AS 1397—2011
(Incorporating Amendment No. 1)

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Australian Standard®

Continuous hot-dip metallic coated steel sheet and strip—Coatings of zinc and zinc alloyed with aluminium and magnesium

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- Australian Building Codes Board
- Australasian Corrosion Association
- Australian Foundry Institute
- Australian Institute of Architects
- Australian Steel Association
- Australian Steel Institute
- Bureau of Steel Manufacturers of Australia
- Materials Australia
- New Zealand Heavy Engineering Research Association
- Society of Automotive Engineers—Australasia
- The University of Sydney

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Continuous hot-dip metallic coated steel sheet and strip—Coatings of zinc and zinc alloyed with aluminium and magnesium

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PREFACE

This Standard was prepared by the Australian members of Joint Standards Australia/Standards New Zealand Committee MT-001, Iron and Steel, to supersede AS 1397—2001, *Steel sheet and strip—Hot-dipped zinc-coated or aluminium/zinc-coated*.

This Standard incorporates Amendment No. 1 (October 2012). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

After consultation with stakeholders in both countries, Standards Australia and Standards New Zealand decided to develop this Standard as an Australian Standard rather than an Australian/New Zealand Standard.

This Standard upgrades the requirements of AS 1397—2001 and introduces three new coating types:

(a) Zinc and aluminium (Type ZA).

(b) Zinc, aluminium and magnesium (Type ZM).

(c) Aluminium, zinc and magnesium (Type AM).

Committee MT-001 has sought to align with the following international and national Standards, where applicable:

ISO 9364:2006, *Continuous hot-dip aluminium/zinc-coated steel sheet of commercial, drawing and structural qualities*

ISO 4998:2011, *Continuous hot-dip zinc-coated carbon steel sheet of structural quality*

ISO 3575:2011, *Continuous hot-dip zinc-coated carbon steel sheet of commercial and drawing qualities*

ASTM A1046/A1046M-10a, *Specification for steel sheet, zinc-aluminium-magnesium alloy-coated by the hot-dip process*

ASTM A902-09, *Terminology relating to metallic coated steel products*

ASTM A875/875M-09a, *Specification for steel sheet, zinc-5% aluminium alloy-coated by the hot-dip process*

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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1.1 SCOPE

This Standard specifies requirements for continuously hot-dip metallic coated sheet steel and strip supplied in thicknesses up to and including 5.0 mm.

Requirements for product conformity to this Standard are given in Appendix B.

Requirements covered in this Standard are as follows:

(a) Formability grades of steel.

(b) Structural grades of steel.

(c) Classes of zinc coating, including differential coatings.

(d) Classes of zinc coating converted to zinc/iron alloy.

(e) Classes of zinc/aluminium coatings.

(f) Classes of zinc/aluminium/magnesium alloy coating.

(g) Classes of aluminium/zinc alloy coating.

(h) Classes of aluminium/zinc/magnesium alloy coating.

(i) Surface finish.

NOTES:

1 Advice and recommendations on information to be supplied by the purchaser at the time of enquiry or order are contained in Appendix A.

2 The specified requirements apply to the full length and full width of the product supplied, unless otherwise indicated.

3 Within the description of the classes of coatings, the majority element present is listed first, followed by the next major element and followed by a third element if appropriate.

1.2 NORMATIVE DOCUMENTS

The following are the normative documents referenced in this Standard:

NOTE: Documents referenced for informative purposes are listed in the Bibliography.

AS	
1391	Metallic materials—Tensile testing of ambient temperature
2331	Methods of test for metallic and related coatings
2331.2.1	Method 2.1: Tests for average coating mass per unit area or for thickness Dissolution methods—Strip and weigh and analytical
2331.2.3	Method 2.3: Tests for average coating mass per unit area or for thickness-Hydrogen evolution method for zinc coatings
2505	Metallic materials
2505.1	Part 1: Sheet, strip and plate—Bend tests

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AS/NZS
1050 Methods for the analysis of iron and steel (all parts)

1365 Tolerances for flat-rolled steel products

ASTM
A754 Test method for coating weight (mass) of metallic coatings on steel by X-ray fluorescence

ISO
7966 Acceptance control charts

1.3 DEFINITIONS

For the purpose of this Standard, the definitions below apply.

1.3.1 Batch

An identifiable amount of 50 t or less of one product type, i.e. of a particular thickness of steel grade, coating type and coating mass, processed sequentially under similar conditions.

1.3.2 Coating mass

The total mass of coating on both surfaces of the steel base, measured in grams per square metre of sheet or strip. In the case of differential coatings, the different surfaces are stated separately.

NOTE: The coating thickness is not subject to specification as it depends upon the coating alloy density, which varies with composition. The approximate coating thickness for various coating classes is given in Table C2 in Appendix C.

1.3.2.1 *One surface single spot coating mass*

The minimum coating mass on any one surface of any one of the three specimens used for the triple spot test.

1.3.2.2 *Single sided coating mass—applicable for differential coatings, see Table 3.6*

The mass of coating on any one surface of the steel base, measured in grams per square metre of sheet or strip, based on the average of three specimens selected from a sample representing the original cross section of the sheet or strip.

1.3.2.3 *Single spot coating mass*

The coating mass for one of the three specimens used for the triple spot coating mass test.

1.3.2.4 *Triple spot coating mass*

The average coating mass of three specimens selected from a sample representing the original cross-section of the sheet or strip.

1.3.3 Coating type

The compositions of many of the metallic coatings described in this Standard are based around a nominal element, e.g. zinc, or a nominal combination of elements, e.g. 55% aluminium with balance zinc. In certain coatings there are additions of elements considered minor in their percentage, or influence in terms of the coating performance, e.g. the addition of 0.20% aluminium to control alloying in zinc type coatings.

The reference to ‘minor additions of control elements’ in this Standard is to cover these instances, i.e. minor additions of control elements are present at less than 1% by mass and do not fundamentally alter the overall properties of the coating type within which they are contained. Percentages referenced in the standard are mass %.

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1.3.3.1 *Zinc coating*

A hot-dip coating of 99% zinc incorporating less than 1% of minor additions of control elements (Type Z) or a coating of zinc converted to a zinc/iron alloy (Type ZF).

1.3.3.2 *Zinc/aluminium coating*

A hot-dip coating of zinc with 3% to 15% aluminium and incorporating less than 1% of minor additions of control elements (Type ZA).

1.3.3.3 *Zinc/aluminium/magnesium coating*

A hot-dip coating of zinc with 5% to 13% aluminium, 2% to 4% magnesium and incorporating less than 1% of minor additions of control elements (Type ZM).

1.3.3.4 *Aluminium/zinc alloy coating*

A hot-dip coating of 50% to 60% aluminium, 1% to 2% silicon, with the remainder zinc, and incorporating less than 1% of minor additions of control elements. (Type AZ).

