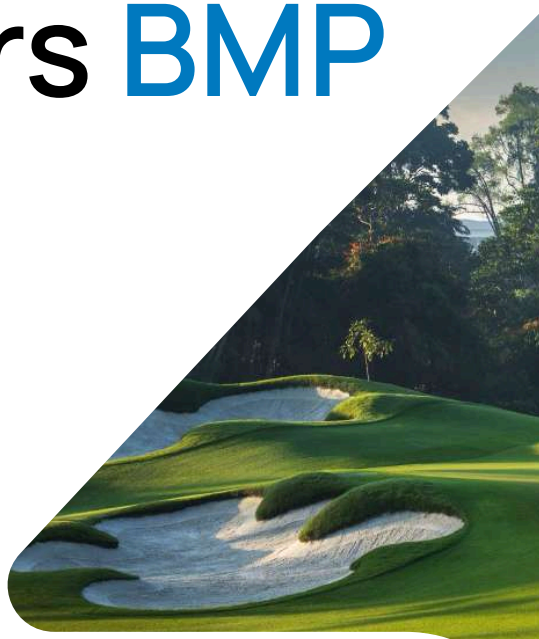
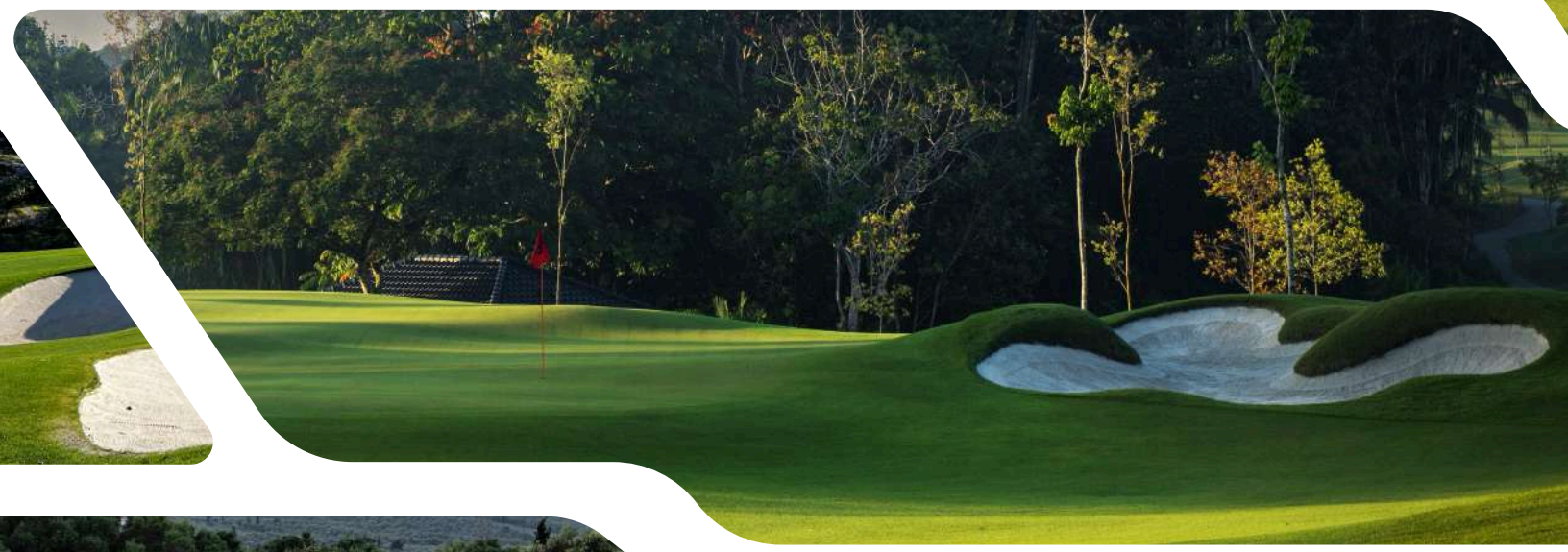
Capillary®Flow

