

**INITIAL STATEMENT OF REASONS
FOR PROPOSED BUILDING STANDARDS
OF THE STATE FIRE MARSHAL
REGARDING THE 2022 CALIFORNIA RESIDENTIAL CODE
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 2.5
(SFM 03/22)**

The Administrative Procedure Act (APA) requires that an Initial Statement of Reasons be available to the public upon request when rulemaking action is being undertaken. The following information required by the APA pertains to this particular rulemaking action:

STATEMENT OF SPECIFIC PURPOSE, PROBLEM, RATIONALE and BENEFITS

Government Code Section 11346.2(b)(1) requires a statement of specific purpose of each adoption, amendment, or repeal and the problem the agency intends to address and the rationale for the determination by the agency that each adoption, amendment, or repeal is reasonably necessary to carry out the purpose and address the problem for which it is proposed. The statement shall enumerate the benefits anticipated from the regulatory action, including the benefits or goals provided in the authorizing statute.

ITEM 1

Chapter 1 SCOPE AND ADMINISTRATION, Division I, California Administration,

ITEM 1-1

Section 1.11.1 SFM-Office of the State Fire Marshal

The SFM is proposing to amend the definition of Specified State-Occupied.

Health and Safety Code 13146 (A) (5) The State Fire Marshal shall enforce the building standards and other regulations of the State Fire Marshal on all University of California campuses and properties administered or occupied by the University of California and on all California State University campuses and properties administered or occupied by the California State University. For each university campus or property, the State Fire Marshal may delegate that responsibility to the person of the State Fire Marshal's choice who shall be known as the Designated Campus Fire Marshal.

The University of California (UC) currently has a memorandum of understanding (MOU) with the State Fire Marshal. The authority of the State Fire Marshal has been delegated to the Designated Campus Fire Marshal's through the MOU. The language in item (8) of Specified state occupied buildings is not needed. The proposal to remove the reference to the UC has no regulatory effect.

The exception is being proposed for deletion. The exception creates more confusion than what is intended. Any of the listed items are under the jurisdiction of the Office of the State Fire Marshal's office.

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 2

Chapter 3 BUILDING PLANNING, Sections R337.1 SCOPE, PURPOSE AND APPLICATION and R337.2 DEFINITIONS

Correct the term Wildland-Urban Interface (WUI) used in the text to correlate with the definition of WUI. The proposed change has no change in regulatory effect. The addition of Local Responsibility Areas (LRA) to the “Purpose” is to correlate with the following sections R337.1.3 Application and R337.1.3.1 Where required”.

ITEM 2-1

Section R337.1.1 Scope

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 2-2

Section R337.1.2 Purpose

CAC Recommendation:

Approve as Amended. Recommended to add phrase “as specified in Section R337.1.3.1” after “Local Responsibility Areas”.

Agency Response:

Accept. To assist the code user in the application of the Section R337 requirements the phrase “as specified in section R337.1.1.1” was added to the Section R337.1.2 Purpose. This creates the ability for local jurisdictions to adopt areas within their respective authorities as are needed for the protection against wildfire.

ITEM 2-3

Section R337.1.3 Application, Section R337.1.3.1 Application date and where required, Section R337.2 Definitions: Fire Protection Plan

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 3

Chapter 3, Section R337.5 ROOFING

ITEM 3-1

Section R337.5.1 General

The proposed revisions to Chapter 3 regarding the roofing provisions for Fire Hazard

Severity Zones (FHSZ). The SFM Wildland Urban Interface (WUI) workgroup met several times in 2022 and came to a consensus on the proposed language. The focus of the SFM WUI workgroup was to correlate Chapter 3 and 9 for roofing requirements in the Wildland Urban Interface. Throughout the discussions a summary of the revisions is as follows:

- All roof assemblies in any Fire Hazard Severity Zone shall be Class A rating when tested in accordance with ASTM E108 or UL790.
- The regulations of Section R902.1.1 are no longer necessary, as they conflict with the regulations of Section R337.5.
- Language was updated to reflect the correct terms “Fire Hazard Severity Zones” and “Wildland-Urban Interface” areas.

