TURF-TEC SAND BRASS SIEVE SET

These solid brass sieves are a full eight inches in diameter and are the same type of sieves used by laboratories and Universities for particle size analysis.

These sieves are excellent for determining the particle size of sand. It is ideal for checking topdressing sands, measuring the consistency of sand trap sands and a must for use during construction.

The Sand Brass Sieve Set comes with a full USGA breakdown with six, eight inch diameter sieves that form a stack with the below diameter mesh screens. The set also includes a top and bottom pan.

The sieves placed in sequential order of largest to smallest will allow a complete particle size breakdown.

DIMENSIONS & SPECIFICATIONS:

Brass Frames.
Brass Cloth and Bronze Phosphorous for smaller meshes.
Sieves are 8" Inches in diameter (or)
Height of 2" Inches.
They fit into each other to form a stack.
Sieve cover and pan are included.

Gravel Sizes are also available.

USGA Class	US Standard Mesh Number	Millimeter Size	Inches
Very Course	10	2.00 MM	.0787
Coarse	18	1.00 MM	.0394
Medium	35	.50 MM	.0197
Fine	60	.25 MM	.0098
Very Fine	100	.15 MM	.0059
Silt	270	.05 MM	.0021

These Millimeter size recommendations and classification are by the United States Department of Agriculture System and USGA.

Instructions

1. **Place the sieves together with the largest size at the top and consecutively smaller mesh as the sieves go under each other.**

2. **Place the pan under all the sieves.**

3. **The material to be tested should be thoroughly dried. Material is easiest dried by spreading out material on newspaper in full sun for an hour or so, lightly stirring material after 30 minutes until dry.**

4. **Measure out a dry amount of material on a scale. (An inexpensive postage scale will work fine.) Use a nice even number in ounces or grams.**

5. **After the material has been weighed and recorded, pour the material to be tested into the top sieve.**

6. **Place the cover on the sieve set and slightly lift top sieve off stack and shake it over the remaining stack. Be sure all the material from the top sieve falls into the stack below. Shake the top sieve for a couple minutes. (Shaking time may vary from mix to mix depending on amount of fines.)**

7. **Remove the cover. Remove the top sieve and pour the material on a clean sheet of paper and weigh the amount. (A dry toothbrush may be needed to get all particles out of the sieve.) Record the results.**

8. **Repeat the weighing process until all the sieves have been emptied and the results recorded.**

9. **Finally take each weight and use the following calculation to find the percentage of each particle size:**

	Divided Into			Multiply By		
Weight of Particles in Each sieve	÷	Total dry Weight of Sample	×	100	=	Percent Of Particle

**** If scale is unavailable put sand in piles on a piece of cardboard and compare sizes of piles. A rough estimate can be made of the volume of each separation.**

2004 Revision of the USGA Recommendations for a Method of Putting Green Construction*

Particle Size Description of Gravel and Intermediate Layer Material

Material	Description
Gravel: Intermediate layer is used	Not more than 10% of the particles greater than 1/2" (12mm)
Gravel: Intermediate layer is used	At least 65% of the particles between 1/4" (6mm) and 3/8" (9mm)
Gravel: Intermediate layer is used	Not more than 10% of the particles less than 2 mm
Intermediate Layer Material	At least 90% of the particles between 1 mm and 4 mm

Size Recommedations for Gravel When Intermediate Layer is not Used

Performance Factors	Recommendation
Bridging Factor	D15 (gravel) less than or equal to 8 X D85 (root zone)
Permeability Factor	D15 (gravel) greater than or equal to 5 X D15 (root zone)
Uniformity Factors	D90 (gravel) / D15 (gravel) is less than or equal to 3.0
Uniformity Factors	No particles greater than 12 mm
Uniformity Factors	Not more than 10% less than 2 mm
Uniformity Factors	Not more than 5% less than 1 mm

A. Selection and Placement of Materials When the Intermediate Layer Is Used

Table 1 describes the particle size requirements of the gravel and the intermediate layer material when the intermediate layer is required.

The intermediate layer shall be spread to a uniform thickness of two to four inches (50 to 100 mm) over the gravel drainage blanket (e.g., if a 3-inch depth is selected, the material shall be kept at that depth across the entire area), and the surface shall conform to the contours of the proposed finished grade.

B. Selection of Gravel When the Intermediate Layer Is Not Used

If an appropriate gravel can be identified (see Table 2), the intermediate layer need not be included in the construction of the green. In some instances, this can save a considerable amount of time and money.

Selection of this gravel is based on the particle size distribution of the root zone material. The architect and/or construction superintendent must work closely with the soil testing laboratory in selecting the appropriate gravel. Either of the following two methods may be used:

Send samples of different gravel materials to the lab when submitting samples of components for the root zone mix. As a general guideline, look for gravel in the 2 mm to 9.5 mm range. The lab first will determine the best root zone mix, and then will test the gravel samples to determine if any meet the guidelines outlined below.

