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Benkelman beam pavement deflectometer

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Benkelman beam pavement deflectometer

1 Scope

This standard specifies the product model, structure, technical requirements, testing methods, inspection rules, marking, packaging, transportation, storage of the Benkelman beam pavement deflectometer.

For the Benkelman beam pavement deflectometer, which is specified in this standard, it is suitable for testing the total deflection or rebound deflection, deflection basin, modulus of deflection of the subgrade, base layer, pavement of the flexible pavement structure and semi-rigid pavement structure, of different levels. It is also suitable for testing the load transfer capacity between rigid pavement slabs.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For the dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard; however, parties who reach an agreement based on this Standard are encouraged to study if the latest versions of these documents are applicable. For undated references, the latest edition of the referenced document applies.

GB 191 Packaging - Pictorial marking for handling of goods (GB 191-2000, eqv ISO 780:1997)

GB/T 699 Quality carbon structural steels

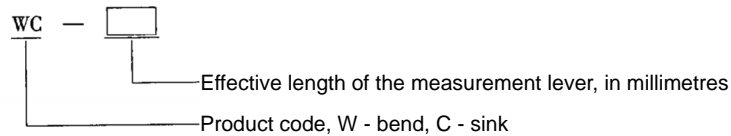
GB/T 1173 Casting aluminum alloys

GB 1220 Stainless steel bars

3 Product model and structure

3.1 Product model

The representation method of product model is as follows:



According to the effective length of the measuring lever, the Benkelman beam pavement deflectometer is divided into two models: WC-3600 and WC-5400.

3.2 Structure

The Benkelman beam pavement deflectometer consists of the following parts, as shown in Figure 1.

- a) Probe structure;
- b) Probe beam;
- c) Beam support;
- d) End structure;
- e) Dial indicator holder.

4 Technical requirements

4.1 Appearance

4.1.1 The color of the instrument shall be silver-gray. The painted surface shall be smooth AND uniform in color. The paint layer shall not have holiday, blisters, scratches, or falling off. The support axis's adjustment screws and the dial indicator frame base's height adjustment bolts shall not be corroded.

4.1.2 The connection of the front and rear beams shall be smooth and firm. There shall be no looseness. The base of the dial indicator frame shall be firmly connected with the screw, AND be perpendicular to the base plane of the dial indicator frame. The leveling bubble shall not be broken; the bubble shall move sensitively.

4.1.3 The accuracy level of the dial indicator, which is used in the Benkelman beam pavement deflectometer, is level 1. It shall be accompanied with the product qualification certificate and verification certificate.

4.3.1 The material of the detection beam shall be selected in accordance with GB/T 1173; its flatness tolerance level is 11.

4.3.2 The material of the support's center shaft shall be selected according to GB/T 699.

4.3.3 The dial indicator's adjusting bolts and dial indicator frame for the probe AND end structure shall be selected according to GB 1220.

4.3.4 The surface roughness (R_a) of the connecting surface of the front and rear beams shall be 1.6 μm .

4.3.5 The matching diameter BETWEEN the center shaft hole of the rear beam support AND the outer ring of the bearing is $\Phi 22$ mm. The matching diameter BETWEEN the center shaft of the rear beam support AND the inner ring of the bearing is $\Phi 8$ mm. The tolerance matching level is H7.

5 Test method

5.1 Testing instruments and appliances

It includes the following instruments and appliances:

- a) Dial indicator: Level 0, range 0 ~ 3 mm;
- b) Gauge block: Level 4, one for 5 mm and one for 10 mm;
- c) Vernier caliper: Graduation value 0.02 mm; range 0 ~ 200 mm;
- d) Steel ruler: Range 0 ~ 10 m;
- e) Weight: 2 N \pm 0.01 N;
- f) Lifting support platform: It can ensure that the platform rises or falls evenly, when it is manually operated.

5.2 Appearance inspection

Use visual inspection and manual methods, to check the appearance of the Benkelman beam pavement deflectometer. It shall meet the requirements of 4.1.

5.3 Testing of maximum allowable error

The testing steps are as follows:

- a) Place the instrument as shown in Figure 2. Adjust the support, to center the bubble. Adjust the dial gauges at both ends to zero;

Table 1.

5.6 Testing of instrument length

Use a steel ruler to measure the horizontal distance, BETWEEN the front end of the probe AND the center of the shaft hole of the support, as well as the horizontal distance, BETWEEN the center of the measuring rod's hole of the indicator AND the center of the shaft hole of the support. The results shall meet the requirements of Table 1.

5.7 Testing of vertical deflection

The testing steps are as follows:

- a) Front lever: Put the beam in the measuring state. Place the dial indicator at 1/2 of the length of the front lever. Set the indicator to zero. Then hang a 2N weight there. Record the reading of the dial indicator. For the 3.6 m beam, its value shall not be greater than 0.05 mm. For the 5.4 m beam, its value shall not be greater than 0.1 mm.
- b) Rear lever: Put the beam in the measuring state. Place the dial indicator on the measuring rod of the indicator. Set the indicator to zero. Then hang a 2N weight there. Record the reading of the dial indicator. For the 3.6 m beam, its value shall not be greater than 0.05 mm. For the 5.4 m beam, its value shall not be greater than 0.1 mm.

5.8 Testing of transverse straightness (Figure 3)

Place the beam in the measurement state. Take a thin line, which is longer than the beam length. Stretch the thin line, close to the top surface of the beam, so that it passes through the center point (point A) of the measuring rod's hole, on the indicator, AND the end point (point B) of the divergent joint, at the top surface of the connection, between the front beam and rear beam. Meanwhile extend it to the probe. Use a ruler to measure the horizontal distance, FROM the perpendicularly projected point of center (point C) at the top surface of the beam at this point, TO the thin line, which shall be not more than 15 mm.

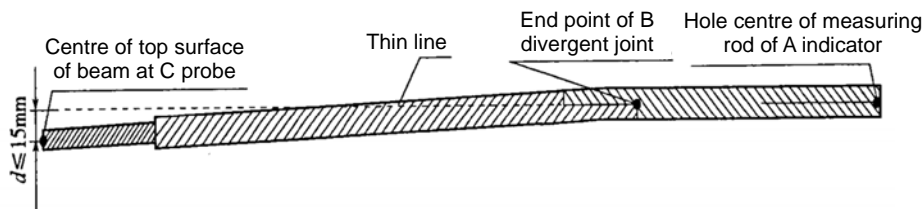


Figure 3 -- Schematic diagram of testing of transverse straightness

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