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# ICC-ES Evaluation Report

**ESR-1411**

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*This report is subject to re-examination in one year.*

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**DIVISION: 07—THERMAL AND MOISTURE PROTECTION**
**Section: 07321—Roof Tile Accessories**

**REPORT HOLDER:**

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**EVALUATION SUBJECT:**

**TYLE-TYE® AND RINESS® TILE-TIE FASTENERS AND FASTENING SYSTEMS FOR CLAY AND CONCRETE ROOFING TILES**

## 1.0 EVALUATION SCOPE

**Compliance with the following codes:**

- 2006 *International Building Code®* (IBC)
- 2006 *International Residential Code®* (IRC)

**Property evaluated:**

Structural

## 2.0 USES

The Tyle-Tye® and Riness® Tile-Tie systems are used as alternative fastening systems to what is indicated in IBC Section 1507.3.7 and IRC Section R905.3.6 for installation of clay and concrete roofing tiles. The fastener systems are limited to use on roof slopes from $2^1/_2$:12 (21%) to 24:12 (200%).

## 3.0 DESCRIPTION

### 3.1 General:

Tyle-Tye® and Riness® Tile-Tie fasteners and fastening system components are manufactured from stainless steel, galvanized steel, brass, and copper as described in Table 1. The Tyle-Tye® and Riness® Tile-Tie fastening systems incorporate metal straps and wires. The fastening systems are designed to connect the roof tile to the roof deck while minimizing underlayment penetrations. See Figure 1 for drawings of components and systems.

### 3.2 Roof Decks:

The fasteners and fastening systems are recognized for use with roof decks including solid wood, plywood, oriented strand board (OSB), concrete, metal, and insulated steel decks. Plywood sheathing must be minimum $^1/_2$-inch-thick (12.7 mm) ACX plywood complying with U.S. DOC PS 1. OSB must be minimum $^1/_2$-inch-thick (12.7 mm) Exposure 1, complying with U.S. DOC PS 2. Normal-weight or structural lightweight structural concrete decks must have a minimum 2,500 psi (17.2 MPa) 28-day compressive strength. Steel decks must be minimum No. 24 gage [base-metal thickness of 0.0239 inch (0.61 mm)], ASTM A 653 SS, Grade 33 steel. Above-deck foam plastic insulation boards must comply with IBC Section 1508 and IRC Section R906.

### 3.3 Roof Tile:

Clay and concrete roof tile must be recognized in a current ICC-ES evaluation report.

### 3.4 Tyle-Tye® Hurricane Strap System (#1010):

The system consists of the Tyle-Tye® Strap (#1010) and either a connector (#1020), a tie rod (#1030), or a tie wire (#1003). The 1-inch-wide (25.4 mm) metal straps have fastener holes every 4 inches (102 mm) on center and formed loops spaced at 4 inches (102 mm) on center. The loops are formed perpendicular to the strap length to accommodate the use of tie rod or tie wire connectors.

### 3.5 Twisted Wire Tyle-Tye® System (#1001):

The system consists of the Twisted Wire Tyle-Tye® (#1001), a (#1003) tie wire, and a connector that is either a (#1002) deck anchor or the (#DPA) double plate anchor. The twisted wire (#1001) consists of two corrosion-resistant wires twisted together with a loop or eyelet every 6 inches (152 mm) on center.

### 3.6 Riness® Tile-Tie System (#1004):

The system consists of the Riness® Tile-Tie (#1004) and the Wind Lock Nose Hook (#1006). The ties consist of a straight section of wire having a vertical loop and a single twist at one end, with a horizontal, offset hook at the other end. The ties lock individual tiles together, automatically setting the head lap and exposure to the weather at between 11 and 17 inches (279 and 432 mm). See Section 3.8 for a description of the Nose Hooks.

### 3.7 Tyle-Tye® Tile Nails (#1008):

These are fasteners for roof tiles nailed to plywood or OSB roof decks. The fasteners are approximately 10 inches (254 mm) long, with a 1-inch (25.4 mm) nail on one end and a nose hook on the other end. The nail end is slipped through the hole in the head end of the tile and nailed into the sheathing approximately 6 inches (152 mm) above the tile.

