

Table 5.18(b) Banded weather data: Birmingham

Hour	Dry-bulb / °C	Incident solar irradiation / W·m ⁻²									
		Horizontal		N		NE		E		SE	
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse
May											
1	12.05	0	0	0	0	0	0	0	0	0	0
2	11.05	0	0	0	0	0	0	0	0	0	0
3	10.44	0	0	0	0	0	0	0	0	0	0
4	10.25	0	0	0	0	0	0	0	0	0	0
5	10.51	23	35	73	40	168	59	165	58	65	38
6	11.19	79	76	61	65	234	101	270	109	148	83
7	12.24	156	119	7	83	241	132	334	152	231	130
8	13.61	232	162	0	97	190	151	336	183	284	172
9	15.18	299	204	0	123	108	161	292	202	304	205
10	16.86	351	241	0	145	12	161	214	209	291	227
11	18.54	385	267	0	160	0	160	113	202	247	234
12	20.09	396	277	0	166	0	166	0	166	176	224
13	21.41	385	267	0	160	0	160	0	160	87	196
14	22.41	351	241	0	145	0	145	0	145	0	145
15	23.02	299	204	0	123	0	123	0	123	0	123
16	23.21	232	163	0	97	0	97	0	97	0	97
17	22.95	156	119	7	83	0	70	0	70	0	70
18	22.27	80	76	61	66	0	43	0	43	0	43
19	21.21	23	35	74	40	0	18	0	18	0	18
20	19.85	0	0	0	0	0	0	0	0	0	0
21	18.27	0	0	0	0	0	0	0	0	0	0
22	16.59	0	0	0	0	0	0	0	0	0	0
23	14.92	0	0	0	0	0	0	0	0	0	0
24	13.37	0	0	0	0	0	0	0	0	0	0

Hour	Dry-bulb / °C	Incident solar irradiation / W·m ⁻²								Altitude	Azimuth
		S		SW		W		NW			
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse		
1	12.05	0	0	0	0	0	0	0	0	0	14.64
2	11.05	0	0	0	0	0	0	0	0	0	28.75
3	10.44	0	0	0	0	0	0	0	0	0	41.99
4	10.25	0	0	0	0	0	0	0	0	0	54.34
5	10.51	0	18	0	18	0	18	0	18	7.29	65.99
6	11.19	0	42	0	42	0	42	0	42	15.95	77.32
7	12.24	0	70	0	70	0	70	0	70	25.01	88.82
8	13.61	66	124	0	97	0	97	0	97	34.1	101.19
9	15.18	138	167	0	123	0	123	0	123	42.77	115.38
10	16.86	197	205	0	145	0	145	0	145	50.35	132.70
11	18.54	236	232	87	196	0	160	0	160	55.8	154.42
12	20.09	249	241	176	224	0	180	0	166	57.85	180.00
13	21.41	236	232	246	234	113	202	0	160	55.82	205.59
14	22.41	197	205	291	227	214	209	12	162	50.38	227.32
15	23.02	138	167	304	205	292	202	109	161	42.81	244.66
16	23.21	66	124	284	172	336	183	191	151	34.16	258.86
17	22.95	0	70	231	131	334	152	241	133	25.08	271.24
18	22.27	0	43	148	84	271	109	235	102	16.03	282.75
19	21.21	0	18	65	38	165	59	169	60	7.38	294.08
20	19.85	0	0	0	0	0	0	0	0	0	305.73
21	18.27	0	0	0	0	0	0	0	0	0	318.07
22	16.59	0	0	0	0	0	0	0	0	0	331.31
23	14.92	0	0	0	0	0	0	0	0	0	345.39
24	13.37	0	0	0	0	0	0	0	0	0	360.00

Dirfac = 0.53; Diffac = 0.95; Maximum dry-bulb = 23.21 °C; Minimum dry-bulb = 10.25 °C; Adaptive comfort range = 22.3–26.3 °C

