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# Electrolytic Tinplate



NIPPON STEEL CORPORATION

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### Introduction

NIPPON STEEL tinplate has long been used throughout the world in food cans, beer cans, beverage cans, 18 liter cans, oil cans, pails, decorative cans, screw caps, crown caps, toys and many other products.

In some ways tinplate is as it has always been, a strong, low-cost steel sheet coated with tin for a beautiful, corrosion-resistant surface. Today, however, continuous casting, continuous annealing, double reduction and other advanced processes are used to make tinplate that is even better and more economical than that of the past. NIPPON STEEL is a master of the new processes.

As one of the world's largest makers of tinplate, NIPPON STEEL conducts extensive R & D programs to assure customers that NIPPON STEEL tinplate is a product of the most up-to-date facilities and technology and that it is of unsurpassed quality.

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#### Features of NIPPON STEEL Electrolytic Tinplate 1. Excellent Corrosion 3. Wide Choice Resistance NIPPON STEEL electrolytic tinplate comes in a wide range of types to allow selection of NIPPON STEEL electrolytic tinplate is prothe tinplate most suitable for any specific duced on the most up-to-date equipment application: using the most advanced technology. The 1. Wide range of coating mass. tinning operations are closely controlled, as 2. Differential coatings available. are the chemical composition and surface 3. Choice of Bright Smooth Finish, Matte quality of the base metal. That means the Finish, and Stone Finish. coating mass (weight) is uniform, and that 4. Comes in both cut sheets and coils. corrosion resistance is high. 5. Wide range of tempers. 6. The most advanced double reduction mill is 2. Excellent Properties used to produce NIPPON STEEL DR (double-reduced) tinplate. for Can-Making 7. Wide range of base metals. 8. K-plate, J-plate and other highly corro-NIPPON STEEL electrolytic tinplate incorposion resistant grades are also available. rates every property vital to the easy pro-9. Good workability of DI (Drawn & Ironed) duction of quality cans: lacquerability, printmaterial. ability, solderability, weldability and 10. Scrolled cut sheet available. workability. 11. Coated and printed sheet available. 12. Slit coil available. Steel cans made of tinplate - oil film



## Manufacturing Process











### **Available Specifications and Applications**

### Standard Specifications \_\_\_\_

Electrolytic tinplate is produced in conformity with Japanese Industrial Standard (JIS G 3303) or American Society

### **Applications** \_

Electrolytic tinplate is classified according to the extent of tempering, the tin coating mass, the type of steel, annealing methods, surface finish, etc. Electrolytic tinplate offers excellent properties for use in a broad range of applications:

### Classification.

1. This table conforms to JIS G 3303. NIPPON STEEL also produces electrolytic tinplate according to

2. Figures under Equally Coated Mass represent the total coating mass for both sides. Figures under Differentially Coated Mass represent the coating mass for each

ASTM specifications.

Notes:

side.

### **COATING MASS (WEIGHTS)**

There are two types of coating mass: the Equally Coated Mass (in which both sides have the same mass of tin coating) and the Differentially Coated Ma

ss (in which one side						
Letter symbol of classifica- tion	Type of coating	Designation of coating mass	Nominal coating mass (g/m²)	MinimumFormeraveragedesignaticcoatingcoating mmass (g/m²)(reference)		- ation of g mass nce only)
	Equally coated	2.8/ 2.8	2.8/ 2.8	2.45/2.45	#	25
		5.6/ 5.6	5.6/ 5.6	5.05/5.05	#	50
		8.4/ 8.4	8.4/ 8.4	7.55/7.55	#	75
		11.2/11.2	11.2/11.2	10.1/10.1	#	100
CDTE	Differen- tially coated	5.6/ 2.8	5.6/ 2.8	5.05/2.45	#	50/25
SPIE		8.4/ 2.8	8.4/ 2.8	7.55/2.45	#	75/25
		8.4/ 5.6	8.4/ 5.6	7.55/5.05	#	75/50
		11.2/ 2.8	11.2/ 2.8	10.1 /2.45	# `	100/25
		11.2/ 5.6	11.2/ 5.6	10.1 /5.05	# '	100/50
		11.2/ 8.4	11.2/ 8.4	10.1 /7.55	# '	100/75

Coating mass for the top surface of the piled sheet or the outside surface of coil

of Testing and Materials (ASTM) specifications. As for other specifications, please contact us.