1.3.3.5 *Aluminium/zinc/magnesium alloy coating*

A hot-dip coating of 47% to 57% aluminium, 1% to 3% magnesium, 1% to 2% silicon with the remainder zinc, and incorporating less than 1% of minor additions of control elements (Type AM).

1.3.4 Differential coating

A coating whereby the manufacturer has deliberatively applied a different coating mass to each side of the steel.

In the case of a differential coating the designation states the coating mass in g/m^2 of sheet for each side separately, see Example 6 in Clause 1.5.3.

For a non-differential coating, the single sided coating mass in a single spot cannot be less than 40% of the stated total coating mass.

1.3.5 Sheet

A flat rolled product of any width and thickness coated by hot-dipping and supplied in cut lengths.

1.3.6 Strip

A flat rolled product of any width and thickness coated by hot-dipping and supplied in coil form.

1.4 SURFACE CONDITIONING AND SURFACE TREATMENT

1.4.1 General

Metallic coated steel products can be conditioned mechanically after coating, and can be supplied with a number of surface treatments. The required surface condition and treatment should be specified upon ordering with the supplier (see Appendix A).

1.4.2 Surface conditioning

1.4.2.1 *Skin passing*

The metallic coated surface can be ‘skin passed’ after the coating process to produce a matte finish, typically for painting.

This process may disguise the natural spangled appearance of the product (see Clause 1.5.3.6.5 below) and is designated by the suffix ‘S’ after the coating mass, e.g. AZ150S.

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NOTE: The purpose of the skin pass is to produce a higher degree of surface smoothness and thereby will change the surface appearance. Skin passing also temporarily minimizes the occurrence of a surface condition known as stretcher strain (Luders lines) or fluting during the fabrication of finished parts. The skin passing also controls and improves flatness. Some increase in hardness and loss of ductility will result from skin passing.

1.4.2.2 *Spangle suppression*

Some manufacturers provide spangle suppression that can minimize or essentially disguise the natural spangled appearance of the product (see Clause 1.5.3.6.4). Suppression techniques can include water spraying to increase the coating cooling rate to make smaller spangles, chemical sprays that initiate many spangles and result in a smaller spangled appearance or the production of a spangle free coating by removing a spangle forming element.

1.4.3 Chemical surface treatment

1.4.3.1 *Organic layer*

A thin organic layer can be applied to the coated steel surface to provide protection against finger printing during handling, and to provide lubrication to the surface to assist in subsequent forming operations. In some cases this organic layer can also contain a chemical to provide passivation protection (see Clause 1.4.3.2).

1.4.3.2 *Passivation*

The application of a chemical solution to the coated steel surface in order to produce a thin, tightly adherent, reactive layer that provides a degree of protection against wet stack storage staining and minimizes early dulling of the surface.

1.4.3.3 *Oiling*

The application of a light mineral oil to the surface of the coated steel in order to provide temporary protection prior to subsequent processing, e.g. painting. The oil is typically removed via chemical cleaning in the subsequent processing operation.

1.5 PRODUCT DESIGNATION

1.5.1 General

The product designation shall comprise, in sequence, the following elements:

(a) The number of this Australian Standard, i.e. AS 1397.

(b) The steel grade (see Clause 1.5.2).

(c) The coating class and surface finish (see Clause 1.5.3).

Example 1:

AS 1397/G550 Z450

Example 2:

AS 1397/G2 Z275

Example 3:

AS 1397/G3N Z200S

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1.5.2 Designation of steel grade

1.5.2.1 *General*

The designation of the steel grade, as given in Tables 2.1, 2.2 and 2.3 of Section 2, shall include a set of characters in accordance with the following:

(a) First character—the letter 'G' to indicate that mechanical properties have been achieved or modified by in-line heat treatment prior to hot-dipping.

(b) Second and subsequent characters—alphanumeric in accordance with Clauses 1.5.2.2 and 1.5.2.3.

1.5.2.2 *For structural grades*

The second, third and fourth characters shall represent the minimum yield strength, in megapascals, namely 250, 300, 350, 450, 500 and 550.

Example 4:

G550

1.5.2.3 *For formability grades*

The second character shall consist of the number 1, 2 or 3 to indicate formability, as follows:

(a) Profiling: 1

(b) Commercial forming: 2

(c) Drawing: 3

A third character, the letter N where applicable, shall be used to indicate non-ageing.

Example 5:

G3N

1.5.3 Designation of coating class and surface finish

1.5.3.1 *Zinc coating class*

The zinc coating class shall be designated by the prefix 'Z' or 'ZF' (see Clause 1.3.3.1), followed by a number representing the minimum coating mass, in grams per square metre of sheet or strip (total both surfaces), determined by the triple spot test (see Clause 3.2). For differential coatings, the designation shall include the minimum coating mass on each surface.

1.5.3.2 *Zinc/aluminium coating class*

The zinc/aluminium coating class shall be designated by the prefix 'ZA' (see Clause 1.3.3.2) followed by a number representing the minimum coating mass, in grams per square metre of sheet or strip (total both surfaces), determined by the triple spot test (see Clause 3.2).

1.5.3.3 *Zinc/aluminium/magnesium coating class*

The zinc/aluminium/magnesium alloy coating class shall be designated by the prefix 'ZM' (see Clause 1.3.3.3), followed by a number representing the minimum coating mass in grams per square metre of sheet or strip (total both surfaces), determined by the triple spot test (see Clause 3.2).

1.5.3.4 *Aluminium/zinc coating class*

The aluminium/zinc alloy coating class shall be designated by the prefix 'AZ' (see Clause 1.3.3.4), followed by a number representing the minimum coating mass, in grams per square metre of sheet or strip (total both surfaces), determined by the triple spot test (see Clause 3.2).

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1.5.3.5 *Aluminium/zinc/magnesium coating class*

The aluminium/zinc/magnesium alloy coating class shall be designated by the prefix 'AM' (see Clause 1.3.3.5), followed by a number representing the minimum coating mass, in grams per square metre of sheet or strip (total both surfaces), determined by the triple spot test (see Clause 3.2).

Example 6:

Z450—a zinc coating with a total coating mass of 450 g/m^2 over both sides of the sheet, or Z120/60 (a different coating)—a differential zinc coating with a coating mass of 120 g/m^2 over one side of the sheet and 60 g/m^2 over the other side of the sheet.

Example 7:

ZF100—an annealed zinc coating of 100 g/m^2 over both sides of the sheet.

Example 8:

ZM180—a zinc/aluminium/magnesium coating with a total coating mass of 180 g/m^2 over both sides of the sheet.

Example 9:

AZ150—an aluminium/zinc coating with a total coating mass of 150 g/m^2 over both sides of the sheet.

Example 10:

AM125—an aluminium/zinc/magnesium coating with a total coating mass of 125 g/m^2 over both sides of the sheet.

1.5.3.6 *Surface finish*

1.5.3.6.1 *General*

The natural appearance of continuous hot-dip metallic coated steel sheet and strip depends upon a number of factors including the coating composition, the steel surface roughness and the cooling rate to name three.

