

PAMNCxBSM Seminar

The Evolution of Coated Steel in Modern Construction and Quality Control

Date: 8th March 2025

Reasonable

We upgraded it to durable steel, so it is more expensive



[1]

Do you think I am
stupiak?

We downgraded the
steel, so we can make
it cheaper

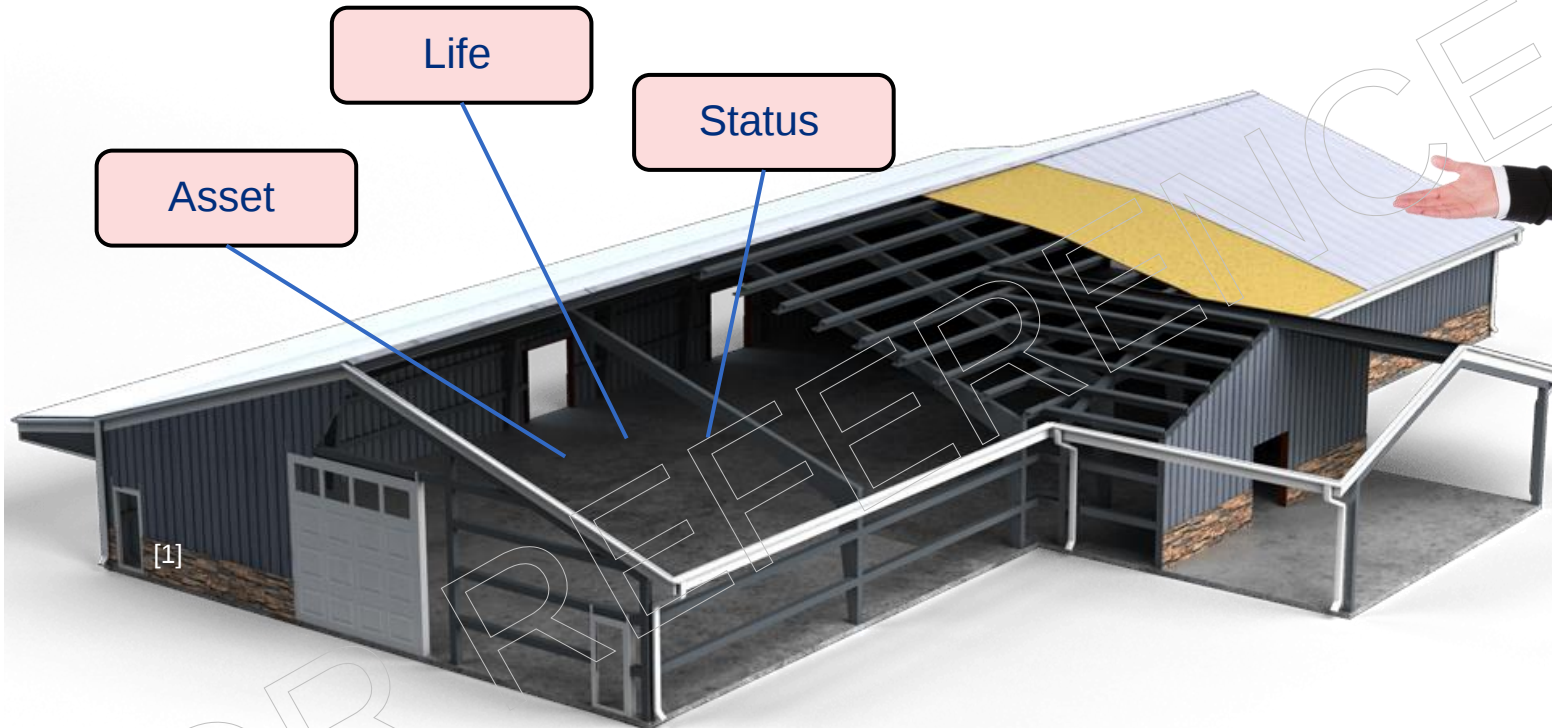


[1]

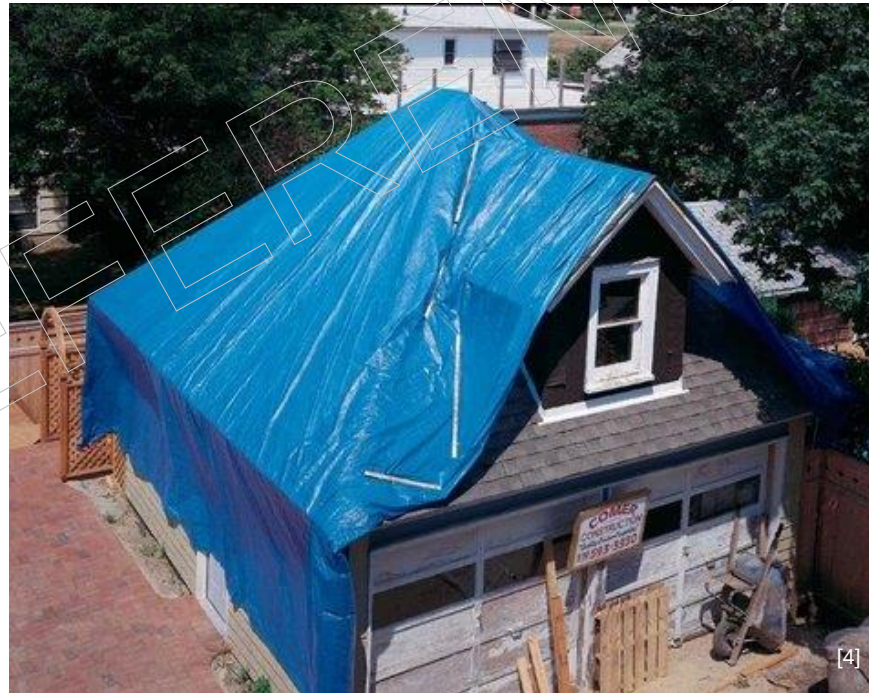
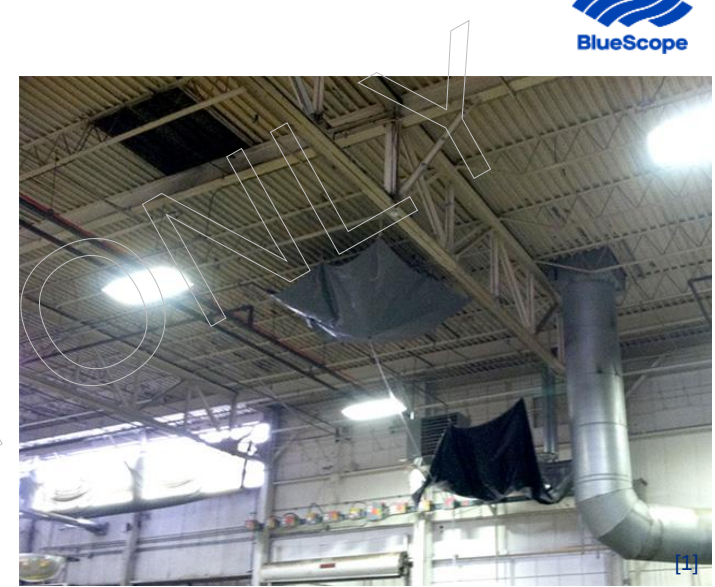


**Shelter from weather, security, living space, privacy, to store belongings,
and to comfortably live and work.**

Use quality material is important, isn't it?



You even spending longer time in your building than your car



Source[1]: <https://www.jurinroofing.com/roof-leaks-affect-bottom-line/>
 Source[2]: <https://www.istockphoto.com/photos/metal-roof-damage>
 Source[3]: <https://www.uline.ca/Product/Detail/H-5744W/Spill-Containment/Deluxe-Leak-Diverter-5-x-5-White>
 Source[4]: <https://www.quora.com/How-do-I-temporarily-fix-a-roof-leak-until-a-professional-can-repair-it>
 Source[5]: <https://colonyroofers.com/learningcenter/stop-roofing-leak-emergency>



CONTENT

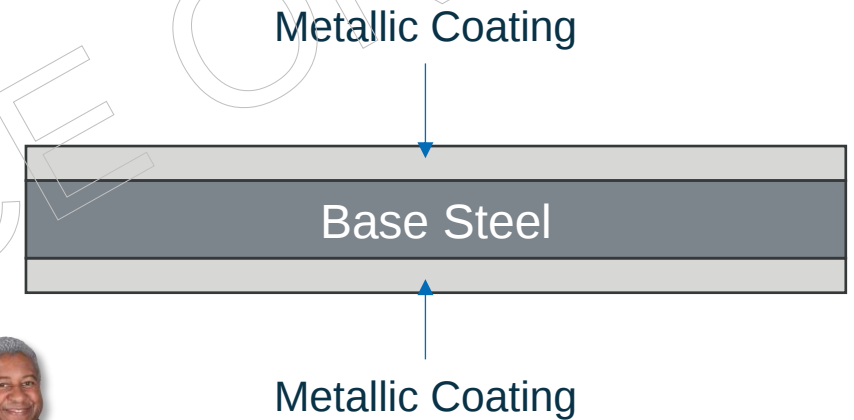
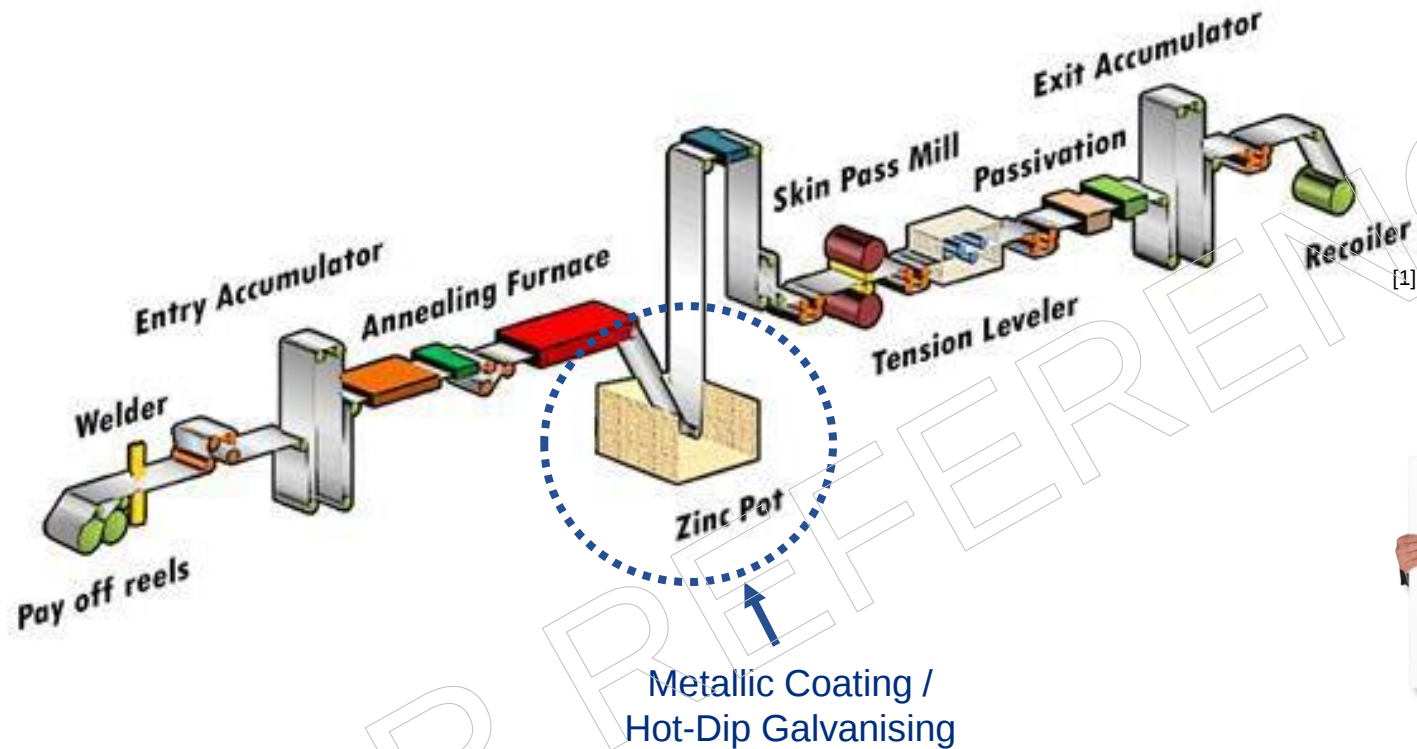
- ① **Type of Metallic Coating**
- ② **History of Coated Steel**
- ③ **Product Performance or Specification**
- ④ **Mandatory and Quality Checking Requirements**
- ⑤ **Way To Conduct Assessment According to Requirements**

Type of Metallic Coating

FOR REFERENCE ONLY

1

METALLIC COATING / HOT-DIP GALVANISING



Corrosion Table		
Gold		Least Active
Stainless Steel		
Bronze		
Copper		
Brass		
Steel		
Iron		
Aluminum		
Zinc		Most Active
Magnesium		

Source [1]: <https://www.facebook.com/photo.php?fbid=605313916162045&id=229713580388749&set=a.605312292828874>

Source [2]: <https://huntergal.com.au/galvanizing/what-is-galvanizing/>



**How many type
of metallic
coating that you
know?**

ZINC COATING - Z

The following sharing is based on the requirement of AS1397.

Zinc Coating (Z)

Which metal(s) is/are used in the metallic coating and what the proportion (%) of the metal is/are?

Corrosion Table	
Gold	Least Active ↑ ↓ Most Active
Stainless Steel	
Bronze	
Copper	
Brass	
Steel	
Iron	
Aluminum	
Zinc	
Magnesium	

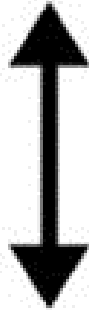
99% Zinc

ALUMINIUM-ZINC COATING - AZ

The following sharing is based on the requirement of AS1397.

Aluminium-Zinc
Coating (AZ)

Which metal(s) is/are used in the metallic coating and what the proportion (%) of the metal is/are?

Corrosion Table	
Gold	Least Active  Most Active
Stainless Steel	
Bronze	
Copper	
Brass	
Steel	
Iron	
Aluminum	
Zinc	
Magnesium	

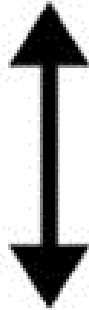
50-60% Aluminium
+
1-2% Silicon
+
Remainder Zinc

ZINC-ALUMINIUM COATING - ZA

The following sharing is based on the requirement of AS1397.

Zinc-Aluminium
Coating (ZA)

Which metal(s) is/are used in the metallic coating and what the proportion (%) of the metal is/are?

Corrosion Table	
Gold	Least Active  Most Active
Stainless Steel	
Bronze	
Copper	
Brass	
Steel	
Iron	
Aluminum	
Zinc	
Magnesium	

3-15% Aluminium
+
Remainder Zinc

ZINC-ALUMINIUM-MAGNESIUM COATING – ZM OR ZAM

The following sharing is based on the requirement of AS1397.

Zinc-Aluminium-
Magnesium Coating
(ZM)

Which metal(s) is/are used in the metallic coating and
what the proportion (%) of the metal is/are?

Corrosion Table	
Gold	Least Active ↑ ↓ Most Active
Stainless Steel	
Bronze	
Copper	
Brass	
Steel	
Iron	
Aluminum	
Zinc	
Magnesium	

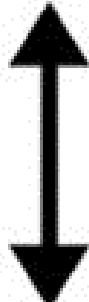
5-13% Aluminium
+
2-4% Magnesium
+
Remainder Zinc

ALUMINIUM-ZINC-MAGNESIUM COATING – AM

The following sharing is based on the requirement of AS1397.

Aluminium-Zinc-
Magnesium Coating
(AM)

Which metal(s) is/are used in the metallic coating and what the proportion (%) of the metal is/are?

Corrosion Table	
Gold	Least Active  Most Active
Stainless Steel	
Bronze	
Copper	
Brass	
Steel	
Iron	
Aluminum	
Zinc	
Magnesium	

47-57% Aluminium
+
1-3% Magnesium
+
1-2% Silicon
+
Remainder Zinc

TYPE OF METALLIC COATING TECHNOLOGY

The following sharing is based on the requirement of AS1397.

Zinc Coating (Z)

99% Zinc

Aluminium-Zinc
Coating (AZ)

50-60% Aluminium
+
1-2% Silicon
+
Remainder Zinc

Which is the
newest
technology?

Zinc-Aluminium
Coating (ZA)

3-15% Aluminium
+
Remainder Zinc

Zinc-Aluminium-
Magnesium Coating
(ZM)

5-13% Aluminium
+
2-4% Magnesium
+
Remainder Zinc

Aluminium-Zinc-
Magnesium Coating
(AM)

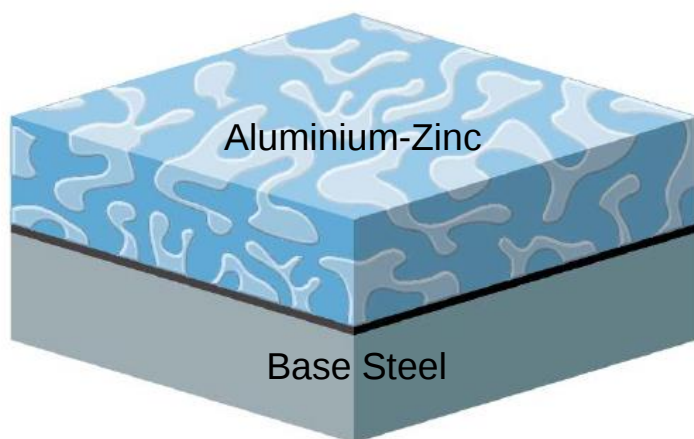
47-57% Aluminium
+
1-3% Magnesium
+
1-2% Silicon
+
Remainder Zinc



NEXT GENERATION OF COATED STEEL TECHNOLOGY

New Coating Technology on steel roof and wall to prolong the lifespan of the building developed in 2013.

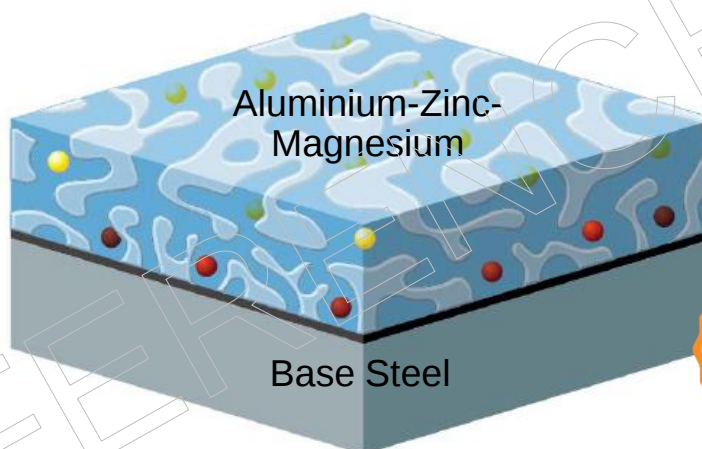
2 Protection Phases



Al-Zn alloy-coated steel

- Aluminium
- Zinc

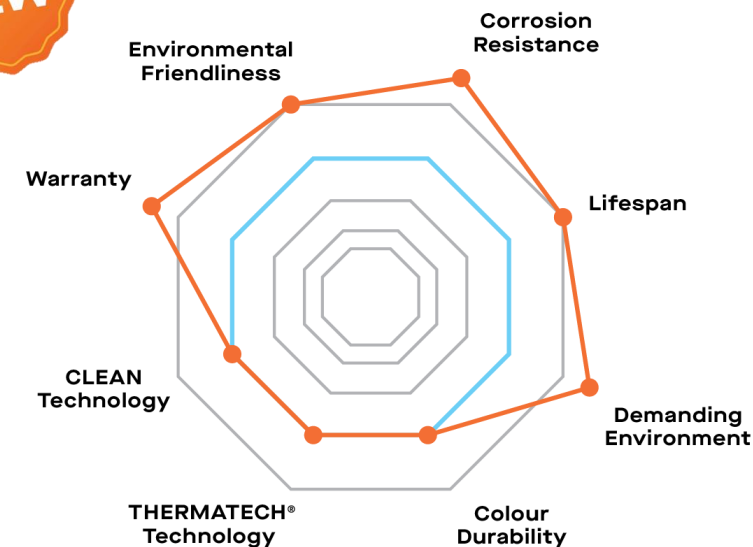
4 Protection Phases



Al-Zn-Mg alloy coated steel with Activate® Technology

- Aluminium
- Zinc
- Magnesium-Zinc (Top)
- Magnesium-Silicide (Bottom)

support up to
36 years of warranty*
against perforation by corrosion
*warranty terms and conditions apply.



WHICH ARE THE MOST COMMON METALLIC COATING USED IN STEEL ROOF, WALL, CEILING AND FACADE?

Zinc Coating (Z)

99% Zinc

Aluminium-Zinc
Coating (AZ)

50-60% Aluminium
+
1-2% Silicon
+
Remainder Zinc



History of Coated Steel

2

ZINC COATING HISTORY



1836

Zinc Galvanizing Process

Stanislas Sorel, a French civil engineer, inventor, and chemist invented and patented a process to clean steel to make the iron even more resistant to oxidation by the air, and only then dipping it into molten zinc.

1916

Zinc Coated Steel Is Used Widely

The production of galvanized steel soared after 1916 in western countries, especially U.S..

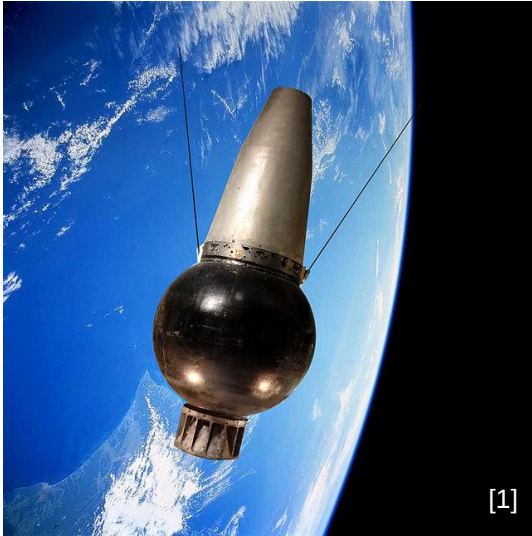


Source[1]: https://en.wikipedia.org/wiki/First_Opium_War

Source[2]: <https://www.pinterest.com/pin/american-history--256705247498004756/>

Source[3]: https://en.wikipedia.org/wiki/Yuan_Shikai

ALUMINIUM-ZINC COATING HISTORY



Early 1970s

Aluminium-Zinc Galvanizing Process

research in America, Europe, and Japan experimented with zinc coatings containing up to 15% aluminum.

1976

Aluminium-Zinc Coated Steel

Aluminium-Zinc Coated Steel was developed in 1976 and over the years has been refined to meet the needs of Australian customers.



Source[1]: https://en.wikipedia.org/wiki/Ohsumi_%28satellite%29

Source[2]: [https://en.wikipedia.org/wiki/World_Trade_Center_\(1973%E2%80%932001\)](https://en.wikipedia.org/wiki/World_Trade_Center_(1973%E2%80%932001))

Source[3]: <https://www.space.com/18234-viking-1.html>

THE OLD AND NEW COATING TECHNOLOGY



Yes, it is old technology, but it is cheaper, and my contractor tell me the performance is same

IF THE OLD AND NEW COATING TECHNOLOGY IS SAME

why do we need to invent the new coating technology?

