

H-1050

### Ductility Testing Machine, 3-Speed for Standard Tests

Determines ductility of formed asphalt/cement or semi-solid bitumen by measuring distance of elongation before breaking point when ends of a briquet are pulled apart at a specific speed and temperature. Tests three briquets simultaneously. D.C. 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.

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. Elongation (pull) capacity is maximum carriage travel (150cm) with automatic stop.

Polished stainless steel trough has overflow connection. Gears are bronze; all other parts are solid brass to prevent rusting. Features 6' (183cm) cord, feed-through switch and 3-prong plug. Includes 3 standard H-1080 briquet molds with H-1090 plates. Trough overall dimension: 11-3/4x74x6-3/8"H. Meets ASTM D113, AASHTO T51.

Description	Model
Ductility testing machine, 3-speed. 110V. 60Hz. 1ph AC	H-1050
Ductility testing machine, 3-speed. 220V. 50Hz. 1ph AC	H-1050.5F

Shipping wt. 200 lbs. (90.7kg)

### Ductility Testing Machine, 3-Speed, Electronically Controlled, for Standard Tests

Same dimensions as H-1050 with solid state speed controller on H-1050 ductility machine continually adjusts feedback to maintain even, proper speed. Direct drive 1/40 HP DC motor pulls carriage at 1/4, 1 or 5cm/min. Meets ASTM D113, AASHTO T51.

Description	Model
Electronically controlled ductility machine. 115V. 60Hz. AC	H-1075
Electronically controlled ductility machine. 230V. 50Hz. AC.	H-1075.5F

Shipping wt. 180 lbs. (81 kg)

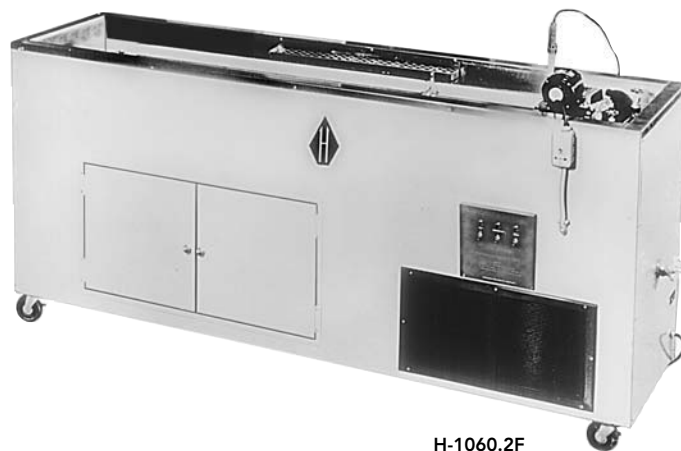
### Ductility Testing Machine, Single-Speed for Standard Tests

Same size, capacity and dimension as H-1050, unit's direct drive 1/75 HP AC motor pulls carriage at one speed 5cm/min.

Description	Model
Single-speed ductility machine. 115V. 60Hz. AC	H-1070
Single-speed ductility machine. 230V. 50Hz. AC	H-1070.5F

Shipping wt. 180 lbs. (81 kg)

*Humboldt Testing Equipment Is Engineered for Precision, Accuracy, Greater Productivity, Longer Life & Easier Use.*



H-1060.2F

### Ductility Testing Machine, 3-Speed Refrigerated for Both Standard and Forced Tests

Features same specification as H-1050 and a polypropylene bath designed for use with sodium chloride solutions. Heavy-gauge-steel enamel finish cabinet is fully insulated. Sealed space between inner and outer walls protects low-thermal conductivity properties of foam and fiberglass combination, is tested and proven 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.

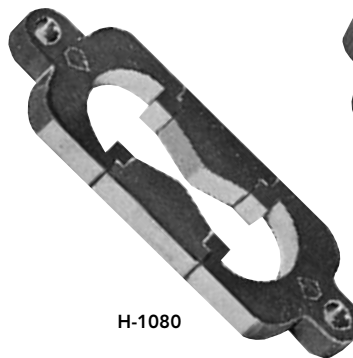
Sensitive magnetic setting transistorized electronic relay control panel for heat or refrigeration controls temperature range of 32°F (0°C) to 120°F (49°C) by 0.1°F. Cabinet is 90x41x23". Includes 3 H-1080 molds. Meets ASTM D113, AASHTO T51.

Description	Model
Refrigerated ductility machine 220V. 60Hz. 1ph AC.	H-1060.2F
Refrigerated ductility machine 220V. 50Hz. 1ph AC.	H-1060.5F

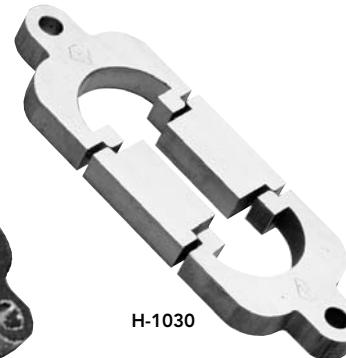
Shipping wt. 1,000 lbs. (454 kg)



H-1068 (includes both H-1068X and H-1068C)



H-1080



H-1030

### Ductility Testing Machine, 3-Speed with Temperature-Control Circulator for Both Standard and Forced Tests

Designed for use with the force ductility test, unit features finned stainless steel tubes beneath a false bottom for efficient thermal transfer. Solid-state thermostatically controlled bath and circulator maintain water temperature within a  $\pm 0.9^\circ\text{F}$  ( $\pm 0.5^\circ\text{C}$ ). Stainless steel interior; baked enamel stainless steel-wrapped exterior. Includes three H-1080 molds. H-1068PC Plastic Cover is recommended to maintain constant tank temperatures, highs and lows. Meets ASTM D113, D6084, D4.

Description	Model
Temp-control ductility machine. 120V. 60Hz. 1ph AC.	H-1068
Temp-control ductility machine. 220V. 50Hz. 1 ph AC.	H-1068.5F

Shipping wt. 430 lbs. (195 kg)

### Ductility Testing Machine, 3-Speed for Both Standard and Forced Tests

Same as H-1068 without temperature-control circulator.

Description	Model
Ductility machine. 120V. 60Hz. AC.	H-1068X
Ductility machine. 220V. 50Hz. AC.	H-1068X.5F

Shipping wt. 350 lbs. (159 kg)

### Temperature-Control Circulator for Ductility Testing Machine

For use with H-1068X.

Description	Model
Temperature-control circulator. 120V, 60Hz AC.	H-1068C
Temperature-control circulator. 220V, 50Hz AC.	H-1068C.5F

Shipping wt. 80 lbs. (36 kg)

### Ductility Machine Cover

Description	Model
Ductility machine temperature-control cover	H-1068PC

Shipping wt. 40 lbs. (18 kg) (Cannot ship via UPS)

### Ductility Briquet Molds

Forms briquets to be tested in any ductility testing machine. 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 D113, D5892, D6084, AASHTO T51.

Description					Model
Ductility briquet mold, angled sides for standard test. ASTM D113.					H-1080
Compatibility					
H-1050	H-1060	H-1068	H-1070	H-1075	
●	●	●	●	●	

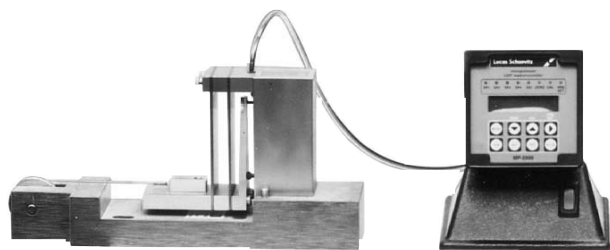
Description					Model
Ductility briquet mold, straight sides for forced test. ASTM D5892, D6084.					H-1030
Compatibility					
H-1050	H-1060	H-1068	H-1070	H-1075	
	●	●			

### Base Plates

Perfectly flat surface of brass plate gives uniform contact with bottom surfaces of either one (single mold plate) or three (triple mold plate) H-1080 or H-1030 molds.

Description					Model
Base plate, single mold. Overall dimension: 5-1/2x 2x 1/8".					H-1090
Compatibility					
H-1050	H-1060	H-1068	H-1070	H-1075	
●	●	●	●	●	

Description					Model
Base plate, triple mold. Overall dimension: 5-1/2x 8x 1/8".					H-1090.3
Compatibility					
H-1050	H-1060	H-1068	H-1070	H-1075	
●	●	●	●	●	



H-1021



H-2266



H-2267

## Force Determination Adapter and Digital Indicator

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; 60 maDC 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: 6x5-3/8x1-3/4".

Description	Model
Force determination adapter and digital indicator. 115V, 60 Hz.	H-1021
Force determination adapter and digital indicator. 220V, 50/60 Hz.	H-1021.4F

Shipping wt. 20 lbs. (9kg)

## Chart Recorder

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. 15x4-1/4 x10".

Description	Model
Versatile chart recorder. 115V, 60Hz.	H-1026
Versatile chart recorder. 220V, 50/60Hz.	H-1026.4F

Shipping wt. 11 lbs. (4.9kg)

## Heater/Circulator

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) I.D. 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. 6h x 5w x 13"d (15.2 x 12.7 x 33cm).

Heater/Circulator						
Temp Range	Temp Stability	Display	Accuracy	Pumping (liters/min)	Over-Temp Cutoff	Model
5°C above ambient to 150°C	± 0.05°C	°C or °F	± 0.5°C	7 or 15	Adjustable	
Heater/Circulator, 120V, 60Hz, 9 amp.						H-2266
Heater/Circulator, 230V, 50/60Hz, 4.5 amp.						H-2266.4F

Shipping wt. 10 lbs. (4.5kg)

## Acrylic Tank

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). I.D. (HxWxD) 7-1/2x13-1/8x18" (190x333x457mm).

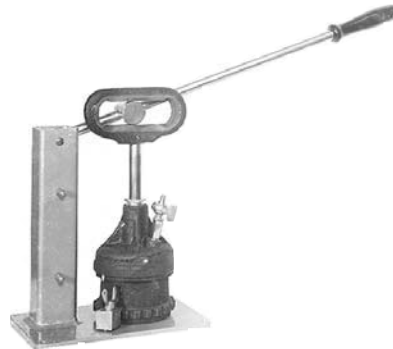
Description	Model
Acrylic tank	H-2267



H-4926, H-4928, H-4929



H-1352



H-2535



H-2515

### Aluminum Moisture Boxes and Sample Cups

Flat-bottom seamless tin sample cups have telescoping covers. Hold samples for determining penetrations of 200 or less determinations of loss by heating.

Aluminum Moisture Boxes			
Description	Dia. in. (mm)	Height in. (mm)	Model
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.	2 (51)	7/8 (22)	H-4926
	2-1/2 (64)	1-3/4 (44)	H-4927
	3 (76)	1 (25)	H-4928
	3-1/2 (89)	2 (51)	H-4929

Tin Sample Cups			
Capacity	Dimensions	Qty. in Set	Model
2.5-Oz. (71g)	1.87" (47.7mm) I.D. 1.41" (36mm) deep.	48	H-1350.3A
4.7-Oz (133g)	2.42" (61.5mm) I.D. 1.67" (42.6mm) deep.	36	H-1350.4A
5.6-Oz. (159g)	2.59" (66mm) I.D. 1.72" (43.4mm) deep.	36	H-1350.6A
8.2-Oz. (232g)	3.05" (77.5mm) I.D. 1.97" (50.1mm) deep.	18	H-1350.8A
16-Oz. (454g)	4" (102mm) I.D. 2-3/8" (51mm) deep.	1	H-1350.16
42.3-Oz. (1200g)	6.12" (155mm) I.D. 3" (76.2mm) deep.	1	H-1350.42
70.5-Oz. (2000g)	6.12" (155mm) I.D. 5" (127mm) deep.	1	H-1350.70

### Transfer Dish

Plastic transfer dish has flat bottom, straight sides and metal centering lugs and magnet in the bottom. Size: 3-3/4" dia. x 3-1/4" deep. Meets ASTM D5.

Description	Model
Transfer dish.	H-1352

### Lever-Operated Grease Worker

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 stopcock and lever-operated plunger handle. Order H-2631D dial thermometer separately. Meets ASTM D217, D937.

Description	Model
Lever-operated grease worker.	H-2535

Shipping wt. 35 lbs. (15.9kg)

### Micro Grease Worker

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 (19x17mm). Order water baths separately. Meets ASTM D1403.

Description	Model
Micro grease worker.	H-2515

Shipping wt. 10 lbs. (4.5kg)

### Grease Cutter

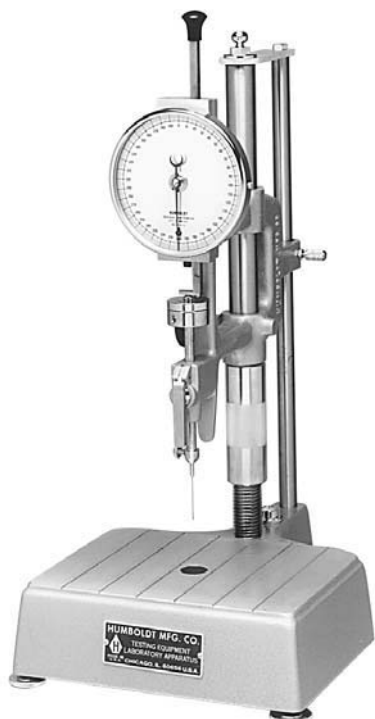
Grease cutter for block grease is mounted on cast-iron support base with plywood top. Features hardened, sharp rigidly mounted beveled blade. Meets ASTM D217.

Description	Model
Grease cutter.	H-2540

Shipping wt. 10 lbs. (4.5kg)



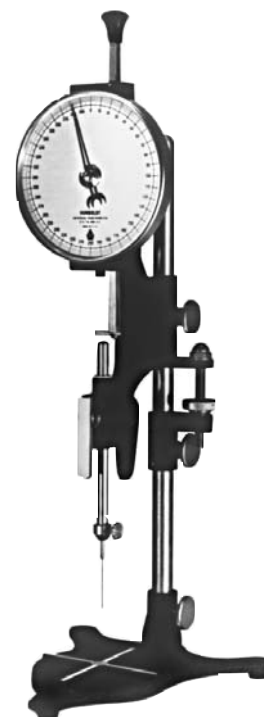
H-2540



H-1200



H-1240



H-1250

## Universal Penetrometers

Direct-reading instruments for precision penetration measurements of bituminous materials, cement, petrolatum, and waxes—as well as food, cosmetic, and pharmaceutical products.

### Universal Penetrometer

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. 10-1/2x13x22" (266.7x330.2x558.8mm). Meets ASTM D5, D217, D1168, D1191, D1321, D1403, D1831, D1855; AASHTO T49, T187, others.

Description	Model
Universal penetrometer, includes H-1280 bituminous penetration needle.	H-1200

### Electric Penetrometer

Automatic. Digital timer with release mechanism is switchable to 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 same as H-1240, except includes voltage adapter and internal switch on timing mechanism to change cycle to 50Hz.

Description	Model
Electric penetrometer, includes H-1280 bituminous penetration needle. 110V. 60Hz. 1ph AC.	H-1240
Electric penetrometer, includes H-1280 bituminous penetration needle. 230V. 60Hz. 1ph AC.	H-1240.2F
Electric penetrometer, includes H-1280 bituminous penetration needle. 230V. 50Hz. 1ph AC.	H-1240.5F

Shipping wt. 32 lbs. (14.5kg)

## Portable Penetrometer

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. 7x7x16" (178x178x406mm).

