Tinplate & Tin Free Steel

Mirach Metallurgy Co.,Ltd

www.tinplatesteelmill.com

Contents

Brief Introduction

Mirach Metallurgy Advantages

- State–controlling enterprise with fiscal support and credit guarantee
- SGS Inspection available
- Including L, D type and precise slitting coil
- Flexible payment: 30~180 Usance L/C alternative
- Brand–quality orientation
- Marketing segmentation: focus on ETP/TFS users requiring advanced type

To end users: technician support to cost reduction and progress

To distributors: marketing exploitation and channel extension

Mirach Metallurgy has been engaged in Tinplate distributing for over a couple of decades, and regarded as one of the most reliable exporters with proficient technical supports, extremely strict QA guarantee, conscientious and diligent services. Our tin mill products are extensively distributed and approved throughout the world for the application of food package, beverage and industrial goods, enjoying remarkably reputation in the global market.

Products Subdivision

Tin mill products consist of electrolytic tinplate, electrolytic chromium coated steel (also referred to as tin free steel or TFS), and black plate, the uncoated steel. Tinplate is a thin steel sheet coated by tin, while TFS is an electrolytic chrome plated steel with structure of a thin layer of chromium and a layer of chromium oxide deposited on the steel base. Both of them appear the unique features of exquisite, metallic luster as well as excellent properties in corrosion resistance and paintability.

Tinplate & Tin Free Steel Lists of Mirach Metallurgy

ETP

Black Plate	Normal Thickness	Normal Width	Normal Length (sheet)
Single Reduce	0.17 ~ 0.55mm	700 ~ 1200mm	500 ~ 1168mm
Double Reduce	0.12 ~ 0.36mm		

