

# Photometric Test Report

## Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77:2014

## Prepared For

**RAB Lighting Inc.**

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## Project Number

**DLF2310103**

## Report Number

**DLF2310103-20a**

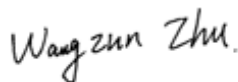
## Test Date

**2023/10/23**

## Issue Date

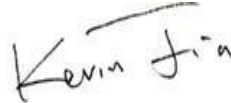
**2023/10/24**

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Outdoor - Stairwell and Passageway Luminaires				
Indoor - Direct Linear Ambient Luminaires/Low Bay				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	5000		2781
Lumen/ft (Goniophotometer - Section 4.2)	IES LM-79-2008	≥375		695
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 115	Premium 130	157.1
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		17.7
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	5.52%
		20.00%	277V	8.77%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.995
		0.9	277V	0.928
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3985±275	4186
		4 step	3985±154	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥80		86
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥0		19
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		85
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		96
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-12%≤IES Rcs,h1≤+23%		-11%
Zonal Lumen Requirement (0°-90°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥85%		97.42%
Zonal Lumen Requirement (0°-60°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥40%		82.55%
Zonal Lumen Requirement (20°-50°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥30%		54.27%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<22 <25		22.5
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		277
(Goniophotometer - Section 4.2)		Non-Wrost Case		120
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		0.069
(Goniophotometer - Section 4.2)		Non-Wrost Case		0.146
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Wrost Case		17.7
(Goniophotometer - Section 4.2)		Non-Wrost Case		17.4

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023/10/23	CS4 @50% Power /4000K	T1
2	Goniophotometer Test	2023/10/23	CS4 @50% Power /4000K	T1
3	THD and PF Test	2023/10/23	CS4 @50% Power /4000K	T1

### Remark(If any)

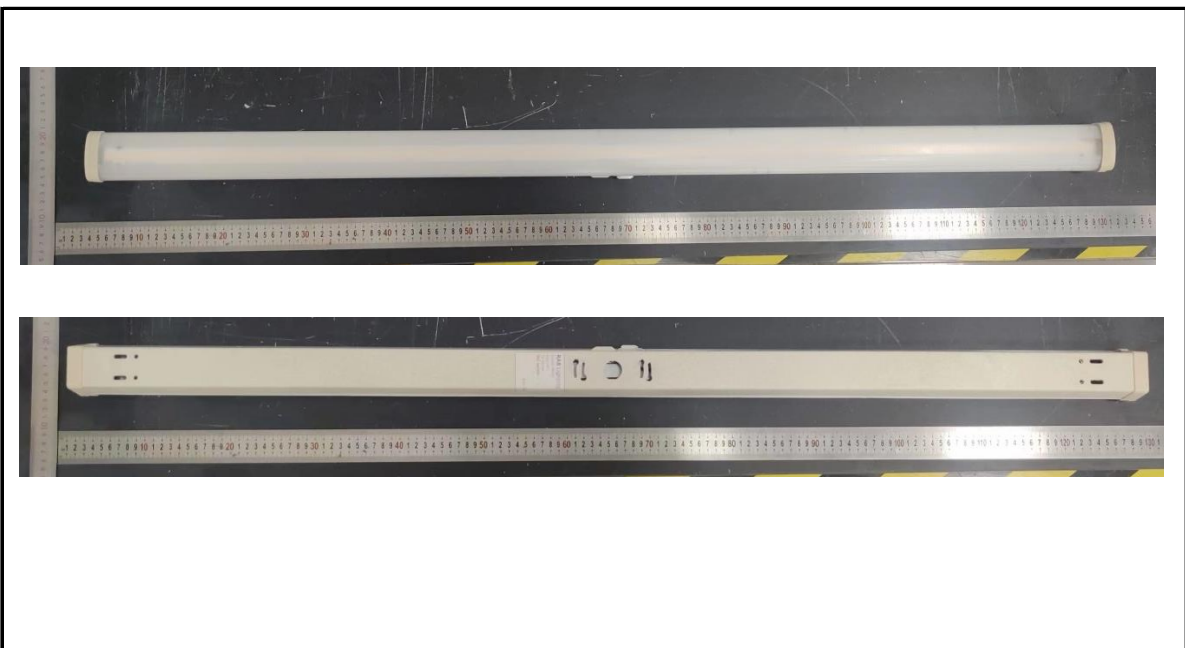
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## 3.0 Production Description

**Luminaire Description:** CS4 @50% Power /4000K

**Electrical Specification:** 120V-277V,50/60HZ

### Photos of Luminaire Characteristics



## 4.0 LM-79 Measurement and Test Results

### 4.1 Integrating Sphere Test

Model No.	CS4 @50% Power /4000K	Sample ID.	T1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.1	Humidity (%RH)	57.0

#### Test Method

The samples were tested according to the IES LM-79-2008.

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ .

The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within  $\pm 0.2$  percent under load.

The sample was measured using  $4\pi$  geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

#### Test Result

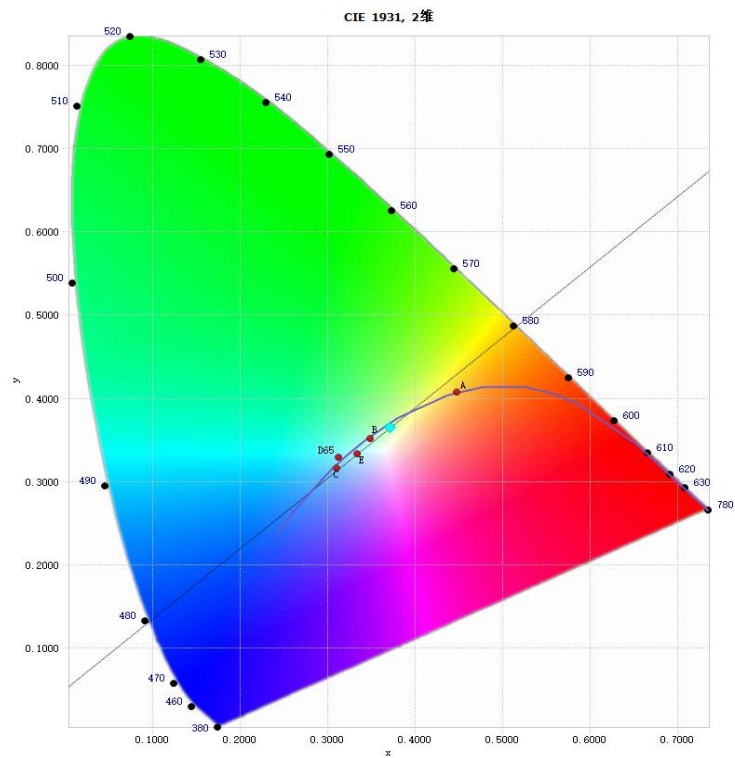
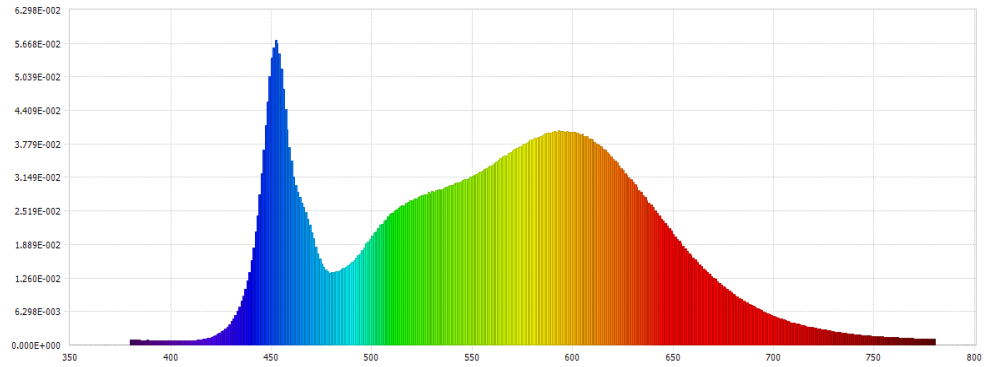
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.06	60	0.146	17.4	0.995
277.02	60	0.069	17.7	0.928

