



# ICC-ES Evaluation Report

## ESR-2515

Reissued February 2022

This report is subject to renewal February 2024.

**DIVISION: 03 00 00—CONCRETE**  
**Section: 03 38 00—Post-Tensioned Concrete**

### REPORT HOLDER:

**GENERAL TECHNOLOGIES, INC.**

### EVALUATION SUBJECT:

**GTI ZERO VOID® POST-TENSIONING SYSTEM**

### 1.0 EVALUATION SCOPE

#### Compliance with the following codes:

- 2018, 2015, 2012 and 2009 *International Building Code*® (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)<sup>†</sup>

<sup>†</sup>The ADIBC is based on the 2009 IBC. 2009 IBC code sections referenced in this report are the same sections in the ADIBC.

#### Property evaluated:

Structural

### 2.0 USES

#### 2.1 General Uses:

The GTI Zero Void® Post-Tensioning System is used as anchorages at fixed-end, intermediate, and stressing-end locations, and as couplers for unbonded, monostrand (single-strand), post-tensioning tendons in prestressed concrete designed in accordance with Chapter 25 of ACI 318-14 (Chapter 18 of ACI 318-11 or -08 for the 2012 and 2009 IBC, respectively), under the provisions of IBC Section 1901.2. The components of the system may be used in structures assigned to Seismic Design Categories A through F.

#### 2.2 Slab-on-ground Foundations on Expansive Soils:

The GTI Zero Void® Post-Tensioning System is also used as anchorages at fixed-end, intermediate, and stressing-end locations, and as couplers for unbonded, monostrand (single-strand), post-tensioning tendons in prestressed concrete slab-on-ground foundations on expansive soils regulated under IBC Section 1808.6.2; and IBC Sections 1904 and 1907 (Sections 1904 and 1910 in the 2009 IBC).

### 3.0 DESCRIPTION

#### 3.1 General:

The GTI Zero Void® Post-Tensioning System consists of ductile iron anchor castings, steel barrel anchors, steel couplers and steel wedges, as described in Section 3.2. The GTI S1-05 and SC1-05 Zero Void® Post-Tensioning System components are used with 1/2-inch-diameter (12.7 mm) and the GTI S1-06 Zero Void® Post-Tensioning System components are used with 0.6-inch-diameter (15.2 mm), seven-wire low relaxation steel strand conforming to ASTM A416, Grade 270 LR. The GTI Zero Void® Post-Tensioning System anchorage and coupler assemblies comply with ACI 423.7-14, which is required by ACI 318-14 Sections 25.8.1, 25.8.3 and 25.9.3.1(a) (ACI 318-11 or -08 Sections 18.21.1 and 18.14.1). They also comply with Sections 2.2 and 2.2.6 of PTI Specifications for Unbonded Single-strand Tendons (PTI M10.2), as required by Section 4.2.2.1.1 of PTI Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations on Expansive Soils (PTI DC 10.5), which is referenced in IBC Section 1808.6.2. Refer to Figure 1 for illustrations of the anchor and coupler assembly components.

#### 3.2 GTI Zero Void® Post-Tensioning System Components:

**3.2.1 GTI S1-05ZV Anchor Casting:** The GTI S1-05ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with either of the wedges described in Section 3.2.9.

**3.2.2 GTI Sure-Lock® Anchor Casting:** The Sure-Lock® Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN range is 187 to 255. The anchors are used with either of the wedges described in Section 3.2.9.

**3.2.3 GTI SM1-05ZV Anchor Casting:** The GTI SM1-05ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with the GTI S1-05 1.2 inch wedges described in Section 3.2.9.

**3.2.4 GTI SC1-05ZV Anchor Casting:** The GTI SC1-05ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with the wedges described in Section 3.2.10.

**3.2.5 GTI SFC1-05ZV Anchor Casting:** The GTI SFC1-05ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with the wedges described in Section 3.2.10.

**3.2.6 GTI SF1-05ZV Anchor Casting:** The GTI SF1-05ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with the 1.2 inch wedges described in Section 3.2.9.

**3.2.7 GTI S1-05ZV Barrel Anchor:** The GTI S1-05ZV Barrel Anchor is machined from steel bar conforming to the Euro-Asian Council for Standardization Metrology and Certification (ESAC) Standard GOST 1050-74, Grade C55 or National Standard of P.R.C. GB/T 3077-1999, Brand 40Cr. The anchors are used with either of the wedges described in Section 3.2.9.

