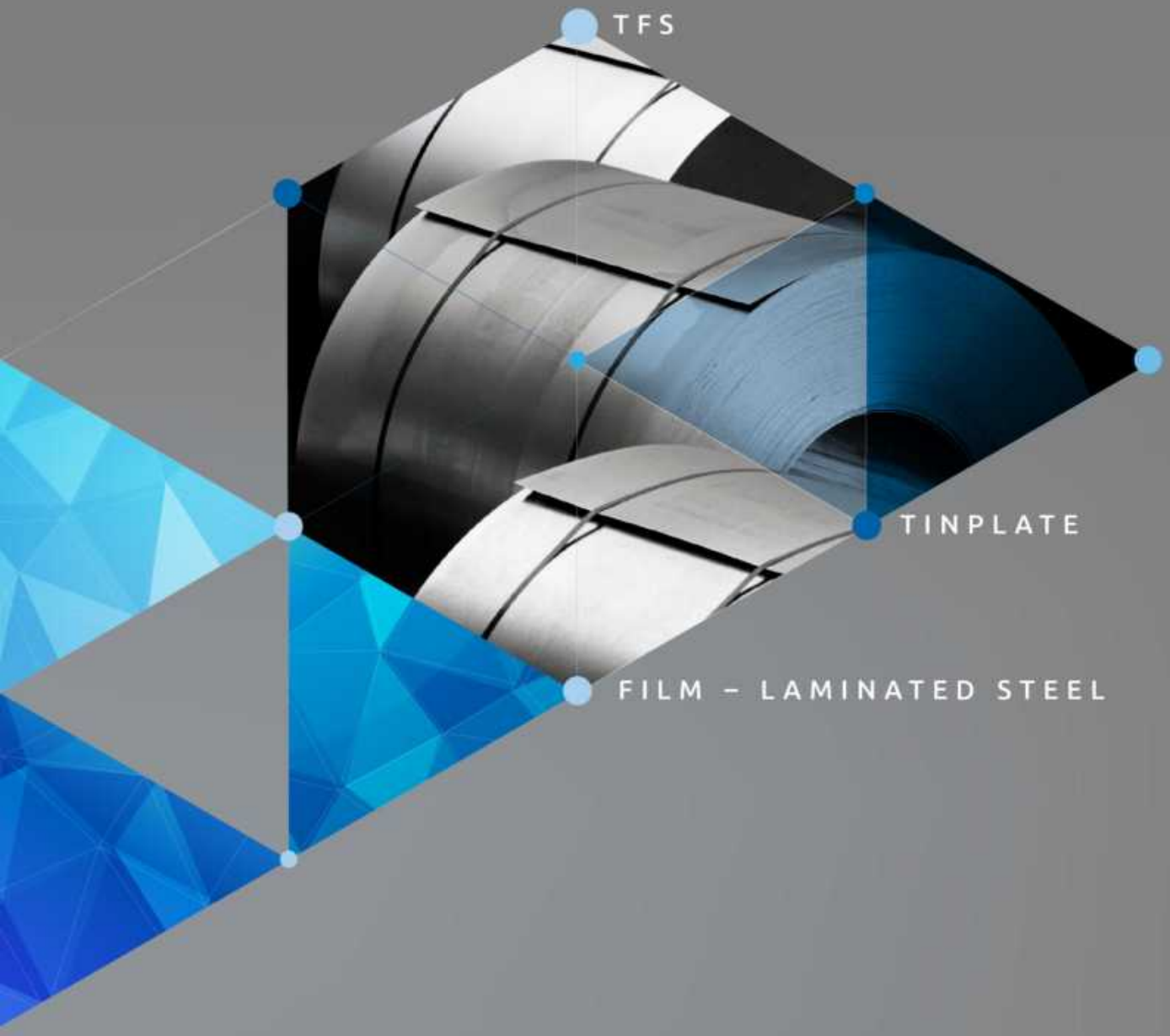


FORUS GROUP

Forus Group provides products and services that benefit society and we grow in partnership with our customers and partners


