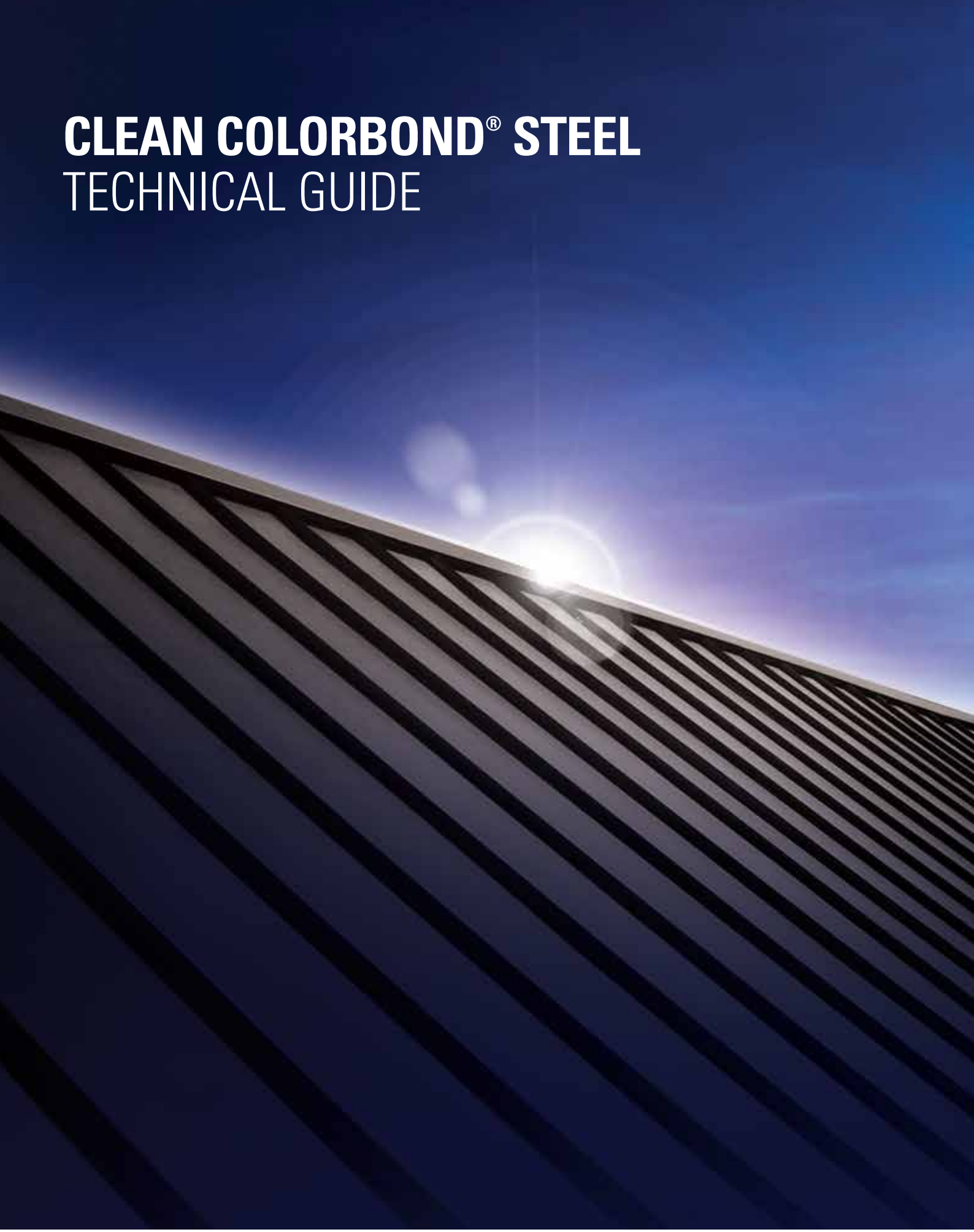
CLEAN COLORBOND® STEEL
TECHNICAL GUIDE



BLUESCOPE

clean Colorbond®
THERMATECH™

WHY CLEAN COLORBOND® STEEL
FROM BLUESCOPE?

