Meets ASTM Standard E2835-11

Exceeds standard with use of Impact Force Transducer

Measure Field Soil Modulus to Ensure Soil Compaction
LWD-1 Applications & Features

Features & Benefits
- Non-nuclear Methodology – avoid higher operating costs & handling risks
- Immediate stiffness/Young’s modulus (E) results (english/metric)
- Measure actual Impact Force with in-line load cell to reduce inherent error in stiffness/modulus
- Displacement measured by geophone (vs. accelerometer) requiring only a single integration reducing error
- Steel spring dampener embedded in drop weight creates clean impact
- Simple design
- Easy to use single-person operation:
  - Rugged
  - Portable with quick attach/detach 2-wheel cart
  - Lightweight
- User-friendly WinLWD Acquisition & Analysis Software
  - MS Windows 10 Pro™

QA/QC of field base & subgrade compaction

Applications
- Road Construction
- Airport Runways
- Railway Beds
- Overlot Fill Grading
- Parking Lots
- Earth Retaining Walls
- Earthen Dams

Options
- Add-On Impact Weights available as follows:
  - 5kg
  - 10kg
- Geophone arrangement for two layer analysis
- Base Plates available in the following diameters:
  - 100mm
  - 150mm
  - 200mm
  - 300mm

Two additional radial geophones allow for two layer analysis by AASHTO Odemark Method of Equivalent Thicknesses approach

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The laboratory option is a compact apparatus with a lighter weight to match loading pressure and impulse duration time in Proctor molds to in situ field testing for determination of the target soil modulus ($E_{\text{LWD}}$).

**Olson LWD QA/QC Implementation Procedure:**

The Olson LWD-Lab unit is used along with a standard or modified Proctor mold compaction test to determine the optimum moisture content, the maximum dry density, and the Target $E_{\text{LWD}}$ value. These three values should be established for each soil material. Once in the field, the compaction acceptance criteria is based upon adequate control of the moisture content (typically ± 1 – 2 %) and exceeding the threshold Target $E_{\text{LWD}}$ value (typically 95% of the Target $E_{\text{LWD}}$ value) during in situ LWD field testing.

From the DOT sponsored Pooled Fund Study at the University of Maryland, there are two methods of test presented suitable for DOTs to adopt. These methods are:
- Laboratory Determination Of Target Modulus Using LWD Drops On Compacted Proctor Mold
- Compaction Quality Control Using LWD

Alternative LWD implementation procedures typically use a field control strip with precisely controlled moisture and full compaction to establish the target or threshold $E_{\text{LWD}}$ values.

The field measured $E_{\text{LWD}}$ values can then be used to verify the adequacy of the pavement design by the pavement design engineers. Using LWD provided modulus and moisture content from field samples, our LWD plots ensure the Target elastic modulus was achieved.
## LWD-1 Specifications

WinLWD software provides force, displacement, stiffness, and modulus values in real time during field and laboratory testing.

### Specifications

<table>
<thead>
<tr>
<th></th>
<th>Field</th>
<th>Lab</th>
</tr>
</thead>
<tbody>
<tr>
<td>Impulse Loading</td>
<td>6.9kN (1550lbs)</td>
<td>1.7kN (390lbs)</td>
</tr>
<tr>
<td>Total Weight</td>
<td>27kg (59lbs)</td>
<td>13.2kg (29lbs)</td>
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<tr>
<td>Height</td>
<td>1.25m (50in)</td>
<td>0.9m (36in)</td>
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<tr>
<td>Impact Weight</td>
<td>10kg (22lbs)</td>
<td>3.6kg (8lbs)</td>
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<tr>
<td>Drop Height</td>
<td>600mm (24in)</td>
<td>250mm (10in)</td>
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<tr>
<td>Impulse Duration</td>
<td>15-20ms</td>
<td>15-20ms</td>
</tr>
<tr>
<td>Two-Wheel Cart</td>
<td>5kg (11lbs)</td>
<td>N/A</td>
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</tbody>
</table>

### Electrical

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<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>Data Channels</td>
<td>2 or 4</td>
</tr>
<tr>
<td>Input Power</td>
<td>USB Powered Control Box</td>
</tr>
</tbody>
</table>

### About Olson Instruments

Headquartered in Wheat Ridge, Colorado, USA, Olson Instruments specializes in Nondestructive Evaluation equipment for the civil engineering industry. We are an established manufacturer of sensors and data collection systems since 1993.

Olson Engineering Inc. specializes in Nondestructive Evaluation and Internal Condition Assessment of Civil Infrastructure throughout the world as well as Geophysical Services for engineering purposes.

To learn more visit:
- www.OlsonInstruments.com
- www.OlsonEngineering.com

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