



Standard Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process¹

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1. Scope*

1.1 This specification covers the general requirements that, unless otherwise specified in the product specification, apply to steel sheet in coils and cut lengths, metallic-coated on continuous lines by the hot-dip process. The product is intended for applications requiring corrosion resistance. The product specifications contain requirements for specific strength levels, heat resistance, paintability, or formability, or a combination thereof.

1.2 Subject to individual product specification provisions, steel sheet is available as Commercial Steel (CS) Types A, B, and C, Forming Steel (FS), Drawing Steel (DS), Deep Drawing Steel (DDS), Extra Deep Drawing Steel (EDDS), High Temperature Steel (HTS), Structural Steel (SS), and High Strength Low Alloy Steel (HSLAS). Steel sheet is produced with the following metallic coatings. Specific information on each of the following is contained in the individual product specification:

- 1.2.1 Zinc or zinc-iron alloy coated,
- 1.2.2 Zinc-5 % aluminum alloy coated,
- 1.2.3 55 % aluminum-zinc alloy coated,
- 1.2.4 Aluminum-coated, and
- 1.2.5 Terne (lead-tin alloy) coated.

1.3 Products covered by this general requirements specification are described in the following product standards: Specifications A 308; A 463/A 463M; A 653/A 653M; A 755/A 755M; A 792/A 792M; A 875/A 875M; and A 929/A 929M.

1.4 Metallic-coated steel sheet is produced to various coating designations, as shown in the individual product specifications. Except for differentially coated sheet, the coating is always expressed as the total coating of both surfaces.

1.5 In case of any conflict in requirements, the requirements of the individual product specifications shall prevail over those of this general specification.

1.6 The purchaser is permitted to specify additional requirements that do not negate any of the provisions of this general

specification or of the individual product specifications. Such additional requirements, the acceptance of which are subject to negotiation with the supplier, shall be included in the order information.

1.7 For purposes of determining conformance with this specification and the various product specifications referenced in 1.3, values shall be rounded to the nearest unit in the right-hand place of figures used in expressing the limiting values (except to the nearest 5 MPa for SI strength values) in accordance with the rounding method of Practice E 29.

1.8 Metallic-coated steel sheet covered by this specification is produced to thickness requirements expressed to 0.001 in. [0.01 mm] for both coils and cut lengths. The thickness is the total of the base steel and the coating.

1.9 The values stated in inch-pound units or SI units are to be regarded separately 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.

1.10 This specification and some of the applicable product specifications are expressed in both inch-pound and SI units. However, unless the order specifies the applicable “M” specification designation (SI units), the product shall be furnished to inch-pound units.

1.11 The text of this specification references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the specification.

2. Referenced Documents

2.1 ASTM Standards:²

- A 90/A 90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- A 308 Specification for Steel Sheet, Terne (Lead-Tin Alloy) Coated by the Hot-Dip Process
- A 309 Test Method for Weight and Composition of Coating on Terne Sheet by the Triple-Spot Test

¹ This specification is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.11 on Sheet Specifications.

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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.

- A 361/A 361M Specification for Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process for Roofing and Siding³
- A 370 Test Methods and Definitions for Mechanical Testing of Steel Products
- A 428/A 428M Test Method for Weight of Coating on Aluminum-Coated Iron or Steel Articles
- A 463/A 463M Specification for Steel Sheet, Aluminum-Coated, by the Hot-Dip Process
- A 653/A 653M Specification for Steel Sheet, Zinc-Coated, (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
- A 700 Practices for Packaging, Marking, and Loading Methods for Steel Products for Domestic Shipment
- A 751 Test Methods, Practices, and Terminology for Chemical Analysis of Steel Products
- A 754/ A 754M Test Method for Coating Weight by X-Ray Fluorescence
- A 755/A 755M Specification for Steel Sheet, Metallic Coated by the Hot-Dip Process and Prepainted by the Coil-Coating Process for Exterior Exposed Building Products
- A 792/A 792M Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process
- A 875/A 875M Specification for Steel Sheet, Zinc-5 % Aluminum Alloy-Coated by the Hot-Dip Process
- A 902 Terminology Relating to Metallic-Coated Steel Products
- A 929/A 929M Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
- A 1030/A 1030M Practice for Measuring Flatness Characteristics of Coated Sheet Products
- E 29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications
- E 376 Practice for Measuring Coating Thickness by Magnetic-Field or Eddy-Current (Electromagnetic) Test Methods
- 2.2 *Military Standards:*
MIL-STD-129 Marking for Shipment and Storage⁴
MIL-STD-163 Steel Mill Products Preparation for Shipment and Storage⁴
- 2.3 *Federal Standard:*
Fed. Std. No. 123 Marking for Shipment (Civil Agencies)⁴

