



Designation: A902 – 23

Standard Terminology Relating to Metallic Coated Steel Products¹

This standard is issued under the fixed designation A902; 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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

1. Scope*

1.1 This standard is a compilation of terminology related to metallic coatings used in the steel industry, and to the steel on which the coatings are applied. Terms that are generally understood or adequately defined in other readily available sources are not included.

1.2 When a term is used in an ASTM document for which Committee A05 is responsible it is included herein only when judged, after review by Subcommittee A05.18, to be a generally usable term.

1.3 Definitions that are identical to those published by other ASTM committees or other standards organizations are identified with the ASTM standard designation (for example, Terminology B374) or with the abbreviation of the name of the organization.

1.4 A definition is a single sentence with additional information included in notes. The year the definition was adopted, or the year of latest revision, is appended. The responsible subcommittee reviews the definition for each term at five-year intervals, and prepares revisions as needed.

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

A641/A641M Specification for Zinc-Coated (Galvanized) Carbon Steel Wire

A924/A924M Specification for General Requirements for Steel Sheet, Metallic-Coated by the Hot-Dip Process

¹ This terminology is under the jurisdiction of ASTM Committee A05 on Metallic-Coated Iron and Steel Products and is the direct responsibility of Subcommittee A05.18 on Editorial and Terminology.

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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.

B374 Terminology Relating to Electroplating

D6386 Practice for Preparation of Zinc (Hot-Dip Galvanized) Coated Iron and Steel Product and Hardware Surfaces for Painting

D7396 Guide for Preparation of New, Continuous Zinc-Coated (Galvanized) Steel Surfaces for Painting

3. Terminology

3.1 *Definitions:*

aluminized coating, *n*—a coating on steel consisting of either commercially-pure aluminum (Type 2) or aluminum-silicon alloy (Type 1), applied by the hot-dip process. (2005)

barb, *n*—*as related to barbed wire*, a short length of wire, with exposed ends cut on a bias to produce sharp points. (1995)

barbed wire, *n*—a fabricated wire product consisting of two line wires twisted to form a two-wire strand, into which 2-point or 4-point barbs are tightly wrapped and locked into place at specified intervals. (1995)

base metal, *n*—*as related to metallic-coated steel*, the steel to which the coating is applied, as distinguished from the coating metal. (1990)

batch coating, *n*—*of metallic coated steel products*, the process of discontinuous-sequential passage of steel articles through the various steps of the coating process, such as, cleaning, pickling, fluxing, and coating. (1995)

breaking strength, *n*—*as related to wire*, the maximum force developed prior to fracture during tension testing of wire and wire products.

DISCUSSION—In testing of stranded wire products, the maximum force may be developed after fracture of one or more individual wires. (1993)

carbon steel, *n*—steel having a maximum carbon content of 2.0 % and a composition conforming to the following: (1) no minimum content is specified for chromium, cobalt, columbium (niobium), molybdenum, nickel, titanium, tungsten, vanadium, zirconium, or any other element added to obtain a desired alloying effect; (2) the specified minimum and maximum values for copper do not exceed 0.35 % and 0.60 %, respectively; (3) the specified maximum for any of the following elements does not exceed these percentages: manganese 1.65 %, silicon 0.60 %, columbium (niobium)

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

0.015 %, vanadium 0.008 %, boron 0.0008 %, or titanium 0.025 %; and (4) the incidental content of the following elements does not exceed these percentages: nickel, 0.20 %; chromium, 0.15 %; and molybdenum, 0.06 %.

DISCUSSION—Carbon steels typically contain small quantities of certain residual elements from the feed materials. When the quantity of such retained elements exceeds the values listed in (4) above, the characteristics of the steel may differ from that of carbon steel without those elements to a degree that the steel may be unsatisfactory for the intended use. The composition limits stated in this definition shall not apply to stabilized steel. (2005)

chemical treatment, n—a passivating surface protectant normally applied to metallic coatings to retard the formation of corrosion products during shipment and storage (storage stain).

DISCUSSION—The corrosion-inhibiting characteristics of chemical treatments are limited. If chemically-treated material becomes wet in shipment or storage, the product should be used or dried immediately. Some types of chemical treatments may be inappropriate in certain applications because of possible undesirable effects on further processing, such as phosphatizing, spot welding, or painting. (2007)

commercial steel, CS, n—a metallic-coated steel sheet designation which includes carbon steel products intended for general fabrication applications involving little or no bending or forming.

