

# RECOMMENDED STEEL GUTTER SYSTEMS

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BlueScope Steel Limited manufactures a large proportion of the coated sheet steel used for the production of guttering or spouting and downpipes in Australia. As a result they have accumulated vast experience regarding the relative performance of their range of products. The weight of evidence indicates that either ZINCALUME<sup>®</sup> zinc/aluminium alloy-coated or COLORBOND<sup>®</sup> prepainted steel sheet is the preferred product choice due to their superior performance over zinc-coated (*galvanised*) steel sheet under normal roofing conditions.

The most common causes of early failure of zinc-coated steel guttering have far less effect

when compared to a product made from ZINCALUME<sup>®</sup> steel.

Such causes of early failure include –

- leaves accumulated in the gutter
- ponding of water resulting from poor fall
- acid in gutter resulting from the cleaning down of brick work above the gutter
- acid flux left in guttering when soldering (*not a problem with ZINCALUME<sup>®</sup> or COLORBOND<sup>®</sup> steel gutters which are not soldered*)
- water dripping into guttering from “INERT” catchments (*refer over*)

## WHAT HAPPENS TO RAINWATER

The collection of rainwater running into gutters is influenced by atmospheric conditions, industrial fallout and rainfall intensity and frequency. Acid rain, which is quite corrosive to metal, is a feature of industrial and heavily populated areas with fumes from motor vehicle exhausts. Rain near the coast can pick up chlorides from salt air depending on the turbulence of the surf prior to precipitation.

Another source of water is overnight condensation which drips into gutters and is often insufficient to drain away where gutter fall is minimal.

## EFFECT OF ROOFING MATERIAL

When acid rain falls on a large area of roof, it is collected and directed in concentrated streams into a small area of gutter/spouting. If there is any tendency for coatings on metals in the roofing system to be affected by water, it is more likely to occur here.

The condition which can arise to cause corrosion to occur in this way is for water to fall on roofs which do not affect the corrosive properties of rain in any way. Such a roof is called an “**inert catchment**” and typical examples are glazed terracotta tiles, fibreglass, decking formed from aluminium, COLORBOND® steel and ZINCALUME® steel.

Roofs which alter the corrosive components of rain are unglazed cement tiles and unpainted zinc-coated materials. These actually counteract to some extent the acids and chlorides in rain so that by the time it reaches the guttering/spouting, it is far less reactive and the gutter will have a longer life.

## A CASE STUDY

A large shopping complex installed zinc-coated gutters with both ZINCALUME® zinc/aluminium alloy-coated steel and COLORBOND® prepainted steel roofs.

Early gutter failure occurred in all the box gutters and downpipes within eighteen months. This early failure can be directly attributed to the “inert catchment” phenomenon, caused by high purity rain water dripping or flowing into the gutters and sumps over extended periods. Replacement of the gutter system after only 18 months was required. An inefficient building, an angry client and possible legal proceedings were the result of a lack of knowledge of the reasons for early gutter failure and the inert catchment phenomenon. Also noted were areas of severe

corrosion with complete loss of protective coating – these were associated with ponding, where water had been retained for long periods, such as run off from the air conditioning plants.



## BLUESCOPE STEEL RESEARCH LABORATORY STUDIES (SRL – Steel Research Laboratory)

The following research was undertaken by the BlueScope SRL based at Port Kembla, NSW.

Apparatus was set up to establish the relative performance of ZINCALUME® steel and zinc-coated steel under different roof catchment conditions.

Distilled water containing 10mg of chloride (*salt*) per litre dripped continuously onto pairs of roof sections. Each pair had a different surface.

The photographs on this page were taken after two years' testing.

**Note:** Picture 4 shows that corrosion has occurred on a zinc-coated sample below a zinc-coated roof. This result indicates that zinc-coated steel will eventually fail before ZINCALUME® steel in a similar situation.

The test on the ZINCALUME® steel sample was abandoned when no rusting was evident even after it had been exposed without failure for more than 17 times the period to rust formation on the zinc-coated sample.



1 Aluminium to ZINCALUME® steel gutter (*left*)  
Aluminium to zinc-coated (*galvanised*) gutter (*right*)



2 COLORBOND® steel to ZINCALUME® steel gutter (*left*)  
COLORBOND® steel to zinc-coated steel gutter (*right*)



3 ZINCALUME® steel to ZINCALUME® steel gutter (*left*)  
ZINCALUME® steel to zinc-coated steel gutter (*right*)



4 Zinc-coated steel to ZINCALUME® steel gutter (*left*)  
Zinc-coated steel to zinc-coated steel gutter (*right*)

### CORRECT SPECIFICATION PROVIDES THE ANSWER

The solution to the problem of early gutter failure lies simply in the knowledge of the mechanism of corrosion. Therefore, the correct specification of a gutter and down-pipe product that will not result in surface breakdown will become a standard detail.

Research carried out by BlueScope SRL has proved that ZINCALUME® steel and ZINCALUME® based COLORBOND® steel used as a gutter and downpipe product in combination with any traditional roofing material will perform the desired non-corrosive functions of a gutter and downpipe system far better than zinc-coated material.

## GUTTER AND DOWNPIPE SPECIFICATION

The following clauses may be used as a standard gutter and downpipe specification:

Eaves, box, and valley gutters, and all downpipes shall be formed from ZINCALUME® steel complying with the Australian Standard 1397.

The formed product shall comply with Australian Standards 2179-2180-1986. Base grade and thickness will depend on profile. Coating mass shall be minimum AZ150 class when used as a substrate for COLORBOND® pre-painted steel or ZINCALUME® steel.

Installation shall be to normal trade practice with particular attention to fall, and freedom for thermal movement.

Sealant shall be as specified, and used in conjunction with compatible fasteners.



Zinc-coated roof receiving water from glass roof.



Early failure of zinc-coated gutter receiving water from pre-painted zinc-coated steel roof.



Typical early failure of zinc-coated gutter receiving water from terracotta roof.

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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## BlueScope Steel

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BlueScope Steel Limited ABN 16 000 011 058  
BlueScope Steel (AIS) Pty Ltd ABN 19 000 019 625



AUSTRALIA	SYDNEY	Telephone: (02) 9795 6700
	MELBOURNE	Telephone: (03) 9586 2222
	BRISBANE	Telephone: (07) 3845 9300
	ADELAIDE	Telephone: (08) 8243 7333
	PERTH	Telephone: (08) 9330 0666

OVERSEAS	BlueScope Steel (Malaysia) Sdn Bhd	Telephone: (603) 3250 8333
	BlueScope Steel (Thailand) Limited	Telephone: (66 38) 685 710
	PT BlueScope Steel Indonesia	Telephone: (62 21) 570 7564
	BlueScope Steel Southern Africa (Pty) Limited	Telephone: (27 21) 555 4265

