

APPROVAL PROCESS FOR PRODUCERS OF CULVERT PIPE

1. SCOPE:
 - 1.1. This method covers the requirements for the qualification of culvert producing facilities. It is intended to provide standards for quality control (QC) plans at all culvert producing facilities (concrete, metal and plastic) to assure that adequate measures are taken during production to consistently produce high quality drainage products.
 - 1.2. This method 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 method to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.
2. BASIC REQUIREMENTS:
 - 2.1. Qualified production plants must have an in house QC plan approved by the Kentucky Transportation Cabinet (KYTC).
 - 2.2. The plant must have or have ready access to an approved testing facility.
 - 2.3. The plant must have a QC technician approved by the KYTC or qualified by an agency approved by the KYTC.
3. QC PLAN: Detail how the producer proposes controlling the equipment, materials and production methods to insure that the specified products are obtained. Indicate the personnel responsible for production and QC at the site. Designate a contact person at each plant. Include the following specific information in the QC plan:
 - 3.1. Identify the physical location of the plant in relation to highways and towns.
 - 3.2. Detail the method of identification of each lot of material during manufacture, storage and shipment.
 - 3.3. Detail the method of sampling and testing raw materials and the finished product. Include lot sizes and types of tests performed as well as a description of equipment and calibrations performed on the testing equipment.
 - 3.4. Include a plan for dealing with QC sample failures. Detail how the producer will initiate an immediate investigation into all sample failures and how corrective action will be implemented to resolve the problem. This must also include the test used for this evaluation and the person(s) responsible for making the determination.
 - 3.5. Specify a loading and shipping control plan, which includes a description of the methods by which the products are to be loaded and shipped for use by the KYTC. Include

safeguards against loading non-specification material. The plan must also include methods of insuring that all products are accurately identified.

4. **APPROVED TESTING FACILITIES:** The program requires all tests to be conducted at facilities approved by the KYTC. Each producer may establish and maintain its own laboratory for the performance of QC testing, or the KYTC will consider a producer's request to utilize an approved independent laboratory. The equipment required for an approved laboratory shall be sufficient to perform the required tests referenced in the applicable AASHTO standards that detail the manufacture of the products. Records on instrument calibration must be maintained at the laboratory. The KYTC may require a demonstration of the equipment and procedures.
5. **QC TECHNICIAN:** All samples must be taken and tested by QC technicians approved by the KYTC or qualified by an agency approved by the KYTC. Identify the QC technicians that are responsible at each plant. The designated QC technicians will be responsible for the overall QC at the plant. The KYTC may require a demonstration of the equipment and procedures used by the technician.
6. **ANNUAL GUARANTEE AND REGISTRATION:** Submit an Annual Guarantee stating that the pipe conforms to the requirements of all applicable AASHTO and ASTM standards and the current Kentucky Specifications for Road and Bridge Construction (Specifications). Identify all brand markings for pipe produced at all locations. Include with the "Annual Guarantee", calibration sheets for all applicable equipment, and a list of personnel with the required certifications. Submit the "Annual Guarantee" for the next calendar year's production by December 31st of each calendar year.
7. **PLANT APPROVAL PROCESS:**
 - 7.1. Submit a written request for approval to: Director, KYTC Division of Materials (Division) 1227 Wilkinson Boulevard, Frankfort, KY 40601-1226. The written request must identify the type and diameters of pipe that will be produced. Two copies of the producer's written QC plan must be submitted with the request for approval. Submit a copy of the annual guarantee with the request.
 - 7.2. After review and approval of the producer's submittal, KYTC personnel will schedule an on site inspection. The on site inspection will verify that the producer's QC plan is in effect and is being followed and that at least one qualified technician is on site and will be present when material is being produced under this program. The testing facilities and equipment are subject to inspection. If either the producer's QC plan or laboratory does not meet KYTC requirements, the producer will be informed of the deficiencies in writing. Once the deficiencies have been addressed, the producer may again submit a request for approval in writing to the Director of the Division of Materials.
8. **QUALIFICATION FOR PARTICIPATION IN THE QC/QA PROGRAM:** If the KYTC has approved the producer's written QC plan and the on site inspection confirms that the initial program requirements have been met, the KYTC will issue a letter qualifying the plant for participation in the program for one year. At the end of the year, and each subsequent year, the KYTC may conduct another on site inspection after receipt of the annual guarantee and registration, and if all requirements are continuing to be met, the plant will be requalified for participation in the program for that year. Random inspections and materials sampling may be

conducted at any time by the KYTC to verify compliance with the program requirements. Failure to perform all of the program requirements may result in a producer being removed from the program.

