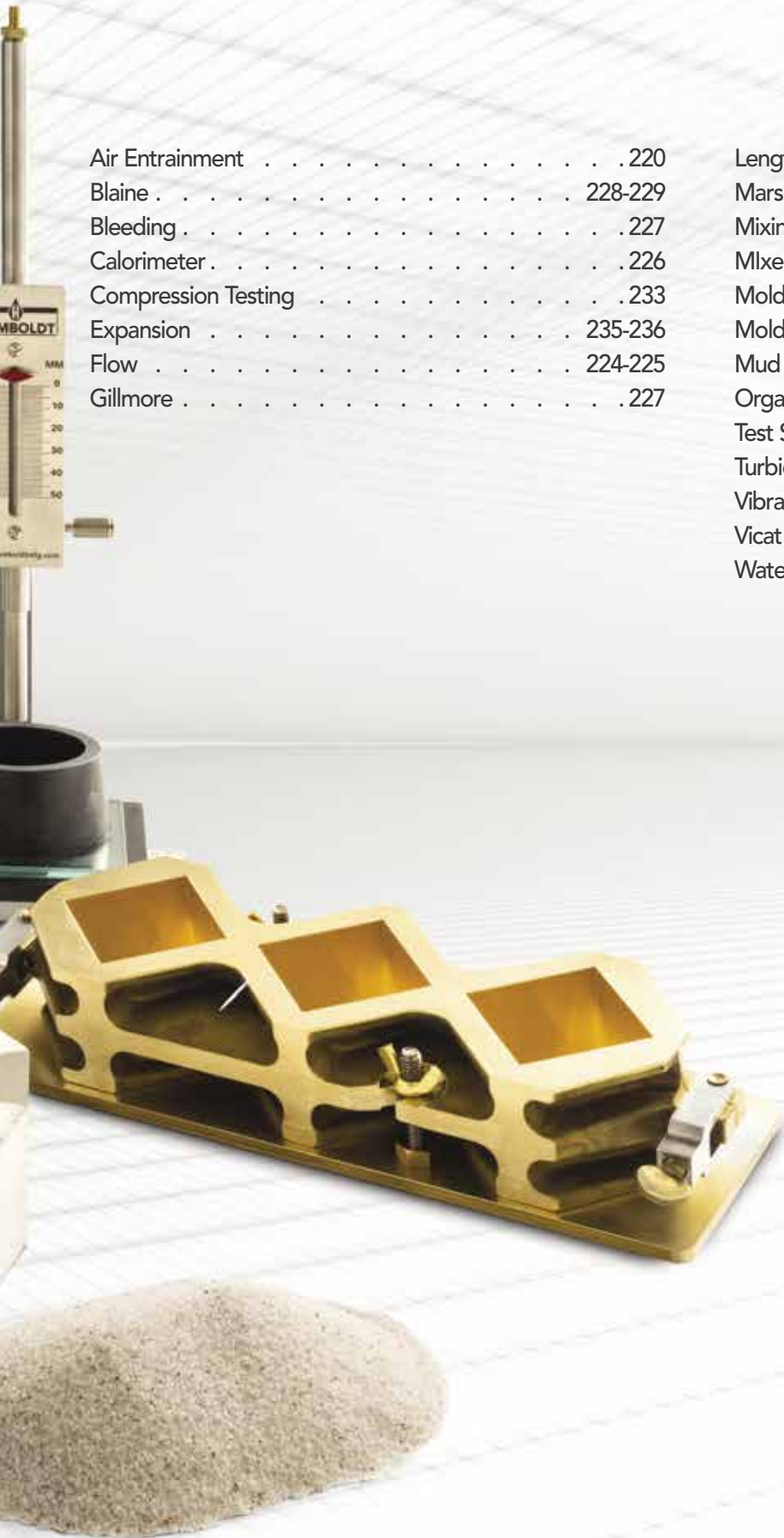




# CEMENT

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H-3852.3F



H-3853.3F



H-3854.3F


**Mortar Mixer, 4.73L (5qt)**

ASTM C305; AASHTO T162; EN 196  
DIN 1164; BS 3892; ISO 679; NF P15-411

Two-speed mixer designed to mix cement mortars and pastes. Mixer provides manually-controlled cement, water and sand supplies. Mixer features a 5 Liter (5.3qt) stainless steel bowl and ASTM stirrer, and a two-speed motor, which runs at either 140 ±5 rpm or 285 ±10rpm.

Features touch screen-operated control panel, which provides fast, easy control in eight languages. Numerous safety features are incorporated in the mixer and includes a service program with malfunction messages for operator, including paddle/planetary speed and time monitoring. Heavy-duty construction of aluminum and cast iron provides durability and a long service life. The mixer provides a powerful motor for quiet and maintenance-free operation aided by the use of planetary gears and a toothed, belt drive. The mixing bowl is connected to the mixer by a quick-release clamping system. The distance between the mixing bowl and the stirrer is 3 ±1 mm and can be easily and accurately set.

Mixer design conforms to CE standards, featuring a mixing bowl cover, electronic position monitoring of the mixing bowl, emergency stop switch and restart protection.

**Mortar Mixer, 4.73L (5qt) 120/230V 50/60Hz H-3852.3F**  
 Ship wt. 165lbs. (75kg)

**Mortar Mixer w/ Program Control and Auto Sand Feed**


ASTM C305; AASHTO T162; EN 196, EN 413, EN 480, DIN 1164; BS 3892; ISO 679; NF P15-411

Mixer with 4.73L (5qt) capacity provides automatic program control and auto sand feed with manually-controlled cement and water supply. Provides software with 4 standard programs installed covering the following standards: ASTM C305, EN 196 -1,3,9; EN 480 and EN 413. Two-speed mixer designed to mix cement mortars and pastes. Mixer features a 5 Liter (5.28qt) stainless steel bowl and ASTM stirrer, and a two-speed motor, which runs at either 140 ±5 rpm or 285 ±10rpm.

Features touch screen-operated control panel, which provides fast, easy control in eight languages. Numerous safety features are incorporated in the mixer and includes a service program with malfunction messages for operator, including paddle/planetary speed and time monitoring.

Heavy-duty construction of aluminum and cast iron provides durability and a long service life. The mixer provides a powerful motor for quiet and maintenance-free operation aided by the use of planetary gears and a toothed, belt drive. The mixing bowl is connected to the mixer by a quick-release clamping system. The distance between the mixing bowl and the stirrer is 3 ±1 mm and can be easily and accurately set.

Mixer design conforms to CE standards, featuring a mixing bowl cover, electronic position monitoring of the mixing bowl, emergency stop switch and restart protection.

**Mortar Mixer w/Program, 120/230V 50/60Hz H-3853.3F**  
 Ship wt. 165lbs. (75kg)

**Mortar Mixer w/ Program Control and Auto Sand and Water Feed**


ASTM C305; AASHTO T162; EN 196, EN 413, EN 480, DIN 1164; BS 3892; ISO 679; NF P15-411

Mixer with 4.73L (5qt) capacity provides automatic program control and auto sand feed with manually-controlled cement and water supply. Provides software with 4 standard programs installed covering the following standards: ASTM C305, EN 196 -1,3,9; EN 480 and EN 413. Two-speed mixer designed to mix cement mortars and pastes. Mixer features a 5 Liter (5.28qt) stainless steel bowl and ASTM stirrer, and a two-speed motor, which runs at either 140 ±5 rpm or 285 ±10rpm.

Features touch screen-operated control panel, which provides fast, easy control in eight languages. Numerous safety features are incorporated in the mixer and includes a service program with malfunction messages for operator, including paddle/planetary speed and time monitoring.

Heavy-duty construction of aluminum and cast iron provides durability and a long service life. The mixer provides a powerful motor for quiet and maintenance-free operation aided by the use of planetary gears and a toothed, belt drive. The mixing bowl is connected to the mixer by a quick-release clamping system. The distance between the mixing bowl and the stirrer is 3 ±1 mm and can be easily and accurately set.

Mixer design conforms to CE standards, featuring a mixing bowl cover, electronic position monitoring of the mixing bowl, emergency stop switch and restart protection.

**Mortar Mixer w/Program, 110/230V 50/60Hz H-3854.3F**  
 Ship wt. 170lbs. (77kg)





H-3858.3F



HC-3851



H-3841

**Humboldt Laboratory Mixer, 5-Qt.**

ASTM C305; AASHTO T162; EN 196  
DIN 1164; BS 3892; ISO 679; NF P15-411

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

The HC-3858 promotes extremely safe operation and complies with CE standards. It provides enclosed operation, an emergency stop button and stops automatically when the bowl is lowered during the mixing process. Its design is optimized for easy handling including its easy-lowering bowl mechanism. The mixer provides two mixing speeds: 140 ±5 rpm and 285 ±10 rpm. Dimensions are: 9.25" x 15.5" x 22.4" (235 x 396 x 568mm).

Mixer, 5-Qt. (4.73L), 120/230V 50/60Hz H-3858.3F  
Shipping wt. 66lbs (30kg)

**Mortar Mixer, 5L (5.3qt)**

ASTM C305; AASHTO T162; EN 196  
DIN 1164; BS 3892; ISO 679; NF P15-411

This excellent, alternative to the Hobart mixer features two-speed, manual-control with a very robust design, expressly made for the efficient mixing of cement pastes and mortar. The mixer offers two speeds: 140 rpm for revolving with 62 rpm planetary action and 285 rpm revolving with 15 planetary action. This mixer features a heavy-duty design, which provides excellent stability when placed on a counter top. Provides open mixing bowl for easy visual consistency control. Simple distance control between stirrer paddle and mixing bowl maintains standard distance between bowl and stirrer.

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

Mortar Mixer, 5L (5.3qt), 120V 60Hz HC-3851  
Mortar Mixer, 5L (5.3qt), 230V 60Hz HC-3851.2F  
Mortar Mixer, 5L (5.3qt), 230V 50Hz HC-3851.5F  
Shipping wt. 125lbs. (56kg)

**Mixer, 5-Qt. (4.73L)**

ASTM C305; AASHTO T162

ASTM-compliant mixer for mixing hydraulic cement pastes and mortars of plastic consistency. Mixer includes H-3844 bowl positioning adapter, a 5-qt. (4.73L) stainless steel bowl and 1 flat, stainless steel beater for mixing heavy materials. Hobart model No. N-50 operates on principle of planetary action—beater reaches every part of the batch, rotating on its axis in opposite directions as it moves around the bowl. Thoroughly blends, mixes and aerates all ingredients for consistent, predictable finished batches. Selective agitator transmission has 3 speed settings: 139, 285 and 591 RPM. Base dimensions: 10.375 x 15" (264 x 381mm). Height: 17" (432mm). Features UL-listed cord and plug. See below for accessories and replacement parts.