Designations for use when ordering are set out below.

1.5.3.6.2 *Regular spangle—designated 'R' or not stated*

The finish achieved on hot-dip zinc type (Z) coatings which is seen as visible, multi-faceted zinc crystals referred to as spangles. The spangle size may be different from different coating facilities. In this case the coating cooling is typically not controlled to achieve a particular visual effect.

1.5.3.6.3 *Spangle free—'f'*

The featureless, uniform surface finish produced on continuous hot-dip metallic coated steel sheet and strip where a distinct 'spangle' appearance, and the irregularities associated with the spangles, is not visible without magnification. Type ZA and ZM coatings are typically spangle free in their natural state.

1.5.3.6.4 *Minimized spangle—designated 'M'*

The manufacturer has deliberately changed the solidification and/or cooling of the coating to produce a finish where the zinc crystals are still visible to the eye without magnification, but are typically smaller and less distinct than the pattern visible on regular spangled product.

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1.5.3.6.5 *Skin passed or smooth finish—designated 'S'*

Skin passing of the coated product can produce a smooth, matte finish often desirable for painting (refer to Clause 1.4.2.1, and Appendix D, Paragraph D2.1).

Example 11:

ZM180S for a Type ZM coating at a nominal coating mass of 180 g/m^2 that has been skin passed; or

Z275MS for a Type Z coating at a nominal coating mass of 275 g/m^2 that has been manufactured with minimized spangle and has been skin passed.

1.6 ROUNDING OF TEST RESULT VALUES

1.6.1 General

With the exception of the tensile test and coating mass results, the observed or calculated values shall be rounded to the same number of figures as in the specified values and then compared with the specified values (see also AS 2706).

1.6.2 For tensile test results

The determined value of tensile strength shall be rounded to the nearest 10 MPa and the determined value of yield strength shall be rounded to the nearest 5 MPa.

1.6.3 For coating mass results

The determined value of coating mass shall be rounded to the nearest 5 g/m^2.

1.7 MARKING

1.7.1 Package

Each package for delivery shall be legibly and durably marked or tagged to enable it to be identified with this Standard. The information on the package shall also include the following:

(a) The product designation (as per Clause 1.5).

(b) The product dimensions.

(c) The manufacturer's name or trademark.

(d) For differential coated sheet or strip, identification of the side which has the heavier coating.

(e) A unique identifier to facilitate product traceability.

1.7.2 Product

The sheet or strip shall be legibly and durably marked with the number of this Australian Standard, i.e. AS 1397, the base steel thickness, and the designation of the steel base and coating, unless such markings are clearly detrimental to the end use, in which case the package shall be so marked.

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SECTION 2 THE STEEL BASE

2.1 SCOPE OF SECTION

This section specifies requirements for nine grades of steel sheet and strip: three grades are based on formability and six structural grades are based on yield stress.

2.2 CHEMICAL COMPOSITION

2.2.1 General

The method of sampling for chemical analysis shall be in accordance with AS/NZS 1050.1 Chemical composition shall be determined by any procedures which are at least as accurate as those given in the AS/NZS 1050 series of Standards.

2.2.2 Cast analysis

Wherever possible, a chemical analysis of the steel from each ladle shall be made to determine the proportions of the specified elements. In cases where it is impracticable to obtain samples from the liquid steel, analysis on test samples taken in accordance with the requirements of AS/NZS 1050.1 may be reported as the cast analysis.

The reported cast analysis of the steel shall conform to the limits given in Table 2.1 for the appropriate grade.

2.2.3 Unspecified chemical elements

For steels complying with this Standard, elements not specified in Table 2.1 shall not be present in quantities detrimental to the intended use of the steel.

2.2.4 Product analysis

Any subsequent analytical checks carried out on the product shall take into consideration the heterogeneity characteristic of the type of steel.

TABLE 2.1

REQUIREMENTS FOR CHEMICAL COMPOSITION

Steel grade designation AS 1397	Chemical composition (cast analysis), % max.			
	Carbon	Manganese	Phosphorus	Sulfur
G450, G500, G550	0.20	1.20	0.040	0.030
G300, G350 (see Note)	0.30	1.60	0.100	0.035
G250, G1	0.12	0.50	0.040	0.035
G2	0.10	0.45	0.030	0.030
G3	0.08	0.40	0.020	0.025

NOTE: For grade G300, nitrogenized steel may be used for sections greater than 1.00 mm thick.

2.3 TENSILE TEST

2.3.1 General

When tested in accordance with AS 1391, the tensile properties shall meet the requirements of Tables 2.2 and 2.3.

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2.3.2 Orientation of test piece

2.3.2.1 *For formability grades*

For Grades G1, G2 and G3, the tensile test piece shall be cut transverse to the direction of rolling.

2.3.2.2 *For structural grades*

For Grades G250, G300, G350, G450, G500 and G550, the tensile test piece shall be cut parallel to the direction of rolling.

NOTES:

1 It is international practice to tensile test zinc-coated sheet and strip with the coating intact, and to calculate the strength using the cross-sectional area of the steel base metal only, since the contribution made by the zinc coating is so small that, for practical purposes, it can be ignored. The strength value obtained is close to the strength of the base material itself.

A similar testing practice with aluminium/zinc-coated products will give higher yield and tensile strength values than those of the base material itself, because the coating makes an appreciable contribution to these values (see Note 2). Nevertheless, this practice will continue because the coating also reduces the ductility of the material, i.e. the specimens will be tested with the coating intact.

2 Design calculations, therefore, should be made on base steel thickness; the effect of the coating will then be accounted for in the quoted strength values which will represent the typical behaviour of the product in practice.

2.4 BEND TEST

2.4.1 General

The test piece with the coating intact shall be bend tested at room temperature in accordance with AS 2505.1. For structural grades, the test piece shall be bent around a mandrel with an external diameter specified in Table 2.2 and for formability grades, the test piece shall be bent flat to the requirements of Table 2.3. After the test, the coating shall be stripped from the bend, using a process that does not induce cracking, and the surface examined. No cracks shall be visible on the outside of the bend. Small cracks at the edges and cracks which require magnification to be visible shall be disregarded.

2.4.2 Orientation of test pieces

The test pieces for both formability and structural grades shall be cut transverse to the direction of rolling and bent with the bend axis parallel to the direction of rolling.

2.5 DIMENSIONAL TOLERANCES

2.5.1 General

The dimensional tolerances of the base steel, including width, thickness, flatness and camber, shall be in accordance with the requirements of AS/NZS 1365:1996 Section 5: Cold-rolled sheet and strip.

2.5.2 Specified thickness

The thickness of the steel base of the sheet or strip shall be specified, as this thickness is required for design purposes. It shall be measured not closer than 50 mm from the sheared edge.

