Tavrida Electric
Test Laboratory

Certificate No 115-2003

TYPE TEST CERTIFICATE OF TEMPERATURE RISE

APPARATUS:	Recloser Control Cubicle
DESIGNATION:	RC Control & Communications Cubicle RC/TEL-01ES
SERIAL NUMBER:	01
MANUFACTURER:	Tavrida Electric Australia
TESTED FOR:	Tavrida Electric Australia
TESTED BY:	Tavrida Electric Test Laboratory 22 Vakulenchuka Street, 99053 Sevastopol, Crimea Ukraine

DATE(S) OF TESTS: 14 April – 13 May, 2003.

The apparatus, constructed in accordance with the description, drawings and photographs incorporated in this certificate has been subjected to the series of proving tests in accordance with:

IEC 60068-2-5 Ed. 1.0 b (1975): ***Environmental testing - Part 2: Tests. Test Sa: Simulated solar radiation at ground level***

The results are shown in the record of proving tests and the charts attached hereto. The values obtained and the general performance are considered to comply with the above standard(s).

The Certificate applies only to the apparatus tested. The responsibility for conformity of any apparatus having the same designations with that tested rests with the Manufacturer.

THE DOCUMENTS FORMING PART OF THIS CERTIFICATE ARE:

Sheets:	14
Circuit diagrams:	0
Drawings:	0
Photographs:	8

This Type Test Certificate has been issued by Tavrida Electric Test Laboratory and follows STL Guide Lines.

We confirm these results to be a true and correct copy of results obtained during these tests. These results have been interpreted into English for the purpose of issuing this report.

Signed by **Oleg Sudnitsin**
This 28th day of July 2003 in the
Presence of : -

OLEG SUDNITSIN
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Summary of Testing

The Recloser Control Cubicle RC/TEL-01ES (Internal Specification ИТЕА.468332.063) as part of Automatic Circuit Recloser (Internal Specification ИТЕА.674792.001) was tested to the requirements of the IEC 6008-2-5 (1975) to determine the thermal effects on equipment and components as a result of exposure to solar radiation at the surface of the earth.

Test Methods

The Test was carried out in accordance with IEC 6008-2-5 procedure C with the following exceptions:

- IEC 6008-2-5 p4.4 recommends maintaining the temperature in the chamber during the testing around 40 or 55°C. During this test the temperature was ambient. Refer Table 1.
- IEC 6008-2-5 p4.4 recommends selecting a duration of each test from 3 days, 10 days and 56 days (to determine only the thermal effects IEC 6008-2-5 p3.3 states the test duration of 3 days is adequate). This test was carried out until the temperature was stabilized.

Table 1: Environmental Conditions

Date of Test	Ambient Temperature °C	Relative Humidity %	Atmospheric Pressure mmHg
14.04.2003	20.0	67	753
15.04.2003	19.0	70	754
29.04.2003	17.0	60	760
30.04.2003	17.4	69	764
06.05.2003	19.0	70	763
07.05.2003	19.4	61	764
12.05.2003	21.0	64	759
13.05.2003	22.0	77	758

Temperatures were measured in three locations as follows (refer to Appendix C fig.:5,6 and 7):

- t_T; top of the cubicle.
- t_M; middle of the cubicle.
- t_B; bottom of the cubicle.

Table 2: Test Equipment

Type / Model	Units	Range	Certificate valid till
BUTS-04	01		
IK NPCH DNE 80-1	01		
VK CP-1250 KM177	solar radiation W/m^2	0-1250	
IK CP-2000 KM178	solar radiation W/m^2	0-2000	
AEK T/V-200/100 COEI15	temperature °C	0-200	21.01.2004

- The test sample was installed on the specially built footing. Control Power was connected and waited until the internal temperature was stabilized (refer Appendix A table 3).

- The equivalent of 2 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 4).

- The equivalent of 5 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 5).

- The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 6).

- The test sample was exposed to solar radiation simulator 1250 W/m^2 at 60° to the top surface (refer Appendix B fig.8). The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 7).

- The test sample was exposed to solar radiation simulator 1250 W/m^2 at 90° to the top surface. The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 8).

- The purposely build sunshield was installed on the top of the cubicle (refer Appendix B fig.4). The test sample was exposed to solar radiation simulator 1250 W/m^2 at 60° to the top surface. The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 9).

- The purposely build sunshield was installed on the top of the cubicle (refer Appendix B fig.4). The test sample was exposed to solar radiation simulator 1250 W/m^2 at 90° to the top surface. The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 10).

