

# 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

**DLF2404111-13a**

## Test Date

**2024/4/21**

## Issue Date

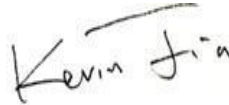
**2024/4/23**

## 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		27899
Minimum Luminaire Efficacy (lm/W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Standard 120	Premium 135	142.7
Power (Input Wattage) (W) (Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		195.5
Total Harmonic Distortion (A%) (THD & PF - section 4.3)	ANSI C82.77:2014	20.00%	120V	2.22%
		20.00%	277V	8.72%
Power Factor (THD & PF - section 4.3)	ANSI C82.77:2014	0.9	120V	0.998
		0.9	277V	0.953
Allowable CCTs* (K) (Integrating Sphere - Section 4.1)	IES LM-79-2008	7 step	3045±175	3052
		4 step	3045±100	
Minimum CRI (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥70		81
Minimum R9 (Integrating Sphere - Section 4.1)	IES LM-79-2008 CIE 13.3-1995	≥-40		2
Minimum Rf (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥70		83
Minimum Rg (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	≥89		95
Minimum IES Rcs,h1 (Integrating Sphere - Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-12%
Zonal Lumen Requirement (20°-50°) (Goniophotometer - Section 4.2)	IES LM-79-2008	≥30%		64.12%
Corrected UGR (X=4H, Y=8H, 70/50/20%) (Goniophotometer - Section 4.2)	CIE 190-2010	<28		26.3
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		1.632
(Goniophotometer - Section 4.2)		Non-Worst Case		0.724
Power (Input Wattage - W)				
(Goniophotometer - Section 4.2)	IES LM-79-2008	Worst Case		195.5
(Goniophotometer - Section 4.2)		Non-Worst Case		191.1

## 2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2024/4/21	H15XLB @ 200W/3000K	M1
2	Goniophotometer Test	2024/4/21	H15XLB @ 200W/3000K	M1
3	THD and PF Test	2024/4/21	H15XLB @ 200W/3000K	M1

### Remark(If any)

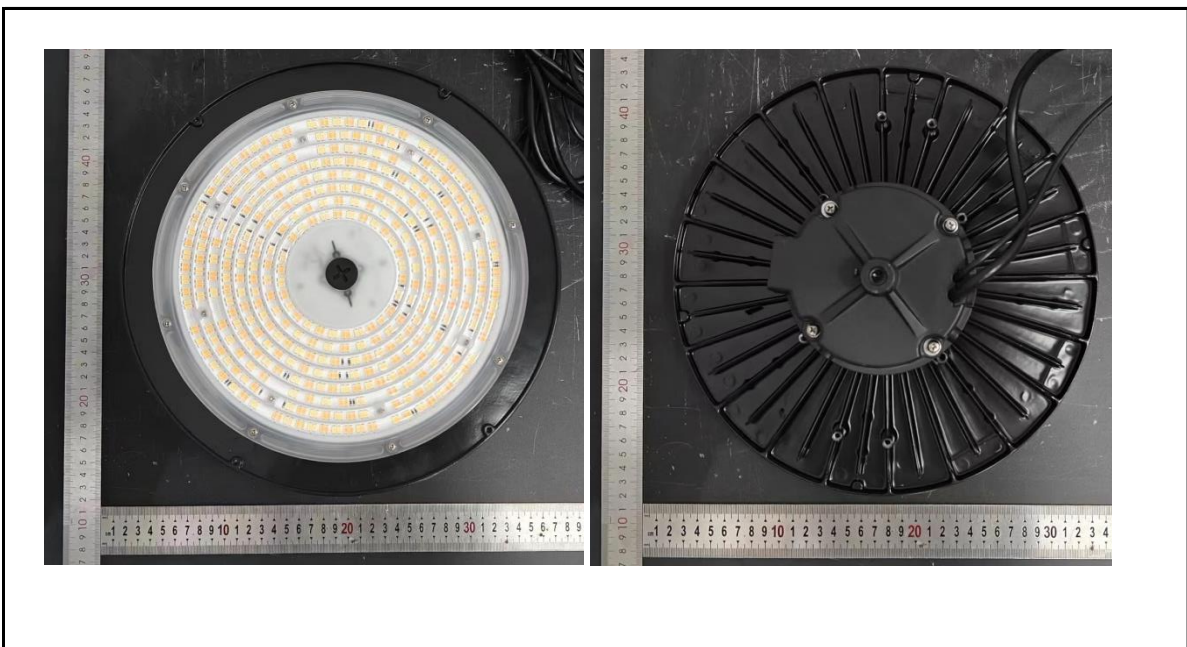
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## 3.0 Production Description

