Testing Equipment
for Construction Materials



THE HUMBOLDT CATALOG
8
EIGHTH EDITION

HUMBOLDT









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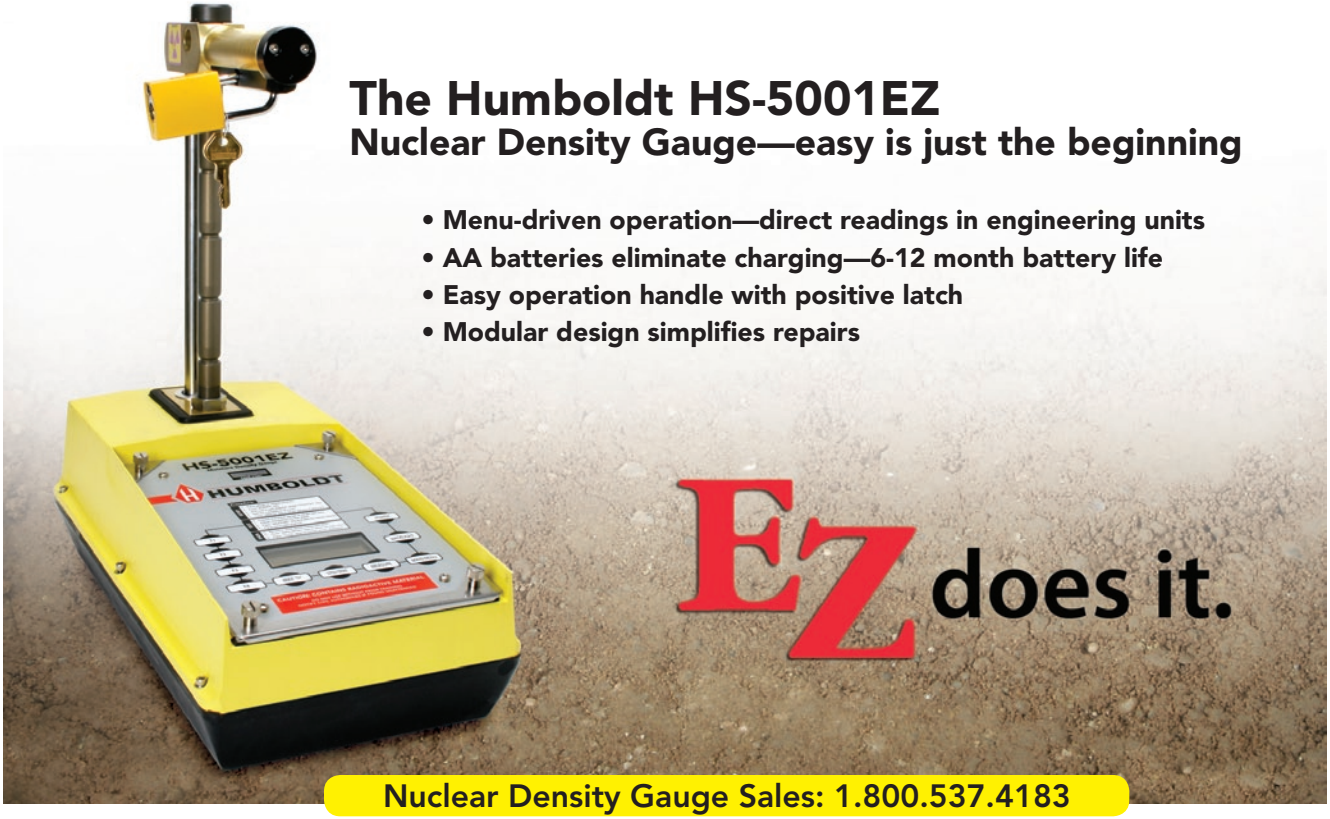
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The Humboldt HS-5001EZ

Nuclear Density Gauge—easy is just the beginning

- **Menu-driven operation—direct readings in engineering units**
- **AA batteries eliminate charging—6-12 month battery life**
- **Easy operation handle with positive latch**
- **Modular design simplifies repairs**

Nuclear Density Gauge Sales: 1.800.537.4183

Moisture/Density Gauge— HS-5001EZ081
Measures to 8" (200mm) depth in 1" (25mm) increments.

Moisture/Density Gauge— HS-5001EZ082
Measures to 8" (200mm) depth in 2" (50mm) increments.

Moisture/Density Gauge— HS-5001EZ121
Measures to 12" (300mm) depth in 1" (25mm) increments.

Moisture/Density Gauge— HS-5001EZ122
Measures to 12" (300mm) depth in 2" (50mm) increments.

Humboldt's HS-5001EZ Moisture/Density Gauge is just that— easy. Easy to operate, easy to power and easy to service. The EZ gauge features a menu-driven control panel with easy-to-use, built-in test routines and auto features, making testing a quick and accurate operation. It also features our innovative trigger release handle that eliminates pinched fingers while providing smooth operation.

Available in 8" (200mm) and 12" (300mm) lengths with either 1" (25mm) or 2" (50mm) increments, the EZ gauge provides a single gauge solution to density and moisture measurements.

The EZ's versatility allows it to measure density through direct transmission and backscatter modes, as well as including thin lift and trench modes, as well as moisture determinations. The gauge uses an advanced micro-processor-based technology to provide highly-accurate measurements of density and moisture that are automatically computed for direct readouts of wet density, dry density, moisture content, percent of moisture, percent of compaction (Proctor or Marshall), void ratio and air voids.

The EZ Gauge complies with all pertinent standards: ASTM D6938, D2950, C1040 and AASHTO T310.

The gauge is calibrated by the Five-block calibration method.



Easy to Operate—
Humboldt's HS-5001EZ Moisture/Density Gauge is just that— easy to operate. The EZ gauge features a menu-driven control panel with easy-to-use, built-in test routines and auto features, making testing a quick and accurate operation.



Easy to Power—
The EZ is powered by six standard AA alkaline batteries, which provide up to 2000 hrs of service. No chargers are needed and you can buy batteries almost anywhere, including the corner convenience store.



Easy to Service—
The EZ gauge also uses a modular design, which allows it to be serviced in the field, if ever necessary. With this gauge, you don't have to send it back to the factory for repairs, we'll send you the necessary components and walk you through any repair procedure.

Nuclear Density Gauge Sales: 1.800.537.4183

Radioactive Materials Data Needed for License Application

Radioactive Material	Chemical/Physical Form	Maximum Amount
Cesium-137	Sealed Source Humboldt 2200064	Not to exceed 11 millicuries per source
Americium-241:Be	Sealed Source Humboldt 2200067	Not to exceed 44 millicuries per source

Measurement: Density at 125 pcf (2000 kg/m3)

Direct Transmission, 6" (150mm)	**15 seconds (Fast)**	**1 minute (Std.)**	**4 minutes (Slow)**
Precision, pcf (kg/m3)	±0.5 (8)	±0.25 (4)	±0.13 (2)
Chemical Error, pcf (kg/m3)	±1.0 (16)	±1.0 (16)	±1.0 (16)
Surface Error, pcf (kg/m3)	-0.5 (8)	-0.5 (8)	-0.5 (8)
Measurement Depth: 2 to 12" (50 to 300mm)			
Backscatter, 3.5" (88mm)	**15 seconds (Fast)**	**1 minute (Std.)**	**4 minutes (Slow)**
Precision, pcf (kg/m3)	±1.0 (16)	±0.5 (8)	±0.25 (4)
Chemical Error, pcf (kg/m3)	±2.5 (40)	±2.5 (40)	±2.5 (40)
Surface Error, pcf (kg/m3)	-3.0 (48)	-3.0 (48)	-3.0 (48)
Measurement Depth: 3.5" (88mm)			
Moisture at 10pcf (160kg/m3)	**15 seconds (Fast)**	**1 minute (Std.)**	**4 minutes (Slow)**
Precision, pcf (kg/m3)	±0.5 (8)	±0.25 (4)	±0.13 (2)
Surface Error, pcf (kg/m3)	-0.25 (4)	-0.25 (4)	-0.25 (4)
Measurement Depth: 4-8" (100 to 200mm)			

All models Include:
Gauge, Reference Standard, Source and Case Certification, Wipe Test Kit, Rod Guide/Scraper Plate, Drill Pin, Four Pound Hammer, Pin Extraction Tool, Zippered Accessory Case, Transit Case, Radiation Safety Manual and Operator's Manual.



Electrical

Displays:	4 lines x 20 alphanumeric with backlit liquid crystal display
Timer Stability:	0.01%
Power Supply Stability:	0.10%
Power Source:	Six alkaline AA-size batteries
Power Consumption:	Active—6.5mA Battery Life—1400 hours
Power Protection:	Main Batteries—Circuit Breaker Regulated Supplies—Short Circuit Proof
Low Battery Condition:	LOBAT Alarm and Auto Shutoff for low and dead battery conditions
Battery Life Remaining:	Automatically Estimated at Power-up by activating TEST routine

Mechanical

Operating Temperature:	14 to 158°F (-10 to 70°C) ambient, 347°F (175°C) Material Surface
Storage Temperature:	-70 to 185°F (-55 to 85°C)
Humidity:	98% without condensation, Rain-Resistant Construction
Vibration:	0.1" (2.5mm) at 12.5 Hz
Materials:	
Shielding:	Tungsten Powder Alloy
Source Rod:	440C Stainless steel, Induction, heat treated to 55 Rockwell C
Gauge Base:	Computer-Machined 6061-T6 Aluminum, Hard-Coated and Teflon Impregnated
Post and Frame:	Computer-Machined 6061-T6 Aluminum, Anodized for Anticorrosion
Index Rod:	7075 aluminum, Hard Coated and Teflon Impregnated
Top Shell:	Injection-Molded Noryl with Integral Color
Bearing:	Relieved Bronze with Neoprene Seals
Screws/Fittings:	Stainless Steel and Brass

Radiological

Gamma Source	
Material, Type and Amount:	Cs-137, 370MBq (10mCi)
Special Form Registration:	USA/0634/S
ANSI and ISO Class:	C66546
Neutron Source	
Material, Type and Amount:	Am-241: Be, 1.48GBq (40mCi)
Neutron Yield:	90 Knps ±10%
Special Form Registration:	USA/0632/S
ANSI and ISO Class:	E66545
Source	
Type:	Sealed Source, Special Form
Housing:	Stainless Steel, Double Encapsulated
Surface Dose Rates	18.7 mrem/hr Maximum (Neutron and Gamma)
Transit (shipping) Case	DOT 7A, Type A, Yellow II Label, O.2 TI

Dimensions/Weight

Gauge:	
Dimensions (base):	15.75" x 8.66" x 5.5" (400 x 220 x 140mm)
Handle Height:	18" or 21.5" (450 or 550mm)
Weight:	30 lbs (13.6kg)
Reference Standard:	
Dimensions:	25" x 7.8" x 3" (350 x 200 x 75mm)
Weight:	10 lbs (4.5kg)
Transit Case:	
Dimensions:	31" x 14" x 19.5" (787 x 356 x 495mm)
Weight:	31 lbs (11.8kg)
Accessory Case (loaded):	
Dimensions:	19.7" x 9.8" x 5" (500 x 250 x 125mm)
Weight:	16 lbs (7.3kg)
Total Shipping Weight:	90 lbs (41kg)



Radiation Safety and Certification Classes

Radiation Safety Course
A one-day course in radiation safety and operation for users of nuclear portable Moisture Density Gauges. The class satisfies the USNRC and Agreement States' requirements for gauges manufactured by Humboldt and other manufacturers of portable, nuclear Moisture Density Gauges. A certificate of training will be issued to those who successfully complete the class.

Radiation Safety Officer's Course
A one-day training class to qualify participants to serve as facility Radiation Safety Officers. This course satisfies USNRC and US Dept. of Transportation Regulations, and is directed toward the individual responsible for the organization's radiation safety program. Course participants will receive a comprehensive training manual, as well as the recent NRC Guidance Document: Program-Specific Guidance About Portable Gauge Licenses (NUREG-1556, Vol. 1).

For information and class schedules for Radiation Safety Classes and Radiation Safety Officer Courses, click the training classes link on our website: **www.humboldtscientific.com** or call: **1.800.537.4183**

Hazmat Refresher Course also available

Tool Set
HS-200112



HS-000176



HS-200127

HS-200145

HS-200130



HS-200177



HS-200313



HS-001057



HS-200820

EZ Gauge Tool Set, Complete with Case— HS-200112
Tool kit includes: rod guide/scraper plate, drill pin, four-pound hammer, pin extraction tool and zippered accessory case.

Drill Rod— HS-200130

Rod Extraction Tool— HS-200145

Scraper Plate/Rod Guide— HS-200127

4 lb Double-Faced Hammer— HS-000176

Leak Test Kit, 10-pack— HS-200177
Leak Test Kit, 2-pack— HS-200185
Each leak test kit contains all of the materials necessary for users to perform a leak test on sealed source devices. These test kits include analysis service from Humboldt.

Humboldt Scientific, Inc. provides leak test kits and analysis services for both portable and fixed nuclear gauges in accordance with Wipe Test Procedures. Humboldt is licensed by the North Carolina Division of Radiation Protection license # 092-0750-1 to provide sealed-source leak testing on any radioactive material with atomic number 3-105 inclusive; and, has National reciprocity recognition. State-of-the-art leak testing equipment, low cost, and prompt turn-around service ensure accurate and convenient measurement of your samples.

Infrared RS232 Data Cable and Software— HS-200313
Cable and software for connecting gauge to a computer or printer via RS232 port.

Caution Radioactive Material Sign— HS-001057
8" x 10" metal sign.

Nuclear Gauge Security Restraint— HS-200820
Cable security restraint effectively locks containment box to vehicle or other structure. One-piece cable web drops easily over box and allows user to lock cables directly to containment box closures to prevent opening, as well as securing the complete box to prevent removal. Web is easily moved from vehicle to vehicle and collapses for easy storage when not in use. Allows for visibility of security labels on case when in use. A minimum of three padlocks are required, but not included.

Padlock— HS-000177
Padlock, which can be keyed so a set uses the same key.

Digital Radiation Survey Meter— HS-130508
Digital Radiation Survey Meter, NIST Traceable— HS-130508C

The HS-130512C survey meter provides an easy-to-use tool for surveying worksites, storage areas and transportation vehicles and is an inexpensive way to adhere to the survey requirements of an ALARA (As Low As Reasonably Achievable) Program. The HS-130512C measures alpha, beta, gamma, and x-rays. Its digital display shows readings in your choice of counts per minute (CPM) or mR/hr, or in accumulated counts. A red LED flashes and beeper sounds with each count detected and when the radiation reaches a user set alert level. Uses one 9-volt alkaline battery. Battery life is up to 2,000 hours at normal background radiation levels.

Operating Range	mR/hr - .001 (1µR) to 100 mR/hr, µSv/hr - .01 to 1000 CPM - 0 to 350,000, CPS - 0 to 5000, Total/ Timer - 1 to 9,999,000 counts
Gamma Sensitivity	1000 CPM/mR/hr referenced to Cs-1 37
Accuracy	±10% typical (NIST), ±15% maximum
Energy Sensitivity	Detects alpha down to 2.5 MeV; typical detection efficiency at 3.6 MeV is greater than 80%. Detects beta at 50 keV with typical 35% detection efficiency. Detects beta at 150 keV with typical 75% detection efficiency. Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the case. Normal background is 5-20 CPM.



HS-130508

Analog Radiation Survey Meter— HS-130512
Analog Radiation Survey Meter, NIST Traceable— HS-130512C

The HS-130512C survey meter is a compact, general purpose meter capable of detecting alpha, beta, gamma, and x-rays over 3 selectable ranges. A red count light flashes and a beep sounds with each event detected. Uses one 9-volt alkaline battery. Battery life is up to 2,000 hours at normal background radiation levels.

Operating Range	0-.5, 0-5, 0-50 mR/hr , 0-500, 0-5,000, 0-50,000 CPM or 0-500 µSv/hr 0-50 mR/hr.
Gamma Sensitivity	1000 CPM/mR/hr (referenced to Cs-137)
Accuracy	±15% of reading (referenced to Cs-137)
Energy Sensitivity	Detects alpha down to 2.5 MeV; typical detection efficiency at 3.6 MeV is greater than 80%. Detects beta at 50 keV with typical 35% detection efficiency. Detects beta at 150 keV with 75% typical detection efficiency. Detects gamma and x-rays down to 10 keV typical through the window, 40 keV minimum through the sidewall of the detector. Normal background is approximately 10-20 CPM.



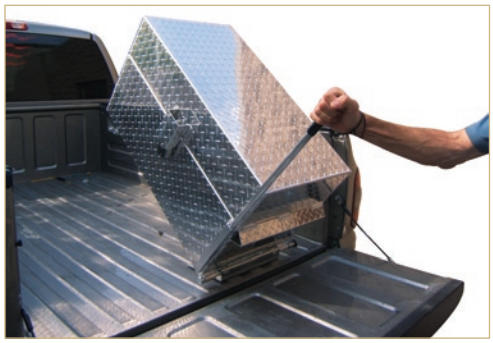
HS-130512

For Recalibration and NIST traceable calibration of meters, contact Humboldt Scientific at: 1.800.537.4183

Nuclear Gauge Containment System for Nuclear Gauges

The NUX safety containment box is an enhanced field security system for nuclear gauges. Constructed of heavy-duty aluminum diamond plate, the NUX can be securely mounted to a host vehicle using the locking hinge pin. The box features a titanium series, high-strength lock assembly, which provides a secure storage enclosure for your gauge in its factory protective container. In addition, the NUX tilting feature makes accessing your gauge an easy operation. Help prevent theft, damage, back injuries, misuse of equipment, improper or unauthorized access to equipment or other misguided actions, which may result in unforeseen costs to your company.

NOTE: When the metal transportation box is mounted in a vehicle it effectively becomes part of the vehicle. It is not part of the TYPE A package nor is it an overpack as defined by U.S. DOT. Therefore, the mounted transportation box is not subject to HAZMAT labeling requirements and no radiation warning markings are required on it.



Boxes include mounting bracket

NUX Safety Containment Boxes	
Mounting Bracket for all style cases	HS-200801
Nux Case for Humboldt Gauge	HS-200800
Nux Case for Troxler 3400 Series Gauges	HS-200802
Nux Case for CPN Gauges	HS-200803

Electrical Density Gauge (EDG)
wet and dry density, gravimetric moisture content and percent compaction



H-4114.3F



ASTM Standard in process, D-18 Committee

Electrical Density Gauge— H-4114.3F

The Electrical Density Gauge (EDG) is a non-nuclear alternative for determining the moisture and density of compacted soils used in road beds and foundations. The EDG is a portable, battery-powered instrument capable of being used anywhere without the concerns and regulations associated with nuclear safety. Its user-friendly, step-by-step menu guides the user through each step of the testing procedure and cautions the user when values do not correspond to established curves for the material being tested.

Easy-to-use, the EDG can be used as a construction aid to monitor day-to-day compaction operations by providing performance and measurement results highly comparable to those achieved with traditional methods, including the nuclear gauge and/or a sand-cone and oven moisture test combination. When conducting a test, the EDG measures and displays the results for wet and dry density, gravimetric moisture content and percent compaction.

For the contractor the advantages of using the EDG are:

- it does not require a highly-trained or licensed technician,
- it does not require special handling for shipping or regulatory compliance for hazardous materials
- it is easy to learn and easy to use with its step-by-step menu
- It is accurate and repeatable with results that mirror known testing methods

The EDG measures the electrical dielectric properties and moisture levels of compacted soil using high, radio frequency traveling between darts driven into the soil being tested. The dart's depth of penetration positively determines the depth of measurement.

Darts are available in 4, 6, 8, 10 and 12" lengths. In addition, the dart's have been designed with a taper, which ensures a continual positive contact with the soil for accurate measurements.

During the testing procedure, four tapered electrodes (darts) are driven into the ground in a cross pattern using the supplied template. Between the two sets of two tapered darts, four point-to-point electrical measurements are made and the electrical characteristics averaged. The dielectric properties that are measured by the unit are compared to a "soil model", which has been developed and programed into the unit prior to testing. These soil models are required only once for each soil type. The soil model is used as a calibration reference during the testing procedure. It is developed by establishing a curve of measured dielectric properties for different densities and moisture combinations of the actual soil to be tested or a similar material. This soil model is used by the unit through a proprietary correction algorithm to automatically determine the wet and dry density, gravimetric moisture content and percent compaction values for the material being tested. In addition, the temperature probe, which is inserted into the material being tested ensures accurate results by compensating for changes in recorded temperatures.

Similar to nuclear gauges, proctor numbers for optimum compaction may be input into the gauge, which would allow for percent compaction to be automatically calculated and displayed at the end of each test. The Proctor numbers would be input into the gauge during the development of the soil model. When determined, this value is entered into EDG to enable the computation of percent compaction.

Features Include

- Alternative to Nuke Gauges—No sources!
- Licensed technician not required
- Easy to learn and simple to use
- Menu-driven operation
- Uses reliable and well-established point-to-point RF technology
- Accurate, robust and lightweight
- Accurate and repeatable results in similar times as nuclear gauges

Application

Density, moisture and acceptance testing of compacted materials for:

- Embankments and fills
- Roadway subgrades, subbases and bases
- Utility backfills and trenches
- Landfills
- All construction soils



H-4114.3F with all components except for hard carrying case.

Electrical Density Gauge— H-4114.3F

includes: Console; 4-tapered 6" darts; hammer; soil sensor and cables; template, temperature probe, battery charger and hard-body case for all components.

Darts are designed in various lengths to correspond to different lift heights. They are sold in sets of 4.



4" Dart— H-4114.4
6" Dart— H-4114.6
8" Dart— H-4114.8
10" Dart— H-4114.10
12" Dart— H-4114.12

Specifications

Wet Density Range	typical compacted earth sites range
Dry Density Accuracy	within 3% of standard tests
Moisture Content Range	typical compacted earth sites range
Moisture Content Accuracy	within 2% of standard tests
Operating Temperature	0-50°C
Ambient Operating Humidity	5-90%, non-condensing
Power	rechargeable 12V lead acid gel cell
Battery Life	approx. 8 hrs. with full charge
Battery Charger	110-240 V 50/60Hz
Dimensions	console: 13.5" x 12" x 6" (343 mm x 305 mm x 152mm)
Net Weight	console: 11 lbs. (5kg), accessories: 4 lbs. (1.8kg)

EDG Principles of Operation

The EDG measures the electrical dielectric properties of compacted soil, including moisture levels, using a high radio frequency traveling between sets of electrodes. The readings achieved from this process are then compared to a "soil model", which has been previously developed for the soil being tested or soils deemed to be similar in properties to that being tested. The soil model, which is programed into the unit, is used to determine the percent compaction, wet and dry density and gravimetric moisture content of the soil being tested.

The Soil Model

To develop a soil model, it is necessary to develop a curve based on at least 3 or as many as 20 tests on the material in question at various densities and moisture readings using the EDG. At the same time, a coordinated test using a sand cone, nuclear gauge or voluvessel is also taken so a correlation between the EDG reading and actual physical data can be made. Once a soil model is developed it can be saved in the unit and recalled to test similar material in the future. For accurate results, it is necessary to develop soil models for the various materials that may be encountered, however, once these models are developed they can be used quickly and accurately in much the same manner as using a nuclear gauge. Time spent developing accurate soil models will result in accurate and repeatable readings being obtained in future tests. To aid in the development of soil models a detailed DVD is provided with the EDG, which explains how to develop soil models in step-by-step directions.

Using the EDG

The EDG, with its step-by-step menu is easy and fast to use. The technician need only follow the instructions displayed on the unit as it guides him through each test. The operator would begin by opening a new "jobsite" in the EDG and associating an appropriate soil model to it. The operator would then place the unit on the ground and connect the darts and temperature probe. Next, the dart template provided would be placed on the soil and darts hammered into the ground in the corresponding holes of the template. The electrodes would then be attached to the four darts in sequence as detailed on the unit's screen and readings taken. Once the measurement sequence is done, the unit will display the representative density and moisture content.

The dart's depth of penetration positively determines the depth of measurement. Darts are available in 4, 6, 8, 10 and 12" lengths. In addition, the dart's have been designed with a taper, which ensures a continual positive contact with the soil for accurate measurements.

GeoGauge®
Compaction Uniformity via in-place Stiffness Measurement



Complies with ASTM D6758

The GeoGauge® — H-4140

The GeoGauge is a unique, QC/QA field tool that can be used to measure the uniformity of unbound pavement layers by measuring the variability in stiffness throughout a structure. It is an excellent tool for identifying construction anomalies that would otherwise go undetected during construction where only density or percent compaction measurements were used. By measuring stiffness, the GeoGauge can reveal and thus help reduce variabilities in layer properties, which density measurements may miss, thus allowing corrective actions to be taken during construction to ensure that the highest quality base and subgrade are achieved despite variations in materials used.

The GeoGauge is the perfect companion instrument for density measuring devices such as nuclear gauges and the electrical density gauge. Density measuring devices can be used to ensure proper compaction is achieved and the GeoGauge can be used to verify that the stiffness/modulus values assumed in the design specifications of new or rehabilitated pavement structures are met. Compacting and monitoring pavement layers directly to design requirements of structural layer stiffness or material modulus in addition to percent compaction during the construction process establishes the means to effectively control structural uniformity, strength and deflection, as well as enabling the monitoring and control of the construction quality of various materials. This leads to better smoothness and longer lasting pavement surfaces at lower cost.

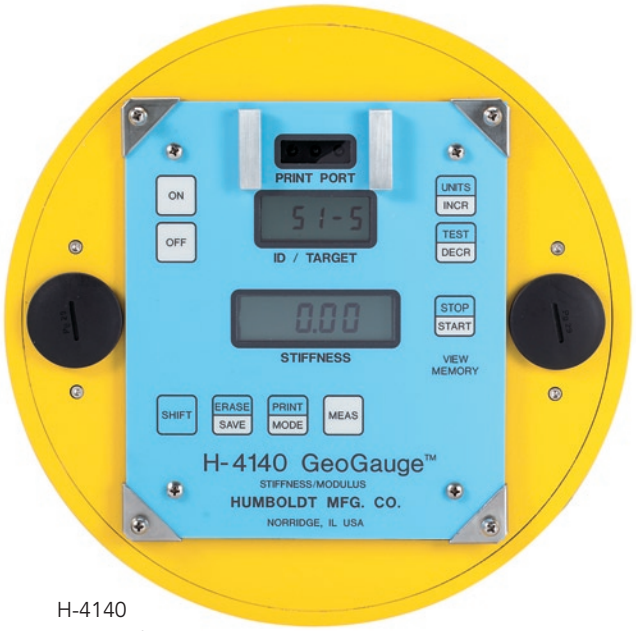
The GeoGauge works by applying a vibrating force at 25 specific frequencies, which produce small deflections in the material. The resulting displacement is measured by the GeoGauge and displayed as stiffness determined by the ratio of the force to deflection. The GeoGauge produces stress and strain levels common for pavement, bedding and foundation applications. In addition, Young's and shear modulus can be determined from GeoGauge measurements if a Poisson's ratio is assumed.

This dynamic technology used by the GeoGauge simulates real in-use conditions. This factor allows the GeoGauge to directly measure in-place engineering properties during the construction process. The GeoGauge supports and directly links the in-place engineering properties of compacted materials with Mechanistic-Empirical Design for effective QC/QA. Successful control of compaction creates a quality functional structure with the desired engineering properties for the application and life intended.

Applications include subgrade, sub-base, base, monitoring the strength gain of lime, cement, fly-ash and polymer stabilized materials, monitoring the re-compaction of underground utility backfills to previous properties matching surrounding undisturbed materials, monitoring the compaction of asphalt and cold in-place recycling to peak properties to prevent wasted effort and damaging over-compaction.

Features include:

- Dynamically measures in-place engineering properties using structural layer stiffness, MN/m (klbf/in) and Young's Modulus of a material, MPa (kpsi)
- In-place QC/QA links compaction and material performance directly to design requirements while advancing Mechanistic-Empirical Pavement Design
- Enables maximum lift stiffness with minimum compactive effort
- Facilitates uniform stress transmission and distribution from pavement to subgrade resulting in longer pavement life, reduced maintenance costs and longer lasting surface smoothness.
- Enables reduced structural variability in construction
- In-place QC/QA of the strength gain of stabilized materials
- Data base development supporting Mechanistic-Empirical Design and performance specifications
- Portable, fast, simple, reliable, non-invasive
- Other compaction applications include: lime, cement, fly-ash and polymer stabilized materials, cement-treated and rehabilitated bases, large particle aggregate bases, as well as underground utility backfills



H-4140
Face Detail

Specifications

Layer Stiffness	17 to 400 klbf/in (3 to 70 MN/m)
Young's Modulus (in-place)	4 to 90 kpsi (26 to 610 MPa
Measuring Depth	9 to 12 inches (230 to 310 mm)
Measuring Duration	75 seconds
Power	six D-cell batteries (1000 to 1500 measurements)
Dimensions	gauge only: 11" dia. x 10.5" high (280 mm x 270 mm) carrying case: 18.5" x 16.5" x 13" (470 x 420 x 330 mm)
Net Weight	gauge only: 22 lbs. (10 kg) with case: 34 lbs. (15.5 kg)
Shipping Weight	39 lbs. (17.7 kg)

Accessories:

Verifier Mass, 10kg— H-4140.20
Verifies calibration of gauge.

Infrared Data Cable— H-4140.12
Infrared (IR) serial interface adapter cable with spreadsheet software template



H-4140.20



GeoGauge™— H-4140
includes: Gauge and hard carrying case.



H-4238



H-4245
H-4249

Density Apparatus— H-4245

Sand density apparatus determines the in-place density of soils. Set includes 1-gal. (3.79L) threaded jar, detachable double cone consisting of a brass cylindrical valve with a 1/2" (12.7mm) dia. orifice. Valve has stops that prevent rotating past completely open or completely closed positions. Bottom cone 6-1/2" (165mm) dia. flanged opening fits the opening of the H-4246 field density plate (order separately). Meets ASTM D1556; AASHTO T191. Shipping wt. 10 lbs. (4.5kg)

Field Density Plate— H-4246

Used with H-4245 density apparatus to simplify removal of soil from test mold and act as template to control hole diameter. Cast aluminum alloy. Size 12 x 12" (305 x 305 mm). Meets ASTM D1556; AASHTO T191.

Density Apparatus— H-4249

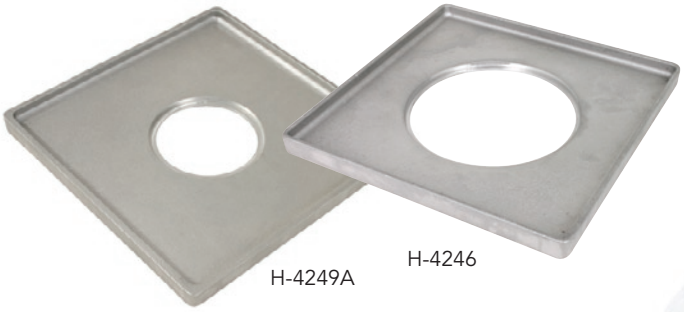
Similar to H-4245, but with 4-1/2" (114mm) dia. bottom cone flanged to fit opening of the H-4249A field density plate (order separately). Shipping wt. 8 lbs. (3.6kg)

Field Density Plate— H-4249A

Used with H-4249 density apparatus. Same as H-4246 Field Density Plate except with 4-1/2" (114mm) dia. hole.

Replacement Jar— H-4238

1-gal (4L) capacity threaded plastic replacement jar is same as furnished with H-4245.



H-4249A

H-4246



H-3821



H-4248

Sand Density Cone— H-4248

For determining in-place density of gravel and coarse soils. Features two identical cones (top cone is clear plastic) with large valve in middle and circular density plate. Flange that fits the lower cone allows apparatus to be used on holes up to 12" (305mm) dia. Meets U.S. Army Corps of Engineers specifications. Shipping wt. 50 lbs. (22.7kg)

Density Sand— H-3821

Clean, dry, free-flowing uncemented sand has few, if any, particles passing the No. 200 (75mm) or retained on the No. 10 (2.00mm) sieves. The sand's variation in bulk density does not vary greater than 1 percent. Packaged in a heavy reinforced bag. Meets ASTM D1556; AASHTO T191. Shipping wt. 50 lbs. (22.7kg)

In-place Density Accessory Kit— H-4117

Accessory Kit for use with Sand Density Cones and Voluvessels. Includes: 100 Sample Bags and Ties, a pocket dial thermometer, a bristle brush, a stainless steel spoon, a steel chisel and a rubber mallet. Does not include sand.



H-4117

Voluvessel, 1/20 cu. ft. (1600ml) capacity— H-4166
Voluvessel, 1/20 cu. ft. (1600ml) capacity— H-4116
Voluvessel, 1/13 cu. ft. (2230ml) capacity— H-4167

Voluvessels determine the in-place density of compacted or firmly-bonded soils using a rubber balloon apparatus viewed through a graduated, direct-reading clear plastic cylinder. Humboldt offers two distinctly different models; one, where the plastic cylinder screws into the density plate with the pump assembly mounted on top; and, the other, which has a metal casing protecting the plastic cylinder and the pump assembly mounted to the base. Both designs come with a pressure-vacuum pump assembly, pressure gauge, quick coupler valve, double-graduated cylinder, 10 balloons and a density plate. Both designs meet ASTM D2167; AASHTO T205.

Voluvessels are not suitable for soft soils that will deform under slight pressure or in which the volume of the hole cannot be maintained at a constant value.

Models H-4166 and H-4167 are individually calibrated before leaving the factory to ensure readings on the scale are accurate without the need for calculations.



H-4116



H-4166
H-4167



H-4166S
shown w/
H-4166

Voluvessel Saddleweights— H-4166S

Weights used to ensure uniform and repeatable weight is applied during testing for accurate readings. Can be used with any Voluvessel model.



H-4168

Replacement Balloons, 10 pk— H-4168

Replacement Pump Assembly— H-4166.10

Clegg Impact Soil Tester

The Clegg Impact Soil Tester can test a full range of soils and soft rocks as encountered in the construction of flexible pavement and earthworks, as well as athletic fields and surfaces. It is useful for quickly checking variations during construction and monitoring changes over time due to seasonal environmental changes or road traffic, as well as testing natural and "as constructed" conditions. The Clegg can test a full range of natural and synthetic athletic surfaces where hardness/impact characteristics need to be controlled for safety or playability. The Clegg offers the convenience of rapidly scanning compaction variations over large areas. The Clegg may be transported and operated by one person, allowing for low cost, rapid field and laboratory testing and direct readout of the test results. In addition, site location can be conveyed via the GPS option; and moisture measurements can be recorded using the optional H-4191A Moisture Probe with 20cm rods. Meets ASTM standards D5874, F1702.0.

All units include the H-4198A Control Unit. To order the GPS-capable model, use the .GPS suffix.



H-4198A, H-4198A.GPS
Control Units Close-up



H-4196A
H-4190A



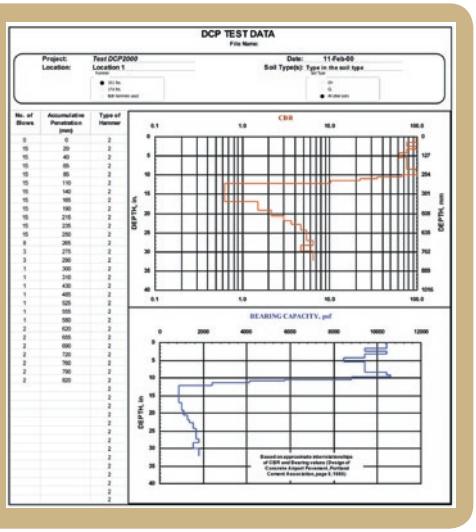
H-4193A
H-4194A

Clegg Impact Soil Tester Models

50mm, 2.25 kg	Natural or synthetic soft turf, sand and golf greens turf (football, baseball, soccer fields, playgrounds,	H-4196A H-4196A.GPS
50mm, 4.5 kg	Natural or synthetic turf (football, baseball, soccer fields, playgrounds, horse tracks, golf greens)	H-4190A H-4190A.GPS
50mm, 10 kg	Pre-constructed soils, trench reinstatement, bell	H-4193A H-4193A.GPS
130mm, 20 kg	Flexible pavement, aggregate road beds, trench reinstatement, bell holes, foundations	H-4194A H-4194A.GPS

Dual-Mass Dynamic Cone Penetrometers


H-4218B DCP (pg. 15) in use



Typical DCP Test Data generated with Excel spreadsheet templates.

Developed by the Army Corps of Engineers, Dynamic Cone Penetrometers (DCPs) provide a low-cost, efficient test method for quickly determining in-situ CBR values of pavement base, subbase and subgrades. They can readily be used for depths up to 30" and up to 6' with optional drive rods and extensions. All Models comply with ASTM D6951 specifications and come with a chart to compute CBR values, as well as an Excel spreadsheet template, which automatically charts the test results. DCPs cover a CBR range from <.05 to 100% and a bearing value range from 430 to 10,800 psf.


H-4219
(includes pelican case)





Dual-Mass Dynamic Cone Penetrometer— H-4219

The H-4219 is designed in full compliance with the U.S. Army Corps of Engineers specifications for weight and design. Its heavy-duty design utilizes threaded connections for accurate, positive operation during test procedure. It features a machined taper and grooves on bottom of hammer mass, which significantly aids in easier lifting of the mass and safer operation. The H-4219 utilizes the original Corps' design of 1 meter long drive rods and offers unique 6 and 9 meter long drive rods for operations where augered holes are used to get test data at extended depths. These one-piece long drive rods make testing fast and efficient in these applications. The standard unit includes: dual-mass slide hammer assembly, 1 meter drive rod with hardened tip, 1 meter drive rod with disposable cone tip adapter, 100 disposable tips, vertical scale, go, no go gauge, all necessary wrenches, user manual with spreadsheet software template and crush-proof Pelican carrying case. **Additional disposable cones, adapters, and hardened points are available.**

Deluxe, Dual-Mass DCP— H-4219D

Same as the H-4219, but comes with (2) 24" extension rods.

Replacement Parts for H-4219 DCPs

Description	Model
Hardened cone tip w/wrench flats	H-4219.4
Disposable cone tip adapter w/wrench flats	H-4219.5
Disposable cones, pkg. of 100	H-4219.100
Disposable cones, pkg. of 25	H-4218.9
Std., 1 meter, threaded drive rod	H-4219.11
Std., 1 meter, disposable cone drive rod	H-4219.10
2 meter, disposable cone drive rod	H-4219.13
3 meter, disposable cone drive rod	H-4219.14
24" extension rod	H-4219.8
Vertical scale, 44"	H-4219.2
Go, No Go Gauge	H-4219.3

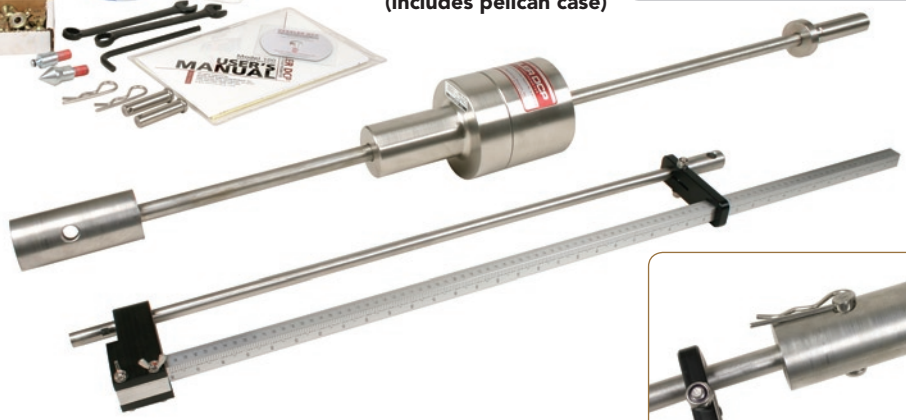
CBR Load Frame, Field Test Set— H-4152F
Load Frame Test Set designed for CBR determinations in the field. See page 40.



H-4218B
(includes pelican case)











Dual-Mass Dynamic Cone Penetrometer— H-4218B

The Standard DCP Kit measures the shear strength of soil with a CBR between 0.5-100% and psf from 455-7072. This single-operator kit is ideal for state/county/city highway departments and geotech firms. CBR and psf can be estimated in the field from tables in the manual and plotted using Corps of Engineers Excel template included on CD. It comes with a stainless steel dual-mass (17.6/10.1 lb) hammer and quick-connect upper rod, 30 inch drive rod (27 ¼ inch penetration), a 40 inch vertical scale, upper and lower scale mounts, a roll of marking tape with pen, a reusable hardened point and a disposable cone adapter with 25 disposable cones for fast and easy extraction of the instrument from hard/cohesive soil. The kit also includes a crush-proof Pelican carrying case with transport wheels and wrench set. Shipping: 45" x 16" x 7", 54 Lbs.

Additional disposable cones, adapters, and hardened points are available.

Magnetic Ruler for the DCP— H-4218.MR

Reduces time for one person to conduct DCP test. The Magnetic Ruler is a battery-operated (9V), data-collection device for the DCP. It automatically displays and records the penetration per blow, correlated values, depth, mm/blow, cumulative mm/blow, and cumulative blow/inch in SI and English. It also displays penetration rate correlations to CBR (California Bearing Ratio), Bearing capacity in Kips per square foot, and unconfined compression test. The data is recorded on an USB flash drive along with the test information entered by the operator and date/time for each test. The USB flash drive enables quick upload of data. Shipping: 48" x 7" x 7", 5 lbs.



H-4218MR

Extra Strong Drive Rod— H-4218B.300

Tempered steel, 37-3/4" long for use with H-4218B DCP. Under normal conditions it will return to straight position after being bent. 5 year warranty.



H-4218.9



H-4218B.150

H-4218B.170

H-4218B.130



H-4218B.800

H-4218B.700

Replacement Parts for H-4218 DCPs

Description	Model
Hardened point with wrench flats (silver)	H-4218B.700
Cone adapter with wrench flats (silver)	H-4218B.800
Disposable cones, pkg. of 25	H-4218.9
Disposable cones, pkg. of 500	H-4218.950
Hardened point with wrench flats (gold, Old)	H-4218.7
Cone adapter with wrench flats (gold, Old)	H-4218.8
Drive rod, 12" stainless	H-4218B.150
Drive rod, 30" stainless	H-4218B.130
Drive rod, 37.75" stainless	H-4218B.135
Extension rod, 24" stainless	H-4218B.170
Vertical scale, 40”	H-4218.503
Vertical scale, upper attachment	H-4218.530
Vertical scale, foot	H-4218.510
Quick connect, pin with clip (2 ea.)	H-4218B.450

Economy, Single-Mass DCP— H-4218E

This Economy DCP Kit is used to estimate the shear strength of soil with a CBR between 10-100 and psf from 762-7072. Tables in the manual provide correlations to CBR and psf values for the penetration rates at 2 inch, 4 inch and 6 inch intervals. Affordably priced, this single-operator kit comes with a 37-3/4 inch drive rod that is marked in 2 inch increments, and a reusable hardened point. The single mass (17.6 lb) structural steel hammer is standard with this kit. Also included are a manual, two Quick Connect pins, two wrenches and 3-in-1 oil.

Please Note: The Economy DCP Kit DOES NOT come with a carrying case.



H-4223
(includes pelican case)

Heavy-Duty Dynamic Cone Penetrometer— H-4223

The H-4223 Heavy-Duty Dynamic Cone Penetrometer was developed for users requiring a more rugged and longer lasting design, yet portable enough for easy transport to the field. It consists of a 10lb slide hammer assembly with a 24" drop, two 36" extension shafts with 6" increment markings, wrenches and a hardened-steel 60-degree cone tip. All components packed in a heavy-duty carrying case with wheels for easy transport to the job site.

Individual Items for H-4223	
Sliding drive hammer assembly	H-4223.1
Extension Shaft, 36 inches	H-4223.2
Extension Shaft, 24 inches	H-4223.4
Cone Tip, 60°, Hardened Steel	H-4223.3



H-4218F

Single-Mass (10.1 lbs) DCP— H-4218F

The H-4218F is used to estimate the shear strength of very weak soil with a CBR less than 20 and psf less than 4000. Tables in the manual provide correlations to CBR and psf values for the penetration rates at 2", 4" and 6" intervals. Affordably priced, this kit comes with a 37-3/4" drive rod that is marked in 2" increments, a single mass structural steel hammer and a reusable, hardened point. Also included are a manual, two quick-connect pins, two wrenches and 3-in-1 oil. Shipping: 44 x 6 x 6", 22 Lbs.
Please note: DOES NOT come with a carrying case.

24" extension rod— H-4218F.24

Dynamic Cone Penetrometer Test Set— H-4202

For use in nearly all types of soils. The H-4202 set for 10 ft. includes; one standard hammer assembly (H-4202.1), one heat treated 60 cone penetrometer point with 1 ft. adapter rod (H-4202.3), four 2.5 ft. E drill rod extensions (H-4202.225), one auger head (H-4202.6), one auger T-handle (H-4202.4), four 36" auger extensions (H-4202.5), and one ASTM special technical publication #399 (H-4202.9).
Shipping wt. 76 lbs. (36kg)

Sleeved Hammer DCP Test Set— H-4202S

Same as above, but with H-4202.1A sleeved drive hammer.

DCP Test Set w/o Auger Set— H-4202X

Sleeved Hammer DCP Test set w/o Auger Set— H-4202SX

Individual Items for H-4202	
Standard drive hammer	H-4202.1
Sleeved drive hammer	H-4202.1A
E drill rod extension 1 ft.	H-4202.21
E drill rod extension 2 ft.	H-4202.22
E drill rod extension 2.5 ft.	H-4202.225
E drill rod extension 5 ft.	H-4202.25
Drive point w/1 ft. adapter	H-4202.3
Drive point only	H-4202.3DP
Auger assembly, includes auger head, two connector pins, tee handle and one extension.	H-4202.6A
Auger Tee handle	H-4202.4
Auger Tee handle, stainless steel	H-4202.4SS
Auger extension. 36"	H-4202.5
Auger extension, stainless steel. 36"	H-4202.5SS
Auger head, standard 3-1/4"	H-4202.6
Auger head, stainless steel 3-1/4".	H-4202.6SS
Windowed auger head, standard (heat-treated carbon steel). 3-1/4"	H-4202.6W
Windowed auger head, standard (stainless steel) 3-1/4"	H-4202.6WSS
Drive tube assembly, zinc plated steel. 3 x 10"	H-4202.7A
Replacement connector pin.	H-4202.8
Replacement connector pin, stainless steel.	H-4202.8SS
ASTM special technical publication.	H-4202.9



H-4202

H-4202.1A

Sleeved Drive Hammer— H-4202.1A

Alternate hammer for H-4202 DCP set.

Digital, Static Cone Penetrometer— HS-4210

The HS-4210 Digital, Static Cone Penetrometer (DSCP), with its large, digital readout, makes testing and recording readings easy. The DSCP can be used to evaluate soil consistency by determining the soil's level of compaction and/or the bearing capacity. The DSCP is especially useful in evaluating shallow foundations and pavement subgrades where fine-grained and soft soils are being used. The DSCP can also be used to aid technicians in quickly selecting sites for testing, as well as correlating with other tests, based on local conditions, such as standard or modified Proctor, CBR or Bearing Capacity. The DSCP uses a dual-rod design, which eliminates the need to correct for soil friction on the rod as the cone is pushed through the material. Penetration resistance is read directly from the cone tip and registered on the digital display. The Unit comes with a 30" starter rod and a 60° cone with a 1.5cm^2 area.



Static Cone Penetrometer— H-4210A

Used in fine-grained, soft soils at shallow foundation and pavement sub-grades to evaluate for soil consistency, level of compaction and bearing capacity. Unmatched for accuracy, reliability and ease of use. Pressure gauge with 0-70kg/cm is scaled for direct reading of cone stress, eliminating proving ring conversions. Dual rod design eliminates soil friction factor. High strength aluminum and steel construction. Standard model includes a 60° cone with 1.5 cm. max. area, a 24" (0.6m) starter rod assembly rated at 250 lbf axial force max., and a pressure gauge. Shipping wt. 8 lb. (3.63kg)

H-4210A Accessories/Replacement Parts	
60° Cone with 3cm^2 max area	H-4210.3
Extension rod, 24 in. (0.6m)	H-4210E.2A
60° Cone with 1.5cm^2 max area	H-4210.1
Starter rod, 24 in. (0.6m)	H-4210.2A
Replacement O-ring	H-4210.9



Proving Ring Penetrometer— H-4204

Used to determine the bearing capacity of subgrades, or to measure soil compaction. Light and easy to handle in the field. A rapid means of determining the penetration resistance of soil in shallow exploration surveys. Includes: 30°, 1 sq. in. (6.45 sq cm) cone; 250 lb. (1.1kN) capacity proving ring; brake type dial indicator, holds final reading until manually released; 3/4" (19mm) dia shaft, graduated at 6", (152mm) intervals; 3/4" (19mm) dia extension rod, graduated at 6" (152mm) intervals; cast aluminum T-handle. Shipping wt. 15 lbs, (6.8kg)

Corps of Engineers Cone Penetrometer— H-4120

Designed to evaluate soil trafficability and manufactured to Corps of Engineers specifications. The factory calibrated dial indicator reads directly in psi. Includes 30 degree cone with 1/2 sq. in. base area, 150 lb capacity proving ring, dial indicator calibrated direct 0–300psi in 5psi increments, extension rod 5/8", (15.8mm) dia x 19" (483mm), plus handle. Shipping wt. 15 lbs. (6.8kg)

Proctor Penetrometer Set— H-4139

Establishes the moisture-penetration resistance relations of fine-grained soils. Includes these interchangeable needles (area in sq. in. or sq. cm): 1 (6.45), 3/4 (4.84), 1/2 (3.22), 1/3 (2.15), 1/5 (1.29), 1/10 (.65), 1/20 (0.32) 1/30 (0.22cm^2) and 1/40 (0.16cm^2). Replacement needles available. Meets ASTM D1558. Shipping wt. 17 lbs. (7.7kg).

Penetration Resistance Needles for H-4139	
Replacement Resistance Needle Set	H-4143N
1 sq. in. (6.45 cm^2) needle	H-4143.1
3/4 sq. in. (4.84 cm^2) needle	H-4143.75
1/2 sq. in. (3.22 cm^2) needle	H-4143.50
1/3 sq. in. (1.29 cm^2) needle	H-4143.33
1/5 sq. in. (2.15 cm^2) needle	H-4143.20
1/10 sq. in. (0.65 cm^2) needle	H-4143.10
1/20 sq. in. (0.32 cm^2) needle	H-4143.05
1/30 sq. in. (0.22 cm^2) needle	H-4143.033
1/40 sq. in. (0.16 cm^2) needle	H-4143.025



Spiral Type Auger— H-4250
For use in sampling soils, auger has 1-1/2" dia. x 4" long (38mm x 102mm) spiral-type auger bit. Features graduation marks every 6" (152mm). Overall length is 36" (915mm), including handle. Screw-on handle permits attachment of H-4251 extension for sampling beyond 36" depths. Meets ASTM D420, D1452; AASHTO T86, T202. Shipping wt. 6 lbs. (2.7kg).

Extension for Spiral Type Auger— H-4251
For use with H-4250 auger, 36" long (914mm) extension allows sampling at greater depths.

Iwan-Type, T-Handle Auger, 2" dia (51mm)— H-4252.2
Iwan-Type, T-Handle Auger, 3" dia (76mm)— H-4252.3
Iwan-Type, T-Handle Auger, 4" dia (102mm)— H-4252.4
Iwan-Type, T-Handle Auger, 6" dia (102mm)— H-4252.6

T-handle augers are also known as post-hole, Iwan-type or non-adjustable augers. Feature 36" (914mm) long steel shaft and hardwood cross handle. Available 2" (51mm) to 4" (152mm) diameter. Overall length 48" (1219mm). Meets ASTM D420, D1452; AASHTO T86, T202. Shipping wt. 7 lbs. (3.2kg).

Extension for 2" Iwan-Type Auger— H-4252.2E
For use with H-4252.2 T-handle auger only, extension is 36" (914.4mm) long and includes end coupling. Shipping wt. 9 lbs. (4.1kg).

Extension for 3", 4" and 6" Iwan-Type Auger— H-4252E
For use with H-4252.3, H-4252.4 and H-4252.6 T-handle augers, extension is 36" (914mm) long and includes end coupling.

Soil Sampling Auger Tube Set— H-4268
Set contains auger and sampling tube. Components are plated steel to resist abrasive action of soil. Includes 1-1/4" (25mm) dia. by 12-1/2" (318mm) long auger, 1" (approx. 25mm) OD by 12-1/2" (318mm) long sampling tube, two 12" (305mm) extension rods, handle and a fiberboard carrying case. Shipping wt. 7 lbs. (3.2kg).

Soil Sampling Tube— H-4362
For use in collecting soft soil samples in 3/4" core sample size. Depth capacity is about 39". Includes sampler tube, one tip, two extension rods, handle and fiberboard case.

Soil Sampling Tube Set— H-4269
Tube sets are helpful and functional for agricultural and other soil-testing procedures. Sampling tube will produce 15" (381mm) core of soil. Includes 18" (457mm) long, 7/8" (22mm) ID sampling tube, handle and carrying case.

Probe Rod— H-4188
Ideal for locating buried pipes, tanks and utility lines. Zinc-plated steel, 36" (914mm) x 1/2" (12.7mm) shaft. Shipping wt. 5 lbs. (2.2kg).

Fiberglass Probe Rod— H-4188F
Ideal for locating buried pipes, tanks and utility lines. Light, non-conductive Fiberglass 36" (914mm) x 1/2" (12.7mm) shaft. Shipping wt. 5 lbs. (2.2kg).

Augers, Quick Connect, Bucket-Type

Bucket augers offer outstanding durability, allow deeper depths. Regular auger bit is designed for ordinary soil sampling. Sand auger bit is used for dry, sandy soils. Mud auger bits are designed for sampling heavy, wet soil or clay samples; opening facilitates removal of wet samples. Heat treated, high carbon steel bits with tungsten carbide hard-surfaced edges. Bits are welded to stainless steel cylinder, topped with carbon steel ball.



Regular



Sand



Mud

Augers, Quick Connect, Bucket-Type

Size	Regular	Sand	Mud
2"	H-4410QC	H-4430QC	H-4420QC
2-1/4"	H-4411QC	H-4431QC	H-4421QC
2-3/4"	H-4412QC	H-4432QC	H-4422QC
3-1/4"	H-4413QC	H-4433QC	H-4423QC
4"	H-4414QC	H-4434QC	H-4424QC



H-4442QC, etc.

Auger Extensions, Quick Connect

2 ft. (610mm), Molybdenum Seamless Tubing	H-4442QC
3 ft. (914mm), Molybdenum Seamless Tubing	H-4443QC
4 ft. (1219mm), Molybdenum Seamless Tubing	H-4444QC
5 ft. (1524mm), Molybdenum Seamless Tubing	H-4445QC



H-4447QC

Auger Cross Handles

Auger Cross Handle, Padded	H-4447QC
Auger Cross Handle	H-4448QC
16" Ratcheting Handle	H-4449QC



H-4448QC



H-4449QC

Rock Breaker and Slide Hammers

Made from high-strength alloy steel with chisel tip. Use with Slide hammers for rock breaking and chiseling. Rubber coating on slide hammers makes them easy to hold on to and absorbs impact shock. Slide hammers have threaded coupling, order threaded adapter listed below to use with quick-connect rock breaker and extensions.



H-4449

Rock Breaker and Slide Hammers

Rock Breaker with Chisel Tip	H-4449
Regular Slide Hammer w/quick connect adapter	H-4450
Compact Slide Hammer w/quick connect adapter	H-4451
Quick-Connect Adapter for Slide Hammer	H-4452



H-4450



H-4451


H-4203.DT3

H-4203.DT4


H-4203.4


H-4203.3

Density Drive Sampler, 3" (76.2mm) Drive Head— H-4203.3
Density Drive Sampler, 4" (101.6mm) Drive Head— H-4203.4
For determining in-place density of soil by driving a thin-walled tube into the soil mass to obtain a relativity undisturbed sample. Typically used to verify compacted fill placement, or to obtain samples from the bottom of shallow excavations. Zinc-plated, steel drive head and sliding weight hammer used with separately ordered drive tubes. Drive head, 10 lb., has shock reducing spring to guard against fatigue failure. Meet ASTM D2937.

Drive tube for use with H-4203.3 Drive Sampler— H-4203DT.3
3" (76.2mm) x 2.75" (69.9mm) length, (3" x 0.01 ft^3).

Drive tube for use with H-4203.4 Drive Sampler— H-4203DT.4
4" (101.6mm) x 5" (127mm) length, (4" x 0.033 ft^3).

Shelby Tubes, Galvanized
3" (76.2mm) dia. thin-walled, open-tube samplers available in galvanized steel. Lower end is chamfered to form a cutting edge and upper end includes holes for securing tubes to a drive head. Can be used to protect sample during transport.

Shelby Tubes, Galvanized	
3" dia x 10" long, galvanized shelby tube	H-4210.10
3" dia x 18" long, galvanized shelby tube	H-4210.18
3" dia x 30" long, galvanized shelby tube	H-4210.30
3" dia x 36" long, galvanized shelby tube	H-4210.36

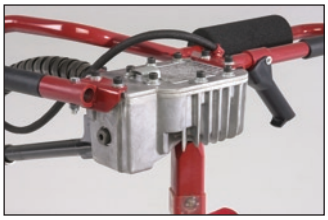
Shelby Tube Caps— H-4210C
3" (76.2mm) dia. plastic caps for holding sample in tube during transportation and storage.

Shelby Tube Drive Head— H-4202.7A
Drive Head for Shelby tubes for use with H-4202.1 or H-4202.1A Drive Hammers with "E" rod connection, see page 16.


H-4202.7A


H-4210C







Power Mechanical Earth Drill, 5hp— H-4050
Power Mechanical Earth Drill, 8hp— H-4051

For soil sampling, construction and more, earth augers are gasoline powered and portable. Using one operator, they allow fast and easy drilling. They feature snap-on or screw-on augers and extensions. Engine mounted on wheel-base carrier keeps motor noise and fumes away from the operator. Torque tube eliminates counter torque. Features such as the carrier and torque tube offer greater mobility, beneficial in areas inaccessible to large equipment, on slopes and horizontal drilling, various standard sampling methods to obtain material samples. Recoil starter and spring-loaded throttle-in-handle assembly provide fingertip control. Centrifugal clutch, heavy-duty flexible shaft connects to the motor and provides for a smooth operation. Blades and points are tool steel, hard-surfaced and heat treated. Blades are reversible for longer life. Most augers are snap-on design; smaller diameter augers are screw-on.

Auger has either 5HP or 8HP, 4-cycle engine with 10:1 gear ratio, complete with wheel kit and torque tube. Order augers and extensions separately. For augers 1-1/2" to 6" dia., maximum depth is 18' (38 to 152mm, 5.5m deep).



42 Inch, Snap-On Augers	
1-1/2" (38mm) Snap-on auger	H-4052A.1
2" (51mm) Snap-on auger	H-4052A.2
3" (76mm) Snap-on auger	H-4052A.3
4" (102mm) Snap-on auger	H-4052A.4
6" (152mm) Snap-on auger	H-4052A.6

42" augers dig a 36" deep hole.

36 Inch, Full-flighted, Snap-On Extensions	
1-1/2" (38mm) Snap-on extension	H-4053.1
2" (51mm) Snap-on extension	H-4053.2
3" (76mm) Snap-on extension	H-4053.3
4" (102mm) Snap-on extension	H-4053.4
6" (152mm) Snap-on extension	H-4053.6

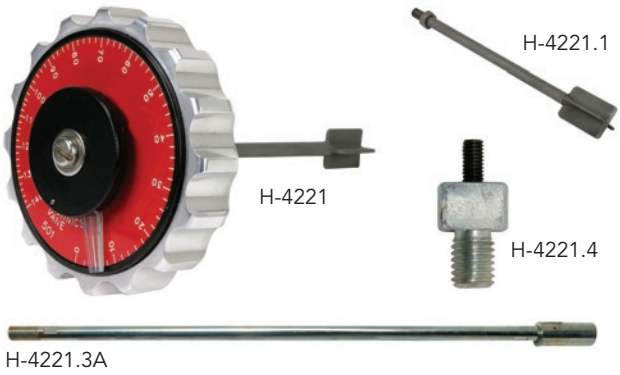
Tube Extensions	
36" Tube extension for 3 to 6" Augers	H-4053.7
18" Tube extension for 3 to 6" Augers	H-4053.8

Replacement Points & Blades	
1-1/2" (38mm) Screw-on replacement point	H-4055.1
2" (51mm) Screw-on replacement point	H-4055.2
3" (76mm) Screw-on replacement point	H-4055.3
Replacement point, 4" (102mm) or 6" (152mm)	H-4055
Replacement blade, 4" (102mm)	H-4056
Replacement blade, 6" (152mm)	H-4057


H-4205

Dial Pocket Penetrometer Kit— H-4205

A sophisticated pocket penetrometer offering greater capacity and sensitivity than others. Maximum value is retained on the dial until released via push-button. Inner dial scale 0 to 6.0, with 0.1 divisions in tsf and kg/cm^2. Outer scale gives load strength over 0 to 11.0 with 0.1 divisions in tsf and kg. This reading is used with charts (included) to estimate safe bearing pressures, depending on plunger used and soil type. Values indicated relate to the standard 1/4" dia. plunger.
In addition, readings with four other included plungers (10, 15, 20, 25mm) indicate safe bearing pressures for foundations in consolidated soils over a range of sandy to clay-type soils. The 2.5" (63mm) dia. dial can be easily recalibrated using register plates (included) and any readable scale of 10-15 lbs. capacity. Includes data tables, register plates, instructions, and carrying case.







Soil Penetrometer, Pocket Type— H-4200

For use by field personnel to check visual classification of soils. Verifies whether excavation side walls require shoring, based on OSHA cohesive soils classifications. Indicates consistency, shear strength, and approximate unconfined shear strength. Direct-reading scale—in tons/sq ft, or kg/sq cm—corresponds to equivalent unconfined compressive strength. Range: 0 to 4.5 tons. High quality construction. Includes belt-loop style carrying case and operating instructions. Should not replace laboratory testing or field analysis, or be used to produce foundation design data.

Penetrometer Adapter Foot— H-4200F

Adapter foot is recommended when testing extremely low strength cohesive soils. 1" (25mm) dia. foot, compared to the 1/4" (6.35mm) penetrometer piston, increases the effective area measured by 16 times. Divide by 16 to obtain correct unconfined compressive strength when the reading in tons per square foot or kilograms per square centimeter is on the low-load side.

Geovane Soil Shear Strength Tester— H-4221

The Geovane is a hand-held instrument used for determining soil shear strength providing the reading in kPa. The device is simple to use. A 19mm vane blade is screwed into the base of the Geovane and the vane is pushed into the soil. Simply rotate the Geovane at a rate of 1 revolution per minute and take a reading off the face when the soil fails. The pointer stays in place when failure occurs allowing you to look up the indicated reading on the supplied calibration chart to get your reading in kPa from zero to 200. Through the use of the optional 33mm vane, readings can be measured between the range of zero to 40 kPa. Extension rods are available to increase the depth measurement capabilities of the unit. The H-4221.4 Adapter is needed to attach extension rods to the Geovane. The Geovane is supplied complete with a 19mm vane blade, wrenches and a carrying case.

Vane Blade (33mm)— H-4221.1

Extension Rod 12" (300mm)— H-4221.2A

Extension Rod 19.7" (500mm)— H-4221.3A

Extension Rod Adapter— H-4221.4

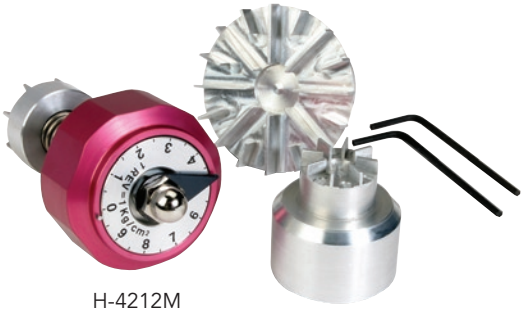
Vane Inspection Set— H-4227

The Vane Inspection Set provides a rapid check of the stability of foundations, excavations and trenches in clay. The total range is 0 to 260kPa (0 to 2.6 ton/sq. ft.). The scale built into the handle holds the peak value until reset. Accuracy is ±10%. Three different sizes vanes are included with the set (16 x 32, 20 x 40 and 25.4 x 50.8mm). The effective ranges are 0 to 260, 0 to 130 and 0 to 65kPa (0 to 2.6, 0 to 1.3 and 0 to 0.65 tsf). A "dummy" vane is also included to calibrate the six 0.5 meter long extension rods for effects of soil friction. All items come in a compartmentalized vinyl carrying case with three wrenches. Shipping Weight: 6 lb (3kg).

Extension rod, 0.5 meter— H-4227.1

50.8 x 101.6mm Vane— H-4227.2
Measuring range is 0 to 8.125kPa (0.08 TSF)

Torvane Shear Tester Set, Metal— H-4212M
This device is recommended for the rapid determination of shear strength of cohesive soils, in either the field or laboratory. The tester may be used for in-place testing of pits or trenches It permits the determination of a large number of strength values with different orientation of failure planes. It is simple to use with sample trimming eliminated. All that is needed is a reasonably flat surface 25mm in diameter. It gives repeatable values in homogeneous clay. Extensive laboratory testing indicates excellent agreement between the unconfined compression test and the shear tester. The simultaneous use of the TST and a pocket penetrometer allows rapid evaluation of the degree of the internal friction of soil in shear strength or to determine if the soil is essentially cohesive.



H-4212M

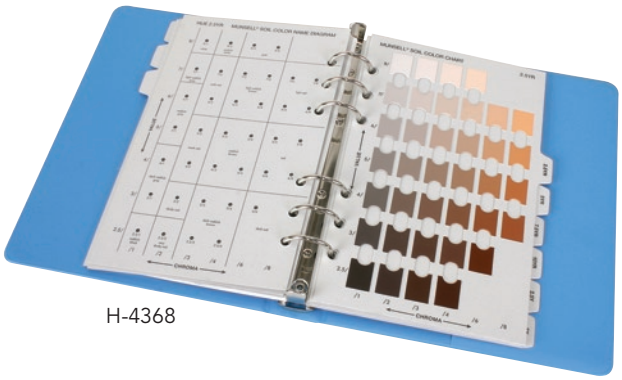
Torvane Shear Tester Set, Plastic— H-4212
Similar to H-4212M, but made of plastic. Comes in plastic case.



H-4212

Soil Color Charts— H-4368
Soil color is measured by comparing with color chart. Set includes nine hue charts displaying 322 colors on a neutral gray chart stock. Apertures are cut between the adjacent color chips so sample may be evaluated directly against the standard colors. Charts, diagrams and interleaves fit into a six-ring loose-leaf binder. Charts are 7-1/4 x 4-1/4" (184x108mm), small enough for field use

Tropical Soil Charts— H-4368T
Tropical Soil Charts for use with H-4368. Special charts for reddish tropical soils. Recommended for regions such as South and Central America, Africa, India, Malaysia, and similar tropical areas. Includes two charts that fit into H-4368 binder.



H-4368

Sand Grading Chart— H-4369
Unique chart useful to engineers, geologists, contractors, and soil scientists for uniform classification of sands.

Soil Strength Classifier, 125lbf / 55kgf Capacity— H-4180.125
Soil Strength Classifier, 250lbf / 110kgf Capacity— H-4180.250
Soil Strength Classifier, 350lbf / 160kgf Capacity— H-4180.350
Hand-lever operated, soil strength classifier provides fast manual approximations of unconfined compressive strength on many soil types in the field or lab. Platen accepts up to 2" (51mm) sample diameters and up to 4-1/2" (114mm) lengths. Reads loads on 4-1/4" (108mm) dial face with ±1% of dial capacity as held with second maximum-reading pointer. Dial has 1 lbf divisions on outer scale, 1 kgf divisions on inner scale. Unit has cast aluminum housing. Base dimensions are: 5-3/4 x 10-1/4" (146 x 260mm), drilled for optional bench mounting. Calibration spring confirms proper operation; order separately. Shipping wt. 18 lbs. (8.2kg)



H-4186.250

Soil Strength Classifier, 125lbf / 55kgf Capacity— H-4186.125
Soil Strength Classifier, 250lbf / 110kgf Capacity— H-4186.250
Soil Strength Classifier, 350lbf / 160kgf Capacity— H-4186.350
The H-4186 Series Soil Classifiers are identical to the H-4180 Series except they feature a geared hand-wheel loading system. This unique system provides a more uniform rate of load and easier loading and recording of peak values by a single operator.

Calibration Spring, 350lbf / 160 kgf Capacity— H-4180S

H-4967
(includes pelican case)





H-4966



H-4965A

Calibration Kit— H-4965A
Includes calibration unit, instructions, wooden carrying case.

Moisture Tester Reagent— H-4966
Calcium carbide reagent for Speedy® Moisture Testers. Carton of 24-1 lb. (0.5kg) containers. Shipped via motor freight only. **See Warning Below.** Shipping wt. 26 lbs. (11.7kg)

Speedy® 2000 Moisture Tester (20g)— H-4967
Speedy® 2000 Moisture Tester (6g)— H-4968

The Series 2000 Speedy moisture tester is a portable system for measuring the moisture content of a wide range of materials including soils, aggregates, dust and powders (and liquids). The system consists of a low pressure vessel fitted with a pressure gauge and an electronic scale and test accessories. Moisture measurements are made by mixing a weighed sample of the material with a calcium carbide reagent in the sealed pressure vessel. The reagent reacts chemically with water in the sample, producing acetylene gas that in turn increases the pressure within the vessel. The pressure increase in the vessel is proportional to the amount of water in the sample, the moisture content can be read directly from the calibrated pressure gauge. The tester is supplied complete with heavy-duty plastic carrying case, electronic balance, beaker, cleaning cloth, cap, washer, scoop, steel pulverizing balls and cleaning brushes. Meets ASTM D4944 and AASHTO T217.
Shipping Wt. 13 lbs. (5.9kg)

Accuracy: Within 0.5% on most materials
Test Speed: 45 sec. to 3 min., depending on material
Gauge: Calibrated from 0-20% moisture based on wet weight
Balance: Electronic; 0-7 oz (0-200g) range; battery operated

HAZARDOUS WARNING:
Danger of explosion/fire may result if Moisture Testing Reagent is allowed to contact with moisture. Calcium carbide forms flammable acetylene gas when wet so must be kept sealed and dry. Provide adequate ventilation and use away from sparks and flame. U.S. shipping regulations require shipment by approved carriers. Contact Humboldt for international shipping regulations.



H-4954

Field Moisture Oven (FMO)— H-4954
The FMO is a compact, portable (powered by 12-volt car battery) moisture testing oven, which provides gravimetric moisture readings to better than 0.5% in the field. The test uses a 200 gram soil sample, placed in the oven, while two heating elements, powered by a vehicle battery, quickly dry the soil. The built in micro processor controls the drying process and determines the percent of moisture based on the ASTM D4959 Direct Heat Standard Test Method. The oven is encased in a heavy-duty case and includes power supply cables, sample tray, pliers, straight edge, and user's manual.

Sample Tray (10pk)— H-4954.1
1000 Watt AC/DC, 110V Power Converter— H-4954.2
Vehicle Adapter Set— H-4954.3
includes: 8-foot Extension Cable and 20-Foot Adapter Cable with fuse.

Resistivity, Guelph, Infiltrometer



H-4386
H-4386SM



H-4385

H-4388

Resistivity Meter— H-4385
The resistivity meter can be easily used to measure resistivity of soil in-situ using the 2, 3, or 4 electrode method or with the soil box to measure resistivity of soil or water in the range of distilled to sea water. It has a wide range (0.01 ohm to 1.1 megohm) in 8 ranges with 10% overlap. It is fully temperature stabilized over temperature ranges encountered in all field conditions; is insensitive to A.C. or D.C. ground currents; can be used safely in wet ground and comes with (1) 12-volt lantern battery and shoulder carrying strap. Shipping wt. 11 lbs (5kg)



H-4387

Soil Box, 8.75 x 1.5 x 1.25" (222 x 38 x 32), 280ml capacity**— H-4386**
Soil Box, Small, 4.375 x 1.125 x 1.5" (111 x 29 x 38), 75ml capacity**— H-4386SM**
Soil Box Leads, set of 4— H-4387
The soil box is used with the H-4385 resistivity meter for a quick and accurate measurement of resistivity of a soil or water sample in the field or laboratory. Construction is clear plastic with stainless steel current plates and brass potential pins. The dimensions are such that the measured resistivity with the H-4385, when the box is filled level, can be expressed in ohm-centimeter, making calculations unnecessary. The box can also be used with other meters.

Resistivity Test Reel with Soil Pins— H-4388
Four pin, test reel set for attaining 1-20 ft. depth measurements. Can be used with any 4-terminal meter. Uses 4-electrode Wenner method. Includes 4 separate, color-coded wires of varying lengths from 5 to 65 ft. Jumper leads (2-foot) are supplied for connection to meter.



HSM-2100

Guelph Permeameter Kit— HSM-2100
The Guelph Permeameter is an easy to use instrument for quickly and accurately measuring in-situ hydraulic conductivity. Accurate evaluation of soil hydraulic conductivity, soil sorptivity, and matrix flux potential can be made in all types of soils. The equipment can be transported, assembled, and operated easily by one person. Measurements can be made in 1/2 to 2 hours, depending on soil type, and require only about 2.5 liters of water. Measurements can be made in the range of 15 to 75 cm below the soil surface. The Guelph Permeameter is a complete kit consisting of the permeameter, field tripod, well auger, well preparation and cleanup tools, collapsible water container, and vacuum test hand pump, all packaged in a durable carrying case. Meets ASTM D5126. Shipping wt. 33 lbs. (14.9 kg)



HM-4502

Double Ring Infiltrometer— HM-4502
Ideal for field testing, as well as lab use. Two stainless steel rings measure 12 and 24 dia x 20"H (304.8 and 609.6 dia x 508mm). Rings have double thick welded top edge for increased stability when driving into the soil. A mariotte tube provides a constant head of water for flow tests. Graduations on the side of the tube used to determine flow rate. Sealed adjusting tube raises or lowers the head inside the infiltrometer ring. Main flow valve in base platform, bleed valve next to adjusting tube seal. Includes: 1/2" thick (12.7mm) aluminum driving cap with centering pins; two 6" square (152.4mm) neoprene splash guards; and two mariotte tubes with 3,000 ml and 10,000 ml capacities. Meets ASTM D3385. Shipping wt. 160 lbs. (72.5kg)



H-4040.150

Water Level Indicator, 150 ft.— H-4040.150
Water Level Indicator, 300 ft.— H-4040.300
Water Level Indicator, 500 ft.— H-4040.500

Water Level Indicator, 50 meters— H-4040.50M
Water Level Indicator 100 meters— H-4040.100M
Water Level Indicator, 150 meters— H-4040.150M

The Water Level Indicator determines water levels in drainage operations, dams, reservoirs, embankments, wells, bore holes, underground cavities, or any hydrological/geological work. Works well with small openings, holes & shafts that are not always straight. Compact, self-contained units feature a jointed design for easy access to difficult openings. Weighted probe is lowered into the opening via high-strength, flexible cable. Buzzer & light indicate when water level has been reached. Readings taken from marked cable to very tip of probe so less than 1 ml of water is displaced. Probe resists false readings caused by cascading water. Standard models have cables marked in feet, metric models marked in centimeters.









Soil— Lab

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H-4257

H-4258

Soil Mortar— H-4257
Heavy porcelain mortar, glazed outside surface and unglazed inside; for use with H-4258 pestle to break up soil particle aggregates for testing. Mortar is 3.5" (90mm) ID x 2-1/4" (57mm) H. Meets ASTM D421; AASHTO T87.

Soil Pestle— H-4258
Rubber-tipped 8" (203mm) long pestle, made for gently grinding soils without breaking individual particles.


H-4199

Soil Grinder— H-4199
Soil Grinder, 220V 50Hz— H-4199.5F
Prepares soil samples to designated particle size for accurate, repeatable test results. Grinds one-pint sample in 15 seconds. Stainless steel construction. Includes a No. 10 perforated stainless plate. Shipping wt. 25 lbs. (11.25kg)

No. 4 Perforated, Stainless Plate— H-4199.A
No. 10 Perforated, Stainless Plate— H-4199.B
No. 35 Perforated, Stainless Plate— H-4199.C
2mm Perforated, Stainless Plate— H-4199.D
Beater Assembly— H-4199.7


H-4215

Rapid Soil Processor— H-4215
Rapid Soil Processor 220V 50/60Hz— H-4215.4F
Compact all-metal soil processor allows customer to produce five-point moisture density relationship test results in about 5 hours. Processor also handles samples for rapid compaction of a family of curves test. Processes up to 30 lbs. of lean-to-fat and tough clays at field moisture in fewer than 15 minutes. Automatically separates and retains up to 3/4" rocks from soil to prolong screen life. Processes soil to pass a No. 4 screen. Offset rotating drum is motor driven; pre-set adjustments aren't necessary. Automatic operation frees up technician's time. Order easy-to-install replacement screen separately. Replacement parts are available. Overall dimensions: 32 x 36 x 53" (813 x 915 x 1346mm). Shipping wt. 408 lbs. (184kg)

Replacement Screen, 11-7/8" (302mm) height— H-4215.32
(for units sold after March, 1995)

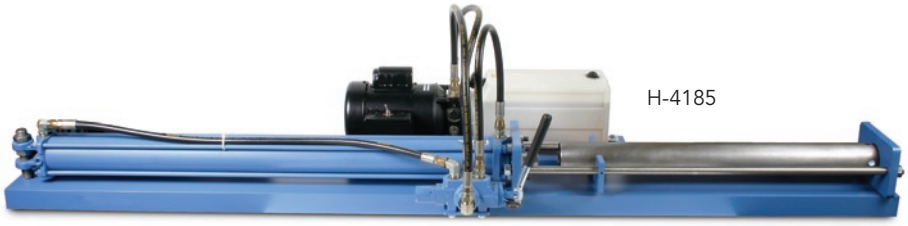
Replacement Screen, 13" (302mm) height— H-4215.26
(Old Style, for units sold before March, 1995)
Shipping wt. 20 lbs. (9.07kg)


H-4157B

Motorized, Hydraulic Sample Ejector— H-4157B
Motorized, Hydraulic Sample Ejector, 230V 60Hz— H-4157B.2F
Motorized, Hydraulic Sample Ejector, 230V 50Hz— H-4157B.5F
Provides a very efficient and easy means for rapid ejection of samples from standard 3" (76.2mm) thin-wall sample tubes. When operated in the standard vertical position, the ejector requires only a maximum height of 76" (1930mm) when extruding samples from a 36" (914mm) long tube. In operation, two electrically driven cylinders, working in tandem, are used to pull the tube down in 20" (508mm) increments. The tube gripper assembly was specifically designed to securely hold the thin wall tube in place and quickly release when the ejection process has completed without damaging the tube. Through the use of optional accessories, the sample ejector can be used to extrude samples from 2" (50.8mm) or 2.5" (63.5mm) OD tubes. For laboratories that desire to eject samples horizontally, an optional V-shaped trough is available. Shipping wt. 177 lbs (80kg)

Sample Trough for Horizontal Configuration— H-4157B.1
Conversion Kit for 2" Sample Tube— H-4157B.2
Conversion Kit for 2-1/2" Sample Tube— H-4157B.3

Sample Ejector, Relative Density



H-4185

Horizontal Sample Ejector— H-4185
Horizontal Sample Ejector, 220V 50/60Hz— H-4185.4F
Hydraulically driven horizontal sample ejector designed for rapid ejection of 3" (76.2mm) samples from 30" (762mm) and 36" (914mm) long, thin-wall sample tubes. Comes with (1) sample "V" trough to support ejected samples. Overall dimensions w/o sample trough are: 84" (2134mm) L x 23" (584mm) W x 18" (457mm) H. Shipping wt. 340 lbs (154kg)

"V"-shaped Sample Trough— H-4185.VT
Round Sample Trough for Soft Soils— H-4185.RT
Conversion Kit for 2" Sample Tube— H-4185.2
Conversion Kit for 2-1/2" Sample Tube— H-4185.3

Harvard Miniature Compaction Apparatus— H-4165
Used for moisture density tests using small samples, its compaction action duplicates the kneading action of a sheepsfoot roller. Mold is 1-5/16" (33mm) ID by 2.816" (71mm) H. Unit is designed so collar remover and specimen ejector are consolidated into one piece.

Set includes specimen ejector, collar remover with spacer plate, mold holder, 1/454 cu. ft. (129m^3) volume mold and collar, compaction tamper with 20 lb. (9.07kg), 37.5 lb. (17kg), and 40 lb. (18.2kg) spring and operating instructions. Mold is machined from seamless tubing. Unit weight in pounds per cu. ft. m^3 and the net weight of a compacted specimen in grams are figuratively equal. Shipping wt. 28 lbs. (12.6kg).



H-4165

Individual Components	
Mold assembly	H-4165.15
Tamper assembly	H-4165.16
20 lb. spring	H-4165.20
37.5 lb. spring	H-4165.375
40 lb. spring	H-4165.40

Relative Density of Cohesionless Soils Apparatus—
230V 60Hz, 12 amps 1ph AC— H-3750.2F
230V 50Hz, 12 amps 1ph AC— H-3750.5F
Apparatus determines the relative density of cohesionless, free-draining soils and provides well-defined results on soils that do not respond well to conventional moisture-density impact compaction testing. Soils for which this method is appropriate may contain up to 12 percent of soil particles passing a No. 200 (75µm) sieve, depending on the distribution of particle sizes, which causes them to have free-draining characteristics. Relative density of cohesionless soils uses vibratory compaction to obtain maximum density and pouring to obtain minimum density. Complete set includes: Vibrating table H-3756.2F, relative density mold sets H-3757 and H-3758 and relative density gauge set H-3759. Meets ASTM D4253, D4254. Shipping wt. 925 lbs. (420kg)



H-3750.2F
H-3750.5F

Pouring Funnel Set— H-3750FS
Used for filling loose 3/8" (9.5mm) or finer soils into relative density mold. Includes two 6" (152mm) dia. x 12" (305mm) long metal cylinders, each with a funnel.

Individual Components	
Vibrating Table, 230V 60Hz 12 amps 1ph	H-3756.2F
Vibrating Table, 230V 50Hz 12 amps 1ph	H-3756.5F
0.1 cu. ft., Relative Density Mold Set	H-3757
0.5 cu. ft., Relative Density Mold Set	H-3758
Relative Density Gauge Set	H-3759



H-3753

Vibration Indicator, Tachometer Type— H-3753
Precision tachometer is pen size to allow accurate readings even on hard-to-reach equipment. Scale gives readings from 2,000 to 21,000.



H-4234



H-4230



H-4228



H-4226

ASTM Liquid Limit Test Set— H-4234
Recommended set for performing liquid limit test in accordance with ASTM specifications. Includes 1 ea. of: H-4230 ASTM Liquid Limit Machine, Mixing Dish, Spatula, Graduated Cylinder and set of 48 sample cans. Meets ASTM D4318; AASHTO T89. Shipping wt. 8 lbs. (3.6kg)

ASTM Liquid Limit Test Set— H-4235
Same set as above except it has machine with counter. Includes 1 ea. of: H-4228 ASTM Liquid Limit Machine, Mixing Dish, Spatula, Graduated Cylinder and set of 48 sample cans. Meets ASTM D4318; AASHTO T89. Shipping wt. 8 lbs. (3.6kg)

ASTM Liquid Limit Machine— H-4230
For determining liquid limit of soil. Unit consists of brass cup, cam mechanism, carriage and crank mounted on a hard rubber base. Includes H-4229 ASTM grooving tool and gauge block. Crank can be shifted to right- or left-hand operation. Meets ASTM D4318; AASHTO T89. Shipping wt. 8 lbs. (3.6kg)

Liquid Limit Machine with Counter— H-4228
Hand-operated liquid limit machine features mechanical revolution counter attached to the shaft to register the number of drops in the liquid limit cup. Includes H-4229 ASTM grooving tool and gauge block. Crank can be shifted for left or right-handed operation. Meets ASTM D4318; AASHTO T89. Shipping wt. 9 lbs. (4.1kg)

Motorized Liquid Limit Machine— H-4226
Motorized Liquid Limit Machine (220V 50Hz)— H-4226.5F
Motorized liquid limit machine gives uniform testing with greater degree of accuracy. Unit is comprised of H-4230 ASTM liquid limit machine with geared motor to give proper operating speed and automatic counter. Machine is attached to metal plate with rubber feet. Includes H-4229 ASTM grooving tool and gauge block. Meets ASTM D4318; AASHTO T89. Shipping wt. 14 lbs. (6.4kg)

Accessories	
ASTM Metal Grooving Tool and Gauge Block	H-4229
ASTM Plastic Grooving Tools (10 pk)	H-4229P
Liquid Limit Metal Grooving Tool	H-4232
Mixing Dish	H-4930.250
Spatula	H-4904
Graduated Cylinder (25ml)	H-4915.025
Sample Cans, 2.5 oz. (48 pk.)	H-1350.3A

Replacement Parts	
Brass cup for Liquid Limit Machines	H-4231
Brass Cup w/ Cam Follower	H-4231.1
Stainless Steel Liquid Limit Cup	H-4231.2
Base	H-4230.1



H-1350.3A



H-4915.025



H-4930.250



H-4229P



H-4229

Resiliency Tester— H-4233

Use to test resiliency of hard rubber base of liquid limit machines, which should be done at 90-day intervals to ensure base is in compliance with ASTM D4318 Standard. Device consists of clear acrylic tube and cap, a 5/16" dia steel ball, and a small bar magnet. Test procedure is simple and quick to perform. As natural aging occurs, base loses resiliency, eventually going out of spec. and necessitating replacement.



H-4232



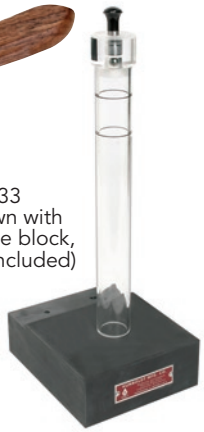
H-4904

Durometer (D Scale)— H-4222D

As required by ASTM D4318, a durometer is used to test the hardness of the base of a Liquid Limit Machine. Precision construction delivers lifetime accuracy. Sealed springs maintain load deflection rate to a tolerance of .0004". Other models are also available, see page 251. Meets ASTM D4318, D2240.



H-4222D



H-4233
(shown with gauge block, not included)

Cone Penetrometer/Method for Measuring Liquid Limit

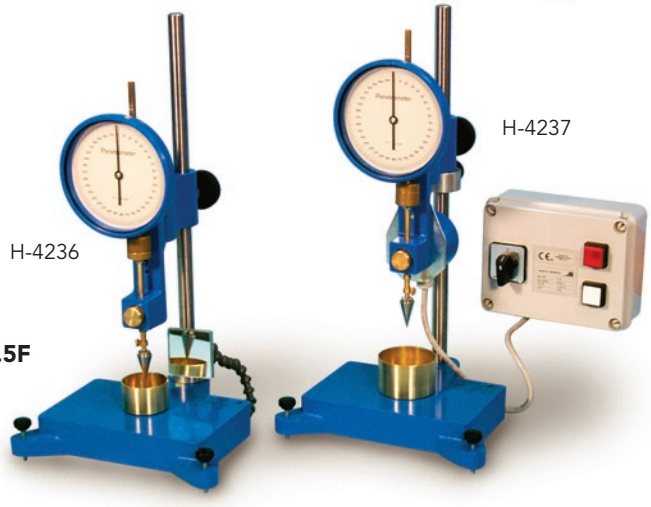
The Cone Penetrometer test method for Liquid Limit is based on the relationship between the moisture content and the penetration of a cone into a soil sample. BS 1337/2, NF P94-052,1

Cone Penetrometer— H-4236

The apparatus consists of a cast aluminum base, 150mm dia. dial with 0.1mm subdivisions, calibrated cursor, automatic zeroing device, release button, micrometric displacement device, penetration test cone and two sample brass cups.

Semi-Automatic, Cone Penetrometer— H-4237
Semi-Automatic, Cone Penetrometer (220-240V 50Hz)— H-4237.5F

Semi-automatic version of the H-4236 Cone Penetrometer incorporates a built-in 5 second timer for greater uniformity in test results.



H-4236

H-4237

H-4237 Accessories	
Test Gauge, Checks cone tip condition	H-4236G
Mirror, Aids in cone height adjustment	H-4236M

H-4237 Replacement Parts	
Test Cone, 35mm long, 30° angle	H-4236.1
Brass Sample Cup	H-4236.2


H-4253



H-4262


H-4254


HM-4501


HM-3930

Plastic Limit Set— H-4253
Includes all apparatus recommended to perform plastic limit test in accordance with specifications.
Set includes the following:
(1) H-4253.1 Plastic Limit Plate, 12 x 12 x 3/8" thick;
(1) H-4930.250 Mixing Dish;
(1) H-4904 Spatula;
(1) H-4915.025 Graduated Cylinder, and
(1) H-1350.3A Pkg. of 48 Sample Cans
All components are also available individually.
Meets ASTM D4318; AASHTO T90. Shipping wt. 11 lbs. (5kg).

Plastic Limit Plate— H-4253.1
12 x 12 x 3/8"-thick (305 x 305 x 9.5mm) glass plate with ground finish on one side and seamed edges. Meets ASTM D4318; AASHTO T90.

Plastic Limit Roller— H-4262
Easily repeatable mechanical technique produces consistent test results and saves time. Includes integral top plate/handle, one pad of 50 sheets of special adhesive backed paper to cover contact surfaces (paper will not introduce fibers into soil samples), and instructions. Rigid acrylic 8 x 4-1/2 x 1-1/4" (203 x 114 x 32mm).
Meets ASTM D4318; AASHTO T90, TX DOT 105-E.

Adhesive Paper— H-4262P
Pad of 50 sheets of special adhesive backed paper for Plastic Limit.

Shrinkage Limit Set— H-4254
Apparatus recommended to perform shrinkage limit test in accordance with specifications. Meets ASTM D427; AASHTO T92.
Set includes:
(1) H-4256 Monel Shrinkage Dish;
(1) H-4930.250 Mixing Dish;
(1) H-4254C Crystallizing Dish;
(1) H-4255 Shrinkage Prong Plate, and
(1) H-4915.025 Graduated Cylinder
All components are also available individually.

Accessories for Shrinkage Limit Test:
Instrument-Grade Mercury— H-3632
Straightedge, Ground-steel w/ Bevel Edge— H-4144
Spatula— H-4904
2600g Digital Balance— HB-4533

Calcium Carbonate Content Chamber— HM-4501
This test method covers the quantitative determination of the calcium carbonate ($CaCO_3$) content of soils. This test complies with ASTM D4373. It is a gasometric method that utilizes a simple portable apparatus. The test method is quickly performed for soils containing calcium carbonate. The acrylic chamber is 2.5" ID x 5.5" long and sealed with anodized end caps. The unit comes complete with 10psi test gauge, bleed valve and a 20ml cup with handle.

Pin Hole Dispersion Apparatus— HM-3930
This test is used for evaluating clay soils for erodibility by flowing water through a small hole that is drilled through the compacted specimen. The test chamber has a unique clamping ring for holding the stainless steel mold to the base while compacting the sample. Included with the chamber are screens, base stand, constant head reservoir, tubing, connections, pipet and a tool for drilling the pinhole. The end cap has a pilot hole for drilling the 1.0mm (.040") hole through the sample.
All aluminum parts are anodized for corrosion resistance.

Sand Equivalent

Sand equivalent tests serve as rapid field-correlation tests to show relative proportions of clay-like or plastic fines and dusts in granular soils and fine aggregates. The test separates sand and clay, a comparative reading is determined between the suspended clay and the settled sand in the measuring cylinder. Tests may be done in the laboratory or the field.

Sand Equivalent Shaker— H-4374
Sand Equivalent Shaker (230V 50Hz, 3.6amps 1ph)— H-4374.5F

Motorized sand equivalent shaker features two separate electronic timers (one preset at 45 seconds and the other preset at 10 minutes) to increase accuracy and ease of operation compared to a spring-type timer. It is recommended for samples in the laboratory.

The consistent, repeatable oscillation of the apparatus eliminates operator-caused variation. Shaking operation delivers an 8" (203mm) stroke at a speed of 175 ±2 strokes per minute. Dimensions:
12 x 24 x 24"H (31 x 61 x 61cm). Meets ASTM D2419; AASHTO T176.
Shipping wt. 80 lbs. (36.3kg)



H-4374

Manually Operated Sand Equivalent Shaker— H-4378

Manually operated sand equivalent shaker is ideal for use on job site to give more uniform shaking action. Shaker consists of mounting bracket with cylinder holder and two spring steel straps, stroke indicator and counter mounted on one end. Uniform shaking action is accomplished by pushing the top frame by a simple stroke of the hand. Portable unit features removable wooden carrying case.
Dimensions: 21 x 6-1/2 x 26-3/8" (53 x 17 x 67cm).
Meets ASTM D2419; AASHTO T176.
Shipping wt. 49 lbs. (22.3kg)


H-4378

Sand Equivalent Test Set with Case— H-4340
Sand Equivalent Test Set without Case— H-4341

Set meets ASTM D2419; AASHTO T176. Shipping wt. 21 lbs (9.5kg)
Set includes the following items:

(4) Graduated, Plastic, Measuring Cylinders—H-4340.1
(2) Solid Rubber Stopper—H-4340.5
(1) Irrigator Tube—H-4340.2.6
(1) Weighted Foot Assembly—H-4340.3
(1) Standard Stock Solution, 8oz. Plastic Bottle—H-4342
(1) Siphon Assembly, (siphon tube and hose, bow tube and hose, stopper)—H-4340.2
(1) Clamp—H-8630
(1) Wide-Mouth Funnel—H-4340A
(1) Measuring Can, 2.5 oz.—H-1350.3A

Individual items above can be ordered separately.


H-4340

Sand Equivalent Stock Solution— H-4342

8 oz. (.24L) Plastic Bottle of Standard Stock Solution, made from anhydrous calcium chloride, glycerine and formaldehyde. Use diluted with distilled water in ratio of 85ml solution per/gal. distilled water.

Sand Equivalent Stock Solution— H-4342.2

Same as above except 1 gallon (3.8L) Plastic Jug.


H-4342

H-4342.2


H-4263


H-4239


H-4244


H-4242

H-4241


H-4260A


H-4244RS


H-4266



H-4247

Hydrometer Analysis Set— H-4263
Hydrometer Analysis Set (220V 50/60Hz)— H-4263.4F
Determines the distribution of soil particles smaller than No. 200 (0.075mm). Meets ASTM D422; AASHTO T88. Shipping wt. 175 lbs. (79.4kg) Set includes:
(1) H-4239 Hydrometer Jar Bath
(6) H-4244 Hydrometer Jars
(1) H-4241 Soil Hydrometer A
(1) H-4242 Soil Hydrometer B
(1) H-4260 Soil Dispersion Mixer
(1) H-4247 Sodium Hexametaphosphate, 1 lb. (0.5kg)

Soil Hydrometer A— H-4241
Seamless, symmetrical stem and bulb do not vary in diameter. One-piece ballast is secured to lower part of the body. Guaranteed calibration accuracy eliminates errors due to variable dilution. Calibrated for use at 68°F (20°C). Graduated in grams of soil per liter from -5 to 60g in 1° divisions. Has ASTM/AASHTO scale 152 H. Total length: 11" (280mm). Meets ASTM D422; AASHTO T88.

Soil Hydrometer B— H-4242
Same as H-4241 except with graduations 0.995 to 1.038 specific gravity by 0.001° divisions. Has ASTM/AASHTO scale 151 H.

Hydrometer Jar— H-4244
Graduated glass cylinder used in determining amount of soil in dispersed suspensions contains 1000ml at 20°C (68°F). Open end is fire-polished without pourout. Dimensions: 18" (457mm) x 2-1/2" OD (64mm). Base is 4-1/3" (107mm).

Hydrometer Jar Rubber Stopper— H-4244RS
Rubber Stopper for H-4244 Hydrometer Jars.

Hydrometer Jar Bath— H-4239
Hydrometer Jar Bath (220V 50/60Hz)— H-4239.4F
Designed to maintain a constant temperature of 20°C ±0.2°C (68°F) for particle size distribution test in accordance with ASTM and AASHTO specifications. Up to eight hydrometer jars can be stored in the bath at the same time. The bath features a stainless steel interior and shelf for corrosion resistance and long service life. The automatic high temperature safety cut-off circuit incorporated into the design prevents damage to the heater and pump system. Inside dimensions are 37-3/4" x 7-3/4" x 16-1/2" deep (959 x 197 x 419mm). The overall outside dimensions are 40" x 10" x 23" high (1,016 x 254 x 584mm). Meets ASTM D422; AASHTO T88. Shipping wt. 155 lbs. (70kg)

Soil Dispersion Mixer— H-4260A
Soil Dispersion Mixer (230V 50/60Hz)— H-4260A.4F
For dispersing soil suspensions used in hydrometer method of testing subgrade soils, heavy-duty mixer operates at a speed above 10,000 RPM (no load). Includes stirring apparatus with H-4266 stainless steel paddle and H-4265 chrome-plated dispersion cup with 4 sets of permanent interior baffles. Rounded cup bottom prevents soil accumulation. Furnished with 5' cord and 3-prong plug. Dimensions: 20 x 6-1/2 x 7" (508 x 165 x 178mm). Meets ASTM D422; AASHTO T88. Shipping wt. 15 lbs. (6.8kg)

Dispersion Cup— H-4265
Chrome-plated Dispersion Cup for use with H-4260 Mixer.

Stirring Paddle— H-4266
Stirring Paddle with 3 blade surfaces, 3/4" (19mm) dia. for H-4260 Mixer. Shaft threads onto mixer.

Sodium Hexametaphosphate— H-4247
Dispersing agent used in combination with gradation analysis of soils. 1 lb. (0.5kg) container. Meets ASTM D422, AASHTO T88.

Sodium Hexametaphosphate— H-4247.10
Same as above except 10 lb. (4.5kg) container.

Microprocessor-based Portable pH Meter— H-4382

The H-4382 portable pH meter can offer nearly the same performance as a top-of-the-line microprocessor bench meter, making it one of the most popular pH meters on the market. By utilizing an advanced, custom microprocessor, the H-4382 is able to perform pH, ORP and temperature measurements with high accuracy and fast response. The meter measures pH from -2.00 to 16.00 with an accuracy of ±0.01 pH. Temperature is measured from -4.0 to 248.0°F (-20.0 to 120.0°C) with an accuracy of ±0.8°F (±0.4°C). The meter has 3 memorized buffer values (pH 4.01, 7.01, 10.01), and automatic buffer recognition to avoid errors during calibration. When powered on, the percentage of remaining battery life is indicated on the display panel. The mV measurements switch automatically from 0.1 to 1 mV resolution when readings reach ±699.9 mV. Temperature effects are automatically or manually compensated for, from 0 to 100°C (32 to 212°F). The meter is supplied complete with a H-4382.1 double-junction pH electrode, a H-4382.2 temperature probe, four 1.5 "AA" batteries, and a rugged molded carrying case. Meets ASTM D4972.



