XtremeMat

Engineering Specifications



GroundGuards®

XtremeMat



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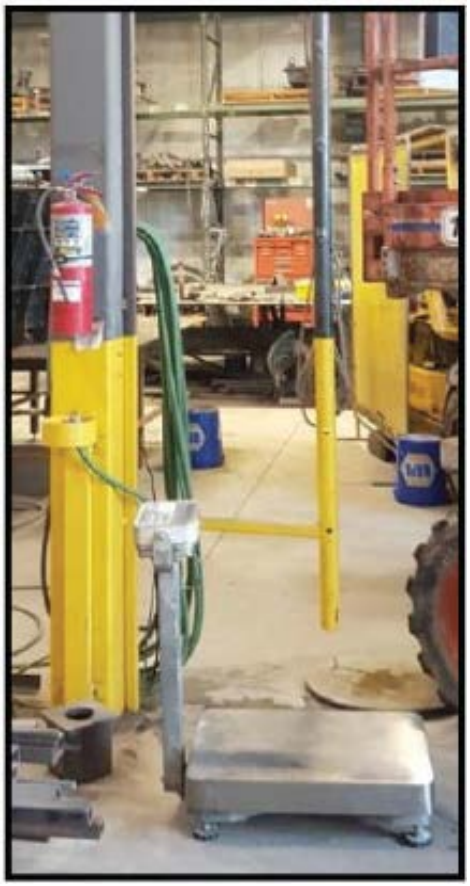
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XtremeMat



Specifications	
Shipping Length:	4.34m / 14.25ft
Shipping Width:	2.29m / 7.5ft
Usable Length:	4.11m / 13.5ft
Usable Width:	2.06m / 6.75ft
Area:	8.46m^2 / 91.13ft^2
Thickness:	100mm / 4in
Weight:	385kg / 860lbs ±22lbs
Material:	High Density Polyethylene
Colour:	Deep Orange
No. of Connectors:	12
Temperature Rating:	-34°C / -30°F to 60°C / 140°F
Load Capacity:	>40kg/cm^2 / 600 PSI / 400 ton/m^2
Observed Comp. PSI:	Over 70kg/cm^2 / 1000PSI
Static Dissipative:	Yes
UV Protection:	Yes
Internal Core:	Solid filled HDPE closed cell

Transport Quantities	
20ft ISO Container:	20 Mats
40ft ISO Container:	40 Mats
Triaxle Truck:	52 Mats
Super B Truck:	80 Mats
Closed Van Truck:	52 Mats



The results in this report were obtained by **COREngineering Ltd** during on-site testing at the Xtreme Mattings Corp. facility, in September of 2017.

Typically for impact testing of plastic the IZOD method is used, using the ASTM D256 as the standard. Test pieces are notched (as per ASTM D256) to help in breaking the part. After being notched, the samples are cooled to the desired testing temperature, since plastic will become brittle after certain temperature. They are then clamped down in the test rig and a pendulum of different weight is used to impact the part and find the breaking point for different temperatures.

Since the Xtreme Mats are filled with foam and not solid plastic, making a notch in the sample for testing would not be a viable option as it would cut through the outer plastic shell completely and only the foam would be left to take the impact. A different testing system had to be put in place to test the reaction and brittleness of the mats at low temperatures.

A long pipe with holes was set up in the plant for testing purposes. A hammer of 38.8 lbs (17.6 kg) was inserted into the pipe and raised to a predetermined height where a pin would safely hold it in position. Once the test piece is set up directly under the pipe, the pin is pulled and the hammer slides down and impacts the mat sample. Tests were done at varying drop heights to find the breaking point for all the different temperature samples. The results are listed below.

