

SECTION 905 — PIPE

905.01 Certification. The manufacturer shall furnish certification for all pipe as specified in TC-1.02.

MATERIAL	SPECIFICATION	REMARKS
Nonreinforced Concrete Pipe	M 86, Class 3	—
Reinforced Concrete Pipe	M 170, Class 4 & 5	54 in. and smaller diameter M 170, load bearing option. 60 in. and larger diameter M 170, material option.
Concrete End Sections	M 170	—
Polyethylene (PE) Plastic Drain Tube or Pipe	M 252 or M 294	—
	M 252	underdrain outlet pipes Type S minimum pipe stiffness 50 psi.
Polyvinyl Chloride (PVC) Plastic Pipe & Drain Pipe	AASHTO Bridge Section 18PVC Ribbed Pipe	—
	M 278	underdrain outlet pipes.
	F 758, Type PS 28, D 3034, SDR 35 (a), M 278 (a)	perforated underdrain.
Reinforced Concrete Arch Culvert	M 206	—
Reinforced Concrete Elliptical Pipe	M 207	horizontal elliptical pipe only.
Preformed Rubber Joint for Circular Pipe	M 198, Type A	—
Corrugated Steel Pipe, Pipe Arches & Underdrain	M 36 (b)	end finish shall be annular corrugations
Corrugated Aluminum Alloy Pipe	M 196 (b)	end finish shall be annular corrugations
Structural Plate for Pipe, Pipe Arches & Arches	M 167	—
Copper Pipe	Federal Spec WW – T – 799 Type K	—
Polyethylene (PE) Precoated Corrugated Steel Pipe	M 245 & M 246	minimum thickness 10 mil on each of the surfaces.
Concrete Drain Tile	M 178	—

(a) Perforations shall conform to the requirements of F 758.

(b) Bands with dimples are prohibited.

905.02 Certified Reinforced Concrete Pipe Plants. Reinforced concrete pipe conforming to the Specifications will be accepted on the

manufacturer's certification based on the requirements outlined below. This includes the sampling, testing, documentation, and certification of the product by the manufacturer in combination with an Administration monitoring program.

905.02.01 Responsibilities of the Concrete Pipe Producer. The concrete pipe producer shall submit a quality control plan to the Engineer for approval prior to the start of production. The plan shall indicate the following:

- (a) Reinforced concrete pipe shall conform to the applicable portion of the pipe table under Section 905.
- (b) The manner in which the materials will be handled.
- (c) Quality control procedures shall include the following:
 - (1) The names, qualifications, and responsibilities of the quality control personnel and the designation of a quality control manager.
 - (2) Sampling and testing in conformance with MSMT Sample Frequency Guide Table 1.
 - (3) Method used for inspecting reinforcement cages prior to and during production.
 - (4) Method of curing.
 - (5) Method of maintaining accurate quality control records.
 - (6) Samples of forms approved by the Administration.
 - (7) Patching procedure.
 - (8) Method of preparation of units for shipping.
 - (9) Method of identification of each unit as tested and approved.

A lot is defined as a production run of concrete pipe, all being of like size, material, strength designation, and manufactured by the same process. The lot size may include up to 500 units produced in not more than 14 days. The 14 days need not be consecutive, as long as they occur within a one month period and the process is not altered in any way between production days.

If a manufacturing process is used which produces two or more pipe sizes, styles, or classes simultaneously, one set of material tests (compression and absorption) may be used to represent all sizes, styles or classes, provided there is no change in the mix design. Individual load bearing tests, if used as a basis of acceptance, will be required for each size, style, or class in conformance with the MSMT Frequency Guide.

905.02.02 Test Facilities. The producer's facilities, equipment, and testing personnel shall be capable of conducting the tests specified in T 280 and shall be as approved by the Engineer.

If compression cylinders or cores are used in lieu of three edge bearing tests, they shall be as specified in T 22.

The producer shall maintain yearly calibration certificates on all equipment used for testing.

The producer may elect to use the services of an independent commercial testing laboratory that is acceptable to the Engineer, in lieu of conducting their own tests.

905.02.03 Shipment. Units may be shipped to the Administration's projects under either of the following conditions:

- (a) The required testing for all units in the lot has been completed with acceptable results and all of the units to be shipped are at least the age of the test specimens at testing.
- (b) Units otherwise conforming to all test criteria may be shipped prior to completion of absorption testing if the concrete mix and manufacturing process used have historically produced the required absorption results, with final acceptance pending acceptable test results.

The quality control stamp shall be affixed to each unit shipped.

905.02.04 Certification. A manufacturer's certification shall accompany each shipment of pipe. A copy of the certification shall be delivered to the Engineer, the Administration's laboratory, and the Contractor for each shipment. One copy shall remain at the plant. The certification shall include the following:

- (a) The plant name, address, and location.
- (b) Size and class of the pipe.
- (c) Date of manufacture and shipment.

- (d) Number of units or linear feet.
- (e) Administration Contract number,
- (f) Statement of Specification compliance.
- (g) Signature of the quality control manager.

905.02.05 Records. All testing and inspection documents shall be maintained at the production plant for a minimum of three years from the manufactured date and shall be made available to the Administration upon request.

The producer shall collect and maintain conformance certificates and mill test reports for aggregates, cement, joint material, and reinforcing steel intended for use in products used on Administration projects.

