

# Photometric Test Report

## Relevant Standards

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

## Prepared For RAB Lighting Inc.

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## Project Number

DLF2404111

## Report Number

DLF2404111-12a

## Test Date

2024/4/21

## Issue Date

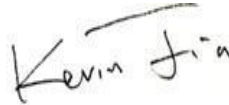
2024/4/23

## Prepared By



Wangzun Zhu

## Approved By



Kevin Jia

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## 1.0 Test Summary

DLC Technical Requirements v5.1

Indoor - High Bay Luminaires (Commercial and Industrial)				
Requirement Category	Test Method	Requirements		Test value
Luminaire Output (lm) (Goniophotometer - Section 4.2)	IES LM-79-2008	10000		23552
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 120	Premium 135	160.2
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		147.0
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	2.58%
		20.00%	277V	12.05%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.997
		0.9	277V	0.927
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	5029±355	5156
		4 step	5029±220	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥70		82
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥-40		-3
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		82
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		93
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-14%
Zonal Lumen Requirement (20°-50°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥30%		64.65%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<28		25.6
Input Voltage (V)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		120
(Goniophotometer - Section 4.2)		Non-Worst Case		277
Input Current (A)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		1.229
(Goniophotometer - Section 4.2)		Non-Worst Case		0.565
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		147.0
(Goniophotometer - Section 4.2)		Non-Worst Case		145.2

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2024/4/21	H15XLB @ 150W/5000K	L1
2	Goniophotometer Test	2024/4/21	H15XLB @ 150W/5000K	L1
3	THD and PF Test	2024/4/21	H15XLB @ 150W/5000K	L1

### Remark(If any)

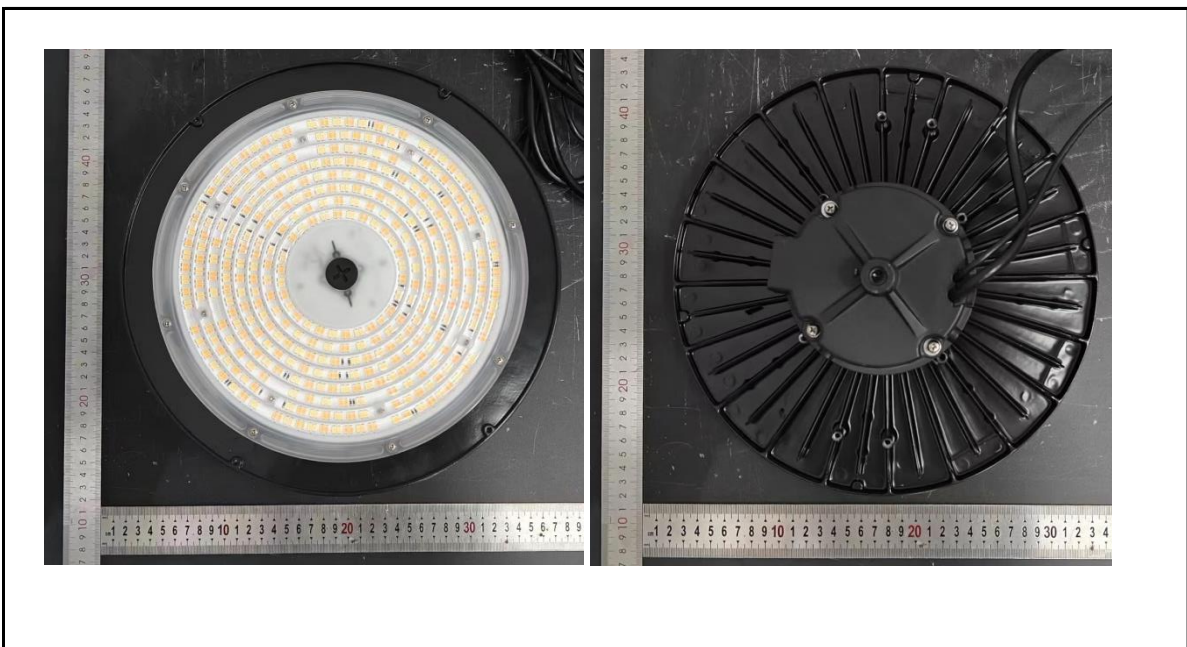
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## 3.0 Production Description

**Luminaire Description:** H15XLB @ 150W/5000K

**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.	H15XLB @ 150W/5000K	Sample ID.	L1
Operate time (Min.)	90	Stabilization time (Min.)	45
Temperature (°C)	25.3	Humidity (%RH)	56.0

