



Highlights and Guidelines of Specifications For
Coating, Fabrication and Field Handling of
Epoxy-Coated Reinforcing Steel Bars



Under normal circumstances and environments, cast-in place reinforced concrete is one of the most durable and structurally robust types of construction. However, under certain conditions, reinforced concrete can fail to provide the expected long service life. The exact technical details for any given situation in which this occurs are numerous and complex. Essentially, wherever carbon steel, moisture and elevated levels of chlorides occur, corrosion should be expected. Epoxy-coated reinforcing bars enhance corrosion resistance and extend service life dramatically under these adverse conditions when produced and installed to specifications.

Table 1 – HIGHLIGHTS OF STANDARD EPOXY-COATING SPECIFICATIONS

ITEM	<i>ASTM A775/A775M-07a Standard Specification for Epoxy-Coated Reinforcing Bars (Fabricate after Coating)</i>	<i>ASTM A934/A934M-07 Standard Specifications for Epoxy-Coated Prefabricated Steel Reinforcing Bars (Coat After Fabrication)</i>
Steel	<ul style="list-style-type: none"> Bars shall be free of contaminants such as oil, grease or paint Recommends checking for chlorides Suggests not to coat bars with sharp edges/rolled in slivers 	<ul style="list-style-type: none"> Bars shall be free of contaminants such as oil, grease or paint Recommends checking for chlorides Suggests not to coat bars with sharp edges/rolled in slivers
Certifications	<ul style="list-style-type: none"> Furnish written powder certification that identifies lot, manufacture date & same composition as qualified by requirements of Annex A1 	<ul style="list-style-type: none"> Furnish written powder certification that identifies lot, manufacture date & same composition as qualified by requirements of Annex A1
Powder Storage	<ul style="list-style-type: none"> Store in temperature-controlled environment according to powder manufacturer requirements Use within shelf life recommended by powder manufacturer 	<ul style="list-style-type: none"> Store in temperature controlled environment according to powder manufacturer requirements Use within shelf life recommended by powder manufacturer
Patching Material	<ul style="list-style-type: none"> Compatible with coating, inert in concrete and recommended by powder manufacturer 	<ul style="list-style-type: none"> Compatible with coating, inert in concrete and recommended by powder manufacturer
Surface Preparation	<ul style="list-style-type: none"> Near white per SSPC-SP10 and SSPC-VIS1 	<ul style="list-style-type: none"> Near white per SSPC-SP10 and SSPC-VIS1
Blast Profile	<ul style="list-style-type: none"> 1.5 to 4.0 mils with profile tape 	<ul style="list-style-type: none"> 1.5 to 4.0 mils with profile tape
Profilometer	<ul style="list-style-type: none"> Recommended in place of profile tape 	<ul style="list-style-type: none"> Recommended in place of profile tape
Blasting	<ul style="list-style-type: none"> Blasting media required to be steel grit Air knives required Salt-contaminated bars should be cleaned by acid washing or other suitable method 	<ul style="list-style-type: none"> Blasting media required to be steel grit Air knives required Salt-contaminated bars should be cleaned by acid washing or other suitable method
Pretreatment	<ul style="list-style-type: none"> Permitted 	<ul style="list-style-type: none"> Permitted
Cleaning/Coating Interval	<ul style="list-style-type: none"> No more than 3 hours 	<ul style="list-style-type: none"> No more than 3 hours
Temperature	<ul style="list-style-type: none"> Measured prior to coating with temperature-indicating crayons or infrared at least once every 30 minutes Use of infrared and crayons is recommended 	<ul style="list-style-type: none"> Measured prior to coating with temperature-indicating crayons or infrared at least once every 30 minutes Use of infrared and crayons is recommended
Application	<ul style="list-style-type: none"> Electrostatic spray or other suitable method 	<ul style="list-style-type: none"> Electrostatic spray or other suitable method
Thickness	<ul style="list-style-type: none"> 7 to 12 mils for Nos. 3, 4, 5 bar size; 7 to 16 mils for Nos. 6 to 18 bar size No single measurement less than 80% of minimum or more than 120% of the maximum Measurement = average of 3 readings minimum of 5 measurements per side Test a minimum of 2 bars every two production hours 	<ul style="list-style-type: none"> 7 to 12 mils for Nos. 3, 4, 5 bar size; 7 to 16 mils for Nos. 6 to 18 bar size No single measurement less than 80% of minimum or more than 120% of the maximum Measurement = average of 3 readings minimum of 5 measurements per side Test a minimum of 2 bars every two production hours
Coating Continuity	<ul style="list-style-type: none"> No more than an average of 1 holiday per foot 	<ul style="list-style-type: none"> No more than an average of 1 holiday per foot
Coating Flexibility (Bend Test)	<ul style="list-style-type: none"> Test temperature 68 to 86°F Mandrel diameter for Nos. 3 to 11 – 8 times bar size; for No. 14 – 17 inches and No. 18 – 23 inches Degree of bend: for Nos. 3 to 11 – 180° bend; for No. 14 and 18 – 90° bend Frequency: test a minimum of 1 bar every 4 production hours 	<ul style="list-style-type: none"> Test temperature 68 to 86°F Mandrel diameter for Nos. 3 to 11 – 8 times bar size; or No. 14 – 17 inches and No. 18 – 23 inches Degree of bend: for Nos. 3 to 5 – 9° bend; for Nos. 6 to 18 – 6° bend Frequency: Test a minimum of 1 bar every 4 production hours