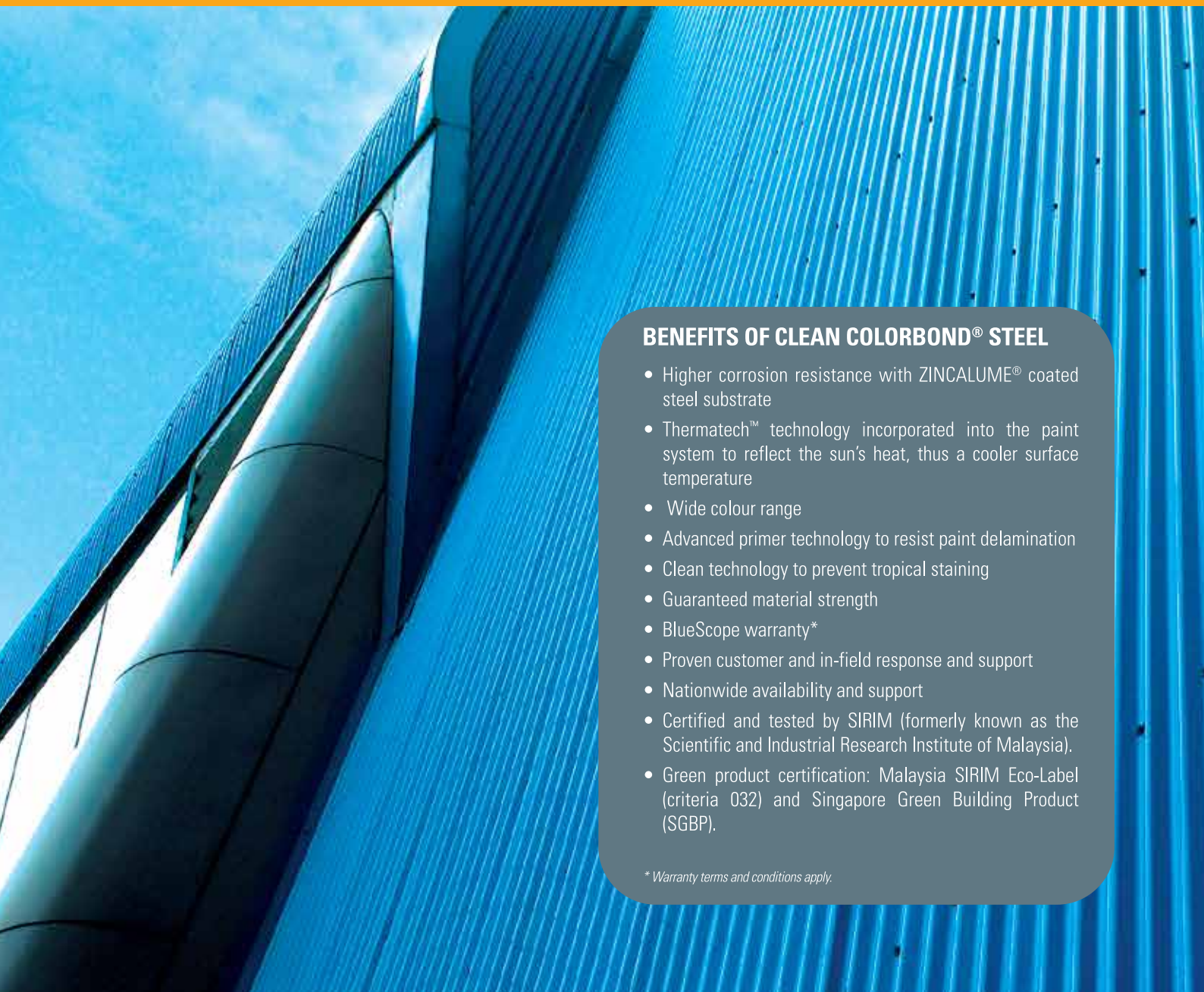
HOW CONFIDENT ARE YOU OF BEING OFFERED AN EQUIVALENT PRODUCT?

Clean COLORBOND® steel combines the superior strength of zinc/aluminium alloy-coated steel with proprietary paint system technology exclusive from BlueScope. BlueScope products undergo continuous research and development, with stringent product testing in the harshest environments.

Clean COLORBOND® steel complies to Australian/ New Zealand Standard AS/NZS 2728 and Malaysia Standard MS 2383. The product durability and performance is backed by a warranty*

HOW TO IDENTIFY GENUINE CLEAN COLORBOND® STEEL, ONLY FROM BLUESCOPE

To identify genuine Clean COLORBOND® steel made only by BlueScope, pay attention to the Clean COLORBOND® steel branding text on the reverse side of the steel sheet. The branding is your assurance of BlueScope's commitment to quality.



BENEFITS OF CLEAN COLORBOND® STEEL

- Higher corrosion resistance with ZINCALUME® coated steel substrate
- Thermatech™ technology incorporated into the paint system to reflect the sun's heat, thus a cooler surface temperature
- Wide colour range
- Advanced primer technology to resist paint delamination
- Clean technology to prevent tropical staining
- Guaranteed material strength
- BlueScope warranty*
- Proven customer and in-field response and support
- Nationwide availability and support
- Certified and tested by SIRIM (formerly known as the Scientific and Industrial Research Institute of Malaysia).
- Green product certification: Malaysia SIRIM Eco-Label (criteria 032) and Singapore Green Building Product (SGBP).

