Designation: A623 – 22

Standard Specification for Tin Mill Products, General Requirements[1]

This standard is issued under the fixed designation A623; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope

1.1 This specification covers a group of common requirements, which unless otherwise specified in the purchase order or in an individual specification, shall apply to tin mill products.

1.2 In case of any conflict in requirements, the requirements of the purchase order, the individual material specification, and this general specification shall prevail in the sequence named.

NOTE 1—A complete metric companion to Specification A623 has been developed—Specification A623M; therefore no metric equivalents are presented in this specification.

1.3 The following safety caveat covers Annex A3 through Annex A10 of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A623M Specification for Tin Mill Products, General Requirements [Metric]

A700 Guide for Packaging, Marking, and Loading Methods for Steel Products for Shipment

A987 Practice for Measuring Shape Characteristics of Tin Mill Products

D1125 Test Methods for Electrical Conductivity and Resistivity of Water

E18 Test Methods for Rockwell Hardness of Metallic Materials

E112 Test Methods for Determining Average Grain Size

2.2 *U.S. Military Standards:*[3]

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-163 Steel Mill Products, Preparation for Marking and Storage

2.3 *U.S. Federal Standard:*[3]

Federal Std. No. 123 Marking for Shipment (Civil Agencies)

3. Terminology

3.1 *Definitions:*

3.1.1 *base box, n*—a unit of area equivalent to 112 sheets 14 by 20 in. or 31 360 in.^{2} (217.78 ft^2) (see Annex A1).

3.1.2 *base weight, n*—a term used to describe the thickness of tin mill products. The designated base weight multiplied by a factor of 0.00011 is the nominal decimal thickness, in inches of the material. Although it is customary industry-wide to use the term "pound" (for example, 75 lb), following the base weight designation, base weight is correctly used only to define nominal material thickness, and is not a measure of the weight of a base box.

3.1.3 *black plate, n*—light-gage, low-carbon, cold-reduced steel intended for use in the untinned state or for the production of other tin mill products; it is supplied only in a dry or oiled condition.

3.1.4 *box annealing, n*—a process involving slow heating of coils to a subcritical temperature, holding, and cooling therefrom, to soften the strip and relieve stresses produced during cold reduction. It is accomplished in a sealed container. By introducing and maintaining an inert or slightly reducing atmosphere during the cycle, a relatively bright surface is obtained.

[1] This specification is under the jurisdiction of ASTM Committee A01 on Steel, Stainless Steel and Related Alloys and is the direct responsibility of Subcommittee A01.20 on Tin Mill Products.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

3.1.5 *bright finish, n*—a surface that has a melted tin coating.

3.1.6 *bundle, n*—a unit containing two or more packages of a cut size, supported by a platform, generally consisting of ten or more packages. (Also commonly referred to as a multiple-package lift containing two or more packages.)

3.1.7 *burr, n*—metal displaced beyond the plane of the surface by slitting or shearing (see 9.1.7 and 9.2.6).

3.1.8 *camber, n*—the greatest deviation of a coil edge from a straight line. The measurement is taken on the concave side and is the perpendicular distance from a straight line to the point of maximum deviation (see 9.1.9 and 9.2.7).

3.1.9 *chemical treatment, electrolytic tin plate, n*—a passivating chemical treatment applied to the surface of electrolytic tin plate to stabilize the plate surface characteristics compatible with a specified end use (see Annex A8 and Annex A10).

3.1.10 *chemically treated steel, n*—light-gage, low-carbon, cold-reduced steel that has a passivating or chemical treatment applied to the surface to provide rust resistance or retard underfilm corrosion, or both.

3.1.11 *cold reduction, n*—the process of reducing the thickness of the strip cold, generally accomplished by one rolling through a series of four-high mills arranged in tandem.

3.1.12 *continuous annealing, n*—a process consisting of passing the cold-reduced strip continuously and in a single thickness through a series of vertical passes within a furnace consisting of heating, soaking, and cooling zones to soften the strip and relieve stresses produced during cold reduction; an inert or slightly reducing atmosphere is maintained in the furnace to obtain a relatively bright strip.

