

MEASUREMENT REPORT

**ON-SITE MEASUREMENT TO DETERMINE
THE PERFORMANCE OF
LIGHT INTENSITY REDUCTION OF DES ENCLOSED BLIND**

2 April 2015

Prepared By



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1. INTRODUCTION

DES Building Innovate Sdn. Bhd. commissioned SIRIM Berhad to measure performance of the 6 enclosed blinds samples.

The measurements were carried out at DES Building Innovate Sdn. Bhd. (Address: 6, Jalan IKS Juru Jaya, Taman IKS Juru Jaya, 14100 Simpang Ampat, Pulau Pinang, Malaysia) testing cell on 17th February 2015.

2. OBJECTIVE

The objective of this measurement is to determine the performance of DES enclosed blinds light intensity reduction.

3. DESCRIPTION OF THE SAMPLES

The six (6) samples are:

- I. Sample 1 (EB1) : 4mm tempered clear glass + 19mm air space with Enclosed Blind + 4mm tempered clear glass
- II. Sample 2 (EB2) : 4mm tempered clear glass + 19mm air space with Enclosed Blind + 5mm tempered light green glass
- III. Sample 3 (EB3) : 4mm tempered clear glass + 19mm air space with Enclosed Blind + 6.38mm laminated clear float glass
- IV. Sample 4 (DG4) : 4mm tempered clear glass + 19mm air space + 6.38mm laminated clear float glass
- V. Sample 5 (DG5) : 4mm tempered clear glass + 8mm air space + 6.38mm laminated clear float glass
- VI. Sample 6 (DG6) : 4mm tempered clear glass + 8mm air space + 4mm tempered clear glass

Refer Appendix 2 for detail of samples description.

4. MEASUREMENT PROCEDURE

Six (6) samples were arranged side-by-side and in-line under the sun light, as shown in Figure 4.1. Every sample was covered with box to avoid indirect light reflection from surrounding.

2 units of LUX meter (model TESTO 435-4 and TESTO 540; Serial No. 02729554; Calibrated Date: 23 Oct 2014 and end on 23 Oct 2015), as shown in Figure 4.2 were used. Two readings (in LUX) were recorded simultaneously, one positioned outside and the other one positioned inside. The measurements were recorded every 30 minutes (from 8:30am to 4:00pm).

All measurements were taken with blind move or adjust to the top.

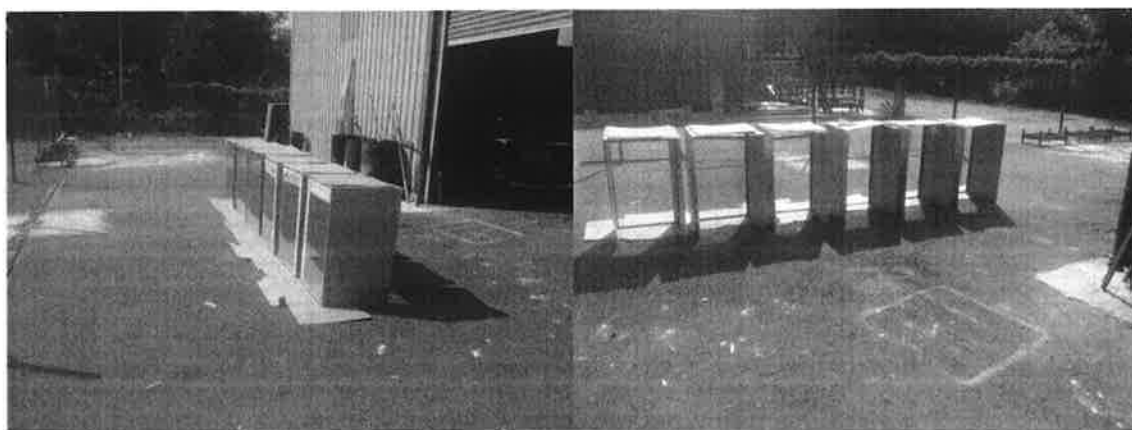


Figure 4.1 – Arrangement of the 6 samples (front and back view)



Figure 4.2 LUX Meter

5. RESULTS

5.1 Sample No.1 (EB1)

4mm tempered clear glass + 19mm air space with Enclosed Blind + 4mm tempered clear glass

Table 5.1.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	19988	16988	3000	MIN	15.01%	MIN
2	9:00 AM	36708	28740	7968	2563	21.71%	15.01%
3	9:30 AM	60840	50400	10440	AVERAGE	17.16%	AVERAGE
4	10:00 AM	63872	52590	11282	8098	17.66%	25.13%
5	10:30 AM	37145	30900	6245	MAX	16.81%	MAX
6	11:00 AM	25416	20400	5016	15331	19.74%	40.31%
7	11:30 AM	42789	35470	7319		17.10%	
8	12:00 PM	54201	38870	15331		28.29%	
9	12:30 PM	43344	33190	10154		23.43%	
10	1:00 PM	37420	23900	13520		36.13%	
11	1:30 PM	30360	18122	12238		40.31%	
12	2:00 PM	20588	14016	6572		31.92%	
13	2:30 PM	20450	14422	6028		29.48%	
14	3:00 PM	19944	13764	6180		30.99%	
15	3:30 PM	16886	11178	5708		33.80%	
16	4:00 PM	11390	8827	2563		22.50%	