** Warranty terms and conditions apply.*

What is **Paint Weathering?**

Colour Fading and Delamination?

Colour fading is caused by the degradation of the key ingredients in the paint system, e.g. pigments and resins, due to prolonged weathering and poor formulation. Delamination is the separation of the top coat from the primer and can be caused by UV effects, poor surface preparation, poor primer formulation and inferior paint formulation.

Paint System

BlueScope utilises optimum paint formulation and pigment blends to provide excellent long-term colour stability for Clean COLORBOND® steel products.

The proprietary paint system is a result of extensive research and development testing, including actual field exposure testing. It has been proven that the paint system used for Clean COLORBOND® steel provides superior durability against weathering and UV penetration, when compared with other pre-painted steel.

First, an effective metallic coating is prepared and a corrosion inhibitive primer is applied for adhesion of the top coat on the substrate and to provide additional corrosion resistance. This is followed by application of the paint top coat with optimum paint thickness to maximize the paint performance against weathering. The multiple coating system layers act in synergy to provide superior performance and durability.

Clean COLORBOND® steel is now incorporated with Thermatech™ technology to provide thermal protection for houses and commercial buildings.

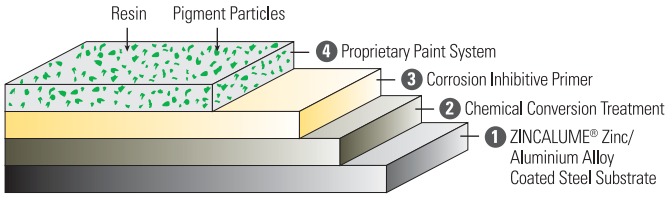
Key notes:

- Colour fading is caused by deterioration of resin and pigment while paint delamination is caused by UV effects, poor manufacturing, poor formulation, or poor specification.
- BlueScope's paint formulation provides superior durability against weathering and is resistant to paint delamination.
- Clean COLORBOND® steel is made up of multiple coating layers that work in synergy to provide superior performance and durability.
- Thermatech™ solar reflectance technology is incorporated into Clean COLORBOND® steel to reflect the sun's heat, thus lowering surface temperature.

How does it work?

The paint system used in the manufacturing of Clean COLORBOND® steel has a high degree of resin stability, colour stability and UV resistance. The effectiveness of a paint system's performance is a function of the multiple layers of coating technology working together to create an effective overall coating.

1. We start with a ZINCALUME® steel base. ZINCALUME® steel has a zinc/aluminium alloy coating that delivers outstanding anti-corrosion performance.
2. We apply a conversion layer to the surface of the steel to improve adhesion.
3. We then bake a polyester primer onto the surface.
4. Finally, we apply the top coat - a specially developed, exterior grade paint that is baked on to ensure maximum resistance to chipping, peeling and cracking.



How does it perform?

The samples pictured below were exposed to the same environmental conditions for the same period of time. The conventional pre-painted steel shows significant colour fading, while the Clean COLORBOND® steel shows very little colour change, thus providing long lasting beauty (figure A).

Figure A

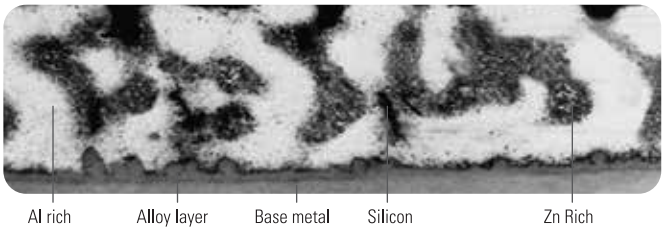
Clean COLORBOND® steel | Conventional pre-painted steel

What is **Corrosion?**

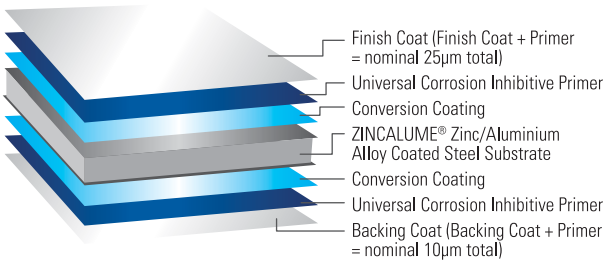
Corrosion is caused by the deterioration of metal due to chemical reaction as a result of exposure to the surrounding environment (water and oxygen). It is also known as oxidation. Corrosion of metal results in the formation of rust or oxides in the corroded area.

