DFI / EFFC - WORKING PLATFORM TASK GROUP
FIELD RESEARCH STUDY (FRS) #1 - PLATFORM TESTING
METHOD STATEMENT_REV 2
1.0 INTRODUCTION


The Guide has identified three areas in particular where knowledge is limited, field testing, the evaluation of track pressures and the application of a range of design methods. This paper refers only to the study of platform testing: Field Research Study Number 1 (FRS #1). The other areas will be investigated at a later date.

Through the work of the Task Group thus far, three testing methods (PLT, DCP and LWD) have been identified that may be useful in testing platforms and, in some cases, the subgrade beneath. Several other methods (like ground penetrating radar, proof rolling, nuclear gauge testing or several seismic test methods) have also been reviewed by the Task Group but have currently been excluded from this FRS after intensive discussions. The main objective of FRS#1 is therefore to evaluate the selected methods in the field to understand how practical and effective they may be.

We are seeking several industry partners (contractors, consultants, engineers, academics and owners) to help conduct this field research over the next twelve months. Funding made available by EFFC and DFI may be used to purchase or hire the required testing equipment. Tests shall be executed by participating partners under their own supervision. It is expected that the costs of shipment or trucking of equipment between the various test sites shall be borne by each industry partner. Equipment shall be handled with care since no funds for repair or replacement are currently available.

It is hoped that as many as possible interested parties will join this effort to gather data, but also to gain experience for their own benefit. Be it as contractor with the urgent need to investigate actual site conditions, or consultants to see if such tests would fit well with their service profile. Engineers as well as academics are welcome to join the effort and maybe help to establish new correlations to existing geotechnical parameters, which could be used for platform design verification in the future.
2.0 OBJECTIVES

The required tests are to be performed after the design and installation of a working platform. In other words, the test is not intended to replace good ground investigation programs that should be arranged before the work starts. The proposed tests are intended to fulfill the following requirements:

- The equipment could test both the platform and the subgrade beneath.
- It would identify soft spots.
- The equipment would be lightweight and easily transportable.
- The method would be easy to deploy with little or no training required.
- The results of the test would be relatable to the platform design, and;
- Be quick and economical.

It is unlikely that any test will meet all of these objectives and so the FRS#1 is executing this trial of the various methods in order to compare the methods and determine each method’s relative advantages and disadvantages.

3.0 TESTING PROPOSAL

Ideally, we would like for each partner to trial each of the four selected methods alongside each other, so that a good comparison may be made for each test method. Similarly, it would be useful if the site in question already had existing ground investigation data so that the numerical outputs of each of the tests could be compared to some baseline information. However, this may not be possible in all circumstances, and we want to encourage the widest take up of trials as possible: so if a partner can only test, say, two of the four methods then we would welcome those results too.

In order that we can properly document the trials the partners should complete a report for each of the methods for each of the trial sites. The format and flow in Section 4.0 below is to be followed. Although not mandatory, to assist, a MS Word form is also available upon request.

- **Stitz DPL**
  This Dynamic Cone Penetrometer test can measure the penetration resistance of both the platform and the subgrade. The trial would ascertain how easy the equipment was to use and how the data could be correlated back to the assumptions in the original platform design. In order to do this some correlation to other data such as more conventional CPT or SPT data will be necessary. This short video demonstrates how the unit is operated. [https://youtu.be/08qKPLHO3Bo](https://youtu.be/08qKPLHO3Bo)

- **Panda DCP**
  This Automatic Dynamic Cone Penetrometer test can measure the penetration resistance of both the platform and the subgrade. The probe will provide a read-out for the dynamic resistance. The trial would establish how easy it was to use and how the data could be correlated back to the platform design. Correlations to CPT or SPT data do already exist. This short video demonstrates how the unit is operated. [https://www.youtube.com/watch?v=EHKdOe_ViCI](https://www.youtube.com/watch?v=EHKdOe_ViCI)

- **Lightweight Deflectometer (LWD)**
  This test is only likely to verify the quality of the working platform itself. The trials are to establish whether the data gleaned from such a test can be used to validate the platform design. In order to do this some correlation to another test such as a more convention Plate Load Test (PLT) will be necessary.

- **Plate Load Tests (300mm plate)**
  This test is also only intended to validate the design parameters used for the platform material in the initial design. Further feedback from the industry is required both on how practical this test is, along with the methods of interpretation.
4.0 OUTPUT

A summary report will be required for each site, which will address the general conditions and test findings. All data will be kept confidential, and each site will be assigned only a number (EU1, EU2 ..., US1, US2 ...).

- Working platform details (type, density, max grain size, thickness ...).
- Subgrade investigation details (Soil type, cu, SPT/CPT ...).
- Equipment and work scope with max loading.
- Working platform design if available.
- Site plan with test locations in relation to available subgrade test locations.

The report should also address the specific areas of interest in relation to each test:

- **Stitz DPL acc. DIN EN ISO 22476-2**
  - Commentary on ease of use.
  - Penetration ability through the upper platform materials (gravel, lime or cement treatment, other).
  - Penetration/blow plots to at least 4m depth.
  - Correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).

- **Panda DCP acc. NF P 94-105**
  - Commentary on ease of use. Automatic or free hammering.
  - Penetration ability through the upper platform materials.
  - Penetration/blow plots to at least 4m depth.
  - Correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).

- **Lightweight Deflectometer (LWD) acc. ASTM E2835**
  - Commentary on ease of use.
  - Surface modulus plots.
  - Method of correlation to an alternative test method (like PLT).
  - Correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).
  - Commentary on dealing with results scatter.

- **Plate Load Tests (PLT - 300mm plate) acc. DIN 18134 or ASTM D1194**
  - Commentary on ease of use
  - Load-settlement curves and subgrade modulus calculations
  - Method of correlation to an alternative test method (like LDW).
  - Correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).
5.0 EXECUTION

All four tools have been purchased and are available for anybody who is interested in joining this effort as industry partner to use for this study. Interested partners in the US shall contact Peter Faust at pfaust@malcolmdrilling.com and partners in Europe shall contact Jim De Waele at jim.dewaele@keller.com, who will coordinate the shipping of tools and data collection.

