

## WHY GALVANIZE?

Hot dip galvanized coatings are applied to steel to improve the anti-corrosion performance of the steel to ensure that it lasts as long as possible with a minimum of maintenance

## COATINGS DIFFER

Only hot-dip galvanizing gives a coating that can reach the 50 year life required of structural building products.

## THICKNESS COUNTS

Compared to other zinc-rich coatings, hot-dipped galvanizing is:-

- THICKER
- HARDER
- FULLER

HOT-DIP GALVANIZED  
PRODUCTS LAST  
LONGER...

## White Rust (Storage Stain) on Galvanized Coatings.



**Storage stain on newly galvanized work.** So-called white rust forms when freshly galvanized steel is exposed to water in a deficiency of oxygen.

One of the commonly encountered problems with galvanized coatings of all kinds is 'white rust' or 'white storage stain'. It is manifested as a bulky, white, powdery deposit that forms rapidly on the surface of the galvanized coating under certain specific conditions.

White rust can cause considerable damage to the coating and is always detrimental to the galvanized coating's appearance.

The surface of galvanized coatings is almost 100% zinc. It is the durability of the zinc that provides the outstanding anti-corrosion performance for steel, yet zinc is a relatively 'reactive' metal. It is the stable oxides that form on the zinc's surface that determine its durability, and these oxides are formed progressively as the zinc is exposed to the atmosphere. Carbon dioxide in particular is a contributor to the formation of these stable oxides.

With newly galvanized steelwork, the zinc's surface has been subjected to little oxidation and is at its most vulnerable.

For this reason, galvanizers use a chromate passivation in conjunction with their galvanizing operations to provide protection to the galvanized coating during the 'youth' period of the coating. This passivation coating provides short term protection to the zinc to give the stable oxides time to form on the surface.

### White rust formation.

Pure water ( $H_2O$ ) contains no dissolved salts or minerals and zinc will react quickly with pure water to form zinc hydroxide, a bulky white and relatively unstable oxide of zinc. Where freshly galvanized steel is exposed to pure water (rain, dew or condensation), in an oxygen deficient environment, the water will continue to react with the zinc and progressively consume the coating. The most common condition in which white rust occurs is with galvanized products that are nested together, tightly packed, or when water can penetrate between the items and remain for extended periods.

### Avoiding white rust formation.

There are a number of simple steps that can greatly reduce or eliminate the formation of white rust. These are:

- Keep the packed work dry
- Pack the items to permit air circulation between the surfaces
- Stack the packed items on an angle to allow water to drain off
- Treat the surface with proprietary water repellent or barrier coatings to prevent moisture contact with galvanized surface.

# White Rust (Storage Stain) on Galvanized Coatings

## TRIED & PROVEN

Over 40 years of field testing shows that galvanized coatings perform well in harsh mining environments.

## WHAT IS STORAGE STAIN (WHITE RUST)?

White rust is a post-galvanizing phenomenon.

The presence of white rust is not a reflection on the galvanized coating's performance.

## WHY GALVANIZE WITH INDUSTRIAL GALVANIZERS?

For steel users requiring fast, proven corrosion protection for local or national projects Industrial Galvanizers is the established hot dip galvanizer with nationwide coverage.

### Treating galvanized surfaces affected by white rust.

Once the galvanized surface has been attacked and the zinc hydroxide compounds have formed, it is desirable to remove the oxide products from the surface because:

1. their presence inhibits the formation of stable carbonate based oxides and
2. they are unsightly

The effect on the galvanized coating can range from very minor to extremely severe and various levels of remedial treatment are available to deal with white rust problems at the various levels at which they are likely to occur.

**Light white rusting.** A light film of white powdery residue frequently occurs on freshly galvanized products during periods of heavy rain. Provided the items are well ventilated and well drained, white rust rarely progresses past this superficial stage. It can be brushed off if required but will generally wash off in service with normal weather. No remedial treatment is generally required at this level.

**Moderate white rusting.** A noticeable darkening and apparent etching of the galvanized coating under the affected area, with the white rust formation appearing bulky. The galvanized coating thickness should be checked to determine the extent of impact on the coating. In the majority of cases, less than 5% of the galvanized coating will have been removed and no remedial work is required if the appearance of the affected area is acceptable once the residues are removed by wire brushing. If appearance is unacceptable, the white rust affected area can be treated as follows: -

- Wire brush the affected area to remove all white corrosion products
- Using a cloth pad wet with aluminium paint, rub the surface with the pad to apply a thin film of aluminium paint to the affected area to blend it with the adjacent unaffected galvanized surfaces.

**Severe white rusting.** Very heavy oxide deposits and items may be stuck together. Areas under the oxidised area may be almost black or show signs of red rust. A coating thickness check will determine the extent to which the galvanized coating has been damaged. Remedial treatment to reinstate the coating should be undertaken by preparing the area and applying one or two coats of approved epoxy zinc-rich paint to achieve required dry film thickness of 100 microns

### Chemical removal of white rust.

Zinc hydroxide dissolves in chromic acid. Bulky white rust deposits can be removed by washing with a 5% solution of chromic acid. Care must be taken in the handling and containment of this solution and its residues. This treatment re-passivates the zinc surface and is well suited to treating batches of small parts. Other chemical treatments based on phosphoric acid can be used, however, these will darken the coating in the process.

### Re-passivating the galvanized surface.

This can be done by treating the surface with a solution of 5% sodium dichromate, 0.1% sulfuric acid, brushing with a stiff bristle brush for 30 seconds before thorough rinsing of the surface.

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