Locating rebar corrosion in concrete walls by potential measurements

Locating Rebar Corrosion in Concrete Walls by Potential Measurements

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Summary

To localize corroding reinforcement in concrete buildings visual or sonic tests are not sufficient, because beginning corrosion cannot be recognized by these methods. By that means it is very likely that some areas starting to corrode will be missed - after a realized repair later damages may result. Therefore it is more useful to determine corrosion areas by electrochemical potential measurements.

Some application limits of the method of potential measurement have been examined. A special equipment has been developed to assess corrosion zones on the surfaces of concrete buildings.

1. Application Limits of Potential Measurements on Concrete Walls

The well-known method of potential mapping of bridges (fig. 1) is not transferable to concrete walls of buildings without problems, because the temperature and moisture of concrete walls is changing in a wide range, the concrete covering differs widely, concrete walls usually are surface finished by coatings or tiles, and often components of galvanized steel are used in concrete walls. Therefore the influences of the following parameters on the potential measurements have been examined:

- temperature and moisture of the concrete,
- thickness of the concrete covering,
- concrete surfaces with or without paints or coatings (fig. 2 and 3),
- components of zinc galvanized steel in concrete.

It could be shown that potential measurements do not depend on the temperature of the concrete but they were only possible between 30 and 90 % relative humidity of the surrounding atmosphere. Thick concrete coverings make it difficult to find small corrosion areas; fair-faced concrete walls coated e.g. with a thin acrylic paint are no problem (fig. 2), but on concrete surfaces with exposed aggregates by washing it is difficult to contact the cement grout (fig. 3). The interpretation of potential measurements in concrete walls with components of zinc galvanized steel is very difficult or impossible.

2. Measuring Equipment and Practical in-situ Tests

Coming from one half cell (cp. fig. 1) a more practical measuring equipment was developed: 6 CSE half cells were assembled in a frame, this enabled only one person to handle the equipment (fig. 4).

3. Conclusions

The reliability of the potential measurement method could be confirmed successfully by practical use on concrete walls.

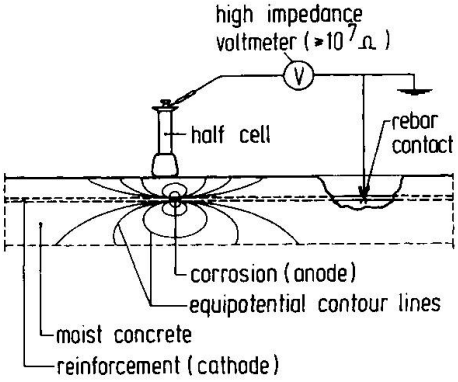

Fig. 1 Scheme for potential measurements with a half cell on the surface of a reinforced concrete member

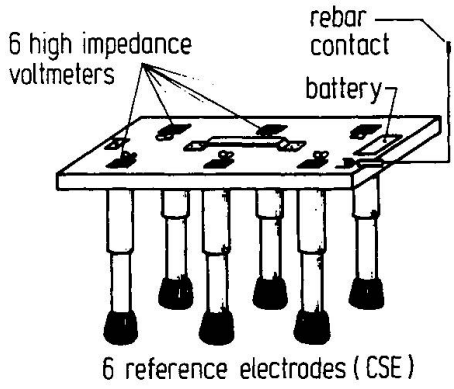

Fig. 4 View of the developed frame with 6 CSE half cells

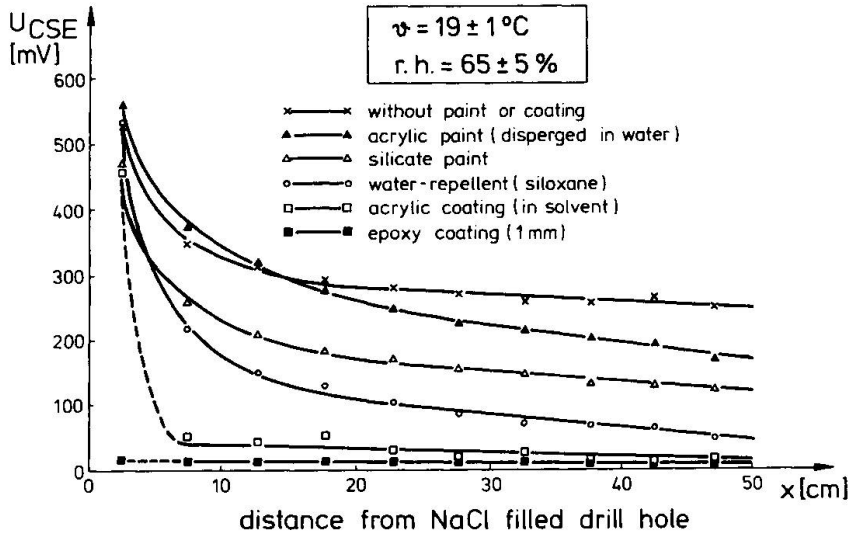

Fig. 2 Dependence of the potential U_{CSE} on the distance x to the NaCl filled drill hole for different paints or coatings on the concrete surface

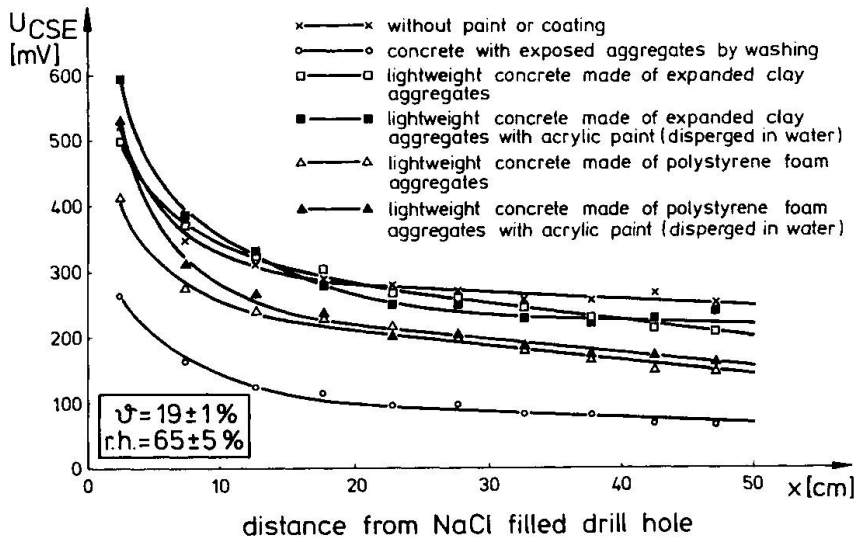

Fig. 3 Dependence of the potential U_{CSE} on the distance x to the NaCl filled drill hole for different lightweight concretes with or without thin acrylic paint