

Blended Barrier

General Description

AquaBlok is a patented, composite-aggregate technology resembling small stones that is typically comprised of a dense aggregate core. In this application of the technology, a powdered high-swell sodium bentonite coating is utilized (Figure 1) with an approximate 30% bentonite layer by weight.

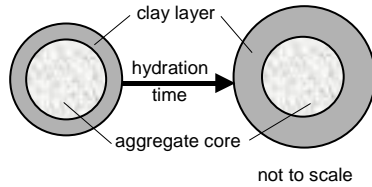


Figure 1. Configuration of AquaBlok-coated particle.



Figure 2. Permeability of Select Blended Barrier Formulations

AquaBlok Formulation	Aggregate Size	Resulting Blended Barrier Formulation ¹
#8 3070 FW	AASHTO #8	2.32×10^{-8}
#8 3070 FW	AASHTO #57	1.71×10^{-8}

1. Blended Barrier is comprised of 50% AquaBlok and 50% aggregate

Blended Barrier Technology

Blended Barrier is created when AquaBlok is mixed with similarly sized aggregate at a ratio of approximately 50% by volume. It has been established that Blended Barrier does not significantly increase the permeability as compared to an AquaBlok only Cap (Figure 2). This results in a very effective contaminated sediment cap for most applications that may be more cost effective than a standard AquaBlok only cap.

Product Specifications

AquaBlok Portion:

Aggregate: Nominal AASHTO #8 (1/4-3/8") or custom-sized to meet project-specific need.

- Limestone or non-calcareous substitute, as deemed project-appropriate

Bentonite: Powdered – Approximate 200 Mesh

- Bentonite Clay; High swell Wyoming Sodium Natural Mineral (Montmorillonite)
- Light Grey Powder; Odorless

Manufacturers – Product Designation

- Bentonite Performance Minerals – Barakade Standard
- Others that are deemed to meet the manufacturer specification

Binder: Cellulosic polymer

Aggregate Portion:

Aggregate: Nominal AASHTO #8 (1/4-3/8") or custom-sized to meet project-specific need.

- Limestone or non-calcareous substitute, as deemed project-appropriate



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Laboratory Test Results for Blended Barrier Product on Back

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Laboratory Test Results for Blended Barrier Product

Note: The test results provided in this table were performed on a Blended Barrier composed of #8 crushed limestone and AquaBlok 3070FW8 in a 50:50 v/v ratio. 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.

Test ¹	Method ²	Blended Barrier ⁴
Visual Classification - Practice for Description and Identification of Soils	ASTM D2488	Gray poorly graded gravel, with and without bentonite coating (GP)
Moisture Content ⁶	ASTM D2216, AASHTO T265	5-15%
Dry Bulk Density	ASTM C29	85-95 pcf
Specific Gravity ⁷	ASTM D854, AASHTO T100	2.64
Permeability - Flexible Wall Permeameter ¹³	ASTM D5084	1×10^{-7} to 1×10^{-9} cm/s
Shear Strength - Direct Shear	ASTM D3080, AASHTO T236	459 psf, 33.9°
Shear Strength - Triaxial Unconsolidated-Undrained (Q or UU)	ASTM D2850, AASHTO T296	2544 psf, 0.0° *.17
Shear Strength - Triaxial Consolidated-Undrained (R or CU)	ASTM D4767, AASHTO T297	512 psf, 21.6° (total) 0 psf, 39.9° (effective)
Compaction - Standard Proctor	ASTM D698, AASHTO T99	Optimum Moisture Content 16.3% Maximum Dry Density 105.1 pcf
Compaction - Modified Proctor	ASTM D1557, AASHTO T180	Optimum Moisture Content 10.5% Maximum Dry Density 122.9 pcf
Compaction - 15-Blow	U.S. Army Corps of Engineers EM 1110-2-1906	Optimum Moisture Content 18.4% Maximum Dry Density 101.8 pcf

1. Results are based on laboratory tests for specific blends. Variability may be experienced due to manufacturing tolerances, screening, distribution of grain sizes quality control, etc.
2. Tests were completed according to AASHTO standards when determined to be equivalent to those set by the U.S. Army Corps of Engineers.
4. Blended Barrier comprises a blend of AquaBlok 3070FW8 particles with nominal AASHTO #8 aggregate. Some variability may be expected with the use of different aggregate sizes.
6. Moisture content values are for dry material.
7. 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.
13. Permeability values are for freshwater scenarios. Results will vary with other permeants and the use of other material blends may be appropriate to maintain the desired permeability.
17. Triaxial unconsolidated-undrained test was performed according to ASTM D4767, saturated.