

Australian/New Zealand Standard™

**Prefinished/prepainted sheet metal
products for interior/exterior building
applications—Performance
requirements**



AS/NZS 2728:2013

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Australian Paint Manufacturers Federation
Australian Steel Institute
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Australian/New Zealand Standard™

Prefinished/prepainted sheet metal products for interior/exterior building applications—Performance requirements

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PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee MT-009, Metal Finishing, to supersede AS/NZS 2728:2007, *Prefinished/prepainted sheet metal products for interior/exterior building applications—Performance requirements*.

The objective of this Standard is to specify the requirements for prefinished sheet and strip intended for fabrication into products for use in the building industry.

No international (ISO) Standards are available on this subject.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard**Prefinished/prepainted sheet metal products for interior/exterior building applications—Performance requirements**

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies performance requirements for prepainted and organic film/metal laminate products in sheet and strip form that are coated on one or both sides, and that are intended for fabrication into products for use in the construction or finishing of buildings.

The Standard classifies prefinished/prepainted metal products into six types according to their performance, in respect to durability and aesthetics, in environments of varying severity.

NOTES:

- 1 Advice and recommendations on information to be supplied by the purchaser at the time of enquiry or order are contained in the purchasing guidelines set out in Appendix A.
- 2 To demonstrate a means of compliance to this Standard refer to Appendix B.
- 3 The performance of a coating will be dependent on the corrosion resistance of the substrate in the particular environment and on climatic influences that directly affect the coating. Such influences include solar radiation and the presence of water vapour (see Appendix C).
- 4 A guide for the safe application for paint products on metallic substrates is shown in Appendix M.
- 5 Appendix N sets out an interim procedure for the testing durability and corrosion resistance in naturally unwashed areas.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

1199	Sampling procedures for inspection by attributes
1199.0	Part 0: Introduction to the ISO 2859 attribute sampling system
1199.1	Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection
1397	Continuous hot-dipped metallic coated steel sheet and strip—Coatings of zinc and zinc alloyed with aluminium and magnesium
1580	Paints and related materials—Methods of test
1580.408.4	Method 408.4: Adhesion (cross-cut)
1580.481.3	Method 481.3: Coatings—Exposed to weathering—Degree of corrosion of coated metal substrates
1734	Aluminium and aluminium alloys—Flat sheet, coiled sheet and plate
2313	Methods of test for single sided and double sided pressure-sensitive adhesive tape
2313.1.1	Method 1.1: Adhesion—Peel adhesion
2331	Methods of test for metallic and related coatings

AS		
2331.1.7	Method 1.7:	Local thickness test—Measurement of dry film thickness of thin coating systems particularly by coated products by destructive means using a boring device
2331.3.1	Method 3.1:	Corrosion and related property tests—Neutral salt spray (NSS) test
2331.3.2	Method 3.2:	Corrosion and related property tests—Acetic acid salt spray (ASS) test
2331.3.13	Method 3.13:	Corrosion and related property tests—Wet (salt fog)/dry/humidity
2331.4.7	Method 4.7:	Physical tests—Resistance to scratching
2848	Aluminium and aluminium alloys	
2848.1	Part 1: Compositions and designations—Wrought products	
4312	Atmospheric corrosivity zones in Australia	
SA HB		
18.28	Conformity assessment—Guidance on a third-party certification system for products	
SANZ HB		
18.28	Guidelines for third-party certification and accreditation—Guide 28: General rules for a model third-party certification system for products	
AS/NZS		
1580	Paints and related materials—Methods of test	
1580.108.1	Method 108.1:	Determination of dry film thickness on metallic substrates—Non-destructive methods
1580.457.1	Method 457.1:	Resistance to natural weathering
1580.481.1.5	Method 481.1.5:	Coatings—Exposed to weathering—Change in gloss
1580.481.1.7	Method 481.1.7:	Coatings—Exposed to weathering—Degree of checking
1580.481.1.8	Method 481.1.8:	Coatings—Exposed to weathering—Degree of cracking
1580.481.1.9	Method 481.1.9:	Coatings—Exposed to weathering—Degree of blistering
1580.481.1.10	Method 481.1.10:	Coatings—Exposed to weathering—Degree of flaking and peeling
1580.481.1.11	Method 481.1.11:	Coatings—Exposed to weathering—Degree of chalking
1580.601.1	Method 601.1:	Colour—Visual comparison
1580.601.3	Method 601.3:	Colour—Methods of colour measurement
1580.601.4	Method 601.4:	Colour—Calculation of colour differences
1580.602.2	Method 602.2:	Measurement of specular gloss of non-metallic paint films at 20°, 60° and 85°
2310	Glossary of paint and painting terms	
2312	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings	
AS/NZS ISO		
8124	Safety of toys	
8124.3	Part 3: Migration of certain elements (ISO 8124-3:2010, MOD)	
9001	Quality management systems—Requirements	
9004	Managing for the sustained success of an organization—A quality management approach	
ISO		
6272	Paints and varnishes—Rapid-deformation (impact resistance) tests	
6272-2	Part 2: Falling-weight test, small-area indenter	