There are two national consensus specifications for the production of epoxy-coated reinforcing bars; ASTM A775/A775M, *Standard Specification for Epoxy-Coated Steel Reinforcing Bars* and A934/A934M, *Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bar*. ASTM A775/A775M prescribes the requirements for epoxy-coated bars that are coated first and then fabricated. ASTM A934/A934M prescribes the requirements for the epoxy coating of bars that are fabricated first and then coated.

Epoxy-coated reinforcing bars coated to the ASTM A775/A775M specification are predominately the choice of both transportation agencies and epoxy-coated reinforcing bar producers. In North America, there are approximately thirty-five coating plants producing bars to ASTM A775/ A775M on a regular basis and one that produces to ASTM A934/ A934M on a regular basis.

Table 1 – HIGHLIGHTS OF STANDARD EPOXY-COATING SPECIFICATIONS (continued)

ITEM	<i>ASTM A775/A775M-07a Standard Specification for Epoxy-Coated Reinforcing Bars (Fabricate after Coating)</i>	<i>ASTM A934/A934M-07 Standard Specification for Epoxy-Coated Prefabricated Steel Reinforcing Bars (Coat After Fabrication)</i>
Coating Adhesion	<ul style="list-style-type: none"> Cathodic disbondment test required and test results provided to purchaser upon request. 30 day rolling average recommended 	<ul style="list-style-type: none"> Cathodic disbondment test required and test results provided to purchaser upon request. 30 day rolling average recommended
Tests	<ul style="list-style-type: none"> Thickness test required on 2 bars every two production hours Coating flexibility on a single bar every four production hours Cathodic disbondment on one bar every eight production hours 	<ul style="list-style-type: none"> Thickness test required on 2 bars every two production hours Coating flexibility on a single bar every four production hours Cathodic disbondment on one bar every eight production hours
Retest	<ul style="list-style-type: none"> If coating thickness or coating flexibility test fails, two retests on random samples, both of which must pass for acceptable lot 	<ul style="list-style-type: none"> If coating thickness or coating flexibility test fails, two retests on random samples, both of which must pass for acceptable lot
Damage	<ul style="list-style-type: none"> 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% 	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> All damage to be repaired Minimum coating repair thickness of 7 mils 	<ul style="list-style-type: none"> All damage to be repaired Minimum coating repair thickness of 7 mils
Storage	<ul style="list-style-type: none"> Cover if stored outdoors for more than 30 days Store off the ground on cribbing 	<ul style="list-style-type: none"> Cover if stored outdoors for more than 30 days Store off the ground on cribbing

For exact requirements, see the applicable specification.