ZINCALUME® coated steel substrate

Clean COLORBOND® steel is incorporated with BlueScope's proprietary metallic coating technology - ZINCALUME® zinc/aluminium alloy coated steel as the base substrate. ZINCALUME® steel comprises a coating composition of 43.5% zinc, 55.0% aluminium and 1.5% silicon. The minimum coating mass of 150 g/m^2 (AZ150) offers superior corrosion performance under varied conditions, when compared with other metallic coated steel.



Cross-section of Clean COLORBOND® steel



How does it work?

Sacrificial protection is provided by an active metal (e.g. zinc), protecting a less active metal (e.g. steel). The more active metal corrodes in preference to the less active metal (figure A). ZINCALUME® steel exhibits a more complex coating structure consisting of both zinc-rich and aluminium-rich areas (figure B). The zinc-rich area provides excellent sacrificial protection, while the aluminium-rich area provides durable barrier protection. It is the combination of these two characteristics that make ZINCALUME® steel durable and effective against corrosion.

Key notes:

- Corrosion is the dissolution of metal due to the surrounding environment.
- Clean COLORBOND® steel provides excellent corrosion resistance with ZINCALUME® steel as the base substrate which comprises a coating composition of 43.5% zinc, 55.0% aluminium and 1.5% silicon with a minimum coating mass of 150 g/m2.
- The zinc-rich area provides excellent sacrificial protection, while the aluminium-rich area provides durable barrier protection.

How does it perform?

The pictured samples were exposed for the same period of time in a similar severe enviroment. The galvanised steel shows severe loss of coating and consequent red rusting of the steel substrate but the ZINCALUME® steel is still in a good condition.

ZINCALUME® steel | Galvanized steel

Corrosion rates of galvanized steel and 55% Al-Zn alloy coated steel at Australian Atmosphere Exposure Test Sites.

Site	Galvanized Steel		55%Al-Zn Alloy Coated Steel	
	g/m^2/y	µm/y	g/m^2/y	µm/y
Severe Marine	140	9.8	16	2.2
Marine	18	1.3	4.0	0.54
Industrial/Marine	20	1.4	4.2	0.57
Rural	4	0.28	1.3	0.17

g/m^2 - two sided | µm - one side

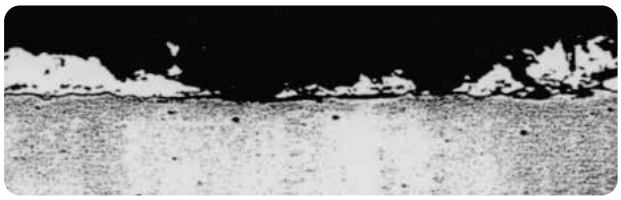


Figure A - Microscopic view of galvanized steel

Figure B - Microscopic view of ZINCALUME® steel

What is **Tropical Staining?**

Dirt Staining

Dirt staining is caused by a combination of airborne particles, heat and humidity. On conventional pre-painted steel, airborne particles such as dirt settle on the pre-painted steel surface. The combination of heat and humidity then results in dirt particles bonding to the pre-painted steel surface. This eventually forms dark stains on the building material. Over time, the building will look dirty and aged.

Clean Technology

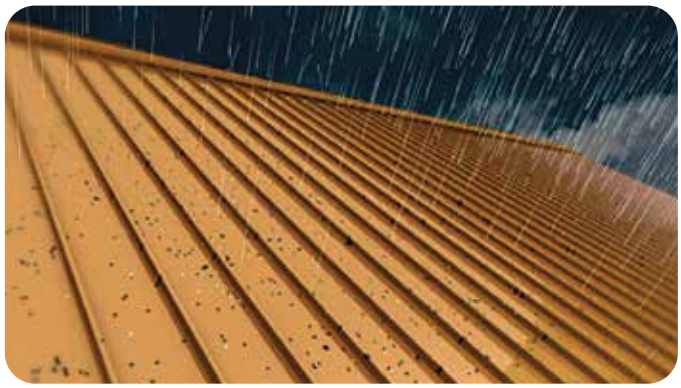
BlueScope developed a revolutionary paint system, which resists dirt staining. The unique Clean COLORBOND® steel paint system prevents dirt from bonding to the surface of Clean COLORBOND® steel (figure A), as compared to other pre-painted steel paint systems where dirt particles can bond to the surface (figure B).

Figure A
Microscopic picture shows dirt not bonding to the surface of Clean COLORBOND® steel.

Figure B
Microscopic picture shows dirt bonding to the surface of conventional pre-painted steel.

How does it work?

