

**DO KIM & ASSOCIATES, LLC**  
**CONSULTING STRUCTURAL ENGINEERS**

Florida Board of Engineers Certificate of Authorization No. 26887

**Product Evaluation Report**

Date: June 10, 2019

Report No.: 120421-1.3

Product Category: Shutters (FL 13531-R3)

Product sub-category: Storm Panels

Product Name: PlyFASTner<sup>®</sup>

Manufacturer: PlyFASTner LLC  
1951 Teakwood Road  
Charleston, SC 29414  
Phone: 843-766-8199

Scope:

This product evaluation report issued by Do Kim and Associates, LLC and Do Kim, P.E. for Metals Building Products based on Florida Department of Business and Professional Regulation Rule 61G20-3, Method (1) (d) of the State of Florida Product Approval. Re-evaluation of this product shall be required following pertinent Florida Building Code modifications or updates.

Do Kim and Associates, LLC and Do Kim, P.E. do not have nor will acquire financial interest in the company manufacturing or distributing the product or in any other entity involved in the approval process of the product named herein.

This product has been evaluated for use in locations adhering to the Florida Building Code 6<sup>th</sup> Edition (FBC), exclusive of the HVHZ and where pressure and deflection requirements, as determined by Chapter 16 of the Florida Building Code, do not exceed the following allowable (net) design pressures of +/- 52 psf.



Do Kim, P.E.  
FL #49497

## Supporting Documents

1. Drawings:
  - a. Drawing No. 100301 titled “PlyFASTner Anchor Products”, Sheets 1-2, prepared by Do Kim & Associates, LLC and signed/sealed by Do Kim, P.E.
  
2. Testing
  - a. Testing per **ASTM E1996/E1886** by PRI-Construction Materials Technologies, LLC, 6412 Badger Drive, Tampa, FL 33610. Test reports referenced:
    - i. PLY-001-02-01 (03/04-05/19)
  - b. Testing per ASTM E 488 by Hurricane Engineering & Testing, Inc., 6120 NW 97<sup>th</sup> Avenue, Doral, FL 33178. Test reports referenced:
    - i. HETI-02-1003 (02/25/02)
    - ii. HETI-02-1004 (02/25/02)
    - iii. HETI-02-1005 (02/25/02)
  - c. Testing per ASTM E 8 by Hurricane Engineering & Testing, Inc., 6120 NW 97<sup>th</sup> Avenue, Doral, FL 33178. Test report referenced:
    - i. HETI-02-T007 (02/25/02)
  - d. Testing per **ASTM E 330** by Hurricane Engineering & Testing, Inc., 6120 NW 97<sup>th</sup> Avenue, Doral, FL 33178. Test report referenced:
    - i. HETI-02-1137 (02/14/02)
  - e. Testing per **ASTM E 1886** and **SSTD 12** by Hurricane Engineering & Testing, Inc., 6120 NW 97<sup>th</sup> Avenue, Doral, FL 33178. Test report referenced:
    - i. HETI-02-1138 (02/14/02)
  
3. Calculations
  - a. Structural engineering calculations have been prepared which evaluate the product based on engineering analysis for tested loading conditions have been prepared based on comparative and/or rational analysis.
    - i. Anchor Spacing
    - ii. Maximum Allowable Size/Pressure Combinations
  - b. Anchor factor of safety is 4:1. No 33% increase in allowable stress has been used in the design of this product.
  
4. Wind Load Resistance
  - a. This product has been designed to resist wind loads as indicated in the span schedule(s) on its Product Evaluation Document (i.e. engineering drawing).
  - b. Max. Nominal Allowable Design Pressure +/-52psf. Ultimate Design Pressure +/-78psf.
  
5. Impact Resistance:
  - a. Large Missile Impact Resistance has been demonstrated as evidenced in the listed test reports above as cited in Section 1609.1.2 FBC.
  - b. This is a non-porous impact protection system.
  - c. Minimum separation between panel and any glazing behind it is not required.

