

Providing complete construction specifications documentation, systems and performance descriptions, and risk and quality advisory services.

Conspectus's Tech Tips received the national Communications Award from CSI.

ABSTRACT:

The zinc coating selection and thickness for metal studs requires knowledge of the corrosiveness of the environment in which the product will be used and the code requirements for the proper coating type and weight.

FILING:

UniFormat™
B2010 Exterior Walls
C1010 Interior Partitions
MasterFormat™
05 54 00 Cold-Formed Metal Framing.
09 22 16 Non-Structural Metal Framing

KEYWORDS:

Stud, Coating, Continuous Sheet Galvanizing, Hot-Dip, Zinc, Galvanized

REFERENCES:

ASTM A653 - Standard Specification for Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM A1003 – Standard Specification for Steel Sheet, Carbon, Metallic, and Nonmetallic – Coated for Cold Formed Framing Members
ASTM C645 - Standard Specification for Nonstructural Steel Framing Members
ASTM C955 - Standard Specification for Load-Bearing (Transverse and Axial) Steel Studs, Runners (Tracks), and Bracing or Bridging for Screw Application of Gypsum Panel Products and Metal Plaster Bases

Zinc Coatings and Metal Studs

By David Stutzman, AIA, CSI, CCS, SCIP, LEED AP

Introduction

There are many different types of zinc coatings available. The major galvanized types are batch hot-dip galvanizing, continuous sheet galvanizing, zinc plating, electrogalvanizing, mechanical plating, zinc spraying, and zinc painting.

This article will discuss continuous sheet galvanizing which is the predominant method used on sheet steel for structural and nonstructural steel studs.

The hot-dip process for continuous sheet galvanizing produces four different types of coated products, including (G)-zinc, (A)-zinc-iron alloy, (AZ)-55% aluminum-zinc alloy, and (GF)-zinc-5% aluminum alloy.

In North America there were approximately 85 hot-dip lines in 2004. Each could apply at least one of the coatings listed above.

Continuous Sheet Galvanizing Process

The molten coating is applied onto the steel surface by passing a continuous ribbon of steel through a bath of molten zinc at speeds up to 600 feet per minute. Sheet size can range from 0.010 to 1.70 inches thick, and up to 72 inches wide.

The coating process begins by cleaning the steel with alkaline liquid combined with brushing and followed by rinsing, and drying of the steel.

The steel passes into the heating or annealing furnace to soften the steel and impart the desired strength and formability.

In the furnace, the steel is maintained under a reducing gas atmosphere to remove any oxide that may be on the steel surface.

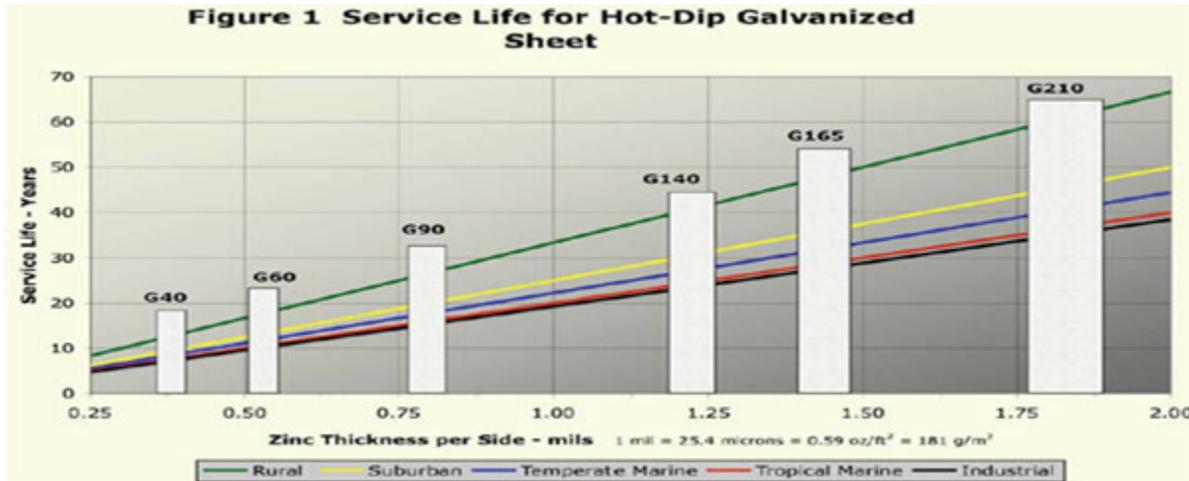
The steel then passes through a vacuum chamber to the molten zinc coating bath to prevent any air from re-oxidizing the heated steel. The steel sheet is sent around a submerged roller, which reacts with the molten metal to create the bonded coating.