Because Clean COLORBOND® steel resists dirt bonding to the surface, any dirt particles residing on the surface remain "loose" and can be easily washed away during rainfall. Clean COLORBOND® steel therefore resists dirt staining and maintains a cleaner look over time.

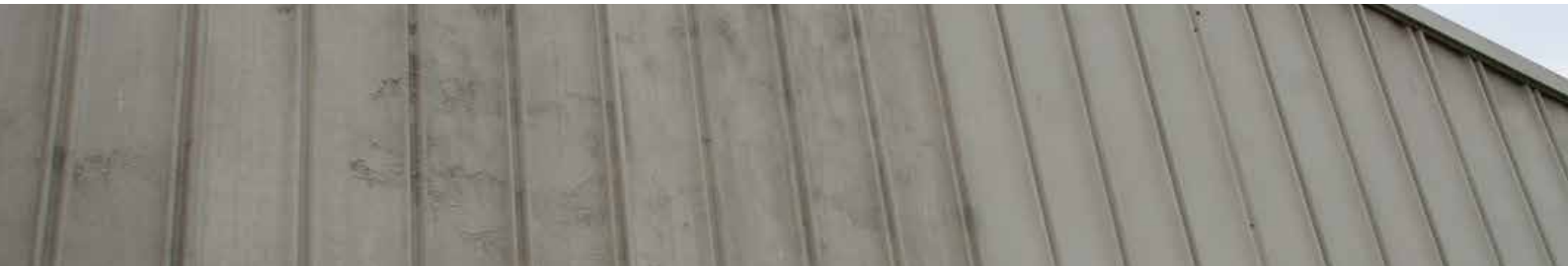


How does it perform?

The samples pictured were exposed under the same tropical environment for the same period of time. The conventional pre-painted steel was badly affected by dirt staining, while the Clean COLORBOND® steel shows no signs of staining and retains its vibrant and beautiful colour.

Key notes:

- Heat and humidity cause dirt particles to bond to the pre-painted coated steel surface.
- Clean COLORBOND® steel's unique paint system prevents dirt from bonding to the pre-painted coated steel surface.
- Dirt that resides on Clean COLORBOND® steel remains "loose" and can be easily washed off during rainfall.
- Clean COLORBOND® steel retains its vibrant and beautiful colour for longer.



What Is THERMATECH™

Solar Reflectance Technology?

- THERMATECH™ solar reflectance technology is incorporated into Clean COLORBOND® steel to lower surface temperature by absorbing less heat from the sun. In other words, THERMATECH™ is able to reflect the solar heat away from the roof.
- Solar Reflectance Index (SRI) is a numerical value used to represent a constructed surface's ability to reflect solar heat. The SRI for standard black is 0 and a standard white is 100. Higher SRI values indicate a roof that has a lower surface temperature.
- THERMATECH™ technology optimizes the thermal performance of every colour in the standard Clean COLORBOND® steel range without changing their appearance. It therefore consumes less energy for air-conditioning and helps to mitigate the Urban Heat Island (UHI) effect.

Why is **THERMATECH™ IMPORTANT?**

- Roofing is a key consideration when designing a building to be thermally efficient, and is essential in mitigating the Urban Heat Island (UHI) effect.
- With the increase in global warming and government's focus on climate change, the need for great thermal efficiency especially in a tropical climate has become more essential.
- Green building rating tools such as Leadership in Energy and Environment Design (LEED) and Malaysia's Green Building Index (GBI) require materials with high SRI values for mitigating the UHI effect. Clean COLORBOND® steel with THERMATECH™ is able to provide higher SRI values thus complying to the green building requirements.
- Clean COLORBOND® steel has been one of the core building materials for more than 50 years in Australia. Today, Clean COLORBOND® steel with THERMATECH™ is leading the innovations again thus fulfilling the needs and requirements of the building industries.

Lower Energy Consumption, for the same comfort

- THERMATECH™ solar reflectance technology acts as an added insulation in hot weather, making it easier for air-conditioning to keep buildings cool.
- In moderate to hot climates, compared to roofing material of similar colour with lower solar reflectance, Clean COLORBOND® steel can reduce annual cooling energy consumption by up to 15%*.

  * Depending on level of insulation, colour, building shape and function.
- Clean COLORBOND® steel with THERMATECH™ technology reduces the peak roof temperature by up to 6°C*, depending on the colour.

  * Depending on level of insulation, colour, building shape and function.
- Greater comfort while using less energy helps to reduce cost and is friendlier to the environment.

Developed specifically
For Severe Environments

If you want an attractive, long lasting roofing material that offers you excellent protection against severe environments, Clean COLORBOND® ULTRA steel is the right choice.