6. Quality Assurance
  - a. Certification Program and License Agreement with National Accreditation & Management Institute, Inc. (FBC Organization ID# QUA1789) that attests PlyFASTner LLC is participating within a quality assurance program with an approved Quality Assurance Entity for this product under Rule 61G20-3.008.

### **Limitations and Condition of Use**

1. This product has been designed and tested in accordance to the 6<sup>th</sup> Edition Florida Building Code (FBC) excluding the HVHZ provisions. Panels and brackets specified and used in the system are part of the PlyFASTner product system and subject to quality assurance audits by the QA entity. Panels shall be labeled in accordance with the labeling requirements of FBC Section 1710.8 Impact resistant coverings.
2. Impact Resistance:
  - Protective panel shall be min. ½” 3-ply CDX plywood or approved equal.
  - This is a non-porous impact protection system.
  - **This product is not valid for use within the HVHZ, ASTM E 1996 Wind Zone 4, or essential facilities as defined in ASTM E1996.**
  - Minimum separation between panel and any glazing behind it is not required.
3. The PlyFASTner bracket and PlyFASTner Plus Heavy Duty bracket is a 1/8” thick formed steel bracket with a min. yield stress of 36 ksi. PlyFASTner brackets are powder coated for corrosion resistance. The PlyFASTner Plus bracket is made from Alcom PA66 which is a base polymer (Polyamide 66) with an infill of 30% glass beads, 2% molybdenum disulphide.
4. The PlyFASTner Plus bracket is a 3/16” (0.187”) thick black 33% glass filled nylon bracket with a min. tensile strength at break at 11 ksi. Density of 1360 kg/m<sup>3</sup>. Thermal melting point is 263° C.
5. PlyFASTner system shall be installed in accordance with manufacturer’s published installation instructions and these instructions. The instructions within this approval govern if there are any conflicts between the manufacturer’s instructions and these product approval documents. Powers Fasteners AC100+ Gold Adhesive Anchoring System shall be used to anchor to concrete and grout filled hollow block. Install per manufacturer’s instructions.
6. Anchors shall be installed in accordance with manufacturer’s published installation instructions and these instructions. PlyFASTner Anchor w/ Retractable Bolt shall be zinc coated C-1022 low carbon steel lag screws.
7. Concrete shall conform to ACI 301 specifications with concrete strength properties as specified herein. Hollow and grout-filled concrete block shall conform to ASTM C-90. Grout shall be min. 3 ksi.
8. Hollow concrete masonry units (CMU) shall conform to ASTM C-90 and be minimum “medium weight” CMU with density > 117 PCF.
9. Pilot holes for all installations shall be provided and have depth ¼” longer than indicated embedment depth and diameter as follows:
  - ¼” dia. anchors shall use a 3/16” carbide tipped masonry drill bit meeting ANSI masonry bit specifications, and whose diameter is 0.206” +.000/- .008”.

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- Pilot holes for all use with AC100+ Gold Adhesive Anchoring System shall use a 5/16" carbide tipped masonry drill bit per manufacturer's instructions.
10. Allowable load design capacities shown in installation drawing tables have been determined using a safety factor of 4:1. No 33% increase in allowable stress has been used in this evaluation.
  11. Minimum edge distance and spacing for 100% of allowable load are shown in tables.
  12. Linear interpolation may be used for edge distance and spacing between minimum and maximum distances shown in tables.