It is expected that partners will pay for all shipping as well as operating cost as their in-kind contribution to this research. It is also expected that all partners maintain the equipment in good working order, since the allocated budget for this research does not allow for repairs or replacement.

6.0 PATH FOREWARD

It is hoped that enough participating partners can be found to provide data for all test for at least 20 sites in total (10 sites in the EU and 10 sites in the US). At the end of the twelve months the principal investigators would compile the reports and present the conclusions to the Task Group. The Task Group will discuss the results and will formulate recommendations for inclusion into Edition 2 of the EFFC-DFI Guide to Working Platform.

6.0 APPENDICES

- Fact sheets on Stitz, Panda, PLT and LWD
- Field sheets for data reporting
Leichte pneumatische Rammsonde E-DPL
zur Baugrunderkundung

Das kompakte nur 13,5 kg leichte Verdichteraggregat mit Elektromotor ist geeignet für den Einsatz mit der leichten pneumatischen Rammsonde DPL.

Rammvorrichtung DPL:
- Fallhöhe 50 cm
- Fallgewicht 10 kg
- Druckluftanschluss
- Gewicht: 16 kg

Verdichteraggregat E-DPL:
- E-Motor 0,35 kW, 230V/50Hz
- Rotationsverdichter
- Fördervolumen regelbar
- Luftfilter
- Tragegestell auf Gummipuffern
- Abmessungen (LxBxH): 340x200x450 mm
- Gewicht: 13,5 kg

Zubehör:
- Drehstab
- Klappstecker
- Plastiköl mit spezial Öl
- Schlagkopf mit Gewinde M16
- Druckluftschlauch mit Handventil
- Transportbox für Rammvorrichtung

<table>
<thead>
<tr>
<th>Art.-Nr.</th>
<th>€/Stück</th>
<th>Bezeichnung</th>
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<tbody>
<tr>
<td>11.108</td>
<td>a. A.</td>
<td>Leichte pneumatische Rammsone E-DPL</td>
</tr>
</tbody>
</table>

Holztransportkiste - Verdichteraggregat E-DPL
Robust aufgebaute Holztransportkiste passend zum Verdichteraggregat E-DPL. Geeignet für den Transport in Fahrzeugen, um das Aggregat vor Schäden zu schützen. Dank der beiden Kistengriffe läßt sich das Verdichteraggregat inkl. Zubehör in der Transportkiste zum Einsatzort tragen.

- Solider Aufbau
- Inkl. 2 Spannverschlüsse
- Inkl. 2 Kistengriffe
- Außenmaß (LxBxH): 440x365x500 mm
- Gewicht: ca. 10 kg

<table>
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<tr>
<th>Art.-Nr.</th>
<th>€/Stück</th>
<th>Bezeichnung</th>
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<tbody>
<tr>
<td>11.031</td>
<td>a. A.</td>
<td>Holztransportkiste - Verdichteraggregat E-DPL</td>
</tr>
</tbody>
</table>
PANDA®
Variable energy light weight
dynamic cone penetrometer
**Advantages**

- Conception and development by Sol Solution
- Variable strike energy input from operator adapted to relative ground resistance
- Measurement of variable strike energy and depth for each blow provides instantaneous calculation of ground resistance
- Lightweight, portable and single person operation
- Automatic data acquisition and storage
- Integrated GPS
- WEBSPRINT® web application for geotechnical data processing
- Penetrographs and strike information viewable on site
- Reference curves and automatic inbuilt calculation of encountered anomalies viewable on site
- Several languages available

**Characteristics**

- **Case dimensions:** L 55 x l 43 x H 21 cm
- **Overall weight with case:** 18.5 kg
- **2 cm² fixed cones and 4 cm² lost cones**
- **Colour touchscreen**

**Options**

- Mechanical rod extractor
- Various automatic hammering systems associated
- Kit wheels on suitcase
# SOIL INVESTIGATIONS

**Aim**

TO OPTIMISE INVESTIGATION AND GEOTECHNIC DIAGNOSIS IN SOILS AND UNBOUND MATERIALS

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**Advantages**

- Geological cross-section reference library
- Access to test results from horizontal, sloping, or steep sites
- Restricted access locations unavailable to larger or cumbersome equipment
- Geotechnical correlation (CBR, CPT, SPT, Cu…)
- Selection of outputs relating to scales, measurement units, elevation, water level.

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# COMPACTION CONTROL

**Aim**

TO VERIFY COMPACTION RELATING TO TRENCHES, EXCAVATIONS, UTILITY INSTALLATIONS, EARTHWORKS, EMBANKMENTS, DIKES, ROADS, …

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**Avantages**

- Full depth control in one single operation
- Compaction homogeneity and layer thickness control (compacted lift thickness)
- Identification of individual structural and/or material layers (Base, Sub-Base, Backfill, …)
- Standard database (GTR soil classification) and compaction quality.
- Inbuilt international soil classifications also available (USCS, AASHTO, DIN 1896, PG3,…)
- Various automatic calculation for compaction anomalies
- Automatic creation of reports

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**Conformity**

- Standard **NF P 94-105**
- Fascicule **70**
- COFRAC
- SETRA Guide
The Static Plate Load Tester

HMP PDG applies in earthworks and foundation engineering as well as road construction. It enables comfortably to determine the load capacity and the deformability of soils by evaluating load settlement lines and dynamic modulus of deformation of soil Ev1 and Ev2 according to DIN 18 134 issue 2012.

Latest technology.
Intuitive handling.

Easily retrofittable for all plate load tester.

First choice for professionals!
HMP Magdeburger Prüfgerätebau GmbH

As a medium-sized family business in second generation we rely on continuity, reliability, confidence and innovation.