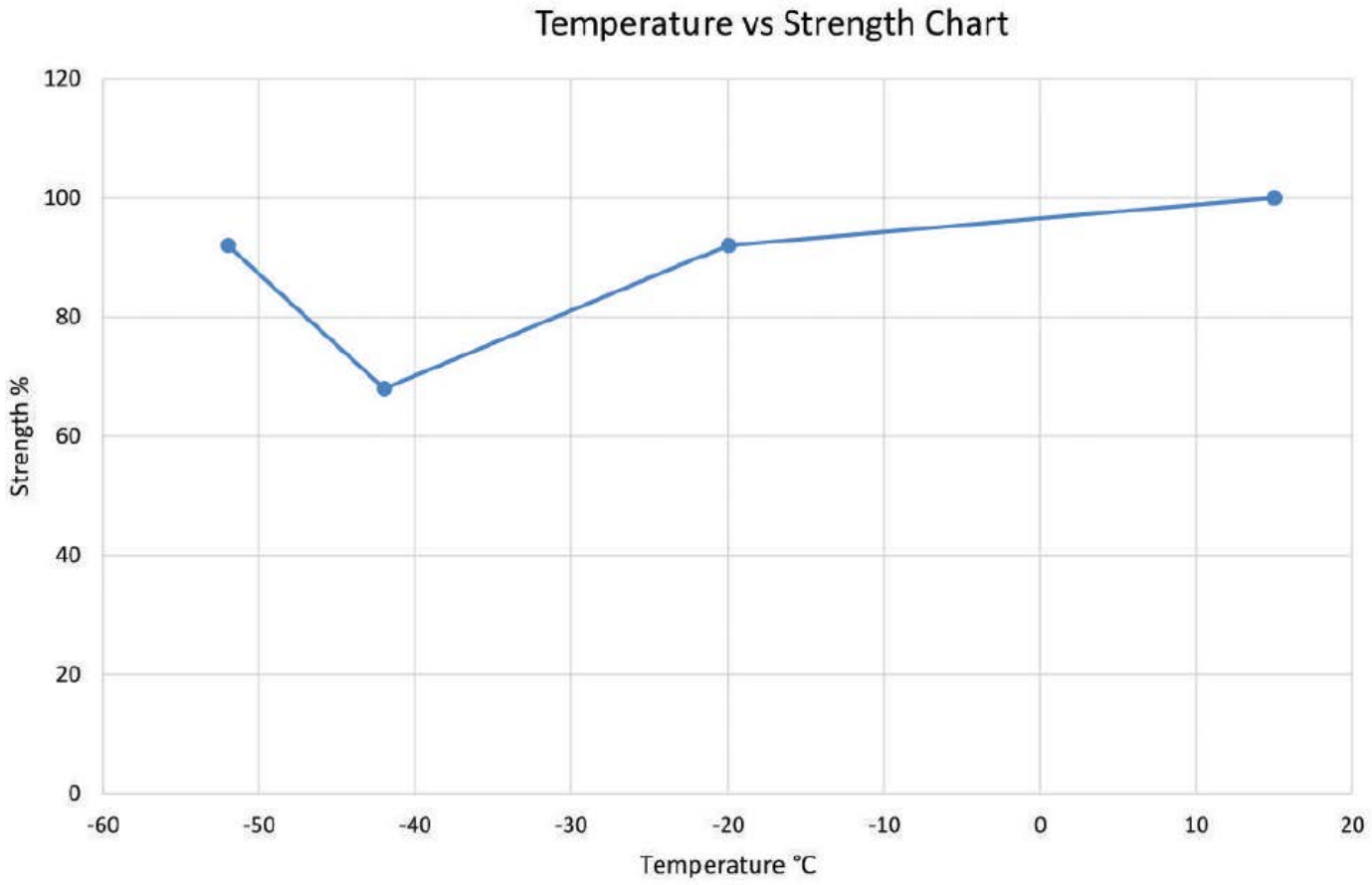
Temperature (°C)	Breaking Height (m)	Kinetic Energy (KJ)	Strength (%)
-52	3.5	60.6	92
-42	2.6	44.8	68
-20	3.5	60.6	92
15	3.8	65.9	100



Test Results at -42 °C
Hammer Dropped at 2.6m



Test Results at 15 °C
Hammer Dropped at 3.8m



It was noticed that during the test at room temperature (15°C) that there was no cracking of the mat's plastic surface upon impact as with the colder tests. The impact force would deform the mat to the shearing point of the plastic.

It is also worth noting that the test results done at -52°C show more breaking resistance than the test done at -42°C. We believe the reason for this is because at those cold temperatures, the foam inside the mats becomes rigid and thus harder. Since the foam is harder, it offers better support to the plastic shell, and a larger impact force is then required to deform the plastic to the point of breaking.



The results in this report were obtained by COREngineering Ltd during on-site testing at the Xtreme Mattings Corp. facility, in September of 2017.