Table 2 – GUIDELINES FOR FABRICATION PRACTICES

ITEM	<i>ASTM D3963/D3963M-01 Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars</i>
Applicability	<ul style="list-style-type: none"> Fabrication for deformed and plain steel reinforcing bars coated in accordance with A775/A775M
Coating Repair Material	<ul style="list-style-type: none"> Patching material compatible with coating, inert in concrete Meets requirements for Qualification of Patching Material
Handling	<ul style="list-style-type: none"> Contact points are to be padded Strapping to be padded or other non-abrasive material Spreader bar or strong back with multiple pick-up points to minimize sags Bars and bundles not to be dropped or dragged
Storage	<ul style="list-style-type: none"> Store coated and uncoated bars separately Store bundles on suitable material, such as timber cribbing Space timber cribbing to minimize sags
Identification	<ul style="list-style-type: none"> Maintained throughout fabrication process
Shearing and Bending	<ul style="list-style-type: none"> Contact points on shearing and bending equipment to be suitable material
Repairs	<ul style="list-style-type: none"> Patch all damage, including visible cracks Disbonded area to be cleaned and repaired Rust, if present, is to be removed by blast cleaning, filing, power brushing or other suitable method Cut ends are to be patched

For additional information, see Appendix F of CRSI's Epoxy Coating Plant Certification Manual

For guidance on field handling of epoxy-coated reinforcing bars, there are three national material specifications that contain applicable provisions. They are ASTM D3963/D3963M-01, Appendix X1 of ASTM A775/A775M-07, and Appendix X2 of ASTM A934/A934M-07.

Table 3 – GUIDELINES FOR FIELD HANDLING

ITEM	<i>ASTM D3963/D3963M-01 Standard Specification for Fabrication and Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars</i>	<i>Appendix X1 Guidelines for Job-Site Practices of ASTM A775/A775M-07a and Appendix X2 Guidelines for Job-Site Practices of ASTM A934/A934M-07</i>
Applicability	<ul style="list-style-type: none"> Fabrication for deformed and plain steel reinforcing bars coated in accordance with A775/A775M 	<ul style="list-style-type: none"> Fusion bonded epoxy-coated steel reinforcing bars where ACI 301 Specifications for Structural Concrete is not referenced in project specifications
Coating Repair Material	<ul style="list-style-type: none"> Patching material compatible with coating, inert in concrete Meets requirements for Qualification of Patching Material 	<ul style="list-style-type: none"> Patching material compatible with coating, inert in concrete Recommended by the powder manufacturer
Handling	<ul style="list-style-type: none"> Contact points are to be padded Strapping to be padded or other non-abrasive material Spreader bar or strong back with multiple pick-up points to minimize sags Bars and bundles not to be dropped or dragged 	<ul style="list-style-type: none"> Contact points are to be padded Strapping to be nylon or other non-abrasive material Spreader bar or strong back with multiple pick-up points to minimize sags Bars and bundles not to be dropped or dragged
Storage	<ul style="list-style-type: none"> Store coated and uncoated bars separately Store bundles on suitable material, such as timber cribbing Space timber cribbing to minimize sags 	<ul style="list-style-type: none"> Store coated and uncoated bars separately Store bundles on suitable material, such as timber cribbing Space timber cribbing to minimize sags
Bar Supports and Tie Wire	<ul style="list-style-type: none"> Bar supports and spacers to be non-conductive or plastic Coated tie wire 	<ul style="list-style-type: none"> Bar supports and spacers to be non-conductive or plastic Coated tie wire
Bar Placement	<ul style="list-style-type: none"> Minimize traffic on placed bars Use of mobile equipment to be planned to avoid coating damage 	<ul style="list-style-type: none"> Minimize traffic on placed bars Use of mobile equipment to be planned to avoid coating damage Placed bar to be covered with opaque plastic if cumulative uncovered time exceeds 2 months
Concrete Placement	<ul style="list-style-type: none"> Recommends use of plastic-headed vibrator to consolidate concrete 	<ul style="list-style-type: none"> Recommends use of plastic-headed vibrator to consolidate concrete
Repairs	<ul style="list-style-type: none"> Patch visible damage Disbonded area to be cleaned and repaired Rust, if present, is to be removed by blast cleaning, filing, power brushing or other suitable method Total damage area not to exceed 2% in a 1 foot section – sheared ends not included Total surface area covered with patching material not to exceed 5% in any 1 foot section – sheared ends not included 	<ul style="list-style-type: none"> Patch visible damage Disbonded area to be cleaned and repaired Rust, if present, is to be removed by blast cleaning, filing, power brushing or other suitable method Total damage area not to exceed 2% in a 1 foot section – sheared ends not included Reject bars Recommends not to excessively coat repaired areas

For exact requirements, see the applicable specification.



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