

APPENDIX B
WEIGHTS AND MEASURES
Length Measure

	<u>Miles</u>	<u>Furlongs</u>	<u>Rods</u>	<u>Yards</u>	<u>Feet</u>	<u>inches</u>
Mile	1	8	320	1,760	5,280	63,360
Furlong		1	40	220	660	7,920
Rod			1	5.5	16.5	198
Yard				1	3	36
Foot					1	12
Inches						1

Square Measure

	Sq. Miles	Acres	Sq. Rods	Sq. Yards	Sq. Feet	Sq. Inches
Sq. Mile	1	640	120,400	3,097,600	27,878,400	4,014,489,600
Acre		1	160	4,840	43,560	62,729,640
Sq. Rod			1	30.25	272.25	39,204
Sq. Yard				1	9	1.296
Sq. Foot					1	12
Sq. Inch						1

Dry Measure

	Bushels	Pecks	Quarts	Pints
Bushel	1	4	32	64
Peck		1	8	16
Quart			1	2
Pint				1

1 Bushel (US) = 2125.42 cubic inches

1 Bushel (British) = 2218.19 cubic inches

Liquid Measure

	Hogshead	Barrels	Gallons	Quarts	Pints	Gills
Hogshead	1	2	63	252	504	2,016
Barrel		1	31.5	126	252	504
Gallon			1	8	16	32
Quart				1	2	4
Pint					1	2
Gill						1

The US gallon contains 231 cu in = 0.134 cu ft

One cubic foot = 7.481 gallons

One cubic foot weighs 62.425 lb. at 39.2°F

One gallon weighs 8.345 lb.

British Imperial gallon weighs 10 lb.

For rough calculations, 1 cu ft is called 7 1/4 gallons and 1 gallon is 8 1/3 lb.

Weight Measure

	<u>Long tons</u>	<u>Tons</u>	<u>Pounds</u>	<u>Ounces</u>	<u>Grains</u>
Long ton	1	1.12	2,240	35,846	250,880,000
Ton		1	2,000	32,000	224,000,000
Pound			1	16	7000
Grain					1

Angles of Arcs

	<u>Circles</u>	<u>Degrees</u>	<u>Minutes</u>	<u>Seconds</u>
Circle	1	360	21,600	1,269,000
Degree		1	60	3,600
Minute			1	60
Second				1

Water Conversion Factors

US gallons	X	8.33	=	pounds
US gallons	X	0.13368	=	cubic feet
US gallons	X	231	=	cubic inches
US gallons	X	0.83	=	British gallons
US gallons	X	3.78	=	liters
British gallons (Imperial)		X	10	= pounds
British gallons (Imperial)		X	0.16	= cubic feet
British gallons (Imperial)		X	277.274	= cubic inches
British gallons (Imperial)		X	1.2	= US gallons
British gallons (Imperial)		X	4.537	= liters
Cubic inches of water (39.2°F)	X	0.036125	=	pounds
Cubic inches of water (39.2°F)	X	0.004329	=	US gallons
Cubic inches of water (39.2°F)	X	0.003607	=	British gallons
Cubic inches of water (39.2°F)	X	0.576384	=	ounces
Cubic inches of water (39.2°F)	X	62.425	=	pounds
Cubic feet (of water) (39.2°F)	X	7.48	=	US gallons
Cubic feet (of water) (39.2°F)	X	6.232	=	British gallons
Cubic feet (of water) (39.2°F)	X	.028	=	tons
Pounds of water	X	7.72	=	cubic inches
Pounds of water	X	.01602	=	cubic feet
Pounds of water	X	0.12	=	US gallons
Pounds of water	X	0.10	=	British gallons

