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Specifier Note: These specifications are divided into 3 parts: PART 1 General Information; PART 2 Products; and PART 3 Execution. PART 2 lists products appropriate for each CSI DIVISION and Section. The DIVISIONS and Sections included in these specifications are as follows:

DIVISION 03 00 00 CONCRETE

Section 03 16 00 Concrete Anchors

DIVISION 03 00 00 CONCRETE

Section 03 15 00 Concrete Accessories

Section 03 15 19 Cast In Concrete Anchors

DIVISION 04 00 00 MASONRY

Section 04 05 19.16 Masonry Anchors

DIVISION 05 00 00 METALS

Section 05 05 23 Metal Fastenings

DIVISION 06 00 00 WOOD, PLASTICS AND COMPOSITES

Section 06 05 23 Wood, Plastic and Composite Fastenings

PART 1 GENERAL

1.01 SECTION INCLUDES

- A. Requirements pertaining to post-installed and cast-in-place anchors for materials and equipment. This section pertains to all other sections of these specifications that require post-installed or cast-in-place anchors, unless specified otherwise.

1.02 RELATED DOCUMENTS

- A. Division 1 General Requirements
- B. Division 3 Concrete
- C. Division 4 Masonry
- D. Division 5 Metals
- E. Division 6 Wood, Plastics and Composites
- F. Division 9 Ceiling Suspension Systems
- G. Division 21 Fire Suppression Equipment Support
- H. Division 22 Plumbing Equipment Support
- I. Division 23 HVAC Equipment Support
- J. Division 26 Electrical Equipment Support

1.03 REFERENCES

- A. ACI 318 – Building Code Requirements for Structural Concrete
- B. ACI 355.2 – Qualification of Post-Installed Mechanical Anchors in Concrete
- C. ACI 355.4 – Qualification of Post-Installed Adhesive Anchors in Concrete
- D. **ANSI B212.15 – Cutting Tools - Carbide-tipped Masonry Drills And Blanks For Carbide-tipped Masonry Drills**
- E. ASTM A36 – Standard Specification for Carbon Structural Steel
- F. ASTM A153 – Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware
- G. ASTM A193 – Standard Specification for Alloy-Steel and Stainless Steel Bolting Materials for High-Temperature Service
- H. ASTM A510 – Standard Specification for General Requirements for Wire Rods and Coarse Round Wire, Carbon Steel
- I. ASTM A615 – Standard Specification for Deformed and Plain Billet-Steel Bars for Concrete Reinforcement
- J. ASTM A706 – Standard Specification for Low-Alloy Steel Deformed and Plain Bars for Concrete Reinforcement
- K. ASTM B633 – Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- L. ASTM B695 – Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
- M. ASTM C881 – Standard Specification Epoxy-Resin-Based Bonding Systems for Concrete
- N. ASTM E488 – Standard Test Methods for Strength of Anchors in Concrete and Masonry Elements
- O. ASTM E1190 – Standard Test Methods for Strength of Power-Actuated Fasteners Installed in Structural Members
- P. ASTM E1512 – Standard Test Methods for Testing Bond Performance of Bonded Anchors
- Q. ASTM E3121 – Standard Test Methods for Field Testing of Anchors in Concrete or Masonry
- R. ASTM F1554 – Standard Specification for Anchor Bolts, Steel, 36, 55, and 105-ksi Yield Strength
- S. ASTM F1624 – Standard Test Method for Measurement of Hydrogen Embrittlement Threshold in Steel by the Incremental Step Loading Technique
- T. Federal Specifications A-A-1922A and A-A-55614 for Expansion and Shield-Type Anchors
- U. ICC-ES AC01 – Acceptance Criteria for Expansion Anchors in Masonry Elements
- V. ICC-ES AC58 – Acceptance Criteria for Adhesive Anchors in Masonry Elements
- W. ICC-ES AC60 – Acceptance Criteria for Anchors in Unreinforced Masonry Elements

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- X. ICC-ES AC70 – Acceptance Criteria for Fasteners Power-Driven into Concrete, Steel and Masonry Elements
- Y. ICC-ES AC106 – Acceptance Criteria for Predrilled Fasteners (Screw Anchors) in Masonry Elements
- Z. ICC-ES AC193 – Acceptance Criteria for Mechanical Anchors in Concrete Elements
- AA. ICC-ES AC308 – Acceptance Criteria for Post-Installed Adhesive Anchors in Concrete Elements
- BB. ICC-ES AC510 – Acceptance Criteria for Seismic Qualification of Post-Installed Anchors in Concrete
- CC. TMS 402/602 – Building Code Requirements and Specifications for Masonry Structures

