HYDROTIMER

OPERATING AND INSTRUCTION MANUAL

READ THIS MANUAL IN ITS ENTIRETY
BEFORE OPERATING THE HYDROTIMER OUTLOW METER.

Product Summary

The Hydrotimer is a patented and self contained outflow meter. Its operation is simply a leak-down test with the primary purpose of checking water drainage through texture voids in pavement surfaces. A rubber sealing ring mounted on its base for contacting the surface insures zero outflow when a test is conducted on a glass smooth surface. Therefore, a test performed on a surface with inter-connected texture voids will result in an incomplete seal and an outflow of water. The measured volume of water is timed by on-board electronics with an LCD display. Averaging the tests indicates the water flow characteristics of a given pavement surface with no allowance for tire tread contribution. The shorter the test times, the better the drainage. The Hydrotimer is accurate and repeatable regardless of the experience of the single operator required, when instructions are followed..

The Hydrotimer Calibration

The Hydrotimer is calibrated to ASTM E 2380-05 specifications at the factory. It is delivered to the owner with a calibration tag good for two (2) years unless the unit is damaged or tampered with prior to that date. It is due for re-calibration after each 2-year period, and must display a current calibration tag in order to perform certified tests. It is not field serviceable, and should be returned to the service center or its authorized representative for any parts or repairs that may become necessary.

For service center information:
www.hydrotimer.com

Calibration

The Hydrotimer is calibrated to ASTM E 2380-05 specifications at the factory. It is not field serviceable and in order to maintain calibration status the adjustments should never be tampered with. If the tamper proof seals become broken or damaged, do not use the instrument for a certified test until it is returned to the factory for recalibration and resealing. **Factory calibration** and resealing should be performed **every two years** in order to maintain current calibration status.

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Timer

The electronic timer is self-powered and cannot be turned off. It has a lithium battery with a guaranteed life of two years, and is serviced as part of the calibration procedure.

Warning

The Hydrotimer is delivered in a internally cushioned and airtight shipping case. **The inside of the case is to be kept completely dry at all times.** When the Hydrotimer is unpacked from the case, it should be stored in a climate controlled environment, and the only time it should be put back into the shipping case is when it is being returned to the factory for servicing. **The case should never be used as a storage container, not even temporarily. The case should never be used as a work cradle.**

While being transported around a jobsite or in a vehicle, it is suggested that a throwaway container lined with absorbent material be employed (an example is a pasteboard box and large towel or absorbent paper). If it is to be hand carried, no container is necessary.

When testing has been completed for the day, the Hydrotimer is to be elevated with the plunger in the up position in order to allow air to circulate through the unit and evaporate any moisture remaining inside.

After completely drying the Hydrotimer, it is best to store it in an atmospherically controlled dry environment to protect and preserve the electronic components from corrosion damage.

The Hydrotimer is water resistant, not waterproof. It is pressure tested at the factory, so normal usage around water will not affect its performance. However, being kept in a damp environment for extended periods will allow condensation to form in the internal passages that contain electronic components**. Condensation moisture will cause rapid deterioration of the electronic components, and can result in the premature failure** of some or all of its parts. To avoid this unnecessary expense and inconvenience, treat it as the delicate instrument it is. It should be dried out as quickly as possible after each use and stored in a dry environment.

DO NOT STORE IN SHIPPING CASE FOR EXTENDED PERIODS

The following operating instructions were taken from the ASTM International Designation E 2380-05 Specification

Scope

This test method covers the connectivity of the texture as it relates to the drainage capability of the pavement through its surface and subsurface voids. This is a specific device that times how long it takes for a known quantity of water, under gravitational pull, to escape through voids in the pavement texture of the structure being tested. The technique is intended to provide a measure of the ability of the pavement to relieve pressure from the face of vehicular tires and thus an indication of hydroplaning potential under wet conditions. A faster escape time indicates a thinner film of water may exist between the tire and the pavement, thus more micro-texture could be exposed to indent the face of the tire and more surface friction available to the tire. The lower the number of seconds it takes to evacuate the water, the lower the water pressure under the tire. It will be up to the operator to compare the results of this test to other pertinent factors such as expected rainfall intensity and frequency, aggregate type, consistency of texture, grade, slope, expected vehicular speed, and accident history, to determine the relationship between the outflow meter reading and the likelihood of hydroplaning on a given surface. Comparing the outflow meter reading of a pavement known to have a history of hydroplaning, against one with a good history, with all other factors similar, will give the operator an indication of the outflow meter number that will be necessary to promote wet weather safety.

The results obtained using this method are related to the mean hydraulic radius of a paved surface and may correlate with other methods to measure texture.