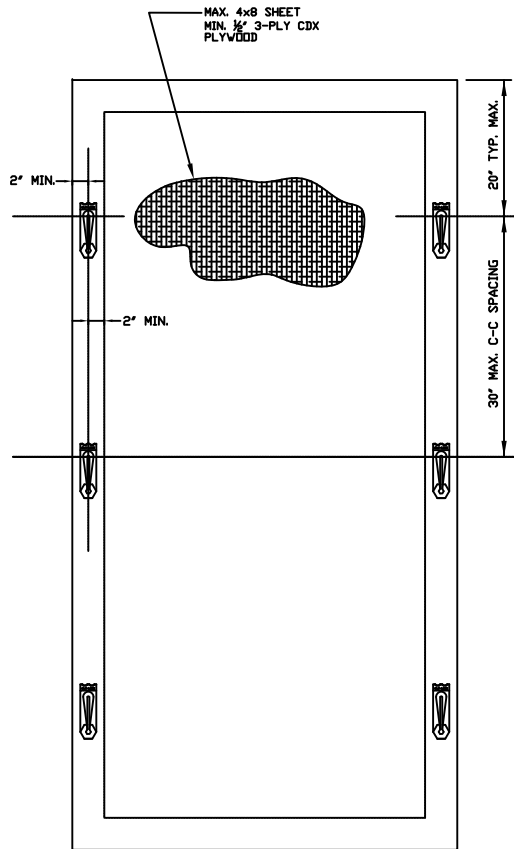
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**ANCHOR SCHEDULE (NOMINAL ALLOWABLE LOAD)**

HOST STRUCT.	ANCHOR	MAX. LOAD (psf)	Spans Up to 24"	Spans Up to 48"	Spans Up to 72"	Spans Up to 96"
CONCRETE OR GROUT-FILLED HOLLOW BLOCK	1/4" PlyFASTner S.S CONC. LAG SCREW x 3" EMBED	52	30.0"	30.0"	15.0"	15.0"
	1/4" PlyFASTner S.S FLUSH ANCHOR LAG w/ S.S. MACHINE BOLT x 3" EMBED (1" MIN. EDGE DISTANCE)	52	30.0"	30.0"	15.0"	15.0"
	1/4" PlyFASTner Retractable Lag Anchor Zinc Coated Steel MACHINE BOLT x 3" EMBED (1" MIN. EDGE DISTANCE)	52	30.0"	30.0"	15.0"	15.0"

HOST STRUCT.	ANCHOR	MAX. LOAD (psf)	Spans Up to 24"	Spans Up to 48"	Spans Up to 72"	Spans Up to 96"
HOLLOW BLOCK	1/4" TAPCON (ELCO OR ITW)x1-1/4" EMBED	52	30.0"	20.0"	12.0"	9"
	1/4" PANELMATE (PLUS OR FEMALE)x1-1/4" EMBED	52	30.0"	20.0"	12.0"	9"
	1/4" PlyFASTner Retractable Lag Anchor Zinc Coated Steel MACHINE BOLT x 3" EMBED (1" MIN. EDGE DISTANCE)	52	30.0"	20.0"	12.0"	9"

HOST STRUCT.	ANCHOR	MAX. LOAD (psf)	Spans Up to 24"	Spans Up to 48"	Spans Up to 72"	Spans Up to 96"
WOOD	1/4" PlyFASTner S.S LAG SCREW x 2 1/2" EMBED	52	30.0"	30.0"	15.0"	15.0"
	1/4" PlyFASTner S.S FLUSH ANCHOR LAG w/ S.S. MACHINE BOLT x 2 1/2" EMBED (1" MIN. EDGE DISTANCE)	52	30.0"	30.0"	15.0"	15.0"
	1/4" PlyFASTner Retractable Lag Anchor Zinc Coated Steel MACHINE BOLT x 3" EMBED (1" MIN. EDGE DISTANCE)	52	30.0"	30.0"	15.0"	15.0"

