

**Interim Report for Project Entitled:
Corrosion of Roofing and Screen Enclosure Fasteners Systems**

Performance Period: 10/10/2014 – 6/30/2015

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by

Kurtis R. Gurley, Ph.D., kgurl@ce.ufl.edu, (352) 392-9537 x 1508
Forrest J. Masters, Ph.D., P.E., masters@ce.ufl.edu, (352) 392-9537 x 1505
David O. Prevatt, Ph.D., P.E. (MA), dprev@ce.ufl.edu, (352) 392-9537 x 1498

Designated Project Leader: Kurtis R. Gurley

Engineering School for Sustainable Infrastructure & Environment



Test Protocol and Fastener Selection

Summary:

This document provides an update regarding the selection of roof system and screen enclosure fasteners for corrosion testing. The primary goals at this stage are to narrow the testing scope to focus on the most commonly used fasteners and their installation configurations, and propose the experimental scope.

The initial scope included three objectives: US vs non-US manufacturers, out-of-the-box vs installed fasteners, and Class 1 vs Class 2 ASTM A 641 fasteners. Based upon the previous Roofing TAC feedback, stakeholder input and discussions with suppliers, the scope has been narrowed to focus on the out-of-the-box vs. installed fasteners for both roofing system and scree enclosure fasteners.

The last section of this report suggests feedback items from the Roofing TAC

Definitions:

Test sequence – one complete 140 cycle (12 day) or 180 cycle (15 day) test as per TAS 114 Appendix E

Subject – one particular fastener type (e.g. 1 ¼ inch roofing coil nails), to be tested in multiple configurations

Configuration – a given preparation for a subject. E.g. 1 ¼ inch roofing nail out-of-the-box, installed into wood, and installed through flashing into wood are three configurations of one subject

Sample – any single subject in any single configuration

Sequence matrix – the complete collection of samples in a single test sequence, consisting of multiple subjects and configurations

Control – a subject tested out-of-the-box (non-installed condition)

Conditioned – a subject tested in an installed configuration or installed and removed configuration. A conditioned sample cannot be a control sample

Install method – hand driven, pneumatic driver, etc., to be determined for each subject

Fastener types:

The duration of the project and time required for conducting testing limit the fastener types that can be tested in this project. Multiple industry stakeholders have been consulted to identify the most prevalent fastener types, and to elicit their experiences with field corrosion issues and previous corrosion testing findings.

The following is the preliminary proposed scope of subjects and test configurations. These are subject to change pending TAC and stakeholder feedback, as well as constraints imposed by the corrosion testing apparatus (TBD).

Roofing system fasteners

Subjects: 1 ¼ inch roofing coil nails are used for multiple roofing systems (dry-ins, singles, flashing), and will be the primary subject for testing.

Configurations: Control and conditioned configurations will be tested. Four conditioned configurations include installed in wood substrate, through felt into wood, through shingles into wood, and through flashing into wood. Installed and removed for each configuration will also be tested.

Install methods: hand driven and pneumatic installs will be included.

Suppliers: samples will be procured from at least two manufacturers.

Number of variants: **99 samples** are required for this sequence. Control (3) + conditioned types (4) * install methods (2) * install / installed and removed (2) * manufacturers (2) * repetitions of each (3) = $3 + 4*2*2*2*3 = 99$. This would likely fill one complete sequence matrix for once test sequence.

Roof tile fasteners are also being considered as a subject, to be determined as test space allows.

Metal to metal screen enclosure fasteners

Subjects:

- 2" #10 hex head SMS. Multiple coatings will be included (TBD)
- ¾" #12 hex head SMS, self-drilling and non-self-drilling. Multiple coatings will be included (TBD)

Configurations: Control and conditioned configurations will be tested. Conditioned configurations include installed in aluminum, installed and removed

Install methods: Impact gun, potentially both hex driver and lobular driver

Suppliers: samples will be procured from at least two manufacturers.

Number of variants for #10: **54 samples** are required for this sequence. Control (3 coating 1 + 3 coating 2) + conditioned types (1) * driver type (2) * install / installed and removed (2) * coating type (2) * manufacturers (2) * repetitions of each (3) = $6 + 2*2*2*2*3 = 54$

Number of variants for #12: **102 samples** are required for this sequence. Control (3 coating 1 + 3 coating 2) + self-drilling and non (2) * conditioned types (1) * driver type (2) * install / installed and removed (2) * coating type (2) * manufacturers (2) * repetitions of each (3) = $6 + 2*1*2*2*2*3 = 102$

Foundation screen enclosure fasteners

Subjects:

- 2 ¼" ¼" D concrete screws. Multiple coatings will be included (TBD)

Configurations: Control and conditioned configurations will be tested. Conditioned configurations include installed through aluminum into concrete or pavers, then removed from the concrete

Install methods: Impact gun

Suppliers: samples will be procured from at least two manufacturers.

Number of variants: **30 samples** are required for this sequence. Control (3 coating 1 + 3 coating 2) + conditioned types (1) * driver type (2) * installed and removed (1) * coating type (2) * manufacturers (2) * repetitions of each (3) = $6 + 1*2*1*2*2*3 = 30$

Test Protocol:

Following TAS 114 Appendix E (references ASTM G85 Annex A5 with modifications)

Requires 140 cycles (12 days) for nails, 180 cycles (15 days) for screws

Test Sequences:

The proposed experimental scope is scheduled for completion over 3 test sequences over a total of 42 days (plus calibration and prep time between sequences TBD).

Sequence number	Fastener type	Required cycles (days)	Number of samples
1	Roofing coil nails	140 (12)	99
2	2" #10 and concrete screws	180 (15)	54 + 30 = 84
3	¾" #12	180 (15)	102
4	TBD (e.g. roof tile screws)	TBD	TBD

Roofing fastener suppliers (more TBD):

Suncoast Roofers Supply

ABC Supply Co. Inc

Enclosure fastener suppliers (more TBD):

All Points Screw, Bolt & Specialty Co.

Millennium Fasteners Inc.

Roofing TAC Feedback

The proposed experimental scope is subject to revision. Roofing TAC and stakeholder feedback should address the selection of subjects, installation configurations, installation methods, appropriate coatings for consideration, number of manufacturers, and fastener suppliers. The maximum capacity for total number of samples that can be tested over 4 test sequences is approximately 500.