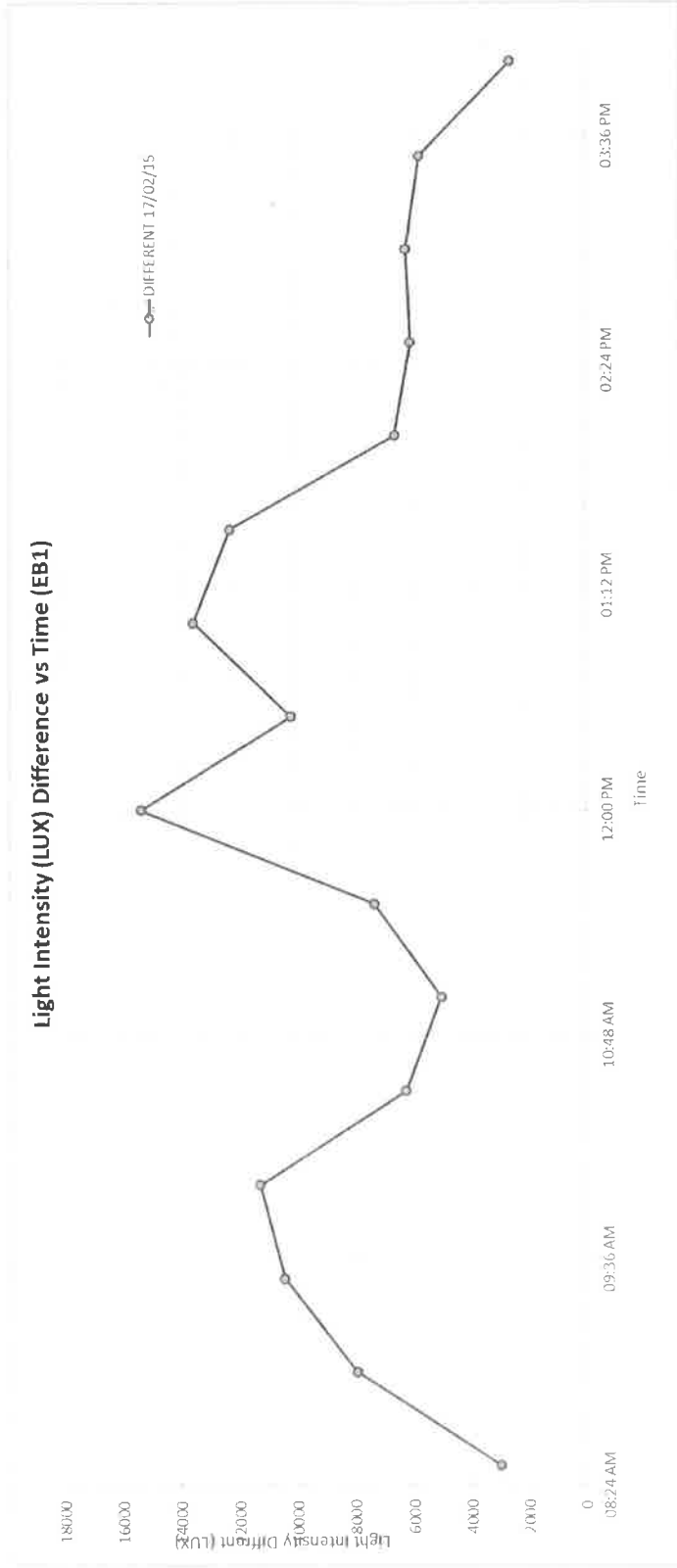


Figure 5.1.1 Light Intensity (LUX) Difference vs Time (EB1)

