

## Standards Buyers Guide

### ASTM C 29

GW-135	Portable Bench Beam Balance, 131 lb
Or GW-34413	Electronic Bench Scale, 200 lb
C-353	Tamping Rod, 5/8" dia
G-29202	Scoop
G-170	Thermometer, General Purpose

Choose unit weight bucket based on aggregate size

C-601	Unit Weight Bucket, 1/10 cu ft
C-603	Unit Weight Bucket, 1/3 cu ft
C-605	Unit Weight Bucket, 1/2 cu ft
C-609	Unit Weight Bucket, 1 cu ft

Choose Strike Off Plate

C-61130	Strike Off Plate, 10 x 10 in
C-61150	Strike Off Plate, 12 x 12 in
C-61190	Strike Off Plate, 16 x 16 in, 1/2 in thick, acrylic

### ASTM C 31

*Making & Curing Concrete Test Specimens in the Field*

*Choose appropriate size molds*

C-209	Lipped Concrete Mold, 6 x 12
C-20910	Plastic Lids for Lipped Molds, 6 x 12
C-210	Plastic Cylinder Molds for 6 x 12
C-212	Domed Lids for C-210
C-215	Plastic Cylinder Mold, 3 x 6
C-21510	Flat Lid for 3 x 6 Molds
C-218	Plastic Cylinder Mold, 2 x 4
C-21810	Flat Lids for 2 x 4 Molds
C-220	Plastic Cylinder Mold, 4 x 8
C-221	Domed Lids for 4 x 8 mold

(see ASTM C 470 for devices needed to verify molds)

Choose Beam Mold

C-231	Steel Beam Mold, 6x6x20
C-234	Plastic Beam Mold, 6x6x21
C-233	Beam Mold Field Cover
C-345	Concrete Vibrator
C-540	Pocket Tachometer

Choose Accessories

G-510	Rubber Mallet
C-352	Graduated Tamping Rod 5/8"
C-353	Tamping Rod, 5/8"
C-357	Tamping Rod (Puddling), 3/8" x 12"
G-161	Pocket Dial Thermometer
G-15910	Armored Case Concrete Thermometer
C-252	Field Curing Box

Economy Curing Box

Transport Rack

Thermostatically Controlled Heater

G-180 Max-Min thermometer

Or G-180E Electronic Max Min Thermometer, two channel

Also needed: wheel barrow, concrete trowel, and items to perform slump, and air content.

### ASTM C 39

*Compressive Strength of Cylindrical Concrete Specimens*

*Select load frame of appropriate load capacity*

CM-200	300,000 lb capacity w/ single readout
CM-216	300,000 lb capacity w/ advanced readout
CM-400	500,000 lb capacity w/ single readout
CM-416	500,000 lb capacity w/ advanced readout

The above come with platens for 6 x 12 cylinders.

Select appropriate Platen sets if other size cylinders are to be tested.

C-18040	Cube Platen Set, 2" specimens
C-18060	Platen set for 3x6 cylinders
C-18070	Platen Set for 4 x 8 cylinders
C-170	Flexural Beam Test Attachment
301110	Splitting Tensile Strength Bar

(Note: On site calibration of load frames required upon delivery and anytime load frame is moved.)

### ASTM C 40 AASHTO T 21

*Organic Impurities in Fine Aggregates for Concrete*

C-404 Organic Impurities Test Set

Consist of:

C-405	16 oz Graduated Glass Test Bottle (6)
C-410	Color Standards Chart
C-415	Sodium Hydroxide Beads, 1 lb container

### ASTM C 42

*Obtaining and Testing Drilled Cores and Sawed Beams of Concrete Coring Drills*

C-822	Trailer Mounted Coring Drill
C-752	Portable Electrical Core Drill
C-820	Portable Gasoline Core Drill

Concrete Core Bits

C-71042	4 1/4 OD x 4 ID Diamond Core bit, Closed Back
C-71062	6 1/4 OD x 4 ID Diamond Core bit, Closed Back

(note other sizes and open back bits available)

### ASTM C 70

C-424	Chapman Specific Gravity Flask
GW-115	Triple Beam Balance, 2610 gram
Or GW-342	Dual Range Electronic Balance

### ASTM C 78

*Flexural Strength of Concrete*

C-16001	Flexural Load Frame
Or CM-216	300,000 lb load Frame
And C-170	Flexural Beam Attachment
G-193	Dial Caliper, 0-12"

**ASTM C 87**

*Effects of Organic Impurities in Fine Aggregate on Strength of Mortar*

- C-248 Flow Table, Manual, with mold  
Or C-24810 Flow Table, Motorized, with mold
- C-24805 Flow Calipers
- C-235 Cube Mold, 2" square, 3 gang
- C-238 Rubber Tamper
- G-296 Trowel
- Compression Machine with cube platens (see ASTM C 39)
- G-250 Mortar Mixer

**ASTM C 109**

*Compressive Strength of Hydraulic Cement Mortars using 2" Cube Specimens*

- C-235 Cube Mold, 2" Square, 3 Gang, Bronze
- GW-115 Triple Beam Balance, 2610 gram x 0.1 gram  
Or GW-342 Dual Range Electronic Balance
- G-37125 Graduated Cylinder, Plastic, 250 ml
- G-37150 Graduated Cylinder, Plastic, 500 ml
- G-250 Mortar Mixer
- C-238 Hard Rubber Tamper
- G-296 Trowel, 2 3/4" x 5 1/2", Triangular
- C-248 Flow Table, Manual, w/ Mold  
Or C-24810 Flow Table, Motorized, with Mold
- G-29201 Scoop, Small
- C-401 Cube Test Sand, 50 lb bag

