



Designation: A1076/A1076M – 12

Standard Specification for Cold Formed Carbon Structural Steel Tubing Made from Metallic Precoated Sheet Steel¹

This standard is issued under the fixed designation A1076/A1076M; 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 specification covers round, square, rectangular, and special shape, electric-resistance-welded structural tubing produced from precoated sheet steel with the following coatings on both sides: zinc (galvanized) or 55% aluminum-zinc alloy. This product is intended for applications requiring minimum mechanical properties and corrosion resistance of both exterior and interior surfaces.

1.2 This specification is applicable to orders in either inch-pound units (as A1076) or SI units (as A1076M). Within the text, SI units are shown in brackets. The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.3 *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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:²

A90/A90M Test Method for Weight [Mass] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings

A370 Test Methods and Definitions for Mechanical Testing of Steel Products

A902 Terminology Relating to Metallic Coated Steel Products

A500/A500M Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes

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 A01.09 on Carbon Steel Tubular Products.

Current edition approved July 1, 2012. Published September 2012. DOI: 10.1520/A1076_A1076M-12.

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.

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

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 *de-dimpled*, *adj*—the condition of the end of tubing after removal of the protrusion or deformation created by the punch cut operation.

3.2.1.1 *Discussion*—The dimple is a protrusion that is displaced from the inside diameter and is unrelated to a shear burr.

3.2.2 *structural tubing*, *n*—tubing tension tested with reported test results.

4. Product Size

4.1 The standard covers products available in the following sizes:

Product	Wall Thickness, max	Exterior Dimension, max
Round Tubing	0.25 in. [6.35 mm]	Diameter – 5 in. [130 mm]
Square, Rectangular, or Special Shapes	0.25 in. [6.35 mm]	Periphery – 16 in. [405 mm]

5. Classification

5.1 The finished tube is available in the following designations:

5.1.1 Round structural tubing steel grade with minimum yield strength 33 ksi [230 MPa], 42 ksi [290 MPa], and 46 ksi [315 MPa] in the finished tube.

5.1.2 Shaped structural tubing steel grade with minimum yield strength 39 ksi [270 MPa], 46 ksi [315 MPa], and 50 ksi [345 MPa] in the finished tube.

5.1.3 The finished tube is available as zinc-coated or 55% aluminum-zinc alloy-coated with a recommended minimum of 0.40 oz/ft² [120 g/m²] total both sides.

6. Ordering Information

6.1 The ordered wall thickness of the tubing shall be the total of the base metal and the metallic coating.

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

- 6.2.1 Steel grade designation,
- 6.2.2 Chemically treated or not chemically treated raw material,
- 6.2.3 Coating designation,
- 6.2.4 Organic or inorganic coating if required,
- 6.2.5 Oiled or dry,
- 6.2.6 End condition,
 - 6.2.6.1 Burrs removed if required,
- 6.2.7 Mill cut or de-dimpled end condition,
 - 6.2.7.1 When the end finish is not specified, mill cut will be furnished,
- 6.2.8 Dimensions (show outside diameter and wall thickness for round tubing), (outside dimensions and wall thickness for square, rectangle, or special shapes), and length,
- 6.2.9 Quantity (length or weight),
- 6.2.10 Mill certification (if required),
- 6.2.11 End-use application, and
- 6.2.12 Recoating of outside diameter weld and heat-affected area of coating, if required.

7. Coating Properties

7.1 Zinc Coating Weight [Mass]:

7.1.1 Coating weight [mass] shall conform to the requirements as shown in **Table 1** for the specific coating designation.

The thickness of the tube includes both the base metal and the coating.

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

7.1.2.1 1 oz/ft² coating weight = 1.7 mils coating thickness

7.1.2.2 7.14 g/m² coating mass = 1 µm coating thickness

7.2 55% Aluminum-Zinc Coating Weight [Mass]:

7.2.1 Coating weight [mass] shall conform to the requirements as shown in **Table 2** for the specific coating designation.

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

7.2.2.1 1 oz/ft² coating weight = 3.2 mils coating thickness

7.2.2.2 3.75 g/m² coating mass = 1 µm coating thickness

7.3 Coating Weight To Coating Mass Conversion:

7.3.1 1 oz/ft² coating weight = 305.15 g/m² coating mass

7.4 Coating Weight [Mass] Tests:

7.4.1 Coating weight [mass] tests shall be performed in accordance with the requirements of Specification **A924/A924M**.

7.4.2 The referee method to be used shall be Test Method **A90/A90M**.

8. Chemical Composition

8.1 Base Metal:

8.1.1 The base metal shall be manufactured using the basic oxygen or electric furnace process.

TABLE 1 Weight [Mass] of Zinc Coating Requirements^A

NOTE 1—Use the information provided in 7.1.2 to obtain the approximate coating thickness from the coating weight [mass].

		Minimum Requirement ^B		
		Triple-Spot Test		Single-Spot Test
		Inch-Pound Units		
Type	Coating Designation	Total Both Sides, oz/ft ²	One Side	Total Both Sides, oz/ft ²
Zinc	G235	2.35	0.80	2.00
	G210	2.10	0.72	1.80
	G185	1.85	0.64	1.60
	G165	1.65	0.56	1.40
	G140	1.40	0.48	1.20
	G115	1.15	0.40	1.00
	G100	1.00	0.36	0.90
	G90	0.90	0.32	0.80
	G60	0.60	0.20	0.50
	G40	0.40	0.12	0.30
	G30	0.30	0.10	0.25
	G01	no minimum	no minimum	no minimum
		SI Units		
Type	Coating Designation	Total Both Sides, g/m ²	One Side	Total Both Sides, g/m ²
Zinc	Z700	700	238	595
	Z600	600	204	510
	Z550	550	190	475
	Z500	500	170	425
	Z450	450	154	385
	Z350	350	120	300
	Z305	305	110	275
	Z275	275	94	235
	Z180	180	60	150
	Z120	120	36	90
	Z90	90	30	75
	Z001	no minimum	no minimum	no minimum

^A 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 zinc coating is not always evenly divided between the two surfaces of a coated sheet; nor is it always evenly distributed from edge to edge. However, the minimum triple-spot average coating weight (mass) on any one side shall not be less than 40 % of the single-spot requirement.

^B No minimum means that there are no established minimum requirements for triple- and single-spot tests.