

## Professional Services

- + Roof consulting
- + Construction documentation and administration
- + Condition assessment reports
- + Leak investigations
- + Cost estimating
- + Hands-on surveys and test probes
- + Historic building restoration and rehabilitation
- + Facilities maintenance plans
- + Materials analysis and selection
- + Preservation planning

## Steep-Slope Roofing

- + Slate
- + Wood shingles
- + Clay tile
- + Standing seam and batten seam copper
- + Asphalt shingles
- + Flashings
- + Rainwater conduction systems

## Low-Slope Roofing

- + Flat seam copper
- + Built-up roofing
- + Modified bitumen systems
- + EPDM
- + Fluid-applied systems
- + Flashings

## Building Envelope

- + Exterior masonry
- + Windows and doors
- + Stained and leaded glass
- + Architectural woodwork
- + Ornamental ironwork
- + Steeples, parapets, and cornices

## Competence

- + Expertise in roofing technology and building pathology
- + Holistic approach to identifying and treating deterioration
- + Hands-on, up-close surveys from ladders and high reach equipment
- + Principal involvement in all projects
- + Attention to detail
- + Close client collaboration
- + Frequent site visits during construction to monitor quality
- + Continuously refining our understanding of building technologies

**SOLUTIONS FOR THE ENTIRE BUILDING ENVELOPE**

## Galvanized Nails – Not All Are Created Equal

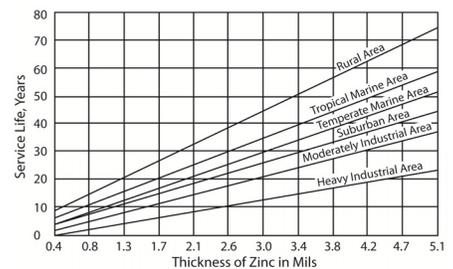
Galvanizing refers to a coating of zinc applied to the surface of ferrous metal to impart corrosion resistance. Why is it called galvanizing? Believe it, or not, the electrochemical reaction between metals was inadvertently discovered by Italian physician Luigi Galvani in 1772 during an experiment which ultimately showed that the muscles of frogs' legs twitched when exposed to electricity. Today, numerous methods exist for coating iron and steel with zinc including electroplating, hot-dipping, mechanical plating, and metallizing (hot zinc spray). Galvanized roofing nails are typically produced by electroplating or hot-dipping, so for the purposes of this newsletter, we will focus on these two methods.

Electroplating (also called electro-galvanizing) involves submerging steel nails in a solution containing zinc ions. An electrical current deposits a coating of zinc onto the surface of the nails.

Hot-dipped galvanizing is exactly what it sounds like. Steel nails are dipped into a bath of molten zinc. An alloy forms between the iron in the steel and the inner surface of the zinc coating, creating a very strong bond. Double hot-dipped galvanized nails, as you might expect, are dipped in the zinc bath twice. This does not translate to doubling the thickness of the zinc coating, however. Rather, the second dipping "improve[s] the overall quality of the outer zinc layer..."<sup>1</sup> by smoothing out any imperfections and adds a marginal amount to the thickness of the coating.

So, what's the practical difference from a roofing standpoint? The biggest difference is the thickness of

the zinc coating. According to the American Galvanizers Association (AGA), the zinc coating achieved by electroplating can range in thickness from 0.14 to 0.28 mils versus 2.0 to 6.0 mils achieved by hot-dipping. A thicker zinc coating generally equates to longer corrosion-resistance. The AGA reports that in a suburban environment, electroplated nails may be expected to exhibit 5% corrosion of the steel surface in 5 years or less whereas hot-dipped galvanized nails in the same conditions may exhibit 5% corrosion of the steel surface in 20 to 50 years, depending on the thickness of the zinc coating (see chart below<sup>2</sup>).



<sup>2</sup>Service Life is defined as the time to reach 5% rusting of the steel surface.

Some nails advertised as hot-dipped galvanized are manufactured from wire that has already been hot-dipped galvanized. The cutting and forming of the nail head can damage and stretch the zinc coating, thereby reducing the nail's corrosion-resistance. Look for nails that comply with ASTM A153, Standard Specification for Zinc Coating (Hot-Dip) on Iron and Steel Hardware, which applies only to pre-formed fasteners, malleable castings, and rolled, pressed, or forged iron and steel items. Even so, given today's marketing practices, it is probably best to confirm with the manufacturer that hot-dip galvanizing is performed after the nails are formed.

<sup>1</sup> Hardison, Shalea. "Life Expectancy of Galvanized Fasteners." *The Journal of Light Construction*, Feb. 1998.

<sup>2</sup> It is interesting to note that the AGA's chart does not go down to 0.14 to 0.28 mils of zinc coating thickness.

**GALVANIZED NAILS – NOT ALL ARE CREATED EQUAL CONT'D.**

Although electroplated nails are acceptable to most asphalt shingle manufacturers, you really want the nails to last at least as long as the shingles. Most dimensional asphalt shingles today are available with 40 to 50 year warranties. Given the relatively brief anticipated service life of electroplated nails, we recommend specifying double hot-dipped galvanized nails for securing dimensional asphalt shingles. Double hot-dipped galvanized nails complying with ASTM A153 are manufactured by Maze Nails, a division of the W.H. Maze Company in Peru, Illinois.

Not sure what you're looking at on a job site? Take a close look. Electroplated and hot-dipped galvanized nails are very different in appearance (photo at right). Electroplated nails are shiny and relatively smooth, whereas hot-dipped galvanized nails are dull gray and have a slight surface texture.

The nail on the left is double hot-dipped galvanized. ►  
The nail on the right is electroplated.



**PROJECT NEWS**

Levine & Company has recently been awarded two projects to design new roofs for historic courthouses in Pennsylvania. The roof design project for the c.1896 Bradford County Courthouse in Towanda, PA



(image below, left) follows two previous phases of condition assessment reports prepared by L&Co., one of which won First Place in RCI, Inc.'s 2015 document competition. The c.1876 Blair County Courthouse in Hollidaysburg, PA (image above, right) presents a new and exciting challenge that L&Co. enthusiastically looks forward to tackling.



Ridgewalker News

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