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Effect of corrosion of lap-spliced steel reinforcement on the flexural strength of reinforced concrete beams

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ABSTRACT

The study aimed to investigate the effect of corrosion on the flexural strength of reinforced concrete (RC) beams with steel lap-splicing in the central constant moment region. A total of 24 RC 100 × 165 × 1500 mm beams were cast each for SANS10100-1 and Eurocode 2. Out of the 24 RC beams, 12 RC beams were cast for each design code (6 with lap-splicing and 6 without spliced flexural reinforcement). Accelerated chloride-induced corrosion was used to induce steel corrosion in the in the central constant moment region. Only 6 RC beams were corroded for each design code, the remaining 6 were used for reference purposes.

All beams were tested for ultimate strength using a 4-point bending configuration. The applied load, mid-span deflection and mode of failure were recorded until failure load was reached. The results showed an increase in deflection and a decrease in ultimate strength in the corrosion-damaged specimens. The failure mode of non-lapped beams remained ductile, while on lap-spliced beams the failure mode changed from ductile to brittle. The corroded bars were physically measured using a Vernier Caliper for the determination of corrosion degree.