

**AGENDA ITEM 2d CARBON REDUCTION REGULATIONS
DRAFT INITIAL EXPRESS TERMS
FOR PROPOSED BUILDING STANDARDS
OF THE CALIFORNIA BUILDING STANDARDS COMMISSION
REGARDING THE 2022 INTERVENING CODE ADOPTION CYCLE,
CALIFORNIA GREEN BUILDING STANDARDS CODE
CALIFORNIA CODE OF REGULATIONS, TITLE 24, PART 11
([RULEMAKING FILE #])**

The State agency shall draft the regulations in plain, straightforward language, avoiding technical terms as much as possible and using a coherent and easily readable style. The agency shall draft the regulation in plain English. A notation shall follow the express terms of each regulation listing the specific statutes authorizing the adoption and listing specific statutes being implemented, interpreted, or made specific (Government Code Section 11346.2(a)(1)).

Note: Select the appropriate legend below. Delete this note and the legend that is not used.

If using assistive technology, please adjust your settings to recognize underline, strikeout, italic and ellipsis.

If using assistive technology, please adjust your settings to recognize underline, strikeout and ellipsis.

LEGEND for EXPRESS TERMS (California only codes - Parts 1, 6, 8, 11, 12)

- Existing California amendments appear upright
- Amended or new California amendments appear underlined
- Repealed California language appears ~~upright and in strikeout~~
- Ellipsis (...) indicate existing text remains unchanged

INITIAL EXPRESS TERMS

ITEM [Insert Item #]

CHAPTER 2 DEFINITIONS, SECTION 202

BUILDING SERVICE LIFE. The period of use for the building, in years, that will be assumed for life cycle assessment.

BUY CLEAN CALIFORNIA ACT. The Buy Clean California Act (BCCA) (Public Contract Code Sections 3500-3505), targets carbon emissions associated with the production of structural steel (hot-rolled sections, hollow structural sections, and plate), concrete reinforcing steel, flat glass, and mineral wool board insulation. The maximum acceptable global warming potential (GWP) limit are established by the Department of General Services (DGS), in consultation with the California Air Resources Board (CARB).

CRADLE-TO-GATE. Activities associated with a product or building's life cycle from the extraction stage through production stage, and covers modules A1 through A3 in accordance with ISO Standards 14025 and 21930.

CRADLE-TO-GRAVE. Activities associated with a product or building's life cycle from the extraction stage through disposal stage, and covers modules A1 through C4 in

accordance with ISO Standards 14025 and 21930.

CONCRETE.

HIGH EARLY STRENGTH READY-MIXED CONCRETE. Concrete that has accelerated early-age strength development through the use of additional cement, high-early-strength cement, or admixtures.

LIGHT WEIGHT READY-MIXED CONCRETE. Concrete made with aggregates of expanded clay, shale, slag, or slate or sintered fly ash or any natural lightweight aggregate meeting ASTM C330 and possessing equivalent fire-resistance properties and weighing 85 to 115 pcf (1360 to 184- kg.m3).

READY-MIXED CONCRETE. Concrete manufactured for delivery to the construction site in a fresh state.

ENVIRONMENTAL PRODUCT DECLARATION.

TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD). A third-party verified report that summarizes how a product impacts the environment. Type III EPDs can be either product-specific, factory-specific, or industry-wide EPDs. Type III EPDs activities comply with cradle-to-gate requirements and are available in a publicly accessible database. See CRADLE-TO-GATE.

PRODUCT-SPECIFIC EPD. A TYPE III EPD in which the environmental impacts can be attributed to a product design and manufacturer across multiple facilities.

FACTORY-SPECIFIC EPD. A product-specific Type III EPD in which the environmental impacts can be attributed to a single manufacturer and manufacturing facility.

INDUSTRY-WIDE EPD (IW-EPD). A TYPE III EPD in which the environmental impacts can be attributed to typical manufacturing impacts for a range of products for a group of manufacturers. IW-EPDs provide the least specific data on a product's embodied carbon footprint and cannot be used to compare products, but relay information regarding the typical impact of a product.

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]

ITEM [Insert Item #]

CHAPTER 5-NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.1- PLANNING AND DESIGN, SECTION 5.105 DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES

SECTION 5.105, DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES (Reserved)

5.105.1 Scope. Alteration(s) to existing building(s) where the aggregate floor area is 50,000 square feet or greater shall comply with either Section 5.105.2, 5.409.2 or

5.409.3. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 50,000 square feet or greater shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3.

