

TECHNICAL DATASHEET

TIN MILL BLACK PLATE

1. DESCRIPTION

Tin Mil Black Plate (TMBP) is a low carbon steel plate used as raw material for TFS or ETP and for some non-food applications. The material has a chemical composition that imparts special properties to resist corrosion.

The material is coated with a special oil film, which protects the sheet from the humidity in the environment and makes easy to handle. It is applied using an electrostatic oiler on both sides of the sheet.

2. USES

TMBP can be used for stamped parts, lids and ends, oval and cylindrical two pieces cans and rectangular cans, all of them for non-food uses.

3.0 TECHNICAL SPECIFICATIONS.

3.1 STEEL

TYPES OF STEEL	FEATURE
D	Aluminum killed steel (deoxidized). This is used for deep drawn cans (two-piece cans, aerosol, etc.) or in those processes where wrinkles –de Luders– are likely to appear during machining.

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L	Contains small quantities of metalloids and residual elements such as: Cu, Ni, Cr, Mo. Used to improve the internal corrosion resistance of cans for certain food products.
MR	Contains low percentages of residual elements and has a good corrosion resistance. It is the most common in the market and is used for general purposes, including cans.

3.2 CHEMICAL COMPOSITION

CHEMICAL COMPOSITION FOR STEEL USED FOR ETP			
Elemental	Type D % max	Type L (1) % max	Type MR (1) % max
Carbon	0.12	0.13	0.13
Manganese	0.60	0.60	0.60
Phosphorus	0.02	0.015	0.02
Sulfur	0,05	0,05	0,05
Silicon(2)	0.02	0.02	0.02
Copper	0.20	0.06	0.20
Nickel	0.15	0.04	0.15
Chromium	0.10	0.06	0.10
Molybdenum	0.05	0.05	0.05
Others, each	0.02	0.02	0.02

According to ASTM A623-2009. (1) Double reduction products are obtained in type L and MR. (2) When it is used steel obtained by continuous casting killed by silicon it is accepted until 0.08%

3.3 FINISHES

ETP FINISHED		
TYPE	MAIN USES	FEATURES
BRIGHT	General purpose cans	Finishing with melted tin, with a bright shine
MATE	Crown caps	Matte finish, without shine, with electrolytically deposited tin without melting on the matte finishes steel plate

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SILVER	Cans for differente applications, crown caps	Finish with melted tin produced using a special treatment on the base metal
STONE	General use cans	Finish with melted tin, produced on the base metal, with a slightly matte appearance. Resist scratching during lithography or cans production.

3.4 HARDNESS, TEMPER AND REDUCTION TYPE.

TEMPER	Hardness, HR 30T	Thickness: e,mm	Uses
T1-BA	Max 53	$e \leq 0,21$	Necks, nozzles, taps, toys bottoms for 5 gal. cans for oil and other uses that require deep drawing.
	Max 52	$0,21 < e \leq 0,28$	
	Max 51	$e > 0,28$	
T2-BA	53 ± 4	$e \leq 0,21$	Small, square cans, cans for fish (0) salted meat, rings and other uses, with moderate draw.
	52 ± 4	$0,21 < e \leq 0,28$	
	51 ± 4	$e > 0,28$	
T2,5 - BA, CA	56 ± 4	$e \leq 0,21$	Crowns, for cans and other applications that require moderate draw and harness.
	55 ± 4	$0,21 < e \leq 0,28$	
	54 ± 4	$e > 0,28$	
T3 - BA,CA	58 ± 4	$e \leq 0,21$	Bodies for 5 gal oil cans, large cans and other applications that require an appropriate level of hardness.
	57 ± 4	$0,21 < e \leq 0,28$	
	56 ± 4	$e \geq 0,28$	
T4 - C4 (1)	62 ± 4	$e \leq 0,21$	Bodies and bottoms for cans that require relatively high strenght, and crown caps.
	61 ± 4	$0,21 < e \leq 0,28$	
	60 ± 4	$e \geq 0,28$	
T5 - CA (1)	65 ± 4	$e \leq 0,21$	Bodies and bottoms for cans that require a combination of high hardness, strength, and good formability.
	65 ± 4	$0,21 < e \leq 0,28$	
	64 ± 4	$e \geq 0,28$	