### 3.8 Tyle-Tye® Wind Lock Nose Hooks (#1006):

These are wire fasteners for the nose or butt end of clay or concrete roof tiles. One end of the hook fits the nose end of the tile, with the other end having a small hook in the opposite plane to attach to the fastening system or nail through the hole in the next lower tile. See Tables 1 and 6 for allowable loads.

### 3.9 Tyle-Tye® "S" Hooks (#1011):

These S-shaped wires are fasteners for the nose or butt end of clay or concrete roof tiles. One end hooks the nose of the tile, with the other end hooking to the head of the tile underneath. See Table 6 for allowable loads.

### 3.10 Tyle-Tye® Hurricane Clips (Side Clips) (#1007):

These $^1/_2$-inch-wide (12.7 mm) metal clips are designed to be fastened to the side of S-shaped and flat interlocking clay tiles, or on the water channel side of concrete roof tiles. Two corrosion-resistant roofing nails are placed in the holes of the clip. See Tables 1 and 6 for allowable loads.

### 3.11 Tyle-Tye® Batten Clips (#1050):

These side clips are for S-shaped clay tiles and interlocking clay and concrete tiles. The clip has a built-in nail for fastening into the side of a wood batten, thus eliminating fastener penetrations of the roof underlayment.

### 3.12 Double Plate Anchor (#DPA):

The double plate anchor consists of two 3-inch-diameter-by-0.024-inch-thick (76 mm by 0.61 mm) stamped plates (#1018). The (#1001) Twisted Tyle-Tye® or (#1004) Riness® Tile-Tie wire is sandwiched between the two (#1018) plates. The plates are fastened to the deck using the fasteners noted in Tables 3 and 4. The fasteners are placed in the center of the plates and a loop of the wire.

## 4.0 DESIGN AND INSTALLATION

### 4.1 General:

The fasteners must be spaced as determined by design. The supporting members must be designed to resist the applicable forces. System components and fasteners must be of similar materials to prevent galvanic corrosion.

### 4.2 Design:

Tile installation and the spacing of the fastening systems are dependent upon the slope, roof design, roof deck, tile type, and size, and requirements in the specific tile manufacturer's specifications. The design forces must not exceed the allowable load values stated in Tables 1 through 7 of this report. Fastener spacing, headlap, and the number of fasteners are dependent on the tile weight, roof slope, wind pressures, etc., and must be calculated for each project.

### 4.3 Installation:

**4.3.1 Tyle-Tye® Hurricane Strap System:** The straps are placed vertically up the roof deck from eave to ridge, and are horizontally spaced as determined by design. The straps are attached to wood roof decks using an electrolytic-compatible nail or screw as described in Table 2. When attaching the Tyle-Tye® Strap to steel or concrete decks, fasteners must be recognized in a current ICC ES evaluation report. Individual tiles are secured to the strap loops using (#1003) tie wires or (#1020) connectors or (#1030) tie rods. Ends of the tie wire are secured with three 360-degree twists of the wire. When using a (#1020) connector or a (#1030) tie rod, the ends of the connectors or tie rods are secured with one 180-degree or 360-degree twist (per Table 2). See Figure 1 for drawings of components, and Tables 1 and 2 for allowable loads for system and components.

**4.3.2 Twisted Wire Tyle-Tye® System:** The Twisted Wire Tyle-Tye® is placed vertically up the roof deck from eave to ridge, and is horizontally spaced as determined by design. The Twisted Wire is attached to wood, steel or concrete roof decks using an electrolytic-compatible deck anchor (#1002) or a double plate anchor (#DPA) with a nail or screw as described in Table 3. When attaching the Twisted Wire Tyle-Tye® to steel or concrete decks, the fasteners used to attach the deck anchor (#1002) or the double plate anchor (#DPA) must be recognized in a current ICC-ES evaluation report. After the deck anchor or the double plate anchor is fastened to the roof deck, the fastener head, or entire anchor, must be fully sealed in membrane-compatible roofer's mastic complying with Newport Tool & Fastener specifications. In the case of the deck anchor (#1002), a loop in the Twisted Wire Tyle-Tye® is slipped down over the stem of the anchor and the legs must be spread apart to engage the wire. In the case of the double plate anchor (#DPA), the Twisted Wire Tyle-Tye® is sandwiched between two (#1018) plates that is fastened to the roof deck using fasteners noted in Table 3, placed in the center of the plate and through a loop of the Twisted-Wire. Individual tiles are secured to the Twisted Wire Tyle-Tye® with separate (#1003) tie wires. The ends of these tie wires must be secured with three full 360-degree twists. See Figure 1 for drawings of components, and Tables 1 and 3 for allowable loads for system and components.