5.105.2 Reuse of existing structure. An alteration or addition to an existing building shall maintain at a minimum 45 percent combined of the existing building's primary structural elements (foundations; columns, beams, walls, and floors; and lateral elements) and existing building enclosure (roof framing, wall framing and exterior finishes). Window assemblies, insulation, portions of buildings deemed structurally unsound or hazardous, and hazardous materials that are remediated as part of the project shall not be included in the calculation.

Exception: Aggregate addition(s) to existing building(s) of two times the area or more of the existing building(s) is not eligible to meet compliance with Section 5.105.2 and shall meet compliance with Section 5.409.2 or Section 5.409.3.

5.105.2.1 Verification of compliance. Documentation shall be provided in the construction documents to demonstrate compliance with Section 5.105.2.

Note: Sample Worksheet WS-3 in Chapter 8 may be used to assist in documenting compliance with this section.

5.105.3 Deconstruction (reserved)

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]

ITEM [Insert Item #]

CHAPTER 5-NONRESIDENTIAL MANDATORY MEASURES, DIVISION 5.4-MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTION 5.401 GENERAL, SECTION 5.402 DEFINITIONS and SECTION 5.409 LIFE CYCLE ASSESSMENT

SECTION 5.104, GENERAL

5.401.1 Scope. The provisions of this chapter shall ~~outline means~~ specify the requirements of achieving material conservation, and resource efficiency, and greenhouse gas (GHG) emission reduction through protection of buildings from exterior moisture, construction waste diversion, employment of techniques to reduce pollution through recycling of materials, the installation of products with lower GHG emissions and building commissioning or testing and adjusting.

...

SECTION 5.402, DEFINITIONS

5.402 Definitions. The following terms are defined in Chapter 2.

ADJUST.

BALANCE.

BUILDING COMMISSIONING.

BUILDING SERVICE LIFE.

BUY CLEAN CALIFORNIA ACT (BCCA).

CRADLE-TO-GATE.

CRADLE-TO-GRAVE.

CONCRETE.

HIGH EARLY STRENGTH READY-MIXED CONCRETE.

LIGHT WEIGHT READY-MIXED CONCRETE.

READY-MIXED CONCRETE.

ENVIRONMENTAL PRODUCT DECLARATION.

TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD).

PRODUCT-SPECIFIC EPD.

FACTORY-SPECIFIC EPD.

INDUSTRY-WIDE EPD (IW-EPD).

ORGANIC WASTE.

TEST.

...

**SECTION 5.409, LIFE CYCLE ASSESSMENT
(Reserved)**

5.409.1 Scope. Projects consisting of newly constructed building(s) with an aggregate floor area of 50,000 square feet or greater shall comply with either Section 5.409.2 or Section 5.409.3. Alteration(s) to existing building(s) where the aggregate floor area is 50,000 square feet or greater shall comply with either 5.105.2, 5.409.2 or 5.409.3. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 50,000 square feet or greater shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3.

5.409.2 Whole building life cycle assessment. Projects shall conduct a cradle-to-grave whole building life cycle assessment performed in accordance with ISO 14044, excluding operating energy, and demonstrating a minimum 10 percent reduction in global warming potential (GWP) as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, and location that meets the requirements of the *California Energy Code* currently in effect. Software used to conduct the whole building life cycle assessment shall have a data set compliant with ISO-14044, and ISO 21930-2017 or EN 15804, and the software shall conform to ISO 21931-2017 and/or EN 15978:2011.

5.409.2.1 Building components. Building enclosure components included in the assessment shall be limited to glazing, insulation, and exterior finishes. Primary and secondary structural members included in the assessment shall be limited to footings and foundations, and structural columns, beams, walls, roofs, and floors.

5.409.2.2 Period of study. The building service life of the proposed building shall be equal to the reference baseline building and shall not be less than 60 years.

5.409.2.3 Verification of compliance. A summary of the GWP analysis produced by the software shall be provided in the construction documents as documentation of

compliance. A copy of the whole building life cycle assessment which includes the GWP analysis produced by the software, in addition to maintenance and training information, shall be included in the operation and maintenance manual and shall be provided to the owner at the close of construction.

