

Australian Standard®

Tinplate and blackplate

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PREFACE

This Standard was prepared by the Standards Australia Committee on Iron and Steel to supersede AS 1517—1982, *Tinplate and blackplate*, Part 1: *Sheet*, and Part 2: *Coil*. In this edition, the former Parts 1 and 2 have been combined to form one document.

This edition includes requirements for double cold-reduced blackplate, double cold-reduced electrolytic tinplate and low tin-coated steel, commonly referred to as LTS. Requirements for double cold-reduced electrolytic tinplate are the same as those specified in ISO 4977—1984, *Double cold-reduced electrolytic tinplate*, Part 1: *Sheet*, issued by the International Organization for Standardization.

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STANDARDS AUSTRALIA

Australian Standard
Tinplate and blackplate

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE This Standard specifies requirements for standard grade cold-reduced electrolytic tinplate and cold-reduced blackplate, either in sheet form or in wide coil and slit coil form, as follows:

- (a) Single cold-reduced material with nominal thickness from 0.20 mm up to and including 0.60 mm.
- (b) Double cold-reduced material with nominal thickness from 0.14 mm up to and including 0.29 mm.

It includes requirements for equally-coated, differentially-coated and low tin-coated (LTS) tinplate. This Standard does not apply to material described commercially as tinned sheets, steel sheets or TFS (electrolytic chromium-coated steel).

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 Alternative means for determining compliance with this Standard are given in Appendix B.

1.2 REFERENCED DOCUMENTS The documents below are referred to in this Standard:

AS	
1050	Methods for the analysis of iron and steel
1199	Sampling procedures and tables for inspection by attributes
1213	Iron and steel—Methods of sampling
1391	Methods for tensile testing of metals
1399	Guide to AS 1199—Sampling procedures and tables for inspection by attributes
2025	Method for Rockwell superficial hardness test
2025.1	Part 1: Testing of metals, N and T scales
2706	Numerical values—Rounding and interpretation of limiting values
3900	Quality systems—Guide to selection and use
3904	Quality systems—Guide to quality management and quality system elements
K1	Methods for the sampling and analysis of iron and steel
ISO	
Guide 44	General rules for ISO or IEC international third-party certification scheme for products.

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

1.3.1 Area—the area of tinplate or blackplate, expressed in SITA (System International Tinplate Area) units, where—

$$1 \text{ SITA} = 100 \text{ m}^2.$$

1.3.2 Batch—a quantity of some commodity produced under conditions which are considered uniform.

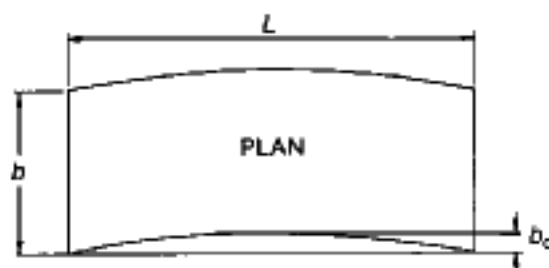
NOTE: Each batch is assumed, as far as practicable, to consist of materials or items of a single type, grade, class, size and composition, and to have been manufactured under essentially the same conditions at essentially the same time.

1.3.3 Batch annealing—annealing of cold-reduced strip in tight coil form, within a protective atmosphere.

1.3.4 Blackplate—low carbon steel sheet or coil normally not oiled or otherwise treated. Thicknesses range from 0.14 mm up to and including 0.60 mm.

NOTE: Steel sheet intended for blackplate is line inspected during processing, and material having visible imperfections of only moderate magnitude or frequency is selected. Blackplate is liable to rust but, at the time it is made available by the manufacturer, has a surface condition suitable for normal lacquering and printing.

1.3.5 Camber—the deviation of an edge from a straight line forming a chord to it (see figure below).



where

- b = width of sheet
- b_c = linear measurement of camber
- L = length of sheet
- C = camber, in percent

NOTE: $C = \frac{b_c}{L} \times 100, \%$

1.3.6 Centre buckle—an intermittent vertical displacement or wave in the sheet occurring other than at the edges.

1.3.7 Continuous annealing—annealing of cold-reduced strip in strand form within a protective atmosphere.

NOTE: The resultant product is relatively stiffer than, and exhibits a finer grain size than batch-annealed material.

