Designation: A657/A657M – 18 (Reapproved 2024)

Standard Specification for Tin Mill Products, Black Plate Electrolytic Chromium-Coated, Single and Double Reduced[1]

This standard is issued under the fixed designation A657/A657M; 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.

1. Scope*

1.1 This specification covers single- and double-reduced tin mill black plate electrolytically coated with chromium and chromium oxide. The steel is furnished in coils and cut lengths for use in the manufacture of cans, closures, crowns, and other products.

1.2 This specification is applicable to orders in either inch-pound units (as A657) which is supplied in thicknesses from 0.0050 to 0.0149 in. or in SI units [as A657M] which is supplied in thicknesses from 0.127 to 0.378 mm.

1.3 The values stated in either inch-pound or SI units are to be regarded as standard. Within the text, the SI units are shown in brackets. The values stated in each system are not exact equivalents. Therefore, each system must be used independently of the other. Combining values from the two systems may result in nonconformance with this specification.

1.4 *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.*

1.5 *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]

A623 Specification for Tin Mill Products, General Requirements

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

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

D1125 Test Methods for Electrical Conductivity and Resistivity of Water

3. Ordering Information

3.1 Orders for product under this specification shall include the following information, as required and applicable, to adequately describe the desired product:

3.1.1 Name of product (include whether single- or double-reduced),

3.1.2 Thickness (must be consistent with intended application),

3.1.3 Oiling (Section 6),

3.1.4 Steel type (MR, L, etc.),

3.1.5 Temper designation (T-3, T-4, etc. for single-reduced) or mechanical designation (DR-8, DR-9, etc., double-reduced),

3.1.6 Surface finish (7B, 7C, etc.).

3.1.7 Coil width or cut size,

3.1.8 Rolling direction must be specified on cut sizes and should be indicated by underlining the slit (rolling width) dimension,

3.1.9 On coils, specify minimum or range of acceptable inside diameters. The standard inside diameter is approximately 16 in. if ordered as Specification A657 [410 mm if ordered as Specification A657M]. Coils should be specified to a maximum coil weight if ordered as Specification A657 [mass if ordered as Specification A657M], or maximum outside diameter, or both.

3.1.10 Packaging,

3.1.11 Special requirements where applicable, and,

3.1.12 ASTM specification designation and year of issue.

NOTE 1—A typical ordering description for coils is as follows: 1250 base boxes, single reduced, black plate electrolytic chromium coated, BSO, (0.0093 in.) MR, T-3 BA, 35⅜ in. by coil, 16 in. inside diameter, 59 in. maximum outside diameter, 25 000 lb maximum coil weight, for regular crowns in accordance with Specification A657/A657M - XX. [250 SITAs, single reduced, black plate electrolytic chromium coated, BSO, 0.235 mm thickness, MR, T-3 BA, 900 mm by coil, 410 mm inside diameter, 1500 mm maximum outside diameter, 11 500 kg maximum coil mass for regular crowns in accordance with Specification A657/A657M - XX].

[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.

***A Summary of Changes section appears at the end of this standard**

NOTE 2—A typical ordering description of cut sizes is as follows: 1000 base boxes, double reduced black plated electrolytic chromium coated, BSO, 0.0061 in., MR, DR8 CA, 31 by 32 in., for cap closures in accordance with Specification A657/A657M - XX. [200 SITAs, double reduced, black plate electrolytic chromium coated, BSO, 0.155 mm thickness, MR, DR8 CA, 788 by 813 mm, cap closures in accordance with Specification A657/A657M - XX].

NOTE 3—The production of coils does not afford the same opportunity for inspection, grading, and sorting as does the production of cut sizes. Accordingly, appropriate processing and quality-control procedures are required by the purchaser to obtain optimum utilization of the material. Cut sizes are line inspected visually and mechanically during production. Sheets having surface imperfections that will not interfere with their utilization are included.

NOTE 4—Tin mill products are supplied on an area basis expressed in base boxes. In coils, the number of base boxes is computed from the measured length and the specified width. In cut sizes, the number of base boxes is computed from the specified length and width dimensions and sheet count. For calculating weight, the density of steel for tin mill products is 0.2836 lb/in.^{3} [Tin mill products are supplied on an area basis expressed in SITAs. In coils, the number of SITAs is computed from the measured length and the specified width. In cut sizes, the number of SITAs is computed from the specified length and width dimensions and sheet count. For calculating mass, the density of steel for tin mill products is 7850 kg/m^3].

4. Chromium Coating Weights [Masses]

4.1 *Total Coating* is made up of chromium metal and chromium oxides. These are determined separately.

4.1.1 *Metallic Chromium* is expressed as milligrams of chromium metal per square foot [milligrams of chromium per square metre] on each side of the sheet or strip.