#### 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

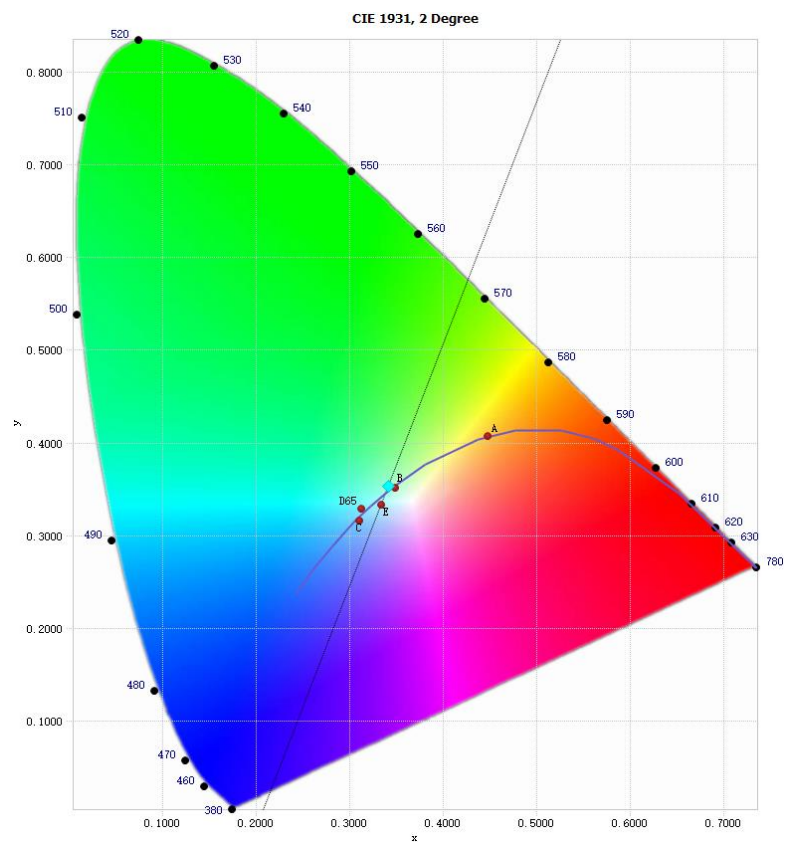
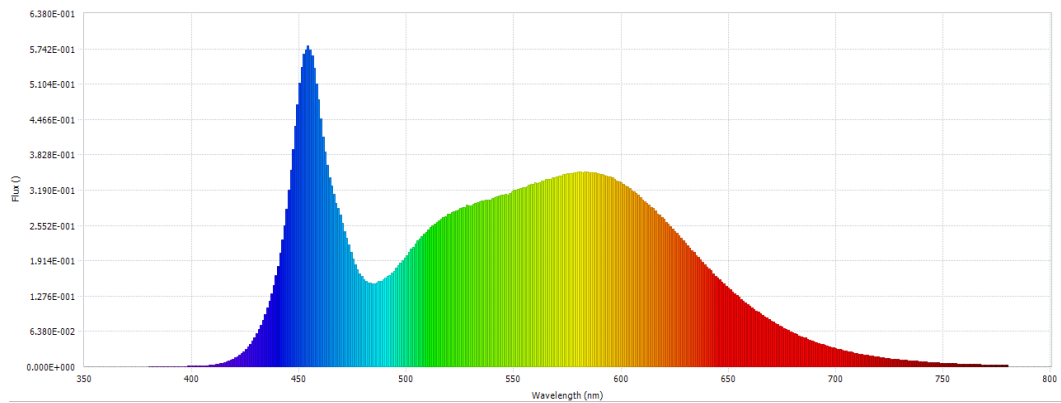
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
119.97	60	1.229	147.0	0.997
277.05	60	0.565	145.2	0.927