**ASTM C 117**

*Materials Finer than # 200 Sieve in Mineral Aggregates by Washing*

- GW-115 Triple Beam Balance, 2610 gram x 0.1  
Or GW-342 Dual Range Electronic Balance
- PCF-80016 Brass Sieve, 8" dia, # 16 ss mesh
- P-404 Wet Wash Sieve, 8" dia, by 4" deep  
Or P-40410 Wet Wash Sieve, 8' dia x 4", with backup
- G-30014 Pan, Stainless Steel, 13.5" dia x 5" deep
- GO-220 Oven, Forced Draft, 7.0 cu ft  
Or GO-216 Oven, Gravity Convection, 2.0 cu ft
- P-620 Aggregate Wash Drum

**ASTM C 127**

*Density, Relative Density (Specific Gravity), and Absorption of Coarse Aggregate*

- GW-30315 Electronic Balance, 12,000 x 0.1 gram  
With weight below capability
- C-625 Density Wire Basket
- A-532 Water Tank, 45 gallon
- PCF-80004 Brass Sieve, 8" dia, # 4 ss mesh

**ASTM C 128**

*Density, Relative Density (Specific Gravity), and Absorption of Fine Aggregates*

- GW-115 Triple Beam Balance, 2610 gram  
Or GW-342 Electronic Dual Range Balance
- G-29151 Volumetric Flask, 500 ml
- S-292 Specific Gravity and Absorption Set  
Consist of:  
S-29220 Pycnometer, 1 qt capacity  
S-29250 Sand Absorption Cone  
S-29290 Tamper
- C-425 Le Chatelier Density Flask
- G-170 General Purpose thermometer

**ASTM C 131**

*Resistance to Degradation of Small-Size Coarse Aggregate by Abrasion and Impact in the Los Angeles Machine*

- C-658 LA Abrasion Machine  
Or C-660 Enclosed LA Abrasion Machine
- C-66020 Abrasion Charges, set of 12
- Ovens, Scales, sieves and handling pans also required.

**ASTM C 136**

*Sieve Analysis of Fine and Coarse Aggregates*

- P-260/261/262 Screen Shaker  
With appropriate size screen trays
- P-220 Portable Sieve Shaker, 8"  
Or P-231/240 Ro-Tap Sieve Shaker, 8" / 12"  
Or P-200/210 Laboratory Sieve Shaker, 8"/12"  
With appropriate size sieves
- P-410/411/412/413 Sieve Brushes
- Ovens, Scales, sample splitters, and handling pans also required

**ASTM C 138**

*Density (Unit Weight), Yield, and Air Content (Gravimetric) of Concrete*

- GW-135 Platform Balance, 131 lbs x 0.01 lb  
Or GW-34413 Electronic Bench Scale, 200 lb
- C-352 Tamping Rod, Graduate, 5/8"  
Or C-353 Tamping Rod, 5/8"

Choose unit weight bucket based on aggregate size

- C-601 Unit Weight Bucket, 1/10 cu ft
- C-603 Unit Weight Bucket, 1/3 cu ft
- C-605 Unit Weight Bucket, 1/2 cu ft
- C-609 Unit Weight Bucket, 1 cu ft

Choose Strike Off Plate

- C-61130 Strike Off Plate, 10 x 10 inches
- C-61150 Strike Off Plate, 12 x 12 inches
- C-61190 Strike Off Plate, 16 x 16 in, 1/2 in thick, acrylic
- G-510 Rubber Mallet

(Note: C-345 Vibrator required if slump is 1" or less)

**ASTM C 143**

*Slump of Hydraulic-Cement Concrete*

- C-350 Slump Cone Test Set  
Includes:  
C-335 Slump Cone  
C-351 Aluminum Base Plate  
C-352 Graduated Tamping Rod

- G-29202 Scoop  
C-354 Funnel, Slump Cone  
C-356 Plastic Slump Cone  
(Note: Tape Measure or stiff ruler, wheel barrow or G-30009 Material Handling Pan also needed)

**ASTM C 151**

*Autoclave Expansion of Portland Cement*

- C-254 Cement Mortar Autoclave  
C-24520 Test Specimen Holder (holds 8)  
C-24550 Length Comparator  
C-24557 Contact Points  
C-24541 Single Bar Mold, 1x1x10 in  
C-24542 Dual Bar Mold, 1x1x10in  
G-296 Triangular Trowel

**ASTM C 173**

*Air Content of Freshly Mixed Concrete by the Volumetric Method*

- Select the Volume Meter:  
C-440 Roll-A-Meter, Bronze  
C-440A Light weight, Air Volume Meter, Aluminum  
C-445 Air Volume Meter, Plastic  
(accessories required for all three models of Volume Meters)  
G-29202 Scoop  
G-510 Rubber Mallet

**ASTM C 231**

*Air Content of Freshly Mixed Concrete by the Pressure Method*

- Select the Air Meter  
C-435 Press-UR-Meter w/ wood case  
C-435A Air Meter with Plastic case  
G-510 Rubber Mallet  
G-29202 Scoop