Mixer, 120V 60Hz H-3841  
Mixer, 230V 60Hz H-3841.2F  
Mixer, 230V 50Hz H-3841.5F  
Shipping wt. 55lbs. (25kg)

Mixer Components	Part #
Bowl positioning adapter	H-3844*
Bowl lid, acrylic	H-3846L
Beater— stainless steel, flat-type	H-3841.1*
Bowl— stainless steel, 5 qt. (4.73L)	H-3841.2*
Wire loop whip— stainless steel	H-3841WW
Cage (guard) for bowl, metal	H-3841.7
Wire loop whip— SS, Heavy-duty, 0.25" dia. wire	H-3841HW

\* Included with H-3841 mixer.



**Humboldt Extreme-Duty Whisk**

Custom, hand-made extreme-duty whisk designed for use with the H-3841 mixer. Whisk is formed from 0.25" dia. stainless steel rod for extended service. Designed to withstand the abuse of mixing heavy-aggregate concrete and asphalt mixes. Whisks are available for other mixers, see page 270 for information.

Humboldt Extreme-Duty Whisk **H-3841HW**  
 Ship wt. 3lbs. (1.3kg)

**Test Sand, ASTM 20-30**

ASTM C91, C141, C185, C359, C778; AASHTO T132, T137, T185

Sand is specially graded natural silica sand to pass a No. 20 (850µ) sieve. Specific gravity is 2.65. Packed in 50 lb. (22.7kg) bags or boxes.

Test Sand, ASTM 20-30, bag **H-3820**  
 Test Sand, ASTM 20-30, box **H-3820BX**  
 Ship wt. 55lbs. (24kg)

**Ottawa Test Sand for Cube Molds**

ASTM C87, C109, C348, C359, C593, C778; AASHTO T71, T106, T185

Sand is specially graded natural silica sand graded to retain 98% on a No. 100 (150µ) sieve, 75% on a No. 50 (300µ) 30% on a No. 40 (425µ) and 2% on a No. 30 (600µ). Specific gravity is 2.65. Packed in 50 lbs. (22.7kg) bags or boxes.

Ottawa Test Sand, bag **H-3825**  
 Ottawa Test Sand, box **H-3825BX**  
 Ship wt. 53lbs. (24kg)

**Tube Sampler with Partitions, Bulk Cement**

ASTM C183; AASHTO T127

For sampling hydraulic cement in bulk shipments or bulk storage. Has two polished brass telescopic tubes with registering slots (with partitions) that open or close by rotation of the inner tube. Outer tube has sharp point to facilitate penetration. Sampler is 1.375" (35mm) dia. x approximately 63" (160cm) long.

Tube Sampler with Partitions **H-3341**  
 Ship wt. 9.8lbs. (4.4kg)

**Tube Sampler w/o Partitions, Bulk Cement**

ASTM C183; AASHTO T127

For sampling hydraulic cement in bulk shipments or bulk storage. Has two polished brass telescopic tubes with registering slots (without partitions) that open or close by rotation of the inner tube. Outer tube has sharp point to facilitate penetration. Sampler is 1.375" (35mm) dia. x approximately 63" (160cm) long.

Tube Sampler without Partitions **H-3342**  
 Ship wt. 10.9lbs. (4.9kg)

**Tube Sampler, Packaged Cement**

ASTM C183; AASHTO T127

For sampling hydraulic packaged cement, brass unit has hardwood handle. Unit is 1.25" (32mm) dia. x 28.75 (730mm) long.

Tube Sampler, Packaged Cement **H-3340**  
 Ship wt. 1.7lbs. (.77kg.)

**Air Entrainment Meters for Mortar**

EN 1015-7, EN 459-2

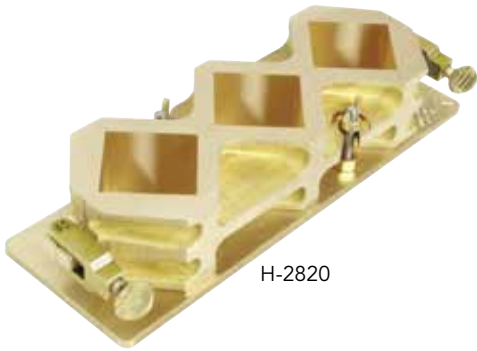
Air entrainment meters for testing freshly mixed mortar with direct readings in percent. Uses hand-operated pump.

Air Entrainment Meter for Mortar, 1L **H-2845**  
 Air Entrainment Meter for Mortar, 0.75L **H-2846**  
 Ship wt. 2.4lbs. (1.08kg)

**Air Meter Accessories**

Description	Model
Filling Hopper (1L & 0.75)	H-2845.1
Transport Box (1L & 0.75)	H-2845.2





H-2820



H-2808



H-2810



H-2823



H-2802



H-2821



H-2822

**Cube Mold, Diagonal Bronze**

ASTM C87, C91, C109, C141, C267, C307, C311, C472, C617, C618, C1073; AASHTO T71, T106.

Three-gang, cube mold with diagonal arrangement in forged bronze. Reinforcing rib prevents spreading and detachable baseplate. Available in 2" and 50mm.

2" Cube Mold, Parallel H-2820  
 50mm Cube Mold, Parallel H-2820M  
ups Ship wt. 13.7lbs. (6.2kg)

**Cube Mold, Diagonal Stainless Steel**

ASTM C87, C91, C109, C141, C267, C307, C311, C472, C617, C618, C1073; AASHTO T71, T106.

Three-gang, 2" cube mold with diagonal arrangement in forged stainless steel. Reinforcing rib prevents spreading with detachable baseplate.

2" Cube Mold, Diagonal Stainless Steel H-2808  
ups Ship wt. 12lbs. (5.4kg)

**Cube Mold, Expansive Grout, Bronze**

2" cube mold for expansive grout with diagonal arrangement, forged bronze. Reinforcing rib prevents spreading. Detachable base plate and top plate. Also available in 50mm.

Cube Mold, Expansive Grout, 2" H-2823  
 Cube Mold, Expansive Grout, 50mm H-2823M  
ups Ship wt. 17.2lbs. (7.8kg)

**Cube Mold, Expansive Grout, Stainless Steel**

2" cube mold for expansive grout with diagonal arrangement, forged stainless steel. Reinforcing rib prevents spreading. Detachable base plate and top plate.

Cube Mold, Expansive Grout H-2802  
ups Ship wt. 14lbs. (6.3kg)

**Cube Mold, Parallel Stainless Steel**

ASTM C87, C91, C109, C141, C267, C307, C311, C472, C617, C618, C1073; AASHTO T71, T106.

Three-gang, cube mold with parallel arrangement in 316 stainless steel. Fitted with angles for attaching to studs threaded into detachable baseplate. Available in 2" and 50mm.

2" Cube Mold, Parallel H-2810  
 50mm Cube Mold, Parallel H-2810M  
ups Ship wt. 14lbs. (6.3kg)

**Cube Mold, Econ-o-Cube**

The Econ-O-Cube cube mold forms three 2" test cubes in a diagonal arrangement. Mold and detachable base are held together by self-aligning thumbscrews, which ensure an even, tight fit. Molded to ASTM C109 dimensional tolerances.

Cube Mold, Econ-o-Cube H-2821  
ups Ship wt. 4lbs. (2.8kg)

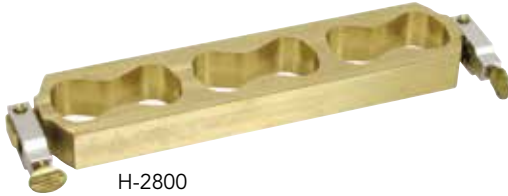
**Cover Plate for Cube Mold**

Cover plate for slowing the cooling rate as compound is poured. Designed to be used with H-2820 cube molds.

Cover Plate for Cube Mold H-2822  
ups Ship wt. 6.2lbs. (2.8kg)



H-2809



H-2800



H-2816.8



H-2817

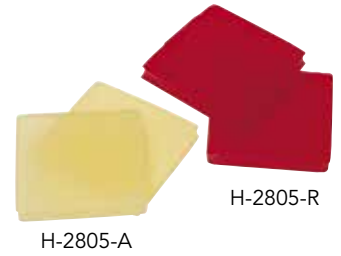


H-3855



H-2860W

H-2860



H-2805-A

H-2805-R



H-2804



H-2812

**Cube Mold, Stamped Construction**

2" cube mold with diagonal arrangement. Used with cement, gypsum, lime, mortars, etc. These molds do not meet ASTM or AASHTO specifications and must be individually measured.

Cube Mold, Stamped Construction **H-2809**  
 Ship wt. 1.7lbs. (0.7kg)

**Briquette Mold**

ASTM C307

Cast-bronze briquette mold for hydraulic cement mortar tensile strength tests. Bronze clamps with pins hold the two mold halves securely. Designed to prevent spreading during molding.

Briquette Mold **H-2800**  
 Ship wt. 3.5lbs. (1.5kg)

**Tamper, Wood**

ASTM C87, C109, C157, C185, C596; AASHTO T106, T137, T160

Wood tamper is 6" (152mm) long with 0.5 x 1" (13 x 25mm) cross section.

Tamper, Wood **H-2860W**  
 Ship wt. 0.3lbs. (0.14kg)

**Tamper, Rubber Compound**

Rubber compound tamper is 6" (152mm) long with 0.5 x 1" (13 x 25mm) cross section. Does not comply with ASTM standards.

Tamper, Rubber Compound **H-2860**  
 Ship wt. 0.3lbs. (0.14kg)

**Tamping Stick**

ASTM C185; AASHTO T137

Maple wood with .625" (16mm) dia. and 6" (152mm) length.

Tamping Stick **H-3855**  
 Ship wt. 0.1lbs. (0.04kg)

**Rubbing Block**

Ground steel block 3" dia. x 1" (76 x 25mm) for removing loose sand grains and encrustations from concrete specimen surfaces before compressive testing.

Rubbing Block **H-2812**  
 Ship wt. 0.2lbs. (0.09kg)

**Digital Caliper, 0-200mm**

Provides accurate outside, inside, depth and step measurements and features large, easy-to-read LCD digits, rolling thumb wheel; plus control buttons for zero, on/off and inch/mm functions.