#### Test Result

CCT (K)	CRI	R9	Duv
5156	82	-3	0.0027

Rf	Rg	IES Rcs,h1
82	93	-14%

## 4.1 Integrating Sphere Test



## 4.1 Integrating Sphere Test

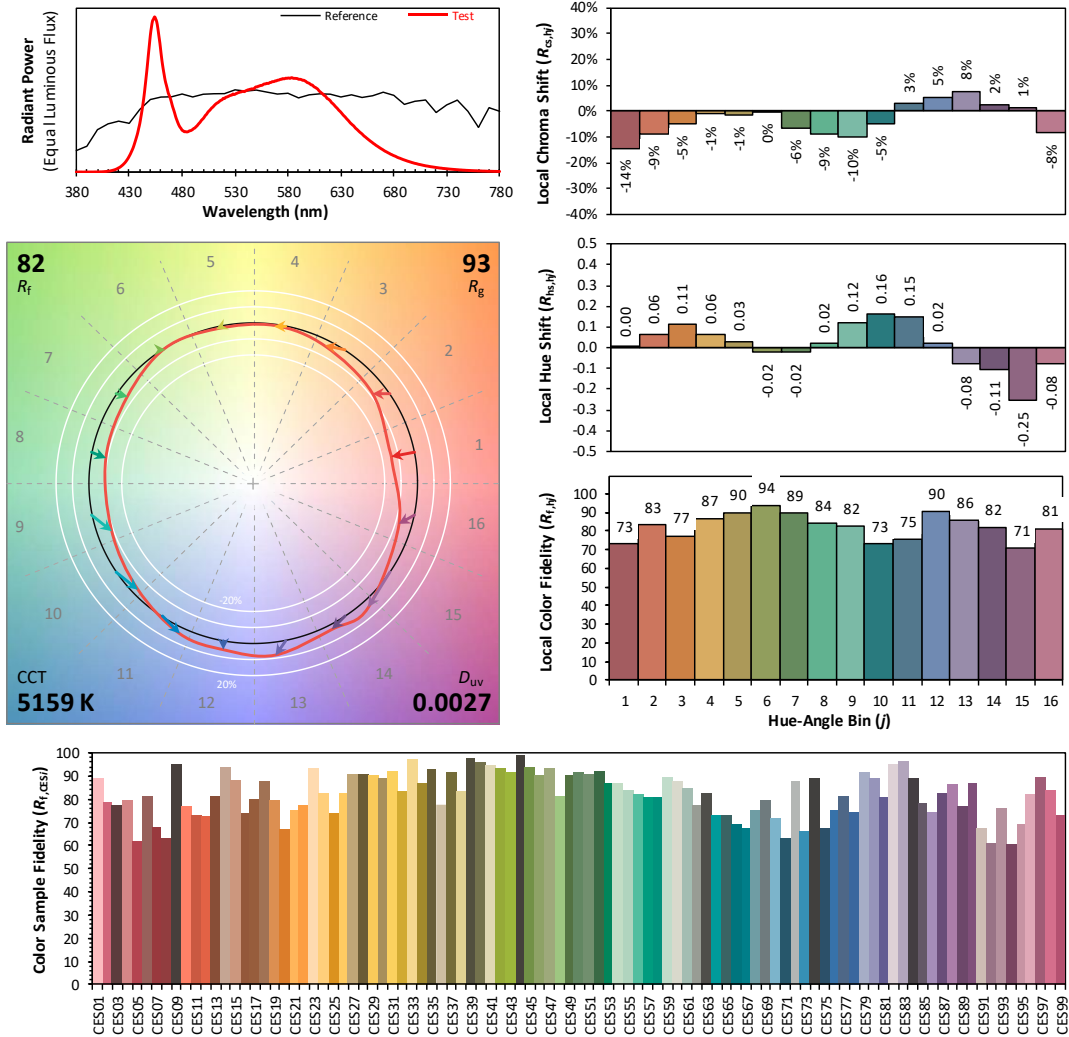
### IES TM-30-18 Color Rendition Report

Source: DLF2404111-12a

Manufacturer: RAB Lighting Inc.