*Optional Equipment*

- C-44201 Calibration Vessel (canister), 5%

**ASTM C 403**

*Time of Setting of Concrete Mixtures by Penetration Resistance*

- C-241 Mortar Penetrometer  
G-170 General Purpose Thermometer  
C-353 Tamping Rod, 5/8"  
G-380 series Pipettes  
Sample containers, and handling pans also required

**ASTM C 490**

*Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete*

- C-24550 Length Comparator  
C-24557 Contact Points  
C-24541 Single Bar Mold, 1x1x10 in  
C-24542 Dual Bar Mold, 1x1x10in

**ASTM C 496**

*Splitting Tensile Strength of Cylindrical Concrete Specimens*

- 301110 Splitting Bar, 12 x 12 x 3 in  
G-191 Concrete Micrometer, 5.5 to 6.5 in.  
Compression machine to meet ASTM C 39 required  
Bearing strips of 1/8" plywood, 1" wide required

**ASTM C 511**

*Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes*

- C-250 Humidifier  
C-252 Curing Tank  
C-255 Heater, Curing Tank  
C-256 Submersible Circulating Pump  
G-184/185 Temperature Recorder  
C-252 Concrete Curing Box

**ASTM C 535 AASHTO T 96**

- C-658 LA Abrasion Machine  
Or C-660 Enclosed LA Abrasion Machine  
C-66020 Abrasion Charges, set of 12  
Ovens, Scales, sieves and handling pans also required.

**ASTM C 597**

*Pulse Velocity Through Concrete*

- C-561 Ultrasonic Concrete Testing System  
Related items:  
C-561220 Handheld Terminal  
C-56130 Coupling Grease

**ASTM C-617***Capping Cylindrical Concrete Specimens*

G-29105	Stainless Steel Capping Ladle
G-153	Thermometer

## Select capping fixture of appropriate size

C-275	Vertical Cylinder Capping Fixture, 6"
C-27510	Vertical Cylinder Capping Fixture, 4"
C-27520	Vertical Cylinder Capping Fixture, 3"

## Select Warming Pot of suitable capacity

GO-230	Warming Pot, 4 qt
GO-231	Warming Pot, 8 qt
GO-232	Warming Pot, 12 qt
GO-23220	Warming Pot, 20 qt

## Select type of capping compound

C-280	Capping Compound, powder
C-282	Capping Compound, Hi Strength flakes

## Cube molds to verify strength of capping compound

C-235	Cube mold, 2", 3 gang
C-23510	Cover Plate, 3 hole, Cube Mold

**ASTM C-803***Penetration Resistance of Hardened Concrete*

C-510	Windsor Probe Test System
C-520	Silver Probe Kit, 3 probes / set
C-530	Gold Probe Kit, 3 probes / set

**ASTM C-805***Rebound Number of Hardened Concrete*

C-500	Concrete Test Hammer
	Includes: rubbing stone and carrying case

Or C-505 Digital Concrete Test Hammer

## Accessories and replacement parts

C-50010	Rubbing Stone
C-50020	Calibration Test Anvil

**ASTM C-1231 AASHTO T 22***Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders*

C-289	6" Capping Pad Set
C-28904	4" Capping Pad Set
C-28903	3" Capping Pad Sets

(sets include 2 steel receivers and 2 pads, Durometer 60)

## Replacement Items

C-288	6" Steel Receivers, set of 2
C-293	6" Capping Pads, pair, soft
C-294	6" Capping Pads, pair, medium
C-295	6" Capping Pads, pair, hard
C-28804	4" Steel Receivers, set of 2
C-28705	4" Capping Pads, pair, medium
C-28706	4" Capping Pads, pair, hard
C-28803	3" Steel Receivers, set of 2
C-28701	4" Capping Pads, pair, soft
C-28702	4" Capping Pads, pair, medium
C-28703	4" Capping Pads, pair, hard

**ASTM D 421 AASHTO T 87, T 146***Dry preparation of soil samples for particle size analysis and determination of soil constants.*

P-421	Soil Mortar
P-420	Soil Pestle, rubber tipped
PCF-80004	#4 Sieve, 8 in diameter
PCF-80010	#10 Sieve, 8 in diameter
PCF-80040	#40 Sieve, 8 in diameter
PB-180	Brass Pan
PB-185	Cover
GW-117	Dial O Gram Triple Beam Scale, 2610 g x 0.1 g
GW-11520	Stainless steel scoop and counterweight
Or GW-342	Electronic Balance, Dual Range
P-512	Sample Splitter, 1 in
G-30012	Mixing Pan, Stainless Steel

