POROUS CONCRETE MATERIAL

POROUS CONCRETE IS A CEMENTITIOUS MATERIAL ENGINEERED WITH AN INTERCONNECTED VOID STRUCTURE THAT ALLOWS WATER TO PASS VERTICALLY THROUGH THE MATERIAL WHILE MAINTAINING STRUCTURAL CAPACITY. THE MATERIAL IS SUITABLE FOR MANUFACTURING A RANGE OF PRECAST OR CAST-IN-PLACE PRODUCTS, INCLUDING PAVERS, PANELS, SLABS, AND OTHER FORMED ELEMENTS INTENDED FOR STORMWATER AND DRAINAGE-RELATED APPLICATIONS.

KEY CHARACTERISTICS
- INTERCONNECTED PORE NETWORK.
- STRUCTURAL CEMENTITIOUS MATRIX.
- HYDRAULIC FUNCTIONALITY COMBINED WITH LOAD-BEARING CAPACITY.

MATERIAL COMPOSITION
- PORTLAND CEMENT-BASED BINDER SYSTEM.
- COARSE AND FINE AGGREGATE MATRIX.
- PROPRIETARY POROUS HYDRATE ADMIXTURE TECHNOLOGY.
- SPECIFIC MIX DESIGNS FOR PRODUCT GEOMETRY AND PERFORMANCE REQUIREMENTS.

PHYSICAL PROPERTIES

TYPICAL PHYSICAL CHARACTERISTICS TESTED USING ASTM C642:

PROPERTY	TYPICAL CONVENTIONAL CONCRETE[1]	AQUIPOR POROUS CONCRETE[2]
BULK DENSITY, DRY (Mg/m^3)	2.30-2.40	2.23
BULK DENSITY, SSD (g/cm^3)	2.35-2.45	2.41
BULK DENSITY, SSD + BOIL (g/cm^3)	2.35-2.45	2.42
APPARENT DENSITY (Mg/m^3)	2.60-2.70	2.75
ABSORPTION AFTER IMMERSION (%)	4.0-6.0	8.70
ABSORPTION AFTER IMMERSION + BOIL (%)	4.5-6.5	8.40
VOLUME OF PERMEABLE PORE SPACE (%)	8-12	18.80
WET UNIT WEIGHT (lb/ft^3)	145-155	151.10

[1] CONVENTIONAL CONCRETE VALUES REPRESENT TYPICAL INDUSTRY RANGES AND ARE PROVIDED FOR GENERAL COMPARISON ONLY.
[2] VALUES SHOWN REPRESENT LABORATORY-TESTED SPECIMENS AND ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT MINIMUM GUARANTEED PROPERTIES. ACTUAL MATERIAL PROPERTIES MAY VARY DEPENDING ON MIX DESIGN, CURING, PLACEMENT, AND ENVIRONMENTAL CONDITIONS.

MECHANICAL PERFORMANCE

DEPENDING ON THE MIX DESIGN, TESTED COMPRESSIVE STRENGTH HAS RANGED FROM 3,500 TO 8,000 PSI (24.1 TO 55.2 Mpa).

- TESTED IN ACCORDANCE WITH ASTM C39.
- CYLINDRICAL SPECIMENS TESTED AT 7, 14, AND 28 DAYS.
- RESULTS DEMONSTRATE COMPRESSIVE STRENGTH SUITABLE FOR MOST STRUCTURAL CONCRETE APPLICATIONS.
- STRENGTH VALUES ARE REPRESENTATIVE OF LABORATORY CONDITIONS AND ARE NOT MINIMUM GUARANTEED VALUES.

HYDRAULIC PERFORMANCE

INFILTRATION CHARACTERISTICS

AQUIPOR TECHNOLOGY HAS DEMONSTRATED THE ABILITY TO TRANSMIT STORMWATER VERTICALLY THROUGH THE MATERIAL UNDER REPEATED LABORATORY AND SIMULATED STORM TESTING. INFILTRATION PERFORMANCE WAS EVALUATED THROUGH A SERIES OF CONTROLLED INFILTRATION TESTS CONDUCTED ON MANUFACTURED UNITS SUBJECT TO MULTIPLE SIMULATED LOADING AND MAINTENANCE CYCLES.

OBSERVED INFILTRATION RATES VARIED OVER THE COURSE OF TESTING DUE TO SURFACE CONDITION, SEDIMENT LOADING, AND MAINTENANCE ACTIVITIES, WHICH IS CONSISTENT WITH THE BEHAVIOR OF PERMEABLE PAVEMENT MATERIALS.

TYPICAL OBSERVED INFILTRATION RATES RANGED FROM APPROXIMATELY 0.3 TO 3.0 IN/HR UNDER CONTROLLED TESTING CONDITIONS.

PERFORMANCE OVER REPEATED LOADING EVENTS

INFILTRATION TESTING WAS CONDUCTED FOLLOWING MULTIPLE SIMULATED STORM EVENTS WITH VARYING SUSPENDED SOLIDS LOADING. RESULTS INDICATE THAT INFILTRATION CAPACITY IS INFLUENCED BY SEDIMENT ACCUMULATION AT THE SURFACE BUT REMAINS FUNCTIONAL OVER REPEATED EVENTS WHEN APPROPRIATE MAINTENANCE IS PERFORMED.

MEASURED INFILTRATION RATES DECREASED FOLLOWING SIMULATED STORM LOADING AND INCREASED FOLLOWING MAINTENANCE ACTIVITIES, DEMONSTRATING THE MATERIAL'S ABILITY TO RECOVER HYDRAULIC PERFORMANCE.