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TABLE 2.2

MECHANICAL PROPERTY REQUIREMENTS FOR STRUCTURAL GRADES

Steel grade designation	Longitudinal tensile test				Transverse bend test	
	Min. yield strength (Note 1)	Min. tensile strength	Min. elongation,% (Note 2)		Angle of bend	Diameter of mandrel in terms of test piece thickness (t)
	MPa	MPa	L_o = 50 mm	L_o = 80 mm	degrees	
G250	250	320	25	22	180	0
G300	300	340	20	18	180	t
G350	350	420	15	14	180	$2t$
G450 (Note 3)	450	480	10	9	90	$4t$
G500 (Note 4)	500	520	8	7	90	$6t$
G550 (Note 5)	550	550	2	2	—	—

NOTES:

1 The yield strength is the lower yield stress. If well-defined yielding is not obvious, the 0.2% proof stress should be determined.

2 Applies to test pieces equal to or greater than 0.6 mm in thickness. For material up to 0.6 mm in thickness, the minimum elongation values in the table are not covered by this Standard.

L_o = original gauge length.

3 Applies to recovery annealed, i.e. not recrystallized after annealing, material equal to or greater than 1.50 mm thick.

4 Applies to recovery annealed, i.e. not recrystallized after annealing, material between 1.00 mm and 1.50 mm thick.

5 Applies to recovery annealed, i.e. not recrystallized after annealing, material up to and including 1.00 mm thick; the values of yield strength, 0.2% proof stress and tensile strength are, for practical purposes, the same.

TABLE 2.3

MECHANICAL PROPERTY REQUIREMENTS FOR FORMABILITY GRADES

Steel grade designation	Transverse tensile test (see Note 1)		Transverse bend test	Thickness range for lockseam (see Note 2)
	Min. elongation, %		Degree of bend	mm
	on 50 mm	on 80 mm		
G1	—	—	180°	—
G2 (Note 3)	30	27	180°	≤ 1.60
G3 (Note 3)	35	32	180°	All

NOTES:

1 Applies to test pieces equal to or greater than 0.60 mm thick. Refer to supplier for typical yield and tensile strengths for design purposes.

2 The ability of grades to lockseam is dependent on recognized profiling practices and machine settings to avoid excessive stretching of the product.

3 For information on fabricating characteristics see Paragraph D2 of Appendix D.

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SECTION 3 THE COATING

3.1 SCOPE OF SECTION

This Section specifies requirements for the following coating classes:

(a) Zinc coating (Z).

(b) Zinc coating converted to zinc/iron alloy (ZF).

(c) Zinc/aluminium (ZA).

(d) Zinc/aluminium/magnesium (ZM).

(e) Aluminium/zinc (AZ)

(f) Aluminium/zinc/magnesium (AM) coatings.

3.2 DETERMINATION OF COATING MASS

3.2.1 General

When test specimens meeting the requirements of Clause 3.2.2 are tested in accordance with one of the methods specified in AS 2331, Methods 2.1 or 2.3, or in accordance with Clause 3.2.3, or when continuous monitoring is used in accordance with Clause 3.2.4, the coating mass shall conform to the requirements of Table 3.1 to Table 3.5 for the appropriate coating class or Table 3.6 for the appropriate differential sided coating class.

3.2.2 Test specimens for spot tests

Spot tests shall be performed on test specimens, each having an approximate area of 2000 mm^2 to 5000 mm^2, selected as follows:

(a) *For triple spot tests* The triple spot test is performed on three specimens selected from a sample (commonly 300 mm × full width), representing the original cross-section of the strip. One specimen is cut from the mid-width position and the others from a position near each edge of the strip but not closer than 25 mm to the edge.

(b) *For single spot tests* The single spot test is performed on one of the three specimens selected for the triple spot test.

(c) *For one surface single spot test* The one surface single spot test is performed on one of the three specimens selected for the triple spot test.

3.2.3 Offline testing

X-ray fluorescence methods in accordance with ASTM A754 may be used as laboratory offline instruments in place of AS 2331, Methods 2.1 or 2.3.

3.2.4 Continuous monitoring

Strip traversing using the double-sided fluorescence method in accordance with ASTM A754 may be employed.

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3.3 DETERMINATION OF COATING ADHESION

3.3.1 General

When tested in accordance with AS 2505.1, both surfaces of test specimens shall be capable of being bent 180° around a mandrel with a diameter specified in Table 3.7, without flaking of the coating. Failure of the coating within 5 mm of the edge of the test specimen shall be disregarded.

NOTES:

1 Although the direction of testing is not significant, a longitudinal test piece (the axis of bend at right angles to the rolling direction) should be selected to reduce the incidence of base failure on the less formable grades before the specified adhesion limit has been reached.

2 Because of the brittle nature of the zinc/iron alloy, some powdering of the coating may occur on Class ZF coatings, particularly on the compression bends.

3 For differential coatings, testing for coating adhesion on each side is subject to agreement between purchaser and supplier.

3.3.2 Selection of test specimen

The test specimen may be selected from any part of the sample. The minimum test specimen width shall be 50 mm.

TABLE 3.1

COATING MASS REQUIREMENTS:
TYPES 'Z' and 'ZF' COATINGS

Coating class designation	Minimum coating mass, g/m^2		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
Z100	100	90	40
Z200	200	180	80
Z275	275	250	110
Z350	350	315	140
Z450	450	405	180
Z600	600	540	240
ZF80	80	70	30
ZF100	100	90	40

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TABLE 3.2

COATING MASS REQUIREMENTS: TYPE 'ZA' COATINGS

Coating class designation	Minimum coating mass, g/m^2		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
ZA90	90	80	35
ZA135	135	120	55
ZA180	180	160	70
ZA225	225	200	90
ZA275	275	250	110
ZA350	350	315	140
ZA450	450	405	180

TABLE 3.3

COATING MASS REQUIREMENTS: TYPE 'ZM' COATINGS

Coating class designation	Minimum coating mass, g/m^2		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
ZM60	60	54	24
ZM90	90	80	35
ZM120	120	110	50
ZM150	150	135	60
ZM180	180	160	70
ZM220	220	200	90
ZM275	275	250	110
ZM350	350	315	140
ZM450	450	405	180

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

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TABLE 3.5

COATING MASS REQUIREMENTS: TYPE 'AM' COATINGS

Coating class designation	Minimum coating mass, g/m^2		
	Total both surfaces		One surface
	Triple spot	Single spot	Single spot
AM100	100	90	40
AM125	125	115	50
AM150	150	135	60
AM175	175	160	70
AM200	200	180	80

TABLE 3.6

COATING MASS REQUIREMENTS: DIFFERENTIAL COATINGS

Coating class designation	Minimum coating mass, g/m^2	
	One surface	
	Triple spot	Single spot
Z60/30	60/30	50/25
Z120/60	120/60	95/50
Z x/y	x/y	0.8x/0.8y

NOTE: The letters x and y represent single-side coating mass values.