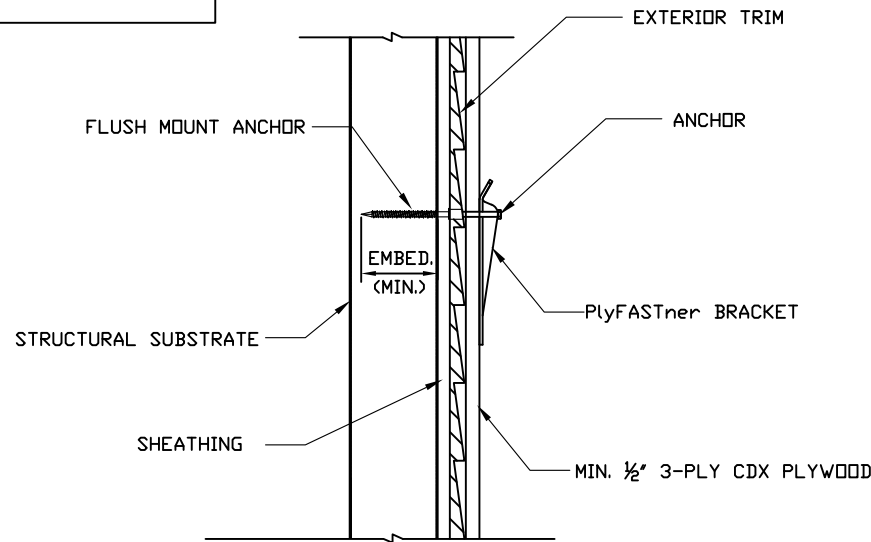


**General Notes and Specifications:**

- This product has been designed and tested in accordance to the 6th Edition Florida Building Code (2017 FBC) excluding the HVHZ. In accordance to Section 1609.1.2, Protection of Openings, PlyFASTner product used in conjunction with min. 1/2" 3-ply CDX plywood meets the requirements of Section 1609.1.2 on buildings. PlyFASTner system has been designed to resist the components and cladding loads determined in accordance with the provisions of ASCE 7.
- The PlyFASTner bracket and PlyFASTner Plus Heavy Duty bracket is a 1/8" thick formed steel bracket with a min. yield stress of 36 ksi. PlyFASTner brackets are powder coated for corrosion resistance. The PlyFASTner Plus bracket is made from Alcom PA66 which is a base polymer (Polyamide 66) with an infill of 30% glass beads, 2% molybdenum disulphide.
- The PlyFASTner and PlyFASTner Plus Heavy Duty brackets are 1/8" thick formed steel bracket with a min. yield stress of 36 ksi. PlyFASTner brackets are powder coated for corrosion resistance.
- The PlyFASTner Plus bracket is a 0.187" thick black 33% glass filled nylon bracket with a min. tensile strength at break of 11 ksi. Density of 1360 kg/m<sup>3</sup>. Thermal melting point is 263 °C.
- PlyFASTners shall be installed in accordance with manufacturer's published installation instructions and these instructions. The instructions within this approval govern if there are any conflicts between the manufacturer's instructions and these product approval documents.
- Concrete shall conform to ACI 301 specifications with concrete strength properties as specified herein. Hollow and grout-filled concrete block shall conform to ASTM C-90. Grout shall be min. 3 ksi.
- Hollow concrete masonry units (CMU) shall conform to ASTM C-90 and be minimum "medium weight" CMU with density > 117 PCF.
- Pilot holes for all installations shall be provided and have depth 1/4" longer than indicated embedment depth and diameter as follows:
  - 1/4" dia. anchors shall use a 3/16" carbide tipped masonry drill bit meeting ANSI masonry bit specifications, and whose diameter is 0.206" +.000/-0.008".
  - Pilot holes for all use with AC108+ Gold Adhesive Anchoring System shall use a 5/16" carbide tipped masonry drill bit per manufacturer's instructions.
- This product has been tested in accordance to these standards:
  - ASTM E 330.
  - ASTM E 1886/E1996
- Allowable load design capacities shown in tables have been determined using a safety factor of 4:1. No 33% increase in allowable stress has been used in this evaluation.
- Minimum edge distance and spacing for 100% of allowable load are shown in tables.

① TENSION & SHEAR ALLOWABLE CAPACITIES IN CONCRETE & GROUTED HOLLOW BLOCK (SEE ANCHOR NOTE #1)

ANCHOR DIA.	EMBED	EDGE DIST	C-C SPACING	MIN. 3500 PSI CONCRETE OR MEDIUM-WEIGHT FILLED CMU BLOCK	
				ALLOWABLE TENSION	ALLOWABLE SHEAR
1/4"	2 3/8"	2"	3"	1098 lb	567 lb



