Data sheet: C 2.1
Availability and properties

Tinplate Material

Electrolytically Coated tinplate

General description

Tinplate is produced from continuously cast, and consists of single reduced cold rolled sheet, which is electrolytically coated with tin. The tin coating provides corrosion resistance to the steel substrate, and plays a beneficial role with regard to the preservation of certain foods. In addition, the surface of tinplate lends itself to printing and silk screening. It is used widely in the packaging industry for cans, can ends, larger containers and a range of closures. Tin coatings of different thicknesses are produced to suit specific requirements.

The thickness and type of the steel substrate should be selected on grounds of processing and/or structural considerations. For special forming applications a distinction is made between drawing applications (Indicated by the suffix D in TS 250D) and stretching applications (Indicated by the suffix S in TS 250S).

As far as possible, tinplate coils are produced to suit the customer's end-use. Grain orientation (rolling direction) in tinplate must be taken into account for critical forming applications. Customers are therefore advised to consult Mittal Steel South Africa in order to obtain material that will best suit their purpose.

Tinplate is suitable for Soudronic welding and also for both lacquering and litho printing.
For information related to paintability, it is recommended that either the lacquer or paint suppliers are contacted.

Chemical Analysis (substrate)

Table 1. Chemical composition of steel substrate (ladle analysis, percentage)

Temper	% C (Max)	% Mn (Max)	% P (Max)	% S (Max)
TS 250	0,12	0,50	0,03	0,03
TS 275	0,12	0,50	0,03	0,03
TH 415	0,12	0,50	0,03	0,03
TH 425	0,12	0,50	0.03	0,03

Note:
Additions of chromium, nitrogen and aluminium may be made to enhance the base metal properties.

Mechanical properties

A number of different mechanical properties may be determined for Tin Mill products, however, no single mechanical test may be used to measure all of the factors, which could affect the fabrication characteristics. Although tensile tests are conducted on all tinplate material, hardness is not measured and the values in Table 2.2 are to be used as a guide only.

For further information, contact:
Mittal Steel South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043, Fax (016) 889-0070
e-mail address: datasheets@mittalsa.com

Table 2.1 Tensile properties

Specification	Yield / 0.2% Proof Stress (MPa)		Tensile Strength (MPa)		Annealing route
	Nominal	Tolerance	Nominal	Tolerance	
TS 250	250	± 50	350	± 50	Batch
TS 275	275	± 50	375	± 50	Batch
TH 415	415	± 50	435	± 50	Continuous
TH 425	425	± 50	450	± 50	Continuous

Notes:
1. The mechanical properties expressed in the revised Euronorm specification for tinplate, EN 10202, indicate only tensile limits and the previous hardness values are used as a guide only.
2. Continuous annealed tinplate is susceptible to ageing, or age hardening, which could increase the mechanical properties. To minimise this phenomenon it is recommended that the period between final processing at the mill and fabrication be kept as short as possible.

Table 2.2 Hardness (Values for guidance only)

Specification	Hardness (HR30T) for thickness t (mm)			Annealing route
	$t \leq 0,21$	$0,21 < t \leq 0,28$	$t > 0,28$	
TS 250	55 (± 4)	54 (± 4)	53 (± 4)	Batch
TS 275	58 (± 4)	57 (± 4)	56 (± 4)	Batch
TH 415	62 (± 4)	61 (± 4)	60 (± 4)	Continuous
TH 425	64 (± 4)	63 (± 4)	62 (± 4)	Continuous

Surface finish

Table 3. Available surface finishes

Designation	Surface appearance[1]
Stone	Shiny, direction orientated appearance, used for general, all purpose applications
Light grit	Fine silky appearance, suited for drawing applications

Notes:
1. The surface finishes are available in a bright (reflowed) or a matt (unreflowed) condition.
2. The quoted values are aimed for on the steel substrate and are not guaranteed. Where a range is shown, the mean value is used for control purposes.

Tin coatings

Electrolytic tinplate is supplied with various tin coatings to suit specific applications and is available with an equal or differential coating mass on each side. The coating mass is expressed in grams per square metre per side.

Table 4.1 Equal coatings

Designation	Coating mass (g/m^2)		Corrosion resistance[1]
	Nominal	Minimum per side	
EG	1,1 / 1,1	0,94	For minimum corrosion resistance requirements
EF	1,4 / 1,4	1,20	For low corrosion resistance requirements
E1	2,8 / 2,8	2,45	For low to mild corrosion resistance requirements

Note:
1. Refer to equal coating data for the general corrosion resistance and minimum coating mass per coil.

For further information, contact:
Mittal Steel South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043, Fax (016) 889-0070
e-mail address: datasheets@mittalsa.com

Table 4.2 Differential coatings

Designation	Nominal coating mass (g/m^2)	Standard marking [1]
D2/1	5,6 / 2,8	12,5 mm equidistant
D3/1	8,4 / 2,8	25,0 mm equidistant
D4/1	11,2 / 2,8	37,5 mm equidistant

Note:
1. For visual identification, differentially coated tinplate is marked with lines a few millimetres wide on the side with the heavier coating.