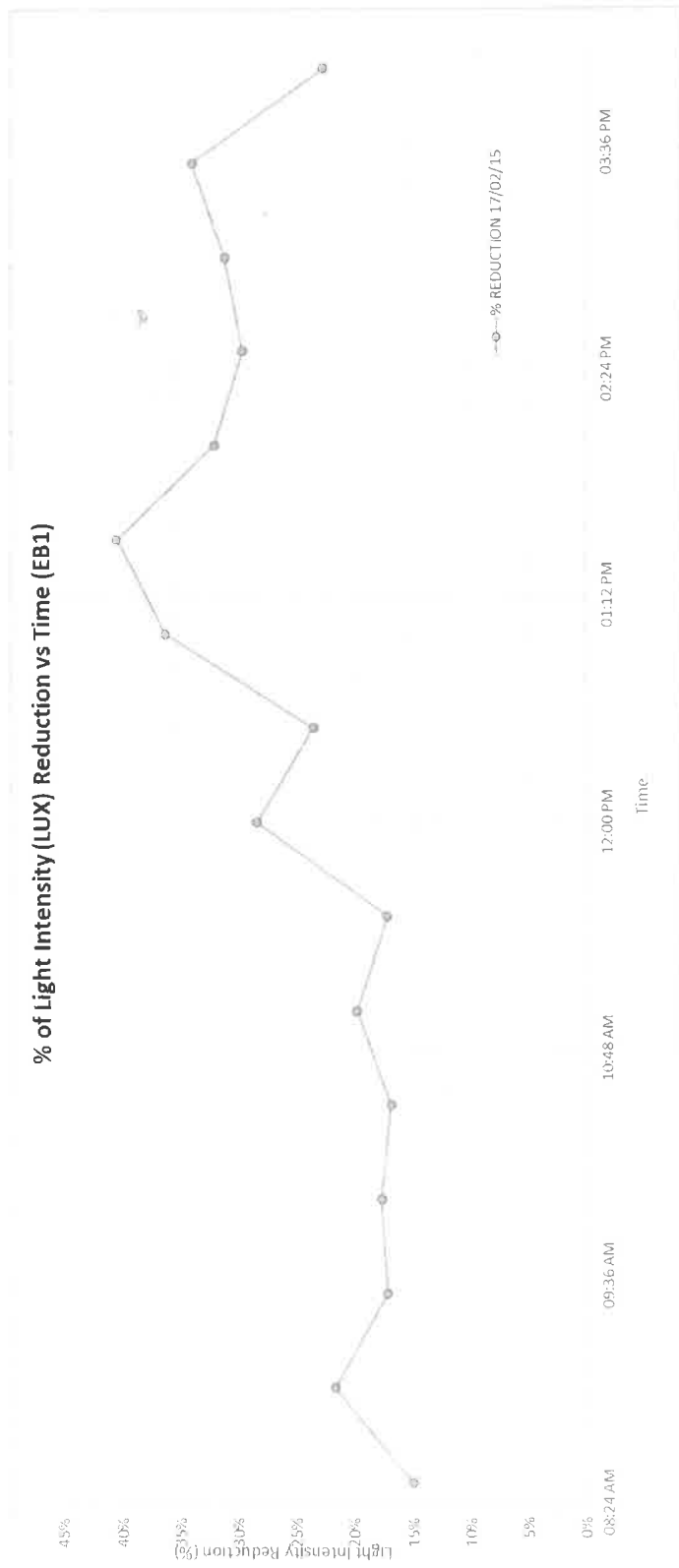


Figure 5.1.2 % of Light Intensity (LUX) Reduction vs Time (EB1)

5.2 Sample No.2 (EB2)

4mm tempered clear glass + 19mm air space with Enclosed Blind + 5mm tempered light green glass

Table 5.2.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	20517	14829	5688	MIN	27.72%	MIN
2	9:00 AM	40501	28120	12381	4236	30.57%	27.72%
3	9:30 AM	60708	30820	29888	AVERAGE	49.23%	AVERAGE
4	10:00 AM	61228	42730	18498	12985	30.21%	38.22%
5	10:30 AM	43167	30280	12887	MAX	29.85%	MAX
6	11:00 AM	26196	16861	9335	29888	35.64%	49.23%
7	11:30 AM	43938	25470	18468		42.03%	
8	12:00 PM	52179	31800	20379		39.06%	
9	12:30 PM	42844	26320	16524		38.57%	
10	1:00 PM	36895	22260	14635		39.67%	
11	1:30 PM	29065	15217	13848		47.64%	
12	2:00 PM	21025	11875	9150		43.52%	
13	2:30 PM	19605	11751	7854		40.06%	
14	3:00 PM	18328	10946	7382		40.28%	
15	3:30 PM	15881	9273	6608		41.61%	
16	4:00 PM	11818	7582	4236		35.84%	

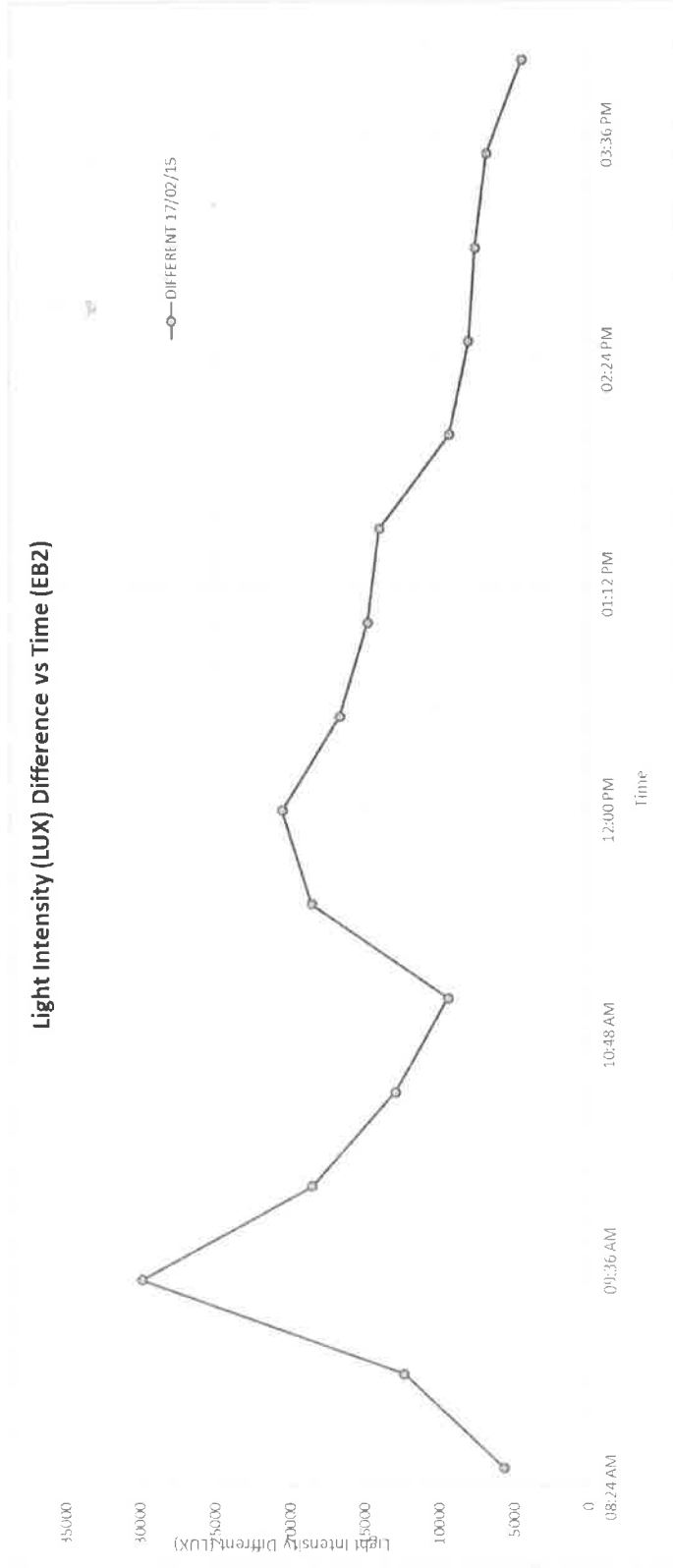


Figure 5.2.1 Light Intensity (LUX) Difference vs Time (EB2)