#### Test Result

CCT (K)	CRI	R9	Duv
4186	86	19	-0.0026

Rf	Rg	IES Rcs,h1
85	96	-11%

## 4.1 Integrating Sphere Test



## 4.1 Integrating Sphere Test

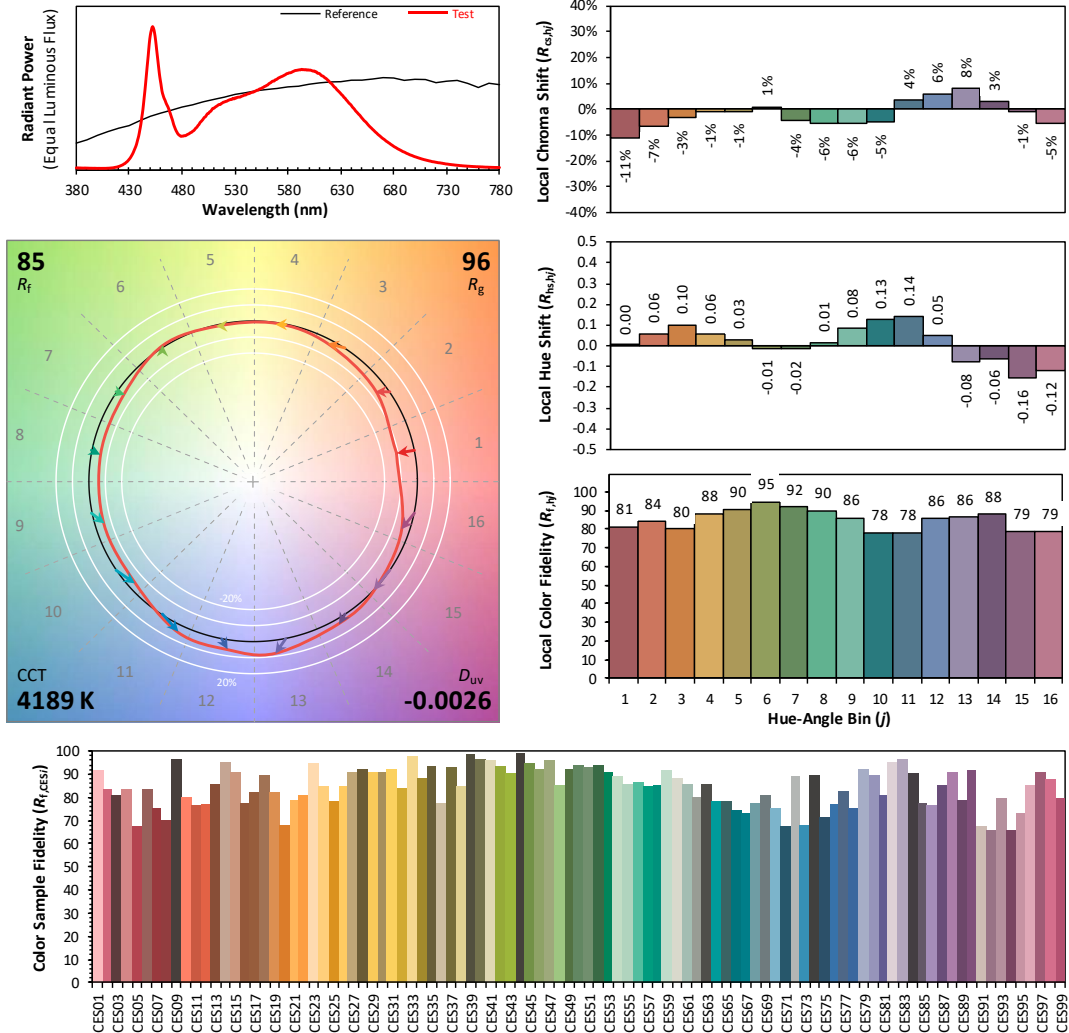
### IES TM-30-18 Color Rendition Report

Source: DLF2310103-20a

Manufacturer: RAB Lighting Inc.

Date: 2023/10/23

Model: CS4 @50% Power /4000K



**Notes:** This is a recommended method for displaying IES TM-30-18 information.

$x$  0.3710  
 $y$  0.3651  
 $u'$  0.2235  
 $v'$  0.4949

CIE 13.3-1995  
(CRI)

$R_a$  86  
 $R_g$  24

#### 4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength							
WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)	WL (nm)	Radiant (Watts/nm)
380	9.41E-04	485	1.42E-02	590	4.00E-02	695	6.22E-03
385	8.70E-04	490	1.56E-02	595	4.02E-02	700	5.41E-03
390	8.49E-04	495	1.78E-02	600	3.99E-02	705	4.71E-03
395	7.92E-04	500	2.04E-02	605	3.96E-02	710	4.12E-03
400	7.49E-04	505	2.27E-02	610	3.85E-02	715	3.61E-03
405	7.55E-04	510	2.47E-02	615	3.68E-02	720	3.18E-03
410	8.06E-04	515	2.62E-02	620	3.50E-02	725	2.84E-03
415	9.84E-04	520	2.72E-02	625	3.29E-02	730	2.49E-03
420	1.48E-03	525	2.81E-02	630	3.05E-02	735	2.21E-03
425	2.49E-03	530	2.89E-02	635	2.81E-02	740	1.98E-03
430	4.37E-03	535	2.92E-02	640	2.58E-02	745	1.76E-03
435	8.23E-03	540	3.00E-02	645	2.32E-02	750	1.61E-03
440	1.59E-02	545	3.09E-02	650	2.08E-02	755	1.48E-03
445	3.22E-02	550	3.17E-02	655	1.85E-02	760	1.38E-03
450	5.39E-02	555	3.26E-02	660	1.63E-02	765	1.28E-03
455	5.18E-02	560	3.39E-02	665	1.43E-02	770	1.19E-03
460	3.45E-02	565	3.54E-02	670	1.26E-02	775	1.12E-03
465	2.67E-02	570	3.64E-02	675	1.10E-02	780	1.08E-03
470	2.11E-02	575	3.75E-02	680	9.53E-03		
475	1.53E-02	580	3.86E-02	685	8.31E-03		
480	1.36E-02	585	3.94E-02	690	7.25E-03		



## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	CS4 @50% Power /4000K	Sample ID.	T1
Opreate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	54.0

#### Test Method

The samples were tested according to the IES LM-79-2008.

Photometric paramters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at 25° C ± 1° C, measured at a point not more than 1 m from the sample and at the same height as the sample.

The voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.

The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5° vertical intervals and 10° horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WROST CASE	277.00	60	0.069	17.7	0.928
NON-WROST CASE	120.02	60	0.146	17.4	0.995

#### Test Result

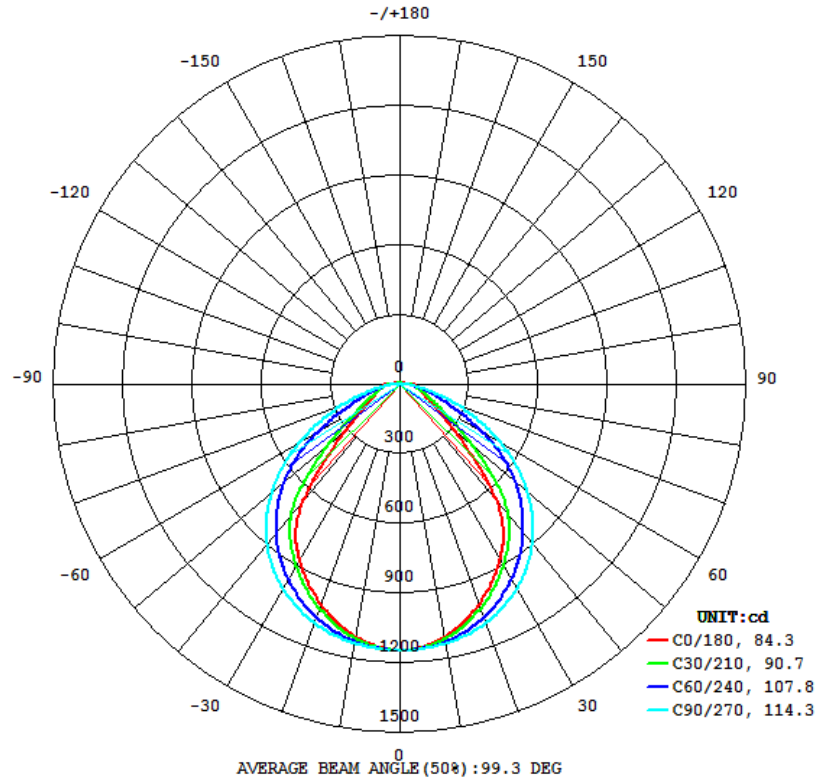
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
2781	136.8	156.2	84.3	114.3	157.1

Zonal Lumen Requirement (0°-90°)	Zonal Lumen Requirement (0°-60°)	BUG rating	UGR (X=4H, Y=8H, 70/50/20%)
97.42%	82.55%	B1-U2-G1	22.5
Zonal Lumen Requirement (20°-50°)	Length(ft)	Lumen/ft	
54.27%	4	695	

