



GREEN KEEPING TERMINOLOGY - KEY PRACTICES AND PROCEDURES

Aeration (include solid tining,
hollow tining, cores)

Golf course aeration is the process of punching holes and removing cores of soil and grass from greens and sometimes fairways. It is done to control organic matter, relieve soil compaction, stimulate root growth, improve drainage, and keep the turfgrass healthy. It may disrupt the smoothness of the playing surfaces for a short period of time, but it is an essential preventive maintenance. It may also involve verticutting, which is the removal of excessive thatch.



It is recommended that aeration work is done during the growing season, to reduce recovery time, although this means some temporary disruption to playing surfaces in the main playing season. Some courses carry out the work at the start and end of the playing season, as their business requires. Some have designated periods in the summer months, such as a maintenance week, where they don't take visitors and reduce green fee rates for a short period afterwards.

There are different ways to aerate, such as hollow tining, where cores are removed and either left or filled with a top dressing material, solid tining, where holes are punched in the surface (this is usually smaller sized holes) to break up soil, verticutting, and scarifying. These last two are covered separately below.

To help your understanding, you may find the following links and videos provided by BIGGA and the USGA, useful. You may wish to share these with your members to help their understanding.

[Why is it important to poke holes in your greens? | BIGGA](#)

[5 Things Every Golfer Should Know About Aeration \(usga.org\)](#)

[Bing Videos](#)

[Scarifying / Verticutting & Grooming](#)

Vertical mowing and grooming are maintenance practices periodically performed on greens to accomplish the following objectives:



Remove excessive leaf growth that contributes to puffy, spongy surface conditions.



Improve mowing quality and surface smoothness.



Cut laterally growing roots (stolons) and promote an upright growth habit.



Open grooves in the turf canopy for the incorporation of sand topdressing.



Dislodge and remove *Poa annua* seedheads.

The verti-cutting process involves using a putting green mower fitted with thin, tightly spaced blades that cut vertically into the turf. The depth of the blades is typically adjusted 1/64-inch to 1/8-inch below the effective cutting height so that the blades penetrate the turf canopy. The goal is to thin the turf canopy while maintaining a proper balance of leaf growth and turf density.

For additional information and explanation, please click the following link from the USGA:

[Grooming, Verticutting and Vertigrooming: Similarities, Differences and Keys to Success \(usga.org\)](#)

Top dressing

Top dressing is the process of spreading a layer of sand, or a mixture of sand and loam (nutrient-filled clay and organic material) across the green. Techniques usually fall into two camps, little and often, or heavy and rare, maybe just once or twice a year. Some of the benefits of top dressing are:



Keeping the putting surface rolling true, firm, and fast



Reducing compaction



Keeping a finer texture leaf



Increasing efficacy of fertilizer/fungicide



Reducing disease



Filling in any inconsistencies in the putting surface



Adding firmness



Reducing the impact of grain

It is important to understand your soil profile so you can apply the most beneficial type of top dressing to your greens, which, over a prolonged period of time, will provide all of the above benefits and aid drainage.

For more information on the benefits of top dressing, please click on these links:

[The Benefits Of Sand Topdressing_\(usga.org\)](https://www.usga.org/Grassroots/Topdressing/Topdressing-And-Quality-Putting-Greens-Go-Together-Like-Peas-And-Carrots)

[Topdressing And Quality Putting Greens Go Together Like Peas And Carrots \(usga.org\)](https://www.usga.org/Grassroots/Topdressing/Topdressing-And-Quality-Putting-Greens-Go-Together-Like-Peas-And-Carrots)

[Bing Videos](#)

Green Speed

This is usually measured with a stimp meter tend to range from 6 to potentially 14 and this value represents the distance in feet that a ball travels when an average is taken, when released from a set point on the stimp meter. A good speed to maintain is around 9, which can be maintained for most of the summer season, with only places like Augusta in tournament conditions reaching values of 13 or 14.

Typical recommendation from the R&A would tend to be around 9 or 10, even for a tournament, so balls on exposed courses, do not suffer from oscillation on the putting surfaces. Once green speeds get above 10, pace of play normally slows down. The stimpmeter is a simple piece of equipment, effectively a chute that a ball rolls down from an indentation in the chute, when lifted.

For a more comprehensive explanation including images and a video, please click here

[What is a stimpmeter and how does it work? | Golf Monthly](#)

Firmness

This is a measure of how firm a green is which indicates how a ball will react when it lands on it. There are many factors which can affect this, including moisture levels, the environment around the green and the organic matter levels in the rootzone/immediate sub-soil. It is measured using a device called a clegg hammer.

You may find this video from the PGA Tour of interest which can be viewed by clicking here:

[Bing Videos](#)

This article from the USGA provides some additional information on firmness but also why it helps to manage greens which are firmer in character:

[Understanding And Appreciating Firmness \(usga.org\)](#)

Additional information on a clegg hammer can be found here:

[Clegg Hammer - Impact Soil Tester Type CIST/883 – Golf Course Agronomy Tools | Pitchcare](#)

Truness & Smoothness

Truness is a measure of whether the ball deviates from side to side during its normal roll and smoothness is a measure of whether the ball deviates from the ground vertically as it follows its natural roll. Most golfers prefer greens which are smooth and true, to ones which are fast. There are several ways to measure smoothness and trueness, which are explained in this video from Turfgrass Asia, a specialist golf agronomist.

