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ICC-ES Evaluation Report

ESR-2515

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DIVISION: 03 00 00— CONCRETE
SECTION: 03 38 00—POST-TENSIONED CONCRETE

REPORT HOLDER:

GENERAL TECHNOLOGIES, INC.

**POST OFFICE BOX 1503
STAFFORD, TEXAS 77477**

EVALUATION SUBJECT:

GTI ZERO VOID® POST-TENSIONING SYSTEM

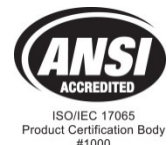


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DIVISION: 03 00 00—CONCRETE
Section: 03 38 00—Post-Tensioned Concrete

REPORT HOLDER:

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EVALUATION SUBJECT:

GTI ZERO VOID® POST-TENSIONING SYSTEM

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2012, 2009 and 2006 *International Building Code*® (IBC)
- 2013 *Abu Dhabi International Building Code* (ADIBC)†

†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 18 of ACI 318, 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 (2006 IBC Section 1805.8.2).

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 318 Sections 18.21.1 and 18.14.1 [which require compliance with ACI 423.7-07 (2006 IBC: ACI 423.6-01)]. They also comply with Sections 2.2 and 2.2.6 of *PTI Specifications for Single-strand Unbonded Tendons*, dated May 2003, as required by Sections 5.3.1 and 6.3 of *PTI Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils*, which is referenced in IBC Section 1808.6.2 (2006 IBC Section 1805.8.2). 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 3.2.6.

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 3.2.6.

3.2.3 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 3.2.7.

3.2.4 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 3.2.6.

3.2.5 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 3.2.6.

3.2.6 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.

3.2.7 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.

3.2.8 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.

3.2.9 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 3.2.12.

3.2.10 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 3.2.12.

3.2.11 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 3.2.12.

3.2.12 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.

3.2.13 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 18 of ACI 318, with the anchorage zones designed in accordance with Sections 18.13 and 18.14 of ACI 318.

4.1.2 Slab-on-ground Foundations on Expansive Soils: The moments, shears and deflections used in the design must be based on PTI *Standard Requirements for Analysis of Shallow Concrete Foundations on Expansive Soils*, as noted in IBC Section 1808.6.2 (2006 IBC Section 1805.8.2). The foundation must comply with IBC Sections 1904 and 1907 (Section 1910 in the 2009 and 2006 IBC), and be designed in accordance with PTI *Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations on Expansive Soils*, as noted in IBC Section 1808.6.2 (2006 IBC Section 1805.8.2). In addition, the prestressed concrete must be designed in accordance with the applicable provisions of Chapter 18 of ACI 318, with the anchorage zones designed in accordance with Sections 18.13 and 18.14 of ACI 318.

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 2012 IBC or Section 1704.4 of the 2009 or 2006 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 2012 IBC; or Table 720.1(1), Item 4-1.1 or 4-1.2 of the 2009 and 2006 IBC, 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** 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 March 2014).

7.0 IDENTIFICATION

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).



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

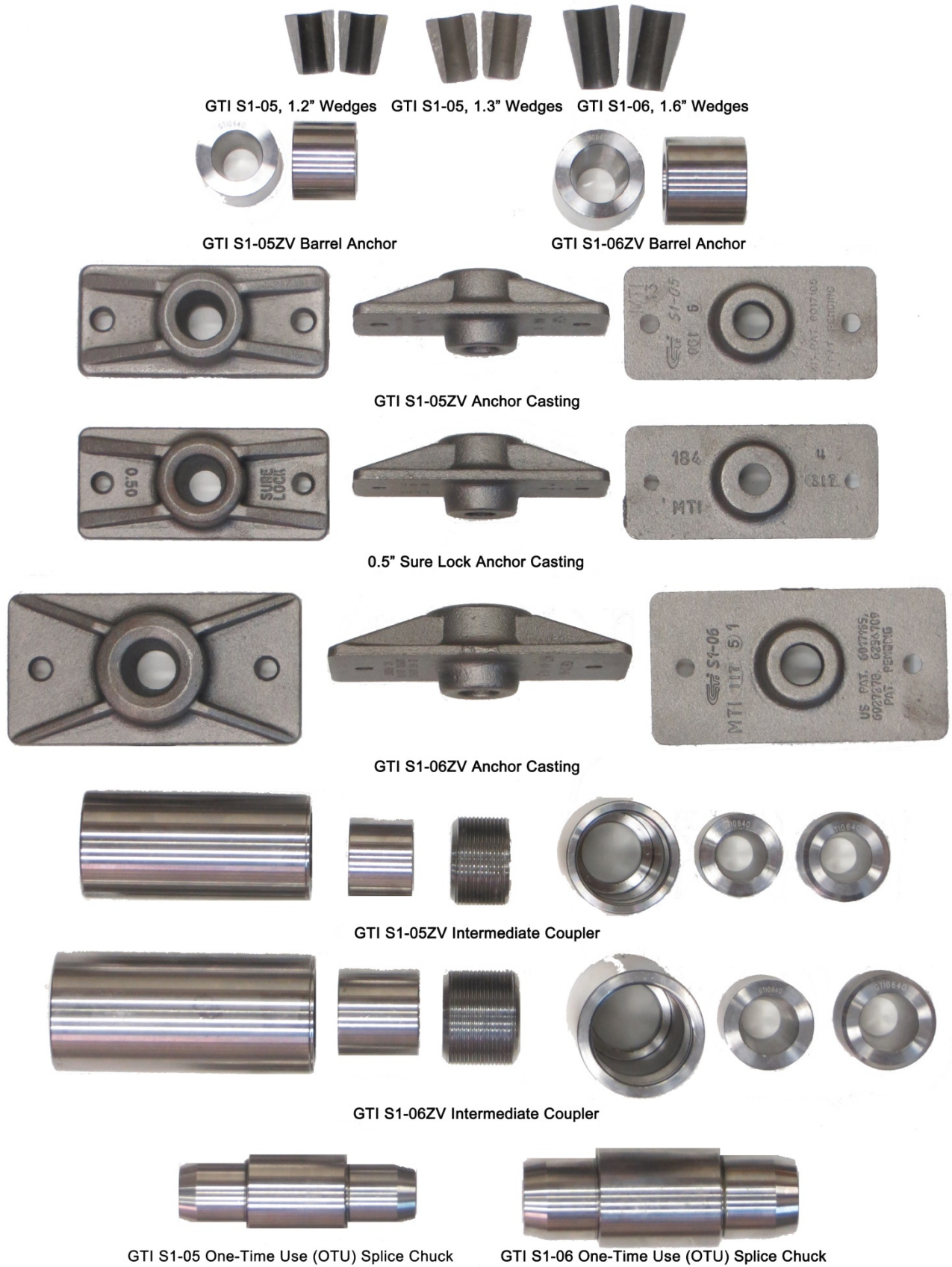


FIGURE 1—GTI ZERO VOID® POST-TENSIONING SYSTEM COMPONENTS (Continued)