



Testing Equipment for



Construction Materials

HUMBOLDT

Testing Equipment for



Construction Materials

HUMBOLDT

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MASTER LOADER
5030

PREVIOUS TESTS		CURRENT TESTS (44EEDWV)	
LOAD_3_301455	DISP_3_15384	3945	1.000
		kN	in
PRESS_3_321764	VOLUM_3_15438	0.0	0.0
		psi	cm³



GEOTECHNICAL TEST EQUIPMENT
HUMBOLDT

SOIL-LAB

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H-4215

Rapid Soil Processor

Processing soil for soil compaction tests has never been easier than when using Humboldt's Rapid Soil Processor. It automatically processes semi-moist, moist and even samples close to optimum moisture content to minus #4 screen size more than five times faster than any other method available. Samples of up to 30 pounds of fat and tough clays at field moisture levels can be processed in less than 15 minutes. For those drying back samples or taking up to 24hrs to prepare samples for five-point moisture/density relationship tests, the rapid soil processor can accomplish this preparation in about 5 hours. Other test preparations can also benefit from the rapid soil processor, reducing prep time to almost nothing. If you use field expedient methods, such as "rapid compaction" or "family of curves" testing, the rapid soil processor is a must.

In addition, while processing a sample, rocks in the sample of up to 0.75" in size are automatically separated from the soil, preventing damage to the screen.

The rapid soil processor features heavy-duty, all-metal construction, which provides years of dependable service under constant use. The offset rotating drum is motor driven and requires no preset adjustments. Automatic operation frees up technician's time allowing them to do other tasks while processing soil samples. Easy-to-install, replacement screens are available, as are replacement parts. Overall dimensions: 32" x 36" x 53" (813 x 915 x 1346mm).

Rapid Soil Processor, 120V 60Hz H-4215
 Rapid Soil Processor, 220V 60Hz H-4215.2F
 Rapid Soil Processor, 220V 50Hz H-4215.5F

Shipping wt. 406 lbs (184kg)



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H-4198



H-4197



H-4199

Replacement Screens for Rapid Soil Processor

Description	Model
Replacement Screen, 11.875" (302mm) height (for units sold after March, 1995)	H-4215.32
Replacement Screen, 13" (330mm) height (Old Style, for units sold before March, 1995)	H-4215.26

Electric, Disk Grinding Mill

ASTM C409

The H-4198 Electric Disk Grinding Mill is used in testing labs around the world and complies with ASTM C409 for sample preparation of Hardgrove Grindability specimens. This grinding mill features a 1/3hp single-phase, geared motor, which is mounted to a rigid, cast-aluminum base with rubber feet for stability. The grinding mill head construction is made of sturdy, durable cast iron. The grinding mill head can be easily removed and disassembled for cleaning without the use of any special tools. The grinding plates are made of a hard iron alloy designed for clog resistance and long life. Plate-to-plate clearance is easily adjusted by hand in order to change the mesh size range desired. Output capacity is up to 40lbs (18kg) per hour with dry material and the material hopper provides 50in³ (820ml) approximately 2lb (0.9kg) of material. Grinding mill is sold with the dry grinding feeder and disk set—a wet grinding feeder and disk set is available as an accessory (H-4198.1). The complete unit ships in two boxes.

Soil Grinder, 120V 60Hz H-4198
 Soil Grinder, 220V 60Hz H-4198.2F
 Soil Grinder, 220V 50Hz H-4198.5F

Shipping wt. 55 lbs (25kg)

Description	Model
Coarse Grinding Plate Set	H-4198.1

Soil Grinder, Humboldt

This table-top unit 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.

Soil Grinder, 120V 60Hz H-4199
 Soil Grinder, 220V 50Hz H-4199.5F

Shipping wt. 28 lbs (12.7kg)

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

Disk Grinding Mill, Hand-operated

Hand-operated Grinding Mill mounts to bench top up to 1.5" (38.1mm) thick with an integral c-clamp for fast grinding of samples. The mill is made of sturdy, durable, painted cast iron. Mill head can be easily disassembled for cleaning without the use of any special tools. The grinding plates are made of a hard iron alloy designed for clog resistance and long life. Unit is sold with dry grinding feeder and disk set, but wet grinding set up is available as an accessory. Output capacity is up to 40lbs (18kg) per hour with dry material and an energized cranker. The material hopper provides 50in³ (820ml) approximately 2lb (0.9kg) of material.

Disk Grinding Mill, Hand-Operated H-4197

Shipping wt. 12.5 lbs (5.7kg)

Description	Model
Revolving Plate	H-4197.1



H-4257

H-4258



H-3839



H-3858.3F



HC-3851



H-3842A
H-3843A



ACCESSORIES

For Mixer Accessories, please see page: 236, 289.

Soil Mortar

ASTM D421; AASHTO T87

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 2.25" (57mm) H.

Soil Mortar H-4257

Shipping wt. 1.5 lbs (0.7kg)

Soil Pestle

ASTM D421; AASHTO T87

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

Soil Pestle H-4258

Shipping wt. 0.7 lbs (0.32kg)

Mixer, 5-Qt.

Mixer for mixing material samples. The H-3839 operates on the principle of planetary action where the beater reaches every part of a batch, rotating on its axis in opposite directions as it moves around the bowl. This mixer thoroughly blends, mixes and aerates all ingredients for a consistent, predictable finished batch. Selective agitator transmission has 3 speed settings: 139, 285 and 591 RPM. Direct gear drive and a heavy-duty motor ensure constant mixing speeds under load. A locking hand-lever provides precise raising and lowering of the mixing bowl. Base dimensions: 10.375" x 15" (264 x 381mm). Height: 17" (432mm). The mixer includes a stainless steel bowl, wire whip, dough hook and an aluminum flat beater. It is suggested that a stainless steel beater or a Humboldt extreme-duty whisk be purchased for materials mixing applications for improved beater life.

Mixer, 5-Qt. (4.73L), 120V 60Hz H-3839

Mixer, 5-Qt. (4.73L), 230V 60Hz H-3839.2F

Mixer, 5-Qt. (4.73L), 230V 50Hz H-3839.5F

Shipping wt. 55 lbs (25kg)

Humboldt Laboratory Mixer, 5-Qt.

Humboldt's 5-Qt. Laboratory Mixer has been designed to provide material testing labs with a step up in quality from the typical lab mixer. This mixer has been designed specifically for the demands of cement and soil mixing and not as a kitchen-prep machine. This new mixer, with its clear safety cover provides a mixing design, which allows for material, water and other additives to be easily added to the mix via a port at the top of the mixer. The clear safety cover is attached to the mixer, independent of the bowl and can be removed for cleaning. The mixer features lightweight aluminum construction and comes with a stainless steel stirrer and mixing bowl.

The HC-3858.3F promotes extremely safe operation and complies with CE standards. It provides enclosed operation, an emergency stop button and stops automatically when the bowl is lowered during the mixing process. Its design is optimized for easy handling including its easy-lowering bowl mechanism. The mixer provides two mixing speeds: 140 ± 5 U/min and 285 ± 10U/min. Dimensions are: 9.25" x 15.5" x 22.4" (235 x 396 x 568mm).

Mixer, 5-Qt. (4.73L), 120/230V 50/60Hz H-3858.3F

Shipping wt. 66lbs (30kg)

Soil and Mortar Mixer, 5L (5.3qt)

This excellent, alternative to the Hobart mixer features two-speed, manual-control with a very robust design, expressly made for the efficient mixing of cement pastes and mortar. The mixer offers two speeds: 140 rpm for revolving with 62 rpm planetary action and 285 rpm revolving with 15 planetary action.

This mixer features a heavy-duty design, which provides excellent stability when placed on a counter top. Provides open mixing bowl for easy visual consistency control. Simple distance control between stirrer paddle and mixing bowl main-

tains standard distance between bowl and stirrer. Hoisting mechanism can also be used to lower the mixing bowl. Quick-clamping system allows mixing bowl to be attached to the mixer easily. Provided with standard stainless steel bowl and standard beater.