**Luminaire Description:** H15XLB @ 200W/3000K

**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 @ 200W/3000K	Sample ID.	M1
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

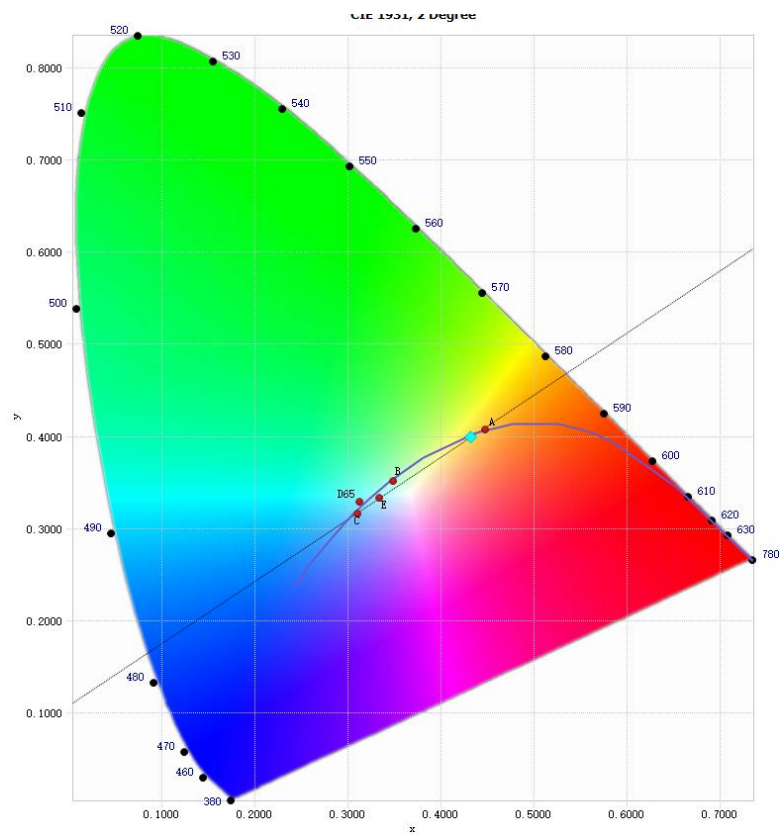
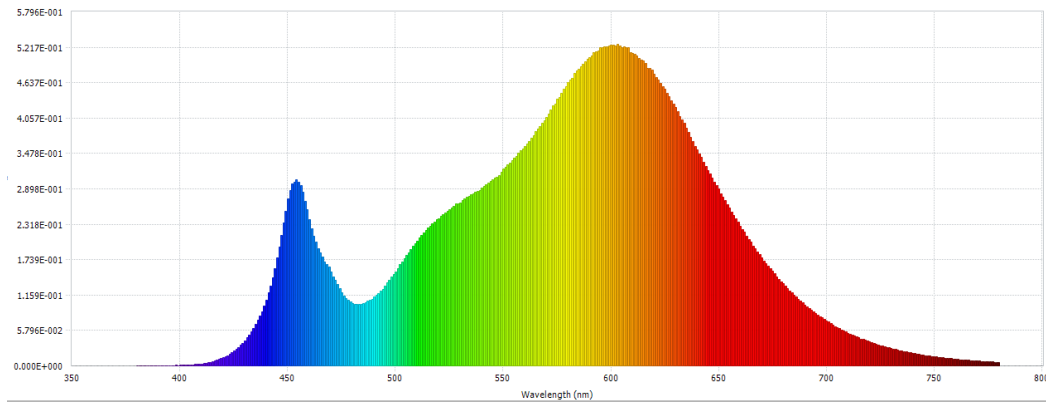
Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
119.98	60	1.634	195.6	0.998
277.06	60	0.724	191.2	0.953