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DR 7,5	70 ± 4	e ≤ 0,21	Bodies and bottoms of small diameter cans requiring high strength.
	70 ± 4	0,21 < e ≤ 0,28	
	70 ± 4	e ≥ 0,28	
DR 8(2) BA - CA	73 ± 4	e ≤ 0,21	
	73 ± 4	0,21 < e ≤ 0,28	
	73 ± 4	e ≥ 0,28	
DR 9(2) CA	76 ± 4	e ≤ 0,21	
	76 ± 4	0,21 < e ≤ 0,28	
	76 ± 4	e ≥ 0,28	
DR 9 M (2)	77 ± 4	e ≤ 0,21	
	77 ± 4	0,21 < e ≤ 0,28	
	77 ± 4	e ≥ 0,28	
DR 10	80 ± 4	e ≤ 0,21	
	80 ± 4	0,21 < e ≤ 0,28	
	80 ± 4	e ≥ 0,28	

(1) CA means continuous annealing and BA means box annealing. (2) DR: Base metal produced using the double cold reduction process; provides greater stiffness and strength than conventional base material and, therefore, provides the same strength using smaller cross sections. These advantages make it possible to produce more cans per unit weight. Service characteristic, thickness distribution and chemical characteristics are similar to those of conventional steel.

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3.5 TIN MILL BLACK PLATE AVAILABILITY

DIMENSIONS AVAILABILITY			
Variable	Units	Minimum	Maximum
3.4.1. MECHANICAL PROPERTIES AND COATINGS			
Thickness	mm	0,15	0,6
Temper	N/A	T1	DR10
Oil	mg/m2	0	25
3.4.2. PACKAGES PRESENTATION			
Rectangular cutting sheets			
Cutting length	mm	457,2	1250
Width	mm	600	965,2
Package weight	Kg	N/A	2500
Package height	mm	N/A	450
Pre-scroll cutting sheets			
Thickness	mm	0,13(1)	0,50
Cutting length	mm	610	1016
Width	mm	610	1118
Package weight	Kg	N/A	2500
Package height	mm	N/A	457,2

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Rectangular re-squared cutting sheets			
Thickness	mm	0,13(1)	0,40
Width	mm	600	1000
Cutting length	mm	500	1000
Package weight	Kg	N/A	2500
Package height	mm	N/A	450
Lithographed sheets (Press)			
Width	mm	710	1130
Lenght	mm	510	960
Maximum printing area	mm	1130 (Width)	945 (Length)
Package weight	Kg	N/A	2500
Package height	mm	N/A	450
Varnished sheets			
Width	mm	710	1130
Lenght	mm	510	960
Maximum printing area	mm	1130 (Width)	970 (Length)
Package weight	Kg	N/A	2500
Package height	mm	N/A	450
3.4.3 COILS PRESENTATION			
3.1 Coils			
Coil weight	Kg	1000	9000
Internal diameter	mm	419	505
External diameter	mm	610	1626

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Strips			
Thickness	mm	0,17	0,6
Coil width	mm	600	984
Strip width	mm	20	614
Strips by step	Units	2	15
Coil weight	Kg	1000	9000
Internal diameter	mm	505	-----
External diameter	mm	610	1624

1 Sheets with thickness less than 0.15 mm are provided by the customer

5.0 RECOMMENDATIONS AND PRODUCT HANDLING.

For maximum usage of the raw material, the following recommendations should be followed:

- The Tin Mill Black Plate (TMBP) should be stored in a humidity-free environment to prevent and risk of oxidation.
- Oxidation is the result of the interaction among the iron, exposed through imperfections in the coating, water (humidity) and oxygen in the air.
- To prevent oxidation it is necessary to take care when transporting, storing and handling the TMBP by following these precautions:
- Demand appropriate transportation, with vehicles that have floors and roofs in good condition

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- Inspect one hundred percent of each production order to check the general status of the packaging
- Never leave the TMBP outdoors
- Store the TMBP in closed warehouses with low relative humidity. In coastal areas or lots of rainfall, it is advisable to use equipment to reduce relative humidity to acceptable levels.
- Do not store TMBP without appropriate packaging
- Do not make piles higher than 2.50 m.
- Never handle TMBP without gloves. The humidity and salts in perspiration attack TMBP very quickly
- If the TMBP bales have to be inspected, they should be covered again for storage. If humidity is seen during inspection, it is advisable to use that TMBP immediately to prevent the oxidation process.
- Use TMBP immediately after opening it.
- In production processes that use TMBP and require cuts, the resulting parts should not be stored for a long time because the edges do not contain tin and become quickly oxidized
- Special care should be taken in handling and fabrication of cans and caps to avoid scratching the TMBP. Do not store the TMBP for very long because the oil applied to protect it evaporates and breaks down until it disappears

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- Do not rub the TMBP with abrasive material or use inorganic liquids to clean it. Use cotton and a solvent compatible with the lacquer or ink that is going to be used.
- Material storage should be as follows:
 - In general the lots with greater area or quantity should be located in the stack's lower side
 - Stack height should be necessary enough to keep visual control to avoid injuries. Moreover, the stability due the base/height and floor capacity resistant should be considered.



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