Mortar Mixer, 5L (5.3qt), 120V 60Hz HC-3851

Mortar Mixer, 5L (5.3qt), 230V 60Hz HC-3851.2F



Ship wt. 125lbs (56kg)

Laboratory Bench Mixers

These mixers are designed with larger bowls for larger samples or busier labs. They feature a direct gear drive and a heavy-duty 1/2hp motor to ensure constant mixing speeds under load. A locking hand-lever provides precise raising and lowering of the mixing bowl. These mixers thoroughly blend, mix and aerate all ingredients for a consistent, predictable finished batch. Selective agitator transmission has 3 fixed speed settings and a stir speed, these are: 107, 198 and 365 and 59 RPM. Its 15-minute SmartTimer provides ease of use and consistency. Bowl Interlock ensures mixer bowl is properly in place for mixer to operate and bowl lift is an ergonomic hand crank operated, which self-locks in the top and bottom positions. Includes stainless-steel bowl, flat-type aluminum grid beater, whip and aluminum dough hook.

Base Dimensions of the 12 Qt. Mixer are: 14.75" x 20" x 29.6125" (375 x 508 x 750mm).

Base Dimensions of the 20 Qt. Mixer are: 21" x 21.5" x 41.25" (533 x 546 x 1048mm).

Bench Mixer, 12Qt, 120V 60Hz H-3842A

Bench Mixer, 12Qt, 230V 50/60Hz H-3842A.4F

Shipping wt. 185 lbs (84kg)

Bench Mixer, 20Qt, 120V 60Hz H-3843A

Bench Mixer, 20Qt, 230V 50/60Hz H-3843A.4F

Shipping wt. 230 lbs (104kg)

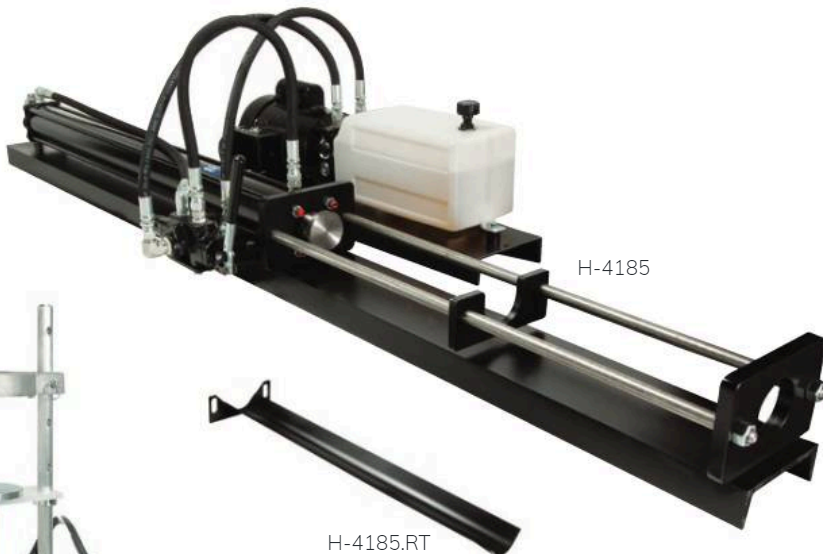




H-4155A



H-4150



H-4185

H-4185.RT

H-4185.100
(shown with ejector,
not included)

Sample Ejector, Hand-Operated

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. Piston stroke is 8" (235mm). Overall dimensions 13"W x 6"D x 27"H (330 x 152 x 686mm).

Sample Ejector, Hand-Operated H-4155A
Shipping wt. 56 lbs (25.5kg)

Sample Ejector, Motorized

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. This sample ejector 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. Piston stroke is 9.25" (184mm). Overall dimensions, excluding pump, 13"W x 6"D x 29"H (330 x 152 x 737mm).

Sample Ejector, Motorized, 120V 60Hz H-4150
Sample Ejector, Motorized, 220V 50/60Hz H-4150.4F
Shipping wt. 90 lbs (40kg)

Horizontal Sample Ejector

Hydraulically driven horizontal sample ejector designed for rapid ejection of 3" (76.2mm) x 30" (762mm) thin-wall sample tubes (Shelby tubes). The horizontal sample ejector provides a smooth and easily controlled piston stroke providing easy and rapid handling of ejected samples. The unit's hydraulic system accurately controls the horizontal piston's 5600lbf (24.9kN) force to eject samples smoothly. The ejector uses 1.7gpm hydraulic pump powered by a 1hp electric motor. Hydraulic oil reservoir provides 2.5gal (9.5L) capacity.

This ejector can also be used with 2 or 2.5" Shelby tube samples using the corresponding conversion kit, see chart below. The ejector comes with (1) sample trough to support ejected samples. Overall dimensions w/o sample trough are: 84" (2134mm) L x 23" (584mm) W x 18" (457mm) H.

Horizontal Sample Ejector, 120V 60Hz H-4185
Horizontal Sample Ejector, 220V 60Hz H-4185.2F
Horizontal Sample Ejector, 220V 50Hz H-4185.5F
Shipping wt. 310 lbs (140kg)

Accessories for H-4185

Sample Trough, Round Bottom	H-4185.RT
Conversion Kit for 2" Sample Tube	H-4185.2
Conversion Kit for 2.5" Sample Tube	H-4185.3

Portable Stand for Horizontal Sample Ejector

Sturdy, mobile stand accommodates H-4185 horizontal sample ejector. Complete with shelf for pneumatic pump and reservoir. Large wheels provide easy maneuverability. Top allows sample ejector to be bolted to it for added stability. Requires longer hoses (included) to reach pump and reservoir. Some assembly required.

Portable Stand for Sample Ejector H-4185.100
Shipping wt. 170 lbs (77kg)



H-4141



H-4225A



H-4162



H-4161A



H-4151



H-4149



H-4159



H-4163



H-4142

Standard Proctor Compaction Mold, 4"

ASTM D558, D559, D560, D698, D1557, D1558, AASHTO T99, T134, T135, T136, T180, T220

Soil mold used where a compacted sample is required, such as standard proctor density/moisture tests. Mold volume is 1/30 ft³. Cold-rolled steel tubing, plated for rust resistance. Mold dimensions are 4" ID x 4.584" H with a 2" detachable collar. Includes detachable base plate, studs and wing nuts.

Standard Proctor Compaction Mold, 4" H-4141
 Shipping wt. 14 lbs (6.3kg)

Standard Proctor Mold, Split Design, 4"

ASTM D558, D559, D560, D698, D1557, D1558, AASHTO T99, T134, T135, T136, T180, T220

Mold volume of 1/30 ft³. 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. Mold dimensions are 4" ID x 4.584" H with a 2" detachable collar. Includes detachable base plate, studs and wing nuts.

Standard Proctor Mold, Split-Design, 4" H-4225A
 Shipping wt. 13 lbs (5.9kg)

Modified Proctor Compaction Mold, 6"

ASTM D558, D559, D560, D698, D1557, D1558, AASHTO T99, T134, T135, T136, T180, T220

Soil mold used for modified proctor density/Moisture tests. Mold volume of 1/13.33 ft³. Cold-rolled steel tubing, plated for rust resistance. Mold dimensions are 6" ID x 4.584" H with a 2" detachable collar. Includes detachable base plate, studs and wing nuts.

Modified Proctor Compaction Mold, 6" H-4162
 Shipping wt. 19 lbs (8.6kg)

Modified Proctor Mold, Split Design, 6"

ASTM D558, D559, D560, D698, D1557, D1558, AASHTO T99, T134, T135, T136, T180, T220

Mold volume of 1/13.33 ft³, 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. Mold dimensions are 6" ID x 4.584" H with a 2" detachable collar. Includes detachable base plate, studs and wing nuts.

Modified Proctor Mold, Split Design, 6" H-4161A
 Shipping wt. 18.3 lbs (8.3kg)

CBR Mold with Perforated Base, 6"

ASTM D1883; AASHTO T193

CBR mold with a volume of .1145 ft³. Cold-rolled steel tubing, plated for rust resistance. Collar extension and perforated base plate can be clamped on either end of cylinder. Mold dimensions are 6" ID x 7" H with a 2.5" detachable collar. Includes detachable base plate, studs and wing nuts.

