

SPECIAL BUILDING CONSTRUCTION REGULATIONS

User notes:**About this chapter:**

Chapter 5 provides regulations that establish minimum standards for the location, design and construction of buildings and structures based on fire hazard severity in the wildland-urban interface.

The construction provisions of Chapter 5 are intended to supplement the requirements of the International Building Code and address mitigation of the unique hazards posed to buildings by wildfire and to reduce the hazards of building fires spreading to wildland fuels. This is accomplished by requiring ignition-resistant construction materials based on the hazard severity of the building site. Construction features regulated include underfloor areas; roof coverings; eaves and soffits; gutters and downspouts; exterior walls, doors and windows; ventilation openings and accessory structures.

Relocations:

Material in this chapter, or that was in this chapter in the last code cycle, has been relocated. For complete information regarding the relocation of sections, tables and figures, see “Content Relocations” in the Preface of this code.

SECTION 501—GENERAL

501.1 Scope. Buildings and structures in a *wildland-urban interface area* shall be constructed in compliance with this chapter or the *International Residential Code*, as applicable, and the applicable building code.

Exceptions:

1. Accessory structures not exceeding 120 square feet (11 m²) in floor area where located not less than 50 feet (15 240 mm) from applicable buildings.
2. Group U agricultural buildings not less than 50 feet (15 240 mm) from applicable buildings.

501.1.1 Other codes. The construction requirements in the *International Building Code* or *International Residential Code*, as applicable, shall be supplemented by the construction requirements in this chapter. Where there is a conflict

between provisions of this code and those of the *International Building Code* or *International Residential Code*, the provisions of this code shall apply.

501.2 Noncombustible building materials. The tests indicated in Section 501.2.1 shall serve as criteria for acceptance of building materials. The term noncombustible does not apply to the flame spread characteristics of interior finish or trim materials. A building material shall not be classified as a noncombustible material if it is subject to an increase in combustibility or flame spread beyond the limitations herein established through the effects of age, moisture or other atmospheric conditions.

501.2.1 Testing. Building materials required to be noncombustible materials shall be tested in accordance with ASTM E136 and pass the test, or tested in accordance with ASTM E2652 using the acceptance criteria prescribed by ASTM E136.

Exceptions:

1. Building materials having a structural base of noncombustible material as determined in accordance with ASTM E136, or with ASTM E2652 using the acceptance criteria prescribed by ASTM E136, with a surfacing of not more than 0.125 inch (3.18 mm) in thickness having a *flame spread index* not greater than 50 when tested in accordance with ASTM E84 or UL 723 shall be acceptable as noncombustible materials.
2. Building material required to be noncombustible materials for reduced clearances to flues, heating appliances or other sources of high temperature shall refer to noncombustible materials conforming to the requirements of ASTM E136.

501.2.2 Testing not required. The following building materials shall not be required to be tested to be acceptable as noncombustible materials:

1. Steel.
2. Concrete containing no combustible aggregates or fibers.
3. Masonry containing no combustible aggregates or fibers.
4. Glass (excluding plastic glazing).
5. 3xxx, 5xxx and 6xxx series aluminum alloys.



SECTION 502—FIRE HAZARD SEVERITY

502.1 General. The fire hazard severity of building sites for buildings hereafter constructed, modified or relocated into *wildland-urban interface areas* shall be established in accordance with Table 502.1. See also Appendix C.

TABLE 502.1—FIRE HAZARD SEVERITY

FUEL MODEL ^b	CRITICAL FIRE WEATHER FREQUENCY								
	≤ 1 Day ^a			2 to 7 days ^a			≥ 8 days ^a		
	Slope (%)			Slope (%)			Slope (%)		
	≤ 40	41–60	≥ 61	≤ 40	41–60	≥ 61	≤ 40	41–60	≥ 61
Light fuel	M	M	M	M	M	M	M	M	H
Medium fuel	M	M	H	H	H	H	E	E	E
Heavy fuel	H	H	H	H	E	E	E	E	E
E = Extreme Hazard. H = High Hazard. M = Moderate Hazard. a. Days per annum. b. Where required by the code official, fuel classification shall be based on the historical fuel type for the area.									