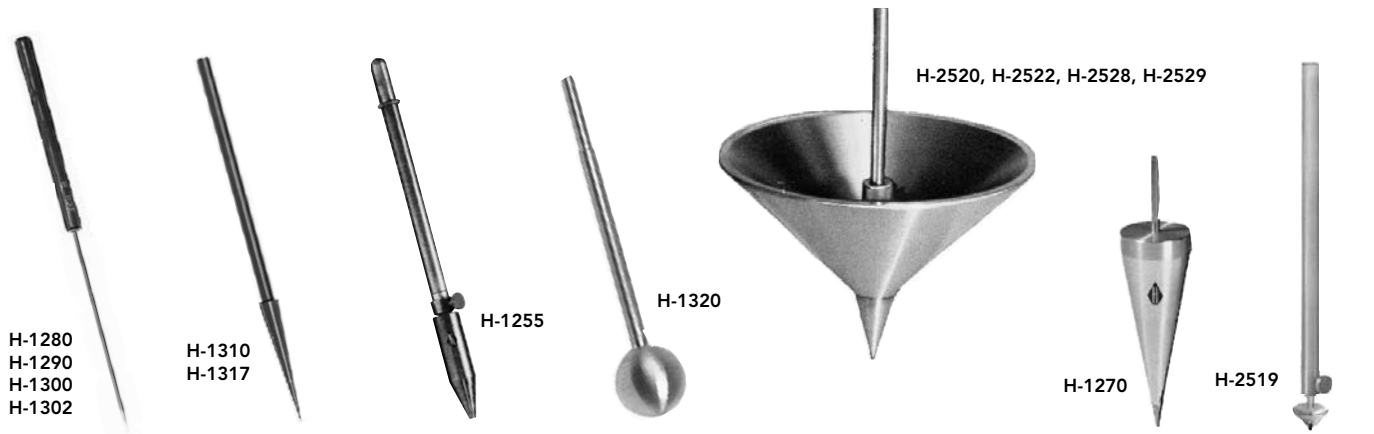
Description	Model
Portable penetrometer. Includes one 50g loading wt., one H-1280 penetrating needle.	H-1250

Shipping wt. 8 lbs. (3.6kg)

## Penetrometers for Special Applications

Description	Includes	Shipping wt.	Model
Grease Penetrometer. Same as H-1200, except cone different.	One H-2520 grease penetration cone	30lbs (13.6kg)	H-2510
Battery Paste Penetrometer. Same as H-1200, except cone different.	One H-1255 special plunger/cone-shaped penetrating needle	30lbs (13.6kg)	H-1202
Portable Battery Paste Penetrometer. Same as H-1250, except cone different.	One H-1255 special plunger/cone-shaped penetrating needle	8lbs (3.6kg)	H-1252

**Note: All penetrometers for special applications may be ordered in electric penetrometer versions. Call 1-800-544-7220.**



### Penetration Needles and Cones

Penetration Needles and Cones			
Applications	Description	Meets Specs	Model
Bituminous materials	Standard hardened stainless steel needle, 40-45mm exposed needle length. Wt. 2.5g	ASTM D5; AASHTO T49, IP49; ASA Std., A37.1; Fed Spec. SS.R. 406C, Meth. 214.01	H-1280
	Long hardened stainless steel needle, 50-55mm exposed needle length. Wt. 2.5g.		H-1290
	Same as H-1290. Certified for accuracy by independent laboratory. Wt. 2.5g.		H-1302
	Same as H-1280. Certified for accuracy by independent laboratory. Wt. 2.5g.		H-1300
Waxes with 250 or more penetration	Hardened stainless steel wax penetration needles with tapered point, blunt tip of truncated cone. Ferrule is approx. 3.2mm dia. Wt. 2.5g.	ASTM D1321	H-1310
	Same as H-1310. Certified for accuracy by independent laboratory.		H-1317
Battery paste	Hardened stainless steel tip with special plunger. Total wt. 60 gm ± .050g.	N/A	H-1255
Joint sealant for asphalt & concrete pavements	Resilience ball penetration tool. Total wt. 27.5g.	ASTM D3407	H-1320
Grease-testing penetrometers	Hollow 90 brass cone, highly polished stainless steel tip. Removable nut and stem. Wt. 102.5g.	ASTM D217, D937 ASA Std. Z11.3	H-2520
	Same as H-2520, completely made of stainless steel. Wt. 102.5g.		H-2522
For all 90° cones	Stainless steel replacement tip, nut and stem.		H-2525
Grease-testing penetrometers	Magnesium cone and plunger, same dim. as H-2520. Total wt. cone and plunger 30.0g.	ASTM D2884	H-2524
Cone penetration of lubricating grease (alt. meth.) section through center of cone	Magnesium. Same dimension as H-2520. Total wt. 102.5g.	ASTM D217, Fig. H-4	H-2528
Food products and paste paints	Aluminum. Same dimension as H-2520. Total wt. 35g.	U.S. Dept. of Agriculture	H-2529
Measuring firmness of solid and plasticized fats (shortenings, margarine, butter, etc.)	10° aluminum cone, 3.2mm ferrule, 0.8mm stainless steel blunt tip. Overall length 106mm. Wt. 45g.	AOCS Cc 16-60	H-1270
Small obtainable samples (i.e., recovery of used grease)	1/4 scale. (Not considered a substitute for full-size cone specified in ASTM D217.) Wt. 9.38g.	ASTM D1403	H-2519



H-1720



H-1745



H-1730



H-1735

## Constant Temperature Bath (Cannon Model CT-500)

- Temperature range:  $\pm 20^{\circ}\text{C}$  to  $100^{\circ}\text{C}$  ( $\pm 0.01^{\circ}\text{C}$ )
- 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  $100^{\circ}\text{C}$ . Two stainless steel encased thermistors 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. 16Wx14-1/4Dx24"H (407x362x610mm). Capacity 4.5 gal. (17L). Meets ASTM D445.

Description	Model
Constant Temperature Bath, Cannon Model CT-500. 120V, 50/60Hz, 1000 watts. Shipping wt. 75 lb. (34kg).	H-1720
Constant Temperature Bath, Cannon Model CT-500. 240V, 50/60Hz, 1000 watts. Shipping wt. 75 lb. (34kg).	H-1720.4F
Vacuum Manifold, Canon Model 3VM, for use with H-1720.	H-1745
IBF Bath Oil for use below 121 C, use with H-1720, 6 gal.	H-1732

## Storage Unit for either H-1720 and/or H-1730

Sturdy two-drawer unit elevates either model Constant Temperature Bath for ease of viewing, plus ample storage of viscometers and accessories. 18W x 18D x 6.5"H (457 x 457 x 165mm).

Description	Model
Storage unit for either H-1720 and/or H-1730.	H-1722

Shipping wt. 30 lbs. (13.6kg).

## Constant Temperature Bath (Cannon Model CT-1000)

- Temperature range:  $\pm 20^{\circ}\text{C}$  to  $150^{\circ}\text{C}$  ( $\pm 0.01^{\circ}\text{C}$ ) (Above  $100^{\circ}\text{C}$  temperature is controlled to  $0.03^{\circ}\text{C}$ )
- 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  $150^{\circ}\text{C}$ . Two stainless steel encased thermistors 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. 17-1/4Wx18-1/4Dx 23"H (438x464x584mm). Capacity 4.5 gal. (17L). Meets ASTM D445.

Description	Model
Constant Temperature Bath, Cannon Model CT-1000. 120V, 50/60Hz, 1400 watts. Shipping wt. 123 lb. (55.8kg).	H-1730
Constant Temperature Bath, Cannon Model CT-1000. 240V, 50/60Hz, 1400 watts. Shipping wt. 123 lb. (55.8kg).	H-1730.4F
Vacuum Manifold, Cannon Model 4VM, for use with H-1730.	H-1735
High-Temperature Bath Silicone for use above 135 C. Use with H-1730, 1/2 gal.	H-1733



### Digital Vacuum Pressure Regulator All Solid-State; Uses No Mercury (Cannon DVR-1000 Series)

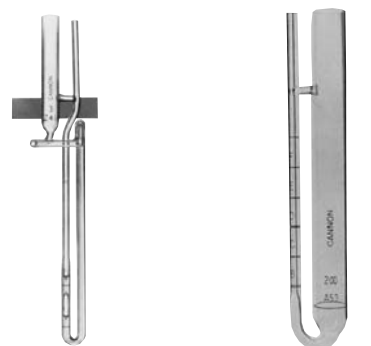
For precise measurement and control of vacuum at 300mm Hg below atmospheric pressure. Use with Cannon-Manning, Asphalt Institute, or Modified Koppers vacuum viscometers for measurement of asphalt cement and in other laboratory applications where accurate measurement and control of vacuum is required.

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: 18.5w x 18d x 6.75"h (470x457x171mm) or vertical: 6.75w x 18d x 18.5"h (171x457x470mm).

Description	Model
Digital vacuum regulator, Cannon DVR 1500H, horizontal, 120V, 50/60Hz, 175 watts.	H-1741H
Digital vacuum regulator, Cannon DVR 1500HF, horizontal, 240V, 50/60Hz, 175 watts.	H-1741H.4F
Digital vacuum regulator, Cannon DVR 1500V, vertical, 120V, 50/60Hz, 175 watts.	H-1741V
Digital vacuum regulator, Cannon DVR 1500VF, vertical, 240V, 50/60Hz, 175 watts.	H-1741V.4F

**NOTE:** Prices and delivery on Cannon-Manning, Cannon-Fenske, Lantz-Zeitfuchs, Modified Koppers and other viscometers are available for quotation on request.



H-1746 Series

H-1747 Series

### 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.

Zeitfuchs® Cross-Arm Viscometer and Holder		
Approx. Constant Cs/Sec.	Range 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 neoprene rubber holder for 2" (51mm) dia. hole and certificate of calibration. Meets ASTM D2171; AASHTO T202.

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
400	9,600 to 200,000	H-1747.5





H-2165

## Saybolt Viscometer Bath

Designed for Saybolt Universal and Furol viscosity testing, this new constant temperature bath meets all ASTM and AASHTO requirements for precise temperature control. The microprocessor 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.

Description	Model
Saybolt Viscometer Bath. 115V, 50/60Hz, 12.3 Amps.	H-2165
Saybolt Viscometer Bath. 220-240V, 50/60Hz, 6.4 Amps	H-2165.4F

Shipping wt. 58 lbs. (26.3kg)

### Saybolt Viscometer Components and Replacement Parts

Description	Model
<b>ORIFICES</b>	
Stainless steel universal orifice only.	H-2173
Stainless steel Furol orifice only.	H-2174
<b>TUBES WITH ORIFICES</b>	
Brass Saybolt viscometer tube. Stainless steel Universal orifice.	H-2180
Brass with stainless steel Furol orifice Saybolt viscosity tube.	H-2182
Stainless steel with stainless steel Furol orifice Saybolt viscosity tube.	H-2183
Brass with stainless steel Universal and Furol orifice Saybolt viscosity tube. Includes wrench.	H-2184
Stainless steel with stainless steel Universal and Furol orifice Saybolt viscosity tube. Includes wrench.	H-2185
<b>TUBES</b>	
Stainless steel Saybolt viscosimeter tube.	H-2171
Brass Saybolt viscosimeter tube.	H-2172
<b>ACCESSORIES</b>	
Tube cleaner.	H-2175
Saybolt viscosity flask; graduated 60 ml volumetric receiving flask.	H-2176
Saybolt withdrawal pipette and aspirator.	H-2177
White Mineral Oil, suitable for use at temperatures of up to 230°F (110°C)	H-2189
Strainer.	H-2178
High-temp Dow-Corning 200 Fluid, 100 centistoke oil, 5 gal., for use with H-2165. Shipping wt. 40 lbs. (18kg)	H-2199
Displacement ring.	H-2194
Thermometer support.	H-2195
Orifice wrench.	H-2196
Tube wrench.	H-2197
Saybolt viscosity thermometer (66 to 80°F).	H-2600.17F
Saybolt viscosity thermometer (94 to 108°F).	H-2600.18F
Saybolt viscosity thermometer (120 to 134°F).	H-2600.19F
Saybolt viscosity thermometer (134 to 148°F).	H-2600.20F
Saybolt viscosity thermometer (174 to 188°F).	H-2600.21F
Saybolt viscosity thermometer (204 to 218°F).	H-2600.22F
Saybolt viscosity thermometer (19 to 27°C).	H-2610.17C
Saybolt viscosity thermometer (34 to 42°C).	H-2610.18C
Saybolt viscosity thermometer (49 to 57°C).	H-2610.19C
Saybolt viscosity thermometer (57 to 65°C).	H-2610.20C
Saybolt viscosity thermometer (79 to 87°C).	H-2610.21C
Saybolt viscosity thermometer (95 to 103°C).	H-2610.22C



H-2405



H-2400

### 8-Oz. Bacon Bomb Sampler

Obtains bottom or any level sample, using thief method, from storage tanks, tank cars and drums. Plunger opens to admit the sample when bomb is lowered to the bottom or when plunger is released at a desired level. Plunger seals tight when bomb is withdrawn; features O-ring-type valve seal. Available in plated brass or stainless steel; specify B or S after model number when ordering, i.e., H-2405B. Capacity: 8 oz; 2" dia. x 10" L. Meets ASTM D117, D270, D923, D943.

Description	Model
8-Oz. opening Bacon bomb sampler, brass.	H-2405B
8-Oz. opening Bacon bomb sampler, stainless steel.	H-2405S

Shipping wt. 5 lbs. (2.3kg)

### 16-Oz. Bacon Bomb Sampler

Larger capacity with same features as H-2405. 2-3/4" dia. x 12"L. Shipping wt. 9 lbs. (4.1kg)

Description	Model
16-Oz. Bacon bomb sampler, brass.	H-2406B
16-Oz. Bacon bomb sampler, stainless steel.	H-2406S

### 32-Oz. Bacon Bomb Sampler

Larger capacity with same features as H-2405. 2-3/4" dia. x 15-1/4"L. Shipping wt. 15 lbs. (6.8kg)

Description	Model
32-Oz. Bacon bomb sampler, brass.	H-2407B
32-Oz. Bacon bomb sampler, stainless steel.	H-2407S

### ASTM Oil Sampler

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.

Description	Model
ASTM oil sampler. 1-qt. capacity.	H-2400

Shipping wt. 6 lbs. (2.7kg)

### 1-1/2" Opening ASTM Oil Sampler

Same as H-2400 with 1-1/2" opening.

Description	Model
ASTM oil sampler.	H-2401

Shipping wt. 6 lbs. (2.7kg)

**Humboldt Testing Equipment  
Is Engineered for Precision,  
Accuracy, Greater Productivity,  
Longer Life & Easier Use.**



H-1530 series, H-1535



H-1400



H-2560

### Ford Viscosity Cups

Used in determining viscosity of paint, lacquers and related coatings. Cup-orifice combination (Ford 2, 3 or 4) should be selected to provide an efflux time within the 20-to-100-second range. Cup body is machined from aluminum; orifice is brass. 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
No. 1 Orifice For Viscosity Cup	H-1530.1
No. 2 Orifice For Viscosity Cup	H-1530.2
No. 3 Orifice For Viscosity Cup	H-1530.3
No. 4 Orifice For Viscosity Cup	H-1530.4
No. 5 Orifice For Viscosity Cup	H-1530.5

### Viscosity Cup Stand

Features leveling base and adjustable support bracket for H-1530 Ford viscosity cups.

