



ZINC COATINGS ON IRON, STEEL, AND FASTENERS

GENERAL

This IM covers the requirements of zinc coating (galvanizing) by the hot dip process on iron and steel products made from rolled pressed and forged shapes, castings, plates, bars, and strips.

Also this IM covers the requirements for hot dip zinc coating and mechanically zinc deposited on fasteners and anchor bolts.

HOT DIP GALVANIZED COATINGS ON IRON AND STEEL PRODUCTS

A. MATERIALS AND FABRICATION

1. Steel and Iron – the grade, specification, designation type and degree of surface contamination of the iron or steel in articles and items to be galvanized shall be supplied by the fabricator to the galvanizer prior to the galvanizing process.
2. Communication and / or consultation between the fabricator and galvanizer at appropriate stages in the fabrication process may reduce the occurrence of potential future problems. Also communication between the fabricator, the galvanizer, and the paint shop shall be required to avoid the occurrence of potential future problems.
3. Bath composition – the molten metal of galvanizing bath shall contain not less than an average value of zinc by weight.
4. Coating thickness
 - a. Minimum of five test measurements on a specimen shall be taken.
 - b. The average thickness of coating for all specimens tested shall conform to the requirements of ASTM A 123 for the specified categories and thickness.
 - c. Coating thickness grade (as specified by ASTM A 123 and / or as specified in the contract documents.
5. All sharp edges shall be rounded up (to near 1/16") prior to galvanizing.

Coating Thickness Grade per ASTM A 123 / A 123 M

<u>Coating Grade</u>	<u>Mils</u>	<u>Oz / Ft²</u>	<u>µm</u>	<u>g/m²</u>
35	1.4	0.8	35	245
45	1.8	1.0	45	320
50	2.0	1.2	50	355
55	2.2	1.3	55	390
60	2.4	1.4	60	425
65	2.6	1.5	65	460
75	3.0	1.7	75	530
80	3.1	1.9	80	565
85	3.3	2.	85	600
100	3.9	2.3	100	705

- a. Appearance – galvanized articles and / or items shall be free from uncoated areas, blisters, flux deposits, lumps, projections, globules (bubbles or tiny balls) and / or heavy deposits of zinc which will interfere with the intended use of the items, shall not be acceptable.
 - b. High spots and rough edges such as the metal drip line shall be removed until it is level with the surrounding area, taking care that the base coating is not removed.
6. Thickness coating test – the thickness coating shall be determined by one or several methods
- a. Magnetic Thickness Gage (most common in the field and in the lab)
 - b. Stripping method
 - c. Weighing before and after galvanizing
7. Certification
The galvanizer shall furnish certification to the Iowa Department of Transportation certifying that samples representing each lot have been either inspected and / or tested as required by the specification and also by ASTM A 123 and that the requirements of the ASTM and the Iowa DOT have been satisfied.

Zinc Coatings of Alloy Steel Bolts, Anchor Bolts, Nuts, Washers, and Special Threaded Fasteners:

Fasteners can only be galvanized by either of these two processes

- a. Mechanically galvanized ASTM B 695 Class 50 or 55 – This process is required for the high strength fasteners such as the ASTM A 325. All other fasteners can be galvanized to the process or to the ASTM F 2329 with hot zinc bath temperature control.
- b. Hot Dip Galvanized Coating – ASTM F 2329 This process is required for all fasteners excluding the A 325. This process requires the removal of excess zinc by spinning the parts in a centrifuge, or brushing the threaded portion or handling otherwise to remove the excess zinc.

The maximum temperature of hot bath cannot exceed 850° F. Galvanizing carried out at a temperature above 850° F can adversely affect the final mechanical properties of fasteners. Therefore when galvanizing to the requirements of F 2329 the galvanizer shall provide a certified report indicating the hot zinc bath temperature and complete compliance with the ASTM requirements of(F 2329).

GALVANIZED (Zinc) COATINGS

1. When hot dip is specified, the fasteners shall be zinc coated by the hot dip process in accordance with the requirements of ASTM F2329
NOTE: Dual certification of galvanizing to the requirements of ASTM F2329 and ASTM A 153 shall not be acceptable.
2. When mechanically deposited is required for high strength fasteners, the fasteners shall be zinc coated by the mechanical deposition process in accordance with the requirements of ASTM B 695 Class 50 or 55
3. All threaded components (bolts, nuts, and anchor bolts) shall be coated by the same zinc coating process. No mixed processes in a lot shall be allowed.
4. Hot dip washers tend to bond to each other. Delivered galvanized washers shall not be bonded to each other. Bonded washers shall be rejected.
5. The zinc coating on all type of fasteners shall be smooth and uniform in thickness. The coated fasteners shall be free from uncoated areas, blisters, flux deposits, lumps, and any type of projections that would interfere with the intended use of the fasteners and / or any defects not consistent with good galvanizing practice.

CERTIFICATION

The galvanizer shall certify to the state of Iowa that the samples representing each lot have been tested and inspected as required by the intended specification and that the requirements have been met. Additionally, the galvanizer shall report the average galvanizing temperature (when galvanizing is performed to the requirements of ASTM F 2329) and the average coating thickness of the production lot shall be furnished.