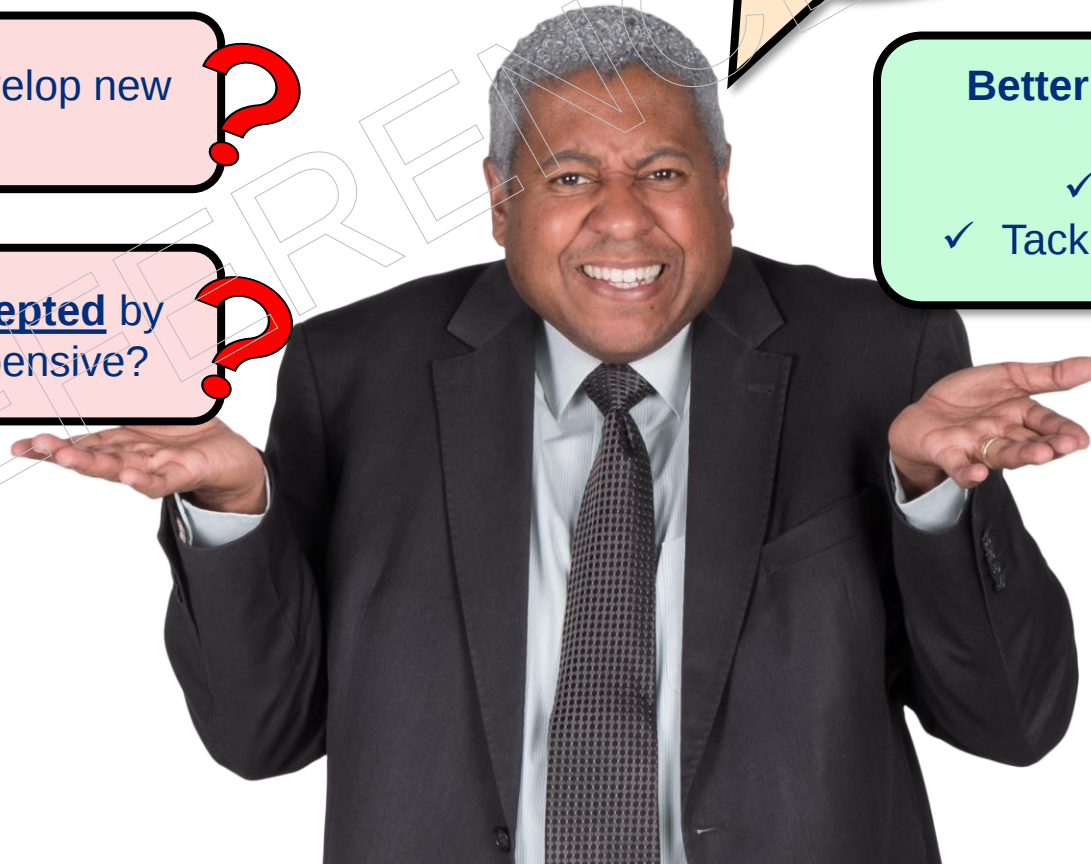
I mana tau? Boss cakap nak cheap cheap saja ma....

Why spend millions of dollars to develop new coating technology?

Why new coating technology is accepted by the market even though it is more expensive?

Better Product to tackle the market needs:

- ✓ Longer life span
- ✓ Tackle the new design needs



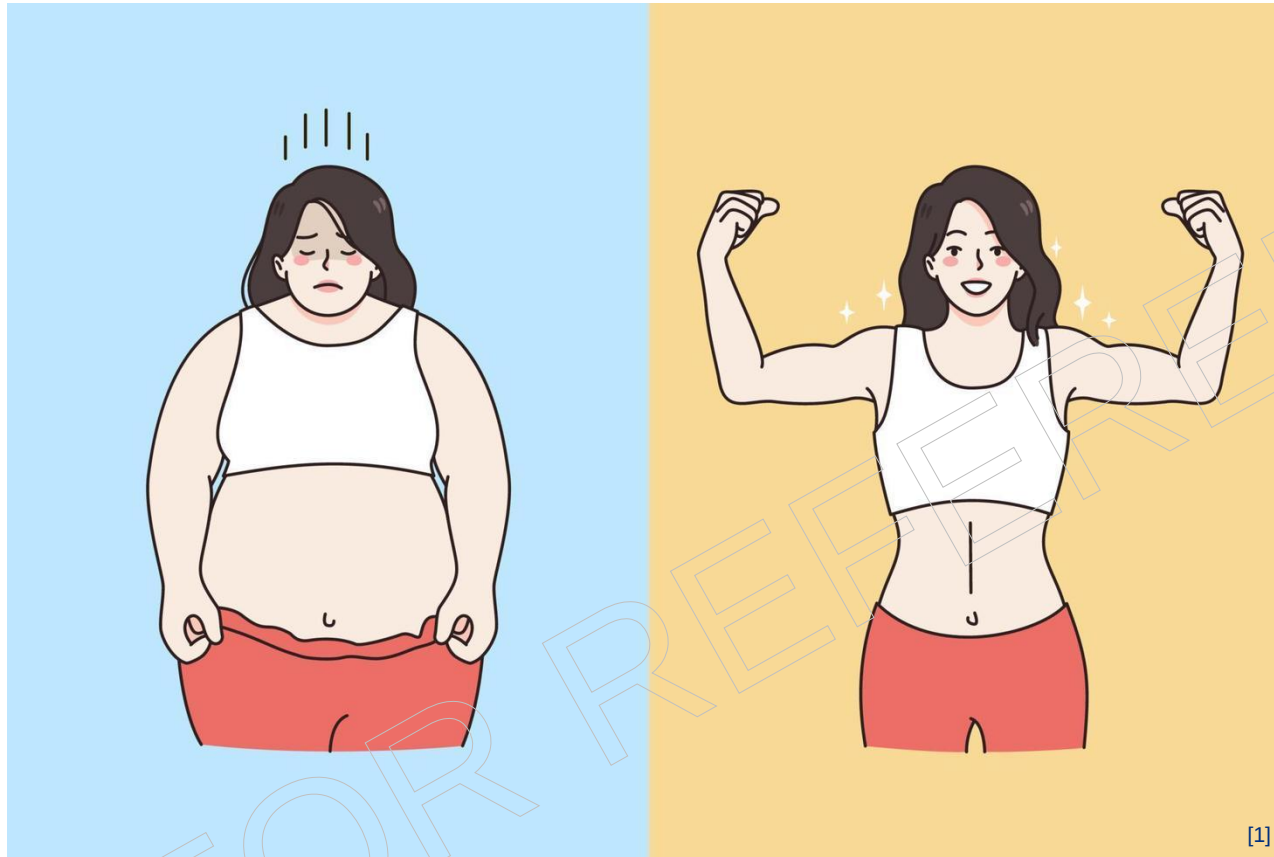
Product Performance and Specification

3

HOW DO YOU CHECK THE PRODUCT PERFORMANCE?



SET YOUR REQUIREMENT AND THEN CHOOSE THE RIGHT PRODUCT



1% Milk (1 Cup)	Whole Milk (1 Cup)
Nutrition Facts	Nutrition Facts
Total Fat 2.5g	Total Fat 8g
Saturated Fat 1.5g	Saturated Fat 5g
Trans Fat 0g	Trans Fat 0g
Cholesterol 15mg	Cholesterol 35mg
Sodium 130mg	Sodium 125mg
Potassium 410mg	Potassium 400mg
Protein 9g	Protein 8g
Vitamin A 10%, C 0%, D 25%	Vitamin A 10%, C 2%, D 25%
Calcium 30% • Iron 0%	Calcium 30% • Iron 0%

SET YOUR REQUIREMENT AND THEN CHECK THE DATASHEET OF COATED STEEL

COLORBOND® steel
Revision 15 September 2021
This literature supersedes all previous issues

Prepainted – PP

GENERAL DESCRIPTION
COLORBOND® prepainted steel, specifically designed by BlueScope to provide a high durability, premier cladding and roofing material for general use. To determine if warranties apply, please contact your nearest BlueScope sales office for advice.

TYPICAL USES
General exterior architectural uses, for example wall cladding, roofing, rainwater goods, as well as other building products such as garage doors and infill panels. For material selection advice, please contact your nearest BlueScope sales office.

AUSTRALIAN STANDARD
Paint Coating – AS/NZS 2728 Type 3-4;
Substrate – AS 1397

MALAYSIAN STANDARD
Paint Coating – MS 2383 C3-C4;
Substrate – MS 1196

PRODUCT INFORMATION

PREFERRED SUBSTRATE	ZINCALUME® G550S AZ150 steel (aluminium/zinc alloy-coated steel) ZINCALUME® G300S AZ150 steel (aluminium/zinc alloy-coated steel) (Refer Note 8)
PRETREATMENT	Corrosion resistant proprietary conversion coating
PRIMER COAT	Universal corrosion inhibitive primer. Nominal dry film thickness 5µm each side
FINISH COAT	Custom formulated super polyester paint system with high performance pigments. Nominal dry film thickness 20µm on the top or weather side. The finish coat can, if required, be applied to both sides to provide a double-sided product.
BACKING COAT	Custom formulated Shadow Grey. Nominal dry film thickness 5µm
COLOUR	A range of standard colours is available. Other specifically required colours may be available on request.

DIMENSIONAL CAPABILITIES*

ZINCALUME® G550S AZ150 STEEL		ZINCALUME® G300S AZ150 STEEL	
PREFERRED BASE METAL THICKNESS, mm*	MAXIMUM WIDTH, mm	PREFERRED BASE METAL THICKNESS, mm*	MAXIMUM WIDTH, mm
0.35, 0.45, 0.50, 0.60, 0.70, 0.75, 0.80, 0.90, 1.00	1219	0.35, 0.45, 0.50, 0.60, 0.70, 0.75, 0.80, 0.90, 1.00	1219
0.42, 0.48	1230	0.42, 0.48	1230
0.55	1200	0.55	1200

Notes
* The dimensional tolerances for thickness, width, flatness, and camber shall be in accordance with the requirements of AS/NZS 1365. Not every combination of thickness and width may be available. Supply conditions may be subject to dimensional restrictions and are subject to BlueScope Sales and Marketing confirmation. Sifting and shearing available on request from BlueScope Sales Offices. For requirements outside the standard product range please contact your local Sales Office.

NS BLUESCOPE MALAYSIA SDN BHD (199101012824 (223136-P))
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ZINCALUME® G550 Steel
Revision 10 September 2021
This literature supersedes all previous issues

Metallic Coated - MC

Structural - S

GENERAL DESCRIPTION
ZINCALUME® G550 steel is a continuous hot-dipped aluminium/zinc alloy-coated structural steel with a regular spangle surface and guaranteed minimum yield strength of 550MPa with limited ductility.

TYPICAL USES
Roofing, walling and structural steel sections. For material selection advice, please contact your nearest BlueScope sales office.

AUSTRALIAN STANDARD
AS 1397

MALAYSIAN STANDARD
MS 1196

GUARANTEED PROPERTIES OF STEEL BASE

MECHANICAL PROPERTIES	GUARANTEED MINIMUM (LONGITUDINAL TENSILE)
Yield Strength, MPa	550
Tensile Strength, MPa	570
Elongation on 50mm (> 0.60mm), %	2

METAL COATING ADHESION - 180° BEND TEST

COATING CLASS	THICKNESS, µm
AZ150	2t
AZ200	2t

Notes
Where t = the diameter of mandrel in terms of thickness of product.

CHEMICAL COMPOSITION OF STEEL BASE

CHEMICAL PROPERTIES	GUARANTEED MAX %
Carbon – C	0.20
Manganese – Mn	1.20
Phosphorus – P	0.035
Sulphur – S	0.030

FIRE HAZARD PROPERTIES – AS/NZS1530.3

INDEX	RANGE	RESULT
Ignitability Index	0-20	0
Spread Of Flame Index	0-10	0
Heat Evolved Index	0-10	0
Smoke Developed Index	0-10	0-1

DIMENSIONAL CAPABILITIES*

PREFERRED BASE METAL THICKNESS, mm	MAXIMUM WIDTH, mm
0.30	914
0.35, 0.45, 0.50, 0.60, 0.70, 0.75, 0.80, 0.90, 1.00, 1.20	1219
0.42, 0.48	1230
0.55	1200

Notes
* Not every combination of thickness and width may be available. Supply conditions may be subject to dimensional restrictions and are subject to BlueScope Sales and Marketing confirmation. Sifting and shearing available on request from BlueScope Sales Offices. For requirements outside the standard product range please contact your local Sales Office.

NORMAL/OPTIONAL SUPPLY CONDITIONS

	NORMAL	OPTIONAL#
Coating Class	AZ150	AZ200
Surface Condition	Spangled	Skin Passed
Surface Treatment	Passivated & Resin Coated	Passivated & Non-Resin Coated
Branding	Branded	Not Branded
Dimensions Tolerance*	Class A	-
Flatness Tolerance*	Class A	-

Notes
Optional supply conditions may be subject to dimensional restrictions.
* The dimensional tolerances for thickness, width, flatness and camber shall be in accordance with the requirements of AS/NZS 1365.

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EXAMPLE: COATING MASS AND PAINT THICKNESS REQUIREMENT

COLORBOND® steel
Revision 15 September 2021
This literature supersedes all previous issues



Prepainted – PP

GENERAL DESCRIPTION
COLORBOND® prepainted steel, specifically designed by BlueScope to provide a high durability, premier cladding and roofing material for general use. To determine if warranties apply, please contact your nearest BlueScope sales office for advice.

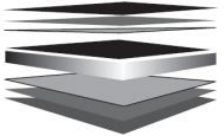
TYPICAL USES
General exterior architectural uses, for example wall cladding, roofing, rainwater goods, as well as other building products such as garage doors and infill panels. For material selection advice, please contact your nearest BlueScope sales office.

AUSTRALIAN STANDARD
Paint Coating – AS/NZS 2728 Type 3-4;
Substrate – AS 1397

MALAYSIAN STANDARD
Paint Coating – MS 2383 C3-C4;
Substrate – MS 1196

PRODUCT INFORMATION

PREFERRED SUBSTRATE	ZINCALUME® G550S AZ150 steel (aluminium/zinc alloy-coated steel) ZINCALUME® G300S AZ150 steel (aluminium/zinc alloy-coated steel) (Refer Note 8)
PRETREATMENT	Corrosion resistant proprietary conversion coating
PRIMER COAT	Universal corrosion inhibitive primer. Nominal dry film thickness 5µm each side
FINISH COAT	Custom formulated super polyester paint system with high performance pigments. Nominal dry film thickness 20µm on the top or weather side. The finish coat can, if required, be applied to both sides to provide a double-sided product.
BACKING COAT	Custom formulated Shadow Grey. Nominal dry film thickness 5µm
COLOUR	A range of standard colours is available. Other specifically required colours may be available on request.



Finish Coat (Nominal 20µm) (Refer Note 4 & 5)
Universal Corrosion Inhibitive Primer (Nominal 5µm)
Conversion Coating
ZINCALUME® AZ150 Steel Substrate
Conversion Coating
Universal Corrosion Inhibitive Primer (Nominal 5µm)
Backing Coat (Shadow Grey, Nominal 5µm) (Refer Note 6)

DIMENSIONAL CAPABILITIES*

ZINCALUME® G550S AZ150 STEEL		ZINCALUME® G300S AZ150 STEEL	
PREFERRED BASE METAL THICKNESS, mm*	MAXIMUM WIDTH, mm	PREFERRED BASE METAL THICKNESS, mm*	MAXIMUM WIDTH, mm
0.35, 0.45, 0.50, 0.60, 0.70, 0.75, 0.80, 0.90, 1.00	1219	0.35, 0.45, 0.50, 0.60, 0.70, 0.75, 0.80, 0.90, 1.00	1219
0.42, 0.48	1230	0.42, 0.48	1230
0.55	1200	0.55	1200

Notes
* The dimensional tolerances for thickness, width, flatness, and camber shall be in accordance with the requirements of AS/NZS 1365. Not every combination of thickness and width may be available. Supply conditions may be subject to dimensional restrictions and are subject to BlueScope Sales and Marketing confirmation. Slitting and shearing available on request from BlueScope Sales Offices. For requirements outside the standard product range please contact your local Sales Office.

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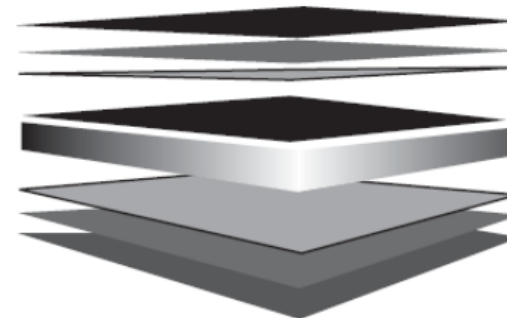
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Requirement:

- Benign environment
- JKR Project

PRODUCT INFORMATION

PREFERRED SUBSTRATE	ZINCALUME® G550S AZ150 steel (aluminium/zinc alloy-coated steel) ZINCALUME® G300S AZ150 steel (aluminium/zinc alloy-coated steel) (Refer Note 8)
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BACKING COAT	Custom formulated Shadow Grey. Nominal dry film thickness 5µm
COLOUR	A range of standard colours is available. Other specifically required colours may be available on request.



Finish Coat (Nominal 20µm) (Refer Note 4 & 5)
Universal Corrosion Inhibitive Primer (Nominal 5µm)
Conversion Coating

ZINCALUME® AZ150 Steel Substrate
Conversion Coating
Universal Corrosion Inhibitive Primer (Nominal 5µm)
Backing Coat (Shadow Grey, Nominal 5µm) (Refer Note 6)

EXAMPLE: BETTER ANTI-CORROSION PERFORMANCE (IN BETWEEN TWO PRODUCTS)

COLORBOND® steel		
Revision 15 September 2021 This literature supersedes all previous issues		
Prepainted – PP		
PRODUCT ATTRIBUTES		
PROPERTY	TEST & EVALUATION METHOD(S)	RESULTS
Resistance to Abrasion		
Scratch	AS 2331.4.7	Typically 1500g
Flexibility		
T-bend	ASTM D4145	Maximum 10T (no cracking). Refer Note 7
Adhesion		
Natural well washed exposure (15 years)	AS/NZS 1580.457.1; AS/NZS 1580.481.1.10	No flaking or peeling. Refer Notes 9 & 10
Resistance to Humidity		
Cleveland (500 hours)	ASTM D4585; AS/NZS 1580.481.1.9 (Blisters); AS 1580.408.4 (Adhesion); AS 1580.481.3 (Undercutting, Corrosion)	Blister density: ≤3. Blister size: ≤S2. Undercut at scribed lines: ≤2mm. No loss of adhesion or corrosion of base metal.
Resistance to Corrosion		
Cyclic corrosion (2000 hours)	AS/NZS 2728 (Appendix I); AS/NZS 1580.481.1.9 (Blisters); AS 1580.408.4 (Adhesion); AS 1580.481.3 (Undercutting, Corrosion)	Blister density: ≤2. Blister size: ≤S2. Undercut at scribed lines: ≤1mm. No loss of adhesion or corrosion. Refer Note 2
QUV (2000 hours)	ASTM G154 & ASTM D2244 (Colour)	ΔE CIELAB 2000: Intermediate colour: ≤5 units
Resistance to Chalking		
Natural well washed exposure (10 years)	AS/NZS 1580.457.1 & AS/NZS 1580.481.1.11 (Chalk Method B)	Chalk Rating: ≤4. Refer Notes 9 & 10
QUV (2000 hours)	ASTM G154 & AS/NZS 1580.481.1.11 (Chalk Method B)	Chalk Rating: ≤4
Resistance to Solvents, Acids, Alkalis		
Exposure	ASTM D1308 (3.1.1) & ASTM D2244 (Colour); AS/NZS 1580.481.1.9 (Blisters)	No discoloration or blistering. Refer Notes 2, 9 & 11
Resistance to Heat		
Exposure 100°C continuous (500 hours)	ASTM D2244 (Colour)	Colour change ΔE CIELAB 2000: ≤3 units
Fire Hazard Properties		
Simultaneous determination of ignitability, flame propagation, heat release and smoke release	AS/NZS 1530.3 (Ignitability index: Spread of flame index; Heat evolved index; Smoke developed index)	Ignitability index: 0 rating in scale of 0 – 20; Spread of flame index: 0 rating in scale of 0 – 10; Heat evolved index: 0 rating in scale of 0 – 10; Smoke evolved index: 2 rating in scale of 0 – 10.
Fire classification	BS 476-6 (Fire propagation); BS 476-7 (Surface spread of flame)	Fire propagation index, I: <12; sub-index, i: <6; Surface spread of flame: Class 1. Classification: Class O.

Requirement:

- Higher anti-corrosion performance
- Tested with higher standard – Cyclic Corrosion Test

Resistance to Corrosion		
Cyclic corrosion (2000 hours)	AS/NZS 2728 (Appendix I), AS/NZS 1580.481.1.9 (Blisters); AS 1580.408.4 (Adhesion); AS 1580.481.3 (Undercutting, Corrosion)	Blister density: ≤2. Blister size: ≤S2. Undercut at scribed lines: ≤1mm. No loss of adhesion or corrosion. Refer Note 2

Alternative Product

Resistance to Corrosion

Salt Spray (2000 hours)	xxx	xxx
-------------------------	-----	-----

Disclaimer: the data above is a virtual example for description purpose only. It does not hint obliquely to any product in the market.

EXAMPLE: BETTER COLOUR RETENTION PERFORMANCE (IN BETWEEN TWO PRODUCTS)

COLORBOND® steel

Revision 15 September 2021
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RESISTANCE TO DIRT STAINING

The change in appearance of normal coil-coated products due to weathering is expected to be minimal within one year of installation. Yet, the overall appearance change can be obvious in some environments, not as a result of changes in the paint system itself, but as a result of severe dirt pick-up which causes darkening of its surface. These effects are more pronounced on light colours than on dark colours. In some instances, atmospheric dirt can become engrained into the surface of the paint, causing dirt staining which is difficult to remove.

COLORBOND® steel (with Clean Technology), can resist dirt pick-up and more importantly, RESIST DIRT STAINING.

A weathering test has been conducted where the appearance changes of normal coil-coated products and COLORBOND® steel (with Clean Technology) is monitored. The samples were placed in environments where atmospheric dirt is known to cause dirt staining problems. The Clean Technology shows clear benefits over normal coil-coated products after one year of exposure to rainfall where there's no cleaning conducted, as shown in TABLE 1 below.

TABLE 1 – Quantitative comparison of colour appearance change after 12 months sample exposure.

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔL UNITS CIELAB 2000)	
	NORMAL COIL-COATED PRODUCTS	COLORBOND® STEEL (WITH CLEAN TECHNOLOGY)
Light (e.g. Off White)	-20 to -10	-4
Intermediate (e.g. Beige)	-10 to -5	-3

EXPECTED PRODUCT SERVICE PERFORMANCE

The appearance of COLORBOND® steel and other coil-coated products can change over time on exterior weathering not only due to dirt pick-up but also to changes in the paint system itself and resulting in gloss loss and fading of pigmentation. Colour change, which is largely due to changes in pigmentation will depend on the colour shade chosen. It is measured using a spectrophotometer, according to ASTM D2244 on surfaces thoroughly cleaned of dirt, oxidised film and foreign contaminants. The typical appearance changes of standard COLORBOND® steel colours in normal environments after 12 years of service are given in TABLE 2.