502.2 Fire hazard severity reduction. The fire hazard severity identified in Table 502.1 is allowed to be reduced by implementing a vegetation management plan in accordance with Appendix B.

SECTION 503—CONSTRUCTION AND MATERIAL

503.1 General. Buildings and structures hereafter constructed, modified or relocated into or within *wildland-urban interface areas* shall meet the construction requirements in accordance with Table 503.1. Class 1, Class 2 and Class 3 *WUI construction classes* shall be in accordance with Sections 504, 505 and 506, respectively. Materials required to be ignition-resistant building materials shall comply with the requirements of Section 503.2. Materials required to be fire-retardant-treated wood *roof coverings* shall comply with the requirements of Section 503.3. Where this code requires fire-resistance-rated construction, fire-resistance ratings shall be determined in accordance with Section 503.4.



TABLE 503.1—WUI CONSTRUCTION CLASSES

DEFENSIBLE SPACE ^a	FIRE HAZARD SEVERITY		
	Moderate Hazard	High Hazard	Extreme Hazard
Less than required by Table 603.2	Class 2	Class 1	Class 1 ^c
Complies with Table 603.2	Class 3	Class 2	Class 1
150% or more of the distance required in Table 603.2 ^b	Class 3	Class 3	Class 2
Class 1 = Construction in accordance with Section 504. Class 2 = Construction in accordance with Section 505. Class 3 = Construction in accordance with Section 506. a. Distance of defensible space provided on all sides of structure as required in Table 603.2. b. In accordance with an approved Vegetation Management Plan conforming to Section 502.2. c. In addition to Class 1 construction, the exterior walls shall comply with any of the following: 1. Exterior walls having a fire-resistance rating of 1 hour or more with a noncombustible exterior wall covering. 2. Exterior walls of heavy timber construction. 3. Exterior walls of log wall construction.			

503.2 Ignition-resistant building material. *Ignition-resistant building materials* shall comply with any one of the requirements in Sections 503.2.1 through 503.2.3.

503.2.1 Noncombustible material. Building material shall comply with requirements for noncombustible materials in Section 501.2.

503.2.2 Fire-retardant-treated wood. Fire-retardant-treated wood shall be labeled for exterior use and shall meet the requirements of Section 2303.2 of the *International Building Code*.

503.2.3 Other ignition-resistant building material. Material shall be tested on the front and back faces in accordance with the extended ASTM E84 or UL 723 test, for a total test period of 30 minutes, or with the ASTM E2768 test. The materials shall bear identification showing the fire test results. Panel products shall be tested with a ripped or cut longitudinal gap of 1/8 inch (3.2 mm). The materials, when tested in accordance with the test procedures set forth in ASTM E84 or UL 723 for a test period of 30 minutes, or with ASTM E2768, shall comply with Sections 503.2.3.1 through 503.2.3.3.

Exception: Materials composed of a combustible core and a noncombustible exterior covering made from either aluminum at a minimum 0.019 inch (0.48 mm) thickness or corrosion-resistant steel at a minimum 0.0149 inch (0.38 mm) thickness shall not be required to be tested with a ripped or cut longitudinal gap.

503.2.3.1 Flame spread. The material shall exhibit a *flame spread index* not exceeding 25.

503.2.3.2 Flame front. The material shall exhibit a flame front that does not progress more than 10 feet 6 inches (3200 mm) beyond the centerline of the burner at any time during the test.

503.2.3.3 Weathering. *Ignition-resistant building materials* shall maintain their performance in accordance with this section under conditions of use. The materials shall meet the performance requirements for weathering (including exposure to temperature, moisture and ultraviolet radiation) contained in Sections 503.2.3.3.1 through 503.2.3.3.3, as applicable to the materials and conditions of use.

503.2.3.3.1 Evaluation requirements for weathering. Fire-retardant-treated wood, wood-plastic composite materials and plastic lumber materials shall be evaluated after weathering in accordance with Method A, “Test Method for Accelerated Weathering of Fire-Retardant-Treated Wood for Fire Testing,” in ASTM D2898.

