

CHAPTER 11
FUNCTIONAL RESILIENCE FOR ONE AND TWO FAMILY DWELLINGS
AND TOWNHOMES NOT MORE THAN THREE STORIES IN HEIGHT

GREEN BUILDING PRACTICES	POINTS
1100 FUNCTIONAL RESILIENCE	
1100.0 Intent. This Chapter applies to the design and construction of buildings or additions thereto that are one- and two-family dwellings detached dwellings or townhomes not more than three stories in height above grade plane. Residential construction outside the scope of this Chapter shall comply with Chapter 12, <i>Functional resistance of residential buildings other than one and two family dwellings and townhomes not more than three stories in height.</i>	
1100.1 Design and construction. Buildings shall be designed and constructed to meet the minimum requirements of this Chapter and the applicable Code whichever is more stringent.	Mandatory
1100.2 Building code. For this Chapter, Code shall mean the Building Code of the jurisdiction or the referenced edition of the ICC <i>International Residential Code</i> , whichever is more stringent.	Mandatory
1100.3 Coordination. This Chapter addresses enhanced functional resilience, therefore the requirements herein shall be coordinated with the requirements in Chapters 1 through 10 of this Standard and Chapters 1 through 9 of the Code.	Mandatory
1101 (Coordinates with Chapter 1 of the Code, Administration) SUBMITTAL DOCUMENTS	
1101.1 Design serviced life plan. A design service life plan (DSLPL) shall be provided to the owner for approval prior to the application for a permit. The DSLPL shall comply with the provisions of this section.	Mandatory
(1) Design service life. The DSLPL shall use a design service life of not less than 60 years.	
(2) DSLPL scope. The DSLPL shall include routine repair, maintenance, replacement, and disposal cost estimates for the design service life of the building for the following components:	
(a) Foundations in accordance with Chapter 4, <i>Foundations</i> of the Code	
(b) Floors in accordance with Chapter 5, <i>Floors</i> of the Code	
(c) Exterior walls in accordance with Chapter 6, <i>Wall Construction</i> and Chapter 7, <i>Wall Coverings</i> , of the Code.	
(d) Glass and Glazing in accordance with Section R612, <i>Exterior Windows and Doors</i> of the Code.	
(e) Roof assemblies and rooftop structures in accordance with Chapter 8, <i>Roof-ceiling Construction</i> and Chapter 9, <i>Roof Assemblies</i> of the Code	
(f) Chimneys and Fireplaces in accordance with Chapter 10, <i>Chimneys and</i>	

<i>Fireplaces of the Code.</i>	
(3) DSLP criteria. The DSLP shall include the following:	
(a) Building components with description of materials.	
(b) Schedule, including cost estimates, of routine maintenance, repair, replacement and disposal, for each component.	
(4) DSLP retention. The DSLP shall be retained for the design service life of the building. During the design service life of the building, the DSLP shall be transferred to each subsequent owner.	
1101.2 Certificate of occupancy. Buildings designed and constructed in accordance with this Standard shall include the designation (-HP) after the occupancy classification.	Mandatory
1101.3 Wildland fires. The provisions of the International Code Council (ICC) <i>International Wildland-Urban Interface Code</i> shall apply to the construction, alteration, movement, repair, maintenance, and use of any building, structure, or premises within the wildland interface areas in this jurisdiction. Fire Hazard Severity shall be based on Table 502.1, <i>Fire hazard severity</i> in the ICC <i>International Wildland-Urban Interface Code</i> .	Mandatory
1101.4 Radon control methods. Appendix F, <i>Radon control methods</i> , of the Code shall apply.	
1101.5 Sound transmission. Appendix K, <i>Sound transmission</i> of the Code shall apply to dwellings with the following modifications:	
(1) Interior wall and floor-ceiling assemblies separating dwelling units shall have a composite sound transmission class (STC) rating of not less than 50 (45 if field tested).	
(2) Exterior wall and roof-ceiling assemblies that are part of the exterior envelope shall have a composite sound transmission class (STC) rating of not less than 50 (45 if field tested) and fenestration that is part of the exterior envelope shall have an STC rating of not less than 30 (25 if field tested).	
(3) Floor-ceiling assemblies separating dwelling units shall have an impact insulation class (IIC) rating of not less than 50 (45 if field tested).	
1102 (Coordinates with Chapter 2 of the Code) DEFINITIONS	
1102.1 Definitions. No additional definitions required.	
1103 (Coordinates with Chapter 3 of the Code) BUILDING PLANNING	
1103.1 Wind design criteria. The basic wind speed, design criteria and exposure category to apply Section 301.2.1, <i>Wind limitations</i> of the Code shall be as follows:	Mandatory
(1) The basic wind speed shall be based on a design wind speed equal to the basic wind speed according to Figure 301.2(4) <i>Basic wind speeds for 50-year-mean recurrence interval</i> of the Code (or locally adopted basic wind speed in special wind zones, if higher) plus 20-mph.	
(2) The exposure category shall be assumed to be terrain Exposure C in	

