

Solar Position and Insolation Values for 48° North Latitude

BTUH/ft² Total Insolation on Surfaces^a

Date	Solar Time			Solar Position			South Facing Surface Angle with Horiz.					
	a.m.	p.m.	Alt.	Azm.	Normal ^b	Horiz.	38	48	58	68	90	
January 21	8	4	3.5	54.6	37	4	17	19	21	22	22	
	9	3	11.0	42.6	185	46	120	132	140	145	139	
	10	2	16.9	29.4	239	83	190	206	216	220	206	
	11	1	20.7	15.1	261	107	231	249	260	263	243	
	<u>12</u>		22.0	0.0	267	115	245	264	275	278	255	
	Surface daily totals			1710	596	1360	1478	1550	1578	1478		
February 21	7	5	2.4	72.2	12	1	3	4	4	4	4	
	8	4	11.6	60.5	188	49	95	102	105	106	96	
	9	3	19.7	47.7	251	100	178	187	191	190	167	
	10	2	26.2	33.3	278	139	240	251	255	251	217	
	11	1	30.5	17.2	290	165	278	290	294	288	247	
	<u>12</u>		32.0	0.0	293	173	291	304	307	301	258	
Surface daily totals			2330	1080	1880	1972	2024	2024	1978	1720		
March 21	7	5	10.0	78.7	153	37	49	49	47	45	35	
	8	4	19.5	66.8	236	96	131	132	129	122	96	
	9	3	28.2	53.4	270	147	205	207	203	193	152	
	10	2	35.4	37.8	287	187	263	266	261	248	195	
	11	1	40.3	19.8	295	212	300	303	297	283	223	
	<u>12</u>		42.0	0.0	298	220	312	315	309	294	232	
Surface daily totals			2780	1578	2208	2182	2228	2182	2074	1632		

April 21

	6	6	8.6	97.8	108	27	13	9	8	7	5
	7	5	18.6	86.7	205	85	76	69	59	48	21
	8	4	28.5	74.9	247	142	149	141	129	113	69
	9	3	37.8	61.2	268	191	216	208	194	174	115
	10	2	45.8	44.6	280	228	268	260	245	223	152
	11	1	51.5	24.0	286	252	301	294	278	254	177
	<u>12</u>		<u>53.6</u>	<u>0.0</u>	<u>288</u>	<u>260</u>	<u>313</u>	<u>305</u>	<u>289</u>	<u>264</u>	<u>185</u>
	Surface daily totals			3076	2106	2358	2266	2114	1902	1262	
	May 21										
	5	7	5.2	114.3	41	9	4	4	4	3	2
	6	6	14.7	103.7	162	61	27	16	15	13	10
	7	5	24.6	93.0	219	118	89	75	60	43	13
	8	4	34.7	81.6	248	171	156	142	123	101	45
	9	3	44.3	68.3	264	217	217	202	182	156	86
	10	2	53.0	51.3	274	252	265	251	229	200	120
	11	1	59.5	28.6	279	274	296	281	258	228	141
	<u>12</u>		<u>62.0</u>	<u>0.0</u>	<u>280</u>	<u>281</u>	<u>306</u>	<u>292</u>	<u>269</u>	<u>238</u>	<u>149</u>
	Surface daily totals			3254	2482	2418	2234	2010	1728	982	
	June 21										
	5	7	7.9	116.5	77	21	9	9	8	7	5
	6	6	17.2	106.2	172	74	33	19	18	16	12
	7	5	27.0	95.8	220	129	93	77	59	39	15
	8	4	37.1	84.6	246	181	157	140	119	95	35
	9	3	46.9	71.6	261	225	216	198	175	147	74
	10	2	55.8	54.8	269	259	262	244	220	189	105
	11	1	62.7	31.2	274	280	291	273	248	216	126
	<u>12</u>		<u>65.5</u>	<u>0.0</u>	<u>275</u>	<u>287</u>	<u>301</u>	<u>283</u>	<u>258</u>	<u>225</u>	<u>133</u>
	Surface daily totals			3312	2626	2420	2204	1950	1644	874	(continued)

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BTUH/ft² Total Insolation on Surfaces^a

Date	Solar Time			Solar Position		Normal ^b	Horiz.	South Facing Surface Angle with Horiz.			
	a.m.	p.m.	Alt.	Azm.	38	48	58	68	70		
July 21	5	7	5.7	114.7	43	10	5	5	4	4	3
	6	6	15.2	104.1	156	62	28	18	16	15	11
	7	5	25.1	93.5	211	118	89	75	59	42	14
	8	4	35.1	82.1	240	171	154	140	121	99	43
	9	3	44.8	68.8	256	215	214	199	178	153	83
	10	2	53.5	51.9	266	250	261	246	224	195	116
	11	1	60.1	29.0	271	272	291	276	253	223	137
	12		62.6	0.0	272	279	301	286	263	232	144
	Surface daily totals			3158	2474	2386	2200	1974	1694	956	
August 21	6	6	9.1	98.3	99	28	14	10	9	8	6
	7	5	19.1	87.2	190	85	75	67	58	47	20
	8	4	29.0	75.4	232	141	145	137	125	109	65
	9	3	38.4	61.8	254	189	210	201	187	168	110
	10	2	46.4	45.1	266	225	260	252	237	214	146
	11	1	52.2	24.3	272	248	293	285	268	244	169
	12		54.3	0.0	274	256	304	296	279	255	177
	Surface daily tools			2898	2086	2300	2200	2046	1836	1208	
September 21	7	5	10.0	78.7	131	35	44	44	43	40	31
	8	4	19.5	66.8	215	92	124	124	121	115	90
	9	3	28.2	53.4	251	142	196	197	193	183	143

10	2	35.4	37.8	269	181	251	254	248	236	185
11	1	40.3	19.8	278	205	287	289	284	269	212
<u>12</u>		<u>42.0</u>	0.0	280	213	299	302	296	283	221
Surface daily totals		2568	1522	2102	2118	2070	1966	1966	1546	
October 21										
7	5	2.0	71.9	4	0	1	1	1	1	1
8	4	11.2	60.2	165	44	86	91	95	95	87
9	3	19.3	47.4	233	94	167	176	180	178	157
10	2	25.7	33.1	262	133	228	239	242	239	207
11	1	30.0	17.1	274	157	266	277	281	276	237
<u>12</u>		<u>31.5</u>	0.0	278	166	279	291	294	288	247
Surface daily totals		2154	1022	1774	1860	1890	1866	1866	1626	
November 21										
8	4	3.6	54.7	36	5	17	19	21	22	22
9	3	11.2	42.7	179	46	117	129	137	141	135
10	2	17.1	29.5	233	83	186	202	212	215	201
11	1	20.9	15.1	255	107	227	245	255	258	238
<u>12</u>		<u>22.2</u>	0.0	261	115	241	259	270	272	250
Surface daily totals		1668	596	1336	1448	1518	1544	1544	1442	
December 21										
9	3	8.0	40.9	140	27	87	98	105	110	109
10	2	13.6	28.2	214	63	164	180	192	197	190
11	1	17.3	14.4	242	86	207	226	239	244	231
<u>12</u>		<u>18.6</u>	0.0	250	94	222	241	254	260	244
Surface daily totals		1444	446	1136	1250	1326	1364	1304		

Source: Kreider, J.F. and Kreith, F., *Solar Heating and Cooling*, revised 1st edn., Hemisphere Publ. Corp., Washington, DC, 1977.

^a 1 Btu/h · ft² = 3.152 W/m². Ground reflection not included on normal or horizontal surfaces.

^b Normal insolation does not include diffuse component.