[How to measure the smoothness and trueness of golf course putting greens? - YouTube](#)

The important thing to remember in measuring smoothness and trueness is to be consistent in how you measure and the method you use, so you can have comparable results over time.

Moisture content

This is a measure of the amount of moisture in the soil. This measure can be particularly useful in helping evaluate how much irrigation is required to be applied to a green to keep it healthy without over watering. With water becoming an increasingly important resource, positive water management will become more important in the coming years. Monitoring moisture levels will also help in your firmness evaluation and courses of action you may take in the future. It is measured using a moisture meter, which provides the hydrostatic values for the soil. In periods of drought, or when irrigation systems do not fully cover certain areas, you may find some areas of turf become what is known as hydrophobic, meaning that moisture will not soak through the surface when applied, which creates dry patches with dead or no grass coverage. You will know if an area has become hydrophobic as when drops of water are applied, they stay as globules of water on the surface.

An informative video from the USGA can be viewed through this link:
<https://www.youtube.com/watch?v=>

Nap

This is less prominent on greens in the UK but still present and is the way that the grass leaf grows or is leaning, sometime referred to as grain in other parts of the world. A Ball will roll slower if it is running in the opposite direction to the nap, and quicker if it is rolling in the same direction. For certain grass types a strong nap can affect the curve on the ball when putting if you are putting sideways to the nap or grain of the grass. If you always cut the grass in the same direction it can create a nap, or lean on the grass. To combat this, greenkeepers usually operate with cut plans on greens, so they cut them in a different direction on a rotational basis every time, such as on a basic level, 12 o'clock, 3 o'clock, 6 o'clock and 9 o'clock.

Root Zone

Rootzone is a term used for the soil layers from the surface down in sports turf surfaces. The soil can consist of many different types and a firm understanding of your rootzone composition, in particular under each of your greens, is very important. It can affect drainage, firmness, trueness, smoothness, water requirements, and ultimately how your greens play at different times of the year, in differing weather conditions. An agronomist will also look at things like particle size in your rootzone, to aid drainage and previously mentioned treatments such as aeration and dressing, can be used to overcome issues.

When constructing a new green, an industry standard is to build what is called a USGA specification green, this is considered the optimum to enable good grass coverage of the desired grass type, good root health, good drainage from the surface down, and a green which

displays good levels of firmness, smoothness, and trueness. They tend to be more playable all year round, as they are firmer in character than greens constructed in the UK over around 30 years ago.

To view some background information on how USGA specification greens were established as an industry standard, click here:

[USGA Putting Green Construction Recommendations Explained - YouTube](#)

To view what a USGA green is composed of, and how it is constructed, click here:

[USGA Putting Green Construction Recommendations - Shaping The Green - YouTube](#)

To view a detailed USGA video on USGA specification green construction, please click here:

[USGA greens construction video - YouTube](#)

Organic Matter / Thatch

This is a layer from the surface of the turf, where a buildup of undesirable organic matter has evolved. This retains moisture like a sponge, and high levels of organic matter mean your greens are likely to be very soft in winter or wet periods. In dry periods they will become much firmer, which can be deceptive in the summer months and mask issues. High levels of organic matter can affect drainage from the surface, as water finds it harder to pass through, and it can significantly affect the types of grass that will grow. It encourages grasses which are more invasive and disease prone like poa annua, whereas low levels of organic matter with a sandier sub soil/rootzone, can help promote the growth of fescue and bet grasses which can

remain healthier all year round and produce faster and smoother greens, at higher cut heights, keeping the grass plant stringer and healthier. They are also more drought resistant, so require less irrigation.

Grass Types

There are many different grass types in the world, and you will hear names such as Bermuda and Kikuyu from places such as Florida, South Africa and Australia. Some of the more frequently occurring species in the UK tend to be fescue and bent grasses, which are better to encourage as they require less water, are more drought resistant, can be cut at higher lengths to still enable speedy and smooth putting surfaces and are more disease resistant. The less desirable species are Yorkshire fog, which has a very broad, sticky leaf and rye grass. That said, rye grass is used in places of high footfall on golf courses, such as grass pathways, as it is hardier. It is less desirable as a playing surface and can create wiry stalks that are difficult to cut on fairways. Poa annua is the most dominant type of grass in the UK and tends to invade greens of desirable grass types if not kept in check, (which should be noted, is a very difficult process). Poa annua is sometimes called meadow grass, and it tends to seed significantly in early season, giving an almost white sheen to greens at that time. The shorter you cut poa annua, the more stressed the grass becomes and the more it then seeds, creating a vicious circle. Poa annua is also more susceptible to diseases such as fusarium (fuzz) and dollar spot.