**ASTM D 422 AASHTO T 88***Particle Size Analysis (hydrometer analysis).*

GW-110	Dial O Gram Balance, 310 g x 0.01 g
Or GW-342	Electronic Balance, Dual Range
GW-117	Dial O Gram Triple Beam Scale, 2610 g x 0.1 g
GW-11520	Stainless steel scoop and counterweight
S-30020	Stirring apparatus with paddle and cup
S-300	Hydrometer, 151 H
S-301	Hydrometer, 152 H
S 30010	Hydrometer Jar
G-18731	Thermometer, 2 to 80°C x 0.2
PCF-83000	3 in Sieve, 8 in diameter
PCF-82000	2 in Sieve, 8 in diameter
PCF-81500	1 1/2 in Sieve, 8 in diameter
PCF-81000	1 in Sieve, 8 in diameter
PCF-80750	3/4 in Sieve, 8 in diameter
PCF-80380	3/8 in Sieve, 8 in diameter
PCF-80004	#4 Sieve, 8 in diameter
PCF-80008	#8 Sieve, 8 in diameter
PCF-80010	#10 Sieve, 8 in diameter
PCF-80016	#16 Sieve, 8 in diameter
PCF-80020	#20 Sieve, 8 in diameter
PCF-80030	#30 Sieve, 8 in diameter
PCF-80040	#40 Sieve, 8 in diameter
PCF-80050	#50 Sieve, 8 in diameter
PCF-80060	#60 Sieve, 8 in diameter
PCF-80100	#100 Sieve, 8 in diameter
PCF-80140	#140 Sieve, 8 in diameter
PCF-80200	#200 Sieve, 9 in diameter
PB-180	Brass Pan
PB-185	Cover
P-412	Wire Sieve Brush
P-220	Motorized Sieve Shaker
S-30050	Hydrometer Jar Bath
G-35125	Glass Beaker
G-190	Stop Watch
S-30060	Sodium Hexameta-phosphate, 1 lb
S-30060-5	Sodium Hexametaphosphate, 5 lb

**ASTM D 427 AASHTO T 92**

*Shrinkage factor of soils.*

Need: 6" straight edge, glass cup, glass plate, glass plate (see hard copy)

G-387	Evaporating Dish
G-29301	Spatula
S-29510	Monel Shrinkage Dish
G-29520	Crystallizing Dish
G-29530	Prong Plate
G-36025	Graduated Cylinder
S-29540	Mercury, 1 lb
GW -117	Dial O Gram Triple Beam Scale, 2610 g x 0.1 g
Or GW-342	Electronic Balance, Dual Range
S-35710	Beveled Straight Edge
S-56028	Brass Plate

**ASTM D 558 AASHTO T 134**

*Standard Method for Moisture-Density Relations of Soil-Cement Mixtures*

S-320	4" Compaction Mold
Or S-322	4" Split Compaction Mold
S-310	Standard Proctor Hammer, 5.5 lbs
Or S-335	Mechanical Compaction Hammer
GW-342	Electronic Dual Range Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
GW-135	Platform Balance, 131 lbs x 0.01 lb
Or GW-34417	Electronic Bench Scale, 50 lbs x 1 gram
S-35710	Straight Edge, beveled
P-47030	Screen Tray, 3" mesh
P-47008	Screen Tray, 3/8" mesh
P-47000	Screen Tray, #4 mesh
G-30014	Round Bowl, SS, 13" x 5"
G-29101	Sampling Spoon
G-296	Triangular Trowel
G-29402	Preparation Knife, large
GC-SC-74	Pan, 13" x 1.9"
GO-220	Oven, Forced Draft
G-316	Moisture Cans, Aluminum

**ASTM D 559 AASHTO T 135**

*Test Methods for Wetting & Drying Compacted Soil Cement Mixtures*

S-320	4" Compaction Mold
Or S-322	4" Split Compaction Mold
S-310	Standard Proctor Hammer, 5.5 lbs
Or S-335	Mechanical Compaction Hammer
GW-342	Electronic Dual Range Balance
Or GW-115	Triple Beam Balance, 2610 x 0.1 gram
GW-135	Platform Balance, 131 lbs x 0.01 lb
Or GW-34417	Electronic Bench Scale, 50 lbs x 1 gram
S-35710	Straight Edge, beveled
P-47030	Screen Tray, 3" mesh
P-47008	Screen Tray, 3/8" mesh
P-47000	Screen Tray, #4 mesh
G-30014	Round Bowl, SS, 13" x 5"
G-29101	Sampling Spoon
G-296	Triangular Trowel
G-29402	Preparation Knife, large
GC-SC-74	Pan, 13" x 1.9"
GO-220	Oven, Forced Draft
G-316	Moisture Cans, Aluminum
G-29003	Scratch Brush
G-192	Dial Caliper, 0-6"
G-37125	Glass Graduated Cylinder, 250 ml

Also need sample carriers, trays, moisture room and 6 prong ice pick.

**ASTM D 698 AASHTO T 99**

*Moisture Density relations of soils and soil aggregate mixtures (5.5 lb hammer, 12 in drop)*

S-310	Compaction Hammer, 5.5 lb
Or S-335	Mechanical Compaction Hammer
S-320	Compaction Mold, 4 in (Methods A & B)
S-326	Compaction Mold, 6 in (Method C)
S-35710	Beveled Straight Edge
S-329	Sample Ejector
GW-120	Solution Balance, 20 kg x 1 g
Or GW-34417	Electronic Balance, 50 lb x 1 g
GW-115	2610 gram Triple Beam Balance
Or GW-342	Electronic Balance Dual Range
GO-220	Forced Draft Lab Oven
S-35710	Straight Edge
P-47000	Screen Tray #4
P-47008	Screen Tray, 3/4"
P-47004	Screen Tray, 3/8"
G-30010	Sample Prep Pan, 24 x 24
G-30015	Stainless Steel Mixing Pan
G-316	Aluminum Moisture Box
G-535	Laboratory Tongs
G-37220	Plastic Graduated Cylinder
G-296	Mixing Trowel
G-29101	Mixing Spoon
G-29202	Scoop
G-341	Water Bottle, 16 oz
G-510	Rubber Mallet
G-29303	Spatula

