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American Association State Highway and Transportation Officials Standard
AASHTO No. M 246/M 246M

# Standard Specification for Steel Sheet, Metallic Coated and Polymer Precoated for Corrugated Steel Pipe[1]

This standard is issued under the fixed designation A742/A742M; 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.

*This standard has been approved for use by agencies of the Department of Defense.*

## 1. Scope*

1.1 This specification covers polymer precoated steel sheet for corrugated steel pipe (CSP) which is coated after metallic coating on continuous lines by coil coating (roller coating or laminating) processes. The metallic coating is either zinc, 55 % aluminum-zinc alloy, or zinc-5 % aluminum-mischmetal alloy. Sheet for this purpose is furnished flat in coils, flat in cut lengths, or corrugated in cut lengths, all being protected by a mill-applied polymer coating on both sides.

1.2 The values stated in either inch-pound units or SI units are to be regarded separately as the standard. Within the text, the SI units are shown in brackets. The values stated in each system are not equivalents; therefore, each system must be used independently of the other.

1.3 The following precautionary caveat refers only to the test method portion, Section 9, of this specification:*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]

A929/A929M Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe

D543 Practices for Evaluating the Resistance of Plastics to Chemical Reagents

D658 Test Method for Abrasion Resistance of Organic Coatings by Air Blast Abrasive (Withdrawn 1996)[3]

D1005 Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers

D2794 Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)

G22 Practice for Determining Resistance of Plastics to Bacteria (Withdrawn 2002)[3]

G23 Practice for Operating Light-Exposure Apparatus (Carbon-Arc Type) With and Without Water for Exposure of Nonmetallic Materials (Discontinued 2001) (Withdrawn 2000)[3]

G62 Test Methods for Holiday Detection in Pipeline Coatings

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *fabricator—in this specification*, fabricator refers to the producer of the pipe.

3.1.2 *manufacturer—in this specification*, manufacturer refers to the producer of the sheet.

3.1.3 *purchaser—in this specification*, purchaser refers to the purchaser of the finished pipe.

3.2 *Abbreviations:*

3.2.1 *55 Al-Zn*—55 % aluminum-zinc.

3.2.2 *MM*—mischmetal.

3.2.3 *Zn-5 Al-MM*—zinc-5 % aluminum-mischmetal.

## 4. Classification

4.1 The polymer coating is classified by grade corresponding to the thickness in mils (thousandths inch) on each side in inch-pound units and the thickness in micrometres on each side in SI units.

| Grade | Coating Thickness in. | Coating Thickness [μm] |
|---|---|---|
| 10/10 [250/250] | 0.010/0.010 | [250/250] |

[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 A05.17 on Corrugated Steel Pipe 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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

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4.2 Any combination of polymer coating thickness other than shown above is subject to agreement between the manufacturer and purchaser or fabricator.

## 5. Ordering Information

5.1 The polymer precoated sheet covered by this specification shall be ordered only to the specified thickness listed in Table 1. The specified thickness is based on the thickness of the metallic-coated steel sheet, not including the thickness of the polymer coating.

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

5.2.1 Name of material (polymer precoated steel sheet for CSP),

5.2.2 Type of metallic coating (see 6.1),

5.2.3 ASTM designation and year of issue, as A742 – ___ for inch-pound units or A742M – ___ for SI units,

5.2.4 Corrugation size, if corrugated (see 6.3),

5.2.5 Substrate dimensions (specified thickness; width, either flat or overall corrugated; and length, if cut length),

5.2.6 Grade of polymer coating (see Section 4), indicating thickness on each side,

5.2.7 Coil size requirements (specify maximum outside diameter (OD), acceptable inside diameter (ID), and maximum weight),

5.2.8 Certification, if required (see 11.1), and

5.2.9 Special requirements.

NOTE 1—Typical ordering descriptions are as follows:

Polymer precoated steel sheet, zinc-coated for CSP, conforming to ASTM A742 – ___, 2⅔ by ½-in. corrugations, 0.064 by 25½ by 60 in., with Grade 10/10 polymer coating (0.010 in./0.010 in.), certified with test report.