**4.3.3 Riness® Tile-Tie System:** The Riness® Tile-Tie system is placed vertically up the roof deck from eave to ridge, and is horizontally spaced as determined by design. The Riness® Tile-Tie system is attached to wood, steel or concrete roof decks using an electrolytic-compatible nail or screw, #1005 U-nails, or the double plate anchor assembly #DPA as described in Table 4. When attaching the Riness® Tile-Tie to steel or concrete roof decks, the fasteners used must be recognized in a current ICC-ES evaluation report. When using the double plate anchor assembly #DPA, the Riness® Tile-Tie is sandwiched between two #1018 plates and is fastened to the roof deck using fasteners noted in Table 4, placed in the center of the plate and through the Riness® Tile-Tie. See Figure 1 for drawings of components, and Tables 1 and 4 for allowable loads for system and components.

## 5.0 CONDITIONS OF USE

The Tyle-Tye® and Riness® Tile-Tie fasteners and fastening systems for clay and concrete roof tiles described in this report comply with, or are suitable alternatives to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

**5.1** The fasteners are manufactured, identified, and installed in accordance with this report and the manufacturer's published installation instructions. In the event of conflict between this report and the manufacturer's published installation instructions, this report governs.

**5.2** Drawings and design details verifying compliance with this report must be submitted to the code official for approval. The drawings and calculations must be prepared by a registered design professional when required by the statutes of the jurisdiction in which the project is constructed.

**5.3** The allowable capacity of the fastening systems must be limited to the maximum allowable loads specified in this report.

## 6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for Concrete and Clay Tile Fasteners (AC65), dated June 1991 (editorially revised October 2005).

## 7.0 IDENTIFICATION

Each package of roof tile fasteners bears a label with the Newport Tool & Fastener Co., Inc., name and address; the type of fastener and material; and the evaluation report number (ESR-1411).

**TABLE 1—MATERIAL PROPERTIES**

| MATERIAL TYPE | ASTM STANDARD | INTENDED USE | DIAMETER OR THICKNESS (inch) | ALLOWABLE TENSILE LOAD (lbf) |
|---|---|---|---|---|
| Stainless steel wire | ASTM A 580 Type 302-304 | #1001S Twisted Wire Tyle-Tye® | 0.090 | 303 |
| | | #1003S Tyle-Tye® Tie Wire | 0.062 | 74 |
| | | #1011S Tyle-Tye® "S" Hook | 0.090 | 170 |
| | | #1008S Tyle-Tye® TileNail | 0.105 | 170 |
| | | #1005S Tyle-Tye® "U" Nail | 0.135 | — |
| | | #1004S Riness® Tile Tie | 0.090 | 195 |
| | | #1006S Tyle-Tye® Wind Lock Nose Hook | 0.090 | 179 |
| | | #1020S Tyle-Tye® Connector | 0.090 | 170 |
| | | #1030S Tyle-Tye® Tie Rod | 0.090 | 170 |
| Stainless steel sheet | ASTM A 240 Type 302-304 | #1010S Tyle-Tye® Strap | 1.00 × 0.024 | 209 |
| | | #1002S Tyle-Tye® Deck Anchor | 0.62 × 0.050 | — |
| | | #1007 Tyle-Tye® Side Clip | 0.50 × 0.050 | — |
| | | #1018S Tyle-Tye® DPA Anchor Plate | 3.0 × 0.024 | — |
| Galvanized steel wire | ASTM A 641 | #1001G Twisted Wire Tyle-Tye® | 0.105 | 354 |
| | | #1003G Tyle-Tye® Tie Wire | 0.062 | 52 |
| | | #1011G Tyle-Tye® "S" Hook | 0.105 | 166 |
| | | #1008G Tyle-Tye® TileNail | 0.120 | 166 |
| | | #1005G Tyle-Tye® "U" Nail | 0.135 | — |
| | | #1004G Riness® Tile Tie | 0.105 | 174 |
| | | #1006G Tyle-Tye® Wind Lock Nose Hook | 0.120 | 166 |
| | | #1020G Tyle-Tye® Connector | 0.105 | 219 |
| | | #1030G Tyle-Tye® Tie Rod | 0.105 | 303 |
| Galvanized steel sheet | ASTM A 653 | #1010G Tyle-Tye® Strap | 1.00 × 0.024 | 245 |
| | | #1002G Tyle-Tye® Deck Anchor | 0.0625 × 0.050 | — |
| | | #1007G Tyle-Tye® Side Clip | 0.50 × 0.050 | — |
| Brass wire | ASTM B 134 | #1001B Twisted Wire Tyle-Tye® | 0.101 | 133 |
| | | #1003B Tyle-Tye® Tie Wire | 0.064 | 42 |
| | | #1004B Riness® Tile Tie | 0.101 | 176 |
| | | #1006B Tyle-Tye® Wind Lock Nose Hook | 0.101 | 156 |
| | | #1008B Tyle-Tye® TileNail | 0.135 | 156 |
| | | #1011B Tyle-Tye® "S" Hook | 0.101 | 156 |
| | | #1005B Tyle-Tye® "U" Nail | 0.135 | — |
| Brass sheet | ASTM B 36 | #1002B Tyle-Tye® Deck Anchor | 0.62 × 0.050 | — |
| | | #1007B Tyle-Tye® Side Clip | 0.50 × 0.050 | — |
| Copper wire | ASTM B 3 | #1001C Twisted Wire Tyle-Tye® | 0.101 | 145 |
| | | #1003C Tyle-Tye® Tie Wire | 0.064 | 28 |