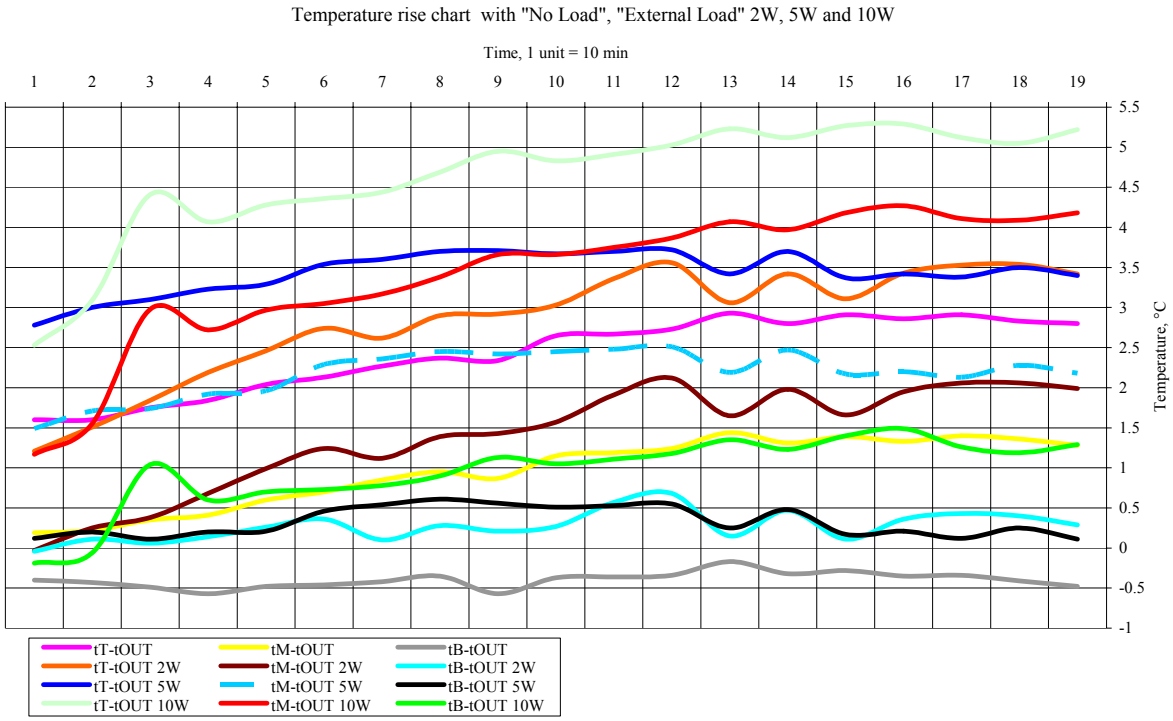
- The sunshield was removed and Thermal-Coat was applied on the top of the cubicle (refer Appendix B fig.5). The test sample was exposed to solar radiation simulator 1250 W/m^2 at 60° to the top surface. The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 11).

- The sunshield was removed and Thermal-Coat was applied on the top of the cubicle (refer Appendix B fig.5). The test sample was exposed to solar radiation simulator 1250 W/m^2 at 90° to the top surface. The equivalent of 10 W energy dissipation was applied to “External Load”, the control power was connected and waited until the internal temperature was stabilized. The temperature data was recorded (refer Appendix A table 12).

Test Results

The test results of the Recloser Control Cubicle RC-01 (Internal Specification ИТЕА.468332.024) are given in Figures 1 and 2.

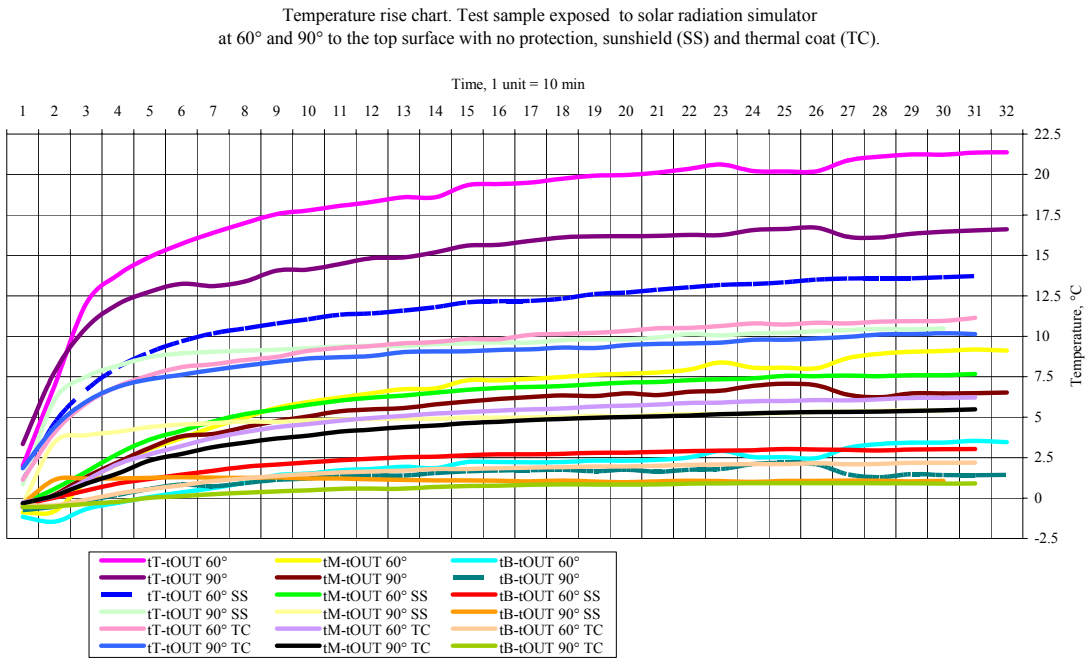
Chart 1



The maximum temperature rise during the tests:

