



**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION**

PAT MCCRORY
GOVERNOR

ANTHONY J. TATA
SECRETARY

**EPOXY COATED REINFORCING STEEL
QUALITY CONTROL/QUALITY ASSURANCE
PROGRAM**

1/30/2014

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NC DEPARTMENT OF TRANSPORTATION
MATERIALS & TESTS UNIT
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RALEIGH NC 27699-1563

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LOCATION:
1801 BLUE RIDGE ROAD
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I GENERAL DESCRIPTION

The Epoxy Coated Reinforcing Steel Quality Control/Quality Assurance Program is designed to give coaters/fabricators more responsibility for controlling the quality of material they produce and to utilize the quality control information they provide in the acceptance process by the North Carolina Department of Transportation (NCDOT). It requires coaters/fabricators to perform quality control sampling, testing, and record keeping on materials shipped for NCDOT use.

The types of sampling and testing procedures are described in Section III of this document.

It is the intent of this program that acceptance or rejection of material be based upon the total program. Therefore, a comparison of the Quality Control, Quality Assurance, and other sample data may be used by the NCDOT for acceptance or rejection of a lot of material.

Participation in this program is a requirement to supply epoxy coated reinforcing steel to NCDOT and does not relieve the producer of responsibility of complying with all requirements of the latest edition of the *NCDOT Standard Specifications for Roads and Structures*.

II PROGRAM REQUIREMENTS

A. Basic Requirements

- The plant must have an approved in house quality control plan.
- The plant must show proof of current **CRSI** certification.
- The plant must have a qualified quality control technician approved by the Department as defined in Section II, Part D.
- The plant must have NCDOT approved equipment for cleaning, coating, testing, and handling coated reinforcing steel.
- The plant use approved epoxy resin powder, patching material, and wax base coating.
- The plant must provide the NCDOT with adequate documentation of materials used for each shipment and provide this documentation in a timely manner.

B. Quality Control Plan – The coater/fabricator must prepare a written quality control plan. The plan may be generic, but must be site specific. The plan must show in detail how the coater/fabricator proposes to control the equipment, materials, and production methods to insure that the specified products are obtained. The plan must list the personnel responsible for production and quality control at the site and include how to contact each person. The following specific information must also be included on the plan:

- Identification of the physical location of the plant, to include a description of the property site and reference to the nearest identifiable points such as highways and towns.

- The method of identification of each lot of material during manufacture, testing, storage, and shipment, including identifying it as intended for NCDOT usage.
- The method of sampling and testing of raw materials and of the finished product, including lot sizes, and type of tests performed as well as a description of equipment modifications, or equipment developed in-house to perform tests.
- 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 NCDOT, including safeguards against loading non specification material. The plan must also include methods of insuring that all products are accurately identified and adequately protected from abrasion or other damage to the coating.
- A plan for dealing with quality control sample/inspection failures. This plan must include how the coater/fabricator plans to initiate an immediate investigation and how the coater/fabricator will implement corrective action to remedy the cause of the problem. The plan must include methods for marking and separating non-specification from specification materials.

C. CRSI Certification - The plant must establish proof of their competency and responsibility in accordance with the Concrete Reinforcing Steel Institute's Fusion Bonded Epoxy Coating Applicator Plant Certification Program. A copy of the plant's CRSI Certification certificate must be forwarded to the State Materials Engineer prior to beginning work for new plants and on a yearly basis for existing plants who wish to continue in this program.

D. Quality Control Technician - An approved Quality Control Technician must be present during all coating and fabrication operations. A qualified Quality Control technician is defined as one who has been trained in the inspection procedures and equipment to be used in accordance with the plant's Quality Control plan and the NCDOT Specifications. This training is to be documented and made available to the NCDOT. The Quality Control Supervisor for the plant shall document the training of Quality Control technicians in the use of the procedures and equipment required by the Quality Control plan and NCDOT specifications every six months. All samples must be taken and all testing must be performed by Quality Control technicians approved by the NCDOT. The coater/fabricator must designate and identify the quality control technicians responsible at each plant. It is imperative that NCDOT sampling and testing procedures be followed and that properly calibrated equipment be used in order to reduce the number of possible causes of differences between the coater/fabricator's quality control results and quality assurance results by NCDOT. The NCDOT representative may require demonstration of the equipment and procedures used by the technician.

E. Plant Approval Process - The approval process requires the coater/fabricator to write the State Materials Engineer at NCDOT, Materials and Tests Unit, 1801 Blue Ridge Road, Raleigh, NC 27607, requesting that the plant be considered for acceptance into the program. This letter must identify the specific products that are to be produced. A copy of the coater/fabricator's written quality control plan and a copy of the plant's **CRSI** Certification document must be submitted with the request for approval.