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

**TABLE 2—ALLOWABLE CONNECTION CAPACITY OF TYLE-TYE® HURRICANE STRAP SYSTEM**

| SYSTEM COMPONENTS | FASTENER TO DECK[1,2] | MATERIALS | | UPLIFT (VERTICAL) LOADS (lbf) | | | HORIZONTAL LOADS[3] (lbf) | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Plywood Sheathing | OSB Sheathing | Insulated Steel or Concrete Deck[2] | Plywood Sheathing | OSB Sheathing | Insulated Steel or Concrete Deck[2] |
| #1010S Tyle-Tye® Hurricane Strap, #1020S Tyle-Tye® Connector or #1030S Tie Rod | No. 10 gage stainless steel (s/s) or No. 11 gage galvanized ring shank nails | All components stainless steel with stainless or galvanized nails | 180E bend at strap loop | 19.4 | 15.3 | — | 27.1 | 18.3 | — |
| #1010S Tyle-Tye® Hurricane Strap, #1020S Tyle-Tye® Connector or #1030S Tie Rod | No. 14 s/s or No.12 coated screws | All components stainless steel with stainless or coated screws | 180E bend at strap loop | 20.1 | — | 15.1 | 27.9 | — | 20.9 |
| | | | 360E bend at strap loop | 117.6 | | 88.2 | 144.1 | | 108.0 |
| #1010G Tyle-Tye® Hurricane Strap, #1020G Tyle-Tye® Connector or #1030G Tie Rod | No. 10 gage s/s or No. 11 gage galvanized ring shank nails | All components galvanized with stainless or galvanized nails | 180E bend at strap loop | 24.2 | 17.1 | — | 37.7 | 31.1 | — |
| #1010G Tyle-Tye® Hurricane Strap, #1020G Tyle-Tye® Connector or #1030G Tie Rod | No. 14 s/s or No.12 coated screws | All components galvanized with stainless or coated screws | 180E bend at strap loop | 36.0 | — | 27.0 | 49.6 | — | 37.2 |
| | | | 360E bend at strap loop | 130.2 | | 97.6 | 173.2 | | 129.9 |
| #1010S Tyle-Tye® Hurricane Strap, #1062S Tie Wire | No. 10 gage s/s or No. 11 gage galvanized ring shank nails | All components stainless steel with stainless or galvanized nails | | 22.8 | 17.9 | — | 39.4 | 35.9 | — |
| #1010S Tyle-Tye® Hurricane Strap, #1062S Tie Wire | No. 14 s/s or No. 12 coated screws | All components stainless steel with stainless or coated screws | | 56.6 | — | 42.5 | 50.7 | — | 38.0 |
| #1010S Tyle-Tye® Hurricane Strap, #1062S Tie Wire | No. 10 gage s/s or No. 11 gage galvanized ring shank nails | All components stainless steel with stainless or galvanized nails | | 29.7 | 19.3 | — | 70.1 | 68.6 | — |
| #1010S Tyle-Tye® Hurricane Strap, #1062S Tie Wire | No. 14 s/s or No. 12 coated screws | All components stainless steel with stainless or coated screws | | 94.7 | — | 71.0 | 112.6 | — | 84.5 |
| #1010G Tyle-Tye® Hurricane Strap, #1003G Tie Wire | No. 10 gage s/s or No. 11 gage galvanized ring shank nails | All components galvanized with stainless or galvanized nails | | 22.9 | 15.4 | — | 40.0 | 41.3 | — |
| #1010G Tyle-Tye® Hurricane Strap, #1003G Tie Wire | No. 14 s/s or No. 12 coated screws | All components galvanized with stainless or coated screws | | 46.4 | — | 34.8 | 55.1 | — | 41.3 |

