

# TEXAS DEPARTMENT OF INSURANCE

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## PRODUCT EVALUATION FA-4

Effective October 1, 2010

*The following product has been evaluated for compliance with the wind loads specified in the International Residential Code (IRC) and the International Building Code (IBC). This product shall be subject to reevaluation October 2011.*

*This product evaluation is not an endorsement of this product or a recommendation that this product be used. The Texas Department of Insurance has not authorized the use of any information contained in the product evaluation for advertising, or other commercial or promotional purpose.*

*This product evaluation is intended for use by those individuals who are following the design wind load criteria in Chapter 3 of the IRC and Section 1609 of the IBC. The design loads determined for the building or structure shall not exceed the design load rating specified for the products shown in the limitations section of this product evaluation. This product evaluation does not relieve a Texas licensed engineer of his responsibilities as outlined in the Texas Insurance Code, the Texas Administrative Code and the Texas Engineering Practice Act.*

The **TIE MAX** and **TIE MAX STUD** Anchors, manufactured by

**Fastening Specialists, Inc.**  
**726 Central Florida Parkway**  
**Orlando, Florida 32824**  
**(800) 245-8826**

will be acceptable in designated catastrophe areas along the Texas Gulf Coast when installed in accordance with the manufacturer's installation instructions and this product evaluation.

## PRODUCT DESCRIPTION

The **TIE MAX** and **TIE MAX STUD** are fabricated systems for anchoring roof and walls to foundations. The **TIE MAX** cast in concrete and **TIE MAX STUD** epoxy set anchoring systems are used to anchor wood stud walls to the foundation by using  $\frac{5}{8}$ " anchor bolts, threaded rods, couplers and square washers. Traditional metal framing anchors are required to anchor the roof framing members to the wall framing. The TIE MAX anchoring system uses a 10  $\frac{1}{2}$ " long cast in place anchor bolt with a preformed 2" diameter head. The bottom of the threads shall be at the top of the slab to insure the minimum 7" of embedment. A coupler attaches the threaded rod to the anchor bolts. The threaded rod extends through the uppermost top plate and is fastened with a washer and a hex head nut. The TIE MAX STUD epoxy anchoring system is identical to the TIE MAX system except the anchor bolt is installed into a predrilled hole with gel epoxy. The specifications for the anchor bolts, threaded rods, couplers, square washers and nuts are as follows:

Washer: Flat steel plate washers with dimensions 2" x 2" x  $\frac{1}{8}$ ", 2.5" x 2.5" x  $\frac{3}{16}$ ", 3" x 3" x  $\frac{1}{4}$ ", or 3" x 3.5" x  $\frac{1}{4}$ ". Manufactured from SAE 1008-1025 grade steel.

Coupler: Threaded rod couplers  $\frac{5}{8}$ " to  $\frac{1}{2}$ " reducing coupler,  $\frac{1}{2}$ " to  $\frac{1}{2}$ " coupler and  $\frac{5}{8}$ " to  $\frac{5}{8}$ " coupler. Manufactured from Grade 2 SAE 1008 Zinc Plated per ASTM B 633 steel.

Threaded Rod: ASTM A 307 fully threaded steel rods with  $\frac{1}{2}$ " or  $\frac{5}{8}$ " diameter. The steel is Zinc Plated per ASTM B 633.

Nuts:  $\frac{1}{2}$ "-13 inch,  $\frac{5}{8}$ "-11 hex nuts, Type 2, low or medium carbon steel, SAE J995.

**LIMITATIONS**

The maximum allowable design loads for the anchors are given in Tables 1 – 4. Design loads for the structure shall be determined using either Chapter 3 of the International Residential Code (IRC) or Chapter 16 of the International Building Code (IBC).

