

Symbols and Abbreviations

<i>EC</i> -----	Electrical conductivity in mhos/cm. unless otherwise specified.	<i>LR</i> -----	Leaching requirement.
<i>EC</i> ×10 ³ -----	Electrical conductivity in millimhos/cm. (value in mhos/cm.×10 ³).	<i>HC</i> -----	Hydraulic conductivity.
<i>EC</i> ×10 ⁶ -----	Electrical conductivity in micromhos/cm. (value in mhos/cm.×10 ⁶).	<i>PWP</i> -----	Permanent-wilting percentage.
<i>EC_e</i> -----	Electrical conductivity of saturation extract.	<i>FAP</i> -----	Fifteen-atmosphere percentage.
<i>EC₁, EC₅, EC₅₀</i> -----	Electrical conductivity of extract from a suspension having the proportions of 1 gm. of dry soil to 1, 5, or 50 gm. of water.	<i>SP</i> -----	Saturation percentage.
<i>EC_{1w}</i> -----	Electrical conductivity of irrigation water.	<i>SMT</i> -----	Soil-moisture tension.
<i>EC_{dw}</i> -----	Electrical conductivity of drainage water or soil solution at the bottom of the root zone.	<i>OP</i> -----	Osmotic pressure.
<i>EC_s</i> -----	Electrical conductivity of saturated soil paste.	<i>OP_e</i> -----	Osmotic pressure of saturation extract.
<i>R_s</i> -----	Resistance of soil paste in Bureau of Soils cup.	ΔT -----	Freezing-point depression, °C.
<i>mho</i> -----	Reciprocal ohm; (ohm spelled backward).	<i>P_w</i> -----	Percentage water, dry-weight basis.
<i>mmho</i> -----	Millimho.	<i>P_d</i> -----	Percentage water, depth basis.
μ mho-----	Micromho.	<i>d_w</i> -----	Density of water.
<i>ESP</i> -----	Exchangeable-sodium-percentage.	<i>d_b</i> -----	Bulk density of soil.
<i>SAR</i> -----	Sodium-adsorption-ratio.	<i>d_p</i> -----	Particle density of soil.
<i>EPP</i> -----	Exchangeable-potassium-percentage.	<i>k</i> -----	Hydraulic conductivity; conductivity-cell constant.
<i>PAR</i> -----	Potassium-adsorption-ratio.	<i>k'</i> -----	Intrinsic permeability.
<i>CEC</i> -----	Cation-exchange-capacity.	<i>D_{1w}</i> -----	Depth of irrigation water applied to soil.
<i>meq./l.</i> -----	Milliequivalent.	<i>D_{dw}</i> -----	Depth (equivalent free depth) of drainage water.
<i>mg./l.</i> -----	Milligrams of solute per liter of solution.	<i>D_{ew}</i> -----	Consumptive use expressed as equivalent free depth of water in a specified time.
<i>p. p. m.</i> -----	Parts per million. As commonly measured and used parts per million is numerically equivalent to milligrams per liter.	<i>E</i> -----	Efficiency of irrigation water application.
<i>pH_s; pH_e; pH₁; pH₅</i> -----	pH reading of saturated soil paste; saturation extract; 1:1 or 1:5 soil-water suspension. Measured with glass electrode unless otherwise specified.	<i>n</i> -----	Porosity.
		<i>C2-S3</i> -----	Example of classification of irrigation water; <i>C</i> denotes conductivity (electrical); <i>S</i> denotes sodium (<i>SAR</i>); numbers denote respective numerical quality classes. (See ch. 5.)
		<i>m</i> -----	Meter.
		<i>cm</i> -----	Centimeter.
		<i>mm</i> -----	Millimeter.
		<i>mμ</i> -----	Millimicron.
		μ -----	Micron (10 ⁻⁶ meter); also prefix micro.
		<i>Å</i> -----	Angstrom (10 ⁻¹⁰ meter).
		<i>RCF</i> -----	Relative centrifugal force.
		<i>r. p. m.</i> -----	Revolutions per minute.
		η -----	Viscosity.

Conversion Formulas and Factors

Conductivity to milliequivalent per liter:
 $\text{meq./l.} = 10 \times EC \times 10^3$, for irrigation waters and soil extracts in the range from 0.1 to 5.0 millimhos per cm. See figures 4 and 20.