1.04 SUBMITTALS AND SUBSTITUTIONS

- A. Submittals are to be in accordance with Conditions of the Contract and Division 1 Submittal Procedures Section.
 - 1. Submit product data for proprietary products and materials that include:
 - i. Product Information
 - ii. Technical Information
 - iii. Material Safety Data Sheets (MSDS)
 - iv. Manufacturer's Published Installation Instructions (MPII)
 - 2. Submit code reports and agency listings as applicable that include:
 - i. ICC-ES Evaluation Report
 - ii. IAPMO-UES Evaluation Report
 - iii. City of Los Angeles
 - iv. Underwriters Laboratories
 - v. Factory Mutual
- B. Substitutions: Substitute in accordance with Conditions of the Contract and Division 1 Substitution Procedures Section.
 - 1. Only manufacturers with an ICC-ES or IAPMO-UES listing will be considered for substitution requests.
 - 2. The contractor shall submit, for Engineer-of-Record's review, calculations that are prepared & sealed by a registered Professional Engineer demonstrating that the substituted product is capable of achieving the pertinent equivalent performance values of the specified product using the appropriate design procedure and/or standard(s) as required by the Building Code.
 - 3. In addition, the calculations shall specify the diameter and embedment depth of the substituted product.
 - 4. Any increase in material costs or labor for such submittal shall be the responsibility of the contractor.

1.05 QUALITY ASSURANCE

- A. Installer Qualifications: The installer shall be experienced in installing anchors equal to type, and into the substrate material required for this project. See PART 3 EXECUTION.
- B. Evaluations Reports and Listings: Anchors and related materials shall be listed by one or more of the following agencies, as applicable:
 - 1. ICC Evaluation Service
 - i. Anchors shall be manufactured under an approved quality assurance program with follow-up inspections by an inspection agency under ISO/IEC 17020 by a recognized accreditation body conforming to the requirements of ISO/IEC 17011.
 - 2. IAPMO Uniform Evaluation Service
 - i. Anchors shall be manufactured under an approved quality assurance program with follow-up inspections by an inspection agency under ISO/IEC 17020 by a recognized accreditation body conforming to the requirements of ISO/IEC 17011.
 - 3. City of Los Angeles
 - 4. City or County of ()
 - 5. Underwriters Laboratories (UL)
 - 6. Factory Mutual (FM)
 - 7. NSF

1.06 DELIVERY, STORAGE, AND HANDLING

- A. Deliver products to job site in manufacturer's or distributor's packaging undamaged, complete with installation instructions.
- B. Protect and handle materials in accordance with manufacturer's recommendations to prevent damage or deterioration.

1.07 PROJECT CONDITIONS

- A. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of anchor installation.
- B. Anchoring adhesives must be stored at temperatures prescribed by the manufacturer and must not be used beyond the expiration date.
- C. The anchor or fastener coating, plating or steel type must provide suitable corrosion resistance for the environment in which the anchor or fastener is installed.

PART 2 PRODUCTS

2.01 DIVISION 03 00 00 CONCRETE Section 03 16 00 Concrete Anchors

A. Expansion Anchors for Cracked and Uncracked Concrete

1. Expansion anchors are post-installed torque-controlled mechanical expansion anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Chapter 17 – Anchoring to Concrete, which requires post-installed mechanical anchors to be qualified according to ACI 355.2. Such anchors shall be imperial sized, threaded stud with an integral cone expander and three-segment expansion clip. The stud shall be manufactured from carbon steel or type 316 or 304 stainless steel. The expansion clip shall have 2 undercutting embossments per segment and be manufactured from carbon steel or 316 stainless steel. Carbon steel anchors shall have an electroplated zinc finish in accordance with ASTM B633, Class SC1, Type III. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2 and ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
2. Expansion anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie Strong-Bolt 2 Wedge Anchor, ICC-ES ESR-3037 (carbon steel or type 316 or 304 stainless steel)

B. Screw Anchors for Cracked and Uncracked Concrete

1. Screw anchors are post-installed concrete anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Chapter 17 – Anchoring to Concrete as amended by the specific design provisions of ACI 355.2. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2 and ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
2. Screw anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor, ICC-ES ESR-2713 or
 - ii. Simpson Strong-Tie Titen HD Rod Hanger, ICC-ES ESR-2713

