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Legacy report on the 1997 Uniform Building Code™

DIVISION: 06—WOOD AND PLASTICS
Section: 06090—Wood and Plastic Fastenings

EARTHBOUND™ SEISMIC HOLDDOWN SYSTEM USING THE “IMPASSE DEVICE™”

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1.0 SUBJECT

The EARTHBOUND Seismic Holddown System Using the “Impasse Device™.”

2.0 DESCRIPTION

2.1 General:

The EARTHBOUND™ Seismic Holddown System is a holddown system used with wood-framed shear wall systems. The EARTHBOUND™ system, consisting of an Impasse Device™, a threaded steel rod, and a bearing plate, resists uplift in the walls while compensating for settlement, shrinkage, and compression loading by the continual downward actuation of the Impasse Device™.

2.2 Components:

2.2.1 Impasse Device™: The Impasse Device™ is a cylindrical, high-strength, structural connector that enables axial compression travel along a bolted or sliding connection and that withstands loads in the opposite direction (tension). The Impasse Device™ is available in different strength levels and in travel lengths of one inch, two inches and three inches (25.4 mm, 51 mm and 76 mm). The Impasse Device™ will actuate in increments of 0.070 inch (1.78 mm) or less with 15 to 20 pounds (67 to 89 N) force. See Table 1 for different Impasse Device™ series and allowable load capacities.

The EARTHBOUND™ Seismic Holddown System uses Series 2xx Impasse devices manufactured from the two different materials noted in this report.

Series x10, x20 and x30 include an outer cylinder (IMP cylinder) and an inner cylinder (IMP nut). Cylinders are produced from ASTM A 311 grade steel with a minimum tensile strength of 100,000 psi (689 MPa); or aluminum complying with 6065-T6511.

2.2.2 Steel Threaded Rods: The Impasse Device™ is used with steel threaded rods or bolts having nominal diameters ranging from $\frac{3}{8}$ inch to $1\frac{1}{8}$ inches (9.5 mm to 28.6 mm) in all load capacities, as shown in Table 2. Standard-grade

threaded rods must comply with ASTM A 36. High-strength rods or bolts must comply with ASTM A 449, or ASTM A 193, Grade B7.

2.2.3 Bearing Plate: Bearing plates are used at floor levels or compression bridge conditions, and are manufactured from steel conforming to ASTM A 36, with dimensions and color codes noted in Table 3.

2.3 Allowable Loads:

Under allowable stress design, the allowable loads for the holddown system components are as shown in Tables 1 and 2. Allowable loads for bearing plates are shown in Table 3. Calculations considering the capacity of devices listed in this report, capacity of rod and nuts, capacity of bearing plates, anchorage into the concrete foundation, and interaction of the system with wood components of the building, must be submitted to the building official for review and approval for each holddown system installation. Supports shall be designed in accordance with the code to transfer loads into the system.

2.4 EARTHBOUND™ Seismic Holddown System Installation:

The Earthbound Seismic Holddown System must be installed in accordance with the building plans approved by the code official. See Figures 1 and 2 for typical installation details.

2.5 Identification:

Each package containing all components of the Impasse™ or Slackjack™ Devices bears a label noting the manufacturer's name (Earthbound Corporation) and address, the component model or series number, lot identification number, and the evaluation report number (ER-5378). A portion of the Impasse™ or Slackjack™ devices are color-coded to represent the allowable component travel for each “S” or “A” series. The color codes for the Impasse™ or Slackjack™ devices are indicated in Table 1. Bearing plates are color-coded as noted in Table 3.

3.0 EVIDENCE SUBMITTED

Installation instructions, calculations, reports on monotonic and cyclic tests, and a quality control manual.

4.0 FINDINGS

That the EARTHBOUND™ Seismic Holddown System Using the “Impasse Device™” complies with the 1997 Uniform Building Code™ (UBC), subject to the following conditions:

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- 4.1 Devices are installed and manufactured in accordance with this report and the manufacturer's instructions.
- 4.2 Allowable loads are as set forth in Tables 1 2 and 3 of this report.
- 4.3 Structural calculations, demonstrating that the applied loads do not exceed the allowable loads, are submitted to the building official for approval.
- 4.4 The systems or devices shall be designed to resist load combinations specified in Sections 1612.1, 1612.3, and 1612.4 of the UBC.
- 4.5 When the Impasse Device™ is used as a standalone fastener, independent of the EARTHBOUND™
- Seismic Holddown System, the applied loads do not exceed the allowable loads noted in this report.
- 4.6 When installation is complete, steel and aluminum Impasse devices are limited to dry, interior locations, except as noted in Section 4.7.
- 4.7 For extended exterior or wet environment exposures, and when in contact with dissimilar metals, aluminum Impasse devices must comply with Section 2011.6.2 of the UBC. Evidence of compliance must be submitted to the building official for approval.
- This report is subject to re-examination in one year.

TABLE 1—IMPASSE DEVICE SELECTION INFORMATION^{1,2,3,4,5}

ASTM A 311 STEEL "S" SERIES			ALUMINUM SLACKJACK™ "SJA" SERIES			TRAVEL INCREMENT (inches)
Series No. ^{1,2,3,4,5}	Color Code ⁶	Allowable Tension Load (pounds)	Series No. ^{1,2,3,4,5}	Color Code ⁶	Allowable Tension Load (pounds)	
IMP S210	Red	18,750	SJA 210	Blue	7,000	1.00
IMP S220	Green	18,750	SJA 220	Orange	7,000	2.00
IMP S230	Black	18,750	SJA 230	Yellow	7,000	3.00
IMP S410	NA	35,100	SJA 410	Red	15,750	1.00
IMP S420	NA	35,100	SJA 420	Green	15,750	2.00
IMP S610	NA	47,475	SJA 610	NA	—	1.00
IMP S620	NA	47,475	SJA 620	NA	—	2.00
			SJA 630	NA	—	3.00

For **SI**: 1 inch = 25.4 mm, 1 pound = 4.45 N.