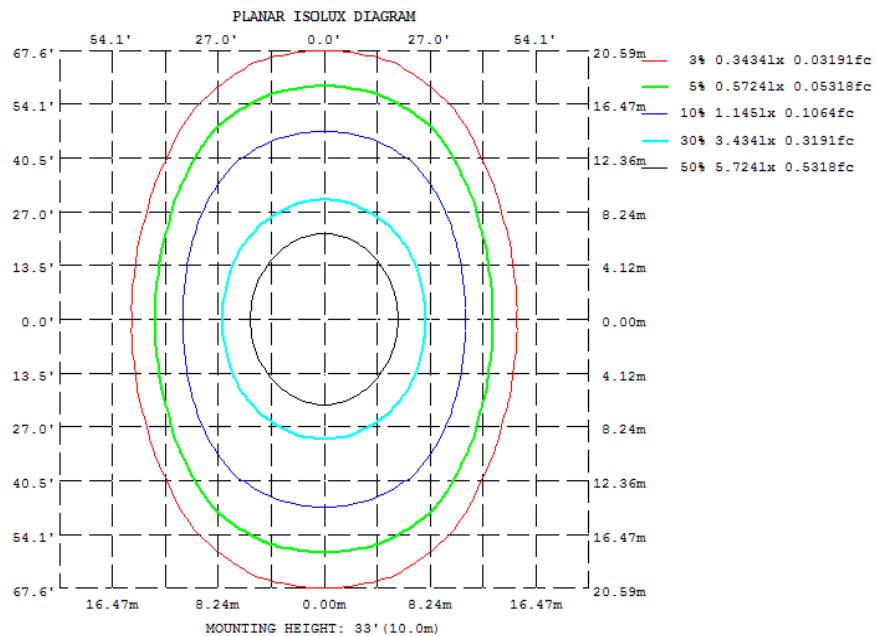


## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

$\gamma$	C0	C45	C90	C135	C180	C225	C270	C315
10	1106	1120	1135	1120	1106	1120	1135	1120
20	1008	1046	1091	1046	1008	1046	1091	1046
30	873.0	933.9	1015	933.9	873.0	933.9	1015	933.9
40	652.3	785.7	895.8	785.7	652.3	785.7	895.8	785.7
50	309.8	556.9	725.7	556.9	309.8	556.9	725.7	556.9
60	160.8	273.2	508.4	273.2	160.8	273.2	508.4	273.2
70	109.5	135.1	274.1	135.1	109.5	135.1	274.1	135.1
80	85.25	68.25	85.76	68.25	85.25	68.25	85.76	68.25
90	59.62	30.57	0.4936	30.57	59.62	30.57	0.4936	30.57
100	32.49	14.52	0.9649	14.52	32.49	14.52	0.9649	14.52
110	22.47	11.23	2.372	11.23	22.47	11.23	2.372	11.23
120	18.74	9.944	3.540	9.944	18.74	9.944	3.540	9.944
130	13.79	8.117	4.511	8.117	13.79	8.117	4.511	8.117
140	9.817	6.220	5.271	6.220	9.817	6.220	5.271	6.220
150	7.063	5.119	5.611	5.119	7.063	5.119	5.611	5.119
160	5.505	4.737	5.586	4.737	5.505	4.737	5.586	4.737
170	6.443	6.765	5.690	6.765	6.443	6.765	5.690	6.765
180	3.708	6.320	6.900	6.320	3.708	6.320	6.900	6.320
DEG	LUMINOUS INTENSITY:cd							

### UGR Table - Corrected

UGR Table - Corrected										
Reflectances										
Ceiling Cavity	70	70	50	50	30	70	70	50	50	30
Walls	50	30	50	30	30	50	30	50	30	30
Floor Cavity	20	20	20	20	20	20	20	20	20	20
Room Size										
X=2H Y=2H										
UGR Viewed Crosswise						UGR Viewed Endwise				
3H	20.3	21.8	20.8	22.2	22.6	14.5	15.9	14.9	16.3	16.7
4H	21.6	22.9	22.0	23.3	23.8	16.0	17.3	16.4	17.7	18.1
6H	21.9	23.2	22.4	23.6	24.0	16.8	18.1	17.3	18.5	19.0
8H	22.1	23.2	22.6	23.7	24.1	17.9	19.0	18.4	19.5	19.9
12H	22.1	23.2	22.6	23.7	24.1	18.5	19.6	19.0	20.0	20.5
	22.1	23.1	22.6	23.6	24.1	19.2	20.2	19.7	20.7	21.2
4H										
2H	20.3	21.6	20.8	22.0	22.4	15.3	16.5	15.7	16.9	17.4
3H	21.8	22.8	22.2	23.3	23.7	16.9	17.9	17.4	18.4	18.8
4H	22.2	23.1	22.7	23.6	24.1	17.8	18.8	18.3	19.2	19.8
6H	22.5	23.3	23.0	23.8	24.3	19.0	19.8	19.5	20.3	20.9
8H	22.5	23.3	23.0	23.8	24.3	19.7	20.4	20.2	20.9	21.5
12H	22.5	23.2	23.0	23.7	24.2	20.5	21.1	21.0	21.7	22.2
8H										
4H	22.2	23.0	22.7	23.5	24.0	18.2	18.9	18.7	19.4	20.0
6H	22.5	23.1	23.1	23.7	24.2	19.5	20.1	20.0	20.6	21.2
8H	22.6	23.1	23.1	23.7	24.3	20.2	20.8	20.8	21.3	21.9
12H	22.6	23.1	23.2	23.7	24.3	21.2	21.7	21.7	22.2	22.8
12H										
4H	22.2	22.9	22.7	23.4	23.9	18.2	18.9	18.7	19.4	20.0
6H	22.5	23.1	23.1	23.6	24.2	19.5	20.1	20.1	20.6	21.2
8H	22.6	23.1	23.2	23.6	24.3	20.3	20.8	20.9	21.4	22.0
Maximum UGR = 24.3										

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	108.2	0 - 10	108.20	3.89%
10-20	307.15	0 - 20	415.35	14.93%
20-30	459.66	0 - 30	875.01	31.46%
30-40	542.48	0 - 40	1417.49	50.96%
40-50	507.31	0 - 50	1924.80	69.20%
50-60	371.40	0 - 60	2296.20	82.55%
60-70	232.15	0 - 70	2528.35	90.90%
70-80	125.47	0 - 80	2653.82	95.41%
80-90	55.83	0 - 90	2709.65	97.42%
90-100	24.14	0 - 100	2733.79	98.29%
100-110	14.00	0 - 110	2747.79	98.79%
110-120	10.92	0 - 120	2758.71	99.18%
120-130	8.36	0 - 130	2767.07	99.48%
130-140	5.72	0 - 140	2772.79	99.69%
140-150	3.85	0 - 150	2776.64	99.83%
150-160	2.57	0 - 160	2779.21	99.92%
160-170	1.60	0 - 170	2780.81	99.98%
170-180	0.63	0 - 180	2781.44	100.00%

## 4.2 Goniophotometer Test

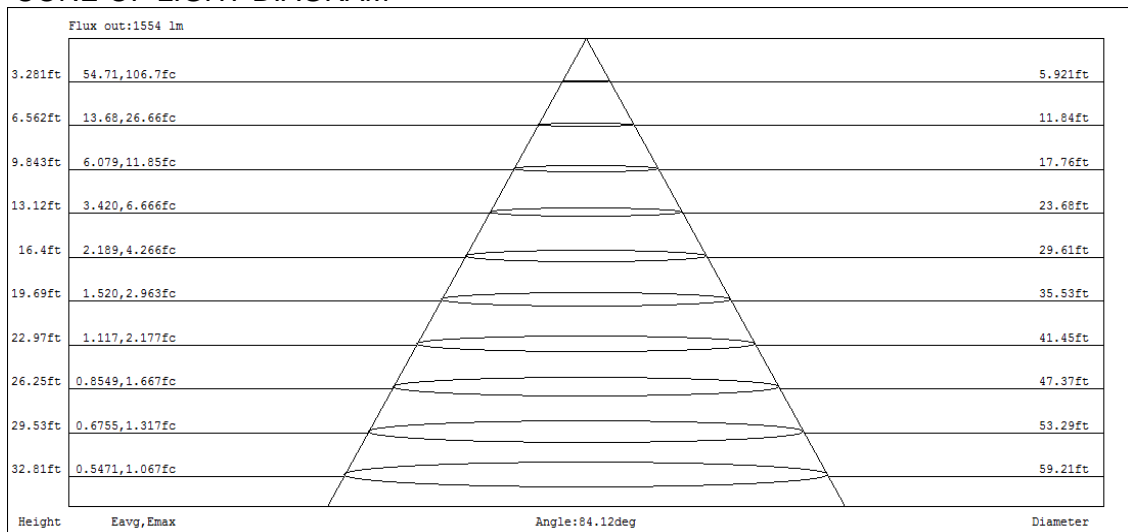
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

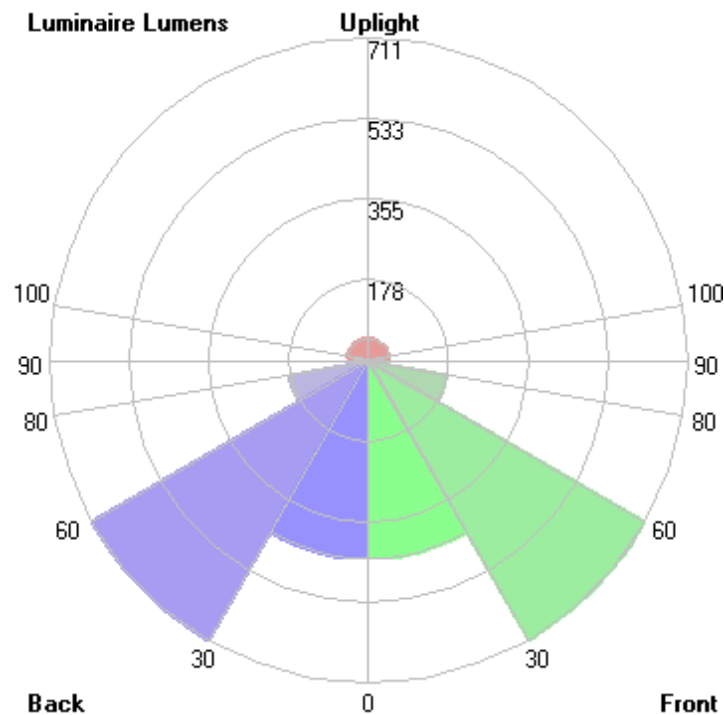
RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	118	118	118	118	115	115	115	115	110	110	110	104	104	104	100	100	100	97
1	109	105	101	97	106	102	98	95	97	94	92	93	91	89	89	87	85	83
2	100	92	86	81	97	90	84	80	86	82	77	83	79	75	79	76	73	71
3	92	82	74	68	89	80	73	68	77	71	66	74	69	65	71	67	63	61
4	85	73	65	59	82	72	64	58	69	62	57	66	61	56	64	59	55	53
5	78	66	58	51	76	65	57	51	62	55	50	60	54	49	58	53	49	47
6	72	60	51	45	70	59	51	45	57	50	44	55	49	44	53	47	43	41
7	67	54	46	40	65	53	46	40	52	45	40	50	44	39	49	43	39	37
8	63	50	42	36	61	49	41	36	48	41	36	46	40	35	45	39	35	33
9	59	46	38	33	57	45	38	32	44	37	32	43	36	32	41	36	32	30
10	55	42	35	30	54	42	34	30	41	34	29	40	33	29	39	33	29	27

