  - 2.3. By protecting both outlet boxes by listed putty pads; or

2.4. By other listed materials and methods.

3. The annular space created by the penetration of a fire sprinkler provided it is covered by a metal escutcheon plate.

### 780 CMR 5318 MOISTURE VAPOR RETARDERS

**5318.1 Moisture Control.** In all framed walls, floors and roof/ ceilings comprising elements of the building thermal envelope, a vapor retarder shall be installed on the warm-in-winter side of the insulation.

**Exceptions:**

1. *See the vapor retarder requirements of 780 CMR 61.00.*
2. Where the framed cavity or space is ventilated to allow moisture to escape.

### 780 CMR 5319 PROTECTION AGAINST DECAY

**5319.1 Location Required.** *The* following locations shall require the use of an approved species and grade of lumber, pressure treated in accordance with AWWPA C1, C2, C3, C4, C9, C15, C18, C22, C23, C24, C28, C31, C33, P1, P2 and P3, or decay-resistant heartwood of redwood, black locust, or cedars.

1. Wood joists or the bottom of a wood structural floor when closer than 18 inches (457 mm) or wood girders when closer than 12 inches (305 mm) to the exposed ground in crawl spaces or unexcavated area located within the periphery of the building foundation.
2. All wood framing members that rest on concrete or masonry exterior foundation walls and are less than eight inches (203 mm) from the exposed ground.
3. Sills and sleepers on a concrete or masonry slab that is in direct contact with the ground unless separated from such slab by an impervious moisture barrier.
4. The ends of wood girders entering exterior masonry or concrete walls having clearances of less than 0.5 inch (12.7 mm) on tops, sides and ends.
5. Wood siding, sheathing and wall framing on the exterior of a building having a clearance of less than six inches (152 mm) from the ground.
6. Wood structural members supporting moisture-permeable floors or roofs that are exposed to the weather, such as concrete or masonry slabs, unless separated from such floors or roofs by an impervious moisture barrier.
7. Wood furring strips or other wood framing

## BUILDING PLANNING FOR SINGLE- AND TWO-FAMILY DWELLINGS

members attached directly to the interior of exterior masonry walls or concrete walls below grade except where an approved vapor retarder is applied between the wall and the furring strips or framing members.

**5319.1.1 Ground Contact.** All wood in contact with the ground and that supports permanent structures intended for human occupancy shall be approved pressure preservative treated wood suitable for ground contact use, except un-treated wood may be used where entirely below groundwater level or continuously submerged in fresh water.

**5319.1.2 Geographical Areas.** In geographical areas where experience has demonstrated a specific need, approved naturally durable or pressure preservative treated wood shall be used for those portions of wood members that form the structural supports of buildings, balconies, porches or similar permanent building appurtenances when such members are exposed to the weather without adequate protection from a roof, eave, overhang or other covering that would prevent moisture or water accumulation on the surface or at joints between members. Depending on local experience, such members may include:

1. Horizontal members such as girders, joists and decking.
2. Vertical members such as posts, poles and columns.
3. Both horizontal and vertical members.

**5319.1.3 Posts, Poles and Columns.** Posts, poles and columns supporting permanent structures that are embedded in concrete in direct contact with the ground or embedded in concrete exposed to the weather shall be approved pressure preservative treated wood suitable for ground contact use.

**5319.1.4 Wood Columns.** Wood columns shall be approved wood of natural decay resistance or approved pressure preservative treated wood.

**Exceptions:**

1. Posts or columns which are either exposed to the weather or located in basements or cellars, supported by piers or metal pedestals projecting one inch (25.4 mm) above the floor or finished grade and six inches (152 mm) above exposed earth, and are separated there from by an approved impervious moisture barrier.
2. Posts or columns in enclosed crawl spaces or unexcavated areas located within the periphery of the building, supported by a concrete pier or metal pedestal at a height greater than eight inches (203 mm) from exposed ground, are separated there from by an impervious moisture barrier.

**5319.2 Quality Mark.** Lumber and plywood required to be pressure preservative treated in accordance with 780 CMR 5319.1 shall bear the quality mark of an approved inspection agency that maintains continuing supervision, testing and inspection over the quality of the product and that has been approved by an accreditation body that complies with the requirements of the American Lumber Standard Committee treated wood program.