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TABLE 3.7

COATING ADHESION (180° BEND TEST) REQUIREMENTS

Steel grade designation	Diameter of mandrel in terms of thickness of product (*t*)							
	Coating class							
	'Z', 'ZA' and 'ZM'						'AZ' and 'AM'	
	Z100, ZA90	Z200, ZA135, ZA180, ZM90, ZM120, ZM150, ZM180	Z275, ZA225, ZA275, ZM220, ZM275	Z350, ZA350, ZM350	Z450, ZA450, ZM450	Z600	AZ150, AM100, AM125 AM150	AZ200, AM175, AM200
G250	0	0	0	0	*t*	2*t*	0	*t*
G300	0	0	*t*	*t*	*t*	2*t*	*t*	*t*
G350	0	0	*t*	*t*	*t*	2*t*	*t*	*t*
G450	0	*t*	2*t*	2*t*	2*t*	3*t*	2*t*	2*t*
G500	*t*	2*t*	2*t*	2*t*	2*t*	3*t*	2*t*	2*t*
G550	*t*	2*t*	2*t*	2*t*	2*t*	3*t*	2*t*	2*t*
G1	0	0	0	0	*t*	2*t*	0	0
G2	0	0	0	0	*t*	2*t*	0	0
G3	0	0	0	0	*t*	2*t*	0	0

NOTES:

1 0 indicates that the coated steel is bent flat on itself.

2 For AM and AZ type coatings produced on continuous, metallic coating lines, the combination of coating pot temperature and after pot cooling results in a higher amount of carbon going into the solid-state solution which is then retained in the rapid cooling. For this reason the grades G1, G2 and G3 are not generally supplied for these coating types. A grade G2N produced from vacuum degassed and stabilized steel is available.

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APPENDIX A

PURCHASING GUIDELINES

(Informative)

A1 GENERAL

Australian Standards are intended to include the technical requirements for relevant products but do not purport to comprise all the necessary provisions of a contract. This Appendix contains advice and recommendations on the information to be supplied by the purchaser at the time of enquiry or order.

A2 INFORMATION TO BE SUPPLIED BY THE PURCHASER

The purchaser should supply the following information at the time of enquiry and order:

(a) The number of this Australian Standard, i.e. AS 1397.

(b) Type of product required (coils (strip) or cut lengths (sheet)).

(c) Designation of steel grade (see Clause 1.5, Table 2.1 and Appendix D).

(d) Designation of coating class (see Clause 1.5 and Tables 3.1 to 3.6).

(e) Surface finish, including any chemical treatment required (see Clause 1.5).

(f) Quantity (mass, or number of sheets) and delivery instructions (dates, schedules, delivery points).

(g) Dimensions, including thickness, width and length, and reference to AS/NZS 1365 for appropriate tolerances.

(h) Defects allowable.

NOTES:

1 Defects such as laminations, segregation or surface flaws cannot be completely quantified. Where the presence, size or frequency of any defects is considered to be of concern, arrangements should be made between the purchaser and the manufacturer. These arrangements may be achieved by the provision of acceptance type samples. Where defects are present and the product is submitted for acceptance, the manufacturer should be able to demonstrate fitness for purpose.

2 It is to be expected that the degree or amount of allowable defects in coils (strip) would be more than in cut lengths (sheet) because of the impracticability of inspection and the impossibility of rejecting portions of a coil without generating small coils.

(i) The testing requirements, the frequency of testing (see Appendix B), and whether a test certificate is required.

NOTES:

1 The certificate issued by the supplier of the steel may be submitted as evidence of compliance in respect of cast analysis.

2 If the purchaser is likely to require referee testing, or testing by an independent authority to verify compliance with this Standard, requirements should be negotiated prior to order.

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(j) Whether it is the intention of the purchaser to inspect the coated steel at the manufacturer's works.

NOTE: Inspection at the manufacturer's works is usually not requested, since the purchaser may reject the coated steel sheet or strip if faults are revealed in subsequent processing.

If it is the purchaser's intention to undertake any of the following functions at the manufacturer's works, this should be notified at the time of enquiry and order, and should be accomplished in a manner which will not interfere with the operation of the works:

(a) Inspection of the coated steel.

(b) Selecting and identifying the test samples.

(c) Witnessing tests.

The manufacturer should afford the purchaser all reasonable facilities to ensure that the coated steel is in accordance with the requirements of this Standard.

(k) Any special or supplementary requirements.

NOTE: When strip is required, checks should be made to ensure that the purchaser's equipment can handle the coils ordered. If any limitations exist in respect of coil mass, or the inside or outside diameters of coils, this should be stated at the time of enquiry and order.

When cut lengths are required, any limitations in respect of packaging, e.g. number or mass of sheets per pack or packaging materials, should be stated at the time of enquiry and order.

(l) Any information concerning processing or end use that the purchaser considers would assist the manufacturer. Note that soldering of material having an aluminium/zinc coating is not practicable.

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APPENDIX B

PRODUCT CONFORMITY

(Normative)

B1 SCOPE

This Appendix sets out the minimum sampling and testing plan for product conformity to this Standard which shall be demonstrated by the manufacturer or supplier. The product conformity requirements shall enable conformity assessment to be made by a manufacturer or supplier (first party), a user or purchaser (second party), or an independent body (third party), and shall not be dependent on a quality management systems standard (e.g. AS/NZS ISO 9001).

NOTES: These provisions are based on:

1 ISO/IEC Directives, Part 2, *Rules for the structure and drafting of International Standard*s, 5th Edition, 2004.

2 ISO/IEC Directives, *Supplement—Procedures specific to IEC*, 4th Edition, 2009.

3 IEC, Conformity Assessment Board (CAB/822/INF, 2009-05-27), Agenda item 7.2, ISO/IEC Directives, text concerning conformity assessment: current status.

B2 SAMPLING AND TESTING

B2.1 General

Sampling and testing shall be carried out by the manufacturer in accordance with Paragraph B2.2 or B2.3 as appropriate. For every batch, the steel and coating properties set out in this Standard shall be obtained in accordance with Paragraph B2.2 as appropriate.

The manufacturer or supplier shall ensure that product which does not meet the requirements of the Standard is identified, deemed nonconforming and controlled to prevent unintended use or delivery. The results from the nonconforming tests shall be excluded from the long-term conformance calculations.

Should a failure on retesting occur, then the quarantined batch shall be rejected or satisfy the provisions of Paragraph B2.3.2.

B2.2 Minimum batch sampling and testing

The term 'batch' has been defined in Clause 1.3.1.

For the steel base requirements of the Standard as defined in Section 2, batches shall be sampled each 50 t as a minimum, or at each process change whereby a different grade, or dimension will be produced in a continuous process, and tested in accordance with the requirements of Section 2.

For the coating requirements of the Standard as defined in Section 3, batches shall be sampled each 50 t as a minimum, or at each process change whereby a different coating type or coating class will be produced in a continuous process and tested in accordance with the requirements of Section 3.