From severe coastal environments to severe industrial environments, Clean COLORBOND® ULTRA steel is one of the most effective building materials available to combat these harsh environments. Its coating consists of 55% aluminium, 43.5% zinc and 1.5% silicon and comes with an AZ200 coating class, which means that for every square meter of steel, there is a minimum of 200 grams of zinc/aluminium coating. With the higher metallic coating mass and the unique protective paint system, Clean COLORBOND® ULTRA steel is one of the most effective building materials available for harsh environments.

Clean COLORBOND® ULTRA steel has superior corrosion resistant, dirt resistant and paint performance properties that allow you to have total peace of mind.

- The zinc and aluminium metallic coating on Clean COLORBOND® ULTRA steel provides a barrier protection as well as a sacrificial protection against corrosion.
- The unique corrosion inhibitive primer in the paint system contributes to the superior corrosion resistance as well.
- The special formulation of the top coat paint system provides excellent dirt resistance.
- Superior paint performance that provides the ability to withstand colour fading.

GUIDELINES	DISTANCE TO SEA*		
PRODUCT TYPE	100 - 400 m	401 - 1000 m	1 - 5 km
Prepainted Galvanised (Z200)	Not recommended	Not recommended	Not recommended
Prepainted Galvanised (Z275)	Not recommended	Not recommended	Recommended
Clean COLORBOND® (AZ150)	Not recommended	Recommended	Recommended
Clean COLORBOND® ULTRA (AZ200)	Recommended	Recommended	Recommended