TABLE 2 – Expected colour change after 12 years in natural well washed exposure (AS/NZS 1580.457.1 & ASTM D2244).

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔE UNITS CIELAB 2000)
Light (e.g. Off White)	≤ 4
Intermediate (e.g. Beige)	≤ 6
Dark (e.g. Autumn Red)	≤ 10

Notes

Refer Note 9 & 10

ATTRIBUTES TESTED DURING MANUFACTURE

PROPERTY	TEST & EVALUATION METHOD(S)	RESULTS
Specular Gloss		
Specular Gloss at 60° meter	AS/NZS 1580.602.2; ASTM D523	Nominal 25 $\pm$ 10 units
Adhesion		
Reverse Impact	AS/NZS 2728 (Appendix E)	≥ 10 joules
T-bend	AS/NZS 2728 (Appendix F)	Maximum 6T. Refer Note 7
Hardness		
Pencil	AS/NZS 1580.405.1	HB or harder

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Requirement:

- Intermediate colour shade
- Lower ΔE

TABLE 2 – Expected colour change after 12 years in natural well washed exposure (AS/NZS 1580.457.1 & ASTM D2244).

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔE UNITS CIELAB 2000)
Light (e.g. Off White)	≤ 4
Intermediate (e.g. Beige)	≤ 6
Dark (e.g. Autumn Red)	≤ 10

Alternative Product

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔE UNITS CIELAB 2000)
Light (e.g. off White)	≤ 16
Intermediate (e.g. Beige)	≤ 14
Dark (e.g. Blue)	≤ 12

Disclaimer: the data above is a virtual example for description purpose only. It does not hint obliquely to any product in the market.

Mandatory and Quality Checking Requirements

4

TESTING / PRODUCT ASSESSMENT TO COATED STEEL

COLORBOND® steel

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RESISTANCE TO DIRT STAINING

The change in appearance of normal coil-coated products due to weathering is expected to be minimal within one year of installation. Yet, the overall appearance change can be obvious in some environments, not as a result of changes in the paint system itself, but as a result of severe dirt pick-up which causes darkening of its surface. These effects are more pronounced on light colours than on dark colours. In some instances, atmospheric dirt can become engrained into the surface of the paint, causing dirt staining which is difficult to remove.

COLORBOND® steel (with Clean Technology), can resist dirt pick-up and more importantly, RESIST DIRT STAINING.

A weathering test has been conducted where the appearance changes of normal coil-coated products and COLORBOND® steel (with Clean Technology) is monitored. The samples were placed in environments where atmospheric dirt is known to cause dirt staining problems. The Clean Technology shows clear benefits over normal coil-coated products after one year of exposure to rainfall where there's no cleaning conducted, as shown in TABLE 1 below.

TABLE 1 – Quantitative comparison of colour appearance change after 12 months sample exposure.

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔL UNITS CIELAB 2000)	
	NORMAL COIL-COATED PRODUCTS	COLORBOND® STEEL (WITH CLEAN TECHNOLOGY)
Light (e.g. Off White)	-20 to -10	-4
Intermediate (e.g. Beige)	-10 to -5	-3

EXPECTED PRODUCT SERVICE PERFORMANCE

The appearance of COLORBOND® steel and other coil-coated products can change over time on exterior weathering not only due to dirt pick-up but also to changes in the paint system itself and resulting in gloss loss and fading of pigmentation. Colour change, which is largely due to changes in pigmentation will depend on the colour shade chosen. It is measured using a spectrophotometer, according to ASTM D2244 on surfaces thoroughly cleaned of dirt, oxidised film and foreign contaminants. The typical appearance changes of standard COLORBOND® steel colours in normal environments after 12 years of service are given in TABLE 2.

TABLE 2 – Expected colour change after 12 years in natural well washed exposure (AS/NZS 1580.457.1 & ASTM D2244).

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔE UNITS CIELAB 2000)
Light (e.g. Off White)	≤ 4
Intermediate (e.g. Beige)	≤ 6
Dark (e.g. Autumn Red)	≤ 10

Notes

Refer Note 9 & 10

ATTRIBUTES TESTED DURING MANUFACTURE

PROPERTY	TEST & EVALUATION METHOD(S)	RESULTS
Specular Gloss		
Specular Gloss at 60° meter	AS/NZS 1580.602.2; ASTM D523	Nominal 25 ± 10 units
Adhesion		
Reverse Impact	AS/NZS 2728 (Appendix E)	≥ 10 joules
T-bend	AS/NZS 2728 (Appendix F)	Maximum 6T. Refer Note 7
Hardness		
Pencil	AS/NZS 1580.405.1	HB or harder

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PRODUCT ATTRIBUTES

PROPERTY	TEST & EVALUATION METHOD(S)	RESULTS
Resistance to Abrasion		
Scratch	AS 2331.4.7	Typically 1500g
Flexibility		
T-bend	ASTM D4145	Maximum 10T (no cracking). Refer Note 7
Adhesion		
Natural well washed exposure (15 years)	AS/NZS 1580.457.1; AS/NZS 1580.481.1.10	No flaking or peeling. Refer Notes 9 & 10
Resistance to Humidity		
Cleveland (500 hours)	ASTM D4585; AS/NZS 1580.481.1.9 (Blisters); AS 1580.408.4 (Adhesion); AS 1580.481.3 (Undercutting, Corrosion)	Blister density: ≤3. Blister size: ≤S2. Undercut at scribed lines: ≤2mm. No loss of adhesion or corrosion of base metal.
Resistance to Corrosion		
Cyclic corrosion (2000 hours)	AS/NZS 2728 (Appendix I); AS/NZS 1580.481.1.9 (Blisters); AS 1580.408.4 (Adhesion); AS 1580.481.3 (Undercutting, Corrosion)	Blister density: ≤2. Blister size: ≤S2. Undercut at scribed lines: ≤1mm. No loss of adhesion or corrosion. Refer Note 2
Resistance to Colour Change		
QUV (2000 hours)	ASTM G154 & ASTM D2244 (Colour)	ΔE CIELAB 2000: Intermediate colour: ≤5 units
Resistance to Chalking		
Natural well washed exposure (10 years)	AS/NZS 1580.457.1 & AS/NZS 1580.481.1.11 (Chalk Method B)	Chalk Rating: ≤4. Refer Notes 9 & 10
QUV (2000 hours)	ASTM G154 & AS/NZS 1580.481.1.11 (Chalk Method B)	Chalk Rating: ≤4
Resistance to Solvents, Acids, Alkalies		
Exposure	ASTM D1308 (3.1.1) & ASTM D2244 (Colour); AS/NZS 1580.481.1.9 (Blisters)	No discoloration or blistering. Refer Notes 2, 9 & 11
Resistance to Heat		
Exposure 100°C continuous (500 hours)	ASTM D2244 (Colour)	Colour change ΔE CIELAB 2000: ≤3 units
Fire Hazard Properties		
Simultaneous determination of ignitability, flame propagation, heat release and smoke release	AS/NZS 1530.3 (Ignitability index; Spread of flame index; Heat evolved index; Smoke developed index)	Ignitability index: 0 rating in scale of 0 – 20; Spread of flame index: 0 rating in scale of 0 – 10; Heat evolved index: 0 rating in scale of 0 – 10; Smoke evolved index: 2 rating in scale of 0 – 10.
Fire classification	BS 476-6 (Fire propagation); BS 476-7 (Surface spread of flame)	Fire propagation index, I: ≤12; sub-index, II: ≤8; Surface spread of flame: Class 1. Classification: Class O.

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Specular Gloss

Resistance to Corrosion

Adhesion

Resistance to Colour Change

Hardness

Resistance to Chalking

Resistance on Abrasion

Resistance to Chemical

Flexibility

Resistance to Heat

Resistance to Humidity

Resistance to Fire

MANDATORY AND QUALITY ASSESSMENT / TESTING

Mandatory Test



By law, tests must be done to the product.
Otherwise, it cannot be commercialised legally
into the market.

Resistance to Fire

Quality Test



By ethic, the tests to be conducted by manufacturer
to ensure the product achieve the quality as
committed to customer.

Specular Gloss

Resistance to
Corrosion

Resistance to
Colour Change

Adhesion

Resistance on
Abrasion

Resistance to
Chalking

Hardness

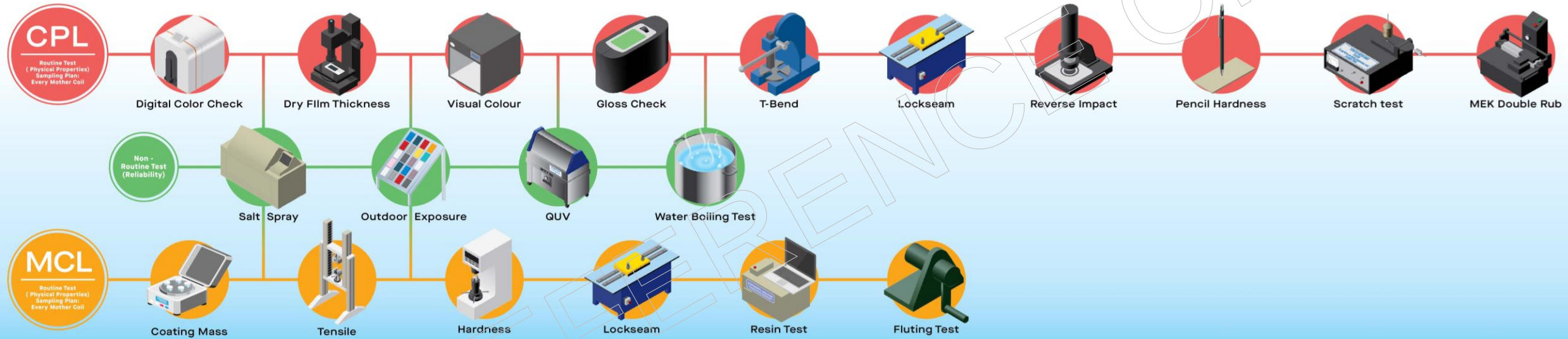
Flexibility

Resistance to
Chemical

Resistance to
Humidity

Resistance to Heat

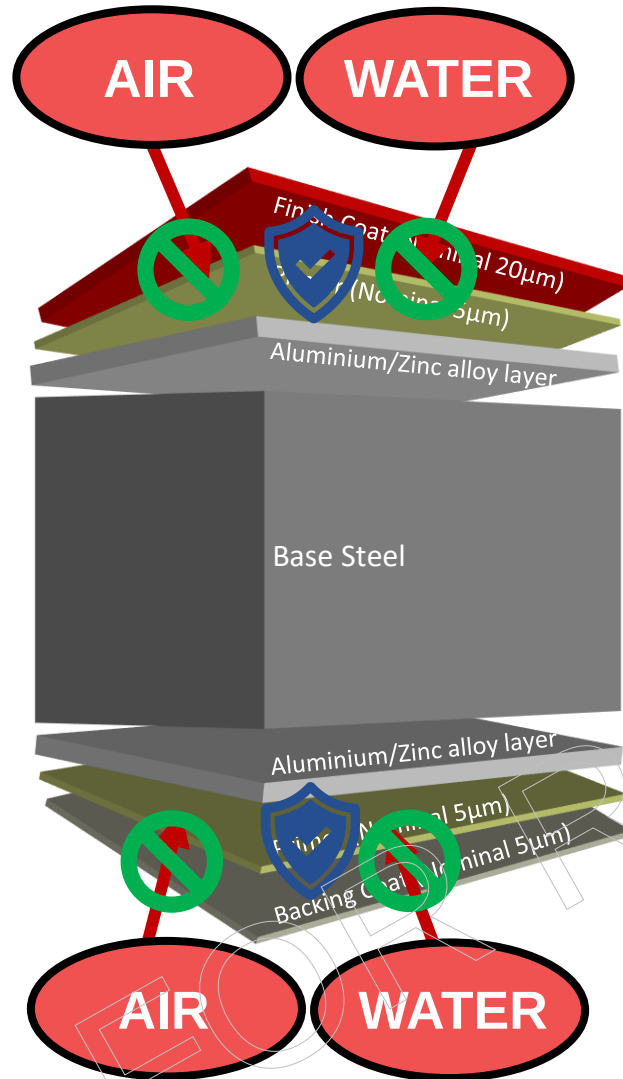
QUALITY ASSESSMENT / TESTING



Way To Conduct Assessment According to Requirements

5

CORROSION RESISTANCE

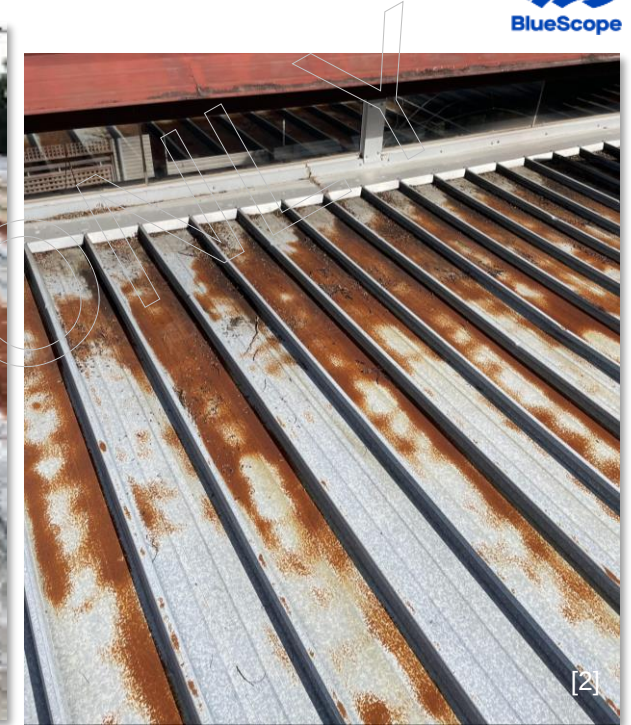


AZ150

150g/m² of AZ coating
over both side of steel

AZ200

200g/m² of AZ coating
over both side of steel



Source[1]: <https://www.belmontroofplumbing.com.au/2023/05/15/metal-roof-corrosion/>

Source[2]: https://www.reddit.com/r/AusProperty/comments/wd0my4/treating_rust_on_metal_roof_post_in_comments/?rdt=64690

Source[3]: <https://www.rooflock.com/author/admin/>

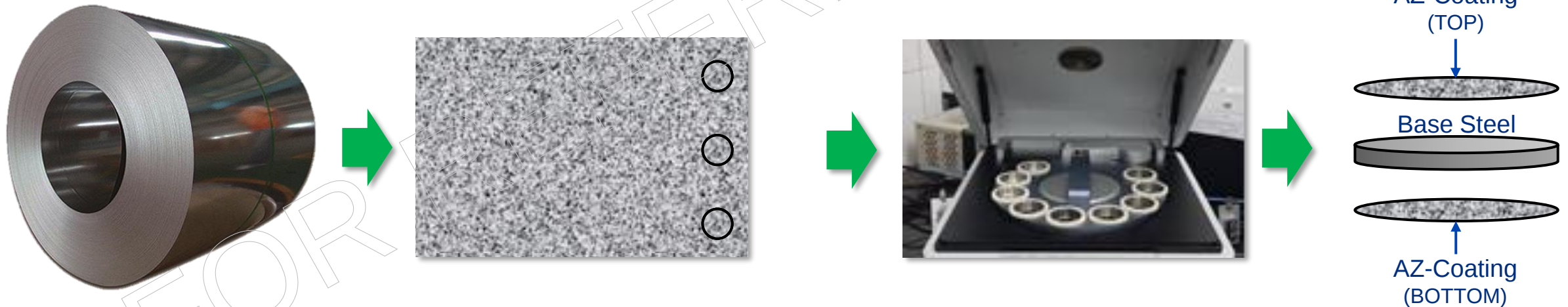
COATING MASS TEST

Coating mass test according to AS1397 & MS1196 to determine the coating mass achieve accordingly. The coating mass of top and bottom must be 150g/m²

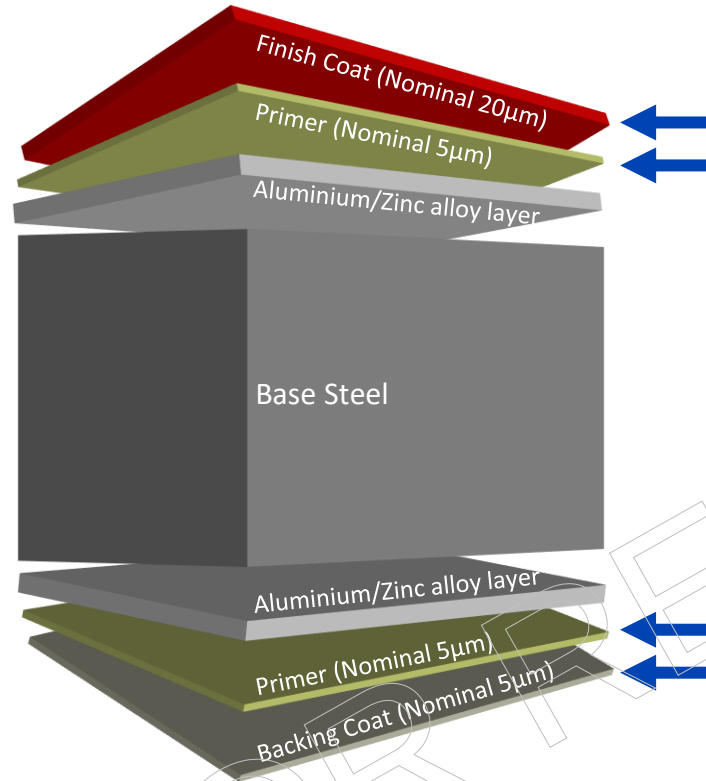
PRODUCT INFORMATION

PREFERRED SUBSTRATE	ZINCALUME® G550S AZ150 steel (aluminium/zinc alloy-coated steel)
	ZINCALUME® G300S AZ150 steel (aluminium/zinc alloy-coated steel) (Refer Note 8)
PRETREATMENT	Corrosion resistant proprietary conversion coating
PRIMER COAT	Universal corrosion inhibitive primer. Nominal dry film thickness 5µm each side
FINISH COAT	Custom formulated super polyester paint system with high performance pigments. Nominal dry film thickness 20µm on the top or weather side. The finish coat can, if required, be applied to both sides to provide a double-sided product
BACKING COAT	Custom formulated Shadow Grey. Nominal dry film thickness 5µm
COLOUR	A range of standard colours is available. Other specifically required colours may be available on request.

Coating class designation	Minimum coating mass, g/m ²		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
AZ150	150	135	60
AZ200	200	180	80



PAINT THICKNESS (DRY FILM THICKNESS – DFT)



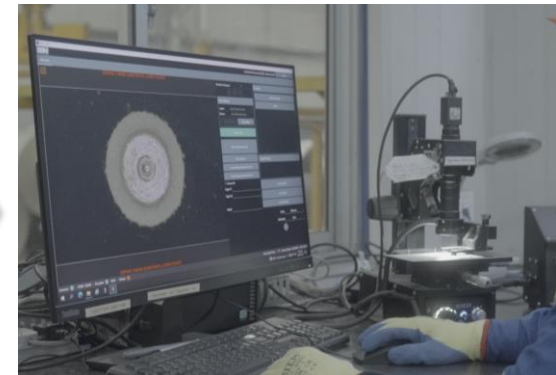
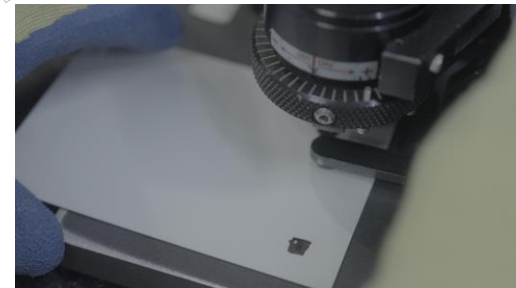
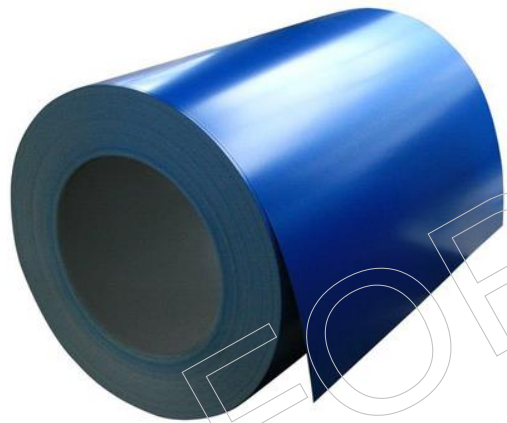
According to AS2728 & MS2383, the DFT is for optimum corrosion protection

DRY FILM THICKNESS TEST

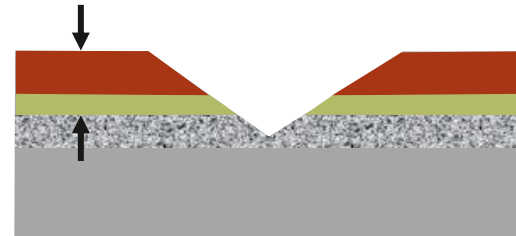
Dry film thickness test according to AS2728 & MS2383 to determine the paint thickness or DFT achieve accordingly. The DFT on weather exposure surface must be 25µm and backing must be 10µm

PRODUCT INFORMATION

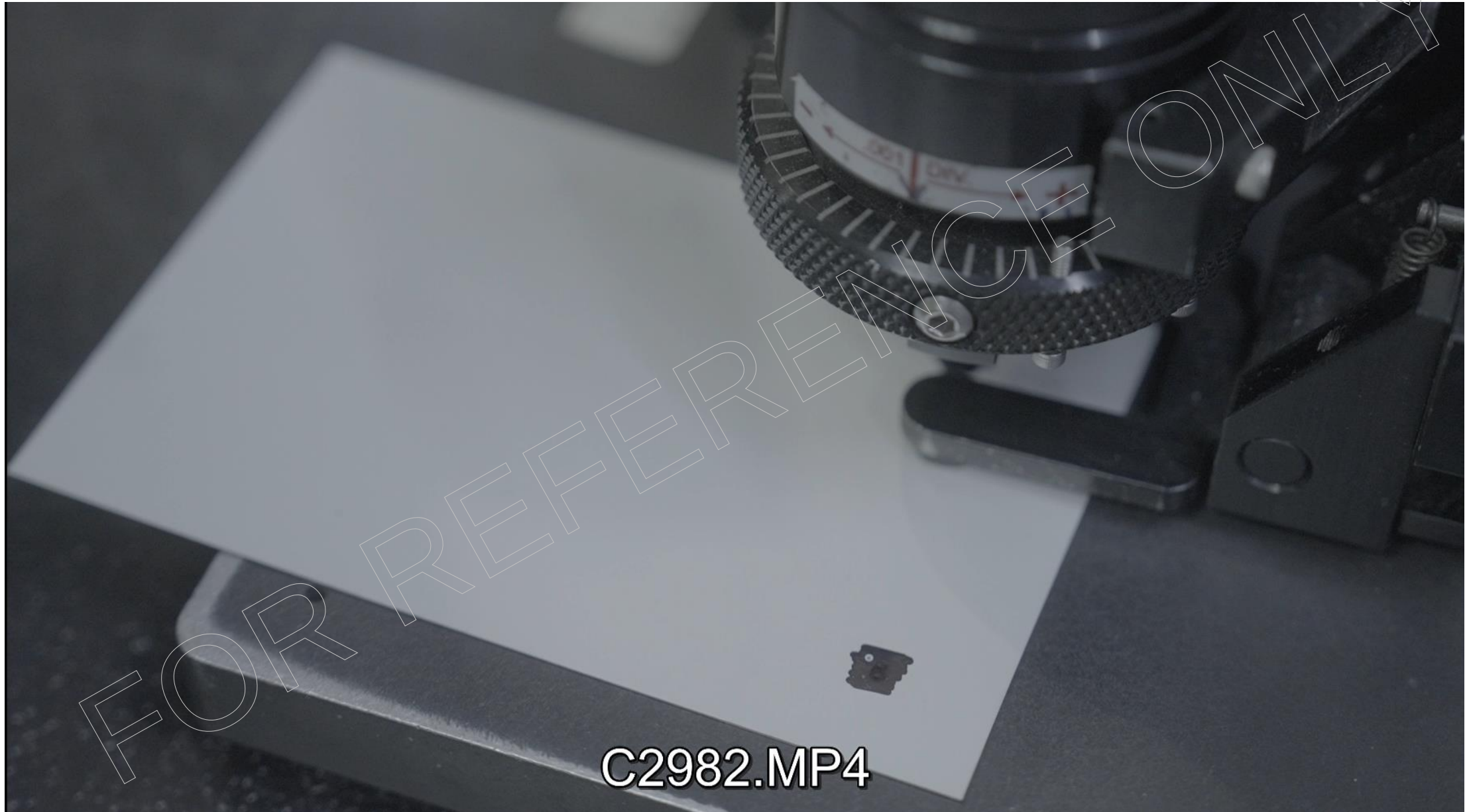
PREFERRED SUBSTRATE	ZINCALUME® G550S AZ150 steel (aluminium/zinc alloy-coated steel) ZINCALUME® G300S AZ150 steel (aluminium/zinc alloy-coated steel) (Refer Note 8)
PRETREATMENT	Corrosion resistant proprietary conversion coating
PRIMER COAT	Universal corrosion inhibitive primer. Nominal dry film thickness 5µm each side
FINISH COAT	Custom formulated super polyester paint system with high performance pigments. Nominal dry film thickness 20µm on the top or weather side. The finish coat can, if required, be applied to both sides to provide a double-sided product
BACKING COAT	Custom formulated Shadow Grey. Nominal dry film thickness 5µm
COLOUR	A range of standard colours is available. Other specifically required colours may be available on request.