Description	Model
Viscosity cup stand.	H-1535

### Asphalt Viscosimeter Float Test Set

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. Also available as components. Order thermometer separately. Meets ASTM D139, AASHTO T50.

Description	Model
Asphalt viscosimeter float test set.	H-1400
Asphalt viscosimeter float only.	H-1410
Three asphalt viscosimeter collars only.	H-1420

### Cloud and Pour Point Apparatus Set

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.

Description, Complete Set	Model
Cloud and pour point apparatus set.	H-2560

Shipping wt. 6 lbs. (2.7kg)

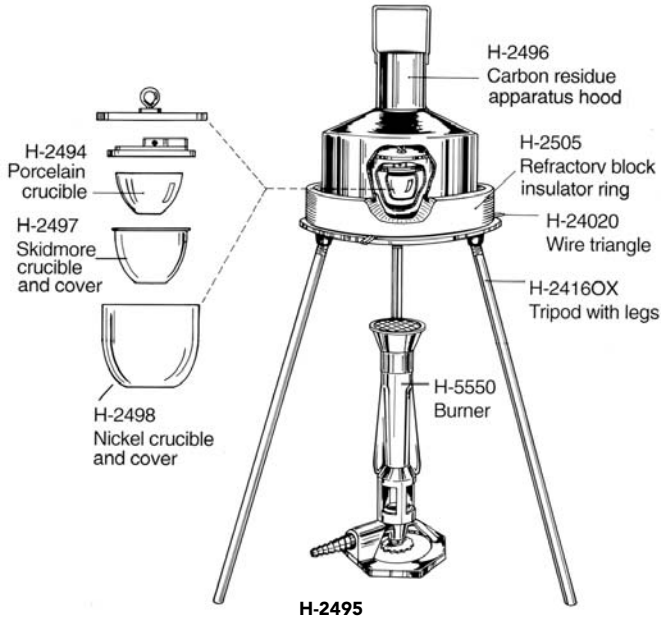
Description, Replacement Parts & Accessories	Model
Metal tripod base.	H-2560.1
Glass test jar.	H-2560.3
Glass battery bath jar.	H-2560.5
Brass cylinder.	H-2560.2
Cork discs.	H-2595
Cork rings.	H-2598
Thermometer -36 to 120°F.	H-2600.5F
Thermometer -38 to 50°C.	H-2610.5C
Thermometer -112 to 70°F.	H-2600.6F
Thermometer -80 to 20°C.	H-2610.6C

### Spot Test Set of Asphaltic Materials

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.

Description	Model
Spot test set.	H-1510

Shipping wt. 5 lbs. (2.2kg)



### Conradson Carbon Residue Apparatus

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.

Description, Complete Set	Model
Conradson carbon residue apparatus.	H-2495

Shipping wt. 7 lbs. (3.2kg)

Description, Replacement Parts & Accessories	Model
Porcelain crucible.	H-2494
Skidmore crucible and cover.	H-2497
Carbon residue apparatus hood.	H-2496
Nickel crucible with cover.	H-2498
Refractory block insulator ring.	H-2505

### Stainless Steel Weight-Per-Gallon Cup

Corrosion-resistant stainless steel cup provides means of rapid, accurate determination of weight per gallon or specific gravity. Capacity of 83.2cc. Includes tight-fitting stainless steel cover. Meets ASTM D244.

Description	Model
Stainless steel weight-per-gallon cup.	HP-1108

### Falling Sand Abrasion Tester

Falling sand test determines resistance of coatings, paint, varnish, lacquer and related products to abrasion. Test panel is enclosed in a receptacle with a window. Ottawa natural silica sand is considered standard for this test because of its known characteristics. Order H-3820 Ottawa silica test sand separately. Meets ASTM D333, D968, D1395, D2205.

Description	Model
Falling sand abrasion tester.	HP-1160

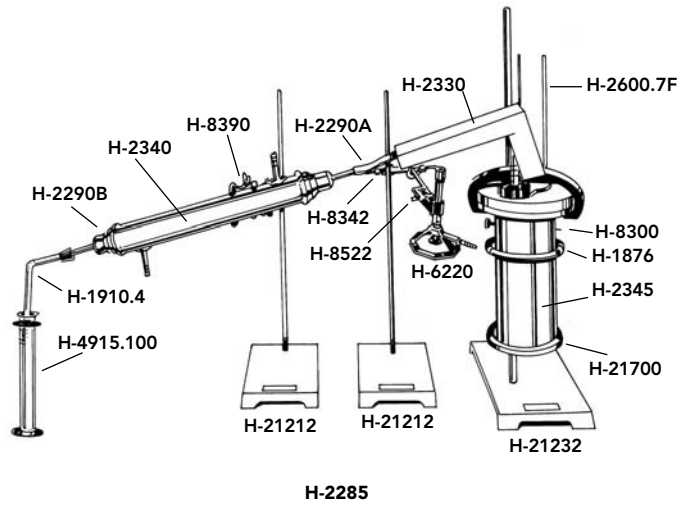
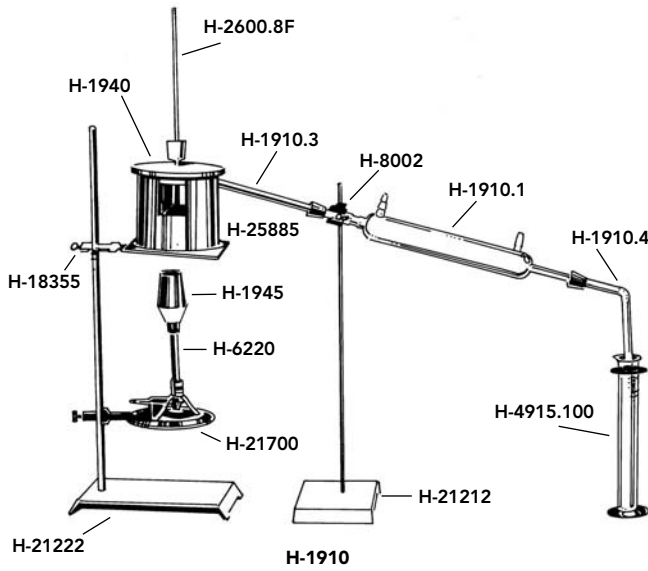
Shipping wt. 110 lbs. (49.9kg)

### Ottawa Silica Sand

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.

Description	Model
Ottawa silica sand.	H-3820

Shipping wt. 50 lbs. (22.7kg)



### Distillation of Cut-Back Asphaltic (Bituminous) Products

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.

Description, Complete Set	Model
Distillation of cut-back asphaltic (bituminous) products.	H-1910

Shipping wt. 18 lbs. (8.2kg)

Description, Replacement Parts & Accessories	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

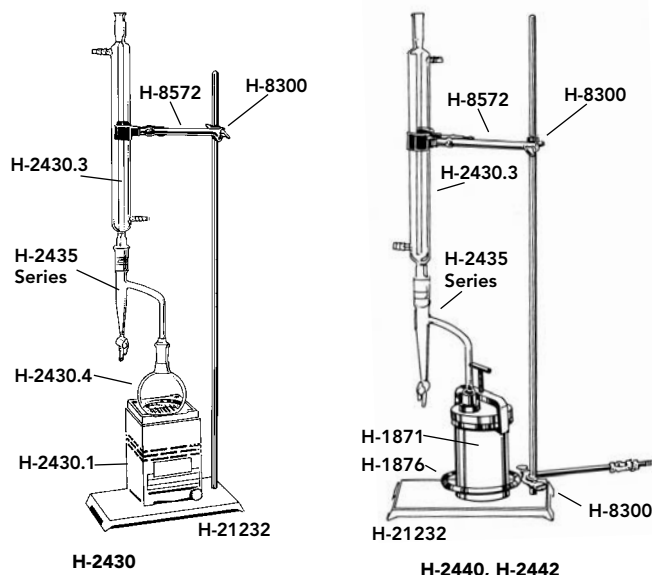
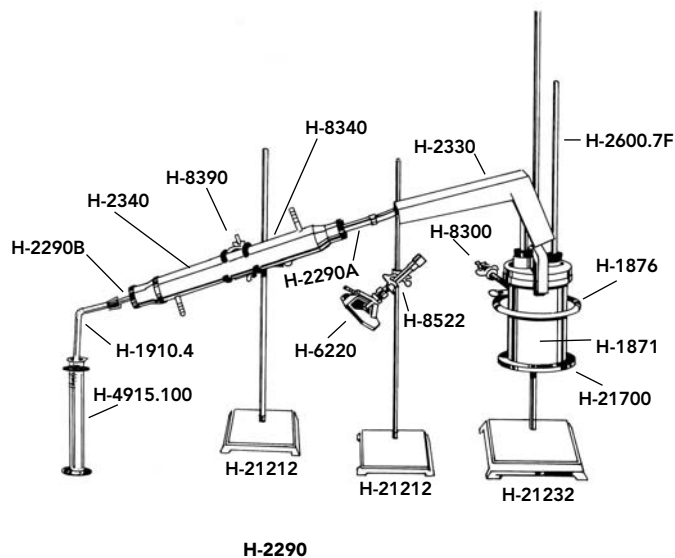
### Emulsified Asphalts Distillation Apparatus

Distillation apparatus accurately determines representative portion of residue in emulsified asphalts. Fahrenheit thermometers furnished standard. Meets ASTM D244; AASHTO T59.

Description, Complete Set	Model
Emulsified asphalts distillation apparatus.	H-2285

Shipping wt. 30 lbs. (13.6kg)

Description, Replacement Parts & Accessories	Model
Ring burner	H-1876
Adapter (see H-1910 product illustration)	H-1910.4
Bent glass tube	H-2290A
Funnelled tube	H-2290B
Tube shield	H-2330
Condenser	H-2340
Aluminum still	H-2345
Thermometers (two in complete set)	H-2600.7F
Graduated cylinder	H-4915.100
Burner	H-6220
Clamp	H-8300
Clamp holders (two in complete set)	H-8342
Clamp	H-8390
Clamp	H-8522
Ring	H-18355
Support stands (two in complete set)	H-21212
Support stand	H-21232
Support shelf	H-21700



### Emulsified Asphalts Water Content Distillation Apparatus

Same as H-2285 with smaller H-1871 still substituted for H-2345 still. Meets ASTM D244; AASHTO T59.

Description, Complete Set	Model
Emulsified asphalts water content distillation apparatus.	H-2290

Shipping wt. 30 lbs. (13.6 kg)

### Dean-Stark Electric Apparatus for Water in Petroleum Products

Electrically heated apparatus determines water content in petroleum products and other bituminous materials. Meets ASTM D95, D244, E123; AASHTO T55, T59.

Description, Complete Set	Model
Dean-Stark electric apparatus for water in petroleum products. 115V, 60Hz, 1 ph, AC.	H-2430
Dean-Stark electric apparatus for water in petroleum products. 230V, 50Hz, 1 ph, AC.	H-2430.5F

Shipping wt. 30 lbs. (13.6kg)

Description, Replacement Parts & Accessories	Model
0 to 750W electric rheostat heater	H-2430.1
Condenser	H-2430.3
Flask	H-2430.4
20 ml 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 Water in Petroleum Products Apparatus

Gas heated apparatus determines water content in petroleum products and other bituminous materials. Uses the same replacement parts as H-2430, except has still and burner (listed below) instead of heater and flask. Meets ASTM D95, D244, E123; AASHTO T55, T59.

Description, Complete Set	Model
Dean-Stark gas-heated water in petroleum products apparatus.	H-2440

Shipping wt. 30 lbs. (13.6kg)

Description, Replacement Parts & Accessories	Model
Tar still	H-1871
Ring burner	H-1876

### Distillation Apparatus for Moisture or Volatile Distillates in Bituminous Paving Mixtures

Same as H-2440, but the distilling receiver is a trap for moisture or volatile fractions of bitumen. Trap is graduated 0 to 5ml in 0.1ml divisions. Includes trap. Meets ASTM D1461; AASHTO T110.

Description	Model
Distillation apparatus with trap for VOLATILE distillates in bituminous paving mixtures.	H-2442.25
Distillation apparatus with trap for MOISTURE distillates in bituminous paving mixtures.	H-2442.10

Shipping wt. 25 lbs. (11.3kg)

**Note:** See following page for distillation accessories and replacement parts.



H-1945



H-1876



H-2345



H-1946



H-2340



H-2348



H-1871



H-1940

### Distillation Apparatus Replacement Shields, Stills and Accessories

Part	Description	Used With	Specifications	Model
Aluminum Tar Still	For determining water in crude petroleum, tars and derivatives of those materials. Cover has 1 tubulure. Dimensions: I.D. 3-1/2" (89mm) x 6" (152mm) inside depth. 1 qt. (0.9 litre) capacity. Cast aluminum.	H-2290	ASTM D95, D244, D370, D1461; AASHTO T55, T59, T83, T110	H-1871
Aluminum Alloy Still	For identifying cationic emulsions and as 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) I.D. x 9-1/2" (241mm) inside depth.	H-2285	ASTM D95, D244; AASHTO T55, T59, T110	H-2345
	Same as H-2345, except cover has 4 tubulures (3 drilled 10/18 and 1 drilled 24/40).			H-2346
Ring Burner	Guide pins keep burner equidistant around still. Fletcher attachment regulates gas and air. I.D. 4-3/4" (121mm) x O.D. 5-1/2" (140mm). Overall shank length 11" (279mm); 3/8" (10mm) serrated hose connection	All gases	ASTM D244; AASHTO D59	H-1876
Distillation Shield	Flanged open-end stainless steel cylinder, with 1/8" ceramic lining and two-part cover. For 500ml flask. Flame distillation only.	H-1880	ASTM D402; AASHTO T78	H-1940
Flame Shield	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.			H-1945
Burner Chimney	Fits standard 4" (102mm) rings.	—	—	H-1946
Connecting Tube Shield	Stainless steel.	H-2285 H-2290	ASTM D244; AASHTO T59	H-2330
Condenser Jacket	Brass, 15" long. Inlet/outlet tubulures on opposite sides of jacket.			H-2340
Still Cleaner	Tool to remove residue from interior of still; 13x4" (328x101mm) dia.	H-1871 H-2345	None	H-2348



### Distillation Replacement Traps

Description	Model
25ml cap trap for volatile distillates. Graduated 0.1ml from 0 to 1ml, 0.1ml from 0 to 25ml. Meets ASTM D95, D1461.	H-2435.25
20ml cap distillation trap, graduated in 0.2ml. Optional for ASTM D95.	H-2435.20
10ml cap trap for moisture distillates. Graduated 0.1ml from 0 to 1ml, 0.2ml from 1ml to 10ml. Meets ASTM D95, D1461.	H-2435.10
5ml cap distillation trap, graduated 0.1ml. Meets ASTM D1461.	H-2435.5

### Particle Charge Meter

Particle charge meter identifies cationic emulsified asphalt, using 0-10DC milliammeter 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.

Description	Model
Particle charge meter. 115V AC operation.	H-2450

**Note:** Order H-1042 Transformer for 220V operation.

### Bitumen Soluble in Organic Solvents Set

Used to determine solubility of asphalt cement materials. Meets ASTM D4, D2042 AASHTO T44.

Description	Model
Bitumen soluble in organic solvents set.	H-1550

Shipping wt. 9 lbs.

