Pavement condition survey MLPC [®] Equipment



DYNAPLAQUE 2 - Dynamic modulus measures of the subgrade -



Before starting the pavement sub-base laying, one of the prerequisites to know accurately the subgrade platform deformability.

The modulus measure allows to decide or not on the compliance of sub-formation levels and capping layers.

Overview

The intensity and the frequency of the dynamic stress applied on the platform to investigate is similar to those caused by the passage of a 13-tonnes axle and going at 60 km/h (37.3 mi/h). The stress is generated by the fall of a mass on a damping spring, which is placed on a load plate.

The resulting subgrade deflection and the impact force are time-based measured.

The combination of these two parameters during the loading phase in a force-deflection diagram, enables to calculate directly the structural dynamic deformation modulus at the test point. The device is fixed to the chassis of a light vehicle.

It includes:

• The shock generator: it comprises the falling mass, the guiding cylinder (jack rod) which ensures also the mass guidance, the damping spring block and the trigger hooks;

• The sensors integrated in the load plate: the force sensor consists of three high rigidity piezoelectric rings; the contactless displacement sensor mounted on a hanging and damping base.

• The maneuvering frame with the fork, the tipping cylinder and the hydraulic control unit,

• The distance traveled encoder to have the tracking for the longitudinal profile survey.

Inside the cabin, the electronic system is composed of:

- An interface box with the automation power control including the force and displacement sensor conditioning;
- An industrial laptop and an electronic box with analogto-digital conversion card, counter card.
- A resident software for the automation control, acquisition, data processing and the result display.

• A professional GPS allows to know exactly where the measures are done.

Principle

DYNAPLAQUE 2 enables to perform 20 to 30 deformability measures per hour. They are carried out in very satisfactory practical, economic and ergonomic conditions. Furthermore, this equipment provides two special useful benefits:

It delivers a deformation modulus value thanks to a measure of the force applied on the plate and its driving in at each stress caused by the drop of the falling weight;
It allows to analyze a larger value domain of modulus.

Schematic diagram
Guide pin
Conical ring enabling to drop the mass with the desired height Lifting cylinder
Hanging and releasing device of the mass Falling weight sliding on the guide pin
Shock-absorber spring
Displacement sensor
Force sensor
Circular load plate

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Features

- Range of dynamic modulus: 20 to 250 MPa
- Test frequency: 20 to 30 per hour (3 shocks per test)
- Storage capacity: a week of intensive work
- The load plate diameter: 600 mm (23.6 in)
- Falling mass: 125 kg (275 lbs)

- Maximum drop height: 0.70 m (2.3 ft)
- Maximum force: 100 kN (105 lbs-f),
- Duration of the impact: 15 ms ± 5 ms
- Course of the displacement sensor: 15 mm
- Windows environment

Terms of use and limitations of use

The device is usable on platforms whose stiffness may reach 250 MPa (36,230 psi), made with materials whose the maximum dimensions are less than or equal to 150 mm (5.9 in) (materials which are defined in the classification NF P11 - 300 sept 1992).

The device installation on a light (4-wheel drive) vehicle gives it an excellent mobility, both on the sites and on the road, and a high intervention responsiveness. The automatic operation of the shock generator and the computerized data acquisition allow a single operator to easily control the operations from the vehicle driving position.

Applications

This equipment, which meets the standard criteria NF P94-117-2 oct.2004 will be used for the following applications:

- Deformability measures of earthwork platforms of capping layers,
- Uniformity determination while testing,

• Assessment of the bearing capacity and the fatigue performance of structures such as parking lots, construction sites, forest or agricultural roads.







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