



Designation: A792/A792M – 22

# Standard Specification for Steel Sheet, 55 % Aluminum-Zinc Alloy-Coated by the Hot-Dip Process<sup>1</sup>

This standard is issued under the fixed designation A792/A792M; 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 ( $\epsilon$ ) 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 55 % aluminum-zinc alloy-coated steel sheet in coils and cut lengths.

1.2 This product is intended for applications requiring corrosion resistance or heat resistance, or both.

1.3 The product is produced in a number of designations, types, and grades which are designed to be compatible with differing application requirements.

1.4 Product furnished under this specification shall conform to the applicable requirements of the latest issue of Specification A924/A924M, unless otherwise provided herein.

1.5 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 this specification.

1.6 *Units*—This specification is applicable to orders in either inch-pound units (as A792) or SI units (as A792M). Values in inch-pound and SI units are not necessarily equivalent. Within the text, SI units are shown in brackets. Each system shall be used independent of the other.

1.7 Unless the order specifies the “M” designation (SI units), the product shall be furnished to inch-pound units.

1.8 *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.*

1.9 *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.*

<sup>1</sup> 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. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

- A90/A90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- A568/A568M Specification for Steel, Sheet, Carbon, Structural, and High-Strength, Low-Alloy, Hot-Rolled and Cold-Rolled, General Requirements for
- A902 Terminology Relating to Metallic Coated Steel Products
- A924/A924M Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process
- A1122/A1122M Test Method for Bend Testing of Metallic-Coated Steel Sheet to Evaluate Coating Adhesion
- E517 Test Method for Plastic Strain Ratio  $r$  for Sheet Metal
- E646 Test Method for Tensile Strain-Hardening Exponents ( $n$  -Values) of Metallic Sheet Materials

## 3. Terminology

3.1 *Definitions*—See Terminology A902 for definitions of general terminology relating to metallic-coated hot-dip products.

3.2 *Definitions of Terms Specific to This Standard*:

3.2.1 *high temperature steel, n*—a product intended for use in elevated temperature applications.

3.2.2 *regular spangle, n*—the unaltered 55 % aluminum-zinc (Al-Zn) crystal structure that occurs during normal solidification of a hot-dip coated steel sheet.

## 4. Classification

4.1 The material is available in several designations, as follows:

- 4.1.1 *Commercial Steel*—CS Types A, B, and C,
- 4.1.2 *Drawing Steel*—DS,
- 4.1.3 *Forming Steel*—FS,
- 4.1.4 *High Temperature Steel*—HTS, and

<sup>2</sup> 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

#### 4.1.5 Structural Steel—SS,

4.1.5.1 Structural steel is available in several grades based on mechanical properties. Structural Steel Grade 50 [340] is available in three classes based on tensile strength. Structural Steel Grade 80 [550] is available in two classes, based on chemistry.

#### 4.1.6 High Strength Low Alloy Steel—(HSLAS),

4.1.6.1 HSLAS is available in several grades based on mechanical properties and HSLAS 55 is available in two classes based on tensile strength, total elongation, and chemistry.

#### 4.1.7 High Strength Low Alloy Steel With Improved Formability—(HSLAS-F),

4.1.7.1 HSLAS-F is available in several grades based on mechanical properties and HSLAS 55 is available in two classes based on tensile strength, total elongation, and chemistry.

4.2 The product is available in several coating weights [masses] with the coating designation in accordance with **Table 1**.

### 5. Ordering Information

5.1 55 % aluminum-zinc alloy-coated steel sheet in coils and cut lengths is produced to thickness requirements expressed to 0.001 in. [0.01 mm]. The thickness of the sheet includes the base metal and the coating.

**TABLE 1 Weight [Mass] of Coating Requirements<sup>A</sup>**

NOTE 1—Use the information provided in 8.1.2 to obtain the approximate coating thickness from the coating weight [mass].

NOTE 2—When considering material with coating designation less than AZ50 [AZM150], users are advised to discuss the intended application with the manufacturer to determine if the product is appropriate for the end use.

Coating Designation	Minimum Requirements	
	Triple-Spot Test	Single-Spot Test
	Inch-Pound Units	
	Total Both Sides, oz/ft <sup>2</sup>	Total Both Sides, oz/ft <sup>2</sup>
AZ30	0.30	0.26
AZ35	0.35	0.30
AZ40	0.40	0.35
AZ50	0.50	0.43
AZ55	0.55	0.50
AZ60	0.60	0.52
AZ70	0.70	0.60

  

Coating Designation	Minimum Requirements	
	Triple-Spot Test	Single-Spot Test
	SI Units	
	Total Both Sides, g/m <sup>2</sup>	Total Both Sides, g/m <sup>2</sup>
AZM100	100	85
AZM110	110	95
AZM120	120	105
AZM150	150	130
AZM165	165	150
AZM180	180	155
AZM210	210	180

<sup>A</sup> The coating designation number is the term by which this product is specified. Because of the many variables and changing conditions that are characteristic of continuous hot-dip coating lines, the weight [mass] of the coating is not always evenly divided between the two surfaces of a sheet, nor is the coating evenly distributed from edge to edge. However, it can normally be expected that not less than 40 % of the single-spot test limit will be found on either surface.