#### Test Result

CCT (K)	CRI	R9	Duv
3052	81	2	-0.0011

Rf	Rg	IES Rcs,h1
83	95	-12%

## 4.1 Integrating Sphere Test



## 4.1 Integrating Sphere Test

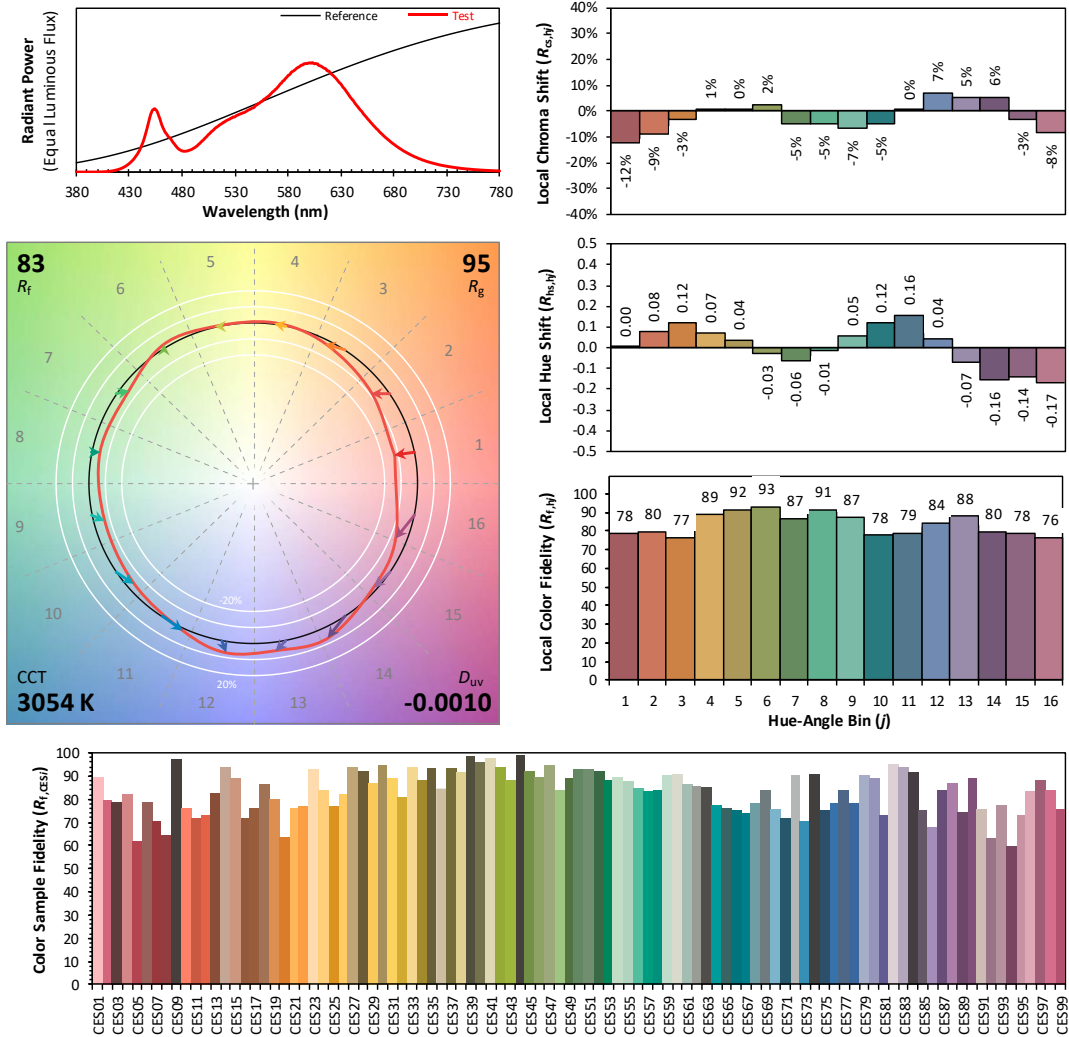
### IES TM-30-18 Color Rendition Report

Source: DLF2404111-13a

Manufacturer: RAB Lighting Inc.

