Building Material Weights
AISC Manual of Load and Resistance Factor Design, 3rd ed.

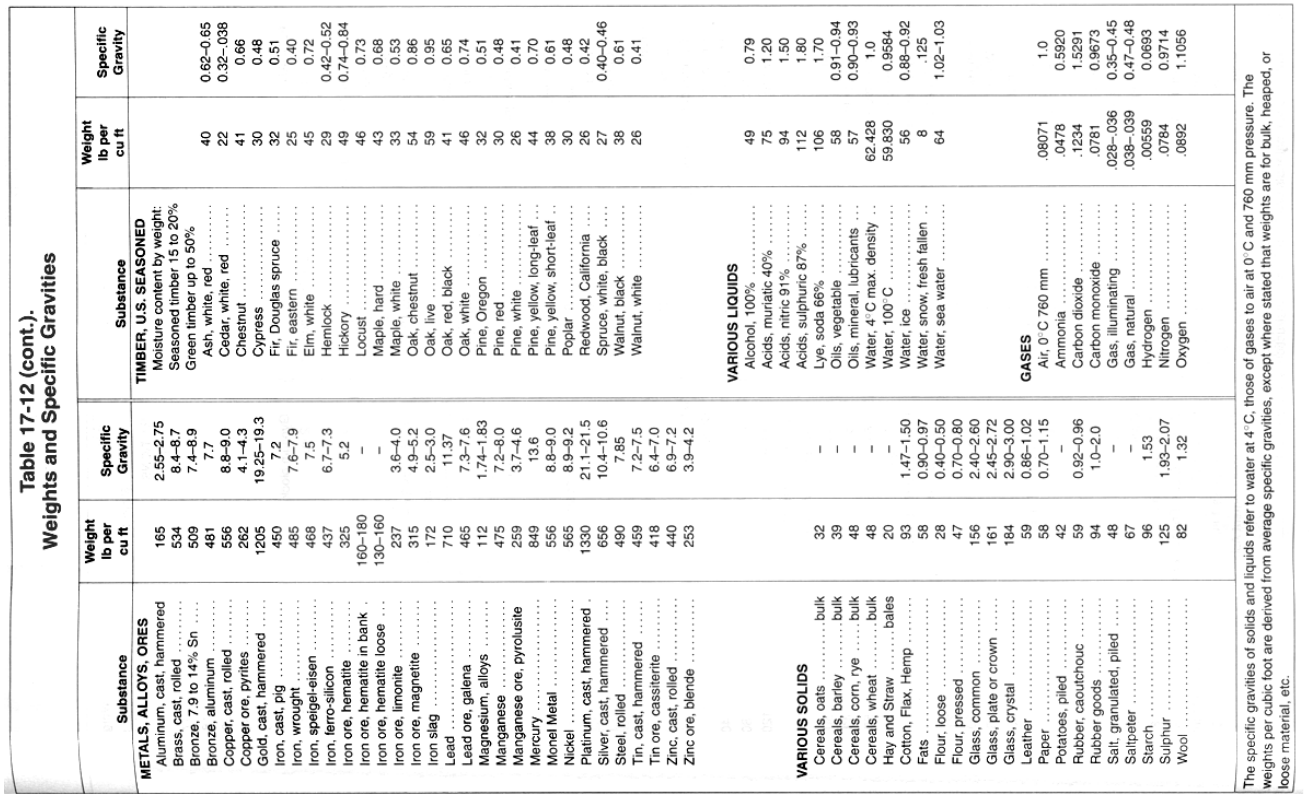

Table 17-12 (cont.).
Weights and Specific Gravities

Substance	Weight lb per cu ft	Specific Gravity
METALS, ALLOYS, ORES		
Aluminum, cast, hammered	165	2.55–2.75
Brass, cast, rolled	534	8.4–8.7
Bronze, 7.9 to 14% Sn	509	7.4–8.9
Bronze, aluminum	481	7.7
Copper, cast, rolled	556	8.8–9.0
Copper ore, pyrites	262	4.1–4.3
Gold, cast, hammered	1205	19.25–19.3
Iron, cast, pig	450	7.2
Iron, wrought	485	7.6–7.9
Iron, speigel-eisen	468	7.5
Iron, ferro-silicon	437	6.7–7.3
Iron ore, hematite	325	5.2
Iron ore, hematite in bank	160–180	–
Iron ore, hematite loose	130–160	–
Iron ore, limonite	237	3.6–4.0
Iron ore, magnetite	315	4.9–5.2
Iron slag	172	2.5–3.0
Lead	710	11.37
Lead ore, galena	465	7.3–7.6
Magnesium, alloys	112	1.74–1.83
Manganese	475	7.2–8.0
Manganese ore, pyrolusite	259	3.7–4.6
Mercury	849	13.6
Monel Metal	556	8.8–9.0
Nickel	565	8.9–9.2
Platinum, cast, hammered	1330	21.1–21.5
Silver, cast, hammered	656	10.4–10.6
Steel, rolled	490	7.85
Tin, cast, hammered	459	7.2–7.5
Tin ore, cassiterite	418	6.4–7.0
Zinc, cast, rolled	440	6.9–7.2
Zinc ore, blende	253	3.9–4.2
VARIOUS SOLIDS		
Cereals, oats ..... bulk	32	–
Cereals, barley ..... bulk	39	–
Cereals, corn, rye ..... bulk	48	–
Cereals, wheat ..... bulk	48	–
Hay and Straw ..... bales	20	–
Cotton, Flax, Hemp	93	1.47–1.50
Fats	58	0.90–0.97
Flour, loose	28	0.40–0.50
Flour, pressed	47	0.70–0.80
Glass, common	156	2.40–2.60
Glass, plate or crown	161	2.45–2.72
