

---

# **Standard Specification for Corrugated Steel Pipe, Polymer- Precoated, for Sewers and Drains**

---

**AASHTO Designation: M 245-20**

**Technical Subcommittee: 4b, Flexible and Metallic Pipe**

**Release: Group 2 (June)**

**ASTM Designation: A762/A762M-19**



**American Association of State Highway and Transportation Officials  
555 12th Street NW, Suite 1000  
Washington, DC 20004**

---

## Standard Specification for

# Corrugated Steel Pipe, Polymer-Precoated, for Sewers and Drains

**AASHTO Designation: M 245-20**



**Technical Subcommittee: 4b, Flexible and Metallic Pipe**

**Release: Group 2 (June)**

**ASTM Designation: A762/A762M-19**

---

## 1. SCOPE

- 1.1. This specification covers polymer-precoated corrugated steel pipe intended for use for storm water drainage, underdrains, the construction of culverts, and similar uses. Pipe covered by this specification is not normally used for the conveyance of sanitary or industrial wastes. The steel sheet used in fabrication of the pipe has a polymer protective coating over a metallic coating of zinc (galvanizing), 55 percent aluminum-zinc alloy (55 Al-Zn), or zinc-5 percent aluminum-mischmetal alloy (Zn-5 Al-MM).
- 1.2. The polymer precoating provides a degree of extra protection for the pipe against abrasion and corrosion as compared with metallic-coated pipe without polymer coating. Some severe environments may cause corrosion problems to accessory items such as rivets or coupling band hardware that does not have a polymer coating. Additional protection for polymer-precoated corrugated steel pipe can be provided by use of coatings applied after fabrication of the pipe as described in M 190 and ASTM A849.
- 1.3. This specification does not include requirements for bedding, backfill, or the relationship between earth cover load and sheet thickness of the pipe. Experience has shown that the successful performance of this product depends on the proper selection of sheet thickness, type of bedding and backfill, controlled manufacture in the plant, and care in the installation. The installation procedure is described in the *AASHTO LRFD Bridge Construction Specifications*, Section 26.

---

## 2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 190, Asphalt-Coated Corrugated Metal Culvert Pipe and Pipe-Arches
  - M 218, Steel Sheet, Zinc-Coated (Galvanized), for Corrugated Steel Pipe
  - M 232M/M 232, Zinc Coating (Hot-Dip) on Iron and Steel Hardware
  - M 243, Field-Applied Coating of Corrugated Metal Structural Plate for Pipe, Pipe-Arches, and Arches
  - M 246, Steel Sheet, Metallic-Coated and Polymer-Precoated, for Corrugated Steel Pipe
  - M 289, Aluminum-Zinc Alloy Coated Sheet Steel for Corrugated Steel Pipe

- T 65M/T 65, Mass [Weight] of Coating on Iron and Steel Articles with Zinc or Zinc-Alloy Coatings
- T 249, Helical Lock Seam Corrugated Pipe
- *AASHTO LRFD Bridge Construction Specifications*
- *AASHTO LRFD Bridge Design Specifications*

## 2.2.

### *ASTM Standards:*

- A493, Standard Specification for Stainless Steel Wire and Wire Rods for Cold Heading and Cold Forging
- A563M, Standard Specification for Carbon and Alloy Steel Nuts (Metric)
- A780/A780M, Standard Practice for Repair of Damaged and Uncoated Areas of Hot-Dip Galvanized Coatings
- A796/A796M, Standard Practice for Structural Design of Corrugated Steel Pipe, Pipe-Arches, and Arches for Storm and Sanitary Sewers and Other Buried Applications
- A849, Specification for Post-Applied Coatings, Pavings, and Linings for Corrugated Steel Sewer and Drain Pipe
- A929/A929M, Standard Specification for Steel Sheet, Metallic-Coated by the Hot-Dip Process for Corrugated Steel Pipe
- B633, Standard Specification for Electrodeposited Coatings of Zinc on Iron and Steel
- B695, Standard Specification for Coatings of Zinc Mechanically Deposited on Iron and Steel
- C443, Standard Specification for Joints for Concrete Pipe and Manholes, Using Rubber Gaskets
- D1005, Standard Test Method for Measurement of Dry-Film Thickness of Organic Coatings Using Micrometers
- D1056, Standard Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
- F568M, Standard Specification for Carbon and Alloy Steel Externally Threaded Metric Fasteners (withdrawn 2012)

## 2.3.

### *AISI Standard:*

- AISI S100, North American Specification for the Design of Cold-Formed Steel Structural Members

