Test Method Q726B: Deflections – Portable Impulse Plate Load Test Device

1 Source

This method is based on ASTM E2835: Standard Test Method for Measuring Deflections using a Portable Impulse Plate Load Test Device.

2 Scope

This method sets out the procedure to determine plate deflections resulting from the application of an impulse load. The resulting deflections are measured at the centre of the top of the load plate.

Deflections may either be correlated directly to pavement or earthworks performance or used to determine in situ material characteristics.

These data may be used for quality control or quality assurance of compacted layers, structural evaluation of load capacity and determination of layer thickness requirements for pavements.

3 Apparatus

The following apparatus is required:

3.1 Portable impulse plate load test device as follows:

a) Force generating device (falling mass), capable of being raised to a pre-determined fixed height and dropped onto a steel spring assembly. The resulting force pulse transmitted to the surface shall provide a half-sine or haversine-shaped load pulse with a time of loading between 10–30 ms and produce a peak load with a resolution of 0.1 kN.

b) Load plate, rigid and capable transferring the impulse load to the surface.

c) Deflection sensor, capable of measuring the maximum vertical plate movement and mounted to maximise angular rotation with respect to its measuring plane at the maximum expected deflection and a resolution of 0.02 mm. The number and spacing of the sensors is optional and will depend of the purpose of the test and the layer characteristics. Sensors may be of several types such as displacement transducers, velocity transducers and accelerometers. The instrument shall be constructed to measure the vertical plate deflection at the centre of the point of impact.

d) Data processing and storage system, able to store and display load and deflection data. The peak load and deflection measurements are to be recorded within a time of 50 ms or longer.

3.2 Suitable tools for levelling and smoothing the material surface.

3.3 Fines, dry fine sand or dry native fines passing a 0.600 mm test sieve.

4 Calibration and checking

4.1 Force generating device

Prior to deflection sensor calibration, undertake calibration of the force generating device in accordance with the procedures and requirements stated in the manufacturer’s user manual and Sub-section 7.5 of ASTM D2835, every 12 months.
4.2 **Deflection sensors**

Undertake calibration and checking of the deflection sensor(s) in accordance with the procedures and requirements stated in the manufacturer’s user manual and Sub-section 7.6 of ASTM D2835 every 12 months.

4.3 **Checking**

Undertake verification of deflection measurements in accordance with the procedures and requirements stated in the manufacturer’s user manual and Section 8 of ASTM D2835, after calibration (Note 7.1).

5 **Procedure**

The procedure shall be as follows:

5.1 Remove any loose material and vegetation from around the test site to create a flat and level surface to undertake the test. The site should be 1.5 times larger than the diameter of the loading plate. The site must not have a slope greater than four percent.

5.2 Sweep all loose material from the test site and sprinkle fine sand or native fines on the surface, then smooth the surface.

5.3 Place the load plate on the prepared test location.

5.4 Rotate the load plate left and right to an angle of 45 degrees.

5.5 Perform six falling mass drops, with the first three used for seating and the second three used for analysis. The procedure for each drop shall be as follows:

5.5.1 Raise the falling weight to the pre-set drop height and secure into release mechanism.

5.5.2 Adjust guide rod to vertical.

5.5.3 Release falling mass and allow to fall freely.

5.5.4 Catch the falling mass after rebound.

5.5.5 Record the resulting peak surface deflection value.

5.6 If the load plate tilts by more than four percent, the seating deflections differ from one another by more than 10 percent, a faulty drop occurs, the load plate is displaced, or the guide rod moves, then the test is not valid. Position the test device at a new location and repeat Steps 5.1 to 5.5.5. Testing cannot be repeated at the same location.

5.7 If required, obtain a sample of the soil and determine the moisture content as detailed in Test Method AS1289.2.1.1 or record the moisture condition of the soil.

6 **Reporting**

The following shall be reported:

6.1 The location at which the test was performed, and the reduced level of the layer tested.

6.2 The date tested.

6.3 A description of the material tested.

6.4 Peak surface deflection(s) to the nearest 0.001 mm.

6.5 Peak load to the nearest 0.1 kN.

6.6 Distance of any additional deflection sensors from the load point.
6.7 Moisture content of the soil or the moisture condition of the soil, that is, wet, moist or dry, if required.

6.8 The number of this test method, that is Q726B.

7 Notes on method

7.1 It is recommended to perform verification testing on calibrated devices before they are returned to service to confirm the device is working. This also provides a baseline that later verification testing may be compared.