9. SAMPLING AND TESTING PROCEDURES:

9.1. Producer's QC: The producer's QC samples are intended for use by the producer to monitor the quality of material being produced and shipped.

9.1.1. Specifications: The producer is to perform all sampling and testing in accordance with the current Specifications.

9.1.2. Comparison Testing: Samples of materials and pipe taken by KYTC personnel during plant visits may be split with half of the sample being tested by the producer and half of the sample tested by KYTC.

9.2. Specific Requirements For Corrugated Metal Pipe (CMP):

9.2.1. Pre-Production Testing:

9.2.1.1. The steel producer will identify the coils as production heats. Each coil of steel shall be clearly stamped and heat identifiable.

9.2.1.2. Perform material evaluations on all materials used for the production of KYTC pipe. The incoming material evaluations shall consist of a physical verification of gauge and heat reports of coil stock.

9.2.1.3. Each lot or heat of material incorporated in the finished products will require a material evaluation.

9.2.2. Production:

9.2.2.1. Perform random evaluations of corrugation depth and width at least twice for each production shift.

9.2.2.2. At start up and at least once during each shift evaluate the lock seam for retaining offset and lap. Welded seam pipe will be continuously evaluated on the line for weld defects.

9.2.2.3. Conduct continuous visual inspections on the exterior of the pipe for deficiencies in the formation of the corrugations and the seam.

9.2.2.4. Inspect recorrugated ends for open seams and rough or sharp edges.

9.2.2.5. If the pipe is to be bituminous coated, monitor coating temperatures and check the pipe for appropriate coating thickness.

9.2.3. Post Production:

- 9.2.3.1. Remove all barbs and protrusions from the recorrugated ends of the pipe.
- 9.2.3.2. Visually inspect pipe for coating (zinc or aluminum) integrity. Repair any damaged or peeling coating by cleaning the area (with a wire brush or disc sander) and brush applying zinc rich primer. The zinc rich primer shall contain at least 60% metallic zinc in the dried film.
- 9.2.3.3. Care shall be taken in storage so that the pipe is not bent or punctured by forklifts or other equipment in the storage yard.
- 9.2.3.4. Spray paint a symbol on the outside ends of a color approved by the Division to facilitate identification of the producer. For coated pipe the symbol shall be applied so that it is clearly visible at the job site.
- 9.2.3.5. Perform a final visual inspection on the finished pipe prior to shipment.
- 9.2.3.6. Scan and email all pipe certifications to the Physical section at time of shipment in addition to sending the certifications with the shipment.

9.3. Specific Requirements For Reinforced Concrete Pipe (RCP):

9.3.1. Pre-Production Testing:

- 9.3.1.1. All of the ingredient materials in RCP will be sampled and evaluated for the appropriate properties as referenced in the Specifications and detailed in Site Manager.
- 9.3.1.2. Perform material evaluations on all materials used for the production of KYTC pipe. The incoming material evaluations shall consist of a check of the cement, aggregate and steel reinforcement certifications for RCP.
- 9.3.1.3. Each lot or heat of material incorporated in the finished products will require a material evaluation.
- 9.3.1.4. Producer will notify the Concrete section prior to producing any special design pipe. Special design means any pipe that requires Department approval.

9.3.2. Production:

- 9.3.2.1. Check the steel reinforcement placement on the first piece produced of each different size or class prior to concreting. Insure specified concrete cover will be achieved.