Digital Caliper, 0-200mm **H-2816.8**  
 Ship wt. 2.2lbs. (1kg)

**Dial Caliper, Stainless Steel 6" (150mm)**

Easy-to-read black face dial caliper with combination inch and metric scales features 0.001" / 0.1mm graduations, hardened and ground stainless steel main beam with hardened, ground and lapped measuring faces.

Dial Caliper, Stainless Steel 6" (150mm) **H-2817M**  
 Ship wt. 1.5lbs. (0.68kg)

**Dial Caliper, Stainless Steel 6"**

Similar to above, features a 6" measuring range with .001" graduations and .100" per revolution.

Dial Caliper, Stainless Steel 6" (150mm) **H-2817**  
 Ship wt. 1.3lbs. (0.58kg)

**Certified Calipers are also available, please inquire.**

**2" Cube Compression Pad, Amber**

Compression pad, 90 durometer, used in compression tests of 2" cubes. Used with H-2804 Retainer Caps. Sold individually.

2" Cube Compression Pads, Amber **H-2805-A**  
 Ship wt. .25lbs. (.11kg)

**2" Cube Compression Pad, Red**

Compression pad, 80 durometer, used in compression tests of 2" cubes. Used with H-2804 Retainer Caps. Sold individually.

2" Cube Compression Pads, Red **H-2805-R**  
 Ship wt. 0.25lbs. (0.11kg)

**2" Cube Pad Retainer Caps**

Stainless steel retainer caps for use with 2" cube specimens. Use with 2" compression pads to eliminate the need for capping compound. Sold in sets of 2.

2" Cube Pad Retainer Caps **H-2804**  
 Ship wt. 0.25lbs. (0.23kg)

**2" Cube Compression Pads Set**

Compression pads used with H-2804 Retainer Caps. Sold in set, consisting of (2) H-2805-R and (2) H-2805-A.

2" Cube Compression Pads Set **H-2805**  
 Ship wt. .5lbs. (.22kg)







Description	Ship wt.	Model
Application: Autoclave expansion of Portland cement; length change of mortar and concrete; potential alkali reactivity of cement/aggregate combinations; linear change of magnesium and oxychloride cements; volume change of cement paste		
1" x 1" x 10" (25 x 25 x 254mm), 1-mold, cold-rolled steel	7.3 lbs (3.3kg)	H-3252
1" x 1" x 10" (25 x 25 x 254mm), 2-mold, cold-rolled steel	9.6 lbs (4.3kg)	H-3253
1" x 1" x 5" (25 x 25 x 127mm), 2-mold, stainless steel	6 lbs (2.72kg)	H-3255S

Description	Ship wt.	Model
Application: Volume change tests of mortars		
2" x 2" x 10" (51 x 51 x 254mm), 2-mold, cold-rolled steel	20.6 lb (9.3kg)	H-3251
1" x 1" x 5" (25 x 25 x 127mm), 2-mold, cold-rolled steel	6 lb (2.7kg)	H-3255
Application: Volume change of cement past; length change of mortar and concrete		
3" x 3" x 10" (76 x 76 x 254mm), 1-mold, cold-rolled steel	24.8 lbs (11kg)	H-3254
Application: Volume change tests		
4" x 4" x 10" (102 x 102 x 254mm), 1-mold, cold-rolled steel	35.5 lbs (16.1kg)	H-3256
1.6 x 1.6 x 6.3" (40 x 40 x 160mm) 3-gang mold, cold- rolled steel <b>This mold, not used with gauge studs</b>	14.3 lbs (6.4kg)	H-3270

**Prism Molds**

ASTM C490

Designed to produce required 10" effective gauge length, prism test bars. Molds feature removable partitions, base and end plates. Effective gauge length is measured from inside end of the studs. Molds produce cement prism specimens 11.25" long. Including studs, outside to outside length of specimen is 11.625".

**Prism Molds**

see chart  
Ship wt. see chart

**Restraining Cage, 2" x 2" x 10"**

ASTM C806

For 2" x 2" x 10" (51 x 51 x 254mm) prism molds. Features 1/4-20 continuous threaded rod and acorn nuts.

**Retaining Cage, 2" x 2" x 10"**

H-3251RC

Ship wt. 1.4lbs. (0.63kg)

**Restraining Cage, 3" x 3" x 10"**

ASTM C878

For 3" x 3" x 10" (51 x 51 x 254mm) prism molds. Features 1/4-20 continuous threaded rod and acorn nuts.

**Restraining Cage, 3" x 3" x 10"**

H-3257

Ship wt. 2.8lbs. (1.27kg)



**Gauge Studs**

ASTM C151, C157, C227, C490; AASHTO M210, T107.

Gauge studs have stainless steel contact points and are knurled and threaded for use with cement prism molds. Packaged 10 per bag.

**Gauge Studs**

H-3260

Ship wt. 0.15lbs. (0.06kg)

**Tamping Rod**

ASTM C157, C192; AASHTO T60.

Round, straight steel .375" dia. x 12" (10 x 305mm). Both ends rounded to a hemispherical tip the same diameter as the rod.

**Tamping Rod**

H-2905.1

Ship wt. 0.5lbs. (0.23kg)

**Demold Device for Prism Molds**

Handy device for removing prism samples from molds.

**Demolding Device for Prism Molds**

H-3258DD

Ship wt. 4lbs. (1.8kg)







H-3624

H-3620

H-3622  
H-3622M

H-3621

H-3624F

H-4144.8

**Flow Table, Motorized with Counter**

ASTM C87, C109, C110, C185, C230, C243, C348, C593; AASHTO T71, T106, T137 and T152

Used to determine the flow of hydraulic cement, mortars and cement pastes. A test specimen is molded on the table to a specified volume and shape. Then, with the mold removed, leaving the test specimen on the table. The table is dropped and raised (via a hand crank or optional motor) a specified number of cycles, after which the flow (or increase in average diameter of the specimen) is measured. Motorized flow table with 10" (254mm) dia. cast-bronze table/platen and automatic digital counter. Motor stops automatically once pre-set number of drops is achieved. Includes heavy-duty table/platen assembly, standard H-3622 cast bronze, 2.75" top dia. x 2" high x 4" bottom dia. cone mold, motor and H-3614B counter. Designed to be mounted to concrete mounting block. Order H-3624F, pedestal form and easily create your own mounting block. Applications include: compression strength and air content tests of cement mortar; flow tests of hydraulic cement mortars; consistency tests of magnesium oxychloride cements; flexural strength test for bond strength or mortar to masonry units.

Flow Table, w/Counter, 120V 60Hz H-3624

Flow Table, w/Counter, 220V 50Hz H-3624.5F

Ship wt. 81lbs. (37kg)

**Flow Table, Motorized**

ASTM C230

Used to determine the flow of hydraulic cement, mortars and cement pastes. A test specimen is molded on the table to a specified volume and shape. Then, with the mold removed, leaving the test specimen on the table. The table is dropped and raised (via a hand crank or optional motor) a specified number of cycles, after which the flow (or increase in average diameter of the specimen) is measured. Motorized flow table with 10" (254mm) dia. cast-bronze table/platen. Includes heavy-duty table/platen assembly, standard H-3622 cast bronze, 2.75" top dia. x 2" high x 4" bottom dia. cone mold, and motor. Designed to be mounted to concrete mounting block. Order H-3624F, pedestal form and easily create your own mounting block. Used in determining consistency of cement mortars.

Flow Table, Motorized, 120V 60Hz H-3625

Flow Table, Motorized, 220V 50Hz H-3625.5F

Ship wt. 80lbs. (36kg)

**Flow Table, Hand-Driven**

ASTM C230

Hand-driven flow table with 10" (254mm) dia. cast-bronze table/platen. Includes standard H-3622 cast bronze, 2.75" top dia. x 2" high x 4" bottom dia. cone mold. Used in determining consistency of cement mortars.

Flow Table, Hand-Driven H-3620

Ship wt. 27lbs. (12.2kg)

**Pedestal Form**

Wooden form used to create a concrete base for flow tables

Pedestal Form H-3624F

Ship wt. 28lbs. (12.7kg)

**Flow Molds**

Cast-bronze 2.75" top dia. x 4" bottom dia. x 2" high cone mold or cast-bronze 70mm top dia. x 100mm bottom x 50mm high. cone mold.

Flow Mold, 2.75" / 4" x 2" high H-3622

Flow Mold, 70mm/100mm x 50mm high H-3622M

Ship wt. 2.4lbs. (1.08kg)

**Counter, Automatic**

Can be used to upgrade H-3625 motorized flow table so a predetermined number of drops can be set to run automatically. Use H-3614B.4F with H-3625.5F.

Counter, Automatic, 120V 60Hz H-3614B

Counter, Automatic, 220v 50Hz H-3614B.4F

Ship wt. 4lbs. (1.8kg)

**Caliper, Mortar Diameter Check**

ASTM C87, C185, C230; AASHTO M152, T71, T137

Rugged caliper used to measure mortar flow diameter and indicate the + percentage of flow.

Caliper, Mortar Diameter Check H-3621

Ship wt. 2lb. (0.9kg)

**Mortar Flow Shield**

ASTM C230; AASHTO M152

Circular shield for use with H-3622 flow mold to prevent mortar from spilling on table top.

Mortar Flow Shield H-3623

Ship wt. 2lbs. (0.9kg)

**Straight Edge**

ASTM C185, D558, D559, D560, D698; AASHTO T137.

Straight edge of ground steel with beveled edge. .125" x 1.25" x 8" (3 x 32 x 200mm)

Straight Edge H-4144.8

Ship wt. 0.9lbs. (0.9kg)



### Grout Flow Cone Set

ASTM C939

Test set for measuring the flow of grout for pre-placed, aggregate concrete. Intended for neat grout and grouts containing fine aggregate capable of passing a No. 8 sieve and grouts which have an eflux time of less than 35 seconds. Kit includes: (1) H-2834 0.5" (13mm) or 0.75" (19mm) interchangeable orifice flow cone and adjustable point gauge assembly, (1) H-2833 stand, and (1) H-2834SSB stainless steel, 6 liter beaker.

Grout Flow Cone Set, 0.5" (13mm) **HC-2834S**  
 Grout Flow Cone Set, 0.75" (19mm) **HC-2835S**  
 Ship wt. 30lbs. (13.6kg)

### Grout Flow Cone

ASTM C939

Cast-aluminum flow cone with either 0.5" (13mm) or 0.75" (19mm) replaceable orifice. Includes adjustable point gauge assembly. Overall dimensions: 8" dia. x 12"H (203 x 305mm).

