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ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



ภาคผนวก

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

ภาคผนวก ก.

ภาพรวมสถานการณ์พลังงานในปัจจุบันและการบริโภคพลังงานในอาคาร^๑

การผลิตและการใช้ไฟฟ้าของประเทศไทย

เศรษฐกิจของประเทศไทยในช่วงแผนพัฒนาฯ ฉบับที่ ๖ ขยายตัวสูงมากด้วยอัตราเฉลี่ย ๑๐.๕% ต่อปี ทำให้ความต้องการไฟฟ้าเพิ่มสูงขึ้นมากถึงปีละ ๑๔-๑๕% ติดต่อกัน กล่าวคือความต้องการใช้ไฟฟ้าเพิ่มขึ้นจาก ๔,๑๘๐ เมกะวัตต์ในปี ๒๕๒๙ เป็นกว่า ๘,๐๐๐ เมกะวัตต์ในปี ๒๕๓๔

ในเดือนกันยายน ๒๕๓๔ คณะทำงานพยากรณ์ความต้องการไฟฟ้าได้ทำการประมาณการไว้ว่าความต้องการไฟฟ้าในช่วงแผนพัฒนาฯ ฉบับที่ ๗ จะเพิ่มขึ้นเฉลี่ยต่อปี ๑๐๐๖ เมกะวัตต์ หรือเฉลี่ยประมาณ ๑๐.๒% ต่อปี คือเพิ่มขึ้นเป็น ๑๓,๐๗๕ เมกะวัตต์ในปี ๒๕๓๙

ความต้องการใช้ไฟฟ้าสูงสุดในปัจจุบัน (เมื่อวันที่ ๑๔ ธันวาคม ๒๕๓๕) คือ ๘,๙๐๓.๕ เมกะวัตต์ ในขณะที่ กฟผ. มีโรงไฟฟ้าในระบบรวม ๑๑,๖๔๐.๕๐ เมกะวัตต์

ในปี ๒๕๓๔ มีการใช้ไฟฟ้าสูงสุด ๘,๐๔๕ เมกะวัตต์ และใช้พลังงานไฟฟ้ารวมทั้งสิ้น ๔๒,๐๖๒ ล้านหน่วย โดยใช้ไปในภาคต่างๆดังนี้

ภาคอุตสาหกรรม	๔๖.๗%
ภาคธุรกิจ	๒๕.๔%
ภาคที่อยู่อาศัย	๒๑.๑%
อื่นๆ	๖.๘%

^๑ วิโรจน์ นพคุณ, ภาพรวมสถานการณ์พลังงาน และการบริโภคพลังงานในอาคาร (การไฟฟ้าฝ่ายผลิตแห่งประเทศไทย, ๒๕๓๖), หน้า ๑-๓.

คาดว่าในปี ๒๕๔๙ การใช้ไฟฟ้าสูงสุดจะเพิ่มขึ้นเป็น ๒๕,๕๑๕ เมกกะวัตต์ และการใช้พลังงานไฟฟ้าในภาคต่างๆ รวมทั้งสิ้นจะสูงถึง ๑๔๔,๔๓๓ ล้านหน่วย โดยแยกตามภาคผู้ใช้ไฟฟ้าได้ดังนี้

ภาคอุตสาหกรรม	๔๖.๕%
ภาคธุรกิจ	๒๗.๕%
ภาคที่อยู่อาศัย	๒๑.๕%
อื่นๆ	๔.๕%

ลักษณะการใช้ไฟฟ้าในรอบวัน

ลักษณะการใช้ไฟฟ้าของระบบไฟฟ้าทั้งประเทศในชั่วโมงต่างๆ ในรอบวันจะไม่สม่ำเสมอ โดยสามารถแบ่งออกได้เป็น ๓ ช่วงดังนี้

๑. ช่วงที่มีการใช้ไฟฟ้าสูงสุด (Peak Period) คือช่วงเวลาหัวค่ำ (๑๘.๓๐ - ๒๑.๓๐ น.)

๒. ช่วงที่มีการใช้ไฟฟ้าปานกลาง (Partial-Peak Period) คือช่วงเวลากลางวัน (๘.๐๐ - ๑๘.๓๐ น.)

๓. ช่วงที่มีการใช้ไฟฟ้าน้อย (Off-Peak Period) คือช่วงเวลาดึก (๒๑.๓๐ - ๐๘.๐๐ น.)

ซึ่งการใช้ไฟฟ้าจะลดลงต่ำสุดในช่วงเวลาดึก เหลือประมาณ ๖๐% ของช่วงเวลาหัวค่ำเท่านั้น

ถึงแม้ว่าการใช้ไฟฟ้าของระบบไฟฟ้าทั้งประเทศจะไม่สม่ำเสมอ แต่เนื่องจาก กฟผ.ต้องสนองความต้องการการใช้ไฟฟ้าให้เพียงพอตลอดเวลา และเนื่องจากพลังไฟฟ้าเมื่อผลิตจากโรงงานไฟฟ้าแล้วไม่สามารถกักเก็บ (Stock) ไว้ใช้ในชั่วโมงอื่นๆที่ต้องการได้ ดังนั้น กฟผ. จึงจำเป็นต้องจัดหาโรงไฟฟ้ามาผลิตไฟฟ้าให้เพียงพอต่อความต้องการใช้ไฟฟ้าในช่วงเวลาหัวค่ำและอีกประการหนึ่ง

โรงไฟฟ้ามีความจำเป็นต้องหยุดการเดินเครื่องเพื่อตรวจสอบและบำรุงรักษาตามกำหนดเป็นประจำ และถึงแม้จะมีการบำรุงรักษาอย่างดีแล้วก็ตาม ยังมีโอกาสเกิดขัดข้องในกรณีฉุกเฉิน (Forced Shut-down) ดังนั้นจึงจำเป็นต้องจัดให้มีโรงไฟฟ้าส่วนหนึ่งเพิ่มจากความต้องการใช้ไฟฟ้าสูงสุดที่คาดการณ์ไว้ ซึ่งเรียกว่า "กำลังผลิตไฟฟ้าสำรองของระบบ" เพื่อมิให้เกิดความเสียหายต่อระบบเศรษฐกิจและสังคม ซึ่งการสร้างโรงไฟฟ้าเพิ่มแต่ละโรงนั้นจะต้องใช้เงินลงทุนสูง ประกอบกับจะต้องมีปัจจัยที่เอื้ออำนวยต่อการผลิต นอกจากนั้นยังมีปัญหาและอุปสรรคนานาประการ

ตามแผนพัฒนากำลังการผลิตไฟฟ้าของ กฟผ. คาดว่าจะต้องใช้เงินลงทุนในช่วง ๕ ปีของแผนพัฒนาฯ ฉบับที่ ๗ สูงถึง ๒๕๐,๐๐๐ ล้านบาท เพื่อให้ประชาชนมีไฟฟ้าใช้อย่างมั่นคงเพียงพอ และสม่ำเสมอ

ตามประมาณการของคณะทำงานพยากรณ์ความต้องการไฟฟ้า ในปี ๒๕๔๙ หรืออีก ๑๕ ปีข้างหน้า ความต้องการไฟฟ้าจะสูงถึง ๒๕,๕๑๕ เมกะวัตต์ เมื่อคิดอัตราค่าลงทุนก่อสร้างเฉพาะโรงไฟฟ้าอย่างเดียวไม่รวมระบบสายส่งและสายระบบจำหน่ายในราคาของปี ๒๕๓๔ ซึ่งเป็นประมาณ ๒๕ ล้านบาทต่อเมกะวัตต์แล้ว ต้องใช้เงินลงทุนเพื่อก่อสร้างโรงไฟฟ้าให้เพียงพอในช่วงแผนพัฒนาฯ ฉบับที่ ๘ คิดเป็นเงินสูงถึง ๕๑๐,๐๐๐ ล้านบาท หากรวมระบบสายส่งไฟฟ้าด้วย จะสูงกว่านี้อีกเกือบเท่าตัว ซึ่งนับว่าเป็นภาระการลงทุนที่สูงมาก ทำให้รัฐบาลไม่สามารถนำเงินไปพัฒนาประเทศในด้านอื่นๆ ได้

ความต้องการไฟฟ้าในปัจจุบันส่วนหนึ่งเกิดจากการใช้พลังงานไฟฟ้าอย่างไม่มีประสิทธิภาพ เนื่องจากการใช้เครื่องใช้ไฟฟ้าประสิทธิภาพต่ำที่มีขายอยู่ในท้องตลาด ผู้ใช้ไฟฟ้าบางส่วน ยังไม่มีจิตสำนึกในเรื่องการประหยัดพลังงานไฟฟ้า โรงงานอุตสาหกรรมขนาดเล็กยังไม่มี การจัดการหรือบริหารการผลิตที่ดีเท่าที่ควร และอัตราค่าไฟฟ้ายังไม่สามารถกำหนดให้สะท้อนต้นทุนที่แท้จริงในแต่ละช่วงเวลาของวันสำหรับผู้บริโภคไฟฟ้าทุกกลุ่มได้

ดังนั้น จึงจำเป็นต้องมีมาตรการในการควบคุมสนับสนุนและส่งเสริม ให้มีการใช้พลังงานไฟฟ้าอย่างมีประสิทธิภาพ เป็นระบบอย่างมีแบบแผนที่เหมาะสม

ภาคผนวก ข.

ข้อมูลสืบจากการทดลอง



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

A REDUCTION OF HEAT GAIN IN BUILDINGS THROUGH ROOFS

TEST I : TEST OF VENTILATION



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

DATA-COLLECTED PERIOD :
MARCH 15-19,1994.

emlin

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
1	hr	min	sec	tic of 3 Temp	middle of 3 Temp	Terpic of 5 Temp	Surf of 5 Temp	middle of 5 Temp	Surf of 1 Temp	tic of 1 Temp	middle of 1 Temp	Terpic of 2 Temp	inside Air Temp	Terpic of 4 Temp	middle of 2 Temp	Surf of 2 Temp	Surf of 4 Temp	middle of 4 Temp	Radiation	Wind Speed	Weather Condition	Remark
1	6	0	0	23 614	23 841	23 647	23 987	23 841	23 906	23 501	23 744	23 663	23 469	23 614	23 906	24 003	23 987	23 89	0.00654	0	Clear Sky	mar15 1994
2	6	15	0	23 563	23 838	23 644	23 984	23 838	23 919	23 515	23 742	23 677	23 418	23 612	23 867	23 984	24	23 867	0.00654	0	Clear Sky	
3	6	30	0	23 644	23 822	23 644	24	23 838	23 919	23 531	23 741	23 644	23 547	23 677	23 867	23 984	23 968	23 871	0.02514	0.21	Clear Sky	
4	6	45	0	23 69	23 836	23 625	24 014	23 868	23 965	23 544	23 755	23 69	23 809	23 674	23 884	23 965	23 965	23 868	0.07843	0.01	Clear Sky	
5	7	0	0	23 663	23 858	23 728	24 036	23 89	23 967	23 615	23 777	23 744	23 793	23 728	23 89	23 955	23 971	23 89	0.19608	0.49	Clear Sky	
6	7	15	0	23 761	23 89	23 761	24 052	23 923	23 971	23 632	23 793	23 793	24 052	23 81	23 907	23 955	23 971	23 89	0.5098	0.07	Clear Sky	
7	7	30	0	23 884	23 981	24 029	24 094	23 997	24 013	23 803	23 851	24 013	24 514	24 029	23 964	24 013	24 045	23 997	0.96078	0.14	Clear Sky	
8	7	45	0	24 202	24 105	24 299	24 17	24 137	24 056	24 024	23 976	24 299	25 026	24 283	24 089	24 121	24 137	24 153	1.0784	0.33	Clear Sky	
9	8	0	0	24 596	24 319	24 723	24 319	24 335	24 174	24 416	24 174	24 691	25 514	24 703	24 287	24 303	24 348	24 348	1.2678	0.1	Clear Sky	
10	8	15	0	25 035	24 631	25 132	24 583	24 648	24 405	24 857	24 47	25 035	26 002	24 922	24 551	24 551	24 583	24 615	1.8468	0.26	Clear Sky	
11	8	30	0	25 582	24 937	25 534	24 86	24 969	24 663	25 34	24 776	25 502	26 033	25 324	24 824	24 824	24 856	24 921	2.5155	0.32	Clear Sky	
12	8	45	0	26 164	25 277	26 244	25 181	25 326	24 955	26 003	25 132	26 003	27 402	25 793	25 132	25 116	25 161	25 213	3.4899	0.4	Clear Sky Sunny	
13	9	0	0	27 038	25 799	26 942	25 638	25 848	25 364	26 861	25 638	26 733	27 471	26 636	25 525	25 525	25 654	25 654	3.4899	0.4	Clear Sky Sunny	
14	9	15	0	28 226	26 492	28 338	26 187	26 476	25 897	28 114	26 293	27 521	29 267	27 344	26 01	25 992	26 25	26 282	3.495	0.96	Clear Sky Sunny	
15	9	30	0	28 986	27 303	29 433	26 885	27 287	26 564	29 242	27 128	28 265	29 178	27 928	26 627	26 595	26 981	26 981	3.2985	0.42	Clear Sky Sunny	
16	9	45	0	30 527	28 114	30 495	27 649	28 13	27 328	30 702	28 001	29 569	30 24	29 106	27 279	27 231	27 728	27 728	4.4938	0.09	Clear Sky Sunny	
17	10	0	0	31 014	28 987	31 046	28 491	29 051	28 171	31 778	28 875	29 882	30 823	29 802	27 948	27 898	28 507	28 523	4.2769	0.44	Clear Sky Sunny	
18	10	15	0	31 808	29 743	32 45	29 296	29 839	28 992	32 879	29 727	30 732	30 493	30 015	26 64	26 623	29 216	29 216	4.6613	0.31	Clear Sky Sunny	
19	10	30	0	33 551	30 692	33 694	30 23	30 868	29 896	34 58	30 709	31 981	32 14	31 075	29 418	29 401	30 023	30 007	6.9463	0.35	Clear Sky Sunny	
20	10	45	0	34 193	31 847	35 221	31 291	32 055	30 925	35 804	31 848	32 325	31 784	31 339	30 388	30 384	31 053	31 069	2.7933	0.06	Clear Sky Sunny	
21	11	0	0	35 575	32 571	36 457	32 206	32 904	31 84	37 574	32 713	33 87	33 624	32 635	31 19	31 237	31 842	31 762	8.6917	0.33	Clear Sky Sunny	
22	11	15	0	36 027	33 752	37 206	33 374	34 165	32 978	38 649	33 896	34 939	33 991	33 465	32 249	32 248	32 835	32 835	4.4038	0.16	Clear Sky Sunny	
23	11	30	0	36 673	34 309	37 615	34 198	34 767	33 835	39 339	34 53	35 004	33 851	34 072	32 885	33 012	33 407	33 376	5.2324	0.15	Clear Sky Sunny	
24	11	45	0	36 828	34 913	37 447	35 008	35 449	34 677	40 044	35 276	35 274	34 011	33 837	33 584	33 742	33 948	33 9	4.2661	0.23	Clear Sky Sunny	
25	12	0	0	36 917	35 328	37 907	35 596	35 895	35 375	40 303	35 785	35 532	34 241	34 573	34 162	34 383	34 336	34 273	4.5785	0.71	Clear Sky Sunny	
26	12	15	0	37 714	35 797	38 012	36 175	36 395	35 986	40 592	36 319	36 822	36 004	34 98	34 712	34 964	34 759	34 696	5.1377	0.2	Clear Sky Sunny	
27	12	30	0	38 831	36 4	39 066	36 777	37 032	36 589	41 78	36 89	37 503	36 565	35 758	35 238	35 537	35 238	35 159	8.4355	0.69	Clear Sky Sunny	
28	12	45	0	39 006	37 157	41 081	37 549	37 878	37 878	42 807	37 675	38 207	36 387	36 434	36 009	36 387	35 978	36 009	5.0913	1.03	Clear Sky Sunny	
29	13	0	0	39 84	37 743	40 354	38 213	38 48	38 053	42 936	38 272	38 198	36 896	36 346	36 629	36 99	36 55	36 472	4.6733	0.41	Clear Sky Sunny	
30	13	15	0	39 663	38 052	41 284	38 694	38 772	38 584	43 065	38 547	38 271	36 608	36 231	36 969	37 456	36 812	36 718	3.884	0.23	Clear Sky Sunny	
31	13	30	0	39 722	38 253	41 448	39 078	39 015	39 015	43 156	38 972	38 592	36 46	36 496	37 276	37 809	36 978	36 884	2.8739	0.14	Clear Sky Sunny	
32	13	45	0	39 327	38 327	40 42	39 347	39 143	39 363	42 927	39 144	38 487	35 882	36 484	37 422	38 049	37 029	36 92	2.4177	0.29	Clear Sky Sunny	
33	14	0	0	39 295	38 216	38 826	39 436	39 014	39 498	41 991	39 061	37 511	34 637	36 129	37 385	38 059	36 867	36 773	4.0339	0.31	Clear Sky Sunny	
34	14	15	0	39 736	38 063	39 705	39 33	38 783	39 502	42 259	38 924	38 267	37 091	36 243	37 232	38	36 75	36 62	3.7732	0.31	Clear Sky Sunny	
35	14	30	0	39 514	38 122	40 575	39 327	38 795	39 596	42 162	38 936	38 67	36 789	36 616	37 26	38 012	36 742	36 647	3.3692	0.46	Clear Sky Sunny	
36	14	45	0	39 213	38 134	40 383	39 338	38 807	39 604	41 878	38 916	37 601	35 952	36 471	37 24	38 024	36 785	36 69	3.4278	0.18	Clear Sky Sunny	
37	15	0	0	38 588	38 181	39 823	39 417	38 865	39 618	41 843	38 928	37 079	34 877	36 058	37 268	38 052	36 86	36 828	2.8343	1.1	Clear Sky Sunny	
38	15	15	0	39 549	38 063	40 501	39 35	38 736	39 58	41 855	38 614	37 236	37 738	36 278	37 201	38 008	36 812	36 687	3.2584	0.53	Clear Sky Sunny	
39	15	30	0	38 666	38 134	39 416	39 369	38 807	39 635	41 661	38 685	37 209	35 432	36 109	37 287	38 04	36 848	36 753	2.7236	0.16	Partly Cloudy Sunny	
40	15	45	0	39 217	38 028	39 935	39 295	38 685	39 561	41 571	38 748	37 808	36 396	36 459	37 181	38 001	36 757	36 663	2.6067	0.42	Partly Cloudy Sunny	
41	16	0	0	39 117	37 965	40 201	39 233	38 623	39 545	41 4	38 717	37 844	35 783	36 742	37 201	37 965	36 757	36 73	2.5676	0.21	Partly Cloudy Sunny	
42	16	15	0	39 537	37 973	39 522	39 194	38 599	39 522	41 361	38 693	38 286	35 759	37 017	37 205	37 989	36 812	36 718	2.535	0.98	Partly Cloudy Sunny	
43	16	30	0	39 194	38 005	39 881	39 163	38 537	39 491	41 21	38 662	37 817	35 401	36 31	37 205	38 005	36 86	36 765	2.0525	0.17	Partly Cloudy Sunny	
44	16	45	0	39 019	37 877	39 722	39 082	38 425	39 425	40 954	38 534	37 528	36 401	36 087	37 171	37 97	36 857	36 716	2.1571	0.35	Partly Cloudy Sunny	
45	17	0	0	39 245	37 664	39 854	38 885	38 248	39 3	40 825	38 405	37 872	39 296	36 574	37 072	37 841	36 747	36 537	1.7918	0.34	Partly Cloudy Sunny	
46	17	15	0	38 362	37 485	38 487	38 785	38 096	39 222	40 611	38 393	37 83	36 747	37 108	37 108	37 861	36 716	36 669	1.4076	0.4	Partly Cloudy Sunny	
47	17	30	0	38 377	37 249	38 631	38 628	37 794	39 159	40 202	38 248	37 527	35 721	36 586	36 963	37 762	36 554	36 444	0.82783	0.12	Partly Cloudy Sunny	
48	17	45	0	37 617	36 926	38 775	38 337	37 366	38 916	39 619	37 867	37 523	34 644	36 502	36 828	37 472	36 262	36 093	0.56044	0.04	Cloudy	
49	18	0	0	37 58	36 528	37 502	37 956	36 89	38 614	38 833	37 341	36 022	31 58	35 675	37 09	35 912	35 754	0.28719	0.1	Cloudy		
50	18	15	0	36 599	35 891	37 054	37 431	36 19	38 121	37 87	36 599	35 765	30 637	34 977	35 483	36 518	35 369	35 148	0.08475	0.03	Cloudy	
51	18	30	0	35 906	35 213	36 079	36 819	35 481	37 509	36 928	35 628	34 643	29 74	34 248	34 785	35 935	34 769	34 501	0.01956	0.0	Cloudy	
52	18	45	0	35 085	34 501	35 148	36 174	34 738	36 833	35 952	35 006	33 836	29 292	32 981	34 089	35 257	34 105	33 867	0.01304	0.26	Clear Sky	
53	19	0	0	34 349	33 764	34 507	35 422	33 986	36 099	35 123	34 223	33 638	29 028									

