

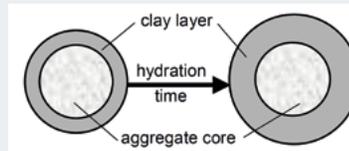
## COMPOSITE BENTONITE AGGREGATE

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 <sup>1</sup>	METHOD <sup>2</sup>	AQUABLOK <sup>®</sup> 2080 FW <sup>3</sup> VALUES
Visual Classification (Description and Identification of Soils)	ASTM D2488	Gray poorly graded gravel with bentonite coating [GP]
Moisture Content <sup>4</sup>	ASTM D2216 [AASHTO T265]	10-20%
Dry Bulk Density	ASTM C29	75-85 lb/cf
Specific Gravity <sup>5</sup>	ASTM D854 [AASHTO T100]	2.63
Atterberg Limits - Liquid Limit	ASTM D4318 [AASHTO T89]	55%
Permeability - Flexible Wall Permeameter <sup>6</sup>	ASTM D5084	1x10 <sup>-7</sup> to 5x10 <sup>-9</sup> cm/sec
Consolidation - Incremental Loading <sup>7</sup>	ASTM D2435 [AASHTO T216]	C <sub>c</sub> = 0.35, e <sub>c</sub> = 0.85 Coeff. of Consolidation = 0.03-0.48 in <sup>2</sup> /min
Consolidation - Swell Pressure <sup>8</sup>	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 <sup>9</sup>	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) <sup>10</sup>	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 <sup>11</sup>	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.