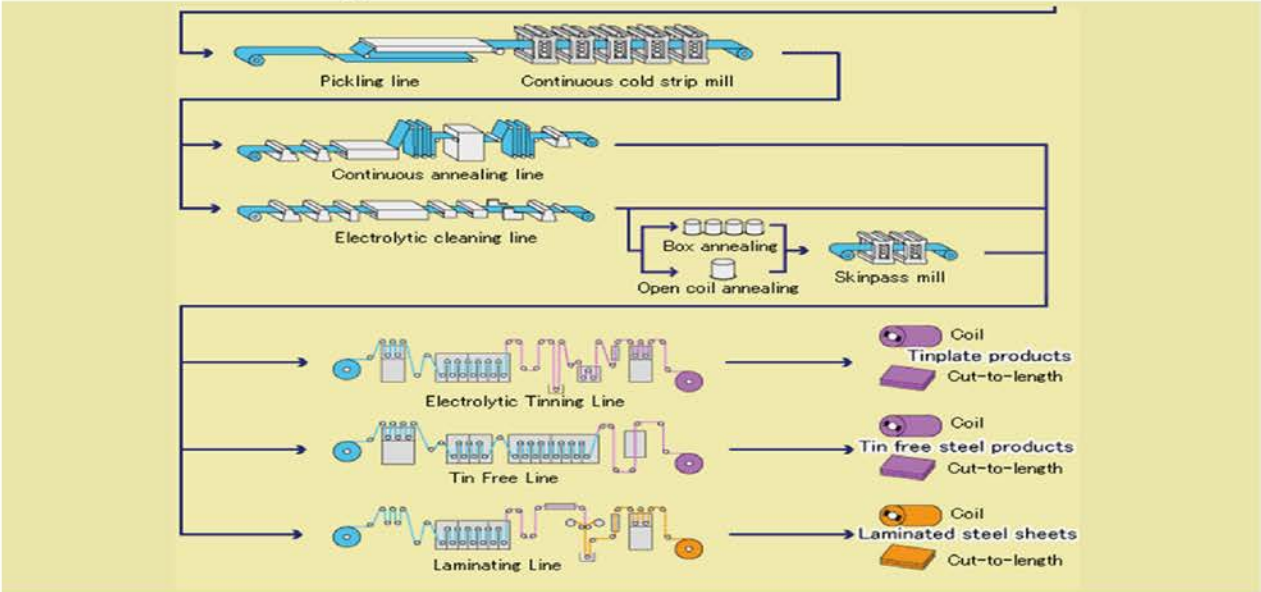
TFS

Black Plate	Normal Thickness	Normal Width	Normal Length (sheet)
Single Reduce	0.17 ~ 0.55mm	700 ~ 1050mm	500 ~ 1168mm
Double Reduce	0.12 ~ 0.36mm		

Temper Grade

Black Plate	Box Annealing	Continuous Annealing
Single Reduce	T–1, T–2, T–2.5, T–3	T–1.5, T–2.5, T–3, T–3.5, T–4, T–5
Double Reduce	DR–7M, DR–8, DR–8M, DR–9, DR–9M, DR–10	

Manufacturing Process



Major Control Items in the Manufacturing Process

Steelmaking	Steelmaking: Chemical composition, minimization of inclusions.
Hot Rolling	Finishing temperature, coiling temperature, gage profile.
Cold Rolling	Gage, flatness.
Annealing	Heating temperature, soaking temperature, cooling temperature, atmospheric gas composition.
Temper Rolling	Shape, surface roughness.
Electrolytic Plating	Coating weight, chemical treatment, oiling amount.

ETP and TFS's Parameters Inspected

Mechanical Properties	Hardness (temper grade)
Mechanical Properties	Thickness Width Cut–length
Shape Parameters	Bowness Camber Askewness Edge waviness
Lubrication	Oil film
Corrosion Resistant Property	Tin coating (for Tinplate) Metallic chromium and chromium in Cr–oxide (for TFS) Passivation film weight Alloy–tin Couple (for required) Iron solution value (for required) Tin grain size (for required) Corrosion resistance SO2 test (for required) Porosity Test (for required) Pickling lag value (for required)

Characteristics

Tinplate Features

Excellent Corrosion Resistance

By selecting a proper coating weight, appropriate corrosion resistance is obtained against container contents.

Excellent Paintability & Printability

Printing is beautifully finished using various lacquers and inks.

Excellent Solderability & Weldability

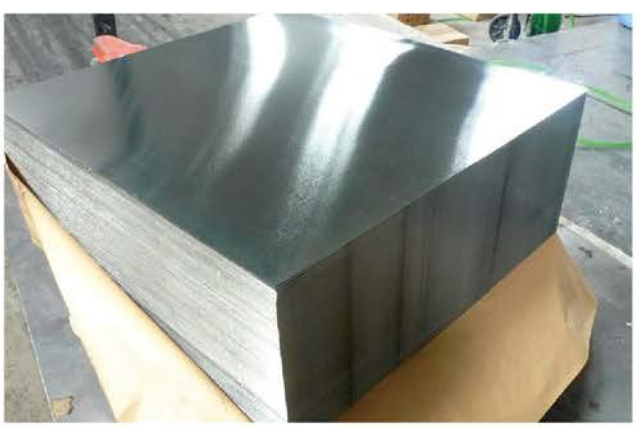
TIN PLATE is widely used for making various types of cans by soldering or welding.

Excellent Formability & Strength

By selecting a proper temper grade, appropriate formability is obtained for various applications as well as the required strength after forming.

Beautiful Appearance

Electrolytic ETP is characterized by its beautiful metallic luster. Products with various kinds of surface roughness are produced by selecting the surface finish of the substrate steel sheet.



TFS Features

Excellent paint adhesion

TFS has excellent paint adhesion proper ties that far surpass those of ETP, allowing its use for making DRD cans and adhesive bonded cans.

Excellent heat resistance

High–temperature baking causes neither discoloration nor deterioration in material proper ties.