503.2.3.3.2 Wood-plastic composite materials. Wood-plastic composite materials shall also demonstrate acceptable fire performance after weathering by the following procedure: first testing in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation, then weathering in accordance with ASTM D7032 and then retesting in accordance with ASTM E1354 and exhibiting an increase of no more than 10 percent in peak rate of heat release when compared to the peak heat release rate of the nonweathered material.

503.2.3.3.3 Plastic lumber materials. Plastic lumber materials shall also demonstrate acceptable fire performance after weathering by the following procedure: first testing in accordance with ASTM E1354 at an incident heat flux of 50 kW/m² in the horizontal orientation, then weathering in accordance with ASTM D6662 and then retesting in accordance with ASTM E1354 and exhibiting an increase of not more than 10 percent in peak rate of heat release when compared to the peak heat release rate of the nonweathered material.

503.3 Fire-retardant-treated wood roof coverings. *Roof assemblies* containing coverings comprised of fire-retardant-treated wood shingles and shakes shall comply with the requirements of Section 1505.6 of the *International Building Code* and shall be classified as Class A *roof assemblies* as required in Section 1505.2 of the *International Building Code*.

503.4 Fire-resistance-rated construction Where this code requires *fire-resistance-rated construction*, the fire-resistance rating of building elements, components or assemblies shall be determined in accordance with the test procedures set forth in ASTM E119 or UL 263.

Exceptions:

1. The fire-resistance rating of building elements, components or assemblies based on the prescriptive designs prescribed in Section 721 of the *International Building Code*.
2. The fire-resistance rating of building elements, components or assemblies based on the calculation procedures in accordance with Section 722 of the *International Building Code*.
3. The fire-resistance rating of *log wall construction*, calculated in accordance with the provisions of Section 303 of ICC 400.

SECTION 504—CLASS 1 WUI CONSTRUCTION

504.1 General. Class 1 WUI construction shall be in accordance with Sections 504.2 through 504.11.

504.2 Roof assembly. Roofs shall have a *roof assembly* classified as Class A when tested in accordance with ASTM E108 or UL 790.

Exceptions:

1. Class A *roof assemblies* include those with coverings of brick, masonry or an exposed concrete *roof deck*.
2. Class A *roof assemblies* include ferrous or copper shingles or sheets, metal sheets and shingles, clay or concrete roof tile or slate installed on noncombustible decks or ferrous, copper or metal sheets installed without a *roof deck* on noncombustible framing.
3. Class A *roof assemblies* include minimum 16 oz/sq ft (0.0416 kg/m²) copper sheets installed over combustible *roof decks*.

504.2.1 Roof valley flashings. Where provided, valley flashings shall be not less than 0.019 inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of cap sheet complying with ASTM D3909 running the full length of the valley.

504.2.2 Flame and ember protection at eaves. For *roof assemblies* where the profile allows a space between the *roof covering* and *roof deck*, the space at the eave ends shall resist flames and embers by one or more of the following methods:

1. Fireblocking of the space between the *roof covering* and the *roof deck*.
2. Installation of one layer of cap sheet complying with ASTM D3909 over the combustible *roof deck*.

504.2.3 Skylights. Skylights, including tubular daylighting devices and sloped glazing shall comply with Section 504.8.

504.3 Protection of eaves. Eaves and soffits shall be protected on the exposed underside by ignition-resistant building materials or by materials *approved* for not less than 1-hour *fire-resistance-rated construction*, 2-inch (51 mm) nominal dimension lumber, or 1-inch (25 mm) nominal fire-retardant-treated lumber or 3/4-inch (19.1 mm) nominal fire-retardant-treated plywood, identified for



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exterior use and meeting the requirements of Section 2303.2 of the *International Building Code*. Fascias are required and shall be protected on the backside by ignition-resistant building materials or by materials *approved* for not less than 1-hour *fire-resistance-rated construction* or 2-inch (51 mm) nominal dimension lumber.

504.4 Gutters and downspouts. Gutters and downspouts shall be constructed of *noncombustible* material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves and debris in the gutter.

504.5 Exterior walls. Exterior walls of buildings or structures shall be constructed with one of the following methods:

1. Materials *approved* for not less than 1-hour *fire-resistance-rated construction* on the exterior side.
2. *Approved noncombustible* materials.
3. Heavy timber or *log wall construction*.
4. Ignition-resistant building materials complying with Section 503.2 on the exterior side.

