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ALWAYS follow these essential Handling, Storage & Care Guidelines

Ayrshire Metals
Cold Rolled Systems

HANDLING, STORAGE & CARE GUIDELINES

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SCI Steel Knowledge

bsi ISO 9001 Quality Management Systems CERTIFIED FM 654994

RIDBA Rural & Industrial Design & Building Association

INTRODUCTION

This booklet includes information and essential methods for the handling and storage of products such as Zed and Zeta Purlins™, Steel Framing systems and SwageBeam™ sections.

Incorrect storage and handling may result in irreversible damage to these products!

Hot dipped galvanising provides excellent corrosion protection to the steelwork; zinc-iron alloy layers are formed by a reaction between the steel and zinc and are slowly sacrificed to protect the steel.

The rate of loss is dependent on the thickness and exposure to the environment.

For example if exposed to highly corrosive or a coastal saline environment then the degradation of the coating would be accelerated, reducing the time period until maintenance is required.

The design life of galvanised steel in service is directly related to its exposure to elements that cause corrosion. Below is a table that gives the predicted design life of steel galvanised to the standard Z275 coating. It can be seen that for a warm frame environment the expected design life is 250 years, provided that the building envelope is properly maintained. Design life will be reduced where the steel is more exposed, thicker zinc coatings or alternative protection measures can also be used where the environment is particularly corrosive.

PRODUCT APPLICATION	ENVIRONMENTAL CONDITIONS	PREDICTED DESIGN LIFE
Walls & floors in warm frame applications	No risk of water ingress or condensation	250 years
Non-load bearing stud panels	**Warm internal environment & no risk of water ingress**	**250 years**
Infill external walls in multi-storey buildings	Warm frame & no risk of water ingress	250 years
Roof structures (insulated)	**Low risk of condensation**	**200 years**
Suspended ground floors (with over-site membrane)	Low risk of water ingress; some risk of condensation	100 years
Roof structures (uninsulated)	**Some risk of condensation**	**100 years**
Purlins and side rails supporting metal cladding	Low risk of condensation; some dust and pollution	60 years
Sub-frames to over-cladding panels	**Low risk of water ingress; risk of condensation**	**60 years**
Suspended ground floors (without over-site membrane)	Low risk of water ingress; higher risk of condensation	50 years

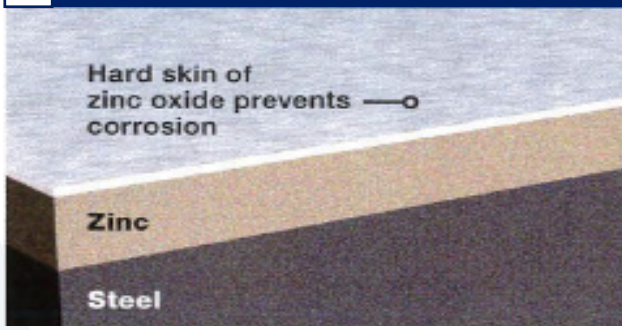
Note: All values are for Z275 (Total weight of zinc coating on both surfaces = 275 g/m²)

Source: SCI Publication ED022

The following information offers some guidance on the general handling, storage/care and maintenance of galvanised steelwork.

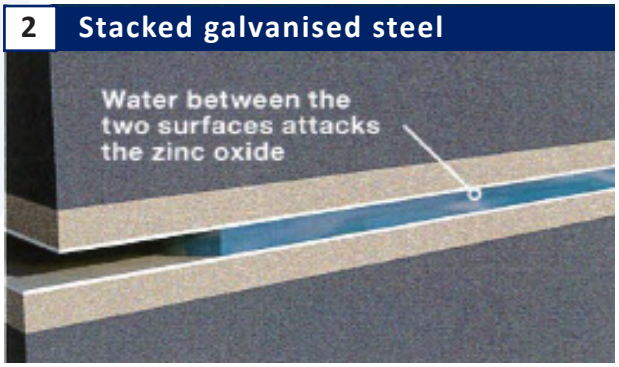
When a steel surface is galvanised, and when it is attacked by humidity in open air, there is immediate oxidisation; this produces a hard skin of zinc oxide which stays in place and does not corrode further **[1]**. The zinc is more attractive to oxidisation than iron, and will continue to protect the steel sacrificially for a long time.