More than 30 years of experience in development, production and service, certified quality standards and latest production conditions make us a competent partner for the construction industry. The from us developed test equipment, as the Light Weight Deflectometer HMP LFG and the Static Plate Load Tester HMP PDG are used all over the world for compaction control and bearing capacity tests at the soil examination.

Trained service- and sales partners form a reliable global network.

We only manufacture in Germany and trust in regional suppliers on the basis of strict certification guidelines.

The HMP GmbH is a from the Federal Highway Research Institute (BAST) approved calibration institute for Light Weight Deflectometer.
Excellence for experts.
The test method

The Static Plate Load Test applies in earthworks and foundation engineering as well as road construction in order to determine load settlement lines and by this to evaluate the deformability and the load capacity of the soil.

The examining soil layer is repeatedly in steps loaded and unloaded by a circular load plate by means of a load device. The settlement measuring instrument consists of the measuring frame with probing arm and dial gauge. As a counterbalance of the load device a heavy-weight construction vehicle is used.

For test evaluation, the settlements of each loading stage and the corresponding average normal stress under the load plate are shown in a diagram as load settlement curves.

The modulus of deformation Ev is determined from the load settlement line of the first load (Ev1) and the second load (Ev2). Through the first loading a certain remaining deformation always obtains and therefore the proportion of the accordingly higher Ev2 value to the Ev1 value provides an indication to the attained compaction.

The procedure of the Static Plate Load Test is standardized in DIN 18134.

Comprehensive correlations to direct test methods are available.
German test regulations

- **DIN 18134 issue 2012-04**
  Soil; testing procedures and testing equipment – Plate load test

- **RStO 01**
  Directives for standardisation of the superstructure of traffic areas

The HMP PDG complies with the Standards for application according to German and international test regulations. Comprehensive correlations with other test methods ensure compatibility.

International test regulations

- **USA**

- **Great Britain**
  BS1377-9 – Methods for test for soils for civil engineering purposes – In-situ tests

- **Switzerland**
  SN 670317 Soils - Plate load test EV/ME
  SN 670312 – VSS-Equipment for plate load test EV/ME

- **Austria**
  ÖNORM B4417 – Geotechnical engineering; Exploration of soils; Plate load test

- **Italy**
  CNR BU 146/92 – Prove di carico con piastra, Il modulo di compressibilità $M_d, M_d'$

- **France**
  NF P94-117-1 – reconnaissance et essais - Portance des plates-formes - Partie 1 : module sous chargement statique à la plaque (EV2)

- **Sweden**
  TDOK 2014:0141 Version 1.0 Bestämning av bärzythsegenskaper med statisk plattbelastning

- **Norway**
  R211 Feltundersøkelser Metode 2.2.4 Platebelastning

**BUILDING CALLS FOR TESTING.**
By means of the Static Plate Load Tester HMP PDGpro immediately after test procedure the deformability and the load capacity of the soil as well as the quality of the construction work can be assessed and documented on the construction site.

The indirect test method works quickly, reliably, comfortably and precisely.

To carry out the test a counterweight of at least 5 t is required. Set up and test procedure can be done by one person. The handling of the measuring instrument is comfortable and very user-friendly. Faulty measurements are almost impossible when handled properly. This is ensured by the internal plausibility check.

The pure test procedure according to DIN 18134 with 15 loading stages takes about 30 minutes and allows immediate conclusions on the load capacity and deformability of soils down to the depth of twice of the load plate diameter. By specifying the GPS coordinates, the measuring point is recorded.

For subsequent post-processing and protocol creation on the PC, the measured values can be exported via USB stick or cable.
Advantages of the HMP PDGpro

Bright red measuring frame
- fast set up and safe position
- user friendly in design and functionality

Automatic evaluation unit
- latest, high-precision measuring technology, safely packed, splash-proof and ready for use even in adverse weather conditions
- intuitive menu navigation
- stored table of nominal values
- automatic logging and evaluation of force and path
- comprehensive language selection and individual adjustment options
- USB for comfortable data transfer
- GPS for localisation of measuring point
- interface for printer and PC

Reliable and precise
- manufactured according to the latest technical standards
- precise, robust, long-lasting
- calibrated on certified calibration point
- worldwide in use for 20 years thousandfold

Measuring procedure

Preparation
- mount and set up the measuring frame
- fasten dial gauge and measuring head
- place the pressure plate onto the test point, position the counterweight
- mount the force transducer, thrust piece, cylinder and magnetic holder on it
- connect hydraulic and automatic evaluation unit

Measure
- switch on the evaluation unit, confirm measuring mode
- follow the menu navigation in the display and so gradually load and unload
- approach the nominal values one after the other by means of the hydraulic pump, hold and store
- displaying the measuring values for the pressing and settlement after each measuring point

Evaluate
- automatic calculation and displaying of Ev1, Ev2 and the ratio Ev2 / Ev1 immediately after completion of the measurement
- displaying the load settlement curve and GPS position
- showing the individual loading stages and corresponding settlements
- print out short protocol directly at the construction site and/or transfer measured values to PC in order to comfortably edit, complete, archive these by means of the software HMPproplat
Reliably

The Static Plate Load Tester HMP PDGpro is a high-precision measuring instrument for professionals and yet designed robust and user-friendly ... used worldwide for 20 years.

The measuring frame and all accessories can be safely stored within the massive carrying cases.

Due to latest technology, the evaluation unit is small, handy, unbeatably easy and comfortable to use.

The measuring device is of course splash-water proof to work even under bad weather conditions. All parts of the tester are also surface sealed.

Latest device generation

- large colourful graphic display 3,5”
- backlight guarantees optimum readability at all weathers!
- intuitive menu navigation
- integrated GPS
- integrated Bluetooth
- interface for printer, USB
- efficient, fast 32-bit processor
- internal memory for 200 tests
- high-performance rechargeable lithium-polymer battery guarantees constant readiness for use
- PCsoftware to create professional test protocols

Best communication

- PC software HMPproplat with comprehensive search and editing options to create professional test protocols
- comprehensive language selection and individual setting options in the menu and the software for smooth communication at international assignments

USB stick 4 GB incl.
movie regarding application

New user? No problem, the movie on the supplied USB stick explains the test procedure within a few minutes - always available and quickly retrievable.
Repeat this process until the last nominal value is reached.

