



Turf-Tec Infiltrometer



Turf-Tec finally has answered the age old question, "How do I determine Infiltration rate?" The Turf-Tec Infiltrometer is simple to operate and easy to use! Determine infiltration rate in as little as fifteen minutes. Now, for the first time, a field instrument to measure the rate of water infiltration on all areas. This instrument determines the downward flow of water through the turf and soil.



Elapsed time indicator makes it possible to correlate irrigation time to the infiltration rate of your turf.



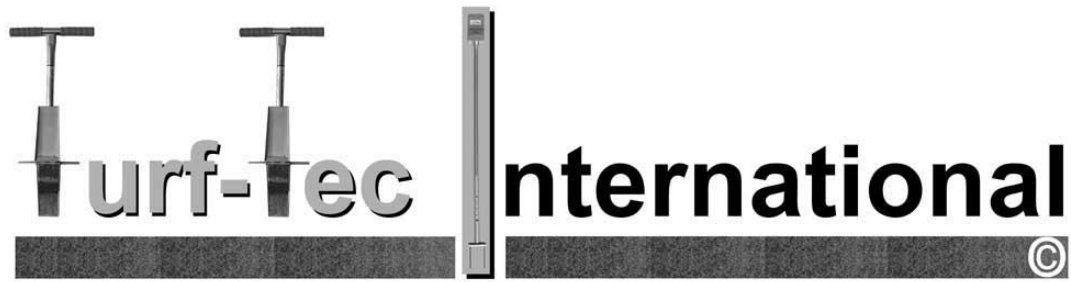
Record keeping of Infiltrometer readings can aid in keeping track of significant changes in water percolation.

Has double ring accuracy. The Infiltrometer has been used by 100's of Colleges, Universities and Government agencies. Trusted, reliable and made to last.

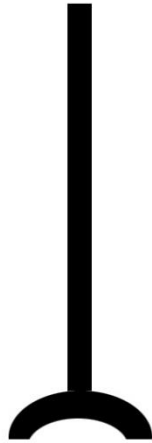
Turf-Tec Infiltrometer has double ring accuracy

Another first from Turf-Tec International

Check Infiltration on:		Specifications:
<p><u>Turfgrass areas</u></p> <ul style="list-style-type: none"> • Golf greens • Fairways • Golf tees • Sports fields • New construction • Lawns • Playgrounds • Research plots • Seed beds • Environmental Science 	<p><u>Engineering Applications</u></p> <ul style="list-style-type: none"> • Drain Fields • Wetland assessment • Urban Runoff • Drainage basins • Retention ponds • Infiltration pits and systems • Percolation holes • Storm water planning • Storm water discharge • Site Planning • Rain Gardens 	<ul style="list-style-type: none"> • No damage to turf or soil • Inner ring diameter (ID) of 2 3/8 inches (6.03 cm) • Outer ring diameter (ID) of 4 1/4 inches (10.79 cm) • Sturdy construction • Rust proof zinc plating • Depth limiting ring • Count down timer clock with beeper alarm • Water level scale in inches and millimeter • Float and inch indicator • Double ring • Heat treated, case hardened cutter blade • Handle grips

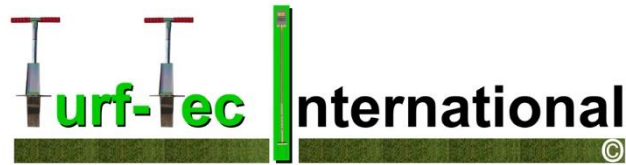


TURF – TEC INFILTROMETER PLUG REMOVER



**USE THIS PLUG REMOVER TO PUSH GRASS OUT
OF INFILTROMETER RING**

**FLOAT CAN BE CAREFULLY MOVED SLIGHTLY
TO THE SIDE AND THE HANDLE OF PLUG
REMOVER CAN BE USED TO PUSH THE CENTER
PLUG OUT**



INFILTROMETER INSTRUCTIONS

Outline of Uses

The Turf-Tec Infiltrometer was specifically designed to give infiltration readings directly on site. It can give you a reading on the rate of water percolation through grass, thatch, mat and soil as well as directly on bare soil.

Reliability of testing and reducing variables

Saturated test (The most reliable test method):

The most reliable test method for measuring infiltration is called a saturated test. This method is performed by placing the Turf-Tec Infiltrometer directly into the soil to be tested and filling the rings 2-3 times, allowing the water to infiltrate into the soil between fillings. Once the soil is saturated, you can perform the test.