[Polymer precoated steel sheet, aluminum-zinc alloy coated for CSP, conforming to ASTM A742M – ___, 2.77 by 700 mm by coil, with Grade 250/250 polymer coating; coil 1200-mm max outside diameter, 600-mm inside diameter, 10 000-kg max coil weight.]

## 6. General Requirements

6.1 The metallic-coated substrate shall conform to all applicable requirements of Specification A929/A929M for zinc coating, 55 % aluminum-zinc alloy coating, or zinc-5 % aluminum-mischmetal alloy coating, whichever is stated in the order. If the type of metallic coating is not stated in the order, zinc-coated steel sheet shall be furnished.

**TABLE 1 Thicknesses of Metallic-Coated Steel Sheet[A]**

| Specified Thickness, in. [mm] | Metallic Coating | | |
|---|---|---|---|
| | Zinc-Coated | 55 Al-Zn Alloy Coated | Zn-5 Al-MM Alloy Coated |
| 0.040 [1.02] | X | X | X |
| 0.052 [1.32] | X | X | X |
| 0.064 [1.63] | X | X | X |
| 0.079 [2.01] | X | X | X |
| 0.109 [2.77] | X | X | X |
| 0.138 [3.51] | X | X | X |
| 0.168 [4.27] | X | | X |

[A]An "X" indicates sheet thicknesses which are available in the corresponding coating type.

6.1.1 The steel sheet shall be thoroughly cleaned of any chromate pretreatment or other passivation using a multi-brush cleaning process. All traces of the caustic cleaning solution shall be immediately rinsed from the sheet following caustic cleaning. After drying, the steel sheet shall be treated with chromic acid solution and heat-cured prior to application of the polymer film. The deposited chromium content shall range from 135 to 190 mg/m$^2$.

6.2 The polymer coating shall be a film coating comprised of at least 85 % ethylene acrylic acid copolymer and be capable of being applied to the sheet specified in 6.1. After application, the polymer coating shall be free of holes, tears, and discontinuities, and shall be sufficiently flexible so that it will withstand the corrugating, forming, and lockseaming operations, and punching of holes for rivets or perforations.

6.3 If the polymer-coated sheet is to be furnished with corrugations, the corrugations shall conform to the requirements stated in Specification A929/A929M.

## 7. Requirements for Polymer Coating

7.1 *Adhesion*—There shall be no spalling or cracking of the coating, or disbonding of the coating at the cut, when tested in accordance with 9.1.

7.2 *Impact*—There shall be no break in the polymer coating when tested in accordance with 9.2.

7.3 *Thickness of Coating*—The thickness of the polymer coating shall meet the requirements of Section 4, or as specified in the purchase order, when tested in accordance with 9.3. The thicknesses indicated are minimum values at any point not less than ⅜ in. [10 mm] from an edge.

7.4 *Holidays*—The polymer coating on the steel shall be substantially free of holidays when tested in accordance with 9.4. An average of two holidays per square foot [22 holidays per square metre] of actual surface area on the test specimen shall be permitted.

NOTE 2—Holidays are pinholes or voids in the polymer coating that are not visually discernible.

7.5 *Abrasion Resistance*—The average abrasion coefficient when tested in accordance with 9.5, shall be a minimum of 100 (expressed in g/mil of thickness) or 3.9 [expressed in g/µm of thickness].

7.6 *Imperviousness*—There shall be no loosening or separation of the polymer coating from the metallic-coated steel substrate when tested in accordance with 9.6.

7.7 *Freeze-Thaw Resistance*—The specimen shall withstand 100 freeze-thaw cycles, as described in 9.7, without spalling, disbonding, or other detrimental effects.

7.8 *Weatherability*—The specimens shall withstand 100 h of weathering with no observable delamination or cracking, when tested in accordance with 9.8.

7.9 *Resistance to Microbial Attack*— There shall be no effect of microbial attack of the polymer coating when tested in accordance with 9.9.

NOTE 3—Tests 7.1 through 7.4 are suggested as quality control tests. When these tests are used for quality control, they may be run at form

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