9.3.2.2. Conduct thorough visual inspections after form removal for honeycombing, slumping, and general finish.

9.3.3. Post Production:

9.3.3.1. Check for correct markings indicating class, date cast, and producer name and location mark.

9.3.3.2. Randomly select two joints of pipe from a lot (date) or group of lots (dates) for each size and class of each 500 joints (200 if diameter is 50 inches or greater) produced. At least one joint should be selected from the youngest (or next to youngest) when several of the lots being tested are less than seven days old.

9.3.3.3. Check the selected joints for dimensional conformity.

9.3.3.4. Use either a three-edge bearing test or compressive strength cores from the selected joints for acceptance. If thickness of the wall is less than 4 inches a three-edge bearing test will be required.

9.3.3.4.1. When performing the three-edge bearing test on the selected joints of pipe, apply the D-load required to produce a 0.01-inch crack to one joint. Continue applying D-load to produce the required ultimate load. If required ultimate load is achieved prior to the 0.01 inch crack, release the load and allow shipment.

9.3.3.4.2. Apply the D-load required to produce a 0.01-inch crack to the second joint. If the load required to produce the 0.01-inch crack is exceeded by 5% and the 0.01-inch crack has not occurred, release the load and allow shipment of that joint of pipe. If the required ultimate load is applied without a 0.01 inch crack, release the load and allow shipment.

9.3.3.5. Test one sample of each class or mix design produced every three months for absorption.

9.3.3.6. Perform a final visual inspection on the finished pipe prior to shipment.

9.3.3.7. Scan and email all pipe certifications to the Physical section at time of shipment in addition to sending the certifications with the shipment.

9.4. Specific Requirements For High Density Polyethylene Pipe (HDPE):

9.4.1. Pre-Production Testing:

9.4.1.1. A lot is defined as a shipment or shipments (railcar or truckload) of resin which has been certified by the supplier or producer.

9.4.1.2. Perform material evaluations on all materials used for the production of KYTC pipe. The incoming material evaluations shall consist of a minimum density and melt index test on each lot of polyethylene resin for HDPE.

9.4.2. Production:

9.4.2.1. Perform the unit weight test a minimum of one (1) time per shift on all 4 inch diameter pipe and larger. This would be per diameter, per machine, per shift.

9.4.2.2. Measure wall thickness for uniformity at the same frequency as the unit weight.

9.4.2.3. Conduct continuous visual inspections on the exterior and interior wall for bonding, blowouts, etc. during production.

9.4.3. Post Production:

9.4.3.1. Conduct a brittleness test a minimum of one (1) time per shift in accordance with the requirements specified in AASHTO M 252 or M 294, whichever is applicable to the pipe being tested.

9.4.3.2. Perform a melt index and density test on the finished product when a piece is rejected because of defects that are suspected of being related to material properties. Grind the rejected pipe and perform the test on the ground material as a verification test or as a step in problem resolution. These tests may not have to be performed if it is determined that the defects are caused by mechanical problems in production.

9.4.3.3. Perform a final visual inspection on the finished pipe prior to shipment.

9.4.3.4. Scan and email all pipe certifications to the Physical section at time of shipment in addition to sending the certifications with the shipment.

9.5. Specific Requirements For Polyvinyl Chloride Pipe (PVC):

9.5.1. Pre-Production Testing:

9.5.1.1. A lot is defined as a shipment or shipments (railcar or truckload) of resin which has been certified by the supplier or producer.

9.5.1.2. Perform material evaluations on all materials used for the production of KYTC pipe. The incoming material evaluations shall consist of a tensile strength and modulus of elasticity, a flexural yield strength, an impact strength and a deflection temperature on each lot of PVC resin for PVC pipe.

9.5.2. Production:

9.5.2.1. Diameter and wall thickness measurements shall be performed a minimum of one (1) time per shift.

9.5.2.2. Pipe flattening, impact strength and pipe stiffness shall be performed a minimum of one (1) time per shift.

9.5.3. Post Production:

9.5.3.1. If failures are encountered during production an “acetone immersion” test shall be performed.

9.5.3.2. A final visual inspection shall be performed on the finished pipe prior to shipment.

9.5.3.3. Scan and email all pipe certifications to the Physical section at time of shipment in addition to sending the certifications with the shipment.