Moisture Sensing (The quickest test method):

Another reliable method for testing infiltration is to use a Moisture Sensor. Moisture Sensor readings should be taken at one, two, three and four inch levels of the soil to be tested using a Turf-Tec Moisture Sensor and the readings should be recorded. The infiltration test can then be performed on that area. This method should be repeated for each test area. In addition, the next time the same area is to be tested for infiltration, be sure the Moisture Sensor readings are in the exact same range before testing. This will eliminate any variables and still produces a reliable test.

Testing on irrigated areas:

Another way to insure a proper infiltration reading on irrigated areas is to use this instrument approximately one hour after irrigation. A visual indication of soil moisture should also be noted by using a Soil Profile Sampler. When using this method, be sure no rainfall has occurred within 48 hours of the test to remove this variable.

Correlating your readings

If the results from your Turf-Tec Infiltrometer show that the soil readings are one inch of water absorbed per hour, this should be recorded.

This reading should not be used as a conclusive result for all areas because each area tested most likely will have different variables like vegetative cover, soil organic matter content, soil physical properties, compaction, soil texture and other factors. The variables all affect infiltration rate.

Each infiltration reading should be duly recorded, so that comparisons can be made periodically. You will probably find wide differences in infiltration rates from area to area, especially when testing newly constructed areas or areas where the soil has been disturbed compared to areas where the soil has remained unchanged. The best way to insure infiltration results will be consistent, is to record the infiltration rate on each area so that you can compare any changes. Use this standard for each particular area only.

Monitoring Golf Greens

If readings on the Infiltrometer are less than one inch per hour, the area is considered to be in a very critical range. When the infiltration rate drops 10% or more, check your topdressing and management practices. Topdressing can sometimes drastically change infiltration rates, especially if even a slight change in the mixture occurs.

When infiltration decreases are detected, the formations of layers in the soil profile are beginning. However, layers can be corrected with aerification and proper topdressing if they are diagnosed with the Infiltrometer before they can cause a major problem.

Putting your readings to use - Turfgrass Areas

The results of your readings of the Infiltration rate can then be used to regulate the amount of water applied from each sprinkler zone. Irrigation can then be adjusted to apply only the amount of water that should be applied per hour.

To check irrigation rates, Turf-Tec precipitation / uniformity gauges can be purchased from Turf-Tec International and placed in the soil, and spaced every 1 1/2 to 3 feet between two sprinkler heads. The irrigation clock should be set for a 15 minute cycle and the amount of water in each rain gauge should be recorded. This will give you the actual amount of water applied.

Applying only the amount of water that the soil will absorb saves water lost by surface runoff and reduces fertilizer loss. It will help prevent waterlogged soils, which reduce oxygen levels in the soil. Excessive surface water will also reduce root systems and can also contribute to increased disease problems. Wet soils can become compacted more easily and in severe cases, harmful anaerobic conditions can be created.

How to get the most out of the Infiltrometer on Turfgrass areas

Areas can be tested before and after certain management practices have been used. These include aerification, Verti-cutting, topdressing along with all the other practices that can change the water infiltration rate.

Monitoring Drain fields

The Turf-Tec Infiltrometer can be used to install drain fields. The double ring is much more accurate than just using a single ring or an excavated cavity to test for infiltration. However please check with your local ordinances to see if an ASTM 3385 Infiltration test is required, if one is, you may need to use the Turf-Tec 12 and 24 Inch Infiltration Rings. To test your lowest infiltration rates (similar to ASTM 3385) you should perform a saturated test where you put the Infiltrometer into the soil and fill it up 2-3 times and then

take your readings. This method is similar to the ASTM 3385 test procedure where you are looking for the lowest rate for that soil. If you take a 15 minute test, the following 15 minute test should be the same infiltration rate to assure the soil has reached saturation. If not continue taking 15 minute tests until the readings are the same for that area.

Environmental testing

The Turf-Tec Infiltrometer can be used to perform various types of environmental tests. It can be used for testing fuel tank containment areas and spill clean up times. The Infiltrometer can also be used for measuring urban runoff. It has also been successfully used for storm water soil evaluations, forestry soil assessments and for groundwater recharge areas.

Particular Specifications - Reason for the double ring

The Turf-Tec Infiltrometer is equipped with a double ring. During use, both rings are filled up with water but only the inner ring is measured. The reason for this is that you may notice that during operation, one ring may infiltrate much faster than the other ring one because there will be lateral movement of water around the cutter blade. This action will also create a seal for the inner ring and give a much more accurate indication of the actual rate of infiltration.

Accuracy of testing the soil on the area in question

This tool is designed to test soil infiltration right on the area that is in question. It differs from lab results because it is representative of all the conditions that naturally occur on that area. The Infiltrometer accounts for the vegetative cover, soil organic matter content, soil physical properties, compaction, soil texture and other factors. The variables all come into consideration when using this tool to determine infiltration.