**3.2.8 GTI S1-05ZV Intermediate Coupler:** The GTI S1-05ZV Intermediate Coupler is comprised of a housing, a threaded barrel anchor and a smooth barrel anchor. The threaded barrel anchor and smooth barrel anchor are machined from steel bar conforming to GOST 1050-74, Grade C55 or GB/T 3077-1999, Brand 40Cr and the housing is machined from steel bar conforming to GOST 1050-74, Grade C60 or GB/T 3077-1999, Brand 40Cr. The couplers are used with either of the wedges described in Section 3.2.9.

**3.2.9 GTI S1-05 Wedges:** GTI S1-05 1.2 inch and 1.3 inch wedges are two-piece wedges which are 1.2 and 1.3 inches (31 and 33 mm) long, respectively, and are manufactured from steel conforming to ASTM A108 Grade 12L14 or GB/T 3077-1999, Brand 20CrMnTi. The wedges are heat treated according to the specification, and have case and core hardness as specified in the GTI quality documentation.

**3.2.10 GTI SC1-05 Wedges:** GTI SC1-05 wedges are two-piece wedges which are 1.1 inches (27.9 mm) long and are manufactured from steel conforming to GB/T 3077-1999, Brand 20CrMnTi. The wedges are heat treated according to the specification, and have case and core hardness as specified in the GTI quality documentation.

**3.2.11 GTI S1-05 One-Time Use (OTU) Splice Chuck:** The GTI S1-05 One-Time Use (OTU) Splice Chuck is comprised of a housing, two threaded barrels (one on each end), and two three-piece wedges (one on each end). Supplied with the splice chuck are two springs (one on each end) with a plastic transfer head, and an iron washer to facilitate the assembly of the splice chuck with the tendons. The housing and barrel anchors are machined from steel bar conforming to GB/T 3077-1999, Brand 40Cr; the wedges are manufactured from steel conforming to GB/T 3077-1999, Brand 20CrMnTi.

**3.2.12 GTI SURE-LOCK® (OUT) Splice Chuck Coupler:** The coupler is comprised of a 2-inch-diameter (51 mm) treaded connecting tube of ASTM A513/5 520 DOM steel tubing (Grade 1026), treaded end chucks (caps) of ASTM A108, C1045 steel, and wedges described in Section 3.2.8. The SURE-LOCK® coupler is nominally 5½ inches (140 mm) long and uses the 1.3 wedges. The couplers also contain a plastic spacer, springs, and rings as temporary positioning aids.

**3.2.13 GTI S1-06ZV Anchor Casting:** The GTI S1-06ZV Anchor Casting is a ductile iron casting complying with ASTM A536, Grade 80-55-06. Acceptable BHN (Brinell Hardness Number) range is 187 to 255. The anchors are used with either of the wedges described in Section 3.2.16.

**3.2.14 GTI S1-06ZV Barrel Anchor:** The GTI S1-06ZV Barrel Anchor is machined from steel bar conforming to the National Standard of P.R.C. GB/T 3077-1999, Brand 40Cr. The anchors are used with either of the wedges described in Section 3.2.16.

**3.2.15 GTI S1-06ZV Intermediate Coupler:** The GTI S1-06ZV Intermediate Coupler is comprised of a housing, a threaded barrel anchor and a smooth barrel anchor. The threaded barrel anchor and the smooth barrel anchor and the housing are machined from steel bar conforming to GB/T 3077-1999, Brand 40Cr. The couplers are used with either of the wedges described in Section 3.2.16.

**3.2.16 GTI S1-06 Wedges:** The GTI S1-06 1.6 inch wedge is two-piece wedges which are 1.6 inches (40.6 mm) long, and is manufactured from steel conforming to ASTM A108 Grade 12L14 or GB/T 3077-1999, Brand 20CrMnTi. The wedges are heat treated according to the specification, and have case and core hardness as specified in the GTI quality documentation.

