



# Welding Zinc-Coated Steel



**American Welding Society**

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# **Welding Zinc-Coated Steel**

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# Section 1 – Zinc Coatings

## Methods of Application to Steel

There are five methods of applying a coating of zinc to steel to increase its corrosion resistance: 1) hot-dip galvanizing, 2) metallizing, 3) painting with zinc-rich paints, 4) zinc plating (electrogalvanizing) and 5) sherardizing. The first three methods, which may be applied to steel that is to be subsequently fabricated by fusion welding, are described more fully below.

### Hot-dip Galvanizing

Steel in the form of strip, plate, girders, beams, piping or fabricated articles is cleaned by means of an acid pickle or by shotblasting and then dipped in molten zinc. A reaction takes place between the zinc and steel surface to produce a chemically bonded (alloyed) coating. Steel strip up to 1/8 in. (3.2 mm) thick can be continuously galvanized by running large coils through a zinc bath, which produces coating thicknesses of approximately 10-50 microns (coating weights 0.5-2.5 oz/ft<sup>2</sup> or 153-763 g/m<sup>2</sup> including both sides). Individually dipped articles have coatings of 85-200 microns thick (coating weights 2-5 oz/ft<sup>2</sup> or 610-1246 g/m<sup>2</sup> each side). Galvanizing is used to impart a corrosion-resistant coating to steel for a very wide range of products including building frames, girders and beams used in road and railway bridges, electricity pylons, television transmitting towers, automobile and truck chassis, railway rolling stock, piers, deck equipment of ships, street lighting poles, etc.

The size of a component that can be galvanized is limited by the capacity of the galvanizing bath; for example, steel beams up to 80 ft (25 m) long could be hot-dip galvanized by dipping one end at a time in a 45 ft (17 m) bath.

### Metallizing

Zinc in the form of powder or wire is fed into the flame of a metallizing gun where the zinc is atomized and the finely divided droplets of molten zinc are projected towards the shotblasted workpiece by means of a jet of compressed air. A recently developed electric arc metallizing process uses two coils of wire which are consumed by an electric arc maintained between the ends of the wires. Again, the molten zinc is directed onto the workpiece by means of compressed air.

The zinc coating thickness is generally at least 0.004 in. (0.1 mm or 100 microns). Metallizing is used to protect a large variety of components and can be applied in situ to protect structures such as bridges without any limitation on size.