MISSISSIPPI POLYMER INSTITUTE

Project Report

October 22, 2021

Keith Simmons
Gigantic Bag, LLC
1301 Hwy 51 N
Summit, Mississippi 39666

Re: MPI Project JUL21-0116

Dear Mr. Simmons,

Thank you for choosing MPI for your technical needs. Enclosed are the results from the analysis requested: physical testing of Blue Gator material using:

- ASTM D638 – 14, "Standard Test Method for Tensile Properties of Plastics"
- ASTM D695 - 15, "Standard Test Method for Compressive Properties of Rigid Plastics"
- ASTM D790 - 17, "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials"
- ASTM D256-18, "Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics."

A report is included in the pages following this letter. If there are any questions regarding this project, please feel free to contact me at (601) 266-4607.

Sincerely,

Cecelia Butts
Analytical Chemist
Mississippi Polymer Institute
46 Shelby Thames Drive
Hattiesburg, MS 39402
(601) 266-4607

Physical Testing of Blue Gator Material

Gigantic Bag, LLC

Cecelia Butts
Sara Bayley
Mississippi Polymer Institute
46 Shelby Thames Drive
Hattiesburg, MS 39402
October 22, 2021
MPI Project #JUL21-0116

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

SUMMARY:

Gigantic Bag, LLC provided sample panels of "Blue Gator" material for analysis. Test specimens were machined from the panels and the sample set was evaluated using ASTM D638 – 14, "Standard Test Method for Tensile Properties of Plastics," ASTM D695 - 15, "Standard Test Method for Compressive Properties of Rigid Plastics," ASTM D790 - 17, "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials," and ASTM D256-18, "Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics." An image of a sample panel (before machining) is provided in Figure 1. A summary of the testing results is provided below in Table 1.