**Table 1 – Allowable Design Loads  
TIE MAX and TIE MAX STUD in Concrete**

Model	Min. Embedment (in.)	Min. Edge Distance (in.)	Threaded Rod Diameter (in.)	Allowable Uplift Load (lbs.)	Allowable Shear Loads (lbs.)
5/8" TIE MAX (cast in place)	7	2	1/2	5585	5343
	7	7	1/2	6023	5343
	7	7	5/8	8377	5343
5/8" TIE MAX (cast in place)	7	2	1/2	3349	3468
	7	7	1/2	4943	3468

Notes:

1. Allowable uplift loads shown in Table 1 for pullout of concrete, the design shall be based on washer bearing capacity see Table 3 below.
2. Allowable shear loads shown in Table 1 are at the bottom wood plate with washer and nut in place, minimum 2 x 4 plate Southern Yellow Pine No. 2 Grade, SG≥0.55.
3. The allowable design value shall not be increased for duration of load.
4. Minimum compressive concrete strength is  $F'_c = 2500$  psi.
5. Epoxy is Power-Bond by Powers Fastening Inc. Special inspection is required.

**Table 2 – Allowable Design Loads  
TIE MAX in Reinforced Masonry Bond Beam**

Model	Min. Embedment (in.)	Min. Edge Distance (in.)	Threaded Rod Diameter (in.)	Allowable Uplift Load (lbs.)
5/8" TIE MAX	7	2	1/2	1998

Notes:

1. Allowable uplift loads shown in Table 2 are for pullout of grouted reinforced masonry bond beams, reinforced with one #5 rebar, minimum grout strength of 2000 psi. The design may be limited on washer bearing capacity, see Table 3 below.
2. Allowable loads shall not be increased for duration of load.

**Table 3 – Allowable Loads  
Top Plate Washers**

Top Plate Washer Size	Southern Yellow Pine SG $\geq$ 0.55 Allowable Uplift Loads (lbs.)	Spruce-Pine-Fire SG $\geq$ 0.42 Allowable Uplift Loads (lbs.)
2" x 2" x $\frac{1}{8}$ "	2260	1513
2.5" x 2.5" x $\frac{3}{16}$ "	3930	2330
3" x 3" x $\frac{1}{4}$ "	5595	3315
3" x 3.5" x $\frac{1}{4}$ "	6545	3880

## Notes:

1. Allowable uplift loads shown in Table 3 are for wood bearing, the design may be limited on concrete pullout capacity, see Table 1 above.
2. The allowable design value shall not be increased for duration of load.
3. Wall construction shall have double top plate system, either Southern Yellow Pine No. 2 Grade with a  $F'_c = 565$  psi or Spruce-Pine-Fir No. 2 grade with an  $F'_c = 335$  psi, perpendicular to grain.

**Table 4  
Spacing for Truss Uplift**

Spacing (feet) TIE MAX/TIE MAX STUD	Southern Yellow Pine (SG $\geq$ 0.55) Maximum Truss Uplift		Spruce-Pine-Fire SG $\geq$ 0.42 Maximum Truss Uplift	
	(plf)	24" o.c. truss spacing (lbs.)	(plf)	24" o.c. truss spacing (lbs.)
4	950	1900	527	1054
6	595	1190	345	690
8	465	930	281	562

1. The allowable design value shall not be increased for duration of load.
2. Wall construction shall have double top plate system, either Southern Yellow Pine No. 2 Grade with a  $F'_c = 565$  psi or Spruce-Pine-Fir No. 2 grade with an  $F'_c = 335$  psi, perpendicular to grain. Minimum  $\frac{7}{16}$ " thick OSB sheathing complying with PS 2 on one side. The OSB sheathing shall be fastened in a manner to resist the design wind loads and in accordance with the windstorm building code specifications.
3. Loads on the TIE MAX/TIE MAX STUD are determined as the spacing in feet multiplied by the load in plf shown in the above table and shall not exceed values in Tables 1, 2 and 3 above.

### INSTALLATION INSTRUCTIONS

#### General Installation Requirements:

The TIE MAX and TIE MAX STUD shall be installed in accordance with the requirements of the International Residential Code (IRC) and the International Building Code (IBC) along with the Texas Revisions. In addition, the TIE MAX and TIE MAX STUD shall be installed in accordance with the manufacturer's installation instructions. A set of windstorm drawings signed and sealed by a Texas licensed engineer appointed as a qualified windstorm inspector shall be present on the job site at all times to indicate as a minimum the design load requirements for the structure, component and construction specifications, spacing, location and uplift loading requirements for the TIE MAX or TIE MAX STUD anchoring system. Requirements for special inspection shall be specifically noted on the windstorm plans.