Dry film thickness



DRY FILM THICKNESS TEST



DRY FILM THICKNESS TEST



COLOUR APPEARANCE



Source[1]: <https://bmroofing.com/metal-roof-fading/>

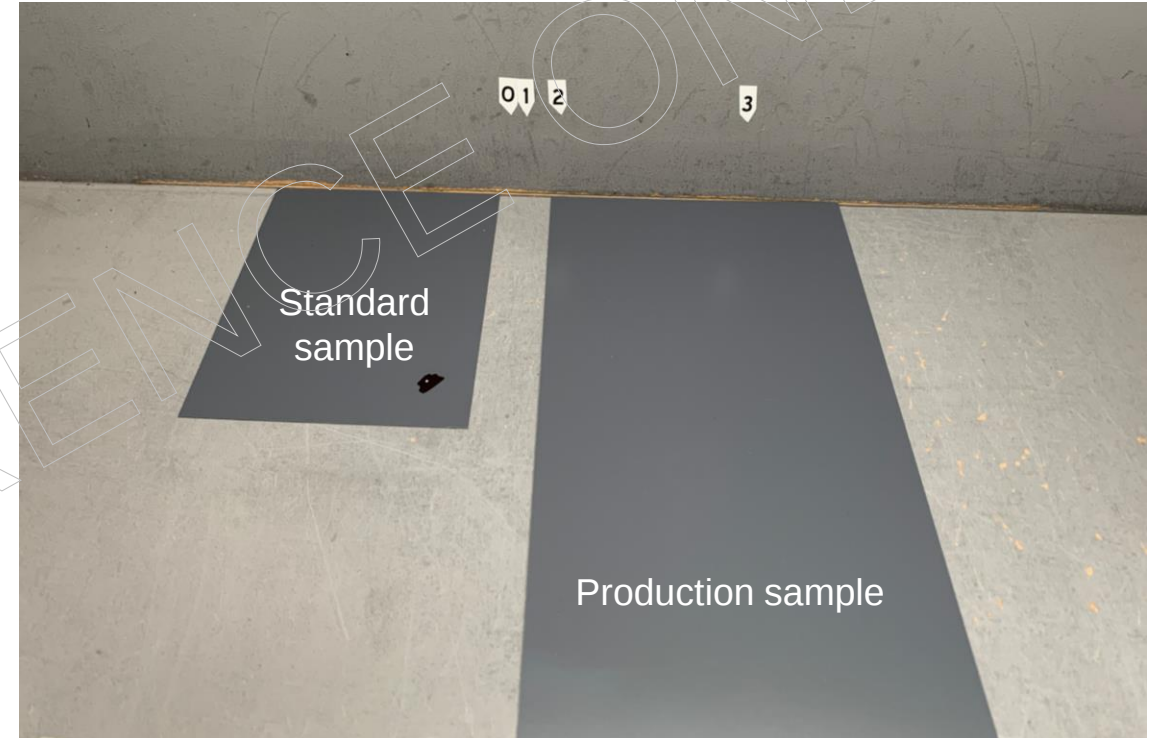
Source[2]: <https://govolve.com/how-to-clean-a-metal-roof-best-methods-for-metal-roof-maintenance/>

Source[3]: <https://www.westernstatesmetalroofing.com/blog/metal-roof-colors-fade>

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LIGHT BOX / VISUAL TEST

Light box test is a visual test to identify the colour tone of production sample compared to standard sample. We compare the colour tone in the distance of 0-1, 0-2 and 0-3.



Rating 0: no perceptible difference, Rating 1: very slight difference, Rating 2 : slight difference, Rating-3 moderate difference.

LIGHT BOX / VISUAL TEST

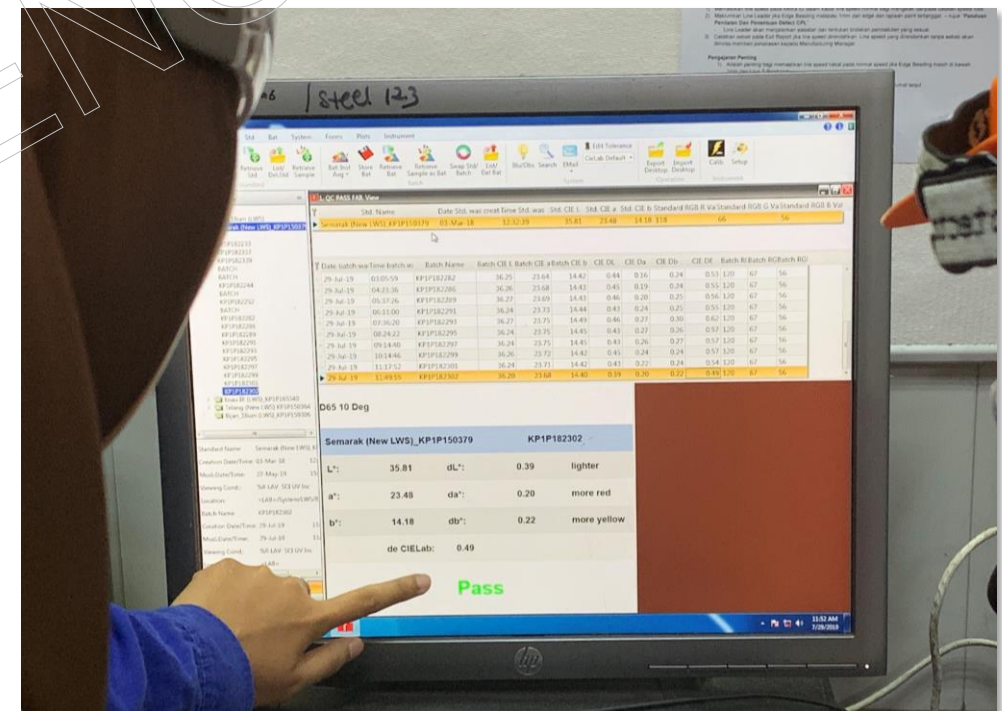


SPECTROPHOTOMETER TEST

Computerised test to identify the colour fading of production sample compared to standard sample. ΔE is defined from the test to determine the colour fading rate.

TABLE 2 – Expected colour change after 12 years in natural well washed exposure (AS/NZS 1580.457.1 & ASTM D2244).

COLOUR SHADE	TYPICAL APPEARANCE CHANGE (ΔE UNITS CIELAB 2000)
Light (e.g. Off White)	≤ 4
Intermediate (e.g. Beige)	≤ 6
Dark (e.g. Autumn Red)	≤ 10



SPECTROPHOTOMETER TEST

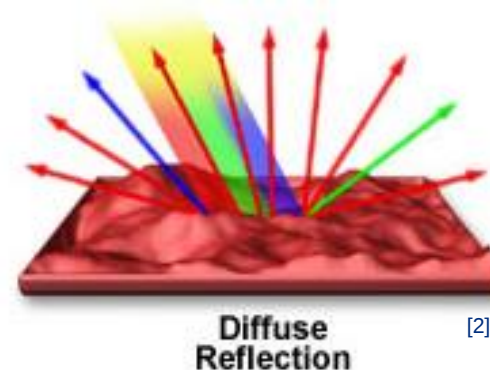
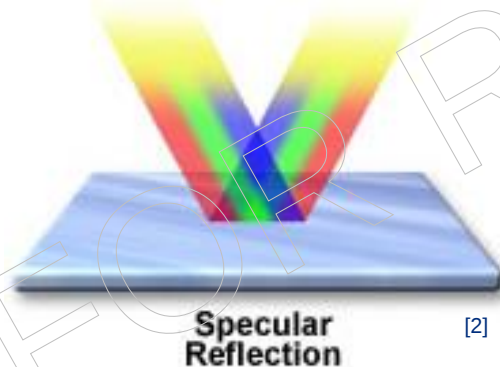


DAYLIGHT REFLECTANCE

Total Daylight Reflectance = Specular Reflection + Diffuse Reflection



Higher the value, the higher daylight reflectance



Source[1]: <https://www.houzz.com/discussions/1189531/glare-on-a-new-metal-roof>

Source[2]: <https://micro.magnet.fsu.edu/primer/java/reflection/specular/>

Source[3]: <https://www.metalroofnet.com/metal-roofing-blog/metal-roofing-questions-answers>

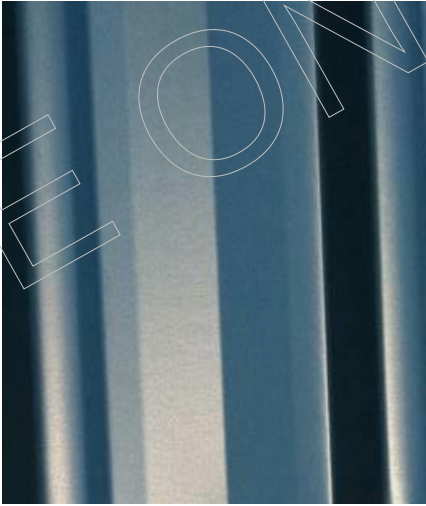
SPECULAR GLOSS TEST

Gloss of the paint finish is measured by a glossmeter (at 60°). The result is represented in Gloss Unit (G.U).



Solid Finishes
25 G.U.

n=02/03			
	value	$\bar{x}$	stdev
20°	2.9	2.9	0.0
60°	20.7	21.0	0.3
85°	48.9	49.1	0.1



Matt Finishes
7 G.U.

n=01/03			
	value	$\bar{x}$	stdev
20°	0.8	0.8	0.0
60°	6.4	6.4	0.0
85°	11.3	11.3	0.0

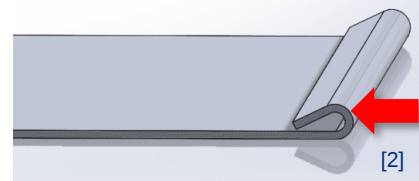
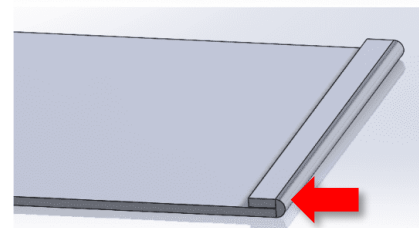
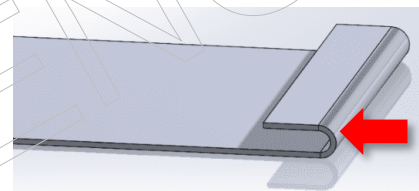
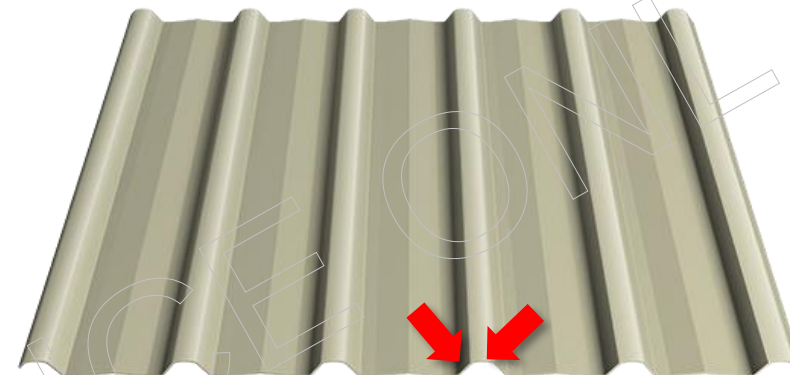
Solid Colour

Specular Gloss		
Specular Gloss at 60°meter	AS/NZS 1580.602.2; ASTM D523	Nominal 25 ± 10 units

Matt Colour

Specular Gloss		
Specular Gloss at 60°meter	AS/NZS 1580.602.2; ASTM D523	Nominal 7 ± 3 units

PAINT FLAKING

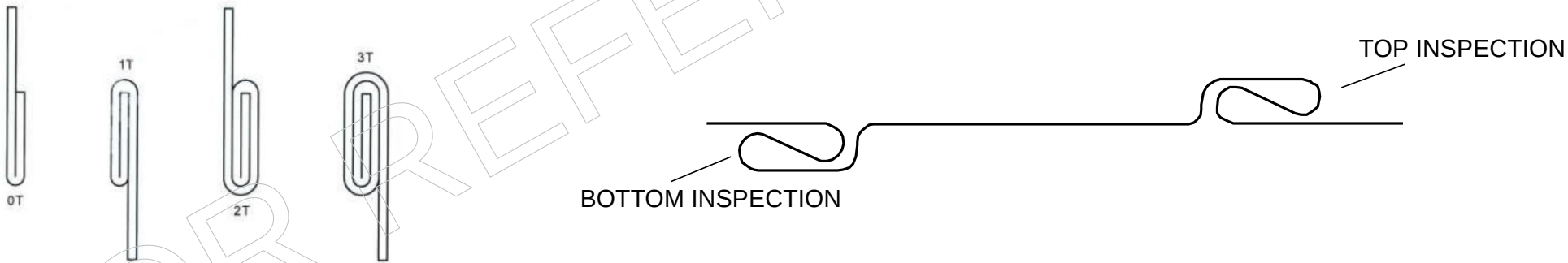


Source[1]: <https://www.ddcoatings.co.uk/4490/full-roof-coating-in-chester>

Source[2]: https://chroress.co.in/click.php?key=5u8u6w0wlqzqrezrbpvt&SUB_ID_SHORT=4a2c0104cd09a31b1054317a2b3335e6&COST_CPC=0.000250&PLACEMENT_ID=16380983&CAMPAIGN_ID=1182720&PUBLISHER_ID=313263&ZONE_ID=1576749

ADHESION TEST – T-BEND

T-Bend test to determine paint adhesion. Adhesion of paint on the outside of the bend is assessed by rapid removal of adhesive tape and visual checking with x10 magnification.



Adhesion		
Reverse Impact	AS/NZS 2728 (Appendix E)	≥10 joules
T-bend	AS/NZS 2728 (Appendix F)	Maximum 6T. Refer Note 7

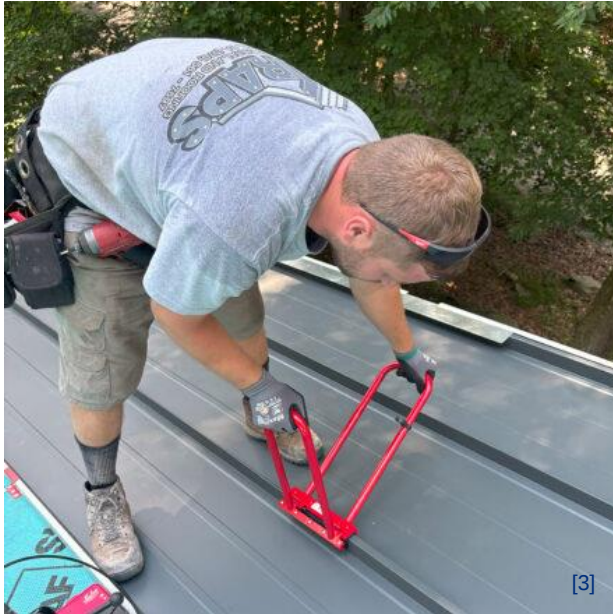
ADHESION TEST – REVERSE IMPACT

Reverse impact test to determine paint adhesion. Adhesion of paint on the outside of the bend is assessed by rapid removal of adhesive tape and visual checking with x10 magnification.



Adhesion		
Reverse Impact	AS/NZS 2728 (Appendix E)	≥10 joules
T-bend	AS/NZS 2728 (Appendix F)	Maximum 6T. Refer Note 7

SCRATCHES ON SURFACE



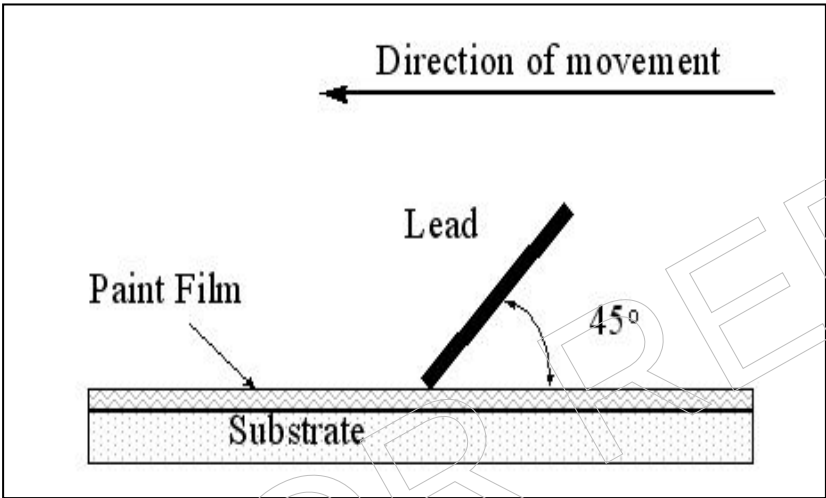
Source[1]: <https://www.ddcoatings.co.uk/4490/full-roof-coating-in-chester>

Source[2]: <https://www.yumisteel.com/High-Rib-Aluminum-Standing-Seam-Metal-Cladding-pd47451865.html>

Source[3]: <https://www.malcotools.com/category/roofing-essentials/fshs2-standing-seam-hand-seamer-2/>

HARDNESS TEST - PENCIL

Different grade of pencils are used to scribe on the paint finished layers.



5.7 Pencil hardness

When determined in accordance with ISO 15184, the pencil hardness of the organic coating shall be equal or harder than pencil hardness HB as indicated in Figure 2.

9B - 8B - 7B - 6B - 5B - 4B - 3B - 2B - B - HB - F - H - 2H - 3H - 4H - 5H - 6H - 7H - 8h - 9H

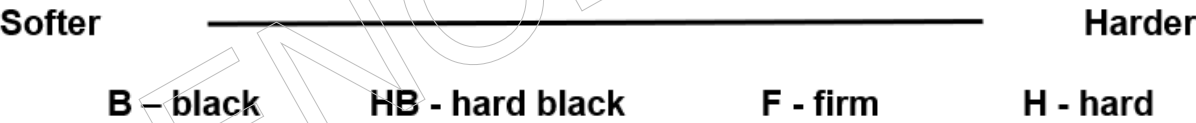


Figure 1. Range of pencil hardness

This method should not be used for embossed or textured coatings; it should be agreed at time of enquiry and order.

Observation: examine the paint surface for visible scratches or mark left by the pencil.

Hardness		
Pencil	AS/NZS 1580.405.1	HB or harder

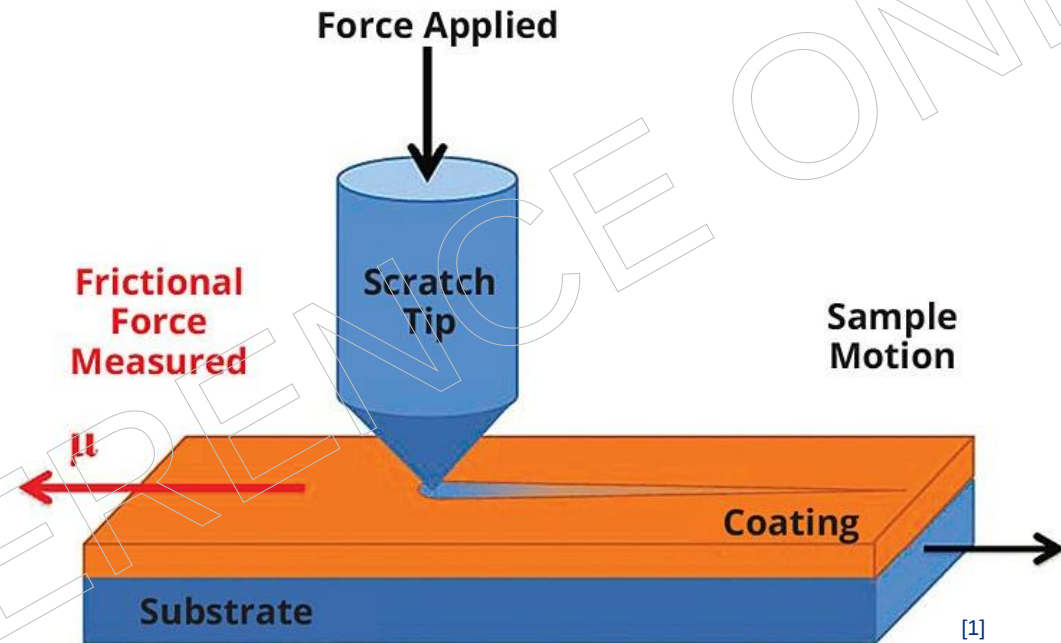
HARDNESS TEST - PENCIL

Different grade of pencils are used to scribe on the paint finished layers.



RESISTANCE TO ABRASION

Determine scratch resistance of the surface of a coated metallic.



Observation: visually analyzing the scratch tracks under a microscope to determine the point of failure.

Resistance to Abrasion		
Scratch	AS 2331.4.7	Typically 1500g

EXPERIENCE TIME.....