DISCUSSION—The chemical composition requirements for this designation can be found in the appropriate sheet product specification. (2013)

continuous coating, n—of *metallic coated steel products*, the process of uninterrupted passage of long lengths of steel products, usually steel sheet, tube, pipe, or wire, through the various processing steps such as cleaning, annealing, and coating.

DISCUSSION—Continuous coating involves the use of equipment that is capable of joining long lengths of product without stoppage of the coating process. Continuous coating of preformed tube or pipe is limited to the outer surface, since the coating material cannot be supplied to the inner surface. (2006)

deep drawing steel, DDS, n—a metallic coated steel sheet designation which includes low carbon steel products intended for applications involving particularly severe forming or deep drawing.

DISCUSSION—The chemical composition requirements for this designation can be found in the appropriate sheet product specification. (2013)

delamination, n—as *related to metallic coated steel*, the separation of a coating (either full or partial thickness) from underlying layers; the separation can occur in small localized areas or large areas of surface.

DISCUSSION—*Flaking, peeling, and spalling* are colloquial terms sometimes used to describe the separation. (1997)

differentially coated sheet, n—metallic coated sheet with unequal specifications for the weight (mass) of metallic coating on each of the two surfaces. (2012)

electrolytic process, n—the application of a metallic coating on a steel product by passing an electric current through a

chemical solution in which the product is immersed; the coating may be applied in a continuous process or a batch process. (1995)

extra deep drawing steel, EDDS, n—a metallic-coated steel sheet designation, which requires the use of non-aging, chemically-stabilized carbon steel intended for applications requiring maximum formability.

DISCUSSION—The chemical composition requirements for this designation can be found in the appropriate sheet product specification. (2013)

extra smooth sheet, n—product produced by cold rolling the metallic coated sheet with a small reduction in thickness to impart both the desired surface texture and resistance to stretcher strains and fluting. (Syn. **skin passed sheet**)

DISCUSSION—Extra smooth is frequently specified when fluting or stretcher strains may be a hazard. Extra smooth sheet is also a preferred surface for post painting and prepainting. Extra smooth may not be available in all coating types or weights (masses). (2012)

fabricator, n—as *related to corrugated metal pipe*, (1) the organization that produces the finished pipe, or (2) for structural plate pipe, the organization that processes flat sheets and other items needed for the field assembly of the finished products. (1990)

flaking—See **delamination**. (1994)

forming steel, FS, n—a metallic-coated steel sheet designation which includes carbon steel products intended for applications involving moderate forming or mild drawing which might not be achieved by commercial steel.

DISCUSSION—The chemical composition requirements for this designation can be found in the appropriate sheet product specification. (2013)

galvanized coating, n—a coating of virtually pure zinc on steel, applied by various methods or processes including hot-dip processes and electrodeposition (electrolytic processes).

DISCUSSION—For hot-dipped galvanized coatings, the molten bath is typically at least 99 % zinc; as applied to the steel, the coating typically contains intermetallic layers of zinc-iron alloys adjacent to the steel surface. Other methods of applying the zinc coating include metal spraying (metallizing), sherardizing, vacuum deposition, and mechanical deposition, but there is not general agreement that all produce a “galvanized coating.” There is general agreement that the coating produced by application of zinc-rich paint is not a “galvanized coating.” (1999)

galvannealed coating, n—a coating on steel of zinc-based alloy, containing about 6 to 15 % iron, produced by hot-dip immersion in a high-zinc content coating bath, followed by heating the steel to induce diffusion alloying between the molten zinc coating and the steel. (1994)

heat, n—a specific lot of material representing a single melt of steel produced to a specified chemical composition. (2017)

heat analysis, n—the chemical analysis determined by the steel producer as being representative of the chemical composition of a heat of steel.

DISCUSSION—The sample on which the analysis is performed is usually taken from the molten steel. (2018)

hot-dip process, *n*—the application of a metallic coating on a steel product by immersion of the product in the molten metal which forms the coating; the coating is applied in either a continuous process or a batch process.

DISCUSSION—Metallic coatings applied by the hot-dip process are characterized by the presence of an intermediate alloy layer which forms as a result of a metallurgical reaction between the steel surface and the molten metal. (2006)

inclusion control, *n*—the process of reducing the volume fraction of inclusions or modifying the shape of inclusions to improve formability, weldability, and machinability.

DISCUSSION—Inclusions, especially those elongated during the rolling process, create the conditions for initiating, and/or propagating cracks when the material is stretched or bent during the manufacture of a part. The adverse effects of inclusions are minimized by reducing the content of inclusions in the steel and/or by altering the shape of inclusions through the use of additions during the steelmaking process that change the elongated shape of the inclusions to less harmful, small, well-dispersed globular inclusions. (2008)

lot, *n*—a finite quantity of a given product, produced under conditions that are considered uniform for sampling purposes.