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B2.3 Statistical sampling

B2.3.1 *General*

Process verification by statistical sampling or alternate methods can be used to demonstrate product conformity where conditions required by this Clause are met. Where it can be demonstrated that the base steel and coating properties, as defined in this Standard, of any group of products manufactured under the same conditions of steel supplier, steel grade and steel processing (e.g. mill) are distributed normally, then it shall be permissible to adopt statistical sampling to verify process acceptance for each product in accordance with ISO 7966.

For product conformance to this Standard via statistical sampling, the inputs of process acceptance verification, ongoing testing and statistical sampling shall be demonstrated and, where applicable, also maintained. Additionally, any sample or sampling that indicates a predicted proportion of nonconforming product in excess of an amount considered within the demonstrated statistical sampling method shall cause sampling for that combination of size, thickness and grade to revert to batch testing rules until it can be demonstrated that the conditions of statistical sampling are valid for that combination. In the event of actual nonconforming test results, the retest provisions of normal batch testing shall also apply.

NOTE: Statistical sampling is a procedure, which enables decisions to be made about the quality of batches of items after inspecting or testing only a portion of those items. This procedure will only be valid if the sampling plan has been determined on a statistical basis and the following requirements are met:

(a) The sample is drawn randomly from a population of product of known history. The history shall enable verification that the product was made from known materials at essentially the same time, by essentially the same processes and under essentially the same system of control.

(b) For each different situation, a suitable sampling plan needs to be defined. A sampling plan for one manufacturer of given capability and product throughput may not be relevant to another manufacturer producing the same items.

In order for statistical sampling to be meaningful to the customer, the manufacturer or supplier needs to demonstrate how the above conditions have been satisfied. Sampling and the establishment of a sampling plan should be carried out in accordance with recognized standards, e.g. AS 2490 and AS 1199.

Under this approach ongoing sampling and testing of product shall be directed primarily at monitoring the process to ensure that product outcomes are acceptable and within characteristic ranges, as well as stable and under control.

B2.3.2 *Retest*

If a test fails to meet the specified results, two or more pieces shall be taken at random from the same lot and retested. Both retests shall conform to the requirements of this Standard (AS 1397), otherwise the lot shall be rejected.

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APPENDIX C

INFORMATION ON COATING THICKNESS DETERMINATION AND ON THE THICKNESS/MASS RELATIONSHIP BETWEEN BASE STEEL AND COATING

(Informative)

C1 GENERAL

This Appendix gives information on the following:

(a) The calculation of total coating thickness.

(b) The thickness of the base steel and the calculated equivalent mass of steel plus coating, per unit area.

(c) The approximate coating thickness which results from the coating mass for the various coating types.

C2 CALCULATION OF TOTAL COATING THICKNESS

With reference to Figure C1 which gives an example of a square sample of coated steel (coating class designation AZ150) of surface area 1 m^2, the total coating thickness is calculated as follows:

Actual coating mass of sample	=	mass on surface A + mass on surface B
	=	170 g/m^2
Approximate total thickness of sample	=	nominal base metal thickness (0.42 mm) plus coating thickness on both surfaces
		(0.025 mm + 0.025 mm)
	=	0.42 + 0.05
	=	0.47 mm

NOTE: The base metal thickness is required for the calculation of structural properties and the coating mass is required to indicate the level of corrosion resistance of the material. The total coated thickness is required to confirm that the metal is compatible with machine clearances, and as an approximate field measurement, to ascertain compliance with the ordered thickness. In the case of differential coatings, the symbols A and B will have different values.

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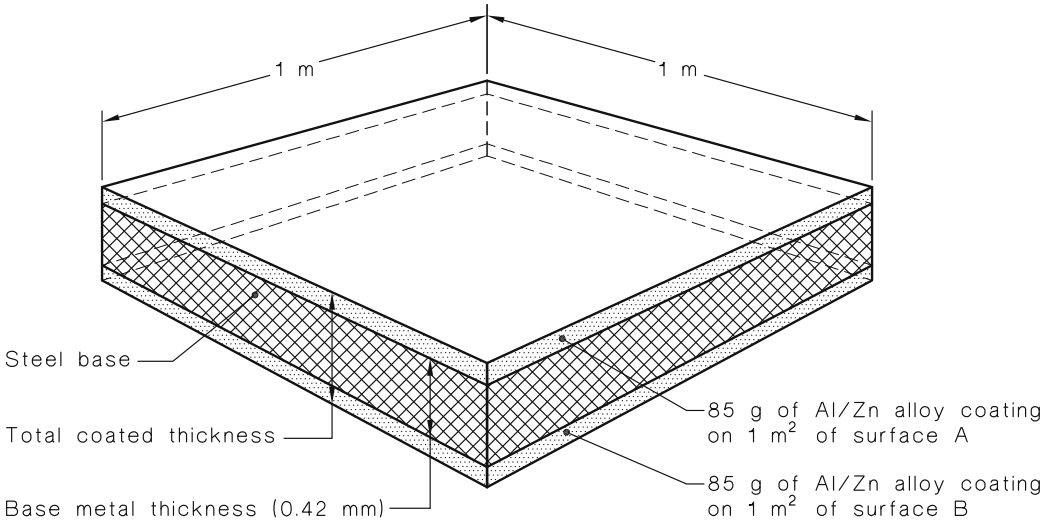

FIGURE C1 COATING MASS ILLUSTRATION (NOMINAL 150 g/m^2 OF SHEET)

C3 THE MASS PER SQUARE METRE OF STEEL PLUS COATING

The mass per square metre of steel can be calculated using the following procedure:

(a) Calculate the mass, m, of 1 square metre of uncoated steel sheet for varying steel base thicknesses from the following equation:

$$m = \frac{\rho \times d}{1000}$$

where

ρ = density of steel, taken as 7850 kg/m^3

d = thickness of steel, in millimetres

Examples:

C1 For 0.30 mm base thickness, $m = \frac{7850 \times 0.30}{1000} = 2.355$ kg.

C2 For 1.20 mm base thickness, $m = \frac{7850 \times 1.20}{1000} = 9.420$ kg.

(b) Add the appropriate coating mass (from Table C2) to the calculated mass (m) of uncoated steel sheet.

Examples:

C3 For 0.30 mm base thickness with a coating type designation Z275, the mass of 1 m^2 of coated sheet = 2.355 + 0.290 = 2.645 kg.

C4 For 1.20 mm base thickness with a coating type designation AZ150, the mass of 1 m^2 of coated sheet = 9.420 + 0.170 = 9.590 kg.

C5 For differential coatings, the actual mass of the coating with manufacturing tolerances can be assumed to be 1.1 (x + y) (see Table 3.6).

C4 APPROXIMATE COATING THICKNESS

Coating thickness is not subject to specification. To assist the designer, the approximate coating thickness (total both sides) for various coating types is given for information in Table C2.