### CONE OF LIGHT DIAGRAM



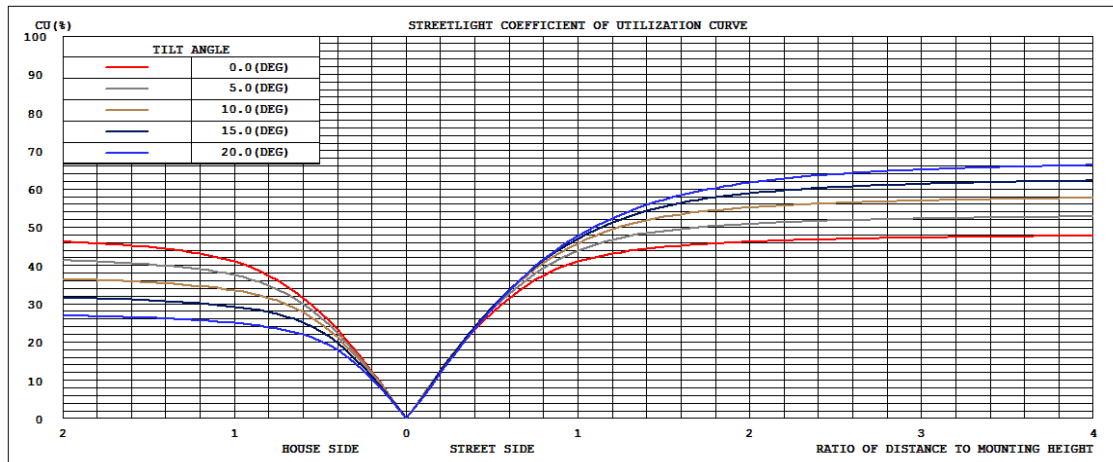
## 4.2 Goniophotometer Test

LCS/BUG

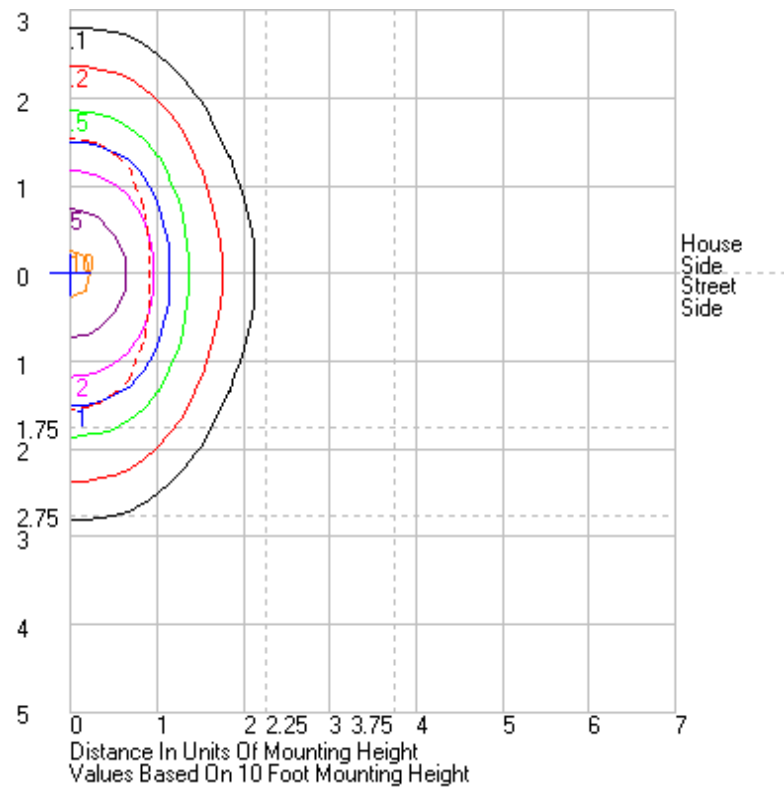


	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	437.5	N.A.	15.7
FM - Front-Medium (30-60)	710.6	N.A.	25.5
FH - Front-High (60-80)	178.8	N.A.	6.4
FVH - Front-Very High (80-90)	27.9	N.A.	1.0
BL - Back-Low (0-30)	437.5	N.A.	15.7
BM - Back-Medium (30-60)	710.6	N.A.	25.5
BH - Back-High (60-80)	178.8	N.A.	6.4
BVH - Back-Very High (80-90)	27.9	N.A.	1.0
UL - Uplight-Low (90-100)	24.1	N.A.	0.9
UH - Uplight-High (100-180)	47.6	N.A.	1.7
<b>Total</b>	<b>2781.3</b>	<b>N.A.</b>	<b>100.0</b>
<b>BUG Rating</b>	<b>B1-U2-G1</b>		