Excellent resistance to Sulphur Blackening

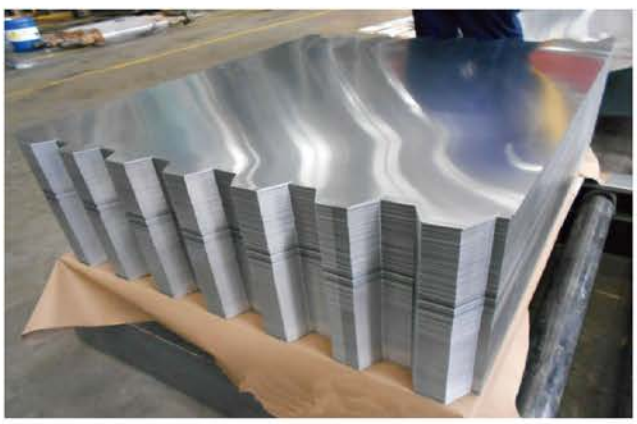
The metallic chromium in TFS has excellent sulphide resistance property when canning protein–rich foodstuff such as fish. TFS compensates for the expensive sulphur resistant lacquer.

Excellent filiform rust resistance

TFS has a excellent under film corrosion resistance.

Excellent alkali resistance

The coating in TFS is not amphoteric. Alkaline products such as detergents and dispersion colours can be packed in TFS with advantage.

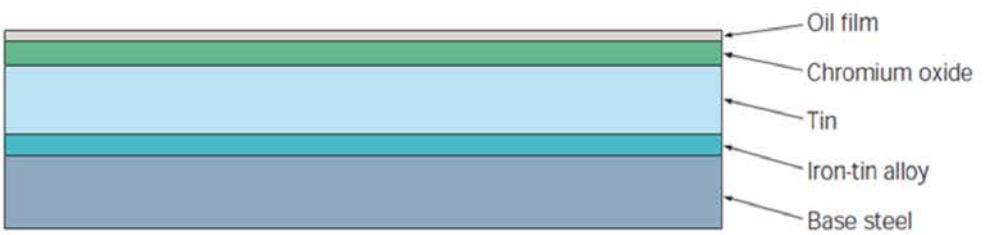


Characteristics

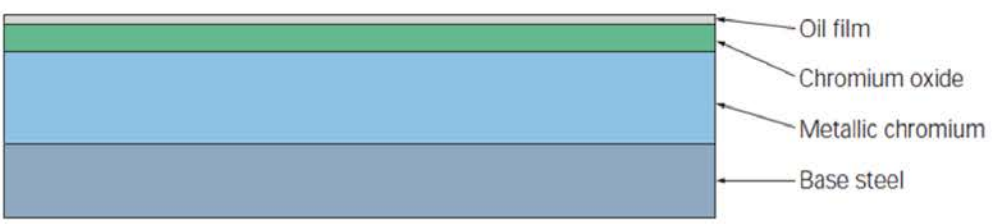
Different Features between TFS and ETP

Appearance	Even when the same surface finish as ETP is applied to the substrate steel sheet, it provides the unique surface luster characteristic of metallic chromium.
Corrosion Resistance	As it has excellent corrosion resistance after painting, it is generally used with both surfaces painted. It can also be used with the internal surface unpainted, depending on the contents.
Solderability	TFS is not compatible with soldering.
Weldability	Although TFS can be welded when the metallic coating layers are removed, its weldability is inferior to ETP.
Coating Weights	Unlike the multiplicity of coating weights with tin, only one standardized chromium–coated product is manufactured.