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
67	22	15	0	28 709	28 965	28 549	29 684	28 965	29 923	28 885	28 309	26 497	28 117	28 757	29 284	28 789	28 561	0.00653	0.69	Clear Sky		
68	22	30	0	28 484	28 724	28 26	29 395	28 692	29 587	28 612	28 564	28 116	26 464	28 02	28 468	28 964	28 484	28 388	0.00653	0.17	Clear Sky	
69	22	45	0	28 371	28 451	27 907	29 138	28 451	29 267	28 339	28 307	27 795	26 125	27 731	28 259	28 787	28 291	28 211	0.00653	0.18	Clear Sky	
70	23	0	0	27 859	28 179	27 89	28 85	28 179	28 963	27 939	28 051	27 65	26 221	27 41	28 019	28 467	28 035	27 89	0.00653	0.13	Clear Sky	
71	23	15	0	27 794	27 964	27 681	28 531	27 938	28 674	27 697	27 601	25 915	27 361	27 778	28 227	27 826	27 746	0.01958	0	Partly Cloudy Foggy		
72	23	30	0	27 569	27 713	27 505	28 29	27 682	28 386	27 393	27 537	27 264	25 819	27 136	27 553	27 966	27 569	27 505	0.00653	0	Partly Cloudy Foggy	
73	23	45	0	27 297	27 49	27 217	28 019	27 474	28 114	27 185	27 361	27 153	25 449	26 88	27 377	27 81	27 442	27 41	0.01305	0	Partly Cloudy Foggy	
74	0	0	0	27 138	27 347	26 93	27 78	27 25	27 86	26 881	27 122	26 961	25 353	26 785	27 202	27 62	27 266	27 202	0.00653	0.02	Partly Cloudy Foggy	mar 16 1994
75	0	15	0	26 98	27 125	26 691	27 542	27 029	27 59	26 659	26 883	26 691	25 243	26 515	26 997	27 382	27 051	27 029	0.00653	0	Partly Cloudy Foggy	
76	0	30	0	26 695	26 936	26 534	27 321	26 639	27 369	26 47	26 711	26 47	25 021	26 309	26 839	27 176	26 871	26 823	0.01305	0	Partly Cloudy Foggy	
77	0	45	0	26 444	26 733	26 267	27 102	26 62	27 118	26 219	26 492	26 09	24 948	26 041	26 637	27 006	26 701	26 637	0.00653	0	Partly Cloudy Foggy	
78	1	0	0	26 309	26 532	26 098	26 869	26 419	26 918	26 001	26 275	26 243	24 777	25 905	26 458	26 821	26 5	26 484	0.00653	0	Partly Cloudy Foggy	
79	1	15	0	26 068	26 41	25 911	26 683	26 249	26 699	25 815	26 104	26 068	24 703	25 863	26 345	26 683	26 345	26 261	0.01306	0	Partly Cloudy Foggy	
80	1	30	0	25 952	26 241	25 662	26 466	26 064	26 499	25 694	25 92	25 903	24 679	25 694	26 177	26 482	26 209	26 177	0.01306	0	Partly Cloudy Foggy	
81	1	45	0	25 767	26 121	25 589	26 298	25 96	26 314	25 477	25 783	25 686	24 654	25 606	26 024	26 33	26 073	26 008	0.00653	0	Partly Cloudy Foggy	
82	2	0	0	25 741	25 985	25 438	26 175	25 854	26 146	25 339	25 647	25 678	24 419	25 452	25 937	26 21	25 953	25 935	0.01306	0	Partly Cloudy Foggy	
83	2	15	0	25 573	25 879	25 299	26 008	25 686	25 992	25 203	25 509	25 492	24 558	25 38	25 815	26 121	25 831	25 783	0.00653	0	Partly Cloudy Foggy	
84	2	30	0	25 501	25 759	25 195	25 888	25 582	25 888	25 082	25 421	25 453	24 631	25 244	25 71	25 952	25 71	25 678	0.00653	0	Partly Cloudy Foggy	
85	2	45	0	25 396	25 702	25 089	25 782	25 509	25 75	24 993	25 332	25 235	24 944	25 282	25 605	25 847	25 622	25 573	0.00653	0	Partly Cloudy Foggy	
86	3	0	0	25 337	25 658	25 047	25 659	25 418	25 66	24 918	25 24	25 225	24 644	25 176	25 547	25 724	25 547	25 531	0.00653	0	Partly Cloudy Foggy	
87	3	15	0	25 263	25 552	25 037	25 585	25 359	25 569	24 827	25 182	25 15	24 375	25 053	25 472	25 665	25 488	25 472	0.01306	0	Partly Cloudy Foggy	
88	3	30	0	25 112	25 433	24 904	25 512	25 286	25 466	24 77	25 079	25 028	24 353	24 982	25 369	25 579	25 402	25 369	0.01306	0	Partly Cloudy Foggy	
89	3	45	0	25 052	25 328	24 892	25 424	25 215	25 407	24 73	25 037	25 102	24 795	25 068	25 295	25 488	25 311	25 263	0.00653	0	Clear Sky	
90	4	0	0	25 106	25 315	24 816	25 347	25 17	25 331	24 717	25 009	25 057	24 573	25 041	25 283	25 444	25 315	25 267	0	0	Clear Sky	
91	4	15	0	25 011	25 302	24 816	25 317	25 157	25 286	24 721	25 011	24 963	24 625	24 98	25 237	25 431	25 285	25 254	0.00653	0.07	Clear Sky	
92	4	30	0	25 035	25 26	24 76	25 291	25 131	25 244	24 743	24 986	24 825	24 597	24 857	25 18	25 355	25 26	25 228	0.00653	0.35	Clear Sky	
93	4	45	0	24 865	25 236	24 688	25 269	25 091	25 22	24 607	24 946	24 736	24 316	24 752	25 107	25 268	25 236	25 172	0.01306	0	Clear Sky	
94	5	0	0	24 746	25 134	24 714	25 198	25 005	25 182	24 537	24 659	24 682	24 439	24 714	25 005	25 182	25 134	25 069	0.00653	0.41	Cloudy Foggy	
95	5	15	0	24 595	25 015	24 595	25 112	24 683	25 08	24 418	24 708	24 563	24 349	24 627	24 87	25 063	24 983	24 918	0.00653	0.01	Cloudy Foggy	
96	5	30	0	24 537	24 908	24 456	25 054	24 828	25 005	24 311	24 667	24 408	24 279	24 618	24 795	24 989	24 925	24 847	0.00653	0.01	Cloudy Foggy	
97	5	45	0	24 466	24 821	24 369	24 95	24 741	24 918	24 24	24 563	24 385	24 111	24 515	24 724	24 886	24 837	24 773	0.00653	0.13	Cloudy Foggy	
98	6	0	0	24 363	24 75	24 217	24 879	24 669	24 863	24 185	24 524	24 298	24 039	24 476	24 653	24 798	24 766	24 734	0.00653	0.2	Cloudy Foggy	
99	6	15	0	24 351	24 674	24 141	24 82	24 594	24 787	24 077	24 432	24 206	23 989	24 206	24 577	24 723	24 707	24 642	0.01306	0.2	Cloudy Foggy	
100	6	30	0	24 155	24 542	24 058	24 704	24 446	24 656	23 88	24 268	24 139	23 783	24 09	24 448	24 623	24 589	24 51	0.00653	0.19	Cloudy Foggy	
101	6	45	0	24 133	24 44	24 068	24 585	24 31	24 569	23 907	24 181	23 971	24 085	24 133	24 343	24 505	24 456	24 391	0.19598	0.2	Cloudy Foggy	
102	7	0	0	24 16	24 386	24 095	24 499	24 322	24 499	23 934	24 16	24 031	24 546	24 225	24 269	24 449	24 402	24 338	0.36583	0.21	Clear Sky	
103	7	15	0	24 615	24 47	24 195	24 502	24 356	24 453	23 952	24 211	24 358	25 018	24 437	24 324	24 421	24 459	24 405	0.49641	0.23	Clear Sky	
104	7	30	0	24 615	24 658	24 594	24 511	24 479	24 497	24 269	24 35	24 592	25 01	24 949	24 415	24 479	24 608	24 592	1.6982	0.24	Clear Sky	
105	7	45	0	25 718	25 009	25 009	24 638	24 654	24 656	24 912	24 719	24 799	27 037	25 59	24 622	24 638	24 944	24 977	2.2669	0.26	Clear Sky	
106	8	0	0	26 684	25 558	25 622	24 912	24 929	25 074	26 007	25 444	25 572	27 646	26 409	24 879	24 815	25 427	25 476	2.9005	0.2	Clear Sky	
107	8	15	0	27 821	26 296	26 682	25 362	25 427	25 733	27 084	26 296	25 62	26 687	27 196	25 185	25 089	26 087	26 152	3.5135	0.26	Clear Sky Sunny	
108	8	30	0	29 263	27 213	28 175	26 12	26 152	26 537	28 511	27 324	26 618	29 822	28 174	25 62	25 475	26 939	26 971	4.0888	0.45	Clear Sky Sunny	
109	8	45	0	30 754	28 31	29 909	27 123	27 107	27 428	30 1	28 405	27 363	31 024	29 365	26 142	25 95	27 877	27 989	4.7862	0.25	Clear Sky Sunny	
110	9	0	0	32 275	29 488	31 576	28 256	28 432	31 575	29 552	27 904	32 021	30 413	26 748	26 524	28 96	29 072	5.3738	0.04	Clear Sky Sunny		
111	9	15	0	33 416	30 619	32 354	29 487	29 583	29 471	33 163	30 652	29 184	31 225	31 448	27 374	27 166	30 03	30 158	5.6266	0.92	Clear Sky Sunny	
112	9	30	0	34 726	31 764	34 252	30 873	30 826	30 475	34 758	31 669	30 762	33 525	32 67	28 08	27 903	31 033	31 129	6.2522	0.57	Clear Sky Sunny	
113	9	45	0	35 517	32 861	35 802	32 163	32 067	31 545	36 589	32 767	31 561	33 844	32 969	28 914	28 786	32 037	32 116	6.7993	0.2	Clear Sky Sunny	
114	10	0	0	36 441	33 934	37 25	33 38	33 349	32 604	37 998	33 808	33 159	34 661	33 586	29 652	29 772	33 002	33 032	7.3885	0.86	Clear Sky Sunny	
115	10	15	0	38 156	35 057	38 045	34 678	34 631	33 778	39 392	34 994	35 183	33 967	35 577	31 002	30 954	34 015	34 062	8 03	0.21	Clear Sky Sunny	
116	10	30	0	39 286	36 071	39 412	35 85	35 85	34 886	41 533	36 07	36 136	36 404	36 592	32 185	32 154	34 97	34 954	8 4983	0.44	Clear Sky Sunny	
117	10	45	0	40 659	37 171	40 955	37 155	37 088	36 051	43 241	37 33	37 641	37 5	37 613	33 47	33 438	35 994	35 979	8 7237	0.67	Clear Sky Sunny	
118	11	0	0	41 21	38 118	41 987	38 243	38 227	37 208	44 144	38 228	38 133	38 322	37 6	34 643	34 694	36 878	36 819	9 2894	0.47	Clear Sky Sunny	
119	11	15	0	41 039	39 073	43 058	39 339	39 339	38 401	45 224	39 354	38 651	35 275	37 209	35 858	35 968	37 696	37 601	2 6914	0.58	Clear Sky Sunny	
120	11	30	0	40 578	39 346	41 43	39 643	39 746	39 331	45 433	39 673	38 69	36 343	38 22	36 542	36 809	37 86	37 84				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
133	14	45	0	44.371	44.276	48.48	44.958	45.313	46.406	50.132	45.636	43.335	41.79	41.162	43.031	43.985	41.677	41.976	6.2165	0.3	Partly Cloudy Sunny		
134	15	0	0	46.307	44.596	46.276	45.383	45.706	46.661	50.642	46.015	44.503	40.968	41.715	43.343	44.209	42.134	42.274	6.6211	0.39	Partly Cloudy Sunny		
135	15	15	0	44.714	45.007	47.702	45.795	46.067	46.948	50.701	46.348	43.2	39.733	41.927	43.694	44.545	42.626	42.765	5.8398	0.07	Partly Cloudy Sunny		
136	15	30	0	46.508	45.192	46.994	45.055	46.332	47.147	51.14	46.562	43.724	40.906	42.439	43.894	44.713	42.895	42.966	5.6445	1.04	Partly Cloudy Sunny		
137	15	45	0	45.444	45.458	45.996	46.368	46.845	47.413	50.917	46.86	43.141	42.769	41.683	44.193	44.965	43.172	43.219	5.2205	0.65	Partly Cloudy Sunny		
138	16	0	0	45.569	45.56	46.822	46.554	46.883	47.629	51.238	47.114	44.798	41.017	42.369	44.418	45.175	43.39	43.444	4.5045	0.63	Partly Cloudy Sunny		
139	16	15	0	45.289	45.351	46.333	46.383	46.721	47.75	50.482	47.013	43.553	38.201	41.926	44.326	45.19	43.181	43.367	3.6367	0.64	Partly Cloudy Sunny		
140	16	30	0	44.231	44.725	45.782	45.706	46.067	47.528	48.975	46.382	42.8	37.44	41.155	43.884	44.842	42.661	42.831	1.2889	0.81	Dark Sky		
141	16	45	0	42.151	43.639	43.252	44.612	45.03	47.031	47.445	45.368	40.877	34.67	38.966	42.982	44.128	41.726	41.85	0.6901	1.38	Dark Sky Windy		
142	17	0	0	38.757	42.045	38.998	42.944	43.491	46.254	43.997	43.966	36.574	29.989	34.676	41.65	43.026	40.12	40.339	0.32557	0.18	Rainy		
143	17	15	0	38.345	39.619	37.773	40.161	40.815	44.614	40.192	41.357	34.499	28.176	33.39	39.423	41.076	37.719	37.985	-0.01954	58	Lightly Rainy Dark Sky		
144	17	30	0	34.537	37.339	34.503	37.712	38.276	42.581	38.214	38.793	32.511	27.589	31.416	37.069	38.916	35.447	35.825	0.1108	63.18	Stormy		
145	17	45	0	30.724	35.113	30.629	35.317	35.962	40.569	34.749	36.514	30.102	25.136	28.649	34.69	36.669	33.405	33.594	0.02608	54.44	Heavy Rainy Dark Sky		
146	18	0	0	30.695	32.671	30.169	33.061	33.632	38.324	32.982	34.043	28.908	25.283	27.483	32.665	34.406	31.092	31.426	0.16311	43.36	Lightly Rainy		
147	18	15	0	29.62	31.452	29.269	31.58	32.056	36.404	31.198	32.942	27.733	24.372	27.573	31.118	32.723	29.748	29.987	0.11095	0.61	Lightly Rainy Dark Sky		
148	18	30	0	29.815	30.276	29.097	30.39	30.788	34.69	30.597	30.699	27.64	24.406	27.479	29.879	31.393	28.761	28.969	0.03264	0.13	Lightly Rainy Cloudy		
149	18	45	0	28.567	29.431	28.935	29.542	29.894	33.297	29.75	29.862	27.862	24.403	26.948	29.015	30.368	28.055	28.248	0.02612	0.22	Cloudy		
150	19	0	0	28.34	28.789	28.596	28.91	29.205	32.153	29.188	29.125	27.314	24.417	26.543	28.374	29.589	27.54	27.684	-0.02612	0.0	Lightly Rainy Cloudy		
151	19	15	0	28.03	28.304	27.903	28.463	28.718	31.21	28.64	28.608	26.908	24.412	26.731	27.903	28.976	27.229	27.342	-0.0849	0.08	Lightly Rainy Cloudy		
152	19	30	0																	0	Stop Raining		
153	19	45	0																	0	Stop Raining		
154	20	0	0	27.389	27.43	27.157	27.542	27.719	29.368	27.638	27.558	26.9	25.37	26.448	27.154	27.908	26.752	26.752	0	0	Cloudy		
155	20	15	0	27.299	27.33	27.21	27.33	27.474	28.692	27.265	27.233	26.749	25.22	26.444	26.926	27.835	26.668	26.651	0.613	0	0	Cloudy	
156	20	30	0	27.276	27.262	26.555	27.262	27.358	28.447	27.196	27.132	26.409	25.088	25.377	26.875	27.42	26.665	26.649	0	0	0	Cloudy	
157	20	45	0	26.929	27.186	26.897	27.17	27.283	28.163	26.88	27.006	26.558	25.673	26.239	26.848	27.312	26.621	26.631	0	0	0.17	Cloudy	
158	21	0	0	26.974	27.134	26.909	27.085	27.182	27.904	26.828	26.871	26.521	26.164	26.538	26.783	27.211	26.616	26.684	0	0	0	Clear Sky	
159	21	15	0	26.932	27.012	26.841	27.023	27.088	27.648	26.748	26.782	26.472	26.423	26.486	26.762	27.062	26.645	26.101	0	0	0	Clear Sky	
160	21	30	0	26.926	27.994	26.821	26.946	27.042	27.453	26.218	26.665	26.471	25.878	26.438	26.693	27.021	26.661	26.621	0	0	0	Clear Sky	
161	21	45	0	26.783	26.91	26.686	26.894	26.942	27.312	26.492	26.572	26.363	25.96	26.233	26.852	26.957	26.604	26.572	0	0.01	0	Clear Sky	
162	22	0	0	26.685	26.814	26.621	26.83	26.878	27.214	26.443	26.507	26.314	25.912	26.33	26.588	26.693	26.556	26.572	0	0	0	Clear Sky	
163	22	15	0	26.636	26.748	26.491	26.732	26.797	27.07	26.292	26.427	26.29	26.057	26.069	26.571	26.844	26.508	26.522	0	0.18	0	Clear Sky	
164	22	30	0	26.605	26.669	26.38	26.589	26.653	26.91	26.154	26.299	26.251	25.687	26.218	26.524	26.764	26.411	26.443	0	0	0	Clear Sky	
165	22	45	0	26.399	26.544	26.159	26.447	26.511	26.753	25.997	26.142	25.961	25.481	25.965	26.399	26.656	26.28	26.286	0	0	0	Clear Sky	
166	23	0	0	26.179	26.388	26.066	26.308	26.388	26.629	25.793	26.035	25.986	25.592	25.712	26.292	26.565	26.179	26.27	0	0	0	Clear Sky	
167	23	15	0	25.398	26.162	25.251	26.049	26.114	26.402	25.581	25.791	25.773	25.777	25.692	26.615	26.367	25.997	26.025	0	0	0	Clear Sky	
168	23	30	0	25.65	26.021	25.543	25.913	25.977	26.219	25.413	25.655	25.671	25.283	25.557	26.007	26.28	25.91	25.941	0.625	0	0	Clear Sky	
169	23	45	0	25.611	25.921	25.471	25.793	25.841	26.098	25.276	25.518	25.421	25.303	25.372	25.687	26.144	25.791	25.838	0.653	0	0	Clear Sky	
170	0	0	0	25.47	25.758	25.307	25.63	25.72	25.967	25.145	25.419	25.301	25.161	25.257	25.773	26.046	26.692	25.723	0.653	0	0	Clear Sky	Mar17 1994
171	0	15	0	25.337	25.626	25.193	25.531	25.594	25.868	25.041	25.305	25.304	25.207	25.158	25.642	25.813	25.571	25.61	0.653	0	0	Clear Sky	
172	0	30	0	25.169	25.408	25.057	25.396	25.444	25.476	25.717	25.185	25.104	25.121	25.282	25.072	25.524	25.465	25.508	0.653	0	0	Clear Sky	
173	0	45	0	25.109	25.415	24.996	25.338	25.366	25.624	24.802	25.092	25.106	25.641	24.962	25.446	25.655	25.396	25.414	0.653	0	0	Clear Sky	
174	1	0	0	24.902	25.291	24.904	25.227	25.259	25.518	24.806	25.032	24.981	25.337	24.853	25.319	25.529	25.271	25.272	0.653	0	0	Clear Sky	
175	1	15	0	24.924	25.198	24.792	25.181	25.196	25.409	24.662	24.986	25.083	25.404	24.985	25.277	25.468	25.243	25.258	0.653	0	0	Clear Sky	
176	1	30	0	24.794	25.15	24.745	25.116	25.132	25.358	24.648	24.939	24.874	25.663	24.807	25.257	25.451	25.209	25.257	0.653	0	0	Clear Sky	
177	1	45	0	24.699	25.07	24.681	25.069	25.084	25.309	24.632	24.907	24.793	25.487	24.825	25.181	25.341	25.163	25.179	0.653	0	0	Clear Sky	
178	2	0	0	24.841	25.099	24.712	25.05	25.067	25.276	24.566	24.906	24.938	24.889	24.873	25.163	25.325	25.18	25.194	0.653	0	0	Clear Sky	
179	2	15	0	24.807	25.065	24.613	25.001	25.049	25.241	24.532	24.871	24.951	25.128	24.903	25.193	25.337	25.177	25.207	0.653	0	0	Clear Sky	
180	2	30	0	24.661	25.188	24.808	25.012	25.044	25.203	24.495	24.809	24.79	24.82	24.967	25.162	25.331	25.212	25.309	0.653	0	0	Clear Sky	
181	2	45	0	24.742	25.08	24.613	24.968	24.984	25.145	24.484	24.774	24.887	25.032	24.921	25.082	25.228	25.163	25.195	0	0	0	Clear Sky	
182	3	0	0	24.749	25.073	24.605	24.96	24.962	25.107	24.463	24.754	24.722	24.865	24.917	25.08	25.205	25.141	25.147	0.653	0	0	Clear Sky	
183	3	15	0	24.635	25.025	24.625	24.948	24.964	25.109	24.514	24.772	24.714	24.934	24.825	25.045	25.174	25.129	25.161	0.653	0	0	Clear Sky	
184	3	30	0	24.755	24.998	24.59	24.912	24.943	25.058	24.427	24.763	24.844	24.907	24.857	25.05	25.145	25.113	25.114	0	0	0	Clear Sky	
185	3	45	0	24.95	25.062	24.573	24.912	24.915	25.04	24.381	24.747	24.815	25.135	24.91	25.055	25.152	25.12	25.118	0	0	0	Clear Sky	
186	4	0	0	24.887	25.097	24.59	24.919	24.935	25.032	24.402	24.725	24.855	25.266	24.932	25.08	25.145	25.129	25.113	0	0	0	Clear Sky	
187	4	15	0	24.918	25.077	24.593	24.916	24.932	25.027	2													

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
199	7	15	0	25.063	24.966	24.965	24.835	24.868	24.832	24.557	24.668	24.957	25.618	25.053	24.878	24.957	24.955	24.673	60.745	0	Clear Sky	
200	7	30	0	25.249	25.167	25.166	25.02	25.068	24.938	24.825	24.858	25.195	25.822	25.306	25.031	25.096	25.096	25.014	75.102	0.34	Clear Sky	
201	7	45	0	25.504	25.391	25.44	25.199	25.261	25.083	25.116	24.035	25.374	25.92	25.501	25.195	25.26	25.308	25.3	11.944	0.43	Clear Sky	
202	8	0	0	25.997	25.562	25.836	25.385	25.401	25.224	25.482	25.256	25.659	26.48	25.822	25.353	25.417	25.482	25.498	1.9922	0.14	Clear Sky	
203	8	15	0	26.815	25.963	26.831	25.706	25.768	25.559	26.414	25.721	26.172	27.441	26.623	25.577	25.608	25.786	25.651	3.0694	0.05	Clear Sky	
204	8	30	0	27.83	26.561	27.862	26.224	26.24	26.063	27.445	26.433	26.754	28.088	27.445	25.934	25.949	26.352	26.4	3.5527	0.04	Clear Sky	
205	8	45	0	28.945	27.326	28.706	26.926	26.926	26.717	28.609	27.263	27.424	28.641	28.401	26.363	25.331	27.038	27.038	2.1874	0.03	Clear Sky Sunny	
206	9	0	0	29.925	28.103	29.574	27.766	27.75	27.478	29.622	28.103	28.15	29.143	29.095	26.851	26.803	27.782	27.75	5.6732	0.01	Clear Sky Sunny	
207	9	15	0	31.067	28.769	31.29	28.513	28.497	28.192	30.828	28.801	29.152	30.493	30.015	27.343	27.343	28.433	28.4	5.6732	0.01	Clear Sky Sunny	
208	9	30	0	32.421	29.443	32.564	29.651	29.619	29.124	32.564	29.507	30.337	30.975	31.452	28.036	28.068	29.364	29.364	5.6602	0.05	Clear Sky Sunny	
209	9	45	0	33.449	30.94	33.734	30.892	30.876	30.175	34.24	31.052	31.529	31.465	32.482	29.53	29.962	30.368	30.367	6.7885	1.16	Clear Sky Sunny	
210	10	0	0	34.547	31.98	35.305	32.028	32.028	31.249	35.809	32.171	32.647	32.124	32.902	29.864	29.944	31.361	31.346	6.4741	0.09	Clear Sky Sunny	
211	10	15	0	35.748	32.903	35.607	33.093	33.157	32.316	37.195	33.188	33.663	32.395	34.042	30.806	30.934	32.221	32.189	5.1876	0.49	Clear Sky Sunny	
212	10	30	0	36.651	33.662	36.865	33.964	34.043	33.252	38.074	33.96	33.996	32.982	34.059	31.665	31.808	32.935	32.903	7.0135	0.7	Clear Sky Sunny	
213	10	45	0	37.064	34.37	37.866	34.78	34.844	34.149	39.478	34.812	35.144	33.911	35.081	32.486	32.676	33.532	33.548	8.7722	1.29	Clear Sky Sunny	
214	11	0	0	38.163	35.318	38.837	35.869	35.964	35.176	41.136	35.654	36.784	33.786	35.73	33.467	33.662	34.42	34.458	8.7722	1.29	Clear Sky Sunny	
215	11	15	0	39.065	36.288	40.472	38.902	37.012	36.242	42.605	36.918	37.761	34.034	36.745	34.462	34.713	35.249	35.296	8.6613	0.76	Clear Sky Sunny	
216	11	30	0	39.838	37.034	41.957	37.772	37.898	37.239	44.254	37.804	38.603	34.689	37.662	35.367	35.666	35.934	35.981	9.7946	0.12	Clear Sky Sunny	
217	11	45	0	40.607	37.824	41.479	38.608	38.779	38.263	44.876	38.67	38.904	34.046	37.792	36.253	36.645	36.615	36.694	4.4727	0.43	Clear Sky Sunny	
218	12	0	0	40.445	38.288	42.593	39.118	39.353	39.055	45.087	39.243	38.555	34.088	37.99	36.908	37.442	37.018	37.19	7.4523	0.67	Clear Sky Sunny	
219	12	15	0	40.423	38.595	42.833	39.549	39.798	39.751	45.512	39.768	39.361	34.665	38	37.435	38.03	37.247	37.294	7.7836	0.22	Cloudy	
220	12	30	0	41.278	38.765	42.224	39.75	40.044	40.343	46.231	40.187	39.281	35.197	36.818	37.791	38.48	37.339	37.402	7.4641	0.4	Rainy Cloud	
221	12	45	0	41.913	39.012	43.264	39.904	40.231	40.824	46.278	40.496	40.075	35.229	38.074	38.074	38.857	37.368	37.446	6.5765	0.33	Rainy Cloud	
222	13	0	0	41.895	39.448	44.176	40.245	40.587	41.32	46.952	40.9	40.914	35.673	38.87	38.463	39.34	37.664	37.79	7.5346	1.34	Rainy Cloud	
223	13	15	0	42.644	40.013	43.032	40.794	41.121	41.852	47.906	41.416	41.432	36.097	38.498	39.014	39.859	38.06	38.232	9.2227	0.04	Rainy Cloud	
224	13	30	0	42.652	40.661	44.557	41.456	41.783	42.517	48.27	42.078	42.171	35.92	38.992	39.632	40.506	38.585	38.71	7.5216	0.73	Rainy Cloud	
225	13	45	0	43.644	41.112	44.417	41.968	42.294	43.024	49.036	42.558	43.12	36.973	39.588	40.196	41.069	39.041	39.135	9.332	0.75	Rainy Cloud	
226	14	0	0	43.768	41.658	44.758	42.574	42.917	43.676	49.573	43.227	42.513	36.483	40.552	40.864	41.69	39.601	39.726	6.4907	0.41	Rainy Cloud	
227	14	15	0	42.959	42.013	44.615	43.053	43.383	44.229	49.583	43.766	42.307	35.394	39.535	41.374	42.214	39.953	40.094	6.6015	0.41	Rainy Cloud	
228	14	30	0	43.755	42.063	45.501	43.181	43.552	44.606	49.329	43.987	42.311	35.918	39.914	41.613	42.483	39.961	40.024	7.1619	0.14	Rainy Cloud	
229	14	45	0	42.611	42.13	45.365	43.401	43.757	44.948	49.407	44.284	42.425	35.578	40.199	41.928	42.781	40.059	40.183	6.0867	0.45	Rainy Cloud	
230	15	0	0	42.249	42.078	44.851	43.49	43.846	45.191	49.22	44.45	42.404	34.784	40.366	42.109	42.932	40.054	40.148	2.6719	0.09	Rainy Cloud	
231	15	15	0	42.347	41.834	43.975	43.417	43.77	45.366	49.211	44.501	42.16	35.498	38.934	42.207	43.014	39.982	40.133	5.1222	0.31	Rainy Cloud	
232	15	30	0	40.444	41.612	44.402	43.225	43.597	45.375	48.483	44.357	41.844	34.578	38.589	42.077	42.9	39.741	39.866	4.6139	0.39	Rainy Cloud	
233	15	45	0	40.975	41.207	43.259	42.918	43.289	45.299	47.794	44.126	40.787	34.8	37.991	41.877	42.716	39.462	39.634	4.1512	0.23	Rainy Cloud	
234	16	0	0	40.418	40.866	43.062	42.472	42.876	45.074	46.954	43.728	40.496	34.615	37.808	41.54	42.41	39.013	39.22	3.9107	0.26	Rainy Cloud	
235	16	15	0	39.943	40.146	42.683	42.154	42.542	44.85	46.531	43.411	40.13	33.612	37.188	41.268	42.123	38.614	38.865	3.2198	0.26	Rainy Cloud	
236	16	30	0	39.525	39.557	41.114	41.643	42.05	44.515	45.857	42.932	39.663	33.679	36.658	40.868	41.72	38.13	38.334	2.8287	1.22	Rainy Cloud	
237	16	45	0	38.409	38.881	40.848	40.986	41.39	44.078	44.898	42.354	39.288	33.169	36.576	40.349	41.254	37.562	37.796	2.2425	0.19	Rainy Cloud	
238	17	0	0	37.738	38.161	39.819	40.275	40.661	43.584	43.877	41.768	38.13	32.578	35.726	39.768	40.739	37	37.283	1.7927	1.21	Rainy Cloud	
239	17	15	0	36.708	37.382	39.386	39.355	39.779	42.966	42.735	41.009	37.684	32.317	35.368	39.074	40.12	36.344	36.598	1.2779	0.69	Rainy Cloud	
240	17	30	0	35.791	36.672	37.85	38.447	38.836	42.267	41.754	40.149	36.861	32.315	34.593	38.273	39.368	35.681	35.854	0.73688	0.01	Clear Sky	
241	17	45	0	35.094	35.977	36.637	37.501	37.909	41.472	40.162	39.177	35.11	32.612	33.641	37.391	38.521	35.031	35.252	0.50212	0.27	Clear Sky	
242	18	0	0	34.57	35.264	35.989	36.602	36.995	40.58	39.157	38.077	34.758	31.05	33.161	36.459	37.621	34.268	34.473	0.13694	1.04	Clear Sky	
243	18	15	0	33.274	34.492	35.044	35.691	36.069	39.599	37.828	37.074	33.97	30.352	32.339	35.58	36.745	33.638	33.796	0.07174	0.14	Clear Sky	
244	18	30	0	32.876	33.716	34.126	34.79	35.153	38.611	36.555	36.035	33.414	30.015	31.829	34.695	35.846	32.876	33.019	-0.01957	0.74	Clear Sky	
245	18	45	0	32.252	32.997	33.282	33.994	34.342	37.849	35.762	35.1	32.315	29.753	31.219	33.899	34.989	32.22	32.379	-0.0261	0.09	Clear Sky	
246	19	0	0	31.736	32.435	32.467	33.323	33.64	36.763	34.54	34.256	31.926	29.49	30.749	33.132	34.176	31.64	31.831	0.03915	0.13	Clear Sky	
247	19	15	0	31.154	31.933	32.393	32.727	32.996	35.919	33.771	33.566	31.409	29.145	30.294	32.566	33.533	31.185	31.392	-0.01305	0.46	Clear Sky	
248	19	30	0	30.903	31.507	31.555	32.191	32.46	35.15	33.253	32.967	31.157	29.148	30.138	32.032	32.92	30.791	30.903	-0.01305	0.34	Clear Sky	
249	19	45	0	30.92	31.111	31.318	31.731	31.969	34.441	32.747	32.414	30.681	29.118	30.044	31.804	32.414	30.474	30.586	0.01305	0.3	Clear Sky	
250	20	0	0	30.457	30.792	31.349	31.365	31.571	33.824	32.397	31.937	30.935	29.101	29.835	31.253	31.965	30.218	30.362	-0.00653	0.32	Clear Sky	
251	20	15	0	30.245	30.564	30.866	31.041	31.254	33.296	31.948	31.582	30.532	28.84	29.671	30.946	31.63	30.053	30.197	0.00653	0.29	Clear Sky	
252	20	30	0	30.114	30.321	30.353	30.752	30.943	32.802	31.468	31.213	30.194	28.82									