METRIC SYSTEM

Length Measures

	<u>Kilometers</u>	<u>Hectometers</u>	<u>Dekameters</u>	<u>Meters</u>	<u>Decimeters</u>	<u>Centimeters</u>	<u>Millimeters</u>
km	1		100	1,000	10,000	100,000	1,000,000
hm	0.1	1	10	100	1,000	10,000	100,000
dkm	0.01	0.1	1	10	100	1,000	10,000
m	0.0001	0.01	0.1	1	10	100	1,000
dm	0.0001	0.001	0.01	0.1	1	10	100
cm	0.00001	0.0001	0.001	0.01	0.1	1	10
mm	0.000001	0.00001	0.0001	0.001	0.01	0.1	1

Square Measure

1	sq.	kilometer	=	100	sq.	hectometers
1	sq.	hectometer	=	100	sq.	dekameters
1	sq.	decameter	=	100	sq.	meters
1	sq.	meter	=	100	sq.	decimeters
1	sq.	decimeter	=	100	sq.	centimeters
1	sq.	centimeter	=	100	sq.	millimeters

Capacity Measure

	<u>Kiloliters</u>	<u>Hectoliters</u>	<u>Dekaliters</u>	<u>Liters</u>	<u>Deciliters</u>	<u>Centiliters</u>	<u>Milliliters</u>
kl	1		100	1,000	10,000	100,000	1,000,000
hl	0.1	1	10	100	1,000	10,000	100,000
dhl	0.01	0.1	1	10	100	1,000	10,000
ml	0.0001	0.01	0.1	1	10	100	1,000
dl	0.0001	0.001	0.01	0.1	1	10	100
ci	0.00001	0.0001	0.001	0.01	0.1	1	10
ml	0.000001	0.00001	0.0001	0.001	0.01	0.1	1

Weight Measure

	<u>Kilograms</u>	<u>Hectograms</u>	<u>Dekagrams</u>	<u>Grams</u>	<u>Decigrams</u>	<u>Centigrams</u>	<u>Milligrams</u>
kg	1		100	1,000	10,000	100,000	1,000,000
hg	0.1	1	10	100	1,000	10,000	100,000
dkg	0.01	0.1	1	10	100	1,000	10,000
mg	0.0001	0.01	0.1	1	10	100	1,000
dg	0.0001	0.001	0.01	0.1	1	10	100
C9	0.00001	0.0001	0.001	0.01	0.1	1	10
mg	0.000001	0.00001	0.0001	0.001	0.01	0.1	1

BRITISH AND METRIC CONVERSION TABLES

Measure of Length

1 inch	=	2.54 centimeters or 25.4 millimeters
1 foot	=	0.3048 meter, 30.48 centimeters, 304.8 millimeters
1 yard	=	0.9144 meters, 91.44 centimeters, 914.4 millimeters
1 rod	=	5.0292 meters
1 mile	=	1.609 kilometers, 1,609.34 meters
1 millimeter	=	0.03937 inch
1 centimeter	=	0.3937 inch
1 meter	=	39.37 inches, 3.28083 feet 1.0936 yards
1 kilometer	=	0.62137 mile

Surface Measure

1 sq. inch	=	6.452 sq. centimeters, 645.2 sq. millimeters
1 sq. foot	=	0.0929 sq. meter, 929.03 centimeters
1 sq. yard	=	0.836 sq. meter
1 sq. millimeter	=	0.00155 sq. inch
1 sq. centimeter	=	0.155 sq. inch
1 sq. meter	=	1.196 sq. yards, 10.764 sq. feet 1,550.003 sq. inches

Volume and Capacity Measure

1 cubic inch	=	16.387 cubic centimeters, 16,387.06 millimeters
1 cubic foot	=	0.02832 cubic meter, 28.317 cubic decimeters, 28.317 liters
1 cubic yard	=	0.7645 cubic meter
1 cubic centimeter	=	0.061 cubic inch
1 cubic decimeter	=	61.023 cubic inches, 0.0353 cubic foot
1 cubic meter	=	231 cubic inches, 1.308 cubic yards, 35.314 cubic feet 264.2 gallons