ISO	
9223	Corrosion of metals and alloys—Corrosivity of atmospheres—Classification, determination and estimation
ASTM	
D2794	Standard test method for resistance of organic coatings to the effect of rapid deformation (Impact)
D4585	Standard practice for testing water resistance of coatings using controlled condensation
G154	Standard practice for operating fluorescent ultraviolet (UV) lamp apparatus for exposure of non-metallic materials
EN	
13523	Coil coated metals—Test methods
13523-3	Part 3: Colour differences—Instrumental comparison

1.3 DEFINITIONS

For the purpose of this Standard, the definitions in AS/NZS 2310 and those below apply.

1.3.1 Metal product

Electrolytic or hot dipped metallic coated steel (types Z, ZM, AZ, AM complying with AS 1397), stainless steel, aluminium or aluminium alloy in the form of sheet, coil or strip.

1.3.2 Organic coating

The paint film of the prepainted metal product or the organic film of the organic film/metal laminate.

1.3.3 Organic film/ metal laminate product

A base metal product that is securely laminated on one or both sides with an organic film before fabrication into products for use in the construction and/or the finishing of buildings.

1.3.4 Prefinished metal product

A prepainted metal product or an organic film/metal laminate product.

NOTE: The prefinishing includes any pretreatment of the metal, the application of any primer or adhesive, and the application of any finishing coats.

1.3.5 Prepainted metal product

A base metal product that is painted before fabrication into products for use in the construction and/or the finishing of buildings.

1.4 SAFETY

All paints (topcoats, primers, backing coats, washcoats) used in the manufacture of products covered by this Standard shall comply with the requirements for the Standard for the Uniform Scheduling of Drugs and Poisons, (SUSDP Appendix I, Uniform Paint Standard) published by the Commonwealth of Australia under the *Therapeutic Goods Act 1989*.

NOTE: For guidance on the safe application of painted products see Appendix M.

1.5 PRODUCT TYPES

This Standard subdivides prepainted and prefinished metal products into product types (and gives corresponding classifications from AS/NZS 2312 and ISO 9223), in accordance with the severity of environment, as specified in Table 1.1.

TABLE 1.1
PRODUCT TYPE

Product type	Equivalent category		Description (AS/NZS 2312)	Corrosion rate/Mild steel ($\mu\text{m}/\text{y}$) (AS/NZS 2312)
	AS/NZS 2312:2002	ISO 9223		
1	A	C1	Very low	<1.3
2	B	C2	Low	1.3–25
3	C	C3	Medium	25–50
4	D & F	C4 (T)	High or Tropical	50–80
5	E-I	C-5I	Very high—Industrial	80–200
6	E-M	C-5M	Very high—Geothermal, marine	80–200

NOTE: A severe industrial environment occurs as a result of the release of corrosive substances such as chemicals and solvents into the surrounding atmosphere. The choice of a Type 5 product will be influenced by the particular chemicals or solvents causing the contamination, and requires consideration on an individual basis.

In the selection of an appropriate product type there are no restrictions on the use of a higher performance product for a lower performance category.

NOTE: General information on atmospheric environments and factors that require consideration when selecting an appropriate product type are given in Appendix C.

1.6 PRODUCT FINISHES

The selection of organic coating system on either side of the prepainted product shall meet the manufacturer's product specification for product flexibility, corrosion resistance of top and reverse sides, durability and aesthetic appearance of the top (exposed) side. The bottom side (typically referred to as double sided) may be coated the same as the top side, subject to agreement between the producer and purchaser, at the time of ordering.