Date: 2024/4/21

Model: H15XLB @ 150W/5000K



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

$x$  0.3411  
 $y$  0.3537  
 $u'$  0.2079  
 $v'$  0.4851

CIE 13.3-1995  
(CRI)  
 $R_a$  83  
 $R_g$  3



#### 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	4.33E-04	485	1.51E-01	590	3.47E-01	695	3.87E-02
385	6.00E-04	490	1.60E-01	595	3.43E-01	700	3.28E-02
390	5.04E-04	495	1.78E-01	600	3.32E-01	705	2.82E-02
395	5.56E-04	500	2.01E-01	605	3.18E-01	710	2.37E-02
400	7.97E-04	505	2.27E-01	610	3.01E-01	715	2.03E-02
405	1.52E-03	510	2.47E-01	615	2.85E-01	720	1.73E-02
410	3.34E-03	515	2.64E-01	620	2.67E-01	725	1.49E-02
415	7.51E-03	520	2.75E-01	625	2.44E-01	730	1.27E-02
420	1.60E-02	525	2.86E-01	630	2.24E-01	735	1.07E-02
425	3.13E-02	530	2.91E-01	635	2.01E-01	740	9.09E-03
430	5.95E-02	535	2.99E-01	640	1.80E-01	745	7.59E-03
435	1.06E-01	540	3.04E-01	645	1.60E-01	750	6.53E-03
440	1.82E-01	545	3.10E-01	650	1.43E-01	755	5.57E-03
445	3.19E-01	550	3.19E-01	655	1.25E-01	760	4.60E-03
450	5.12E-01	555	3.24E-01	660	1.10E-01	765	4.08E-03
455	5.72E-01	560	3.32E-01	665	9.57E-02	770	3.51E-03
460	4.47E-01	565	3.38E-01	670	8.28E-02	775	2.85E-03
465	3.26E-01	570	3.43E-01	675	7.15E-02	780	2.56E-03
470	2.60E-01	575	3.49E-01	680	6.16E-02		
475	1.95E-01	580	3.51E-01	685	5.29E-02		
480	1.57E-01	585	3.51E-01	690	4.54E-02		

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	H15XLB @ 150W/5000K	Sample ID.	L1
Operate 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 parameters were measured using a type C goniophotometer and software.

The ambient temperature shall be maintained at  $25^{\circ}\text{C} \pm 1^{\circ}\text{C}$ , 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  $\pm 0.2$  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  $0.5^{\circ}$  vertical intervals and  $10^{\circ}$  horizontal intervals.

#### Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	120.01	60	1.229	147.0	0.997
NON-WORST CASE	277.02	60	0.565	145.2	0.927

#### Test Result

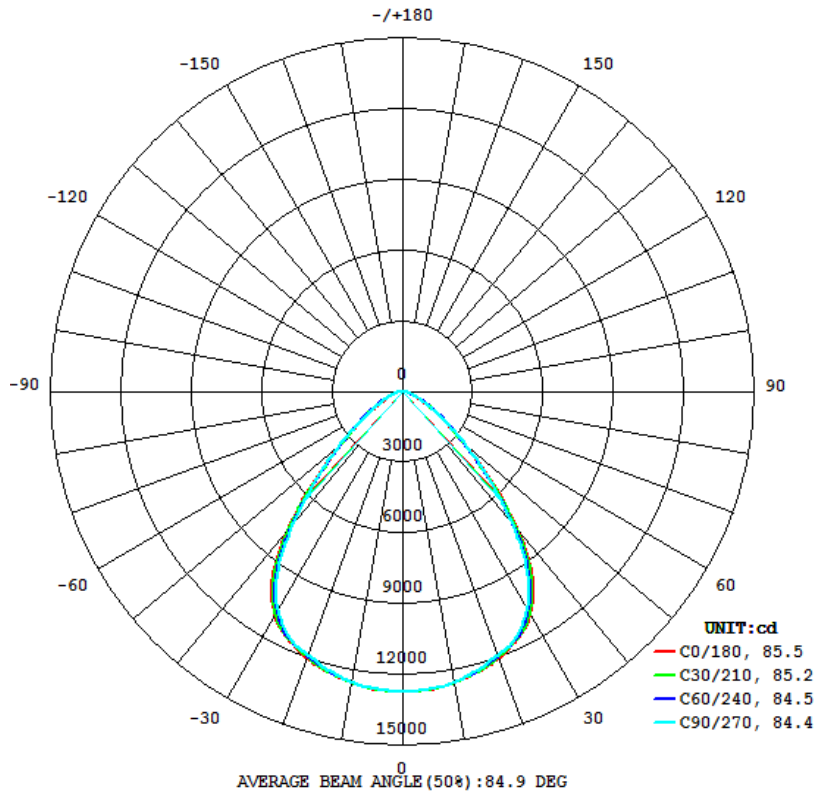
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
23552	122.9	124.2	85.5	84.4	160.2

Zonal Lumen Requirement ( $20^{\circ}$ - $50^{\circ}$ )	UGR ( $X=4H$ , $Y=8H$ , 70/50/20%)
64.65%	25.6