CAC Recommendation:

Further Study. Recommended to delete the proposed amendment regarding “Exceptions 1 through 4 of Section R902.1 ...”. Associated with SFM 02/22 Part 2, Items 7-2 and 11.

Agency Response:

Accept. In addition to removing the references to Exceptions 1 through 4, language was added to the first paragraph referring compliance with section 1505.2. The exceptions for Class A roof assemblies from Section R902.1 remain a path of compliance.

ITEM 3-2

Section R337.5.2 Roof Covering Voids

Rearrange this section adding two subsections and additional language related to roofing requirements for Fire Hazard Severity Zones.

CAC Recommendation:

Further Study. Action taken on Items 3-1 and 3-2 together to be consistent with action taken on the associated item in SFM proposal for Part 2 even though the recommended change is in Item 3-1 only.

Agency Response:

Disagree. No recommendations were made. No changes were made. The proposal is to make clear the roofing terminology associated with the airspace roof covering and the roof underlayment.

ITEM 4

Chapter 3, Sections R337.7 EXTERIOR COVERING and R337.10 ACCESSORY BUILDINGS AND MISCELLANEOUS STRUCTURES

ITEM 4-1

Section R337.7.5 Open roof eaves, R337.7.6 Enclosed roof eaves and roof eave soffits, R337.7.7 Exterior porch ceilings, R337.7.8 Floor projections, R337.10.2 Applicability

The SFM proposes to delete the exception to R337.7.5, R337.7.6, R337.7.7, R337.7.8 and R337.10.2 for fascia and architectural trims. Through data collections, these features have been identified as adding the potential for fire spread to the building or structure, when exposed to wildfire embers. Several studies of the Insurance Institute for Business and Home Safety (IBHS), as well as data collected from CalFire damage assessment teams have identified that the fascia and other trim details will contribute to the fire spread of a building or structure when exposed to wildfire embers or radiant heat. These features originally thought to be too small to cause any significant damage, has been reassessed. Fire, like water will find the path of least resistance and cause more damage to the building or structure when allowed to be unprotected.

Attached Document A: Quarles2011_Vulnerability of Eaves to Direct Flame and Radiation

Included is a report written by Stephen L. Quarles, Ph.D. which provides background data and research to support the proposal to remove the exception. This work presented here is document in the IBHS Research Report [Near-Building Noncombustible Zone](#); page 11 of that report shows an image of the flames impacting the fascia/roof edge. The “previous research” mentioned here from Steve Quarles, including a proceedings paper from 2011 (attached) and in this post [surviving-wildfire](#).

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 5

Chapter 3, Section R337.11 MODEL ORDINANCE FOR FIRE SEVERITY ZONE ADOPTION

ITEM 5-1

Section R337.11 Model Ordinance for Fire Severity Zone Adoption

Adopt a model ordinance that provides for the establishment of very high fire hazard severity zones pursuant to the Government Code Section 51179.

Government Code Section 51179.

- a) A local agency shall designate, by ordinance, very high fire hazard severity zones in its jurisdiction within 120 days of receiving recommendations from the State Fire Marshal pursuant to Section 51178.

- b) A local agency may, at its discretion, include areas within the jurisdiction of the local agency, not identified as very high fire hazard severity zones by the State Fire Marshal, as very high fire hazard severity zones following a finding supported by substantial evidence in the record that the requirements of Section 51182 are necessary for effective fire protection within the area.
- c) The local agency shall transmit a copy of an ordinance adopted pursuant to subdivision (a) to the State Board of Forestry and Fire Protection within 30 days of adoption.
- d) Changes made by a local agency to the recommendations made by the State Fire Marshal shall be final and shall not be rebuttable by the State Fire Marshal.
- e) The State Fire Marshal shall prepare and adopt a model ordinance that provides for the establishment of very high fire hazard severity zones.
- f) Any ordinance adopted by a local agency pursuant to this section that substantially conforms to the model ordinance of the State Fire Marshal shall be presumed to be in compliance with the requirements of this section.
- g) A local agency shall post a notice at the office of the county recorder, county assessor, and county planning agency identifying the location of the map provided by the State Fire Marshal pursuant to Section 51178. If the agency amends the map, pursuant to subdivision (b) or (c) of this section, the notice shall instead identify the location of the amended map.