Thank you

Let's have a break.....



A man with brown hair and a beard, wearing a beige long-sleeved shirt, is shown from the waist up. He has a thoughtful expression, with his hand resting on his chin. Two green speech bubbles are positioned around him, one to his left and one to his right. The background is a solid blue color.

Am I using the
coated steel
product right?

Am I using the
right coated
steel product?

CONTENT

- ① **Criteria of Good Quality Coated Steel**
- ② **Case Study: Steel Roof and Wall Cladding**
- ③ **JKR Master Specification: Section G**
- ④ **Warranty vs Material Performance**

Criteria of Good Quality Coated Steel



BEST WARRANTY OFFER VS BEST QUALITY PRODUCT



VS



BEST WARRANTY OFFER VS BEST QUALITY PRODUCT



VS



Worry Free

Affect Your Reputation

Waste Your Resources

Worry Free

Protect Your Reputation

Save Your Resources



BEST WARRANTY OFFER VS BEST QUALITY PRODUCT



VS



You let others to decide which product to be used in your project

You are not sure what you are buying



You decide which product to be used in your project

You know what the value of the product is



Why Rolex watches are so expensive



@BusinessInsider

Subscribe

► Why Rolex Watches Are So Expensive | So Expensive

Why Rolex watches are so expensive. #rolex #watches #luxury #style

IF FUNCTION SAME, THE PRICE SHOULD BE THE SAME?



~RM3,975

Show accurate time

Can wear on your wrist

Looks good

Water resistance



~RM31,350

Long Lasting

Post-sale service

Show your reputation

Worry free

BEST QUALITY PRODUCT FOR COATED STEEL



Corrosion Resistance

Corrosion

Colour Retention



Most
Basic

Clean Technology



Reflect Heat Technology



Service Support



Value
Added

Corrosion Resistance Technology

TYPE OF METALLIC COATING TECHNOLOGY

The following sharing is based on the requirement of AS1397.

Zinc Coating (Z)

99% Zinc

Aluminium-Zinc
Coating (AZ)

50-60% Aluminium
+
1-2% Silicon
+
Remainder Zinc

Aluminium-Zinc-
Magnesium Coating
(AM)

47-57% Aluminium
+
1-3% Magnesium
+
1-2% Silicon
+
Remainder Zinc

Technology
cannot be
patented

Zinc-Aluminium
Coating (ZA)

3-15% Aluminium
+
Remainder Zinc

Zinc-Aluminium-
Magnesium Coating
(ZM)

5-13% Aluminium
+
2-4% Magnesium
+
Remainder Zinc

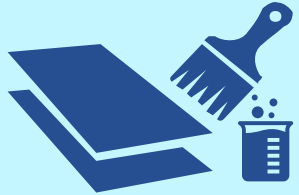


So? All the coated
steel products are
same!



THE DIFFERENTIATION ARE COMING FROM.....

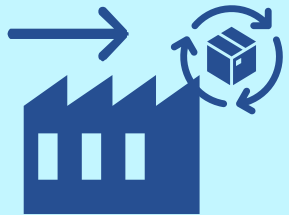
Metallic Coating Technology



Aluminium-Zinc
Coating (AZ)

Zinc Coating (Z)

Manufacturing Process & QC

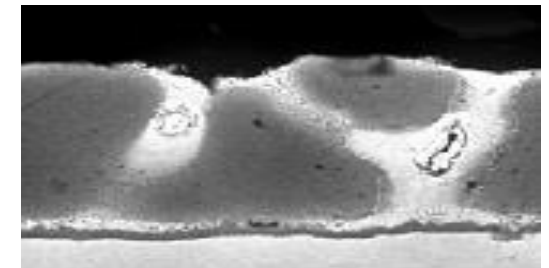
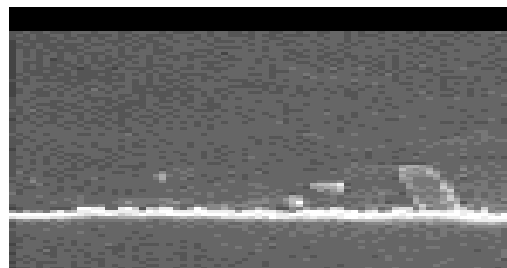
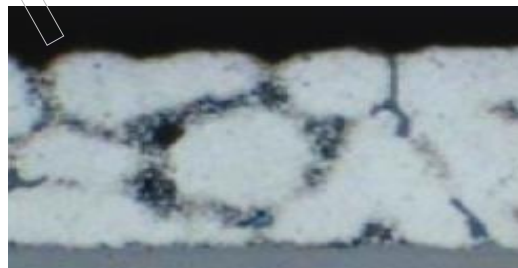
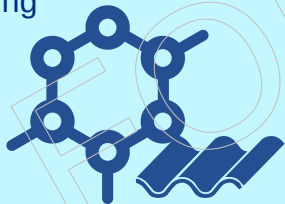


Australian Standard &
Malaysia Standard

Japanese Standard &
Malaysia Standard

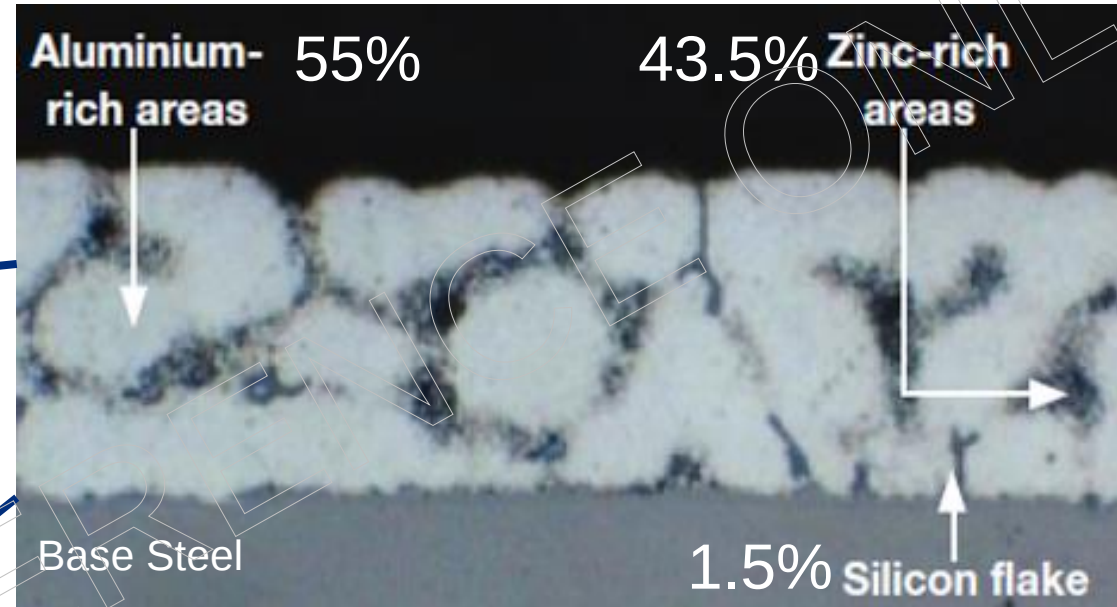
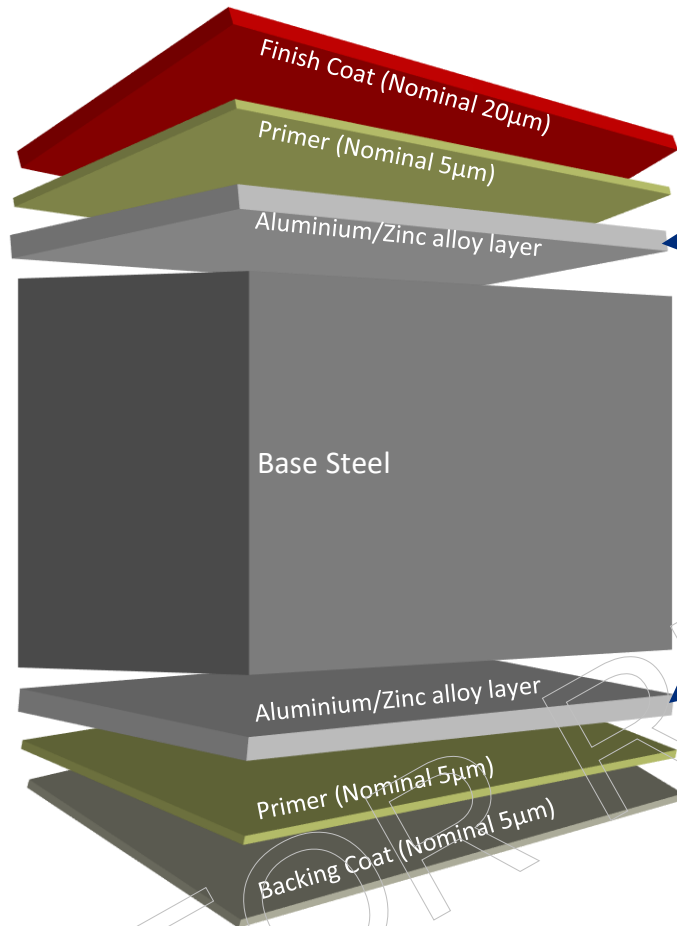
American Standard &
Malaysia Standard

Microstructure of Metallic Coating

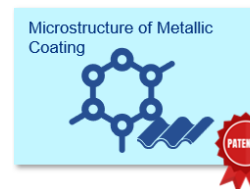


THE RESPONSIBILITY OF MANUFACTURER

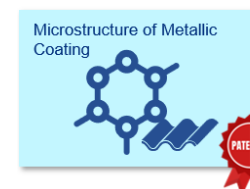
The patented manufacturer process gives the ability to control temperature, thickness and evenness of metallic coating.



The top and bottom coating mass must be even



Optimum Microstructure



Manage Coating Composition

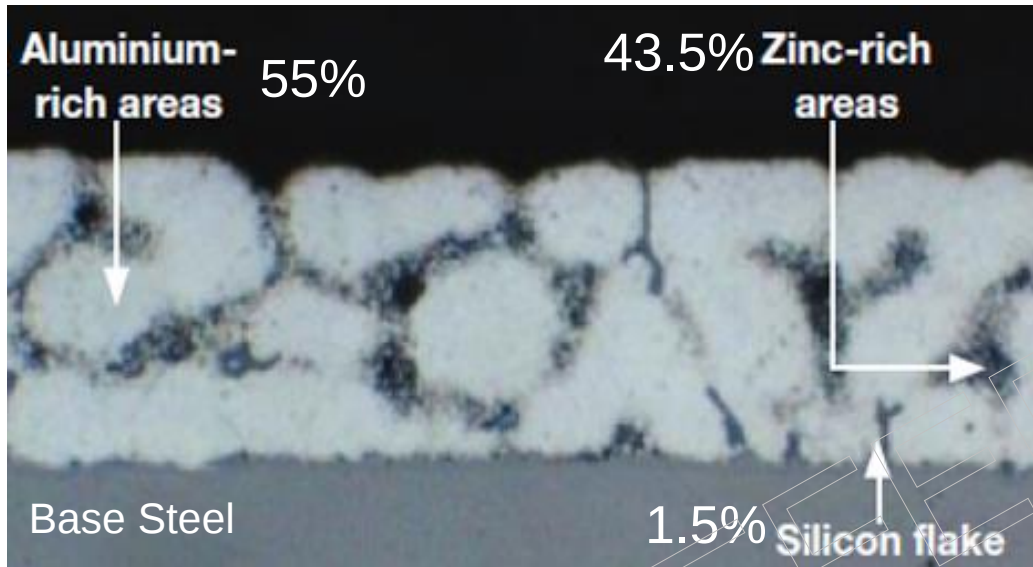


Manage Coating Consistency

Deliver the **best corrosion resistance performance**

COATING TECHNOLOGY

Aluminium-Zinc Coated Steel (AZ)



Cross Sectional Microstructure View of AZ Coating

Newer Technology: thinner and lighter coating



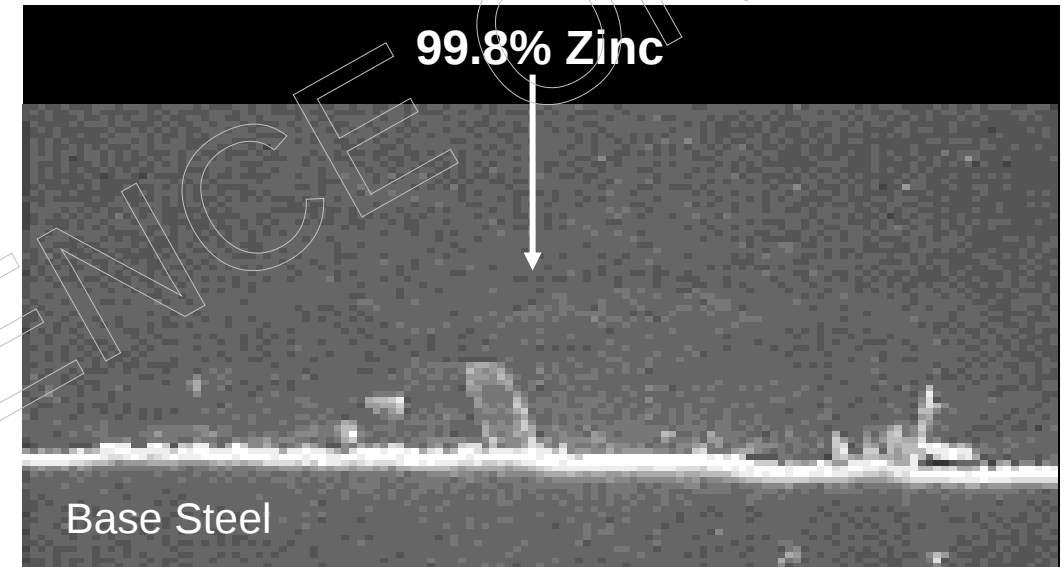
Double Protection: sacrificial and barrier protection



Best Performance: *4 Times better in benign env.



Zinc Coated Steel (Z)



Cross Sectional Microstructure View of Z Coating

Old Technology: thicker and heavier coating

Single Protection: sacrificial protection

Good Performance: In benign environment

*note: it is only applicable for case of coated steel with AZ150 compared to Z275 at benign environment only.

PERFORMANCE OF THE COATING TECHNOLOGY

As shown, the exposure test in ISO 9223 – Category C4 (severe marine environment) after 5 years. Z275 in general will show shorter galvanic protection compared to AZ150. If the coating is lower than Z275, we foresee the corrosion performance will be worse than what's shown in Z275.

Aluminium-Zinc Coated Steel (AZ)



Aluminium-Zinc Coated steel AZ150 – 150g/m²

Zinc Coated Steel (Z)



Galvanised Steel Z275 – 275g/m²

Shorter galvanic protection

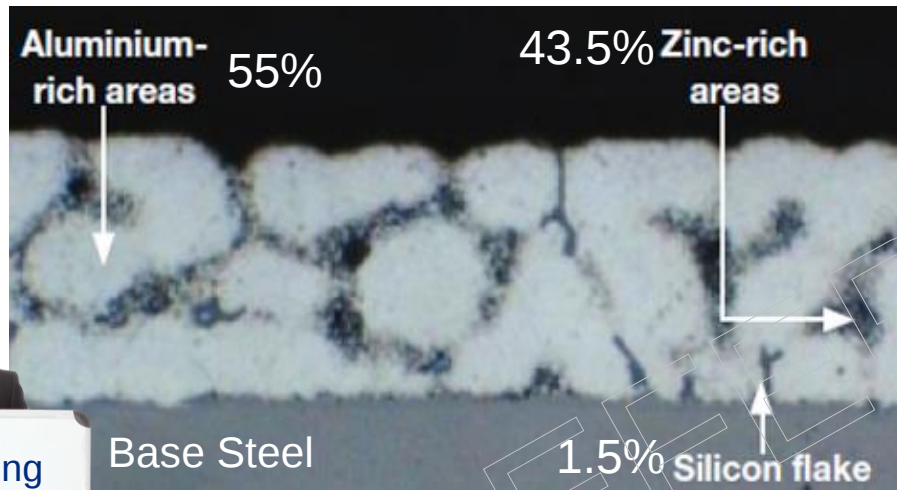
You are buying
better anti-
corrosion
performance



PATENTED MANUFACTURING SYSTEM

Based on the test of ASTM B487:2020 at accredited lab, the variation of top and bottom coating mass of Zinalume® steel is minimal. Whereas the variation of ALUZINC product is **47%**. It shows the same technology, but different manufacturing method will produce different level of quality in anti-corrosion protection.

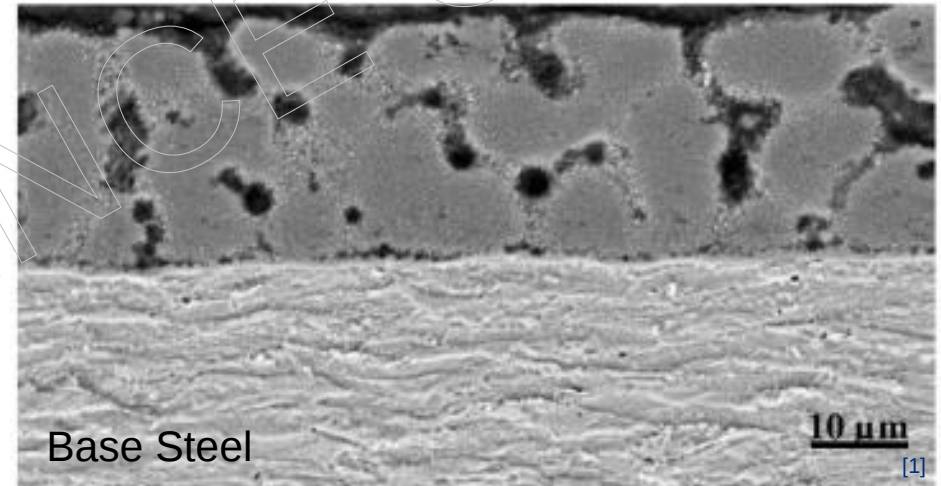
Aluminium-Zinc Coated Steel (AZ) by BlueScope



Cross Sectional Microstructure View of AZ Coating

The top and bottom coating mass must be even

Aluminium-Zinc Coated Steel (AZ) by Other



Cross Sectional Microstructure View of AZ Coating

The top and bottom coating mass must be even

Uneven coating mass may cause corrosion happen faster than expected

You are buying better manufacturing method



Source [1]: <https://www.sciencedirect.com/science/article/abs/pii/S025789721630024X>.

Disclaimer: The testing is only applied to these samples, so it does not represent all the products available in the market.

Colour Retention Technology

TYPE OF PAINTING TECHNOLOGY

Polyester Paint

Super-Polyester Paint

Super Modified
Polyester Paint

PVDF Paint

These are
the common
paint
technology

So? Once again,
all the coated
steel products are
same!



THE DIFFERENTIATION ARE COMING FROM.....

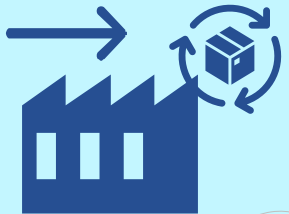
Paint Technology



Proprietary Super-Polyester Paint

Proprietary PVDF Paint

Manufacturing Process & QC



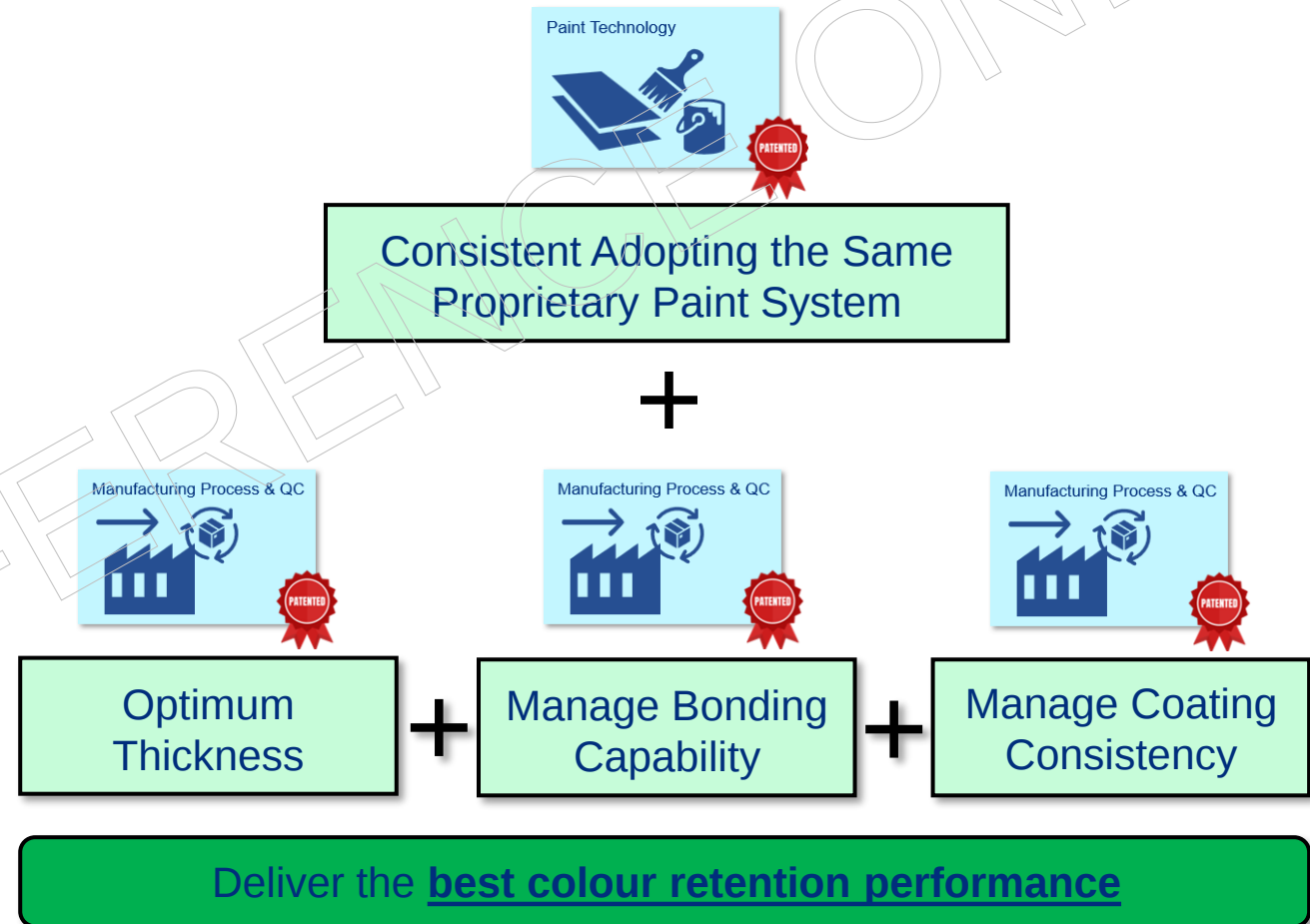
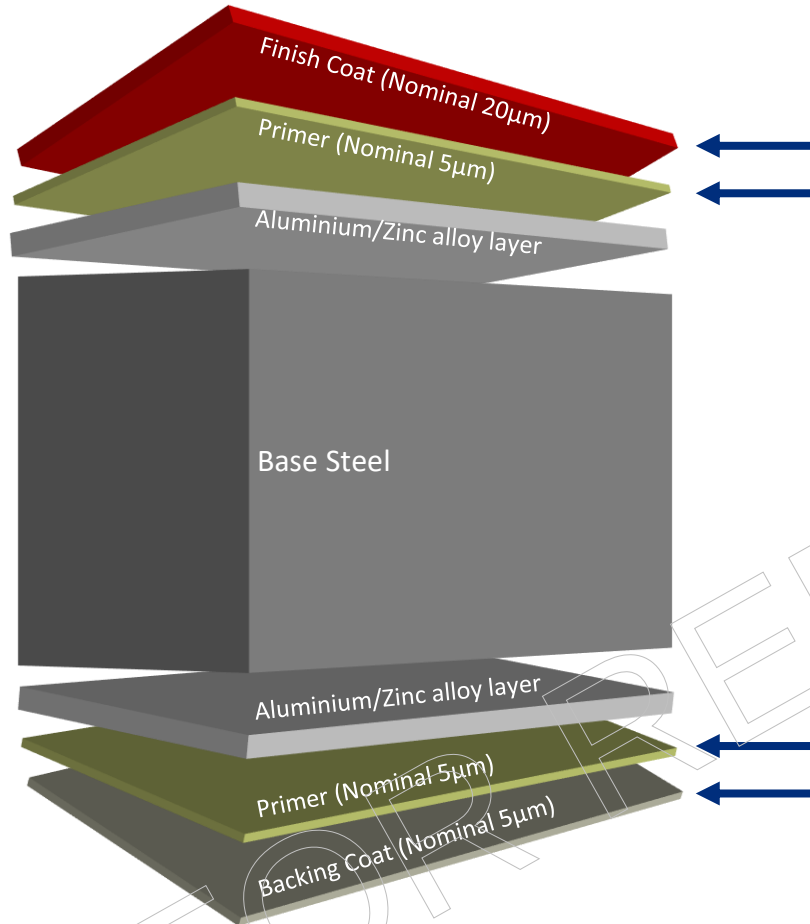
Australian Standard & Malaysia Standard

Japanese Standard & Malaysia Standard

American Standard & Malaysia Standard

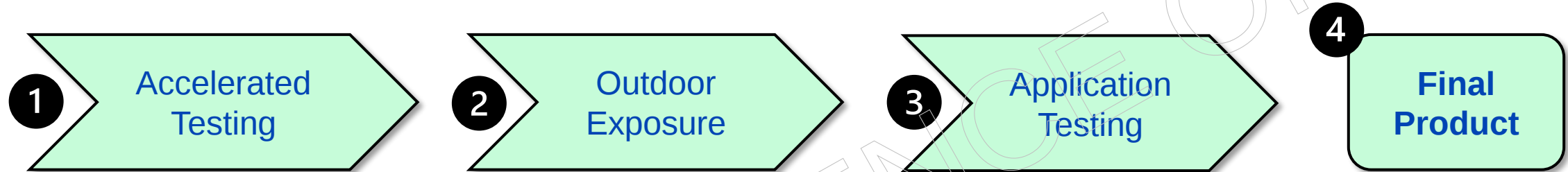
THE RESPONSIBLE OF MANUFACTURER

The patented manufacturer process gives the ability to control temperature, thickness, adhesiveness and evenness of paint coating.