CBR Mold with Perforated Base, 6" H-4151
 Shipping wt. 23.2 lbs (10.5kg)

CBR Mold with Solid Base, 6"

ASTM D1883; AASHTO T193

CBR mold with a volume of .1145 ft³. Cold-rolled steel tubing, plated for rust resistance. Collar extension and solid base plate can be clamped on either end of cylinder. Mold dimensions are 6" ID x 7" H with a 2" detachable collar. Includes detachable base plate, studs and wing nuts.

CBR Mold with Solid Base, 6" H-4149
 Shipping wt. 22 lbs (10kg)

Compaction Mold, 6"

ASTM D1883; AASHTO T193

Compaction mold with a volume of 1/10th ft³. Cold-rolled steel tubing, plated for rust resistance. Mold dimensions are 6" ID x 6.1" H with a 2.5" detachable collar. Includes detachable base plate (8" x 8" x 0.5" thick), studs and wing nuts.

Compaction Mold, 6" H-4159
 Shipping wt. 21 lbs (9.5kg)

LBR Mold, 6"

FM 1-T 180, FM 5-515

Compaction mold with a volume of 1/13.33 ft³, cold-rolled steel tubing, plated for rust resistance. Mold dimensions are 6" ID x 6.1" H with a 2.5" detachable collar. Collar extension and perforated base plate can be clamped on either end of cylinder. Compatible with H-4169 Compactor. LBR test requires H-4147 spacer disc, sold separately, see next page.

LBR Mold, 6" H-4163
 Shipping wt. 22 lbs (10kg)

Compaction Split Mold, 2.8"

Compaction mold with a volume of .0214 ft³. Cold-rolled steel tubing, plated for rust resistance. Mold dimensions are 2.8" ID x 4" H with a 2" detachable collar. Mold has vertical-split body with 2 quick-acting clamps for easy removal of specimen. Not compatible with H-4169 compactor.

Compaction Split Mold, 2.8" H-4142
 Shipping wt. 7.8 lbs (3.5kg)

Compaction Mold, California 216

CA Method 216B

Compaction mold 6" ID x 2.875" H with a 2.5" detachable collar. For use with H-4169.CA Compactor.

Compaction Mold, 6" H-4169.4CA
 Shipping wt. 21 lbs (9.5kg)





H-4174



H-4172



H-4158

H-4158.1
H-4465.25

H-4175



H-4177



H-4176



H-4179



H-4153



H-4147



H-4154FP



H-4154



H-4178BR



H-4178

Cutting Edge

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 and has a 6" (152mm) ID and 2" (51mm) high. Recess in upper section allows edge to be mounted at either end of a H-4149 or H-4151 mold to facilitate sample removal in the field.

Cutting Edge

H-4174

Ship wt. 2 lbs. (0.9kg)

Swell Plate

Perforated 5.875" (149mm) dia. base with adjustable stem. Contact end of the stem is easily locked in place with a knurled nut.

Swell Plate

H-4172

Ship wt. 5 lbs. (2.3kg)

Swell Tripod Attachment

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.

Swell Tripod Attachment

H-4158

Ship wt. 0.8 lbs. (0.3kg)

Dial Indicator

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. Metric version, H-4465.25 is 25mm x 0.01mm.

Dial Indicator

H-4158.1

Dial Indicator, Metric

H-4465.25

Ship wt. 1.3 lbs. (0.5kg)

Surcharge Weight, 5 lb.

Used in the application of surcharged loads on the soil's surface during soaking and penetration. Rust-resistant, plated annular disk weighs 5 lbs. (2.3kg), 5.875" (149mm) OD with a 2.125" (54mm) ID hole in center.

5 lb. Surcharge Weight

H-4175

Ship wt. 5.7 lbs. (2.5kg)

Surcharge Weight, 10 lb.

10 lb. (4.5kg) Field surcharge weight, made in two parts; 5.875" (149mm) OD; 2.125" (54mm) ID.

10 lb. Surcharge Weight

H-4177

Ship wt. 12 lbs. (5kg)

Slotted Surcharge Weight, 5 lb.

Used in the application of surcharged loads on the soil's surface during soaking and penetration. Rust-resistant, plated annular disk weighs 5 lbs. (2.3kg), 5.875" (149mm) OD with a 2.125" (54mm) slot.

5 lb. Slotted Surcharge Weight

H-4176

Ship wt. 6 lbs. (3kg)

Slotted Surcharge Weight, 10 lb.

10 lb. (4.5kg) slotted, field surcharge weight, 8.5" (216mm) dia.

Slotted Surcharge Weight, 10 lb.

H-4179

Ship wt. 11 lbs. (5kg)

Spacer Disk

Disk is used as a false bottom in a soil mold during the compaction process. Plated, rust-resistant steel disk is 2.416" (36mm) high, 5-15/16" (152mm) dia.

Spacer Disk

H-4153

Ship wt. 20 lbs. (9kg)

Spacer Disk LBR 6"

For use with the H-4163 LBR mold. Compatible with H-4169 Compactor. Disk is used as a false bottom in a soil mold during the compaction process. Plated, rust-resistant steel disk is 1.416" (36mm) high, 5-15/16" (152mm) dia.

Spacer Disc. LBR

H-4147

Ship wt. 12.2 lbs. (5.5kg)

Filter Paper

100 pack of coarse grade filter paper 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.

Filter Paper

H-4154FP

Ship wt. 0.3 lbs. (0.13kg)

Filter Screen

100 mesh stainless screen is 5-15/16" (152mm) dia.

Filter Screen

H-4154

Ship wt. 0.1 lbs. (0.04kg)

Dial Indicator Bracket

Bracket used to attach a dial indicator to the penetration piston.

Dial Indicator Bracket

H-4178BR

Ship wt. 0.8 lbs. (0.36kg)

Penetration Piston

CBR penetration piston has 3 sq. in. (19.35cm²) base area and is about 7.5" (191mm) long. Designed for use in conjunction with weights H-4175 and H-4176 to apply penetration surcharge loads.

Penetration Piston

H-4178

Ship wt. 7 lbs. (3kg)





H-4169



H-4169.100-B



H-4169.2415



H-4169.2416



H-4170B



H-4160B



H-4173A



H-4171A



NOTES

For Compaction Molds, see page 85.

Mechanical Compactor, Automatic

ASTM D558, D559, D560, D698, D1557; AASHTO T99, T134, T135, T180

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, making maintenance/adjustments easier without moving machine away from mounted location.

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 16.5"W x 30"D (1422 x 419 x 762mm). Max. height in operation: 66" (1677mm).

Mechanical Compactor, 120V 60Hz H-4169
Mechanical Compactor, 230V 50/60Hz H-4169.4F

Shipping wt. 387 lbs (175kg)

Mechanical Compactor Safety Cage

Cage provides protection from moving parts during compaction. Cage is hinged to allow access to mold and hammer.

Mechanical Compactor Safety Cage H-4169.100-B

Shipping wt. 8 lbs (3.6kg)

California Mechanical Auto Compactor

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. Use with H-4169.4CA Mold. **California Mechanical Auto Compactor H-4169.CA**

Shipping wt. 432 lbs (195kg)

Calibration Kit for Mechanical Compactor

ASTM D2168

For use with H-4169 automatic mechanical compactor. Calibration kit includes lead deformation apparatus, micrometer and 50 lead calibration cylinders.

Calibration Kit for Mechanical Compactor H-4169CK

Shipping wt. 4.9 lbs (2.2kg)

Replacement Hammers	
4" Round, New-Style*	H-4169.2415
6" Pie-Shape, New-Style*	H-4169.2416
4" Round, Old-Style*	H-4169.415
6" Pie-Shape, Old-Style*	H-4169.416

*Hammers do not include weights. New-Style Hammers are only threaded in the middle of the shaft. Old-Style Hammers are threaded almost to the end of the shaft.



NOTES

Replacement parts are available. Please inquire and include Unit Serial Number.

