



TURF-TEC 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 aeration 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 aeration, 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 Infiltration test is required, if one is, you may need to use the Turf-Tec 12 and 24 Inch Infiltration Rings.

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.

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

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.

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: Yonder Country Club DATE: 7/31/06

TIME: 6:30 am EXACT LOCATION: #14 Fairway, 100 yards, left side

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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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.

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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 AN A 1.5 VOLT "AAA" BATTERY AND IS GOOD FOR A LONG PERIOD. TO REPLACE BATTERY REMOVE TIMER BY LOOSINING TWO SCREWS LOCATED ON THE BACK SIDE 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.