10. TEST FAILURE RESOLUTION: Tests performed on materials prior to production, during production, and post production will be required to meet all of the applicable specifications and references found in the Specifications. Segregate and identify any material or products that do not comply with Specifications.

11. SAMPLE IDENTIFICATION AND RECORD KEEPING:

11.1. Identify producer’s QC samples with consecutive numbers. (QC1, QC2, etc.) Number the samples consecutively for the entire calendar year.

11.2. Retain QC and quality assurance data for at least two years. Make all data available to the KYTC for review upon request.

11.3. Include lot identification on all QC test reports.

11.4. Test reports do not have to be filed for specific projects.

12. KYTC QUALITY ASSURANCE SAMPLES: The KYTC’s QA samples are intended to verify the performance of the producer’s QC plan.

12.1. The KYTC may sample incoming material during plant visits for testing and evaluation. The material sampled does not have to be material that is to be incorporated into pipe

produced for the KYTC.

- 12.2. The KYTC may sample pipe during plant visits for testing. These samples may be split with the producer performing the same tests for comparison.
- 12.3. KYTC samples taken from projects or maintenance yards may also be tested.
- 12.4. Pipe may be rejected at any point during this process if it fails to meet the minimum standards established in the current specifications.

13. QC/QA COMPARISON:

13.1. Sample Comparison: The producer's QC test results and the corresponding KYTC QA test results will be compared to verify the performance of the sampling and testing procedures and results. If the results of the QA tests are not in reasonable agreement with the results of the corresponding QC tests, an investigation will be made to determine the source of the difference. The investigation will include a review of the sampling and testing procedures and the testing equipment. The results of the investigation will be recorded and made available to the producer.

13.2. Resolution Procedures:

13.2.1. Comparison Testing/Rejection: In the event that the above referenced investigation does not resolve the difference and the results of the next QA sample are not in agreement with the corresponding QC sample, a resolution system will be employed. The resolution system will require that two additional samples be taken. The samples are to be taken by KYTC personnel and are to be shared with the producer for testing at the producer's lab. The average test results of the two QA samples are to be within the appropriate specification limits and the comparison of the two averages is to be within five percent of each other. If these results are not within the appropriate specification limits and the comparison of the average test results is not within five percent, the material will be rejected. If rejected, the material is to be disposed of in a manner approved by the KYTC.

13.2.2. Comparison Testing/Acceptance: If the test results of the comparison tests indicate that the material is within the specification requirements, but the comparison of the QC samples and the QA samples are not within five percent, the material will be accepted for use. However, the producer, with the assistance of the KYTC, must determine the cause of the differences in test results.

13.2.2.1. If the cause is determined to be improper sampling or testing procedures by the producer or the KYTC, the appropriate qualified QA or QC technician will be notified. If the problem continues, the technician's qualification may be revoked.

13.2.2.2. If the cause is determined to be in the producer's testing equipment or handling of the material, the producer is to take corrective action. If the problem continues, the producer's approval to provide material to the KYTC may be revoked.

13.2.2.3. If the cause is determined to be in the KYTC's testing equipment, the KYTC will take corrective action.

14. PROJECT ACCEPTANCE OF PIPE: Send a Statement of Product Certification with each shipment of culvert to each project. Include specific lot identification and production dates. Examples of these Product Certification forms are attached. The Statement of Certification should state that the manufacturing process followed all applicable AASHTO or ASTM standards, and that the culvert is from an approved producer. Include the physical location of the plant and the signature of the producer's QC technician from that specific location.
15. DISQUALIFICATION OF PRODUCERS: Producers that are qualified under these requirements may be disqualified and not permitted to supply pipe to KYTC projects if the following occurs:
 - 15.1. During any two (2) inspections by KYTC personnel, the production facility is not following the approved QC plan.
 - 15.2. The producer has falsified QC records.
 - 15.3. Production records indicate that the facility is accepting materials that do not meet the minimum specification requirements.
 - 15.4. The producer supplies products (to more than one project) that do not meet the minimum specification requirements and fails to notify the KYTC and take the appropriate corrective actions.

