research report

# Performance of Steel Products Coated with Zinc and Zinc Alloys in Pressure Treated Wood

RESEARCH REPORT RP07-1

2007

American Iron and Steel Institute

Steel Framing Alliance™

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## PREFACE

This project is part of an ongoing investigation to establish reliable life prediction data for galvanized steel products used with currently available pressure treated woods and to explore ways of making this environment less hostile. This report provides helpful insight on testing methodologies and useful data for researchers and product manufacturers that are relatively familiar with the details of this technical issue.

It is expected that work in this area will continue under the overall leadership and direction of the International Lead Zinc Research Organization.

Research Team
Steel Framing Alliance

# ILZRO ZC-26

# PERFORMANCE OF STEEL PRODUCTS COATED WITH ZINC AND ZINC ALLOYS IN PRESSURE TREATED WOOD

**PREPARED FOR**

**INTERNATIONAL LEAD ZINC RESEARCH ORGANIZATION (ILZRO)**
**2525 MERIDIAN PARKWAY, SUITE 100**
**DURHAM, NC**

**BY**

**NAHB RESEARCH CENTER, INC.**
**UPPER MARLBORO, MD**

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## About the NAHB Research Center

The NAHB Research Center, located in Upper Marlboro, Md., is known as America's Housing Technology and Information Resource. In it's nearly 40 years of service to the home building industry, the Research Center has provided product research and building process improvements that have been widely adopted by home builders throughout the United States. The Research Center carries out extensive programs of information dissemination and interchange among members of the home building industry and between the industry and the public.

## About ILZRO

The International Lead Zinc Research Organization, Inc. was formed in 1958 as a non-profit research foundation. Silver was added to its core group of research metals in 2002 with the launching of the Silver Research Consortium. ILZRO's sponsors include most of the major producers of lead, zinc and silver, and significant numbers of end-users of these metals from among the steel, automotive, die casting, battery, galvanizing and other industries. ILZRO's R&D encompasses the primary applications of lead, zinc and silver, as well as significant work in the areas of the environment and human health. The results of ILZRO R&D efforts are communicated through a variety of forums, including research reports, technical seminars, expert consulting, internet sites and printed publications.

# ZC-26 PROJECT SPONSORS

Arch Chemicals, Inc.

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# AKNOWLEDGEMENTS

This report is the result of efforts of a wide range of participants from ILZRO, the steel industry, the wood preservative industry, the zinc and Galvalume industries, and other related fields. The primary author of this document is Nader Elhajj, P.E. of the NAHB Research Center. Special appreciation is extended to Dr. Frank Goodwin of ILZRO for his guidance through out the project.

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- Arch Chemicals for providing treated wood
- AGA for providing fasteners.

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## ZC-26 - Steering Committee

| | |
|---|---|
| Graeme Anderson | Teck Cominco Metals, Ltd |
| Ken DeSouza | Dofasco |
| Prentiss Douglass | Simpson Strong Tie |
| Nader Elhajj | NAHB Research Center |
| Margie Farabaugh | The Techs |
| Frank Goodwin | International Lead Zinc Research Organization (ILZRO) |
| Bill Hornfeck | The Techs |
| Tom Langill | American Galvanizers Association (AGA) |
| Jay Larson | American Iron and Steel Institute (AISI) |
| Matthew McCosby | U.S. Steel |
| Doug Rourke | International Lead Zinc Research Organization (ILZRO) |
| Phil Schneider | Arch Wood Protection |
| Larry Williams | Steel Framing Alliance |

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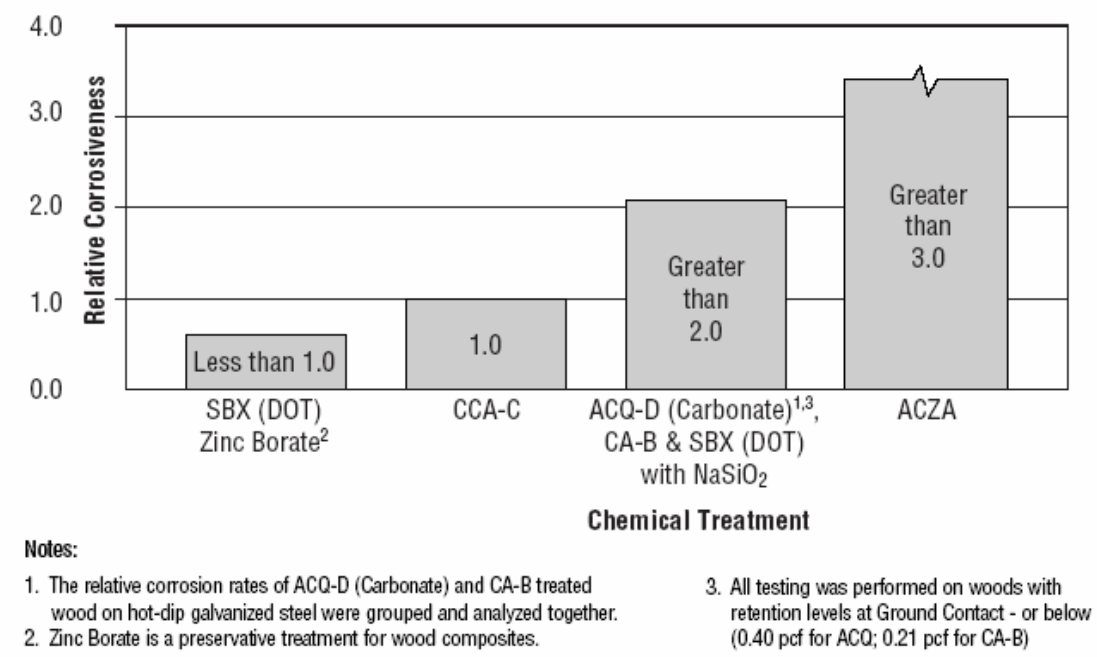
## 1.0 BACKGROUND

Wood products are usually treated with fungicide like chromate copper arsenate (CCA), Creosote, and Pentachlorophenol to fight decay and increase product life span. Moisture and temperature, which vary greatly with local conditions, are the principal factors that affect the rate of wood decay. In the presence of moisture, metals used for fasteners (nails, screws, etc.) may corrode when in contact with wood treated with certain preservative or fire-retardant salts. The decay resistance of hardwood is greatly affected by differences in the preservative qualities of the wood extractives, the attacking fungus, and the conditions of exposure.

The use of chromate copper arsenate (CCA) treatment has been phased out in most residential applications as of December 2003 in the US. This was a voluntary action by the wood preservative industry. There are a number of alternative treatments to CCA ranging from azoles to borates, such as copper azoles (CA), arcylated copper quaternary (ACQ), sodium borate (SB), and ammoniacal copper zinc arsenate (ACZA). Copper content has increased significantly in some treatments and high corrosion rates of galvanized steel connectors and fasteners have been reported. Initial studies on the corrosivity of alternative treatments reported high corrosion rates of galvanized fasteners with some treatments and recommended stainless steel products or steel with thicker zinc coating. Home improvement centers in some markets had already pulled out galvanized fasteners and replaced them with ceramic-coated fasteners that cost approximately twice that of galvanized fasteners.

There aren't many studies done on the performance of metals in alternative treatments to CCA. Figure 1 below shows Simpson Strong-Tie[1] test results of the relative corrosivity of galvanized metals in wood samples treated with different preservatives including CCA (as baseline), ACQ and SB according to AWPA[2] E 12-94 Standard (Tests carried out by Simpson Strong-Tie Co.).

[1] Simpson Strong-Tie, Inc. Technical Bulletin "Preservative Treated Wood". Dublin CA. 2004. http://www.strongtie.com/ftp/bulletins/T-PTWOOD05.pdf.
[2] American Wood Preservers' Association, P.O. Box 388, Selma, AL 36702-0388, USA. www.awpa.com.




Notes:

1. The relative corrosion rates of ACQ-D (Carbonate) and CA-B treated wood on hot-dip galvanized steel were grouped and analyzed together.
2. Zinc Borate is a preservative treatment for wood composites.
3. All testing was performed on woods with retention levels at Ground Contact - or below (0.40 pcf for ACQ; 0.21 pcf for CA-B)

**Figure 1 – Relative corrosivity of treatments compared to CCA using G90 and G185 continuous Hot-Dipped Galvanized steel samples (AWPA E12 tests)**

## 2.0 OBJECTIVE

This research project has the following objectives:

- Develop a test protocol to evaluate the performance of zinc-coated fasteners and sheet steel in wood specimens treated with CCA, CA, ACQ and untreated wood.
- Conduct long-term corrosion tests for zinc-coated fasteners (nails and screws) in wood specimens treated with CCA, CA, ACQ and untreated wood.
- Conduct long-term corrosion tests of zinc-coated and Galvalume steel coupons (heavy and light gauge) in wood specimens treated with CCA, CA, ACQ and untreated wood.

## 3.0 TEST METHOD

### 3.1 Available Test Methods

The most common and widely available accelerated tests to evaluate the corrosion of fasteners and sheet steels in pressure treated wood are:

1. American Wood-Preservers' Association Standard E12-94 *"Standard Method of Determining Corrosion of Metal in Contact With Treated Wood."*

2. ASTM B117-03[3] *"Standard Practice for Operating Salt Spray (Fog) Apparatus."*

The AWPA E12 test method was promulgated to enable the user to determine corrosion rates of treated wood for a specific set of metals. It, however, was not originally designed to test specific types of fasteners. The test method currently does not provide meaningful data to users and specifiers of treated wood.

As with AWPA E12, there are several concerns with ASTM B117 salt spray test when trying to rank the corrosion performance of fasteners and connectors. The reason that the ASTM B117 test methods do not accurately reproduce corrosion performance for fasteners and connectors is that they do not accurately reproduce the conditions in which these components are installed. For one thing, fasteners and connectors tested in a salt-spray cabinet are continuously wet, while those components on a structures experience periods of wetness and dryness.

Another difference between the conditions in a salt spray test and real-world conditions is the salt concentration. Salt spray tests use solutions with a very high salt concentration (as high as 5%) that is much higher than concentrations found in the real world.

Currently, the AWPA, International Staple, Nail, and Tool Association (ISANTA), the American Galvanizers Association (AGA), and the International Lead Zinc Research Organization (ILZRO) are all actively working to develop an improved consensus standard that will give better real life predictability to these tests and result in better use recommendations.

## 3.2 Recommended Test Method

In the absence of an improved consensus standard, the following test method was recommended by the project steering committee to be used for testing the fasteners and sheet steel specimens for this project:

- Prepare specimens and place in environmental chamber with the following conditions:
  - Temperature 49°C ± 1°C (120°F)
  - Relative Humidity 90% (± 1%)

[3] ASTM B117-03 "*Standard Practice for Operating Salt Spray (Fog) Apparatus." American Society of Testing and Materials (ASTM).* West Conshohocken, PA.

- Water spray specimens with de-ionized water in the chamber daily for 15-30 minutes
- Keep steel specimens in the chamber for 30 days, 60 days, and 180 days.
- Keep fastener specimens in the chamber for 15 days, 30 days, and 90 days.

# 4.0 MATERIALS

## 4.1 Wood Specimens

Wood blocks used for testing were treated with different treatments (i.e., preservative) as shown in Table 1. All wood specimens were received in dry condition. Table 2 shows the results from the actives analyses for the different treatments used in Table 1. These are in pounds of active per cubic foot of wood. Preservative retention in the wood is commercially determined by multiplying the percent of analyte by the average density of oven dry wood. In the case of southern pine, the industry accepted value is 32 pounds of wood per cubic foot of wood (513 Kg/m$^3$).

**Table 1 – Wood Specimens Used for Testing**

| Wood Species | Treatment | Retention |
|---|---|---|
| Southern Yellow Pine (SYP) | Chromated Copper Arsenate (CCA) | 0.4 lb/ft$^3$ |
| | Copper Azoles (CA-B) | 0.2 lb/ft$^3$ |
| | Alkaline Copper Quaternary Ammonium Compound (ACQ) | 0.4 lb/ft$^3$ |
| Spruce Pine Fir (SPF) | Un-treated (UN) | 0 |
| For SI: 1 lb/ft$^3$ (pcf) = 16 Kg/m$^3$ | | |

**Table 2 – Analysis of Actives in Wood Samples (pcf Based on Wood Density of 32 pcf)**

| Preservative | CuO | Cr $O_3$ | $AS_2O_5$ | Cu | Teb or Quart | Total Cu | Total Actives |
|---|---|---|---|---|---|---|---|
| CCA | 0.083 | 0.193 | 0.138 | NA [1] | NA [1] | 0.066 | 0.414 |
| CA-B | NA [1] | NA [1] | NA [1] | 0.211 | 0.0074 | 0.211 | 0.219 |
| ACQ Type D w/carboquat | 0.237 | NA [1] | NA [1] | NA [1] | 0.0979 | 0.189 | 0.335 |

For SI: 1 lb/ft$^3$ (pcf) = 16 Kg/m$^3$
[1] N/A = Not applicable analyte.

### 4.2 Sheet Steel Specimens

Steel specimens used for testing represented a variety of thicknesses and coating types as shown in Table 2a.

The regular galvanized sheet coatings (G60, G90, and G185) had a small amount (about 0.18-0.25%) Aluminum added to the zinc per normal industrial practice. The Galvalume (AZ) coatings were nominally 55% Aluminum, 1.6% Silicon, and 43.4% Zinc (Zn). The chrome (Cr) layer on AZ is lighter than on Zn because of the different reactivity of these coatings with Cr.

All sheet steel samples were with sheared, unprotected edges.

### 4.3 Fastener Specimens

Fasteners used for testing represented two different fastener types (nails and screws) with two different coating each as shown in Table 3.

**Table 3 – Sheet Steel and Fastener Specimens Used for Testing**

| Sheet Steel Specimens | | | Fastener Specimens |
|---|---|---|---|
| **Steel Type** | **Coating** | **Coating Weight** | |
| Chromated Galvanized | G60 | 0.6 oz/ft$^2$ [a][b] | Hot Galvanized Nails<br>HD Galvanized Screws (Maze S263)<br>Hot Galvanized Screws |
| | G90 | 0.9 oz/ft$^2$ [a][b] | |
| | G185 | 0.185 oz/ft$^2$ [a][b] | |
| Galvanized plus Acrylic | G90 | 0.9 oz/ft$^2$ [a] | |
| Chromated Galvalume | AZ50 | 10 to 20 mg/m$^2$ of Acrylic per side | |
| Galvalume plus Acrylic | AZ55 | 15 mg/m$^2$ | |

For SI: 1 oz/ft$^2$ = 304 g/m$^2$

[a] Weight on both sides

[b] 10 to 20 mg/m$^2$ of Acrylic per side

## 5.0 TEST SPECIMENS

Tables 4 and 5 show the test matrix for sheet steel and fasteners that were tested in this research project, respectively.

**Table 4 – Sheet Steel Test Matrix**

| Specimen Type | Steel Type | Coating | Treated Wood | No. of Tests | | |
|---|---|---|---|---|---|---|
| | | | | First Pull | Second Pull | Final Pull |
| Heavy Gauge Sheet Steel 16 Gauge (54 Mil) | Chromated Galvanized | G60 | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Chromated Galvanized | G185 | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Chromated Galvalume | AZ 50 | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Galvalume plus Acrylic | AZ 55 | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| Light Gauge Sheet Steel 20, 23, and 27 Gauge (33, 24, 14 Mil) | Chromated Galvanized | G90 LG | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Galvanized plus Acrylic | G90 LG | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Chromated Galvalume | AZ 50 LG | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |
| | Galvalume plus Acrylic | AZ 55 LG | CCA | 3 | 3 | 3 |
| | | | ACQ | 3 | 3 | 3 |
| | | | CA | 3 | 3 | 3 |
| | | | Untreated | 3 | 3 | 3 |

For SI: 1 mil = 0.0254 mm

**Table 5 – Fastener Test Matrix[1,2]**

| Specimen Type | Coating | Fastener Brand | Fastener Size[1] | Wood Treatment | No. of Tests | | |
|---|---|---|---|---|---|---|---|
| | | | | | First Pull | Second Pull | Final Pull |
| Nails | HD Galvanized | Maze S263 | 8d x 1.5” | CCA | 3 | 3 | 3 |
| | Hot Galvanized | | | CCA | 3 | 3 | 3 |
| | HD Galvanized | Maze S263 | | ACQ | 3 | 3 | 3 |
| | Hot Galvanized | | | ACQ | 3 | 3 | 3 |
| | HD Galvanized | Maze S263 | | CA | 3 | 3 | 3 |
| | Hot Galvanized | | | CA | 3 | 3 | 3 |
| | HD Galvanized | Maze S263 | | Untreated | 3 | 3 | 3 |
| | Hot Galvanized | | | Untreated | 3 | 3 | 3 |
| Screws | HD Galvanized | Zinclad | #10x1.5” | CCA | 3 | 3 | 3 |
| | Hot Galvanized | | | CCA | 3 | 3 | 3 |
| | HD Galvanized | Zinclad | | ACQ | 3 | 3 | 3 |
| | Hot galvanized | | | ACQ | 3 | 3 | 3 |
| | HD Galvanized | Zinclad | | CA | 3 | 3 | 3 |
| | Hot galvanized | | | CA | 3 | 3 | 3 |
| | HD Galvanized | Zinclad | | Untreated | 3 | 3 | 3 |
| | Hot galvanized | | | Untreated | 3 | 3 | 3 |

For SI: 1 inch = 25.4 mm
[1] Fasteners are spaced at a minimum of 10 times the diameter of the fastener.
[2] All fasteners were galvanized.

## 6.0 SPECIMEN PREPARATION AND TEST PROCESS

The following describes specimen preparation and testing processes.

### 6.1 Sheet Steel Specimens (see photos 1 through 16 in Appendix A).

a. Sheet steel samples were cut into rectangles 1-1/2” wide by 4” long (12.7 x 102 mm).
b. Each sheet steel specimen was properly labeled (i.e., coating type)
c. All wood blocks were lightly sanded to ensure a smooth surface.
d. Each steel sample was pre-drilled two 3/16” (4.77 mm) diameter holes, one close to each end.
e. Each steel sample was placed on top of a wood block and fastened with two nail through the pre-drilled holes.
f. A hammer with rubber head was used to drive the nails through the wood blocks.

g. Nails used were J-148 Hanger Nails (1-1/2" long, D = 0.156") for the 16 gauge steel, and MAZE S263 for the thinner gauge steel. All fasteners used were galvanized.
h. The wood block can be as long and as wide as needed.
i. The prepared samples were placed in the environmental chamber.
j. Steel samples were tested as described in Section 3.2.
k. First pull was after 30 days. Second pull was after 60 days. Final pull was after 180 days.
l. Each Pull:
    i. Three (3) specimens from each type of wood treatment and each coating type were retrieved from the chamber.
    ii. The wood block was carefully split to retrieve the specimen without damaging the specimen.
    iii. Steel specimens were weighed as they come out of the wood block.
    iv. The retrieved specimens were cleaned as described in Section 7.0.

## 6.2 Fastener Specimens

a. Treated and un-treated wood were conditioned in the environmental chamber for 30 days under the same conditions as described in the recommended test method in Section 3.2.
b. Each fastener was weighed before being driven into the wood block.
c. The diameter of each fastener is measured before being driven into the wood block.
d. The same number and type of fasteners are weighed and set aside outside the chamber as the ones driven in wood blocks.
e. A hammer with rubber head is used to drive nails through wood. No pre-drilling was used in the wood blocks.
f. Fasteners were spaced at 10d apart (about 1-1/2") (38 mm).
g. Wood blocks were of slightly different dimensions.
h. Prepared samples are placed in the environmental chamber.
i. Fastener samples were tested as described in Section 3.2.
j. First pull was after 15 days. Second pull was after 30 days. Final pull was after 90 days.
k. Each Pull:
    i. Three (3) fasteners from each type of wood treatment and for each type of fastener were removed from the chamber.
    ii. The wood block was carefully split to retrieve the fasteners without damaging the fastener or the fastener head.
    iii. Each retrieved fastener was weighed as it came out of the wood block.

iv. An exact number and type of fasteners was taken from the untested ones (outside the chamber).
v. The retrieved specimens were cleaned as described in Section 7.2.

## 7.0 CLEANING PROTOCOL

Different cleaning methods were used for the steel and the fastener specimens as described in Sections 7.1 and 7.2.

### 7.1 Sheet Steel Specimens

Sheet steel specimens were cleaned in two stages:

Stage 1: Mechanical cleaning that consisted of lightly brushing the corrosion byproducts of the specimen

Stage 2: Chemical cleaning as described below:

a. 8.5% concentrated HCL solution (1.5 specific gravity)
b. Solution kept at ambient temperature.
c. Steel specimens were dipped in solution for 15 seconds, repeated six times.
d. Steel specimens were dried.
e. Steel specimens were weighed immediately after they were out of the solution and dried.

### 7.2 Fastener Specimens

Fastener coatings were chemically stripped (corroded, tested, and un-corroded, untested, ones) using the following steps:

a. A beaker of sufficient size was used with some room left at top as some foaming could occur
b. Beaker was set in a shallow Pyrex dish with some water in case foam overflows the beaker.
c. Approximately 30-50% HCl acid was mixed with distilled or de-ionized water (50% of 36% HCl = ~16% acid)
d. Acid was always added to water, not water to acid (solution gets warm as acid mixes)
e. 1% inhibitor was used, 10mL /Liter of Acid solution
f. Specimens were dipped in 50% HCL solution mixed with 3% inhibitors.
g. De-ionized water was used to make the solution
h. Solution kept at ambient temperature
i. Fasteners were dipped in solution for 3 minutes.
j. Fasteners were rinsed with water immediately after removing from solution

k. Fasteners were dried
l. Fasteners were weighed immediately after they are out of the solution and dried
m. The diameter of each cleaned fastener is measured and recorded

# 8.0 RETREIVALS

## 8.1 Sheet Steel Specimens

Four different types of sheet steel (Chromated Galvanized, Galvanized plus Acrylic, Chromated Galvalume, and Galvalume plus Acrylic) were tested for 30-, 60-, and 180-days. Photos of selected specimens after retrieval are shown in photos 17 through 28 of Appendix A.

### 8.1.1 30-Day Retrievals

A total of ninety-six (96) samples were retrieved after 30 days of being placed inside the chamber. List of the retrieved specimens is shown in Table 6. Three samples for each coating/ treatment were retrieved. The specimens were kept in the chamber for a total of 768 hours. The final weight and the weight loss of each of the retrieved specimens are shown in Tables B1 and B2 (Appendix B). Concerns about the adequacy of the coating thickness were raised for the G60 galvanized samples. These samples were discarded after the 30-day pull and new samples were made and placed in the chamber in December 2005. Results of the new G60 samples 30-day retrieval are shown in Table B3.

### 8.1.2 60-Day Retrievals

A total of ninety six (96) samples were retrieved after 60 days of being inside the chamber. Summary of the retrieved samples is shown in Table 6. Three samples for each coating/ treatment were retrieved. The specimens were kept in the chamber for a total of 1512 hours. The final weights and the weight loss of the retrieved samples are shown in Tables B4, B5, and B6.