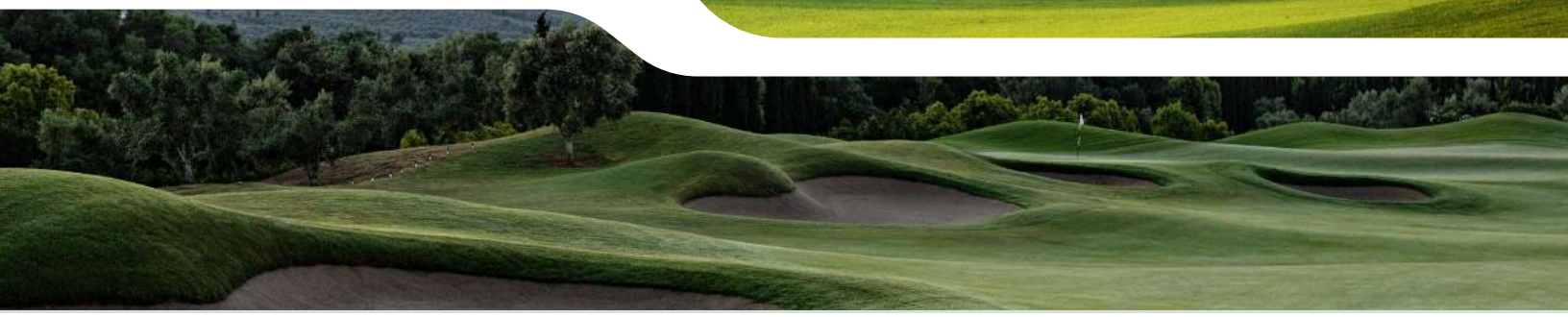
Capillary Bunkers BMP

Owner's manual

How to maintain the right playability in your bunkers







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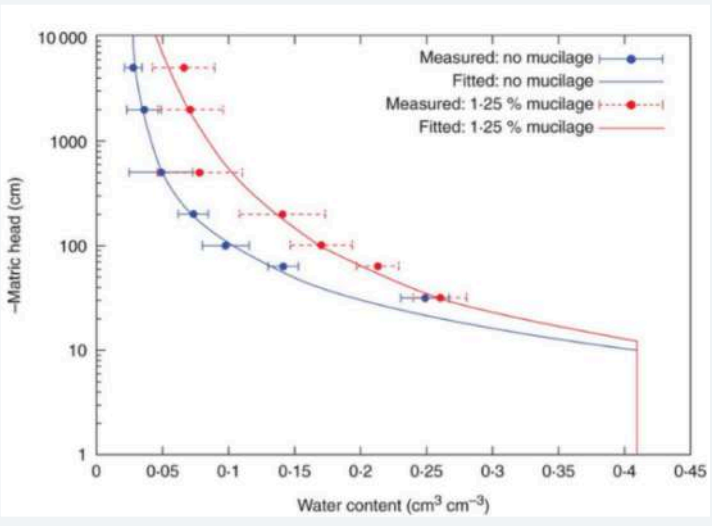
The goal of this guide is to provide you and your maintenance staff with the tools and insights necessary to ensure that your course's bunkers not only meet golfers' expectations but also enhance the overall beauty and playability of the course. Our recommendations are designed to manage resources efficiently and sustainably. By following all our suggestions, your bunkers will maintain their intended appearance and performance for many years without any issues.

Sand depths

The sand depth in your bunkers should be determined based on the Water Release Curve of your sand and the desired compaction levels as measured by the TrueMeter from the USGA. Since different players may require different compaction levels, it's crucial to establish a general TrueMeter value for all bunkers, considering the specific rakes to be used and raking methods. This value directly correlates with the moisture levels of the sand, which are determined by the Water Release Curve. Your sand supplier should provide this Water Release Curve. However, the USGA recommends an average sand depth of 4-6 inches at the base of the bunker and 2-4 inches on bunker faces, providing a general guideline. As a rule of thumb, faces should never have the same sand depth as the bases. The firmer the faces, the better, as it promotes faster play and reduces maintenance problems.