Submit samples of the components for the root zone mix, and ask the laboratory to provide a description, based on the root zone mix tests, of the particle size distribution required of the gravel. Use the description to locate one or more appropriate gravel materials, and submit them to the laboratory for confirmation.

Gravel meeting the criteria below will not require the intermediate layer. It is not necessary to understand the details of these recommendations; the key is to work closely with the soil testing laboratory in selecting the gravel. **Strict adherence to these criteria is imperative; failure to follow these guidelines could result in greens failure.**

The criteria are based on engineering principles which rely on the largest 15% of the root zone particles "bridging" with the smallest 15% of the gravel particles. Smaller voids are produced, and they prevent migration of root zone particles into the gravel yet maintain adequate permeability. The D85 (root zone) is defined as the particle diameter below which 85% of the soil particles (by weight) are smaller. The D15 (gravel) is defined as the particle diameter below which 15% of the gravel particles (by weight) are smaller.

- For bridging to occur, the D15 (gravel) must be less than or equal to eight times the D85 (root zone).
- To maintain adequate permeability across the root zone/gravel interface, the D15 (gravel) shall be greater than or equal to five times the D15 (root zone).
- The gravel shall have a uniformity coefficient (Gravel D90/Gravel D15) of less than or equal to 3.0.

Furthermore, any gravel selected shall have 100% passing a 1/2" (12 mm) sieve and not more than 10% passing a No. 10 (2 mm) sieve, including not more than 5% passing a No. 18 (1 mm) sieve.

Step 4 - The Root Zone Mixture

The sand used in a USGA root zone mix shall be selected so that the particle size distribution of the **final root zone mixture** is as described in Table 3.

Table 3

USGA Specifications

www.usga.org

USGA Recommendations for a method of putting green construction

Classification	Particle Diameter Range	Percentage(%)	
Fine gravel	3.4 to 2.0 mm	Less Than 3 %	10% Max
Very coarse sand	2.0 to 1.0 mm	Less Than 10 %	
Coarse sand	1.0 to 0.50 mm	20 to 40 %	At Least 60%
Medium sand	0.50 to .25 mm	20 to 40 %	
Fine sand	0.25 to 0.15 mm	Less Than 20 %	20% Max
Very fine sand	0.15 to 0.05 mm	Less Than 5 %	10% Max
Silt	0.05 to 0.002 mm	Less Than 5 %	
Clay	Less Than 0.002 mm	Less Than 3 %	

ASTM Specifications

(American Society for Testing and Materials) ASTM.ORG

F-2396-04 Construction of High Performance Sand-Based Rootzones

Classification	Particle Diameter Range	Percentage(%)	
Gravel	Greater Than 4.75 mm	0%	
Gravel	4.75 to 3.4 mm	Less Than 5 %	30% Max
Fine gravel	3.4 to 2.0 mm	Less Than 20 %	
Very coarse sand	2.0 to 1.0 mm	Less Than 20 %	
Coarse sand	1.0 to 0.50 mm	25 to 50 %	At Least 60%
Medium sand	0.50 to .25 mm	25 to 50 %	
Fine sand	0.25 to 0.15 mm	Less Than 10 %	15% Max
Very fine sand	0.15 to 0.05 mm	Less Than 5 %	
Silt	0.05 to 0.002 mm	Less Than 5 %	
Clay	Less Than 0.002 mm	Less Than 3 %	

Soil Selection:

If soil is used in the root zone mix, it shall have a minimum sand content of 60%, and a claycontent of 5% to 20%. The final particle size distribution of the sand/soil/peat mix shall conform to that outlined in these recommendations, and meet the physical properties described herein.

Organic Matter Selection:

Peats - The most commonly used organic component is a peat. If selected, it shall have a minimum organic matter content of 85% by weight as determined by loss on ignition (ASTM D 2974 Method D).

Other organic sources - Organic sources such as rice hulls, finely ground bark, sawdust, or other organic waste products are acceptable if composted through a thermophilic stage, to a mesophilic stabilization phase, and with the approval of the soil physical testing laboratory. Composts shall be aged for at least one year. Furthermore, the root zone mix with compost as the organic amendment must meet the physical properties as defined in these recommendations. Composts can vary not only with source, but also from batch to batch within a source. Extreme caution must be exercised when selecting a compost material. Unproven composts must be shown to be nonphytotoxic using a bentgrass or bermudagrass bioassay on the compost extract. **Inorganic and Other Amendments:** Porous inorganic amendments such as calcined clays (porous ceramics), calcined diatomites, and zeolites may be used in place of or in conjunction with peat in root zone mixes, provided that the particle size and performance criteria of the mix are met. Users of these products should be aware that there are considerable differences between products, and long term experience with some of these materials is lacking. It should also be noted that the USGA requires any such amendment to be incorporated throughout the full 12-inch (300 mm) depth of the root zone mixture. Polyacrylamides and reinforcement materials are not recommended.

*Source for most of above information is located at:

http://www.usga.org/course_care/articles/construction/greens/USGA-Recommendations-For-A-Method-Of-Putting-Green-Construction(2)/