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

[1]Nails used to attach the strap to a wood roof deck must comply with ASTM F 1667. Screws used to attach the strap to a steel or concrete roof deck must be recognized in a current ICC-ES evaluation report.
[2]Fasteners must be long enough to penetrate through the substrate a minimum of $^1/_2$ inch.
[3]The direction of horizontal loads is parallel to roof slope.

**TABLE 3—ALLOWABLE CONNECTION CAPACITY OF TWISTED WIRE TYLE-TYE® SYSTEM**

| CONNECTION TYPE | | UPLIFT (VERTICAL) LOADS (lbf) | | | HORIZONTAL LOADS[3] (lbf) | | |
|---|---|---|---|---|---|---|---|
| **System Components** | **Fastener to Deck[1,2]** | **Plywood Sheathing** | **OSB Sheathing** | **Insulated Steel or Concrete Deck[2]** | **Plywood Sheathing** | **OSB Sheathing** | **Insulated Steel or Concrete Deck[2]** |
| #1001S Twisted Wire Tyle-Tye®, #1062S Tie Wire, #1002S Deck Anchor | Two No. 10 gage s/s or No. 11 gage galv. ring shank nails | 39.2 | 41.5 | — | 94.0 | 95.5 | — |
| #1001S Twisted Wire Tyle-Tye®, #1062S Tie Wire Double Plate Assembly (DPA) | Double plate with No. 14 s/s or No. 12 coated screws | 36.7 | — | 36.3 | 96.1 | — | 96.1 |
| #1001S Twisted Wire Tyle-Tye®, #1062S Tie Wire, #1002G Deck Anchor | Two No. 10 gage s/s or 11 gage galvanized ring shank nails | 30.4 | 31.63 | — | 43.0 | 38.9 | — |
| #1001S Twisted Wire Tyle-Tye®, #1062S Tie Wire, #1002B Deck Anchor | Two No. 10 gage copper or No. 10 stainless steel ring shank nails per deck anchor | 40.3 | 33.7 | — | 91.6 | 87.3 | — |
| #1001G Twisted Wire Tyle-Tye®, #1003G Tie Wire, #1002G Deck Anchor | Two No. 10 gage s/s or No. 11 gage galvanized ring shank nails | 49.2 | 48.7 | — | 63.1 | 53.1 | — |
| #1001G Twisted Wire Tyle-Tye®, #1003G Tie Wire Double Plate Assembly (DPA) | Double plate with No. 14 s/s or No. 12 coated screws | 45.5 | — | 45.5 | 63.9 | — | 63.9 |
| #1001C Twisted Wire Tyle-Tye®, #1003C Tie Wire, #1002B Deck Anchor | Two No. 10 gage copper ring shank nails per deck anchor | 31.5 | 27.6 | — | 33.3 | 34.0 | — |
| #1001B Twisted Wire Tyle-Tye®, #1003B Tie Wire, #1002B Deck Anchor | Two No. 10 copper ring shank nails per deck anchor | 18.5 | 20.7 | — | 49.4 | 50.3 | — |

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

[1]Nails used to attach the strap to a wood roof deck must comply with ASTM F 1667. Screws used to attach the strap to a steel or concrete roof deck must be recognized in a current ICC-ES evaluation report.
[2]Fasteners must be long enough to penetrate through the substrate a minimum of $^1/_2$ inch.
[3]The direction of horizontal loads is parallel to roof slope.

