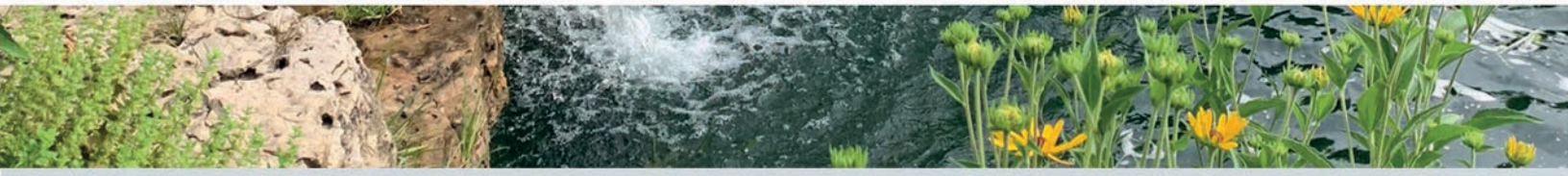
GEOTECHNICAL sealing solutions

AquaBlok®



AquaBlok is a composite bentonite aggregate manufactured by coating conventional gravel with sodium bentonite clay, using a proprietary binder. The result is a unique product that is easy to install, then swells and self-compacts once hydrated to form a waterproof barrier. AquaBlok remains plastic; conforming to complex shapes like pipes, sheet pile walls, water control structures, and other infrastructure. AquaBlok is durable; will withstand freeze-thaw cycles and extensive dryness and will self-heal when re-hydrated. AquaBlok can achieve low permeability (1×10^{-8} cm/sec or lower), forming a seal without the need for mechanical compaction.

AquaBlok has been demonstrated to be effective for hydraulic control in dam and levee projects, cutoff walls, trench dams (anti-seep collars), pond and canal lining/sealing, and infrastructure repairs. Please refer to our online documentation **sealing.aquablok.com/downloads** and **Installation Profiles**.

SEEPAGE CONTROL	POND SEALING	REPAIRS
Dam / Levee Enhancement	Pond Lining, Sealing, Capping / Closure	Wildlife Damage & Repairs
Cutoff Walls / Hydraulic Barriers	Irrigation Channel / Waterway Lining	Structure / Pipe Repair (Inflow & Infiltration)
Trench Dams / Anti-Seep Collars	Wastewater Containment	Synthetic Liner Repair

175 Woodland Avenue | Swanton, OH 43558 | (419) 825-1325 | **aquablok.com**

Where to use AquaBlok

ANTI-SEEP COLLAR | TRENCH DAM

Backfill in pipe or conduit trenches is often difficult to compact, and before long, water will find a flow path along the conduit's outer wall causing erosion. AquaBlok is ideal for use as a trench dam, or anti-seep collar built perpendicular to the flow direction to effectively stop erosive flow. Using AquaBlok can increase the speed of installation, and make for safer installations in trenches.

DAM | LEVEE PROTECTION

Earthen structures such as dams and levees can experience internal erosion and seepage as water ultimately finds a path through voids and poorly compacted soil. AquaBlok is a versatile product to mitigate seepage and repair earthen levees and dams as a low-permeability barrier.

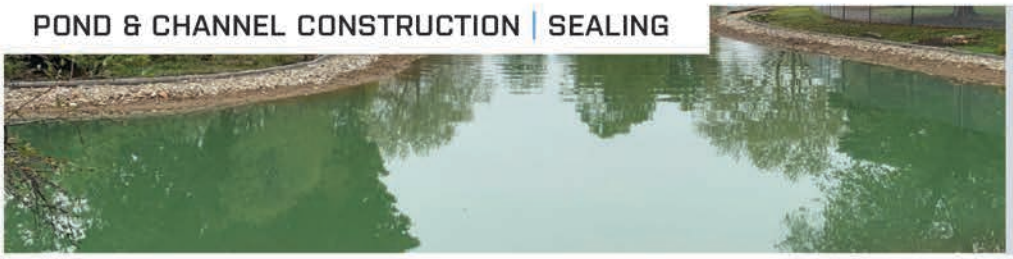
CUTOFF TRENCH | WALL

The unique ability of AquaBlok to achieve low permeability without the need for mechanical compaction makes it ideal for use in cutoff trenches, walls, and barriers. AquaBlok can be a very simple and cost-effective vertically-oriented hydraulic barrier, installed using conventional equipment without continuous installation or a large staging area.