% of Light Intensity (LUX) Reduction vs Time (EB2)

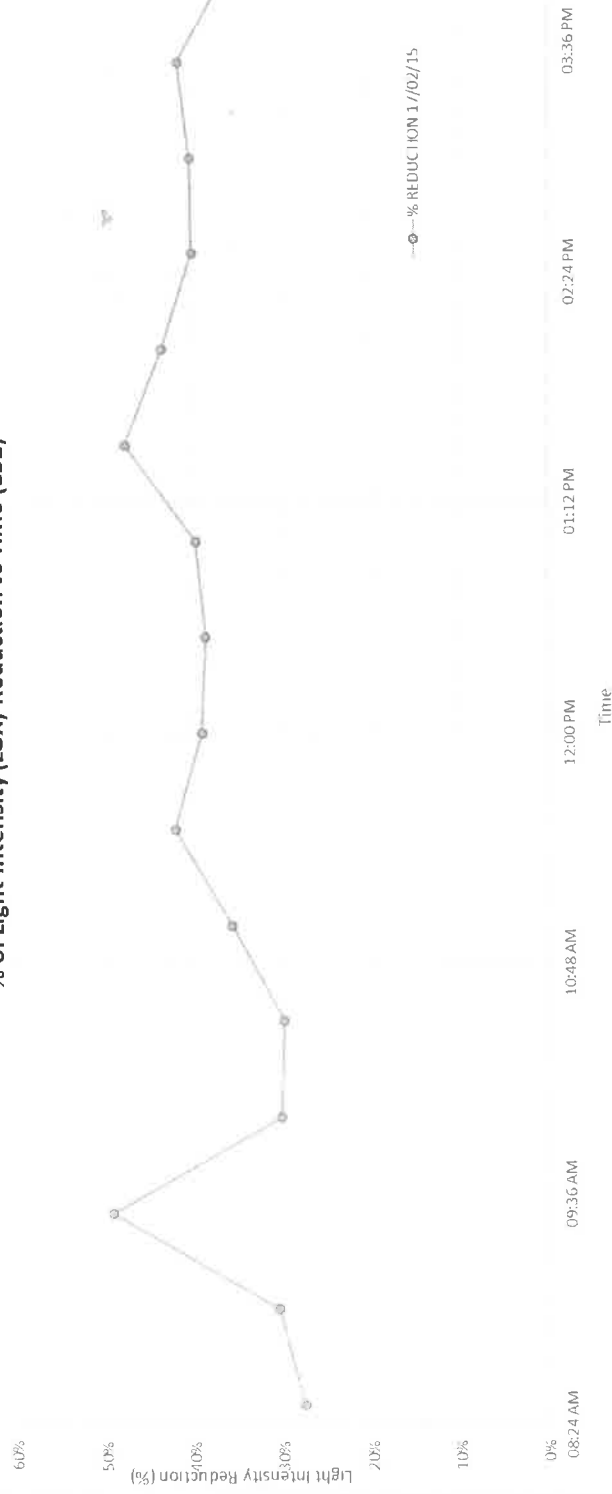


Figure 5.2.2 % of Light Intensity (LUX) Reduction vs to Time (EB2)

5.3 Sample No.3 (EB3)

4mm tempered clear glass + 19mm air space with Enclosed Blind + 6.38mm laminated clear float glass

Table 5.3.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	21251	15135	6116	MIN	28.78%	MIN
2	9:00 AM	41991	33020	8971	2884	21.36%	14.09%
3	9:30 AM	61001	46510	14491	AVERAGE	23.76%	AVERAGE
4	10:00 AM	59620	30820	28800	10159	48.31%	30.29%
5	10:30 AM	45932	37310	8622	MAX	18.77%	MAX
6	11:00 AM	26320	18990	7330	28800	27.85%	48.31%
7	11:30 AM	48319	33810	14509		30.03%	
8	12:00 PM	50624	35090	15534		30.69%	
9	12:30 PM	39681	34090	5591		14.09%	
10	1:00 PM	36495	21110	15385		42.16%	
11	1:30 PM	27605	16224	11381		41.23%	
12	2:00 PM	19788	13272	6516		32.93%	
13	2:30 PM	18158	12465	5693		31.35%	
14	3:00 PM	16846	11155	5691		33.78%	
15	3:30 PM	15097	10073	5024		33.28%	
16	4:00 PM	10953	8069	2884		26.33%	