accordance with Section 301.2.1.4, <i>Exposure category</i> of the Code regardless of the actual local exposure.	
1103.2 Townhouse requirements. Exterior walls and common walls between townhouses shall comply with the Code and with the following.	
(1) Common townhouse separation walls - Where common walls are used to separate townhouse the fire resistance rating shall be 2-hours	Mandatory
(2) Parapets – Exterior walls and common walls between townhouses shall be provided with parapets in accordance with Section R302.2.2, <i>Parapets</i> , of the Code. The exception for parapets in Item 2 of Section R302.2.2 shall not be permitted.	Mandatory
1103.3 – Two-family dwelling unit separation – The walls and/or floor-ceiling assemblies separating dwelling units in two family dwellings shall have a one hour fire resistance rating. The fire resistance shall not be permitted to be reduced in accordance with Exception 1 to Section R302.3, <i>Two-family dwellings</i> of the Code. The walls shall not be permitted to terminate at ceilings in accordance with Exception 2 to Section R302.3, <i>Two-family dwellings</i> of the Code.	Mandatory
1103.4 – Fire protection features – All dwelling units shall be provided with fire protection features in accordance with one of the following.	Mandatory
(1) Automatic sprinkler protection - An automatic sprinkler protection system in accordance with NFPA 13D, 13 or 13R shall be provided throughout all dwelling units.	
(2) Automatic smoke alarm system and non-combustible construction – The dwelling unit shall be provided with a smoke alarm system in accordance with Section R314, <i>Smoke alarms</i> of the Code including smoke detectors in all rooms. In addition, the structural members of walls, floors, ceilings and roofs of the dwelling unit shall be constructed entirely of noncombustible materials.	
1103.5 Flood resistant construction requirements. Dwellings required to be constructed in accordance with Section R322, <i>Flood resistant construction</i> of the Code, shall also comply with the following:	Mandatory
(1) The floor and their lowest horizontal supporting members shall be not less than the following:	
(a) The design flood elevation	
(b) The base elevation plus 3 feet	
(c) The 500 year flood elevation, if known	
(2) Flood protective works. Dwellings designed and constructed in accordance with ASCE 24 shall not consider flood protective works for providing flood protection during the design flood. Exception: Dams where approved by the code official.	
1103.6 Storm shelter construction. In addition to other applicable requirements in this Standard, all one and two family dwellings shall be provided with storm shelters constructed in accordance with ICC/NSSA-500 in the following locations:	Mandatory
(1) Hurricane shelters. In <i>hurricane-prone regions</i> as defined in Section 202 of the Code, <i>Definitions</i> .	
(2) Tornado shelters. In areas where the shelter design wind speed for tornadoes in Figure 304.2 (1) of ICC/NSSA-500 is 160 mph or greater.	
(3) Combined hurricane and tornado shelters. Storm shelters required to provide protection from both tornadoes and hurricanes shall be designed and	