Monitoring player feedback on bunkers and sand is important. Remember that the less sand in a bunker, the more moisture it will hold, resulting in firmer play. Regularly washing the sand with Capillary Wash Box is also important, depending on your location and contamination levels.

Compacting sand manually



Water release curve

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Guide: How to check the sand depth

When
Spot check sand depth monthly; conduct thorough checks every quarter

Why
Sand is gradually lost from bunkers as a result due to player activity, wind erosion, and maintenance operations to remove tree litter, grass clippings and other airborne contaminants. It also compacts over time. To ensure player safety, prevent liner damage and maintain desired playability, sand depth should be kept within the recommended range.

How
Locate spots in a grid pattern across the whole bunker floor. Measure the sand depth at these points and make sure it is your desired depth. Measure at even distances on faces.

Spacing
Use a grid pattern with a maximum spacing of 10 ft (3 m) between measurement points across the entire bunker floor.

Measurement
Equip maintenance staff with one probe each (e.g., broken steel golf shaft) marked with clear indicators (tape or similar) for floor and face depths.

Procedure
1. Shove the probe into the sand at designated points on the floor grid to check for the desired depth. Do the same on the marked spots on faces.
2. If the depth is insufficient, attempt to redistribute sand from deeper areas to shallower ones.
3. If redistribution is not feasible, the bunker may require a sand refill.

Sand compaction

Sand naturally compacts with about 10 %. If you aim for a 4” sand depth in your bunkers, we recommend initially installing 10 % more than that (4,4’’). The excess will naturally compact down to 4” over time. While using a light plate compactor on wet sand is necessary for compaction, please note that it may take several months for the sand to reach its final compaction level, which depends on your chosen sand type.

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Maintenance of completed bunkers

Raking

The Capillary Bunker Liner is designed to work seamlessly with various raking equipment and methods.
Bunkers can be raked according to your preferences and at a frequency of your choosing. Regular raking and mixing of sand are essential to prevent algae and weed growth (weeds cannot penetrate the Capillary Bunker Liner but can germinate in the sand layer).

Various raking methods exist, each with its pros and cons. The choice often depends on your desired visual appearance of the bunkers, and some methods may be more labor intensive than others. However, the most crucial aspect is consistency: Select one method and stick to it.

Bunkers can be raked as you wish and on a frequency of your choice. Mechanical trap rakes are okay to use as well, but require more attention to sand depths, see below. With the added stability of the sand on the faces due to the Capillary Bunker installation, some clubs have gone to the “Aussie” method of bunker raking. They will use the rounded back of the rake to smooth the slopes of the bunker and rake the interior as usual. Regularly raking and mixing up of sand is important to avoid algae and weed growth (weeds do not grow through the Capillary Bunker but can germinate in the sand layer).

Machine raking

Machine raking is an excellent method to rake the bunkers when the Capillary Bunker Liner is installed. There is no risk in damaging the liner.

It’s important to note that CapillaryFlow’s Bunker Liner revolutionizes the approach to maintaining golf bunkers, significantly reducing the reliance on traditional raking methods. The system utilizes capillary action to maintain optimal sand moisture levels, resulting in the following impacts on traditional bunker maintenance methods:

Traditional raking method

The need for manual raking to distribute sand evenly and remove debris becomes somewhat redundant. The system maintains consistent sand conditions, reducing the labor and time involved in this method. Raking bunkers twice a week is however important.

Deep-raking method

This method, used for aerating compacted sand, becomes less necessary with the Capillary Bunker Liner. The system’s ability to manage moisture levels prevents the sand from becoming overly compacted, thus reducing the need for deep raking.

