

Use of surface treatment materials to improve concrete durability

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Abstract: The effectiveness of concrete surface treatment materials such as silanes, siloxanes, etc., in preventing concrete deterioration due to sulfate attack, carbonation, and chloride-induced reinforcement corrosion was investigated. The effectiveness of these materials in decreasing the sulfate attack was evaluated by measuring the reduction in compressive strength. The chloride diffusion in the coated and uncoated concrete specimens was also evaluated. The performance of these materials in reducing carbonation was studied by exposing the coated and uncoated concrete specimens to a saturated carbon dioxide environment. The reduction in compressive strength due to sulfate attack in the concrete specimens coated with silane/siloxane in conjunction with an acrylic topcoat was very low compared with that in the uncoated concrete specimens and those coated with other surface treatment materials. The chloride diffusion was also least in the concrete specimens coated with silane/siloxane followed by a topcoat. Among all the surface treatment materials tested, silane/siloxane with an acrylic topcoat and two-component acrylic coating were most effective in preventing carbonation of concrete. Furthermore, silane and silane/siloxane with a topcoat were effective in reducing chloride-induced reinforcement corrosion in in-service structures.