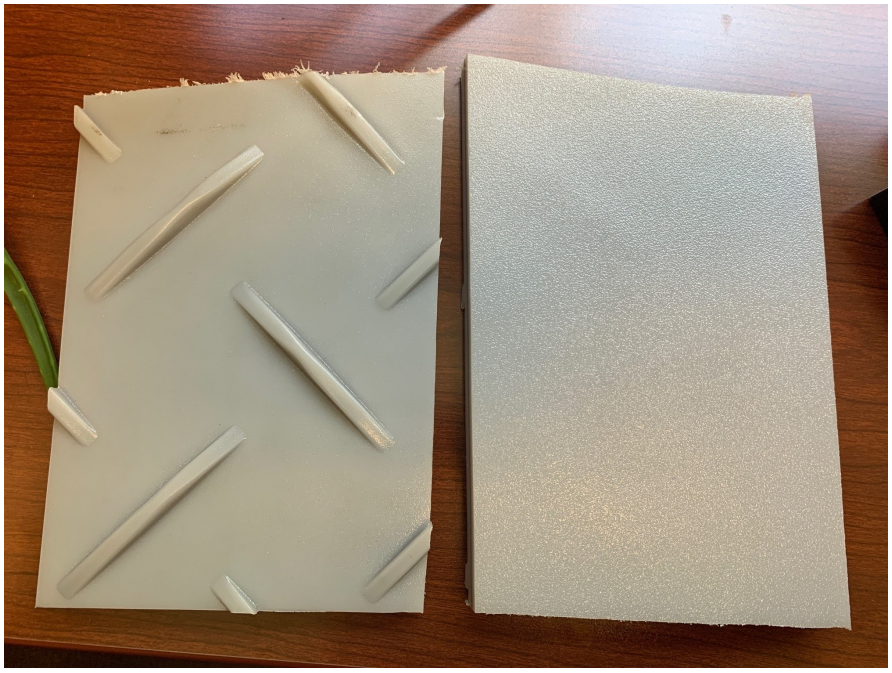


Figure 1. Blue Gator Sample Panel

Table 1. Test Results

ASTM Method	Parameter	Blue Gator Results
ASTM D638	Tensile Strength at Yield, average, psi	3500 ± 33.7
	Percent Elongation at Yield, average, %	10.2 ± 0.37
	Tensile Strength at Break, average, psi	607 ± 148
	Percent Elongation at Break, average, %	153 ± 100
ASTM D695	Compressive Modulus, average, psi	61700 ± 4760
	Compressive Strength at 1% Offset Yield, average, psi	2520 ± 132
	Compressive Strain at 1% Offset Yield, average, %	5.44 ± 0.42
	Compressive Strength at Max Extension of 0.6", average, psi	7810 ± 1450
	Compressive Strain at Max Extension of 0.6", average, %	55.4 ± 10.4
ASTM D790	Flexural Modulus, average, psi	19400 + 667
	Flexural Strength at 5% Strain, average, psi	722 + 11.2
ASTM D256	Impact Strength, Notched Izod, average, (in-lbf/in)	28.7 ± 5.25

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

TENSILE TESTING, PROCEDURES, FINDINGS, & DATA:

ASTM D638 type I tensile bars were machined from the sample panels. The test specimens were allowed to condition at 23°C ± 2°C and 50% ± 10% humidity for at least 40 hours before testing on October 20, 2021. The samples were evaluated in accordance with ASTM D638 – 14, "Standard Test Method for Tensile Properties of Plastics." Tensile testing was performed using an Instron 5582 with a 5 kN load cell.

A class B1 video extensometer was used. A 16 mm field of view lens was used for the video extensometer. Calibration of the Instron equipment occurred May 25-27, 2021.

The width and thickness of each sample bar was measured in three places and an average value entered for calculations. The samples were inserted into wedge grips, and the specimen-loading rate was 2 inches/minute.

Testing was carried out at 23°C ± 2°C and 50% ± 10% humidity. Five specimens were tested and used to calculate an average and standard deviation. All data was analyzed using Bluehill Universal software. A summary of the results is provided in Table 2, additional tensile data is provided in Appendix I.

Table 2. Tensile Data

Parameter	Results
Tensile Strength at Yield, average, psi	3500 ± 33.7
Tensile Strength at Break, average, psi	607 ± 148
Percent Elongation at Yield, average, %	10.2 ± 0.37
Percent Elongation at Break, average, %	153 ± 100

COMPRESSIVE PROPERTIES

Compression specimens were machined from the samples panels, measuring approximately 0.5" x 0.5" and 1" tall. These samples were allowed to condition at 23°C ± 2°C and 50% ± 10% humidity for at least 40 hours before testing.

Compression testing was performed using an Instron 5582 with a 50kN load cell with guidance from ASTM D695, "Standard Test Method for Compressive Properties of Rigid Plastics". A class B1 video extensometer was used. A 16 mm field of view lens was used for the video extensometer. Calibration of the Instron equipment occurred May 25-27, 2021.

The specimen-loading rate was 0.05 inches/minute. The sample runs were conducted at 23°C ± 2°C and 50% ± 10% humidity. Each specimen was placed into a compression sub-press, which was centered in 8-inch compression platens for testing. All data was analyzed using Bluehill Universal software.

The samples did not break therefore they were taken to 0.6 inches of compressive extension. The material did not experience a traditional compressive yield (zero slope), an offset of 1% was used to calculate the compressive strength and strain at yield values. A summary of the results is provided below in Table 3, additional compression data is provided in Appendix II.

Table 3. Compression Data

Parameter	Results
Compressive Modulus, average, psi	61700 ± 4760
Compressive Strength at 1% Offset Yield, average, psi	2520 ± 132
Compressive Strain at 1% Offset Yield, average, %	5.44 ± 0.42
Compressive Strength at Max Extension of 0.6", average, psi	7810 ± 1450
Compressive Strain at Max Extension of 0.6", average, %	55.4 ± 10.4

FLEXURAL TESTING, PROCEDURES, FINDINGS, & DATA:

The flexural specimens, approximately 5" long, 0.5" wide, and 0.25" thick, were machined from the sample panels. These samples were allowed to condition at 23°C ± 2°C and 50% ± 10% humidity for at least 40 hours before testing on October 19, 201.

