News and Views on the USGA Specifications

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IT HAS BEEN SAID that there's more than one way to build a green. This fact has been well established through the years as different "systems" of green construction have been used. While some systems have been very successful, others have not. Promises of lower construction costs often have compromised agronomic soundness. Certain systems have even been outright irresponsible from an environmental viewpoint.

The USGA specifications for green construction are the most widely accepted in the industry, the standard to which other methods are often compared. Many years of experience and research went into the original specs that were developed by Dr. Marvin Ferguson and his associates 30 years ago. Revisions in 1973 and 1989 incorporated new research, technology, and materials. Such is the case now, as a new version of the specs is expected soon. In fact, the USGA has just completed its most thorough review of the specifications since they were first published in 1961.

The goal of the USGA in supporting this review was to provide practical construction specifications that not only assure success, but are flexible enough to accommodate conditions inherent to a particular site or climate. All sections of the specifications have been reviewed and revised, with input provided by soil and turfgrass scientists, architects, contractors, and superintendents in the United States and abroad.

The following are some pending changes in the specifications. Please realize that these changes are preliminary as of this writing, and the published specifications will be the final word.

The Subgrade and Drainage

One of the outstanding qualities of a USGA green is its ability to provide excellent surface and subsurface drainage. Minor changes in the specifications should make subsurface drainage foolproof, regardless of the contours in the green above.

Among the changes in this section are slightly different procedures for contouring the subgrade and placing the drainage tiles. The new specifications will describe a system better able to intercept and remove subsurface water. For example, one change will call for the placement of a perimeter tile at the low end of the gradient to prevent a wet spot from developing at that point. Several other changes have been added, including:

- Geotextile fabrics will be allowed in USGA specification greens, but only *under* the gravel blanket to prevent settling of gravel into unstable subsoils.
- Poor-quality stone, such as soft limestones, sandstones, and shales, will not be acceptable.
- Tips on selecting stone will be added. Angular stone (¼ to ⅜ inches) will be suggested since it is more stable and easier to shape than rounded pea gravel.

Avoid the cost and disruption of reconstruction by building it right the first time.

Intermediate Coarse Sand Layer

Current USGA specifications call for the placement of a 2- to 4-inch layer of very coarse sand between the gravel and rootzone mix. The original purpose of this layer was to prevent the rootzone mix from migrating into the sand layer. Its presence in the green profile also forms a perched water table in the rootzone, a trait that conserves water.

The coarse sand layer has for years been a controversial element in the specifications. Architects and contractors have frequently cited its high cost and difficulty in placement as reasons to eliminate it. Right or wrong, they frequently build greens without the coarse sand layer. As of this writing, the fate of the coarse sand intermediate layer has not been decided. It probably will remain, but the options for materials will be expanded and better defined.

The Rootzone Mixture

The rootzone mix of a USGA green is composed of a mixture of sand with peat and/or soil. Past specifications have exactly defined the particle size of the sand to be used, but have been vague in defining the organic and soil components. It is in this area that the USGA felt there could be many improvements.

The new specifications will set limits on the amount of gravel and very coarse sand allowed in the rootzone mix. These limits should prevent doughty mixes from being allowed, mixes that may have met the 1989 specifications. Also, it is likely that the specifications will have greater allowances for fine sands, with tighter restrictions on very fine sands.

Where soil is used in a mix, the specifications will clearly define soil types acceptable to use.

Many times new greens do not perform to expectation. My experience has been that green failure often can be blamed on the poor quality of the organic source used in the mix. The new USGA specifications will include guidelines for organic matter selection that should help prevent failure. Only high-quality organic sources, meeting specific criteria in areas such as ash and fiber content, will be allowed in a USGA rootzone mix.

Rootzone mixtures meeting USGA specifications are required to meet a set of laboratory-measured physical parameters. Measured under a standard compaction treatment, the porosity, bulk density, and moisture retention values provide a sense of how well a rootzone mixture will support plant growth. In the new specifications, minor adjustments will be made in the acceptable ranges of these measurements to eliminate minor technical inconsistencies.

Infiltration rates, omitted from the 1989 specifications, provide a sense of how well a rootzone mix will drain. The desired infiltration rate for a mix will depend on conditions in which the green is grown. Fast-draining greens are needed where water quality is poor so that salts can be leached occasionally from the rootzone. Fast drainage also is needed where bentgrass is grown in tropical or subtropical climates.

On the basis of these needs, the USGA specifications will provide at least two desirable ranges of acceptable infiltration rates, one being a normal range, the other for situations where rapid drainage is needed. An intermediate range also may be included. A set of ranges such as these will provide flexibility so that rootzone mixes can be designed to match the needs of the site.

An example of topmix construction materials: topmix sand, intermediate layer sand, and pea gravel. USGA specifications for green construction are the most widely accepted in the turfgrass industry.

Laboratory Standards

Imagine having your blood samples sent to two labs, with the reports varying in their outcome. Also, how stable would skyscrapers be if there were no standard test methods for the stability of underlying rock and soil? Standard test methods have been used for years in the medical, construction, and other industries.

No such standards have ever been invoked in the golf construction industry. This should at least partially explain why split rootzone mixes sent to different labs frequently come back with different results. Realizing this, and concerned because their specs are based on lab data, the USGA sought to correct it.

The turfgrass industry must first accept the fact that there is variability inherent to this entire process, from sampling (a major source) through testing, to the actual construction of the green. Results may differ by up to 10% for some values, such as infiltration rate. This inherent variability, however, could not explain the differences coming out of the labs.

How can this happen? Are there not written procedures for testing USGA mixes? There were procedures for testing USGA rootzone mixtures published in 1961 in the *USGA Journal* and *Turf Management*. While these procedures provided some guidance for compaction treatment, they were incomplete in many regards. Searching through other scientific publications, however, one can find accepted procedures for testing all the values required of a USGA rootzone mix.

Nine commercial laboratories willingly cooperated with the USGA on a project to correct these shortcomings in lab procedures. Potential sources of variation among the labs have been identified. Recently, standard test methods were written and then reviewed by several soil scientists. Quality assurance/quality control guidelines also have been written, and lab accreditation is being considered. While these standards are voluntary, all the lab directors expressed a willingness to conform.

Construction superintendents have enough to worry about without having to deal with the confusion of dissimilar lab data. Hopefully, this problem will be a thing of the past.

Summary

No construction specification is perfect, and greens will continue to be built by many different means. The USGA, however, has gone to great lengths to improve the revised version of their construction specifications. They should continue to serve as the standard for the industry.