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Watering method

The CapillaryFlow Bunker Liner eliminates the need for applying water to firm up the sand. Its ability to move moisture up into the sand when dry, and drain efficiently during heavy rainfall maintains the ideal sand condition without additional watering.

Spot raking method

Since the CapillaryFlow system ensures consistent sand conditions, the selective raking of disturbed areas is less frequently required. This leads to more uniform playability and reduces the need for constant monitoring and selective maintenance.

Edge-trimming

Depending on your choice of edge construction, you can use various techniques to edge the bunkers. If your bunkers have artificial turf edges or stacked sod edges, exercise great care to avoid damaging the edge and refrain from using any tools other than string trimmers or hand scissors. It's crucial to bear in mind that a bunker's shape tends to change over time due to edging, and eventually, all bunkers will end up oval-shaped. Therefore, it is essential to locate the original edge before commencing the edging procedure. Remember that edging without properly locating the original edge will result in oval-shaped bunkers where noses have been edged back, and other areas of the bunker have grown over with grass. Applying a plant growth regulator to bunker edges can reduce the need for frequent edging and minimizes the risk of compromising the bunker edge integrity.

Guide: How to do edge trimming without compromising the original bunker shape

1. Locate the very end of the Capillary Material with a probe.
2. Flag or spray the original edge after locating it.
3. We highly recommend trimming your edges instead of verticutting them. This is possible when you have the Capillary Edge installed, without risking compromising the bunker shape

Monitoring bunker playability

Measuring sand moisture in golf bunkers is essential for maintaining the bunker's playability and effective drainage. The moisture level in the sand significantly influences the interaction of the golf ball with the bunker, where consistent moisture ensures predictable ball behavior and fair playing conditions. Additionally, maintaining the right moisture balance is key to preventing issues like waterlogging or rapid drying, which can lead to erosion or compaction, adversely affecting the bunker's condition. Regular monitoring of sand moisture is also crucial for efficient maintenance, enabling timely actions such as cleaning the bunker sand, to keep the bunkers in ideal condition.

While the Capillary Bunker Liner usually prevents issues related to excessively wet or dry bunker sand, the accumulation of silt, clay and other contaminants might interfere with this. Hence, to ensure long-term performance of bunkers, we recommend continuous measurement of sand moisture levels to identify any excessive or insufficient moisture in the sand profile. Appropriate actions can then be taken to aid the issue.

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Understanding and managing the contamination level and keeping track of moisture levels are key to providing a quality golfing experience and maintaining the integrity of the course.

6-month moisture control and sand washing procedure

In the dynamic environment of a golf course, each bunker possesses its own distinctive characteristics, such as varying levels of moisture retention and specific sand requirements, influenced by unique factors. To accurately gauge these aspects, the best approach is to conduct tests. As a standard guideline, we recommend assessing the sand moisture in all bunkers six months after installation. This duration allows the bunkers to undergo changes influenced by factors like weather conditions, geographical orientation, proximity to irrigation systems, and more. Such an evaluation provides insight into the moisture levels and the presence of silts and fine particles in the sand, which in turn affects the wetness of the bunker base. If you ever find yourself with too wet bunker bases, this might be the problem. It is never a problem of too much or too little bunker sand, but is all about the amount of moisture holding particles.

Should you encounter issues with moisture or contamination, we advise proceeding with a thorough cleaning of the bunker sand.

Contamination control

Measure and control the sand contamination level and drain capacity is essential to have your bunkers playability as expected from the sand you originally had in your bunkers. The USGA recommends no more than 3% silt and clay and 0% organic material in bunker sand.

CapillaryFlow offers a sand test kit for easy evaluation of the quality and contamination levels of your bunker sand. With the test comes a guide that will lead you through different steps to determine contamination level. It works basically like this:

- Visually inspect the bunker to identify areas with visible moisture issues, such as pooling water or overly dry patches
- Collect contaminated sand and mix thoroughly with water in a small container
- Examine the settled layers, organics, silt and fine particles will migrate up in the water and eventually settle on top off the sand
- Use a ruler to measure each layer and calculate the percentage of fine particles. Visual differences in the layers indicate the cleanliness and composition of the sand

The test kit also holds a drainage capacity test which is very useful to compare contaminated sand with clean sand.

