

# EPOXY GROUP

Epoxy Interest Group of CRSI

## FAST FACTS ON EPOXY-COATED REBAR (ECR)

### When was ECR first used?

- ECR was first used in 1973 on the Schuylkill Bridge near Philadelphia, PA.
- ECR has been used for corrosion protection of pipelines since 1960's.

### How many bridges have used ECR?

- In 2008, over 60,000 bridges with ECR were in the National Bridge Inventory.

### Why should I use ECR?

- Structures built with ECR have longer lives than structures built with black steel.
- ECR protects even in cracked concrete.
- Life cycle analysis shows that ECR provides the lowest cost.
- Unlike corrosion protection systems used within the concrete mixture, ECR is readily identified at the jobsite.

### Where can ECR be used?

- Bridge decks
- Continuous reinforced concrete pavement
- Parking garages
- Piers and docks
- Water towers
- Columns and parapets
- Dowels

### Where can I buy ECR?

- ECR is produced and inventoried nationwide.
- For current CRSI certified Epoxy-Coated Bar Manufacturers please see [www.crsi.org](http://www.crsi.org).

### What specifications cover ECR?

- ECR is covered in ASTM A775 Standard Specification for Epoxy-Coated Steel Reinforcing Bars.
- Fabrication and handling of ECR is covered in ASTM D3963 Standard Specification for Fabrication.
- Jobsite Handling of Epoxy-Coated Steel Reinforcing Bars. Jobsite handling is also covered in the Appendix of ASTM A775.

### What precautions should I take in using ECR?

- Follow required design requirements for ECR, as outlined in ACI 318.
- Purchase from a CRSI certified manufacturer.
- Consider use of a CRSI certified fabricator.
- Use the ECR in both top and bottom mats of decks.
- Minimize damage during transport, handling and placement.
- Repair damage using 2-part epoxy coating, approved by bar supplier.
- Use plastic headed concrete vibrators during concrete placement.

Concrete Reinforcing  
Steel Institute

### What design issues should be considered if I specify epoxy-coated bars rather than black reinforcement?

- The development length for epoxy-coated bars is longer.
- Maintain concrete cover.

### How is ECR manufactured?

- ECR is manufactured by preparing black reinforcing steel using abrasive grit to remove mill scale and contaminants and to provide a rough profile.
- The bar is then heated to approximately 450° F and passed through a powder spray booth where electrically charged epoxy particles are attracted to the steel.
- The coating then undergoes a cross-linking process to form a uniform barrier over the steel.

### Is ECR environmentally friendly?

- Yes.
- ECR is manufactured using reinforcing bars that are made using almost 100% recycled steel. ECR can also be recycled after use.
- ECR produces no VOC's during manufacture or use.
- Structures with ECR are more durable than those that do not.





### How much does ECR Cost?

- In 1998 the cost of three bridges containing ECR were considered. The increase in total cost was between 0.49 to 2.16% for the total structure compared with structures made using uncoated bars.
- Generally 25 - 50 percent more than uncoated bars.

### When did the CRSI ECR certification commence?

- 1991



### What changes have been observed in certified plants?

- Epoxy thickness variability decreased by 23 percent.
- Backside contamination was reduced from 40 – 50% to 15%.
- Chloride contamination is measured and reduced.

### How does ECR compare with galvanized rebar?

- According to the National Bridge Inventory, ECR has been used in over 60,000 decks whereas galvanized has been used in only 950.
- ECR is readily available from certified plants, galvanized rebar is not.
- ECR has outperformed galvanizing in almost every ECR laboratory corrosion test.
- Galvanized coating quality depends on the steel quality, ECR does not.
- Galvanizing may result in brittle bars that break during bending. ECR does not have these embrittlement issues.

### How does ECR compare with stainless steel rebar?

- Stainless steel bars are up to five times the cost of black bars and may increase the total structural cost by 10% or more.
- Funding is often not available for use of these products.
- Stainless steel bars use materials from hard rock mining operations, whereas ECR uses scrap steel.
- Not all stainless steels have demonstrated good corrosion performance in concrete as it depends on the grade of stainless.
- Care must be taken to ensure that stainless bars are not contaminated with black bar.

### How does ECR compare with new steels, such as MMFX?

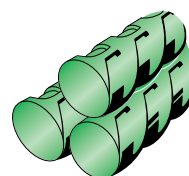
- ECR has demonstrated long-term field performance.
- ECR has outperformed MMFX in almost every lab test.

### How does ECR compare with Fiber Reinforced Polymer (FRP) bars?

- FRP bars require extensive redesign due to differences in stress/strain values for these bars.

### What are some recent prominent projects that have used ECR?

- Runway 10-28 at Hartsfield-Jackson Atlanta International Airport (2033 ton; 2006)
- I-35 bridge in Minneapolis (5000 ton; 2008)
- Woodrow Wilson Bridge (11000 ton; 2000)
- Capital Visitors Center, D.C. (4600 ton; 2006)
- I-290/IL-53 Reconstruction (6000 ton; 2003)
- National World War II Memorial (1400 ton; 2004)
- Creve Coeur Memorial Bridge, St. Louis MO (11300 ton; 2003)
- Cape Fear River, Wilmington (10,000 ton; 2004)
- San Mateo Bridge California (13500 ton; 2004)
- Utah I-15 (61000 ton; 2002)
- Boston Tunnel Project (176000 ton; 2006)
- Mayo Clinic parking garage MN



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