Notes:

1. Software for calculating whole building life cycle assessment is available for free at Athena Sustainable Materials Institute (<https://calculateca.com/software/impact-estimator/>) and OneClick LCA - Planetary (www.oneclicklca.com/planetary). Paid versions include, but are not limited to, Sphera GaBi Solutions (gabi.sphera.com), SimaPro (simapro.com), OneClick LCA (www.oneclicklca.com) and Tally for Revit (apps.autodesk.com).
2. Sample Worksheet WS-4 in Chapter 8 may be used to assist in documenting compliance with this section.

5.409.3 Prescriptive product GWP compliance. Products shall comply with the requirements for prescriptive product GWP performance in accordance with Section 5.409.3.

5.409.3.1 Disclosure of product GWP. Each product listed in Table 5.409.3.2, if included in the project, shall have a Type III product-specific environmental product declaration (EPD) or factory-specific EPD.

5.409.3.2. Product GWP limits. Products required to comply shall not exceed the maximum value specified in Table 5.409.3.2.

5.409.3.3. Verification of compliance. Type III EPDs for products required to comply, if included in the project, shall be provided on the construction documents.

Note: Sample Worksheet WS-5 in Chapter 8 may be used to assist in documenting compliance with this section.

**TABLE 5.409.3.2
PRODUCT GWP LIMITS**

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated)</u>	<u>Unit of Measurement</u>
<u>Hot-rolled structural steel sections</u>	<u>1.77</u>	<u>MT CO₂ eq./MT</u>
<u>Hollow structural sections</u>	<u>3.00</u>	<u>MT CO₂ eq./MT</u>
<u>Steel plate</u>	<u>2.61</u>	<u>MT CO₂ eq./MT</u>
<u>Concrete reinforcing steel</u>	<u>1.56</u>	<u>MT CO₂ eq./MT</u>
<u>Flat glass</u>	<u>2.50</u>	<u>MT CO₂ eq./MT</u>
<u>Light-density mineral wool board insulation</u>	<u>5.83</u>	<u>kg CO₂ eq./1 m²</u>

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated)</u>	<u>Unit of Measurement</u>
<u>Heavy-density mineral wool board</u>	<u>14.28</u>	<u>kg CO₂ eq./1 m²</u>
<u>Ready-mixed Concrete up to 2499</u>	<u>401</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 2500-3499</u>	<u>445</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 3500-4499</u>	<u>545</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 4500-5499</u>	<u>622</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 5500-6499</u>	<u>697</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 6500 and greater</u>	<u>808</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete up to 2499</u>	<u>521</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 2500-3499</u>	<u>579</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 3500-4499</u>	<u>709</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 4500-5499</u>	<u>809</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 5500-6499</u>	<u>906</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 6500 and greater</u>	<u>1,050</u>	<u>CO₂e/m³</u>
<u>Lightweight Ready-mixed Concrete up to 2499</u>	<u>835</u>	<u>CO₂e/m³</u>

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated)</u>	<u>Unit of Measurement</u>
<u>Lightweight Ready-mixed Concrete 2500-3499</u>	<u>955</u>	<u>CO2e/m3</u>
<u>Lightweight Ready-mixed Concrete 3500-4499</u>	<u>1,054</u>	<u>CO2e/m3</u>

Note: The GWP values of the products listed in Table 5.409.3.2 are based on 175% of Buy Clean California Act (BCCA) and the Industry-Wide Environmental Product Declaration (IW-EPD) GWP values, except for concrete products which are not included in BCCA. High-early-strength ready-mixed concrete is based on 130% of the ready-mixed concrete GWP values.

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]

ITEM [Insert Item #]

CHAPTER 6 REFERENCED ORGANIZATIONS AND STANDARDS, AND MATERIALS

**SECTION 601
GENERAL**

601.1 This chapter lists the organizations and standards that are referenced in various sections of this document. The standards are listed herein by the promulgating agency of the standard.