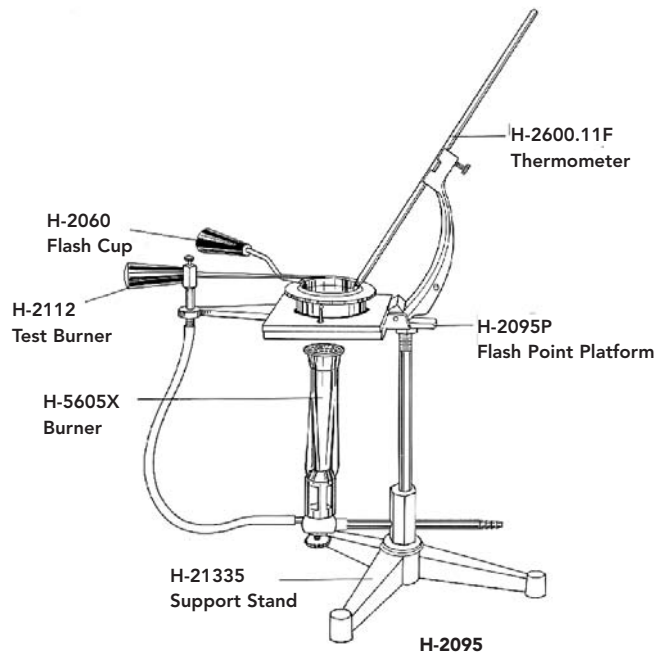
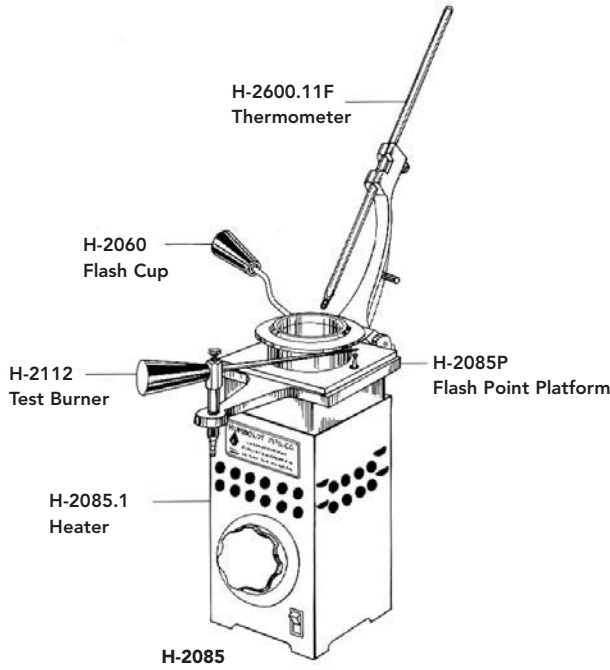
### Particle Charge Meter Plates

Set of two 1x4" (25.4x101.6mm) stainless steel plates for use with H-2450.

Description	Model
Two particle charge meter plates.	H-2452

Description, Replacement Parts & Accessories	Model
Gooch crucible.	H-1550.1
Crucible holder.	H-1550.2
Buchner funnel.	H-1550.3
Glass fiber pad.	H-1550.8
Adapter.	H-12155
Flask filter ring.	H-4913.500
Stopper #7.	H-1550.5





## Electric Cleveland Flash and Fire Point Tester

Thermometer position is adjustable. Meets ASTM D92, D117; AASHTO T48.

Description, Complete Set	Model
Electric Cleveland open cup flash tester. 115V. 60Hz. 1ph. AC.	H-2085
Electric Cleveland open cup flash tester. 220V. 50/60Hz. 1ph. AC.	H-2085.4F

Shipping wt. 20 lbs. (9.1kg)

Description, Replacement Parts & Accessories	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

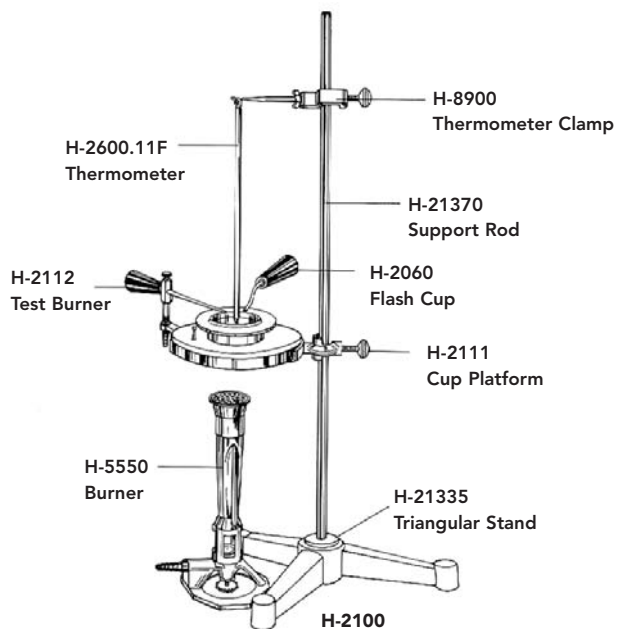
## Natural Gas Cleveland Flash and Fire Point Tester

One source supplies gas for both heating and test flame. Replacement parts available separately. Meets ASTM D92, D117; AASHTO T48.

Description, Complete Set	Model
Gas Cleveland flash and fire-point tester.	H-2095

Shipping wt. 20 lbs. (9.1kg)

Description, Replacement Parts & Accessories	Model
Cast-iron tripod base with steel support rod	H-21335
High temperature burner with adjustable needle valve orifice	H-5605X
Flash-point platform	H-2095P
Test burner	H-2112
Flash cup	H-2060
Thermometer	H-2600.11F



### Gas Cleveland Flash and Fire Point Tester

Meets ASTM D92; AASHTO T48.

Description, Complete Set	Model
Cleveland flash and fire point tester.	H-2100

Shipping wt. 17 lbs. (7.7kg)

Description, Replacement Parts & Accessories	Model
Cast-iron tripod base with steel support rod.	H-21335
Support rod.	H-21370
Burner.	H-5550
Test burner.	H-2112
Thermometer clamp.	H-2113
Cup platform.	H-2111
Flash cup.	H-2060
Thermometer.	H-2600.11F

### Flash Cup

Used with flash point testers, H-2085, H-2095, and H-2100.

Description	Model
Flash cup.	H-2060

### Tag Open-Cup Flash Tester

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. Choose electric, gas or alcohol burner; specify gas type. Order H-2610.9C thermometer, leveling device and draft shield separately. Meets ASTM D1310, D3143; AASHTO T79.

Description	Model
Tag open-cup flash tester, electric heat. 115V. 50/60Hz.	H-1990
Tag open-cup flash tester, electric heat. 230V. 50/60Hz.	H-1990.4F
Tag open-cup flash tester with gas burner.	H-1995

Shipping wt. 9-1/2 lbs. (4.3kg)

Description, Replacement Parts & Accessories	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-1456, H-1466, H-1471, H-1473



H-1460, H-1461, H-1464, H-1465

H-1452, H-1451, H-1474



H-1478

## 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).

Filter Papers						
for use with Centrifuge Extractors and Reflux Extraction Sets						
Size Inches (O.D. x I.D.)	Filter Speed	Thickness (mm)	Flow Rate (ml/min.)	Retention (µm)	Per Pkg.	Dry Strength Model
9-3/4x2-1/2"	Medium	0.71	85	4	100	H-1480.627
9-3/4x1-3/4"	Medium	0.71	85	4	100	H-1481.627
10x5"	Medium	0.71	85	4	100	H-1487.627
12-1/4x5"	Medium	0.71	85	4	100	H-1489.627
11-5/8x1-3/4"	Medium	0.71	85	4	100	H-1485.627
33cm dia	Very Fast	0.51	360	48	50	H-1497.617
33cm dia	Very Fast	1.02	435	31	100	H-1497.633
33cm dia	Fast	0.25	235	24	100	H-1497.615
33cm dia	Medium	0.17	60	6	100	H-1497.613
33cm dia	Medium	0.71	85	4	100	H-1497.627
40cm dia	Medium	0.71	85	4	100	H-1498.627
40cm dia	Medium Fast	0.17	60	6	100	H-1498.613
40cm dia	Medium Fast	0.25	235	24	100	H-1498.615
40cm dia	Very Fast	0.51	360	48	50	H-1498.617

**Centrifuge Extractors, Traditional Quality Cast Aluminum**

<b>Analog Control Models</b> with analog controller on base. 18x18x18" (457x457x457mm)						<b>Replacement Parts</b>	
Capacity	Open Motor		Explosion-Proof Motor		Shipping Wt.	Replacement Filter Rings	
	115V 60Hz	220V 50/60Hz	115V 60Hz	220V 50/60Hz			
1,500g	H-1456	H-1456.4F	H-1466	H-1466.4F	75 lbs. (33kg)	4-micron retention capability 10" O.D. x5" I.D. Package of 100. H-1487.627	Aluminum bowl for models H-1456 and H-1466 H-1456B Aluminum bowl for models H-1471 and H-1473 H-1471B
3,000g	H-1471	H-1471.4F	H-1473	H-1473.4F	80 lbs. (36kg)	4-micron retention capability 12-1/4" O.D. x5" I.D. Package of 100. H-1489.627	Aluminum bowl cover for models H-1456 and H-1466 H-1456BC Aluminum bowl cover for models H-1471 and H-1473 H-1471BC
<b>Automatic Digital Models</b> with controller for wall mounting to minimize vibration problems. Push button and walk away while machine runs unattended. Memory holds "last test" cycle settings. Shuts off automatically at end of test cycle. 18x18x18" (457x457x457mm)							
Capacity	Open Motor		Explosion-Proof Motor		Shipping Wt.	Replacement Filter Rings	
	115V 60Hz	220V 50/60Hz	115V 60Hz	220V 50/60Hz			
1,500g	H-1460	H-1460.4F	H-1461	H-1461.4F	76 lbs. (34.5kg)	4-micron retention capability 10" O.D. x5" I.D. Package of 100. H-1487.627	Cover nut. H-1456N Clamp for models H-1456 through H-1473 H-1471C Rubber viton O ring for models H-1456, H-1466, H-1471, H-1473. H-1471RV
3,000g	H-1464	H-1464.4F	H-1465	H-1465.4F	80 lbs. (36kg)	4-micron retention capability 12-1/4" O.D. x5" I.D. Package of 100. H-1489.627	Brake band for models H-1456 through H-1473. H-1456BB Brake band assembly for models H-1456 through H-1473. H-1471BBA

**Centrifuge Extractors, Value Line**

<b>Analog Control Models</b> with analog controller in base. 12x22x20" (304x559x508mm)							
Capacity	Open Motor		Explosion-Proof Motor		Shipping Wt.	Replacement Filter Rings	
	115V 60Hz	220V 50/60Hz	115V 60Hz	220V 50/60Hz			
1,500g	H-1452	H-1452.4F	H-1451	H-1451.4F	85 lbs. (39kg)	6-micron retention capability 9-3/4" O.D. x1-3/4" I.D. Package of 100. Shipping wt. 8lbs (3.6kg) H-1481.627	
3,000g	—	—	H-1474	H-1474.4F	140 lbs. (63.5kg)	6-micron retention capability 11-5/8" O.D. x1-3/4" I.D. Package of 100. Shipping wt. 8lbs (3.6kg) H-1485.627	

**Centrifuge Extractor, Hand Driven**

<b>Hand Driven Model</b> with machine-cut gears and anti-friction bearings operating in an oil bath. 13x13x17" (330x330x432mm)				<b>Replacement Parts</b>	
Capacity	Model		Shipping Wt.	Replacement Filter Rings	
1,500g	H-1478		50 lbs. (23kg)	4-micron retention capability 10" O.D. x5" I.D. Package of 100. H-1487.627	Aluminum bowl. Aluminum bowl cover. Cover nut. H-1478B H-1456BC H-1456N



H-1448



H-1449



H-1448GS



H-1857

### Vacuum Extractors

Used for quantitative determination of bitumen in hot-mixed paving mixtures and pavement samples. Unit is stainless steel 3000g capacity combination vacuum/storage tank. and 12" (305mm) dia. filtering surface. Unit includes connecting hose, 50 H-1497.613 filter papers, test procedure, see-through extraction gauge, sight tube and vacuum gauge. For replacement filter paper, use H-1497 series. Order H-1760 vacuum pump separately. Meets ASTM D2172 (Meth. E); AASHTO T164 (Meth. E).

Description	Model
Vacuum extractor with storage tank.	H-1448

Shipping wt. 84 lbs. (38kg)

Description	Model
Vacuum extractor. Same as H-1448, except without storage tank, gauge, and sight tube.	H-1449

Shipping wt. 60 lbs. (27kg)

Vacuum Extractor Accessories	
Description	Model
Replacement fluorosilicone "O" ring for H-1448 or H-1449.	H-1448.1
Replacement gauge for H-1448.	H-1448G
Replacement glass tubing. Includes 2 "O" rings for H-1448.	H-1448GT
Free-Flow Vacuum Plate.	H-1448GS
Stainless steel plate. Same as provided with H-1448 or H-1449.	H-1448P
Heavy stainless steel plate for H-1448 or H-1449.	H-1448HP
Replacement rubber tubing for H-1448 or H-1449.	H-1448RT
Heavy-wall clear vacuum tubing for H-1448 or H-1449.	H-1446
4,000cc Erlenmeyer flask for H-1448 or H-1449. Meets ASTM D2172; AASHTO T164 (Meth. E).	H-4913.4M
8" sieve adapter for use with H-1448 or H-1449.	H-1447

### Free-Flow Vacuum Plate

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.

Description	Model
Free-Flow vacuum plate.	H-1448GS

### Filterless Centrifuge Extractor

The new H-1857 series 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: 20x15x33" (508x380x840mm).

Description	Model
Filterless Centrifuge Extractor. 115V/60Hz/1Ph.	H-1857
Filterless Centrifuge Extractor. 230V/50Hz/1Ph.	H-1857.5F

Shipping wt. 150 lbs. (68kg)



### 1,000g Reflux Extractor Set

Using hot solvent extraction, determines percentage of bitumen in paving mixture. Each cone has 500g capacity. Components are available as replacement parts. For replacement filter paper, use H-1497 series. Meets ASTM D2172; AASHTO T164 (Method B).

Description, Complete Set	Model
1,000g Reflux extractor set. 115V. 50/60Hz. 1ph. AC.	H-1495
1,000g Reflux extractor set. 240V. 50/60Hz. 1ph. AC.	H-1495.4F

Shipping wt. 26 lbs. (12kg)

Description, Replacement Parts & Accessories	Model
Wire-screen cone (two in complete set).	H-1495.1
Copper condenser with inlet/outlet water tubes	H-1495.2
Glass jar with ground open edges for tight fit. 6" O.D. x 18"H (152x457mm).	H-1495.3
Electric hot plate	H-4950
100-pack 33cm filter paper.	H-1497.613

### 2,000g Reflux Extractor Set

Similar to H-1495 except each cone has 1,000g capacity. For replacement filter paper use H-1482 or H-1498 series. Meets ASTM D2171; AASHTO T164 (Method B).