Date: 2024/4/21

Model: H15XLB @ 200W/3000K



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

$x$  0.4317  
 $y$  0.3996  
 $u'$  0.2491  
 $v'$  0.5188

CIE 13.3-1995  
(CRI)  
 $R_a$  82  
 $R_g$  6



#### 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	4.56E-04	485	1.02E-01	590	5.05E-01	695	8.56E-02
385	4.37E-04	490	1.12E-01	595	5.21E-01	700	7.33E-02
390	5.37E-04	495	1.31E-01	600	5.25E-01	705	6.33E-02
395	4.74E-04	500	1.54E-01	605	5.21E-01	710	5.34E-02
400	7.56E-04	505	1.81E-01	610	5.12E-01	715	4.58E-02
405	1.54E-03	510	2.05E-01	615	4.99E-01	720	3.90E-02
410	3.23E-03	515	2.25E-01	620	4.78E-01	725	3.33E-02
415	6.90E-03	520	2.41E-01	625	4.53E-01	730	2.85E-02
420	1.34E-02	525	2.55E-01	630	4.24E-01	735	2.42E-02
425	2.41E-02	530	2.66E-01	635	3.89E-01	740	2.05E-02
430	4.13E-02	535	2.80E-01	640	3.54E-01	745	1.73E-02
435	6.77E-02	540	2.91E-01	645	3.20E-01	750	1.50E-02
440	1.07E-01	545	3.05E-01	650	2.90E-01	755	1.27E-02
445	1.76E-01	550	3.22E-01	655	2.58E-01	760	1.08E-02
450	2.73E-01	555	3.40E-01	660	2.29E-01	765	9.17E-03
455	3.00E-01	560	3.60E-01	665	2.03E-01	770	7.85E-03
460	2.39E-01	565	3.83E-01	670	1.77E-01	775	6.86E-03
465	1.86E-01	570	4.07E-01	675	1.55E-01	780	5.71E-03
470	1.54E-01	575	4.37E-01	680	1.34E-01		
475	1.20E-01	580	4.64E-01	685	1.16E-01		
480	1.02E-01	585	4.86E-01	690	9.96E-02		

## 4.0 LM-79 Measurement and Test Results

### 4.2 Goniophotometer Test

Model No.	H15XLB @ 200W/3000K	Sample ID.	M1
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	120.05	60	1.632	195.5	0.998
NON-WORST CASE	276.97	60	0.724	191.1	0.953

#### Test Result

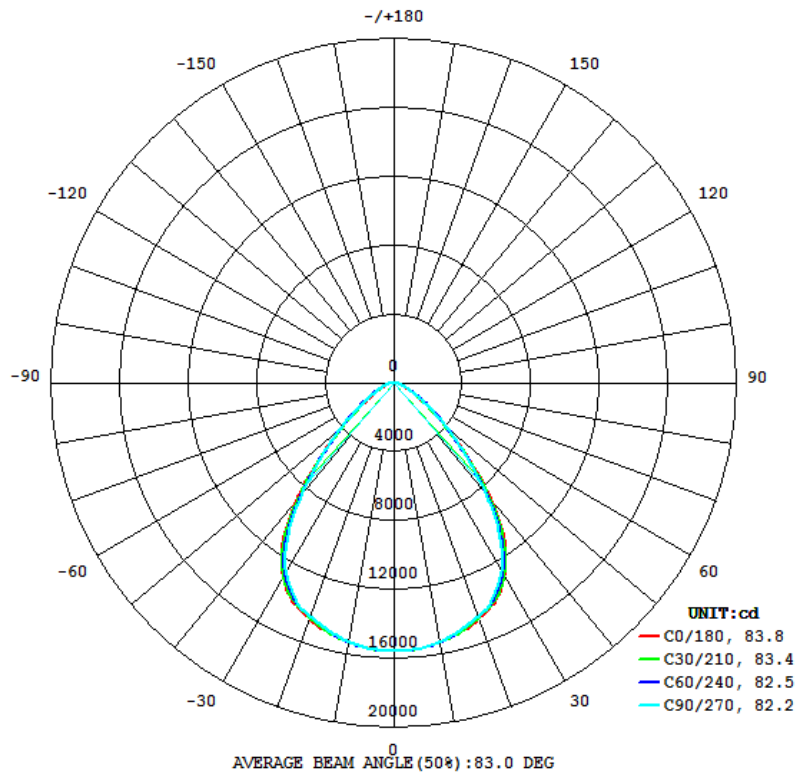
Flux (lm)	Field Angle(10%)		Beam Angle(50%)		Luminous Efficacy (lm/W)
	C0-180	C90-270	C0-180	C90-270	
27899	121.0	122.5	83.8	82.2	142.7

Zonal Lumen Requirement ( $20^{\circ}$ - $50^{\circ}$ )	UGR ( $X=4H$ , $Y=8H$ , 70/50/20%)
64.12%	26.3