C. Self-Undercutting Anchors for Cracked and Uncracked Concrete

1. Self-undercutting anchors are post-installed torque-controlled anchors that cut their own undercut by application of setting torque that forces a sleeve over a cone used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be designed in accordance with ACI 318 Chapter 17 – Anchoring to Concrete, which requires post-installed mechanical undercut anchors to be qualified according to ACI 355.2. Self-undercutting anchors shall be imperial sized and have an expansion ring with undercutting teeth that expand over a cone upon tightening of the nut. Threaded rod, spacer sleeve, undercut expansion ring and expansion cone shall be manufactured from carbon steel and shall be zinc-plated in accordance with ASTM B633, Class SC1. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.2 and ICC-ES AC193 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
2. Self-undercutting anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie TCA Self-Undercutting Anchor, ICC-ES ESR-2705 (Please note a minimum order of 2500 anchors is required and a 6 week lead time)

D. Adhesive Anchors for Cracked and Uncracked Concrete

1. An adhesive anchor shall consist of: 1) threaded rod or reinforcing bar insert; and 2) adhesive formula. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 60 or ASTM A706 Grade 60. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.

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2. Adhesive anchors are post-installed anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Adhesive anchors shall be designed in accordance with ACI 318 Chapter 17 as amended by the specific design provisions of ICC-ES AC308. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in cracked and uncracked concrete in accordance with ACI 355.4 and ICC-ES AC308 for all mandatory tests and including the following:
 - i. Seismic tension in cracked concrete
 - ii. Seismic shear in cracked concrete
 - iii. Horizontal and overhead applications
 - iv. Installation in saturated concrete
 - v. Sensitivity to freeze/thaw conditions
 - vi. Long term creep at elevated temperatures
 - vii. Submerged hole applications (SET-3G only)
3. Adhesive anchors for cracked and uncracked concrete shall be:
 - i. Simpson Strong-Tie SET-3G Epoxy Adhesive, ICC-ES ESR-4057
 - ii. Simpson Strong-Tie SET-XP Epoxy Adhesive, ICC-ES ESR-2508
4. Adhesive anchors for cracked and uncracked concrete and decreased installation temperature (14°F) shall be:
 - i. Simpson Strong-Tie AT-XP Acrylic Adhesive, IAPMO-UES ER-263
 - a. Factory Mutual 3017082
 - b. Underwriters Laboratories File Ex3605.
 - c. Meets requirements of Federal Specifications A-A-55614, Type 1

2.02 DIVISION 04 00 00 MASONRY
Section 04 05 19.16 Masonry Anchors

A. Expansion Anchors for Grout-Filled Concrete Masonry Units

1. Expansion anchors are post-installed torque-controlled mechanical expansion anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Such anchors shall be imperial sized, threaded stud with an integral cone expander, expansion clip, nut and washer. The stud shall be manufactured from carbon steel. The expansion clip shall be manufactured from carbon steel. Carbon steel anchors shall have an electroplated zinc finish in accordance with ASTM B633, Class SC1, Type III or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry in accordance with ICC-ES AC01 for all mandatory tests and including the following:
 - i. Seismic tension in grout-filled concrete masonry units
 - ii. Seismic shear in grout-filled concrete masonry units
2. Expansion anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Strong-Bolt 2 Wedge Anchor, IAPMO-UES ER-240 (carbon steel) or
 - ii. Simpson Strong-Tie Wedge-All Anchor, ICC-ES ESR-1396 (carbon steel or mechanically galvanized)

B. Screw Anchors for Grout-Filled Concrete Masonry Units

1. Screw anchors are post-installed concrete anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III or shall be mechanically galvanized in accordance with ASTM B695, Class 55, Type 1, as appropriate. Anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry in accordance with ICC-ES AC106 for all mandatory tests and including the following:
 - i. Seismic tension in grout-filled concrete masonry units
 - ii. Seismic shear in grout-filled concrete masonry units
2. Screw anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor, ICC-ES ESR-1056