Weight Measure

1 gram		
1 kilogram	=	0.03527 ounce, 15.432 grains
1 metric ton	=	2.2046 pounds, 35.274 ounces avoirdupois
1 grain	=	0.9842 long ton (2,240 lb.), 1.1023 ton (2,000 lb.), 2,204.6 pounds
1 ounce avoirdupois	=	0.0648 grams
1 pound	=	28.35 grams
1 ton (2,000 lb.)		
1 long ton (2,240 lb.)	=	0.4536 kilogram, 453.6 grams
	=	907.2 kilograms
	=	1.016 metric tons, 1,016 kilograms

Fahrenheit		Temperature Conversion
Celsius	=	(Celsius x 1.8) + 32
	=	(Fahrenheit - 32) / 1.8

POWER UNITS

1 HORSEPOWER = 33,000 FOOT-POUNDS PER MINUTE, 746 WATTS.

1 WATT = 0.00134 HORSEPOWER, 44.24 FOOT-POUNDS PER MINUTE

1 KILOWATT = 1,000 WATTS, 1.34 HORSEPOWER 44,240 FOOT-POUNDS PER MINUTE

WEIGHTS OF MATERIALS

<u>Material</u>	Weight in pounds per cubic foot	Weight in pounds per cubic inch	Weight in kilograms per cubic meter	Weight in grams per cubic centimeter
Aluminum	168.5	0.0975	2,699.11	2.6988
Brass, 80% C, 20% Z	536.6	0.3105	8,595.51	8.5946
Brass, 70% C, 30% Z	526.7	0.3048	8,436.92	8.4368
Brass, 60% C, 40% Z	521.7	0.3019	8,356.83	8.3538
Brass, 50% C, 50% Z	511.7	0.2961	8,196.65	8.1960
Brick, common	112	0.0648	1,794.07	1.7937
Brick, fire	143	0.0827	2,290.64	2.2891
Brick, pressed	137	0.0793	2,194.53	2.1950
Brick, hard,	125	0.0723	29002.31	2.0013
Bronze, 90% C, 10% T	547.9	0.3171	8,776.51	8.7773
Cement portland, loose	90	0.0521	1,441.66	1.4421
Cement portland, set	183	0.1059	2,931.38	2.9313
Chromium	432.4	0.2502	6,926.38	6.9255
Clay, loose	63	0.0365	1,009.16	1.0103
Coal broke, loose, anthracite	54	0.0313	864.99	0.8664
Coal broken loose, bituminous	49	0.0294	784.90	0.7861
Concrete	137	0.0793	2,194.53	2.1950
Copper	554.7	0.3210	8,885.44	8.8852
Earth, common, loam	75	0.0434	1,201.38	1.2013
Earth, packed	100	0.0579	1,601.85	1.6027
Glass	162	0.0938	2,594.99	2.5964
Gravel dry, loose	90 to 106		1,441.66 to 1,697.96	
gravel well shaken	99 to 117		1,585.83 to 1,874.16	
Gold	19204.3	0.6969	19,291.03	19.2901
Ice	56	0.0324	897.03	0.8968
Iron, cast	450	0.2604	7,08.31	7.2078
Iron, wrought	486.7	0.2817	7,796.18	7.7974
Lead	707.7	0.4095	11,336.26	11.3349
Lime	53	0.0307	848.98	0.8498
Magnesium	108.6	0.0628	1,739.60	1.7383
Masonry	150	0.0868	2,402.77	2.4026
Masonry, dry rubble	138	0.0799	2,210.55	2.2116
Molybdenum	636.5	0.3683	10,195.75	10.1945
Mortar, set	103	0.05%	1,649.90	1.6497
Nickel	549	0.3177	8,794.13	8.7939
Petroleum, benzene	46	0.0266	736.85	0.7363
Petroleum gasoline	42	0.0243	672.78	0.6726
Plaster of Paris	112	0.0648	1,794.07	1.7937
Platinum	1,333.5	0.7717	21,360.62	21.3606
Quartz	162	0.0938	2,594.99	2.5964