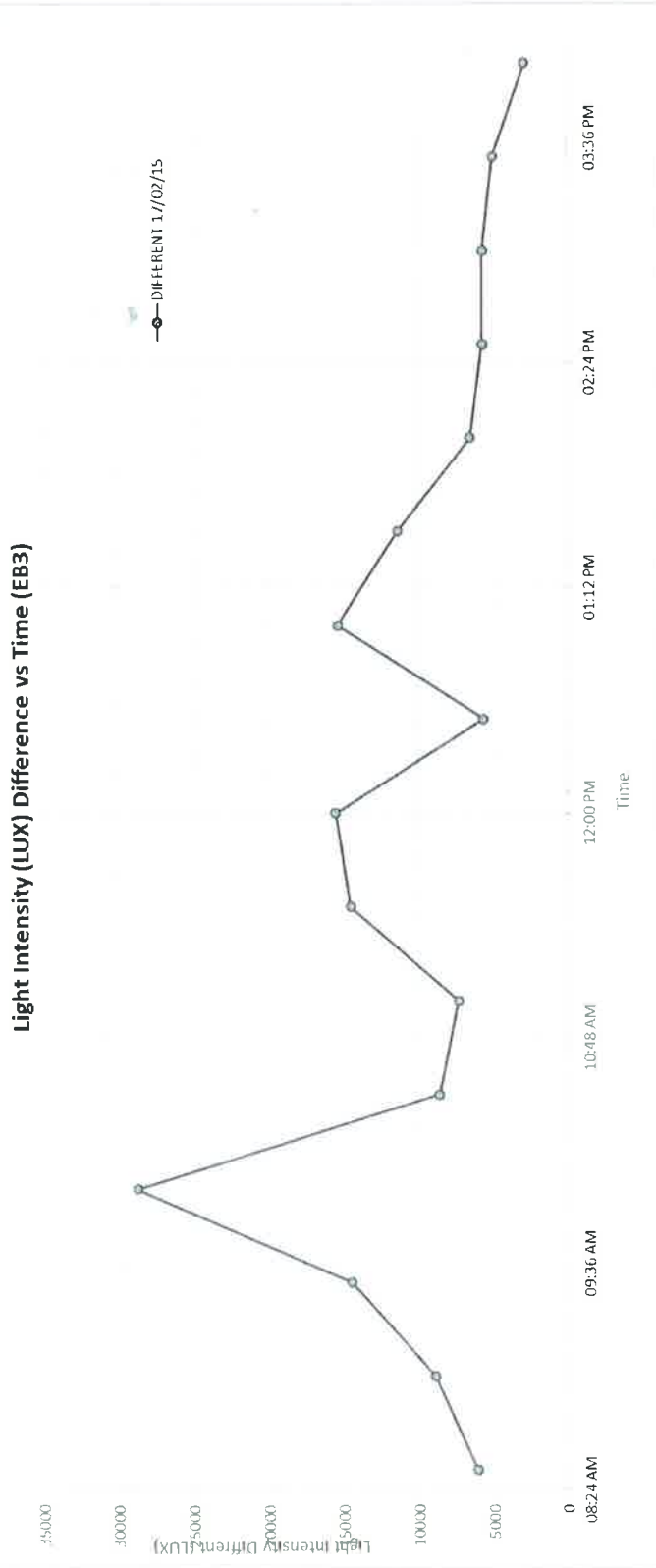


Figure 5.3.1 Light Intensity (LUX) Difference vs to Time (EB3)