C. Adhesive Anchors for Grout-Filled Concrete Masonry Units

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1. An adhesive anchor shall consist of: 1) threaded rod or reinforcing bar insert; and 2) adhesive formula. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 40. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
2. Adhesive anchors are post-installed anchors used to transmit structural loads by means of tension, shear, or a combination of both between: (a) connected structural elements; or (b) safety-related attachments and structural elements. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in grout-filled concrete masonry units in accordance ICC-ES AC58 for all mandatory tests and including the following:
 - i. Seismic tension in cracked and uncracked grout-filled concrete masonry units
 - ii. Seismic shear in cracked and uncracked grout-filled concrete masonry units
 - iii. Sensitivity to freeze/thaw conditions in grout-filled concrete masonry units
 - iv. Long term creep at elevated temperatures in grout-filled concrete masonry units
3. Adhesive anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie SET-3G Epoxy Adhesive, IAPMO-UES ER-265 or
 - ii. Simpson Strong-Tie AT-XP Acrylic Adhesive, IAPMO-UES ER-281 or

D. Sleeve Anchors for Grout-Filled Concrete Masonry Units

1. Sleeve anchors are post-installed torque-controlled mechanical expansion anchors used to transmit medium duty, non-seismic loads to concrete masonry units by means of tension, shear, or a combination of both. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in fully grouted concrete masonry units. Such anchors shall be imperial sized, threaded anchor body with an expansion sleeve. The stud shall be manufactured from zinc plated carbon steel or type 304 stainless steel. The expansion sleeve shall be manufactured from zinc plated carbon steel or 304 stainless steel. Anchors shall have Factory Mutual (FM) approval, an Underwriters Laboratories (UL) listing, meet the requirements of Federal Specification A-A-1922A and be tested for performance in fully grouted concrete masonry units.
2. Sleeve anchors for concrete masonry units shall be:
 - i. Simpson Strong-Tie Sleeve-All Anchor carrying the following approvals and listings:
 - a. Factory Mutual 3017082, 3026805, 3029959, and 3043442, 3/8"-3/4" dia.
 - b. Underwriters Laboratories File Ex3605, 3/8"-3/4" dia.
 - c. Meets requirements of Federal Specifications A-A-1922A

E. Screw Anchors for Hollow Concrete Masonry Units

1. Screw anchors are post-installed concrete anchors used to transmit medium duty, non-seismic loads to hollow concrete masonry units by means of tension or shear, or a combination of both. Anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in hollow concrete masonry units. Anchors shall be manufactured from carbon steel which is subsequently heat-treated. Anchors shall be zinc-plated in accordance with ASTM B633, Class SC1, Type III. Anchors shall have been tested and qualified for performance in hollow concrete masonry units.
2. Screw anchors for hollow concrete masonry units shall be:
 - i. Simpson Strong-Tie Titen HD Screw Anchor

F. Adhesive Anchors for Hollow Concrete Masonry Units

1. An adhesive anchor shall consist of: 1) threaded rod insert; 2) adhesive formula; and 3) carbon steel, stainless steel or plastic screen tube. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
2. Adhesive anchors are post-installed anchors used to transmit medium duty, non-seismic loads to hollow concrete masonry units by means of tension, shear, or a combination of both. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in hollow concrete masonry units. Adhesive anchors shall have been tested and qualified for performance in hollow concrete masonry units.

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3. Adhesive anchors for hollow concrete masonry units shall be:
 - i. Simpson Strong-Tie SET-XP Epoxy Adhesive (use carbon steel or plastic screen tube)
 - ii. Simpson Strong-Tie AT-XP Acrylic Adhesive (use stainless steel or plastic screen tube)