MAINTENANCE RESPONSE AND HYDRAULIC RECOVERY

MAINTENANCE ACTIVITIES, INCLUDING VACUUM-BASED SURFACE CLEANING, WERE EVALUATED AS PART OF THE TESTING PROGRAM. INFILTRATION TESTING CONDUCTED BEFORE AND AFTER MAINTENANCE INDICATES THAT A SIGNIFICANT PORTION OF LOST INFILTRATION CAPACITY CAN BE RESTORED THROUGH ROUTINE MAINTENANCE PRACTICES.

HYDRAULIC VARIABILITY AND SURFACE CONDITION

INFILTRATION PERFORMANCE EXHIBITED VARIABILITY BETWEEN TEST UNITS AND ACROSS TEST CYCLES. THIS VARIABILITY IS ATTRIBUTED TO DIFFERENCES IN SURFACE EXPOSURE, SEDIMENT LOADING, AND LOCALIZED CLOGGING, WHICH ARE INHERENT TO PERMEABLE MATERIALS.

RELATIONSHIP TO MATERIAL VOID STRUCTURE

INTERCONNECTED VOID CONTENT MEASURED VIA ASTM C642 SHOWING INCREASED PERMEABLE PORE SPACE RELATIVE TO CONVENTIONAL CONCRETE AT AROUND 18%.

HYDRAULIC PERFORMANCE IS ENABLED BY THE MATERIAL'S INTERCONNECTED VOID STRUCTURE, AS QUANTIFIED THROUGH PERMEABLE PORE SPACE MEASUREMENTS CONDUCTED IN ACCORDANCE WITH ASTM C642. INCREASED PERMEABLE PORE VOLUME SUPPORTS VERTICAL FLOW THROUGH THE MATERIAL WHILE MAINTAINING STRUCTURAL INTEGRITY OF THE CEMENTITIOUS MATRIX.

LIMITATIONS OF HYDRAULIC PERFORMANCE DATA

HYDRAULIC PERFORMANCE RESULTS PRESENTED HEREIN ARE BASED ON LABORATORY AND SIMULATED TESTING OF MANUFACTURED UNITS UNDER CONTROLLED CONDITIONS. FIELD PERFORMANCE MAY VARY DEPENDING ON INSTALLATION METHODS, ENVIRONMENTAL EXPOSURE, CONTRIBUTING DRAINAGE AREA, SEDIMENT CHARACTERISTICS, AND MAINTENANCE PRACTICES.

HYDRAULIC PERFORMANCE VALUES ARE PROVIDED FOR INFORMATIONAL PURPOSES ONLY AND ARE NOT INTENDED TO REPRESENT MINIMUM GUARANTEED INFILTRATION RATES.

DURABILITY AND MATERIAL REACTIVITY

HEAT OF HYDRATION

HEAT OF HYDRATION EVALUATED USING ISOTHERMAL CALORIMETRY (ASTM C1702), WITH RESULTS INDICATING CONTROLLED HYDRATION BEHAVIOR AT EARLY AGES.

CHEMICALLY BOUND WATER

CHEMICALLY BOUND WATER CONTENT EVALUATED PER (ASTM C1897), WITH RESULTS INDICATING EFFECTIVE CEMENTITIOUS REACTION AND HYDRATION EFFICIENCY.

WATER QUALITY PERFORMANCE

TOTAL SUSPENDED SOLIDS (TSS) REDUCTION

- LABORATORY AND SIMULATED STORM TESTING INDICATE THE MATERIAL'S ABILITY TO REDUCE SUSPENDED SOLIDS, BY 97.2%, IN INFILTRATING WATER.
- LABORATORY AND SIMULATED STORM TESTING INDICATE THE MATERIAL'S ABILITY TO REDUCE 6PPD-Q (TIRE WEAR PARTICLES), BY 81.6%, IN INFILTRATING WATER.
- REMOVAL EFFICIENCY OBSERVED UNDER CONTROLLED TESTING CONDITIONS
- DEMONSTRATED POTENTIAL FOR POLLUTANT REDUCTION UNDER CONTROLLED TESTING CONDITIONS. FIELD PERFORMANCE MAY VARY.

TARGETED POLLUTANT REDUCTION

MATERIAL TESTED FOR REDUCTION OF SELECT ROADWAY-DERIVED POLLUTANTS WITH RESULTS INDICATING MEASURABLE REDUCTION THROUGH INFILTRATION AND FILTRATION MECHANISMS.

INSTALLATION AND HANDLING

- AVOID CONTAMINATION OF PORE STRUCTURE DURING HANDLING AND INSTALLATION.
- PREVENT EXPOSURE TO FINE SOILS, SEDIMENTS, OR CONSTRUCTION DEBRIS PRIOR TO SERVICE.
- FOLLOW PRODUCT-SPECIFIC INSTALLATION GUIDELINES WHERE APPLICABLE.

MAINTENANCE CONSIDERATIONS

- PERIODIC CLEANING RECOMMENDED TO MAINTAIN INFILTRATION PERFORMANCE.
- SURFACE CLOGGING MAY REDUCE HYDRAULIC CONDUCTIVITY IF NOT ADDRESSED.
- MAINTENANCE FREQUENCY DEPENDS ON SITE USE AND ENVIRONMENTAL EXPOSURE.

LIMITATIONS

- PERFORMANCE VALUES ARE BASED ON LABORATORY TESTING AND CONTROLLED CONDITIONS.
- MATERIAL PERFORMANCE IS DEPENDENT ON INSTALLATION, ENVIRONMENT, AND MAINTENANCE.
- NOT INTENDED TO REPLACE PROJECT-SPECIFIC ENGINEERING DESIGN OR SYSTEM-LEVEL ANALYSIS.

AQUIPOR

PRODUCT
AQUIPOR POROUS CONCRETE MATERIAL

TITLE
MATERIAL TECHNICAL SPECIFICATIONS