Checking infiltration at lower depths in the soil profile

If the Infiltration rate needs to be determined at lower levels in the soil profile, a post hole digger can be used to remove the turf, thatch and mat. The Turf-Tec Infiltrometer can then be lowered into the hole and the rate of infiltration can be determined at that level. Maximum depth of the Infiltrometer is approximately two feet. If readings are needed at lower levels a backhoe can be used for excavation.

Features

- STURDY WELDED CONSTRUCTION
- SATURN DEPTH LIMITING RING
- DOUBLE RING FOR ACCURACY
- COUNTDOWN TIMER
- BEEPING ALARM ABLE TO BE SET FROM 1 SECOND TO 100 MINUTES
- QUICK ON/OFF SWITCH
- WATER LEVEL SCALE IN INCHES AND MILLIMETERS
- FLOAT AND EASY TO READ POINTER
- LEAVES NO DAMAGE TO TURF
- CASE HARDENED CUTTER BLADES FOR STRENGTH

TURF-TEC INTERNATIONAL INFILTRATION RINGS MONITORING RECORD

We suggest recording your results along with these certain variables on this page:

* MAKE A COPY OF THIS PAGE FOR EACH AREA TO BE TESTED.

PLACE: _____ DATE: _____

TIME: _____ EXACT LOCATION: _____

FORMER RAINFALL / IRRIGATION INFORMATION:

PENETROMETER (COMPACTION) READINGS: () %

MOISTURE SENSOR READINGS AT DIFFERENT LEVELS

MOISTURE AT 1" INCH LEVEL : () %

MOISTURE AT 2" INCH LEVEL : () %

MOISTURE AT 3" INCH LEVEL : () %

MOISTURE AT 4" INCH LEVEL : () %

INFILTRATION RATE
ACTUAL

INFILTRATION RATE
CALCULATED

1 MINUTE : () INCHES X 60 = () INCHES PER HOUR

5 MINUTES : () INCHES X 12 = () INCHES PER HOUR

15 MINUTES : () INCHES X 4 = () INCHES PER HOUR

30 MINUTES : () INCHES X 2 = () INCHES PER HOUR

60 MINUTES : () INCHES X 1 = () INCHES PER HOUR

A free Excel spreadsheet that will auto calculate this page can be downloaded at

www.turf-tec.com

TURF-TEC INTERNATIONAL INFILTRATION RINGS MONITORING RECORD (SAMPLE PAGE)

We suggest recording your results along with these certain variables on this page:

PLACE: Test site L4682 DATE: 7/31/10

TIME: 6:30 am EXACT LOCATION: NE corner 100 yards from boundary

FORMER RAINFALL / IRRIGATION INFORMATION
No rainfall, past 48 hours 1/4 inch irrigation, 28 hours ago.

PENETROMETER (COMPACTION) READINGS: (55) %

MOISTURE SENSOR READINGS AT DIFFERENT LEVELS

MOISTURE AT 1" INCH LEVEL : (35) %

MOISTURE AT 2" INCH LEVEL : (50) %

MOISTURE AT 3" INCH LEVEL : (60) %

MOISTURE AT 4" INCH LEVEL : (80) %

INFILTRATION RATE

ACTUAL

INFILTRATION RATE

CALCULATED

1 MINUTE : () INCHES X 60 = () INCHES PER HOUR
 5 MINUTES : () INCHES X 12 = () INCHES PER HOUR
 15 MINUTES : (1) INCHES X 4 = (4) INCHES PER HOUR
 30 MINUTES : (2) INCHES X 2 = (4) INCHES PER HOUR
 60 MINUTES : () INCHES X 1 = () INCHES PER HOUR

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www.turf-tec.com

Turf-Tec Infiltrometer Operating Instructions

1. Setting the timer:
 - A) Press the Stop/Reset Button once to reset the timer to read "00 00".
 - B) Set the timer for 15 minutes by pressing minutes 15 times until 15:00 is displayed.
2. Place double ring cutting blades on the area to be tested. Silicone spray may be applied to the cutter edges to allow easier and cleaner removal of tool.
3. Push down on handle grips while slightly turning instrument back and forth* until the Saturn ring is against the soil surface.**
 - *On turf areas, excessive twisting can also cause roots to tear and a plug to be pulled upon removal of tool.
 - **Do not move the instrument side to side while turning.
4. Fill both the outer and inner ring with clean water until they slightly overflow. (This is accomplished easiest by filling the inner ring first and allowing it to spill over and fill the outer ring to the edge.)
5. When the pointer reaches the beginning of the inch scale, start the timer immediately by pressing the start button.
6. As the water seeps into the soil, the plastic ball attached to the tube will measure the water in inches and register it on the scale with the pointer located just below the timer.
7. At fifteen minutes, the timer will start beeping.
8. Stop the beeper by depressing the stop/reset button on the timer.
9. Note the position of the pointer on the scale. Record this number on the monitoring record. This scale is in inches. Multiply the inches registered on the scale by four to give you the water infiltration in one hour.
10. Also record this information on the record chart.
11. To remove the instrument from the soil, use the hand grips to rotate the cups in a twisting motion.
12. The handles may also require a slight but constant turning while lifting the tool out of the ground. Extract the tool slowly in order not to disturb the soil surface.
13. If any soil is removed use the plug pusher that is provided with the Turf-Tec Infiltrometer to remove the plug in one piece.