Finally dry some sand from the bunker, spread it on a dark surface, and examine under a microscope to assess the shape of the particles, which affects the sand's playing characteristics. Angular sands are generally preferred as they stay on slopes better.

To have a test kit delivered for free, contact your CapillaryFlow representative or email info@capillaryflow.com

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Sand moisture control

It's important to note that the interpretation of moisture levels in golf bunkers can vary significantly depending on several factors. The moisture levels presented here serve as a general guideline, but they may not apply universally to all golf courses due to differences in geography, climate, sand type, and bunker design. Here are some key considerations:

Geographical location

Different climates and weather patterns can affect how moisture behaves in bunker sand. For instance, courses in arid regions may experience quicker drying, while those in humid climates might retain moisture longer.

Sand type

The composition and texture of the sand can influence its moisture retention and drainage properties. Coarser sand typically drains better than finer sand.

Bunker design

The shape and depth of a bunker, as well as its drainage system, play a role in how moisture is managed.

Seasonal changes

Moisture levels can fluctuate with seasonal weather variations, requiring adjustments in maintenance practices.

Therefore, while the moisture levels of low (<10%), moderate (10-20%), and high (>20%) can serve as a basic reference, it's crucial for course maintenance teams to consider their specific course condition and adjust their practices accordingly. Regular monitoring and a tailored approach to bunker maintenance are essential for maintaining optimal playability and course conditions.

Low moisture (<10%)

Indicates dry, loose sand. Balls may bury more deeply, making shots more challenging. It would normally require light watering to maintain playability. But, in Capillary Bunkers, which moves water up into the bunker sand from below, low moisture is rarely the case.

Moderate moisture (10-20%)

Ideal for most bunkers. Offers a balance between firmness and playability, with consistent ball behavior.

High moisture (>20%)

Suggests overly wet sand, risking puddles and compaction. Restoring drainage capabilities might be necessary to restore optimal conditions. Usually, the sand is dirty and binds too much moisture due to abnormal amounts of silt, clay and other contaminants in the sand. But, first and foremost, the sand should be washed with the help of the Capillary Wash Box.

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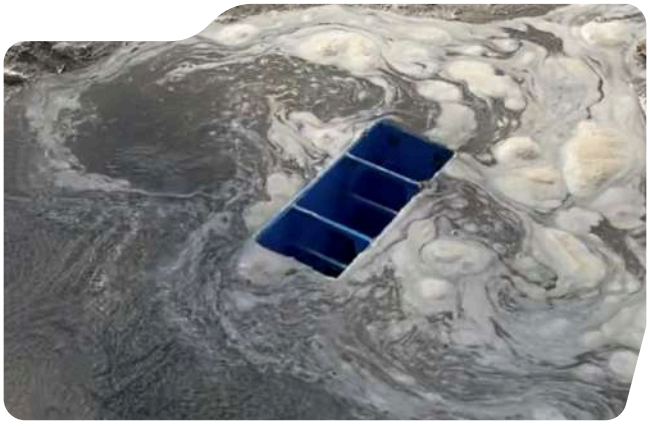
Guide: How to wash the bunker sand

Scan to see instructions

The Capillary Wash Box and this system is designed to only remove organic material (algae, clippings, leafs etc.) and particles smaller than 0.05 mm, which will float in water for some time.These are the particles that can darken color and slow infiltration rates. They can effectively be removed by following the washing instructions.