Flexural testing was performed using an Instron 5582 with a 1kN load cell in accordance with Procedure A of ASTM D790 – 17, "Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials". A 16 mm field of view lens was used for the video extensometer. Calibration of the Instron equipment occurred May 25-27, 2021.

No extensometer was used. The support span distance for this size sample was set at 3.984 inches (16 times the thickness). The specimen-loading rate was 0.10624 inches/minute as per the calculation included in the test method. The sample runs were conducted at 23°C ± 2°C and 50% ± 10% humidity. Five specimens were tested for the set, and all data was analyzed using Bluehill Universal software.

All samples were set up with a pre-load of 0.1 – 0.2 lbf to prevent a "toe" in the data. This was necessary to ensure accurate modulus calculations were made. The samples did not "break", therefore they were taken to 5% strain. Bending of the samples did occur within the 5% strain. A summary of the results is provided in Table 4, additional data is provided in Appendix III.

Table 4. Flex Data

Parameter	Results
Flexural Strength at 5% Strain, average, psi	722 + 11.2
Flexural Modulus, average, psi	19400 + 667

IZOD IMPACT TESTING, PROCEDURES, FINDINGS, & DATA:

The Pendulum Impact Resistance (Izod) specimen preparation and testing were carried out in accordance with ASTM D256-18, "Standard Test Methods for Determining the Izod Pendulum Impact Resistance of Plastics" using Test Method A. Specimens 2.5"x 0.5", having a depth/strike face width of 1/4" were machined from the sample panels. Notches were also machined into the samples. The samples were allowed to condition at 23°C ± 2°C and 50% ± 10% humidity for at least 40 hours before testing on October 20, 2021.

The notch depth (specification for passing notches is 0.4 ± 0.002 inches) of each specimen was checked using a notch depth dial indicator. Impact testing was performed using a Tinius Olsen model 92T Izod Impact Tester using the 4.5N weight set, with a potential energy of 2.7 in-lbf (calibration date 9-2-21). At least 10 specimens were tested, and the data was used to calculate an average and standard deviation. Failures for all samples tested were hinges (H). A summary of the results is provided in Table 5.