3. Terminology

3.1 *Definitions*—For definitions of items used in this specification, refer to Terminology A 902.

4. Ordering Information

4.1 Ordering information for all products are shown in the individual product specifications.

5. Chemical Composition

5.1 Base Steel:

TABLE 1 Product Analysis Tolerances

Element	Limited or Maximum of Specified Element, %	Tolerance	
		Under Minimum Limit	Over Maximum Limit
Carbon	To 0.15, incl	0.02	0.03
	Over 0.15 to 0.40, incl	0.03	0.04
	Over 0.40 to 0.80, incl	0.03	0.05
Manganese	To 0.60, incl	0.03	0.03
	Over 0.60 to 1.15, incl	0.04	0.04
	Over 1.15 to 1.65, incl	0.05	0.05
Phosphorus	...	...	0.01
Sulfur	...	...	0.01
Silicon	To 0.30, incl	0.02	0.03
	Over 0.30 to 0.60	0.05	0.05
Copper	...	0.02	...
Titanium	To 0.10, incl	0.01 ^A	0.01
Vanadium	To 0.10, incl	0.01 ^A	0.01
	Over 0.10 to 0.25, incl	0.02	0.02
Columbium	Minimum only specified	0.01	...
	To 0.10, incl	0.01 ^A	0.01

^AIf the minimum of the range is 0.01 %, the under tolerance is 0.005 %.

5.1.1 Chemical composition requirements of the base steel are shown in the individual product specifications.

5.1.2 An analysis of each heat shall be made by the manufacturer to determine the percentage of carbon, manganese, phosphorus, sulfur, and any other elements specified or restricted by the individual product specification.

5.1.3 When desired, product analysis shall be made by the purchaser on finished product. The product analysis so determined shall meet the tolerances shown in Table 1.

5.1.3.1 Capped or rimmed steels are not technologically suited to product analysis due to the nonuniform character of their chemical composition, and therefore, the tolerances in Table 1 do not apply. Product analysis is appropriate on these steels only when misapplication is apparent.

5.1.3.2 Product analysis for phosphorus or sulfur is not technologically appropriate because of segregation of these elements in non-killed steels. Product analysis is appropriate only when misapplication is apparent.

5.1.3.3 Samples for product analysis shall be drillings through areas stripped free of coating. At least three pieces shall be selected, but if the product of more than one mill lift or coil is involved, at least six pieces shall be selected.

5.1.3.4 When supplying High-Strength Low-Alloy Steel (HSLA), some producers use one or more microalloying elements as strengthening agents or use alloy additions to effect inclusion control, or both. The producer shall be consulted for the specific chemical composition applied. If any alloying addition is known to be of concern to the user, the producer shall be notified of this concern.

5.1.4 *Method of Analysis*—The determination of chemical composition is permitted to be made by any test method, except in case of dispute, where the referee test methods listed in the section on test methods of Test Methods A 751 shall be used.

5.2 Coating:

5.2.1 *Coating Analysis*—The nominal composition of the coating is described in the individual product specification.

5.2.2 *Method of Analysis*—The determination of chemical composition shall be made in accordance with acceptable chemical, spectrochemical, or other test methods.

³ Withdrawn.

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

6. Tests for Mechanical Properties

6.1 Test specimens shall be prepared from finished metallic-coated product.

6.2 *Mechanical Properties-Base Metal*—When base metal mechanical properties are specified, tests shall be conducted in accordance with Test Methods A 370. Requirements for all mechanical properties are included in the individual product specifications.