¹Series 2xx denotes an Impasse Device Slackjack with two total locking C-Rings.

²Series 4xx denotes a Slackjack Impasse Device with four total locking C-rings.

³Series 6xx denotes a Slackjack Impasse Device with six total locking C-rings.

⁴The Series' center digit "x1x" denotes total travel length, in inches (for example, the "1" denotes 1-inch travel).

⁵The Series' last digit "xx5" denotes threaded rod diameter size in eighths on an inch (5 equals $\frac{5}{8}$ -inch-diameter rod).

⁶NA = Not available.

TABLE 2—ALLOWABLE THREADED ROD CAPACITIES^{1,2}

ROD LABEL	ROD SIZE (inches)	ASTM SPECIFICATION	F_{ULT} (psi)	ALLOWABLE TENSION LOAD ¹ (pounds)
R4	1/2	ASTM A 36	58,000	3,800
R5	5/8	ASTM A 36	58,000	5,930
R6	3/4	ASTM A 36	58,000	8,540
R7	7/8	ASTM A 36	58,000	11,630
R8	1	ASTM A 36	58,000	15,180
R9	1 1/8	ASTM A 36	58,000	19,220
R5HS-A449	5/8	ASTM A 449	120,000	12,270
R6HS-A449	3/4	ASTM A 449	120,000	17,670
R7HS-A449	7/8	ASTM A 449	120,000	24,050
R8HS-A449	1	ASTM A 449	120,000	31,420
R9HS_A449	1 1/8	ASTM A 449	105,000	34,790
R5HS-B7	5/8	ASTM A 193 B7	125,000	12,780
R6HS_B7	3/4	ASTM A 193 B7	125,000	18,410
R7HS-B7	7/8	ASTM A 193 B7	125,000	25,060
R8HS-B7	1	ASTM A 193 B7	125,000	32,720
R9HS-B7	1 1/8	ASTM A 193 B7	125,000	41,420

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N.

¹Allowable tension load is calculated with safety factor (SF) = 3 from $F_{ULT} \times$ Gross Rod Area.

²Other threaded rod specifications, when substantiated by data determining the allowable tensile loads in accordance with Chapter 22 of the UBC, can be specified on the plans that are approved by the building official.

TABLE 3—BEARING PLATE ALLOWABLE LOAD CAPACITIES^{1,2,3,4}

PLATE LABEL	COLLECTED DIFFERENTIAL TENSION LOAD (pounds)	PLATE COLOR CODE	PLATE DIMENSIONS (inches)		
			Width	Length	Thickness
P8	8,000	Black	3 1/4	5	1/4
P10	10,000	Blue	3 1/4	5	3/8
P12	12,000	Gray	3 1/4	6	5/8
P14	14,000	Red	3 1/4	7	3/4
P18	18,000	Yellow	3 1/4	9	1

For SI: 1 inch = 25.4 mm, 1 pound = 4.45 N, 1 psi = 6.89 kPa.

¹Plate steel must comply with ASTM A 36: $F_{ULT} = 58,000$ psi.

²Substitutions of designated bearing plate shall not be permitted unless approved by a structural designer and building official.

³Collected differential tension loads are tension loads resisted by the Impasse Device bearing plate at levels where the Impasse Device and plate are located.

⁴Collected differential tension loads are based on plate placement on lumber with minimum $F_{cL} = 625$ psi.

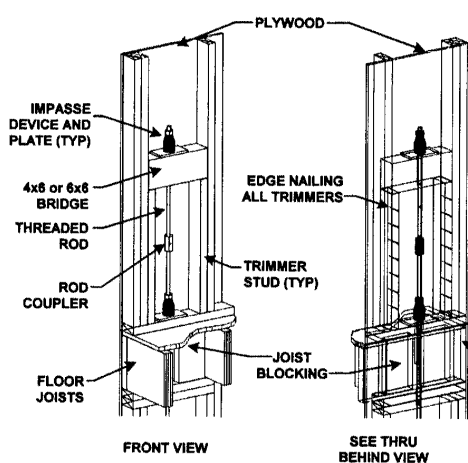


FIGURE 1—TYPICAL SYSTEM INSTALLATION

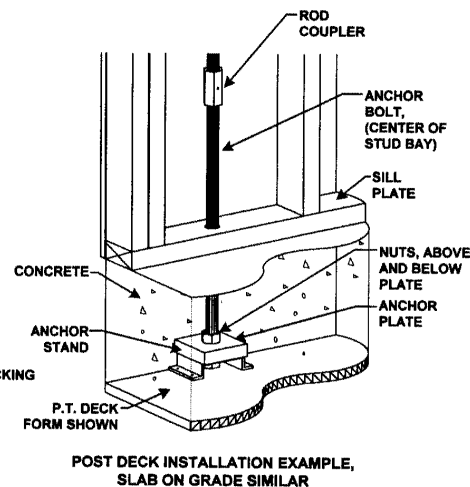


FIGURE 2—TYPICAL ANCHOR INSTALLATION