The steel is then removed in a vertical direction and high pressure air is used to remove any excess molten zinc to create a controlled coating thickness. The steel is then cooled to allow the zinc to solidify onto the steel surface before the steel contacts another roller to avoid transferring or damaging the coating.

Selecting the Correct Coating Thickness

Although hot-dipped galvanizing is available in a variety of coating weights ranging from G01 to G360, the steel stud industry typically offers three standard zinc coatings G40, G60, and G90 with 0.40, 0.60, and 0.90 total ounces of zinc per square foot, respectively, applied to both sides of the sheet metal. The standard coatings requirements for structural products are listed in ASTM C955 and nonstructural products are found in ASTM C645.

The metallic coating requirements for structural studs can be found within ASTM C955 Table 1. The table lists three coating designators CP40, CP60, and CP90 that permit coatings using any one of the four galvanizing types. ASTM C955 states that



structural studs must have a minimum protective coating CP60. The CP60 designator requires G60 as the minimum zinc coating or A60, AZ50 or GF30, the equivalent of the other permitted coatings.

For ASTM C645 nonstructural studs, a minimum G40 zinc coating conforming to ASTM A653 is required. The standard also allows other protective coatings with an equivalent corrosion resistance. When extreme humidity, salt spray or corrosive environments are anticipated, a G90 coating weight is recommended, which most manufacturers offer as a special purchase item. It is important to remember that for all continuously galvanized sheet materials, the coating weight is given as the total zinc weight for both sides of the sheet. This coating weight is not necessarily evenly divided between both sides of the sheet.

Figure 1 shows the estimated service life for the various coating thicknesses, assuming full exposure during the life cycle. (Illustration used with permission from www.galvinfo.com.)

Identifying Studs in the Field

Most Architects don't carry micrometers to the field to check metal thicknesses. A disk micrometer is required for use on dimpled studs produced by many manufacturers today and will also work on flat studs. The International Building Code (IBC) 2006 and 2003, for both structural and nonstructural products, by referencing ASTM C955 and ASTM C645, require that all studs and tracks be labeled at a maximum 96 inches on center. The marking must show the manufacturer's identification, minimum uncoated metal thickness, minimum yield strength (ksi) and coating type and weight.

Therefore, if the product is not marked, it is not code compliant material and should not even be allowed on the jobsite.

Conclusion

Understanding what galvanized coatings are available is the first step in selecting what coating is right for your product and project. We suggest

the following as the minimum coatings based on use: Exterior Walls: G90; Interior Wet Areas: G60; and Interior Dry Areas: G40, the default by ASTM C645.

Be sure to take advantage of your product reps to assist in selecting the correct coating thickness for your metal studs, especially for unusual conditions. For additional information to help select coating thicknesses, refer to the [GalvInfo Notes](#) series of Documents.

Add Your Comments

We invite your comments. Visit our blog and add your comments.

Like it? Share it!

[Tweet](#) or [Email](#) your friends

The information contained in this document is offered for educational purposes, only, and not as technical advice suitable for any particular project or specific condition. Technical consulting is unique to the facts of a particular condition, and Conspectus recommends that a specialist be consulted to determine solutions for each specific condition.