6.2.1 *Tension Tests*—Specimens for base-metal tension tests shall be taken longitudinally, approximately midway between the center and edge of the product as rolled, and shall conform to the requirements for the sheet-type test specimen in the figure for rectangular tension test specimens of Test Methods A 370.

6.2.1.1 The determination of the yield strength and tensile strength values shall be based on the as-produced base-metal thickness that is obtained after stripping the coating from the ends of the specimen contacting the grips of the tension testing machine. The thickness measurement shall be made before testing on an end of the specimen that has been stripped free of coating.

7. Tests for Coating Properties

7.1 Coating Weight [Mass]:

7.1.1 Coating weight [mass] shall conform to the requirements prescribed in the individual product specifications (see 1.3).

7.1.2 The coating weight [mass] of equally coated product is the total amount on both sides of the sheet, expressed in ounces per square foot [grams per square metre] of sheet.

7.1.3 For differentially coated product, the coating weight [mass] on each surface is nominally one half of the stated coating designation.

7.2 *Coating Weight [Mass] Tests*—One of the following test methods shall be used:

7.2.1 Weigh-Strip-Weigh Method:

7.2.1.1 The weigh-strip-weigh method, described in Test Methods A 90/A 90M, A 309, and A 428/A 428M, is a destructive test that determines coating weight [mass] by measuring the difference in weight [mass] between a coated and a stripped (uncoated) sample. If one surface is protected suitably during the initial stripping, coating weight [mass] can be determined for each surface independently.

7.2.1.2 Test specimens for product over 18 in. [450 mm] in width shall be taken from a representative sample piece approximately 1 ft [300 mm] in length by the associated width. Three test specimens shall be taken from the sample, one from the middle of the width and one from each edge. The edge samples shall not be taken closer than 2 in. [50 mm] from each edge. The test specimen shall have a minimum area of 5 in.² [3200 mm²].

7.2.1.3 For product 18 in. [450 mm] in width and narrower, only one test specimen is required. Specimens shall be at least 2 in. [50 mm] from the edge, when possible. For product narrower than 2.25 in. [60 mm] the test specimen shall be chosen to give a minimum area of 5 in.² [3200 mm²].

7.2.1.4 The triple-spot coating weight [mass] shall be the average of the determinations of the three tests done in accordance with the procedures in 7.2.1.2.

7.2.1.5 The minimum single-spot coating weight [mass] shall be that test result that is the lightest coating weight [mass], or in those cases where only one test is needed, it shall be that single test result.

7.2.1.6 The frequency of sampling shall be sufficient to adequately characterize the lot of material being tested.

7.2.2 X-Ray Fluorescence Method:

7.2.2.1 The X-ray fluorescence method is a nondestructive test that determines coating weight [mass] by converting X-ray fluorescence measurements to coating weight [mass] values. X-ray fluorescence gages can be used as off-line laboratory instruments or as a means of continuous on-line testing for conformance to coating weight [mass] requirements, or both.

7.2.2.2 *Off-Line Testing*—X-ray fluorescence gages can be used as off-line laboratory instruments to test for coating weight [mass] provided that they have been calibrated in accordance with Test Method A 754/A 754M and use the sample test locations as described in 7.2.1.2 or 7.2.1.3.

7.2.2.3 *On-Line Testing*—When X-ray fluorescence gages are used for on-line testing, they shall be operated in accordance with Test Method A 754/A 754M. A minimum of five random full-width traverses shall be used to characterize each coil tested.

(a) The triple-spot coating weight [mass] of a coil shall be determined using the following procedure: from the individual edge, center, edge readings provided by the minimum five full width traverses, compute the average of one edge, the average of the center, and the average of the other edge. These three results shall then be averaged to obtain the triple-spot average of the coil.

(b) The minimum single-spot coating weight [mass] shall be the lightest coating weight [mass] obtained from the individual edge, center, edge measurements provided by the minimum five full width traverses (lightest of at least fifteen readings—five from one edge, five from the center, and five from the other edge).

7.3 *Coating Bend Test*—Refer to the individual product specification.

7.3.1 Coating bend test specimens shall be 2 to 4 in. [50 to 100 mm] wide. The specimen shall be cut not less than 2 in. [50 mm] from the edges of the test sheet.