Grout Flow Cone, 0.5" (13mm) **H-2834**  
 Grout Flow Cone, 0.75" (19mm) **H-2835**  
 Ship wt. 10lbs. (4.5kg)

### Grout Flow Orifice, Replacement

ASTM C939

Grout flow orifice with either 0.5" (13mm) or 0.75" (19mm) opening.

Grout Flow Orifice, 0.5" (13mm) **H-2834.500**  
 Grout Flow Orifice, 0.75" (19mm) **H-2834.750**  
 Ship wt. 1lb. (0.45kg)

### Grout Flow Cone Stand

Sturdy well-constructed steel stand to support flow cones so the top is level and the cone free from vibration. Overall dimensions: 21"W x 9.5"D x 23"H.

Grout Flow Cone Stand **H-2833**  
 Ship wt. 9.5lbs. (4.3kg)

### Beaker, 6-liter Stainless Steel

6-liter stainless steel beaker with rolled-top edge, perfect for grout flow testing. Cleans up with ease.

Beaker, 6-liter Stainless Steel **H-2834SSB**  
 Ship wt. 2.8lbs. (1.27kg)

### Grout Boxes

ASTM C1019

Cardboard box designed to be used to mold grout test samples. Each box forms 4 molds and can be used as a transport/shipping container as well. Boxes yield consistent, identical prism samples, while the engineered, slotted corrugation retains moisture while closely simulating CMU absorption rates. 25 boxes to a package. Overall dimensions: 7.5" x 7.5" x 7" (190 x 190 x 178mm). Section: 3.25" x 3.25" x 6.75" (83 x 83 x 171mm)

Grout Boxes (package of 25) **H-2838**  
 Ship wt. 17.3lbs. (7.84kg)

### Micrometer Bridge Set

Designed to hold one cylinder to permit repeated volume change measurements without moving or disturbing the specimen. Includes the following items: H-2901 micrometer bridge, H-2902 micrometer depth gauge, H-2904 tapered cylinder mold, H-2905.2 tamping rod, H-2905.2 glass plate and H-2905.3 weight.

Micrometer Bridge Set **H-2903**  
 Ship wt. 23.4lbs. (10.6kg)

### Tapered Cylinder Mold

ASTM C1090

Used to determine volume change of grout, mold is constructed of steel tubing 0.25" wall x 3" dia. x 6"H (6 x 76 x 152mm). Mold is split longitudinally with two quick-acting clamps welded to the mold. Top edge of mold is machine tapered to a narrow rim. Includes detachable base plate.

Tapered Cylinder Mold **H-2904**  
 Ship wt. 7.8lbs. (3.5kg)

### Micrometer Depth Gauge

Graduations in the thousandths of an inch (.001"), range 0 to 3", .125" rod dia. Sleeve is designed with staggered lines, hardened and precision ground screw; lock nut holds the setting at the precise measurement. Includes protective case. Base length is 2.5".

Micrometer Depth Gauge **H-2902**  
 Ship wt. 2lbs. (.9kg)

### Micrometer Bridge

Bridge is used to hold the H-2904 mold in place while repeated volume change measurements are made. Stainless Steel.

Micrometer Bridge **H-2901**  
 Ship wt. 7lbs. (3.1kg)

### Tamping Rod

ASTM C157, C192

Round, straight steel rod is .375" (10mm) dia. x 12" (305mm) long. Both ends are rounded to a hemispherical tip of the same diameter as the rod.

Tamping Rod **H-2905.1**  
 Ship wt. 4.5lbs. (2.04kg)

### Glass Plate

Glass plate used with micrometer bridge setup.

Glass Plate **H-2905.2**  
 Ship wt. 0.4lbs. (0.18kg)

### Weight, 3 lb

3 lb weight for use with micrometer bridge setup.

Weight, 3 lb **H-2905.3**  
 Ship wt. 3lbs. (1.4kg)



H-3320



H-3493A



H-3492A



H-3491



H-3490A



H-3161



H-3162.5F

**Reaction Container**

ASTM C289

For determining potential alkali reactivity of aggregates (chemical method) when used with high alkali cements. Stainless steel unit is 2" dia. x 2.25" high (51mm dia. x 57mm) fitted with air-tight cover. 50-75ML capacity.

Reaction Container

H-3320



Ship wt. 1.3 lbs. (0.56kg)

**Organic Impurities Test Set**

ASTM C40; AASHTO T21

Determines presence of injurious organic compounds in sands used in cement mortar or concrete. Test serves as warning that further tests of sands are necessary before they can be approved for use. Air shipments must meet Dangerous Goods requirements because of Sodium Hydroxide Beads. **Order H-3493X without Sodium Hydroxide Beads to avoid Dangerous Goods requirements.**

Organic Impurities Test Set

H-3493A

Test Set, w/o Sodium Hydroxide

H-3493AX



Ship wt. 6.8lbs. (3kg)

**Sodium Hydroxide Beads**

1lb (454g) Container of Sodium Hydroxide Beads. Air shipments must meet Dangerous Goods requirements.

Sodium Hydroxide Beads

H-3491



Ship wt. 1.5lbs. (.68kg)

**Graduated Bottle**

12 oz. (.35L) graduated bottle for organics impurities test.

Graduated Bottle

H-3490A



Ship wt. 0.8lbs. (0.3kg)

**Organic Color Wheel**

ASTM C40; AASHTO T21

Color comparison wheel for use with organic impurities test. Color wheel has five different color filters to compare to test solution.

Organic Color Wheel

H-3492A



Ship wt. 0.6lbs. (.27kg)

**Cement Calorimeter, Digital**

ASTM C186

Features precision digital thermometer for determining heat of hydration of cements by measuring difference between heat of solution of dry cement and heat of solution of a separate sample partially hydrated for 7 to 28 days. Constant-speed stirrer maintains uniform temperature throughout liquid and supplies sufficient agitation to keep solid reactant suspended in the acid mixture. Includes insulated wood case, insulated 1G (3.8L) can; 1 pt. (0.47L) vacuum jar with stopper; 2-channel, Precision Digital Thermometer; plastic funnel; stirring paddle and chuck; geared synchronous motor.

Cement Calorimeter, Digital, 120V 60Hz

H-3161

Cement Calorimeter, Digital, 230V 50/60Hz

H-3161.4F



Ship wt. 35lbs. (15.8kg)

**Calorimeter**

EN 196-9

Used to measure the heat of hydration of cement by the semi-automatic Langavant method. Test calorimeter includes factory calibration certificate. Temperature recorder provides (4) input channels for recording and transmission of temperature values. Analysis software provides reporting and editing function for calculating the heat of hydration. Unit includes: test calorimeter; reference calorimeter; mortar-sample container, temperature recording device and analysis software. Power for unit is supplied by USB from a PC or laptop. Does not include required PC.

Calorimeter, 220V, 50Hz

H-3162.5F

Ship wt. 77lbs. (35kg)





### Gillmore Apparatus

ASTM C91, C141, C150, C266, C414; AASHTO T154

Used to determine initial and final set times of Portland cement, masonry cement, hydraulic hydrated lime and certain mortars. Comprised of two stainless steel needles with 0.0375" (4.8mm) cylindrical flat-end needles. One is 1/12" (2.12mm) dia. 1/4lb. (113.4g) weight for initial set. The second is 1/24" (1.06mm) dia., 1lb (453.6g) weight for final set.

**Gillmore Apparatus** H-3150  
Ship wt. 5.7lbs. (2.5kg)

### Gillmore Accessories and Replacement Parts

Description	Model
Strike-off plate, 0.5" thickness	H-3154
Needle, 1/24" (1.06mm) dia. with 1lb (453.6g) weight	H-3151
Needle, 1/12" (2.12mm) dia. with 1/4lb. (113.4g) weight	H-3152
Gillmore needle, 0.050" dia.	H-3152.4

### Water Retention Apparatus

ASTM C1506, C110, C207 and E149

The apparatus is used in specification tests of masonry cement and physical testing of quicklime and hydrated lime. Unlike older models, this unit incorporates a vacuum regulator and gauge system in place of the old mercury manometer and relief column. The complete unit consists of an aspirator pump, vacuum regulator, vacuum gauge, three-way stopcock, flask, rubber gasket, brass funnel, perforated brass dish, filter paper and hardwood stand.

**Water Retention Apparatus** H-3630A  
Ship wt. 25lbs. (11.3kg)

### Water Retention Apparatus Replacement Parts

Description	Model
Funnel	H-3630.3
Stopcock	H-3630.4
Rubber gasket	H-3630.18
Filter paper, 15cm, package of 100	H-3630.21
Perforated brass dish	H-3631
Flask, 1000ml	H-4913.1M
Vacuum Pump	H-1763A
Drierite Air Drying Unit	H-1759

### Cement Bleeding Apparatus

ASTM C243

Used to determine bleeding rate and bleeding capacity of cement paste and mortar by direct and continuous procedure. Includes noncorrosive metal container for paste or mortar, collecting ring, support stand and necessary glassware. Rubber-covered double V-jaw burette clamp holds stopcock in position; single rubber-covered jaw clamp supports the burette and funnel assembly.

**Cement Bleeding Apparatus** H-3600  
Ship wt. 16lbs. (7.2kg)



**Blaine Air Permeability Apparatus**

ASTM C204; AASHTO T153

Determines fineness of Portland cement in terms of specific surface expressed as total surface area in square centimeters per gram of cement. Consists of: calibrated U-tube manometer, ground glass joint, stainless steel test cell and plunger, rubber aspirator bulb and perforated disc. Includes 8 oz (226.8g) bottle of red manometer fluid, filter paper, wood block for holding test cell during filling and funnel. Mounted on finished wood panel with rubber-footed base.

**Blaine Air Permeability Apparatus** H-3810

CE Ship wt. 7lbs. (3.1kg)

**H-3810 Accessories & Replacement Parts**

Description	Model
Rubber bulb	H-3811
Cell and plunger	H-3812
Cell and plunger, Calibrated	H-3812CAL
Perforated brass disc	H-3813B
Perforated stainless steel disc	H-3813S
Manometer fluid, 8oz (240ml)	H-3814
Monometer u-tube, calibrated	H-3815
Filter paper discs, medium retentive, 1.27cm, pkg 1000	H-3816.1M

**SRM 114q - Portland Cement Fineness Standard**

This Standard Reference Material (SRM) is used in calibrating fineness testing equipment according to ASTM Standard Methods. The SRM unit consists of a glass vial with plastic caps containing powdered cement (each vial is contained in a sealed foil bag). Each vial contains approximately 5g of cement.