Table 5. Izod Impact Data

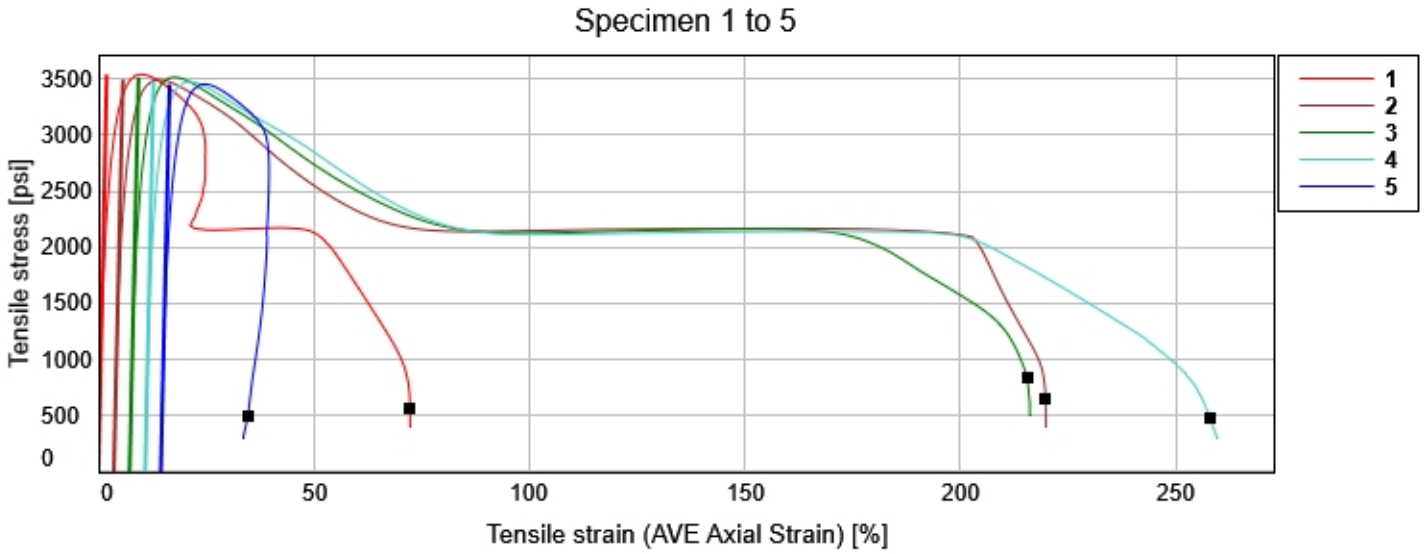
Run	Width (")	depth/ thickness (")	notch depth (")	Break Energy (in-lbf)	Strength 1 (in-lbf/in)	Strength 2 (J/m)	Break Type
1	0.501	0.249	0.4020	8.2877	33.338	148.290	Hinge
2	0.500	0.248	0.4000	6.4340	25.954	115.450	Hinge
3	0.500	0.248	0.4000	6.0927	24.577	109.320	Hinge
4	0.501	0.249	0.4020	10.0370	40.261	179.090	Hinge
5	0.501	0.249	0.4020	8.8157	35.348	157.230	Hinge
6	0.500	0.246	0.4020	6.9512	28.245	125.640	Hinge
7	0.500	0.249	0.3980	5.6014	22.523	100.190	Hinge
8	0.501	0.249	0.4015	7.7372	31.123	138.440	Hinge
9	0.501	0.249	0.4020	6.5096	26.133	116.240	Hinge
10	0.501	0.249	0.3990	6.3031	25.293	112.510	Hinge
11	0.499	0.249	0.3990	6.7832	27.275	121.320	Hinge
12	0.501	0.248	0.3980	6.1827	24.910	110.810	Hinge
Average		**0.248**	***Pass= 0.400 ± 0.002**	**7.1446**	**28.748**	**127.878**	**100% H**
Std Dev		**0.001**		**1.3147**	**5.246**	**23.333**	

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

APPENDIX I
Tensile Data

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

Client Name	Gigantic Bag
Lens Used	16mm
Load Cell Used	5 kN
Method	D638
Project ID#	JUL21-0016
Sample Set Name	Blue Gator
Specimen Geometry	Type I
Humidity	50.0 %
Temperature	23.0 C
Rate 1	2.00 in/min



Results table 1

	Width [in]	Thickness [in]	Force at Break (Standard) [kN]	Tensile displacement at Break (Standard) [in]	Tensile strain at Break [%]	Tensile stress at Break [psi]	Specimen Name
1	0.500	0.250	0.32	0.72	72.297	571.205	
2	0.500	0.249	0.36	2.14	216.144	648.701	
3	0.500	0.249	0.47	2.10	208.269	842.088	
4	0.500	0.249	0.26	2.46	247.100	471.196	
5	0.500	0.248	0.28	0.20	20.268	503.496	
Mean	0.500	0.249	0.34	1.53	152.816	607.337	
Standard deviation	0.000	0.001	0.082	0.999	100.034	147.853	
Coefficient of variation	0.000	0.22	24.34	65.45	65.461	24.344	

Results table 2

	Maximum Load [lbf]	Tensile Strain at Maximum Axial Strain (Video) [%]	Tensile Stress at Maximum Load [psi]	Modulus [psi]	Tensile stress at Yield (Zero Slope) [psi]	Tensile strain (AVE Axial Strain) at Yield (Zero Slope) [%]
1	442.678	24.846	3541.424	185852.913	3541.42	9.72
2	435.067	199.077	3494.517	167265.868	3494.52	10.71
3	437.705	208.829	3515.699	171022.856	3515.70	10.43
4	432.885	248.782	3476.987	180747.692	3476.99	10.22
5	429.215	25.129	3454.445	169000.399	3454.44	10.15