Common Diseases

There are many different types of disease which are all becoming increasingly challenging to treat as restrictions on pesticides and fertilisers become tighter and restrictive. Preventative measures are now a better way of tackling these problems, as treatment to cure

becomes harder. Some of the more common diseases are fusarium, red thread, dollar spot, dry patch, anthracnose and fairy rings.

To view an informative article from Syngenta showing these more common types of disease, along with identifying pictures, and to gather further information on them, we would encourage you to click [here](#):

[Disease Notes | Syngenta Turf & Landscape](#)

NPK Values

The letters "NPK" on a fertilizer label stand for nitrogen, phosphorus, and potassium, the three primary nutrients plants need to grow. The numbers on the label indicate the ratio (by percentage) of nitrogen, phosphorus, and potassium in the fertilizer container.

Even if you do not see the letters N-P-K, but you see a set of three numbers, for example, 5-10-5, you can correctly assume it stands for 5% nitrogen, 10% phosphorus, and 5% potassium, always in that order. This fertilizer contains 20% nutrients; the remaining 80% is minor nutrients or fillers. Plants need about 16 nutrients; some they get from the air and water, and others are nutrients like iron, calcium, and chlorine from soil.

Nitrogen

Nitrogen, the first number referenced in an NPK sequence, plays a key role in a plant's coloring and chlorophyll production, making it an important factor in leaf development. Fertilizers high in nitrogen are often used for grass or other plants where green foliage growth is more important than flowering. At the opposite end of the spectrum, gardeners sometimes encounter the problem of nitrogen depletion -

the yellowing of typically green plants often indicates a nitrogen deficiency.

Phosphorus

The middle number in an NPK series refers to the percentage of phosphorous in the fertilizer product. Phosphorus plays a key role in the growth of roots, blooming, and fruiting, which is why it is an essential nutrient for your plants in spring. Phosphorus contributes to many fundamental plant processes, such as rooting and seed formation.

Potassium

The final number in the major ingredients listing gives the percentage of potassium in the product. Potassium contributes to the overall health and vigor of plants. It is known to help strengthen plants' ability to resist disease, assist in the movement of water and nutrients in the plant, and can be especially important in areas that experience cold or dry weather.

Granular vs liquid

Most fertilisers are applied on a golf courser in liquid form, which is becoming increasingly the preference. This way of applying fertilizer goes straight onto the leaf and is absorbed quickly by the plant. There is also little to no disruption to the playing surfaces, in particular on putting greens. Some of the issues with this are having to use spraying equipment to apply, training of team members to be qualified to spray product, mixing the product correctly before application, and clean down of equipment post application. Granular applications can also be used, although these do not go straight into the plant. They are absorbed over a longer period, slow release, which can sometimes be preferable. Some of the downsides of granular application is that

you should use fine grain, as anything larger can have a detrimental effect on the playing surface whilst it is breaking down. It can also be moved through mowing and foot traffic, so the initial even spread can be changed.

Cut Direction

This is the effect that offers aesthetics on greens, fairways and surrounds. It provides stripes of mower width thickness, and cutting in opposite directions for each pass is the most fuel and time efficient way to cut greens, tees and fairways. If sections of grass are always cut in the same direction, this can create nap on the grass (see earlier definition on nap), which can affect the playability of that area long term. Some greenkeepers prefer simple half and half cuts on fairways, others will double cut at 90 degrees on diagonals, to produce a cross hatching effect

Height of Cut

The height of cut you set will depend upon the type of surface you are trying to produce (putting green, fringe, fairway, semi-rough, rough) and also the time of year. The predominant grass type will also have an effect, especially on putting surfaces, as to how low you can cut.

These articles from the UGA may be useful to you:

[Understanding Mowing Heights \(msu.edu\)](https://www.msue.edu/extension/programs/landscape/understanding_mowing_heights/)

[Finding The Right Fairway Height \(usga.org\)](https://www.usga.org/golf-course-management/management-practices/fairway-maintenance/fairway-height)

[Determining Greens Heights — Wolf Creek - wholesale Irrigation | Landscape | Lighting | Drainage | Ponds | Golf | Turf Systems | Training | Project Support \(wolfcreekcompany.com\)](https://www.wolfcreekcompany.com/wholesale-irrigation-landscape-lighting-drainage-ponds-golf-turf-systems-training-project-support)

[What height is the grass on a golf Course? - Robot Lawnmower Installers \(mrobot.co.uk\)](https://www.mrobot.co.uk/robot-lawnmower-installers/what-height-is-the-grass-on-a-golf-course?)

Grinding and backlapping

Grinding your mower blades helps to keep the cut even and crisp, and it is good practice to do this at regular intervals. Some clubs have found investing in their own grinding equipment is useful, as they can do this as often as they want to. Some offer this as a service to other local clubs and invoice them for it, as a way of both parties benefiting due to the initial cost of purchasing the equipment.

Backlapping is a technique used in re-grinding mower blades, which helps to sharpen the blade but the way it is done helps to prolong the life of the blade.