Conductivity to osmotic pressure in atmospheres:
 $OP = 0.36 \times EC \times 10^3$ for soil extracts in the range from 3 to 30 millimhos/cm.

Conductivity to parts per million:
 $\text{p. p. m.} = 0.64 \times EC \times 10^3$ for irrigation waters in the range 100 to 5,000 micromhos/cm.

Parts of salt per million parts of irrigation water to tons of salt per acre-foot of water:
 Tons per acre-foot (t. a. f.) = $0.00136 \times \text{p. p. m.}$

Grains per gallon to parts per million:
 $\text{p. p. m.} = 17.1 \times \text{grains per gallon.}$

Milliequivalents per liter (from chemical analyses) to parts per million:
 Multiply meq./l. for each ion by its equivalent weight and obtain the sum.

Gypsum (CaSO₄·2H₂O) equivalent weight=86.09 gm.
 Saturated gypsum solution at 25° C. contains:
 30.5 meq./l.; 2.63 gm./l.; 2,630 p. p. m.; 3.5 tons of gypsum per acre-foot of water. One milliequivalent of gypsum per 100 gm. of soil corresponds to 1.72 tons of gypsum per acre-foot of soil (4,000,000 lb.). In other words, tons of gypsum per acre-foot of soil = $1.72 \times$ (milliequivalents gypsum per 100 gm. of soil). $EC \times 10^3 = 2.205$ at 25° C.

1 standard atmosphere = 1.013×10^6 dynes cm.⁻²; 14.71 lb. in.²; 76.39 cm. of mercury column; 1,036 cm. of water column; 34.01 ft. of water column. (Mercury and water at 20° C.)

1 bar = 10^6 dynes cm.⁻² = 1,023 cm. of water column.
 1 millibar = one thousandth of a bar.
 1 mile = 5,280 feet.
 1 inch = 2.54 cm.
 1 foot = 30.48 cm.
 1 pound = 453.59 gm.
 1 acre = 43,560 sq. ft.

1 acre-foot soil weighs 4,000,000 pounds (approximate).
 1 acre-foot water weighs 2,720,000 pounds (approximate).
 Gallons per minute to cubic feet per second:

c. f. s. = $0.002228 \times$ g. p. m.

1 cubic foot per second (c. f. s.) =

50 miner's inches in: Idaho, Kansas, Nebraska, Nevada, New Mexico, North Dakota, South Dakota, Utah, and southern California.

40 miner's inches in: Arizona, California (statute), Montana, and Oregon.

38.4 miner's inches in: Colorado.

1 c. f. s. for 24 hours = 1.98 acre-feet.

1 U. S. gallon = 231 cubic inches,

8.345 pounds of water.

0.1337 cubic foot.

58,417 grains of water.

1 cubic foot = 7.48 gallons.

1 cubic foot of water weighs 62.43 lbs.

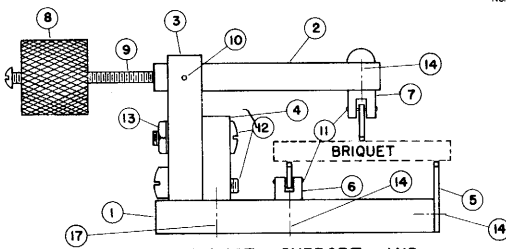
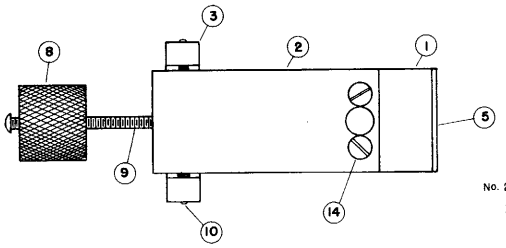
1 cubic foot of soil in place weighs 68 to 112 pounds. Bulk density 1.1 to 1.8 gm. cm.⁻³.

Average particle density = 2.65 gm. cm.⁻³, approximately.
 (For soils which are low in organic matter.)