[Entire table not shown, just new European (EO) and International Organization for Standardization (ISO) reference standards]

EN EUROPEAN STANDARDS

ORGANIZATION	STANDARD	REFERENCED SECTION
European and International standards online store - European Standards (en-standard.eu)	<u>EN 15804</u> <u>EN 15978-2011</u>	<u>[ADD LATER]</u>

ISO International Organization for Standardization

ORGANIZATION	STANDARD	REFERENCED SECTION
ISO Central Secretariat Chemin de Blandonnet 8 CP 401 - 1214 Vernier, Geneva, Switzerland https://www.iso.org	ISO 14044-2006 ISO 21930-2017 ISO 21931-2017	[ADD LATER]

ITEM [Insert Item #]

CHAPTER 8 COMPLIANCE FORMS, WORKSHEETS AND REFERENCE MATERIAL

[No change to Worksheet 1 or 2, new Worksheets added below]

WORKSHEET (WS-3)

DOCUMENTATION OF COMPLIANCE OF EXISTING BUILDING REUSE

<u>Area of Existing Building(s)</u>	_____ SF
<u>Area of Aggregate Addition(s)</u> (if applicable)	_____ SF

<u>Building Elements</u>	<u>Existing Total Area</u> <u>(A)</u>	<u>Retained Total Area</u> <u>(B)</u>	<u>% of Retained Structure</u> <u>(B)/(A)</u>
<u>Primary Structural Elements of Existing Building(s)</u> (foundations; columns, beams, walls, and floors; and lateral elements)	_____ SF	_____ SF	_____ %

<u>Building Elements</u>	<u>Existing Total Area</u> (A)	<u>Retained Total Area</u> (B)	<u>% of Retained Structure</u> (B)/(A)
<u>Building Enclosure of Existing Building(s)</u> <u>(roof framing, wall framing and exterior finishes only)</u>	_____ SF	_____ SF	_____ %
<u>Total percent reuse of required elements => 45 percent</u>			_____ %

WORKSHEET (WS-4)
WHOLE BUILDING LIFE CYCLE ASSESSMENT

[Worksheet under construction]

WORKSHEET (WS-5)
PROJECT REPORTING TABLE OF GWP LIMITS AND COMPLIANCE STATEMENT

[Worksheet under construction]

WORKSHEET (WS-6)
DOCUMENTATION OF COMPLIANCE OF EXISTING BUILDING REUSE TIER 1 AND TIER 2

<u>Area of Existing Building</u>	_____ SF
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<u>Building Elements</u>	<u>Existing Total Area (A)</u>	<u>Retained Total Area (B)</u>	<u>Percent of Retained Structure (B)/(A)</u>
<u>Primary Structural Elements of Existing Building</u> (foundations: columns, beams, walls, and floors; and lateral elements)	_____ SF	_____ SF	_____ %
<u>Building Enclosure of Existing Building</u> (roof framing, wall framing and exterior finishes only)	_____ SF	_____ SF	_____ %
<u>Interior Nonstructural Elements</u> (interior walls, doors, floor coverings, ceiling systems applicable for voluntary Tier 2 compliance)	_____ SF	_____ SF	_____ %
<u>Total Percent Reuse of Required Elements</u>			_____ %

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]

ITEM [Insert Item #]

APPENDIX A5-NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.1 – PLANNING AND DESIGN

SECTION A5.105, DECONSTRUCTION AND REUSE OF EXISTING STRUCTURES

A5.105.1 ~~If feasible, disassemble existing buildings instead of demolishing to allow reuse or recycling of building materials.~~

~~**A5.105.1.1 Existing building structure.** Maintain at least 75 percent of existing building structure (including structural floor and roof decking) and envelope (exterior skin and framing) based on surface area.~~

~~**Exceptions:**~~

- ~~1. Window assemblies and nonstructural roofing material.~~
- ~~2. Hazardous materials that are remediated as a part of the project.~~
- ~~3. A project with an addition of more than two times the square footage of the existing building.~~

~~**A5.105.1.2 Existing nonstructural elements.** Reuse existing interior nonstructural elements (interior walls, doors, floor coverings and ceiling systems) in at least 50 percent of the area of the completed building (including additions).~~

~~**Exception:** A project with an addition of more than two times the square footage of the existing building.~~

~~**A5.105.1.3 Salvage.** Salvage additional items in good condition such as light fixtures, plumbing fixtures and doors as follows. Document the weight or number of the items salvaged.~~

- ~~1. Salvage for reuse on the project items that conform to other provisions of Title 24 in an on-site storage area.~~
- ~~2. Nonconforming items may be salvaged in dedicated collection bins for exempt projects or other uses.~~

A5.105.1 Scope. Projects with area limits specified shall comply with Section A5.105.2 to achieve Tier 1 or Tier 2 compliance with Section A5.105.

