PROMPT ATTENTION TO SPALLED JOINTS VITAL TO PREVENT COSTLY REPAIRS

By Jan De Beer

PRESS RELEASE

Spalling joints in concrete floors should be considered an early warning of more potential severe long-term damage. The size and cost of spalling repairs can be reduced if the damage is detected and repaired early, says Bryan Perrie, CEO of Cement & Concrete SA (CCSA).

Perrie says spalling of joints is the cracking, breaking or chipping near joints, usually within 100mm of the joint. “A spall usually does not extend vertically through the slab but extends to intersect the joint at an angle,” he explains.

Spalling at joints usually results from:

- Excessive stress at the joint, caused by the accumulation of incompressible material in the joint and subsequent expansion of adjoining slabs in concrete pavements;
- Weak concrete at the joint;
- Poorly designed or constructed load-transfer devices or failure of such devices; and
- Poorly constructed joints.

“Early repair of spalling is needed to improve serviceability, deter further deterioration and provide proper edges so that the joints can be resealed effectively,” Perrie advises. “Before any repairs are carried out, it should be determined if the spalling is due to a loss of load transfer at the joints.”

Suppose there is adequate load transfer at the joints. In that case, all areas of delamination should be determined using a “sounding technique” by striking the existing concrete surface with a steel rod or tapping lightly with a hammer. “A sharp metallic ring will indicate undamaged concrete, while a dull or hollow sound will indicate delaminated areas,” Perrie explains.

“The area around the perimeter of the patch area should be sawn down with a concrete saw to a minimum depth of 35mm to provide a vertical face at the patch edges and sufficient depth to give integrity to the patch. Additional cuts in the joint to a depth of 25mm below the bottom of the patch, and extending at least 75mm laterally beyond each end of the prepared patch boundaries, should then be sawn.”

Perrie says the concrete inside the patch area should be at least 35mm deep with a hammer and sharp cold chisel or lightweight pneumatic tool until sound and clean concrete is exposed, and the patch area is uniform in thickness. “It is important that tools of the appropriate size are used. For example, using a pneumatic hammer - too large - will cause damage and fracture the concrete below. Under no circumstances should heavy jackhammering be used,” Perrie cautions.

When all partially loose concrete has been removed, a bond-breaking compressible joint filler (such as expanded polystyrene foam) should be inserted into the existing joint against the existing slab to fill the saw cut.
“Then a wet-to-dry epoxy resin should be applied as a bonding agent to the entire area, including patch sides. In larger patches, consideration should be given to the use of mechanical anchors as well.”

The hole should then be patched with concrete designed by an approved concrete testing laboratory to suit the aggregates available and the desired time of opening to traffic.
“The minimum compressive strengths are 30 MPa for vehicles with pneumatic tyres and 40 MPa for cars with solid tyres. The recommended minimum strengths should be achieved with a cement content not exceeding 500 kg/m3. In addition, a water reducer may be used. The preferred stone size is 9.5mm, or about a quarter of the patch thickness.

“Where circumstances do not permit a designed concrete mix, trial mix proportions may be used. The correct proportions will permit opening to traffic with pneumatic tyres after three days and to traffic with solid tyres after four days, provided the joints can be sawn and sealed within this time. Advice regarding sealant installation should be obtained from the supplier of the sealant. Small poker vibrators with a maximum diameter of 25mm should be used for compaction, and the repair area should be slightly over-filled to compensate for compaction.”

Perrie says the recommended finishing procedure is to screed from the centre of the patch to the patch boundaries to promote good bonding with vertical concrete faces. “Curing should follow immediately by covering the patch with polyethylene sheeting sealed at the edges and maintained in place until removal of the polystyrene filler.”
He concludes: “When it comes to successfully repairing spalled joints, important aspects include the need for clean and dry joint interfaces before sealing; priming of joint sides for liquid sealants; providing the proper joint shape factor for liquid sealants; using a bond-breaking cord of closed-cell expanded polyethylene foam, and a bond breaker for liquid sealants. The undersealing joints - usually 3 to 5mm – is also important.”

For further information, visit www.cemcon-sa.org.za.

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