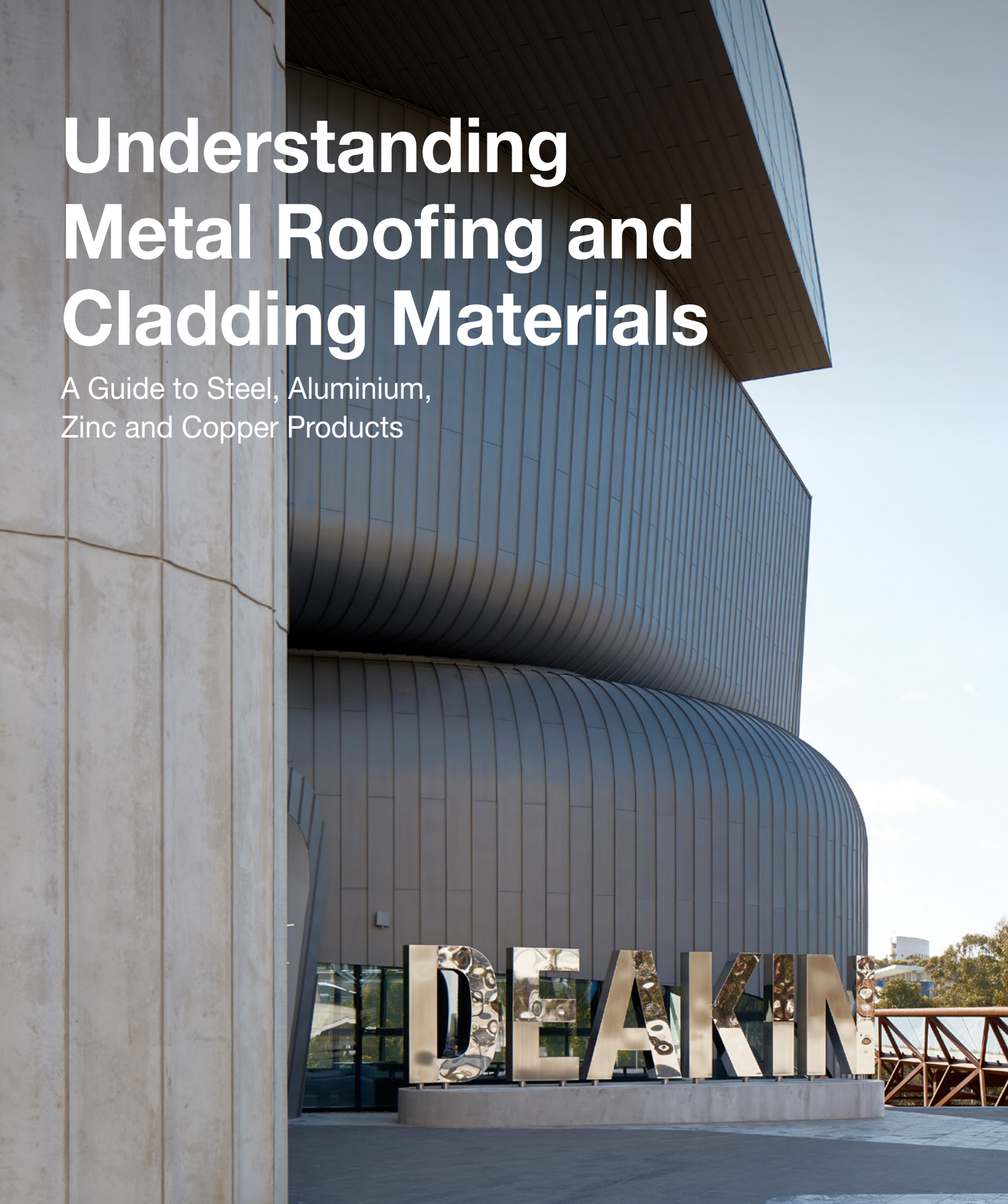


# Understanding Metal Roofing and Cladding Materials

A Guide to Steel, Aluminium,  
Zinc and Copper Products



INSPIRE



## INTRODUCTION

Metal cladding and roofing has become a cornerstone of modern construction due to its adaptability for use in a wide range of building types, from residential and commercial to industrial. Its core benefits—durability, weather resistance, non-combustibility, low maintenance, and cost-effectiveness—make it an attractive option for long-term building performance. Furthermore, its recyclability and longevity, along with its ability to improve energy efficiency, contribute to the environmental goals of modern building projects.