1 Section through galvanised steel



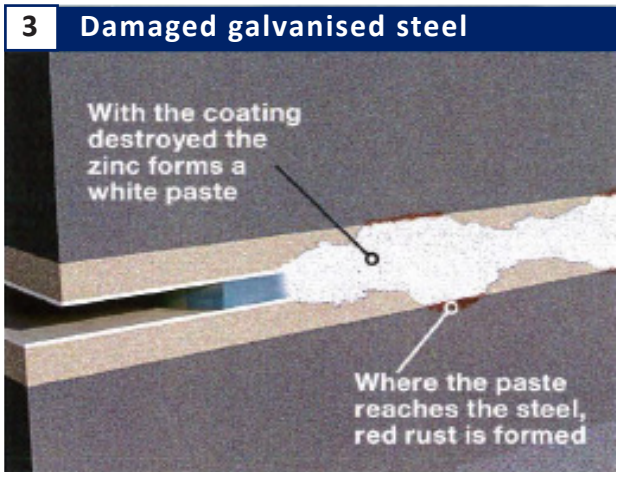
When two galvanised surfaces are stacked together and when there is water between the two surfaces **[2]**, the humidity attacks the zinc, forming an electric battery between the steel and the zinc and rapidly damages the zinc.

2 Stacked galvanised steel



The oxidised zinc does not form a hard skin, but a white paste **[3]** which conducts electricity and speeds up the oxidisation.

3 Damaged galvanised steel



A stack of such surfaces can have the zinc coating destroyed rapidly. This ‘white rust’, will be found between any two galvanised surfaces stacked wet and touching. As soon as enough zinc has been used up, red rust will start. If the water between the surfaces is saline the corrosion will be greatly accelerated.

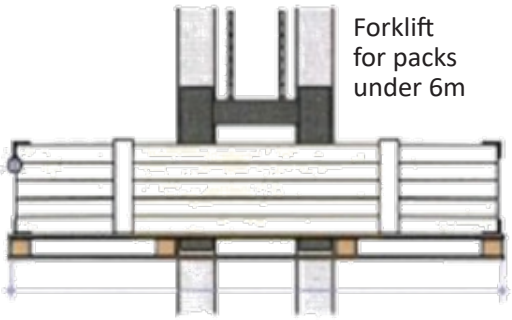
HANDLING

1 **Check materials on arrival**
On arrival check materials are dry. If any moisture is present unpack from the bundles and dry the surfaces.

2 **Never Drag**
When unpacking sections from the bundles, never drag from the stack. Remove by lifting the section.

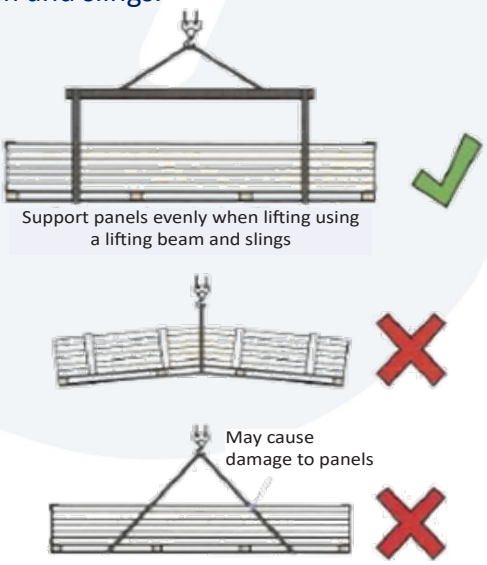
3 **No Walking**
Do not store bundles of section where people will walk across them.

4 **Sections under 6m - lifting**
Bundles of section less than 6 metres long may be lifted with suitable care using a fork lift truck, or by crane using suitable lifting slings.