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
265	23	45	0	25 45	25 837	25 708	26 03	26 127	27 187	25 982	26 159	25 418	24 885	25 144	25 982	26 336	25 531	25 547	0.00653	0	Lightly Rainy	
266	0	0	0	25 454	25 722	25 657	25 699	25 98	26 912	25 819	25 979	25 352	24 981	25 142	25 819	26 124	25 448	25 448	0.03266	0	Lightly Rainy	mar18 1994
267	0	15	0	25 337	25 642	25 498	25 787	25 837	26 688	25 739	25 835	25 191	24 982	24 935	25 724	25 981	25 37	25 417	0.0196	0	Stop Raining Dark Sky	
268	0	30	0	25 254	25 528	25 399	25 656	25 736	26 429	25 51	25 673	25 173	24 931	24 851	25 808	25 85	25 318	25 302	-0.00653	0	Rainy Cloud	
269	0	45	0	25 201	25 458	25 361	25 555	25 638	26 231	25 297	25 555	25 216	25 429	25 152	25 539	25 764	25 281	25 249	-0.01306	0.38	Rainy Cloud	
270	1	0	0	25 177	25 389	25 257	25 499	25 58	26 095	25 29	25 483	25 178	25 209	24 984	25 487	25 677	25 258	25 273	-0.00653	0	Rainy Cloud	
271	1	15	0	25 019	25 342	25 164	25 424	25 486	25 953	25 116	25 373	24 986	25 019	24 841	25 406	25 585	25 212	25 228	0.01959	0.01	Rainy Cloud	
272	1	30	0	24 936	25 274	25 084	25 355	25 403	25 822	24 984	25 29	24 872	24 663	24 84	25 308	25 501	25 146	25 179	0	0	Rainy Cloud	
273	1	45	0	24 924	25 198	24 973	25 279	25 311	25 698	24 924	25 199	24 973	24 688	24 714	25 214	25 408	25 102	25 15	0.01306	0	Rainy Cloud	
274	2	0	0	24 763	25 104	24 847	25 12	25 169	25 553	24 86	25 069	24 782	25 053	24 733	25 134	25 298	25 007	24 875	-0.0196	0.01	Rainy Cloud	
275	2	15	0	24 74	25 046	24 806	25 079	25 112	25 432	24 79	24 967	24 789	24 967	24 741	25 078	25 225	24 55	24 933	-0.00653	0.08	Rainy Cloud	
276	2	30	0	24 612	24 965	24 755	24 997	25 032	25 306	24 658	24 9	24 612	24 502	24 457	24 967	25 142	24 887	24 868	-0.02613	0	Rainy Cloud	
277	2	45	0	24 492	24 847	24 603	24 88	24 942	25 216	24 508	24 78	24 554	24 151	24 345	24 877	25 038	24 78	24 78	0	0	Rainy Cloud	
278	3	0	0	24 327	24 698	24 359	24 746	24 795	25 069	24 343	24 633	24 391	24 213	24 246	24 763	24 924	24 666	24 666	0.00653	0	Rainy Cloud	
279	3	15	0	24 175	24 547	24 206	24 579	24 628	24 918	24 159	24 482	24 256	24 401	24 143	24 66	24 821	24 563	24 547	0.01306	0	Rainy Cloud	
280	3	30	0	24 028	24 432	24 077	24 448	24 481	24 771	24 012	24 352	24 206	24 267	24 093	24 56	24 721	24 465	24 463	0	0	Rainy Cloud	
281	3	45	0	24 018	24 374	23 986	24 374	24 406	24 664	23 921	24 26	24 083	23 937	23 953	24 454	24 616	24 39	24 422	0	0	Rainy Cloud	
282	4	0	0	23 932	24 271	23 948	24 271	24 303	24 546	23 818	24 158	24 158	24 206	24 012	24 368	24 513	24 304	24 287	0.0196	0.01	Rainy Cloud	
283	4	15	0	23 919	24 226	23 935	24 242	24 274	24 501	23 886	24 145	24 096	24 177	23 999	24 323	24 5	24 274	24 274	0.01307	0	Rainy Cloud	
284	4	30	0	23 993	24 297	23 942	24 268	24 313	24 51	23 847	24 203	24 121	24 138	23 993	24 365	24 493	24 329	24 332	0.02613	0.01	Rainy Cloud	
285	4	45	0	23 949	24 273	23 9	24 272	24 321	24 451	23 902	24 193	24 096	24 144	23 95	24 401	24 467	24 354	24 387	-0.01307	0.01	Rainy Cloud	
286	5	0	0	23 83	24 202	24 04	24 218	24 234	24 412	23 798	24 17	24 073	24 347	24 024	24 347	24 428	24 347	24 347	0.00653	0.15	Rainy Cloud	
287	5	15	0	23 782	24 127	23 912	24 17	24 219	24 348	23 734	24 122	23 976	24 788	24 138	24 316	24 38	24 33	24 268	-0.0196	0.23	Rainy Cloud	
288	5	30	0	23 831	24 171	23 992	24 202	24 235	24 348	23 799	24 123	23 993	24 494	24 074	24 316	24 396	24 332	24 284	0	0	Rainy Cloud	
289	5	45	0	23 841	24 151	23 922	24 197	24 245	24 296	23 776	24 1	24 019	24 474	24 116	24 296	24 361	24 342	24 296	0.00653	0.24	Rainy Cloud	
290	6	0	0	23 735	24 126	23 867	24 158	24 221	24 271	23 738	24 074	23 948	24 174	23 948	24 301	24 319	24 302	24 286	-0.00653	0.01	Cloudy Dark Sky Foggy	
291	6	15	0	23 827	24 12	23 813	24 15	24 201	24 255	23 699	24 04	23 927	23 991	23 894	24 25	24 298	24 25	24 234	-0.0392	0	Cloudy Dark Sky Foggy	
292	6	30	0	23 884	24 097	23 739	24 127	24 159	24 243	23 707	23 952	23 981	24 03	23 952	24 224	24 275	24 224	24 224	0.11106	0.01	Cloudy Dark Sky Foggy	
293	6	45	0	23 908	24 085	23 794	24 069	24 117	24 214	23 648	23 988	23 956	24 57	24 004	24 198	24 233	24 182	24 198	0.37237	0.01	Cloudy Dark Sky Foggy	
294	7	0	0	24 124	24 156	24 205	24 14	24 156	24 221	23 898	24 043	24 221	25 334	24 366	24 205	24 27	24 237	24 237	0.73167	0.12	Cloudy Dark Sky Foggy	
295	7	15	0	24 528	24 382	24 673	24 334	24 366	24 302	24 269	24 253	24 625	25 334	24 673	24 398	24 447	24 447	24 463	0.83619	0.22	Cloudy Dark Sky Foggy	
296	7	30	0	24 959	24 668	25 023	24 604	24 62	24 474	24 619	24 493	24 929	25 461	24 959	24 622	24 606	24 7	24 717	0.96031	0.3	Cloudy Lightly Sunny	
297	7	45	0	25 466	24 957	25 423	24 92	24 906	24 71	25 116	24 823	25 374	25 89	25 372	24 888	24 872	24 971	24 965	1.3327	0.18	Cloudy Lightly Sunny	
298	8	0	0	25 926	25 346	25 958	25 25	25 286	24 991	25 668	25 185	25 733	25 91	25 652	25 189	25 153	25 282	25 288	1.1171	0.29	Cloudy Lightly Sunny	
299	8	15	0	26 289	25 661	26 305	25 58	25 629	25 307	26 128	25 548	26 08	26 096	26 015	25 484	25 452	25 613	25 613	0.99298	0.18	Cloudy Lightly Sunny	
300	8	30	0	26 621	25 96	26 717	25 897	25 928	25 605	26 587	25 831	26 443	26 491	26 314	25 718	25 702	25 847	25 815	1.6985	0.17	Cloudy Lightly Sunny	
301	8	45	0	27 412	26 303	27 604	26 287	26 303	25 965	27 315	26 207	27 171	27 38	26 978	25 997	25 997	26 11	26 109	2.4694	0.01	Cloudy Lightly Sunny	
302	9	0	0	28 343	26 889	28 535	26 867	26 899	26 419	28 359	26 773	27 884	28 183	27 576	26 465	26 485	26 61	26 579	4.128	0.41	Cloudy Lightly Sunny	
303	9	15	0	30 174	27 759	30 636	27 743	27 775	27 133	30 173	27 695	29 296	29 375	28 943	27 068	27 052	27 357	27 357	4.8204	0.22	Cloudy Lightly Sunny	
304	9	30	0	31 281	28 968	31 831	29	29 032	28 119	32 124	28 952	30 518	29 495	30 277	27 879	27 879	28 488	28 503	6.3282	0.18	Cloudy Lightly Sunny	
305	9	45	0	33 131	30 254	33 971	30 302	30 286	29 248	33 688	30 206	31 194	30 477	30 923	28 769	28 8	29 663	29 631	4.3421	0.19	Cloudy Lightly Sunny	
306	10	0	0	33 308	31 196	34 116	31 292	31 276	30 24	34 779	31 196	31 69	30 384	31 578	29 618	29 714	30 543	30 543	2.2915	0.2	Cloudy Lightly Sunny	
307	10	15	0	34 356	31 852	35 209	31 995	32 027	31 121	35 778	31 885	32 932	30 547	32 106	30 324	30 452	31 168	31 153	3.3818	0.25	Cloudy Lightly Sunny	
308	10	30	0	36 08	32 809	37 087	32 984	33 015	32 08	37 685	32 873	34 772	33 57	33 57	31 142	31 317	31 889	31 889	9.0862	0.55	Partly Cloudy	
309	10	45	0	37 549	34 161	38 772	34 398	34 447	33 322	39 821	34 303	35 944	32 705	34 589	32 293	32 531	33 07	33 117	5.9315	0.15	Partly Cloudy	
310	11	0	0	37 967	35 165	39 499	35 481	35 513	34 455	40 048	35 244	35 339	31 141	34 487	33 284	33 522	34 044	34 044	1.6705	0.49	Dark Sky	
311	11	15	0	37 883	35 351	38 402	35 604	35 744	35 225	39 887	35 587	35 619	31 281	34 483	33 74	34 119	34 246	34 261	3.1778	0.14	Dark Sky	
312	11	30	0	37 665	35 515	38 688	35 782	35 971	35 72	40 081	35 83	36 066	32 7	34 947	34 046	34 552	34 331	34 394	5.5521	0.13	Dark Sky	
313	11	45	0	38 006	35 9	39 603	36 183	36 357	36 261	41 04	36 261	36 246	33 357	35 364	34 448	34 985	34 59	34 654	8.3706	0.23	Cloudy Sunny	
314	12	0	0	40 183	36 827	40 59	37 005	37 177	36 942	43 109	37 021	39 215	36 203	37 179	35 102	35 685	35 197	35 275	8.6954	0.23	Cloudy Sunny	
315	12	15	0	41 443	37 723	40 928	38 288	38 444	37 958	44 964	38 224	39 383	35 253	38 82	36 167	36 749	36 246	36 309	3.5029	1.09	Cloudy Lightly Sunny	
316	12	30	0	40 691	38 456	41 158	39 144	39 284	38 846	45 267	39 034	38 502	35 407	36 855	37 012	37 529	36 98	36 98	8.72	0.87	Cloudy Lightly Sunny	
317	12	45	0	42 427	39 28	42 194	39 967	40 186	39 781	46 989	39 952	40 545	35 513	39 061	37 808	38 403	37 557	37 651	3.0844	0.73	Cloudy Dark Sky	
318	13	0	0	41 987	39 852	42 981	40 414	40 648	40 617	45 827	40 598	40 538	33 393									

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V
331	16	15	0	37 457	38 299	40 113	39 441	39 799	41 39	42 882	39 987	38 11	33 005	35 769	38 298	39 19	36 745	36 902	2 954	0 45	Clear Sky Lightly Sunny	
332	16	30	0	37 741	37 818	40 088	39 181	39 524	41 162	42 577	39 838	37 897	33 455	35 996	38 132	38 948	36 405	36 578	3 2931	0 21	Clear Sky Sunny	
333	16	45	0	37 191	37 426	38 946	39 024	39 369	41 007	42 128	39 822	36 893	32 568	34 562	38 054	38 217	36 437	36 437	1 7411	0 42	Clear Sky Sunny	
334	17	0	0	36 594	36 893	38 653	38 508	38 651	40 743	41 35	39 417	31 961	34 609	37 756	38 524	35 823	36 028	0 67167	0 19	Clear Sky Sunny		
335	17	15	0	35 094	36 149	37 94	37 627	38 003	40 209	39 928	38 583	35 314	31 293	33 814	37 045	37 54	35 141	35 296	0 41089	0 15	Partly Cloudy Lightly Sunny	
336	17	30	0	34 804	35 324	36 127	36 647	37 024	39 516	38 843	37 558	35 103	30 856	33 253	36 174	37 275	34 441	34 661	0 56099	0 11	Partly Cloudy Lightly Sunny	
337	17	45	0	34 161	34 682	35 721	35 88	36 226	38 799	37 876	36 759	34 38	30 51	32 734	35 437	36 524	33 779	33 969	0 33258	0 96	Partly Cloudy Lightly Sunny	
338	18	0	0	33 376	34 151	34 814	35 194	35 525	38 119	36 926	36 028	33 344	30 15	32 186	34 798	35 887	33 264	33 453	0 15006	0 54	Dark Sky	
339	18	15	0	32 433	33 511	33 669	34 476	34 823	37 39	36 069	35 281	32 735	29 282	31 258	34 16	35 138	32 734	32 876	0 05219	0 58	Dark Sky Rainy Cloud	
340	18	30	0	31 507	32 682	31 84	33 538	33 885	36 583	34 755	34 408	30 998	28 349	29 675	33 3	34 249	31 92	32 031	0 01958	0 53	Dark Sky Rainy Cloud	
341	18	45	0	30 789	31 696	30 82	32 442	32 806	35 653	33 741	33 33	30 47	27 769	29 417	32 267	33 218	30 9	30 98	-0 00653	0 19	Dark Sky Rainy Cloud	
342	19	0	0	29 936	30 924	30 813	31 529	31 863	34 746	32 72	32 371	29 793	27 006	28 85	31 386	32 387	30 112	30 303	-0 01305	0 03	Dark Sky Rainy Cloud	
343	19	15	0	29 432	30 246	29 847	30 772	31 059	33 838	31 87	31 536	29 225	26 886	28 217	30 645	31 631	29 464	29 688	0 00653	0 43	Dark Sky Rainy Cloud	
344	19	30	0	29 142	29 685	29 973	30 148	30 404	33 026	31 2	30 802	29 43	26 45	27 959	30 021	30 961	28 951	29 143	0 00653	0 03	Dark Sky Rainy Cloud	
345	19	45	0	28 538	29 194	28 89	29 626	29 885	32 253	30 519	30 184	28 746	26 55	27 593	29 514	30 423	28 554	28 698	0 00653	0 04	Partly Cloudy	
346	20	0	0	28 136	28 792	28 584	29 176	29 415	31 584	29 959	29 655	28 232	26 575	27 478	29 064	29 879	28 2	28 328	0 00653	0 11	Partly Cloudy	
347	20	15	0	27 746	28 467	28 307	28 835	29 041	31 005	29 347	29 219	27 842	26 413	27 088	28 689	29 412	27 89	28 002	0	0 32	Partly Cloudy	
348	20	30	0	27 841	28 178	28 21	28 514	28 676	30 479	28 994	28 652	27 649	26 637	27 215	28 386	29 026	27 649	27 729	0 00653	0 32	Partly Cloudy	
349	20	45	0	27 588	27 988	28 117	28 277	28 421	30 035	28 709	28 596	27 636	26 84	27 235	28 133	28 709	27 491	27 571	-0 00653	0 05	Partly Cloudy	
350	21	0	0	27 532	27 821	27 82	28 083	28 221	29 661	28 3	28 334	27 548	26 794	27 083	27 949	28 446	27 372	27 484	0	0 02	Partly Cloudy	
351	21	15	0	27 408	27 665	27 681	27 889	28 002	29 298	28 194	28 098	27 232	26 702	26 814	27 745	27 232	27 28	27 28	0	0 01	Partly Cloudy	
352	21	30	0	27 071	27 504	27 167	27 712	27 825	28 978	27 889	27 873	26 99	26 331	26 524	27 584	27 985	27 103	27 183	0	0 05	Partly Cloudy	
353	21	45	0	26 768	27 314	27 011	27 458	27 587	28 676	27 587	27 835	26 816	25 931	26 43	27 378	27 763	26 944	26 991	-0 00653	0 21	Partly Cloudy	
354	22	0	0	26 703	27 073	26 72	27 2	27 298	28 371	27 294	27 346	26 703	25 819	26 253	27 121	27 506	26 752	26 816	0	0	Partly Cloudy	
355	22	15	0	26 318	26 816	26 478	26 912	27 041	28 036	26 977	27 073	26 289	25 867	25 883	26 896	27 282	26 543	26 623	0 00653	0 27	Partly Cloudy	
356	22	30	0	26 244	26 614	26 388	26 694	26 807	27 738	26 662	26 839	26 196	25 536	25 906	26 694	27 064	26 405	26 468	-0 00653	0	Partly Cloudy	
357	22	45	0	26 01	26 412	26 235	26 46	26 557	27 44	26 444	26 573	25 994	25 462	25 623	26 444	26 798	26 171	26 219	0	0	Partly Cloudy	
358	23	0	0	25 954	26 276	26 099	26 276	26 356	27 192	26 276	26 34	25 873	25 857	25 896	26 276	26 597	26 034	26 083	-0 02613	0 02	Partly Cloudy	
359	23	15	0	25 853	26 175	25 901	26 175	26 239	26 962	26 062	26 176	25 724	25 514	25 532	26 128	26 45	25 951	25 999	0 00653	0	Partly Cloudy	
360	23	30	0	25 728	26 05	25 78	26 018	26 082	26 741	25 905	26 018	25 663	25 728	25 47	26 018	26 307	25 857	25 873	0 01307	0	Partly Cloudy	
361	23	45	0	25 643	25 961	25 611	25 917	25 981	26 528	25 691	25 901	25 498	25 514	25 389	25 933	26 191	25 788	25 604	0	0 01	Partly Cloudy	
362	0	0	0	25 491	25 877	25 539	25 813	25 877	26 36	25 587	25 748	25 41	25 636	25 378	25 829	25 038	25 7	25 7	-0 0196	0	Partly Cloudy	
363	0	15	0	25 419	25 791	25 5	25 757	25 791	26 224	25 421	25 682	25 388	25 324	25 276	25 727	25 952	25 646	25 679	0 01307	0	Partly Cloudy	Mar/19 1994
364	0	30	0	25 286	25 609	25 238	25 576	25 641	26 027	25 319	25 512	25 254	25 486	25 141	25 625	25 634	25 544	25 543	0 01307	0 01	Partly Cloudy	
365	0	45	0	25 203	25 509	25 283	25 477	25 509	25 895	25 187	25 396	25 202	25 493	25 299	25 557	25 751	25 477	25 444	0 00653	0 37	Partly Cloudy	
366	1	0	0	25 128	25 483	25 225	25 451	25 499	25 819	25 16	25 386	25 193	25 273	25 11	25 515	25 724	25 497	25 483	0 00653	0 03	Partly Cloudy	
367	1	15	0	25 17	25 476	25 186	25 428	25 46	25 75	25 121	25 383	25 186	25 299	25 121	25 492	25 669	25 476	25 492	0	0 09	Partly Cloudy	
368	1	30	0	25 065	25 404	25 065	25 372	25 42	25 694	25 065	25 323	25 049	25 113	25 017	25 468	25 678	25 484	25 501	0 00653	0 3	Partly Cloudy	
369	1	45	0	24 977	25 364	24 961	25 299	25 348	25 606	25 025	25 235	24 929	24 961	24 912	25 348	25 509	25 283	0	0 01	Partly Cloudy		
370	2	0	0	24 946	25 269	24 962	25 204	25 269	25 511	24 882	25 124	24 833	25 156	24 979	25 253	25 398	25 204	25 172	-0 0196	0 13	Partly Cloudy	
371	2	15	0	24 901	25 254	24 933	25 175	25 191	25 449	24 869	25 079	24 889	25 082	24 853	25 192	25 353	25 159	25 208	0	0 01	Partly Cloudy	
372	2	30	0	24 843	25 185	24 879	25 12	25 153	25 407	24 862	24 959	24 733	25 136	25 296	25 153	25 185	0 00653	0 18	Partly Cloudy			
373	2	45	0	24 801	25 136	24 781	25 072	25 091	25 346	24 798	25 007	24 749	24 865	24 684	25 072	25 233	25 072	25 072	0 00653	0 01	Partly Cloudy	
374	3	0	0	24 815	25 071	24 716	25 007	25 039	25 265	24 735	24 928	24 638	24 912	24 654	24 993	25 138	24 977	25 009	0	0	Partly Cloudy	
375	3	15	0	24 658	24 965	24 593	24 884	24 916	25 19	24 626	24 819	24 496	24 739	24 529	24 9	25 045	24 9	24 932	0 00653	0 04	Partly Cloudy	
376	3	30	0	24 501	24 84	24 469	24 76	24 792	25 082	24 453	24 679	24 372	24 824	24 453	24 76	24 921	24 743	24 744	0	0 2	Partly Cloudy	
377	3	45	0	24 413	24 72	24 364	24 639	24 671	24 962	24 332	24 558	24 3	24 413	24 203	24 639	24 639	24 639	24 639	0 01307	0	Partly Cloudy	
378	4	0	0	24 352	24 626	24 19	24 529	24 562	24 836	24 222	24 449	24 222	24 384	24 267	24 545	24 707	24 532	24 544	0 00653	0 01	Partly Cloudy	
379	4	15	0	24 223	24 546	24 158	24 449	24 482	24 74	24 142	24 356	24 094	24 401	24 11	24 437	24 611	24 453	24 449	0 01307	0 15	Partly Cloudy	
380	4	30	0	24 175	24 466	24 158	24 369	24 401	24 627	24 045	24 272	24 158	24 74	24 175	24 369	24 485	24 372	24 352	0 00653	0 03	Partly Cloudy	
381	4	45	0	24 249	24 427	24 136	24 348	24 378	24 572	24 059	24 236	24 188	24 604	24 168	24 362	24 463	24 362	24 362	0 00653	0 01	Clear Sky	
382	5	0	0	24 163	24 389	24 195	24 337	24 369	24 547	24 066	24 256	24 159	24 744	24 179	24 353	24 45	24 341	24 337	0	0 27	Clear Sky	
383	5	15	0	24 14	24 366	24 058	24 301	24 346	24 511	24 043	24 236	24 075	24 559	24 107	24 317	24 427	24 333	24 301	0	0	Clear Sky	
384	5	30	0	24 017	24 34	24 033	24 275	24 307	24 465	23 984	24 21	24 017	24 386	23 984	24 307	24						

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	
397	8	45	0	29 208	27 526	29 112	27 237	27 253	26 709	29 192	27 317	28 344	29 466	28 504	26 645	26 579	27 255	27 207	3 0372	0.32	Cloudy Lightly Sunny		
398	9	0	0	30 201	28 347	30 393	28 074	28 074	27 497	30 392	28 203	28 987	30 26	29 354	27 304	27 24	28 042	28 01	3 5663	0.4	Cloudy Lightly Sunny		
399	9	15	0	31 584	29 319	31 647	29 064	29 096	28 392	31 853	29 192	30 066	31 408	30 405	28 007	27 943	28 904	28 888	5 5314	0.96	Cloudy Lightly Sunny		
400	9	30	0	33 116	30 302	32 91	30 078	30 126	29 296	33 299	30 158	31 13	32 581	31 257	28 832	28 794	29 839	29 823	5 3934	0.42	Cloudy Lightly Sunny		
401	9	45	0	33 946	31 455	33 471	31 296	31 28	30 372	34 959	31 38	32 535	31 169	32 425	29 75	29 766	30 914	30 866	5 0008	0.09	Cloudy Lightly Sunny		
402	10	0	0	35 715	32 711	35 951	32 599	32 615	31 551	36 818	32 584	33 583	32 505	33 709	30 724	30 788	31 965	31 917	5 3786	0.44	Cloudy Lightly Sunny		
403	10	15	0	36 497	33 846	37 236	33 763	33 767	32 69	38 272	33 704	34 906	32 722	34 953	31 69	31 786	32 976	32 928	4 9143	0.31	Cloudy Lightly Sunny		
404	10	30	0	37 889	34 803	37 889	34 884	34 899	33 824	40 066	34 789	36 094	33 682	35 942	32 621	32 779	33 824	33 745	9 4878	0.35	Cloudy Lightly Sunny		
405	10	45	0	38 264	35 97	39 172	35 965	36 049	34 993	40 813	35 892	36 096	32 033	35 372	33 634	33 871	34 819	34 851	1 9984	0.06	Cloudy Lightly Sunny		
406	11	0	0	37 768	36 232	38 994	36 279	36 389	35 775	40 464	36 295	35 869	32 756	36 554	34 165	34 497	35 081	35 05	9 6217	0.33	Cloudy Sunny		
407	11	15	0	37 935	36 475	38 547	36 507	36 664	36 365	40 798	36 601	36 46	33 287	35 578	34 521	34 931	35 184	35 215	7 4625	0.16	Cloudy Lightly Sunny		
408	11	30	0	38 831	36 949	40 891	37 091	37 246	36 965	42 325	37 185	37 75	33 29	36 258	35 092	35 533	35 565	35 675	2 4592	0.15	Cloudy Lightly Sunny		
409	11	45	0	40 356	37 634	40 746	37 979	38 104	37 712	43 437	37 932	38 355	34 707	37 068	35 889	36 33	36 251	36 314	9 8416	0.23	Cloudy Lightly Sunny		
410	12	0	0	40 543	38 513	42 831	39 028	39 139	38 576	45 214	38 905	40 045	35 969	38 875	36 65	37 289	37 069	37 085	10 375	0.71	Cloudy Lightly Sunny		
411	12	15	0	40 818	39 383	42 235	40 163	40 269	39 632	45 411	39 992	39 632	33 279	37 548	37 942	38 366	38 033	38 049	1 7017	0.2	Cloudy Dark Sky		
412	12	30	0	38 793	39 106	40 684	39 825	40 106	40 074	43 837	39 981	38 245	32 541	36 959	38 026	38 636	37 837	37 9	2 0668	0.69	Cloudy Dark Sky		
413	12	45	0	37 532	38 348	39 831	39 051	39 381	40 066	42 759	39 472	37 889	32 786	35 675	37 64	38 439	37 075	37 234	4 4278	1.03	Cloudy Lightly Sunny		
414	13	0	0	38 882	37 881	39 289	38 585	38 898	40 009	42 918	39 164	37 926	33 864	36 324	37 315	38 162	36 515	36 639	5 282	0.41	Cloudy Lightly Sunny		
415	13	15	0	38 902	37 931	39 588	38 649	38 934	40 059	42 891	39 161	37 146	33 191	35 24	37 335	38 2	36 468	36 628	2 5236	0.23	Cloudy Lightly Sunny		
416	13	30	0	38 117	37 835	39 149	38 413	38 71	40 006	42 375	38 974	37 584	33 134	35 614	37 109	38 034	36 841	36 066	36 225	1 6433	0.29	Cloudy Lightly Sunny	
417	13	45	0	37 984	37 655	38 658	38 155	38 47	39 893	41 452	38 736	36 304	32 339	35 091	36 901	37 841	36 066	36 225	1 6433	0.29	Cloudy Lightly Sunny		
418	14	0	0	36 838	37 23	36 653	37 669	37 983	39 626	40 61	38 281	35 83	31 655	34 821	36 507	37 481	35 673	35 799	1 5064	0.31	Cloudy Lightly Sunny		
419	14	15	0	36 966	36 731	37 814	37 092	37 406	39 193	39 865	37 657	35 77	32 007	34 035	35 976	36 982	35 14	35 298	1 9045	0.31	Rainy Cloud Dark Sky		
420	14	30	0	36 656	36 357	36 748	36 671	36 969	38 773	39 087	37 172	35	31 199	33 69	35 552	36 528	34 779	34 963	0 76981	0.46	Rainy Cloud Dark Sky		
421	14	45	0	35 366	35 901	35 949	36 138	36 435	38 321	38 305	36 808	34 148	30 738	33 231	35 049	36 042	34 354	34 48	0 42394	0.18	Rainy Cloud Dark Sky		
422	15	0	0	34 982	35 314	35 013	35 534	35 834	37 767	37 595	36 007	38 766	31 089	32 594	34 524	35 503	33 845	33 956	1 2329	1.1	Rainy Cloud Dark Sky		
423	15	15	0	34 862	34 847	34 688	35 083	35 367	37 287	36 973	35 572	33 534	31 409	32 869	34 151	35 035	33 423	33 534	2 0091	0.53	Rainy Cloud Dark Sky		
424	15	30	0	34 812	34 559	35 002	34 828	35 065	36 876	36 877	35 285	33 658	31 565	32 803	33 88	34 686	33 151	33 262	2 531	0.16	Rainy Cloud Dark Sky		
425	15	45	0	34 722	34 501	35 179	34 785	34 99	36 613	36 99	35 195	34 058	31 791	32 934	33 852	34 532	33 124	33 203	2 3483	0.42	Cloudy Lightly Sunny		
426	16	0	0	34 311	34 516	35 037	34 816	35 022	36 456	37 021	35 211	33 583	31 442	32 331	33 868	34 501	33 188	33 298	1 6047	0.21	Cloudy Lightly Sunny		
427	16	15	0	34 068	34 4	34 968	34 653	34 842	36 276	36 811	35 079	33 498	31 373	32 262	33 767	34 384	33 087	33 182	2 1856	0.96	Cloudy Lightly Sunny		
428	16	30	0	35 19	34 48	35 522	34 796	35 001	36 184	37 441	35 254	34 654	32 628	33 452	33 911	34 433	33 151	33 278	3 1577	0.17	Cloudy Lightly Sunny		
429	16	45	0	35 081	34 781	36 751	35 381	35 57	36 42	37 913	35 689	34 939	32 423	33 596	34 45	34 797	33 596	33 691	1 7939	0.35	Cloudy Lightly Sunny		
430	17	0	0	35 006	34 771	36 994	35 496	35 717	36 583	38 012	36 063	35 165	32 19	33 728	34 771	35 102	33 791	33 87	1 983	0.34	Cloudy Lightly Sunny		
431	17	15	0	34 244	34 624	35 602	35 365	35 602	36 672	37 819	36 137	34 845	31 423	33 137	34 876	35 255	33 786	33 913	0 96543	0.4	Clear Sky		
432	17	30	0	34 279	34 328	34 595	34 974	35 21	36 582	37 272	35 762	34 026	30 63	32 569	34 627	35 064	33 504	33 615	0 6459	0.12	Clear Sky		
433	17	45	0	33 562	33 847	33 768	34 432	34 685	36 277	36 214	35 158	33 45	30 689	32 04	34 148	34 716	33 072	33 118	0 52194	0.04	Clear Sky		
434	18	0	0	32 794	33 301	33 539	33 839	34 093	35 876	35 403	34 535	32 54	29 836	31 524	33 586	34 219	32 493	32 603	0 31989	0.1	Clear Sky		
435	18	15	0	31 82	32 74	32 835	33 216	33 485	35 365	34 56	33 681	32 042	29 479	30 681	32 978	33 659	31 915	32 01	0 11093	0.03	Clear Sky		
436	18	30	0	31 547	32 151	31 754	32 58	32 849	34 826	33 704	33 23	31 34	28 948	30 417	32 421	33 181	31 436	31 547	0 02611	0.4	Clear Sky		
437	18	45	0	31 187	31 616	31 469	32 029	32 284	34 264	33 061	32 632	30 757	28 65	30 024	31 87	32 632	30 916	31 043	0 00653	0.26	Clear Sky		
438	19	0	0	30 143	30 796	30 35	31 178	31 386	33 291	31 942	31 607	29 872	27 952	28 908	30 796	31 496	29 84	29 984	0	0.37	Clear Sky		