**TABLE 4—ALLOWABLE CONNECTION CAPACITY OF RINESS® TILE TIE SYSTEM**

| CONNECTION TYPE | | MATERIALS | | UPLIFT (VERTICAL) LOADS (lbf) | | | HORIZONTAL LOADS[3] (lbf) | | |
|---|---|---|---|---|---|---|---|---|---|
| System Components | Fastener to Deck[1,2] | | | Plywood Sheathing | OSB Sheathing | Insulated Steel or Concrete Deck | Plywood Sheathing | OSB Sheathing | Insulated Steel or Concrete Deck |
| #1004S Riness® Tile-Tie, #1006S Wind Lock Nose Hook | Double Plate Anchor (#1018S) with No. 14 s/s or No. 12 coated screws | Stainless steel and stainless or coated screws | 360E bend of wire at Double Plate Anchor | 45.0 | 41.2 | 48.1 | 40.0 | 45.1 | 31.3 |
| #1004G Riness® Tile-Tie, #1006G Nose Hook | Double Plate Anchor (#1018S) with No. 14 s/s or No. 12 coated screws | Galvanized with stainless steel plates and stainless or coated screws | 360E bend of wire at Double Plate Anchor | 73.3 | 48.2 | 66.7 | 55.8 | 57.5 | 47.0 |
| #1004S Riness® Tile-Tie, #1006S Nose Hook | #1005S “U” Nail | Stainless steel | 180E bend of wire at Double Plate Anchor | 51.4 | 25.6 | — | 21.8 | 28.3 | — |
| #1004G Riness® Tile-Tie, #1006G Nose Hook | #1005G “U” Nail | Galvanized steel | 180E bend of wire at Double Plate Anchor | 43.0 | 38.6 | — | 15.8 | 25.3 | — |
| #1004B Riness® Tile-Tie, #1006B Nose Hook | #1005B “U” Nail | Brass | 180E bend of wire at Double Plate Anchor | 22.9 | 20.2 | — | 42.1 | 35.1 | — |

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

[1]Nails used to attach the strap to a wood roof deck must comply with ASTM F 1667. Screws used to attach the strap to a steel or concrete roof deck must be recognized in a current ICC-ES evaluation report.
[2]Fasteners must be long enough to penetrate through the substrate a minimum of $^1/_2$ inch.
[3]The direction of horizontal loads is parallel to roof slope.

**TABLE 5—ALLOWABLE CONNECTION CAPACITY OF TYLE-TIE TILE NAIL SYSTEM**

| CONNECTION TYPE | MATERIAL | UPLIFT (VERTICAL) LOADS (lbf) | | HORIZONTAL LOADS[1] (lbf) | |
|---|---|---|---|---|---|
| | | Plywood Sheathing | OSB Sheathing | Plywood Sheathing | OSB Sheathing |
| #1008S Tyle-Tie® Tile Nail | Stainless steel | 26.3 | 9.6 | 19.1 | 16.4 |
| #1008G Tyle-Tie® Tile Nail | Galvanized steel | 18.4 | 16.2 | 21.4 | 20.4 |
| #1008B Tyle-Tie® Tile Nail | Brass | 34.3 | 19.0 | 10.0 | 9.4 |

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

[1]The direction of horizontal loads is parallel to roof slope.

