

**KUAB 70-150 SPGE
TRAILER & VEHICLE MOUNTED FALLING WEIGHT
DEFLECTOMETER**

As per IRC: 115-2014 & 117-2015



INDIGENOUS



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Complete Instrumentation Solutions Private Limited in technical collaboration with M/s KUAB, Sweden, is offering locally manufactured KUAB 70-150 SPGE Falling Weight Deflectometer, (FWD), a mobile system performing non-destructive dynamic plate loading tests with a falling weight as force generator. The peak load, the rise time and the shape of the impact load simulate traffic load. A flexible load distributing loading plate gives a uniform and reproducible stress distribution. Seismic deflection transducers accurately measure the shape of the deflection basin. In addition to the basic measurement of load and deflections, KUAB 70-150 SPGE measures the test point position, the air temperature and the pavement surface temperature. This model is designed to meet and slightly exceed the requirements laid down in IRC 115-2014 & 117-2015 Guidelines for Structural Evaluation and Strengthening of Flexible Road Pavements using Falling Weight Deflectometer (FWD) technique. This system is available in 70 kN to 150 kN versions with 7 or 9 sensors, both in Trailer Mounted and Vehicle Mounted versions.

Optional Accessories: Are supplied on request- GPR, GPS, Data Analysis Programs, other plate diameters, additional Deflection Sensors, other Deflection Sensor spacing, Calibration equipment, Camera system, Measurement in 700 mm deep test pits, Video equipment for plate positioning, Semi-automatic core drill with cooling water, Continuous drop height, other load ranges, Temperature Sensors for measurement in small drilled hole, 4 wheel trailer, trailer brakes, FWD built into van or truck, separate distance display, power on box in tow vehicle, automatic transport locks, enclosure with or without automatic floor, 12 V alternator on trailer, 5 mm deflection sensor range, Deflection sensor with built-in reference calibration device, Warning lights and signs.

Trailer-Mounted Version:

The device is Trailer mounted and can be towed by a passenger car, a station wagon or a similar vehicle with 50 mm towing ball or other suitable coupling to the tow vehicle. Immediately after the test the device is ready for transport to the next test point at ordinary traffic



speed. This is available with 7 or 9 sensors and in load capacities of 70kN to 150kN.

Vehicle-Mounted Version:

This device is mounted on ISUZU DMAX commercial vehicle, is highly user friendly and single man operation. It is pertinent to mention that this is a closed loop system and the software only becomes functional once the operator pull the hand break of the vehicle, and the test can be conducted only thereafter.

We are offering a special safety feature in the Vehicle Mounted Version wherein the Hand Break does not get released, in case the Falling Weight and sensors are deployed on the road. Thus the vehicle cannot move till the Weight and the sensors are moved up. The hand break only gets released once Falling Weight and sensors are moved up, avoiding the damage by inadvertent movement of the vehicle.

Another feature which has been added in the both the versions is the display of DMI readings on the laptop. This is highly beneficial as the operator knows exactly where the test is to be carried out.



Force-Generator Properties:

The peak load can be selected from the keyboard of the computer, by the choice of height of fall. The peak load range is 10 – 150 kN, and the rise time (time from pulse start to peak) is about 12-15 ms. Other load pulses can be offered on request.



Transmission of the load to the surface:

The pressure distribution under a rigid loading plate highly depends on the type of pavement tested. If the pavement has a very stiff and even surface course, such as a heavy-duty road or airport pavement in good condition, there is a mainly even pressure under the plate. If the pavement has not a stiff surface layer, the pressure under the load plate is higher closer to the edge of the plate, even if the unloaded surface is even. If the surface of the tested pavement is uneven, which on an old road is the normal situation, due to for example rutting, the pressure under the rigid plate will be concentrated to the higher parts of the pavement. Thus a rigid plate can give all kinds of stress distribution. Most computer programs used in the analysis anticipate even stress distribution. KUAB 70-150 SPGE therefore has developed a special stress distributing loading plate, giving even stress distribution also on uneven roads, in order to obtain reproducible results also on uneven roads and in order to apply the load in the same way as anticipated by the computer programs. The load plate that transmits the load to the surface is divided into four segments. This configuration ensures that the load is evenly distributed across the area of the plate, an especially useful feature when testing irregular surfaces

like aggregate sub-bases. A piston is attached to each segment, and each of the four pistons is linked to the same fluid chamber. When a load hits the surface, each piston pushes up individually, and the common fluid chamber ensures that the cumulative load across all segments remains constant. The loading system can be fitted with a 300 or 450 mm plate, depending on the force per square inch required for the test.



In this advanced technology of KUAB all the four segments are controlled independently through pistons. These features are not available in any other system and this ensures that there is equal distribution of load on uneven roads.

Deflection Sensors:

The deflections are measured by deflection transducers called sensors, which use a mass spring system as reference and magnetic/coil system as sensing element. The deflection transducers are automatically placed on the surface of the pavement and all necessary parts for the placement are included in the delivery. The range is 2 mm, and the resolution is 1 micrometer. KUAB 70-150 SPGE Single Mass Falling Weight Deflectometer can be delivered with 7 deflection sensors, placed in positions 0, 200, 300, 450, 600, 900, 1200, 1500 and 1800 mm along the centerline in front of the load plate. More sensors and other positions can be delivered on request. The deflection time history and the load time history are always displayed on the laptop screen, and the operator can select if only the peaks or the entire time histories shall be stored.

LOAD PULSE:

Peak load range: 10 - 150 kN
 Rise time: 12 ms-15
 Number of drop heights: 4

LOAD MEASUREMENT:

Precision: $\pm 1\% \pm 10$ kgf
 Accuracy: $\pm 2\% \pm 15$ kgf

LOADING PLATE:

Type: 4 segments with individual tilt and individual vertical movement
 Size: 300 mm diameter
 Rubber under plate: 32 mm ribbed

DEFLECTION MEASUREMENT:

Range: 2 mm
 Precision: $\pm 1 \mu\text{m} \pm 1\%$
 Accuracy: $\pm 2 \mu\text{m} \pm 2\%$
 Number of sensors: 7 or 9
 Sensor positions:

CAPACITY:

Time to make one standard test: 25 s

0, 200, 300, 450, 600, 900, 1200, 1500 and 1800 mm from load center

OTHER FEATURES IN THE SYSTEM:

Available both in Trailer and Vehicle Mounted versions with 7 or 9 Sensors, Time history of load and deflections, Automatic surface IR-thermometer and air thermometer
 Automatic distance meter

OPTIONS:

- GPR
- Data analysis programs
- Other plate diameters
- More deflection sensors, other deflection sensor spacing
- Calibration equipment
- Camera system
- Measurement in 700 mm deep test pits
- Video equipment for plate positioning
- Automatic transport lock
- Enclosure with or without automatic floor
- Semi-automatic core drill with cooling water
- Continuous drop height, other load ranges
- 5 mm deflection sensor range
- Warning lights and signs
- Deflection sensor with built-in reference calibration device
- Temperature measurement in small drilled holes



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