

RockBlok™

General Description

RockBlok™ is a blend of AquaBlok® 2080FW9 material with a sand and gravel fill material. Typical formulations are 6, 7, or 8% Bentonite by weight. This product will provide a low-permeability material for construction of waste containment barriers, by standard compaction methods, particularly in remote access areas where local aggregate and sands are available. Geotextiles and/or additives may also be incorporated in specific designs.

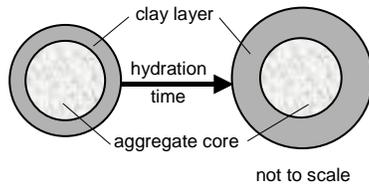


Figure 1. Configuration of AquaBlok-coated particle.

AquaBlok® is a patented, composite-aggregate. The blend is based on a varied grain-sized material, which is typically comprised of a dense aggregate core surrounded with clay minerals. In this application of the technology, a powdered high-swell sodium bentonite coating is utilized (Figure 1) with varying percentages of additive (bentonite) layer by percent of total weight for the AquaBlok.



Compacted RockBlok™

Product Specifications

AquaBlok Portion:

Aggregate: Nominal AASHTO #9 or custom-sized to meet project-specific needs

- 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
- Formulation Range from 15 – 25% by weight (average)

Manufacturers – Product Designation

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

Binder: Cellulosic polymer

Sand and Aggregate Portion:

Sand and Nominal AASHTO #8 (1/4-3/8")



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Laboratory Test Results for RockBlok Product

Note: The test results provided in this table were performed on RockBlok composed of #8 crushed limestone, sand, and AquaBlok 2080FW9. 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	RockBlok ⁵
Visual Classification - Practice for Description and Identification of Soils	ASTM D2488	Gray poorly graded gravel, with and without bentonite coating, with sand (GP)
Moisture Content ⁶	ASTM D2216, AASHTO T265	5-15%*
Dry Bulk Density	ASTM C29	100-110 pcf*
Classification of Soils for Engineering Purposes	ASTM D2487, ASTM D3282, AASHTO M145	Non-plastic granular material, comprised of poorly-graded sand with silt and gravel (SP-SM), poorly-graded sand with gravel (SP), and well-graded sand with silt and gravel (SW-SM)
Specific Gravity ⁷	ASTM D854, AASHTO T100	2.67
Relative Density - Maximum Densities of Cohesionless Soils	ASTM D4253	1.62 g/cu cm, 101 pcf
Relative Density - Minimum Densities of Cohesionless Soils	ASTM D4254	2.00 g/cu cm, 124.9 pcf
Permeability - Flexible Wall Permeameter ¹³	ASTM D5084	1x10 ⁻⁷ to 1x10 ⁻⁹ cm/s*
Shear Strength - Direct Shear	ASTM D3080, AASHTO T236	339 psf, 29.5°
Shear Strength - Unconfined Compression ¹⁷	ASTM D2166, AASHTO T208	500-900 psf
Shear Strength - Triaxial Unconsolidated-Undrained (Q or UU)	ASTM D2850, AASHTO T296	1494 psf, 0.0° *, ¹⁷
Shear Strength - Triaxial Consolidated-Undrained (R or CU)	ASTM D4767, AASHTO T297	1300-1700 psf, 25-30° (total) 0 psf, 40-45° (effective)
Compaction - Standard Proctor	ASTM D698, AASHTO T99	114 pcf (MDD), 15% (OMC)
California Bearing Ratio	ASTM D1883, AASHTO T193	5-10 (0.1 inch), 9-16 (0.2 inch)
Free Swell	ASTM D5890	500 ml/40g*

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.
5. RockBlok comprises a blend of AquaBlok 2080FW9 particles with fines (sand, silt or aggregate fines) and gravel fill material. Typical formulations range from 6 – 8% bentonite by weight. Variability may be expected with different fine-graded and aggregate sources.
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.