The results obtained using this test method are related to the mean texture depth (MTD).

The values stated in SI units are considered standard. This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish limitations prior to use.

This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

Summary of Test Method Operations

The main body of the outflow meter is a vertical cylinder for containing water. It has an open top and a rubber ring mounted centrally around an orifice or opening on the bottom of the device to form a seal against the pavement surface. Water discharge is through the opening in the center of the seal and is controlled by a spring-loaded plunger suspended from a cap mounted on the upper end of the cylinder. Upper and lower float switches are suspended from the cap into the cylinder and mounted vertically. An electronic timer is provided and is wired to the float switches.

The outflow meter is placed on the pavement with the plunger sealing the water discharge opening. Sufficient water is then poured into the cylinder to raise the switch floats to their raised or top position, which will prevent the timer from operating. The timer is reset to zero, and the plunger is released to allow discharge of the water. As water flows out of the opening and through the pavement voids, the water level in the cylinder falls past the upper float switch, which activates, causing the electronic timer to begin counting. As the water level continues to fall past the level of the lower float switch, the lower float switch then activates, causing the timer to stop. The time required for the water level in the cylinder to fall from the level of the upper float switch to the level of the lower float switch is indicated on the timer. This is recorded as the outflow time.

Calibrations over a temperature range of 40 to 120 degrees F (4 to 49 degrees C) show no temperature affects.

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Significance and Use

This test method is suitable as a field test to evaluate the surface drainage, and in some cases, the internal drainage of the surface course of a pavement. When used with other tests, the outflow time may be used to evaluate the texture produced by an asphalt pavement mix, a finishing method used on Portland Cement Pavement, and refinishing operations on an old pavement surface. Test results will correlate with other methods such as the CTMeter (Test Method E 2157), MPD (Practice E 1845) and MTD (Test Method E 965).

Note 1—The reciprocal of the outflow time is highly correlated with the MPD except when the surface is highly porous since the MPD is a measure of the surface texture and does not account for the water flowing through the surface pores.

The outflow times measured by this method are an indication only, and are not meant to provide a complete assessment of the pavement surface friction, or wet weather safety characteristics.

This test method does not necessarily correlate or agree with other methods of measuring pavement surface characteristics. It is up to the operator to determine the correlation of each method considered.

Procedure

Test Area

Inspect the pavement surface to be measured, and select a homogenous area that contains no unique localized features such as paint, holes, bumps, cracks, or joints. If there is any loose or semi-adhered dirt, debris, or deteriorated surface material, thoroughly clean the pavement surface in the area where the test is to be taken using a broom or stiff wire brush. On pavements that have just been under traffic, tests performed without cleaning will give actual drainage capability.

Measurement

Place the Outflow Meter on the pavement, making sure that it is stable and uniformly contacts the rubber sealing ring to the pavement. On the first test, wet the plunger sealing ring by holding it close to the seat and pour in a little water. Set the plunger by pushing down on the handle until the plunger seal enters the seat, and fill the cylinder with water. For accurate measurement, the water level must extend over the top float switch sufficiently to allow air bubbles trapped between the pavement surface and the plunger to escape, and the surface water must have a chance to settle down before the water level reaches the top float switch. Make sure the timer is reset to zero. Carefully pull the plunger up while applying an equal counter force downward on the handle. When the plunger seal is released from the seat, this becomes a hands-off operation. A spring will return the plunger to its most upright position. From this point , the Outflow Meter works automatically and should not be touched until the test is over. When the lower float switch is activated and the timer stops, the plunger may be reset to save water and be ready to be filled with water for the next test. After each test, the outflow meter timer reading and the location of the test should be recorded.

Number of Measurements

The more test that are performed, the better the average pavement drainage information will be. In any case, a minimum of four randomly spaced tests shall be performed and the arithmetic average of the test times shall be reported as the average time for the section of the pavement being evaluated.

For each pavement test section, the arithmetic average of all outflow meter test times will be determined and recorded to the 0.01s. The following equation will be used to estimate the Mean Texture Depth:
MTD= 3.114/OFT + 0.636 where:
MTD = volumetric texture depth defined in Terminology E 867.

Faulty Tests

Tests that are manifestly faulty, or that give outflow times differing by more than 10 s from the average of all tests on the same pavement surface, shall be treated in accordance with practice E 178 on outlying observations.

Report

The report for each pavement test surface shall contain data on the following items:

1. Location and identification of test pavement surface.
2. Date
3. Ambient air temperature
4. Pavement temperatures (optional)
5. Number of measurements, and
6. Outflow times recorded

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