Description, Complete Set	Model
2,000g Reflux extractor set. 115V. 50/60Hz. 1ph AC.	H-1499
2,000g Reflux extractor set. 240V. 50/60Hz. 1ph AC.	H-1499.4F

Shipping wt. 26 lbs. (12kg)

Description, Replacement Parts & Accessories	Model
Wire-screen cone (two in complete set).	H-1499.1
Copper condenser with inlet/outlet water tubes	H-1499.2
Glass jar with ground open edges for tight fit. 8-3/4" O.D. x 18"H (222x457mm).	H-1499.3
Electric hot plate	H-4951
100-pack 40cm filter paper.	H-1498.613

### Asphalt Dispenser

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; O.D. = 10-1/4" dia. x 14" height (260 x 356mm). I.D. = 6-3/4" dia. x 7-1/4" depth (171 x 184MM). 12-qt Capacity— 1,200 watts; O.D. = 15" dia. x 17" height (381 x 432mm). I.D. = 10" dia. x 9-1/2" depth (254 x 241mm). (Valve & controls excluded from dimensions.)

Description	Model
6-qt. melting pot, 110V, 60Hz.	H-1440
6-qt. melting pot, 220V, 50/60Hz.	H-1440.4F

Shipping wt. 30 lbs. (13.6kg)

Description	Model
12-qt. melting pot, 110V, 60Hz.	H-1442
12-qt. melting pot, 220V, 50/60Hz.	H-1442.4F

Shipping wt. 43 lbs. (19.5kg)

### Solvent Reclaimer

Spee-Distill® reclaims up to 4-1/4 of 5 gallons of contaminated solvent at minimal cost. Operates unattended; shuts off when process is complete. Electric heater, controlled by adjustable thermostat. Will reclaim Trichlorethylene, Triclene D, Methylene Chloride, Trichlorethane, Perchlorethylene, Blacosolv, Percleve, Chlorothene Nu and other nonflammable solvents. Unit features 16" (404mm) I.D. glass-lined tank and condensing unit of corrosion-resistant incoloy tubing. Includes input and output water hoses, water-cooled heat exchanger, lid and seal, 6-ft. heavy-duty cord and 3-wire plug. Dimensions: 21" (534mm) O.D. x 27" (686mm)H. Solvent capacity 5 gallons (18.9L). Operating time: 1 hr., 50 min. Distilling cycle: 1.5 hrs. Consumes 73 gal (276.4 L) water.

Description	Model
Solvent reclaimer. 110V, 60Hz, 1ph AC.	H-1430
Solvent reclaimer. 230V, 50/60Hz, 1ph AC.	H-1430.4F

Shipping wt. 100 lbs. (45kg)

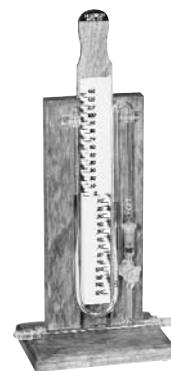


H-1750

H-1820



H-1754D



H-1752



H-1754

### Vacuum Pycnometer (Rice Test) Set

Vacuum pycnometer is used in Rice testing to determine the maximum specific gravity of bituminous paving mixtures with maximum aggregate size up to 19.1mm (3/4in.). Designed for operator safety, 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"), metal water vacuum aspirator with 3/8" IPT, 6' hose. Unit achieves vacuum using an aspirator or optional vacuum pump. Order H-1756 vibrating table, and H-1752, H-1754 or H-1754D manometer separately. See page 26 for vacuum pumps. Replacement parts are available separately. Meets ASTM D2041; AASHTO T209, T283.

Description	Model
Vacuum pycnometer, aluminum, 2kg capacity, 7-1/2" I.D. x 6" depth.	H-1750
Vacuum pycnometer, stainless steel, 2kg capacity, 7-1.2" I.D. x 6" depth.	H-1750SS
Vacuum pycnometer, 4" depth, I.D. 7-1/2".	H-1751

Description, Replacement Parts	Model
Replacement aluminum lid with one hole for use with H-1750, H-1751.	H-1750.2
Replacement O-ring for H-1750, H-1751	H-1750.3

### Large-Capacity Vacuum Pycnometer (Rice Test) Set

Larger-capacity unit has many of the same features as H-1750 but also has sample capacity of 10L (2.64 gal.), 6kg (13 lbs.) weight, with maximum aggregate size of 50mm (2in.). Set features domed transparent cover for easy observation of sample testing. Unit includes water inlet valve and 1/4" I.D. hose, quick-disconnect, vacuum gauge, vacuum hose and aspirator with 3/8" NPT fitting. Flange O.D. is 10-3/4" (273mm); maximum clearance above plate is 7-3/4" (197mm). Order H-1825 vibrating table, vacuum pump and H-1752, H-1754 or H-1754D manometer separately. Replacement parts are available separately. Dimensions: 9-7/16" I.D. x 12-1/8" (240 I.D. x 311mm). Meets ASTM D2041; AASHTO T209, T283.

Description	Model
Large-capacity vacuum pycnometer, 6kg cannister.	H-1820

### Digital Manometer

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.

Description	Model
Digital manometer.	H-1754D
Digital manometer, certified.	H-1754DCA

### Residual-Pressure Manometer (Rice Test)

Mandatory for ASTM D2041, residual-pressure manometer features sliding scale graduated above and below zero to 130x1mm. U-tube, mounted on wooden stand, includes mercury. Meets ASTM and AASHTO specifications.

Description	Model
Residual-pressure manometer.	H-1752
T-connector.	H-1752T

### Closed-End Residual-Pressure Manometer

The Closed-end U-tube-type manometer has range of 1-150mm absolute pressure. Scale is graduated 0 to 75mm in 1mm divisions, upward and downward from mid-scale zero. Tubulations on base take 3/8-in. tubing.

Description	Model
Closed-end residual-pressure manometer.	H-1754

### Vacuum Level Valve for Vacuum Pycnometers

For use with H-1750 & H-1751, for greater accuracy and shorter dry back time. Brass valve maintains 30mm vacuum pressure on sample. Meets ASTM D2041, AASHTO T283.

Description	Model
Vacuum level valve for vacuum pycnometers (Rice Test) H-1750 & H-1751.	H-1749

Note: Please see Page 26 for our complete line of vacuum pumps.



### Orbital De-Airing Table for H-1750

The new 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.

Description	Model
Orbital de-airing table for use with 2kg canister. 115V, 50/60 Hz.	H-1782

Shipping wt. 28lbs (13kg)

**Note: For 220V operation, order Model H-1042 Transformer.**

### Vibrating Table for H-1750

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.

Description	Model
Vibrating table for use with 2kg canister. 3,000 VPMs. 115V. 60Hz.	H-1756A
Vibrating table for use with 2kg canister. 2,400 VPMs. 230V. 50Hz.	H-1756A.5F

### Vibrating Table for H-1820

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 130x1mm.

Description	Model
Vibrating table for use with 6kg canister. 3,000 VPMs. 115V. 60Hz.	H-1826A
Vibrating table for use with 6kg canister. 2,400 VPMs. 230V. 50Hz.	H-1826A.5F

Shipping wt. 12lbs (5.4kg)

### Universal Timer

Portable timer automatically shuts off electrical apparatus at set time up to 60 minutes. Features two receptacles and 3-wire cord and plug.

Description	Model
Universal timer. 115V. 60Hz. 10 amps. 1ph. AC.	H-4296
Universal timer. 220V. 50/60Hz. 5 amps. 1ph. AC.	H-4296.4F

### Flask Attachment For use with H-1756A and H-1782

Description	Model
Flask attachment.	H-1753

### Drierite Desiccant

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.

Description	Model
Drierite desiccant, 1 lb.	H-1757

### Indicating Drierite Desiccant

For use with H-1757 Drierite desiccant in performing Rice test. Blue desiccant turns red to show absorption and may be reused.

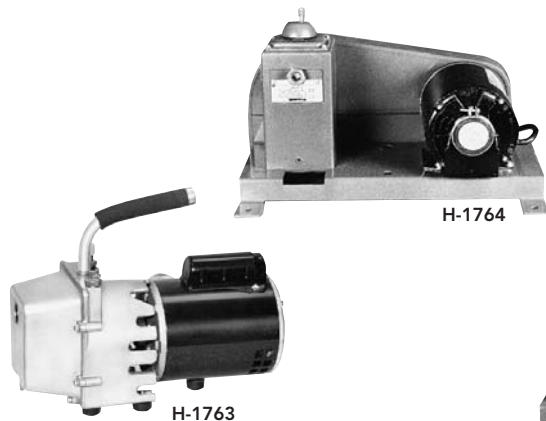
Description	Model
Indicating Drierite Desiccant, 1 lb.	H-1758

### Indicating Drierite Air Drying Unit

Easily installs in-line between vacuum pump and rice test equipment. This refillable unit measures 2-5/8 by 11-3/8" (667x289mm) with hose barbs at both ends, which can accept 1/4" to 3/8" flexible tubing. Supplied complete with 650g of indicating desiccant.

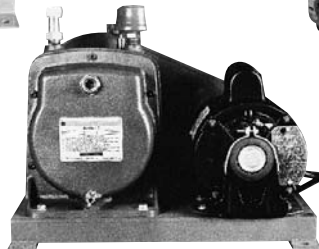
Description	Model
Indicating Drierite Air Drying Unit.	H-1759



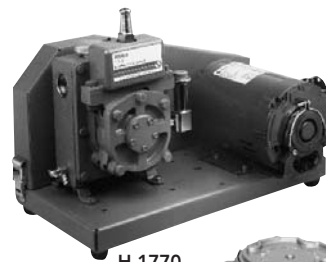


H-1764

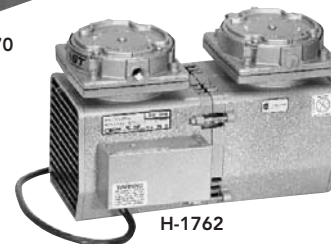
H-1763



H-1765



H-1770



H-1762

## High Vacuum Pump

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 85 L 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" O.D. intake ports for 1/4" I.D. tubing. Dimensions: 11-1/4x15-1/2x6-1/2" (28.6x39.4x16.5cm).

Description	Model
High vacuum pump. 1/3HP. 115V. 60Hz.	H-1763
High vacuum pump. 1/3HP. 230V. 50/60Hz.	H-1763.4F

Shipping wt. 26 lbs. (12.7 kg)

## Belt-Driven Two-Stage Vacuum Pump

Designed for continuous use, this two-stage 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.

Description	Model
Belt-driven two-stage vacuum pump. HyVac® 1 No. 91105-001. 115V, 60Hz	H-1764
Belt-driven two-stage vacuum pump. HyVac® 1 No. 91105-001. 230V,60Hz	H-1764.2F
Belt-driven two-stage vacuum pump. HyVac® 1 No. 91105-001. 230V,50Hz	H-1764.5F

Shipping wt. 80 lbs. (36.3 kg)

## Belt-Driven Two-Stage Vacuum Pump with Gas Ballast

Same as H-1764 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.

Description	Model
Belt-driven two-stage vacuum pump with gas ballast. HyVac® 7 No. 91506-001. 115V, 60Hz.	H-1765
Belt-driven two-stage vacuum pump with gas ballast. HyVac® 7 No. 91506-007. 230V, 50Hz.	H-1765.5F

Shipping wt. 110 lbs. (50kg)

## Vacuum Pump

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). Requires vacuum tubing.

Description	Model
Vacuum pump with belt guard. 115V. 60Hz.	H-1770

## Two-Stage Oil-less Diaphragm Vacuum Pump

Split-capacitor four-pole, two-stage oil-less diaphragm vacuum pump pulls 29" Hg maximum-obtainable vacuum.

Description	Model
Two-stage oil-less diaphragm vacuum pump. 110V. 60Hz. 1ph AC.	H-1762
Two-stage oil-less diaphragm vacuum pump. 230V. 50Hz. 1ph AC.	H-1762.5F

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).

Description	Model
1 qt. Bottle vacuum pump oil.	H-1766.2
1 gal. Bottle vacuum pump oil. Shipping wt. 9 lbs (4.0kg)	H-1766.3
5 gal. Bottle vacuum pump oil. Shipping wt. 56 lbs (25.4kg).	H-1766.4
12 qt. case, vacuum pump oil. Shipping wt. 26 lbs (11.8kg).	H-1766.5
6 gal. case, vacuum pump oil. Shipping wt. 37 lbs (16.8kg).	H-1766.6

## Flushing Oil for Vacuum Pumps

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.

Description	Model
Flushing oil for vacuum pumps, 1 gallon.	H-1768.3

Shipping wt. 9 lbs. (4.1kg).



### Basic Marshall Asphalt Stability Test Apparatus

Basic Marshall compression and testing machine for asphalt stability. Measures stability and plastic flow of bituminous paving mixtures. Basic set is ideal for field use. Superior construction minimizes deflection of the load frame to provide:

- Improved stability in testing
- Increased reliability of test results
- Improved stability in flow monitoring & measuring
- Increased Productivity
- Longer life & reduced repairs

Humboldt’s electro-mechanical load frame has 1-1/4" (31.8mm) dia. rods & heavy-duty steel cross head. This design provides nearly twice the rigidity of other load frames on the market. The more rigid frame deflects less under test loading—yielding far more reliable test results.

A screw jack gear box & motor mounted inside the testing frame produce precise uniform vertical 2" (50.8 mm) platen movement per minute. Maximum piston travel is 3-1/2" (88mm). Limit switches increase safety, decrease equipment damage & repairs. Power to jack is automatically stopped when empty platen reaches top or bottom limit to prevent gear box jams.

Simple operation features: Adjustable cross head to accommodate specimen sizes; plus convenient front mounted power direction switch, and indicator lights for travel direction and limit.

Available as a set, or individual components/accessories. Meets ASTM D1559; AASHTO T245.

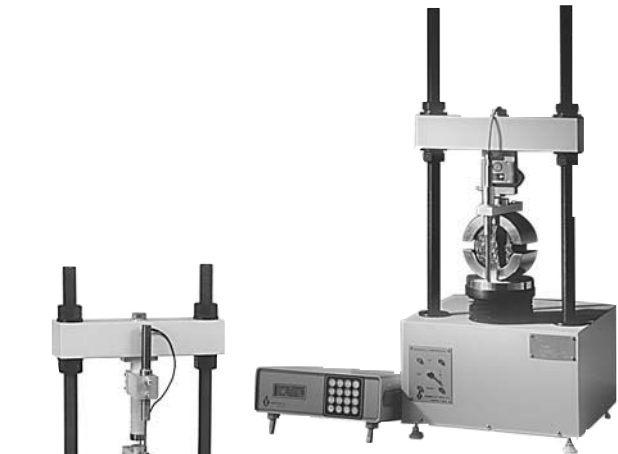
Description	Model
Basic Marshall asphalt stability test set with two compaction molds. Set includes: H-1339, H-1340, H-1341, H-1342, H-1343, H-1344 or H-1344M, H-1347, H-1348, and H-1390. 110V, 60Hz. 1ph, AC.	H-1335
Same as H-1335, except 230V, 60Hz. 1ph, AC.	H-1335.2F
Same as H-1335, except 230V, 50Hz. 1ph, AC.	H-1335.5F



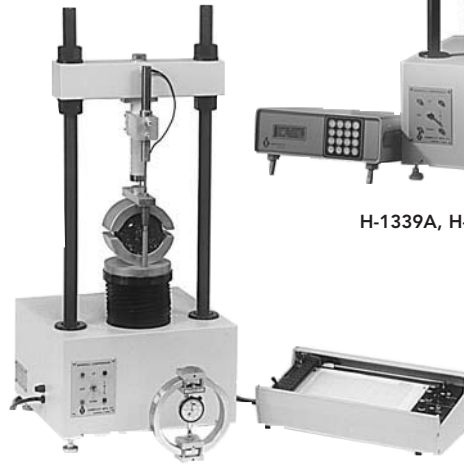
H-1339A



HM-2000A



H-1339A, H-1324A



H-1339A, H-1329CK

## Marshall Compression and Testing Machine

For measuring resistance to plastic flow of bituminous paving mixtures. Testing Machine has motor with reversing switch that produces uniform vertical 2" (51mm) movement per minute. Includes calibrated load ring and dial indicator for determining test load. Load capacity is 10,000 lbs. (4500kg); maximum piston travel is 3-1/2" (88mm). Overall dimension: 18x18x38-1/2" H (457x457x978mm).