DISCUSSION—In the case of metallic-coated iron or steel products, the conditions which may be considered necessary for a single lot are similar units, coating at approximately the same time, in the same manner, in a single coating bath. Consideration must also be given to the uniformity of the iron or steel product to which the coating is applied, such as being from a single heat. For material sampled after shipment from the manufacturer's or coater's facility (where the heat or processing identification may have been lost), a lot would consist of all similar material in a given shipment. (2006)

manufacturer, *n*—*as related to corrugated metal pipe*, the organization that produces the metal sheet from which pipe is made. (1990)

mechanical polishing, *n*—*of metallic coatings*, smoothing of a surface using mechanical tools and abrasives in a series of several steps with progressively finer abrasives until the desired smoothness is obtained. (1994)

minimum thickness, *n*—*of metallic-coated steel sheet*, an ordering designation which indicates that the applicable tolerance for thickness is all plus from the ordered thickness. (2013)

nominal thickness, *n*—*of metallic coated steel sheet*, an ordering designation which indicates that the applicable tolerance for thickness is divided equally, plus and minus from the ordered thickness. (2012)

oiled, *adj*—describing a coating applied to metallic coated steel sheet alone or in addition to chemical treatment for further protection against the onset of storage corrosion; the oil coating is intended as a corrosion inhibitor only and not as a rolling or drawing lubricant. (2001)

peeling—See **delamination**. (1994)

phosphatized, *adj*—pertains to the treatment, in a phosphate solution, of uncoated and metallic coated sheet to prepare the surface for painting without further treatment except normal cleaning. (Syn. **phosphated, phosphate coated**)

DISCUSSION—This is a surface treatment only and other characteristics of the metallic coating remain unchanged on phosphatized sheet. Additional information about this and other types of available surface treatments is presented in Appendix X2 of Specification **A924/A924M**. Cleaning procedures are described in Guides **D6386** and **D7396**. (2009)

powdering, *n*—*as related to metallic coatings*, microcracking and fine particle separation of generally brittle coatings when the coating is severely stressed. (2005)

product analysis, *n*—a chemical analysis of a specimen taken from the semi-finished product or the finished product.

DISCUSSION—The resultant chemistry is expected to be similar, but not necessarily equivalent to the chemistry obtained by the associated heat analysis. (2014)

purchaser, *n*—*as related to corrugated metal pipe*, the entity that contracts to buy the finished pipe. (2009)

sample, *n*—a portion of the material that represents the lot.

DISCUSSION—The sample may consist of one or more discrete units, or may be one or more portions selected from one or more large units (such as from a coil of wire or steel sheet). (2015)

seam, *n*—*in wire*, a longitudinal discontinuity that extends radially into the wire from its surface.

DISCUSSION—The discontinuity may appear as a crack. The discontinuity can develop during solidification, rolling, or the wire drawing operation as a result of dynamic strain aging. A seam originating in wire drawing is also known as a split. (1992)

skin passed sheet, *n*—Synonym for **extra smooth sheet**. (1991)

spalling—See **delamination**. (1997)

spangle, *n*—*in hot-dip coatings*, the crystalline structure that develops on a metallic-coated surface when the molten coating metal solidifies, especially on steel sheet and articles coated after fabrication.

DISCUSSION—The crystalline structure can range from large, very visible dendritic grains to small, equiaxed grains that are difficult to discern with the unaided eye. Variables that affect the crystal size and visibility include: steel substrate composition and prior treatment, coating bath composition, coating solidification rate, and post coating processing such as temper rolling. (2005)

specimen, *n*—a portion of a sample on which a specific test or evaluation is performed. (2005)

stabilized steel, *n*—a steel which has been treated with one or more carbide- or nitride-forming elements such as titanium, vanadium, or columbium, to control the level of interstitial solute elements (carbon or nitrogen) in the steel.

DISCUSSION—Fully stabilized interstitial free (IF) steel is non-aging and has improved formability as compared to steel that has not been fully stabilized. (2012)

steel sheet designation, *n*—a title given to a steel sheet product, associated with unique requirements for chemical composition and with mandatory or nonmandatory (typical) mechanical properties; the specific titles include *commercial steel, drawing steel, deep drawing steel, extra deep drawing steel, forming steel, high strength-low alloy steel, high temperature steel, structural steel, bake hardenable steel, solution hardened steel, complex phase steel, dual phase steel*, and *transformation induced plasticity steel*.