FORUS GROUP

Introduction

Forus Group is a globally integrated enterprise with the headquarter in HONG KONG (HongKong Forus LTD, 2010) and branches in China (Shanghai Forus Metal Materials LTD.), Australia (Forus Australia PTY LTD) and Russia (LLC FORUS). We are committed to supplying premium steel product, metal coating/printing ink, metal packaging production systems and steel processing equipment worldwide. Strategic partnership with World leading manufacturers and service providers shapes our competitive advantage in supplying best quality product and service to our customers. Flexibility, innovation, collaboration and communication underpin Forus's principal imperative, which is **Providing One-stop, Customized and Comprehensive service for our product to our customers.**

FORUS GROUP provides prepurchase service

- We provide detailed instruction data and standards of the manufacture's steel products.
- We service our clients with instructions on correct selection of material.

FORUS GROUP provides on-purchase service

- We provide order tracking information to ensure punctual goods delivery.
- We perform sample inspection and make sure that the production is conducted in compliance with the contract.

FORUS GROUP provides after sales service

- We provide clients with online query for certificated quality level.
- We provide clients with advisories for various problems met during the application.

CONTENTS

TINPLATE

TINPLATE

Tin mill products include 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 consisting of a thin layer of chromium and a layer of chromium oxide deposited on the steel base. Both of them have a beautiful, metallic luster as well as excellent properties in corrosion resistance and paintability.

List Of Tin Mill Products

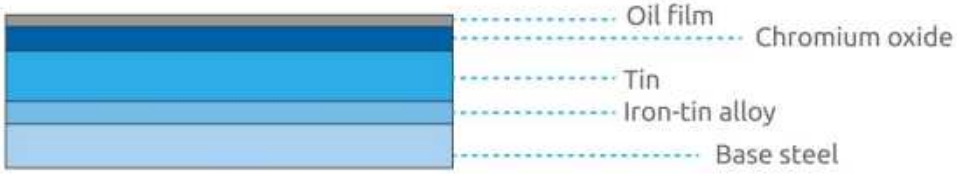
Tin Mill Products

TINPLATE	SR
	DR

Note:
Tinplate includes K-tinplate, DI-tinplate, Low-Tin Plate, L-Cr Tinplate.

Coating Structure

- ETP Products



Features

Features of Tinplate Products

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 Solder-ability & 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.

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 remo ved, its weldability is inferior to ETP.
Coating weights	Unlike the multiplicity of coating weights with tin, only one standardized chromium-coated product is manufactured.

Comparison of Properties

		Tinplte		TFS
		2.8	Over 5.6	
Bare Corrosion Resistance (sealed) [1]	Rust Resistance	○	◉	○
	Acid Resistance	○	○	△
	Alkali Resistance	△	△	◉
	Black Sulfide Stain Resistance	△	△	◉
	Stress Cracking Resistance	◉	◉	○
Paintability		○	○	◉
Corrosion Resistance after Painting [2]		◉	◉	○
Filiform Corrosion Resistance		◉	◉	◉
Paint Adhesion		○	○	◉
Formabity		◉	◉	○
Solderability		○	◉	x
Weldability		○	○	△[3]
Heat Resistance [4]		○	○	◉

◉ excellent ○ good △ fair x poor

Note:
(1) Bare corrosion resistance is evaluated under tightly sealed conditions.
(2) Corrosion resistance after painting is evaluated by crosshatching corrosion tests.
(3) The evaluation is for the case where welding is performed without grinding the surface to remove the metallic coating layer.
(4) High-temperature baking after painting and printing may cause changes in material properties.

Advantages of Tinplate Cans in Food Packaging

Hygienic	Provide excellent and non-toxic barrier properties to protect food products from impurities, bacteria, moisture, light, and odours.
Safe	Low weight and high strength make food cans easy to ship and store.
Eco-friendly	Offer 100% recyclability; and significant cost benefits compared with aluminum.

