Corrosion performance of Galvanised steel verses Zincalume® steel

Metal Coatings Explained

Corrosion protection of steel via metallic coatings was traditionally approached by one of two methods; barrier protection or sacrificial protection

1. Barrier Protection:

Works on the principal of allowing oxygen & moisture to reach the steel surface. In the absence of oxygen and moisture corrosion may not proceed.
In a metal coated context, coatings consist of inherently corrosion resistant metals such as Aluminium, Tin, Gold ,etc

Pros - Coatings are long-lasting and resistant to temperature change, abrasion, erosion, UV and are often electrically conductive.

Cons – If the coating is scratched, cracked, etc and steel is exposed, localised corrosion will proceed uninhibited and in some instance will be accelerated by presence of metal coating.

Metal Coatings Explained

2. Sacrificial Protection:

All metals have the potential to corrode. This potential is referred to as “activity”. When steel is coated with a more active metal, that metal will corrode in preference to the steel and provide protection from the corrosive influence. ie sacrifice itself.

Pros – Sacrificial protection is effective even if the steel substrate is exposed, as it is based on electrical conductivity. Sacrificial coatings physically migrate to a corrosion site to provide protection.

Cons – Being sacrificial in nature, the coating is depleted as it provides protection.

Duplex Coatings

Takes both principals previously described and combines the best features of each.

Alloying of metals with differing corrosion performance allows coating to be created that offer both barrier protection to protect the underlying steel, but also sacrificial protection in the event the steel is cut, scratched, drilled etc.

Pros – Coatings are very long life and at the same time protect exposed areas of steel

Cons – Compromise in properties, sacrificial protection slightly less than full sacrificial system and barrier slightly less than full barrier system.

Galvanised steel ⇒ **Sacrifical Coating**

ZINCALUME®steel ⇒ **Duplex Coating**

What is Galvanised steel?

- Galvanised steel is zinc coated (99.8% zinc)
- Has been around in its current form since 1936
- The zinc coating is completely sacrificial,
- It gives itself up to the environment to protect the steel

A standard coating weight of Z275 = minimum 275 g of zinc per m^2 (both sides)

What is ZINCALUME® Steel?

- Only made by BlueScope Steel

- ZINCALUME® with Activate™ technology is coated with a zinc/aluminium/magnesium alloy (55% Al, Zn)

- Combines the sacrificial benefits of zinc with the long life barrier protection of aluminium

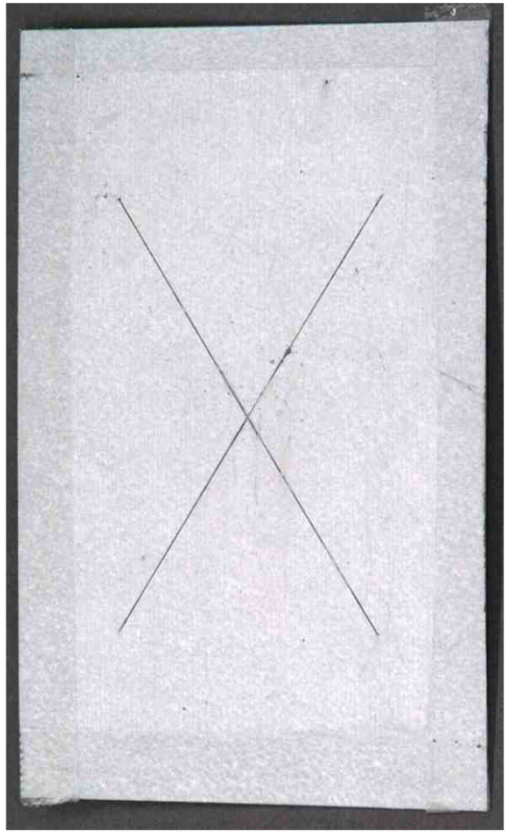
- AM 125 = a minimum of 125 grams of zinc/aluminium/magnesium alloy coating per m^2 (both sides)

	ZINCALUME® steel	Galvanised steel
Coating Composition	Aluminium / Zinc / Magnesium	Zinc
Typ. Coating Thick (Total)	35mm	38mm
Typ. Coating Mass (Total)	125g/m²	275g/m²
Passivated	Yes	Yes
Resin Coated	Yes	No
Weldable	Yes	Yes
Post-paint or powdercoat	Yes	Yes
Combustible	No	No
Recommended exposure Roofing & Walling:		
– Marine	Yes	No
– Light Industrial	Yes	No
– Heavy Industrial	No	No*
– Concrete	No	Yes
Thickness Range (bmt)	0.30mm – 1.6mm	0.30mm – 3.5mm

* May be used for heavy industrial at higher coating classes + post-painting

Salt Spray testing:- ZINCALUME® versus Galvanised.

