All Bloc

CONCRETE ADMIX

Water Resistant • Freeze-Thaw Tolerant • Stronger • Inhibits Rust
Increased Durability • Contaminant Resistant • Halts Efflorescence • Longer Service Life

Technical Characteristics

All Bloc™ testing to evaluate its performance characteristics when added to concrete mixtures.

Comprehensive Concrete Performance

All Bloc™, a product of EndWater Solutions, LLC, is a highly engineered, proprietary, liquid concrete admixture that thoroughly disperses and internally bonds concrete, to form a more durable end product. As the concrete cures, All Bloc™ “seals” pores and capillaries to create a durable, solid “bloc” of concrete, resistant to water and typical concrete contaminants.

Performance enhancements include reduced water permeability, decreased chloride ion penetration, increased compression strength, excellent freeze-thaw tolerance, resulting in improved durability and service life.

Water Permeability (DIN 1048)

Water permeability testing was performed on four cylinders (4”x8”) each of Control and with **All Bloc™** admixture. The 28 day test applied 72.5 psi of water pressure to the bottom of each cylinder for a period of 72 hours. **All Bloc™** greatly outperformed the control samples in all 4 cylinders. The Control cylinders experienced nearly total water penetration (7 3/16” average).

Control Sample 3 side A

Nearly full water penetration in the Control Sample.

All Bloc™ Sample 3 side

Virtually no water penetration in the All Bloc™ sample.

Compressive Strength

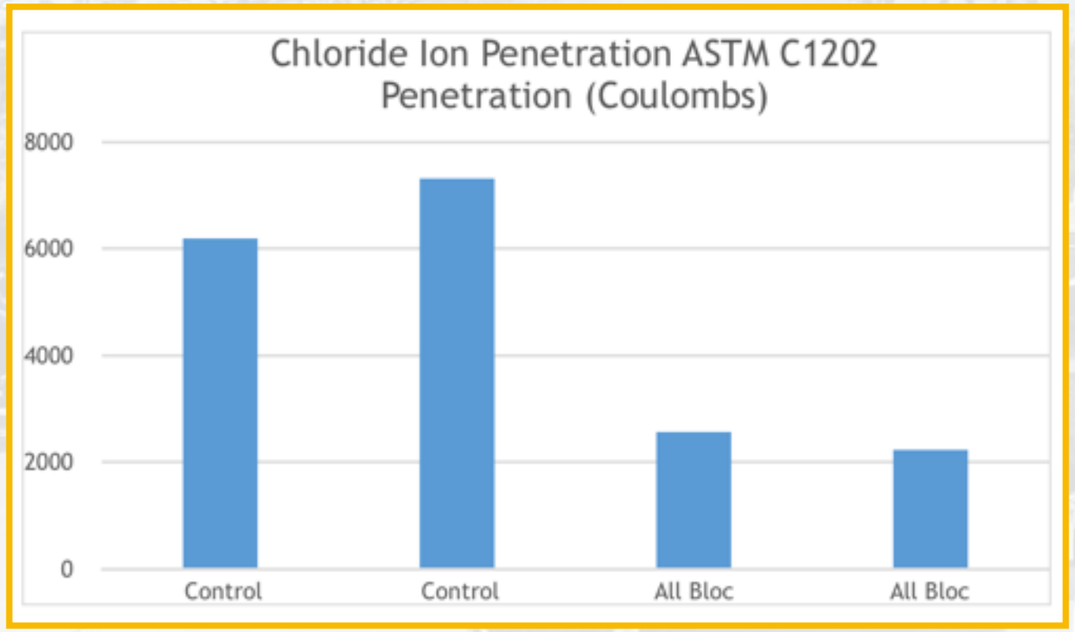
All Bloc™ was tested using **ASTM C39**, Compressive Strength of Cylindrical Concrete Specimens, resulting in a positive effect on the compressive strength versus standard 3000 psi concrete mix (w/fly ash) Control samples. **All Bloc™** increased the compressive strength of the concrete cylinders (4”x8”) by more than 20% at 7-days, 28-days, and 56-days.

