

Hot Dip Galvanising (HDG)

1.2.2

Surface Preparation - Issues and Precautions

The most critical factor to success or failure in all coating projects is the degree of surface preparation undertaken. A hot-dip galvanised (HDG) steel surface is no different. In fact, as far as we (as leading manufacturers of protective coatings) are concerned, it is considered that the surface preparation of a HDG steel surface is even more critical than most other substrates because of its nature.

The following are some of the main reasons that great care **MUST** be taken when preparing a HDG steel surface prior to painting:

- New HDG steel surfaces usually have a **very smooth surface** which can lack sufficient surface profile¹ to provide a key for coating adhesion.
- New HDG steel surfaces are commonly subjected to some form of **post treatment**, this generally leaves a deposit on the surface. Depending on the type of treatment these deposits can range from lubricants (ie oils/grease/waxes) to dipping in a bath of chromate solution and other forms of passivation². These post treatments are applied for varying reasons, eg chromates are to protect the HDG steel surface from aggressive corrosion (white rust or storage stain) during shipment and storage. In all cases the presence of post treatments can lead to delamination of a subsequent coating. Great care must be taken to ensure the **complete** removal of post treatments before any other surface preparation is undertaken. It is more prudent to request that the post treatments are **not** used if it is known that the item is to be subsequently painted (AS2312: 2002).
- It is **commonly believed** that allowing the newly HDG steel surface to "weather" will provide a satisfactory surface for painting. The weathering process will change the smooth, bright zinc surface to a dull, finely etched surface and tends to remove the presence of any post treatment deposits. The etched surface provides a profile that will greatly improve the adhesion of a coating to the surface. However other than the obvious time delay between the galvanising process and weathering, great care needs to be taken to ensure that all **corrosion products** are completely removed from the etched surface. A weathered zinc surface will be contaminated with loosely bound white rust (zinc oxide products) and will adversely affect the performance of any coating applied over it.
- Careful inspection of a HDG steel surface should be undertaken prior to any surface preparation. In some cases the quality of the galvanising may not be satisfactory and so should be inspected for **defects** such as **pinholes**, **blowholes**, **dags** (or lumps in the galvanising) and any indications of **scale**, **inclusions** or **laminations**, which were not removed prior to galvanising. In most cases these defects will have an effect on the performance and appearance of the subsequent coating system and must be rectified prior to paint application.



Little or no surface profile on the substrate caused coating failure.



Rough peaks and dags are abraded in an attempt to provide a more even finish.

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Surface Preparation - Issues and Precautions (continued)

To ensure a HDG steel surface is clean and rough enough to ensure effective coating adhesion, the paint industry prefers a preparation method of "sweep" or "brush" **abrasive blast cleaning**. The purpose of this method is to provide an evenly etched surface, with a 5 - 10 micron profile. This method is ideally suited for "shop" applied coatings, which can be sometimes impractical for site work. Care must be taken during this process to ensure minimal loss of zinc from the surface, however the selection of a suitable abrasive can assist in reducing this risk.

- **Acid washing is not advisable** for the surface preparation of galvanising. While it is normally effective in etching the surface to promote good paint adhesion, it is very difficult to ensure all of the acid has been removed prior to painting. Any residual acid present under the paint will continue to act on the zinc, causing blistering and delamination of the coating. On this basis the use of any form of acid washing of galvanising is to be avoided as a preparation for painting.
- The coating process must be carried out as soon as possible after the surface preparation has been completed to ensure the surface is not re-contaminated, i.e. particularly to ensure **zinc corrosion products** do not redevelop before paint application and subsequently affect adhesion properties. This is most critical especially when work is being carried out in marine, coastal and chemical environments.

For preferred surface preparation methods, please refer to **Dulux Protective Coatings Tech Note No. 1.2.3**



For more information, please contact the Dulux Protective Coatings Technical Consultant in your state.

ⁱ Profile or Surface Profile - can be described as the miniature ridges and valleys that give the surface the "teeth" to form a successful bond with a coating.

ⁱⁱ Passivation or Passive - surface that has shown no active corrosion due to the formation of a protective oxide film as a result of a reaction.