**ASTM D 854 AASHTO T-100***Specific Gravity of Soils*

Select Volumetric Flask of appropriate size

S-29111	100 ml Volumetric Flask, Unstoppered
S-29121	250 ml Volumetric Flask, Unstoppered
S-29151	500 ml Volumetric Flask, Unstoppered
S-29120	250 ml Volumetric Flask, Plain Stopper
S-29150	500 ml Volumetric Flask, Plain Stopper
S-29151	One hole rubber stopper for 250 & 500 ml flask

## Other items

GW-30312	Electronic Balance, 2100 gram x 0.01 gram
GO-220	Oven, Forced Draft
G-169	Thermometer, -1 to 51 C x 0.1
S-293	Desiccator
G-430	Dessicant, color reactive
GO-235	Hot Plate, 6.26 x 6.25 inches
G-400	Vacuum Pump
GC-MA-194	Vacuum Aspirator
Cooler, Stryrofoam	(purchase locally)
S-274	Buckner Funnel Assembly w/ Flask
PCF-80004	#4 Sieve, 8" diameter, Brass w/ss mesh
G-530	High Temperature Cotton Gloves, pair

**ASTM D 1140***Amount of Material in Soils Finer than the # 200 Sieve*

GW-342	Electronic Balance, Dual Range
P-40410	Wet Wash Sieve # 200 with B/U, 8" x 4" deep
P-40610	Wet Wash Sieve #200, 8" dia x 8" deep
PCF-80040	Brass Sieve, # 40 ss mesh, 8" diam

Other sieve sizes may be necessary based on soil particle size

S-30060	Sodium Hexametaphosphate, 1 lb
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**ASTM D 1556 ASSHTO T 191***Density of soil in place by the sand cone method.*

S-120	Sand Cone Apparatus
S-121	Density Base Plate
S-125	Density Sand, 100 lb, w/ plastic bag
Or 2190-A	Density Sand, 100 lb, paper bag
GW-130	Field Scale, 36 lb x 0.01 lb
GW-115	Triple Beam Scale, 2610 g x 0.1 g
Or GW-50030	Electronic Balance, 15 Kg x 2 Grams
GW-50099	Carrying Case for GW-30030
G-500	Pick Hammer
G-515	Chisel
G-29101	Spoon
G-29001	Brush
G-510	Rubber Mallet
G-310	Field Can
GW-200	Forced Draft Oven
G-316	Aluminum Moisture Cans
G-535	Laboratory Tongs

Note: Field Moisture Contents can be performed by Model S-141 Speedy Moisture Tester, hot plate, or camp stove

**ASTM D 1557 AASHTO T 180***Moisture Density relations of soils and soil. aggregate mixtures (10 lb hammer and 18 in drop).*

S-311	Compaction Hammer, 10 lb
Or S-335	Mechanical Compactor
S-320	Compaction Mold, 4 in (Methods A & B)
S-326	Compaction Mold, 6 in (Method C)
S-35710	Beveled Straight Edge
S-329	Sample Ejector
GW-120	Solution Balance, 20 kg x 1 g
Or GW-34417	Electronic Balance, 50 lbs x 1 g
GW-115	2610 gram Triple Beam Balance
Or GW-342	Electronic Balance Dual Range
GO-220	Forced Draft Lab Oven
S-35710	Straight Edge
P-47000	Screen Tray #4
P-47008	Screen Tray, 3/4"
P-47004	Screen Tray, 3/8"
G-30010	Sample Prep Pan, 24 x 24
G-30015	Stainless Steel Mixing Pan
G-316	Aluminum Moisture Box
G-535	Laboratory Tongs
G-37220	Plastic Graduated Cylinder
G 296	Mixing Trowel
G 29101	Mixing Spoon
G-29202	Scoop
G-341	Water Bottle, 16 oz
G-510	Rubber Mallet
G-29303	Spatula

**ASTM D 1558***Moisture Content Penetration Resistance Relationships of Fine-Grained Soils*

S-172	Proctor Penetrometer Set
GW-347	Electronic Bench Scale, 110 lbs x 0.05 lbs

Items to perform ASTM D 698 also needed.