- No “External Load, no solar radiation - 3.44°C
- “External Load” equivalent 2W, no solar radiation - 3.56°C
- “External Load” equivalent 5W, no solar radiation - 3.72°C
- “External Load” equivalent 10W, no solar radiation - 5.29°C

Chart 1



The maximum temperature rise during the tests:

- "External Load" equivalent 10W, solar radiation at 60° - 21.38°C
- "External Load" equivalent 10W, solar radiation at 90° - 16.71°C
- "External Load" equivalent 10W, solar radiation at 60° with sunshield - 13.72°C
- "External Load" equivalent 10W, solar radiation at 90° with sunshield - 10.49°C
- "External Load" equivalent 10W, solar radiation at 60° with Thermal Coat - 11.15°C
- "External Load" equivalent 10W, solar radiation at 90° with Thermal Coat - 10.18°C

t_T; top of the cubicle.
t_M; middle of the cubicle.
t_B; bottom of the cubicle.

t_{TO}; outside top surface
t_{OUT}; outside of cubicle

All measurements recorded every 10 min.

Table 3: Temperature data with Control Power connected.

Measure No.	t_T °C	t_M °C	t_B °C	t_{OUT} °C	$t_T - t_{OUT}$ °C	$t_M - t_{OUT}$ °C	$t_B - t_{OUT}$ °C
1	21.59	20.18	19.59	19.99	1.60	0.19	-0.40
2	21.62	20.24	19.59	20.02	1.60	0.22	-0.43
3	21.79	20.39	19.55	20.04	1.75	0.35	-0.49
4	21.96	20.53	19.55	20.12	1.84	0.41	-0.57
5	22.08	20.64	19.56	20.04	2.04	0.60	-0.48
6	22.17	20.74	19.58	20.04	2.13	0.70	-0.46
7	22.27	20.85	19.58	20.00	2.27	0.85	-0.42
8	22.28	20.86	19.56	19.91	2.37	0.95	-0.35
9	22.46	20.99	19.55	20.12	2.34	0.87	-0.57
10	22.56	21.06	19.54	19.91	2.65	1.15	-0.37
11	22.62	21.14	19.59	19.95	2.67	1.19	-0.36
12	22.68	21.19	19.61	19.95	2.73	1.24	-0.34
13	22.73	21.24	19.63	19.80	2.93	1.44	-0.17
14	22.76	21.27	19.64	19.96	2.80	1.31	-0.32
15	22.85	21.33	19.66	19.94	2.91	1.39	-0.28
16	22.90	21.37	19.69	20.04	2.86	1.33	-0.35
17	22.96	21.45	19.71	20.05	2.91	1.40	-0.34
18	22.99	21.52	19.75	20.16	2.83	1.36	-0.41
19	23.07	21.55	19.79	20.27	2.80	1.28	-0.48
20	23.18	21.64	19.84	20.25	2.93	1.39	-0.41
21	23.77	21.78	19.93	20.33	3.44	1.45	-0.40
22	23.60	21.86	19.99	20.27	3.33	1.59	-0.28
23	23.53	21.92	20.00	20.43	3.10	1.49	-0.43
24	23.54	21.97	20.09	20.49	3.05	1.48	-0.40
25	23.64	22.06	20.12	20.49	3.15	1.57	-0.37
26	23.70	22.13	20.19	20.49	3.21	1.64	-0.30
27	23.78	22.20	20.24	20.57	3.21	1.63	-0.33
28	23.85	22.25	20.27	20.72	3.13	1.53	-0.45
29	23.91	22.35	20.31	20.79	3.12	1.56	-0.48
30	24.09	22.47	20.40	20.79	3.30	1.68	-0.39
31	24.16	22.56	20.47	20.84	3.32	1.72	-0.37
32	24.21	22.66	20.54	21.04	3.17	1.62	-0.50
33	24.29	22.69	20.56	20.96	3.33	1.73	-0.40
34	24.40	22.77	20.64	20.99	3.41	1.78	-0.35

Table 4: Temperature data with Control Power and "External Load" of 2 W connected.

Measure	t_T	t_M	t_B	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C
1	19.54	18.30	18.29	18.33	1.21	-0.03	-0.04
2	19.75	18.49	18.35	18.24	1.51	0.25	0.11
3	20.19	18.73	18.41	18.35	1.84	0.38	0.06
4	20.52	19.01	18.47	18.33	2.19	0.68	0.14
5	20.71	19.24	18.51	18.25	2.46	0.99	0.26
6	20.95	19.45	18.57	18.21	2.74	1.24	0.36
7	21.13	19.63	18.61	18.51	2.62	1.12	0.10
8	21.30	19.79	18.68	18.40	2.90	1.39	0.28
9	21.46	19.97	18.75	18.54	2.92	1.43	0.21
10	21.53	20.07	18.77	18.50	3.03	1.57	0.27
11	21.61	20.16	18.82	18.25	3.36	1.91	0.57
12	21.66	20.22	18.78	18.10	3.56	2.12	0.68
13	21.69	20.28	18.78	18.63	3.06	1.65	0.15
14	21.80	20.36	18.85	18.38	3.42	1.98	0.47
15	21.88	20.43	18.88	18.77	3.11	1.66	0.11
16	21.98	20.50	18.91	18.55	3.43	1.95	0.36
17	22.04	20.57	18.94	18.51	3.53	2.06	0.43
18	22.11	20.63	18.97	18.57	3.54	2.06	0.40
19	22.12	20.69	18.99	18.70	3.42	1.99	0.29

Table 5: Temperature data with Control Power and "External Load" of 5 W connected.