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

A REDUCTION OF HEAT GAIN IN BUILDINGS THROUGH ROOFS

TEST II : TEST OF INSULATION



ศูนย์วิจัยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

DATA-COLLECTED PERIOD :
MAR.30 - APR.2 ,1994

Hour	Minute	C-R7slope	R-R7hor	C-R10hor	M-R7slope	R-R7slope	M-Parsec	M-Noinsu	R-Noinsu	C-Noinsu	Outside-Air	R-Parsec	M-R7hor	R-R10hor	C-Parsec	M-R10hor	RADIATION	Weather Condition
16	0	31 721	43 854	31 837	32 319	36 915	33 479	36 593	41 839	34 747	35 582	36 741	31 756	43 552	32 763	32 129	4 399	Sunny
16	15	32 467	42 954	32 451	32 942	37 214	34 16	37 386	41 588	35 72	34 049	36 968	32 25	42 974	33 658	32 768	3 4865	Sunny
16	30	32 785	42 133	32 801	33 149	37 183	34 397	37 607	41 184	36 052	33 904	38 785	32 389	42 567	34 034	33 038	2 8283	Sunny Lightly Windy
16	45	33 029	41 296	33 041	33 247	36 935	34 495	37 656	40 797	36 243	33 311	38 585	32 451	41 867	34 27	33 116	2 541	Sunny
17	0	33 191	40 157	33 203	33 203	36 855	34 404	37 503	40 162	36 254	33 06	38 193	32 427	41 062	34 431	33 167	2 131	Sunny
17	15	33 275	38 656	33 322	33 053	36 193	34 191	37 167	39 276	36 205	31 845	37 571	32 289	40 152	34 519	33 061	1 6031	Lightly Sunny
17	30	33 294	37 421	33 341	32 847	35 768	33 904	36 743	38 582	36 032	31 209	36 818	32 182	39 065	34 484	32 935	1 0754	Lightly Sunny Lightly Windy
17	45	33 226	36 18	33 261	32 606	35 2	33 653	36 221	37 556	35 764	30 206	36 17	31 933	37 513	34 405	32 726	0 45625	Lightly Sunny Lightly Windy
18	0	33 135	34 839	33 082	32 273	34 584	33 254	35 454	36 453	35 257	29 325	35 462	31 894	36 529	34 212	32 424	0 14342	Lightly Windy
18	15	32 966	33 74	32 852	31 932	34 007	32 867	34 749	35 315	34 715	28 774	34 729	31 387	35 249	33 921	32 036	0 0652	Lightly Windy
18	30	32 661	32 376	32 518	31 453	33 27	32 31	33 736	33 973	33 893	28 455	33 893	31 006	33 577	33 451	31 513	0 00652	Lightly Windy
18	45	32 378	31 409	32 219	31 155	32 741	31 916	33 027	33 051	33 294	28 105	33 374	30 754	32 772	33 151	31 216	0	Lightly Windy
19	0	32 121	30 766	31 979	30 882	32 36	31 567	32 488	32 408	32 774	27 754	32 932	30 485	32 092	32 855	30 885	0	Lightly Windy
19	15	31 787	30 084	31 612	30 482	31 898	31 102	31 642	31 484	31 976	27 862	32 405	30 194	31 102	32 421	30 592	0	Lightly Windy
19	30	31 525	29 614	31 305	30 236	31 605	30 794	31 144	30 969	31 414	27 711	31 954	29 965	30 555	32 034	30 3	0	Lightly Windy
19	45	31 38	31 253	31 27	30 896	31 253	30 59	30 76	30 414	30 871	27 661	31 541	29 764	29 739	31 672	29 952	0	Lightly Windy
20	0	31 079	29 02	30 888	29 916	31 047	30 347	30 379	30 188	30 507	27 705	31 273	29 664	29 8	31 431	29 873	0	Lightly Windy
20	15	30 964	28 828	30 159	29 852	30 983	30 202	30 155	29 947	30 268	27 646	31 048	29 589	29 408	31 257	29 776	0	Lightly Windy
20	30	30 705	28 487	30 53	29 67	30 659	29 448	29 766	29 511	29 782	27 401	30 676	29 384	29 017	30 715	29 578	0	Lightly Windy
20	45	30 515	28 295	30 307	29 463	30 451	29 702	29 483	29 271	29 474	26 725	30 371	29 221	28 693	30 624	29 492	0	Lightly Windy
21	0	30 312	28 984	30 119	29 252	30 199	29 449	29 161	28 922	29 13	26 776	30 071	29 05	28 443	30 375	29 307	0	Lightly Windy
21	15	30 208	27 744	29 87	29 006	29 903	29 153	28 835	28 544	28 787	26 447	29 724	28 836	28 132	30 044	29 06	0	Rainy Cloud
21	30	29 845	27 463	29 668	28 823	29 686	28 904	28 584	28 313	28 505	26 55	29 512	28 666	27 898	29 8	28 89	0	Rainy Cloud
21	45	29 559	27 154	29 454	28 586	29 411	28 65	28 251	27 994	28 155	26 166	29 179	28 46	27 498	29 482	28 7	0	Rainy Cloud
22	0	29 417	27 017	29 274	28 46	29 227	28 476	28 06	27 804	27 431	26 108	28 451	28 301	27 307	29 244	28 573	0	Rainy Cloud
22	15	29 217	26 881	29 089	28 307	29 042	28 291	27 859	27 586	27 115	25 99	28 69	28 179	27 122	29 026	28 401	0	Rainy Cloud
22	30	29 053	26 667	28 442	28 158	28 846	28 126	27 662	27 373	27 469	26 126	28 44	28 014	26 875	28 798	28 261	0	Rainy Cloud
22	45	28 861	26 457	28 732	27 964	28 605	27 917	27 468	27 147	27 24	26 055	28 269	27 869	26 779	28 556	28 092	0	Rainy Cloud
23	0	28 695	26 386	28 599	27 879	28 487	27 766	27 301	26 98	27 094	26 081	28 055	27 718	26 611	28 375	27 975	0	Rainy Cloud
23	15	28 503	26 247	28 438	27 701	28 34	27 637	27 112	26 9	26 944	26 323	27 927	27 634	26 547	28 199	27 895	0	Rainy Cloud
23	30	28 354	26 79	28 306	27 617	28 178	27 537	27 056	26 784	26 816	25 803	27 811	27 587	26 464	28 066	27 794	0	Rainy Cloud
23	45	28 21	26 125	28 179	27 539	28 035	27 41	26 924	26 64	26 624	26 499	27 419	27 454	26 351	27 875	27 684	0	Rainy Cloud
0	0	28 064	26 096	28 053	27 444	27 183	27 348	26 867	26 697	26 571	26 172	27 558	27 43	26 367	27 783	27 67	0	Rainy Cloud
0	15	27 966	26 232	27 481	27 452	27 402	27 324	26 875	26 114	26 506	26 806	27 5	27 404	26 44	27 794	27 584	0	Rainy Cloud
0	30	27 406	26 302	27 89	27 426	27 827	27 298	26 865	26 624	26 448	26 416	27 454	27 374	26 481	27 704	27 556	0	Lightly Rainy Cloudy
0	45	27 83	26 275	27 848	27 399	27 784	27 204	26 654	26 646	26 373	26 341	27 364	27 316	26 486	27 524	27 482	0	Lightly Rainy Cloudy
1	0	27 822	26 198	27 775	27 386	27 675	27 21	26 825	26 581	26 376	26 489	27 354	27 306	26 39	27 482	27 444	0	Lightly Rainy Cloudy
1	15	27 732	26 142	27 595	27 282	27 634	27 153	26 8	26 511	26 333	25 734	27 264	27 232	26 334	27 426	27 376	0	Lightly Rainy Cloudy
1	30	27 641	25 471	27 624	27 174	27 572	27 063	26 126	26 373	26 275	25 488	27 154	27 142	26 099	27 379	27 254	0	Lightly Rainy Cloudy
1	45	27 505	25 651	27 506	27 025	27 458	26 879	26 579	26 172	26 172	25 657	27 006	26 991	25 429	27 198	27 102	0	Lightly Rainy Cloudy
2	0	27 402	25 557	27 371	26 842	27 323	26 696	26 39	26 022	26 053	25 822	26 903	26 84	25 474	27 145	26 951	0	Stop Raining No Wind
2	15	27 265	25 386	27 234	26 654	27 136	26 521	26 221	25 835	25 915	25 279	26 735	26 671	25 498	26 944	26 761	0	Stop Raining No Wind
2	30	27 164	25 222	27 102	26 523	26 488	26 383	26 556	25 554	25 678	25 787	26 614	26 507	25 325	26 695	26 629	0	Stop Raining No Wind
2	45	26 985	25 012	26 921	26 342	26 824	26 182	25 86	25 506	25 586	24 974	26 499	26 326	25 2	26 648	26 471	0	Stop Raining No Wind
3	0	26 417	25 003	26 827	26 276	26 773	26 087	25 725	25 422	25 455	24 828	26 292	26 144	25 085	26 5	26 274	0 0052	Stop Raining No Wind
3	15	26 751	29 903	26 894	26 142	26 803	25 964	25 574	25 272	25 322	24 884	26 141	26 111	25 031	26 351	26 151	0	Stop Raining No Wind
3	30	26 667	24 881	26 571	26 04	26 475	25 847	25 445	25 189	25 22	24 72	26 041	25 993	24 979	26 257	26 09	0 0653	Stop Raining No Wind
3	45	26 553	24 75	26 424	25 904	26 344	25 749	25 33	25 057	25 088	24 537	25 658	25 909	24 863	26 166	25 989	0	Stop Raining No Wind
4	0	26 425	24 286	26 309	25 821	26 287	25 65	25 031	24 958	25 006	24 306	25 794	25 794	24 715	26 019	25 907	0	Stop Raining No Wind
4	15	26 307	24 504	26 227	25 144	26 195	25 586	25 148	24 857	24 906	24 112	25 727	25 694	24 832	25 92	25 727	0	Stop Raining No Wind
4	30	26 221	24 494	26 772	25 679	26 096	25 517	25 083	24 792	24 808	24 985	25 597	25 63	24 486	25 822	25 77	0 0653	Stop Raining No Wind
4	45	26 547	24 758	26 751	25 548	25 997	24 516	25 584	24 467	24 724	24 544	25 579	25 545	24 53	25 773	25 692	0 0653	Stop Raining No Wind
5	0	26 036	24 334	25 977	25 537	25 901	25 352	24 95	24 644	24 661	24 499	25 424	25 481	24 353	25 642	25 53	0 0653	Stop Raining No Wind
5	15	25 932	24 152	25 839	25 444	25 804	25 273	24 869	24 534	24 574	24 563	25 389	25 432	24 207	25 465	25 524	0	Stop Raining No Wind
5	30	25 852	24 018	25 739	25 352	25 707	25 159	24 788	24 4	24 481	24 29	25 277	25 336	24 024	25 481	25 246	0	Stop Raining No Wind
5	45	24 26	23 77	25 674	25 231	25 609	25 093	24 691	24 238	24 401	23 536	25 126	25 191	23 98	25 351	25 251	0	Stop Raining No Wind
6	0	25 705	23 774	25 577	25 158	25 54	24 933	24 559	24 109	24 287	23 521	25 013	25 094	23 738	25 555	25 125	0	Clear Sky
6	15	25 583	23 512	25 448	25 03	25 32	24 82	24 4	23 448	24 142	23 464	24 852	24 987	23 825	25 155	25 094	0 3916	Clear Sky
6	30	25 553	23 536	25 375	24 413	25 312	24 147	24 28	23 779	24 038	23 683	24 76	24 846	23 489	25 009	24 925	1 1751	Clear Sky
6	45	25 42	23 405	25 227	24 84	25 163	24 598	24 131	23 678	23 889	23 905	24 583	24 145	23 34	24 858	24 778	2 4155	Clear Sky
7	0	25 316	23 444	25 123	24 785	25 075	24 554	24 042	23 664	23 732	24 824	24 57	23 363	24 736	24 751	24 848	5 5553	Clear Sky
7	15	25 216	23 84	25 022	24 78	25 04	2											

9	45	28 746	38 753	27 663	29 653	32 992	29 122	31 904	36 977	30 676	34 119	33 967	29 307	34 901	28 453	28 876	6 43	Clear Sky Sunny
10	0	29 486	42 482	28 147	30 471	34 208	30 997	33 408	38 818	31 704	34 249	35 384	30 21	37 253	29 966	28 946	7 0561	Clear Sky Sunny
10	15	30 066	44 089	28 702	31 042	35 136	31 675	34 344	40 038	32 62	35 68	36 56	30 654	38 112	30 636	29 365	7 1443	Clear Sky Sunny
10	30	30 666	45 893	29 419	31 148	36 48	32 603	35 554	41 112	33 782	34 618	37 901	31 298	40 604	31 496	30 116	6 6481	Clear Sky Sunny
10	45	31 518	47 136	30 034	32 336	37 487	33 301	36 493	42 671	34 801	33 737	39 076	31 817	42 758	32 308	30 706	8 8642	Clear Sky Sunny
11	0	32 118	48 873	30 653	32 904	38 424	33 978	37 485	44 176	35 742	34 446	40 292	32 329	44 387	32 992	31 212	8 9232	Clear Sky Sunny
11	15	32 666	49 927	31 289	33 406	39 426	34 558	38 39	45 455	36 666	37 58	41 352	32 637	45 688	33 738	31 791	9 056	Partly Cloudy Sunny
11	30	33 157	51 147	31 827	33 821	40 003	35 067	39 144	46 384	37 439	39 269	42 166	33 194	47 465	34 284	32 165	8 5951	Partly Cloudy Sunny
11	45	33 647	52 091	32 413	34 276	40 969	35 633	40 003	47 613	38 332	37 392	43 385	33 687	48 734	34 957	32 762	8 9468	Partly Cloudy Sunny
12	0	34 089	52 887	32 936	34 657	41 668	36 089	40 704	48 564	39 066	39 176	44 371	34 01	50 041	35 476	33 125	9 344	Partly Cloudy Sunny
12	15	34 617	54 286	33 574	35 136	42 544	36 63	41 587	49 479	39 984	40 233	45 034	34 511	51 265	36 211	33 754	9 077	Partly Cloudy Sunny
12	30	35 079	54 713	34 117	35 52	43 045	37 106	42 27	50 303	40 776	38 125	45 811	34 906	51 854	36 787	34 334	9 1421	Partly Cloudy Sunny
12	45	35 705	55 624	34 876	36 025	43 852	37 704	43 125	51 191	41 651	38 205	46 675	35 443	53 093	37 5	34 939	8 8737	Partly Cloudy Sunny
13	0	36 021	56 147	35 224	36 325	44 271	38 019	43 544	51 68	42 103	39 831	47 137	35 712	53 519	37 846	35 281	9 2643	Clear Sky Sunny
13	15	36 374	56 818	35 635	36 625	44 736	38 38	44 041	51 88	42 632	38 801	47 4	36 06	54 112	38 302	35 777	9 2187	Clear Sky Sunny
13	30	36 813	57 034	36 138	37 017	45 081	38 839	44 649	52 555	43 257	38 605	47 974	36 411	54 527	38 73	36 16	8 7826	Clear Sky Sunny
13	45	37 191	58 186	36 627	37 385	45 985	39 263	45 114	53 134	43 785	40 121	48 144	36 774	54 68	39 185	35 57	8 3789	Clear Sky Sunny
14	0	37 495	58 478	37 009	37 636	45 391	39 581	45 459	52 708	44 172	39 107	48 236	37 103	54 534	39 559	36 999	8 2292	Clear Sky Sunny
14	15	37 896	58 062	37 536	37 943	45 501	39 881	45 756	52 049	44 599	37 74	48 291	37 396	54 296	39 943	37 38	7 7409	Clear Sky Sunny
14	30	38 073	55 299	37 77	38 12	45 374	40 072	45 914	52 032	44 803	38 224	48 198	37 629	53 991	40 222	37 738	7 0638	Clear Sky Sunny
14	45	38 37	54 635	38 091	38 295	45 284	40 277	46 055	51 943	45 001	38 863	48 063	37 835	53 539	40 49	38 054	6 888	Clear Sky Sunny
15	0	38 517	53 623	38 376	38 439	45 164	40 374	46 012	51 678	45 056	35 855	47 887	37 938	53 001	40 654	38 235	6 7187	Clear Sky Sunny
15	15	38 781	53 153	38 702	38 624	45 04	40 528	45 964	51 145	45 065	35 947	47 518	38 077	53 044	40 824	38 515	6 0101	Clear Sky Sunny
15	30	38 894	52 352	38 879	38 738	44 797	40 611	45 954	50 995	45 09	34 888	47 24	37 17	52 77	40 948	38 748	5 5469	Clear Sky Sunny
15	45	39 024	51 549	39 055	38 789	44 678	40 615	45 835	50 467	45 069	35 522	47 075	38 143	52 183	41 021	38 784	5 1571	Clear Sky Sunny
16	0	39 149	50 679	39 242	38 836	44 322	40 615	45 588	49 911	44 894	35 149	46 723	38 164	51 29	41 097	38 914	4 7013	Clear Sky Lightly Sunny

