



INSPECTION AND ACCEPTANCE EPOXY-COATED STEEL REINFORCEMENT

GENERAL

Acceptance of epoxy-coated steel reinforcement (Article 4151.03B) will be on the basis of certification from an approved manufacturer of steel reinforcement, an approved coater, and an approved distributor or supplier of steel reinforced products subject to the testing of acceptance and verification samples secured at destination as outlined herein. Approval to furnish epoxy-coated steel on a certification basis may be withdrawn for deficient test results on verification samples or inadequate documentation or identification of materials. Approved coaters are listed in Appendix A of this IM and approved suppliers are listed in Appendix B of IM 451. Approved manufacturers of reinforcing steel are listed in Appendix D of IM 451. Approved epoxy powders are listed in Appendix B of this IM.

All reinforcement (deformed and plain) required to be epoxy-coated shall have a protective coating of epoxy applied by the electrostatic spray method in accordance with the full requirements of ASTM A775/A775M. Fabrication, acceptance, and job site handling of epoxy-coated reinforcing steel bars shall be in accordance with the requirements of ASTM D3963/D3963M and IM 451.03B.

SURFACE PREPARATION

Reinforcing steel surfaces to be coated shall receive a thorough blast cleaning to near-white metal in accordance with SSPC SP10. Mill scale, rust and foreign matter shall be completely removed. The blasting media containing sufficient grit shall produce a suitable anchor pattern profile. A profile depth of 2.0 to 4.0 mils (50 μm to 100 μm) shall be considered suitable as an anchor pattern. Coating shall be applied to the cleaned surface soon thereafter. In no case shall the coating be delayed more than 0.5 hr. after cleaning.

Additional blast media requirements shall be specified if a suitable anchor pattern and/or profile depth is not achieved. A minimum of 10% steel shot may be added to G-40-R or G-25-R grit.

REQUIREMENTS FOR COATED STEEL REINFORCING BARS

- For acceptance purposes, at least 90% of all recorded thickness measurements of the coating after curing shall be 8 to 12 mils (200 to 300 μm). A single thickness measurement below 6 mils (150 μm) shall be considered cause for rejection.
- A minimum of ten recorded measurements shall be obtained evenly spaced along each side of the test bar (a minimum of 20 recorded measurements per bar) individual reading only.
- Test for coating thickness shall be made on a minimum of two bars every two production hours.

In-Line Holiday detection is required. Handheld detector checks shall be performed at least twice per shift, and/or when the bar size changes, to verify the accuracy of the In-Line System. Only 1 Holiday per 1.0 linear foot (3 Holidays per meter) shall be allowed on the coated steel reinforcing bars.

A bend test shall be performed to evaluate the flexibility of the coating. Coated bars shall be tested at a uniform rate, a minimum of one bar of each size every four production hours around a mandrel of a specified size within a maximum specified time period. (See Table 1, ASTM A775/AA775M.) No cracking or disbonding of the coating shall be visible on the outside radius of the bent bar. Evidence of cracking or disbonding of the coating shall be considered a cause for rejection.

Long-term storage (greater than two months) of bars shall be minimized at the fabricator and at the job site. Coated steel reinforcing bars stored outdoors shall be protected from sunlight, salt spray and weather exposure. The coated bars shall be covered with a non-transparent material, or other suitable opaque protective material. Provisions shall be made for adequate ventilation to minimize condensation. Coated steel reinforcing bars shall be stored off the ground on protective cribbing, and/or on padded support with padded timbers placed between bundles when stacking is necessary. Additionally, support shall be provided to prevent sagging in the bundles. The date on which the coated bars are placed outdoors shall be recorded on the identification tag on the bundled steel. Weathered (discolored) bars shall be rejected.

REJECTION

Coated bars that do not meet the requirements of this IM, ASTM A775/A775M, ASTM D3963/D3963M, and the requirements of Specification 4151.03 shall be rejected. Rejected bars shall be marked with contrasting color paint or other suitable identification and stored separately.

COATER APPROVAL

Each coater shall be approved before materials may be furnished to projects. The coater shall provide the Central Materials Office a written application to become an approved coater of reinforcing steel. This application shall include the following:

1. Sources of steel that would be handled by the company and supplied to Iowa DOT projects.
2. Quality Control procedures that the company has established to ensure material identity (as to heat numbers and inventory control) from the time the material arrives from a mill or a source, through the coating and fabricating process, and shipment.