### 8.1.3 180-Day Retrievals

A total of ninety six (96) samples were retrieved after 180days of being inside the chamber. Summary of the retrieved samples is shown in Table 6. Three samples for each coating/ treatment were retrieved. The specimens were kept in the chamber for a total of 4,440 hours. The final weights and the weight loss of the retrieved samples are shown in Tables B7, B8, and B9.

**Table 6 – 30-, 60-, and 180-Day Retrieval Summary**

| Steel Type | Coating | Treated Wood | Date Placed in Chamber | Date 30-Day Pull | Date 60-Day Pull | Date 180-Day Pull |
|---|---|---|---|---|---|---|
| Galvanized | G60 | CCA | 8/22/2005 | 9/23/2005 | - | - |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvanized | G185 | CCA | 8/22/2005 | 9/23/2005 | 10/24/2005 | 2/23/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvanized (New) | G60-N | CCA | 12/21/2005 | 1/22/2006 | 2/23/2006 | 6/26/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Chromated Galvalume | AZ50 | CCA | 8/22/2005 | 9/23/2005 | 10/24/2005 | 2/23/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvalume + Acrylic | AZ55 | CCA | 8/22/2005 | 9/23/2005 | 10/24/2005 | 2/23/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvanized (Light Gauge) | G90 LG | CCA | 8/22/2005 | 9/23/2005 | 10/24/2005 | 2/23/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvanized + Acrylic (Light Gauge) | G90 LG | CCA | 9/23/2005 | 10/24/2005 | 11/23/2005 | 3/27/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Chromated Galvalume (Light Gauge) | AZ50 LG | CCA | 9/23/2005 | 10/24/2005 | 11/23/2005 | 3/27/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Galvalume + Acrylic (Light Gauge) | AZ55 LG | CCA | 9/23/2005 | 10/24/2005 | 11/23/2005 | 3/27/06 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |

## 8.2 Fastener Specimens

Two nail types and two screw types were tested for 15-, 30-, and 90-days. Photos of selected specimens after retrieval are shown in photos 29 through 47 of Appendix A.

### 8.2.1 15-Day Retrievals

A total of forty eight (48) fastener specimens were retrieved after 15 days of being inside the chamber. Summary of the retrieved samples is shown in Table 7. The specimens were kept in the chamber for a total of 360 hours. A similar number of nails and screws (total of 48) were kept outside the chamber. These specimens were cleaned and weighted as described in Section 7. Weight loss and change in diameter for the tested specimens are shown in Tables B10 and B11. Results of the un-tested specimens (outside chamber) are shown in Tables B12 and B13.

### 8.2.2 30-Day Retrievals

A total of forty eight (48) fastener samples were retrieved after 30 days of being inside the chamber. Summary of the retrieved samples is shown in Table 7. The specimens were kept in the chamber for a total of 744 hours. A similar number of nails and screws (total of 48) were kept outside the chamber. These specimens were cleaned and weighted as described in Section 7. Weight loss and change in diameter for the tested specimens are shown in Tables B14 and B15. Results of the un-tested specimens (outside chamber) are shown in Tables B16 and B17.

### 8.2.3 90-Day Retrievals

A total of forty eight (48) fastener samples were retrieved after 90 days of being inside the chamber. Summary of the retrieved samples is shown in Table 7. The specimens were kept in the chamber for a total of 2136 hours. A similar number of nails and screws (total of 48) were kept outside the chamber. These specimens were cleaned and weighted as described in Section 7. Weight loss and change in diameter for the tested specimens are shown in Tables B18 and B19. Results of the un-tested specimens (outside chamber) are shown in Tables B120 and B121.

**Table 7 – 15-, 30-, and 90-Day Fastener Retrieval Summary**

| Fastener Type | Fastener Type | Treated Wood | Date Placed in Chamber | Date of 15-Day Pull | Date of 30-Day Pull | Date of 90-Day Pull |
|---|---|---|---|---|---|---|
| Zinclad | #8x 1.5" Screw | CCA | 02/24/2006 & 03/01/2006 | 03/16/2006 | 04/01/2006 | 05/24/2006 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| 8d Nail | #8x 1.5" Screw | CCA | 02/24/2006 & 03/01/2006 | 03/16/2006 | 04/01/2006 | 05/24/2006 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| Maze S263 | 8dx1.5" Nail | CCA | 02/24/2006 & 03/01/2006 | 03/16/2006 | 04/01/2006 | 05/24/2006 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |
| 8d Nail | 8dx1.5" Nail | CCA | 02/24/2006 & 03/01/2006 | 03/16/2006 | 04/01/2006 | 05/24/2006 |
| | | CA | | | | |
| | | ACQ | | | | |
| | | UN | | | | |

# 9.0 RESULTS

## 9.1 Sheet Steel

Table 8 shows the average mass loss, in grams, for the retrieved sheet steel specimens for the 30-day, 60-day, and 180-day retrievals in the different wood treatments. Figures 2 through 5 show the average weight loss by coating type and by treatment type for both heavy gauge and light gauge specimens.

**Table 8 – Average Sheet Steel Weight Loss**

| Specimen Type | Steel Type | Coating | Treated Wood | Average Weight Loss (grams) | | |
|---|---|---|---|---|---|---|
| | | | | 30-Day | 60-Day | 180-Day |
| Heavy Gauge Sheet Steel | Chromated Galvanized | G60-N | CCA | 0.4008 | 0.4881 | 0.6093 |
| | | | ACQ | 0.6419 | 0.6547 | 0.8577 |
| | | | CA | 0.4873 | 0.4972 | 0.7145 |
| | | | Untreated | 0.2311 | 0.2410 | 0.2850 |
| | Chromated Galvanized | G185 | CCA | 1.2675 | 0.8383 | 1.4365 |
| | | | ACQ | 2.7325 | 2.4797 | 2.9266 |
| | | | CA | 1.1591 | 1.3814 | 1.6029 |
| | | | Untreated | 1.1993 | 1.0847 | 1.2177 |
| | Chromated Galvalume | AZ 50 | CCA | 0.2320 | 0.2816 | 0.4491 |
| | | | ACQ | 0.7252 | 1.5179 | 1.8081 |
| | | | CA | 0.5783 | 1.0894 | 1.4737 |
| | | | Untreated | 0.4623 | 0.2465 | 0.4640 |
| | Galvalume plus Acrylic | AZ 55 | CCA | 0.0900 | 0.1082 | 0.2589 |
| | | | ACQ | 0.7252 | 0.5399 | 0.6337 |
| | | | CA | 0.8011 | 1.0955 | 1.2715 |
| | | | Untreated | 0.1092 | 0.1931 | 0.2592 |
| Light Gauge Sheet Steel | Chromated Galvanized | G90 LG | CCA | 0.5032 | 0.3855 | 0.6509 |
| | | | ACQ | 1.2277 | 1.3980 | 1.4185 |
| | | | CA | 0.5181 | 0.4295 | 0.6280 |
| | | | Untreated | 0.3783 | 0.0952 | 0.4225 |
| | Galvanized plus Acrylic | G90 LG | CCA | 0.4067 | 0.4170 | 0.4677 |
| | | | ACQ | 0.7741 | 0.7825 | 0.9720 |
| | | | CA | 0.4246 | 0.4981 | 0.6241 |
| | | | Untreated | 0.5810 | 0.1080 | 0.5216 |
| | Chromated Galvalume | AZ 50 LG | CCA | 0.0245 | 0.1174 | 0.1674 |
| | | | ACQ | 0.1646 | 0.2795 | 0.4335 |
| | | | CA | 0.1741 | 0.2759 | 0.4515 |
| | | | Untreated | 0.0270 | 0.0527 | 0.1379 |
| | Galvalume plus Acrylic | AZ 55 LG | CCA | 0.0093 | 0.0098 | 0.0524 |
| | | | ACQ | 0.0958 | 0.2065 | 0.2681 |
| | | | CA | 0.1127 | 0.1173 | 0.1583 |
| | | | Untreated | 0.0101 | 0.0225 | 0.0381 |

For SI: 1 mil = 0.0254 mm, 1 pound = 453.6 grams

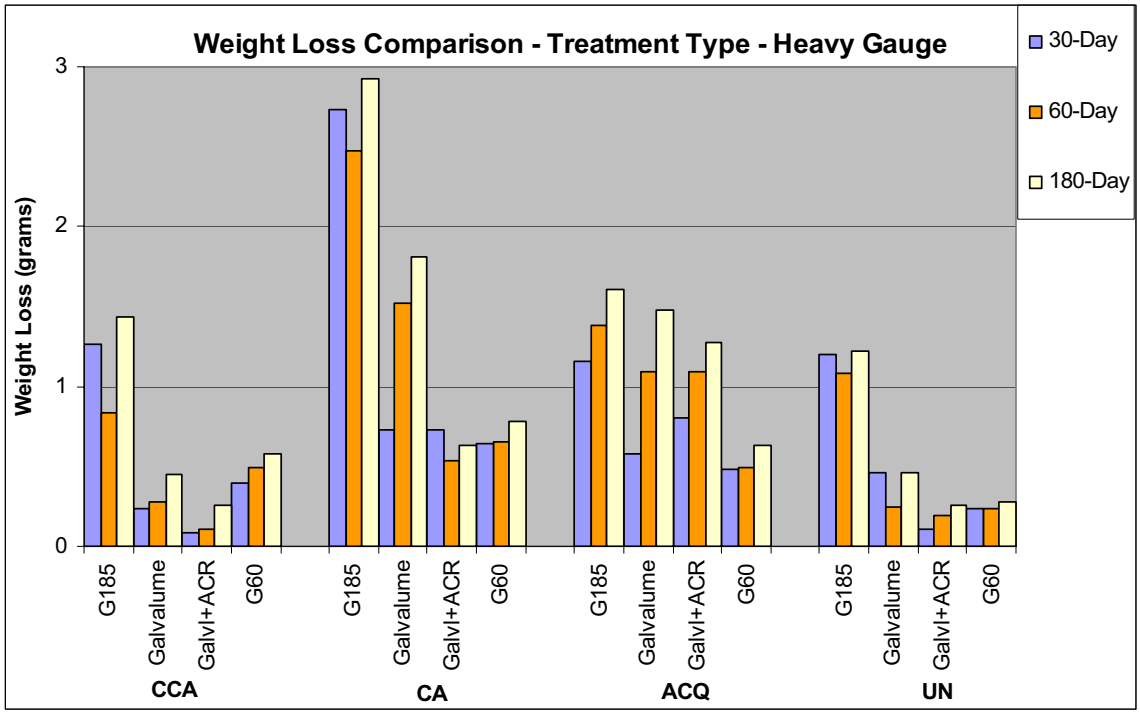



**Figure 2 – Average Mass Loss Comparison – Treatment Type – Heavy Gauge**

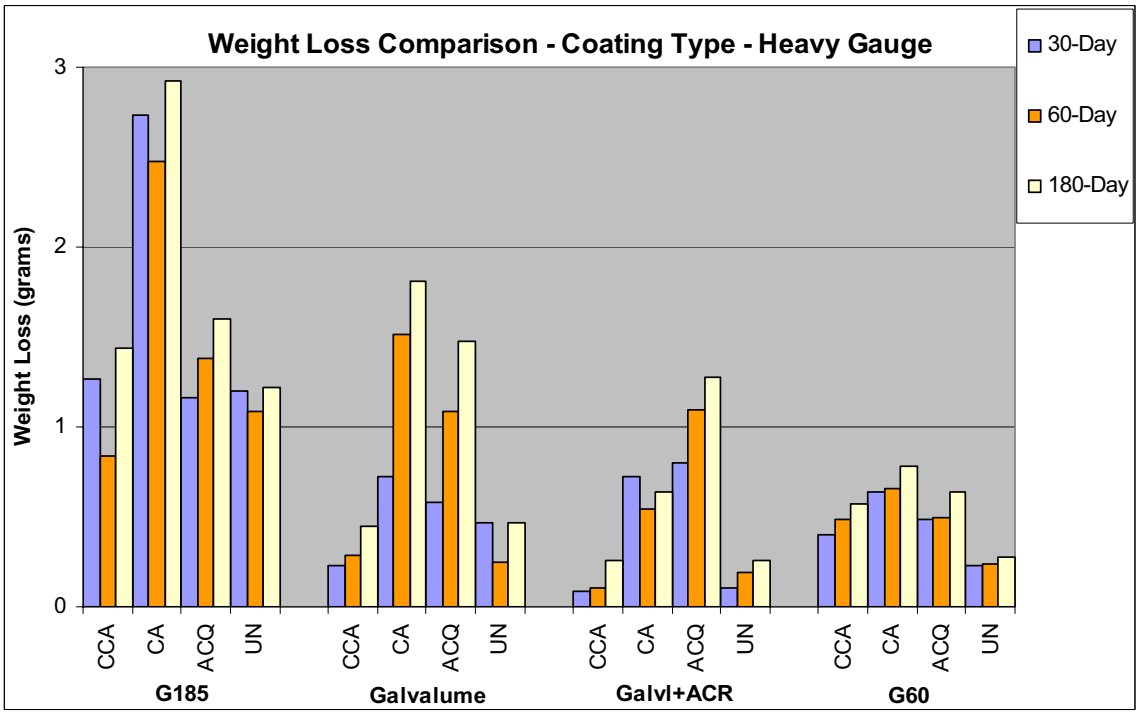



**Figure 3 – Average Mass Loss Comparison – Coating Type – Heavy Gauge**

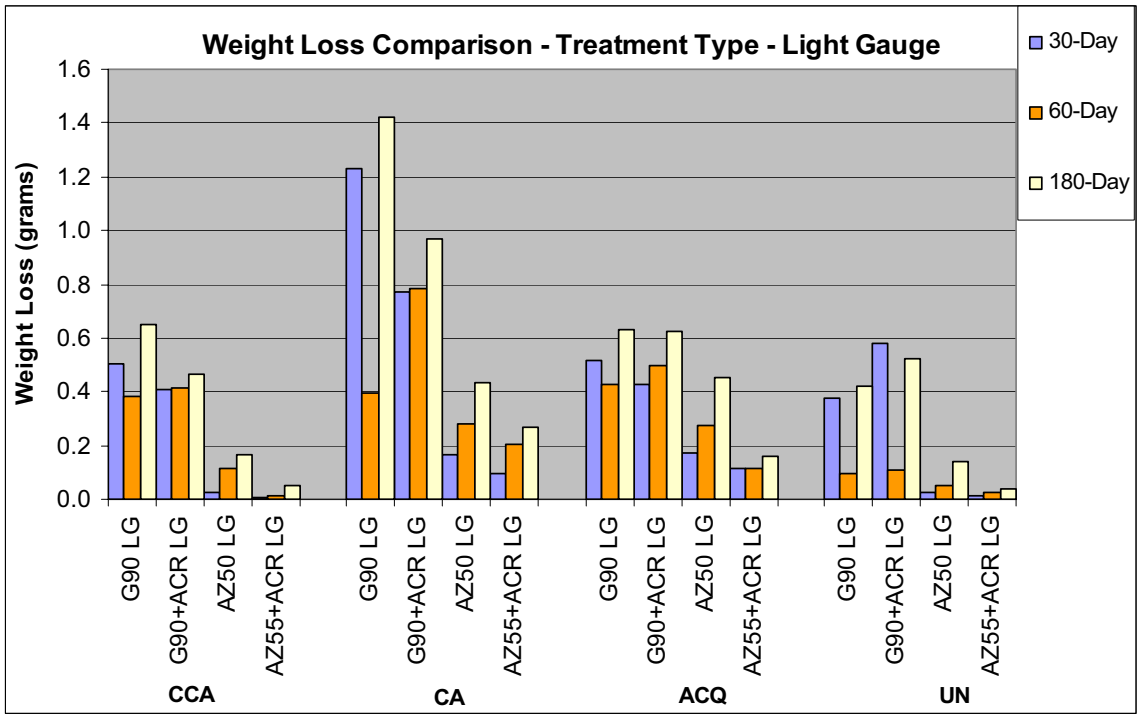



**Figure 4 – Average Mass Loss Comparison – Treatment Type – Light Gauge**

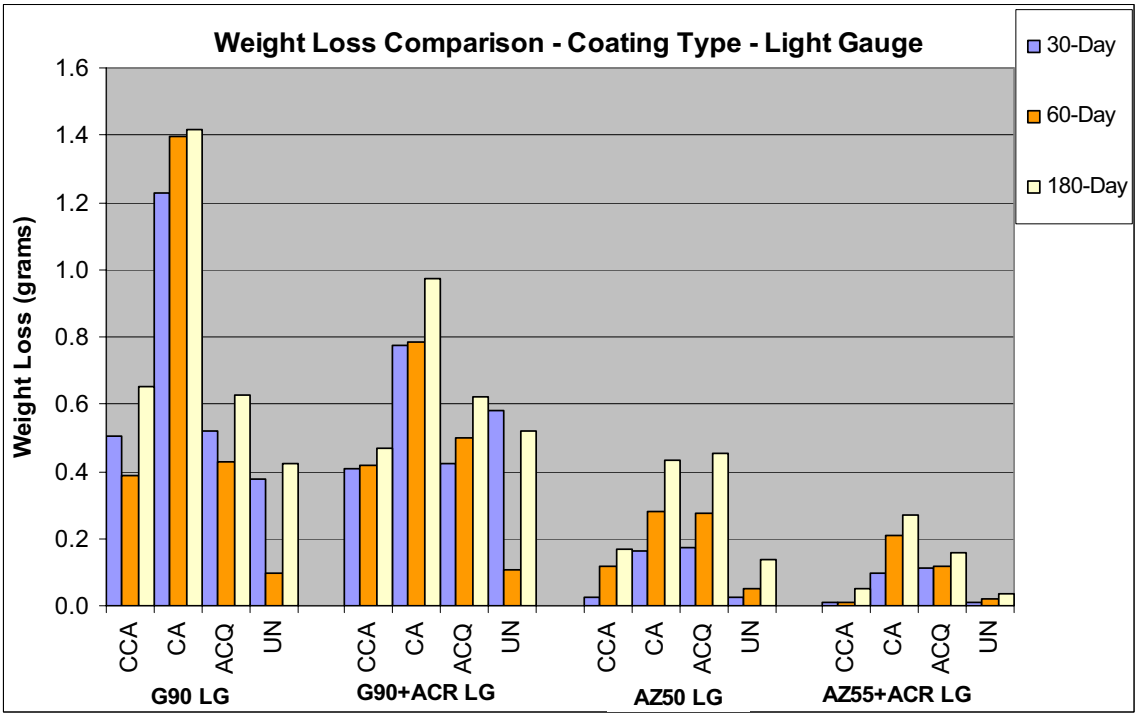



**Figure 5 – Average Mass Loss Comparison – Treatment Type – Light Gauge**

## 9.2 Fasteners

Table 9 shows the average mass loss, in grams, for the retrieved fastener specimens for the 15-day, 30-day, and 90-day retrievals in the different wood treatments. Figures 6 through 9 show the average weight loss by treatment type for both nails and screws.

**Table 9 – Average Fastener Weight Loss**

| Fastener Type | Steel Type | Treated Wood | Average Weight Loss (grams) | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 15-Day | | 30-Day | | 90-Day | |
| | | | Test | Control | Test | Control | Test | Control |
| Screws | Zinclad | CCA | 0.1966 | 0.1537 | 0.2633 | 0.236 | 0.2673 | 0.2304 |
| | | ACQ | 0.2103 | 0.0891 | 0.23 | 0.2261 | 0.2367 | 0.2421 |
| | | CA | 0.1966 | 0.1858 | 0.2253 | 0.208 | 0.2401 | 0.2119 |
| | | Untreated | 0.2191 | 0.0897 | 0.2202 | 0.2253 | 0.2364 | 0.2282 |
| | HGS | CCA | 0.0167 | 0.0152 | 0.0236 | 0.0149 | 0.0242 | 0.0149 |
| | | ACQ | 0.0169 | 0.0144 | 0.0223 | 0.0151 | 0.0218 | 0.0175 |
| | | CA | 0.0165 | 0.0165 | 0.019 | 0.0157 | 0.0235 | 0.0172 |
| | | Untreated | 0.0145 | 0.016 | 0.0159 | 0.0156 | 0.0167 | 0.0151 |
| Nails | S263 | CCA | 0.1438 | 0.1347 | 0.1543 | 0.1459 | 0.161 | 0.1429 |
| | | ACQ | 0.1288 | 0.1827 | 0.1353 | 0.1282 | 0.1347 | 0.1362 |
| | | CA | 0.1371 | 0.1375 | 0.1561 | 0.1417 | 0.1617 | 0.1402 |
| | | Untreated | 0.1275 | 0.1423 | 0.1419 | 0.1483 | 0.1491 | 0.1473 |
| | HGN | CCA | 0.1507 | 0.1639 | 0.1679 | 0.1707 | 0.1672 | 0.1743 |
| | | ACQ | 0.1682 | 0.1823 | 0.1846 | 0.1759 | 0.1978 | 0.188 |
| | | CA | 0.1859 | 0.1789 | 0.1885 | 0.1905 | 0.1892 | 0.2001 |
| | | Untreated | 0.1693 | 0.1696 | 0.1704 | 0.1657 | 0.176 | 0.1759 |

