

Repair of Field Welds on Hot Dip Galvanizing

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Introduction

Ideally, the design and build phase of a structure should allow for only the minimum of on-site rectification works. By minimising or eliminating field work, the risk of early corrosion of steelwork is reduced, especially in medium to high corrosivity zones. However, there are times when field welding is a necessary activity and this Advisory Note provides general information on the repair of hot dip galvanized steel after on-site or field welding has been carried out.

Weld damage

When severe damage to the galvanized coating has occurred during welding, protection of the steelwork must be restored. The level and extent of the restoration must be more robust and the repair work completed prior to the article being put in service if the steel will be exposed to severe corrosive conditions in service.

The width of the weld damaged zone will depend on heat input during welding, being greater with a slow process such as oxyacetylene welding than with high speed arc welding. In the manual metal arc welding and oxyacetylene welding of galvanized steel, the weld metal itself will corrode in most atmospheres and the application of a protective coating is essential. Suitable materials for coating the weld metal and adjacent damaged areas of the coating are zinc rich paints, and in some circumstances, zinc metal spraying.

Repair methods

In the case of weld repairs, additional surface preparation of the damaged area is usually required to remove any welding slag followed by additional abrasive cleaning of the damaged area. Appropriate coating repair methods are detailed below. These follow the general requirements of AS/NZS 4860 - *Hot-dip galvanized (zinc) coatings on fabricated ferrous articles (Part 8 Repair After Galvanizing)*.

1. Surface preparation for all conditions

- Power tool clean to Australian Standard 1627.2 Class 3.¹
- Remove all welding scale, slag and corrosion products.
- Degrease and remove all surface contaminants.

2. Zinc rich paint repair

Decorative finish

- a) Apply 2 coats of Galvanite® epoxy zinc rich primer or equivalent to 125 – 150µm DFT.
- b) Stipple edges of the painted area to achieve optimum appearance of the repair.
- c) If a very close colour match is essential, on completion apply 1 coat of a 'silver' paint with an aluminium pigment² over the zinc rich primer for appearance only. Otherwise a more uniform metallic colour match will be achieved over time.

¹ Suitable tools include power wire brush, needle gun, disc sander, angle grinder and/or chipping hammer.

² An aluminium (oxide) platelet or leafing aluminium pigment, which orientate parallel to the substrate and reflect light, giving the coating a shiny appearance.

Moderate atmospheric corrosivity zones (C1 – C3)

Apply 2 coats of Galvanite® epoxy zinc rich primer or equivalent to 125 – 150µm DFT.

Severe atmospheric corrosivity zones (C4 – C5)

Apply 2 coats of 2 pack epoxy zinc to AS 3750.9 to 150µm minimum DFT followed by 2 pack epoxy enamel to 150µm DFT.

If a decorative finish is required, follow steps b) and c) from the decorative finish instructions above.

It is important to observe normal good painting practice with respect to weather and application conditions. Apply all paint strictly in accordance with paint manufacturers' recommendations.

Repaired areas of hot dip galvanized steel are normally considered to be most 'at risk' of early corrosion. Repaired areas should therefore receive an earlier maintenance inspection than the remainder of the structure.

Note:

Hot dip galvanized steels are welded easily and satisfactorily by all commonly practised welding techniques. Closer control of welding conditions than for uncoated steel is usually necessary but procedures are simple and well established. Chapter 5 of the After Fabrication Hot Dip Galvanizing Reference Guide (published by the GAA) details the procedures of the suitable welding techniques for galvanized steel, including GMA (gas metal arc), carbon arc, GTA (gas tungsten arc), manual arc, and oxyacetylene welding.



An example of poorly repaired handrail in a severe corrosive environment (wastewater treatment plant) where the repaired area has failed well before the main hot dip galvanized rails and posts.



An example of well repaired handrail in a severe corrosive environment (marine).

Technical Data

Galvanite



Jotun Protects Property

Product description

Galvanite is a single pack, zinc-rich primer for repair of damaged or degraded galvanized surfaces or as a zinc primer for properly prepared steel surfaces.

Recommended use

General purpose primer for repair of welding or other damage to galvanized surfaces. May also be used as a zinc-rich primer for steel surfaces.

Film thickness and spreading rate

	Minimum	Maximum	Typical
Film thickness, dry (μm)	30	75	40
Film thickness, wet (μm)	55	135	70
Theoretical spreading rate (m^2/l)	18.3	7.3	13.8

Physical properties

Colour	Light metallic grey. Weathers to a galvanized appearance
Solids (vol %)*	55 \pm 2
Flash point	25°C \pm 2 (Setaflash)
Abrasion resistance	Good
Chemical resistance	Good
Flexibility	Good

*Measured according to ISO 3233:1998 (E)

Surface preparation

All surfaces should be clean, dry and free from contamination. The surface should be assessed and treated in accordance with ISO 8504.

Other surfaces

The coating may be used on other substrates. Please contact your local Jotun office for more information.

Condition during application

The temperature of the substrate should be minimum 5°C and at least 3°C above the dew point of the air, temperature and relative humidity measured in the vicinity of the substrate. Good ventilation is required in confined areas to ensure correct drying.

Application methods

Spray	Conventional or airless spray may be used for larger areas.
Brush	Recommended
Roller	Recommended

Application data

Thinner/Cleaner	Jotun Thinner No. 7
Guiding data airless spray	
Pressure at nozzle	5-10MPa (700-1400 psi)
Nozzle tip	0.38-0.53 mm(0.015-.021")
Spray angle	40-80°
Filter	Check to ensure that filters are clean

Drying time

Drying times are generally related to air circulation, temperature, film thickness and number of coats, and will be affected correspondingly. The figures given in the table are typical with:

* Good ventilation (Outdoor exposure or free circulation of air)

* Typical film thickness

* One coat on top of inert substrate

Substrate temperature	5°C	10°C	23°C	40°C
Surface dry	2 h	1 h	30 min	7 min
Through dry	8 h	4 h	2 h	45 min
Dry to recoat, minimum	48 h	24 h	16 h	6 h

The given data must be considered as guidelines only. The actual drying time/times before recoating may be shorter or longer, depending on film thickness, ventilation, humidity, underlying paint system, requirement for early handling and mechanical strength etc. A complete system can be described on a system sheet, where all parameters and special conditions could be included.

Typical paint system

Galvanite 2 x 40 micron (Dry Film Thickness)

Other systems may be specified, depending on area of use

Storage

The product must be stored in accordance with national regulations. Storage conditions are to keep the containers in a dry, cool, well ventilated space and away from source of heat and ignition. Containers must be kept tightly closed.

Handling

Handle with care. Stir well before use.

Packing size

4 litres in a 5 litre container.

Health and safety

Please observe the precautionary notices displayed on the container. Use under well ventilated conditions. Do not breathe or inhale mist. Avoid skin contact. Spillage on the skin should immediately be removed with suitable cleanser, soap and water. Eyes should be well flushed with water and medical attention sought immediately.

For detailed information on the health and safety hazards and precautions for use of this product, we refer to the Material Safety Data Sheet.

DISCLAIMER

The information in this data sheet is given to the best of our knowledge based on laboratory testing and practical experience. However, as the product can be used under conditions beyond our control, we can only guarantee the quality of the product itself. We also reserve the right to change the given data without notice. Minor product variations may be implemented in order to comply with local requirements.

If there is any inconsistency in the text the English (UK) version will prevail.

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