After the stepwise load, follows the un-load and then again a load.

The internal plausibility check prevents avoids measurement errors.

Comfortable menu navigation

The menu navigation of the HMP PDGpro is particularly user-friendly. In order to perform the test, just follow the instructions on the display.

Nominal values according to DIN 18134 are stored. Individual nominal value tables can be added.

Start display

Welcome. The start display shows the charging status of logging unit + printer and also the GPS + Bluetooth activity. Warnings will additionally inform you about critical values, so that your testing device is always optimally ready for operation.

Settings

Adjust the display and device configurations to your requirements. Regarding menu navigation just choose one of the various languages and use nationally usual measuring units.

Measured data

Here you can find all stored measurements clearly arranged for further processing and documentation.

That’s how easy the measurement works

- After activating the menu item with ENTER you will be guided through the measuring process.
- Reset dial gauge and force measurement. The first measuring point (MP) is stored
- By operating the hydraulic, the stress (σ) below load plate will be increased to the next nominal value. Hold it for 60s and store the corresponding settlement (s).
- Repeat this process until the last nominal value is reached.
- After the stepwise load, follows the un-load and then again a load.
- The internal plausibility check prevents avoids measurement errors.
Result

After reaching the last loading stage, the Ev1, Ev2 and the ratio Ev2 / Ev1 are calculated and displayed immediately. Scrolling will take you to the corresponding load settlement lines and to the GPS coordinates of the measuring point.

The measurement and its curve- and GPS data an be printed out directly or transferred onto a USB stick or via cable directly to the PC for later processing.

Measured data

The individual plate load tests are clearly stored in the memory. Select the single measurements and scroll through their details, such as curve and GPS data.

Export

Transfer your measured data onto an USB stick or via cable directly to your PC for archiving and further processing.
Evaluation

Print out
Document the measuring result directly on site by means of the thermal printer.

Create protocols
Use the evaluation software HMPproplat in order to create professional protocols for the measurements on PC. Add your logo, your contact details and comments.

Archive measurements
The software also enables you to store the data in a database with comfortable search and editing capabilities.
THE HMP PDG pro
### Optional upgrade
Because of the modular construction you only buy, what is actually needed – basic equipment with manual evaluation or professional device for exact documentation. An upgrade or modification is possible at any time fast and cost-effective.

### Technical data/Sope of supply

<table>
<thead>
<tr>
<th></th>
<th>PDG&lt;sub&gt;pro&lt;/sub&gt;</th>
<th>PDG-M</th>
</tr>
</thead>
<tbody>
<tr>
<td>Display unit</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>with automatic evaluation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>with manual evaluation</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Loading mechanism</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Hydraulıc pump with tension cylinder for 100 kN tension force and 150 mm lift, 2 m high-pressure hose</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>1 set of hydraulic cylinder extensions pieces (attachable)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Pressure plate with holding magnet and upper ball-and-socket-joint</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Load plate with handles and adjustable bubble level diameter / plate thickness:300/25 mm</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Force measurement</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Electrical force transducer 50kN (optional 100kN) complete with thrust piece and adapter</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Path measurement</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Electronic dial gauge, measuring range 25 mm, resolution 0.01 mm, digital display, degree of protection IP42</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Measuring head</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Logging of force and path values and digital, interference-free transfer to measuring unit</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>USB stick incl. movie</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>regarding its application and instruction manual, 4 GB</td>
<td>✓</td>
<td>✓</td>
</tr>
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</table>

### Technical data/Sope of supply

<table>
<thead>
<tr>
<th></th>
<th>PDG&lt;sub&gt;pro&lt;/sub&gt;</th>
<th>PDG-M</th>
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</thead>
<tbody>
<tr>
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<td>✓</td>
</tr>
<tr>
<td>graphic display, coloured, illuminated 56 x 73 mm</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>plausibility check</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>fast, efficient 32-bit processor</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>interface for USB, integrated GPS, Bluetooth</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>dimensions: 210 x 100 x 31 mm</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>internal storage capacity in measurement series</td>
<td>200</td>
<td>200</td>
</tr>
<tr>
<td>external storage capacity on 4 GB USB stick</td>
<td>200,000</td>
<td>200,000</td>
</tr>
<tr>
<td>high-performance rechargeable Li polymer battery 3,7 V, 6300 mAh</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>menu navigation selectable in many languages</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Measuring frame</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>three-point bearing with attachable contact arm and adjustable plate-shaped feet</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>dimensions: 2,320 x 570 x 420 mm (LxWxH)</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Weight: 12,5 kg, material: aluminium, anodised</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

### Guaranteed
- 2 years of HMP guarantee included
- 10 years of spare parts availability guaranteed
- Competent all-round service - even after sale has been made!
- Certified production according to DIN EN ISO 9001:2015
- Development and production within Germany
- Trained service and distribution partners in your vicinity
Additional options

**Thermal printer**
- small, quick printer with light resistant thermal paper. Document your measuring results directly at the site.

**HMPproplat Software**
- PC Software for comfortable evaluation and processing of measured results
- Add details regarding measuring point and take advantage of the clearly arranged user interface to create and archive representative A4 test protocols.

**Robust carrying cases**
- extra robust wooden boxes for safe storage and transport of the HMP PDG on construction vehicle, in the warehouse or during shipping - ecologically valuable produced from renewable resources.

Set consists of:
- Ø 600 mm, 70 kg, with holding bolt
- Ø 762 mm, 96 kg, with holding bolt

**Load plate for HMP PDG**
- 120 x 25 x 21cm, weight complete 23,0 kg
- 92 x 40,5 x 23,5cm, weight complete 49,5 kg

**Calibration**
The Static Plate Load Tester HMP PDG are delivered in calibrated condition. According to DIN 18134, these devices must be calibrated annually. Therefore HMP has returned test equipment to provide the calibration proof for force and path.