(Amended by Stats. 2021, Ch. 225, Sec. 6. (AB 9) Effective January 1, 2022.)

The purpose of the adoption of the model ordinance form is to comply with the mandates of the GOV 51179. This form is the minimum criteria of what shall be presumed as in compliance with the State with a Local Jurisdiction is adopting the Fire Hazard Severity Zones within its jurisdiction. The local jurisdiction shall provide the data as stated in the adopted form but may include additional information.

CAC Recommendation:

Further Study. The CAC recommendation is based on SFM request. Associated with SFM 02/22 Part 2, Item 7-4 and SFM 07/22 Part 9, Item 13-2.

Agency Response:

Accept. The proposed Model ordinance has been updated to reflect the different adoption scenarios that a local jurisdiction will most likely encounter.

ITEM 6

Chapter 9 ROOF ASSEMBLIES, Section R902 FIRE CLASSIFICATION

ITEM 6-1

Section R902.1 Roof covering materials.

The SFM proposes to amend Chapter 9 regarding the roofing provisions for Fire Hazard Severity Zones. The proposed revisions to both Chapter 3 and Chapter 9 regarding the roofing provisions for Fire Hazard Severity Zones (FHSZ). The SFM Wildland Urban Interface (WUI) workgroup met several times in 2022 and came to a consensus on the

proposed language. The focus of the SFM WUI workgroup was to correlate Chapter 3 and 9 for roofing requirements in the Wildland Urban Interface. Throughout the discussions a summary of the revisions is as follows:

- All roof assemblies in any Fire Hazard Severity Zone shall be Class A rating when tested in accordance with ASTM E108 or UL790,
- The regulations of Section R902.1.1 are no longer necessary, as they conflict with the regulations of Section R337.5
- Language was updated to reflect the correct terms “Fire Hazard Severity Zones” and “Wildland-Urban Interface” areas.

CAC Recommendation:

Further Study. Recommended to delete the proposed amendment regarding “Exceptions 1 through 4 ...”. Associated with SFM 02/22 Part 2, Items 7-2 and 11.

Agency Response:

Accept. The language regarding “Exceptions 1 through 4 ...” is deleted. The exceptions for Class A roof assemblies from Section 902.1 remain a path of compliance.

ITEM 6-2

Section R902.1.1 Roof coverings within fire hazard severity zones

Remove this section as an amendment addressing it is added to section R337.5.1.

CAC Recommendation:

Further Study. Action taken on Items 6-1, 6-2 and 6-3 together to be consistent with action taken on the associated item in SFM proposal for Part 2 even though the recommended change is in Item 6-1 only.

Agency Response:

Disagree. No recommendations were made. No changes were made.

ITEM 6-3

Section R902.1.1 Roofing requirements within Fire Hazard Severity Zones or in the Wildland-Urban Interface (WUI), R902.1.2 Roof coverings in all other area other than Fire Hazard Severity Zones or a Wildland-Urban Interface (WUI) area

Amend these sections to correct the term Wildland-Urban Interface (WUI), renumber, rename and add some new language.

CAC Recommendation:

Further Study. Action taken on Items 6-1, 6-2 and 6-3 together to be consistent with action taken on the associated item in SFM proposal for Part 2 even though the recommended change is in Item 6-1 only.

Agency Response:

Disagree. No recommendations were made. No changes were made.

ITEM 6-4

Section R902.2 Fire-retardant-treated wood shingles and shakes.

Amend this section to add reference to ASTM E108 and UL 790.

CAC Recommendation:

Approve

Agency Response:

Accept.

ITEM 7

Chapter 44 REFERENCED STANDARDS, ASTM E108

ITEM 7-1

Adopt the latest edition of ASTM E108

The SFM proposes to adopt the latest edition of ASTM E108.