Such material shall extend from the top of the foundation to the underside of the roof sheathing.

504.5.1 Flashing. A minimum of 6 inches (152 mm) of noncombustible material or metal flashing extending vertically is required on the exterior of the wall at the ground, decking and roof intersections. Flashing provided in accordance with this section shall be lapped with flashing, counterflashing or water-resistive barriers as required by the *International Building Code* or *International Residential Code*.

504.6 Underfloor enclosure. Underfloor areas of buildings and structures shall be enclosed to the ground with exterior walls in accordance with Section 504.5.

Exception: Complete enclosure shall not be required where not less than 6 inches (152 mm) of noncombustible material or metal flashing extending vertically from grade is required on the exterior of columns and walls, and where the underside of exposed floors and exposed structural columns, beams and supporting walls are constructed with one of the following:

1. Exterior 1-hour fire-resistance-rated construction.
2. Noncombustible material.
3. Heavy timber or *log wall construction*.
4. *Ignition-resistant building materials* complying with Section 503.2 on the exterior side.

504.7 Attachments. *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be constructed with one of the following methods, except that coated materials shall not be used as the walking surface of decks:

1. Materials *approved* for not less than 1-hour fire-resistance-rated construction on the exterior side.
2. *Approved noncombustible* materials.
3. Heavy timber or *log wall construction*.
4. *Ignition-resistant building materials* complying with Section 503.2 on the exterior side.

504.7.1 Underfloor areas. *Unenclosed accessory structures* and projections attached to buildings with habitable spaces shall have underfloor areas enclosed to the ground with materials permitted for exterior wall construction in accordance with Section 504.5.

Exception: Complete enclosure shall not be required where the underside of exposed floors and exposed structural members and walls are constructed in accordance with Section 504.7. The exposed structural members and walls shall be constructed of or protected with a minimum of 6 inches (152 mm) of noncombustible material or metal flashing extending vertically from grade.

504.8 Exterior glazing. Exterior windows, window walls, *glazed doors*, windows within exterior doors, and skylights shall be one of the following:

1. Multilayered glazed panels containing not less than one tempered pane.
2. Glass block units.
3. A fire door or fire window with a fire protection rating of not less than 20 minutes when tested in accordance with NFPA 252, UL 10B or UL 10C, or in accordance with NFPA 257 or UL 9 as appropriate.

504.9 Exterior doors. Exterior doors shall be *approved noncombustible* construction, solid-core wood not less than 1 3/4 inches thick (44 mm), or have a fire protection rating of not less than 20 minutes. Windows within doors and *glazed doors* shall be in accordance with Section 504.8.

Exception: Vehicle access doors.

504.9.1 Exterior underfloor access doors. Exterior underfloor access doors shall be constructed with noncombustible material or not less than 6 inches (152 mm) of noncombustible material that extends vertically from the ground.

504.9.2 Garage doors. Automatic garage door openers for vehicle use in a residential building, where provided, shall be listed and labeled in accordance with UL 325 and shall be installed in accordance with the manufacturer's instructions. The opener shall be equipped with battery backup, or a secondary power supply shall be provided.

504.9.3 Garage door perimeter gap. Exterior garage doors for vehicles shall resist the intrusion of embers by protecting the gaps between each door and the opening at the bottom, sides and top by all of the following:

1. Bottom openings shall provide a gap of not greater than 1/8 inch (3.2 mm) between the surface and the door opening seal.

2. Side and top openings shall provide one or more of the following:
 - 2.1. Gaps not greater than 1/8 inch (3.2 mm) between the door and the door opening.
 - 2.2. Gaps covered or blocked with weather-stripping products constructed of materials that comply with both of the following:
 - 2.2.1. The tensile strength of the material shall be tested in accordance with ASTM D638 before and after light exposure in accordance with ASTM G155 for a period of 2,000 hours, and the maximum allowable difference in tensile strength values between exposed and nonexposed samples shall not exceed 10 percent.
 - 2.2.2. The material shall be tested in accordance with UL 94 and have a flammability rating of V-2 or better.
 - 2.3. Gaps covered or blocked with metal flashing.

