

Concrete Technology in Focus

Pervious Concrete

Introduction

Also known as porous, no-fines or permeable concrete, pervious concrete is one of the fastest growing applications in the ready-mixed concrete industry. Pervious concrete has the unique ability to allow water to flow through easily, which results in concrete pavements that have no runoff from stormwater or snowmelt.

This Concrete Technology in Focus has been developed to provide an overview of the unique solution developed by Master Builders Solutions specifically for achieving maximum performance of pervious concrete.



Definition

ACI 522R defines pervious concrete as “a zero-slump, open-graded material consisting of portland cement, coarse aggregate, little or no fine aggregates, admixtures, and water. The combination of these ingredients will produce a hardened material with connected pores ranging in size from 0.08 to 0.32 in. (2 to 8 mm), that allow water to pass through easily.”

“The void content can range from 18 to 35%, with typical compressive strengths of 400 to 4000 psi (2.8 to 28 MPa). The drainage rate of pervious concrete pavement will vary

with aggregate size and density of the mixture, but will generally fall into the range of 2 to 18 gal/min/ft² (81 to 730 L/min/m²).”

Applications

Though it may be new in some areas of the country, pervious concrete has been installed since the 1970's in certain parts of the U.S. as an alternative to complex drainage systems and water retention areas.

Typical uses and applications include:

- Parking lots
- Streets, road shoulders
- Bridge embankments
- Edge drains
- Driveways, sidewalks
- Patios, tennis courts
- Swimming pool decks
- Golf cart paths
- Greenhouse floors
- Zoo areas, animal barns

Pervious Concrete Advantage

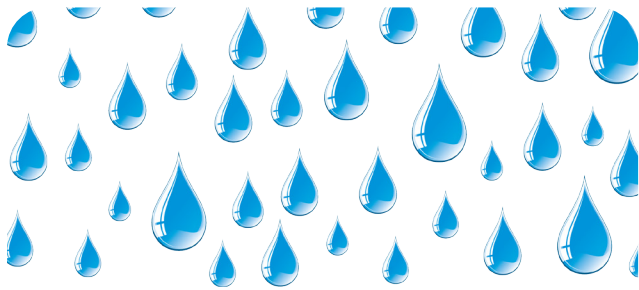
New federally mandated regulations have made pervious concrete a viable solution for stormwater management. The EPA recognizes pervious concrete as a Best Management Practice (BMP) to help engineers design procedures for treating polluted stormwater. Building owners are realizing better land utilization and LEED credits with pervious concrete parking lots.

Design, Placement and Performance

Pervious concrete must be placed on a well compacted permeable subbase. As water passes through the system, the pervious concrete, subbase, and soil act as a natural filter removing unwanted materials such as oil, grease and other harmful pollutants.

Pervious concrete pavements can be placed using either fixed form set ups or slip-form pavers. With fixed forms, there is typically a riser strip at the top of each form so that the strike off is actually above the final pavement height. Strike off is by vibratory or manual screed and then the riser strips are removed and the pavement is manually compacted with a hand roller. Slip-form paver applications only require one pass.

After jointing pervious concrete, curing is essential. The pervious concrete pavement must be covered with plastic sheeting within 20 minutes from the time the material is discharged from the truck, and allowed to cure for a minimum of 7 days.



Pervious Concrete – Typical Low Slump Mix Challenges

- Difficulty getting the material out of the truck
- Requires addition of water at the jobsite resulting in inconsistent mix quality
- Accelerated setting time, stiffening
- Short workability window
- Difficult mix to place



Master Builders Solutions System for Pervious Concrete

Through laboratory and field experience, Master Builders Solutions has identified a system of admixtures that helps ready-mixed concrete producers and concrete contractors overcome placement challenges.



How can the Master Builders Solutions System help?

- Allows mix to easily discharge from truck
- No need to add water on site (user-friendly)
- Increases workability time
- Improves flow for ease of placement
- Increases compressive strength
- Inhibits paste drain down



Admixture System Components

MasterPolyheed® Mid-Range Water-Reducing Admixtures (MRWRs)

MasterSet® DELVO Hydration-Controlling Admixture (HCA)

MasterMatrix® Viscosity-Modifying Admixtures (VMAs)

MasterMatrix® 33 Rheology-Controlling Admixture (RCA)



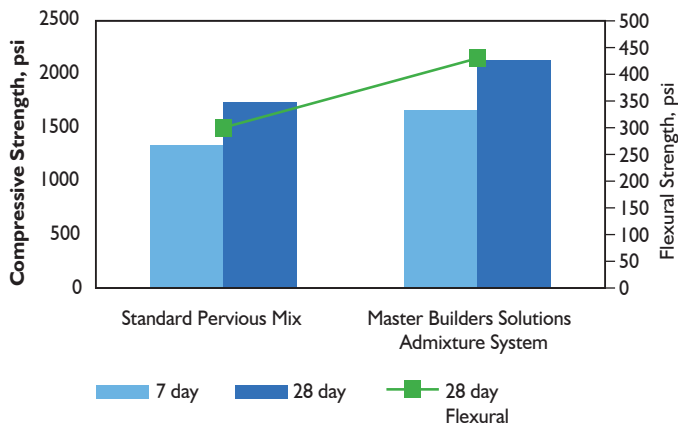
Admixture System Value Proposition

MasterPolyheed admixtures: These polycarboxylate-based MRWRs provide excellent water reduction and superior cement dispersion and hydration resulting in maximum strength performance. Strength is sometimes a challenge because pervious concrete has a high void content which negatively affects strength. MasterPolyheed admixtures also provide excellent response to vibration of low slump concrete enhancing and facilitating placement.

MasterSet DELVO admixture: Pervious concrete has a low water content and the cement tends to hydrate quickly, resulting in fast concrete setting time and a short workability window. MasterSet DELVO admixture is used to slow down the rate of cement hydration and extend the mix workability window which allows for easier and faster concrete placement. The use of MasterSet DELVO admixture in pervious concrete eliminates the need for jobsite retempering with water.

MasterMatrix VMA admixtures and MasterMatrix 33 admixture: Since pervious concrete is a harsh mix, these VMAs add body and MasterMatrix 33 rheology-controlling admixture helps lubricate low slump mixes. The result is better mix flow and faster discharge time from the truck, easier placement and compaction. In addition, the use of MasterMatrix VMA admixtures is an insurance policy to help prevent paste drain down and significantly increase compressive and flexural strength in low compaction pervious concrete mixes.

The combination of these products has significantly improved the mixing and handling of pervious concrete. For more information on suggested dosages for pervious concrete applications, contact your local sales representative.



About Master Builders Solutions

Master Builders Solutions is a leading global manufacturer of concrete admixtures, as well as other sustainable solutions for the construction industry, focussed on delivering its vision: **Inspiring people to build better**. Master Builders Solutions provides value-added technology and market-leading R&D capabilities to improve the performance

of construction materials and to enable the reduction of CO2 emissions in the production of concrete. Founded in 1909, Master Builders Solutions has ca. 1600 employees operating 35 production sites globally, supporting their customers in mastering their building challenges of today – for a decarbonised future.

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