## Coefficients of Utilization



## Isolines



## 4.2 Goniophotometer Test

	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360
0	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01	1147.01
1	1146.02	1146.9	1146.49	1146.39	1145.9	1146.2	1146.25	1146.2	1145.9	1146.39	1146.49	1146.9	1146.02	1146.9	1146.49	1146.39	1145.9	1146.2	1146.25	1146.2	1145.9	1146.39	1146.49	1146.9	1146.02
2	1145.76	1145.96	1145.99	1145.29	1144.84	1144.94	1145.19	1144.94	1144.84	1145.29	1145.99	1145.96	1145.76	1145.96	1145.99	1145.29	1144.84	1144.94	1145.19	1144.94	1145.29	1145.99	1145.96	1145.76	1145.76
3	1146.94	1146.1	1145.17	1144.62	1143.97	1143.27	1141.03	1143.27	1143.97	1144.62	1145.17	1146.1	1146.94	1146.1	1145.17	1144.62	1143.97	1143.27	1141.03	1143.27	1143.97	1144.62	1145.17	1146.1	1146.94
4	1145.38	1144.72	1143.6	1142.19	1141.55	1140.36	1139.25	1140.36	1141.55	1142.19	1143.6	1144.72	1145.38	1144.72	1143.6	1142.19	1141.55	1140.36	1139.25	1140.36	1141.55	1142.19	1143.6	1144.72	1145.38
5	1142.58	1142.85	1141.71	1140.24	1137.72	1136.85	1136.29	1136.85	1137.72	1140.24	1141.71	1142.85	1142.58	1142.85	1141.71	1140.24	1137.72	1136.85	1136.29	1136.85	1137.72	1140.24	1141.71	1142.85	1142.58
6	1142.82	1142.41	1139.78	1137.44	1134.58	1133.32	1130.42	1133.32	1134.58	1137.44	1139.78	1142.41	1142.82	1142.41	1139.78	1137.44	1134.58	1133.32	1130.42	1133.32	1134.58	1137.44	1139.78	1142.41	1142.82
7	1140.47	1139.94	1136.82	1133.88	1130.61	1128.25	1125.91	1128.25	1130.61	1133.88	1136.82	1139.94	1140.47	1139.94	1136.82	1133.88	1130.61	1128.25	1125.91	1128.25	1130.61	1133.88	1136.82	1139.94	1140.47
8	1137.76	1137.07	1134.07	1129.63	1125.21	1121.79	1121.54	1121.79	1125.21	1129.63	1134.07	1137.07	1137.76	1137.07	1134.07	1129.63	1125.21	1121.79	1121.54	1121.79	1125.21	1129.63	1134.07	1137.07	1137.76
9	1136.7	1134.94	1131.02	1125.22	1119.78	1115.83	1113.02	1115.83	1119.78	1125.22	1131.02	1134.94	1136.7	1134.94	1131.02	1125.22	1119.78	1115.83	1113.02	1115.83	1119.78	1125.22	1131.02	1134.94	1136.7
10	1134.84	1132.22	1127.05	1119.96	1114.37	1109.19	1105.9	1109.19	1114.37	1119.96	1127.05	1132.22	1134.84	1132.22	1127.05	1119.96	1114.37	1109.19	1105.9	1109.19	1114.37	1119.96	1127.05	1132.22	1134.84
11	1129.9	1128.64	1122.6	1114.98	1107.21	1101.75	1100.06	1101.75	1107.21	1114.98	1122.6	1128.64	1129.9	1128.64	1122.6	1114.98	1107.21	1101.75	1100.06	1101.75	1107.21	1114.98	1122.6	1128.64	1129.9
12	1128.52	1125.26	1118.35	1109.17	1099.38	1093.38	1090.07	1093.38	1099.38	1109.17	1118.35	1125.26	1128.52	1125.26	1118.35	1109.17	1099.38	1093.38	1090.07	1093.38	1109.17	1118.35	1125.26	1128.52	1129.9
13	1125.15	1121.99	1114.11	1102.46	1092.15	1085.06	1080.5	1085.06	1092.15	1102.46	1114.11	1121.99	1125.15	1121.99	1114.11	1102.46	1092.15	1085.06	1080.5	1085.06	1092.15	1102.46	1114.11	1121.99	1125.15
14	1119.3	1116.66	1107.75	1095.41	1083.94	1076.55	1072.84	1076.55	1083.94	1095.41	1107.75	1116.66	1119.3	1116.66	1107.75	1095.41	1083.94	1076.55	1072.84	1076.55	1083.94	1095.41	1107.75	1116.66	1119.3
15	1117.24	1112.41	1102.13	1088.52	1074.81	1066.25	1062.09	1066.25	1074.81	1088.52	1102.13	1112.41	1117.24	1112.41	1102.13	1088.52	1074.81	1066.25	1062.09	1066.25	1074.81	1088.52	1102.13	1112.41	1117.24
16	1113.41	1108.32	1096.35	1080.28	1066.02	1056.44	1051.09	1056.44	1066.02	1080.28	1096.35	1108.32	1113.41	1108.32	1096.35	1080.28	1066.02	1056.44	1051.09	1056.44	1066.02	1080.28	1096.35	1108.32	1113.41
17	1107.66	1102.42	1089.34	1071.75	1057.71	1046.82	1042.56	1046.82	1057.71	1071.75	1089.34	1102.42	1107.66	1102.42	1089.34	1071.75	1057.71	1046.82	1042.56	1046.82	1057.71	1071.75	1089.34	1102.42	1107.66
18	1102.34	1096.96	1082.6	1064.24	1046.97	1035.29	1030.22	1035.29	1046.97	1064.24	1082.6	1096.96	1102.34	1096.96	1082.6	1064.24	1046.97	1035.29	1030.22	1035.29	1046.97	1064.24	1082.6	1096.96	1102.34
19	1098.77	1091.8	1075.77	1054.98	1036.4	1024.43	1018.36	1024.43	1036.4	1054.98	1075.77	1091.8	1098.77	1091.8	1075.77	1054.98	1036.4	1024.43	1018.36	1024.43	1036.4	1054.98	1075.77	1091.8	1098.77
20	1091.19	1084.96	1067.07	1045.75	1027.23	1013.84	1008.14	1013.84	1027.23	1045.75	1067.07	1084.96	1091.19	1084.96	1067.07	1045.75	1027.23	1013.84	1008.14	1013.84	1027.23	1045.75	1067.07	1084.96	1091.19
21	1086.53	1077.95	1059.22	1036.55	1015.96	1001.67	996.47	1001.67	1015.96	1036.55	1059.22	1077.95	1086.53	1077.95	1059.22	1036.55	1015.96	1001.67	996.47	1001.67	1015.96	1036.55	1059.22	1077.95	1086.53
22	1081.1	1072.07	1051.42	1026.14	1003.73	988.81	982.5	988.81	1003.73	1026.14	1051.42	1072.07	1081.1	1072.07	1051.42	1026.14	1003.73	988.81	982.5	988.81	1003.73	1026.14	1051.42	1072.07	1081.1
23	1073.33	1064.35	1041.52	1015.79	992.95	977.32	970.93	977.32	992.95	1015.79	1041.52	1064.35	1073.33	1064.35	1041.52	1015.79	992.95	977.32	970.93	977.32	992.95	1015.79	1041.52	1064.35	1073.33
24	1066.34	1055.75	1032.69	1004.99	981.88	965.13	958.18	965.13	981.88	1004.99	1032.69	1055.75	1066.34	1055.75	1032.69	1004.99	981.88	965.13	958.18	965.13	981.88	1004.99	1032.69	1055.75	1066.34
25	1060	1048.83	1023.84	994.5	967.7	950.68	943.28	950.68	967.7	994.5	1023.84	1048.83	1060	1048.83	1023.84	994.5	967.7	950.68	943.28	950.68	967.7	994.5	1023.84	1048.83	1060
26	1051.82	1040.58	1013.34	982.62	955.51	937.89	930.36	937.89	955.51	982.62	1013.34	1040.58	1051.82	1040.58	1013.34	982.62	955.51	937.89	930.36	937.89	955.51	982.62	1013.34	1040.58	1051.82
27	1042.61	1030.63	1003.03	971.01	943.78	924.87	917.52	924.87	943.78	971.01	1003.03	1030.63	1042.61	1030.63	1003.03	971.01	943.78	924.87	917.52	924.87	943.78	971.01	1003.03	1030.63	1042.61
28	1035.43	1021.65	993	959.39	929.36	909.29	901.51	909.29	929.36	959.39	993	1021.65	1035.43	1021.65	993	959.39	929.36	909.29	901.51	909.29	929.36	959.39	993	1021.65	1035.43
29	1026.04	1013.36	981.59	947.22	915.25	895.68	886.89	895.68	915.25	947.22	981.59	1013.36	1026.04	1013.36	981.59	947.22	915.25	895.68	886.89	895.68	915.25	947.22	981.59	1013.36	1026.04
30	1015.37	1001.86	970.01	933.87	902.45	881.39	873.02	881.39	902.45	933.87	970.01	1001.86	1015.37	1001.86	970.01	933.87	902.45	881.39	873.02	881.39	902.45	933.87	970.01	1001.86	1015.37
31	1006.6	991.66	959	921.03	887.99	865.71	857.38	865.71	887.99	921.03	959	991.66	1006.6	991.66	959	921.03	887.99	865.71	857.38	865.71	887.99	921.03	959	991.66	1006.6
32	996.41	981.54	946.99	907.95	872.31	850.27	840.95	850.27	872.31	907.95	946.99	981.54	996.41	981.54	946.99	907.95	872.31	850.27	840.95	850.27	872.31	907.95	946.99	981.54	996.41
33	984.89	969.31	933.58	893.34	858.05	835.11	825.96	835.11	858.05	893.34	933.58	969.31	984.89	969.31	933.58	893.34	858.05	835.11	825.96	835.11	858.05	893.34	933.58	969.31	984.89
34	973.68	957.12	921.47	879.25	843.36	818.5	809.46	818.5	843.36	879.25	921.47	957.12	973.68	957.12	921.47	879.25	843.36	818.5	809.46	818.5	843.36	879.25	921.47	957.12	973.68
35	962.78	946.19	908.22	864.84	826.54	800.48	787.7	800.48	826.54	864.84	908.22	946.19	962.78	946.19	908.22	864.84	826.54	800.48	787.7	800.48	826.54	864.84	908.22	946.19	962.78
36	949.46	932.81	893.91	849.89	810.82	781.51	767.59	781.51	810.82	849.89	893.91	932.81	949.46	932.81	893.91	849.89	810.82	781.51	767.59	781.51	810.82	849.89	893.91	932.81	949.46
37	937.25	918.95	880.2	834.23	794.73	759.54	745.22	759.54	794.73	834.23	880.2	918.95	937.25	918.95	880.2	834.23	794.73	759.54	745.22	759.54	794.73	834.23	880.2	918.95	937.25
38	925.09	906.38	865.86	819.2	775.38	734.87	714.83	734.87	775.38	819.2	865.86	906.38	925.09	906.38	865.86	819.2	775.38	734.87	714.83	734.87	775.38	819.2	865.86	906.38	925.09
39	909.88	891.72	850.22	802.61	755.61	708.01	686.2	708.01	755.61	802.61	850.22	891.72	909.88	891.72	850.22	802.6									