**3.2.17 GTI S1-06 One-Time Use (OTU) Splice Chuck:** The GTI S1-06 One-Time Use (OTU) Splice Chuck is comprised of a housing, two threaded barrels (one on each end), and two three-piece wedges (one on each end). Supplied with the splice chuck are two springs (one on each end) with a plastic transfer head, and an iron washer to facilitate the assembly of the splice chuck with the tendons. The housing and barrel anchors are machined from steel bar conforming to GB/T 3077-1999, Brand 40Cr; the wedges are manufactured from steel conforming to GB/T 3077-1999, Brand 20CrMnTi.

## 4.0 DESIGN AND INSTALLATION

### 4.1 Design:

**4.1.1 General Uses:** Concrete prestressed with the GTI Zero Void® Post-Tensioning System anchorage and coupler assemblies must be designed in accordance with Chapter 25 of ACI 318-14 (Chapter 18 of ACI 318-11 or -08), with the anchorage zones designed in accordance with ACI 318-14 Sections 25.8.1, 25.8.3 and 25.9.3.1(a) (Sections 18.13 and 18.14 of ACI 318-11 or -08).

**4.1.2 Slab-on-ground Foundations on Expansive Soils:** The moments, shears and deflections used in the design must be based on the PTI Standard Requirements for Design and Analysis of Shallow Concrete Foundations or Expansive Soils (PTI DC 10.5), as noted in IBC Section 1808.6.2. The foundation must comply with IBC Sections 1904 and 1907 (Sections 1904 and 1910 in the 2009 IBC), and be designed in accordance with the PTI Standard Requirements for Design and Analysis of Shallow Post-Tensioned Concrete Foundations or Expansive Soils (PTI DC 10.5), as noted in IBC Section 1808.6.2. In addition, the prestressed concrete must be designed in accordance with the applicable provisions of Chapter 25 of ACI 318-14 (Chapter 18 of ACI 318-11 or -08), with the anchorage zones designed in accordance with ACI 318-14 Sections 25.8.1, 25.8.3 and 25.9.3.1(a) (Sections 18.13 and 18.14 of ACI 318-11 or -08).

### 4.2 Installation:

The GTI Zero Void® Post-Tensioning System components must be installed in accordance with the manufacturer's published installation instructions. The manufacturer's

published installation instructions must be available at the jobsite at all times during installation. The GTI Zero Void® Post-Tensioning System components must only be used in combination with other components described in this report.

#### 4.3 Special Inspection:

Special inspection must be provided for the installation and stressing of the tendons, in accordance with Section 1705.3.3 of the 2018, 2015 and 2012 IBC or Section 1704.4 of the 2009 IBC, as applicable. The special inspector's duties include verification of concrete compressive strength at the time the tendons are stressed; compliance with the design engineer's requirements, including prestressing instructions; and checking elongation and jacking force parameters, and the sequence of tendon stressing, as well as end and edge distance and tendon spacing dimensions.

#### 5.0 CONDITIONS OF USE

The GTI Zero Void® Post-Tensioning System described in this report complies with, or is a suitable alternative to what is specified in, the code noted in Section 1.0 of this report, subject to the following conditions:

- 5.1 The materials, fabrication and installation must comply with this report and the manufacturer's instructions. In the event of a conflict between this report and the manufacturer's instructions, this report governs.
- 5.2 Where fire-resistance-rated construction is required, the minimum concrete cover on the tendons, anchor castings, wedges, and couplers must comply with Table 721.1(1), Item 4-1.1 or 4-1.2 of the 2018, 2015 and 2012 IBC; or Table 720.1(1), Item 4-1.1 or 4-1.2 of the 2009, as applicable.
- 5.3 The design and installation of the anchor castings, wedges, and couplers and the prestressed concrete must be in accordance with Section 4.0 of this report.

5.4 Use of encapsulated tendons has not been evaluated and is outside the scope of the evaluation report. Reports of tests of the encapsulated tendons must be provided when required by the authority having jurisdiction.

5.5 Special inspection must be provided in accordance with Section 4.3 of this report.

#### 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Post-tensioning Anchorages and Couplers of Prestressed Concrete (AC303), dated April 2011 (editorially revised August 2020).

#### 7.0 IDENTIFICATION

7.1 GTI Zero Void® Post-Tensioning System components are identified by markings and labeling. The anchor castings are identified by embossments with the product name designation and date lot codes. Packages of the anchor castings, machined anchors, couplers and wedges are labeled with the company name (General Technologies, Inc.) and address, part designation and tracing codes, and the evaluation report number (ESR-2515).