Compaction Hammer, Standard, Manual

ASTM D558, D698; AASHTO T99

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" (51) 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.

Standard Compaction Hammer, Manual H-4160B

Shipping wt. 9.2 lbs (4.2kg)

Compaction Hammer, Modified, Manual, AASHTO

AASHTO T180

Manual, moisture/density hammer meets AASHTO specs. It incorporates a 10 lb (4.5kg) weight and a drop of 18" (457mm) with a 2" (51) 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.

Compaction Hammer, Modified H-4170B

Shipping wt. 15 lbs (7kg)

Compaction Hammer, Manual, 5lb, COE

EM 1110-1-1804

Hammer incorporates a 5.5 lb (2.54kg) weight and a drop of 12" (305mm) with a 2" (51) 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.

Compaction Hammer, Manual, 5lb, COE H-4173A

Shipping wt. 11 lbs (4.9kg)

Compaction Hammer, 10lb, COE

Manual, moisture/density hammer, which incorporates a 10 lb (4.5kg) weight and a drop of 12" (305mm) with a 2" (51) face.

Compaction Hammer, 10lb, COE H-4171A

Shipping wt. 18 lbs (8.3kg)





Relative Density Apparatus

ASTM D4253, D4254

Apparatus determines the relative density of cohesion-less, 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 cohesion less soils uses vibratory compaction to obtain maximum density and pouring to obtain minimum density. Complete set includes: vibrating table H-3750.2F, relative density mold sets H-3757 and H-3758 and relative density gauge set H-3759. Both models are 12 amps 1ph AC.

Relative Density Apparatus, 230V 60Hz H-3750.2F

Relative Density Apparatus, 230V 50Hz H-3750.5F

Shipping wt. 925 lbs (420kg)

Vibrating Table with Controller

Vibrating table for use with the relative density mold sets or other processes requiring vibratory compaction. Table is 30" x 30" (762 x 762mm), and vibration is provided by an electromagnetic vibrator rated above 100lbs (45.5kg). Capacity for table is 750 lbs (341kg) and height is 21" (533mm).

Vibrating Table/Controller, 230V 60Hz H-3756.2F

Vibrating Table/Controller, 230V 50Hz H-3756.5F

Shipping wt. 605 lbs (275kg)

Relative Density Mold Set, 0.1 ft³

0.1 cu. ft. capacity mold set for use with relative density apparatus. Mold set comes with detachable guide sleeve and clamp assembly. Includes surcharge base plate with removable handle and surcharge weight with handle. Mold is 6" (152.4mm) ID x 6.112" (155.2mm) H.

Relative Density Mold Set, 0.1 ft³ H-3757

Shipping wt. 103 lbs (46kg)

Relative Density Mold Set, 0.5 ft³

0.5 cu. ft. capacity mold set for use with relative density apparatus. Mold set comes with detachable guide sleeve and clamp assembly. Includes surcharge base plate with removable handle and surcharge weight with handle. Mold is 11" (279.4mm) ID x 9.092" (230.9mm) H.

Relative Density Mold Set, 0.5 ft³ H-3758

Shipping wt. 280 lbs (127kg)

Pouring Funnel Set

Used for filling loose .375" (9.5mm) or finer soils into relative density mold. Includes two 6" (152mm) dia. x 12" (305mm) long metal cylinders, each with an integral funnel at the end. Orifices are 1" (25.4mm) and 0.5" (12.7mm).

Pouring Funnel Set H-3750FS

Shipping wt. 25 lbs (11kg)

Gauge Set, Relative Density

Gauge set for use with relative density molds. Designed to fit guide brackets of either the H-3757 or H-3758 mold sets. Set includes a 2" (50.8mm) dia., 2.0 x 0.001" mechanical dial gauge. A metal, 3 x 12 x .125" (76 x 305 x 3.2mm), calibration bar is also included.

Gauge Set, Relative Density H-3759

Shipping wt. 8 lbs (4kg)

Vibration Indicator, Tachometer Type

Precision, pen-sized tachometer provides accurate readings even on hard-to-reach equipment. Scale gives readings from 2,000 to 21,000.

Vibration Indicator, Tachometer Type H-3753

Shipping wt. 0.5 lbs (0.2kg)

Vibration Compaction Frame and Hammer Set

ASTM D7382-08

Vibration compaction set used to compact soil samples for use in tests referencing ASTM D7382-08 methods. This method refers to the determination of the maximum dry unit weight and water content range for the effective compaction of granular soils using a vibrating hammer. The test set includes a heavy-duty frame designed specifically for easily mounting a vibration hammer. A vibration hammer, which includes a 5.75" tamper and a 12" long mounting shank. The set also includes an 11" split, compaction mold. The vibrating hammer test method may be performed in the field or in the laboratory.

Vibration Compaction Frame/Hammer Set H-4115

Shipping wt. 368 lbs (167kg)

Compaction Frame Only

Mounting frame for compaction hammer set up. Does not include hammer or mold.

Compaction Frame H-4115.2

Shipping wt. 269 lbs (122kg)

Vibration Compaction Hammer with Tamper

ASTM D7382-08

Includes hammer, 5.75" (146mm) Tamper and 12" (305mm) long mounting shank.

Compaction Hammer with Tamper H-4115.3

Shipping wt. 35 lbs (15.8kg)

Compaction Molds

ASTM D7382-08

Split compaction molds for use with vibration compaction mold set.

11-Inch Compaction Mold H-4115.4

6-Inch Compaction Mold H-4161A

Shipping wt. 60 lbs (27kg)

Tamper for Compaction Hammer

ASTM D7382-08

Replacement tamper and foot for compaction hammer.

Tamper and Foot H-4115.5

Shipping wt. 14 lbs (6kg)



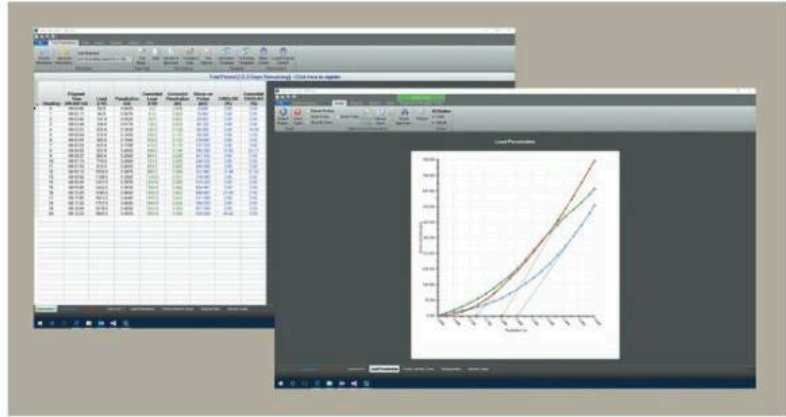
Typical CBR/LBR Setup for HM-5030.3F

Description	Part #
(1) Pancake load cell, 10,000lbf (50kN)	HM-2300.100CP
(1) Linear Potentiometer Transducer, 1" (25mm)	HM-2305.10
(1) Penetration piston with stud	H-4178
(1) Displacement transducer bracket	HM-5000BR
(1) CBR/LBR reporting software	HM-5001SW

Shown with H-4151 CBR Mold.

NOTES

HM-5030.3F Load Frame is sold as a load frame only. (Shown with typical CBR setup). For more information on the HM-5030 Master Loader, See pages 140-143.



The California Bearing Ratio (CBR) test was developed by The California state highway department and is widely used to determine the resistance strength of sub-grade and sub-base 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.

LBR or lime-rock bearing ratio is a variation of the CBR test. Developed primarily in Florida, it is used on materials with a high lime content. Humboldt offers several CBR/LBR testing solutions based on your overall testing needs and budget, from the advanced HM-5030.3F load frame with computer interface using our NEXT software to a simple, hand-operated H-4156 load frame suitable for lab or field use.