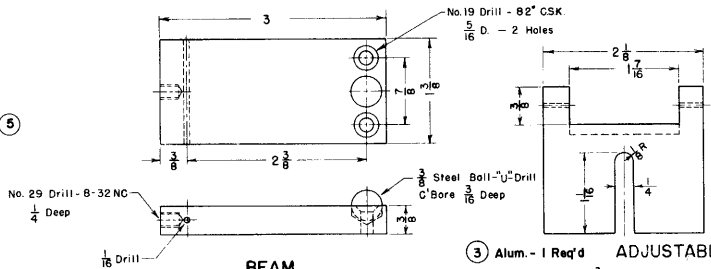
Chemical symbols, equivalent weights, and common names

Chemical symbol or formula—	Equivalent weight	Common name
<i>Grams</i>		
Ions:		
Ca ⁺⁺	20. 04	Calcium ion.
Mg ⁺⁺	12. 16	Magnesium ion.
Na ⁺	23. 00	Sodium ion.
K ⁺	39. 10	Potassium ion.
Cl ⁻	35. 46	Chloride ion.
SO ₄ ⁻⁻	48. 03	Sulfate ion.
CO ₃ ⁻⁻	30. 00	Carbonate ion.
HCO ₃ ⁻	61. 01	Bicarbonate ion.
Salts:		
CaCl ₂	55. 50	Calcium chloride.
CaSO ₄	68. 07	Calcium sulfate.
CaSO ₄ ·2H ₂ O.....	86. 09	Gypsum.
CaCO ₃	50. 04	Calcium carbonate.
MgCl ₂	47. 62	Magnesium chloride.
MgSO ₄	60. 19	Magnesium sulfate.
MgCO ₃	42. 16	Magnesium carbonate.
NaCl.....	58. 45	Sodium chloride.
Na ₂ SO ₄	71. 03	Sodium sulfate.
Na ₂ CO ₃	53. 00	Sodium carbonate.
NaHCO ₃	84. 01	Sodium bicarbonate.
KCl.....	74. 56	Potassium chloride.
K ₂ SO ₄	87. 13	Potassium sulfate.
K ₂ CO ₃	69. 10	Potassium carbonate.
KHCO ₃	100. 11	Potassium bicarbonate.
Chemical amend- ments:		
S.....	16. 03	Sulfur.
H ₂ SO ₄	49. 04	Sulfuric acid.
Al ₂ (SO ₄) ₃ ·18H ₂ O..	111. 07	Aluminum sulfate.
FeSO ₄ ·7H ₂ O.....	139. 01	Iron sulfate (ferrous).

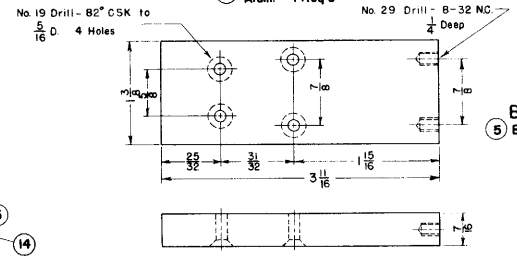
Modulus of rupture apparatus.