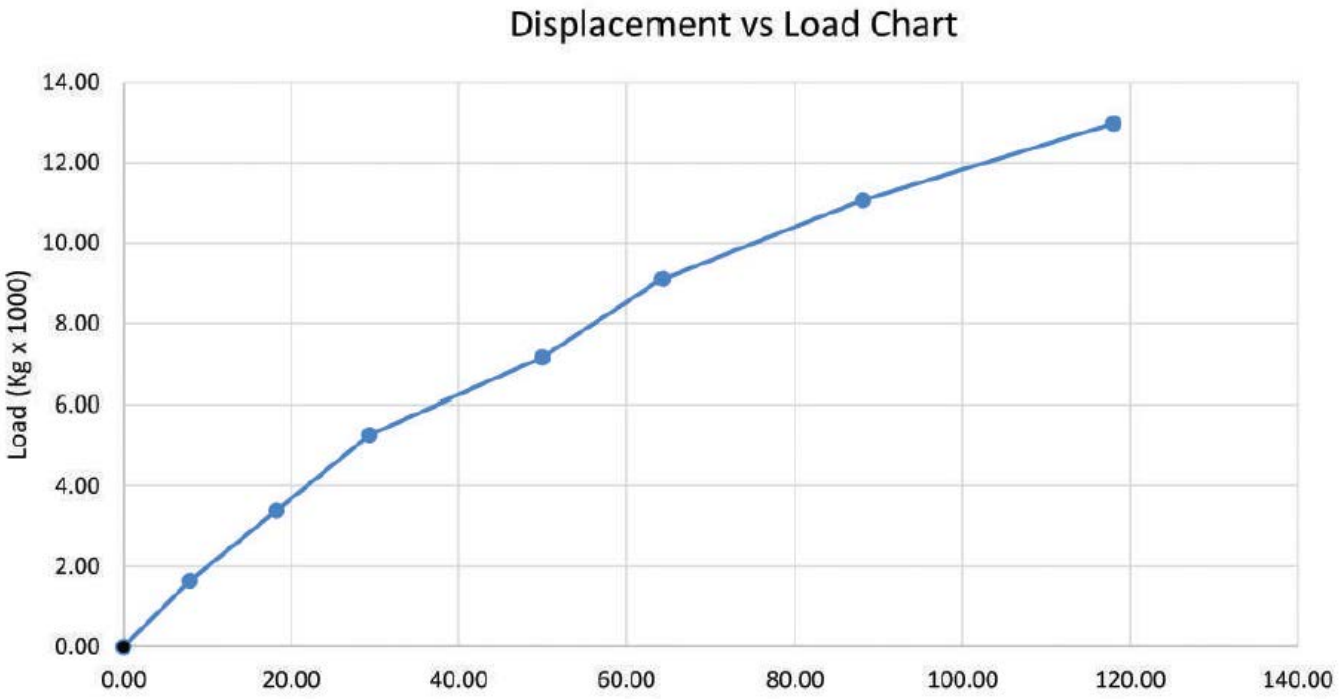
Test Method

For on-site strength testing a guided frame was loaded up with pre-weighted concrete blocks and slowly lowered onto the mat. An 8" steel pipe was used to transfer the load onto the mat and two 8" steel pipes were used as bottom support. The bottom supports were set up at 4' centre to centre.



Test Results

Weight (kg)	Deflection (mm)
1633	8
3382	18
5252	29
7141	50
9091	64
11045	88
12951	118





The results in this report were obtained by COREngineering Ltd during on-site testing at the Xtreme Mattings Corp. facility, in September of 2017.

During in-house testing we found that the Xtreme matting system had a coefficient of friction of 0.73. The testing was done using 40A durometer Neoprene rubber and the Xtreme matting system.



The results in this report were obtained by **Cube Automation** during on-site testing at the Xtreme Mattings Corp. facility, in October of 2016.

Test Method



This test was done using a manual press. The press has a digital indicator for load. A digital indicator was added to the setup to measure displacement. A steel plate 8" x 8", 1" thick was used to distribute the weight onto the product. The sample dimension was approximately 12" x 16". The plate was positioned onto an area where the mat was completely full of material (no void).

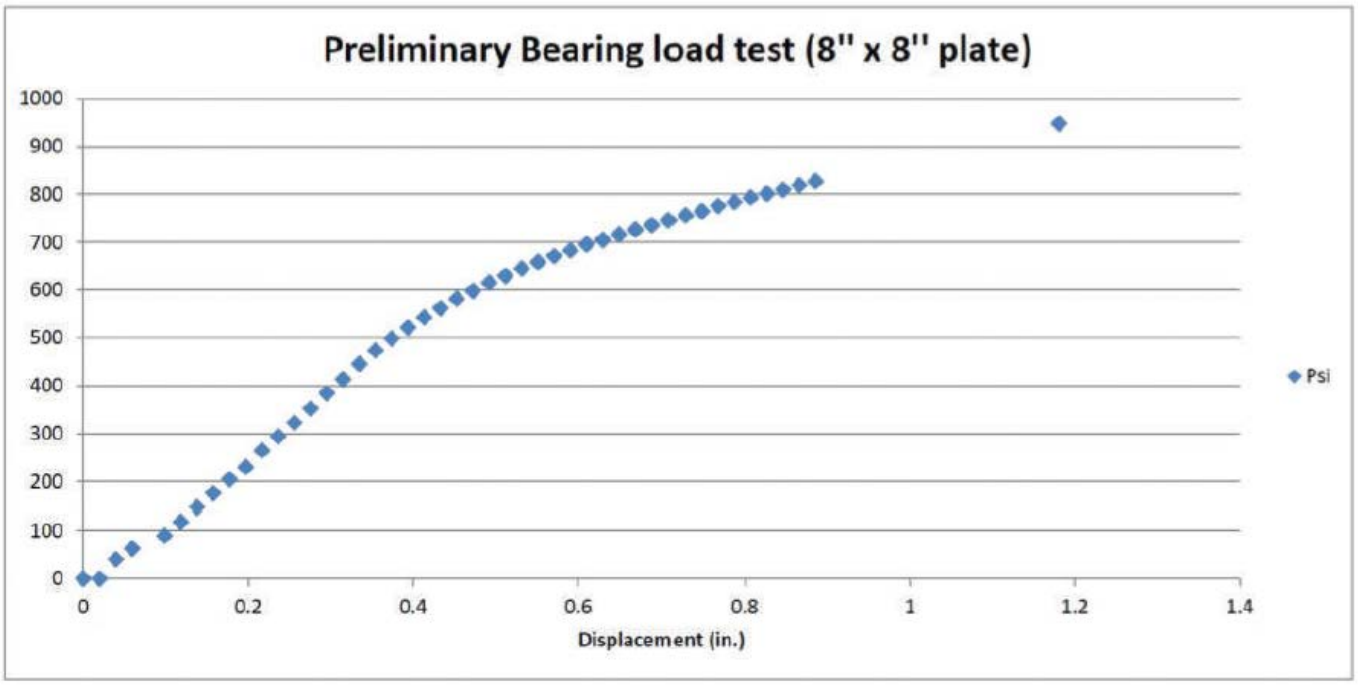
The force was applied slowly and consistently. Manual readings of force were taken every 0.5mm of displacement.