APPROVED

DIRECTOR
DIVISION OF MATERIALS

DATE

12/17/12

Kentucky Method 64-115-12

Revised 12/17/12

Supersedes 64-115-08

Dated 03/05/08

Attachments

km11508.doc

**REINFORCED CONCRETE PIPE PRODUCER'S
CERTIFICATE OF COMPLIANCE**

**TO: KENTUCKY TRANSPORTATION CABINET (KYTC)
KENTUCKY DEPARTMENT OF HIGHWAYS (KYDOH)
DIVISION OF MATERIALS**

CONTRACTOR _____

COUNTY _____ DATE _____

PROJECT NO _____

- PIPE DATA -

TYPE-CLASS	DIAMETER	NUMBER OF JOINTS	PRODUCTION DATES

THIS IS TO CERTIFY THAT ALL MATERIALS IN THIS SHIPMENT COMPLY IN ALL RESPECTS TO THE APPLICABLE REQUIREMENTS OF SECTION 810 OF THE CURRENT STANDARD SPECIFICATIONS AND ARE FROM A PRODUCER ON THE APPROVED LIST.

COPIES OF INGREDIENT MATERIALS SAMPLED AND APPROVED ARE ON FILE AND AVAILABLE AT ANY TIME IN OUR PLANT OFFICE.

PRODUCER

LOCATION

QC TECHNICIAN

***CORRUGATED METAL PIPE
PRODUCER'S CERTIFICATE OF COMPLIANCE***

**TO: KENTUCKY TRANSPORTATION CABINET (KYTC)
KENTUCKY DEPARTMENT OF HIGHWAYS (KYDOH)
DIVISION OF MATERIALS**

CONTRACTOR: _____ **DATE:** _____

PROJECT NO.: _____ **COUNTY:** _____

QUANTITY	DESCRIPTION OF MATERIALS	FABRICATION LOTS OR HEATS

THIS IS TO CERTIFY THAT ALL MATERIALS IN THIS SHIPMENT COMPLY IN ALL RESPECTS TO THE APPLICABLE REQUIREMENTS OF SECTION 810 OF THE CURRENT STANDARD SPECIFICATIONS AND ARE FROM A PRODUCER ON THE APPROVED LIST. PRODUCT CONTAINS TEN (10) PERCENT POST-CONSUMER WASTE OR RECOVERED MATERIAL.

COPIES OF CERTIFIED MILL TEST REPORTS, SHOWING COMPLIANCE IN FULL TO THE APPLICABLE SPECIFICATION BY NUMERICAL TEST RESULTS, FOR EACH HEAT, LOT AND GAUGE INCLUDED IN THIS SHIPMENT ARE ON FILE AND AVAILABLE IN OUR PLANT OFFICE.

PRODUCER

LOCATION

QC TECHNICIAN

***THERMOPLASTIC (HDPE/PVC) PIPE
PRODUCER'S CERTIFICATE OF COMPLIANCE***

**TO: KENTUCKY TRANSPORTATION CABINET (KYTC)
KENTUCKY DEPARTMENT OF HIGHWAYS (KYDOH)
DIVISION OF MATERIALS**

CONTRACTOR: _____ **DATE:** _____

PROJECT NO.: _____ **COUNTY:** _____

TYPE	DIAMETER (INCHES)	QUANTITY (LINEAR FEET)	LOT NUMBER

THIS IS TO CERTIFY THAT ALL MATERIALS IN THIS SHIPMENT COMPLY IN ALL RESPECTS TO THE APPLICABLE REQUIREMENTS OF SECTION 810 OF THE CURRENT STANDARD SPECIFICATIONS AND ARE FROM A PRODUCER ON THE APPROVED LIST.

PRODUCER

LOCATION

QC TECHNICIAN