

Concrete Technology in Focus

4x4™ Concrete System

Repair for Airport Pavement

Introduction

As transportation requirements in North America continue to grow, there is an ever-increasing demand placed on the highway and airport infrastructure systems. Concrete pavements, for example, carry larger volumes of automobile and aircraft traffic than originally intended and are wearing out. Many pavements have already outlived their useful service lives and are scheduled for repair or replacement.



Challenge

Fixing and returning these pavements to service quickly is a real challenge for engineers, producers, and contractors who are attempting to meet the demands of the public for minimal disruption to their traveling experience.

Solution

An innovative, patented, high-early strength concrete known as the 4x4 Concrete system has been developed for fast-track replacement of deteriorated pavement panels to permit early opening of highways and airport pavements. The 4x4 Concrete system achieves 400 psi (2.8MPa) flexural strength within 4 hours after placement and 600 psi (4.1MPa), the minimum ultimate flexural strength established by the FAA for airport pavements, shortly thereafter.

The 4x4 Concrete system is produced using locally available portland cement and aggregates and uses a unique combination of BASF's Master Builders Solutions brand MasterGlenium®, MasterSet® DELVO and MasterSet® admixtures, permitting workability, rheology control, and strength performance for economical repairs.

4x4™ Concrete System

4x4 Concrete System for Repair of Airport Pavements

Features

- Uses DOT approved admixtures and locally available cement and aggregates
- Mixed and delivered in ready-mix concrete trucks
- Meets FAA P-501 Specification requirements for airport concrete pavements
- Easy to place and finish
- Attains high-early strength quickly
- Resistant to aviation fuel and deicing fluids
- Resistant to abrasion and freezing and thawing cycles

Benefits

- Minimizes pavement repair logistics
- Alternative to fast-setting cement concrete
- Minimizes closure time and traffic disruption
- Lowers in-place cost
- Durable – increased service life
- Less expensive than proprietary fast-setting cement concrete

FAA Acceptance Criteria Item P-501 Portland Cement Concrete Pavement Description

Relevant Sections for the 4x4 Concrete System

Item	Criteria	4x4 Concrete Compliance
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Materials

Item	Criteria	4x4 Concrete Compliance
Cement	ASTM C 150 – Type I, II, or III	Meets
Fly Ash	ASTM C 618 – Class C or F	Meets
Fine Aggregate	ASTM C 33	Meets
Coarse Aggregate	ASTM C 33	Meets
Water	Potable	Meets

Admixtures

Item	Criteria	4x4 Concrete Compliance
Air-Entraining	ASTM C 260/C 494M	Meets
MasterGlenium® or MasterPolyheed®	ASTM C 494/C 494M – Type A or F	Meets
MasterSet® DELVO	ASTM C 494/C 494M – Type B	Meets
MasterSet® AC 534 or MasterLife® CI 30	ASTM C 494/C 494M – Type C	Meets

Item	Criteria	4x4 Concrete Compliance
Concrete		
Cement Content	500 lb/yd ³ (297 kg/m ³) minimum	Meets 750-850 lb/yd ³ (445-505 kg/m ³)
w/cm	0.50 maximum	Meets < 0.36 required
Slump		
Side Form	ASTM C 143:1 – 2 in. (25 – 50 mm)	Requires specification modification to allow 8 in. (200 mm) slump or greater
Admixture Batching Sequence	Manufacturers recommendations	Meets
Mixing	ASTM C 94	Meets
Flexural Strength	ASTM C 78: • 550 psi (3.8 MPa) minimum to open pavement to traffic • 600 psi (4.1 MPa) minimum ultimate strength	Meets
Compressive Strength (alternative)	ASTM C 39: • 3,500 psi (24.1 MPa) minimum	Meets
Side-Form Construction	Place concrete on moistened subgrade	Modify specification to allow slip sheet on subgrade

More Information

The Master Builders Solutions brand brings all of BASF's expertise together to create chemical solutions for new construction, maintenance, repair and renovation of structures. Master Builders Solutions is built on the experience gained from more than a century in the construction industry.

The know-how and experience of a global community of BASF construction experts form the core of Master Builders Solutions. We combine the right elements from our portfolio to solve your specific construction challenges. We collaborate across areas of expertise and regions and draw on the experience gained from countless construction projects worldwide. We leverage global BASF technologies, as well as our in-depth knowledge of local building needs, to develop innovations that help make you more successful and drive sustainable construction.

The comprehensive portfolio under the Master Builders Solutions brand encompasses concrete admixtures, cement additives, chemical solutions for underground construction, waterproofing solutions, sealants, concrete repair & protection solutions, performance grouts, performance flooring solutions.

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*Effective January 1, 2014, the names of BASF's Master Builders Solutions brand products have changed:
Glenium became MasterGlenium
Delvo became MasterSet DELVO
Pozzolith NC 534 became MasterSet NC 534
PolyHeed became MasterPolyHeed
Rhecrete CNI became MasterLife CI 30



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