The **HMP calibration includes firmware updates**! This keeps your testing equipment up to latest technical standards.

**Service**
We do not only calibrate your tester, we also adjust and clean it and perform a comprehensive function check. In case we recognize any defects at your tester, we are able to repair it directly - fast and precise, so that your tester will definitely work correctly afterwards.

On request we remind you free of charge in good time before the end of the calibration cycle.
The in-house research- and development department and the cooperation with renowned institutes, f. e. the Fraunhofer Institute Magdeburg guarantee the constant further development of our devices.

More than 30 years of experience and a certified service department with calibration institute ensure you an All-round service and an operational readiness of your HMP PDG for man years.

If basic equipment with manual evaluation or professional device with automatic evaluation for exact documentation - you only need to buy, what you really need. Because of the modular construction of the HMP testing equipment an upgrade or modification is possible at any time fast and cost-effective.

That you can rely on:

- German production, certified according to DIN EN ISO 9001:2015
- Calibration institute - authorized by the Federal Highway Research Institute
- 2 years of guarantee, 10 years of spare part availability
- more than 30 years of experience in development, production and service
- trained service and distribution partners in your vicinity
Your competent specialised dealer:

HMP Magdeburger Prüfgerätebau GmbH
Bühlster Straße 6
39126 Magdeburg

Tel.: + 49 391 2514666
Fax: + 49 391 2514668
info@hmp-online.de
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Development, Production and Service - soil-mechanical test equipment

HMP PDG
Static Plate Load Tester
DIN 18134 issue 2012
ASTM D1195/1196
BS 1377 Part 9

HMP LFG
The Light Weight Deflectometer
TP BF-StB B 8.3 issue 2012

HMP SON
Automatic acquisition-and evaluation unit for penetration
EN ISO 22476-2

HMP DEN
Determination of soil density
DIN 18125 part 2

Distribution of tester for road construction, concrete construction, refurbishment of buildings, laboratory equipment

www.hmp-online.com
Revision 04/2019, Technical changes reserved
By means of the Light Weight Deflectometer HMP LFG you are able to purposefully manage and control your compaction works and to improve the quality of your construction site.

This gives you confidence, saves time and money!
HMP Magdeburger Prüfgerätebau GmbH

As a medium-sized family business in second generation we rely on continuity, reliability, confidence and innovation.

More than 30 years of experience in development, production and service, certified quality standards and latest production conditions make us a competent partner for the construction industry. The from us developed test equipment, as the Light Weight Deflectometer HMP LFG and the Static Plate Load Tester HMP PDG are used all over the world for compaction control and bearing capacity tests at the soil examination. Trained service- and sales partners form a reliable global network.

We only manufacture in Germany and trust in regional suppliers on the basis of strict certification guidelines.

The HMP GmbH is a from the Federal Highway Research Institute (BASf) approved calibration institute for Light Weight Deflectometer.
The test method

The dynamic plate load test by means of the Light Weight Deflectometer enables an uncomplicated bearing capacity test and compaction control of soils, non-cohesive subbases and soil improvements – within only 2 minutes – just place the device, measure and evaluate immediately!

Inbuilt soil layers can be tested very quickly and without load abutment, facilitating quick assessments of test lots even under limited space conditions. The test method is suited for coarse-grain and mixed grain soils having a maximum grain size of 63mm and can be used to determine the dynamic modulus of deformation of soil in the range of $E_{vd} = 15...70$ MN/m².

The dynamic plate load test is described in the Engineering Code for Soil and Rock in Road Construction TP BF-StB part B 8.3 issue 2012. Detailed correlations to other test methods exist.

Areas of application

- Road- and railway construction, earthworks
- Quality assurance in canal construction
- Compaction control in pipe trenches
- Testing of pavement beddings
- Testing of foundation backfill
- Quality inspection in boreholes
- Testing of modulus of deformation within the framework of soil examination

Chile, Philippines, Senegal
BUILDING CALLS FOR TESTING.

Self-monitoring

The Light Weight Deflectometer HMP LFG is especially suitable for in-house self-monitoring, due to the easy handling and the immediately available measurement results. This facilitates quick decisions to continue construction work at the site.

Minimize your costs by avoiding unnecessary compaction works but also optimize the quality of your construction project.

Convince your customer by proving the quality assurance of your construction site. Prevent f. e. expensive recourse claims because of subsidence damages.

Document your measured data directly at the site via printout by means of the thermal printer or as protocol printout after transferring and reliable archiving the measurement series onto your PC.

Determine the bearing capacity and compaction quality of soils and non-cohesive subbases fast, reliably and precisely.

By means of the Light Weight Deflectometer HMP LFG you are able to purposefully manage and control your compaction works and to improve the quality of your construction.

This gives you confidence, saves time and money!
Advantages

Fast and cost saving
- quick examination – only 2 minutes per measuring point
- measurement result immediately available
- documentation directly at the site
- no vehicle as counterweight necessary

Easy to use
- low tare weight, ergonomic design
- can easily be operated by one person
- testing even in difficult-to-reach places
- intuitive menu navigation
- automatic storage, evaluation and archiving
- detailed correlations to other test methods exist

Reliable and precise
- manufactured according to newest technical standards
- precise, robust, durable
- calibrated by approved calibration institute
- in use all over the world for more than 30 years

German regulations
- TP BF-StB B 8.3 issue 2012
  The Engineering Code for Soil and Rock in Road Construction
- ZTV E-StB 2017
  German additional terms of contract and rules for earthwork in road construction
- ZTV T-StB 95/02
  German additional terms of contract and rules for subbases in earthwork
- ZTV A-StB 12
  German additional terms of contract and rules for excavation in traffic access
- RIL 836, Deutsche Bahn AG (NGT39)
  Guideline for the use of the Light Weight Deflectometer in railway construction

International regulations
- USA
- Austria
  RVS 08.03.04 March 2008 compaction control by means of dynamic plate load test
- Spain
  UNE 103807-2:2008 Plate Loading Test of Soils by means of Dynamic Plate - Part 2: Rigid Plate, Diameter 2r = 300 mm, Method 2
- China
  TB 10102-2010, J338-2004 Standard for soil testing in railway construction

The HMP LFG complies with the standards for its usage according to German and International regulations. Detailed correlations to other test methods ensure the compatibility.
UNBEATABLY FAST AND EASY TO USE

The handling

The handling of the Light Weight Deflectometer is comfortable and very user-friendly. Measurement errors are excluded. The internal plausibility control guarantees this.