Test Results

The measurements were taken until the dial indicator for displacement was at its maximum. At that point (22.5mm) the force reading was indicating 235.6 kN or approximately 53,000 lbs. Equivalent to 828 PSI.

The press kept applying pressure although displacement could not be certain at this point. Prior to stopping the test, the force had reached 270 kN or approximately 60,700 lbs. Equivalent to 948 PSI.

The sample was removed, although the plate left an imprint into the sample the first plastic layer had no tear in it.



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Test Method

A mat was bought indoor and left several hours to have a stable temperature.

After finding the center of the mat the electrodes were positioned around the center per test format below.

Five tests in different location (Rtt #1 to #5) were done as per test format below. Resistance Point to Point was measured.

Due to anti-slip nature of the mat, the surface is rough. In order to have good conductivity from the probe to the mat slight pressure had to be applied.

Test Results

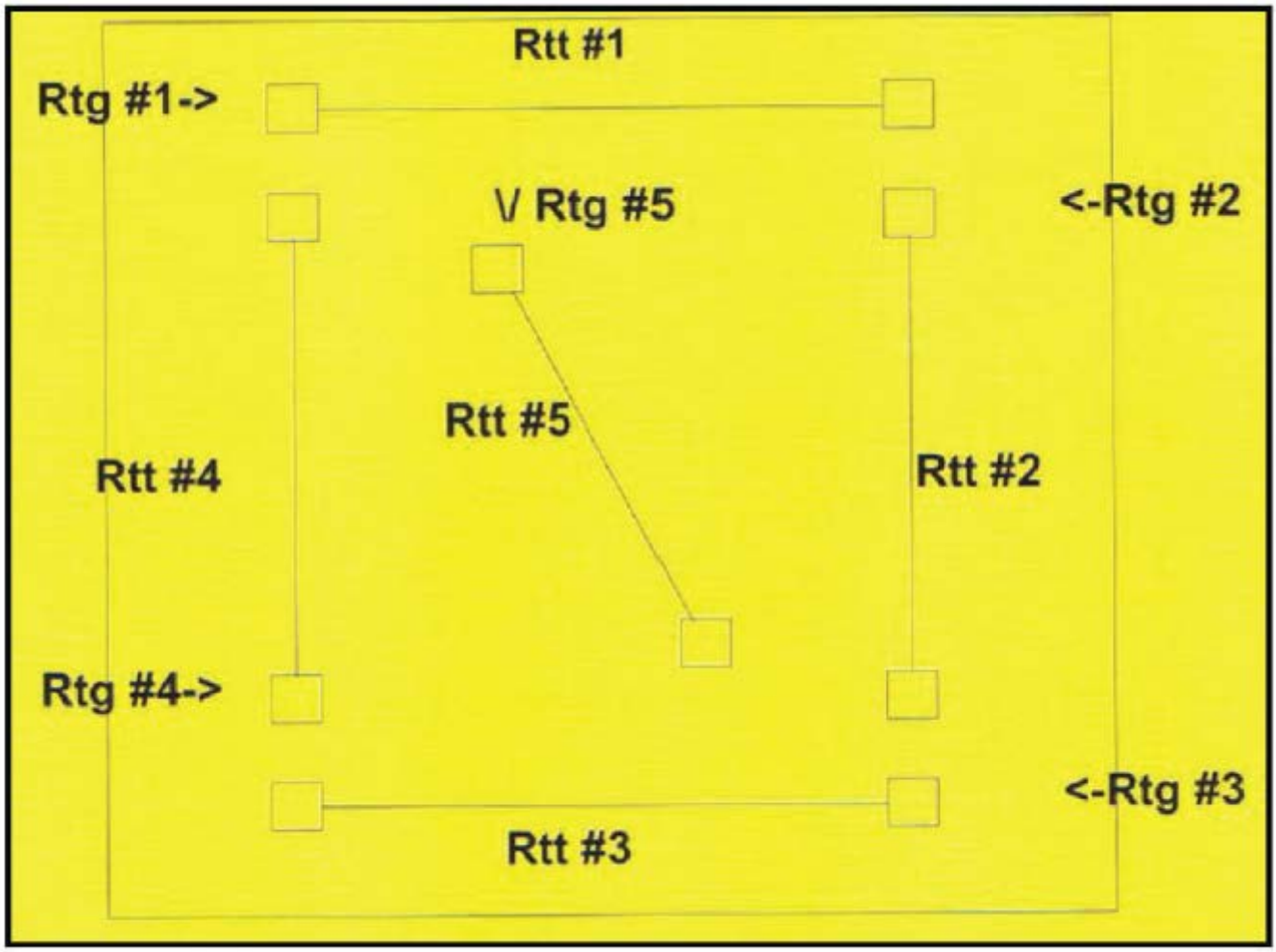


Figure 1: Test Format

Test Results Cont'd

Results

Operator: Louis DeGrâce, P.Eng.
Date: 2016/10/05

Test Voltage: 100 Volts (Automatic Mode)
Air Temperature: 23.9°C
Relative Humidity: 25–30%
Surface Temperature: 23.5°C

Position	Ohms
#1	6.60E+10
#2	1.73E+10
#3	2.50E+10
#4	1.73E+10
#5	1.07E+10

Average	2.73E+10
Min.	1.07E+10
Max:	6.60E+10

The average resistance measured during this test is **2.73 E^{10} Ohms.**

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The results in this report were obtained by COREngineering using FEA simulation while testing the Xtreme Matting System.