*Area exposed to breaking surf and ocean spray

clean Colorbond® ULTRA

You'll have
TOTAL PEACE OF MIND

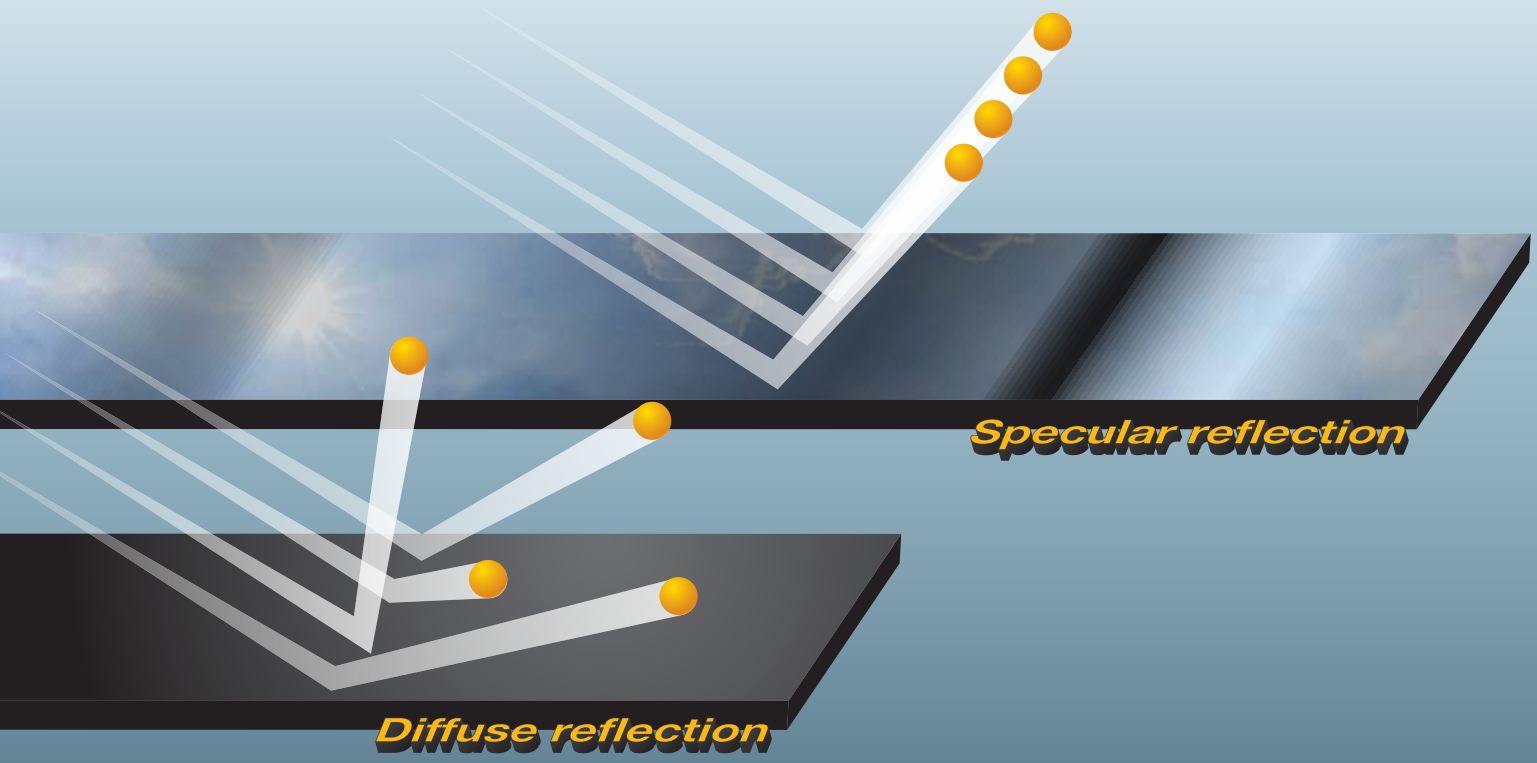
Clean COLORBOND® MATT

Intelligently Addresses Glare Issues

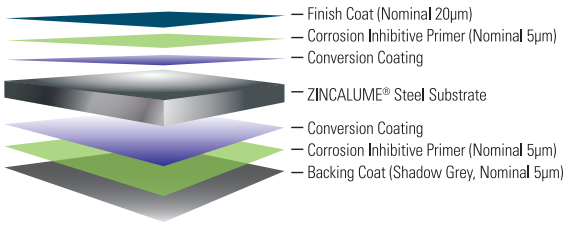
Initially designed for the Singapore market to address glare issues, this innovative product has been extremely well received by architects and the like in the South African market. They recognised the benefits and aesthetic value it adds to their design portfolio.

How does MATT work?

With a gloss unit of nominal 7 +/-3, Clean COLORBOND® MATT drastically reduces specular reflection, a reflection that occurs when light is reflected in a concentrated mirror-like manner, resulting in a discomforting glare.



Retaining our renowned durability and reliability, you will discover that the Clean COLORBOND® MATT steel is not only the more fashionable option, but the more sensible one as well. Available in ZINCALUME® steel substrate with AZ150 and AZ200 coating class.



clean Colorbond® MATT

Art of **Bluescope Warranty**

Figure 1: Accelerated test as part of the product evaluation regime.

BlueScope takes a professional approach with warranties. They are not just a sales tool but form an integral part of our after sales performance.

Our success is backed by the vigorous research and development (R&D) by BlueScope Steel Research (BSR) in Australia. Over the past 50 years, BSR have made significant achievements in refining the technology to produce ZINCALUME® steel and improving the performance of Clean COLORBOND® steel.

The quality and performance of our products are monitored by Weathering Laboratory in BSR which was accredited by National Association of Testing Authorities (NATA) to conduct accelerated testing and exposure testing. In Malaysia such laboratory is governed by Skim Akreditasi Makmal Malaysia (SAMM).

Key Facts

- A warranty issued by BlueScope is a formal, legally binding contract between BlueScope and the customer in relation to the performance of our products.
- Warranty obligations and its terms and conditions are clearly stated so that our customer understands their rights.
- A BlueScope warranty is backed by extensive exposure data and accelerated testing results unlike some manufacturers or distributors who rely on "back-to-back" warranties with other companies.
- Our warranty clearly explains the method of measurement or assessment of warranty claims.

Accelerated Testing

- Accelerated weathering (impact of ultra violet light, heat, rainfall, humidity, condensation and corrosion) is one aspect of evaluating new coating technology (e.g. metallic alloy coating and organic coating) in relative to incumbent products.

Exposure and Application Testing

- BlueScope do not simply rely upon accelerated testing, but assess our products in real world conditions and application (e.g. roofs) to provide our customers with confidence in product performance.
- Our product durability outdoor exposure testing regimes have been in place since 1963 to study and evaluate long term real-world product performance.
- More than 20,000 exposure samples have been tested at respective test sites across Australia, New Zealand and Asia, all under different weather conditions.

Figure 2: Test panels placed at BlueScope exposure rack

Figure 3: Application test to obtain more realistic result.

Clean COLORBOND® Steel Colour Chart

Offering you a vibrant selection to match your most prestigious designs.

