

Common Design Loads in Building Codes

adapted from SEI/ASCE 7-10: Minimum Design Loads for Buildings and Other Structures

Minimum Concentrated Loads

<i>Location</i>	<i>Concentrated load lb (kN)</i>
Catwalks for maintenance access	300 (1.33)
Elevator machine room grating (on area of 2 in. by 2 in. (50 mm by 50 mm))	300 (1.33)
Finish light floor plate construction (on area of 1 in. by 1 in. (25 mm by 25 mm))	200 (0.89)
Hospital floors	1,000 (4.45)
Library floors	1,000 (4.45)
Manufacturing	
Light	2,000 (8.90)
Heavy	3,000 (13.40)
Office floors	2,000 (8.90)
Awnings and canopies	
Skeleton structure with fabric	300 (1.33)
Support frame with screen enclosure	200 (0.89)
Roofs – primary members and subject to maintenance workers	300 (1.33)
School floors	1,000 (4.45)
Sidewalks, vehicular driveways, and yards subject to trucking (over wheel area of 4.5 in. by 4.5 in. (114 mm x 114 mm))	8,000 (35.60)
Stairs and exit ways on area of 2 in. by 2 in. (50 mm by 50 mm) non-concurrent with uniform load	300 (1.33)
Store floors	1,000 (4.45)

Minimum Uniformly Distributed Live Loads

<i>Location</i>	<i>Uniform load psf (kN/m²)</i>
Apartments (see Residential)	
Access floor systems	
Office use	50 (2.4)
Computer use	100 (4.79)
Armories and drill rooms	150 (7.18)
Assembly areas and theaters	
Fixed seats (fastened to floor)	60 (2.87)
Lobbies	100 (4.79)
Movable seats	100 (4.79)
Platforms (assembly)	100 (4.79)
Stage floors	150 (7.18)
Balconies and decks	1.5 times the live load for the occupancy served. Not required to exceed 100 psf (4.79 kN/m ²)
Catwalks for maintenance access	40 (1.92)
Corridors	
First floor	100 (4.79)
Other floors, same as occupancy served except as indicated	

<i>Location</i>	<i>Uniform load psf (kN/m²)</i>
Dining rooms and restaurants	100 (4.79)
Dwellings (see Residential)	
Elevator machine room grating (on area of 2 in. by 2 in. (50 mm by 50 mm))	300 (1.33)
Finish light floor plate construction (on area of 1 in. by 1 in. (25 mm by 25 mm))	200 (0.89)
Fire escapes	100 (4.79)
On single-family dwellings only	40 (1.92)
Garages	
Passenger vehicles only	40 (1.92)
Helipads	60 (2.87)
Hospitals	
Operating rooms, laboratories	60 (2.87)
Patient rooms	40 (1.92)
Corridors above first floor	80 (3.83)
Hotels (see Residential)	
Libraries	
Reading rooms	60 (2.87)
Stack rooms	150 (7.18)
Corridors above first floor	80 (3.83)
Manufacturing	
Light	125 (6.00)
Heavy	250 (11.97)
Office buildings	
File and computer rooms shall be designed for heavier loads based on anticipated occupancy	
Lobbies and first floor corridors	100 (4.79)
Offices	50 (2.40)
Corridors above first floor	80 (3.83)
Penal institutions	
Cell blocks	40 (1.92)
Corridors	100 (4.79)
Recreational uses	
Bowling alleys, poolrooms, and similar uses	75 (3.59)
Dance halls and ballrooms	100 (4.79)
Gymnasiums	100 (4.79)
Reviewing stands, grandstands, and bleachers	100 (4.79)
Stadiums and arenas with fixed seats (fastened to the floor)	60 (2.87)
Residential	
One- and two-family dwellings	
Uninhabitable attics without storage	10 (0.48)
Uninhabitable attics with storage	20 (0.96)
Habitable attics and sleeping areas	30 (1.44)
All other areas except stairs	40 (1.92)
All other residential occupancies	
Private rooms and corridors serving them	40 (1.92)
Public rooms and corridors serving them	100 (4.79)
Roofs	
Ordinary flat, pitched, and curved roofs	20 (0.96n)
Roofs used for roof gardens	100 (4.79)
Roofs used for assembly purposes	Same as occupancy served
Roofs used for other occupancies	As approved by authority having jurisdiction
Awnings and canopies	
Fabric construction supported by a skeleton structure	5 (0.24) nonreducible