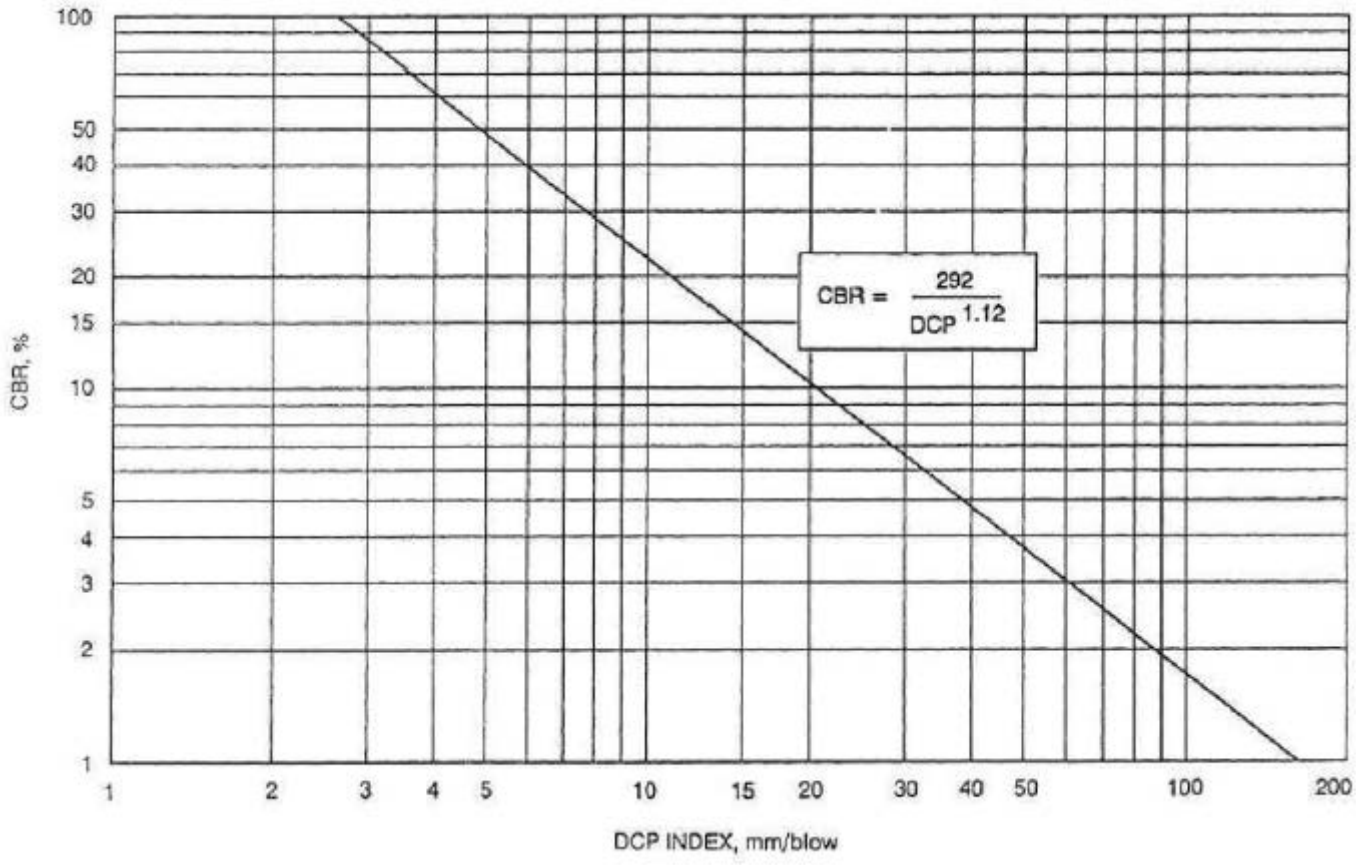


Soil Strength vs California Bearing Ratio (CBR)

$$CBR = \frac{\text{penetration resistance of sample}}{\text{penetration resistance of crushed rock}}$$

