VR 96A: Delivery of a Device for Cyclic Falling Weight and Measurement of Road Surface Deflection for Transport R&D Centre

Technical Specification

Product name:
Stationary HWDS (Heavy Weight Deflectometer Stationary) – device for cyclic dynamic loading and measurement of road surface deflection at one testing spot

Purpose:
- research and development activities,
- cyclic dynamic loading of testing road sections (hundreds of thousands cycles at one place),
- measurement of deflection on rigid and flexible pavements and monitoring the trends in deflection and behaviour of pavement layers.

Delivery shall include:
- HWD device in the form of a stationary structure fixable to pavement,
- seven sensors recording changes in road surface position on the basis of measuring acceleration, speed, or displacement in a measured place with the accuracy of up to 1 μm,
- one sensor placed in the centre of the load plate, the others with changeable positions,
- 4 thermometers to record temperatures of air and road surface, and temperatures inside of the pavement, with the accuracy of up to 0.2 °C,
- notebook with software to control the device and to save measurement results,
- WIFI connection for remote access and processes control.

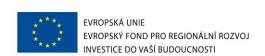## Description of important device components and their functions:

Device:
- allows for the movement on road for an accurate position setting (with the use of small wheels),
- loading device and sensors can be fixed to the road pavement,
- can be transported by a heavy vehicle (transport hooks for handling),
- is driven by an electromotor 220 V, 50 Hz max. 2.0 kW (possibility to be charged from an engine generator),
- possibility to change weights,
- allows for changing the number of rubber bumpers to set the length of the loading pulse,
- allows for applying the loading pulse in the range of 25 kN to 300 kN,
- the length of a loading cycle is max. 5 s.

Function and measuring system:
- loading device consists of a load plate, a load cell, an anvil, rubber impact bumpers, lifting device, basic loading segment(s), and additional loading segments,
- loading device is controlled by a hydraulic system,
- resulted loading is transferred from the anvil through the load cell to the load plate,
- load plate is of the diameter of 300 mm,
- rubber bumpers are used for loading of damped falling weight; through their number/type it is possible to set the required loading time up to 30 ms,
- device is equipped with a deflection sensor in the centre of the loading plate and 6 sensors with changeable positions on the pavement and fixable to the pavement,
- measurement process is controlled from a notebook located in the electric system of the device,

- measurement process can be controlled with the use of WIFI connection,
- falling weight deflectometer consists of 4 thermometers to record temperatures of air and road surface, and temperatures inside of the pavement, with the accuracy of up to 0.2 °C, the thermometers have changeable positions,
- the device is equipped with a video camera with lighting and a display for remote control of the measuring process.

Options for system setting:
- required length of the loading cycle is set by a different number/type of rubber bumpers,
- the controlling software performs:
    o turning on individual sensors which are to be used for measurement,
    o setting the required loading strength of individual falls in kN,
    o determining the number of individual falls,
    o entering intervals between individual falls

Control and documenting software:
- during the measurement it continuously displays and records the number of cycles, values of individual deflection and strength sensors, as well as temperatures from all thermometers – all in numeric and graphic form,
- allows manual and automatic control of the loading device,
- allows to set the required strength, number of falls, etc.,
- allows to set the length of the time window of the recording of the loading strength and values on individual sensors min. 400 ms, for this time it allows the export of all values in all sensors to a file (very important for the use for research activities)
- allows to provide notes for individual measurements,
- allows to overlook the measured data in the form of graphs and tables (measuring position, loading strength, deflection values on individual sensors, contact pressure, temperature) and export these data into a file for a back calculation,
- software DG_Laymed FWD for back calculation needs to be able to work with an output file with measured data.

Training for the work with the device
- the price shall cover at least a 1-day training of using HWD device and delivered software.