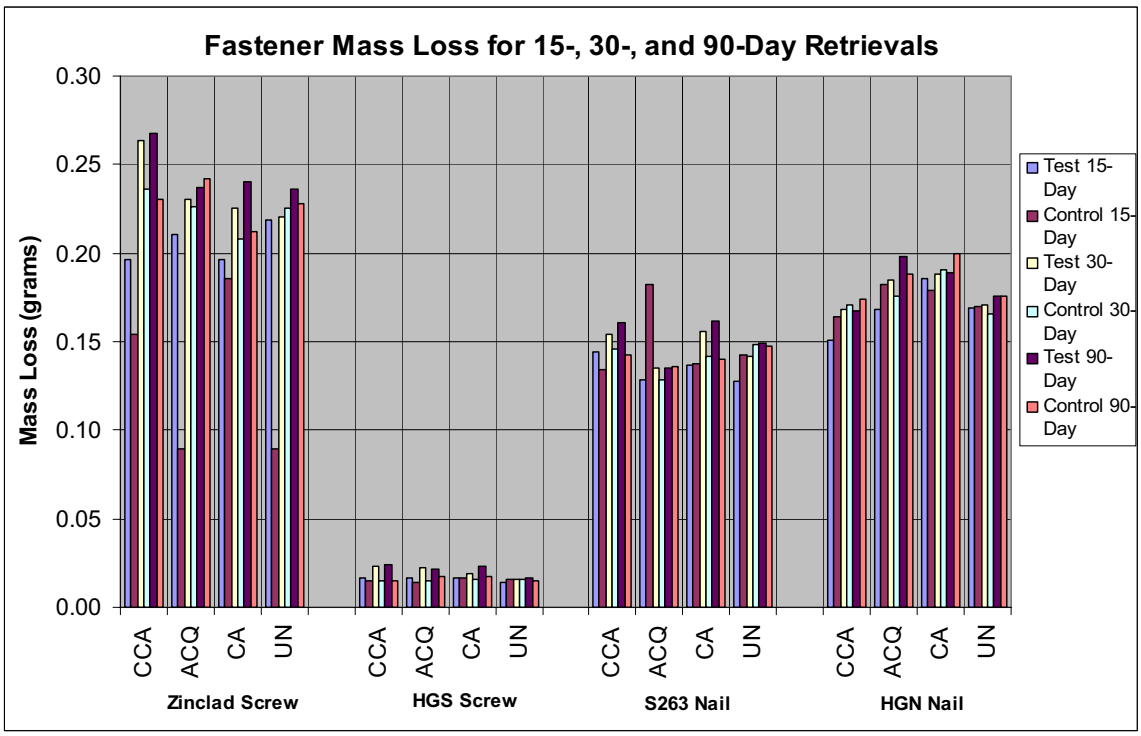



**Figure 6 – Average Fastener Mass Loss Comparison – All Retrievals**

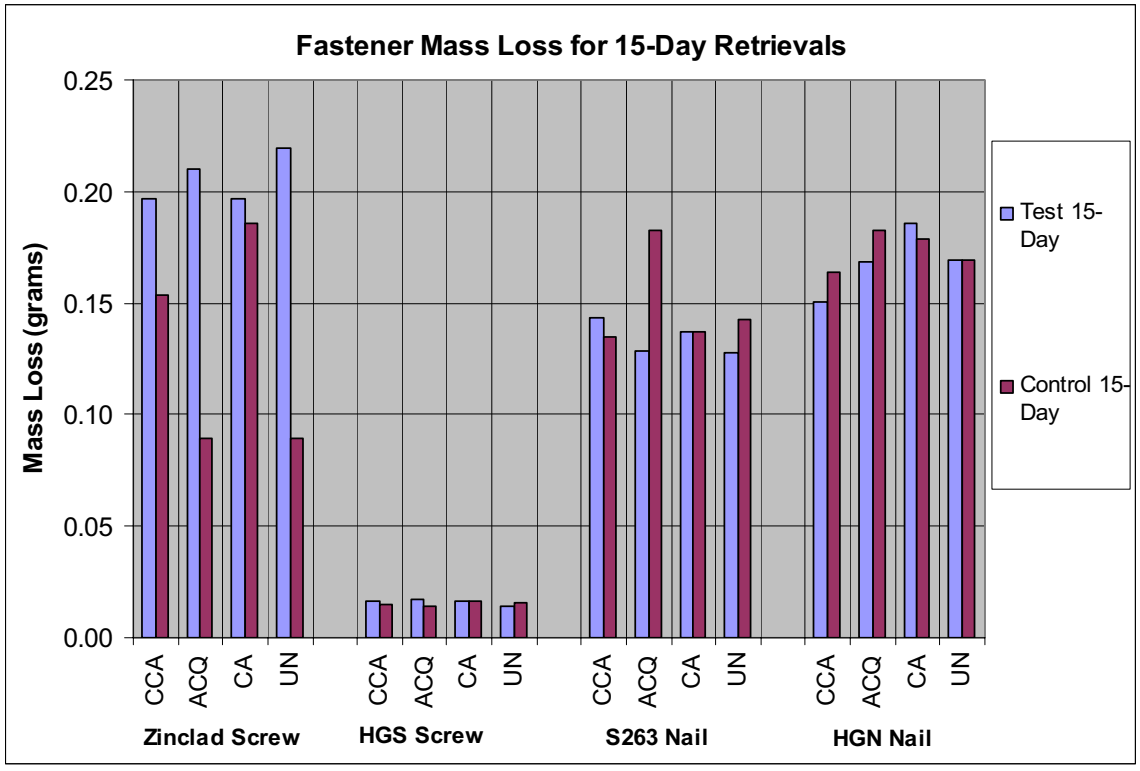



**Figure 7 – Average Fastener Mass Loss – 15-Day Retrieval**

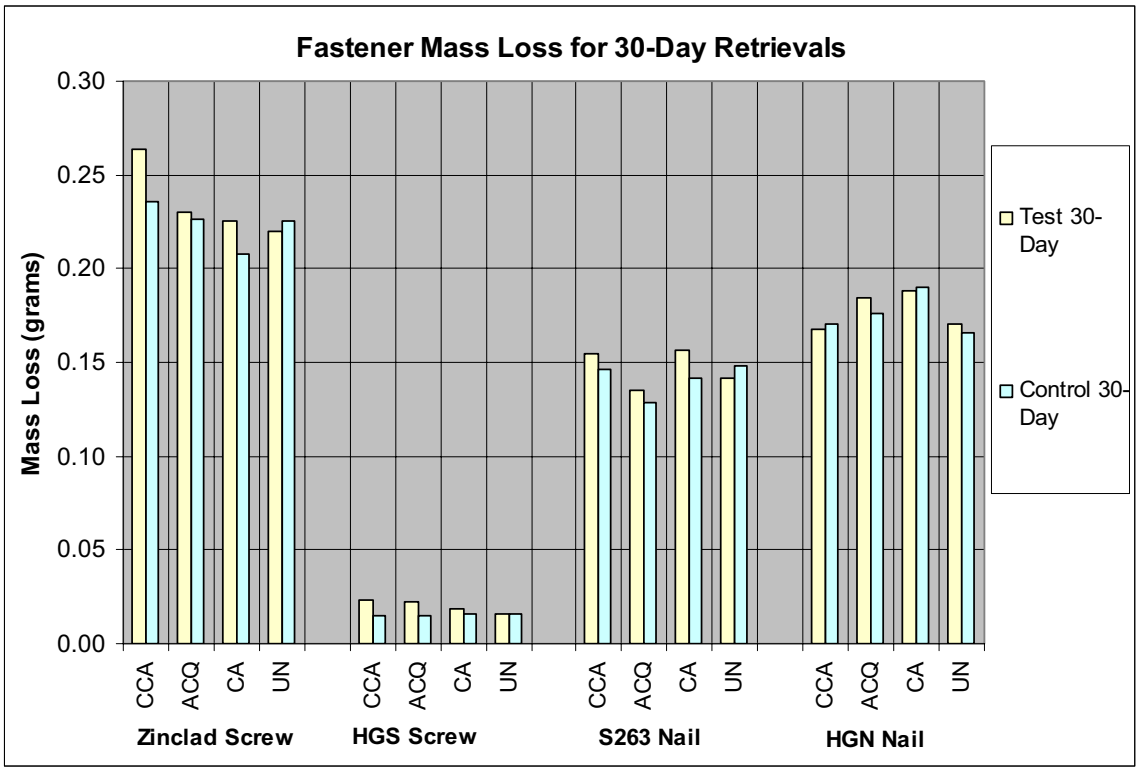



**Figure 8 – Average Fastener Mass Loss – 30-Day Retrieval**

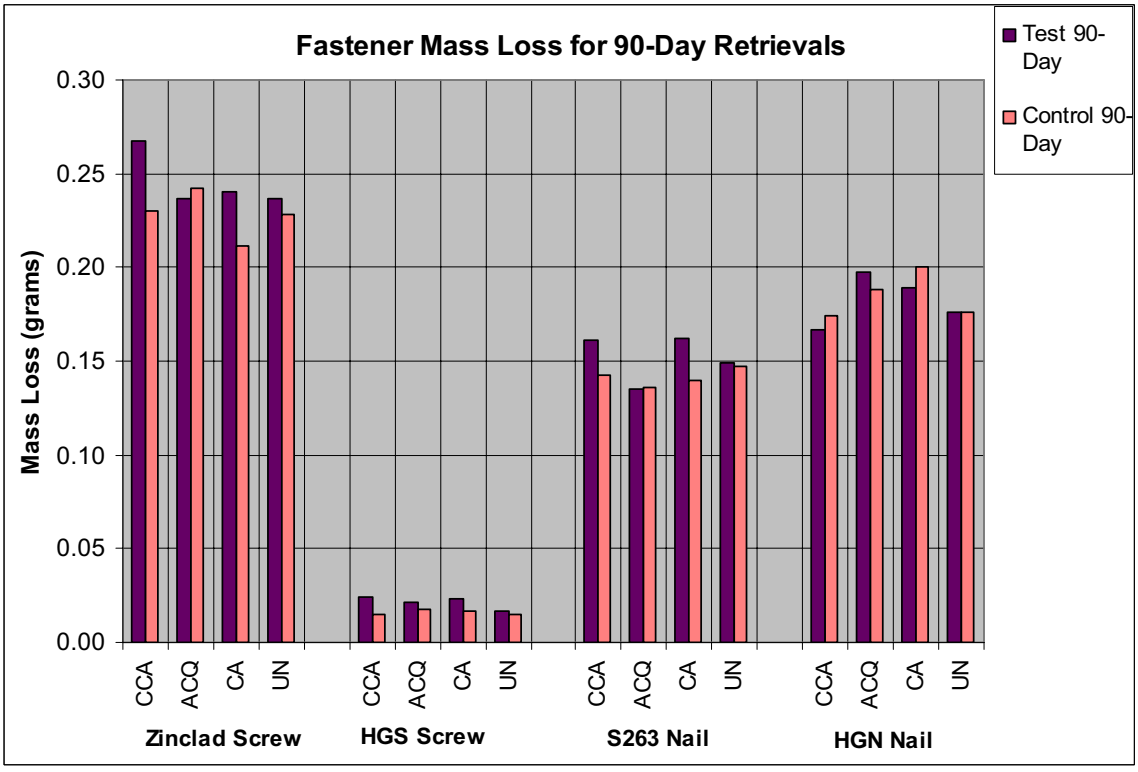



**Figure 9 – Average Fastener Mass Loss – 90-Day Retrieval**

## 10.0 SUMMARY

A total of 300 sheet steel specimens and 288 fastener specimens were tested and retrieved at intervals ranging from 30 to 180 days for sheet steel specimens and 15 to 180 days fastener specimens. Testing was conducted in accordance with a modified (cyclic) AWPA E12 test method to simulate cyclic wetness of the specimens. Most retrieved sheet steel specimens showed small traces of red rust after thirty days. The following observations are made from the retrieved sheet steel specimens:

1. The G-185 galvanized steel specimens had the most weight loss amongst the heavy gauge specimens in all wood treatments compared to other coating types.
2. The G-185 galvanized steel specimens in CA treated wood showed the most weight loss for both the 30-day and 60-day period compares to other treated wood.
3. The weight loss of almost all specimens stabilized after the initial 30-day period. The 60-day and 180-day weight loss was slightly higher, but not significantly higher, than the 30-day weight loss.
4. The G-90 plus acrylic coated steel specimens had the most weight loss amongst the light gauge specimens in all wood treatments compared to other coating types.
5. Light gauge steel specimens in contact with CA treated wood had the most weight loss compared to other wood treatment types.

The following observations are made from the retrieved fastener specimens:

1. Both nail and screw fasteners showed very little weight loss (corrosion) after being in the test chamber for up to 90 days.
2. Hot dipped galvanized screws showed the least amount of weight loss after cleaning (not necessarily the least amount of corrosion though).
3. Zinclad screws had the highest weight loss after cleaning.
4. The weights of the fasteners after cleaning were about the same for tested and untested specimens.
5. The different treatments did not have a significant impact on the weight loss of the fasteners (after cleaning).