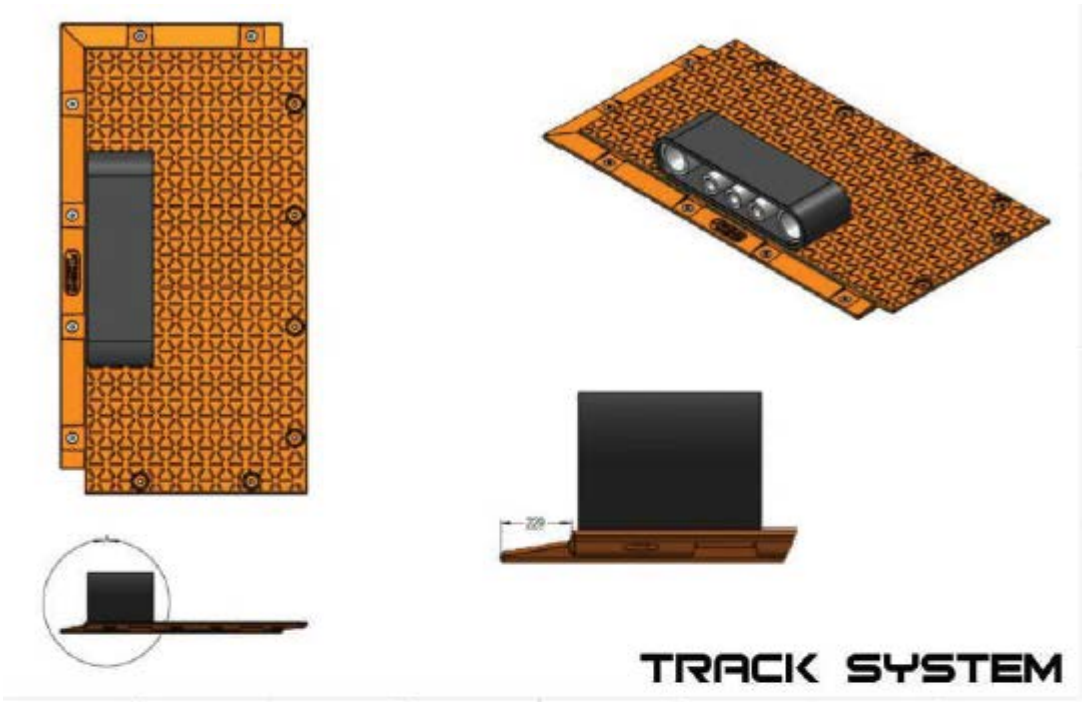
A California Bearing Ratio (CBR) test as per ASTM standard D4429 will have to be performed on site to determine the proper CBR to use for maximum loads.

A Dynamic Cone Penetrometer (DCP) test as per ASTMD6951 can also be performed on site and converted to CBR using the chart below.