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TABLE C2

COATING MASS (TOTAL BOTH SIDES, see Note 1), APPROXIMATE COATING THICKNESS (TOTAL BOTH SIDES, see Note 2) and MINIMUM COATING THICKNESS (ONE SIDE, see Note 3)

Coating type designation	Coating mass sum of both sides* g/m^2	Approximate coating thickness sum of both sides mm †	Minimum coating thickness, µm, on one surface ‡
Z100	130	0.02	6
Z200	220	0.03	11
Z275	290	0.04	15
Z350	370	0.05	20
Z450	470	0.07	25
Z600	650 ≤ 2.0 mm thick 680 >2.0 mm thick	0.09 0.10	34
ZF80	100	0.01	4
ZF100	130	0.02	6
ZA90	100	0.015	5
ZA135	145	0.025	8
ZA180	190	0.032	11
ZA225	235	0.04	14
ZA275	290	0.05	17
ZA350	370	0.06	21
ZA450	470	0.08	27
ZM60	65	0.01	4
ZM90	100	0.015	6
ZM120	135	0.02	8
ZM150	170	0.03	10
ZM180	195	0.035	12
ZM220	235	0.04	15
ZM275	290	0.05	18
ZM350	370	0.07	23
ZM450	470	0.08	30
AZ150	170	0.05	16
AZ200	220	0.06	22
AM100	110	0.03	11
AM125	135	0.04	14
AM150	170	0.045	17
AM175	190	0.05	19
AM200	215	0.06	22

* The coating mass used for thickness calculations includes an approximate manufacturing margin that may be used to achieve the specified minimum requirements.

† Total coating thickness of both sides based upon nominal coating class.

‡ Thickness equivalent to the one surface single spot coating mass.

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NOTES TO TABLE C2

1 It is common for manufacturers to apply more than the nominal coating mass to ensure that one surface single spot and single spot requirements are met. The numbers in the 'coating mass both sides' column give an indication of these coating masses.

2 The numbers in the 'approximate coating thickness, both sides' column are calculated thicknesses corresponding to the expected coating masses. Users can add these thicknesses to the base steel thickness to determine a total coated thickness.

3 The 'minimum coating thickness, µm, on one surface' is a calculated thickness based upon the one surface single spot coating mass and the respective coating density for each coating type. Where a type spans a range of composition, the densest figure is used to give the lowest thickness for each class.

4 The calculations for the coating types in Table C2 are based upon coating densities as follows:

Types 'Z' and 'ZF': 7140 kg/m^3

Type 'ZA': For 4% to 9% aluminium use 6000 kg/m^3; for 9% to 15% aluminium use 5600 kg/m^3

Type 'ZM': For 5% to 9% aluminium use 6000 kg/m^3; for 9% to 13% aluminium use 5590 kg/m^3

Type 'AZ': 3680 kg/m^3

Type 'AM': 3622 kg/m^3

These densities can also be used for calculating the thickness on each surface of differential coatings.

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APPENDIX D

INFORMATION AND GUIDELINES ON THE SELECTION OF STEEL GRADES AND COATING CLASSES

(Informative)

D1 SCOPE AND CHANGES TO THIS STANDARD

D1.1 Scope

This Appendix gives information on fabricating characteristics and surface finish, and provides guidelines on the application of coated steels complying with this Standard.

The information refers to the generic coating types, for example aluminium-zinc coatings, and not to commercially available coated steel products. Information about commercially available products can be obtained from manufacturers or suppliers. The information that is included in Appendix D is generic, and where possible obtained from publicly available sources such as Edavan and Kopinski's (2009) paper from the Corrosion Science Journal*.

D1.2 Changes made to this Standard in this revision, and explanatory notes

Revision of this Standard includes:

(a) The addition of three new coating types, as follows:

  (i) Zinc-aluminium coatings in 7 classes, 'ZA'.

  (ii) Zinc-aluminium-magnesium coatings in 9 classes, 'ZM'.

  (iii) Aluminium-zinc-magnesium coatings in 4 classes, 'AM'.

(b) The inclusion of an indicative minimum coating thickness for each of the coating types and classes corresponding to the one surface single spot coating masses in Table C2.

Descriptions of typical applications for the coating types are included in section D3 below. For each of the coating types there are a number of coating classes referenced that cover the range of usage for each of the coating types in the Australian market.

Different coating types protect steel with differing mechanisms so it is not possible to conclude that a thicker coating of one type will necessarily outperform a thinner coating of another type. It is the case though, that within each coating type, e.g., Type Z, in a specific environment a higher coating class, e.g. Z275, can be expected to provide a longer life than a lower coating class, e.g. Z200, on an undeformed section.

Zinc coatings in the Australian construction industry are typically encountered in two broad categories, i.e. continuously coated sheet and coil steels as covered in AS 1397, and batch galvanized coatings as covered in AS/NZS 4680. There are important differences between the ways that these Standards specify the amount of coating on the steel in each case.

In AS 1397, the coating is specified as a total coating mass that is the average coating across the sheet or coil width, inclusive of both top and bottom surfaces, per m^2. Minimum masses are also given for a single spot and a single surface of a spot. Indicative thicknesses for the minimum spot surface are also given, but not specified.

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* Edavan, R.P., & Kopinski, R. (2009). *Corrosion resistance of painted zinc alloy coated steels*. Corrosion Science, 51, 2429-2442.

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AS/NZS 4680 covers hot-dip zinc coatings on fabricated ferrous articles, and unlike the steel sheet and coil covered in AS 1397, the top and bottom surfaces are not generally interchangeable, and so an average coating mass inclusive of both top and bottom surfaces is not necessarily meaningful. Also, fabricated articles often include different thicknesses of steel in the one article. On this basis, AS/NZS 4680 specifies the coating in terms of local coating thickness minima, and also average coating mass minima in g/m^2, both in terms of one surface only.

Each of the coating types in AS 1397, other than the zinc 'Z' and annealed zinc 'ZF' coatings, contain significant amounts of aluminium. Batch galvanizing processes based upon the use of chemical fluxes have not traditionally been capable of applying coatings containing aluminium, and hence the batch galvanizing of fabricated articles has been limited to zinc coatings.

Coating types ZA, ZM, AZ and AM are alloy coatings designed to offer more efficient protection in specific environments and applications than plain zinc, and hence their protection of steel cannot be compared to zinc through simple comparisons of thickness. For example, an AZ150 coating on 0.42 mm steel roofing has approximately the same coating thickness as a Z275 coating on the same steel, yet the AZ150 coated steels have been seen to offer longer life across a wide range of corrosive environments in Australia.

Further information on intended uses is given in D3.2 below, and in summary:

(a) Zinc-coated (Type Z) steel is intended for a wide variety of applications requiring added corrosion resistance.

(b) The zinc/iron alloy coatings (Type ZF) are intended to be painted for most applications, and are predominantly used by the auto industry for body panels.

(c) Zinc/aluminium (Type ZA) coatings have approximately the same sacrificial protection as zinc with improved corrosion resistance in most environments.