Measure	t_T	t_M	t_B	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C
1	21.39	20.10	18.73	18.61	2.78	1.49	0.12
2	21.70	20.41	18.90	18.70	3.00	1.71	0.20
3	22.00	20.64	19.01	18.90	3.10	1.74	0.11
4	22.15	20.84	19.12	18.92	3.23	1.92	0.20
5	22.30	20.97	19.22	19.01	3.29	1.96	0.21
6	22.37	21.12	19.29	18.83	3.54	2.29	0.46
7	22.43	21.19	19.37	18.83	3.60	2.36	0.54
8	22.52	21.27	19.43	18.82	3.70	2.45	0.61
9	22.62	21.33	19.47	18.91	3.71	2.42	0.56
10	22.67	21.45	19.51	19.00	3.67	2.45	0.51
11	22.71	21.49	19.54	19.01	3.70	2.48	0.53
12	22.76	21.55	19.59	19.04	3.72	2.51	0.55
13	22.83	21.60	19.66	19.41	3.42	2.19	0.25
14	22.94	21.71	19.72	19.24	3.70	2.47	0.48
15	22.95	21.75	19.75	19.58	3.37	2.17	0.17
16	23.02	21.80	19.81	19.60	3.42	2.20	0.21
17	23.13	21.88	19.87	19.75	3.38	2.13	0.12
18	23.21	21.99	19.96	19.71	3.50	2.28	0.25
19	23.29	22.07	20.00	19.89	3.40	2.18	0.11

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Table 6: Temperature data with Control Power and "External Load" of 10 W connected.

Measure	t_T	t_M	t_B	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C
1	22.35	20.99	19.63	19.82	2.53	1.17	-0.19
2	23.15	21.61	20.00	20.06	3.09	1.55	-0.06
3	23.67	22.24	20.30	19.26	4.41	2.98	1.04
4	23.97	22.62	20.50	19.90	4.07	2.72	0.60
5	24.32	23.01	20.74	20.04	4.28	2.97	0.70
6	24.64	23.33	21.01	20.28	4.36	3.05	0.73
7	24.84	23.57	21.18	20.40	4.44	3.17	0.78
8	25.10	23.79	21.31	20.41	4.69	3.38	0.90
9	25.28	23.99	21.46	20.33	4.95	3.66	1.13
10	25.33	24.16	21.55	20.50	4.83	3.66	1.05
11	25.47	24.31	21.67	20.56	4.91	3.75	1.11
12	25.60	24.44	21.75	20.57	5.03	3.87	1.18
13	25.70	24.54	21.82	20.47	5.23	4.07	1.35
14	25.79	24.64	21.90	20.67	5.12	3.97	1.23
15	25.83	24.74	21.96	20.56	5.27	4.18	1.40
16	25.78	24.76	21.98	20.49	5.29	4.27	1.49
17	25.92	24.91	22.06	20.80	5.12	4.11	1.26
18	26.04	25.08	22.18	20.99	5.05	4.09	1.19
19	26.18	25.14	22.25	20.96	5.22	4.18	1.29

Table 7: Temperature data with 10 W "External Load" and solar radiation simulator at 60°

Measure	t_T	t_M	t_B	t_{TO}	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$	$t_{TO} - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C	°C	°C
1	19.34	16.47	16.20	20.40	17.36	1.98	-0.89	-1.16	3.04
2	25.34	17.58	16.93	46.05	18.39	6.95	-0.81	-1.46	27.66
3	30.43	19.45	17.73	51.54	18.40	12.03	1.05	-0.67	33.14
4	32.33	20.64	18.24	52.36	18.53	13.80	2.11	-0.29	33.83
5	33.47	21.59	18.63	52.59	18.57	14.90	3.02	0.06	34.02
6	34.52	22.50	19.15	53.13	18.80	15.72	3.70	0.35	34.33
7	35.29	23.27	19.51	53.23	18.89	16.40	4.38	0.62	34.34
8	35.87	23.84	19.83	53.59	18.87	17.00	4.97	0.96	34.72
9	36.25	24.28	20.10	53.57	18.69	17.56	5.59	1.41	34.88
10	36.54	24.70	20.27	53.45	18.76	17.78	5.94	1.51	34.69
11	36.78	24.93	20.43	53.44	18.71	18.07	6.22	1.72	34.73
12	37.09	25.27	20.59	53.63	18.79	18.30	6.48	1.80	34.84
13	37.38	25.51	20.71	53.69	18.78	18.60	6.73	1.93	34.91
14	37.58	25.76	20.84	54.00	18.98	18.60	6.78	1.86	35.02
15	38.14	26.09	21.04	54.25	18.81	19.33	7.28	2.23	35.44
16	38.26	26.13	21.08	54.40	18.85	19.41	7.28	2.23	35.55
17	38.47	26.34	21.17	54.53	18.96	19.51	7.38	2.21	35.57
18	38.70	26.44	21.19	54.41	18.96	19.74	7.48	2.23	35.45
19	38.84	26.54	21.24	54.62	18.92	19.92	7.62	2.32	35.70
20	38.94	26.66	21.28	54.87	18.97	19.97	7.69	2.31	35.90
21	39.11	26.76	21.36	55.08	18.99	20.12	7.77	2.37	36.09
22	39.25	26.84	21.40	54.88	18.89	20.36	7.95	2.51	35.99
23	39.18	26.95	21.47	54.11	18.56	20.62	8.39	2.91	35.55
24	39.15	26.99	21.47	54.08	18.93	20.22	8.06	2.54	35.15