22%
(56 days)

Compressive Strength Results				
Mix ID	**7-day**	**28-day**	**56-day**	
Control	**1830**	**2620**	**3700**	***Air Cured***
Control		**2650**	**3130**	***Wet Cured***
Control		**2730**		
All Bloc™	**2540**	**3210**	**4520**	***Air Cured***
All Bloc™		**3360**	**3480**	***Wet Cured***
All Bloc™		**3310**		

Rapid Chloride Ion Penetration

Chloride Ion Penetration ASTM C1202	
	Penetration (Coulombs)
Control	6187
Control	7313
All Bloc™	2569
All Bloc™	2231



-64%
Chloride Ion Penetration

All Bloc™ was tested within 3000 psi concrete using the "Standard Test Method for Electrical Indication of Concrete's Ability to Resist Chloride Ion Penetration" **ASTM C1202**. The Control samples averaged 6,750 Coulombs penetration, while **All Bloc™** samples averaged only 2,400 Coulombs, a 64% reduction in chloride ion penetration. Low penetration indicates that **All Bloc™** admixture produces concrete that would perform well in corrosive environments and inhibit rust .

Freeze-Thaw Cycles

Resistance of Concrete to Rapid Freezing and Thawing **ASTM C666** was utilized to determine that **All Bloc™** admixture increases the durability of concrete. Compared to Control samples of 3000 psi standard mix (w/o fly ash), **All Bloc™** greatly surpassed in performance. Whereas the Control samples failed at an average of 59 cycles (between weeks 3 & 4), the **All Bloc™** concrete **never failed** through 323 cycles (19 weeks).

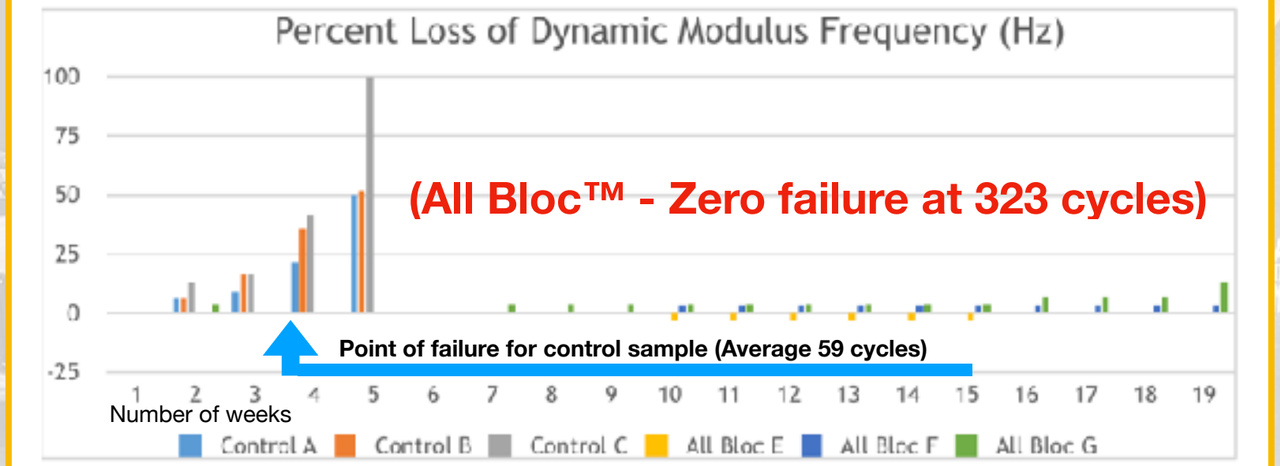
Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	18-Sep	25-Sep	3-Oct	9-Oct	16-Oct	23-Oct	30-Oct	6-Nov	14-Nov	20-Nov	27-Nov	4-Dec	11-Dec	19-Dec	26-Dec	2-Jan	9-Jan	16-Jan	22-Jan
Cycle Count																			
Number of Cycles	0	19	18	16	20	20	19	16	19	17	17	17	17	17	19	18	19	17	18
Accumulated Cycles	-	19	37	53	73	93	112	128	147	164	181	198	215	232	251	269	288	305	323
Relative Dynamic Molulus Frequency (Hz)																			
Control A	1696	1590	1537	1325	848	Control Sample testing terminated due to failure													