Tinplate Products



TFS Products



Comparison of Properties

		TIN PLATE (g/m²)		TFS
		2.8	over 5.6	
Bare Corrosion Resistance (Sealed)	Rust Resistance	○	◎	○
	Acid Resistance	○	○	△
	Alkali Resistance	△	△	◎
	Black Sulfide Stain Resistance	△	△	◎
	Stress Cracking Resistance	◎	◎	△
Paintability		○	○	◎
Corrosion Resistance afrer Painting		◎	◎	○
Filiform Corrosion Resistance		◎	◎	◎
Paint Adhesion		○	○	◎
Internal Surface No-lubricant Press Formability		○	○	△
Solderability		○	◎	×
Weldability		○	○	△
Heat Resistance		○	○	◎

◎:excellent ○:good △:fair ×:poor

Application

Consumer Packaging and Industrial Packaging

ETP is primarily used for packaging foodstuffs and beverages, but it is also used in containers for oils, grease, paints, polishes, chemicals and many other products. Aerosol containers and caps and closures are also made from ETP.

TFS are most frequently used for can tops, screw and lug caps, snap and press–on closures and shallow–drawn food cans.

Miscellaneous

In Electronics: Electrodes, Cable tape, Magnetic screen covers, etc.

In Engineering: Automotive oil filters, Automotive air filters, Gaskets, etc.

In Construction: Gas meter internal components, Heat exchangers, cookware, shelving, etc.

Steel Types

Steel Grade	Characteristics	Products
SPCC	Normal cold reduced carbon steel, industrial grade, non–food contact.	ETP、TFS
MR	Base steel low in residual elements that has excellent corrosion resistance, widely used in general applications.	ETP、TFS
L	Base steel extremely low in residual elements such as Cu, Ni, Co, and Mo that has excellent corrosion resistance to certain types of food products.	ETP、TFS
D	Aluminum–killed base steel used in applications involving deep drawing or other types of severe forming that tend to give rise to Lueder's lines.	ETP

Types and Sizes Available

Available Sizes

	Temper	Nominal Thickness (mm)	Nominal Width (mm)
SR-CA	T-1.5CA	0.22-0.25	700-840
		0.26-0.35	700-915
		0.36-0.49	790-960
	T-2.5CA	0.22	700-880
		0.23-0.26	700-1050
		0.27-0.45	700-1150
		0.46-0.55	900-1150
	T-3CA	0.18-0.19	700-840
		0.20-0.21	700-880
		0.22	700-940
		0.23-0.26	700-1050
		0.27-0.35	700-1150
		0.36-0.45	800-1150
		0.46-0.55	900-1150
	T-3.5CA	0.20-0.22	700-900
		0.23-0.32	700-1050
		0.33-0.50	800-1050
	T-4CA	0.18-0.22	700-1050
		0.23-0.26	700-1150
		0.27-0.36	700-1080
	T-5CA	0.18-0.22	700-1050
		0.23-0.26	700-1150
		0.27-0.29	700-960
		0.30-0.50	800-1000

Types and Sizes Available

	Temper	Nominal Thickness (mm)	Nominal Width (mm)
SR-BA	T-2BA	0.22 - 0.50	700 - 960
	T-2.5BA,T-3BA	0.19	700 - 860
		0.20	700 - 900
		0.21	700 - 920
		0.22 - 0.23	700 - 940
		0.24 - 0.50	700 - 960
DR-CA	DR520 DR7M	0.15	700 - 880
		0.16	700 - 920
		0.17	700 - 940
		0.18 - 0.28	700 - 970
		0.29 - 0.40	800 - 970
	DR550 DR8	0.14	700 -880
		0.15 - 0.16	700 - 920
		0.17 - 0.26	700 - 970
		0.27 - 0.38	800 - 970
	DR580 DR8M	0.14	700 - 920
		0.15	700 - 950
		0.16 - 0.25	700 - 970
		0.26 - 0.36	800 -1000
	DR620 DR9	0.14	700 - 940
		0.15 - 0.23	700 - 970
		0.24 - 0.34	800 - 1000
DR-BA	DR520 DR7M	0.15	700 - 880
		0.16 - 0.17	700 - 900
		0.18 - 0.40	700 - 960
	DR550 DR8	0.14	700 - 820
		0.15	700 - 900
		0.16	700 - 920
		0.17 - 0.37	700 - 960