Description	Model
Motorized stability compression and testing machine 110V, 60Hz, 1ph AC.	H-1339A
Motorized stability compression and testing machine 220V, 60Hz, 1ph AC.	H-1339A.2F
Motorized stability compression and testing machine 220V, 50Hz, 1ph AC.	H-1339A.5F

Shipping wt. 185 lbs. (78.9 kg)

## Digital Master-Loader

Handles a variety of tests with one load frame (Marshall, CBR, Unconfined, Unconsolidated undrained triaxial). Bench-mounted unit features pre-set speed selections and accessories. Variable speed setting allows stepless adjustment from 0.002" to 2.000" per minute. Order H-1342 breaking head, H-1344 flowmeter and H-4454.100 load ring separately. Meets ASTM D1633, D1883, D2166, D1559, D5581 and AASHTO T193, T208, T245.

Description	Model
Master Loader multi-use compression tester, 120V, 50/60 Hz, 1 ph AC.	HM-2000A
Master Loader multi-use compression tester, 240V, 50/60 Hz, 1 ph AC.	HM-2000A.4F

Shipping wt. 300 lbs. (137kg)

## Digital Conversion Kit Includes Twin-Channel Digital Display

Twin-channel digital display for use with H-1339. Includes S-type 10,000 lbf (50kN) load cell, 0.4" (10mm) linear strain transducer, and transducer bracket. Display: 12x10 x4" (304x254x102mm).

Description	Model
Digital conversion kit. Includes twin-channel digital display,120V 50/60Hz	H-1324A
Digital conversion kit. Includes twin-channel digital display,220V, 50/60Hz	H-1324A.4F

Shipping wt. 10 lbs. (4.5 kg)

## Marshall Test Recorder Conversion Kit

Kit converts your H-1339 compression tester to an automatic Marshall compression tester and recorder. Includes LVDT sensor, electronic load cell, H-4454.100 load ring and plotter assembly.

Description	Model
Marshall test recorder conversion kit.	H-1329CK

Shipping wt. 18 lbs (8.2kg)

## Accessories for Marshall Compression Testing Machines

See complete product specifications elsewhere in this section.

Description, Accessories	Model
4" Breaking head.	H-1342
6" Breaking head.	H-1362
4" Lottman head.	H-1349
6" Lottman head.	H-1369

Shipping wt. 20 lbs. (9.1 kg)

Description, Accessories	Model
Dial flowmeter.	H-1344
Metric dial flowmeter.	H-1344M
Dual-calibrated load ring 11,000 LBF (4,550kgF, 44,500KN).	H-4454.100

Shipping wt. 8 lbs. (3.7kg)



H-1322

## Marshall and TSR Compression Machine

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 (AtoD) 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 D5581, D4123-82; AASHTO T245, T283, BS 598-107

### Features include:

- The Marshall and TSR Compression Machine has a total frame capacity of 10,000lbs (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 the computer or to a 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 in. (88 mm) with limit switch to prevent gearbox jams and damages.

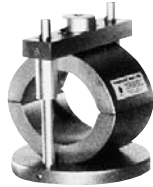
### Specifications:

Dimensions (W x D x H)	36 x 18 x 38-1/2 in (914 x 457 x 978 mm)
Platen speed	2.0 in/min (50.8 mm per minute)
Shipping Weight	250 lbs (113.6 kg)

Description	Model
Automatic Marshall / TSR apparatus with load cell and chart recorder, 115 VAC, 60 Hz.	H-1322
Automatic Marshall / TSR apparatus with load cell and chart recorder, 220 VAC, 50 Hz.	H-1322.5F



H-1344



H-1342, H-1362



H-1349, H-1369



H-4454.100, H-4454.050

### Dial Flowmeter

Consists of special dial indicator with a maximum position brake assembly and a guide sleeve that fits over either guide rod of the H-1342 or H-1362 stability test mold

Description	Model
Dial flowmeter with gage graduations of 0.01" div., range 1.00".	H-1344
Dial flowmeter with gage graduations of 0.25mm. div., range 25mm.	H-1344M

### Dial Indicators

Replacement dial indicators with brake assembly for H-1344 dial flowmeter.

Description	Model
Dial indicator, range 1.00", graduation .010".	H-1344.2
Dial indicator, range 25mm; graduation 0.25mm.	H-1344.2M

### Breaking Heads

Test heads consist of upper and lower cylindrical segments having inside radius of curvature of 3" for 6" sample 2" and for 4" sample. Lower segment is mounted on a base; two perpendicular guide rods extend vertically from the base. One guide rod is larger than the other, with a correspondingly larger guide sleeve in the upper segment to assure correct assembly. Guide sleeves in the upper segment bring the two sections together without appreciable binding or loose motion on the guide rods.

Description	Model
Breaking head for 4" Marshall samples. ASTM D1559.	H-1342

Shipping wt. 20 lbs. (9.1kg)

Description	Model
Breaking head for 6" Marshall samples. ASTM D5581.	H-1362

Shipping wt. 30 lbs. (13.65kg)

### Lottman Breaking Heads

Breaking head tests tensile strength. H-1349 has 1/2" wide upper and lower segments for use on 4" mold. H-1369 has 3/4" wide upper and lower segments for use on 6" mold. Meets ASTM D4123, AASHTO T283.

Description	Model
Lottman breaking head for 4" mold.	H-1349
Lottman breaking head for 6" mold.	H-1369

Shipping wt. 10 lbs.

### Dual-Calibrated Load Rings, 20lb Calibration

Dual-calibrated load rings are individually serial numbered for positive identification. 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. Also available with digital indicators, see below. Also calibrates load cell.

Description	Model
Dual-calibrated load ring 11,000 LBF (4,550kgF, 44.5KN).	H-4454.100

Shipping wt. 8 lbs. (3.7kg).

### Dual-Calibrated Load Rings, 10lb Calibration

Same as H-4454.100 except calibration is every 10 lbs. Also available with digital indicators, see below. Also calibrates load cell.

Description	Model
Dual-calibrated load ring 5,500 LBF (2,500kgF, 25.0KN).	H-4454.050

Shipping wt. 8 lbs. (3.7kg).

Load Rings					
Description	Range and Measurement Units			Meets Spec.	Model (Analog Gauge) (Digital Gauge)
	lbf	kN	kgf		
Tensile steel load rings, 0.75% FS linearity, 0.15 % FS error, 8.20" high, 3/4-16 female mounting.	110	0.5	50	ASTM E74	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-1345



H-1360B



H-1360A



H-1364, H-1366 Series

4" and 6" compactors can be easily converted for testing either 4" or 6" samples by ordering the desired size hammer and mold separately.

### Hand Compaction Set

Compaction pedestal features an adjustable guide that fits the handle of the hammer. Guide holds axis of the compaction hammer perpendicular to the base of the mold assembly during compaction.

Description, Complete Set	Model
Hand compaction set.	H-1345

Shipping wt. 165 lbs. (74.8 kg)

Description, Replacement Parts	Model
Compaction pedestal with steel plate.	H-1347
Compaction mold, 4" for H-1345.	H-1341
Compaction mold holder.	H-1343
Compaction hammer.	H-1340
Hammer support rod.	H-1345.6
Adjustable guide.	H-1345.5

### Spare Hammers for H-1364, H-1366

Hammer assembly promotes operation, allows preheating of foot and acts as a stand-by replacement. Includes locator guide, redesigned rod release mechanism assembled with screws to avoid broken welds, weight and foot.

Description	Model
Spare 4" hammer with tapered foot for rotating base compactors.	H-1360A
Spare 4" hammer with flat foot for non-rotating base compactors.	H-1360AF

Shipping wt. 10 lbs. (4.5kg)

Description	Model
Spare 6" hammer with tapered foot for rotating base compactors.	H-1360B
Spare 6" hammer with flat foot for non-rotating base compactors.	H-1360BF

Shipping wt. 22.5 lbs. (10.2kg)

### Marshall Heavy-Duty Automatic Single Compactor with Rotating Base for 4" or 6" Diameter Specimens

For preparing 4" or 6" diameter compacted specimens, model has beveled foot on hammer and mold that rotates throughout compaction, giving a modified kneading action. Spare molds recommended. 23-1/4x21x64-1/4" (591x534x1,632mm).

Description, Complete Set	Model
Automatic single mechanical compactor with rotating base for 4" diameter specimens. 115V, 60Hz.	H-1364R
Automatic single mechanical compactor with rotating base for 4" diameter specimens. 230V, 60Hz.	H-1364R.2F
Automatic single mechanical compactor with rotating base for 4" diameter specimens. 230V, 50Hz.	H-1364R.5F
Automatic single mechanical compactor with rotating base for 6" diameter specimens. 115V, 60Hz.	H-1366R
Automatic single mechanical compactor with rotating base for 6" diameter specimens. 230V, 60Hz.	H-1366R.2F
Automatic single mechanical compactor with rotating base for 6" diameter specimens. 230V, 50Hz.	H-1366R.5F

Shipping wt. 400 lbs. (181.4kg)

### Marshall Heavy-Duty Automatic Single Compactor with Non-Rotating Base for 4" or 6" Diameter Specimens

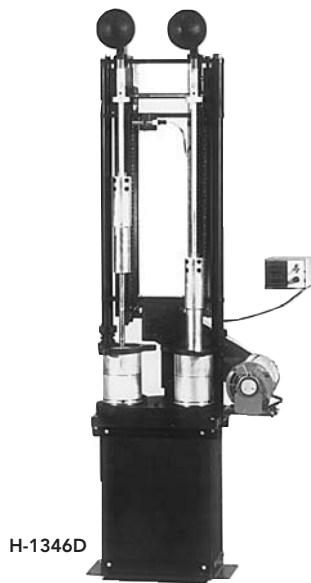
Same as H-1364R and H-1366R, except non-rotating mold and flat hammer.

Description, Complete Set	Model
Single mechanical compactor with non-rotating base for 4" diameter specimens. 115V, 60Hz.	H-1364
Single mechanical compactor with non-rotating base for 4" diameter specimens. 230V, 60Hz.	H-1364.2F
Single mechanical compactor with non-rotating base for 4" diameter specimens. 230V, 50Hz.	H-1364.5F
Single mechanical compactor with non-rotating base for 6" diameter specimens. 115V, 60Hz.	H-1366
Single mechanical compactor with non-rotating base for 6" diameter specimens. 230V, 60Hz.	H-1366.2F
Single mechanical compactor with non-rotating base for 6" diameter specimens. 230V, 50Hz.	H-1366.5F

Shipping wt. 400 lbs. (181.4kg)



H-1336D



H-1346D



H-1356D

## Marshall Standard-Duty 4" Automatic Single Compactor

Ease sample preparation with automatic mechanical compactor. Apparatus compacts samples at preset number of hammer blows and shuts off on completion. Automatic unit includes mechanical compactor, automatic counter, oak compaction pedestal and H-1341 mold assembly. Additional mold and hammer assemblies are recommended.

Description	Model
Automatic single mechanical compactor. 115V, 60Hz, 15.0 amps.	H-1336D
Automatic single mechanical compactor. 230V, 60Hz, 10.0 amps.	H-1336D.2F
Automatic single mechanical compactor. 230V, 50Hz, 10.0 amps.	H-1336D.5F

Shipping wt. 198 lbs. (89.8kg)

## Marshall Automatic Double Mechanical Compactor with Rotating Base for 4" Diameter Specimens

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. Total dimensions: 10x21x66"H.

Description	Model
Automatic double mechanical compactor. 115V, 60 Hz.	H-1346D
Automatic double mechanical compactor. 230V, 60Hz.	H-1346D.2F
Automatic double mechanical compactor. 230V, 50Hz.	H-1346D.5F

Shipping wt. 265 lbs. (120.2kg)

Description, Replacement Parts	Model
Hammer assembly, 4" with tapered foot for H-1346, H-1356.	H-1338B
Compaction mold, 4" for H-1346, H-1356.	H-1337
Pedestal, for H-1346	H-1347.2M
Pedestal, for H-1356	H-1347.3M
Lift chain for H-1336, H-1346, H-1356	H-1336.21

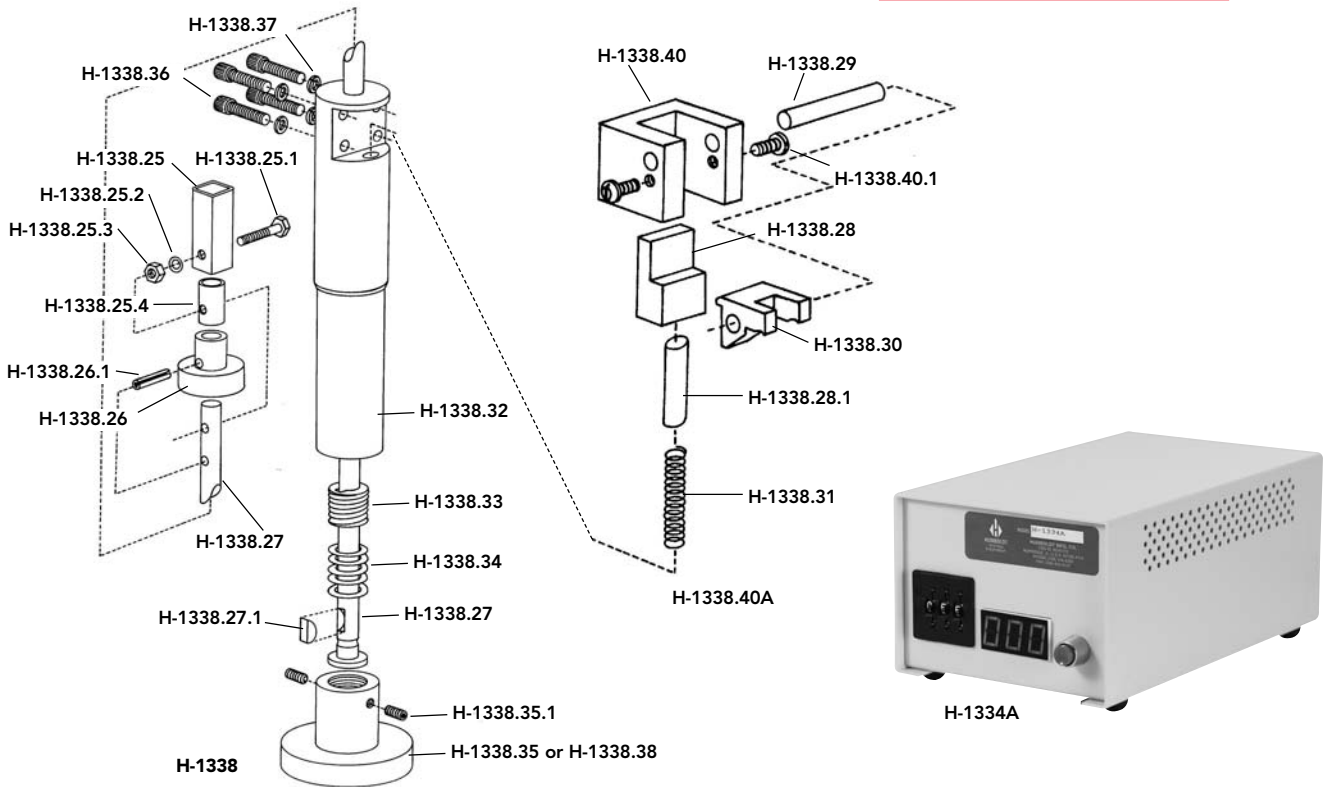
## Marshall Automatic Triple Mechanical Compactor with Rotating Base for 4" Diameter Specimens

Triple simultaneous specimen compactations 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. Total dimension: 16x22x66"H.