clean Colorbond® THERMATECH™

- African White AZ150 (86)*
- Amazing White AZ200 (86)*

- Off White AZ150 (84)*
- Enduring White AZ200 (84)*

- African Cream AZ150 (72)*
- Durable Cream AZ200 (72)*

- Shale Grey AZ150 (70)*
- Ultimate Grey AZ200 (70)*

- Armour Grey AZ150 (48)*
- Livid Grey AZ200 (48)*

- Heritage Red AZ150 (32)*
- Enchanting Red AZ200 (32)*

- African Blue AZ150 (24)*
- Two Oceans Blue AZ200 (24)*

- Colonial Green AZ150 (24)*
- Garden Route Green AZ200 (24)*

clean Colorbond® ULTRA

- Cape White AZ150 (80)*
- Cedarberg White AZ200 (80)*

- Dune AZ150 (63)*
- Sahara Sands AZ200 (63)*

- Volcanic Grey AZ150 (28)*
- Ore Grey AZ200 (28)*

- Cape Charcoal AZ150 (19)*
- African Charcoal AZ200 (19)*

clean Colorbond® MATT

- ★ Winter MATT AZ150 (84)*
- ◆ Sonata MATT AZ200 (84)*

- ★ Scallop MATT AZ150 (82)*
- ◆ Oyster MATT AZ200 (82)*

- ★ Hidden MATT AZ 150 (47)*
- ◆ Alley MATT AZ 200 (47)*

- ★ Graphite MATT AZ150 (26)*
- ◆ Iron MATT AZ200 (26)*

clean Colorbond® ULTRA MATT

- ★ Coffee MATT AZ150 (68)*
- ◆ Latte MATT AZ200 (68)*

- ★ Eclipse MATT AZ150 (18)*
- ◆ Granite MATT AZ200 (18)*

■ Clean COLORBOND® XRW ● Clean COLORBOND® ULTRA ★ Clean COLORBOND® MATT ◆ Clean COLORBOND® ULTRA MATT

Note: The Clean COLORBOND® steel colours shown in the brochure have been reproduced to represent actual product clours as accurately as possible. However, we recommend you to check your chosen colour against actual sample of the product before purchasing, as varying light conditions and limitations of the printing process affect colour tones.

* Solar Reflectance Index (SRI) – ASTM E1980

* SRI is calculated using ASTM E1980-01 with Medium Convection Coefficient (12) value reported. This data is approximate values only - may vary based on paint formulation and/or metallic coating thickness

Material Specification

Clean COLORBOND® XRW AZ150 (designed for inland use)

0.47mm TCT or 0.53mm TCT in Clean COLORBOND® steel (Colour:TBD), metallic coating AZ150 (minimum 150g/m² coating mass), Grade G550 (minimum yield strength 550 MPa) or G300 (minimum yield strength of 300 MPa), super polyester paint system, 25µm on topside and 10µm on reverse side.

Fasteners to comply with Australian Standard AS3566.2 Class 3 or 4.

Flashing or ridge capping should be manufactured from the same material as used for the roofing.

Clean COLORBOND® ULTRA AZ200 (designed for coastal use – heavy corrosive and industrial area)

0.48mm TCT or 0.54mm TCT in Clean COLORBOND® ULTRA steel (Colour: TBD), metallic coating AZ200 (minimum 200g/m² coating mass), Grade G550 (minimum yield strength 550 MPa) or G300 (minimum yield strength 300 MPa), super polyester paint system, 25µm on topside and 15µm on reverse side.

Fasteners to comply with Australian Standard AS3566.2 Class 4.

Flashing or ridge capping should be manufactured from the same material as used for the roofing.

Clean COLORBOND® MATT AZ150 (designed for inland use)

0.47mm or 0.53mm TCT in Clean COLORBOND® MATT steel (Colour: TBD) with a gloss finish of 7 ± 3 units, metallic coating AZ150 (minimum 150g/m² coating mass), Grade G550 (minimum yield strength 550 MPa) or G300 (minimum yield strength of 300 MPa), super polyester paint system, 25µm on topside and 10µm on reverse side.

Fasteners to comply with Australian Standard AS3566.2 Class 3 or 4.

Flashing or ridge capping should be manufactured from the same material as used for the roofing.

Clean COLORBOND® ULTRA MATT AZ200 (designed for coastal use – heavy corrosive and industrial area)

0.48mm or 0.54mm TCT in Clean COLORBOND® ULTRA MATT steel (Colour: TBD) with a gloss finish of 7 ± 3 units, metallic coating AZ200 (minimum 200g/m² coating mass), Grade G550 (minimum yield strength 550 MPa) or G300 (minimum yield strength of 300 MPa), super polyester paint system, 25µm on topside and 15µm on reverse side.

Fasteners to comply with Australian Standard AS3566.2 Class 4.

Flashing or ridge capping should be manufactured from the same material as used for the roofing.

For product identification and originality, please check the reverse side of the coil for the following branding text.

Clean COLORBOND (R) steel made by BlueScope G550 AZ150 0.53TCT 16:18 01:APR:13 16

BlueScope Steel Southern Africa (Pty) Ltd.

+27 (0)21 442 5420

+27 (0)21 448 9132

www.**bluescopesteel**.co.za

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