Passivation

A passivation treatment is applied to increase resistance of the tin coating to tarnishing.

The following treatments are available:

a. Passivation code 311: A cathodic sodium dichromate treatment with a nominal chromium level in the range of 3,5 to 9,0 mg/m^2 per surface.
This passivation coating is utilised to improve the appearance of the sheet after lacquering.

b. Passivation code 300: A sodium dichromate chemical treatment with a nominal chromium level in the range of 1 to 3 mg/m^2 per surface.
This passivation coating is utilised for Beverage Can Stock, and non-reflowed tinplate, where the appearance of the surface after lacquering is not critical.

Oiling

In order to facilitate stacking of tinplate sheets and to reduce chaffing damage during subsequent handling, tinplate is oiled with dioctyl sebacate (DOS). Because the oil is of an unstable nature and reacts with the tin coating, the thickness of the oil layer cannot be verified after a lapse of 24 hours from the time of application.

Table 5. Available DOS coatings

Designation	Film weight average per side (aim)
Normal DOS	2,0 - 6,0mg/m^2
High DOS	6,0 -10,0mg/m^2

Notes:
1. Normal DOS is available on equal tin coatings only.
2. High DOS is available on differential tin coatings only.

Dimensions

Table 6.1 Available dimensions (coils)

Specification	Thickness (mm)	Width (mm)
TS 250 / TS 275	0,21 – 0,45	650 – 950
TH 415 / TH 425	0,21 – 0,36	690 – 915

Note:
1. Coils are supplied with an inside diameter of 420 mm +0 – 6 mm

For further information, contact:
Mittal Steel South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043, Fax (016) 889-0070
e-mail address: datasheets@mittalsa.com

Table 6.2 Available dimensions (cut sheets)

Temper	Thickness (mm)	Width (mm)	Length (mm)
TS 250 / TS 275	0,21 – 0,45	610 – 950	460 – 1090
TH 415 / TH 425	0,21 – 0,36	610 – 915	460 – 1090

Dimensional tolerances

1. Thickness

The thickness tolerance is –4% + 5% measured with a calibrated micrometer (0.01mm accuracy) at least 10mm from the trimmed edge.

2. Feather edge

The difference in thickness, between the centre of a sheet and a position 10mm from the trimmed sheet edge, will not exceed 8% of the sheet centre thickness.

3. Width

Deviations from the specified width will not exceed -0 +3mm at any point for side-trimmed material. Material with untrimmed edges will be +15 to +30mm over nominal widths, but deviations up to + 15mm will be regarded as prime material.

4. Camber

Camber is the deviation of an edge of a cut sheet from a straight line touching both ends of the edge and will not exceed 0,15% of the actual sheet length.

In the case of side trimmed coils, the camber is the greatest deviation of an edge from a straight line, the measurement being taken on the concave edge using a taut line or straight edge, and is limited to 6mm per 4000 mm of length.

5. Flatness (cut lengths)

5.1. Edge wave

The maximum allowance for edge wave is given in Table 7.

5.2. Floppy centre

A sheet when cut through the floppy centre in a direction parallel to the rolling direction, will conform to the limits specified in Table 7.

5.3. Reverse bow

A sheet lying on a flat surface will not show edge lift exceeding the limits specified in Table 7.

For further information, contact:
Mittal Steel South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043, Fax (016) 889-0070
e-mail address: datasheets@mittalsa.com

Table 7. Maximum flatness deviations

Specification	Thickness *t* (mm)	Width (mm)	Maximum wave height (mm)
TS 250 / TS 275	0,21 ≤ t ≤ 0,30	≤ 875	3
	0,21 ≤ t ≤ 0,30	> 875	5
	0,30 < t ≤ 0,35	≤ 875	5
	0,30 < t ≤ 0,35	> 875	6
TH 415 / TH 425 (End plate)	0,21 ≤ t ≤ 0,35	≤ 875	4
		> 875	5
TH 415 / TH 425 (Body plate)	0,21 ≤ t ≤ 0,35	≤ 875	3
		> 875	5
All specifications	0,35 < t ≤ 0,60	≤ 900	6
		> 900	10

Supply Conditions

SITA

Tinplate is supplied in SITA (Systeme Internationale Tinplate Area). One SITA consists of 100 square metres of tinplate.

Formula: $\frac{\text{Coil length (m) x ordered width (m)}}{100}$ = SITA

Mass

Tinplate material is supplied in terms of Price List 150 with Mittal Steel South Africa's General Conditions of Sale applying.

For further information, contact:
Mittal Steel South Africa Limited, PO Box 2, Vanderbijlpark 1900. Toll free number 0800 005043, Fax (016) 889-0070
e-mail address: datasheets@mittalsa.com