905.02.06 Quality Control Forms. The producer shall maintain an Administration approved quality control form for all pipe produced for use on Administration projects. Each form, for each lot shall contain the following:

PIPE DIMENSIONS	REINFORCEMENT	TESTS	GENERAL INFORMATION
Diameter Length Wall Thickness Joint Style	Size Spacing Area-Spec & Test Results Adequacy & Quality of Welds & Splices	Cylinder Compressive Strength Spec & Test Results Core Compressive Strength Spec & Test Results Absorption Spec & Test Results Visual Inspection	Plant Name Technician Signature Lot Identification Production Dates Pipe Class Units Per Lot Material Sources Cement Fine Aggregate Coarse Aggregate Reinforcement
THREE EDGE BEARING			
0.01 in. Crack Strength Spec & Test Results	Ultimate Strength Spec & Test Results		

905.02.07 Responsibilities of the Administration. Verification of certification will be performed at the discretion of the Administration a minimum of once per year.

905.03 Certified Corrugated Polyethylene Pipe Plants. Polyethylene pipe conforming to the Specifications will be accepted on the manufacturer’s certification based on the requirements outlined

below. This includes the sampling, testing documentation, and certification of the product by the manufacturer in combination with an Administration Monitoring Program.

905.03.01 Responsibilities of the Corrugated Polyethylene Pipe Producer. The polyethylene pipe producer shall submit a quality control plan to the Engineer for approval. The plan shall indicate the following:

- (a) The plan may be general, but shall be site specific.
- (b) The plan shall indicate in detail how the producer proposes to control the equipment, materials, and the production methods to ensure that products produced are in conformance with the Specifications.
- (c) The plan shall list the personnel responsible for production and quality control at the site and include information on how to contact each person. Additionally, the following specific information shall be included:
 - (1) Identification of the physical location of the plant.
 - (2) The method of identification of each lot of material during manufacture, testing, storage, and shipment, including identifying it as intended for Administration projects.
 - (3) The method of sampling and testing of raw materials and of the finished product, including lot sizes, type of material tests performed, and a description of equipment modifications or equipment developed in-house to perform the tests.
 - (4) A plan for dealing with quality control sample failures. This plan shall include how the producer plans to initiate an immediate investigation and what corrective action will be implemented to remedy the cause of the problem.
 - (5) A loading and shipping control plan that includes a description of the methods by which products are to be loaded and shipped for Administration projects.
 - (6) A lot is defined as a production run of polyethylene pipe, all being of like size, material, and manufactured by the same process. It shall represent a single days production, not to exceed 15 000 linear feet for culvert pipe and 85 000 linear feet for underdrain pipe.

905.03.02 Test Facilities. The Certification Program requires all tests to be conducted at laboratories that are accredited by AASHTO or approved by the Administration. Each source may establish and maintain its own laboratory for the performance of quality control testing or may request to utilize an approved independent laboratory. The producer shall make a written request and have written approval from the Administration prior to having material tested off site. The equipment required for all approved laboratories shall be sufficient to perform the required test procedures as required by the applicable specification and standards such as M 252, M 294 and D 2412.

905.03.03 Certification. A manufacturer's certification shall accompany each shipment of pipe. A copy of the certification shall be delivered to the Engineer, Administration's laboratory, and the Contractor for each shipment. One copy shall remain at the plant. The certification shall include the following:

- (a) Plant name, address, and location.
- (b) Lot or production identification.
- (c) Date of manufacture and shipment.
- (d) Number of units of each size pipe or total linear feet of each size pipe.
- (e) Administration Contract number.
- (f) Statement of Specification compliance.
- (g) Signature of the quality control manager, or authorized representative (name shall be designated in the Quality Control Plan).

905.03.04 Records. All testing and inspection documents shall be maintained at the manufacturing facility for a minimum of three years from the manufactured date, and shall be made available to Administration personnel upon request.

905.03.05 Quality Control Forms. The manufacturer shall maintain an Administration approved quality control form for all pipe produced on Administration projects that contain the following:

GENERAL INFORMATION	TESTS
Plant Identification QC Technician's Signature Lot Identification Production Dates Tubing/Pipe Dimension Perforation Dimensions Workmanship Identification Markings	Pipe Stiffness Pipe Flattening Elongation* Environmental Stress Cracking Brittleness Low Temperature Flexibility*

*Type C or CP only.

905.03.06 Responsibilities of the Administration. The Administration will randomly conduct a minimum of two plant inspections per year with the cooperation and assistance of the producer to ensure that specifications and quality control requirements are being met. Visual inspection will be made by the Engineer when pipe is received on the project. The Administration will verify the manufacturer's certification test results by sampling in conformance with Table 4 of the Administration Frequency Guide.

SECTION 906 — GABIONS

906.01 WIRE FOR GABIONS. The wire shall have a minimum tensile strength of 60 000 psi when tested as specified in A 370. All wire sizes and mesh spacing shall be as recommended by the manufacturer. Tie and connecting wire shall also conform to this Specification.

Stainless steel interlocking fasteners may be substituted for wire ties. The fasteners shall conform to A 313. When subjected to directional tension along its axis, the fastener shall remain in a closed and locked condition for a minimum force of 900 lb.

906.01.01 Galvanized Coating for Gabions. Galvanized coating for fabric, ties, and connecting wire shall not be less 0.8 oz/ft² when tested as specified in A 90.

906.01.02 Polyvinyl Chloride (PVC) Coating for Gabions. PVC coating for fabric, ties, and connecting wires for gabions shall exhibit no weight loss when tested as specified in MSMT 508. Color shall conform to Federal Standard 595, gray color No. 26440 or green color No. 24533 and shall match throughout the project.