The measuring procedure shown on the right shows the easy and quick implementation of the measurement. The menu navigation is intuitive and easily understandable even without prior knowledge.

The measuring results can be printed out immediately on-site. The measuring point will be recorded by specifying the corresponding GPS data. The measured values can be exported via Bluetooth, USB stick or cable for subsequent processing and protocol creation on tablet or PC.

The comprehensive language selection and individual adjustment possibilities ensure a smooth communication for international operations.

The measuring process

1. Set it up
   - level the test area
   - lay down the full-size load plate
   - put loading mechanism onto it
   - connect it with measuring instrument

2. Measure
   - switch on, confirm mode „Measuring”
   - follow the instructions in the display
   - perform successively 3 precompacting impacts & 3 measuring impacts
   - displaying the settlement after each impact

3. Evaluate
   - automatic calculation and displaying all measured data and the Evd value
   - save the measurement, print and transfer it
   - showing the GPS and curve data after completion of the measurement
THE PREMIUM MODEL
HMP LFG pro

Reliably

The Light Weight Deflectometer can easily be used by one person – even without prior knowledge.

Due to latest technology, the measuring instrument is small, handy, unbeatably easy to use but also extremely accurate.

The measuring device is of course splash-water proof to work under bad weather conditions. All parts of the tester are also surface sealed.

Latest device generation

- large colourful graphic display 3.5"
- lightsensor-controlled backlighting > guarantees optimum readability at all weathers!
- very comfortable menu navigation
- integrated GPS
- integrated Bluetooth
- interface for thermal printer, USB
- efficient, fast 32-bit processor
- internal memory for up to 1000 tests
- high-performance rechargeable lithium-polymer-battery > guarantees constant readiness for use

USB stick 4GB incl. movie regarding application

New user? No problem, the movie on the supplied USB stick explains the test procedure within a few minutes - always available and quickly retrievable.

Best communication

- Data transfer to tablet, smartphone or PC via IOS/Android-App HMPtransfer, USB stick or cable
- web-based evaluation software HMPreport, password protected > availability of the measurement data in real time at any place
- menu, app, software in many languages

About the movie:
www.hmp-online.com
It doesn’t get any easier! Intuitive menu navigation

The menu navigation of the HMP LFGpro is very user-friendly. In order to perform the test, just follow the instructions in the display.

Start display

Welcome. The start display shows the charging status of measuring device + printer and also the GPS + Bluetooth activity. Warnings will additionally inform you about critical values, so that your testing device is always optimally ready for operation.

Measurement

› After activating the menu item with ENTER you will be guided through the measurement process.
› An acoustic signal indicates the readiness to measure.
› The internal plausibility control avoids measurement errors.

After the third impact, the individual settlement amplitudes, the average settlement $S_m$, the deformation speed and the calculated $E_{vd}$-value will be shown.

You can have a look at the measurement series and its GPS + curve data, print out directly, reject or upload for later processing.

Settings

Adjust the display and device configurations to your requirements. Regarding menu navigation just choose one of the various languages and use nationally usual measuring units.

Measured data

Here you can find all stored measurements clearly arranged for further processing and documentation.
Measured data

Select the single measurement series & scroll through their details, as curve and GPS data.

Export

Export your measured data via USB, Bluetooth (HMPtransfer App) directly into the Cloud or to your PC for archiving and further processing. Protocols can already be prepared in the office, while you are still on the construction site.
Print out
Document the measuring results directly on site my means of thermal printer.

Create protocols
Use the web-based evaluation software HMPreport, in order to create professional protocols for each measuring point including your logo and contact details – wherever and whenever you want. Work with the data from the Cloud or from your PC. The Software also enables you to store the data in a database with comfortable search- and editing options.
Standard model

Reduced to the basics – successfully in use for more than 30 years worldwide!

Technical features

- large graphic display (62 x 35 mm)
- comfortable menu navigation
- acoustic signal when ready to measure
- Bluetooth interface
- printer port
- GPS port
- internal memory for 500 tests
- more than 1000 tests with one battery charge

USB stick 4 GB incl. movie regarding application

New user? No problem, the movie on the supplied USB stick explains the test procedure within a few minutes – always available and quickly retrievable.

Intuitive menu navigation:
Choose, confirm, done!

Easy and quick selection of the stored data

Individual adjustments

Best communication!

- Data transfer to tablet, smartphone or PC via iOS/Android-App HMPTransfer, USB stick or cable
- web-based evaluation software HMPreport, password protected > availability of the measurement data in real time at any place
- menu, app, software in many languages
**Scope of supply**

**Light Weight Deflectometer HMP LFG**

according to «German Engineering Code for Soil and Rock in Road Construction TP BF-StB part B 8.3 / issue 2012»

consisting of:

- Loading mechanism with bubble level
- Load plate with acceleration sensor
- Electronic settlement measuring instrument within protective aluminum case, Displaying and storage of settlement values, settlement speed (ratio s/v), deflection module E vd and settlement curve
- USB stick incl. movie regarding its application and instruction manual, 4 GB

**Optional upgrade**

Because of the modular construction you only buy, what is actually needed – basic equipment for the efficient self-monitoring or professional device for exact documentation. An upgrade or modification is possible at any time fast and cost-effective.