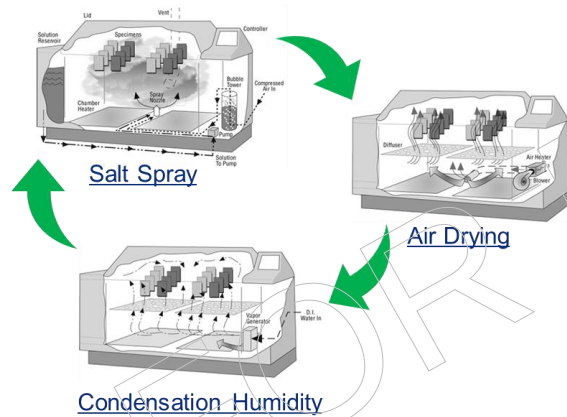


THE EXTENSIVE PRODUCT EVALUATIONS

Developed its paint formulation and conducted rigorous product development and evaluation to ensure long-lasting aesthetic performances.



Cyclic Corrosion Test (CCT)



PERFORMANCE COMPARISON OF “AZ” VS “Z” COATING

Performance after 9 years exposure at ISO 9223 – Category C4 (severe marine site)

Aluminium-Zinc Coated Steel (AZ)



Pre-Painted Steel AZ150 – 150g/m²

You are buying product with best assessment



Zinc Coated Steel (Z)



PPGI Z275 – 275g/m²

Corrosion happen at cut edge and under the paint

PROPRIETARY PAINT SYSTEM

As shown, the testing samples exposed to sunlight after 10 years at Kapar, Malaysia. Alternative product in general will show more severe colour fading compared to Colorbond® Steel.

Pre-Painted Steel



Proprietary Super-Polyester Paint System

Alternative



Standard Polyester Paint System

5 times worse in colour fading

You are buying
better colour
retention
performance



PROPRIETARY PAINT SYSTEM

As shown, the actual roof exposed to sunlight after 7 years at project site. Alternative product in general show paint delamination.

Prepainted Steel



Proprietary Primer Technology

Alternative



Standard Primer Technology

Unsustainable with bad adhesion

You are buying
durable and better
adhesion paint
system

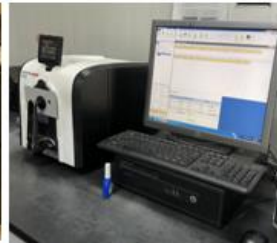


QUALITY CONTROLLING PROCESS

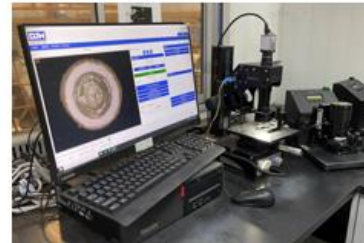
Rigorous tests in manufacturing plant to ensure that our products meet the highest standards. Other than that, we did continuous outdoor exposure test to assess our product performance against actual weather.



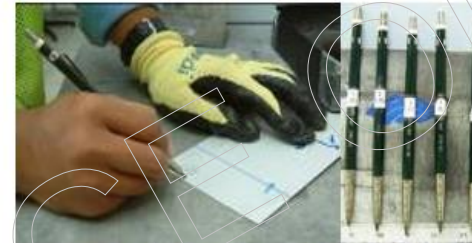
1. Colour Appearance / Colour Deviation



2. Paint Thickness (DFT)



3. Pencil Hardness (B<HB<F<H<2H)



4. Specular Gloss (60°)



5. Paint Curing – MEK Double Rub



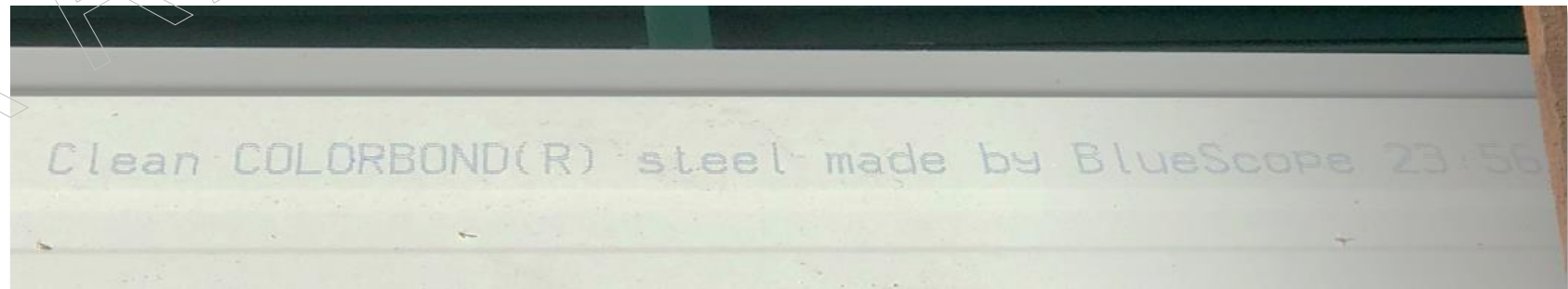
6. Paint Adhesion – Reverse Impact Test



7. T-Bend Adhesion Test



Outdoor Exposure Test



You are buying the best quality control to achieve highest standard

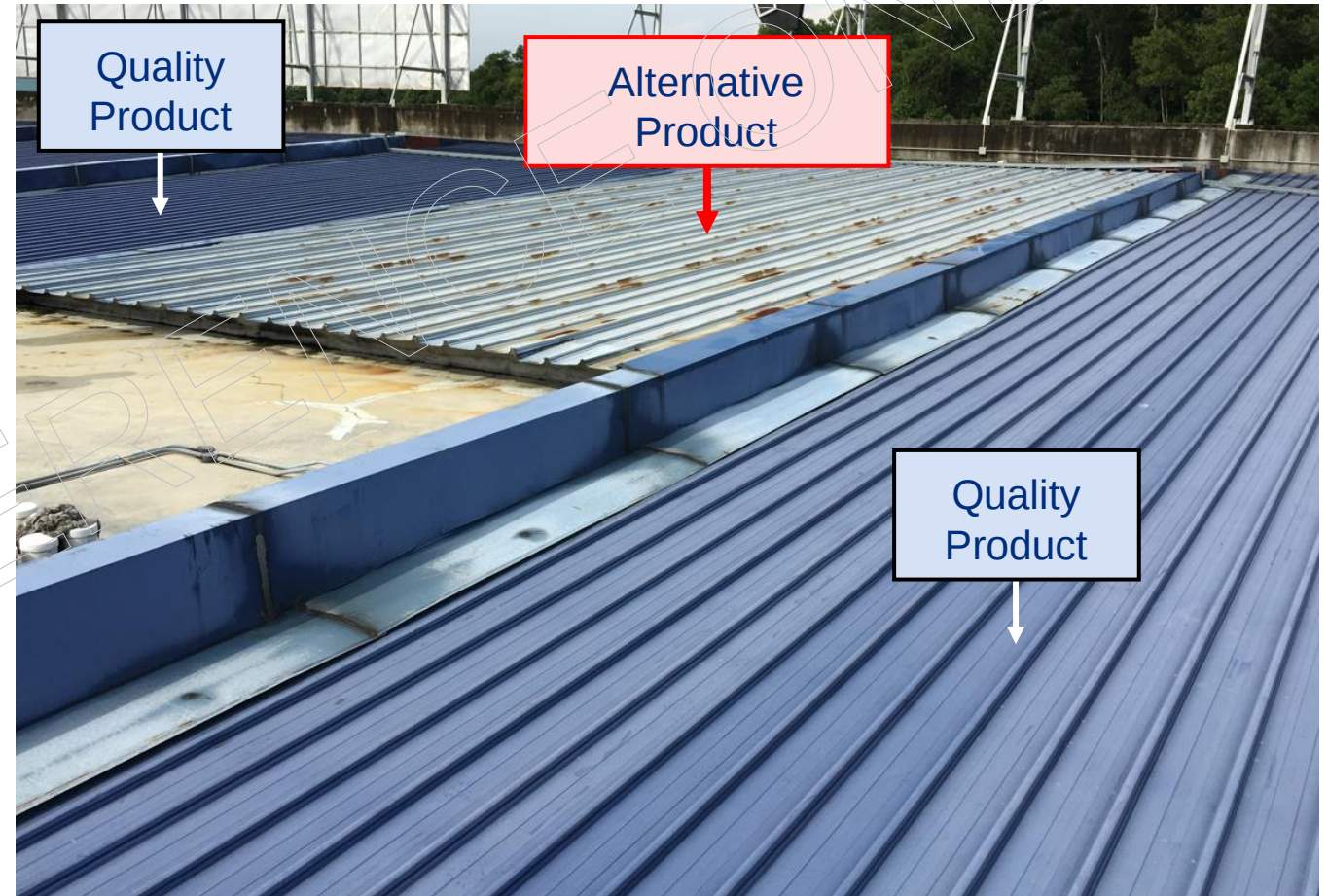


Case Study – Steel Roofing / Wall Cladding

4

COMMERCIAL BUILDING (5 YEARS)

Coated steel may look the same, but performance is not the SAME!!



COMMERCIAL BUILDING AT SARAWAK (10 YEARS)

The quality product shows consistent weathering, and no sign of premature failures as compared to the alternative product.



COMMERCIAL BUILDING AT LANGKAWI (15 YEARS)

This project was completed in 2005. No sign of corrosion is observed after 15 years in such a marine environment (<125m marine)



FERRY TERMINAL AT LABUAN (19YEARS)

This project was completed in 2003. No sign of corrosion is observed after 19 years in such a marine environment (<100m marine)

2004



2014



2022



FERRY TERMINAL AT LABUAN (19YEARS)

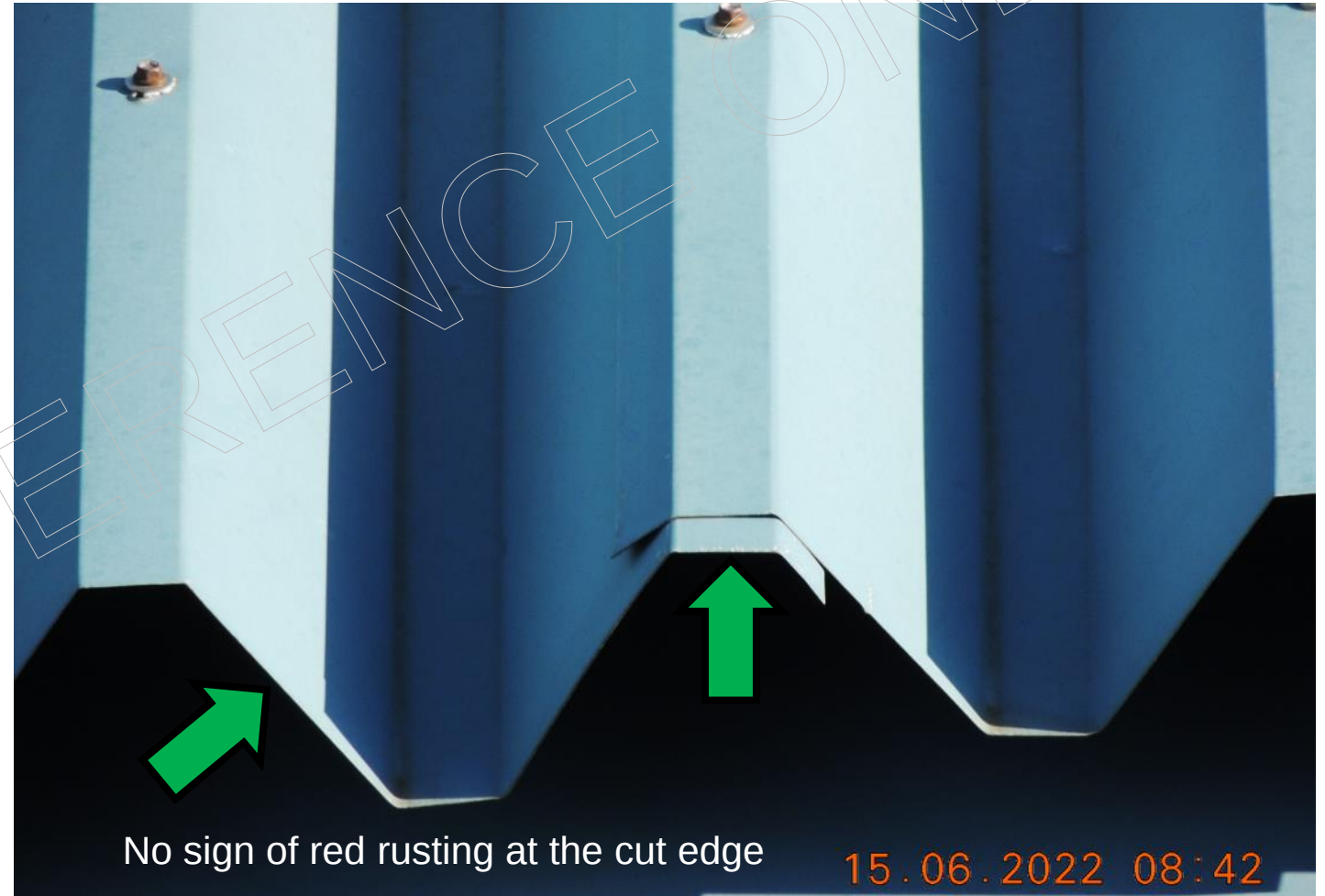
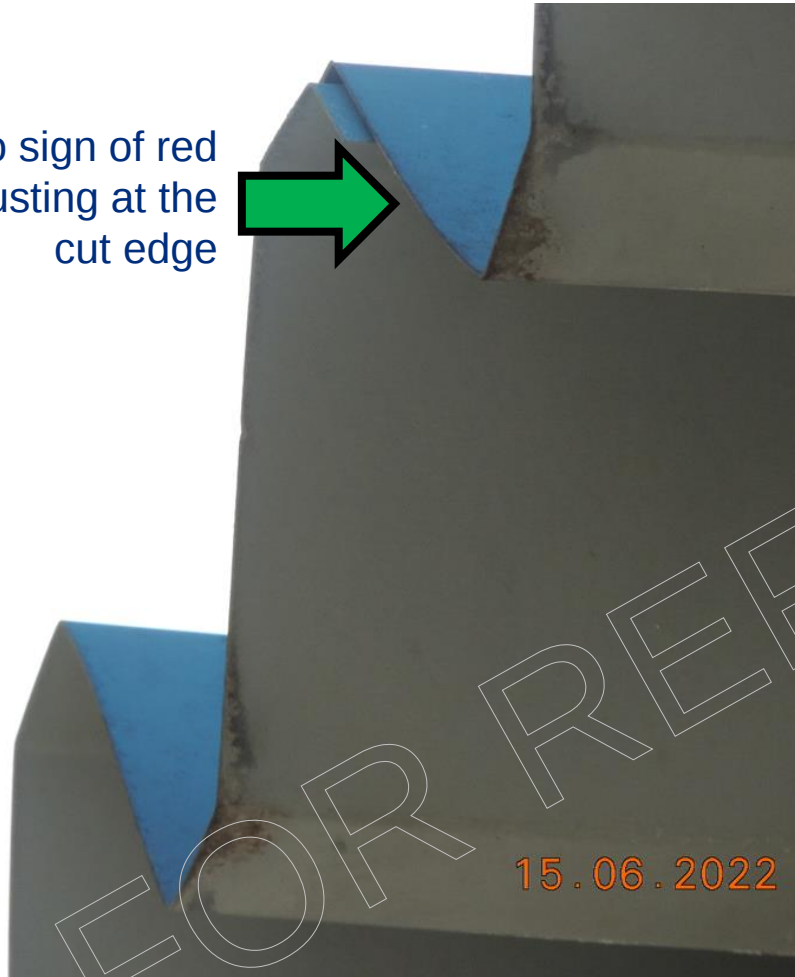
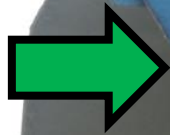
Steel roof on other buildings show sign of red rusting.



FERRY TERMINAL AT LABUAN (19YEARS)

Cut edge and drip edge do not have the sign of red rusting.

No sign of red rusting at the cut edge



FERRY TERMINAL AT LABUAN (19YEARS)

Lapping at flashing and side lap do not have the sign of red rusting.



RESORT AT PORT DICKSON (10 YEARS)

This project was completed in 2014. No sign of corrosion is observed after 10 years in marine environment.

Since 2014

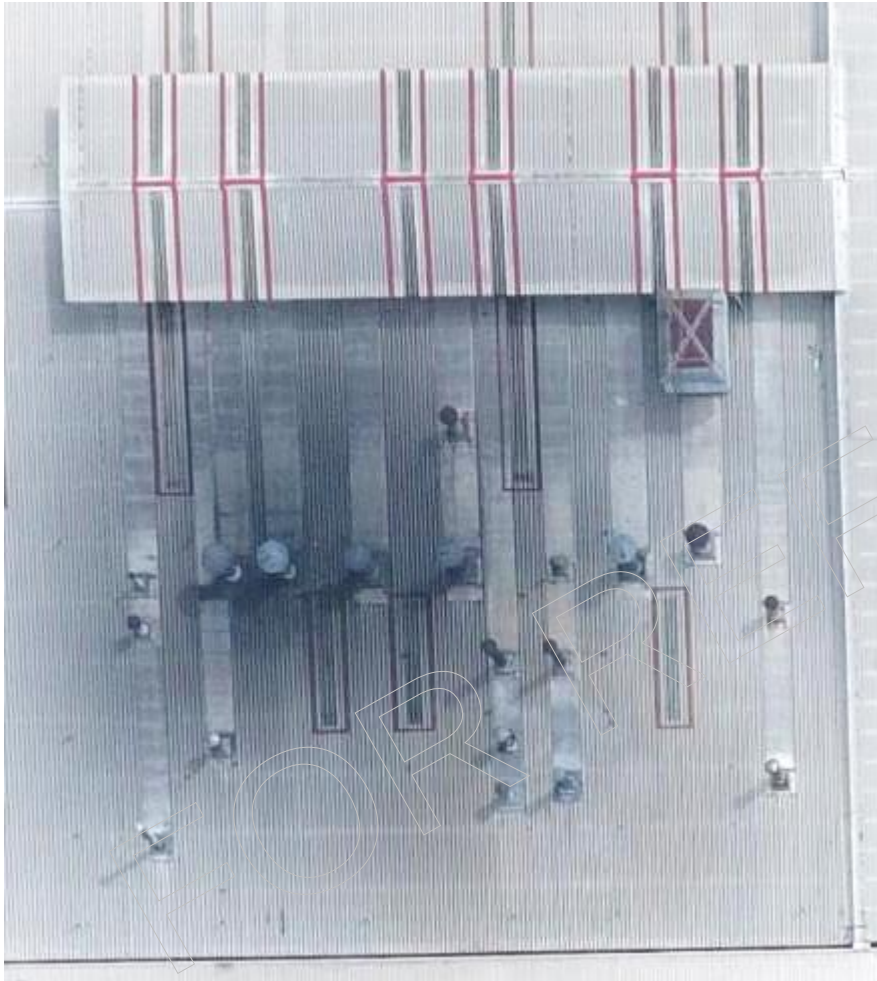


After 10 years



INDUSTRIAL BUILDING AT SELANGOR (22 YEARS)

This project was completed in 1997. No sign of corrosion is observed after 22 years in such an environment.