25	39.22	27.09	21.55	54.63	19.03	20.19	8.06	2.52	35.60
26	39.37	27.20	21.64	55.22	19.17	20.20	8.03	2.47	36.05
27	39.47	27.25	21.71	54.89	18.59	20.88	8.66	3.12	36.30
28	39.59	27.40	21.82	54.78	18.48	21.11	8.92	3.34	36.30
29	39.71	27.52	21.90	55.32	18.47	21.24	9.05	3.43	36.85
30	39.77	27.63	21.97	54.70	18.54	21.23	9.09	3.43	36.16
31	39.86	27.69	22.05	55.22	18.51	21.35	9.18	3.54	36.71
32	40.05	27.78	22.12	55.84	18.67	21.38	9.11	3.45	37.17

Table 8: Temperature data with 10 W "External Load" and solar radiation simulator at 90°

Measure	t_T	t_M	t_B	t_{TO}	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$	$t_{TO} - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C	°C	°C
1	20.75	16.86	16.67	23.44	17.41	3.34	-0.55	-0.74	6.03
2	25.54	17.96	17.22	46.16	17.75	7.79	0.21	-0.53	28.41
3	28.41	19.19	17.72	50.13	17.88	10.53	1.31	-0.16	32.25
4	29.88	20.12	18.10	50.67	17.90	11.98	2.22	0.20	32.77
5	30.66	21.00	18.47	50.59	17.90	12.76	3.10	0.57	32.69
6	31.26	21.84	18.86	50.68	18.02	13.24	3.82	0.84	32.66
7	31.48	22.33	19.10	49.40	18.37	13.11	3.96	0.73	31.03
8	31.83	22.82	19.36	51.26	18.44	13.39	4.38	0.92	32.82
9	32.52	23.22	19.59	51.60	18.46	14.06	4.76	1.13	33.14
10	32.66	23.58	19.74	51.03	18.53	14.13	5.05	1.21	32.50
11	32.95	23.85	19.89	51.33	18.48	14.47	5.37	1.41	32.85
12	33.46	24.11	20.03	51.76	18.63	14.83	5.48	1.40	33.13
13	33.64	24.33	20.15	51.73	18.76	14.88	5.57	1.39	32.97
14	33.9	24.50	20.26	52.22	18.71	15.19	5.79	1.55	33.51
15	34.28	24.65	20.33	52.21	18.68	15.60	5.97	1.65	33.53
16	34.36	24.83	20.41	52.10	18.70	15.66	6.13	1.71	33.40
17	34.65	25.00	20.47	51.87	18.75	15.90	6.25	1.72	33.12
18	34.87	25.11	20.51	52.37	18.76	16.11	6.35	1.75	33.61
19	35.10	25.22	20.58	52.23	18.92	16.18	6.30	1.66	33.31
20	35.07	25.35	20.63	52.61	18.88	16.19	6.47	1.75	33.73
21	35.27	25.43	20.69	52.16	19.06	16.21	6.37	1.63	33.10
22	35.23	25.53	20.71	51.65	18.96	16.27	6.57	1.75	32.69
23	35.25	25.63	20.79	51.63	18.99	16.26	6.64	1.80	32.64
24	35.39	25.76	20.93	51.40	18.82	16.57	6.94	2.11	32.58
25	35.37	25.81	20.91	52.38	18.74	16.63	7.07	2.17	33.64
26	35.64	25.90	21.01	52.78	18.93	16.71	6.97	2.08	33.85
27	35.72	25.95	21.03	52.37	19.57	16.15	6.38	1.46	32.80
28	35.92	26.04	21.10	53.23	19.81	16.11	6.23	1.29	33.42
29	36.05	26.18	21.19	52.61	19.71	16.34	6.47	1.48	32.90
30	36.29	26.28	21.25	53.61	19.82	16.47	6.46	1.43	33.79
31	36.47	26.40	21.33	53.68	19.92	16.55	6.48	1.41	33.76
32	36.57	26.49	21.40	54.65	19.96	16.61	6.53	1.44	34.69

Table 9: Temperature data with 10 W "External Load" and solar radiation simulator at 60° with screened cover on