1. Alteration(s) to existing building(s) where the aggregate floor area is 50,000 square feet or greater shall comply with either A5.105.2, A5.409.2 or A5.409.3.
2. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 50,000 square feet or greater shall comply with either Section A5.105.2, Section A5.409.2, or Section A5.409.3.

Exception: Aggregate addition(s) to existing building(s) of two times the area or more of the existing building(s) is not eligible to meet compliance with Section 5.105.2 and shall meet compliance with Section 5.409.2 or Section 5.409.3.

3. Alteration(s) to existing building(s) where the aggregate floor area is less than 50,000 square feet shall comply with either Section 5.105.2, Section 5.409.2 or Section 5.409.3 for Tier 1 compliance, and either Section A5.105.2.1, Section A5.409.2.1 or A5.409.3 Tier1 requirements for Tier 2 compliance.
4. Addition(s) to an existing building where the total floor area combined with the existing building(s) is less than 50,000 square feet shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3 for Tier 1 compliance, and either Section A5.105.2.1, Section A5.409.2.1 or A5.409.3 Tier 1 requirements for Tier 2 compliance.

Exception: Aggregate addition(s) to existing building(s) of two times the area or more of the existing building(s) is not eligible to meet compliance with Section 5.105.2 and shall meet compliance with Section 5.409.2 or Section 5.409.3.

A5.105.2 Reuse of existing structure. Projects shall meet the minimum requirements of Section A5.105.2.

A5.105.2.1 Tier 1: An alteration or addition to an existing building shall maintain at least 75 percent combined of the existing building's primary structural elements (foundations; columns, beams, walls, and floors; and lateral elements) and existing building enclosure (roof framing, wall framing and exterior finishes). Window assemblies, insulation, portions of buildings deemed structurally unsound or hazardous, and hazardous materials that are remediated as part of the project shall not be included in the calculation.

A5.105.2.2 Tier 2: An alteration or addition to an existing building shall maintain at least 75 percent combined of the existing building's primary structural elements (foundations; columns, beams, walls, and floors; and lateral elements) and existing building enclosure (roof framing, wall framing and exterior finishes). In addition, an alteration to an existing building shall maintain 30% of existing interior nonstructural elements (interior walls, doors, floor coverings, ceiling systems). Window assemblies, insulation, portions of buildings deemed structurally unsound or hazardous, and hazardous materials that are remediated as part of the project shall not be included in the calculation.

5.105.2.3 Verification of compliance. Documentation shall be provided in the construction documents to demonstrate compliance with Section A5.105.2.

Note: Sample Worksheet WS-6 in Chapter 8 may be used to assist in documenting compliance with this section.

A5.105.3 Deconstruction (reserved)

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]

ITEM [Insert Item #]

APPENDIX A5-NONRESIDENTIAL VOLUNTARY MEASURES, DIVISION A5.4 – MATERIAL CONSERVATION AND RESOURCE EFFICIENCY, SECTIONS A5.401 GENERAL, A5.402 DEFINITIONS, A5.405 MATERIAL SOURCES and A5.406 LIFE CYCLE ASSESSMENT

SECTION A5.401, GENERAL

A5.401.1 Scope. The provisions of this chapter specify the requirements of achieving enhanced compliance with material conservation, ~~and resource efficiency,~~ and greenhouse gas (GHG) emissions reduction through reuse of existing building stock

and materials; use of recycled, regional, rapidly renewable, and certified wood materials; and employment of techniques to reduce pollution through recycling of materials.

SECTION A5.402, DEFINITIONS

A5.402.1 Definitions. The following terms are defined in Chapter 2.

BUILDING COMMISSIONING

BUILDING SERVICE LIFE.

BUY CLEAN CALIFORNIA ACT (BCCA).

CRADLE-TO-GATE.

CRADLE-TO-GRAVE.

CONCRETE.

HIGH EARLY STRENGTH READY-MIXED CONCRETE.

LIGHT WEIGHT READY-MIXED CONCRETE.

READY-MIXED CONCRETE.

EMBODIED ENERGY

ENVIRONMENTAL PRODUCT DECLARATION.