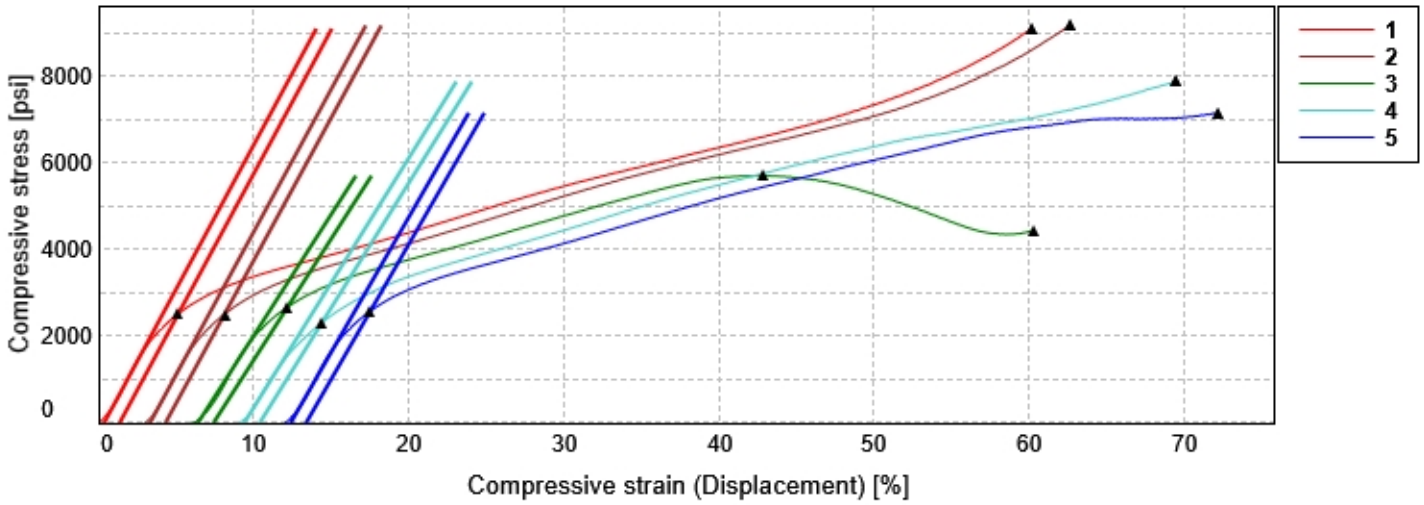
	Maximum Load [lbf]	Tensile Strain at Maximum Axial Strain (Video) [%]	Tensile Stress at Maximum Load [psi]	Modulus [psi]	Tensile stress at Yield (Zero Slope) [psi]	Tensile strain (AVE Axial Strain) at Yield (Zero Slope) [%]
Mean	435.510	141.333	3496.614	174777.946	3496.61	10.24
Standard deviation	5.072	107.828	33.690	8096.370	33.690	0.365
Coefficient of variation	1.165	76.294	0.963	4.632	0.96	3.56

APPENDIX II
Compression Data

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

Client Name	Gigantic Bag
Sample Name	gator
Test Method	ASTM D695
Notes	
Rate 1	0.05 in/min
Temperature	22
Humidity	55
Extensometer used?	yes
Load Cell	50kN

Graph



Results table 1

	Width [in]	Thickness [in]	Area [in^2]	Maximum Compressive Load [lbf]	Modulus (Automatic) [psi]
1	0.503	0.506	0.255	2319.447	66591.05
2	0.502	0.506	0.255	2337.574	65964.85
3	0.496	0.503	0.249	1424.819	56051.07
4	0.492	0.503	0.247	1952.754	57690.40
5	0.504	0.507	0.256	1831.202	62347.31
Mean	0.500	0.505	0.252	1973.159	61728.94
Standard deviation	0.005	0.002	0.004	378.800	4756.926