**ASTM D 1883      AASHTO T 193**

*CBR (California Bearing Ratio of laboratory compacted soils)*

- S-350      CBR Lab Set  
Which Contains
- S-327      (4) CBR Mold, 6" I.D.
- S-32710    (1) CBR Spacer DisK, 2.416 thick
- S-359      (1) CBR Filter Paper
- S-352      (4) Filter Screens, #100 brass
- S-353      (4) Swell Plates, 5 7/8" diameter
- S-354      (1) Aluminum Tripod
- E-814      (1) Dial Indicator
- S-355A     (4) Surcharge Weight, Circular
- S-356A     (4) Surcharge Weight, slotted
- S-311      (1) Compaction Hammer
- S-35710    (1) Straight Edge with Beveled Edge
- Sample Preparation Equipment which is the same as equipment needed for ASTM D698 and D1557 listed above
- S-329      Sample Ejector
- GW-120    Solution Balance, 20 kg x 1 g  
Or GW-34417 Electronic Balance, 50 lbs x 1 g
- GW-115    2610 gram Triple Beam Balance  
Or GW-342 Electronic Balance Dual Range
- GO-220    Forced Draft Lab Oven
- S-35710    Straight Edge
- P-47000    Screen Tray #4
- P-47008    Screen Tray, 3/4"
- P-47004    Screen Tray, 3/8"
- G-30010    Sample Prep Pan, 24 x 24
- G-30015    Stainless Steel Mixing Pan
- G-316      Aluminum Moisture Box
- G-535      Laboratory Tongs
- G-37220    Plastic Graduated Cylinder
- G-296      Mixing Trowel
- G-29101    Mixing Spoon
- G-29202    Scoop
- G-341      Water Bottle, 16 oz
- G-510      Rubber Mallet
- G-29303    Spatula
- Load Frame, Either Mechanical or Manual
- S-360      Manual CBR load frame, w/ Penetration Piston
- S-610      Mechanical Load Frame  
And Either
- S-61020    Mechanical CBR Accessory Set  
Or S-61025 Electronic CBR Accessory Set
- Note: The S-611 offers automated Load Frame, data collection and report preparation

**ASTM D 2166**

*Unconfined compressive strength of soil.*

- S-611 & S-61130 Automated UCC Load Frame, Electronic Accessories, and software  
Or S-610 Mechanical Load Frame  
And either
- S-61030    Mechanical Accessory Set  
Or S-61035 Electronic Accessory Set
- G-190      Stop Watch
- GW-117    Dial-O-Gram Triple Beam Scale, 2610 g x 0.1 g  
Or GW-342 Dual Range Electronic Balance
- G-192      Dial Caliper, 0-6"  
Or G-194 Digital Caliper, 0-12"
- S-240      Sample Extruder for Shelby Tubes, full length  
Or S-329 & Sample Ejector  
S-32922 Accessory Set for 3 in Shelby tubes
- S-57428    Miter Box
- S-57628    Trimming Device
- G-29402    Large Preparation Knife
- G-295      Open Wire Saw

Note: If remolded samples are needed then add

- S-57729    Compaction Mold, 2.875 x 6"
- S-57728    2.8" Gauge Block
- S-577      Sliding Weight Hammer

Equipment to perform D 2216 Moisture Content of Soils is also needed

**ASTM D 2167      AASHTO T 205**

*Density and unit weight of soil in place by the rubber balloon method.*

Balloon Density Apparatus Choose either S 130, S 132, or S 133.

- S-130      1.20 ft<sup>3</sup>
- S-132      1/13 ft<sup>3</sup>
- S-133      1/10 ft<sup>3</sup>
- GW-130    Field Scale, 36 lb x 0.01 lb
- GW-115    Triple Beam Scale, 26 10 g x 0.1 g
- G-310      Field Can
- G-500      Pick Hammer
- G-515      Chisel
- G-29101    Mixing Spoon, stainless
- G-29001    Dusting Brush
- G-510      Rubber Mallet
- GW-200    Forced Draft Oven
- G-316      Aluminum Moisture Cans
- G-535      Laboratory Tongs

Note: Field moisture contents can be determined by Model S-141 Speedy Moisture Tester, hot plate, or camp stove

**ASTM D 2168**

*Calibration of Laboratory Mechanical-Rammer Soil Compactor*

- S-33020    Calibration Kit
- S-33050    Lead Calibration Cylinders, 100/ pk

**ASTM D 2216 AASHTO**

*Water Moisture Content of Soil and Rock*

GO-220	Forced Draft Oven, 7.0 ft <sup>3</sup> (recommended)
Or GO-216	Gravity Convection Oven, 2.0 ft <sup>3</sup>
GW-342	Electronic Balance, Dual Range
Or GW-115	Triple Beam Balance, 2610 gram x 0.1
And GW-110	Dial-O-Gram Balance, 310 gram x 0.01
G-316	Aluminum Moisture containers, with lids
S-293	Dessicator
Or S-29350	Dessicator Cabinet
G-340	Desiccant, 5 lb container, color reactive
G-530	Gloves, High Temperature, Cotton
G-535	Laboratory tongs
G-29401	Knife, Sample Preparation
G-29302	Spatula, medium
LT-98	Quartering Canvas
P-512	Sample Splitter, Riffle type, 1" chutes

**ASTM D 2434 ASHTO T-215**

*Permeability of Granular Soils*

S-488	Constant Head Tank and Wall Mounted Manometer
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*Select Cell Based on sample particle size*

S-48625	Sand Gravel Permeameter, 2.5"
S-486	Sand Gravel Permeameter, 3.0" (most popular)
S-48645	Sand Gravel Permeameter, 4.5"
S-48660	Sand Gravel Permeameter, 6.0"
S-48090	Sand Gravel Permeameter, 9.0"
GC-MA-194	Vacuum Aspirator
Or G-400	Vacuum Pump
S-577	Sliding Weight Hammer
G-29201	Scoop, Small
G-170	Thermometer, General Purpose
G-36125	Glass Graduated Cylinder, 250 ml
Or G-37125	Plastic Graduated Cylinder, 250 ml
G-30015	Stainless Steel Bowl, 17" x 6"
G-190	Stop Watch
GW-115	Triple Beam Balance, 2610 x 0.1 gram

**ASTM D 2435 AASHTO T-216**

*One dimensional consolidation properties of soil.*

Select either a Pneumatic Load Frame.