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# APPENDIX A – TEST PHOTOS


**Photo 1 – Wood Blocks**

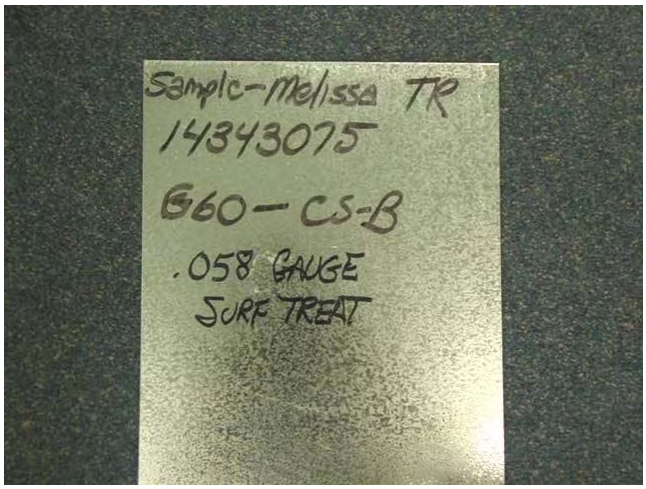


**Photo 2 – Sheet Steel**

**Photo 3 – Steel Types**

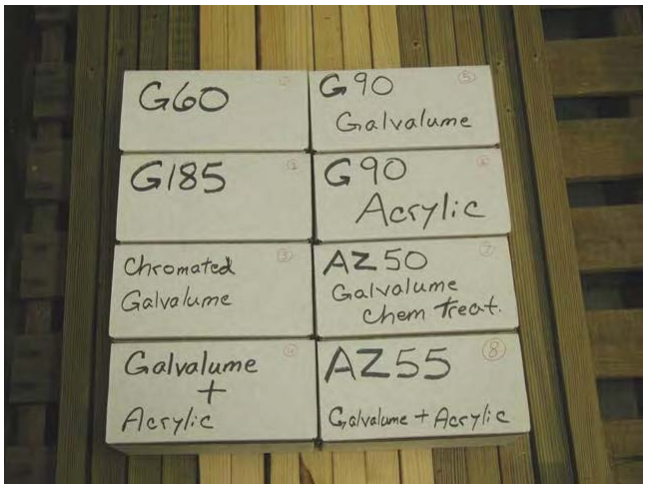


**Photo 4 – Steel Specimens**

**Photo 5 – Pre-Drilling Holes in Steel Coupons**

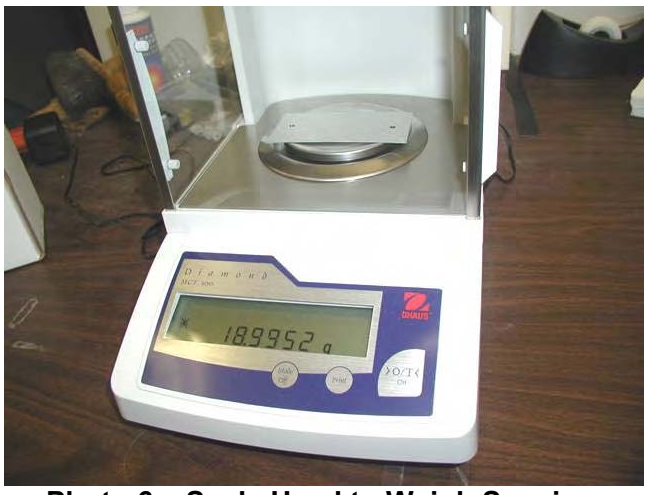


**Photo 6 – Scale Used to Weigh Specimens**

**Photo 7 – Driving Nails Through Specimen**


**Photo 8 – Specimen Ready For Testing**

**Photo 9 – Environmental Chamber**

**Photo 10 – Racks Within the Chamber**

**Photo 11 – Drainage for Each Rack**

**Photo 12 – Specimen inside Chamber**

**Photo 13 – De-Ionized Water for Spraying**

**Photo 14 – Equipment Used for Spraying**

**Photo 15 – Daily Spraying**

**Photo 16 – Specimens After Spraying**

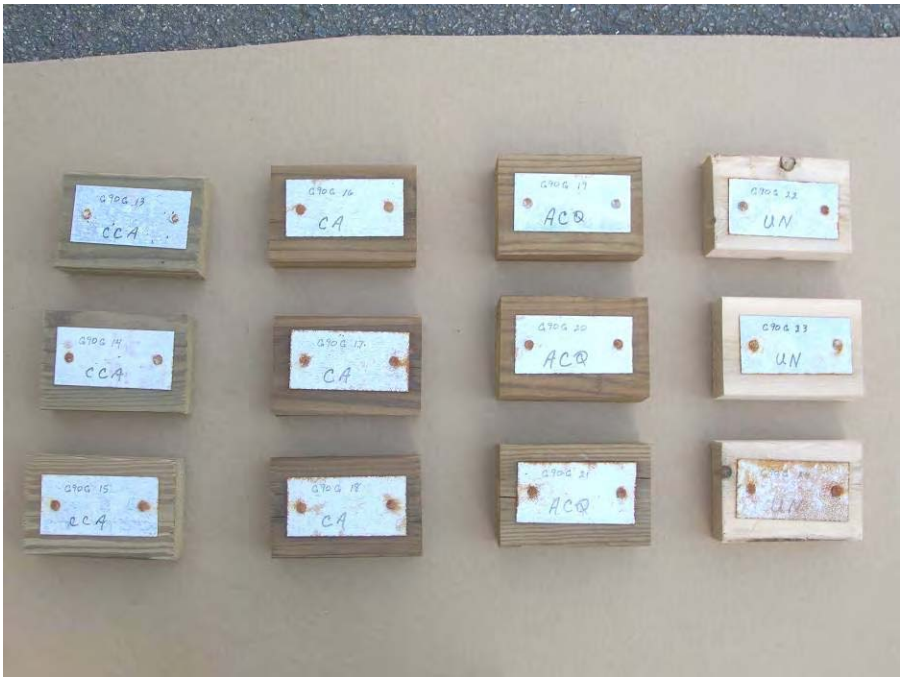


**Photo 17 – Specimens Before Cleaning (30-Days)**


**Photo 18 – Specimens Before Cleaning (30-Days)**


**Photo 19 – Specimens Before Cleaning (30-Days)**


**Photo 20 – Specimens Before Cleaning (30-Days)**


**Photo 21 – Specimen in CA Treated Wood After 30-Days**

**Photo 22 – Specimen in ACQ Treated Wood After 30-Days**

**Photo 23 – Retrieved Samples (30-Days)**


**Photo 24 – ACQ, CA, & Untreated Retrieved Samples (30-Days)**


**Photo 25 – Exposed Side of CA Treated Sample (30-Days)**


**Photo 26 – Contact Side of CA Treated Sample (30-Days)**

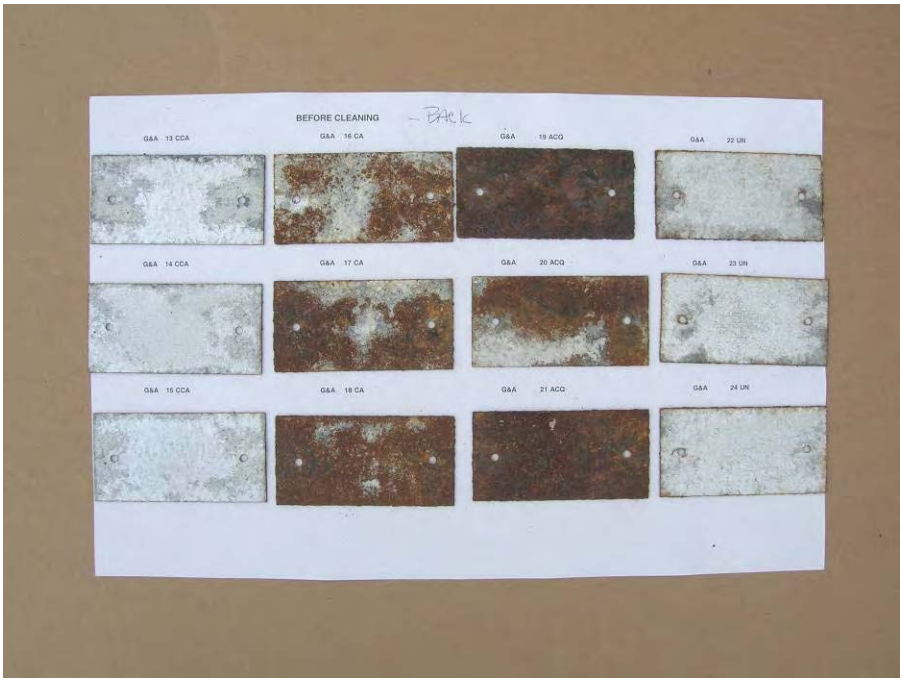


**Photo 27 – Back of Specimens Before Cleaning (30-Days)**


**Photo 28 – Specimens After Cleaning (30-Days)**


**Photo 29 – Fastener Specimen After Testing – 15-Day**


**Photo 30 –Fastener Specimen After Testing – 15-Day**


**Photo 31 – Fastener Specimen After Testing – 15-Day**

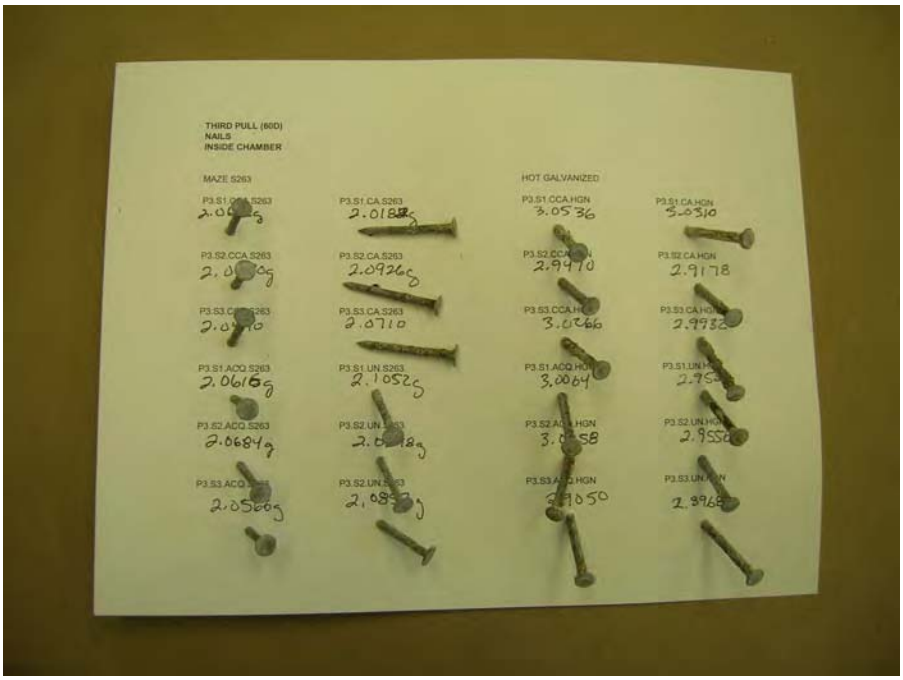


**Photo 32 –Fastener Specimen After Testing – 15-Day**


**Photo 33 – Fastener Specimen After Testing – 15-Day**

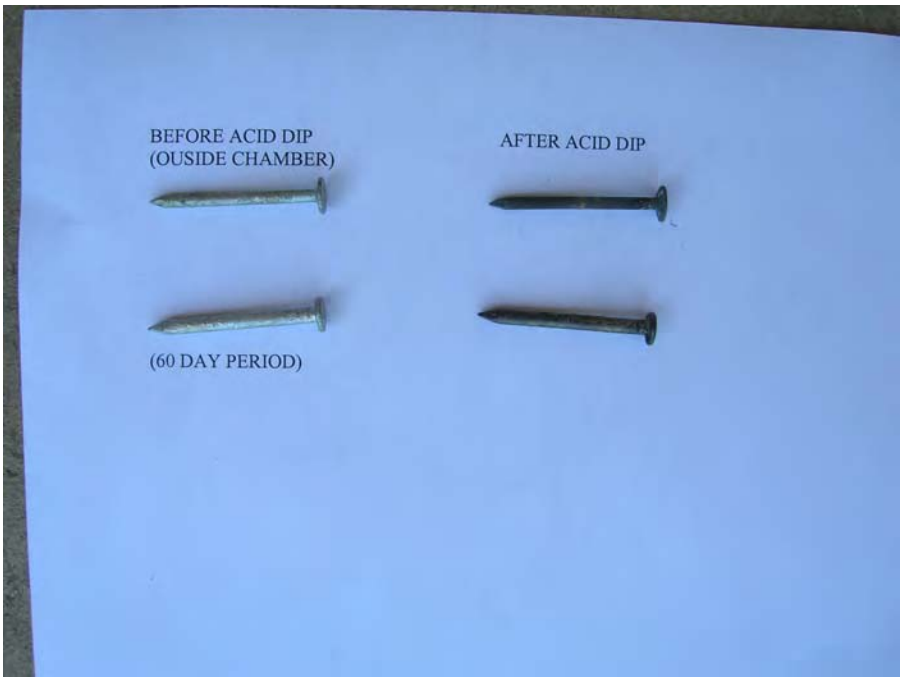


**Photo 34 –Fastener Specimen After Testing – 15-Day**


**Photo 35 – Fastener Specimen After Testing – 30-Day**

**Photo 36 –Fastener Specimen After Testing – 30-Day**

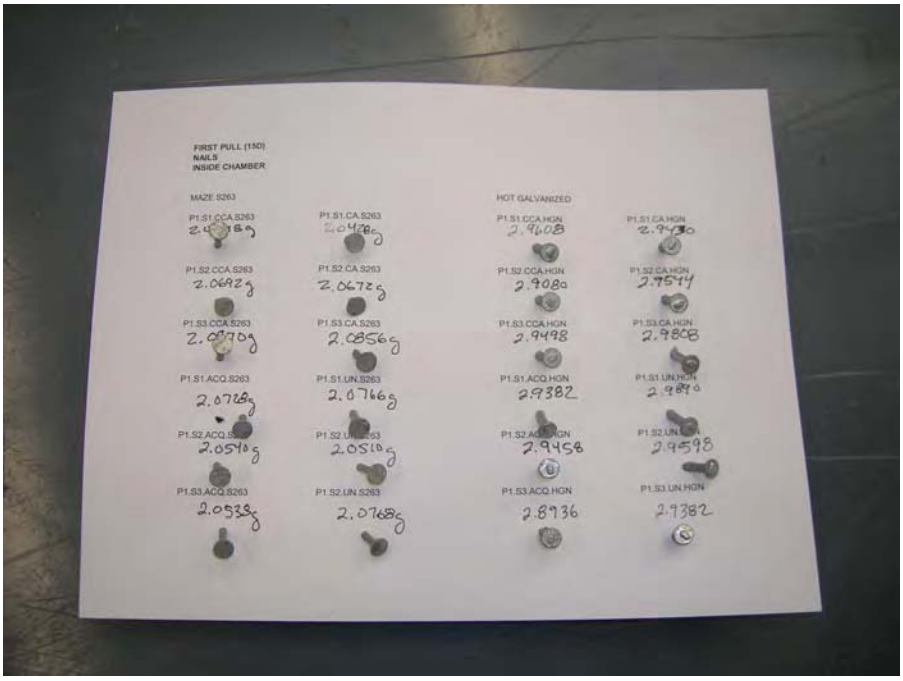


**Photo 37 – Fastener Specimen Before Cleaning- 30-Day**


**Photo 38 –Fastener Specimen After Testing – 30-Day**

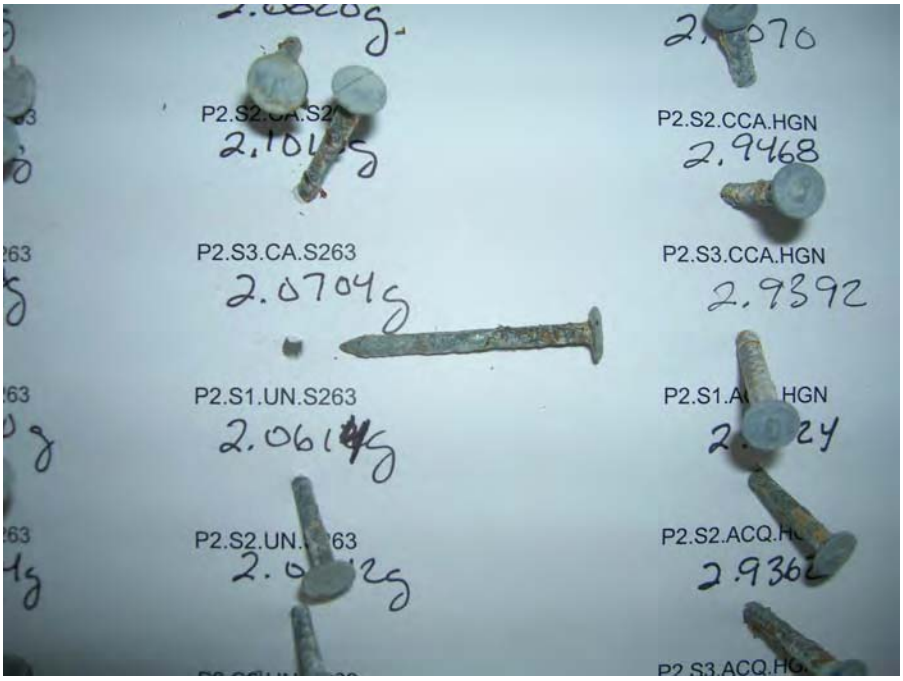


**Photo 39 – Fastener Specimen After Testing – 30-Day**

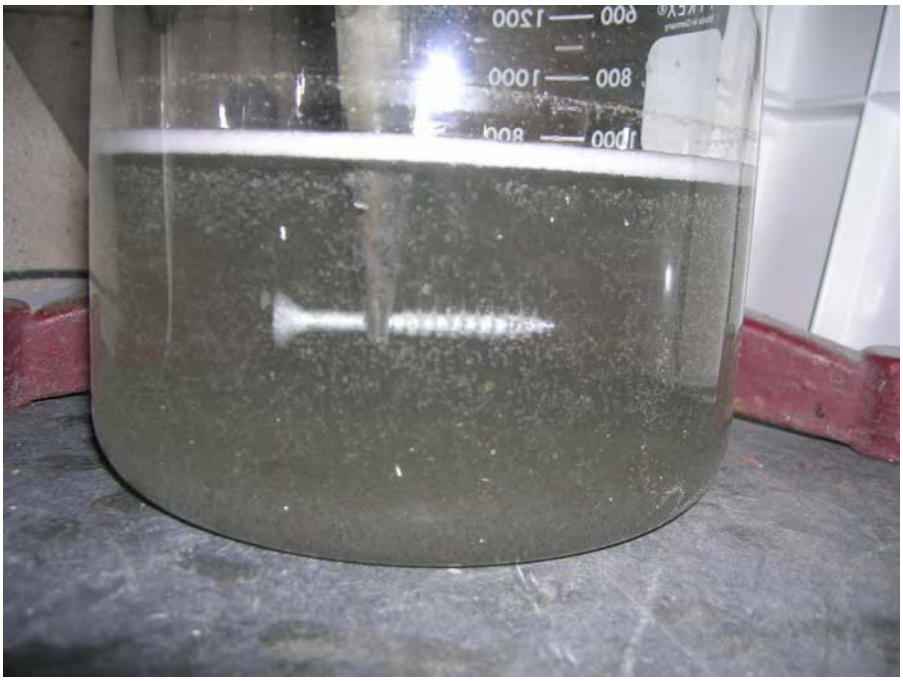

**Photo 40 –Fastener Specimen During Cleaning – 30-Day**

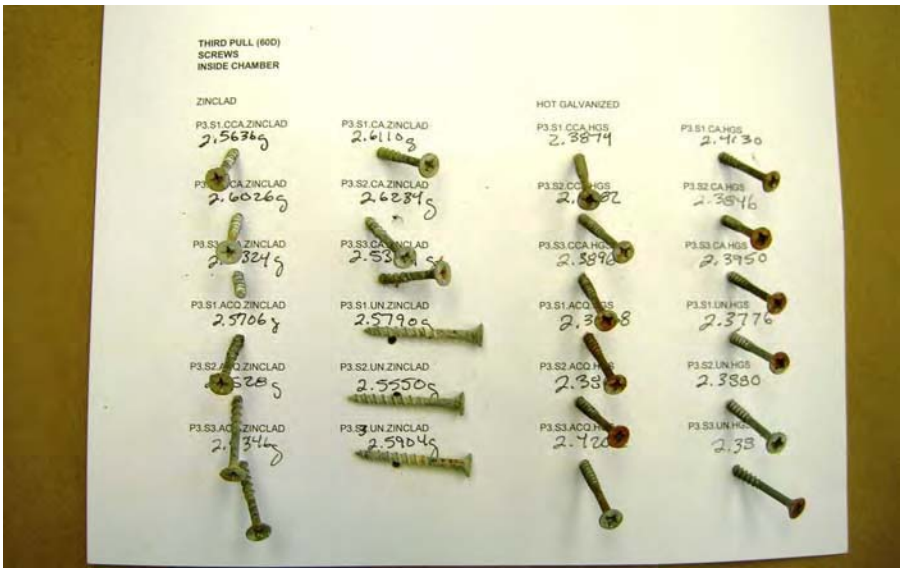


**Photo 42 – Fastener Specimen After Testing – 90-Day**

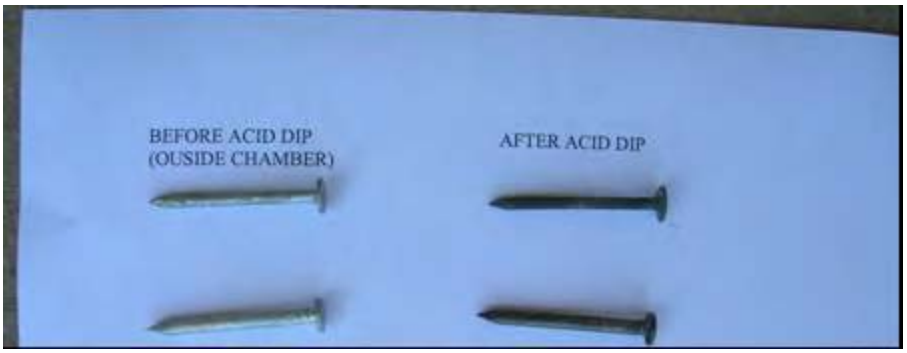


**Photo 43 –Fastener Specimen After Testing – 90-Day**

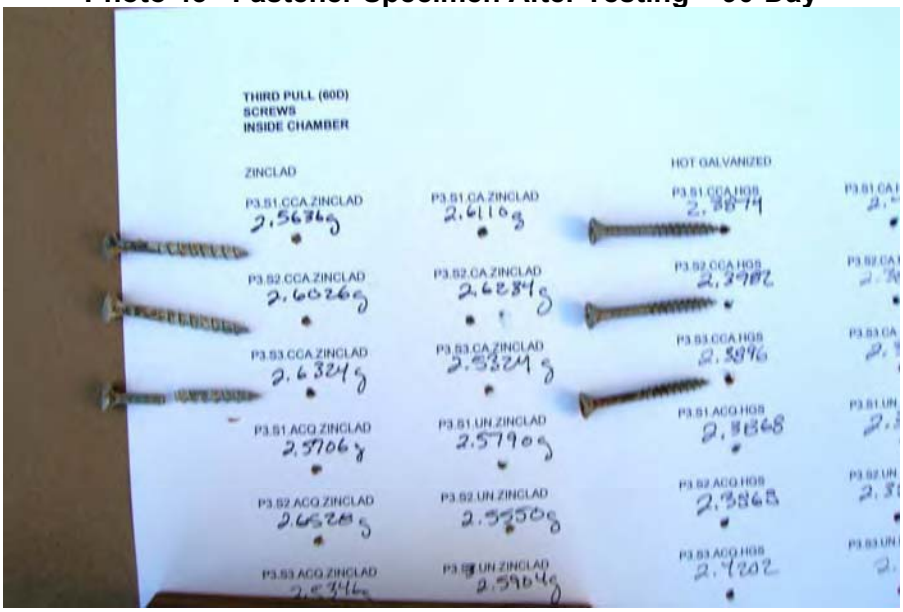


**Photo 44 –Fastener Specimen After Testing – 90-Day**

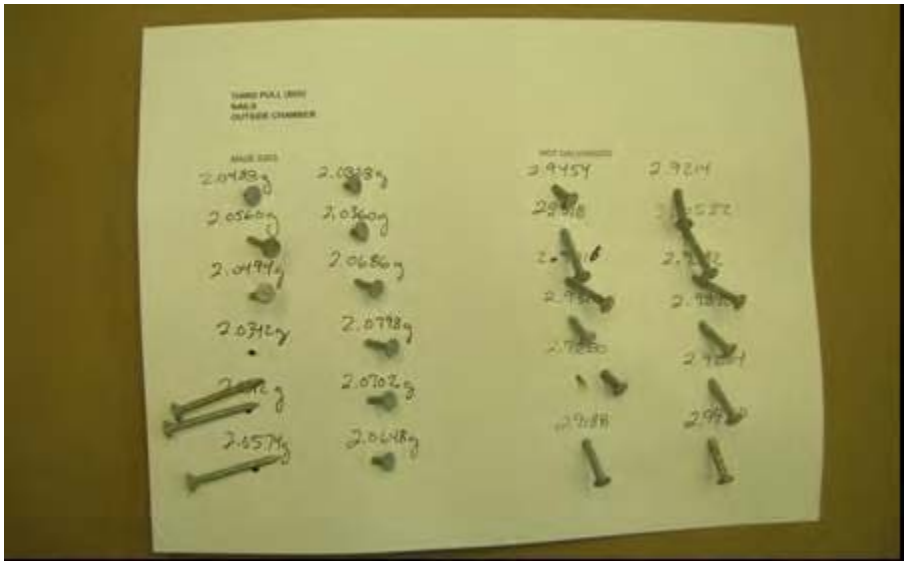

**Photo 45 – Fastener Specimen After Testing – 90-Day**

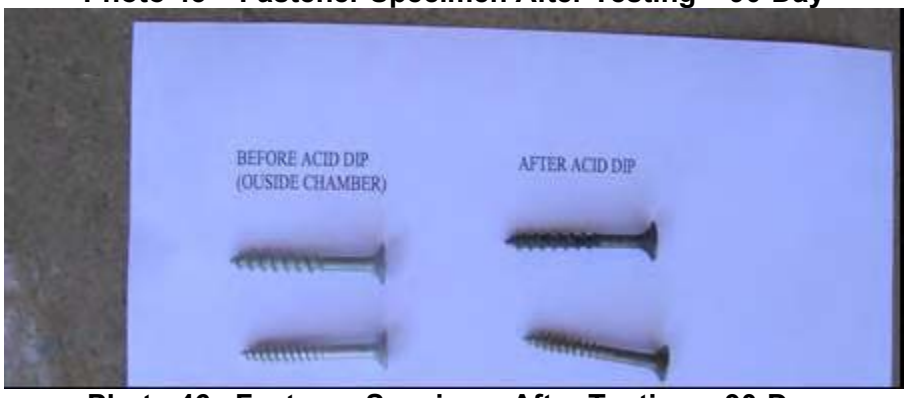


**Photo 46 –Fastener Specimen After Testing – 90-Day**

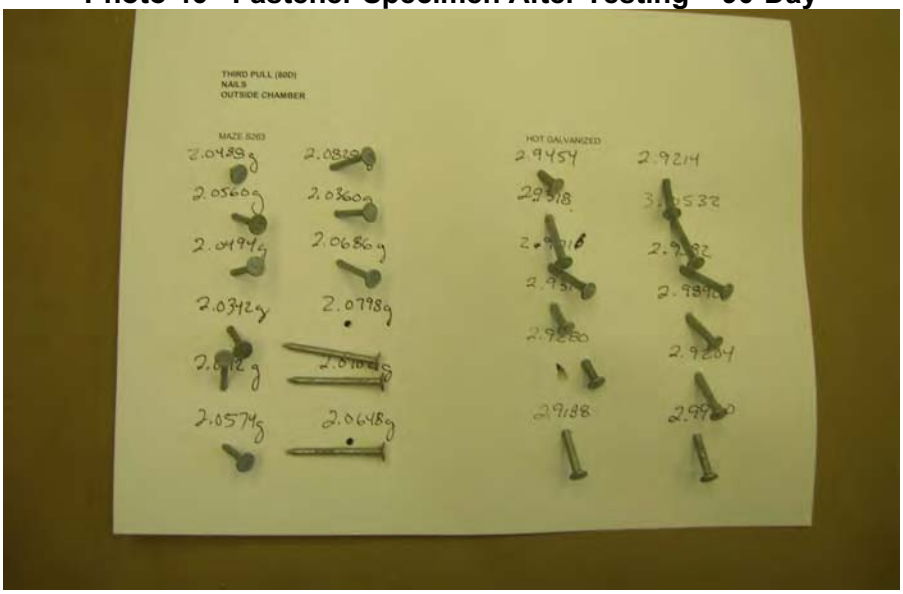


**Photo 47 –Fastener Specimen After Testing – 90-Day**

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# APPENDIX B – RETRIEVAL RESULTS

## Table B1 – 30-Day Retrieval Results – Heavy and Light Gauge

| Sample No. | Tested Specimen | | | | | Mech. Cleaning | | Chemical Cleaning | |
|---|---|---|---|---|---|---|---|---|---|
| | Thickness mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Weight grams | Wt. Loss grams | Final Wt. grams | Wt. Loss grams |
| G60-1 | 54 | Galvanized | G60 | 59.0966 | CCA | 57.8682 | 1.2284 | | |
| G60-2 | 54 | Galvanized | G60 | 59.0462 | CCA | 58.3922 | 0.6540 | | |
| G60-3 | 54 | Galvanized | G60 | 59.1140 | CCA | 59.0220 | 0.0920 | | |
| G60-4 | 54 | Galvanized | G60 | 58.9868 | CA | 57.7378 | 1.2490 | | |
| G60-5 | 54 | Galvanized | G60 | 62.0294 | CA | 61.0166 | 1.0128 | | |
| G60-6 | 54 | Galvanized | G60 | 58.8018 | CA | 57.3254 | 1.4764 | | |
| G60-7 | 54 | Galvanized | G60 | 61.8466 | ACQ | 60.7892 | 1.0574 | | |
| G60-8 | 54 | Galvanized | G60 | 62.1222 | ACQ | 61.6778 | 0.4444 | | |
| G60-9 | 54 | Galvanized | G60 | 59.1602 | ACQ | 58.9166 | 0.2436 | | |
| G60-10 | 54 | Galvanized | G60 | 59.7182 | UN | 59.0050 | 0.7132 | | |
| G60-11 | 54 | Galvanized | G60 | 58.9340 | UN | 58.1752 | 0.7588 | | |
| G60-12 | 54 | Galvanized | G60 | 59.1746 | UN | 58.3070 | 0.8676 | | |
| G185-1 | 54 | Galvanized | G185 | 68.1034 | CCA | 66.5632 | 1.5402 | 66.5632 | 1.5402 |
| G185-2 | 54 | Galvanized | G185 | 67.9930 | CCA | 67.0676 | 0.9254 | 67.0676 | 0.9254 |
| G185-3 | 54 | Galvanized | G185 | 67.9230 | CCA | 66.5862 | 1.3368 | 66.5862 | 1.3368 |
| G185-4 | 54 | Galvanized | G185 | 67.7772 | CA | 64.5860 | 3.1912 | 64.5860 | 3.1912 |
| G185-5 | 54 | Galvanized | G185 | 67.8322 | CA | 65.5152 | 2.3170 | 65.5152 | 2.3170 |
| G185-6 | 54 | Galvanized | G185 | 67.4734 | CA | 64.7842 | 2.6892 | 64.7842 | 2.6892 |
| G185-7 | 54 | Galvanized | G185 | 68.2034 | ACQ | 67.1718 | 1.0316 | 67.1718 | 1.0316 |
| G185-8 | 54 | Galvanized | G185 | 68.2652 | ACQ | 67.1786 | 1.0866 | 67.1786 | 1.0866 |
| G185-9 | 54 | Galvanized | G185 | 68.3532 | ACQ | 66.9942 | 1.3590 | 66.9942 | 1.3590 |
| G185-10 | 54 | Galvanized | G185 | 68.0284 | UN | 66.8608 | 1.1676 | 66.8608 | 1.1676 |
| G185-11 | 54 | Galvanized | G185 | 67.7284 | UN | 66.6280 | 1.1004 | 66.6280 | 1.1004 |
| G185-35 | 54 | Galvanized | G185 | 68.0438 | UN | 66.7140 | 1.3298 | 66.7140 | 1.3298 |
| CG-1 | 54 | Chromated Galvalume | AZ50 | 52.2008 | CCA | 52.0072 | 0.1936 | 52.0072 | 0.1936 |
| CG-2 | 54 | Chromated Galvalume | AZ50 | 52.2860 | CCA | 52.0786 | 0.2074 | 52.0786 | 0.2074 |
| CG-3 | 54 | Chromated Galvalume | AZ50 | 52.3938 | CCA | 52.0988 | 0.2950 | 52.0988 | 0.2950 |
| CG-4 | 54 | Chromated Galvalume | AZ50 | 51.8402 | CA | 50.6020 | 1.2382 | 50.6020 | 1.2382 |
| CG-5 | 54 | Chromated Galvalume | AZ50 | 52.3486 | CA | 51.3854 | 0.9632 | 51.3854 | 0.9632 |
| CG-6 | 54 | Chromated Galvalume | AZ50 | 52.1774 | CA | 51.1366 | 1.0408 | 51.1366 | 1.0408 |
| CG-7 | 54 | Chromated Galvalume | AZ50 | 52.3802 | ACQ | 51.6554 | 0.7248 | 51.6554 | 0.7248 |
| CG-9 | 54 | Chromated Galvalume | AZ50 | 51.8136 | ACQ | 50.9606 | 0.8530 | 50.9606 | 0.8530 |
| CG-10 | 54 | Chromated Galvalume | AZ50 | 52.5008 | UN | 52.3438 | 0.1570 | 52.3438 | 0.1570 |
| CG-11 | 54 | Chromated Galvalume | AZ50 | 52.4960 | UN | 52.2914 | 0.2046 | 52.2914 | 0.2046 |
| CG-12 | 54 | Chromated Galvalume | AZ50 | 52.1360 | UN | 51.9440 | 0.1920 | 51.9440 | 0.1920 |
| CG-20 | 54 | Chromated Galvalume | AZ50 | 52.3622 | ACQ | 51.3720 | 0.9902 | 51.3720 | 0.9902 |
| G+A-1 | 54 | Galvalume + Acrylic | AZ55 | 49.5010 | CCA | 49.4630 | 0.0380 | 49.4630 | 0.0380 |
| G+A-2 | 54 | Galvalume + Acrylic | AZ55 | 49.1492 | CCA | 49.0181 | 0.1311 | 49.0181 | 0.1311 |
| G+A-3 | 54 | Galvalume + Acrylic | AZ55 | 49.4206 | CCA | 49.3198 | 0.1008 | 49.3198 | 0.1008 |
| G+A-4 | 54 | Galvalume + Acrylic | AZ55 | 49.4668 | CA | 48.7546 | 0.7122 | 48.7546 | 0.7122 |
| G+A-5 | 54 | Galvalume + Acrylic | AZ55 | 49.2284 | CA | 48.5112 | 0.7172 | 48.5112 | 0.7172 |
| G+A-6 | 54 | Galvalume + Acrylic | AZ55 | 49.3728 | CA | 48.6266 | 0.7462 | 48.6266 | 0.7462 |
| G+A-7 | 54 | Galvalume + Acrylic | AZ55 | 49.4836 | ACQ | 48.8138 | 0.6698 | 48.8138 | 0.6698 |
| G+A-8 | 54 | Galvalume + Acrylic | AZ55 | 49.2816 | ACQ | 48.3770 | 0.9046 | 48.3770 | 0.9046 |
| G+A-9 | 54 | Galvalume + Acrylic | AZ55 | 49.0196 | ACQ | 48.1906 | 0.8290 | 48.1906 | 0.8290 |
| G+A-10 | 54 | Galvalume + Acrylic | AZ55 | 49.3088 | UN | 49.1876 | 0.1212 | 49.1876 | 0.1212 |
| G+A-11 | 54 | Galvalume + Acrylic | AZ55 | 49.5616 | UN | 49.4356 | 0.1260 | 49.4356 | 0.1260 |
| G+A-12 | 54 | Galvalume + Acrylic | AZ55 | 49.4090 | UN | 49.3286 | 0.0804 | 49.3286 | 0.0804 |
| G90G-1 | 27 | Galvanized | G90 LG | 30.7342 | CCA | 30.2062 | 0.5280 | 30.2062 | 0.5280 |
| G90G-2 | 27 | Galvanized | G90 LG | 30.4964 | CCA | 30.0756 | 0.4208 | 30.0756 | 0.4208 |
| G90G-3 | 27 | Galvanized | G90 LG | 30.7760 | CCA | 30.2152 | 0.5608 | 30.2152 | 0.5608 |
| G90G-4 | 27 | Galvanized | G90 LG | 30.3456 | CA | 29.1360 | 1.2096 | 29.1360 | 1.2096 |
| G90G-5 | 27 | Galvanized | G90 LG | 30.6092 | CA | 29.4630 | 1.1462 | 29.4630 | 1.1462 |
| G90G-6 | 27 | Galvanized | G90 LG | 31.2270 | CA | 29.8998 | 1.3272 | 29.8998 | 1.3272 |
| G90G-7 | 27 | Galvanized | G90 LG | 30.6514 | ACQ | 30.2124 | 0.4390 | 30.2124 | 0.4390 |
| G90G-8 | 27 | Galvanized | G90 LG | 30.9508 | ACQ | 30.3732 | 0.5776 | 30.3732 | 0.5776 |
| G90G-9 | 27 | Galvanized | G90 LG | 31.6350 | ACQ | 31.0974 | 0.5376 | 31.0974 | 0.5376 |
| G90G-10 | 27 | Galvanized | G90 LG | 30.8900 | UN | 30.5132 | 0.3768 | 30.5132 | 0.3768 |
| G90G-11 | 27 | Galvanized | G90 LG | 31.2110 | UN | 30.8454 | 0.3656 | 30.8454 | 0.3656 |
| G90G-12 | 27 | Galvanized | G90 LG | 31.4788 | UN | 31.0862 | 0.3926 | 31.0862 | 0.3926 |