8. Dimensions and Permissible Variations

8.1 The permissible variations for dimensions shall comply with the applicable limits in Tables 2-14.

8.2 Flatness Tolerances:

8.2.1 Flatness tolerances for sheet are contained in Table 10 and in Table 11 for sheet specified to restricted flatness.

8.2.2 Measurement techniques for flatness characteristics are described in Practice A 1030/A 1030M.

8.2.3 Two alternative methods for flatness determination are the use of I-Units and % Steepness. A description of these two alternative methods is contained in Practice A 1030/A 1030M.

8.2.3.1 The use of I-Units or % Steepness as a flatness standard is subject to negotiation between the purchaser and the producer.

TABLE 2 Thickness Tolerances for Hot-Dip Metallic-Coated Sheet— $\frac{3}{8}$ -in. [10-mm] Minimum Edge Distance

NOTE 1—The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than $\frac{3}{8}$ in. [10 mm] from a side edge.

NOTE 2—Regardless of whether total thickness tolerance is specified equally or unequally, over and under, the total tolerance shall be equal to twice the tabular tolerances.

NOTE 3—Micrometers used for measurement of thickness shall be constructed with anvils and spindles having minimum diameters of 0.188 in. [4.80 mm]. The tip of the anvil shall be flat or rounded with a minimum radius of curvature of 0.10 in. [2.55 mm] and the tip of the spindle shall be flat. Micrometers with conical tips shall not be used for thickness measurements of sheet steels.

Inch-Pound Units							
Specified Width, in.		Thickness Tolerances, Plus and Minus, in., for Specified Thickness, in. ^A					
Over	Through	Through 0.023	Over 0.023 Through 0.043	Over 0.043 Through 0.061	Over 0.061 Through 0.075	Over 0.075 Through 0.101	Over 0.101 Through 0.187
...	32	0.003	0.004	0.005	0.006	0.007	0.008
32	40	0.003	0.004	0.005	0.006	0.008	0.008
40	60	0.003	0.004	0.005	0.006	0.008	0.009
60	72	...	0.004	0.005	0.006	0.009	0.009

SI Units							
Specified Width, mm		Thickness Tolerances, Plus and Minus, mm, for Specified Thickness, mm ^B					
Over	Through	Through 0.4	Over 0.4 Through 1.0	Over 1.0 Through 1.5	Over 1.5 Through 2.0	Over 2.0 Through 2.5	Over 2.5 Through 5.0
...	1500	0.08	0.10	0.13	0.15	0.20	0.23
1500	...	...	0.10	0.13	0.15	0.23	0.23

^AThickness is measured at any point across the width not less than $\frac{3}{8}$ in. from a side edge.

^BThickness is measured at any point across the width not less than 10 mm from a side edge.

TABLE 3 Thickness Tolerances for Hot-Dip Metallic-Coated Sheet—1-in. [25-mm] Minimum Edge Distance

NOTE 1—The coated sheet thickness includes the base metal and coating and is measured at any point across the width of the coated sheet not less than 1 in. [25 mm] from a side edge.

NOTE 2—Regardless of whether total thickness tolerance is specified equally or unequally, over and under, the total tolerance shall be equal to twice the tabular tolerances.

NOTE 3—Micrometers used for measurement of thickness shall be constructed with anvils and spindles having minimum diameters of 0.188 in. [4.80 mm]. The tip of the anvil shall be flat or rounded with a minimum radius of curvature of 0.10 in. [2.55 mm] and the tip of the spindle shall be flat. Micrometers with conical tips shall not be used for thickness measurements of sheet steels.

Inch-Pound Units				
Specified Widths, in.	Thickness Tolerance, Plus and Minus, in., for Specified Thickness, in.			
	0.061 and thinner	Over 0.061 to 0.075, inclusive	Over 0.075 to 0.101, inclusive	Over 0.101 to 0.187, inclusive
To 40, inclusive	0.002	0.003	0.006	0.006
Over 40 to 60, inclusive	0.002	0.003	0.006	0.007
Over 60 to 72, inclusive	0.002	0.003	0.007	0.007

SI Units				
Specified Widths, mm	Thickness Tolerance, Plus and Minus, mm, for Specified Thickness, mm			
	1.5 and thinner	Over 1.5 to 2.0, inclusive	Over 2.0 to 2.5, inclusive	Over 2.5 to 5.0, inclusive
To 1500, inclusive	0.05	0.08	0.15	0.18
Over 1500	0.05	0.08	0.18	0.18

8.2.3.2 Measurement techniques for I-Units and % Steepness and rejection limits are subject to negotiation between the purchaser and producer.