H-4382



H-4382.1



H-4382.2

Portable pH Meter with Waterproof Casing— H-4384

For users requiring a more rugged instrument for on-site applications, the H-4384 series meter offers all of the same features as the H-4382, plus the addition of a more rugged, waterproof casing. The meter is supplied complete with a double-junction pH electrode, temperature probe, four 1.5 "AA" batteries, and a rugged carrying case.

Replacement Double-Junction pH Electrode— H-4382.1
Replacement Temperature Probe for H-4382— H-4382.2
Replacement Temperature Probe for H-4384— H-4384.2

Pocket pH/Temperature Tester— H-4380A

This pocket pH tester not only displays both pH and temperature simultaneously on one multi-level display, but also features automatic calibration, stability indicator and battery level at start up. The tester is completely waterproof and will actually float if dropped into the sample that is being tested. The meter has an easily replaceable pH sensor that incorporates an extractable cloth junction for longer service life. All readings are automatically compensated for temperature variations and have an accuracy of ±0.1 for pH and ±1.0°F (±0.5°C) for temperature.



H-4380A

Checker pH Tester— H-4381

At the cost of a few rolls of pH litmus paper, the Checker series pH Tester offers users with fast and accurate readings on a large LCD display. The meter will measure pH from 0.00 to 14.00 with an accuracy of ±0.2 pH units. The tester features manual two-point calibration through trimmers and has an easily replaceable electrode. The meter uses two 1.4V watch-type batteries and will last for approximately 3000 hours of continuous use.



H-4381



H-4381.1

Replacement pH Probe— H-4381.1

Replacement probe for H-4381 Checker pH Tester.

pH 4.01 Buffer Solution— H-4360A.4
pH 7.01 Buffer Solution— H-4360A.7
pH 10.01 Buffer Solution— H-4360A.10

500ml bottles of buffer solution.
Accurate to ±0.01pH @ 77°F (25°C).



All Molds on facing page can be used with H-4169 compactors, except H-4142



H-4169

Automatic Mechanical Compactor— H-4169

Automatic Mechanical Compactor, 230V, 50/60 Hz— H-4169.4F

The Mechanical Compactor automatically compacts and rotates mold after each blow while keeping track of the number of hammer blows and shutting off once a preset number of blows is reached. The start/stop function of the compactor is independent of the counter. The unit can be used to perform standard or modified compaction tests using a 5.5 lb. (2.5kg) hammer with 12" (305mm) height of drop or a 10 lb. ((4.5kg) hammer with 18" (457mm) drop. Hammer lift compensates the height of the drop for soil thickness in the mold during compaction. Hammer weight is concentrated at the foot, allowing free fall of the hammer. Hammer changes are made from in front of the compactor.

Included with the compactor are: (1) 5.5 lb (2.5kg) hammer; (1) 10 lb. (4.5kg) pie-shaped hammer; (1) hammer surcharge weight to convert hammers to 10lb (4.5kg); (1) hammer safety device; (1) 4" (102mm) mold, and (1) 6" (152mm) mold.

Overall dimensions: 56"H x 16-1/2"W x 30"D (1422 x 419 x 762mm). Max. height in operation: 66" (1677mm). Meets ASTM D558, D559, D560, D698, D1557; AASHTO T99, T134, T135, T180. Shipping wt. 432 lbs. (196.0kg)

California Modified Automatic Compactor,— H-4169.CA

Model complies with California Method 216 and is supplied with a 2" round 10 lb hammer and corresponding piston and rod. Required Split Mold is available upon request.

Calibration Kit— H-4169CK

For use with H-4169 Automatic Mechanical Compactor. Calibration kit includes lead deformation apparatus, micrometer and 50 lead calibration cylinders. Meets ASTM D2168.

Lead Calibration Cylinders, pkg. 100— H-4169LC

Replacement Hammers (do not include weights)

4" Round Hammer (New Style)**— H-4169.2415**

6" Pie-Shape Hammer (New Style)**— H-4169.2416**

(New Style Hammers are only threaded in the middle of the shaft)

4" Round Hammer (Old Style)**— H-4169.415**

6" Pie-Shape Hammer (Old Style)**— H-4169.416**

(Old Style Hammers are threaded almost to the end of the shaft)



H-4170A H-4160A

Standard Compaction Hammer— H-4160A

Manual, Moisture/Density Hammer meets ASTM and AASHTO Specs. It incorporates a 5.5 lb (2.54kg) weight and a drop of 12" (305mm) with a 2" (50.8) face. Guide sleeve has four vent holes in each end of sleeve to release built-up air pressure. Machined Steel, plated for rust resistance. Features resilient rubber ball handle. ASTM D558, D698, AASHTO T99. Shipping wt. 12 lbs. (5.4kg)

Modified Compaction Hammer— H-4170A

Manual, Moisture/Density Hammer meets AASHTO Specs. It incorporates a 10 lb (4.5kg) weight and a drop of 18" (457mm) with a 2" (50.8) face. Guide sleeve has four vent holes in each end of sleeve to release built-up air pressure. Machined steel, plated for rust resistance. Features resilient rubber ball handle. AASHTO T180. Shipping wt. 18 lbs. (8.3kg)



H-4173

Manual Compaction Hammers

Weight	Drop	Model
5.5 lb (2.54kg)	12" (305mm)	H-4160A
10 lb (4.5kg)	18" (457mm)	H-4170A
5.5 lb (2.54kg)	12" (305mm)	H-4173
10 lb (5.08kg)	12" (305mm)	H-4171

Army Corps of Engineers Hammer— H-4173

Manual, Moisture/Density Hammer meets EM1110-1-1804 Spec. It incorporates a 5.5 lb (2.54kg) weight and a drop of 12" (305mm) with a 2" (50.8) face. Hammer is guided on shaft. Length of drop is slightly adjustable. Foot assembly has recoil mechanism to reduce impact fatigue on parts. Tamping face is removable and replaceable. Shipping wt. 15 lbs. (6.8kg)

Army COE 10 lb. Hammer— H-4171

Same as above, but 10 lb (5.08kg)

Compaction, 2.8" Split Mold
2.8" ID x 4" H
with 2" detachable collar

H-4142— Mold volume of .0214 cu. ft., cold-rolled steel tubing, plated for rust resistance. Mold has vertical split in body with 2 quick-acting clamps for easy removal of specimen. Used for permeability testing of remolded samples. Shipping wt. 10 lbs. (5.5kg)



H-4142

Standard Proctor Density/Moisture, 4"
4" ID x 4.584" H with
2" detachable collar

H-4141— Mold volume of 1/30 cu. ft., cold-rolled steel tubing, plated for rust resistance. Includes detachable base plate, studs and wing nuts. ASTM D558, D698, D1557 AASHTO T99, T134, T180 Shipping wt. 16 lbs. (7.3kg)



H-4141

Standard Proctor Density/Moisture 4" Split Mold
4" ID x 4.584" H
2" detachable collar

H-4225— Mold volume of 1/30 cu. ft., cold-rolled steel tubing, plated for rust resistance. Includes detachable base plate, studs and wing nuts. Mold has vertical split in body with 2 quick-acting clamps for easy removal of specimen. ASTM D558, D698, D1557, AASHTO T99, T134, T180 Shipping wt. 17 lbs. (7.7kg)



H-4225

CBR w/Perf. Base
6" ID x 7" H
with 2" detachable collar

H-4151— Mold volume of .1145 cu. ft., cold-rolled steel tubing, plated for rust resistance. Collar extension and perforated base plate can be clamped on either end of cylinder. ASTM D1883, AASHTO T193, Shipping wt. 22 lbs. (10kg)



H-4151

Solid Base
6" ID x 7" H with
2" detachable collar

H-4149— Same as H-4151, but with solid base. Shipping wt. 22 lbs. (10kg)



H-4149

Compaction
6" ID x 6.1" H
with 2" detachable collar

H-4159— Mold volume of 1/10 cu. ft., cold-rolled steel tubing, plated for rust resistance. Steel base plate is 8" x 8" x 1/2" thick. Shipping wt. 22 lbs. (10kg)



H-4159

LBR
6" ID x 6" H with
2" detachable collar

H-4163— Mold volume of 1/13.33 cu. ft., cold-rolled steel tubing, plated for rust resistance. Collar extension and perforated base plate can be clamped on either end of cylinder.
LBR requires H-4147 spacer, sold separately. See page 41.
Shipping wt. 22 lbs. (10kg)



H-4163

Modified Proctor, 6"
6" ID x 4.584" H
with 2" detachable collar

H-4162— Mold volume of 1/13.33 cu. ft., cold-rolled steel tubing, plated for rust resistance. Steel base plate is 8" x 8" x 1/2" thick. ASTM D698, D1557, AASHTO T99, T180, Shipping wt. 15 lbs. (6.8kg)



H-4162

Modified Proctor, 6" Split Mold
6" ID x 4.584" H
with 2" detachable collar

H-4161— Mold volume of 1/13.33 cu. ft., cold-rolled steel tubing, plated for rust resistance. Mold has vertical split in body with 2 quick-acting clamps for easy removal of specimen. Steel base plate is 8" x 8" x 1/2" thick. ASTM D698, D1557, AASHTO T99, T180, Shipping wt. 16 lbs. (7.3kg)



H-4161

Humboldt CBR/LBR Solutions

The California Bearing Ratio (CBR) Test was developed by The California State Highway Department and is widely used to determine the resistance strength of subgrade and subbase materials. The test is basically a simple penetration test using a load frame and a standard, compacted CBR test mold of the material to be tested. The results of the test are then compared and evaluated to known standards already established for the material being tested. Meets ASTM D1883; AASHTO T193; BS 1377 Part 4.

LBR or Limerock Bearing Ratio is a variation of the CBR test. Developed primarily in Florida, it is used with materials with high lime content.

Humboldt offers several CBR/LBR testing solutions based on your overall testing needs and budget, from the advanced HM-3000.3F Load Frame with computer interface using our HMTS software to a simple, hand-operated H-4156 Load Frame suitable for lab or field use.

CBR Setup using the HM-3000.3F Load Frame

Pictured is the HM-3000.3F Load frame with a typical CBR setup. See the chart below for items to order for the setup shown. See page 60 for more information on the HM-3000.3F Load Frame.

Typical CBR Setup using HM-3000.3F

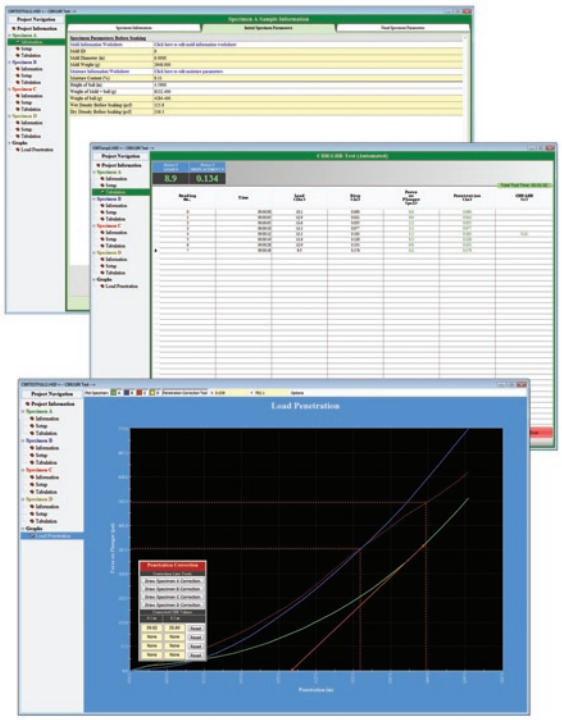
Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-2300.100	1	S-Type Load Cell, 10,000lbf (50kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
H-4178	1	Penetration Piston with Stud
HM-4178BRT	1	Displacement Transducer Bracket
HM-3001SW	1	CBR/LBR Reporting Software

Typical LBR Setup

For LBR setups, substitute H-4178F.4 for the H-4178 penetration piston and HM-2300.100P for the HM-2300.100 S-type load cell.



HM-3000.3F



HMTS Reporting Software, CBR/LBR Module— HM-3001SW

Humboldt Material Testing Software (HMTS) provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. HMTS works in conjunction with Microsoft Excel to present test data in easy-to-read Excel workbook format files, which can be evaluated directly or sent to any computer using Microsoft Excel.

The CBR/LBR Module provides a simple, test-specific interface to control CBR/LBR test operations and automatically record data while also displaying it in real-time tables and graphs. Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

- Test Information is stored, and all calculations are performed automatically
- Live tests and live graphing capabilities (real-time)
- Complete test report including all calculations and graphs required for testing
- Review and export tests using Microsoft Excel

See page 72 for more information on Humboldt's HMTS software.



HM-2800



H-4156M

CBR Setup using the HM-2800 Load Frame
The HM-2800 provides a simpler, less advanced solution for doing CBR testing than the HM-3000. The HM-2800 features the ability to assign a speed of operation between 0.008 and 2.000 inches/minute for doing the multitude of tests required by today's labs, including CBR. Pictured above is the HM-2800 Load Frame with a typical CBR setup. See the chart below for items to order for the setup shown.

CBR Setup using the H-4156M Load Frame
Pictured above is the H-4156M Load Frame with a typical CBR setup. Chart below shows items included with load frame. The H-4156M Load Frame has been designed as a low-cost solution to doing CBR testing. It features one-speed operation with a preset speed specifically for CBR tests. The CBR speed is set at 0.050 inches/minute (1.27 mm/minute).

Typical CBR Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Multi-Speed Load Frame
H-4454.100	1	Load Ring, 10,000lbf (50kN)
H-4158.1	1	Dial Gauge 1.000" x .001"
H-4178	1	Penetration Piston with Stud
H-4178BR	1	Dial Indicator Bracket

Typical CBR Setup using H-4156M

Part #	Qty	Description
H-4156M	1	CBR-Specific Load Frame
H-4454.100	1	Load Ring, 10,000lbf (50kN)
H-4158.1	1	Dial Gauge 1.000" x .001"
H-4178	1	Penetration Piston with Stud
H-4178BR	1	Dial Indicator Bracket

Multi-Speed Load Frame— HM-2800
Multi-Speed Load Frame, 220 50/60Hz— HM-2800.4F
HM-2800 is sold as a load frame only, order setup items separately. See page 62 for more information on the HM-2800 Load Frame.

CBR-Specific Load Frame— H-4156M
Machine has a one-speed motor with a reversing switch that produces a uniform vertical movement of .05" (1.27mm) per minute, ASTM D1883. Maximum piston travel is 3-1/2" (88mm). H-4156M is sold as a set with Items in above chart included with load frame. Overall dimensions are: 18 x 18 x 38-1/2"H (457 x 457 x 978mm). Shipping wt. 185 lbs. (78.9 kg)

CBR-Specific Load Frame, 220 50/60Hz— H-4156M.4F
Same as above machine. When operated at 60Hz it complies with ASTM D1883, .05" (1.27mm) per minute. When it is operated at 50Hz it complies with BS 1377: Part 4, .04" (1.00mm) per minute.



H-4156



H-4155A

H-4150

CBR Mechanical, Loading Press— H-4156
The CBR loading press (load frame) uses a two-position mechanical jack to provide steady test speeds, as well as rapid travel of the platen for positioning of the sample. The Press, includes a H-4454.100, 11,000lbf (48.8kN) calibrated load ring, a H-4178, 1.95" (49.5mm) dia. (3 in^2 area) penetration piston, a H-4158.1, 1.000" x .001, dial indicator and a H-4178BR dial indicator bracket, Overall dimensions: 18" x 12" x 34" (45.8 x 30.5 x 86.4cm).

Two-speed Mechanical Replacement Jack— H-4156J

CBR Testing Set with H-4156 Loading Press— H-4152

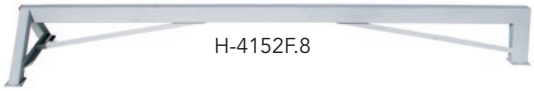
H-4152 CBR Testing Set, includes:

Part #	Qty	Description
H-4156	1	Mechanical Loading Press
H-4151	4	Mold
H-4153	1	Spacer Disk
H-4154	4	Filter Screens
H-4172	2	Swell Plates
H-4158	1	Tripod Attachment
H-4158.1	1	Dial Indicator
H-4175	4	Surcharge Weights
H-4176	4	Slotted Surcharge Weights
H-4170A	1	Density Hammer
H-4144	1	Straight Edge
H-4174	1	Cutting Edge

Hand-operated Sample Ejector— H-4155A
Designed for lab and field use to extract soil samples from 4" and 6" compaction molds, as well as 2" and 2.8" tube samples. The ejection force is generated by means of a 3-ton (27.7kN) capacity, hand-operated hydraulic jack. The cast-aluminum ejector head assembly can be positioned at different heights through the use of quick release pins. This enables the operator to easily match the ejection travel to the height of the mold being used. Overall dimensions 13"W x 6"D x 27"H (330 x 152 x 686mm). Shipping wt. 65 lbs. (29.5kg)

Motorized Sample Ejector— H-4150
Motorized Sample Ejector, 220V 50/60Hz— H-4150.4F
Similar in design and construction to the H-4155A series sample ejector, this model features the use of a 5-ton capacity, motorized hydraulic pump and ram assembly. The unit incorporates extended upright rods in order to accommodate standard 4" and 6" compaction molds, as well as 2" and 2.8" sample tubes. Overall dimensions, excluding pump, 13"W x 6"D x 29"H (330 x 152 x 737mm). Shipping wt. 80 lbs. (36kg)

CBR Field Test Set— H-4152F
The CBR field test set is designed for making CBR determinations in the field and is built around a modified H-4156 Load Frame. The set includes 1 of each of the following: H-4156J Gear Box w/ handle, H-4156SB Swivel Base; H-4454.020 2200 lbf Load Ring; H-4454.050 5500 lbf Load Ring; H04178F.4 Penetration Piston - 4"; H-4152F.1 Extension Set; H-4152F.2 Extension Set; H-4158.1 Dial Indicator 1.000" x .001"; H-4466.10 Extension Points - 1" length; H-4470 Magnet Holder w/ swivel; H-4152F.8 Steel Bridge Support – 8 ft., and 2 of H-4179F.10 Surcharge Weight and H-4179F.20 Surcharge Weight.



H-4152F.8



H-4156J

Swell Plate— H-4172
Perforated 5-7/8" (149mm) dia. base with adjustable stem. Contact end of the stem is easily locked in place with a knurled nut. Shipping wt. 5 lbs. (2.3kg)

Swell Tripod Attachment— H-4158
Metal tripod supports dial gauge for measuring the amount of swell during soaking. Attachment is used with H-4172 swell plate. Order dial indicator separately.

Dial Indicator— H-4158.1
Dial indicator has 1.000" operating range, graduated in 0.001" divisions, clockwise movement and revolution counter. Recommended for use with H-4158 tripod attachment.

Cutting Edge— H-4174
Machined from seamless tubing with a sharpened edge to enable undisturbed samples to be taken in the field, cutting edge is plated for rust resistance. Cutting edge has 6" (152mm) ID and is 2" (51mm) high. Recess in upper section allows edge to be mounted at either end of the H-4149 or H-4151 mold to facilitate sample removal in the field.

Filter Screen— H-4154
100 mesh brass screen is 5-15/16" (1521mm) dia.

Filter Paper— H-4154FP
100 pack of coarse grade paper filter, used to separate spacer disc and soil in the CBR mold during compaction operation or over the top surface of the soil when the compaction operation is completed.

5 lb. Surcharge Weight— H-4175
Used in the application of surcharged loads on the soil's surface during soaking and penetration. Rust-resistant, plated annular disc weighs 5 lbs. (2.3kg), 5-7/8" (149mm) OD with a 2-1/8" (54mm) ID hole in center.

5 lb. Slotted Surcharge Weight— H-4176
Same as H-4175 above, except with a 2-1/8" (54mm) slot.

10 lb. Surcharge Weight— H-4177
10 lb. (4.5kg) Field surcharge weight, made in two parts; 5-7/8" (149mm) OD; 2-1/8" (54mm) ID
Shipping wt. 11 lbs. (5.0kg)

10 lb. Slotted Surcharge Weight— H-4179
10 lb. (4.5kg) Field surcharge weight, slotted design, 8-1/2" (216mm) dia.

Spacer Disc. LBR— H-4147
Disc is used as a false bottom in a soil mold during the compaction process. Plated rust-resistant steel disc is 1.416" (36mm) high, 5-15/16" (150.8mm) dia.

Spacer Disc— H-4153
Disc is used as a false bottom in a soil mold during the compaction process. Plated rust-resistant steel disc is 2.416" (61mm) high, 5-15/16" (150.8mm) dia.

Penetration Piston— H-4178
CBR Penetration Piston has 3 sq. in. (19.35cm^2) base area and is about 7-1/2" (191mm) long. Designed for use in conjunction with weights H-4175 and H-4176 to apply penetration surcharge loads.

Dial Indicator Bracket— H-4178BR
Bracket used to attach a dial indicator to the penetration piston.

Swivel Base— H-4156SB
Swivel Base for mechanical jack. Shipping wt. 6 lbs. (2.7kg)


H-4172

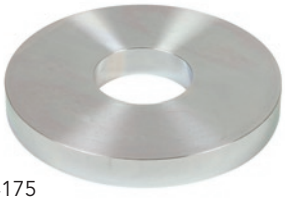

H-4158


H-4158.1


H-4174


H-4154


H-4154FP


H-4175


H-4177


H-4176


H-4179


H-4147


H-4153

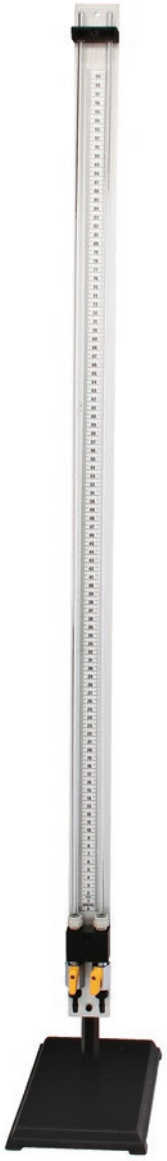

H-4178


H-4178BR


H-4156SB


HM-3860
Detail


HM-3860


HM-3861

Economy Manometer Tube Stand, Wall Mount— HM-3860
Economy Manometer Tube Stand, Free Standing— HM-3861
Economical manometer tube setup for use with many permeameters. Two acrylic tubes with valves mounted on aluminum rail, with scale for monitoring flow volumes. Scale is 100cm long with cm and mm graduations. Each tube has its own valve to allow running two tests. Choose wall mount or free standing. Meets ASTM D2434. Shipping wt. 8 lbs. (3.7kg)

Constant Head Tank, 1000cc— HM-3880
Constant Head Tank, 4000cc— HM-3881
Acrylic tank with regulating valve for flow control of water and a porous media on bottom to filter out air bubbles. Maintains constant water head via an overflow port. Includes: saddle valve for connection to either de-aired or tap water source; rails for wall mounting with easy height adjustment and tubing for hook-up to test chamber. Shipping wt. 8 lbs. (3.7kg)

Constant Head Permeameter Cells
Use to determine the coefficient of permeability by the constant head method for laminar flow of water through granular soils. Two manometer ports are grooved & screened on the inside. Distance between ports is always equal to diameter. 100 mesh screens used to prevent migration of material through valves & tubing during test. Acrylic chamber permits viewing sample. Spring incorporated into top cap to apply 5-10 lbs. force against top stone or screen to prevent soil density changes. End caps & clamping ring of anodized aluminum. Each chamber complete with: valves; porous stones or perforated screens, depending on the diameter of sample; tubing for connection to water source and manometer tubes. Permeameters without manometer outlets available. Meets ASTM D2434; BS 1377 Part 5.
Shipping wt. 7 to 12 lbs. (3.2 to 5.4kg)

Permeameter Cells	Model
2.5" (63.4mm) Permeameter Cell	HM-3801
3.0" (76mm) Permeameter Cell	HM-3802
4.5" (114mm) Permeameter Cell	HM-3803
6" (152mm) Permeameter Cell	HM-3804
9" (229mm) Permeameter Cell	HM-3805

Compacting Hammer— HM-3701
Rod with sliding weights on a 2" (51mm) dia foot. Stop allows adjusting height of drop up to 8" (203mm). Includes one 1/4 lb. (100g) and one 2-1/4 lb. (1kg) weight. Shipping wt. 6 lbs. (2.72kg)


HM-3701


HM-3804


HM-3880

Shelby Tube Permeameter, 2"— HM-3913
Shelby Tube Permeameter, 2.5"— HM-3914
Shelby Tube Permeameter, 3"— HM-3915
Allows you to perform permeability tests within a Shelby tube without removing the sample. Ideal for cohesionless materials and sands. It is suggested that the specimen be ejected at test conclusion and examined for voids or large aggregate, which possibly could affect the test results. Two sets of end caps fit over a Shelby tube liner up to 6" long. End caps each contain valve to control flow of permeants through the specimen, along with a porous stone to prevent material from flowing into and clogging the valve. End caps are anodized aluminum. Includes o-rings, connecting rods, clamping knobs, and tubing. Shelby tube not included. Shipping wt. 6 lbs. (2.72kg)


HM-3915

Compaction Permeameter, 4"— H-4145
Compaction Permeameter, 6"— H-4146
For determining permeability of clay, sand, and gravel soils. Uses Proctor plasticity compaction method. Two-piece cylindrical mold includes: upper plate with valve; water inlet/outlet; filter base plate; and filter stones. 6"W x 6"D x 12"H. Meets ASTM D5856. Shipping wt. 18 lbs. (8.16kg)

Replacement Parts	Model
Filter Stone for H-4146	H-4148X
Porous Stone for H-4146	H-4148.6
Spring for H-4146 and H-4145	H-4145.8
Filter Stone for H-4145	H-4148
Porous Stone for H-4145	H-4184.100


H-4146

H-4145

Constant/Falling Head Permeameters
For use with granular soils in determining the coefficient of permeability via the constant or falling-head method for laminar flow of water. Compact and portable unit includes manometer tube, scale and permeameter base attached to a platform. Funnel provides adjustable constant head reservoir. Spring incorporated into top cap to apply 5-10 lbs. force against top stone or screen to prevent soil density changes. End caps & clamping ring of anodized aluminum. Each set complete with: permeameter; manometer tube; two funnels; either porous stones or perforated screens depending on diameter, and tubing for connection to water source.
Shipping wt. 13 lbs. (5.9kg)


HM-3892

Permeameter Sets	Model
2.5" (63.4mm) Permeameter Set	HM-3891
3.0" (76mm) Permeameter Set	HM-3892
4.5" (114mm) Permeameter Set	HM-3893
6" (152mm) Permeameter Set	HM-3894
9" (229mm) Permeameter Set	HM-3895



HM-4160



HM-4160A

Permeability/Hydraulic Conductivity
Permeability testing measures the rate of discharge of water under laminar flow conditions through a unit cross-sectional area of a porous medium under a unit hydraulic gradient and standard (20°C) temperature conditions. In permeability testing, soil is subjected to water under a known pressure, and the flow is measured. The coefficient of permeability (k), or simply permeability, expresses the ability of water to flow through the particular medium. The "Constant Head" test method is applicable to course granular soils such as sands and gravels. The "Falling Head" test method is applicable to fine grain soils. Either method may be used to test clay soils.

Humboldt FlexPanels
Humboldt FlexPanels provide a simple and highly efficient distribution system for providing air, water and deaired water for use in permeability and triaxial testing applications. The FlexPanel's simple, straight-forward configuration, with its integral burettes provides a condensed/compact design that takes up less counter space than competing systems with air/water bladders.

The long, narrow burette design of Humboldt's FlexPanels provide faster test processing times when compared to larger, shorter burette systems, while providing the same volume. This is due to the reduced amount of meniscus formation in the narrower burettes, which allows the water level to drop faster, resulting in faster readings. In addition, the use of longer/narrower burettes and a scale graduation of 0.02ml, also provides an easier-to-read and more accurate scale.

FlexPanels also feature a bias regulator and bridge. The bias regulator maintains the differential pressure when confining and back pressures are increased. The bridge delivers simultaneous control of base and top pressures through the use of just one regulator. This feature minimizes operator time and reduces the margin of error in opening and adjusting regulators during a test. The Humboldt Flexpanel System is comprised of 5 separate panel configurations, which can be grouped together to accommodate from 1 to 5 cell setups.

The Control Panel
The HM-4140 control panel or the integral control panels on the HM-4150 and HM-4160 are identical control panels and include: a digital readout pressure meter, a pressure supply gauge, a master pressure regulator, a vacuum supply gauge, a master vacuum regulator, de-aired water tank controls, tap and de-aired water supply outlets and pressure and vacuum outlets.

Fast and Easy Setup and Operation
Humboldt FlexPanels make setup fast and easy with clearly labeled ports and quick-connect hookups. Operation is just as easy with clearly labeled controls, large gauges and easy-to-read burette markings.

All Humboldt FlexPanels use no-volume change Swagelock valves and Fairchild constant-bleed type precision regulators for accurate control. All inlets and outlets utilize quick-connects to ensure fast, accurate setup to permeater cells, as well as air, water and drain hook ups. Fittings, tubing and connectors are supplied with each unit. All FlexPanels are designed to handle air pressures up to 150 psi. For testing contaminated samples, Humboldt offers an optional Toxic Interface Unit, which prevents toxic fluids and vapors from entering the FlexPanel.


Rear of panel showing quick-connect hookups and plumbing.


HM-4140


HM-4150


HM-4150A

Humboldt FlexPanels Features:

- Bias pressure regulator allows simultaneous control of confining and back pressures, while maintaining a constant differential
- Longer Burette and 0.02ml graduation give more accurate results, better productivity, and faster turnaround
- Cost efficient, expandable system
- Uses no-volume-change Swagelock valves
- Bridge feature delivers simultaneous control of base and top pressures by adjusting one pressure regulator
- Quick-connect hookups for fast and reliable set up.
- Master control panel houses digital pressure readout for the controlling pressure, inlet vacuum regulator & gauge, inlet pressure regulators and gauge, de-aired water tank controls, tap and de-aired water supply outlets, and pressure & vacuum outlets
- Humboldt's bridge and bias controls simplify testing
- Long burette design provides a highly accurate scale, as well as faster test response and results
- Lightweight, aluminum frame is extremely durable and resists rust
- Complies with ASTM D5084; BS 1377 Part 6 1990.

Humboldt FlexPanels

	HM-4140	HM-4150	HM-4160	HM-4150A	HM-4160A
Pressure/ Resolution	2-150 psi (0.1 psi) Metric Models: 14-1000 kPa (1 kPa)				
Vacuum	0-14.7 psi (0-100kPa) or 30 Hg				
Inner Burette					
Cell	NA	50cc x 0.1 cc (ml)			
Top		10cc x 0.02 cc (ml)			
Base		10cc x 0.02 cc (ml)			
Outer Burette					
Cell	NA	400cc (ml)			
Top		460cc (ml)			
Base		460cc (ml)			
Voltage	115V 50/60Hz 220V 50/60Hz (use .4F suffix to part number, i.e. H-4150.4F)			NA	
Power	6 watts				
Operating Temp.	14 to 158°F (-10 to 70°C)				
Dimensions	8" x 8" x 37.5" (203 x 203 x 952mm)	8" x 25.5" x 37.5" (203 x 648 x 952mm)	8" x 43.5" x 37.5" (203 x 1105 x 952mm)	8" x 19.5" x 37.5" (203 x 495 x 952mm)	8" x 37.5" x 37.5" (203 x 952 x 952mm)
Shipping Weight	35lb (16kg)	95lb (43kg)	145lb (66kg)	107lb (49kg)	157 (71kg)

Humboldt FlexPanels are available with regulators reading in kPa. To order, use an M suffix to the Model Number, i.e. HM-4150M.

Permeability Cells & Setups



HM-4188B

Permeability Cells

HM-4188B permeability cells are constructed of high-quality materials throughout for long-lasting performance. The cell top and base are precision machined from 6061 T6 aluminum and then hard-coated and Teflon-impregnated for a durable finish. To facilitate sample setup, the chamber and cell top can be quickly and easily removed by loosening the three knobs that hold the upper assembly to the base. The clear acrylic chamber provides a working pressure of 150 psi (1,000 kPa) and is tested to 250 psi (1,700 kPa).

The cell has five, no-volume-change, valves aligned along the front of the cell for maximum convenience. Two valves handle top drainage, two valves handle bottom drainage, and one valve handles filling/emptying and providing confining pressure to the cell.

The removable base pedestal accommodates various sample diameters from 35mm to 4 inch, see charts below for model numbers corresponding to the size needed. Cells are available with black-anodized aluminum or stainless steel top caps and base pedestals, refer to chart below.

Brass valves are standard with these cells, but stainless steel valves (stainless steel is typically used with hazardous materials) are an option, please inquire. Cell dimensions are: 13-3/4" H x 8-3/4" dia. (349.2 x 222.3mm). Overall dia. is: 11" (279.4mm). Meets ASTM D5084.

Triaxial Cells— HM-4199

For those who plan to do triaxial tests in addition to permeability testing, consider using HM-4199B and HM-4199SS Triaxial Cells for the added convenience of using one cell for both tests.

Cell: Brass Valves, Aluminum Top and Base Pedestal

Size	Cell	Top Cap	Base Pedestal
35mm	HM-4188B	HM-4199.35T	HM-4193.35B
1.4"		HM-4199.14T	HM-4193.14B
50mm		HM-4199.50T	HM-4193.50B
2.0"		HM-4199.20T	HM-4193.20B
70mm		HM-4199.70T	HM-4193.70B
2.8"		HM-4199.28T	HM-4193.28B
100mm		HM-4199.100T	HM-4193.100B
4.0"		HM-4199.40T	HM-4193.40B

Cell: Stainless Valves, Top and Base Pedestal

Size	Cell	Top Cap	Base Pedestal
35mm	HM-4188SS	HM-4199.35TSS	HM-4193.35BSS
1.4"		HM-4199.14TSS	HM-4193.14BSS
50mm		HM-4199.50TSS	HM-4193.50BSS
2.0"		HM-4199.20TSS	HM-4193.20BSS
70mm		HM-4199.70TSS	HM-4193.70BSS
2.8"		HM-4199.28TSS	HM-4193.28BSS
100mm		HM-4199.100TSS	HM-4193.100BSS
4.0"		HM-4199.40TSS	HM-4193.40BSS

Permeability, Three Cell Set, Typical Setup:

Part #	Qty	Description
HM-4150	1	FlexPanel (1 cell unit) w/ Control Panel
HM-4160A	1	FlexPanel (2 cell unit add-on)
HM-4188B	3	Permeability Cell
HM-4199.XXT	3	Top Cap
HM-4199.XXB	3	Base Pedestal
HM-4180.XX	1	Latex Membranes
HM-4181.XX	1	Membrane Stretcher
HM-4182.XX	1	O-Rings, 12 pk

Part #	Qty	Description
HM-4184.XX	6	Porous Stones
HM-4189.XX	1	Filter Paper, 100pk
HM-4198	1	Vacuum Grease, 5.3 oz.
HM-4170	3	Pore Pressure Transducer
HM-4170B	3	De-airing Block
HM-4187E	1	De-airing Tank, 6 liter
HM-3847.XX	1	Split Miter Box
HM-2325A.3F	1	MiniLogger 4 CH Analog Data Acquisition

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

For Permeability, sample sizes are: .14 = 1.4"; .15 =1.5"; .20 = 2.0"; .28 = 2.8"; .40 = 4.0; .35 = 35mm; .38 = 38mm; .50 = 50mm; .70 = 70mm; .100 = 100mm



For sample prep and other permeability testing accessories see page 69-71.

Expansion Index Consolidometer— HM-2405

Self-contained unit for conducting expansion tests on cured soil specimens. After compaction in stainless steel ring, specimen is placed in the consolidometer with air-dried porous stones, and loaded with a stainless steel weight. Specimen is allowed to consolidate for 10 minutes, after which it is immersed in distilled water for up to 24 hrs. During this time, height of specimen is recorded to determine maximum swell. Corrosion resistant, durable anodized aluminum and stainless steel construction. Includes anodized aluminum base & collar, stainless steel specimen ring and weight, 12.6 lb. (5.7kg) loading weight, and 3.99" dia. x 1/2" (101.4 x 12.5mm) porous stones. **Order dial indicator below.** 6" dia x 11" H (152 x 279 mm). Meets ASTM D4829, California Test Method UBC 29-2. Shipping wt. 20 lbs. (9 kg)

Dial Indicator, for HM-2405 Consolidometer— H-4471

0.5 x 0.0001" dial indicator.

Replacement Porous Stones— HM-4184.399T

Porous stones for use with HM-2405 consolidometer, 3.99" x 0.5".



HM-2405

HM-4184.399T

Basic Swell/Expansion Consolidometer, 2.440"— HM-1972-1D
Basic Swell/Expansion Consolidometer, 2.500"— HM-1972-1E

A self-contained consolidometer used to conduct swell expansion tests on soil specimens. Set includes: stainless steel base/acrylic ring device with adjustable, dial indicator standard and bracket, a compaction specimen ring, top and bottom porous stones and a 60 psf stainless steel loading weight. Consolidometer can also be used with cutting ring, listed below, instead of supplied compaction ring for use in acquiring samples from undisturbed Shelby tube samples. Dial indicator necessary for test, choose from those listed below. Alternative loading weights are available, please enquire.

Compaction Base and Collar, 2.440"— HM-1975-D
Compaction Base and Collar, 2.500"— HM-1975-E

The compaction base and collar is used to produce a soil sample for use with the basic swell/expansion consolidometer above. Use HM-3701 compaction hammer listed below.



HM-3701



HM-1975-D

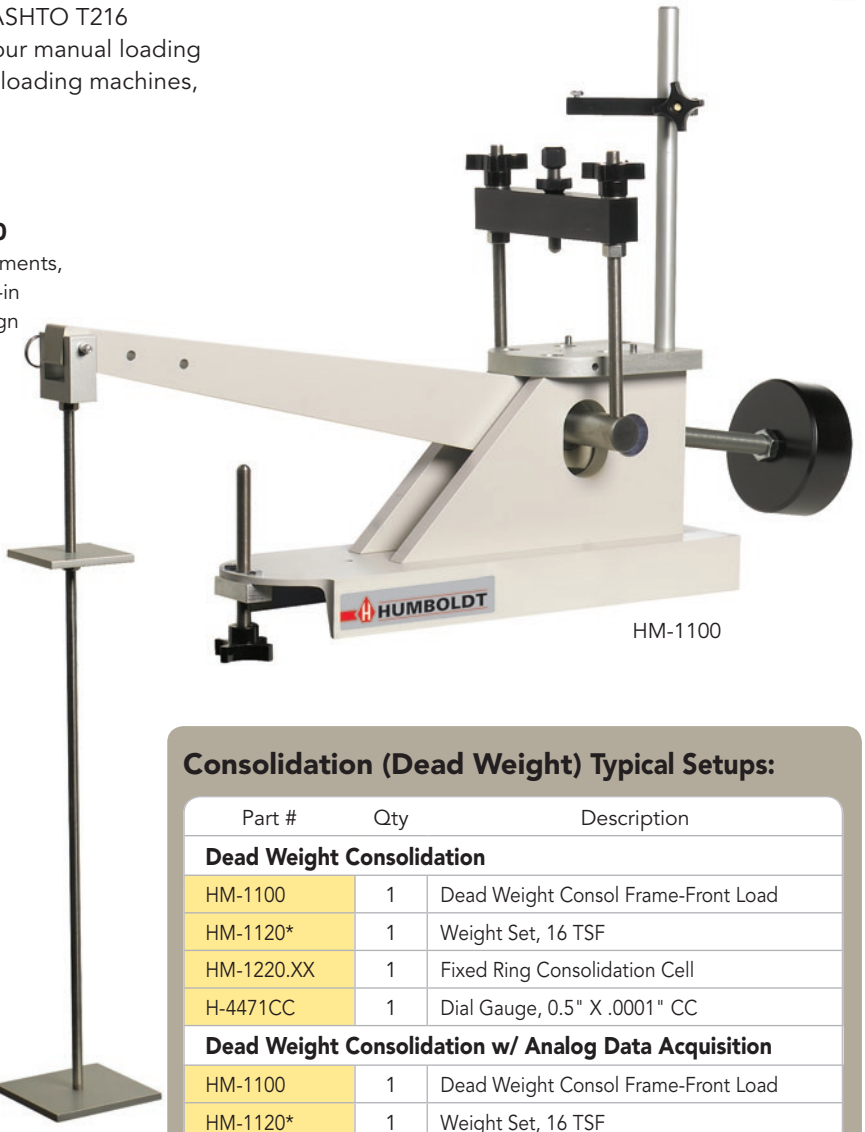


HM-1972-1E

Components	HM-1972-1D	HM-1972-1E
Stainless steel Cutting Ring	HM-1220.24.8	HM-1220.25.8
Stainless steel Compaction Ring	HM-1972-3D	HM-1972-3E
60 PSF Stainless steel Loading Weight	HM-1972-6D	HM-1972-6E
Stainless steel Compaction Ring	HM-1972-3D	HM-1972-3E
Stainless steel Cutting Ring	HM-1220.24.8	HM-1220.25.8
Top Porous Stone	HM-1220.24.11	HM-1220.25.11

Accessories	Model
Dial Indicator, 0.2" range x 0.0001"	H-4460
Dial Indicator, 0.5" range x 0.0001"	H-4471
Dial Indicator, 1.0" range x 0.001"	H-4458.1
Base Porous Stone, 3.31" dia. x 1/4" thick	HM-1220.25.2
Compaction Hammer	HM-3701

Consolidation testing (ASTM D2435, D4546; AASHTO T216 and BS 1377 part 5 can be handled with either our manual loading machine, the HM-1100 or one of the pneumatic loading machines, the HM-2432 or HM-2470A.



HM-1100

Dead-Weight Consolidation Frame— HM-1100

Able to survive in even the harshest laboratory environments, the HM-1100 will provide you with reliable service day-in and day-out. The design features a rugged frame design manufactured from aluminum with stainless steel vertical rods, horizontal cross arms and beam support rods. The load arm incorporates 9:1, 10:1, and 11:1 beam ratios for greater flexibility and loading weight requirements. Using the 10:1 ratio on 2.5" (63 mm) diameter samples, the system is capable of producing load up to 48 tsf (4,597 kPa).

Features include:

- Triple beam ratios minimize loading weight requirements
- 48 tsf (5,148 kPa) maximum load capacity
- Aluminum and stainless steel construction for corrosion resistance and long life
- Wide range of consolidation cells available in fixed ring, floating ring, permeability and backpressure designs
- Loading weights available in both, tsf and kg versions
- Available with standard mechanical dial gauges, digital indicators or with strain transducers (LSCT) coupled to one of our data loggers

Specifications

Load Capacity	48 tsf (4,597 kPa)
Beam Ratios	9:1, 10:1 and 11:1
Frame Construction	Heavy-duty aluminum frame with stainless steel vertical, horizontal and beam support rods
Cell Platform	Anodized aluminum with locating pins for centering cells.
Dimension (W x D x H)	7-3/4" x 32" x 19-1/2" (197 x 812 x 495 mm)
Weight	47 lbs. (104kg)
Shipping Weight	62 lbs (137kg))

Single-Station Consolidation Frame Stand— HM-1100.1

Triple-Station Consolidation Frame Stand— HM-1100.3

Simple, steel frame structure to hold HM-1100 Consolidation frames.

Consolidation (Dead Weight) Typical Setups:

Part #	Qty	Description
Dead Weight Consolidation		
HM-1100	1	Dead Weight Consol Frame-Front Load
HM-1120*	1	Weight Set, 16 TSF
HM-1220.XX	1	Fixed Ring Consolidation Cell
H-4471CC	1	Dial Gauge, 0.5" X .0001" CC
Dead Weight Consolidation w/ Analog Data Acquisition		
HM-1100	1	Dead Weight Consol Frame-Front Load
HM-1120*	1	Weight Set, 16 TSF
HM-1220.XX	1	Fixed Ring Consolidation Cell
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	1	Strain Transducer Bracket
HM-2325A.3F	1	MiniLogger 4 CH Analog Data Acquisition
HM-1100SW	1	HMTS Consolidation Reporting Software
Dead Weight Consolidation w/ Digital Data Acquisition		
HM-1100	1	Dead Weight Consol Frame-Front Load
HM-1120*	1	Weight Set, 16 TSF
HM-1220.XX	1	Fixed Ring Consolidation Cell
HM-4469.10	1	Digital Indicator 1" x .0001" (25 x 0.002 mm)
HM-4469C	1	Data Cable for Indicator
HM-2330D.3F	1	MiniLogger 4 CH Digital Data Acquisition
HM-1100SW	1	HMTS Consolidation Reporting Software

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

For Consolidation samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .30 = 3.0"; .40 = 4.0"; .50 = 50mm; .70 = 70mm; .75 = 75mm, and .100 = 100mm.

*For Metric applications, use HM-1122, Weight Set, 32kg.



HM-2432

Con-Matic Consolidation Machine— HM-2432
Compact and easy-to-use, the HM-2432 pneumatic consolidation load frame is used to estimate the rate and amount of settlement anticipated for a proposed structure. The unit applies loads instantly without impact for stress-controlled consolidation testing; and, maintains the load regardless of sample compression. Its small footprint saves valuable lab counter space while maintaining its versatility by supporting fixed ring, floating ring, or permeability cells. Available with standard mechanical dial gauge, digital indicators or with strain transducers (LSCT) coupled to one of our data loggers. Meets ASTM D2435, D4546; AASHTO T216; BS 1377 part 5.

English Models
Con-Matic 32 TSF (110V 50/60Hz)— HM-2432
Con-Matic 32 TSF (220V 50/60Hz)— HM-2432.4F

Metric Models
Con-Matic 32 kg/cm² (110V 50/60Hz)— HM-2432M
Con-Matic 32 kg/cm² (220V 50/60Hz)— HM-2432M.4F

Features include:

- Highly sensitive and accurate in lower load ranges
- Integral digital readout simplifies checking applied load and setup of predetermined load
- Adjustable upper cross beam
- Instantaneous loading without impact
- Flexible load choice
- Not sensitive to shock
- Choice of English or Metric models

Consolidation (Pneumatic) Typical Setups:

Part #	Qty	Description
Pneumatic Consolidation		
HM-2432	1	ConMatic 32 TSF, 110/50-60
HM-1220.XX	1	Fixed Ring Consolidation Cell
H-4471CC	1	Dial Gauge, 0.5" X .0001" CC
Pneumatic Consolidation w/ Analog Transducer Data Acquisition		
HM-2432	1	ConMatic 32 TSF, 110/50-60
HM-1220.XX	1	Fixed Ring Consolidation Cell
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	1	Strain Transducer Bracket
HM-2325A.3F	1	MiniLogger 4 CH Analog Data Acquisition
HM-1100SW	1	HMTS Consolidation Reporting Software
Pneumatic Consolidation w/ Digital Indicator Data Acquisition		
HM-2432	1	ConMatic 32 TSF, 110/50-60
HM-1220.XX	1	Fixed Ring Consolidation Cell
HM-4469.10	1	Digital Indicator 1" x .0001" (25 x 0.002 mm)
HM-4469C	1	Data Cable for Indicator
HM-2330D.3F	1	MiniLogger 4 CH Digital Data Acquisition
HM-1100SW	1	HMTS Consolidation Reporting Software

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

For Consolidation samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .30 = 3.0"; .40 = 4.0"; .50 = 50mm; .70 = 70mm; .75 = 75mm, and .100 = 100mm.

Typical Consolidation Data Acquisition Setups Using Humboldt MiniLoggers



HM-1100
with HM-1220.25,
HM-2310.10,
HM-2310BR and
HM-2325A.3F



HM-1100
with HM-1220.25,
HM-4469C,
and HM-2330D.3F



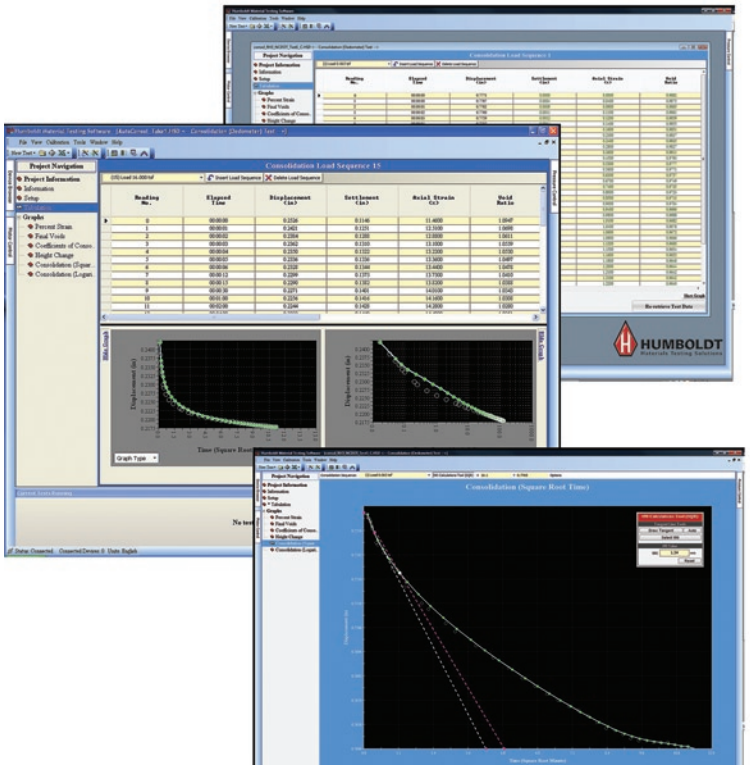


HM-2432
with HM-1220.25,
HM-2310.10,
HM-2310BR and
HM-2325A.3F





HM-2432
with HM-1220.25,
HM-4469C,
and HM-2330D.3F



HMTS Reporting Software, Consolidation Module— HM-1100SW

Humboldt Material Testing Software (HMTS) provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. HMTS works in conjunction with Microsoft Excel to present test data in easy-to-read Excel workbook format files, which can be evaluated directly or sent to any computer using Microsoft Excel.

The Consolidation Module provides a simple, test-specific interface to control Consolidation test operations and automatically record data while also displaying it in real-time tables and graphs.

Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

- Test Information is stored, and all calculations are performed automatically
- Live tests and live graphing capabilities (real-time)
- Complete test report including all calculations and graphs required for testing
- Review and export tests using Microsoft Excel

See page 72 for more information on Humboldt's HMTS software.

HMTS Reporting Software and the ConMatic IPC

The ConMatic IPC includes the Advanced, Module level of the Humboldt Material Testing Software (HMTS), which provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. The HMTS software and the ConMatic IPC unit provide complete automation of incremental pressure controller for performing incremental consolidation and one-dimensional swell tests. The HMTS controls the test functions and automatically records data while also displaying it in real-time tables and graphs. Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

ConMatic IPC,
Automated Consolidation System— HM-2470A.3F

The ConMatic IPC is a fully-automated, incremental pressure controller for performing incremental consolidation and one-dimensional swell tests. The ConMatic IPC allows consolidation and constant load and volume swell tests to be run automatically, freeing up technicians for other tasks and reducing the duration of the testing procedures by more than half—effectively saving time and manpower and increasing lab profitability. One ConMatic automated system can replace the production of several manual machines— running incremental consolidation tests according to ASTM D2435 Method B, where successive load increments are applied after 100% primary consolidation.

Once a sample has been placed onto the test platform and the test conditions set, the ConMatic IPC, used in conjunction with a computer and Humboldt's HMTS software, performs all consolidation tests, including moving to the next stress level, without operator assistance. The system automatically moves through the different test parameters specified by the user with incremental consolidation tests typically being completed in 24 to 48 hours. The HMTS software records readings from the force and displacement transducers to control the unit's exceptionally accurate stepper motor. Test results are recorded and rendered in real-time on the computer screen while test data is stored and calculations are performed automatically. The HMTS software provides:

- Live tests and live graphing capabilities (real-time)
- Complete test reporting including all calculations and graphs required for testing
- Review and exporting of tests using Microsoft Excel
- Smart Test Function: automatically picks up where it left off if the test was not finished due to unexpected events within your computer

The unique design of the ConMatic IPC system enables the user to choose from multiple tests and run them independently and simultaneously.



HM-2470A.3F
with HM-1220.25,
HM-2310.10 and
HM-2310BR

Applicable Test Standards
ASTM: D2435, D4546, AASHTO: T216, BS: 1377:5

Order Consolidation cells: page 52

Order Instrumentation: page 76

The ConMatic IPC system requires a supply of good clean compressed air and a computer, please contact Humboldt for system requirements.

ConMatic IPC Typical Setup:

Part #	Qty	Description
HM-2470A.3F	1	ConMatic IPC
HM-1220.XX	1	Fixed Ring Consolidation Cell
HM-2310.10	1	Linear strain transducer, 1.0" (25mm)
HM-2310BR	1	Strain Transducer Bracket
HM-1100SW	1	HMTS Consolidation Reporting Software

Specifications

Sample Size	up to 4" (100mm)
Maximum Load	2200lbf (10kN)
Vertical Clearance	8.25" (210mm)
Horizontal Clearance	7.75" (197mm)
Maximum Piston Travel	0.5" (12.7mm)
Dimension (L x W x H)	12 x 12 x 30 inches (300 x 300 x 750 mm
Weight	42 lbs. (19Kg)

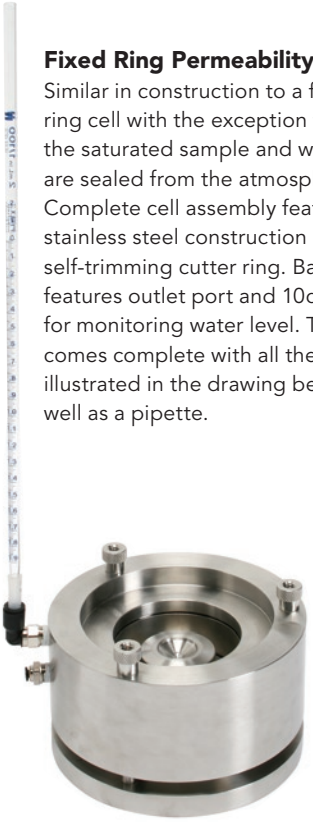
Fixed Ring Consolidation Cell—
Complete cell assembly features stainless steel construction and self-trimming cutter ring. Cutter ring rests inside clamping ring on lower porous stone, which is larger than the sample. The top porous stone and loading pad rest on the sample. The assembly is fixed on the cell base and enclosed within an acrylic cylinder open to the atmosphere, which permits saturation of the sample. The cell comes complete with all the parts illustrated in the drawing below.

Floating Ring Consolidation Cell—
Complete cell assembly features stainless steel construction with self-trimming cutter ring. Similar in construction to a fixed ring cell with the exception that the lower porous stone fits inside the cutter ring and can move vertically within it. The sample ring is also free to move vertically. The cell comes complete with all the parts illustrated in the drawing below.

Fixed Ring Permeability Cell—
Similar in construction to a fixed ring cell with the exception that the saturated sample and water are sealed from the atmosphere. Complete cell assembly features stainless steel construction and self-trimming cutter ring. Base features outlet port and 10cc pipette for monitoring water level. The cell comes complete with all the parts illustrated in the drawing below, as well as a pipette.



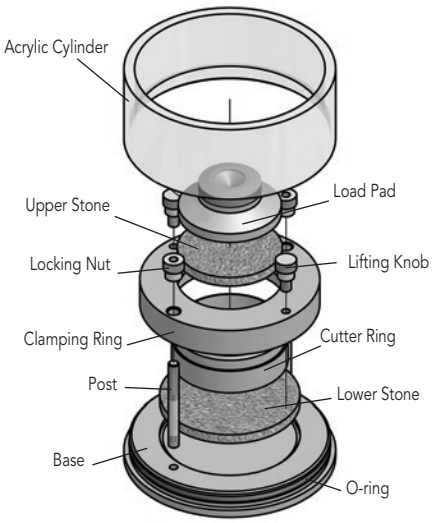


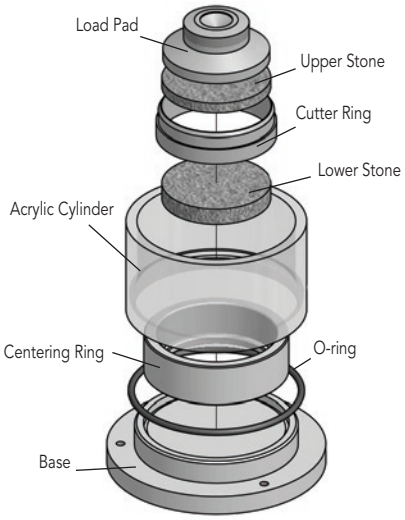


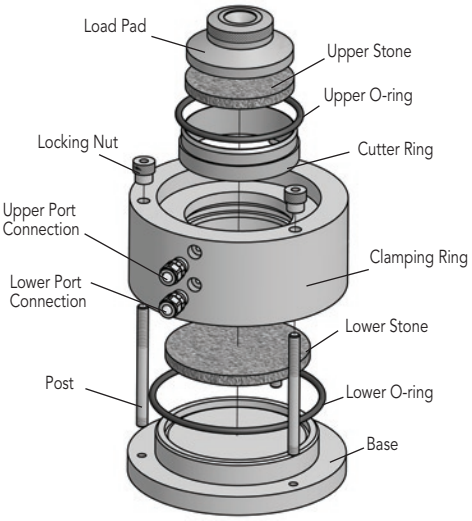
Fixed Ring Consolidation Cell	
2.0"	HM-1220.20
2.42"	HM-1220.242
2.5"	HM-1220.25
3.0"	HM-1220.30
4.0"	HM-1220.40
50mm	HM-1220.50
70mm	HM-1220.70
75mm	HM-1220.75
100mm	HM-1220.100

Floating Ring Consolidation Cell	
2.0"	HM-1210.20
2.42"	HM-1210.242
2.5"	HM-1210.25
3.0"	HM-1210.30
4.0"	HM-1210.40
50mm	HM-1210.50
70mm	HM-1210.70
75mm	HM-1210.75
100mm	HM-1210.100

Fixed Ring Permeability Cell	
2.0"	HM-1230.20
2.42"	HM-1230.242
2.5"	HM-1230.25
3.0"	HM-1230.30
4.0"	HM-1230.40
50mm	HM-1230.50
70mm	HM-1230.70
75mm	HM-1230.75
100mm	HM-1230.100







Consolidation Cell Components

	2.0"	2.42"	2.5"	3.0"	4.0"	50mm	70mm	75mm	100mm
Load Pad (All)	HM-1220.20.10	HM-1220.24.10	HM-1220.25.10	HM-1220.30.10	HM-1220.40.10	HM-1220.50.10	HM-1220.70.10	HM-1220.75.10	HM-1220.100.10
Upper Stone (All)	HM-1220.20.11	HM-1220.24.11	HM-1220.25.11	HM-1220.30.11	HM-1220.40.11	HM-1220.50.11	HM-1220.70.11	HM-1220.75.11	HM-1220.100.11
Lower Stone (Floating)	HM-1210.20.7	HM-1210.24.7	HM-1210.25.7	HM-1210.30.7	HM-1210.40.7	HM-1210.50.7	HM-1210.70.7	HM-1210.75.7	HM-1210.100.7
Lower Stone (Fixed & Permability)	HM-1220.25.7	HM-1220.25.7	HM-1220.25.7	HM-1220.25.7	HM-1220.40.7	HM-1220.25.7	HM-1220.25.7	HM-1220.25.7	HM-1220.40.7
Acrylic Cylinder (Fixed)	HM-1220.25.2	HM-1220.25.2	HM-1220.25.2	HM-1220.25.2	HM-1220.40.2	HM-1220.25.2	HM-1220.25.2	HM-1220.25.2	HM-1220.40.2
Acrylic Cylinder (Floating)	HM-1210.25.2	HM-1210.25.2	HM-1210.25.2	HM-1210.25.2	HM-1210.40.2	HM-1210.25.2	HM-1210.25.2	HM-1210.25.2	HM-1210.40.2
Centering Ring (Floating)	HM-1210.20.12	HM-1210.24.12	HM-1210.25.12	HM-1210.30.12	HM-1210.40.12	HM-1210.50.12	HM-1210.70.12	HM-1210.75.12	HM-1210.100.12
Clamping Ring (Permability)	HM-1230.20.9	HM-1230.24.9	HM-1230.25.9	HM-1230.30.9	HM-1230.40.9	HM-1230.50.9	HM-1230.70.9	HM-1230.75.9	HM-1230.100.9
Clamping Ring (Fixed)	HM-1220.20.9	HM-1220.24.9	HM-1220.25.9	HM-1220.30.9	HM-1220.40.9	HM-1220.50.9	HM-1220.70.9	HM-1220.75.9	HM-1220.100.9
Base (Floating & Permability)	HM-1230.25.1	HM-1230.25.1	HM-1230.25.1	HM-1230.25.1	HM-1230.40.1	HM-1230.25.1	HM-1230.25.1	HM-1230.25.1	HM-1230.40.1
Base (Fixed)	HM-1220.25.1	HM-1220.25.1	HM-1220.25.1	HM-1220.25.1	HM-1220.40.1	HM-1220.25.16	HM-1220.25.1	HM-1220.25.1	HM-1220.40.1
Cutter Ring (All)	HM-1220.20.8	HM-1220.24.8	HM-1220.25.8	HM-1220.30.8	HM-1220.40.8	HM-1220.50.8	HM-1220.70.8	HM-1220.75.8	HM-1220.100.8
Lower O-ring (Floating & Permability)	HM-003053	HM-003053	HM-003053	HM-003053	HM-003056	HM-003053	HM-003053	HM-003053	HM-003056
Lower O-ring (Fixed)	HM-003052	HM-003052	HM-003052	HM-003052	HM-003024	HM-003052	HM-003052	HM-003052	HM-003024
Upper O-ring (Permability)	HM-003057	HM-003058	HM-003054	HM-003059	HM-003060	HM-003057	HM-003061	HM-003062	HM-003063
Post (All)	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3	HM-1220.25.3
Locking Nut (All)	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5	HM-1220.25.5
Lifiting Knob (All)	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6	HM-1220.25.6
Port Connection Upper (Permability)	HM-003027	HM-003027	HM-003027	HM-003027	HM-003027	HM-003027	HM-003027	HM-003027	HM-003027
Port Connection Lower (Permability)	HM-003055	HM-003055	HM-003055	HM-003055	HM-003055	HM-003055	HM-003055	HM-003055	HM-003055
Filter Paper	HM-4189.20	HM-4189.25	HM-4189.25	HM-4189.30	HM-4189.40	HM-4189.20	HM-4189.28	HM-4189.30	HM-4189.40
Calibration Disk	HM-1220.20.4	HM-1220.24.4	HM-1220.25.4	HM-1220.30.4	HM-1220.40.4	HM-1220.50.4	HM-1220.70.4	HM-1220.75.4	HM-1220.100.4

Soil Volume Change Meter (PVC)— HM-2415

Use to evaluate potentially dangerous swelling/shrinking conditions found in clay soils in commercial/residential development sites. PVC (potential volume change) refers to maximum possible volume change a soil could undergo when submitted to changing moisture conditions. It features fast and simple operation, measuring both shrinkage and swelling of soils and is ideal for gauging swelling of clay soils. Includes: H-4454.010, 1,000 lb. (4.5 kN) capacity proving ring, mold assembly, loading cap, porous stones, loading pistons, 2-3/4" (70 mm) dia. specimen ring (HM-1220.70), and conversion charts. 7-1/4" (184 mm) dia. base x 1 5-1/2" H (394 mm). Shipping wt. 30 lbs. (16.3 kg)



HM-2415

Toxic Interface Unit— HM-4190

Safe and convenient means of performing permeability tests of corrosive or toxic permeants. Flexible Viton bladder accumulator interfaces between control panel and sample drains on permeameter. Serves as a fluid separator to prevent permeant from entering control panel. Also prevents contact of air with permeant, thus no toxic or corrosive vapors can escape into lab. Handles any fluid compatible with stainless steel, Teflon, and the Viton bladder. Unit measure 8" H x 5" dia. Two units are required for each cell. Shipping wt. 6 lbs. (2.72kg)



HM-4190



HM-2700D.3F

Direct/Residual Shear, Standard Controller— HM-2700.3F
Direct/Residual Shear, Analog Controller— HM-2700A.3F
Direct/Residual Shear, Digital Controller— HM-2700D.3F

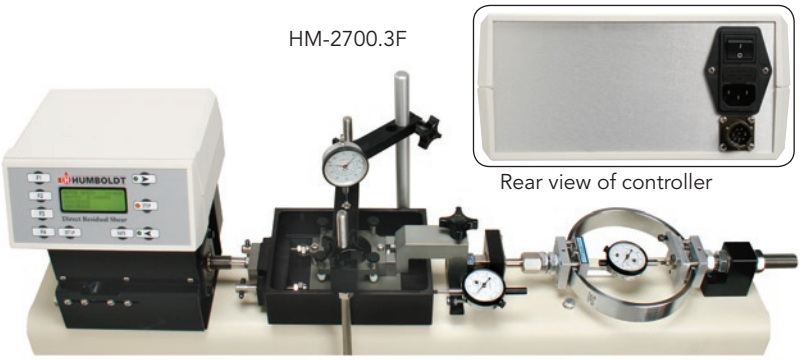
The Humboldt HM-2700 Series Direct/Residual Shear Machines are an economical choice for performing direct/residual shear tests utilizing the deadweight method. The HM-2700s come in three different configurations: a standard controller model; a controller with four analog instrumentation channel inputs, an RS-232 Port and RS-485 Input and Output; and, a controller with four Digital instrumentation channel inputs, an RS-232 Port and RS-485 Input and Output.

All models include the carriage, stand, vertical load hanger and a balanced lever loading arm with a 10:1 ratio that reduces the weight required to perform tests. The microprocessor-based system features a stepper motor drive system, large display, touch-sensitive keypad and forward/reverse travel limit switches.

All models allow for rapid and easy manual adjustment of Shearing force speed rates. The maximum shear force is 2000 lbf (10kN), and, the maximum consolidation force is 2000 lbf (10kN). The carriage accepts shear box squares up to 4.0" (100mm) internal dimension. Forward and reverse measurements permit residual shear testing as standard. A built-in safety feature prevents the overloading of the load measuring system. Meets ASTM D3080, AASHTO T236 and BS1377 standards.

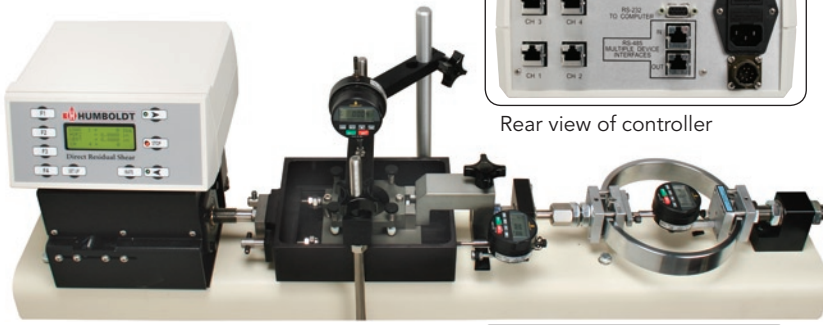
Model Configurations

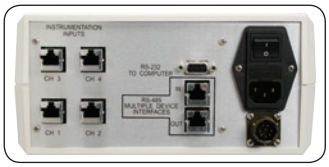
HM-2700.3F



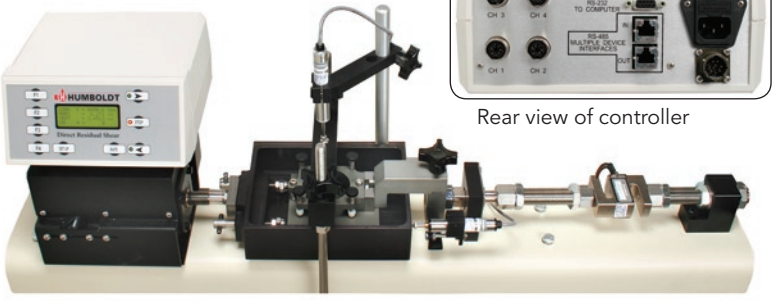
Rear view of controller

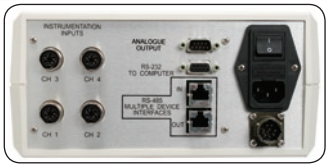
HM-2700D.3F




Rear view of controller

HM-2700A.3F

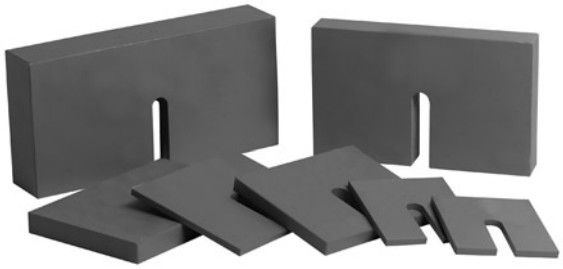



Rear view of controller

Models A and D Feature:

- Backlit LCD display
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversation of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Four channels with real-time data acquisition
- RS-232 interface for computer or printer.
- Humboldt HMTS, Basic, User-Defined Level software included for data acquisition

Specifications	
Horizontal Movement:	2" (50.mm) maximum
Horizontal Shear Force:	2,000 lbf (10kN)
Vertical Load:	2,000 lbf (10kN)
Speed Range:	0.00001 - 0.49999 inch/min (0.00001 - 12.9999 mm/min)
Voltage	110/220 VAC 50/60HZ
Current	6.5 Amps
Analog to digital converter	16 Bit
Data storage	4000 Readings
Data collection rate	100 ms
Computer port	RS232
Dimensions:	40 x 10 x 45" (L x D x H) (1016 x 254 x 1143mm)
Shipping Weight:	288 lb (131kg)



Individual Weights and Sets—
For use with the HM-2700 Direct/Residual Shear and HM-1000 Dead-weight Consolidation Frame.

Individual Weights	
TSF Weight	**Model No.**
0.125 (1/8)	HM-1120.125
0.25 (1/4)	HM-1120.250
0.50 (1/2)	HM-1120.500
1.0	HM-1120.1
2.0	HM-1120.2
4.0	HM-1120.4
KGF Weight	**Model No.**
0.5 kg	HM-1122.05
1.0 kg	HM-1122.1
2.0 kg	HM-1122.2
4.0 kg	HM-1122.4
5.0 kg	HM-1122.5
8.0 kg	HM-1122.8
10.0 kg	HM-1122.10

Direct/Residual Shear (Dead Weight) Typical Setups:

Part #	Qty	Description
Dead Weight with Manual Control		
HM-2700.3F	1	Direct Residual Shear Apparatus 10:1
HM-2701.XX (S/D)	1	Shearbox Assembly
HM-2702.XX (S/D)	1	Shearbox Cutter
HM-2703.XX (S/D)	1	Dolly/Tamper
H-4454.020	1	Load Ring, 2,200 lbf (10.0 kN)
H-4158.1	1	Dial Indicator, 1.000 (25 x 0.001 mm)
H-4471	1	Dial Indicator, 0.5" x .0001" (12.7 x .0025 mm)
HM-1120*	1	Weight Set, 16 TSF
Dead Weight, w/ Analog Transducer Data Acquisition		
HM-2700A.3F	1	Direct Shear w/ Analog Inputs
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper
HM-2300.020	1	S-Type Load Cell 2,000 lbf (10.0 kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	2	Strain Transducer Bracket
HM-1120*	1	Weight Set, 16 TSF
HM-2700SW	1	HMTS Direct Shear Reporting Software
Dead Weight, w/ Digital Dial Gauge Data Acquisition		
HM-2700D.3F	1	Direct Shear w/ Digital Inputs
HM-2701.XX (S/D)	1	Shearbox Assembly
HM-2702.XX (S/D)	1	Shearbox Cutter
HM-2703.XX (S/D)	1	Dolly/Tamper
H-4454.020D	1	Load Ring, Digital 2,200 lbf (10.0 kN)
HM-4469.10	2	Digital Indicator 1" x .0001" (25 x 0.002 mm)
HM-4469C	3	Data Cable for Indicator
HM-1120*	1	Weight Set, 16 TSF
HM-2700SW	1	HMTS Direct Shear Reporting Software

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

For Direct/Residual Shear samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.
NOTE: For Direct/Residual Shear, also, use "S" for square and "D" for round samples.

*For Metric applications, use HM-1122, Weight Set, 32kg.

Weight Set	Model No.	Set Includes
16 TSF Set	HM-1120	includes: (2) .125 TSF, (1) .25 TSF, (1) .50 TSF, (1) 1.0 TSF, (1) 2.0 TSF, (3) 4.0 TSF weights
32 TSF Set	HM-1121	includes: (2) .125 TSF, (1) .25 TSF, (1) .50 TSF, (1) 1.0 TSF, (1) 2.0 TSF, (7) 4.0 TSF weights
32 kgf Set	HM-1122	includes: (4) 1 kg, (3) 4 kg, (2) 8 kg weights
50 kgf Set	HM-1125	includes: (3) 1 kg, (1) 2 kg, (1) 5 kg, (4) 10 kg weights
64 kgf Set	HM-1123	includes: (4) 1 kg, (5) 4 kg, (5) 8 kg weights
88 kgf Set	HM-1124	includes: (4) 1 kg, (5) 4 kg, (8) 8 kg weights



HM-2560A.3F

Pneumatic Direct/Residual Shear Apparatus, 110/220 VAC 50/60Hz— HM-2560A.3F

The Humboldt HM-2560A Direct/Residual Shear Apparatus utilizes the pneumatic loading concept for applying the vertical load to the sample. In doing so, this self-contained model eliminates the need for cumbersome loading weights used in dead weight-type systems.

The microprocessor-based system features a stepper motor drive system, large display, touch-sensitive keypad and forward/reverse travel limit switches. Through the use of a built-in 4-channel data acquisition system, the operator can preset the logging condition for the test.

Built to last in the harshest laboratory environments, the vertical/horizontal loading mechanism and shear box assembly are mounted on a 1.25" (30mm) thick solid aluminum base and heavy-gage enamel painted steel cabinet. The strain rods are manufactured from stainless steel and the shearbox carriage (water chamber) is constructed of anodized cast aluminum for corrosion resistance and long service life. The shearbox is constructed of anodized aluminum for light weight.

The HM-2560A is supplied complete with a 2,000 lbf (10kN) capacity load cell, 1" (25.4mm) horizontal strain transducer, 0.4" (10.2mm) vertical strain transducer and a built-in 4-channel analog data acquisition system. Shearbox assemblies and related accessories are not included and must be ordered separately. Complies with ASTM D3080, AASHTO T236 and BS1377 standards.

Features include:

- Four channels with real-time data acquisition
- Backlit LCD display
- RS232 interface for computer or printer.
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversation of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Humboldt HMTS, Basic, User-Defined Level software included for data acquisition

Specifications

Horiz. Movement	2" (50.mm) maximum
Horiz. Shear Force	HM-2560A: 2,000 lbf (10kN) HM-2550: 1,500 lbf (6.7kN)
Vertical Load	HM-2560A: 2,000 lbf (10kN) HM-2550: 1,500 lbf (6.7kN)
Speed Range	HM-2560A: 0.00001 to 0.49999 in/min. 0.00001 to 12.99999 mm/min. HM-2550: 0.0001 to 0.3 in/min. 0.0025 to 7,6200 mm/min.
Voltage	110/220 VAC 50/60HZ
Current	6.5 Amps
Analog to Digital	16 bit
Data Storage	4000 Readings
Data Collection Rate	100 ms
Computer Port	RS232
Dimension (W x D x H)	30 x 15.5 x 22" (L x D x H) (760 x 368 x 558mm))
Weight	140 lb (64 kg)
Shipping Weight	168 lb (76 kg)

Direct/Residual Shear Typical Setups:

Part #	Qty	Description
Pneumatic, Computer Control w/ Analog Instrumentation		
HM-2560A.3F	1	ShearScan 10, w/ Analog Inputs
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper
HM-2300.020	1	S-Type Load Cell 2,000 lbf (10.0 kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
HM-2310.04	1	Strain Transducer 0.4" (10mm)
HM-2310BR	2	Strain Transducer Bracket
HM-2700SW	1	HMTS Direct Shear Reporting Software
Pneumatic with Manual Control		
HM-2550	1	Pneumatic Direct Shear Set
HM-2701.XX(S/D)	1	Shearbox Assembly
HM-2702.XX(S/D)	1	Shearbox Cutter
HM-2703.XX(S/D)	1	Dolly/Tamper

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

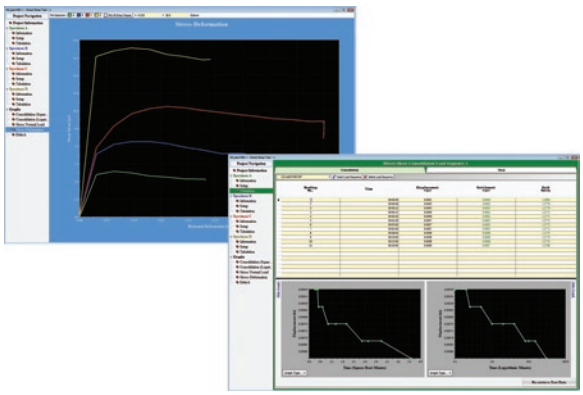
For Direct/Residual Shear samples, sizes are: .20 = 2.0"; .242 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.

NOTE: For Direct/Residual Shear, also, use "S" for square and "D" for round samples.



Pneumatic Direct/Residual Shear, Basic Version— HM-2550 220-240V 50/60Hz— HM-2550.4F

Similar in design to the HM-2560, this economical version is perfect for laboratories not requiring data acquisition or reporting functions. The HM-2550 has a 1,500 lbf (6.7kN) vertical load and horizontal shear force capacity, and, has built-in digital readouts for pressure and load. These are used for setting the vertical load and for the measurement of shear forces. Horizontal and vertical shear displacement values are measured by means of two mechanical dial indicators, which are included, as well as a S-Type Load Cell 2,000 lbf (10.0 kN). Shearbox assemblies and related accessories are not included and must be ordered separately. Meets ASTM D3080, AASHTO T236 and BS1377 standards.



HMTS Reporting Software, Direct/Residual Shear Module— HM-2700SW

Humboldt Material Testing Software (HMTS) provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. HMTS works in conjunction with Microsoft Excel to present test data in easy-to-read Excel workbook format files, which can be evaluated directly or sent to any computer using Microsoft Excel.

The Direct/Residual Shear Module provides a simple, test-specific interface to control Shear test operations and automatically record data while also displaying it in real-time tables and graphs. Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

- Test Information is stored, and all calculations are performed automatically
- Live tests and live graphing capabilities (real-time)
- Complete test report including all calculations and graphs required for testing
- Review and export tests using Microsoft Excel

See page 72 for more information on Humboldt's HMTS software.

Direct/Residual Shear Components

HM-2703.60S

HM-2702.60S



HM-2704.60S

HM-2701.25D





HM-2701.60S

Accessory	Model
Cutter	HM-2702.XXS/D
Dolly Tamper	HM-2703.XXS/D
Porous Plate	HM-2704.XXS/D

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested.

For Direct/Residual Shear samples, sizes are: .20 = 2.0"; .24 = 2.42"; .25 = 2.5"; .40 = 4.0"; .50 = 50mm; .60 = 60mm, and .100 = 100mm.
NOTE: For Direct/Residual Shear, also, use "S" for square and "D" for round samples.

Round Shearbox Assemblies

Size	Model
2.0"	HM-2701.20D
2.42"	HM-2701.24D
2.5"	HM-2701.25D
4.0"	HM-2701.40D
50mm	HM-2701.50D
60mm	HM-2701.60D
100mm	HM-2701.100D

Square Shearbox Assemblies

Size	Model
2.0"	HM-2701.20S
2.42"	HM-2701.24S
2.5"	HM-2701.25S
4.0"	HM-2701.40S
50mm	HM-2701.50S
60mm	HM-2701.60S
100mm	HM-2701.100S

Shearbox Assemblies include: Sample Box, (2) Porous Plates, (1) Loading Pad, and (1) Grid Plate.

Load Rings w/ Mechanical Dial Gauge	Model
Proving ring w/ mechanical dial gauge, 550 lbf (2.5 kN)	H-4454.005
Proving ring w/ mechanical dial gauge, 1,100 lbf (5.0 kN)	H-4454.010
Proving ring w/ mechanical dial gauge, 2,200 lbf (10 kN).	H-4454.020
Load Rings w/ Digital Indicators	
Proving ring w/ digital indicator, 550 lbf (2.5 kN).	H-4454.005D
Proving ring w/ digital indicator, 1,100 lbf (5.0 kN)	H-4454.010D
Proving ring with digital indicator, 2,200 lbf (10 kN)	H-4454.020D
Data cable for digital indicator	HM-4469C
Load Cells	
Load cell, 2,000 lbf (10 kN)	HM-2300.020



H-4465.12



H-4454.005



H-4454.005D



HM-4469.05



HM-2310.10



HM-2300.010

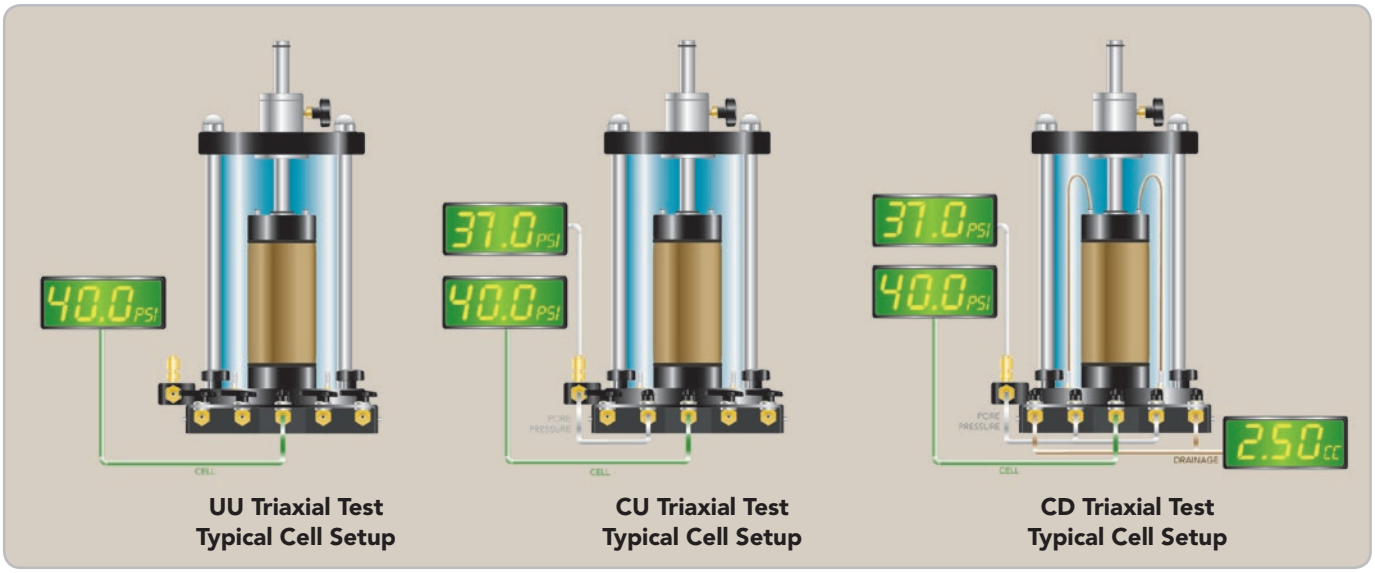
Displacement Measuring Devices

Vertical Devices	Model
Mechanical dial gauge, 0.5 x 0.0001"	H-4471
Mechanical dial gauge, 12 x 0.002mm	H-4465.12
Digital indicator, 0.5 x 0.0001" (12 x 0.002mm)	HM-4469.05
Data cable for digital indicator	HM-4469C
Strain Transducer, 0.4" (10mm)	HM-2310.04
Horizontal Devices	
Mechanical dial gauge, 1.0 x 0.001"	H-4158.1
Mechanical dial gauge, 25 x 0.01mm	H-4465.25
Digital indicator, 1.0 x 0.0001" (25 x 0.002mm)	HM-4469.10
Data cable for digital indicator	HM-4469C
Strain Transducer, 1.0" (25mm)	HM-2310.10

Humboldt and Triaxial Testing

Humboldt provides a complete offering of Triaxial testing equipment to fit almost any need; from automated systems with data acquisition software to simple load frame setups utilizing load rings and dial gauges. For our triaxial systems, we utilize a modular design concept that allows you to build your setup from individual components, giving you the flexibility to build exactly what you want to handle any of your test requirements from individual specimen testing to multiple, computer-controlled automated tests. Humboldt can supply all the components you'll need to construct a customized testing solution to fulfill your needs today, as well as tomorrow. Triaxial setups for testing UU, CU and CD can be quickly set up from the array of Humboldt components, such as:

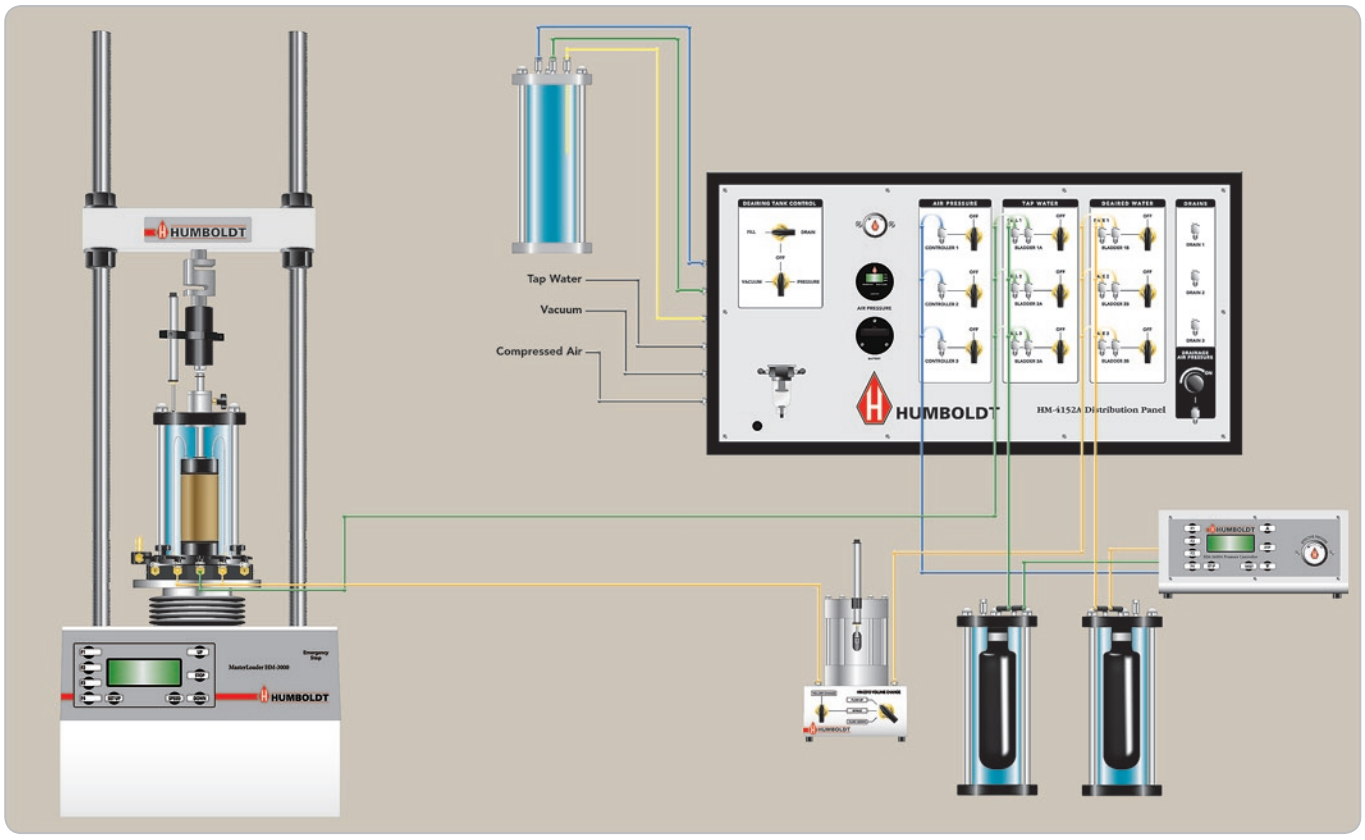
- Load Frames
- Triaxial Cells
- Load Cells
- Distribution Panels
- Strain Transducers
- Sample Prep
- Pressure Controllers
- De-Airing Tanks
- Data Loggers
- Air/Water Bladders
- Data Acquisition
- Software
- Volume Change Apparatus
- Accessories/Consumables



UU Triaxial Test Typical Cell Setup

CU Triaxial Test Typical Cell Setup

CD Triaxial Test Typical Cell Setup



Fully automated triaxial setup showing the plumbing interconnection between components. ASTM D4767

The HM-3000 Digital MasterLoader is the most versatile load frame available. Stand-alone or computer-driven, the HM-3000 can handle it all—automating your lab and increasing your productivity.



HM-3000.3F

Designed for applications requiring multi-purpose loading systems, the HM-3000 is ideal for just about any application from road construction to high-volume commercial and educational laboratories. The HM-3000 MasterLoader provides fully-automatic test performance allowing unattended operation while controlling motor start/stop, speed selection and test data acquisition. Its modular design allows the machine to be custom configured to handle any test necessary.
You can buy the machine to handle any specific test needs and add on to its capabilities at a later time. This way you only pay for what you need, but you are never faced with an obsolete system.

The HM-3000 will function as a standalone device or can be interfaced with a computer using Humboldt's HMTS software. It also provides an analog output port if you need to utilize an XYt chart recorder.
The HM-3000 is specifically designed for soil testing labs conducting multiple testing operations including: UU, CU and CD triaxials, UC, CBR and LBR. With its built-in four-channel data logger, the HM-3000 can acquire data from load, strain, pore pressure and volume transducers. The data acquisition can be automated by setting trigger conditions to start and stop logging. Tests can be initiated or terminated automatically increasing lab productivity.

Features include:

- Four channels with real-time data acquisition
- Backlit LCD display
- RS232 interface for computer or printer.
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversation of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Humboldt HMTS, Basic, User-Defined Level software included for data acquisition

Digital MasterLoader— HM-3000.3F

Includes:
SHH04— 3/4-16 Bolt x 3-1/2 inch long
WF04— Washer for SHH04 Bolt
H-4178.2— 3/4-16 Stud x 1-1/2 inch long
H-4454.3— 3/4-16 Plug / Adapter
HM-3000.10.1— Cylinder Bracket Holder
HM-3000.10.2— Displacement Indicator Platform
HM-3000.10.3— Displacement Indicator Rod.

Typical CU Triaxial, 1-Cell Setup using HM-3000.3F

Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-3003SW	1	CU Triaxial Reporting Software
HM-4150	1	FlexPanel I (3-Burette Panel)
HM-4199B	1	Triaxial Cell, Brass Fittings
HM-4199.XX	1	Top Cap & Base
HM-2300.020	1	S-Type Load Cell, 2,000lbf (50 kN)
HM-2310.20	1	Strain Transducer 2" (50mm)
HM-4170	1	Pore Pressure Transducer 200 PSI
HM-4178BRT	1	Displacement Transducer Bracket
HM-200387	1	Ball Seat Adapter

Typical UU Triaxial, 1-Cell Setup using HM-3000.3F

Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-3002SW	1	UU Triaxial Reporting Software
HM-4140	1	FlexPanel I (3-Burette Panel)
HM-4199B	1	Triaxial Cell, Brass Fittings
HM-4199.XX	1	Top Cap & Base
HM-2300.020	1	S-Type Load Cell, 2,000lbf (50 kN)
HM-2310.20	1	Strain Transducer 2" (50mm)
HM-4179.XX	2	Acrylic Base Disk
HM-4178BRT	1	Displacement Transducer Bracket
HM-200387	1	Ball Seat Adapter

Typical Unconfined Compression Setup using HM-3000.3F

Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-3004SW	1	UC Triaxial Reporting Software
HM-2300.020	1	S-Type Load Cell, 2,000lbf (50 kN)
HM-2310.20	1	Strain Transducer 2" (50mm)
HM-4178BRT	1	Displacement Transducer Bracket
HM-2002	1	Unconfined Upper Platen

Typical Triaxial Sample Prep Items

Part #	Qty	Description
HM-4180.XX	1	Membranes, 12/pk
HM-4181.XX	1	Membrane Stretcher
HM-4182.XX	1	O-Rings, 12/pk
HM-4184.XX	2	Porous Stone
HM-4187E	1	De-Airing Tank, 6 Liter, 110V
HM-3847.XX	1	Split Miter Box
HM-4189.XX	1	Filter Paper, 100/pk
HM-4189FS	1	Filter Strips 5 x 150mm 100/pk

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested. **For Triaxial** samples, sizes are: .14 = 1.4"; .15 = 1.5"; .20 = 2.0"; .25 = 2.5"; .28 = 28"; .30 = 3.0".40 = 4.0"; .35 = 35mm; .38 = 38mm; .50 = 50mm; .70 = 70mm, and .100 = 100mm.



Triaxial Setup using the HM-3000.3F Load Frame
Pictured is the HM-3000.3F Load frame with a typical Triaxial setup. See the charts to the left for items to order for the setup shown.

Specifications

Dimensions (l x w x h)	17 x 19 x 59 inch (430 x 480 x 1500mm)
Platen Travel	4 inches (100mm) Max.
Net Weight	240 lbs. (110Kg)
Shipping Weight	285 lbs. (130Kg)
Speed Range	0 - 3.0000 inch/min (0 - 75.0000 mm/min)
Load Capacity	11000 lbf (50 kN)
Vertical Clearance	40 inch (1000mm) Max.
Horizontal Clearance	15 inch (380mm)
Voltage	110/220 VAC 50/60HZ
Current	8.5 Amps
Analog to Digital Converter	16 Bit
Data Storage	4000 Readings
Data Collection Rate	100 ms
Computer Port	RS232

Covers: CBR, UU, CU, CD, UC, Marshall and Hveem Tests
ASTM: D1883, D2850, D2166, D4767, and D1559
AASHTO: T193, T296, T297, T208, T245, and T246
BS 1377: Part 4: 1990, BS 1377: Part 7: 1990,
BS 1377: Part 8: 1990, BS 598: Part 107



The HM-2800 Multi-speed Load Frame is designed for those who want a high-quality but simple, multi-purpose load frame without built-in data acquisition capabilities. The HM-2800 is ideal for applications where the operator either is not concerned with data acquisition; or, already has an existing data acquisition system or plans on constructing one. With its digital display, the HM-2800 also provides the operator the ability to select any speed with three decimal accuracy within its speed range.

The HM-2800 features a quiet, direct drive DC motor that provides a loading speed range from .008 to 1.999 in/min., controlled through the use of edit keys and a digital display. It also incorporates a separate, dedicated control to accommodate 2.00 in/min. for use in Marshall and TSR Testing. The controls also accommodate a rapid travel speed of 2.25 in/min for moving the platen into position quickly.

Features include:

- 10" platen provides roomy, stable base for test equipment
- Backlit LCD display
- Test speeds adjustable from .008 to 1.999 in/min. via keypad
- User selectable unit change between U.S. Standard and Metric from keypad

Specifications

Dimensions (l x w x h)	17 x 22 x 51 inch (432 x 559 x 1295mm)
Platen Travel	3 inches (76mm) Max.
Net Weight	206 lbs. (94kg)
Shipping Weight	300 lbs. (660kg)
Speed Range	0 - 1.99 inch/min (0 - 50.5 mm/min)
Load Capacity	11000 lbf (50 kN)
Vertical Clearance	32 inch (812mm) Max.
Horizontal Clearance	11 inch (2 79mm)
Voltage	120 VAC 50/60HZ 220 VAC 50/60HZ
Current	9 Amps @ 125V 4.5 Amps @250V

Multi-Speed Load Frame— HM-2800
Includes:
SHH04—3/4-16 Bolt x 3-1/2 inch long
WF04—Washer for SHH04 Bolt

Multi-Speed Load Frame, 220 50/60Hz— HM-2800.4F
Includes:
SHH04—3/4-16 Bolt x 3-1/2 inch long
WF04—Washer for SHH04 Bolt
HM-2000.56— Step-down transformer for electric conversion

Covers: CBR, UU, CU, CD, UC, Marshall and Hveem Tests
ASTM: D1883, D2850, D2166, D4767, D5581 and D6927
AASHTO: T193, T296, T297, T208, T245, and T246
BS 1377: Part 4: 1990, BS 1377: Part 7: 1990,
BS 1377: Part 8: 1990, BS 598: Part 107

Typical CU Triaxial, 1-Cell Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Multi-Speed Load Frame
HM-4150	1	FlexPanel I (3-Burette Panel)
HM-4199B	1	Triaxial Cell, Brass Fittings
HM-4199.XX	1	Top Cap & Base Pedestal 2.8"
H-4454.020	1	Load Ring 2,200 lbf (10 kN)
H-4463	1	Dial Gauge 2.0" travel, 0.001" divisions)
HM-4170	1	Pore Pressure Transducer, 200 PSI
HM-2350	1	Single Channel Readout
HM-200387	1	Ball Seat Adapter

Typical UU Triaxial, 1-Cell Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Digital MasterLoader 110/220V
HM-4140	1	FlexPanel I (3-Burette Panel)
HM-4199B	1	Triaxial Cell, Brass Fittings
HM-4199.XX	1	Top Cap & Base
H-4454.020	1	Load Ring 2,200 lbf (10 kN)
H-4463	1	Dial Gauge 2.0" travel, 0.001" divisions)
HM-4179.XX	2	Acrylic Base Disk
HM-200387	1	Ball Seat Adapter

Typical Unconfined Compression Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Multi-Speed Load Frame
HM-2002	1	Unconfined Upper Platen
HM-3000.10.2	1	Displacement Indicator Platform
HM-3000.10.3	1	Displacement Indicator Rod
H-4454.005	1	Load Ring 500 lbf (2.5 kN)
H-4158.1	1	Dial Gauge 1.0" travel, 0.001" divisions)

Typical Soil Cement Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Multi-Speed Load Frame
HM-2003E	1	Upper Swivel Platen
HM-4454.050	1	Load Ring 5,000 lbf (25 kN)

Part Numbers ending in .XX require a size code to be entered referring to the sample size to be tested. **For Triaxial** samples, sizes are: .14 = 1.4"; .15 = 1.5"; .20 = 2.0"; .25 = 2.5"; .28 = 28"; .30 = 3.0".40 = 4.0"; .35 = 35mm; .38 = 38mm; .50 = 50mm; .70 = 70mm, and .100 = 100mm.