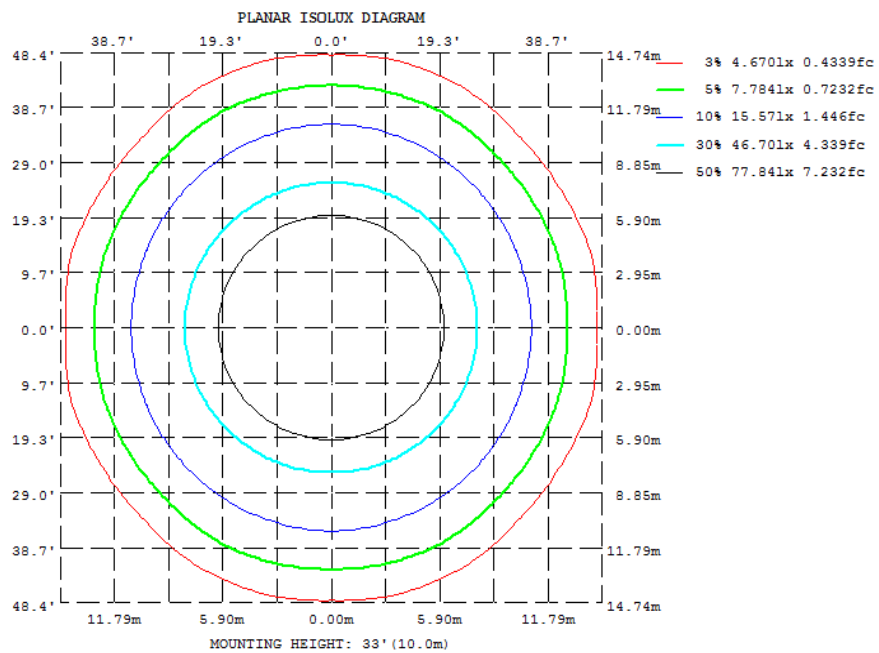


## 4.2 Goniophotometer Test

### Light Distrubtion Curve



### Isolux Plot



## 4.2 Goniophotometer Test

### Zonal Lumen Summary

γ	C0	C45	C90	C135	C180	C225	C270	C315
10	1528	1530	1528	1530	1528	1530	1528	1530
20	1454	1444	1440	1444	1454	1444	1440	1444
30	1297	1280	1264	1280	1297	1280	1264	1280
40	891.0	860.2	834.2	860.2	891.0	860.2	834.2	860.2
50	403.2	400.9	411.3	400.9	403.2	400.9	411.3	400.9
60	162.9	170.7	173.7	170.7	162.9	170.7	173.7	170.7
70	70.55	72.76	74.95	72.76	70.55	72.76	74.95	72.76
80	27.60	28.45	29.53	28.45	27.60	28.45	29.53	28.45
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	24.5	25.8	24.8	26.1	26.4	24.3	25.6	24.7	25.9	26.3
3H	25.2	26.4	25.6	26.7	27.1	25.0	26.2	25.4	26.5	26.9
4H	25.5	26.6	25.9	26.9	27.3	25.2	26.3	25.6	26.7	27.1
6H	25.6	26.7	26.1	27.0	27.4	25.4	26.4	25.8	26.8	27.2
8H	25.7	26.7	26.1	27.1	27.5	25.5	26.4	25.9	26.8	27.2
12H	25.7	26.6	26.2	27.0	27.5	25.5	26.4	25.9	26.8	27.2
UGR Viewed Endwise										
4H 2H	24.6	25.7	25.0	26.1	26.5	24.5	25.6	24.9	25.9	26.3
3H	25.6	26.5	26.0	26.9	27.3	25.4	26.3	25.8	26.7	27.1
4H	25.9	26.7	26.4	27.1	27.6	25.7	26.5	26.1	26.9	27.4
6H	26.2	26.9	26.7	27.3	27.8	25.9	26.6	26.4	27.1	27.6
8H	26.3	26.9	26.8	27.4	27.9	26.0	26.7	26.5	27.1	27.6
12H	26.3	26.9	26.8	27.4	27.9	26.1	26.7	26.6	27.1	27.6
UGR Viewed Endwise										
8H 4H	26.0	26.6	26.5	27.1	27.6	25.8	26.4	26.3	26.9	27.3
6H	26.4	26.9	26.9	27.4	27.9	26.1	26.6	26.6	27.1	27.6
8H	26.5	27.0	27.0	27.5	28.0	26.2	26.7	26.7	27.2	27.7
12H	26.6	27.0	27.1	27.5	28.1	26.3	26.8	26.8	27.3	27.8
UGR Viewed Endwise										
12H 4H	26.0	26.5	26.5	27.0	27.5	25.8	26.3	26.2	26.8	27.3
6H	26.3	26.8	26.9	27.3	27.8	26.1	26.6	26.6	27.1	27.6
8H	26.5	26.9	27.0	27.4	28.0	26.3	26.7	26.8	27.2	27.8
Maximum UGR = 28.1										