NOTES:

- The reverse side coating (backing coat or wash coat) should be chosen as appropriate. It is normally required to withstand handling and storage. In some circumstances, it can also be required to provide corrosion protection and/or aesthetic appearance or to be compatible with foam or adhesive bonding. Specific properties of the reverse side coating should be expressly stated by the purchaser at the time of ordering.
- The application of organic coatings on a continuous coil coating line, when producing products to the requirements of this Standard involves three major steps:
 - Application of conversion coating*
A conversion coating is a chemical treatment, applied to the metal prior to the application of primer, reacts with and modifies the metal surface to enable chemical bonding to promote adhesion and corrosion resistance.
 - Application of primer*
The purpose of the primer is to serve as the bond between the substrate and the topcoat and to offer added corrosion protection for the entire system. A primer shall be compatible with both the conversion coating and the topcoat to ensure optimum properties of the coating system
 - Application of topcoat*
The topcoat provides colour and durability and also acts as protection against atmospheric corrosion. Different topcoats may be selected based on the performance or appearance requirements. The topcoat is applied to the top (exposed) side of the sheet and the backing coat (wash coat) is applied to the bottom (unexposed) side of the sheet.

1.7 SURFACE PROTECTION

Prepainted products may be supplied with the additional temporary protection of a removable film.

NOTES:

- 1 The choice of surface protection should take into consideration the coating system indicated by the product finish and is subject to agreement between the purchaser and the supplier.
- 2 Easy removal of temporary protection films is possible only for a limited period, and the user should ensure proper stock rotation.
- 3 Temporary protective films should be exposed to outdoor weathering only for a limited period.

SECTION 2 PERFORMANCE REQUIREMENTS FOR PREFINISHED METAL PRODUCTS

2.1 SCOPE OF SECTION

This Section specifies requirements for the following tests, which are applicable to all prefinished metal products:

- (a) Appearance.
- (b) Specular gloss.
- (c) Dry film thickness.
- (d) Reverse impact resistance.
- (e) Adhesion.
- (f) Scratch resistance.

In addition, requirements are specified for the following tests, which form part of the producer's product surveillance:

- (i) Durability of the organic film.
- (ii) Humidity resistance.
- (iii) Corrosion resistance.

NOTE: Prepainted metal products may also be subject to other tests specified in the relevant product specification.

Test panels, unless otherwise specified in this Section, shall be selected and prepared for testing as specified in Appendix D.

2.2 APPEARANCE

2.2.1 General

There shall be no irregularities likely to affect the performance of the finished item.

The coating shall cover all significant surface as specified by the purchaser, be of uniform appearance, colour and texture, and be free of visible defects.

For all viewing situations a minimum of 1 m, unless otherwise agreed, shall apply provided that another distance be allowed commensurate with the use of the product and its in situ viewing distances.

NOTE: It is strongly recommended that the manufacturer or supplier and customer agree appropriate standards of acceptance for the presence, size or frequency of any coating defects (such as deficiencies in colour, uniformity or texture, or the presence of defects). Appropriate standards may take the form of acceptable type samples or methods of test.

2.2.2 Colour

The colour batch to the specified standard shall match the colour specified. When tested in accordance with AS/NZS 1580.601.1, the visual colour match shall achieve a rating of 2 or better.

2.3 SPECULAR GLOSS (PRODUCT SPECIFICATION)

When determining specular gloss in accordance with AS/NZS 1580.602.2, using a 60° exposure head, the measurable specular gloss shall not vary by more than the tolerance specified in Table 2.1.

TABLE 2.1
GLOSS CATEGORY

Gloss category	Nominal value range	Tolerance units
Type 1	0–15	±3
Type 2	16–80	±10
Type 3	80+	Nominal value –10

2.4 DRY FILM THICKNESS

When measured in accordance with AS/NZS 1580.108.1 or any of the methods specified in AS 2331.1.7, the as-supplied dry film thickness of organic coatings, except embossed coatings, shall comply with the requirements of the relevant product specification.

NOTE: The dry film thickness of embossed organic coatings is normally determined by gravimetric methods agreed to by contracting parties.

In all cases, the triple spot organic coating thickness, i.e. the average of three tests, shall be not less than 80% of the nominal coating thickness specified in the relevant product specification. The single spot thickness, i.e. the lowest value of the three determinations, shall be not less than 90% of the triple spot thickness.

NOTE: For guidance on triple spot thickness refer to AS 1397—2011, Clause 3.2.2(a).

In order to determine the total dry film thickness required for an organic coating or laminate for optimum corrosion protection, the following details should be considered together:

- (a) The type of substrate, e.g. galvanized steel, aluminium/zinc, zinc/aluminium/magnesium or aluminium/zinc/magnesium alloy-coated steel, (taking into consideration the required coating mass), aluminium or stainless steel.

NOTE: Coating mass requirements for classes of hot-dipped steel with coatings of zinc and zinc alloyed with aluminium and magnesium (types Z, ZM, AZ and AM) sheet and strip are given in AS 1397.

- (b) The type and thickness of the primer.
- (c) The type and thickness of the topcoat.