TABLE 4 Width Tolerances for Hot-Dip Metallic-Coated Sheet, Coils, and Cut Lengths, Not Resquared

Inch-Pound Units		
Specified Width, in.		Tolerance Over Specified Width, No Tolerance Under, in.
Over	Through	
12	30	$\frac{1}{8}$
30	48	$\frac{3}{16}$
48	60	$\frac{1}{4}$
60	72	$\frac{5}{16}$

SI Units		
Specified Width, mm		Tolerance Over Specified Width, No Tolerance Under, mm
Over	Through	
300	600	3
600	1200	5
1200	1500	6
1500	1800	8

9. Number of Tests and Retests

9.1 *Number of Tests*—The frequency of tests by the producer shall be adequate to ensure conformance of the lot. The producer and user shall agree to a frequency other than that normally used by the producer.

9.2 *Number of Retests:*

9.2.1 Retests may be permitted if test method variability, as described in 9.2.2, is believed to be a cause of the out-of-specification test result. Retests are also permitted under the criteria described in 9.2.3.

9.2.2 Test method variability is considered to be a factor if test results on an original test specimen are within 2 ksi [15 MPa] of the required tensile strength, within 1 ksi [5 MPa] of the required yield strength, within 2 % of the required elongation, or within 0.05 oz/ft² [15 g/m²] of the specified coating

TABLE 5 Length Tolerances for Hot-Dip Metallic-Coated Sheet, Cut Lengths, Not Resquared

Inch-Pound Units		
Specified Length, in.		Tolerance Over Specified Length, No Tolerance Under, in.
Over	Through	
12	30	1/8
30	60	1/4
60	96	1/2
96	120	3/4
120	156	1
156	192	1 1/4
192	240	1 1/2
240	...	1 3/4
SI Units		
Specified Length, mm		Tolerance Over Specified Length, No Tolerance Under, mm
Over	Through	
300	1500	6
1500	3000	20
3000	6000	35
6000	...	45

TABLE 6 Camber Tolerances for Hot-Dip Metallic-Coated Sheet

NOTE 1—Camber is the greatest deviation of a side edge from a straight line, the measurement being taken on the concave side with a straightedge.
 NOTE 2—The camber tolerances for sheet in cut lengths, not resquared, are as shown in this table.

Inch-Pound Units		
For Coils Over 12 in. in Width		
Cut Length, ft		Camber Tolerance, ^A in.
Over	Through	
...	4	1/8
4	6	3/16
6	8	1/4
8	10	5/16
10	12	3/8
12	14	1/2
14	16	5/8
16	18	3/4
18	20	7/8
20	30	1 1/4
30	40	1 1/2
SI Units		
For Coils Over 300 mm in Width		
Cut Length, mm		Camber Tolerance, ^B mm
Over	Through	
...	1200	4
1200	1800	5
1800	2400	6
2400	3000	8
3000	3700	10
3700	4300	13
4300	4900	16
4900	5500	19
5500	6000	22
6000	9000	32
9000	12 200	38

^AThe camber tolerance for sheet in coils is 1 in. in any 20 ft, except as shown in Table 14.
^BThe camber tolerance for sheet in coils is 25 mm in any 6000 mm, except as shown in Table 14.

weight. If such is the case, two additional tests shall be taken at random. If the results on both of these retest specimens meet