51	706.34	685.89	636.62	524.86	381.75	308.34	286.73	308.34	381.75	524.86	636.62	685.89	706.34	685.89	636.62	524.86	381.75	308.34	286.73	308.34	381.75	524.86	636.62	685.89	706.34
52	684.53	664.96	616.22	492.01	353.24	285.02	266.13	285.02	353.24	492.01	616.22	664.96	684.53	664.96	616.22	492.01	353.24	285.02	266.13	285.02	353.24	492.01	616.22	664.96	684.53
53	664.32	645.07	594.5	460.32	327.36	264.97	248.23	264.97	327.36	460.32	594.5	645.07	664.32	645.07	594.5	460.32	327.36	264.97	248.23	264.97	327.36	460.32	594.5	645.07	664.32
54	644.14	623.68	571.19	428.33	303.06	246.97	230.6	246.97	303.06	428.33	571.19	623.68	644.14	623.68	571.19	428.33	303.06	246.97	230.6	246.97	303.06	428.33	571.19	623.68	644.14
55	621.39	602.29	547.6	397.89	281.4	230.39	216.15	230.39	281.4	397.89	547.6	602.29	621.39	602.29	547.6	397.89	281.4	230.39	216.15	230.39	281.4	397.89	547.6	602.29	621.39
56	599.41	580.76	523.13	369.46	261.53	215.13	202.92	215.13	261.53	369.46	523.13	580.76	599.41	580.76	523.13	369.46	261.53	215.13	202.92	215.13	261.53	369.46	523.13	580.76	599.41
57	577.48	559.43	496.5	342.32	243.45	201.79	190.31	201.79	243.45	342.32	496.5	559.43	577.48	559.43	496.5	342.32	243.45	201.79	190.31	201.79	243.45	496.5	559.43	577.48	
58	554.12	536.83	469.75	317.04	227.06	189.64	179.5	189.64	227.06	317.04	469.75	536.83	554.12	536.83	469.75	317.04	227.06	189.64	179.5	189.64	227.06	317.04	469.75	536.83	554.12
59	530.6	514.56	442.52	294.43	212.29	178.45	169.86	178.45	212.29	294.43	442.52	514.56	530.6	514.56	442.52	294.43	212.29	178.45	169.86	178.45	212.29	294.43	442.52	514.56	530.6
60	508.39	492.04	415	273.22	198.75	168.73	160.78	168.73	198.75	273.22	415	492.04	508.39	492.04	415	273.22	198.75	168.73	160.78	168.73	198.75	273.22	415	492.04	508.39
61	484.17	468.8	387.02	253.41	186.29	159.83	152.99	159.83	186.29	253.41	387.02	468.8	484.17	468.8	387.02	253.41	186.29	159.83	152.99	159.83	186.29	253.41	387.02	468.8	484.17
62	460.01	446.09	360.52	235.73	175.23	151.68	146.4	151.68	175.23	235.73	360.52	446.09	460.01	446.09	360.52	235.73	175.23	151.68	146.4	151.68	175.23	235.73	360.52	446.09	460.01
63	437.03	423.01	334.67	219.31	164.93	144.35	139.59	144.35	164.93	219.31	334.67	423.01	437.03	423.01	334.67	219.31	164.93	144.35	139.59	144.35	164.93	219.31	334.67	423.01	437.03
64	413.25	399.94	309.78	204.09	155.62	137.8	133.73	137.8	155.62	204.09	309.78	399.94	413.25	399.94	309.78	204.09	155.62	137.8	133.73	137.8	155.62	204.09	309.78	399.94	413.25
65	389.07	376.95	286.62	190.31	147.18	131.72	128.64	131.72	147.18	190.31	286.62	376.95	389.07	376.95	286.62	190.31	147.18	131.72	128.64	131.72	147.18	190.31	286.62	376.95	389.07
66	365.94	353.88	264.48	177.73	139.11	126.37	123.93	126.37	139.11	177.73	264.48	353.88	365.94	353.88	264.48	177.73	139.11	126.37	123.93	126.37	139.11	177.73	264.48	353.88	365.94
67	342.44	331.03	244.01	165.93	131.83	121.63	119.85	121.63	131.83	165.93	244.01	331.03	342.44	331.03	244.01	165.93	131.83	121.63	119.85	121.63	131.83	165.93	244.01	331.03	342.44
68	318.65	308.22	225.05	155.08	125.44	117.2	116.14	117.2	125.44	155.08	225.05	308.22	318.65	308.22	225.05	155.08	125.44	117.2	116.14	117.2	125.44	155.08	225.05	308.22	318.65
69	296.46	285.63	207.17	144.87	119.25	113.09	112.65	113.09	119.25	144.87	207.17	285.63	296.46	285.63	207.17	144.87	119.25	113.09	112.65	113.09	119.25	144.87	207.17	285.63	296.46
70	274.1	263.7	190.7	135.12	113.67	109.39	109.46	109.39	113.67	135.12	190.7	263.7	274.1	263.7	190.7	135.12	113.67	109.39	109.46	109.39	113.67	135.12	190.7	263.7	274.1
71	251.55	242.08	175.37	126.34	108.47	105.94	106.59	105.94	108.47	126.34	175.37	242.08	251.55	242.08	175.37	126.34	108.47	105.94	106.59	105.94	108.47	126.34	175.37	242.08	251.55
72	230.54	221.28	161.22	118.32	103.55	102.73	103.88	102.73	103.55	118.32	161.22	221.28	230.54	221.28	161.22	118.32	103.55	102.73	103.88	102.73	103.55	118.32	161.22	221.28	230.54
73	209.8	201.01	147.98	110.61	99.07	99.7	101.23	99.7	99.07	110.61	147.98	201.01	209.8	201.01	147.98	110.61	99.07	99.7	101.23	99.7	99.07	110.61	147.98	201.01	209.8
74	189.39	181.8	135.07	103.4	94.87	96.86	98.86	96.86	94.87	103.4	135.07	181.8	189.39	181.8	135.07	103.4	94.87	96.86	98.86	96.86	94.87	103.4	135.07	181.8	189.39
75	170.15	163.6	123.16	96.74	90.75	94.14	96.51	94.14	90.75	96.74	123.16	163.6	170.15	163.6	123.16	96.74	90.75	94.14	96.51	94.14	90.75	96.74	123.16	163.6	170.15
76	151.76	146.38	112.16	90.4	86.92	91.48	94.17	91.48	86.92	90.4	112.16	146.38	151.76	146.38	112.16	90.4	86.92	91.48	94.17	91.48	86.92	90.4	112.16	146.38	151.76
77	133.86	129.84	101.93	84.33	83.38	88.89	91.96	88.89	83.38	84.33	101.93	129.84	133.86	129.84	101.93	84.33	83.38	88.89	91.96	88.89	83.38	84.33	101.93	129.84	133.86
78	116.61	114.23	92.17	78.7	79.78	86.38	89.7	86.38	79.78	78.7	92.17	114.23	116.61	114.23	92.17	78.7	79.78	86.38	89.7	86.38	79.78	78.7	92.17	114.23	116.61
79	100.82	99.83	83.05	73.41	76.37	83.89	87.4	83.89	76.37	73.41	83.05	99.83	100.82	99.83	83.05	73.41	76.37	83.89	87.4	83.89	76.37	73.41	83.05	99.83	100.82
80	85.76	86.31	74.55	68.25	73.13	81.44	85.25	81.44	73.13	68.25	74.55	86.31	85.76	86.31	74.55	68.25	73.13	81.44	85.25	81.44	73.13	68.25	74.55	86.31	85.76
81	71.83	74.07	66.68	63.51	69.79	78.97	82.97	78.97	69.79	63.51	66.68	74.07	71.83	74.07	66.68	63.51	69.79	78.97	82.97	78.97	69.79	63.51	66.68	74.07	71.83
82	58.94	62.64	59.43	59.05	66.71	76.46	80.55	76.46	66.71	59.05	59.43	62.64	58.94	62.64	59.43	59.05	66.71	76.46	80.55	76.46	66.71	59.05	59.43	62.64	58.94
83	46.53	51.94	52.54	54.64	63.73	73.89	78.22	73.89	63.73	54.64	52.54	51.94	46.53	51.94	52.54	54.64	63.73	73.89	78.22	73.89	63.73	54.64	52.54	51.94	46.53
84	35.46	42.09	46.07	50.52	60.66	71.52	75.73	71.52	60.66	50.52	46.07	42.09	35.46	42.09	46.07	50.52	60.66	71.52	75.73	71.52	60.66	50.52	46.07	42.09	35.46
85	25.68	33.53	40.26	46.69	57.68	68.85	73.21	68.85	57.68	46.69	40.26	33.53	25.68	33.53	40.26	46.69	57.68	68.85	73.21	68.85	57.68	46.69	40.26	33.53	25.68
86	17.18	25.99	35.04	43.02	54.83	66.06	70.86	66.06	54.83	43.02	35.04	25.99	17.18	25.99	35.04	43.02	54.83	66.06	70.86	66.06	54.83	43.02	35.04	25.99	17.18
87	11.14	19.63	30.3	39.55	51.94	63.39	68.08	63.39	51.94	39.55	30.3	19.63	11.14	19.63	30.3	39.55	51.94	63.39	68.08	63.39	51.94	39.55	30.3	19.63	11.14
88	5.89	14.72	26.1	36.35	49.1	60.68	65.29	60.68	49.1	36.35	26.1	14.72	5.89	14.72	26.1	36.35	49.1	60.68	65.29	60.68	49.1	36.35	26.1	14.72	5.89
89	2.04	10.96	22.52	33.36	46.34	57.86	62.54	57.86	46.34	33.36	22.52	10.96	2.04	10.96	22.52	33.36	46.34	57.86	62.54	57.86	46.34	33.36	22.52	10.96	2.04
90	0.49	8.11	19.48	30.57	43.59	55.04	59.62	55.04	43.59	30.57	19.48	8.11	0.49	8.11	19.48	30.57	43.59	55.04	59.62	55.04	43.59	30.57	19.48	8.11	0.49
91	0.09	6.19	16.95	28.01	40.85	52.15	56.63	52.15	40.85	28.01	16.95	6.19	0.09	6.19	16.95	28.01	40.85	52.15	56.63	52.15	40.85	28.01	16.95	6.19	0.09
92	0.09	5.02	14.95	25.64	38.2	49.19	53.57	49.19	38.2	25.64	14.95	5.02	0.09	5.02	14.95	25.64	38.2	49.19	53.57	49.19	38.2	25.64	14.95	5.02	0.09
93	0.11	4.34	13.41	23.5	35.64	46.3	50.59	46.3	35.64	23.5	13.41	4.34	0.11	4.34	13.41	23.5	35.64	46.3	50.59	46.3	35.64	23.5	13.41	4.34	0.11
94	0.13	3.9	12.16	21.61	33.15	43.44	47.59	43.44	33.15	21.61	12.16	3.9	0.13	3.9	12.16	21.61	33.15	43.44	47.59	43.44	33.15	21.61	12.16	3.9	0.13
95	0.19	3.6	11.08	19.95	30.87	40.72	44.7	40.72	30.87	19.95	11.08	3.6	0.19	3.6	11.08	19.95	30.87	40.72	44.7	40.72	30.87	19.95	11.08	3.6	0.19
96	0.34	3.38	10.25	18.5	28.78	38.13	41.95	38.13	28.																