HM-2800
w/ typical Triaxial Setup

Triaxial Setup using the HM-2800 Load Frame

The HM-2800 provides a simpler, less advanced solution to doing CBR testing than the HM-3000. The HM-2800 features the ability to assign a speed of operation between .008 and 1.99 inches/minute for doing the multitude of tests required by today's labs including Triaxial testing. Pictured above is the HM-2800 Load Frame with a typical Triaxial setup. See the chart to the left for items to order for the setup shown.

Typical Triaxial Sample Prep Items

Part #	Qty	Description
HM-4180.XX	1	Membranes, 12/pk
HM-4181.XX	1	Membrane Stretcher
HM-4182.XX	1	O-Rings, 12/pk
HM-4184.XX	2	Porous Stone
HM-4187E	1	De-Airing Tank, 6 Liter, 110V
HM-3847.XX	1	Split Miter Box
HM-4189.XX	1	Filter Paper, 100/pk
HM-4189FS	1	Filter Strips 5 x 150mm 100/pk



Fully Automated Triaxial Testing System—
The Humboldt Fully Automated Triaxial Testing System is a state-of-the-art system specifically designed for soil testing laboratories conducting UU, CU and CD Triaxial and Unconfined Compression Tests. This is the most advanced and complete automated triaxial testing system available to soil testing laboratories. The system consists of a microprocessor-based stepper motor driven HM-3000.3F compression frame with a built-in, 4-channel data acquisition for stress, strain, pore water pressure and volume change measurement. The HM-4152A Distribution Panel is designed to accommodate all the necessary connections and valves for filling and draining up to 3 triaxial cells, the HM-2450A.3F Pressure Controller with automatic back pressure valve provides automatic incremental back pressure saturation with B-value calculation and check, the HM-2315 Volume Change Measuring Apparatus measures the volume during various stages of triaxial testing and the Humboldt Material Testing Software HMTS for monitors, controls and reports the test data.The complete system also requires a supply of good clean compressed air, vacuum pump and a computer please contact Humboldt for system requirements.

Typical Automated Triaxial, 3-Cell Setup

Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-3002SW	1	UU Triaxial Reporting Software
HM-3003SW	1	CU Triaxial Reporting Software
HM-4152A	1	Distribution Panel (3 cells)
HM-4151A	6	Air/Water Bladder Cylinder
HM-4199B	3	Triaxial Cell, Brass Fittings
HM-4199.XX	3	Top Cap & Base Pedestal
HM-2300.020	1	S-Type Load Cell, 2,000lbf (50 kN)
HM-2310.20	1	Strain Transducer 2" (50mm)
HM-4170	3	Pore Pressure Transducer 200 PSI
HM-2315	3	Automatic Volume Change Apparatus
HM-2310.10	3	Strain Transducer 1" (25mm)
HM-2310BR	3	Strain Transducer Bracket
HM-4178BRT	1	Displacement Transducer Bracket

Part #	Qty	Description
HM-200387	1	Ball Seat Adapter and Converter
HM-4180.XX	1	Membranes, 12/pk
HM-4181.XX	1	Membrane Stretcher
HM-4182.XX	1	O-Rings, 12/pk
HM-4184.XX	6	Porous Stone
HM-4187E	1	De-Airing Tank, 6 Liter, 110V
HM-3847.XX	1	Split Miter Box
HM-4189.XX	1	Filter Paper, 100/pk
HM-4189FS	1	Filter Strips 5 x 150mm 100/pk
HM-4198	1	Vacuum Grease
HM-4179.XX	6	Acrylic Base
HM-2325A.3F	1	MiniLogger 4 CH Analog Data Acquisition
HM-2450A.3F	3	Pressure Controller

Automatic Volume Change Apparatus— HM-2315

The apparatus is used for measuring the volume change of a soil sample by monitoring the flow of water through the chamber of the unit. The lower assembly contains changeover valves, which when used in conjunction with the upper assembly provides limitless capacity. The unit can be used with a linear strain transducer, digital indicator, or as part of an automated system. It is accurate to better than ±0.05 ml and is easily de-aired in seconds. Includes connectors, valves, and tubing. Order indicator separately. Shipping wt. 21 lbs. (9.5kg)

Transducer for use with above— HM-2310.10

Transducer Bracket for use with HM-2310.10— HM-2310BR

Digital Indicator for use with above— HM-4469.10



HM-2315

Pressure Controller— HM-2450A.3F

Stand alone unit for accurate control of air pressure in the Triaxial laboratory testing. It provides automatic incremental back pressure saturation with B-value calculation and check, when used with HMTS (Humboldt Material Testing Software) and Humboldt Triaxial testing equipment. The on board digitalized and bias pressure regulators plus two air/water bladder systems (HM-4151A) and the distribution panel (HM-4152A) allow simultaneous control of the confining and back pressure while maintaining a constant differential pressure.

Specifications

Pressure Readout	psi/kPa
Maximum Input Pressure	200/1400
Maximum Output Pressure	150/1000
Pressure Resolution	0.1/1
Input Voltage	110/220 VAC 50/60 Hz
Display	LCD
Dimension (L x W x H)	12 x 12 x 7 inches (300 x 300 x 175 mm)



HM-2450A.3F

Distribution Panel— HM-4152A

The HM-4152A Distribution Panel is designed to provide all the necessary port connections in one panel for fully automated Triaxial testing. It provides distribution of de-aired water, tap water, pressure and vacuum within the Triaxial testing system for up to 3 Triaxial cells, 1 de-airing tank, 3 cell/back pressure controllers, and 6 air/water bladder cylinders. The panel also houses a pressure regulator, digital pressure readout, air/water filter for the input pressure and de-aired water tank control valves.

Specifications

Pressure Readout	PSI / BAR / MPA
Maximum Input Pressure	200 / 14 / 1.4
Maximum Output Pressure	150 / 10 / 1
Pressure Resolution	0.1 / 0.01 / 0.001
Input Voltage	9V DC
Display	LCD
Dimension (L x W x H)	37.5 x 8 x 19.5 inches (952 x 203 x 495 mm)



HM-4152A

HM-4151A

See Page 67 for Air/Water Bladder Cylinders


HM-4140


HM-4150


HM-4150A


HM-4160


HM-4160A

Humboldt FlexPanels Features:

- Bias pressure regulator allows simultaneous control of confining & back pressures, while maintaining a constant differential
- Longer Burette and 0.02ml graduation give more accurate results, better productivity, and faster turnaround
- Cost efficient, expandable system
- Uses no-volume-change Swagelock valves
- Bridge feature delivers simultaneous control of base and top pressures by adjusting one pressure regulator
- Quick-connect hookups for fast and reliable set up.
- Master control panel houses digital pressure readout for the controlling pressure, inlet vacuum regulator & gauge, inlet pressure regulators & gauge, de-aired water tank controls, tap & de-aired water supply outlets, and pressure & vacuum outlets
- Humboldt's bridge and bias controls simplify testing
- Long burette design provides a highly accurate scale, as well as faster test response and results
- Lightweight, aluminum frame is extremely durable and resists rust
- Complies with ASTM D5084; BS 1377 Part 6 1990.

Humboldt FlexPanels

	HM-4140	HM-4150	HM-4160	HM-4150A	HM-4160A
Pressure/ Resolution	2-150 psi (0.1 psi) Metric Models: 14-1000 kPa (1 kPa)				
Vacuum	0-14.7 psi (0-100kPa) or 30 Hg				
Inner Burette					
Cell	NA	50cc x 0.1 cc (ml)			
Top		10cc x 0.02 cc (ml)			
Base		10cc x 0.02 cc (ml)			
Outer Burette					
Cell	NA	400cc (ml)			
Top		460cc (ml)			
Base		460cc (ml)			
Voltage	115V 50/60Hz 220V 50/60Hz (use .4F suffix to part number, i.e. H-4150.4F)			NA	
Power	6 watts				
Operating Temp.	14 to 158°F (-10 to 70°C)				
Dimensions	8" x 8" x 37.5" (203 x 203 x 952mm)	8" x 25.5" x 37.5" (203 x 648 x 952mm)	8" x 43.5" x 37.5" (203 x 1105 x 952mm)	8" x 19.5" x 37.5" (203 x 495 x 952mm)	8" x 37.5" x 37.5" (203 x 952 x 952mm)
Shipping Weight	35lb (16kg)	95lb (43kg)	145lb (66kg)	107lb (49kg)	157 (71kg)


Rear of panel showing quick-connect hookups and plumbing.

Humboldt FlexPanels are available with regulators reading in kPa. To order, use an M suffix to the Model Number, i.e. HM-4150M.



HM-4156A

Pressure Control/Distribution Panel— HM-4156A

The HM-4156A panel utilizes the HM-4152A distribution panel and adds an integral control panel, which allows you to set and monitor cell and back pressure for each of the possible three triaxial cells. The Pressure Control/Distribution Panel offers a simple and efficient method of monitoring up to 6 independent pressures. The panel controls the distribution of the confining and back pressure supplies to up to 3 triaxial cells by way of pressure regulators and digital pressure readout. In addition the panel offers an air/water filter for the input pressure and de-aired water tank control valves.

Specifications

Pressure Readout	PSI / BAR / MPA
Maximum Input Pressure	200 / 14 / 1.4
Maximum Output Pressure	150 / 10 / 1
Pressure Resolution	0.1 / 0.01 / 0.001
Input Voltage	9V DC
Display	LCD
Dimension (L x W x H)	37.5 x 8 x 19.5 inches (952 x 203 x 495 mm)



HM-4151A

Air/Water Bladder Cylinder— HM-4151A

The Air/Water Bladder Cylinder is used to deliver pressurized de-aired water to the triaxial cell. It acts as an interface between the compressed air, used as a pressure source, and the deaired water, which is used as the means of pressurizing the sample. The cylinder will operate continuously to a maximum pressure of 150 psi (1000 kPa).

Spare Replacement Bladder for HM-4151A— HM-4151.1



HM-4199B

Triaxial Cells

HM-4199B Triaxial Cells are available for use with sample sizes from 1.4" (35mm) to 4" (100mm). The clear acrylic chamber has a working pressure of 150 psi (1,000 kPa) and is tested to 250 psi (1,700 kPa). The design features a solid base, which provides an extremely stable test platform making it faster and easier to center the cell on the load frame platen— reducing setup times. HM-4199B cells provide easy access to the test chamber by utilizing a one-piece, chamber unit that is quickly removed through the removal of three easy-turn knobs. These cells also have an integral de-airing block for the pore pressure transducer built into the side. The cells have five no-volume-change valves aligned on one side for maximum convenience. Two valves handle top drainage, two valves handle bottom drainage, and one valve handles filling and drainage, as well as providing confining pressure to the cell. The removable base pedestal accommodates various sample diameters. Top caps and base pedestals are available in a choice of black-anodized aluminum or stainless steel in various sizes (see chart below). Other sizes are available. The cell top and base are precision machined from 6061 T6 aluminum, hard-coated and Teflon impregnated. A 5/8" hardened stainless steel piston runs inside a linear bearing to reduce friction. Choice of brass or stainless steel valve fittings (stainless steel for use with hazardous materials). When ordering, specify top cap and base pedestal for desired sample size. Order porous stones separately, see page 70. Cell dimensions are: 13-3/4" H x 8-3/4" dia. (349.2 x 222.3mm); overall diameter is: 11" (279.4mm).


HM-4199.28

Triaxial Cell and Top Cap/Base Pedestal Set

Size	Cell	Top Cap/Base Pedestal Set
35mm	HM-4199B	HM-4199.35
1.4"		HM-4199.14
50mm		HM-4199.50
2.0"		HM-4199.20
70mm		HM-4199.70
2.8"		HM-4199.28
100mm	HM-4199B-4	HM-4199.100
4.0"		HM-4199.40
150mm	HM-4199B-6	HM-4199.150
6"		HM-4199.60

Stainless Triaxial Cell and Top Cap/Base Pedestal Set

Size	Cell	Top Cap/Base Pedestal Set
35mm	HM-4199SS	HM-4199.35SS
1.4"		HM-4199.14SS
50mm		HM-4199.50SS
2.0"		HM-4199.20SS
70mm		HM-4199.70SS
2.8"		HM-4199.28SS
100mm	HM-4199SS-4	HM-4199.100SS
4.0"		HM-4199.40SS
150mm	HM-4199SS-6	HM-4199.150SS
6"		HM-4199.60SS

To order individual Top Caps or Pedestal Bases, use the part number for the set of the desired size indicated above and add a "T" suffix for a Top and a "B" suffix for a base, i.e. HM-4199.20T would be the part number for a 2" Top Cap.

Precision Diameter Tape, 0.75 to 7"— HM-4174
Precision Diameter Tape, 28 to 200mm— HM-4174M
Diameter tapes provide a fast, reliable method for measuring the diameter of concrete, soil and asphalt cores and cylinders. One reading provides round and out-of-round diameters within an accuracy of .001" (.03mm) by means of special graduations and vernier scale. All tapes are made from a stainless alloy and are precision engraved to ensure accuracy. Tape has diameter range of 2 to 12" (50 to 300mm on metric model). Includes certificate of calibration. Tapes are calibrated and include a NIST-traceable certification. Meet ASTM D2166, D2850, D4767, BS 1377:8.



HM-4174
HM-4174M

Length Comparator— HM-4173
Length comparator designed to quickly and accurately measure the height of soil samples to within ±0.1% of the total height. Includes a digital indicator accurate to within 0.0001 inches (0.002mm) with 0 to 1" (0 to 25mm) total range. The comparator is comprised of an upright support 14" (356mm) tall attached to a 6 x 6 x 2" (150 x 150 x 50mm) granite base and includes a 6" (152mm) reference bar. Other reference bars such as 4.0", 3.0" and 2.0" for other sample sizes are available. Meets ASTM D2166, D2850, D4767, BS 1377:8. Reference bar includes Calibration Report traceable to the National Institute of Standards and Technology. Shipping wt. 16 lb (7.2kg)



HM-4173

Soil Sample Trimmer, 1.0 to 3.0"— HM-3130
Soil Sample Trimmer, 1.0 to 4.0"— HM-3140
Sample trimmer for cutting samples to precise diameters. The HM-3130 handles samples up to 3" and HM-4140 handles up to 4" samples by employing easily interchangeable top platens. Stainless steel pins in pedestal & top platen hold sample in position. Top platen bearing assembly is lowered & locked and sample trimmed with wire saw, order top platens and saw separately. Shipping wt. 6 lbs. (2.72kg)



HM-3130.20
HM-3130
HM-3175

Wire Saw— HM-3175
Sample trimming saw with replaceable wire blade.

Open-Type Miter Box— H-4187
For trimming and squaring soil specimens, miter box consists of base and sides. Opening is 3.2"W x 3-1/2"H (81 x 89mm) Plated for corrosion resistance. Shipping wt. 10 lbs. (4.5kg)

Sample Trimmer Top Platens

Top Platen	Model
1.0"	HM-3130.10
1.4"	HM-3130.14
1.875"	HM-3130.18
2.0"	HM-3130.20
2.5"	HM-3130.25
2.8"	HM-3130.28
3.0"	HM-3130.30
4.0"	HM-3130.40



H-4187

Two-Part Compaction Molds

Sample	Mold	Base Plate
1.4"	HM-3817.14	HM-3817.14BP
1.5"	HM-3817.15	HM-3817.15BP
1.875"	HM-3817.18	HM-3817.18BP
2.0"	HM-3817.20	HM-3817.20BP
2. 36"	HM-3817.23	HM-3817.23BP
2.5"	HM-3817.25	HM-3817.25BP
2.8"	HM-3817.28	HM-3817.28BP
4.0"	HM-3817.40	HM-3817.40BP
6.0"	HM-3817.60	HM-3817.60BP
35mm	HM-3817.35	HM-3817.35BP
38mm	HM-3817.38	HM-3817.38BP
50mm	HM-3817.50	HM-3817.50BP
70mm	HM-3817.70	HM-3817.70BP
100mm	HM-3817.100	HM-3817.100BP
150mm	HM-3817.150	HM-3817.150BP



HM-3817.28
HM-3817.28BP

Two-Part Compaction Molds
Two-part Aluminum molds with easy-close band clamp closure. Base plate/Pedestal combination provides a stable platform for mold during production.



Latex Membranes	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4180.14	HM-4180.15	HM-4180.20	HM-4180.28	HM-4180.40	HM-4180.60	HM-4180.14	HM-4180.15	HM-4180.20	HM-4180.28	HM-4180.40	HM-4180.60

Made from non-porous latex rubber. Length varies according to sample diameter. All have sufficient length to enclose full length of sample, both top & base of pedestal, and disc—plus enough surplus to allow doubling over the O-rings. 12/pkg. Membranes are 0.012" in thickness. For 0.025" thickness, add T suffix after part number, i.e. HM-4180.28T

Membrane Stretcher	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4181.14	HM-4181.15	HM-4181.20	HM-4181.28	HM-4181.40	HM-4181.60	HM-4181.14	HM-4181.15	HM-4181.20	HM-4181.28	HM-4181.40	HM-4181.60

Simple & effective method of sheathing (encasing) sample with latex membrane without creasing or damaging the sleeve.

O-Rings	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4182.14	HM-4182.15	HM-4182.20	HM-4182.28	HM-4182.40	HM-4182.60	HM-4182.14	HM-4182.15	HM-4182.20	HM-4182.28	HM-4182.40	HM-4182.60

For sealing membranes from confining fluid and sample. Neoprene. 12/pkg.

O-Rings Placing Tool	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4183.14	HM-4183.15	HM-4183.20	HM-4183.28	HM-4183.40	HM-4183.60	HM-4183.14	HM-4183.15	HM-4183.20	HM-4183.28	HM-4183.40	HM-4183.60

Positions rings to seal membrane with minimum disturbance to specimen.

Porous Stones	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4184.35	HM-4184.38	HM-4184.50	HM-4184.70	HM-4184.100	HM-4184.150	HM-4184.14	HM-4184.15	HM-4184.20	HM-4184.28	HM-4184.40	HM-4184.60

Used for permeability and triaxial testing to allow even distribution of water through sample. Two stones required per cell, each 1/4" thick (6mm).

Membrane Tester	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4185.14	HM-4185.15	HM-4185.20	HM-4185.28	HM-4185.40	HM-4185.60	HM-4185.14	HM-4185.15	HM-4185.20	HM-4185.28	HM-4185.40	HM-4185.60

Tester is easy to use for quick visual detection of possible flaws in membranes.

2-Part Split Miter Box	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-3847.35	HM-3847.38	HM-3847.50	HM-3847.70	HM-3847.100	HM-3847.150	HM-3847.14	HM-3847.15	HM-3847.20	HM-3847.28	HM-3847.40	HM-3847.60

For use with undisturbed samples and for sample trimming of cohesive soils. Made from non-ferrous metal.

2-Part Vacuum Split Former	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-3827.35	HM-3827.38	HM-3827.50	HM-3827.70	HM-3827.100	HM-3827.150	HM-3827.14	HM-3827.15	HM-3827.20	HM-3827.28	HM-3827.40	HM-3827.60

For use with non-cohesive soils and disturbed samples. Made from non-ferrous metal. Larger sizes require use of supporting jacks.

Sample Trimmer with Knife	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4186.14	HM-4186.15	HM-4186.20	HM-4186.28	HM-4186.40	HM-4186.60	HM-4186.14	HM-4186.15	HM-4186.20	HM-4186.28	HM-4186.40	HM-4186.60

Used to trim sample ends or cut sample to a specific length.



HM-4189.28



HM-4189FS



HM-4179.28

Filter Paper	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4189.15	HM-4189.15	HM-4189.20	HM-4189.28	HM-4189.40	HM-4189.60	HM-4189.15	HM-4189.15	HM-4189.20	HM-4189.28	HM-4189.40	HM-4189.60

Used to prevent soil from penetrating into porous stones or into panel. 100/pkg.

Filter Paper Strips	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4189FS											

Wrapped around sample to accelerate saturation in triaxial testing, 5 x 150mm, Grade 55, 100/pkg.

Base Disk	35mm	38mm	50mm	70mm	100mm	150mm	1.4"	1.5"	2.0"	2.8"	4.0"	6.0"
	HM-4179.35	HM-4179.38	HM-4179.50	HM-4179.70	HM-4179.100	HM-4179.150	HM-4179.14	HM-4179.15	HM-4179.20	HM-4186.28	HM-4179.40	HM-4179.60

Acrylic disk used in UU triaxial tests.

High Vacuum Grease— HM-4198
Effective means of sealing latex membranes to sides of the top cap.



HM-4198



HM-4175

Digital Pore Pressure Set— HM-4175
For accurately measuring and monitoring pore water pressures and back pressure. For determining level of saturation ("B" parameter) during saturation stages of triaxial/permeability tests. Includes readout, pore pressure transducer, and de-airing block assembly.
Shipping wt. 8 lb. (3.63kg)

De-Airing Water Tank— For use with Triaxial/Permeability Distribution Panels. Cast acrylic chamber, 6" dia x 16"H (152 x 406mm). Head plate mounted with three fittings. One is modified to allow 1/4" tubing to pass through to tank bottom, one for filling with tap water and the other for extracting the water once de-aired. The third fitting is used to connect vacuum/pressure to tank. Shipping wt. 13 lb. (5.8kg)

Nold De-Aerator Water System— HM-4187
Completely self-contained unit produces 8-liter batches of de-aired water without the use of heat. Combined mechanical agitation and vacuum evacuation removes gasses at much higher rate than conventional heat-boiling methods. Will de-air water to less than 0.5 pph dissolved oxygen in 4 minutes. 1/55hp motor 110V, 60Hz. 7.5 x 7.5 x 20" (190 x 190 x 508mm). Shipping wt. 19 lb (8.6kg)

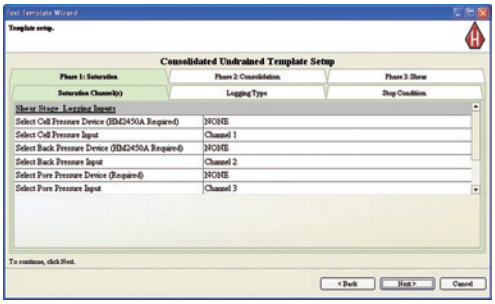


HM-4187E

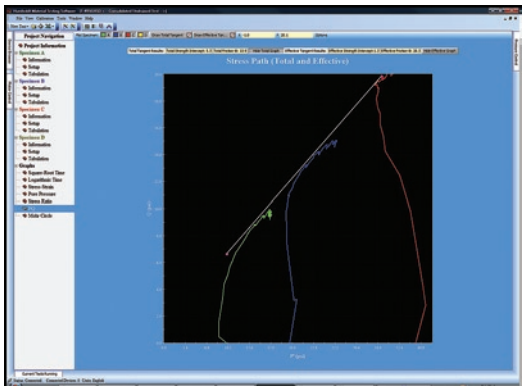


HM-4187





Test templates for quick test setup.


Stress Path graph from CU test.

Humboldt Material Testing Software (HMTS) provides a complete solution for the acquisition, recording and presentation of test data, as well as controlling testing operations when used in conjunction with compatible Humboldt testing equipment. HMTS works in conjunction with Microsoft Excel to present test data in easy-to-read Excel workbook format files, which can be evaluated directly or sent to any computer using Microsoft Excel. The HMTS is configured in two levels of functionality.

Basic, User-Defined Level

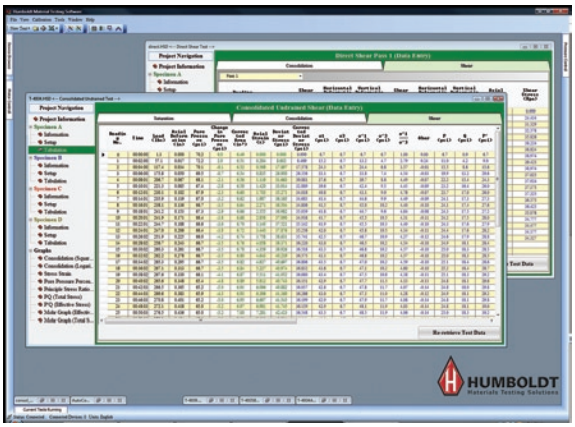
The basic solution, or user-defined level, is provided free with our HM-3000 MasterLoader, HM-2325A and HM-2330D MiniLoggers, HM-2560A ShearScan 10 and the HM-2700A and HM-2700D Direct Residual Shear Machines. This free software allows you to:

- set up and run user-configured tests;
- save test configurations as templates for rapid setup of future tests;
- collect and view data in real time with basic graphing functions;
- generate graphs in real time through the use of custom-designed Excel templates for report generation and printing, and
- simultaneously run multiple tests on one computer—based on the number of Humboldt logger-capable machines listed above you have connected.

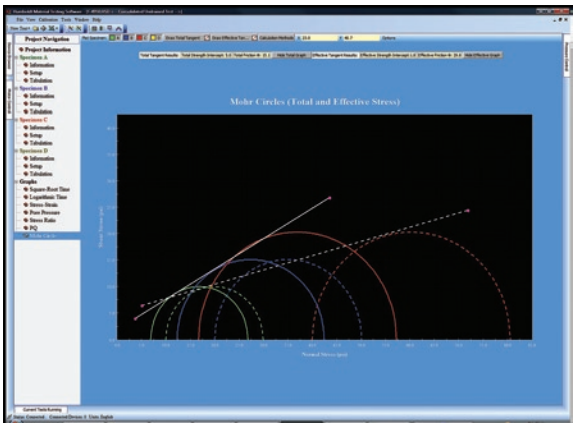
Advanced, Module Level

The advanced version of the HMTS involves upgrading the capabilities of the basic HMTS by purchasing and registering test-specific modules that are unlocked with a registration code. Purchasing test-specific modules allows you to go beyond the functionality of the basic software by providing you with the following capabilities:

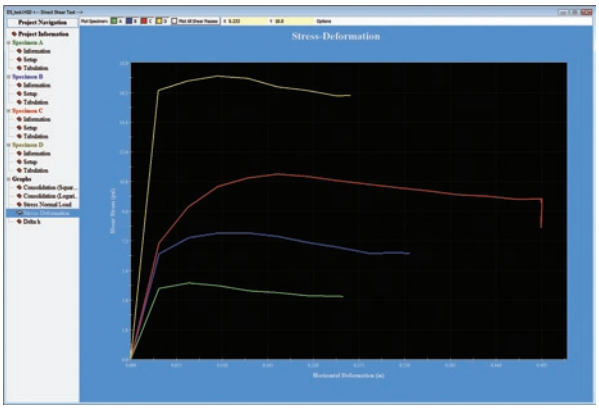
- test-specific setup that guides you through the process, which includes selecting data collection parameters that best fit the specific test;
- input specific project information for each test, such as project name, client information, etc;
- all test-specific initial, intermediate, and final parameters required by ASTM and BS standards is dynamically calculated for you, based on your input of specimen information, such as size, weight, etc.
- tabulated test data, graphs and all test-specific calculations are provided in real time, allowing you to monitor tests in process;
- generate test-specific reports that include all graphs and data presented in the projects. Reports are generated in Microsoft Excel workbooks allowing you to modify any report template to fit your company's needs
- simultaneously run multiple tests on one computer, involving any of the available HMTS modules and any compatible Humboldt equipment up to 255 device connections, which is up to 1020 inputs;
- create and store test-specific test setup templates for rapid setup of future tests;
- produce test-specific graphs, which allow you to draw construction lines to calculate angles and other test-specific parameters;
- automatically recover from a PC shutdown without loss of data;
- single click between imperial and metric units;
- easily change between different test standards, and
- access free, downloadable software upgrades for purchased modules.



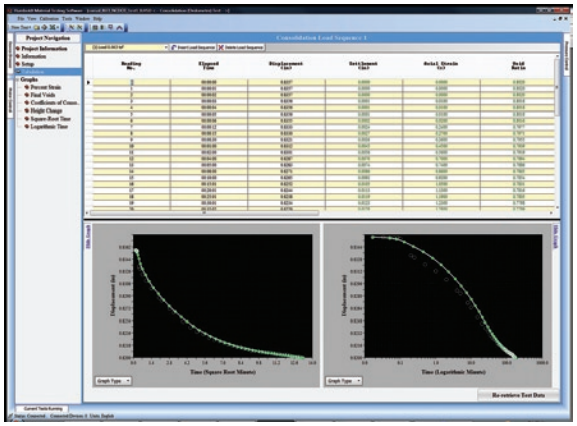
Data Entry Tabulation from CU Shear and Direct Shear tests.



Mohr Circles plot from CU test.



Stress Deformation graph from Direct Shear test.



Consolidation tabulation with plots.

Available advanced modules include:

Consolidation (ASTM D2435)— HM-1100SW

Direct Shear (ASTM D3080)— HM-2700SW

CBR/LBR (ASTM D1883)— HM-3001SW

Unconfined Compression (ASTM D2166)— HM-3004SW

UU Triaxial (ASTM D2850)— HM-3002SW

CU/CD Triaxial (ASTM D4767)— HM-3003SW

Marshall Design (ASTM D6927)— HM-3005SW

Operating System Requirements

Windows 2000 (with at least Service Pack 4), Windows XP Professional, Windows XP Home, and Windows Vista. Other Windows versions, such as Windows 3.1, Windows 95, 98, and NT are not supported.

Software Requirements

Microsoft® Excel is required for creating reports.

Hardware Requirements

- Pentium® 4 (32-bit) equivalent or faster
- Minimum 512 MB RAM (1024 MB or more recommended)
- 300 MB swap space (or more)
- CD-ROM or DVD Drive
- 1024 x 768 display resolution

Internet Connection

As recommended above, it is highly recommended that you have an internet connection. With an internet connection you can:

- Check for updates.
- Automatic updates are performed.
- Tests can be sent to Humboldt or to anyone you choose.
- Humboldt can be notified of issues.
- Registration can be sent directly to Humboldt for quicker processing.
- In the event of issues with the software we can connect to your computer remotely and help you.

How to Use the Software

The HMTS disk contains the complete HMTS offering including all test-specific modules. After installation on your computer, you will be able to use the Basic Level software capabilities for any applicable application, for as long as you like for free. You will also be able to use all the Advanced Level Modules, with full capabilities 20 times for each test module as a free trial. The software will keep track of the number of uses and display the remaining number of tests available on the screen.



HM-2325A.3F

HM-2330D.3F

MiniLoggers—
You can fully automate your test data collection by using one of these MiniLoggers. The MiniLogger is a simple-to-use, four channel, stand-alone data-logging system specifically designed for use in: Soil Testing, such as: Triaxial, Consolidation, Direct Shear, CBR/LBR Unconfined Compression; Asphalt Testing, such as: TSR Hveem; Flow/Stability; and, Cement Testing such as: Soil/Cement and Cement Cubes.

Features include:
- Four channels with real-time data acquisition
- Backlit LCD display
- RS232 interface for computer or printer.
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversation of instrument calibration between English or Imperial units and SI or metric units
- Test setup and selection via keypad
- Automatic triggering of test logging data
- View logged test data via the LCD display
- Logging rate as fast as 0.1 second/reading
- Windows-based software included for viewing and exporting test data into an Excel format files with plug and play features.
- Up to sixteen units can be connected to a computer.

Specifications

Data Storage	1000 readings/channel
Voltage	110/220 VAC 50/60Hz
Weight	6 lbs. (2.7Kg)
Dimension (L x W x H)	8.3 x 9.5 x 4.7 inch (210 x 240 x 120mm)

Computer (Software/Hardware)
Windows 98, Windows 2000, Windows XP compatible, Pentium III or better, 512 Mbytes of RAM, 30Mbytes of space in hard drive.





MiniLogger— HM-2325A.3F
- Ideal with instruments, such as Pressure Transducers, Load Cells, and Strain Transducers.
- Four individual, 16-bit analog to digital converters
- Instrumentation excitation supply of 10 VDC
- Analogue outputs for XYt chart recorder
- To be used with instruments with an output of 0 up to 100 mvdc



MiniLogger— HM-2330D.3F
- For use with Digital Indicators
- Four individual, Digital Indicator inputs.
- Instrumentation excitation supply of 5 VDC.



H-4454. 050D

H-4454. 050



HM-2300.020

HM-2300.100

Load Rings—

Sometimes called "Proving Rings," Load Rings are used with various asphalt, concrete, or soil instrumentation to measure loads, and are ideal for use with our MasterLoader compression machines, Direct Shear machines and other testing equipment.

Our high quality tensile steel rings have spherical seatings suitable for all shear boxes and load frames. Each load ring is shipped with a fitted dial gauge and calibration certificate, and supplied with tables listing all measurement units. 8-1/4" (210mm) high, 3/4-16 UNF thread female mounting. Available with digital indicators compatible with data acquisition systems. Eight models range in size from 110 to 22,000 lbf (0.5 to 100.0 kN). Meet ASTM E74.

Load Ring with Dial Gauge

lbf	kN	kgf	Model
110	0.5	50	H-4454.001
220	1.0	100	H-4454.002
550	2.5	250	H-4454.005
1100	5.0	500	H-4454.010
2200	10.0	1000	H-4454.020
5500	25.0	2500	H-4454.050
11000	50.0	5000	H-4454.100
22000	100.0	10000	H-4454.200

Load Ring with Digital Indicator

lbf	kN	kgf	Model
110	0.5	50	H-4454.001D
220	1.0	100	H-4454.002D
550	2.5	250	H-4454.005D
1100	5.0	500	H-4454.010D
2200	10.0	1000	H-4454.020D
5500	25.0	2500	H-4454.050D
11000	50.0	5000	H-4454.100D
22000	100.0	10000	H-4454.200D

S-Type Load Cells—

Load cells are bi-directional for both tension and compression loads. Constructed from stainless steel. Load cells can be used with various instrumentation to measure loads. Includes: 6 ft. cable with 5-pin DIN plug and calibration certificate.

Performance Specifications:

Excitation Voltage:	10 VDC, Maximum 15 VDC
Rated output:	3.0 mv/V Minimum
Non-linearity:	0.03% Full Scale Output
Hysteresis:	0.02% FSO
Non-repeatability:	0.01% FSO
Creep (30 minutes):	0.03% FSO
Zero Balance:	±1.0% FSO
Bridge resistance	
Input:	350 ohms, nominal
Output:	350 ohms, ±3.5 ohms
Overload	
Safe Static:	150% of Rated Capacity
Ultimate:	175% of Rated Capacity
Temperature	
Compensated range:	0-150°F
Effect on output:	0.0006% FSO/°F
Effect on zero:	0.0008% FSO/°F
Finish:	Nickel-plated or Stainless Steel
Seal:	Waterproof

S-type Load Cells

	Model
Load Cell 500 lbf (2.5 kN)	HM-2300.005
Load Cell 1000 lbf (5 kN)	HM-2300.010
Load Cell 2000 lbf (10 kN)	HM-2300.020
Load Cell 5000 lbf (25 kN)	HM-2300.050
Load Cell 10000 lbf (50 kN)	HM-2300.100
Single Channel Readout	HM-2350

Other capacities and styles of Load Cells are available, such as pancake and submersible, please contact Humboldt for information.



HM-2310.10

Linear Strain Conversion Transducers (LSCT)
Extremely accurate and reliable strain gauge instruments. Compact size does not require a module. High resolution and performance superior to LVDT.

- Less than 250g spring force on spindle
- Non-linearity better than ± 0.1% of full scale deflection
- Hysteresis-compensated with linearity better than ± 0.1% of full scale in both directions
- Negligible temperature effect

Stainless steel casing for environmental protection. Operating temperature range 0 to 70°C. Requires input of 10V dc; output up to 6.5 mV per volt.

LSCT

Range	Resolution	Model
Linear strain transducer, .4" (10mm)		HM-2310.04
Linear strain transducer, 1.0" (25mm)		HM-2310.10
Linear strain transducer, 2.0" (50mm)		HM-2310.20

LSCT Mounting Bracket— HM-4178BRT
Bracket used for CBR and 3" bracket.

LSCT Mounting Bracket— HM-2310BR
Bracket used in mounting LSCT to equipment in replacement of dial gauge.

LSCT Mounting Bracket— HM-4193BR
Bracket used in mounting LSCT or dial gauge to the upper part of a triaxial cell with a 5/8" (15.5mm) dia. ram for strain measurement. (HM-2310BR also required for use with LSCT.)



HM-4170

HM-4170B



HM-4172

Digital Pressure Transducer— HM-4172
Solid state transducer/readout unit incorporates the latest semiconductor technology into a high-quality, yet inexpensive strain gauge. Three-digit readout display has ±.25% of full scale accuracy—comparable to others at twice the cost. Battery operated with very long battery life—typically up to 5 years. On/off button at top of readout has factory set "on" time built into the memory. Readout shuts off automatically after 20 minutes.



H-4470

Magnetic Indicator Mount— H-4470
Convenient, portable mount for mounting indicators and gauges. Mount has magnetic base, which mounts on flat or curved metallic surfaces. Non-magnetic stainless steel holding rod is 6 x 1/4" (154 x 6.4mm) and set in hardened ball socket so indicator or gauge may be mounted in almost any position.

Pore Pressure Transducer— HM-4170
Highly accurate, 200 psi (1400 kPa) Pore Pressure Transducer. Designed for geotechnical lab applications with outstanding overload protection and protected from corrosive water. Requires input of 10 V DC, with an output of 100 mV. Supplied with 2 meter cable and 5-pin DIN plug.

6 Ft. Extension Cable— HM-4170EC
6-foot extension cable for Pore Pressure Transducer.

De-Airing Block— HM-4170B
For use with Pore Pressure Transducer

Dial Gauges, Extensions



HM-4469.10



H-4158.1



H-4665.25CC

Digital Indicators—
Switchable inch/metric digital indicator is accurate to ±.0001" (.002mm). Instant zero feature. Locks in maximum reading on LCD display with characters 0.240" high and 0.115" wide. Runs either clockwise or counter clockwise. Operates with replaceable batteries or AC power with automatic shutoff. Will replace any mechanical dial gauge.

Digital Indicators

Range	Resolution	Model
.250"/ 6.35mm	.0001"/.002mm	HM-4469.02
.600"/ 15.0mm	.0001"/.002mm	HM-4469.05
1.0"/ 25.4mm	.0001"/.002mm	HM-4469.10
2.0"/ 50.0mm	.0001"/.002mm	HM-4469.20
4.0"/ 101.6mm	.0001"/.002mm	HM-4469.40

AC Adapter for Digital Indicator— HM-4469AC
Allows Indicator to run off AC power.

Data Cable for Digital Indicator— HM-4469C
Serial Data Cable for Digital Indicator— HM-4469RS
USB Data Cable for Digital Indicator— HM-4469USB
Data cables to transfer data from indicator to MiniLogger, Load Frame or computer.

6' Data Cable Extension— HM-4170EC

25' Data Cable Extension— HM-2310C

Gauge Contact Point Extensions—
Used in applications where gauges require longer contact points to ensure correct gauge placement. Contact Points feature hardened steel points with polished tip to prevent scratching. Points fit all standard indicators and gauges.

Contact Point Extensions	Model
.25" (6.4mm) Extension	H-4466.2
1" (25mm) Extension	H-4466.10
1.5" (38mm) Extension	H-4466.15
2" (50mm) Extension	H-4466.20
3" (76mm) Extension	H-4466.30
5" (127mm) Extension	H-4466.5

Dial Gauges
Indicators are built to American Gauge Design Specifications for accuracy and are used in field and laboratory testing applications. Dials are high-quality, low-friction type, designed for long life and accurate repeatable readings. All dial indicators have continuous graduations and revolution counters that show revolutions of the indicator hand. They are furnished with a lug back (with a 90° mounting hole to be used vertically or horizontally), a regular contact point .25" long, and a dust cap. Dials listed are clockwise rotation; counter-clockwise rotation see note below.

Dial Gauges, Inches

Range	Division	Diameter	Brake	Model
.200"	.0001"	2.25"	No	H-4460
.200"	.0001"	2.25"	Yes	H-4461A
.300"	.0001"	2.25"	No	H-4462
.500"	.0001"	2.25"	No	H-4471
1.000"	.001"	2.25"	No	H-4158.1
2.000"	.001"	2.75"	No	H-4463
3.000"	.001"	2.75"	No	H-4464
4.000"	.001"	2.75"	No	H-4465
5.000"	.001"	2.75"	No	H-4466

For counter-clockwise dial indicators add "CC" suffix to part number, i.e.: H-4460CC.

Dial Gauges, Metric

Range	Division	Diameter	Brake	Model
8mm	.002mm	57mm	No	H-4465.08
12mm	.002mm	57mm	No	H-4465.12
25mm	.010mm	57mm	No	H-4465.25
50mm	.020mm	70mm	No	H-4465.50

For counter-clockwise dial indicators add "CC" suffix to part number, i.e.: H-4465.08CC.



H-4466.30
H-4466.15
H-4466.10



Concrete

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H-2783


H-2786C replacement parts on page 82

H-2786C


H-2786

All our Type B Concrete Air Meters feature our all-brass H-2785.DB Super Pump for reliability and faster operation. All air meters meet ASTM C231; AASHTO T152.

Humboldt Pressure Meter— H-2783
Easy-to-use stainless clamping system employs four, one-piece, self-locking clamps to seal lid to base with proper tension. O-ring assures watertight seal. Easy-to-read (to nearest 1/10th %) 4-inch diameter direct percentage gauge with calibration adjustments. Features all-brass H-2785.DB super pump for reliability and faster operation. Unique pop-it valve eliminates seal failures. Complete with high-impact horizontal plastic carrying case, syringe, tamping rod, strike-off bar, calibration vessel, inside and outside calibration tubes and instructions.

Press-Ur-Meter— H-2786
The original Press-Ur-Meter for field and laboratory tests, 1/4-cu.-ft. (.007m^3) air meter is designed to determine air content, determination of specific gravity and free moisture test of aggregates. Designed to save time, reduce water used, ensure accuracy and maintain sample integrity (sample may be used for slump and compression tests). Features built-in, all-brass H-2785.DB super pump. Furnished with all necessary accessories for calibration and operation and carrying case. Overall height: 20-1/2" (521mm). Shipping wt. 36 lbs. (16.4kg)

Press-Ur-Meter— H-2786P
Same as H-2786 except that it comes with a plastic carrying case.

Press-Ur-Meter— H-2786C
Economy model similar to H-2786 except that the needle valve, the air release lever and the handles on the pressure chamber have been eliminated. A third petcock has been added for pressure release. This model comes with a metal carrying case.

Plastic Air Meter Calibrator— H-2788
Calibrator checks the accuracy of any pressure-type concrete air meter. Set the specially designed canister upright at the bottom of the water-filled base, and the meter should read 5% air by volume. Two calibrators will check 10% air reading.
Dimensions: 4" dia. x 3-3/4" (102 x 95mm).

Brass Air Meter Calibrator— H-2789
Same concept as calibrator above, this model is constructed from machined brass for greater durability.

Super Pump for Press-Ur-Meter Type B— H-2785.DB
The Super Pump's all brass construction resists acids in cement. All parts, including valve, are replaceable. For use with all Type B airmeters.

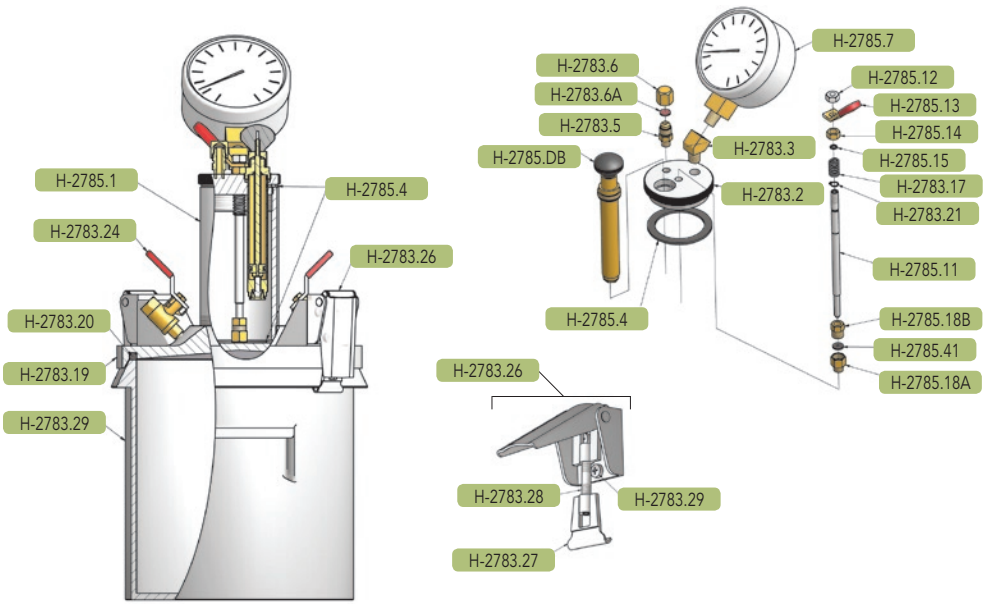

H-2785.DB


H-2788


H-2789

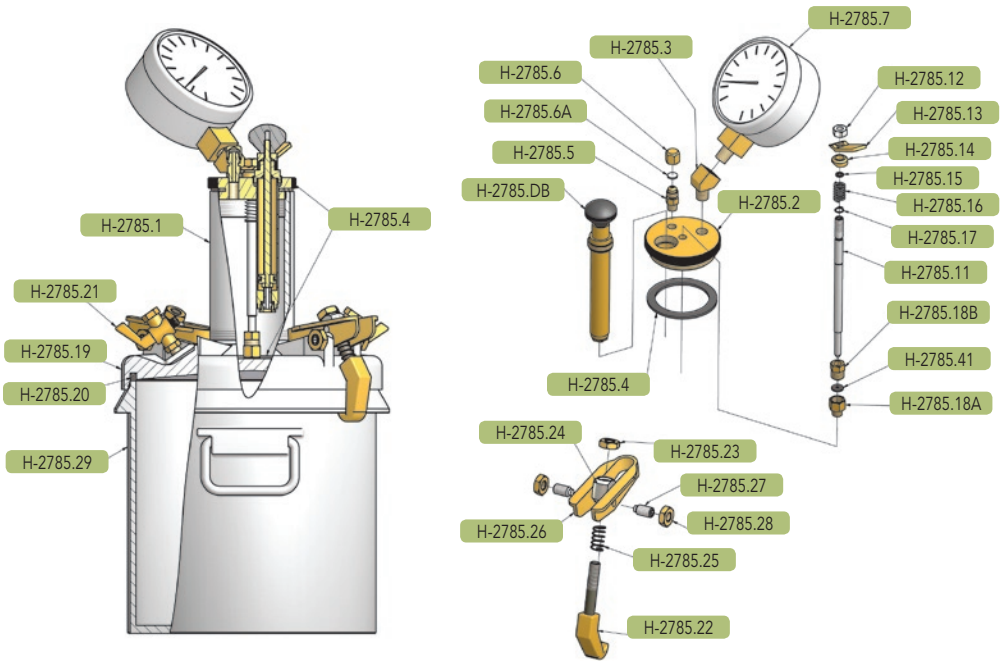
H-2783 Replacement Parts

H-2785.1	Pressure chamber
H-2783.2	Pressure chamber cap
H-2783.3	Pressure chamber elbow
H-2785.4	Pressure chamber gasket
H-2783.5	Air-release stem
H-2783.6	Air-release cap
H-2785.7	Air meter gauge
H-2783.6A	Release cap gasket
H-2785.11	Needle valve stem
H-2785.12	Needle valve nut
H-2785.13	Needle valve lever
H-2785.14	Needle valve spacer
H-2785.15	Needle valve O-ring
H-2783.17	Needle valve spring
H-2785.18A	Needle valve seat assembly
H-2785.18B	Needle valve seat bushing
H-2783.19	Cover
H-2783.20	Cover O-ring
H-2783.21	Needle valve spring retainer
H-2783.24	Cover Petcock
H-2785.29	Base
H-2785.41	Needle valve seat gasket
H-2785.51	Pump piston O-ring
H-2785.53	Pump tube O-ring
H-2783.26	Latch Assembly
H-2783.27	Latch
H-2783.28	Clamp Tap
H-2783.29	Latch Assy. screw
H-2785.DB	Super Pump Assembly



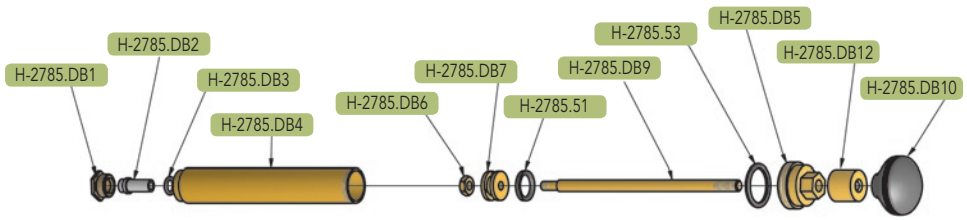
H-2786 Replacement Parts

H-2785.1	Pressure chamber
H-2786.2	Pressure chamber cap
H-2785.3	Pressure chamber elbow
H-2785.4	Pressure chamber gasket
H-2785.5	Air-release stem
H-2785.6	Air-release cap
H-2785.6A	Release cap gasket
H-2785.7	Air meter gauge
H-2785.11	Needle valve stem
H-2785.12	Needle valve nut
H-2785.13	Needle valve lever
H-2785.14	Needle valve spacer
H-2785.15	Needle valve O-ring
H-2785.16	Needle valve spring
H-2785.17	Needle valve spring retainer
H-2785.18A	Needle valve seat assembly
H-2785.18B	Needle valve seat bushing
H-2785.19	Cover
H-2785.20	Cover O-ring
H-2785.21	Cover Petcock
H-2785.22	Clamp
H-2785.23	Clamp nut
H-2785.24	Clamp trunnion
H-2785.25	Clamp spring
H-2785.26	Clamp toggle
H-2785.27	Clamp toggle set screw
H-2785.28	Clamp toggle lock nut
H-2785.29	Base
H-2785.41	Needle valve seat gasket
H-2785.51	Pump piston O-ring
H-2785.53	Pump tube O-ring
H-2785.DB	Super Pump Assembly



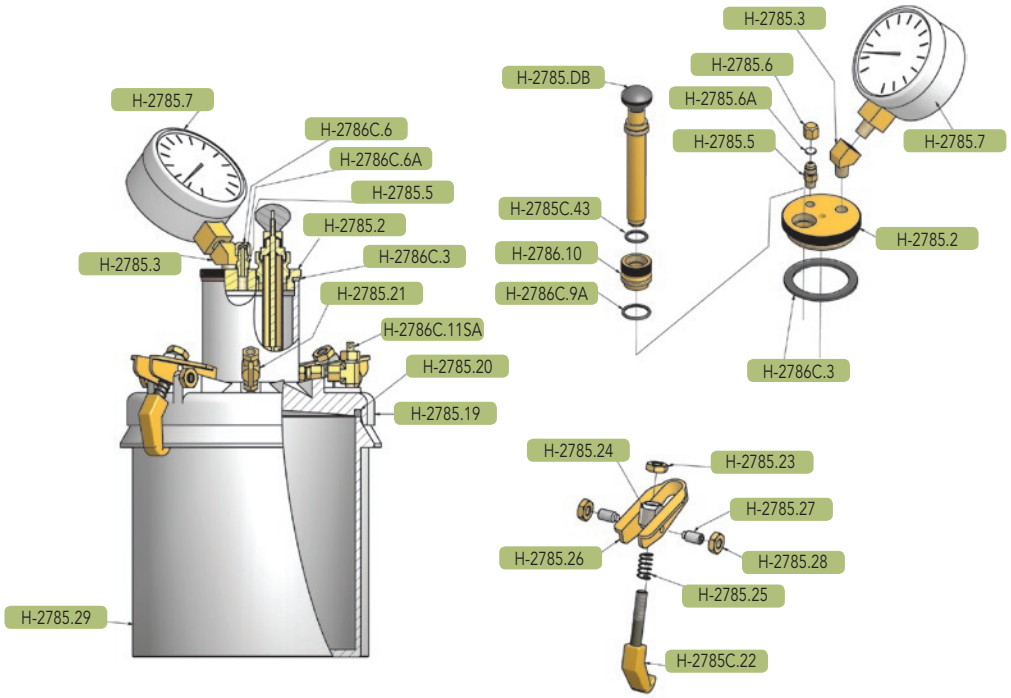
H-2785DB Super Pump Replacement Parts

H-2785.DB1	Valve nut
H-2785.DB2	Valve
H-2785.DB3	Valve O-ring
H-2785.DB4	Pump tube
H-2785.DB5	Pump cap
H-2785.DB6	Stem nut
H-2785.DB7	Pump piston
H-2785.DB9	Pump stem
H-2785.DB10	Pump handle
H-2785.DB12	Stem cap
H-2785.51	Pump piston O-ring
H-2785.53	Pump tube O-ring



H-2786C Replacement Parts

H-2785.2	Pressure chamber cap
H-2785.3	Pressure chamber elbow
H-2786C.3	Pressure chamber gasket
H-2785.5	Air-release stem
H-2786C.6	Air-release cap
H-2786C.6A	Release cap gasket
H-2785.7	Air meter gauge
H-2786C.11SA	Valve assembly complete
H-2785.19	Cover
H-2785.20	Cover o-ring
H-2785.21	Cover Petcock
H-2785C.22	Clamp
H-2785.23	Clamp nut
H-2785.24	Clamp trunnion
H-2785.25	Clamp spring
H-2785.26	Clamp toggle
H-2785.27	Clamp toggle set screw
H-2785.28	Clamp toggle lock nut
H-2785.29	Base
H-2785.51	Pump piston o-ring
H-2785.53	Pump tube o-ring
H-2785.DB	Super pump assembly
H-2785C.43	Upper o-ring for adapter
H-2786.10	Super Pump adapter
H-2786C.9A	Lower o-ring for adapter







Chase Concrete Air Indicator Kit— H-2756

(Isopropyl-Alcohol Method)
Complete kit for measuring air content of fresh concrete includes H-2755 air indicator, instructions, cleaning brush and plastic squeeze-type bottle for alcohol in plastic storage box. Meets AASHTO T199.

Chase Concrete Air Indicator— H-2755

(Isopropyl-Alcohol Method)
For quick field checks for air content of fresh concrete in about three minutes, pocket-sized unit air meter is furnished with instructions and correlation chart. Unit does not replace conventional 1/4 and 1/2-cu. ft. (.007 and .014m^3) air meters. Overall dimensions: 6-1/4 x 1-1/8" dia. (159 x 29mm). Meets AASHTO T199.

Chase Air Indicator Glass Filter Tube Only— H-2755.2

Roll-A-Meter Air Indicator
Brass— H-2795
Aluminum— H-2796

Rolling or washout method air indicator for use with any aggregate not exceeding 2" (51mm). Capacity in base section: 130 cu. in. (2130cm^3). Easy to handle in the field. Requires no special training or computation. Includes instructions and carrying case.
Height: 22" (559mm). Max. OD 8" (203mm).
Meets ASTM C173; AASHTO T196.

Volumetair Air Meter— H-2795P

The Volumetair is used for the rolling method of measuring entrained air in any concrete. This ultra lightweight and easy-to-use instrument is supplied complete with the meter, funnel, syringe, tamper, calibration cup, mallet, strike-off bar and plastic carrying case. The plastic materials used in the construction of this unit not only make it lightweight; but also allow the user to use water for clean-up and small amounts of muriatic acid for periodic cleaning. The sight tube has a range of 0 to 9% and the base volume is 134 cu. in. (2200ml). Meets ASTM C173.

ASTM C31, C143, C172, C192, C232; AASHTO T23, T119, T126, T141, T158.

SLUMP CONE SETS



Slump Cone Test Set— H-3635
For measuring slump of freshly mixed concrete. Set includes: H-3636 Base Plate, H-3638 Funnel, H-3639.20 Brush, H-3640 Slump Cone (standard steel), H-3651 Tamping Rod w/ 6" scale on handle, H-3731 Scoop. Shipping wt. 25 lbs. (11.3kg).



Portable Slump Cone Set— H-3637
Set includes: H-3636 Base Plate, H-3640 Slump Cone (standard steel), H-3651 Tamping Rod w/ 6" scale on handle.
Shipping wt. 19 lbs. (8.6kg).



Slump Test Set— H-3645
Set includes: H-3640 Slump Cone (standard steel), H-3800 Brush, H-3650 Tamping (Puddling) Rod, H-3725 Cement Immersion Pan, H-3760 Trowel.
Shipping wt. 24 lbs. (10.9kg)

INDIVIDUAL COMPONENTS

Steel Slump Cone— H-3640
Steel slump cone has plated finish to resist rust. Fitted with handles and foot lugs for use with H-3636 base plate. 8" (203mm) dia. at base, 4" (102mm) dia. at top and 12" (305mm) high.
Shipping wt. 6 lbs. (2.7kg)

Metric Slump Cone— H-3640M
Same as above except with metric dimensions: (200mm) dia. at base, (100mm) dia. at top and (300mm) high.

Plastic Slump Cone— H-3640P
Lightweight, plastic slump cone will not dent or rust and can be cleaned with an acid bath. Formed with handles and foot lugs for use with H-3636 base plate. 8" (203mm) dia. at base, 4" (102mm) dia. at top and 12" (305mm) high.

Cement Immersion Pan— H-3725
Durable steel pan, 24" x 24" x 3"

Funnel— H-3638
Aluminum funnel, use with all slump cones to assist in filling.

Tape Measure— H-4901
16 ft. inch/metric tape measure

Brush, 8" Handle— H-3639.8
8 inch acid-proof crete brush

Brush, 20" Handle— H-3639.20
20 inch acid-proof crete brush

Scoop— H-3731
One-piece aluminum scoop

Trowel— H-3760
Steel blade with wooden handle





Field Testing Video CD— CFT06
Video CD that covers ASTM concrete field testing with presentations and test specific videos that explain and show the step-by-step procedures needed to accomplish each test.

Base Plate— H-3636
Cast-aluminum base plate firmly holds all slump cone models, permitting one person to conveniently perform test. Base clamps turn down over cone foot lugs to secure entire assembly. Movable handle raises vertically over specimen (after removal of cone) and slump is easily measured with the 6" scale cut into handle end of H-3651 tamping rod.

Graduated Tamping Rod— H-3651
Tamping Rod with 6" scale in 1/4" increments engraved on handle for measuring amount of slump when handle of H-3636 base is raised over specimen.

Tamping (Puddling) Rod— H-3650
Round, straight steel rod for use with concrete cylinder molds, slump cones and unit weight measures. Rod measures 5/8" (16mm) dia. x 24" (600mm) long. Both ends rounded to hemispherical tip. Plated for rust resistance.



H-3643

K Slump Tester— H-3643
For in-place measurements of forms and test molds. Tester indicates correlation to the slump test. Probe determines the workability of concrete and the degree of compaction after being placed in the forms. Includes correlation chart and instructions.



H-3655

Ball Penetration Apparatus (Kelly Ball)— H-3655
Ball Penetration Apparatus (Kelly Ball), 20lb.— H-3655-20
Determines depth of penetration of metal weight into plastic concrete. Apparatus consists of 30 lb. (14kg) cylinder with hemispherically shaped bottom and handle. Stirrup or frame guides handle and acts as reference for measuring depth of penetration. Handle is graduated in 1/4" (6.4mm) increments on one side and half-centimeter increments on the other side. Concrete may be tested as placed in the forms prior to any manipulation or in a suitable container. Meets ASTM C360; AASHTO T183; California Test Method CTM533. Shipping wt. 40 lbs. (18kg)



H-3656

Ball Penetration Apparatus Carrier— H-3656
Heavy-duty, cast-aluminum design with quick release latches. Provides convenience for the operator and protection to Kelly ball when transporting to and from the job site.



H-3648



H-3649

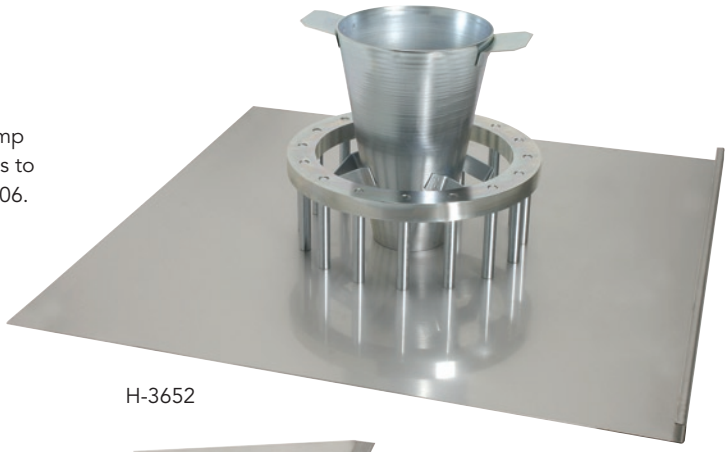
Vebe Consistometer (ASTM C1170)— H-3648
Vebe Consistometer (ASTM C1176)— H-3649
Model H-3648 conforms to ASTM C1170 for determining the consistency and density of roller-compacted concrete. The unit is comprised of a vibrating table, swing arm with guide sleeve for the 50 lb surcharge weight and a test mold. Model H-3649 conforms to ASTM C1176 for determining the consistency and density of roller-compacted concrete. The H-3649 is comprised of a vibrating table, swing arm with guide sleeve for the 20 lb surcharge weight and a test mold.

Self Consolidating Concrete (SCC) Flowability

These tests are used to determine the flowability and passing ability of self-consolidating concrete (SCC), ASTM C1621. Passing ability refers to the ability of SCC, under its own weight (without vibration), to flow into and completely fill the spaces within intricate framework, containing obstacles such as reinforcement bars.

J-Ring Test Set, Smooth Rods— H-3652

Provides a method to measure the distance of lateral flow of Self Consolidating Concrete. Designed for durability, the set includes a slump cone, J-Ring with smooth rods, and steel baseplate with engraved rings to measure flow distance. Complies with ASTM standards C1621/1621M-06.



H-3652

J-Ring Test Set, Rebar Rods— H-3652R

Same as above except J-Ring has rebar rods.

Individual Components	
J-Ring, Smooth Rods	H-3654
J-Ring, Rebar Rods	H-3654R
Stainless Steel Base Plate, Engraved	H-3653
Slump Cone	H-3640

L-Box Flowability Test— H-3658

Method used to determine flow rates and passibility of SCC in confined spaces. Test box is comprised of concrete reservoir, slide gate, three obstacles and test basin. Includes metal strikeoff bar.

V-Funnel Flowability Test— HC-3665

Stainless steel construction with 10L capacity. Upper edge is smooth and reinforced and the outflow orifice is equipped with seal valve. Includes polyethylene box to collect discharge and 900mm long straight edge to level concrete before test.



HC-3665

Static Segregation Column Mold— HC-3666

Used to determine the potential static segregation of self-consolidating concrete. An easy-to-use clamping and collection system allows the segregation test to be conducted by a single operator. Built with Schedule 40 PVC, the 8" diameter mold has sections of 6.5", 13", and 6.5" in height. The supporting base is 15" x 15". The 2 collection plates are 8.5" wide stainless steel.



HC-3666

Self Consolidating Concrete Video Training CD— SCC07

Use this interactive CD to train your technicians on how to properly test self-consolidating concrete (SCC) in the field and laboratory. The CD covers ASTM C1610– Column Segregation, C1611– Slump Flow, and C1621– Passing Ability, J-Ring. The CD also includes information on the basics of SCC. Each test procedure is explained using slide presentations, test specific video demonstrations, glossary of terms, and a step-by-step procedural outline. Use the multiple choice quiz to assess your knowledge of the test procedure. Comes with a Multi-User license.



SCC07



H-3658



H-4133

H-4133N



H-4137



H-4132



H-4134F

H-4134

Acme Penetrometer— H-4133

Hydraulic reaction-type apparatus for determining the setting time of concrete with slump greater than zero by testing mortar sieved from the concrete mixture. It also determines the effects of variables such as temperature, cement, mixture proportions, additions and admixtures upon the time of setting and hardening of concrete. The penetrometer's design makes it easy to operate, being more efficient, with a longer gear rack. All needles are one length so settings may remain the same. Loads are applied hydraulically with pressures read on a 200 lbf (890N) capacity gauge graduated in 2 lbf divisions. Set of six needles allows multiplication to a maximum reading of 8000 lbf. The Acme penetrometer features cast aluminum base and set of stainless steel penetration needles in a wooden block (bearing area: 1, 1/2, 1/4, 1/10, 1/20 and 1/40 sq. in., (645, 323, 161, 65, 32 and 16mm^2). Includes 100 laboratory test data reporting forms. Meets ASTM C403; AASHTO T197. Shipping wt. 60 lbs. (27kg)

Penetration Needle Set— H-4133N

Set of six, stainless steel needles and holding block for use with H-4133 Acme Penetrometer Mortar Penetration Resistance Apparatus.

Individual Penetration Needles

1 sq. in. (645mm^2)— H-4133.15
1/2 sq. in. (323mm^2)— H-4133.16
1/4 sq. in. (161mm^2)— H-4133.17
1/10 sq. in. (65mm^2)— H-4133.18
1/20 sq. in. (32mm^2)— H-4133.19
1/40 sq. in. (16mm^2)— H-4133.20

Data Sheets, 100/pkg.— H-4133F

"Time of Setting of Concrete Mixtures" data sheets for use with H-4133 and H-4137.

Mortar Penetration Resistance Apparatus— H-4137

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^2). Meets ASTM C403; AASHTO T197. Shipping wt. 20 lbs. (9kg)

Replacement Resistance Needle Set— H-4143

Set of six, screw-on type, replacement needles for use with H-4137 mortar penetration resistance apparatus. Available as set or separately below.

Individual Penetration Needles

1 sq. in. (645mm^2)— H-4143.1
1/2 sq. in. (323mm^2)— H-4143.50
1/4 sq. in. (161mm^2)— H-4143.25
1/10 sq. in. (65mm^2)— H-4143.10
1/20 sq. in. (32mm^2)— H-4143.05
1/40 sq. in. (16mm^2)— H-4143.025

Concrete Pocket Penetrometer— H-4134
Concrete Pocket Penetrometer, w/ Dial— H-4132

Lightweight, spring-reaction type concrete penetrometer for field and lab evaluation of the initial set of concrete mortar, based on ASTM C403. Penetration plunger has a 1/20 sq. in. tip area. Plunger is steadily pushed into the mortar to a 1 in. depth, as indicated on the shaft, at periodic time intervals. Penetrometer's calibrated range is 0-700psi. Resistance in psi is indicated on the scale. The term "initial set" is the semi-hardened, partially hydrated condition of the concrete beyond which it can no longer be worked. The point of initial set is reached when the penetration value is 500psi. Meets ASTM C780.

Foot for above Penetrometers— H-4134F

For use with masonry mortars to determine board life and initial consistency. Method can be used as a basis for acceptance of mortars. Stainless steel disk, 2.70" (68.58mm) dia. Meets ASTM C780.

Maturity Testing Benefits (ASTM C1074)

Open pavements to traffic faster | Safely strip forms sooner | End reliance on field-cured test cylinders | Improve jobsite safety
Monitor in-place temperatures to ensure proper curing | Terminate external heating sooner
Speeds production by at least a day per pour on structural projects and more on pavement projects

Single-Channel Maturity Meter Set— H-2670A

Brighter back-lit display, impact and water resistant too. Simultaneously displays concrete temperature and maturity number via inexpensive, quick-connecting type "T" thermocouple wire. Operating temperature, -20° to 60°C. Temperature readout ± 1°C. Rechargeable battery allows up to 2-1/2 month continuous operation. Includes thermocouple wire, spare plug and battery charger. Meets ASTM C-1074.

Multi-Channel Maturity Meter Set— H-2680

Digital unit gives maturity number calculation, instant readout and temperature history. All four channels may be used simultaneously. All information is available on menu-driven alphanumeric display. Datum temperature is programmable from -20° to +60°C. Communications port allows information transfer from meter to meter, printer or computer. Includes four type "T" thermocouple wire, connectors, RS-232 communications cable and plastic carrying case. Dimensions: 8 x 4-3/4 x 3" (203 x 121 x 76mm). Meets ASTM C1074. Shipping wt. 7.6 lbs. (3.44kg)

Rechargeable Multi-Channel Meter— H-2682

Same as H-2680 except that a rechargeable nickel-cadmium battery is used. A waterproof battery charge connector enables charging from the 120V charger supplied or run directly off of AC power. This unit provides improved low ambient service temperature performance. Meets ASTM C1074.



H-2670A

H-2682

Individual Components	
Thermocouple Wire, 24 GA, (per foot)	H-2670.1
Thermocouple Wire, 20 GA, Type T (per foot)	H-2670.1T
Plug for thermocouple	H-2680P
Printer	H-2684
Serial Cable	H-2686
AC Adapter/Charger	H-2682CH



Cementometer, Type-R Moisture Meter— HC-4972

The Cementometer Type R handles normal water/cement ratios between 0.35 to 0.65 water/cement. The unit is calibrated for standard type I, II, and III cements and can also be programmed with up to ten different mix designs by the user. For highest accuracy, the user should program the unit for the material being used. The simple-to-use calibration process rapidly creates user programs without the need for external computing devices. The unit can store over 150 readings complete with time and date for future reference. Data can be recalled via RS-232 interface.

Concrete Mixer, 110V 60Hz— H-3847
Concrete Mixer, 220V 60Hz— H-3847.2F
Concrete Mixer, 220V 50Hz— H-3847.5F

Compact, sturdy, lightweight concrete mixer for concrete, mortar, etc., can be bolted to floor or skid for permanent installation. Counterbalanced drum has four mixing blades and tilting mechanism with adjustable lever for discharging the mix. Mixing drum may be charged or discharged from either side. Drum mixing capacity is 3 cu. ft. (85 Liters). Includes hand tow pole and wheels. Drum size: 5-1/2 cu. ft. (156 Liters). Overall dimensions: 41 x 26 x 55" (1041 x 660 x 1397mm). Meets ASTM C192. Shipping wt. 366 lbs. (166kg)

Concrete Mixer, 110V 60Hz— H-3848
Concrete Mixer, 220V 60Hz— H-3848.2F
Concrete Mixer, 220V 50Hz— H-3848.5F

Same as H-3847 with 1-7/8" (48mm) ball-and-socket hitch to tow mixer by truck or auto. Includes pneumatic tires with tapered roller wheel bearings. Meets ASTM C192.

Larger capacity mixers are available, please inquire. Call Humboldt at: 1.800.544.7220



H-3847



H-3030

Concrete Beam Tester—
16" distance, single point, manual pump— H-3030
18" distance, single point, manual pump— H-3032
18" distance, three point, manual pump— H-3033

Self-contained shock-proof portable concrete beam tester accurately and easily determines flexural strengths of 6 x 6" cross-section test beams. Hydraulically driven unit uses center-point loading method with continuous readings to the break and retains maximum reading to eliminate lost data. Gauge resets to zero for repeat tests. Lightweight aluminum unit has dual registration of modulus of rupture between 10,000 lbf. and 0–4,500 kgf. Shipping wt. 65 lbs. (29kg)

Concrete Beam Forms
Reusable. Fast and easy to assemble and use. Easy to strip clean, knock down and store. Molds give accurate specimens or center or third-point loading tests. Meet ASTM C31, C78, C192, C293; AASHTO T23, T97.

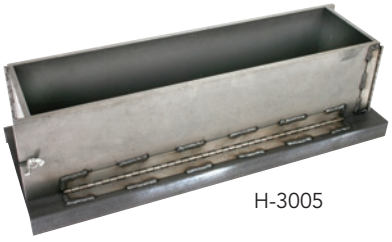

H-3007

Lightweight, Stamped-Steel

6" x 6" x 22"
(152 x 152 x 533mm)

H-3007— Lightweight, Stamped-Steel Model Hinge-free, collapsible in to interchangeable parts. Fastened with wing nuts. Shipping wt. 21 lbs (9.5kg)

Heavyweight, Machined 3/8" Steel


H-3005

6" x 6" x 21"
(152 x 152 x 533mm)

H-3005— Concrete Beam Form, heavyweight, machined 3/8" steel. One-piece sides hinge to base, ends hinge to sides. Fastened with wing nuts. Shipping wt. 59 lbs (26.8kg)

6" x 6" x 24"
(152 x 152 x 610mm)

H-3010— Concrete Beam Form, heavyweight, machined 3/8" steel. One-piece sides hinge to base, ends hinge to sides. Fastened with wing nuts. Shipping wt. 67 lbs (30.4kg)

6" x 6" x 30"
(152 x 152 x 762mm)

H-3015— Concrete Beam Form, heavyweight, machined 3/8" steel. One-piece sides hinge to base, ends hinge to sides. Fastened with wing nuts. Shipping wt. 82 lbs (37.2kg)

6" x 6" x 36"
(152 x 152 x 914mm)

H-3020— Concrete Beam Form, heavyweight, machined 3/8" steel. One-piece sides hinge to base, ends hinge to sides. Fastened with wing nuts. Shipping wt. 100 lbs (45.4kg)


H-3009

Plastic Beam Molds

6" x 6" x 21"
(152 x 152 x 533mm)

H-3009— Weighs less than one quarter the weight of steel molds. Requires no tools. Interlocking joints make mold virtually watertight, eliminating need to grease or seal joints. Thumb screws speed assembly/stripping. Shipping wt. 10 lbs (4.5kg)


H-2827

Cube Mold

6" x 6" x 6"
(152 x 152 x 152mm)

H-2827— Single-cavity steel cube mold with base plate is 6 x 6 x 6" (152 x 152 x 152mm). Used for compression testing of concrete cubes and for mortar specimens in the Time of Initial and Final Setting of Concrete. Meets ASTM C403; AASHTO T197.

150 x 150 x 150mm

H-2827M— Same as above, except metric sizing.


H-2827MP

150 x 150 x 150mm

H-2827MP— Plastic metric cube mold.

Unit Weight Measures

ASTM— Machined aluminum cylindrical unit weight measures with handles for determining unit weight of fine, coarse or mixed aggregates. Water-tight with true and even top and bottom. Measures retain form after repeated use. Meet ASTM C29, C138, C192, C232 and AASHTO T19, T121, T158.

Capacity	Inside Dia.	Inside Ht.	Ship Wt.	Model
1/10 cu. ft (2.8 liter)	6" (152mm)	6.1" (155mm)	6 lbs. (2.7kg)	H-3660.1
1/2 cu. ft (14.1 liter)	10" (254mm)	11" (279mm)	16 lbs. (7.2kg)	H-3661.1
1 cu. ft (28.3 liter)	14" (356mm)	11.2" (285mm)	31 lbs. (13.6kg)	H-3662.1
1/13 cu. ft (9.3 liter)	8" (203mm)	11.5" (292mm)	17 lbs. (7.7kg)	H-3663.1
1/4 cu. ft (7.1 liter)	8" (203mm)	8.8" (224mm)	11 lbs. (4.9kg)	H-3664.1

Non-ASTM— Heavy-gauge, seam-welded, water-tight, steel unit weight measures with bail handles. Can be used for concrete or aggregate.

Capacity	Inside Dia.	Inside Ht.	Ship Wt.	Model
1/10 cu. ft (2.8 liter)	6" (152mm)	6.1" (155mm)	7 lbs. (3.2kg)	H-3660
1/2 cu. ft (14.1 liter)	10" (254mm)	11" (279mm)	22 lbs. (10kg)	H-3661
1 cu. ft (28.3 liter)	14" (356mm)	11.2" (285mm)	33 lbs. (15kg)	H-3662
1/13 cu. ft (9.3 liter)	8" (203mm)	11.5" (292mm)	19 lbs. (8.7kg)	H-3663
1/4 cu. ft (7.1 liter)	8" (203mm)	8.8" (224mm)	15 lbs. (6.8kg)	H-3664


H-3661.1

H-3660.1


H-3660

H-3661

Strike-off Plates

	8" sq. (203mm sq.)	10" sq. (254mm sq.)	12" sq. (305mm sq.)	16" sq. (406mm sq.)
Plastic (5/8" thick)	**H-3669.1P**	**H-3669.4P**	**H-3669.2P**	**H-3669.3P**

NOTE: Use 2" larger plate than the diameter of the unit weight measure.

Scales for Unit Weight Measures



Economy Bench Scale— HB-4785

Capacity: 150lb/60kg, Readability: .02lb/.01kg
Rugged scale with large backlit LCD display unit. Features rechargeable 100 hr. battery and display unit with several mounting options, includes column.

- Stainless steel weighing pan (12 x 14 in./ 305 x 355mm)
- Four weighing units: lb, oz, lb:oz, kg, and g
- 100-hour, internal rechargeable battery with power-saving auto-shut off feature
- Built-in RS232 port

Hard Carrying Case for HB-4785 Scale—HB-4785C

165lb (75kg) Portable Scale— HB-4775

Compact and portable, this scale has a capacity of 165 lb (75kg) and a readability of .05lb (.02kg). Pan size is 12.25" x 12" (310 x 300mm). Can be used with AC or batteries and a great, hard carrying case is available.



Hard Carrying Case for HB-4775 Scale—HB-4775C



H-2942



H-2950H



H-2934



H-2920

Metal Cylinder Molds

Molds are constructed of plated steel for rust resistance and are dimensionally stable under severe use. Molds are split along one side with 2 quick-acting clamps welded to mold. When open, mold springs apart slightly to allow specimen removal. Include detachable base plate. Meet ASTM C31, C39, C192, C470; and AASHTO T22, T23, T126, T198.

H-2942— 6" x 12" (152 x 305mm): 1/8" (3mm) wall thickness, 1/4" (6mm) base plate. Shipping wt. 18 lbs. (8.2kg)

H-2950— 6" x 12" (152 x 305mm): Similar to above, except 1/4" (6mm) wall thickness. Shipping wt. 31 lbs (14kg)

H-2950H— 6" x 12" (152 x 305mm): Similar to H-2950 with built-in carrying handle. Shipping wt. 32 lbs (15kg).

H-2934— 4" x 8" (102 x 203mm): 1/4" (6mm) wall thickness and base plate. Shipping wt. 8 lbs (3.6kg)

H-2935— 4" x 8" (102 x 203mm): 1/8" (6mm) wall thickness and 1/4" (6mm) base plate. Shipping wt. 8 lbs (3.6kg)

H-2931— 3" x 6" (76 x 152mm): 1/4" (6mm) wall thickness and base plate. Shipping wt. 7 lbs (3.2kg)

H-2920— 2" x 4" (51 x 102mm): 3-Gang, split, cast bronze mold has heavy rib reinforcement at top, bottom and sides. Fitted with heavy, quick-acting yoke clamps, bolts and thumbscrews for locking halves. Meets ASTM C31, C39, C192. Shipping wt. 5 lbs (2kg)



H-3041L



H-3041



H-3037PML

Plastic, Single-Use Cylinder Molds

Disposable plastic cylinder molds with flat plastic bottoms. Easily stripped with stripper tools (order separately). Meet ASTM C31, C39, C192, C470, C496; AASHTO T22, T23, T126, T198, M205.

H-3041— 6" x 12" (152 x 305mm). Reinforcing rib around top opening. Lids not included. Sold in cartons of 36, oversize shipping charges apply.

H-3041L— 6" Lid. Domed, 6" plastic lid for use with H-3041 mold. Protects specimens from damage. Sold individually.

H-3037PML— 4" x 8" (102 x 203mm). Complete with integral, domed plastic lid. Sold in cartons of 36, oversize shipping charges apply.

H-3038PML— 3" x 6" (76 x 152mm). Complete with integral, domed plastic lid. Sold in cartons of 80, oversize shipping charges apply.

H-3039P— 2" x 4" (51 x 102mm). Complete with integral domed plastic lid. Sold in cartons of 84.

Plastic, Reusable Cylinder Molds

Lightweight, impact resistant construction. Will not crack, rust or deform. Can be reused up to 100 times. Meets ASTM specifications. 1/4" (6.2mm) wall thickness. Sold individually.

H-3043.6— 6" x 12" (152 x 305mm).

H-3043.4— 4" x 8" (102 x 203mm).



H-3043.6



H-3040

Cardboard Cylinder Molds

Waxed cardboard molds with flat metal bottoms. Meet ASTM C31, C39, C192, C470 C496; and AASHTO T22, T23, T126, T198.

H-3040— 6" x 12" (152 x 305mm). Carton of 24, oversize shipping charges apply

H-3037— 4" x 8" (102 x 203mm). Carton of 50, oversize shipping charges apply.

H-3038— 3" x 6" (76 x 152mm). Carton of 50, oversize shipping charges apply.

H-3039— 2" x 4" (51 x 1023mm). Carton of 50.



H-3041S



H-3041SMA

Mold Strippers

H-3041S— T-Handle-style mold stripper, splits single-use cylinder molds for cylinder removal.

H-3041SMA— Screwdriver-style mold stripper, splits single-use cylinder molds cylinder removal.

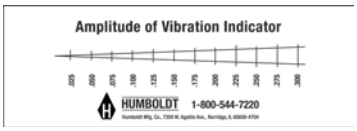
Vibrating Table, 115V, 60Hz— H-3755
Vibrating Table, 230V, 60Hz— H-3755.2F
Vibrating Table, 230V, 50Hz— H-3755.5F
Cushioned impact vibrating table with load capacity of 300 lbs. (136.1kg) is used to vibrate beam forms, cylinder molds, concrete products and soil specimens. Table deck is 20 x 20" (508 x 508mm). Table vibrates at 3600 vpm. Amplitude or power of vibration is regulated by means of a rheostat in the electrical control circuit. Not supplied with cord and plug due to high wattage consumption requirements—must be connected through electrical conduit and fittings. Meets ASTM C31, C192.
Shipping wt. 115 lb.


H-3755

Vibration Indicator, Tachometer Type— H-3753
Precision tachometer is pen size to allow accurate readings even on hard-to-reach equipment. Scale gives readings from 2,000 to 21,000


H-3753

Vibration Indicator, Visual Type— H-3754A
Visual indicator gives accurate reading of amplitude of vibration so vibrating table may be adjusted.



H-3754A

Laboratory Vibrator—
115V, 50/60Hz 7 amps 1ph— H-2999
230V, 50/60Hz 3.6 amps 1ph— H-2999.5F
Lightweight square-head model is used for vibrating concrete test cylinders and molds in the laboratory or field. Unit is flexible-shaft type, powered with 3/4 HP electric motor. Shaft is 24" (610mm) long; vibrating head is 1" sq x 13" L (25 x 330mm) with a speed of 10,000 vpm. Meets ASTM C31, C138, C192.


H-2999


H-2970.1

6" Test Cylinder Transport Rack— H-2970.1
Test Cylinder Transport Rack securely holds (8) 6" x 12" cylinders in a lightweight and durable frame, which can be secured to a truck bed or used in conjunction with the Field Curing Chest listed to right. Open center position is available for heater. Will not rot or rust. Rack is 23 1/2" square by 9" high.

4" Test Cylinder Transport Rack— H-2970.2
Test Cylinder Transport Rack similar to above, but securely holds (16) 4" x 8" cylinders. Rack is 23" square by 7" high.


H-2970A

Field Curing Chest— H-2970A
Field Curing Chest offers the user with an affordable approach to store, transport and cure concrete test cylinders. The chest consists of a 24" x 24" x 14" (610 x 610 x 356mm) zipper-sealed polymer and vinyl chest with 1/2" (12.7mm) insulating foam. The unit can accept up to nine 6" x 12" concrete cylinders. Shipping wt. 15 lbs. (6.8kg)



H-2968

Deluxe Concrete Curing Box— H-2968
Lightweight, portable—74 lbs. (33.6kg)— curing box for concrete cylinders. Plastic construction is rugged, durable and rustproof. Up to 22 standard 6" x 12" (152 x 305mm) test specimens can be stored at 72 ±2°F (22.2 ±1.1°C) over an ambient range of -10 to 100°F (-23 to 37.8°C). Sturdy, 14-gauge steel bottom rack provides optimum water circulation for even curing. Bottom valve for fast drainage. Lockable lid resists tampering. Requires minimum 15 amp circuit. Deluxe model includes recirculating water temperature control unit with temperature set buttons, indicating lights and digital readout for water temperature. Meets ASTM C192, C511, C31; AASHTO M201, T126, T23. Shipping wt. 200lb. (90.9kg)

Economy Concrete Curing Box— H-2967
Same as above except that it only has heating controls, though cooling can be achieved by cool water recirculation if available. Includes adjustable heating control and dial thermometer. Shipping wt. 120lb (54.5kg).



H-2961

Metal Curing Tanks— H-2961 Series
Useful for curing cylinders, beams and material needing total immersion in laboratory or the field. Tanks are constructed from 20GA. galvanized steel; side walls are deeply corrugated and made from one piece, having only one side seam. All joints are assembled with elastic packing and rivets. Rolled into the metal at top of the tank is a steel pipe, forming a rigid top that will not break or get out of shape. Larger tanks are supplied with top angle brace. Meets ASTM C192; AASHTO T127.

Capacity gal (L)	Width ft (m)	Depth ft (m)	Length ft (m)	Weight lbs (kg)	Models
95 (360)	2 (.6)	2 (.6)	4 (1.2)	55 (25)	H-2961
142 (538)	2 (.6)	2 (.6)	6 (1.8)	80 (36.3)	H-2961.1
300 (1136)	3 (.9)	2 (.6)	8 (2.4)	120 (54.4)	H-2961.2
385 (1458)	3 (.9)	2 (.6)	10 (3.1)	155 (70.3)	H-2961.3



H-2986A

Precision Tank Heater, 110V, 50/60Hz— H-2986A
Precision Tank Heater, 230V, 50/60Hz— H-2986A.4F
Designed for efficient and economical indoor operation with H-2961 series curing tanks where temperature does not fall below 55°F (13°C). Temperature is thermostatically controlled and adjustable. The 1,000W, 8.3 amp, 120V solid-state controlled element will warm to a maximum of 200°F. Heater is Incoloy sheathed to prevent rust and is secured to aluminum base. Base provides protection for heater components from test cylinders in the tank. Overall length: 22-1/2" (46cm). Shipping wt. 6 lbs. (2.7kg)



H-2985

Curing Tank Circulator, 110V, 60Hz— H-2985
Curing Tank Circulator, 220V, 50/60Hz— H-2985.4F
Silent submersion pump is 1/160HP (30W) with 120 GPH rating at 1ft. (0.3cm) height. Circulation from the 1/4" (6.4mm) MNPT discharge may be aimed; simply place the housing on any of five sides. Flow also may be directed using elbow connector (included) or by attaching extension tubing. Working parts are lubricated and sealed for life in glass-filled nylon housing with flush inlet. Features 6ft. (1.8m) grounded cord.

Heater/Circulator, 110V, 50/60Hz, 9 amp— H-2988
Heater/Circulator, 220V, 50/60Hz, 5 amp— H-2988.4F
Analog controller with proportional temperature control and low liquid safety. Suitable for use with any tank or jar-style bath to create a highly accurate constant temperature circulating system from 5°C above ambient to 100°C. Minimum immersion depth 3" (8cm), maximum immersion depth 7" (17cm). Clamp-on style fits up to 1-3/16" (3cm) wall thickness, or rod type lab stand. All stainless steel construction. Two-speed (7 or 15 liters/min.) pump minimizes turbulence in small tanks, maintains greater uniformity in large tanks. Adjustable flow director accepts 1/2" (13mm) ID tubing for external circulation. Includes thermometer. 6 x 5 x 13" (152 x 127 x 330mm). Shipping wt. 10 lbs (4.5kg)



H-2988

Master Humidifier— H-2914
Unit is recommended for humidifying comparatively large areas, evaporating a maximum of 5 lbs. (approximately 6/10 gal) of water per hour. Reservoir is copper; unit includes adjustable brass water float for operation on variable water pressures up to 75 lbs. (334N). Sealed to protect it from water, motor section drives both disc and pump tube to produce vapor without heat. Overall dimensions: 14-1/2" dia. x 10-1/2" height (368 x 267mm).



H-2915

Humidistat Controller— H-2915
Measures moisture in air of room or space in which it is installed. Automatically controls H-2914 Master Humidifier to achieve desired indoor relative humidity.



H-2914

Fogging Fan— H-2734
Designed specifically for small spaces that need a dependable unit in environments up to 100% RH (relative humidity). Well suited for areas between 16 to 30 feet in length, (and can be used in smaller areas down to 12 foot) this model has a maximum fogging output of 5 GPH and can propel fog up to 20 feet. The H-2734 utilizes a two-blade fan, making it about 30% quieter than larger units. The nozzle-free fans can atomize ordinary water supplies into a very fine mist-like fog. Utilizing high-speed centrifugal force and powerful air flow, these units can propel a misty-fog stream up to 20 feet away.

The powerful H-2734 is engineered to withstand humid conditions as high as 100% RH and above, and corrosive environments containing salts, lime, ammonia and other acidic compounds. Units are constructed of impenetrable components like Nema 4 connections, all 304 SST hardware, UV stabilized polyethylene plastics, PVC dip-coated steel, and sulfuric anodized aluminum. Standard configuration includes a Baldor wash-down-duty motor that is specifically designed for wet, corrosive environments, 115/230V, 1ph, 60Hz.

Included with unit is an: adjustable-angle hanging bracket; visual flowmeter panel with strainer, 12 ft. SJO indoor/outdoor, heavy-duty power cord; 20 ft. Poly-Flo water line tubing; 16 ft. water drainage line; 100% stainless steel hardware, and easy-to-follow operator's manual.

For 50Hz applications order H-2735.5F, which has a slightly different motor wired for this purpose.



H-2734

Economical Mobile Stand— H-2734.1
An economical stand that also ads mobility to your Fogging Fan. Adjustable boom to 6 ft. 8" and 35" footprint for clearance through doorways. These Floor stands are equipped with 10" semi-pneumatic wheels, a durable frame construction and a fully adjustable boom allowing for quick height adjustment.


H-2735

Circular Chart Recorder (°F)— H-2735F
Circular Chart Recorder (°C)— H-2735C
Circular Chart Recorder (°F) 220V 50/60Hz— H-2735F.4F
Circular Chart Recorder (°C) 220V 50/60Hz— H-2735C.4F
This chart recorder provides reliable and rugged trend reporting with the ability to measure 3 different temperature ranges and 4 recording speeds (6 or 24 hr. and 7 or 31 days). Large LED display shows sensor temperature and all controls are located on the front panel. Can be free standing or wall mounted. Battery backup provides operation during power interruptions. Comes with 2 cartridge pens and 60 assorted charts.

Universal Recorder— H-2745A
Universal Recorder, 220V 50/60Hz— H-2745A.4F
Universal chart recorder provided with KTH (Temperature and Humidity Probe) features automatic probe recognition, front panel touch pad and real time data view. Provides reliable and rugged trend reporting with the ability to measure 3 different temperature ranges and 4 recording speeds (6 or 24 hr. and 7 or 31 days). Can be free standing or wall mounted. Battery backup provides operation during power interruptions. Comes with cartridge pens and 60 assorted charts.


H-2745A

Chart Recorder

Description	Range	Model
6" w/display	50 to 120°F, -20 to 50°F, -40 to 30°F	H-2735F
6" w/display	10 to 50°C, -30 to 10°C, -40 to 0°C	H-2735C
6" 7-Day Chart	50 to 120°F	H-2735F.1
6" 24-Hr. Chart	50 to 120°F	H-2735F.5
6" 7-Day Chart	10 to 50°C	H-2735C.1
6" 24-Hr. Chart	10 to 50°C	H-2735C.5
SST Probe w/ lead		H-3185RT.1
Pen for H-2735	one black pen	H-3185.3A

Universal Recorder

Description	Range	Model
6" w/display w/ RH Probe	-20 to 120°F, 20 to 50°F, 40 to 110°F 5 to 45°C, -30 to 10°C, -30 to 50°C	H-2745A
6" 7-Day Chart	-20 to 120°F & 0-100% RH	H-2745F.1
6" 24-Hr. Chart	40 to 110°F & 0-100% RH	H-2745F.5
6" 7-Day Chart	-30 to 50°C & 0-100% RH	H-2745C.1
6" 24-Hr. Chart	5 to 45°C F & 0-100% RH	H-2745C.5
T & RH Probe		H-2745A.3
Pens for H-2745A	Red (inner), Blue (outer) one of each	H-2745A.2

Dual-Channel, Temperature/Relative Humidity Logger— H-2736
This self-contained, data logger is housed in a robust, waterproof (IP68-rated) case, which is designed for use in harsh applications like cylinder curing rooms. This small data logger has a high reading accuracy and resolution, large memory capacity, a fast off-load speed and a low battery monitor. Data is downloaded to a computer for viewing, reports and archiving.

Temperature/Humidity Logger Software— H-2736.SW
Software for operating H-2736 data logger, which includes multi language support. This Windows-based program is simple and intuitive, allowing users to easily manage their data loggers and recorded data.

Download Cable— H-2736.1
A serial PC download cable for use with H-2736 data logger.



H-2736

Relative Humidity

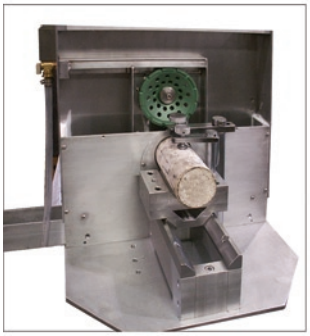
Sensor Type	Capacitive
Reading Range	0 to 100% RH
Accuracy	±3.0% at 77°F (25°C)
Reading Resolution	Better than 0.3% RH
Sensor Location	Externally mounted
Response Time	10 seconds to 90%

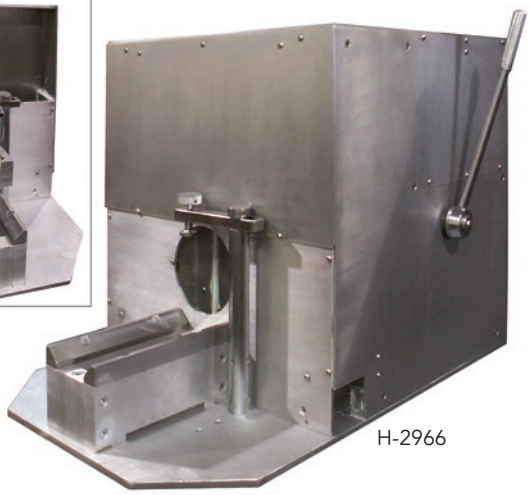
Temperature

Sensor Type	10K NTC Thermistor
Reading Range	-13 to 185°F (-25 to 85°C)
Response Time	25 mins to 90% FSD in moving air
Resolution Accuracy	0.01°C or better



H-2965





H-2966

Concrete Cylinder End Grinding Machine— H-2965

This machine is ideal for commercial testing labs and large producers who need to prepare a lot of cylinders for testing and don't want to deal with the fumes or wait times associated with capping compounds. It can handle all sizes of cylinders and cores from 3" x 6" to 6" x 12". The unit is an easy-to-use, self-contained machine that will face cylinder ends to ASTM C617 specs. The H-2965 uses a high-quality genuine diamond cutting wheel, which is supplied, to produce an accurate, smooth finish. The rotational speed of the diamond cutting wheel is variable to 6200 RPM, depending on quality of finish desired.

- Grinds the faces of concrete cylinders plane and parallel to within ASTM C617
- One pass of the diamond wheel is usually sufficient
- Compression testing can commence immediately after grinding without the use of capping materials
- Eliminates fumes and waiting time associated with capping compound

Specifications

Sample Size	Adjustable for 3" x 6" (75 x 150mm) to 6" x 12" (75 x 150mm) cylinders
Cut Precision	Plane and Parallel to within 0.002" (.05 mm)
Feed	Removes 0.4mm of material per handwheel rotation
Cutting Head	Diamond wheel
Utilities Required	Water source required for coolant
Dimensions	43" L x 31" D x 42" H (1092 x 787 x 1067mm)
Shipping wt.	742 lb (336 kg)

Mini Cylinder End Grinding Machine— H-2966

Manually-operated grinding machine designed for medium production laboratories processing approximately 24 cylinders per day. Grinds 4" x 8" and 6" x 12" cylinders plane and parallel within ASTM C617 tolerances. Removes 1/16" (1.6mm) of material per incremental cutting. Water recirculation system included. Voltage 110/120V 60HZ.

- Grinds the faces of concrete cylinders plane and parallel to within ASTM C617
- One pass of the diamond wheel is usually sufficient
- Compression testing can commence immediately after grinding without the use of capping materials
- Eliminates fumes and waiting time associated with capping compound

Spares suggested:

(1) H-2965.1 Diamond Cutting Wheel

Specifications

Sample Size	4" x 8" (75 x 150mm) 6" x 12" (75 x 150mm) cylinders
Cut Precision	Plane and Parallel to within 0.002" (.05 mm)
Cutting Feed	Manual—right hand operation
Cutting Head	Diamond wheel
Cutting Speed	3800 rpm
Utilities Required	Water source required for coolant
Dimensions	30" D x 24" H x 22"W (764 x 610 x 559mm)
Shipping wt.	275 lb (125 kg)



H-2964

(Shown with computer, not included)

Linear Traverse Machine— H-2964
Computer Controlled Linear Traverse to determine microscopic air voids in concrete. Utilizes round or square specimens up to 9" x 9". Positioning motors allow review of all points as many times as required, as long as specimen remains in the initial configuration of the test. Meets or exceeds ASTM C457 Specifications
Supplied complete with the following:
- Stereoscopic microscope with boom stand
- Two-point light source
- Cross slide table c/w solid state positioning motors
- Software controller and readout program

Other requirements:
- Cut-off saw
- 12" rotary lapidary machine with a polishing grit—sizes 60/90 through 600
- Computer c/w Windows 98 or better

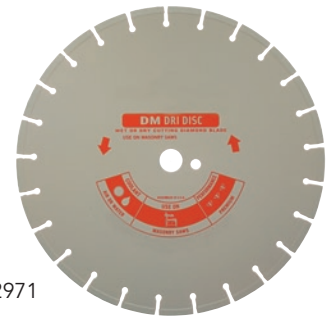


HC-2970

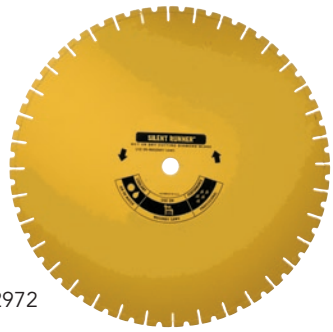
Masonry Saw— HC-2970
Saw for use in cutting concrete and mortar cylinders and blocks. Blade capacity is 20" (508mm), which allows a cutting depth of 8" (203mm). Capable of cutting 8" x 8" x 16" block. Unit features a 3hp 230 60hz 1ph Baldor motor. The saw has only two pivot points for reduced saw maintenance and longer diamond blade life. The cutting head pivots on bearings, which are sealed and lubricated for life requiring no greasing. Its ergonomically designed steel handle with molded grip bolts securely into place and the Sta-level® blade guard keeps the blade guard parallel to the cutting table for accurate cuts. Height can be controlled with a convenient crank control on foot pedal.