ASTM E108 is a fire-test-response standard that is used to evaluate roof coverings in both residential and commercial roofing applications for materials used on combustible or noncombustible decks. The evaluation simulates the fire originating outside the building accompanied by wind conditions. The 3 classifications afford different severity of testing parameters and criteria; Class A roof coverings are effective against severe fire test exposures, Class B roof coverings are effective against moderate fire test exposures, and Class C roof coverings are effective against light fire test exposures.

Applicable Products: Roof covering materials, including but not limited to asphalt shingles, sheet roofing, fire-retardant-treated wood shingles and shakes.

Test Procedure: The roof covering material is installed on a test deck to create a roof assembly. The test deck can either be of combustible (plywood or wood boards) or noncombustible (metal, concrete, gypsum) material depending on the intended installation of the product. The test exposure depends on the classification that is being sought by the manufacturer. The test parameters will vary depending on which class is being specified for the evaluation.

There are 6 different test sections that the roof covering can be tested to depending on the type of roof covering and associated characteristics. The sections are: Spread of Flame test, Intermittent Flame test, Burning Brand test, Flying Brand test, Rain test, and Weathering test.

- Roof coverings on combustible decks, other than fire-retardant-treated wood shakes or shingles, shall be subjected to the spread of flame, intermittent flame, and burning brand tests. The flying brand test is only required for these types of decks if there is a potential for the roof covering to break into pieces of flying, flaming brands or particles which continue to glow after reaching the floor. The rain test and weathering tests are only required if the fire-retardant characteristics of the roof covering material has the potential of being adversely affected by water or weather outdoors, respectively.

- Roof coverings restricted to noncombustible decks only require the spread of flame test.
- Roof coverings consisting of fire-retardant-treated wood shakes and shingles shall be subjected to all the test sections: the spread of flame test, intermittent flame test, burning brand test, flying brand test, rain test, and weathering test.

This test procedure utilizes a test apparatus which exposes a roof system to simulated wind conditions and fire sources (test specimen exposure simulates a fire originating from outside environment) by means of an inline blower and either a gas burner or burning brands. The test apparatus framework incline can be adjusted to different slopes as per the test sponsor's instructions, with the default test slope being 5 inches per horizontal foot. The blower is adjusted to simulate a 12 mile per hour wind condition over top of the roof covering. The gas burner (for intermittent flame, spread of flame, and flying brand tests) is adjusted to 1400°F ± 50°F for Class A and B test exposures or 1300°F ± 50°F for Class C test exposure. The brands for Class A and Class B are constructed from 1-inch-by-1-inch wood strips spaced 1/4 in. The Class A brands are 12 inches by 12 inches by 2¼ inch, and Class B brands are 6 inches by 6 inches by 2¼ inch. Class C brands are 1½-inch-by-1½-inch-by-25/32-inch wood pieces with two 1/8-inch saw kerfs. Class A tests use a single brand, Class B tests use two brands, and Class C tests use 20 brands.

Result: The test results will indicate if the roof covering achieves a classification of A, B, or C. For certification projects the final deliverable will be a listing report and authorization to mark the product. For performance only projects, the final deliverable will be a test report.

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 8
Chapter 44, UL 790

ITEM 8-1

Adopt the 9th edition of UL 790

The SFM proposes to amend the 9th edition of UL 790.

UL 790, 9th Edition, February 18, 2022 - UL Standard for Safety Standard Test Methods for Fire Tests of Roof Coverings

These requirements cover the measurement of the relative fire characteristics of roof coverings exposed to simulated fire sources originating from outside a building on which the coverings are installed. They are applicable to roof coverings intended for installation on either combustible or noncombustible roof decks (see 1.4) when the roof coverings are applied as intended. The following test methods are included:

- a) Intermittent-Flame Exposure test;
- b) Spread of Flame test;

- c) Burning Brand test;
- d) Flying Brand test; and
- e) Rain test.

Three classes of fire exposure are described.

- a) Class A roof coverings that are expected to be effective against severe fire exposures. Under such exposures, roof coverings of this class afford a high degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.
- b) Class B roof coverings that are expected to be effective against moderate fire exposures. Under such exposures, roof coverings of this class afford a moderate degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.
- c) Class C roof coverings that are expected to be effective against light fire exposures. Under such exposures, roof coverings of this class afford a light degree of fire protection to the roof deck, do not slip from position, and are not expected to produce flying brand.