Table continues

Table 5.18(b) Banded weather data: Birmingham — *continued*

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²									
		Horizontal		N		NE		E		SE	
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse
June											
1	14.22	0	0	0	0	0	0	0	0	0	0
2	13.27	0	0	0	0	0	0	0	0	0	0
3	12.72	0	0	0	0	0	0	0	0	0	0
4	12.62	1	11	19	11	31	16	25	13	4	3
5	12.98	24	54	60	52	129	69	123	67	45	48
6	13.76	67	100	52	82	175	111	195	116	102	94
7	14.91	119	149	14	106	172	145	229	159	152	140
8	16.36	170	199	0	108	136	170	227	193	185	182
9	18.01	214	248	0	134	80	188	196	218	196	218
10	19.75	249	291	0	158	16	198	143	233	187	245
11	21.45	271	323	0	174	0	174	75	235	157	258
12	23.00	279	335	0	181	0	181	0	181	110	253
13	24.30	271	323	0	174	0	174	0	174	50	228
14	25.25	249	291	0	158	0	158	0	158	0	158
15	25.80	214	248	0	134	0	134	0	134	0	134
16	25.90	170	199	0	108	0	108	0	108	0	108
17	25.54	119	149	14	106	0	80	0	80	0	80
18	24.76	67	100	52	82	0	52	0	52	0	52
19	23.61	24	54	60	52	0	27	0	27	0	27
20	22.16	1	11	19	11	0	5	0	5	0	5
21	20.51	0	0	0	0	0	0	0	0	0	0
22	18.77	0	0	0	0	0	0	0	0	0	0
23	17.07	0	0	0	0	0	0	0	0	0	0
24	15.52	0	0	0	0	0	0	0	0	0	0

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²								Altitude	Azimuth
		S		SW		W		NW			
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse		
1	14.22	0	0	0	0	0	0	0	0	0	14.10
2	13.27	0	0	0	0	0	0	0	0	0	27.74
3	12.72	0	0	0	0	0	0	0	0	0	40.60
4	12.62	0	5	0	5	0	5	0	5	2.07	52.66
5	12.98	0	27	0	27	0	27	0	27	9.84	64.09
6	13.76	0	52	0	52	0	52	0	52	18.39	75.21
7	14.91	0	80	0	80	0	80	0	80	27.39	86.52
8	16.36	35	144	0	108	0	108	0	108	36.5	98.70
9	18.01	82	188	0	134	0	134	0	134	45.28	112.77
10	19.75	121	227	0	158	0	158	0	158	53.07	130.22
11	21.45	146	255	50	228	0	174	0	174	58.78	152.73
12	23.00	155	266	110	253	0	181	0	181	60.96	180.00
13	24.30	146	255	157	258	75	235	0	174	58.78	207.27
14	25.25	121	227	187	245	143	233	16	198	53.07	229.78
15	25.80	82	188	196	218	196	218	80	188	45.28	247.23
16	25.90	35	144	185	182	227	193	136	170	36.5	261.30
17	25.54	0	80	152	140	229	159	172	145	27.39	273.48
18	24.76	0	52	102	94	195	116	175	111	18.39	284.79
19	23.61	0	27	45	48	123	67	129	69	9.84	295.91
20	22.16	0	5	4	3	25	13	31	16	2.07	307.33
21	20.51	0	0	0	0	0	0	0	0	0	319.39
22	18.77	0	0	0	0	0	0	0	0	0	332.26
23	17.07	0	0	0	0	0	0	0	0	0	345.90
24	15.52	0	0	0	0	0	0	0	0	0	360.00

Dirfac = 0.36; Diffac = 1.09; Maximum dry-bulb = 25.91 °C; Minimum dry-bulb = 12.61 °C; Adaptive comfort range = 23.3–27.3 °C

Table continues

Table 5.18(b) Banded weather data: Birmingham — *continued*

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²									
		Horizontal		N		NE		E		SE	
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse
July											
1	16.81	0	0	0	0	0	0	0	0	0	0
2	15.55	0	0	0	0	0	0	0	0	0	0
3	14.69	0	0	0	0	0	0	0	0	0	0
4	14.29	0	0	0	0	0	0	0	0	0	0
5	14.37	20	40	64	44	147	64	145	63	57	42
6	14.94	68	89	52	74	204	111	236	119	130	93
7	15.94	136	140	5	95	211	147	294	168	204	145
8	17.32	203	191	0	107	167	170	296	203	252	192
9	18.98	262	241	0	136	95	183	257	226	270	230
10	20.80	308	284	0	160	9	186	189	236	258	255
11	22.66	337	315	0	177	0	177	100	231	219	265
12	24.44	348	326	0	184	0	184	0	184	157	254
13	26.02	337	315	0	177	0	177	0	177	78	224
14	27.27	308	284	0	160	0	160	0	160	0	160
15	28.13	261	240	0	136	0	136	0	136	0	136
16	28.53	202	191	0	107	0	107	0	107	0	107
17	28.45	135	139	5	95	0	77	0	77	0	77
18	27.89	68	88	52	73	0	47	0	47	0	47
19	26.88	19	39	64	43	0	20	0	20	0	20
20	25.50	0	0	0	0	0	0	0	0	0	0
21	23.85	0	0	0	0	0	0	0	0	0	0
22	22.02	0	0	0	0	0	0	0	0	0	0
23	20.16	0	0	0	0	0	0	0	0	0	0
24	18.38	0	0	0	0	0	0	0	0	0	0