Humboldt Master Loader CBR/LBR Solution

ASTM D1883; AASHTO T193; BS 1377 Part 4

Designed for applications requiring multi-purpose loading systems, such as road construction projects in either mobile or fixed labs, educational institutions and consulting firms, the HM-5030 Master Loader is ideal for just about any application from road construction to high-volume commercial and educational laboratories.

While the HM-5030 has been specifically designed for soil testing labs conducting multiple testing operations including: UU, CU and CD tri-axial, UC, CBR and LBR, it is also perfect for running Marshall, Hveem, TSR and SCB asphalt tests as well. Its heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service allowing the HM-5030 to perform any tests required up to its load capacity of 11000 lbf (50kN).

Like all Elite Series load frames, the HM-5030 is built around Humboldt integral, 4-channel data logger with touch-screen control, which allows the load frame to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Master Loader, 110/220V 50/60 Hz HM-5030.3F

Shipping wt. 300 lbs (136kg)

NEXT CBR/LBR Software Module

ASTM D1883; AASHTO T193; BS 1377 Part 4

Humboldt's NEXT software is used to control the operation of Humboldt's testing machines, as well as provide data acquisition and reporting of test data. The software provides a computer-based platform with the ability to configure testing machines and the testing process; specify testing parameters and limits, operate the machine during the testing and provide detailed reports of the data collected in tabular or graphical formats.

From controlling a single operation to a complete geotechnical lab, Humboldt's NEXT data acquisition software, in conjunction with compatible Humboldt testing equipment, provides a complete solution for the acquisition, recording and presentation of test data. NEXT software is included with many of Humboldt's load frames, consolidation and direct shear machines; providing robust machine control, data acquisition and report generation for those using a computer to control load frame operations.

- Test-specific setup, which guides you through the process and 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 are 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 a project

NEXT CBR/LBR Software Module HM-5001SW

Download

NOTES

For more information on Humboldt's NEXT Software. See pages 110-111.





HM-5150A.3F

NOTES
 HM-5150.3F and HM-5170.3F Load Frames are sold as load frames only. (Shown with typical CBR setup.)



HM-5170A.3F



HM-5170A.3F showing Marshall setup



HM-2850.3F

NOTES
 HM-2850.3F Load Frame is sold as a load frame only. See page 91 for a HM-2850 CBR setup.



CBR/LBR Specific Automatic Load Frame

ASTM D1883; AASHTO T193; BS 1377 Part 4

Humboldt provides these two Elite Series Load Frames for doing CBR and LBR applications. The two machines are identical except that the HM-5170A can also do Marshall and TSR tests for those also doing asphalt testing.

The HM-5150A and HM-5170A Load Frames have been specifically designed to handle CBR and LBR applications. Their heavy-duty design and precise stepper-motor control provide a stable platform for years of reliable service. From educational institutions and consulting firms to high-volume commercial labs and construction projects, the Load Frames can perform these applications with ease.

Like all Elite Series Load Frames, the HM-5150A and HM-5170A are built around Humboldt's integral, data logger with touch-screen control, which allows the load frames to be used as standalone devices capable of full test control and data logging, as well as controlled from a network computer.

Standalone Control

The waterproof, touch screens featured on these load frames provide a colorful, at-a-glance monitoring of testing functions without the use of a computer. Operators can see all the data in several formats at the machine during the testing procedure. Test data can then be transferred to a computer for use with Humboldt's NEXT Software for report generation.

Computer Control

Humboldt's Next software is included with the all Elite Series Load Frames. This software provides robust machine control, data acquisition and report generation for those using a computer to control testing operations.

In addition, operators have the ability to view and control testing operations from a PC in the lab,

in the next room or at a different location, while also providing report generating capabilities using NEXT software and the test-specific software modules.

A CBR-specific software module is available for use with the NEXT software, which provides CBR-specific setup and formatting, rather than the generic formatting provided with the basic NEXT software.

HM-5150 and HM-5170 Specifications	
Load Capacity	11000 lbf (50kN)
Speed Range	Both Machines: 0.05 in/min (1.27mm/min) HM-5170A.3F ALSO: 2 in/min. (50.8mm/min.)
Data Channels	2
Data Storage	1000 tests and up to 3000 readings per test
Platen Size Travel	8" (203mm) / 4" (100mm)
Clearance	27" (686mm) Vertical 11" (279mm) Horizontal
Voltage	110/220V 50/60Hz - 5.0amps
Net Weight	120 lbs (54kg)

CBR, LBR Frame, 110/220V 50/60 Hz **HM-5150A.3F**
 Shipping wt. 300 lb (136kg)

CBR, LBR, and Marshall Load Frame
 110/220V 50/60 Hz **HM-5170A.3F**
 Shipping wt. 300 lbs (136kg)

CBR/LBR Setup: HM-5150A.3F and HM-5170A.3F	
Description	Part #
(1) Pancake load cell, 11,000lbf (50kN)	HM-2300.100CP
Linear Potentiometer Transducer, 1" (25mm)	HM-2305.10
(1) Penetration piston with stud	H-4178
(1) Linear Potentiometer Universal Bracket	HM-5000BR
(1) NEXT CBR/LBR software module	HM-5001SW

Multi-Speed Load Frame

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

The HM-2850 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-2850 is ideal for applications where the operator is either not concerned with data acquisition; or, already has or is planning to construct their own data acquisition system. With its large 7" color, touch-screen, the HM-2850 provides the operator with the ability to precisely select any speed with five decimal accuracy within the machine's speed range.

The HM-2850 features a quiet, direct drive, stepper motor that provides a range of loading speeds from 0.05 to 2.00000 (0.00001 to 50.80000 mm/min). This speed range is more than adequate for the majority of standard soil tests. The HM-2850 can also be used for asphalt Marshall and TSR testing and features a rapid travel speed of 2.25 in/min. for moving the platen into position quickly.

HM-2850.3F Specifications	
Load Capacity	11000 lbf (50kN)
Speed Range	0.05 to 2.00000 inch/min .00001-50.80000 mm/min
Platen Size [Travel]	8" (203mm) [4" (100mm)]
Clearance	32" (812mm) Vertical 11" (279mm) Horizontal
Current	9 Amps @ 125V (4.5 @ 250V)
Dimensions	17 x 22 x 51" (432 x 559 x 1295mm)

Multi-Speed Frame, 110/220V 50/60 Hz **HM-2850.3F**
 Shipping wt. 258 lbs (117kg)





Typical CBR Setup for HM-2850.3F (page 90)

Description	Part #
(1) Load ring, 11,000lbf (50kN)	H-4454.100
(1) Dial gauge 1.000" x .001"	H-4158.1
(1) Penetration piston with stud	H-4178
(1) Dial indicator bracket	H-4178BR

Mechanical, Two-Speed Loading Jack

Mechanical, two-speed loading jack used in the H-4156 and H-4156M loading presses.

Mechanical, Two-Speed Loading Jack H-4156J

Ship wt. 42lbs. (19kg)

CBR Mechanical Test Set

ASTM D1883; AASHTO T193

Complete mechanical test set used for CBR testing. Includes a complete complement of test equipment for performing CBR testing. The test set features the H-4156 loading press (load frame), which 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 in² 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).

