

DECRA Fasteners: Design Features and Lab Test Protocol Validate Severe Environment Performance

DECRA provides a #10 x 1.5” corrosion-resistant fastener with a ¼” drive hex bolt head. This fastener is even approved for use in Miami-Dade County, Florida building code jurisdiction – the toughest code jurisdiction in the United States due to both high wind potential and corrosive environment near saltwater. That’s fine, but what makes the DECRA fastener so good? And how do we test performance to verify its function? This PK topic reviews performance features and the associated benefits for use in our roof system.

Design and Material Characteristics

- T17 Cut Point
- High-Low Threads
- C1022 Steel Alloy
- 14 Thread-Count per Inch
- Head Flute Reinforcement
- L3 Dura Protec™ Anti-Corrosion Coating Process

Product Performance Test Methods

ASTM D1761 – 06	Standard Test Methods for Mechanical Fasteners in Wood <ul style="list-style-type: none">• Fastener Withdrawal• Lateral Shear
ASTM G85 – 11	Standard Practice for Modified Salt Spray (Fog) Testing
TAS 114 – 95	Test Procedure for Corrosion Resistance of Fasteners

Fastener Design and Material

The **T17 cut point design** allows for the DECRA fastener to quickly penetrate our metal panels and accessories for easier, faster fastener installation. The **high-low thread design** configuration aids in speeding up the installation speed into wood substrate – solid wood, plywood and oriented strand board (OSB).

The **engineered head flute**, located under the fastener hex head, provides reinforcement for high torque environments. This allows the fastener to be installed without snapping the hex head off of the screw shank when high-torque battery-operated screw guns are used – this includes impact drive screw guns.

C1022 steel coil used in the manufacture of the DECRA fastener is a low-carbon steel, ideal for fastener use due to its greater strength characteristics, good ductility and machinability for quality fastener fabrication, and noted for its benefit in structural applications. Maximum carbon content is 0.23%.

The **L3 Dura Protec™** corrosion resistance coating finish on the DECRA fastener is a high-grade metal surface process technology. The coating finish consists of three layers:

1. Metallic zinc layer
2. High-grade anti-corrosion chemical conversion film
3. Baked ceramic surface coating

The **L3 Dura Protec™** coating system distinguishing feature is the tight joining of the baked ceramic surface coating and the chemical conversion film. These layers are bonded together through chemical reactions, and this unique method of combining layers results in a rigid combination of the coating films. This system doesn't attribute its anti-corrosion properties to just a single material, but the synergy of the three layers, which combined have excellent rust proof properties.

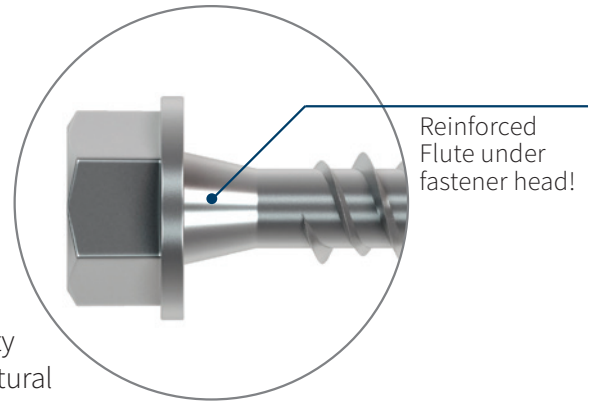
L3 Dura Protec™ coating system benefits:

- Excellent corrosion resistance – saltwater, gas, weathering
- Corrosion resistance against scratches, due to the composite layers
- Electrolytic corrosion resistance – less contact corrosion with other dissimilar metals
- Low processing temperature – protects the fasteners from metallurgic changes during manufacture

Precautions

Two key attributes are tested for roof fasteners: Withdrawal resistance force and lateral shear force. Both attributes are tested per **ASTM D1761**.

For the **Withdrawal Test**, five fasteners are used for this evaluation. The fasteners are screwed into Spruce-Pine-Fir (SPF) 2x4 lumber, leaving sufficient head offset for gripping the fastener withdrawal fixture. For our DECRA fastener, a peak load average “pounds of withdrawal force” of 631.1 was recorded. Depending on the density of the pine lumber, a withdrawal extraction force has been recorded in lab as high as 1,105 pounds of pull force. Further testing on ½” thick exterior plywood yielded a withdrawal force of 425 pounds of pull, and OSB sheathing recorded a withdrawal force of 325 pounds.



Solid wood battens provide the most resistive withdrawal force using DECRA fasteners, as long as the battens are securely anchored to the roof rafters per wind uplift installation requirements. All recorded values are more than substantial when fastening DECRA roof panels to a steep slope roof application to wood battens, plywood or OSB roof sheathing. Plywood and OSB sheathing panels must be installed per building code requirements for fastener type and spacing.

Lateral Shear Force is a fastener failure when a force is applied to the side of the fastener head in the upward direction until a distinct load drop-off of at least 75% occurred. Again, five fasteners are tested in SPF lumber. The average shear force at failure was recorded at 342.0 pounds of force. Again, this force is more than adequate to withstand the forces at play in a high wind uplift situation on a DECRA roof panel fastened per **DECRA Installation Guide** detail.

Corrosion resistance is tested via **Testing Application Standard (TAS) 114: Salt Spray Corrosion**. A salt solution containing an electrolyte solution of sodium chloride and ammonium sulfate is administered in a sealed chamber containing the test fasteners. The “salt fog” spray is applied in one hour cycles of fog followed by one hour of dry-off period at a temperature of 95 degrees F. 140 full cycles are run on the fasteners. All fastener samples completed the test with a **PASS** rating – no red rust is exhibited after this corrosive environment exposure.

Intertek / ATI – York, PA laboratory conducted the fastener performance testing, as recorded in Report No. E1036.01-106-18; Report Date: 12/02/2014. Miami-Dade Notification No. ATI 14047

Performance Test Reviews

Test Procedure	Testing Method	Test Result
Hardness	Pencil Hardness	Over 4H
Adhesion	Peel Test – Tape	Pass
Acid Resistance	24 hrs in 5% Sulfuric Acid	Pass
Alkali Resistance	72 hrs in 5% Sodium Hydroxide	Pass
Heat Resistance	Expose to 250° C for 1 hr	Pass
Accelerated Weathering	Salt Spray Chamber – 1,000 hrs	Pass
Accelerated Weathering +	Salt Spray Chamber – 1,500 hrs	(0% Visible Red Rust)
Corrosion – Other Metals	Contact w/ Other Metal – Salt Spray	Pass

Precautions

The DECRA roof panel fastener is approved by the Miami-Dade County, Florida Code Administration - Product Control Section for use in area roofing projects – **Notice of Approval (NOA) 15-0423.02**.

Further, our fastener is listed in the **Miami-Dade County, Florida – Roofing Fastener and Batten Plate Listing as of May 17, 2019**.

DECRA #10 x 1.5” hex head fasteners are thoroughly vetted as an ideal fastener choice to install a DECRA roof system, in any panel style, offered by our company.