Measure No.	t_T °C	t_M °C	t_B °C	t_{TO} °C	t_{OUT} °C	$t_T - t_{OUT}$ °C	$t_M - t_{OUT}$ °C	$t_B - t_{OUT}$ °C	$t_{TO} - t_{OUT}$ °C
1	19.61	18.18	18.13	19.82	18.52	1.09	-0.34	-0.39	1.30
2	23.36	19.30	18.76	33.52	18.73	4.63	0.57	0.03	14.79
3	25.58	20.52	19.36	38.35	18.89	6.69	1.63	0.47	19.46
4	27.10	21.76	19.92	40.19	19.02	8.08	2.74	0.90	21.17
5	28.22	22.82	20.40	41.21	19.21	9.01	3.61	1.19	22.00
6	29.02	23.50	20.79	41.71	19.34	9.68	4.16	1.45	22.37
7	29.67	24.23	21.18	42.18	19.49	10.18	4.74	1.69	22.69
8	30.09	24.79	21.54	42.50	19.60	10.49	5.19	1.94	22.90
9	30.55	25.23	21.83	42.77	19.76	10.79	5.47	2.07	23.01
10	30.92	25.63	22.07	43.03	19.86	11.06	5.77	2.21	23.17
11	31.27	25.96	22.27	43.18	19.93	11.34	6.03	2.34	23.25
12	31.44	26.23	22.45	43.21	20.02	11.42	6.21	2.43	23.19
13	31.69	26.44	22.62	43.28	20.10	11.59	6.34	2.52	23.18
14	31.98	26.70	22.74	43.66	20.18	11.80	6.52	2.56	23.48
15	32.33	26.92	22.88	44.10	20.23	12.10	6.69	2.65	23.87
16	32.52	27.16	23.06	44.01	20.35	12.17	6.81	2.71	23.66
17	32.60	27.28	23.12	44.05	20.41	12.19	6.87	2.71	23.64
18	32.8	27.40	23.21	44.18	20.47	12.33	6.93	2.74	23.71
19	33.13	27.56	23.32	44.34	20.52	12.61	7.04	2.80	23.82
20	33.32	27.76	23.43	44.8	20.62	12.70	7.14	2.81	24.18
21	33.55	27.85	23.52	44.92	20.67	12.88	7.18	2.85	24.25
22	33.78	28.04	23.65	45.21	20.75	13.03	7.29	2.90	24.46
23	33.98	28.15	23.73	45.41	20.80	13.18	7.35	2.93	24.61
24	34.10	28.27	23.83	45.59	20.87	13.23	7.40	2.96	24.72
25	34.25	28.46	23.94	45.76	20.91	13.34	7.55	3.03	24.85
26	34.52	28.56	24.02	45.87	21.02	13.50	7.54	3.00	24.85
27	34.68	28.68	24.09	45.88	21.11	13.57	7.57	2.98	24.77
28	34.77	28.73	24.14	45.87	21.19	13.58	7.54	2.95	24.68
29	34.81	28.82	24.22	45.93	21.22	13.59	7.60	3.00	24.71
30	34.92	28.87	24.29	46.03	21.27	13.65	7.60	3.02	24.76
31	35.01	28.96	24.32	46.07	21.29	13.72	7.67	3.03	24.78

Table 10: Temperature data with 10 W "External Load" and solar radiation simulator at 90° with screened cover on

Measure No.	t_T °C	t_M °C	t_B °C	t_{TO} °C	t_{OUT} °C	$t_T - t_{OUT}$ °C	$t_M - t_{OUT}$ °C	$t_B - t_{OUT}$ °C	$t_{TO} - t_{OUT}$ °C
1	19.74	18.51	18.53	19.36	18.89	0.85	-0.38	-0.36	0.47
2	25.51	22.89	20.58	32.58	19.45	6.06	3.44	1.13	13.13
3	27.12	23.51	20.83	38.13	19.62	7.50	3.89	1.21	18.51
4	28.02	23.93	21.04	39.99	19.83	8.19	4.10	1.21	20.16
5	28.70	24.38	21.24	40.77	19.98	8.72	4.40	1.26	20.79
6	29.10	24.70	21.45	41.13	20.16	8.94	4.54	1.29	20.97
7	29.40	24.99	21.62	41.22	20.35	9.05	4.64	1.27	20.87
8	29.61	25.24	21.76	41.39	20.50	9.11	4.74	1.26	20.89
9	29.84	25.38	21.95	41.61	20.67	9.17	4.71	1.28	20.94
10	30.06	25.61	22.01	41.81	20.80	9.26	4.81	1.21	21.01