504.10 Ventilation openings. Where provided, ventilation openings of enclosed attics or enclosed rafter spaces in accordance with Section 1202.2 of the *International Building Code* or Section R806 of the *International Residential Code*, or of underfloor areas in accordance with Section 1202.4 of the *International Building Code* or Section R408.2 of the *International Residential Code*, shall be in accordance with Section 504.10.1 or Section 504.10.2.

504.10.1 Performance requirements. Ventilation openings shall be fully covered with listed vents, tested in accordance with ASTM E2886, to demonstrate compliance with all the following requirements:

1. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
2. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
3. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).

Gaps around such vents shall be sealed in accordance with vent manufacturer installation instructions to avoid flame intrusion through the gaps.

504.10.2 Prescriptive requirements. Ventilation openings shall be fully covered with noncombustible corrosion-resistant mesh with openings not exceeding 1/8 inch (3.2 mm) or with vents designed and approved to prevent flame and ember penetration into the structure. Additionally, vents protecting ventilation openings into attics and enclosed rafter spaces shall be constructed entirely of noncombustible, corrosion-resistant material.

504.10.3 Vent locations. Gable-end and dormer vents shall be located not less than 10 feet (3048 mm) from lot lines. Underfloor ventilation openings shall be located as close to grade as practical.

504.11 Detached accessory structures. Detached *accessory structures* located less than 50 feet (15 240 mm) from a building containing habitable space shall have exterior walls constructed in accordance with Section 504.5, underfloor areas constructed in accordance with Section 504.6, *roof assemblies* constructed in accordance with Section 504.2, gutters and downspouts constructed in accordance with Section 504.4 and vents constructed in accordance with Section 504.10. Where detached *accessory structures* are located less than 20 feet (6096 mm) from a building containing habitable space, exterior glazing and exterior doors in the detached *accessory structure* shall not be located in walls that face the building containing habitable space.

Exceptions: Exterior glazing complying Section 504.8 and exterior doors complying Section 504.9.

SECTION 505—CLASS 2 WUI CONSTRUCTION

505.1 General. Class 2 WUI construction shall be in accordance with Sections 505.2 through 505.11.

505.2 Roof assembly. Roofs shall have a *roof assembly* classified as Class A when tested in accordance with ASTM E108 or UL 790, or an *approved noncombustible roof covering*.

505.2.1 Roof valley flashings. Where provided, valley flashings shall be not less than 0.019-inch (0.48 mm) (No. 26 galvanized sheet gage) corrosion-resistant metal installed over a minimum 36-inch-wide (914 mm) underlayment consisting of one layer of cap sheet complying with ASTM D3909 running the full length of the valley.

505.2.2 Flame and ember protection at eaves. For *roof assemblies* where the profile allows a space between the *roof covering* and *roof deck*, the space at the eave ends shall resist flames and embers by one or more of the following methods:

1. Fireblocking of the space between the *roof covering* and the *roof deck*.
2. Installation of one layer of cap sheet complying with ASTM D3909 over the combustible *roof deck*.

505.2.3 Skylights. Skylights, including tubular daylighting devices and sloped glazing, shall comply with Section 505.8.

505.3 Protection of eaves. Combustible eaves, fascias and soffits shall be enclosed with solid materials with a minimum thickness of 3/4 inch (19 mm). Exposed rafter tails shall not be permitted unless constructed of heavy timber materials.

505.4 Gutters and downspouts. Gutters and downspouts shall be constructed of *noncombustible* material. Gutters shall be provided with an *approved* means to prevent the accumulation of leaves and debris in the gutter.

505.5 Exterior walls. Exterior walls of buildings or structures shall be constructed with one of the following methods:

1. Materials approved for not less than 1-hour *fire-resistance-rated construction* on the exterior side.
2. *Approved noncombustible* materials.
3. Heavy timber or *log wall construction*.



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4. Ignition-resistant building materials complying with Section 503.2 on the exterior side.

Such material shall extend from the top of the foundation to the underside of the roof sheathing.

