



# Weights and Measures

Weights and Measures	
<b>Earthen Materials:</b>	<u>Weights of Materials</u>
<b>Forestry:</b>	<u>Cubic Feet of Solid Wood Per Cord</u>
	<u>Unit of Measurement Definitions</u>
	<u>Rule of Thumb Conversions</u>
<b>Links to:</b>	<u>Bucket Rating - Hydraulic Excavators</u> <ul style="list-style-type: none"> <li>• <u>Fill Factors</u></li> </ul>
	<u>Bucket Rating - Wheel Loaders</u> <ul style="list-style-type: none"> <li>• <u>Fill Factors</u></li> </ul>

MINERALS AND EARTHEN WEIGHT* OF MATERIALS					
	LOOSE		BANK		LOAD
	kg/m <sup>3</sup>	lb/yd <sup>3</sup>	kg/m <sup>3</sup>	lb/yd <sup>3</sup>	FACTORS
Basalt	1960	<b>3300</b>	2970	<b>5000</b>	.67
Bauxite, Kaolin	1420	<b>2400</b>	1900	<b>3200</b>	.75
Caliche	1250	<b>2100</b>	2260	<b>3800</b>	.55
Carnotite, uranium ore	1630	<b>2750</b>	2200	<b>3700</b>	.74

Cinders	560	<b>950</b>	860	<b>1450</b>	.66
Clay . . . . Natural bed	1660	<b>2800</b>	2020	<b>3400</b>	.82
..... Dry	1480	<b>2500</b>	1840	<b>3100</b>	.81
..... Wet	1660	<b>2800</b>	2080	<b>3500</b>	.80
Clay & gravel . . . Dry	1420	<b>2400</b>	1660	<b>2800</b>	.85
..... Wet	1540	<b>2600</b>	1840	<b>3100</b>	.85
Coal . . . . . Anthracite, Raw	1190	<b>2000</b>	1600	<b>2700</b>	.74
.....Washed	1100	<b>1850</b>			.74
..... Ash, Bituminous Coal	530-650	<b>900-1100</b>	590-890	<b>1000-1500</b>	.93
..... Bituminous, Raw	950	<b>1600</b>	1280	<b>2150</b>	.74
.....Washed	830	<b>1400</b>			.74
Decomposed rock —					
..... 75% Rock, 25% Earth	1960	<b>3300</b>	2790	<b>4700</b>	.70
..... 50% Rock, 50% Earth	1720	<b>2900</b>	2280	<b>3850</b>	.75
..... 25% Rock, 75% Earth	1570	<b>2650</b>	1960	<b>3300</b>	.80
Earth. . . . Dry packed	1510	<b>2550</b>	1900	<b>3200</b>	.80
..... Wet excavated	1600	<b>2700</b>	2020	<b>3400</b>	.79
..... Loam	1250	<b>2100</b>	1540	<b>2600</b>	.81
Granite . .Broken	1660	<b>2800</b>	2730	<b>4600</b>	.61
Gravel . . . . Pitrun	1930	<b>3250</b>	2170	<b>3650</b>	.89
..... Dry	1510	<b>2550</b>	1690	<b>2850</b>	.89
..... Dry 6-50 mm (1/4"-2")	1690	<b>2850</b>	1900	<b>3200</b>	.89
..... Wet 6-50 mm (1/4"-2")	2020	<b>3400</b>	2260	<b>3800</b>	.89
Gypsum . . . Broken	1810	<b>3050</b>	3170	<b>5350</b>	.57
..... Crushed	1600	<b>2700</b>	2790	<b>4700</b>	.57
Hematite, iron ore, high grade	1810-2450	<b>4000-5400</b>	2130-2900	<b>4700-6400</b>	.85
Limestone . . . Broken	1540	<b>2600</b>	2610	<b>4400</b>	.59

