

South Carolina Department of Transportation

Qualified Product Policy For Reinforced Concrete Pipe (RCP)

1. General

The purpose of this policy is to establish the minimum qualifications for the manufacture and acceptance of reinforced concrete pipe (RCP). This policy provides the requirements for producers, testing frequencies, re-testing procedures, and product identification. Qualified producers will be listed on SCDOT Qualified Products Listing (QPL) 69. All pipes must conform to the requirements given in Section 714 of the SCDOT Standard Specifications.

To be considered for qualification, the producer must submit to the SCDOT Structural Materials Engineer (SME) the following:

- 1.1 **A plant certification from either the American Concrete Pipe Association (ACPA) or the National Pre-cast Concrete Association (NPCA) for each plant proposed to provide RCP for SCDOT projects.**
- 1.2 **A Hydrostatic Pressure Test certification and copies of test results for each joint design for range of pipe sizes, conducted at the producer's facility.**
- 1.3 **A Quality Control Plan for the plant.**
- 1.4 **A professional engineer (licensed in South Carolina) certification and documentation that standard pipe listed on QPL 69 meets or exceeds the material and fabrication properties listed in AASHTO M 170 for Class II, III, IV, V pipe, and that all standard pipe produced for use within SCDOT right of way will be in conformance with B or C wall with circular reinforcement only. Manufacturers may produce custom pipe, such as circular pipe with additional reinforcement (beyond AASHTO M 170 requirements), elliptical reinforcement, or stirrups as described in SC-M-714 provided proper marking and installation requirements are met. However, these pipes will not be listed on QPL 69 and should be specified on an as-need basis.**

2. Procedures

- 2.1. **Producer Requirements:** All producers of RCP products to be supplied on SCDOT projects shall be third party certified through either ACPA or NPCA, herein referred to as "Certification Program." Certified producers must submit a copy of their certification and documentation that they are certified and have successfully completed the annual inspections.
- 2.2. **Manufacture:** All RCP shall be manufactured in strict accordance with the dimensions and details shown on the SCDOT Standard Drawings, approved shop drawings, plans, or AASHTO/ASTM specifications.
- 2.3. **Materials:** Ensure that all applicable raw materials used in the manufacture of RCP come from an applicable SCDOT QPL.
 - 2.3.1. **Aggregates:** All aggregate used shall be in accordance with Subsections 701.2.9 and 701.2.10 of the SCDOT Standard Specifications.

2.3.2. Cement: All cements shall meet the requirements of Subsection 701.2.1 of the SCDOT Standard Specifications with the exception of the following:

Subsection 701.2.1.1, Paragraph 3 – Portland cement with alkali contents greater than 0.60% but no greater than 0.75% will be allowed with the following conditions.

- Sources with alkali contents greater than 0.60% will be designated as “High Alkali” on SCDOT Qualified Product List 6. Unless the use of cement with alkali contents greater than 0.60% is explicitly specified, concrete produced using sources so designated require the use of a supplementary cementitious material (SCM) as given herein. Use a maximum replacement of 30% of the cement at a ratio of 1.2:1 with Type “F” Fly Ash with at least 20% as designated in Subsection 701.4.9(c) or replace at a ratio of 1:1 by weight with at least 30% but not more than 50% of the cement with water-granulated blast-furnace slag from an SCDOT Qualified Products List 6 source as designated in Subsection 701.4.9(d). Where fly ash is used, use only Type “F” Fly Ash from SCDOT Qualified Product List 3.
- Concrete manufactured using cement designated as high alkali without the specified SCM replacement is not acceptable.

2.3.3. Supplementary Cementitious Materials: All other cementitious and Pozzolanic materials must meet the requirements of Subsection 701.2 of the SCDOT Standard Specifications.

2.3.4. Reinforcing Steel: All reinforcing steel used for the reinforcement of RCP shall be in accordance with the AASHTO Standard for the product as indicated in Section 714 of the SCDOT Standard Specifications. The producer shall retain copies of all mill test reports and material certifications.