SRM 114q, 1 vial H-3817

SRM 114q, package of 20 H-3817.20

CE Ship wt. 0.5lbs. (0.2kg)

**Blaine Air Permeability (H-3810) Replacement Parts**



**Blaine Semi-Automatic Apparatus (H-3056.3F) Replacement Parts**



**Blaine Apparatus, Semi-Automatic**

ASTM C204; AASHTO T153, EN 196; DIN 1164; BS 4550

Determines fineness of cement in terms of specific surface expressed as total surface area square centimeters per gram. To obtain the most accurate results, the test should be performed in a temperature-controlled environment. The Semi-automatic Blaine Apparatus provides more accuracy and precision than provided by the manual Blaine Apparatus. The device uses an automatic pump and timer to evaluate the time precisely. Calibration of this unit is done using a cement sample reference, such as NIST 114q. To obtain the most accurate results, the test should be performed in a temperature controlled environment. Unit includes: the unit with an electric pump and timer; measuring cell, filter papers ( 12.8mm, 1000pk; fill oil (50ml); plug; thermometer; brush and funnel.

**Blaine Apparatus, Semi-Automatic** H-3056.3F

CE Ship wt. 15lbs. (6.8kg)

**H-3056.3F Accessories & Replacement Parts**

Description	Model
Calibration Sand, Coarse	H-3056.2
Calibration Sand, Fine	H-3056.4
Fill Oil	H-3056.5
Light Grease	H-3056.10
U-shaped Tube	H-3056.6
Filter Papers, 12.8mm (1000)	H-3056.1
Measuring Cell	H-3056.11
Perforated Disc	H-3056.8
Tamper	H-3056.13

**Electronic Blaine Apparatus, Dyckerhoff**  
(see next page)

The Electronic Blaine Apparatus, Dyckerhoff system is a semi-automatic device with pump and time registration for the rapid determination of specimen characteristics. This device is a semi-automatic cement air permeability tester used for the determination of the specific surface or Blaine value. Once the test material is set inside the chambers, the test procedure is able to measure the values for the user. Measuring cell dia. is 41 mm (1.6"). Volume of measuring cell is 73 cm<sup>3</sup>. Unit includes apparatus, measuring cell, filter papers ø41mm 500pk, fill oil 150ml, tamper and dust filter ø13mm.

**Electronic Blaine Apparatus, Dyckerhoff** H-3058.3F

CE Ship wt. 47lbs. (21.3kg)

**PC-Controlled Blaine Apparatus, Dyckerhoff**  
(see next page)

The PC-controlled, electronic Blaine Apparatus, Dyckerhoff system provides a fully automatic test procedure and evaluation, complete with software, for one cell. Once the test material is set inside the chambers, the test procedure is able to measure the values for the user. This device provides quick test preparation, which does not require the operator to determine the weighed quantity, as precise as he would for the standard procedure. After test preparation, the device can perform the test in full automation, recording all information without need of supervision Software automatically records all information without need of supervision. Apparatus and software are able to measure the final result for the user. Measuring cell dia. is 41 mm (1.6"). Volume of measuring cell is approximately ca. 75 cm<sup>3</sup>. Comes complete with apparatus, measuring cell, filter papers ø41mm 500pk, fill oil 150ml, tamper and dust filter ø13mm.

**Does not include required PC.** See next page for replacement parts and accessories.

**PC-Controlled Apparatus, Dyckerhoff** H-3059.3F

CE Ship wt. 47lbs. (21.3kg)

**NOTES**

.3F part numbers are 120/220V 50/60Hz





**H-3058, H-3059 Accessories & Replacement Parts**

Description	Model
Reference Sand, Coarse, 600g	H-3058.7
Reference Sand, Fine, 600g	H-3058.8
Fill Oil	H-3056.5
Light Grease	H-3056.10
U-shaped Tube	H-3056.6
Filter Papers, 41mm (500)	H-3058.1
Foam Plugs, dust filters (10)	H-3058.5
Precision Digital Gauge	H-3059.6
O-ring	H-3058.2
Perforated Disk, 30 x 7mm	H-3058.4

**Vicat Apparatus, Automatic**

ASTM C187, C191, AASHTO T131, EN 196-3, DIN 1164, DIN 1168 gypsum, NF P15/431 and BS4550

This automatic Vicat Apparatus provides a completely automatic method for determining the initial and final setting time of cements or mortar pastes.

The HA-3056 is supplied complete with a 1.13mm x 57mm needle; a vicat mold (70/80 dia. x 40mm height); sample container (water bath); 500 sheets of plotting paper; final set needle; cleaning strip; tweezer, T-wrench and delay timer.

Vicat Apparatus, Auto, 120/220V 50/60Hz **HA-3056.3F**  
Ship wt. 37lbs. (17.6kg)

**HA-3056 Accessories, Spare Parts**

Description	Model
Initial set needle, 1.13mm dia. x 57mm length	HA-3056.2
Final set needle with special foot, 1.13mm dia.	HA-3056.5
Vicat mold, 70/80 dia. x 40mm (EN 196, ASTM C187-191)	HA-3056.6
Plotting Paper (500 sheets)	HA-3056.1
Recording Pen (1)	HA-3056.3
Sample Container (140 x 60mm)	HA-3056.8
Glass Base Plate	HA-3056.7
Cleaning Strip for Needle	HA-3056.4

**Vicat Machine, Automatic**

ASTM C187, C191; AASHTO T131; EN 196-3; DIN 1164, DIN 1168 gypsum; NF P15/431 and BS4550

The Vicatronic apparatus provides a completely automatic method for determining the initial and final setting time of cements or mortar pastes. The automated test operation provides for precise and repeatable results, which are automatically printed out from the integral printer built into the apparatus. The Vicatronic can also be connected to a PC via a RS232 cable allowing data to be downloaded via programs like Microsoft hyper terminal. The Vicat-Win software (H-3052.4) allows the receiving, managing, processing and completing test data; the software can automatically create graphs, personalize them and print test reports.

The Vicatronic has a large high-contrast, high-resolution LCD display, which shows the test data together with the general functions of the unit. The easy-to-see menu provides a simplified guide to running a test. During the test, the display also provides a real-time graph of the results, which can be monitored.

The Vicatronic is supplied with firmware that allows the automatic performance of tests in accordance with the following standards: ASTM C191, AASHTO T131, EN 196/3, DIN 1164, DIN 1168 gypsum, NF P15/431 and BS4550. Additional programs can be developed by the operator. This is particularly useful when testing new mortars, additives or research tests requiring sophisticated and flexible applications.

The Vicatronic is supplied complete with the integral printer, two hardened needles (one with 1mm diameter and one with 1.13mm. diameter), two conical molds EN and ASTM, and a glass plate to hold the conical mold. Dimensions: 15.75" x 7.87" x 18.5" (400 x 200 x 470mm).

Vicat Machine, Automatic, 120V 50/60Hz **H-3052**  
 Vicat Machine, Automatic, 230V 50/60Hz **H-3052.4F**  
Ship wt. 37.6lbs. (17kg)

**H-3052 Accessories, Spare Parts**

Description	Model
Needle 1.13mm dia., EN 196-3	H-3052.2
Needle 1mm dia., ASTM C191	H-3052.9
Weight, 700g	H-3052.45
Mold tank, in-water testing	H-3052.3
Printer paper (5 rolls)	H-3052.6

**Vicat-Win Software**

Allows the receiving, managing, processing and completion of test data on a PC. This software can automatically create graphs, personalize them and print test reports.

Vicat-Win Software **H-3052.4**  
Ship wt. 0.1lbs. (0.04kg)





**Vicat Apparatus, 6-Station, Computer Controlled**

ASTM C191 Method B; AASHTO T131; EN 196-3, EN 480-2; DIN 1164; BS4550

Computer-controlled Vicat needle apparatus with six (6) test stations positioned in a rectangular water bath. The Computer-controlled, Vicat Apparatus can be used to determine the initial and final setting time of cement, mortar pastes and gypsum. This six-station apparatus automatically monitors the setting process and provides output curves of the process. The test sequence is programmable and tests can be performed in air or in the supplied, temperature-controlled water bath. With programmed test sequences, the unit provides automatic registration of initial set and final set times, as well as providing setting plots of the entire sequence. The supplied plunger and needle weigh  $300g \pm 1g$  and after each penetration the vicat needle is automatically cleaned.

The computer-controlled vicat apparatus includes: Base unit as a table model apparatus with a control unit and standard software for performing programmable test sequences and for data recording. Includes: (6) vicat molds (60/70 dia. x 40 mm conical hard-plastic rings); (6) glass base plates (120 mm dia.); (6) centerings for the vicat molds; 1 pair of cleaning brushes; (1) t-wrench (1.25 mm); (1) t-wrench (2 mm); (2) spare glass plates (120 mm dia.); (2) spare initial-set needles, (1.0 mm dia.); Filter sponge (coarse); Filter sponge (fine); serial cable, and cover. **PC or laptop required for operation— not included.**

Vicat Apparatus, 6-Station, 120/220V 50/60Hz HC-3057.3F



Ship wt.115lbs. (52kg)

**Vicat Apparatus, 8-Station, Computer Controlled**

ASTM C191 Method B; AASHTO T131; EN 196-3, EN 480-2; DIN 1164; BS4550

Eight (8)-station version of the computer-controlled vicat apparatus. See previous listing (H-3057.3F) for information. The computer-controlled vicat apparatus includes: Base unit as a table model apparatus with a control unit and standard software for performing programmable test sequences and for data recording. Includes: (8) vicat molds (60/70 dia. x 40 mm conical hard-plastic rings); (8) glass base plates (120 mm dia.); (8) centerings for the vicat molds; 1 pair of cleaning brushes; (1) t-wrench (1.25 mm); (1) t-wrench (2 mm); (2) spare glass plates (120 mm dia.); (2) spare initial-set needles, (1.0 mm dia.); Filter sponge (coarse); Filter sponge (fine); serial cable, and cover. **PC or laptop required for operation— not included.**

Vicat Apparatus, 8-Station, 120/220V 50/60Hz HC-3058.3F



Ship wt.115lbs. (52kg)

**Vicat Apparatus, 12-Station, Computer Controlled**

ASTM C191 Method B; AASHTO T131; EN 196-3, EN 480-2; DIN 1164; BS4550

Computer-controlled Vicat needle apparatus with twelve (12) test stations positioned in a rectangular water bath, which is built into a stainless steel workbench. The Computer-controlled, Vicat Apparatus can be used to determine the initial and final setting time of cement, mortar pastes and gypsum. This 12-station apparatus automatically monitors the setting process and provides output curves of the process. The test sequence is programmable and tests can be performed in air or in the supplied, temperature-controlled water bath. With programmed test sequences, the unit provides automatic registration of initial set and final set times, as well as providing setting plots of the

entire sequence. The supplied plunger and needle weigh  $300g \pm 1g$  and after each penetration the vicat needle is automatically cleaned.