<i>Location</i>	<i>Uniform load psf (kN/m²)</i>
Roofs (<i>continued</i>)	
Screen enclosure support frame	5 (0.24) nonreducible and applied to the roof frame members only, not the screen
All other construction	20 (0.96)
Schools	
Classrooms	40 (1.92)
Corridors above first floor	80 (3.83)
First-floor corridors	100 (4.79)
Scuttles, skylight ribs, and accessible ceilings	200 (0.89)
Sidewalks, vehicular driveways, and yards subject to trucking	250 (11.97)
Stairs and exit ways	100 (4.79)
One- and two-family dwellings only	40 (1.92)
Storage areas above ceilings	20 (0.96)
Storage warehouses (shall be designed for heavier loads if required for anticipated storage)	
Light	125 (6.00)
Heavy	250 (11.97)
Stores	
Retail	
First floor	100 (4.79)
Upper floors	75 (3.59)
Wholesale, all floors	125 (6.00)
Walkways and elevated platforms (other than exit ways)	60 (2.87)
Yards and terraces, pedestrian	100 (4.79)

Live load reductions are not permitted for specific types (see code).

Some occupancies must be designed for appropriate loads as approved by the authority having jurisdiction.

Library stack room floors have specified limitations (see code)

AASHTO lane loads should also be considered where appropriate.

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	Substance	Weight lb per cu ft	Specific Gravity
ASHLAR, MASONRY			METALS, ALLOYS, ORES		
Granite, syenite, gneiss	165	2.3-3.0	Aluminum, cast, hammered	165	2.55-2.75
Limestone, marble	160	2.3-2.8	Brass, cast, rolled	534	8.4-8.7
Sandstone, bluestone	140	2.1-2.4	Bronze, 7.9 to 14% Sn	509	7.4-8.9
			Bronze, aluminum	481	7.7
MORTAR RUBBLE			Copper, cast, rolled	556	8.9-9.0
Granite, syenite, gneiss	155	2.2-2.8	Copper ore, pyrites	262	4.1-4.3
Limestone, marble	150	2.2-2.6	Gold, cast, hammered	1205	19.25-19.3
Sandstone, bluestone	130	2.0-2.2	Iron, cast, pig	450	7.2
			Iron, wrought	485	7.6-7.9
DRY RUBBLE MASONRY			Iron, ferro-silicon	437	7.5
Granite, syenite, gneiss	130	1.9-2.3	Iron, ferro-silicon	488	7.5
Limestone, marble	125	1.9-2.1	Iron ore, hematite	325	5.2
Sandstone, bluestone	110	1.8-1.9	Iron ore, hematite in bank	160-180	—
			Iron ore, hematite loose	130-160	—
BRICK MASONRY			Iron ore, limonite	237	3.6-4.0
Pressed brick	140	2.2-2.3	Iron ore, magnetite	315	4.9-5.2
Common brick	120	1.8-2.0	Iron ore, hematite	172	2.5-3.0
Soft brick	100	1.5-1.7	Iron slag	710	11.37
			Lead	465	7.3-7.6
CONCRETE MASONRY			Lead ore, galena	112	1.74-1.83
Cement, stone, sand	144	2.2-2.4	Magnesium, alloys	475	7.2-8.0
Cement, slag, etc.	130	1.9-2.3	Manganese ore, pyrolusite	259	3.7-4.6
Cement, cinder, etc.	100	1.5-1.7	Mercury	849	13.6
			Monel Metal	559	8.8-9.0
VARIOUS BUILDING MATERIALS			Nickel	585	8.9-9.2
Ashes, cinders	40-45	—	Platinum, cast, hammered	1330	21.1-21.5
Cement, portland, loose	90	2.7-3.2	Silver, cast, hammered	656	10.4-10.6
Cement, portland, set	163	—	Steel, rolled	490	7.85
Lime, gypsum, loose	53-64	—	Tin, cast, hammered	459	7.2-7.5
Mortar, set	103	1.4-1.9	Tin ore, cassiterite	418	6.4-7.0
Slags, bank screenings	67-72	—	Zinc, cast, rolled	440	6.9-7.2
Slags, machine slag	96	—	Zinc ore, blende	253	3.9-4.2
Slags, slag sand	49-55	—			
EARTH, ETC., EXCAVATED			VARIOUS LIQUIDS		
Clay, dry	63	—	Alcohol, 100%	49	0.79
Clay, damp, plastic	110	—	Acids, muriatic 40%	75	1.20
Clay and gravel, dry	100	—	Acids, nitric 91%	94	1.50
Earth, dry, loose	76	—	Acids, sulphuric 87%	112	1.80
Earth, dry, packed	95	—	Lye, soda 68%	106	1.70
Earth, moist, loose	78	—	Oils, vegetable	58	0.91-0.94
Earth, moist, packed	96	—	Oils, mineral, lubricants	57	0.90-0.93
Earth, mud, flowing	108	—	Water, 4° C max. density	62.428	1.0
Earth, mud, packed	115	—	Water, 100° C	59.830	0.9584
Riprap, limestone	80-85	—	Water, ice	56	0.88-0.92
Riprap, sandstone	90	—	Water, snow, fresh fallen	8	.125
Riprap, shale	105	—	Water, sea water	64	1.02-1.03
Sand, gravel, dry, loose	90-105	—			
Sand, gravel, dry, packed	100-120	—	GASES		
Sand, gravel, wet	118-120	—	Air, 0° C 760 mm	.08071	1.0
			Ammonia	.0476	0.5920
EXCAVATIONS IN WATER			Carbon dioxide	.1234	1.5291
Sand or gravel	60	—	Carbon monoxide	.0781	0.9673
Sand or gravel and clay	65	—	Gas, illuminating	.028-0.36	0.35-0.45
Clay	80	—	Gas, natural	.038-0.39	0.47-0.48
River mud	90	—	Hydrogen	.00559	0.0693
Soil	70	—	Nitrogen	.0784	0.8714
Stone riprap	65	—	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.