K-Tinplate's Resistance to Corrosion

Pickling Lag Value	Iron Solution Value	Tin Crystallite Size	Alloy-Tin Couple
≤ 10 Sec	≤ 20μg/3in²	≤ 9#	≤ 0.12μA/3in²

Note:
If different coating tinplate, the sideof higher coating weight was tested

Mechanical Properties of DR Tin Mill Products

Temper Grade	(HR30Tm) Hardness		Yield Strength/ MPa
	Target Value	Range	
DR-7M	71	71±5	520
DR-8	76	73±5	550
DR-8M	77	73±5	580
DR-9	73	76±5	620
DR-9M	73	77±5	660
DR-10	80	80±5	690

Note:
Making cans with DR materials, please pay a special attention to the rolling direction.

Applications Of Tinplate And TFS

Consumer Packaging and Industrial Packaging

TINPALTE	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	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.

Application Examples

DI can

Two-piece steel can represents the highest development level of tinplate production. Nowadays, Our DI material is used for two-piece can to pack beer and carbonated beverage such as Cocacola and Pepsi-cola.

Three-piece can for beverage

Representative Clients: Include Wanglaoji, Redbull, Robust, Etc.

Food can (3-piece can & 2-piece can)

Our tin mill products are used for the package of all kinds of canned food such as Huangguan, Meilin and Gulong.

Metal closure and ends

Our tinplate and TFS are used for Budweiser, Harbin and Yanjing beer, etc. Our the major supplier of Ziquan Group, Huapeng closures, Yiwu Easy Open End Industry Group, etc.

Spray can

Clients are Hangzhou Meite, Shenzhen Huate, zhongshan Kaida, etc.

High-grade industrial package

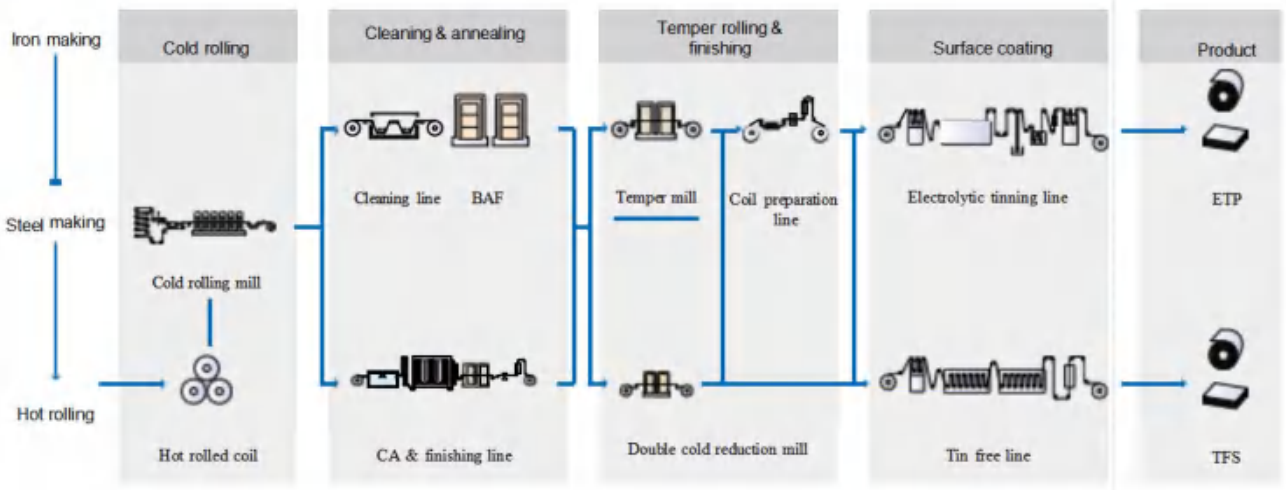
Tinplate and TFS are used for the package of Nippon, International Paint, Sigma.

High-grade gift package

Irregular cans are made from Our tinplate and TFS for high-grade gift package.

Manufacturing Process

Process Diagram



Note:
Tinplate and TFS products are manufactured under strict quality control all through the manufacturing process to provide the excellent corrosion resistance and uniform material properties required of can-making materials.

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

A	Mechanical Properties	Hardness (temper grade)
B	Dimensional Accuracy	Thickness Width Cut-length
C	Shape Parameters	Bowness Camber Askewness Edge waviness
D	Lubrication	Oil film
E	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)

Available Specifications And Sizes

Steel Types

Steel grade	Characteristics	Products
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

Note:
With regard to steel types other than those listed above, please consult us.