**Guaranteed**

- 2 years of guarantee included
- 10 years of spare part availability guaranteed
- competent all-round service – even after the sale has been made!
- certified according to DIN EN ISO 9001:2015
- development and production within Germany
- trained service- and distribution partner nearby

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**Technical data**

<table>
<thead>
<tr>
<th>Electronic settlement measuring instrument</th>
<th>LFGpro</th>
<th>LFG4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Settlement measuring range 0,1 bis 2,0 mm ± 0,02 mm</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Measuring range E&lt;sub&gt;vd&lt;/sub&gt; &lt; 225 MN/m²</td>
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<td>✔️</td>
</tr>
<tr>
<td>Temperature range 0 to 40 °C</td>
<td>✔️</td>
<td>✔️</td>
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<tr>
<td>Very robust, splash-water proof, connection cable with high-quality LEMO connectors</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Graphic display in mm</td>
<td>56 x 73</td>
<td>38 x 68</td>
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<tr>
<td>Colourful, lightsensor-controlled and illuminated</td>
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<td>✔️</td>
</tr>
<tr>
<td>Black/white</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Fast, efficient 32-bit processor</td>
<td>✔️</td>
<td>✔️</td>
</tr>
<tr>
<td>Bluetooth, USB, thermal printer interface</td>
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<td>✔️</td>
</tr>
<tr>
<td>GPS</td>
<td>✔️</td>
<td>Optional</td>
</tr>
<tr>
<td>Dimensions in mm</td>
<td>210 x 100 x 31</td>
<td>211 x 100 x 26</td>
</tr>
<tr>
<td>Storage capacity, internal in measurement series</td>
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<td>500</td>
</tr>
<tr>
<td>Power supply</td>
<td>high-performance rechargeable lithium-polymer-battery</td>
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<tr>
<td>3.7 V, 6300 mAh</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>4 x R6 Batterien</td>
<td>✔️</td>
<td></td>
</tr>
<tr>
<td>Menu navigation (19 languages available)</td>
<td>✔️</td>
<td>✔️</td>
</tr>
</tbody>
</table>

**Loading Mechanism**

| Total weight 15,0 kg | ✔️ | ✔️ |
| Drop weight 10,0 kg | ✔️ | ✔️ |
| Max. impact force 7,07 kN | ✔️ | ✔️ |
| Duration of impact 17,0 ± 1,5 ms | ✔️ | ✔️ |
| Material: zinc coated/hard-crome plated steel | ✔️ | ✔️ |
| Spring element 17 disk springs | ✔️ | ✔️ |

**Load plate**

| Diameter 300 mm, Plate thickness 20,0 mm | ✔️ | ✔️ |
| Total weight 15,0 kg, Material: zinc coated steel | ✔️ | ✔️ |
Measured values immediately available everywhere!

Transfer the measured values directly to your smartphone / tablet and from there via the HMPtransfer App into the cloud for processing by means of the web-based software HMPreport.

While you are still on construction site, the data can be evaluated and further processed in the office. Or just simply add by yourself - even on site - directly via your smartphone the missing information to the protocol and send it as a PDF file to whom you want.

Simply transfer measured values to the HMPtransfer App on your smartphone.

Send measured values directly by email and continue processing on the PC by means of the software HMPkurv.

Upload measured values into the cloud and immediately access them from anywhere and continue processing by means the web-based software HMPreport!

Immediately save brief protocol as a picture and send it via messenger or email.

Open HMPreport on your smartphone, add additional information and send it directly to the recipient in the A4 protocol as a PDF file.
Perform further measurements, while the data are being already processed in the office and forwarded to the decision maker! Upon the continuation of the construction project can be decided immediately - independently of the presence on site. This saves time and money.
Anytime and anywhere

The software HMPreport, developed by HMP, is web-based.

You can quickly and safely access to your measured values, project- and customer data at any time and from anywhere in order to process, distribute and archive these.

The operation is easy and intuitive - whether on the phone, PC or laptop.

Due to different user accounts, you can work on projects with colleagues simultaneously.

All data on projects, contractor, user, measurements and measuring devices are clearly arranged.

Import the measured values from the cloud, via USB or from PC.

Add information about measuring point and simply create representative, detailed A4 measurement protocols.

These can then be printed out or sent immediately to your contractor via email / messenger.

Import, process, archive data

› data import via cloud, USB, hard disk …
› comfortable search and editing options
› manage and archive comfortably and safely projects, contractor, user and measuring devices

Evaluate, send measured values

› create professional A4 protocols incl. logo and contact details, settlement curves and GPS position of the measuring point
› create PDF files and send via email / messenger

Individual settings

› manage measuring devices and inspector
› manage user and set usage rights
› store logo and contact details
› choose personal language setting
Advantages

› everywhere and anytime
Available at any time of the day and all over the world. If required it is possible that several colleagues work on projects simultaneously due to multiple user accounts.

› immediately without installation
Without extra installation on PC or other devices. Immediate availability via the web browser.

› secure and reliable
Password-protected, flexible access to the software. Compliant with data privacy protection. Without restrictive single-user licenses! Without additional storage requirements on local hard disk.

› always up-to-date
Updates occur automatically. All user work with the same version and are thus always compatible.

› independent
Reliable function - regardless of operating system, location, type of device and its display size.

› internationally available
Language settings selectable for menu and user.
THE ACCESSORIES

Additional options

**Thermal printer**
- Small, quick printer with light resistant thermal paper.
- State of charge of the printer is shown in the display of the settlement measuring instrument. The actuation is performed automatically.
- Document your measuring results directly at the site.

**Transport cart**
- For comfortable transport of the Light Weight Deflectometer at the site to the corresponding measuring points – device and accessories are stored safely but still immediately ready for use.
- Space saving foldable, small enough to fit into the trunk.