**Table B2 – 30-Day Retrieval Results – Light Gauge**

| Sample No. | Thick. Mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Final Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| G90A-1 | 27 | Galvanized+Acrylic | G90 | 17.4710 | CA | 16.6900 | 0.7810 |
| G90A-2 | 27 | Galvanized+Acrylic | G90 | 17.5002 | UN | 17.0860 | 0.4142 |
| G90A-3 | 27 | Galvanized+Acrylic | G90 | 17.8896 | ACQ | 17.5176 | 0.3720 |
| G90A-4 | 27 | Galvanized+Acrylic | G90 | 18.0264 | CCA | 17.7920 | 0.2344 |
| G90A-5 | 27 | Galvanized+Acrylic | G90 | 16.6556 | CA | 16.0178 | 0.6378 |
| G90A-6 | 27 | Galvanized+Acrylic | G90 | 17.0950 | UN | 16.4124 | 0.6826 |
| G90A-7 | 27 | Galvanized+Acrylic | G90 | 17.4718 | ACQ | 16.9102 | 0.5616 |
| G90A-8 | 27 | Galvanized+Acrylic | G90 | 17.0926 | CCA | 16.4496 | 0.6430 |
| G90A-9 | 27 | Galvanized+Acrylic | G90 | 17.0230 | CA | 16.1194 | 0.9036 |
| G90A-10 | 27 | Galvanized+Acrylic | G90 | 16.8744 | UN | 16.2282 | 0.6462 |
| G90A-11 | 27 | Galvanized+Acrylic | G90 | 16.7644 | ACQ | 16.4242 | 0.3402 |
| G90A-12 | 27 | Galvanized+Acrylic | G90 | 16.8994 | CCA | 16.5568 | 0.3426 |
| AZ50-1 | 23 | Galvalume Chem Treat | AZ50 | 23.3966 | CA | 23.2376 | 0.1590 |
| AZ50-2 | 23 | Galvalume Chem Treat | AZ50 | 23.7340 | UN | 23.7132 | 0.0208 |
| AZ50-3 | 23 | Galvalume Chem Treat | AZ50 | 23.7720 | ACQ | 23.6388 | 0.1332 |
| AZ50-4 | 23 | Galvalume Chem Treat | AZ50 | 23.4696 | CCA | 23.4534 | 0.0162 |
| AZ50-5 | 23 | Galvalume Chem Treat | AZ50 | 23.5128 | CA | 23.3514 | 0.1614 |
| AZ50-6 | 23 | Galvalume Chem Treat | AZ50 | 23.5760 | UN | 23.5350 | 0.0410 |
| AZ50-7 | 23 | Galvalume Chem Treat | AZ50 | 23.5088 | ACQ | 23.2800 | 0.2288 |
| AZ50-8 | 23 | Galvalume Chem Treat | AZ50 | 23.4764 | CCA | 23.4460 | 0.0304 |
| AZ50-9 | 23 | Galvalume Chem Treat | AZ50 | 23.3762 | CA | 23.2028 | 0.1734 |
| AZ50-10 | 23 | Galvalume Chem Treat | AZ50 | 23.6706 | UN | 23.6514 | 0.0192 |
| AZ50-11 | 23 | Galvalume Chem Treat | AZ50 | 23.5028 | ACQ | 23.3426 | 0.1602 |
| AZ50-12 | 23 | Galvalume Chem Treat | AZ50 | 23.6886 | CCA | 23.6616 | 0.0270 |
| AZ55-1 | 20 | Galvalume + Acrylic | AZ55 | 18.9956 | CA | 18.9200 | 0.0756 |
| AZ55-2 | 20 | Galvalume + Acrylic | AZ55 | 19.0520 | UN | 19.0488 | 0.0032 |
| AZ55-3 | 20 | Galvalume + Acrylic | AZ55 | 19.0990 | ACQ | 18.9750 | 0.1240 |
| AZ55-4 | 20 | Galvalume + Acrylic | AZ55 | 19.0300 | CCA | 19.0278 | 0.0022 |
| AZ55-5 | 20 | Galvalume + Acrylic | AZ55 | 18.9632 | CA | 18.8712 | 0.0920 |
| AZ55-6 | 20 | Galvalume + Acrylic | AZ55 | 18.9640 | UN | 18.9378 | 0.0262 |
| AZ55-7 | 20 | Galvalume + Acrylic | AZ55 | 19.0376 | ACQ | 18.9460 | 0.0916 |
| AZ55-8 | 20 | Galvalume + Acrylic | AZ55 | 18.3384 | CCA | 18.3268 | 0.0116 |
| AZ55-9 | 20 | Galvalume + Acrylic | AZ55 | 19.1128 | CA | 18.9929 | 0.1199 |
| AZ55-10 | 20 | Galvalume + Acrylic | AZ55 | 19.1106 | UN | 19.1096 | 0.0010 |
| AZ55-11 | 20 | Galvalume + Acrylic | AZ55 | 18.9132 | ACQ | 18.7906 | 0.1226 |
| AZ55-12 | 20 | Galvalume + Acrylic | AZ55 | 19.1196 | CCA | 19.1056 | 0.0140 |

**Table B3 – 30-Day Retrieval Results – New G60 Samples – Heavy Gauge**

| Sample No. | Tested Specimens | | | | | Final Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| | Thickness mil | Coating Type | Coating Thicknes | Initial Weight grams | Treatment | | |
| G60-1-N | 54 | Galvanized | G60 | 70.9144 | CCA | 70.5206 | 0.3938 |
| G60-2-N | 54 | Galvanized | G60 | 69.4106 | CCA | 69.0170 | 0.3936 |
| G60-3-N | 54 | Galvanized | G60 | 67.6120 | CCA | 67.1970 | 0.4150 |
| G60-4-N | 54 | Galvanized | G60 | 64.9092 | CA | 64.3142 | 0.5950 |
| G60-5-N | 54 | Galvanized | G60 | 73.0268 | CA | 72.3494 | 0.6774 |
| G60-6-N | 54 | Galvanized | G60 | 67.0074 | CA | 66.3540 | 0.6534 |
| G60-7-N | 54 | Galvanized | G60 | 67.9894 | ACQ | 67.4608 | 0.5286 |
| G60-8-N | 54 | Galvanized | G60 | 65.6122 | ACQ | 65.1682 | 0.4440 |
| G60-9-N | 54 | Galvanized | G60 | 70.5452 | ACQ | 70.0558 | 0.4894 |
| G60-10-N | 54 | Galvanized | G60 | 71.4730 | UN | 71.2582 | 0.2148 |
| G60-11-N | 54 | Galvanized | G60 | 71.9524 | UN | 71.6998 | 0.2526 |
| G60-12-N | 54 | Galvanized | G60 | 71.4786 | UN | 71.2528 | 0.2258 |

**Table B4 – 60-Day Retrieval Results – New G60 Samples – Heavy Gauge**

| Sample No. | Tested Specimens | | | | | Final Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| | Thickness mil | Coating Type | Coating Thicknes | Initial Weight grams | Treatment | | |
| G60-13-N | 54 | Galvanized | G60 | 65.8688 | CCA | 65.3558 | 0.5130 |
| G60-14-N | 54 | Galvanized | G60 | 63.8112 | CCA | 63.2610 | 0.5502 |
| G60-15-N | 54 | Galvanized | G60 | 68.8236 | CCA | 68.4226 | 0.4010 |
| G60-16-N | 54 | Galvanized | G60 | 68.7396 | CA | 68.1100 | 0.6296 |
| G60-17-N | 54 | Galvanized | G60 | 81.7846 | CA | 81.1184 | 0.6662 |
| G60-18-N | 54 | Galvanized | G60 | 72.8052 | CA | 72.1368 | 0.6684 |
| G60-19-N | 54 | Galvanized | G60 | 67.1246 | ACQ | 66.6598 | 0.4648 |
| G60-20-N | 54 | Galvanized | G60 | 68.9724 | ACQ | 68.4416 | 0.5308 |
| G60-21-N | 54 | Galvanized | G60 | 72.6690 | ACQ | 72.1730 | 0.4960 |
| G60-22-N | 54 | Galvanized | G60 | 76.8760 | UN | 76.6114 | 0.2646 |
| G60-23-N | 54 | Galvanized | G60 | 70.4808 | UN | 70.2601 | 0.2207 |
| G60-24-N | 54 | Galvanized | G60 | 70.0216 | UN | 69.7838 | 0.2378 |

**Table B5 – 60-Day Retrieval Results – Heavy and Light Gauge**

| Specimen No. | Thick. Mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Final Weighty grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| Sheet Steel | 54 | Galvanized | G185 | 68.0904 | CCA | 67.2890 | 0.8014 |
| Sheet Steel | 54 | Galvanized | G185 | 68.1636 | CCA | 67.1870 | 0.9766 |
| Sheet Steel | 54 | Galvanized | G185 | 68.3194 | CCA | 67.5826 | 0.7368 |
| Sheet Steel | 54 | Galvanized | G185 | 67.9580 | CA | 66.0124 | 1.9456 |
| Sheet Steel | 54 | Galvanized | G185 | 68.7038 | CA | 66.1534 | 2.5504 |
| Sheet Steel | 54 | Galvanized | G185 | 68.5108 | CA | 65.5678 | 2.9430 |
| Sheet Steel | 54 | Galvanized | G185 | 68.4778 | ACQ | 66.9690 | 1.5088 |
| Sheet Steel | 54 | Galvanized | G185 | 67.7536 | ACQ | 66.2798 | 1.4738 |
| Sheet Steel | 54 | Galvanized | G185 | 67.4956 | ACQ | 66.3340 | 1.1616 |
| Sheet Steel | 54 | Galvanized | G185 | 67.9924 | UN | 66.8340 | 1.1584 |
| Sheet Steel | 54 | Galvanized | G185 | 67.6408 | UN | 66.6920 | 0.9488 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.4302 | ACQ | 51.3522 | 1.0780 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 51.9292 | CCA | 51.6538 | 0.2754 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 51.8254 | CCA | 51.5184 | 0.3070 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 51.7352 | CCA | 51.4728 | 0.2624 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.3986 | CA | 51.1038 | 1.2948 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.2856 | CA | 50.5192 | 1.7664 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.3200 | CA | 50.8276 | 1.4924 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.4954 | ACQ | 51.4414 | 1.0540 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.4620 | ACQ | 51.3259 | 1.1361 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.4688 | UN | 52.2524 | 0.2164 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 51.7070 | UN | 51.4274 | 0.2796 |
| Sheet Steel | 54 | Chromated Galvalume | AZ50 | 52.3168 | UN | 52.0734 | 0.2434 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.4426 | CCA | 49.3086 | 0.1340 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.4506 | CCA | 49.3264 | 0.1242 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.5820 | CCA | 49.5156 | 0.0664 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.3848 | CA | 48.8616 | 0.5232 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.5352 | CA | 48.8758 | 0.6594 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.5254 | CA | 49.0882 | 0.4372 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.5912 | ACQ | 48.3292 | 1.2620 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.4408 | ACQ | 48.7302 | 0.7106 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.4544 | ACQ | 48.1406 | 1.3138 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.5414 | UN | 49.3338 | 0.2076 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.2974 | UN | 49.1472 | 0.1502 |
| Sheet Steel | 54 | Galvalume + Acrylic | AZ55 | 49.3160 | UN | 49.0946 | 0.2214 |
| Sheet Steel | 27 | Galvanized | G90 | 31.3036 | CCA | 30.8588 | 0.4448 |
| Sheet Steel | 27 | Galvanized | G90 | 31.0762 | CCA | 30.7828 | 0.2934 |
| Sheet Steel | 27 | Galvanized | G90 | 30.6960 | CCA | 30.2778 | 0.4182 |
| Sheet Steel | 27 | Galvanized | G90 | 30.9472 | CA | 29.5866 | 1.3606 |
| Sheet Steel | 27 | Galvanized | G90 | 30.9236 | CA | 29.3126 | 1.6110 |
| Sheet Steel | 27 | Galvanized | G90 | 30.8428 | CA | 29.6204 | 1.2224 |
| Sheet Steel | 27 | Galvanized | G90 | 31.1480 | ACQ | 30.8092 | 0.3388 |
| Sheet Steel | 27 | Galvanized | G90 | 30.6460 | ACQ | 30.3244 | 0.3216 |
| Sheet Steel | 27 | Galvanized | G90 | 31.7184 | ACQ | 31.0902 | 0.6282 |
| Sheet Steel | 27 | Galvanized | G90 | 31.1878 | UN | 31.0890 | 0.0988 |
| Sheet Steel | 27 | Galvanized | G90 | 30.7718 | UN | 30.6494 | 0.1224 |
| Sheet Steel | 27 | Galvanized | G90 | 31.3190 | UN | 31.2546 | 0.0644 |

**Table B6 – 60-Day Retrieval Results – Light Gauge**

| Sample Number | Thick. mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Final Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| G90A-16 | 27 | Galvanized+Acrylic | G90 | 16.8644 | CCA | 16.5498 | 0.3146 |
| G90A-20 | 27 | Galvanized+Acrylic | G90 | 16.9542 | CCA | 16.7440 | 0.2102 |
| G90A-24 | 27 | Galvanized+Acrylic | G90 | 16.9584 | CCA | 16.2320 | 0.7264 |
| G90A-13 | 27 | Galvanized+Acrylic | G90 | 16.6742 | CA | 16.0724 | 0.6018 |
| G90A-17 | 27 | Galvanized+Acrylic | G90 | 16.8530 | CA | 16.0190 | 0.8340 |
| G90A-21 | 27 | Galvanized+Acrylic | G90 | 16.9676 | CA | 16.0560 | 0.9116 |
| G90A-19 | 27 | Galvanized+Acrylic | G90 | 16.8358 | ACQ | 16.5066 | 0.3292 |
| G90A-15 | 27 | Galvanized+Acrylic | G90 | 16.6856 | ACQ | 16.3310 | 0.3546 |
| G90A-23 | 27 | Galvanized+Acrylic | G90 | 16.9564 | ACQ | 16.7836 | 0.1728 |
| G90A-14 | 27 | Galvanized+Acrylic | G90 | 16.5944 | UN | 16.3096 | 0.2848 |
| G90A-18 | 27 | Galvanized+Acrylic | G90 | 16.8502 | UN | 16.5588 | 0.2914 |
| G90A-22 | 27 | Galvanized+Acrylic | G90 | 16.9114 | UN | 16.4562 | 0.4552 |
| AZ50-16 | 23 | Galvalume Chem Treat | AZ50 | 23.6152 | CCA | 23.5226 | 0.0926 |
| AZ50-20 | 23 | Galvalume Chem Treat | AZ50 | 23.7202 | CCA | 23.6840 | 0.0362 |
| AZ50-24 | 23 | Galvalume Chem Treat | AZ50 | 23.5150 | CCA | 23.2916 | 0.2234 |
| AZ50-13 | 23 | Galvalume Chem Treat | AZ50 | 23.6944 | CA | 23.2192 | 0.4752 |
| AZ50-17 | 23 | Galvalume Chem Treat | AZ50 | 23.6984 | CA | 23.5378 | 0.1606 |
| AZ50-21 | 23 | Galvalume Chem Treat | AZ50 | 23.7384 | CA | 23.5356 | 0.2028 |
| AZ50-15 | 23 | Galvalume Chem Treat | AZ50 | 23.6834 | ACQ | 23.6740 | 0.0094 |
| AZ50-19 | 23 | Galvalume Chem Treat | AZ50 | 23.6124 | ACQ | 23.3646 | 0.2478 |
| AZ50-23 | 23 | Galvalume Chem Treat | AZ50 | 23.7444 | ACQ | 23.1740 | 0.5704 |
| AZ50-14 | 23 | Galvalume Chem Treat | AZ50 | 23.5388 | UN | 23.4878 | 0.0510 |
| AZ50-18 | 23 | Galvalume Chem Treat | AZ50 | 23.7320 | UN | 23.6660 | 0.0660 |
| AZ50-22 | 23 | Galvalume Chem Treat | AZ50 | 23.6580 | UN | 23.6168 | 0.0412 |
| AZ55-16 | 20 | Galvalume + Acrylic | AZ55 | 19.0924 | CCA | 19.0844 | 0.0080 |
| AZ55-20 | 20 | Galvalume + Acrylic | AZ55 | 19.0618 | CCA | 19.0500 | 0.0118 |
| AZ55-24 | 20 | Galvalume + Acrylic | AZ55 | 19.0656 | CCA | 19.0560 | 0.0096 |
| AZ55-13 | 20 | Galvalume + Acrylic | AZ55 | 19.1272 | CA | 18.9588 | 0.1684 |
| AZ55-17 | 20 | Galvalume + Acrylic | AZ55 | 19.119 | CA | 18.8240 | 0.2950 |
| AZ55-21 | 20 | Galvalume + Acrylic | AZ55 | 19.1028 | CA | 18.9468 | 0.1560 |
| AZ55-15 | 20 | Galvalume + Acrylic | AZ55 | 19.0468 | ACQ | 18.9554 | 0.0914 |
| AZ55-19 | 20 | Galvalume + Acrylic | AZ55 | 19.1058 | ACQ | 18.9438 | 0.1620 |
| AZ55-23 | 20 | Galvalume + Acrylic | AZ55 | 19.0198 | ACQ | 18.9212 | 0.0986 |
| AZ55-14 | 20 | Galvalume + Acrylic | AZ55 | 19.1492 | UN | 19.1452 | 0.0040 |
| AZ55-18 | 20 | Galvalume + Acrylic | AZ55 | 19.103 | UN | 19.0758 | 0.0272 |
| AZ55-22 | 20 | Galvalume + Acrylic | AZ55 | 19.0206 | UN | 18.9842 | 0.0364 |

**Table B7 – 180-Day Retrieval Results – New G60 Samples – Heavy Gauge**

| Sample Designation | Thickness mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| G60-25-N | 54 | Galvanized | G60 | 70.1038 | CCA | 69.5512 | 0.5526 |
| G60-26-N | 54 | Galvanized | G60 | 70.6420 | CCA | 70.0497 | 0.5923 |
| G60-27-N | 54 | Galvanized | G60 | 67.2362 | CCA | 66.6531 | 0.5831 |
| G60-28-N | 54 | Galvanized | G60 | 74.3488 | CA | 73.5536 | 0.7952 |
| G60-29-N | 54 | Galvanized | G60 | 67.7686 | CA | 67.0184 | 0.7502 |
| G60-30-N | 54 | Galvanized | G60 | 69.8060 | CA | 69.0112 | 0.7948 |
| G60-34-N | 54 | Galvanized | G60 | 70.1430 | ACQ | 69.4856 | 0.6574 |
| G60-35-N | 54 | Galvanized | G60 | 71.8458 | ACQ | 71.2266 | 0.6192 |
| G60-36-N | 54 | Galvanized | G60 | 70.4186 | ACQ | 69.7888 | 0.6298 |
| G60-31-N | 54 | Galvanized | G60 | 70.2428 | UN | 69.9708 | 0.2720 |
| G60-32-N | 54 | Galvanized | G60 | 72.0772 | UN | 71.8027 | 0.2745 |
| G60-33-N | 54 | Galvanized | G60 | 73.1088 | UN | 72.8263 | 0.2825 |