Glass, crystal	184	2.90–3.00
Leather	59	0.86–1.02
Paper	58	0.70–1.15
Potatoes, piled	42	–
Rubber, caoutchouc	59	0.92–0.96
Rubber goods	94	1.0–2.0
Salt, granulated, piled	48	–
Saltpeter	67	–
Starch	96	1.53
Sulphur	125	1.93–2.07
Wool	82	1.32
TIMBER, U.S. SEASONED		
Moisture content by weight:		
Seasoned timber 15 to 20%		
Green timber up to 50%		
Ash, white, red	40	0.62–0.65
Cedar, white, red	22	0.32–.038
Chestnut	41	0.66
Cypress	30	0.48
Fir, Douglas spruce	32	0.51
Fir, eastern	25	0.40
Elm, white	45	0.72
Hemlock	29	0.42–0.52
Hickory	49	0.74–0.84
Locust	46	0.73
Maple, hard	43	0.68
Maple, white	33	0.53
Oak, chestnut	54	0.86
Oak, live	59	0.95
Oak, red, black	41	0.65
Oak, white	46	0.74
Pine, Oregon	32	0.51
Pine, red	30	0.48
Pine, white	26	0.41
Pine, yellow, long-leaf	44	0.70
Pine, yellow, short-leaf	38	0.61
Poplar	30	0.48
Redwood, California	26	0.42
Spruce, white, black	27	0.40–0.46
Walnut, black	38	0.61
Walnut, white	26	0.41
VARIOUS LIQUIDS		
Alcohol, 100%	49	0.79
Acids, muriatic 40%	75	1.20
Acids, nitric 91%	94	1.50
Acids, sulphuric 87%	112	1.80
Lye, soda 66%	106	1.70
Oils, vegetable	58	0.91–0.94
Oils, mineral, lubricants	57	0.90–0.93
Water, 4°C max. density	62.428	1.0
Water, 100°C	59.830	0.9584
Water, ice	56	0.88–0.92
Water, snow, fresh fallen	8	.125
Water, sea water	64	1.02–1.03
GASES		
Air, 0°C 760 mm	.08071	1.0
Ammonia	.0478	0.5920
Carbon dioxide	.1234	1.5291
Carbon monoxide	.0781	0.9673
Gas, illuminating	.028–.036	0.35–0.45
Gas, natural	.038–.039	0.47–0.48
Hydrogen	.00559	0.0693
Nitrogen	.0784	0.9714
Oxygen	.0892	1.1056