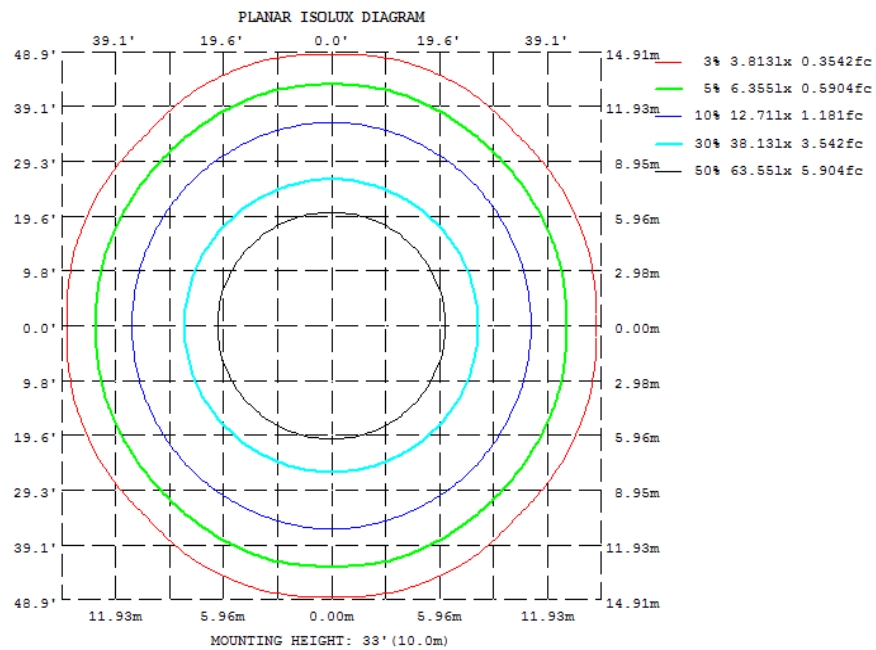


## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	1253	1252	1252	1252	1253	1252	1252	1252
20	1202	1193	1190	1193	1202	1193	1190	1193
30	1093	1081	1067	1081	1093	1081	1067	1081
40	768.0	747.6	730.3	747.6	768.0	747.6	730.3	747.6
50	344.8	346.2	354.2	346.2	344.8	346.2	354.2	346.2
60	144.1	139.1	151.4	139.1	144.1	139.1	151.4	139.1
70	59.65	59.20	63.92	59.20	59.65	59.20	63.92	59.20
80	22.35	22.76	23.86	22.76	22.35	22.76	23.86	22.76
90	0	0	0	0	0	0	0	0
100	0	0	0	0	0	0	0	0
110	0	0	0	0	0	0	0	0
120	0	0	0	0	0	0	0	0
130	0	0	0	0	0	0	0	0
140	0	0	0	0	0	0	0	0
150	0	0	0	0	0	0	0	0
160	0	0	0	0	0	0	0	0
170	0	0	0	0	0	0	0	0
180	0	0	0	0	0	0	0	0
DEG	LUMINOUS INTENSITY: *10cd							

### UGR Table - Corrected

<b>UGR Table - Corrected</b>										
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										
UGR Viewed Crosswise										
X=2H Y=2H	23.9	25.2	24.3	25.5	25.9	23.6	25.0	24.0	25.3	25.6
3H	24.6	25.8	25.0	26.1	26.5	24.3	25.5	24.7	25.8	26.2
4H	24.8	25.9	25.2	26.3	26.7	24.5	25.6	24.9	26.0	26.4
6H	25.0	26.0	25.4	26.4	26.8	24.7	25.7	25.1	26.1	26.5
8H	25.0	26.0	25.5	26.4	26.8	24.7	25.7	25.1	26.1	26.5
12H	25.1	26.0	25.5	26.4	26.8	24.7	25.7	25.2	26.0	26.5
UGR Viewed Endwise										
4H 2H	24.0	25.1	24.4	25.5	25.9	23.8	24.9	24.2	25.2	25.6
3H	24.9	25.8	25.3	26.2	26.6	24.7	25.6	25.1	26.0	26.4
4H	25.3	26.1	25.7	26.5	26.9	25.0	25.8	25.4	26.2	26.6
6H	25.5	26.2	26.0	26.7	27.1	25.2	25.9	25.7	26.4	26.8
8H	25.6	26.2	26.0	26.7	27.2	25.3	25.9	25.7	26.4	26.9
12H	25.6	26.2	26.1	26.7	27.2	25.3	25.9	25.8	26.4	26.9
Maximum UGR = 27.4										