1. Locate the Vault with the Wash Box and remove the bunker sand to expose the lid
2. Remove the lid and place enough Extensions (the middle part of the Wash Box) to where the top of the last Extension is above the top of the sand surrounding the Vault
3. Connect a hose with nozzle to the irrigation system and start by washing the immediate area surrounding the Wash Box to make sure the sand layer is never above the top edge of the Wash Box Extension. This must be done from time to time while washing not to have larger sand particles enter the drainage pipe
4. Now start as far away from the Wash Box as possible and wash the sand with a water beam from the nozzle that is at least 2 ft wide
5. Work the water beam so that the sand does not displace too much, merely gets turned around and washed in its place. You may have to push the dirty water along to reach the Wash Box from time to time
6. Be sure to wash all the way to the edge of the bunker as there is often an excess of sand located there and we seek to re-establish the original sand depth and edge
7. From time to time, check the drainage pipe in the Wash Box to make sure larger sand particles do not wash into the pipe and clog it. Some particles will inevitably reach the pipe, and the pipe must be washed clean by directing the water beam into the pipe, but this should not have to be done more than once or twice and after completing the entire bunker when the pipe must be cleaned at least for 5 minutes
8. After completion, the sand must be pushed back to ensure a uniform sand layer in the bunker, and often times new, clean sand must be added to reach the desired sand depths throughout the bunker



Do you don't have the Wash Box installed? It can easily be retrofitted! Contact your CapillaryFlow representative or email info@capillaryflow.com to learn more

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Drainage maintenance

A locator wire is recommended in the trench with your drain tile. The wire aids in locating the pipe if you ever need to inspect it or repair it. Ensure that the locator wire follows the pipe up to the cleanouts on the exterior of the bunker. The cleanout should be installed inside a 10" round valve box with a lid for easy inspection. To prevent clogging, it is advisable to install the outfall with sufficient fall to allow self-cleaning. The recommended slope is 1.25% for a 4" pipe and 0.85% for a 6" pipe. A good practice is to daylight the drain into a 12" catch basin, safeguarding the pipe from potential crushing or clogging. In scenarios where the pipe daylights into a pond with water levels rising above the bunker, consider installing a flapper-style check valve in the pipe. This will prevent backflow into the bunker and possible damage.

Maintenance guidelines and suggested schedule

Drawing from our extensive experience in building and maintaining bunkers, we recommend the following schedule to guarantee the prolonged success and durability of your Capillary Bunkers, free from any failures. If your bunkers encounter varying degrees of contamination or other factors influencing the sand, it is advisable to adjust the schedule accordingly.

Weekly maintenance

Activity	When	How
Rake bunkers	At least 2 times weekly	Hand or machine rake. Consider not raking the bunker faces for a firmer surface.
Measure sand depth	Weekly	With a marked probe going down to the liner. Make sure you have your preferred sand depth everywhere.
Weed picking	Weekly	Do not tolerate any spread of organic material in your bunker.

Monthly maintenance

Activity	When	How
Edge trimming	Depending on grass growth	Use a small easy to handle trimmer. Be careful not to kill the rootheads. Use the most proper method for your bunker style and what edge you like to achieve.
Sand refill	If you can't achieve your preferred sand depths	Make sure you fill with the same sand you already have in the bunkers.

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Post season

Activity	When	How
Drainage check	When the season has ended	Service drain system by flushing it before you winterise your irrigation system.
Keep bunkers clean	When the season has ended and after all leaves have fallen. Though it can be done several times throughout the end of the season.	Any leaves and organic matters should be removed from the bunker.
Monitor the architectural vision	Especially after edge-trimming but every once in a while.	Make sure the bunker shape stays true to the original design by ensuring the edge of the Capillary Material and your edge match.

Pre season

Activity	When	How
Clean your bunker	This is easiest to do in dry conditions and not when contaminants such as leaves, debris and branches are soaked.	Clean your bunkers by removing any debris, leaves, branches and organic matter with a blower or rake.
Wash bunker sand	When bunker sand becomes contaminated and loses its original properties, it's time to wash the sand. A bunker problem-solving kit can be sent to you by your Capillary Sales rep, allowing you to evaluate the quality and contamination levels of your sand.	Use Wash Box guidelines to wash your sand. You can find them further up in this document.

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