Steel, in particular, has evolved over centuries, gaining widespread use in the 1800s and improving with technological advances such as durable coatings and innovative paint systems. These developments have solidified its reputation as a cost-effective, long-lasting option for building exteriors, ensuring that it remains a top choice for both structural and aesthetic purposes. Aluminium's lightweight flexibility, zinc's self-healing patina, and copper's timeless beauty also bring unique qualities to the table.

This paper will provide a comprehensive guide to understanding the various metal roofing and cladding materials available, focusing on steel, aluminium, zinc, and copper. It will explore the unique properties of each metal, highlighting their specific advantages in terms of durability, weather resistance, and suitability for different architectural applications.





# Materials for cladding and roofing

## What is steel?

Steel is an alloy composed primarily of iron and carbon, known for its strength, versatility, and wide range of applications in construction. There are various types of steel used for roofing and cladding, each offering unique properties that make them suitable for specific building needs.

### **COR-TEN® steel**

COR-TEN® Steel also known as weathering steel, is designed to form a stable, rust-like appearance when exposed to the elements. This layer of rust acts as a protective barrier, eliminating the need for painting or other surface treatments. Over time, the steel develops a distinctive, weathered and rusted look.

### **Galvanised steel**

One of the most widely used steel types, galvanised steel combines the strength and formability of steel with the corrosion resistance provided by a zinc-iron coating. The zinc layer acts as a protective barrier, shielding the underlying steel from corrosive elements. This type of steel is prized for its durability, offering long-lasting protection in various environmental conditions.

### **Zincalume®/UniZinc™ Steel**

Zincalume® or UniZinc™ steel is coated with an alloy of aluminium, zinc, and magnesium. The inclusion of magnesium in aluminium-zinc alloy-coated steel significantly improves its performance, particularly in corrosive environments. Magnesium enhances the ability of zinc to 'flow' across the surface, effectively sealing cut edges and protecting them from premature corrosion. This makes it an ideal choice for coastal areas and other harsh environments, where additional corrosion resistance is essential for long-term performance.

### **Pre-painted steel**

Pre-painted steel products, such as UniCote® Coastal (from brand UniCote® Steel), are essentially aluminium-zinc alloy-coated steel with an added layer of baked-on paint. The paint, typically made from polyester or epoxy, not only enhances the appearance but also offers an additional layer of protection against the elements. This type of steel is available under various brand names and is widely used for both roofing and cladding.

## What is aluminium?

Aluminium is a lightweight, corrosion-resistant metal widely used in construction and various industries for its strength, versatility, and recyclability. Aluminium forms a natural oxide layer on its surface when exposed to air, providing effective corrosion protection. While lightweight, it has a high strength-to-weight ratio. These

characteristics make it an ideal choice for roofing and cladding applications, where both structural integrity, resistance and ease of installation are important considerations.

Aluminium is produced using different alloys, each tailored to specific uses. There are seven main series of aluminium alloys, with the series number indicating the alloying element. These alloys modify the base aluminium's properties to suit a range of applications, from building materials to transportation components. The 5000 series, commonly referred to as 'marine grade' aluminium, is alloyed with magnesium. This series is well-known for its corrosion resistance, making it suitable for harsh environments such as coastal areas.

## What is zinc?

Zinc is a naturally occurring, non-ferrous metal widely used in construction for its exceptional corrosion resistance, durability, and ability to form a self-healing patina. When exposed to the elements, zinc develops a protective layer that repairs minor scratches and imperfections, providing long-term protection against atmospheric corrosion. This self-healing quality, along with zinc's recyclability and low maintenance requirements, makes it an ideal material for roofing and cladding in sustainable building applications.