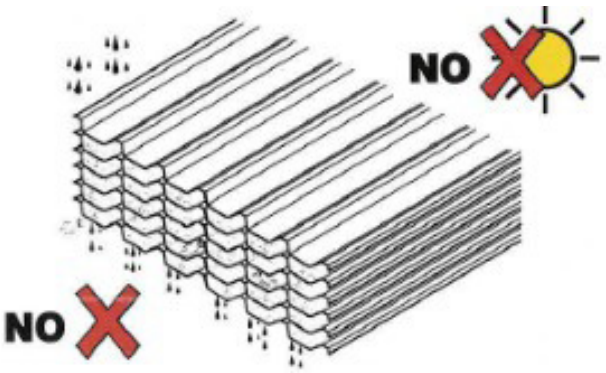


Less than or equal to 6m

5 **Sections over 6m - lifting**
Bundles of section over 6 metres long may be lifted by crane using a suitable spreader beam and slings.



NEVER leave sections in wet, damp or high humidity conditions.



Also avoid extremes of temperature because changes in temperature can cause condensation and entrapment of moisture between the sections, which can result in corrosion and damage to the coating of the material.

Trapped moisture can penetrate the coating through a process called osmosis and cause 'white rusting', which can lead to failure of the coating.

This risk applies to bundles of delivered materials prior to installation.

ALWAYS follow these essential Handling, Storage & Care Guidelines

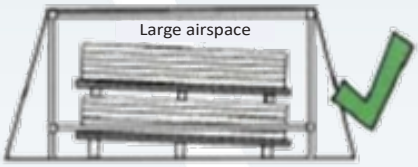
STORAGE

1 Ideal storage

Store bundles inside a building and away from open doorways.

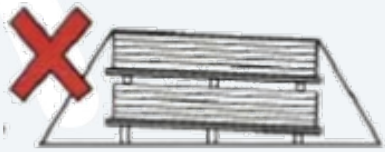
2 Alternative storage

If inside storage is not possible, erect simple scaffolding around the stacks of sections and cover the scaffold with a waterproof tarpaulin/sheet to protect materials from direct sunlight and rain.



Always ensure there is a large airspace between the tarpaulin/sheet and the sections to permit a full free circulation of air.

IMPORTANT: - NEVER lay the tarpaulin/sheet directly over the bundles of section.

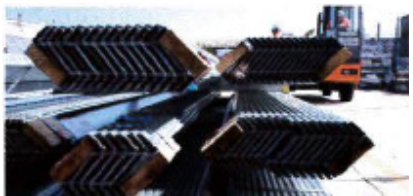


3 Storage

Good storage practice before erection can help prevent unsightly staining and any premature reduction in the thickness of the galvanised coating.

The most common problem is wet storage stain, sometimes misleadingly referred to as 'white rust'. Wet storage stain is caused by moisture being trapped on the surface of the galvanised coating which will then produce a whitish powdery substance called Zinc Hydroxide.

The damage is more aesthetic than physical and is frequently over-estimated, it will not get any worse once the conditions that have caused it have been removed, i.e. allow sufficient air to circulate.



Pre-galvanised cold rolled rails

4 Good practice includes:-

- Avoid long term storage of any galvanised steel in damp and poorly ventilated conditions.
- Store off the ground on timber bolsters.
- Do not store in long grass, in puddles or in mud.
- Use timber bolsters between layers. (Note: if the timber is wet or is already stained this can cause staining to the galvanising)
- Keep a good gap between steelwork sections to let the air circulate around the galvanised coating.
- Avoid water traps if you can, position steelwork to avoid the ponding of water.
- Do not let animals such as cattle have a free rein around the stored steel. (Urine and faeces can stain)
- Do not cover with tarpaulins or plastic sheets as this can cause condensation.
- Store as far away as possible from areas of fabrication or building, steel swarf, cement and mortar can stain and affect the coating.
- Store all loose galvanised fixings/bolts in the dry and avoid condensation.
- Avoid direct contact with dissimilar metals such as brass and copper.
- Avoid areas where water/ rain can run off other materials and sit on the galvanised coating, for example copper and certain hardwoods like oak.

CARE & CLEANING

1 Cleaning Galvanised Surfaces

There are a number of ways of treating different types of stains or marks. It is advised that any cleaning treatment of the galvanising should be conservative at first and then, if the situation demands, the treatment can become steadily more aggressive.

It is important to note that mechanical methods of cleaning zinc surfaces can cause aesthetic issues. The “cleaned” areas are likely to contrast with adjacent untreated surfaces and may take a significant period of time to weather to a uniform colour. If aesthetics is a great concern, it is advisable to first test the cleaning method in an inconspicuous area in case the aesthetic effect is unappealing.