The computer-controlled vicat apparatus with integral stainless steel bench includes: Base apparatus unit is built into a stainless steel bench with a control unit and standard software for performing programmable test sequences and for data recording. Includes: (12) vicat molds (60/70 dia. x 40 mm conical hard-plastic rings); (12) glass base plates (120 mm dia.); (12) centerings for the vicat molds; 1 pair of cleaning brushes; (1) t-wrench (1.25 mm); (1) t-wrench (2 mm); (2) spare glass plates (120 mm dia.); (2) spare initial-set needles, (1.0 mm dia.); Filter sponge (coarse); Filter sponge (fine); serial cable, USB/RS232 adapter and power supply. **Standard PC or laptop required for operation— not included.**

Vicat Apparatus, 12-Station, 120/220V 50/60Hz HC-3059.3F



Ship wt.115lbs. (52kg)

**HC-3057, HC-3058 & HC-3059 Spare Parts**

Description	Model
Needle 1.13mm dia., EN 196-3	HC-3057.13
Needle 1.0mm dia., ASTM C191	HC-3057.14
EN ring $\varnothing 70/80 \times 40$ mm	HC-3057.02
ASTM ring $\varnothing 60/70 \times 40$ mm	HC-3057.03
Glass plate, 120mm	HC-3057.07
Cleaning brushes, 1 pair	HC-3057.08
700g weight for EN 480-2	HC-3057.10



**Vicat Consistency Apparatus**

ASTM C91, C141, C187, C191, C308, C451, C472; AASHTO T129, T131, T186

Reversible stainless steel plunger with 10mm dia. on one end and threaded, H-3070 1mm dia. stainless steel needle on the other. Weight of plunger assembly with adjustable indicator is 300g total. This includes the 1mm stainless needle. Graduated 0-50mm scale. Includes frame with bakelite platform, graduated 0-50mm scale, reversible plunger assembly with H-3070 1mm diameter stainless steel needle, H-3080 conical mold and H-3049 glass plate.

**Vicat Consistency Apparatus** H-3050  
 Ship wt. 5lbs. (2.2kg)

**Vicat Apparatus, Modified, 400g**

ASTM C1191, AASHTO T131, EN196/3

Modified vicat apparatus with 10mm dia. plunger and H-3061 100 gram weight. Weight of plunger assembly with adjustable indicator is 400g total. Includes graduated 0-50mm scale, frame with bakelite platform, plunger assembly, H-3080 conical mold and H-3049 glass plate.

**Vicat Apparatus, Modified, 400g** H-3060  
 Ship wt. 4.6lbs. (2kg)

**Vicat Apparatus, Set Time & Consistency**

ASTM C807

Designed to switch between 17.5mm dia. plunger for consistency determinations and a 2mm dia. needle for time of set determinations. Plunger assembly with adjustable indicator weighs 400g with 17.5mm needle attached and 300g with 2mm needle. Includes graduated 0-50mm scale, frame

with bakelite platform, plunger assembly with adjustable indicator and H-3086 brass ring mold (76mm ID x 40mm).

**Vicat Apparatus, Set Time & Consistency** H-3085  
 Ship wt. 4.7lbs. (2.1kg)

**Vicat Consistency Apparatus, Modified. 50g**

ASTM C110

Modified consistency vicat apparatus with 19mm dia. aluminum plunger on .25" rod. Weight of plunger assembly with adjustable indicator is 50g total. Includes graduated 0-50mm scale, frame with bakelite platform, plunger assembly, H-3080 conical mold and H-3049 glass plate.

**Vicat Consistency Apparatus, Modified, 50g** H-3090  
 Ship wt. 5lbs. (2.7kg)

**Vicat Consistency Apparatus, Modified, 30g**

ASTM C110

Modified consistency vicat apparatus with 12.5mm dia. aluminum plunger on .25" rod. Weight of plunger assembly with adjustable indicator is 30g total. Includes graduated 0-50mm scale, frame with bakelite platform, plunger assembly, H-3080 conical mold and H-3049 glass plate.

**Vicat Consistency Apparatus, Modified, 30g** H-3120  
 Ship wt. 10lbs. (4.5kg)

**Modified Vicat Cone Penetrometer, 100g**

American Dental Association

Features a 35g magnesium cone with a 65g brass weight for a total plunger weight of 100g. Includes frame with bakelite platform, graduated 0-50mm scale, magnesium cone plunger assembly with adjustable indicator, 65g weight and H-3080 conical mold.

**Modified Vicat Cone Penetrometer, 100g** H-3134  
 Ship wt. 6.8lbs. (3kg)

**Modified Vicat Cone Penetrometer, 35g**

ASTM C472

Used to evaluate unsanded plaster. Features a magnesium cone and plunger assembly with a total weight of 35g. Includes frame with bakelite platform, graduated 0-50mm scale, magnesium cone plunger assembly with adjustable indicator and H-3080 conical mold.

**Modified Vicat Cone Penetrometer, 35g** H-3135  
 Ship wt. 6.8lbs. (3kg)

**Modified Vicat Cone Penetrometer, 50g**

ASTM C472

Used to evaluate unsanded plaster. Features a magnesium cone and plunger assembly, which includes a 15g weight for a total plunger weight of 50g. Includes frame with bakelite platform, graduated 0-50mm scale, magnesium cone plunger assembly with weight and adjustable indicator and H-3080 conical mold.

**Modified Vicat Cone Penetrometer, 50g** H-3137  
 Ship wt. 4lbs. (1.8kg)

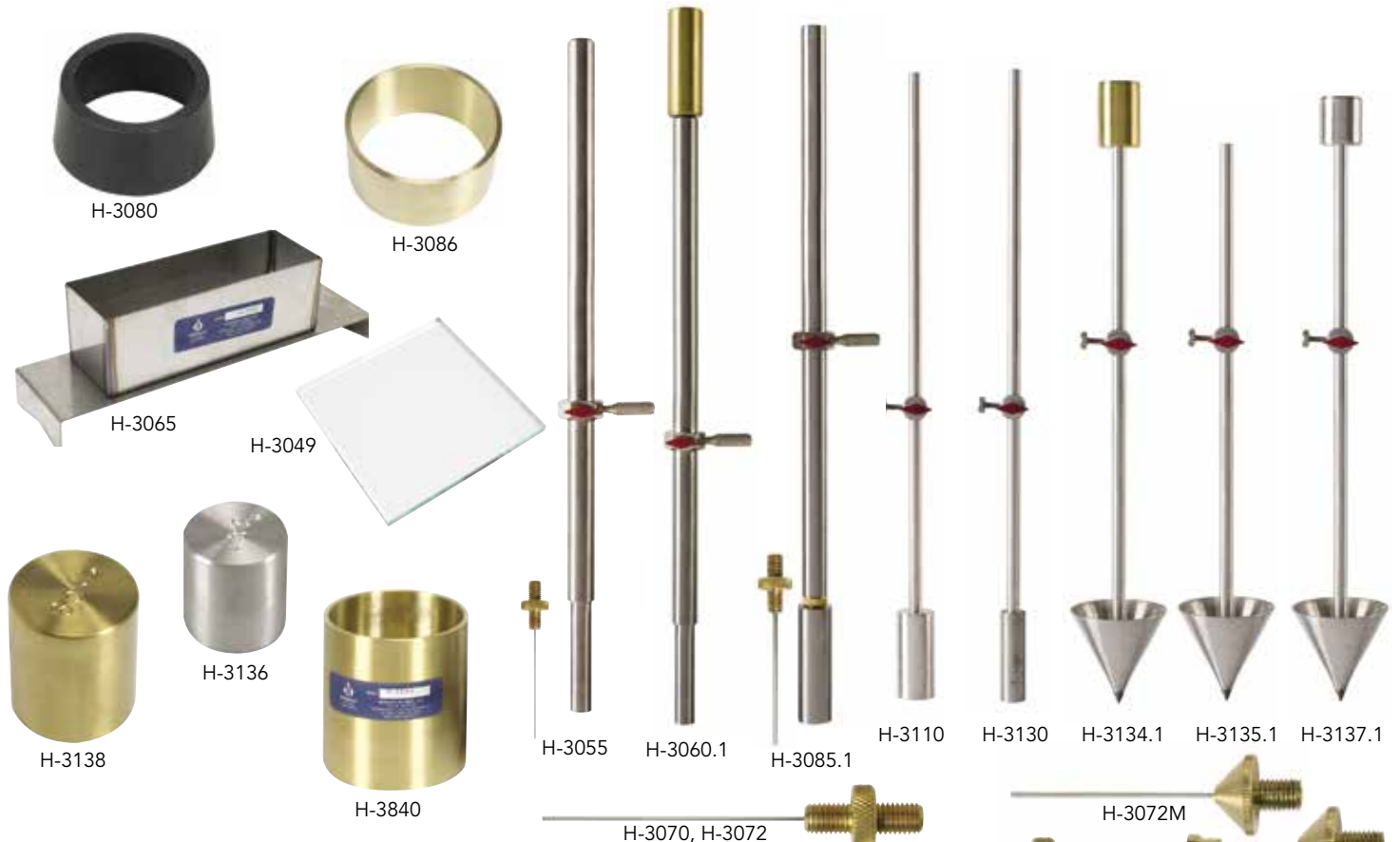
**Modified Vicat Cone Penetrometer, 200g**

ASTM C780, C185

Used to evaluate unsanded plaster. Features an aluminum cone, 1.625" x 3.625" (41.3 x 92.08mm) and blunted to a hemisphere a distance of .125" (3.2mm) for an overall length of 3.5" (88.9mm) and plunger assembly with adjustable indicator. Total plunger weight is 200g. Includes frame with bakelite platform, aluminum cone plunger assembly with adjustable indicator and H-3840 400ml brass measure cup as specified for ASTM C185.

**Modified Vicat Cone Penetrometer, 200g** H-3133  
 Ship wt. 7lbs. (3.1kg)





**Conical Mold, Plastic**

Plastic mold, 70mm bottom dia. x 60mm top dia. x 40mm high. For use with all Vicat apparatuses.