Available Sizes

- 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		

- 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	

Note:
(1)There are two types of annealing: batch annealing(BA) and continuous annealing(CA). When continuous annealing is designated, the symbol of "CA" is added after the temper grade symbol such as "T-4CA".
(2)The DR materials can also be manufactured by box annealing, Normal Width limited from 700~1050mm. Please consult us.

Coating Weight

ETP

	Former Coating Designation	Coating Weight Code	Nominal Coating Weight (g/m2)	Minimum average Coating Weight (g/m2)
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

Note:

(1) The tin coating weight is determined in accordance with specific end use applications.Tinplate with a heavy coating weight is used for making cans that require a high corrosion resistance or those used bare. Tinplate with a light coating weight is used for making cans that do not require so high a corrosion resist ance or those used after painting or printing.
(2) Differential Markings A white line (differential marking) is painted along the edge of a differentially coated product in order to clearly indicate that it is differentially coated.
(3) With regard to other types of differential markings, please consult us.

Surface Finishes

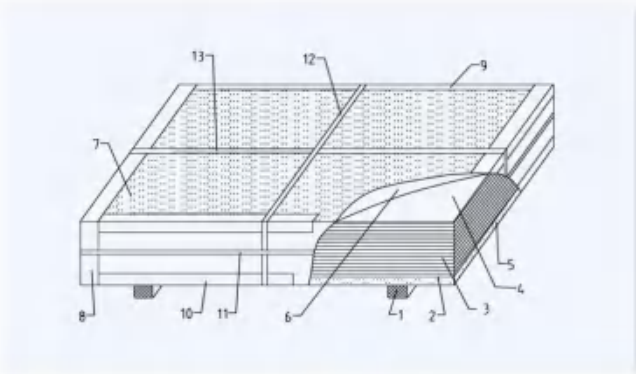
- ETP

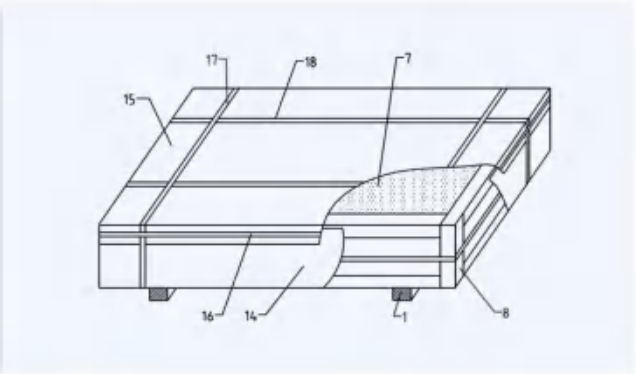
Black Plate	Code	Surface Finish	Characteristics
Single Reduce	B	Bright surface	Glazed surface obtained after melting treatment of electro tinned smooth raw material strip with extremely fine stone figure s by processing.
	R	Stone surface	Glazed surface obtained after melting treatment of electro-tinned raw material strip featuring certain oriented stone figures.
	R2	Stone rough surface	Glazed surface obtained after melting treatment of electro-tinned raw material strip featuring certain oriented stone figures, roughness higher than "R".
	S	Silver surface	Glazed surface obtained after melting treatment of electro-tinned raw material strip with rough matt surface.
	S2	Silver rough surface	Glazed surface obtained after melting treatment of electro-tinned raw material strip with rough matt surface, roughness high er than "S".
	M	Matte surface	Matt surface of general matt raw material strip without reflowing treatment.
Double Reduce	R	Stone surface	Glazed surface obtained after melting treatment of electro-tinned raw material strip featuring certain oriented stone figures.
	M	Matte surface	Matt surface of general matt raw material strip without reflowing treatment.