Control B	1643	1537	1378	1060	795														
Control C	1643	1431	954	1378	0														
All Bloc™ E	1590	1590	1590	1590	1590	1590	1590	1590	1590	1643	1643	1643	1643	1643	1643	1590	1590	1590	1590
All Bloc™ F	1643	1643	1643	1643	1643	1643	1643	1643	1643	1590	1590	1590	1590	1590	1590	1590	1590	1590	1590
All Bloc™ G	1590	1537	1590	1590	1590	1590	1537	1537	1537	1537	1537	1537	1537	1537	1537	1484	1484	1484	1378
Percent Loss From Original Relative Dynamic Modulus Frequency (Hz)																			
Control A	-	0.0	3.3	16.7	46.7	Control Sample testing terminated due to failure													
Control B	-	0.0	10.3	31.0	48.3														
Control C	-	0.0	16.1	41.9	100.0														
All Bloc™ E	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-3.3	-3.3	-3.3	-3.3	-3.3	-3.3	0.0	0.0	0.0	0.0
All Bloc™ F	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2	3.2
All Bloc™ G	-	0.0	-3.4	-3.4	-3.4	-3.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.4	3.4	3.4	10.3
Weight of Test Specimens (grams)																			
Control A	7731	7731	7615	7552	7489	Control Sample testing terminated due to failure													
Control B	7500	7471	7413	7389	7266														
Control C	7576	7571	7492	7445	N/A														
All Bloc™ E	7586	7594	7582	7586	7523	7472	7439	7310	7281	7392	7322	7305	7240	7168	7133	7126	7108	7063	6780
All Bloc™ F	7579	7589	7595	7593	7555	7545	7515	7450	7449	7253	7191	7128	7098	7055	7042	7011	6957	6935	6905
All Bloc™ G	7399	7428	7420	7408	7385	7404	7320	7267	7242	7174	7088	7051	7011	6962	6954	6921	6902	6803	6780
Percent Mass Loss from Original Weight																			
Control A	-	0.0	1.5	2.3	3.1	Control Sample testing terminated due to failure													
Control B	-	0.0	0.8	1.1	2.7														
Control C	-	0.0	1.0	1.7	N/A														
All Bloc™ E	-	0.0	0.2	0.1	0.9	1.6	2.0	3.7	4.1	2.7	3.6	3.8	4.7	5.6	6.1	6.2	6.4	7.0	10.7
All Bloc™ F	-	0.0	-0.1	-0.1	0.4	0.6	1.0	1.8	1.8	4.4	5.2	6.1	6.5	7.0	7.2	7.6	8.3	8.6	9.0
All Bloc™ G	-	0.0	0.1	0.3	0.6	0.3	1.5	2.2	2.5	3.4	4.6	5.1	5.6	6.3	6.4	6.8	7.1	8.4	8.7