106	1.83	2.95	6.87	11.93	17.74	22.93	25.11	22.93	17.74	11.93	6.87	2.95	1.83	2.95	6.87	11.93	17.74	22.93	25.11	22.93	17.74	11.93	6.87	2.95	1.83
107	1.98	2.93	6.79	11.71	17.31	22.3	24.39	22.3	17.31	11.71	6.79	2.93	1.98	2.93	6.79	11.71	17.31	22.3	24.39	22.3	17.31	11.71	6.79	2.93	1.98
108	2.11	2.9	6.74	11.52	16.93	21.69	23.72	21.69	16.93	11.52	6.74	2.9	2.11	2.9	6.74	11.52	16.93	21.69	23.72	21.69	16.93	11.52	6.74	2.9	2.11
109	2.24	2.88	6.69	11.37	16.58	21.17	23.07	21.17	16.58	11.37	6.69	2.88	2.24	2.88	6.69	11.37	16.58	21.17	23.07	21.17	16.58	11.37	6.69	2.88	2.24
110	2.37	2.86	6.61	11.23	16.29	20.69	22.47	20.69	16.29	11.23	6.61	2.86	2.37	2.86	6.61	11.23	16.29	20.69	22.47	20.69	16.29	11.23	6.61	2.86	2.37
111	2.5	2.84	6.54	11.11	16.05	20.27	21.93	20.27	16.05	11.11	6.54	2.84	2.5	2.84	6.54	11.11	16.05	20.27	21.93	20.27	16.05	11.11	6.54	2.84	2.5
112	2.62	2.82	6.47	10.99	15.85	19.92	21.5	19.92	15.85	10.99	6.47	2.82	2.62	2.82	6.47	10.99	15.85	19.92	21.5	19.92	15.85	10.99	6.47	2.82	2.62
113	2.74	2.81	6.39	10.86	15.69	19.63	21.11	19.63	15.69	10.86	6.39	2.81	2.74	2.81	6.39	10.86	15.69	19.63	21.11	19.63	15.69	10.86	6.39	2.81	2.74
114	2.87	2.81	6.33	10.7	15.56	19.4	20.84	19.4	15.56	10.7	6.33	2.81	2.87	2.81	6.33	10.7	15.56	19.4	20.84	19.4	15.56	10.7	6.33	2.81	2.87
115	2.99	2.8	6.27	10.53	15.4	19.19	20.65	19.19	15.4	10.53	6.27	2.8	2.99	2.8	6.27	10.53	15.4	19.19	20.65	19.19	15.4	10.53	6.27	2.8	2.99
116	3.1	2.81	6.21	10.4	15.22	18.93	20.42	18.93	15.22	10.4	6.21	2.81	3.1	2.81	6.21	10.4	15.22	18.93	20.42	18.93	15.22	10.4	6.21	2.81	3.1
117	3.21	2.82	6.15	10.27	15.04	18.63	20.13	18.63	15.04	10.27	6.15	2.82	3.21	2.82	6.15	10.27	15.04	18.63	20.13	18.63	15.04	10.27	6.15	2.82	3.21
118	3.32	2.83	6.08	10.16	14.82	18.26	19.75	18.26	14.82	10.16	6.08	2.83	3.32	2.83	6.08	10.16	14.82	18.26	19.75	18.26	14.82	10.16	6.08	2.83	3.32
119	3.43	2.85	6	10.06	14.56	17.9	19.25	17.9	14.56	10.06	6	2.85	3.43	2.85	6	10.06	14.56	17.9	19.25	17.9	14.56	10.06	6	2.85	3.43
120	3.54	2.87	5.92	9.94	14.31	17.51	18.74	17.51	14.31	9.94	5.92	2.87	3.54	2.87	5.92	9.94	14.31	17.51	18.74	17.51	14.31	9.94	5.92	2.87	3.54
121	3.65	2.9	5.83	9.81	14.02	17.09	18.26	17.09	14.02	9.81	5.83	2.9	3.65	2.9	5.83	9.81	14.02	17.09	18.26	17.09	14.02	9.81	5.83	2.9	3.65
122	3.77	2.93	5.74	9.66	13.71	16.67	17.75	16.67	13.71	9.66	5.74	2.93	3.77	2.93	5.74	9.66	13.71	16.67	17.75	16.67	13.71	9.66	5.74	2.93	3.77
123	3.88	2.96	5.66	9.51	13.4	16.24	17.23	16.24	13.4	9.51	5.66	2.96	3.88	2.96	5.66	9.51	13.4	16.24	17.23	16.24	13.4	9.51	5.66	2.96	3.88
124	3.98	3	5.57	9.34	13.04	15.79	16.77	15.79	13.04	9.34	5.57	3	3.98	3	5.57	9.34	13.04	15.79	16.77	15.79	13.04	9.34	5.57	3	3.98
125	4.07	3.04	5.49	9.15	12.66	15.36	16.25	15.36	12.66	9.15	5.49	3.04	4.07	3.04	5.49	9.15	12.66	15.36	16.25	15.36	12.66	9.15	5.49	3.04	4.07
126	4.17	3.08	5.4	8.95	12.29	14.92	15.75	14.92	12.29	8.95	5.4	3.08	4.17	3.08	5.4	8.95	12.29	14.92	15.75	14.92	12.29	8.95	5.4	3.08	4.17
127	4.27	3.13	5.31	8.75	11.95	14.46	15.29	14.46	11.95	8.75	5.31	3.13	4.27	3.13	5.31	8.75	11.95	14.46	15.29	14.46	11.95	8.75	5.31	3.13	4.27
128	4.35	3.17	5.22	8.53	11.63	14	14.81	14	11.63	8.53	5.22	3.17	4.35	3.17	5.22	8.53	11.63	14	14.81	14	11.63	8.53	5.22	3.17	4.35
129	4.43	3.21	5.14	8.32	11.3	13.55	14.3	13.55	11.3	8.32	5.14	3.21	4.43	3.21	5.14	8.32	11.3	13.55	14.3	13.55	11.3	8.32	5.14	3.21	4.43
130	4.51	3.26	5.05	8.12	10.98	13.09	13.79	13.09	10.98	8.12	5.05	3.26	4.51	3.26	5.05	8.12	10.98	13.09	13.79	13.09	10.98	8.12	5.05	3.26	4.51
131	4.59	3.3	4.97	7.9	10.65	12.65	13.33	12.65	10.65	7.9	4.97	3.3	4.59	3.3	4.97	7.9	10.65	12.65	13.33	12.65	10.65	7.9	4.97	3.3	4.59
132	4.66	3.35	4.89	7.69	10.33	12.23	12.85	12.23	10.33	7.69	4.89	3.35	4.66	3.35	4.89	7.69	10.33	12.23	12.85	12.23	10.33	7.69	4.89	3.35	4.66
133	4.74	3.39	4.81	7.48	9.99	11.82	12.39	11.82	9.99	7.48	4.81	3.39	4.74	3.39	4.81	7.48	9.99	11.82	12.39	11.82	9.99	7.48	4.81	3.39	4.74
134	4.83	3.44	4.75	7.27	9.65	11.43	11.99	11.43	9.65	7.27	4.75	3.44	4.83	3.44	4.75	7.27	9.65	11.43	11.99	11.43	9.65	7.27	4.75	3.44	4.83
135	4.91	3.5	4.7	7.07	9.32	11.05	11.57	11.05	9.32	7.07	4.7	3.5	4.91	3.5	4.7	7.07	9.32	11.05	11.57	11.05	9.32	7.07	4.7	3.5	4.91
136	4.99	3.58	4.65	6.9	9.02	10.67	11.18	10.67	9.02	6.9	4.65	3.58	4.99	3.58	4.65	6.9	9.02	10.67	11.18	10.67	9.02	6.9	4.65	3.58	4.99
137	5.07	3.66	4.61	6.72	8.73	10.3	10.84	10.3	8.73	6.72	4.61	3.66	5.07	3.66	4.61	6.72	8.73	10.3	10.84	10.3	8.73	6.72	4.61	3.66	5.07
138	5.14	3.76	4.57	6.54	8.46	9.93	10.48	9.93	8.46	6.54	4.57	3.76	5.14	3.76	4.57	6.54	8.46	9.93	10.48	9.93	8.46	6.54	4.57	3.76	5.14
139	5.21	3.87	4.54	6.38	8.2	9.58	10.13	9.58	8.2	6.38	4.54	3.87	5.21	3.87	4.54	6.38	8.2	9.58	10.13	9.58	8.2	6.38	4.54	3.87	5.21
140	5.27	3.98	4.52	6.22	7.96	9.28	9.82	9.28	7.96	6.22	4.52	3.98	5.27	3.98	4.52	6.22	7.96	9.28	9.82	9.28	7.96	6.22	4.52	3.98	5.27
141	5.35	4.09	4.51	6.06	7.74	8.97	9.5	8.97	7.74	6.06	4.51	4.09	5.35	4.09	4.51	6.06	7.74	8.97	9.5	8.97	7.74	6.06	4.51	4.09	5.35
142	5.42	4.22	4.49	5.92	7.51	8.69	9.19	8.69	7.51	5.92	4.49	4.22	5.42	4.22	4.49	5.92	7.51	8.69	9.19	8.69	7.51	5.92	4.49	4.22	5.42
143	5.48	4.37	4.48	5.79	7.28	8.42	8.9	8.42	7.28	5.79	4.48	4.37	5.48	4.37	4.48	5.79	7.28	8.42	8.9	8.42	7.28	5.79	4.48	4.37	5.48
144	5.52	4.58	4.47	5.66	7.06	8.17	8.6	8.17	7.06	5.66	4.47	4.58	5.52	4.58	4.47	5.66	7.06	8.17	8.6	8.17	7.06	5.66	4.47	4.58	5.52
145	5.54	4.83	4.47	5.55	6.84	7.92	8.32	7.92	6.84	5.55	4.47	4.83	5.54	4.83	4.47	5.55	6.84	7.92	8.32	7.92	6.84	5.55	4.47	4.83	5.54
146	5.55	5.11	4.46	5.44	6.65	7.67	8.05	7.67	6.65	5.44	4.46	5.11	5.55	5.11	4.46	5.44	6.65	7.67	8.05	7.67	6.65	5.44	4.46	5.11	5.55
147	5.57	5.34	4.46	5.34	6.48	7.43	7.79	7.43	6.48	5.34	4.46	5.34	5.57	5.34	4.46	5.34	6.48	7.43	7.79	7.43	6.48	5.34	4.46	5.34	5.57
148	5.58	5.56	4.46	5.26	6.31	7.19	7.53	7.19	6.31	5.26	4.46	5.56	5.58	5.56	4.46	5.26	6.31	7.19	7.53	7.19	6.31	5.26	4.46	5.56	5.58
149	5.59	5.75	4.46	5.18	6.14	6.96	7.29	6.96	6.14	5.18	4.46	5.75	5.59	5.75	4.46	5.18	6.14	6.96	7.29	6.96	6.14	5.18	4.46	5.75	5.59
150	5.61	5.91	4.46	5.12	5.99	6.74	7.06	6.74	5.99	5.12	4.46	5.91	5.61	5.91	4.46	5.12	5.99	6.74	7.06	6.74	5.99	5.12	4.46	5.91	5.61
151	5.63	6.06	4.47	5.06	5.84	6.54	6.85	6.54	5.84	5.06	4.47	6.06	5.63	6.06	4.47	5.06	5.84	6.54	6.85	6.54	5.84	5.06	4.47	6.06	5.63
152	5.67	6.17	4.48	5.01	5.7	6.35	6.64	6.35	5.7	5.01	4.48	6.17	5.67	6.17	4.48	5.01	5.7	6.35	6.64	6.35	5.7	5.01	4.48	6.17	5.67
153	5.72	6.22	4.5	4.96	5.59	6.17	6.46	6.17	5.59	4.96	4.5	6.22	5.72	6.22	4.5	4.96	5.59	6.17	6.46	6.17	5.59	4.96	4.5	6.22	5.72
154	5.74	6.32	4.55	4.89	5.48	6	6.27	6	5.48	4.89	4.55	6.32	5.74	6.32	4.55	4.89	5.48	6	6.27	6	5.48	4.89	4.55	6.32	5.74
155	5.72	6.43	4.62	4.87	5.4	5.85	6.1	5.85	5.4	4.87	4.62	6.43	5.72	6.43	4.62	4.87	5.4	5.85	6.1	5.85	5.4	4.87	4.62	6.43	5.72
156	5.69	6.45	4.73	4.83	5.31	5																			