TYPE III ENVIRONMENTAL PRODUCT DECLARATION (EPD).

PRODUCT-SPECIFIC EPD.

FACTORY-SPECIFIC EPD.

INDUSTRY-WIDE EPD (IW-EPD).

EUTROPHICATION

LIFE CYCLE ASSESSMENT (LCA)

LIFE CYCLE INVENTORY (LCI)

OVE.

POST CONSUMER CONTENT

PRECONSUMER (or POSTINDUSTRIAL) CONTENT.

RECYCLED CONTENT.

RECYCLED CONTENT VALUE (RCV).

[No change to Sections A5.403 and A5.404]

SECTION A5.405, MATERIAL SOURCES

[No change to Sections A5.405.1 through A5.405.4. Work with Concrete industry on potential changes to Sections A5.405.4.5 through A5.405.5.3.2.4]

A5.405.4.5 Alternate method for concrete.

TABLE A5.405.4 MINIMAL RECYCLED CONTENT LEVELS

A5.405.5 Cement and concrete. . . .

A5.405.5.1 Cement.

A5.405.5.2 Concrete.

A5.405.5.2.1 Supplementary cementitious materials (SCM).

A5.405.5.2.1.1 Mix design equation.

A5.405.5.3 Additional means of compliance.

A5.405.5.3.1 Cement.

A5.405.5.3.1.1 Alternative fuels.

A5.405.5.3.1.2 Alternative power.

A5.405.5.3.2 Concrete.

A5.405.5.3.2.1 Alternate energy.

A5.405.5.3.2.2 Recycled aggregates.

A5.405.5.3.2.3 Mixing water.

A5.405.5.3.2.4 High strength concrete.

. . . [No change to Sections A5.406 and A5.408]

SECTION A5.409, LIFE CYCLE ASSESSMENT

[Repeal sections A5.409.1 and add new scope, repeal A5.409.3, A5.409.4, A5.409.5, and whole building life cycle assessment. Renumber whole building life cycle assessment additional impacts.]

~~**A5.409.1 General.** Life cycle assessment shall be ISO 14044 compliant. The service life of the building and materials assemblies shall not be less than 60 years unless designated in the construction documents as having a shorter service life as approved by the enforcing agency.~~

[New Life Cycle Assessment regulations]

A5.409.1 Scope. Projects with area limits specified shall comply with Section A5.409.1 to achieve Tier 1 or Tier 2 compliance with Section A5.409. All projects regardless of area shall comply with A5.409.4 to achieve Tier 2 compliance.

1. Projects consisting of newly constructed building(s) with an aggregate floor area of 50,000 square feet or greater shall comply with either Section A5.409.2 or Section A5.409.3.
2. Alteration(s) to existing building(s) where the aggregate floor area is 50,000 square feet or greater shall comply with either Section A5.105.2, Section A5.409.2 or Section A5.409.3.
3. Addition(s) to existing building(s) where the total floor area combined with the existing building(s) is 50,000 square feet or greater shall comply with either Section A5.105.2, Section A5.409.2, or Section A5.409.3.

Exception: Aggregate addition(s) to existing building(s) of two times the area or more of the existing building(s) is not eligible to meet compliance with Section 5.105.2 and shall meet compliance with Section 5.409.2 or Section 5.409.3.

4. Projects consisting of newly constructed building(s) with an aggregate floor area of less than 50,000 square feet shall comply with either Section 5.409.2 or Section 5.409.3 for Tier 1 compliance, and either Section A5.409.2.1 or A5.409.3 Tier 1 requirements for Tier 2 compliance.
5. Alteration(s) to existing building(s) where the aggregate floor area is less than 50,000 square feet shall comply with either Section 5.105.2, Section 5.409.2 or Section 5.409.3 for Tier 1 compliance, and either Section A5.105.2.1, Section A5.409.2.1 or A5.409.3 Tier 1 requirements for Tier 2 compliance.
6. Addition(s) to an existing building where the total floor area combined with the existing building(s) is less than 50,000 square feet shall comply with either Section 5.105.2, Section 5.409.2, or Section 5.409.3 for Tier 1 compliance, and either Section A5.105.2.1, Section A5.409.2.1 or A5.409.3 Tier 1 requirements for Tier 2 compliance.