Masonry Saw Blade, 20"— HC-2971
High-quality, 20" fast cutting blade for a variety of materials. Designed for dry or wet cutting. The segment height is .275", segment thickness is .125".

Silent Runner Saw Blade, 20"— HC-2972
A diamond blade for medium to large jobs and maximum production at a low cost per cut. It features a laminated core for maximum noise reduction. The segment height is .390", segment thickness is .14".



HC-2971



HC-2972

Concrete Micrometer— H-2938
Designed for accurately measuring diameters of concrete cylinders, micrometer has spindles of hardened steel. Thimble and sleeve sections are chrome finish and have black graduations and numbers. Instrument has a range of 5.5 to 6.5 inches; readings can be made to hundredths or thousandths in decimals.


H-2938

Core Length Measuring Device— H-2939
For determining concrete core lengths. Device accommodates either 4" or 6" diameter specimens up to 24" long. Allows measurements to be taken at the center of the specimen's upper end, as well as eight equidistant points along the circumference. Measuring rod has gradations 0.10" (2.5mm) apart. Meets ASTM C174.
Shipping wt. 19 lbs. (8.6kg)


H-2939

Digital Caliper— HC-2817
This 0-20" (0-1000mm) digital caliper has 5.9" long jaw blades for use in measuring cylinders. It features a large, easy-to-read LCD digit, rolling thumb wheel; plus control buttons for zero, on/off and inch/mm functions. It provides digital readout to .0005"/0.01mm for error-free reading and an accuracy of ±.0025". Meets ASTM C174.


HC-2817

Precision Diameter Tape— H-2937
Precision Diameter Tape, Metric— H-2937M
Diameter tapes provide a fast, reliable method for measuring the diameter of concrete, soil and asphalt cores and cylinders. One reading provides round and out-of-round diameters within an accuracy of .001" (.03mm) by means of special graduations and vernier scale. All tapes are made from a stainless alloy and are precision engraved to ensure accuracy. Tape has diameter range of 2" to 12" (50 to 300mm). Includes certificate of calibration. Tapes are calibrated and include a NIST-traceable certification. Meets ASTM D2166, D2850, D4767, BS 1377:8.



H-2937
H-2937M

Cylinder Carrier (Cradle Type)— H-2945
Steel cylinder carrier is plated to resist rust. Used to carry 6" (152mm) dia. concrete cylinders in field or laboratory.


H-2945

Cylinder Carrier (Gripper Type)— H-2945G
Employs a hand-grip pincer action to secure standard 6" (152mm) dia. cylinders.

4" Concrete Cylinder Wrap— H-2900.4
6" Concrete Cylinder Wrap— H-2900.6
Used to minimize fragment scattering and reduce cleanup time after the compression test. Made of canvas/nylon with Velcro fastening strips.


H-2900.4
H-2900.6


H-2945G

Sample Cart— H-2944
For use in handling concrete beams and cylinders, plus soil and aggregate samples in the lab or field. Ready to assemble. Cart has pan-type rolled-edge 3-1/2" (89mm) deep steel shelves. Top shelf reverses to flat working surface. Features 5" (127mm) dia. rubber casters; front casters swivel for easy steering. Dimensions: 24" x 36" x 32" (61 x 91 x 97cm). Assembly required. Shipping wt. 43 lbs. (19.5kg)

Welded Sample Cart— H-2943
Premium-grade all-welded cart has 800-lb. capacity. Features 5 x 1-1/4" casters mounted to cross-channel bolster plate for added support, convenient offset handle and 36" x 24" (914 x 609mm) tray size. Smooth finish; no rough edges. Shipped assembled. Shipping wt. 75 lbs. (34kg)


H-2943



H-2952

Vertical Cylinder Capper— H-2952

For capping 6" dia. x 12" high (152 x 305mm) concrete test cylinders when making compression tests. Simplifies capping process by assuring plane end surfaces are right angles to the axis of the cylinder. The upright is a guide for positioning the cylinder. Molten capping compound is poured into the mold (plate); then cylinder is placed on the capping material. After the compound is set, the capped cylinder is removed for testing. All types of capping compounds can be used with this apparatus. Capping plate is machined and finish-ground from cold-rolled steel to within .002" (.05mm) planeness. Thickness of the capping plate is 3/4" (19mm), to allow regrinding and refinishing after considerable usage should the plate become gouged. Capping plates are round, allowing circular rotation during use that results in uniform wearing down of contacting surfaces for maximum length of service. The frame is machined from high-strength aluminum alloy.
Meets ASTM C31, C39, C192, C617; AASHTO T22, T23, T126, T231.
Shipping wt. 27 lbs. (12.3kg)

Capping Plate— H-2952.3

Replacement ring and bottom plate for H-2952 vertical cylinder capper.
Shipping wt. 16 lbs. (7.3kg)



H-2925A

Vertical Cylinder Capper— Universal

For 2" dia x 4" (51 x 102mm) Specimens— H-2925A
For 3" dia x 6" (76 x 152mm) Specimens— H-2925B
For 4" dia x 8" (102 x 203mm) Specimens— H-2925C

Base and capping plate are machined from cold-rolled steel. Capping plate is finish-ground within .002" (.05mm) planeness. Guide is machined from high-strength, cast-aluminum alloy. Shipping wt. 18 lbs. (7.7kg)

Capping Plates—

For 2" dia x 4" (51 x 102mm) Specimens— H-2925A.1
For 3" dia x 6" (76 x 152mm) Specimens— H-2925B.1
For 4" dia x 8" (102 x 203mm) Specimens— H-2925C.1

Replacement top and bottom plates for H-2925 vertical cylinder capper.



H-2953

Compound Melting Pots

Designed for melting capping compound, paraffin and similar materials, compound melting pots feature adjustable thermostat to deliver close temperature control automatically from 100° to 320°F (37.8 to 160°C). Includes cover, pilot light, 6' (1.8m) 3-conductor grounded cord set. Inner pot is cast aluminum encased in a metal jacket with fiberglass and air insulation, keeping heat loss to a minimum. Replaceable heating elements are securely clamped to the bottom and sides of the crucible for even heat distribution.
Meets ASTM C617; AASHTO T231.

Capacity	Amps	Model	Shipping Wt.
4 qt.	6	H-2953	13 lbs
3.8L	3	H-2953.4F (220V 50/60Hz)	5.9 kg
8 qt.	10	H-2954	27 lbs
7.6L	5	H-2954.4F (220V 50/60Hz)	12.3 kg
12 qt.	11	H-2955	29 lbs
11.4L	5.5	H-2955.4F (220V 50/60Hz)	13.2 kg
20 qt.	12	H-2948	32 lbs
19L	6	H-2948.4F (220V 50/60Hz)	14.5 kg
28 qt.	15	H-2949	38 lbs
26.5L	7.5	H-2949.4F (220V 50/60Hz)	17.3 kg



CST06



H-2959





H-2958



H-2951

Strength Testing Video CD— CST06
Video CD that covers ASTM concrete strength testing with presentations and test specific videos that explain and show the step-by-step procedures needed to accomplish each test.

Concrete Capping Compound, Flake-Style— H-2959
50 lb bag of Sauereisen No. 600 sulfur-based, flake-form capping compound melts and sets within minutes. Silica-filled compound has 150 psi bond strength, 9000 psi compressive strength and 605 psi tensile strength. Compound pours between 265 and 290°F (129 to 143°C). Over-heated material's viscosity is reinstated by decreasing temperature to 290°F. Meets ASTM C307, C321, C386, C579, C617, D71.

Concrete Capping Compound, Ingot-Style— H-2960
50 lb carton of mineral-filled, sulfur-based, ingot-form capping compound. Compressive strength exceeds 6500 psi at 2hrs per ASTM C617. Strength will increase with time. Compound pours between 280 and 300°F (138 to 149°C).

Capping Ladle— H-2958
Stainless steel ladle with 4" (102mm) dia. bowl is used in transferring capping compound from melting pot to capping fixture.

Vertical Cylinder Capping Kit— H-2951
Vertical Cylinder Capping Kit (220V 50/60Hz)— H-2951.4F
Kit provides the basic components for cylinder capping and includes: (1) H-2945 Cylinder Carrier, (1) H-2952 Vertical Cylinder Capper, (1) H-2953 Compound Melting Pot, (1) H-2957 Capping Compound and (1) H-2958 Ladle. See individual components for descriptions. Meets ASTM C31, C39, C192, C617; AASHTO T22, T23, T126, T231. Shipping wt. 140 lbs. (63.5kg)

Econo-Cap Cylinder Pads	Part #
2" Pad, 60 Durometer	H-2946ACP60
2" Pad, 70 Durometer	H-2946ACP70
3" Pad, 50 Durometer	H-2946BCP50
3" Pad, 60 Durometer	H-2946BCP60
3" Pad, 70 Durometer	H-2946BCP70
4" Pad, 50 Durometer	H-2946CCP50
4" Pad, 60 Durometer	H-2946CCP60
4" Pad, 70 Durometer	H-2946CCP70
6-1/8" Pad, 50 Durometer	H-2946DCP50
6-1/8" Pad, 60 Durometer	H-2946DCP60
6-1/8" Pad, 70 Durometer	H-2946DCP70
6-3/16" Pad (Old Style), 50 Durometer	H-2946DOCP50
6-3/16" Pad (Old Style), 60 Durometer	H-2946DOCP60
6-3/16" Pad (Old Style), 70 Durometer	H-2946DOCP70



Econo-Cap
Precision-machined high-alloy steel retaining caps hold compression pads that fit over the ends of a concrete cylinder. Compression pads are made from tough elastomeric material that evens out irregularities, distributing the test load uniformly to ensure consistent breaks. Includes (2) caps and (2) pads. Meets ASTM C1231; AASHTO T22, T851.

Econo-Cap Cylinder Rings	Part #
2" Econo-Cap Replacement Ring	H-2946AR
3" Econo-Cap Replacement Ring	H-2946BR
4" Econo-Cap Replacement Ring	H-2946CR
6" Econo-Cap Replacement Ring	H-2946DR

Econo-Cap Cylinder Pad Sets	Part #
2" Econo-Cap Set	H-2946A
3" Econo-Cap Set	H-2946B
4" Econo-Cap Set	H-2946C
6" Econo-Cap Set	H-2946D

HCM-2500DIR machine with optional floor stand.





HCM-4000DIR machine with floor stand.



HCM-0135 Cylinder Loading Shelf is available for use with HCM-2500 Series machines.

Choose from three Digital Load Indicators see page 106-107 for information.



All machines feature, quiet-running, continuous-duty hydraulic pumps



How to Order:

HCM-3000SD.5F

All machines come set up to do 6 x 12 in. cylinders.

Mounting Stands are optional on HCM-2500/3000 Series machines, but come standard on HCM-4000/5000 Series machines.

Machine Series

Load Indicating System
DIR, SD, LXI
(see page 106-107 for descriptions)

Electrical Configuration
110V 60Hz use no suffix
220V 60Hz use .2F suffix
220V 50Hz use .5F suffix

COMPRESSION MACHINE ACCESSORIES

Cylinders		HCM-2500	HCM-3000	HCM-4000	HCM-5000
6 x 12 in.	Platen	Supplied	Supplied	Supplied	Supplied
	Spacer	NR	NR	NR	NR
4 x 8 in.	Platen	Supplied	Supplied	Supplied	Supplied
	Spacer	HCM-0612	HCM-0662	HCM-0653	HCM-0653
3 x 6 in.	Platen	HCM-0023L	HCM-0023N	HCM-0023	HCM-0023
	Spacer	HCM-0612	HCM-0661	HCM-0654	HCM-0654
2 x 4 in.	Platen	HCM-0023L	HCM-0023N	NR	NR
	Spacer	HCM-0615	HCM-0666	NR	NR

Supplied: Item comes with machine, NR: Not required



HCM-0612



HCM-0113

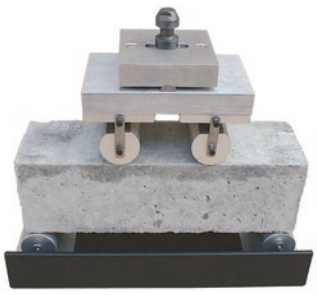


HCM-0112

Cubes		HCM-2500	HCM-3000	HCM-4000	HCM-5000
6 in.	Set	HCM-0113	HCM-0111	HCM-0116	HCM-0116
2 in.	Set	HCM-0112	HCM-0114	HCM-0115	HCM-0115

Set includes platen and pedestal. Cube pedestal (11 in.) only: MP0022.

Beams	HCM-2500	HCM-3000	HCM-4000	HCM-5000
Flexural Attach.	HCM-0119	HCM-0117	HCM-0119	HCM-0119



HCM-0119

Blocks	HCM-2500	HCM-3000	HCM-4000	HCM-5000
Platen Assembly	HCM-0106	HCM-0106.3	HCM-0107P	HCM-0107P

Platen carrier bracket for loading platen into 400K machine: MA-0190-SP
Platen carrier bracket for loading platen into 500K machine: MA-0190-P

Block set-ups on HCM-2500 and HCM-3000 do not meet ASTM Specifications

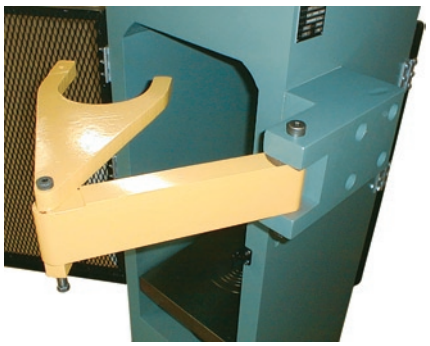


HCM-0107P

Split Cylinders	HCM-2500	HCM-3000	HCM-4000	HCM-5000
Splitter Attach.	HCM-0120	HCM-0124	HCM-0123	HCM-0123

Carrier Bracket— HCM-0190

Changing block platens and spacers is quick, easy, and safe with the carrier bracket, which features a heavy-duty arm mounted on the rear left corner of the load frame that pivots on two hinged joints. When the block platen is not being used, it can be conveniently stored on the bracket's arm.



HCM-0190



HCM-0120

HCM-2500 Series

- **Perfect machine for labs, contractors and even mobile labs**
- **Accuracy of ±.5% of indicated load from 2,500–250,000 lbs. (11–1,112 kN)**
- **Choice of 3 digital load-indicating systems**
- **Quiet-running, continuous-duty hydraulic pump**
- **Supplied with platen set for 6" (150 mm) cylinders using unbonded or sulfur-capping method**

The CM-2500 has all the features you look for in a basic compression testing machine: accuracy, compactness, portability, versatility, and dependability.

The load frame features a wrap-around box construction with each corner fully welded on both the inside and outside crosshead seams, providing the rugged stability needed for accurate and repeatable test results year after year. The load frame is also protected with a unique baked-on, powder-coated painting process for a durable, long-lasting finish that keeps it looking good for years to come. The machine's eye-level digital indicator, loading-control valve, and hydraulic pump are positioned on the right side of the load frame for easy access, increasing productivity, and safer operation. Featuring superior rate-of load control, its unique quiet-running, continuous-duty hydraulic pump and pressure-compensated loading-control valve are manufactured to ISO 9001 international quality standards. Exceeds ASTM C39, E4 and AASHTO T22 specifications.

Optional .75 hp motor available. Order optional stand HCM-0200, if desired. See page 101 for list of accessories available.

Maximum Compression Capacity	250,000 lbs (1,112kN)
Vertical Opening	19.375 in. (492mm)
Horizontal Opening	9.25 in. (235mm)
Piston Stroke	2.5 in (63.5mm)
Dimensions w/ Opt. Stand (W x D x H)	27 x 17 x 56.312 in. (686 x 432 x 1430mm)
Lower Platen Diameter	33.2 sq in. (214 sq mm)
Upper Platen Diameter	6.5 in. (165mm)
Pump	.5 hp (.4kw)
Oil Reserve Capacity	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	780 lbs (353kg)

HCM-3000 Series

- **Accuracy and testing range of ±.5% of indicated load from 1% to full machine capacity**
- **Quiet-running, continuous-duty hydraulic pumps**
- **Rigid load frames exceed ACI 363 frame-elongation requirements**
- **Choice of 3 digital load-indicating systems**

The CM-3000 features thicker crossheads and a wrap-around frame design. The result is a solid one-piece load frame that provides the stability needed for repeatable and accurate test results year after year, even when testing high-strength concrete.

For easier loading of test specimens, the frame has a wide horizontal opening and a large lower compression platen. The platens are through-hardened to 55 HRC or greater, ground plane, plated for corrosion resistance, and have concentric circles for easier centering of specimens.

Bottom-mounted piston is larger in diameter than those of competitive models and is protected by a steel dust shield that keeps its hydraulic system cleaner. Test platens and spacers are mounted to the top crosshead for easier changing, and the machine's quiet-running hydraulic pump is rated for continuous duty, with all its components and those of the loading-control valve manufactured to ISO 9001 international quality standards. The control valve is pressure-compensated for a smooth and constant rate of loading, meeting the test specification requirements for a range of specimens.

Optional .75 hp motor available. Order optional stand HCM-0300, if desired. See page 101 for list of accessories available.

Maximum Compression Capacity	300,000 lbs (1,334kN)
Vertical Opening	18.5 in. (470mm)
Horizontal Opening	9.5 in. (241mm)
Piston Stroke	3 in (76mm)
Dimensions w/ Opt. Stand (W x D x H)	31.5 x 17 x 58.8 in. (800 x 432 x 1486mm)
Lower Platen	9 x 12 in. (229 x 305mm)
Upper Platen Diameter	6.5 in. (165mm)
Pump	.5 hp (.4kw)
Oil Reserve Capacity	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	975 lbs (442kg)

HCM-4000 Series

- **Accuracy and testing range of ±.5% of indicated load from 1% to full machine capacity**
- **Quiet-running, continuous-duty hydraulic pumps**
- **Rigid load frames exceed ACI 363 frame-elongation requirements**
- **Choice of 3 digital load-indicating systems**

The HCM-4000 features thicker crossheads and a wrap-around frame design. The result is a solid one-piece load frame that provides the stability needed for repeatable and accurate test results year after year, even when testing high-strength concrete.

For easier loading of test specimens, both frames have a wide horizontal opening and a large lower compression platen. The platens are through-hardened to 55 HRC or greater, ground plane, plated for corrosion resistance, and have concentric circles for easier centering of specimens.

Bottom-mounted pistons are larger in diameter than those of competitive models and are protected by a steel dust shield that keeps their hydraulic system cleaner. Test platens and spacers are mounted to the top crosshead for easier changing, and the machine's quiet-running hydraulic pump is rated for continuous duty, with all its components and those of the loading-control valve manufactured to ISO 9001 international quality standards. The control valve is pressure-compensated for a smooth and constant rate of loading, meeting the test specification requirements for a range of specimens.

Includes mounting stand. See page 101 for list of accessories available.

Maximum Compression Capacity	400,000 lbs (1,780kN)
Vertical Opening	18.375 in. (467mm)
Horizontal Opening	13.312 in. (338mm)
Piston Stroke	2.5 in (63.5mm)
Dimensions w/ Stand (W x D x H)	39.9 x 20 x 61.3 in. (1013 x 508 x 1556mm)
Lower Platen	12 x 18 in. (305 x 475mm)
Upper Platen Diameter	6.5 in. (165mm)
Pump	.75 hp (.6kw)
Oil Reserve Capacity	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	1620 lbs (734kg)

HCM-5000 Series

- **Rigid load frame exceeds ACI 363 frame-elongation requirements**
- **Accuracy and testing range of ±.5% of indicated load from 1% to full machine capacity**
- **Thicker crossheads and side members than competitors'**
- **Choice of 3 digital load-indicating systems**

High-capacity series compression testing machine features rigid distortion-resistant load frame designed to meet the demands of testing high-performance concrete in a production testing program where accurate and repeatable test results are required.

High-strength frame incorporates thicker crossheads and deeper side members than competitors' models. For example, the frame has a stiffness of 41.6 million lbs./in. We invite comparison of the frame design specifications to any other high-capacity machine.

For easier operation and loading of specimens, the frames feature a wide horizontal opening, large lower platen, bottom-mounted piston with dust shield, heavy-duty load-frame mounting stand that positions the lower platen at a convenient height for loading heavy test specimens, and steel front and rear safety guard doors. The lower platen is through-hardened to 55 HRC or greater, ground plane, plated for corrosion resistance, and has concentric circles for easier centering of test specimens. A quick-change platen system is available to assist in fast and easy switching of test platens, please call 1.800.544.7220.

Includes mounting stand. See page 101 for list of accessories available.

Maximum Compression Capacity	500,000 lbs (2,224kN)
Vertical Opening	18.375 in. (467mm)
Horizontal Opening	14 in. (356mm)
Piston Stroke	2.5 in (63.5mm)
Dimensions w/ Stand (W x D x H)	30 x 23.75 x 60.63 in. (762 x 603 x 1540mm)
Lower Platen Diameter	13 x 18 in. (330 x 475mm)
Upper Platen Diameter	6.5 in. (165mm)
Pump	.75 hp (.6kw)
Oil Reserve Capacity	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	2500 lbs (1134kg)



HCM-400P

Block and Prism Compression Machines

- **Test block, masonry prisms, pavers, and wall retainer units**
- **Testing range from 1% to 100% of machine capacity, with an accuracy of ±.5% of indicated load**
- **Accessories for testing a full range of concrete and cement specimens available. Ships with block and cylinder platens.**

Block Compression Testing machines are available in two load frame configurations for testing single- or two-block masonry prisms of full-sized block up to 12" (304 mm) wide. The heavy-duty load frames use the same proven design and manufacturing process found in all our machines, with a wide horizontal opening and large lower compression platen for easier loading of test specimens.

The machine's mounting stand also places the lower platen at a convenient height for easier loading of heavy specimens. The unique lower dual-platen system features a wear platen through-hardened to 60 HRC or greater and is designed for fast and easy maintenance without the need for expensive rental equipment to remove the platen, unlike the cumbersome single-plate systems used in competitive units. Changing test platens and spacers is quick, easy, and safe with our draw rod, used to adjust the load frame's inside vertical working height, and optional carrier bracket system, which features a heavy-duty arm mounted on the rear left corner of the load frame that pivots on two hinged joints. When the block platen is not being used, it can be conveniently stored on the bracket's arm.

Includes mounting stand. See page 101 for list of accessories available.

Specifications for Prism Machines (Single block available)

	HCM-4000P	HCM-5000P
Maximum Compression Capacity	400,000 lbs (1,780kN)	500,000 lbs (2,2240kN)
Vertical Opening	26.750 in. (679mm)	26.750 in. (679mm)
Horizontal Opening	13.312 in. (338mm)	14 in. (356mm)
Piston Stroke	2.5 in (63.5mm)	2.5 in (63.5mm)
Dimensions w/ Opt. Stand (W x D x H)	39.9 x 20 x 71.6 in. (1013 x 508 x 1819mm)	30 x 23.8 x 68.9 in. (762 x 603 x 1749mm)
Lower Platen	12 x 16 in. (305 x 407mm)	12 x 16 in. (305 x 407mm)
Upper Block Platen	12 x 16 in. (305 x 407mm)	12 x 16 in. (305 x 407mm)
Pump	.75 hp (.6kw)	.75 hp (.6kw)
Oil Reserve Capacity	2 gallon (7.6 liter)	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	2375 lbs (1077kg)	2960 lbs (1342kg)

Cube Molds
Compression Machine, Molds, Accessories

See Pages 120-122



Compressometer

The Compressometer is used for evaluating deformation and strain characteristics of concrete cylinders while undergoing compression testing. The Compressometer includes two cast aluminum-alloy yokes, mounting and central points, stainless steel control rods. Models are available with a dial gauge— with a range of 0.2" (5.08mm) and minimum graduations of .0001 (.0025mm), as well as with a digital indicator or a LSCT transducer. Digital indicators and LSCT models can be used with data acquisition systems through the use of our MiniLoggers, see below. Meets ASTM C469. Shipping wt. 22 lb (10kg).

Compressometer	Dial Gauge	Digital Indicator	LSCT
Compressometer for use with 6" x 12" (152 x 305mm) cylinders	H-2911	H-2911D	H-2911L
Compressometer for use with 4" x 8" (101 x 203mm) cylinders	H-2916	H-2916D	H-2916L
Compressometer for use with 3" x 6" (76 x 152mm) cylinders	H-2918	H-2918D	H-2918L



H-2911

Compressometer-Extensometer

Combined compressometer and extensometer for 6" dia. x 12"L (152 x 305mm) concrete cylinders is a convenient unbounded device. Apparatus contains a third yoke located halfway between the two compressometer yokes and attached to the specimen at two diametrically opposite points. Middle yoke is hinged to permit rotation of the two segments of the yoke in the horizontal plane. Indicator gives deformation readings. Second indicator is furnished for compressometer section. Unit measures changes in length and diameter. All H-2900 Series Compressometers may be ordered with dial gauges, digital indicators or strain transducers, see charts. Digital Indicators and strain transducers can be used to construct a data acquisition system, see below. Meets ASTM C469.

Compressometer/ Extensometer	Dial Gauge	Digital Indicator	LSCT
for use with 6" x 12" (152 x 305mm) cylinders	H-2912	H-2912D	H-2912L
for use with 4" x 8" (101 x 203mm) cylinders	H-2917	H-2917D	H-2917L
for use with 3" x 6" (76 x 152mm) cylinders	H-2919	H-2919D	H-2919L



H-2912D



H-2912L

Data Acquisition Setups—

You can fully automate your test data collection by using one of these MiniLoggers. The MiniLogger is a simple-to-use, four channel, stand-alone data-logging system, which can collect data generated from digital indicators or LSCT transducers. Use model HM-2325A.3F for LSCTs and HM-2330D.3F for Digital Indicators.

Features include:

- Four channels with real-time data acquisition
- Backlit LCD display
- RS232 interface for computer or printer.
- Nonvolatile test data storage and instrument calibration
- Battery-backed real-time clock
- Auto conversation of instrument calibration between English or Imperial units and SI or metric units
- View logged test data via the LCD display



HM-2325A.3F

HM-2330D.3F

See page 74 for additional information.

DIGITAL LOAD INDICATING SYSTEMS



DIR Digital Load Indicator

The DIR digital is a basic, easy-to-use, budget-minded load indicator. The DIR model simultaneously displays both live load and rate of load in force units per second during a test and peak load automatically at the end of a test.

The DIR is one of the easiest-to-use digitals available, featuring automatic test reset—eliminating the need to zero between tests—and automatic peak-load display at the end of a test through the pre-set sample-break detector function. The digital's face is set on a 60° angle for easier reading of load values, and the display uses 3/8" (9.5 mm) characters protected by a nonglare, scratch-resistant window. Users can select from load-value engineering units of lbs., kN, kg, and N. Designed for years of dependable service, the digital's tactile keys have a life cycle of greater than two million uses, and accuracy is ±.5% of indicated load from 1% to 100% of machine capacity, exceeding ASTM C-39 and E-4 requirements.

The calibration program is password protected in permanent, non-volatile memory. The DIR digital has no hardcopy test documentation capabilities.



SD Digital Load Indicator

The SD Digital System was designed for production-testing laboratories where dependability, accuracy, and minimal operator input is required. During a test it indicates live load or stress and rate of load simultaneously, and at the end of a test it automatically displays both peak stress and load. Plus, if activated, the average rate of load applied to a specimen during a test can also be displayed.

The SD is truly operator-friendly; using menu-driven scroll-through prompts. A pre-set menu lists six common specimen types from which to select: cylinder, cube, beam center or third point, round, and cross-sectional area.

All test information is easily read on the indicator's back-lit LCD display, which can show test data in any of the selectable engineering units, including lbs., kN, N, kg, psi, MPa, Kpa, kg/cm2, in, mm, cm, seconds, or minutes. A durable membrane keypad allows you to scroll, enter, store, print, or enter numbers manually.

Accuracy is achieved through a five-point calibration program using piece wise linear fit between points to exceed ASTM C-39 and E-4 requirements at better than ±.5% of indicated load from 1% to full machine capacity. The linearity of the calibration in specific areas is further improved through a unique edit-calibration program, which allows the on-site calibrator to re-enter the program and reset an individual value assigned to a point.

For added dependability, if the digital's calibration is ever changed or lost, its original calibration can be reinstalled in the field by reentering the original A/D conversion values into the program. Up to four separate calibration programs can be stored in the SD, allowing it to be used with multiple transducer/load cell combinations in one or more load frames.

For hard-copy test documentation, up to 750 tests can be stored in memory and printed directly on an optional serial-port printer or transferred to a PC through an RS-232 serial port. The print function allows the operator to print only the current test or all stored tests at once.

The standard test report uses a spreadsheet format and lists sequential test number, date and time, specimen ID number, specimen type, specimen area and length, peak load and stress, cylinder correction factor, and cylinder break type. Optional information includes average rate of load applied to a test specimen, specimen age and weight, job ID number, and a statistical summary of peak load and stress.

LXI Digital Load Indicator

The LXI Digital System is the system of choice for commercial and in-house testing laboratories where ease of operation, accuracy, and test documentation are required.

During a test it displays load, stress, rate of loading in load or stress units seconds or minutes, plus the type of specimen being tested and its size - all simultaneously on the indicator's four-line display. At the end of a test it automatically displays peak stress and load, and, if activated, the average rate of load applied to the specimen during the test, with an accuracy exceeding ASTM C39 and E4 requirements.

The LXI's user-friendly scroll-through test set-up menu allows the operator to select an option and enter a "yes/no" command to activate or a numeric value to set the test parameter field.

A pre-set menu lists seven common specimen types to select from: cylinder, cube, beam center, beam third point, and cross-sectional area, allowing you to select, display, and document test data.

All test information is easily read on the indicator's back-lit LCD display, which can show test data in any of the selectable engineering units, including lbs., kN, N, kg, psi, MPa, Kpa, kg/cm2, in, mm, cm, seconds, or minutes. A durable membrane keypad allows you to scroll, enter, store, print, or enter numeric values. Calibration is also password-protected.

Accuracy is achieved through a 10-point calibration program using piece wise linear fit between points to exceed ASTM C39 and E4 requirements at better than +.5% of indicated load from 1% to full machine capacity. The linearity of the calibration curve in specific areas is further improved through a unique edit calibration function, which allows the on-site calibrator to re-enter the program and reset an individual value assigned to a calibration point. The indicator can also be used with multiple transducer/load cell combinations with one or more load frames by storing up to six separate calibration programs. For added dependability, the LXI features a unique restore calibration program that allows the calibration to be re-installed in the field if it is ever changed, lost, or the unit is damaged. Simply enter the original load value points and their corresponding A/D counts into the calibration program via the digital keypad. Your machine's original



calibration information is maintained in the unit's Q.C. inspection report. For hard-copy test documentation, up to 1,000 tests can be stored in memory and printed directly on a parallel-port printer or transferred to a PC through a standard RS-232 serial port. The system also features the X-Y plotting of a load or stress vs. time graph with title block listing date and time, specimen ID number, and peak stress of the test. An optional compatible printer is required for graphing.

The standard test report printout is in a spreadsheet format and lists the following information: sequential test number, date and time, specimen ID number, specimen type, specimen area and length, peak load, and peak stress. Optional data includes average rate of load applied to a specimen during a test, cylinder correction factor to C-39, cylinder break type, cylinder cap type, specimen age and weight, operator ID number, and statistical summary of peak load and stress.

Print options allow you to print only the current test or all stored tests and X-Y graphs.

Wincom Data Transfer Software (LXI)— HCM-0711
Wincom Data Transfer Software (SD)— HCM-0711SD
Wincom Plus Data Transfer Software (LXI)— HCM-0712

To transfer stored test results to a PC, the Wincom or Wincom Plus data communications transfer program is required. The Wincom Plus program includes the added feature of allowing raw X-Y data to be transmitted directly to a PC for generating a load/stress vs. time graph.

Storage of tests and graphs are limited only by space in the PC, and up to 10 individual graphs can be printed on one report page. An optional piston travel speed indicator package is available, and, when activated, displays travel rates in in., mm, or cm per second or minute.

Concrete Test Hammers

We carry the Original Schmidt® Concrete Test Hammer. It is the device and method most frequently used for non-destructive strength testing of concrete and structural components. The spring-driven hammer is also useful in determining when forms may be removed, as well as assessing the damage done to a structure from freezing or fire. In operation, the hammer hits the concrete at a defined energy. Its rebound is dependent on the hardness of the concrete. Through the use of the included conversion table, the rebound value can then be converted to compressive strength. The Schmidt Hammer accurately measures compressive strength, which directly determines the load-bearing capacity and durability of concrete structures.



H-2975



H-2975L



H-2975NR



H-2972



H-2975.27

Type N Schmidt Hammer— H-2975
The H-2975, Type N Hammer is designed for testing concrete items 4" (100mm) or more in thickness, or concrete with a maximum particle size less than or equal to 1.25" (32mm). It is designed for testing concrete within a compressive strength range of 1,450 to 10,150 psi (10 to 70 N/mm²) and Impact energy of the test is 1.6 ft-lbs (2.207 Nm) The standard (Type N) hammer displays rebound values on a mechanical sliding scale. These values can then be correlated to compressive strength by using the conversion table chart affixed to the hammer.

Type N Schmidt Hammer (N/mm²)— H-2975M
Same as above, but includes a conversion table with a N/mm² scale instead of psi.

Type NR Schmidt Hammer— H-2975NR
The H-2975NR hammer utilizes the same hammer mechanism as the H-2975, but includes an integral paper strip recorder, which provides rebound values as a bar chart on a paper strip, providing a hardcopy record of the test data. One roll of paper can document 4,000 test impacts.

Type NR Schmidt Hammer (N/mm²)— H-2975NRM
Same as above, but includes a conversion table with a N/mm² scale instead of psi.

Replacement Paper for NR Hammer— H-2975NRP
Roll of paper used with the Type NR Schmidt Hammer

Type L Schmidt Hammer— H-2975L
The H-2975L hammer is designed for testing thin-walled structural components with a thickness of less than 4" (100mm) or rock cores. This hammer features an impact of 0.74 Nm ,1/3 less energy than the Type N hammers.

Type L Schmidt Hammer (N/mm²)— H-2975LM
Same as above, but includes a conversion table with a N/mm² scale instead of psi.

All models include a grinding stone, carrying case and instruction booklet with conversion charts.

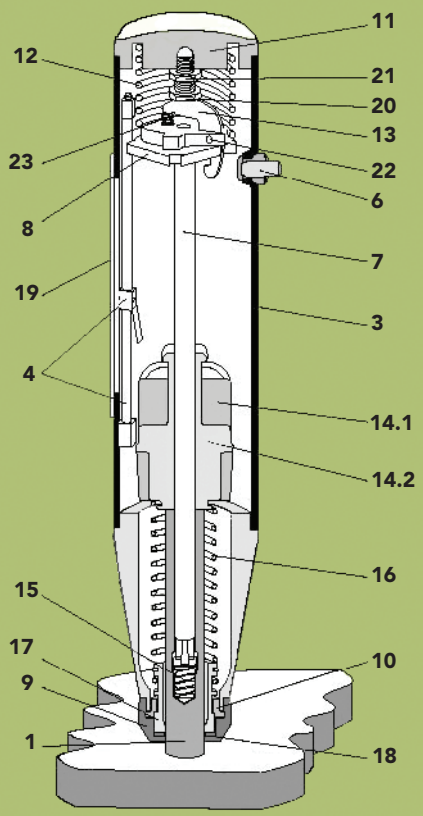
Grinding Stone— H-2975.27
Replacement grinding stone

Calibration Anvil— H-2972
Calibration anvil ensures continued test accuracy. For use with all test hammers. Hammers should be periodically checked to determine correct performance.

Replacement Conversion Chart Label (psi)— H-2975.25
Replacement Conversion Chart Label (N/mm²)— H-2975.25N

®registered trademark of Proceq USA, Inc.

All Schmidt hammers meet:
ASTM C805, D5873
BS 1881: Part 202
ISOIDIS8045
ENV 206
IGJ/T 23-2001



Replacement Parts

Key	Description	Part #
1	Impact Plunger	H-2975.1
3	Housing, complete	H-2975.3
4	Rider with Guide Rod	H-2975.4
6	Push-button, complete	H-2975.6
7	Hammer Guide Bar	H-2975.7
8	Guide Disk	H-2975.8
9	Cap	H-2975.9
10	Two-part Ring	H-2975.10
11	Rear Cover	H-2975.11
12	Compression Spring	H-2975.12
13	Pawl	H-2975.13
14	Hammer Mass	H-2975.14
15	Retaining Spring	H-2975.15
16	Impact Spring	H-2975.16
17	Guide Sleeve	H-2975.17
18	Felt Washer	H-2975.18
19	Plexiglass Window	H-2975.19
20	Trip Screw	H-2975.20
21	Lock Nut	H-2975.21
22	Pin	H-2975.22
23	Pawl Spring	H-2975.23



Digi-Schmidt Concrete Test Hammer— H-2976

The Digi-Schmidt Concrete Test Hammer couples the original Schmidt Hammer with rebound measuring sensors and microprocessor technology to provide an instrument designed applications requiring numerous measurements. The method is rapid, reproducible, and has resolution previously unattainable by manual models.

The hammer is connected to a control and display unit by means of a connecting cable. Strength values are shown digitally as they are taken and also displayed as groups of bars on the 128 x 128 pixel graphic LCD. Mean value and standard deviation for a preset number of measurements are computed and displayed. Via a menu display, the user can select hammer impact direction (up, down, horizontal, etc.) and desired engineering units (psi, MPa, kg/cm^2, or N/mm^2) and indicates the specimen size and type (cylinders, cubes, etc.) for which strength data are to be predicted.

Instrument measuring range is 1,450 to 10,150 psi (10-70 N/mm^2) using 2.207 Nm impact energy. Accuracy is ±0.2R with 0.5R reproducibility. Rebound vs. strength correlation curves for 7 and 28 day strengths are installed in memory, or the users own data may be installed via keyboard entry. The Internal memory holds 5000 measurements, each with date and time. Data can be transferred via the RS-232C interface to a PC in Microsoft Excel using the included cable and software. Direct printing is possible.

The Digi-Schmidt consists of the test hammer, control and display unit, connecting cable, PC cable, carrying strap, rubbing stone, instruction manual and a plastic carrying case. Meets ASTM C805.

Optional Printer Cable— H-2976C

Calibration and Repair Services

Humboldt provides complete calibration and repair services for all Concrete Test Hammers. We maintain an extensive inventory of parts for fast turnaround of repairs. Call 1.800.544.7220 for pricing and/or to schedule repairs or calibration.



H-2979A



H-2853B

H-2854



TICO Ultrasonic System— H-2979A

You can use the TICO to determine cracks, honey-combs, voids, delaminations in concrete as well as frozen concrete and other non homogenous conditions that occur in concrete. The unit also allows you to determine modulus of elasticity and concrete strength.

The TICO uses 2 Transducers to send ultrasonic sound waves through the concrete. The unit allows you to test in 3 different modes, Direct, Semi-Direct, and Indirect. A wide range of transducers allows the user to meet the demands of almost any test site. Ultrasonic testing is often used in conjunction with the Schmidt hammer to pin point specific weak areas. All information is displayed on a large easy to read screen. Data can be saved for downloading to a PC for analysis and evaluation.

The unit comes equipped with two 54khz transducers, two 5ft (1.5m) BNC cables, calibration bar, coupling agent, carrying case and easy to follow instruction manual. Conforms to ASTM C597, BS1881-203

Pundit Plus Ultrasonic System— H-2853B
Pundit Plus, 240V— H-2853B.4F

The Pundit Plus is the new generation, pulse velocity test system that features the latest in microprocessor technology for today's increasing demands for accuracy, reliability and ease of operation. For added convenience, the new system incorporates a transducer-mounted switch for ease in recording of readings and built-in memory to store up to 100 readings.

A standard RS-232C port allows the user to download the stored information using HyperTerminal for exporting into compatible spreadsheet applications. Menu-driven options permit the user to display transit time, velocity, limits or elastic modulus in either English or Metric units. The complete kit includes the instrument in a nylon holder, AC power supply and power cord, two 54 kHz transducers, two 12 ft. (3.7m) cables, coupling agent and operating manual. Meets ASTM C597, AASHTO TP37 and BS1881-203.

V-Meter, Ultrasonic System—H-2854

The V-Meter™ is an advanced ultrasonic, pulse-velocity test system widely used for quality control and evaluation of concrete structures. It can identify non-homogeneous conditions such as voids, cracks, honeycombs and frozen concrete. The V-Meter comes with standard 54khz transducers, and its large easy-to-read display is perfect for field use. The battery will last up to 10 hrs. on a single charge, and the unit is capable of storing over 1800 readings for later processing. Conforms to ASTM C597, BS1881-203 and other international standards.

Optional Hand-held Terminal— H-2854T

Facilitates input of control parameters such as distance between transducers, density and moisture corrections, etc. It also enables calculations of P-wave, S-Wave, calculated modulus and Poissons ratio to be made automatically and includes an RS-232C port for transfer of data to a PC.

Velocity	1 to 9999 ft/s or m/s at an accuracy of ±1 ft/s or m/s.
Transit Time	1 to 9999 m/s at an accuracy of ±1 m/s.
Elastic Modulus	up to 999.9 GN/m2 at an accuracy of ±0.1 GN/m2
Resolution	0.1 us
Voltage Pulse	1 kV
Pulse Rate	3/s
Transducers	54 kHz with 12ft. (3.6m) BNC cables, two included
Display	128 x 128 pixel graphic LCD
Data Output	RS-232C interface
Temp. Range	0° to +40°C
Battery	8 Internal rechargeable NiMH batteries
Dimensions	9.8" x 6.3" x 3.9" (250 x 160 x 100 mm)
Weight	Shpg. 12 lbs. (5.4 kg)

Range	approx. 15 to 6550 µs
Resolution	0.1 µs
Voltage Pulse	1 kV
Pulse Rate	3/s
Impedance	1M
Transducers	54 kHz with 5ft. (1.5m) BNC cables, two included
Memory	Nonvolatile, up to 250 measured values
Display	128 x 128 pixel graphic LCD
Data Output	RS-232C interface
Temp. Range	-10° to +60°C
Battery	30 hours with six AA (LR 6) batteries (1.5V)
Dimensions	12.8" x 11.6" x 4.15" (325 x 295 x 105 mm)
Weight	Shpg. 12 lbs. (5.4 kg)

Frequency Range	24-500 KHz, based on transducers selected
Sensitivity	250 micro volts, between 30 KHz and 100 KHz
Input impedance	approximately 2 M OHMS
Transit Time	0.1 to 6400 microseconds, direct digital display
Accuracy	+ 0.1 microseconds
Pulse Rate	selectable 1, 3 or 10
Transmitter output	pulse 1000/500V, 2 microseconds
Display	240 x 64 pixel graphic LCD
Storage	1 K byte
Data Transfer	RS-232C w/handheld option.
Temp. Range	0° to +40°C
Battery	NI-CAD batteries, 9 hours operation.
Dimensions	7.5" x 4" x 8" 190 x 100 x 220mm
Weight	6 lbs. (2.7 kg) w/ battery

Transducers with other frequencies and longer length cables are available for special test applications, contact Humboldt for details.

Windsor HP Probe System— H-2978
The Windsor HP Probe System is used to evaluate the compressive strength of in-place concrete. This non-destructive test can be used on fresh or mature concrete with equal effectiveness. The system features an electronic measuring device for accuracy and efficiency. Three individual tests can be automatically averaged and displayed on the LCD in compliance with ASTM procedures. The data, together with time and date of the test can be stored in the memory for uploading to a PC. Two probe and power load types are available: silver probes are used for high performance concrete with strengths up to 17,000 psi (110 MPa) and gold probes for test applications on concrete with less than 3,000 psi (19.4 MPa) strength. The system consists of the drive unit, electronic measuring device, templates, measuring caps, gauge plates and carrying case. Meets ASTM C803 and BS-1881.
Probes are not included and must be ordered separately.


H-2978

Silver Probe Kit— H-2978.01
Gold Probe Kit— H-2978.03
Each certified probe kit includes 3 probes and 3 matched, nickel-plated power loads. Silver probe kit is for natural stone or coarse aggregate (density greater than 125 lbs/cu ft). Gold probe kit is for lightweight aggregate (less than 125 lbs/cu ft density) **Shipping restrictions prohibit overseas sales.**


HC-2978

Windsor HP Pin System— HC-2978
Measures the compressive strength of concrete, mortar and brick in-situ, quickly, accurately. A non-explosive instrument, the Windsor Pin™ System uses a spring-loaded device to drive a steel pin into the concrete or mortar. The depth of penetration of the needle correlates to the compressive strength of the material under test. A removable chuck and a small pin size facilitate the testing of mortar joints; this is the only system for testing the in-place strength of brick mortar joints. Conforms to ASTM C803.


H-3422

Mohr's Scale of Hardness of Minerals— H-3422
Set includes 9 specimens, from talc to Carborundum, to determine mineral hardness by scratch test. Numbered specimens are keyed to descriptions inside box cover.

Plus 120 Rebar Locator— HC-2973
Metric Plus 120— HC-2973M
Easy-to-use and inexpensive rebar locator can be used to accurately determine rebar location and direction before coring and drilling applications. It is supplied with a 4" (100mm) head, but can also accept an optional 6" (150mm) head. It can distinguish between horizontal and vertical bars with its highly directional detection field. Loud audio tone and analog meter provide fast scanning. Supplied with search coil, leather case and batteries. Conforms to ACI 318.



HC-2973

Mini R Rebar Locator— HC-2974
Determine position and orientation of rebar quickly and accurately with this digital rebar locator. A great tool for those who need to determine bar location for coring, grinding, drilling or resurfacing operations. Can also be used to inspect new structures for compliance with specifications, as well as old structures under modification. The HC-2974 uses an eddy current sensor, which detects metal objects in concrete, including ferrous and non-ferrous metals. This allows the unit to locate tendons, copper tubing and conduit in addition to rebar. Unit features and easy-to-read digital display and a rechargeable 4-hour battery life. Conforms to ACI 318, BS 1881 Part 204.


HC-2974

Rebar Locators/Covermeters

Humboldt offers a large selection of rebar locators and concrete covermeters, from basic analog models to the latest in digital technology. We have rebar locators and covermeters to fit almost any application and budget. If your application only requires that you locate bar position, one of the analog models should suffice. However, if you need to know bar size or are concerned with mapping bar orientation or depth of cover over a large area, one of the digital models would be called for. We also have a rebar locator/covermeter that includes the ability to do half cell corrosion detection.



H-2981



H-2973

H-2974


Profometer 5 Rebar Locator— H-2981
The H-2981 Rebar Locator features a universal probe that allows you to measure both shallow and deep ranges at the push of a button. This gauge will locate, size and show bar orientation, as well as indicate concrete cover. In areas where adjacent and parallel bars effect readings, the operation can include a correction to isolate bars for more accurate diameter determinations. The operator can also include a correction factor for determining cover depth in congested bar arrangements. The H-2981 includes several optical and acoustical locating aids, one of which is a variable tone level that can be heard over the internal loudspeaker or on a headset. Highly accurate measurements and single-probe design makes this rebar locator an easy-to-use workhorse. Includes processing and report generation software. Conforms to ACI 318, BS 1881 Part 204.

Rebar Locator/Half Cell Meter— H-2973
The H-2973 Covermeter with half cell capability is designed to meet all your surveying needs with one gauge. It will locate, size and show bar orientation, as well as indicate concrete cover. In addition, the gauge can also accept a half cell attachment, which indicates signs and severity of rebar corrosion. Sold without a head, The H-2973 offers a choice of head selections, which are easily interchangeable and automatically recognized by the unit. It can also accept a borehole probe attachment that allows you to locate tendon ducts and deep rebar locations. If your surveying goes beyond location and cover to include corrosion, the H-2973 is a great single gauge solution. The unit includes: concrete covermeter with head connecting cable, rechargeable battery pack and battery charger, earphone, shoulder strap, CD containing EDTS+ software and CoverMaster® software, data transfer cable, plastic carrying case and operating instructions. Conforms to ACI 318, BS 1881 Part 204.

Other models available, please inquire.

MKIII Rebar Locator— H-2974
The H-2974 Rebar Locator is the digital version of a classic rebar locator, rebar finder, which enables the user to locate reinforcement bars and determine their location and size. This gauge uses a single sensor for all depth ranges and can determine bar size with the use of the included spacer block. The unit can statistically analyze data, searching automatically for minimum cover points, and the least cover of a group of points. Cover points can be displayed as a symbolic map of a structure to assist the user in finding problematic areas. Built in memory can store over 80 thousand individual data points for processing and the LCD can be changed to daylight mode for easier viewing in bright sunlight. The optional scan cart and software can be used to graphically display a cross section of the concrete and the location of the metal objects within. With its built in encoder objects can be located with both distance and depth recorded. Basic unit includes: rebar locator, probe with 8 foot cable, spacer block, sizing template, charger, and headphones. Conforms to ACI 318, BS 1881 Part 204.

	H-2981	H-2973	H-2974
Range (depends on bar size)	Shallow: up to 3.94" (100mm) Deep: up to 7.41" (188mm)	Standard: up to 3.75" (95mm) Deep: up to 7.00" (180mm) Narrow: up to 3.10" (80mm)	Shallow: up to 3.00" (76mm) Deep: up to 7.50" (190mm)
Accuracy	Better than ±0.08" (2mm) or ±5% for cover		
Bar Sizing	#3-12 (8-40mm) better than ±1 bar size	#2-18 (5-50mm) better than ±1 bar size	#3-12 (8-40mm) better than ±1 bar size
Display	128 x 128 pixel graphic LCD w/ backlight	320 x 205 pixel graphic LCD w/backlight	320 x 240 pixel graphic LCD
Memory	up to 40,000 measure values in 60 locations	10 linear batches of 1,000 readings each	80,000 data points
Data Output	RS232 interface, USB via adapter	RS232 interface	RS232 interface
Power Supply	1.5V (6), 45 hr operation; 30 with backlight	7.4V lithium ion, 32 hrs/4 hr charge	12V, 4-6 hr continuous run time
Dimensions	16.3 x 19.7 x 4.9" (415 x 500 x 125mm)	9 x 5.1 x 4.9" (230 x 130 x 125mm)	10.6 x 9.7 x 4.9" (270 x 245 x 125mm)
Weight	13.7 lb (6.2kg)	3.4 lb (1.54kg) (does not include head)	5.4 lb (2.4kg) (instrument only)

H-2981 Accessories

Telescopic Extension Rod— H-2981.1
5 ft telescoping rod for use with ScanCar

Marking Pen— H-2981.2
Pen with three refills, for use with universal probe.

Calibration Test Block— H-2981.3
Test block for ensuring proper operation

Probe Cable— H-2981.4
5 ft. (1.5m) cable for connecting probe

Path Measuring Device Cable— H-2981.5
5 ft. (1.5m) cable for use with ScanCar

ScanLog Upgrade Package— H-2981.6
Converts basic Profometer to ScanLog model. Includes: ScanCar probe carriage, path measuring device cable and interface converter cable.



H-2981.2



H-2981.1



H-2981.3

H-2974 Accessories

Optional Software— H-2974.1

Scan Cart Upgrade— H-2974.2
Includes the following: scan cart, 2-piece extension rod, 12 ft cable, scanning software. Turns your Basic Unit into a complete system

Replacement Probe— H-2974.3
Standard probe replacement

Probe Cable— H-2974.4
8 ft cable for connecting probe to unit.

Extension Rod— H-2974.5
2-piece extension rod for use with scan car.



H-2974.5



H-2974.2



H-2982

ScanLog Rebar Locator— H-2982
The H-2982 ScanLog system improves on the H-2981 with the Cyberscan function to visualize reinforcing bars on the display, a "measuring with grid" function for grayscale display of concrete cover and the ScanCar probe cart with integrated path measuring device for scanning.

H-2973 Accessories

Standard Search Head— H-2973.1
Range:
#12 (40mm) bar: 0.6 to 3.75" (15-95mm)
#2 (8mm) bar, 0.3 to 2.75" (8-70mm)
Sensing area: 4.72 x 2.36" (120 x 60mm)



H-2973.1

Narrow Pitch Search Head— H-2973.2
Range:
#12 (40mm) bar: 0.3 to 3.1" (8-80mm)
#2 (8mm) bar, 0.2 to 2.4" (5-60mm)
Sensing area: 4.72 x 2.36" (120 x 60mm)



H-2973.2

Deep Cover Search Head— H-2973.3
Range:
#12 (40mm) bar: 1.4 to 7" (35-180mm)
#2 (8mm) bar, 1" to 6.3" (25-160mm)
Sensing area: 6.3 x 3.15" (160 x 80mm)



H-2973.3

Spare Battery Pack— H-2973.4
Spare battery pack for use with the H-2973 Covermeter. A great accessory for big jobs.

Calibration Test Block— H-2973.5
Calibration test block for use with the H-2973 Covermeter.



H-2973.5

Short Borehole Probe— H-2973.BH1
The solution for locating tendon ducts and layers of rebar lying deep within concrete. Range 0-16" (0-40cm). Detection ranges: Tendon duct 2.75" dia. (70mm) up to 3.54" (90mm). Reinforcement bar up to 2.36" (60mm)



H-2973.BH1

Long Borehole Probe— H-2973.BH2
Range 0-40" (0-100cm). Detection ranges: Tendon duct 2.75" dia. (70mm) up to 3.54" (90mm). Reinforcement bar up to 2.36" (60mm)

Extension Arm Kit— H-2973.7
Extension arm kit allows the user to scan bridge decks and floor areas from a standing position. It can be connected to either the standard or narrow pitch search head.



H-2973.7



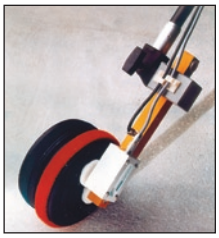
H-2873

CANIN Corrosion Analysis— H-2873

The CANIN Corrosion Analysis Instrument utilizes the half-cell test method and measures the corrosion potential of reinforcing bars. It discovers corrosion activity before rust becomes visible. This early detection can be key in preventing an unanticipated structural failure.

The instrument is ideally suited for assessment of large areas of 43,000 sq. ft. (4,000 m^2) or a several fold, depending on the individually selectable grid size. 120,000 values can be stored by the intelligent memory. Up to 240 measurement values are displayed at a time in easy to read grayscale, and a menu technique facilitates simple operation using just nine keys. A movable cursor indicates where measurement is taking place. Unit provides immediate presentation of test area readings and data can be transferred to a printer or to a PC. Includes display unit, rod electrode with spare parts, electrode cable, cable coil, data transfer cable, Interface converter with cable, copper sulfate, carrying strap, carrying case and Instruction manual. ASTM C876; BS 1881 Part 201.

H-2873.1



1-Wheel Electrode Set (all directions)— H-2873.1

Specifications

Range:	±999 mV	Data Output:	RS-232C interface
Resolution:	1 mV	Temp. Range:	-0° to +60°C
Impedance:	10 M	Battery Oper.:	60 hours with six AA (LR 6) batteries (1.5V)
Memory:	Nonvolatile, for up to 120,000 measurements stored in up to 72 object files	Dimensions:	12.8" x 11.6" x 4.15" (325 x 295 x 105 mm)
Display:	128 x 128 pixel graphic LCD	Weight:	Shpg. 11 lbs. (5 kg)



H-2973.HC1
with H-2973

Half Cell Kits for use with H-2973 Covermeter (see page 112)

Copper Sulfate Half Cell Kit— H-2973.HC1
Silver Chloride Half Cell Kit— H-2973.HC2

You now can measure potential corrosion of rebar and steel structures in concrete with a half cell kit and the H-2973 Rebar Locator/Covermeter. Available as an add-on, the half cell kits are available in either a copper electrode in a copper sulfate solution or a silver electrode in a silver chloride solution. Both half cells are sealed units, no need to mix chemicals on site. Each is supplied with a 80ft./25m cable and comes with a 5-year guarantee. Used with the H-2973 Rebar Locator/ Covermeter, you can store up to 10 linear batches of 1,000 half cell or cover readings.



H-2973.HC2

H-2872



CorMap Rebar Corrosion Mapping System— H-2872

The CorMap is a simple and economical instrument for use in identifying areas of probable rebar corrosion. The system consists of the voltmeter, two electrode extensions, reference electrode with copper sulfate reservoir, copper sulfate, wetting agent reservoir, dispensing sponge, 250 ft. (80m) cable reel, and a heavy-duty carrying case.

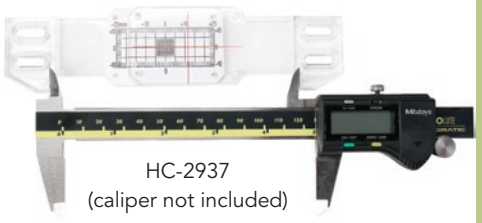
In operation, the high impedance voltmeter is connected between the reinforcing steel and the reference electrode on the concrete surface where a measurement can be made for the half-cell potential. This measurement is then used to determine the probability of corrosion activity. By testing at a fixed distance apart, a grid of half-cell potentials can be developed and areas delineated.
Meets ASTM C876; BS 1881 Part 201.

Copper Sulfate, 8.5 oz (400ml) container— H-2872.1

Crack Monitor Gauge— H-2936
Simple and accurate device for monitoring & charting movement of cracks and joints in concrete and masonry structures. Movement is indicated by crosshairs on a grid and is recorded by periodically copying the crosshair positions onto an accompanying chart.

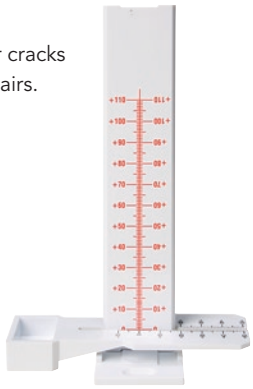

H-2936

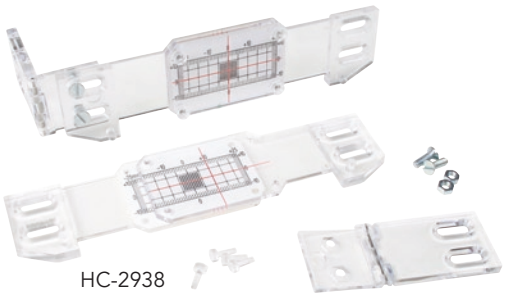
Crack Monitor Gauge with Measurement Tabs— HC-2937
Similar to the standard gauge above, but allows you to measure the width of the crack using a vernier or digital caliper— enhancing accuracy.


HC-2937
(caliper not included)

Corner Crack Monitor Gauge— HC-2938
The corner crack gauge, with its hinged design is used to monitor cracks in both internal and external corners. Corner gauges are sold in pairs.

Multi-Direction Crack Monitor Gauge— HC-2939
The displacement crack gauge monitors displacements in 3 directions. It monitors displacement and horizontal movement where there is a step across a crack due to displacement or an out of plane movement.


HC-2939


HC-2938

Multi-Length Strain Gauge Set— H-3230
Digital Multi-Length Strain Gauge Set— H-3230D
Metric Multi-Length Strain Gauge Set— H-3231
Digital Metric Multi-Length Strain Gauge Set— H-3231D
Mechanical gauge is recommended as a substitute for the Whittemore strain gauge for many applications. Designed to measure strain in masonry-type materials, structural components under load, opening or closing of structural cracks, measuring relative structural displacements, rock mechanics testing and drying shrinkage of concrete block testing. Instrument frame is cast aluminum alloy with 5 master settings of 2, 4, 6, 8 and 10 inches, easily set for gauging. Dial indicator has .0001" minimum graduation; effective strain range is 0.3". Maximum linear measurement is 0.4". Set includes: strain gauge, dial indicator, 8 brass inserts, 2 contact seats, 2 mounted contact points, invar master bar, punch bar and one compartmented wood storage case. Metric model has 5, 10, 15, 20 and 25cm settings and dial indicator with 002mm graduations. Meets ASTM C426.


H-3230

Strain Gauge Set Replacement Parts	Models
Replacement contact points for H-3230 or H-3231 gauge,	H-3230.2
Brass inserts for mounting specimen, package of 100	H-3230.3
Contact seats, stainless steel, used as a measurement position,	H-3230.4
Invar steel master bar with stainless steel seat inserts for H-3230	H-3230.5
Strain gauge punch bar for use with H-3230	H-3230.6
Invar steel master bar with stainless steel seat inserts, for H-3231M	H-3230.5M
Strain gauge punch bar for use with H-3231M	H-3230.6M

Vapor Emission Test Kit, 3-Pak (1,000 sq. ft.)— HC-2993A
Vapor Emission Test Kit, 12-Pak (10,000 sq. ft.)— HC-2993B
The vapor emission test is used for determining the moisture acceptability for the placement of floor coverings and coatings over concrete slab surfaces. Using this method, users can easily quantify the volume of water vapor emitting from a 1,000 square foot concrete slab over a 24-hour period. Commonly known as the Anhydrous Calcium Chloride Vapor Emission Method, the test is directly specified by the vast majority of the Floor Covering Industry as the primary measure of moisture acceptability for floor covering or coating installations. The kit consists of a calcium chloride container, a specifically designed dome cover with seal and step-by-step instructions. A balance or scale readable to 0.1 grams is required, but must be purchased separately. Meets ASTM E1907 and F1869 specifications.



HC-2993A
HC-2993B



HC-2990

Concrete Encounter for Moisture Testing— HC-2990

The Concrete Encounter is a hand-held electronic moisture meter, which uses non-destructive impedance measurement to determine moisture levels in concrete floor. The Concrete Encounter will give you an instant reading of moisture content to over 6% for concrete and 0-10 comparative for gypsum floor screeds, enabling you to make an informed decision on when to install floor coverings. Designed to be used on clean, dust-free slabs, just switch on and press the instrument firmly against the floor surface. Readings are the read directly from the analog meter. Coplanar electrodes with spring-loaded contacts enhance signal depth and sensitivity to a depth of .5" (12.5mm).

Moisture Meter and Thermo-Hygrometer— HC-2991

Advanced Moisture/Humidity meter measures the moisture content, relative humidity, temperature and dew point of concrete and gypsum flooring. The meter enables you to carry out four individual tests:

- Moisture content of concrete or gypsum flooring
- Relative humidity, temperature and dew point of floor environment
- Below surface, In-situ measurements of Relative humidity, temperature and dew point per ASTM F2170-02
- Relative humidity, temperature and dew point above floor surface using RH hood test method BS 5325-2001 & 8202-2001

Moisture Mode: Measures concrete from 0 to 7% moisture, 0 to 12 (comparative) for anhydride and gypsum screeds and 0 to 100 reference.

Hygrometer Mode/RH Mode: Measures 5 to 98% RH, 14 to 120°F (-10 to 50°C) and 0.1% RH 1°C/F.

Can store 900 readings in 30 files, large LCD display, RS232 port. Power supply is 9 volt PP3 lithium manganese battery. Includes meter, software and PC cable.

HC-2991



HC-2992

Moisture Meter and Thermo-Hygrometer— HC-2992

Kit includes: a HC-2991 Moisture and Humidity Meter with Software and PC Cable, Two Relative Humidity Probes, RH Probe Calibration Check Solution with Sleeve, Pack of twelve RH Sleeves, and optional instant read Infrared Surface Thermometer. Use to perform ASTM F2170-02 and ASTM F2420-05.

RH Sleeves, pack of 12— HC-2991.1



HC-2995

Dyna Pull-off Tester, 1350 lbf (6kN) with Digital Manometer— HC-2995
Dyna Pull-off Tester, 3600 lbf (16kN) with Digital Manometer— HC-2996

The easily transported, manual DYNA Pull-off Tester determines strength of concrete overlay adhesion and the strength of applied coatings, such as plastics, mortars, plasters, bituminous coats, as well as paint and other coatings. The DYNA Pull-off Tester tests at any measuring point, without requiring specimen preparation. Both models are crank drive, manual units. Adjustable legs optimize measurements for the specific test situation. Units include: digital force gauge with lbf, PSI, kN and N/mm2 selectable display units, 50 mm diameter test disc, tensile draw bolt, carrying case and instruction manual. Meets ASTM C4541, ACI 503-30, BS 1881 Part 207.

Note: Electric drive option, which provides a constant, jerk-free load increase is available, please inquire.

Test Disks for use with Dyna Pull-off Testers— HC-2995.1

50mm tests disks for use with Dyna Pull-off Testers, set of 10.

Replacement Draw Bolt— HC-2995.2

Steel replacement draw bolt for Dyna Pull-off Testers.



HC-2996

Adhesion Tester— HC-2996

The HC-2996 has been specifically designed to measure adhesion strength of coatings on concrete. In use, a 2" (50mm) diameter dolly is bonded to the coating using an adhesive. The operator then uses the wrench to apply a lift force to the dolly. The scale along the side of the unit indicates a numerical value of adhesion expressed in terms of the force required to remove the dolly. Fully portable, the HC-2996 comes in a carrying case, and is ideal for site tests being hand operated so you don't have to worry about a power supply.

Spare Dollies, Pack of 5— HC-2996.1

Araldite Epoxy Adhesive— HC-2996.2

Rapid, Freeze-Thaw Cabinet—
The Rapid Freeze-Thaw Cabinet is used to measure the resistance of concrete to deterioration caused by repeated cycles of freezing and thawing in water. The system is designed to test up to eighteen 3" x 4" x 16" (76 x 102 x 406cm) concrete specimens simultaneously, with one being a control. Key features of system include:

- Fully automatic operation frees operator to perform other lab duties.
- Allows users to establish field control using correlations between concrete strength and durability
- Permits the evaluation of variables in concrete properties and conditioning.
- Useful in the evaluation of the durability of aggregates, as well as the properties of admixtures.

Up to eight freeze-thaw cycles are possible within a 24-hour period. But the exact number of cycles is dependent upon the time required for the temperature at the center of the control prism to from 40 to 0°F (4.4 to -17.8°C) and then back to 40°F (4.4°C). The temperature at the center of the control specimen is cycled by means of a 3/4 HP (0.6KW) refrigeration unit and electric resistance heaters with fully automatic controls. An electric temperature recorder with 24-hour, 7-day week chart is incorporated into the unit to accurately maintain a record of the control specimen temperature throughout the testing period.
For corrosion resistance and long service life, the system features a stainless steel, 84" x 34" x 11" (213 x 86 x 30cm) cabinet construction with 3" (76mm) insulation on all sides. The internal test compartment measures 6" x 26" x 74" (15 x 66 x 188cm). A 30-amp circuit is required for operation. Meets ASTM C666, procedure A; and AASHTO T161, procedure A.
Order H-3195 freeze-thaw molds separately, page 118.
Shipping wt. 950 lbs. (431kg); 29 cu. ft.


H-3185

Rapid, Freeze-Thaw Cabinet— H-3185B
Rapid, Freeze-Thaw Cabinet, 220V 50/60Hz— H-3185B.4F
The H-3185B uses on/off control of heating and cooling devices to cycle between two temperatures. It can be set to cycle continuously between two temperatures for a finite number of cycles and then stop. When set to run for a finite number of cycles, ramp rate between temperature extremes can be adjusted, as well as soak duration at each extreme.

- Set temperature min/max for cycles
- Select number of cycles
- LCD temperature display
- analog temperature vs. time graph


H-3185B

Rapid, Freeze-Thaw Cabinet— H-3185SD
Rapid, Freeze-Thaw Cabinet, 220V 50/60Hz— H-3185SD.4F
The H-3185SD goes beyond the basic capabilities of the B model above and provides the following capabilities:

- User-created test capabilities are possible, to change freeze time, temperature minimum, temperature maximum and the number of cycles to run.
- Real-time, on-screen testing with graphing, allowing different data views to be chosen.
- Test data can be reviewed after a test is completed, which includes tabulation and graph views.
- Touch-screen interface for easy navigation.
- Export test data to a PC using Humboldt IR Download. This includes report creation for internal or customer usage.
- Connect to the Freeze-Thaw Cabinet remotely for control and/or observation.



H-3185SD



H-3195

Freeze-Thaw Specimen Mold— H-3195
For 3 x 4 x 16" (76 x 102 x 406mm) specimens exposed to rapidly repeated freeze-thaw cycles in water or air. Mold is cold-rolled steel with detachable base plate. Meets ASTM C233, C666; AASHTO T157, T161.



H-3185TM

Stainless Steel Sample Positioning Tray— H-3185T

Stainless Steel Sample Positioning Tray with spout— H-3185TS

Replacement Heating Element, Specify 115 or 230V— H-3185SH

Chart Paper for Recording Thermometer— Call, specify model

Pen Replacement Kit, (2) per kit— Call, specify model



H-3176

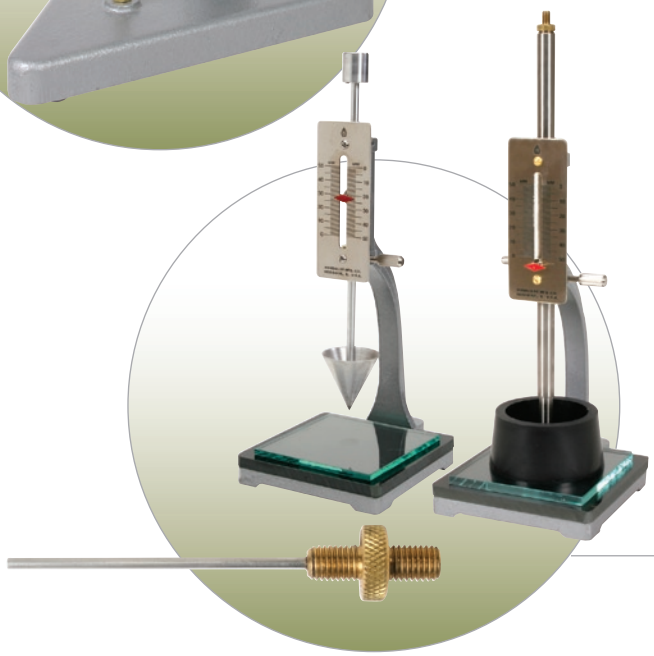
E-Meter for Flexural Resonance of Concrete— H-3176
The E-Meter can determine flexural resonance of concrete under accelerated freezing and thawing cycles and aggressive environments, conforming to ASTM C-215 and C-666. It determines the resonant frequencies of the three modes of vibration and is the only method of calculating the following material parameters non destructively: such as Youngs Modulus of Elasticity, Modulus of Rigidity, Poissons Ratio and Damping Constant. Frequencies are automatically scanned in one of four ranges. It can handle specimen sizes up to 6 inches (150mm) in cross section and from 1.75 inches (45mm) to 28 inches (700mm) in length.
A semi-automatic feature facilitates the fast identification of resonance.

Oscillator frequency range: 10 Hz to 100 kHz in 4 switched range
Frequency indicator display: 6 digit LED
Gate times: 1 sec. or 10 sec. switch selected, LED indicated
Accuracy: 20 ppm + 1 count over full operating temperature range









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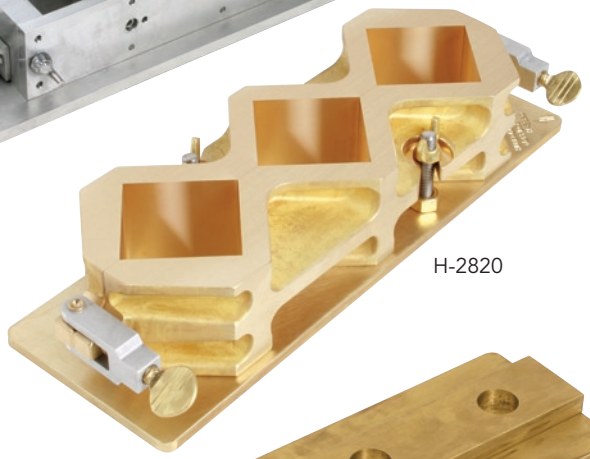
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H-2810

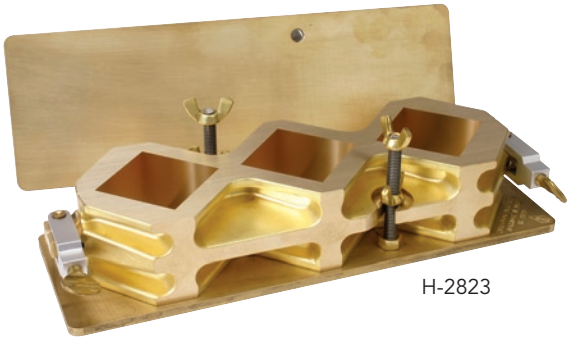




H-2820



H-2822



H-2823



H-2809



H-2800



H-3825

H-3820

Cube Molds

For Compression strength tests of Portland cement, mortars, lime and gypsum. ASTM C87, C91, C109, C141, C267, C311, C472, C617, C618, C1073; AASHTO T71, T108.

2" Cube Mold, parallel arrangement— H-2810

2" Cube Mold, parallel arrangement, 316 stainless steel. Fitted with angles for attaching to studs threaded into detachable baseplate. Shipping wt. 15lbs (6.8kg)

50mm Cube Mold, parallel arrangement— H-2810M

50mm Cube Mold, parallel arrangement, 316 stainless steel. Fitted with angles for attaching to studs threaded into detachable baseplate. Shipping wt. 15lbs (6.8kg)

2" Cube Mold, diagonal arrangement— H-2820

2" Cube Mold, diagonal arrangement, forged bronze. Reinforcing rib prevents spreading. Detachable base plate. Shipping wt. 15lbs (6.8kg)

50mm Cube Mold, diagonal arrangement— H-2820M

50mm Cube Mold, diagonal arrangement, forged bronze. Reinforcing rib prevents spreading. Detachable base plate. Shipping wt. 15lbs (6.8kg)

Cover Plate for H-2820 Cube Mold— H-2822

Cover plate for slowing the cooling rate as compound is poured. Shipping wt. 7lbs (3.2kg)

Expansive Grout Cube Mold— H-2823

2" Cube Mold for expansive grout with diagonal arrangement, forged bronze. Reinforcing rib prevents spreading. Detachable base plate and top plate. Shipping wt. 19lbs (8.6kg)

Stamped Cube Mold— H-2809

2" Cube Mold with diagonal arrangement. Used with cement, gypsum, lime, mortars, etc. These molds do not meet ASTM or AASHTO specifications and must be individually measured.

Briquette Mold— H-2800

Cast bronze briquette mold for hydraulic cement mortar tensile strength tests. Bronze clamps with pins hold two halve securely. Designed to prevent spreading during molding.

ASTM 20-30 Test Sand— H-3820

Sand is specially graded natural silica sand to pass a No. 20 (850µ) sieve. Specific gravity is 2.65. Packed in 50 lb. (22.7kg) bags. Meets ASTM C91, C141, C185, C359, C778; AASHTO T132, T137, T185. Shipping wt. 50 lbs. (22.7kg)

Cube Test Ottawa Sand C109— H-3825

Sand is specially graded natural silica sand graded to retain 98% on a No. 100 (150µ) sieve, 75% on a No. 50 (300µ) 30% on a No. 40 (425µ) and 2% on a No. 30 (600µ). Specific gravity is 2.65. Packed in 50 lbs. (22.7kg) bags. Meets ASTM C87, C109, C348, C359, C593, C778; AASHTO T71, T106, T185. Shipping wt. 50 lbs. (22.7kg)

ASTM-Compliant Mixer, 5-Qt. (4.73L)— H-3841
ASTM-compliant mixer for mixing hydraulic cement pastes and mortars of plastic consistency. Mixer includes H-3844 Bowl Positioning Adapter, a 5-qt. (4.73L) stainless steel bowl and 1 flat, stainless steel beater for mixing heavy materials. Hobart Model No. N-50 operates on principle of planetary action—beater reaches every part of the batch, rotating on its axis in opposite directions as it moves around the bowl. Thoroughly blends, mixes and aerates all ingredients for consistent, predictable finished batches. Selective agitator transmission has 3 speed settings: 139, 285 and 591 RPM. Base dimensions: 10-3/8 x 15" (264 x 381mm). Height: 17" (432mm). Features U/L listed cord and plug.
Meets ASTM C227, C305; AASHTO T162.



H-3841

Mixer, 5-Qt. (4.73L), 230V 60Hz— H-3841.2F
Mixer, 5-Qt. (4.73L), 230V 50Hz— H-3841.5F
Identical to H-3841 mixer above, except that the electrical configurations cause the mixer to run at a slightly slower speed, which renders them non-ASTM compliant.

Mixer Components	Part #
Bowl Positioning Adapter	H-3844
Bowl Lid, acrylic	H-3846L
Beater—Stainless Steel, Flat-type	H-3846.1
Bowl—Stainless Steel, 5 qt. (4.73L)	H-3841.2
Wire Loop Whip—Stainless Steel	H-3841WW
Wire Loop Whip—Stainless Steel, 1/4" dia. wire	H-3841HW


H-3844


H-3841.2

H-3841.1




H-3841WW

Tamper, Rubber Compound— H-2860
Rubber compound tamper is 6" (152mm) long with 1/2 x 1" (13 x 25mm) cross section.

Tamper, Wood— H-2860W
Wood tamper is 6" (152mm) long with 1/2 x 1" (13 x 25mm) cross section. H-2860W meets ASTM C87, C109, C157, C185, C596; AASHTO T106, T137, T160.

Tapping Stick— H-3855
Maple wood with 5/8" (16mm) dia. and 6" (152mm) length. Meets ASTM C185; AASHTO T137.

Rubbing Block— H-2812
Ground steel block 3" dia. x 1" (76 x 25mm) for removing lose sand grains and encrustations from concrete specimen surfaces before compressive testing.

H-2860


H-2860W


H-2812


H-3855

Digital Caliper (0-200mm)— H-2816.8
Provides accurate outside, inside, depth and step measurements and features large, easy-to-read LCD digits, rolling thumb wheel; plus control buttons for zero, on/off and inch/mm functions.

Stainless Steel Dial Caliper 6" (150mm)— H-2817M
Easy to read black face dial caliper with combination inch and metric scales features 0.001" / 0.1mm graduations, hardened and ground stainless steel main beam with hardened, ground and lapped measuring faces.

Stainless Steel Dial Caliper (6 inch)— H-2817
Similar to above, features a 6" measuring range with .001" graduations and .100" per revolution.

H-2817


H-2816.8

See all Caliper offerings on page 251



HCM-1000 Series

- **Machine custom-configured to do cubes**
- **Accuracy of ±.5% of indicated load from 2,500–100,000 lbs. (11–1,112 kN)**
- **Includes HCM-0112 2" Platen Set**
- **Choice of 3 digital load-indicating systems**
- **Quiet-running, continuous-duty hydraulic pump**

The HCM-1000 is based on our HCM-2500 machine, custom-configured for use as a cube machine. It has all the features you look for in a basic compression testing machine: accuracy, compactness, portability, versatility, and dependability.

The load frame features a wrap-around box construction with each corner fully welded on both the inside and outside crosshead seams, providing the rugged stability needed for accurate and repeatable test results year after year. The load frame is also protected with a unique baked-on, powder-coated painting process for a durable, long-lasting finish that keeps it looking good for years to come. The machine's eye-level digital indicator, loading-control valve, and hydraulic pump are positioned on the right side of the load frame for easy access, increasing productivity, and safer operation. Featuring superior rate-of load control, its unique quiet-running, continuous-duty hydraulic pump and pressure-compensated loading-control valve are manufactured to ISO 9100 international quality standards. Exceeds ASTM C39, E4 and AASHTO T22 specifications.

Order optional stand HCM-0200, if desired. See page 101 for list of accessories available.

Maximum Compression Capacity	100,000 lbs (1,112kN)
Vertical Opening	19.375 in. (492mm)
Horizontal Opening	9.25 in. (235mm)
Piston Stroke	2.5 in (63.5mm)
Dimensions w/ Opt. Stand (W x D x H)	27 x 17 x 56.312 in. (686 x 432 x 1430mm)
Lower Platen Diameter	33.2 x 33.2 in. (214 x 214 mm)
Upper Platen Diameter	6.5 in. (165mm)
Pump	.5 hp (.4kw)
Oil Reserve Capacity	2 gallon (7.6 liter)
Electrical Configuration	110V 60Hz 220V 60Hz 220V 50Hz
Shipping Weight	780 lbs (353kg)

Cube Platen Sets

2" Cube Platen Set—HCM-0112
Set includes platen and pedestal.
Cube pedestal (11") only: MP0022.

6" Cube Platen Set—HCM-0113
Set includes platen and pedestal.
Cube pedestal (11") only: MP0022.



HCM-0112



HCM-0113

Length Comparators
Length comparators measure length changes of hardened cement paste, mortar and concrete prismatic specimens. Indicators are mounted on a sturdy upright support attached to a solid triangular base. All units Include stationary and movable anvils designed to fit H-3260 gauge studs, which are cast into test specimens and an invar reference bar. Meet ASTM C151, C157, C227, C311, C341, C342, C452, C490, C596; AASHTO M210, T107, T160. **Custom lengths are also available, contact us for details.**

10" Effective Length Comparator/dial indicator— H-3250
16" Effective Length Comparator, dial indicator— H-3248
Comparators for 10" (254mm) or 16" (406mm) effective length samples with 3-5/8" (92mm) dia. dial gauge with a range of .400" and gradations of .0001". The Dial is marked 0-10. Includes stationary and movable anvils designed to fit the H-3260 gauge studs that are cast on test specimens and an invar reference bar. Unit accommodates test specimens up to 4 x 4" (102 x 102mm) cross section. Shipping wt.: H-3250: 32 lb (14.5kg), H-3248: 38 lb (17.2kg).

10" Effective Length Comparator, digital indicator— H-3250D
16" Effective Length Comparator, digital indicator— H-3248D
Comparators for 10" (254mm) or 16" (406mm) effective length samples with digital indicator with a range of .600" and resolution of .0001". Measures inches and millimeters includes batteries and AC adapter. Unit can be zeroed at any point on the range and can be switched from inches to mm by pressing a button. Includes stationary and movable anvils designed to fit the H-3260 gauge studs that are cast on test specimens and an invar reference bar. Unit accommodates test specimens up to 4 x 4" (102 x 102mm) cross section. Shipping wt.: H-3250: 32 lb (14.5kg), H-3248: 38 lb (17.2kg).

Replacement Components

Description	Model
Invar Reference Bar for use with H-3250 and 10" (254mm) specimens	H-3249A
Invar Reference Bar for use with H-3248 and 16" (254mm) specimens	H-3249A.16
Dial Indicator	H-3250.3
Digital Indicator	H-3250.3D
Anvil with collar (one each)	H-3250.4
Anvil only	H-3250.4.4
Collar only	H-3250.4.3
Elevating Screw, nut collar & anvil assembly	H-3250.7
Adapter for 5" specimens	H-3250.8

Gage Studs— H-3260
Gage Studs have stainless steel contact points and are knurled and threaded for use with cement prism molds. Packaged 10 per bag. Meets ASTM C151, C157, C227, C490; AASHTO M210, T107,



H-3250



H-3250D



H-3250.8



H-3260

Prism Molds, Mortar Bar Molds



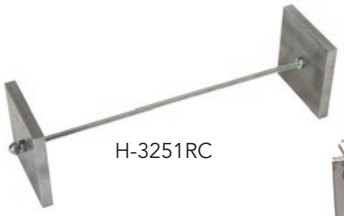
H-3251



H-3252



H-3256



H-3251RC



H-3265





H-3267

Prism Molds

Designed to produce required 10" effective gauge length, prism molds Molds feature removable partitions, base and end plates. Effective gauge length is measured from inside end of the studs. Molds produce cement prism specimens 11-1/4" long. Including studs, outside to outside length of specimen is 11-5/8". See table for product specifications.

2" x 2" x 10" (51 x 51 x 254mm), 2-mold, cold-rolled steel shipping wt. 27 lb (12.2kg)	**H-3251**
1" x 1" x 5" (25 x 25 x 127mm), 2-mold, cold-rolled steel shipping wt. 25 lb (11.4kg)	**H-3255**
Application: Volume change tests of mortars	
1" x 1" x 10" (25 x 25 x 254mm), 1-mold, cold-rolled steel shipping wt. 10 lb (4.5kg)	**H-3252**
1" x 1" x 10" (25 x 25 x 254mm), 2-mold, cold-rolled steel shipping wt. 10 lb (4.5kg)	**H-3253**
1" x 1" x 5" (25 x 25 x 127mm), 2-mold, stainless steel shipping wt. 25 lb (11.4kg)	**H-3255S**
Application: Autoclave expansion of Portland cement; length change of mortar and concrete; potential alkali reactivity of cement/aggregate combinations; linear change of magnesium and oxychloride cements; volume change of cement paste	
3" x 3" x 10" (76 x 76 x 254mm), 1-mold, cold-rolled steel shipping wt. 25 lb (11.4kg)	**H-3254**
Application: Volume change of cement past; length change of mortar and concrete	
4" x 4" x 10" (102 x 102 x 254mm), 1-mold, cold-rolled steel shipping wt. 35 lb (15.8kg)	**H-3256**
Application: Volume change tests	

Gauge Studs, see page 123

Tamping Rod— H-2905.1

Round, straight steel 3/8" dia. x 12" (10 x 300mm). Both ends rounded to a hemispherical tip the same diameter as the rod. Meets ASTM C157, C192; AASHTO T160.

Rectangular Mortar Bar Container— H-3265

Stainless steel container for storing test specimens has tight-fitting cover that prevents moisture loss. Supports up to 36 bars vertically. Dimensions: 9" x 11" x 15-1/2" (229 x 279 x 394mm). Meets ASTM C227 and C1260. Shipping wt. 25 lbs. (11.3kg)

Round Mortar Bar Container— H-3267

Plastic container includes test bar rack that supports 8 bars vertically. Dimensions: 6" x 17" (150 x 430mm). Meets ASTM C227. Shipping wt. 12 lbs. (5.44kg)

Mortar Bar Container— H-3264

Stainless steel. Dimensions: 1-1/4" x 3-1/2" x 12" (32 x 89 x 305mm) ID Tight-fitting cover prevents moisture loss. Capacity not more than 315ml of water, which completely immerses three specimens supported above bottom of container. Meets ASTM C342, C33 and C856.

Retaining Cage— H-3251RC

For 2" x 2" x 10" (508 x 508 x 2540mm) prism molds. Features 1/4-20 continuous threaded rod and acorn nuts. Meets ASTM C806.

Retaining Cage— H-3257

For 3" x 3" x 10" (762 x 762 x 2540mm) prism molds. Features 10-24 continuous threaded rod. Meets ASTM C878.



H-3050



H-3133



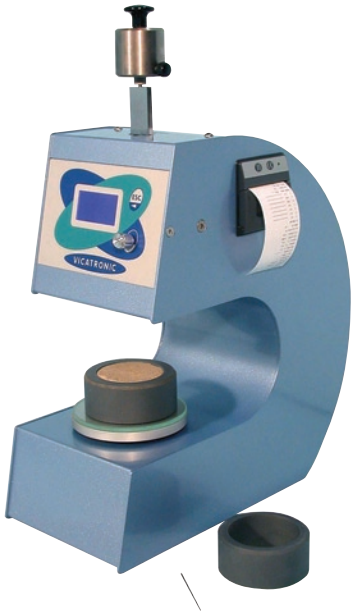
H-3085



H-3137

Vicat Testers	Specifications
Vicat Consistency Apparatus—H-3050, Reversible stainless steel plunger with 10mm dia. on one end and threaded, H-3070 1mm dia. stainless steel needle on the other. Weight of plunger assembly with adjustable indicator is 300g. Graduated 0-50mm scale. Includes frame, graduated 0-50mm scale, plunger assembly, H-3080 conical mold and H-3049 glass plate. Shipping wt. 8 lbs (3.6kg)	**ASTM C91, C141, C187, C191, C308, C451, C472; AASHTO T129, T131, T186**
Modified Vicat Apparatus—H-3060, Same as H-3050, but weight of plunger assembly with adjustable indicator is 400g.	**ASTM C1191, AASHTO T131, EN196/3**
Time of Set & Consistency Vicat Apparatus—H-3085, Designed to switch between 17.5mm dia. needle for consistency determinations and a 2mm dia. needle for time of set determinations. Plunger assembly with adjustable indicator weighs 300g with 17.5mm needle attached and 400g with 2mm needle. Includes H-3086, 76mm ID x 40mm brass ring mold. Shipping wt. 6 lbs (2.7kg).	**ASTM C807**
Modified Vicat Consistency Apparatus—H-3090, Features 19mm dia. plunger with a weight of 50g. Includes plunger rod and indicator, frame, H-3080 conical mold and H-3049 glass plate. Shipping wt. 6 lbs (2.7kg).	
Modified Vicat Consistency Apparatus—H-3120, Features 12.5mm dia. plunger with a weight of 30g. Includes plunger rod and indicator, frame, H-3080 conical mold and H-3049 glass plate. Shipping wt. 6 lbs (2.7kg).	**ASTM C110**
Modified Vicat Cone Penetrometer—H-3133, Features 10cm scale, attached aluminum cone and plunger. Total weight of plunger assembly, 200g. Includes frame, moveable rod with variable weights and plunger assemblies. Includes H-3840 400ml measure for sample as specified by ASTM C185. Shipping wt. 6 lbs (2.7kg).	**ASTM C780**
Modified Vicat Cone Penetrometer—H-3134, 35g magnesium cone and added 65g weight for 100g plunger weight. Includes frame, moveable rod with variable weights and plunger assemblies. Includes H-3080 mold. Shipping wt. 6lbs (2.7kg)	**American Dental Assoc.**
Modified Vicat Cone Penetrometer—H-3135, Includes magnesium cone on plunger with total weight of 35g. Use on unsanded plaster. Includes H-3080 conical mold. Shipping wt. 6 lbs (2.7kg).	**ASTM C472**
Modified Vicat Cone Penetrometer—H-3137, Same as H-3135 with additional 15g weight for 50g total weight for use on sanded plaster. Includes H-3080 mold. Shipping wt. 6 lbs (2.7kg).	**ASTM C472**

Replacement Parts Listed on Page 126



H-3052.4F

Automatic Vicat Machine— H-3052.4F

The Vicatronic apparatus provides a completely automatic method for determining the initial and final setting time of cements or mortar pastes. The automated test operation provides for precise and repeatable results, which are automatically printed out from the integral printer built into the apparatus.

The Vicatronic has a large high-contrast, high-resolution LCD display, which shows the test data together with the general functions of the unit. The easy-to-see menu provides a simplified guide to running a test. During the test, the display also provides a real-time graph of the results, which can be monitored.

The Vicatronic is supplied with firmware that allows the automatic performance of tests in accordances to the following standards: ASTM C191, AASHTO T131, EN 196/3, DIN 1164, DIN 1168 gypsum, NF P15/431 and BS4550. Additional programs can be developed by the operator. This is particularly useful when testing new mortars, additives or research tests requiring sophisticated and flexible applications.

The Unit is supplied with the integral printer, two needles (1mm and 1.13mm. dia), two conical molds, EN and ASTM, and a glass plate to hold the conical mold. Power supply is: 220-240V 1 Ph 50Hz. Dimensions: 15.75" x 7.87" x 18.5" (400 x 200 x 470mm). Weight: 28.6 lb (13kg).



H-3055



H-3147



H-3075



H-3070



H-3138

Replacement and Alternative Parts for Vicat Apparatuses

Use with Vicat Model & Description	Model
Plungers	
Use with H-3050—Replacement plunger, includes plunger, needle & indicator	H-3055
Use with H-3050, H-3090—Replacement plunger, includes plunger & bushings	H-3110
Use with H-3050, H-3120—Replacement plunger, includes plunger & bushings	H-3130
Use with H-3135—Replacement plunger, includes plunger, cone, indicator & spacers	H-3135.1
Needles	
Use with H-3050—1mm dia. stainless steel with knurled threaded holder	H-3070
Use with H-3050—1.13mm dia. stainless steel with knurled threaded holder	H-3072
Use with H-3050—Determination of initial and final setting of cement. Needle has an air vent and an annular attachment	H-3075
H-3085—2mm stainless steel vicat needle	H-3147
Weights	
Use with H-3060—Replaces 1mm needle. Threaded one end Provides 400g uncalibrated total weight.	H-3061
Use with H-3090—One end bored to fit over 1/4" (6.4mm) dial. plunger shaft; 100g to increase weight of plunger furnished with H-3090 to 150g	H-3100
Use with H-3137—One end bored to fit over plunger. Total weight: 15g	H-3136
Use with H-3135 and H-3134—One end bored to fit over plunger. Total weight: 65g	H-3138

Plastic Conical Mold— H-3080
For use with all Vicat apparatuses. Plastic mold, 70mm bottom dia. x 60mm top x 40mm high.

Brass Conical Mold— H-3086
For use with H-3085 Vicat apparatuses. Brass mold, 76mm dia. x 40mm high.

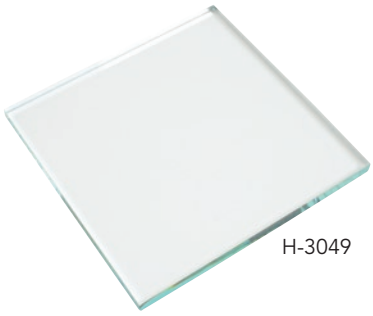
Mold Container— H-3065
Mold for use in false set test. 2" x 2" x 6" (50mm x 50mm x 150mm) Overall length including base is 9-1/4" (240mm). Meets ASTM C359.

Glass Plate— H-3049
For use with Vicat apparatuses, 4" x 4" x 3/16" (101.6mm x 101.6mm x 4.8mm).

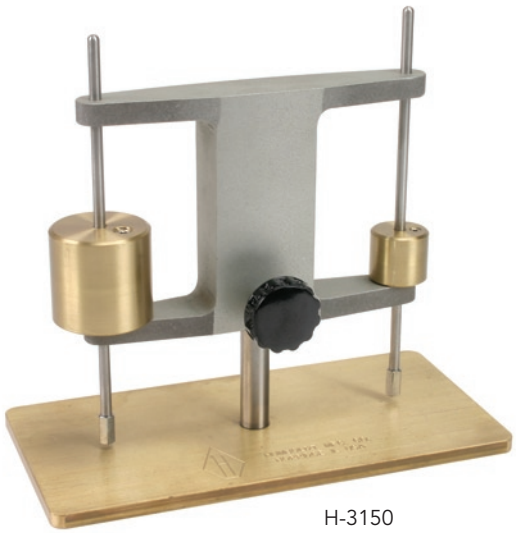

H-3080


H-3086


H-3065


H-3049

Gillmore Apparatus— H-3150
Used to determine initial and final set times of Portland cement, masonry cement, hydraulic hydrated lime and certain mortars. Complies with ASTM standards C91, C141, C150, C266, C414; AASHTO T154. Comprised of two stainless steel needles with 3/16" (4.8mm) cylindrical flat-end needles. One is 1/12" (2.12mm) dia. 1/4lb. (113.4g) weight for initial set. The second is 1/24" (1.06mm) dia., 1lb (453.6g) weight for final set. Shipping wt. 10lb (4.5kg)


H-3150

Gillmore Apparatus Replacement Parts

Description	Model
Flat plate with 1/2" sides for striking off sample to exact 1/2" thickness for Gillmore test	H-3154
1/24" (1.06mm) dia. needle with weight	H-3151
1/12" (2.12mm) dia. needle with weight	H-3152
.050" dia. Gillmore Needle	H-3152.4


H-3151
H-3152


H-3240

Cement Autoclave— H-3240
Cement Autoclave, 220V 50/60Hz w/ transformer— H-3240.4F
Uses accelerated means of estimating delayed expansion of Portland cement caused by hydration of CaO and MgO. Test bars are exposed to controlled steam pressure and corresponding constant temperature. Unit produces 60-350 psi (0.4-2.4MPa) range of pressures and consists of steam vessel, pressure regulator, pressure gauge (0-600 psi x 5 psi), air vent valve, power switches and safety pop valve set at 350psi. Includes thermometer, wrench and 5 gaskets. Additional gaskets, heating units and safety pop valves are available as replacement parts. Chamber dimensions: 6-1/8" ID x 16". Overall dimensions: 17 x 48 x 28" (431 x 1219 x 711mm) 1700W maximum power demand. Meets ASTM C151; AASHTO T107. Shipping wt. 171 lbs. (77.7kg)

Rupture Disk, Monel— H-3240.21M
Rupture Disk, Nickel— H-3240.21N
Rupture disks are used as safety devices in systems that involve pressure vessels, eliminating the need for a safety valve. The rupture disk is designed to be the weakest part of a pressure system so if there is a situation when excessive pressures occur, then the rupture disk fractures or opens thus releasing the built-up energy rendering the system safe. Rupture disks are a simple, yet reliable method for providing a safe system, which does not require calibration.

Rupture Disk Holder— H-3240.22

Rupture disk holder, complete with piping to attach to cement autoclave. Order rupture disks separately above.

Test Bar Holder— H-3243B

Test bar holder for 10"-long (254mm) gauge bars; 8-bar capacity. Holds specimens vertically, above water level, so each test bar is exposed to steam. Meets ASTM C141, C151; AASHTO T107.

Test Bar Holder— H-3243A
Test bar holder for 5"-long (127mm) samples.


H-3240.22

H-3240.21M
H-3240.21N


H-3245


H-3244


H-3243B

Autoclave Replacement Parts

Description	Model
Air vent valve	H-3240.2
Safety pop-off valve	H-3240.3
Pressure gauge	H-3240.4
Pressure-control switch	H-3240.5
Set of cap screws, 16 per set	H-3240.6
Relay 60Hz	H-3240.7
Gaskets, graphite, 100 per package	H-3242
Lower heating unit; two heaters in one housing. 115V. 50/60Hz	H-3244
Upper heating element; two-piece wrap-around type. 115V. 50/60Hz	H-3245
Thermometer, 20 to 580°F	H-2600.2F
Thermometer, -5 to 300°C	H-2610.2C

Flow Tables

Used to determine the flow of hydraulic cement, mortars and cement pastes. A test specimen is molded on the table to a specified volume and shape. Then, with the mold removed, leaving the test specimen on the table. The table is dropped and raised (via a hand crank or optional motor) a specified number of cycles, after which the flow (or increase in average diameter of the specimen) is measured.

Motorized Flow Table with Counter— H-3624
Motorized Flow Table with Counter, 220V, 50Hz— H-3624.5F
Motorized flow table with 10" (254mm) dia. cast-bronze table/platen and automatic digital counter. Motor stops automatically once pre-set number of drops is achieved. Includes heavy-duty table/platen assembly, standard H-3622 cast bronze, 2-3/4" top dia. x 2" high x 4" bottom dia. cone mold, motor and H-3614B counter. Designed to be mounted to concrete mounting block. Order H-3624F, Pedestal Form and easily create your own mounting block.