The CBR Test Set Includes:

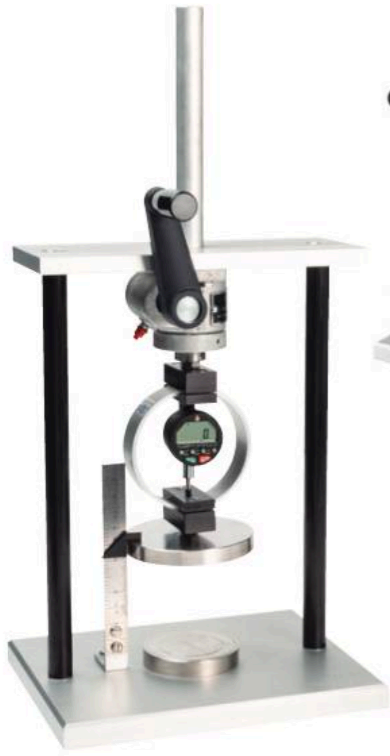
Description	Part #
(1) Mechanical loading press	H-4156
(4) Mold	H-4151
(1) Spacer disk	H-4153
(4) Filter screens	H-4154
(2) Swell plates	H-4172
(1) Tripod attachment	H-4158
(4) Surcharge weights	H-4175
(4) Slotted surcharge weights	H-4176
(1) Proctor Hammer, AASHTO	H-4170B
(1) Straight edge, 12-inch	H-4144.12
(1) Cutting edge	H-4174

CBR Mechanical Test Set

H-4152

Ship wt. 379lbs. (172kg)





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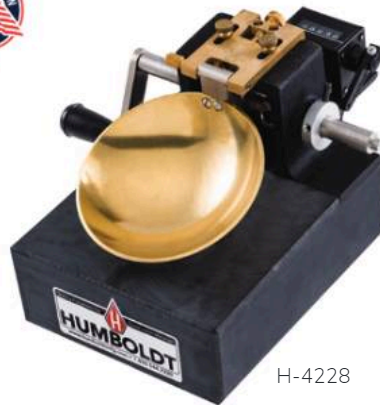
Test Set
H-4234



Test Set
H-4235



H-4230



H-4228



H-4226

Atterberg Limits (Liquid Limit Testing)

Liquid limit testing determines the water content at which soil changes from a liquid to a plastic state. It is determined using the devices on this page. To perform, a soil sample is placed into the cup of the liquid limit machine and separated into two halves using a grooving tool. The crank on the machine is then rotated so that the cup holding the sample strikes the base of the test machine. The number of blows is recorded until the two halves flow together and close the groove.

ASTM Liquid Limit Test Set

ASTM D4318; AASHTO T89, T90

Recommended for performing liquid limit test in accordance with ASTM specifications. Includes 1 ea. of: H-4230 ASTM liquid limit machine, H-4930.250 mixing dish, H-4904 spatula, H-4915.025 graduated cylinder and a H-1350.3A 48 sample cans pack.

ASTM Liquid Limit Test Set **H-4234**
Shipping wt. 11 lbs (5kg)

ASTM Liquid Limit Test Set with Counter

ASTM D4318; AASHTO T89, T90

Same set as above except it has machine with counter. Includes 1 ea. of: H-4228 ASTM liquid limit machine, H-4930.250 mixing dish, H-4904 spatula, H-4915.025 graduated cylinder and a H-1350.3A 48 sample cans pack.

ASTM Liquid Limit Test Set w/ Counter **H-4235**
Shipping wt. 15 lbs (7kg)

ASTM Liquid Limit Machine

ASTM D4318; AASHTO T89, T90

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.

ASTM Liquid Limit Machine **H-4230**
Shipping wt. 5.5 lbs (2.5kg)

ASTM Liquid Limit Machine with Counter

ASTM D4318; AASHTO T89, T90

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-hand operation.

ASTM Liquid Limit Machine with Counter **H-4228**
Shipping wt. 6 lbs (2.7kg)

ASTM Liquid Limit Machine, Motorized

ASTM D4318; AASHTO T89, T90

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.

Liquid Limit Machine, 120V 60Hz **H-4226**
Liquid Limit Machine, 220V 50Hz **H-4226.5F**
Shipping wt. 14 lbs (6.4kg)



ACCESSORIES

For Liquid Limit Accessories and Replacement Parts, please see page 95.





H-5236



H-5237



H-4236



H-4237

Cone Penetrometer (Liquid Limit Testing)

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. This method eliminates test results dependent upon operator skills and provides a visual measurement of penetration. Two cone penetrometer models are available. One, a manual operation model, and the other an automatic model, which releases the cone for a set amount of time and then locks the movement of the cone, registering the result.

Cone Penetrometer, Digital

BS 1377-2, NF P94-052,1; CEN ISO/TS 17892

The H-5236 digital cone penetrometer features an aluminum base with leveling screws and a spirit level for maintaining a level testing position. The digital readout provides readings in 0.1mm resolution in either mm or inches. The chromed support rod features micro-metric vertical displacement for accurate positioning with a brass slider that provides smooth free fall, a stop and release button and an automatic zero set. Includes a stainless steel penetration test cone: 35mm long with a 30° angle, weighing 20g. Two brass cups are included (55 x 35mm and 70 x 45mm). This cone penetrometer can also be used to measure the shear undrained strength of undisturbed and reconstituted soil samples per CEN ISO/TS 17892-06. Overall dimensions are: 8.6" x 6.7" x 16.1" (220 x 170 x 410mm).

Cone Penetrometer, Digital **H-5236**

Shipping wt. 19 lbs (8.6kg)

Cone Penetrometer, Digital, Semi-Automatic

BS 1377-2, NF P94-052,1; CEN ISO/TS 17892

The H-5237 semi-automatic cone penetrometer is equipped with a magnetic controller device with an electronic, digital, programmable timer that automatically releases the plunger head and ensures free falling of the cone during the five second test. The digital readout provides readings in 0.1mm resolution in either mm or inches. The chromed support rod features micro-metric vertical displacement for accurate positioning with a brass slider that provides smooth free fall, a stop and release button and an automatic zero set. Includes a stainless steel penetration test cone: 35mm long with a 30° angle and a 20g surcharge weight. Two brass cups are included (55 x 35mm and 70 x 45mm). This cone penetrometer can also be used to measure the shear undrained strength of undisturbed and reconstituted soil samples per CEN ISO/TS 17892-06. Overall dimensions are: 8.6" x 6.7" x 16.1" (220 x 170 x 410mm).

Cone Penetrometer, Digital Semi-Auto

120V 60Hz **H-5237**

230V 50Hz **H-5237.5F**

Shipping wt. 33 lbs (15kg)

Cone Penetrometer, Dial Indicator

BS 1377-2, NF P94-052,1; CEN ISO/TS 17892

The H-4236 cone penetrometer with dial indicator features a 6" (150mm) diameter dial gauge, which is easily readable and is graduated in 0.1mm divisions. Overall dimensions are: 8.6" x 6.7" x 16.1" (220 x 170 x 410mm).

Cone Penetrometer, Dial Indicator **H-4236**

Shipping wt. 21.6 lbs (9.8kg)

Cone Penetrometer, Semi-Automatic

BS 1377-2, NF P94-052,1; CEN ISO/TS 17892

The H-4237 semi-automatic cone penetrometer with dial indicator is equipped with the same magnetic controller device as the digital version, H-5237. Its electronic, digital, programmable timer automatically releases the plunger head and ensures a free-falling cone during the five second test. Overall Dimensions: 8.6" x 6.7" x 16.1" (220 x 170 x 410mm).

Cone Penetrometer, 120V 60Hz **H-4237**

Cone Penetrometer, 220V 50Hz **H-4237.5F**

Shipping wt. 25 lbs (11.3kg)

Accessories / Replacement Parts

Test cone, 35mm long, 30° angle	H-4236.1
Test cone, 60° angle w/ 60g weight	H-4236.5
Sample cup, brass, 70 x 45mm	H-4236.2
Sample cup, brass, 55 x 35mm	H-4236.3
Weight, 20g	H-4236.4
Weight, 320g (shear strength for 400g total weight)	H-4236.6
Test gauge, 30° angle (cone point check)	H-4236.7
Test gauge, 60° angle (cone point check)	H-4236.8
Mirror (for height adjustment)	H-4236.9
Thermometer, -36.5-107.5°F	H-2600.33F
Thermometer, -38-42°C	H-2610.33C



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68



H-4270



H-4264

H-4379
(shown with H-4374.C cover)

H-4378



H-4340



H-4374



H-4342



H-4342.2

Air Jet Dispersion Tube

ASTM D7928; AASHTO T88

Alternative method for dispersing soil suspensions used in hydrometer method of testing sub-grade soils. Uses air bubbles to disperse soil samples. Comparative tests show the unique air jet action achieves better dispersion of clays with less degradation of soft particles like micas. Provides easier method, as samples are dispersed right in the sedimentation cylinder, eliminating the mess and sample loss from moving samples from one container to the other. Used by U.S. government agencies, State DOTs and consulting geotechnical engineers. **Shown with hydrometer jar, Not included.**

Air Jet Dispersion Tube

H-4270

Shipping wt. 6 lbs (2.72kg)

Dispersion Hand Stirrer

ASTM D7928; AASHTO T88

Inexpensive hand stirrer for dispersing soil suspensions used in hydrometer method of testing sub-grade soils. **Shown with hydrometer jar, Not included.**

Dispersion Hand Stirrer

H-4264

Shipping wt. 2 lbs (0.9kg)

Sand Equivalent Testing

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, Digital Timer

ASTM D2419; AASHTO T176

Motorized sand equivalent shaker features a digital timer, which can be set from 0 to 60 minutes with automatic shutoff. It features an easy-to-

use digital interface with an accuracy of 0.5% to increase accuracy and ease of operation. 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).