The specific gravities of solids and liquids refer to water at 4°C, those of gases to air at 0°C and 760 mm pressure. The weights per cubic foot are derived from average specific gravities, except where stated that weights are for bulk, heaped, or loose material, etc.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

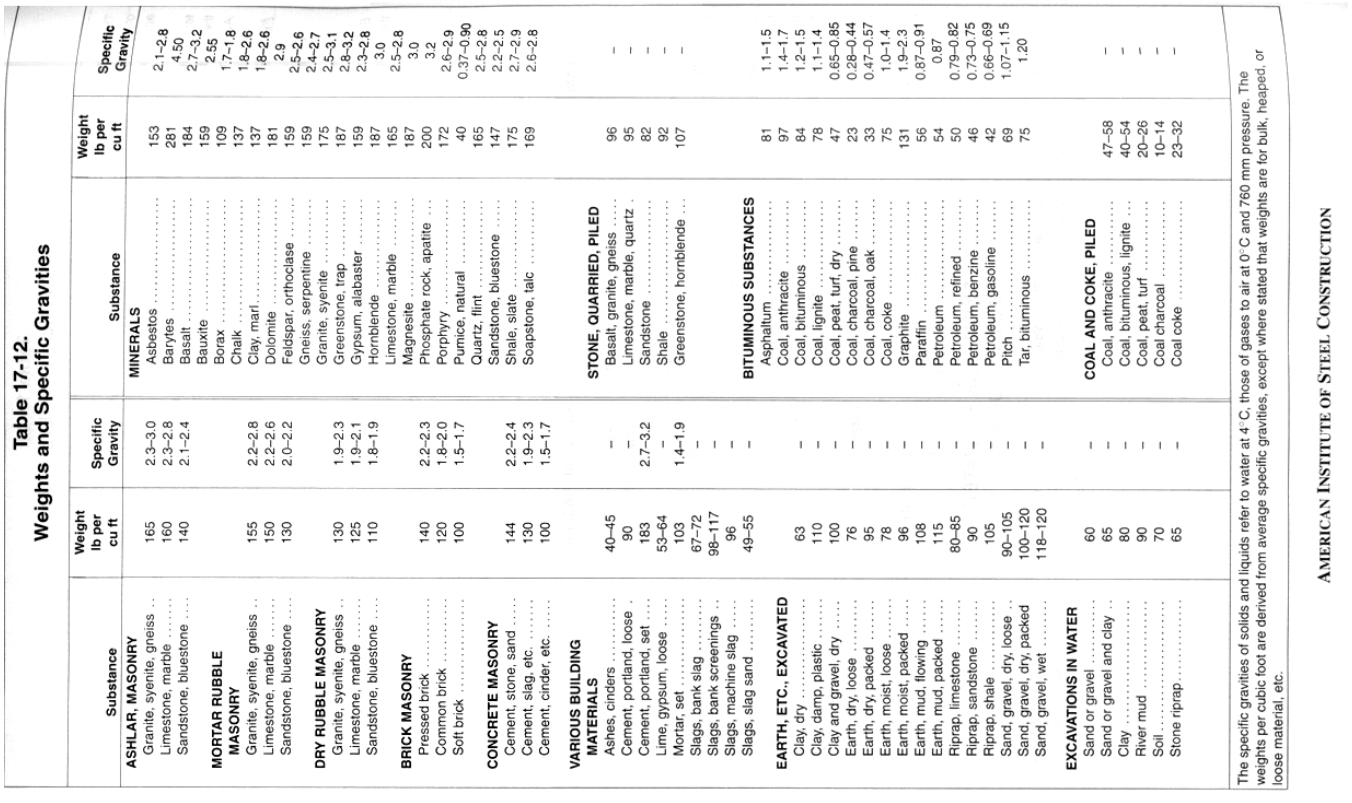

Table 17-12.
Weights and Specific Gravities

Substance	Weight lb per cu ft	Specific Gravity
ASHLAR, MASONRY		
Granite, syenite, gneiss	165	2.3–3.0
Limestone, marble	160	2.3–2.8
Sandstone, bluestone	140	2.1–2.4
MORTAR RUBBLE MASONRY		
Granite, syenite, gneiss	155	2.2–2.8
Limestone, marble	150	2.2–2.6
Sandstone, bluestone	130	2.0–2.2
DRY RUBBLE MASONRY		
Granite, syenite, gneiss	130	1.9–2.3
Limestone, marble	125	1.9–2.1
Sandstone, bluestone	110	1.8–1.9
BRICK MASONRY		
Pressed brick	140	2.2–2.3
Common brick	120	1.8–2.0
Soft brick	100	1.5–1.7
CONCRETE MASONRY		
Cement, stone, sand	144	2.2–2.4
Cement, slag, etc.	130	1.9–2.3
Cement, cinder, etc.	100	1.5–1.7
VARIOUS BUILDING MATERIALS		
Ashes, cinders	40–45	–
Cement, portland, loose	90	–
Cement, portland, set	183	2.7–3.2
Lime, gypsum, loose	53–64	–
Mortar, set	103	1.4–1.9
Slags, bank slag	67–72	–
Slags, bank screenings	98–117	–
Slags, machine slag	96	–
Slags, slag sand	49–55	–
EARTH, ETC., EXCAVATED		
Clay, dry	63	–
Clay, damp, plastic	110	–
Clay and gravel, dry	100	–
Earth, dry, loose	76	–
Earth, dry, packed	95	–
Earth, moist, loose	78	–
Earth, moist, packed	96	–
Earth, mud, flowing	108	–
Earth, mud, packed	115	–
Riprap, limestone	80–85	–
Riprap, sandstone	90	–
Riprap, shale	105	–
Sand, gravel, dry, loose	90–105	–
Sand, gravel, dry, packed	100–120	–
Sand, gravel, wet	118–120	–
EXCAVATIONS IN WATER		
Sand or gravel	60	–
Sand or gravel and clay	65	–
Clay	80	–
River mud	90	–
Soil	70	–
Stone riprap	65	–
STONE, QUARRIED, PILED		