**TABLE 6—ALLOWABLE CONNECTION CAPACITY OF SUPPLEMENTAL CONNECTORS**

| CONNECTION TYPE | | UPLIFT (VERTICAL) LOADS (lbf) | |
|---|---|---|---|
| **System Components** | **Fastener to Deck[1,2]** | **Plywood Sheathing Insulated Steel or Concrete Deck** | **OSB Sheathing** |
| #1006S Tyle-Tye® Wind Lock Nose Hook[3] | One No. 10 gage s/s ring shank nail or No. 12 coated screw | 11.6 | 10.6 |
| #1006G Tyle-Tye® Wind Lock Nose Hook[3] | One No. 11 gage galvanized ring shank nail or No. 12 coated screw | 21.8 | 21.8 |
| #1006B Tyle-Tye® Wind Lock Nose Hook[3] | One No. 10 gage copper ring shank nails | 12.1 | 13.4 |
| #1007S Tyle-Tye® Hurricane Side Clip | Two No. 10 gage s/s ring shank nail or No. 12 coated screw | 14.8 | 14.6 |
| #1007G Tyle-Tye® Hurricane Side Clip | Two No. 11 gage galvanized ring shank nail or No. 12 coated screw | 15.2 | 15.1 |
| #1007B Tyle-Tye® Hurricane Side Clip | Two No. 10 gage copper ring shank nails | 6.1 | 6.6 |
| #1011S Tyle-Tye® “S” Hook | No. 10 gage s/s or No. 11 gage galvanized ring shank nail | With clay or concrete tile: 11.8 | |
| #1011G Tyle-Tye® “S” Hook | No. 11 gage galvanized ring shank nail | With clay or concrete tile: 14.7 | |
| #1050S Batten Clip | N/A | Into 1 inch × 3 inch Douglas fir batten: 19.8 | |
| #1050G Batten Clip | N/A | Into 1 inch × 3 inch Douglas fir batten: 14.7 | |

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

[1]Nails used to attach the strap to a wood roof deck must comply with ASTM F 1667. Screws used to attach the strap to a steel or concrete roof deck must be recognized in a current evaluation report.
[2]Fasteners must be long enough to penetrate through the substrate a minimum of $^1/_2$ inch.
[3]Unless otherwise noted, data pertains to a 180E bend of wire at the connection.

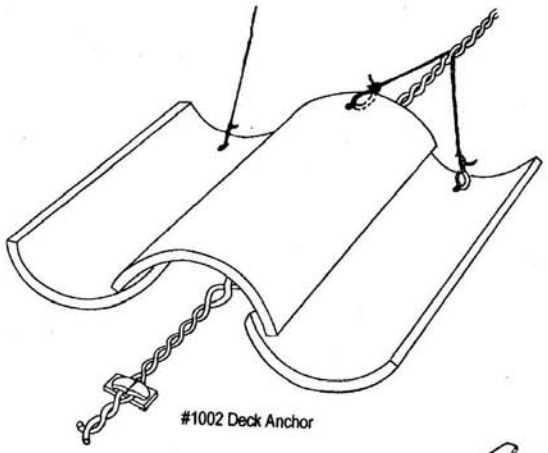
**TABLE 7—ALLOWABLE WITHDRAWAL CAPACITY OF FASTENERS**

| FASTENER[1] | WITHDRAWAL CAPACITY (lbf) | | | |
|---|---|---|---|---|
| | $^{15}/_{32}$-Inch Plywood | $^{19}/_{32}$-Inch Plywood | $^{15}/_{32}$-Inch OSB | $^{19}/_{32}$-Inch OSB |
| No. 10 gage stainless steel ring shank nail | 30.8 | — | 21.3 | — |
| No. 10 gage copper ring shank nail | 33.0 | — | 22.7 | — |
| No. 12 stainless steel self-tapping sheet metal screws | 77.4 | — | 36.6 | — |
| No. 14 stainless steel self-tapping sheet metal screws | 85.4 | — | 46.6 | — |
| No. 11 gage galvanized steel ring shank nail | 9.9 | 19.4 | 4.8 | 7.8 |

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

[1]Fasteners must be long enough to penetrate through the substrate a minimum of $^1/_2$ inch.