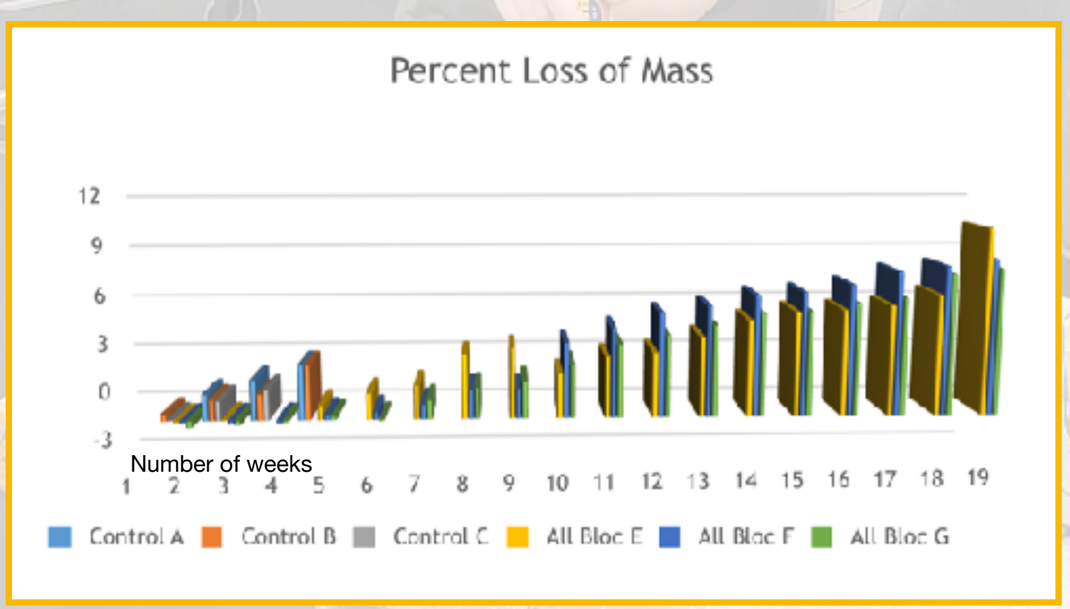
Freeze-Thaw Cycles

The temperature cycles (44° F to -4° F) used for testing Freeze-Thaw resistance were slightly wider than the standard (40° F to 0° F) specified in **ASTM C666**.

Control - Post Freeze Thaw
(Failure at 59 cycles average)

All Bloc™ - Post Freeze Thaw
(Zero failure at 323 cycles)





Durability Factor

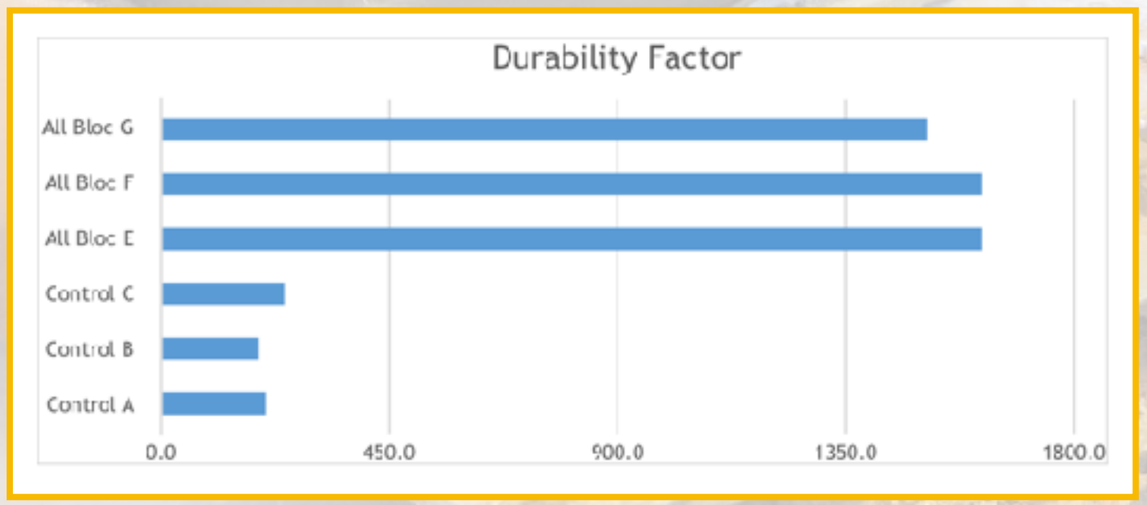
637%

Durability Factor Increase

The Durability Factor was calculated from the Freeze-Thaw testing data and the average improvement for concrete with **All Bloc™** admixture was **637%** versus standard concrete. The Durability Factor indicates a substantial potential for increased service life. Harsh environment applications subject to concrete repairs and/or replacement would benefit greatly from a more durable concrete installation. The initial costs for **All Bloc™** admixture are dwarfed by the excessive cost and time for repair/replacement in the future.

Week		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
	18-Sep	25-Sep	3-Oct	9-Oct	16-Oct	23-Oct	30-Oct	6-Nov	14-Nov	20-Nov	27-Nov	4-Dec	11-Dec	19-Dec	26-Dec	2-Jan	9-Jan	16-Jan	22-Jan
Cycle Count																			
Number of Cycles	0	19	18	16	20	20	19	16	19	17	17	17	17	17	19	18	19	17	18
Accumulated Cycles	-	19	37	53	73	93	112	128	147	164	181	198	215	232	251	269	288	305	323
Relative Dynamic Molulus Frequency (Hz)																			
Control - **A**	1696	1590	1537	1325	848	Control Sample testing terminated due to failure													
Control - **B**	1643	1537	1378	1060	795														
Control - **C**	1643	1431	954	1378	0														
All Bloc™ - **E**	1590	1590	1590	1590	1590	1590	1590	1590	1590	1643	1643	1643	1643	1643	1643	1590	1590	1590	1590
All Bloc™ - **F**	1643	1643	1643	1643	1643	1643	1643	1643	1643	1590	1590	1590	1590	1590	1590	1590	1590	1590	1590
All Bloc™ - **G**	1590	1537	1590	1590	1590	1590	1537	1537	1537	1537	1537	1537	1537	1537	1537	1484	1484	1484	1378

