CHAPTER 3—REFERENCED STANDARDS

CODE

3.1—Scope

3.1.1 Standards, or specific sections thereof, cited in this Code, including Annex, Appendixes, or Supplements where prescribed, are referenced without exception in this Code, unless specifically noted. Cited standards are listed in the following with their serial designations, including year of adoption or revision.

3.2—Referenced standards

3.2.1 *American Association of State Highway and Transportation Officials (AASHTO)*

LRFDUS-9—LRFD Bridge Design Specifications, 9th Edition, 2020, Articles 5.8.4.4.2, 5.8.4.4.3, and 5.8.4.5

LRFDCONS-4—LRFD Bridge Construction Specifications, Fourth Edition, 2017, Article 10.3.2.3

3.2.2 *American Concrete Institute (ACI)*

ACI SPEC-301-20—Specifications for Concrete Construction, Article 4.2.3

ACI CODE 318-19—Building Code Requirements for Structural Concrete

ACI CODE-318.2-25—Building Code Requirements for Concrete Thin Shells and Commentary

ACI/PCI CODE-319-25—Structural Precast Concrete—Code Requirements and Commentary

ACI/PTI CODE-320-25—Structural Post-Tensioned Concrete—Code Requirements and Commentary

ACI CODE-332-20—Code Requirements for Residential Concrete and Commentary

ACI CODE-355.2-24—Post-Installed Mechanical Anchors in Concrete—Qualification Requirements and Commentary

ACI CODE-355.4-24—Post-Installed Adhesive Anchors in Concrete—Qualification Requirements and Commentary

ACI CODE-355.5-24—Post-Installed Reinforcing Bar Systems in Concrete—Qualification Requirements and Commentary

ACI CODE-369.1-22—Seismic Evaluation and Retrofit of Existing Concrete Buildings—Code and Commentary

ACI CODE-374.1-05(19)—Acceptance Criteria for Moment Frames Based on Structural Testing

ACI SPEC-423.7-14—Specification for Unbonded Single-Strand Tendon Materials

ACI CODE-437.2-22—Load Testing of Existing Concrete Structures—Code and Commentary

ACI CODE-550.4-18—Qualification of Precast Concrete Diaphragm Connections and Reinforcement at Joints for Earthquake Loading and Commentary

ACI CODE-550.5-18—Code Requirements for the Design of Precast Concrete Diaphragms for Earthquake Motions and Commentary

COMMENTARY

R3.1—Scope

R3.1.1 In the Code, references to standard specifications or other material are to a specific edition of the cited document. This is done by using the complete serial designation for the referenced standard including the title that indicates the subject and year of adoption. All standards referenced in the Code are listed in this chapter, with the title and complete serial designation. In other sections of the Code, referenced standards are abbreviated to include only the serial designation without a title or date. These abbreviated references correspond to specific standards listed in this chapter.

R3.2—Referenced standards

R3.2.1 *American Association of State Highway and Transportation Officials (AASHTO)*

Three articles of the AASHTO LRFD Specifications for Highway Bridge Design (AASHTO LRFDUS) and one article of the AASHTO LRFD Construction Specifications (AASHTO LRFDCONS) are cited in Chapters 2 and 25 of the Code.

R3.2.2 *American Concrete Institute (ACI)*

Article 4.2.3 of ACI SPEC-301 is referenced for the method of mixture proportioning cited in 26.4.3.1(b).

Prior to 2014, the provisions of ACI CODE-318.2 were specified in Chapter 19 of the ACI 318 Building Code.

ACI CODE-355.2 contains qualification requirements for testing and evaluating post-installed expansion, screw, and undercut anchors for use in both cracked and uncracked concrete.

ACI CODE-355.4 contains qualification requirements for testing and evaluating adhesive anchors for use in both cracked and uncracked concrete.

ACI SPEC-423.7 requires the use of encapsulated tendon systems for applications subject to the Code.

CODE

ACI CODE-550.6-19—Acceptance Criteria for Special Unbonded Post-Tensioned Precast Structural Walls Based on Validation Testing and Commentary

3.2.3 *American Society of Civil Engineers (ASCE)*

ASCE/SEI 7-22—Minimum Design Loads and Associated Criteria for Buildings and Other Structures including Supplements 1 and 2.

3.2.4 *ASTM International*

ASTM A184/A184M-24—Standard Specification for Welded Deformed Steel Bar Mats for Concrete Reinforcement

ASTM A307-21—Standard Specification for Carbon Steel Bolts, Studs, and Threaded Rod 60000 PSI Tensile Strength

ASTM A370-24—Standard Test Methods and Definitions for Mechanical Testing of Steel Products

ASTM A416/A416M-24—Standard Specification for Low-Relaxation, Seven-Wire Steel Strand for Prestressed Concrete

ASTM A421/A421M-21—Standard Specification for Stress-Relieved Steel Wire for Prestressed Concrete

ASTM A615/A615M-24—Standard Specification for Deformed and Plain Carbon-Steel Bars for Concrete Reinforcement

ASTM A706/A706M-24—Standard Specification for Deformed and Plain Low-Alloy Steel Bars for Concrete Reinforcement including Supplementary Requirements S1

ASTM A722/A722M-18—Standard Specification for Uncoated High-Strength Steel Bars for Prestressed Concrete

ASTM A767/A767M-19—Standard Specification for Zinc-Coated (Galvanized) Steel Bars for Concrete Reinforcement

ASTM A775/A775M-22—Standard Specification for Epoxy-Coated Steel Reinforcing Bars

ASTM A820/A820M-22—Standard Specification for Steel Fibers for Fiber-Reinforced Concrete

ASTM A884/A884M-19$^{\varepsilon 1}$—Standard Specification for Epoxy-Coated Steel Wire and Welded Wire Reinforcement

ASTM A934/A934M-22—Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars

ASTM A955/A955M-20c—Standard Specification for Deformed and Plain Stainless-Steel Bars for Concrete Reinforcement

ASTM A970/A970M-24—Standard Specification for Headed Steel Bars for Concrete Reinforcement, including Annex A1 Requirements for Class HA Head Dimensions

ASTM A996/A996M-24—Standard Specification for Rail-Steel and Axle-Steel Deformed Bars for Concrete Reinforcement

ASTM A1022/A1022M-22a—Standard Specification for Deformed and Plain Stainless Steel Wire and Welded Wire for Concrete Reinforcement

ASTM A1034/A1034M-24—Standard Specification for Mechanical Splices for Steel Reinforcing Bars

ASTM A1035/A1035M-24—Standard Specification for Deformed and Plain, Low-Carbon, Chromium, Steel Bars for Concrete Reinforcement

COMMENTARY

R3.2.4 *ASTM International*

The ASTM standards listed are the latest editions at the time these code provisions were adopted. ASTM standards are revised frequently relative to the revision cycle for the Code. Current and historical editions of the referenced standards can be obtained from ASTM International. Use of an edition of a standard other than that referenced in the Code obligates the user to evaluate if any differences in the nonconforming edition are significant to use of the standard.

Many of the ASTM standards are combined standards as denoted by the dual designation, such as ASTM A36/A36M. For simplicity, these combined standards are referenced without the metric (M) designation within the text of the Code and Commentary. In this provision, however, the complete designation is given because that is the official designation for the standard.

CODE

ASTM A1044/A1044M-22a—Standard Specification for Steel Stud Assemblies for Shear Reinforcement of Concrete

ASTM A1055/A1055M-22—Standard Specification for Zinc and Epoxy Dual-Coated Steel Reinforcing Bars

ASTM A1060/A1060M-22—Standard Specification for Zinc-Coated (Galvanized) Steel Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM A1064/A1064M-24—Standard Specification for Carbon-Steel Wire and Welded Wire Reinforcement, Plain and Deformed, for Concrete

ASTM C29/C29M-23—Standard Test Method for Bulk Density ("Unit Weight") and Voids in Aggregate

ASTM C31/C31M-24b—Standard Practice for Making and Curing Concrete Test Specimens in the Field

ASTM C33/C33M-24—Standard Specification for Concrete Aggregates

ASTM C39/C39M-24—Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens

ASTM C42/C42M-20—Standard Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

ASTM C94/C94M-24b—Standard Specification for Ready-Mixed Concrete

ASTM C138-24a—Standard Test Method for Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete

ASTM C150/C150M-24—Standard Specification for Portland Cement

ASTM C172/C172M-17—Standard Practice for Sampling Freshly Mixed Concrete

ASTM C173/C173M-24—Standard Test Method for Air Content of Freshly Mixed Concrete by the Volumetric Method

ASTM C192/C192M-19—Standard Practice for Making and Curing Concrete Test Specimens in the Laboratory

ASTM C231/C231M-24—Standard Test Method for Air Content of Freshly Mixed Concrete by the Pressure Method

ASTM C260/C260M-10a(2016)—Standard Specification for Air-Entraining Admixtures for Concrete

ASTM C330/C330M-23—Standard Specification for Lightweight Aggregates for Structural Concrete

ASTM C469/C469M- 22—Standard Test Method for Static Modulus of Elasticity and Poisson's Ratio of Concrete in Compression

ASTM C494/C494M-24—Standard Specification for Chemical Admixtures for Concrete

ASTM C567/C567M-19—Standard Test Method for Determining Density of Structural Lightweight Concrete

ASTM C595/C595M-24—Standard Specification for Blended Hydraulic Cements

ASTM C618-23$^{\varepsilon 1}$—Standard Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete

ASTM C685/C685M-24—Standard Specification for Concrete Made by Volumetric Batching and Continuous Mixing

ASTM C845/C845M-18—Standard Specification for Expansive Hydraulic Cement

ASTM C989/C989M-24—Standard Specification for Slag Cement for Use in Concrete and Mortars

COMMENTARY

CODE

ASTM C1012/C1012M-24—Standard Test Method for Length Change of Hydraulic-Cement Mortars Exposed to a Sulfate Solution

ASTM C1077-24—Standard Practice for Agencies Testing Concrete and Concrete Aggregates for Use in Construction and Criteria for Testing Agency Evaluation

ASTM C1107/C1107M-20—Standard Specification for Packaged Dry, Hydraulic-Cement Grout (Nonshrink)

ASTM C1116/C1116M-23—Standard Specification for Fiber-Reinforced Concrete

ASTM C1140/C1140M-11(2019)—Standard Practice for Preparing and Testing Specimens from Shotcrete Test Panels

ASTM C1157/C1157M-23—Standard Performance Specification for Hydraulic Cement

ASTM C1218/C1218M-20—Standard Test Method for Water-Soluble Chloride in Mortar and Concrete

ASTM C1240-20—Standard Specification for Silica Fume Used in Cementitious Mixtures

ASTM C1580-20—Standard Test Method for Water-Soluble Sulfate in Soil

ASTM C1582/C1582M-11(2017)$^{\varepsilon 1}$—Standard Specification for Admixtures to Inhibit Chloride-Induced Corrosion of Reinforcing Steel in Concrete

ASTM C1602/C1602M-22—Standard Specification for Mixing Water Used in the Production of Hydraulic Cement Concrete

ASTM C1604/C1604M-05(2019)—Standard Test Method for Obtaining and Testing Drilled Cores of Shotcrete

ASTM C1609/C1609M-24—Standard Test Method for Flexural Performance of Fiber-Reinforced Concrete (Using Beam with Third-Point Loading)

ASTM C1797-23a—Standard Specification for Ground Calcium Carbonate and Aggregate Mineral Fillers for use in Hydraulic Cement Concrete

ASTM C1866/C1866M-22—Standard Specification for Ground-Glass Pozzolan for Use in Concrete

ASTM D516-22—Standard Test Method for Sulfate Ion in Water

ASTM E2921-22—Standard Practice for Minimum Criteria for Comparing Whole Building Life Cycle Assessments for Use with Building Codes and Rating Systems

ASTM E329-18—Standard Specification for Agencies Engaged in Construction Inspection, Testing, or Special Inspection

3.2.5 *American Welding Society (AWS)*

AWS D1.1/D1.1M: 2020—Structural Welding Code – Steel

AWS D1.4/D1.4M: 2018—Structural Welding Code – Steel Reinforcing Bars

3.2.6 *International Organization for Standardization (ISO)*

ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines

ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services

COMMENTARY

R3.2.6 *International Organization for Standardization (ISO)*

The ISO standards listed are referenced in Appendix C.