TABLE 7 Diameter Tolerances for Hot-Dip Metallic-Coated Sheet, Sheared Circles

Inch-Pound Units				
Specified Thickness, in.	Tolerance Over Specified Diameter, No Tolerance Under, in.			
	Diameters			
Over	Through	Under 30	30 through 48	Over 48
...	0.61	1/16	1/8	3/16
0.061	0.101	3/32	5/32	7/32
0.101	...	1/8	3/16	1/4
SI Units				
Specified Thickness, mm	Tolerance Over Specified Diameter, No Tolerance Under, mm			
	Diameters			
Over	Through	Through 600	Over 600 Through 1200	Over 1200
...	1.5	1.5	3.0	5.0
1.5	2.5	2.5	4.0	5.5
2.5	...	3.0	5.0	6.5

TABLE 8 Out-of-Square Tolerances for Hot-Dip Metallic-Coated Sheet Cut Lengths, Not Resquared

NOTE 1—Out-of-square is the greatest deviation of an end edge from a straight line at right angles to a side and touching one corner. It is also obtained by measuring the difference between the diagonals of the cut length. The out-of-square deviation is one half of that difference.

Inch-Pound Units	
For Coils Over 12 in. in Width	
The tolerance for cut lengths of all thicknesses and all sizes is 1/16 in. in each 6 in. of width or fraction thereof.	
SI Units	
For Coils Over 300 mm in Width	
The tolerances for cut lengths of all thicknesses and all sizes is 1.0 mm in each 100 mm of width or fraction thereof.	

TABLE 9 Resquared Tolerances for Hot-Dip Metallic-Coated Sheet

NOTE 1—When cut lengths are specified resquared, the width and length are not less than the dimensions specified. The individual tolerance for over-width, over-length, camber, or out-of-square shall not exceed the stated values.

Inch-Pound Units	
For Cut-lengths Over 12 in. in Width	
Shall not exceed 1/16 in. for cut lengths up to and including 48 in. in width and up to and including 120 in. in length. For cut lengths wider or longer the applicable tolerance is 1/8 in.	
SI Units	
For Cut-lengths Over 300 mm in Width	
Shall not exceed 1.6 mm for cut lengths up to and including 1200 mm in width and up to and including 3000 mm in length. For cut lengths wider or longer, the applicable tolerance is 3.2 mm.	

the specified requirements, the lot shall be accepted. For chemical analysis not in conformance, retesting shall be done by the methods contained in the section on test methods of Test Methods, Practices, and Terminology A 751.

9.2.3 If the original test results do not conform to the specification for either base-metal properties or coating and are outside the criteria described in 9.2.2, the product represented by the out-of-specification test results must be discarded and a new test shall be taken from the remaining lot adjacent to the product associated with the out-of-specification test result. The retest must conform to the requirements of this specification.

TABLE 10 Flatness Tolerances for Hot-Dip Metallic-Coated Sheet, Cut Lengths

NOTE 1—This table does not apply to structural steel (SS) and High-Strength Low-Alloy Steel (HSLAS).

NOTE 2—This table also applies to sheet cut to length from coils by the consumer when adequate flattening measures are performed

Inch-Pound Units			
Specified Thickness, in.	Specified Width, in.		Flatness Tolerance, ^A in.
	Over	Through	
Through 0.048	12	36	3/8
	36	60	5/8
	60	72	7/8
Over 0.048	12	36	1/4
	36	60	3/8
	60	72	5/8

SI Units			
Specified Thickness, mm	Specified Width, mm		Flatness Tolerance, ^A mm
	Over	Through	
Through 1.0	300	900	10
	900	1500	15
	1500	...	20
Over 1.0	300	900	8
	900	1500	10
	1500	1800	15
	1800	...	20

^AMaximum deviation from a horizontal flat surface.

TABLE 11 Flatness Tolerances Specified to Restricted Flatness for Hot-Dip Metallic-Coated Sheet, Cut Lengths

Inch-Pound Units			
Specified Thickness, in.	Specified Width, in.	Specified Length, in.	Flatness Tolerance, ^A in.
Over 0.019 through 0.032	over 12 through 36	through 120, inclusive	1/4
		wider or longer	3/8
Over 0.032	over 12 through 48	through 120, inclusive	1/8
		wider or longer	1/4

SI Units			
Specified Thickness, mm	Specified Width, mm	Specified Length, mm	Flatness Tolerance, ^A mm
0.35 through 0.8	through 900	through 3000	8
		wider or longer	10
Over 0.8	through 1200	through 3000	5
		wider or longer	8

^AMaximum deviation from a horizontal flat surface.