**Table B8 – 180-Day Retrieval Results – Heavy Gauge**

| Sample Designation | Thickness mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| G185-25 | 54 | Galvanized | G185 | 65.8138 | CCA | 64.5130 | 1.3008 |
| G185-26 | 54 | Galvanized | G185 | 65.8880 | CCA | 63.9962 | 1.8918 |
| G185-27 | 54 | Galvanized | G185 | 65.5440 | CCA | 64.4270 | 1.1170 |
| G185-28 | 54 | Galvanized | G185 | 67.0038 | CA | 63.9548 | 3.0490 |
| G185-29 | 54 | Galvanized | G185 | 67.0746 | CA | 64.2840 | 2.7906 |
| G185-30 | 54 | Galvanized | G185 | 67.1060 | CA | 64.1658 | 2.9402 |
| G185-31 | 54 | Galvanized | G185 | 65.5218 | ACQ | 63.9198 | 1.6020 |
| G185-32 | 54 | Galvanized | G185 | 66.4386 | ACQ | 64.8312 | 1.6074 |
| G185-33 | 54 | Galvanized | G185 | 66.1590 | ACQ | 64.5596 | 1.5994 |
| G185-24 | 54 | Galvanized | G185 | 67.4740 | UN | 66.2400 | 1.2340 |
| G185-34 | 54 | Galvanized | G185 | 68.0438 | UN | 66.7880 | 1.2558 |
| G185-36 | 54 | Galvanized | G185 | 67.2378 | UN | 66.0744 | 1.1634 |
| CG-25 | 54 | Chromated Galvalume | AZ50 | 51.7148 | CCA | 51.2590 | 0.4558 |
| CG-26 | 54 | Chromated Galvalume | AZ50 | 52.0836 | CCA | 51.5928 | 0.4908 |
| CG-27 | 54 | Chromated Galvalume | AZ50 | 52.4232 | CCA | 52.0224 | 0.4008 |
| CG-28 | 54 | Chromated Galvalume | AZ50 | 51.5526 | CA | 49.5004 | 2.0522 |
| CG-29 | 54 | Chromated Galvalume | AZ50 | 51.5232 | CA | 49.5902 | 1.9330 |
| CG-30 | 54 | Chromated Galvalume | AZ50 | 51.4500 | CA | 50.0110 | 1.4390 |
| CG-31 | 54 | Chromated Galvalume | AZ50 | 50.4826 | ACQ | 48.9920 | 1.4906 |
| CG-32 | 54 | Chromated Galvalume | AZ50 | 50.4804 | ACQ | 48.8664 | 1.6140 |
| CG-33 | 54 | Chromated Galvalume | AZ50 | 50.0234 | ACQ | 48.7070 | 1.3164 |
| CG-34 | 54 | Chromated Galvalume | AZ50 | 51.9172 | UN | 51.4906 | 0.4266 |
| CG-35 | 54 | Chromated Galvalume | AZ50 | 52.6636 | UN | 52.1830 | 0.4806 |
| CG-36 | 54 | Chromated Galvalume | AZ50 | 52.2890 | UN | 51.8042 | 0.4848 |
| G+A-25 | 54 | Galvalume + Acrylic | AZ55 | 49.2058 | CCA | 48.9930 | 0.2128 |
| G+A-26 | 54 | Galvalume + Acrylic | AZ55 | 49.0732 | CCA | 48.7392 | 0.3340 |
| G+A-27 | 54 | Galvalume + Acrylic | AZ55 | 49.4478 | CCA | 49.2180 | 0.2298 |
| G+A-28 | 54 | Galvalume + Acrylic | AZ55 | 49.3384 | CA | 48.6482 | 0.6902 |
| G+A-29 | 54 | Galvalume + Acrylic | AZ55 | 49.3860 | CA | 48.7260 | 0.6600 |
| G+A-30 | 54 | Galvalume + Acrylic | AZ55 | 49.4558 | CA | 48.9050 | 0.5508 |
| G+A-31 | 54 | Galvalume + Acrylic | AZ55 | 49.3944 | ACQ | 48.0228 | 1.3716 |
| G+A-32 | 54 | Galvalume + Acrylic | AZ55 | 49.3408 | ACQ | 48.3150 | 1.0258 |
| G+A-33 | 54 | Galvalume + Acrylic | AZ55 | 49.2546 | ACQ | 47.8376 | 1.4170 |
| G+A-34 | 54 | Galvalume + Acrylic | AZ55 | 49.2079 | UN | 48.9206 | 0.2873 |
| G+A-35 | 54 | Galvalume + Acrylic | AZ55 | 49.2396 | UN | 48.9854 | 0.2542 |
| G+A-36 | 54 | Galvalume + Acrylic | AZ55 | 49.5542 | UN | 49.3180 | 0.2362 |

## Table B9 – 180-Day Retrieval Results – Light Gauge

| Sample Designation | Thickness mil | Coating Type | Coating Thickness | Initial Weight grams | Treatment | Weight grams | Weight Loss grams |
|---|---|---|---|---|---|---|---|
| G90G-25 | 27 | Galvanized | G90 | 30.7164 | CCA | 29.9880 | 0.7284 |
| G90G-26 | 27 | Galvanized | G90 | 31.0968 | CCA | 30.6496 | 0.4472 |
| G90G-27 | 27 | Galvanized | G90 | 30.5640 | CCA | 29.7870 | 0.7770 |
| G90G-28 | 27 | Galvanized | G90 | 30.5906 | CA | 28.9970 | 1.5936 |
| G90G-29 | 27 | Galvanized | G90 | 30.3344 | CA | 28.7846 | 1.5498 |
| G90G-30 | 27 | Galvanized | G90 | 30.8076 | CA | 29.6954 | 1.1122 |
| G90G-31 | 27 | Galvanized | G90 | 29.5218 | ACQ | 28.9454 | 0.5764 |
| G90G-32 | 27 | Galvanized | G90 | 29.1738 | ACQ | 28.2066 | 0.9672 |
| G90G-33 | 27 | Galvanized | G90 | 29.1858 | ACQ | 28.8454 | 0.3404 |
| G90G-34 | 27 | Galvanized | G90 | 30.2730 | UN | 29.8256 | 0.4474 |
| G90G-35 | 27 | Galvanized | G90 | 30.9128 | UN | 30.5964 | 0.3164 |
| G90G-36 | 27 | Galvanized | G90 | 29.4802 | UN | 28.9764 | 0.5038 |
| G90A-28 | 27 | Galvanized+Acrylic | G90 | 16.9746 | CCA | 16.5388 | 0.4358 |
| G90A-32 | 27 | Galvanized+Acrylic | G90 | 16.9396 | CCA | 16.5160 | 0.4236 |
| G90A-36 | 27 | Galvanized+Acrylic | G90 | 16.9160 | CCA | 16.3724 | 0.5436 |
| G90A-25 | 27 | Galvanized+Acrylic | G90 | 16.9600 | CA | 15.9816 | 0.9784 |
| G90A-29 | 27 | Galvanized+Acrylic | G90 | 16.9796 | CA | 15.9950 | 0.9846 |
| G90A-33 | 27 | Galvanized+Acrylic | G90 | 16.9440 | CA | 15.9910 | 0.9530 |
| G90A-27 | 27 | Galvanized+Acrylic | G90 | 16.9750 | ACQ | 16.3660 | 0.6090 |
| G90A-31 | 27 | Galvanized+Acrylic | G90 | 16.9198 | ACQ | 16.2782 | 0.6416 |
| G90A-35 | 27 | Galvanized+Acrylic | G90 | 16.8660 | ACQ | 16.2442 | 0.6218 |
| G90A-26 | 27 | Galvanized+Acrylic | G90 | 16.9294 | UN | 16.4100 | 0.5194 |
| G90A-30 | 27 | Galvanized+Acrylic | G90 | 18.0584 | UN | 17.5112 | 0.5472 |
| G90A-34 | 27 | Galvanized+Acrylic | G90 | 16.9558 | UN | 16.4576 | 0.4982 |
| AZ50-28 | 23 | Galvalume Chem Treat | AZ50 | 23.5568 | CCA | 23.4056 | 0.1512 |
| AZ50-32 | 23 | Galvalume Chem Treat | AZ50 | 23.5596 | CCA | 23.4254 | 0.1342 |
| AZ50-36 | 23 | Galvalume Chem Treat | AZ50 | 23.6162 | CCA | 23.3994 | 0.2168 |
| AZ50-25 | 23 | Galvalume Chem Treat | AZ50 | 23.7584 | CA | 23.4040 | 0.3544 |
| AZ50-29 | 23 | Galvalume Chem Treat | AZ50 | 23.5822 | CA | 23.1720 | 0.4102 |
| AZ50-33 | 23 | Galvalume Chem Treat | AZ50 | 23.5344 | CA | 22.9984 | 0.5360 |
| AZ50-27 | 23 | Galvalume Chem Treat | AZ50 | 23.5018 | ACQ | 22.7878 | 0.7140 |
| AZ50-31 | 23 | Galvalume Chem Treat | AZ50 | 23.5578 | ACQ | 23.1902 | 0.3676 |
| AZ50-35 | 23 | Galvalume Chem Treat | AZ50 | 23.6716 | ACQ | 23.3988 | 0.2728 |
| AZ50-26 | 23 | Galvalume Chem Treat | AZ50 | 23.6412 | UN | 23.5172 | 0.1240 |
| AZ50-30 | 23 | Galvalume Chem Treat | AZ50 | 23.4588 | UN | 23.2972 | 0.1616 |
| AZ50-34 | 23 | Galvalume Chem Treat | AZ50 | 23.7146 | UN | 23.5864 | 0.1282 |
| AZ55-28 | 20 | Galvalume + Acrylic | AZ55 | 18.9674 | CCA | 18.9150 | 0.0524 |
| AZ55-32 | 20 | Galvalume + Acrylic | AZ55 | 19.035 | CCA | 18.9818 | 0.0532 |
| AZ55-36 | 20 | Galvalume + Acrylic | AZ55 | 19.1992 | CCA | 19.1476 | 0.0516 |
| AZ55-25 | 20 | Galvalume + Acrylic | AZ55 | 19.0846 | CA | 18.7190 | 0.3656 |
| AZ55-29 | 20 | Galvalume + Acrylic | AZ55 | 19.0218 | CA | 18.8310 | 0.1908 |
| AZ55-33 | 20 | Galvalume + Acrylic | AZ55 | 19.061 | CA | 18.8132 | 0.2478 |
| AZ55-27 | 20 | Galvalume + Acrylic | AZ55 | 19.0994 | ACQ | 18.7132 | 0.3862 |
| AZ55-31 | 20 | Galvalume + Acrylic | AZ55 | 19.1134 | ACQ | 19.1006 | 0.0128 |
| AZ55-35 | 20 | Galvalume + Acrylic | AZ55 | 19.1192 | ACQ | 19.0432 | 0.0760 |
| AZ55-26 | 20 | Galvalume + Acrylic | AZ55 | 19.1002 | UN | 19.0451 | 0.0551 |
| AZ55-30 | 20 | Galvalume + Acrylic | AZ55 | 19.0354 | UN | 19.0072 | 0.0282 |
| AZ55-34 | 20 | Galvalume + Acrylic | AZ55 | 19.1318 | UN | 19.1008 | 0.0310 |

**Table B10 – Fastener 15-Day Retrieval Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Loss After Clean (grams) |
|---|---|---|---|---|---|---|---|
| P1.S1.CCA.ZINCLAD | #8 Screw | CCA | 2.5942 | 2.5980 | 0.0038 | 2.358 | 0.2362 |
| P1.S2.CCA.ZINCLAD | | | 2.5606 | 2.5662 | 0.0056 | 2.3938 | 0.1668 |
| P1.S3.CCA.ZINCLAD | | | 2.5466 | 2.5492 | 0.0026 | 2.3598 | 0.1868 |
| P1.S1.ACQ.ZINCLAD | | ACQ | 2.5806 | 2.5834 | 0.0028 | 2.3714 | 0.2092 |
| P1.S2.ACQ.ZINCLAD | | | 2.5356 | 2.5380 | 0.0024 | 2.3378 | 0.1978 |
| P1.S3.ACQ.ZINCLAD | | | 2.5682 | 2.5714 | 0.0032 | 2.3444 | 0.2238 |
| P1.S1.CA.ZINCLAD | | CA | 2.5278 | 2.5316 | 0.0038 | 2.3462 | 0.1816 |
| P1.S2.CA.ZINCLAD | | | 2.5092 | 2.5150 | 0.0058 | 2.3078 | 0.2014 |
| P1.S3.CA.ZINCLAD | | | 2.6008 | 2.6056 | 0.0048 | 2.394 | 0.2068 |
| P1.S1.UN.ZINCLAD | | UN | 2.5888 | 2.5928 | 0.0040 | 2.3804 | 0.2084 |
| P1.S2.UN.ZINCLAD | | | 2.6284 | 2.6318 | 0.0034 | 2.397 | 0.2314 |
| P1.S3.UN.ZINCLAD | | | 2.5902 | 2.5932 | 0.0030 | 2.3726 | 0.2176 |
| P1.S1.CCA.HGS | #8 Screw | CCA | 2.3970 | 2.3978 | 0.0008 | 2.3838 | 0.0132 |
| P1.S2.CCA.HGS | | | 2.3900 | 2.3912 | 0.0012 | 2.3744 | 0.0156 |
| P1.S3.CCA.HGS | | | 2.2948 | 2.2928 | -0.0020 | 2.2736 | 0.0212 |
| P1.S1.ACQ.HGS | | ACQ | 2.3900 | 2.3914 | 0.0014 | 2.374 | 0.016 |
| P1.S2.ACQ.HGS | | | 2.3988 | 2.3998 | 0.0010 | 2.3808 | 0.018 |
| P1.S3.ACQ.HGS | | | 2.3886 | 2.3882 | -0.0004 | 2.3718 | 0.0168 |
| P1.S1.CA.HGS | | CA | 2.3876 | 2.3874 | -0.0002 | 2.3714 | 0.0162 |
| P1.S2.CA.HGS | | | 2.4006 | 2.4010 | 0.0004 | 2.383 | 0.0176 |
| P1.S3.CA.HGS | | | 2.3900 | 2.3912 | 0.0012 | 2.3744 | 0.0156 |
| P1.S1.UN.HGS | | UN | 2.3848 | 2.3834 | -0.0014 | 2.3702 | 0.0146 |
| P1.S2.UN.HGS | | | 2.2926 | 2.2920 | -0.0006 | 2.2778 | 0.0148 |
| P1.S3.UN.HGS | | | 2.4008 | 2.3994 | -0.0014 | 2.3868 | 0.014 |
| P1.S1.CCA.S263 | 8d Nail | CCA | 2.0698 | 2.0770 | 0.0072 | 1.9274 | 0.1424 |
| P1.S2.CCA.S263 | | | 2.0692 | 2.0750 | 0.0058 | 1.93 | 0.1392 |
| P1.S3.CCA.S263 | | | 2.0870 | 2.0952 | 0.0082 | 1.9372 | 0.1498 |
| P1.S1.ACQ.S263 | | ACQ | 2.0728 | 2.0770 | 0.0042 | 1.9418 | 0.131 |
| P1.S2.ACQ.S263 | | | 2.0540 | 2.0588 | 0.0048 | 1.9284 | 0.1256 |
| P1.S3.ACQ.S263 | | | 2.0538 | 2.0608 | 0.0070 | 1.924 | 0.1298 |
| P1.S1.CA.S263 | | CA | 2.0428 | 2.0460 | 0.0032 | 1.9156 | 0.1272 |
| P1.S2.CA.S263 | | | 2.0672 | 2.0712 | 0.0040 | 1.9292 | 0.138 |
| P1.S3.CA.S263 | | | 2.0856 | 2.0894 | 0.0038 | 1.9396 | 0.146 |
| P1.S1.UN.S263 | | UN | 2.0766 | 2.0806 | 0.0040 | 1.9496 | 0.127 |
| P1.S2.UN.S263 | | | 2.0510 | 2.0548 | 0.0038 | 1.9238 | 0.1272 |
| P1.S3.UN.S263 | | | 2.0768 | 2.9406 | 0.8638 | 1.9484 | 0.1284 |
| P1.S1.CCA.HGN | 8d Nail | CCA | 2.9608 | 2.9682 | 0.0074 | 2.815 | 0.1458 |
| P1.S2.CCA.HGN | | | 2.9080 | 2.9134 | 0.0054 | 2.763 | 0.145 |
| P1.S3.CCA.HGN | | | 2.9498 | 2.9560 | 0.0062 | 2.7884 | 0.1614 |
| P1.S1.ACQ.HGN | | ACQ | 2.9382 | 2.9414 | 0.0032 | 2.7652 | 0.173 |
| P1.S2.ACQ.HGN | | | 2.9458 | 2.9546 | 0.0088 | 2.7788 | 0.167 |
| P1.S3.ACQ.HGN | | | 2.8936 | 2.9024 | 0.0088 | 2.729 | 0.1646 |
| P1.S1.CA.HGN | | CA | 2.9430 | 2.9514 | 0.0084 | 2.7732 | 0.1698 |
| P1.S2.CA.HGN | | | 2.9544 | 2.9642 | 0.0098 | 2.7636 | 0.1908 |
| P1.S3.CA.HGN | | | 2.9808 | 2.9866 | 0.0058 | 2.7836 | 0.1972 |
| P1.S1.UN.HGN | | UN | 2.9890 | 2.9930 | 0.0040 | 2.8279 | 0.1611 |
| P1.S2.UN.HGN | | | 2.9598 | 2.9632 | 0.0034 | 2.7968 | 0.163 |
| P1.S3.UN.HGN | | | 2.9382 | .8962 | -0.0420 | 2.7544 | 0.1838 |

**Table B11 – Fastener 15-Day Retrieval Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| P1.S1.CCA.ZINCLAD | #8 Screw | CCA | 0.164 | 0.160 | 0.004 |
| P1.S2.CCA.ZINCLAD | | | 0.156 | 0.151 | 0.005 |
| P1.S3.CCA.ZINCLAD | | | 0.155 | 0.150 | 0.005 |
| P1.S1.ACQ.ZINCLAD | | ACQ | 0.155 | 0.151 | 0.004 |
| P1.S2.ACQ.ZINCLAD | | | 0.164 | 0.159 | 0.005 |
| P1.S3.ACQ.ZINCLAD | | | 0.160 | 0.153 | 0.007 |
| P1.S1.CA.ZINCLAD | | CA | 0.160 | 0.155 | 0.005 |
| P1.S2.CA.ZINCLAD | | | 0.150 | 0.145 | 0.005 |
| P1.S3.CA.ZINCLAD | | | 0.161 | 0.154 | 0.007 |
| P1.S1.UN.ZINCLAD | | UN | 0.160 | 0.153 | 0.007 |
| P1.S2.UN.ZINCLAD | | | 0.162 | 0.157 | 0.005 |
| P1.S3.UN.ZINCLAD | | | 0.160 | 0.155 | 0.005 |
| P1.S1.CCA.HGS | #8 Screw | CCA | N/A | 0.164 | N/A |
| P1.S2.CCA.HGS | | | N/A | 0.164 | N/A |
| P1.S3.CCA.HGS | | | N/A | 0.164 | N/A |
| P1.S1.ACQ.HGS | | ACQ | N/A | 0.163 | N/A |
| P1.S2.ACQ.HGS | | | N/A | 0.165 | N/A |
| P1.S3.ACQ.HGS | | | N/A | 0.164 | N/A |
| P1.S1.CA.HGS | | CA | N/A | 0.164 | N/A |
| P1.S2.CA.HGS | | | N/A | 0.163 | N/A |
| P1.S3.CA.HGS | | | N/A | 0.163 | N/A |
| P1.S1.UN.HGS | | UN | N/A | 0.164 | N/A |
| P1.S2.UN.HGS | | | N/A | 0.163 | N/A |
| P1.S3.UN.HGS | | | N/A | 0.158 | N/A |
| P1.S1.CCA.S263 | 8d Nail | CCA | 0.111 | 0.107 | 0.004 |
| P1.S2.CCA.S263 | | | 0.110 | 0.107 | 0.003 |
| P1.S3.CCA.S263 | | | 0.110 | 0.107 | 0.003 |
| P1.S1.ACQ.S263 | | ACQ | 0.110 | 0.108 | 0.002 |
| P1.S2.ACQ.S263 | | | 0.110 | 0.107 | 0.003 |
| P1.S3.ACQ.S263 | | | 0.111 | 0.107 | 0.004 |
| P1.S1.CA.S263 | | CA | 0.110 | 0.107 | 0.003 |
| P1.S2.CA.S263 | | | 0.112 | 0.107 | 0.005 |
| P1.S3.CA.S263 | | | 0.111 | 0.109 | 0.002 |
| P1.S1.UN.S263 | | UN | 0.110 | 0.107 | 0.003 |
| P1.S2.UN.S263 | | | 0.112 | 0.108 | 0.004 |
| P1.S3.UN.S263 | | | 0.112 | 0.108 | 0.004 |
| P1.S1.CCA.HGN | 8d Nail | CCA | N/A | 0.133 | N/A |
| P1.S2.CCA.HGN | | | N/A | 0.132 | N/A |
| P1.S3.CCA.HGN | | | N/A | 0.131 | N/A |
| P1.S1.ACQ.HGN | | ACQ | N/A | 0.131 | N/A |
| P1.S2.ACQ.HGN | | | N/A | 0.133 | N/A |
| P1.S3.ACQ.HGN | | | N/A | 0.137 | N/A |
| P1.S1.CA.HGN | | CA | N/A | 0.131 | N/A |
| P1.S2.CA.HGN | | | N/A | 0.134 | N/A |
| P1.S3.CA.HGN | | | N/A | 0.132 | N/A |
| P1.S1.UN.HGN | | UN | N/A | 0.132 | N/A |
| P1.S2.UN.HGN | | | N/A | 0.136 | N/A |
| P1.S3.UN.HGN | | | N/A | 0.132 | N/A |