G. Adhesive Anchors for Unreinforced Masonry

1. Adhesive anchors for existing unreinforced masonry walls having a minimum nominal thickness of 13 inches (three wythes of brick) shall consist of: 1) adhesive formula; and 2) Three types of adhesive anchor assemblies: Configuration A, threaded rods or steel reinforcing bars in shear, Configuration B, bent threaded rods in shear or tension (22 1/2-degree combination anchor), and Configuration C, through-bolts in tension and shear (combination anchor).
2. Threaded rod inserts shall meet the minimum requirements of ASTM F1554 Grade 36, ASTM A193 Grade B7, ASTM A193 Grade B6 (Type 410 Stainless Steel) or ASTM A193 Grade B8 and B8M (Types 304 and 316 Stainless Steel). Reinforcing bar inserts shall meet the minimum requirements of ASTM A615 Grade 40. For exterior exposure the insert shall be stainless steel. Inserts in contact with preservative-treated and fire-retardant-treated wood shall be zinc coated in accordance with ASTM A153 Class C or D or stainless steel or demonstrated through tests to be equivalent to the coatings described.
3. Configuration A consists of a 3/4-inch-diameter straight threaded rod or a No. 5 or No. 6, straight deformed steel reinforcing dowel bar, and a 8-inch-long steel wire or plastic mesh screen tube. This anchor must be embedded a minimum of 8 inches into the wall and is used when the outside wall is inaccessible. This anchor configuration resists shear loads only.
4. Configuration B consists of a 3/4-inch-diameter threaded rod prebent at a 22.5-degree angle and installed a minimum of 13 inches into the wall at a downward angle of 22.5 degrees, to within a maximum of 1 inch of the exterior wall surface. The prebent threaded rod is used with a 13-inch-long steel wire or plastic mesh screen tube. This anchor configuration resists tension and shear loads, and is used where the outside of the wall is inaccessible.
5. Adhesives shall be injectable, two-component, cartridge-type systems dispensed and mixed through a static mixing nozzle supplied by the manufacturer. Acceptable installation and performance temperature ranges shall be verified with manufacturer's literature prior to installation.
6. Adhesive anchors for unreinforced masonry are post-installed anchors used to transmit short-term earthquake and wind loads by means of tension, shear, or a combination of both. Adhesive anchors shall be assigned allowable tension and shear loads for designs based on allowable stress design in unreinforced masonry brick walls. Adhesive anchors shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested and qualified for performance in unreinforced masonry brick walls in accordance ICC-ES AC60 for all mandatory tests.
7. Adhesive anchors for unreinforced masonry shall be:
 - i. Simpson Strong-Tie SET-XP Epoxy Adhesive
 - ii. Simpson Strong-Tie ET-HP Epoxy Adhesive
 - iii. Simpson Strong-Tie AT-XP Acrylic Adhesive

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DIVISION 05 00 00 METALS Section 05 05 23 Metal Fastenings

A. Gas-Actuated Fasteners and Assemblies

1. Gas-actuated fasteners are used for general fastening of building components, such as cold-formed steel framing members, to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units.
2. Simpson Strong-Tie GDP and GDPS Gas-Actuated Fasteners are manufactured from steel complying with ASTM A510, Grade 1060 or 10B60, and austempered to a Rockwell "C" core hardness of 53-56. GDP fasteners have a straight, smooth shank with a diameter of 0.106 inch, and a head diameter of 0.24 inch. GDPS fasteners have a step-shank with a diameter of 0.118 inch above the step and a diameter of 0.102 inch below the step, and a head diameter of 0.24 inch. GDP fasteners are galvanized in accordance with ASTM B695, Class 5, Type I. GDPS fasteners are zinc electroplated in accordance with ASTM B633 SC1, Type I. Both GDP and GDPS fasteners are supplied in collated strips. Fasteners shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested in accordance with ICC-ES AC70.

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3. Gas-Actuated Fasteners and Assemblies attached to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units shall be:
 - i. Simpson Strong-Tie Gas-Actuated Fasteners and Assemblies, ICC-ES ESR-2811

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DIVISION 06 00 00 WOOD, PLASTICS AND COMPOSITES
Section 06 05 23 Wood, Plastic and Composite Fastenings

A. Powder-Actuated Fasteners, Threaded Studs and Assemblies

1. Powder-actuated fasteners and threaded studs are used to fasten building components, such as wood and steel, to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units.
2. Simpson Strong-Tie fasteners and threaded studs are manufactured from steel complying with ASTM A510, Grades 1060 to 1065 or 10B60 to 10B65 and austempered to a Rockwell "C" core hardness of 51 to 56, except for PDPA headed fasteners, which are manufactured from steel complying with ASTM A510, Grade 1060, and austempered to a Rockwell "C" core hardness of 53 to 58. Unless otherwise noted in the evaluation report, the fasteners have a mechanically plated zinc finish complying with ASTM B695, Class 5, Type I. When installed with the powder-actuated fastening tool recommended by Simpson Strong-Tie, the fasteners pierce the material being fastened and embed into the supporting concrete, structural steel, hollow or grout-filled concrete masonry units substrate. Fasteners shall have an evaluation report issued by ICC-ES or IAPMO-UES and have been tested in accordance with ICC-ES AC70.
3. Powder-actuated fasteners, threaded studs and assemblies attached to normal-weight and sand-lightweight concrete, steel deck with sand-lightweight concrete fill, structural steel, and hollow and grout-filled concrete masonry units shall be:
 - i. Simpson Strong-Tie Powder-Actuated Fasteners, Threaded Studs and Assemblies, ICC-ES ESR-2138

PART 3 EXECUTION

3.01 EXAMINATION

- A. Examine supporting base materials and environmental conditions. Do not begin installation until base materials have been properly prepared.
- B. Unless otherwise specified, do not drill holes in concrete or masonry until concrete, mortar, or grout has achieved full design strength.
- C. Install only if environmental conditions are in compliance with manufacturer's recommendations for installation conditions.