2.3.5. Admixtures: All admixtures must comply with Subsection 701.2 of the SCDOT Standard Specifications.

2.4. Products: All RCP products must comply with the following:

2.4.1. Supplemental Technical Specification 714 (SC-M-714).

2.4.2. SCDOT Instructional Bulletin 2007-04 for the design cover height for the project and the pipe material chosen.

2.4.3. SCDOT Standard Drawings

3. Mixture Design

The producer shall prepare a concrete mixture design for each mixture that will be used to manufacture RCP. The mixture design documentation shall be available at the production facility for review by SCDOT officials at any time during production or inspection of RCP. All mixture design criteria shall be in accordance with AASHTO M 170.

4. Quality Control Program

4.1. Quality Control Plan (QCP): Each production facility shall have a QCP as required by the applicable National certification program. This plan is to include the testing frequencies for raw materials and the final products as well as a contingency plan to address periods of quality control personnel turnover. Ensure that any changes of items in the plan, such as quality control personnel turnover, are addressed by immediately contacting the SME with a follow-up submittal

of a revised QCP. A recent QCP showing personnel responsible for the QCP and their telephone numbers must be provided to the SME before approval.

4.2. Testing Equipment and Laboratory:

4.2.1. Each production facility shall have, or have immediate access to, a laboratory that is fully equipped to perform the required tests on RCP and RCP materials.

4.2.2. Each production facility that is certifying products for acceptance must have a compression machine that is of sufficient capacity to test to the required strength of cylinders or cores and a testing rack for conducting three-edge bearing for testing pipe products to the required load strengths.

4.2.3. The testing equipment shall be certified a minimum of every 12 months. The producer shall maintain documentation and records of all certifications.

4.2.4. A private testing laboratory, acceptable to the SME at the SCDOT Office of Materials and Research (OMR), may be used for compressive strength testing of cylinders and cores only. The testing laboratory shall be accredited through the AASHTO Accreditation Program (AAP).

4.3. Quality Control (QC) Personnel:

4.3.1. Each production facility shall have an individual responsible for the quality production of RCP. This individual shall have authority to make necessary adjustments, reject concrete, cease production, or reject products when the quality of the product is in question.

4.3.2. Technicians and other individuals who conduct sampling and testing for QC, or prepare mixture designs, shall be trained as QC Technicians for the areas in which they work and will be certified after having passed a training assessment test of the relevant section(s) of the QC Training Program. Training records and the assessment tests will be retained by the manufacturer. The Training Program will include reassessment and recertification of each technician's competency on a regular frequency. Recertification records will be documented and kept by the manufacturer.

4.3.3. Once certified, the RCP Quality Control Technician shall complete all related test reports and quality control data submittals involved in the acceptance of RCP by the producer.

5. Acceptance Testing

5.1. All testing for acceptance shall be completed, as a minimum, in accordance with the frequencies given in the Certification Program.

5.2. A product will be acceptable if all of the following items are met:

5.2.1. All the acceptance test results for the LOT comply with the requirements of the applicable specifications.

5.2.2. The product is manufactured within the permissible variations allowable in AASHTO M 170.

5.2.3. The product is manufactured in accordance with the rejection limits established in AASHTO M 170.

5.2.4. The pipe manufacturer shall furnish the OMR a one-time certification for each joint design for range of pipe sizes, preformed flexible sealant and rubber gasket furnished to SCDOT projects. The certification will consist of a joint performance test conducted at the pipe manufacturer's facility. Perform such tests in the presence of the manufacturer's Certified

Plant Quality Control Technician or Plant Manager. Tests are to be performed on each joint design and preformed flexible sealant or rubber gasket combination that will be certified and identified on QPL 69. For certification purposes, testing will be performed for each joint design and preformed flexible sealant or rubber gasket combination. Additional testing is required if any material changes are made for a given pipe's joint design or change in the preformed flexible sealant or rubber gasket material properties.

- 5.2.5. For Preformed Flexible Sealants: The pipe manufacturer shall hydrostatically test each joint design for range of pipe sizes and preformed flexible sealant in accordance with ASTM C990. If the pipe manufacturer elects to change preformed flexible sealant manufacturers and/or joint design for a given pipe size, the pipe manufacturer must furnish a new certification to the OMR. The user of this Policy is advised that the hydrostatic test for preformed flexible sealant joint assemblies is intended only for use as an in-plant quality control test and is not intended as a field service test.