7.2 The report holder's contact information is the following:

**GENERAL TECHNOLOGIES, INC.**

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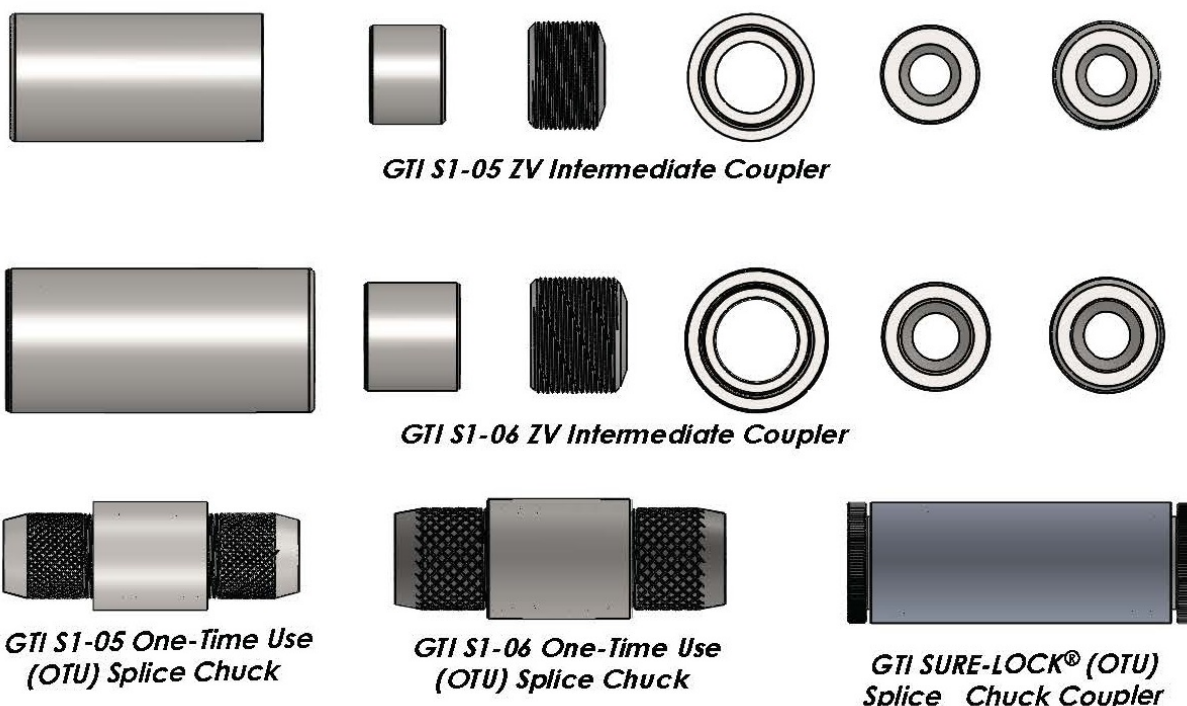