#1001 Twisted Wire Tyle-Tye®

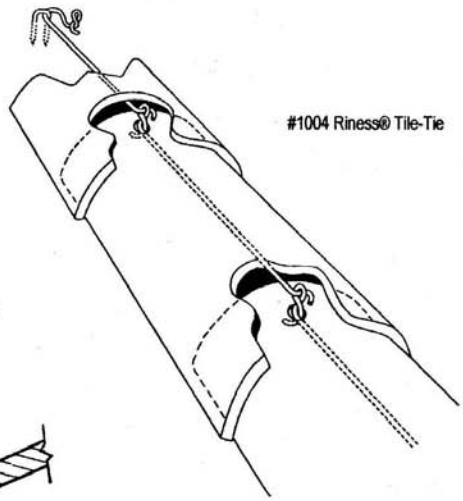


#1002 Deck Anchor

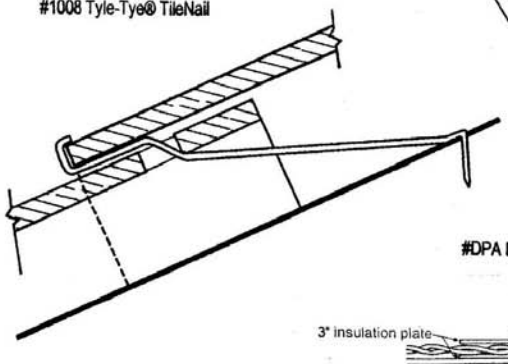
#1006 Tyle-Tye® Wind Lock Nose Hook

#1005 U-Nail

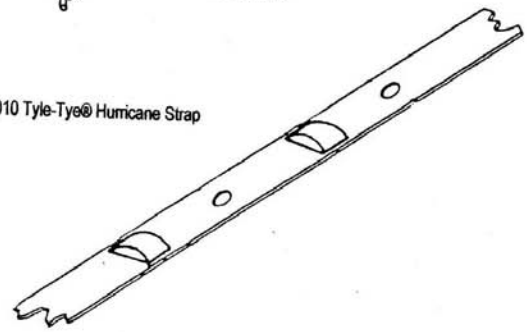
#1004 Riness® Tile-Tie



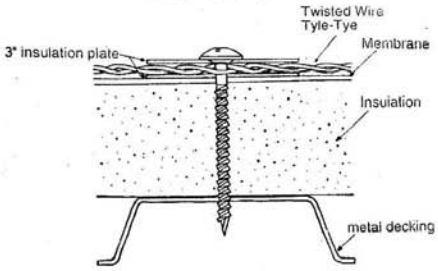
#1008 Tyle-Tye® TileNail



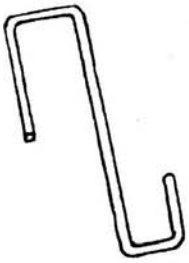
#1010 Tyle-Tye® Hurricane Strap

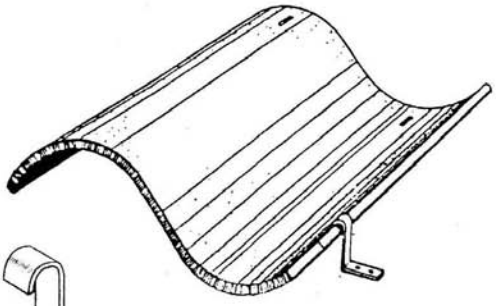


#DPA Double Plate Anchor




#1011 Tyle-Tye® "S" Hook

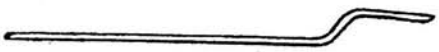




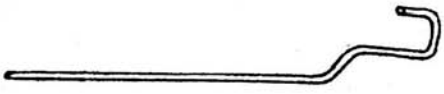
#1007 Tyle-Tye® Hurricane Side Clip

#1018 3" Stainless Steel Plates

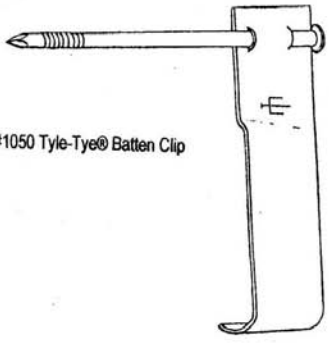
#1020 Tyle-Tye® Connector w/o Nose Hook



#1020 Tyle-Tye® Connector w/ Nose Hook



#1050 Tyle-Tye® Batten Clip



#1030 Tie Rod

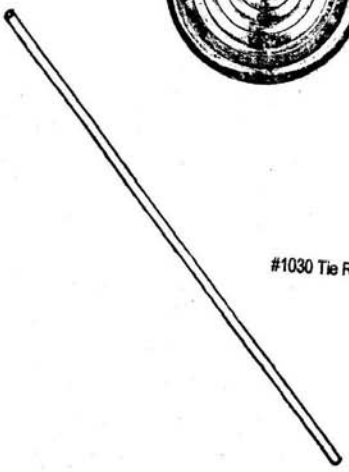


**FIGURE 1**