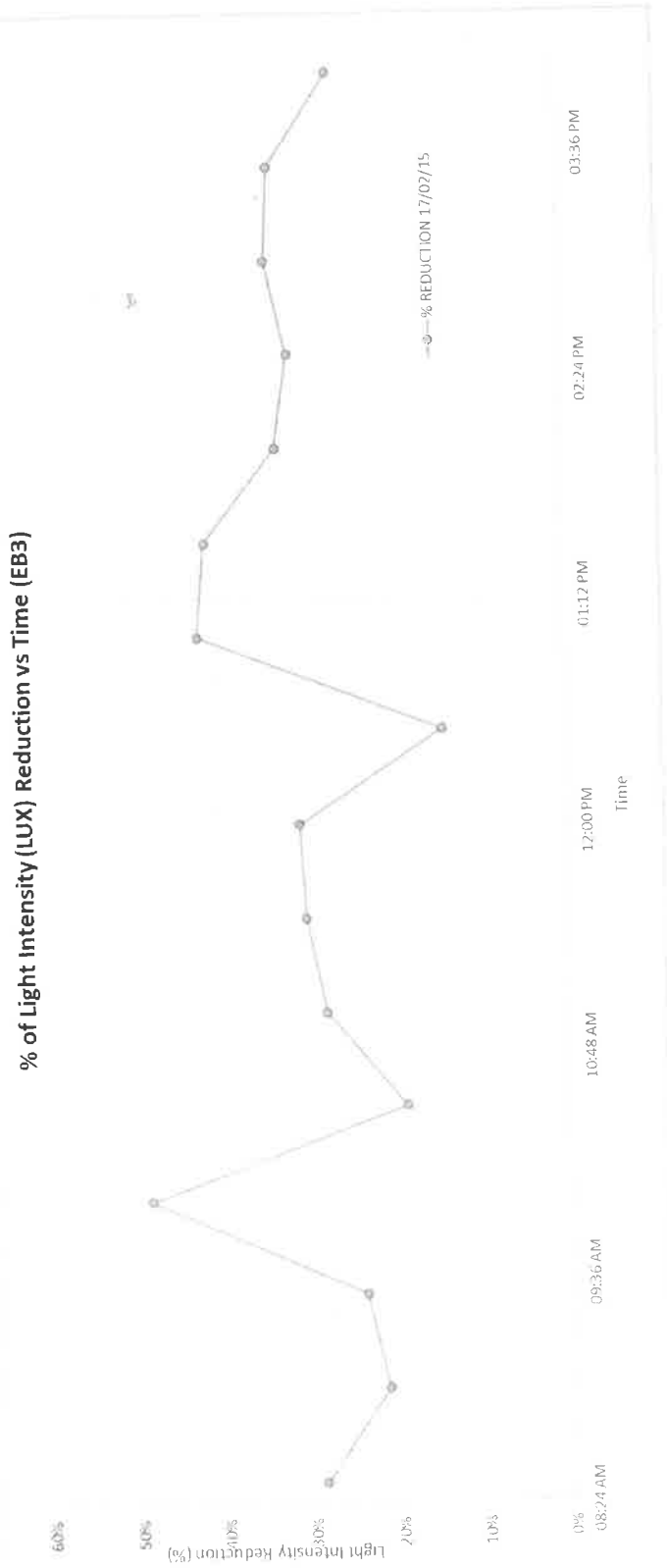


Figure 5.3.2 % of Light Intensity (LUX) Reduction vs to Time (EB3)

5.4 Sample No.4 (DG4)

4mm tempered clear glass + 19mm air space + 6.38mm laminated clear float glass

Table 5.4.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	21486	16408	5078	MIN	23.63%	MIN
2	9:00 AM	44743	34360	10383	2903	23.21%	19.37%
3	9:30 AM	61987	45110	16877	AVERAGE	27.23%	AVERAGE
4	10:00 AM	59834	47710	12124	10014	20.26%	29.91%
5	10:30 AM	49321	37850	11471	MAX	23.26%	MAX
6	11:00 AM	26775	19267	7508	18079	28.04%	47.27%
7	11:30 AM	56049	45190	10859		19.37%	
8	12:00 PM	52779	34700	18079		34.25%	
9	12:30 PM	42928	32420	10508		24.48%	
10	1:00 PM	37062	19541	17521		47.27%	
11	1:30 PM	29045	16408	12637		43.51%	
12	2:00 PM	20659	13361	7298		35.33%	
13	2:30 PM	19097	12243	6854		35.89%	
14	3:00 PM	17974	12178	5796		32.25%	
15	3:30 PM	12583	8258	4325		34.37%	
16	4:00 PM	11066	8163	2903		26.23%	



Figure 5.4.1 Light Intensity (LUX) Difference vs Time (DG4)

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Figure 5.4.2 % of Light Intensity (LUX) Reduction vs to Time (DG4)

5.5 Sample No.5 (DG5)

4mm tempered clear glass + 8mm air space + 6.38mm laminated clear float glass

Table 5.5.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	21481	16260	5221	MIN	24.31%	MIN
2	9:00 AM	44791	34530	10261	3747	22.91%	22.91%
3	9:30 AM	60966	44310	16656	AVERAGE	27.32%	AVERAGE
4	10:00 AM	59608	43240	16368	10126	27.46%	30.48%
5	10:30 AM	51239	39040	12199	MAX	23.81%	MAX
6	11:00 AM	27272	18775	8497	17704	31.16%	38.75%
7	11:30 AM	49141	37370	11771		23.95%	
8	12:00 PM	49364	31660	17704		35.86%	
9	12:30 PM	40605	26910	13695		33.73%	
10	1:00 PM	35105	21900	13205		37.62%	
11	1:30 PM	27840	17053	10787		38.75%	
12	2:00 PM	19297	13368	5929		30.72%	
13	2:30 PM	18741	12829	5912		31.55%	
14	3:00 PM	16585	11287	5298		31.94%	
15	3:30 PM	13945	9176	4769		34.20%	
16	4:00 PM	11575	7828	3747		32.37%	