161	5.57	6.2	6.01	4.78	4.97	5.24	5.42	5.24	4.97	4.78	6.01	6.2	5.57	6.2	6.01	4.78	4.97	5.24	5.42	5.24	4.97	4.78	6.01	6.2	5.57
162	5.58	6.08	6.16	4.88	4.91	5.18	5.35	5.18	4.91	4.88	6.16	6.08	5.58	6.08	6.16	4.88	4.91	5.18	5.35	5.18	4.91	4.88	6.16	6.08	5.58
163	5.58	5.96	6.29	5.12	4.89	5.1	5.28	5.1	4.89	5.12	6.29	5.96	5.58	5.96	6.29	5.12	4.89	5.1	5.28	5.1	4.89	5.12	6.29	5.96	5.58
164	5.55	5.95	6.42	5.41	4.91	5.05	5.22	5.05	4.91	5.41	6.42	5.95	5.55	5.95	6.42	5.41	4.91	5.05	5.22	5.05	4.91	5.41	6.42	5.95	5.55
165	5.5	5.9	6.48	5.73	4.98	5.02	5.19	5.02	4.98	5.73	6.48	5.9	5.5	5.9	6.48	5.73	4.98	5.02	5.19	5.02	4.98	5.73	6.48	5.9	5.5
166	5.42	5.87	6.49	6.04	5.18	5.04	5.19	5.04	5.18	6.04	6.49	5.87	5.42	5.87	6.49	6.04	5.18	5.04	5.19	5.04	5.18	6.04	6.49	5.87	5.42
167	5.33	5.82	6.44	6.25	5.51	5.15	5.26	5.15	5.51	6.25	6.44	5.82	5.33	5.82	6.44	6.25	5.51	5.15	5.26	5.15	5.51	6.25	6.44	5.82	5.33
168	5.34	5.82	6.42	6.41	5.89	5.41	5.43	5.41	5.89	6.41	6.42	5.82	5.34	5.82	6.42	6.41	5.89	5.41	5.43	5.41	5.89	6.41	6.42	5.82	5.34
169	5.49	5.89	6.5	6.6	6.22	5.81	5.76	5.81	6.22	6.6	6.5	5.89	5.49	5.89	6.5	6.6	6.22	5.81	5.76	5.81	6.22	6.6	6.5	5.89	5.49
170	5.69	5.94	6.57	6.77	6.47	6.21	6.44	6.21	6.47	6.77	6.57	5.94	5.69	5.94	6.57	6.77	6.47	6.21	6.44	6.21	6.47	6.77	6.57	5.94	5.69
171	5.9	6.02	6.52	6.89	6.69	6.48	7.07	6.48	6.69	6.89	6.52	6.02	5.9	6.02	6.52	6.89	6.69	6.48	7.07	6.48	6.69	6.52	6.02	5.9	
172	6.06	6.14	6.56	6.94	6.8	6.58	7.58	6.58	6.8	6.94	6.56	6.14	6.06	6.14	6.56	6.94	6.8	6.58	7.58	6.58	6.8	6.94	6.56	6.14	6.06
173	6.19	6.25	6.55	6.91	6.86	6.66	7.87	6.66	6.86	6.91	6.55	6.25	6.19	6.25	6.55	6.91	6.86	6.66	7.87	6.66	6.86	6.91	6.55	6.25	6.19
174	6.32	6.36	6.49	6.72	6.9	6.69	7.4	6.69	6.9	6.72	6.49	6.36	6.32	6.36	6.49	6.72	6.9	6.69	7.4	6.69	6.9	6.72	6.49	6.36	6.32
175	6.48	6.45	6.51	6.63	6.84	6.68	7.2	6.68	6.84	6.63	6.51	6.45	6.48	6.45	6.51	6.63	6.84	6.68	7.2	6.68	6.84	6.63	6.51	6.45	6.48
176	6.64	6.59	6.59	6.67	6.65	6.52	6.14	6.52	6.65	6.67	6.59	6.59	6.64	6.59	6.67	6.65	6.52	6.14	6.52	6.65	6.67	6.59	6.59	6.64	
177	6.85	6.77	6.72	6.7	6.48	5.99	5.1	5.99	6.48	6.7	6.72	6.77	6.85	6.77	6.72	6.7	6.48	5.99	5.1	5.99	6.48	6.7	6.72	6.77	6.85
178	6.94	6.88	6.78	6.72	6.37	5.66	4.2	5.66	6.37	6.72	6.78	6.88	6.94	6.88	6.78	6.72	6.37	5.66	4.2	5.66	6.37	6.72	6.78	6.88	6.94
179	6.92	6.85	6.69	6.49	6.16	5.21	2.65	5.21	6.16	6.49	6.69	6.85	6.92	6.85	6.69	6.49	6.16	5.21	2.65	5.21	6.16	6.49	6.69	6.85	6.92
180	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9	6.9

## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	CS4 @50% Power /4000K	Sample ID.	T1
Temperature (°C)	25.1	Humidity (%RH)	57.0

#### Test Method

The samples were tested according to the ANSI C82.77:2014.

The total harmonic distortion shall be measured to the 40th order.

The ambient temperature condition was maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ . The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated.

#### Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD
120.06	60	0.146	17.4	0.995	5.52%
277.02	60	0.069	17.7	0.928	8.77%

## 5.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2022/12/24	2023/12/23
DLF108	Auxiliary Lamp	2022/12/24	2023/12/23
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-directional	2022/12/24	2023/12/23
DLF116	AC Power Source	2022/12/16	2023/12/15
DLF516	Power Meter	2022/12/16	2023/12/15
DLF112	Temperature Recorder	2022/12/28	2023/12/27
DLF114	Temperature & Humidity Datalogger	2022/12/28	2023/12/27
DLF101	Goniophotometer	2022/12/24	2023/12/23
DLF511	AC Power Source	2022/12/16	2023/12/15
DLF512	AC Power Source	2022/12/16	2023/12/15
DLF513	AC Power Source	2022/12/16	2023/12/15
DLF507	DC Power Source	2022/12/16	2023/12/15
DLF111	Temperature & Humidity Datalogger	2022/12/28	2023/12/27
DLF119	Power Meter	2022/12/16	2023/12/15
DLF031	Temperature data logger	2023/6/22	2024/6/21
DLF073	Power Analyzer	2023/6/22	2024/6/21
DLF003	Temperature & Humidity Datalogger	2023/6/22	2024/6/21

\*\*\*\*\* End of Test Report\*\*\*\*\*