

ELECTRICAL CONTINUITY

CTI TECHNICAL NOTE C3

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BACKGROUND

This Technical Note describes CTI's procedure for testing electrical continuity of reinforcing steel for concrete elements intended to have cathodic protection applied to them.

This procedure utilises DC reverse polarity resistance measurements and is based on AS 2832.5-2002, *Cathodic Protection of metals – Part 5: Steel in concrete structures*, Clause 4.2, Electrical Continuity.

PROCEDURE FOR VERIFYING ELECTRICAL CONTINUITY OF REINFORCING STEEL

EQUIPMENT

A quality multimeter with a high input impedance of 10 M Ω or more (Fluke 12).

Test leads with probes or suitable alligator clips; one lead is suggested to be least 5 metres in length.

PROCEDURE

Select the two items of, or locations on the steel to be tested for continuity, separated by not more than the length of available leads. Prepare a test point on each item by exposing bright metal (using a grinder, rasp or other mechanical means).

Turn on the multimeter, set it to DC resistance and select a scale appropriate for reading resistance to an accuracy of 1 Ω (or 0.001 M Ω). Connect both leads to the multimeter.

Connect one probe to one piece of steel, and connect or firmly hold the other probe against the second steel item.

If the resistance is high, check that the probe connections are good by rubbing them firmly against the metal.

Read the DC resistance directly of the scale. Record the DC resistance in Ohms (Ω). Then disconnect the probes, reconnect to the steel with the probes interchanged (ie reverse the polarity) and retest. Again record the DC resistance in Ohms (Ω).

ACCEPTANCE CRITERIA

According to AS 2832.5, if the resistance measured in both directions is stable and is less than 2 Ω , then the two items of steel being tested are considered to be electrically continuous.

TEST REGIMES

VERIFYING RE-BAR CONNECTION PROCEDURES

This procedure may be used as a verifying procedures rebar connections using either welding or tie-wire techniques. Simply make a sample connection using the intended procedure, and check the continuity as described above. If the DC resistance is stable and less than 2 Ω in both directions, the procedure is appropriate for use with Cathodic Protection, and may be specified or implemented for the project.

QUALITY CONTROL OF STEEL CONNECTIONS

This procedure may be used as a QA check on actual re-bar connections prior to placing concrete. Carry out checks across the entire reinforcing mat or cage, using a step-wise leap-frog technique so that any one set of points checked includes one point from a previous reading. In this manner the entire mat or cage can be verified as being electrically continuous.

VERIFYING BONDING OF SPECIFIED ITEMS

This procedure may be used to confirm that electrical bonding has been achieved between metal items specified as requiring bonding. Select test points at least 100 mm behind welded or bolted connections.

VERIFYING ISOLATION OF METAL ITEMS

This procedure may be used to confirm that anodes are electrically isolated from anodes, and from earthing systems if this is required by the specification.

VERIFYING RE-BAR CONTINUITY IN EXISTING CONCRETE STRUCTURES

This procedure may be used to check the electrical continuity between exposed reinforcing steel in existing structures, as part of the condition assessment or as part of a survey the CP design. Test incidentally exposed items, or use a covermeter to detect the location of reinforcing steel in typical locations, expose the steel by coring through the cover-concrete, and perform the test as described above.

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