Tests conducted in accordance with these requirements are intended to demonstrate the performance of roof coverings during the types and periods of fire exposure involved, but are not intended to determine the acceptability of roof coverings for use after exposure to fire. These fire test methods do not provide a basis to compare expected performance under all actual fire conditions, but they do provide a basis for comparison of the response of roof coverings when subjected to fire sources that are described herein.

These test methods address roof coverings used over both combustible and noncombustible decks. A combustible deck is generally constructed using materials that do not comply with the requirements of ASTM E136, such as wood sheathing boards, oriented strand boards (OSB), or plywood. A noncombustible deck is generally constructed entirely of materials that comply with the requirements of ASTM E136, such as metal, concrete, or poured gypsum.

CAC Recommendation:

Approve

Agency Response:

Accept

ITEM 9

Items added per SFM addendum dated February 13, 2023

ITEM 9-1

Chapter 3, Section R328.5 Energy Ratings

The SFM proposal provides the clear intent of the maximum threshold of kWh of ESS for each location on a property.

The proposed changes to the first three sentences of R328.5 clarify the original intent for this section, which was to provide a maximum threshold for each location. It was not the intent to limit installations to one location on the property, or to limit to only 80 kWh for all ESS installed on the property.

CAC Recommendation:

Further Study. Action taken on Items 9-1 and 9-2 together even though the recommended revisions is in Item 9-2 only.

Agency Response:

Disagree. No recommendations made. No changes were made.

ITEM 9-2

Chapter 3, Table R328.5 Maximum Aggregate Ratings of ESS

The SFM proposal provides the clear intent of the maximum threshold of kWh of ESS for each location on a property.

Providing the various maximum thresholds in tabular form provides an easier method for the code user to determine the limits for each location.

Within utility closets, basements and storage or utility spaces:

The 40-kWh limit is unchanged from the 2022 CRC. That language clarifies that the 40-kWh limit does not apply to spaces or closets located within garages or accessory structures. It only applies to within the dwelling.

In attached garages:

As the ESS industry has gained more experience with the needs of their customers and the grid, and the building safety community has gained more experience with ESS, it is becoming clear that the arbitrary capacity restrictions in the residential code are a hinderance to the deployment of clean energy technologies and are unneeded for safety. Hundreds of thousands of residential batteries have been installed and constructed to standards leading to greater levels of safety. Taken together these facts support a reasonable increase in kWh capacity to align with other anticipated hazards and fuel loads that may be present in a residential garage.

A modest increase in the allowable aggregate ESS capacity from 80-kWh to 100-kWh does not pose a significant elevated fire risk in the garage.

Manufacturers design ESS to well-established safety standards, have proven track records of operating without igniting in homes, and are built in ways to resist adding fuel to fires from other sources. In the rare event of an ESS fire, a fire from 100-kWh of energy storage does not pose a significantly greater threat to occupant safety and is not significantly more difficult to extinguish than a fire from 80 kWh of energy storage.

The fuel energy density and heat release rate potential presented by a 100-kWh energy storage system are comparable to that of vehicles parked in garages. 100-kWh is a typical capacity of currently available electric vehicles (EVs), which use lithium-ion chemistries as do many stationary ESS. EVs also present significant additional fuel load through materials like upholstered seating and plastic trim. Internal combustion engine (ICE) vehicles have fuel, engine lubricants, and other components with the potential for very significant heat

release rates. While the fuel load in a vehicle fueled by a gaseous fuel such as CNG or hydrogen can be less than that of a 100-kWh ESS in total energy output, the dynamics of a designed quick release of a gaseous fuel due to fire exposure in an attached garage can pose a significant concentrated fire exposure, or potentially a deflagration hazard risk to occupants and emergency responders.