.....Crushed	1540	<b>2600</b>	—	—	—
Magnetite, iron ore	2790	<b>4700</b>	3260	<b>5500</b>	.85
Pyrite, iron ore	2580	<b>4350</b>	3030	<b>5100</b>	.85
Sand . . . Dry, loose	1420	<b>2400</b>	1600	<b>2700</b>	.89
.....Damp	1690	<b>2850</b>	1900	<b>3200</b>	.89
.....Wet	1840	<b>3100</b>	2080	<b>3500</b>	.89
Sand & clay . . . Loose	1600	<b>2700</b>	2020	<b>3400</b>	.79
..... Compacted	2400	<b>4050</b>			
Sand & gravel . . . Dry	1720	<b>2900</b>	1930	<b>3250</b>	.89
..... Wet	2020	<b>3400</b>	2230	<b>3750</b>	.91
Sandstone	1510	<b>2550</b>	2520	<b>4250</b>	.60
Shale	1250	<b>2100</b>	1660	<b>2800</b>	.75
Slag . . . broken	1750	<b>2950</b>	2940	<b>4950</b>	.60
Snow . . Dry	130	<b>220</b>			
.....Wet	520	<b>860</b>			
Stone . . . crushed	1600	<b>2700</b>	2670	<b>4500</b>	.60
Taconite	1630-1900	<b>3600-4200</b>	2360-2700	<b>5200-6100</b>	.58
Top Soil	950	<b>1600</b>	1370	<b>2300</b>	.70
Taprock . . . broken	1750	<b>2950</b>	2610	<b>4400</b>	.67
Wood Chips**	—	—	—	—	—

\*Varies with moisture content, grain size, degree of compaction, etc. Tests must be made to determine exact material characteristics.

\*\*Weights of commercially important wood species can be found in the last pages of the Logging & Forest Products section. To obtain wood weights use the following equations:

$$\text{lb/yd}^3 = (\text{lb/ft}^3) 27$$

$$\text{kg/m}^3 = (\text{kg/m}^3) 27$$

<b>FORESTRY</b>	
<b>CUBIC FEET OF SOLID WOOD PER</b>	<b>RULE OF THUMB</b>

### CORD

Length of Sticks-Ft.	Diameter at Small End		
	1.0"-2.5"	2.5"-5.5"	Over 5.5"
2	65	84	91
4	64	82	89
8	59	77	84
12	54	71	78

### CONVERSIONS

1 cunit of wood	= 1.117 cords
	= 1.25 units of chips
	= 250 ft <sup>3</sup> of chips
	= 7.08 m <sup>3</sup>
1 cord of wood	= 85 ft <sup>3</sup> of solid wood
	= 1.06 units of chips
	= 2.41 m <sup>3</sup>
1 unit of chips	= 80 ft <sup>3</sup> of solid wood
	= 2.27 m <sup>3</sup>
1 cord of wood	= 500 board feet
	= 1.18 m <sup>3</sup>
2000 pounds of chips	= 500 pounds of pulp
1 cord	= 212 ft <sup>3</sup> of chips
	= 6.00 m <sup>3</sup>

### UNIT OF MEASUREMENT DEFINITIONS

1 board foot	= 1/12 ft <sup>3</sup> of solid wood (1' 2 1' 2 1")	1 cubic meter	= 35.32 ft <sup>3</sup>
1000 board feet	= 83.33 ft <sup>3</sup> of solid wood		= 424 board feet
1 cunit of wood	= 100 solid ft <sup>3</sup>		= 333 board feet Hoppus tons
	= 1200 board feet		= 0.555 Hoppus Tons
	= 2.83 <sup>3</sup>	1 MBF Brereton	= 2.36 m <sup>3</sup>
1 cord of wood	= 128 ft <sup>3</sup> of stacked logs		= 785.4 board feet Hoppus
	= 3.62 m <sup>3</sup>	1 MBF Hoppus	= 1273 board feet-Brereton

1 unit of wood	= 200 ft <sup>3</sup> of loose chips	MBF	= Thousand board feet
	= 5.66 m <sup>3</sup>	1 Super Foot	= 1 board foot
1 cord of wood	= .85 units	100 Super Feet	= 1000 board foot
1 Hoppus Ton	= 50 ft <sup>3</sup> (assumed)		= 0.236 m <sup>3</sup>
	= 63.65 ft <sup>3</sup> (actual)	600 Super Feet	= 50 ft <sup>3</sup>
	= 600 board feet	1 lb/ft <sup>3</sup>	= 16.0185 kg/m <sup>3</sup>
	= 763.8 BF Brereton		
	= 1.8 M 3 actual		
	= 1.4 M 3 assumed		