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ESR-2381

Reissued 11/2016
This report is subject to renewal 11/2018.

DIVISION: 03 00 00—CONCRETE

SECTION: 03 38 00—POST-TENSIONED CONCRETE

REPORT HOLDER:

PRECISION-HAYES INTERNATIONAL

**704 WEST SIMONDS ROAD
SEAGOVILLE, TEXAS 75159**

EVALUATION SUBJECT:

**PRECISION SURE-LOCK® POST-TENSION ANCHORAGE AND COUPLING SYSTEM
AND THE HSM POST-TENSIONING ANCHORAGE SYSTEM**



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

REPORT HOLDER:

PRECISION-HAYES INTERNATIONAL
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EVALUATION SUBJECT:

PRECISION SURE-LOCK® POST-TENSION ANCHORAGE AND COUPLING SYSTEM AND THE HSM POST-TENSIONING ANCHORAGE SYSTEM

1.0 EVALUATION SCOPE

Compliance with the following code:

- 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

The Precision SURE-LOCK® Post-Tension Anchorage and Coupling System and the HSM Post-Tensioning Anchorage System are 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.

3.0 DESCRIPTION

3.1 Precision SURE-LOCK® Post-Tension Anchorage and Coupling System:

The Precision SURE-LOCK® Post-Tension Anchorage and Coupling System consist of ductile iron castings, steel wedges, and splice chuck couplers as described in Section 3.1.1. The Precision SURE-LOCK® System components are used with 1/2-inch-diameter (12.7 mm), seven-wire, low-relaxation steel strand conforming to ASTM A416, Grade 270 LR. The Precision SURE-LOCK® Post-Tension Anchorage and Coupling 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)]. Refer to Figure 1 for illustrations of the anchor and coupler assembly components.

3.1.1 Precision SURE-LOCK® System Components:

3.1.1.1 SURE-LOCK® and SURE-LOCK® II Anchor Castings: The SURE-LOCK® and SURE-LOCK® II Anchor Castings are ductile iron castings complying with ASTM A536, Grades 80-55-03 or 80-55-06, or SAE J434C, Grades D5503 or D5506. Acceptable BHN range is 170 to 302. The anchors are used with either of the wedges described in Section 3.1.1.2.

3.1.1.2 Precision SURE-LOCK® Wedges: SURE-LOCK® 1/2" x 1.2 and 1/2" x 1.3 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. The wedges are heat-treated according to the Precision SURE-LOCK® specification.

3.1.1.3 Precision SURE-LOCK® and SURE-LOCK® II Splice Chuck Couplers: The couplers are comprised of a 2-inch-diameter (51 mm) threaded connecting tube of ASTM A513/5 520 DOM steel tubing (Grade 1026), threaded end chucks (caps) of ASTM A108, C1045 steel, and wedges described in Section 3.2.2. The SURE-LOCK® coupler is nominally 5 1/2 inches (140 mm) long and the SURE-LOCK® II coupler is nominally 4 1/2 inches long. Both use the 1.3 wedges. The couplers also contain a plastic spacer, springs, and rings as temporary positioning aids.

3.2 HSM Post-Tensioning Anchorage System:

The HSM Post-Tensioning Anchorage System consists of ductile iron castings, two-piece wedges and coupler assemblies. The components are described in Sections 3.2.1 and 3.2.2. The system must be used with 1/2-inch-diameter (12.7 mm), seven-wire, low-relaxation, steel strand conforming with ASTM A416, Grade 270. Refer to Figure 2 for illustrations of the anchor and coupler assembly components.

3.2.1 Anchor Assembly Components:

3.2.1.1 HSM 0.50-inch and HSM-S 0.50-inch Ductile Anchors: The ductile anchors are manufactured to material specifications SAE J434C, Grade D5506 or Grade D5503, or ASTM A536, Grade 80-55-06 or Grade 80-55-03, with a Brinell hardness in either grade of 170-302. See Figure 2.

3.2.1.2 HSM H500PL2-1.2 2/3 Wedges: The two-piece wedges are manufactured from steel conforming to ASTM A108, Grade 12L14, and heat-treated to the HSM Wedge System Specification.

3.2.2 Coupler Assembly Components:

3.2.2.1 HSM 0.50-inch Threaded Connecting Tube: The connecting tubes are manufactured from ASTM A513, DOM (Drawn on Mandrel) Grade 1020/1026, steel tubing.

3.2.2.2 HSM 0.50-inch System Plastic Spring Retainer and Springs: These components are used to aid in field installation of the anchor assembly and are not critical to the coupler assembly performance. The springs are 0.09-inch-diameter (2.29 mm) music wire.

3.2.2.3 HSM H500PL2-1.2 2/3 Wedges: The two-piece wedges are manufactured from steel conforming to ASTM A108, Grade 12L14, and heat-treated to the HSM Wedge System Specification.