**HMPtransfer App**
- For convenient data transfer via Bluetooth/Smartphone from the site directly to the office.

**HMPreport Software**
- Web-based Software for comfortable evaluation and processing of measured results. Add details regarding measuring point and take advantage of the clearly arranged user interface to create and archive representative A4 test protocols – anytime, anywhere.

**Magnetic base plate**
- In order to put down the loading mechanism clean and safe.
- Then you have both hands free to align the load plate.

**Robust transport box**
- Wooden box for safe storage of device and its transportation.

**GPS – External Bluetooth-GPS-Receiver**
- Compatible with HMP LFG4, to proof the coordinates of the measuring point.
The in-house research- and development department and the cooperation with renowned institutes, f. e. the Fraunhofer Institute Magdeburg guarantee the constant further development of our devices.

More than 30 years of experience and a certified service department with calibration institute ensure you an All-round service and an operational readiness of your device for years!

Basic equipment for the efficient self-monitoring or professional device for exact documentation – you only buy, what is actually needed.

Because of the modular construction of the HMP testing equipment an upgrade or modification is possible at any time fast and cost-effective.

That you can rely on:
- German production, certified according to DIN EN ISO 9001:2015
- Calibration institute – authorized by the Federal Highway Research Institute
- 2 years of guarantee
- 10 years of spare part availability
- More than 30 years of experience in development, production and service.
- Trained service- and distribution partner nearby
Development, Production and Service –  
Soil-mechanical test equipment

HMP LFG
The Light Weight Deflectometer
TP BF-SIB B 8.3 issue 2012

HMP PDG
Static Plate Load Tester
DIN 18134 issue 2012
ASTM D1195, 1196
BS 1377 Part 9:1990-08

HMP SON
Automatic acquisition-
and evaluation unit for 
penetration
EN ISO 22476-2

HMP DEN
Determination of soil density
DIN 18125 part 2

Your competent specialised dealer:

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www.hmp-online.com
Revision 04/2019 Technical changes reserved
SITE NUMBER:
(Unique number will be assigned to keep information confidential)

GENERAL SITE INFORMATION:

Working platform details:
   Material type:
   Max grain size in mm:
   Platform thickness:
   Installed in how many layers:
   Compaction Method:
   Geogrid used (yes/no):
   Current condition (wet/dry):

Subgrade details (provide SPT, CPT, Boring log if available or describe below):

Additional Notes:

Provide site plan with all test locations (including existing SPT or CPT locations).
Provide copy of Platform Design Calculations (if available).
Provide pictures of site and platform
DFI / EFFC - WORKING PLATFORM TASK GROUP
FIELD RESEARCH STUDY (FRS) #1 - PLATFORM TESTING
FIELD LOG SHEET 2 OF 5

**Stitz DPL (DIN EN ISO 22476-2)**

Cone size (5 or 10 cm2):

Commentary on ease of use:

- Operating manual adequate (yes/no):
- Instructional YouTube video used (yes/no):
- Unit easy to transport (yes/no)
- Unit easy to assemble (yes/no):
- One person / two person needed to operate:
- Predrilling required through platform (yes/no):
- Sufficient investigation depth achieved (yes/no):
- Verticality can easily be maintained (yes/no):
- Rod extraction with/without extractor:
- Maximum amount of test per shift performed:
- Maximum amount of test per shift possible:

Field Personnel’s comments:

Additional Notes:

Provide penetration/blow count plots.
Provide correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).
Provide pictures and video of test execution.
Panda DCP (NF P 94-105)

Automatic or free hammering:

Commentary on ease of use:

- Operating manual adequate (yes/no):
- Unit easy to transport (yes/no)
- Unit easy to assemble (yes/no):
- One person / two person needed to operate:
- Predrilling required through platform (yes/no):
- Sufficient investigation depth achieved (yes/no):
- Verticality can easily be maintained (yes/no):
- Rod extraction with/without extractor:
- Automatic recording unit functions properly (yes/no):
- Evaluation software useful (yes/no):
- Test protocol useful (yes/no):
- Maximum amount of test per shift performed:
- Maximum amount of test per shift possible:

Field Personnel's comments:

Additional Notes:

Provide penetration/cone resistance plots.
Provide correlation to standard platform design parameters (Cu/SPT(N)/CPT/Phi).
Provide pictures and video of test execution.
**Lightweight Deflectometer (LWD) (ASTM E2835)**

Exact LWD model used (HMP is supplied unit):

Commentary on ease of use:
- Operating manual adequate (yes/no):
- Unit easy to transport (yes/no)
- Unit easy to assemble (yes/no):
- One person / two person needed to operate:
- Self-monitoring unit functions properly (yes/no):
- Data transfer to computer easy (yes/no):
- Evaluation software useful (yes/no):
- Test protocol useful (yes/no):
- Maximum amount of test per shift performed:
- Maximum amount of test per shift possible:

Field Personnel's comments:

Additional Notes:

Provide surface modulus plots.
Commentary on dealing with results scatter.
Provide pictures of test execution.
Plate Load Test (PLT) (DIN 18134 or ASTM D1194)

Plate size used (300mm or other size):

Commentary on ease of use:

- Operating manual adequate (yes/no):
- Unit easy to transport (yes/no)
- Unit easy to assemble (yes/no):
- One person / two person needed to operate:
- Data Logging unit functions properly (yes/no):
- Data transfer to computer easy (yes/no):
- Evaluation software useful (yes/no):
- Test protocol useful (yes/no):
- Maximum amount of test per shift performed:
- Maximum amount of test per shift possible:

Field Personnel's comments:

Additional Notes:

Provide surface modulus plots.
Commentary on dealing with results scatter.
Provide pictures of test execution.
DFI / EFFC - WORKING PLATFORM TASK GROUP
FIELD RESEARCH STUDY (FRS) #1 - PLATFORM TESTING
DETAILED LAYOUT FOR LWD AND PLT TESTS

Test arrangement (not to scale)

LWD test 300mm dia

Plate loading test 300mm dia

0.3m

5m

5m

5m

0.3m
<table>
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