**Table B12 – Un-Tested Fastener 15-Day Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Loss After Clean (grams) |
|---|---|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 2.5198 | 2.5198 | 0.0000 | 2.3376 | 0.1822 |
| ZINCLAD 2 | | | 2.6000 | 2.5994 | -0.0006 | 2.4698 | 0.1302 |
| ZINCLAD 3 | | | 2.6606 | 2.6606 | 0.0000 | 2.5118 | 0.1488 |
| ZINCLAD 4 | | ACQ | 2.6210 | 2.6204 | -0.0006 | 2.5332 | 0.0878 |
| ZINCLAD 5 | | | 2.5406 | 2.5402 | -0.0004 | 2.4648 | 0.0758 |
| ZINCLAD 6 | | | 2.6668 | 2.6672 | 0.0004 | 2.563 | 0.1038 |
| ZINCLAD 7 | | CA | 2.5888 | 2.5892 | 0.0004 | 2.3878 | 0.2010 |
| ZINCLAD 8 | | | 2.5182 | 2.5172 | -0.0010 | 2.3456 | 0.1726 |
| ZINCLAD 9 | | | 2.6214 | 2.621 | -0.0004 | 2.4376 | 0.1838 |
| ZINCLAD 10 | | UN | 2.5964 | 2.5964 | 0.0000 | 2.4838 | 0.1126 |
| ZINCLAD 11 | | | 2.5492 | 2.5494 | 0.0002 | 2.482 | 0.0672 |
| ZINCLAD 12 | | | 2.5780 | 2.5788 | 0.0008 | 2.4886 | 0.0894 |
| HGS 1 | #8 Screw | CCA | 2.3920 | 2.3924 | 0.0004 | 2.376 | 0.0160 |
| HGS 2 | | | 2.3728 | 2.3734 | 0.0006 | 2.3582 | 0.0146 |
| HGS 3 | | | 2.3892 | 2.3888 | -0.0004 | 2.3742 | 0.0150 |
| HGS 4 | | ACQ | 2.3804 | 2.381 | 0.0006 | 2.3642 | 0.0162 |
| HGS 5 | | | 2.3930 | 2.3936 | 0.0006 | 2.3786 | 0.0144 |
| HGS 6 | | | 2.3810 | 2.3816 | 0.0006 | 2.3684 | 0.0126 |
| HGS 7 | | CA | 2.3918 | 2.3924 | 0.0006 | 2.3784 | 0.0134 |
| HGS 8 | | | 2.3760 | 2.3764 | 0.0004 | 2.3618 | 0.0142 |
| HGS 9 | | | 2.4008 | 2.4014 | 0.0006 | 2.379 | 0.0218 |
| HGS 10 | | UN | 2.3810 | 2.3816 | 0.0006 | 2.3676 | 0.0134 |
| HGS 11 | | | 2.4058 | 2.4062 | 0.0004 | 2.3838 | 0.0220 |
| HGS 12 | | | 2.3656 | 2.366 | 0.0004 | 2.353 | 0.0126 |
| S263 1 | 8d Nail | CCA | 2.0860 | 2.0864 | 0.0004 | 1.9212 | 0.1648 |
| S263 2 | | | 2.0548 | 2.055 | 0.0002 | 1.9332 | 0.1216 |
| S263 3 | | | 2.0408 | 2.0408 | 0.0000 | 1.9232 | 0.1176 |
| S263 4 | | ACQ | 2.0696 | 2.0696 | 0.0000 | 1.8228 | 0.2468 |
| S263 5 | | | 2.0966 | 2.0966 | 0.0000 | 1.9322 | 0.1644 |
| S263 6 | | | 2.0818 | 2.0816 | -0.0002 | 1.945 | 0.1368 |
| S263 7 | | CA | 2.0374 | 2.0374 | 0.0000 | 1.9168 | 0.1206 |
| S263 8 | | | 2.0720 | 2.0718 | -0.0002 | 1.9338 | 0.1382 |
| S263 9 | | | 2.0800 | 2.0796 | -0.0004 | 1.9264 | 0.1536 |
| S263 10 | | UN | 2.0686 | 2.0684 | -0.0002 | 1.9238 | 0.1448 |
| S263 11 | | | 2.0694 | 2.0692 | -0.0002 | 1.9338 | 0.1356 |
| S263 12 | | | 2.0754 | 2.0752 | -0.0002 | 1.929 | 0.1464 |
| HGN 1 | 8d Nail | CCA | 2.9542 | 2.954 | -0.0002 | 2.7792 | 0.1750 |
| HGN 2 | | | 2.9298 | 2.93 | 0.0002 | 2.7864 | 0.1434 |
| HGN 3 | | | 3.0516 | 3.0516 | 0.0000 | 2.8784 | 0.1732 |
| HGN 4 | | ACQ | 2.9760 | 2.9758 | -0.0002 | 2.794 | 0.1820 |
| HGN 5 | | | 2.9696 | 2.9692 | -0.0004 | 2.7894 | 0.1802 |
| HGN 6 | | | 2.9530 | 2.953 | 0.0000 | 2.7684 | 0.1846 |
| HGN 7 | | CA | 2.9298 | 2.9294 | -0.0004 | 2.7788 | 0.1510 |
| HGN 8 | | | 3.0582 | 3.058 | -0.0002 | 2.889 | 0.1692 |
| HGN 9 | | | 2.9780 | 2.978 | 0.0000 | 2.7616 | 0.2164 |
| HGN 10 | | UN | 3.0416 | 3.042 | 0.0004 | 2.8778 | 0.1638 |
| HGN 11 | | | 2.9424 | 2.9422 | -0.0002 | 2.7772 | 0.1652 |
| HGN 12 | | | 2.9545 | 2.9542 | -0.0003 | 2.7748 | 0.1797 |

**Table B13 – Un-Tested Fastener 15-Day Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 0.160 | 0.154 | 0.006 |
| ZINCLAD 2 | | | 0.162 | 0.157 | 0.005 |
| ZINCLAD 3 | | | 0.165 | 0.162 | 0.003 |
| ZINCLAD 4 | | ACQ | 0.158 | 0.155 | 0.003 |
| ZINCLAD 5 | | | 0.160 | 0.156 | 0.004 |
| ZINCLAD 6 | | | 0.159 | 0.156 | 0.003 |
| ZINCLAD 7 | | CA | 0.164 | 0.158 | 0.006 |
| ZINCLAD 8 | | | 0.159 | 0.153 | 0.006 |
| ZINCLAD 9 | | | 0.158 | 0.154 | 0.004 |
| ZINCLAD 10 | | UN | 0.163 | 0.163 | 0.000 |
| ZINCLAD 11 | | | 0.160 | 0.157 | 0.003 |
| ZINCLAD 12 | | | 0.165 | 0.163 | 0.002 |
| HGS 1 | #8 Screw | CCA | N/A | 0.164 | N/A |
| HGS 2 | | | N/A | 0.165 | N/A |
| HGS 3 | | | N/A | 0.163 | N/A |
| HGS 4 | | ACQ | N/A | 0.164 | N/A |
| HGS 5 | | | N/A | 0.165 | N/A |
| HGS 6 | | | N/A | 0.164 | N/A |
| HGS 7 | | CA | N/A | 0.164 | N/A |
| HGS 8 | | | N/A | 0.164 | N/A |
| HGS 9 | | | N/A | 0.165 | N/A |
| HGS 10 | | UN | N/A | 0.165 | N/A |
| HGS 11 | | | N/A | 0.164 | N/A |
| HGS 12 | | | N/A | 0.165 | N/A |
| S263 1 | 8d Nail | CCA | 0.112 | 0.107 | 0.005 |
| S263 2 | | | 0.110 | 0.107 | 0.003 |
| S263 3 | | | 0.110 | 0.107 | 0.003 |
| S263 4 | | ACQ | 0.112 | 0.107 | 0.005 |
| S263 5 | | | 0.110 | 0.107 | 0.003 |
| S263 6 | | | 0.110 | 0.107 | 0.003 |
| S263 7 | | CA | 0.111 | 0.107 | 0.004 |
| S263 8 | | | 0.111 | 0.107 | 0.004 |
| S263 9 | | | 0.112 | 0.107 | 0.005 |
| S263 10 | | UN | 0.111 | 0.107 | 0.004 |
| S263 11 | | | 0.111 | 0.107 | 0.004 |
| S263 12 | | | 0.111 | 0.107 | 0.004 |
| HGN 1 | 8d Nail | CCA | N/A | 0.131 | N/A |
| HGN 2 | | | N/A | 0.131 | N/A |
| HGN 3 | | | N/A | 0.132 | N/A |
| HGN 4 | | ACQ | N/A | 0.133 | N/A |
| HGN 5 | | | N/A | 0.133 | N/A |
| HGN 6 | | | N/A | 0.132 | N/A |
| HGN 7 | | CA | N/A | 0.131 | N/A |
| HGN 8 | | | N/A | 0.131 | N/A |
| HGN 9 | | | N/A | 0.131 | N/A |
| HGN 10 | | UN | N/A | 0.131 | N/A |
| HGN 11 | | | N/A | 0.134 | N/A |
| HGN 12 | | | N/A | 0.131 | N/A |

**Table B14 – Fastener 30-Day Retrieval Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Loss After Clean (grams) |
|---|---|---|---|---|---|---|---|
| P2.S1.CCA.ZINCLAD | #8 Screw | CCA | 2.6106 | 2.619 | 0.0084 | 2.3554 | 0.2552 |
| P2.S2.CCA.ZINCLAD | | | 2.6178 | 2.6286 | 0.0108 | 2.3326 | 0.2852 |
| P2.S3.CCA.ZINCLAD | | | 2.5876 | 2.6146 | 0.0270 | 2.338 | 0.2496 |
| P2.S1.ACQ.ZINCLAD | | ACQ | 2.6432 | 2.6498 | 0.0066 | 2.3924 | 0.2508 |
| P2.S2.ACQ.ZINCLAD | | | 2.5596 | 2.5708 | 0.0112 | 2.349 | 0.2106 |
| P2.S3.ACQ.ZINCLAD | | | 2.5500 | 2.5616 | 0.0116 | 2.3214 | 0.2286 |
| P2.S1.CA.ZINCLAD | | CA | 2.5972 | 2.6032 | 0.0060 | 2.373 | 0.2242 |
| P1.S2.CA.ZINCLAD | | | 2.5182 | 2.524 | 0.0058 | 2.315 | 0.2032 |
| P2.S3.CA.ZINCLAD | | | 2.6552 | 2.6776 | 0.0224 | 2.4068 | 0.2484 |
| P2.S1.UN.ZINCLAD | | UN | 2.5840 | 2.5906 | 0.0066 | 2.3744 | 0.2096 |
| P2.S2.UN.ZINCLAD | | | 2.5812 | 2.5864 | 0.0052 | 2.3486 | 0.2326 |
| P2.S3.UN.ZINCLAD | | | 2.5524 | 2.5678 | 0.0154 | 2.334 | 0.2184 |
| P2.S1.CCA.HGS | #8 Screw | CCA | 2.3942 | 2.386 | -0.0082 | 2.3672 | 0.0270 |
| P2.S2.CCA.HGS | | | 2.3780 | 2.3764 | -0.0016 | 2.3592 | 0.0188 |
| P2.S3.CCA.HGS | | | 2.3980 | 2.3924 | -0.0056 | 2.373 | 0.0250 |
| P2.S1.ACQ.HGS | | ACQ | 2.3904 | 2.3906 | 0.0002 | 2.3734 | 0.0170 |
| P2.S2.ACQ.HGS | | | 2.3926 | 2.3864 | -0.0062 | 2.3668 | 0.0258 |
| P2.S3.ACQ.HGS | | | 2.3956 | 2.3928 | -0.0028 | 2.3714 | 0.0242 |
| P2.S1.CA.HGS | | CA | 2.3926 | 2.3914 | -0.0012 | 2.3714 | 0.0212 |
| P2.S2.CA.HGS | | | 2.3956 | 2.3934 | -0.0022 | 2.3778 | 0.0178 |
| P2.S3.CA.HGS | | | 2.4030 | 2.4062 | 0.0032 | 2.385 | 0.0180 |
| P2.S1.UN.HGS | | UN | 2.3860 | 2.3852 | -0.0008 | 2.3702 | 0.0158 |
| P2.S2.UN.HGS | | | 2.3680 | 2.3668 | -0.0012 | 2.3518 | 0.0162 |
| P2.S3.UN.HGS | | | 2.3808 | 2.381 | 0.0002 | 2.365 | 0.0158 |
| P2.S1.CCA.S263 | 8d Nail | CCA | 2.0716 | 2.1078 | 0.0362 | 1.929 | 0.1426 |
| P2.S2.CCA.S263 | | | 2.0928 | 2.0518 | -0.0410 | 1.9228 | 0.1700 |
| P2.S3.CCA.S263 | | | 2.0448 | 2.0846 | 0.0398 | 1.8944 | 0.1504 |
| P2.S1.ACQ.S263 | | ACQ | 2.0470 | 2.0554 | 0.0084 | 1.9144 | 0.1326 |
| P2.S2.ACQ.S263 | | | 2.0464 | 2.058 | 0.0116 | 1.9124 | 0.1340 |
| P2.S3.ACQ.S263 | | | 2.0666 | 2.0758 | 0.0092 | 1.9274 | 0.1392 |
| P2.S1.CA.S263 | | CA | 2.0820 | 2.106 | 0.0240 | 1.9386 | 0.1434 |
| P2.S2.CA.S263 | | | 2.1018 | 2.1144 | 0.0126 | 1.9288 | 0.1730 |
| P2.S3.CA.S263 | | | 2.0704 | 2.0806 | 0.0102 | 1.9184 | 0.1520 |
| P2.S1.UN.S263 | | UN | 2.0614 | 2.066 | 0.0046 | 1.9298 | 0.1316 |
| P2.S2.UN.S263 | | | 2.0642 | 2.0708 | 0.0066 | 1.93 | 0.1342 |
| P2.S3.UN.S263 | | | 2.0720 | 2.0918 | 0.0198 | 1.9122 | 0.1598 |
| P2.S1.CCA.HGN | 8d Nail | CCA | 2.4070 | 2.4256 | 0.0186 | 2.2482 | 0.1588 |
| P2.S2.CCA.HGN | | | 2.9468 | 2.9682 | 0.0214 | 2.7694 | 0.1774 |
| P2.S3.CCA.HGN | | | 2.9392 | 2.9702 | 0.0310 | 2.7718 | 0.1674 |
| P2.S1.ACQ.HGN | | ACQ | 2.9024 | 2.91 | 0.0076 | 2.7196 | 0.1828 |
| P2.S2.ACQ.HGN | | | 2.9362 | 2.952 | 0.0158 | 2.7584 | 0.1778 |
| P2.S3.ACQ.HGN | | | 2.9578 | 2.9618 | 0.0040 | 2.7646 | 0.1932 |
| P2.S1.CA.HGN | | CA | 2.9484 | 2.9912 | 0.0428 | 2.7756 | 0.1728 |
| P2.S2.CA.HGN | | | 2.9280 | 2.9444 | 0.0164 | 2.7338 | 0.1942 |
| P2.S3.CA.HGN | | | 3.0198 | 3.0338 | 0.0140 | 2.8212 | 0.1986 |
| P2.S1.UN.HGN | | UN | 2.9102 | 2.9216 | 0.0114 | 2.7484 | 0.1618 |
| P2.S2.UN.HGN | | | 3.0392 | 3.0488 | 0.0096 | 2.874 | 0.1652 |
| P2.S3.UN.HGN | | | 2.9300 | 2.9508 | 0.0208 | 2.7458 | 0.1842 |

**Table B15 – Fastener 30-Day Retrieval Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| P2.S1.CCA.ZINCLAD | #8 Screw | CCA | 0.16 | 0.1547 | 0.15285 |
| P2.S2.CCA.ZINCLAD | | | 0.163 | 0.1566 | 0.15475 |
| P2.S3.CCA.ZINCLAD | | | 0.161 | 0.1573 | 0.1547 |
| P2.S1.ACQ.ZINCLAD | | ACQ | 0.155 | 0.15465 | 0.15095 |
| P2.S2.ACQ.ZINCLAD | | | 0.159 | 0.1571 | 0.1561 |
| P2.S3.ACQ.ZINCLAD | | | 0.16 | 0.15615 | 0.1525 |
| P2.S1.CA.ZINCLAD | | CA | 0.159 | 0.162 | 0.1551 |
| P1.S2.CA.ZINCLAD | | | 0.155 | 0.1547 | 0.15195 |
| P2.S3.CA.ZINCLAD | | | 0.157 | 0.15535 | 0.1517 |
| P2.S1.UN.ZINCLAD | | UN | 0.166 | 0.16655 | 0.1603 |
| P2.S2.UN.ZINCLAD | | | 0.157 | 0.1548 | 0.15185 |
| P2.S3.UN.ZINCLAD | | | 0.155 | 0.15425 | 0.15175 |
| P2.S1.CCA.HGS | #8 Screw | CCA | N/A | 0.16435 | 0.1642 |
| P2.S2.CCA.HGS | | | N/A | 0.1638 | 0.1636 |
| P2.S3.CCA.HGS | | | N/A | 0.16425 | 0.16455 |
| P2.S1.ACQ.HGS | | ACQ | N/A | 0.1647 | 0.1648 |
| P2.S2.ACQ.HGS | | | N/A | 0.1648 | 0.1646 |
| P2.S3.ACQ.HGS | | | N/A | 0.16435 | 0.15735 |
| P2.S1.CA.HGS | | CA | N/A | 0.16455 | 0.16465 |
| P2.S2.CA.HGS | | | N/A | 0.16325 | 0.164 |
| P2.S3.CA.HGS | | | N/A | 0.1646 | 0.1622 |
| P2.S1.UN.HGS | | UN | N/A | 0.16455 | 0.16455 |
| P2.S2.UN.HGS | | | N/A | 0.16355 | 0.1637 |
| P2.S3.UN.HGS | | | N/A | 0.16445 | 0.16455 |
| P2.S1.CCA.S263 | 8d Nail | CCA | 0.112 | 0.11835 | 0.1072 |
| P2.S2.CCA.S263 | | | 0.113 | 0.11155 | 0.10695 |
| P2.S3.CCA.S263 | | | 0.111 | 0.1187 | 0.1072 |
| P2.S1.ACQ.S263 | | ACQ | 0.111 | 0.1161 | 0.1073 |
| P2.S2.ACQ.S263 | | | 0.111 | 0.11415 | 0.1073 |
| P2.S3.ACQ.S263 | | | 0.11 | 0.11165 | 0.10765 |
| P2.S1.CA.S263 | | CA | 0.112 | 0.11445 | 0.10735 |
| P2.S2.CA.S263 | | | 0.111 | 0.11855 | 0.10705 |
| P2.S3.CA.S263 | | | 0.112 | 0.11585 | 0.10735 |
| P2.S1.UN.S263 | | UN | 0.111 | 0.11355 | 0.10755 |
| P2.S2.UN.S263 | | | 0.111 | 0.11525 | 0.10715 |
| P2.S3.UN.S263 | | | 0.112 | 0.11775 | 0.1069 |
| P2.S1.CCA.HGN | 8d Nail | CCA | N/A | 0.14415 | 0.13255 |
| P2.S2.CCA.HGN | | | N/A | 0.1379 | 0.13145 |
| P2.S3.CCA.HGN | | | N/A | 0.1434 | 0.1312 |
| P2.S1.ACQ.HGN | | ACQ | N/A | 0.13765 | 0.13305 |
| P2.S2.ACQ.HGN | | | N/A | 0.13785 | 0.1312 |
| P2.S3.ACQ.HGN | | | N/A | 0.14025 | 0.1317 |
| P2.S1.CA.HGN | | CA | N/A | 0.1455 | 0.13215 |
| P2.S2.CA.HGN | | | N/A | 0.13785 | 0.13245 |
| P2.S3.CA.HGN | | | N/A | 0.1378 | 0.1318 |
| P2.S1.UN.HGN | | UN | N/A | 0.1414 | 0.13245 |
| P2.S2.UN.HGN | | | N/A | 0.1366 | 0.13135 |
| P2.S3.UN.HGN | | | N/A | 0.14665 | 0.13675 |

**Table B16 – Un-Tested Fastener 30-Day Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Change After Clean (grams) |
|---|---|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 2.5656 | 2.5662 | 0.0006 | 2.3442 | 0.2214 |
| ZINCLAD 2 | | | 2.6372 | 2.6372 | 0.0000 | 2.3568 | 0.2804 |
| ZINCLAD 3 | | | 2.5724 | 2.5724 | 0.0000 | 2.3662 | 0.2062 |
| ZINCLAD 4 | | ACQ | 2.6212 | 2.621 | -0.0002 | 2.3974 | 0.2238 |
| ZINCLAD 5 | | | 2.5822 | 2.5822 | 0.0000 | 2.3512 | 0.2310 |
| ZINCLAD 6 | | | 2.6128 | 2.6124 | -0.0004 | 2.3892 | 0.2236 |
| ZINCLAD 7 | | CA | 2.5048 | 2.5048 | 0.0000 | 2.3254 | 0.1794 |
| ZINCLAD 8 | | | 2.6104 | 2.6098 | -0.0006 | 2.3738 | 0.2366 |
| ZINCLAD 9 | | | 2.5476 | 2.5474 | -0.0002 | 2.3396 | 0.2080 |
| ZINCLAD 10 | | UN | 2.5720 | 2.5726 | 0.0006 | 2.3554 | 0.2166 |
| ZINCLAD 11 | | | 2.6026 | 2.602 | -0.0006 | 2.3748 | 0.2278 |
| ZINCLAD 12 | | | 2.5486 | 2.5476 | -0.0010 | 2.3172 | 0.2314 |
| HGS 1 | #8 Screw | CCA | 2.3930 | 2.3928 | -0.0002 | 2.3796 | 0.0134 |
| HGS 2 | | | 2.3842 | 2.3838 | -0.0004 | 2.3696 | 0.0146 |
| HGS 3 | | | 2.4004 | 2.4004 | 0.0000 | 2.3838 | 0.0166 |
| HGS 4 | | ACQ | 2.3918 | 2.3914 | -0.0004 | 2.3772 | 0.0146 |
| HGS 5 | | | 2.4002 | 2.3996 | -0.0006 | 2.3854 | 0.0148 |
| HGS 6 | | | 2.3984 | 2.3982 | -0.0002 | 2.3826 | 0.0158 |
| HGS 7 | | CA | 2.4018 | 2.401 | -0.0008 | 2.386 | 0.0158 |
| HGS 8 | | | 2.3698 | 2.369 | -0.0008 | 2.354 | 0.0158 |
| HGS 9 | | | 2.3852 | 2.3848 | -0.0004 | 2.3696 | 0.0156 |
| HGS 10 | | UN | 2.3930 | 2.3928 | -0.0002 | 2.38 | 0.0130 |
| HGS 11 | | | 2.3902 | 2.3898 | -0.0004 | 2.3748 | 0.0154 |
| HGS 12 | | | 2.2846 | 2.2842 | -0.0004 | 2.2662 | 0.0184 |
| S263 1 | 8d Nail | CCA | 2.0594 | 2.0592 | -0.0002 | 1.9308 | 0.1286 |
| S263 2 | | | 2.0870 | 2.087 | 0.0000 | 1.9246 | 0.1624 |
| S263 3 | | | 2.0680 | 2.068 | 0.0000 | 1.9214 | 0.1466 |
| S263 4 | | ACQ | 2.0248 | 2.0248 | 0.0000 | 1.9088 | 0.1160 |
| S263 5 | | | 2.0564 | 2.0566 | 0.0002 | 1.9138 | 0.1426 |
| S263 6 | | | 2.0348 | 2.0346 | -0.0002 | 1.9088 | 0.1260 |
| S263 7 | | CA | 2.0686 | 2.068 | -0.0006 | 1.9296 | 0.1390 |
| S263 8 | | | 2.0610 | 2.0606 | -0.0004 | 1.9088 | 0.1522 |
| S263 9 | | | 2.0518 | 2.0512 | -0.0006 | 1.918 | 0.1338 |
| S263 10 | | UN | 2.0826 | 2.0822 | -0.0004 | 1.9276 | 0.1550 |
| S263 11 | | | 2.0820 | 2.0818 | -0.0002 | 1.9254 | 0.1566 |
| S263 12 | | | 2.0522 | 2.052 | -0.0002 | 1.919 | 0.1332 |
| HGN 1 | 8d Nail | CCA | 3.0778 | 3.0766 | -0.0012 | 2.8988 | 0.1790 |
| HGN 2 | | | 2.9980 | 2.997 | -0.0010 | 2.8412 | 0.1568 |
| HGN 3 | | | 2.9348 | 2.934 | -0.0008 | 2.7586 | 0.1762 |
| HGN 4 | | ACQ | 2.9936 | 2.9932 | -0.0004 | 2.7916 | 0.2020 |
| HGN 5 | | | 2.9308 | 2.9304 | -0.0004 | 2.74 | 0.1908 |
| HGN 6 | | | 2.8618 | 2.8612 | -0.0006 | 2.727 | 0.1348 |
| HGN 7 | | CA | 3.0142 | 3.0136 | -0.0006 | 2.8026 | 0.2116 |
| HGN 8 | | | 2.9286 | 2.928 | -0.0006 | 2.739 | 0.1896 |
| HGN 9 | | | 3.0116 | 3.011 | -0.0006 | 2.8414 | 0.1702 |
| HGN 10 | | UN | 2.9214 | 2.9202 | -0.0012 | 2.7722 | 0.1492 |
| HGN 11 | | | 3.0448 | 3.0436 | -0.0012 | 2.876 | 0.1688 |
| HGN 12 | | | 2.9188 | 2.918 | -0.0008 | 2.7396 | 0.1792 |