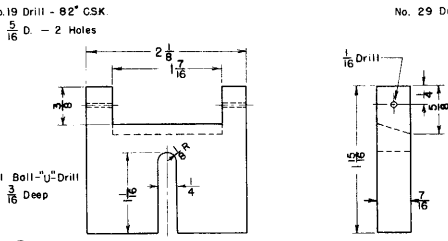
BRIQUET SUPPORT AND KNIFE EDGE ASSEMBLY



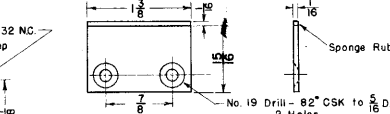
BEAM
Alum. - 1 Req'd



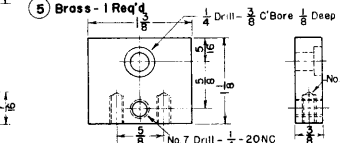
BASE
Alum. - 1 Req'd



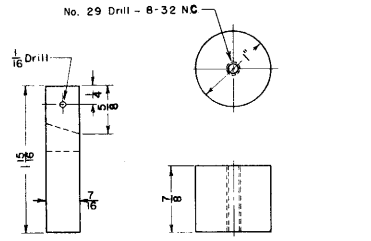
ADJUSTABLE END POST
Alum. - 1 Req'd



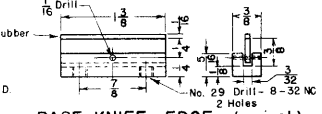
BASE KNIFE EDGE (fixed)
Brass - 1 Req'd



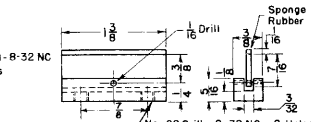
END POST
Alum. - 1 Req'd



COUNTERBALANCE
Brass - 1 Req'd

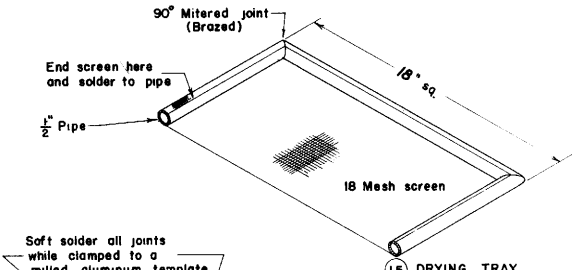


BASE KNIFE EDGE (swivel)
Brass - (2 pieces) 1 unit Req'd

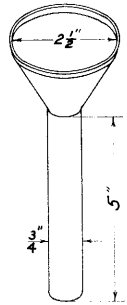


BEAM KNIFE EDGE (swivel)
Brass - (2 pieces) 1 unit Req'd.

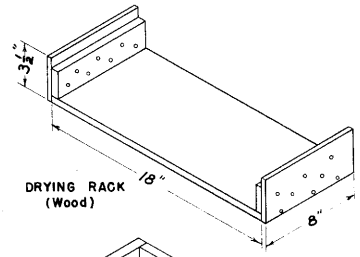
- ⑨ Round head machine screw - 8-32 NC x $2\frac{1}{4}$ " 1 Req'd.
- ⑩ Pin, adj. end post $\frac{1}{16}$ " x $2\frac{1}{4}$ " 1 "
- ⑪ Pin, knife edges $\frac{1}{16}$ " x $\frac{7}{16}$ " 2 "
- ⑫ Fillister head machine screw $\frac{1}{4}$ " - 20NC x 1" 2 "
- ⑬ Nut, hexagon $\frac{1}{4}$ " - 20NC 1 "
- ⑭ Flat head machine screw (knife edges) 8-32 NC x $\frac{3}{16}$ " 6 "
- ⑰ Flat head machine screw (end post) 8-32 NC x $\frac{1}{2}$ " 2 "



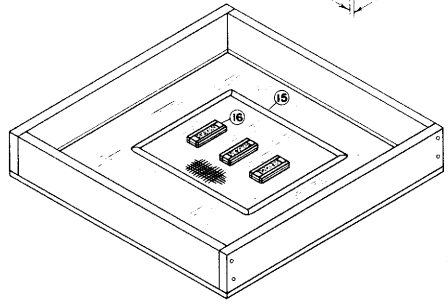
DRYING TRAY
(Galvanized pipe and Wire screen)



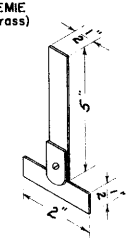
TREMIE
(Brass)



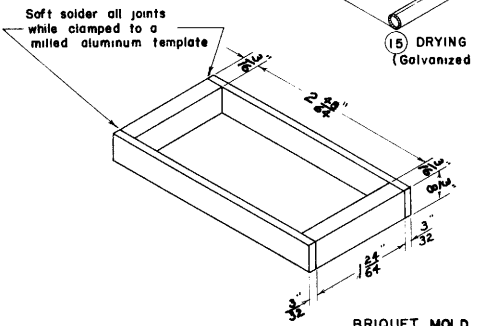
DRYING RACK
(Wood)



SOAKING TANK
(Metal or Wood)