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
1	Hour	C-R1/slope	R-R1/horiz.	C-R10/horiz.	M-R1/slope	R-R1/slope	M-Parsec	M-Nolsu.	R-Nolsu.	C-Nolsu.	Outside-Air	R-Parsec	M-R7/horiz.	R-R10/horiz.	C-Parsec	M-R10/horiz.	RADIATION	Weather Condition	Remark
2	16	39 099	50 584	39 113	38 651	44 023	40 509	45 485	49 643	44 311	35 061	46 718	38 116	51 141	40 032	38 772	4 0957	Clear Sky Lightly Sunny	
3	16	39 091	49 58	39 093	38 431	43 858	40 421	45 352	49 6	44 299	34 801	46 716	38 124	51 048	39 902	37 919	3 5488	Clear Sky Lightly Sunny	
4	16	38 995	47 807	39 011	38 154	43 774	40 25	45 104	48 576	44 125	34 731	46 132	38 099	49 782	39 813	37 582	2 6916	Clear Sky Lightly Sunny	
5	17	38 897	46 179	38 993	37 838	43 022	40 154	44 896	47 362	44 031	34 291	45 267	38 001	48 589	39 747	37 495	2 2143	Clear Sky Lightly Sunny	
6	17	38 665	44 177	38 764	37 776	42 175	40 076	44 038	46 096	43 675	33 727	44 375	37 537	46 813	39 461	37 445	1 6605	Clear Sky Lightly Sunny	
7	17	38 565	42 146	38 419	37 459	41 383	39 433	43 06	44 686	43 657	32 892	43 106	36 959	45 011	39 287	37 189	1 205	Clear Sky Lightly Sunny	
8	17	38 529	39 466	37 933	36 821	40 185	38 51	41 545	42 42	43 263	31 482	41 659	36 342	42 446	39 198	36 983	0 19544	Clear Sky Lightly Sunny	
9	18	38 145	38 962	37 689	36 362	39 757	37 513	40 196	40 526	41 58	30 569	40 058	35 373	40 911	38 795	36 736	0 17595	Clear Sky Lightly Sunny	
10	18	37 418	37 35	37 491	35 637	38 432	26 707	39 23	39 805	40 164	30 297	39 399	35 067	39 458	38 613	36 056	0 0717	Clear Sky Lightly Windy	
11	18	36 857	35 898	36 901	34 966	37 498	25 927	37 951	38 343	39 09	29 666	38 418	34 503	37 76	37 933	35 431	0 01304	Clear Sky Lightly Windy	
12	18	36 399	34 518	36 415	34 444	36 886	35 297	36 98	37 185	38 171	29 269	37 677	34 002	36 565	37 292	34 758	0 00652	Clear Sky Lightly Windy	
13	19	35 874	33 776	35 906	33 943	36 095	34 644	35 969	36 032	37 196	29 44	36 739	33 501	35 244	36 598	34 134	0	Clear Sky Lightly Windy	
14	19	35 281	32 831	35 281	33 372	35 407	33 973	34 952	34 961	36 197	29 047	35 413	33 008	34 052	35 898	33 58	0	Clear Sky Lightly Windy	
15	19	34 899	32 259	34 901	33 018	34 948	33 558	34 351	34 161	35 532	29 044	35 377	32 703	33 418	35 437	33 276	0	Clear Sky Lightly Windy	
16	19	34 322	31 877	34 349	32 99	34 102	32 736	34 002	33 771	35 119	28 976	34 966	32 215	32 988	34 4	32 941	0	Clear Sky Lightly Windy	
17	20	34 005	31 151	33 942	32 326	33 862	32 723	33 071	32 77	34 052	28 696	34 083	32 072	31 882	34 339	32 582	0	Clear Sky Lightly Windy	
18	20	33 643	30 692	33 596	32 075	33 421	32 392	32 614	32 156	33 534	28 584	33 63	31 823	31 314	33 914	32 22	0	Clear Sky Lightly Windy	
19	20	33 317	30 269	33 255	31 195	33 113	32 067	32 149	31 655	32 967	28 435	33 177	31 545	30 862	33 462	31 908	0	Clear Sky Lightly Windy	
20	20	32 966	29 899	32 903	31 525	32 794	31 715	31 732	31 302	32 477	28 405	32 765	31 273	30 494	33 068	31 623	0	Clear Sky Lightly Windy	
21	21	32 691	29 58	32 65	31 268	32 475	31 443	31 363	30 951	32 062	28 375	32 364	31 078	30 044	32 794	31 425	0	Clear Sky Lightly Windy	
22	21	32 378	29 403	32 33	31 028	32 09	31 123	30 978	30 532	31 582	28 321	31 931	30 803	29 581	32 344	31 185	0	Clear Sky Lightly Windy	
23	21	32 091	29 138	32 034	30 827	31 894	30 891	30 583	30 158	31 208	28 276	31 653	30 571	29 455	32 003	30 619	0	Clear Sky Lightly Windy	
24	21	31 841	28 973	31 768	30 599	31 54	30 647	30 392	29 883	30 87	28 254	31 267	30 394	29 213	31 649	30 697	0	Clear Sky Lightly Windy	
25	22	31 621	28 803	31 559	30 462	31 302	30 426	30 19	29 646	30 603	28 171	31 08	30 234	29 024	31 429	30 506	0	Clear Sky Lightly Windy	
26	22	31 358	28 584	31 279	30 26	31 119	30 212	29 925	29 414	30 292	28 073	30 77	30 053	28 761	31 12	30 308	0	Clear Sky Lightly Windy	
27	22	31 177	28 482	31 082	30 095	30 934	30 047	29 728	29 265	30 046	27 87	30 557	29 866	28 643	30 854	30 079	0	Clear Sky Lightly Windy	
28	22	30 866	28 184	30 165	29 841	30 626	29 794	29 489	29 01	29 839	28 03	30 909	29 834	28 538	30 302	30 277	0	Clear Sky Lightly Windy	
29	23	30 692	28 041	30 628	29 702	30 562	29 1	29 38	28 915	29 728	28 002	30 333	29 79	28 43	30 299	30 248	0	Clear Sky	
30	23	30 492	27 824	30 379	29 518	30 348	29 437	29 139	28 654	29 435	27 965	30 01	29 652	28 204	30 406	29 961	0	Clear Sky	
31	23	30 344	27 756	30 323	29 37	30 152	29 301	29 081	28 523	29 075	27 995	29 811	29 434	28 021	30 216	29 769	0	Clear Sky	
32	23	30 098	27 508	29 971	29 188	29 939	29 076	28 741	28 277	28 98	27 628	29 524	29 188	27 989	29 907	29 534	0	Clear Sky	
33	0	29 937	27 414	29 871	29 054	29 794	28 931	28 595	28 098	28 814	27 618	29 364	29 074	27 681	29 78	29 394	0	Clear Sky	
34	0	29 761	27 329	29 633	28 898	29 569	28 738	28 418	27 905	28 67	27 521	29 138	28 898	27 457	29 49	29 186	0	Clear Sky	
35	0	29 587	27 171	29 413	28 772	29 587	28 53	28 229	27 761	28 937	27 62	28 916	28 756	27 317	29 316	29 044	0	Clear Sky	
36	0	29 397	26 963	29 238	28 614	29 206	28 406	28 069	27 627	28 15	27 189	28 126	28 598	27 108	29 11	28 92	0	Clear Sky	
37	1	29 241	26 822	29 081	28 487	29 033	28 265	27 924	27 448	28 105	26 918	28 553	28 484	27 062	28 964	28 745	0	Clear Sky	
38	1	29 088	26 667	29 928	28 32	28 896	28 128	27 775	27 262	27 926	26 845	28 4	28 352	26 697	28 8	28 593	0	Clear Sky	
39	1	28 959	26 523	29 199	28 191	28 183	27 938	27 646	27 133	27 79	26 18	28 116	28 223	26 587	28 632	28 415	0	Clear Sky	
40	1	28 8	26 383	28 64	28 048	28 546	27 775	27 44	26 925	27 627	26 636	28 076	28 064	26 33	28 417	28 247	0	Clear Sky	
41	2	28 625	26 126	28 437	27 176	28 405	27 62	27 267	26 138	27 444	26 448	27 873	27 925	26 224	28 218	28 134	0	Clear Sky	
42	2	28 51	25 99	28 316	27 757	28 254	27 489	27 133	26 554	27 404	26 265	27 646	27 806	26 008	28 127	28 075	0	Clear Sky	
43	2	28 168	25 637	27 945	27 382	27 863	27 077	26 659	26 113	26 862	26 308	27 114	27 382	25 452	27 623	27 478	0	Clear Sky	
44	2	28 105	25 645	27 878	27 379	27 199	27 027	26 609	26 095	26 802	26 143	27 143	27 332	25 417	27 604	27 443	0	Clear Sky Lightly Windy	
45	3	27 938	25 481	27 128	27 213	27 664	26 877	26 415	25 977	26 652	26 073	26 989	27 261	25 38	27 438	27 344	0	Clear Sky Lightly Windy	
46	3	27 845	25 87	27 637	27 139	27 557	26 786	26 388	25 837	26 521	25 644	26 896	27 203	25 305	27 365	27 285	0	Clear Sky Lightly Windy	
47	3	27 64	25 148	27 48	26 961	27 384	26 597	26 176	25 6	26 372	25 391	26 727	27 408	25 18	27 21	27 178	0	Clear Sky Lightly Windy	
48	3	27 481	24 978	27 295	26 813	27 231	26 454	26 009	25 445	26 203	25 624	26 584	26 927	25 104	27 04	27 024	0	Clear Sky Lightly Windy	
49	4	27 384	24 916	27 205	26 127	27 144	26 37	25 889	25 323	26 038	25 161	26 404	26 77	24 423	26 867	26 651	0	Clear Sky Lightly Windy	
50	4	27 231	24 864	27 052	26 636	26 99	26 264	25 765	25 252	25 912	25 829	26 297	26 698	24 061	26 684	26 794	0	Rainy Cloud No Wind	
51	4	27 146	24 909	26 937	26 584	26 889	26 165	25 699	25 215	25 811	25 843	26 181	26 616	24 763	26 601	26 665	0	Rainy Cloud No Wind	
52	4	27 031	24 784	26 873	26 492	26 811	26 179	25 639	25 091	25 719	25 768	26 081	26 54	24 752	26 493	26 635	0	Rainy Cloud No Wind	
53	5	26 935	24 71	26 126	26 404	26 707	26 036	25 583	25 033	26 662	25 516	25 961	26 466	24 682	26 388	26 515	0	Rainy Cloud No Wind	
54	5	26 865	24 615	26 644	26 339	26 612	25 42	25 502	24 889	25 582	25 518	25 937	26 371	24 647	26 307	26 487	0	Rainy Cloud No Wind	
55	5	26 737	24 562	26 544	26 222	26 496	25 82	25 385	24 804	25 433	25 582	25 171	26 287	24 562	26 174	26 303	0	Rainy Cloud No Wind	
56	5	26 595	24 484	26 402	26 144	26 418	25 157	25 338	24 725	25 354	25 644	25 125	26 207	24 515	26 077	26 192	0	Rainy Cloud No Wind	
57	6	26 577	24 525	26 362	26 721	26 33	25 734	25 263	24 702	25 299	25 638	25 67	26 185	24 525	26 008	26 169	0	Clear Sky	
58	6	26 477	24 527	26 269	26 06	26 269	25 657	25 255	24 739	25 255	25 803	25 61	26 14	24 465	25 965	26 143	0 0306	Clear Sky	
59	6	26 446	24 513	26 221	26 029	26 222	25 642	25 239	24 765	25 24	25 757	25 595	26 059	24 466	25 901	26 095	0 2613	Clear Sky	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
60	6	26.391	24.635	26.168	26.021	26.198	25.635	25.231	24.695	25.182	26.084	25.553	26.02	24.505	25.794	25.472	0.6532	Clear Sky	
61	7	26.316	24.931	26.107	26.027	26.235	25.655	25.282	24.494	25.188	26.596	25.574	26.041	24.751	25.75	26.007	2.0248	Clear Sky	
62	7	26.351	25.514	26.142	26.125	26.318	25.111	25.416	25.303	25.254	26.412	25.689	26.108	25.045	25.185	26.091	1.3714	Clear Sky	
63	7	26.401	26.304	26.192	26.288	26.546	25.134	25.627	25.774	25.373	27.082	25.84	26.025	25.435	25.67	26.226	2.2204	Clear Sky	
64	7	26.531	27.461	26.305	26.546	27.127	26.144	26.063	26.754	25.676	29.62	26.174	26.467	25.964	25.964	26.365	2.2204	Clear Sky	
65	8	26.698	28.526	26.391	26.777	27.467	26.358	26.502	27.706	26.003	30.551	26.501	26.677	26.291	26.05	26.451	2.5489	Clear Sky	
66	8	26.926	30.176	26.557	27.199	28.289	26.177	27.262	29.04	26.604	32.435	27.774	27.038	26.988	26.331	26.666	3.1595	Clear Sky	
67	8	27.252	31.462	26.753	27.7	28.737	27.218	28.164	30.577	27.314	32.925	28.308	27.48	27.859	26.687	26.968	3.7212	Clear Sky	
68	8	27.721	34.204	27.004	28.321	30.031	27.888	29.249	32.165	28.241	31.195	29.564	28.065	29.151	27.157	27.28	3.5254	Clear Sky	
69	9	28.215	35.621	27.334	28.92	30.767	28.616	30.229	33.441	29.16	30.941	30.66	28.649	30.672	27.768	27.704	6.7221	Clear Sky	
70	9	28.194	37.589	27.77	29.594	31.935	29.451	31.317	35.34	30.218	31.572	32.145	29.261	33.061	28.495	28.027	4.5032	Clear Sky	
71	9	29.354	38.717	28.219	30.136	32.585	30.169	32.205	35.969	31.156	31.188	33.125	29.786	33.79	28.211	28.812	2.3481	Clear Sky	
72	9	29.839	38.784	28.672	30.476	33.115	30.652	32.909	36.211	32.068	31.098	33.684	30.079	34.492	29.904	29.138	1.0375	Clear Sky	
73	10	30.23	40.436	29.033	30.788	33.821	31.061	33.41	37.543	32.682	32.112	34.599	30.331	36.444	30.363	29.343	1.5661	Cloudy Lightly Windy	
74	10	30.628	40.044	29.4	31.185	34.183	31.582	34.041	37.632	33.36	30.756	35.049	30.107	36.502	30.963	29.863	9.0687	Cloudy Lightly Windy	
75	10	30.77	39.744	29.551	31.262	34.18	31.692	34.212	37.489	33.344	30.736	35.096	30.847	36.325	31.16	29.987	7.9595	Cloudy Lightly Windy	
76	10	31.042	41.445	30.932	32.473	35.909	31.202	34.107	39.865	33.571	31.28	35.433	31.063	38.053	31.185	30.182	7.8591	Cloudy Lightly Windy	
77	11	32.44	42.321	32.806	32.501	35.906	32.801	34.67	41.631	34.7	32.802	36.342	32.061	40.508	31.101	30.96	7.958	Cloudy Lightly Windy	
78	11	32.214	45.654	31.136	32.692	37.848	33.486	36.484	42.442	35.555	34.848	38.779	32.207	42.712	32.891	31.336	8.2765	Cloudy Lightly Windy	
79	11	32.346	46.188	31.284	32.84	37.115	33.681	36.14	42.74	36.124	34.147	39.236	32.705	43.675	33.057	31.514	8.4311	Clear Sky Lightly Windy	
80	11	32.662	48.378	31.911	33.42	38.927	34.4	37.893	44.899	37.158	35.365	40.814	32.95	45.707	33.757	32.184	8.5621	Clear Sky Lightly Windy	
81	12	33.306	50.14	32.419	33.862	39.862	34.452	38.865	46.534	38.065	34.51	42.12	33.388	47.403	34.337	32.786	8.4624	Clear Sky Lightly Windy	
82	12	34.043	51.872	33.284	34.596	41.227	35.81	40.292	47.632	39.512	34.312	43.217	34.059	49.121	35.243	33.601	3.2008	Clear Sky Lightly Windy	
83	12	34.453	52.115	33.777	34.961	41.978	36.236	40.939	48.308	40.217	35.953	43.948	34.364	49.983	35.767	33.691	6.6482	Clear Sky Lightly Windy	
84	12	34.942	52.821	34.358	35.305	42.171	36.784	41.753	49.044	41.104	35.828	44.705	34.851	50.864	36.457	34.519	9.3857	Clear Sky Lightly Windy	
85	13	35.297	53.732	34.749	35.632	42.728	37.188	42.342	49.833	41.75	34.701	45.392	35.131	51.689	36.878	34.768	8.9686	Clear Sky Lightly Windy	
86	13	35.716	54.784	35.247	36.066	43.513	37.699	42.97	50.497	42.492	35.666	46.128	35.534	52.346	37.451	35.282	9.2929	Clear Sky Lightly Windy	
87	13	36.228	53.275	35.819	36.527	43.427	38.265	43.632	50.116	43.281	35.122	45.956	35.906	52.222	38.045	35.91	8.6673	Clear Sky Lightly Windy	
88	13	36.576	53.487	36.214	36.737	43.58	38.477	43.957	50.752	43.771	35.73	46.058	36.155	52.506	38.448	36.269	8.0026	Clear Sky Lightly Windy	
89	14	36.834	52.997	36.903	36.944	43.712	38.731	44.268	51.18	44.083	36.492	46.726	36.413	52.737	38.687	36.492	8.4001	Clear Sky Lightly Windy	
90	14	37.127	54.095	36.891	37.284	44.077	39.085	44.572	51.221	44.483	36.298	46.904	36.722	53.082	39.026	36.915	7.9374	Clear Sky Lightly Windy	
91	14	37.487	54.185	37.397	37.691	44.218	39.584	45.081	51.662	44.989	36.247	47.423	37.173	53.748	39.537	37.741	7.467	Clear Sky Lightly Windy	
92	14	37.789	54.462	37.769	37.942	44.278	39.978	45.452	51.677	45.405	35.822	47.561	37.561	53.785	39.571	38.047	6.8936	Clear Sky Lightly Windy	
93	15	38.052	53.913	38.13	38.208	44.185	40.236	45.666	51.765	45.71	35.094	47.865	37.826	53.77	40.398	38.314	6.8024	Clear Sky Lightly Windy	
94	15	38.165	53.765	38.275	38.306	44.096	40.369	45.78	51.63	45.822	35.039	47.669	37.911	53.504	40.442	38.412	6.6064	Clear Sky Lightly Windy	
95	15	38.479	52.626	38.744	38.572	43.988	40.649	45.903	50.782	46.104	35.338	47.516	38.087	52.939	40.786	38.819	5.8637	Clear Sky Lightly Windy	
96	15	38.71	52.09	39.054	38.71	43.813	40.801	45.9	50.73	46.176	35.713	47.424	38.319	52.577	41.052	39.038	5.2647	Clear Sky Lightly Windy	
97	16	38.805	51.468	39.215	38.777	43.598	40.865	45.793	50.275	46.147	35.383	47.256	38.351	51.953	41.223	39.254	4.868	Clear Sky Lightly Windy	
98	16	38.896	50.753	39.38	38.786	43.379	40.904	45.607	49.891	46.077	35.282	46.653	38.329	51.445	41.345	39.221	4.2229	Clear Sky Lightly Sunny Lightly Windy	
99	16	38.93	49.954	39.446	38.711	43.228	40.865	45.392	49.28	45.944	34.922	46.3	38.222	50.61	41.434	39.286	3.5973	Clear Sky Lightly Sunny Lightly Windy	
100	16	38.915	47.93	39.505	38.505	42.634	40.612	44.938	48.174	45.663	37.185	45.845	37.968	49.455	41.37	39.249	3.0694	Clear Sky Lightly Sunny Lightly Windy	
101	17	38.768	46.515	39.41	38.189	42.167	40.268	44.446	47.095	45.292	35.784	45.042	37.666	48.152	41.258	38.962	2.4963	Clear Sky Lightly Sunny Lightly Windy	
102	17	38.534	44.708	39.237	37.719	41.467	39.673	43.668	45.989	44.719	34.867	44.085	37.274	46.648	41.011	38.541	1.8641	Clear Sky Lightly Sunny Lightly Windy	
103	17	38.263	42.863	38.968	37.229	40.794	39.093	42.829	44.78	44.084	34.108	43.136	36.83	45.318	40.664	38.164	1.3034	Clear Sky Lightly Sunny Lightly Windy	
104	17	37.932	40.808	38.587	36.107	39.872	38.415	41.802	43.321	43.241	32.739	42.017	36.338	43.901	40.159	37.703	0.35204	Clear Sky Lightly Sunny Lightly Windy	
105	18	37.56	39.127	38.17	36.159	39.093	37.791	40.793	41.805	42.471	30.998	40.945	35.996	41.722	39.773	37.235	0.24776	Clear Sky Lightly Windy	
106	18	37.161	37.537	37.679	35.587	38.242	37.033	39.619	40.334	41.506	30.404	39.929	35.425	40.131	39.145	36.608	0.1239	Clear Sky Lightly Windy	
107	18	36.644	36.125	37.098	34.942	37.476	36.264	38.383	38.621	40.4	29.685	38.914	34.889	38.443	38.457	35.96	0.02609	Clear Sky Lightly Windy	
108	18	36.145	34.962	36.489	34.362	36.757	35.513	37.196	37.526	39.28	29.069	38.058	34.373	36.911	37.795	35.336	0	Clear Sky Lightly Windy	
109	19	35.695	33.911	36.011	33.895	36.184	34.907	36.262	36.34	38.385	38.87	37.22	33.878	35.757	37.141	34.763	0	Clear Sky Lightly Windy	
110	19	35.193	32.71	35.461	33.407	35.429	34.261	35.287	35.112	37.272	28.856	36.311	33.375	34.482	36.453	34.128	0	Clear Sky Lightly Windy	
111	19	34.629	31.714	34.819	32.61	34.629	33.475	34.123	33.808	35.987	28.574	35.183	32.636	33.048	35.451	33.286	0	Clear Sky Lightly Windy	
112	19	34.41	31.366	34.584	32.627	34.379	33.24	33.783	33.462	35.583	28.416	34.822	32.431	32.685	35.122	33.018	0	Clear Sky Lightly Windy	
113	20	34.094	30.841	34.236	32.351	33.951	32.859	33.224	32.748	34.947	28.463	34.268	32.161	31.954	34.695	32.764	0	Clear Sky Lightly Windy	
114	20	33.986	30.415	33.902	31.936	33.023	32.6	31.987	32.112	33.958	28.401	33.944	32.006	31.219	33.782	32.36	0	Clear Sky Lightly Windy	
115	20	33.233	29.911	33.024	31.588	32.674	31.991	31.631	31.885	33.444	28.258	33.349	31.722	30.953	31.533	31.84	0	Clear Sky Lightly Windy	
116	20	32.732	29.342	32.78	31.223	32.462	31.462	31.335	30.841	32.653	28.191	32.479	31.096	30.076	32.987	31.605	0	Clear Sky Lightly Windy	
117	21	32.575	29.184	32.623	31.113	32.385	31.288	31.145	30.836	32.385	27.968	32.274	30.938	29.886	32.781	31.368	0	Clear Sky Lightly Windy	
118	21	32.159	28.18	32.158	30.127	31.936	30.886	30.663	30.105	31.766	26.123	31.834	30.694	29.482					

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
119	21	31 947	28 632	31 932	30 563	31 757	30 707	29 854	31 534	30 991	31 574	30 579	29 319	29 106	31 589	31 101	0	Clear Sky Lightly Windy	
120	21	31 2	28 316	31 826	30 353	31 364	29 786	30 366	30	30 802	31 955	31 053	30 28	28 851	31 57	30 671	0	Clear Sky Lightly Windy	
121	22	31 434	28 25	31 402	30 192	31 108	30 24	29 88	29 41	30 782	27 89	31 005	30 192	28 187	31 768	30 606	0	Clear Sky Lightly Windy	
122	22	31 132	25 054	31 084	29 969	30 829	29 921	29 538	29 034	30 304	27 714	30 559	29 857	28 339	31 027	30 24	0.0653	Clear Sky Lightly Windy	
123	22	30 829	27 778	30 765	29 729	30 622	29 633	29 25	28 675	29 953	27 686	30 224	29 644	28 098	30 685	29 985	0	Clear Sky Lightly Windy	
124	22	30 638	27 665	30 574	29 569	30 383	29 441	29 042	28 498	29 665	27 569	29 936	29 426	27 784	30 399	29 729	0	Clear Sky Lightly Windy	
125	23	30 415	27 505	30 335	29 41	30 176	29 234	28 85	28 257	29 425	27 553	29 713	29 298	27 682	30 144	29 585	0	Clear Sky Lightly Windy	
126	23	30 192	27 297	30 096	29 234	29 985	29 037	28 611	28 002	29 138	27 457	29 474	29 106	27 458	29 905	29 458	0	Clear Sky Lightly Windy	
127	23	30 032	27 184	29 92	29 09	29 750	28 898	28 466	27 905	29 01	27 441	29 282	29 01	27 36	29 761	29 298	0	Clear Sky Lightly Windy	
128	23	29 841	27 008	29 681	28 914	29 616	28 69	28 258	27 713	28 77	27 281	29 074	28 634	27 2	29 489	29 09	0	Clear Sky Lightly Windy	
129	0	29 745	26 943	29 569	28 835	29 425	28 579	28 099	27 554	28 578	27 344	28 877	28 674	27 023	29 314	28 946	0	Clear Sky Lightly Windy	
130	0	29 554	26 879	29 362	28 691	29 298	28 434	27 986	27 441	28 434	27 553	28 738	28 585	26 912	29 154	28 802	0	Clear Sky Lightly Windy	
131	0	29 378	26 768	29 202	28 579	29 155	28 29	27 858	27 345	28 242	27 457	28 531	28 451	29 896	28 947	28 659	0	Clear Sky Lightly Windy	
132	0	29 202	26 761	29 027	28 467	29 043	28 179	27 762	27 216	28 13	27 137	28 435	28 371	26 751	28 819	28 579	0	Clear Sky Lightly Windy	
133	1	29 107	26 687	28 899	28 377	28 883	28 05	27 634	27 105	28 003	27 522	28 297	28 227	26 623	28 659	28 378	0	Clear Sky Lightly Windy	
134	1	28 978	26 493	28 754	28 259	28 736	27 937	27 537	27 039	27 889	27 231	28 194	28 145	26 509	28 53	28 29	0	Clear Sky Lightly Windy	
135	1	28 834	26 461	28 626	28 161	28 642	27 841	27 44	26 943	27 761	27 376	28 049	28 033	26 467	28 386	28 193	0	Clear Sky Lightly Windy	
136	1	28 69	26 364	28 465	28 004	28 53	27 728	27 328	26 781	27 634	27 183	27 905	27 931	26 331	28 273	28 081	0	Clear Sky Lightly Windy	
137	2	28 594	26 268	28 353	27 954	28 413	27 632	27 216	26 654	27 504	27 167	27 794	27 825	26 204	28 058	27 937	0	Clear Sky Lightly Windy	
138	2	28 482	26 14	28 226	27 841	28 29	27 521	27 12	26 574	27 425	26 96	27 697	27 745	26 108	28 049	27 874	0	Clear Sky Lightly Windy	
139	2	28 386	26 012	28 096	27 729	28 13	27 392	27 001	26 43	27 296	26 734	27 553	27 649	25 975	27 873	27 778	0	Clear Sky Lightly Windy	
140	2	28 227	25 819	27 939	27 596	28 05	27 266	26 897	26 366	27 233	26 768	27 411	27 586	25 899	27 813	27 768	0	Clear Sky Lightly Windy	
141	3	28 139	25 666	27 835	27 498	27 899	27 161	26 76	26 299	27 081	26 454	27 274	27 466	25 731	27 691	27 675	0	Clear Sky Lightly Windy	
142	3	28 064	25 558	27 745	27 377	27 713	27 023	26 606	26 09	26 916	25 803	27 089	27 319	25 544	27 555	27 577	0	Clear Sky Lightly Windy	
143	3	27 827	25 239	27 554	27 154	27 523	26 833	26 415	25 836	26 769	25 949	26 93	27 172	25 355	27 445	27 429	0	Clear Sky Lightly Windy	
144	3	27 672	25 018	27 383	26 965	27 367	26 626	26 226	25 599	26 549	25 696	26 742	26 967	25 132	27 239	27 159	0	Clear Sky Lightly Windy	
145	4	27 476	24 805	27 188	26 754	27 139	26 4	25 966	25 37	26 352	25 661	26 562	26 803	24 871	27 044	26 948	0	Clear Sky Lightly Windy	
146	4	27 299	24 657	27 043	26 609	27 01	26 255	25 837	25 256	26 207	25 176	26 433	26 706	24 754	26 947	26 915	0	Clear Sky Lightly Windy	
147	4	27 162	24 457	26 889	26 439	26 841	26 085	25 651	25 055	26 005	24 911	26 231	26 521	24 669	26 746	26 742	0	Clear Sky Lightly Windy	
148	4	27 013	24 371	26 757	26 323	26 66	25 921	25 421	24 824	25 776	24 889	26 002	26 292	24 487	26 501	26 533	0	Clear Sky Lightly Windy	
149	5	26 985	24 299	26 716	26 282	26 539	25 832	25 316	24 719	25 654	24 733	25 848	26 17	24 301	26 344	26 348	0	Clear Sky Lightly Windy	
150	5	26 714	24 007	26 442	26 04	26 329	25 637	25 137	24 524	25 427	25 057	25 685	26 04	24 185	26 186	26 184	0	Clear Sky Lightly Windy	
151	5	26 59	23 946	26 332	25 946	26 203	25 495	25 011	24 414	25 302	24 769	25 542	25 912	24 093	26 028	26 125	0	Clear Sky Lightly Windy	
152	5	26 411	23 847	26 186	25 816	26 13	25 413	24 929	24 364	25 203	24 784	25 477	25 849	24 091	25 868	26 01	0.00653	Clear Sky Lightly Windy	
153	6	26 386	23 654	26 144	25 79	26 018	24 805	24 272	25 047	24 547	25 289	25 676	23 933	25 706	25 755	25 903	0.04573	Lightly Cloudy	
154	6	26 236	23 576	26 025	25 687	25 912	25 236	24 736	24 201	24 96	24 637	25 202	23 872	25 829	25 603	25 872	0.21555	Lightly Cloudy	
155	6	26 171	23 8	25 93	25 64	25 817	25 189	24 673	24 122	24 866	24 092	25 124	25 561	23 913	25 511	25 64	0.35271	Lightly Cloudy	
156	6	26 083	23 97	25 841	25 584	25 727	25 131	24 62	24 241	24 879	25 949	25 407	25 497	23 963	25 382	25 485	0.4181	Lightly Cloudy	
157	7	25 995	24 304	25 738	25 605	25 733	25 153	24 685	24 36	24 764	26 776	25 037	25 505	24 09	25 31	25 518	0.52245	Lightly Cloudy	
158	7	25 986	24 896	25 79	25 762	25 79	25 287	24 838	24 628	24 82	27 168	25 143	25 656	24 416	25 336	25 643	1.9268	Lightly Cloudy	
159	7	26 015	25 853	25 85	25 854	26 044	25 447	25 067	25 77	24 913	30 653	25 267	25 814	24 783	25 346	25 148	2.4294	Lightly Cloudy	
160	7	26 159	27 219	25 966	26 2	26 706	25 702	25 545	26 237	25 238	29 65	25 991	26 123	25 268	25 462	25 975	3.1402	Lightly Cloudy	
161	8	26 441	29 422	36 182	26 681	27 372	26 199	26 379	27 66	25 795	30 011	26 261	26 419	25 972	25 838	26 277	3.3753	Lightly Cloudy	
162	8	26 199	31 037	39 396	27 28	26 353	26 269	27 312	29 377	26 588	30 398	27 327	27 064	26 765	26 041	26 572	4.2559	Lightly Cloudy	
163	8	27 231	32 641	39 637	27 825	29 106	27 215	28 306	30 781	27 441	31 72	28 402	27 553	27 521	26 493	26 863	4.9026	Lightly Cloudy	
164	8	27 786	35 009	26 936	28 555	30 376	28 012	29 499	32 524	28 442	32 142	29 787	28 221	29 989	27 147	27 292	5.5073	Lightly Cloudy	
165	9	28 336	36 677	27 242	29 143	31 538	28 181	30 505	33 934	29 43	32 445	30 999	28 814	30 49	27 773	27 546	5.7423	Lightly Cloudy	
166	9	28 562	37 44	27 993	29 442	31 536	29 091	30 682	34 448	29 812	32 246	31 475	29 044	30 97	28 053	27 165	5.7423	Lightly Cloudy	
167	9	28 679	37 978	27 462	29 558	31 773	29 288	31 073	34 878	30 023	32 663	31 87	29 177	31 346	28 186	27 86	5.7423	Lightly Cloudy	
168	9	30 836	40 143	29 164	31 65	35 007	32 097	31 772	39 488	33 905	34 601	36 195	31 182	37 284	31 184	29 53	2.9598	Lightly Cloudy	
169	10	31 031	44 662	29 495	31 992	35 756	32 6	35 005	40 855	34 533	36 441	37 184	31 614	39 398	31 644	29 865	2.0183	Lightly Cloudy	
170	10	31 23	45 611	31 104	32 053	36 188	32 818	35 101	41 305	34 806	34 439	37 66	31 365	40 14	31 844	30 066	1.9426	Lightly Cloudy No Wind	
171	10	32 636	46 906	31 348	33 583	37 882	34 658	38 086	43 155	37 33	33 334	39 45	33 064	42 841	33 855	31 985	1.8253	Lightly Cloudy No Wind	
172	10	33 001	46 66	31 46	33 643	37 898	34 706	38 198	42 984	37 587	33 413	39 903	33 144	42 489	33 998	31 749	8.7744	Lightly Cloudy No Wind	
173	11	33 083	46 465	31 584	33 666	37 885	35 755	38 245	43 98	37 732	34 822	39 891	33 179	42 802	34 08	31 168	7.502	Lightly Cloudy No Wind	
174	11	33 188	47 168	31 73	33 71	38 055	34 816	38 618	44 693	37 976	36 092	40 212	33 347	43 787	34 39	32 111	8.7526	Lightly Cloudy No Wind	
175	11	33 6	48 523	32 301	34 114	38 812	35 405	39 015	44 504	38 604	35 422	41 244	33 858	45 105	34 866	32 632	8.8809	Lightly Cloudy No Wind	
176	11	33 979	49 877	32 742	34 516	39 743	35 987	39 975	46 059	39 404	35 855	42 34	34 316	48 044	35 446	33 22	9.1771	Lightly Cloudy No Wind	
177	12	34 318	51 231	33 028	34 518	40 521	36 412	40 418	46 901	40 085	34 56	43 211	34 402	48 404	35 482	33 744	9.516	Lightly Cloudy No Wind	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S
178	12	34.785	52.031	33.825	35.246	41.157	36.844	41.255	48.15	40.915	35.015	43.784	35.05	49.85	36.556	34.368	9.0984	Clear Sky No Wind	
179	12	35.024	52.478	34.188	35.45	41.757	37.517	41.679	48.459	41.414	35.871	44.609	35.257	49.835	36.837	34.655	9.5118	Clear Sky No Wind	
180	12	35.267	52.533	34.545	35.633	41.751	37.315	42.015	48.745	41.824	36.452	44.279	35.365	50.45	37.064	34.738	9.8419	Clear Sky No Wind	
181	13	35.321	52.323	34.612	35.683	41.803	37.381	42.192	48.463	41.46	36.156	44.486	35.419	50.156	37.149	34.188	2.6789	Clear Sky No Wind	
182	13	36.165	53.425	35.76	36.631	43.505	38.444	43.506	50.804	43.536	35.035	46.372	36.26	52.907	38.308	35.908	2.0854	Clear Sky No Wind	
183	13	36.566	54.184	36.028	36.825	43.932	38.881	44.011	51.308	44.042	38.706	46.485	36.451	53.883	38.569	36.263	9.3255	Clear Sky Lightly Windy	
184	13	36.746	54.594	36.432	37.044	44.119	39.034	44.289	51.832	44.335	38.052	47.315	36.471	53.543	38.803	36.545	8.9005	Clear Sky Lightly Windy	
185	14	37.302	55.368	37.161	37.516	44.795	39.696	45.162	52.3	45.268	38.446	47.822	37.255	54.747	39.54	37.545	7.6438	Clear Sky Lightly Windy	
186	14	37.705	55.798	37.642	38.002	45.386	40.128	45.665	52.559	45.833	38.061	48.212	37.606	54.963	39.952	37.774	8.0586	Clear Sky Lightly Windy	
187	14	38.009	55.854	38.009	38.291	45.392	40.431	46.009	52.772	46.291	38.009	48.556	37.911	55.211	40.348	38.271	7.75	Clear Sky Lightly Windy	
188	14	38.358	55.023	38.421	38.624	45.242	40.829	46.325	52.626	46.614	38.533	48.718	38.786	55.053	40.669	38.499	7.9856	Clear Sky Lightly Windy	
189	15	38.658	55.524	38.783	38.907	45.8	41.122	46.47	52.445	46.91	38.892	48.658	38.506	54.832	41.034	38.65	7.0096	Clear Sky Lightly Windy	
190	15	38.928	54.605	39.155	39.147	45.712	41.36	46.731	52.454	47.145	37.765	48.665	38.125	54.518	41.429	39.131	6.5668	Clear Sky Lightly Windy	
191	15	39.152	53.473	39.417	39.308	45.563	41.485	46.759	52.1	47.482	38.521	48.464	38.845	53.873	41.574	39.408	5.8766	Clear Sky Lightly Windy	
192	15	39.359	52.717	39.686	39.437	45.505	41.634	46.106	51.438	47.348	37.461	48.1	38.923	53.333	41.784	39.65	5.1848	Clear Sky Lightly Windy	
193	16	39.508	51.802	39.851	39.45	45.081	41.627	46.952	51.336	47.31	38.19	47.863	38.951	52.77	41.913	39.765	4.8336	Clear Sky Lightly Windy	
194	16	39.699	50.584	40.413	39.651	46.023	39.509	46.85	49.643	46.311	50.161	47.172	37.16	47.141	38.832	39.772	4.2058	Clear Sky Lightly Windy	
195	16	39.691	49.58	40.093	39.431	44.358	41.521	46.052	49.6	46.999	37.601	46.716	38.124	51.048	42.102	39.919	3.5635	Clear Sky Lightly Windy	
196	16	39.631	47.807	40.11	39.154	43.774	41.15	45.504	48.576	46.625	35.731	46.132	38.399	49.782	42.013	38.182	2.9642	Clear Sky Lightly Windy	
197	17	39.497	46.179	39.993	38.838	43.022	40.754	44.896	47.362	46.731	35.291	45.267	38.001	48.589	41.747	39.347	2.4369	Clear Sky Lightly Windy	
198	17	39.265	44.177	39.784	38.276	42.175	40.076	44.038	46.096	45.475	34.727	44.375	37.537	46.813	41.461	38.449	1.753	Clear Sky Lightly Windy	
199	17	38.965	42.146	39.419	37.759	41.383	39.433	43.06	44.686	44.657	31.892	43.106	36.959	45.011	40.87	38.189	0.26067	Clear Sky Lightly Windy	
200	17	38.529	39.466	38.933	37.021	40.185	38.51	41.648	42.42	43.583	30.482	41.659	36.342	42.446	40.298	37.463	0.15643	Clear Sky Lightly Windy	