Applications include: compression strength and air content tests of cement mortar; flow tests of hydraulic cement mortars; consistency tests of magnesium oxychloride cements; flexural strength test for bond strength or mortar to masonry units. ASTM C87, C109, C110, C185, C230, C243, C348, C593; AASHTO T71, T106, T137 and T152.



H-3624

Motorized Flow Table with Mold— H-3625
Motorized Flow Table with Mold, 220V, 50Hz— H-3625.5F
Motorized flow table with 10" (254mm) dia. cast-bronze table/platen Same as H-3624, but without counter. Includes standard H-3622 cast bronze, 2-3/4" top dia. x 2" high x 4" bottom dia. cone mold. Shipping wt. 30 lb (13.6kg). Used in determining consistency of cement mortars. ASTM C230.

Hand-Driven Flow Table with Mold— H-3620
Hand-driven flow table with 10" (254mm) dia. cast-bronze table/platen. Includes standard H-3622 cast bronze, 2-3/4" top dia. x 2" high x 4" bottom dia. cone mold. Shipping wt. 30 lb (13.6kg). Used in determining consistency of cement mortars. ASTM C230.


H-3620

Automatic Counter— H-3614B
Automatic Counter, 220V 50/60Hz— H-3614B.4F
Can be used to upgrade H-3625 Motorized Flow Table so a pre-determined number of drops can be set to run automatically. Use H-3614B.4F with H-3625.5F.

Caliper— H-3621
Used to measure mortar diameter and indicate percentage of flow. ASTM C87, C185, C230; AASHTO M152, T71, T137.

Flow Mold— H-3622
Cast bronze 2-3/4" top dia. x 2" high x 4" bottom dia. cone mold.

Flow Mold— H-3622M
Cast bronze 70mm top dia. x 50mm high x 100mm bottom dia. cone mold.


H-3622

400ml Measure— H-3840
Calibrated to 400ml, this measure is used to determine air content of hydraulic cement mortar. Cylindrical with 3" (76mm) ID, approximately 3-15/32" (88mm) depth. ASTM C185, C780; AASHTO T137.

Shield— H-3623
Circular shield for use with H-3622 flow mold to prevent mortar from spilling on table top. ASTM C230; AASHTO M152.


H-3624F


H-3840

Straight Edge— H-4144.8
Straight edge of ground steel with bevelled edge. 1/8" x 1-1/4" x 8" (3 x 32 x 200mm) ASTM C185, D558, D559, D560, D698; AASHTO T137.

Pedestal Form— H-3624F
Wooden form to create concrete base for flow tables.


H-4144.8


H-3621



H-3630A



H-3600



H-3810



H-3816



H-3813B



H-3817

Water Retention Apparatus— H-3630A

The apparatus is used in specification tests of masonry cement and physical testing of quicklime and hydrated lime. Unlike older models, the newly designed unit incorporates a vacuum regulator and gauge system in place of the old mercury manometer and relief column. The complete unit consists of an aspirator pump, vacuum regulator, vacuum gauge, three-way stopcock, flask, rubber gasket, brass funnel, perforated brass dish, filter paper and hardwood stand. Meets ASTM C1506, C110, C207 and E149.

Water Retention Apparatus Replacement Parts

Funnel	H-3630.3
Stopcock	H-3630.4
Rubber Gasket	H-3630.18
Filter Paper, 15cm, Package of 100	H-3630.21
Perforated Brass Dish	H-3631
Flask, 1000ml	H-4913.1M

Cement Bleeding Apparatus— H-3600

Used to determine bleeding rate and bleeding capacity of cement paste and mortar by direct and continuous procedure. Includes noncorrosive metal container for paste or mortar, collecting ring, support stand and necessary glassware. Rubber-covered double V-jaw burette clamp holds stopcock in position; single rubber-covered jaw clamp supports the burette and funnel assembly. Shipping wt. 20 lbs. (9.0kg)

Blaine Air Permeability Apparatus— H-3810

Determines fineness of Portland cement in terms of specific surface expressed as total surface area in square centimeters per gram of cement. Consists of: calibrated U-tube manometer, ground glass joint, stainless steel test cell and plunger, rubber aspirator bulb and perforated disc. Includes 8 oz (226.8g) bottle of red manometer fluid, filter paper, wood block for holding test cell during filling and funnel. Mounted on finished wood panel with rubber-footed base. Meets ASTM C204; AASHTO T153. Shipping wt. 15 lbs. (6.8kg)

Blaine Air Permeability Replacement Parts

Rubber Bulb	H-3811
Stopcock, cell and plunger	H-3812
Perforated brass disc	H-3813B
Perforated stainless steel disc	H-3813S
Manometer fluid, 8oz (240ml)	H-3814
Monometer U-tube, calibrated	H-3815
Filter paper discs, medium retentive, pkg 500	H-3816

SRM 114q - Portland Cement Fineness Standard— H-3817

This Standard Reference Material (SRM) is used in calibrating fineness testing equipment according to ASTM Standard Methods. The SRM unit consists of a glass vial with plastic caps containing powdered cement (each vial is contained in a sealed foil bag). Each vial contains approximately 5g of cement.

SRM 114q - Portland Cement Fineness Standard— H-3817.20

Package of 20, H-3817 individual vials.

Cement Calorimeter— H-3160
Cement Calorimeter, 230V 50Hz— H-3160.5F
For determining heat of hydration of cements by measuring difference between heat of solution of dry cement and heat of solution of a separate sample partially hydrated for 7 to 28 days. Constant-speed stirrer maintains uniform temperature throughout liquid and supplies sufficient agitation to keep solid reactant suspended in the acid mixture. Includes insulated wood case, insulated 1G (3.8L) can; 1 pt. (0.47L) vacuum jar with stopper; differential thermometer plus holder, rod and reading magnifier; glass funnel; stirring paddle and chuck; geared synchronous motor; 4oz. (120ml) bottle of vinylite paint, and instructions. Meets ASTM C186.


H-3160

Wagner Turbidimeter— H-3805
Wagner Turbidimeter, 230V 50Hz— H-3805.5F
Determines fineness of Portland cement, using photoelectric cell to measure light passing through suspended pulverized material. Microamp meter measures current generated in the cell; indicated reading is measure of turbidity of the suspension. Includes photoelectric cell {and light source in metal cabinet, timing burette and stand, wet sieving assembly including gauge and spray nozzle, microamp meter, 3 flasks, 4 test tubes, stirring apparatus and instruction book. Battery not included. Meets ASTM C115; AASHTO T98. Shipping wt. 140 lbs. (53.5kg)


H-3805

Reaction Container— H-3320
For determining potential alkali reactivity of aggregates (chemical method) when used with high alkali cements. Stainless steel unit is 2" dia. x 2-1/4" high (51mm dia. x 57mm) fitted with air-tight cover. 50-75ML capacity. Meets ASTM C289.

Cement Soundness Tester— H-3350
Mold used to determine soundness of cement by measuring the expansion of cement when heated in an atmosphere of steam or boiling water. It consists of a brass split ring and two long parallel indicating arms. As cement expands, the ring is spread and an increased distance between the free ends of the indicating arms gives an index of soundness.

Organic Impurities Test Set— H-3493
Determines presence of injurious organic compounds in sands used in cement mortar or concrete. Test serves as warning that further tests of sands are necessary before they can be approved for use.
Meets ASTM C40; AASHTO T21.
Sodium Hydroxide— H-3391
Graduated Bottle— H-3490A


H-3493

Tube Sampler, Bulk Cement— H-3341
For sampling hydraulic cement in bulk shipments or bulk storage. Has two polished brass telescopic tubes with registering slots (with partitions) that open or close by rotation of the inner tube. Outer tube has sharp point to facilitate penetration. Sampler is 1-3/8" (35mm) dia. x approximately 63" (160cm) long. Meets ASTM C183; AASHTO T127. Shipping wt. 11 lbs. (5kg)



H-3492


H-3490A



H-3391


H-3320

Tube Sampler, Packaged Cement— H-3340
For sampling hydraulic packaged cement, brass unit has hardwood handle. Unit is 1-1/4" (32mm) dia.x 28-3/4 (730mm) long.
Meets ASTM C183; AASHTO T127.


H-3341


H-3340


H-3350



HC-2834S



H-2834



H-2833



H-2834SSB

Grout Flow Cone Set, 1/2" (13mm)— HC-2834S
Test set for measuring the flow of grout for preplaced, aggregate concrete. Intended for neat grout and grouts containing fine aggregate capable of passing a No. 8 sieve and grouts which have an eflux time of less than 35 seconds. Kit includes: (1) H-2834 Interchangeable Orifice Flow Cone and Adjustable Point Gauge Assembly, (1) H-2833 Stand, and (1) H-2834SSB Stainless Steel, 6 liter Beaker. ASTM C939.
Shipping wt. 9 lbs. (4.1kg)

Grout Flow Cone Set, 3/4" (19mm)— HC-2835S
Test set same as above but with 3/4" (19mm) orifice.

Grout Flow Cone, 1/2" (13mm)— H-2834
Cast-aluminum flow cone from above set, has 1/2" (13mm) replaceable orifice. Can also accommodate 3/4" (19mm) orifice, which can be purchased below. Includes adjustable point gauge assembly. Overall dimensions: 8" dia. x 12"H (203 x 305mm). ASTM C939.

1/2" (13mm) Orifice— H-2834.500

3/4" (19mm) Orifice— H-2834.750

Grout Flow Cone, 3/4" (19mm)— H-2835
Cast-aluminum flow cone from above set, has 3/4" (19mm) replaceable orifice. Can also accommodate 1/2" (13mm) orifice, which can be purchased below. Includes adjustable point gauge assembly. Overall dimensions: 8" dia. x 12"H (203 x 305mm). ASTM C6449.

Flow Cone Stand— H-2833
Sturdy well-constructed steel stand to support flow cones so the top is level and the cone free from vibration. Overall dimensions: 21"W x 9-1⁄2"D x 23"H. Shipping wt. 17 lbs. (7.7kg)

6-Liter, Stainless Steel Beaker— H-2834SSB

Grout Box— H-2838
Cardboard box designed to be used to mold grout test samples. Each box forms 4 molds and can be used as a transport/shipping container as well. Boxes yield consistent, identical prism samples, while the engineered, slotted corrugation retains moisture while closely simulating CMU absorption rates. 25 boxes to a package.



H-2838

Micrometer Bridge Set— H-2903
Designed to hold one cylinder to permit repeated volume change measurements without moving or disturbing the specimen. Includes the following items: H-2901 Micrometer Bridge, H-2902 Micrometer Depth Gauge, H-2904 Tapered Cylinder Mold, H-2905.2 Tamping Rod, H-2905.2 glass plate and H-2905.3 Weight.

Tapered Cylinder Mold— H-2904
Used to determine volume change of grout, mold is constructed of steel tubing 1/4" wall x 3" dia. x 6"H (6 x 76 x 152mm). Mold is split longitudinally with two quick-acting clamps welded to the mold. Top edge of mold is machine tapered to a narrow rim. Includes detachable base plate. Meets ASTM C1090. Shipping wt. 6 lbs. (2.7kg)

Micrometer Depth Gauge— H-2902
Graduations in the thousandths of an inch (.001"), range 0 to 3", 1/8" rod dia. Sleeve is designed with staggered lines, hardened and precision ground screw; lock nut holds the setting at the precise measurement. Includes protective case. Base length is 2-1/2".

Micrometer Bridge— H-2901
Bridge is used to hold the H-2904 mold in place while repeated volume change measurements are made.

Tamping Rod— H-2905.1
Round, straight steel rod is 3/8" (10mm) dia. x 12" (300mm) long. Both ends are rounded to a hemispherical tip of the same diameter as the rod. Meets ASTM C157, C192.

Glass Plate— H-2905.2
Glass plate used with Micrometer Bridge Setup

Weight— H-2905.3
3 lb weight for use with Micrometer Bridge Setup

Fireproofing Mat Depth Gauge— H-2818
Gauge for measuring the depth of fireproofing. Plastic body with steel probe.

Marsh Funnel Viscometer— H-2842
The Marsh Funnel Viscometer is a rugged, easy to operate instrument that is used for making rapid, on the spot measurements of drilling mud viscosity. Marsh Funnel readings are only general measurements, but the frequent reporting of the Marsh Funnel Viscosity will alert the mud engineer to sudden changes in the mud viscosity that could require corrective action. The Marsh Funnel Viscosity is the ratio of the speed of the mud as it passes through the outlet tube (the Shear Rate) to the amount of force - the weight of the mud itself - that is causing the mud to flow (the Shear Stress). Marsh Funnel Viscosity is reported as the number of seconds required for one quart of mud to flow out of a full Marsh Funnel.

1L Measuring Cup for Marsh Funnel— HC-2843
1 liter, plastic measuring cup used for collecting sample from Marsh Funnel.

Mud Balance— H-4790
The Mud Balance provides a simple, practical method for the accurate determination of fluid density. The item's durable construction makes it ideal for field use. Despite its sensitivity, it contains no easily broken parts. Principally, the balance consists of a base and graduated arm with cup, lid, knife-edge, rider, built-in spirit level, and a counterweight. A plastic carrying case is provided to hold the balance intact and in it's working position.


H-2901


H-2904


H-2902

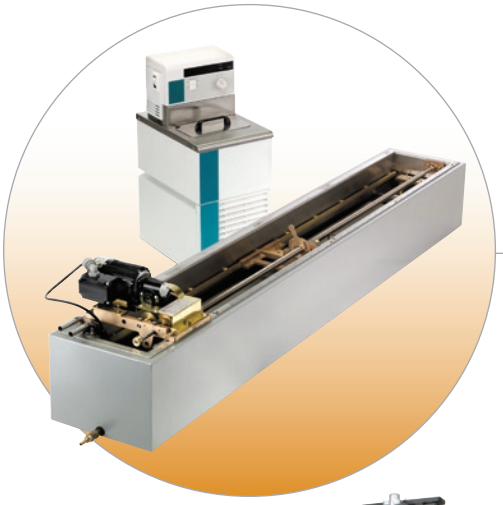

H-2905.1


H-2905.3

H-2905.2


H-2818

Asphalt









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Heavy-Duty, Automatic Single Compactor with Rotating Mold

The Humboldt Automatic Marshall Compaction Machine is designed to provide a stable and rigid mechanism for producing 4" or 6" diameter asphalt pills used in Marshall tests. The heavy-duty design stands up well to the constant jarring caused by the compaction process. The Humboldt Compaction Machine features a rotating mold mechanism and a hammer with a beveled foot, which together produce a kneading action when producing test pills.
The machine's automatic counter allows the operator to preset the number of blows wanted and will turn off the machine when completed. After the number of blows has been set, the operator can start the machine with a push button and keep track of the number of blows on an LED readout.
The counter can be operated on either 115V/60Hz or 230V/50Hz, switchable inside the cover. A cam-action lever operates the integral mold holder to facilitate insertion and removal of the stability mold.

Machines can be ordered as 4" or 6" machines, but can be altered to easily accommodate the other size by purchasing a hammer and test molds of the desired size. Each machine includes: the mechanical compactor, an automatic counter, tapered-foot hammer assembly for rotating mold models or a flat-foot hammer assembly for the stationary mold models, (1) stability mold, and (1) package of paper discs. Shipping wt. 400 lbs. (181.4kg).
Complies with ASTM D6926, D5581, AASHTO T245 and PTM705

Heavy-Duty, Automatic Single Compactor with Rotating Mold

Description	Model
For 4" diameter specimens. 115V 60Hz	H-1364R
For 6" diameter specimens. 115V 60Hz	H-1366R
For 4" diameter specimens. 230V 60Hz	H-1364R.2F
For 6" diameter specimens. 230V 60Hz	H-1366R.2F
For 4" diameter specimens. 230V 50Hz	H-1364R.5F
For 6" diameter specimens. 230V 50Hz	H-1366R.5F

Heavy-Duty, Automatic Single Compactor with Stationary Mold

Identical to the machines above except these have a stationary mold (non-rotating) and use a flat bottom hammer.

Heavy-Duty, Automatic Single Compactor with Stationary Mold

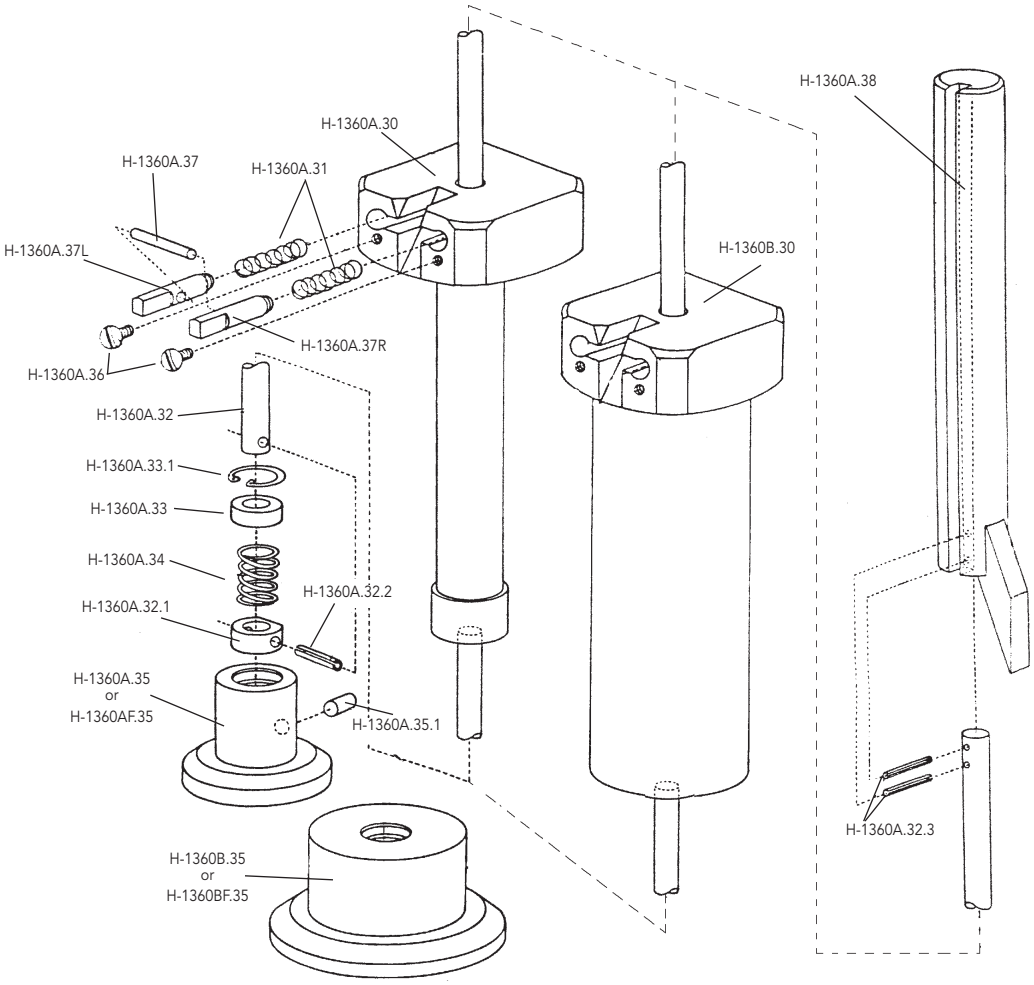
Description	Model
For 4" diameter specimens. 115V 60Hz	H-1364
For 6" diameter specimens. 115V 60Hz	H-1366
For 4" diameter specimens. 230V 60Hz	H-1364.2F
For 6" diameter specimens. 230V 60Hz	H-1366.2F
For 4" diameter specimens. 230V 50Hz	H-1364.5F
For 6" diameter specimens. 230V 50Hz	H-1366.5F

Replacement Parts for Heavy-Duty, Automatic Single Compactors

Description	Model
4" hammer with tapered foot (rotating mold)	H-1360A
6" hammer with tapered foot (rotating mold)	H-1360B
4" hammer with flat foot (stationary mold)	H-1360AF
6" hammer with flat foot (stationary mold)	H-1360BF
Lift Chain for H-1364, H-1366 Series	H-1360.21
Replacement pedestal for H-1364 and H-1366 Compactors	H-1347M
Replacement Counter and proximity switch for Compactors	H-1334BA
Replacement Counter and proximity switch for Compactors, 230V	H-1334BA.4F



1360A





H-1360B

Hammer Assemblies and Replacement Parts

Description	Model
Compaction hammer, 10 lb (for 4" mold)	H-1360A.30
Compaction hammer, 22.5 lb (for 6" mold)	H-1360B.30
Hammer slide shaft	H-1360A.32
Spring retainer, anvil	H-1360A.32.1
Spring washer, anvil	H-1360A.33
Hammer foot, 4" tapered	H-1360A.35
Hammer foot, 4" flat	H-1360AF.35
Hammer foot, 6" tapered	H-1360B.35
Hammer foot, 6" flat	H-1360BF.35
Hammer release pin, left hand	H-1360A.37L
Hammer release pin, right hand	H-1360A.37R

Description	Model
Anvil release arm weldment	H-1360A.38
Hammer release arm	H-1360A.38.1
Anvil, top	H-1360A.38.2
Spring	H-1338.34
Spring	H-1360A.31
1/4" dia. x 1" large roll pin	H-1360A.32.2
3/16" dia. x 1-1/2" roll pin	H-1360A.32.3
Internal retaining ring	H-1360A.33.1
5/16" dia x 1/2" large dowel pin	H-1360A.35.1
1/4-20 x 1/2" large truss head screw	H-1360A.36
1/4" dia. x 1-3/8" Large dowel pin	H-1360A.37



H-1336D



H-1346D



H-1356D

Standard-Duty 4" Automatic, Single Compactor with Stationary Mold

Ease sample preparation with an automatic mechanical compactor. Apparatus compacts samples at a preset number of hammer blows and shuts off on completion. Unit includes mechanical compactor, automatic counter, oak compaction pedestal and H-1341 mold assembly. Additional mold and hammer assemblies are recommended. Complies with ASTM D6926, D5581, AASHTO T245 and PTM705. Shipping wt. 198 lbs (89.8kg)

Description	Model
Compactor, 115V 60Hz	H-1336D
Compactor, 230V 60Hz	H-1336D.2F
Compactor, 230V 50Hz	H-1336D.5F

Standard-Duty 4" Automatic, Double Compactor with Rotating Mold

Automatically compacts dual samples at a preset number of hammer blows and shuts off automatically on completion. Unit includes mechanical compactor, automatic counter, oak pedestal and mold assembly. Overall dimensions: 10 x 21 x 66"H. Complies with ASTM D6926, D5581, AASHTO T245 and PTM705. Shipping wt. 265 lbs (120.2kg)

Description	Model
Compactor, 115V 60Hz	H-1346D
Compactor, 230V 60Hz	H-1346D.2F
Compactor, 230V 50Hz	H-1346D.5F

Standard-Duty 4" Automatic, Triple Compactor with Rotating Mold

Triple simultaneous specimen compactions are produced automatically at a preset number of hammer blows. Machine shuts off on completion. Units include mechanical compactor, automatic counter, oak pedestal and mold assembly. Overall dimensions: 16 x 22 x 66"H. Complies with ASTM D6926, D5581, AASHTO T245 and PTM705. Shipping wt. 400 lbs (181.4kg)

Description	Model
Compactor, 115V 60Hz	H-1356D
Compactor, 230V 60Hz	H-1356D.2F
Compactor, 230V 50Hz	H-1356D.5F



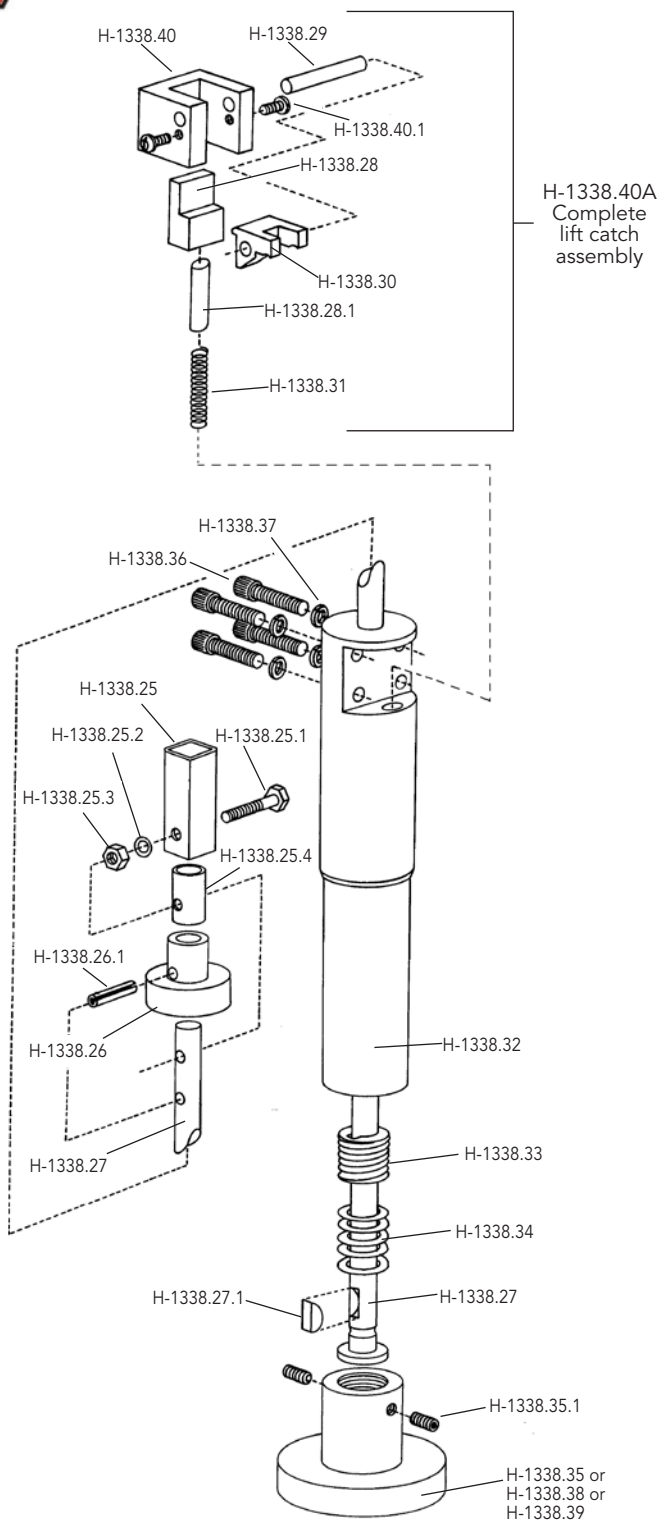
H-1338A
H-1338B
H-1338C

Replacement Parts for Standard-Duty, Automatic Compactors

Description	Model
4" hammer with flat foot (stationary mold) for H-1336D	H-1338A
4" hammer with tapered foot (rotating mold) for H-1346D, H-1356D	H-1338B
4" hammer with "Canadian" tapered foot (rotating mold) for H-1346D, H-1356D	H-1338C
Lift Chain for H-1336D, H-1346D and H-1356D	H-1336.21
Replacement Counter and proximity switch for Compactors	H-1334B
Replacement Counter and proximity switch for Compactors, 230V	H-1334B.4F



H-1334B
H-1334B.4F



Hammer Assemblies and Replacement Parts

Description	Model
Clevis pin with screw	H-1338.29
Locator guide	H-1338.25
Hex head bolt	H-1338.25.1
Washer	H-1338.25.2
Nut	H-1338.25.3
Spacer	H-1338.25.4
Hammer handle	H-1338.26
Spring pin	H-1338.26.1
Hammer rod	H-1338.27
Key	H-1338.27.1
Hammer weight (complete)	H-1338.32
Plug	H-1338.33
Spring	H-1338.34
Hammer foot, flat	H-1338.35
Hammer foot, tapered	H-1338.38
Hammer foot, Canadian spec	H-1338.39
Screw for foot	H-1338.35.1

Lift Catch Assembly and Replacement Parts

Description	Model
Complete lift catch assembly	H-1338.40A
Release block	H-1338.28
Pin	H-1338.28.1
Clevis pin	H-1338.29
Lift catch	H-1338.30
Spring	H-1338.31
Screw	H-1338.36
Washer	H-1338.37
Release housing	H-1338.40
Screw for release housing	H-1338.40.1

Replacement Pedestal for H-1336 Marshall Compactor— H-1347M

Replacement Pedestal for H-1346 Marshall Compactor— H-1347.2M

Replacement Pedestal for H-1356 Marshall Compactor— H-1347.3M



H-1347M



H-1367



H-1341



H-1337



H-1341P
H-1361P



H-1331



H-1348
H-1363



H-1353A



H-1355

6" Marshall Compaction Mold— H-1367
6" stability compaction mold for preparing test specimens with the H-1366 and H-1366R Compactors. Can be used with rotating or stationary mold models. Complies with ASTM D5581. Shipping wt. 10 lbs. (4.5 kg)

4" Marshall Compaction Mold (Rotating Mold)— H-1337
4" stability compaction mold for preparing test specimens with all rotating mold compactors (H-1346, H-1356 and H-1364R). Base plate of mold is designed to link with rotating base feature of compactors causing the mold to rotate during compaction. Forming mold is 4" (102mm) ID by 3" (76mm) high. Complies with ASTM D6926. Shipping wt. 10 lbs. (4.5kg)

4" Marshall Compaction Mold (Stationary Mold)— H-1341
4" Stability compaction mold for preparing test specimens with H-1364, H1336D mechanical compactors and H-1340/H-1345 Hand Compactors. Consists of base plate, forming mold and collar. Molds are machined from seamless tubing and plated. Base plate and collar are interchangeable with either end of the forming mold. Forming mold is 4" (102mm) ID by 3" (76mm) high. Use with H-1336 mechanical compactor and H-1340 hand compactor only. Complies with ASTM D6926. Shipping wt. 10 lbs. (4.5 kg)

4" Paper Disks (1000 pkg)— H-1341P
6" Paper Disks (500 pkg)— H-1361P
Circular, smooth-edged 4" or 6" diameter disc fit in bottom of H-1337 (4"), H-1341 (4") or H-1367 (6") compaction molds before introducing mixture prior to compaction test. Facilitates removal of sample specimen from mold. Shipping wt. 10lbs.

Marshall Sample Storage Can— H-1331
Lidded, 2 lb can for storing Marshall samples.

4" Mold Extractors— H-1348
6" Mold Extractors— H-1363
Used with compression tester for removing 4" or 6" compaction mold specimens. Shipping wt. 8 lbs. (3.6kg).

Hand-Operated Sample Ejector— H-1353A
Designed for lab and field use to extract asphalt samples from either 4" or 6" compaction molds. The ejection force is generated by means of a 3-ton (27.7kN) capacity hand-operated hydraulic jack. The cast-aluminum ejector head assembly can be positioned at different heights through the use of quick release pins. This enables the operator to easily match the ejection travel to the height of the mold being used. Overall dimensions 13"W x 6"D x 27"H (330 x 152 x 686mm).

Motorized Sample Ejector— H-1355
Motorized Sample Ejector, 220V 60Hz— H-1355.4F
Similar in design and construction to the H-1353A series sample ejector, this model features the use of a 5-ton capacity motorized hydraulic pump and ram assembly. The unit incorporates extended upright rods in order to accommodate both standard 4" or 6" asphalt compaction molds, as well as the taller gyratory compaction molds. Overall dimensions excluding pump 13"W x 6"D x 29"H (330 x 152 x 737mm).

Marshall Hand Compactor

Hand Compactor Set for 4" Molds— H-1345
Compactor set that facilitates hand compaction of 4" Marshall specimens. Set features oak pedestal with hammer support rod, which holds hammer in perpendicular to base position during compaction. Also features a mold holder, which keeps the mold securely positioned during compaction. Set includes: H-1340 Compaction Hammer; H-1347 Pedestal with steel plate; H-1341 Compaction Mold; H-1343 Compaction Mold Holder; H-1345.6 Hammer Support Rod, and H-1345.5 Adjustable Guide. Complies with ASTM D6926. Shipping wt. 165 lbs. (74.8 kg)

4" Hand Compaction Hammer— H-1340
Compacts asphalt mixture in the compaction mold. Flat circular face is 3-7/8" (98mm) dia.; hammer is 10 lb. (4.54kg.) sliding weight and has a free fall of 18" (457mm). Two compaction hammers are recommended. Shipping wt. 20 lbs. (9.0kg)

4" Hand Compaction Hammer, Finger Guard— H-1340G
Compacts asphalt mixture in the compaction mold. Hammer has finger guard at base of sliding weight. Flat circular face is 3-7/8" (98mm) dia.; hammer is 10 lb. (4.54kg.) sliding weight and has a free fall of 18" (457mm). Two compaction hammers are recommended. Shipping wt. 20 lbs. (9.0kg)

Mold Holder for Hand Compaction— H-1343
Holder mounts on compaction pedestal and centers the compaction mold over the center of the post. Mold holder keeps mold, collar and base plate securely positioned during compaction. Shipping wt. 7 lbs. (3.2 kg)

Pedestal for 4" Hand Compactor— H-1347
Necessary to stabilize mold during compaction. Consists of 8" x 8" x 18" (203 x 203 x 457mm) wooden post capped with 12" x 12" x 1" (305 x 305 x 25mm) steel plate. Pedestal mounts to a concrete slab with four angle brackets at bottom of pedestal. Shipping wt. 90 lbs. (40.8kg)

Adjustable Hammer Guide— H-1345.5
Guide for hand compaction hammer.

Hammer Support Rod— H-1345.6
Support rod for hand compaction hammer.

Marshall Mix Design and Testing Booklet— H-1328A
While the new Superpave mix design system continues to evolve, many users worldwide continue to rely on the Marshall Method for hot asphalt mix design. This booklet covers the Marshall mix design criteria; equipment necessary to perform the tests; sample preparation and testing procedures; data analysis, as well as moisture susceptibility testing methods.



H-1345


H-1340 H-1340G


H-1345.5



H-1347

H-1345.6



H-1328A


H-1343



H-1339B

Marshall Compression Machine— H-1339B
Marshall Compression Machine, 220V 60Hz— H-1339B.2F
Marshall Compression Machine, 220V 50Hz— H-1339B.5F
Compression machine designed specifically for testing the resistance to plastic flow of bituminous paving mixtures—the Marshall Test. Machine has a one-speed motor with reversing switch that produces a uniform vertical movement of 2" (51mm) per minute. Unit includes a H-4454.100 calibrated load ring and dial indicator for determining test load. Load capacity is 10,000 lbs. (45kN). Maximum piston travel is 3-1/2" (88mm). Overall dimensions are: 18" x 18" x 38-1/2"H (457 x 457 x 978mm). Shipping wt. 185 lbs. (78.9 kg)

Chart Recorder Accessory Kit— H-1329CK
Chart Recorder Accessory Kit, 220V 50Hz— H-1329CK.5F
This kit is comprised of a H-1329LR chart recorder, an LVDT and a H-2300.100 load cell for converting a H-1339B Marshall compression machine into an automatic Marshall compression tester and recorder. Includes LVDT sensor, electronic load cell and plotter assembly. Shipping wt. 18 lbs (8.2kg)

Digital Accessory Kit, 110-250V 50-60Hz— H-1324A.3F
Twin-channel digital display for use with the H-1339. Includes S-type 10,000 lbf (45kN) load cell, 0.4" (10mm) linear strain transducer, and transducer bracket. Display: 12" x 10" x 4" (304 x 254 x 102mm).

Basic Marshall Test Set— H-1335
Basic Marshall Test Set, 230V, 60Hz— H-1335.2F
Basic Marshall Test Set, 230V, 50Hz— H-1335.5F
Basic Test Set for evaluating stability and plastic flow (Marshall Tests) of bituminous paving mixtures. Includes all the basic testing equipment for performing these tests. Ideal setup for field lab applications, as well as dedicated Marshall test labs. Included in the set are: (1) H-1339B—Marshall Compression Machine; (1) H-1340—4" Hand Compaction Hammer; (2) H-1341—4" Marshall Compaction Molds; (1) H-1342—4" Marshall Breaking Head; (1) H-1343— Mold Holder for Hand Compactor; (1) H-1344—Dial Flowmeter with Guide Sleeve (Specify H-1344M if you desire a metric Flowmeter); (1) H-1347—Pedestal for 4" Hand Compactor; (1) H-1348—4" Mold Extractor, and (1) H-1390— Water Bath.



H-1335
Basic Marshall Test Set

Marshall and TSR Compression Machine— H-1322
Compression Machine, 220V 50Hz— H-1322.5F

The Humboldt H-1322, Marshall and TSR Compression Machine, is a state-of-the-art apparatus specifically designed for Marshall and TSR testing. These tests can be used to evaluate the relative quality of materials, as well as generate input for pavement design or pavement evaluation and analysis. The microprocessor-based system incorporates a 16-bit Analog to Digital (A to D) converter with chart recorder output and RS232 computer connection capabilities. The system automatically tests and records Marshall stability and plastic flow of Bituminous mixture on one chart with an accuracy to less than 1 percent over the total range, eliminating operator error in dial readings and manual recording of data. Meets ASTM D6927, D4123-82; AASHTO T245, T283, BS 598-107. Overall dimensions are: 36" x 18" x 38-1/2"H (914 x 457 x 978mm). Shipping wt. 250 lbs. (113.6 kg)

Features include:

- The Marshall and TSR Compression Machine has a total frame capacity of 10,000 lb (45kN).
- Stress is measured with a supplied S-Type load cell.
- The apparatus features an AC single-speed motor with an operating rate of 2 in/min or (50.8mm/sec.), and a built-in yt chart recorder, for monitoring load vs. rate of compression.
- The 16-bit Analog to Digital converter can be connected directly to a computer or serial printer for live data monitoring.
- The apparatus automatically detects the peak value, automatically stops testing procedure upon completion and automatically activates the chart recorder for a hard copy of the test data.
- Maximum piston travel is 3-1/2" (88mm) with limit switch to prevent gearbox jams and damages.



H-1322

H-1322 Dual Range Chart Paper— H-1322CP

Chart paper with dual-range scale that allows switching between 5000 and 10,000 lbf by using switch on H-1322 chart recorder. Package of 100 sheets.

Marshall Setup using the HM-2800 Load Frame

The HM-2800 is a multi-use, multi-speed machine that provides a dedicated setting for Marshall testing in addition to its ability to provide variable speeds of operation between 0.008 and 2.000 inches/minute for doing the multitude of tests required by today's labs. Pictured above is the HM-2800 Load Frame with a typical Marshall setup. See the chart below for items to order for the setup shown.

Typical Marshall Setup using HM-2800

Part #	Qty	Description
HM-2800	1	Multi-Speed Load Frame
H-4454.100	1	Load Ring, 10,000 (45kN)
H-1344	1	Flow Meter Dial Gauge 1.000" x .0001"
H-1342	1	Breaking Head



HM-2800

Multi-Speed Load Frame— HM-2800
Multi-Speed Load Frame, 220 50/60Hz— HM-2800.4F

See page 62 for more information on the HM-2800 Load Frame.

HM-3000 Marshall Testing Solution

The HM-3000 provides the ultimate lab solution of a multi-purpose load frame that can handle Marshall and Hveem tests with built-in test parameters, as well as soil tests such as CBR, UU, CU, CD and UC. The HM-3000 can work as a stand-alone unit, which can perform Marshall tests at the push of a button; or with the aid of Humboldt's HMTS software and a computer, be automated to run tests and gather data in real-time data acquisition in the form of charts and graphs. The HM-3000 is ideal for road construction projects in either mobile or fixed labs, educational institutions and consulting firms.

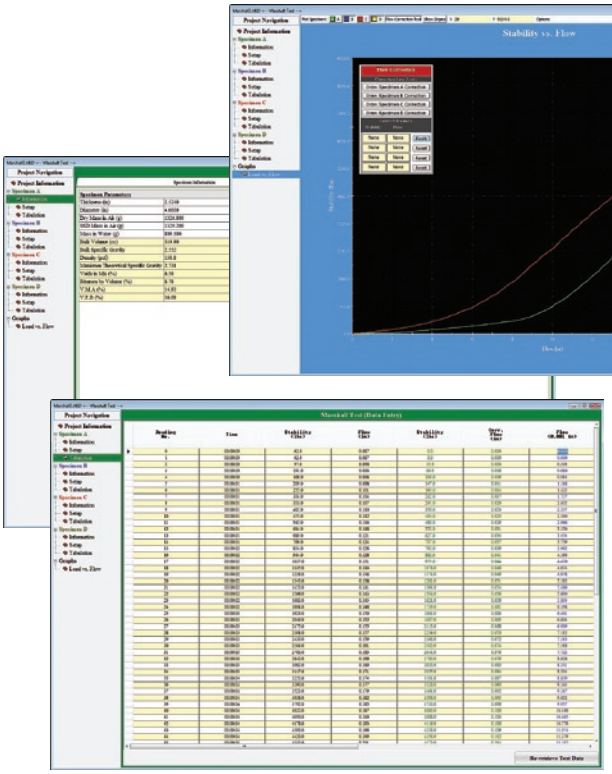


Marshall Setup using the HM-3000.3F Load Frame

Pictured is the HM-3000.3F Load frame with a typical Marshall setup. See the chart below for items to order for the setup shown. See page 60 for more information on the HM-3000.3F Load Frame.

Typical Marshall Setup using HM-3000.3F

Part #	Qty	Description
HM-3000.3F	1	Digital MasterLoader 110/220V
HM-2300.100	1	S-Type Load Cell, 10,000 (50kN)
HM-2310.10	1	Strain Transducer 1" (25mm)
HM-4178BRT	1	Displacement Transducer Bracket
HM-3005SW	1	Marshall Reporting Software



HMTS Reporting Software, Marshall Module— HM-3005SW

Humboldt Material Testing Software (HMTS) is a stand-alone application used in conjunction with Humboldt's load frames, MiniLoggers, etc. to provide real-time data acquisition. The Marshall Module provides a simple, test-specific interface to control Marshall test operations and automatically record data while also displaying it in real-time tables and graphs. Technicians can be freed-up for other duties with the assurance that all test data is being collected and saved.

- Test Information is stored, and all calculations are performed automatically
- Live tests and live graphing capabilities (real-time)
- Complete test report including all calculations and graphs required for testing
- Review and export tests using Microsoft Excel
- Smart Test Function: automatically picks up where it left off if the test was not finished due to unexpected events within your computer.

4" Marshall Breaking Head— H-1342
6" Marshall Breaking Head— H-1362
Marshall Breaking Heads consist of an upper and lower cylindrical segment having an inside radius of curvature of 3" for a 6" samples and 2" for a 4" sample. The lower segment is mounted on a base with two perpendicular guide rods extending vertically from the base. One guide rod is larger than the other, with a correspondingly larger guide sleeve in the upper segment to ensure correct assembly. Guide sleeves in the upper segment bring the two sections together without appreciable binding or loose motion on the guide rods. Meet ASTM D6927.
H-1342 shipping wt. 20 lbs. (9.1kg), H-1362 shipping wt. 30 lbs. (13.65kg)



H-1342
H-1362

4" Lottman Breaking Head— H-1349
6" Lottman Breaking Head— H-1369
Breaking heads for testing tensile strength. H-1349 has 1/2" wide upper and lower segments for use on 4" samples. H-1369 has 3/4" wide upper and lower segments for use on 6" samples. Meet ASTM D6931, AASHTO T283. Shipping wt. 10 lbs.



H-1349
H-1369

Dial Flowmeter— H-1344
Dial Flowmeter, metric— H-1344M
Consists of a special dial indicator with a maximum position brake assembly and a guide sleeve that fits over either guide rod of a H-1342 or H-1362 stability test mold. H-1344 has a range of 1.00" with 0.01" divisions and the H-1344M has a range of 25mm with 0.25mm divisions.

Dial Gauge Replacement— H-1344.2
Dial Gauge Replacement— H-1344.2M
Replacement Dial Gauges for H-1344 and H-1344M Dial Flowmeters.



H-1344.2

Marshall Test Load Ring, 11,000 LBF (4,550kgF, 50kN)— H-4454.100
Marshall Test Load Ring, 5,500 LBF (2,500kgF, 25kN)— H-4454.050
Calibrated load rings with dial Gauges for use in Marshall testing are individually serial numbered for positive identification and comes with a calibration chart showing the relationship between deflection and pounds force for the individual ring. Units are calibrated in lbs. force every 20 lbs. from 0 to 1,000 lbs. and every 50 lbs. from 1,000 to 11,000 lbs. with adequate deflection to interpolate to 10 lbs., in kg force and kN. Comes with 3/4" -16 female, threaded mount. Meet ASTM E74.
Shipping wt. 8 lbs. (3.7kg).



H-1344

Digital Load Ring, 11,000 LBF (4,550kgF, 44.5kN)— H-4454.100D
Digital Load Ring, 5,500 LBF (2,500kgF, 25kN)— H-4454.050D
Identical to Load Rings above except they use digital indicators in place of the dial indicators.

Load Rings
Load Rings for use in various other applications. Meet ASTM E74. Rings are individually serial numbered for positive identification and come with a calibration chart showing the relationship between deflection and pounds force for the individual ring.

Range and Measurement Units			Model	
lbf	kN	kgf	Analog	Digital
110	0.5	50	H-4454.001	H-4454.001D
220	1.0	100	H-4454.002	H-4454.002D
550	2.5	250	H-4454.005	H-4454.005D
1,100	5.0	500	H-4454.010	H-4454.010D
2,200	10.0	1,000	H-4454.020	H-4454.020D
5,500	25.0	2,500	H-4454.050	H-4454.050D
11,000	50.0	5,000	H-4454.100	H-4454.100D
22,000	100.0	10,000	H-4454.200	H-4454.200D



H-4454.100D



H-4454.100

NOTE: ASTM recommends that load rings be recalibrated each year after they have been put into service.



H-1390

H-1394

Water Baths with Microprocessor-based Temperature Control

Microprocessor-based temperature controller, controls temperature throughout range from ambient to 180°F (82°C), with accuracy of ±0.1% of input span. All models are fully-insulated and models H-1390 and H-1394 include a magnetic circulator which assures constant water temperature throughout bath. Model H-1392 does not have a magnetic circulator.

- Auto-tuning is fast & effortless
- Dual, digital display simultaneously shows set point and process temperature
- Ramp-to-set point handles critical temperature processes smoothly
- Set point range limiting protects process and equipment
- Percent power limit protects components from stress
- Rapid cycling provides fast system response
- Operator lockout guards against unwanted changes
- All exposed parts are stainless steel. Front panel is water and corrosion resistant.

Deluxe Water Bath, 110V 60Hz— H-1390
Deluxe Water Bath, 220V 50/60Hz— H-1390.4F
Microprocessor-based temperature control for precise temperature control throughout the range. Includes magnetic circulator, ensuring constant water temperature, and, a stainless steel shelf, which stands 2" (51mm) above the bottom of the unit for free circulation of water above and below test samples. Volume is 7.76 gallons (29.40L) and dimensions are: . ID: 19.5"W x 11.5"D x 8" H (495.3 x 292.1 x 203.2mm). Meets ASTM D1559.
Shipping wt. 47 lbs. (21.4kg)

Large Deluxe Water Bath, 110V 60Hz— H-1394
Large Deluxe Water Bath, 220V 50/60Hz— H-1394.4F
Same as H-1390, except volume is: 14 gallons (53L) and dimensions are 20" x 20" x 10" deep (508 x 508 x 254mm).
Shipping wt. 74 lbs. (33.5kg)

Water Bath, 110V 60Hz— H-1392
Water Bath, 220V 50/60Hz— H-1392.4F
Same as H-1390, except it does not have a magnetic circulator.
Shipping wt. 74 lbs. (33.5kg)

Economy Water Bath, 110V 60Hz— H-1380
Economy Water Bath, 220V 50/60Hz— H-1380.4F
Low-cost alternative water bath for heating specimens holds eight standard 4" stability molds. Supporting shelf above the bottom allows water circulation around specimens. Automatic thermostatic control with a range of 150° to 500°F (65° to 160°C). ID 11-1/2 x 19-1/2 x 5-1/2" (293 x 497 x 140mm) deep. H-1380.4F uses included step-down transformer for electric conversion.



H-1380

12-Qt. Laboratory Bench Mixer— H-3842A
Bench Mixer, 230V 50/60Hz— H-3842A.4F

The Hobart Model HL-120 bowl has a 12-qt. (0.401 cu. ft.) mixing capacity and a 15-minute motor-driven timer. Planetary action of the beater assures thorough blending and mixing. Selective agitator transmission has 3 speed settings: 106, 196 and 358 RPM. Includes stainless-steel bowl, flat-type aluminum grid beater and aluminum dough hook. Base dimension: 14-3/4" x 20" x 29-9/16" (375 x 508 x 750cm). Shipping wt. 185 lbs. (83.9 kg)

H-3842A—12-Qt. Mixer Replacement Parts

Description	Model
Aluminum Beater	H-3842A.1
12-Qt. Stainless Steel Bowl	H-3842A.2
Aluminum Dough Hook	H-3842ADH
Stainless Steel Wire Loop Whip	H-3842AWW

20-Qt. Laboratory Bench Mixer— H-3843A
Bench Mixer, 230V 50/60Hz— H-3843A.4F

With a 20-qt. capacity (0.6684 cu. ft.) bowl, the Hobart HL-200 mixer has a positive gear drive and planetary mixing action to deliver positive results. Selective agitator transmission has 3 speed settings: 107, 198 and 361 RPM. Exclusive stirring switch provides low (53RPM) speed to facilitate adding liquids to semi-solids. Includes stainless-steel bowl and flat-type aluminum grid beater. Base dimension: 21" x 21-1/2" x 41-1/4" (533 x 546 x 1048cm). Shipping wt. 226 lbs. (102kg)

H-3843A—20-Qt. Mixer Replacement Parts

Description	Model
Aluminum Beater	H-3843A.1
20-Qt. Stainless Steel Bowl	H-3843.2
Aluminum Dough Hook	H-3843DH
Stainless Steel Wire Loop Whip	H-3843WW

Humboldt Extreme-Duty 12 Qt. Whisk— H-3842HW
Humboldt Extreme-Duty 20 Qt. Whisk— H-3843HW

Custom, hand-made extreme duty whisks are formed from 1/4" dia. stainless steel rod. Designed to stand up to the abuse of mixing heavy aggregate asphalt mixes in the Mixers listed above.

Asphalt/Concrete Mixer, 5 gal., Stationary— H-1690

Ideal for sample batch mixing in either laboratory or field. Separate utility bucket cradles securely inside enameled-steel mixer frame. Maximum capacity 70 lbs (50lb recommended). Built for continuous duty performance. Choice of 4 Mixing angles. Mix bucket speed is 60 rpm with 1/4 HP motor. Includes bucket, chain guard and R-paddle. Shipping wt. 45 lb (20kg).

Asphalt/Concrete Mixer, 5 gal., Portable— H-1691

5 gallon, portable mixer with 8-inch semi-pneumatic wheels for mobility. Mix bucket speed is 60 rpm with 1/4 HP motor. Includes mix bucket only, order desired paddles separately. Shipping wt. 81 lb (37kg).

Asphalt/Concrete Mixer, 10 gal., Portable— H-1692

10 gal. version of H-1691. Includes mix bucket only, order desired paddles separately.



H-3843A

H-3842A

Extreme-duty Whisks and parts for previous models, H-3842 (Hobart A-120) and H-3843 (Hobart A-200) are available, please call.



H-3842HW
H-3843HW



H-1690



H-1691

H-1690 Asphalt/Concrete Mixer Accessories

Description	Model
Mixing Paddle for 5 gal. H-1690 Mixer	H-1690.2
Deluxe Mixing Paddle for 5 gal. H-1690 Mixer	H-1690.3
Bucket & Cover for 5 gal. H-1690 Mixer	H-1690.1

H-1691, H-1692 Asphalt/Concrete Mixer Accessories

Description	Model
Asphalt Paddle for 5 gal. Portable Mixer	H-1691.6
Asphalt Paddle for 10 gal. Portable Mixer	H-1692.6
Concrete Paddle for 5 gal. Portable Mixer	H-1691.8
Concrete Paddle for 10 gal. Portable Mixer	H-1692.9
Mix Bucket for 5 gal. Portable Mixer	H-1691.4
Mix Bucket for 10 gal. Portable Mixer	H-1692.5



Rice Test Setup

Typical Rice Test Stetup



H-1750



H-1820



H-1754D



H-1749

Vacuum Pycnometer (Rice Test) Set— H-1750
Used in Rice testing to determine the maximum specific gravity of bituminous paving mixtures with maximum aggregate size up to 19.1mm (3/4in.). 2000g capacity, 7-1/2" ID x 6" depth. Set includes aluminum volumetric canister; volumetric lid; flat, Plexiglas vacuum lid with O-ring; volumeter; vacuum gauge with release valve and fittings (dial reading 0 to 30"), and a metal water vacuum aspirator with 3/8" IPT and 6' hose. Unit achieves vacuum using an aspirator or optional vacuum pump. Use with H-1756 vibrating table, and H-1754D manometer, sold separately. See page 150 for vacuum pumps. Replacement parts are available, please inquire.
Meets ASTM D2041; AASHTO T209, T283.

Aluminum Lid— H-1750.2
Replacement lid for models H-1750 and H-1751.

O-Ring— H-1750.3
Replacement o-ring for models H-1750 and H-1751.

Stainless Steel, Vacuum Pycnometer Set— H-1750SS
Same as H-1750 except stainless steel vessel.

Small Vacuum Pycnometer Set— H-1751
Same as H-1750 except 1500g capacity, 7-1/2" ID x 4" depth.

Large-Capacity Vacuum Pycnometer Set— H-1820
Large-capacity unit, 10L (2.64 gal.), 6000g (13.2 lbs.) sample weight, with maximum aggregate size of 50mm (2in.). Set features domed transparent cover for easy observation of sample testing, perforated plastic shelf, which some States require; water inlet valve and 1/4" ID hose, quick-disconnect, vacuum gauge, vacuum hose and aspirator with 3/8" NPT fitting. Flange OD is 10-3/4" (273mm); maximum clearance above plate is 7-3/4" (197mm). Use with H-1826A vibrating table, and H-1754D manometer, sold separately. See page 150 for vacuum pumps. Replacement parts are available, please inquire. Dimensions: 9-7/16" ID x 12-1/8" (240 ID x 311mm). Meets AASHTO T209, T283.

Digital Manometer— H-1754D
Digital Manometer, Certified— H-1754DCA
A precise measurement device designed to replace mercury-filled manometers used in Rice test applications. This portable, hand-held device can be easily moved around the laboratory. Holes are provided for bench or wall mounting and a 3/8" barb fitting is used for quick connections. The instrument features a digital display range of 0 to 1000mm Hg (absolute) at a resolution of 0.1mm Hg. The device has a rated accuracy of +/-0.5% full scale and is powered by one 9V battery.

Slow Release Valve for Vacuum Pycnometers— H-1749
For use with H-1750, H-1751 and H-1820 for greater accuracy and shorter dry back time. Brass valve maintains 30mm vacuum pressure on sample. Meets ASTM D2041, AASHTO T283.

Orbital De-Airing Table for H-1750 Pycnometer— H-1782
The Humboldt Orbital De-Airing Table is designed for use in maximum specific gravity and density determinations of bituminous paving mixtures. Through the use of an orbital shaking action, material densification that entraps air is virtually eliminated, resulting in more accurate and uniform test results. The front panel incorporates a variable speed controller with a range of 10 to 250 rpm and an LED programmable timer with an accuracy of better than ±0.1%. The orbital diameter of the 11" x 12" (279 x 305mm) table is set at 1-1/2" (38.1mm). Taking up little counter space, the base is 10" x 10" (154 x 154mm) and has an overall height of 16" (406mm). Quick release clamps are used to permit quick mounting and removal of the pycnometer. The optional H-1753 Flask Attachment allows the user to conduct tests using a laboratory flask. Shipping wt. 28lbs (13kg)
Note: For 220V operation, order Model H-1042 Transformer.



H-1782

Vibrating Table for H-1750 Pycnometer— H-1756A
Vibrating Table for Pycnometer, 220V 50Hz— H-1756A.5F
Heavy-duty vibrating tables keep sample material loose for more reliable test results. Strong, rugged-duty vibrators and sturdy bases having integral, heavy-duty on/off switches. Exclusive quick-release cam/lock fasteners allow quick placement and removal of canister.



H-1756A

Vibrating Table for H-1820— H-1826A
Vibrating Table for H-1820, 220V 50Hz— H-1826.5F
Heavy-duty vibrating tables keep sample material loose for more reliable test results. Strong, rugged-duty vibrators and sturdy bases having integral, heavy-duty on/off switches. Exclusive quick-release cam/lock fasteners allow quick placement and removal of canister. The open-end model has a sliding scale and is graduated above and below zero to 130 x 1mm. Shipping wt. 12lbs (5.4kg)



H-1826A

Flask Attachment— H-1753
For use with H-1756A and H-1782, flask not included.



H-1753 shown in use with H-1782

Universal Timer— H-4296
Universal Timer, 220V 60Hz— H-4296.4F
Portable timer automatically shuts off electrical apparatus at set time up to 60 minutes. Features two receptacles and 3-wire cord and plug.



H-4296

Indicating Drierite Air Drying Unit— H-1759
Easily installs in-line between vacuum pump and rice test equipment. This refillable unit measures 2-5/8" by 11-3/8" (667 x 289mm) with hose barbs at both ends, which can accept 1/4" to 3/8" flexible tubing. Supplied complete with 650g of indicating desiccant.



H-1759

Drierite Desiccant— H-1757
For use while performing Rice test. Protects vacuum pump by removing final trace of moisture. Must be used with H-1758 Indicating Drierite. Meets ASTM D2041.



H-1757

Indicating Drierite Desiccant— H-1758
For use with H-1757 Drierite desiccant in performing Rice test. Blue desiccant turns red to show absorption and may be reused.



H-1758

Vacuum Pumps Available on Page 150



H-1763A

High Vacuum Pump— H-1763A
High Vacuum Pump, 230V 50/60Hz— H-1763A.4F
Direct-drive two-stage rotary sliding vane high vacuum pump features gas ballast and trap to reduce risk of oil being sucked into the system. Produces free air displacement 85L per minute (3 cu. ft. per minute) and maximum vacuum 29-30". Operating temperature is 30 to 170°F (-1.11 to 76.6°C). Has 1/4" OD intake ports for 1/4" ID tubing. Dimensions: 11-1/4" x 15-1/2" x 6-1/2" (28.6 x 39.4 x 16.5cm). Shipping wt. 26 lbs (13kg)



H-1764

Two-Stage Vacuum Pump— H-1764
Two-Stage Vacuum Pump, 230 60Hz— H-1764.2F
Two-Stage Vacuum Pump, 230 50Hz— H-1764.5F
Designed for continuous use, this two-stage, belt-driven pump operates on the oil-sealed rotary vane principle and is ideal for distillation, filtration, degassing and as a roughing pump for high-vacuum systems. Pumps are mounted on rectangular steel base plate and include V-belt and belt guard that totally encloses belt and pulleys. Pump pulls 29-30" maximum vacuum. Includes initial supply of oil plus an extra quart of HyVac® oil. Shipping wt. 80 lbs (36kg)



H-1770

Two-Stage Vacuum Pump w/Gas Ballast— H-1765
Vacuum Pump w/Gas Ballast, 230 50Hz— H-1765.5F
Same as H-1764 but with gas ballast that consists of an adjustable valve to permit controllable proportion of air to be bled into exhaust stage for rapid purging of entrained water vapor in pump oil. For maximum vacuum, this can be operated totally closed. Pump pulls 29-30" maximum vacuum. Shipping wt. 110 lbs (50kg)

Vacuum Pump— H-1770
High-vacuum, small capacity, general-purpose vacuum pump with belt guard has two-stage construction for efficiency with low maintenance. Features metal vanes and vented exhaust for introduction of air to remove condensable vapors. Pump is filled with oil; an extra quart is included. Exhaust filter is available separately. Guaranteed ultimate vacuum is 25-29" (635-736mm) mercury, and free-air displacement is 25L/min. (0.9cfm).



H-1762

Two-Stage Oil-less Vacuum Pump— H-1762
Two-Stage Oil-less Vacuum Pump, 230 50Hz— H-1762.5F
Split-capacitor four-pole, two-stage oil-less diaphragm vacuum pump pulls 29" Hg maximum-obtainable vacuum.
Shipping wt. 25 lbs (11.36kg)

Vacuum Pump Oil
High purity oil with low vapor pressure that does not materially increase at temperatures up to 50°C (122°F) and viscosity sufficiently low for use at 125°C (59°F). Oil remains fairly constant up to 50°C (122°F).
Vacuum Pump Oil, 1 Quart— H-1766.2
Vacuum Pump Oil, 1 Gallon— H-1766.3
Vacuum Pump Oil, 5 Gallon— H-1766.4
Vacuum Pump Oil, 12 Quart Case— H-1766.5
Vacuum Pump Oil, 6 Gallon Case— H-1766.6



H-1766.2



H-1766.3



H-1768.3

Flushing Oil for Vacuum Pumps— H-1768.3
Purges contaminants and condensables, such as water & solvents from all mechanical vacuum pumps. Use between oil changes minimizes contamination of new oil by residue from old oil; extends pump life. Shipping wt. 9 lbs (4.1kg).

QuarterMaster™ Hot Asphalt Mix Sample Splitter— H-4122
The QuarterMaster™ is ideal for dividing the larger asphalt mix samples required in Superpave specifications. The hopper accepts samples up to 120 lb (54kg) of any mix with aggregate between 9.5 to 37.5mm and quarters it into four equal parts. In operation, a simple throw of a lever divides the sample. Using the device ensures greater control, consistency and uniformity in the preparation of test samples. The unit is supplied complete with four sample buckets. Dimensions are 14"W x 17"D x 48"H (356 x 432 x 1219mm). To assist operation, order a H-1702 materials handling scoop. Shipping wt. 84 lb (38kg)





H-4122QF

QuarterMaster™ Quick Funnel Insert— H-4122QF

QuarterMaster™ Replacement Bucket— H-3372

Asphalt Permeameter, 4"— HM-9110
Asphalt Permeameter, 6"— HM-9111
These asphalt permeameters are compact, self-contained, easy-to-use units, which can be used in the lab or in the field. They are used to test the permeability of a compacted asphalt paving mixture by using the falling head method to determine hydraulic conductivity of saturated 4" or 6" samples. To use, place the specimen inside the metal cylinder, where it is held in place by a latex. The unit is then pressurized by the built in hand pump. The expanding membrane pushes against the outer edge of the sample, filling in voids and preventing flow down the side of the core. The sample is then saturated from the bottom, and 500cc of water is allowed to flow through the sample while being timed. Both permeameters include a 500cc manometer with 15 ft of 1/4" OD water line, built-in hand pump and a pressure gauge.

H-4122



HM-9110
HM-9111

4" Membranes— HM-9110.2 **4" O-rings— HM-9110.1**
6" Membranes— HM-9111.2 **6" O-rings— HM-9111.1**

Asphalt Content/Binder Ignition Furnace— F85930
The Asphalt Content/Binder Furnace with internal automatic balance is an environmentally-friendly and cost-effective method for the accurate determination of asphalt content. Developed by NCAT, the National Center for Asphalt Technology. Furnace's large capacity handles samples up to 4,000 grams. Ignition method reduces testing time compared to solvent testing methods and automatic operation frees technicians for other tasks. Temperature range is: 392 to 1202°F (200 to 650°C). Accurate internal balance monitors weights automatically throughout ignition to within ±0.1 gram. Easy operation— simply enter sample weight, calibration factor, load the sample, and push start, when unit beeps at test end, push stop, and sign receipt. Door safety features, such as a software-activated door lock, an automatic interlock that cuts power when door is open, full 180 degree door opening and door hinge lock eliminate harmful solvents and make operation easy.
Chamber dimensions: 14"W x 10.5"H x 14"D (355 x 266 x 355mm).
Overall dimensions: 21.75"W x 36.75"H x 25.75"D (552 x 933 x 654mm).
240V 60Hz, 20 amp, 4,800 watt operation. Shipping wt. 290 lb (131.6kg)



F85930
F85938

Asphalt Content/Binder Ignition Furnace— F85938
Same as above except 208V 60Hz, 23 amp, 4,800 watt operation.

Accessory Package for Ignition Furnaces— AY1087X1
Accessory package includes: 4 baskets, 2 trays, 2 covers, handle, cooling cage, insulated plate, gloves, face shield, 4 rolls of printer tape, balance calibration plate and anderol oil.

F85930 & F85938 Replacement Parts

Description	Model
Exhaust Tubing (per foot)	H-1515
Exhaust Tubing, Stainless Steel (per foot)	H-1515SS
Printer Paper	PRX2

Rhoma-Sol™ Specialty Emulsifier— H-1304
Spray-on solution used to remove bituminous deposits and stains from test equipment, contains no hazardous petroleum solvents and is 100% biodegradable.



H-1304



H-1610

SHRP Gyratory Compactor— H-1610
SHRP Gyratory Compactor, 220V 60Hz— H-1610.2F
SHRP Gyratory Compactor, 220V 50Hz— H-1610.5F

The SHRP Gyratory Compactor is designed for use in Superpave asphalt mix design. The system has undergone complete testing and is approved by the South Central Superpave Center. Test results were comparable a perfect 12 out of 12 times. Weighing only 550 lbs (249kg), the system is ideally suited for both laboratory and field jobsite applications. The unit is supplied complete with one 150mm mold and PC with calibration equipment and software. Meets ASTM D6925 and all AASHTO and FHWA specifications.

Features include:

- Supplied complete with PC, calibration equipment and software.
- Completely enclosed compaction chamber
- Continuous height measurement of specimen during testing to within +/-0.1mm
- Built-in power assisted specimen extractor
- Real-time display of test data
- User-friendly software programs for editing test data acquisition and analysis
- See-through door with safety switch and illuminated test chamber
- Interchangeable 100mm and 150mm molds

Specifications:

- Consolidation pressure 200 to 1,000 kPa
- Consolidation ram travel adjustable, factory set at 10mm/second
- Angle of gyration adjustable from 0.5° to 2.0° +/-0.02° (factory set at 1.25°)
- Rate of gyration 30.0 rpm +/-0.5 rpm, constant
- Automated shutoff for preset specimen height, Nmax or number of gyrations
- Mold height 250mm
- Mold wall thickness 9.5mm minimum
- RS232 communications port
- Dimensions 21.15"W x 28"D x 63"H (537 x 711 x 1600mm) excluding PC
- Weight 550 lb (249kg)

SHRP Gyratory Accessories

Description	Model
Piston Face Conversion Kit for 100mm Samples	H-1612
Mold Assembly, 100mm	H-1614
Mold Bottom, 100mm	H-1614B
Filter Paper, 100mm, Pkg. of 1000	H-1341P
Mold Assembly, 150mm	H-1616
Mold Bottom, 150mm	H-1616B
Filter Paper, 150mm, Pkg. of 1000	H-1361P
Calibration Kit, includes: indicator, mounting brackets and gauge blocks	H-1620
Material Handling Chute	H-1702

Revolving Shelf Oven— H-30065
Revolving Shelf Oven, 220V 50Hz— H-30065.4F
This, revolving shelf, gravity convection asphalt drying ovens has been designed for use in a wide range of specialty ASTM or general purpose applications including thin film and loss on heating tests. Temperature range from 40°C to 260°C (up to 500°F). Revolving 13-1/2" (342mm) dia. shelf holds four 5-1/2" (140mm) H-1540 or H-1541 pans or nine 2.17" (55mm) dia. H-1350 sample cups. Has externally mounted 5 RPM induction motor without brushes, non-exposed heaters clamped between double walls, heavy-gauge steel insulated door and an 11" x 11" (30 x 30cm) double-paned window. Two types of thermometers are included: ASTM 13°C loss on heat (+155°C to +170°C) mounted on shelf support shaft with two sets of mounting brackets and a standard thermometer. Standard thermometer for insertion through the top of oven when operated as utility oven, (0°C to +300°C range.) Inside dimensions are: 19" x 18" x 15" (48 x 46 x 38cm). Overall dimensions are: 27" x 26" x 39" (68 x 66 x 99cm). Order test pans and sample cups separately. Meets ASTM D1754, D6; AASHTO T179, T47. Shipping wt. 270 lbs. (122kg)



H-30065

Thin Film Test Pan, Stainless Steel— H-1540
Stainless steel pan used with H-30065 revolving shelf oven in testing the effect of heat and air on semisolid asphaltic materials. Flat-bottom pan is 5-1/2" ID x 3/8" (140 x 9.5mm). Meets ASTM D1754, AASHTO T179.

Thin Film Test Pan, Aluminum— H-1541
Aluminum version of the H-1540 Pan.

Sample Cups— H-1350.3A


H-30068.4F

Asphalt Rolling Thin Film Oven, 208-230V 50/60Hz— H-30068.4F
The rolling thin film oven is used to measure the effect of heat and air on a moving film of semi-solid asphaltic material. The results of this treatment are determined from measurements of the asphalt properties before and after the test. Through the use of a programmable temperature controller and 4-digit digital display system, the oven accurately maintains the specified test temperature of 163°C. The oven includes a 200 to 14,000 ml/min flow meter, 0 to 100 psi air pressure gauge, rotating test rack and eight glass specimen jars. Overall dimensions 40"W x 36"H x 26"D (1016 x 3292 x 660mm). Meets ASTM D2872, AASHTO T240 and California test method 346. A clean, dry compressed air source is required for oven operation. Shipping wt. 380 lbs. (173kg)


Oven Interior

Glass Container for Rolling Thin-Film Oven— H-30068.12
Heat-resistant, glass, oven jar. 64mm OD (2.52") x 139.7mm H (5.50"). Meets ASTM D2872, AASHTO T240.

H-1642



Bending Beam Rheometer— H-1642
Bending Beam Rheometer, 230V 50Hz— H-1642.5F

The Bending Beam Rheometer (BBR) performs flexural tests on asphalt binder and similar specimens per ASTM D6648-01 and AASHTO T313-02. These tests, initially developed by the Strategic Highway Research Program (SHRP), consist of a constant force being applied to a specimen in a chilled fluid bath in order to derive specific rates of deformation at various temperatures. The complete BBR system consists of a fluid bath base unit, a three-point bend test apparatus, which is easily removed from the base unit for specimen loading and unloading, an external cooling unit with temperature controller and a calibration hardware kit with carrying case. The unit features an integral, stainless steel load frame and In-line, blunt-point loading shaft. The large, easy-to-read digital display shows load, displacement, and bath temperature for ease of setup and operation. Real-time displacement, loading, and temperature graphs are displayed during the test cycle and can be re-plotted and re-scaled as needed for easy viewing. Unit includes ASTM/AASHTO-compliant specimen molds and complete calibration kit with carrying case. Shipping Weight 250 lbs. (115kg)

System Features:

- Durable, corrosion-resistant construction
- Computerized control, data acquisition, and analysis
- PID temperature controller with digital display
- Two independent platinum RTDs for precise temperature control
- Mechanically-refrigerated cooling bath with environmentally-safe non-CFC coolant
- Integral LVDT and temperature-compensated load cell for accurate test results
- Patented air bearing ensures reliable loading with accurate, repeatable results

Specifications

Test Load	0 to 200g
Test Cycle Control	±0.5g
Cycle Times	Operator Adjustable
Load Cell (temp. compensated	500g
Sample Supports	25mm (0.98 in.) dia. spaced 4.00 in. (101.6mm) apart
Operating Temperature	Ambient to -40°F (-40°C)
Compressed Air Requirements	50 psi (0.34 MPa) clean, dry

Specimen Mold Set— H-1642.1

Set is for 5 complete specimen molds and includes: aluminum casing bars, mylar strips, holding bands 127mm length with end piece location marks, 6.4 mm thick, 12.7 mm wide.



H-1641

Vacuum Degassing Oven (VDO)— H-1641
Vacuum Degassing Oven, 230V 50Hz— H-1641.5F

The Vacuum Degassing Oven (VDO) is used to precisely and accurately degas pressure-aged binder samples to meet AASHTO R28-06 and ASTM D6521-05 standards. The compact, table-top unit is constructed of stainless steel with a hinged lid to conserve space while allowing easy access to the stainless steel vacuum chamber. The oven holds up to (4) specimen containers and features a self-contained, automatic vacuum system. The high-precision controller features a digital display indicating time, temperature and the current stage of each process, as well as illuminated pre-heat, degas and end/stop buttons. It also features audible and visual alarms, indicating end of process. Over temperature protection is provided by a pressure safety release solenoid valve. The VDO includes (4) specimen containers and a specimen removal tool.

Specifications

Operating Pressure	Adjustable from 15 KPA to Atmosphere
Temperature Range	175° C ± 5° C
Temperature Control Resolution	0.1° C
Test Temperature Uniformity	± 5° C

Pressure Aging Vessel— H-1640
Pressure Aging Vessel, 230V 50/60Hz— H-1640.4F
The Pressure Aging Vessel (PAV) is used to simulate in service oxidative aging of asphalt binder according to procedures developed by the Strategic Highway Research Program (SHRP). The H-1640 is fully compliant with the most recent ASTM and AASHTO standards for these tests. (Refer to ASTM designation D6521-05 and AASHTO method R28-06). The complete PAV system consists of an ASME-code stainless steel pressure vessel in a stainless steel cabinet with encased band heaters, a precision sample holder for simultaneous testing of ten specimens, a set of ten TFOT specimen trays, a pressure controller, temperature controller, pressure and temperature measurement devices, temperature recorder, and a specimen loading and unloading tool.

The H-1640 PAV takes the hassle out of running and documenting asphalt binder aging operations. Three easy, non-complicated steps produce accurate and reliable results. Just press the "heat" button, inset specimens when prompted and press the "Age" button and let the PAV do the rest. Custom status screens guide the user step-by-step through the entire process. Each display screen (preheat start-up, preheat ready, aging heat up, aging pressurized, and aging complete) is simple and direct, with detailed process and status information. The final output screen, when the test is complete, shows the current vessel pressure, as well as minimum and maximum temperatures achieved during the test procedure. Process data (temperature and pressure) is continually stored at regular intervals in the programmable logic controller (PLC) that controls and monitors the process.

The H-1640 PAV features a compact, benchtop design with integral pressure vessel. Its rotating vessel lid with rounded support block provides easy opening and closing.
A built-in timer accumulates and records out-of-range time (out-of-range time for the PAV is typically less than 10 minutes during a 20-hour test) Minimum and maximum temperature data is recorded and displayed at the end of each test.

Optional remote control operation and data access is also available, please contact Humboldt. This new control setup has many exciting prospects, including improved productivity and tighter process control, with the ability to control testing and to access data from a single remote location. With the appropriate hardware, a single user is able to initiate or cancel a test, monitor test progress, and view test results on any number of PAVs located anywhere in the world.

UPS Battery Backup System— H-1641.1
Prevents power failures, sags, surges, under and over voltages. Includes extended battery module EDM, and provides 4 hours of backup at full load. Provides three-stage charging, doubling battery life and optimizing recharge times. Provides 60-day advanced notification of end of useful battery life. Power Requirements: 230 VAC, 1 Ph. 60 Hz.


H-1640

Specifications

Operating Pressure	2.10 ±0.05 MPa (304 psi)
Temperature Range	90°C to 110°C (194°F to 230°F)
Temperature Control Resolution	±0.1°C
Test Temperature Uniformity	±0.5°C
Time to Setpoint	3 hours from ambient
Return to Setpoint	120 min. after preheating and loading of specimens
Pressure Vessel	ASME code section VIII, division 1; 1992 A 93
Maximum Pressure	325 psi (2.24 MPa) at 120°C (250°F)
Pressure Safety Release	325 psi (2.24 MPa)

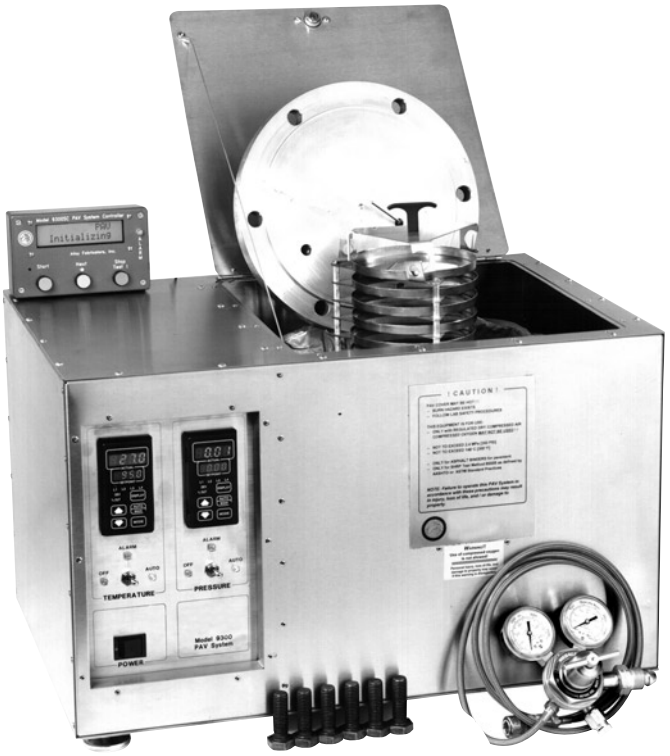
PAV Verification Kit— H-1641.2
Provides NIST-traceable temperature and pressure verification and includes a calibration block. Temperature range is -201 to 1210°C with a ± 0.03°C accuracy. Pressure range is 0 to 500 psi with an accuracy of ± 0.25% full scale (ANSI/ASME B40.1 Grade 4A)

PAV O-Ring— H-1641.3
Single-stage air pressure regulator (for external use on air tank)
- 0-4,000 psi high pressure gauge.
- 0-600 psi low pressure gauge includes relief valve.

CGA Adapter— H-1641.4
For use with bottles with 346 CGA connection

High Pressure Hose— H-1641.5
6 ft. stainless steel braided sheath pressure hose.
Includes fittings and quick connect coupling.

Specimen Pans Set— H-1641.6
Set of 10 AASHTO T179 pans reduces down time between aging samples.





Pressure Aging Vessel— H-1630
Pressure Aging Vessel, 220-250V 50/60 Hz— H-1630.4F

The H-1630 pressure aging vessel (PAV), provides a test method for simulating in-service oxidative aging of asphalt binders in accordance to procedures developed by the Strategic Highway Research Program (SHRP) The H-1630 meets ASTM D6521 and AASHTO R28 requirements and consists of a stainless steel pressure vessel with encased band heaters and integral pressure and temperature controls, providing a completely automated system with push-button operation. The system's controller, which can be remotely mounted, automatically pressurizes the PAV vessel and prompts when the unit is primed and ready for use. It also stores temperature and pressure data for later evaluation. The PAV's compact benchtop design allows it to fit into even the smallest of labs; and, it comes complete with all items necessary for operation, including an air pressure regulator.

The H-1630 PAV system is furnished with: a calibrated pressure relief valve, a spare o-ring gasket, a 2-piece removable insulation cover, (10) stainless TFOT pans, a rack for the TFOT sample pans, a handle for the TFOT pan rack, a IEC 340-type, 120 volt power cord, an air supply hose with pressure regulator, in-line filter and quick-disconnect fitting, the system controller (with 1 power and 2 data cables, an air exhaust muffler, and an air exhaust pipe-away adapter. The H-1630 also comes with a back-up power supply, calibration instruments, and other instruments necessary for maintenance.

TFOT Stainless Steel Pans, 10 Pack— H-1630.2

The vacuum oven temperature and pressure must be certified

Calibration Kit— H-1630.3

Kit contains all items required to perform these certifications. Instruments are furnished with current certification at PAV aging points, and N.I.S.T.-traceable data sheets with certification performed by an ISO-9002 certified laboratory.

Vacuum Degassing Oven— H-1632
Pressure Aging Vessel, 230V 50/60 Hz— H-1632.5F

The Vacuum Degassing Oven (VDO) is used to degas pressure-aged binder samples to meet AASHTO R28-06 and ASTM D6521-05 standards. The H-1632 vacuum degassing oven (VDO) is a compact, tabletop design that provides push-button automation of the degassing process. The simple control panel has only three buttons to control the process: Preheat, Start Process and Stop; and, an end-of-cycle alarm lets you know when testing is complete.

The VDO is made from durable stainless steel and features a fully-integrated, vacuum source, which is air-powered. It uses a venturi driven by a laboratory compressed air supply capable of providing compressed air at 6.5 bar pressure or more. A flow rate of approximately 55 liters/minute is required for 30 minutes. The air must be filtered and dried— the venturi produces a chilling effect, and moisture can freeze, expand, and damage the venturi unit. The H-1632A is almost totally silent when producing vacuum and has no moving parts to wear out or break, other than an air flow control solenoid valve.

The H-1632A Vacuum Degassing Oven is furnished with: (4) 250 ml (8oz) sample tins, (2) O-ring gaskets, AC power cord – IEC 340 Type, Stainless steel lid with 5-1/2" diameter heat-resistant glass viewing port and metering valve for vacuum adjustment, Quick-disconnect coupling for user's air supply and an air line filter-dryer for installation in supply line.

Calibration Kit— H-1634

The vacuum oven temperature and pressure must be certified every 6 months. Instruments are furnished with current certification at PAV aging points, and N.I.S.T.-traceable data sheets with certification performed by an ISO-9002-certified laboratory.

Components

Description	Model
Orifices	
Stainless steel universal orifice only	H-2173
Stainless steel Furol orifice only	H-2174
Tubes with Orifices	
Brass Sayboldt viscometer tube w/ stainless steel universal orifice	H-2180
Brass with stainless steel Furol orifice Sayboldt viscosity tube	H-2182
Stainless steel with stainless steel Furol orifice Sayboldt viscosity tube, includes wrench	H-2183
Brass with stainless steel universal and Furol orifice Sayboldt viscosity tube, includes wrench	H-2184
Stainless steel with stainless steel universal and Furol orifice Sayboldt viscosity tuber, includes wrench	H-2185
Tubes	
Stainless steel Sayboldt viscometer tube	H-2171
Brass Sayboldt viscometer tube	H-2172

Accessories

Description	Model
Tube cleaner	H-2175
Seyboldt viscosity flask, graduated 60ml volumetric receiving flask	H-2176
Seyboldt withdrawal pipette and aspirator	H-2177
White mineral oil, suitable for use up to 230°F (110°C)	H-2189
Strainer	H-2178
High-temp. Dow-Corning 200 Fluid, 100 centistroke oil, 5 gallon (wt.40lb (18kg)	H-2199
Displacement ring	H-2194
Thermometer support	H-2195
Orifice wrench	H-2196
Tube wrench	H-2197
Sayboldt viscosity thermometer (66 to 80°F)	H-2600.17F
Sayboldt viscosity thermometer (94 to 108°F)	H-2600.18F
Sayboldt viscosity thermometer (120 to 134°F)	H-2600.19F
Sayboldt viscosity thermometer (134 to 148°F)	H-2600.20F
Sayboldt viscosity thermometer (174 to 188°F)	H-2600.21F
Sayboldt viscosity thermometer (204 to 218°F)	H-2600.22F
Sayboldt viscosity thermometer (19 to 27°C)	H-2600.17C
Sayboldt viscosity thermometer (34 to 42°C)	H-2600.18C
Sayboldt viscosity thermometer (49 to 57°C)	H-2600.19C
Sayboldt viscosity thermometer (57 to 65°C)	H-2600.20C
Sayboldt viscosity thermometer (79 to 87°C)	H-2600.21C
Sayboldt viscosity thermometer (95 to 103°C)	H-2600.22C



H-2165

Saybolt Viscometer Bath— H-2165
Saybolt Viscometer Bath, 220V 50/60Hz— H-2165.4F

Designed for Saybolt Universal and Furol viscosity testing, this constant temperature bath meets all ASTM and AASHTO requirements for precise temperature control. The micro-processor PID circuitry assures accurate temperature control within ASTM tolerances throughout the range of ambient to 464°F (240°C).

Simple push-button controls and dual digital displays are used for easy setting and monitoring of the baths temperature. With a capacity of four viscometers and 60ml receiving flasks, the bath features sliding draft shields, chemical-resistant alignment plates for handling of flasks and a glare-free fluorescent backlight for easy viewing of test sample. The insulated bath interior is constructed entirely of heavy-gage stainless steel and the built-in overflow pipe and drain valve simplifies filling the bath oil to the required level.

A chemical resistant top plate provides insulation and is easily removed to allow for cleaning of the bath interior. The bath is supplied complete with four thermometer supports, four port covers, four chained corks, two port closures, tube nut wrench, orifice wrench, withdrawal tube and oil strainer. Viscometer tubes, orifices, receiving flasks, oil and thermometers are not included and must be ordered separately. Meets ASTM D88, D244, E102, AASHTO T72. Shipping wt. 58 lbs. (26.3kg)



H-1720



H-1745



H-1730

Constant Temperature Bath— H-1720
Constant Temperature Bath, 220V 50/60-Hz— H-1720.4F
(Cannon Model CT-500)
- Temperature range: ±20°C to 100°C (±0.01°C)
- Quick-set dial for commonly used temperatures
- Variable setting to any temperature within the operating range

State-of-the-art, yet relatively inexpensive. Precision viscosity determination with glass capillary viscometers. Quick-set dial selects temperatures of 20, 25, 30, 40, 50, 60, 70, 80, 90, and 100°C. Two stainless steel encased thermisters and solid-state circuitry ensure accurate temperature control, plus over-temperature and liquid level protection. All wetted parts are stainless steel or glass. Frame is heavy aluminum, epoxy coated. Bath chamber is 17L Pyrex glass vessel. 16"W x 14-1/4"D x 24"H (407 x 362 x 610mm). Capacity 4.5 gal. (17L).

Vacuum Manifold— H-1745
Canon Model 3VM for use with H-1720

UBF Bath Oil— H-1732
For use with H-1720 with temperatures below 121°C, 6 gallon.

Storage Unit— H-1722
For use with H-1720 or H-1730 Constant Temperature Water Baths above. Sturdy two-drawer unit elevates either model Constant Temperature Bath for ease of viewing, plus ample storage of viscometers and accessories.
18"W x 18"D x 6.5"H (457 x 457 x 165mm).

Constant Temperature Bath— H-1730
Constant Temperature Bath, 220V 50/60Hz— H-1730.4F
(Cannon Model CT-1000)
- Temperature range: ±20°C to 150°C (±0.01°C) (Above 100°C temperature is controlled to 0.03°C)
- Quick-set dial for commonly used temperatures. Variable setting to any temperature within the operating range
- Radiant internal lighting provides improved viewing clarity
- Enclosed bath housing for rapid heat-up/greater safety

State-of-the-art, with higher temperature limit, plus added features over the CT-500, yet still relatively inexpensive. Precision viscosity determination with glass capillary viscometers. Quick-set dial selects temperatures of 20, 25, 30, 40, 50, 60, 70, 80, 90, 100, 135, and 150°C. Two stainless steel encased thermisters and solid-state circuitry ensure accurate temperature control, plus over-temperature and liquid level protection. All wetted parts are stainless steel or glass. Frame is heavy aluminum, epoxy coated. Bath chamber is 17L Pyrex glass vessel.
17-1/4"W x 18-1/4"D x 23"H (438 x 464 x 584mm).
Capacity 4.5 gal. (17L). Meets ASTM D445.

Vacuum Manifold— H-1735
Canon Model 4VM for use with H-1730

High-Temperature Bath Silicone— H-1733
For use with H-1730 with temperatures above 135°C, 1/2 gallon.



H-1741H H-1741V

Digital Vacuum Pressure Regulators, (Solid-State, Use no Mercury)

Horizontal— H-1741H
Horizontal, 220V 50/60 Hz— H-1741H.4F

Vertical— H-1741V
Vertical, 220V 50/60 Hz— H-1741V.4F

(Cannon DVR-1000 Series)
For precise measurement and control of vacuum at 300mm Hg below atmospheric pressure. Use with Cannon-Manning, Asphalt Institute, or Modified Koppers vacuum viscometers for measurement of asphalt cement and in other laboratory applications where accurate measurement and control of vacuum is required.
In normal mode, the amount of vacuum in mm Hg is displayed on the LCD screen. Or, user may select from nine other units of measurement via a membrane touchpad. Internal set points are preset to regulate vacuum at 300 +/0.5mm Hg below atmospheric pressure. Set points may be altered to fit user's specific needs within the operating range of 1 to 410mm Hg below atmospheric pressure.
Reading accuracy: ±0.05% of reading ± the least significant digit (includes combined effects of linearity, repeatability, hysteresis, and temperature). NIST certification is supplied. Vacuum regulation accuracy: ±0.5mm HG. Operating temperature: 0 to 40°C (32 to 104°F). Upper/lower safety limit: 746mm HG below atmospheric pressure. Choice of horizontal: 18.5"w x 18"d x 6.75"h (470 x 457 x 171mm) or vertical: 6.75"w x 18"d x 18.5"h (171 x 457 x 470mm).

NOTE: Prices and delivery on Cannon-Manning, Cannon-Fenske, Lantz-Zeitfuchs, Modified Koppers and other viscometers are available upon request.



H-1746.7



H-1747.1

Zeitfuchs® Cross-Arm Viscometer and Holder
These models are used to determine kinematic viscosity of liquid asphalts, road oils and distillation residues of liquid asphalts at 140°F (60°C) and of asphalt cements at 275°F (135°C), requiring a charge of only 1 to 3ml can easily be filled and cleaned while immersed in a temperature bath and need not be removed. Requires a liquid depth of 9" (229mm). Includes round metal holder for 2" (51mm) dia. hole and certificate of calibration. Meets ASTM D2170; AASHTO T201.

Seitfuchs® Cross-Arm Viscometer and Holder

Approximate Constant Cs/Sec.	Range of Centistokes	Model
0.003	0.6 to 3	H-1746.1
0.01	2 to 10	H-1746.2
0.03	6 to 30	H-1746.3
0.1	20 to 100	H-1746.4
0.3	60 to 300	H-1746.5
1.0	200 to 1,000	H-1746.6
3.0	600 to 3,000	H-1746.7
10	2,000 to 10,000	H-1746.8
30	6,000 to 30,000	H-1746.9
100	20,000 to 100,000	H-1746.10

Asphalt Institute Vacuum Viscometer
Designed for highly viscous materials, such as asphalt cement, viscometer contains a graduated capillary instead of timing bulbs. Requires 7" (178mm) bath depth and 3ml sample size. Includes

Asphalt Institute Vacuum Viscometer

Viscometer Size/No.	Viscosity Range (Poise)	Model
25	42 to 800	H-1747.1
50	180 to 3,200	H-1747.2
100	600 to 12,800	H-1747.3
200	2,400 to 52,000	H-1747.4
400R	9,600 to 140,000	H-1747.5
800R	38,000 to 5,800,000	H-1747.6



H-1530.2

Ford Viscosity Cup—

Used in determining viscosity of paint, lacquers and related coatings. Cup body is machined from aluminum; orifice is brass. Orifice not included with H-1530 cup, order from chart below. Cup-orifice combination (Ford 2, 3 or 4) should be selected to provide an efflux time within the 20 to 100-second range. Measurements with the Ford viscosity cup should be made at temperature of 25°C ±0.1° (77°F ±0.2°) with H-2610.17C (or H-2600.17F) thermometer. Order thermometers and stand separately. Meets ASTM D333, D365, D1200.

Description	Model
Ford Viscosity Cup w/ No. 1 Orifice	H-1530.1
Ford Viscosity Cup w/ No. 2 Orifice	H-1530.2
Ford Viscosity Cup w/ No. 3 Orifice	H-1530.3
Ford Viscosity Cup w/ No. 4 Orifice	H-1530.4
Ford Viscosity Cup w/ No. 5 Orifice	H-1530.5



H-1535

Viscosity Cup Stand— H-1535

Features leveling base and adjustable support bracket for H-1530 Ford viscosity cup.

Asphalt Viscosimeter Float Test Set— H-1400

Used to test flow behavior or consistency of certain bituminous materials and tar products via a float test. Includes calibrated aluminum float and three brass collars. Individual components can be ordered. Order thermometer separately. Meets ASTM D139, AASHTO T50.

Description	Model
Float only	H-1410
Collars only (set of three)	H-1420



H-1400

Cloud and Pour Point Apparatus Set— H-2560

Used to test flow characteristics of petroleum oils using cloud and pour points. Includes glass bath jar, polished brass cylinder mounted on metal tripod base, glass test cylinder, cork bottom disc and top rings, thermometer (H-2600.5F -36° to 120°F) fitted into cork for sealing test cylinder. Meets ASTM D97, D117, D2500. Shipping wt. 6 lbs. (2.7kg)

Description	Model
Metal tripod base	H-2560.1
Glass test jar	H-2560.3
Glass battery bath jar	H-2560.5
Brass cylinder	H-2560.2
Cork disks	H-2595
Cork rings	H-2598
Thermometer, -36 to 120°F	H-2600.5F
Thermometer, -38 to 50°C	H-2600.5C
Thermometer, -112 to 70°F	H-2600.6F
Thermometer, -80 to 20°C	H-2600.6C



H-2560

Spot Test Set of Asphaltic Materials— H-1510

Spot test set only for asphaltic products derived from petroleum not to be used for natural asphalts containing nonbituminous matter insoluble in xylene. Includes 250ml flask, box of filter paper, cork stopper and 10ml pipette. Meets AASHTO T102. Shipping wt. 5 lbs. (2.2kg)

Single, Softening Point Apparatus Set— H-1595

Ring and ball method softening point apparatus used for single determinations, asphalts, pitches, tars and most resins. Includes burner, beaker, support stand, 1 ring, wire gauze with ceramic center, thermometer clamp, 1 shouldered ring and stem with hardened steel ball and H-2600.113F thermometer. Meets ASTM D36, E28; AASHTO T53.

Single, Softening Point Apparatus Set— H-1596

Hotplate version of the H-1595.

Double, Softening Point Apparatus— H-1569

Includes 800ml beaker with brass, double set-up fixture with cover and thermometer port with stopper, 2 shouldered rings, 2 ball centering guides and 2 standard balls. Order thermometer separately.

Quad, Softening Point Apparatus— H-1570

Includes 800ml beaker with brass, quad set-up fixture with cover and thermometer port with stopper, 4 shouldered rings, 4 ball centering guides and 4 standard balls. Order thermometer separately.



H-1569



H-1595



H-1596



H-1658

Individual Softening Point Components

Description	Model	Use With
Brass, shouldered ring, Top: 23mm OD, 19.8mm ID; Bottom: 19mm OD, 15.9mm ID; Top to Shoulder: 4.4mm High; Shoulder to Bottom: 2mm High, 10 per package	H-1575	H-1569
Hardened steel ball, 3/8" 99.5mm) dia.; weight between 3.45 and 3.55g, 10 per package	H-1580	H-1569 H-1595 H-1645
Ball centering guides for shouldered rings, ball is centered on specimen by 3 locator pins	H-1588	H-1575
Ring and stem assembly with 16" (406mm) long brass wire stem with shouldered brass ring	H-1602	H-1595
Ring and stem assembly with 2-1/2" (64mm) long brass wire stem with shouldered brass ring	H-1658	H-1645
Steel clamp hook support suspended thermometers, locks into any position with check nut, Maximum distance from center of muff to hook: 4-1/4" (108mm), minimum distance is: 3-7/8" (89mm)	H-8900	All H-2600 Series Thermometers
Thermometer clamp with adjustable 360° muff, phosphor-bronze jaws, 3-1/2" (89mm) long	H-8950	H-1570
Thermometer clamp similar to H-8950, but holds H-1602 ring and stem and thermometer together	H-8980	H-1595



H-8980



H-8900

Thermometers for Softening Point Apparatus

Description	Model
30 to 180°F (ASTM 15F) Thermometer	H-2600.15F
-2 to 80°C (ASTM 15C) Thermometer	H-2610.15C
85 to 392°F (ASTM 16F) Thermometer	H-2600.16F
30 to 200°C (ASTM 16C) Thermometer	H-2610.16C
30 to 350°F (ASTM 113F) Thermometer	H-2600.113F
-1 to 175°C (ASTM 113C) Thermometer	H-2610.113C



H-1588



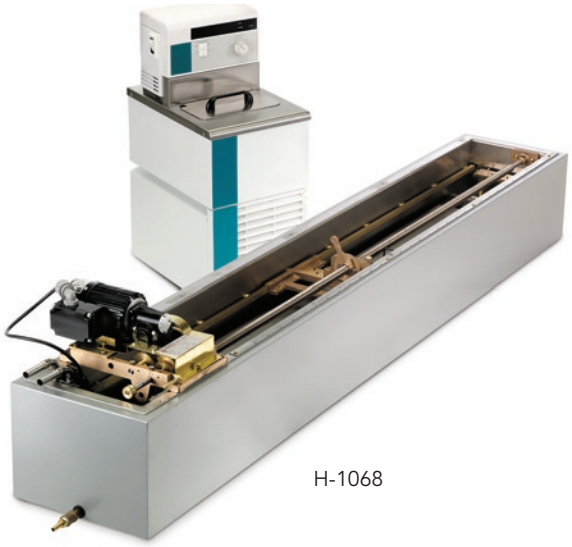
H-1575

Ductility Testing Machines

These machines determine ductility of formed asphalt/cement or semi-solid bitumen by measuring the distance of elongation before reaching the breaking point of a briquet sample, which is pulled apart at a specific speed and temperature.
Meet ASTM D113, D5892, D6084, AASHTO T51



H-1068X



H-1068

Humboldt Ductility Machine— H-1068X
Humboldt Ductility Machine, 220V 50Hz— H-1068X.5F
The H-1068X is a three-speed machine designed for Standard and Force Ductility tests. The unit tests three briquets simultaneously and its DC, direct-drive motor maintains constant speed, entirely vibration-free. Speeds of 1/4, 1 or 5cm per minute are selected via lever shift on mechanical gear box.

A single brass lead screw mounted above water level prevents agitation of water and premature rupture of specimens. A traveling pointer adjusts to zero starting position and indicates exact position of carriage on a linear centimeter scale attached to trough's front edge. Maximum carriage travel (elongation) is 150cm with an automatic stop.

