07.25

product manual

H-4120D & H-4120DA

H-4120DA

H-4120D

Corps of Engineers Cone Penetrometer

GENERAL INFORMATION

The H-4120D and H-4120DA Corps of Engineers Cone Penetrometers are the principal instrument used in evaluating a soil's trafficability. They consist of a 30 degree cone 1/2 sq. in. base area, an 18 in. extension rod, a proving ring, a digital indicator and a handle. Both units feature a Direct-Read Digital Indicator, which eliminates the need for calculating reading results.

Humboldt offers two models, which feature different handles. The H-4120D is designed with a palm-grip handle, while the H-4120DA uses a T-handle design. This is the only difference between the two.

In use, the cone is forced into the ground, and 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 digital indicator 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.

OPERATION

A. Inspect the instrument before using to make sure all nuts, screws and joints are tight and that the digital indicator stem contacts the proving ring bearing block.

B. Allow the penetrometer to hang vertically from its handle and press the zero button of the indicator.

C. If additional extension rods are added, or removed, zero the instrument again, as described above.

D. To use the H-4120D Penetrometer, place the hands over each other on the handle, palms down and approximately at right angles to the shaft. This minimizes any eccentric loading of the proving ring and helps keep the rod vertical.

   To use the H-4120DA, place the hands, palms down on each side of the T-handle to control the rod in a vertical position and minimizes any eccentric loading of the proving ring

E. Take a reading from the digital indicator just as the base of the cone is flush with the ground surface. Continue the slow, steady downward movement (roughly 18" (457.2mm) in approximately 15 seconds in very soft soil) and take successive readings from the digital indicator at 3" intervals to a depth of 18" (457.2mm).

   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 digital indicator at the proper moment, while maintaining a constant penetration rate.

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

1. Keep the Penetrometer in a vertical position during the test.
2. Do not attempt readings higher than the capacity of the digital indicator since this might overstress the proving ring .
3. If the digital indicator capacity is exceeded at less than 18" (457.2mm) 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 digital indicator and the lower mounting block (#10 Figure 1).

B. Dgital Indicator

The digital 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 the 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.

PROVING-RING VERIFICATION

Unless the ring is severely overstressed, deformed by a hard knock, or subjected to extreme changes in temperature or other unusual strains, the calibration should remain true for the life of the instrument. If the ring needs recalibration, the following steps should be taken:

A. Remove handle and rod.

B. Place lower mounting block (#10) of the ring assembly on a smooth, horizontal surface.

C. Check mounting-block alignment. Both blocks should be on a diameter of the ring. A drafting triangle or a carpenter's square may be used in this operation.

D. Extensometer arm of the digital indicator should bear firmly on the lower block with sufficient travel of the arm available for the full range (approximately 1/10" deflection) of the proving ring. To move the digital indicator up or down, adjust the two nuts (#8) on the threaded stud (#7), which holds the gauge in position. Both nuts should be tight when in final position.

E. Apply loads in 10 lb. increments, noting any differences between the applied load and the indicator's reading. Any of the following loading methods may be used:

   1. Add dead weights to the top of the ring assembly. If a plate is used to hold the weights, its weight should be considered in the first 10 lb. load.
   2. Use any of the load machines commonly used in laboratory work.
   3. Set ring assembly on a set of platform scales. Apply load increments by a jack and measure with the platform scales.

F. Remove load in 10 lb. increments, noting the indicator's reading after the removal of each increment.

G. Make load run at least twice, using the average of the indicator's reading for each increment as the final point.

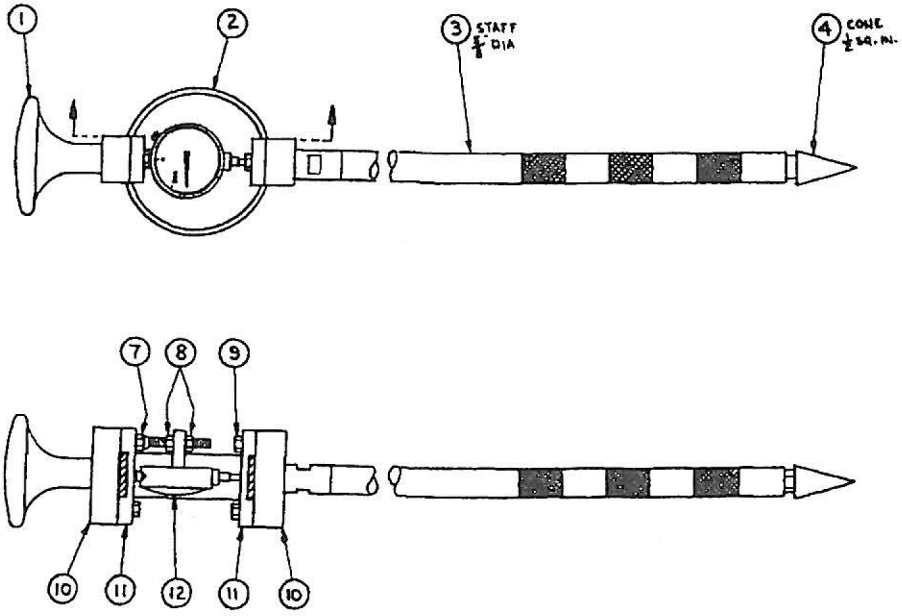
H. Some variation in load may occur, but will not be significant.

I. If large discrepancies between the applied load and the reading of the digital indicator are found, please contact our Sales team at 708-468-6300 about the creation of a recalibration of the ring

SPECIFICATIONS

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

FIGURE 1



Item	Item	Part No.	Required
1	Handle	4901-0008	1
2	Proving Ring	4901-0007	1
3	Staff, 5/8" dia.	4901-0003	1
4	Cone, 1/2 sq. in.	4901-0004	1
7	Stud, Support	4901-0009	1
8	Nut, 5/16-24 Hex	4901-0040	2
9	Screw, Hex Hd #5/16-24 x 7/8" SS	4901-0013	3
10	Block, Mounting	4901-0005	2
11	Clamp, Mounting	4901-0006	2
12	Digital Indicator	4901-0046	1

Typical Calibration Certificate for H-4120D or H-4120DA Penetrometer

Cone Penetrometer Calibration Certificate

Control Number 099-F REV D

Instrument: H-4120DA **Serial Number:** 4120DA118

Description: Humboldt COE Cone Penetrometer W/T-Handle Digital

Customer Name: Customer 1

Address:

Calibration Date: 07/07/25 **Next Calibration Date:** 07/07/26

Calibration Interval: 1 year

Cal. Equipment Type: Interface Load Cell **Model:** 1210AF-500-B

Cal. Equipment Serial: 1186972A **Last Calibrated Date:** 05/23/2024

Digital Indicator Serial Number: 240684534

This instrument has been processed and calibrated in accordance with HUMBOLDT MFG. CO's quality management system and is traceable to the SI units through the National Institute of Standards and Technology (NIST). The results contained herein relate only to the item calibrated.

This certificate shall not be reproduced, except in full without the written permission of HUMBOLDT MFG. Co. Calibration due dates appearing on the Certificate of Calibration and label are determined by the customer and do not imply continued conformance to specifications.

The HUMBOLDT MFG. Co's quality management system complies with the requirements of ISO 9001.

Name: A. Caul

Authorized Signature: A. Caul

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Testing Equipment for Construction Materials

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