3.1.13 *differentially coated tin plate, n*—electrolytic tin plate with a different weight of tin coating on each surface.

3.1.14 *double-reduced plate, n*—plate given a second major cold reduction following annealing. Some double-reduced products are produced to achieve a minimum level of ductility (% elongation) in the material. These products carry the designation of High Elongation Double Reduced, or HEDR.

3.1.15 *electrolytic chromium-coated steel, n*—light-gage, low-carbon, cold-reduced steel on which chromium and chromium oxides have been electrodeposited.

3.1.16 *electrolytic tin plate, n*—light-gage, low-carbon, cold-reduced steel on which tin has been electrodeposited by an acid or alkaline process.

3.1.16.1 *J Plate, n*—electrolytic tin plate, No. 50 or heavier tin coating, with improved corrosion performance for some galvanic detinning food products as specified in the table following 3.1.16.2 and as measured by the Special Property Tests for Pickle Lag (*PL*) (see Annex A3), Iron Solution Values (*ISV*) (see Annex A5), Tin Crystal Size (*TCS*) (see Annex A4). The alloy layer is normally light in color, characteristic of the acid tinning process.

3.1.16.2 *K Plate, n*—electrolytic tin plate, No. 50 or heavier tin coating, with improved corrosion performance for some galvanic detinning food products as specified in the following table and as measured by the Special Property Tests for Pickle Lag (*PL*) (see Annex A3), Iron Solution Value (*ISV*) (see Annex A5), Tin Crystal Size (*TCS*) (see Annex A4), and Alloy Tin Couple (*ATC*) (see Annex A6) and Aerated Media Polarization (AMP) (see Annex A9).

Special Properties Aims	
Pickle Lag[A]	10 s max
Iron Solution Value	20 µg Iron max
Tin Crystal Size	ASTM No. 9 or larger
Alloy Tin Couple[B]	0.12 µA/cm^2 max

[A] The Pickle Lag test is not necessary if the product is processed using an anneal atmosphere gas of HNX or H_2.
[B] Good mill practice has demonstrated the ability to average 0.05 µA/cm ^{2} or less over an extended period of production.

3.1.16.3 *Discussion*—The production of J Plate and K Plate require special processing and testing. In order to receive J Plate or K Plate, this requirement must be specified on the order.

3.1.17 *length dimension, n*—the longer dimension of a cut size.

3.1.18 *lot, n*—each 20 000 sheets or part thereof or the equivalent in coils, of an item in a specific shipment having the same order specifications.

3.1.19 *matte finish, n*—a surface that has an unmelted tin coating, generally on a shot-blast finish (SBF) base steel.

3.1.20 *mechanical designation, n*—an arbitrary number to designate Rockwell hardness and ultimate tensile strength characteristics for double-reduced plate (see 8.2).

3.1.21 *oiling, n*—a lubricant film applied to both surfaces of the plate.

3.1.22 *package, n*—a unit quantity of 112 sheets.

3.1.23 *passivating treatment, n*—a surface chemical treatment (see 3.1.9).

3.1.24 *ratio, n*—the number of base boxes in a package of a given size (see 3.1.1 and Annex A1).

3.1.25 *Rockwell hardness test, n*—a test for determining hardness (see Annex A2).

3.1.26 *rolling width, n*—the dimension of the sheet perpendicular to the rolling direction.

3.1.27 *single-reduced plate, n*—plate produced with one major cold reduction.

3.1.28 *steel Type D, n*—base-metal steel aluminum killed, sometimes required to minimize severe fluting and stretcher-strain hazards or for severe drawing applications (see Table 1).

3.1.29 *steel Type L, n*—base-metal steel, low in metalloids and residual elements, sometimes used for improved internal corrosion resistance for certain food-product containers (see Table 1).

3.1.30 *steel Type MR, n*—base-metal steel, similar in metalloid content to Type L but less restrictive in residual elements, commonly used for most tin mill products (see Table 1).

3.1.31 *surface appearance, n*—visual characteristics determined primarily by the steel surface finish. For electrolytic tin plate, the appearance is also influenced by the weight of coating and by melting or not melting the tin coating.