This proposal allows homes to add an aggregate of 100-kWh of energy storage to an attached garage, while keeping the content fuel loads at safe levels. While actual fuel loads in garages can vary widely, this can be demonstrated using typical and conservative figures:

A reasonable fuel load for a garage is approximately 22,300 MJ. This assumes the garage is 20' x 20' and that a reasonable fuel load density is 600 MJ/m. Parking two gasoline powered cars in the garage makes up approximately 10,600 MJ of fuel load. Other garage items can make up approximately 3,300 MJ of fuel load. The remaining fuel load available to an ESS (22,300 MJ minus 10,600 MJ minus 3,300 MJ) is 8,400 MJ. 8,400 MJ is equivalent to an ESS with an aggregate capacity of 100 kWh, assuming the ESS has a fuel load of 84 MJ/kWh.

On or within 3 feet (914 mm) of exterior walls of dwellings and attached garages:

ESS on the exterior side of exterior walls pose less of a safety risk than ESS inside attached garages. If an ESS with an aggregate rating of 100-kWh in an attached garage is considered reasonable, then an ESS with an aggregate rating of 100-kWh on the exterior side of exterior walls should also be reasonable.

If an ESS with an aggregate rating of more than 100 kWh catches on fire, the non-combustible surface would protect occupant safety. Batteries that undergo burn tests on non-combustible surfaces, including masonry and cementitious board, perform well. Some tests have been done as part of 9540A.

In detached garages and detached accessory structures:

This scenario poses minimal risk to occupant safety, considering the distance from the dwelling and testing required of ESS. ESS in detached structures pose less of a safety risk than ESS on the exterior side of the dwelling. If an ESS with an aggregate rating of 200-kWh on the exterior side of the dwelling is considered reasonable, then an ESS with an aggregate rating of 200 kWh should be reasonable for ESS in detached structures.

600-kWh matches Table 1207.5 of the CFC. ESS in structures separated from the dwelling by 10 feet do not pose demonstrable risk to occupants.

Outdoors on the ground:

This scenario poses minimal risk to occupant safety, considering the distance from the dwelling and the testing required of ESS. Ground mount ESS pose less of a safety risk than ESS on the exterior side of the dwelling. If an ESS with an aggregate rating of 200-kWh on the exterior side of the dwelling is considered reasonable, then an ESS with an aggregate rating of 200 kWh should be reasonable for ESS mounted on the ground.

Additionally, 200 kWh is equivalent to two typical EVs that can be parked anywhere on the property. 600 kWh matches Table 1207.5 of the CFC. ESS separated from the dwelling by 10 feet do not pose demonstrable risk to occupants.

Endnotes:

1. Tesla Model X has a capacity of 100 kWh. Tesla Model S has a capacity of 70-85 kWh. Chevy Bolt has a capacity of 66 kWh. The electric Ford F150 has a capacity of 110-130 kWh or 150-180 kWh with extended range.

Sources:

<https://www.forbes.com/wheels/cars/tesla/model-x/>,
<https://www.tesla.com/sites/default/files/tesla-model-s.pdf>,
<https://media.chevrolet.com/media/us/en/chevrolet/vehicles/bolt-ev/2021.tab1.html>,
<https://www.forbes.com/wheels/news/2022-ford-f-150-lightning-ev-pickup-debuts-300-mile-range-priced-at-40k>.