**Design Documents:** A Texas licensed engineer shall prepare calculations, design drawings and details for each installation. The design drawings shall include complete instructions for the connection and

installation of the and other components as needed to provide a continuous load path and transfer of tension loads between portions of the structure. The design drawings shall be signed, sealed and dated by the engineer. The design drawings shall reference the appropriate edition of the wind load standard (ASCE 7) used based on the current building specifications adopted by the Texas Department of Insurance. The basic wind speed and the Exposure Category used for the design shall also be referenced.

A load path from the peak of the roof to the foundation shall be provided. Roof framing members (rafters or trusses), headers and bottom plates are connected with sheathing and traditional metal framing connectors to provide distribution of uplift loads to the TIE MAX and TIE MAX STUD anchoring system, which in turn transfers this load to the foundation. The TIE MAX and TIE MAX STUD anchoring system is not used to replace anchor bolts or framing anchors that are required to resist lateral loads.

The design of the wall framing anchorage system and associated connections is the responsibility of the engineer. The design shall be performed in accordance with the current building code specifications adopted by the Texas Department of Insurance, and the design shall consider appropriate load conditions, stress, deflection, wood shrinkage, bending and rotation of the plates and strength limit cases. The design of the wall top plates receiving uplift loads and distributing it to the shall consider both deflection and limit states, including combined axial and flexural stress for cases where the wood top plate(s) act as a drag strut or collector, and shall also consider geometric compatibility. A positive method to resist torsional rotation and cross-grain flexure of the top plates due to offsets between the point of load application (e.g., hurricane ties at the sides of the top plate) shall be provided where such conditions exist; and calculations in accordance with principles of mechanics shall be used to determine the demand connection used to resist top plate torsion.

**Design Loads:** Design wind loads for the shall be determined using the wind load requirements for the structure as specified in the current building specifications adopted by the Texas Department of Insurance. All loads on the TIE MAX and TIE MAX STUD anchoring system shall not exceed the allowable loads specified in this report.

**Foundation:** TIE MAX and TIE MAX STUD anchor bolts shall have a minimum 7" of embedment into concrete foundations that are a minimum of 12" thick exterior to receive the edge bolt and 10" interior to receive field bolts. Concrete slab shall have minimum compressive strength of 2500 psi. The bolts shall have a minimum edge distance of 2" and shall be spaced to resist the specified design loads for the structure.

**Wood Construction:** Wood frame walls shall be constructed with a double top plate system. The allowable loads for the top plate washers are based on use of either Southern Yellow Pine (SG $\geq$ 0.55) or Spruce-Pine-Fir (SG $\geq$ 0.42).

**Masonry Bond Beams:** TIE MAX bolts are embedded 7" into reinforced masonry lintels or bond beams with a minimum of one (1) #5 steel reinforcing bar complying with ACI 318. The lintel or bond beam shall be filled with grout complying with ASTM C 476 with a minimum compressive strength of 2000 psi. The bolts shall have a minimum edge distance of 2". TIE MAX anchors may also be installed in formed concrete lintels or bond beams used as part of the masonry wall. The concrete lintels or bond beams shall have a minimum compressive strength of 2,500 psi. Design loads, minimum embedment and edge distances for the anchors shall be as noted in the product evaluation report for installation in concrete.

**Special Inspection:** Special inspection is required for use of Power-Bond adhesive. The construction shall be inspected by a Texas licensed professional engineer appointed by the Texas Department of Insurance as a qualified windstorm inspector. Items to be verified by the engineer appointed as a qualified windstorm inspector include hole diameter, cleanliness of hole and anchor rod, adhesive type, adhesive application, rod diameter, rod embedment, grade of steel and other requirements as specified in the manufacturer's installation instructions and this evaluation report.

**Note:** The manufacturer's installation instructions shall be available on the job site during installation. All fasteners shall be corrosion resistant as specified in the International Residential Code (IRC) and the International Building Code (IBC) along with the Texas Revisions.