Do not constantly abrade clean galvanised steel and, where possible, avoid abrasive washing altogether. Constant abrasive cleaning will consume the zinc more quickly and therefore may reduce the life of the galvanised steel.

For light wet storage stains, remove using a stiff wire brush, the surface below may retain a blackish colour but this is not detrimental to the performance of the zinc coating. For aesthetics the area can then be covered using a zinc rich paint/paste.

For general cleaning of bulk contaminants such as dirt and the like, ordinary soaps can be satisfactorily used. For more adherent contamination or for larger areas, the use of a low pressure wash with just pure water or in conjunction with proprietary cleaning materials such as car wash or truck wash, can be effective. The car and truck cleaners are formulated to minimise corrosion on the metallic parts of vehicles so are generally suitable for use on galvanised steel although it is important that the steel be washed down with freshwater after cleaning.

Many mild stains (such as those from water ponding and water runs or, in public areas, those from food, drink etc) can be removed with the use of common household ammonia cleansers, again being sure to thoroughly rinse the galvanised article with fresh water afterwards.

Often, water draining from other adjacent steelwork that is rusting can flow on to galvanised steel and cause conspicuous brown staining. This can be treated with the use of commercial oxalic acid or a proprietary solution that has been developed for de-scaling pots and pans. Thorough rinsing with water is again important to remove any corrosive residues of the cleaner.

2 Removing Cement & Mortar Drops

Sometimes during building or renovations, cement and mortar can be dropped onto the galvanised steel and this can be very difficult to remove once it has hardened.

Firstly remove the large parts of the deposit as close to the surface as practicable, then oxalic acid can be used to remove the remaining remnants from the galvanised steel, followed with a thorough rinsing.

Other acids are more effective on the mortar or cement, but these can be very aggressive on zinc and are not recommended.

3 Removing Paint & Graffiti

Paints, such as graffiti, can be removed using thinners. If some form of scraping is required, use plastic or wooden scrapers (not steel/metallic items).

If the paint is wet or fresh, then normal thinners can be used. Once the paint has hardened, then a non-alkaline stripper can be used.

Again, rinsing is important to remove residues that may cause discolouration later and/or encourage corrosion.

4 Repairing Galvanised Surfaces

Although galvanised steel has excellent resistance to rough treatment, small areas of damage may occur during transport or erection.

Due to the sacrificial action of the zinc, small localised flaws or damage (up to 5mm in width) are usually self-healing and do not reduce the overall protection of underlying steelwork.

For larger areas or if you want to make a repair for reasons of aesthetics then these can be repaired on site.

5 Repair using Zinc rich paint/paste

The paint/paste should contain (when dry) not less than 90% zinc by weight.

Preparation of the damaged surface will be influenced by the type of paint selected and the anticipated service conditions.

Experience shows that in general organic zinc-rich systems are more tolerant of surface preparation.

General Guidelines

- Surfaces to be repaired with a zinc rich paint or paste should be clean, dry and free of oil, grease, corrosion products or other surface contaminants.
- If the area to be repaired includes welds, first remove all flux residue and weld spatter.
- To ensure that a sound repair coating can be achieved the galvanised coating should be feathered back to a firm intact surface as necessary. Surface preparation of the area to be repaired would then normally involve degreasing as necessary and/or use of a power disc sander, wire brushing or other means of abrasion to achieve a bright metal finish.
- Spray or brush-apply the zinc rich paint or paste onto the prepared area. Apply the product as recommended by the paint manufacturer as a single coat or as a series of coats as required to achieve the minimum average coating thickness requirement.
- Note it is important to allow a coat to fully dry before a subsequent coat can be applied.
- Coating thickness measurements with either a magnetic or electromagnetic gauge might be taken to ensure that the applied repair coating meets specification requirements.
- Where aesthetics are critical the repair coating may be over-coated with a zinc-aluminium paint to help blend it in with the surrounding galvanised coating.

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Ayrshire Metals Limited

are experts in the design and build of the following:

- Purlin & Cladding rail system's
- Zeta Purlin™ & Cladding Rails
- Steel Framing Systems
- SwageBeam™ Systems
- AyrFrame™

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