(d) Zinc/aluminium/magnesium coatings (Type ZM) show superior to high corrosion resistance in many aggressive environments with good galvanic protection and scratch resistance. They are typically used for thicker (>1mm) structural applications.

(e) Aluminium/zinc alloy coatings (AZ) offer excellent barrier-coating protection combined with some galvanic protection. The corrosion resistance is very high in most environments compared to the previous coatings and long-term durability has been demonstrated. These coatings are widely used on bare and painted roofing and walling.

(f) Aluminium/zinc/magnesium alloy coatings (AM) offer excellent barrier-coating protection combined with better galvanic protection than the AZ coatings. The corrosion resistance is very high in most environments compared to all the previous coatings. These coatings are designed to offer superior performance to Type AZ in bare and painted roofing and walling.

D2 FABRICATING CHARACTERISTICS

D2.1 Skin passing

A light rolling of annealed, normalized or hot-rolled sheet or strip is called 'skin passing', and may be used for one or more of the following purposes:

(a) To temporarily minimize the occurrence of the condition known as 'stretcher strain' (Luders lines), or fluting, during fabrication of finished parts.

(b) To obtain the required surface finish for the end use.

(c) To control shape.

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However, material supplied in the skin-passed condition (other than non-ageing or stabilized grades) is subject to strain-age hardening which occurs at room temperature or more rapidly at elevated temperatures, such as during paint baking. Strain-age hardening causes the following changes:

(i) The appearance of stretcher strain markings on deformation, i.e. a furrowed roughening of the steel surface due to uneven yielding in the first stages of cold deformation.

(ii) A deterioration of ductility.

(iii) An increase in yield strength.

Because of the nature of these characteristics, it is essential that the period between final processing at the mill and pressing into a shape be kept to a minimum.

D2.2 Specific grades

Attention is drawn to the following fabricating characteristics of grades G550, G1, G2 and G3:

(a) G550: Suitable for corrugating or simple forming; the corrugated sheet is not suitable for curving.

(b) G1: Normally heavily roller-levelled.

(c) G2: Reasonably free from fluting but this is not guaranteed; sheet up to and including 1.60 mm thick will lockseam.

(d) G3: Levelled for control of coil break only; it is not free of fluting and will lockseam in all thicknesses.

D3 COATING TYPES

D3.1 Coating classes

It is not possible to specify the absolute relative performance of each of the coating types as performance varies with end use, exposure environment and coating class. For example, for deeply drawn or formed heavy gauge sections where the coating is deformed along with the steel base, coating ductility may also influence coating performance.

D3.2 Coating types

D3.2.1 *General*

The descriptions in this Paragraph (D3.2) are provided in order to guide users in selecting appropriate coating types for particular applications.

D3.2.2 *Zinc coating (Types Z and ZF)*

Zinc-coated (Type Z) steel is a most commonly used type of coated-steel sheet in manufacturing and construction. It is intended for a range of applications where steel requires the protection of a sacrificial coating in order to extend the life of the article or structure.

Typical applications are: components for building and construction, e.g. steel framing (purlins and girts); steel frame decking; rainwater goods (when painted/coated); automotive components and body panels; tubes and sections; engineering components; domestic appliances (washing machine frames and panels, cooker plates, industrial dryer drums, speaker support etc.); industrial goods (gasoline pumps, tanks, heat exchangers, ventilator housing, trapezoidal profiles, cable tray systems); electrical goods; and components for agricultural machinery.

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The zinc/iron alloy coatings (Type ZF) are intended to be painted for most applications. These coatings are characterized by high hardness and brittle behaviour during forming. Type ZF coatings are considered to be easier to spot weld and paint than Type Z coatings and are predominantly used by the auto industry for body panels.

D3.2.3 *Zinc/aluminium coating (Type ZA)*

This type of zinc coating has approximately the same sacrificial protection as a Type Z coating with improved corrosion resistance in most environments. Used mostly for applications that require good coating ductility, e.g. deep drawn parts, and in environments requiring moderate to high corrosion resistance.

Typical applications are: components for building and construction (cladding, roofing, partition walls, ceilings, doors, steel framing for residential housing, window frames, snow guards, nail boards, spiral-ducting); automotive components (motor housings, oil filters, cover of shock-absorbers, alternator plates); domestic appliances (washing machine frames and panels, cooker plates, industrial dryer drums, speaker support); industrial goods (gasoline pumps, tanks, heat exchangers, ventilator housing, trapezoidal profiles, cable tray systems); and roadside guardrails.

D3.2.4 *Zinc/aluminium/magnesium coating (Type ZM)*

This type of coating has superior to high corrosion resistance in many aggressive environments with good galvanic protection and scratch resistance.

Typical applications are: components for building and construction in aggressive environments (purlins and girts, partition walls, ceilings, doors, steel framing, window frames, snow and wind guards, nail boards, spiral-ducting, steel framed decks, guard railings); automotive components (console box brackets**,** motor housings, wind shield wiper parts, steering wheel shaft supports, tank heat protectors, surge tank stay etc); domestic appliances (washing machine frames and panels, cooker plates, industrial dryer drums, speaker support); and industrial goods (gasoline pumps, tanks, heat exchangers, ventilator housing, trapezoidal profiles, cable tray systems).

D3.2.5 *Aluminium/zinc alloy coating (Type AZ)*

Aluminium/zinc alloy coatings offer excellent barrier-coating protection combined with some galvanic protection. The corrosion resistance is very high in most environments compared to the previous coatings and long-term durability has been demonstrated. Additionally, these coatings have good high temperature resistance and heat reflectivity.

The predominant use of this type of coated steel is in both bare and prepainted applications such as roofing and walling. Other applications of this coated steel are: components for building and construction (cladding, roofing, partition walls, ceilings, doors); rainwater goods; furniture and outdoor cabinetry; unexposed automotive parts; appliances (ovens, heaters); ducting and computer cases.

D3.2.6 *Aluminium/zinc/magnesium alloy coating (Type AM)*

A1 Aluminium/zinc/magnesium alloy coatings offer excellent barrier-coating protection combined with better galvanic protection than the AZ coatings. The corrosion resistance is very high in most environments compared to all the previous coatings. In addition Type AM coatings also show good high temperature resistance and heat reflectivity.

The predominant use of this type of coated steel is in roofing and walling applications in both bare and prepainted forms. Applications of this coated steel include: components for building and construction (cladding, roofing, partition walls, ceilings, doors); furniture and outdoor cabinetry; unexposed automotive parts; appliances (ovens, heaters); rainwater goods; ducting; and computer cases.

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AS/NZS	
4680	Hot-dip galvanized (zinc) coatings on fabricated ferrous articles

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AMENDMENT CONTROL SHEET

AS 1397—2011

Amendment No. 1 (2012)

CORRECTION

SUMMARY: This Amendment applies to Paragraph D3.2.6.

Published on 22 October 2012.

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