2. Builders' websites show the typical two-garage is around 20' x 20'. For example, HWS Garages' website states that "The average 2-car garage size is anywhere from 18' x 20' to 22' x 22'." While some garages are one-car and some are three-car, a poll conducted by Garage Living shows that 61 percent of garages are two-car. Sources: www.hwsgarage.com/average-garage-sizes/ and www.garageliving.com/blog/home-garage-stats.
3. The average fuel load of a living room is 600 MJ/m. 600 MJ/m² is also the business standard in NFPA 557. Sources: Alex Bwalya et al., "A Pilot Survey of Fire Loads in Canadian Homes," National Research Council Canada, March 9, 2004; National Fire Protection Association, "NFPA 557: Standard for Determination of Fire Loads for Use in Structural Fire Protection Design," 2020 Edition, Section 6.1.3.
4. 10,577 MJ (rounded to 10,600 MJ) assumes a small car (2,909 MJ) and large car (7,648 MJ). Sources: Mohd Tohir and Michael Spearpoint, "Distribution analysis of the fire severity characteristics of single passenger road vehicles using heat release rate data," Fire Science Reviews, 2013. Also see M.J. Spearpoint, et. al., "Fire load energy densities for risk-based design of car parking buildings," Case Studies in Fire Safety, 29 April 2015.
5. 3,341 MJ (rounded to 3,300 MJ) is equivalent to half the fuel load items in a typical basement living room. Source: Bwalya, A.C., et. al., "Survey Results of Combustible Contents and Floor Areas in Multi-Family Dwellings," National Research Council Canada, 24 October 2008.
6. 84 MJ/kWh is derived from the estimated fuel load of the gases released by an ESS in thermal runaway (44 MJ/kWh) and the estimated fuel load of the burnable contents inside the ESS (40 MJ/kWh). 44 MJ/kWh was derived from reviewing several studies referenced below. 40 MJ/kWh was derived from multiplying 2 kg/kWh (a conservative figure for burnable contents inside the ESS – the weight of internal contents for some ESS is 1.0- 1.5 kg/kWh) by 20 MJ/kg (the typical fuel load of a computer). Sources for fuel load of gases: Frederik Larsson, "Toxic fluoride gas emissions from lithium-ion battery fires," Scientific Reports, 30 August 2017; David Sturk et. al., "Fire Tests on E-vehicle Battery Cells and Packs," Traffic Injury Prevention, 25 February 2015. Sources for kg/kWh weight of internal burnable contents: Tesla, SimpliPhi, and Solaredge. Source for fuel load of a computer: Alex Bwalya et al., "A Pilot Survey of Fire Loads in Canadian Homes," National Research Council Canada, March 9, 2004.

Cost Impact: The code change proposal will not increase or decrease the cost of construction. It clarifies how the maximum thresholds are applied. Allows for more ESS while maintaining a level of safety.

CAC Recommendation:

Further Study. Recommended to revise Table R328.5 footnotes (the last sentence in the footnote a) to clarify the intent of the amendment. CAC Action associated with SFM 07/22 Part 9, Item 10-2.

Agency Response:

Accept. The last sentence of the footnote a was modified to address the intent that the authority having jurisdiction is authorized to reduce the installation requirements of setbacks prescribed in the third column based on large-scale testing data that complies with Section 1207.1.5 of the California Fire Code.

TECHNICAL, THEORETICAL, AND EMPIRICAL STUDY, REPORT, OR SIMILAR DOCUMENTS

Government Code Section 11346.2(b)(3) requires an identification of each technical, theoretical, and empirical study, report, or similar document, if any, upon which the agency relies in proposing the regulation(s).

The SFM did not rely on any technical, theoretical, and empirical study, report, or similar documents outside of those contained and referenced in this rulemaking in proposing amendments for the California Building Standards Codes.

STATEMENT OF JUSTIFICATION FOR PRESCRIPTIVE STANDARDS

Government Code Section 11346.2(b)(1) requires a statement of the reasons why an agency believes any mandates for specific technologies or equipment, or prescriptive standards are required.

The SFM believes that the amendments to the code and additional building standards proposed are offered in both a prescriptive and performance base. The nature and format of the code adopted by reference allow for both methods, the following is a general overview of the code proposed to be adopted by reference as well as state modifications:

- This comprehensive code establishes minimum regulations for fire prevention and fire protection systems using prescriptive and performance-related provisions. It is founded on broad-based principles that make possible the use of new materials and new system designs.
- This code is founded on principles intended to establish provisions consistent with the scope of a building and fire code that adequately protects public health, safety, and welfare; provisions that do not unnecessarily increase construction costs; provisions that do not restrict the use of new materials, products, or methods of construction; and provisions that do not give preferential treatment to types or classes of materials, products, or methods of construction.

CONSIDERATION OF REASONABLE ALTERNATIVES

Government Code Section 11346.2(b)(4)(A) requires a description of reasonable alternatives to the regulation and the agency's reasons for rejecting those alternatives. In the case of a regulation that would mandate the use of specific technologies or equipment or prescribe specific action or procedures, the imposition of performance standards shall be considered as an alternate. It is not the intent of this paragraph to require the agency to artificially construct alternatives or describe unreasonable alternatives.