For Rubber Gaskets: The pipe manufacturer shall hydrostatically test each joint design for range of pipe sizes and rubber gasket in accordance with ASTM C443. If the pipe manufacturer elects to change the rubber gasket manufacturer, gasket size, and/or joint design for a given pipe size, the pipe manufacturer must furnish a new certification to the OMR. The user of this Policy is advised that the hydrostatic test for rubber gasket joint assemblies is intended to serve as an in-plant quality control test and is not intended as a field service test.

The joint certification furnished to the OMR shall consist of the following:

- Detailed design of joint with primary dimensions in accordance with ASTM C 443 and ASTM C 990.
- List of tested preformed flexible sealant materials, sizes, manufacturers, etc.
- List of tested rubber gaskets materials, sizes, manufacturers, etc.
- Table or list of pipe sizes which utilize the joint design.
- Title block with plant identification information.
- Hydrostatic test report.
- Letter of certification of joint compliance with ASTM C 443 and ASTM C 990 and certification of hydrostatic proof test.

- 5.3. Retesting: When an acceptance test fails to meet the requirements specified, then the product is unacceptable. Retesting will be allowed as indicated in AASHTO M 170.

6. Product Markings

- 6.1. Each product produced shall be marked on the inside or outside of the pipe following the requirements of AASHTO M 170 (ASTM C 76) and includes as a minimum:

- Date of manufacture
- Diameter
- AASHTO/ASTM designation and class
- Manufacturing plant's unique stamp/location identifier
- The word "NPCA" or "Qcast" clearly marked on the product

7. Documentation and Reporting

7.1. The manufacturer shall keep daily reports documenting each product made that day and the number made as per the requirements of the Certification Program. The report shall identify the date, type, and test results of all acceptance tests made for that product.

7.2. The manufacturer shall maintain this information for a minimum of 3 years.

8. SCDOT Verification testing and inspection

8.1. The SCDOT retains the right to test and/or request the producer to retest any SUBLOT or LOT for verification purposes. Verification may include any of the acceptance tests identified. The frequency of the verification testing will vary at the discretion of the OMR inspector.

8.2. If verification test results do not comply with product specifications, then all products represented by the manufacturer's acceptance test results will be immediately considered "questionable for acceptance" and additional testing will be required.

8.3. Additional testing will entail that 2 additional samples of product manufactured the same day as the verification sample will be tested. Both test results must exceed the requirements of the applicable test. If both results do not comply with specification requirements the products from that day are unacceptable and shall not be used on SCDOT projects.

8.4. If products are deemed unacceptable as determined above, then additional verification testing shall be conducted on other products produced.

8.5. The SCDOT will maintain records and documentation of all verification testing that occurs and shall have the right to review and inspect all producer quality control data, records, and files to ensure compliance with these requirements.

9. Disqualification of Manufacturers

9.1. If a producer fails to maintain their third party certification they will not be allowed to produce products for use on SCDOT projects and will be taken off the QPL. If the SCDOT removes a producer from the list, the producer must provide a new ACPA/NPCA certification, along with the inspector QC documentation to be considered for reinstatement.

9.2. The SCDOT may disqualify a producer if they fail to manufacture, test, accept, or certify in accordance with the procedure set forth in this Policy.

9.3. The SCDOT may disqualify a producer that falsifies acceptance test results or certifies/stamps products that have not met acceptance criteria.

9.4. The SCDOT may disqualify a producer if SCDOT verification testing indicates that the quality of product being manufactured is questionable (see paragraph 8.2).

10. Shipment

- 10.1. No products shall be shipped from the fabrication plant/stockyard to SCDOT projects until they have met all acceptance criteria.

11. Requests for qualification

Producers should make a formal request by email to be included on SCDOT QPL 69 to:

Caleb Gunter, PE
Structural Materials Engineer
South Carolina Department of Transportation
Office of Materials and Research
Email: guntercb@scdot.org
Phone: (803) 737-6694

12. Guidelines for Continued Qualification

- 12.1 Provide to the SCDOT SME up to date copies of ACPA or NPCA certifications prior to the expiration date listed on the QPL.
- 12.2 Keep up to date copies of the Quality Control Plan at the facility. If any changes are made to the Quality Control Plan, provide the new version to the SCDOT SME within one week of the effective date of the changes.