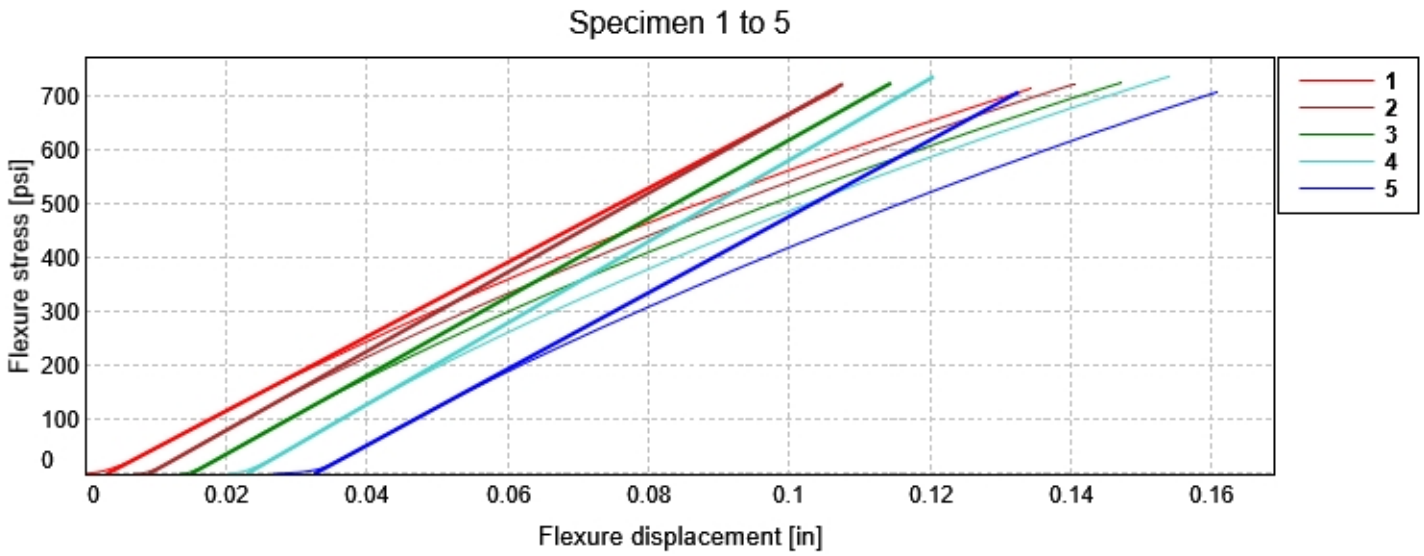
Results table 2

	Compressive strain (Extension) at Maximum load [%]	Compressive stress at Maximum Comp. load [psi]	AVE Axial Compressive Strain at Yield (Offset 1 %) [%]	Compressive strain (Displacement) at Yield (Offset 1 %) [%]	Compressive stress at Yield (Offset 1 %) [psi]
1	60.161	9113.097	3.74	5.14	2517.68
2	59.613	9184.381	4.32	5.11	2510.48
3	36.874	5710.972	4.44	6.15	2666.84
4	60.418	7890.680	5.42	5.36	2307.49
5	60.094	7166.344	4.02	5.47	2573.44
Mean	55.432	7813.095	4.39	5.44	2515.19
Standard deviation	10.378	1450.315	0.641	0.421	131.868

APPENDIX III
Flex Data

The data in this report does not purport to address samples other than the specific sample tested or a larger sample size than was tested.