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²								Altitude	Azimuth
		S		SW		W		NW			
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse		
1	16.81	0	0	0	0	0	0	0	0	0	14.68
2	15.55	0	0	0	0	0	0	0	0	0	28.82
3	14.69	0	0	0	0	0	0	0	0	0	42.10
4	14.29	0	0	0	0	0	0	0	0	0	54.48
5	14.37	0	20	0	20	0	20	0	20	7.07	66.16
6	14.94	0	47	0	47	0	47	0	47	15.73	77.51
7	15.94	0	77	0	77	0	77	0	77	24.78	89.05
8	17.32	60	142	0	107	0	107	0	107	33.85	101.44
9	18.98	124	190	0	136	0	136	0	136	42.49	115.66
10	20.80	176	232	0	160	0	160	0	160	50.03	132.97
11	22.66	210	262	78	224	0	177	0	177	55.44	154.60
12	24.44	222	273	157	254	0	209	0	184	57.45	180.00
13	26.02	210	262	219	265	100	230	0	177	55.42	205.39
14	27.27	176	232	258	255	189	236	9	186	50.00	227.00
15	28.13	124	190	270	229	258	226	94	182	42.45	244.30
16	28.53	60	142	252	192	296	203	167	170	33.80	258.50
17	28.45	0	77	204	145	294	168	211	147	24.71	270.89
18	27.89	0	47	130	93	235	119	203	111	15.65	282.42
19	26.88	0	20	57	42	144	63	147	64	6.97	293.77
20	25.50	0	0	0	0	0	0	0	0	0	305.45
21	23.85	0	0	0	0	0	0	0	0	0	317.83
22	22.02	0	0	0	0	0	0	0	0	0	331.12
23	20.16	0	0	0	0	0	0	0	0	0	345.29
24	18.38	0	0	0	0	0	0	0	0	0	360.00

Dirfac = 0.47; Diffac = 1.13; Maximum dry-bulb = 28.56 °C; Minimum dry-bulb = 14.26 °C; Adaptive comfort range = 24.00–28.00 °C

Table continues

Table 5.18(b) Banded weather data: Birmingham — *continued*

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²									
		Horizontal		N		NE		E		SE	
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse
August											
1	14.41	0	0	0	0	0	0	0	0	0	0
2	13.89	0	0	0	0	0	0	0	0	0	0
3	13.71	0	0	0	0	0	0	0	0	0	0
4	13.88	0	0	0	0	0	0	0	0	0	0
5	14.38	0	0	0	0	0	0	0	0	0	0
6	15.19	16	49	12	38	81	54	103	59	64	50
7	16.25	51	100	0	51	103	95	159	109	123	100
8	17.49	93	150	0	78	84	125	176	148	164	145
9	18.81	130	197	0	103	42	146	158	176	181	182
10	20.14	159	236	0	124	0	124	117	192	177	208
11	21.38	178	263	0	138	0	138	62	196	154	221
12	22.45	184	273	0	143	0	143	0	143	116	217
13	23.27	178	263	0	138	0	138	0	138	66	197
14	23.79	159	236	0	123	0	123	0	123	12	164
15	23.97	130	196	0	102	0	102	0	102	0	102
16	23.81	92	149	0	77	0	77	0	77	0	77
17	23.30	51	99	0	50	0	50	0	50	0	50
18	22.49	15	48	12	37	0	23	0	23	0	23
19	21.43	0	0	0	0	0	0	0	0	0	0
20	20.20	0	0	0	0	0	0	0	0	0	0
21	18.87	0	0	0	0	0	0	0	0	0	0
22	17.54	0	0	0	0	0	0	0	0	0	0
23	16.30	0	0	0	0	0	0	0	0	0	0
24	15.24	0	0	0	0	0	0	0	0	0	0

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²								Altitude	Azimuth
		S		SW		W		NW			
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse		
1	14.41	0	0	0	0	0	0	0	0	0	16.31
2	13.89	0	0	0	0	0	0	0	0	0	31.83
3	13.71	0	0	0	0	0	0	0	0	0	46.15
4	13.88	0	0	0	0	0	0	0	0	0	59.27
5	14.38	0	0	0	0	0	0	0	0	0	71.49
6	15.19	0	24	0	24	0	24	0	24	8.67	83.28
7	16.25	14	73	0	51	0	51	0	51	17.78	95.18
8	17.49	57	118	0	78	0	78	0	78	26.70	107.86
9	18.81	99	161	0	103	0	103	0	103	34.96	122.09
10	20.14	134	197	12	164	0	124	0	124	41.90	138.72
11	21.38	156	221	66	197	0	138	0	138	46.67	158.26
12	22.45	164	230	116	217	0	186	0	143	48.39	180.00
13	23.27	156	221	154	221	62	196	0	138	46.65	201.73
14	23.79	134	197	177	208	117	192	0	123	41.85	221.24
15	23.97	99	160	182	182	158	175	41	146	34.89	237.85
16	23.81	57	118	164	145	175	147	84	125	26.61	252.07
17	23.30	15	73	123	99	159	108	102	94	17.66	264.73
18	22.49	0	23	64	50	102	59	81	54	8.53	276.62
19	21.43	0	0	0	0	0	0	0	0	0	288.39
20	20.20	0	0	0	0	0	0	0	0	0	300.60
21	18.87	0	0	0	0	0	0	0	0	0	313.73
22	17.54	0	0	0	0	0	0	0	0	0	328.07
23	16.30	0	0	0	0	0	0	0	0	0	343.63
24	15.24	0	0	0	0	0	0	0	0	0	360.00