14. To start timer again repeat step #1. It is best to get several readings on an area to get the average infiltration rate.
15. If the infiltration rate is slow, a thirty minute or an hour long test may be desired, if the infiltration rate is fast (In new sand construction), a five minute test may be sufficient.
16. After using your Turf-Tec Infiltrometer, wash the cutter blades, dry, and spray with silicone (this will help the Infiltrometer to remove a clean plug and prevent rust).

NOTE: Timer operates on a 1.5 volt "AAA" battery and is good for a long period. To replace battery, remove timer by loosening two screws located on the backside of the face plate and then removing timer. Replace battery located inside timer body under battery cover. Be sure to replace battery cover when new battery is installed and then re-attach timer to Infiltrometer face plate.

LIMITED WARRANTY OF TURF-TEC INTERNATIONAL PRODUCTS

Turfgrass Products Corporation - dba - Turf-Tec International ("Seller") warrants to the final purchaser, that all Turf-Tec International tools will be free from defects in material or workmanship for a period of one year from date of purchase. SELLER'S SOLE OBLIGATION AND YOUR EXCLUSIVE REMEDY under this Limited Warranty and, to the extent permitted by law, any warranty or condition implied by law, shall be the repair or replacement of parts, without charge, which are defective in material or workmanship and which have not been misused, carelessly handled, or improperly repaired by persons other than Turf-Tec International. To make a claim under this Limited Warranty, you must return the complete tool, transportation prepaid, to Turf-Tec International after contacting Turf-Tec International and receiving a return authorization number. Please include a dated proof of purchase with your tool.

ANY IMPLIED WARRANTIES SHALL BE LIMITED IN DURATION TO ONE YEAR FROM DATE OF PURCHASE. IN NO EVENT SHALL SELLER BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES (INCLUDING BUT NOT LIMITED TO LIABILITY FOR LOSS OF PROFITS) ARISING FROM THE SALE OR USE OF THIS PRODUCT.

Hold Harmless Agreement

The seller shall protect, defend, indemnify and hold the purchaser and their respective assigns and their attorneys, accountants, employees, officers and directors harmless from and against all losses, costs, liabilities, claims, damages and expenses of every kind and character, as incurred, resulting from or relating to or arising out of the inaccuracy of results, injury of user, injury of sports participant, turfgrass loss, warranty, covenant or any agreement made by the seller in this agreement.



Free downloadable spreadsheets for monitoring turfgrass areas.

--also--

Free downloadable spreadsheet for ASTM 3385 Infiltration testing

Included is Moisture Sensor data, Penetrometer data sheet and Infiltrometer data sheets with automatic calculation of averages.

Sample of the Turf-Tec Moisture Sensor monitoring spreadsheet. This sheet includes moisture readings for levels of 1, 2, 3, and 4 inches in the soil profile. It also calculates average moisture by depth and by area.

Sample of the Turf-Tec Infiltrometer monitoring spreadsheet. It is meant for infiltration readings for three different test areas and will automatically calculate average infiltration readings in inches per hour.

Sample of the Turf-Tec Penetrometer monitoring spreadsheet. It is meant for Penetrometer readings for three different test areas and will automatically calculate average compaction readings.

For A free download of Excel spreadsheet for diagnosing Golf Greens click here and **save the file to your computer: <http://www.turf-tec.com/Excel/Golf-Tests.xls>**

For A free download of Excel spreadsheet for diagnosing Athletic Fields click here and **save the file to your computer: <http://www.turf-tec.com/Excel/Sports-Tests.xls>**

Free downloadable spreadsheet for ASTM 3385 Infiltration Ring testing

[Click here to download Turf-Tec International's free Excel spreadsheet for ASTM 3385 double ring infiltration test.](#)

[Click here to download Turf-Tec International's free sample of a partially completed Excel spreadsheet for ASTM 3385 double ring infiltration test.](#)