5.2 Orders for product to this specification shall include the following information, as necessary, to adequately describe the desired product.

5.2.1 Name of product (steel sheet, 55 % aluminum-zinc alloy coated),

5.2.2 Designation of sheet steel {CS (Type A, B, or C), FS, DS, HTS, or SS}.

5.2.2.1 When a CS type is not specified, Type B will be furnished.

5.2.3 Strength grade and class as required for Structural Steel,

5.2.3.1 When a class is not specified for SS 80, Class 1 will be furnished,

5.2.4 Strength grade as required for HSLAS and HSLAS-F,

5.2.4.1 When a class is not specified for HSLAS 55 or HSLAS-F 55, Class 1 will be furnished,

5.2.5 ASTM designation number and year of issue, such as A792 – \_\_\_\_ for inch-pound units or A792M – \_\_\_\_ for SI units,

5.2.6 Coating designation,

5.2.7 Chemically treated or not chemically treated,

5.2.8 Oiled or not oiled,

5.2.9 Dimensions (show thickness, minimum or nominal, width, flatness requirements (if appropriate), and length (if cut lengths)).

5.2.10 Coil size requirements (specify maximum outside diameter (OD), acceptable inside diameter (ID), and maximum weight [mass]),

5.2.11 Packaging,

5.2.12 Certification, if required, and heat analysis and mechanical property report,

5.2.13 Application (show part identification and description), and

5.2.14 Special requirements (if any).

5.2.14.1 If required, the product may be ordered to a specified base metal thickness. See Supplementary Requirement S1.

NOTE 1—Typical ordering descriptions are as follows:

Steel sheet, 55 % aluminum-zinc alloy-coated, Forming Steel (FS), ASTM A792 – \_\_\_\_, coating designation AZ55, chemical treatment, no oil, minimum 0.035 by 36 in. by coil, 48 in. maximum OD, 24 in. ID, 10 000 lb maximum, for muffler wrappers.

Steel sheet, 55 % aluminum-zinc alloy-coated, Commercial Steel (CS Type A), ASTM A792M – \_\_\_\_, coating designation AZM150, chemical treatment, no oil, minimum 0.90 by 900 mm by coil, 1200 mm maximum OD, 600 mm ID, 4500 kg maximum, for building panels.

5.2.14.2 When the purchaser requires thickness tolerances for 3/8 in. [10 mm] minimum edge distance (see Supplementary Requirement in Specification A924/A924M), this requirement shall be specified in the purchase order or contract.

### 6. Chemical Composition

#### 6.1 Base Metal:

6.1.1 The heat analysis of the base metal shall conform to the requirements of **Table 2** for CS (Types A, B, and C), FS, DS, HTS, **Table 3** for SS, and **Table 4** for HSLAS and HSLAS-F.

6.1.2 Include each of the elements listed in **Tables 2-4** in the report of heat analysis. When the amount of copper, nickel,

**TABLE 2 Chemical Requirements**

Designation	Composition, %—Heat Analysis Element, Maximum, Unless Otherwise Shown													
	C	Mn	P	S	Al	Cu	Ni	Cr	Mo	V	Cb/ Nb <sup>H</sup>	Ti <sup>B</sup>	N	B
CS Type A <sup>C,D,E</sup>	0.10	0.60	0.030	0.035	<sup>A</sup>	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>
CS Type B <sup>C,F</sup>	0.02 to 0.15	0.60	0.030	0.035	<sup>A</sup>	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>
CS Type C <sup>C,D,E</sup>	0.08	0.60	0.10	0.035	<sup>A</sup>	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>
FS <sup>C,G</sup>	0.02 to 0.10	0.50	0.020	0.030	<sup>A</sup>	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>
DS <sup>D,E</sup>	0.06	0.50	0.020	0.025	0.01, min	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>
HTS <sup>C</sup>	0.02 to 0.15	0.60	0.040, min	0.035	<sup>A</sup>	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>A</sup>	<sup>A</sup>

<sup>A</sup> There is no specified requirement, but the analysis result shall be reported.

<sup>B</sup> For steels containing more than 0.02 % carbon, titanium is permitted at the producer's option, to the lesser of 3.4N + 1.5S or 0.025 %, for the purpose of stabilization.

<sup>C</sup> When a deoxidized steel is required for the application, the purchaser has the option to order CS, FS, and HTS to a minimum of 0.01 % total aluminum.