10. Inspection

10.1 The producer shall afford the purchaser's inspector reasonable access to facilities to ensure that the product is being produced in compliance with this specification. Unless otherwise specified, all inspection and tests, except product analysis, shall be made at the producer's facilities prior to shipment. Such inspection or sampling shall be made concurrently with the producer's regular inspection and test operations unless it causes interference with normal operations or is otherwise specified.

10.2 *Responsibility for Inspection*—Unless otherwise specified in the contract or purchase order, the producer is responsible for the performance of all inspection requirements as

TABLE 12 Width Tolerances—Narrow Widths for Hot-Dip Metallic-Coated Sheet, Coil and Cut Lengths, Not Resquared

NOTE 1—This table applies to widths produced by slitting from wider sheet.

NOTE 2—The specified width range captions noted as follows are also applied when sheet is specified to width tolerance all over, nothing under. In such cases, the stated tolerances are doubled.

NOTE 3—Tolerances based upon practice found to be generally followed by producers.

Inch-Pound Units					
Specified Thickness, in.	Tolerances Over and Under Specified Width, in.				
	Over	Through	From 2 Through 6	Over 6 Through 9	Over 9 Through 12
0.014	0.068		0.008	0.016	0.032
0.068	0.083		0.012	0.016	0.032
0.083	0.110		0.016	0.032	0.032
0.110	0.187		0.032	0.032	0.032

SI Units		
Specified Width, mm	Width Tolerance, Over and Under, mm	
	Over	Through
50	100	0.3
100	200	0.4
200	300	0.8

TABLE 13 Length Tolerances—Narrow Widths for Hot-Dip Metallic-Coated Sheet, Cut Lengths, Not Resquared

NOTE 1—This table applies to widths of 2 to 12 in. [50 to 300 mm] incl. that have been produced by slitting from wider sheet.

Inch-Pound Units		
Specified Length, in.	Tolerance Over Specified Length, No Tolerance Under, in.	
	Over	Through
from 24	60	1/2
60	120	3/4
120	240	1

SI Units		
Specified Length, mm	Tolerance Over Specified Length, No Tolerance Under, mm	
	Over	Through
600	1500	15
1500	3000	20
3000	6000	25

TABLE 14 Camber Tolerances—Narrow Widths for Hot-Dip Metallic-Coated Sheet, in Coils

NOTE 1—This table applies to widths of 2 to 12 in. [50 to 300 mm] incl. that have been produced by slitting from wider sheet.

Inch-Pound Units
The camber tolerance is 1/4 in. in any 8 ft.
SI Units
The camber tolerance is 5.0 mm in any 2000 mm.

specified herein. Except as otherwise specified in the contract or order, the producer's facilities, or any other facilities suitable for the performance of the inspection requirements, shall be used. The purchaser reserves the right to perform any

of the inspections set forth in this specification to ensure supplies and services conform to the prescribed requirements.

11. Rejection and Rehearing

11.1 Unless otherwise specified, any rejection shall be reported to the producer within a reasonable time after receipt of product by the purchaser.

11.2 Product that is reported to be unacceptable subsequent to the shipment to the purchaser's plant, shall be set aside, adequately protected, and correctly identified. The producer shall be notified as soon as possible to permit a timely investigation.

11.3 Samples that are representative of the rejected product shall be made available to the producer. In the event that the producer is dissatisfied with the rejection, a rehearing shall be requested.

12. Certification

12.1 When required by the purchase order, a certificate of compliance or a test report, or both, shall be furnished to the purchaser.

12.1.1 The certificate of compliance shall include a certification that the product has been manufactured and tested in accordance with the requirements of the product specification, and that the test results conform to the requirements of that specification.

12.1.2 The test report shall show the heat analysis and the results of all tests required by the product specification and the order.

12.1.3 These documents shall provide information necessary to identify the product represented; for example, the manufacturer's name or brand, ASTM specification, coating designation, grade (when required), ordered thickness, width, length (if cut length), and unit identification (heat number, coil number, etc.).