Coating

ETP Coating Weight

	Former Coating Designation	Coating Weight Code	Nominal Coating Weight (g/m^2)	Minimum Average Coating Weight (g/m^2)
Equally Coated	10#	1.1/1.1	1.1/1.1	0.9/0.9
	20#	2.2/2.2	2.2/2.2	1.8/1.8
	25#	2.8/2.8	2.8/2.8	2.5/2.5
	50#	5.6/5.6	5.6/5.6	5.2/5.2
	75#	8.4/8.4	8.4/8.4	7.8/7.8
	100#	11.2/11.2	11.2/11.2	10.1/10.1
Differentially Coated	25#/10#	2.8/1.1	2.8/1.1	2.5/0.9
	50#/10#	5.6/1.1	5.6/1.1	5.2/0.9
	50#/25#	5.6/2.8	5.6/2.8	5.2/2.5
	75#/25#	8.4/2.8	8.4/2.8	7.8/2.5
	75#/50#	8.4/5.6	8.4/5.6	7.8/5.2
	100#/25#	11.2/2.8	11.2/2.8	10.1/2.5
	100#/50#	11.2/5.6	11.2/5.6	10.1/5.2
	100#/75#	11.2/8.4	11.2/8.4	10.1/7.8
	125#/50#	15.1/5.6	15.1/5.6	13.9/5.2

TFS Coating Weight

Metallic Chromium Layer (one side)		Chromium Oxide Layer (one side)	
Minimum Average Coating Weight	Maximum Average Coating Weight	Minimum Average Coating Weight	Maximum Average Coating Weight
50 mg/m^2	150 mg/m^2	5 mg/m^2	35 mg/m^2

Surface Finishes

Fninsh	Surface Roughness Alm Ra	Features & Applications
Bright	0.25	Bright finish for general use
Stone	0.40	Surface finish wifh stone marks that make printing and can–making scratches less consplcuous.
Super Stone	0.60	Surface finish with heavy stone marks.
Matte	1.00	Dull finish mainly used for making crowns and DI cans (unmelted finish for tinplate).
Silver (Satin)	—	Rough dull finish mainly used for making artistic cans (tinplate only,melted finish).

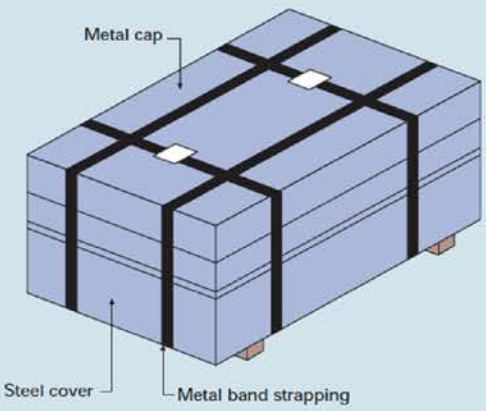
Oiling: If no engagement, tinplate and TFS are electro statically oiled with DOS.

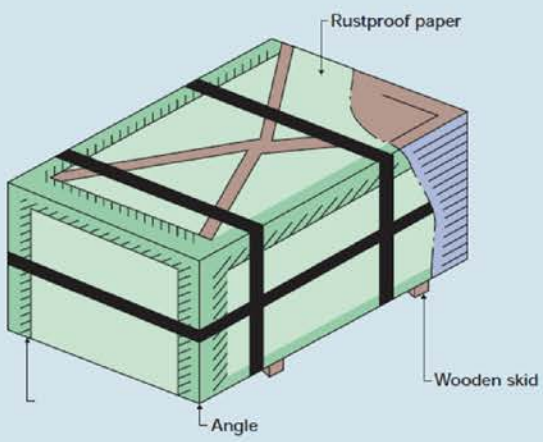
Special Requirement

- **Slitting ETP/TFS Coil:** width 2~599mm available after slitting with precise tolerance control
- **Color prepainted ETP/TFS:** according to or customers' color or logo design