## What is copper?

Copper is a highly durable, naturally weather-resistant metal that forms a protective patina over time, increasing its longevity and resistance to corrosion. Its evolving appearance adds a distinctive aesthetic, making it a popular choice for architectural cladding in high-end residential, commercial, and historical projects. Copper's recyclability, low maintenance needs, and long lifespan make it not only a sustainable material but also one that contributes to LEED certification.

---

“Magnesium enhances the ability of zinc to 'flow' across the surface, effectively sealing cut edges and protecting them from premature corrosion.”

## Finishes



Metallic-coated steel is available with a variety of pre-painted finishes, each designed to enhance both its durability and aesthetic appeal. Common coating systems include PVDF, polyester, acrylic, and water-based options, all of which provide resistance to environmental wear and tear while offering a wide range of colour and finish options. These coatings help prolong the life of the steel, ensuring it maintains its appearance and performance over time.

Aluminium offers a broad spectrum of finishes, including both metallic and low-gloss pre-painted coatings. These finishes are designed to maximise the metal's service life by adding a protective layer that shields against corrosion and weathering.

Zinc naturally develops a protective patina, transforming from its shiny, silvery appearance to a matte grey finish when exposed to the elements. Over time, zinc finishes evolved to include pre-weathered options that provide a more uniform appearance, as well as coloured finishes achieved through mineral pigment layers. Today, zinc is available in natural, pre-weathered, coloured, and textured finishes.

Copper finishes are renowned for their evolving aesthetic, starting as a reddish-brown and developing into a green patina, known as verdigris, over time due to exposure to moisture and air. For architects seeking a consistent look, pre-patinated options like Nordic Green and Nordic Blue replicate the natural aging process, providing a controlled, uniform appearance while maintaining copper's renowned durability and longevity.

## Durability

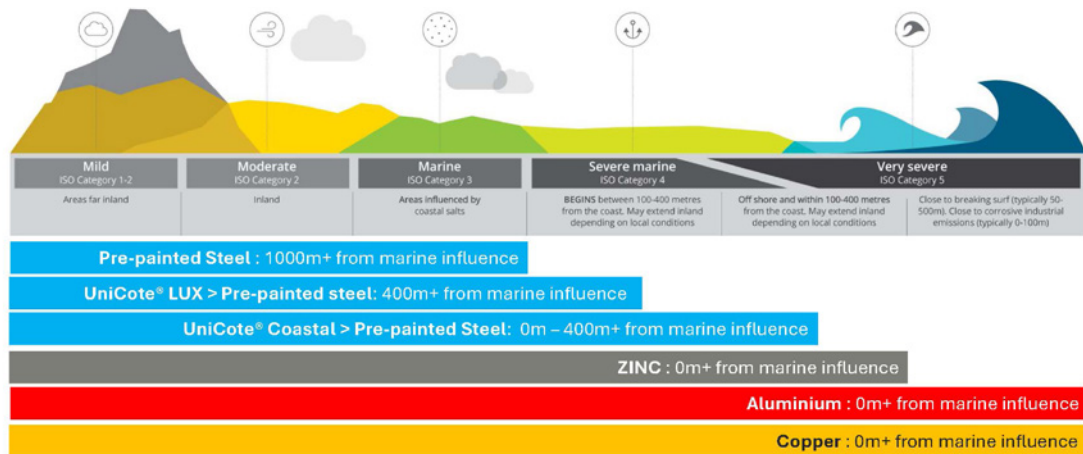
Steel roofing and cladding are known for their long lifespan, often exceeding 50 years, which makes them a cost-effective and durable option. Modern steel products benefit from advanced coatings that provide excellent corrosion resistance, particularly in harsh environments such as coastal areas. With its high strength-to-weight ratio, steel can withstand extreme weather conditions without compromising structural integrity. Additionally, steel's non-combustible nature ensures superior fire resistance, making it ideal for buildings located in bushfire-prone regions.

Aluminium is highly durable and requires minimal maintenance due to its natural corrosion resistance, both in its mill finish and when coated with paint systems. As a non-ferrous metal, aluminium does not develop red rust, although localised pitting corrosion can occur in specific conditions. Depending on environmental factors and applications, aluminium can last between 60 to 100 years, with some structures, like the San Gioacchino Church roof, demonstrating its potential to last over 100 years.

