

# Tifton Physical Soil Testing Laboratory, Inc.

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1014.01

Date Received: April 6, 2010  
 Date Reported: April 8, 2010  
 Sample Number: L81-10

Test Report For: Alliance Sand and Aggregates, LLC  
P.O. Box 1945  
Decatur, AL 35602  
 Attn: Rodney Terry

## PHYSICAL ANALYSIS<sup>1</sup>

MIXES ANALYZED (% by Volume)			SATURATED HYDRAULIC CONDUCTIVITY in/hr	POROSITY (%)			BULK DENSITY g/cm <sup>3</sup>	WATER RETENTION AT FIELD CAPACITY %	CHEMICAL	
SOIL	SAND	AMENDMENT		NON-CAPILLARY (air-filled)	CAPILLARY (water-filled)	TOTAL			pH <sup>2</sup>	EC <sup>3</sup> mmhos/cm
104 Bama Premium Bunker Sand			25.2	29.4	12.7	42.1	1.54	8.2	6.3	
USGA Recommendations for Root Zone Mix:			Minimum of 6 in/hr.	15 - 30	15 - 25	35 - 55				

PARTICLE DENSITY<sup>4</sup> 2.65 g/cm<sup>3</sup>

## PARTICLE SIZE ANALYSIS

SAMPLES	GRAVEL 2 mm %	SAND FRACTIONS (% Retained) <sup>5</sup>					SAND <sup>6</sup> 0.05-2 mm %	SILT <sup>6</sup> .002-.05 mm %	CLAY <sup>6</sup> <.002 mm %	ORGANIC MATTER <sup>7</sup> % by wt.
		VERY COARSE 1 mm	COARSE 0.5 mm	MEDIUM 0.25 mm	FINE 0.15 mm	VERY FINE 0.05 mm				
104 Bunker Sand	0.0	2.0	11.9	64.8	15.5	3.6	97.8	1.5	0.7	
USGA Recommendations for Root Zone Mix	≤ 10% (≤3% gravel)	← Bunker Sand →			60% minimum	≤ 20%	≤ 5%	≤ 5%	≤ 3%	

Note: Total 'fines' (very fine sand, silt, and clay) in a root zone mix should be less than (<) 10%.

1. Determined at 30 cm tension by USGA testing protocol (ASTM F1815) 2. ASTM D4972 3. SSSA Soluble Salts 4. SSSA Particle Density  
 5. ASTM C136 and F1632 6. Bouyoucos, 1962 7. ASTM F1647 7<sup>th</sup> Revision 11/12/07

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Revised 11/11/03

## Recommendations:

The 104 Bama Premium Bunker Sand from Alliance Sand and Aggregates, LLC was evaluated on April 7, 2010, to determine if it meets USGA recommendations as described in the enclosed USGA guidelines for selecting a bunker sand. The condition of the sample as received was normal.

The Sand is a medium sand with 76.7% particles within the USGA recommended range of 1.0 to 0.25mm for a bunker sand. The USGA recommends a minimum of 65% particles within this range. Therefore, this sand meets the USGA particle size recommendation for selecting a bunker sand.

The Sand has a minimal amount ( $\leq 3\%$ ) of silt and clay at 2.2%, so crusting of the surface layer should not be a problem.

The Sand is a mix of sub-angular and sub-rounded particles, medium sphericity in particle shape.

The Sand has a very white color, and a penetrometer reading of 2.8 kg/cm<sup>2</sup> which means it has a very low tendency to bury based on this fried-egg lie potential test.

The Sand is a silica sand and not a calcareous sand with a pH of 6.3.

The Sand had a water permeability rate of 25.2 in/hr. when compacted by the USGA procedure ASTM F1815 to simulate a compacted golf green. This is a very adequate rate for a bunker sand. The USGA recommends  $> 20$  in/hr. for a bunker sand.

**Conclusion:** According to USGA guidelines for selecting a bunker sand, this Sand is an excellent bunker sand. This Sand is outstanding in the seven guidelines the USGA recommends for selecting a bunker sand. This Sand is about as good as a bunker sand gets.

*Rowell Gimes*

Recommendations are based on the samples received. Results and comments relate to the samples tested. This report cannot be reproduced except in full, and not without written approval of the laboratory.

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## Recommendations:

The USGA offers the following seven guidelines when selecting a bunker sand.

1. Minimum of 65% sand particle size between 0.25mm and 1.0mm.
2. Sharp, angular sand preferred to round particle shape to reduce fried-egg lie potential.
3. Minimal amount ( $\leq 3\%$ ) of silt and clay to prevent crusting of the surface layer.
4. Silica sand preferred over calcareous sand.
5. A minimum infiltration rate of 20 in/hr.
6. Lighter colored sands are preferred for aesthetics.
7. Playability consisting of consistency and good management.

Reprinted from USGA Green Section Record. Jan/Feb, 1998.

*Powell Gaines*

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