2.5 REVERSE IMPACT RESISTANCE OF PREPAINTED PRODUCTS

When a prepainted metal product test piece is subjected to the reverse impact test in accordance with Appendix E, using the impact energy levels specified in Table 2.2, there shall be no loss of adhesion of the paint coating. For steel, this test applies to base steel thicknesses of between 0.3 mm and 1.2 mm.

If rupture of the steel occurs before the specified energy level is reached, the adhesion of the coating shall be assessed as for gauges 0.3 mm to less than 0.4 mm at 1 J below the point of rupture.

NOTE: Cracking of the paint film, or powdering of the paint on type 1 products, as a result of this test, is not a cause for rejection.

TABLE 2.2
IMPACT ENERGY LEVELS REQUIRED
FOR REVERSE IMPACT TEST

Product type	Substrate metal	
	Steel J	Aluminium J/mm of thickness
1	7	5
2	10	5
3	10	5
4	10	5
5	10	5
6	10	5

2.6 ADHESION

2.6.1 T-bend test for prepainted sheet and strip

All T-bend testing of prefinished steel shall comply to 6T unless an agreement has been reached between the purchaser and the supplier.

When tested in accordance with Appendix F, the adhesion of the paint shall be sufficient to prevent its removal from the metal when the tape is pulled.

NOTE: Refer to Table F1 for maximum T-bend ratings for aluminium and aluminium alloys.

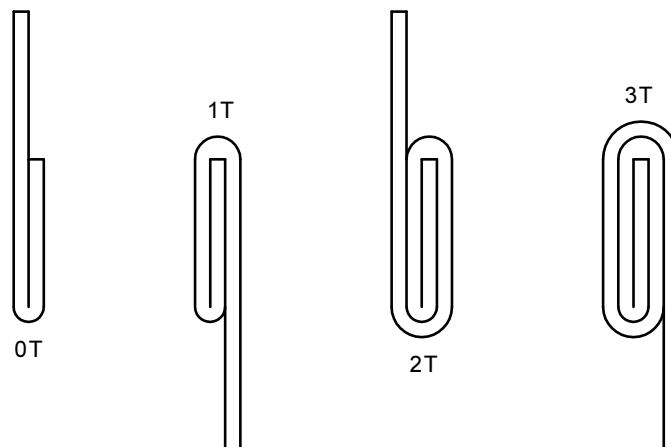


FIGURE 1 ILLUSTRATES MANNER OF BENDING TEST PIECE TO ACHIEVE VARIOUS
INTERNAL BEND DIAMETERS (EXPRESSED IN TERMS OF THICKNESS, 0T)

2.6.2 Ball test for organic film/metal laminate sheet and strip

When tested in accordance with Appendix G, adhesion of the organic film shall not be worse than rating D for products for internal applications, or rating B for products for external applications. These requirements apply to both as-manufactured and aged panels.

2.7 SCRATCH RESISTANCE

Subject to agreement between the purchaser and the supplier the scratch resistance test weight on the coating shall not be less than 1.5 kg when applied in accordance with AS 2331.4.7.

2.8 DURABILITY OF THE ORGANIC FILM

The durability of the organic coating system shall show no loss of integrity and shall comply with the ratings in Table 2.4 for sunshine test sites 2 to 6, and with the ratings for blistering in Table 2.3 for corrosion test sites 2 to 6.

NOTE: Test sites are shown in Paragraph H2 of Appendix H.

In addition, test panels that have been subjected to corrosion test sites shall comply with rating 0 for cracking (see AS/NZS 1580.481.1.8) and rating 0 for flaking and peeling (see AS/NZS 1580.481.1.10).

No requirements for the durability of the organic film at the bends of shaped test panels (see Appendix D) are specified in this Standard; the test results are for the manufacturer's information only.

NOTES:

- 1 Information on New Zealand and Australian durability test sites is given in Tables J1, J2 and Appendix J.
- 2 Advice on the weathering performance of fabricated prepainted and organic film/metal laminate product is given in Appendix K.

TABLE 2.3

FOUR YEAR DURABILITY REQUIREMENTS (FOR BLISTERING ON FLAT SURFACE) FOR ORGANIC COATING SYSTEMS EXPOSED AT CORROSION TEST SITES WHERE PANELS ARE WASHED BY RAIN

Product type	Maximum permissible rating for blistering (AS/NZS 1580.481.1.9)	
	Category 4*	Category 5*
3	D2-S4	D3-S4
4	D2-S2	D3-S2
5	D2-S2	D3-S2
6	D2-S2	D3-S2

* First year corrosivity rating in accordance with ISO 9223.