505.5.1 Flashing. A minimum of 6 inches (152 mm) of noncombustible material or metal flashing extending vertically is required on the exterior of the wall at the ground, decking and roof intersections. Flashing provided in accordance with this section shall be lapped with flashing, counterflashing or water-resistive barriers as required by the *International Building Code* or *International Residential Code*.

505.6 Underfloor enclosure. Underfloor areas of buildings and structures shall be enclosed to the ground, with exterior walls in accordance with Section 505.5.

Exception: Complete enclosure shall not be required where not less than 6 inches (152 mm) of noncombustible material or metal flashing extending vertically from grade is required on the exterior of columns and walls, and where the underside of exposed floors and exposed structural columns, beams and supporting walls are constructed with one of the following:

1. Exterior 1-hour fire-resistance-rated construction.
2. Noncombustible material.
3. Heavy timber or *log wall construction*.
4. *Ignition-resistant building materials* complying with Section 503.2 on the exterior surface.

505.7 Attachments. *Unenclosed accessory structures* attached to buildings with habitable spaces and projections, such as decks, shall be constructed with one of the following methods, except that coated materials shall not be used as the walking surface of decks:

1. Materials approved for not less than 1-hour fire-resistance-rated construction on the exterior side.
2. *Approved noncombustible materials*.
3. Heavy timber or *log wall construction*.
4. *Ignition-resistant building materials* complying with Section 503.2 on the exterior side.

505.7.1 Underfloor areas. *Unenclosed accessory structures* and projections attached to buildings with habitable spaces shall have underfloor areas enclosed to the ground with one of the following methods:

1. Materials permitted for exterior wall construction in accordance with Section 505.5.
2. Noncombustible corrosion-resistant mesh with openings not to exceed 1/8 inch (3.2 mm).

Exception: Complete enclosure shall not be required where the underside of exposed floors and exposed structural members and walls are constructed in accordance with Section 505.7. The exposed structural members and walls shall be constructed or protected with not less than 6 inches (152 mm) of noncombustible material or metal flashing extending vertically from grade.

505.8 Exterior glazing. Exterior windows, window walls, *glazed doors*, windows within exterior doors, and skylights shall be one of the following:

1. Multilayered glazed panels containing at least one tempered pane.
2. Glass block units.
3. A fire door or fire window with a fire protection rating of not less than 20 minutes when tested without the hose stream test in accordance with NFPA 252, UL 10B, or UL 10C, or in accordance with NFPA 257 or UL 9, as appropriate.

505.9 Exterior doors. Exterior doors shall be *approved noncombustible* construction, solid core wood not less than 1 3/4 inches thick (44 mm), or have a fire protection rating of not less than 20 minutes. Windows within doors and *glazed doors* shall be in accordance with Section 505.8.

Exception: Vehicle access doors.

505.9.1 Exterior underfloor access doors. Exterior underfloor access doors shall be constructed of noncombustible material or with not less than 6 inches (152 mm) of noncombustible material that extends vertically from the ground.

505.10 Ventilation openings. Where provided, ventilation openings of enclosed attics or enclosed rafter spaces in accordance with Section 1202.2 of the *International Building Code* or Section R806 of the *International Residential Code*, or of underfloor areas in accordance with Section 1202.4 of the *International Building Code* or Section R408.2 of the *International Residential Code*, shall be in accordance with Section 505.10.1 or Section 505.10.2 of this code.

505.10.1 Performance requirements. Ventilation openings shall be fully covered with listed vents, tested in accordance with ASTM E2886, to demonstrate compliance with all the following requirements:

1. There shall be no flaming ignition of the cotton material during the Ember Intrusion Test.
2. There shall be no flaming ignition during the Integrity Test portion of the Flame Intrusion Test.
3. The maximum temperature of the unexposed side of the vent shall not exceed 662°F (350°C).

Gaps around such vents shall be sealed in accordance with vent manufacturer installation instructions to avoid flame intrusion through the gaps.

505.10.2 Prescriptive requirements. Ventilation openings shall be fully covered with noncombustible corrosion-resistant mesh with openings not exceeding 1/8 inch (3.2 mm) or with vents designed and approved to prevent flame and ember penetration