**PlyFASTner ANCHOR DETAIL**

**DO KIM & ASSOCIATES, LLC**  
CONSULTING STRUCTURAL ENGINEERS

P.O. Box 10039  
Tampa, FL 33679  
Tel: (813) 857-9955

Rev./Date	Description
3/1/2010	ISSUED
4/9/2010	REVISED
4/23/2012	REVISED/UPDATED TO 2010 FBC
8/25/2015	REVISED/UPDATED TO 5th Edition FBC (2014)
8/10/2019	REVISED/UPDATED TO 6th Edition FBC (2017)

PlyFASTner, LLC  
1951 TEAKWOOD ROAD  
CHARLESTON, SC 29414  
843-766-8199

PlyFASTner®  
ANCHOR PRODUCTS

DRAWN BY:	JMS
CHECKED BY:	DYK
SCALE:	AS SHOWN
DATE:	10/14/08

DO YEON KIM, P.E.  
FLA. REG. NUMBER 49497

DO KIM & ASSOCIATES, LLC  
P.O. Box 10039  
Tampa, FL 33679

Rev./Date	Description
△ 8/10 2019	ISSUED
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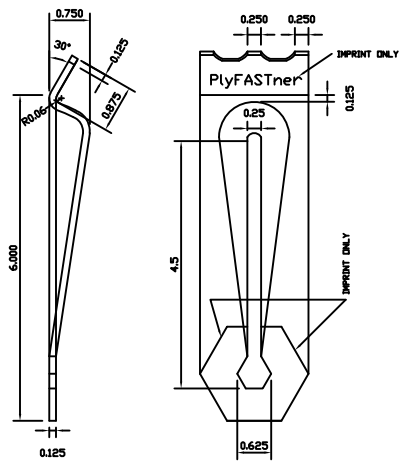
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ANCHOR PRODUCTS

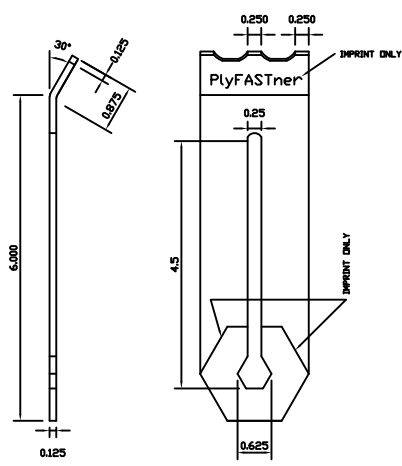
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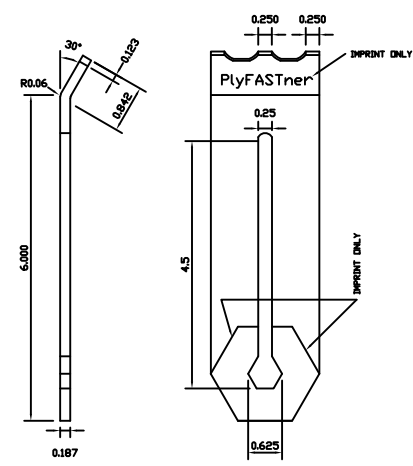
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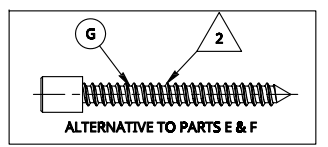
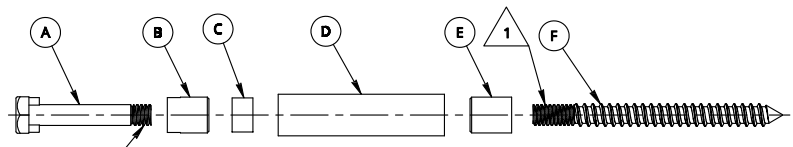
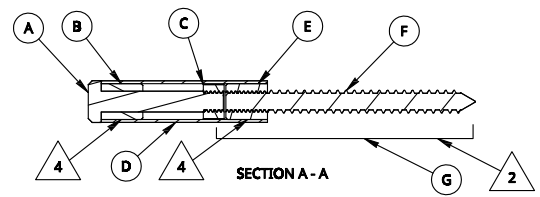
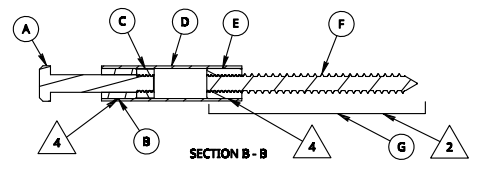
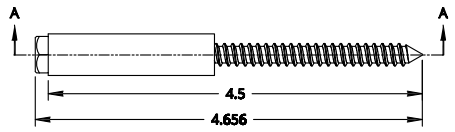
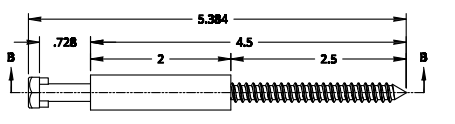
**PlyFASTner®**