constructed using the most restrictive requirements for each hazard applied to the entire storm shelter.	
1104 (Coordinates with Chapter 4 of the Code) FOUNDATIONS	
1104.1 Frost protected shallow foundations. All buildings using frost protected shallow foundations constructed in accordance with Section R403.3, <i>Frost protected shallow foundations</i> of the Code or ASCE 32 shall be marked in accordance with all of the following:	Mandatory
(1) Placard Locations. A placard shall be attached to the building on the front of the structure in the vicinity of the front entrance and in a visible location. Additional placards shall be applied to each side of the structure in a visible location.	
(2) Placard Size. Building placards shall be 8 inches high by 24 inches long (203 mm by 610 mm) in size with a white background, black letters and a black border. The letters and border shall have easily visible and readable at 10 feet.	
(3) Placard Verbiage. The placard shall state: “This building uses insulation materials to protect the foundation from frost heave. Do not disturb any earth within 3 feet of the building without the determining the extent of the insulation protection”.	
(4) Label. A label shall be affixed to the inside of the main electrical panel with the following statement: “This building uses insulation materials to protect the foundation from frost heave. Do not shut off power to the building or reduce the interior temperature to the building below 45 °F without determining the impact to the foundation protection. Do not disturb any earth within 3 feet of the building without the determining the extent of the insulation protection”.	
1105 (Coordinates with Chapter 5 of the Code) FLOORS	
1105.1 Floors. Toilets, bathing rooms, showering rooms, kitchens, laundry rooms, and spa area floors shall have smooth, hard, non-absorbent surface that extends up onto the walls at least 6 inches.	Mandatory
1106 (Coordinates with Chapter 6 of the Code) WALLS	
1106.1 Walls. No additional requirements.	
1107 (Coordinates with Chapter 7 of the Code) WALL COVERINGS	
1107.1 Vinyl siding. Vinyl siding wall coverings conforming to Section R703.11 of the Code shall not be permitted in the following locations:	Mandatory
(1) Hurricane-prone regions	
(2) Regions of moderate and severe hail exposure determined in Figure R903.5, <i>Hail exposure map</i> of the Code	
(3) Fire separation distance of 30 feet or less.	

1107.2 Exterior insulation and finish systems (EIFS). Exterior insulation and finish system wall coverings conforming to Section R703.9 of the Code shall not be permitted in the following locations.	Mandatory
(1) Hurricane-prone regions	
(2) Regions of moderate and severe hail exposure as determined in Figure R903.5, <i>Hail exposure map</i> of the Code	
(3) Fire separation distance of 10 feet or less.	
1107.3 Solar reflectance for wall coverings. All opaque portions of above grade exterior walls, other than those listed below, having an orientation measured perpendicularly to compass directions between and including SSE (157.5°) and WNW (292.5°) having a solar reflectance index (SRI) of not less than 29 as determined in accordance with <i>ASTM E1980 Standard Practice for Calculating Solar Reflectance Index of Horizontal and Low-Sloped Opaque Surfaces</i> for medium wind speed. The SRI shall be based on the thermal emittance determined in accordance with ASTM E408 or C1371 and solar reflectance as determined in accordance with ASTM E1918 or C1549. The points shall not apply to the following walls:	4
(1) Exterior walls complying with Section 703.1.1 of this standard.	
(2) Exterior walls complying with Section 703.1.3 of this standard.	
(3) Exterior walls in Climate Zones 4, 5, 6, 7, and 8 of Figure 6(1).	
(4) Exterior walls that are at least 75% shaded by plants, man-made structures, existing buildings, topography, or permanent building projections.	
1108 (Coordinated with Chapter 8 of the Code) ROOF-CEILING CONSTRUCTION	
1108.1 Roof construction. No additional requirements	
1109 (Coordinates with Chapter 9 of the Code) ROOF ASSEMBLIES	
1109.1 Roofs in warm and dry climates. Roofs in climate zones 1, 2, 3, 4, 5B (dry), and 6B (dry) of Figure 6(1), <i>Climate zones</i> , of this Standard shall have a Class A roof covering or Class A roof assembly according to UL 790. For roof coverings where the profile allows a space between the roof covering and roof decking, the space at the eave ends shall be firestopped to preclude entry of flames or embers.	Mandatory
1109.2 Roof coverings subject to hail exposure. Roof coverings used in regions where hail exposure is Moderate or Severe, as determined in accordance with Section R903.5, <i>Hail exposure</i> and Figure R903.5, <i>Hail exposure map</i> of the Code shall be tested, classified, and labeled in accordance with UL 2218 or FM 4473.	Mandatory
1109.3 Solar reflectance for roof coverings. Roof coverings having a solar reflectance indices in accordance with Items (1) or (2) below:	4
1) Roof slopes < 2-1/2:12. All opaque portions of roofs having a slope less than 2-1/2 units vertical in 12 units horizontal having a solar reflectance index (SRI) of not less than 78.	
2) Roof slopes > 2-1/2:12. All opaque portions of roofs having a slope of 2-	