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

A REDUCTION OF HEAT GAIN IN BUILDINGS THROUGH ROOFS

TEST III: TEST OF MATERIALS



ศูนย์วิจัยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

DATA-COLLECTED PERIOD :
APR.6 - 9 , 1994

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	Hour	LOWER-MO	UPPER-JAA	ROOF SURF	UPPER-GLA	UPPER-OC	LOWER-OC	ROOF SURF	ROOF SURF	LOWER-ASE	OUTSIDE AL	UPPER-MO	UPPER-ASE	LOWER-JAA	LOWER-GLA	ROOF SURF	RADIATION	Wind Spd	Weather Condn	Remark
2	6	26 151	27 666	25 304	25 626	26 253	28 221	25 604	27 938	25 754	26 391	26 011	25 613	27 413	25 593	24 9	0.065073	0	Clear Sky	
3	6	26 011	27 536	25 234	25 54	26 187	26 122	25 36	27 905	25 688	26 3	25 96	25 64	27 567	25 642	25 673	0.07833	0	Clear Sky	
4	6	25 946	27 457	25 205	25 865	26 187	26 14	25 604	27 873	25 672	26 589	25 988	25 624	27 424	25 818	25 846	0.12402	1	Clear Sky	
5	6	25 996	27 415	25 289	26 415	26 302	26 286	25 916	27 859	25 755	27 25	25 889	25 644	27 364	26 335	26 512	0.2754	1	Clear Sky	
6	7	26 032	27 462	25 42	26 916	26 385	26 331	26 434	27 874	25 806	27 733	25 903	25 693	27 316	26 899	27 744	0.26762	2	Clear Sky Lightly Sunny	
7	7	26 142	27 491	25 658	27 988	26 559	26 495	27 234	27 779	26 012	28 446	25 998	25 916	27 362	28 019	29 491	0.34596	2	Clear Sky	
8	7	26 477	27 761	26 283	30 015	26 203	26 926	28 781	27 915	26 54	29 377	26 349	26 493	27 616	30 015	32 577	0.46991	0	Clear Sky	
9	7	26 589	27 825	26 993	30 605	27 157	27 087	29 281	27 969	27 611	29 68	26 992	26 653	27 665	30 672	33 813	0.50261	0	Clear Sky	
10	8	27 104	28 114	27 264	33 323	27 198	27 524	30 878	28 083	27 297	31 19	25 929	27 283	27 908	33 32	37 93	0.66162	0	Clear Sky	
11	8	27 653	28 485	27 941	34 682	28 244	28 29	30 96	28 422	27 442	32 081	27 492	27 845	28 342	34 604	38 886	0.13054	2	Clear Sky	
12	8	27 314	28 951	29 159	39 107	29 031	28 908	33 312	28 824	28 193	34 436	28 281	28 162	28 651	39 018	46 211	0.90064	2	Clear Sky	
13	8	28 845	29 245	29 916	41 311	29 517	29 454	34 458	29 087	29 359	34 712	28 168	29 328	29 152	41 317	48 155	2.3169	2	Clear Sky	
14	9	29 902	29 091	30 144	42 121	29 12	29 619	34 719	29 189	29 588	35 127	28 965	29 509	29 253	42 515	49 604	2.2513	2	Clear Sky	
15	9	31 361	30 864	32 661	43 011	30 929	30 891	35 44	30 991	30 924	35 788	29 788	30 891	30 874	42 784	50 195	5.8874	3	Clear Sky	
16	9	31 424	30 963	33 054	45 801	32 157	31 072	36 075	30 551	31 225	36 272	30 375	31 004	30 935	45 581	54 881	5.5344	0	Clear Sky	
17	9	31 112	31 126	33 399	53 966	32 418	32 355	38 424	30 12	32 372	36 353	31 579	32 375	31 068	53 631	59 744	5.8056	2	Clear Sky Sunny	
18	10	32 466	32 405	35 453	61 724	34 218	34 247	40 512	31 887	33 26	36 082	33 354	34 295	32 455	56 448	65 696	6.5682	2	Clear Sky	
19	10	32 633	32 661	35 18	62 044	34 521	34 521	40 265	32 02	34 092	37 708	33 634	34 629	32 562	62 262	66 891	7 0154	2	Clear Sky	
20	10	34 661	33 176	36 159	65 47	35 902	35 405	40 907	32 501	35 219	37 374	34 51	35 512	33 09	65 656	69 643	7 7119	2	Clear Sky	
21	10	34 841	33 364	36 937	66 442	35 544	35 569	41 742	32 605	35 405	38 593	34 609	35 781	33 682	66 062	70 353	7 8001	1	Clear Sky	
22	11	35 869	34 026	38 102	70 471	36 501	36 546	42 609	33 39	36 455	38 085	36 555	36 405	33 98	72 832	73 586	8 9214	1	Clear Sky	
23	11	35 582	34 378	39 481	72 431	37 216	37 264	43 502	33 819	37 045	38 016	36 353	37 045	34 51	75 864	76 341	8 941	1	Clear Sky	
24	11	36 477	34 606	39 529	74 924	37 762	37 681	43 902	34 163	37 515	40 869	36 187	37 507	34 802	78 089	78 092	9 034	1	Clear Sky	
25	11	37 339	35 031	40 034	76 356	38 084	38 021	44 635	34 42	37 833	38 569	37 063	37 817	35 035	79 347	79 379	9 2588	1	Clear Sky	
26	12	38 266	35 671	41 131	79 543	39 351	39 013	44 886	35 074	38 047	40 439	38 305	38 743	35 793	82 372	81 724	9 2044	1	Clear Sky	
27	12	38 651	35 922	41 412	79 715	39 256	39 209	45 609	35 304	38 991	40 373	38 595	38 986	35 96	82 928	82 068	9 2688	1	Clear Sky	
28	12	39 258	36 306	41 808	81 058	39 846	39 184	44 612	35 663	39 425	39 045	39 216	39 465	36 412	84 046	82 475	9 3585	1	Clear Sky	
29	12	39 439	36 433	41 962	81 166	40 063	39 923	44 383	35 147	39 486	39 865	39 398	39 455	36 465	84 465	83 302	9 3565	2	Clear Sky	
30	13	39 772	36 615	42 401	82 635	40 391	40 25	46 05	35 935	39 856	40 411	39 105	39 866	36 105	84 665	83 125	9 9432	2	Clear Sky	
31	13	40 283	37 125	43 024	83 561	40 854	40 714	46 933	36 366	40 293	41 055	40 221	40 268	37 11	84 891	84 804	9 8102	2	Clear Sky Sunny	
32	13	40 458	37 204	43 096	83 868	40 406	40 782	46 291	36 361	40 367	40 991	40 366	40 351	37 225	84 334	84 224	1 7255	2	Clear Sky	
33	13	40 889	37 457	43 409	84 054	41 449	41 24	46 597	36 6	40 149	40 792	40 861	40 505	37 412	83 752	84 534	1 7122	2	Clear Sky	
34	14	40 94	37 491	43 223	84 623	41 632	41 284	46 155	36 587	40 639	40 677	40 895	40 702	37 523	83 612	84 345	1 6732	2	Clear Sky	
35	14	41 194	37 739	43 427	84 334	41 785	41 496	46 077	37 129	40 823	39 186	41 157	40 861	37 755	81 51	83 308	1 7315	3	Clear Sky	
36	14	41 441	38 026	43 519	84 297	41 929	41 634	46 696	37 801	40 966	40 966	41 323	40 96	37 91	80 503	82 578	8 0585	3	Clear Sky	
37	14	41 588	38 252	43 408	82 111	41 992	41 697	45 348	37 165	41 022	41 955	41 882	41 032	38 224	77 853	79 116	1 6664	3	Clear Sky	
38	15	41 591	38 249	43 071	80 422	41 992	41 631	44 561	37 205	40 832	40 441	41 438	40 874	38 258	75 516	78 27	1 6738	4	Clear Sky	
39	15	41 566	38 432	42 922	78 299	41 882	41 55	44 492	37 336	40 781	39 441	41 388	40 782	38 245	73 533	76 502	1 6488	4	Clear Sky	
40	15	41 191	38 328	42 061	72 337	41 524	41 116	43 727	37 341	40 288	39 99	41 036	40 309	38 228	69 385	72 604	5 7418	4	Clear Sky	
41	15	41 136	38 416	41 913	71 115	41 441	41 006	43 111	37 43	40 112	40 167	40 969	40 237	38 301	68 25	71 764	5 4028	4	Clear Sky	
42	16	40 892	38 412	41 484	68 846	41 101	40 615	42 357	37 404	39 968	39 268	40 115	39 968	38 218	65 894	69 233	4 9935	4	Clear Sky	
43	16	40 545	38 423	41 068	66 142	40 632	40 244	41 424	37 551	39 666	39 089	40 455	39 691	38 36	63 415	66 828	4 2051	4	Clear Sky	
44	16	40 208	38 335	40 572	63 688	40 021	39 803	40 286	37 458	39 319	37 575	40 156	39 345	38 266	61 611	64 045	3 1826	4	Clear Sky	
45	16	39 538	38 022	39 756	60 904	39 251	39 169	38 383	37 401	38 7	37 411	39 528	38 669	38 043	58 634	58 759	1 1104	3	Clear Sky	
46	17	39 162	37 983	39 218	58 466	38 16	38 138	37 606	37 334	38 205	36 428	39 153	38 272	37 938	56 314	56 205	0 91161	3	Clear Sky	
47	17	38 701	37 812	38 516	55 646	38 305	38 284	36 44	37 381	37 695	35 932	38 676	37 737	37 717	53 652	51 338	0 70335	1	Clear Sky	
48	17	38 016	37 62	37 804	52 484	37 6	37 709	36 151	37 293	36 974	34 62	38 02	36 906	37 426	50 859	47 323	0 33871	1	Clear Sky	
49	17	37 263	37 228	36 221	50 54	36 985	36 881	35 2	37 118	36 112	33 011	37 362	36 196	37 092	48 533	44 784	0 18893	1	Clear Sky	
50	18	36 279	36 646	35 294	47 2	35 99	35 883	34 833	36 544	34 989	32 365	36 362	35 071	36 281	45 88	42 089	0 1173	1	Clear Sky	
51	18	35 281	35 885	34 22	44 985	35 131	35 058	33 127	36 121	34 119	31 534	35 675	34 238	35 673	43 806	40 215	0 0782	1	Clear Sky	
52	18	34 482	35 468	33 496	43 233	34 419	34 384	32 518	35 724	33 409	31 269	35 019	33 567	35 209	42 236	38 442	0 02601	1	Clear Sky	
53	18	34 014	34 965	32 752	41 334	33 934	33 845	32 167	35 41	32 157	31 06	33 365	32 915	34 733	40 456	36 821	0 00652	1	Clear Sky	
54	19	33 865	34 486	31 871	39 15	33 238	33 143	31 44	34 939	31 967	30 776	33 518	32 061	34 197	38 068	34 975	0	1	Clear Sky	
55	19	33 124	34 29	31 602	38 41	33 024	32 932	31 343	34 81	31 788	30 628	33 211	31 851	34 011	37 733	34 478	0	1	Clear Sky	
56	19	33 003	34 23	31 514	38 151	32 952	32 857	31 257	34 6	31 115	30 46	32 805	31 179	33 525	37 52	34 216	0	1	Clear Sky	
57	19	32 383	33 878	30 895	36 014	32 412	32 321	30 876	34 483	31 065	30 365	32 423	31 112	33 52	35 424	32 452	0	1	Clear Sky	
58	20	32 108	33 688	30 624	35 62	32 12	32 046	30 646	34 399	30 847	30 11	31 71	30 675	33 308	34 712	31 848	0 0652	1	Clear Sky	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
63	21	30.116	32.215	28.531	30.945	29.975	29.911	28.959	32.885	28.876	29.215	29.931	28.734	31.824	30.65	28.438	0.00652	1	Clear Sky	
64	21	29.815	32.058	28.291	30.959	29.865	29.769	28.899	32.799	28.771	29.216	29.615	28.616	31.683	30.235	28.303	0.00652	1	Clear Sky	
65	21	29.615	31.931	28.192	30.061	29.615	29.566	28.529	32.62	28.562	29.233	29.451	28.434	31.561	29.842	28.02	0.00652	1	Clear Sky	
66	22	29.459	31.799	28.068	29.779	29.501	29.421	28.436	32.439	28.42	29.155	29.3	28.358	31.451	29.54	27.831	0.00652	0	Clear Sky	
67	22	29.245	31.619	27.881	29.341	29.304	29.246	28.303	32.286	28.255	29.296	29.088	28.209	31.286	28.931	27.601	0.00652	0	Clear Sky	
68	22	28.981	31.441	27.621	29.003	29.068	29.021	28.093	32.03	28.045	28.889	28.613	27.949	31.076	28.828	27.31	0.00652	0	Clear Sky	
69	22	28.841	31.204	27.513	28.761	28.921	28.873	27.914	31.852	27.899	28.675	28.667	27.803	30.992	28.571	27.083	0.00652	0	Clear Sky	
70	23	28.66	31.116	27.346	28.453	28.74	28.692	27.732	31.73	27.732	28.564	28.501	27.652	30.766	28.309	26.883	0.00652	1	Clear Sky	
71	23	28.49	30.931	27.194	28.234	28.559	28.501	27.545	31.531	27.579	28.104	28.313	27.463	30.559	28.011	26.596	0.00652	2	Clear Sky	
72	23	28.379	30.814	27.048	27.94	28.392	28.344	27.304	31.354	27.432	28.088	28.072	27.271	30.388	27.721	26.36	0.00652	2	Clear Sky	
73	23	28.225	30.699	26.942	27.791	28.272	28.224	27.262	31.234	27.359	28.224	27.919	27.182	30.268	27.502	26.203	0.00652	2	Clear Sky	
74	0	28.296	30.569	27.155	27.748	28.405	28.356	27.732	31.259	27.374	28.404	27.892	27.251	30.225	27.461	26.531	0.00652	2	Clear Sky	
75	0	28.223	30.681	27.198	27.711	28.367	28.332	27.711	31.328	27.422	28.314	27.935	27.246	30.219	27.421	26.523	0.00652	0	Clear Sky	
76	0	28.217	30.661	27.192	27.659	28.33	28.293	27.592	31.153	27.369	28.425	27.914	27.224	30.182	27.385	26.455	0.00652	3	Clear Sky	
77	0	28.131	30.596	26.916	27.48	28.185	28.131	27.319	31.025	27.256	28.265	27.611	27.16	30.119	27.241	26.165	0.00652	3	Clear Sky	
78	1	28.041	30.468	26.861	27.4	28.051	28.004	27.096	30.897	27.16	27.736	27.721	27.015	30.006	27.078	25.94	0.00652	3	Clear Sky	
79	1	27.827	30.284	26.624	27.154	27.794	27.763	26.752	30.685	26.96	27.425	27.554	26.848	29.84	26.864	25.671	0.00652	3	Clear Sky	
80	1	27.596	30.058	26.361	26.923	27.564	27.532	26.555	30.471	26.728	27.355	27.307	26.648	29.658	26.632	25.362	0.00652	3	Clear Sky	
81	1	27.413	29.875	26.193	26.739	27.413	27.391	26.467	30.306	26.672	27.29	27.124	26.498	29.461	26.483	25.274	0.00652	4	Clear Sky	
82	2	27.295	29.741	26.123	26.62	27.343	27.294	26.311	30.204	26.523	27.246	26.973	26.395	29.311	26.364	25.254	0.00652	4	Clear Sky	
83	2	27.195	29.528	25.924	26.454	27.128	27.063	26.084	29.926	26.374	26.694	26.871	26.261	29.176	26.228	25.004	0.00652	4	Clear Sky	
84	2	26.876	29.262	25.653	26.216	26.907	26.895	25.862	29.708	26.169	26.473	26.601	26.039	28.941	25.975	24.718	0.00652	4	Clear Sky Lightly Sunny	
85	2	26.676	29.046	25.486	26.033	26.724	26.708	25.728	29.526	25.033	26.402	26.402	25.673	28.758	25.807	24.616	0.00652	4	Clear Sky	
86	3	26.523	28.879	25.381	25.912	26.587	26.554	25.59	29.389	25.928	26.309	26.282	25.781	28.589	25.67	24.558	0.00652	4	Clear Sky	
87	3	26.337	28.684	25.26	25.759	26.483	26.434	25.561	29.254	25.824	26.194	26.162	25.711	28.439	25.582	24.439	0.00653	4	Clear Sky	
88	3	26.118	28.476	25.088	25.603	26.376	26.321	25.346	29.068	25.684	26.038	26.006	25.556	28.252	25.374	24.177	0.00653	2	Clear Sky	
89	3	26.02	28.346	24.989	25.489	26.229	26.165	25.215	28.906	25.553	25.939	25.843	25.425	28.106	25.248	24.114	0.00653	2	Clear Sky	
90	4	25.874	28.185	24.794	25.295	26.018	25.97	25.004	28.681	25.358	25.826	25.648	25.213	27.945	25.101	23.875	0.00653	2	Clear Sky	
91	4	25.759	28.054	24.68	25.163	25.887	25.855	24.969	28.454	25.243	25.549	25.501	25.147	27.782	24.969	23.759	0.00653	0	Clear Sky	
92	4	25.66	28.893	24.569	25.065	25.774	25.741	24.806	28.341	25.145	25.644	25.388	25.032	27.636	24.823	23.628	0.00653	0	Clear Sky	
93	4	25.547	27.827	24.461	24.983	25.707	25.675	24.692	28.196	25.13	25.546	25.24	24.901	27.591	24.725	23.563	0.00653	0	Clear Sky	
94	5	25.353	27.57	24.288	24.784	25.578	25.546	24.724	28.002	24.911	25.491	25.143	24.768	27.361	24.61	23.545	0.00653	0	Clear Sky	
95	5	25.271	27.473	24.272	24.723	25.513	25.464	24.627	27.89	24.62	25.626	25.03	24.724	27.216	24.462	23.495	0.00653	1	Clear Sky	
96	5	25.207	27.36	24.304	24.722	25.464	25.432	24.98	27.825	24.835	26.108	25.081	24.738	27.104	24.53	23.839	0.00653	1	Clear Sky	
97	5	25.222	27.324	24.416	24.803	25.512	25.491	25.061	27.791	24.416	25.899	25.002	24.82	27.109	24.626	23.883	0.00653	1	Clear Sky	
98	6	25.27	27.328	24.465	24.819	24.496	25.48	24.916	27.633	24.801	25.561	25.013	24.771	27.056	24.61	23.836	0.01305	0	Clear Sky	
99	6	25.223	27.232	24.23	24.82	25.432	25.384	24.675	27.531	24.188	25.629	24.964	24.675	27.991	24.642	23.731	0.03916		Clear Sky Sunny	
100	6	25.11	27.104	24.255	25.029	25.432	25.4	24.868	27.488	24.793	25.689	24.885	24.627	26.879	24.804	24.045	0.07832		Clear Sky	
101	6	25.125	27.088	24.287	25.287	25.399	25.383	24.835	27.377	24.69	25.773	24.851	24.593	26.815	25.077	24.367	0.11749		Clear Sky	
102	7	25.043	26.442	24.368	25.979	25.512	25.511	25.335	27.345	24.803	26.381	24.9	24.706	26.783	25.883	25.77	0.22846		Clear Sky	
103	7	25.206	27.07	24.604	26.841	25.658	25.642	25.802	27.377	24.948	26.702	24.948	24.835	26.831	26.858	26.543	0.31584		Clear Sky	
104	7	25.287	27.12	24.82	27.509	25.728	25.105	25.964	27.447	25.201	27.088	25.142	25.092	26.991	27.47	27.404	0.33931		Clear Sky	
105	7	25.464	27.2	25.254	28.898	25.963	25.947	26.735	27.473	25.985	27.928	25.368	25.4	27.137	28.998	29.799	0.47652		Clear Sky	
106	8	25.963	27.473	26.236	31.243	26.263	26.423	27.792	27.618	26.124	30.197	25.85	26.027	27.36	31.147	32.165	0.51567		Clear Sky	
107	8	26.558	27.842	26.864	34.588	27.136	27.072	29.534	27.841	26.182	32.276	26.398	26.67	27.544	34.415	36.229	0.1376		Clear Sky	
108	8	26.976	28.155	27.346	37.41	27.683	27.635	31.149	28.148	27.395	33.136	26.865	27.399	27.988	37.065	40.199	0.8094		Clear Sky	
109	8	27.641	28.56	27.961	41.015	28.528	28.458	33.441	28.474	28.186	33.425	27.574	28.09	28.426	40.938	45.034	4.699		Clear Sky	
110	9	28.308	28.885	29.125	44.81	29.253	29.173	34.528	28.742	28.902	35.973	28.195	28.54	28.744	44.6	48.041	1.1225		Clear Sky	
111	9	29.246	29.401	30.501	48.69	30.126	30.062	35.186	29.131	29.856	36.069	29.075	29.826	29.236	48.294	51.982	5.195		Clear Sky	
112	9	30.046	29.967	31.592	52.59	31.608	30.973	36.387	29.664	30.152	35.552	29.973	30.122	29.879	52.44	54.487	6.2512		Clear Sky	
113	9	30.92	30.538	32.699	56.198	31.846	31.15	37.891	30.128	31.625	35.708	30.688	31.579	30.481	56.382	57.662	2.561		Clear Sky	
114	10	31.057	30.627	32.806	57.036	31.982	31.955	38.214	30.232	32.162	36.315	30.855	32.232	30.586	56.699	58.173	1.2521		Clear Sky	
115	10	32.691	31.611	34.165	64.524	33.643	33.596	39.68	31.028	33.314	36.17	32.522	33.322	31.633	64.645	63.752	8.1486		Clear Sky	
116	10	33.327	32.033	35.99	67.353	34.316	34.284	40.39	31.464	33.981	37.631	33.148	33.455	32.023	68.041	66.285	8.8556		Clear Sky	
117	10	34.041	32.498	36.445	70.385	35.045	34.999	41.076	31.838	34.684	37.236	33.976	34.69	32.52	71.045	68.75	8.8951		Clear Sky	
118	11	34.7	32.882	36.998	72.416	35.665	35.618	41.74	32.141	35.12	37.26	34.657	35.082	32.67	75.037	69.513	9.4068		Clear Sky	
119	11	35.372	33.272	37.839	75.513	36.323	36.241	42.609	32.586	35.784	39.364	35.237	35.192	33.315	78.34	72.088	9.6529		Clear Sky	
120	11	36.001	33.772	38.6	77.277	36.936	36.879	42.895	32.66	36.969	36.317	36.155	35.96	33.306	80.008	73.853	9.8078		Clear Sky	

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	
126	12	38.174	35.921	41.411	84.051	39.084	39.007	45.501	35.071	38.743	39.368	38.649	38.712	35.952	86.452	79.243	10.024		Clear Sky		
126	13	39.102	36.124	41.937	84.868	39.601	39.56	45.578	35.133	39.075	39.326	39.024	39.076	36.161	87.124	80.119	10.331		Clear Sky		
127	13	39.659	36.591	42.538	84.885	40.065	40.034	45.662	35.695	39.581	38.331	39.644	39.566	36.632	87.372	80.9	9.5278		Clear Sky		
128	13	40.034	36.985	42.812	85.108	40.382	40.34	46.284	35.951	39.878	39.894	39.412	39.631	36.752	86.542	80.981	9.7493		Clear Sky		
129	13	40.3	37.236	42.933	85.685	40.602	40.524	46.284	36.754	40.071	40.14	40.218	40.031	37.216	86.506	80.582	9.4562		Clear Sky		
130	14	40.84	37.88	43.191	86.346	41.111	41.002	45.586	36.705	40.157	40.086	40.768	40.448	37.808	84.100	80.014	1.6862		Clear Sky		
131	14	41.064	38.021	43.298	86.432	41.298	41.287	45.538	36.861	40.637	39.196	41.025	40.622	38.015	83.266	79.441	1.6146		Clear Sky		
132	14	41.325	38.441	43.311	84.43	41.502	41.456	45.43	37.304	40.787	42.095	41.253	40.765	38.405	81.514	79.32	1.6536		Clear Sky		
133	14	41.514	38.14	43.344	83.665	41.669	41.499	44.689	37.551	40.908	40.55	41.389	40.671	38.672	79.75	77.335	1.6016		Clear Sky		
134	15	41.552	38.182	42.988	80.608	41.763	41.539	44.513	37.529	40.808	40.326	41.446	40.787	38.728	76.068	73.13	1.5134		Clear Sky		
135	15	41.451	38.926	42.445	77.742	41.668	41.383	43.833	37.825	40.62	40.356	41.336	40.63	38.899	73.509	72.017	1.5034		Clear Sky		
136	15	41.313	39.1	42.12	74.139	41.541	41.203	44.247	38.043	40.474	40.12	41.241	40.525	40.075	71.909	72.295	5.4551		Clear Sky		
137	15	41.283	39.326	42.045	72.14	41.424	41.035	43.18	38.258	40.49	40.583	41.215	40.5	39.268	69.652	70.253	5.1292		Clear Sky		
138	16	41.14	39.255	41.684	69.905	41.156	40.798	42.771	38.129	40.222	40.565	41.025	40.231	39.202	67.127	68.012	4.9805		Clear Sky		
139	16	40.834	39.389	41.207	67.22	40.735	40.449	41.827	38.289	40.196	40.436	40.687	40.143	39.834	64.452	65.233	4.3164		Clear Sky		
140	16	40.454	39.222	40.657	64.605	40.091	40.013	40.309	38.311	39.467	37.303	40.381	39.446	39.149	62.245	63.109	3.6925		Clear Sky		
141	16	39.91	38.98	39.985	61.619	39.354	39.426	38.283	38.201	38.901	36.165	39.848	38.889	38.849	59.428	58.076	1.0744		Clear Sky		
142	17	39.415	38.656	39.072	59.061	38.744	38.963	37.57	38.066	38.279	35.928	39.295	38.295	38.468	56.56	54.694	0.93185		Clear Sky		
143	17	38.583	38.244	38.103	55.464	38.193	38.208	36.828	37.895	37.503	35.586	38.578	37.529	38.125	53.633	50.074	0.15545		Clear Sky		
144	17	38.002	37.966	37.402	52.884	37.633	37.581	36.085	37.702	36.882	34.727	37.912	36.909	37.973	51.146	47.412	0.48852		Clear Sky		
145	17	37.173	37.487	36.482	50.302	36.902	36.887	35.346	37.364	36.066	34.128	37.083	36.03	37.721	48.46	44.338	0.37134		Clear Sky		
146	18	36.256	36.962	35.292	47.991	36.11	36.095	34.437	37.003	35.162	32.9	36.292	35.159	36.701	46.649	42.444	0.29972		Clear Sky		
147	18	35.172	36.164	33.913	44.961	35.115	35.04	33.287	36.381	33.969	31.784	35.188	33.957	35.802	43.736	39.537	0.11732		Clear Sky		
148	18	34.195	34.39	32.819	42.475	34.105	34.109	32.222	35.72	32.979	30.898	34.457	33.078	35.195	41.439	37.451	0.03259		Clear Sky		
149	18	33.352	34.11	31.786	40.204	33.244	33.228	31.329	35.127	31.949	30.375	33.501	32.044	34.443	39.352	35.336	0.00652		Clear Sky		
150	19	32.647	34.134	31.476	38.583	32.6	32.615	30.742	34.703	31.235	29.643	32.653	31.346	33.913	37.832	34.102	0		Clear Sky		
151	19	31.935	33.535	30.406	36.676	32.122	32.094	30.533	34.132	30.533	30.452	32.09	30.644	33.246	36.196	32.866	0		Clear Sky		
152	19	31.543	33.144	30.145	35.133	31.798	31.718	30.382	33.824	30.207	30.175	31.638	30.567	32.856	35.099	32.069	0		Clear Sky		
153	19	31.2	32.85	29.784	34.684	31.375	31.607	29.878	33.405	29.892	29.764	31.261	29.924	32.629	34.792	31.408	0		Clear Sky		
154	20	31.098	32.184	29.649	34.44	31.256	31.178	29.161	33.448	29.193	29.639	31.178	29.808	32.495	33.998	31.204	0		Clear Sky		
155	20	30.072	31.965	28.718	31.692	30.23	30.144	29.065	32.612	28.925	29.751	30.035	28.686	31.13	31.465	29.349	0.00652		Clear Sky		
156	20	29.984	31.961	28.643	31.57	30.184	30.12	29.036	32.615	28.889	29.384	30.018	28.885	31.748	31.332	29.358	0.00652		Clear Sky		
157	20	30.031	31.958	28.595	31.46	30.101	30.025	28.888	32.548	28.885	29.601	29.981	28.883	31.759	31.279	29.385	0.00652		Clear Sky		
158	21	29.974	31.95	28.571	31.36	30.068	30.004	28.948	32.544	28.866	29.552	29.931	28.863	31.742	31.183	29.272	0.00652		Clear Sky		
159	21	29.531	31.632	28.173	30.408	29.654	29.644	28.526	32.22	28.445	28.277	29.499	28.461	31.442	30.291	28.459	0.00652		Clear Sky		
160	21	29.308	31.487	27.958	29.898	29.356	29.276	28.045	31.981	28.259	28.173	29.276	28.251	31.311	29.815	27.971	0.00652		Clear Sky		
161	21	29.042	31.304	27.581	29.422	28.959	28.911	27.508	31.778	27.965	27.645	28.972	27.933	31.134	29.324	27.485	0.00652		Clear Sky		
162	22	28.754	31.112	27.712	29.024	28.754	28.105	27.49	31.75	27.73	28.755	28.651	27.765	30.908	28.922	27.269	0.00652		Clear Sky		
163	22	28.72	31.188	27.48	28.983	28.979	28.965	28.164	31.677	27.982	29.323	28.63	27.915	30.992	28.656	27.479	0.00652		Clear Sky		
164	22	28.663	31.116	27.316	28.715	28.815	28.77	27.941	31.655	27.827	28.739	28.595	27.763	30.987	28.771	27.427	0.00652		Clear Sky		
165	22	28.489	31.008	27.192	28.487	28.614	28.582	27.771	31.531	27.671	28.263	28.454	27.951	30.847	28.518	27.412	0.00652		Clear Sky		
166	23	28.264	30.815	26.982	28.151	28.425	28.376	27.497	31.421	27.479	28.52	28.17	27.386	30.58	28.074	26.583	0.00652		Clear Sky		
167	23	28.101	30.702	26.836	27.924	28.214	28.198	27.238	31.293	27.334	27.99	27.992	27.207	30.467	27.767	26.32	0.00652		Clear Sky		
168	23	27.941	30.62	26.706	27.7	28.1	28.009	27.155	31.211	27.219	28.181	27.831	27.109	30.353	27.558	26.147	0.00652		Clear Sky		
169	23	27.825	30.555	26.558	27.501	27.985	27.953	27.056	31.176	27.136	27.937	27.712	27.009	30.301	27.376	26.012	0.00652		Clear Sky		
170	0	27.699	30.462	26.416	27.331	27.868	27.795	26.799	26.51	30.794	26.783	27.527	27.361	26.656	30.014	26.912	25.514	0.00652		Clear Sky	
171	0	27.475	30.255	26.192	27.009	27.552	27.537	26.51	30.794	26.783	27.527	27.361	26.656	30.014	26.912	25.514	0.00652		Clear Sky		
172	0	27.297	30.076	25.979	26.846	27.391	27.375	26.412	30.633	26.655	27.458	27.2	26.51	29.838	26.735	25.403	0.00652		Clear Sky		
173	0	27.083	29.861	25.799	26.58	27.189	27.163	26.136	30.47	26.473	27.365	27.003	26.345	29.658	26.506	25.074	0.00652		Clear Sky		
174	1	26.896	29.68	25.595	26.4	26.978	26.928	25.82	30.221	26.253	26.558	26.766	26.108	29.435	26.525	24.82	0.00652		Clear Sky		
175	1	26.655	29.423	25.369	26.421	26.734	26.685	25.644	29.98	26.027	26.252	26.557	25.95	29.291	26.011	24.626	0.00652		Clear Sky		
176	1	26.412	29.199	25.141	25.85	26.543	26.542	25.383	29.787	25.833	26.202	26.283	25.687	28.957	25.725	24.204	0.00652		Clear Sky		
177	1	26.252	28.991	24.949	25.656	26.381	26.365	25.303	29.614	25.653	26.151	26.14	25.577	28.832	25.593	24.224	0.00652		Clear Sky		
178	2	26.096	28.835	24.807	25.532	26.273	26.207	25.131	29.458	25.515	25.966	25.933	25.37	28.594	25.338	24.001	0.00652		Clear Sky		
179	2	25.856	28.582	24.616	25.245	26.033	26.001	25.033	29.157	25.34	25.806	25.727	25.229	28.405	25.104	23.843	0.00652		Clear Sky		
180	2	25.667	28.395	24.527	25.136	25.893	25.86	25.007	28.954	25.265	26.165	25.602	25.136	28.205	25.255	23.845	0.00652		Clear Sky		
181	2	25.597	28.304	24.519	25.066	25.823	25.79	24.969	28.932	25.227	26.241	25.469	25.114	28.116	24.954	23.839	0.00652		Clear Sky		
182	3	25.512	28.224	24.4	24.984	25.737	25.705	24.835	28.831	25.173	26.107	25.383	25.044	28.03	24.85	23.689	0.00652		Clear Sky		
183	3	25.4																			

