



H-4120H, H-4120HA



Corps of Engineers
Cone Penetrometer

GENERAL INFORMATION

The H-4120H and H-4120HA Corps of Engineers Cone Penetrometer is the principal instrument used in evaluating a soil's trafficability. The COE Cone Penetrometer can also be used during field investigations for a preliminary estimation of a subgrade treatment. It is lighter and less difficult to use than the Dynamic Cone Penetrometer. The COE Cone Penetrometer consists of a 30 degree cone 1/2 sq. in. base area, an 18 in. extension rod, a proving ring, a dial indicator and a handle.

When the cone is slowly forced into the ground, the proving ring is deformed in proportion to the force applied. The amount of force required to move the cone slowly through a given material is indicated on the dial inside the ring. This force is considered to be an index of the shearing resistance of the soil and is called the cone index of the soil in that plane. The range of the dial is a 150 pound load and is marked 0-300 pounds per sq. inch since the cone base is 1/2 sq. inch.

OPERATION

- A. Inspect the instrument before using to make sure all nuts, screws and joints are tight and that the dial indicator stem contacts the proving ring bearing block.
- B. Allow the penetrometer to hang vertically from its handle and rotate the dial face until "0" is under the needle. Note that when the instrument is kept vertical between the fingertips and allowed to rest on its cone, the dial will register about 2.5 pounds, which is the total weight of the instrument when the 18 in. (457.2 mm) rod is used.
- C. If additional extension rods are added, or removed, zero the instrument again, as described above.
- D. Place the hands over each other on the handle, palms down and approximately at right angles, to minimize eccentric loading of the proving ring and to help keep the rod vertical.
- E. Apply force by pressing the chest against the hands until slow, steady, downward movement occurs.
- F. Take a dial reading just as the base of the cone is flush with the ground surface. Continue the slow, steady downward movement (18 in. (457.2 mm) in approximately 15 seconds in very soft soil) and take successive dial readings at 3-in. intervals to a depth of 18 in. (457.2 mm).

NOTE: An assistant should be provided to record the readings taken by the operator. The operator will quickly learn to shift his vision from the rod at the ground to the dial at the proper moment, meanwhile maintaining a constant penetration rate.

G. **CAUTIONS:** Observe the following cautions:

1. Keep the instrument vertical.
2. Do not attempt readings higher than the capacity of the dial since this might overstress the proving ring .
3. If the dial capacity is exceeded at less than 18 in. (457.2 mm) of penetration, make another penetration nearby to be assured that the cone is not striking an isolated rock fragment.
4. Never withdraw the instrument by the ring but always by the rod.

CARE AND ADJUSTMENT OF THE PENETROMETER

A. General Care

The penetrometer needs little care beyond keeping the instrument free from dirt and rust, keeping all parts tight, and frequently checking and, if necessary, re-zeroing the instrument. Take particular care to see that no grit is caught between the extensometer arm of the dial and the lower mounting block (#10 Figure 1).

B. Dial Gauge

The dial indicator is a sensitive instrument, which should be protected against water and rough usage. Never immerse it in water. Wipe it dry as soon as possible after its use in rainy weather. When transported by truck, cushion the dial by wrapping it in paper or cloth.

C. Mounting- block Adjustments

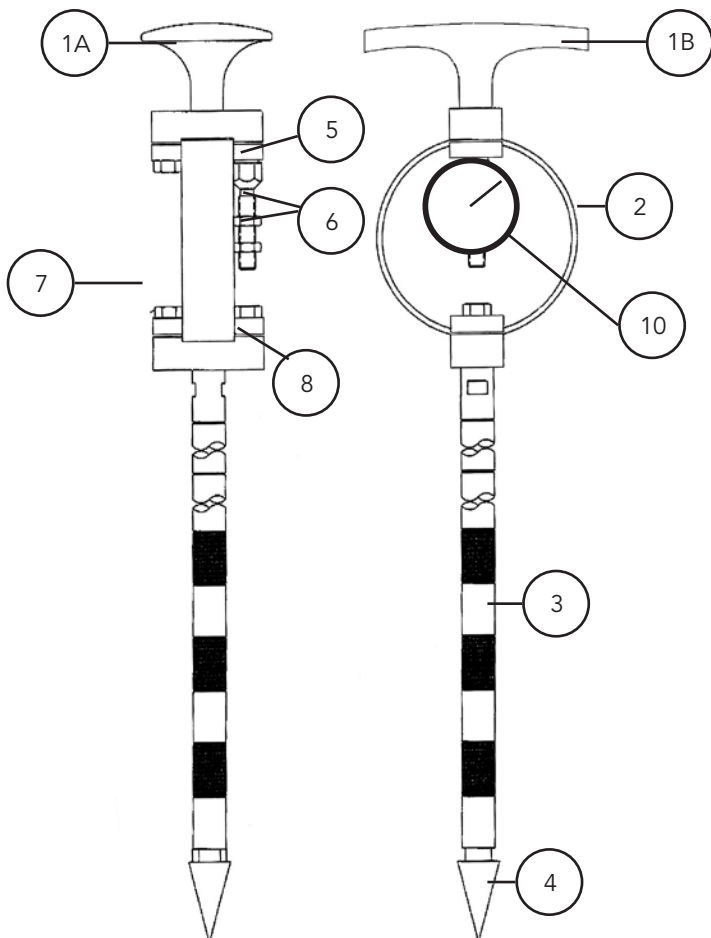
If either or both mounting blocks (#10) become loosened or moved, adjust them so that they lie on a diameter of the ring, and then retighten.

D. Cone Replacement

Considerable use of the same cone may result in a rounding of its point. This will not affect the accuracy of the instrument, but if the base of the cone has had excessive wear or is deformed by hard usage, the cone should be replaced.

SPECIFICATIONS

Proving Ring:	150 lb. capacity; dial indicator calibrated direct in psi, 0 to 300 psi by 5 psi subdivisions
Shaft:	5/8" (15.8 mm) diam. x 19" l. (483 mm)
Cone:	30 degree; 1/2 sq. in. base area
Weight:	Net 2 lbs. (0.9 kg)



Item	Item	Part No.	Required
1A	Handle, Mushroom	H-4120H.12	1
1B	Handle, T-Handle	H-4120A.1	1
2	Proving Ring	H-4120H.2	1
3	Staff, 5/8" dia.	H-4120H.3	1
4	Cone, 1/2 sq. in.	H-4120H.4	1
5	Stud, 5/16-24 SS	H-4120H.7	1
6	Nut, 5/16-24 SS	H-4120H.8	2
7	Screw, 5/16-24 x 7/8" Hex SS	H-4120H.9	3
8	Block, Mounting	H-4120H.10	2
9	Clamp, Mounting	H-4120H.11	2
10	Dial Indicator	H-4120H.1	1

NOTES

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Humboldt Mfg. Co.

875 Tollgate Road
Elgin, Illinois 60123 U.S.A.

U.S.A. Toll Free: 1.800.544.7220

Voice: 1.708.456.6300

Fax: 1.708.456.0137

Email: hmc@humboldtmfg.com

Testing Equipment for



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www.humboldtmfg.com