Comparison of Standard Specifications

Coating Application, Fabrication and Field Specifications of Epoxy-Coated Rebar

CRSI

The following are the applicable AASHTO and ASTM standards for epoxy-coated reinforcement and are recommended for use on most projects where corrosion of reinforced concrete is a concern.

The CRSI Certification Program has served as a proving ground for many of the recent changes and improvements to these standard specifications for epoxy-coated reinforcement.

This easy to use comparison simplifies each item and directly compares for each situation. This summary was prepared in January 2000. It will be regularly updated at the epoxy-coated rebar area of the CRSI website, www.crsi.org

Table 1 — Comparison of Standard Epoxy Coating Application Specifications

Item	*AASHTO M284-97 (Coating Application, Fabrication & Field)*	*ASTM A775-97 (Coating Application Before Fabrication)*	*ASTM A934-97 (Coating Application After Fabrication)*
Steel	• Bars shall be free of contaminants	• Bars shall be free of contaminants • Note-bars with sharp edges/rollovers should not be coated	• Bars shall be free of contaminants • Note-bars with sharp edges/rollovers should not be coated
Certifications	• Upon request, furnish written certification to purchaser that identifies batch, manufacture date & meets requirements of spec	• Furnish written certification to purchaser that identifies batch, manufacture date & meets requirements of Annex A1	• Furnish written certification to purchaser that identifies batch, manufacture date & meets requirements of Annex A1
Powder Storage	• None	• Stored in temperature controlled environment	• Stored in temperature controlled environment
Surface Preparation	• Near white per SSPC-SP10and SSPC-Vis 1	• Near white per SSPC-SP10	• Near white per SSPC-SP10
Average Blast Profile	• One third of coating thickness	• 1.5 to 4.0 mils	• 1.5 to 4.0 mils
Use of Profilometer	• Not specified	• Recommended	• Recommended
Contamination	• Not specified	• Air Knives required • Clean salt-contaminated bars by acid washing or other suitable method	• Air Knives required • Salt-contaminated bars should be cleaned by acid washing or other suitable method
Pretreatment	• Not addressed	• Permitted	• Permitted
Cleaning/Coating Interval	• No more than 8 hr.	• No more than 3 hr.	• No more than 3 hr.
Temperature	• Shall be controlled as recommended by the manufacturer to assure a workmanlike finish	• Measured prior to coating with crayons or infrared at least once every 30 min.	• Measured prior to coating with crayons or infrared at least once every 30 min. • Use of both infrared and crayons is recommended
Application	• Electrostatic spray	• Electrostatic spray or other suitable	• Electrostatic spray or other suitable
Thickness	• 90% measurements—7 to 12 mils; • single measurement < 5 mils cause for rejection • Measurement = average of 3 readings; minimum of 5 measurements per side • Use correction factor for gage calibration	• 90% measurements—7 to 12 mils; • single measurement < 5 mils cause for rejection • Measurement = average of 3 readings; minimum of 5 measurements per side • Test a minimum of 2 bars of each size every 4 production hours	• 90% measurements—7 to 12 mils; • single measurement < 5 mils cause for rejection • Measurement = average of 3 readings; minimum of 5 measurements per side • Test a minimum of 2 bars of straight section and 2 bars of bent section of each size every production hour
Coating Continuity	• No more than average of 2 per ft.	• No more than average of 1 per ft.	• No more than average of 1 per ft.

Item	*AASHTO M284-97 (Coating Application, Fabrication & Field)*	*ASTM A775-97 (Coating Application Before Fabrication)*	*ASTM A934-97 (Coating Application After Fabrication)*
Coating Flexibility (Bend Test)	• Temperature: 68 to 85°F • Bend: For Nos. 3 -- 6: 120° @6-in pin; For Nos. 8--11: 120°@8d; For Nos. 14 & 18: 120°@17-in. & 23-in pins respectively • Time: For all bar sizes, time to complete test = 90 seconds • Frequency: may be specified by purchaser	• Test Temperature: 68 to 86°F • Bend: For Nos. 3 -- 11: 180°@8d; For Nos. 14 & 18: 90°@10d; • Time: For Nos. 3 -- 6: 15 seconds; For Nos. 7 -- 18: = 45 seconds • Frequency: Test a minimum of 1 bar every 4 production hours	• Test Temperature: 68 to 86°F • Pin Diameter: For Nos. 3 -- 11: 8d; For Nos. 14 & 18: 10d; • Degree of Bend: For Nos. 3-5 = 9 deg.; for Nos. 6-18 = 6 deg. • Time: 5 seconds • Frequency: Test a minimum of 1 bar every 4 production hours
Coating Adhesion	• Cathodic disbondment test not specified; bend test used (see above)	• Cathodic Disbondment test on one bar every 8 hrs.	• Cathodic Disbondment test on two bars every 8 hrs.; one straight bar section, one bent section
Retest	• If coating flexibility test fail—take 2 retests, both of which must pass	• If coating thickness or flexibility test fail—take 2 retests, both of which must pass	• If coating thickness or flexibility test fail—take 2 retests, both of which must pass
Damage	• Maximum area of patched damage shall not exceed 5% of surface area	• Maximum amount of repaired damaged shall not exceed 1% of surface area in a given foot of bar	• Maximum amount of repaired damaged shall not exceed 1% of surface area in a given foot of bar • Total area covered by patch material shall not exceed 2%
Repair	• Repair all visible damage; Minimum thickness = 7 mils	• Repair all visible damage; Minimum thickness = 7 mils	• Repair all visible damage; Minimum thickness = 10 mils
Storage	• Store off the ground on protective cribbing	• Cover if stored outdoors for more than 2 months • Store off the ground on protective cribbing	• Cover if stored outdoors for more than 2 months • Store off the ground on protective cribbing

