

ICC Evaluation Service, Inc.
www.icc-es.org

Business/Regional Office ■ 5360 Workman Mill Road, Whittier, California 90601 ■ (562) 699-0543
Regional Office ■ 900 Montclair Road, Suite A, Birmingham, Alabama 35213 ■ (205) 599-9800
Regional Office ■ 4051 West Flossmoor Road, Country Club Hills, Illinois 60478 ■ (708) 799-2305

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

REPORT HOLDER:

RAS ENGINEERING
POST OFFICE BOX 111225
CAMPBELL, CALIFORNIA 95011
(408) 866-2525
www.rasengineering.com
rsmith@rasengineering.com

EVALUATION SUBJECT:

RAS NUT™ SHRINKAGE COMPENSATING DEVICES:
SIZES 1/2-13 THROUGH 1 1/4-1 1/8-7

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2006 *International Building Code*® (2006 IBC)
- 2006 *International Residential Code*® (2006 IRC)
- 2003 *International Building Code*® (2003 IBC)
- 2003 *International Residential Code*® (2003 IRC)
- 1997 *Uniform Building Code*™ (UBC)

Property evaluated:

Structural

2.0 USES

The devices described in this report are used as part of a tension-restraint system, removing slack due to wood shrinkage and building settlement in wood-frame construction. The system resists tension in the wall assemblies while compensating for settlement and shrinkage by the continual downward actuation of the RAS Nut™.

3.0 DESCRIPTION

3.1 General:

The tension-restraint system consists of RAS Nuts™ devices and threaded steel rods or bolts.

3.2 RAS Nut™:

The RAS Nut™ is a ratcheting, thread-clamping, structural connector that enables unidirectional movement along a bolted connection and resists tension loads in the opposite direction. Available in seven sizes, the RAS Nut™ actuates in increments of one-half a thread pitch or less. The RAS Nut™ is assembled from components consisting of a top housing; a base; four internal, moveable, threaded ratcheting segments; and an internal extension spring.

3.3 Steel Threaded Rods:

The steel threaded rods or bolts must have nominal diameters of 1/2 inch to 1 1/4 inches (12.7 mm to 31.75 mm) corresponding to each RAS Nut™.

3.4 Materials:

3.4.1 RAS Nut™: The RAS Nut™ load-bearing components are manufactured from steel with a minimum tensile strength of 120,000 psi (827 MPa). The RAS Nut™ cover is made of nylon and the internal extension spring is made of steel. The steel components (segments, base and spring) are zinc-plated.

3.4.2 Steel Threaded Rods: The threaded rods or bolts must comply with ASTM A 36, ASTM A 449, ASTM A 193 Grade B7, or ASTM A 354 Grade BD.

4.0 DESIGN AND INSTALLATION

4.1 Allowable Loads:

Under allowable stress design, the allowable tension loads for the RAS Nut™ are shown in Table 1 for the various diameters of threaded rods or bolts. Calculations considering the capacity of the RAS Nut™, capacity of rod or bolt, capacity of nuts, capacity of bearing plates, capacity of 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 restraint system installation. Supports must be designed in accordance with the applicable code to transfer loads into the restraint system.

4.2 Installation:

RAS Nut™ and rod or bolt installation must be done in the following sequence:

1. Threaded anchor bolts must be installed into the foundation in accordance with the approved plans.
2. Holes must be drilled into the wood members, as applicable to receive the rods.
3. The threaded rods must be placed through the wood or steel plate hole.
4. The bearing plates must be placed over the rod or bolt, followed by the RAS Nut™.
5. The RAS Nut™ must be placed hand-tight to the steel plate and then torqued one quarter turn past hand-tight.
6. The RAS Nut™ must then be backed off until the RAS Nut™ housing holes align with the bearing plate holes.
7. The RAS Nut™ must be fastened to the wood framing using nails or screws in accordance with the applicable code.

5.0 CONDITIONS OF USE

The RAS Nut™ Shrinkage Compensating Devices described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 The RAS Nut™ systems must be manufactured and identified in accordance with this report and the manufacturer's instructions.
- 5.2 The RAS Nut™ systems must be installed in accordance with this report, the manufacturer's instructions and the plans approved by the code official. In the event of a conflict between this report and the manufacturer's instructions, this report governs.
- 5.3 The allowable tension loads in Table 1 of this report are only noted for the RAS Nut™. Other items that must be considered are noted in Section 4.1 of this report. Calculations, demonstrating that the design loads do not exceed the allowable loads, must be submitted to the code official for approval. The calculations must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is to be constructed.
- 5.4 The RAS Nut™ must not be used to support a dead load other than its own weight.

- 5.5 No further duration of load increase for wind or earthquake is allowed.
- 5.6 When the RAS Nut™ is used as a stand-alone fastener, the applied loads must be less than or equal to the allowable tension loads noted in this report.
- 5.7 When installation is complete, the RAS Nut™ is limited to dry, interior locations.
- 5.8 Use of the system components in contact with fire-retardant-treated or preservative-treated wood is prohibited.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Shrinkage Compensating Devices (AC316), dated February 2008.

7.0 IDENTIFICATION

Each package containing RAS Nuts™ bears a label noting the manufacturer's name (RAS Engineering) and address, the component model or series number, and the ICC-ES evaluation report number (ESR-1992). The RAS Nuts™ are imprinted with the rod or bolt diameter to be used.

TABLE 1—ALLOWABLE LOADS AND DEFLECTION FOR RAS NUT™ 1,2

RAS NUT™ SIZE	CORRESPONDING THREADED ROD	ALLOWABLE TENSILE CAPACITY (lb-f)	DEFLECTION AT ALLOWABLE LOAD
$1/2$ -13	$1/2$ inch x 13 UNC	7,753 lbf	.020 in
$5/8$ - 11	$5/8$ inch x 11 UNC	11,620 lbf	.029 in
$3/4$ - 10	$3/4$ inch x 10 UNC	17,083 lbf	.048 in
$7/8$ - 9	$7/8$ inch x 9 UNC	22,750 lbf	.036 in
1.0 - 8	1.0 inch x 8 UNC	29,732 lbf	.067 in
$1\ 1/4$ - $1\ 1/8$ -7 ³	$1\ 1/8$ inch x 7 UNC	36,188 lbf	.062 in
$1\ 1/4$ - $1\ 1/8$ -7 ⁴	$1\ 1/4$ inch x 7 UNC	49,809 lbf	.073 in

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

¹Allowable load values are for the RAS Nut™ only. The attached components (including anchors, threaded rods, bolts, bearing plates, wood members, etc.) must be designed to resist design loads in accordance with the applicable code.

²The deformation of the RAS nut at allowable load is $1/8$ inch or less. The deformations of attached components (including threaded rods, bolts, wood members, etc.) must be determined in accordance with the applicable code.

³ For $1\ 1/8$ -inch-diameter threaded rods.

⁴ For $1\ 1/4$ -inch-diameter threaded rods.