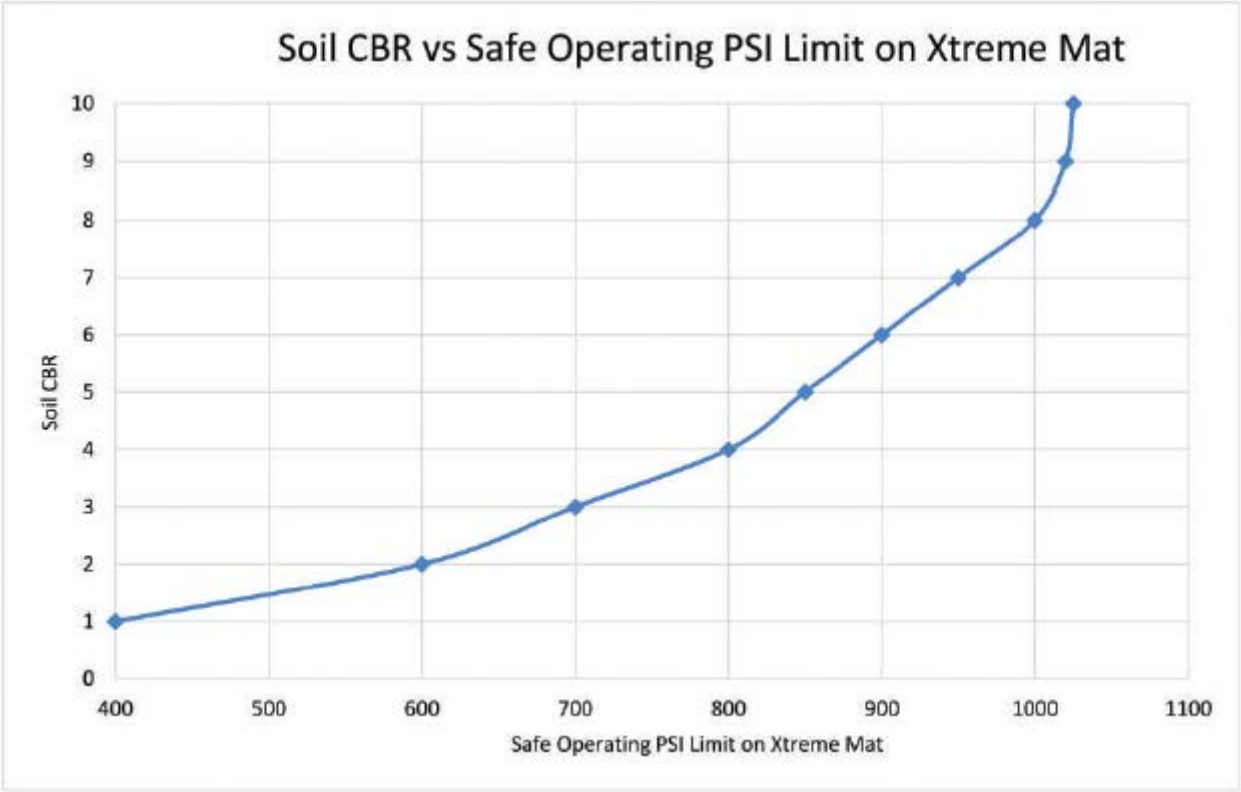


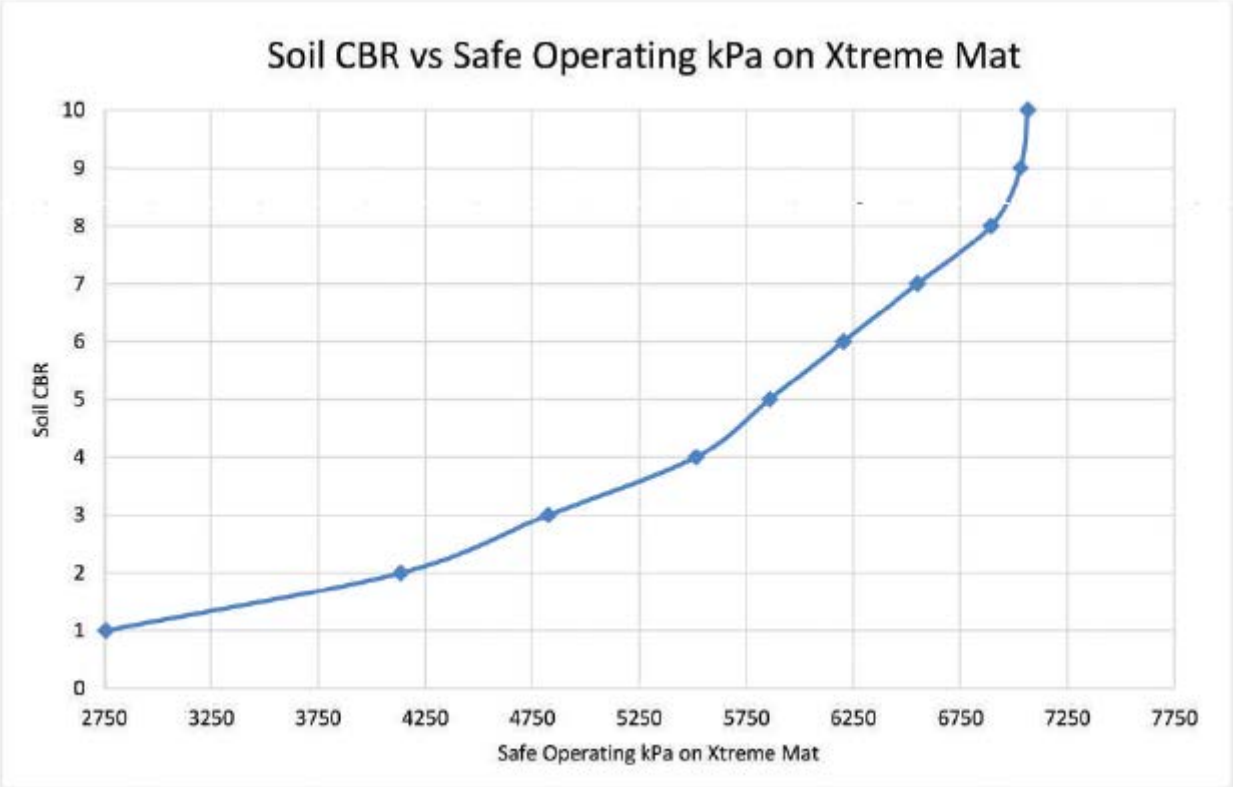
Constant Pressure Load

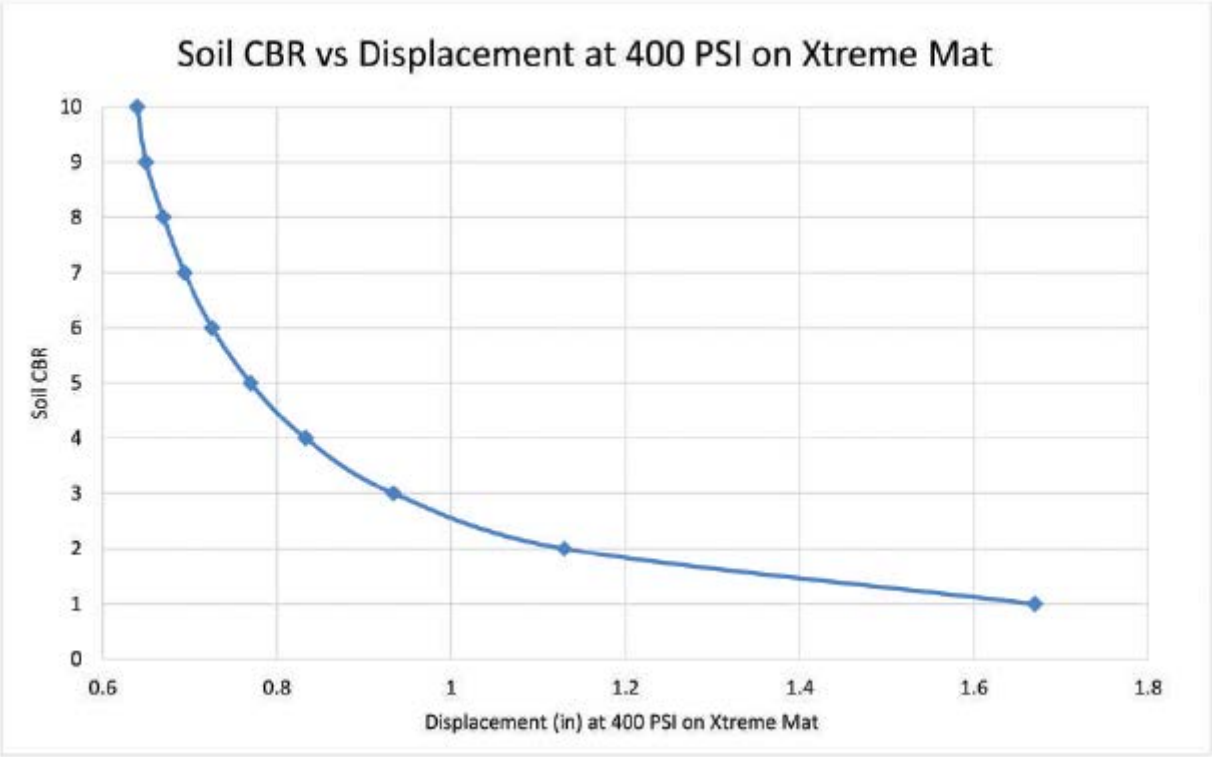
To test the safe operating limits of the Xtreme Matting System, the method used constant pressure loads of various track & tire systems of different sizes over simulations of various grades of CBR soils.