The Unit has a stainless steel interior with an overflow connection, and a baked enamel stainless steel-wrapped exterior. Gears are bronze or brass; all other parts are solid brass to prevent rusting. Finned stainless steel tubes beneath a false bottom provide efficient thermal transfer. Includes a 6' (183cm) cord, feed-through switch and 3-prong plug. Includes 3 standard H-1080 briquet molds with H-1090 plates. Trough overall dimension: 11-3/4 x 74 x 6-3/8"H.
H-1068PC Plastic Cover is recommended to maintain constant tank temperatures. Shipping wt. 350 lbs. (159 kg)

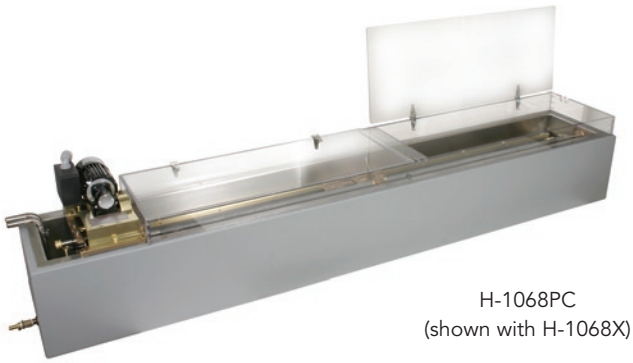
Temperature Controlled Ductility Machine— H-1068
Temp Control Ductility Machine, 220V 50Hz— H-1068.5F
The H-1068 Ductility machine takes our H-1068X machine and adds a circulating temperature control unit. Solid-state thermostatically controlled bath and circulator maintain water temperature within a ± 0.18°F (± 0.1°C). All features identical to the H-1068X. Includes three H-1080 molds. H-1068PC Plastic Cover is recommended to maintain constant tank temperatures. Shipping wt. 430 lbs. (195 kg)

Circulating Temperature Controller— H-1068C
Circulating Temp. Controller, 220V 50Hz— H-1068C.5F
The H-1068C Circulating Temperature Controller is designed for use with the H-1068X Ductility Machine. It provides a solid-state, thermostatically controlled bath and circulator to maintain water temperature within a ± 0.9°F (± 0.5°C).

Clear Cover for Ductility Machine— H-1068PC
Temperature control cover made from clear Plexiglas. Can be used with all ductility machines. Shipping wt. 40 lbs (18kg), (cannot ship via UPS)

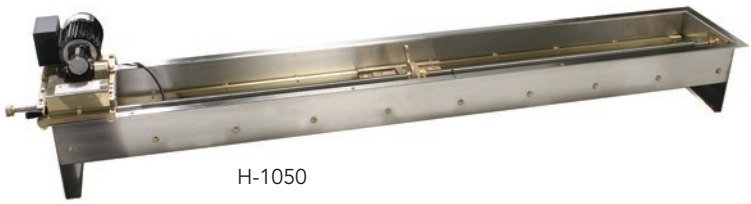


H-1068C



H-1068PC
(shown with H-1068X)

Basic Ductility Machine— H-1050
Basic Ductility Machine, 220V 50Hz— H-1050.5F
The H-1050 is a three-speed machine designed for Standard and Force Ductility tests. The unit is a lower cost machine, identical to the H-1068X except that it does not include the baked enamel stainless steel-wrapped exterior or the thermal finned stainless steel tubes in the bottom for enhanced thermal transfer. Shipping wt. 200 lbs. (90.7 kg)


H-1050

Electronic-controlled Ductility Machine— H-1075
Electronic Ductility Machine, 220V 50Hz— H-1075.5F
Same machine as the Basic H-1050, but includes a solid-state speed controller, which continually adjusts feedback to maintain even and proper speed. Direct drive 1/40 HP DC motor pulls carriage at 1/4, 1 or 5cm/min.

Single-speed Ductility Machine— H-1070
Single-speed Machine, 220V 50Hz— H-1070.5F
Same machine as the Basic H-1050, but operates only at one speed: 5cm/min. Machine uses a direct drive 1/75 HP AC motor.

Refrigerated Machine, 220V 60Hz— H-1060.2F
Refrigerated Machine, 220V 50Hz— H-1060.5F
This Refrigerated Ductility Machine features the H-1050 machine mounted into a polypropylene bath designed for use with sodium chloride solutions. The heavy-gauge, enamel-finish steel cabinet is fully-insulated and the sealed space between the inner and outer walls protects the low-thermal conductivity properties of the foam and fiberglass combination (tested and proven to have the best K factor). High-capacity pump assures positive circulation in bath to give close temperature control. Three-direction flow regulation is handled with flow cut-off valves that engage when equilibrium is reached. Sensitive magnetic setting transistorized electronic relay control panel for heat and refrigeration maintains temperature range of 32°F (0°C) to 86°F (30°C) by 0.1°F (0.1°C. Cabinet is 90 x 41 x 23". Includes 3 H-1080 molds.


H-1060.2F

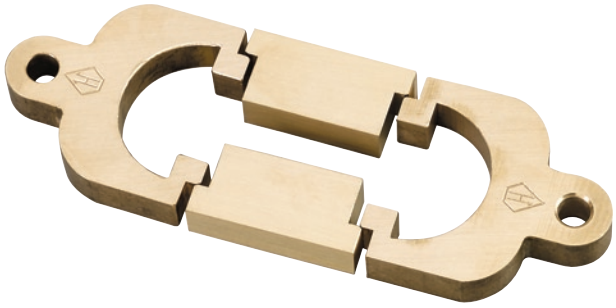
Ductility Briquet Mold— H-1030
Mold for making test briquets for use with any ductility testing machine. H-1030 Briquet Mold has straight sides for use in forced tests. Requires H-1090 or H-1090.3 base plates. Four accurately machined interlocking brass segments are interchangeable with same parts from different molds; no parts identification marks are needed for matching. End pieces, designed to hold specimens being elongated, are provided with mounting holes. Meets ASTM D5892, D6084, AASHTO T51.

Ductility Briquet Mold— H-1032
Mold for making test briquets to meet AASHTO T301

Ductility Briquet Mold— H-1080
Same as above, but mold has angled sides for use in standard test. Meets ASTM D113

Base Plate— H-1090
Brass base plate for single mold. Flat surface provides uniform contact with bottom surfaces mold. 5-1/2" x 2" x 1/8"

Base Plate, Triple Mold— H-1090.3
Brass base plate for triple mold. Flat surface provides uniform contact with bottom surfaces mold. 5-1/2" x 8" x 1/8"


H-1030


H-1080


H-1090 H-1090.3



H-1021

Force Determination Adapter— H-1021
Force Determination Adapter, 220V, 50/60Hz— H-1021.4F
Provides precise tensile strength measurement of any material, preparation, procedure or type of test to an accuracy of 0.01 lbs. Attaches over existing pin in ductilometer without tools or machine modification, eliminating need for dedicated equipment for standard and force ductility testing. Stainless steel unit has spring-loaded movable platform to which sample is attached and stationary L-shaped base that incorporates LVDT sensor. LVDT can accommodate two adapters simultaneously. Electric components are located out of the water bath. Digital display is calibrated in pounds. Includes power supply to serve LVDT, digital display, calibration stand to ensure consistent results, one 4-lb. and five 5-lb. slotted weights and standard 0-2 VDC analog output; 60ma DC power supply provides constant voltage excitation with adjustable voltage. Analog output provides easy interface with chart recorder, computer or other readout devices via RS232 port. H-1030 mold is recommended for use with this equipment. Adapter overall dimension: 6" x 5-3/8" x 1-3/4". Shipping wt. 20 lbs. (9kg)

Chart Recorder— H-1026
Chart Recorder, 220V, 50/60Hz— H-1026.4F
For accurate, permanent graphic record of the input signal on single-channel, multi-range potentiometric null balance servo recorder. Versatile precision instrument records a wide range of laboratory test results. Writing width is 7-3/4" (200mm). Dim. 15" x 4-1/4" x 10". Shipping wt. 11 lbs. (4.9kg)



H-2266

Acrylic Tank— H-2267
See-through acrylic tank is ideal for applications where visibility is desired. Temperature range up to 70°C maximum. Capacity 5-1/2 gal. (21 liters). ID, 7-1/2"H x 13-1/8"W x 18"D (190 x 333 x 457mm).

Heater/Circulator— H-2266
Heater/Circulator, 230V 50/60Hz— H-2266.4F
Immersion circulator suitable for use with any tank or jar style bath to create a highly accurate constant temperature circulating system at above ambient temperatures. Minimum immersion depth 3" (8cm), maximum immersion depth 7" (17cm). Clamp-on style fits up to 1-3/16" (3cm) wall thickness, or rod type lab stand. All stainless steel construction. Two-speed pump minimizes turbulence in small tanks, maintains greater uniformity in large tanks. Adjustable flow director accepts 1/2" (13mm) ID tubing for external circulation. Suitable for use with wide variety of fluids. LED set and read. Adjustable PID parameters and very precise temperature control under changing heat loads, plus great temperature stability over a broad range. 6"H x 5"D x 13"D (15.2 x 12.7 x 33cm). Shipping wt. 10 lbs. (4.5kg)



H-2515

Lever-Operated Grease Worker— H-2535
Tests consistency of lubricating greases by penetration of the standard cone after 60 double strokes in standard grease worker. Perforated brass plate has 51 holes, 1/4" (6.35mm) dia. Includes grease chamber, cover with stop-cock and lever-operated plunger handle. Order H-2631D dial thermometer separately. Meets ASTM D217, D937. Shipping wt. 35 lbs. (15.9kg)

Micro Grease Worker— H-2515
Grease worker prepares small grease samples for testing with quarter scale (1/4) H-2519 penetrometer cone. Perforated grease plate has 8-1/8" (3.2mm) dia. holes. Chamber is 3/4" dia. x 11/16" L (19 x 17mm). Order water baths separately. Meets ASTM D1403. Shipping wt. 10 lbs. (4.5kg)

Grease Cutter— H-2540
Grease cutter for block grease is mounted on cast-iron support base with plywood top. Features hardened, sharp rigidly mounted beveled blade. Meets ASTM D217. Shipping wt. 10 lbs. (4.5kg)

Aluminium Moisture Boxes

Flat-bottom, straight-side seamless aluminium box has tight fitting cover, which fits bottom of box as well. Protects sample from exposure during storage and weighing operations.

Aluminium Moisture Boxes

OD	ID	Height	Inside Ht.	Volume cu. in.	Volume fl. oz.	Model
2" (51mm)	1.975 (50mm)	.875" (22mm)	0.865" (22mm)	2.650 (44cc)	1.47 (44ml)	H-4926
2.5" (64mm)	2.470 (63mm)	1.75" (44mm)	1.746" (44mm)	8.366 (137cc)	4.64 (137ml)	H-4927
3" (76mm)	3.000 (76mm)	1" (25mm)	0.985" (25mm)	6.963 (114cc)	3.86 (114ml)	H-4928
3.5" (89mm)	3.490 (89mm)	2" (51mm)	1.990" (51mm)	19.037 (312cc)	10.55 (312ml)	H-4929



H-4929

Tin Sample Cups

Flat-bottom, seamless tin sample cups have telescoping covers. Hold samples for determining penetrations. Select

Tin Sample Cups

Capacity	Dimensions	Set Quantity	Model
2.5 oz (71g)	1.87" (47.7mm) ID, 1.41" (36mm) deep	48	H-1350.3A
4.7 oz (133g)	2.42" (61.5mm) ID, 1.67" (42.6mm) deep	36	H-1350.4A
5.6 oz (159g)	2.59" (66mm) ID, 1.72" (43.4mm) deep	36	H-1350.6A
8.2 oz (232g)	3.05" (77.5mm) ID, 1.97" (50mm) deep	18	H-1350.8A
16 oz (454g)	4" (102mm) ID, 2.375" (60.3mm) deep	1	H-1350.16
42.3 oz (1200g)	6.12" (155mm) ID, 3" (76.2mm) deep	1	H-1350.42
70.5 oz (2000g)	6.12" (155mm) ID, 5" (127mm) deep	1	H-1350.70



H-1350.70



H-1352

Transfer Dish— H-1352

Plastic transfer dish has flat bottom, straight sides and metal centering lugs with magnet in the bottom. Size is: 3-3/4" dia. x 3-1/4" deep. Meets ASTM D5.

8oz. Bacon Bomb Sampler, Brass— H-2405B
8oz. Bacon Bomb Sampler, Stainless Steel— H-2405S

Obtains samples from storage tanks, tank cars and drums using thief method. Plunger opens to admit the sample when bomb is lowered to the bottom or when plunger is released at any desired level. Plunger seals tight when bomb is withdrawn; features o-ring-type valve seal. Available in plated brass or stainless steel. Capacity: 8 oz; 2" dia. x 10" L. Meets ASTM D117, D270, D923, D943. Shipping wt. 5 lbs. (2.3kg)

16oz. Bacon Bomb Sampler, Brass— H-2407B
16oz. Bacon Bomb Sampler, Stainless Steel— H-2407S

Larger capacity with same features as H-2405. 2-3/4" dia. x 12"L. Shipping wt. 9 lbs. (4.1kg)

32oz. Bacon Bomb Sampler, Brass— H-2406B
32oz. Bacon Bomb Sampler, Stainless Steel— H-2406S

Larger capacity with same features as H-2405. 2-3/4" dia. x 15-1/4"L. Shipping wt. 15 lbs. (6.8kg)

ASTM Oil Sampler, 3/4" Neck Opening— H-2400
ASTM Oil Sampler, 1-1/2" Neck Opening— H-2401

Weighted beaker ASTM oil sampler collects crude petroleum, petroleum products, butane, propane and other petroleum products that are gases at atmospheric temperature and pressure. Copper construction with lead-weighted bottom and bail handle. Chained cork stopper seals tight. Brass disc and loop on top allow easy removal. Corrosion-resistant paint finish. 3/4" neck opening; body is 3-3/8" dia. x 14"L. Meets ASTM D270. Shipping wt. 6 lbs. (2.7kg)



H-2405



H-2400



H-1200

Universal Penetrometer— H-1200

Direct-reading instrument for precision penetration measurements of bituminous materials, cement, petrolatum and waxes, as well as food, cosmetics and pharmaceutical products. Unit has 5" diameter indicator dial, graduated in 400 divisions of 0.1mm, corresponding to 40mm penetration. Zero preset to eliminate errors. Includes 47.5g plunger with 3.2mm hole, and two loading weights (50g and 100g). Overall dim. 10-1/2" x 13" x 22" (266.7 x 330.2 x 558.8mm). Meets ASTM D5, D217, D1168, D1191, D1321, D1403, D1831, D1855; AASHTO T49, T187 and others.

Special Application Penetrometers

Description	Model	Shpg. wt.
Grease Penetrometer: Model H-1200 penetrometer with H-2520 grease cone	H-2510	30lbs. (13.6kg)
Battery Paste Penetrometer: Model H-1200 penetrometer with H-1255 battery paste cone	H-1202	30lbs. (13.6kg)

Special Application Penetrometers are available in electric versions, like below. Call 1-800-544-7220 for information.



H-1240D

H-1240

Electric Penetrometer— H-1240
Electric Penetrometer, 230V 60Hz— H-1240.2F
Electric Penetrometer, 230V 50Hz— H-1240.5F

Takes our H-1200 Universal Penetrometer and adds an automatic digital timer to it. The timer's release mechanism is switchable between seconds minutes, or hours. Timer may be set in 1/10th second intervals. Plunger releases with push of a button, and automatically stops after the preset time duration. H-1240.5F adds a voltage adapter and internal switch on the timing mechanism to change cycle to 50Hz.
Shipping wt. 32 lbs. (14.5kg)

Digital Penetrometer— H-1240D
Digital Penetrometer, 230V 60Hz— H-1240D.2F
Digital Penetrometer, 230V 50Hz— H-1240D.5F

The H-1240D Penetrometer adds a digital gauge to the H-1240 electric penetrometer to provide precise at-a-glance readings, as well as the ability to automatically start a test with a button push and have the test end after a preset duration.
Shipping wt. 32 lbs. (14.5kg)

Portable Penetrometer— H-1250

Lighter and smaller than H-1200 for field work, unit's micrometer adjusts for accurate settings as well as coarse adjustment for approximate settings. Only one additional 50g loading weight is included. Overall dim. 7" x 7" x 16" (178 x 178 x 406mm). Shipping wt. 8 lbs. (3.6kg)


H-1250

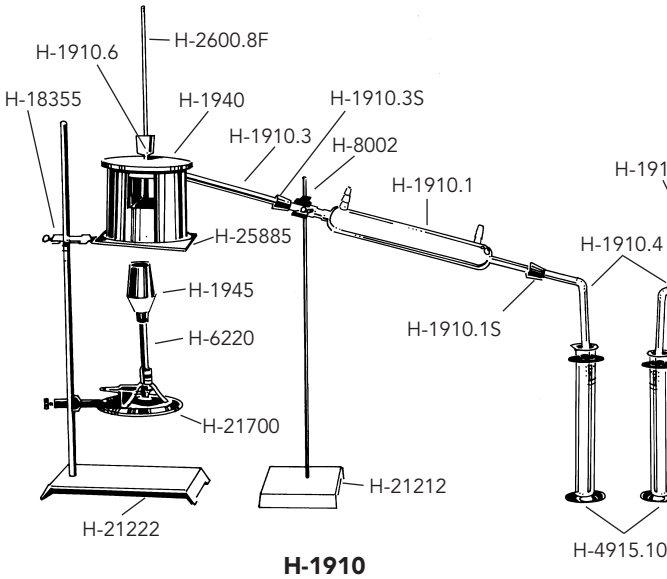
Special Application Penetrometer

Description	Model	Shpg. wt.
Portable Grease Penetrometer: Model H-1250 penetrometer with H-2520 grease cone	H-1252	8lbs. (3.6kg)

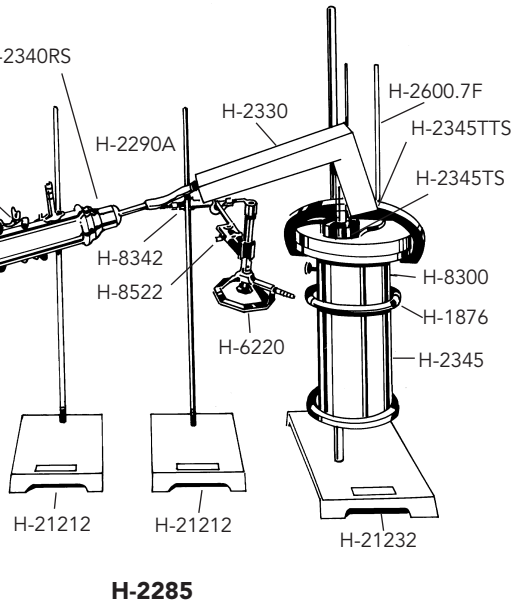
Penetration Needles and Cones

Application	Specification	Model	Description
Bituminous materials	ASTM D5; AASHTO T49, IP49; ASA Std., A37.1; Fed Spec. SS.R. 406C, Meth. 214.01	H-1280	Standard hardened stainless steel needle, 40-45mm exposed needle length. Wt. 2.5g.
		H-1300	Same as H-1280. Certified to ASTM accuracy by independent laboratory. Wt. 2.5g.
		H-1302	Same as H-1290. Certified to ASTM accuracy by independent laboratory. Wt. 2.5g.
		H-1290	Long hardened stainless steel needle, 50-55mm exposed needle length. Wt. 2.5g.
Waxes with 250 or less penetration	ASTM D1321	H-1310	Hardened stainless steel wax penetration needles with tapered point, blunt tip of truncated cone. Ferrule is approx. 3.2mm dia. Wt. 2.5g.
		H-1317	Same as H-1310. Certified to ASTM accuracy by independent laboratory.
Battery paste	N/A	H-1255	Hardened stainless steel tip with special plunger. Total wt. 60g ± .050g.
Joint sealant for asphalt & concrete pavements	ASTM D5329	H-1320	Resilience ball penetration tool. Total wt. 27.5g.
Grease-testing penetrometers	ASTM D217, D937 ASA Std. Z11.3	H-2520	Hollow 90° brass cone, highly polished stainless steel tip. Removable nut and stem. Wt. 102.5g.
		H-2522	Same as H-2520, completely made of stainless steel. Wt. 102.5g.
For all 90° cones		H-2525	Stainless steel replacement tip, nut and stem.
Grease-testing penetrometers	ASTM D2884	H-2524	Magnesium cone and plunger, same dim. as H-2520. Total wt. cone and plunger 30.0g.
Food products and paste paints	U.S. Dept. of Agriculture	H-2529	Aluminum. Same dimension as H-2520. Total wt. 35g.
(shortenings, margarine, butter, etc.) Measuring firmness of solid and plasticized fats	AOCS Cc 16-60	H-1270	10° aluminum cone, 3.2mm ferrule, 0.8mm stainless steel blunt tip. Overall length 106mm. Wt. 45g.
(i.e., recovery of used grease) Small obtainable samples	ASTM D1403	H-2519	1/4 scale. (Not considered a substitute for full-size cone specified in ASTM D217.) Wt. 9.38g.





H-1910



H-2285

Distillation of Cut-Back Asphaltic (Bituminous) Products— H-1910

Distillation apparatus accurately determines residue content and separates volatile and non-volatile cut-back asphaltic products. Fahrenheit thermometers furnished standard. Meets ASTM D402; AASHTO T78. Shipping wt. 18 lbs. (8.2kg)

Emulsified Asphalts Distillation Apparatus— H-2285

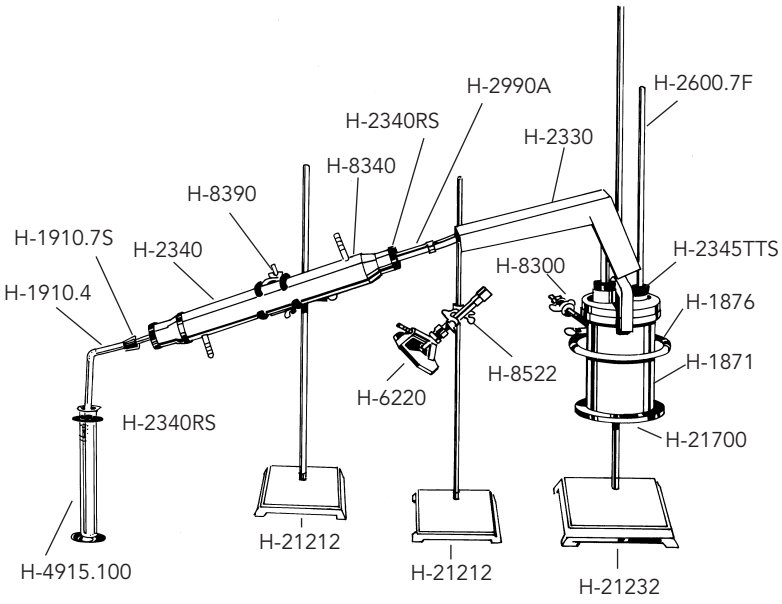
Distillation apparatus accurately determines representative portion of residue in emulsified asphalts. Fahrenheit thermometers furnished standard. Meets ASTM D244; AASHTO T59.
Shipping wt. 30 lbs. (13.6kg)

Individual Items Included in H-1910

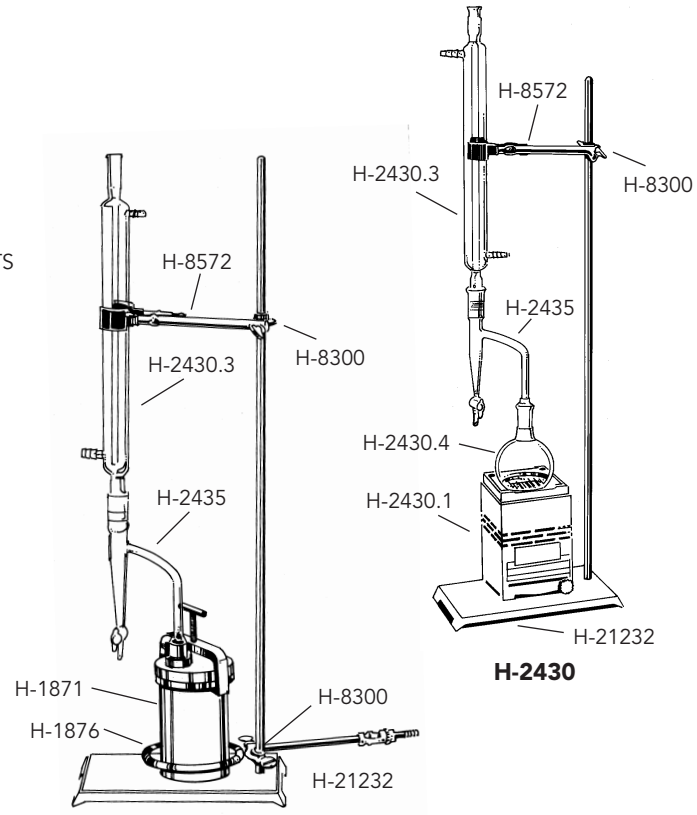
Description	Model
Flask	H-1910.3
Condenser	H-1910.1
Adapter	H-1910.4
Distillation Shield	H-1940
Flame Shield	H-1945
Thermometer	H-2600.8F
Graduated Cylinder	H-4915.100
Burner	H-6220
Clamp	H-8002
Support Ring	H-18355
Support Stand	H-21212
Support Stand	H-21222
Support Shelf	H-21700
Wire Gauze	H-25885

Individual Items Included in H-2285

Description	Model
Ring Burner	H-1876
Adapter	H-1910A
Bent Glass Tube	H-2290A
Funneled Tube	H-2290B
Tube Shield	H-2330
Condenser	H-2340
Aluminum Still	H-2345
Thermometer	H-2600.7F
Graduated Cylinder	H-4915.100
Burner	H-6220
Clamp	H-8300
Clamp Holders (2 in set)	H-8342
Clamp	H-8390
Clamp	H-8522
Ring	H-18355
Support Stands (2 in set)	H-21212
Support Stand	H-21232
Support Shelf	H-21700



H-2290



H-2430

H-2440, H-2442

Emulsified Asphalts Water Content Distillation Apparatus— H-2290

Same as H-2285 with smaller still, H-1871, substituted for H-2345 still. Meets ASTM D244; AASHTO T59. Shipping wt. 30 lbs. (13.6 kg)

Dean-Stark Electric Apparatus— H-2430
Dean-Stark Electric Apparatus, 220V 50Hz— H-2430.5F

Electrically heated apparatus determines water content in petroleum products and other bituminous materials. Meets ASTM D95, D244, E123; AASHTO T55, T59. Shipping wt. 30 lbs. (13.6kg)

Individual Items Included in H-2430

Description	Model
0 to 750W Electric Rheostat Heater	H-2430.1
Condenser	H-2430.3
Flask	H-2430.4
20ml Distilling Receiver Trap with Stopcock	H-2435.20
Clamp	H-8300
Burette Clamp	H-8572
Rectangular Support Stand with Rod	H-21232

Dean-Stark Gas-Heated Apparatus— H-2440

Gas heated apparatus determines water content in petroleum products and other bituminous materials. Uses the same component parts as the H-2430, except instead of an electric heater and flask, it includes a Tar Still and Ring Burner (listed below). Meets ASTM D95, D244, E123; AASHTO T55, T59. Shipping wt. 30 lbs. (13.6kg)

Items Included in H-2440

Description	Model
Tar Still	H-1871
Ring Burner	H-1876

Distillation Apparatus for Volatile Distillates— H-2442.25

Same components as the H-2440, but the distilling receiver is a trap for volatile fractions of bitumen. Included Trap is graduated 0 to 5ml in 0.1ml divisions. Meets ASTM D1461; AASHTO T110. Shipping wt. 25 lbs. (11.3kg)

Distillation Apparatus for Moisture Distillates— H-2442.10

Same components as the H-2440, but the distilling receiver is a trap for moisture distillates of bitumen. Included Trap is graduated 0 to 5ml in 0.1ml divisions. Meets ASTM D1461; AASHTO T110. Shipping wt. 25 lbs. (11.3kg)

Note: See following page for distillation accessories and replacement parts.


H-2345


H-1871

Aluminum Tar Still— H-1871
Used with H-2290 for determining water in crude petroleum, tars and derivatives of those materials. Cover has 1 tubulure. Dimensions: 3-1/2" (89mm) ID x 6" (152mm) Inside depth. 1 qt. (0.9 liter) capacity. Cast aluminum. Meets ASTM D95, D370, D1461, AASHTO T55, T59, T83, T110.

Aluminum Alloy Still— H-2345
Used with H-2285 for identifying cationic emulsions and as a container to determine water content and residue by distillation and evaporation. Cover has 3 tubulures (2 drilled 10/18 and 1 drilled 24/40), 3-3/4" (95mm) ID x 9-1/2" (241mm) inside depth. Meets ASTM D95, D244, AASHTO T55, T59, T110.

Aluminum Alloy Still— H-2346
Same as H-2345, except cover has 4 tubulures (3 drilled 10/18 and 1 drilled 24/40)

Stoppers for use with above Stills:

Glass Tube Stopper— H-2345TS
Thermometer Stopper— H-2345TTS


H-1876

Ring Burner— H-1876
Can be used with all gases. 4-3/4" (121mm) ID x 5-1/2" (140mm) OD. Overall shank length is 11" (279mm) with 3/8" (10mm) serrated hose connection. Guide pins keep burner equidistant around still. Fletcher attachment regulates gas and air. Meets ASTM D244, AASHTO T59.


H-1945

Distillation Shield— H-1940
Use with H-1880. Flanged, open-end, stainless steel cylinder with 1/8" ceramic lining and two-part cover. For use with 500ml flask. Flame distillation only. Meets ASTM D402, AASHTO T78.

Flame Shield— H-1945
Use with H-1880. Stainless steel, spot-welded cone 2" (51mm) dia. at bottom with spring clip to fit 7/16" to 5/8" (11 to 16mm) burner tubes. Meets ASTM D402, AASHTO T78.


H-2340


H-2348


H-1946

Burner Chimney— H-1946
Fits standard 4" (102mm) rings.

Connecting Tube Shield— H-2330
For use with H-2285 and H-2290. Stainless steel. Meets ASTM D244, AASHTO T59.

Condenser Jacket— H-2340
For use with H-2285 and H-2290. Brass, 15" long inlet/outlet tubulures on opposite sides of jacket. Meets ASTM D244, AASHTO T59.


H-2330


H-1940

Still Cleaner— H-2348
Use with H-1871 and H- 2345. Tool to remove residue from interior of still, 13" x 4" (328 x 101mm) dia.

Distillation Traps/Particle Charge Meter


H-2435.25


H-2435.20


H-2435.10


H-2435.5

25ml Cap Trap For Volatile Distillates— H-2435.25
25ml cap trap graduated 0.1ml from 0 to 25ml. Meets ASTM D95, D1461.

20ml Distillation Trap— H-2435.20
20ml distillation trap graduated in 0.2ml. Optional for ASTM D95

10ml Cap Trap For Moisture Distillates— H-2435.10
10ml cap trap graduated 0.1ml from 0 to 1ml, 0.2ml from 1ml to 10ml. Meets ASTM D95, D1461.

5ml Cap Distillation Trap— H-2435.5
5ml cap distillation trap, graduated 0.1ml. Meets ASTM D95, D1461.

Particle Charge Meter— H-2450
Particle charge meter identifies cationic emulsified asphalt, using 0-10DC millimeter controlled by variable resistor. Fail-safe design prevents exceeding meter capacity. Includes positive- and negative-identified test clips and 3-wire plug. Order stainless steel plates separately. Meets ASTM D244; AASHTO T59.

Note: Order H-1042 Transformer for 220V operation.



H-2450

Particle Charge Meter Plates— H-2452
Set of two 1" x 4" (25.4 x 101.6mm) stainless steel plates for use with H-2450.

Bitumen Soluble in Organic Solvents Set— H-1550
Used to determine solubility of asphalt cement materials. Meets ASTM D4, D2042 AASHTO T44. Shipping wt. 9 lbs.

Replacement Parts, Model H-1550

Description	Model
Gooch crucible	H-1550.1
Crucible holder	H-1550.2
Buchner funnel	H-1550.3
Glass fiber filters	H-1550.8
Chapman filter pump	H-12020
3/8" Threaded coupling	H-12155
Flask filter ring	H-4913.500
Stopper #7	H-1550.5


H-1550

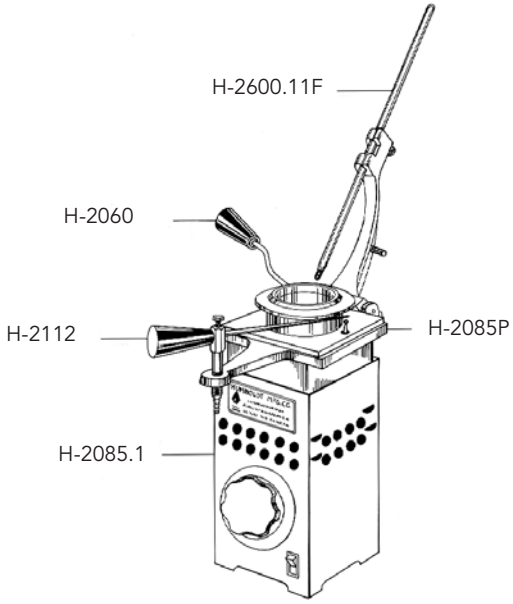




Cleveland Open Cup Flash Tester, Electric— H-2085
Cleveland Flash Tester, 220V 50/60Hz— H-2085.4F
Thermometer position is adjustable. Meets ASTM D92, D117; AASHTO T48. Shipping wt. 20 lbs. (9.1kg)

Replacement Parts, Model H-2085, H-2085.4F

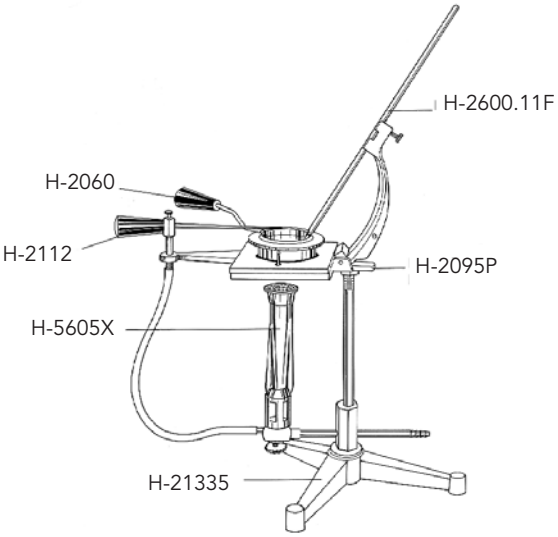
Description	Model
Electric Heater with Rheostat	H-2085.1
Flash-Point Platform	H-2085P
Test Burner	H-2112
Flash Cup	H-2060
Thermometer	H-2600.11F



Cleveland Flash and Fire Point Tester, Natural Gas— H-2095
One source supplies gas for both heating and test flame. Replacement parts available separately. Meets ASTM D92, D117; AASHTO T48. Shipping wt. 20 lbs. (9.1kg)

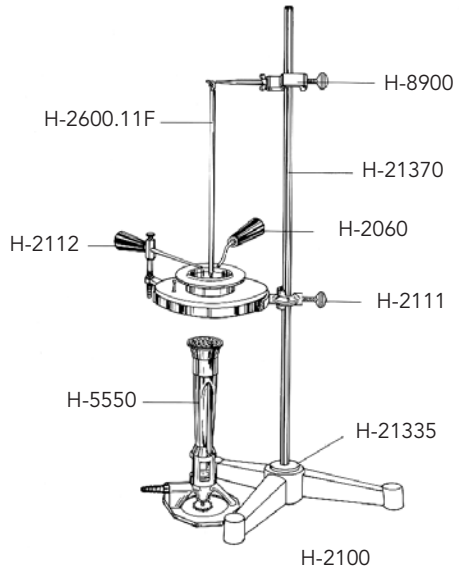
Replacement Parts, Model H-2095

Description	Model
Cast Iron tripod base with Steel Support Rod	H-21335
High Temp Burner w/ Adj. Valve Orifice	H-5605X
Flash-Point Platform	H-2095P
Test Burner	H-2112
Flash Cup	H-2060
Thermometer	H-2600.11F



Cleveland Flash and Fire Point Tester— H-2100

Uses natural gas. Thermometer and cup platform positions are adjustable up and down on support rod. Meets ASTM D92, D117; AASHTO T48. Shipping wt. 17 lbs. (7.7kg)



H-2100

Replacement Parts, Model H-2095

Description	Model
Cast Iron, tripod base with Steel Support Rod	H-21335
Support rod	H-21370
Burner	H-5550
Test burner	H-2112
Flash-Point Platform	H-2095P
Thermometer clamp	H-2113
Cup platform	H-2111
Flash cup	H-2060
Thermometer	H-2600.11F

Tag Open-Cup Flash Tester, Electric— H-1990
Tag Open-Cup Flash Tester, 230 50/60Hz— H-1990.4F

For determination of flash points of liquids having a flash point up to 230°F (110°C) and cutback asphalts with flash points of less than 200°F (93°C). Includes Pyrex cup, base and liquid bath with overflow, pivoting ignition taper with pilot light and reference bead and thermometer holder. Order H-2610.9C thermometer, leveling device and draft shield separately. Meets ASTM D1310, D3143; AASHTO T79. Shipping wt. 9-1/2 lbs. (4.3kg)



H-1990

Tag Open-Cup Flash Tester, Gas— H-1995

Same unit as above, but uses gas to operate.

Replacement Parts, Model H-1990 and H-1995

Description	Model
Replacement Pyrex cup	H-1990.1
Leveling device	H-1990.2
Draft shield	H-1990.3
Thermometer, range: 20 to 230°F	H-2600.9F
Thermometer, range: -5 to 110°C	H-2610.9C



H-2060

Flash Cup— H-2060

Used with Flash Point Testers, H-2085, H-2095 and H-2100.

Conradson Carbon Residue Apparatus— H-2495

Tests petroleum products to determine the amount of carbon residue left after evaporation and pyrolysis of an oil and to indicate relative coke-forming propensities. Includes burner, tripod, refractory block, nickel chrome triangle, nickel crucible and cover, Skidmore crucible, porcelain crucible and monel hood and bridge. Component parts available separately. Meets ASTM D189, D2416. Shipping wt. 7 lbs. (3.2kg)



H-2495

Replacement Parts, Model H-2495

Description	Model
Porcelain crucible	H-2494
Skidmore crucible and cover	H-2497
Carbon residue apparatus hood	H-2496
Nickle crucible with cover	H-2498
Refractory block insulator ring	H-2505

Centrifuge Extractors

For quantitative determination of bitumen content in paving mixtures, centrifuge extractor operation requires relatively short time. Sample is weighed, heated slightly until it starts crumbling, cooled, placed in rotor bowl and solvent is added. Centrifugal action forces liquid through a filter paper ring at bowl's periphery, and process is repeated until expelled solvent is clear color. Aggregates are weighed and graded. Weight before and after extraction determines constituent proportions. All motorized units have accurate, dependable electronic solid state speed control; rotation speed adjusts up and down. Electric brake stops rotation in less than 10 seconds. Explosion-proof motorized units offer same features along with greater safety. Hand-driven unit is ideal for field application or labs with light duty. Units are corrosion-resistant lightweight cast aluminum. Includes 10 filter rings. Extra bowls recommended to speed multiple batching; order separately. Meets ASTM D2172 (Method A).



H-1456

Centrifuge Extractors, Analog Control, Cast Aluminum Construction

Dimensions are: 18" x 18" x 18" (457 x 457 x 457mm)

Capacity	Open Motor	Explosion-Proof Motor		Shipping Wt.	Filter Ring Replacements
	115V 60Hz	115V 60Hz	220V 50/60Hz		
1500g	H-1456	H-1466	H-1466.4F	75 lb (33kg)	H-1487.627 4 micron retention 10" OD x 5" ID Package of 100
3000g	H-1471	H-1473	H-1473.4F	80 lb (36kg)	H-1489.627 4 micron retention 12-1/4" OD x 5" ID Package of 100

Centrifuge Extractors, Digital Control, Cast Aluminum Construction

Controller can be wall mounted to minimize vibrations. Push button and walk away while machine runs unattended. Memory holds "last test" cycle settings. Shuts off automatically at end of test cycle. Dimensions are: 18" x 18" x18" (457 x 457 x 457mm)

Capacity	Open Motor	Explosion-Proof Motor		Shipping Wt.	Filter Ring Replacements
	115V 60Hz	115V 60Hz	220V 50/60Hz		
1500g	H-1460	H-1461	H-1461.4F	76 lb (35kg)	H-1487.627 4 micron retention 10" OD x 5" ID Package of 100
3000g	H-1464	H-1465	H-1465.4F	80 lb (36kg)	H-1489.627 4 micron retention 12-1/4" OD x 5" ID Package of 100



H-1461

Replacement Parts, Models H-1456 to H-1473

Description	Model
Aluminum Bowl, Model H-1456, H-1466	H-1456B
Aluminum Bowl, Model H-1471, H-1473	H-1471B
Bowl Cover, Model H-1456, H-1466	H-1456 BC
Bowl Cover, Model H-1471, H-1473	H-1471BC
Cover Nut	H-1456N
Clamp for all models	H-1471C
Rubber Viton O-ring for all models	H-1471RV
Brake band for all models	H-1456BB
Brake Band Assembly for all models	H-1471BBA

Centrifuge Extractors, Analog Control, Value Line

Dimensions are: 12" x 22" x 20" (304 x 559 x 508mm)

Capacity	Open Motor		Explosion-Proof Motor		Shipping Wt.	Filter Ring Replacements
	115V 60Hz	220V 50/60Hz	115V 60Hz	220V 50/60Hz		
1500g	H-1452	H-1452.4F	H-1451	H-1451.4F	85 lb (39kg)	H-1481.627 6 micron retention 9-3/4" OD x 1-3/4" ID Package of 100
3000g			H-1474	H-1474.4F	140 lb (64kg)	H-1485.627 6 micron retention 11-5/8" OD x 5" ID Package of 100



H-1451
H-1452
H-1474

Centrifuge Extractors, Hand Driven

Hand-drive model with machine-cut gears and anti-friction bearings operating in an oil bath. Dimensions are: 13" x 13" x 17" (330 x 330 x 432mm)

Capacity	Model	Shipping Wt.	Filter Ring Replacements
1500g	H-1478	50 lb (23kg)	H-1481.627 6 micron retention capability 9-3/4" OD x 1-3/4" ID Package of 100



H-1478

Replacement Parts, Model H-1478

Description	Model
Aluminum Bowl	H-1478B
Bowl Cover	H-1456BC
Cover Nut	H-1456N

Filter Papers

For use with Centrifuge Extractors and Reflux Extraction Sets

Size	Filter Speed	Flow Rate (ml/min.)	Thickness	Retention (µm)	Per Pkg.	Model
9-3/4" x 2-1/2"	medium	85	0.71	4	100	H-1480.627
9-3/4" x 1-3/4"	medium	85	0.71	4	100	H-1481.627
10" x 5"	medium	85	0.71	4	100	H-1487.627
12-1/4" x 5"	medium	85	0.71	4	100	H-1489.627
11-5/8" x 1-3/4"	medium	85	0.71	4	100	H-1485.627
33cm dia.	Very Fast	360	0.51	48	50	H-1497.617
33cm dia.	Very Fast	435	1.02	31	100	H-1497.633
33cm dia.	Fast	235	0.25	24	100	H-1497.615
33cm dia.	Medium	60	0.17	6	100	H-1497.613
33cm dia.	Medium	85	0.71	4	100	H-1497.627
40cm dia.	Medium	85	0.71	4	100	H-1498.627
40cm dia.	Medium Fast	60	0.17	6	100	H-1498.613
40cm dia.	Medium Fast	235	0.25	24	100	H-1498.615
40cm dia.	Very Fast	300	0.51	48	50	H-1498.617

H-1448



H-1448GS





H-1449



H-1857

Vacuum Extractor— H-1448
Used for quantitative determination of bitumen in hot-mixed paving mixtures and pavement samples. Unit is a stainless steel 3000g capacity combination vacuum/storage tank with a 12" (305mm) dia. filtering surface. Unit includes connecting hose, (100) H-1497.613 filter papers, test procedure, see-through extraction gauge, sight tube and vacuum gauge. For replacement filter paper, use H-1497 series. Meets ASTM D2172 (Meth. E); AASHTO T164 (Method E). Shipping wt. 84 lbs. (38kg)
For vacuum pump, order H-1763A pump separately.

4000cc Erlenmeyer Flask— H-4913.4M
Meets ASTM D2172; AASHTO T164 (Method E)

8" Sieve Adapter for Vacuum Extractor— H-1447

Vacuum Extractor— H-1449
H-1448 Vacuum Extractor without storage tank, gauge and sight tube. Shipping wt. 60 lbs. (27kg)

H-1448 and H-1449 Extractor Replacement Parts

Description	Model
Fluorosilicone o-ring	H-1448.1
Gauge, H-1448	H-1448G
Glass Tubing, includes 2 o-rings	H-1448GT
Free-flow vacuum plate	H-1448GS
Stainless Steel Plate, as provided	H-1448P
Stainless Steel Plate, Heavy-Duty	H-1448HP
Rubber Tubing	H-1448RT
Clear, Heavy-wall, Vacuum Tubing	H-1446
4,000cc Erlenmeyer Flask, meets ASTM D2172 and AASHTO T164 (Method E0	H-4913.4M
8" Sieve adapter	H-1447

Free-Flow Vacuum Plate— H-1448GS
Prevents vacuum flow problems when performing vacuum extractor tests. This heavy-duty stainless steel plate won't draw down when vacuum is applied. Prevents blockage of flow holes. Solvent always passes through freely for consistently accurate test results. Eliminates problems and speeds testing. Can be used with both models H-1448 and H-1449 Vacuum Extractors.

Filterless Centrifuge Extractor— H-1857
Filterless Centrifuge Extractor, 230V 50Hz— H-1857.5F
The Continuous-flow Filterless Centrifuge Extractor is ideally suited for use in the extraction of mineral fines from bitumen-laden solvents obtained from standard asphalt extraction tests. In operation, the solvent suspension is fed through the top funnel into a special aluminum beaker. Using the high, 11,000 rpm centrifugal force, the liquid moves up the beaker wall and out the overflow tube while the solids remain for easy removal at test completion. The system allows the continuous feeding of the suspension until the solids-retaining capacity of the beaker is reached. The unit is supplied complete with a No. 18 (1.0mm) and No. 200 (75µm) sieve for placement at the top of the inlet funnel. Using this arrangement, an asphalt mix extraction test can be carried out by pre-dissolving the mix with solvent and then pouring the sample into the sieve. Meets ASTM D1856; AASHTO T164, T170. Dimensions: 20" x 15" x 33" (508 x 380 x 840mm). Shipping wt. 150 lbs. (68kg)

Reflux Extractor Set, 1000g— H-1495
Reflux Extractor Set, 220V 50/60Hz— H-1495.4F
Used to determine the percentage of bitumen in a paving mixture using hot solvent extraction. Each cone has 500g capacity. Set includes: 2 Wire Screen Cones, Copper Condenser with 1/2" inlet/outlet water tubes, Glass Jar 6" OD x 18" H (152mm x 457mm) with ground open edges for a tight fit, a H-4950, 6" square Hot Plate and a 100-pack of 33cm Filter Paper. Components are available individually below.
Meets ASTM D2172; AASHTO T164 (Method B). Shipping wt. 26 lbs. (12kg)

H-1495 Extractor Components

Description	Model
Wire Screen Cone Sample Holder (set of 2)	H-1495.1
Copper Condenser w/ inlet/outlet water tubes	H-1495.2A
Glass Jar with ground open edges	H-1495.3
Electric Hot Plate	H-4950
Filter Paper, 33cm, 100-pack	H-1497.613



H-1495.1
H-1499.1



H-1495.2A
H-1499.2A



H-1495
H-1499

Reflux Extractor Set, 2000g— H-1499
Reflux Extractor Set, 220V 50/60Hz— H-1499.4F
Similar to H-1495 except cones have 1000g capacity. Set includes: 2 Wire Screen Cones, Copper Condenser with 1/2" inlet/outlet water tubes, Glass Jar 8-3/4" OD x 18" H (222mm x 457mm) with ground open edges for a tight fit, a H-4951, 9" square Hot Plate and a 100-pack of 40cm Filter Paper. Components are available individually below.
Meets ASTM D2171; AASHTO T164 (Method B). Shipping wt. 26 lbs. (12kg)

H-1499 Extractor Components

Description	Model
Wire Screen Cone Sample Holder	H-1499.1
Copper Condenser w/ inlet/outlet water tubes	H-1499.2A
Glass Jar with ground open edges	H-1499.3
Electric Hot Plate	H-4951
Filter Paper, 33cm, 100-pack	H-1498.613



H-4950



H-1494

Pressure Limit Device— H-1494
For use with Reflux Extractor Kits to protect copper condenser from excessive pressure. For use with 3/8" tubes.

Asphalt Dispenser, 6 Qt.— H-1440
Asphalt Dispenser, 6 Qt., 220V 50/60Hz— H-1440.4F
Round melting pot has stainless steel crucible (18 gauge) & shell (20 gauge) to facilitate easy clean up. Choice of 6 quart, or 12 quart model. Includes heavy duty, adjustable bench mounting stand which fits either size. Dual-point temperature control allows independent temperature for pot (0-350°) and for valve (1-10°). Digital display may be read in either Centigrade or Fahrenheit. Other features include: multiple-circuit blanket heater for very uniform heat; no-drip 1" ball valve dispenser, 7-1/4" (184mm) above work surface; 50 watt valve heater; 3" (76mm) fiberglass insulation; separate aluminum cover; 6' power cord. 6-qt Capacity— 800 watts; OD = 10-1/4" dia. x 14" height (260 x 356mm). ID = 6-3/4" dia. x 7-1/4" depth (171 x 184mm). 12-qt Capacity— 1,200 watts; OD = 15" dia. x 17" height (381 x 432mm). ID = 10" dia. x 9-1/2" depth (254 x 241mm). (Valve & controls excluded from dimensions.)
Shipping wt. 30 lbs. (13.6kg)



H-1440



Asphalt Dispenser, 12 Qt.— H-1442
Asphalt Dispenser, 12 Qt., 220V 50/60Hz— H-1442.4F
Like H-1440, but has 12 quart capacity. Shipping wt. 43 lbs. (19.5kg)


HR-2500


HR-2503


HR-2504


HR-2508

Electric Core Drill— HR-2500
Electric Core Drill, 230 50/60Hz— HR-2500.4F
The electric model offers full feature flexibility, adapting to a wide range of drilling applications in addition to pavement core sampling. Includes a two-speed (350-900 RPM), 3.5 HP 20 amp heavy-duty motor, waterproof switch box, built-in water swivel, continuous duty oil-less vacuum pump, filter, hose, quick connections and has a 12-inch bit diameter capacity. Easy transport with 6-inch wheels. The 10" (254mm) wide base is a vacuum pad anchor with more than 1000 pounds of vacuum force that solidly grips the drilling surface within seconds, making it the ideal drill stand for floors, walls, ceilings, as well as, pavement. When snapping cores and adding extension rods, motor and carriage can be removed/attached without changing drill location. For wall drilling, base and column are attached to the wall by the vacuum, then the carriage and motor are added. When working in limited space areas, drilling is possible with the base removed. Adding the optional Angle Drilling Attachment allows the column to tilt up to 45 degrees from vertical. Requires water supply, if none is available order HR-2516 portable water pressure tank separately. Order diamond bits and expansion adapters separately. Shipping wt. 130 lbs. (59kg).

Gasoline-Powered Core Drill— HR-2503
Electric Start Gas-Powered Core Drill— HR-2503E
Drill twice as fast as electric with a gasoline-powered core drill. Features include a 10.5 HP, 4-cycle, pull-start or electric-start gasoline motor, 8-inch diameter bit capacity, and an effortless ball-screw feed system for single operator use. Can be carried in pick-up or van for easy transport. Quick set up, dead weight machine requires no anchor bolts or mounting hardware. Requires water supply, if none is available order HR-2516 portable water pressure tank separately. Order diamond bits and expansion adapters separately.

Gasoline-Powered Core Drill— HR-2504
Same as above units, but with a 16-inch diameter bit capacity and a 13 HP, 4-cycle, electric start gas motor.

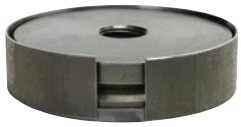
Hand-Held, Gasoline Powered Drill— HR-2508
For fast, economic drilling—either vertical or horizontal—of concrete/asphalt and/or auger drilling into soil. Easy-to-handle, 22 lbs. overall weight. Quick set-up, easy-to-use, reliable. 2.5 HP, 2-cycle gasoline engine, high performance water swivel, Bit Locator. Accepts up to 6-1/4" dia max. bit. Shipping wt. 30 lbs. (13.6kg)


HR-2600

Core Drill Trailer System— HR-2600
This complete stand-alone core drill rig offers field independence, versatility, dependability, and easy single person operation. Features include; HR-2504 Core Drill Machine, a variable positioning system, which allows for approximately 48-inches side-to-side and 12 inches fore and aft drill head movement for accurate hole placement, a hydraulic assisted machine lift allows single operator removal and replacement of drill head for remote drilling applications, a 200-gallon water tank and 12 VDC water pump for a full day of drilling, and a lockable weather-resistant toolbox is added for storage of tools and drill bits. All mounted on a 5 ft. by 8 ft. (approx. bed size) steel construction trailer, equipped with electric brakes and Order diamond bits and expansion adapters and auger blades separately.

Bit Size	Diamond Bit	Adapter
2" (51mm)	HR-2520.2	HR-2540.2
2-1/2" (64mm)	HR-2520.25	HR-2540.25
3" (76mm)	HR-2520.3	HR-2540.3
3-1/2" (89mm)	HR-2520.35	HR-2540.35
4" (102mm)	HR-2520.4	HR-2540.4
4-1/4" (108mm)	HR-2520.42	HR-2540.42
4-1/2" (114mm)	HR-2520.45	HR-2540.45
5" (127mm)	HR-2520.5	HR-2540.5
5-1/2" (140mm)	HR-2520.55	HR-2540.55
6" (152mm)	HR-2520.6	HR-2540.6
6-1/4" (159mm)	HR-2520.62	HR-2540.62
6-1/2" (165mm)	HR-2520.65	HR-2540.65

Diamond Tip, Core Drill Bits, Open-Ended
Economical, Open-Ended Drill Bits for use with reusable Expanding Adapter. Adapter is designed for quick and easy attachment of bits. Two beveled plates tighten expander ring firmly against inside of bit barrel to attach to drill machine. Expanding Adapters are size specific.



HR-2540.6



HR-2520.65

CoreSnap, 4"— HR-2554
CoreSnap, 6"— HR-2556
The CoreSnap allows you to remove a drilled sample from a roadbed at or below the tackline without prying or drilling completely through the old roadbed. The CoreSnap is placed down over a normally cut core and tighten the binding bolt with a 1/2"-drive socket/ratchet. A quick lateral motion of the handle breaks the core sample away from the older mat beneath, allowing the core to be removed easily.



HR-2554

Diamond Tip, Core Drill Bits
Professional Series for critically hard concrete with heavy steel reinforcing. Total segment height is .320" (.250 diamond depth and .070 segment base). Standard bit length core sample is 13". Bits use a 1-1/4"–7 thread adapter.

Bit Size	Diamond Bit
2" (51mm)	HR-2530.2
2-1/2" (64mm)	HR-2530.25
3" (76mm)	HR-2530.3
3-1/2" (89mm)	HR-2530.35
4" (102mm)	HR-2530.4
4-1/4" (108mm)	HR-2530.42
4-1/2" (114mm)	HR-2530.45
5" (127mm)	HR-2530.5
5-1/2" (140mm)	HR-2530.55
6" (152mm)	HR-2530.6
6-1/4" (159mm)	HR-2530.62
6-1/2" (165mm)	HR-2530.65



HR-2530.4

HR-2530.25

Core Drilling Machine Accessories	Models
Extension Rod, 9" (229mm) for drilling holes deeper than 12" (305mm)	HR-2510
Water Trapping Assembly, confines wastewater on surface and electric pump mover water into container	HR-2511
Diamond bit edge dresser	HR-2512
Replacement wheel for diamond bit edge dresser (HR-2512)	HR-2513
Strap wrench, 18" (457mm) allows bit removal from drill spindle without damage to bit barrel	HR-2514
Angle drilling attachment for HR-2500. Tilts column to allow drilling from 90° to 45° angle from surface	HR-2515
Portable water pressure tank. Hand-operated. 4 gallon (15 liter), delivers water under pressure when water supply is not available.	HR-2516



HR-2514



High-Low Detector (Rolling Straight Edge)
High-Low Detector, 10 ft. (3m) Span— H-2790
High-Low Detector, 12 ft. (3.7m) Span— H-2791
High-Low Detector, 16 ft. (4.9m) Span— H-2792

Used to measure planeness of pavement surfaces, such as highways, airport runways, bridge decks, etc. Requires only one operator to detect, register, and dye mark high and low areas that need to be ground down or filled.

- Easy-to-use
- One-person operation
- Vertical sweep vertical indicator

Operator has full view of variations which are magnified 16 times, on a vertical scale graduated in 1/8" (1mm) increments, so that magnified readings range up to 1/4" (6.4mm), high or low. The 16 ft. long model incorporates aluminum reinforcing riveted along both sides of the frame for added support and rigidity.

Specifications

Frame	Rectangular aluminum
Wheels	One front, one rear for support, with one indicator wheel, center. Provision to check wheel alignment. Precision ball bearings, neoprene tires. Scraper blades keep wheels clean to maximize accuracy. Includes wheel stands for stabilizing during calibration, transport, and storage.
Dye	Bright orange, 12 oz. (340g) aerosol can. Non-clogging, contains no fluorocarbons. Mounts beside indicator wheel.
Steering Handle	T-type with button for discharge of dye
Scale	Vertical with large pointer, magnifies variations 16x, mounted above indicator wheel
Graduations	1/8" or 1mm
Readings	Magnified, High or Low Range: 0 to 1/4" (6.4mm),

Bell/Buzzer Indicator— H-2790B
Sounds simultaneously with visual indicator, 9V DC battery

Aerosol Dye, 12 Pack— H-2790D
12 pack of 16oz. (454g) spray cans

Benkelman Beam— H-3220

Measures the deflection of a flexible pavement under moving wheel loads. Extremely accurate and easy to use. Direct-reading dial indicator eliminates need for conversion tables or field calculations.

- Precision accuracy
- Easy to use on test site
- Lightweight, quick set-up
- Easy to transport, easy to store
- No need for conversions or field calculations

Dial indicator vibrator system assures accurate pavement measurements. Telescoping design adds convenience, reduces weight, and saves storage space. Lightweight aluminum construction. Order dial gauge separately. AASHTO T256.

Specifications

Main Body	Aluminum with black finish 55" (1397mm)
Probe Beam	Telescopes into body, aluminum 8 ft. (2.4m)
Probe Fulcrum	Provides lever ratio of 2:1, ball pivot bearing
Vibrator System	Assures measurement accuracy. Operating switch mounted on top of instrument section. Requires 4 "D" size batteries
Dial Indicators	Ordered separately. Compensated for direct reading
Leveling Wheel	Adjusts beams to proper elevation
Overall Length	With beam fully extended 12 ft. (3.7m).
Shipping Weight	40lbs. (18kg)

Horizontal Dial Indicator— H-3221H
0.4" range x 0.002" divisions

Vertical Dial Indicator— H-3222
1" range x 0.002" divisions

Vertical Dial Indicator— H-3222M
25mm range x 0.02mm divisions



Portable Skid Resistance Tester— H-3204
Measures friction (skid resistance) on flat, cambered, or gradient road surfaces. Originally developed by the Transport and Road Research Laboratory of Great Britain.

- Compact, easily transported & used in the field
- Can be used in remote locations, independent of any vehicle
- Enclosed bearings & working parts for protection against wear and contamination
- Heavy-duty frame construction
- Adjustable feet on base

A pendulum arm, having a spring-loaded rubber slider on the pendulum foot. Device is placed on the portion of the road surface to be tested. It is then leveled, and the height of the center of suspension of the pendulum is adjusted to a fixed value which is read on a special gauge.

The pendulum is then released from its horizontal position, to swing down freely until the rubber slider contacts the test surface. As the slider travels across the surface for a fixed distance, the pendulum is slowed and a frictionally-constrained pointer affixed to the pendulum arm measures the highest point in the pendulum arc. The position of the pointer is then read on a measuring arc graduated from 0 to 150. Pointer readings indicate the resistance to skidding of the test surface. Dimensions (include carrying case): 31" x 25.5" x 9" (787 x 648 x 229mm). Meets ASTM E303.
Shipping wt. 75 lbs. (34.0kg)

H-3204 Accessories	Model
Rubber slider, 1-1/4", for lab use	H-3207
Rubber slider, 3", for field use	H-3208
Laboratory base plate	H-3206

Accelerated Polishing Machine— H-3205
The Accelerated Polishing Machine polishes samples of aggregates, simulating actual road conditions, and is used in conjunction with the Portable Skid Resistance Tester to determine the Polished Stone Value for aggregates used in road surfaces, and gives a measure of the resistance to skidding. Fourteen specimens are clamped around the "road wheel" of the polishing machine, and subjected to two stages of polishing by a loaded rubber tire. First by corn emery, and secondly by emery flour. Use of the Accelerated Polishing Machine and the Skid Resistance Tester in road construction has had a major influence in reduction of accidents.

The H-3205 features:

- Heavy welded steel mainframe, standing in adjustable pads
- Digitial display preset timer and revolution counter.
- Specimens are easily affixed and removed from testing wheel
- Water gravity fed from high level tank through calibrated flowmeter.
- Used abrasive and water collected in removable tray.
- Loaded tire raised and lowered to the running surface by machanical lifting device.
- Easily removed covers and guards protect operator during testing and safety switch ensures removable saftey covers are in place.

Aggregates









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Sample Splitters

H-3962, H-3964, H-3966
H-3987, H-3989, H-3990
H-3992
Removable Hopper:
H-3980, H-3985



H-3970, H-3975



Humboldt Sample Splitters

Riffle-type sample splitters divide or halve dry materials such as cement, gravel, powdered ores, coal, coke, sand, soils, etc. Material poured into the hopper is divided into two equal portions by a series of chutes that discharge the material alternately in opposite directions into separate pans. Humboldt Splitters are stainless steel construction, and pans are stainless or cold-rolled steel, see chart for type and quantity of pans included. All splitters include pans, scoop and cleaning brush. See chart for product details on specific models. Meet ASTM B215, C136, C702, C778, D421, D424, D457, D806, AASHTO T27, T144, T248.

One-Piece Construction Sample Splitters

For rapid, single-step reduction of large sample volumes—ideal for field applications. See models: H-3962, H-3964, H-3966, H-3987, H-3989, H-3990, H-3992.

Removable Hopper Sample Splitters

Same design as above models except these have a removable hopper for easier cleaning. See models: H-3980 and H-3985.

Enclosed Sample Splitters

Enclosed Sample Splitters are ideal for dusty samples, including coal, coke and chaff. Meet ASTM C702, D410, D2013, D3176, D3180; AASHTO T248. See models: H-3970 and H-3975.

Chutes Number	Chutes Width in. (mm)	Hopper W x L inches (mm)	Pans (furnished)	Ship Wgt. lbs. (kg)	Splitter Model	Standard Pan Pan Model	Standard Pan L x W x D —inches (mm)	Stainless Steel Pan Pan Model	Stainless Steel Pan L x W x D —inches (mm)
14	3/8 (10)	6 3/4 x 8 (171 X 203)	4	14 (8.2)	H-3962	H-3981	8 x 5 1/4 x 4 1/4 (203 x 133 x 105)	H-3981S	6 1/2 x 6 1/2 x 4 1/2 (165 x 165 x 140)
14	1/2 (13)	6 3/4 x 11 (171 X 279)	4	17 (7.7)	H-3964	H-3986	10 1/2 x 5 1/2 x 4 1/2 (267 x 140 x 114)	H-3986S	11 1/4 x 6 1/2 x 5 1/2 (286 x 165 x 140)
14	3/4 (19)	6 3/4 x 14 3/4 (171 X 375)	4	21 (9.5)	H-3966			H-3967S	13 1/2 x 6 3/4 x 5 (343 x 171 x 127)
16	1 (25)	9 x 20 (229 X 508)	4	31 (14.1)	H-3987				
8	2 (50)	9 1/2 x 19 1/2 (241 X 495)	4	27 (12.3)	H-3989	H-3988	19 x 6 1/2 x 5 1/4 (483 x 165 x 133)	H-3988AS	16 3/8 x 6 1/2 x 5 1/4 (415 x 165 x 133)
10	1-1/2 (38)	9 x 20 (229 X 508)	4	50 (22.7)	H-3990			H-3996S	15 3/8 x 8 x 7.125 (391 x 203 x 181)
8	2-1/2 (65)	9 x 24 (229 X 610)	4	50 (22.7)	H-3992			H-3993S	22 x 6 5/8 x 5 1/8 (559 x 168 x 130)
Removable Hopper Models									
12	1/2 (13)	8 1/2 x 11 (216 X 279)	4	15 (6.8)	H-3980 (removable hopper)	H-3981	8 x 5 1/4 x 4 1/2 (203 x 133 x 114)	H-3981S	6 1/2 x 6 1/2 x 5 1/2 (165 x 165 x 140)
12	3/4 (19)	8 1/2 x 14 (216 X 356)	4	21 (9.5)	H-3985 (removable hopper)	H-3986	10 1/2 x 5 1/2 x 4 1/2 (267 x 140 x 114)	H-3986S	11 1/4 x 6 1/2 x 5 1/2 (286 x 165 x 140)
Enclosed Models									
14	3/8 (10)	6 1/2 x 8 (165 X 203)	2	22 (10)	H-3970 (enclosed)			H-3977S (drawer)	7 x 5 3/4 x 3 3/4 (178 x 95 x 146)
24	3/8 (10)	4 1/2 x 11 (114 X 279)	2	25 (11.4)	H-3975 (enclosed)			H-3976S (drawer)	11 7/8 x 6 1/8 x 5 (302 x 156 x 140)

Standard pans (cold-rolled steel) are supplied with splitters except when only stainless models are listed with the splitter in the chart above.



H-4291



H-4290



H-4289



H-4288



H-4293

Gilson Universal Sample Splitters

At home in the lab or in the field, Gilson Universal Sample Splitters feature a patented combination of adjustable chutes and a gate release hopper to ensure accuracy for mixing and reducing gross samples to representative smaller test quantities. See chart below for specifications.

Capacity Hopper/Pans in^3/ft^3 (liters)	Chute Bar Width	Chute Bar Number of	Chute Slope	Dimensions L x W x H inches (mm)	Gilson Model	Model	Pans Replacements
125 in^3 (2.0)	1/8"	48	60°	9-1/2 x 8-1/2 x 13-1/2 (165 x 715 x 981)	SP-3	H-4291	H-4291.1
.28 ft^3 (7.9)	1/4"	48	60°	15-1/2 x 12-1/2 x 17-1/2 (165 x 715 x 981)	SP-2.5	H-4290	H-4290.1
0.55 ft^3 (15.6)	1/2"	36	45°	22 x 14-1/2 x 20-1/2 (165 x 715 x 981)	SP-2	H-4289	H-4289.1
1.0 ft^3 (28.3)	1/2"	48	45°	29 x 19 x 39 (165 x 715 x 981)	SP-1	H-4288	H-4288.2
1.0 ft^3 (28.3)	1/2"	48	60°	29 x 19 x 39 (165 x 715 x 981)	SP-10	H-4293	H-4288.2

Wheels (set of 2) are available (rubber tires w/ ball bearing races) for above sample splitters, H-4288.1

Mini-Splitter— H-4291

The smallest of the bench-top units is all stainless steel except for aluminum chute bars and pans. Can be used to split powders to 1/4" (6.4mm) aggregate. The H-4289.5 Dust Enclosure accessory consists of two stainless steel panels held to front and back of the unit by springs. Includes 2 pans.

Mini-Splitter Dust Enclosure— H-4291.5

Versa-Splitter— H-4290

The Versa-Splitter can be used for fine aggregates up to 3/4" aggregate. Contact parts and pans are stainless steel except for aluminum chute bars, which are anodized for corrosion resistance. The H-4290.5 Dust Enclosure accessory consists of two stainless steel panels held to front and back of the unit by springs. Includes 2 pans.

Versa-Splitter Dust Enclosure— H-4290.5

Porta-Splitter— H-4289

The Porta-Splitter is designed to split most fine gravel and sand. Lightweight with a large hopper capacity, this splitter provides extreme durability in a portable model. Chute slope is 45°, but a 60° adapter kit is available. Includes 2 pans.

60° Adapter Kit— H-4290.4

Universal Splitter— H-4288

Rugged, large-capacity floor model for field or lab use.Features adjustable chutes and gate release 1 ft^3 hopper. Includes 2 pans.

Wheel Kit (set of 2)— H-4288.1

Bag Loading Chute— H-4288.3

60° Adapter Kit— H-4288.4

Total Enclosure Upgrade—H-4288.7

Totally Enclosed Splitter— H-4293

A totally enclosed version of the H-4288 Universal Splitter. Hinged doors provide access to hopper and pans while keeping dust to a minimum.

Chute Settings—Width and Number of Chutes

Chute Width	Number of Chutes (openings) H-4291	H-4290	H-4289	H-4288	H-4293
1/8" (3.2mm)	48	—	—	—	—
1/4" (6.4mm)	24	48	—	—	—
3/8" (9.5mm)	16	—	—	—	—
1/2" (12.7mm)	12	24	36	48	48
3/4" (19.1mm)	8	16	—	—	—
1" (25.4mm)	6	12	18	24	24
1-1/2" (38.1mm)	4	8	12	16	16
2" (51mm)	—	6	—	12	12
3" (76mm)	—	4	6	8	8
4" (102mm)	—	—	—	6	6
6" (152mm)	—	—	—	4	4


H-4287

California Sample Splitter—H-4287
Designed and constructed for the California Department of Transportation, this splitter meets CalTrans C 201 requirements. For use with 1-1/8" (28.6mm) to sand sized aggregate. Large capacity, 1.9 Cu. Ft. (53.8L) gate release hopper. Ten 2-1/4" (57.2mm) fixed chutes process particle sizes up to 1-1/8" (28.6mm). Sturdy, heavy-gauge steel frame with painted and baked finish is built for extended service life under heavy use. Four swivel casters permit mobility and easy storage in busy, crowded labs. Two 1.2 Cu. Ft. (34L) capacity, welded-steel sample pans are included. Reinforced pans have sturdy handles at each end for safe and convenient handling of heavy samples. Overall dimensions: 29" x 28" x 46" (71 x 74 x 117cm).

Replacement Materials Pan for above—H-4287.1

16-to-1 Sample Reducer— H-3994
Produces 10-lb.-or-greater representative samples with maximum particle size 1/2" (13mm). Reducer cuts out 1/16th of the material fed through in one pass. (a one-pound sample can be obtained from a 256-pound original by passing it through twice).

Materials Pan for Reducer—H-3996
Wash Tub— H-3997


H-3996


H-3994


H-4135

Quartering Canvas—
5' Square (1.5m)— H-4135
5' x 8' (2m x 2.5m)— H-4136
Heavy-duty quartering canvas for use in selecting and quartering soils and aggregates. All edges are seamed and stitched. H-4135 does not meet ASTM and AASHTO specs. H-4136 meets ASTM C109, C702; AASTO T248.


H-3971C


H-3970

Microsplitters & Pans
For fine easily segregated materials, particularly low-grade and radioactive ores. Stainless steel and aluminum alloy splitter is made entirely of non-magnetic metals. Hopper is designed with cut-off gate to stop flow of materials from the hopper, preventing possible errors normally caused by overflowing material at corner of pan into riffles. See corresponding table for complete details on all models.

Microsplitters

Chutes Number	Chutes Width in. (mm)	Hopper L x W— inches (mm)	Pans (furnished)	Pan Size L x W x D —inches (mm)	Ship Wgt. lbs. (kg)	Model	Repl. Pans
16	1/8 (3)	4-1/4 x 4-1/4 x 3-1/2 (108 x 108 x 89)	2	2 x 3-1/2 x 1-3/4 (51 x 89 x 45)	7 (3.2)	H-3971C	H-3972
32	1/4 (6)	7 x 8-1/4 x 3-1/2 (178 X 210 x 89)	2	5-3/4 x 9-3/4 x 4 (146 x 248 x 102)	23 (10.4)	H-3973	H-3973.1
16	1/2 (13)	7 x 8 x 3-1/2 (178 X 203 x 89)	2	5-3/4 x 9-3/4 x 4 (146 x 248 x 102)	21 (9.5)	H-3974	H-3973.1

Sieves

sampling, classification and ASTM standard tests in all popular sizes and configurations

U.S.A. Standard Sieve Sizes and Equivalents

Alternative Number	Nominal Opening	Standard (mm)
4"	4.000	100mm
3.5"	3.500	90mm
3"	3.000	75mm
2.5"	2.500	63mm
2.12"	2.120	53mm
2"	2.000	50mm
1.75"	1.750	45mm
1.5"	1.500	37.5mm
1.25"	1.250	31.5mm
1.06"	1.060	26.5mm
1"	1.000	25.0mm
.875"	0.875	22.4mm
.75"	0.750	19.0mm
.625"	0.625	16.0mm
.530"	0.530	13.2mm
.500"	0.500	12.5mm
.434"	0.434	11.2mm
.375"	0.375	9.5mm
.312"	0.312	8.0mm
.265"	0.265	6.7mm
.25"	0.250	6.3mm
.125"	0.125	3.17mm
No. 3-1/2	0.223	5.6mm
No. 4	0.187	4.75mm
No. 5	0.157	4.00mm
No. 6	0.131	3.35mm
No. 7	0.110	2.80mm
No. 8	0.094	2.36mm
No. 10	0.078	2.00mm
No. 12	0.066	1.70mm
No. 14	0.055	1.40mm
No. 16	0.046	1.18mm
No. 18	0.039	1.00mm
No. 20	0.033	850µ
No. 25	0.027	710µ
No. 30	0.023	600µ
No. 35	0.019	50µ
No. 40	0.016	425µ
No. 45	0.013	355µ
No. 50	0.011	300µ
No. 60	0.009	250µ
No. 70	0.008	212µ
No. 80	0.007	180µ
No. 100	0.005	150µ
No. 120	0.0049	125µ
No. 140	0.0041	106µ
No. 170	0.0035	90µ
No. 200	0.0029	75µ
No. 230	0.0024	62µ
No. 270	0.0020	53µ
No. 32	0.0017	45µ
No. 400	0.0014	38µ
No. 450	0.0012	32µ
No. 500	0.0009	25µ
No. 635	0.0007	20µ

U.S.A. Standard Sieve Series

Looking for sieves? Humboldt stocks an extensive offering of sieves for use in all types of sieve testing applications, from sampling and classification of soils, aggregates and other powdered and granular materials to specific ASTM standard tests. Humboldt carries an extensive inventory of sieves in all popular sizes and mesh/frame material configurations. We try to maintain a complete stock of 8" and 12" sieves in both full and half heights for quick turnaround, as well as keeping a large inventory of other sieve sizes and frame and mesh configurations.

Our sieves are of the highest quality to ensure consistent fit, accurate specifications and durable construction. All our sieves comply with ASTM E11 and AASHTO M92; and, are given individual serial numbers for traceability. Certified sieves are also available as an option, please inquire.

Humboldt sieves are available with brass frame and mesh, brass frame with stainless steel mesh or stainless frame and mesh. Brass sieves are cost efficient while stainless sieves tend to last longer and have sag-resistant mesh. Sieve frames are seamless spun brass or stainless steel with rigid rolled edges and extended bottoms (skirts) to ensure a good fit between frames, pans and separators of the same diameter; and ensuring that your set of sieves stacks properly.

All sieves include a permanently attached metal plate that includes the sieve number, micron size and the nominal opening in millimeters and inches. Sieve covers, bottom pans and separator pans are also in stock and ready for shipment.



8" (203mm) Dia. USA Standard Sieves

		Brass Frame and Mesh		Brass Frame, Stainless Mesh		Stainless Frame and Mesh	
		Full Height 2" (50mm)	Half Height 1" (25mm)	Full Height 2" (50mm)	Half Height 1" (25mm)	Full Height 2" (50mm)	Half Height 1" (25mm)
Coarse Series	4" (100mm)	–	–	H-3920CS4.000	H-3910CS4.000	H-3920CSS4.000	H-3910CSS4.000
	3-1/2" (90mm)	–	–	H-3920CS3.500	H-3910CS3.500	H-3920CSS3.500	H-3910CSS3.500
	3" (75mm)	–	–	H-3920CS3.000	H-3910CS3.000	H-3920CSS3.000	H-3910CSS3.000
	2-1/2' (63mm)	–	H-3910C2.500	H-3920CS2.500	H-3910CS2.500	H-3920CSS2.500	H-3910CSS2.500
	2.12" (53mm)	–	–	H-3920CS2.120	H-3910CS2.120	H-3920CSS2.120	H-3910CSS2.120
	2" (50mm)	H-3920C2.000	H-3910C2.000	H-3920CS2.000	H-3910CS2.000	H-3920CSS2.000	H-3910CSS2.000
	1-3/4" (45mm)	–	–	H-3920CS1.750	H-3910CS1.750	H-3920CSS1.750	H-3910CSS1.750
	1-1/2" (37.5mm)	H-3920C1.500	H-3910C1.500	H-3920CS1.500	H-3910CS1.500	H-3920CSS1.500	H-3910CSS1.500
	1-1/4" (31.5mm)	–	–	H-3920CS1.250	H-3910CS1.250	H-3920CSS1.250	H-3910CSS1.250
	1.06" (26.5mm)	–	–	H-3920CS1.060	H-3910CS1.060	H-3920CSS1.060	H-3910CSS1.060
	1" (25.0mm)	H-3920C1.000	H-3910C1.000	H-3920CS1.000	H-3910CS1.000	H-3920CSS1.000	H-3910CSS1.000
	7/8" (22.4mm)	–	–	H-3920CS.875	H-3910CS.875	H-3920CSS.875	H-3910CSS.875
	3/4" (19.0mm)	H-3920C.750	H-3910C.750	H-3920CS.750	H-3910CS.750	H-3920CSS.750	H-3910CSS.750
	5/8" (16.0mm)	–	–	H-3920CS.625	H-3910CS.625	H-3920CSS.625	H-3910CSS.625
	0.530" (13.2mm)	–	–	H-3920CS.530	H-3910CS.530	H-3920CSS.530	H-3910CSS.530
	1/2" (12.5mm)	H-3920C.500	H-3910C.500	H-3920CS.500	H-3910CS.500	H-3920CSS.500	H-3910CSS.500
	7/16" (11.2mm)	–	–	H-3920CS.438	H-3910CS.438	H-3920CSS.438	H-3910CSS.438
	3/8" (9.5mm)	H-3920C.375	H-3910C.375	H-3920CS.375	H-3910CS.375	H-3920CSS.375	H-3910CSS.375
	5/16" (8.0mm)	–	–	H-3920CS.312	H-3910CS.312	H-3920CSS.312	H-3910CSS.312
	0.265" (6.7mm)	–	–	H-3920CS.265	H-3910CS.265	H-3920CSS.265	H-3910CSS.265
	1/4" (16.3mm)	H-3920C.250	H-3910C.250	H-3920CS.250	H-3910CS.250	H-3920CSS.250	H-3910CSS.250
	1/8" (3.17mm)	–	–	H-3920CS.125	H-3910CS.125	H-3920CSS.125	H-3910CSS.125
Fine Series	No. 3-1/2 (5.6mm)	–	–	H-3920FS3-1/2	H-3910FS3-1/2	H-3920FSS3-1/2	H-3910FSS3-1/2
	No. 4 (4.75mm)	H-3920F4	H-3910F4	H-3920FS4	H-3910FS4	H-3920FSS4	H-3910FSS4
	No. 5 (4.0mm)	–	–	H-3920FS5	H-3910FS5	H-3920FSS5	H-3910FSS5
	No. 6 (3.35mm)	–	–	H-3920FS6	H-3910FS6	H-3920FSS6	H-3910FSS6
	No. 7 (2.80mm)	–	–	H-3920FS7	H-3910FS7	H-3920FSS7	H-3910FSS7
	No. 8 (2.36mm)	H-3920F8	H-3910F8	H-3920FS8	H-3910FS8	H-3920FSS8	H-3910FSS8
	No. 10 (2.00mm)	H-3920F10	H-3910F10	H-3920FS10	H-3910FS10	H-3920FSS10	H-3910FSS10
	No. 12 (1.70mm)	H-3920F12	H-3910F12	H-3920FS12	H-3910FS12	H-3920FSS12	H-3910FSS12
	No. 14 (1.40mm)	H-3920F14	H-3910F14	H-3920FS14	H-3910FS14	H-3920FSS14	H-3910FSS14
	No. 16 (1.18mm)	H-3920F16	H-3910F16	H-3920FS16	H-3910FS16	H-3920FSS16	H-3910FSS16
	No. 18 (1.00mm)	H-3920F18	H-3910F18	H-3920FS18	H-3910FS18	H-3920FSS18	H-3910FSS18
	No. 20 (850µ)	H-3920F20	H-3910F20	H-3920FS20	H-3910FS20	H-3920FSS20	H-3910FSS20
	No. 25 (710µ)	H-3920F25	H-3910F25	H-3920FS25	H-3910FS25	H-3920FSS25	H-3910FSS25
	No. 30 (600µ)	H-3920F30	H-3910F30	H-3920FS30	H-3910FS30	H-3920FSS30	H-3910FSS30
	No. 35 (500µ)	H-3920F35	H-3910F35	H-3920FS35	H-3910FS35	H-3920FSS35	H-3910FSS35
	No. 40 (425µ)	H-3920F40	H-3910F40	H-3920FS40	H-3910FS40	H-3920FSS40	H-3910FSS40
	No. 45 (355µ)	H-3920F45	H-3910F45	H-3920FS45	H-3910FS45	H-3920FSS45	H-3910FSS45
	No. 50 (300µ)	H-3920F50	H-3910F50	H-3920FS50	H-3910FS50	H-3920FSS50	H-3910FSS50
	No. 60 (250µ)	H-3920F60	H-3910F60	H-3920FS60	H-3910FS60	H-3920FSS60	H-3910FSS60
	No. 70 (212µ)	H-3920F70	H-3910F70	H-3920FS70	H-3910FS70	H-3920FSS70	H-3910FSS70
	No. 80 (180µ)	H-3920F80	H-3910F80	H-3920FS80	H-3910FS80	H-3920FSS80	H-3910FSS80
	No. 100 (150µ)	H-3920F100	H-3910F100	H-3920FS100	H-3910FS100	H-3920FSS100	H-3910FSS100
	No. 120 (125µ)	H-3920F120	H-3910F120	H-3920FS120	H-3910FS120	H-3920FSS120	H-3910FSS120
	No. 140 (106µ)	H-3920F140	H-3910F140	H-3920FS140	H-3910FS140	H-3920FSS140	H-3910FSS140
	No. 170 (90µ)	–	–	H-3920FS170	H-3910FS170	H-3920FSS170	H-3910FSS170
	No. 200 (75µ)	H-3920F200	H-3910F200	H-3920FS200	H-3910FS200	H-3920FSS200	H-3910FSS200
	No. 230 (63µ)	H-3920F230	H-3910F230	H-3920FS230	H-3910FS230	H-3920FSS230	H-3910FSS230
	No. 270 (53µ)	H-3920F270	H-3910F270	H-3920FS270	H-3910FS270	H-3920FSS270	H-3910FSS270
	No. 325 (45µ)	H-3920F325	H-3910F325	H-3920FS325	H-3910FS325	H-3920FSS325	H-3910FSS325
	No. 400 (38µ)	–	–	H-3920FS400	H-3910FS400	H-3920FSS400	H-3910FSS400
	No. 450 (32µ)	–	–	H-3920FS450	H-3910FS450	H-3920FSS450	H-3910FSS450
	No. 500 (25µ)	–	–	H-3920FS500	H-3910FS500	H-3920FSS500	H-3910FSS500
	No. 635 (20µ)	–	–	H-3920FS635	H-3910FS635	H-3920FSS635	H-3910FSS635
	No. 850 (10µ)	–	–	H-3920FS850	H-3910FS850	–	–
	No. 1000 (2µ)	–	–	H-3920FS1000	H-3910FS1000	–	–

12" (305mm) Dia. USA Standard Sieves

		Brass Frame and Mesh			Brass Frame, Stainless Mesh			Stainless Frame and Mesh	
		Full Height 3" (75mm)	Inter-Height 2" (50mm)	Half Height 1-5/8" (41mm)	Full Height 3" (75mm)	Inter-Height 2" (50mm)	Half Height 1-5/8" (41mm)	Full Height 3" (75mm)	Half Height 1-5/8" (41mm)
Coarse Series	4" (100mm)	–	–	–	H-3912CS4.000	H-3922CS4.000	H-3932CS4.000	H-3912CSS4.000	H-3932CSS4.000
	3-1/2" (90mm)	–	–	–	H-3912CS3.500	H-3922CS3.500	H-3932CS3.500	H-3912CSS3.500	H-3932CSS3.500
	3" (75mm)	–	–	–	H-3912CS3.000	H-3922CS3.000	H-3932CS3.000	H-3912CSS3.000	H-3932CSS3.000
	2-1/2" (63mm)	–	–	–	H-3912CS2.500	H-3922CS2.500	H-3932CS2.500	H-3912CSS2.500	H-3932CSS2.500
	2.12" (53mm)	–	–	–	H-3912CS2.120	H-3922CS2.120	H-3932CS2.120	H-3912CSS2.120	H-3932CSS2.120
	2" (50mm)	H-3912C2.000	–	H-3932C2.000	H-3912CS2.000	H-3922CS2.000	H-3932CS2.000	H-3912CSS2.000	H-3932CSS2.000
	1-3/4" (45.0mm)	–	–	–	H-3912CS1.750	H-3922CS1.750	H-3932CS1.750	H-3912CSS1.750	H-3932CSS1.750
	1-1/2" (37.5mm)	H-3912C1.500	–	H-3932C1.500	H-3912CS1.500	H-3922CS1.500	H-3932CS1.500	H-3912CSS1.500	H-3932CSS1.500
	1-1/4" (31.5mm)	–	–	–	H-3912CS1.250	H-3922CS1.250	H-3932CS1.250	H-3912CSS1.250	H-3932CSS1.250
	1.06" (26.5mm)	–	–	–	H-3912CS1.060	H-3922CS1.060	H-3932CS1.060	H-3912CSS1.060	H-3932CSS1.060
	1" (25.0mm)	H-3912C1.000	–	H-3932C1.000	H-3912CS1.000	H-3922CS1.000	H-3932CS1.000	H-3912CSS1.000	H-3932CSS1.000
	7/8" (22.4mm)	–	–	–	H-3912CS.875	H-3922CS.875	H-3932CS.875	H-3912CSS.875	H-3932CSS.875
	3/4" (19.0mm)	H-3912C.750	H-3922C.750	H-3932C.750	H-3912CS.750	H-3922CS.750	H-3932CS.750	H-3912CSS.750	H-3932CSS.750
	5/8" (16.0mm)	–	–	–	H-3912CS.625	H-3922CS.625	H-3932CS.625	H-3912CSS.625	H-3932CSS.625
	0.530" (13.2mm)	–	–	–	H-3912CS.530	H-3922CS.530	H-3932CS.530	H-3912CSS.530	H-3932CSS.530
	1/2" (12.5mm)	H-3912C.500	H-3922C.500	H-3932C.500	H-3912CS.500	H-3922CS.500	H-3932CS.500	H-3912CSS.500	H-3932CSS.500
	7/16" (11.2mm)	–	–	–	H-3912CS.438	H-3922CS.438	H-3932CS.438	H-3912CSS.438	H-3932CSS.438
	3/8" (9.5mm)	H-3912C.375	H-3922C.375	H-3932C.375	H-3912CS.375	H-3922CS.375	H-3932CS.375	H-3912CSS.375	H-3932CSS.375
	5/16" (8.0mm)	–	–	–	H-3912CS.312	H-3922CS.312	H-3932CS.312	H-3912CSS.312	H-3932CSS.312
	0.265" (6.7mm)	–	–	–	H-3912CS.265	H-3922CS.265	H-3932CS.265	H-3912CSS.265	H-3932CSS.265
	1/4" (6.3mm)	H-3912C.250	H-3922C.250	H-3932C.250	H-3912CS.250	H-3922CS.250	H-3932CS.250	H-3912CSS.250	H-3932CSS.250
	1/8" (3.17mm)	–	–	–	H-3912CS.125	H-3922CS.125	H-3932CS.125	–	H-3932CSS.125
Fine Series	No. 3-1/2 (5.6mm)	–	–	–	H-3912FS3-1/2	H-3922FS3-1/2	H-3932FS3-1/2	H-3912FSS3-1/2	H-3932FSS3-1/2
	No. 4 (4.75mm)	H-3912F4	H-3922F4	H-3932F4	H-3912FS4	H-3922FS4	H-3932FS4	H-3912FSS4	H-3932FSS4
	No. 5 (4.0mm)	–	–	–	H-3912FS5	H-3922FS5	H-3932FS5	H-3912FSS5	H-3932FSS5
	No. 6 (3.35mm)	–	–	–	H-3912FS6	H-3922FS6	H-3932FS6	H-3912FSS6	H-3932FSS6
	No. 7 (2.80mm)	–	–	–	H-3912FS7	H-3922FS7	H-3932FS7	H-3912FSS7	H-3932FSS7
	No. 8 (2.36mm)	H-3912F8	H-3922F8	H-3932F8	H-3912FS8	H-3922FS8	H-3932FS8	H-3912FSS8	H-3932FSS8
	No. 10 (2.00mm)	H-3912F10	H-3922F10	H-3932F10	H-3912FS10	H-3922FS10	H-3932FS10	H-3912FSS10	H-3932FSS10
	No. 12 (1.70mm)	H-3912F12	H-3922F12	H-3932F12	H-3912FS12	H-3922FS12	H-3932FS12	H-3912FSS12	H-3932FSS12
	No. 14 (1.40mm)	H-3912F14	H-3922F14	H-3932F14	H-3912FS14	H-3922FS14	H-3932FS14	H-3912FSS14	H-3932FSS14
	No. 16 (1.18mm)	H-3912F16	H-3922F16	H-3932F16	H-3912FS16	H-3922FS16	H-3932FS16	H-3912FSS16	H-3932FSS16
	No. 18 (1.0mm)	H-3912F18	H-3922F18	H-3932F18	H-3912FS18	H-3922FS18	H-3932FS18	H-3912FSS18	H-3932FSS18
	No. 20 (850µ)	H-3912F20	H-3922F20	H-3932F20	H-3912FS20	H-3922FS20	H-3932FS20	H-3912FSS20	H-3932FSS20
	No. 25 (710µ)	H-3912F25	H-3922F25	H-3932F25	H-3912FS25	H-3922FS25	H-3932FS25	H-3912FSS25	H-3932FSS25
	No. 30 (600µ)	H-3912F30	H-3922F30	H-3932F30	H-3912FS30	H-3922FS30	H-3932FS30	H-3912FSS30	H-3932FSS30
	No. 35 (500µ)	H-3912F35	H-3922F35	H-3932F35	H-3912FS35	H-3922FS35	H-3932FS35	H-3912FSS35	H-3932FSS35
	No. 40 (425µ)	H-3912F40	H-3922F40	H-3932F40	H-3912FS40	H-3922FS40	H-3932FS40	H-3912FSS40	H-3932FSS40
	No. 45 (355µ)	H-3912F45	H-3922F45	H-3932F45	H-3912FS45	H-3922FS45	H-3932FS45	H-3912FSS45	H-3932FSS45
	No. 50 (300µ)	H-3912F50	H-3922F50	H-3932F50	H-3912FS50	H-3922FS50	H-3932FS50	H-3912FSS50	H-3932FSS50
	No. 60 (250µ)	H-3912F60	H-3922F60	H-3932F60	H-3912FS60	H-3922FS60	H-3932FS60	H-3912FSS60	H-3932FSS60
	No. 70 (212µ)	H-3912F70	H-3922F70	H-3932F70	H-3912FS70	H-3922FS70	H-3932FS70	H-3912FSS70	H-3932FSS70
	No. 80 (180µ)	H-3912F80	H-3922F80	H-3932F80	H-3912FS80	H-3922FS80	H-3932FS80	H-3912FSS80	H-3932FSS80
	No. 100 (150µ)	H-3912F100	H-3922F100	H-3932F100	H-3912FS100	H-3922FS100	H-3932FS100	H-3912FSS100	H-3932FSS100
	No. 120 (125µ)	H-3912F120	H-3922F120	H-3932F120	H-3912FS120	H-3922FS120	H-3932FS120	H-3912FSS120	H-3932FSS120
	No. 140 (106µ)	H-3912F140	H-3922F140	H-3932F140	H-3912FS140	H-3922FS140	H-3932FS140	H-3912FSS140	H-3932FSS140
	No. 170 (90µ)	–	–	–	H-3912FS170	H-3922FS170	H-3932FS170	H-3912FSS170	H-3932FSS170
	No. 200 (75µ)	H-3912F200	H-3922F200	H-3932F200	H-3912FS200	H-3922FS200	H-3932FS200	H-3912FSS200	H-3932FSS200
	No. 230 (63µ)	H-3912F230	H-3922F230	H-3932F230	H-3912FS230	H-3922FS230	H-3932FS230	H-3912FSS230	H-3932FSS230
	No. 270 (53µ)	H-3912F270	H-3922F270	H-3932F270	H-3912FS270	H-3922FS270	H-3932FS270	H-3912FSS270	H-3932FSS270
	No. 325 (45µ)	H-3912F325	H-3922F325	H-3932F325	H-3912FS325	H-3922FS325	H-3932FS325	H-3912FSS325	H-3932FSS325
	No. 400 (38µ)	–	–	–	H-3912FS400	H-3922FS400	H-3932FS400	H-3912FSS400	H-3932FSS400
	No. 450 (32µ)	–	–	–	H-3912FS450	H-3922FS450	H-3932FS450	H-3912FSS450	H-3932FSS450
	No. 500 (25µ)	–	–	–	H-3912FS500	H-3922FS500	H-3932FS500	H-3912FSS500	H-3932FSS500
	No. 635 (20µ)	–	–	–	H-3912FS635	H-3922FS635	H-3932FS635	H-3912FSS635	H-3932FSS635
	No. 850 (10µ)	–	–	–	H-3912FS850	H-3922FS850	H-3932FS850	–	–
	No. 1000 (2µ)	–	–	–	H-3912FS1000	H-3922FS1000	H-3932FS1000	–	–

4" and 12" (101mm or 305mm) Dia. Deep Frame USA Standard Sieves

		4" Diameter				12" Diameter Deep Frame			
		Brass Frame and Mesh		Brass Frame, Stainless Mesh		Brass Frame and Mesh		Brass Frame, Stainless Mesh	
		1-1/2" Deep	4" Deep	1-1/2" Deep	4" Deep	4" Deep	8" Deep	4" Deep	8" Deep
Coarse Series	4" (100mm)	–	–	–	–	–	–	H-3928CS4.000	H-3938CS4.000
	3-1/2" (90mm)	–	–	–	–	–	–	H-3928CS3.500	H-3938CS3.500
	3" (75mm)	–	–	–	–	H-3928C3.000	H-3938C3.000	H-3928CS3.000	H-3938CS3.000
	2-1/2" (63mm)	–	–	–	–	H-3928C2.500	H-3938C2.500	H-3928CS2.500	H-3938CS2.500
	2.12" (53mm)	–	–	–	–	H-3928C2.120	H-3938C2.120	H-3928CS2.120	H-3938CS2.120
	2" (50mm)	–	–	–	–	H-3928C2.000	H-3938C2.000	H-3928CS2.000	H-3938CS2.000
	1-3/4" (45.0mm)	–	–	–	–	H-3928C1.750	H-3938C1.750	H-3928CS1.750	H-3938CS1.750
	1-1/2" (37.5mm)	–	–	–	–	H-3928C1.500	H-3938C1.500	H-3928CS1.500	H-3938CS1.500
	1-1/4" (31.5mm)	–	–	–	–	–	–	H-3928CS1.250	H-3938CS1.250
	1.06" (26.5mm)	–	–	–	–	–	–	H-3928CS1.060	H-3938CS1.060
	1" (25.0mm)	H-3914C1.000	H-3924C1.000	H-3914CS1.000	H-3924CS1.000	H-3928C1.000	H-3938C1.000	H-3928CS1.000	H-3938CS1.000
	7/8" (22.4mm)	–	–	H-3914CS.875	H-3924CS.875	–	–	H-3928CS.875	H-3938CS.875
	3/4" (19.0mm)	H-3914C.750	H-3924C.750	H-3914CS.750	H-3924CS.750	H-3928C.750	H-3938C.750	H-3928CS.750	H-3938CS.750
	5/8" (16.0mm)	–	–	H-3914CS.625	H-3924CS.625	–	–	H-3928CS.625	H-3938CS.625
	0.530" (13.2mm)	–	–	H-3914CS.530	H-3924CS.530	–	–	H-3928CS.530	H-3938CS.530
	1/2" (12.5mm)	H-3914C.500	H-3924C.500	H-3914CS.500	H-3924CS.500	H-3928C.500	H-3938C.500	H-3928CS.500	H-3938CS.500
	7/16" (11.2mm)	–	–	H-3914CS.438	H-3924CS.438	–	–	H-3928CS.438	H-3938CS.438
	3/8" (9.5mm)	H-3914C.375	H-3924C.375	H-3914CS.375	H-3924CS.375	H-3928C.375	H-3938C.375	H-3928CS.375	H-3938CS.375
	5/16" (8.0mm)	–	–	H-3914CS.312	H-3924CS.312	–	–	H-3928CS.312	H-3938CS.312
	0.265" (6.7mm)	–	–	H-3914CS.265	H-3924CS.265	–	–	H-3928CS.265	H-3938CS.265
	1/4" (6.3mm)	H-3914C.250	H-3924C.250	H-3914CS.250	H-3924CS.250	H-3928C.250	H-3938C.250	H-3928CS.250	H-3938CS.250
	1/8" (3.17mm)	–	–	H-3914CS.125	H-3924CS.125	–	–	H-3928CS.125	H-3938CS.125
Fine Series	No. 3-1/2 (5.6mm)	–	–	H-3914FS3-1/2	H-3924FS3-1/2	–	–	H-3928FS3-1/2	H-3938FS3-1/2
	No. 4 (4.75mm)	H-3914F4	H-3924F4	H-3914FS4	H-3924FS4	H-3928F4	H-3938F4	H-3928FS4	H-3938FS4
	No. 5 (4.0mm)	–	–	H-3914FS5	H-3924FS5	–	–	H-3928FS5	H-3938FS5
	No. 6 (3.35mm)	–	–	H-3914FS6	H-3924FS6	–	–	H-3928FS6	H-3938FS6
	No. 7 (2.80mm)	–	–	H-3914FS7	H-3924FS7	–	–	H-3928FS7	H-3938FS7
	No. 8 (2.36mm)	H-3914F8	H-3924F8	H-3914FS8	H-3924FS8	H-3928F8	H-3938F8	H-3928FS8	H-3938FS8
	No. 10 (2.00mm)	H-3914F10	H-3924F10	H-3914FS10	H-3924FS10	H-3928F10	H-3938F10	H-3928FS10	H-3938FS10
	No. 12 (1.70mm)	H-3914F12	H-3924F12	H-3914FS12	H-3924FS12	H-3928F12	H-3938F12	H-3928FS12	H-3938FS12
	No. 14 (1.40mm)	H-3914F14	H-3924F14	H-3914FS14	H-3924FS14	H-3928F14	H-3938F14	H-3928FS14	H-3938FS14
	No. 16 (1.18mm)	H-3914F16	H-3924F16	H-3914FS16	H-3924FS16	H-3928F16	H-3938F16	H-3928FS16	H-3938FS16
	No. 18 (1.0mm)	H-3914F18	H-3924F18	H-3914FS18	H-3924FS18	H-3928F18	H-3938F18	H-3928FS18	H-3938FS18
	No. 20 (850µ)	H-3914F20	H-3924F20	H-3914FS20	H-3924FS20	H-3928F20	H-3938F20	H-3928FS20	H-3938FS20
	No. 25 (710µ)	H-3914F25	H-3924F25	H-3914FS25	H-3924FS25	H-3928F25	H-3938F25	H-3928FS25	H-3938FS25
	No. 30 (600µ)	H-3914F30	H-3924F30	H-3914FS30	H-3924FS30	H-3928F30	H-3938F30	H-3928FS30	H-3938FS30
	No. 35 (500µ)	H-3914F35	H-3924F35	H-3914FS35	H-3924FS35	H-3928F35	H-3938F35	H-3928FS35	H-3938FS35
	No. 40 (425µ)	H-3914F40	H-3924F40	H-3914FS40	H-3924FS40	H-3928F40	H-3938F40	H-3928FS40	H-3938FS40
	No. 45 (355µ)	H-3914F45	H-3924F45	H-3914FS45	H-3924FS45	H-3928F45	H-3938F45	H-3928FS45	H-3938FS45
	No. 50 (300µ)	H-3914F50	H-3924F50	H-3914FS50	H-3924FS50	H-3928F50	H-3938F50	H-3928FS50	H-3938FS50
	No. 60 (250µ)	H-3914F60	H-3924F60	H-3914FS60	H-3924FS60	H-3928F60	H-3938F60	H-3928FS60	H-3938FS60
	No. 70 (212µ)	H-3914F70	H-3924F70	H-3914FS70	H-3924FS70	H-3928F70	H-3938F70	H-3928FS70	H-3938FS70
	No. 80 (180µ)	H-3914F80	H-3924F80	H-3914FS80	H-3924FS80	H-3928F80	H-3938F80	H-3928FS80	H-3938FS80
	No. 100 (150µ)	H-3914F100	H-3924F100	H-3914FS100	H-3924FS100	H-3928F100	H-3938F100	H-3928FS100	H-3938FS100
	No. 120 (125µ)	H-3914F120	H-3924F120	H-3914FS120	H-3924FS120	H-3928F120	H-3938F120	H-3928FS120	H-3938FS120
	No. 140 (106µ)	H-3914F140	H-3924F140	H-3914FS140	H-3924FS140	H-3928F140	H-3938F140	H-3928FS140	H-3938FS140
	No. 170 (90µ)	–	–	H-3914FS170	H-3924FS170	–	–	H-3928FS170	H-3938FS170
	No. 200 (75µ)	H-3914F200	H-3924F200	H-3914FS200	H-3924FS200	H-3928F200	H-3938F200	H-3928FS200	H-3938FS200
	No. 230 (63µ)	H-3914F230	H-3924F230	H-3914FS230	H-3924FS230	H-3928F230	H-3938F230	H-3928FS230	H-3938FS230
	No. 270 (53µ)	H-3914F270	H-3924F270	H-3914FS270	H-3924FS270	H-3928F270	H-3938F270	H-3928FS270	H-3938FS270
	No. 325 (45µ)	H-3914F325	H-3924F325	H-3914FS325	H-3924FS325	H-3928F325	H-3938F325	H-3928FS325	H-3938FS325
	No. 400 (38µ)	–	–	H-3914FS400	H-3924FS400	–	–	H-3928FS400	H-3938FS400
	No. 450 (32µ)	–	–	H-3914FS450	H-3924FS450	–	–	H-3928FS450	H-3938FS450
	No. 500 (25µ)	–	–	H-3914FS500	H-3924FS500	–	–	H-3928FS500	H-3938FS500
	No. 635 (20µ)	–	–	H-3914FS635	H-3924FS635	–	–	H-3928FS635	H-3938FS635
	No. 850 (10µ)	–	–	H-3914FS850	H-3924FS850	–	–	H-3928FS850	H-3938FS850
	No. 1000 (2µ)	–	–	H-3914FS1000	H-3924FS1000	–	–	H-3928FS1000	H-3938FS1000