Durability Factor	
Control - **A**	206.3
Control - **B**	193.5
Control - **C**	243.4
All Bloc™ - **E**	1616.5
All Bloc™ - **F**	1616.5
All Bloc™ - **G**	1508.7



Concrete Mix - Batch A

Water Permeability (DIN 1048)

Compressive Strength (ASTM C39)

Cement	**12.9 lbs**
Fly Ash	**3.7 lbs**
Limestone #57	**67.6 lbs**
River Sand	**53.6 lbs**
Water	**9.8 lbs**
***All Bloc™**	**37ml**

Concrete Mix - Batch B

Rapid Chloride Ion Penetration (ASTM C1202)

Freeze-Thaw cycles (ASTM C666)

Durability Factor (ASTM C666)

Cement	**16.7 lbs**
Limestone #57	**67.6 lbs**
River Sand	**53.6 lbs**
Water	**9.9 lbs**
***All Bloc™**	**37ml**

Plastic Properties A

Control	*All Bloc™
Slump 5”	Slump 4”
Air Content 1.7%	Air Content 3.5%
Unit Weight 147.6 lbs/ft^3	Unit Weight 147.2 lbs/ft^3
Concrete Temp 76°F	Concrete Temp 75° F

Based on 3000 psi concrete

Plastic Properties B

Control	*All Bloc™
Slump 2”	Slump 3”
Air Content 2.1%	Air Content 5.4%
Unit Weight 150.0 lbs/ft^3	Unit Weight 145.3 lbs/ft^3
Concrete Temp 76°F	Concrete Temp 77° F

Based on 3000 psi concrete

CONCRETE INDUSTRY MANAGEMENT

Lab Testing by MTSU School of Concrete and Construction

General Instructions & Observations

Dosage Rate -The dosage rate of 1.0 liter of **All Bloc™** per cubic yard of concrete (by weight) provides ideal concrete performance results for most standard concrete applications. All testing reported in this document was done at the rate of 1.0 liter/yd^3. Depending on the concrete mix design criteria, the application, strength requirements, the targeted performance, and the use of other concrete additives, additional testing for up to 2.0 liters/yd^3, may be worth testing.

Mixing Instructions - For most consistent results, **All Bloc™** admixture should be added after complete mixing of standard concrete materials to the target slump, followed by additional mixing for at least 5 to 7 minutes or en route to the installation site. As an example, in a standard 360 revolution mix, **All Bloc™** can be added at 200 revolutions and followed by the additional 160 revolutions.

Water Hydration - Due to the "plasticizer and water reducer" properties exhibited by **All Bloc™** admixture, it is best to lean towards using less water to cement. Workability is noticeably improved with **All Bloc™** and less water will deliver a stronger concrete.

Increased Air Entrainment - It is NOT recommended to ADD AIR to the concrete mixture, since **All Bloc™** typically increases air entrainment by about 3% to 3.5%. Adding air to the mix may drive air entrainment measurements beyond the 8% range.

Air Dry vs. Wet Cure - Air Dry curing is recommended. **All Bloc™** has been observed to retain water longer than standard concrete mixtures and wet curing may retard the curing process and may not produce an increase in compressive strength. Air Dry curing produces the most consistent characteristics for compressive strength versus time.

Testing Methods

ASTM C39 - Test Method for Compressive Strength of Cylindrical Concrete Specimens
ASTM C666 - Test Method for Tolerance of Concrete to Rapid Freezing and Thawing
ASTM C1202 - Test Method for Ability to Resist Chloride Ion Penetration
DIN 1048 - Test for Water Penetration through a Concrete Cylinder

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