1.3.8 Differentially coated tinplate—tinplate, one surface of which carries a heavier tin coating than the other.

1.3.9 Double cold-reduced tinplate—low carbon steel sheet or coil which has received a second major cold reduction after annealing and is coated on both sides with tin, applied by electrodeposition. Tinplate thicknesses may range from 0.14 mm up to and including 0.29 mm.

1.3.10 Edge wave—an intermittent vertical displacement occurring at the sheet edge.

1.3.11 Flow brightening—a process used to produce a bright tin coating from the silvery white as-plated deposit, by rapid melting of the tin under controlled conditions of heating and quenching.

1.3.12 Lateral weave (short-pitch camber)—the deviation of a mill-trimmed edge from a straight line lying in the same plane as the edge and forming a chord to it over a relatively short distance.

1.3.13 Longitudinal bow—residual curvature in the sheet remaining along the direction of rolling.

1.3.14 Low tin-coated steel—low carbon steel sheet coated on both sides with tin applied by electrodeposition, the tin coating being non-flow brightened.

1.3.15 Nitrogenized steel—low carbon steel containing a controlled amount of nitrogen, customarily introduced during the steelmaking process as a strengthening and hardening element.

1.3.16 Oiling—the application of a thin uniform oil film to the surface of the tinplate by electrostatic deposition of fine oil particles from a mist.

1.3.17 Out-of-squareness—the deviation of an edge from a straight line placed at right angles to the adjacent edge of the sheet, and touching one corner and extending to the opposite edge (see figure below).



where

- A = out-of-squareness, in percent
- b = straight line at right angles to adjacent edge
- L = length of sheet
- L_A = linear measurement of out-of-squareness

NOTE: $A = \frac{L_A}{b} \times 100, \%$

1.3.18 Package—100 sheets of the same dimensions and specification.

1.3.19 Passivation—a chemical or an electrochemical treatment applied to tinplate to impart desired properties to the surface of the plate, e.g. to improve the resistance to surface discolouration and to give superior lacquering and printing properties.

NOTE: The most widely used passivation procedure is the cathodic sodium dichromate (CDC) method which utilizes a cathodic treatment in a solution of sodium dichromate and provides a highly passivated surface against the formation of tin oxides. An alternative chemical treatment, sodium dichromate dip (SDD) is available, and this treatment imparts limited resistance to the growth of surface tin oxide.

1.3.20 Single cold-reduced tinplate—low carbon steel sheet coated on both sides with tin, applied by electrodeposition. Tinplate thicknesses range from 0.20 mm up to and including 0.60 mm.

1.3.21 Stabilized steel—low carbon steel fully deoxidized by the addition of a suitable deoxidant, e.g. aluminium, and used for severe drawing applications or to minimize fluting and stretcher strain hazards and other difficulties associated with strain-age hardening.

1.3.22 Standard grade tinplate—the product of normal tinplate production lines employing the usual inspection and classification procedures. Under normal conditions of storage and use, standard grade tinplate has a surface condition suitable for lacquering and printing.

1.3.23 Stillage—a number of packages containing sheets of the same dimensions and specification.

1.3.24 Transverse bow—a mode of curvature in the sheet whereby the distance between the edges parallel to the rolling direction is less than the sheet width.

1.4 DESIGNATION

1.4.1 Steel type designation

1.4.1.1 General The base material shall be designated as either type L or type MR as follows:

- (a) Type L—Type L material has a low metalloid content and a low residual element content (see Clause 2.2.2).

NOTE: Type L material is sometimes used to give improved internal corrosion resistance for food product containers.

- (b) Type MR—Type MR material has a low metalloid content but is less restrictive in residual element content than type L material (see Clause 2.2.2).

NOTE: Type MR material is used for most tin mill products.

1.4.1.2 Nitrogenized steel Steel which has been nitrogenized shall be designated by the addition of the suffix 'N' to the steel type designation.

Example 1

MRN

1.4.1.3 Stabilized steel Steel which has received a stabilizing treatment shall be designated by the addition of the suffix 'S' to the steel type and the temper designation.

