



# Mortar Penetration Resistance Apparatus

## **Scope**

Spring-reaction-type apparatus, graduated from 10 to 130 lbf (45 to 580N) in increments of 2 lbf (9N) for testing rate of hardness of mortars sieved from concrete mixtures. Determines effects of variables such as temperature, cement, mixture proportions, additions and admixtures upon the time of setting and hardening of concrete. Penetration resistance is measured by the downward vertical force exerted to penetrate the mortar 1" (25mm). Pressure reading is measured by a scale with a sliding ring indicator on the handle's stem. Includes these interchangeable mortar penetration resistance needles: 1, 1/2, 1/4, 1/10, 1/20 and 1/40 sq. in (645, 323, 161, 65, 32, 16mm<sup>2</sup>).

## **Assembly**

The penetrometer is furnished in a carrying case. To assemble, place the slide indicator over the graduated shaft. Place the handle on the shaft and tighten in place with the hex nut. Place the other end of the shaft in the open end of the spring barrel assembly and tighten the sleeve nut finger tight. To install the needle of various end areas, screw the needle shank into the tapped hole in the lower end of the spring barrel assembly.

## **Preparation of Specimen**

Prepare sample in accordance with either ASTM C403 or AASHTO T197.

## **Storage of Specimen**

Store and maintain the specimen at the desired temperature of test. Prevent excessive evaporation of moisture. Keep specimen covered with a suitable material such as damp burlap or a tight fitting, water impermeable cover for the duration of the test, except when bleeding water is being removed or penetration tests are being made. Specimen should also be shield from the sun.

## **Number of Specimens**

At least three (3) separate batches shall be made for each test condition. One (1) rate of hardening test shall be made on each batch. An equal number of batches for each condition shall be made on any given day.

## **Procedure**

Remove bleeding water from the surface of the mortar specimens just prior to making a penetration test by means of a pipet or suitable instrument. Place the container of the specimen on a smooth surface spaced between the feet of the test operator.

Insert a needle of appropriate size in the apparatus and bring the bearing surface of the needle into contact with the mortar surface. Gradually and uniformly apply a vertical force downward on the apparatus until the needle penetrates the mortar to a depth of 1 inch (25mm) as indicated by the scribe mark read at top of slide. The time required to penetrate to the scribe mark shall be approximately 10 seconds. Record the force required and time of application, measured as elapsed time after initial contact. In subsequent penetration tests, avoid areas where mortar has been disturbed by previous

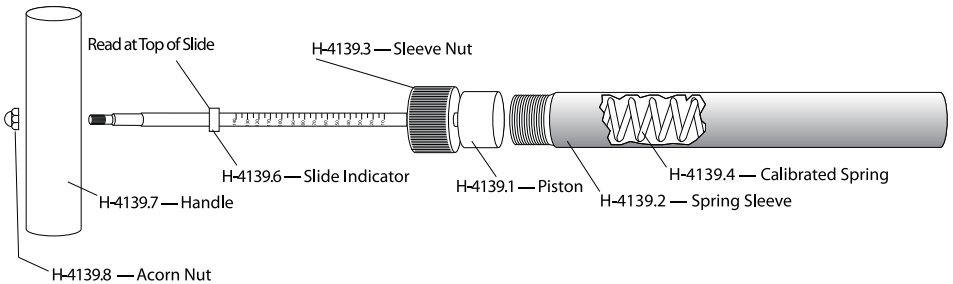
tests. Distance between impressions should be at least two (2) diameters of the needle used, but not less than ½" (13mm) and at least 1" (25mm) from the side of the container being used.

Make penetration tests at hourly intervals for normal mixtures and normal temperatures. The initial test being made after an elapsed time of 3 to 4 hours. In some instances, the initial elapsed test times maybe increased or decreased.

Not less than six (6) penetration determinations should be made in each rate of hardening test. The time intervals between penetrations resistance determinations shall be such as to give a satisfactory rate of hardening curve. Continue test until one penetration resistance of at least 4,000 psi (27.6 mpa) is reached.

**Calculation**

Calculate the penetration resistance, in pounds per square inch, or mega Pascal, as the force required to cause a 1" (25mm) depth of penetration of the needle divided by the area of the bearing face of the needle.



**Replacement Needles**

Description	Part No.
1 sq. in. (645mm <sup>2</sup> )	H-4143.1
1/2 sq. in. (323mm <sup>2</sup> )	H-4143.50
1/4 sq. in. (161mm <sup>2</sup> )	H-4143.25
1/10 sq. in. (65mm <sup>2</sup> )	H-4143.10
1/20 sq. in. (32mm <sup>2</sup> )	H-4143.05
1/40 sq. in. (16mm <sup>2</sup> )	H-4143.025

## Warranty

Humboldt Mfg. Co. warrants its products to be free from defects in material or workmanship. The exclusive remedy for this warranty is Humboldt Mfg. Co., factory replacement of any part or parts of such product, for the warranty of this product please refer to Humboldt Mfg. Co. catalog on Terms and Conditions of Sale. The purchaser is responsible for the transportation charges. Humboldt Mfg. Co. shall not be responsible under this warranty if the goods have been improperly maintained, installed, operated or the goods have been altered or modified so as to adversely affect the operation, use performance or durability or so as to change their intended use. The Humboldt Mfg. Co. liability under the warranty contained in this clause is limited to the repair or replacement of defective goods and making good, defective workmanship.

**Humboldt Mfg. Co.**  
875 Tollgate Road  
Elgin, Illinois 60123 U.S.A.

U.S.A. Toll Free: 1.800.544.7220  
Voice: 1.708.468.6300  
Fax: 1.708.456.0137  
Email: [hmc@humboldtmgf.com](mailto:hmc@humboldtmgf.com)

Testing Equipment for



Construction Materials

# HUMBOLDT

[www.humboldtmgf.com](http://www.humboldtmgf.com)