Client Name	Gigantic Bag
Sample Name	Blue Gator
Project ID#	JUL21-0116
Test Method	D790
Support Span	3.984
Fixture Type	3 point bend
Rate 1	0.10624 in/min
Temperature	22.5
Humidity	53



Results table 1

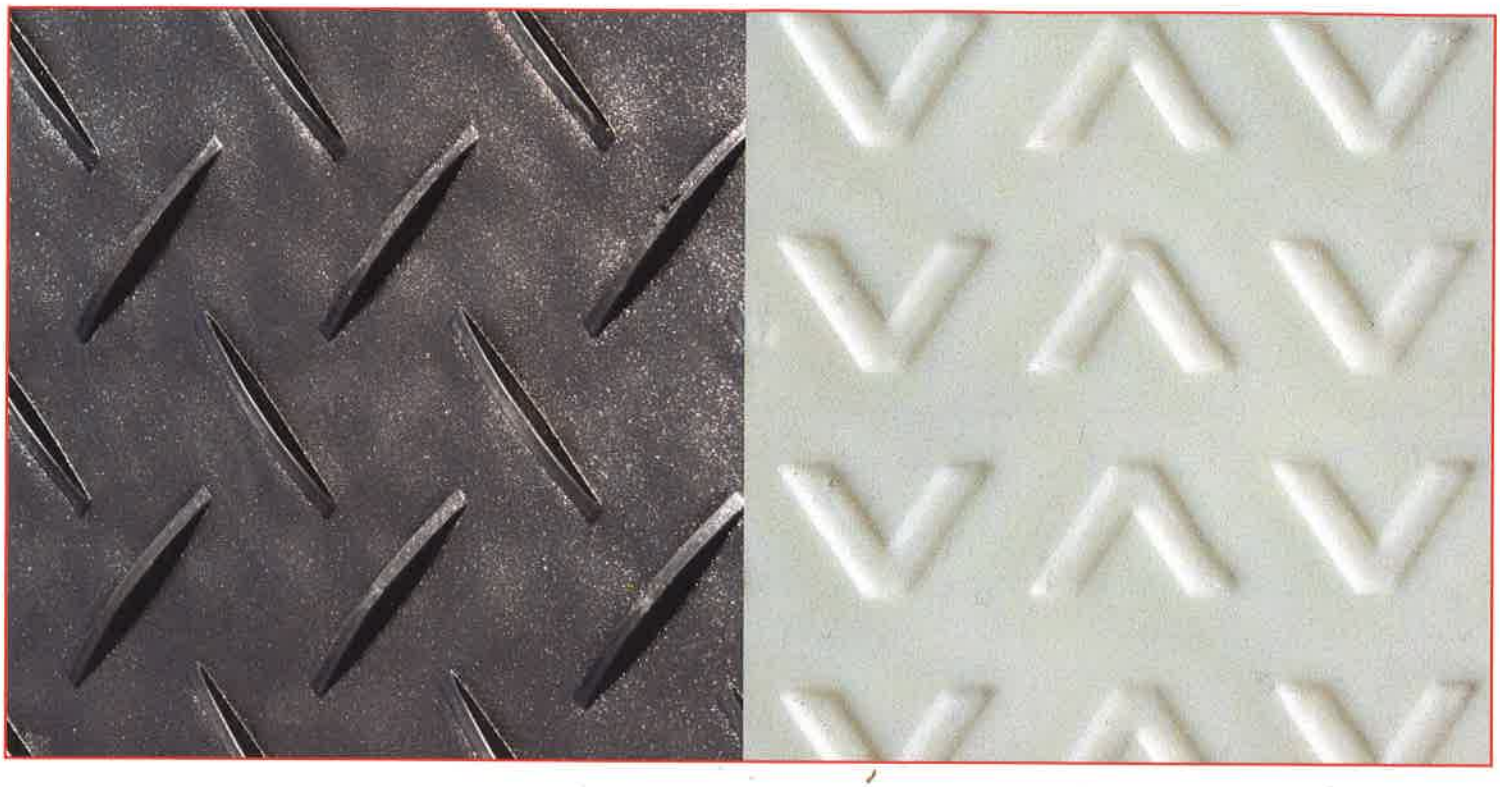
	Thickness [in]	Width [in]	Flexure stress at Yield (Zero slope) [psi]	Flexure strain at Yield (Zero slope) [%]	Modulus (Automatic Young's) [psi]
1	0.248	0.500	-----	-----	18497.40
2	0.249	0.500	-----	-----	19658.09
3	0.250	0.500	-----	-----	19494.18
4	0.249	0.500	-----	-----	20239.13
5	0.249	0.500	-----	-----	18963.63
Mean	0.249	0.500	-----	-----	19370.49
Standard deviation	0.000	0.000	-----	-----	667.156