3.02 INSTALLATION

- A. Adhesive anchors shall be installed in concrete having a minimum age of 21 days at time of anchor installation.
- B. Installation shall conform to the manufacturer's published installation instructions.
- C. Where holes are drilled in concrete or masonry, holes shall be accurately and squarely drilled, and the holes shall be cleaned in accordance with the manufacturer's recommendations.
- D. Unless otherwise noted, anchors shall be installed in holes drilled into base materials using carbide-tipped drill bits conforming to ANSI B212.15-1994.
- E. Where manufacturer recommends use of special tools for installation of anchors, such tools shall be used, unless otherwise permitted specifically by the Engineer or Architect of Record.
- F. Identify position of reinforcing steel and other embedded items prior to drilling holes for anchors. Exercise care in drilling to avoid damaging existing reinforcing or embedded items. Notify the Engineer if reinforcing steel or other embedded items are encountered during drilling.

1.01 FIELD QUALITY CONTROL

A. Special Inspection

1. Special inspection is defined in ACI 318 as a function performed by qualified special inspectors in the employ of the owner or the owner's agent. Inspection is particularly important for post-installed anchors to make certain that the Manufacturer's Printed Installation Instructions (MPII) are followed. A distinction is made between continuous special inspection and periodic special

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inspection. Special Inspection, continuous or periodic, of post-installed anchors, shall be provided as required by ICC-ES or IAPMO-UES evaluation reports and/or as specified by the Engineer of Record. This service shall be performed by personnel independent of the manufacturer or contractor so as to prevent a conflict of interest.

2. For mechanical anchors qualified for use in cracked and uncracked concrete in accordance with ACI 355.2, periodic special inspection is required.
3. For adhesive anchors qualified for use in cracked and uncracked concrete in accordance with ACI 355.4, installations may be made under continuous special inspection with an onsite proof loading program or periodic special inspection, as determined by the registered design professional. Strength reduction factors, Φ , and additional factors published in the evaluation report, and used in design, must correspond to the type of inspection provided.
4. For adhesive anchors qualified for use in cracked and uncracked concrete in accordance with ACI 355.4, where required, a program for on-site proof loading, that is, proof loading program, to be conducted as part of the special inspection shall be established by the engineer or design professional of record and shall conform to the following minimum requirements:
 - i. Frequency of proof loading based on anchor type, diameter, and embedment
 - ii. Proof loads by anchor type, diameter, embedment, and location
 - iii. Acceptable displacements at proof load
 - iv. Remedial action in the event of failure to achieve proof load or excessive displacement
5. Unless otherwise directed by the engineer or design professional of record, proof loads shall be applied as confined tension tests. Proof load levels shall not exceed the lesser of 50 percent of the expected peak load based on adhesive bond strength or 80 percent of the anchor yield strength. Maintain the proof load at the required load level for a minimum of 10 seconds.

B. Installer Certification

1. The following installer certification requirements apply to adhesive anchors assessed by the acceptance testing under ACI 355.4:
 - i. Adhesive anchors shall be installed by qualified personnel in accordance with the contract documents. The contract documents shall require installation of post-installed anchors in accordance with the Manufacturer's Printed Installation Instructions (MPII). Installation of adhesive anchors shall be performed by personnel trained to install adhesive anchors.
 - ii. Adhesive anchors installed in horizontal or upwardly inclined orientations to resist sustained tension loads shall be continuously inspected during installation by an inspector specially approved for that purpose by the building official. The special inspector shall furnish a report to the licensed design professional and building official that the work covered by the report has been performed and that the materials used and the installation procedures used conform with the approved contract documents and the manufacturer's printed installation instructions.
 - iii. Installation of adhesive anchors horizontally or upwardly inclined to support sustained tension loads shall be performed by personnel certified by an applicable certification program. Certification shall include written and performance tests in accordance with the ACI/CRSI Adhesive Anchor Installer Certification program, or equivalent.
 - iv. The acceptability of certification other than the ACI/CRSI Adhesive Anchor Installer Certification shall be the responsibility of the licensed design professional.

END OF SECTION