Dirfac = 0.29; Diffac = 1.13; Maximum dry-bulb = 23.97 °C; Minimum dry-bulb = 13.71 °C; Adaptive comfort range = 22.8–26.8 °C

Table continues

Table 5.18(b) Banded weather data: Birmingham — *continued*

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²									
		Horizontal		N		NE		E		SE	
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse
September											
1	12.34	0	0	0	0	0	0	0	0	0	0
2	12.33	0	0	0	0	0	0	0	0	0	0
3	12.61	0	0	0	0	0	0	0	0	0	0
4	13.17	0	0	0	0	0	0	0	0	0	0
5	13.96	0	0	0	0	0	0	0	0	0	0
6	14.92	0	1	0	0	1	1	1	1	1	1
7	16.00	12	54	0	26	40	48	72	56	61	54
8	17.12	36	104	0	51	39	84	101	99	104	100
9	18.21	61	150	0	74	15	109	99	131	125	138
10	19.18	80	187	0	93	0	93	76	151	128	164
11	19.98	93	212	0	106	0	106	41	159	115	178
12	20.54	98	221	0	110	0	110	0	110	90	178
13	20.84	93	212	0	106	0	106	0	106	57	163
14	20.84	80	187	0	93	0	93	0	93	20	136
15	20.56	60	149	0	74	0	74	0	74	0	74
16	20.00	35	104	0	51	0	51	0	51	0	51
17	19.22	12	53	0	25	0	25	0	25	0	25
18	18.25	0	0	0	0	0	0	0	0	0	0
19	17.17	0	0	0	0	0	0	0	0	0	0
20	16.05	0	0	0	0	0	0	0	0	0	0
21	14.97	0	0	0	0	0	0	0	0	0	0
22	13.99	0	0	0	0	0	0	0	0	0	0
23	13.20	0	0	0	0	0	0	0	0	0	0
24	12.63	0	0	0	0	0	0	0	0	0	0

Hour	Dry-bulb /°C	Incident solar irradiation / W·m ⁻²								Altitude	Azimuth
		S		SW		W		NW			
		Direct	Diffuse	Direct	Diffuse	Direct	Diffuse	Direct	Diffuse		
1	12.34	0	0	0	0	0	0	0	0	0	18.61
2	12.33	0	0	0	0	0	0	0	0	0	35.96
3	12.61	0	0	0	0	0	0	0	0	0	51.48
4	13.17	0	0	0	0	0	0	0	0	0	65.29
5	13.96	0	0	0	0	0	0	0	0	0	77.90
6	14.92	0	0	0	0	0	0	0	0	0.12	89.91
7	16.00	15	42	0	26	0	26	0	26	9.18	101.92
8	17.12	46	85	0	51	0	51	0	51	17.83	114.54
9	18.21	78	126	0	74	0	74	0	74	25.6	128.37
10	19.18	104	158	20	136	0	93	0	93	31.91	143.91
11	19.98	121	180	57	163	0	106	0	106	36.1	161.32
12	20.54	127	188	90	178	0	154	0	110	37.57	180.00
13	20.84	121	180	115	178	41	159	0	106	36.07	198.68
14	20.84	105	158	128	164	76	151	0	93	31.85	216.06
15	20.56	78	125	125	137	99	130	14	109	25.51	231.58
16	20.00	46	85	103	99	100	99	38	83	17.72	245.39
17	19.22	15	42	61	53	71	56	40	48	9.05	257.98
18	18.25	0	0	0	0	0	0	0	0	0	269.97
19	17.17	0	0	0	0	0	0	0	0	0	281.96
20	16.05	0	0	0	0	0	0	0	0	0	294.56
21	14.97	0	0	0	0	0	0	0	0	0	308.37
22	13.99	0	0	0	0	0	0	0	0	0	323.90
23	13.20	0	0	0	0	0	0	0	0	0	341.30
24	12.63	0	0	0	0	0	0	0	0	0	360.00

Dirfac = 0.20; Diffac = 1.17; Maximum dry-bulb = 20.88 °C; Minimum dry-bulb = 12.3 °C; Adaptive comfort range = 22.2–26.2 °C