food cans, beer and soft drink cans, 18 liter cans, decorative and general cans, crown caps and screw caps, as well as electrical parts, oil filter parts and wire-shielding material.

is more heavily coated than the other). For coating mass not listed in the table please contact us

Example:

2.8/11.2

Coating mass for the bottom surface of the piled sheet or the inside surface of coil

#### **DESIGNATIONS AND MARKINGS FOR DIFFERENTIAL COATINGS**

NIPPON STEEL differentially coated electrolytic tinplate. Please order according to the following three designations

Notes: If use of parallel lines or metrical symbols is und able because of appeara or because of print or p designs, single line markin edge developed by NIP STEEL can be employed.

The following designations and markings are used for and markings for differentially coated electrolytic tinplate.

	Designation	Parallel lines on heavy coating side	Geometric symbols on light coating side	Edge line mark on light coating side
	5.6/2.8	1/2″ apart	1" square	
	8.4/2.8	1″ apart	1" circle	1/16" lines are marked
geo- lesir- ance, paint g on PON	8.4/5.6	1″ apart	1" circle	on the single side within
	11.2/2.8	1-1/2″ apart	1-1/2"×1" widediamond	4 mm of an edge.
	11.2/5.6	1-1/2″ apart	1-1/2"×1" widediamond	
	11.2/8.4	1-1/2″ apart	1-1/2"×1" widediamond	
	Examples of	5.6M/2.8	5.6/2.8M	5.6/2.8S
	designation	11.2M/2.8	11.2/2.8M	11.2/2.85

#### TEMPER

NIPPON STEEL produces tinplate in the following tempers.

	Designation	Nominal rockwell hardness (HR30TSm)	Characteristic	Typical usages	
	T-1	49	Soft for drawing	Drawing requirements, drawn and ironed cans, nozzles, spouts, closures	
	T-2	53	Moderate drawing where some stiffness is required	Rings and plugs, dome tops, closures, shallow drawn and specialized can parts	
	T-2.5	55	Combines the characteristics of T-2 and T-3.	Battery cell bodies, small can ends and bodies	
SR	T-3	57	Shallow drawing, general purpose with fair degree of stiffness to minimum fluting	Can ends and bodies, large diameter closures, crown caps	
	T-3.5	59	Decreased stiffness	Can bodies, and closures and crown caps	
	T-4	61	Moderate stiffness	Can bodies, crown caps and closures	
	T-4.5	63	Stiffness	Can bodies, crown caps and closures	
	T-5	65	Increased stiffness to resist buckling without the use of rephosphorized steel	Can ends and bodies	
	DR-7.5	71			
	DR-8	72			
DR	DR-8.5	73	Great stiffness and strength	Can ends and bodies,	
	DR-9	75	Great stimess and strength	drawn-and-redrawn-cans	
	DR-9M	76			
	DR-10	79			

Notes: 1. The annealing method involves batch annealing and continuous annealing, and even though the hardness values expressed in HR30T obtained from those processes are equal, mechanical characteristics other than hardness are not always consistent. Therefore, you may specify either of them by agreement with us. In the case where the continuous annealing process is selected, the letter symbol CA shall be suffixed to the temper designation specified in Table (Example: T-4 CA).

2. Rockwell hardness values are based on the use of a diamond anvil.

#### **Double-Reduced (DR) Tinplate**

DR tinplate is a thin, strong material developed by NIPPON STEEL as a substitute for ordinary tinplate to meet customers' requirement to reduce tinplate thickness.

#### Features

- •Stiffness and strength are equal to those of much thicker ordinary tinplate.
- Reduced thicknesses make it possible to increase the number of sheets per unit mass, and consequently, reduce costs.
- •NIPPON STEEL DR tinplate has excellent uniform quality through the application of continuously cast steel.

#### Applications

Because of its great stiffness and strength, DR tinplate has been used mainly in the bodies and ends of ordinary beer and carbonated beverage cans. But recently its applications have been extended to necked-in cans, drawn-and-redrawn cans (DRD), soft drink cans, food cans, screw caps, etc, where ordinary tinplate has been used.

#### FINISHES

NIPPON STEEL electrolytic tinplate is available in the following surface finishes.

