

# ICC-ES Evaluation Report

## ESR-2515

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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:

- 2009 *International Building Code*® (2009 IBC)
- 2006 *International Building Code*® (2006 IBC)

###### 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 Zero Void® Post-Tensioning System components

are used with 1/2-inch-diameter (12.7 mm), seven-wire low relaxation steel strand conforming to ASTM A 416, 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 A 536, 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 3.2.5.

**3.2.2 GTI Sure-Lock® Anchor Casting:** The Sure-Lock® Anchor Casting is a ductile iron casting complying with ASTM A 536, Grade 80-55-06. Acceptable BHN range is 187 to 255. The anchors are used with either of the wedges described in Section 3.2.5.

**3.2.3 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. The anchors are used with either of the wedges described in Section 3.2.5.

**3.2.4 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, and the housing is machined from steel bar conforming to GOST 1050-74, Grade C60. The couplers are used with either of the wedges described in Section 3.2.5.

**3.2.5 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 A 108 Grade 12L14. The wedges are heat treated according to the specification, and have case and core hardness as specified in the GTI quality documentation.

## 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 or 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 1910, and be designed in accordance with PTI *Standard Requirements for Design of Shallow Post-Tensioned Concrete Foundations or 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 1704.4 of the IBC. 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:

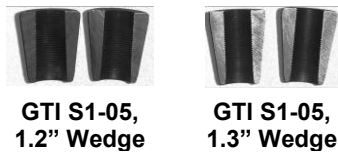
- 5.1** The materials, fabrication and installation must comply with this report and the manufacturer's instructions. In the event of a conflict between this report and the manufacturer's instructions, this report governs.
- 5.2** Where fire-resistance-rated construction is required, the minimum concrete cover on the tendons, anchor castings, wedges, and couplers must comply with IBC Table 720.1(1), Item 4-1.1 or 4-1.2, 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 October 2006.

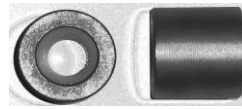
## 7.0 IDENTIFICATION

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).

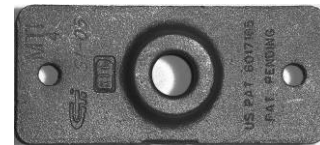


GTI S1-05,  
1.2" Wedge

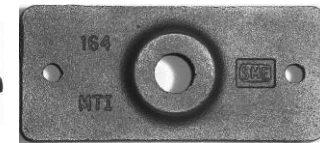
GTI S1-05,  
1.3" Wedge



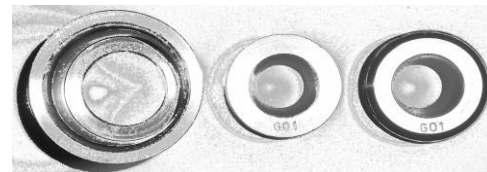
GTI S1-05ZV Barrel Anchor



GTI S1-05ZV Anchor Casting



0.5" Sure Lock® Anchor Casting



GTI S1-05ZV Intermediate Coupler

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