Basalt, granite, gneiss	96	–
Limestone, marble, quartz	95	–
Sandstone	82	–
Shale	92	–
Greenstone, hornblende	107	–
BITUMINOUS SUBSTANCES		
Asphaltum	81	1.1–1.5
Coal, anthracite	97	1.4–1.7
Coal, bituminous	84	1.2–1.5
Coal, lignite	78	1.1–1.4
Coal, peat, turf, dry	47	0.65–0.85
Coal, charcoal, pine	23	0.28–0.44
Coal, charcoal, oak	33	0.47–0.57
Coal, coke	75	1.0–1.4
Graphite	131	1.9–2.3
Paraffin	56	0.87–0.91
Petroleum	54	0.87
Petroleum, refined	50	0.79–0.82
Petroleum, benzine	46	0.73–0.75
Petroleum, gasoline	42	0.66–0.69
Pitch	69	1.07–1.15
Tar, bituminous	75	1.20
COAL AND COKE, PILED		
Coal, anthracite	47–58	–
Coal, bituminous, lignite	40–54	–
Coal, peat, turf	20–26	–
Coal charcoal	10–14	–
Coal coke	23–32	–

The specific gravities of solids and liquids refer to water at 4°C, those of gases to air at 0°C and 760 mm pressure. The weights per cubic foot are derived from average specific gravities, except where stated that weights are for bulk, heaped, or loose material, etc.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION

Table 17-13.
Weights of Building Materials

Materials	Weight lb per sq ft
CEILINGS	
Channel suspended system	1
Lathing and plastering	See Partitions
Acoustical fiber tile	1
FLOORS	
Steel deck	See Manufacturer
Concrete-Reinforced 1 in.	
Stone	12 1/2
Slag	11 1/2
Lightweight	6 to 10
Concrete-Plain 1 in.	
Stone	12
Slag	11
Lightweight	3 to 9
Fills 1 inch	
Gypsum	6
Sand	8
Cinders	4
Finishes	
Terrazzo 1 in.	13
Ceramic or Quarry Tile 3/4-in.	10
Linoleum 1/4-in.	1
Mastic 3/4-in.	9
Hardwood 7/8-in.	4
Softwood 3/4-in.	2 1/2
ROOFS	
Copper or tin	1
Corrugated steel	See Manufactuer
3-ply ready roofing	1
3-ply felt and gravel	5 1/2
5-ply felt and gravel	6
Shingles	
Wood	2
Asphalt	3
Clay tile	9 to 14
Slate 1/4 in.	10
Sheathing	
Wood 3/4 in.	3
Gypsum 1 in.	4
Insulation 1 in.	
Loose	1/2
Poured	2
Rigid	1 1/2