11	30.30	25.80	22.15	42.07	20.94	9.36	4.86	1.21	21.13
12	30.50	25.97	22.25	42.08	21.09	9.41	4.88	1.16	20.99
13	30.60	26.12	22.32	42.36	21.20	9.40	4.92	1.12	21.16
14	30.82	26.20	22.40	42.46	21.30	9.52	4.90	1.10	21.16
15	30.97	26.37	22.50	42.53	21.40	9.57	4.97	1.10	21.13
16	31.15	26.50	22.59	42.70	21.52	9.63	4.98	1.07	21.18
17	31.24	26.61	22.66	42.91	21.62	9.62	4.99	1.04	21.29
18	31.42	26.67	22.74	43.37	21.66	9.76	5.01	1.08	21.71
19	31.57	26.84	22.79	43.36	21.76	9.81	5.08	1.03	21.6
20	31.70	26.92	22.87	43.35	21.89	9.81	5.03	0.98	21.46
22	31.93	27.16	23.04	43.45	22.00	9.93	5.16	1.04	21.45
23	32.19	27.24	23.12	43.65	22.05	10.14	5.19	1.07	21.6
24	32.17	27.31	23.16	43.77	22.11	10.06	5.20	1.05	21.66
25	32.37	27.40	23.20	43.94	22.19	10.18	5.21	1.01	21.75
26	32.44	27.49	23.29	44.15	22.23	10.21	5.26	1.06	21.92
27	32.60	27.61	23.34	44.32	22.28	10.32	5.33	1.06	22.04
28	32.70	27.66	23.40	44.43	22.31	10.39	5.35	1.09	22.12
29	32.81	27.74	23.43	44.33	22.36	10.45	5.38	1.07	21.97
30	32.87	27.86	23.48	44.27	22.44	10.43	5.42	1.04	21.83
31	32.97	27.90	23.54	44.42	22.48	10.49	5.42	1.06	21.94

Table 11: Temperature data with 10 W "External Load" and solar radiation simulator at 60° with thermal coat applied on the top

Measure	t_T	t_M	t_B	t_{TO}	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$	$t_{TO} - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C	°C	°C
1	21.73	20.34	20.19	21.39	20.6	1.13	-0.26	-0.41	0.79
2	25.04	21.12	20.53	41.38	20.98	4.06	0.14	-0.45	20.40
3	27.02	22.28	21.08	43.23	21.17	5.85	1.11	-0.09	22.06
4	28.31	23.50	21.67	44.45	21.39	6.92	2.11	0.28	23.06
5	29.14	24.25	22.09	44.76	21.54	7.60	2.71	0.55	23.32
6	29.78	24.91	22.48	44.14	21.69	8.09	3.22	0.79	23.55
7	30.13	25.57	22.90	43.97	21.85	8.28	3.72	1.05	23.82
8	30.53	26.07	23.20	43.84	21.99	8.54	4.08	1.21	24.05
9	30.80	26.45	23.44	44.44	22.07	8.73	4.38	1.37	24.37
10	31.31	26.79	23.70	46.70	22.21	9.10	4.58	1.49	24.49
11	31.57	27.07	23.87	47.08	22.29	9.28	4.78	1.58	24.79
12	31.77	27.32	24.02	47.26	22.37	9.40	4.95	1.65	24.89
13	32.02	27.53	24.15	47.41	22.45	9.57	5.08	1.70	24.96
14	32.16	27.73	24.31	47.56	22.51	9.65	5.22	1.80	25.05
15	32.42	27.90	24.39	47.63	22.59	9.83	5.31	1.80	25.04
16	32.48	28.07	24.51	48.14	22.66	9.82	5.41	1.85	25.48
17	32.82	28.21	24.62	47.97	22.73	10.09	5.48	1.89	25.24
18	32.96	28.35	24.72	48.16	22.81	10.15	5.54	1.91	25.35
19	33.10	28.55	24.85	48.25	22.89	10.21	5.66	1.96	25.36
20	33.29	28.67	24.92	48.62	22.96	10.33	5.71	1.96	25.66
22	33.51	28.79	25.00	48.65	23.01	10.50	5.78	1.99	25.64
23	33.57	28.93	25.10	48.66	23.05	10.52	5.88	2.05	25.61
24	33.74	29.02	25.19	48.64	23.11	10.63	5.91	2.08	25.53
25	33.97	29.16	25.28	49.14	23.18	10.79	5.98	2.10	25.96
26	33.98	29.25	25.35	49.19	23.25	10.73	6.00	2.10	25.94

27	34.10	29.32	25.41	48.89	23.26	10.84	6.06	2.15	25.63
28	34.16	29.41	25.46	48.54	23.37	10.79	6.04	2.09	25.17
29	34.31	29.51	25.52	49.13	23.40	10.91	6.11	2.12	25.73
30	34.35	29.60	25.60	48.92	23.41	10.94	6.19	2.19	25.51
31	34.39	29.64	25.62	49.19	23.44	10.95	6.20	2.18	25.75
32	34.62	29.69	25.67	49.19	23.47	11.15	6.22	2.20	25.72

Table 12: Temperature data with 10 W "External Load" and solar radiation simulator at 90° with thermal coat applied on the top