**Table B17 – Un-Tested Fastener 30-Day Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 0.1656 | 0.16155 | 0.0041 |
| ZINCLAD 2 | | | 0.1647 | 0.16055 | 0.0041 |
| ZINCLAD 3 | | | 0.1573 | 0.15405 | 0.0033 |
| ZINCLAD 4 | | ACQ | 0.1517 | 0.15165 | 0.0000 |
| ZINCLAD 5 | | | 0.1632 | 0.1603 | 0.0029 |
| ZINCLAD 6 | | | 0.1608 | 0.1583 | 0.0025 |
| ZINCLAD 7 | | CA | 0.1626 | 0.15395 | 0.0086 |
| ZINCLAD 8 | | | 0.1587 | 0.15675 | 0.0020 |
| ZINCLAD 9 | | | 0.1589 | 0.15385 | 0.0050 |
| ZINCLAD 10 | | UN | 0.1559 | 0.15115 | 0.0048 |
| ZINCLAD 11 | | | 0.1593 | 0.15675 | 0.0025 |
| ZINCLAD 12 | | | 0.1531 | 0.148 | 0.0051 |
| HGS 1 | #8 Screw | CCA | 0.1650 | 0.1638 | N/A |
| HGS 2 | | | 0.1614 | 0.1644 | N/A |
| HGS 3 | | | 0.1651 | 0.16245 | N/A |
| HGS 4 | | ACQ | 0.1648 | 0.16285 | N/A |
| HGS 5 | | | 0.1655 | 0.16495 | N/A |
| HGS 6 | | | 0.1646 | 0.16365 | N/A |
| HGS 7 | | CA | 0.1638 | 0.16525 | N/A |
| HGS 8 | | | 0.1641 | 0.1645 | N/A |
| HGS 9 | | | 0.1650 | 0.16485 | N/A |
| HGS 10 | | UN | 0.1649 | 0.16425 | N/A |
| HGS 11 | | | 0.1654 | 0.1646 | N/A |
| HGS 12 | | | 0.1640 | 0.1643 | N/A |
| S263 1 | 8d Nail | CCA | 0.1122 | 0.1075 | 0.0047 |
| S263 2 | | | 0.1134 | 0.10705 | 0.0063 |
| S263 3 | | | 0.1161 | 0.10715 | 0.0090 |
| S263 4 | | ACQ | 0.1136 | 0.10695 | 0.0067 |
| S263 5 | | | 0.1126 | 0.10705 | 0.0055 |
| S263 6 | | | 0.1133 | 0.1071 | 0.0062 |
| S263 7 | | CA | 0.1122 | 0.10705 | 0.0051 |
| S263 8 | | | 0.1141 | 0.10715 | 0.0070 |
| S263 9 | | | 0.1132 | 0.10715 | 0.0061 |
| S263 10 | | UN | 0.1128 | 0.1075 | 0.0053 |
| S263 11 | | | 0.1124 | 0.1069 | 0.0055 |
| S263 12 | | | 0.1126 | 0.107 | 0.0056 |
| HGN 1 | 8d Nail | CCA | 0.1361 | 0.13095 | N/A |
| HGN 2 | | | 0.1346 | 0.13255 | N/A |
| HGN 3 | | | 0.1360 | 0.13185 | N/A |
| HGN 4 | | ACQ | 0.1388 | 0.1311 | N/A |
| HGN 5 | | | 0.1372 | 0.1311 | N/A |
| HGN 6 | | | 0.1344 | 0.13185 | N/A |
| HGN 7 | | CA | 0.1373 | 0.1325 | N/A |
| HGN 8 | | | 0.1381 | 0.13225 | N/A |
| HGN 9 | | | 0.1382 | 0.131 | N/A |
| HGN 10 | | UN | 0.1358 | 0.13255 | N/A |
| HGN 11 | | | 0.1387 | 0.132 | N/A |
| HGN 12 | | | 0.1362 | 0.163095 | N/A |

**Table B18 – Fastener 90-Day Retrieval Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Loss After Clean (grams) |
|---|---|---|---|---|---|---|---|
| P3.S1.CCA.ZINCLAD | #8 Screw | CCA | 2.564 | 2.560 | -0.004 | 2.311 | 0.253 |
| P3.S2.CCA.ZINCLAD | | | 2.603 | 2.635 | 0.032 | 2.305 | 0.298 |
| P3.S3.CCA.ZINCLAD | | | 2.632 | 2.590 | -0.043 | 2.381 | 0.251 |
| P3.S1.ACQ.ZINCLAD | | ACQ | 2.571 | 2.563 | -0.007 | 2.320 | 0.251 |
| P3.S2.ACQ.ZINCLAD | | | 2.653 | 2.664 | 0.011 | 2.424 | 0.229 |
| P3.S3.ACQ.ZINCLAD | | | 2.535 | 2.536 | 0.002 | 2.304 | 0.230 |
| P3.S1.CA.ZINCLAD | | CA | 2.611 | 2.579 | -0.032 | 2.356 | 0.255 |
| P3.S2.CA.ZINCLAD | | | 2.623 | 2.585 | -0.038 | 2.401 | 0.223 |
| P3.S3.CA.ZINCLAD | | | 2.532 | 2.542 | 0.010 | 2.290 | 0.243 |
| P3.S1.UN.ZINCLAD | | UN | 2.579 | 2.580 | 0.001 | 2.342 | 0.237 |
| P3.S2.UN.ZINCLAD | | | 2.555 | 2.563 | 0.008 | 2.315 | 0.240 |
| P3.S3.UN.ZINCLAD | | | 2.590 | 2.614 | 0.024 | 2.359 | 0.232 |
| P3.S1.CCA.HGS | #8 Screw | CCA | 2.387 | 2.393 | 0.005 | 2.361 | 0.027 |
| P3.S2.CCA.HGS | | | 2.398 | 2.402 | 0.004 | 2.380 | 0.018 |
| P3.S3.CCA.HGS | | | 2.390 | 2.388 | -0.001 | 2.362 | 0.028 |
| P3.S1.ACQ.HGS | | ACQ | 2.387 | 2.365 | -0.022 | 2.368 | 0.019 |
| P3.S2.ACQ.HGS | | | 2.387 | 2.380 | -0.007 | 2.362 | 0.025 |
| P3.S3.ACQ.HGS | | | 2.420 | 2.418 | -0.002 | 2.399 | 0.022 |
| P3.S1.CA.HGS | | CA | 2.413 | 2.411 | -0.002 | 2.391 | 0.022 |
| P3.S2.CA.HGS | | | 2.385 | 2.381 | -0.004 | 2.360 | 0.024 |
| P3.S3.CA.HGS | | | 2.395 | 2.392 | -0.003 | 2.371 | 0.024 |
| P3.S1.UN.HGS | | UN | 2.378 | 2.377 | -0.001 | 2.361 | 0.016 |
| P3.S2.UN.HGS | | | 2.388 | 2.386 | -0.002 | 2.372 | 0.016 |
| P3.S3.UN.HGS | | | 2.387 | 2.386 | -0.002 | 2.370 | 0.018 |
| P3.S1.CCA.S263 | 8d Nail | CCA | 2.064 | 2.063 | -0.001 | 1.912 | 0.152 |
| P3.S2.CCA.S263 | | | 2.098 | 2.088 | -0.010 | 1.927 | 0.171 |
| P3.S3.CCA.S263 | | | 2.044 | 2.037 | -0.007 | 1.885 | 0.159 |
| P3.S1.ACQ.S263 | | ACQ | 2.062 | 2.071 | 0.009 | 1.925 | 0.136 |
| P3.S2.ACQ.S263 | | | 2.068 | 2.073 | 0.005 | 1.933 | 0.135 |
| P3.S3.ACQ.S263 | | | 2.057 | 2.059 | 0.002 | 1.924 | 0.133 |
| P3.S1.CA.S263 | | CA | 2.018 | 2.025 | 0.007 | 1.874 | 0.144 |
| P3.S2.CA.S263 | | | 2.093 | 2.103 | 0.010 | 1.917 | 0.175 |
| P3.S3.CA.S263 | | | 2.071 | 2.072 | 0.001 | 1.906 | 0.165 |
| P3.S1.UN.S263 | | UN | 2.105 | 2.110 | 0.004 | 1.954 | 0.151 |
| P3.S2.UN.S263 | | | 2.068 | 2.060 | -0.007 | 1.934 | 0.134 |
| P3.S3.UN.S263 | | | 2.085 | 2.073 | -0.013 | 1.923 | 0.162 |
| P3.S1.CCA.HGN | 8d Nail | CCA | 3.054 | 3.078 | 0.024 | 2.901 | 0.152 |
| P3.S2.CCA.HGN | | | 2.947 | 2.950 | 0.003 | 2.760 | 0.187 |
| P3.S3.CCA.HGN | | | 3.027 | 3.020 | -0.006 | 2.864 | 0.163 |
| P3.S1.ACQ.HGN | | ACQ | 3.006 | 3.019 | 0.013 | 2.800 | 0.207 |
| P3.S2.ACQ.HGN | | | 3.026 | 3.042 | 0.016 | 2.837 | 0.188 |
| P3.S3.ACQ.HGN | | | 2.905 | 2.922 | 0.017 | 2.707 | 0.198 |
| P3.S1.CA.HGN | | CA | 3.031 | 3.097 | 0.066 | 2.852 | 0.179 |
| P3.S2.CA.HGN | | | 2.918 | 2.936 | 0.019 | 2.722 | 0.196 |
| P3.S3.CA.HGN | | | 2.993 | 3.010 | 0.017 | 2.800 | 0.193 |
| P3.S1.UN.HGN | | UN | 2.959 | 2.957 | -0.002 | 2.791 | 0.168 |
| P3.S2.UN.HGN | | | 2.956 | 2.969 | 0.013 | 2.781 | 0.175 |
| P3.S3.UN.HGN | | | 2.897 | 2.912 | 0.015 | 2.712 | 0.185 |

**Table B19 – Fastener 90-Day Retrieval Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| P2.S1.CCA.ZINCLAD | #8 Screw | CCA | 0.156 | 0.151 | 0.005 |
| P2.S2.CCA.ZINCLAD | | | 0.160 | 0.158 | 0.002 |
| P2.S3.CCA.ZINCLAD | | | 0.160 | 0.152 | 0.008 |
| P2.S1.ACQ.ZINCLAD | | ACQ | 0.160 | 0.153 | 0.007 |
| P2.S2.ACQ.ZINCLAD | | | 0.160 | 0.157 | 0.003 |
| P2.S3.ACQ.ZINCLAD | | | 0.160 | 0.153 | 0.007 |
| P2.S1.CA.ZINCLAD | | CA | 0.161 | 0.159 | 0.002 |
| P1.S2.CA.ZINCLAD | | | 0.156 | 0.151 | 0.005 |
| P2.S3.CA.ZINCLAD | | | 0.157 | 0.153 | 0.004 |
| P2.S1.UN.ZINCLAD | | UN | 0.159 | 0.150 | 0.009 |
| P2.S2.UN.ZINCLAD | | | 0.155 | 0.151 | 0.004 |
| P2.S3.UN.ZINCLAD | | | 0.155 | 0.152 | 0.003 |
| P2.S1.CCA.HGS | #8 Screw | CCA | N/A | 0.164 | N/A |
| P2.S2.CCA.HGS | | | N/A | 0.164 | N/A |
| P2.S3.CCA.HGS | | | N/A | 0.164 | N/A |
| P2.S1.ACQ.HGS | | ACQ | N/A | 0.163 | N/A |
| P2.S2.ACQ.HGS | | | N/A | 0.163 | N/A |
| P2.S3.ACQ.HGS | | | N/A | 0.164 | N/A |
| P2.S1.CA.HGS | | CA | N/A | 0.163 | N/A |
| P2.S2.CA.HGS | | | N/A | 0.164 | N/A |
| P2.S3.CA.HGS | | | N/A | 0.164 | N/A |
| P2.S1.UN.HGS | | UN | N/A | 0.165 | N/A |
| P2.S2.UN.HGS | | | N/A | 0.164 | N/A |
| P2.S3.UN.HGS | | | N/A | 0.165 | N/A |
| P2.S1.CCA.S263 | 8d Nail | CCA | 0.113 | 0.107 | 0.006 |
| P2.S2.CCA.S263 | | | 0.111 | 0.112 | 0.001 |
| P2.S3.CCA.S263 | | | 0.112 | 0.107 | 0.005 |
| P2.S1.ACQ.S263 | | ACQ | 0.112 | 0.108 | 0.004 |
| P2.S2.ACQ.S263 | | | 0.112 | 0.107 | 0.005 |
| P2.S3.ACQ.S263 | | | 0.112 | 0.107 | 0.005 |
| P2.S1.CA.S263 | | CA | 0.113 | 0.107 | 0.006 |
| P2.S2.CA.S263 | | | 0.113 | 0.108 | 0.005 |
| P2.S3.CA.S263 | | | 0.112 | 0.109 | 0.003 |
| P2.S1.UN.S263 | | UN | 0.112 | 0.107 | 0.005 |
| P2.S2.UN.S263 | | | 0.110 | 0.107 | 0.003 |
| P2.S3.UN.S263 | | | 0.112 | 0.108 | 0.004 |
| P2.S1.CCA.HGN | 8d Nail | CCA | N/A | 0.133 | N/A |
| P2.S2.CCA.HGN | | | N/A | 0.136 | N/A |
| P2.S3.CCA.HGN | | | N/A | 0.131 | N/A |
| P2.S1.ACQ.HGN | | ACQ | N/A | 0.131 | N/A |
| P2.S2.ACQ.HGN | | | N/A | 0.132 | N/A |
| P2.S3.ACQ.HGN | | | N/A | 0.133 | N/A |
| P2.S1.CA.HGN | | CA | N/A | 0.136 | N/A |
| P2.S2.CA.HGN | | | N/A | 0.132 | N/A |
| P2.S3.CA.HGN | | | N/A | 0.132 | N/A |
| P2.S1.UN.HGN | | UN | N/A | 0.134 | N/A |
| P2.S2.UN.HGN | | | N/A | 0.132 | N/A |
| P2.S3.UN.HGN | | | N/A | 0.133 | N/A |

**Table B20 – Un-Tested Fastener 90-Day Results – Weight Loss**

| Fastener Number | Fastener Type | Treated Wood | Initial Weight (grams) | Weight Before Clean (grams) | Weight Change (grams) | Weight After Clean (grams) | Weight Loss After Clean (grams) |
|---|---|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 2.5656 | 2.5662 | 0.0006 | 2.330 | 0.236 |
| ZINCLAD 2 | | | 2.6372 | 2.6372 | 0.0000 | 2.311 | 0.223 |
| ZINCLAD 3 | | | 2.5724 | 2.5724 | 0.0000 | 2.322 | 0.233 |
| ZINCLAD 4 | | ACQ | 2.6212 | 2.621 | -0.0002 | 2.371 | 0.230 |
| ZINCLAD 5 | | | 2.5822 | 2.5822 | 0.0000 | 2.313 | 0.254 |
| ZINCLAD 6 | | | 2.6128 | 2.6124 | -0.0004 | 2.314 | 0.243 |
| ZINCLAD 7 | | CA | 2.5048 | 2.5048 | 0.0000 | 2.480 | 0.183 |
| ZINCLAD 8 | | | 2.6104 | 2.6098 | -0.0006 | 2.307 | 0.232 |
| ZINCLAD 9 | | | 2.5476 | 2.5474 | -0.0002 | 2.335 | 0.221 |
| ZINCLAD 10 | | UN | 2.5720 | 2.5726 | 0.0006 | 2.357 | 0.228 |
| ZINCLAD 11 | | | 2.6026 | 2.602 | -0.0006 | 2.423 | 0.231 |
| ZINCLAD 12 | | | 2.5486 | 2.5476 | -0.0010 | 2.343 | 0.226 |
| HGS 1 | #8 Screw | CCA | 2.3930 | 2.3928 | -0.0002 | 2.378 | 0.015 |
| HGS 2 | | | 2.3842 | 2.3838 | -0.0004 | 2.361 | 0.014 |
| HGS 3 | | | 2.4004 | 2.4004 | 0.0000 | 2.360 | 0.016 |
| HGS 4 | | ACQ | 2.3918 | 2.3914 | -0.0004 | 2.371 | 0.015 |
| HGS 5 | | | 2.4002 | 2.3996 | -0.0006 | 2.377 | 0.016 |
| HGS 6 | | | 2.3984 | 2.3982 | -0.0002 | 2.374 | 0.022 |
| HGS 7 | | CA | 2.4018 | 2.401 | -0.0008 | 2.377 | 0.016 |
| HGS 8 | | | 2.3698 | 2.369 | -0.0008 | 2.384 | 0.014 |
| HGS 9 | | | 2.3852 | 2.3848 | -0.0004 | 2.378 | 0.021 |
| HGS 10 | | UN | 2.3930 | 2.3928 | -0.0002 | 2.382 | 0.013 |
| HGS 11 | | | 2.3902 | 2.3898 | -0.0004 | 2.377 | 0.015 |
| HGS 12 | | | 2.2846 | 2.2842 | -0.0004 | 2.384 | 0.017 |
| S263 1 | 8d Nail | CCA | 2.0594 | 2.0592 | -0.0002 | 1.921 | 0.128 |
| S263 2 | | | 2.0870 | 2.087 | 0.0000 | 1.904 | 0.152 |
| S263 3 | | | 2.0680 | 2.068 | 0.0000 | 1.901 | 0.148 |
| S263 4 | | ACQ | 2.0248 | 2.0248 | 0.0000 | 1.899 | 0.135 |
| S263 5 | | | 2.0564 | 2.0566 | 0.0002 | 1.911 | 0.140 |
| S263 6 | | | 2.0348 | 2.0346 | -0.0002 | 1.924 | 0.133 |
| S263 7 | | CA | 2.0686 | 2.068 | -0.0006 | 1.936 | 0.146 |
| S263 8 | | | 2.0610 | 2.0606 | -0.0004 | 1.902 | 0.134 |
| S263 9 | | | 2.0518 | 2.0512 | -0.0006 | 1.928 | 0.140 |
| S263 10 | | UN | 2.0826 | 2.0822 | -0.0004 | 1.934 | 0.146 |
| S263 11 | | | 2.0820 | 2.0818 | -0.0002 | 1.913 | 0.158 |
| S263 12 | | | 2.0522 | 2.052 | -0.0002 | 1.926 | 0.139 |
| HGN 1 | 8d Nail | CCA | 3.0778 | 3.0766 | -0.0012 | 2.758 | 0.187 |
| HGN 2 | | | 2.9980 | 2.997 | -0.0010 | 2.768 | 0.164 |
| HGN 3 | | | 2.9348 | 2.934 | -0.0008 | 2.800 | 0.172 |
| HGN 4 | | ACQ | 2.9936 | 2.9932 | -0.0004 | 2.724 | 0.207 |
| HGN 5 | | | 2.9308 | 2.9304 | -0.0004 | 2.728 | 0.200 |
| HGN 6 | | | 2.8618 | 2.8612 | -0.0006 | 2.762 | 0.157 |
| HGN 7 | | CA | 3.0142 | 3.0136 | -0.0006 | 2.711 | 0.210 |
| HGN 8 | | | 2.9286 | 2.928 | -0.0006 | 2.849 | 0.204 |
| HGN 9 | | | 3.0116 | 3.011 | -0.0006 | 2.773 | 0.186 |
| HGN 10 | | UN | 2.9214 | 2.9202 | -0.0012 | 2.829 | 0.160 |
| HGN 11 | | | 3.0448 | 3.0436 | -0.0012 | 2.743 | 0.177 |
| HGN 12 | | | 2.9188 | 2.918 | -0.0008 | 2.803 | 0.190 |

**Table B21 – Un-Tested Fastener 90-Day Results – Change in Diameter**

| Fastener Number | Fastener Type | Treated Wood | Initial Diameter (in) | Diameter After Clean (in) | Loss in Diameter (in) |
|---|---|---|---|---|---|
| ZINCLAD 1 | #8 Screw | CCA | 0.161 | 0.160 | 0.002 |
| ZINCLAD 2 | | | 0.153 | 0.152 | 0.001 |
| ZINCLAD 3 | | | 0.156 | 0.154 | 0.002 |
| ZINCLAD 4 | | ACQ | 0.165 | 0.161 | 0.004 |
| ZINCLAD 5 | | | 0.156 | 0.156 | 0.000 |
| ZINCLAD 6 | | | 0.160 | 0.155 | 0.005 |
| ZINCLAD 7 | | CA | 0.161 | 0.159 | 0.002 |
| ZINCLAD 8 | | | 0.163 | 0.162 | 0.002 |
| ZINCLAD 9 | | | 0.160 | 0.159 | 0.001 |
| ZINCLAD 10 | | UN | 0.160 | 0.156 | 0.004 |
| ZINCLAD 11 | | | 0.161 | 0.158 | 0.003 |
| ZINCLAD 12 | | | 0.161 | 0.157 | 0.004 |
| HGS 1 | #8 Screw | CCA | N/A | 0.165 | N/A |
| HGS 2 | | | N/A | 0.165 | N/A |
| HGS 3 | | | N/A | 0.164 | N/A |
| HGS 4 | | ACQ | N/A | 0.164 | N/A |
| HGS 5 | | | N/A | 0.164 | N/A |
| HGS 6 | | | N/A | 0.165 | N/A |
| HGS 7 | | CA | N/A | 0.162 | N/A |
| HGS 8 | | | N/A | 0.165 | N/A |
| HGS 9 | | | N/A | 0.164 | N/A |
| HGS 10 | | UN | N/A | 0.165 | N/A |
| HGS 11 | | | N/A | 0.166 | N/A |
| HGS 12 | | | N/A | 0.164 | N/A |
| S263 1 | 8d Nail | CCA | 0.111 | 0.111 | 0.000 |
| S263 2 | | | 0.112 | 0.111 | 0.001 |
| S263 3 | | | 0.112 | 0.111 | 0.001 |
| S263 4 | | ACQ | 0.110 | 0.109 | 0.001 |
| S263 5 | | | 0.110 | 0.108 | 0.002 |
| S263 6 | | | 0.110 | 0.109 | 0.001 |
| S263 7 | | CA | 0.112 | 0.111 | 0.001 |
| S263 8 | | | 0.111 | 0.110 | 0.001 |
| S263 9 | | | 0.111 | 0.110 | 0.001 |
| S263 10 | | UN | 0.111 | 0.110 | 0.001 |
| S263 11 | | | 0.111 | 0.111 | .000 |
| S263 12 | | | 0.112 | 0.110 | -.002 |
| HGN 1 | 8d Nail | CCA | N/A | 0.140 | N/A |
| HGN 2 | | | N/A | 0.137 | N/A |
| HGN 3 | | | N/A | 0.140 | N/A |
| HGN 4 | | ACQ | N/A | 0.135 | N/A |
| HGN 5 | | | N/A | 0.139 | N/A |
| HGN 6 | | | N/A | 0.138 | N/A |
| HGN 7 | | CA | N/A | 0.141 | N/A |
| HGN 8 | | | N/A | 0.135 | N/A |
| HGN 9 | | | N/A | 0.138 | N/A |
| HGN 10 | | UN | N/A | 0.138 | N/A |
| HGN 11 | | | N/A | 0.142 | N/A |
| HGN 12 | | | N/A | 0.137 | N/A |

**American Iron and Steel Institute**

1140 Connecticut Avenue, NW
Suite 705
Washington, DC 20036

www.steel.org


1201 15th Street, NW
Suite 320
Washington, DC 20005

www.steelframing.org


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