Table 17-12.
Weights and Specific Gravities

Substance	Weight lb per cu ft	Specific Gravity	Substance	Weight lb per cu ft	Specific Gravity
MINERALS			STONE, QUARRIED, PILED		
Asbestos	153	2.1-2.8	Basalt, granite, gneiss	96	1.1-1.5
Barytes	281	4.50	Limestone, marble, quartz	95	1.4-1.7
Basalt	184	2.7-3.2	Sandstone	82	—
Bauxite	159	2.55	Shale	92	—
Borax	109	1.7-1.8	Greenstone, hornblende	107	—
Chalk	137	1.8-2.6			
Clay, marl	137	1.8-2.6	BITUMINOUS SUBSTANCES		
Dolomite	181	2.9	Asphaltum	81	1.1-1.5
Feldspar, orthoclase	159	2.5-2.6	Coal, anthracite	97	1.4-1.7
Gneiss, serpentine	144-2.7	—	Coal, bituminous	84	1.2-1.5
Granite, syenite	175	2.5-3.1	Coal, lignite	78	1.1-1.4
Greenstone, trap	187	2.8-3.2	Coal, peat, turf, dry	47	0.65-0.85
Gypsum, alabaster	159	2.3-2.8	Coal, charcoal, pine	23	0.28-0.44
Hornblende	187	3.0	Coal, charcoal, oak	33	0.47-0.57
Limestone, marble	165	2.5-2.8	Coal, coke	75	1.0-1.4
Magnesite	187	3.0	Graphite	131	1.9-2.3
Phosphate rock, apatite	200	3.2	Paraffin	56	0.87-0.91
Porphyry	172	2.6-2.9	Petroleum	50	0.79-0.82
Pumice, natural	40	0.37-0.90	Petroleum, refined	46	0.79-0.75
Quartz, flint	165	2.5-2.8	Petroleum, benzene	42	0.66-0.69
Sandstone, bluestone	147	2.2-2.5	Petroleum, gasoline	69	1.07-1.15
Shale, slate	175	2.7-2.9	Pitch	75	1.20
Soapstone, talc	169	2.5-2.8	Tar, bituminous	—	—
			COAL AND COKE, PILED		
CONCRETE QUARRIED, PILED			Coal, anthracite	47-58	—
Basalt, granite, gneiss	96	1.1-1.5	Coal, bituminous, lignite	40-54	—
Limestone, marble, quartz	95	—	Coal, peat, turf	20-26	—
Sandstone	82	—	Coal, charcoal	10-14	—
Shale	92	—	Coal coke	23-32	—
Greenstone, hornblende	107	—			
VARIOUS 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	50	0.79-0.82			
Petroleum, refined	46	0.79-0.75			
Petroleum, benzene	42	0.66-0.69			
Petroleum, gasoline	69	1.07-1.15			
Pitch	75	1.20			
Tar, bituminous	—	—			
			EXCAVATIONS IN WATER		
EXCAVATIONS IN WATER			Sand or gravel	60	—
Sand or gravel	60	—	Sand or gravel and clay	65	—
Sand or gravel and clay	65	—	Clay	80	—
Clay	80	—	River mud	90	—
River mud	90	—	Soil	70	—
Soil	70	—	Stone riprap	65	—
Stone riprap	65	—			