WEIGHTS OF MATERIALS (continued)

.....	Weight in pounds per cubic foot	Weight in pounds per cubic inch	Weight in kilograms per cubic meter	Weight in grams per cubic centimeter
Material				
Salt, common	48	0.0278	768.88	0.7695
Sand dry, loose	90 to 106		1,441.66 to 1,697.96	
Sand, well shaken	99 to 106 .		1,585.83 to 1,874.16	
Silver	657	0.3802	10,524.13	10.5239
Snow, freshly fallen	5 to 12		80.09 to 192.22	
Snow, wet and compacted	15 to 50 ...		240.28 to 800.92	
Steel	490	0.2836	7,849.05	7.8500
Stone, gneiss	168	0.0972	2,691.10	2.6905
Stone, granite	168	0.0972	2,691.10	2.6905
Stone, limestone	162	0.0938	2,594.99	2.5964
Stone, marble	168	0.0972	2,691.10	2.6905
Stone, sandstone	143	0.0828	2,290.64	2.2919
Stone, shale	162	0.0938	2,594.99	2.5964
Stone, slate	175	0.1013	21803.23	2.8040
Tar	75	0.0434	1,201.38	1.2013
Tin	455	0.2632	7,288.40	7.2881
Titanium	280.1	0.1621	4,486.77	4.4869
Tungsten	1,192	0.6898	19,094.00	19.0936
Water, fresh	62.5	0.0362	1,001.15	1.0020
Water, sea water	64	0.0370	1,025.18	1.0242
Wood, dry				
As, black	28	0.0162	448.52	0.4484
Ask white	41	0.0237	656.76	0.6560
Beech	45	0.0260	720.83	0.7197
Birch	44	0.0255	704.81	0.7058
Birch paper	38	0.0220	608.70	0.6090
Cedar, Alaska	31	0.0179	496.57	0.4955
Cedar, eastern red	33	0.0191	528.61	0.5287
Cedar, southern white	23	0.0133	368.42	0.3681
Cedar, western re	23	0.0133	368.42	0.3681
Cherry	42	0.0203	672.78	0.6726
Cherry, black	35	0.0203	560.65	0.5619
Chestnut	41	0.0237	656.76	0.6560
Cypress	30	0.0174	480.55	0.4816
Elm	45	0.0260	720.83	0.7197
Hemlock	29	0.0168	464.54	0.4650
Hickory	49	0.0284	784.90	0.7861
Locust	46	0.0266	736.85	0.7363
Mahogany	53	0.0307	848.98	0.8498
Maple, hard	43	0.0249	688.79	0.6892
Maple, white	33	0.0191	528.61	0.5287
Oak, chestnut	54	0.0313	864.99	0,8664
Oak, live	59	0.0341	954.09	0.9439
Oak, red black	41	0.0237	656.76	0.6560
Oak, white	46	0.0266	738.85	0.7363

WEIGHTS OF MATERIALS (Continued)

Material	Weight in pounds per cubic foot	Weight in pounds per cubic inch	Weight in kilograms per cubic meter	Weight in grams per cubic centimeter
Pine, white	26	0.0150	416.48	0.4152
Pine, yellow, longleaf	44	0.0255	656.76	7058
Pine, yellow, short leaf	36	0.0208	576.66	0.5757
Poplar	28	0.0162	448.52	0.4484
Red wood California	26	0.0150	416.48	0.4152
Spruce, white, black	27	0.0156	432.50	0.4318
Sycamore	37	0.0214	592.68	0.5923
Walnut black	38	0.0220	608.70	0.6089
Walnut, white	26	0.0150	416.48	0.4152
Zinc	439.3.....	0.2542	7,036.91	7.0362