Exception: Aggregate addition(s) to existing building(s) of two times the area or more of the existing building(s) is not eligible to meet compliance with Section 5.105.2 and shall meet compliance with Section 5.409.2 or Section 5.409.3.

A5.409.2 Whole building life cycle assessment. Projects shall meet the minimum requirements of Section A5.409.2.

A5.409.2.1 Tier 1. Projects shall conduct a cradle-to-grave whole building life cycle assessment performed in accordance with ISO 14044, excluding operating energy, demonstrating a minimum 15 percent reduction in global warming potential (GWP) as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, and location that meets the requirements of all parts of the *California Building Standards Code* currently in effect. Software used to conduct the whole building life cycle assessment shall have a data set compliant with ISO-14044, and ISO 21930-2017 or EN 15804, and the software shall conform to ISO 21931-2017 and/or EN 15978:2011.

Exception: For projects that include building reuse, the reference baseline building shall exclude the reused elements. The baseline building shall be of similar size, function, complexity, type of construction, material specification and location. The percent reduction in GWP shall be achieved through the design and construction of new project elements.

A5.409.2.2 Tier 2. Projects shall conduct a cradle-to-grave whole building life cycle assessment, performed in accordance with ISO 14044, excluding operating energy, demonstrating a minimum 20 percent reduction in GWP as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, and location that meets the requirements of all parts of the *California Building Standards Code* currently in effect. Software used to conduct the whole building life cycle assessment shall have a data set compliant with ISO-14044, and ISO 21930-2017 or EN 15804, and the software shall conform to ISO 21931-2017 and/or EN 15978:2011.

Exception: For projects that include building reuse, the reference baseline

building shall be of similar size, function, complexity, type of construction, material specification and location, shall not be of new construction, and shall retain existing materials. The percent reduction in GWP shall be achieved through the design and construction of new project elements.

A5.409.3 Prescriptive Product GWP Compliance. Projects shall comply with the requirements in Section A5.409.3 for prescriptive product GWP performance.

A5.409.3.1 Disclosure of product GWP. Each product listed in Table A5.409.3.2, if included in the building, shall have a Type III product-specific environmental product declaration (EPD) or factory-specific EPD.

A5.409.3.2. Product GWP limits. Products required to comply shall not exceed the maximum value specified in Table A5.409.3.2 and shall demonstrate minimum compliance for all products in the tier category, if included in the building, to achieve Tier 1 or Tier 2 compliance with Section A5.409.3.

A5.409.3.3. Verification of Compliance: Type III EPDs for products required to comply, if included in the building, shall be provided on the construction documents.

A5.409.24 Whole building life cycle assessment of additional impacts. In addition to compliance with Section 5.409.2, Conduct a cradle-to-grave whole building life assessment performed in accordance with ISO 14044, including operating energy, showing that the building project achieves at least a and demonstrating a minimum 10 percent improvement for at least three of the a minimum of two additional impacts listed in Section A5.409.2-24.1, one of which shall be climate change, as compared to a reference baseline building of similar size, function, complexity, type of construction, material specification, location and operating energy performance, and meeting that meets the 2016 requirements of the California Energy Code at a minimum currently in effect.

A5.409.2.1 Building components. The building envelope, structural elements, including footings and foundations, interior ceilings, walls and floors; and exterior finishes shall be considered in the assessment.

Exceptions:

1. Plumbing, mechanical and electrical systems and controls; fire and smoke detection and alarm systems and controls; and conveying systems.
2. Interior finishes are not required to be included.

Notes:

1. Software for calculating whole building life cycle assessments includes those found at the Athena Institute website (Impact Estimator software), the PE International website (GaBi software), and the PRe Consultants website (SimaPro software).
2. Interior finishes, if included, may be assessed using the NIST BEES tool.

A5.409.2.24.1 Impacts to be considered. Select from the following impacts in the assessment:

1. Climate change (greenhouse gases).
2. 1. Fossil fuel depletion.
3. 2. Stratospheric ozone depletion.
4. 3. Acidification of land and water sources.
5. 4. Eutrophication.
6. 5. Photochemical oxidants (smog).

A5.409.3 Materials and system assemblies. If whole building analysis of the project is not elected, select a minimum of 50 percent of materials or assemblies based on life cycle assessment of at least three of the impacts listed in Section A5.409.2.2, one of which shall be climate change.

