



Supplementary User Manual

for the

Dynamic Field CBR extension



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ZORN INSTRUMENTS GmbH & Co. KG
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Picture 1: Complete assembly of the CBR-field test with Static force application device with 10 kg drop weight



Picture 2: Elektronic box ZFG 3000 GPS

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1 Notice / Preliminary remark

The manual provides additional information needed to perform a dynamic field CBR test. For the main instrument (for the 300mm configuration – 10 / 15 kg) refer to the Standard Operating Manual.

The following Electronic boxes can be use:

- ZFG 3000 ECO
- ZFG 3000 GPS
- ZFG 3.0
- ZFG 3.0 GPS

Since the delivery configuration may vary according to the customer, this Manual assumes that the user has a 300 mm loading plate and a 10 kg drop weight.

Make sure the bearing bolt on the load plate is suitable for CBR. (The bearing spigot and accelerometer housing has a built-in accelerometer sensor with a 5 mm washer)

If the requirements are not met, the load plate has to be returned to ZORN INSTRUMENTS for modification.

2 Purpose

The dynamic CBR-test may be used alternatively to the static CBR-test according to the German Technical Regulations for soil and rocks in road construction, TP BF - StB Part B 7.1. Due to its little effort of time, it is used as a quick testing method in line with the self-monitoring for the regulation of the production of mineral mixtures. An advantage towards the CBR- test according to TP BF – StB Part B 7.1 is the omission of a loading frame and the corresponding load device (pressure test machine). In its place, a loading device according to TP BF – StB Part B 8.3 is used.

The dynamic CBR- test, in particular the in-situ field test, is a material test on undisturbed samples, with which one can judge what level of compaction can be achieved on the tested soil.

The dynamic CBR – value (CBR_d) is a complex strength coefficient that depends on the strength, the grain shape, the frost-resistance and the grain roughness of the single grain, the grain composition, the content on fines, the water content and the compaction of the mineral mix.

It serves as an assessment method for frost resistance or the evaluation of trafficability and compactibility and the sustainability of built-mineral mineral mixtures.

The dynamic CBR value is calculate as follows: $CBR_d = 87.3 / s^{0.59} \%$

“s” is the dynamic settlement amplitude (in mm) of the CBR stamp.

The CBR-stamp has a diameter of 50 mm and a corresponding pressure amplitude of 3.6 MN/m².

3 Scope of supply

- Plunger - complete consisting of bracket for plunger with handles, pressure plunger, intermediate plate with cylinder screws
- Load plate with plunger guide
- Hex screwdriver



Picture 3: plunger



Picture 4: load plate with plunger guide

Depending on the equipment, it may be possible that there already is a bearing bolt on the plunger (Picture 6: Plunger with bearing bolt). Otherwise, the bearing bolt with accelerometer on the load plate from the Light Weight Deflectometer is used. To replace the bearing bolt please read „4 Conversion of bearing bolt “.For the execution of the test, an entire bearing bolt must be on the plunger.

4 Conversion of bearing bolt

If there is no bearing bolt with accelerometer attached to the CBR stamp, it's necessary to remove the bearing bolt with accelerometer from the Light Weight Deflectometer load plate and mount in onto the CBR stamp.

The bearing bolt contains the accelerometer sensor that collects the measuring data.

Tools required: Hex screwdriver (8mm)