The NCDOT representative will review the coater/fabricator's written quality control plan and if it meets all requirements, an on-site inspection will be scheduled. This on-site inspection will verify that the coater/fabricator's quality control plan has been implemented and is being followed and that at

least one approved quality control technician is on site and will be present when material is being coated/fabricated under this program. If either the coater/fabricator's quality control plan or plant does not meet NCDOT requirements, the coater/fabricator will be informed of the deficiencies in writing. Once the deficiencies have been addressed, the coater/fabricator may again request approval of the quality control plan in writing to the State Materials Engineer.

F. Certification for Participation in the Epoxy Coated Reinforcing Steel QC/QA Program - If the NCDOT representative has approved the coater/fabricator's written quality control plan and the on-site inspection confirms that the program requirements have been met, NCDOT will issue a certificate. The certificate will be valid for one year from the date of certification, certifying the plant for participation in the program. At the end of the year, and each subsequent year, the coater/fabricator must request in writing to remain on the list of certified companies. The coater/fabricator must submit a copy of an updated Quality Control Plan or must state in writing that the previously submitted plan is still in effect. NCDOT will conduct another on-site inspection and if all requirements continue to be met, the plant will be re-certified for participation in the program for another year. This annual re-inspection of the plant will be scheduled after the NCDOT has received a copy of the Plant's updated QC Plan. Random inspections may be conducted at any time by NCDOT to verify compliance with the program requirements.

G. Documentation – The plant must provide with each shipment of epoxy coated reinforcing steel all required documentation as outlined in Appendix A. Each shipment of coated reinforcing steel must be reported on the M&T ER-02 Form as designated in Appendix B. Each shipment of coated dowel bar or baskets must be reported on the M&T DB-06 Form as designated in Appendix C. The heat numbers of steel used on each shipment must be recorded on M&T 913 Form as designated in Appendix D. This documentation will also include mill test reports for steel. Each shipment must be accompanied by this documentation.

The plant must also transmit by email a completed electronic copy of the M&T ER-02 or DB-06 Form to the NCDOT Materials and Test representative in a timely manner after shipment date. Failure to provide all applicable documentation to NCDOT will be considered a noncompliance with this program and will be handled in accordance to section IV of this program.

The plant must also retain all documentation required to support traceability of materials. This documentation will include mill test reports for steel, certifications for epoxy resins and patching materials, and daily quality control reports.

III SAMPLING AND TESTING PROCEDURES

A. Coater/Fabricator's Quality Control – The coater/fabricator's Quality Control (QC) technicians will perform sampling and testing and will be used by the coater/fabricator to monitor the quality of material being produced and shipped.

- Standard Specifications – The coater/fabricator is to perform all sampling and testing in accordance with current specifications and procedures referenced in the *NCDOT Standard*

Specifications for Roads and Structures and **CRSI** test requirements, whichever is more stringent. The procedures for following the specifications must be outlined in the coater/fabricator's Quality Control Plan.

- **Test Equipment** – The coater/fabricator must maintain test equipment and instruments required by current specifications referenced above. All test equipment and instruments must have proof of current calibration, if applicable, and be in good working order. The inline holiday detector must have the capability of recording the number of holidays on any individual piece of rebar and then reset to zero for the next bar. Averaging the number of holidays for quantities of rebar greater than one will not be permitted in lieu of resetting the counter for each bar.
- **Dowel Baskets** - The plant must perform production weld quality tests in accordance to an approved weld test procedure, which must be documented and witnessed by the Quality Control technician. The welding and qualifying of welders, welding operators, and tackers shall be in accordance with the applicable AWS welding code.
- **Final Inspection** - In addition to all other required tests and inspections, the Quality Control technician must perform a final visual inspection of each load of epoxy coated reinforcing steel after loading for shipment. Any bars that do not meet specifications must be repaired or removed from the load at this point. Final inspection must be documented by signing the certification statement on M&T Forms ER02 or DB-06.

B. NCDOT Quality Assurance - The NCDOT Materials and Tests Unit will monitor the coater/fabricator's compliance with this QC/QA program through plant audits and field inspections. Inspections may include visual inspection, thickness testing of coating, holiday testing of coating, and sampling of coated bars for laboratory tests.

IV COMPLIANCE

NCDOT will perform audits at a frequency to be determined by the Materials and Tests Unit. This frequency will be determined based on the volume of work performed by the coater/fabricator and the results of past audits and/or field inspections.

Noncompliance with this program will be addressed immediately at the time of any plant audit or field inspection. Materials and Tests personnel performing audits or field inspections will inform the coater/fabricator of any noncompliance as soon as possible. Notification will be by telephone, fax, email, US mail, or in person as deemed practical in each case.