3.2.2.4 HSM 0.50-inch Threaded End Caps: The end caps are manufactured from steel conforming to ASTM A108, Grade 12L14.

4.0 INSTALLATION AND DESIGN

4.1 General:

The Precision SURE-LOCK[®] Post-Tension Anchorage and Coupling System components and the HSM Post-Tensioning Anchorage System components must be installed in accordance with the third edition of the Post-Tensioning Institute's Field Procedures Manual for Unbonded Tendons (PTI Field Procedures Manual) and Chapter 18 of ACI 318. The Precision SURE-LOCK[®] Post-Tension Anchorage and Coupling System components must only be used in combination with other Precision SURE-LOCK[®] components described in this report. The HSM Post-Tension Anchorage System components must only be used in combination with other HSM components described in this report. The resulting prestressed concrete 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.

4.2 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; checking 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 Precision SURE-LOCK[®] Post-Tension Anchorage and Coupling System and the HSM Post-Tensioning

Anchorage System described in this report comply with, or are a suitable alternative to what is specified in, the code indicated 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 (PTI Field Procedures Manual). 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 IBC 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 4.2 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

Precision SURE-LOCK[®] Post-Tension Anchorage and Coupling System components are identified by markings and labeling. The SURE-LOCK[®] and SURE-LOCK[®] II Anchor Castings are identified by embossments with the product name designation and date lot codes (see Figure 1). Packages of the Precision SURE-LOCK[®] and SURE-LOCK[®] II anchor castings, wedges and splice chuck couplers are labeled with the company name (Precision-Hayes International) and address, part designation and tracing codes, and the evaluation report number (ESR-2381).

The HSM Post-Tensioning Anchorage System components are identified by their unique shape (refer to Figure 2). Additionally, cast iron components may be embossed with their designations. Containers of components must be identified by a label with the manufacturer's name (Precision-Hayes International) and address, the part designation, the serial number or date code for traceability, and the evaluation report number (ESR-2381).

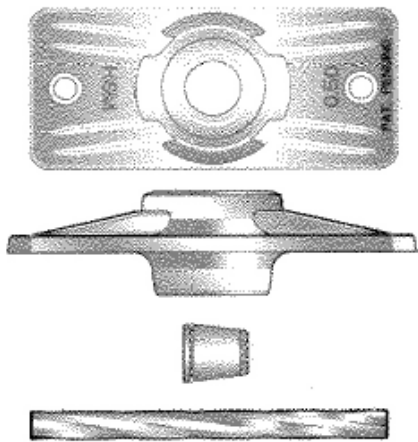
TABLE 1—MANUFACTURING LOCATIONS AND ASSOCIATED SYSTEMS

MANUFACTURING FACILITY	ASSOCIATED SYSTEMS
Precision-Hayes International Seagoville, Texas 75159	Precision SURE-LOCK Post-Tension Anchorage and Coupling System components (see Section 3.1)
Precision-Hayes International Trenton, Texas 75490	HSM Post-Tensioning Anchorage System components (see Section 3.2) Precision Sure-Lock Wedges (see 3.1.1.2)

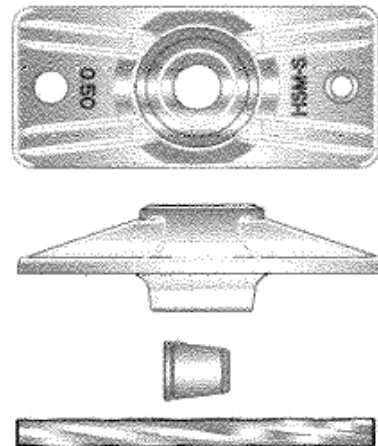


FIGURE 1—PRECISION SURE-LOCK® POST-TENSION ANCHORAGE AND COUPLING SYSTEM COMPONENTS

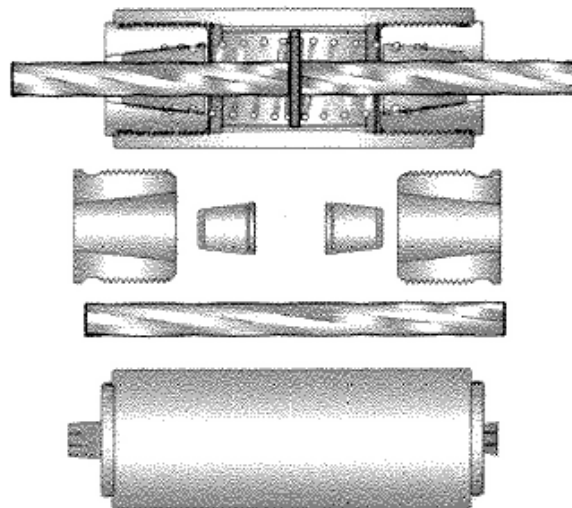
HSM Post-Tensioning Anchorages and Coupler Systems



HSM 0.50-in. Ductile Anchor
 HSM H500PI.2-1.2 2/3 Wedge
 ASTM A416 270 ksi Strand



HSM-S 0.50-in. Ductile Anchor
 HSM H500PI.2-1.2 2/3 Wedge
 ASTM A416 270 ksi Strand



HSM 0.50-in. Threaded End Caps
 HSM 0.50-in. Threaded Connecting Tube
 HSM 0.50-in. System plastic partitioned barrier
 and system springs for wedge lock
 ASTM A416 270 ksi Strand

FIGURE 2—ANCHOR AND COUPLER COMPONENTS