Conical Mold, Plastic **H-3080**  
 Ship wt. 0.6lbs. (0.2kg)

**Mold, Brass**

Brass mold, 76mm dia. x 40mm high. For use with H-3085 vicat apparatus.

Mold, Brass **H-3086**  
 Ship wt. 0.5lbs. (0.2kg)

**Mold Container**

ASTM C359

Mold for use in false set test. 2" x 2" x 6" (51mm x 51mm x 152mm) Overall length including base is 9.25" (235mm).

Mold Container **H-3065**  
 Ship wt. 1lbs. (0.4kg)

**Glass Plate**

Glass plate, 4" x 4" x .1375" (101.6mm x 101.6mm x 4.8mm). For use with H-3050, H-3060 and H-3090 vicat apparatus.

Glass Plate **H-3049**  
 Ship wt. 0.4lbs. (0.1kg)

**Measure, 400ml**

ASTM C185, C780; AASHTO M152

Calibrated to 400ml, this measure is used to determine air content of hydraulic cement mortar. Cylindrical with 3" (76mm) ID, approximately 3-15/32" (88mm) depth.

Measure, 400ml **H-3840**  
 Ship wt. 2.3lbs. (1.04kg)

Replacement Plunger Assemblies	Vicat	Plunger
Plunger assembly: plunger, needle and indicator, 300g	H-3050	H-3055
Plunger assembly: plunger, weight and indicator, 400g	H-3060	H-3060.1
Plunger assembly: plunger and indicator, 300g	H-3085	H-3085.1
Plunger assembly: plunger, needle, weight and indicator	H-3090	H-3110
Plunger assembly: plunger, needle, weight and indicator	H-3120	H-3130
Plunger assembly: plunger, cone, weight, indicator, and (2) bushings	H-3134	H-3134.1
Plunger assembly: plunger, cone, indicator and (2) bushings	H-3135	H-3135.1
Plunger assembly: plunger, cone, weight, indicator and (2) bushings	H-3137	H-3137.1
Plunger assembly: plunger, cone and indicator	H-3133	H-3133.1

Needles	Vicat	Needle
1mm dia. stainless steel with knurled threaded holder	H-3050 H-3085	H-3070
1.13mm dia. stainless steel with knurled threaded holder		H-3072
Initial set needle, 1.13mm dia. x 45mm, BS EN 196-3.		H-3072M
Final set needle, 1.13mm dia., BS EN 196-3.		H-3073
Initial and final set needle, ASTM C191		H-3075
2mm dia., stainless steel vicat needle		H-3147
17.5mm dia., stainless steel vicat needle		H-3085.1.1

Weights	Vicat	Weight
100g weight replacement for H-3060	H-3060	H-3061
100g weight, increases H-3090 to 150g	H-3090	H-3100
100g weight replacement for H-3137	H-3137	H-3136
65g weight replacement for H-3134	H-3134	H-3138







HC-2820.5F



HC-3254.5F



HC-3253.5F

**Cement Compression/Flexural Machine**

ASTM C109; EN 196-1,459-2,1744-1,1015-11,13459-2; BS 3892-1, 4554-1

This fully-automatic, Servo-hydraulic cement compression and flexural machine has been designed according to the EN196-1 and ASTM C109 standards for testing the compression and flexure of mortar prisms and cubes. The machine features a very rigid, two-column frame, automatic closed-loop, PID-controlled, servo-hydraulic power pack and LCD, graphic digital control and readout. Machine speed can be adjusted from 0.05 kN/sec to 20 kN/sec.

**Controller Features**

Controller is designed to control the machine and provide data acquisition from load cells or pressure transducers installed on the compression machine frame. Easy-to-read LCD graphics display and touch-button data pad keys make the unit quick and straight forward to operate. All interactions with the measuring system are via the front control panel by using simple menu-driven procedures. The controller provides real-time load vs. time graph. At the end of the test cycle, the results can be stored in the large memory or downloaded to a PC. Dedicated software package is available for further data processing data base management and printing.

Compression/Flexural Machine, 230V 50Hz **HC-2820.5F**  
 Ship wt. 959lbs. (435kg)

**HCM-1000 Series Compression Machines**

ASTM C39, ASTM C78, ASTM C293, ASTM C469, ASTM C496, ASTM C1019, ASTM C109/C109M, BS EN 12390-3

The HCM-1000 has been custom-configured to be used for mortar applications like 2" and 4" cubes, beams and other low-strength materials, below 100,000 lbs. (445kN). These machines are based on HCM-2500 frames, which have been reconfigured for accurate readings of lower-strength materials. The machines are sold without platens, so be sure to order the appropriate set for your applications.

- Custom-configured for mortar applications like 2" and 4" cubes
- 1,000 to 100,000 (11 to 445kN) testing range with accuracy of ±5% of indicated load
- Machine comes with no platens, order the appropriate set for your applications
- **Mounting stand: OPTIONAL**, order: HCM-0200

Specification	Value
Vertical Opening	19.375" (492mm)
Horizontal Opening	9.25" (235mm)
Piston Stroke	2.5" (63.5mm)
Lower Platen	NA
Upper Platen, Dia.	NA
Oil Reservoir Cap.	2 gal (7.6 liter)
Overall Width	30" (762mm)
Overall Depth	23.750" (603mm)
Overall Height	60.625" (1540mm)

See Page 166 for models and ordering information.  
**HCM-1000 Series Compression Machines**  
 Ship wt. 610lbs. (277kg)

**Vibrating Table, 3-gang Molds**

EN 196-1, BS 4550

Required for compaction of 40 x 40 x 160mm samples for EN 196-1 and BS 4550 standards. It can be ordered with either a fast-action clamp fitting or a general-purpose clamp fitting for (1) 3-gang mold for 40 x 40 x 160mm samples. The vibrating plate is 400 x 300 mm in size and is built into a powder-coated steel cabinet. The power switch box is mounted on a post attached to the top of the cabinet. Oscillation frequency is 50Hz with a sinusoidal waveform digital timer. Peak-to-peak value is 0.75 ± 0.05mm. **Note: A total vibrating mass of 35.0 +/- 1.5 kg acc. to EN 196-1:2005 can only be guaranteed by utilizing the precision three-gang mold with feeding hopper listed below.**

Vibrating Table, Fast-action Clamp, 230V 50Hz **HC-3253.5F**  
 Ship wt. 552lbs. (250kg)

Vibrating Table, General Clamp, 230V 50Hz **HC-3254.5F**  
 Ship wt. 552lbs. (250kg)

**Precision, 3-gang Mold**

EN 196

For use with vibrating table above. 40.1 x 40 x 160mm. Polished bright surface with numbered webs and nutplates. Electroless nickel finish.

Precision, 3-gang Mold **HC-3253.1**  
 Ship wt. 1.4lbs. (0.63kg)

**Feeding Hopper for 3-gang Mold**

EN 196

Feeding hopper for 3-gang mold and vibrating table.

Feeding Hopper, 3-gang Mold **HC-3253.2**  
 Ship wt. 1.4lbs. (0.63kg)





H-3250



H-3250D



H-3250.8

**Length Comparator, Dial Indicator**

ASTM C151, C157, C227, C311, C341, C342, C452, C490, C596; AASHTO M210, T107, T160.

Length comparators measure length changes of hardened cement paste, mortar and concrete prismatic specimens. Indicators are mounted on a sturdy upright support attached to a solid triangular base. All units include stationary and movable anvils designed to fit H-3260 gauge studs, which are cast into test specimens and an invar reference bar. Comparators for 10" (254mm) or 16" (406mm) effective length samples with 3.625" (92mm) dia. dial gauge with a range of .400" and gradations of .0001". The Dial is marked 0-10. Includes stationary and movable anvils designed to fit the H-3260 gauge studs that are cast on test specimens and an invar reference bar. Unit accommodates test specimens up to 4" x 4" (102 x 102mm) cross section.

Length Comparator, 10" Effective Length H-3250  
 Length Comparator, 16" Effective Length H-3248  
UPS Ship wt. 32.7lbs. (14.8kg)

**Length Comparator, Digital Indicator**

ASTM C151, C157, C227, C311, C341, C342, C452, C490, C596; AASHTO M210, T107, T160.

Length comparators measure length changes of hardened cement paste, mortar and concrete prismatic specimens. Indicators are mounted on a sturdy upright support attached to a solid triangular base. All units include stationary and movable anvils designed to fit H-3260 gauge studs, which are cast into test specimens and an invar reference bar. Comparators for 10" (254mm) or 16" (406mm) effective length samples with digital indicator with a range of .600" and resolution of .0001". Measures inches and millimeters includes batteries and AC adapter. Unit can be zeroed at any point on the range and can be switched from inches to mm by pressing a button. Includes stationary and movable anvils designed to fit the H-3260 gauge studs that are cast on test specimens and an invar reference bar. Unit accommodates test specimens up to 4" x 4" (102 x 102mm) cross section.

Length Comparator, 10" Effective Length  
 120V 60Hz H-3250D  
 220V 50/60Hz H-3250D.4F  
 Length Comparator, 16" Effective Length  
 120V 60Hz H-3248D  
 220V 50/60Hz H-3248D.4F  
UPS Ship wt. 36.5lbs. (16.8kg)

**Comparator Replacement Components**

Description	Model
Invar reference bar for use with H-3250 and 10" (254mm) specimens	H-3249A
Invar reference bar for use with H-3248 and 16" (406mm) specimens	H-3249A.16
Dial indicator	H-3250.3
Digital indicator, 120V 60Hz	H-3250.3D
Digital indicator, 220V 50/60Hz	H-3250.3D.4F
Anvil, Top with collar (one each)	H-3250.4
Anvil, Top only	H-3250.4.4
Collar w/ set screw	H-3250.4.3
Elevating screw, nut collar & anvil assembly, Bottom	H-3250.7
Adapter for 5" specimens	H-3250.8

Custom size Invar Reference Bars are available, please inquire: 1.800.544.7220.

**NOTES**

Length Comparators can be custom made for any length prism molds.