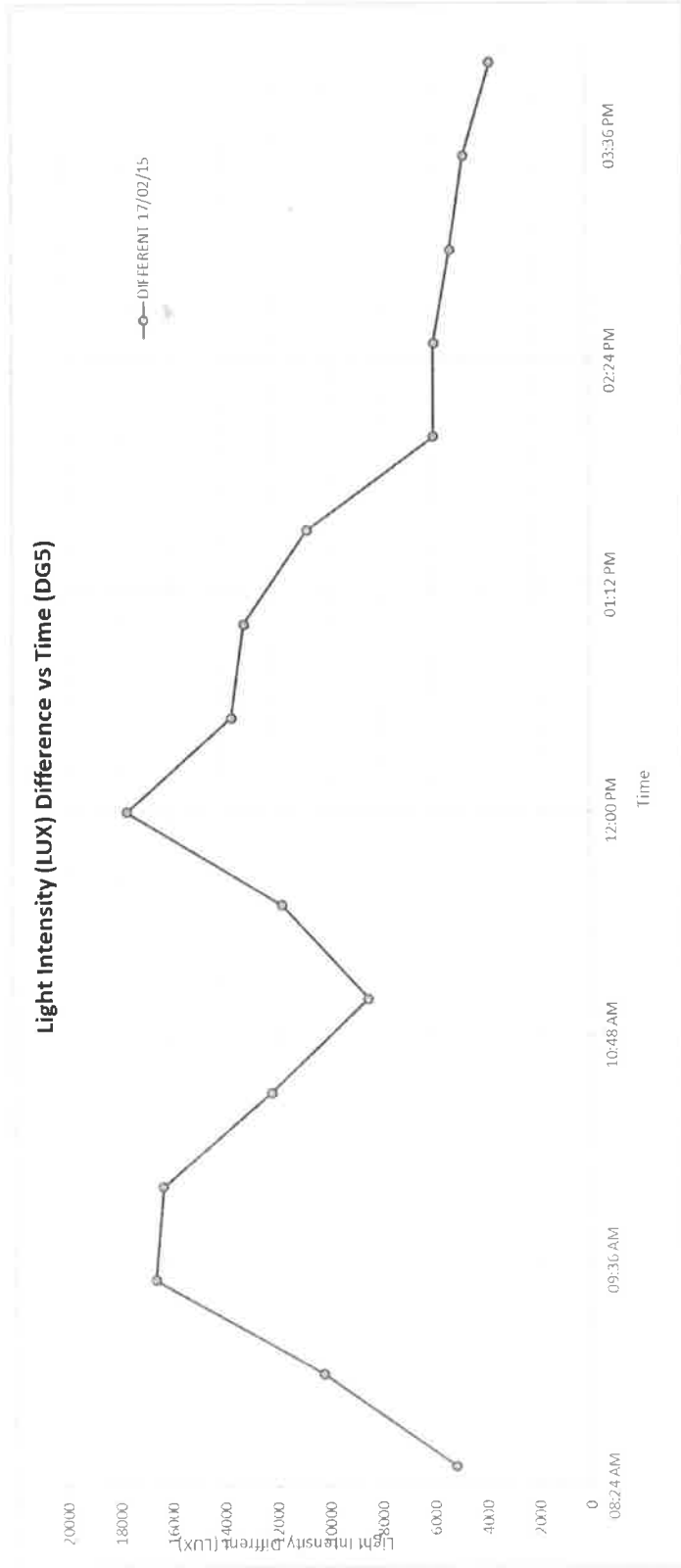


Figure 5.5.1 Light Intensity (LUX) Difference vs Time (DG5)



Figure 5.5.2 % of Light Intensity (LUX) Reduction vs to Time (DG5)

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5.6 Sample No.6 (DG6)

4mm tempered clear glass + 8mm air space + 4mm tempered clear glass

Table 5.6.1 Measurement taken on 17/02/2015

NO	TIME	IN	OUT	DIFFERENT 17/02/15		% REDUCTION 17/02/15	
1	8:30 AM	21384	17116	4268	MIN	19.96%	MIN
2	9:00 AM	43634	34400	9234	3022	21.16%	17.76%
3	9:30 AM	60694	45740	14954	AVERAGE	24.64%	AVERAGE
4	10:00 AM	59210	44970	14240	8966	24.05%	27.12%
5	10:30 AM	51533	42380	9153	MAX	17.76%	MAX
6	11:00 AM	29780	23430	6350	16169	21.32%	41.96%
7	11:30 AM	59714	49010	10704		17.93%	
8	12:00 PM	48479	34590	13889		28.65%	
9	12:30 PM	39499	23330	16169		40.94%	
10	1:00 PM	34074	24230	9844		28.89%	
11	1:30 PM	28502	16543	11959		41.96%	
12	2:00 PM	17558	12905	4653		26.50%	
13	2:30 PM	18330	13017	5313		28.99%	
14	3:00 PM	16145	11194	4951		30.67%	
15	3:30 PM	13848	9088	4760		34.37%	
16	4:00 PM	11536	8514	3022		26.20%	

