

U FACTORS

Material	U factor
Asbestos-cement board	0.0358
Asbestos-cement sheets	0.0080
Asbestos-cement	0.0997
Asbestos, loosely packed	0.0072
Asbestos mill board	0.0067
Asphalt	0.0361
Balsa wood	0.0023
Bitumen	0.0082
Bitumen/felt layers	0.0241
Brick dense	0.0631
Brick, fire	0.0226
Brick, insulating	0.0072
Brickwork, dense	0.0771
Cellulose, cotton, wood pulp and regen	0.0111
Cement, Portland	0.0140
Cement, mortar	0.0833
Concrete, lightweight	0.0096
Concrete, stone	0.0819
Cork board	0.0021
Cork, re-granulated	0.0021
Cork	0.0034
Cotton Wool insulation	0.0014
Earth, dry	0.0722
Felt insulation	0.0019
Fiberglass	0.0019
Fiber insulating board	0.0023
Fiber hardboard	0.0096
Fire-clay brick 500oC	0.0674
Foam glass	0.0022
Glass	0.0506
Glass, Pearls, dry	0.0087
Glass, Pearls, saturated	0.0366
Glass, window	0.0462
Glass, wool Insulation	0.0019
Gravel	0.0337
Ground or soil, very moist area	0.0674
Ground or soil, moist area	0.0482

Material	U factor
Ground or soil, dry area	0.0241
Ground or soil, very dry area	0.0159
Gypsum board	0.0082
Hairfelt	0.0024
Hardboard high density	0.0072
Hardwoods (oak, maple..)	0.0077
Hastelloy C	0.5779
Mineral wool insulation materials, ...	0.0019
Pitch	0.0063
Plaster light	0.0096
Plaster, metal lath	0.0226
Plaster, sand	0.0342
Plaster, wood lath	0.0135
Plastics, foamed (insulation materials)	0.0014
Plywood	0.0063
Polycarbonate	0.0092
Polyester	0.0024
Polyethylene low density, PEL	0.0159
Polyisoprene natural rubber	0.0063
Polyisoprene hard rubber	0.0077
Polystyrene, expanded	0.0014
Polystyrol	0.0021
Polyurethane foam	0.0014
Porcelain	0.0722
Rock Wool insulation	0.0022
Rosin	0.0154
Rubber, cellular	0.0022
Rubber, natural	0.0063
Sandstone	0.0819
Sawdust	0.0039
Sheep wool	0.0019
Silica aerogel	0.0010
Silicon oil	0.0048
Slag wool	0.0020
Slate	0.0968
Softwoods (fir, pine ..)	0.0058
Soil, clay	0.0530

U FACTORS

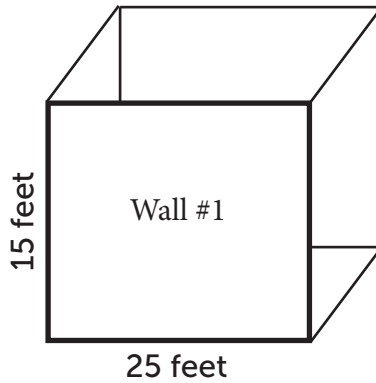
Material	U factor
Straw slab insulation, compressed	0.0043
Styrofoam	0.0016
Tar	0.0092
Timber, alder	0.0082
Timber, ash	0.0077
Timber, birch	0.0067
Timber, larch	0.0058
Timber, maple	0.0077
Timber, oak	0.0082
Timber, pitchpine	0.0067
Timber, pockwood	0.0092
Timber, red beech	0.0067
Timber, red pine	0.0072
Timber, white pine	0.0072
Timber, walnut	0.0072
Urethane foam	0.0010
Wood across the grain, white pine	0.0058
Wood across the grain, balsa	0.0026
Wood across the grain, yellow pine, timber	0.0071
Wood, oak	0.0082
Wool, felt	0.0034