TABLE 2.4
FOUR YEAR DURABILITY REQUIREMENTS FOR ORGANIC COATING
SYSTEMS EXPOSED AT SUNSHINE TEST SITES*

Type of determination	Test method	Rating range		Maximum permissible rating		
		Min.	Max.	Light ‡	Pastel ‡	Dark ‡
Change in gloss	AS/NZS 1580.481.1.5	0	5	4	4	5
Checking†	AS/NZS 1580.481.1.7	0	5	0	0	0
Chalking	AS/NZS 1580.481.1.11	0	5	2	1	0
Colour change (dE)	AS/NZS 1580.601.4	0	N/A	2	4	5
Cracking	AS/NZS 1580.481.1.8	0	5	0	0	0
Flaking and peeling	AS/NZS 1580.481.1.10	0	5	0-0	0-0	0-0
Blistering	AS/NZS 1580.481.1.9	0	5	D0-S0	D0-S0	D0-S0

* Sites to have sunshine daily average > 8 hours and solar radiation >19.8 MJ/m².

† Micro-checking (checking only visible at a magnification greater than 10×) is not a cause for rejection of organic film/metal laminate products.

‡ Light: = HunterLab L value > 70

Pastel = 40 < HunterLab L value < 70

Dark = HunterLab L value < 40

NOTES:

- 1 Flaking and peeling AS/NZS 1580.481.1.10
This has two ratings 1) Quantity of flaking or peeling.
 2) Average size of areas subject to flaking or peeling.
- 2 Blistering AS/NZS 1580.481.1.9
This has two ratings 1) Rating for density of blistering.
 2) Rating for size of blisters.

2.9 HUMIDITY RESISTANCE

When suitably prepared test specimens (scribed or unscribed, as appropriate) are tested for 500 h in accordance with ASTM D4585 and assessed in accordance with AS 1580, Methods 408.4 and 481.3, and AS/NZS 1580.481.1.9, the prefinished product shall comply with the requirements of Table 2.5.

TABLE 2.5
REQUIREMENTS FOR HUMIDITY RESISTANCE

Type of deterioration	Test method	Requirement
Undercut at scribed lines	AS 1580.481.3	2.0 mm max. with no corrosion of the base metal
Loss of adhesion	AS 1580.408.4	Rating 0
Blistering	AS/NZS 1580.481.1.9	Not worse than rating D3-S2 (see Note)
Corrosion of the base metal	AS 1580.481.3	Rating 0

NOTE: Maximum permissible means no more than density 3 (D3) and no larger than size 2 (S2) e.g. D4-S2 fails and D3-S3 fails.

2.10 CORROSION RESISTANCE (APPLICABLE TO PRODUCT TYPES 3, 4, 5 AND 6)

2.10.1 Salt spray test

When suitably prepared test specimens (scribed or unscribed, as appropriate) are exposed to the corrosion test specified in Paragraph I1, Appendix I, and assessed in accordance with AS 1580 Methods 408.4, 481.1.9 and 481.3, the prefinished product shall comply with the requirements of Table 2.6.

No requirements for the durability of the organic film at the bends of shaped test panels (see Appendix D) are specified in this Standard; the test results are for the manufacturer's information only.

TABLE 2.6
REQUIREMENT FOR SALT SPRAY RESISTANCE

Type of deterioration	Test method	Requirement
Undercut at scribed lines	AS 1580.481.3	2.0 mm max. with no corrosion of base metal, and when the base metal is steel, no red rust formation
Loss of adhesion	AS 1580.408.4	Rating 0
Blistering	AS/NZS 1580.481.1.9	Not worse than rating D2-S3*
Corrosion of the base metal	AS 1580.481.3	Rating 0

* Face of panel.

2.10.2 Cyclic corrosion test (applicable to product types 3, 4, 5 and 6)

When suitably prepared test specimens (scribed or unscribed, as appropriate) are exposed to cyclic corrosion test specified in Paragraph I1, Appendix I, and assessed in accordance with AS 1580, Methods 408, 481.1.9 and 481.3, the organic coating shall comply with the requirements of Table 2.7.

No requirements for the durability of the organic film at the bends of shaped test panels (see Appendix D) are specified in this Standard; the test results are for the manufacturer's information only.

TABLE 2.7
REQUIREMENTS FOR CYCLIC CORROSION TEST

Type of deterioration	Test method	Requirement
Undercutting at scribed lines	AS 1580.481.3	1.0 mm max. with no corrosion of base metal
Loss of adhesion	AS 1580.408.4	Rating 0
Blistering	AS/NZS 1580.481.1.9	Not worse than rating D2-S2*
Corrosion of the base metal	AS 1580.481.3	Rating 0

* Face of panel.