**PlyFASTner Plus® Heavy Duty**



**PlyFASTner Plus®**



PARTS LIST		ALTERNATIVE OPTIONS	
PART	DESCRIPTION	PART	DESCRIPTION
A	HEX CAP SCREW W/ KEY	-	(NONE)
B	SMOOTH BUSHING	-	(NONE)
C	STOP NUT	-	(NONE)
D	COLLAR TUBE	-	(NONE)
E	THREADED BUSHING	G	LAG W/ RECEIVER
F	HANGER BOLT		

### ANCHOR NOTES

- PlyFASTner S.S. LAG SHALL BE 302 STAINLESS STEEL WITH 7/16" HEX HEAD. S.S. FLUSH ANCHOR SHALL BE 304 STAINLESS STEEL WITH 7/16" HEX HEAD, 1/4"/20 MACHINE TREAD, AND SPACER 1 1/4" x 1/2" with DIAMETER FULL THREAD. PlyFASTner Anchor w/ Retractable Bolt SHALL BE ZINC COATED C-1022 LOW CARBON STEEL LAGS. EQUAL CONCRETE SCREWS MAY BE USED WITH APPROVAL OF AUTHORIZED DESIGN PROFESSIONAL. POWERS FASTENERS AC100+ GOLD ADHESIVE ANCHORING SYSTEM SHALL BE USED TO INSTALL ANCHORS INTO CONCRETE AND GROUT FILLED HOLLOW BLOCK WITH PlyFASTner ANCHORS SHOWN IN TABLE. INSTALL PER MANUFACTURER'S INSTRUCTIONS.
- ENSURE MINIMUM 2.0" EDGE DISTANCE FOR ANCHORS TO CONCRETE & TO HOLLOW BLOCK. EDGE DISTANCE OF 1" IS ACCEPTABLE FOR ANCHORS TO WOOD.
- MINIMUM EMBEDMENT SHALL BE AS NOTED IN ANCHOR SCHEDULE. MINIMUM EMBEDMENT AND EDGE DISTANCE EXCLUDES STUCCO, FOAM, BRICK, AND OTHER WALL FINISHES.
- ANCHORS SHALL BE INSTALLED IN ACCORDANCE WITH MANUFACTURERS' RECOMMENDATIONS.
- WHERE EXISTING STRUCTURE IS WOOD FRAMING, EXISTING CONDITIONS MAY VARY. FIELD VERIFY THAT FASTENERS ARE INTO ADEQUATE WOOD FRAMING MEMBERS, NOT PLYWOOD.
- WHERE ANCHORS FASTEN TO NARROW FACE OF STUD FRAMING, ANCHOR SHALL BE LOCATED IN CENTER OF NOMINAL 2X4 (MIN) WOOD STUDS. WOOD STUDS SHALL HAVE A MINIMUM SPECIFIC GRAVITY OF 0.50.
- MACHINE SCREWS SHALL HAVE MINIMUM OF 1/2" ENGAGEMENT OF THREADS IN BASE ANCHOR AND MAY HAVE EITHER A PAN HEAD, TRUSS HEAD, OR WAFER HEAD ("SIDEWALK BOLT") U.N.O.

### PlyFASTner Retractable Anchor