Note: Software for calculating life cycle assessments for assemblies and materials may be found at the Athena Institute web site and the NIST BEES web site.

A5.409.4 Substitution for prescriptive standards. Performance of a life cycle assessment completed in accordance with Section A5.409.2 may be substituted for other prescriptive Material Conservation and Resource Efficiency provisions of Division A5.4, including those made mandatory through local adoption of Tier 1 or Tier 2 in Division A5.6.

A5.409.5 Verification of compliance. Documentation of compliance shall be provided as follows:

1. The assessment is performed in accordance with ISO 14044.
2. The project meets the requirements of other parts of Title 24.
3. A copy of the analysis shall be made available to the enforcement authority.
4. A copy of the analysis and any maintenance or training recommendations shall be included in the operation and maintenance manual.

Note: Sample Worksheet WS-7 in Chapter 8 may be used to assist in documenting compliance with this section.

**TABLE A5.409.3.2
PRODUCT GWP LIMITS TIER 1 AND TIER 2**

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 1</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 2</u>	<u>Unit of Measure</u>
<u>Hot-rolled structural steel sections</u>	<u>1.52</u>	<u>1.01</u>	<u>MT CO₂ eq./MT</u>
<u>Hollow structural sections</u>	<u>2.57</u>	<u>1.71</u>	<u>MT CO₂ eq./MT</u>

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 1</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 2</u>	<u>Unit of Measure</u>
<u>Steel plate</u>	<u>2.24</u>	<u>1.49</u>	<u>MT CO₂ eq./MT</u>
<u>Concrete reinforcing steel</u>	<u>1.34</u>	<u>0.89</u>	<u>MT CO₂ eq./MT</u>
<u>Flat glass</u>	<u>2.15</u>	<u>1.43</u>	<u>MT CO₂ eq./MT</u>
<u>Light-density mineral wool board</u>	<u>5.00</u>	<u>3.33</u>	<u>kg CO₂ eq./1 m²</u>
<u>Heavy-density mineral wool board insulation</u>	<u>12.24</u>	<u>8.16</u>	<u>kg CO₂ eq./1 m²</u>
<u>Ready-mixed Concrete up to 2499</u>	<u>344</u>	<u>229</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 2500-3499</u>	<u>381</u>	<u>254</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 3500-4499</u>	<u>467</u>	<u>311</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 4500-5499</u>	<u>568</u>	<u>379</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 5500-6499</u>	<u>597</u>	<u>398</u>	<u>CO₂e/m³</u>
<u>Ready-mixed Concrete 6500 and greater</u>	<u>692</u>	<u>462</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete</u>	<u>447</u>	<u>298</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 2500-3499</u>	<u>496</u>	<u>331</u>	<u>CO₂e/m³</u>
<u>High Early Strength Ready-mixed Concrete 3500-</u>	<u>607</u>	<u>405</u>	<u>CO₂e/m³</u>

<u>Product</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 1</u>	<u>Maximum acceptable GWP limit (unfabricated) Tier 2</u>	<u>Unit of Measure</u>
<u>High Early Strength Ready-mixed Concrete 4500-5499</u>	<u>738</u>	<u>492</u>	<u>CO2e/m3</u>
<u>High Early Strength Ready-mixed Concrete 5500-6499</u>	<u>777</u>	<u>518</u>	<u>CO2e/m3</u>
<u>High Early Strength Ready-mixed Concrete 6500 and greater</u>	<u>900</u>	<u>600</u>	<u>CO2e/m3</u>
<u>Lightweight Ready-mixed Concrete up to 2499</u>	<u>716</u>	<u>477</u>	<u>CO2e/m3</u>
<u>Lightweight Ready-mixed Concrete 2500-3499</u>	<u>819</u>	<u>546</u>	<u>CO2e/m3</u>
<u>Lightweight Ready-mixed Concrete 3500-4499</u>	<u>904</u>	<u>602</u>	<u>CO2e/m3</u>

The GWP values of the products listed in Table A5.409.3.2 are based on 150% of Buy Clean California Act (BCCA) and the Industry-Wide Environmental Product Declaration (IW-EPD) GWP values, except for concrete products which are not included in BCCA. High-early-strength ready-mixed concrete is based on 130% of the ready-mixed concrete GWP values.

Notation:

Authority: [Insert statutory authority]

Reference(s): [Insert statutory reference(s)]