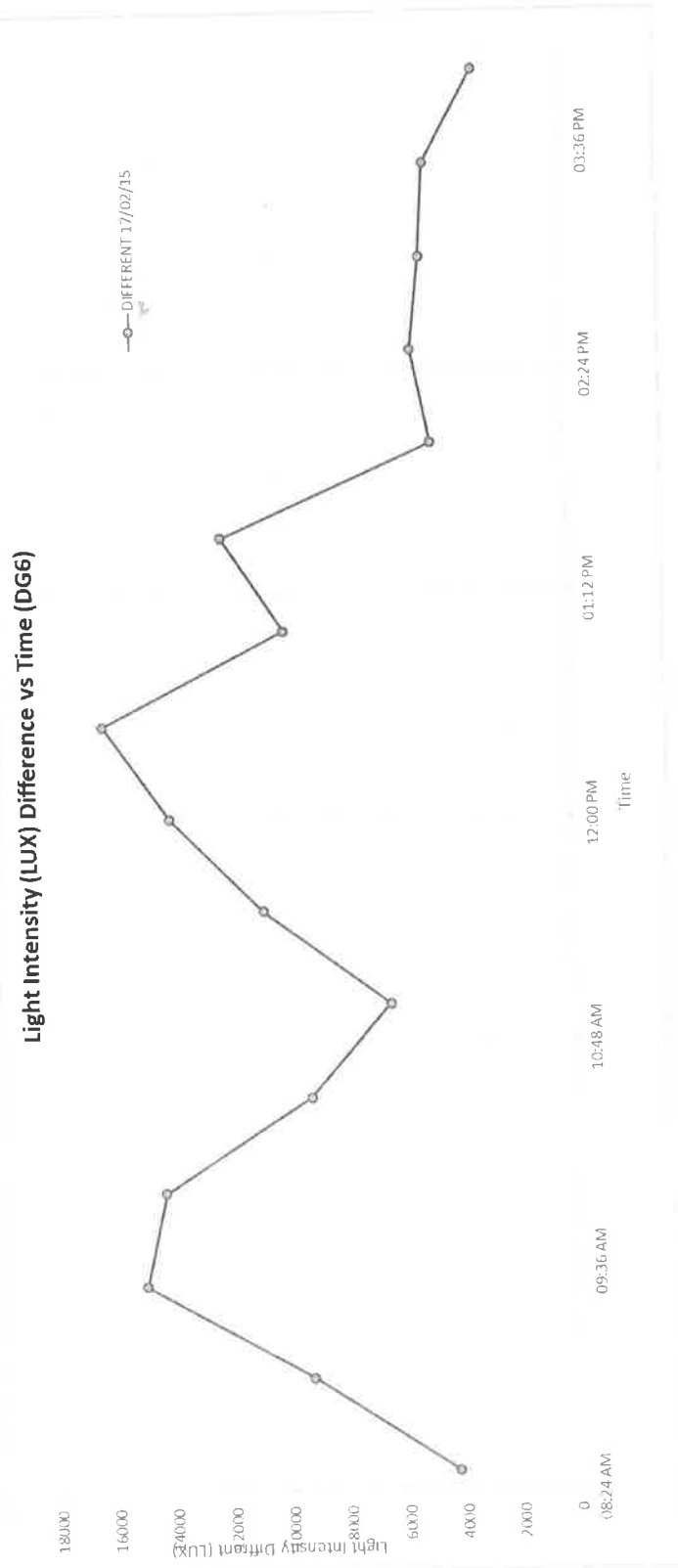


Figure 5.6.1 Light Intensity (LUX) Difference vs Time (DG6)

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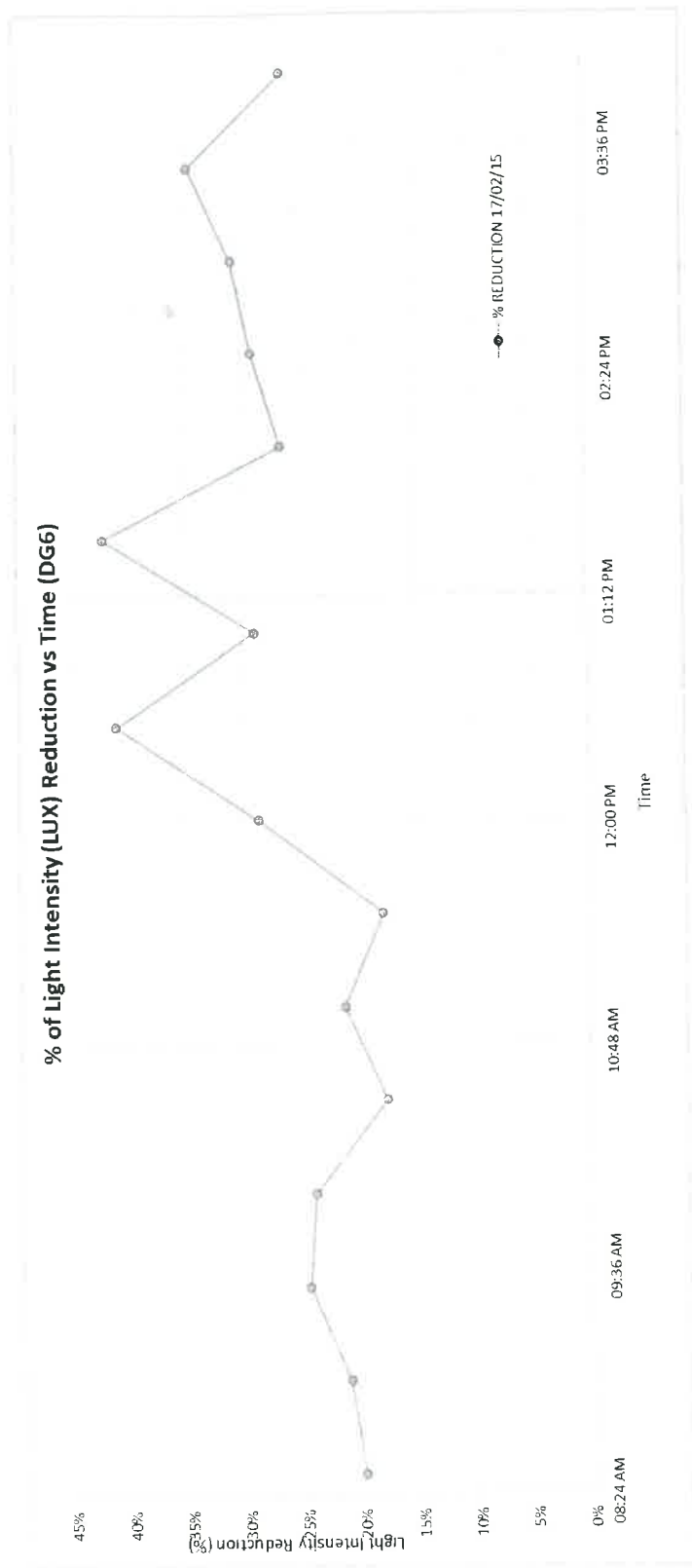


Figure 5.6.2 % of Light Intensity (LUX) Reduction vs to Time (DG6)

6. SUMMARY

The min average and max light intensity reductions are summarised in Table 6.1 below:-

Table 6.1 Summary of Light Intensity Reduction

No.	Date	Sample	Min Value (%)	Average (%)	Max Value (%)
1	17/02/2015	EB1	15.01	25.13	40.31
2	17/02/2015	EB2	27.72	38.22	49.23
3	17/02/2015	EB3	14.09	30.29	48.31
4	17/02/2015	DG4	19.37	29.91	47.27
5	17/02/2015	DG5	22.91	30.48	38.75
6	17/02/2015	DG6	17.76	27.12	41.96

In terms of average light intensity reduction, sample EB2 has the best performance (38.22%), followed by sample DG5 (30.48%), EB3 (30.29%), DG4 (29.91%), DG6 (27.12%) and EB1 (25.13%).