The SFM has determined that no alternative considered would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected private persons than the proposed adoption by reference with SFM amendments. Therefore, there are no alternatives available to the SFM regarding the proposed amendments.

REASONABLE ALTERNATIVES THE AGENCY HAS IDENTIFIED THAT WOULD LESSEN ANY ADVERSE IMPACT ON SMALL BUSINESS

Government Code Section 11346.2(b)(4)(B) requires a description of any reasonable alternatives that have been identified or that have otherwise been identified and brought to the attention of the agency that would lessen any adverse impact on small business.

The SFM has determined that no alternative considered would be more effective in carrying out the purpose for which the regulation is proposed or would be as effective and less burdensome to affected small business than the proposed adoption by reference with SFM amendments. Therefore, there are no alternatives available to the SFM regarding the proposed amendments.

FACTS, EVIDENCE, DOCUMENTS, TESTIMONY, OR OTHER EVIDENCE OF NO SIGNIFICANT ADVERSE IMPACT ON BUSINESS

Government Code Section 11346.2(b)(5)(A) requires the facts, evidence, documents, testimony, or other evidence on which the agency relies to support an initial determination that the action will not have a significant adverse economic impact on business.

The SFM has determined that this proposed action will not have a significant adverse economic impact on business. The SFM affirms that this rulemaking action complies specifically with the mandates of HSC Sections 13143, 18928, 18949.2(b), 18949(c) and the mandates of the statutory authority of the SFM. Numerous public workshops were held during the per-rulemaking phase of the intervening code cycle and no comments have been made that the proposed changes would have significant statewide adverse economic impact on businesses.

Therefore, the SFM has determined that there are minimal facts, evidence, documents, testimony, or other evidence upon which the agency relied to support its initial determination of no effect pursuant to Government Code Section 11346.2(b)(5)(A). The public is welcome to submit any information, facts, or documents either supporting SFM's initial determination or finding to the contrary.

ASSESSMENT OF EFFECT OF REGULATIONS UPON JOBS AND BUSINESS EXPANSION, ELIMINATION OR CREATION

Government Code Sections 11346.3(b)(1) and 11346.5(a)(10)

The SFM has assessed whether and to what extent this proposal will affect the following:

A. The creation or elimination of jobs within the State of California.

These regulations will not affect the creation, or cause elimination, of jobs within the State of California.

B. The creation of new businesses or the elimination of existing businesses within the State of California.

These regulations will not affect the creation, or cause elimination, of existing businesses within the State of California.

C. The expansion of businesses currently doing business within the State of California.

These regulations will not affect the expansion of business currently doing business within the State of California.

D. The benefits of the regulation to the health and welfare of California residents, worker safety, and the state's environment.

These regulations will update and improve minimum existing building standards, which will provide increased protection of public health and safety, worker safety and the environment.

ESTIMATED COST OF COMPLIANCE, ESTIMATED POTENTIAL BENEFITS, AND RELATED ASSUMPTIONS USED FOR BUILDING STANDARDS

Government Code Section 11346.2(b)(5)(B)(i) states if a proposed regulation is a building standard, the initial statement of reasons shall include the estimated cost of compliance, the estimated potential benefits, and the related assumptions used to determine the estimates.

The SFM does not anticipate any increase in cost of compliance with the proposed building standards.

DUPLICATION OR CONFLICTS WITH FEDERAL REGULATIONS

Government Code Section 11346.2(b)(6) requires a department, board, or commission within the Environmental Protection Agency, the Resources Agency, or the Office of the State Fire Marshal to describe its efforts, in connection with a proposed rulemaking action, to avoid unnecessary duplication or conflicts with federal regulations contained in the Code of Federal Regulations addressing the same issues. These agencies may adopt regulations different from these federal regulations upon a finding of one or more of the following justifications: (A) The differing state regulations are authorized by law and/or (B) The cost of differing state regulations is justified by the benefit to human health, public safety, public welfare, or the environment.

The SFM has determined that this proposed rulemaking action does not unnecessary duplicate or conflict with federal regulations contained in the Code of Federal Regulations that address the same issues as this proposed rulemaking.