Disposition of noncompliance with this program will include, but not be limited to, immediate rejection of material on hand, probation period, or removal of the coater/fabricator from the NCDOT approved list of coater/fabricators. If the NCDOT Metals Engineer determines that a probation period is warranted, the plant will be informed that such probation will extend for one calendar quarter from the time of the noncompliance that caused probation. If at the end of the probation period the plant has not had any more noncompliance, the Metals Engineer will inform them in writing that they have been removed from probation status. If the plant has any more noncompliance with this program during the probation period, the Metals Engineer will decide whether to extend probation or remove the plant from the list of approved coater/fabricators.

Appeals of dispositions of noncompliance where a coater/fabricator has been removed from the approved list are to be submitted in writing immediately to the State Materials Engineer.

Failure to supply documents required with each shipment of reinforcing steel will result in rejection of the shipment. Also, you are reminded that General Statute 136-13.2 states that any person who knowingly falsifies or any person who directs a subordinate to falsify any inspection report or test report shall be guilty of a Class H felony.

Appendix A

Below are the appropriate documents required to accompany each type of steel shipped:

Plain (Black) Reinforcing Steel:

- A Type 1 Certification – Certified Mill Test Report. This is a certified report of tests conducted by the manufacturer on samples taken from the same heat or lot number as the material actually shipped to the project. This report shall also contain a statement certifying that the material was “melted and manufactured” in the United States.
- An M&T Form 913. This is a supplier’s certification that the Type 1 Certification included with the shipment is, in fact, the actual certification for that material. This is necessary since there are no heat numbers on reinforcing steel. A copy of Form 913 is included and you may make as many copies as you need.

Epoxy Coated Reinforcing Steel:

- A Type 1 Certification as detailed above
- An M&T Form 913 as detailed above
- An M&T Form ER-02 with a unique number for each shipment. This number will be assigned by the coater in the following format:

Coater or Coater / Fabricator

RCXX-MMDDYY-XXXX Load or Control Number

- RCXX The coater’s ID Number assigned by M&T
- MMDDYY The projected shipment date
- XXXX A unique 4-digit number assigned by the producer for that shipment

Coated Bar Fabricator Only

CRFXX-MMDDYY-XXXX Load or Control Number

- CRFXX The coated fabricator ID Number assigned by M&T
- MMDDYY The projected shipment date
- XXXX A unique 4-digit number assigned by the producer for that shipment

Epoxy Coated Dowel Bars:

- A Type 1 Certification as detailed above
- An M&T Form 913 as detailed above
- An M&T Form DB-06 with a unique number for each shipment. This number will be assigned by the coater in the following format:

DBXX-MMDDYY-XXXX Load or Control Number

- DBXX The coater’s ID Number assigned by M&T
- MMDDYY The projected shipment date
- XXXX A unique 4-digit number assigned by the producer for that shipment

A copy of Forms is available online at:

<https://connect.ncdot.gov/resources/Materials/Pages/Structural.aspx>

Appendix B

**DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS AND TESTS UNIT**

Epoxy Coated Reinforcing Steel Shipping Report

Date:		Contractor:	
Plant:		Plant Location:	
Project:		Station:	
Job #:		Structure Number:	
County:		Load or Control #:	
Fabricator:			

Rebar Size	Grade	Rebar Manufacturer	Heat Number	Epoxy Coated By	Epoxy Powder Batch #	Weight Lbs./Kgs

Total weight represented by this report:

_____ (Each shipment requires a separate report.)

I hereby certify that the above material was coated and fabricated in accordance with the North Carolina Department of Transportation Standard Specifications and Supplemental Contract Special Provisions and all steel was melted and manufactured in the USA..

Signature of Authorized Representative:

I hereby certify that I have made final inspection of the above load of epoxy coated reinforcing steel, and to the best of my knowledge, all pieces meet the requirements of the specifications.

Sample bars are included with this shipment. (Check "yes or no")	Yes	
	No	

Signature:

Mill test reports and certifications are retained by NCDOT Materials and Tests Unit.

Appendix C

**STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
MATERIALS AND TESTS UNIT**

Dowel Basket Fabrication Report

Date:		Contractor:	
Plant:		Plant Location:	
Project:		Station:	
Job #:		Structure Number:	
County:		Load or Control #:	
Fabricator:			

Basket Height	Dowel Diameter	Dowell Grade	Heat Number	Epoxy Coated By	Epoxy Powder Batch No.	Expansion	Contraction

Total number of baskets or loose dowels represented by this report:

(Each shipment requires a separate report.)

I hereby certify that the above material was coated and fabricated in accordance with the North Carolina Department of Transportation Standard Specifications, Standard Drawings, and Supplement Contract Special Provisions and that all steel was melted and manufactured in the USA.

Signature of Authorized Representative

Mill test reports and certifications are retained by NCDOT Materials and Tests unit.