S-450	Terralload Consolidation Device
S-45040	Digital Transducer Readout matched with 150 psi Pres-sure Transducer
G-410	Laboratory Air Compressor
TR-738	Air Filter, Regulator Assembly

Or a Dead Weight Load Frame

S-449	Dead Weight Load Frame
S-44901	Weight set, 16 TSF

Other weight sets available, see catalog description

And Select either a Floating ring

S-453	Floating Ring Consolidometer
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Or a Fixed Ring Consolidometer

S-455	Fixed Ring Consolidometer
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Select a Measuring device, dial gauge or electronic

E-805	Dial Indicator, 0.4 in x 0.0001 in and flat tips
Or E-405	Smart Digital Transducer Readout with a Linear displacement Transducer, 0.5x0.0001 in
E-310	Linear displacement Transducer, 0.5x0.0001 in
E-344	LDT Mount Bracket or E-342

Displacement Transducer mounted to Dial Indicator

Other Items

S45599	Calibration Disk
G-29402	Preparation Knife
G-295	Wire Saw
S-359	Filter Paper, cut to size
GW-342	Electronic Dual Range Balance

Equipment to perform ASTM D 2216 also needed

**ASTM D 2850 AASHTO T-296**

Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils

S-600	Triaxial Load Frame
Or S-6100E	Load Frame, 0.005 to 0.200 speed range
E-212	Load cell, 2,000 lb capacity
E-405	Digital Readout calibrated to E-212
S-500	Panel, 3 burettes for one cell
S-502	Extension Panel, 6 burettes for 2 cells
S-505	Deairing Tank
Or S-530	Nold Deairing Apparatus
S-510	Triaxial Cell with 1.4 and 2.8" accessories
E-814	Dial Indicator, 1.0 inch x 0.001
S-54028	Membranes, 2.8"
S-57028	Membrane Stretcher, 2.8"
S-56128	Glass Fiber Filter Disc, 2.8"
G-5002G	High Vacuum Grease

**ASTM D 2850 AASHTO T-296 (continued)**

*Unconsolidated Undrained Triaxial Compression Test on Cohesive Soils*

- G-192 Dial Caliper, 0-6"
- GW-342 Dual Range Electronic Balance
  - Or GW-115 Triple Beam Balance, 2610 x 0.1 gram
  - And GW-110 Dial-O-Gram, 310 x 0.01 gram
- G-400 Vacuum Pump
- G-410 Laboratory Air Compressor
- TR-738 Filter Regulator Assembly
- S-57428 Split Mitre Box, 2.8"
- G-295 Wire Saw
- G-29402 Large Sample Knife
- S-35710 Straight Edge, Beveled

Equipment to perform ASTM D 2216 Moisture Content of Soils also needed

Items to extrude sample from Shelby Tube

- S-240 Sample Extruder
  - And S-24030 Sample Tray for S-240 extruder
  - Or S-329 Sample Ejector
  - And S-32924 Adaptor Plate and Piston, 2.8"

Items to remold sample (technique will decide actual items)

- S-57729 2.875 x 6" Compaction Mold
- S-57730 Spacer Plug, 2.85 x 2"
- S-57728 Gauge Block
- G-510 Rubber Mallet
- S-577 Sliding Weight Hammer
- S-575 Pneumatic Kneading Compactor
- S-57528 Split Compaction Mold
- S-57228 Vacuum Split Mold

Optional and Suggested Spare Items

- S-53028 O-rings, pack of 4, 2.8"
- S-55028 Porous Stones, 2.8",
- S-57629 Soil Sample Trimmers, Lathe
  - And S-57606 2.8" cap for S-57629 Trimmer

**ASTM D 2937**

*Density of Soil in Place by the Drive Cylinder Method*

- S-104 Density Drive Sampler
- S-10230A Density Drive Tubes, 4" Swaged end
- Or Optional S-10230 Drive tubes, straight bevel end
- S-35710 Straight Edge
- GW-115 Triple Beam Balance, 2610 gram x 0.1
- GW-11905 Plastic Carry Case for GW-115
- GW-33040 Portable Balance 6000 x 1 gram
- GW-33090 Hard Carrying Case for GW-33040

Note: Field moisture determination equipment is also needed. (Such as the S-141 Speed Moisture Tester or Hot plate.)

**ASTM D-3385**

*Infiltration Rate of soils in Field using Double Ring Infiltrometer*

- S-475 Double Ring Infiltrometer Set
- G-189 Digital Stop Watch
- G-18731 Thermometer, -2 to 81°C by 0.2°C
- G-510 Rubber Mallet
- S-110 Hand Auger Set

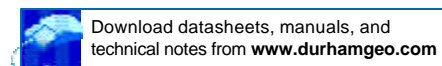
Other items to be purchased locally including, level, steel tape measure, steel ruler, 2x4 or 4x4 wood, water container.

