Hot Dip Galvanising (HDG) 1.2.4

Painting of HDG Steel

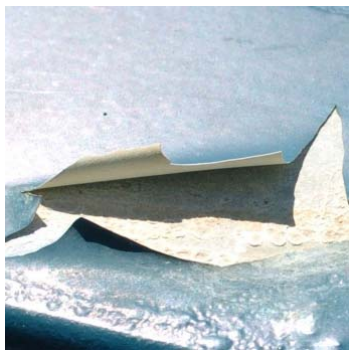
Why Paint HDG Steel?

Hot Dip Galvanised (HDG) steel surfaces are often **painted** for one or more of the following reasons:

- **Aesthetics/Appearance** – Hot dip galvanising usually has an uneven grey finish, from bright silver to dull grey, thus, paint can provide a uniform appearance in a wide range of metallic and solid colours.
- **Improvement in protection** to the **mild steel** substrate – to increase the barrier between the mild steel substrate and the environment.
- **Provide protection** to the HDG steel surface - in severe environments the zinc layer will sacrifice itself at a much greater rate than normal, thus reducing its life considerably.

Issues With Painting HDG Steel

- Hot dip galvanising requires control over surface preparation and application processes much the same way as required for the application of a paint coating and it is just as vulnerable to variations in process. These **potential variations in quality** of surface preparation and product quality are outside the control of a supplier of subsequent paint products and for this reason painting over galvanising should be treated with the **same caution as painting over another company's primer**.
- Due to the process of hot dip galvanising, a large variation in the nature and condition of the surface can occur. This can affect the performance and appearance of an applied coating system.
- In immersed or high humidity conditions, moisture vapour will eventually penetrate the coating and take with it soluble salts. These soluble salts will initiate corrosion at the zinc/coating interface to produce soluble corrosion products, commonly known as "white rust". White rust takes up more volume than the original zinc metal, forcing the paint to delaminate from the surface. Once the paint begins to shed from the surface, ever more moisture comes in contact with the newly exposed zinc surface, rapidly accelerating the corrosion process.
- The quality of surface preparation is more difficult to assess visually on a HDG steel surface than a mild steel surface. Corrosion products or soluble contaminants are more difficult to see on the lighter HDG steel surface.



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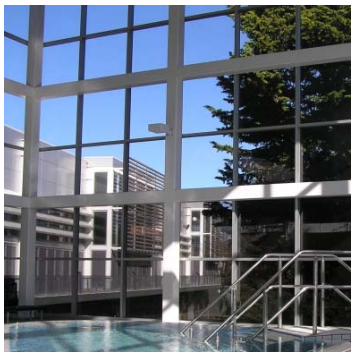
Issues With Painting HDG Steel (Continued)

- Care needs to be taken to ensure a suitable coating is used to prime a HDG steel surface. The surface of all zinc-rich coatings (including hot dip galvanising) are alkaline in nature. When oil based/alkyd type coatings are applied directly onto alkaline surfaces a reaction occurs with the resin, this will ultimately result in the coating delaminating - This is known as **saponification**[i].

- Corrosion products or soluble salts left on the surface prior to painting can serve to draw moisture through the paint film, accelerating corrosion and leading to blistering (commonly known as "**osmotic blistering**").
- The surface of HDG steel is usually quite smooth. As with all good coating practices the removal of contaminants that may interfere with adhesion must be carried out along with the mechanical abrasion (using non-metallic abrasive) to maximise mechanical and chemical adhesion. Please refer to **Dulux Protective Coatings Tech Note 1.2.2 'Surface Preparation Issues'** and **Dulux Protective Coatings Tech Note 1.2.3 'Preferred Surface Preparation Methods'** that discuss the preparation of HDG steel for painting.
- Typical products used to coat HDG steel include water-based acrylics, vinyl butyrate etch primers, solution vinyls and epoxies. The choice of product type is dictated by the **environment** and the **performance expectations** of the coating system.

Do These Issues Exist With Zinc-Rich Primers?



Overall, painting over zinc-rich primers is far less of a problem. Manufacturers ensure that their zinc-rich primer has tenacious adhesion to both the properly prepared mild steel surface and their own intermediate and topcoats. These coating systems are generally designed to prevent the ingress of salts, moisture and oxygen, virtually eliminating such problems as the formation of white rust. The zinc metal is present as finely divided pigment in the primer, spaced out by resin. The "spacing out" of the zinc metal accommodates any zinc corrosion products (should they occur), without loss of coating adhesion.

As both surface preparation and priming of the steel are generally done in shop, corrosion products and soluble salts, the causes of **osmotic blistering**, are unlikely to be trapped between the primer and subsequent coatings.

For more information on the advantages of inorganic zinc silicate coatings, please refer to **Dulux Protective Coatings Tech Note 3.8.1**, and for those of zinc-rich epoxy primers please refer to **Dulux Protective Coatings Tech Note 3.8.2**.

For specification advice, please contact the Dulux Protective Coatings Technical Consultant in your state.

[i] Saponification - Breakdown of a paint film resulting from the reaction of alkali (galvanised surface) on the binder medium (resin) in paint. This reaction forms a soap film that will cause softness and loss of adhesion of the coating.