FIGURE 1—GTI ZERO VOID® POST-TENSIONING SYSTEM COMPONENTS



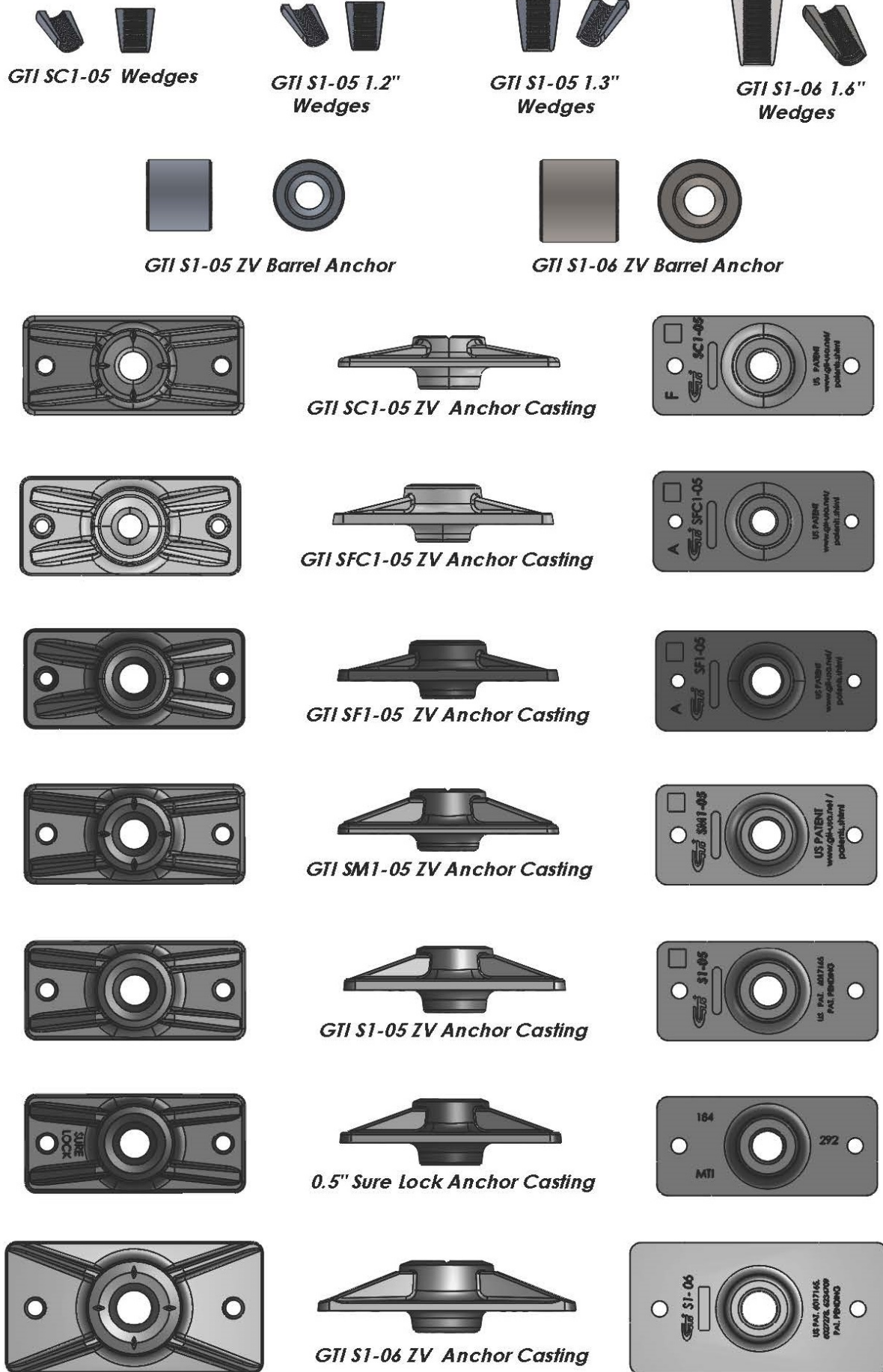


FIGURE 1—GTI ZERO VOID® POST-TENSIONING SYSTEM COMPONENTS (CONTINUED)

DIVISION: 03 00 00—CONCRETE

Section: 03 38 00—Post-Tensioned Concrete

## REPORT HOLDER:

GENERAL TECHNOLOGIES, INC.

## EVALUATION SUBJECT:

GTI ZERO VOID® POST-TENSIONING SYSTEM

## 1.0 REPORT PURPOSE AND SCOPE

## Purpose:

The purpose of this evaluation report supplement is to indicate that GTI Zero Void® Post-Tensioning System, described in ICC-ES evaluation report ESR-2515, have also been evaluated for compliance with the code noted below.

## Applicable code edition:

- 2019 California Building Code (CBC)

For evaluation of applicable chapters adopted by the California Office of Statewide Health Planning and Development (OSHPD) and Division of State Architect (DSA), see Sections 2.1.1 and 2.1.2 below.

## 2.0 CONCLUSIONS

## 2.1 CBC:

The GTI Zero Void® Post-Tensioning System, described in Sections 2.0 through 7.0 of the evaluation report ESR-2515, comply with CBC Chapter 19, provided the design and installation are in accordance with the 2018 *International Building Code*® (IBC) provisions noted in the evaluation report and the additional requirements of CBC Chapters 17, 18 and 19, as applicable.

## 2.1.1 OSHPD:

The applicable OSHPD Sections and Chapters of the CBC are beyond the scope of this supplement.

## 2.1.2 DSA:

The applicable DSA Sections and Chapters of the CBC are beyond the scope of this supplement.

This supplement expires concurrently with the evaluation report, reissued February 2022.