Phase 1
Nov'97 (~22 years)



- No sign of corrosion is observed even covered with these “black” deposits

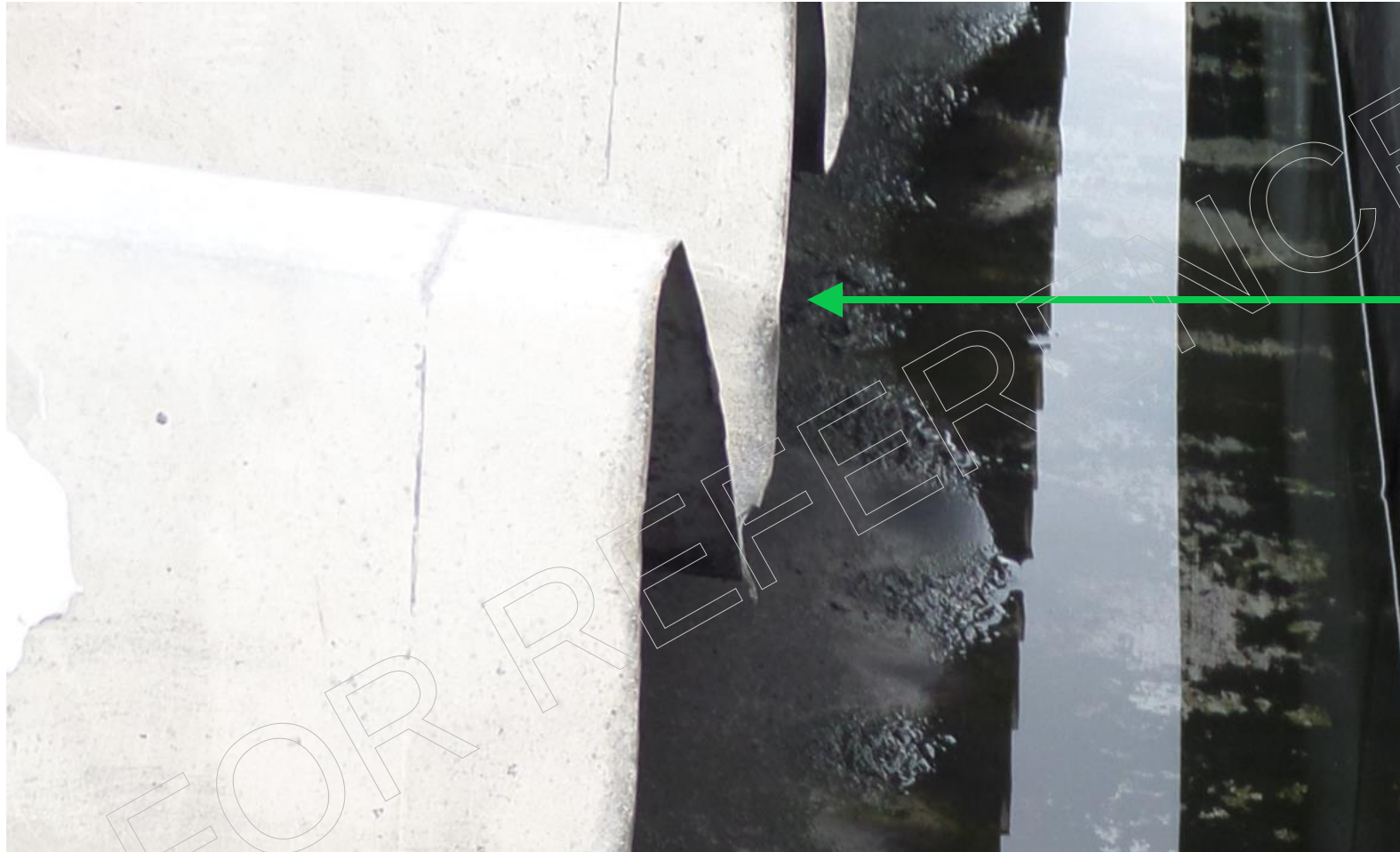
INDUSTRIAL BUILDING AT SELANGOR (22 YEARS)

Lapping at flashing and side lap do not have the sign of red rusting.



INDUSTRIAL BUILDING AT SELANGOR (22 YEARS)

Cut edge and drip edge do not have the sign of red rusting.



Drip edges
still OK

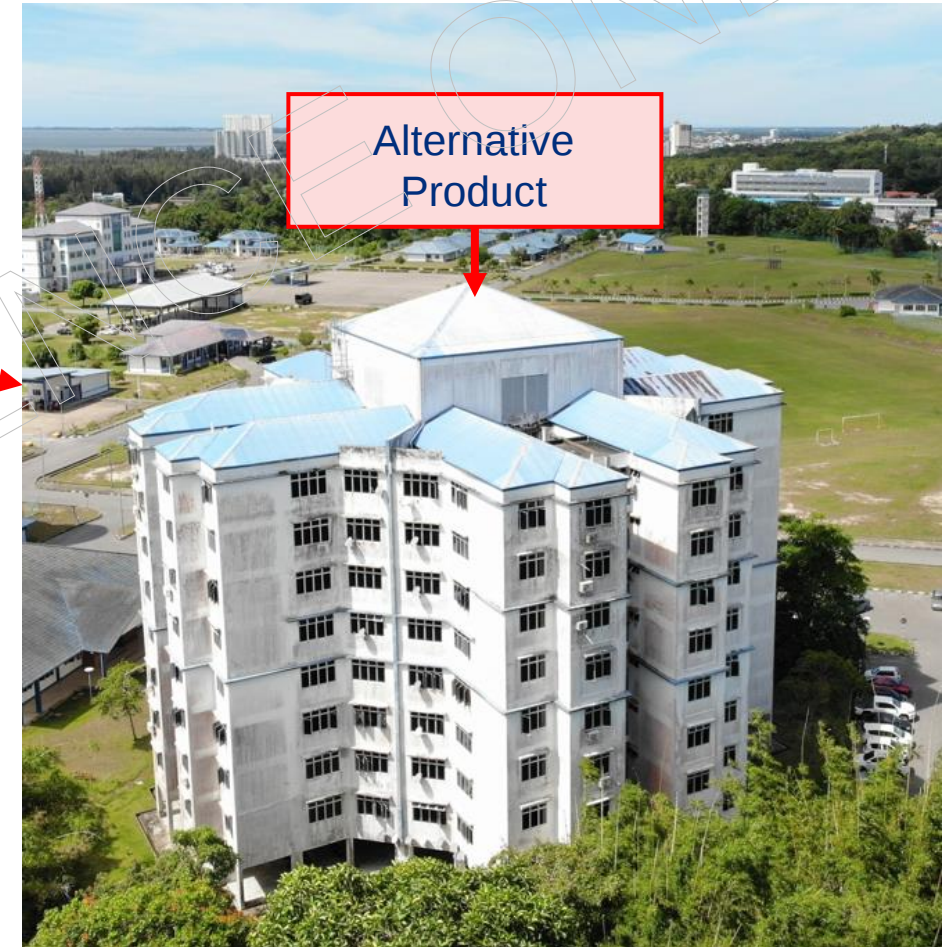
RESIDENTIAL BLOCK AT MIRI (12 YEARS)

This project was completed in 2010. No sign of corrosion is observed after 12 years in such a marine environment (<700m breaking surf marine).



RESIDENTIAL BLOCK AT MIRI (12 YEARS)

The roofing sheets in show consistent weathering in such a marine environment (<700m breaking surf marine) as compared to Alternative Supplier roofing sheets.



RESIDENTIAL BLOCK AT MIRI (12 YEARS)

Alternative roofing sheets show inconsistent weathering i.e. differential colour fading and red rusting corrosion as compared to roofing sheets with quality product.



RESIDENTIAL BLOCK AT MIRI (12 YEARS)

The record shows differential colour fading was observed in the Alternative Supplier roofing sheet since July 2011. Now its appearance is getting worst.

2011



2022



RESIDENTIAL BLOCK AT MIRI (12 YEARS)

Red rusting happened on alternative product.



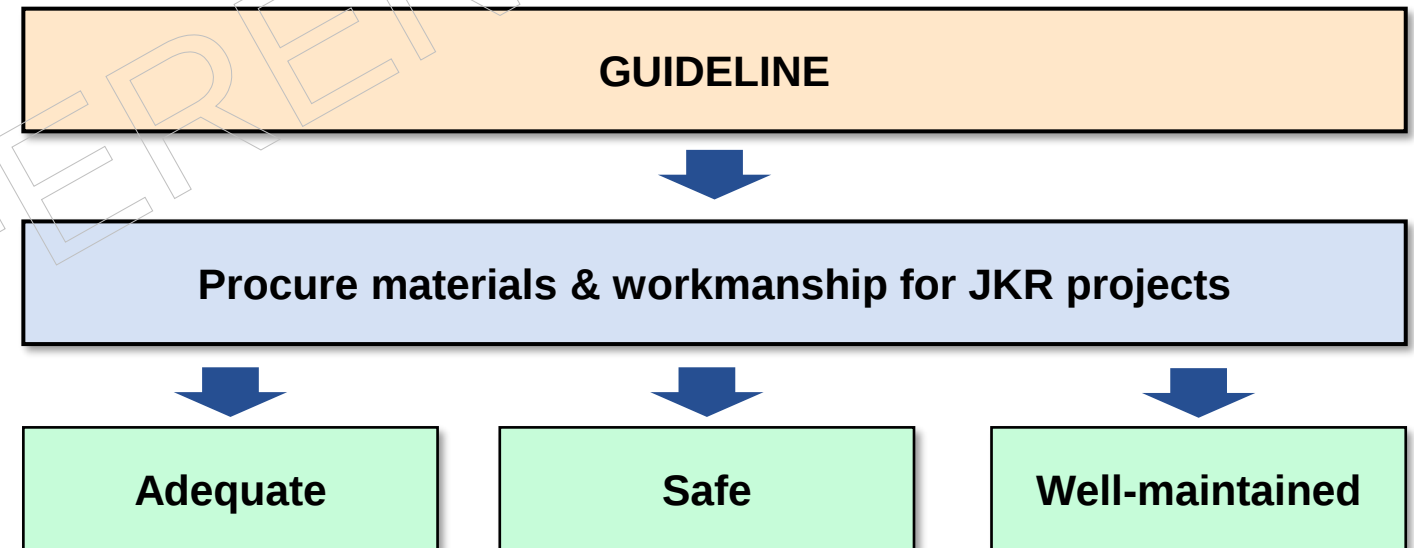
JKR Master Specification: Section G

5

JKR MASTER SPECIFICATION 2020



This Standard serves to establish uniformity and base specifications for materials and workmanship required for building works particularly in conventional tender procurement for JKR projects. It also sets out the level of technical performance and characteristics required to promote an adequate, safe and well-maintained building so as to effectively contribute to the development of the country.



JKR MASTER SPECIFICATION 2020 – TABLE OF CONTENT (PAGE III)

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SECTION C	:	FOUNDATION AND WORKS BELOW LOWEST FLOOR LEVEL	C/1 - C/69
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SECTION E	:	WALL SYSTEM	E1 - E/20
SECTION F	:	SEWERAGE	F/1 - F/12
SECTION G	:	ROOFING	G/1 - G/11
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SECTION R	:	LANDSCAPING AND TURFING	R/1 - R/10
SECTION S	:	DRAINAGE	S/1 - S/8
SECTION T	:	SIGNAGE	T/1 - T/4
SECTION U	:	SLOPE STABILISATION	U/1 - U/89
SECTION V	:	GROUND IMPROVEMENT	V/1 - V/58
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SECTION X	:	INTERNAL COLD WATER AND SANITARY PLUMBING SYSTEM	X/1 - X/35
SECTION Y	:	SANITARY FITTINGS	Y/1 - Y/5

Section G: Roofing



JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 6: Pre-Painted Steel Roofing Sheet, Material Clause 6.1.1.1 & 2



Metallic Coating Requirement

Zinc Coating (Z)	Aluminium-Zinc Coating (AZ)
MS2385 & AS1397 MS2384 & JIS G3302	MS1196 & AS1397

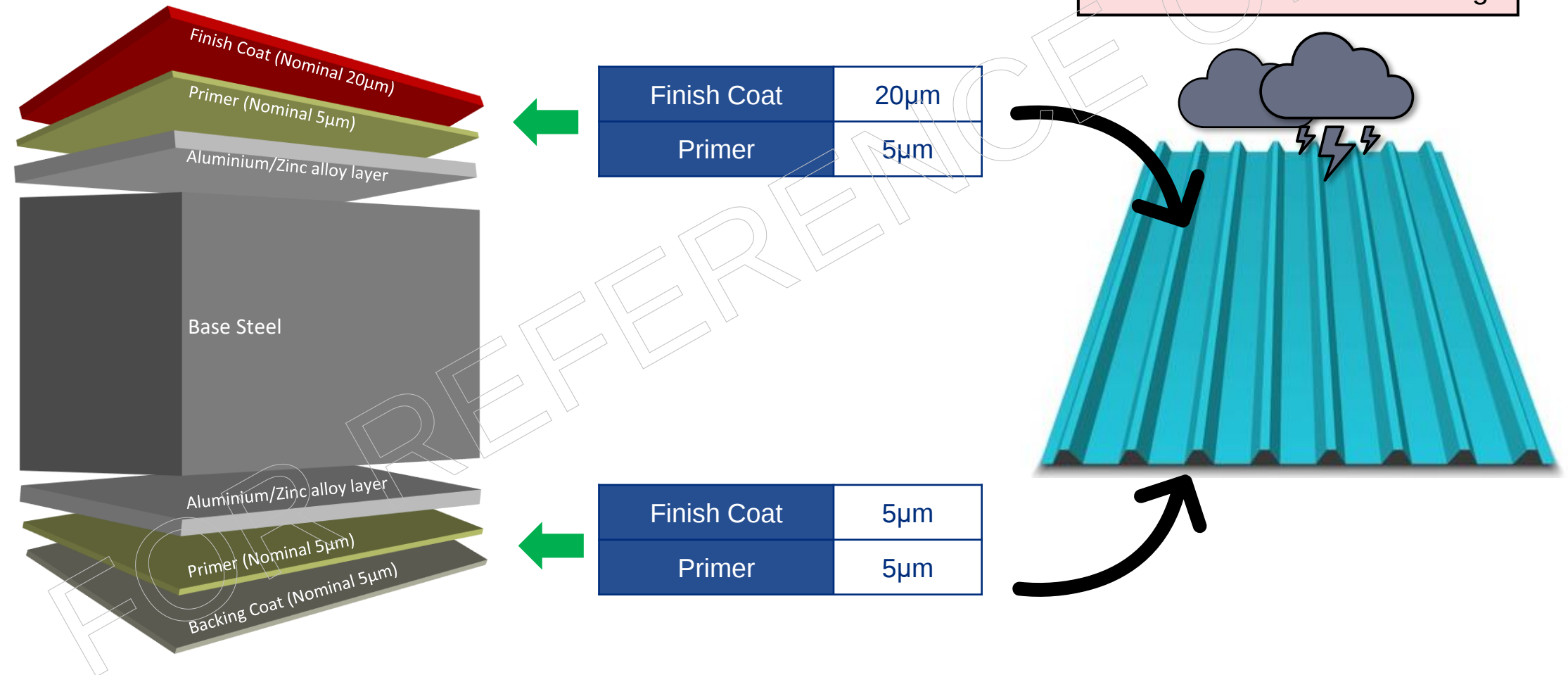
Pre-Painted Finish Requirement

Zinc Coating (Z)	Aluminium-Zinc Coating (AZ)
MS2383 & AS/NZS 2728	

Minimally conforming to ISO9223 C3 Environment

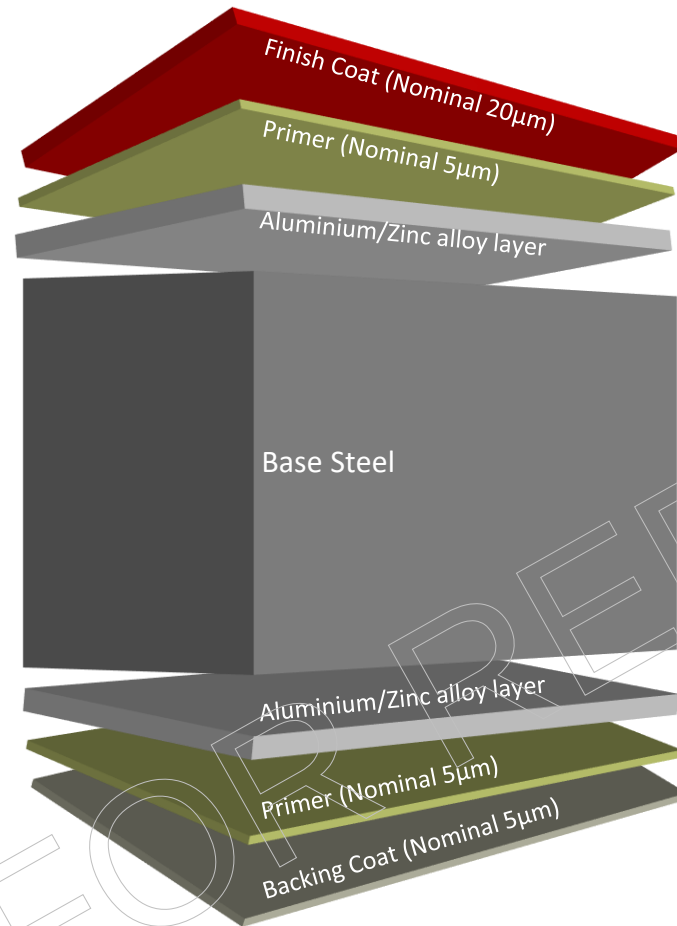
JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 6: Pre-Painted Steel Roofing Sheet, Material Clause 6.1.1.3



JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 6: Pre-Painted Steel Roofing Sheet, Material Clause 6.1.1.4 & 5



Metallic Coating on top surface

300MPa OR 550MPa ONLY

No matter is Z or AZ Coating

Metallic Coating at bottom surface



Minimum
AZ150 / Coating Mass = 150g/m²
**note: conforming to C3 environment which is >1km from sea side.*

Zinc Coating???

JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 6: Pre-Painted Steel Roofing Sheet, Material Clause 6.1.1.6

Warranty Requirement	
Warranty	Zinc Coating (Z) Aluminium-Zinc Coating (AZ)
Perforation by Corrosion	25 years
Paint Flake and Peel	15 years
Colour Fading	10 years
Dirt Staining	5 years

JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 6: Pre-Painted Steel Roofing Sheet, Clips & Fasteners Clause 6.1.4.1 & 3

Sealing washer made in EPDM or Neoprene Chlorinated rubber to insulate the contact of dissimilar metal.

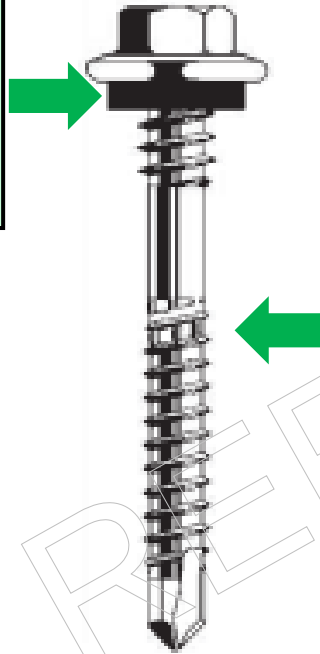


TABLE 1

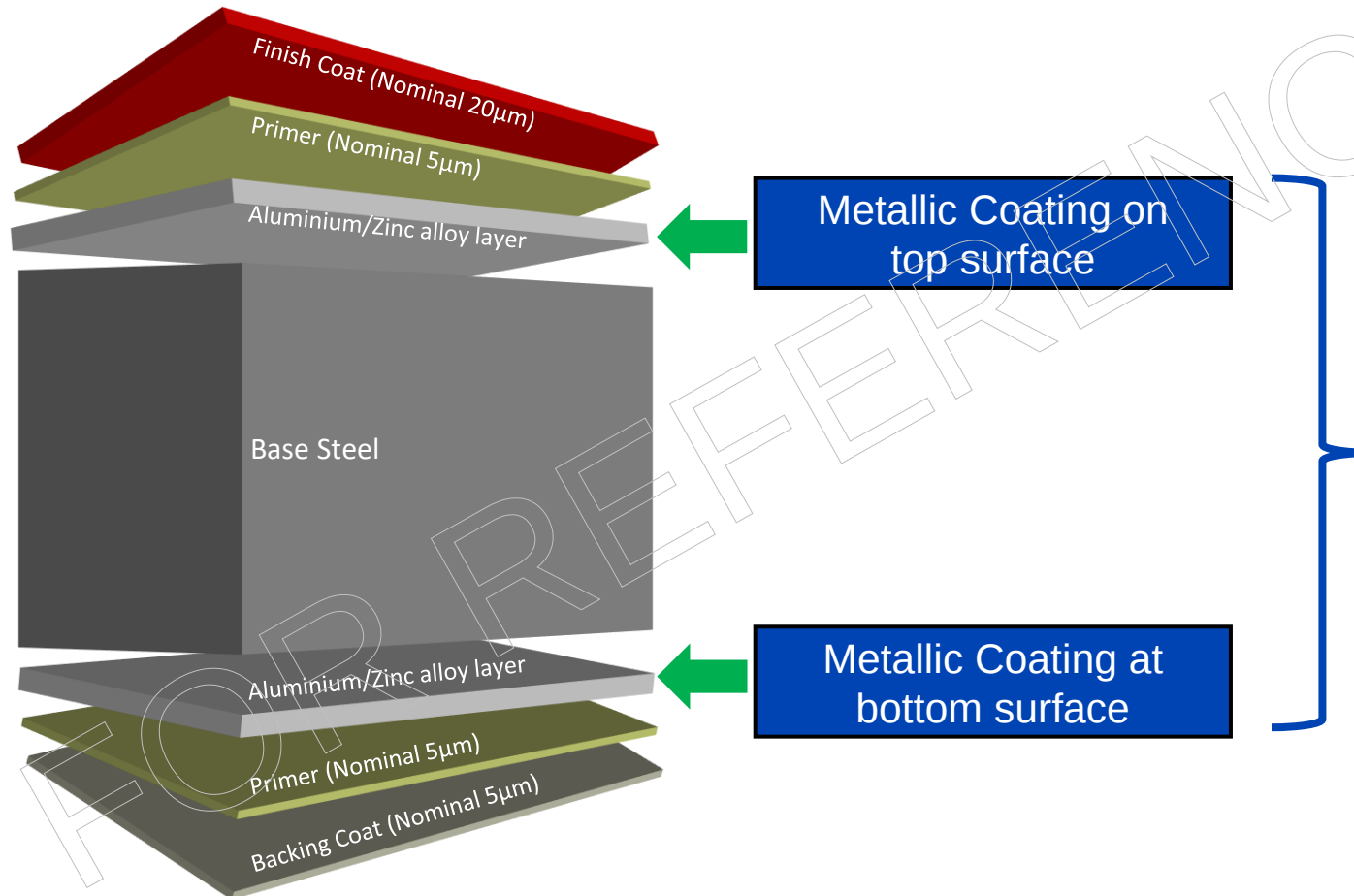
CLASSIFICATION AND DESIGNATION OF CORROSION RESISTANCE

Corrosion resistance class	Atmosphere of intended use
1	General use in internal application.
2	General use in other than external applications but where significant levels of condensation occurs.
3	External use in mild, moderate industrial or marine environments. Corrosivity categories C2 and C3 classified in accordance with ISO 9223.
4	External use in severe marine environment. Corrosivity category C4 classified in accordance with ISO 9223.