Packing Details

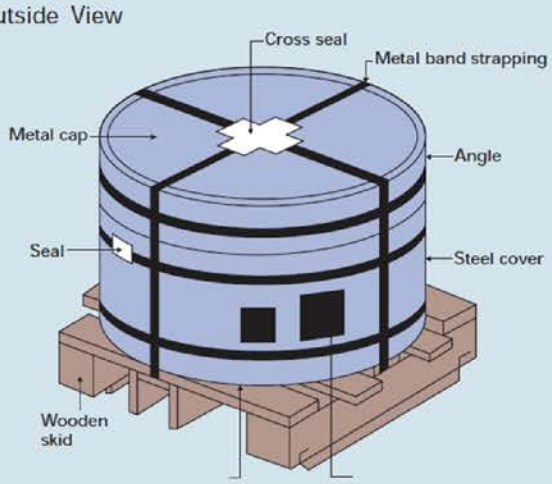
Sheets



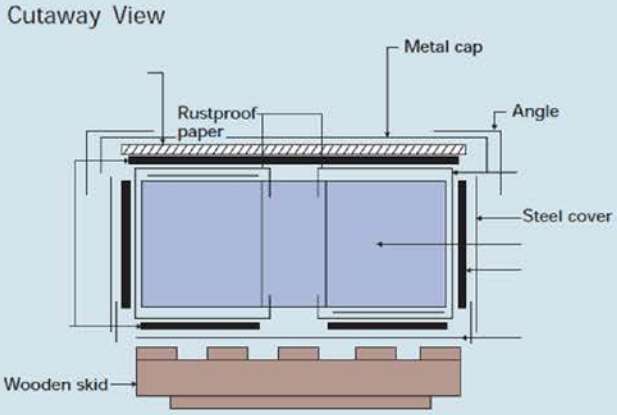


Coils

Outside View



Cutaway View



Tinplate Usage Precautions

- As Tinplate is covered by soft metallic tin coatings, due precautions should be taken not to cause scratches by rough handling or vibration during transportation.
- Paintability, printability, solderability, and mechanical properties of Tinplate tend to deteriorate as time elapses after production. Useas soon as possible after delivery.
- Although Tinplate has excellent corrosion resistance, it tends to rust in a humid atmosphere. Use as soon as possible after unpacking.
- Tin is dissolved by a strongly alkaline solution. When using Tinplate for making cans for alkaline contents, paint the internal surface.
- As contents that contain sulfur cause blackening of the Tinplate surface, paint the internal surface.

TFS Usage Precautions

- TFS is not compatible with soldering and DI forming. However, once painted, it can be used in almost all applications where TIN PLATE is used.
- The metallic coating layer of TFS has a high electrical resistance. When welding it, the metallic coating layers in the welded areas should be removed in advance.
- TFS tends to rust in a humid atmosphere. Use as soon as possible after unpacking.
- The external surfaces of cans should be painted to prevent corrosion.
- The internal surfaces should also be painted to prevent corrosion except when the content is motor oil or cooking oil.
- TFS does not provide sacrificial protection like TIN PLATE. Due precautions should be taken not to cause scratches on the surface of TFS after it is formed into cans and painted.

Inquiry and Order

The following information are essential for inquiries and orders

1. Product name and grade.
2. Coating weight (for tinplate only), temper grade, finish, and product size.
3. Rolling direction.
4. Quantity.
5. Application and delivery date.
6. Number of sheets per packaging (for cut–to–length products).
7. Inner diameter and maximum acceptable unit coil weight (for coiled products).
8. Other special requirements, if any.

Standard Reference:

- GB/T2520, 24180
- JIS G3303, 3315
- ASTM A623, A624, A625, A626, A650, A657
- ISO11949, 11950
- EN10202, 10203

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