Zinc's durability stems from its ability to form a naturally protective, self-healing patina when exposed to air and water. This patina typically takes between six months and two years to fully develop, depending on the site's atmospheric conditions. Zinc corrodes at an average rate of 1 micron per year, giving it a lifespan of over 100 years in stable environments. Even in more aggressive conditions, zinc can maintain a lifespan of over 40 years, though special care is needed in unwashed areas like soffits where salt deposits may accumulate.

Copper is renowned for its exceptional durability, thanks to the naturally forming oxide patina that provides superior corrosion resistance and makes the material virtually maintenance-free. However, the development of the patina varies depending on the environmental conditions at the site, which should be considered when specifying copper for roofing or cladding applications.

Figure 2. Choosing the right material for different environmental contexts



\*Project specific warranties available upon application

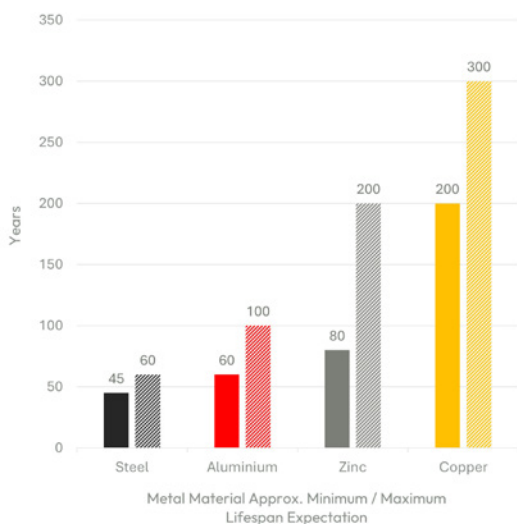
## Warranties

Warranties for metal roofing and cladding materials are typically influenced by environmental factors and specific material applications. Products closer to bodies of saltwater or in harsh industrial environments often experience reduced coverage due to the increased risk of corrosion. High-quality painted steel, for example, may offer a service life of 25 to 30 years, although paint and coating longevity may be shorter in marine or industrial settings.

Aluminium is similarly durable and can be used near water with warranties comparable to steel. Zinc, on the other hand, often comes with warranties ranging from 20 to 50 years for structural integrity rather than surface finish, as the material naturally forms a protective patina over time. Despite warranty limitations, zinc roofs can last well over 150 years, demonstrating excellent long-term performance.

Copper's proven historical performance generally makes extended warranty terms unnecessary. Manufacturers find it difficult to determine an appropriate warranty for copper when its life expectancy can be hundreds of years.

Figure 1. Metal Durability Approximate Lifespan in Years





## Panel types and profiles

Profiles of metal cladding are often marketed under different brand names by manufacturers, which can lead to some confusion. Common profiles include Corrugated, Interlocking Panel, Standing

Seam, Nailstrip, and Snaplock. Each profile offers unique characteristics in terms of installation and appearance, giving architects and specifiers flexibility in design.

See the below table outlining the various profile options available for each material:

Table 1. Profile options

Steel	Aluminium	Zinc	Copper
<ul style="list-style-type: none"><li>• Corrugated (wide range)</li><li>• Five-Rib</li><li>• Snaplock/ Concealed Deck</li><li>• Dual Lock Standing Seam</li><li>• Single Lock Standing Seam</li><li>• Interlocking Panel Flat Lock Panel</li></ul>	<ul style="list-style-type: none"><li>• Dual Lock Standing Seam</li><li>• Single Lock Standing Seam</li><li>• Interlocking Panel</li><li>• Flat Lock Panel</li><li>• Corrugated</li><li>• Composite Panel</li><li>• Cassette</li></ul>	<ul style="list-style-type: none"><li>• Batten Cap</li><li>• Dual Lock Standing Seam</li><li>• Single Lock Standing Seam</li><li>• Interlocking Panel</li><li>• Flat Lock Panel</li><li>• Pre-formed Tiles Cassette</li><li>• Can be customized</li></ul>	<ul style="list-style-type: none"><li>• Batten Cap</li><li>• Dual Lock Standing Seam</li><li>• Single Lock Standing Seam</li><li>• Interlocking Panel</li><li>• Flat Lock Panel</li><li>• Cassette</li><li>• Wide range of lap joint options</li></ul>