Sand Equivalent Shaker, 120V 60Hz H-4379

Sand Equivalent Shaker, 220V 50Hz H-4379.5F

Shipping wt. 125 lbs (56.6kg)

Sand Equivalent Shaker, Motorized

ASTM D2419; AASHTO T176

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).

Sand Equivalent Shaker, 120V 60Hz H-4374

Sand Equivalent Shaker, 220V 50Hz H-4374.5F

Shipping wt. 125 lbs (56.6kg)

Cover for Motorized Sand Equivalent Shaker

Clear acrylic cover encloses the sand equivalent shaker for safer operation. The cover swings back out of the way for loading.

Cover for Sand Equivalent Shaker H-4374.C

Shipping wt. 8 lbs (3.7kg)

Sand Equivalent Shaker, Manual Operation

ASTM D2419; AASHTO T176

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 6.5" x 26.375" (53 x 17 x 67cm).

Sand Equivalent Shaker, Manual Operation H-4378

Shipping wt. 26 lbs (11.7kg)

Sand Equivalent Test Set

ASTM D2419; AASHTO T176

The Humboldt sand equivalent test set includes all items required to perform a sand equivalent test except for a shaker. Be sure to choose a shaker from those offered on this page. These test sets include:

Components	
Measuring cylinder, plastic	H-4340.1
Latex Tubing (ft.)	H-4340.2.2
Rubber stopper	H-4340.5
Irrigator tube	H-4340.2.6
Weighted foot assembly	H-4340.3
Siphon assembly	H-4340.2
Wide-mouth funnel	H-4340.4
Measuring can (3.0 oz.)	H-1350.3SP
Standard stock solution (8 oz.)	H-4342

Sand Equivalent Test Set with Case H-4340

Sand Equivalent Test Set without Case H-4341

Shipping wt. 25.1 lbs (11kg)

Sand Equivalent Stock Solution

ASTM D2419; AASHTO T176

Standard stock solution, made from anhydrous calcium chloride, glycerin and formaldehyde. Use diluted with distilled water in ratio of 85ml solution per/gal. distilled water.

Sand Equivalent Stock Solution, 8oz (.24L) H-4342

Sand Equivalent Stock Solution, 1G (3.8L) H-4342.2

Shipping wt. 0.8 lbs (0.36kg)





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6



Triaxial cells can also be used for permeability testing.



ACCESSORIES

For Sample Prep Accessories and consumables, please see pages 154-155.



Permeability Cells, Top Cap/Base Pedestal Sets and Individual Top Caps and Bases

Size	Cell Standard	Cell Stainless	Set Aluminum	Top Cap Only	Base Only	Set Stainless Steel	SS Top Cap Only	SS Base Only
35mm	HM-4188B	HM-4188SS	HM-4188.35	HM-4199.35T	HM-4188.35B	HM-4188.35SS	HM-4199.35SST	HM-4188.35SSB
1.4"			HM-4188.14	HM-4199.14T	HM-4188.14B	HM-4188.14SS	HM-4199.14SST	HM-4188.14SSB
38mm			HM-4188.38	HM-4199.38T	HM-4188.38B	HM-4188.38SS	HM-4199.38SST	HM-4188.38SSB
1.5"			HM-4188.15	HM-4199.15T	HM-4188.15B	HM-4188.15SS	HM-4199.15SST	HM-4188.15SSB
50mm			HM-4188.50	HM-4199.50T	HM-4188.50B	HM-4188.50SS	HM-4199.50SST	HM-4188.50SSB
2.0"			HM-4188.20	HM-4199.20T	HM-4188.20B	HM-4188.20SS	HM-4199.20SST	HM-4188.20SSB
70mm			HM-4188.70	HM-4199.70T	HM-4188.70B	HM-4188.70SS	HM-4199.70SST	HM-4188.70SSB
2.8"			HM-4188.28	HM-4199.28T	HM-4188.28B	HM-4188.28SS	HM-4199.28SST	HM-4188.28SSB
100mm			HM-4188.100	HM-4199.100T	HM-4188.100B	HM-4188.100SS	HM-4199.100SST	HM-4188.100SSB
4.0"			HM-4188.40	HM-4199.40T	HM-4188.40B	HM-4188.40SS	HM-4199.40SST	HM-4188.40SSB

Permeability Cells

ASTM D5084; BS 1377 Part 6 1990

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 black anodized 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 chart above 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 above.

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: 13.75" H x 8.75" dia. (349.2 x 222.3mm). Overall dia. is: 11" (279.4mm).

Triaxial Cells— HM-4199

For those who plan to do triaxial tests in addition to permeability testing, consider using HM-4199B or HM-4199SS triaxial cells for the added convenience of using one cell for both tests. See page 145.



ELITE SERIES

Automated Pressure Controller



HM-5810-500.3F

Automated, Hydro-Control Pressure Controller

ASTM D5084, D2166, D4767, D7181, D2850; AASHTO T296, T297, T208

The HM-5810 is an automated three-channel pressure controller designed to handle saturation, consolidation and permeation of a triaxial test sample. In this application it can be used solely for permeability testing as well, eliminating the need for distribution panels, etc. The HM-5810 is all you need to successfully do permeability testing for soil.

Cell, head and tail pressure can be set in increments of 0.1 PSI while volume change is measured to 0.0001cc. The flow rate for permeation can be set from 1 cc/sec (60 cc/min) down to less than 0.000002 cc/sec (0.00012 cc/min). There are three data input channels – one for each pressure transducer, or if you are only doing permeability, you will only need one of the channels/pressure transducers.

The HM-5810 provides an accurate and simplified permeability setup, which eliminates the need for separate distribution panels, and simplifying tubing and control cable setup. By using the integral staging platform, the HM-5810 provides an extremely compact and organized setup.

The HM-5810 is built around Humboldt's integral, data logger with touch-screen control, which allows the HM-5810 to be used as a standalone device capable of full test control and data logging. It can also be controlled by a networked computer at any location with access to the network.

Standalone Mode

In stand-alone mode, the HM-5810 Pressure Controller provides a 7" (178mm) touch-screen controller, giving you finger-tip control of your testing processes, as well as providing real-time, visual views of your data in both tabular and graphic formats. The waterproof, touch screen provides colorful, at-a-glance monitoring of testing functions without the use of a computer. Operators can see all the data in several formats at the machine while the test is running. Data can then be viewed simultaneously from a computer or downloaded later to a computer in the lab, in the next room or at a different location, while also providing report generation capabilities from within Humboldt's NEXT software or our enhanced HM-5007SW Permeability Software Module.

Computer Control

When operated from a networked computer the NEXT software provides robust machine and test control, and report generation. It also provides the ability to control and monitor multiple machines from a single computer.

NEXT software and the enhanced Permeability module, HM-5007SW provides robust machine control, calibration, data acquisition and report generation for those who want to use a computer to control permeability testing operations.