ROOMS FOR HEAT TRANSFER

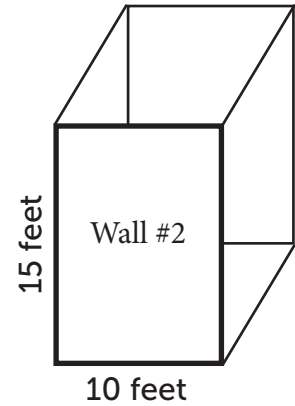
Room

A

Front View

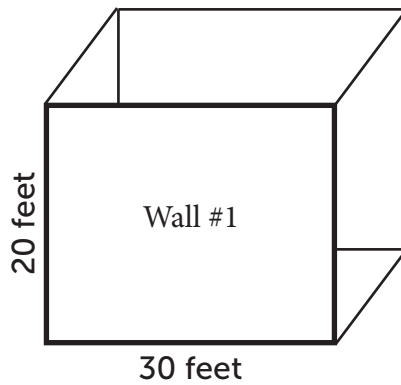


Side View

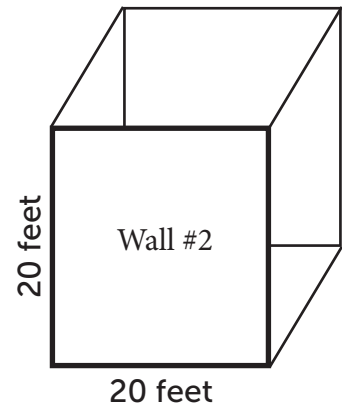


B

Front View

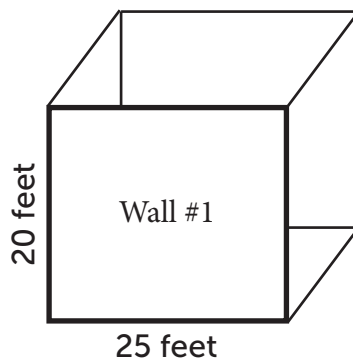


Side View

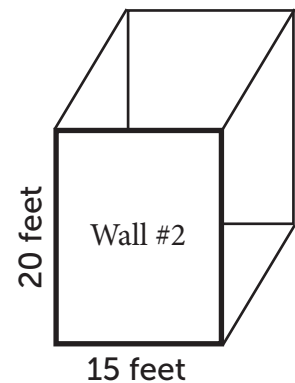


C

Front View



Side View



INSOLATION

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Avg
Albuquerque	2.92	3.97	4.92	6.30	6.68	6.94	6.66	5.80	5.68	4.18	3.16	2.50	4.97
Anchorage	0.21	0.76	1.68	3.12	3.98	4.58	4.25	3.16	1.98	0.98	0.37	0.12	2.09
Annapolis	1.96	2.80	3.71	4.55	5.54	6.03	5.77	5.34	4.48	3.40	2.37	1.81	3.98
Atlanta	2.31	3.37	4.08	5.20	6.02	6.01	5.81	5.59	4.76	3.95	2.98	2.33	4.37
Billings	1.55	2.57	3.52	4.82	5.63	6.45	6.39	5.75	4.67	3.19	1.77	1.30	3.96
Birmingham	2.29	3.31	4.04	5.14	5.92	5.98	5.81	5.70	4.80	3.93	2.96	2.25	4.34
Boise	1.73	2.72	3.77	5.22	5.90	6.57	7.17	6.12	5.28	3.29	1.74	1.46	4.24
Boston	1.66	2.50	3.51	4.13	5.11	5.47	5.44	5.05	4.12	2.84	1.74	1.40	3.58
Casper	1.93	2.80	3.79	5.13	5.90	6.68	6.50	5.90	5.13	3.59	2.06	1.65	4.25
Charleston	1.75	2.64	3.34	4.26	5.20	5.67	5.49	5.19	4.26	3.19	2.15	1.62	3.73
Charlotte	2.22	3.17	3.95	4.98	5.80	6.01	5.76	5.27	4.58	3.75	2.76	2.21	4.20
Chicago	1.50	2.45	3.20	4.48	5.56	6.07	5.68	5.27	4.51	3.07	1.69	1.26	3.72
Columbia	2.14	2.91	3.62	5.03	5.56	6.22	6.13	5.64	4.95	3.57	2.25	1.82	4.15
Columbus	1.64	2.57	3.26	4.63	5.40	6.08	5.73	5.29	4.74	3.29	1.96	1.45	3.83
Denver	2.25	3.20	4.32	5.61	6.11	6.71	6.50	5.86	5.47	4.01	2.59	1.98	4.55
Detroit	1.43	2.33	3.19	4.34	5.44	5.98	5.64	4.99	4.25	2.73	1.52	1.14	3.58
Dover	1.85	2.62	3.60	4.33	5.44	5.91	5.64	5.30	4.38	3.23	2.21	1.66	3.84
Dubuque	1.64	2.58	3.34	4.57	5.54	6.06	5.81	5.26	4.33	3.03	1.72	1.35	3.77
Fargo	1.44	2.39	3.36	4.79	5.62	5.82	5.94	5.14	4.01	2.83	1.59	1.31	3.68
Great Falls	1.30	2.36	3.41	4.84	5.56	6.18	6.44	5.53	4.40	2.90	1.53	1.11	3.79
Hartford	1.70	2.43	3.48	4.07	5.14	5.58	5.38	5.04	4.13	2.91	1.81	1.42	3.59
Honolulu	4.38	5.15	5.99	6.69	7.05	7.48	7.37	7.07	6.51	5.46	4.41	4.01	5.96
Houston	2.47	3.50	4.40	5.59	6.03	6.45	6.36	6.07	5.46	4.61	3.30	2.44	4.72
Indianapolis	1.67	2.59	3.28	4.67	5.46	6.11	5.79	5.37	4.76	3.33	1.97	1.46	3.87
Jackson	1.47	2.41	3.22	4.33	5.46	5.93	5.57	4.99	4.30	2.78	1.55	1.17	3.59
Kansas City	2.06	2.89	3.62	4.92	5.58	6.17	6.21	5.59	4.90	3.49	2.20	1.75	4.11
Las Vegas	3.02	4.13	5.05	6.57	7.25	7.69	7.37	6.42	6.08	4.26	3.18	2.60	5.30
Little Rock	2.36	3.39	4.01	5.32	5.71	6.19	6.15	5.85	5.25	4.17	2.95	2.25	4.46