**5319.2.1 Required Information.** The required quality mark on each piece of pressure preservative treated lumber or plywood shall contain the following information:

1. Identification of the treating plant.
2. Type of preservative.
3. The minimum preservative retention.
4. End use for which the product was treated.
5. Standard to which the product was treated.
6. Identity of the approved inspection agency.
7. The designation "Dry," if applicable.

**Exception:** Quality marks on lumber less than one inch (25.4 mm) nominal thickness, or lumber less than nominal one inch by five inches (25.4 mm by 127 mm) or two inches by four inches (51 mm by 102 mm) or lumber 36 inches (914 mm) or less in length shall be applied by stamping the faces of exterior pieces or by end labeling not less than 25% of the pieces of a bundled unit.

**5319.3 Fasteners.** Fasteners for pressure preservative and fire-retardant-treated wood shall be of hot-dipped galvanized steel, stainless steel, silicon bronze or copper *but such fasteners must be acceptable for the chemical preservatives utilized.*

## 780 CMR 5320 PROTECTION AGAINST TERMITES

**5320.1 Subterranean Termite Control.** In areas favorable to termite damage as established by 780 CMR Table 5301.2(1), methods of protection shall be by chemical soil treatment, pressure preservative treated wood in accordance with the AWWA standards listed in 780 CMR 5319.1, naturally termite-resistant wood or physical barriers (such as metal or plastic termite shields), or any combination of these methods. *All chemicals and chemical treatment and disposal methods shall conform to all governing laws and regulations.*

**5320.1.1 Quality Mark.** Lumber and plywood required to be pressure preservative treated in accordance with 780 CMR 5320.1 shall bear the quality mark of an approved inspection agency which maintains continuing supervision, testing and inspection over the quality of the product and which has been approved by an accreditation body which complies with the requirements of the American Lumber Standard Committee treated

THE MASSACHUSETTS STATE BUILDING CODE

wood program.

**5320.2 Chemical Soil Treatment.** The concentration, rate of application and treatment method of the termiticide shall be consistent with and never less than the termiticide label.

**5320.3 Pressure Preservatively Treated and Naturally Resistant Wood.** Heartwood of redwood and eastern red cedar shall be considered termite resistant. Pressure preservatively treated wood and naturally termite-resistant wood shall not be used as a physical barrier unless a barrier can be inspected for any termite shelter tubes around the inside and outside edges and joints of a barrier.

**5320.3.1 Field Treatment.** Field cut ends, notches and drilled holes of pressure preservatively treated wood shall be retreated in the field in accordance with AWPA M4.

**5320.4 Foam plastic Protection.** In areas where the probability of termite infestation is “very heavy” as indicated in 780 CMR Figure 5301.2(6), extruded and expanded polystyrene, polyisocyanurate and other foam plastics shall not be installed on the exterior face or under interior or exterior foundation walls or slab foundations located below grade. The clearance between foam plastics installed above grade and exposed earth shall be at least six inches (152 mm).

**Exceptions:**

1. Buildings where the structural members of walls, floors, ceilings and roofs are entirely of noncombustible materials or pressure preservatively treated wood.
2. When in addition to the requirements of 780 CMR 5320.1, an approved method of protecting the foam plastic and structure from subterranean termite damage is provided.
3. On the interior side of basement walls.

**780 CMR 5321 SITE ADDRESS**

**5321.1 Premises Identification.** *See M.G.L. c. 148, § 59, enforced by the head of the fire department.*

**780 CMR 5322 ACCESSIBILITY**

**5322.1 Scope.** *Refer to 780 CMR 5311.6.*

**780 CMR 5323 FLOOD-RESISTANT CONSTRUCTION**

**5323.1 General.** Buildings and structures constructed in flood hazard areas (including A or V Zones) as established *by FEMA Flood Insurance Rate Maps* shall be designed and constructed in accordance with Appendix 780 CMR 120.G.

(PAGES 567 THROUGH 570 ARE RESERVED FOR FUTURE USE)