Specifications

Max. hydraulic Pressure	HM-5810-500.3F: 0-500psi (3500kpa) HM-5810-150.3F: 0-150psi (1034kpa)
Volumetric capacity	250mL / channel
Voltage/Current	110/220V 50/60Hz 16.0 amps
Dimensions	38" x 15" x 20.5" (970 x 385 x 520 mm)
Load capacity	—
Display (Resistive Touch)	7" (178mm) VGA (480 x 800)
Real-time test data	Graphic and tabulation
Processor	Dual 32-bit ARM
RAM	64MB
Memory, non-volatile	4GB
Analog to digital converter	24 bit
Logging speed	up to 50 readings per second
Multi-test storage	1000
Points per test	3000
USB port (front)	export data, import/export calibration data
USB port (back)	provides external power for wireless access point
Ethernet connection	for network connectivity
24-bit differential analog-to-digital converter	3
Data Acquisition Channels	6
Ambient temp. sensor	1
Firmware Update	flash drive

Hydro-Control Controller, 500psi HM-5810-500.3F
Hydro-Control Controller, 150psi HM-5810-150.3F

Shipping wt. 168 lb (76kg)



NOTES

Permeability cells and related accessories are not included and should be ordered separately.



NEXT SOFTWARE

For more information on Humboldt's Next Permeability Module, please see pages 110-111.





HM-4150.3F



HM-4160.3F



HM-4150A



HM-4160A

Humboldt FlexPanels

ASTM: D1559, D2850, D2166, D4767, and D5084; AASHTO: T193, T296, T297, T208; BS 1377: Part 4: 1990, BS 1377: Part 6, BS 1377: Part 7: 1990, BS 1377: Part 8: 1990

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 coarse 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 de-aired 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 6 cell setups.

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 valves and constant-bleed-type precision regulators for accurate control. All inlets and outlets utilize quick-connects to ensure fast, accurate setup to permeameter 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. See next page.

Humboldt FlexPanels Features:

Humboldt FlexPanels are constructed of lightweight aluminum for long, rust-free life. FlexPanels provide an accurate and easy-to-operate solution for controlling compressed air, water, de-aired water and vacuum without the need for air/water bladder interfaces to produce the pressures necessary for permeability and triaxial testing. FlexPanels utilize a set of three burettes to control cell, top cap and base pedestal pressures. This extremely versatile pressure system controls the pressure, water, de-airing tank and vacuum from a single panel. The three burettes allow for the control of the cell pressure and the back pressure for each cell. They can monitor volume change in the sample and can be used to measure the flow of water through the sample for permeability testing.

FlexPanels can manually measure volume change or permeability in a triaxial test sample without the use of a volume change apparatus, a distinct benefit when compared to air/water bladder systems.

- 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.
- Uses no-volume-change Swagelock valves
- Bridge feature delivers simultaneous control of base and top pressures by adjusting one pressure regulator simplifying testing.
- Quick-connect hookups for fast and reliable set up.
- Master control panel houses digital pressure readout for the controlling pressure, inlet vacuum regulator and gauge, inlet pressure regulators and gauge, de-aired water tank controls, tap and de-aired water supply outlets, and pressure and vacuum outlets.

Control Panels

The integral control panels on the HM-4150 and HM-4160 provide pressure controls and readouts for permeability and triaxial applications. All three controllers provide identical controls, which 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.

Auxiliary Panels

The HM-4150A and HM-4160A auxiliary panels provide additional sets of burettes, which can be used to expand the capacity of a system. Each set of three (3) burettes provide the controls necessary for another cell to be used. The HM-4150A provides one (1) set of burettes and the HM-4160A provides two (2) sets. Humboldt recommends any combination of up to six (6) burettes sets can be used with each control panel.



Rear of panel showing quick-connect hookups and plumbing.

Toxic Interface Unit

Safe and convenient means of performing permeability tests of corrosive or toxic permeants. Flexible fluoro-elastomer 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, PTFE, and the fluoro-elastomer bladder. Unit measure 8" H x 5" dia. Two units are required for each cell.

Toxic Interface Unit

HM-4190

Shipping wt. 7 lbs (3.1kg)



	HM-4150.3F	HM-4150M.3F	HM-4160.3F	HM-4160M.3F	HM-4150A	HM-4160A
Pressure/Resolution	2-150 psi (0.1 psi)	14-1000 kPa (1 kPa)	2-150 psi (0.1 psi)	14-1000 kPa (1 kPa)	Not Applicable	
Vacuum	0-14.7 psi or 30 Hg	(0-100kPa) or 30 Hg	0-14.7 psi or 30 Hg	(0-100kPa) or 30 Hg		
Inner Burette						
Cell	50cc x 0.1cc (ml)					
Top	10cc x 0.02cc (ml)					
Base	10cc x 0.02cc (ml)					
Outer Burette						
Cell	400 cc (ml)					
Top	460 cc (ml)					
Base	460 cc (ml)					
Voltage	110/220VAC 50/60Hz				Not Applicable	
Power	6 watts					
Operating Temperature	14 to 158°F (-10 to 70°C)					
Dimensions	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 952)	8 x 37.5 x 37.5" (203 x 952 x 952)
Shipping Weight	95lb (43kg)		145lb (66kg)		77lb (35kg)	133lb (60kg)





Expansion Index Consolidometer

ASTM D4829

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 and collar, stainless steel specimen ring and weight, 12.6 lb. (5.7kg) loading weight, and 3.99" dia. x 0.5" (101.4 x 12.5mm) porous stones. Dial Indicator required, see below. 6" dia x 11" H (152 x 279mm).

Expansion Index Consolidometer **HM-5405**
 Shipping wt. 20 lbs (9kg)

Dial Indicators for Consolidometer

The expansion index consolidometer requires one of these dial indicators.

- 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-4158.1**
- Dial Indicator, 12mm range x .002mm **H-4465.12**
- Dial Indicator, 25mm range x .010mm **H-4465.25**
- Dial Indicator, 50mm range x .020mm **H-4465.50**

Shipping wt. 1.3 lbs (0.6kg)

Porous Stone

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

Porous Stone, 3.99" x 0.5" **HM-4184.399T**
 Shipping wt. 0.5 lbs (0.2kg)

Soil Volume Change Meters (PVC)

Used 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. (4.5kN) capacity proving ring, mold assembly, loading cap, porous stones, loading pistons, 2-3/4" (70mm) dia. specimen ring (HM-1220.70), and conversion charts. 7.25" (184mm) dia. base x 15.5" (394mm) height.

Soil Volume Change Meter PVC, Analog **HM-2415**
 Shipping wt. 32 lbs (14.5kg)

Soil Volume Change Meter PVC, Digital **HM-2415A**
 Shipping wt. 32 lbs (14.5kg)

Compaction Base and Collar

The compaction base and collar are used to produce a soil sample for use with the basic swell/expansion consolidometers. Use HM-3701 compaction hammer.

- Compaction Base & Collar, 2.440"** **HM-1975-D**
- Compaction Base & Collar, 2.500"** **HM-1975-E**

Shipping wt. 7 lbs (3kg)

Compaction Hammer

Rod with sliding weights on a 2" (51mm) dia foot. Stop allows adjusting height of drop up to 8" (203mm). Includes one .25 lb. (100g) and one 2.25 lb. (1kg) weight.

Compaction Hammer **HM-3701**
 Shipping wt. 6 lbs (2.7kg)

Basic Swell/Expansion Consolidometer

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. A dial indicator is required, choose from either H-4471 with a range of .500" with .0001" divisions or H-4465.12 with a range of 12mm and .002mm divisions. Alternative loading weights are also available, please inquire.

Consolidometer, 2.440" **HM-1972-1D**
Consolidometer, 2.500" **HM-1972-1E**
 Shipping wt. 8 lbs (4kg)

Components for HM-1972-1D	
Cutting Ring, SS	HM-1220.24.8
Compaction Ring, SS	HM-1972-3D
Loading Weight, 60 PSF (SS)	HM-1972-6D
Top Porous Stone	HM-4184.240
Base Porous Stone, 3.31" dia. x 0.25" thick	HM-4184.331

Components for HM-1972-1E	
Cutting Ring, SS	HM-1220.25.8
Compaction Ring, SS	HM-1972-3E
Loading Weight, 60 PSF (SS)	HM-1972-6E
Top Porous Stone	HM-4184.2485
Base Porous Stone, 3.31" dia. x 0.25" thick	HM-4184.331

