# SANDS FOR SPORTS TURF USE

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Presently there is a sharp increase in the demand for high quality sports turf. Sport turfs are those natural turfs that host soccer, football, baseball and similar participation games both professionally and recreational. For a sports turf to be successful it must be well-drained for use in any weather and it must offer good traction in addition to good density, wear characteristics, color and so forth. A review of the various sports turf construction designs to meet these criteria shows sand to be a common denominator.

There are a number of different characteristics for sand that I will discuss. Unlike other materials we use for our growing mediums, sand can be more accurately defined and specified than say a loam topsoil or peat. In Michigan we have the largest deposits of naturally occurring sands known to exist in the world. Most visible are our sand dunes along Lake Michigan but large quarry deposits exist throughout the state. In other parts of the world, some sand can be gotten from the oceans but old stream beds often have excellent sand that can be used with a minimum of washing, sieving, of hydrosizing.

For use in sports turf a sand should be specified as to its infiltration rate, physical sizing, the shape of its grains, chemical makeup, and its hydraulic conductivity. When I look for a sand I first consider uniformity of particle size. Ideally most researchers agree a sand for use in a growing medium should be from .25 mm to .35 mm diameter with at least 80% falling in this range. For those of you familiar with dune sand it is about .25 mm and generally 85% uniform. If you work with sieve sizing, this is a #40 to #60 screen. The American Foundry Association calls a 1 to 2 mm sand very coarse and below a .125 mm very fine sand. Particle uniformity dictates how we use the sand in sports turf to its best advantage. It is a geometric law that a solid to void ratio exists if spheres are uniform in size. What this states is we know the pore space in a bucket of baseballs with precision. However, if we add golf balls and ball bearings to the bucket of baseballs, we are filling the pore space around the baseballs and canceling our ability to state pore space.

Poor space is vital to any turf but critical to sports turf. When we have a variety of pore spacing in the growing medium we run the risk of realigning the particles primarily in the upper inch or two of growing medium when the turf is used under very wet conditions. We can, and do, change the porosity of our growing medium when the soil is super saturated making it unacceptable both with respect to drainage and ultimately as a playing surface. If you purchase a sand with very large or fine particles you are not improving a soil structure if the sand is being incorporated. If you use a sand

with a large amount of fines in a sand bed construction, by pass, or pat field, you have greatly reduced your infiltration.

Infiltration and hydraulic conductivity are the second properties I look at when considering a sand as the or a part of growing medium. Generally a good sports turf sand will have an infiltration rate of 30 inches per hour with hydraulic conductivity (water under pressure) greater than this. You can measure infiltration fairly easily by using a cylinder with the sand in it, open at one end and double cheese cloth over the other. Measure water passing through without allowing any water to stand or create a head on the sand when pouring water. After one minute measure the water, multiply by 60 to get inches per hour. Hydraulic conductivity can be done several different ways, requiring care in setting up and procedure. One method involves maintaining a given head of water over the sand while adding water whereas the other involves pushing water through the sand column from the bottom. There are qualified labs that can perform this for you.

My next consideration is the pH and mineral content of the sand. Sands normally have high pH values. Additionally a freshly washed or processed sand will run considerably higher in pH than it will one year later. Due to the very low cation or non-cation existent, a buffered water pH reading will give an unreliable evaluation. A better way is to use an acid value demand test. This involves the use of HCl acid and measures the loss of weight in the sample which consumes the alkalinity. The origin of the sand comes into consideration if the sand were say mica in origin. The large plate-like structure would have a greater surface for chemical activity. If the sand has any limestone origin it will break down chemically. Iron and other metals can form precipitates and block pore space, particularly if the sand has a high percentage of less than .125 mm particle size.

Finally, I consider particle shape. Wind blown sands, such as dunes are generally well rounded. A round sand grain is thought by many to be more unstable with a less shear strength than an angular particle grain shape. Inter particle friction is greater for angular particles than round particles and in theory offers greater stability but in my experience I find little difference. If I can choose among the previous factors, then the particle is of minor concern.

If all of this seems too detailed, consider that I reviewed at least ten detailed sand specifications from extremely well-qualified turf researchers that do not agree in total with their colleagues. The purpose of this discussion is to recognize the properties of a good sand for sports turf usage be it for drainage, construction, or top dressing. Price in today's market can range from $6.50 per ton to over $20.00 per ton depending on transportation and availability. When you purchase a sand be certain to specify exactly what you need and check the loads delivered on a random basis for consistency.