Description	Model
Automatic triple mechanical compactor. 115V, 60 Hz, 15.0 amps.	H-1356D
Automatic triple mechanical compactor. 230V, 60Hz, 10.0 amps.	H-1356D.2F
Automatic triple mechanical compactor. 230V, 50Hz, 10.0 amps.	H-1356D.5F

Shipping wt. 400 lbs. (181.4kg)

Description, Replacement Parts	Model
Automatic counter for use with all compactor models.	H-1334A
Compaction mold, 4" non-rotating, for H-1336.	H-1341
Compaction mold, 4" rotating, for H-1346, H-1356, H-1364 series.	H-1337
Compaction mold, 6" for H-1366 series.	H-1367
Pedestal for H-1336, H-1364, H-1366 series.	H-1347M
Lift chain for H-1336, H-1346, H-1356.	H-1336.21
Lift chain for H-1364 and H-1366 series.	H-1360.21



### Spare Hammer Assemblies

Hammer assembly promotes compaction operation, allows preheating of foot and acts as a stand-by replacement. Includes **complete lift catch assembly**, locator guide, weight, foot, and a redesigned rod release mechanism assembled with screws to avoid broken welds. Same model as furnished with original Marshall mechanical compactors. Use model H-1338A with H-1336 only; H-1338B with H-1346 and H-1356 mechanical compactors only. Meets ASTM D1559, AASHTO T245.

Description, Complete Set	Model
Spare flat-foot hammer assembly for H-1336.	H-1338A
Spare tapered-foot hammer assembly for H-1346 and H-1356.	H-1338B
Spare Canadian spec tapered foot for H-1346 and H-1356.	H-1338C
Complete lift catch assembly.	H-1338.40A

Shipping wt. 24 lbs. (10.9kg)

Description, Replacement Parts & Accessories	Model
Clevis pin with screw.	H-1338.29.3
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

### Spare Hammer Lift Catch Assembly

Also sold as part of H-1338.

Description, Complete Set	Model
Complete lift catch assembly for compaction hammers.	H-1338.40A

Description, Replacement Parts & Accessories	Model
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

### Automatic Counter

Automatic counter with 3-digit LCD readout features non-contact sensor to record preset number of hammer blows and automatic shut off when number is reached. Main unit should be isolated from the machine to avoid vibration damage. For use with H-1336, H-1346, H-1356, H-1364 and H-1366 mechanical compactors. Specify compactor model when ordering.

Description	Model
Automatic counter 115V, 50/60Hz, 1ph.	H-1334A
Automatic counter 220V, 50/60Hz, 1ph.	H-1334A.4F

Shipping wt. 4 lbs. (1.8kg)





H-1340



H-1337, H-1341, H-1367



H-1348, H-1363



H-1347

### Hand Compaction Hammer, 4"

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.

Description	Model
Hand compaction hammer.	H-1340

Shipping wt. 20 lbs. (9.0kg)

### Marshall Compaction Mold, 4" For Hand and Non-rotating Base Compactors

Stability compaction mold for preparing test specimens. 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) I.D. by 3" (76mm) high. Use H-1341 molds with H-1340 compaction hammer and H-1336 mechanical compactor only.

Description	Model
Compaction mold.	H-1341

Shipping wt. 10 lbs. (4.5 kg)

### Marshall Compaction Mold, 4" For Rotating Base Compactors

4" compaction mold for all rotating base compactors. For use with H-1346, H-1356 and H-1364 mechanical compactors only. Base plate is designed for indexing during compacting.

Description	Model
Marshall compaction mold for rotating base compactors.	H-1337

Shipping wt. 10 lbs. (4.5kg)

### 4" or 6" Paper Discs

Circular, smooth-edged 4" or 6" diameter disc fits in bottom of H-1337 and H-1341 (4") or H-1367 (6") compaction molds before introducing mixture prior to compaction test. Facilitates removal of sample specimen cylinders.

Description	Model
4" paper disc for use with H-1337 and H-1341 compaction molds.	H-1341P
6" paper disc for use with H-1367 compaction mold.	H-1361P

### Compaction Mold, 6"

Stability compaction mold for preparing test specimens. 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. Use of three mold cylinders is recommended by ASTM and AASHTO. Use H-1367 molds with H-1366 and H-1366R compaction hammers only.

Description	Model
Compaction mold for 6" Marshall samples.	H-1367

Shipping wt. 15 lbs. (6.8kg).

### Mold Extractors

Used with compression tester for removing 4" or 6" compaction mold specimens.

Description	Model
Mold extractor, 4".	H-1348
Mold extractor, 6".	H-1363

Shipping wt. 8 lbs. (3.6kg).

### Mold Holder for Hand Compaction, 4"

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 of specimens.

Description	Model
Mold holder for hand compaction, 4".	H-1343

Shipping wt. 7 lbs. (3.2 kg)

### Pedestal for Hand Compaction, 4"

Necessary to stabilize mold during compaction. Consists of 8x8x18" (203x203x457mm) wooden post capped with 12x12x1" (305x305x25mm) steel plate. Pedestal mounts to a concrete slab with four angle brackets at bottom of pedestal.

Description	Model
Pedestal for hand compaction, 4".	H-1347

Shipping wt. 90 lbs. (40.8kg)



### Hand-Operated Sample Ejector

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"Wx6"Dx27"H. (330x152x686mm).

Description	Model
Sample ejector.	H-1353A

### Motorized Sample Ejector

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"Wx6"D.x29"H. (330x152x737mm).

Description	Model
Motorized sample ejector. 115V, 50/60Hz.	H-1355
Motorized sample ejector. 230V, 50/60Hz.	H-1355.4F

### Pedestals for Mechanical Compactors

Description	Model
Pedestal for use with H-1336 Marshall single mechanical compactor.	H-1347M

Shipping wt. 43 lbs. (19.5kg)

Description	Model
Pedestal for use with H-1346 Marshall double mechanical compactor.	H-1347.2M

Shipping wt. 54 lbs. (24.5kg)

Description	Model
Pedestal for use with H-1356 Marshall triple mechanical compactor.	H-1347.3M

Shipping wt. 84 lbs. (38.1kg)

### Procedure Booklet— Marshall Mix Design and Testing

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.

Description	Model
Technical Booklet—Marshall Mix Design and Testing.	H-1328A

### Marshall Sample Storage Can

Description	Model
Lidded 2 lb. can for storing Marshall samples.	H-1331

### Hubbard 24ml Specific Gravity Bottle

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.

Description	Model
Specific gravity bottle.	H-2640

### Hubbard-Carmick 24ml Specific Gravity Bottle

Modified wide-mouth Hubbard-Carmick, Erlenmeyer-style bottle allows easier filling and cleaning and is more stable. Meets ASTM D70, D115, D1963; AASHTO T228.

Description	Model
Specific gravity bottle.	H-2660



H-1382, H-1383



H-1390, H-1392

### Circulating Water Bath

Thermostatically controlled, fully insulated water bath with magnetic circulator heats up to twelve 4" diameter Marshall specimens at a time. Shelf supports molds and allows free circulation of 2" of water above and below molds. Magnetic circulator assures water temperature is constant throughout tank. Temperature controls provide range from ambient to 150°F (65.5°C), accurate to within ±1°F (±1°C). I.D. 11-1/2x19-1/2x8" deep. Steel exterior, stainless steel tank. Volume: 7.76 gal (29.398 liters), 1,780 cu. in. Meets ASTM D1559.

Description	Model
Water bath with magnetic circulator. 120V, 60Hz.	H-1383

Shipping wt. 47 lbs. (21.4kg).

### Non-Circulating Water Bath

Thermostatically controlled, fully insulated water bath heats up to twelve 4" diameter Marshall specimens at a time. Same product features as H-1383, without magnetic circulator.

Description	Model
Water bath. 120V, 60Hz.	H-1382

Shipping wt. 44 lbs. (20kg).

**NOTE: Model H-1383 and H-1382 baths are not available in 220V versions. See H-1390 and H-1392 for 220V models.**

### Water Bath with Microprocessor-based Temperature Control

Microprocessor-based temperature controller throughout range from ambient up to 180°F (82°C), with accuracy of ±0.1% of input span. Fully insulated, models are available with or without magnetic circulator which assures constant water temperature throughout bath.

- Auto-tuning is fast & effortless
- Dual digital display simultaneously shows set point & process temperature
- Ramp-to-set point handles critical temperature processes smoothly
- Set point range limiting protects process & 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. Samples are supported by a shelf which allows free circulation of 2" of water above and below. Volume: 7.76 gals. (29.398 L). I.D.: 19.5Wx11.5Dx8" H (495.3x292.1x203.2mm). Meets ASTM D1559.

Description	Model
Water bath with microprocessor-based temperature control, with magnetic circulator. 110V, 60 Hz.	H-1390
Water bath with microprocessor-based temperature control, with magnetic circulator. 220V, 50/60 Hz.	H-1390.4F
Water bath with microprocessor-based temperature control, without magnetic circulator. 110V, 60 Hz.	H-1392
Water bath with microprocessor-based temperature control, without magnetic circulator. 220V, 50/60 Hz.	H-1392.4F

Shipping wt. 44 lbs. (20kg)



H-1394



H-1380



H-2988

### Extra-Large Capacity Circulating Water Bath

This new bath is ideal for the larger samples used in Superpave and Marshall test applications. The bath features a microprocessor-based digital controller with built-in magnetic circulator for precise temperature control throughout the range from ambient to 180°F (82°C) at an accuracy +/-1% of input span. The dual digital display simultaneously shows the set point and process temperature. All exposed parts are stainless steel and the front control panel is designed for water and corrosion resistance. Samples are supported by a shelf that rests 2" (51mm) above the bottom of the bath for free circulation of water above and below the test samples. Bath volume is 14.0 gal. (53 liters) and the inside dimensions are 20x20x10" deep (508x508x254mm).

Description	Model
Extra-large capacity water bath with microprocessor control, with circulator. 110V, 60Hz	H-1394
Extra-large capacity water bath with microprocessor control, with circulator. 220V, 50/60Hz	H-1394.4F

Shipping wt. 74 lbs. (33.5kg)

### Economy Water Bath

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). I.D. 11-1/2 x 19-1/2 x 8" (293x 497x204mm) deep.

Description	Model
Water bath 120V, 60Hz, 1425W.	H-1380
Water bath 220V, 50Hz, 1425W.	H-1380.5F

Shipping wt. 28 lbs. (12.7kg).

### Heater/Circulator

Analog controller with proportional temperature control. Low liquid safety. 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) I.D. tubing for external circulation. Suitable for use with wide variety of fluids. 6x5x13" (15.2x12.7x33mm).

Heater/Circulator					
Temp Range	Temp Stability	Display	Pumping (liters/min)	Over-temp Cutoff	Model
5°C above ambient to 100°C	±0.2°C	H-2614 Thermometer (included)	7 or 15	Adjustable	H-2988
Heater/Circulator, 120V,60Hz, 9 amp.					H-2988.4F
Heater/Circulator, 220V, 50/60Hz, 5 amp.					

Shipping wt. 10 lbs (4.5kg)



H-30065



H-1540



H-30068



H-30068.12

## Revolving Shelf Oven

Oven used to conduct "thin film" tests determines effect of heat and air on a film of semisolid asphaltic materials when heated to 163°C±1°C. Temperature range to 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 11x11" (27.9x27.9cm) double-paned window. Features interior light with separate switch, power switch, three-wire cord and H-2610.13C. ASTM loss-on heat thermometer. Inside dimensions: 19x18x15" (48x46x38cm). Overall dimensions: 27x26x39" (68x66x99cm). Order test pans and sample cups separately. Meets ASTM D1754, D6; AASHTO T179, T47.

Description	Model
Revolving shelf oven. 120V. 60Hz. 1340W.	H-30065
Revolving shelf oven. 220V. 50Hz. 1340W.	H-30065.5F

Shipping wt. 270 lbs. (122kg)

## Thin Film Test 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" (140x9.5mm). Available in stainless steel or aluminum. Meets ASTM D1754, AASHTO T179.

Description	Model
Stainless steel thin film test pan.	H-1540
Aluminum thin film test pan.	H-1541

## Asphalt Rolling Thin Film Oven

The rolling thin film oven is used to measure the effect of heat and air on a moving film of semi-solid asphaltic materials. 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 40Wx 36H x 26"D (1016x3292x660mm). Meets ASTM D2872, AASHTO T240 and California test method 346. A clean, dry compressed air source is required for oven operation.

Description	Model
Asphalt rolling thin-film oven. 208-230V. 60Hz. 1ph AC.	H-30068
Asphalt rolling thin-film oven. 220V. 50Hz. 1ph AC.	H-30068.5F

Shipping wt. 380 lbs. (173kg)

## Glass Container for Asphalt Rolling Thin-Film Oven

Heat resistant glass oven jar. 64mm O.D. (2.52") x 139.7mm H (5.50"). Meets ASTM D2872, AASHTO T240.

Description	Model
Glass container for asphalt rolling thin-film oven.	H-30068.12

## SHRP Gyratory Compactor

The SHRP Gyratory Compactor is designed for use in Superpave asphalt mix design. The system has undergone complete testing and was 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 ideally suited for both laboratory and field job site applications. The unit is supplied complete with one 150mm mold. Meets 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"Wx28"Dx63"H (537x711x1600mm) excluding PC.
- Weight 550 lbs (249kg).



H-1610

Description	Model
SHRP gyratory compactor with PC, calibration equipment and 150mm mold.120V, 60Hz	H-1610
SHRP gyratory compactor with PC, calibration equipment and 150mm mold.220V, 60Hz	H-1610.2F
SHRP gyratory compactor with PC, calibration equipment and 150mm mold.220V, 50Hz	H-1610.5F

Description, Replacement Parts & Accessories	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-1614P
Mold assembly, 150mm	H-1616
Mold bottom, 150mm	H-1616B
Filter paper, 150mm. Pkg. of 500.	H-1616P
Calibration kit. Includes indicator, mounting brackets and gauge blocks.	H-1620
Material Handling Chute.	H-1702



F85930, F85938



H-4122



H-1304

### Asphalt Content/Binder Ignition Furnaces

- Barnstead/Thermolyne Model F85930 Model F85938
  - With Internal Automatic Balance
- Environmentally friendly and cost effective method for the accurate determination of asphalt content. Developed by NCAT, the National Center for Asphalt Technology.
- Large Capacity—handles samples up to 5,000 grams
  - Automatic—frees technician for other tasks during testing
  - Fast—ignition method reduces testing time compared to solvent testing methods
  - Temperature Range—392 to 1,202°F (200 to 650°C)
  - Accurate Internal Balance—to within ±0.1 gram, monitored automatically throughout ignition
  - Easy operation—simply enter sample weight, calibration factor, load the sample, and push start-at the ending beep, push stop, and sign receipt
  - Safer—eliminates harmful solvents
    - software-activated lock prevents door opening during test
    - automatic interlock cuts power when door is opened
    - door opens full 180 degrees for easier/safer loading & unloading
    - door hinge has stop to prevent opened door from floating closed

Chamber dimensions: 14Wx10.5Hx14"D (355x266x355mm).  
Overall dimensions: 21.75Wx36.75Hx25.75"D (552x933x654mm).