Oiling

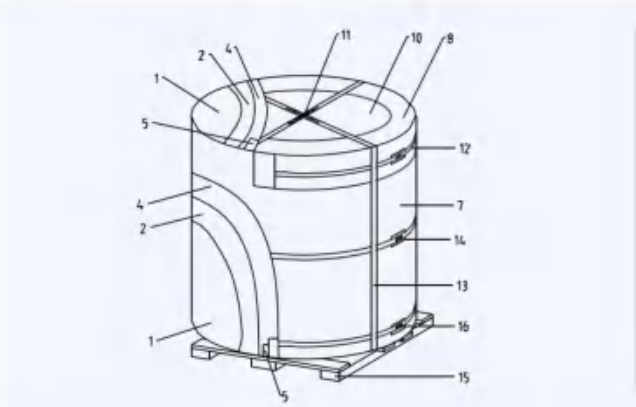
- If no engagement, tinplate and TFS are electro statically oiled with DOS.

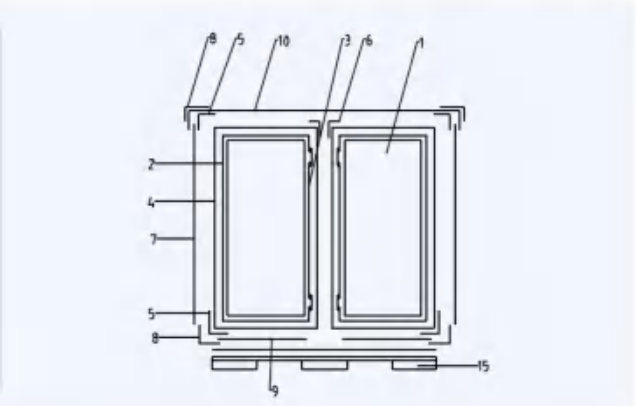
Packaging and Marking





01 Wood bracket
02 Bottom cover
03 Steel sheet
04 Top cover
05 Bottom corrugated paper
06 Rust-proof paper
07 Top corrugated paper
08 Side corner guard
09 Top corner guard
10 Bottom corner guard
11 Circumferential banding strip (inner)
12 Horizontal banding strip (inner)
13 Vertical banding strip (inner)
14 Grard plate
15 Steel package box
16 Circumferential banding strip (outer)
17 Horizontal banding strip (outer)
18 Vertical banding strip (outer)





01 Steel coil
02 External peripheral rest-proof paper
03 Inner core rest-proof paper
04 Paper inner corner guard
05 Paper external corner guard
06 Iron round cover
07 Iron inner corner guard
08 Iron external corner guard
09 External peripheral wrapping plate
10 Inner peripheral guard plate
11 Circumferential banding strip
12 Radial banding strip
13 Shim for lock
14 Lock

Offers coils and sheets, coil packed in a vertical form or a horizontal.
A label that indicates the manufacturing history is affixed to the outside of the packaging.
In addition, a service card is contained inside.
With regard to types of packing and markings, please consult us.

Products Standard

ETP

- ETP orders are placed in accordance with Q/BQB 450-2009 standard which uses in a non-equivalent to JIS G 3303:2008, DIN EN 10202:2001, EN 10203 standards

List of Usual Specification

	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
	T-2.5CA,T-3CA (IF)	0.26-0.5	800-1000

Note:
Specific specifications are available on-site subject to the actual production.

	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

Usage Precautions

Usage Precautions for ETP

01 As ETP is covered by soft metallic tin coatings, due precautions should be taken not to cause scratches by rough handling or vibration during transportation.

