

TECVAC, Inc.

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# Technical Report

# TecSeal<sup>tm</sup> Leak Repair

# Method

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Ronald Reagan National Airport

Washington, DC

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TecSeal<sup>tm</sup> Technical Report

## Repairs To Leaking Fractures At Reagan National Airport

### Background

A pedestrian tunnel linking a parking structure with the main terminal facility at Ronald Reagan Washington National Airport is scheduled for completion in the Fall of 1998. Shortly after the parking structure was completed in 1991, several hundred linear feet of cracks developed in the 30" thick concrete floor of the future tunnel link constructed 25-30 feet below grade. Wall cracks also developed, but the major source of intrusion was generated from the floor. For some time after each rainfall, these cracks allowed the natural high water table to flow up through the floor and into the areaway. Now nearing completion linking, the floors are to receive a terrazzo finish and the leaks were required to be repaired by the general contractor.

Lane Construction Corporation, the general contractor completing the work, and URS Griner sought a long term solution and a five year guarantee was specified. After several weeks of soliciting contractors to perform the repairs, Lane found none, save TECVAC, Inc., who were willing to perform the repairs and provide the guarantee required by the contract.

## Execution

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The TecSeal™ Process of leak repair employs negative pressure upon the fracture zone. Examination of the cracks within the tunnel posed two problems: a. the cracks were very fine and ranged from 0.005in to 0.010in in width and, b. the thickness of the slab, some 30", was complicated with grade beams and expansion joints. The fractures were notably fouled with efflorescence deposits resulting from the long term leaking.

The efflorescence was removed by abrasive blasting and the mouths of the fractures were opened in the process. Surface mounted ports were installed along the crack line and the entire length and offshoots of the singular fracture was sealed. The ability of the fracture to accept resin was then tested by applying negative demand on the enclosed fissure. Each port along the length was tested for evidence of the demand and identified. While maintaining the negative demand, water-thin vinyl ester repair resin was introduced into the tightly sealed system.

Only minimal lengths of the wall cracks required drilling access holes. Because of flow and configuration, holes were drilled at 45° angles to intersect the fracture at 5"-6" depth. Ports were installed into the drilled holes and spaced along the length the crack. The entire length of the crack was then sealed. By applying negative demand to the enclosed system the repair resin was introduced deep into the fissure and the flow was arrested.

## Outcome

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Upon completion of the tunnel, the pumps used to facilitate the construction, were disconnected and removed. The cracks treated with the TecSeal™ Process are completely dry and there is no evidence of water intrusion.

## Conclusion

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The TecSeal™ Permeation Leak Repair Process has been successfully applied to the leaking cracks in the floors and walls of the Pedestrian Tunnel at Ronald Reagan Washington National Airport. With the exception of a few lineal feet, the entire task was completed without the necessity of drilling. By applying negative demand, the TecSeal™ Process intakes repair resin deep into fracture zones and can eliminate unsightly member destruction by drilling.

This proprietary method of delivering repair materials into leaking cracks has a number of advantages over conventional pressure methods. Conventional pressure injection of resins are poorly suited to deliver materials into fine cracks. Attempts to do so by increasing delivery pressure often damages the member and exacerbates the problem. Interconnected fractures are pressure locked and receive little resin and internal shears can separate large areas of

delamination with dangerous consequences. Rather than fight the flow, TecSeal™ entices the resin along and into the finest of hairline cracks and interconnecting cracks.

The vinyl ester repair resin used for the TecSeal™ Process contributes substantially to the success of the repair and has a number of advantages over polyurethanes typically used for this sort of work. Low viscosity (1cps) and low flow resistance, vinyl ester penetrates into the narrowest cracks and capillaries to seal reliably and permanently. Because the resin does not chemically react with water, there is no foam layer or resulting reduction of adhesion that accompanies polyurethane. Most importantly is the ability of the vinyl ester to self-heal after dry periods. Unlike polyurethanes, the cured gel will re-swell when contacted with water and reestablish equilibrium.

The TecSeal™ Permeation Leak Repair Process can be used in any instance where it is required to stop leaking or seeping water flow. The process can be performed at temperatures as low as +40°F. and will maintain a strong resistance against permanent water pressure.