Description	Model
Asphalt content/binder ignition furnace (Barnstead/Thermolyne model F85930), 240V, 60Hz, 20 amp, 4,800 watt, with internal automatic balance.	F85930
Asphalt content/binder ignition furnace (Barnstead/Thermolyne model F85938), 208V, 60Hz, 23 amp, 4,800 watt, with internal automatic balance.	F85938

Shipping wt. 290 lbs. (131.6kg)

Description, Accessories	Model
Accessories package for use with F85930 and F85938—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.	AY1087X1
Exhaust Tubing.	H-1515
Exhaust Tubing, stainless steel.	H-1515SS
Printer Paper.	PRX2

### QUARTERMASTER™ (includes buckets) Hot Asphalt Mix Sample Sizer

The QUARTERMASTER™ is ideal for dividing the larger asphalt mix samples required in Superpave specifications. The hopper accepts and quarters into four equal parts up to 120 lbs. (54kg) of any mix with aggregates between 9.5 to 37.5mm. In operation, a simple throw of a lever divides the sample. Using the device insures greater control, consistency and uniformity in the preparation of test samples. The unit is supplied complete with four sample containers. Dimensions 14Wx17Dx48"H (356x432x1219mm). Order H-1702 materials handling scoop separately.

Description	Model
QUARTERMASTER™ asphalt mix sample sizer.	H-4122

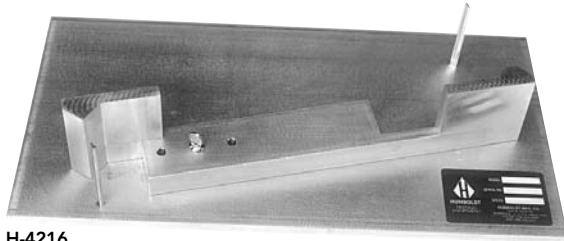
Shipping wt. 84 lbs. (38kg)

Description, Replacement Parts & Accessories	Model
Utility Bucket.	H-3372
Quick Funnel.	H-4122QF

### Rhoma-Sol™ Specialty Emulsifier

Spray-on solution used to remove bituminous deposits and stains from test equipment, counters and tools. Rhoma-Sol™ contains no hazardous petroleum solvents and is 100% biodegradable. When applied to equipment prior to contact with asphalt, the gelled formulation helps to reduce asphalt from sticking to the treated surface. Rhoma-Sol™ should be only used in a well-ventilated area and eye and skin contact should be avoided.

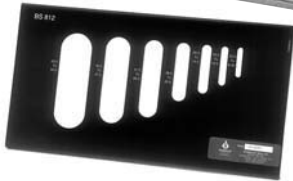
Description	Model
Rhoma-Sol™ Specialty Emulsifier, 18oz. (532g) Spray Can	H-1304



H-4216



H-1682



H-1684



H-1680A



H-1686

### Proportional Caliper Device

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. 6x16" (152.4x406.4mm) 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 = 1:2; 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.

Description	Model
Proportional caliper device.	H-4216

### Elongation Index for Classification of Aggregate Particles

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.

Description	Model
Elongation index for classification of aggregate particles.	H-1682

### Flakiness Gauge for Classification of Aggregate Particles

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.

Description	Model
Flakiness gauge for classification of aggregate particles.	H-1684

### Void Content Apparatus for Fine Aggregates

Use to determine the uncompacted void content of a fine aggregate sample. Indicates the angularity, sphericity, 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.

Description	Model
Void content apparatus.	H-1680A

Shipping wt. 10 lbs. (4.5kg)

Description, Replacement Parts & Accessories	Model
Extra glass plate.	H-3049
Sample retainer pan, aluminum, 12" diam x 1-1/2"h (302x37mm).	H-4940.6
Spatula, 7/8w x 6"L (22x152mm).	H-4906

### Void Content Apparatus for Coarse Aggregates

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 coarse 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 off 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.

Description	Model
Void content apparatus for coarse aggregates.	H-1686

Description, Accessories	Model
Plastic overflow pan.	H-1686.1
Material handling scoop.	H-1702





H-1690



H-3842



H-3843



H-3842HA



H-3842HW

H-3843HW

## Asphalt/Concrete Mixers

Ideal for sample or batch mixing in either laboratory or field. Separate utility bucket cradles securely inside enameled steel mixer frame. Bucket is rotated by chain drive at 60 rpm, while a stationary paddle scrapes insides and bottom of bucket to insure thorough mixing.

Description	Model
Asphalt/concrete mixer, stationary, 5-gal. Includes bucket, cover, paddle. Shipping wt. 45 lbs (20.4kg).	H-1690
Asphalt/concrete mixer, portable, 5-gal. Includes bucket & frame only. Shipping wt. 81 lbs (36.7kg). Order mixing paddle separately.	H-1691
Asphalt/concrete mixer, portable, 10-gal. Includes bucket & frame only. Shipping wt. 97 lbs (44kg). Order mixing paddle separately.	H-1692

Description, Replacement Parts & Accessories	Model
Bucket & cover for stationary, 5-gal. Shipping wt. 7 lbs (3.2kg)	H-1690.1
Mixing paddle for stationary, 5-gal. Shipping wt. 6 lbs (2.7kg)	H-1690.2
Deluxe mixing paddle for stationary, 5-gal. Shipping wt. 6 lbs (2.7kg)	H-1690.3
Bucket for portable, 5-gal. Shipping wt. 5 lbs (2.2kg)	H-1691.4
Bucket for portable, 10-gal. Shipping wt. 11 lbs (5.0kg)	H-1692.5
Asphalt paddle for portable, 5-gal. Shipping wt. 7 lbs (3.2kg)	H-1691.6
Asphalt paddle for portable, 10-gal. Shipping wt. 8 lbs (3.6kg)	H-1692.6
Concrete paddle for portable, 5-gal. Shipping wt. 3 lbs (1.4kg)	H-1691.8
Concrete paddle for portable, 10-gal. Shipping wt. 4 lbs (1.8kg)	H-1692.9

## Laboratory Bench Mixer, Heating Adapter Kits

Used to improve mixing efficiency and ensure proper temperatures of asphaltic concrete mixes. Kits consist of heating mantle and solid-state proportional temperature controller. Meets ASTM D1559; AASHTO T245, TP4; SHRP M-002

Description, Accessories	Model
Heating Adapter Kit for 12 Qt. Mixer. 115V, 50/60Hz, 600 watts.	H-3842HA
Heating Adapter Kit for 12 Qt. Mixer. 230V, 50/60Hz, 600 watts.	H-3842HA.4F
Heating Adapter Kit for 20 Qt. Mixer. 115V, 50/60Hz, 600 watts.	H-3843HA
Heating Adapter Kit for 20 Qt. Mixer. 230V, 50/60Hz, 600 watts.	H-3843HA.4F

## 12-Qt. Laboratory Bench Mixer

Hobart Model A-120's bowl has 12-qt. (0.401 cu. ft.) mixing capacity and 15-minute motor-driven timer. Planetary action of 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: 14-3/4x20x29-9/16" (375x508x750cm).

Description	Model
12-Qt. Laboratory bench mixer. 115V. 60Hz. 1ph. AC. 1/3HP. 373 W.	H-3842
12-Qt. Laboratory bench mixer. 230V. 50/60Hz. 1ph. AC. 1/3HP. 373 W.	H-3842.4F

Shipping wt. 185 lbs. (83.9 kg)

Description, Accessories	Model
Aluminum beater.	H-3842.1
12-Qt. Stainless-steel bowl.	H-3842.2
Aluminum dough hook.	H-3842DH
Stainless-steel wire loop whip.	H-3842WW
*Custom heavy-duty 1/4" diam wire stainless steel whip.	H-3842HW

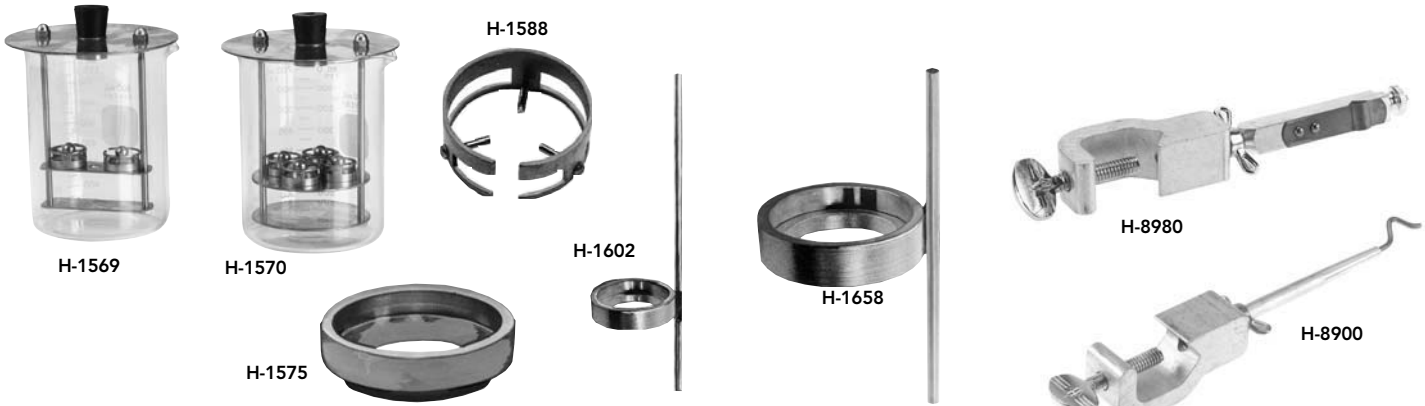
## 20-Qt. Laboratory Bench Mixer

With 20-qt.-capacity (0.6684 cu. ft.) bowl, Hobart A-200 mixer has 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: 21x21-1/2x 41-1/4" (533x546x1048cm).

Description	Model
20-Qt. Laboratory bench mixer. 115V. 60Hz. 1ph. AC. 1/2HP. 373 W.	H-3843
20-Qt. Laboratory bench mixer. 230V. 50/60Hz. 1ph. AC. 1/2HP. 373 W.	H-3843.4F

Shipping wt. 226 lbs. (102kg)

Description, Accessories	Model
Aluminum flat-type grid beater.	H-3843.1
Stainless-steel bowl, 20-qt.	H-3843.2
Aluminum dough hook.	H-3843DH
Stainless-steel wire loop whip.	H-3843WW
*Custom heavy-duty 1/4" diam wire stainless steel whip.	H-3843HW



### Softening Point Apparatus

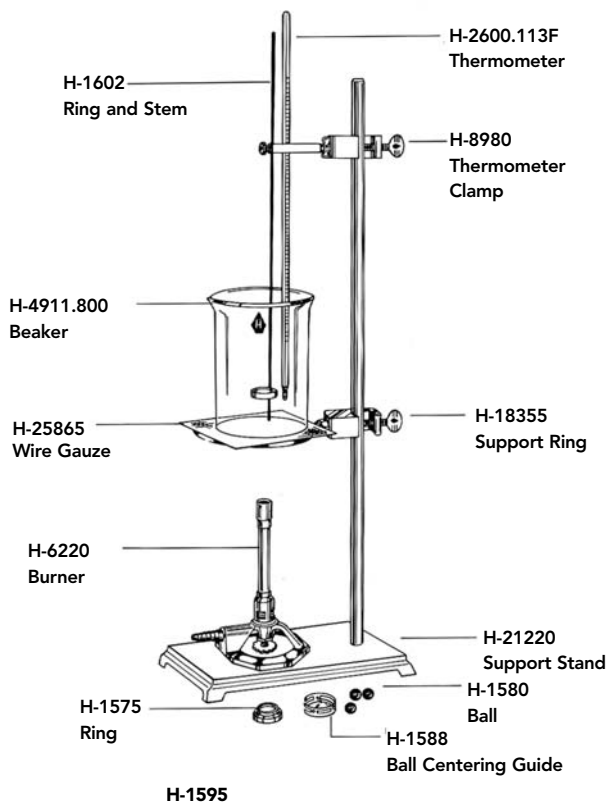
Ring and ball method softening point apparatus used for single determinations, asphalts, pitches, tars and most resins. All apparatus meet ASTM D36, E28; AASHTO T53.

Description	Model
Includes 800ml beaker, 2 standard balls, 2 shouldered rings and 2 ball centering guides. Order thermometer separately, see chart this page.	H-1569
Same as H-1569, with 4 standard rings and 4 standard balls and 4 ball centering guides. Order thermometer separately, see chart this page.	H-1570
Includes burner, beaker, support stand and 1 ring, wire gauze with asbestos center, thermometer clamp, shouldered ring and stem and hardened steel ball. Includes H-2600.113F thermometer, others available separately, see chart this page.	H-1595

### Softening Point Replacement Parts and Accessories

All meet ASTM D36, E28; AASHTO T53.

Softening Point Replacement Parts		
Description	For Use With	Model
Brass-shouldered ring. Top 23mm O.D., 19.8mm I.D.; bottom, 19mm O.D., 15.9mm I.D.; top to shoulder, 4.4mm high; shoulder to bottom, 2mm high. 10 per package.	H-1569	H-1575
Hardened steel ball. 3/8" (9.5mm) dia.; weight between 3.45 and 3.55g. 10 per package.	H-1569 H-1595 H-1645	H-1580
Ball centering guides for shouldered rings. Ball is centered on specimen by 3 locator pins.	H-1575	H-1588
Ring and stem assembly, 16" (406mm) long brass wire stem with H-1575 ring.	H-1595	H-1602
Ring and stem assembly 2-1/2" (64mm) long brass wire stem with shouldered brass ring.	H-1645	H-1658
Steel clamp hook supports suspended thermometers, drying tubes, potash bulbs, etc. Locks into any position with check-nut. Max. distance from center of muff to hook 4-1/4" (108mm); minimum distance 3-7/8" (98mm).	All H-2600 thermometers	H-8900
Thermometer clamp with adjustable 360° muff, phosphor-bronze jaws, 3-1/2" (89mm) long.	H-1570	H-8950
Thermometer clamp similar to H-8950 but holds H-1602 ring and stem in addition to the thermometer.	H-1595	H-8980



### Thermometers for Softening Point Apparatus

Description, Thermometers	Model
Thermometer with 30 to 180°F range (ASTM 15F).	H-2600.15F
Thermometer with -2 to 80°C range (ASTM 15C).	H-2610.15C
Thermometer with 85 to 392°F range (ASTM 16F).	H-2600.16F
Thermometer with 30 to 200°C range (ASTM 16C).	H-2610.16C
Thermometer with 30 to 350°F range (ASTM 113F).	H-2600.113F
Thermometer with -1 to 175°C range (ASTM 113C).	H-2610.113C