3", 5", 6" and 10" (76, 127, 152, and 258mm) Dia. USA Standard Sieves

		3" Diameter 1" Deep		5" Diameter 1-1/2" Deep		6" Diameter 1-1/2" Deep		10" Diameter 3" Deep	
		Brase Frame and Mesh	Brase Frame Stainless Mesh	Brase Frame and Mesh	Brase Frame Stainless Mesh	Brase Frame and Mesh	Brase Frame Stainless Mesh	Brase Frame and Mesh	Brase Frame Stainless Mesh
Coarse Series	4" (100mm)	–	–	–	–	–	–	–	H-3919CS4.000
	3-1/2" (90mm)	–	–	–	–	–	–	–	H-3919CS3.500
	3" (75mm)	–	–	–	–	–	–	H-3919C3.000	H-3919CS3.000
	2-1/2" (63mm)	–	–	–	–	–	–	H-3919C2.500	H-3919CS2.500
	2.12" (53mm)	–	–	–	–	–	–	–	H-3919CS2.120
	2" (50mm)	–	–	–	–	–	–	H-3919C2.000	H-3919CS2.000
	1-3/4" (45.0mm)	–	–	–	–	–	–	–	H-3919CS1.750
	1-1/2" (37.5mm)	–	–	–	–	–	–	H-3919C1.500	H-3919CS1.500
	1-1/4" (31.5mm)	–	–	–	–	–	–	–	H-3919CS1.250
	1.06" (26.5mm)	–	–	–	–	–	–	–	H-3919CS1.060
	1" (25.0mm)	H-3913C1.000	H-3913CS1.000	H-3915C1.000	H-3915CS1.000	H-3916C1.000	H-3916CS1.000	H-3919C1.000	H-3919CS1.000
	7/8" (22.4mm)	–	H-3913CS.875	–	H-3915CS.875	–	H-3916CS.875	–	H-3919CS.875
	3/4" (19.0mm)	H-3913C.750	H-3913C.750	H-3915C.750	H-3915CS.750	H-3916C.750	H-3916CS.750	H-3919C.750	H-3919CS.750
	5/8" (16.0mm)	–	H-3913CS.625	–	H-3915CS.625	–	H-3916CS.625	–	H-3919CS.625
	0.530" (13.2mm)	–	H-3913CS.530	–	H-3915CS.530	–	H-3916CS.530	–	H-3919CS.530
	1/2" (12.5mm)	–	H-3913C.500	H-3915C.500	H-3915CS.500	H-3916C.500	H-3916CS.500	H-3919C.500	H-3919CS.500
	7/16" (11.2mm)	–	H-3913CS.438	–	H-3915CS.438	–	H-3916CS.438	–	H-3919CS.438
	3/8" (9.5mm)	H-3913C.375	H-3913CS.375	H-3915C.375	H-3915CS.375	H-3916C.375	H-3916CS.375	H-3919C.375	H-3919CS.375
	5/16" (8.0mm)	–	H-3913CS.312	–	H-3915CS.312	–	H-3916CS.312	–	H-3919CS.312
	0.265" (6.7mm)	–	H-3913CS.265	–	H-3915CS.265	–	H-3916CS.265	–	H-3919CS.265
	1/4" (6.3mm)	H-3913C.250	H-3913C.250	H-3915C.250	H-3915CS.250	H-3916C.250	H-3916CS.250	H-3919C.250	H-3919CS.250
	1/8" (3.17mm)	–	H-3913CS.125	–	H-3915CS.125	–	H-3916CS.125	–	H-3919CS.125
Fine Series	No. 3-1/2 (5.6mm)	–	H-3913FS3-1/2	–	H-3915FS3-1/2	–	H-3916FS3-1/2	–	H-3919FS3-1/2
	No. 4 (4.75mm)	H-3913F4	H-3913FS4	H-3915F4	H-3915FS4	H-3916F4	H-3916FS4	H-3919F4	H-3919FS4
	No. 5 (4.0mm)	–	H-3913FS5	–	H-3915FS5	–	H-3916FS5	–	H-3919FS5
	No. 6 (3.35mm)	–	H-3913FS6	–	H-3915FS6	–	H-3916FS6	–	H-3919FS6
	No. 7 (2.80mm)	–	H-3913FS7	–	H-3915FS7	–	H-3916FS7	–	H-3919FS7
	No. 8 (2.36mm)	H-3913F8	H-3913FS8	H-3915F8	H-3915FS8	H-3916F8	H-3916FS8	H-3919F8	H-3919FS8
	No. 10 (2.00mm)	H-3913F10	H-3913FS10	H-3915F10	H-3915FS10	H-3916F10	H-3916FS10	H-3919F10	H-3919FS10
	No. 12 (1.70mm)	H-3913F12	H-3913FS12	H-3915F12	H-3915FS12	H-3916F12	H-3916FS12	H-3919F12	H-3919FS12
	No. 14 (1.40mm)	H-3913F14	H-3913FS14	H-3915F14	H-3915FS14	H-3916F14	H-3916FS14	H-3919F14	H-3919FS14
	No. 16 (1.18mm)	H-3913F16	H-3913FS16	H-3915F16	H-3915FS16	H-3916F16	H-3916FS16	H-3919F16	H-3919FS16
	No. 18 (1.0mm)	H-3913F18	H-3913FS18	H-3915F18	H-3915FS18	H-3916F18	H-3916FS18	H-3919F18	H-3919FS18
	No. 20 (850µ)	H-3913F20	H-3913FS20	H-3915F20	H-3915FS20	H-3916F20	H-3916FS20	H-3919F20	H-3919FS20
	No. 25 (710µ)	H-3913F25	H-3913FS25	H-3915F25	H-3915FS25	H-3916F25	H-3916FS25	H-3919F25	H-3919FS25
	No. 30 (600µ)	H-3913F30	H-3913FS30	H-3915F30	H-3915FS30	H-3916F30	H-3916FS30	H-3919F30	H-319FS30
	No. 35 (500µ)	H-3913F35	H-3913FS35	H-3915F35	H-3915FS35	H-3916F35	H-3916FS35	H-3919F35	H-3919FS35
	No. 40 (425µ)	H-3913F40	H-3913FS40	H-3915F40	H-3915FS40	H-3916F40	H-3916FS40	H-3919F40	H-3919FS40
	No. 45 (355µ)	H-3913F45	H-3913FS45	H-3915F45	H-3915FS45	H-3916F45	H-3916FS45	H-3919F45	H-3919FS45
	No. 50 (300µ)	H-3913F50	H-3913FS50	H-3915F50	H-3915FS50	H-3916F50	H-3916FS50	H-3919F50	H-3919FS50
	No. 60 (250µ)	H-3913F60	H-3913FS60	H-3915F60	H-3915FS60	H-3916F60	H-3916FS60	H-3919F60	H-3919FS60
	No. 70 (212µ)	H-3913F70	H-3913FS70	H-3915F70	H-3915FS70	H-3916F70	H-3916FS70	H-3919F70	H-3919FS70
	No. 80 (180µ)	H-3913F80	H-3913FS80	H-3915F80	H-3915FS80	H-3916F80	H-3916FS80	H-3919F80	H-3919FS80
	No. 100 (150µ)	H-3913F100	H-3913FS100	H-3915F100	H-3915FS100	H-3916F100	H-3916FS100	H-3919F100	H-3919FS100
	No. 120 (125µ)	H-3913F120	H-3913FS120	H-3915F120	H-3915FS120	H-3916F120	H-3916FS120	H-3919F120	H-3919FS120
	No. 140 (106µ)	H-3913F140	H-3913FS140	H-3915F140	H-3915FS140	H-3916F140	H-3916FS140	H-3919F140	H-3919FS140
	No. 170 (90µ)	–	H-3913FS170	–	H-3915FS170	–	H-3916FS170	–	H-3919FS170
	No. 200 (75µ)	H-3913F200	H-3913FS200	H-3915F200	H-3915FS200	H-3916F200	H-3916FS200	H-3919F200	H-3919FS200
	No. 230 (63µ)	H-3913F230	H-3913FS230	H-3915F230	H-3915FS230	H-3916F230	H-3916FS230	H-3919F230	H-3919FS230
	No. 270 (53µ)	H-3913F270	H-3913FS270	H-3915F270	H-3915FS270	H-3916F270	H-3916FS270	H-3919F270	H-3919FS270
	No. 325 (45µ)	H-3913F325	H-3913FS325	H-3915F325	H-3915FS325	H-3916F325	H-3916FS325	H-3919F325	H-3919FS325
	No. 400 (38µ)	–	H-3913FS400	–	H-3915FS400	–	H-3916FS400	–	H-3919FS400
	No. 450 (32µ)	–	H-3913FS450	–	H-3915FS450	–	H-3916FS450	–	H-3919FS450
	No. 500 (25µ)	–	H-3913FS500	–	H-3915FS500	–	H-3916FS500	–	H-3919FS500
	No. 635 (20µ)	–	H-3913FS635	–	H-3915FS635	–	H-3916FS635	–	H-3919FS635
	No. 850 (10µ)	–	H-3913FS850	–	H-3915FS850	–	H-3916FS850	–	H-3919FS850
	No. 1000 (2µ)	–	H-3913FS1000	–	H-3915FS1000	–	H-3916FS1000	–	H-3919FS1000

Sieves Pans and Covers



200mm Diameter Test Sieves

Brass frame with stainless steel cloth mesh.
Full ht = 66mm
Half ht = 41mm.
Depth to cloth: Full ht. = 51mm, Half ht. = 25mm

200mm Diameter Test Sieves

Micron	Std. (mm)	Full Ht. Model	Half Ht. Model
40000	40	H-3906.40000	H-3908-40000
28000	28	H-3906.28000	H-3908.28000
20000	20	H-3906.20000	H-3908.20000
14000	14	H-3906.14000	H-3908.14000
10000	10	H-3906.10000	H-3908.10000
5000	5	H-3906.05000	H-3908.05000
2500	2.5	H-3906.02500	H-3908.02500
1250	1.25	H-3906.01250	H-3908.01250
630	630µ	H-3906.00630	H-3908.00630
315	315µ	H-3906.00315	H-3908.00315
160	160µ	H-3906.00160	H-3908.00160
80	80µ	H-3906.00080	H-3908.00080

200mm Sieve Pans & Cover

Size	Description	Model
25mm deep	brass bottom pan	H-3906HP
50mm deep	brass bottom pan	H-3906P
200mm dia.	cover	H-3906C
25mm deep	brass separator pan	H-3906HSP
50mm deep	brass separator pan	H-3906SP
100mm deep	brass separator pan	H-3906DSP

Sieve Covers with Ring

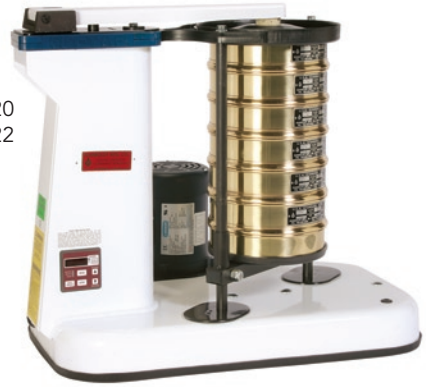
Description	Brass	Stainless
3" Dia. Sieve Cover	H-3913BC	H-3913SC
4" Dia. Sieve Cover	H-3914BC	—
5" Dia. Sieve Cover	H-3915BC	—
6" Dia. Sieve Cover	H-3916BC	—
8" Dia. Sieve Cover	H-3930BC	H-3930SC
10" Dia. Sieve Cover	H-3919BC	—
12" Dia. Sieve Cover	H-3912BC	H-3912SC

Bottom Sieve Pans

Description	Brass	Stainless
3" Dia., 5/8" (17mm) deep	H-3913HP	
3" Dia., 1" (25mm) deep	H-3913P	H-3913SS
4" Dia., 1-1/2" (38mm) deep	H-3914P	—
5" Dia., 1" (25mm) deep	H-3915P	—
6" Dia., 1-5/8" (43mm) deep	H-3916P	—
8" Dia., 1" (25mm) deep	H-3960P	H-3960SS
8" Dia., 2" (51mm) deep	H-3950P	H-3950SS
10" Dia., 2" (51mm) deep	H-3919P	—
12" Dia., 1" (25mm) deep	H-3932P	H-3932PSS
12" Dla., 2" (51mm) deep	H-3922P	—
12" Dia., 3" (75mm) deep	H-3912P	H-3912PSS

Separator Pans

Description	Brass	Stainless
3" Dia., 1" (25mm) deep	H-3913SP	—
3" Dia., 3" (75mm) deep	H-3913DSP	—
4" Dia., 1-1/2" (38mm) deep	H-3914SP	—
4" Dia., 4" (102mm) deep	H-3924SP	—
5" Dia., 1" (25mm) deep	H-3915SP	—
6" Dia., 1-5/8" (43mm) deep	H-3916SP	—
8" Dia., 1" (25mm) deep	H-3955SP	H-3955SS
8" Dia., 2" (51mm) deep	H-3956SP	H-3956SS
8" Dia., 4" (102mm) deep	H-3945SP	
8" Dia., 6" (152mm) deep	H-3946SP	
8" Dia., 8" (203mm) deep	H-3947SP	
10" Dia., 2" (51mm) deep	H-3919SP	—
12" Dia., 1" (25mm) deep	H-3932SP	H-3932SSP
12" Dia., 2" (51mm) deep	H-3922SP	H-3922PSS
12" Dia., 3.25" (83mm) deep	H-3912SP	H-3912SSP
12" Dia., 4" (102mm) deep	H-3928SP	—
12" Dia., 6" (152mm) deep	H-3929SP	—
12" Dia., 8" (200mm) deep	H-3938SP	—



H-4320
H-4322



H-4315A



H-4325
H-4330

Motorized Sieve Shakers

Humboldt carries a wide variety of heavy-duty sieve shakers to meet most applications and budgets within the construction materials testing market. From our own basic shakers to the well-known Ro-Tap models, you can find a shaker to fit your needs. Use the chart below to check and compare specfications between the various shakers.

220V Models: All models below are also available in optional voltages. Use the .2F suffix to order a 220V 60Hz model and a .5F suffix to order a 220V 50Hz model.

Description	Model (115V 60Hz)	Sieve Dia. in. (mm)	Sieve Capacity Full	Sieve Capacity Inter.	Sieve Capacity Half	ASTM	Timer Minutes	Mounting Required	Motor HP	Dimensions W x D x H in. (mm)	Ship Wt. lbs (kg)
Motorized Sieve Shaker	H-4325	3 (76) 5 (127) 8 (203)	16 12 10	—	18	C136	30	Yes	1/4	15x15x45" (380x380x1143)	65* (29.5)
Larger Capacity Motorized Sieve Shaker	H-4330	8 (203) 10 (254) 12 (305)	11 7 7	11	19 13	C136	30	Yes	1/4	21x18x47" (533x457x1194)	85 (38.5)
Ro-Tap Motorized Sieve Shaker	H-4320	8 (203)	6	—	13	C136	99 (Digital)	No	1/4	28x21x25" (635x711x533)	225 (102.1)
Ro-Tap Motorized Sieve Shaker	H-4322	12 (305)	4	6	10	C136	99 (Digital)	No	1/4	28x21x25" (635x711x537)	225 (102.1)
Mary-Ann Motorized Laboratory Sifter	H-4315A	8 (203) 12 (305)	10 6	—	—	—	99 (Digital)	No	1/3	13x35x45" (330x889x1143)	140 (63.5)

Ro-Tap Sound Enclosure— H-4324

Sound Reduction Cabinet for the Ro-Tap Sieve Shakers, H-4320 and H-4322. Dimensions are: 34" x 21" x 25" (860mm x 610mm x 780mm). Shipping Weight is 120 lbs (55 Kg).

Ro-Tap Test Stand— H-4320.3

Test Stand provides a convenient and stable means of anchoring Ro-Tap H-4320 and H-4322 Sieve Shakers. Can be used in conjunction with the H-4324 Sound Enclosure.

Wet/Dry Sieve Shaker— H-4328

Economical, electric sieve vibrator that works great in wet sieving applications. Designed to sit atop a bucket, but can be used over a sink or standard sieve pan. Vibrating unit is mounted to plastic-coated aluminum frame. Can accept 4 half height or 2 full height sievess. Includes 3-wire plug for 115V 50/60 operation. Shipping Weight 10 lb (4.5Kg)

Motorized Sieve Shaker for 3" Sieves— H-4326

Small, simple shaker for use with 3" sieves. Will accomodate up to 6 shieves and uses a 1/20 Hp motor. Includes 3-wire plug for 115V 50/60 operation. Shipping Weight 6 lb (2.7Kg)

Hand-Operated Sieve Shaker— H-4310

Identical to Model H-4325 except that it uses a hand crank instead of a motor for shaking. Shipping Weight is 49 lbs (22 Kg).



H-4328



H-4326



H-3945

Deep Frame Wet Washing Sieves

Extra-deep frame sieves for wet testing of various materials make it possible to wash the fines through the sieve without losing any of the sample. Sieves are constructed of brass frames and permanently installed stainless steel cloth.

Description	Size (dia x deep)	Shpg. Wt. lbs. (kg)	Model
Wet washing sieve with No. 200 stainless steel cloth	8" x 4" (203 x 102mm)	7 (3.2)	H-3945
Same as H-3945 with supporting back-up cloth			H-3945RC
Wet washing sieve with No. 200 stainless steel cloth	8" x 6" (203 x 152mm)	8 (3.6)	H-3946
Same as H-3946 with supporting back-up cloth			H-3946RC
Wet washing sieve with No. 200 stainless steel cloth	8" x 8" (203 x 203mm)	9 (4.0)	H-3947
Same as H-3947 with supporting back-up cloth			H-3947RC
Wet washing sieve with No. 200 stainless steel cloth	12" x 4" (305 x 102mm)	11 (5.0)	H-3928FS200
Same as H-3928FS200 with supporting back-up cloth			H-3928FS200RC
Wet washing sieve with No. 200 stainless steel cloth	12" x 6" (305 x 152mm)	13 (5.9)	H-3929FS200
Same as H-3928FS200 with supporting back-up cloth			H-3929FS200RC
Wet washing sieve with No. 200 stainless steel cloth	12" x 8" (305 x 203mm)	14 (6.3)	H-3938FS200
Same as H-3938FS200 with supporting back-up cloth			H-3938FS200RC

Additonal mesh sizes are available: Call 1-800-544-7220 for availability.



H-3942, H-3943

Replaceable Mesh, Wet Washing Sieves

Cost-effective replaceable mesh inserts allow you to interchange mesh sizes in this sieve, as well as make quick replacements of damaged screens. Inserts include back-up cloth and are available in either No. 200 or 325 mesh sizes. These sieves can also use almost any size mesh material 20 mesh and finer, call for availability.

Description	Model
8" x 4" high (203 x 101mm) with No. 200 replaceable mesh disk	H-3942FS.200
8" x 6" high (203 x 152mm) with No. 200 replaceable mesh disk	H-3943FS.200
8" x 4" high (203 x 101mm) with No. 325 replaceable mesh disk	H-3942FS325
8" x 6" high (203 x 152mm) with No. 325 replaceable mesh disk	H-3943FS325
No. 200 replacement mesh disk	H-3942.200
No. 325 replacement mesh disk	H-3942.325


H-3948

Corps of Engineers Wash Screen Assembly— H-3948

Unit is used to wash out fines from samples of base coarse materials. Assembly has 10 to 12 lb. (4.5 to 5.4kg) capacity. Includes 12" (305mm) dia. brass frame with No. 200 mesh detachable screen with a coarser mesh backing at the bottom. Sieve is 10" deep (254mm) with an overload screen at midpoint. Sieves easily disassembles to clean and replace mesh. Shipping wt. 112 lbs. (5.4kg)

No. 10 Overload Screen for H-3948— H-3948M10

Replacement No. 200 Mesh for H-3948— H-3948M200

Cement Wet Washing Sieves

Stainless steel mesh sieves with nickel-plated brass frame and legs for support when drying on hot plates. Legs are quick and easy to remove to facilitate mesh replacement.

Description	Model
2" x 3" high (52 x 76mm) with No. 325 replaceable mesh	H-3807
3" x 3-1/2" high (76 x 89mm) with No. 200 replaceable mesh	H-3804
4" x 4-1/2" high (102 x 114mm) with No. 325 replaceable mesh	H-3809
2" dia. No. 325 replacement mesh disk	H-3807.325
3" dia. No. 200 replacement mesh disk	H-3804.200
4" dia. No. 200 replacement mesh disk	H-3809.200
Replacement Leg	H-3807.4
Replacement Screw	H-3807.5



H-3807

All Wet Washing Sieves are available from 50-400 mesh. Call 1-800-544-7220 to order mesh not listed.

Aggregate Washer—(15lb (7Kg) Capacity)
115/230V 60Hz 1ph 3 amps— H-3949
230V 50Hz 1ph— H-3949.5F

Removes clay, aggregate particles and water-soluble materials by the decanted wash water. Specimen is agitated sufficiently to completely separate all particles. Revolving drum is 10-3/4" dia. x 13"D (27 x 33cm) and locks in four angle positions. Includes valve and 3/8" goose-neck water tube. O.D. 30" x 20" x 32" H (76 x 51 x 81cm). Order USA Standard Sieve, 200 mesh separately. Meets ASTM C117. Shipping Wt. 115 lbs. (52.2kg)


H-3949

Table-Top Aggregate Washer (8lb (3.5Kg) Capacity)—
115V 50/60Hz— H-3880
230V 50/60Hz— H-3880.4F

This lightweight, table-top model is designed to be located near the sink drain on a laboratory countertop. The easily removable drum that measures 9" diameter by 10-3/4" deep (229 x 273mm) is manufactured from stainless steel for rust and corrosion resistance. With the drum mounted in its fixed tilted position, the complete unit weighs only 25 lbs. (11.3kg). In operation, the washer applies a gentle agitation to the sample in the revolving drum until all particles are washed, separated and the overflow water runs clear. The unit is supplied complete with a permanent water connect with regulator valve, tubing, saddle valve, stainless steel goose-neck water tube with swivel connection and a 6-ft. power cord with GFCI plug for operator safety.
Meets ASTM C117. Shipping Wt. 40 lbs. (18.1kg)


H-3880

Sieves for use with Aggregate Washers (ASTM C117)	Model
Standard, Full Height, No. 200 Mesh, 8" dia. Sieve	H-3920FS200
Standard, Full Height, No. 200 Mesh, 12" dia. Sieve	H-3912FS200
Standard, Full Height, No.16 Mesh, 8" dia. Sieve	H-3920FS16
Standard, Full Height, No. 16 Mesh, 12" dia. Sieve	H-3912FS16

Wet Washing Sieve Apparatus— H-3806

Controls spray and water pressure. Includes valve, pressure gauge, piping and H-3808 spray nozzle. Meets ASTM C430, D1514; AASHTO T192; Test Standard No. 158 (Method 211)


H-3806

Replacement Spray Nozzle— H-3808
Replacement Gauge— H-3806.1


H-4334

Micron Air-Jet Sieve Shaker — H-4334

Effective single sieve for dry powders, fragile samples or material that can't be wet sieved, Micron air-jet sieve shaker uses 200mm dia. sieve drums, with 2mm to 20µ particle size range. Unit adapts to 75mm diameter electro-formed sieves in 90mm drums for 45µ to 5µ. Timer and vacuum controls allow reproducibility of the results. Filter attachment, micromesh sieve or cyclone collector accessories may be used to recover fines.

Includes 200mm cast aluminum sieve drum housing unit, Plexiglas lid, 15W slotted brass air nozzle, 0-15 minute rotary timer switch, 1HP vacuum power system, gauge and 9.5 gal. recoverable capacity, steel filter canister. Sieves are not included. Accessories and air-jet sieve drums are available; call for details and pricing.
Shipping Wt. 110 lbs. (50kg). 115V. 60Hz

Same as above in 230V. 50/60Hz— H-4334.4F

Micron Air-Jet Sieves

For use with Air-Jet sieving systems. Stainless steel frame and cloth mesh. 7-7/8" dia. (200mm) frame with rubber seal. Overall height: 1-3/4" (44.5mm). Depth to cloth: 1-1/8" (28.6mm). Each sieve supplied with serial number and matching "Test Sieve Certificate" for traceability. Meets ASTM E-11.

U.S. Std (Mesh)	Micron	Model
No. 8	2360	H-4335F8
No. 10	2000	H-4335F10
No. 12	1700	H-4335F12
No. 14	1400	H-4335F14
No. 16	1180	H-4335F16
No. 20	850	H-4335F20
No. 25	710	H-4335F25
No. 30	600	H-4335F30
No. 35	500	H-4335F35
No. 40	425	H-4335F40
No. 45	355	H-4335F45
No. 50	300	H-4335F50
No. 60	250	H-4335F60
No. 70	212	H-4335F70

U.S. Std (Mesh)	Micron	Model
No. 80	180	H-4335F80
No. 100	150	H-4335F100
No. 120	125	H-4335F120
No. 140	106	H-4335F140
No. 170	90	H-4335F170
No. 200	75	H-4335F200
No. 230	63	H-4335F230
No. 270	53	H-4335F270
No. 325	45	H-4335F325
No. 400	38	H-4335F400
No. 450	32	H-4335F450
No. 500	25	H-4335F500
No. 635	20	H-4335F635



Sieve Brushes—

Sieve Brush, fine mesh— H-3774
Horsehair, wood handle; 1-1/2" x 1-1/4" dia. (38 x 32mm), 5-1/4" (133mm) overall length.

Sieve Brush, oval shape— H-3799
Horsehair, wood handle; 2-3/4" x 1-1/8" x 3/4" (70 x 29 x 19mm), 10-1/2" (267mm) overall length.

Sieve Brush, fine mesh— H-3770
Horsehair, wood handle; 2-1/2" x 1" x 3/8" (64 x 25 x 10mm), 10-1/2" (267mm) overall length.

Sieve Brush, coarse mesh— H-3772
Wire, wire loop handle; 1-1/2" x 3/4" x 1/8" (38 x 19 x 3mm), 5-1/2" (140mm) overall length.

Magnifying Comparator— H-2813

The magnifying Comparator is ideal for use in examining sieve mesh for size verification, as well as general inspection for damage. The instrument is supplied complete with four interchangeable scales:
#121— .5 x .005" Ruler line scale
#122— 15 x .1mm Ruler line scale
#172— .5 x 0.1" Parallel line scale
#173— 1/2 x 1/64" Parallel line scale


H-2813

18" Riddles, Rocker-Type Sieves

18" Dia. Brass Frame, Riddles (Sieves)— H-4100 Series

Brass frame riddles (sieves) are made with stainless steel wire cloth and are used to wash, sift, strain for draining-off liquids and separate aggregates and dry materials in the sieve analysis of concrete and other materials. Meet ASTM specifications.



H-4100 Series

H-4100 Series, Brass Frame Riddles

Screen No.	Size Mesh	Model
4"	100mm	H-4109.4
3-1/2"	90mm	H-4109A
3"	75mm	H-4109
2-1/2"	63mm	H-4108
2"	50mm	H-4107
1-1/2"	37.5mm	H-4106
1-1/4"	31.5mm	H-4105A
1"	25.0mm	H-4105
7/8"	22.4mm	H-4104A
3/4"	19.0mm	H-4104
5/8"	16.0mm	H-4103A
1/2"	12.5mm	H-4103
3/8"	9.5mm	H-4102
1/4"	6.3mm	H-4101
No. 3-1/2	5.60mm	H-4100.3
No. 4	4.75mm	H-4100.4
No. 5	4.00mm	H-4100.5
No. 6	3.35mm	H-4100.6
No. 7	2.80mm	H-4100.7
No. 8	2.36mm	H-4100.8
No. 10	2.00mm	H-4100.10
No. 12	1.70mm	H-4100.12
No. 14	1.40mm	H-4100.14
No. 16	1.18mm	H-4100.16
No. 18	1.00mm	H-4100.18
No. 20	850µ	H-4100.20
Cover		H-4100C
Bottom Pan		H-4100P



H-3903



H-3902

Rocker-Type Field-Testing Sieves— H-4391

For sieve analysis of coarse aggregates and other materials. Consists of a 12" (305mm) square frame with handles mounted on a collector box with rockers. Includes 3" (76.1mm), 2" (50.8mm), 1-1/2" (38.1mm), 1" (25.4mm), 3/4" (190mm), 1/2" (12.7mm), 3/8" (9.51mm) and No. 4 ASTM wire screen plates with square openings.

Screen plates of any standard openings are available; separations finer than No. 20 mesh are not recommended for this unit. Screens are held in place with two locking devices on opposite sides. All screens can be clamped into frame for carrying or storage. OD 15-1/4 x 12-1/4 x 10" (387 x 311 x 354mm). Replacement screens available, call 1-800-544-7220. Shipping Wt. 42 lbs. (19kg)



H-4391

5" Dia. Soil Analysis Sieves Set— H-3903

Used by agricultural engineers because of their accuracy and ease of handling. Frames are seamless brass with rolled edges and extended skirts for nesting Set includes: (1) ea of: No. 10, 20, 40, 60, 80, 100 Pan and Cover.

5" Dia. Perforated Plate, Soil Analysis Sieve Set— H-3902

Set includes pan, cover and five metric perforated plate sieves. Screening surfaces are perforated brass plate with 0.5mm, 1mm, 2mm, 3mm and 5mm size openings. Frames are 5" (127mm) dia. by 1-1/2" (38mm) deep. Shipping Wt. 10 lbs. (4.5kg)

Gilson Testing Screens (Hydraulic Clamping)— H-4283
Gilson Testing Screens (Hand Clamping)— H-4276

Both models H-4283 (with hydraulic clamping) and H-4276 (with hand clamping) are ideal for sizing samples of crushed stone, sand gravel, slag, coal, coke, wood chips, ores, pellets, and similar materials. The hydraulic clamping model is recommended for heavy-use situations.

These testing screens with hydraulic or hand clamping are ideal for particle size determinations of crushed stone, sand and gravel, slag, ores, woodchips and similar coarse materials. Samples are quickly processed into as many as seven separations in as little as three to five minutes. Typical batch sizes up to one cubic foot (0.028m^3) or more vary with material type.

Both testing screens are often used with fine mesh sizes down to #200 on larger samples when less efficient separation is acceptable. Low-amplitude drive shafts and speed variation accessories are available to optimize machine performance when testing finer samples or special materials. Both units feature high capacity screening for large samples, enclosed drive mechanism for safety, and sturdy feet designed for permanent mounting.

Each unit has a six-tray capacity. Included with each unit are five course screen trays with mesh up to a #4 screen and one dustpan tray (specify desired mesh sizes when ordering). See the chart on the opposite page for complete specifications and ordering information. Shipping Wt. 470 lbs. (214 kg).

Dustpan Tray— H-4283P
Sand Attachment— H-4281T
Tray Rack— H-4285
Door Enclosure— H-4286
Clean-n-Weigh Accessory— H-4307



H-4276
Shown with additional tray



H-4273

Gilson Test-Master® (6-Tray Model)— H-4273
Gilson Test-Master® (7-Tray Model)— H-4274

Gilson Test-Master Testing Screens feature an integrated, moveable material hopper for easier sample introduction and vertically-hinged panel doors for improved access and clearance. The 1.6 ft^3 (45.3L) hopper is hinged at the rear and allows the sample to be introduced incrementally if desired, as the machine is running. When the hopper is closed, a panel blocks dust from escaping through the opening. The units feature reliable counter-balanced drive assembly, fully enclosed operation and electronic digital controller. Internal rotating counterweights of the drive system equalize the vertical screening action to assure smooth, quiet operation and prevent transfer of vibrations to other lab instruments.

Factory-installed options allow greater versatility for processing a wider range of materials. These accessories also reduce particle breakage during screening of sensitive materials such as coal and coke.

Screen tray capacity of the H-4273 model is six (five included) plus the dust pan while the H-4274 will hold seven trays (six included) plus the dust pan. Both units are fully enclosed to minimize dust and have built-in digital timers for maximum test repeatability.

Included are five course screen trays with mesh up to #4 screen and one dustpan tray (specify desired mesh sizes when ordering). See the chart on the facing page for more information. Shipping Wt. both models is 650 lbs. (295 kg).

Dustpan Tray— H-4273P
Stationary Dustpan Tray with Adapter— H-4273DP
Sand Attachment— H-4281M
Tray Rack— H-4285
Clean-n-Weigh Accessory— H-4307

Gilson Porta-Screen® (Seven Tray Capacity)— H-4295
Gilson Porta-Screen® (Five Tray Capacity)— H-4297

The H-4295 and H-4297 Porta-Screen® have long been the accepted standard portable screens for field control of construction aggregates and quality control of asphalt and ready to mix plants. These units are also useful for size separations of many other materials. Capacity depends on test material, but may range up to 60 lb (27.3 kg) per test. Vibration of both models is mechanically counterbalanced for smooth, stable operation with no required mounting.

Porta-Screen models are designed for performance durability, yet are light enough to be portable. Trays are quickly secured for operation by dual hand clamp levers. When levers are released, trays are individually removable for empyting, cleaning and weighing.

The vibrating assembly is held top and bottom on hardened guide pins. The 1/4-HP motor, drive shaft, and connecting rod are synchronized with a rotating weight counterbalance system. All are enclosed by the enameled steel protective outer case.

Included with the H-4295 are six course screen trays with mesh up to a #4 screen and one dustpan tray (specify desired mesh sizes when ordering).

Included with the H-4297 are four course screen trays with mesh up to a #4 screen and one dustpan tray (specify desired mesh sizes when ordering).

See the chart below for complete specifications and ordering information. Shipping Wt. both models is 225 lbs. (116 kg).

Porta Wheels — H-4288.1

Dustpan Tray— H-4302

Porta-Screen® Cover— H-4305

Gilson Porta-Pan— H-4306



H-4295
H-4297

Screen Shakers

Description	Material Size	Maximum Capacity	Model	Gilson No.	Overall Tray Size	Features (see chart)	Motor	Dimensions inches (mm)
Testing Screen with hydraulic clamping	4" (104mm) to No. 200 mesh (14.75mm)	1 cu.ft. (0.3m³) 80 lbs (36kg)	H-4283	TS1	18" x 26" (457 x 660mm)	1, 2, 3	1/3 HP capacitor	23 x 31 x 33 (584 x 787 x 838)
Testing Screen with hand clamping			H-4276	TS2		1, 2	1/2 HP*	
Porta-Screen® (7-tray)	2" (51mm) to No. 16 mesh (1.18mm) or finer meshes to No. 200 (75mm)	.75 cu.ft. (0.23m³) 860 lbs (27kg)	H-4295	PS4	16" x 16.5" (406 x 419mm)	1, 4, 5, 6	1/4 HP	19 x 16.5 x 48.3 (483 x 419 x 1222)
Porta-Screen® (5-tray)			H-4297	PS3				19 x 16.5 x 42 (483 x 419 x 1067)
Test-Master® (6-tray)	4" (104mm) to No. 200 mesh (14.75mm)	1 cu.ft. (0.3m³) 80 lbs (36kg)	H-4273	TM5	18" x 26" (457 x 660mm)	5, 6, 7	1/3 HP	27 x 33 x 45 (686 x 838 x 1143)
Test-Master® (7-tray)			H-4274	TM6	18" x 26" (457 x 660mm)	5, 6, 7	1/3 HP	27 x 33 x 45 (686 x 838 x 1143)

NOTE: For 220V, 50/Hz applications, Use .5F suffix to part number, i.e. H-4273.5F

*** H-4276.5F has a 1/3hp motor.**

TEFC or explosion-proof motors can be quoted upon request.

Features Key:

1. Trays independently removable
2. In-progress viewing
3. Special speed and/or amplitude available
4. Portable-mounting not required
5. Counter-balanced
6. Digital timer
7. Totally enclosed



U.S.A. Standard Screen Trays

Use these tables to order replacement screen trays and wire cloth for Gilson Testing Screens, Test-Masters and Porta-Screens.

ASTM Size	Alternative	Nominal Opening	18" x 26" (457 x 660mm) For Models H-4273, H-4274 H-4276 & H-4283		16" x 16-1/2" (406 x 419mm) For Models H-4295, H-4297		Cloth Material S = Steel SS = Stainless Steel
			Tray	Cloth Only	Tray	Cloth Only	
Coarse Series							
100.0	4.00	4.00	H-4278C4.000	H-4278WC4.000			S
90.0	3.50	3.50	H-4278C3.500	H-4278WC3.500			S
75.0	3.00	3.00	H-4278C3.000	H-4278WC3.000			S
63.0	2.50	2.50	H-4278C2.500	H-4278WC2.500			S
50.0	2.00	2.00	H-4278C2.000	H-4278WC2.000	H-4398C2.000	H-4398WC2.000	S
45.0	1.75	1.750	H-4278C1.750	H-4278WC1.750	H-4398C1.750	H-4398WC1.750	S
38.1	1.50	1.500	H-4278C1.500	H-4278WC1.500	H-4398C1.500	H-4398WC1.500	S
31.5	1.25	1.250	H-4278C1.250	H-4278WC1.250	H-4398C1.250	H-4398WC1.250	S
25.0	1.00	1.000	H-4278C1.000	H-4278WC1.000	H-4398C1.000	H-4398WC1.000	S
22.4	.875	.875	H-4278C.875	H-4278WC.875	H-4398C.875	H-4398WC.875	S
19.0	.750	.750	H-4278C.750	H-4278WC.750	H-4398C.750	H-4398WC.750	S
16.0	.625	.625	H-4278C.625	H-4278WC.625	H-4398C.625	H-4398WC.625	S
12.5	.500	.500	H-4278C.500	H-4278WC.500	H-4398C.500	H-4398WC.500	S
11.2	.438	.438	H-4278C.438	H-4278WC.438	H-4398C.438	H-4398WC.438	S
9.5	.375	.375	H-4278C.375	H-4278WC.375	H-4398C.375	H-4398WC.375	S
8.0	.312	.312	H-4278C.312	H-4278WC.312	H-4398C.312	H-4398WC.312	S
6.3	.250	.250	H-4278C.250	H-4278WC.250	H-4398C.250	H-4398WC.250	S
5.6	No. 3-1/2	.223	H-4278F3-1/2	H-4278WF3-1/2	H-4398F3-1/2	H-4398WF3-1/2	SS
4.75	No.4	.187	H-4278F4	H-4278WF4	H-4398F4	H-4398F4	S
Intermediate Series							
4.00	No.5	.157	H-4278F5	H-4278WF5	H-4398F5	H-4398WF5	SS
3.35	No.6	.132	H-4278F6	H-4278WF6	H-4398F6	H-4398WF6	SS
2.80	No.7	.111	H-4278F7	H-4278WF7	H-4398F7	H-4398WF7	SS
2.36	No.8	.0937	H-4278F8	H-4278WF8	H-4398F8	H-4398WF8	SS
2.00	No.10	.0787	H-4278F10	H-4278WF10	H-4398F10	H-4398WF10	SS
1.70	No.12	.0661	H-4278F12	H-4278WF12	H-4398F12	H-4398WF12	SS
1.40	No.14	.0555	H-4278F14	H-4278WF14	H-4398F14	H-4398WF14	SS
Fine Series							
1.18	No.16	.0469	H-4278F16	H-4278WF16	H-4398F16	H-4398WF16	SS
1.00	No.18	.0394	H-4278F18	H-4278WF18	H-4398F18	H-4398WF18	SS
850µ	No.20	.0331	H-4278F20	H-4278WF20	H-4398F20	H-4398WF20	SS
710µ	No.25	.0278	H-4278F25	H-4278WF25	H-4398F25	H-4398WF25	SS
600µ	No.30	.0234	H-4278F30	H-4278WF30	H-4398F30	H-4398WF30	SS
500µ	No.35	.0197	H-4278F35	H-4278WF35	H-4398F35	H-4398WF35	SS
425µ	No.40	.0165	H-4278F40	H-4278WF40	H-4398F40	H-4398WF40	SS
335µ	No.45	.0139	H-4278F45	H-4278WF45	H-4398F45	H-4398WF45	SS
300µ	No.50	.0117	H-4278F50	H-4278WF50	H-4398F50	H-4398WF50	SS
250µ	No.60	.0098	H-4278F60	H-4278WF60	H-4398F60	H-4398WF60	SS
212µ	No.70	.0083	H-4278F70	H-4278WF70	H-4398F70	H-4398WF70	SS
180µ	No.80	.0070	H-4278F80	H-4278WF80	H-4398F80	H-4398WF80	SS
150µ	No.100	.0059	H-4278F100	H-4278WF100	H-4398F100	H-4398WF100	SS
75µ	No.200	.0029	H-4278F200	H-4278WF200	H-4398F200	H-4398WF200	SS

Specific Gravity and Fine Aggregate Kit— H-3373A
Same Kit as above, 230V 50/60Hz— H-3373A.4F

Kit designed to provide you with the major equipment to do specific gravity and absorption of fine aggregate testing. The kit includes a H-3360 Conical mold and tamper; H-3381 Pycnometer Top and 1 Qt. (.95L) glass jar, HB-4533 .1g readability, 2600 gram scale; H-30120 Lab Oven, and H-3966 3/4" (19mm) sample splitter. Meets ASTM C128, AASHTO T84. Shipping wt. 95 lb (43kg)



H-3373A

Conical Mold and Tamper— H-3360

Used for determination of bulk and apparent specific gravity and absorption of fine aggregate, brass mold is 40mm ID at top, 90mm ID at bottom, 75mm high. Steel tamper weighs 12 oz (340g) and has 1" dia. (25mm) flat circular tamping face. Meets ASTM C128; AASHTO T84.

Mold Only— H-3361
Tamper Only— H-3362



H-3360

Pycnometer Top and Glass Jar— H-3381

Pycnometer top and 1qt. (.95L) glass jar set for determining specific gravity of fine aggregate. Top is spun brass with 3/8" (10mm) hole in one end; threaded end fits 1- or 2-qt. (1 or 2L) glass jar. Includes rubber gasket that fits on jar mouth to prevent fine particles from becoming deposited in the threads. Meets ASTM C128. Order jars separately.

Glass Jar— H-3380.2

1qt. (.95L) glass jar. Meets ASTM C128.

Pycnometer Top Only— H-3380



H-3381



H-3383F

H-3383L



H-3380

Specific Gravity Flask for Fine Aggregate— H-3383F
Specific Gravity Flask for Larger Aggregate— H-3383L

The Phunque Flask is the key element in a newly developed method for conducting specific gravity/absorption determinations for aggregate. This method has been designed to eliminate the inherent guess work built into ASTM C128 and AASHTO T-84— the current cone and tamper methods in use today. The new test is easy to perform, easy to understand and easily reproduceable between technicians and labs. The test is very easy to run and can be reliably run in the field. This can be especially helpful in asphalt operations where specific gravities can make a big impact on pay factors. This test lets the contractor check specific gravities on the material he is currently using, not lab tests, which may not be current. The H-3388F is for fine aggregate and has a neck approximately 1" in diameter. The H-3388L is used for coarse aggregate and has a neck approximately 2" in diameter. The scale on both items is readable to 0.1 grams; Both include an excel calculation sheet and a swabbing utensil to keep the neck of the flask dry during loading.

SSDetect™ Bulk Specific Gravity and Absorption of Fine Aggregates Test System— H-3384

The SSDetect system is a two-part, automated system that determines: Bulk S pecific Gravity (dry), Bulk Specific Gravity (SSD), Apparent Specific Gravity, and Absorption of the fine aggregate, all in about one hour. The SSDetect "directly measures" the saturated surface dry condition of the fine aggregate, which is done by way of an infrared light source "tuned" to water. This infrared signal "looks" at the surface of the aggregate for traces of water, and, by measuring the amount of infrared reflectance, the saturated surface dry condition can be accurately measured. The process involves two samples of a desired material, dried to a constant mass. One sample is placed in the unit's volumetric flask and mounted to the mixing platform of the Automated Vaccum Mixer (AVM), which determines the Apparent Specific Gravity condition. The second sample is placed in the SSD Device where information derived from the AVM test is entered. The SSD Device mixies the sample and injects small amounts of water, allowing the material to absorb water until it reaches the Saturated Surface Dry condition. Once The infrared signal detects a stable SSD condition has been reached the unit will automatically stop and alert the user. The test bowl is then removed and weighed, the net weight of the material is the weight at SSD.



H-3384


H-2713A

Specific Gravity Bench Set— H-2713A

Our specific gravity weighing kit includes our deluxe bench, our H-2712 Specific gravity tank kit with heater and circulating pump and our HB-4537WB scale— a 20,000g x .1g readability scale with weigh-below feature.

The bench is 46" tall with a 31" x 25" platform top, which includes a hole to accommodate the weigh-below scale feature; and, a crank-operated shelf that lets you bring the water tank up to the sample, making for easier sample immersion.

The H-2712 tank kit is comprised of a 30 gal. polyethylene tank, which measures 18" x 24" x 18" and comes with a drain valve and overflow port. It also comes with a 200-watt, durable tank heater and a circulating pump, both of which are attached to a stainless steel mounting bracket that holds both securely to the tank. Kit is shown with optional H-3371 wire basket.

Specific Gravity Bench Set with Tank— H-2710A

Specific gavity bench with hole to accommodate hook for weigh-below scales; and, a crank-operated shelf that lets you bring the water tank up to the sample, making for easier sample immersion. Includes 30 gal. polyethylene tank, which measures 18" x 24" x 18" with drain valve and overflow port.


H-2710A

Specific Gravity Tank w/ Heater/Circulator— H-2712A

30 gal. polyethylene tank, which measures 18" x 24" x 18" and comes with a drain valve and overflow port. It also comes with a H-2712A.6, 200-watt, durable tank heater and circulating pump, both of which are attached to a stainless steel mounting bracket that holds both securely to the tank. ASTM C127.

Heater/CirculatorAssembly— H-2712A.6

Comprised of a 200-watt, durable tank heater and circulating pump attached to stainless steel bracket that hangs on specific gravity tank to maintain constant temperature bath.


H-2712A


H-2712A.6


H-3371


H-3351


H-3353


H-3372

8" Specific Gravity Sieve #4— H-3355
12" Specific Gravity Sieve #4— H-3356
Designed for use in specific gravity test applications. Heavy-gauge brass construction.

Hollow Tube Specific Gravity Cradle— H-2715
Through this unique, yet simple stainless steel hollow tube designed, water displacement is virtually eliminated for improved accuracy in specific gravity test applications.

Specific Gravity Baskett— H-3371
Stainless steel No. 8 wire mesh basket features reinforced construction and bail-type handle. Dimensions: 8" x 8" dia. Meets ASTM C127. Shipping wt. 9 lbs. (4kg)

Utility Bucket— H-3372
Heavily galvanized utility bucket has wire-reinforced top edge, bail-type handle and 14-qt. (13L) capacity. Meets ASTM C127.

Sample Container— H-3351
For use in testing aggregate soundness, container is used to immerse samples of coarse aggregate in solution and then transfer samples to oven for uniform drying in minimum time. No. 4 wire mesh, bottom soldered to frame after fabricating. Overall dimension: 10" x 4" dia. (254 x 102mm) with 1/8" (3mm) round wire handle. Meets ASTM C88; AASHTO T104.

Sample Container— H-3353
Used to immerse samples of coarse aggregates in solution and transfer samples to oven. #8 stainless steel wire mesh, bottom soldered to frame after fabricating. Overall dimension: 5-1/2" x 4" dia. (140 x 102mm). Meets ASTM C88; AASHTO T104. Shipping wt. 6 lbs. (2.7kg)

Specific Gravity Flask (Le Chatelier)— H-3400
For determining density of powdered materials—limes, slag and hydraulic cement. Capacity: 250ml. Neck is graduated from 0 to 1ml and from 18 to 24ml. Flask is accurate to .05ml. Meets ASTM C188; AASHTO T133.

Specific Gravity Flask (Chapman)— H-3460
Flask has two bulbs for determining approximate percentage of voids and surface moisture in fine aggregates. Graduated to 200ml between bulbs and from 375ml up to 450ml (in 1ml divisions) above second bulb. Meets ASTM C70; AASHTO T142.

Hubbard 24ml Specific Gravity Bottle— H-2640
Hubbard-form 24ml bottle for determination of specific gravity of semi-solid bituminous materials, asphalt cements, soft tar pitches and emulsions. Features ground-in stopper with 1.6mm hole. Meets ASTM D70, D115, D1963; AASHTO T228.

Hubbard-Carmick Specific Gravity Bottle— H-2660
Modified 24ml, wide-mouth Hubbard-Carmick, Erlenmeyer-style bottle allows easy filling and cleaning and is very stable. Meets ASTM D70, D115, D2343; AASHTO T228, T43

Volumetric Flasks
Glass flasks used in specific gravity determinations are calibrated to contain rated capacity at 20°C within permissible tolerance. Available stoppered or unstoppered. Meets ASTM D854; AASHTO T100.



H-3355
H-3356



H-2715



H-2640



H-2660



H-3400 H-3460



H-3393

Volumetric Flasks

100ml, unstoppered volumetric flask	H-3391
250ml, unstoppered volumetric flask	H-3392
500ml, unstoppered volumetric flask	H-3393
250ml, stoppered volumetric flask	H-3394
500ml, stoppered volumetric flask	H-3395

H-4967
(includes pelican case)



Speedy® 2000 Moisture Tester (20g)—H-4967

Speedy® 2000 Moisture Tester (6g)—H-4968

The Series 2000 Speedy moisture tester is a portable system for measuring the moisture content of a wide range of materials including soils, aggregates, dust and powders (and liquids). The system consists of a low pressure vessel fitted with a pressure gauge and an electronic scale and test accessories. Moisture measurements are made by mixing a weighed sample of the material with a calcium carbide reagent in the sealed pressure vessel. The reagent reacts chemically with water in the sample, producing acetylene gas that in turn increases the pressure within the vessel. The pressure increase in the vessel is proportional to the amount of water in the sample, the moisture content can be read directly from the calibrated pressure gauge. The tester is supplied complete with heavy-duty plastic carrying case, electronic balance, beaker, cleaning cloth, cap, washer, scoop, steel pulverizing balls and cleaning brushes. Meets ASTM D4944 and AASHTO T217.
Shipping Wt. 13 lbs. (5.9kg)

Accuracy: Within 0.5% on most materials
Test Speed: 45 sec. to 3 min., depending on material
Gauge: Calibrated from 0-20% moisture based on wet weight
Balance: Electronic; 0-7 oz (0-200g) range; battery operated



H-4965A



H-4966

Calibration Kit—H-4965A
Includes calibration unit, instructions, wooden carrying case.

Moisture Tester Reagent—H-4966
Calcium carbide reagent for Speedy® Moisture Testers. Carton of 24-1 lb. (0.5kg) containers. Shipped via motor freight only. **See Warning Below.** Shipping wt. 26 lbs. (11.7kg)

HAZARDOUS WARNING:
Danger of explosion/fire may result if Moisture Testing Reagent is allowed to contact with moisture. Calcium carbide forms flammable acetylene gas when wet so must be kept sealed and dry. Provide adequate ventilation and use away from sparks and flame. U.S. shipping regulations require shipment by approved carriers. Contact Humboldt for international shipping regulations.



H-4972

Trident Moisture Probe—H-4972
The H-4972 Trident Moisture Meter utilizes the latest microwave and microprocessor technology to measure moisture content in various fine and coarse-grained materials. The prongs of the probe are inserted into the material to be tested and the percentage of moisture content is instantaneously shown on the easy to read display. The Trident comes calibrated for both sand and aggregate, and can be programmed by the user for up to ten different materials. The Trident can store more than 150 readings – complete with time and date for future reference.

Proportional Caliper Device— H-4216
Use to determine the percentage of flat particles, elongated particles, or both flat & elongated particles in coarse aggregates. Steel construction for strength & durability, plated for corrosion resistance. 6" x 16" (152.4 x 406.4mm) base plate with four rubber feet for stability, and for convenience in tabletop testing. Ratio desired is obtained by selecting one of four adjustable positions: 2 = l:2; 3 = 1:3; 4 = 1:4; or 5 = 1:5. Meets ASTM D4791. It is recommended that the desired procedure be reviewed carefully prior to conducting the test. Meets ASTM D4791.

Elongation Index for Classification of Aggregate Particles— H-1682
For determining elongation index. Particle is elongated when its length (longest dimension) is more than 1.8 of the midsize of the sieve fraction. Aggregate to be classified is separated into seven sieve fractions from 63 to 6.3mm, and each fraction is examined separately. Six labeled openings between pairs of metal pins measure particle from each of the six sieve cuts below 50mm. The mass of all elongated particles (failing to pass between pins) as percent of the sample is the elongation index. Meets BS 812.

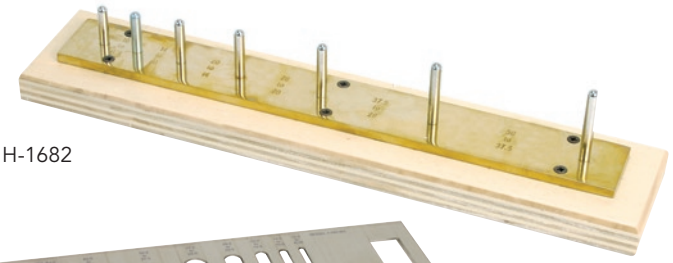
Flakiness Gauge for Classification of Aggregate Particles— H-1684
For determining flakiness index. Particle is flaky when its thickness (smallest dimension) is less than 0.6 of the mid-size of the sieve fraction. Gauge has seven labeled slots for rapid hand trying of particles from each of the seven sieve cuts. The mass of all flaky particles (passing appropriate slots) as percent of the sample is the flakiness index. Meets BS 812.

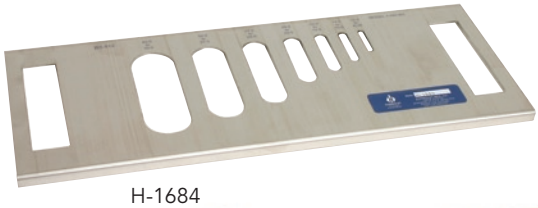
Void Content Apparatus, Fine Aggregates— H-1680A
Use to determine the uncompacted void content of a fine aggregate sample. Indicates the angularity, sphericality, and workability of fine aggregate in a mixture. Includes 100 ml brass cylindrical measure, funnel assembly, funnel stand, and glass plate for calibration. Meets ASTM C1252, AASHTO TP33. Shipping wt. 10 lbs. (4.5kg)

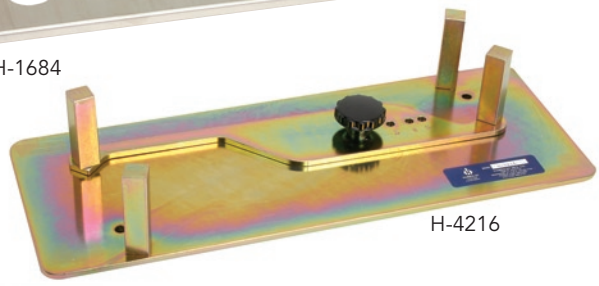
Void Content Apparatus, Coarse Aggregates— H-1686
Used to determine the void content of uncompacted coarse aggregates used in HMA applications. When used on aggregates of a known size, the void content provides the user with an indication of the angularity, sphericity and surface texture as compared to other course aggregates of the same grading. In operation, the aggregate is allowed to free-fall 115mm from the funnel bottom into a 154mm diameter by 160mm high cylindrical measure. The excess heaped aggregate is struck of using the included bar, the mass is measured, and the void content is computed. The apparatus consists of a stainless steel hopper, stand, measure and strike-off bar and a 170mm square glass plate for calibration of the measure. Meets AASHTO TP56. Order overflow pan and material handling scoop separately.

Scratch Hardness Tester— H-3420
Determines quantity of soft particles in coarse aggregates on basis of scratch hardness. Apparatus consists of 1/16" (1.6mm) dia. brass rod with rounded point inserted into plunger. Overall weight of brass point and plunger is 2 ±0.1 lbs (8.9 ±0.4N). Plunger is mounted on support stand, permitting plunger to lower and raise freely. Furnished with one extra brass scratch rod. Meets ASTM C851. Shipping wt. 9 lbs. (4kg)

Brass Rod— H-3421
For use with H-3420. package of 10.


H-1682


H-1684


H-4216


H-1680A


H-1686


H-3420



H-3860

Los Angeles Abrasion Machine— H-3860
Los Angeles Abrasion Machine, 220V 50Hz— H-3860.5F
Tests for resistance to abrasion in crushed rock, slag, crushed and uncrushed gravel, using Los Angeles testing method. Features welded structural steel frame, fabricated 1/2"-thick (913mm) abrasion-resistant steel drum, removable shelf bolted to drum and balanced drum assembly for easy rotation by hand. Enclosed chain drive rotates drum without conventional slip clutch. Positive drive delivers greater accuracy. Self-contained worm-drive motorized speed reducer has anti-friction bearings and sealed lubrication. Motor is 1HP (746W), equipped with magnetic push-button control and automatic overload cutout. Includes revolution counter, material catch pan and 1 abrasion charge consisting of 12 hardened-steel balls. Dimen.: 39" x 29" x 37" (991 x 737 x 940mm). Meets ASTM C131, C535; AASHTO T96. Shipping wt. 1060 lbs. (485kg)

Abrasion Charge—H-3865
Replacement abrasive charge for H-3860 Los Angeles Abrasion Machine. Consists of 12 hardened-steel balls.



H-3861

Micro-Deval Aggregate Tester, 110/220 60Hz— H-3861.3F
Used to test the resistance of fine and/or coarse aggregate to degradation by abrasion to determine the loss due to abrasion. Two-tiered unit is 25"W x 15"D x 47"H and the maximum load per tier is 60 lbs. Includes timing belt for quiet, mantenance-free operation. Special, no-creep roller design keeps jars centered and 2" long-wearing rollers are chemical and solvent resistant. Meets ASHTO TP58 and TXDOT standards. Includes two stainless steel test jars and standard ball charge sets.

Abrasive Ball Set, TXDOT—H-3861.1
Replacement abrasive ball set for Micro-Deval.

Abrasive Ball Set, ASTM, AASHTO—H-3861.2
Replacement abrasive ball set for Micro-Deval.

Stainless Steel Test Jar—H-3861.3
Replacement stainless steel test set for Micro-Deval.



HP-1160

Falling Sand Abrasion Tester— HP1160
The Falling sand test determines the abrasion resistance of coatings, such as paint, varnish, lacquer and related products. The test panel is enclosed in a receptacle with a window. Ottawa natural silica sand is considered the standard use in this test because of its known characteristics. Order H-3820 Ottawa silica test sand separately. Meets ASTM D333, D968, D1395, D2205. Shipping wt. 110 lbs. (49.9kg)

Ottawa Silica Sand— H-3820
Specially graded, natural Ottawa silica sand will pass a No. 20 (850µ) sieve and be retained on a No. 30 (600µ) sieve. Specific gravity is 2.65. Packed in 50 lb. (22.7kg) bags. Meets ASTM C778. Shipping wt. 50 lbs. (22.7kg)

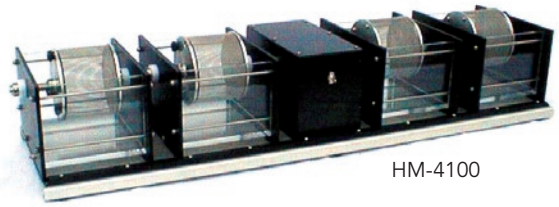


H-3861.2
H-3861.3

Slake Durability Apparatus— HM-4100
The Slake Durability Apparatus is used to determine the durability of rocks and the probable amount of deterioration of weak rocks, over a period of time, after simulated exposure to nature's continual wetting and drying cycles. The apparatus consists of a base-mounted motor drive unit with two mesh drums and two water tanks with quick-release drive assemblies. The drums rotate at a speed of 20 revolutions per minute. Options include two extra drums and tanks for running up to four tests simultaneously. Conforms to ASTM D4644 standard.

Wire Mesh Drums— HM-4100.1
Set of 2 wire mesh drums for use with Slake Durability Apparatus.

Drum and Tank Assembly— HM-4100.2
Set of two wire mesh drum and water tank assemblies.



HM-4100

Shown with optional, 2 additional drums

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ASTM E1 Thermometers—Fahrenheit

Application	ASTM	Range	Model	Length	Immersion	Subdiv.
General Use	1F	0-320°F	H-2600.1F	12-1/2" (322mm)	3" (76mm)	2
	2F	20-580°F	H-2600.2F	15-3/8" (390mm)		
	3F	20-760°F	H-2600.3F	16-1/4" (413mm)		
Cloud and Pour	5F	-36-120°F	H-2600.5F	9-1/8" (231mm)	4.25" (108mm)	2
Low Cloud and Pour	6F	-112-70°F	H-2600.6F	9-1/8" (231mm)	3" (76mm)	2
Low Distillation	7F	30-580°F	H-2600.7F	15-1/4" (386mm)	total	2
High Distillation	8F	30-760°F	H-2600.8F	15-1/4" (386mm)	total	2
Pensky-Martens Low, Tag Closed High	9F	20-230°F	H-2600.9F	11-1/4" (287mm)	2.25" (57mm)	1
Pensky-Martens High	10F	200-700°F	H-2600.10F	11-1/4" (287mm)	2.25" (57mm)	5
Open Flash	11F	20-760°F	H-2600.11F	12-1/8" (308)	1" (25mm)	5
Gravity	12F	-5-215°F	H-2600.12F	16-1/2" (420mm)	total	1/2
Low Softening Point	15F	30-180°F	H-2600.15F	15-5/8" (397mm)	total	1/2
High Softening Point	16F	85-392°F	H-2600.16F	15-5/8" (397mm)	total	1
Saybolt Viscosity	17F	66-80°F	H-2600.17F	10-7/8" (275mm)	total	1/5
	18F	94-108°F	H-2600.18F			
	19F	120-134°F	H-2600.19F			
	20F	134-148°F	H-2600.20F			
	21F	174-188°F	H-2600.21F			
	22F	204-218°F	H-2600.22F			
Kinematic Viscosity	28F	97.5-102.5°F	H-2600.28F	12" (305mm)	total	1/10
	30F	207.5-212.5°F	H-2600.30F			
Aniline Point	33F	-36.5-107.5°F	H-2600.33F	16-1/2" (420mm)	2" (50mm)	1/2
	35F	194-338°F	H-2600.35F			
Kinematic Viscosity	45F	74.5-79.5°F	H-2600.45F	12" (305mm)	total	1/10
	46F	119.5-124.5°F	H-2600.46F			
	47F	137.5-142.5°F	H-2600.47F			
Tag Closed Tester Low Range	57F	-4-122°F	H-2600.57F	11-1/4" (287mm)	2.25" (57mm)	1
Precision	63F	18-89°F	H-2600.63F	15" (379mm)	total	1/5
	64F	77-131°F	H-2600.64F			
Kinematic Viscosity	110F	272.5-277.5°F	H-2600.110F	12" (305mm)	total	1/10
Bituminous Softening Point	113F	30-350°F	H-2600.113F	16" (406mm)	total	1

Specifications: All of these thermometers meet ASTM E1. All of the thermometers listed here can be calibrated and certified per ASTM specification. Call Humboldt for a price quote.



Precision Certified Standard Thermometers

Each thermometer certified at the five ASTM verification temperatures specified in ASTM E-1. Certificates show all corrections to the nearest tenth of the smallest scale division. Each thermometer has an ice-point which can be used to check the validity of the corrections at any time. Per NIST/SP-819, August 1991, ANY PREVIOUSLY CERTIFIED THERMOMETER WITH A CALIBRATED ICE POINT NEED NEVER BE COMPLETELY RE-CALIBRATED. Complete sets include channel case with compartment holding certificates.

Certified Standard Thermometer Set— H-2602

Set of 9 precision certified standard thermometers listed in the chart to the right.

Range	Model
-36 to 35.9°F	H-2603.62FFC
18 to 89°F	H-2603.63FFC
77 to 131°F	H-2603.64FFC
122 to 176°F	H-2603.65FFC
167 to 221°F	H-2603.66FFC
203 to 311°F	H-2603.67FFC
293 to 401°F	H-2603.68FFC
383 to 581°F	H-2603.69FFC
563 to 761°F	H-2603.70FFC

Mercury Spill Clean-up Kit—H-3632SK

For recovery and disposal of spills up to 500g. Includes gloves, two plastic spatulas for cleaning, mercury collector to swab spill, absorbent and activator to absorb mercury, plastic bag for disposal, instructions.

ASTM E1 Thermometers—Celsius

Application	ASTM	Range	Model	Length	Immersion	Subdiv.
General Use	1C	-20 to 150°C	H-2610.1C	322mm (12-1/2")	76mm (3")	2
	2C	-5 to 300°C	H-2610.2C	390mm (15-3/8")		
	3C	-5 to 400°C	H-2610.3C	413mm (16-1/4")		
Cloud and Pour	5C	-38 to 50°C	H-2610.5C	231mm (9-1/8")	108mm (4.25")	2
Low Cloud and Pour	6C	-80 to 20°C	H-2610.6C	231mm (9-1/8")	76mm (3")	2
Low Distillation	7C	-2 to 300°C	H-2610.7C	386mm (15-1/4")	total	2
High Distillation	8C	-2 to 400°C	H-2610.8C	386mm (15-1/4")	total	2
Pensky-Martens Low, Tag Closed High	9C	-5 to 1100°C	H-2610.9C	287mm (11-1/4")	57mm (2.25")	1
Pensky-Martens High	10C	90 to 370°C	H-2610.10C	287mm (11-1/4")	57mm (2.25")	5
Open Flash	11C	-6 to 400°C	H-2610.11C	308mm (12-1/8")	25mm (1")	5
Gravity	12C	-20 to 102°C	H-2610.12C	420mm (16-1/2")	total	1/2
Loss on Heat	13C	155 to 170°C	H-2610.13C	169mm (6-5/8")	total	1/5
Low Softening Point	15C	-2 to 80°C	H-2610.15C	397mm (15-5/8")	total	1/2
High Softening Point	16C	30 to 200°C	H-2610.16C	397mm (15-5/8")	total	1
Saybolt Viscosity	17C	19 to 27°C	H-2610.17C	275mm (10-7/8")	total	1/5
	18C	34 to 42°C	H-2610.18C			
	19C	49 to 57°C	H-2610.19C			
	20C	57 to 65°C	H-2610.20C			
	21C	79 to 87°C	H-2610.21C			
	22C	95 to 103°C	H-2610.22C			
Turpentine Distallation	27C	147 to 182°C	H-2610.27C	301mm (11-7/8")	76mm (3")	1/2
Kinematic Viscosity	28C	36.6 to 39.4°C	H-2610.28C	305mm (12")	total	1/10
Aniline Point	33C	-38 to 42°C	H-2610.33C	420mm (16-1/2")	50mm (2")	1/2
	35C	90 to 170°C	H-2610.35C			
Kinematic Viscosity	45C	23.6 to 26.4°C	H-2610.45C	305mm (12")	total	1/10
	46C	48.6 to 51.4°C	H-2610.46C			
	47C	58.6 to 61.4°C	H-2610.47C			
Tag Closed Tester Low Range	57C	-20 to 50°C	H-2610.57C	287mm (11-1/4")	57mm (2.25")	1
Precision	63C	-8 to 32°C	H-2610.63C	379mm (15")	total	1/5
	64C	25 to 55°C	H-2610.64C			
Kinematic Viscosity	110C	133.6 to136.4°C	H-2610.110C	305mm (12")	total	1/10
Bituminous Softening Point	113C	-1 to175°C	H-2610.113C	406mm (16")	total	1



Specifications: All of these thermometers meet ASTM E1. All of the thermometers listed here can be calibrated and certified per ASTM specification. Call Humboldt for a price quote.

Range		Model
Min	Max	
-38°C	2°C	H-2607.62CFC
-8°C	32°C	H-2607.63CFC
25°C	55°C	H-2607.64CFC
50°C	80°C	H-2607.65CFC
75°C	105°C	H-2607.66CFC
95°C	155°C	H-2607.67CFC
145°C	205°C	H-2607.68CFC
195°C	305°C	H-2607.69CFC
295°C	405°C	H-2607.70CFC

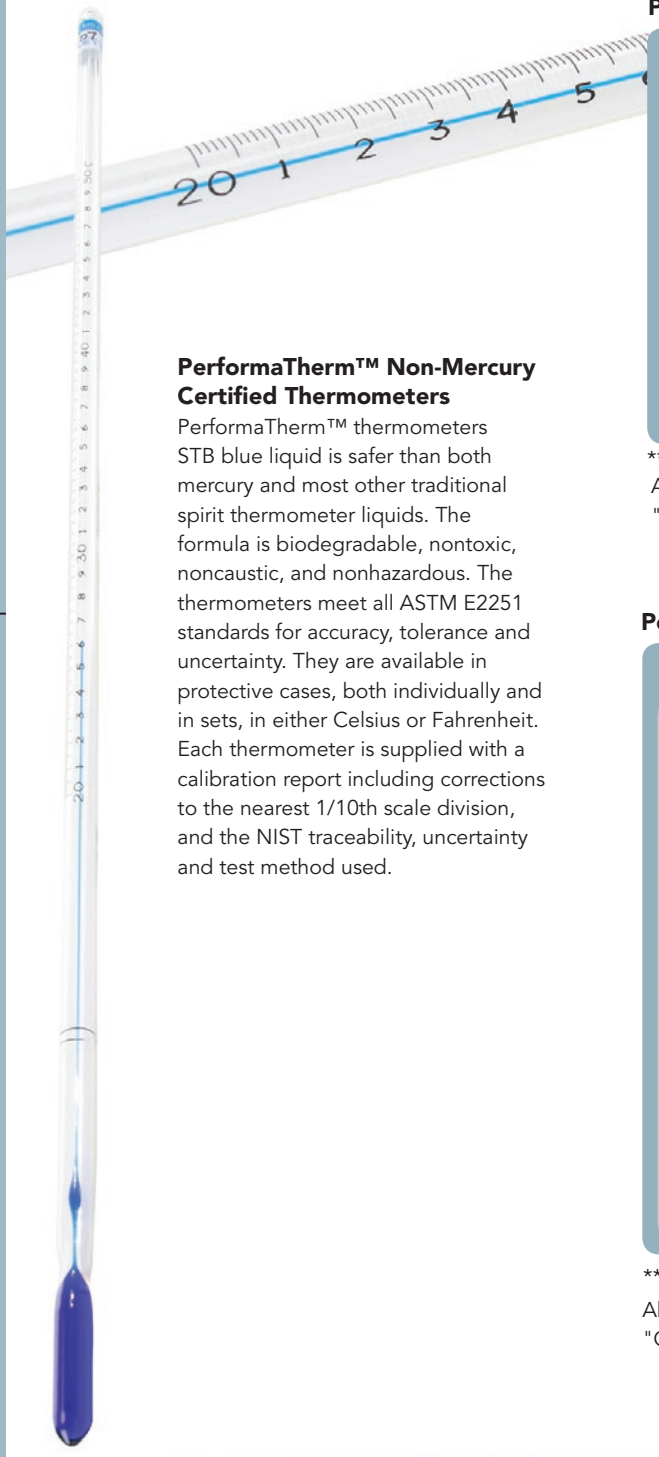
Precision Certified Standard Thermometers

Each thermometer certified at the five ASTM verification temperatures specified in ASTM E-1. Certificates show all corrections to the nearest tenth of the smallest scale division. Each thermometer has an ice-point which can be used to check the validity of the corrections at any time. Per NIST/SP-819, August 1991, ANY PREVIOUSLY CERTIFIED THERMOMETER WITH A CALIBRATED ICE POINT NEED NEVER BE COMPLETELY RE-CALIBRATED. Complete sets include channel case with compartment holding certificates.

Certified Standard Thermometer Set— H-2606

Set of 9 precision certified standard thermometers listed in the chart to the left.





PerformaTherm™ Non-Mercury Certified Thermometers

PerformaTherm™ thermometers STB blue liquid is safer than both mercury and most other traditional spirit thermometer liquids. The formula is biodegradable, nontoxic, noncaustic, and nonhazardous. The thermometers meet all ASTM E2251 standards for accuracy, tolerance and uncertainty. They are available in protective cases, both individually and in sets, in either Celsius or Fahrenheit. Each thermometer is supplied with a calibration report including corrections to the nearest 1/10th scale division, and the NIST traceability, uncertainty and test method used.

PerformaTherm™ Non-Mercury Certified Thermometers—Fahrenheit

Range	Div.	ASTM	Case	Model
-36 to +35°F	0.2°F	S62F	No	H-2601.S62FFC
-30 to +120°F	1.0°F	S58F	No	H-2601.S58FFC
-5 to +215°F	0.5°F	S12F	No	H-2601C.S12FFC
0 to 180°F	1.0°F	S59F	No	H-2601.S59FFC
18 to +89°F	0.2°F	S63F	No	H-2601.S63FFC
66 to 95°F	0.05°F	S56F	No	H-2601.S56FFC
77 to +131°F**	0.2°F	S64F	No	H-2601.S64FFC
122 to +176°F**	0.2°F	S65F	No	H-2601.S65FFC
167 to +221°F**	0.2°F	S66F	No	H-2601.S66FFC
203 to +311°F**	0.5°F	S67F	No	H-2601.S67FFC

**Has auxiliary ice point
Above Thermometers are available with a case. To order, please add a "C" suffix after the main model number, i.e.: H-2601**C**.S67FCC.

PerformaTherm™ Non-Mercury Certified Thermometers—Celsius

Range	Div.	ASTM	Case	Model
-38 to +2°C	0.1°C	S62C	No	H-2601.S62CFC
-34 to 49°C	0.5°C	S58C	No	H-2601.S58CFC
-20 to 102°C	0.2°C	S12C	No	H-2601.S12CFC
-18 to 82°C	0.5°C	S59C	No	H-2601.S59CFC
-8 to +32°C	0.1°C	S63C	No	H-2601.S63CFC
-7 to 105°C	0.5°C	S130C	No	H-2601.S130CFC
19 to 35°C	0.02°C	S56C	No	H-2601.S56CFC
20 to 50°C	0.1°C	S91C	No	H-2601.S91CFC
25 to 55°C**	0.1°C	S64C	No	H-2601.S64CFC
34 to 42°C	0.1°C	S18C	No	H-2601.S18CFC
38.5 to 41.5°C**	0.05°C	S120C	No	H-2601.S120CFC
50 to 80°C**	0.1°C	S65C	No	H-2601.S65CFC
75 to 105°C**	0.1°C	S66C	No	H-2601.S66CFC
95 to 103°C	0.1°C	S22C	No	H-2601.S22CFC
95 TO 155°C**	0.2°C	S67C	No	H-2601.S67CFC

**Has auxiliary ice point
Above Thermometers are available with a case. To order, please add a "C" suffix after the main model number, i.e.: H-2601**C**.S67FCC.



General Purpose Thermometers

Single-scale, mercury-filled, engraved stem thermometers, calibrated for total immersion tolerances. Meet NBS accuracy requirements.

General Purpose Thermometers, Fahrenheit

Range	Div.	Length	Model
-30 to 120°F	1°F	12" (305mm)	H-2611
0 to 230°F	2°F	12" (305mm)	H-2613
0 to 300°F	2°F	12" (305mm)	H-2615
20 to 500°F	2°F	16" (405mm)	H-2617
20 to 750°F	5°F	16" (405mm)	H-2619

General Purpose Thermometers, Celsius

Range	Div.	Length	Model
-35 to 50°C	1°C	305mm (12")	H-2612
-20 to 110°C	1°C	305mm (12")	H-2614
-20 to 150°C	1°C	305mm (12")	H-2616
-10 to 260°C	1°C	405mm (16")	H-2618
-10 to 400°C	2°C	405mm (16")	H-2620



IR Gun, Infrared Thermometer, H-3593

Point and shoot simplicity. IR Gun with high-quality 9:1 optics and laser pointer. Reads °C or °F. Backlit display and batteries are included. Pull the trigger for an instant reading, hold it down for scanning or checking a changing temperature. Let go of the trigger and the last reading is held on the display.

Infrared and Type K Thermocouple Combo Gun, H-3599

Infrared and Type K Thermocouple Combo Gun. High-quality 11:1 optics with laser pointer. Fast Response Type-K Probe is included. You also get Max, Min, Hold, Diff, Avg, Hi Alarm, Lo Alarm, backlit display and a °C/°F button. Easy to use - just press the mode key once-to step through the features.

Mini, Laser Infrared Thermometer, H-3595A

Pocket size, high-quality infrared gun with high-quality 10:1 optics and laser pointer. Operation is simple— aim, press trigger and read the backlit display. Reads °C or °F and has ergonomic grip handle. Uses 9V alkaline of NiCd battery, included.

Heavy-duty, Infrared Thermometer—H-3590

Handheld, and portable, the H-3590 Infrared Thermometer stands up to the day-to-day usage professionals require of their equipment. The H-3590 provides an expanded temperature range, higher resolution optics, tighter accuracy and brighter laser sighting than many other models. Features backlit LCD and extra bright laser pointer, making it more visible in all conditions, especially outdoors. Includes tripod mount, display hold (7 seconds) and is switchable between °F and °C. Uses 9V alkaline of NiCd battery, included.

Professional Infrared Thermometer—H-3597A

The Professional IR Thermometer is packed full of the features you need to make accurate infrared measurements. The H-3597A shows you exactly the size of your target every time. Its unique dual laser design highlights the outer edges of your target eliminating any guesswork or calculations. With a 50:1 target ratio you can be confident from long distance. It includes data functions like Min, Max, Lock, and Hi/Low alarms. Includes ABS carrying case and two AAA batteries.

Range	Accuracy	Model	Repeatability	Optics/Target Size
-58°F to 750°F, -50°C to 400°C	15-35°C: ±1°C, Full Range: ±2%, 2°C	H-3593	0.15°C at 25°C, 0.75°C at 80°C	9:1 (1" target dia. at 9" distance)
IR:-76°F to 932°F, -60°C to 500°C Probe: -76°F to 1999°F, -60°C to 1400°C	IR: 15-35°C: ±1°C, Full Range: ±2%, 2°C Probe: ±0.8%, 1°C	H-3599	0.15°C at 25°C, 0.75°C at 80°C	11:1 (1" target dia. at 11" distance)
-25°F to 999°F, -32°C to 535°C	±1% of reading or ±2°F (±1°C), whichever is greater, at 73°F (23°C) ambient temp.	H-3590	±0.5% of reading or ±2°F (±1°C), whichever is greater	12:1 (1" target dia. at 12" distance)
-20 to 932°F -30 to 500°C	±1°C (2°F) from 10°C to 30°C (50°F to 86°F), ± 1.5% of reading or ± 1.5°C (3°F)	H-3595A	±0.5% of reading or < ±1°C (±2°F) whichever is greater	10:1 (1" target dia. at 10" distance)
-76°F to 1832°F, -60°C to 1000°C	±1.5% of reading or ±2.7°F (±1.5°C), whichever is greater, at 73°F (23°C) ambient temp.	H-3597A	±1.5% of reading -76°F to 1832°F (-60°C to 1000°C)	50:1 (1" target dia. at 50" distance) Dual-Laser shows target

NIST Calibration Certification
NIST certification is available for Digital IR Thermometers, please enquire.

See Accessories on Page 212



H-3494


H-3590.1


H-3599.2



H-3599.36


H-3564.3


H-3564.2

IR Temperature Device— H-3494
One-button operation for accurate temperatures Simply point the unit at the desired target and hold the "on" button for the temperature to display. Temperature range: 0 to 600°F (-18 to 315°C) with 3:1 optics ratio with a 1" min. target. Selectable °F or °C and an accuracy of ±2% of Reading or 3°F (2°C) and a resolution of 1°F (1°C). Includes belt-loop pouch.

Holster for H-3590 IR Gun— H-3590.1
Durable, water-resistant nylon construction with snap-open belt loop attaches to belt in seconds. Easy open velcro cover and extra accessory pocket for probe storage.

8 Inch Long, K-Probe— H-3599.2
Eight inch long, K Thermocouple with 4-1/ 2" metal handle and 40" long coiled cable. Item is standard probe sold with H-3599 IR Gun. Temperature range is: -76°F to 1999°F (-60°C to 1400°C), Accuracy is: ±0.8%, 1°C. Compatible with K-type measurement instruments.

3ft. Long, K-Probe— H-3599.36
Three foot long, K Thermocouple is great for use in asphalt operations where you desire to know material temperatures in hoppers, trucks, piles, etc. Temperature range is: -30 to 1600°F and can be used with many digital thermometers and IR guns with probe ports. Heavy duty .250 dia. probe, 36" long with spring transition and 40" of lead wire with mini, type-K plug.

Piercing Probe Thermocouple— H-3564.3
4" stainless steel probe with 40" (1m) cable. Measurement range: -40 to 662°F (-40 to 350°C). Accuracy is ±3.96°F (2.2°C). ASTM-E230-1993. Compatible with K-type measurement instruments.

General Purpose Bead Probe— H-3564.2
40" (1m) wire length with maximum continuous temperature measurement: 500°F (260°C). Accuracy is: ±1.1°C (0-260°C). Fast response time. Not suitable for liquid immersion. Compatible with K-type measurement instruments.

Shockproof Cover for Hand-held Digital— H-3588.1O
Orange, shockproof rubber boot for H-3585N and H-3588N hand-held digital thermometers.

Shockproof Cover for Hand-held Digital— H-3588.1B
Blue, shockproof rubber boot for H-3585N and H-3588N hand-held digital thermometers.



H-3558D



H-3564



H-3588N



H-3585N

Hand-held Digital Thermometers

Range	Model	Description
-58 to 2000°F (-50 to 1093°C)	H-3558D	Heavy-duty design with 3-1/2-digit LCD display. Range from -58 to 2000°F (-50 to 1093°C). Resolution is 1° F/C. Accuracy is ±0.3% +2°F (1°C) from 32 to 2000°F (1093°C) and ±4°F (2°C) from -58 to 32°F (-50 to 0°C). Dual input jacks for K thermocouples allow operator to monitor two locations. Other features include hold button, max temperature display and max memory. Supplied complete with removable rubber boot and one type-K 3-1/2" (89mm) stainless steel probe w/handle and 2 K wire probes.
-24 to 1000°F (-150 to 1000°C)	H-3585N	Meter includes K-type probe but switches between different types of thermocouples. Meter can read with a resolution of 0.1 in an extended range of -149.9 to 999.9°C or -24.9 to 999.9°F. Dual-level LCD displays highest and lowest readings in cycle along with current temperature. Toggles between C and F. H-3585N allows easy user-calibration of meter and probe in an ice bath at 0°C.
-58 to 302°F (-50 to 150°C)	H-3588N	High performance waterproof thermometer made for lab or field applications. Switchable from Fahrenheit to Celsius. Provides 0.1°C or 0.1°F (-59 to 230°F/0.2°F outside). Accuracy is 0.4°C or 0.8°F. Dual-level LCD displays highest and lowest readings in cycle along with current temperature. Accuracy is conscistent across entire range and battery life has been increased to 2000 hours. H-3588N allows easy user-calibration of meter and probe in an ice bath at 0°C. Range: -50.0 to 150.0 C, –58 to 302 F
-58 to 2000°F (-50 to 1093°C)	H-3564	Laboratory accuracy and fast response in a rugged dual-point contact thermometer kit. Includes the Fluke 52II thermometer and (4) general purpose bead probes and (2) SureGrip™ piercing probes and a case. Can use K, J, T and E probes. Resolution is 0.1 °C/°F/K <1000 and 1 °C/°F/K >1000.


H-3599

Digital Thermometer, H-3599

Fast response digital pocket test, with 0.1° resolution on easy to read 0.25" (6.4 mm) high LCD displays and a 5" (27 mm) stem length. Thermistor sensors are located in the probe tip for quick, response time and accurate readings. Temperature range is: -40° to 450°F (-40° to 232°C), ±2°F (±1°C). Thermometer has maximum temperature memory; auto shutoff is field calibratable, waterproof, and, comes with a spare battery.


H-2630

H-3540


H-3542


H-2639


H-3550

Pocket-Type, Stick Thermometers

Description	Range	Div	Model
5" long stem. Features copper-plated bulb to resist cutting, includes metal pocket case and clip.	100 to 450°F	5°F	H-2630
5" long stem. Large-bore, tempered glass with non-toxic liquid, includes plastic pocket case and clip.	0 to 220°F	2°F	H-3540
5" long stem. Mercury thermometer, includes metal pocket case and clip.	-20 to 110°C	1°C	H-3542

Pocket-Type, Dial Thermometers

Description	Range	Div	Model
1" Dial, 5" long stem, includes plastic pocket case and clip.	25 to 125°F	1°F	H-2633
1" Dial, 5" long stem, includes plastic pocket case and clip.	50 to 550°F	5°F	H-2639
1" Dial, 5" long stem, includes plastic pocket case w/ calibration tool.	-40 to 180°F	2°F	H-3550
1" Dial, 5" long stem, includes plastic pocket case w/ calibration tool.	0 to 220°F	2°F	H-3552
1" Dial, 5" long stem, includes plastic pocket case and clip.	0 to 150°C	2°C	H-3553
1" Dial, 5" long stem, includes plastic pocket case and clip.	0 to 250°C	5°C	H-3554


H-2634D


H-3532

Dual-Scale General Testing Thermometers

Description	Ranges	Div.	Model
Direct-reading, all-metal dial thermometers for general use include °F and °C scales. Units have bi-metal element in 8" long x 0.15" dial (203 x 4mm) stainless steel stem that actuate pointer over graduated dial. Dial face is 1-3/4" (45mm) dia. External adjustment allows recalibration.	025 to 125°F 0 to 50°C	1°F .5°C	H-2631D
	0 to 220°F -10 to 100°C	2°F 1°C	H-2632D
	50 to 500°F 0 to 260°C	5°F 2°C	H-2634D

General Purpose Dial Thermometer

Description	Range	Div.	Model
Accurate, durable thermometer features 1" dial with insulated bezel ring, adjustable pen clip and 12" stainless stem	50 to 500°F	5°F	H-3532

Bi-metal Oven Thermometer

Description	Range	Div.	Model
All-metal unit is 2.3" x 3.3" with baked-enamel finish on bezel. Feaues bi-metal coil movement and glass lens. Hangs or stands.	100 to 600°F 50 to 315°C	25°F	H-3568



H-3568

Surface Thermometer

Description	Range	Div.	Model
Sensing element comes into direct contact with surface to be measured. Dial readout results from expansion or contraction of bi-metal. Unit is dual-magnet type, 2" (51mm) dia. x 1/2" (13mm) high.	0 to 250°F	2°F	H-2628
	0 to 500°F	5°F	H-2628H
	-20 to 120°C	1°C	H-2629



H-2629

Minimum/Maximum Thermometer— H-3543

Wall or desk-mount minimum/maximum thermometer with remote sensor. Sensor range is -58° to 158°F (-50° to 70°C). Switchable between°F and °C. Indoor/outdoor capabilities: Outdoor Temperature Range: -58 to 158°F (-50 to 70°C) Indoor Temperature Range: 32 to 122°F (0 to 50°C), Temperature Accuracy: ±2°F/±1°C, Sensor cord length: 120" (304cm). Battery: 1 Alkaline 1.5v, AAA



H-3543

Maximum and Minimum Thermometer— H-3560

Dual-scale thermometer has U-shaped capillary mounted in plastic 8" x 2-5/8" x 1" (203 x 67 x 25mm) with guard and mounting tab. Ranges: -40°F to 120°F in 2°F div. and -40°C to 50°C in 1°C div. Thermometer indicates present, highest and lowest temperature since last indices setting. Indices are easily reset after each reading.

Maximum and Minimum Thermometer— H-3560D

Dual-scale thermometer has U-shaped capillary mounted in plastic 8" x 2-5/8" x 1" (203 x 67 x 25mm) with guard and mounting tab. Ranges: -40°F to 120°F in 2°F div. and -40°C to 50°C in 1°C div. Thermometer indicates present, highest and lowest temperature since last indices setting. Indices are easily reset after each reading.



H-3560D



H-3560



H-2727D



H-3557D


H-4292


H-2260


H-4294


H-4296



H-3575

Hygrometer—H-2727D
Precision hygrometer has temperature gauge and is accurate within ±3 percent relative humidity from 20 to 85 percent. Unit is tested and calibrated five times in humidity-and-temperature-controlled rooms, monitored by chart recorders. Black metal case is 5-1/4" dia.

Digital Thermo-Timer—H-3557D
Versatile, 24-hour lab timer for use with ovens, incubators and other environmental chambers. Includes probe with 48" (1.2mm) long cable. Probe may be placed inside oven door for internal chamber temperature monitoring. Monitors and displays temperatures over a 0 to 200°C range at an accuracy of ±2°C. Time and temperature functions may be used separately or simultaneously. Alarm sounds when programmed time or temperature high limits are reached. Display shows remaining time/temperature/high limit setpoints. Magnet permits mounting on side of oven. Uses "AAA" battery, not included.

Thermo-Timer Probe—H-3557D-P
Replacement probe for H-3557D Thermo-Timer.

Universal Lab Timer—H-4292
Universal Lab Timer—H-4292.5F
Portable electric timer functions as elapsed-time indicator, interval timer and electrical apparatus on-off timer. Features time range of 60 minutes by minutes and seconds, 8". dial with two sets of numerals (use inner circle of small numerals as stop clock) and selective automatic buzzer alarm. Has two separate outlet receptacles for automatic switching of external appliances. Toggle switch controls one outlet, which can make or break circuit at "0." Circuit automatically breaks on second outlet after time interval. Shipping wt. 6 lbs. (2.7kg)

Stopwatch, 1/5 sec. movement, 1 rev = 60 sec.—H-2260
Stopwatch, 1/10 sec. movement, 1 rev = 30 sec.—H-2261
Time-out type stopwatch, used for timing operations and tests Start, stop and restart are activated by depressing the crown. Hands are reset by depressing pin on side of case. Features nickel-chromium case and anti-magnetic shock-resistant 7-jewel movement.

Bell-Type Timer—H-4294
Economical, manual mechanical timer has 60-minute time range. Signals with clear bell tone at end of set time for manual apparatus shut off.

Universal Timer Portable—H-4296
Universal Timer Portable—H-4296.4F
Timer automatically shuts off electrical apparatus at set time up to 60 minutes. Features two receptacles and 3-wire cord and plug.

24-Hour Digital Timer Clock—H-3575
Electronic digital timer/clock is programmed to alarm for one minute when time is up. Unit counts down or up in seconds. LCD displays hours, minutes and seconds. Memory timer allows preset time to be stored. Unit has magnetic back and can also clip on or stand. Includes one 1.5 volt battery.



H-4460



H-4461A



HM-4469.02

Dial Gauges

Indicators are built to American Gauge Design specifications for accuracy and are used in field and laboratory testing applications. Dials are high-quality, low-friction type, designed for long life and accurate repeatable readings. All dial indicators have continuous graduations and revolution counters that show revolutions of the indicator hand. They are furnished with a lug back (with a 90° mounting hole to be used vertically or horizontally), a regular contact point .25" long, and a dust cap. Dials listed are clockwise rotation; counter-clockwise rotation see note below.

Dial Gauges, Inches

Range	Division	Diameter	Brake	Model
.200"	.0001"	2.25"	No	H-4460
.200"	.0001"	2.25"	Yes	H-4461A
.300"	.0001"	2.25"	No	H-4462
.500"	.0001"	2.25"	No	H-4471
1.000"	.001"	2.25"	No	H-4158.1
2.000"	.001"	2.75"	No	H-4463
3.000"	.001"	2.75"	No	H-4464
4.000"	.001"	2.75"	No	H-4465
5.000"	.001"	2.75"	No	H-4466

For counter-clockwise dial indicators add "CC" suffix to part number, i.e.: H-4460CC.

Dial Gauges, Metric

Range	Division	Diameter	Brake	Model
8mm	.002mm	57mm	No	H-4465.08
12mm	.002mm	57mm	No	H-4465.12
25mm	.010mm	57mm	No	H-4465.25
50mm	.020mm	70mm	No	H-4465.50

For counter-clockwise dial indicators add "CC" suffix to part number, i.e.: H-4465.08CC.

Electronic Digital Indicators

For use in all Humboldt instrumentation. Switchable inch/metric digital indicators are accurate to ±0.0001 (0.002mm). Feature instant "0" at any spindle position, lock in maximum reading, LCD display with .305"-high characters, infrared linear encoder, AC power or replaceable batteries. Order HM-4469.02 as replacement indicator for H-4454-series proving rings—see pages 75 and 145. Brake is available for most model dial indicators, call 1-800-544-7220

Electronic Digital Indicators (clockwise)

Range	Division	Model	Diameter	Peak Hold
0.2500" (6.250mm)	0.0001" (0.002mm)	HM-4469.02	2-9/32" (72mm)	Yes
0.6000" (15.000mm)	0.0001" (0.002mm)	HM-4469.05	2-9/32" (72mm)	Yes
1.0000" (25.400mm)	0.0001" (0.002mm)	HM-4469.10	2-9/32" (72mm)	Yes
2.0000" (50.800mm)	0.0001" (0.002mm)	HM-4469.20	2-9/32" (72mm)	Yes
4.0000" (101.600mm)	0.0001" (0.002mm)	HM-4469.40	2-9/32" (72mm)	Yes

Magnet Holder with Swivel Adapter Yoke—H-4470

Convenient, portable method of mounting dial indicators. Holder's Alnico magnetic base mounts on flat or curved metallic surfaces. Non-magnetic stainless steel holding rod is 6 x 1/4" (154 x 6.4mm) and set in hardened ball socket so indicator may be mounted in almost any position.

Extension Contact Points

Length	Model	Description
1/4" (6mm)	H-4466.2	For applications requiring longer contact points. Hardened steel points have polised tip to prevent scratching. Point fit all standard indicators.
1/2" (13mm)	H-4466.5	
1" (25.4mm)	H-4466.10	
1-1/2" (38mm)	H-4466.15	
2" (51mm)	H-4466.20	
3" (76mm)	H-4466.30	

Muffle Furnaces

Electric muffle furnaces are designed for laboratory and industrial applications. Used in engineering tests of soils and aggregates, cement testing, ashing organic and inorganic samples, gravimetric analysis, ignition tests, etc. Cases are welded steel construction; perforated base case design keeps benchtop cool. Heating elements are embedded in refractory cement for structural strength and long life. Furnace is insulated with Insu-Light molded ceramic fiber insulation; a percentage input controller allows desired temperature to be selected with repeatable results. Features fluorescent digital display. Each unit contains a Chromel/Alumel thermo-couple directly connected to 32-2200°F, 0-1200°C dual scale pyrometer.