Table 2 — Comparison of Standard Epoxy Coating Fabrication Specifications

Item	*AASHTO M284-97 (Application, Fabrication & Field)*	*ASTM D3963-99 (Fabrication & Field Only))*	*ASTM A934-97 (Coating Application After Fabrication)*
Damage	• Maximum amount of repaired damaged shall not exceed 5% of surface area	• Maximum amount of repaired damaged shall not exceed 5% of surface area	• Maximum amount of repaired damaged shall not exceed 5% of surface area
Repair	• Fabricator responsible for repair of fabrication damage • Repair all visible damage; Minimum thickness = 7 mils	• Repair all visible damage; Minimum thickness = 7 mils	• Repair all visible damage; Minimum thickness = 10 mils
Storage	• Store off the ground on protective cribbing	• Cover if stored outdoors for more than 2 months • Store off the ground on protective cribbing	• Cover if stored outdoors for more than 2 months • Store off the ground on protective cribbing
Bar Identification	• Maintain identity of coated bars	• Maintain identity (including heat no. & mill tests) of coated bars	• Maintain identity (including heat no. & mill tests) of coated bars
Bending	• Back-up barrels on benders shall have protective covering	• Back-up barrels on benders shall have protective covering	• Back-up barrels on benders should be protected with suitable covering to minimize crushing & rollover

Item	*AASHTO M284-97 (Application, Fabrication & Field)*	*ASTM D3963-99 (Fabrication & Field Only))*	*ASTM A934-97 (Coating Application After Fabrication)*
Handling	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands • Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands • Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands • Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles
Shearing	• Drive rolls shall be protected with suitable covering	• Drive rolls shall be protected with suitable covering	• Drive rolls on shear beds should be protected with suitable covering to minimize crushing & rollover

Table 3 — Comparison of Standard Epoxy Coating Field Specifications

Item	*AASHTO M284-97 (Application, Application, Fabrication & Field)*	*ASTM D3963-99 (Fabrication & Field Only)*	*ASTM A934-97 (Coating Application After Fabrication)****
Damage	• Total bar area covered by patch material shall not exceed 5%	• Maximum amount of repaired damaged shall not exceed 2% of surface area in a given foot of bar • Total area covered by patch material shall not exceed 5%	• Maximum amount of repaired damaged shall not exceed 2% of surface area in a given foot of bar
Repair	• Repair all visible damage; Minimum thickness = 7 mils	• Contractor shall be responsible for repair of field damage • Repair all visible damage; Minimum thickness = 7 mils	• Repair all visible damage
Storage	• Store off the ground on protective cribbing	• Cover if stored outdoors for more than 2 months • Store off the ground on protective cribbing	• Coated and uncoated steel should be stored separately • Store off the ground on protective cribbing • Cover if stored outdoors for more than 2 months
Bar Identification	• Maintain identity of coated bars	• Maintain identity (including heat no. & mill tests) of coated bars	• Maintain identity (including heat no. & mill tests) of coated bars
Steel Placement	• Not specified	• Use coated tire wire • Use bar supports coated with or made of dielectric material	• Use coated tire wire • Use bar supports coated with or made of dielectric material
Handling	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands • Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands • Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles	• All systems for handling shall have padded contact areas • Nylon or padded bundling bands Lift with strong back, spreader bar or multiple supports • Shall not drop or drag bars or bundles
Concreting	• Not specified	• Note: use of resilient headed vibrators recommended	• Walking on coated bars should be minimized • Note: use of resilient headed vibrators recommended

*** Field requirements of ASTM A934 are guidelines only; A934 is a product specification only