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
187	4	24 775	27 419	23 045	23 808	24 809	24 693	23 181	29 404	24 129	24 628	24 275	23 46	27 84	23 836	22 285	0 00652		Clear Sky	
188	4	24 341	27 155	22 95	23 457	24 322	24 207	23 16	27 748	23 604	24 872	24 162	23 191	25 978	23 322	21 848	0 00652		Lightly Sunny Lightly Cloudy	
189	4	24 137	26 976	22 801	23 319	24 192	24 144	23 011	27 649	23 723	24 546	24 045	23 626	26 767	23 19	21 898	0 00652		Lightly Sunny Lightly Cloudy	
190	5	23 933	26 703	22 642	23 092	24 046	24 029	22 972	27 408	23 527	24 401	23 852	23 415	25 589	23 037	21 865	0 00652		Lightly Sunny Lightly Cloudy	
191	5	23 7	26 488	22 421	22 891	23 813	23 797	22 881	27 178	23 312	23 814	23 635	23 215	26 374	22 842	21 529	0 00653		Lightly Sunny Lightly Cloudy	
192	5	23 534	26 274	22 19	22 74	23 633	23 647	22 579	26 964	23 145	24 082	23 404	22 983	26 096	22 594	21 296	0 00653		Lightly Sunny Lightly Cloudy	
193	5	23 404	26 095	22 042	22 592	23 498	23 499	22 538	26 737	22 948	25 45	23 207	22 802	25 869	22 445	21 162	0 00653		Lightly Sunny Lightly Cloudy	
194	6	23 27	25 012	22 021	22 493	23 491	23 415	22 484	26 684	22 978	25 303	23 201	22 897	25 915	22 476	21 503	0 01305		Lightly Sunny Lightly Cloudy	
195	6	23 186	25 948	22 008	22 492	23 319	23 312	22 477	26 607	22 963	24 579	23 189	22 899	25 825	22 494	21 395	0 03263		Lightly Sunny Lightly Cloudy	
196	6	23 093	25 893	21 876	22 672	23 205	23 206	23 229	26 414	22 866	24 03	23 141	22 818	25 771	22 737	21 65	0 11095		Lightly Sunny Lightly Cloudy	
197	6	22 931	25 644	21 764	23 061	23 175	23 126	22 461	26 223	22 722	24 789	22 766	22 575	25 499	23 126	22 323	0 2154		Lightly Sunny Lightly Cloudy	
198	7	22 95	25 614	21 945	23 807	23 258	23 241	22 952	26 226	22 805	25 293	22 886	22 708	25 471	23 858	23 582	0 30679		Lightly Sunny Lightly Cloudy	
199	7	23 085	25 667	22 241	25 023	23 457	23 427	23 488	26 198	23 003	25 893	22 988	22 907	25 523	25 126	25 41	0 43134		Lightly Sunny Lightly Cloudy	
200	7	23 296	25 814	22 65	26 264	23 67	23 653	24 266	26 25	23 33	26 62	23 233	23 232	25 67	26 538	27 465	0 56145		Clear Sky	
201	7	23 569	25 973	23 197	27 868	23 99	23 957	25 184	26 237	23 699	27 098	23 504	23 585	25 892	28 108	29 611	0 68855		Clear Sky	
202	8	24 004	26 227	23 892	29 991	24 407	24 358	26 483	26 484	24 197	28 072	23 905	24 114	26 162	30 168	32 092	0 86829		Clear Sky	
203	8	24 548	26 545	24 142	32 402	24 935	24 886	27 732	26 688	24 805	28 012	24 486	24 773	26 479	32 786	35 034	1 3579		Clear Sky	
204	8	25 143	26 945	25 578	35 001	25 546	25 497	29 123	26 944	25 497	30 145	25 046	25 432	26 864	35 332	37 724	1 2992		Clear Sky	
205	8	25 803	27 345	26 43	37 662	26 205	26 742	30 19	27 248	26 22	29 25	25 689	26 188	27 264	37 661	39 948	1 9321		Clear Sky	
206	9	26 461	27 793	27 312	39 963	28 848	26 814	30 765	27 584	26 91	30 965	26 2	26 846	27 696	39 76	41 695	1 6906		Clear Sky	
207	9	27 715	28 305	28 033	41 942	27 568	27 553	31 338	27 938	27 617	31 099	27 071	27 553	28 211	41 803	42 845	1 9909		Clear Sky	
208	9	27 898	28 795	28 875	45 137	28 299	28 284	32 794	28 412	28 249	32 524	27 724	28 302	28 724	45 756	47 371	2 6044		Clear Sky	
209	9	28 325	29 045	29 589	48 548	28 775	28 728	34 152	28 729	28 857	33 425	28 25	28 843	29 019	48 998	50 445	2 6828		Clear Sky	
210	10	29 405	29 79	30 985	52 764	29 727	29 678	35 265	29 249	29 967	34 034	29 299	29 281	29 147	52 428	53 144	2 9042		Clear Sky	
211	10	29 802	30 027	31 38	53 989	30 075	30 028	35 616	29 455	30 286	35 990	29 649	30 255	29 985	54 48	55 194	6 186		Clear Sky	
212	10	31 206	30 906	33 4	61 215	31 468	31 438	38 572	30 248	31 856	37 354	31 124	31 89	30 939	62 307	63 198	8 3314		Clear Sky	
213	10	32 75	31 626	34 795	65 758	32 55	32 426	39 842	30 919	32 952	37 607	32 181	32 925	31 675	66 288	66 484	8 5384		Clear Sky	
214	11	33 872	32 148	36 524	70 268	34 068	33 992	41 24	31 885	34 563	35 193	33 729	34 566	32 906	71 652	68 902	8 2621		Clear Sky	
215	11	34 721	33 371	37 418	72 452	34 901	34 67	42 325	32 501	35 362	36 385	34 408	35 365	33 483	74 052	70 871	8 2289		Clear Sky	
216	11	35 402	33 935	38 011	73 745	35 532	35 469	42 305	32 925	35 898	36 54	35 492	35 813	33 981	75 677	71 375	7 5276		Clear Sky	
217	11	35 967	34 39	38 415	72 92	36 076	36 077	41 754	33 458	36 397	36 847	35 872	36 36	34 453	74 679	69 998	6 9741		Clear Sky	
218	12	36 412	34 748	38 611	72 843	36 592	36 529	41 846	33 864	36 69	37 271	36 25	36 646	34 725	74 325	69 338	6 5309		Clear Sky	
219	12	36 785	35 149	38 82	72 626	36 899	36 836	41 38	33 936	37 044	37 264	36 636	36 918	35 157	73 524	68 499	6 1463		Clear Sky	
220	12	37 013	35 424	38 885	73 235	37 162	37 099	42 5	34 644	37 24	37 469	36 899	37 197	35 42	74 132	69 52	6 1584		Clear Sky	
221	12	37 395	35 796	39 297	74 655	37 517	37 443	42 794	34 942	37 635	39 434	37 325	37 608	35 711	75 827	71 15	7 3509		Clear Sky	
222	13	37 978	36 215	40 26	76 722	38 124	37 958	44 477	35 38	38 269	39 832	37 909	38 284	36 203	77 994	74 134	7 9036		Clear Sky	
223	13	38 58	36 636	40 812	77 205	38 6	38 522	44 324	35 698	38 635	40 278	38 511	38 808	36 63	78 055	73 832	7 3813		Clear Sky	
224	13	38 963	36 916	41 074	78 222	38 925	38 876	43 795	35 914	39 16	39 447	38 807	39 749	36 862	78 667	73 916	7 8111		Clear Sky	
225	13	39 363	37 266	41 513	78 296	39 274	39 272	43 897	36 277	39 678	38 812	39 306	39 587	37 25	77 582	73 585	6 6626		Clear Sky	
226	14	39 628	37 505	41 533	78 126	39 477	39 474	43 302	36 47	39 126	38 883	39 508	39 68	37 464	76 65	72 74	6 6713		Clear Sky	
227	14	39 79	37 679	41 447	76 582	39 603	39 54	43 571	36 664	39 195	39 187	39 592	39 78	37 632	74 951	71 72	2 5857		Clear Sky	
228	14	39 903	37 892	41 249	75 855	39 69	39 634	42 615	36 92	39 831	39 821	39 768	39 831	37 811	73 522	69 79	2 5008		Clear Sky	
229	14	39 95	38 038	41 004	74 148	39 664	39 554	42 02	37 098	39 788	38 442	39 783	39 783	37 996	71 539	68 434	2 4422		Clear Sky	
230	15	39 809	38 122	40 568	72 808	39 445	39 336	41 409	37 228	39 643	38 143	39 674	39 653	38 075	69 674	67 179	5 5103		Clear Sky	
231	15	39 659	38 137	40 292	70 932	39 138	39 013	40 822	37 354	39 477	38 059	39 523	39 506	38 132	67 662	65 619	4 3508		Clear Sky	
232	15	39 275	38 055	39 789	67 953	38 759	38 665	40 179	37 381	39 124	37 768	39 197	39 176	38 002	65 441	63 743	4 781		Clear Sky	
233	15	38 968	37 93	39 265	65 115	38 396	38 186	39 312	37 309	38 144	38 024	38 623	38 801	37 852	63 123	62 169	4 312		Clear Sky	
234	16	38 777	37 948	38 058	63 933	38 073	37 932	39 924	37 337	38 621	38 068	38 715	38 647	37 865	61 863	61 202	4 3771		Clear Sky	
235	16	38 55	37 991	38 86	61 652	37 651	37 541	38 403	37 389	38 329	36 903	38 36	38 318	37 832	59 396	59 133	3 7915		Clear Sky	
236	16	38 108	37 828	38 067	59 657	37 141	37 094	37 302	37 396	37 882	35 385	37 992	37 782	37 741	57 556	57 684	3 8371		Clear Sky	
237	16	37 73	37 73	37 6	57 73	36 676	36 659	35 504	37 334	37 47	35 002	37 607	37 502	37 762	55 659	55 934	1 1401		Clear Sky	
238	17	37 342	37 624	37 138	55 472	36 243	36 164	34 987	37 232	36 981	34 512	37 106	36 934	37 342	53 32	53 39	1 0999		Clear Sky	
239	17	36 765	37 232	36 459	52 722	35 734	35 661	34 396	37 056	36 33	34 755	36 609	36 343	37 08	50 689	48 54	0 82111		Clear Sky	
240	17	36 206	36 929	35 613	49 882	35 167	35 057	33 797	36 796	35 69	33 43	36 02	35 674	36 691	48 092	48 945	0 48876		Clear Sky	
241	17	35 35	36 358	34 865	47 184	34 454	34 383	32 952	36 332	34 694	32 559	35 17	34 665	36 078	45 693	41 245	0 33241		Clear Sky	
242	18	34 289	35 598	33 182	44 246	33 548	33 487	31 913	35 754	33 435	31 378	34 067	33 435	35 267	43 022	38 487	0 22816		Clear Sky	
243	18	33 501	34 983	32 221	40 476	33 005	32 907	31 13	35 371	32 651	30 475	33 455	32 6	34 688	41 221	38 665	0 13038		Clear Sky	
244	18	32 594	34 343	30 922	39 949	31 997	31 902	29 728	34 796	31 405	29 237	32 48	31 305	33 824	38 747	34 295	0 0236		Clear Sky	
245	18	31 722	33 642	29 83	37 981	31 122	31 027	28 827	34 26	30 406	28 556	31 726	30 358	33 217	37 112	32 726	0 01304		Clear Sky	
2																				

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
248	19	28 327	30 577	26 501	31 148	28 293	28 213	26 419	31 629	27 09	27 442	26 545	27 073	30 492	30 938	27 746	0.00652		Clear Sky	
250	20	27 56	29 892	25 857	29 429	27 766	27 719	26 484	31 023	26 256	27 366	27 761	26 291	29 748	29 269	26 597	0.00652		Clear Sky	
251	20	27 511	29 844	25 829	29 285	27 703	27 721	26 42	30 992	26 274	27 574	27 626	26 259	29 716	29 141	26 455	0.00652		Clear Sky	
252	20	27 38	29 73	25 662	28 964	27 572	27 476	26 192	30 83	26 16	27 33	27 46	26 127	29 467	28 803	26 205	0.00652		Clear Sky	
253	20	27 1	29 53	25 364	28 267	27 258	27 209	25 973	30 549	25 859	27 329	27 259	25 843	29 383	28 185	25 737	0.00652		Clear Sky	
254	21	26 966	29 447	25 363	28 105	27 208	27 217	25 923	30 466	25 826	26 998	27 045	25 776	29 35	28 055	25 601	0.00652		Clear Sky	
255	21	26 207	28 814	24 653	26 443	26 555	26 507	25 794	29 675	25 091	27 096	26 201	25 062	28 749	26 442	24 642	0.00652		Clear Sky	
256	21	26 189	28 719	24 7	26 324	26 55	26 502	25 588	29 703	25 07	27 224	26 181	24 974	28 711	26 32	24 586	0.00652		Clear Sky	
257	21	26 194	28 808	24 773	26 274	26 564	26 515	25 575	29 7	25 076	27 092	26 193	24 965	28 773	26 321	24 632	0.00652		Clear Sky	
258	22	26 191	28 221	24 726	26 209	26 562	26 514	25 629	29 714	25 049	27 267	26 175	24 965	28 75	26 256	24 63	0.00652		Clear Sky	
259	22	26 249	28 993	24 913	26 169	26 619	26 587	25 8	29 708	25 204	27 24	26 234	25 14	28 798	26 153	24 753	0.00652		Clear Sky	
260	22	26 266	28 942	24 922	26 136	26 602	26 555	25 764	29 108	25 22	27 308	26 25	25 139	28 83	26 137	24 736	0.00652		Clear Sky	
261	22	26 244	29 249	24 929	25 842	26 517	26 484	25 696	29 59	25 23	26 997	26 163	25 166	28 92	25 793	24 538	0.00652		Clear Sky	
262	23	26 177	29 013	24 925	25 742	26 95	26 434	25 613	29 573	25 196	27 026	26 144	25 115	28 918	25 727	24 438	0.00652		Clear Sky	
263	23	26 247	28 949	24 744	25 533	26 304	26 256	25 323	29 444	25 265	26 834	26 016	25 018	28 805	25 548	24 21	0.00652		Clear Sky	
264	23	25 838	28 773	24 452	25 29	26 015	25 965	24 871	29 295	24 919	26 158	25 788	24 671	28 627	25 306	23 887	0.00652		Clear Sky	
265	23	25 605	28 525	24 17	25 058	25 748	25 716	24 637	29 084	24 701	26 279	25 538	24 652	28 427	25 055	23 651	0.00652		Clear Sky	
266	0	25 372	28 326	24 002	24 808	25 613	25 564	24 565	28 885	24 549	26 272	25 323	24 469	28 164	24 79	23 484	0.00653		Clear Sky	
267	0	25 175	28 114	23 804	24 611	25 352	25 336	24 24	28 61	24 385	25 481	25 109	24 336	27 991	24 642	23 221	0.00653		Clear Sky	
268	0	25 971	27 896	23 6	24 407	25 39	25 419	24 116	28 436	24 304	25 782	25 065	24 255	27 797	24 531	23 222	0.00653		Clear Sky	
269	0	24 852	27 767	23 56	24 32	25 158	25 11	24 352	28 386	24 223	26 118	24 772	24 125	27 649	24 32	23 255	0.00653		Clear Sky	
270	1	24 939	27 728	23 69	24 416	25 254	25 222	24 69	26 305	24 286	26 75	24 755	24 239	27 552	24 335	23 512	0.00653		Clear Sky	
271	1	24 935	27 728	23 769	24 368	25 27	25 237	24 754	26 273	24 4	26 733	24 787	24 303	27 6	24 432	23 721	0.00653		Clear Sky	
272	1	24 9	27 761	23 883	24 841	25 302	25 303	24 864	28 225	24 465	26 893	24 82	24 384	27 616	24 448	23 739	0.00653		Clear Sky	
273	1	24 552	27 301	23 518	24 1	24 892	24 825	24 604	27 703	24 245	25 582	24 552	24 164	27 237	24 083	23 968	0.00653		Clear Sky	
274	2	24 566	27 318	23 507	24 083	24 856	24 08	24 115	27 639	24 196	25 859	24 987	24 115	27 157	24 057	23 452	0.00653		Clear Sky	
275	2	24 567	27 286	23 55	24 116	24 841	24 842	24 148	27 655	24 23	25 648	24 472	24 099	27 143	24 066	23 033	0.00653		Clear Sky	
276	2	24 536	27 223	23 518	24 036	24 809	24 193	24 099	27 607	24 212	25 551	24 503	24 164	27 114	24 133	23 065	0.00653		Clear Sky	
277	2	24 47	27 158	23 485	24 083	24 87	24 116	24 1	27 577	24 148	25 112	24 39	24 088	27 03	24 035	23 085	0.00653		Clear Sky	
278	3	24 431	27 06	23 468	24 034	24 193	24 745	24 227	27 392	24 178	25 486	24 388	24 115	27 043	24 066	23 048	0.00653		Clear Sky	
279	3	24 418	27 091	23 95	23 483	24 11	24 677	24 129	27 539	24 157	25 064	24 37	24 095	27 058	24 031	23 044	0.00653		Clear Sky	
280	3	24 417	27 072	23 464	23 808	24 643	24 626	24 062	27 607	24 125	25 106	24 4	24 077	27 072	24 009	22 865	0.00653		Clear Sky	
281	3	24 384	27 068	23 415	23 819	24 628	24 67	24 072	27 537	24 11	24 707	24 384	24 028	27 056	23 9	22 489	0.00653		Clear Sky	
282	4	24 255	26 911	23 172	23 657	24 432	24 416	23 754	27 131	23 835	24 463	24 109	23 738	26 628	23 512	22 395	0.00653		Clear Sky	
283	4	24 294	26 736	23 21	23 512	24 304	24 304	23 674	27 153	23 723	24 486	24 001	23 626	26 576	23 448	22 179	0.00653		Clear Sky	
284	4	23 982	26 516	22 922	23 432	24 252	24 224	23 578	27 041	23 642	24 434	23 9	23 529	26 399	23 335	22 281	0.00653		Clear Sky	
285	4	23 934	26 512	22 934	23 401	24 142	24 176	23 546	26 962	23 595	24 434	23 886	23 514	26 384	23 336	22 3	0.00653		Clear Sky	
286	5	23 822	26 321	22 82	23 273	24 08	24 069	23 48	26 804	23 548	24 146	23 791	23 45	26 257	23 29	22 227	0.00653		Clear Sky	
287	5	23 711	26 147	22 774	23 195	24 003	23 938	23 195	26 661	23 518	23 699	23 768	23 423	26 179	23 291	22 239	0.00653		Clear Sky	
288	5	23 552	25 989	22 921	23 004	23 797	23 764	22 824	26 578	23 679	23 527	23 537	23 197	26 022	23 02	21 757	0.00653		Clear Sky	
289	5	23 323	25 878	22 221	22 794	23 636	23 687	22 646	26 329	23 637	23 44	23 346	22 925	25 782	22 719	21 611	0.00653		Clear Sky	
290	6	23 142	25 596	22 14	21 878	22 477	23 287	22 287	26 264	23 59	22 688	23 012	22 96	25 576	22 364	21 049	0.00653		Clear Sky	