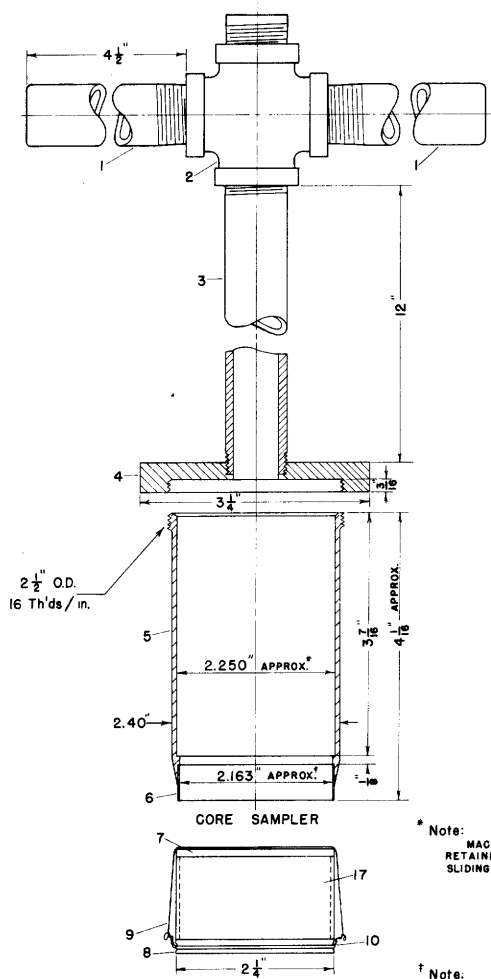


STRIKE-OFF TOOL
(Hacksaw blades)

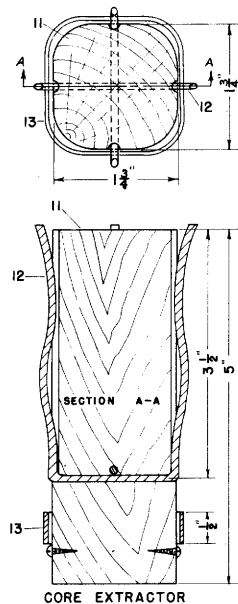


BRIQUET MOLD
(Brass)

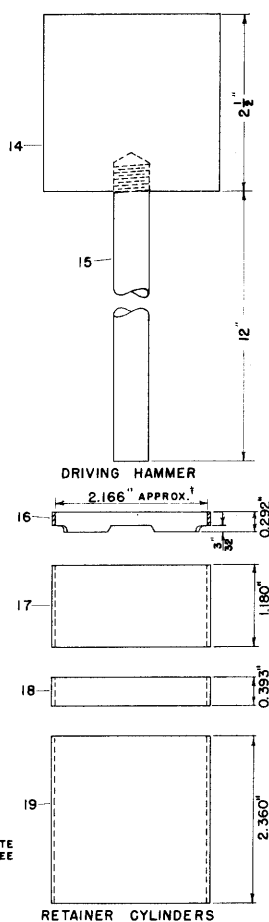
MODULUS OF RUPTURE APPARATUS



SOIL RETAINER ASSEMBLY



CORE EXTRACTOR



RETAINER CYLINDERS

* Note: MACHINE TO ACCOMMODATE RETAINER CYLINDERS - FREE SLIDING FIT.

† Note: INSIDE DIAMETER OF CUTTING EDGE MUST BE 0.003" SMALLER THAN INSIDE DIAMETER OF RETAINER CYLINDERS.

No.	NAME	SIZE	No. REQ.	MATERIAL
1	Handles	1/2"	2	Pipe, galvanized iron
2	Handle, fitting	1/2"	1	Cross, " "
3	Handle, stem	1/2"	1	Pipe, " "
4	Cap, core sampler	1/2"	1	Plate, mild steel
5	Barrel, core sampler	2 1/2" x 7/8" wall	1	Seamless tubing, steel
6	Cutting edge	1/2" x .010"	1	Blued clock spring steel
7	Retainer disk	1/8"		Plastic
8	" "	3/16"		Ceramic
9	Rubber band	* 30	2	
10	Wire, retainer disk	19 ga.		Wire, nichrome
11	Block, core extractor	nominal 2" x 2"	1	Wood, pine
12	Fingers, core extractor	1/8"	2	Rod, tobin bronze
13	Finger depressor ring	2"	1	Thinwall conduit
14	Head, hammer	2 1/2" dia.	1	Mild steel
15	Guide, hammer	1/2" dia.	1	" "
16	Retainer cylinder	2 1/4" x 19 ga.	1	Seamless tubing, brass
17	" "	" "	2	" " "
18	" "	" "	2	" " "
19	" "	" "	1	" " "

Soil sampler and core retainer.