Example 2

MRT1S

1.4.2 Temper designation

1.4.2.1 Designations for single cold-reduced material For single cold-reduced material to be batch annealed, the designations T1, T2, T3 and T4 shall be used and shall follow the steel type designation.

Example 3

MRTI

For single cold-reduced material to be continuously annealed, the designation shall be either T4CA, T5CA or NT5CA and shall follow the steel type designation.

Example 4

MRNT5CA

1.4.2.2 Designations for double cold-reduced material For double cold-reduced material, the temper designation shall be either DR8, DR9, DR9M or DR10 and shall follow the steel type designation.

Example 5

MRDR8

Where the method of annealing prior to the second major cold reduction is specified, this shall be indicated by the inclusion of the letters BA (batch annealed) or CA (continuously annealed) after the temper designation.

Example 6

MRDR8BA

NOTE: An M suffix indicates that the steel has been modified (see Table 2.3).

1.4.3 Tin coating mass designation The tin coating mass designation shall consist of either of the following letters followed by a number or numbers which designate the coating mass (see Table 1.1):

- (a) Equally-coated (tinplate with the same coating mass on both surfaces) E

- (b) Differentially-coated (tinplate with a different coating mass on each of the two surfaces) D
- (c) Low tin-coated LTS

1.4.4 Surface finish designation

1.4.4.1 Tinplate The surface finish designation for tinplate shall consist of a letter or letters in accordance with the following:

- (a) Stone finish (regular steel-base produced by rolling with ground rolls and having a flow-brightened tin coating) S
- (b) Matt stone finish (a non-reflective surface produced by an unmelted coating on a regular steel-base) MS
- (c) Matt grit finish (a non-reflective surface produced by an unmelted coating on a grit finish steel-base) MG
- (d) Silver finish (a surface produced by a flow-brightened tin coating on a highly roughened grit finish steel-base) SF

1.4.4.2 Blackplate The surface finish designation for blackplate shall consist of a letter in accordance with the following:

- (a) Stone finish (regular steel-base produced by rolling with ground rolls) S
- (b) Grit finish (finish produced by rolling with grit-blasted rolls) G

TABLE 1.1
TIN COATING MASS REQUIREMENTS

Coating characteristic	Coating designation	Coating mass, g/m ²	
		Nominal—each surface	Min average—each surface
Low tin-coated	LTS/1	1.1/1.1	1.0/1.0
Equally coated	E02	1.1/1.1	0.9/0.9
	E05	2.8/2.8	2.5/2.5
	E07	3.9/3.9	3.6/3.6
	E10	5.6/5.6	5.2/5.2
	E15	8.4/8.4	7.8/7.8
	E20	11.2/11.2	10.1/10.1
Differentially coated	E27	15.1/15.1	13.4/13.4
	D05/02	2.8/1.1	2.5/0.9
	D10/05	5.6/2.8	5.2/2.5
	D15/05	8.4/2.8	7.8/2.5
	D15/10	8.4/5.6	7.8/5.2
	D20/05	11.2/2.8	10.1/2.5
	D20/10	11.2/5.6	10.1/5.2
	D27/10	15.1/5.6	13.4/5.2

1.5 MARKING

1.5.1 General The following information shall be clearly and durably marked on the outside of the stillage (for sheet) or on each coil:

- (a) Name of purchaser.
- (b) Destination.
- (c) Order number and item number of manufacturer.
- (d) Identification of the production batch and date of manufacture (month/year).
- (e) Purchaser's order number.
- (f) Quantity (for sheet).
- (g) Coating mass.
- (h) Dimensions, i.e. thickness, width and length.
- (i) Steel type and temper designation.
- (j) Gross mass of stillage (for sheet), coil mass, or bundle mass (for slit tinplate).
- (k) Special requirements, e.g. a special chemical treatment.

NOTE: Manufacturers making a statement of compliance with this Australian Standard on a product or on packaging or promotion material related to that product are advised to ensure that such compliance is capable of being verified.

1.5.2 Line marking

1.5.2.1 Differentially-coated tinplate Differentially-coated tinplate shall be marked with lines parallel to the rolling direction and spaced as specified in Table 1.2.