## 4.2 Goniophotometer Test

### ZONAL LUMEN SUMMARY

	Zonal (lm)		Total (lm)	Percent
0-10	1473.67	0 - 10	1473.67	5.28%
10-20	4212.24	0 - 20	5685.91	20.38%
20-30	6358.17	0 - 30	12044.08	43.17%
30-40	6832.81	0 - 40	18876.89	67.66%
40-50	4698.01	0 - 50	23574.90	84.50%
50-60	2475.45	0 - 60	26050.35	93.37%
60-70	1182.46	0 - 70	27232.81	97.61%
70-80	523.96	0 - 80	27756.77	99.49%
80-90	142.27	0 - 90	27899.04	100.00%
90-100	0.00	0 - 100	27899.04	100.00%
100-110	0.00	0 - 110	27899.04	100.00%
110-120	0.00	0 - 120	27899.04	100.00%
120-130	0.00	0 - 130	27899.04	100.00%
130-140	0.00	0 - 140	27899.04	100.00%
140-150	0.00	0 - 150	27899.04	100.00%
150-160	0.00	0 - 160	27899.04	100.00%
160-170	0.00	0 - 170	27899.04	100.00%
170-180	0.00	0 - 180	27899.04	100.00%

## 4.2 Goniophotometer Test

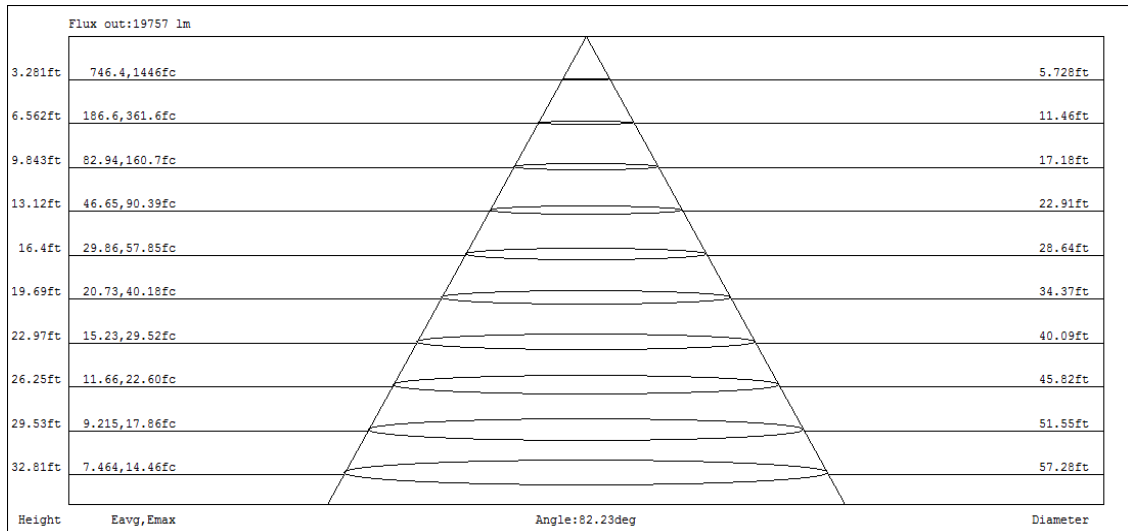
### COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

#### 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	97	88	82	76	94	87	81	76	84	79	75	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	63
5	84	73	66	60	82	72	65	60	70	64	59	68	63	59	66	62	58	56
6	78	67	59	54	76	66	59	54	64	58	53	63	57	53	61	56	52	51
7	73	61	54	49	72	61	54	49	59	53	48	58	52	48	57	52	48	46
8	69	57	49	44	67	56	49	44	55	48	44	54	48	44	53	47	43	42
9	64	53	45	40	63	52	45	40	51	45	40	50	44	40	49	44	40	38
10	61	49	42	37	60	48	42	37	47	41	37	47	41	37	46	40	37	35

### CONE OF LIGHT DIAGRAM



## 4.0 LM-79 Measurement and Test Results

### 4.3 THD and PF Test

Model No.	H15XLB @ 200W/3000K	Sample ID.	M1
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
119.98	60	1.634	195.6	0.998	2.22%
277.06	60	0.724	191.2	0.953	8.72%

## 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-derectional	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\*\*\*\*\*