NOTE: The specification for self-drilling screws suitable for use in specific corrosive atmospheres are subject to agreement between manufacturer and consumer. *Extracted from AS3566.2, Clause 4*

JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 7: Roofing Sheet for Marine Environment (Coastal Areas), Clause 7.2



(Z)	(AZ)
Minimum Z350	Minimum AZ200

**note: conforming to C4 & C5 environment which is <1km from sea side.*

JKR MASTER SPECIFICATION 2020

Refer to Section G: Roofing; Part 7: Roofing Sheet for Marine Environment (Coastal Areas), Clause 7.5 & 7.6

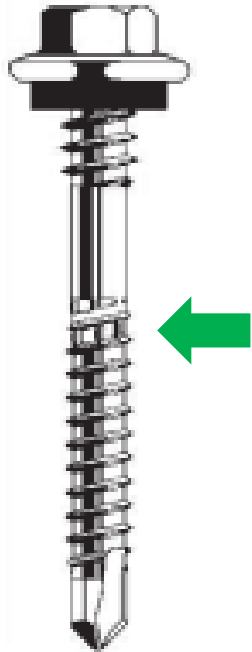


TABLE 1
CLASSIFICATION AND DESIGNATION OF CORROSION RESISTANCE

Corrosion resistance class	Atmosphere of intended use
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NOTE: The specification for self-drilling screws suitable for use in specific corrosive atmospheres are subject to agreement between manufacturer and consumer. *Extracted from AS3566.2, Clause 4*



(Z)	(AZ)
Minimum Z350	Minimum AZ200

**note: conforming to C4 & C5 environment which is <1km from sea side.*

Warranty vs Material Performance

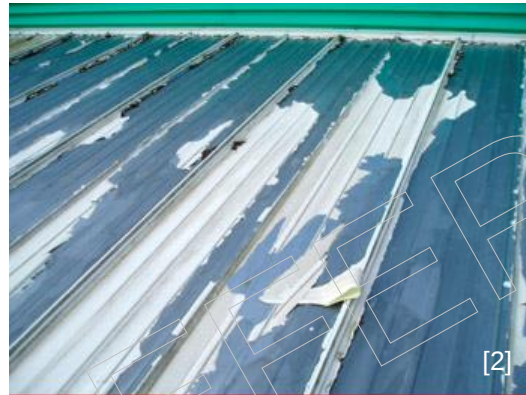
6

COMMON WARRANTY GIVING BY PREPAINTED COATED STEEL ROOF MANUFACTURER / SUPPLIER

Shall not Perforated by Corrosion



Shall not Peel or Flake Excessively



Shall not Colour Fade Excessively



Shall not Discolour by Dirt Stain



Source [1]: <https://stock.adobe.com/hi/images/rusty-and-holed-sheet-metal-background-metallic-corrugated-sheet-roof-texture-deep-broken-profiled-sheet-panel-corrugated-metal-roof-exterior-close-up/570996444>

Source [2]: http://www.idcoatingservices.com/our_services_planned_maintenance_scheduling.asp

Source [3]: <https://longhomeproducts.com/blog/do-metal-roofs-affect-wi-fi/>

Source [4]: https://gamebestmk.best/product_details/46204677.html

YEARS OF WARRANTY



What the basis to
determine the
warranty period?



I can give you
many years of
warranty

GUIDELINE FROM MS EN 1990:2010 (NATIONAL ANNEX)



The following information is extracted from MS EN 1990:2010 (National Annex), page 2

Table NA1. Indicative design working life

Design working life category	Indicative design working life (years)	Examples
1	10	Temporary structures ^a
2	10 to 30	Replaceable structural parts, e.g. gantry girders, bearings
3	15 to 25	Agricultural and similar structures
4	50	Building structures and other common structures, not listed elsewhere in this table
5	120	Monumental building structures, highway and railway bridges, and other civil engineering structures
^a Structures or parts of structures that can be dismantled with a view of being re-used should not be considered as temporary.		

Prepainted Coated Steel Roof is considered as replaceable structural part

Shall not Perforated by Corrosion



[1]

FACTORS THAT MAKE MATERIAL PERFORMANCE TALLY WITH WARRANTY

Design



Workmanship



Inspection



Design



CHOOSE THE RIGHT METALLIC COATING CLASS ACCORDING TO THE ENVIRONMENT

Metallic Coating Class

AZ150

**Suitable for Benign Environment
or Mild Urban / Rural**

**at least 1km away from marine or corrosive
industrial point*

AZ200

**Suitable for Severe Marine /
Industrial Environment**

**Extreme severe marine environment
subject to case-to-case study basis*

TABLE 3.4

COATING MASS REQUIREMENTS:
TYPE 'AZ' COATINGS

Coating class designation	Minimum coating mass, g/m ²		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
AZ150	150	135	60
AZ200	200	180	80

Extracted from AS1397:2011, Page 16



Note: warranty might be downgraded or voided if unsuitable metallic coating class is used in corrosive environment

Source [1]: <https://www.yourdictionary.com/articles/rural-urban-suburban-difference>

Source[2]: <https://www.irgcayman.com/properties-for-sale-in-the-cayman-islands/george-town/>

Source[3]: https://integratedglobal.com/case_studies/corrosion-mitigation-through-hvts-cladding-in-singapore/

CHOOSE THE RIGHT FASTENER

The following information is extracted from AS3566:2:2002, Page 6

TABLE 1

CLASSIFICATION AND DESIGNATION OF CORROSION RESISTANCE

Corrosion resistance class	Atmosphere of intended use
1	General use in internal application.
2	General use in other than external applications but where significant levels of condensation occurs.
3	External use in mild, moderate industrial or marine environments. Corrosivity categories C2 and C3 classified in accordance with ISO 9223.
4	External use in severe marine environment. Corrosivity category C4 classified in accordance with ISO 9223.

NOTE: The specification for self-drilling screws suitable for use in specific corrosive atmospheres are subject to agreement between manufacturer and consumer.

At least **Class 3 screw in benign environment**, but **Class 4 must be used in corrosive environment**

Note: warranty might be voided if unsuitable corrosion resistance class of screws used for corrosive environment



CHOOSE THE COMPATIBLE MATERIAL

The following information is extracted from AS1562:1:2018, Page 28

TABLE C3
ACCEPTABILITY OF DIRECT CONTACT BETWEEN METALS OR ALLOYS

Cladding material	Accessory or fastener material													
	Aluminium and aluminium alloys		Copper and copper alloys		Stainless steel (300 series)		Zinc-coated steel and zinc		Aluminium/zinc and aluminium/zinc magnesium alloy-coated steel		Lead		Zinc-tin (20–30 %) mechanically plated steel	
Atmospheric classification														
	SI and VS	Mild	SI and VS	Mild	SI and VS	Mild	SI and VS	Mild	SI and VS	Mild	SI and VS	Mild	SI and VS	Mild
Aluminium and aluminium alloys	Yes	Yes	No	No	No*	Yes	Yes†	Yes†	Yes	Yes	No	No	Yes	Yes
Copper and copper alloys	No	No	Yes	Yes	No	Yes	No	No	No	No	No	Yes	No	No
Stainless steel (300 series)	No	No	No	No	Yes	Yes	No	No	No	No	No	Yes	No	No
Zinc-coated steel and zinc	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Aluminium/zinc and aluminium/zinc magnesium alloy-coated steel	Yes	Yes	No	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes

SI, VS, Mild = severe industrial, very severe and mild classifications (refer to Table C2 for comparable climatic zone classifications)

Extracted from AS1562:1:2018, Table C3

Note: warranty might be voided if incompatible material is touch with prepainted coated steel



Workmanship

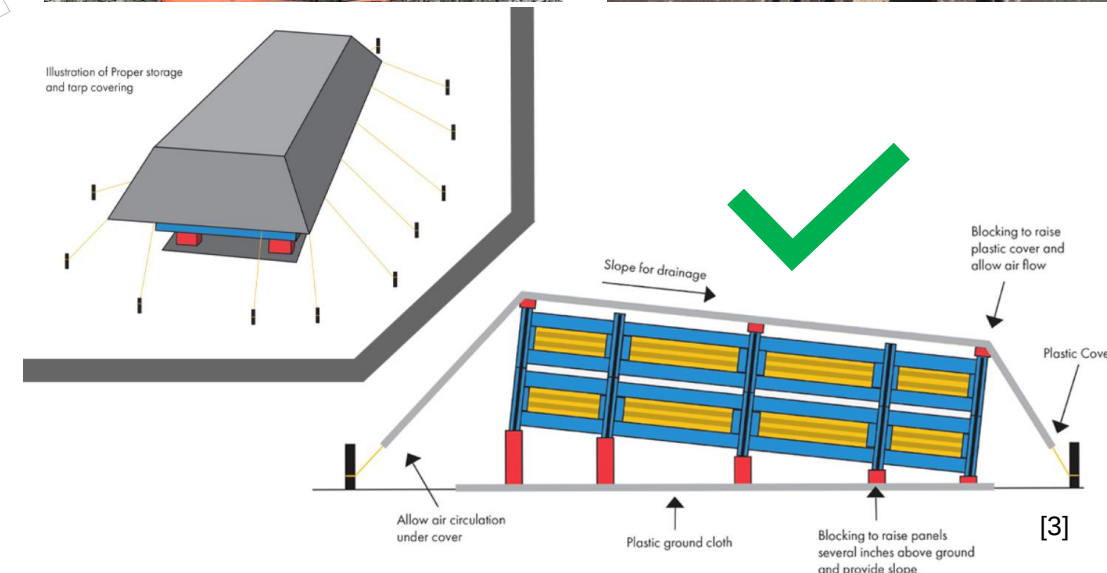
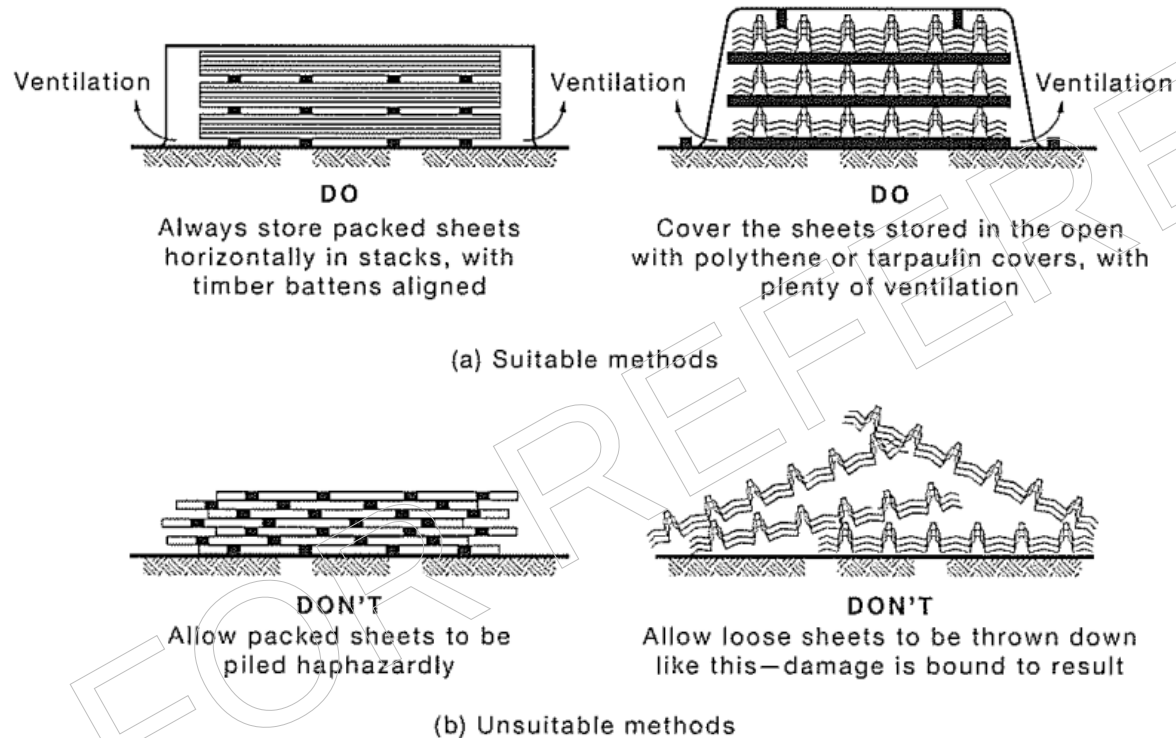


SITE STORAGE

The following information is extracted from SA HB39:2015; Page 28

3.1 SITE STORAGE

Sheets that have become wet during transport should be unpacked immediately and each sheet dried thoroughly on both sides before stacking. Sheets should be stored clear of the ground under cover or, for outside storage, fully wrapped with tarpaulins or plastic sheeting with the sheet and wraps clear of the ground (see Figure 3.1).



Source [1]: <https://cedarrapids.craigslist.org/mat/d/walford-metal-roof-sqft/7752571822.html>

Source[2]: <https://roofingmagazine.com/the-top-5-issues-in-metal-roof-installation/>

Source[3]: <https://sheffieldmetals.com/learning-center/how-to-handle-store-panels/>

Note: perforation by corrosion caused by improper storage on site will not be covered under warranty

TRIMMING ON SITE

The following information is extracted from SA HB39:2015; Page 29 & 30

3.5 CUTTING SHEETS ON SITE

Sheets should be placed face down on padded protection to reduce potential damage to the surface. Abrasive discs are to be avoided as they create copious amounts of swarf and burred edges, both of which can cause unsightly rust stains. Steel cutting blades in a minimum 4000 rpm saw, power shears, nibblers and slot-shears produce relatively clean sharp edges with a minimum of swarf (see Figure 3.5).

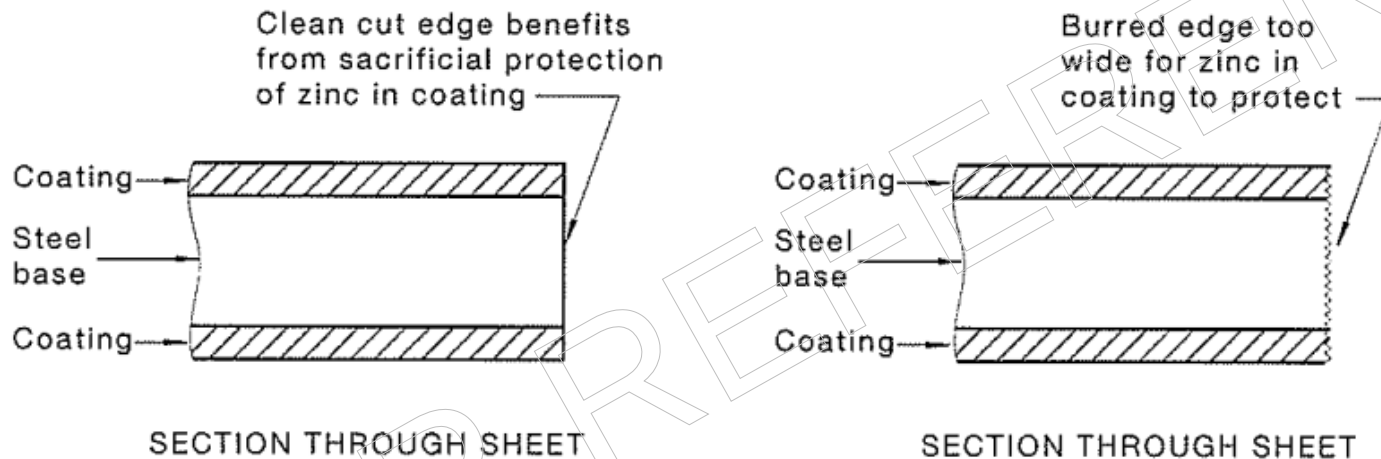
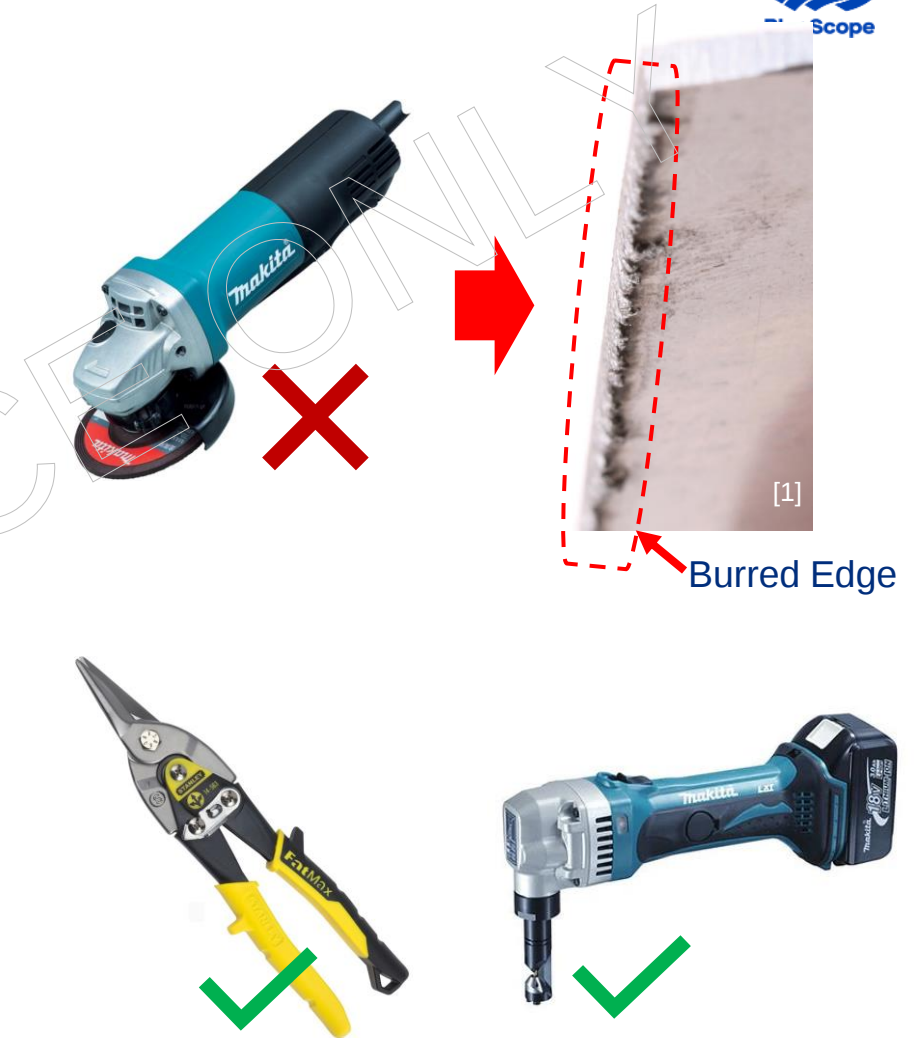


FIGURE 3.5 CUTTING STEEL SHEETS



Note: perforation by corrosion caused by improper tools used on site to trim the prepainted coated steel sheets will not be covered under warranty

HOUSEKEEPING ON SITE

The following information is extracted from SA HB39:2015; Page 30

3.6 CLEANING UP

Normal installation practices such as drilling and cutting usually leave offcuts and metallic swarf on or around the roof area. These materials and all other debris, including blind rivet shanks, nails and screws are to be cleaned from the roof area and gutter regularly during the installation process as unsightly staining of the surface due to oxidation of the metal particles will result, leading to corrosion and possible failure of the roofing material or guttering. Where practicable, the entire installation should be cleaned down with a blower vac, swept or, alternatively, if a water supply is available, hosed down at the completion of the work.

Swarf must be cleaned immediately or by the end of each working day.

Note: swarf stain will not be covered under warranty



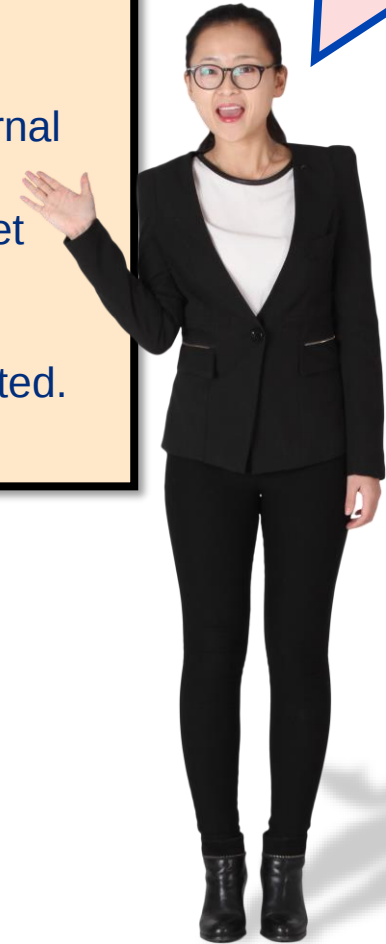
Inspection



OTHER CASES THAT DEEM TO BE COVERED UNDER WARRANTY

- a) Defects due to faulty design, method of manufacture or installation of the product.
- b) Mechanical, chemical or other damage sustained during transport, handling, storage, erection or subsequent to erection.
- c) Attack from chemical agents, fumes, liquids or solids.
- d) Unwashed areas sheltered from normal rainfall and not regularly cleaned.
- e) Extended contact with soil, dust, ashes, fertilizers, or moisture retaining substances.
- f) Failure to remove debris and/or failure to provide free drainage of water including internal condensation all surfaces of the product.
- g) Deterioration of the panels caused by contact with wet, green or treated timber and wet cement.
- h) Corrosion arising within the lapped areas of end-lapped sheets.
- i) Severe marine, industrial or corrosive environments unless specifically agreed and noted.
- j) Storm and tempest or other Acts of God.

All these are not covered under warranty



INSPECTION IS IMPORTANT TO ENSURE THE MATERIAL PERFORMANCE IS ACHIEVED

Pre-installation



Inspection on goods received

- Ensure the products are free from any damage during transport.



Inspection on goods storage

- Ensure the products are free from any damage in storage.



Inspection before / during installation

- Ensure the products are free from any damage before / during installation.



Inspection after installation

- Ensure the products are free from any potential damage after installation.

Post-installation



Regular Inspection

- Ensure the roof free from the risk of deterioration during maintenance



Regular Inspection

- Ensure the roof is always free from the risk of deterioration by cleaning work

COLORBOND® STEEL : EXAMPLE OF BILL OF QUANTITY (BQ) WRITING FOR ROOF COVERING

Item	Description	Qty.	Unit
A	ROOF COVERING Supply and install BlueScope's COLORBOND® steel <Profile Name> roofing sheets.		
1	Supply and install 0.42mm BMT (0.50mm APT) <Profile Name> roofing sheet in COLORBOND® steel (AZ150 G550) with a Material Warranty of up to 30 years against perforation due to corrosion; 15 years paint flaking; 12 years against excessive colour fading and 5 years dirt staining (T&C apply). The coated steel shall be certified according to MS 2383 – C4 (2000 hours Cyclic Corrosion Test) with a CIDB PPS (Act 520) ; and SIRIM Eco-Label Criteria 032 certified to promote the usage of green-rated building material. The exterior finish shall have a total nominal dry film thickness (DFT) of 25µm on the top side or weather side. The backing coat shall be Shadow Grey with a total nominal 10µm DFT. Fasteners used shall comply with minimum AS 3566 Class 3 (>400m marine) and be certified as such by the supplier of fasteners and to the approval of the S.O.		m ²
B	FLASHING AND CAPPING Supply and install 0.48mm BMT (0.56mm APT) BlueScope's COLORBOND® (AZ150) steel flashing and capping.		
1	Gable capping with four bends as detailed in <Dwg. No.> 600mm girth (to check with drawings)		m ²
2	Wall capping / flashing with four bends and top ends embedded into brickwork with approved neutral cured sealant and bottom ends bent over profiled roofing sheet 900mm girth (to check with drawings)		m ²

Make the right choice,
make you worry free



Q&A

FOR REFERENCE ONLY

Tell us more!

Thank you for your attendance.

Kindly scan the QR code & fill up the survey form to let us know your feedback.



Thank you

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