---

## 3. TERMINOLOGY

### 3.1. *Description of Terms Specific to This Standard:*

- 3.1.1. *fabricator*—producer of the pipe.
- 3.1.2. *manufacturer*—producer of the sheet.
- 3.1.3. *minimized coating structure*—coating characterized by a finer metallurgical coating structure obtained by a treatment designed to restrict the formation of the normal coarse grain structure formed during solidification of the Zn-5Al-MM alloy coating.
- 3.1.4. *purchaser*—purchaser of the finished product.
- 3.1.5. *regular coating structure*—normal coating structure resulting from unrestricted grain growth during normal solidification of the Zn-5 Al-MM alloy coating.

---

## 4. CLASSIFICATION

- 4.1. *The corrugated steel pipe covered by this specification is classified as follows:*
- 4.1.1. *Type I*—This pipe shall have a full circular cross section, with a single thickness of corrugated sheet, fabricated with annular (circumferential) or helical corrugations.
- 4.1.2. *Type IA*—This pipe shall have a full circular cross section with an outer shell of corrugated sheet fabricated with helical corrugations and an inner liner of smooth (uncorrugated) sheet attached to the shell at helical lock seams.
- 4.1.3. *Type IR*—This pipe shall have a full circular cross section with a single thickness of smooth sheet, fabricated with helical ribs projecting outwardly.
- 4.1.4. *Type II*—This pipe shall be a Type I pipe that has been reformed into a pipe-arch having an approximately flat bottom.
- 4.1.5. *Type IIA*—This pipe shall be a Type IA pipe that has been reformed into a pipe-arch having an approximately flat bottom.
- 4.1.6. *Type IIR*—This pipe shall be a Type IR pipe that has been reformed into a pipe-arch having an approximately flat bottom.
- 4.1.7. *Type III*—This pipe, intended for use as underdrains or for underground disposal of water, shall be a Type I pipe that has been perforated to permit the inflow or outflow of water.
- 4.1.8. *Type IIIA*—This pipe, intended for use as underdrains, shall consist of a semicircular cross section having a smooth (uncorrugated) bottom with a corrugated top shield.
- 4.2. Perforations in Type III pipe are included in two classes as described in Section 8.3.2.
- 4.3. Zn-5 Al-MM alloy coated material is available in two coating classes, or structures, as follows:
- 4.3.1. *Class A*—Minimized coating structure; and
- 4.3.2. *Class B*—Regular coating structure.

---

## 5. ORDERING INFORMATION

- 5.1. *Orders for material to this specification shall include the following information as necessary to adequately describe the desired product:*
- 5.1.1. Name of material (polymer-coated corrugated steel pipe);
- 5.1.2. Grade of polymer coating indicating thickness on inside and outside (Section 6.1.1);
- 5.1.3. Type of metallic coating (zinc, 55 Al-Zn alloy, or Zn-5 Al-MM alloy ) (Section 6.1.2);
- 5.1.4. AASHTO designation and date of issue;
- 5.1.5. Type of pipe (Section 4.1);
- 5.1.6. Diameter of circular pipe (Table 8), or span and rise of pipe-arch section (Tables 10, 11, or 12);

- 5.1.7. Length, either total length or length of each piece and number of pieces;
- 5.1.8. Description of corrugations (Section 7.2);
- 5.1.9. Sheet thickness (Section 8.1.2);
- 5.1.10. For Type I and Type II pipe, the pipe fabrication method, whether with annular corrugations or helical corrugations (Section 7.1.1) (Note 1);
- 5.1.11. Coupling bands, number, and type (Section 9.1) if special type is required;
- 5.1.12. Gaskets for coupling bands, if required (Section 9.3);
- 5.1.13. For Type III pipe, class of perforations, if other than Class 1 (Section 8.3.2);
- 5.1.14. Certification, if required (Section 14.1); and
- 5.1.15. Special requirements.

**Note 1**—Pipe manufactured with annular corrugations may have an element of weakness in the longitudinal seams compared with pipe with helical corrugations. Therefore, consideration of the method of fabrication is important when pipe is installed under certain conditions of loading.

---

## 6. MATERIALS

- 6.1. *Steel Sheet for Pipe*—All pipe fabricated under this specification shall be formed from polymer-precoated sheet conforming to M 246.
- 6.1.1. The grade of coating shall be stated in the order, and the polymer coating thickness on both inside and outside of the pipe. The polymer coating is classified by grade corresponding to the thickness in micrometers on each side in SI units (see Table 1).

**Table 1**—Grade

| Grade   | Coating Thickness, $\mu\text{m}$ |
|---------|----------------------------------|
| 250/250 | 250/250                          |

- 6.1.1.1. Any combination of polymer coating thickness or other than shown in Table 1 is subject to agreement between the manufacturer and purchaser or fabricator.
- 6.1.2. The polymer coating is applied to steel sheet having a metallic coating of zinc, 55 Al-Zn alloy, or Zn-5 Al-MM alloy, as described in M 218, M 289, or ASTM A929/A929M. The type of metallic coating should be stated in the order, consistent with thickness availability as shown in Table 9. If the type of metallic coating is not stated, zinc-coated sheet conforming to M 218 shall be used. All pipe furnished on the order shall have the same metallic coating unless otherwise specified.
- 6.2. *Steel Sheet for Coupling Bands*—The sheet used in fabricating coupling bands shall conform to M 246 with the same polymer coating grade as that used for fabrication of the pipe furnished under the order, and having the same metallic coating.
- 6.2.1. As an alternate, the steel sheet for coupling bands shall conform to M 218, M 289, or ASTM A929/A929M (with the same metallic coating as the pipe), with the sheet having a bituminous coating according to M 190, except the thickness requirement shall not apply.

- 6.2.2. When specifically permitted by the purchaser, coupling bands shall be made of steel sheet conforming to the specification listed in Section 6.2.1 having the same metallic coating as the pipe, but without bituminous coating.
- 6.3. *Rivets*—The rivets used in riveted pipe shall be of the same material as the base metal specified for the corrugated sheets. They shall be thoroughly galvanized or sherardized. If bolts and nuts are substituted for rivets (Section 7.3.1), they shall meet the following requirements (see Table 2).

**Table 2**—Bolts and Nuts

|                       | Bolts                    | Nuts                    |
|-----------------------|--------------------------|-------------------------|
| For pipe fabrication: |                          |                         |
| For M 245 pipe        | ASTM F568M,<br>Class 8.8 | ASTM A563M,<br>Class 12 |
| For coupling bands:   |                          |                         |
| For M 245 pipe        | ASTM F568M,<br>Class 4.6 | ASTM A563M,<br>Class 5  |

The bolts and nuts shall be hot-dip galvanized in conformance with M 232M/M 232, or be mechanically galvanized in conformance with ASTM B695, Class 40.

- 6.3.1. When specified in the order, rivets used in riveted pipe to be installed in severely corrosive environments shall be made of stainless steel conforming to any of the S 3xxxx UNS designations in ASTM A493. Stainless steel rivets may be substituted for those described in Section 6.3 at the fabricator's option.

**Note 2**—Some polymer-precoated pipe in a severe environment is reported to have failed due to corrosion of rivets conforming to Section 6.3, while the sheet was essentially unaffected. The use of stainless steel rivets is recommended to overcome such problems.

- 6.4. *Hardware for Coupling Bands*—Bolts and nuts for coupling bands shall conform to the following requirements (see Table 2). Bolts, nuts, and other threaded items used with coupling bands shall be zinc coated by one of the following processes: hot-dip process as provided in M 232M/M 232; electroplating process as provided in ASTM B633, Class Fe/Zn 8; or mechanical process as provided in ASTM B695, Class 8. Other hardware items used with coupling bands shall be zinc coated by one of the following processes: hot-dip process as provided in M 232M/M 232; electroplating process as provided in ASTM B633, Class Fe/Zn 25; or mechanical process as provided in ASTM B695, Class 25.
- 6.5. *Gaskets*—If gaskets are used in couplings, they shall be a band of expanded rubber meeting the requirements of ASTM D1056 for the “RE” closed cell grades, or O-rings meeting the requirements of ASTM C443 .

## 7. FABRICATION

- 7.1. *General Requirements*—Pipe shall be fabricated in full circular cross section except for Type IIIA, which is described in Section 8.4.
- 7.1.1. Type I pipe shall have annular corrugations with lap joints fastened with rivets or shall have helical corrugations with a continuous lock seam extending from end to end of each length of pipe. The type of fabrication used shall be the option of the fabricator unless otherwise specified.
- 7.1.2. Type IA pipe shall be fabricated with a smooth liner and helically corrugated shell integrally attached at helical lock seams extending from end to end of each length of pipe. The shell shall have corrugations of nominal 68-, 75- or 125 -mm pitch.