## Installation

Steel installation requires a moderate level of skill, involving techniques like cutting, forming, and fastening, which need to be executed with precision to avoid issues such as oil canning. Poor installation can compromise both the visual appeal and performance, making it critical that experienced installers handle the process.

Aluminium, zinc, and copper are all materials that require a high level of expertise for installation, particularly for architectural profiles like Standing Seam and Flat Lock. Aluminium's lightweight and flexible properties make it popular for modern designs, but these same traits demand precise handling. Zinc installation is labour-

intensive and often involves custom-made panels. Copper, known for its malleability and thermal expansion, also requires skilled installation to prevent issues like buckling or warping over time.

Other important installation considerations include selecting the right substrate, membrane or underlay and ensuring proper ventilation. The substrate provides structural support, while membranes manage moisture and improve thermal efficiency. Ventilation regulates temperature and moisture, reducing the risk of condensation and corrosion. These factors are crucial for the long-term durability and performance of metal cladding systems.



## Specify the right solution for your next project

INSPIRE are committed to empowering architects, builders, and designers by offering expert guidance and a comprehensive selection of premium metal cladding and roofing solutions. Specialising in high-quality materials such as steel, aluminium, zinc, and copper from top brands like UniCote®, VMZINC®, and Nordic Copper, INSPIRE helps ensure that every project achieves architectural excellence.

Nordic Copper offers exceptional beauty and long-term durability. Available in a range of natural and pre-patinated finishes, Nordic Copper offers unique visual appeal that evolves over time, forming a natural patina that enhances its longevity. Its inherent corrosion resistance ensures that Nordic Copper maintains its integrity even in the harshest environments, making it a superior choice for architectural excellence with a lifespan spanning hundreds of years.

VMZINC® provides a versatile solution for both roofing and cladding applications. Known for its self-healing properties, VMZINC's natural patina formation protects against corrosion, ensuring decades of performance with minimal maintenance. Available in a variety of finishes—from the raw, natural zinc to pre-weathered surfaces—VMZINC® provides a timeless aesthetic with exceptional durability and sustainability, making it a reliable choice for modern, long-lasting architecture.

UniCote® gives architects and designers a comprehensive selection of premium steel and aluminium solutions for cladding and roofing, helping practitioners choose the right materials based on both aesthetic preferences and performance requirements. The company has developed and refined a four-tiered product suite

that delivers solutions for various environments, offering striking patterns, colours, and textures while maintaining the strength and durability of steel and aluminium.

The UniCote® LUX range stands out for its premium finishes, such as weathering steel, timber, and stone, elevating architectural designs with unique textures and colours. It combines the beauty of natural finishes with the durability of steel, making it ideal for high-end architectural projects. UniCote® Select provides a robust solution for standard environments, offering a balance of durability and aesthetics, making it a versatile option for a variety of projects.

For coastal and marine applications, UniCote® Coastal delivers unparalleled corrosion resistance, designed specifically to withstand harsh coastal conditions. This product is crafted with a special coating to protect against the challenges posed by salt and moisture, ensuring long-lasting performance. UniCote® Extreme is designed for the most demanding environments, offering aluminium materials suited for severe marine conditions, industrial applications, and high-end inland buildings.

With over 70 colours and finishes, including the Essential and Tasman ranges, UniCote's vast palette can be suited to all types of projects—from classic to modern designs—allowing for personalised service and precise specification.

By understanding the characteristics, strengths and properties of Copper, Zinc, Aluminium and Steel, architects can design beautiful fit-for-purpose buildings with metal roofing and cladding solutions to suit any project type, in any location.





Poor installation can compromise both the visual appeal and performance, making it critical that experienced installers handle the process.

INSPIRE