Materials	Weight lb per sq ft
PARTITIONS	
Clay tile	
3 in.	17
4 in.	18
6 in.	28
8 in.	34
10 in.	40
Gypsum block	
2 in.	9 1/2
3 in.	10 1/2
4 in.	12 1/2
5 in.	14
6 in.	18 1/2
Wood studs 2×4	
12–16 in. o.c.	2
Steel partitions	4
Plaster 1 in.	
Cement	10
Gypsum	5
Lathing	
Metal	1/2
Gypsum board 1/2 in.	2
WALLS	
Brick	
4 in.	40
8 in.	80
12 in.	120
Hollow concrete block (Heavy aggregate)	
4 in.	30
6 in.	43
8 in.	55
12 1/2 in.	80
Hollow concrete block (Light aggregate)	
4 in.	21
6 in.	30
8 in.	38
12 in.	55
Clay tile (Load bearing)	
4 in.	25
6 in.	30
8 in.	33
12 in.	45
Stone 4 in.	55
Glass block 4 in.	18
Window, Glass, Frame, & Sash	8
Curtain walls	See Manufacturer
Structural glass 1 in.	15
Corrugated Cement Asbestos 1/4 in.	3

For weights of other materials used in building construction, see Table 17-12.

Table 17-14.
Weights and Measures
United States System

LINEAR MEASURE

Inches	Feet	Yards	Rods	Furlongs	Miles
1.0 =	.08333 =	.02778 =	.0050505 =	.00012626 =	.00001578
12.0 =	1.0 =	.33333 =	.0606061 =	.00151515 =	.00018939
36.0 =	3.0 =	1.0 =	.1818182 =	.00454545 =	.00056818
198.0 =	16.5 =	5.5 =	1.0 =	.025 =	.003125
7,920.0 =	660.0 =	220.0 =	40.0 =	1.0 =	.125
63,360.0 =	5,280.0 =	1,760.0 =	320.0 =	8.0 =	1.0

SQUARE AND LAND MEASURE

Sq. Inches	Square Feet	Square Yards	Square Rods	Acres	Sq. Miles
1.0 =	.006944 =	.000772			
144.0 =	1.0 =	.111111			
1,296.0 =	9.0 =	1.0 =	.03306 =	.000207	
39,204.0 =	272.25 =	30.25 =	1.0 =	.00625 =	.0000098
	43,560.0 =	4,840.0 =	160.0 =	1.0 =	.0015625
		3,097,600.0 =	102,400.0 =	640.0 =	1.0

AVOIRDUPOIS WEIGHTS

Grains	Drams	Ounces	Pounds	Tons
1.0 =	.03657 =	.002286 =	.000143 =	.0000000714
27.34375 =	1.0 =	.0625 =	.003906 =	.00000195
437.5 =	16.0 =	1.0 =	.0625 =	.00003125
7,000.0 =	256.0 =	16.0 =	1.0 =	.0005
14,000,000.0 =	512,000.0 =	32,000.0 =	2,000.0 =	1.0

DRY MEASURE

Pints	Quarts	Pecks	Cubic Feet	Bushels
1.0 =	.5 =	.0625 =	.01945 =	.01563
2.0 =	1.0 =	.125 =	.03891 =	.03125
16.0 =	8.0 =	1.0 =	.31112 =	.25
51.42627 =	25.71314 =	3.21414 =	1.0 =	.80354
64.0 =	32.0 =	4.0 =	1.2445 =	1.0

LIQUID MEASURE

Gills	Pints	Quarts	U.S. Gallons	Cubic Feet
1.0 =	.25 =	.125 =	.03125 =	.00418
4.0 =	1.0 =	.5 =	.125 =	.01671
8.0 =	2.0 =	1.0 =	.250 =	.03342
32.0 =	8.0 =	4.0 =	1.0 =	.1337
			7.48052 =	1.0