

CUT EDGE PROTECTION OF ZINC-COATED AND ZINC/ALUMINIUM ALLOY-COATED STEEL

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EFFECT OF CUT EDGES

The single aspect that most frequently concerns prospective users of zinc-coated and zinc/aluminium alloy-coated steel sheet is cut edge performance.

It is an established fact that the sacrificial protection afforded to the steel at cut edges will delay corrosion while there is zinc or zinc/aluminium alloy left in the vicinity of the edges.

Almost every metal-coated steel product has cut edges and when piercing occurs within the area of the sheet a further "cut" edge is generated.

Prime examples of such products are roofing, guttering and spouting.

These items are first slit to width then cropped to length. Holes are often pierced to accommodate fasteners, however corrosion in these areas has never constituted a problem where the recommended faster has been used.

Regardless of the environment, the more coating present, the more protection the steel has, both on flat unmarked surfaces and at cut edges.

MEASURE OF PROTECTION

Zinc and zinc/aluminium alloy hot-dipped metallic-coated steel sheet is produced by passing continuous steel strip through a bath of appropriate molten metal.

As the strip emerges from the bath the thickness of the coating is precisely adjusted according to the coating class required.

The coating class is a designation describing the coating type and amount of coating applied.

The coating type is generally described by the capital letters of the chemical symbols of the metals in the coating. The amount of coating is indicated by the minimum "coating mass" measured by the triple spot test specified in Australian Standard 1397.

Examples: Coating Classes AZ150, Z275

AZ = Aluminium/zinc

150 = 150 grams per square metre
(*minimum, total of both sides*)

Z = Zinc

275 = 275 grams per square metre,
(*minimum, total of both sides*).

The severity of the intended application should dictate the coating class specified. The more severe the environment in which the product must perform, the heavier the coating must be.

TWO WAY PROTECTION

Zinc and zinc/aluminium alloy metallic coatings perform in two ways:

1. As a barrier when the steel base is completely enclosed by the coating. Protection is afforded by the corrosion resistance of the coating itself.
2. As a sacrificial coating at edges when the barrier is broken by slitting, shearing, piercing or scratching.

The barrier effect is universally recognised. However, it is the sacrificial protection this bulletin addresses.

PROTECTION IS AUTOMATIC

Complete coating of steel sheet products is not practical, economical nor generally necessary. It is therefore normal practice, and has been since zinc-coated sheet has been produced, to have edges that have been slit, sheared, drilled or sawn.

In service, galvanic action causes zinc compounds to automatically build up at cut edges and scratches by an electrolytic reaction whenever water or moisture is present. These compounds slow the rate at which the surrounding coating is consumed around damaged areas. This effect is sometimes referred to as the "self healing" property of coatings containing zinc.

CUT EDGE PROTECTION OF ZINC/ALUMINIUM COATINGS

The cut edges of unpainted ZINCALUME® zinc/aluminium alloy-coated steel will perform in a very similar manner to zinc-coated sheet in the relatively thin range of thicknesses associated with roofing, wall cladding, gutters and downpipes.

(Note that cut edge performance is only one contributing factor to overall corrosion performance. For the applications mentioned above, BlueScope Steel Limited recommends the use of ZINCALUME® steel due to its overall superior corrosion performance).

To illustrate comparative cut edge performance, a series of channels ranging from 0.4 mm to 4.0 mm in width, were cut through coatings of both types down to the base metal.

The samples were exposed for 12 months at Port Kembla NSW in an aggressive industrial/coastal atmosphere.

The following photographs of the samples with similar coating thicknesses illustrate the lack of steel base corrosion, especially in the narrower channels. The width of these narrow channels correspond to the sheet thicknesses used for roofing, walling and rainwater goods applications.

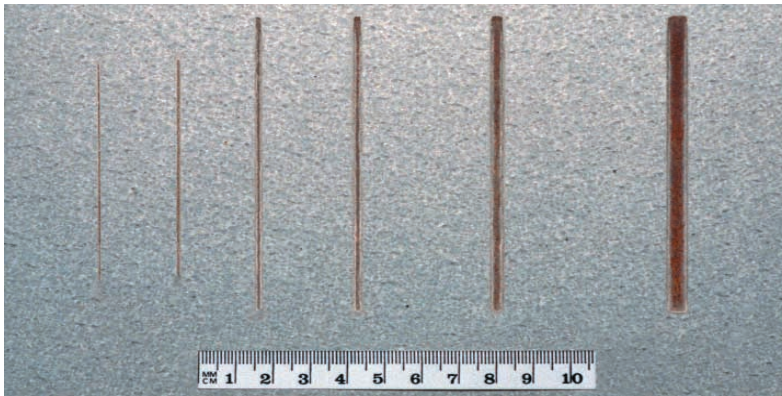


Figure 1: ZINCALUME® steel sample (AZ150 coating class).



Figure 2: Zinc-coated steel sample (Z275 coating class).

The information and advice contained in this Bulletin is of a general nature only, and has not been prepared with your specific needs in mind. You should always obtain specialist advice to ensure that the materials, approach and techniques referred to in this Bulletin meet your specific requirements.

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