

Surface Coatings

Basic Descriptions and Benefits

As iron and steel are fragile in the environment, the most popular finish for them is corrosion protection through galvanising. We stock a variety of steel products in a number of finishes. Most products that are stocked in Self Colour can have some form of corrosion resistant coating applied.

Hot Dip Galvanising is generally accomplished by two methods, both of which immerse or coat the metal with a liquid zinc bath after various processes. This protective coating is the interdiffusion of zinc and iron and will last for many years. However, if the product is to be cut, welded or otherwise fabricated-your product should be fabricated first, galvanised second.

Hot Dip Galvanizing ISO 1461

The immersion of steel in molten zinc creates a tough protective coating which is metallurgically bonded to the steel. A deep grey finish and would be a minimum of 45 microns. It also has amazing electrochemical properties whereby the steel is still protected from corrosion even where the galvanizing has been chipped or scratched. Being an immersion process all internal surfaces of a fabrication receive the same level of protection, giving hot dip galvanizing its reputation for a 'Heineken' effect. Externally exposed galvanizing on heavy steelwork is now lasting an average of 40 years in the UK, with lifetime continuing to increase as acid rain concentrations decline. Over 730,000 tonnes of steel were hot dip galvanized in the UK alone in 1999.

Zinc Electroplating BS 1706

Bright zinc gives reasonable protection at fairly low thicknesses, typically 8/10 micron, so is ideal for small components such as machine screws with fine threads.

Widely used by industry in general, and automotive manufacturers in particular, electrodeposited zinc gives sacrificial protection to the underlying iron or steel, that is the zinc corrodes in preference to the underlying metal. This has the additional benefit that steel exposed at cut or abraded areas will not easily rust.

The relative corrosion performance of coatings is often assessed using neutral salt spray testing. During electroplating, hydrogen is evolved at the surface of components and can embrittle hardened steel components.

Sherardising BS EN 13811 Class 15

Sherardising is a diffusion process in which particles are heated in the presence of zinc dust. Sherardising produces a matt grey finish and would be a minimum of 30 microns. The process is normally carried out in a slowly rotating closed container at temperatures ranging from 320-500 degrees centigrade.

The resultant zinc/iron alloyed coating is subsequently zinc phosphated or chromated, resulting in a clean, passivated, matt grey surface. The coating closely follows the contours of the base material and uniform coatings are produced on articles, including those of intricate shapes. Carbon steels, low alloy steels, sintered steels, malleable grey iron and cast iron are suitable for sherardizing. The process does not give rise to hydrogen embrittlement.

Hydrogen Embrittlement

In spite of all the precautions taken during electrolytic surface coating, the danger of fracture as a result of hydrogen embrittlement can never be completely eliminated. This applies to articles with mechanical properties for which the tensile strength is $R_m > 1000 \text{ N/mm}^2$ (this includes grade 10.9, 12.9 and higher) and/or the hardness is partially or completely higher than 320 HV. The risk of fracture is largely eliminated by special heat treatment (see ISO 4042).

We recommend to think critically whether items may be vulnerable to hydrogen embrittlement require an electrolytic surface treatment. Equivalent methods of surface coating can be used without the risk of hydrogen embrittlement.

Dinstock accepts no responsibility whatsoever for the development of cracks as a result of hydrogen embrittlement. This also applies to products that are subjected to electrolytic or chemical treatment by third parties after delivery.

Other coatings available:

Dacromet® 500
Delta®Tone 9000
Geomet®
Xylan® - PTFE Coating