<sup>D</sup> Steel is permitted to be furnished as a vacuum degassed or chemically stabilized steel, or both, at producer's option.

<sup>E</sup> For carbon levels less than or equal to 0.02 %, vanadium, columbium, or titanium, or combinations thereof, are permitted to be used as stabilizing elements at producer's option. In such cases, the applicable limit for vanadium and columbium shall be 0.10 % max. and the limit for titanium shall be 0.15 % max.

<sup>F</sup> For CS, specify Type B to avoid carbon levels below 0.02 %.

<sup>G</sup> Shall not be furnished as a stabilized steel.

<sup>H</sup> Columbium (Cb) and Niobium (Nb) are considered interchangeable names for Element 41 in the periodic table and both names are acceptable for use.

**TABLE 3 Chemical Requirements**

Designation	Composition, %—Heat Analysis Element, Maximum, Unless Otherwise Shown											
	C	Mn	P	S	Cu	Ni	Cr	Mo	V	Cb/Nb <sup>D</sup>	Ti <sup>A</sup>	N
Structural Steel:												
Grade 33 [230]	0.20	1.35	0.04	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 37 [255]	0.20	1.35	0.10	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 40 [275]	0.25	1.35	0.10	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 50 Class 1, Class 2, and Class 4 [340 Class 1, Class 2, and Class 4]	0.25	1.35	0.20	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 60 [410]	0.25	1.35	0.20	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 70 [480]	0.25	1.35	0.20	0.040	0.25	0.20	0.15	0.06	0.008	0.008	0.025	<sup>B</sup>
Grade 80 [550] Class 1	0.20	1.35	0.04	0.040	0.25	0.20	0.15	0.06	0.008	0.015	0.025	<sup>B</sup>
Grade 80 [550] Class 2 <sup>C</sup>	0.02	1.35	0.05	0.020	0.25	0.20	0.15	0.06	0.10	0.10	0.15	<sup>B</sup>
Grade 80 [550] Class 3	0.20	1.35	0.04	0.040	0.25	0.20	0.15	0.06	0.008	0.015	0.025	<sup>B</sup>

<sup>A</sup> Titanium is permitted at the producer's option, to the lesser of 3.4N + 1.5S or 0.025 %, for the purpose of stabilization.

<sup>B</sup> There is no specified requirement, but the analysis shall be reported.

<sup>C</sup> Steels containing less than or equal to 0.02 % carbon shall be furnished as a stabilized steel.

<sup>D</sup> Columbium (Cb) and Niobium (Nb) are considered interchangeable names for Element 41 in the periodic table and both names are acceptable for use.

chromium, or molybdenum is less than 0.02 %, report the analysis either as <0.02 % or the actual determined value. When the amount of vanadium, titanium, or columbium is less than 0.008 %, report the analysis either as <0.008 % or the actual determined value. When the amount of boron is less than 0.0005 %, report as <0.0005 % or the actual determined value.

6.2 *Coating Composition*—The 55 % aluminum-zinc alloy coating composition, by weight, is nominally 55 % aluminum, 1.6 % silicon, and the balance zinc.

## 7. Mechanical Properties

7.1 Structural Steel, High Strength Low Alloy Steel, and High Strength Low Alloy Steel with Improved Formability shall conform to the mechanical property requirements in [Table 5](#) and [Table 6](#) for the grade specified.

7.2 The typical mechanical properties for CS (Types A, B, and C), FS, DS, and HTS are listed in [Table 7](#). These typical mechanical properties are nonmandatory. They are intended solely to provide the purchaser with as much information as possible to make an informed decision on the steel to be specified. Values outside these ranges are to be expected.

7.3 All tests for mechanical properties shall be conducted in accordance with the methods described in Specification [A924/A924M](#).

## 7.4 Bending Properties:

7.4.1 *Minimum Inside Radii for Cold Bending*—Structural Steel sheet is commonly fabricated by cold bending. There are many interrelated factors that affect the ability of a steel to cold form over a given radius under shop conditions. These factors include thickness, strength level, degree of restraint, relationship to rolling direction, chemistry, and base metal microstructure. [Table X1.1](#) lists the suggested minimum inside radii for 90° cold bending for Structural Steels. They presuppose “hard way” bending (bend axis parallel to the rolling direction) and reasonably good shop forming practices. Where possible, the use of larger radii or “easy way” bends are recommended for improved performance.

7.4.2 Fabricators should be aware that cracks may initiate upon bending a sheared or cold-worked edge. This is not considered to be a fault of the steel but is rather a function of the induced localized cold-work zone.

## 8. Coating Properties

### 8.1 Coating Weight [Mass]:

8.1.1 Coating weight [mass] shall conform to the requirements as shown in [Table 1](#) for the specific coating designation.

8.1.2 Use the following relationships to estimate the coating thickness from the coating weight [mass]: