

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS CONTROL, SOILS AND TESTING DIVISION

MATERIALS PROCEDURE

PROCEDURE FOR THE QUALITY ASSURANCE
OF CORRUGATED METAL PIPE

1.0 PURPOSE

- 1.1 To provide the procedure for the quality assurance of corrugated metal pipe. Quality assurance is comprised of both Quality Control and Acceptance activities. Quality Control is the responsibility of the fabricator and acceptance is the responsibility of the Division. Quality control data developed by the fabricator may be used as acceptance.

2.0 SCOPE

- 2.1 This procedure shall apply to the following material types:

- 1) Metallic coated corrugated steel pipe and pipe arch
- 2) Bituminous coated corrugated steel pipe and pipe arch
- 3) Bituminous coated paved corrugated steel pipe
- 4) Corrugated stainless steel culvert and underdrains
- 5) Corrugated aluminum alloy pipe and pipe arches
- 6) Polymer precoated, metallic coated steel pipe and underdrain
- 7) Other assembled items such as metal coupling bands, fittings, rivets, bolts and nuts, connecting plates, and end sections.

3.0 APPLICABLE SPECIFICATIONS

3.1 All material under this procedure shall meet the requirements of Section 713 of the West Virginia Division of Highways Standard Specifications for Roads and Bridges. This section specifically includes the following AASHTO Specifications for the applicable item:

- 1) M 36
- 2) M 190
- 3) M 196
- 4) M 218
- 5) M 245
- 6) M 246

4.0 PROCEDURE

4.1 A list of approved fabricators will be developed and maintained by the Materials Control, Soils and Testing Division. Fabricators on the approved list will be authorized to ship materials without specific LOT-by-LOT approval by the Division. Those fabricators not on the approved list will be required at the fabricator's expense to obtain LOT-by-LOT inspection and approval by an independent agency acceptable to the Division.

4.2 To qualify for the approved list, the fabricator must comply with the following:

4.2.1 It is the fabricator's responsibility to assure that all materials used in the process comply with applicable specifications. The fabricator will obtain and maintain ready for review test records from the manufacturers of component materials (and from the precoater, if applicable) necessary to confirm compliance with specifications. The Division will be supplied copies of test data upon request.

- 4.2.2 The fabricator shall submit to Materials Control, Soils and Testing Division a Quality Control Plan detailing how the product will be controlled. As a minimum, the Plan shall include the following:
- Name of company employee responsible for Quality Control. Tests to be conducted and their frequencies (see Attachment 1). Procedure for disposition of noncomplying materials.
- 4.2.3 Upon approval of the Quality Control Plan by Materials Control, Soils and Testing Division, the fabricator will be assigned a laboratory number and be placed on the approved list. Approved fabricators shall maintain and have ready for review the results of testing conducted in accordance with the Quality Control Plan.
- 4.3 For fabricators not on the approved list, corrugated metal pipe must be inspected, tested, and approved prior to shipment by an independent inspection agency acceptable to the Division (see Attachment 2 for frequencies). The inspection will be arranged and paid for by the fabricator.
- 4.4 The acceptance plan for fabricators on the approved list requires submittal of a Certificate of Compliance with each shipment of pipe (see 5.1 for details), and inspection by the Division at the fabricating facility at least once per year. The Division's inspection will cover the following:
- 4.4.1 The fabricator's Quality Control Program will be reviewed for compliance with his Quality Control Plan.
- 4.4.2 Samples of base metal will be taken by the Division. Two samples per gauge from each type of metallic coated stock (100mm x width of coil) will be randomly selected for physical and chemical analysis. These samples will be selected from flat sheet or coils of the same material used in fabrication of the pipe. Connecting band base metal will be represented by the base metal samples. Accessories for connecting bands - such as bolts, angles, bars, etc. - will be sampled per item.

- 4.4.3 Inspection of welded seam pipe will be done at the fabricator's storage site and will be done in accordance with the requirements of AASHTO M 36. The seams will be visually inspected throughout the length of the pipe to determine any visible indications of weld defects. When welded seam pipe is fabricated without reformed ends, the fabricator will conduct, in the presence of the Division's representative, the weld seam cup test procedure as required by AASHTO T 241. The number of pipe selected for this inspection will be three 6.1 m sections of different diameters. These dimensions will be randomly selected.
- 4.4.4 Inspection of lock seam pipe will be at the fabricator's storage site and will be in accordance to AASHTO M 36. The seams will be visually inspected throughout the length of pipe to determine the workmanship of the seam. Lock seam samples will be taken from available pipe and will be tested by the Division in accordance to AASHTO T 249 and shall meet the requirements of AASHTO M 36.
- 4.4.5 One polymer precoated stock sample 610 mm by the coil width of one gauge will be selected at random for tests by the Division. The testing will be in accordance with the requirements of AASHTO M 246.
- 4.4.6 The inspection of the fabricated polymer precoated corrugated steel pipe will be in accordance with the fabrication requirements of AASHTO M 245. A minimum of one 6.1m length of any diameter of this pipe will be randomly selected for this inspection. When applicable, lock seam samples will be taken by the Division.
- 4.4.7 Asphalt coated corrugated steel pipe will be inspected in accordance with AASHTO M 190, except that a minimum of five pipe sections will be sampled for asphalt stripping. Samples of asphalt taken from the five pipes will be combined into a single test sample. This sample will be tested by the Division in accordance with AASHTO M 190.

4.4.8 The Division representative will conduct an imperviousness test in accordance with AASHTO M 190 on one section of pipe.

4.4.9 If the documentation of Quality Control data is not maintained, or if inspection or tests of pipe reveal noncompliance with the specifications, the fabricator will be removed from the approved list of fabricators. Until correction of all deficiencies can be documented to the satisfaction of the Division, the fabricator will be required to comply with Section 4.3. The fabricator may request that the Division make a reinspection after he has reestablished his Quality Control.

5.0 SHIPPING DOCUMENTATION

5.1 The fabricator shall furnish with each shipment a signed Certificate of Compliance. The original certificate will accompany the pipe to the project site or other location as applicable. A copy of the certificate will be forwarded directly to Materials Control, Soils and Testing Division. This document attests that the shipment meets the chemical, physical, manufacturing, and fabricating requirements as given in the specifications, and shall include the following information (whichever is applicable):

- 1) Date of Certification
- 2) State Project or Purchase Order Number
- 3) County
- 4) Fabricator's Order Number
- 5) Consignee
- 6) Item Reference (Number and Length of Pieces)
- 7) Diameter and Size
- 8) Gauge of Material
- 9) Heat Number
- 10) Type of Pipe (To Include Type of Metallic Coating and Asphalt Coating When Applicable)
- 11) Corrugation Size
- 12) Quantity (Total Linear Feet)
- 13) Quantity and Type of Connecting Bands
- 14) End Sections, Fittings, Etc.
- 15) Division Assigned Approved List Number (When Applicable)

- 5.2 Fabricators not on the approve list shall submit, in addition to the information required by Section 5.1, the independent inspection agency test results for each shipment. The original certificate will accompany the pipe to the project site or other location as applicable. A copy of the certificate will be forwarded directly to Materials Control, Soils and Testing Division.
- 6.0 PROCEDURES AT THE DELIVERY SITE
- 6.1 Division personnel will determine if the information on the Certificate of Compliance, as required in Section 5.1, agrees with the shipment it accompanies. If not, a corrected Certificate of Compliance will be required.
- 6.2 Division personnel will complete a visual inspection of the shipment for evidence of damage during shipment. Material which has been damaged or does not meet the specifications will be rejected.
- 7.0 DIVISION DOCUMENTATION
- 7.1 After the items on the shipment have been verified as in 6.1 and 6.2, a copy of the Certificate of Compliance indicating acceptance by the project will be forwarded to the Materials Control, Soils and Testing Division through the District Materials Section. If from an unapproved source, the documents will be reviewed by the Materials Control, Soils and Testing Division and a laboratory number assigned.



Gary L. Robson, Director
Materials Control, Soils
and Testing Division

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Attachments

CORRUGATED METAL PIPE
 TESTS AND FREQUENCY FOR
UNAPPROVED CMP FABRICATION PLANTS

Metallic Coated Corrugated Steel Pipe, Corrugated Alloy Pipe
 and Polymer Precoated Corrugated Pipe

The tests and frequencies are based on shipping LOT.

<u>Item - Test</u>	<u>Frequency</u>
Sheet or Coil - thickness	3 per heat
Coating on Sheet or Coil - thickness	3 per heat
Pipe dimensions	10%
Pipe - arch dimensions	10%
Corrugation - measurements	10%
Workmanship - visual	50%
Seams Welded - visual & test	10%
Seams Lock - visual	50%
End Finish - visual	10%
 Coupling Bands - visual	 10%
Thickness - measure	10%
Dimensions - measure	10%
 Repair of Damaged Metallic Coating - visual	 100%
Degree of Surface Cleaning	When Applicable
Thickness of Repair Coating	100%
 Underdrain - visual	 20%
Size of Perforations	10%
Rows of Perforations	10%
 Slotted Drain - visual	 10%
Slot Height - measurements	10%
Slot Width - measurements	10%
Bar Thickness - measurements	10%
Weld Size	10%
 Bituminous Coated Products	
Coating Thickness - measurements	10%
Paving Thickness - measurements	10%
Properties of Coatings taken from Pipe	
*1 Sample from 10% of Pipe	*
Imperviousness Test	One/Shipment
 Other Items	 10%

Signed by
 Consultant & Firm

CORRUGATED METAL PIPE
 TESTS AND FREQUENCY FOR
APPROVED CMP FABRICATION PLANTS

Metallic Coated Corrugated Steel Pipe, Corrugated Alloy Pipe
 and Polymer Precoated Corrugated Pipe

The tests and frequencies are based on a daily quality control basis and are considered minimum.

<u>Item - Test</u>	<u>Frequency</u>
Sheet or Coil - thickness	1 per heat
Coating on Sheet or Coil - thickness	1 per heat
Pipe - dimensions	Measurements or visual inspection on the applicable items a minimum of once per day for each pipe size as well as for each gauge of metal
Gauge of Pipe	
Corrugation - arch dimensions	
Workmanship - visual	
Seams Welded - visual and test	
Seams Lock - visual	
End Finish - visual	
Coupling Bands - visual	Measurements or visual inspection on the applicable items once/day for production
Thickness - measure	
Dimensions - measure	
Repair of Damaged Metallic Coating - visual	Once per day if applicable
Degrees of Surface Cleaning	
Thickness of Repair Coating	
Underdrain - visual	Once per day if applicable
Size of Perforations - measurements	
Rows of Perforations - visual	
Slotted Drain - visual	
Slot Height - measurements	
Slot Width - measurements	
Bar Thickness - measurements	
Weld Size	
Bituminous Coated Products	Once per each day of operation
Coating Thickness - measurement	
Paving Thickness - measurement	
Properties of Coatings taken from Pipe	Quarterly Once/Year
Imperviousness Test	
Other Items	Once per day if applicable

Company to retain this document for two years.

Signed by