INSOLATION

City	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year Avg
Los Angeles	3.09	4.25	5.09	6.58	7.29	7.62	7.45	6.72	6.11	4.42	3.43	2.72	5.40
Louisville	1.71	2.65	3.32	4.73	5.38	6.08	5.79	5.35	4.80	3.42	2.10	1.56	3.90
Manchester	1.66	2.50	3.51	4.13	5.11	5.47	5.44	5.05	4.12	2.84	1.74	1.40	3.58
Miami	3.72	4.61	5.42	6.40	6.61	6.29	6.26	6.08	5.47	4.84	3.96	3.46	5.26
Milwaukee	1.43	2.41	3.29	4.48	5.60	6.09	5.74	5.21	4.34	2.90	1.60	1.20	3.69
Minneapolis	1.60	2.61	3.30	4.55	5.44	5.86	5.77	5.12	4.12	2.90	1.62	1.34	3.68
Montpelier	1.58	2.54	3.50	4.05	5.00	5.24	5.37	4.92	3.79	2.46	1.52	1.28	3.43
Nashville	1.94	2.90	3.54	4.76	5.57	5.90	5.86	5.62	4.63	3.53	2.45	1.82	4.04
New Orleans	2.64	3.73	4.67	5.80	6.60	6.15	6.09	5.70	5.13	4.48	3.49	2.68	4.76
New York	1.67	2.37	3.41	3.93	5.11	5.48	5.26	5.01	4.05	2.85	1.82	1.40	3.53
Omaha	1.92	2.76	3.45	4.74	5.60	6.14	6.11	5.46	4.74	3.34	2.00	1.57	3.98
Philadelphia	1.85	2.62	3.60	4.33	5.44	5.91	5.64	5.30	4.38	3.23	2.21	1.66	3.84
Phoenix	3.25	4.41	5.17	6.76	7.42	7.70	6.99	6.11	6.02	4.44	3.52	2.75	5.38
Pittsburgh	1.59	2.40	3.26	4.07	5.05	5.53	5.27	4.94	4.05	2.88	1.86	1.41	3.53
Portland, ME	1.38	2.33	3.49	4.57	5.46	6.09	6.64	5.78	4.80	2.79	1.41	1.10	3.82
Portland, OR	1.38	2.33	3.49	4.57	5.46	6.09	6.64	5.78	4.80	2.79	1.41	1.10	3.82
Providence	1.70	2.46	3.53	4.20	5.17	5.67	5.48	5.08	4.21	2.97	1.80	1.43	3.64
Salt Lake City	2.23	3.15	4.09	5.57	6.26	6.98	6.86	5.98	5.39	3.68	2.29	1.97	4.53
San Antonio	2.57	3.70	4.43	5.54	5.94	6.62	6.49	6.28	5.70	4.67	3.43	2.62	4.83
San Francisco	2.35	3.33	4.42	5.95	6.84	7.39	7.55	6.51	5.75	3.92	2.65	2.06	4.89
Seattle	1.14	2.04	3.23	4.26	5.19	5.75	6.27	5.46	4.43	2.50	1.21	0.90	3.53
Sioux Falls	1.72	2.71	3.31	4.65	5.61	6.10	6.04	5.42	4.47	3.20	1.78	1.43	3.87
St. Louis	2.02	2.82	3.52	4.97	5.56	6.21	6.05	5.63	4.91	3.55	2.21	1.73	4.09
Trenton	1.71	2.39	3.43	4.04	5.26	5.67	5.39	5.14	4.18	3.00	1.98	1.48	3.63
Tulsa	2.33	3.22	3.90	5.25	5.58	6.32	6.40	5.80	5.08	3.80	2.62	2.06	4.36
Washington DC	1.95	2.80	3.66	4.46	5.42	5.88	5.63	5.22	4.38	3.36	2.34	1.79	3.90

HEAT CAPACITIES

Coolant	Heat Capacity
Alcohol, ethyl 104oF (ethanol)	0.65
Alcohol, ethyl 32oF (ethanol)	0.548
Alcohol, methyl. 40 - 50oF	0.59
Alcohol, methyl. 60 - 70oF	0.6
Alcohol, propyl	0.57
Ammonia, 104oF	1.16
Ammonia, 176oF	1.29
Ammonia, 212oF	1.48
Ammonia, 238oF	1.61
Ammonia, 32oF	1.1
Aniline	0.514
Calcium Chloride	0.73
Decane	0.528
Dodecane	0.528
Ether	0.528
Ethyl ether	0.529
Ethylene glycol	0.56
Glycerine	0.576
Heptane	0.535
Hexane	0.54
n-Butane, 32oF	0.55
Propane, 32oF	0.576
Propylene	0.68
Propylene Glycol	0.6
Sodium hydrate	0.94
Water, fresh	1
Water, sea 36oF	0.938