

# HOT-DIP GALVANIZATION

## HOT-DIP GALVANIZATION INCREASES THE LIFE USE OF YOUR FABRIC BUILDING

Hot-dip galvanization (HDG) is the process in which steel components are dipped into molten zinc. The iron in the steel creates a metallurgical reaction that bonds with the zinc forming a superior coating that is corrosion resistant. Since steel and zinc are naturally occurring elements, this process makes the construction of fabric structures affordable, durable, recyclable, and environmentally sound.

## HOT-DIP GALVANIZATION VS. INLINE

There are two types of galvanized steel: Hot-Dip Galvanization (HDG) and Inline. While both use zinc, the application is different, and the most critical, particularly when used for steel tubing.

HDG occurs after the steel has been cut and welded to spec (post-production). The materials are then dipped into the melted zinc coating. Where steel tubing is concerned, HDG completely covers the materials, inside and out, creating a layer that is three times thicker than the Inline method. HDG adds strength to the materials while increasing the life use of the steel components.

Inline galvanization is treated to a bath of zinc, covering the steel tubing with approximately 0.76 mils thickness per side. The Inline method is often more affordable, however, during welding the heat burns off the interior zinc coating, leaving the steel unprotected and susceptible to corrosion.

For steel frameworks used in fabric buildings, HDG is preferable to Inline since it coats the entire piece of steel inside and out. This increases the reliability of the steel framework of the fabric structure by adding an extra layer of corrosion-resistance. HDG offers the ability to withstand increased environmental stress and pressure on the fabric cover, improving the longevity of the trusses and posts.

### QUICK FACTS ABOUT HOT-DIP GALVANIZATION

- > Galvanization is completed after fabrication
- > 45 to 75 micrometers of zinc
- > 3600psi after metallurgical bond
- > Coats all surfaces including the unseen, inside surface



Hot Dip Galvanized Steel

Source: Calhoun Super Structure, 2015

## CHARACTERISTICS OF QUALITY HDG

### CORROSION PROTECTION

Steel materials coated with a zinc layer are protected from moisture deterioration. HDG offers three times the protection as Inline galvanization but both processes increase the life use of the steel.

### IMPROVED STRENGTH

HDG dipped steel posts, beams, trusses, and other steel parts are used to construct the fabric building. They are tested and proven before being used so to provide a reliable framework that meets the needs of the customer.

### CORROSION-RESISTANT

HDG resists corrosion, reduces friction, and prevents snags when applying the fabric covering. The metal requires very little care to maintain its strength and durability.

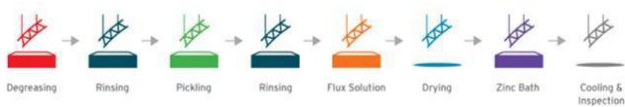
**99.4%**

THE PERCENT OF STEEL REMAINING AFTER 8 YEARS OF HDG STEEL SUBMERSED IN HIGHLY CORROSIVE SWINE MANURE

Source: Swerea KIMAB, 2015

### THE HDG PROCESS

Studies show that next to stainless steel, HDG is the best protection against rust and weathering. The HDG process make trusses more reliable, while creating a smooth surface that won't snag or tear the cover. Here's how it works:



> Where steel delivered for galvanizing shows residue of grease or oil, this is removed in a degreaser. After degreasing, the steel fabrication is washed in a water bath to avoid transfer of degreasing solvent to the next stage.

> Pickling removes rust and scale, which are the most common corrosion products that contaminate the surface of steel. Pickling is done to produce a chemically-cleaned surface prior to galvanizing.

> After chemical cleaning by pickling is done, the steel is washed again in a water bath to minimize the transfer of acid residue to the next stages of the process.

> The application of flux immediately follows the pickling and rinsing. Flux removes any remaining residue and provides a final intensive cleaning of the steel.

> After immersion in the flux tank, the steel is dried and becomes coated with a thin film of flux.

> The galvanizing stage takes place in a bath of molten zinc in which the galvanizing process causes the formation of a coating consisting of three layers of zinc-iron alloy due to the reaction of zinc with iron in the steel. The time in which the steel is immersed depends on its weight and thickness.

> The final cooling and inspection stage include either the steel to be left to cool or immersed in a water bath. Quality checks and weighing occurs once the galvanized steel has cooled.

### HDG IN OPEN WEB STEEL TRUSSES

To ensure HDG sectional steel, such as trusses, meet the highest standard, vent holes must be reinforced to parts, pieces, end plates, and similar features. Open web trusses meet these standards. As the components are immersed in molten zinc on an angle, vent holes must be arranged so the zinc can run in and out freely of corners and angles. Otherwise, zinc may get trapped in these 'pockets' resulting in defects, as is common in bent web trusses. This causes buckling and corrosion from the inside of the steel trusses, resulting in a weaker overall fabric building. Be sure that the fabric structure company you choose aerates all corners of the welding points so the zinc penetrates and coats the steel while avoiding pockets for zinc to trap.



Trapped Zinc in a Bent Web Truss

Source: Galvanizers Association, 2018