INFRASTRUCTURE REPAIR

Damaged and dilapidated infrastructure threatens communities across the country, with valuable time, money, and even lives at stake. Whether it's a complex drainage system, a sinkhole, pond liner, or a simple animal burrow, AquaBlok is an ideal product to use for long-lasting repairs.

POND & CHANNEL CONSTRUCTION | SEALING



Using AquaBlok over part or all of pond and/or irrigation channel bottoms and slopes can reduce or eliminate water loss through the ground without negatively affecting water chemistry. Since AquaBlok can be installed in submerged applications, using it can minimize disturbance to aquatic life.

BENEFITS:

AquaBlok in Geotechincal Applications

- → Composed of high-quality Wyoming sodium bentonite coated over an aggregate core.
- → Forms a reliable, extremely low permeability seal (10^{-8} to 10^{-9} cm/sec).
- → Highly durable, withstands freeze-thaw cycles, will rehydrate.
- → Provides the structural integrity of a crushed stone aggregate.
- → Easy handling & targeted delivery; no mixing required and minimized product loss.
- → Can be installed in wet and dry environments, often eliminating the need for dewatering.
- → No need for compaction, inter-lift filling or tilling/mixing with parent soil.
- → Reduces labor and installation costs while enhancing safe trench construction.

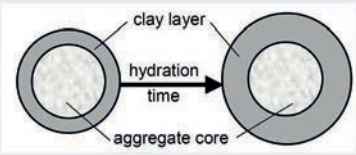
COMPOSITE BENTONITE AGGREGATE

A proprietary, composite-aggregate product resembling small stones, typically comprised of a dense aggregate core with a powdered high-swell sodium bentonite coating utilized with varying percentages of total weight.

AGGREGATE | Nominal AASHTO #8 (1/4" to 3/8") or custom sized to meet project-specific needs. Limestone or non-calcareous substitute can be used if deemed project-appropriate.

BENTONITE | Natural Wyoming Sodium Bentonite (Montmorillonite). Approximate 200 mesh powder, odorless, light gray in color. Properties may vary for project-specific formulation.

BINDER | Cellulosic polymer



AquaBlok 2080 FW is a standard freshwater formulation, which is approximately 20% bentonite by weight based on the total quantity of material used in production. This product will provide a low permeability seal without mechanical compaction. Other custom or design-specific formulations can be made available.

NOTE: The test results provided in this table were performed on 2080FW manufactured on a #8 crushed limestone. While additional testing and certification may not be necessary for small-scale projects (especially if the typical reported material characteristics significantly outperform the design requirements), large-scale projects may warrant additional testing to verify results, specifically with respect to incorporation of locally available materials in product manufacturing. Manufacturing tolerances will vary based on source materials and required performance designs.

TESTS[1]	METHOD[2]	AQUABLOK® 2080 FW[3] VALUES
Visual Classification (Description and Identification of Soils)	ASTM D2488	Gray poorly graded gravel with bentonite coating (GP)
Moisture Content[4]	ASTM D2216 (AASHTO T265)	10-20%
Dry Bulk Density	ASTM C29	75-85 lb/cf
Specific Gravity[5]	ASTM D854 (AASHTO T100)	2.63
Atterberg Limits - Liquid Limit	ASTM D4318 (AASHTO T89)	55%
Permeability - Flexible Wall Permeameter[6]	ASTM D5084	$1x10^{-7}$ to $5x10^{-9}$ cm/sec
Consolidation - Incremental Loading[7]	ASTM D2435 (AASHTO T216)	Cc = 0.35, e_o=0.85 Coeff. of Consolidation = 0.03-0.48 in^2/min
Consolidation - Swell Pressure[8]	ASTM D4546 (AASHTO T258)	310-360 lb/sf
Shear Strength - Direct Shear	ASTM D3080 (AASHTO T236)	139 lb/sf, 31.4°
Shear Strength - Unconfined Compression[9]	ASTM D2166 (AASHTO T208)	70-220 lb/sf
Shear Strength - Triaxial Unconsolidated-Undrained (Q or UU)	ASTM D2850 (AASHTO T296)	520 lb/sf, 0°
Shear Strength - Triaxial Consolidated-Undrained (R or CU)[10]	ASTM D4767 (AASHTO T297)	180 lb/sf, 11.7° (total) 140 lb/sf, 25.8° (effective)
Compaction - Standard Proctor	ASTM D698 (AASHTO T99)	Optimum Moisture Content 16.9% Maximum Dry Density 107.5 lb/cf
Compaction - Modified Proctor	ASTM D1557 (AASHTO T180)	Optimum Moisture Content 10.1% Maximum Dry Density 123.3 lb/cf
Compaction - (Blow Count n = 15)	US Army Corps of Engineers	Optimum Moisture Content 21.3% Maximum Dry Density 98.8 lb/cf
Free Swell[11]	ASTM D5890	25 (min.)