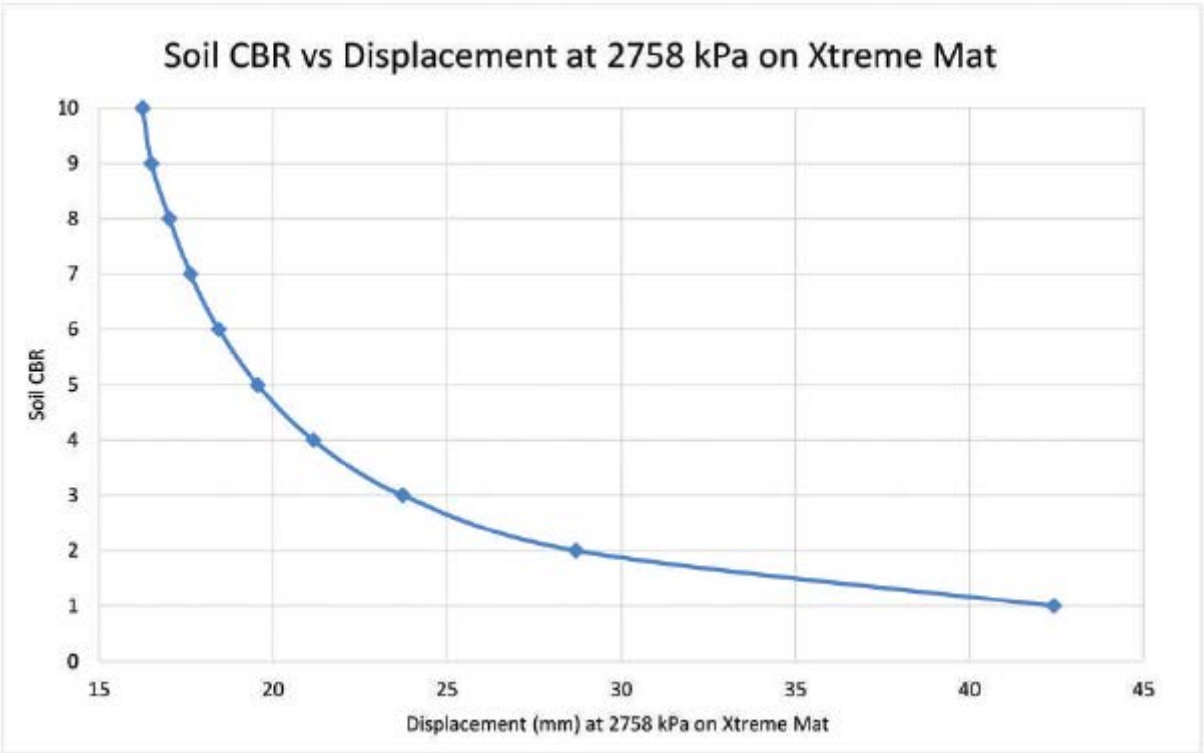





Soil CBR vs Safe Operating PSI Limit on Xtreme Mat
Soil CBR
0
1
2
3
4
5
6
7
8
9
10
400
500
600
700
800
900
1000
1100
Safe Operating PSI Limit on Xtreme Mat


Soil CBR vs Safe Operating kPa on Xtreme Mat
Soil CBR
0
1
2
3
4
5
6
7
8
9
10
2750
3250
3750
4250
4750
5250
5750
6250
6750
7250
7750
Safe Operating kPa on Xtreme Mat


Soil CBR vs Displacement at 400 PSI on Xtreme Mat
Soil CBR
10
9
8
7
6
5
4
3
2
1
0
0.6
0.8
1
1.2
1.4
1.6
1.8
Displacement (in) at 400 PSI on Xtreme Mat


Soil CBR vs Displacement at 2758 kPa on Xtreme Mat
Soil CBR
10
9
8
7
6
5
4
3
2
1
0
15
20
25
30
35
40
45
Displacement (mm) at 2758 kPa on Xtreme Mat

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