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

A REDUCTION OF HEAT GAIN IN BUILDINGS THROUGH ROOFS

TEST IV : TEST OF COMPOSITION



ศูนย์วิจัยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

DATA-COLLECTED PERIOD :
APR.12 - 16 , 1994

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
1	Hrs.	1	2	3	4	5	6	7	8	9	10	UTSIDE AIR	12	13	14	15	Radiat
2	20	31 209	30 286	30 063	27 103	30 652	30 842	32 C97	31 399	32 779	29 897	28 851	31 528	25 553	29 059	26 531	0.00652
3	20	30 867	29 879	29 656	26 619	30 39	30 517	31 676	31 137	32 423	29 465	28 267	31 214	24 883	28 666	25 632	0
4	21	30 529	29 498	29 462	26 148	30 067	30 179	31 26	30 879	32 15	29 142	27 544	30 942	24 12	28 168	25 233	0
5	21	30 215	29 111	29 159	26 133	29 764	29 86	30 863	30 624	31 853	29 047	28 248	30 678	25 04	28 408	25 828	0.00651
6	21	29 948	28 832	28 943	26 046	29 582	29 676	30 565	30 422	31 582	28 976	28 062	30 473	24 727	28 169	25 592	0.00652
7	21	29 683	28 529	28 64	25 661	29 344	29 406	30 251	30 235	31 349	28 61	26 928	30 268	23 713	27 698	24 596	0.00652
8	22	29 373	28 24	28 417	25 58	29 07	29 134	29 947	30 013	31 061	28 415	27 965	29 995	24 097	27 776	24 952	0.00652
9	22	29 134	27 983	28 366	25 304	28 879	28 91	29 66	29 788	30 822	28 336	27 359	29 788	23 693	27 486	24 564	0.00652
10	22	28 913	27 762	28 114	25 244	28 642	28 724	29 424	29 615	30 62	28 115	27 299	29 599	23 903	27 424	24 709	0.00652
11	22	28 704	27 552	27 984	25 176	28 481	28 496	29 167	29 423	30 383	28 032	27 344	29 407	23 952	27 409	24 725	0.00652
12	23	28 583	27 414	27 88	25 216	28 389	28 422	28 997	29 285	30 21	28 12	27 622	29 269	24 28	27 588	25 05	0.00652
13	23	28 477	27 306	27 786	25 202	28 348	28 385	28 872	29 212	30 025	28 108	27 547	29 18	24 513	27 562	25 25	0.01304
14	23	28 403	27 252	27 814	25 163	28 307	28 323	28 804	29 139	29 873	28 147	27 572	29 092	24 601	27 587	25 34	0.00652
15	23	28 351	27 149	27 823	25 192	28 288	28 287	28 703	29 054	29 724	28 08	27 47	28 99	24 58	27 52	25 303	0.01304
16	0	28 282	27 131	27 77	25 348	28 235	28 25	28 618	28 97	29 592	28 06	27 706	28 907	24 914	27 58	25 556	0.01304
17	0	28 298	27 13	27 818	25 361	28 252	28 252	28 566	28 937	29 496	28 074	27 789	28 844	25 026	27 722	25 672	0.01304
18	0	28 284	27 151	27 804	25 383	28 27	28 254	28 556	28 891	29 402	28 078	27 645	28 795	24 93	27 644	25 573	0.01304
19	0	28 255	27 117	27 838	25 417	28 222	28 189	28 526	28 83	29 309	28 046	27 646	28 75	25 013	27 598	25 624	0.01304
20	1	28 225	27 088	27 713	25 354	28 21	28 177	28 481	28 785	29 232	28 001	27 681	28 689	24 806	27 585	25 498	0.01304
21	1	28 133	26 996	27 54	25 019	28 101	28 053	28 421	28 708	29 137	27 7	26 808	28 612	23 875	27 057	24 614	0.00652
22	1	27 91	26 787	27 204	24 778	27 878	27 83	28 262	28 549	29 029	27 381	26 242	28 437	23 537	26 788	24 314	0.00652
23	1	27 754	26 679	27 242	24 946	27 673	27 673	28 124	28 428	28 922	27 435	27 227	28 297	24 301	27 131	24 817	0.01304
24	2	27 724	26 682	27 311	25 105	27 661	27 644	28 012	28 349	29 813	27 597	27 388	28 253	24 591	27 293	25 253	0.00652
25	2	27 779	26 753	27 457	25 324	27 764	27 764	28 003	28 356	28 739	27 779	27 698	28 224	25 147	27 524	25 758	0.01304
26	2	27 818	26 775	27 45	25 202	27 819	27 803	28 027	28 383	28 714	27 722	27 467	28 25	24 72	27 369	25 314	0.00652
27	2	27 761	26 736	27 201	25 129	27 762	27 73	27 986	28 321	28 641	27 538	26 912	28 193	24 403	27 008	24 983	0.01304
28	3	27 64	26 646	27 063	24 991	27 624	27 591	27 895	28 248	28 568	27 369	26 55	28 12	24 168	26 822	24 716	0.00652
29	3	27 552	26 557	27 055	24 933	27 536	27 52	27 84	28 144	28 512	27 247	26 653	28 032	24 095	26 846	24 629	0.00652
30	3	27 495	26 516	27 03	24 991	27 512	27 478	27 768	28 055	28 439	27 192	26 743	27 961	24 296	26 741	24 731	0.00652
31	3	27 487	26 492	27 151	24 982	27 472	27 422	27 745	27 999	28 385	27 183	26 863	27 904	24 225	26 831	24 709	0.01304
32	4	27 45	26 456	26 888	24 91	27 434	27 418	27 722	27 978	28 33	27 081	26 262	27 85	24 088	26 567	24 572	0
33	4	27 379	26 417	26 898	24 774	27 345	27 329	27 634	27 909	28 242	26 990	26 463	27 778	24 161	26 447	24 564	0.00652
34	4	27 275	26 313	26 898	24 719	27 243	27 227	27 564	27 82	28 172	26 842	26 056	27 692	23 832	26 296	24 365	0.00652
35	4	27 171	26 224	26 594	24 657	27 124	27 107	27 46	27 733	28 1	26 786	26 433	27 587	24 212	26 481	24 663	0.00652
36	5	27 134	26 219	26 618	24 946	27 068	27 052	27 406	27 645	28 013	26 747	26 153	27 533	24 013	26 33	24 576	0.01304
37	5	27 029	26 146	26 5	24 909	26 996	26 983	27 319	27 556	27 941	26 581	26 016	27 446	23 897	26 144	24 343	0.00652
38	5	26 941	26 057	26 33	24 69	26 861	26 845	27 213	27 453	27 87	26 411	25 865	27 326	23 51	25 912	24 19	0.01304
39	5	26 805	25 921	26 259	24 682	26 71	26 71	27 11	27 314	27 767	26 291	25 858	27 206	23 392	25 857	24 021	0.01304
40	6	26 7	25 818	26 171	24 608	26 572	26 572	26 989	27 199	27 663	26 234	25 704	27 103	23 383	25 833	24 029	0.02251
41	6	26 615	25 727	26 101	24 941	26 485	26 518	26 887	27 112	27 576	26 196	25 94	27 016	23 941	25 809	24 457	0.14349
42	6	26 592	25 803	26 221	25 465	26 478	26 446	26 799	27 038	27 505	26 269	26 317	26 944	24 892	25 98	24 966	0.29349
43	6	26 634	25 975	26 458	26 232	26 538	26 521	26 795	27 067	27 438	26 457	26 666	26 955	25 75	26 232	25 782	0.42394
44	7	26 792	26 277	26 775	27 368	26 679	26 695	26 823	27 129	27 435	26 743	27 32	27 016	27 433	26 6	26 807	0.61308
45	7	27 06	26 808	27 387	28 747	26 954	26 97	27 257	27 432	27 13	28 474	27 146	29 067	27 131	27 979	0.7957	
46	7	27 502	27 517	27 982	30 617	27 309	27 309	27 181	27 454	27 485	27 614	29 756	27 309	31 158	27 774	29 469	0.95875
47	7	28 006	28 39	28 807	32 627	27 814	27 879	27 527	27 702	27 806	28 246	30 338	27 606	33 261	28 47	31 15	1.2457
48	8	28 723	29 522	29 968	34 95	28 483	28 515	28 971	28 051	27 779	28 979	31 036	27 955	35 265	29 49	32 798	1.4479
49	8	29 52	30 763	31 193	37 468	29 249	29 313	28 547	28 515	28 035	29 697	33 512	28 418	38 001	30 305	34 824	1.6762
50	8	30 519	32 299	32 204	39 808	30 168	30 284	29 259	29 051	28 364	30 455	32 711	29 003	39 433	30 868	35 808	1.8265
51	8	31 582	33 929	33 786	42 641	31 153	31 249	30 087	29 656	28 746	31 378	34 071	29 609	42 952	32 061	38 586	1.9762
52	9	32 733	35 703	35 026	45 357	32 194	32 289	31 002	30 269	29 203	31 924	34 386	30 273	44 555	32 447	39 972	2.0667
53	9	33 95	37 509	35 575	47 559	33 254	33 412	32 002	30 905	29 663	32 668	34 49	30 892	45 42	32 971	40 359	2.1125
54	9	35 163	39 292	36 501	50 759	34 295	34 466	32 995	31 522	30 154	33 504	36 799	31 472	48 596	34 245	42 984	2.2755
55	9	36 391	41 164	37 479	52 803	35 355	35 56	34 061	32 113	30 668	34 219	36 347	32 066	50 897	35 008	44 736	2.6557
56	10	37 551	42 825	38 241	53 36	36 341	36 581	35 081	32 663	31 155	34 608	35 825	32 616	48 323	35 132	42 872	4.8362
57	10	38 82	44 453	39 374	55 71	37 228	37 53	36 085	33 162	31 656	35 121	36 176	33 114	51 343	35 66	44 998	7.4381
58	10	39 729	45 965	40 279	56 708	38 122	38 416	37 04	33 684	32 164	35 452	36 6	33 605	50 91	35 704	44 812	7.9713
59	10	40 43	47 011	39 916	55 295	38 791	39 139	37 504	34 095	32 608	35 42	37 024	34 001	46 846	35 593	41 602	8.6138
60	11	41 231	48 076	42 923	59 097	39 281	39 672	38 625	34 398	32 975	36 225	37 716	34 303	55 177	36 932	48 216	8.8483
61	11	42 172	49 355	43 319	60 377	40 039	40 491	39 446	34 817	33 396	36 968	38 305	34 754	55 803	37 192	48 79	8.8339
62	11	42 909	50 535	41 295	62 347	40 803	41 285	40 273	35 322	33 85	37 265	39 196	35 221	56 148	37 939	49 118	8.9562
63	11	43 924	51 828	44 573	63 068	41 427	41 971	41 017	35 702	34 285	37 618	38 162	35 608	55 666	37 837	48 62	9.0604

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
64	12	44 643	52 886	44 153	63 268	42 078	42 637	41 736	38 063	34 677	37 899	39 228	35 953	56 233	38 415	49 23	9 0915
65	12	45 166	53 625	45 152	64 571	42 536	43 141	42 382	36 309	35 002	38 06	38 581	36 167	56 592	37 658	49 255	9 1488
66	12	45 807	54 504	44 796	63 243	42 939	43 605	42 986	36 591	35 334	38 206	36 968	36 45	53 321	38 08	47 75	8 9258
67	12	46 201	54 769	44 473	62 497	43 398	44 063	43 562	36 847	35 684	38 413	39 319	36 753	53 587	38 632	47 184	8 9634
68	13	46 468	55 034	45 46	64 928	43 66	44 294	43 963	37 119	35 989	38 872	39 762	37 009	56 083	38 872	49 031	9 1066
69	13	46 882	55 611	46 281	65 796	44 061	44 709	44 432	37 384	36 286	38 949	40 415	37 306	56 504	39 058	49 732	8 9373
70	13	47 23	56 03	45 93	64 162	44 412	45 051	44 866	37 694	36 535	38 882	39 943	37 638	54 165	38 57	48 197	8 272
71	13	47 608	56 341	45 994	61 825	44 714	45 347	45 209	37 915	36 889	39 048	39 009	37 844	49 798	38 923	46 287	4 7836
72	14	47 391	55 916	44 249	62 815	44 744	45 36	45 452	38 093	37 074	38 843	40 48	37 967	52 903	38 6	46 89	8 3697
73	14	46 955	55 138	44 451	59 78	44 467	45 077	45 509	38 198	37 258	38 314	40 872	38 08	50 155	38 509	45 1	6 9562
74	14	46 734	54 405	44 902	60 02	44 161	44 732	45 395	38 232	37 418	38 482	39 379	38 068	50 455	38 263	45 295	6 8315
75	14	46 635	54 125	45 265	59 082	44 092	44 664	45 281	38 328	37 53	38 578	39 905	38 218	49 011	38 234	44 432	6 4791
76	15	46 388	53 743	45 14	58 961	44 014	44 539	45 202	38 436	37 67	38 488	39 529	38 311	48 657	38 326	44 184	6 0563
77	15	46 158	53 319	43 552	57 563	43 954	44 479	45 111	38 548	37 814	38 361	38 938	38 438	48 281	37 969	42 406	5 8592
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85	17	36 414	37 417	31 508	31 746	35 346	35 644	38 723	34 622	36 43	29 236	27 537	34 708	27 395	28 062	27 635	0 28667
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88	18	33 133	33 15	30 295	29 117	32 279	32 515	34 727	32 738	34 579	29 222	27 418	32 864	25 944	26 09	26 634	0 03964
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94	19	29 536	28 946	27 892	26 705	29 058	29 152	30 364	30 236	31 857	27 746	26 433	30 299	25 148	26 898	25 648	0 01303
95	19	29 285	28 68	28 088	26 54	28 838	28 919	29 987	30 003	31 497	27 671	26 293	30 035	25 104	26 902	25 508	0
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127	3	26 099	25 279	25 552	24 006	26 051	26 035	26 422	26 646	27 112	25 688	25 311	26 533	23 116	25 311	23 649	0 00652
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176	16	45 688	52 532	41 607	55 4	43 719	44 193	44 753	38 242	37 383	38 023	39 118	38 102	44 378	37 93	41 421	4 227
177	16	45 2	51 796	41 101	52 662	43 333	43 796	44 507	38 202	37 436	37 656	38 811	38 077	42 327	37 514	40 355	3 4206
178	16	44 552	50 761	42 604	52 114	42 805	43 223	44 166	38 107	37 497	37 34	37 795	37 566	41 487	36 84	39 512	2 9324
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181	17	42 001	45 93	39 145	42 001	40 447	40 843	42 472	37 208	37 302	35 056	33 528	37 129	34 46	34 192	34 176	1 0208
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189	19	34 535	34 567	32 735	31 309	33 715	33 936	35 528	33 557	34 708	31 642	29 958	33 588	28 492	30 833	29 13	0 00

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
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201	22	31 132	30 416	30 353	28 439	30 798	30 895	31 593	31 212	31 973	29 923	28 639	31 18	27 097	29 303	27 673	0
202	22	30 968	30 252	30 078	28 93	30 666	30 745	31 397	31 079	31 794	29 918	29 296	31 048	28 372	29 467	28 584	0 00651
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213	1	26 64	25 372	25 419	23 352	26 19	26 287	27 345	27 457	28 961	25 467	23 516	27 487	22 514	24 465	23 045	0 01304
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298	22	30 095	29 618	29 458	28 147	29 68	29 792	30 478	29 776	30 541	29 074	28 579	29 744	26 688	28 643	27 267	0 01303
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324	5	23 571	23 249	23 765	22 634	24 04	24 04	24 12	24 863	25 67	24 009	22 644	24 758	22 31	23 556	22 616	0 00653
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340	9	26 628	28 997	28 517	36 09	26 931	26 978	26 003	26 207	25 821	27 043	29 429	26 127	35 932	27 492	32 279	1 847
341	9	27 243	29 947	29 516	38 758	27 532	27 612	26 552	26 585	26 103	27 795	29 021	26 505	35 34	28 045	32 492	1 925
342	9	27 75	30 737	30 322	40 106	28 054	28 158	27 076	26 884	26 321	28 182	31 357	26 787	42 318	28 742	37 05	2 0359
343	9	28 273	31 718	32 004	44 051	28 641	28 817	27 601	27 292	26 59	29 073	31 56	27 168	46 881	29 672	40 788	3 5954
344	10	29 041	33 273	31 67	48 204	29 536	29 711	28 273	27 712	26 943	29 823	31 766	27 664	48 816	30 461	42 686	6 8183
345	10	30 004	35 033	33 927	51 283	30 418	30 705	29 014	28 29	27 333	30 737	32 533	28 214	51 393	31 326	44 443	7 8488
346	10	30 973	36 887	34 634	51 755	31 481	31 814	29 888	28 755	27 747	31 512	31 816	28 708	50 118	31 61	43 433	7 7651
347	10	31 883	38 555	37 662	51 738	32 502	32 858	30 817	29 271	28 183	32 089	32 74	29 239	45 769	32 466	43 729	7 5843
348	11	32 669	39 924	37 183	52 752	33 398	33 809	31 717	29 727	28 577	32 306	34 207	29 697	51 87	32 243	43 909	8 2975
349	11	33 491	41 108	38 592	54 997	34 237	34 71	32 59	30 126	29 009	32 86	34 632	30 079	53 555	32 907	46 021	8 3105
350	11	34 432	42 358	38 114	55 983	34 985	35 505	33 42	30 547	29 399	33 199	34 1	30 487	51 338	33 579	44 9	8 4382
351	11	35 152	43 372	39 107	57 831	35 562	36 11	34 126	30 86	29 78	33 24	35 436	30 732	52 92	33 751	45 651	8 5034
352	12	36 235	44 734	38 025	59 14	36 172	36 835	34 835	31 145	30 075	33 967	34 046	31 018	53 232	33 745	46 575	8 6925
353	12	37 196	45 894	40 216	61 032	36 693	37 383	35 484	31 382	30 399	34 301	34 475	31 275	54 6	34 553	47 408	8 991
354	12	38 018	47 314	42 356	61 33	37 233	37 987	36 086	31 628	30 69	34 763	35 63	31 501	55 737	35 236	48 391	8 8396
355	12	39 063	48 496	42 616	60 293	37 889	38 704	36 743	31 911	30 99	35 17	36 539	31 8	53 973	35 343	47 036	8 2289
356	13	39 687	49 197	41 619	60 708	38 436	39 28	37 37	32 212	31 292	35 22	36 082	32 085	54 473	35 598	47 652	8 5044
357	13	40 163	49 892	43 226	61 908	38 913	39 726	37 911	32 49	31 57	35 46	36 929	32 363	55 1	35 59	48 149	8 5305
358	13	40 773	50 567	43 425	58 433	39 474	40 29	38 505	32 843	31 923	35 349	35 632	32 764	48 541	36 742	43 735	3 9029
359	13	40 97	50 394	42 074	60 589	39 723	40 518	38 942	33 059	32 204	35 364	37 736	32 932	54 077	35 463	46 852	8 2945
360	14	41 425	50 929	42 001	61 295	40 06	40 855	39 358	33 339	32 468	36 015	36 868	33 211	52 642	36 208	46 644	7 798
361	14	41 767	51 364	44 202	60 961	40 398	41 176	39 743	33 619	32 75	36 361	37 067	33 54	53 122	36 55	46 839	7 4711
362	14	42 086	51 651	44 193	61 892	40 732	41 479	40 125	33 928	33 02	36 363	37 702	33 848	52 365	36 84	46 296	7 5427
363	14	42 536	52 092	45 012	60 592	41 045	41 791	40 506	34 228	33 351	36 776	38 565	34 134	50 997	37 208	45 681	6 8066
364	15	42 536	52 062	45 261	59 926	41 191	41 89	40 795	34 504	33 599	36 691	37 667	34 426	49 734	36 754	44 477	6 2836
365	15	42 621	51 991	43 628	58 891	41 239	41 97	40 928	34 702	33 85	36 621	37 452	34 608	48 622	36 625	44 331	5 5534
366	15	42 767	51 691	44 485	57 007	41 354	42 068	41 136	34 892	34 088	36 59	38 454	34 812	46 626	36 954	42 704	5 0773
367	15	42 468	51 032	42 22	53 403	41 226	41 894	41 211	35 031	34 289	36 256	36 616	34 904	41 304	35 642	38 888	4 3287
368	16	42 089	49 941	41 701	52 455	40 839	41 53	41 111	35 023	34 426	35 921	37 192	34 898	41 297	35 654	38 617	3 6659
369	16	41 697	49 027	41 456	51 5	40 493	41 145	40 951	34 996	34 506	35 967	36 671	34 871	40 858	35 656	38 503	3 3388
370	16	41 423	48 12	40 505	49 39	40 178	40 769	40 692	34 978	34 584	35 734	35 965	34 868	38 699	35 45	37 162	2 727
371	16	40 948	47 069	40 294	47 283	39 733	40 325	40 419	34 85	34 64	35 364	34 355	34 797	37 106	34 766	35 836	0 91116
372	17	40 414	45 88	39 026	45 271	39 12	39 713	40 025	34 729	34 603	34 934	33 593	34 634	35 956	34 634	35 138	0 73544
373	17	39 663	44 335	37 49	41 438	38 383	38 945	39 523	34 489	34 568	34 363	32 879	34 41	33 179	33 765	33 179	0 57924
374	17	38 868	42 719	37 436	39 196	37 593	38 11	38 646	34 167	34 458	33 74	32 325	34 143	31 66	33 022	32 017	0 42934

ภาคผนวก-ค

คำนิยามและสูตรเบื้องต้นของศัพท์ที่อ้างถึงในวิทยานิพนธ์



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย

การหาค่าสัมประสิทธิ์ของการถ่ายเทความร้อน (Overall Coefficient of Heat Transfer, U-Value)

การหาค่าสัมประสิทธิ์ของการถ่ายเทความร้อนของวัสดุต่างๆ ที่กั้นระหว่างภายในและภายนอกอาคารนั้น ก็เพื่อใช้ในการคำนวณการถ่ายเทความร้อน สำหรับการเลือกขนาดเครื่องปรับอากาศได้ถูกต้อง

คำนิยามเบื้องต้นเกี่ยวกับคุณสมบัติในการถ่ายเทความร้อนของวัสดุ สัมประสิทธิ์การนำความร้อน (K)

ความสามารถในการถ่ายเทความร้อนโดยการนำความร้อนของวัสดุใดๆ สามารถพิจารณาได้จาก ค่าสัมประสิทธิ์การนำความร้อนของวัสดุนั้นๆ ซึ่งกำหนดว่า คือ ปริมาณความร้อนภายใต้สภาวะคงที่ ที่ถ่ายเทผ่าน ๑ หน่วยพื้นที่ ของวัสดุซึ่งมีความหนา ๑ หน่วย ใน ๑ หน่วยเวลา โดยมีความแตกต่างของอุณหภูมิผิววัสดุทั้งสองด้าน ๑ หน่วย

ค่าสัมประสิทธิ์การนำความร้อนมีหน่วยเป็น วัตต์ ม./ $^{\circ}\text{C}$

ความนำความร้อน (C)

ค่าความนำความร้อนของวัสดุใดๆ คือ อัตราส่วนระหว่าง ค่าสัมประสิทธิ์การนำความร้อนต่อความหนาของวัสดุ ซึ่งแสดงได้ดังสมการ

$$C = \frac{K}{dX}$$

เมื่อ X คือ ความหนาของวัสดุ (ม.)

C ค่าความนำความร้อน (วัตต์/ม. 2 - $^{\circ}\text{C}$)

ความต้านทานความร้อน (R)

ค่าความต้านทานความร้อนของวัสดุใดๆ คือ ส่วนกลับของค่าความนำความร้อนซึ่งแสดงได้ดังสมการ

$$R = \frac{1}{C} = \frac{dX}{K}$$

เมื่อ R คือ ค่าความต้านทานความร้อน (ม. 2 - $^{\circ}\text{C}$ /วัตต์)

อุณหภูมิโซล-แอร์ (Sol-Air Temperature)

การหาความร้อนที่ผ่านกำแพงและหลังคาภายนอกเกี่ยวข้องกับแนวความคิดในเรื่องอุณหภูมิโซล-แอร์ อุณหภูมิโซล-แอร์ คือ อุณหภูมิของอากาศภายนอกที่ไม่คิดการแลกเปลี่ยนพลังงานรังสีใดๆ แต่ให้อัตราความร้อนเข้าสู่ผิวเช่นเดียวกับผลรวมจริงของพลังงานรังสีดวงอาทิตย์ตกกระทบ การแลกเปลี่ยนพลังงานรังสีกับท้องฟ้าและสิ่งแวดล้อมภายนอกอื่นๆ และการแลกเปลี่ยนความร้อนเนื่องจากการพาความร้อน การทำสมดุลย์ความร้อนที่ผิวที่ถูกแสงแดด จะให้อัตราไหลของความร้อนเข้าสู่ผิว q_w/A มีหน่วยเป็น W/m^2 ดังนี้

$$q_w/A = \alpha I_t + h_o(t_o - t_s) - \epsilon \Delta R \quad \dots\dots\dots(1)$$

- เมื่อ
- α = ค่าการดูดกลืนพลังงานแสงอาทิตย์ของผิว
 - I_t = พลังงานแสงอาทิตย์แบบรวมที่ตกกระทบบนผิว, W/m^2
 - h_o = สัมประสิทธิ์การถ่ายเทความร้อนโดยการแผ่รังสีคลื่นยาวและการพาที่ผิวภายนอก, $W/m^2 \cdot ^\circ C$
 - t_o = อุณหภูมิอากาศภายนอก, $^\circ C$
 - t_s = อุณหภูมิที่ผิว, $^\circ C$
 - ϵ = ค่าการปล่อยรังสีแบบครึ่งทรงกลมของผิว
 - ΔR = ค่าแตกต่างระหว่างพลังงานรังสีคลื่นยาวที่ตกกระทบบนผิวจากท้องฟ้าและสิ่งแวดล้อมกับพลังงานรังสีที่ปล่อยจากวัตถุที่อุณหภูมิอากาศภายนอก, W/m^2

สมมติว่า อัตราการถ่ายเทความร้อน สามารถอธิบายได้ในเทอมของอุณหภูมิโซล-แอร์, t_e

$$q_w/A = h_o (t_e - t_s) \quad \dots\dots\dots(2)$$

จากสมการที่ ๑ และ ๒

$$t_e = t_o + \alpha I_t / h_o - \epsilon \Delta R / h_o \quad \dots\dots\dots(3)$$

สำหรับระนาบระดับ ผิวจะรับพลังงานรังสีคลื่นยาวจากท้องฟ้าเท่านั้น ค่า ΔR จะมีค่าประมาณ 63 W/m^2 ดังนั้น ถ้า $\epsilon = 0$ และ $h_o = 0.7$ เทอมสุดท้ายจะมีค่าประมาณ -0.9 องศาเซลเซียส

สำหรับระนาบในแนวดิ่ง, ผิวจะรับพลังงานรังสีคลื่นยาวจากพื้นและอาคารข้างเคียงเช่นเดียวกับจากท้องฟ้า ดังนั้นจึงเป็นการยากที่จะหาค่า ΔR ที่ละเอียดถูกต้องได้ เมื่อความเข้มของพลังงานแสงอาทิตย์สูง, ผิวของวัตถุบนโลกจะมีอุณหภูมิสูงกว่าอุณหภูมิอากาศภายนอก ดังนั้น พลังงานรังสีคลื่นยาวได้ชดเชยบางส่วนสำหรับการปล่อยรังสีที่ต่ำของท้องฟ้า และด้วยเหตุผลนี้ ในทางปฏิบัติจึงสมมุติให้ $\Delta R = 0$ สำหรับผิวในแนวดิ่ง

อุณหภูมิแตกต่างเทียบเท่า (Equivalent Temperature Difference)

วิธีทรานสเฟอร์ฟังก์ชัน (Transfer Function Method) (๕) ได้ถูกนำมาใช้ในการคำนวณหาการไหลของความร้อนแบบทรานเซียนในหนึ่งมิติ (One - Dimensional Transsient Heat Flow) ผ่านหลังคาและกำแพงที่ถูกแดดแบบต่างๆ ซึ่งผลที่ได้คือค่าของความร้อนนี้ เมื่อหารด้วยค่าสัมประสิทธิ์การถ่ายเทความร้อนรวม, U, ของกำแพงหรือหลังคา ก็จะได้ค่าอุณหภูมิแตกต่างเทียบเท่า (Equivalent Temperature Difference, $T_{e q}$)

ในกรณีคำนวณการไหลของความร้อนผ่านกำแพง และหลังคาภายนอก ได้ใช้ อุณหภูมิโซล-แอร์ แทนสภาพภายนอกบริเวณปรับอากาศ และได้สมมุติว่าอุณหภูมิอากาศภายในบริเวณปรับอากาศและสัมประสิทธิ์การถ่ายเทความร้อนที่ผิวทั้งภายในและภายนอกมีค่าคงที่ ความร้อนที่ผ่านหลังคา หรือกำแพงสามารถหาได้จากสมการดังนี้

$$q_{we, T} = \frac{A_w}{A_w} [\sum b_n (t_e, T - n\Delta) - \sum d_n q_{we, T - n\Delta} - tr c \sum C_n] \dots\dots(4)$$

ภาคผนวก-ง

COMPUTER PROGRAM
"TARE1"
IN COMPUTER SOFTWARE "TELIX"



ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย


```

main()
{
    int chr = 0,fp,i,nostar;
    int xl,x2;
    str cmdtemp[] = "I^M";
    str cmdtime[] = "C^M";
    // str timestr[S],hr_str[2],min_str[2],sec_str[2];

    nostar=1;
    if ((fp = fopen("tare1.txt","w")) == 0)
    {
        prints("Error opening file!^M");
        return;
    }
    while (nostar)
    {
        cputs("^M^M^M^M^M");
        if (waitfor("^*",5))
            nostar=0;
    }
    while (1)
    {
        cputs(cmdtime);
        if (waitfor("^T",100))
        {
            while ((chr = cgetc(10)) != -1)
            {
                if (chr == 'C')
                    break;
                printc(chr);
                fputc(chr,fp);
            }
        }
        for (i=1; i <= 16; i=i+1)
        {
            if (i < 10)
                cputc('0'+i);
            else
            {
                cputc('1');
                cputc('0'+i-10);
            }
        }
        cputs(cmdtemp);
        if (waitfor(cmdtemp,100))
        {
            while ((chr = cgetc(10)) != -1)
            {
                if (chr == 0x11)
                    break;
                printc(chr);
                if (chr != '^J')
                    fputc(chr,fp);
            }
        }
    }
}

```

```

cputc('~M');
waitfor("~",100);
}
fputs("~M~J",fp);
fclose(fp);
if ((fp = fopen("tare1.txt","a")) == 0)
{
prints("Error opening file!~M");
return;
}
prints("~M~Waiting for reading temperature in next cycle ....~M~M~M");
x1 = curtime();
//
//      Time (Sec.)      900sec = 15 min.
//      :
//      :      Interval Loop
//      :      :
//      :      :
//
x2 = x1 + 900 - 22;
while ( x1 <= x2 )
{
cputs(cmdtime);
if (waitfor("T",100))
{
while ((chr = cgetc(10)) != -1)
{
if (chr == 'C')
break;
putc(chr);
}
}
x1 = curtime();
}
}
fclose(fp);
}

```

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย



ประวัติผู้เขียน

นางสาวจัญดา บุญเกียรติ เกิดวันที่ ๑๘ เมษายน พ.ศ. ๒๕๑๒ ที่จังหวัดกรุงเทพฯ สำเร็จการศึกษาปริญญาตรีสถาปัตยกรรมศาสตรบัณฑิต ภาควิชาสถาปัตยกรรม สถาบันเทคโนโลยีพระจอมเกล้า เจ้าคุณทหาร ลาดกระบัง ในปีการศึกษา ๒๕๓๓ และเข้าศึกษาต่อในหลักสูตรสถาปัตยกรรมศาสตรมหาบัณฑิต ที่จุฬาลงกรณ์มหาวิทยาลัย เมื่อ พ.ศ. ๒๕๓๕ หลังจากสำเร็จการศึกษาระดับปริญญาตรี ได้เข้าทำงานในบริษัทอิตาเลียน-ไทย ดีเวลลอปเม้นท์ คอร์ปฯ โครงการก่อสร้างอาคารสีลมคอมเพล็กซ์ ถนนสีลม ในตำแหน่งสถาปนิกผู้ควบคุมการก่อสร้าง เป็นเวลา ๑ ปี ๒ เดือน จากนั้นได้ลาออกมาศึกษาต่อระดับปริญญาโท เคยได้รับรางวัลผลงานดี จากโครงการประกวดแบบสถาปัตยกรรมเรื่อง "สถาปัตยกรรมประหยัดพลังงานเพื่อสภาพแวดล้อม : โครงการสมมุติบ้านพักอาศัยเดี่ยว" ซึ่งจัดขึ้นเนื่องในวาระครบรอบ ๖๐ ปี คณะสถาปัตยกรรมศาสตร์ จุฬาลงกรณ์มหาวิทยาลัย ปัจจุบันอาศัยอยู่ในกรุงเทพมหานคร

ศูนย์วิทยทรัพยากร
จุฬาลงกรณ์มหาวิทยาลัย