Controller	Temp. Range	Model	Dimensions		Electrical	Shipping Wt.
			Chamber (HxWxD)	Outside (HxWxD)		
Digital, Single Setpoint	212 to 2012°F (100 to 1100°C)	H-30200	4.25" x 5" x 6" (108 x 127 x 152mm)	14.5" x 10" x 15.8" (370 x 2500 x 400mm)	120V, 12amps, 1500 watts, 50/60Hz	28lb (12.7kg)
		H-30200.4F			240V, 6.3amps, 1500 watts, 50/60Hz	
	212 to 2192°F (100 to 1200°C)	H-30201	5" x 7" x 10" (130 x 180 x 250mm)	19" x 13.25" x 19.5" (490 x 340 x 495mm)	120V, 15amps, 1500 watts, 50/60Hz	60 lb (27.2kg)
		H-30201.4F			240V, 7.5amps, 1800 watts, 50/60Hz	
Separate Digital, Single Setpoint	576 to 3630°F (302 to 1999°C)	H-30202	5" x 5.5" x 13" (127 x 139 x 330mm)	15.5" x 18" x 24" (393 x 457 x 609mm)	120V, 34amps, 4100 watts, 50/60Hz	160 (72.5kg)
		H-30202.4F			240V, 17.5amps, 4100 watts, 50/60Hz	
Digital, SS	212 to 2192°F (100 to 1200°C)	H-30204.4F	6.8" x 12.8" x 10" (180 x 330 x 250mm)	21" x 19.1" x 29.5" (533 x 485 x 749mm)	240V, 12.9amps, 3095 watts, 50/60Hz	134 (61kg)
Digital, Single Setpoint with ramp and dwell		H-30206.4F			240V, 18.3amps, 4400 watts, 50/60Hz	
	212 to 2000°F (100 to 1093°C)	H-30208.4F	14" x 14" x14" (360 x 360 x 360mm)	29.5" x 21.5" x 25.5" (749 x 546 x 647mm)	240V, 22.9amps, 5500 watts, 50/60Hz	260 (118kg)



H-30200

H-30202





Small Benchtop Muffle Furnace—H-30200 & H-30201
Small benchtop muffle furnace has ceramic fiber insulation, which provides faster heat-up and reduced energy consumption. Embedded heating element on top and both sides provides temperature uniformity. Drop-down door doubles as a convenient shelf for loading and unloading. Shipped with power cord. Refer to table above for specifications.

Small Benchtop Muffle Furnace—H-30200.4F & H-30201.4F
Same as above models except with 240V, 50/60Hz. Refer to table above for specifications.

Heavy-duty Muffle Furnace and Controller—H-30202
Heavy-duty muffle furnace has heavy-duty firebrick insulation. Hard, abrasion resistant and designed to suport heavy loads. Steel case and refractory cement-filled door support the most demanding requirements. Heating elements are located on all four sides for maximum heat transfer and chamber uniformity. No power cord is supplied, requires fixed wiring. Comes complete with a digital, single set-point controller with a single ramp to set point and a dwell capability. A single display shows actual temperature or set point. The furnace has a mechanical over temperature protection relay. Output power adjustment can be set from 1% to 100% for furnace operation below 260°C (500°F). Controllers can be operated in ambient temperatures of 0–50°C (32°–122°F) and field adjusted to change input type, ramp rates and dwell times. Solid state relay to control power to furnace. Refer to table above for specifications.

Benchtop Muffle Furnace—H-30202.4F
Same as above models except with 240V, 50/60Hz. Refer to table above for specifications.

Premium Large Muffle Furnace—H-30204.4F

864 cubic inch capacity furnace with maximum temperature of 1200°C. Four heating elements are located on top, bottom and both sides of the chamber for enhanced temperature uniformity. Built-in vent port removes undesirable contaminants and moisture and extends the life span of the element and unit. Digital single set-point control. A single display shows actual temperature or set point. Rear of chamber incorporates a port for monitoring temperatures with independent measuring devices. Supplied with cord and plug set. Refer to table to the left for specifications.



H-30204.4F

Premium Large Muffle Furnace—H-30206.4F

864 cubic inch capacity furnace with maximum temperature of 1200°C. Four heating elements are located on top, bottom and both sides of the chamber for enhanced temperature uniformity. Built-in vent port removes undesirable contaminants and moisture and extends the life span of the element and unit. Digital single set-point control with a single ramp to set point and a dwell. A single display shows actual temperature or set point. The furnace has a mechanical over temperature protection relay. Rear of chamber incorporates a port for monitoring temperatures with independent measuring devices. Supplied with cord and plug set. Refer to table to the left for specifications.

Large Volume Muffle Furnace—H-30208.4F

1.6 cubic ft. capacity furnace with maximum temperature of 1093°C. Four heating elements are located on top, bottom and both sides of the chamber for enhanced temperature uniformity. Triple the usable working area with two supplied shelves. Critical electronic components and heating elements protected by a 35 amp circuit breaker. Built-in vent port removes undesirable contaminants and moisture and extends the life span of the element and unit. Digital single set-point control with a single ramp to set point and a dwell. A single display shows actual temperature or set point. The furnace has a mechanical over temperature protection relay. Rear of chamber incorporates a port for monitoring temperatures with independent measuring devices. No power cord supplied, requires fixed wiring. Refer to table to the left for specifications.



H-30208.4F

Heat-Resistant Gloves—H-3746

Made with large thumb, fingers and loose-fitting palm with wide gauntlet, gloves feature one-piece full-length palm and finger portions, keeping seams to a minimum.



H-3746

Crucible Tongs—H-23392

Stainless steel crucible tongs 1/4" (6mm) wire size and 18" (343mm) long.



H-23392

Safety Tongs—H-23440

Stainless steel tongs with fiberglass covered jaws, 1/4" (6mm) wire size and 13.5" (343mm) long.



H-23440



H-4924 series

H-4930.250

Nickel Evaporating Dishes

Heavy gauge pure nickel dishes have straight sides, flat bottom and pour lip

Capacity	Top Dia.	Height	Model
40ml	2-1/4" (57mm)	1" (25mm)	H-4924.040
100ml	2-3/4" (70mm)	1-3/8" (35mm)	H-4924.100
200ml	3-3/8" (867mm)	1-13/16" (46mm)	H-4924.200
300ml	3-7/8" (98mm)	2-1/4" (57mm)	H-4924.300

Porcelain Evaporating Dishes

Shallow porcelain dish has pour lip, glazed inside, partly glazed outside.

Capacity	Top Dia.	Height	Model
120ml	90mm	37mm	H-4930.120
250ml	115mm	45mm	H-4930.250
525ml	165mm	54mm	H-4930.500
760ml	185mm	54mm	H-4930.765
1285ml	215mm	63mm	H-4930.M1285

Laboratory Ovens

Quality fan-forced circulation or gravity-convection ovens feature double-wall construction and heavy, welded-steel exterior. Work space is insulated from the outer cabinet with one inch of high-density mineral wool, and interiors are made of corrosive-resistant aluminized steel. Low-watt density incoloy-sheathed elements are used. Include automatic thermocontrol, pilot light heat indicator and either a top-mounted, mercury thermometer (0°-300°C) on the gravity convection models or a door-mounted, dial thermometer on the forced air models. All ovens come with two, adjustable shelves and a 6 ft., 3-wire power cord and grounded plug. Units also have scratch-proof rubber feet, full-length piano-hinged door and extruded thermoplastic door handle.


H-30100


H-30105



H-30128

Laboratory Ovens – Forced Air

Description	Model	Max. Temp.	Dimensions (W x H x D)
.6 cu. ft. (17L) capacity. Features bi-metal temperature controller, ±2° sensitivity. 115V, 60 Hz, 800 watts minimum. Shipping wt. 50 lbs. (22.6kg)	H-30105	437°F (225°C)	Inside: 12" x 8.6" x 10" (305 x 218 x 254mm) Overall: 14" x 20.5" x 12" (356 x 521 x 305mm)
230V, 50/60 Hz. version of above	H-30105.4F		
1.14 cu. ft. (32L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz, 1000 watts minimum. Shipping wt. 66 lbs. (30kg)	H-30115	437°F (225°C)	Inside: 13" x 11.6" x 13" (330 x 295 x 330mm) Overall: 15" x 24.5" x 15" (381 x 622 x 381mm)
230V, 50/60 Hz. version of above	H-30115.4F		
2 cu. ft. (56L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz, 1600 watts min. Shipping wt. 82 lbs. (31.7kg)	H-30125	437°F (225°C)	Inside: 18" x 14.6" x 12" (457 x 371 x 305mm) Overall: 20" x 28.5" x 14" (508 x 724 x 356mm)
230V, 50/60 Hz. version of above	H-30125.4F		
2.86 cu. ft. (81L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz, 1600 watts min. Shipping wt. 112 lbs. (51kg)	H-30131	437°F (225°C)	Inside: 18" x 19.6" x 14" (457 x 498 x 356mm) Overall: 20" x 33.5" x 16" (508 x 851 x 406mm)
230V, 50/60 Hz. version of above	H-30131.4F		

Laboratory Ovens – Gravity Convection

Description	Model	Max. Temp.	Dimensions (W x H x D)
.7 cu. ft. (20L) capacity. Features bi-metal temperature controller, ±2° sensitivity. 115V, 60 Hz, 600 watts minimum. Shipping wt. 44 lbs. (20kg)	H-30100	437°F (225°C)	Inside: 12" x 10" x 10" (305 x 254 x 254mm) Overall: 4" x 17" x 12" (355 x 431 x 304mm)
230V, 50/60 Hz. version of above	H-30100.4F		
1.27 cu. ft. (35L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz, 800 watts minimum. Shipping wt. 60 lbs. (27.2kg)	H-30110	437°F (225°C)	Inside: 13" x 13" x 13" (330 x 330 x 330mm) Overall: 15" x 21" x 15" (381 x 534 x 381mm))
230V, 50/60 Hz. version of above	H-30110.4F		
2 cu. ft. (56L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz. 1200 watts min. Shipping wt. 78 lbs. (35kg)	H-30120	437°F (225°C)	Inside: 18" x 16" x 12" (457 x 406 x 305mm)) Overall: 20" x 25" x 14" (508 x 635 x 356mm)
230V, 50/60 Hz. version of above	H-30120.4F		
3.0 cu. ft. (85L) capacity. Features hydraulic temperature controller, ±1° sensitivity. 115V, 60 Hz, 1600 watts min. Shipping wt. 94 lbs. (43kg)	H-30128	437°F (225°C)	Inside: 18" x 21" x 14" (457 x 534 x 356mm) Overall: 20" x 30" x 16" (508 x 762 x 406mm)
230V, 50/60 Hz. version of above	H-30128.4F		

Laboratory Bench Ovens

These ovens feature fan-forced-air circulation, which provides even work space temperature for testing applications. Ovens incorporate large, 7/16" diameter, Low-watt density incoloy-sheathed elements and 2" (51mm) thick mineral wool, high density insulation, steel-lined interior, piano-hinged and gasketed doors, adjustable damper control and an ambient temperature range to 300°F (149°C). Ovens include two adjustable shelves. Additional shelves can be ordered, shelf support holes are on 1-1/2" (38mm) centers to accomodate up to 11 shelves. Features on-off switch, panelboard, thermostat, heat switch, 3-wire cord and plug.

Digital Control Bench Ovens (E-Series)

These units utilize a precise digital PID microprocessor temperature controller, which with a J-type thermocouple will hold set temperatures accurately within 1 degree with improved chamber uniformity. Control features include large easy-to-read dual LED display, showing both set and process temperatures, °C or °F units. A versatile on/off control mode allows for even faster temperature recovery times and processing of batch-style work loads not requiring accurate temperature stability.





Description	Model	Max. Temp.	Dimensions (W x H x D)
7 cu. ft. (198L) capacity. Features calibrated dial-type temperature controller, 115V, 60 Hz, 1110 watts Shipping wt. 180 lbs. (68kg)	H-30140	300°F (149°C)	Inside: 25.5" x 20" x 24" (648 x 508 x 610mm) Overall: 33" x 24' x 35.5" (838 x 610 x 902mm)
230V, 50/60Hz version of above	H-30140.4F		
E-Series digital control version of H-30140	H-30140E		
230V, 50/60Hz version of above	H-30140E.4F		
7 cu. ft. (198L) capacity. Features calibrated dial-type temperature controller, 115V, 60 Hz, 2110 watts. Uses 20 amp grounded plug. Shipping wt. 180 lbs. (68kg)	H-30145	437°F (225°C)	Inside: 26" x 20" x 26" (660 x 508 x 660mm) Overall: 33" x 24" x 32" (838 x 610 x 813mm)
230V, 50/60Hz version of above	H-30145.4F		
E-Series digital control version of H-30145	H-30145E		
230V, 50/60Hz version of above	H-30145E.4F		
10.6 cu. ft. (1980L) capacity. Features calibrated dial-type temperature controller,, 115V, 60 Hz. 2110 watts. Shipping wt.180 lbs (68kg). Uses 20 amp grounded plug.	H-30135	437°F (225°C)	Inside: 25.5" x 30" x 24" (660 x 508 x 610mm) Overall: 33" x 34" x 35.5" (838 x 610 x 902mm)
230V, 50/60Hz version of H-30135	H-30135.4F		
E-Series digital control version of H-30135	H-30135E		
230V, 50/60Hz version of above	H-30135E.4F		
6.6 cu. ft. (187L) capacity. Features calibrated dial-type temperature controller, 230V, 60 Hz, 2800 watts. Shipping wt. 185 lbs (77.1kg)	H-30160.4F	550°F (287°C)	Inside: 25.5" x 20" x 22.5" (660 x 508 x 572mm) Overall: 33" x 24' x 35.5" (838 x 610 x 902mm)
230V, 50/60Hz version of H-30160	H-30160.4F		
E-Series digital control version of H-30160	H-30160E		
230V, 50/60Hz version of above	H-30160E.4F		


H-32300


H-32333


H-32343
(shown with
optional stand)

Large Capacity Bench Ovens

These economical, large-capacity, bench ovens are designed to handle a wide variety of applications, which require a maximum temperature of 400°F (204°C) with a ±0.5% control accuracy and ±8°F (4°C) uniformity for efficient drying of large samples.

All models feature an analog thermocouple-actuated, temperature controller and a 1/3 HP motor with a 400 CFM blower. Ovens have 2" (51mm) 6 lb/cf industrial rockwool insulation and the built-in baffle helps prevent radiant heat and optimizes oven heating operation. All ovens have 304 stainless steel interiors, explosion venting latches and incoloy sheathed tubular heating elements.

All ovens feature a UL-listed control panel and meet the requirements of National Fire Prevention Association Standard 86, Industrial Risk Insurers, Factory Mutual and OSHA standards. Motor starter and heating element contactors are electrically interlocked to shut off heaters if power to the blower is interrupted, and, permits operation of the blower without heat for cooling.

Ovens include two (2) 50lb (22.7kg) capacity nickel-plated wired shelves, which can be placed on any of the 10 support channels, which are located on 3" centers. Extra shelves can be ordered to accomodate needs.

Digital Controller Option for Ovens—

A Digital, Microprocessor-based indicating, thermocouple-acutated temperature controller can be requested at time of order. Add the suffix. DIG2 to the oven model number, (ie: H-32300.DIG2).

Additional Shelf for H-32300—H-32300.1
Additional Shelf for H-32333—H-32333.1
Additional Shelf for H-32343—H-32343.1
50lb (22.7kg) capacity nickel-plated wired shelf for use with H-32300 oven.

Optional Stand for H-32300—H-32300.2
Optional Stand for H-32333—H-32333.2
Optional Stand for H-32343—H-32343.2
Designed to hold oven at convenient 24" working height. Specify modle number of oven when ordering.

Large Capacity Bench Ovens

Volume Cu. ft (m)	Inside Dim. W x D x H	Max. Temp.	Model	Voltage	Outer Dim. W x D x H	Kw	Rise Time	Shpg. wt.
15.8 (.447)	36" x 21" x 36" (91 x 53 x 91cm)	400°F (204.4°C)	H-32300.2F	230V,60Hz 1ph.	40" x 28" x 47" (102 x 71 x 119cm)	4.4	18 min.	600 (272)
			H-32300.2F.3	230V,60Hz 3ph.				
			H-32300.8F	208V,60Hz 1ph.				
			H-32300.8F.3	208V,60Hz 3ph.				
			H-32300.9F.3	460V,60Hz 3ph.				
27 (.764)	36" x 36" x 36" (91 x 91 x 91cm)		H-32333.2F	230V,60Hz 1ph.	40" x 43" x 47" (102 x 109 x 119cm)	6.6	18 min.	750 (340)
			H-32333.2F.3	230V,60Hz 3ph.				
			H-32333.8F	208V,60Hz 1ph.				
			H-32333.8F.3	208V,60Hz 3ph.				
			H-32333.9F.3	460V,60Hz 3ph.				
36 (1.01)	36" x 48" x 36" (91 x 122 x 91cm)		H-32343.2F	230V,60Hz 1ph.	40" x 55" x 47" (102 x 140 x 119cm)	6.6	22 min.	850 (385)
			H-32343.2F.3	230V,60Hz 3ph.				
			H-32343.8F	208V,60Hz 1ph.				
			H-32343.8F.3	208V,60Hz 3ph.				
			H-32343.9F.3	460V,60Hz 3ph.				



H-30170.4F



H-30174.4F

Heavy-Duty Laboratory Ovens

- Heavy-duty, 200lb. (90.7 kg) capacity shelf design.
- Excellent temperature stability and uniformity performance
- Digital PID control system
- 8 and 12.5 cu. ft. capacity models available

Thermolyne heavy-duty ovens are designed for today's material testing laboratory. The horizontal airflow of the oven results in excellent temperature stability and uniformity performance. These large capacity ovens are able to take on big heavy loads. The heavy-duty shelves are designed to hold up to 200 lbs. (90.7kg) each. Spilling materials on the bottom of the ovens are not a problem since the heating elements and fans are designed into the top of the ovens. A digital PID controller allows for precise temperature control. As the temperature nears the setpoint, the controller maintains the maximum heat-up rate without overshooting. Using this type of temperature control provides the stability and uniformity necessary to meet the most demanding procedures.

Built-in hydraulic controlled over-temperature protection ensures that the oven temperature does not exceed the preset limits. To meet the latest industry standards, the ovens feature a temperature uniformity of ±3°C at 150°C and a temperature range of +10° above ambient to 250°C.

Heavy-Duty Laboratory Oven with Internal Thermocouple Probes

This 18 cubic foot capacity oven comes equipped with (3) stainless steel thermocouple probes inside the oven chamber, which allow you to monitor the temperature of your mix inside the Gyratory molds. Each probe corresponds with a digital display on the control panel, allowing the user to monitor compaction temperature without opening the oven door. Includes built-in timer for programmable start-up and shut-down of oven. Single set-point digital PID controller provides excellent temperature stability and control.

Heavy-Duty Laboratory Ovens

Capacity Cu. feet	Chamber Size W x D x H	Model	Overall Size W x D x H	Operating Range	Stability	Uniformity	Electrical	Shelves	Ship wt.
8 (227)	26" x 26" x 21" (66 x 66 x 53.3cm)	H-30170.4F	34.5" x 31" x 35" (87.6 x 78.7 x 88.9cm)	+10° above Ambient to 250°C	±0.2° at 150°C	±0.3° at 150°C	50/60Hz 220-240V 12.5 amps 3,000 watts	2	200 lb (91 kg)
12.5 (354)	26" x 26" x 32.5" (66 x 66 x 82.5cm)	H-30172.4F	35" x 34" x 53.75" (88.9 x 86 x 136.5cm)				50/60Hz 220-240V 20.5 amps 4,900 watts	3	275 lb (125 kg)

Laboratory Oven with Thermocouple Probes

Capacity Cu. feet	Chamber Size W x D x H	Model	Overall Size W x D x H	Operating Range	Stability	Uniformity	Electrical	Shelves	Ship wt.
18	26" x 46" x 26" (66 x 116.8 x 66cm)	H-30174.4F	35" x 75" x 34" (80.9 x 190.5 x 86.4cm)	+10° above Ambient to 250°C	±0.1° at 150°C	±0.3° at 150°C	50/60Hz 220-240V 17.1 amps 4,100 watts	2	350 lb (159 kg)



Heavy-Duty Forced-Air, Convection Ovens

Ideally suited for soil and asphalt testing, the Despatch LBB series ovens feature fast heat-up rates and precise, easy-to-read digital controls. Powerful heating elements bring the oven to temperature very quickly, resulting in fast test results and improved sample quality. Digital controls deliver precise temperature and a large LED panel makes it easy to monitor oven temperatures. The LBB series ovens operate at temperatures up to 400°F (204°C) and use forced convection airflow for uniform temperatures throughout the oven chamber. Standard shelves can handle up to 50 lbs. (22.7kg) and are easy to slide out and reposition. Shelves that can handle 200 lbs. (90.7kg) of material are available as an option.
Meets AASHTO uniformity requirements of ±3° at 150°C. Motor and fan are located above the stainless steel oven chamber to prevent damage if materials are spilled.

Heavy-Duty Laboratory Ovens

Chamber Size W x D x H	Capacity cu. ft. (L)	Oper. Range	Model	Despatch Model	Overall Size W x D x H	Electrical	Shpg. wt.
18 x 18 x 12" (46 x 46 x 31cm)	2.3 (65)	40°F to 204°C	H-30356	LBB1-23	24 x 24.5 x 26" (61 x 63 x 67cm)	50/60Hz, 1ph, 120V 15 amps, 1.2KW heater	205 lb (92 kg)
			H-30356.4F			50/60Hz, 1ph, 240V 15 amps, 1.2KW heater	
24 x 14 x 22" (61 x 36 x 56cm)	4.3 (122)	40°F to 204°C	H-30358	LBB1-43	30 x 20.5 x 36.5" (77 x 53 x 93cm)	50/60Hz, 1ph, 120V 20 amps, 1.6KW heater	270 lb (121 kg)
			H-30358.4F			50/60Hz, 1ph, 240V 15 amps, 1.6KW heater	
30 x 18 x 22" (77 x 46 x 56cm)	6.9 (196)	40°F to 204°C	H-30360	LBB1-69	36 x 24.5 x 36.5" (92 x 63 x 93cm)	50/60Hz, 1ph, 120V 21.6 amps, 2.4KW heater	320 lb (146 kg)
			H-30360.4F			50/60Hz, 1ph, 240V 10.8 amps, 2.4KW heater	
30 x 20 x 35" (77 x 51 x 89cm)	12.1 (340)		H-30364.4F	LBB2-12	36 x 26.5 x 51.5" (92 x 68 x 131cm)	50/60Hz, 1ph, 240V 16.4 amps, 3.6KW heater	385 lb (175 kg)
37 x 24 x 35" (94 x 61 x 89cm)	18 (510)		H-30366.4F	LBB2-18	43 x 30.5 x 51.5" (110 x 78 x 131cm)	50/60Hz, 1ph, 240V 16.4 amps, 3.6KW heater	485 lb (221 kg)
37 x 37 x 35" (94 x 94 x 89cm)	27 (765)		H-30368.4F	LBB2-27	43 x 43.5 x 51.5" (110 x 111 x 131cm)	50/60Hz, 1ph, 240V 21.4 amps, 4.8KW heater	635 lb (289 kg)

High-Performance Forced-Air Bench-Top Ovens

For faster processing, testing, preheating, sterilizing, drying, aging, curing and other production applications. Despatch LAC ovens have microprocessor-based control system with single set-point operation, timer function and up to 48 steps of ramp/soak programming, as well as manual reset high-limit protection and solid-state relay switching. Horizontal air flow with high fan volume of forced recirculated air through perforated stainless steel walls for uniform heating. Welded double-wall construction, 3" Fiberglass insulation, rapid-response heater with 5-year warranty, baked enamel finish and stainless steel interior.



High Performance Forced-Air Bench-Top Ovens

Chamber Size W x D x H	Capacity cu. ft. (L)	Oper. Range	Model	Despatch Model	Overall Size WxDxH	Electrical, Single Phase	Exhaust Dia. (on Chamber Back)	Cord and Plug	Doors	Shpg. wt.
14 x 12 x 12" (36x30x30cm)	1.1 (28)	35-260°C (95-500°F)	H-30320	LAC1-10	23 x 21 x 30" (58x53x76cm)	120V 50/60Hz, 10 amps, 1KW heater	1"	incl.	1	95 lb (43 kg)
19 x 18 x 19" (48x46x48cm)	3.8 (108)		H-30322	LAC1-38A	28 x 28 x 37" (36x30x42cm)	120V 50/60Hz, 16amps, 1.6 KW heater	2"		1	165 lb (75 kg)
19 x 18 x 19" (48x46x48cm)	3.8 (108)		H-30322.4F	LAC1-38B	28 x 28 x 37" (36x30x42cm)	240V 50/60Hz, 9.2amps, 1.8 KW heater	2"		1	165 lb (75 kg)
24 x 20x 24" (61x51x61cm)	6.7 (190)		H-30324.4F	LAC1-67	36 x 30 x 42" (91x76x107cm)	240V 50/60Hz, 11.7amps, 2.4 KW heater	2"		1	203 lb (92 kg)
24 x 24 x36" (61x61x90cm)	12 (340)	50-260°C (122-500°F)	H-30326.4F	LAC2-12	36 x 33 x 54" (91x84x137cm)	240V 50/60Hz, 18.4 amps, 3.6 KW heater	2 to 2-1/2"	none	1	535 lb (243 kg)
36 x 24 x 36" (90x61x90cm)	18 (510)		H-30328.4F	LAC2-18	48 x 31 x 54" (122x79x 137cm)	240V 50/60Hz, 23.4 amps, 4.8 KW heater	2 to 2-1/2"		2	720 lb (284 kg)



H-4947A



H-4949

Field Stoves

Description	Application	Size	Temperature Range	Shpg. wt.	Model
2-burner, portable, gas-powered cooker with 20-Gauge Steel Construction with cast iron top/burner. Fully assembled, complete with UL-approved hose and low-pressure regulator and adjustable, A.G.A.-approved gas valves.	General use	7" x 12" x 27" (180 x 310 x 690mm)	35,000 btu input per burner, LP or natural gas	34 lbs. (15.4kg)	H-4947A
Dual-burner electric hot plate. Two 825-watt rapid heating burners. Infinite heat controls, heavy-gauge steel construction; chrome finish; phenolic feet. Includes 3-wire cord and plug.	General use with tubular elements.	6-1/2" (16.5cm) dia. heating elements: Overall: 20-1/2" x 8-3/4" x 4" (52 x 22 x 10cm)	Warm-simmer rollingboil with adjustable controls.	9lbs. (4.1kg)	H-4949



H-4958

Industrial-grade Heat Gun—H-4958
Powerful blower provides a high volumes of air needed for almost any application and convenient base allows for stationary use. Unit is 14.3 Amps and produces temperatures of 750-1000°F. Air intake regulator provides temperature adjustment and cool air setting is great for no-heat applications, adding versatility. Insulated nozzle Protects operatior, provides a cool exterior temperature.

Stirring Hot Plate—H-4944
Hot plate with built-in stirring function, features 1040 watts of power and a 7.25" (184mm) square aluminum heating surface. Operating temperature range is 41-1004°F (5-540°C) and a stir range of 50-1200 RPM. Easy-to-read digital temperature stttings, low, stable design, high, wattage heating element and microprocessor feedback, speed control.

Large Stirring Hot Plate—H-4945
Same design as above, but has a 10.25" (260mm) square heating surface and 1440 watts of power.



H-4944



H-4953



H-4950



H-4952

Hot Plates

Description	Application	Size	Temperature Range	Shpg. wt.	Model
Electric hot plate. Extra-sensitive thermostat power unit input automatically adjusts to size and temperature of load placed on top. Cast aluminum top plate with integral ribs will not warp or buckle. Stainless steel case; phenolic feet. Includes dove-tail socket, pilot light, 3-wire cord and plug. 120V. 50/60Hz. 6.3 amps. 750W. AC.	General laboratory, soil analysis, shop, etc.	Top plate: 6-1/4 x 6-1/4" (15.9 x 15.9cm) Overall: 6-5/8 x 4-3/8 x 7-5/8" (16.8 x 11.1 x 29.4cm)	Automatic stepless control holds within 5°F (3°C) to 200°F (93°C); within 2°F (1.1°C) from 200 to 700°F (93 to 371°C).	6lbs. (2.7kg)	H-4950
240V 50/60Hz. 3.15 amps. 750W. AC version of H-4950 above.					H-4950.4F
Electric hot plate. Heats slow or fast, as needed. Machined cast-iron top plate provides best heat transfer. Stainless steel 2-section case is separated by insulation. Includes 3-wire cord and plug. 120V. 50/60Hz. AC. 8.32 amps. 200 to 1080W. AC.	Heating asphaltic products, limestone analysis, heavy-duty industrial jobs, production line use. Supports heavy loads.	Top plate: 9" x 9" (23 x 23cm) Overall: 9" x 6-1/4" x 10" (23 x 16 x 25cm)	4-position switch selects input and temperature range: 425°F (224°C) 600°F (316°C) 675°F (357°C) 900°F (482°C)	21lbs. (9.5kg)	H-4951
240V 50/60Hz. 4.16 amps. 1000W. AC version of H-4951 above.					H-4951.4F
Electric hot plate. Cast aluminum top plate with integral ribs will not warp or buckle. Perforated stainless steel case supports heavy loads. Includes 3-wire cord and plug. 120V. 50/60Hz. 13.3 amps. 1600W. AC.	Distillation of liquids, drying aggregates, bituminous paving samples, soil analysis, etc.	Top plate: 12" x 12" (30 x 30cm) Overall: 12" x 6-1/8" x 13" (30 x 13 x 33cm)	Variable temperature control from ambient to 700°F (371°C).	26lbs. (11.8kg)	H-4952
240V 50/60Hz. 6.7 amps. 1600W. AC version of H-4952 above.					H-4952.4F
Electric hot plate. Solid-state controls; porcelain coated stainless steel top plates. Low-profile design. Includes 3-wire cord and plug. 120V. 50/60Hz. 7.0 amps. 840W. AC.		Top plate: 12" x 24" (30 x 61cm) Overall: 24" x 6-1/8" x 13" (61 x 13 x 33cm)	Variable temperature control from ambient to 700°F (371°C).	50lbs. (22.7kg)	H-4953
S240V 50/60Hz. 13.3 amps. 3200W. AC version of H-4953 above.					H-4953.4F
Similar to H-4952; Not supplied with cord and plug due to high-wattage consumption requirements—must be connected through electrical conduit fittings. 120V. 50//60Hz. 26.6 amps. 3200W. AC.	Laboratory, shop, office, etc.	Top plate: 7" x 7" (18 x 18cm) Overall: 11" x 3-1/2" x 7-1/4" (28 x 9 x 18cm)	Demand-type thermostatic control from ambient to 700°F (371°C)	8lbs. (3.6kg)	H-4959
Same as H-4959 except 240V, 50/60Hz. 3.5 amps. 840W. AC.					H-4959.4F



Scale and Balance Comparison Chart

200 – 450g

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
200g	.01g	HB-4528	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
200g	.01g	HB-4720	AC / AA batteries	12mm dia. / 4.7 in dia.	Ohaus	236
250g	0.001g	HB-4700	AC	140mm x 140mm / 5.5 x 5.5"	Adam	231
250g	0.1g	HB-4529	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
300g	0.01g	HB-4710	AC / battery	120mm / 4.7" Dia.	Adam	231
310g	0.001g	HB-313	AC	4.7" Dia. / 120mm	Ohaus	230
310g	0.01g	HB-312	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
400g	.01g	HB-4724	AC / AA batteries	12mm dia. / 4.7 in dia.	Ohaus	236
400g	.1g	HB-4723	AC / AA batteries	12mm dia. / 4.7 in dia.	Ohaus	236
410g	.001g	HB-4500	AC	120mm / 4.7" Dia.	Ohaus	232
450g	0.001g	HB-4701	AC	140mm x 140mm / 5.5 x 5.5"	Adam	231

600 – 1500g

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
600g	0.02g	HB-4711	AC / battery	120mm / 4.7" Dia.	Adam	231
600g	0.01g	HB-4712	AC / battery	120mm / 4.7" Dia.	Adam	231
600g	0.1g	HB-4530	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
600g	.1g	HB-4726	AC / AA batteries	16.5 x 14.2mm / 6.5 x 5.5 in.	Ohaus	236
610g	0.01g	HB-612	AC / 4AA batteries	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
750g	0.001g	HB-4702	AC	140mm x 140mm / 5.5 x 5.5"	Adam	231
810g	0.01g	HB-812	AC / 4AA batteries	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
1000g	0.01g	HB-4713	AC / battery	120mm / 4.7" Dia.	Adam	231
1500g	0.01g	HB-4703	AC	192mm x 192mm / 7.6 x 7.6"	Adam	231
1500g	0.05g	HB-4714	AC / battery	5.7 x 4.9"/ 144 x 124mm"	Adam	231
1500g	0.1g	HB-4532	AC / AA batteries	130mm / 5.1" Dia.	Adam	233

2000 – 3500g

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
2000g	1g	HB-4534	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
2000g	.1g	HB-4727	AC / AA batteries	16.5 x 14.2mm / 6.5 x 5.5 in.	Ohaus	236
2000g	.1g	HB-4820	AC / C batteries	5.75 x 6.22" (146 x 158mm)	Ohaus	236
2100g	.01g	HB-4501	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	232
2100g	0.1g	HB-2101	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
2500g	0.01g	HB-4704	AC	192mm x 192mm / 7.6 x 7.6"	Adam	231
2600g	0.1g	HB-4533	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
3000g	0.01g	HB-4715	AC / battery	5.7 x 4.9"/ 144 x 124mm	Adam	231
3000g	1g	HB-4821	AC / C batteries	5.75 x 6.22" (146 x 158mm)	Ohaus	236
3000g	1g	HB-4823	AC / C batteries	5.75 x 6.22" (146 x 158mm)	Ohaus	236
3100g	0.01g	HB-3101	AC	6.6 x 7.1" / 16.8 x 18mm	Ohaus	230
3100g	0.01g	HB-3102	AC	6.6 x 7.1" / 16.8 x 18mm	Ohaus	230
3500g	0.01g	HB-4705	AC	192mm x 192mm / 7.6 x 7.6"	Adam	231

Scale and Balance Comparison Chart

4000 – 32,000g

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
4000g	.1g	HB-4728	AC / AA batteries	16.5 x 14.2mm / 6.5 x 5.5 in.	Ohaus	236
4100g	.01g	HB-4502	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	232
4100g	0.1g	HB-4101	AC / 4AA batteries	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
4500g	0.01g	HB-4706	AC	192mm x 192mm / 7.6 x 7.6"	Adam	231
5000g	1g	HB-4535	AC / AA batteries	130mm / 5.1" Dia.	Adam	233
6000g	2g	HB-4822	AC / C batteries	5.75 x 6.22" (146 x 158mm)	Ohaus	236
6000g	2g	HB-4824	AC / C batteries	5.75 x 6.22" (146 x 158mm)	Ohaus	236
6100g	0.1g	HB-6101	AC / 4AA batteries	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
8100g	0.1g	HB-8101	AC / 4AA batteries	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	230
8100g	0.1g	HB-4504	AC	6.6 x 7.1" / 16.8 x 18mm	Ohaus	232
10,000g	0.1g	HB-4538WB	AC	300 x 340mm / 11.8 x 13.4"	Adam	233
12,000g	0.1g	HB-4506	AC	120mm / 4.7" Dia.	Ohaus	232
20,000g	0.1g	HB-4537WB	AC	300 x 340mm / 11.8 x 13.4"	Adam	233
22,000g	0.1g	HB-4508	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	232
32,000g	0.1g	HB-4510	AC	5.8 x 6.3" / 14.9 x 16.2mm	Ohaus	232

25 lb – 110 lb

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
25lb./10kg	.002lb/.001kg	HB-4761	AC / AA batteries	300mm sq. / 12 in sq.	Ohaus	235
35lb./15Kg	.001lb/.5g	HB-4636	AC / battery	225 x 275mm / 8.9 x10.8 in.	Adam	234
50lb./25kg	.005lb/.002kg	HB-4760	AC / AA batteries	300mm sq. / 12 in sq.	Ohaus	235
60lb./30kg	.02lb/.005kg	HB-4830	AC / battery	12 x 14 in./ 305 x 355mm	Ohaus	235
60lb/30Kg	.002lb/.001kg	HB-4781	AC / battery	00 x 230mm / 11.8 x 9 in.	Ohaus	236
65lb./30Kg	.002lb/1g	HB-4635	AC / battery	225 x 275mm / 8.9 x10.8 in.	Adam	234
75lb./35Kg	.02lb/.01kg	HB-4774	AC / AA batteries	300mm sq. / 12" sq	Adam	234
100lb./45Kg	.005lb/2g	HB-4634	AC / battery	225 x 275mm / 8.9 x10.8 in.	Adam	234
100lb./50kg	.01lb/.005kg	HB-4762	AC / AA batteries	450mm sq. / 18 in sq.	Ohaus	235
110lb./50kg	.05lb/.02kg	HB-4770	AC / AA batteries	310 x 270mm / 12.2 x 10.8 in.	Ohaus	235
110lb./50kg	.05lb/.02kg	HB-4769	AC / AA batteries	520 x 400mm / 20.5 x 15.7 in.	Ohaus	235

165 lb – 500 lb

Capacity	Readability	Model Number	Power	Platform	Mfg.	Page No.
165lb./75Kg	.05lb/.02kg	HB-4775	AC / AA batteries	300mm sq. / 12" sq	Adam	234
220lb./100kg	.1lb/.05kg	HB-4771	AC / AA batteries	520 x 400mm / 20.5 x 15.7 in.	Ohaus	235
250lb./100kg	.02lb/.01kg	HB-4764	AC / AA batteries	450mm sq. / 18 in sq.	Ohaus	235
300lb./150kg	.05lb/.02kg	HB-4832	AC / battery	16.5 x 21.6 in./ 420 x 550mm	Ohaus	235
330lb./150Kg	.1lb/.05kg	HB-4776	AC / AA batteries	300mm sq. / 12" sq	Adam	234
440lb./200Kg	.1lb/.05kg	HB-4777	AC / AA batteries	300mm sq. / 12" sq	Adam	234
440lb./200kg	.2lb/.1kg	HB-4772	AC / AA batteries	520 x 400mm / 20.5 x 15.7 in.	Ohaus	235
500lb./250kg	.05lb/.02kg	HB-4767	AC / AA batteries	600mm sq. / 24 in sq.	Ohaus	235



Ohaus Adventurer Pro and SL Analytical & Precision Balances

The Adventurer Series gives you the choice between the uncomplicated performance of the SL and the feature-rich versatility of the Pro. Both models feature a large stainless steel weighing platform, mechanical and software overload/underload protection, an integrated security bracket, weigh below hook and a standard protective in-use cover. Some models offer portability, operating on either the included AC adapter, or on 4 "AA" batteries. An Auto Shutoff feature helps conserve battery life.

The Pro model offers these additional features:
Display hood, Totalization, RS232 (Second interface optional), Internal calibration, backlight, GLP data output, Time/Date, Dynamic animal weighing.

Software features include a stability indicator, a low battery indicator, user selectable span calibration points, auto tare, user selectable printing options, user selectable communications settings, user selectable data print options, user definable project & user ID, a software reset menu and a software lockout menu. Other notable features include:

Weighing Modes: Milligram, Gram, Kilogram, Ounce, Pound, Carat, Pennyweight, Ounce Troy, Grain, Newton, Hong Kong Tael, Singapore Tael, Taiwan Tael, Momme, Tical, Baht, Mesghal, Tola, Custom

Calibration: Digital with External Weight (SL and Pro) or Digital with Internal Weight (Pro "C" models with InCal option)

Display Type: SL: Single Line LCD (4" x 1" (10cm x 2.5cm)
Pro: 2-Line Alphanumeric Backlit LCD Display

RS232 Interface with GLP Data Output: Connect to a PC or a printer and record GLP/GMP data including date, time, balance ID, user ID, project ID and reference data to meet traceability and compliance requirements (Pro model only).

Easy to View Display: Adventurer Pro features a 2- line alphanumeric LCD with brilliant backlight. Portable models include a backlight auto-off feature to conserve battery life (Pro model only).

Easy to Use Keypad: Four-button keypad with dedicated YES, NO, BACK and EXIT functions simplify menu navigation and balance set-up.

Ohaus Adventurer Pro Analytical & Precision Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
310g	0.001g	HB-313	0.001g	±0.002g	AC	4.7" Dia. / 120mm
810g	0.01g	HB-812	0.01g	±0.02g	AC / 4AA batteries	5.8" x 6.3" / 14.9 x 16.2mm
2100g	0.1g	HB-2101	0.1g	±0.2g	AC	5.8" x 6.3" / 14.9 x 16.2mm
3100g	0.01g	HB-3102	0.01g	±0.02g	AC	6.6" x 7.1" / 16.8 x 18mm
4100g	0.1g	HB-4101	0.1g	±0.2g	AC / 4AA batteries	5.8" x 6.3" / 14.9 x 16.2mm
8100g	0.1g	HB-8101	0.1g	±0.2g	AC / 4AA batteries	5.8" x 6.3" / 14.9 x 16.2mm

NOTE: Models above are available with InCal Internal Calibration—Place a "C" at the end of the part number to order this option.
(all InCal models above do not provide for AA battery operation)

Adventurer SL Analytical & Precision Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
310g	0.01g	HB-312	0.01g	±0.02g	AC	5.8" x 6.3" / 14.9 x 16.2mm
610g	0.01g	HB-612	0.01g	±0.02g	AC / 4AA batteries	5.8" x 6.3" / 14.9 x 16.2mm
3100g	0.01g	HB-3101	0.01g	±0.02g	AC	6.6" x 7.1" / 16.8 x 18mm
6100g	0.1g	HB-6101	0.1g	±0.2g	AC / 4AA batteries	5.8" x 6.3" / 14.9 x 16.2mm

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F

Adam PGW Precision Balances

PGW balances are designed for the lab but have the rugged features needed for materials testing. They include all metal chemical resistant die-cast housings, below balance weighing, and a huge backlit display.

Weighing Modes: g, ct, mg*, Kg, GN, N, dr, oz, ozt, dwt, mm, tl T, tl H, tl S, T, ti, custom. (*0.001 models only)

- All models are available with or without motorized internal calibration
- GLP-compliant software and print outs via RS232 connection; date and time stored in memory
- Density calculation, check weighing, counting, percent, dynamic weighing (for vibration), net/total
- Lock down Kensington™ type mounting point
- Below balance weighing with optional hanger
- Digital filters compensate for vibration, drafts or temperature changes



HB-4703

Weigh Below Hook— HB-4700WB
In-use Cover— HB-4700CV

Adam PGW Precision Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
250g	0.001g	HB-4700	0.001g	0.002g	AC	5.5" x 5.5" / 140mm x 140mm
450g	0.001g	HB-4701	0.001g	0.002g	AC	5.5" x 5.5" / 140mm x 140mm
750g	0.001g	HB-4702	0.001g	0.002g	AC	5.5" x 5.5" / 140mm x 140mm
1500g	0.01g	HB-4703	0.01g	0.02g	AC	7.6" x 7.6" / 192mm x 192mm
2500g	0.01g	HB-4704	0.01g	0.02g	AC	7.6" x 7.6" / 192mm x 192mm
3500g	0.01g	HB-4705	0.01g	0.02g	AC	7.6" x 7.6" / 192mm x 192mm
4500g	0.01g	HB-4706	0.01g	0.02g	AC	7.6" x 7.6" / 192mm x 192mm

NOTE: Internal Calibration—Place a "C" at the end of the part number to order this option.

Adam ACBplus Compact Balances

ACBplus balances have some very unique features that make them well suited for materials testing. The ACBplus comes complete with all the necessary accessories included: draft shield, AC adapter, RS232 interface and a below balance weighing hook.

- A removable draft shield helps when working on site where wind makes accurate readings difficult
- The rechargeable battery allows complete portability
- A weigh below hook is included to perform below balance weighing for density determination
- Parts counting, percentage weighing, totalization/accumulation
- Optional carry case for transporting to job sites or storage



HB-4711

Hard Carrying Case for ACB Scales—HB-4710C
In-use Cover—HB-4530CV

Adam ACBplus Compact Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
300g	0.01g	HB-4710	0.001g	0.002g	AC / battery	4.7" Dia. / 120mm
600g	0.02g	HB-4711	0.001g	0.002g	AC / battery	4.7" Dia. / 120mm
600g	0.01g	HB-4712	0.001g	0.002g	AC / battery	4.7" Dia. / 120mm
1000g	0.01g	HB-4713	0.01g	0.02g	AC / battery	4.7" Dia. / 120mm
1500g	0.05g	HB-4714	0.01g	0.02g	AC / battery	5.7" x 4.9"/ 144 x 124mm"
3000g	0.01g	HB-4715	0.01g	0.02g	AC / battery	5.7" x 4.9"/ 144 x 124mm

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F



HB-4500

Explorer Pro Analytical and Precision Balances

The Explorer Pro offers all the features and durability found in high-end laboratory balances plus the industry's easiest user interface for easy setup and operation. Features like weigh-below, RS232 port and a large high-resolution display are standard. These models can also be ordered with AutoCal Internal Calibration.

- Weighing units: gram, kilogram, pound, ounce, ounce troy, carat, pennyweight, Hong Kong Tael, Singapore Tael, Taiwan Tael, mommes, grain, tical, Newton, custom
- Simple 2-key menu operation and navigation
- Text prompts for fast setup
- Brilliant backlit high resolution dot matrix display
- RS232 port for easy communication with computer or printer
- Weigh below capability
- GLP compliant with user selectable outputs
- 5 Language operational display text
- Protective in-use cover and security bracket included



HB-4506

Explorer Pro High Capacity Models

Built to meet the most rugged demands, Ohaus Explorer Pro high-capacity balances provide an industrial capacity balance with the resolution and features of a premium laboratory balance. Three models are available with loads up to 32,000g and a readability of 0.1g. The extra large 11" x 14" (28 x 35.6cm) platform is ideal for laboratory and industrial applications in concrete/asphalt production and quality control.

- Weighing units: gram, kilogram, pound, ounce, ounce troy, carat, pennyweight, Hong Kong Tael, Singapore Tael, Taiwan Tael, mommes, grain, tical, Newton, custom
- Unique high-resolution graphic display with pop-up windows and menus to guide you through balance functions
- RS232 port for easy communication with computer or printer
- Weigh below capability
- Application library to store/recall Procedures
- Models available with AutoCal™, temperature sensitive motor driven internal calibration, which automatically self-calibrates when needed—always ready and calibrated!

Ohaus Explorer Pro Precision Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
410g	.001g	HB-4500	0.001g	±0.002g	AC	4.7" Dia. / 120mm
2100g	.01g	HB-4501	0.01g	±0.02g	AC	5.8" x 6.3" / 14.9 x 16.2mm
4100g	.01g	HB-4502	0.1g	±0.2g	AC	5.8" x 6.3" / 14.9 x 16.2mm
8100g	0.1g	HB-4504	0.01g	±0.02g	AC	6.6" x 7.1" / 16.8 x 18mm

NOTE: Models above are available with AutoCal Internal Calibration—Place a "C" at the end of the part number to order this option.

Ohaus Explorer Pro HIgh-Capacity Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
12,000g	0.1g	HB-4506	0.001g	±0.002g	AC	4.7" Dia. / 120mm
22,000g	0.1g	HB-4508	0.01g	±0.02g	AC	5.8" x 6.3" / 14.9 x 16.2mm
32,000g	0.1g	HB-4510	0.1g	±0.2g	AC	5.8" x 6.3" / 14.9 x 16.2mm

NOTE: Models above are available with AutoCal Internal Calibration—Place a "C" at the end of the part number to order this option.

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F

Adam AQT Compact Balances

The AQT provides a low-cost solution for field and lab usage. Complete with removable draft shield, AC adapter, adjustable feet and level and an integral security bracket. Ready for use out of the box, the AQT balances can operate with 6 AA batteries and an optional carrying case is available.

- A removable draft shield helps when working on site where wind makes accurate readings difficult
- Battery-powered with six AA batteries
- Optional carrying case available
- 2600g model is a great upgrade for triple-beam balances



HB-4532

Hard Carrying Case for AQT Scales—HB-4530C
In-use Cover—HB-4530CV



HB-4533

Adam AQT Compact Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
200g	.01g	HB-4528	0.02g	±0.02g	AC / AA batteries	5.1" Dia. / 130mm
250g	0.1g	HB-4529	0.1g	±0.1g	AC / AA batteries	5.1" Dia. / 130mm
600g	0.1g	HB-4530	0.1g	±0.1g	AC / AA batteries	5.1" Dia. / 130mm
1500g	0.1g	HB-4532	0.2g	±0.2g	AC / AA batteries	5.1" Dia. / 130mm
2000g	1g	HB-4534	1g	±1g	AC / AA batteries	5.1" Dia. / 130mm
5000g	1g	HB-4535	1g	±1g	AC / AA batteries	5.1" Dia. / 130mm

AQT 2600g Compact Balance sold with case: Perfect for field use, great upgrade to triple-beam balance.

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
2600g	0.1g	HB-4533	0.2g	±0.2g	AC / AA batteries	5.1" Dia. / 130mm

ADK High Capacity High Precision Balances

ADK high precision balances are built for heavy samples with a durable cast aluminum base, a generous weighing platform and a vacuum fluorescent display for high visibility. They provide high precision results at capacities up to 20kg. and 0.1g readability. And, with the ADK's below balance weighing capability density determination is easily accomplished.

- Durable 13.4" x 11.8" stainless steel platform
- Adjustable feet and level bubble
- Grams, ounces, pounds, parts counting, percentage weighing, and dynamic weighing for vibration
- Bi-directional RS232 interface
- Below balance hanger for density determination measurements
- Splash-proof keypad

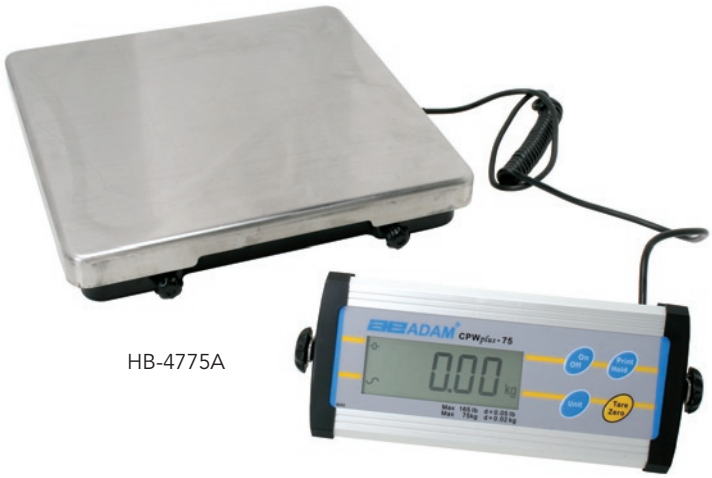


HB-4538WB

Adam ADK High Capacity High Precision Balances

Capacity	Readability	Model	Repeatability	Linearity	Power	Pan Size
10,000g	0.1g	HB-4538WB	0.1g	±0.2g	AC	300 x 340mm / 11.8" x 13.4"
20,000g	0.1g	HB-4537WB	0.1g	±0.2g	AC	300 x 340mm / 11.8" x 13.4"

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F



HB-4775A

Adam CPWplus Portable Scales

The CPWplus line of industrial scales is one of our most popular scales for materials testing and general field use. With a steel base, stainless steel weighing pan, flexible remote indicator and splash-proof keypad, the CPWplus can handle harsh messy applications easily. The RS232 interface, AC adapter and wall-mount bracket make it a versatile solution for lab and field work. Uses 6 AA batteries and has an optional carrying case for ease of portability.

- Large backlit LCD display on flexible remote indicator
- RS232 bi-directional interface
- Hold function freezes reading on display
- Uses 9V adapter (included) or six AA batteries
- Steel base, stainless weighing pan and splash-proof keypad

Hard Carrying Case for CBWplus Scales—HB-4775C

Adam CPWplus Portable Scales

Capacity	Readability	Model	Repeatability	Units	Power	Pan Size
75lb./35Kg	.02lb/.01kg	HB-4774	.02lb/.01kg	lb, oz, kg, g	AC / AA batteries	12" sq / 300mm sq.
165lb./75Kg	.05lb/.02kg	HB-4775	.05lb/.02kg	lb, oz, kg, g	AC / AA batteries	12" sq / 300mm sq.
330lb./150Kg	.1lb/.05kg	HB-4776	.1lb/.05kg	lb, oz, kg, g	AC / AA batteries	12" sq / 300mm sq.
440lb./200Kg	.1lb/.05kg	HB-4777	.1lb/.05kg	lb, oz, kg, g	AC / AA batteries	12" sq / 300mm sq.

HB-4635



Adam CBW Bench Scales

The CBW portable scale provides unmatched value for many weighing applications. Features a large stainless steel pan and rechargeable battery operation with up to 70 hours of operation from a charge. These scales can be ordered with a weigh-below hook for density applications. This is a factory-installed option only. The scale can also be fitted with a RS232 interface at the factory as well.

- Large backlit LCD display
- Overload protection
- Rechargeable battery
- Tare function
- Pre-set weighing with alarm
- Factory-installable RS232 interface and weigh-below features

In-use Cover—HB-4636CV

Adam CBW Bench Scales

Capacity	Readability	Model	Repeatability	Units	Power	Pan Size
35lb./15Kg	.001lb/.5g	HB-4636	.001lb/.5g	g, kg, lb, oz	AC / battery	8.9" x 10.8" / 225 x 275mm
65lb./30Kg	.002lb/1g	HB-4635	.002lb/1g	g, kg, lb, oz	AC / battery	8.9" x 10.8" / 225 x 275mm
100lb./45Kg	.005lb/2g	HB-4634	.005lb/2g	g, kg, lb, oz	AC / battery	8.9" x 10.8" / 225 x 275mm

NOTE: To order factory-installed weigh-below hook, use WB suffix to part number.

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F

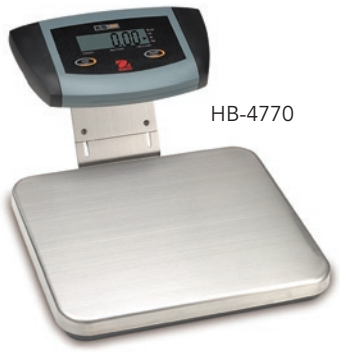
Ohaus ES Bench Scales

The Ohaus ES Low profile Bench Scale brings utility and economy together. Easy, two-button operation and a large display guarantee accurate and unmistakable results. The unique 3-way mounting bracket allows you to mount the indicator to the scale base, above the scale platform, or on any vertical surface. For simple weighing at a favorable cost, this scale is the one to choose.

- Auto-zero tracking • Large platform with leveling feet
- Battery saving auto-off timer, (after 5 minutes of inactivity)
- Large backlit LCD display on flexible remote indicator
- RS232 bi-directional interface • Hold function freezes reading
- Steel base, stainless weighing pan and splash-proof keypad



HB-4772



HB-4770

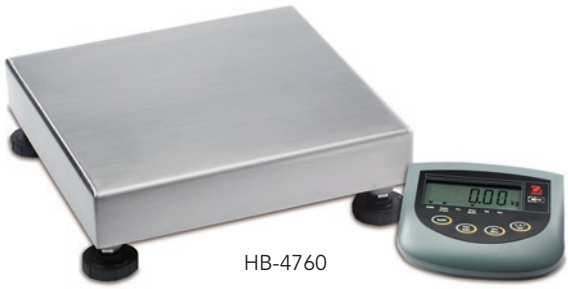
Ohaus ES Bench Scales

Capacity	Readability	Model	Repeatability	Units	Power	Pan Size
110lb./50kg	.05lb/.02kg	HB-4770	.02lb/10g	lb, oz, kg, lb:oz	AC / AA batteries	12.2 x 10.8 in. / 310 x 270mm
110lb./50kg	.05lb/.02kg	HB-4769	.02lb/10g	lb, oz, kg, lb:oz	AC / AA batteries	20.5 x 15.7 in. / 520 x 400mm
220lb./100kg	.1lb/.05kg	HB-4771	.02lb/10g	lb, oz, kg, lb:oz	AC / AA batteries	20.5 x 15.7 in. / 520 x 400mm
440lb./200kg	.2lb/.1kg	HB-4772	.02lb/10g	lb, oz, kg	AC / AA batteries	20.5 x 15.7 in. / 520 x 400mm

Ohaus Champ General Purpose Scale

For general weighing needs, the Champ™ general purpose bench scale is just right for your application and budget. When you need affordable performance, Champ's general purpose models offer custom versatility built on a rugged steel frame with leveling feet and leveling bubble. Every Champ General Purpose Bench Scale comes with an impressive range of features, including:

- Easy-to-use indicator, featuring weighing and display hold
- Stainless steel platter with painted steel carbon frame
- RS232 interface standard



HB-4760

Ohaus Champ General Purpose Scale

Capacity	Readability	Model	Repeatability	Units	Power	Pan Size
25lb./10kg	.002lb/.001kg	HB-4761	.01%	lb, oz, kg, g	AC / AA batteries	12 in sq. / 300mm sq.
50lb./25kg	.005lb/.002kg	HB-4760	.01%	lb, oz, kg, g	AC / AA batteries	12 in sq. / 300mm sq.
100lb./50kg	.01lb/.005kg	HB-4762	.01%	lb, oz, kg, g	AC / AA batteries	18 in sq. / 450mm sq.
250lb./100kg	.02lb/.01kg	HB-4764	.01%	lb, oz, kg, g	AC / AA batteries	18 in sq. / 450mm sq.
500lb./250kg	.05lb/.02kg	HB-4767	.01%	lb, oz, kg, g	AC / AA batteries	24 in sq. / 600mm sq.

Ohaus Defender Bench Scales

Similar to the Champ scales above, but with a lower price. Features a stainless steel removable pan and painted carbon steel frame and indicator column. AC power withan 80-hour internal rechargeable lead acid battery, included. Back lit dispaly and RS232 interface included.



HB-4831

Ohaus Defender Bench Scales

Capacity	Readability	Model	Units	Power	Pan Size
60lb./30kg	.02lb/.005kg	HB-4830	lb, oz, lb:oz, kg, g	AC / battery	12" x 14" / 305 x 355mm
150lb./60kg	.02lb/.01kg	HB-4831	lb, oz, lb:oz, kg, g	AC / battery	12" x 14" / 305 x 355mm
300lb./150kg	.05lb/.02kg	HB-4832	lb, oz, lb:oz, kg, g	AC / battery	16.5" x 21.6" / 420 x 550mm

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F



HB-4726

Ohaus Scout Pro Portable Balance

The Ohaus Scout Pro portable balances feature easy-to-use two-button operation, a high-contrast LCD display, multiple weighing units, four application modes, and the option of either RS232 or USB connectivity.

- Easy to Use – The high-contrast LCD display combined with two key operation makes the Scout Pro a snap to operate
- Battery or AC Power – Uses 4 "AA" batteries with auto shut-off feature for 40 hours of operation, or AC powerpack
- Integral Weigh-Below Hook – for density or specific gravity determination
- USB or RS232 Connectivity – Quickly-installed option with integral cable allows data connection to PC or printer
- Easy to Clean – Removable stainless steel weighing platform, sealed front panel and molded spill ring

Ohaus Scout Pro Portable Balance

Capacity	Readability	Model	Linearity	Units	Power	Pan Size
200g	.01g	HB-4720	±.01	kg, lb, g, oz	AC / AA batteries	4.7" dia. / 12mm dia.
400g	.01g	HB-4724	±.01	kg, lb, g, oz	AC / AA batteries	4.7" dia. / 12mm dia.
400g	.1g	HB-4723	±.1	kg, lb, g, oz	AC / AA batteries	4.7" dia. / 12mm dia.
600g	.1g	HB-4726	±.1	kg, lb, g, oz	AC / AA batteries	6.5" x 5.5" / 16.5 x 14.2mm
2000g	.1g	HB-4727	±.1	kg, lb, g, oz	AC / AA batteries	6.5" x 5.5" / 16.5 x 14.2mm
4000g	.1g	HB-4728	±.1	kg, lb, g, oz	AC / AA batteries	6.5" x 5.5" / 16.5 x 14.2mm


HB-4821

Ohaus Valor Xtreme Compact Precision Scale

The Valor Xtreme features a full stainless steel housing with added chemical resistance and a removable stainless weighing pan. It has advanced overload protection rated at 10x the scale capacity, making it ideal for tough environments. Long battery life of up to 100 hours is supplied from four C-type batteries. These scales also feature up-front level bubbles and a large backlit display.
Models HB-4823 and HB-4824 provide full NEMA 4X/IP65 water resistance for use in wet applications.

Ohaus Valor Xtreme Compact Precision Scale

Capacity	Readability	Model	Units	Power	Pan Size
2000g	.1g	HB-4820	lb, oz, lb:oz, kg, g	AC / C batteries	5.75" x 6.22" / 146 x 158mm
3000g	1g	HB-4821	lb, oz, lb:oz, kg, g	AC / C batteries	5.75" x 6.22" / 146 x 158mm
6000g	2g	HB-4822	lb, oz, lb:oz, kg, g	AC / C batteries	5.75" x 6.22" / 146 x 158mm
3000g	1g	HB-4823	lb, oz, lb:oz, kg, g	AC / C batteries	5.75" x 6.22" / 146 x 158mm
6000g	2g	HB-4824	lb, oz, lb:oz, kg, g	AC / C batteries	5.75" x 6.22" / 146 x 158mm


HB-4781

Multi-function Weighing Scale

This multi-function weighing scale is designed for light to medium industrial applications and provides fast displayed results, multiple functionality and internal battery operation.It offers versatility, portability and dependability in one affordable package.

- Stainless steel weighing pan
- Four weighing units: kg, g, lb and oz
- 80-hour internal rechargeable battery with power-saving auto-shut off feature
- Included in-use cover

Ohaus Multi-function Weighing Scale

Capacity	Readability	Model	Units	Power	Pan Size
60lb/30Kg	.002lb/.001kg	HB-4781	g, kg, lb	AC / rechargeable battery	11.8" x 9" / 300 x 230mm

NOTE: For 220V, 50/60 Hz applications use .4F suffix to part number, i.e. HB-4500.4F

Portable Bench Platform Scale— H-4732

Compact, self-contained scale is designed for rugged use, ideal for location or lab applications where scale can take a pounding. Complete with carrying handle, which doubles as a beam guard and allows convenient hanging from wall brackets, freeing bench and counter space. Weighs in lbs. only. 131 lbs capacity, Top: 125 lbs by 5 lbs; Left: 5 lbs x 1 oz; Right: 1 lb x 0.01 lb; Tare Bar: 0-10 lbs.
The H-4732 is constructed of steel and cast aluminum with adjustable hardened steel pivots and self-aligning steel bearings. The built-in platform and steel locking mechanism ensure safe, secure operation and portability. Also features a stainless steel poise rail, the beams are mounted below the platform, allowing unrestricted visibility when weighing. Beam balance indicator ensures correct reading. Main frame has rubber cushion mounting for protection. Platform: 12" x 17" (305 x 432mm).


H-4732

Portable Bench Platform Scale (metric)— H-4732M

Metric version of H-4732 above. Weighs in kg only. 52 kg capacity, Top: 50 kg by 2 kg; Left: 0-2 kg blank tare; Right: 2 kg x 0.01 kg.

Heavy Capacity Portable Bench Platform Scale— H-4748A

Heavier capacity model of the H-4732 above. Weighs in lbs. only. 260 lbs capacity, Top: 250 lbs by 10 lbs; Left: 5 lbs x 1 oz; Right: 5 lbs x 0.1 lb; Tare Bar: 0-25 lbs. Complete with carrying handle, which doubles as a beam guard and allows convenient hanging from wall brackets, freeing bench and counter space.

Stainless Steel Cover for H-4732 and H-4732M— H-4732SC

Digital Readout, U.S./Metric Suspension Scale— H-4621

High accuracy, compact digital hanging scale uses a 12-bit A/D converter for accuracy ± 0.1% of applied load. Weatherproof ABS plastic case assures maximum protection against moisture, dust and rough usage. High visibility, 1/2" high LCD digital readout provides easy reading of weights. Membrane push button switches allow simple trouble-free operation. Power is supplied by (1) 9-volt alkaline battery (not included). Peak hold, stainless steel hooks. Function keys for Zero, lb/kg, On/Off. Overall case size 3.75" W x 2" D x 6"H.

Capacity	Resolution	Model	Accuracy
250lb/113.4kg	.01lb/.01kg	H-4621	±.01%



H-4621

Spring Scale— H-4480

For field soil tests in mechanical analysis of aggregates, scale has 60 lb. capacity. Dial is 30 lbs. by 0.1 lb. For direct reading, loose pointer is set at any position on the 8" (203mm) dia. dial with thumbscrew. Overall dimensions: 8" x 1-5/8" x 16" (203 x 41 x 406mm). Shipping wt. 8 lbs. (3.6kg)

Straight Spring Balance— H-4490

Heavy-duty spring balance for batch weighings with reliable accuracy and 100 lb. capacity. Gauge 100 lbs. by 1 lb. Easy-to-read recessed gauge has deep-etched graduations. Adjustable indicator is set to zero for taring. Overall dimensions: 2" x 1-3/4" x 11" (51 x 45 x 279mm).


H-4490


H-4480


H-4888.1KG
H-4888.2KG


H-4888.200G


H-4887A

Brass Weight Sets

Model	Description
H-4886	**1 to 1000g metric set in box w/ lid**, includes: (1) 1g; (2) 2g; (1) 3g; (1) 5g; (2) 10g; (1) 30g; (1) 50g, (2) 100g; (1) 200g, and (1) 500g
H-4876	same as above except box has no lid
H-4887	**1 to 2000g metric set in box w/ lid**, includes: (1) 1g; (2) 2g; (1) 3g; (1) 5g; (2) 10g; (1) 30g; (1) 50g, (2) 100g; (1) 200g; (1) 500g, and (1) 1,000g
H-4877	same as above except box has no lid
H-4878	**100 to 1000g metric set, includes**: (1) 100g; (1) 200g; (1) 500g; , and (1) 1,000g
H-4882	**100g to 2kg calibration weight set**, includes: (1) 100g; (2) 200g; (1) 500g; (1) 1kg, and (1) 2kg

ASTM Class 1 Calibration Masses

Mass Value	Model
200g	H-4888.200G
300g	H-4888.300G
400g	H-4888.400G
500g	H-4888.500G
1000g	H-4888.1KG
2kg	H-4888.2KG
4kg	H-4888.4KG
5kg	H-4888.5KG
10kg	H-4888.10KG
20kg	H-4888.20KG
30kg	H-4888.30KG

Sizes through 5kg are cylindrical style and include a carrying case. 10kg through 30kg have grip-style handles and do not come with a case.

Field Scale Replacement Weights



Model H-4660 (avoirdupois)

Weight	Model
1 lb.	H-4660.1
2 lb.	H-4660.2
5 lb.	H-4660.5
10 lb.	H-4660.10

Original set includes: (1) 1lb; (2) 2 lb; (2) 5 lb, and (2) 10lb

Model H-4665 (metric)

Weight	Model
500g	H-4665.1
1kg	H-4665.2
2kg	H-4665.3
5kg	H-4665.4

Original set includes: (1) 500g; (1) 1 kg; (2) 2 kg, and (2) 5 kg


H-4603CC


H-4615S


H-4615P


H-21170


H-4609

Mechanical Balance Accessories

(Models: H-4603, H-4604, H-4605, H4835, H-4837)

Description (Ohaus No.)	Model
Polypropylene scoop & counterweight (703-00)	H-4615P
Stainless steel scoop & counterweight (703-SO)	H-4615S
Rod & clamp assembly for under-balance weighing (183-00)	H-21170
Vinyl dust cover (706-00)	H-4603C
Steel carrying case	H-4603CC
Replacement attachment weight set (707-00)	H-4609



H-4825

H-4830



H-4604



H-4835



H-4837



H-4605



H-4660



H-4785

Ohaus Mechanical Balances

Model	Description (Ohaus No.)	Capacity	Readability	Tare	Platform	Shipping Wt.
H-4825	Cent-O-Gram (311-00)	311g	0.01g	—	3.5" dia. x .5" deep stainless steel pan	5.5lb/2.49kg
H-4830	Dial-O-Gram (310-00)	310g	0.01g	—	3.5" dia. x .5" deep stainless steel pan	5.5lb/2.49kg
H-4603	Series 700 Triple Beam w/ H-4609 weight set (750-SW/707)	2610g	0.1g	—	6" dia. stainless steel plate	8.8lb/3.99kg
H-4604	Series 700 Triple Beam w/ H-4609 weight set (750-SW/707)	2610g	0.1g	225g	6" dia. stainless steel plate	8.8lb/3.99kg
H-4605	Series 700 Triple Beam w/ H-4609 weight set (750-SW/707)	2610g	0.1g	—	12" x 6" x 3" stainless steel scoop	8.3lb/3.76kg
H-4835	Dial-O-Gram (1650-WO)	2610g	0.1g	225g	6" dia. stainless steel plate	9.9lb/4.49kg
H-4837	Dial-O-Gram w/ H-4615S Scoop* (1650-WO and 703-SO)	2610g	0.1g	225g	6" dia. stainless steel	10lb/4.5kg
H-4665	Heavy-Duty Field Scale, metric (2400-11)	16kg	5.0g	—	10"dia. epoxy-coated steel	23lb/10.4.5kg
H-4660	Heavy-Duty Field Scale, english (2400-12)	36lb	0.01lb	—	10"dia. epoxy-coated steel	23lb/10.4.5kg
H-4785	Heavy-Duty Solution Balance (1119-DO)	20kg	1.0g	2270g	11"dia. stainless steel	44lb/19.96kg

* includes H-4615S stainless steel scoop and counterweight



H-4911.400 H-4911.100

Graduated Glass Beakers

Description	Capacity	Grad. Range	Interval	Model
Griffin low-form beakers for general laboratory use have pourout lip. Design provides greater strength via heavier uniform walls.	50ml	10-40	10	H-4911.050
	100ml	20-80	10	H-4911.100
	250ml	25-200	25	H-4911.250
	400ml	25-325	25	H-4911.400
	600ml	50-500	50	H-4911.600
	800ml	50-750	50	H-4911.800
	1000ml	50-950	50	H-4911.1M
	2000ml	50-1950	50	H-4911.2M
	3000ml	50-2950	50	H-4911.3M
	4000ml	50-3950	50	H-4911.4M

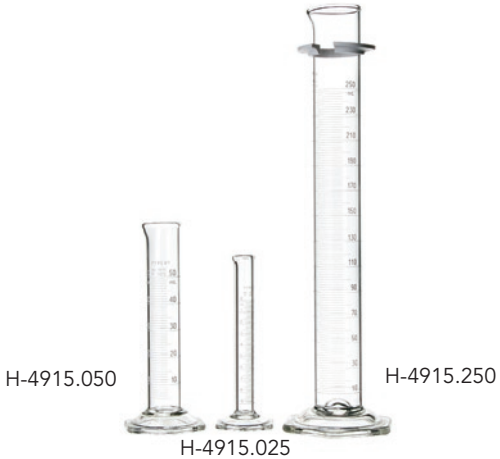


H-4912P.250

H-4912P.1M H-4912P.050

Graduated Plastic Beakers

Description	Capacity (ml)	Model
Low-form laboratory beakers with slightly tapered heavy walls provide firm grip and convenient stacking. Beakers have pourout spout and graduation markings (±5%).	250	H-4912P.050
	100	H-4912P.1000
	250	H-4912P.250
	400	H-4912P.400
	600	H-4912P.600
	1000	H-4912P.1M
	2000	H-4912P.2M



H-4915.050 H-4915.250

H-4915.025

Graduated Glass Cylinders

Description	Capacity	Model
Glass graduated cylinders. Graduated circular divisions, double-numbered, reading up and down. Calibrated to deliver the indicated capacities. Packed one cylinder to a carton.	10ml	H-4915.010
	25ml	H-4915.025
	50ml	H-4915.050
	100ml	H-4915.100
	250ml	H-4915.250
	500ml	H-4915.500
	1000ml	H-4915.1M
	2000ml	H-4915.2M



H-4916P.500

H-4916P.050

Graduated Plastic Cylinders

Description	Capacity	Model
Polypropylene graduated cylinders are double scale with easy-to-read numbers. Stable base makes cylinders tip- and roll-proof. 10ml size has flared top for easy filling.	10ml	H-4916P.010
	25ml	H-4916P.025
	50ml	H-4916P.050
	100ml	H-4916P.100
	250ml	H-4916P.250
	500ml	H-4916P.500
	1000ml	H-4916P.1M
	2000ml	H-4916P.2M

Narrow Mouth Flasks

Description	Capacity (ml)	Model
Narrow-mouth flasks feature heavy-duty rim, volume graduations, tubulation and matte spot for temporarily identifying contents.	250	H-4917.250
	500	H-4917.500
	1000	H-4917.1M
	2000	H-4917.2M
	4000	H-4917.4M



H-4917.2M

H-4913.1M

H-4913.250

Erlenmeyer Flasks—Vented

Description	Capacity (ml)	Model
Narrow-mouth flasks feature heavy-duty rim, volume graduations, tubulation and matte spot for temporarily identifying contents.	250	H-4913.250
	500	H-4913.500
	1000	H-4913.1M
	2000	H-4913.2M
	4000	H-4913.4M

Rubber Stoppers for Erlenmeyer Flasks

Description	Capacity (ml)	Model
Rubber stopper with brass hose fitting for use with Erlenmeyer flasks.	250	H-4913.250S
	500	H-4913.500S
	1000	H-4913.1MS
	2000	H-4913.2MS
	4000	H-4913.4MS



H-4913.250S

H-4913.1MS

Guth Wash Bottle— H-3397

Bottle has aspirator bulb with integral passageways and neck-mounted check-valve on a 1,000ml borosilicate florence flask. Includes bent delivery tube and flexible tubing tip. Flask allows natural grip with either hand. Forefinger closes the opening while the other fingers squeeze the bulb ejecting a stream of liquid.

8 oz (250ml) Polyethylene Dispensing Bottle—H-3398
16 oz (500ml) Polyethylene Dispensing Bottle—H-3399

Easy-to-squeeze, resilient bottles provide excellent leak-proof dispensing units. Heavier flow rate can be accomplished by cutting back dispenser tip.



H-3397

H-3399

H-3398

Desiccator Jar, 5" (128mm) Diameter— H-4960
Desiccator Jar, 8" (203mm) Diameter— H-4961

Heavy-walled, annealed jar has finely ground flanges and cover knob. Includes specimen plate. 5" (128mm) Jar has 5" inside diameter and 5-1/4" (134mm) inside height, and, 8" (203mm) jar has 8" inside diameter and height.

Desiccator Jar, Specimen Plate for H-4960— H-4960P
Desiccator Jar, Specimen Plate for H-4961— H-4961P



H-4962



H-4960

Desiccab Desiccator— H-4962

Stainless steel cabinet with Clear-Vue door eliminates danger of glass breakage. Interior has chemical-resistant finish; door is sealed with two firm-grip latches and molded rubber gasket. Includes glass desiccator tray and two heavy-gauge ceramic shelves that are fully adjustable with 1/2" (13mm) centers. Inside dimensions: 13" x 13" x 13-1/4" (330 x 330 x 336mm).



H-1702

Material Handling Scoops

Size	Model	Description	Shpg. Wt.
8" H x 15" W x 23" L (203 x 381 x 584mm)	H-1702	Material Handling Scoop	12 lb (5.4kg)
15" x 30" x 4" (381 x 762 x 102mm)	H-4308	Welded steel construction with open chute simplifies transfer or bag loading. Front swing-down handle folds inside pan to permit criss-cross stacking. Tapered scoop section controls flow.	9 lb (4.1kg)
12" x 20" x 4" (305 x 508 x 102mm)	H-4309		



H-4308

Moisture and Immersion Pans

Size	Model	Description	Shpg. Wt.
18 x 18 x 1-1/2" deep (457 x 457 x 38mm)	H-3700	Galvanized iron with wire-bound, rolled-top edges. Features 2 drop handles, straight sides. ASTM D2234, D2961	10 lb (4.5kg)
18 x 18 x 3" deep (457 x 457 x 76mm)	H-3707	Same as above but without handles	
18 x 18 x 3" deep (457 x 457 x 76mm)	H-3705	Same as H-3700, except with tapered sides for nesting. ASTM D346, D2013, D2234	12 lb (5.4kg)
24 x 24 x 4" deep (610 x 610 x 102mm)	H-3710	Same as H-3700. ASTM D346, D2013, D 2234	20 lb (9kg)
24 x 24 x 6" deep (610 x 610 x 152mm)	H-3712		
10 x 20 x 3" deep (254 x 508 x 76mm)	H-3723	Same as H-3700, except with tapered sides for nesting.	9 lb (4.1kg)
24 x 24 x 3" deep (610 x 610 x 76mm)	H-3725	Same as H-3700, except with tapered sides for nesting. ASTM C192	18 lb (8.2kg)



H-3700



H-3705

Stainless Steel Rectangular Pans

Dimensions	Model	Shpg. Wt.
6-1/2" x 6" x 4-1/2"D (165 x 152 x 114)	H-3981S	3 lb (1.4kg)
10-1/2" x 5-1/2" x 4-1/2"D (267 x 40 x 114)	H-3986S	4 lb (1.8kg)
13-1/2" x 6-3/4" x 5"D (343 x 71 x 127)	H-3967S	5 lb (2.3kg)
22" x 6-1/2" x 5-1/4"D (559 x 165 x 133)	H-3993S	6 lb (2.7kg)
15-1/2" x 8" x 7"D (3394 x 204 x 178)	H-3996S	6 lb (2.7kg)



H-3967S



H-4359A

Bakalon Rectangular Mixing Pans

Model	Size (LxWxD)
H-4359A	18 x 13 x 1-7/8" (457 x 330 x 47mm)



H-4934

Tin Rectangular Mixing Pans

Model	Size (LxWxD)
H-3981	8 x 5-1/4 x 4-1/4" (203 x 133 x 108mm)
H-4934	8-1/2 x 4-1/2 x 2-1/2 (216 x 114 x 64mm)

Stainless Steel Rectangular Mixing Pans

Model	Size (L x W x D)
H-3969	10-3/8 x 6-3/8 x 2-1/2" (264 x 162 x 64mm)
H-4352.2	20-3/4 x 12-3/4 x 2-1/2" (527 x 323 x 63mm)
H-4352.4	20-3/4 x 12-3/4 x 4" (527 x 324 x 102mm)
H-4352.6	20-3/4 x 12-3/4 x 6" (527 x 324 x 152mm)
H-4353.2	13-7/8 x 12-3/4 x 2-1/2" (346 x 323 x 63mm)
H-4353.4	13-7/8 x 12-3/4 x 4" (346 x 323 x 102mm)
H-4353.6	13-7/8 x 12-3/4 x 6" (346 x 323 x 152mm)
H-4354.2	10-3/8 x 12-3/4 x 2-1/2"(264 x 342 x 64mm)
H-4354.4	10-3/8 x 12-3/4 x 4" (264 x 342 x 102mm)
H-4354.6	10-3/8 x 12-3/4 x 6" (264 x 342 x 152mm)
H-4355.2	6-7/8 x 12-3/4 x 2-1/2" (174 x 342 x 64mm)
H-4355.4	6-7/8 x 12-3/4 x 4" (174 x 342 x 102mm)
H-4355.6	6-7/8 x 12-3/4 x 6" (174 x 342 x 152mm)
H-4356.2	14-7/8 x 10-1/4 x 2" (376 x 269 x 50mm)
H-4356.4	16-1/8 x 11-1/8 x 2-1/4" (409 x 282 x 57mm)
H-4356.6	18-1/8 x 12-3/8 x 2-3/8" (460 x 314 x 60mm)



H-4352 Series



H-3969

Aluminum Rectangular Mixing Pans

Model	Size (L x W x D)
H-4351.2	15-3/8" x 10-7/8" x 2-3/8" (390 x 276 x 60mm)
H-4351.4	17-5/8" x 11-3/4" x 2-3/8" (447 x 298 x 60mm)
H-4351.6	25-3/4" x 17-3/4" x 3-1/2" (654 x 450 x 89mm)
H-4941	8" x 8" x 2"(203 x 203 x 51mm)



H-4351.6

Stainless Steel Round Mixing Bowls and Pans

Model	Size and Volume
H-4936	7-1/4" x 3" (198 x 76mm), 1-1/2 qt. (1.4L)
H-4937	9-1/2" x 3-1/2" (241 x 89mm), 3 qt. (2.8L)
H-4938	12-1/2" x 5-1/2" (318 x 140mm), 8 qt. (7.6L)
H-4939	10-3/4" x 4-3/4" (273 x 121mm), 5-1/2 qt. (5.2L)
H-4939.5	17-1/2" x 6-1/2" (444 x 165mm), 16 qts. (13.9L)



H-4936

Aluminum Round Mixing Bowls and Pans

Model	Size (L x W x D)
H-4940.2	9" x 1-1/2" (228 x 38mm)
H-4940.4	10" x 1-1/2" (254 x 38mm)
H-4940.6	12" x 1-1/2" (304 x 38mm)
H-4940.8	15" x 1-1/2" (381 x 38mm)



H-4940



H-4920.050

H-4920.1M

Aluminum Beaker

Capacity	Description	Aluminum	Nickel
60ml 125ml 250ml	Low-form laboratory beakers with pour spout. One-piece construction eliminates breakage.	H-4920.060 H-4920.125 H-4920.250	H-4921.060 H-4921.125 H-4921.250
500ml 1,000ml 2,000ml		H-4920.500 H-4920.1M H-4920.2M	H-4921.500 H-4921.1M H-4921.2M



H-4922.050



H-4922C.050

Nickel Crucibles & Covers

Nickel crucibles from pure heavy sheet nickel. Suitable for fusions, including those with sodium peroxide. Highly resistant to dilute alkalies.

Capacity	Top Dia.	Height	Crucible	Cover
20ml	38mm	35mm	H-4922.020	H-4922C.020
30ml	42mm	45mm	H-4922.030	H-4922C.030
50ml	45mm	51mm	H-4922.050	H-4922C.050
75ml	51mm	57mm	H-4922.075	H-4922C.075
100ml	60mm	64mm	H-4922.100	H-4922C.100
250ml	83mm	83mm	H-4922.250	H-4922C.250
500ml	102mm	92mm	H-4922.500	H-4922C.500
1000ml	127mm	114mm	H-4922.1M	H-4922C.1M



H-4923.1M



H-4923.500

Stainless Steel Measures

Capacity	Description	Model
500ml	Measures feature convenient handle and graduations in milliliters and ounces on inside.	H-4923.500
1,000ml		H-4923.1M
2,000ml		H-4923.2M



Aluminum Moisture Boxes

Dia	Height	Description	Model
2" (51mm)	7/8" (22mm)	Seamless aluminum flat bottom, straight side box has tight fitting cover that fits bottom of box also. Sample is protected from exposure during weighing operations.	H-4926
2-1/2" (64mm)	1-3/4" (44mm)		H-4927
3" (76mm)	1" (25mm)		H-4928
3-1/2" (89mm)	2" (51mm)		H-4929

Nickel Evaporating Dishes

Capacity	Dia	Height	Description	Model
40ml	2-1/4" (57mm)	1" (25mm)	Heavy gauge pure nickel dishes have straight sides, flat bottom, pour lip.	H-4924.040
100ml	2-3/4" (70mm)	1-3/8" (35mm)		H-4924.100
200ml	3-3/8" (86mm)	1-13/16" (46mm)		H-4924.200
300ml	3-7/8" (98mm)	2-1/4" (57mm)		H-4924.300



H-4924 Series

Porcelain Evaporating Dishes

Capacity	Top Dia	Height	Description	Model
120ml	90mm	37mm	Shallow porcelain dish has pour lip, glazed inside, partly glazed	H-4930.120
250ml	115mm	45mm		H-4930.250
765ml	185mm	54mm		H-4930.765
1,285ml	215mm	63mm		H-4930.M1285



H-4930.250

Plastic Jars with Caps

Capacity	Description	Model
4 oz (113.4g)	White plastic jar with cap; 12 per pack.	H-4914.04
8 oz (226.8g)		H-4914.08
16 oz (453.6g)		H-4914.16



H-4914.08

Aluminum Moisture Dish— H-17150
Inverted slip-in cover with beaded edge for tight sealing, can be handled with crucible tongs. Inside dia at top 2-1/4" x 3/4" deep (57mm x 19mm). Drawn aluminum construction. Packed 10 per ctn.



H-17150

Sample Can— H-4184
For storing and transporting sample materials, 1qt.-capacity (.87L) can has friction-type cover. Dimensions: 4-1/8" dia. x 4-7/8" (105 x 124mm)

Field Can— H-4183
For receiving, transporting and storing samples, 1 gal-capacity (3.48L) can adequately holds all material from average-size density hole. Has friction-type lid. Dimensions: 6-1/2" dia. x 7" (165 x 178mm).



H-4184



Stainless Steel Scoops

Model	Teflon® Coated	Scoop No.	Nose	Bowl Vol./ Water (oz/cu. in.)	Bowl Demensions Length	Width	Depth	Overall Length
H-3734	H-3734TC	–	Round	3.3 (6.1)	5" (114mm)	2-1/2" (63mm)	1" (25.4mm)	9" (228mm)
H-3735	H-3735TC	–	Flat	6.6 (12.2)	5-1/2" (139mm)	3" (76mm)	1-1/2" (38mm)	9.3" (236mm)
H-3736	H-3736TC	–	Flat	29 (53)	8" (203mm)	5-1/2" (139mm)	2-1/2" (63mm)	13-1/2" (343mm)
H-3738		–	Curved	–	2-1/2" (635mm)	2-1/2" (635mm)	–	9" (228mm)

Aluminum Scoops

Model	Teflon® Coated	Scoop No.	Nose	Bowl Vol./ Water (oz/cu. in.)	Bowl Demensions Length	Width	Depth	Overall Length
H-3729	H-3729TC	1	Round	13.5 (24.4)	6-3/4" (172mm)	4" (102mm)	2-1/2" (64mm)	10" (254mm)
H-3730	H-3730TC	–	Square	6.7 (12.2)	6" (152mm)	3-3/4" (95mm)	2" (51mm)	9-1/4" (235mm)
H-3731	H-3731TC	2	Round	20 (36.6	8-1/4" (210mm)	5-1/4" (133mm)	3" (76mm)	12-1/4" (311mm)
H-3732	H-3732TC	3	Round	33 (61.02)	10-1/4" (260mm)	5-3/4" (146mm)	3-1/2" (89mm)	14-1/2" (368mm)

Plastic Scoop

Model	Teflon® Coated	Scoop No.	Nose	Bowl Vol./ Water (oz/cu. in.)	Bowl Demensions Length	Width	Depth	Overall Length
H-3727	–	–	Flat	67 (115.5)	9" (228mm)	4" (102mm)	5-1/2" (139)	9" (228mm)



H-3727



H-3760

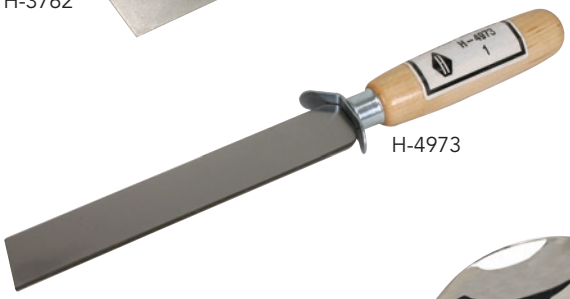
Trowels — H-3760, H-3780
Forged steel trowel for mixing cement batches, filling molds, etc., has flat pointed blade and wood handle.
Dimensions: H-3760 – 2-3/4" x 5" (70 x 127mm)
Dimensions: H-3780 – 5-1/4" x 10" (133 x 254mm)



H-3762

Trowels — H-3761
Forged steel trowel for striking off molds, etc., has edges ground straight. Meets ASTM C109; AASHTO T106.
Dimensions: 2-3/4" x 5" (70 x 127mm)

Trowels — H-3762
Plasterer-type trowel's flat rectangular blade is fastened to the mounting and wood handle with stainless steel pins.
Dimensions: 4-1/2" x 10" (114 x 254mm)



H-4973

Preparation Knife — H-4973
Used for sample preparation and general lab work, knife has 6"-long thin, sharp blade and wood handle.



H-4974

Spoon — H-4974
For mixing and transferring soils, handling corrosive chemicals, etc., stainless steel spoon is 13" (330mm) long.



H-4908
H-4906
H-4904
H-4907

Spatula — H-4904, H-4906, H-4907, H-4908, H-4910
Flexible stainless steel blades with straight edges and rounded ends. Blade is riveted into wooden handle. H-4907 meets ASTM C185, C780; AASHTO T137.
Dimensions:
H-4904 – 3/4" (19mm) wide x 4" (102mm) long, straight-edge spatula.
H-4906 – 7/8" (22mm) wide x 6" (152mm) long, straight-edge spatula.
H-4907 – 1/2" (13mm) wide x 6" (152mm) long, straight-edge spatula.
H-4908 – 1-1/4" (32mm) wide x 8" (204mm) long, straight-edge spatula.
H-4910 – 1-1/4" (32mm) wide x 10" (254mm) long, straight-edge spatula.





Hammers

Size	Model
14 oz. Rock Pick—Pointed tip: nylon-vinyl grip	H-4891
22 oz. Rock Pick—Pointed tip; leather grip	H-4892
20 oz. Rock Pick—Chiseled edge; nylon-vinyl grip	H-4893
22 oz. Rock Pick—pointed tip, 16-1/4" long	H-4894
3 lb. Crack Hammer—painted finish w/nylon-vinyl grip	H-4895
28 oz. Dead Blow Hammer	H-4890

Rubber Mallets

ASTM Weight	Head (L x Dia)	Handle	Model
2.10 lbs (0.95 kg)	5 x 2.5" (127 x 64mm)	12.75" (324mm)	H-4975
1.30 lbs (0.59 kg)	3.75 x 2.25" (95 x 57mm)	11" (280mm)	H-4976

Chisels / Pry Bars

Size	Model
Rock Chisel, .5" x 12" long, vinyl cushion grip	H-4896
Rock Chisel, 5/8" x 9" long, vinyl cushion grip	H-4897
Rock Chisel, 1.25" x 8" long, for splitting	H-4898
Pry Bar, 18" long with forged I-beam construction	H-4899
Chisel, 1.25" x 9" long, with finger-grip vinyl handle	H-4970

Clear Safety Goggles — H-4900
soft vinyl frame and replaceable lens



Straightedges

Description	Model	Dimensions (mm)
For striking-off samples in containers, measures or molds. Ground steel with beveled edge. Meets ASTM C185, D558, D559, D560, D698; AASHTO T137.	H-4144.8	8" Straightedge, 1/8 x 1-1/4 x 8" (3 x 32 x 203mm)
	H-4144.12	12" Straightedge, 1/8 x 1-1/4 x 12" (3 x 32 x 305mm)
	H-4144.16	16" Straightedge, 1/8 x 1-1/4 x 16" (3 x 32 x 406mm)
	H-4144.24	24" Straightedge, 1/8 x 1-1/4 x 24" (3 x 32 x 610mm)



Brushes

Description	Model	Handle	Bristle	Bristle Length (mm)	Overall Dimension (mm)
Table Brush	H-3776	Wood	Horsehair	2-1/4" x 2" x 8" (57 x 51 x 203)	13-1/2" (343)
Wire Scratch Brush*	H-4259	Wood	Wire No. 26 gauge flat	2" x 2" x 7" (51 x 51 x 178)	7-3/4" x 2-5/8" (197 x 67)
Acid-proof Crete Brush	H-3639.8	Plastic	Polypropylene	2" x 3" x 4" (51 x 76 x 102)	8-1/4" (210)
Acid-proof Crete Brush	H-3639.20	Plastic	Polypropylene	2" x 3" x 4" (51 x 76 x 102)	20" (508)
Mold Cleaning Brush	H-3800	Wood	Brass Wire	2" x 7/8" x 5-1/4" (25 x 22 x 133)	10-1/4" (360)
Sieve Brush, Fine Mesh	H-3774	Wood	Horsehair	1-1/2" x 1-1/4" diam. (38 x 32)	5-1/4" (133)
Sieve Brush, Oval Shaped	H-3799	Wood	Horsehair	2-3/4" x 1-1/8" x 3/4" (70 x 29 x 19)	10-1/2" (267)
Sieve Brush, Fine Mesh	H-3770	Wood	Horsehair	2-1/2" x 1" x 3/8" (64 x 25 x 10)	10-1/2" (267)
Sieve Brush, Coarse Mesh	H-3772	Wire Loop	Wire	1-1/2" x 3/4" x 1/8" (38 x 19 x 3)	51/2" (140)


H-3740


H-3743.10


H-4982

H-4983


H-3745


H-3746

Round Point Shovel — H-4982
Heat-treated high-carbon steel round-pointed blade has 27" (69cm) D-grip handle and full wooden yoke with steel casing.

Square-Point Shovel — H-4983
Heat-treated high-carbon steel 9-3/8x11-1/2" (24x29cm) square-pointed blade with 48" (122cm) handle.

Rubber Gloves—H-3740
For use in compaction, concrete and general lab work, medium thickness short-form gloves without gauntlets are chemical and abrasion resistant and feature curved fingers and contoured palm for ease while working.

Nitrile0Coated Hot Mill Glove, Size 9—H-3743.9
Nitrile0Coated Hot Mill Glove, Size 10—H-3743.10
Non-woven, felt insulation and a full-length heat barrier protect hands. Nitrile coating prevents cuts and abrasions. For use in handling hot objects up to 400°F.

Heavyweight Terrycloth Glove—H-3745
Heavyweight terrycloth glove; one size.

Heat-Resistant Gloves—H-3746
Made with large thumb, fingers and loose-fitting palm with wide gauntlet, gloves feature one-piece full-length palm and finger portions, keeping seams to a minimum.

Heavy-Weight Heat-Resistant Gloves—H-3742
Made from heavy-weight hot mill, kevlar cotton blend. Cotton acrylic liner with nitrile N-coating. Reversible.


H-4206


H-4208


H-4207A


H-4207

Plastic-lined Sample Bags

Size	Model
10 x 18" (254 x 457mm)	H-4208
17 x 32" (432 x 813mm)	H-4209

Sample Bags

Size	Model
10 x 18" (254 x 457mm)	H-4206
17 x 32" (432 x 813mm)	H-4207

Economy Sample Bags

Size	Model
10 x 19" (254 x 483mm)	H-4206A
15 x 29" (381 x 737mm)	H-4207A

Stepdown Transformers
Allows use of 115-volt electrical equipment on 230-volt line current. Features case and core internally connected to third conductor of NEMA standard cord and receptacle for safety. Has 3-conductor 8' 0" (2.4m) line cord and plug on primary side and female receptacle as output connection.

General Description	Model	Model Description
Allows use of 115-volt electrical equipment on 230-volt line current. Features case and core internally connected to third conductor of NEMA standard cord and receptacle for safety. Has 3-conductor 8' 0" (2.4m) line cord and plug on primary side and female receptacle as output connection. Available in 250W, 500W, 750W, 1,000W, 1,500W, 2,000W.	H-1042	250-watt transformer. Shipping wt. 10 lbs. (4.5kg)
	H-1042.5	500-watt transformer. Shipping wt. 12 lbs. (5.4kg)
	H-1042.7	750-watt transformer. Shipping wt. 16 lbs. (7.3kg)
	H-1042.10	1,000-watt transformer. Shipping wt. 17 lbs. (7.7kg)
	H-1042.15	1,500-watt transformer. Shipping wt. 21 lbs. (9.5kg)
	H-1042.20	2,000-watt transformer. Shipping wt. 28 lbs. (12.7kg)

H-17270



Mortar & Pestle (Plattner's)— H-17270
For crushing small samples of ore. Made of hardened alloy tool steel. Mortar has flat-bottomed cylindrical cavity with removable sleeve for containing crushed material. Mortar: 3" (76mm), O.D. cavity: 1" dia x 1/4" deep (25mm x 6.4mm). Guide sleeve: 1-1/2" (38mm) long. Pestle: 1" dia x 3" long (25 x 76mm).

H-17280



Mortar & Pestle— H-17280
Meets U.S. Pharmacopeia XIX. Made from hardened tool steel in accordance with specifications for Powdered Glass Test. Mortar has a flat-bottomed cylindrical cavity. Mortar: 76.2mm. O.D. cavity: 50.8mm dia x 43.9mm deep; Pestle: 50.4mm dia, 108mm overall length, Shipping. wt.: 8 lbs

Mortar & Pestle For Crushing Hard, Tough Substances— H-17300
Pestle Only— H-17301
Mortar Only— H-17302
Made of hardened alloy tool steel. Pestle has ball-end to fit bottom of mortar cavity. Mortar: 3" x 3" x 4-1/2"H (76 x 76 x 114mm); bore: 2" dia x 3" deep (51 x 76mm). Pestle: 9-1/2" (241mm) overall length.



H-17300

Mortar and Pestle Compaction Mold— H-1675
Mortar and pestle compaction mold used to prepare powdered samples to test softening point of resins and other bituminous materials using ring-and-ball method. Mortar, pestle, sleeve, knockout button and ring support are C.R. steel. Meets dimensions in Fig. 3 of ASTM E28.



H-1675

Digital Calipers — H-2616, H-2616.8, H-2616.12
May be used for outside, inside, depth and step measurements. Switchable from inches to millimeters.
Dimensions:
H-2616 – 0-6" (0-150mm), Range: ±0.001" accurracy.
H-2616.8 – 0-8" (0-200mm), Range: ±0.001" accurracy.
H-2616.12A – 0-12" (0-300mm), Range: ±0.0015" accurracy.



H-2817

Stainless Steel Dial Caliper 6" (150mm)—H-2817M
Easy to read black face dial caliper with combination inch and metr scales features 0.001" / 0.1mm graduations, hardened and ground stainless steel main beam with hardened, ground and lapped measuring faces.



H-2816.8

Stainless Steel Dial Caliper (6 inch)—H-2817
Similar to above, features a 6" measuring range with .001" graduations and .100" per revolution

Durometers

Type	Applications/Indenter	Model
Type A	Soft rubber, plastics, and elastomers, printer's rolls. Flat cone point 35° included angle.	H-4222A
Type B	Harder elastomers and plastics. Paper and fibrous materials above 93 Duro A. Sharp Cone Point 30°	H-4222B
Type C	Medium hard elastomers and plastics. Useful to avoid surface marks. Flat cone point 35° included angle	H-4222C
Type D	Hard rubber and plastics, thermo plastics, flooring materials. Sharp cone point 30° included angle	H-4222D



H-4222D



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