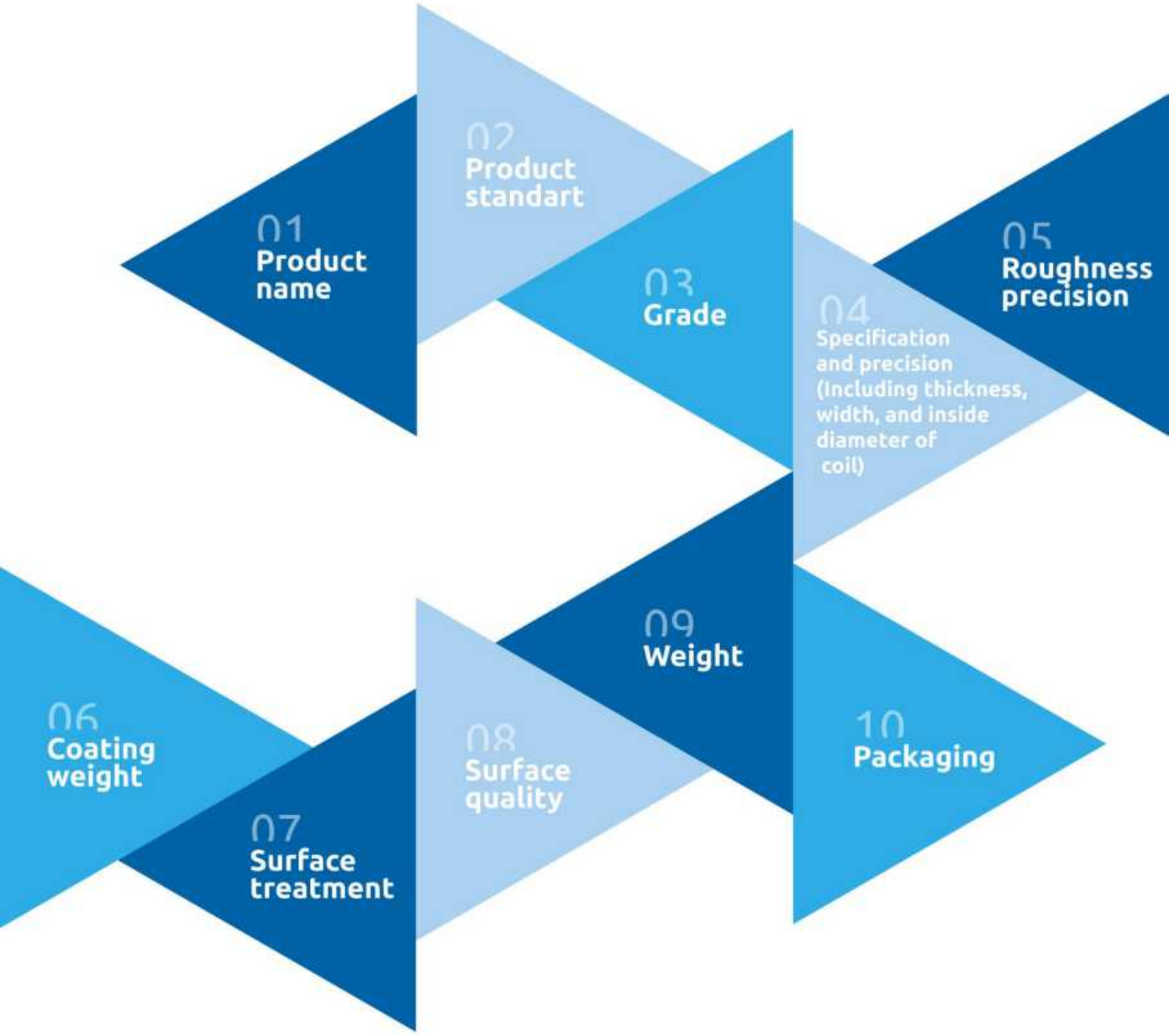
02 Paintability, printability, solderability, and mechanical properties of ETP tend to deteriorate as time elapses after production. Use as soon as possible after delivery.

03 Although ETP has excellent corrosion resistance, it tends to rust in a humid atmosphere. Use as soon as possible after unpacking.

04 Tin is dissolved by a strongly alkaline solution. When using ETP for making cans for alkaline contents, paint the internal surface.

05 As contents that contain sulfur cause blackening of the ETP surface, paint the internal surface.

Information Required with Orders and Inquiries



Please contact us to get more information

FORUS HONG KONG (HQ)

Office 910, 9F, 610 Nathan Road, Kowloon, Hong Kong, China.
+852-38927477
info@forusgroup.com

FORUS SHANGHAI

Office 1404, 1101 Pudong South Road, Pudong New District, Shanghai, China.
+86 (021) 68775187
info@forusgroup.com

FORUS AUSTRALIA

618/5 Alma road, Macquarie park, Sydney. 2113.
+610452619660
info@forusgroup.com

FORUS RUSSIA

Office 311, Building 2, 2 Prospect Marshala Zhukova, Moscow, Russia.
+7 (495) 5392768
info@forusgroup.com