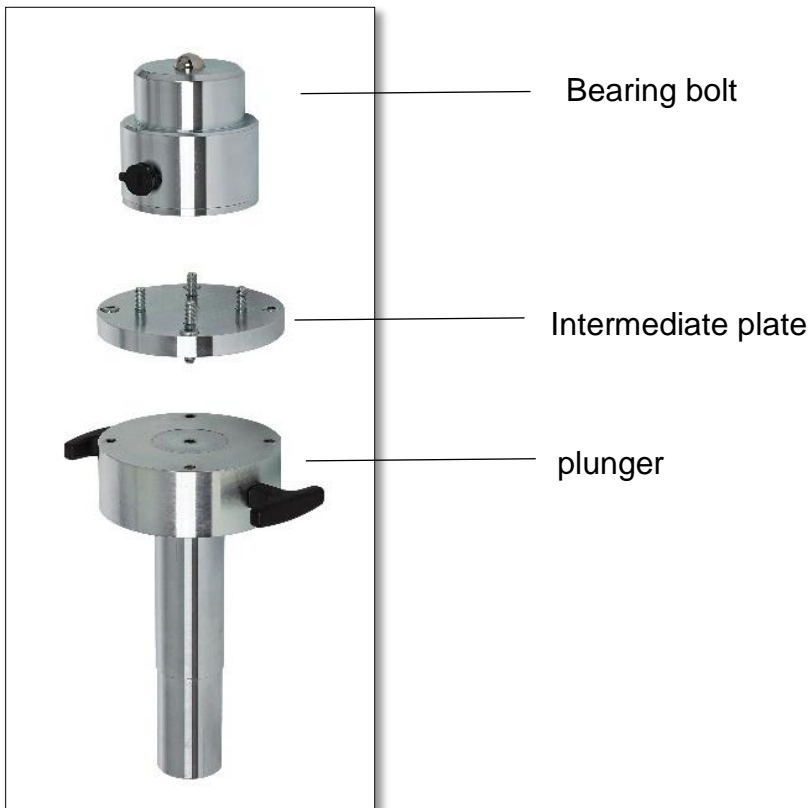
When mounting on cleanliness. If parts are dirty, clean them before reassembly. For the conversion of the bearing bolt from the load plate to CBR stamp, the following steps are necessary:

1. Place the load plate face down (4 securing bolt heads showing)
2. The 4 securing bolts (M8x25), which hold the bearing bolt with accelerometer, are removed
3. Separate the load plate from the bearing bolt with accelerometer. Make sure the spring washers that go on the securing bolts are not lost.
4. Unscrew the intermediate plate (Picture 6: Plunger with bearing bolt) from the CBR stamp (M8x16)
5. Thread the intermediate plate onto the bearing bolt. Use the M8x25 screw with spring washers. Make sure that the intermediate plate is thread correctly. The bolt heads must be completely within in the recesses.
6. Unscrew the intermediate plate with the bolt on the bearing bolt. Use the M8x25 screw with spring washer.

To disassembly, proceed in the reverse order.



Picture 5:Load plate single components



Picture 6: Plunger with bearing bolt

5 Execution of dynamic CBR Field Test

5.1 Preparation

1. The test surface is prepared so, that the load plate with plunger guide can be placed horizontally.
2. Set the load plate with plunger guide on the test surface. The plate must not wobble.
3. Insert the CBR plunger complete in the CBR plunger guide. The CBR arrangement must look as in Picture 7: Complete assembly of CBR field test.
4. Carefully put the load device on top of the CBR plunger. (Picture 1: Complete assembly of the CBR-field test with Static force application device with 10 kg drop weight)
5. Connect the CBR stamp to the electronic box with the measuring cable.



Picture 7: Complete assembly of CBR field test

5.2 Execution of a measurement

1. Turn on the electronic box, press the Mode button and select "CBR".
2. Start the measurement on the electronic box. Press "Start".
3. Unlock the transportation lock and engage the drop weight into the release mechanism. (To avoid damage during transport, it is essential to use the transport lock).
4. Hold the guide rod vertically and disengage the drop weight when the electronic box prompts you to execute a pulse.
5. On spring back, catch the drop weight. Lower it down to the bottom of the guide rod and secure it with the transport lock.

5.3 Evaluation of results

The display of results depends on the used electronic box. Deflection s in mm and CBR_d is displayed in %.

5.4 After a measurement

After the execution of a measurement, the device can be switched off. The disassembly of the device is in reverse order to the assembly.