1/2 units vertical in 12 units horizontal or greater having a solar reflectance index (SRI) of not less than 29. A default SRI value of 35 for new gray concrete without added color pigment is allowed to be used in lieu of measurements and calculations.			
11105 (Coordinates with Chapter 44 of the Code)			
REFERENCED DOCUMENTS			
ASCE/SEI		American Society of Civil Engineers Structural Engineering Institute 1801 Alexander Bell Drive Reston, VA 20191-4400	
ASCE 24	2005	<i>Flood Resistant Design and Construction</i>	1103.5(2)
ASCE 32	2001	<i>Design and Construction of Frost Protected Shallow Foundations</i>	1104.1
ASTM		American Society for Testing and Materials 100 Barr Harbor Drive West Conshohocken, PA 19428-2959	
C1371	2004	<i>Standard Test Method for Determining the Emittance Materials Nears Room Temperature Using Portable Emmissometers</i>	1107.3
C1549	2004	<i>Standard Test Method for Determining Solar Reflectance Near Ambient Temperature Using a Portable Solar Reflectometer</i>	1107.3
E408	2008	<i>Standard test Method for Total Normal Emittance of Surfaces Using Inspector-Meter Techniques</i>	1107.3
E1918		<i>Standard Test Method for Determining Solar Reflectance of Horizontal and Low-sloped surfaces in the Field.</i>	1107.3
E1980		<i>Standard Practice for Calculating the Solar reflectance Index of Horizontal and Low-sloped Surfaces in the Field</i>	1107.3
FM		Factory Mutual Global Research Standards Laboratory Department 1301 Atwood Avenue Johnson, RI 02919	
4473	2005	<i>Specification Test Standard for Impact Resistance of Rigid Roof Materials by Impacting with Freezer Ice Ball</i>	1109.2

ICC		International Code Council 500 New Jersey Avenue, N.W. Washington, DC 20001	
IRC	2009	<i>International Residential Code</i>	1100.2
ICC/ NSSA 500	2008	<i>Standard on the Design and Construction of Storm Shelters</i>	1103.6
IUWIC	2009	<i>International Urban Wildland Interface Code</i>	1101.3
NFPA			
		National Fire Protection Association 1 Batterymarch Park Quincy, MA 02169	
13	2007	<i>Standard for the Installation of Sprinkler Systems</i>	1103.4(1)
13D	2007	<i>Standard for the Installation of Sprinkler Systems in One- and Two-family Dwellings and Manufactured Homes</i>	1103.4(1)
13R	2007	<i>Standard for the Installation of Sprinkler Systems in Residential Occupancies Up to and Including Four Stories in Height</i>	1103.4(1)
UL			
		Underwriters Laboratories, Inc. 333 Pfingsten Road Northbrook, IL 60062	
790	2004	<i>Standard Test Methods for Fire Tests of Roof Coverings</i>	1109.1
2218	1996	<i>Standard for Safety Impact Resistance of Prepared Roof Covering Materials</i>	1109.2