Nominal	Average Min	Average Max
mg/ft^2 [mg/m ^{2}]	mg/ft^2 [mg/m ^{2}]	mg/ft^2 [mg/m ^{2}]
5 [54]	3 [32]	13 [140]

4.1.2 *Chromium Oxide* is expressed as milligrams of chromium in the oxide per square foot [milligrams of chromium per square metre] as shipped on each side of the sheet or strip.

Average Min,	Average Max,
mg/ft^2 [mg/m ^{2}]	mg/ft^2 [mg/m ^{2}]
0.7 [8]	2.5 [27]

4.2 *Sampling for Chromium Coating Weights [Masses]:*

4.2.1 *Coils*—When the purchaser wishes to make tests to ascertain compliance with the requirements of this specification for metallic chromium and chromium oxide weights [masses] on a lot of any specific item of electrolytic chromium-coated steel in coils, use the following procedure:

4.2.1.1 Take one test strip at random from a representative section of each coil across its width. Select a minimum of three test strips, each taken from different coils from any one item of a specific lot. Spot test each test strip at three positions (edge, center, edge) across the rolling direction of the strip. Spot samples are customarily disks or squares, each of 4 in.^{2} [25.8 cm^2] in area. In order to secure representative samples, take samples so that the outer edge of the sample is at least 1 in. [25 mm] from either edge of the test strip. The average value of all spot tests on all test strips represents the average coating-weight [mass] test value.

4.2.1.2 From one- or two-coil lots, sample each coil. A minimum of three randomly selected test strips shall represent the lot.

4.2.2 *Cut Lengths*—When the purchaser wishes to make tests to ascertain compliance with the requirements of this specification for metallic chromium and chromium oxide weights [mass] on a specification of electrolytic chromium-coated steel in cut sizes, use the following procedure:

4.2.2.1 Take one sheet at random from each 50 packages, or part thereof, with a minimum of three different sample sheets, each taken from different bundles from any one item of a specific shipment. Spot test each sample at three positions across the rolling direction of the sheet (edge, center, edge). Spot samples are customarily disks or squares, each of 4 in.^{2} [25.8 cm^2] in area. In order to secure representative samples, take edge specimens so that the outer edge of the sample is at least 1 in. [25 mm] from either edge of the sheet. The average value of all spot tests on all sheets tested represents the average coating-weight (mass) test value.

4.3 *Determination of Chromium Coating Weights [Masses]*—Typical method for determining metallic chromium and chromium oxide weights [masses] for electrolytic chromium-coated steel is described in Annex A1, Annex A2, Annex A3, and Fig. A1.1 and Fig. A3.1.

5. Surface Appearance and Finish

5.1 *Single-Reduced Base Metal Finish*—Single-reduced electrolytic chromium coated steel is produced with ground roll finishes and shot-blasted roll finishes as follows:

5.1.1 *Ground Roll Finishes:*

5.1.1.1 *7B*—A smooth finish that may contain fine grit lines. This finish is specified for special applications.

5.1.1.2 *7C*—A smooth finish with grit lines. The surface roughness will range from 10 to 25 µin. Ra [0.254 to 0.635 µm Ra]. This is the standard finish for tin mill products.

5.1.2 *Blasted and/or Otherwise Textured Roll Finishes:*

5.1.2.1 *5C*—A shot-blasted finish (SBF) for general applications. The surface roughness will range from 30 to 60 µin. Ra [0.760 to 1.52 µm Ra].

5.1.2.2 *5D*—A shot-blasted finish for special applications.

5.2 *Double-Reduced Base Metal Finish*—Double-reduced electrolytic chromium-coated steel is produced only with ground-roll finishes.

5.2.1 *Ground Roll Finishes:*

5.2.1.1 *7C*—A smooth finish with grit lines. The surface roughness will range from 6 to 25 µin. Ra [0.152 to 0.635 µm Ra]. This is the standard finish for tin mill products.

6. Oiling

6.1 *Electrolytic Chromium-Coated Steel* is furnished with an extremely thin oil film on both surfaces to minimize abrasion in shearing, coiling or uncoiling, shipping, and handling. Acetyl tributylcitrate (ATBC), butyl stearate (BSO), or dioctyl (di(2-ethylhexyl) sebacate) (DOS) is used. Surface active agents such as glycerol monooleate may be incorporated into the oil film. Oil film other than normal should be negotiated with the producer. The oil film is not a drawing lubricant.

6.1.1 Unless indicated by the purchaser, the special oiling treatment will be left to the discretion of the plate supplier.

6.1.2 Weight [mass] of oil film as applied by the plate supplier normally ranges from approximately 0.10 g/base box to 0.40 g/base box [0.50 to 200 g/SITA (5 to 20 mg/m^2)]. The