The guidelines in Chapter 6 Care and Maintenance must be followed.

6 Care and Maintenance

All metal parts have to clean of all adhering dirt using a dry cloth. Tough stains may be removed using ethyl alcohol or petroleum. During transport, all parts have to be put away safely.

7 Technical Information

7.1 CBR plunger complete

Width (max)	207 mm
Height	280 mm
Weight	10,6 kg

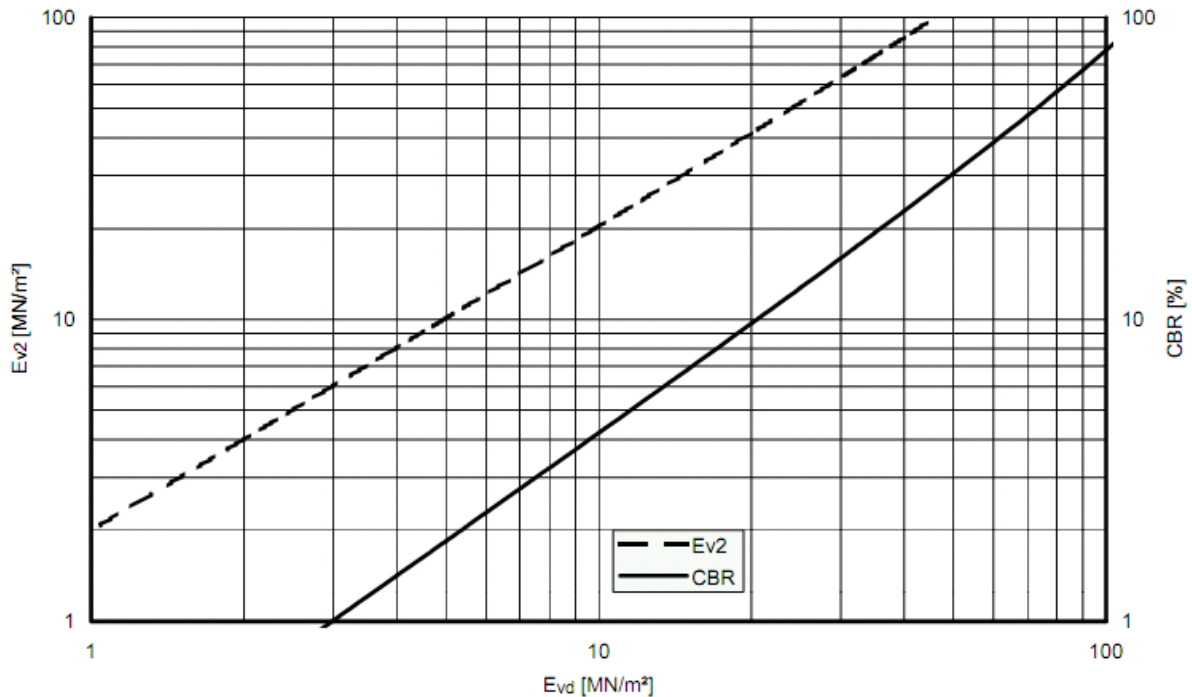
7.2 Load plate with plunger guide

Diameter	300 mm
Height	181 mm
Weight	13,5 kg

8 Correlations

For information purposes only, no responsibility taken for the correctness of the information

On well compacted subsoils applies to $E_{v2} = 2 E_{vd}$ and the CBR value follows to the diagram:



Example:

A gravel layer with a CBR value of 30% is compactable to an E_{vd} value of 50% (Continuous graph) or an E_{v2} value 100% (interrupted graph).

9 Warranty

From the date of delivery, equipment defects are covered for a 12 months warranty period and, at our discretion, we may repair or place the defective components.

We do not grant warranty for damage due to improper use, normal wear-and-tear, improper handling, incorrect treatment, insufficient care and maintenance, use of non-original parts, force majeure or transport damage.



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