12.1.4 A signature is not required. However, the certification documents shall clearly identify the organization submitting the information. Notwithstanding the absence of a signa-

ture, the organization submitting the documents is responsible for the accuracy of the information.

12.2 The furnishing of a certificate of compliance or test report, or both, shall not restrict the right of the purchaser to sample and test the product furnished.

13. Packaging and Package Marking

13.1 It is common practice to use the methods of packaging as listed in the latest revision of Practices A 700, but the purchaser is permitted to specify other packaging methods.

13.2 As a minimum requirement, the product shall be identified by having the manufacturer's name or brand, ASTM specification, coating designation, grade, size, unit weight, purchaser's order number, and unit identification (that is, ticket number, coil number, etc.) legibly shown on a tag attached to each coil or shipping unit.

13.3 Most producers are able to ink stamp metallic-coated sheet with their logo and the pertinent ASTM specification when ordered in either coil or cut lengths. Since many of the metallic-coated products are stamped with a permanent ink (not water soluble), the purchaser shall be very specific when placing an order as to the requirements on sheet marking.

13.4 The purchase order shall include the specific loading instructions.

13.5 When specified in the contract or order, and for direct shipments to the U.S. Federal government, when Level A is specified, preservation, packaging, and packing shall be in accordance with the Level A requirements of MIL-STD-163. Marking for shipment shall be in accordance with Fed. Std. No. 123 for civil agencies and MIL-STD-129 for military agencies.

14. Keywords

14.1 aluminum-coated iron/steel; aluminum-zinc alloy-coated steel, 55 %; coating; coatings—aluminum; coatings—55 % aluminum-zinc; coatings—hot dip; coatings—metallic; coatings—terne metal; coatings—zinc (hot-dip); coatings—zinc-5 % aluminum; corrosion; hot-dip; metallic-coated; sheet; steel; steel products—hot-dip coatings; steel sheet—aluminum-coated; steel sheet—terne coated; steel sheet—zinc-coated (galvanized); zinc-coated iron/steel

APPENDIX

(Nonmandatory Information)

X1. PRODUCT INFORMATION

X1.1 Metallic coated sheets are used to provide corrosion protection to steel. The various types of coatings have different characteristics and the consumer should consult the individual producers for applicability and product data.

X1.2 Metallic-coated sheet of rimmed- or capped-type steels is subject to the phenomenon commonly known as aging when stored over a period of time. This may result in such surface disturbances as fluting and stretcher strains when fabricated. To minimize fluting, effective roller leveling must

be performed immediately before fabrication, or Deep Drawing Steel (DDS), which ages at a slower rate, should be specified. To minimize stretcher straining, extra-smooth steel sheet is required and it must be effectively roller-leveled immediately prior to fabrication, otherwise extra-smooth DDS must be specified.

X1.3 Metallic-coated sheet in coils is subject to coil breaks when coiled to a smaller inside diameter than is compatible to the thickness of the sheet. Other factors also effect this

tendency for coil breaks.

X1.4 The production of coils does not afford the same opportunity for inspection and sorting as does the production of cut lengths. Consequently, appropriate processing and quality control procedures are required by the purchaser to obtain optimum utilization of the product.

X1.5 *Coating Thickness Measurements with Magnetic*

Gages—A reasonable estimate of weight [mass] of coating may be obtained by converting coating thickness measurements made with magnetic gages. An accuracy of $\pm 15\%$ in determining the thickness may be realized by following the recommended practice for magnetic instruments described in Practice E 376. This test may be used as a basis for acceptance, but rejection shall be governed by the weight [mass] of coating tests described in Section 7.

SUMMARY OF CHANGES

Committee A05 has identified the location of selected changes to this standard since the last issue (A 924/A 924M - 99) that may impact the use of this standard.

A 924/A 924M - 04:

- (1) Added reference to Practice A 1030/A 1030M in 2.1.
- (2) Added new 8.2.2 to refer to Practice A 1030/A 1030M.

- (3) Renumbered subsequent subsections, and changed reference in 8.2.3 from Appendix X2 to Practice A 1030/A1030M.
- (4) Deleted Appendix X2 in its entirety.

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