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	1205.32	0 - 10	1205.32	5.12%
10-20	3465.72	0 - 20	4671.04	19.83%
20-30	5299.51	0 - 30	9970.55	42.33%
30-40	5852.98	0 - 40	15823.53	67.19%
40-50	4073.78	0 - 50	19897.31	84.48%
50-60	2112.59	0 - 60	22009.90	93.45%
60-70	997.87	0 - 70	23007.77	97.69%
70-80	430.88	0 - 80	23438.65	99.52%
80-90	112.99	0 - 90	23551.64	100.00%
90-100	0.00	0 - 100	23551.64	100.00%
100-110	0.00	0 - 110	23551.64	100.00%
110-120	0.00	0 - 120	23551.64	100.00%
120-130	0.00	0 - 130	23551.64	100.00%
130-140	0.00	0 - 140	23551.64	100.00%
140-150	0.00	0 - 150	23551.64	100.00%
150-160	0.00	0 - 160	23551.64	100.00%
160-170	0.00	0 - 170	23551.64	100.00%
170-180	0.00	0 - 180	23551.64	100.00%

## 4.2 Goniophotometer Test

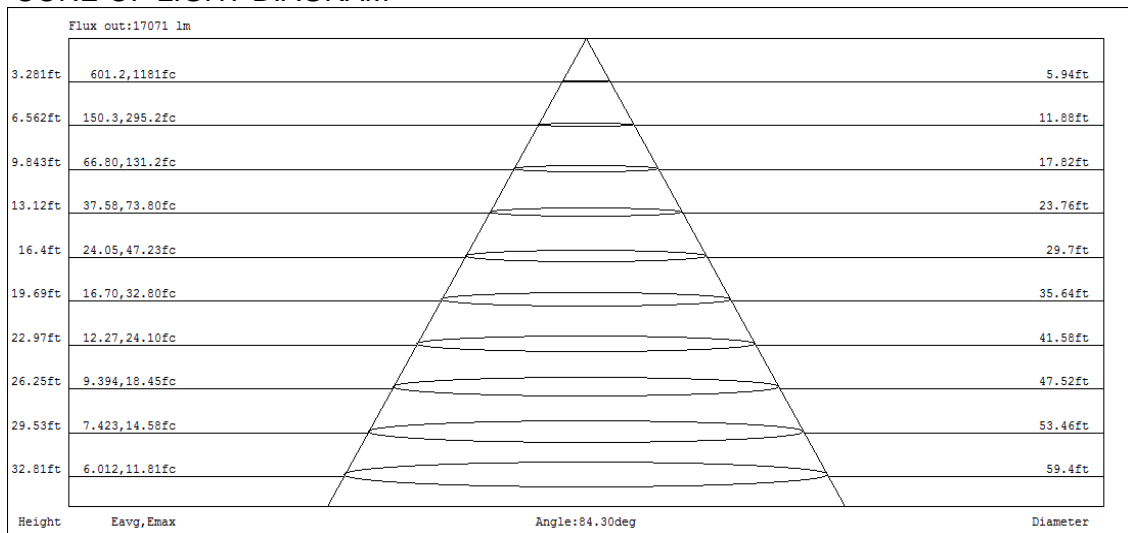
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### Coefficients Of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 0.20

RC	80				70				50			30			10			0
R/W	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	111	108	105	102	109	106	103	100	102	99	97	98	96	94	94	93	91	89
2	104	97	92	88	101	96	91	87	92	88	85	89	86	83	86	83	81	79
3	96	88	81	76	94	87	80	76	84	79	74	81	77	73	79	75	72	70
4	90	80	73	67	88	79	72	67	76	71	66	74	69	65	72	68	64	62
5	84	73	65	60	82	72	65	59	70	64	59	68	63	58	66	62	58	56
6	78	67	59	54	76	66	59	53	64	58	53	63	57	53	61	56	52	50
7	73	61	54	48	71	60	53	48	59	53	48	58	52	48	56	51	47	46
8	68	56	49	44	67	56	49	44	55	48	44	53	48	43	52	47	43	41
9	64	52	45	40	63	52	45	40	51	44	40	50	44	40	49	43	39	38
10	60	49	41	37	59	48	41	37	47	41	37	46	40	36	45	40	36	35

### CONE OF LIGHT DIAGRAM



## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	H15XLB @ 150W/5000K	Sample ID.	L1
Temperature (°C)	25.3	Humidity (%RH)	56.0

#### 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
119.97	60	1.229	147.0	0.997	2.58%
277.05	60	0.565	145.2	0.927	12.05%

## 5.0 Equipment Information

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