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.

Table 17-13.
Weights of Building Materials

Materials	Weight lb per sq ft	Materials	Weight lb per sq ft
CEILING		PARTITIONS	
Channel suspended system	1	Clay tile	17
Lathing and plastering	See Partitions	3 in.	18
Acoustical fiber tile	1	4 in.	28
		6 in.	34
		8 in.	40
		10 in.	
FLOORS		Gypsum block	
Steel deck	See Manufacturer	2 in.	9 1/2
		3 in.	10 1/2
Concrete-Reinforced 1 in.		4 in.	12 1/2
Stone	12 1/2	5 in.	14
Slag	11 1/2	6 in.	18 1/2
Lightweight	6 to 10	Wood studs 2x4	
		12-16 in. o.c.	
Concrete-Plain 1 in.		Steel partitions	2
Stone	12	Plaster 1 in.	4
Slag	11	Cement	10
Lightweight	3 to 9	Gypsum	5
		Lathing	
Fills 1 inch		Merl	1/2
Gypsum	6	Gypsum board 1/2 in.	2
Sand	8		
Cinders	4		
Finishes			
Terrazzo 1 in.	13	WALLS	
Ceramic or Quarry Tile 3/4-in.	10	Brick	40
Linoleum 1/4-in.	1	4 in.	80
Mastic 3/4-in.	9	12 1/2 in.	
Hardwood 7/8 in.	4	Hollow concrete block	
Softwood 3/4-in.	2 1/2	(Light aggregate)	
		4 in.	21
		6 in.	30
		8 in.	38
		12 in.	55
		Hollow concrete block	
		(Heavy 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	Miles
1.0 =	.08333 =	.02778 =	.00012626 =
12.0 =	1.0 =	.33333 =	.00118939 =
36.0 =	3.0 =	1.0 =	.00356818 =
198.0 =	16.5 =	5.5 =	.003125 =
7,920.0 =	660.0 =	220.0 =	1.0 =
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
1.0 =	.006944 =	.000772 =	
144.0 =	1.0 =	.11111 =	
1,296.0 =	9.0 =	1.0 =	.03306 =
39,204.0 =	272.25 =	30.25 =	1.0 =
	43,560.0 =	4,840.0 =	160.0 =
		3,097,600.0 =	102,400.0 =
			640.0 =
			1.0 =

AVOIRDUPOIS WEIGHTS			
Grains	Drams	Ounces	Pounds
1.0 =	.03657 =	.002286 =	.000000714 =
27.34375 =	1.0 =	.0625 =	.0000195 =
437.5 =	16.0 =	1.0 =	.0625 =
7,000.0 =	256.0 =	16.0 =	1.0 =
14,000,000.0 =	512,000.0 =	32,000.0 =	2,000.0 =
			1.0 =

DRY MEASURE			
Pints	Quarts	Pecks	Bushels
1.0 =	.5 =	.0625 =	.01945 =
2.0 =	1.0 =	.125 =	.03125 =
8.0 =	4.0 =	1.0 =	.125 =
51.42827 =	25.71314 =	3.21414 =	1.0 =
64.0 =	32.0 =	4.0 =	1.0 =

LIQUID MEASURE			
Gills	Pints	Quarts	U.S. Gallons
1.0 =	.25 =	.125 =	.03125 =
4.0 =	1.0 =	.5 =	.125 =
8.0 =	2.0 =	1.0 =	.25 =
32.0 =	8.0 =	4.0 =	1.0 =
			7.48052 =