

# FAQS\*

## CORRODED REINFORCING STEEL

*Reported by ACI Committee 364, Rehabilitation. FAQs and responses have passed through ACI's full consensus process, including review by the TAC Repair and Rehabilitation Committee, which oversees and coordinates issues related to repair and rehabilitation for the Institute.*

### FREQUENTLY ASKED QUESTION:

When corroded reinforcing steel is encountered in a repair, should the bar be undercut? How far should the bar be exposed along its length?

### SIGNIFICANCE:

The performance of a repair depends significantly on the preparation of concrete in the vicinity of the bar.

### ANSWER:

If corroded reinforcement in the repair is exposed and found to have loose oxidation products or is not bonded to the surrounding concrete, it is recommended that the concrete be removed from around the bar (Fig. 1). The clear space behind the reinforcing steel should be not less than 1/4 in. (6 mm) plus the dimension of the maximum size aggregate in the repair material, as shown in Fig. 2.<sup>1,2</sup>

The chloride ion concentration and the depth of carbonation in the existing concrete should be determined. When a portion(s) of the electrically continuous reinforcing bar is exposed to a chloride-free repair material and the rest of the bar remains in contact with chloride-contaminated and/or carbonated concrete, corrosion in areas adjacent to the repair may be accelerated. This condition is often referred to as the "ring effect" or "halo effect."

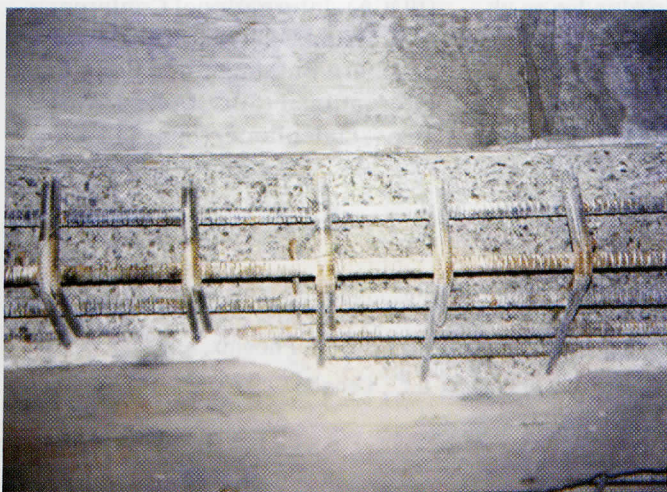


Fig. 1: Typical concrete removal around reinforcing bar

The decision to undercut the reinforcing bar should be made based on the chloride ion concentration in the surrounding concrete. There is a high risk of continuing corrosion where the acid-soluble chloride content by weight of cement exceeds 1% (ASTM C 114). Significant contamination may require the removal of existing concrete surrounding the bar. Such a removal will avoid creating an environment where part of the circumference is depassivated and another part is passive, which may lead to accelerated corrosion.

Concrete removal along the reinforcing bar shall continue until the bar is essentially free from corrosion products. The size of the repair shall be based on both technical and economic considerations. In some cases of advanced corrosion, it may be appropriate to replace the affected reinforcement and concrete along the entire length of the member.

### References

1. International Concrete Repair Institute, "Guide for Surface Preparation for the Repair of Deteriorated Concrete Resulting from Reinforcing Steel Corrosion (ICRI 03730)," 1995.
2. ACI Committee 546, "Concrete Repair Guide (ACI 546R-96 (Reapproved 2001)), American Concrete Institute, Farmington Hills, Mich., 2001, 41 pp.

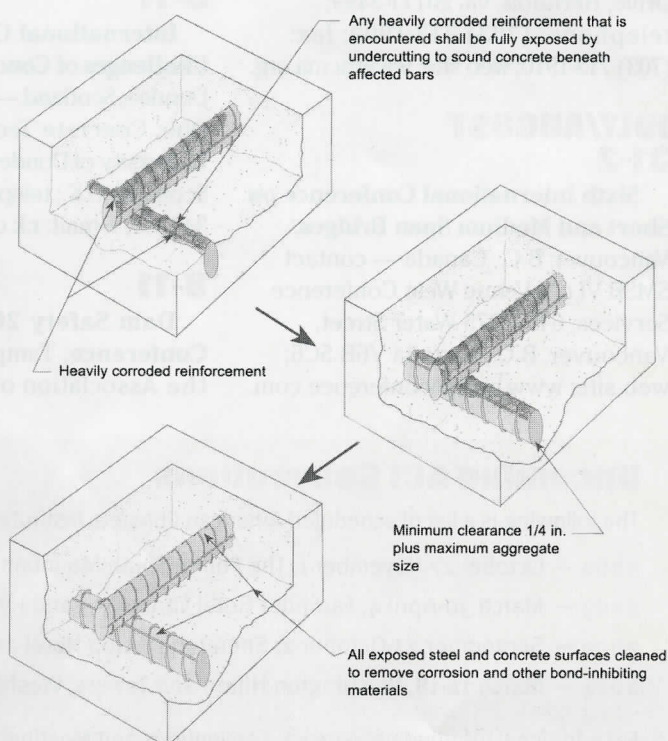


Fig. 2: Removal of concrete from around reinforcing bar (adapted from ICRI 03730)