Galvanized Z275
after 240 hrs

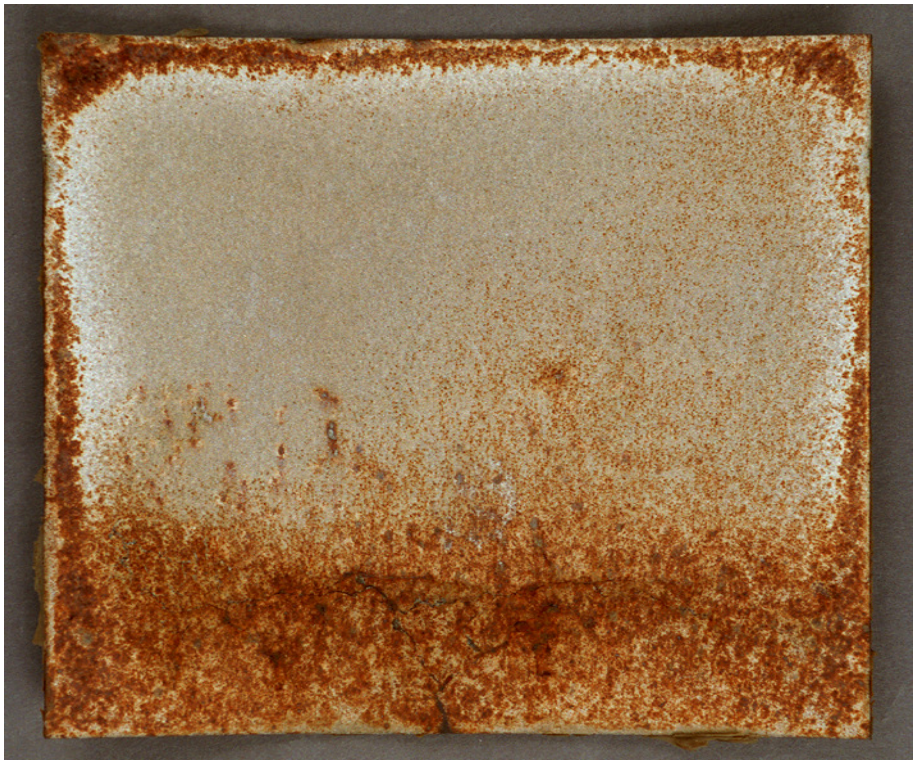


ZINCALUME® AZ150
after 240 hrs

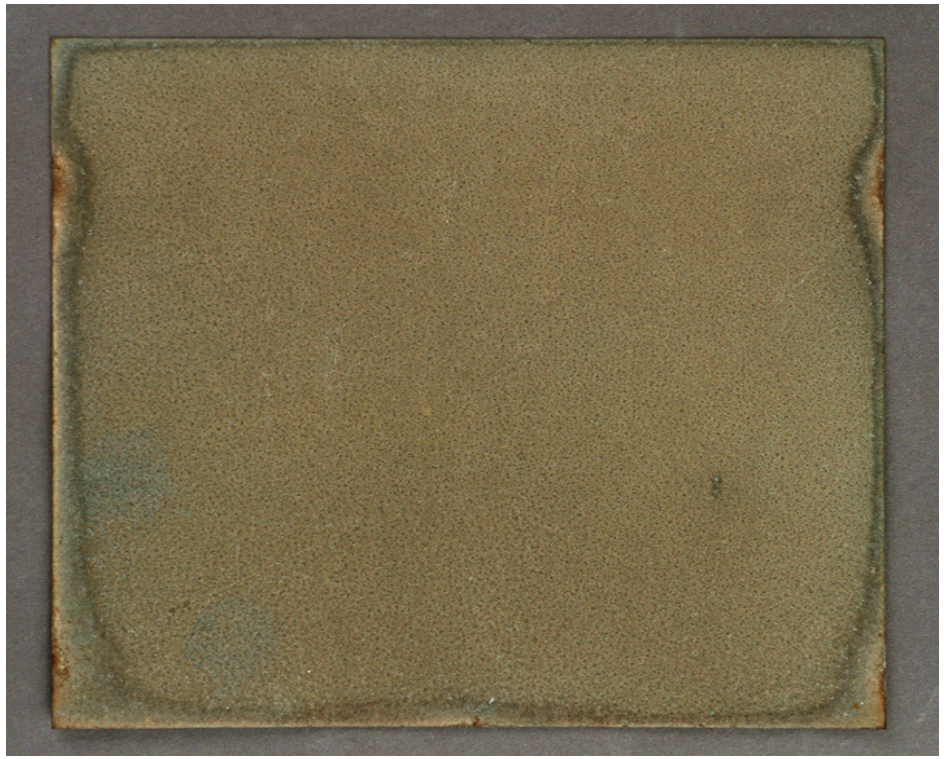
ZINCALUME® AZ150
after 2000 hrs

Outdoor exposure test:- ZINCALUME® vs galv

Bellambi Point site:- 11 years exposure



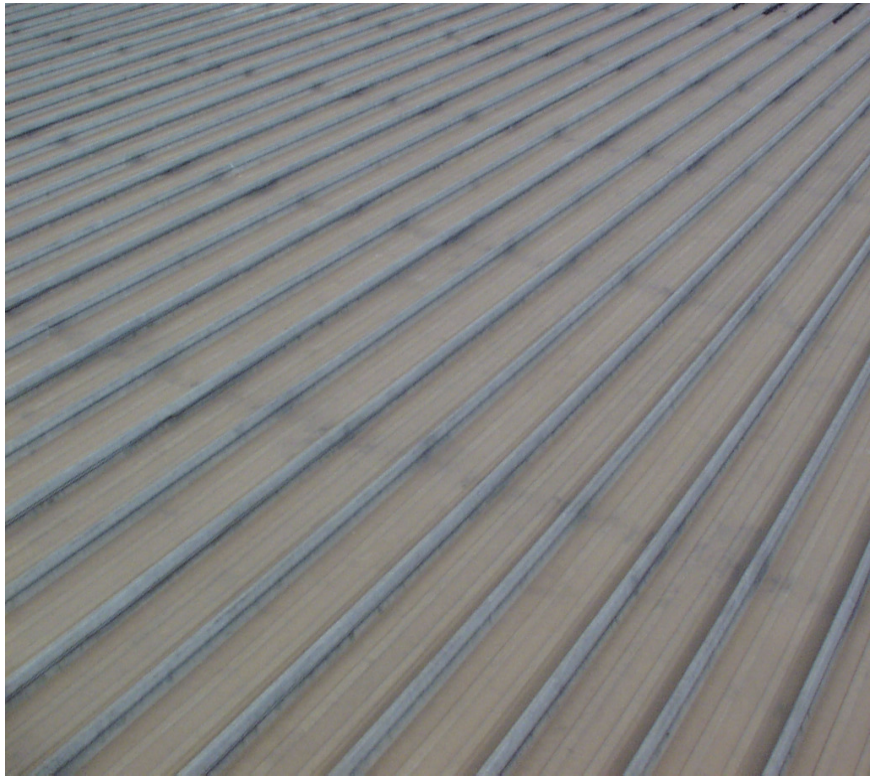
Galvanized Z275



ZINCALUME® AZ150

The Proof is there …..ZINCALUME® steel is superior

20 yrs Industrial / Moderate Marine Exposure



ZINCALUME® steel AZ150

Galvanized steel Z275

ZINCALUME® Steel verses Galvanised Steel

1. In the majority of applications, ZINCALUME® steel offers superior corrosion performance to galvanised steel.

2. When compared to a galvanised steel of equivalent coating thickness, ZINCALUME® steel offers an increase in service life from 200% to in excess of 400%.

3. ZINCALUME® steel surface has a much smaller spangle and presents a better surface for post-painting applications than galvanised steel.

ZINCALUME® Steel verses Galvanised Steel

4. ZINCALUME® steel has a fine resin coating that serves a number of functions including, temporary corrosion protection, anti-finger marking, reduction of wet stack storage and dry lubricant. Galvanised steel is not resin-coated.

5. ZINCALUME® steel offers a better sustainability position as it requires significantly lower volumes of coating metals. At the same time, increased service life over galvanised steel means it is in service longer prior to requiring replacement lowering the building energy inputs through lifecycle extension.

The summary of all this is…..

ZINCALUME® with Activate™ technology offers far greater resistance to atmospheric corrosion in ALL normal roofing and walling conditions.

(it typically lasts 4 to 6 times longer than Galvanised)