Finish	
Bright	Melted finish. This finish feat electrolytic tinplate.
Stone	Melted finish. This finish has during coating and can maki
Super stone	Melted finish. High resistanc and can-making widely used
Matte	Unmelted dull finish. This fin exceptional ink adherence, a
Silver	Melted finish. This finish is obt has an attractive, subdued lust ance and finds much use in the

#### **STEEL TYPES**

NIPPON STEEL produces tinplate base steel in a broad range of types to meet customers' requirements for corrosion resistance, workability and strength. Chemical compositions are controlled by ladle analysis.

Chemical Treatment

Chemical Treatment

### **Available Sizes**

	Single-reduced size			Double-reduced Tinplate size				
	Sheet		Coil		Sheet		Coil	
	Negotiable Range	Normal Range	Negotiable Range	Normal Range	Negotiable Range	Normal Range	Negotiable Range	Normal Range
Thickness mm (lbs)	0.12–0.60 (44–214)	0.20–0.41 (72–146)	0.12–0.80 (44–285)	0.20–0.41 (72–146)	0.10–0.49 (36–175)	0.15–0.36 (54–128)	0.10–0.49 (36–175)	0.15–0.36 (54–128)
Width mm (in)	508–1,080 (20–42.5)	680–950 (26.8–37.4)	508–1,080 (20–42.5)	680–950 (26.8–37.4)	508–1,040 (20–40.9)	680–950 (26.8–37.4)	508–1,063 (20–41.8)	680–950 (26.8–37.4)
Length mm (in)	457–1,083.9 (18–42.6)	500.1–1,063 (19.7–41.8)	_	_	457–1,083.9 (18–42.6)	500.1–1,063 (19.7–41.8)	_	—
Coil Mass metric tons (lbs)	_	_	2–14 (4,410–30,860)	5–14 (11,030–30,860)	_	_	2–14 (4,410–30,860)	5–14 (11,030–30,860)
Coil Inside Diameter mm (in)	_	_	406, 419, 508 (16, 16.5, 20)	419, 508 (16.5, 20)	_	_	406, 419, 508 (16, 16.5, 20)	419, 508 (16.5, 20)
Coil Outside Diameter mm (in)			1778 Max. (70 Max.)	1778 Max. (70 Max.)			1,778 Max. (70 Max.)	1,778 Max. (70 Max.)

#### Applications

tures a metallic gloss of tin. It is the natural finish for ordinary

fine grit lines, and is easy to handle because it resists scratching

e to scratching, thus making for easy handling during coating for can ends.

ish gives the tinplate a unique silver-gray surface. It offers nd is widely used in crown caps and printed cans.

ained by reflowing tin on dull finished plate. The finished surface ter. When printed or lacquered, silver finish has a beautiful appeare production of high quality decorated cans and screw caps.

Steel types	Remarks
L	This steel which is low in metalloids and residual elements, is sometimes used for improved internal corrosion resistance for certain food product containers.
MR	Similar in metalloid content to Type L but less restrictive in residual elements, is commonly used for most tinplate applications.
D	Aluminum killed, is sometimes required for severe drawing applications or to minimize severe fluting and stretcher strain hazards.

Chromate treatment	
Non-chromatetreatment	Phosphate treatment
	Zirconium treatment   ※EZP™

Note: For sizes out of above range, please contact us.

### **Packaging and Marking**



#### PACKAGING

NIPPON STEEL tinplate is packed with special care to withstand severe handling in marine transit. Special care is given to prevent rust and scratching.

Typical examples of packaging methods are shown above.

#### MARKING

Each package is marked with product name, specifications, coating mass, thickness, dimensions, temper, number of sheets contained, net mass, gross mass, production number, package number, origin and "NIPPON STEEL Corp." Other marks can be added, if desired.

An inspection card inside the package gives the same information.

### **Information Required for Ordering**

Customers are requested to provide the following information with orders or inquiries, so that NIPPON STEEL can meet their requirements perfectly.

- Coating mass, thickness and dimensions.
- Desired temper designation.
- Surface finish required (Bright, Matte, etc.).
- In the case of differentially coated tinplate, the coating mass for each surface and the differential mark to be used should be specified.
- Special information, if any, on the can-making process, including can shape, intended contents of the cans, and whether or not lacquering (printing) will be used, should be given.
- The grain direction or desired direction of rolling should be indicated.



### MEMO