-
3. Coating quality procedures to ensure the coated steel complies with Iowa DOT specifications. This shall include the following:
 - a. Names of Quality Control personnel.
 - b. Quality Control testing conducted during the bar cleaning operation.
 - c. Quality Control testing conducted on the epoxy coating after coating.
 4. Three epoxy-coated bars of every size that the coater plans to coat. These samples will be called Process Approval Samples. The bars shall be approximately 6 ft. (2 m) in length. Samples are to be secured by the District Materials Engineer for the source approval.
 5. An example of certification documents that the company will furnish for Iowa DOT projects.
 6. Plant must be CRSI certified. Copies of the last three CRSI inspection reports must be submitted for review and evaluation.

Upon satisfactory review of this application, satisfactory test results and satisfactory inspection of the facilities for compliance with Quality Control procedures, the company may be placed on the approved list, Appendix A.

POWDER APPROVAL

Prior to furnishing epoxy powder to coaters for Iowa DOT projects, the powder manufacturer shall submit the following:

1. A written application by the company to become an approved powder manufacturer shall be submitted to the Central Materials Office in Ames, Iowa.
2. Product information, specifications, and recommended application procedures, including minimum gel and cure time
3. A fingerprint sample of the powder, product name and number, and manufacturer name.
4. Prequalification shall be in accordance with ASTM D3963/D3963M and ASTM A775/A775M.
5. A 100 gm (3.5 oz.) sample shall accompany the application.

Upon satisfactory review of this application and a satisfactory trial run in an approved coating plant, the company will be placed on the approved list in Appendix B. Continued approval will be based on satisfactory test results of monitor samples secured at the coating plant.

ACCEPTANCE PROCEDURES

Epoxy-coated steel will be accepted on a certification basis. The coating plant shall furnish an identification list, invoice, or bill of materials for each shipment to a project. It shall show the project and design number, the size, length, grade, heat number and number and weight of pieces in the shipment and contain a certification stating that the attached mill certifications and epoxy-coating certifications are applicable to the material.

The mill certifications, which are to be attached as directed above, shall state the chemical, physical, and mechanical tests reported and the ASTM designation, type, and grade for each heat.

The epoxy-coating certifications, which are to be attached as directed above, shall provide the powder certifications.

Coating plants that have been approved on a project-by-project basis shall supply all necessary documentation for each shipment as described above. An acceptance sample, 6 ft. (2m) of the most common size in the shipment, shall be secured and tested for coating thickness and flexibility (bend test) prior to incorporation into the project. **NOTE:** The location of the sample within a bar shall be at least 3 ft. (1m) away from the ends of the bar.

One copy of the documents prescribed above shall accompany each shipment and be retained in the Project Engineer file. Two copies shall be forwarded, at the time of shipment, one to the Central Materials Office in Ames, Iowa, and one to the District Materials Office responsible for project administration.

VERIFICATION SAMPLING & TESTING

Personnel from the District Materials Office shall secure a random field verification sample 6 ft. (2 m) of the largest size bar in the project. The location of the sample within a bar shall be at least 3 ft. (1 m) away from the ends of the bar.

Two additional samples shall be secured if the first sample indicates non-compliance. Non-compliance may be considered a cause for rejection.

Bridge Decks

The verification sample and acceptance sample will be the same sample. The District Materials Office will randomly sample the largest bar size for the deck. If the sample fails, two additional samples shall be secured. Noncompliance on any one of the additional samples shall be cause for rejection of that particular size in the shipment.

If the largest size bar in a shipment is rejected, a similar sampling procedure shall be applied to the remaining bars in the shipment.

The contractor shall not place concrete on the deck until there are passing test results of the epoxy-coated steel.

Samples of epoxy-coated steel reinforcement for all other applications (other than bridge decks) shall be limited to a project quantity of 5 tons (5 Mg) or over.

Pavement Tie Bars

Epoxy-coated pavement tie bars shall be accepted on the same basis as dowel bars in accordance with Appendix C of this IM.

STEEL SHIPPED TO STEEL SUPPLIERS/CONTRACTOR FOR USE ON SEVERAL PROJECTS

The District Materials Engineer shall sample epoxy-coated reinforcing steel, which is shipped to a fabricator or contractor for use on several projects, at the above-indicated rates.

Certification

Each coating plant shall furnish at the time of shipment, written certification that samples representing each lot of coated steel reinforcing bars have been either tested or inspected as specified and that the coating requirements have been met. A report of the test results shall be furnished on a regular basis.