**ASTM D 4318 AASHTO T 89**

*Liquid Limit, Plastic Limit and Plasticity index of soils.*

- S-271 Liquid Limit Device with counter
  - Or S-272 Motorized Liquid Limit Device with counter
- S-27510 Plastic Grooving Tool, Set/12
- S-275 Metal ASTM Tool with Measuring Block
- S-275 AASHTO Wedge Grooving Tool
- G-315 Small aluminum Moisture Cans w/ lids
- GW-110 Dial-O-Gram Balance, 310 g x 0.01 gram
  - Or GW-342 Electronic Balance, dual range
  - Or G W-30312 Electronic Balance, 2100 gram x 0.01 gram
- G-386 Evaporating Dish, 4 5/8" diameter
- S 27710 Plastic Limit Plate
- S-278 Plastic Limit Roller (optional)
- S-27801 Adhesive paper for S-278
- G 29301 Spatula
- PCF-80040 #40 Brass Sieve, 8" dia, ss mesh
- G 340 Plastic Dispensing Bottle
- C 36110 Graduated Cylinder, 200 ml
- G-36025 Graduated Cylinder, 25 ml
- GO 200 Forced Draft Oven
- G 30012 Stainless steel bowl, 9 in dia.

Equipment necessary to perform ASTM D 2216 also needed



**ASTM D 4546**

*One Dimensional Swell or Settlement Potential of Cohesive Soils*

Select either a Pneumatic Load Frame  
 S-450 Terraload Consolidation Device  
 S-45040 Digital Transducer Readout matched with  
 150 psi Pressure Transducer  
 G-410 Laboratory Air Compressor  
 TR-738 Air Filter, Regulator Assembly

Or a Dead Weight Load Frame

S-449 Dead Weight Load Frame  
 S-44901 Weight set, 16 TSF  
 Other weight sets available, see catalog description

And Select either a Floating Ring

S-453 Floating Ring Consolidometer

Or a Fixed Ring

S-455 Fixed Ring Consolidometer

Select a Measuring device, dial gauge or electronic

E-805 Dial Indicator, 0.4 in x 0.0001 in and flat tips  
 Or E-405 Smart Digital Transducer Readout with a  
 E-310 Linear displacement Transducer, 0.5x0.0001 in  
 E-344 LDT Mount Bracket or E-342 Displacement  
 Transducer mounted to Dial Indicator

Other Items

S45599 Calibration Disk  
 G-29402 Preparation Knife  
 G-295 Wire Saw  
 S-359 Filter Paper, cut to size  
 GW-342 Electronic Dual Range Balance  
 Equipment to perform ASTM D 2216 also needed

**ASTM D-4767 AASHTO T 297**

*Consolidated Undrained Triaxial Test for Cohesive Soils*  
 See equipment for D-2850 and add

E-124 Pore Pressure Transducer  
 E-405 Digital Readout for E-124  
 S-56150 Filter Strips

**ASTM D-4829**

*Expansion Index of Soils*

S-441 Expansion Index Consolidometer  
 E-805 Dial Indicator  
 S-310 Standard Compaction Hammer  
 S-35710 Straight Edge, Beveled  
 PCF-80004 Brass Sieve, 8" dia, # 4 stainless steel mesh  
 G-29101 Sampling Spoon  
 G-30014 Stainless Steel Mixing Pan, 13.5 x 5  
 GO-216 Oven, Gravity Convection  
 Or GO-220 Oven, Forced Draft

**ASTM D-5084**

*Measurement of Hydraulic Conductivity of Saturated Porous Materials using a Flexible Wall Permeameter*

S-500 Panel, 3 burettes for one cell  
 S-502 Extension Panel, 6 burettes for 2 cells  
 S-480 Permeability Cell, 2.8"  
 S-505 Deairing Tank  
 Or S-530 Nold Deairing Apparatus  
 S-54028 Membranes, 2.8"  
 S-57028 Membrane Stretcher, 2.8"  
 S-56128 Glass Fiber Filter Disc, 2.8"  
 G-5002G High Vacuum Grease  
 G-192 Dial Caliper, 0-6"  
 GW-342 Dual Range Electronic Balance  
 Or GW-115 Triple Beam Balance, 2610 x 0.1 gram  
 And GW-110 Dial-O-Gram, 310 x 0.01 gram  
 G-170 General Purpose Thermometer  
 S-57428 Split Mitre Box, 2.8"  
 G-295 Wire Saw  
 G-29402 Large Sample Knife  
 G-400 Vacuum Pump  
 G-410 Laboratory Air Compressor  
 TR-738 Filter Regulator Assembly  
 E-124 Pore Pressure Transducer, 150 psi  
 E-405 Digital Readout, Calibrated to E-124  
 Equipment to perform ASTM D 2216 Moisture Content of  
 Soils also needed

Items to extrude sample from Shelby Tube

S-240 Sample Extruder  
 And S-24030 Sample Tray for S-240 extruder  
 Or S-329 Sample Ejector  
 And S-32924 Adaptor Plate and Piston, 2.8"

Items to remold sample (technique will decide actual items)

S-57729 2.875 x 6" Compaction Mold  
 S-57730 Spacer Plug, 2.85 x 2"  
 S-57728 Gauge Block  
 G-510 Rubber Mallet  
 S-577 Sliding Weight Hammer  
 S-575 Pneumatic Kneading Compactor  
 S-57528 Split Compaction Mold  
 S-57228 Vacuum Split Mold

Optional and Suggested Spare Items

S-53028 O-rings, pack of 4, 2.8"  
 S-55028 Porous Stones, 2.8",  
 S-470 Permeant Interface Device  
 S-57629 Soil Sample Trimmers  
 And S-57606 2.8" cap for S-57629 Trimmer