1. Results based on laboratory tests for specific blends. Variability may be experienced due to manufacturing tolerances, screening, distribution of grain sizes, quality control.
2. Tests were completed according to AASHTO standards when determined to be equivalent to those set by the U.S. Army Corps of Engineers.
3. Core material is typically nominal AASHTO #8 aggregate. Some variability may be expected with the use of different aggregate sizes.
4. Moisture content values are for dry material (as manufactured).
5. Calculated using a weighted average of the specific gravities for the material that was retained and that passed the #4 sieve. Material retained was assumed to be nominal AASHTO #8 aggregate and have a specific gravity of 2.62. Material passed was tested according to ASTM D854 to determine its specific gravity.
6. Permeability values are for freshwater scenarios. Results will vary with other environments, and use of other material blends may be appropriate to maintain desired permeability.
7. The ASTM D2435 test procedure was modified for AquaBlok, and accepted engineering applications were used to estimate settlement by analysing product compression behaviour under different loading conditions.
8. Swell pressure determined based on pressure required to prevent free-swell during hydration of the material prior to consolidation testing.
9. Test is commonly performed on fine-grained homogeneous material; it may not be representative of AquaBlok's actual strength, since the product is a mixture of fine-grained material and aggregate. Results from the UU triaxial test may provide a more reliable undrained shear strength value and is recommended for most preliminary stability analyses.
10. Triaxial unconsolidated-undrained test was performed according to ASTM D4767, saturated.
11. Free Swell (Swell Index) values are for the bentonite component only.

COMPOSITE BENTONITE AGGREGATE | Composed of a specific gradation of stone coated with sodium bentonite and a proprietary binder.

HOW AQUABLOK WORKS | AquaBlok composite particles expand when hydrated, transforming the material into a cohesive seal that self-compacts and conforms to uneven surfaces. The result is a natural and sustainable hydraulic barrier.

AQUABLOK DRY

AQUABLOK HYDRATED

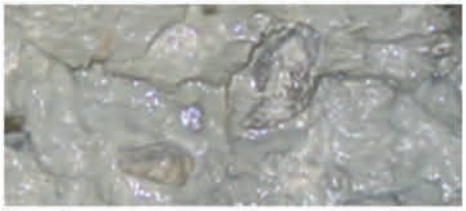
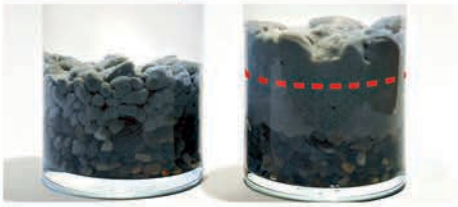


Photo of hydrated split core sample.

AQUABLOK HYDRATED | 24-HOURS



50-LB. BAGS

Packaged 48 per skid on a 40x48-in. pallet, each bag contains ~0.6 cubic foot of product; each pallet contains 2,400-lbs.

BULK BAGS

Standard totes contain 2,400-lbs. or 2,700-lbs. of product and ship on a 40x48-in. pallet. Sack has four lifting straps and empties from the bottom. Stackable.

LOOSE BULK OR LOCAL MANUFACTURING

For large quantity shipments (within 100 miles of a manufacturing facility), AquaBlok can be shipped in sealed, dry containers or dump trucks (dry storage required). Local or on-site manufacturing can also be provided for significant quantities (contact AquaBlok for details).

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