Results table 2

	Maximum Flexure Stress [psi]	Maximum Flexure Load [lbf]	Flexure strain at Maximum Flexure Load [%]	Flexure stress at Break (Standard) [psi]	Flexure strain at Break (Standard) [%]
1	714.354	7.352	5.00	714.35	5.00
2	723.723	7.479	5.00	723.72	5.00
3	725.326	7.525	5.00	725.33	5.00
4	737.488	7.621	5.00	737.49	5.00
5	708.274	7.319	5.00	708.27	5.00
Mean	721.833	7.459	5.00	721.83	5.00
Standard deviation	11.188	0.124	0.000	11.188	0.000

HEAVY-DUTY GROUND PROTECTION

BLUE GATOR
GROUND PROTECTION MATS



GROUND PROTECTION

Most heavy equipment will create ruts and tire treads in the ground surface when traveling back and forth at a construction site. By using our **Blue Gator Mats**, the ground stays smooth and even. No more having to regrade after the job is done.

EQUIPMENT PROTECTION

Running heavy equipment over muddy ground surfaces means water and dirt constantly splashing up onto the underbelly of the equipment causing excess wear and tear over time. **Blue Gator Mats** offer protection to your equipment saving cleaning time and repair costs.

PLANT PROTECTION

Laying down a **Blue Gator Mat** gives the driver a clear path to tread. No more running over existing and often expensive plant life and landscaping that will need to be replaced after the job is completed.

TURF PROTECTION

Protect grass, sod, and intentional ground cover with **Blue Gator Mats**. No need to worry about driving heavy equipment over beautiful lawns and grounds. Gator mats save time and money and you can recycle them for reuse over and over.

LIGHTWEIGHT • EASY INSTALL • PREVENTS RUTTING • 100% RECYCLABLE

RUGGED RECYCLABLE

Blue Gator Mats provide a rugged solid layer of protection between the ground and your equipment. **Blue Gator Mats** are lightweight and extremely durable.

Made of High-Density Polythylene (HDPE), the unique design allows the mats to bend without breaking – able to withstand nearly *60 tons! **Blue Gator Mats** are heavy-duty, flexible, and affordable.

BENEFITS OF COMPOSITE CONSTRUCTION MATS

- Reduces cleanup time and the need to use gravel
- Easy to install
- Protects plants and vegetation
- Prevents runoff and rutting
- Comes in multiple textures to suit
- Tread texture provides ultimate grip
- Lightweight and easy to transport
- Mats weighs 80 lbs each
- Mats measure 4' x 8' x ½"
- Keeps the soil safe
- 100% Recyclable

Varies depending on ground condition

628-800-6287
bluegatorgroundprotection.com

SUGGESTED APPLICATIONS

Well Drilling
Temporary Access Roads
Construction Sites
Tree Care & Landscaping
Usable Work Surfaces

Innovation – infused with rubber for grip & flex

Protection – prevents ruts & damage to the environment

Traction – maximum grip for equipment & crewmen

Rugged – withstands up to 60 tons!

Flexible – bends but won't break

Waterproof – won't rot, crack, or peel

Lightweight – easy to transport, install, and store

Durable – a lifespan of 5+ years!

Eco-Friendly – 100% recyclable High-Density Polyethylene

Affordable – an excellent return on investment!

BLUE GATOR
GROUND PROTECTION MATS