Measure	t_T	t_M	t_B	t_{TO}	t_{OUT}	$t_T - t_{OUT}$	$t_M - t_{OUT}$	$t_B - t_{OUT}$	$t_{TO} - t_{OUT}$
No.	°C	°C	°C	°C	°C	°C	°C	°C	°C
1	23.09	20.93	20.69	24.05	21.25	1.84	-0.32	-0.56	2.80
2	26.08	21.84	21.17	43.85	21.69	4.39	0.15	-0.52	22.16
3	27.94	22.87	21.62	46.51	21.98	5.96	0.89	-0.36	24.53
4	29.10	23.75	21.99	46.77	22.22	6.88	1.53	-0.23	24.55
5	29.80	24.77	22.47	47.57	22.45	7.35	2.32	0.02	25.12
6	30.21	25.32	22.71	47.16	22.59	7.62	2.73	0.12	24.57
7	30.67	25.90	22.99	47.76	22.75	7.92	3.15	0.24	25.01
8	31.07	26.31	23.22	48.28	22.88	8.19	3.43	0.34	25.40
9	31.43	26.69	23.42	47.72	23.01	8.42	3.68	0.41	24.71
10	31.73	26.96	23.58	47.63	23.10	8.63	3.86	0.48	24.53
11	31.89	27.29	23.75	48.07	23.18	8.71	4.11	0.57	24.89
12	32.05	27.50	23.85	47.50	23.26	8.79	4.24	0.59	24.24
13	32.36	27.73	23.93	48.20	23.34	9.02	4.39	0.59	24.86
14	32.48	27.90	24.10	47.42	23.41	9.07	4.49	0.69	24.01
15	32.49	28.05	24.15	48.07	23.41	9.08	4.64	0.74	24.66
16	32.62	28.17	24.23	47.78	23.46	9.16	4.71	0.77	24.32
17	32.67	28.31	24.30	47.52	23.48	9.19	4.83	0.82	24.04
18	32.84	28.43	24.38	47.43	23.53	9.31	4.90	0.85	23.90
19	32.85	28.54	24.41	47.78	23.58	9.27	4.96	0.83	24.20
20	33.09	28.64	24.47	48.00	23.63	9.46	5.01	0.84	24.37
22	33.21	28.74	24.53	48.00	23.68	9.53	5.06	0.85	24.32
23	33.27	28.81	24.60	47.69	23.71	9.56	5.10	0.89	23.98
24	33.33	28.91	24.62	47.90	23.72	9.61	5.19	0.90	24.18
25	33.55	29.01	24.70	48.21	23.77	9.78	5.24	0.93	24.44
26	33.56	29.07	24.70	48.32	23.78	9.78	5.29	0.92	24.54
27	33.71	29.16	24.77	48.85	23.85	9.86	5.31	0.92	25.00
28	33.87	29.23	24.82	48.75	23.9	9.97	5.33	0.92	24.85
29	34.07	29.31	24.87	49.23	23.96	10.11	5.35	0.91	25.27
30	34.14	29.38	24.91	49.18	24.00	10.14	5.38	0.91	25.18
31	34.23	29.48	24.94	49.29	24.05	10.18	5.43	0.89	25.24
32	34.24	29.58	25.00	49.47	24.10	10.14	5.48	0.90	25.37

Figure 1: Exposure of the test sample to solar radiation simulator at 60° to the top surface

Figure 2: Exposure of the test sample to solar radiation simulator at 90° to the top surface

Figure 3: Thermal-Coat applied to the top surface of the test sample

Figure 4: Sunshield installed on the top of the test sample

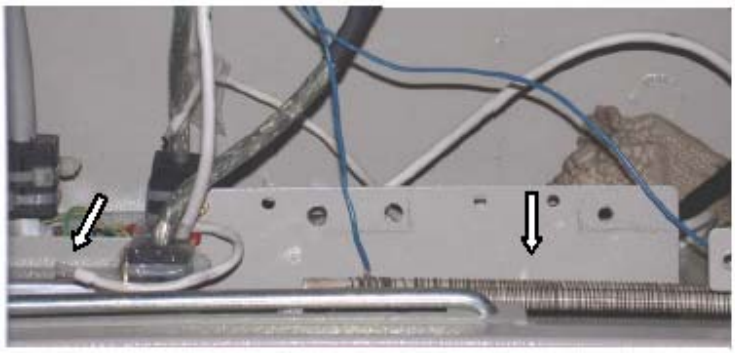

Figure 5: Locations of bottom temperature sensor and "External Load" simulator

Figure 6: Location of top temperature sensor inside of the test sample

Figure 7: Location of middle temperature sensor inside of the test sample

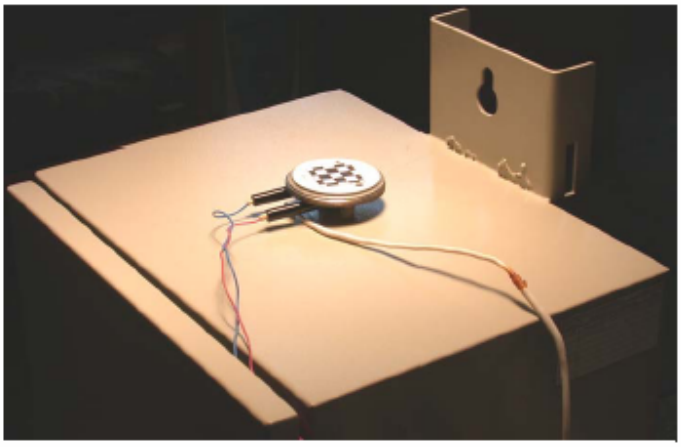

Figure 8: Location of pyranometer during adjustments of solar radiation intensity