H-3240



H-3243B



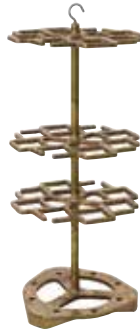
H-3240.3



H-3242



H-3240.4



H-3243A



H-3240.22



H-3245



H-3240.21M  
H-3240.21N



H-3244

**Cement Autoclave**

ASTM C151; AASHTO T107

Uses accelerated means of estimating delayed expansion of Portland cement caused by hydration of CaO and MgO. Test bars are exposed to controlled steam pressure and corresponding constant temperature. Unit produces 60-350 psi (0.4-2.4MPa) range of pressures and consists of steam vessel, pressure regulator, pressure gauge (0-600 psi x 5 psi), air vent valve, power switches and safety pop valve set at 350psi. Includes 20° 500°F spirit thermometer, wrench and 5 gaskets. Additional gaskets, heating units and safety pop valves are available as replacement parts. Chamber dimensions: 6.125" ID x 16". Overall dimensions: 17" x 48" x 28" (431 x 1219 x 711mm) 1700W maximum power demand. 220V version comes with transformer.

Cement Autoclave, 120V 60Hz H-3240

Cement Autoclave, 220V 50/60Hz H-3240.4F

Ship wt. 180lbs. (81.6kg)

**Test Bar Holder, 10"**

ASTM C141, C151; AASHTO T107

Test bar holder for 10"-long (254mm) gauge bars; 8-bar capacity. Holds specimens vertically, above water level, so each test bar is exposed to steam.

Test Bar Holder H-3243B

Ship wt. 2.9lbs. (1.4kg)

**Test Bar Holder, 5"**

ASTM C141, C151; AASHTO T107

Test bar holder for 5"-long (127mm) samples.

Test Bar Holder H-3243A

Ship wt. 4lbs. (1.8kg)

**Rupture Disk**

Rupture disks are used as safety devices in systems that involve pressure vessels, eliminating the need for a safety valve. The rupture disk is designed to be the weakest part of a pressure system so if there is a situation when excessive pressures occur, then the rupture disk fractures or opens thus releasing the built-up energy rendering the system safe. Rupture disks are a simple, yet reliable method for providing a safe system, which does not require calibration. Both disks are rated to 420°F. The Monel disk is rated to 375psi and the Nickel disk is rated to 341psi.

Rupture Disk, Monel H-3240.21M

Rupture Disk, Nickel H-3240.21N

Ship wt. 0.4lbs. (0.18kg)

**Rupture Disk Holder**

Rupture disk holder, complete with piping to attach to the H-3240 cement autoclave. Order rupture disks separately.

Rupture Disk Holder H-3240.22

Ship wt. 2.9lbs. (1.3kg)

**Autoclave Replacement Parts**

Description	Model
Air vent valve	H-3240.2
Safety pop-off valve	H-3240.3
Pressure gauge	H-3240.4
Pressure-control switch	H-3240.5
Set of cap screws, 16 per set	H-3240.6
Relay 60Hz	H-3240.7
Gaskets, 100 per package	H-3242
Lower heating unit for discontinued models. 115V. 50/60Hz	H-3244
Heating element; two-piece wrap-around type for both top and bottom. 115V 50/60Hz	H-3245
Thermometer, 20 to 580°F	H-2600.2F
Thermometer, -5 to 300°C	H-2610.2C





**High-Pressure Autoclave**

ASTM C141, C151; DIN

Uses accelerated means of estimating delayed expansion of Portland cement caused by hydration of CaO and MgO. This is done by determining the volume constancy of mortar prism samples. Test bars are exposed to high-pressure steam compartment, which accepts a sample holder for 8 prisms per ASTM, 1" x 1" x 11.25" (25 x 25 x 285mm) and 6 prisms as per the DIN standard, 40 x 40 x 160mm. Unit has a capacity of 7.8 liters, a max pressure of 360 psi (25 bar) and a max temperature of 482°F (250°C).

Includes two gauges, one for temperature and one for pressure and a safety pop valve for safety. Also includes security test certificate for pressure chamber in accordance with EN pressure device directive.

The 120V 60Hz version of this autoclave comes with an auxiliary voltage converter, which is included. Overall dimensions: 20.5 dia" x 44" (550 dia x 1120).

High-Pressure Autoclave, 120V 60Hz **H-3241**  
 High-Pressure Autoclave, 220V 50Hz **H-3241.5F**

Ship wt. 220lbs. (100kg)

**Prism Bar Frame**

ASTM C141, C151; DIN

Prism bar frame for use with H-3241 autoclave. ASTM model holds 8 prisms 1" x 1" x 11.25" (25 x 25 x 285mm). DIN model holds 6 prisms 40 x 40 x 160mm.

Prism Bar Frame, ASTM **H-3241.1**  
 Prism Bar Frame, DIN **H-3241.2**

Ship wt. 4lbs. (1.8kg)

**Wagner Turbidimeter**

ASTM C115; AASHTO T98

Determines fineness of Portland cement, using photoelectric cell to measure light passing through suspended pulverized material. Microamp meter measures current generated in the cell; indicated reading is measure of turbidity of the suspension. Includes photoelectric cell (and light source in metal cabinet, timing burette and stand, wet sieving assembly including gauge and spray nozzle, microamp meter, 3 flasks, 4 test tubes, stirring apparatus and instruction book. Battery not included.

Wagner Turbidimeter **H-3805**  
 Wagner Turbidimeter, 230V 60Hz **H-3805.2F**  
 Wagner Turbidimeter, 230V 50Hz **H-3805.5F**

Ship wt. 65lbs. (29.4kg)

**Mortar Bar Container, 9" x 11" x 15.5"**

ASTM C227, C1260

Stainless steel covered container for storing test specimens has tight-fitting cover that prevents moisture loss. Supports up to 36 mortar bars vertically. Dimensions: 9" x 11" x 15.5" (229 x 279 x 394mm).

Container, Mortar Bar-Rectangular **H-3265**

Ship wt. 16lbs. (7.2kg)

**Mortar Bar Container, Round with Bar Holder**

ASTM C227

Plastic container includes H-3267.1 Test bar holder (cast bronze) that supports 8 bars vertically. Holder has feet that elevate it from the base of the container, which provides space for water and keeps test bars out of the water. Dimensions: 6" dia. x 17" (152 x 432mm).

Mortar Bar Container with Bar Holder **H-3267**

Ship wt. 6.1lbs. (2.7kg)

**Test Bar Holder Only**

ASTM C227

Test bar holder (cast bronze) for use with H-3267 mortar bar container. Holder has feet that elevate it from the base of the container providing space for water.

Test Bar Holder **H-3267.1**

Ship wt. 4lbs. (1.8kg)





H-4790



HC-2842



HC-2843



H-4791



HC-2845



H-2818

H-2818HD

H-2818MS

**Mud Balance**

ASTM D4380

The mud balance provides a simple, practical method for the accurate determination of fluid density. The item's durable aluminum construction makes it ideal for field use. Its high-impact plastic case protects the balance during transport while providing a secure base for the balance during use. Scale reads in pounds per gallon (6-24 lb/gal); specific gravity (0.72-2.88 gms/cm<sup>3</sup>); pounds per cubic foot (45-180 lb.cu ft), and pounds per square inch per 1,000 feet of depth (310-1250 lb/sq in/100ft of depth). The H-4790 mud balance meets all the requirements of the API standard procedures for testing water base drilling fluids, oil base drilling fluids and oil well cements.

**Mud Balance** **H-4790**

Ship wt. 5lbs. (2.2kg)

**Tru-Wate Density Balance**

ASTM D4380

The TRU-WATE Mud Balance is an instrument for measuring the absolute density of a fluid sample. With the TRU-WATE Balance, the density of a fluid sample, such as cement slurry, can be measured in a fixed volume sample under pressure. By pressurizing the sample cup the entrained air or gas can be decreased to a negligible volume, thus providing a slurry density measurement more closely in agreement with the true density which will be realized under down-hole conditions. This density balance is constructed of premium metals for durability, accuracy and ease of use. A high impact plastic case protects the balance during transport and provides a secure base in its working position.

**TRU-WATE Density Balance** **H-4791**

Ship wt. 5lbs. (2.2kg)

**Marsh Funnel Viscometer**

ASTM D6910

The marsh funnel viscometer is a rugged, easy to operate instrument that is used for making rapid, on the spot measurements of drilling mud viscosity. Marsh funnel readings are only general measurements, but the frequent reporting of the marsh funnel viscosity will alert the mud engineer to sudden changes in the mud viscosity that could require corrective action. The marsh funnel Viscosity is the ratio of the speed of the mud as it passes through the outlet tube (the shear rate) to the amount of force—the weight of the mud itself, which is causing the mud to flow (the shear stress). marsh funnel viscosity is reported as the number of seconds required for one quart of mud to flow out of a full marsh funnel.

**Marsh Funnel Viscometer** **HC-2842**

Ship wt. 3lbs. (1.3kg)

**1 Liter Measuring Cup for Marsh Funnel**

1 liter, plastic measuring cup used for collecting sample from marsh funnel.

**1 Liter Measuring Cup** **HC-2843A**

Ship wt. 1lbs. (0.45kg)

**1 Liter Measuring Cup for Marsh Funnel**

1 liter, plastic measuring cup used for collecting sample from marsh funnel.

**1 Liter Measuring Cup** **HC-2843**

Ship wt. 1lbs. (0.45kg)

**Sand Content Test Set**

ASTM D4380

The sand content kit is a simple, accurate and inexpensive sieve analysis apparatus for determining the sand content of drilling muds. The sand content kit consists of a special 200-mesh sieve 2.5" in diameter, fastened inside a collar upon which a small funnel is fitted on either end. This is used with a 10 ml glass measuring tube, graduated to read from 0 to 20% the percentage sand by volume. The collar and funnel are made of polyethylene and the screen is made of brass. A 500ml wash bottle and carrying case are included.

**Sand Content Test Set** **HC-2845**

Ship wt. 3lbs. (1.3kg)

**Mat Depth Gauge, Fireproofing**

Gauge for measuring the depth of fireproofing. Plastic body with steel probe. Range: 0-6" (0-150mm).

**Mat Depth Gauge, Fireproofing** **H-2818**

Ship wt. 0.3lbs. (0.13kg)

**Mat Depth Gauge, Fireproofing**

Gauge for measuring the depth of fireproofing. Plastic body with steel probe. Range: 0-3" (0-76mm).

**Mat Depth Gauge, Fireproofing** **H-2818HD**

Ship wt. 0.3lbs. (0.13kg)

**Mat Depth Gauge, Fireproofing**

Gauge for measuring the depth of fireproofing. Plastic body with steel probe. Range: 0-3" (0-76mm).

**Mat Depth Gauge, Fireproofing** **H-2818MS**

Ship wt. 0.3lbs. (0.13kg)

