

Photometric Test Report

Relevant Standards

- ☒ IES LM-79-2008
- ☒ ANSI C82.77-2017

Prepared For

RAB Lighting Inc.

Prepared By

Dongguan New Testing Centre Co., Ltd.

Prepare by:

Alan Wang

Engineer: Alan Wang
Date: 2023-06-14

Review by:

Vincent Yuan

Technical Lead: Vincent Yuan
Issue Date: 2023-06-14
Revised Date: N/A

1.0 Test Summary

DLC Technical Requirements V5.1

Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires				
Requirement Category	Test Method	Requirements		Test Value
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		2728
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		141.3
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		2652
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	137.4
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		19.3
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	2.66
			277V	15.26
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.987
			277V	0.790
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3045±175	3084
		4 steps	3045±100	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		73.7
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		-28
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		77
Minimum Rg (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥89		95
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-16%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		4.7%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		277.0
(Goniophotometer – Section 4.2)		Non-Worst Case		120.0
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.088
(Goniophotometer – Section 4.2)		Non-Worst Case		0.160
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		19.3
(Goniophotometer – Section 4.2)		Non-Worst Case		18.9

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-06-13	W34S @ 17W / 3000K	230612003-S1
2	Goniophotometer Test	2023-06-13	W34S @ 17W / 3000K	230612003-S1
3	THD and PF Test	2023-06-13	W34S @ 17W / 3000K	230612003-S1

Remark (If any)

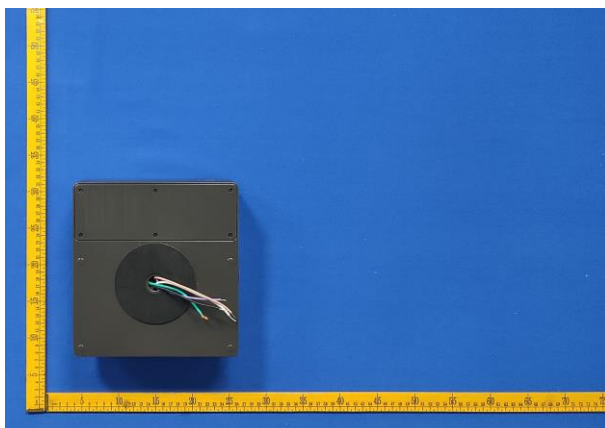
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

3.0 Product Description

Luminaire Description: Model No. W34S @ 17W / 3000K, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 120-277Vac, 50/60Hz

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	W34S @ 17W / 3000K	Sample ID	230612003-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

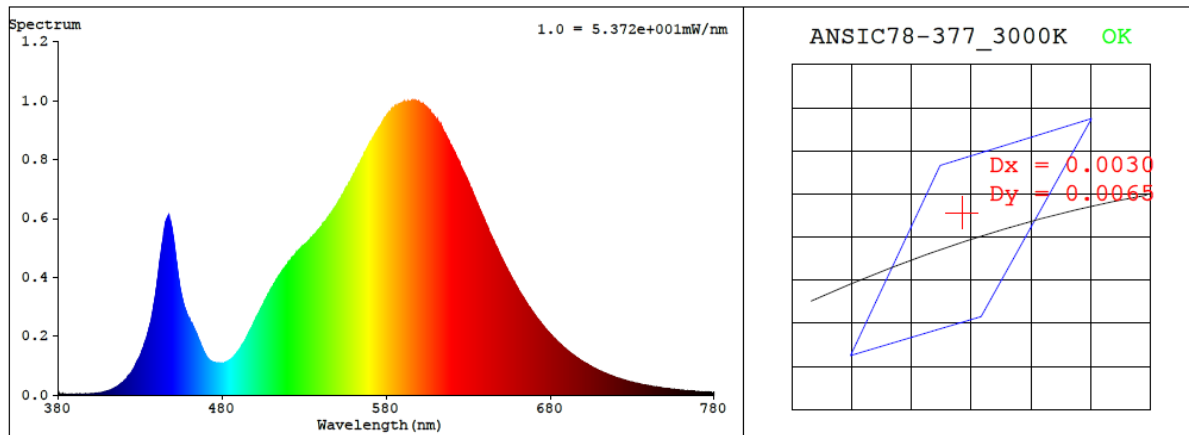
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere.</p> <p>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.</p> <p>The sample was measured using 4π 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 780nm.</p>

Test Result

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.0	60	0.160	18.9	0.987
277.0	60	0.088	19.3	0.790

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3084	73.7	-28	0.0022	77	95	-16%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.4341$ $y = 0.4085$ / $u' = 0.2469$ $v' = 0.5227$ ($duv=2.17e-03$)

CCT= 3084K Prcp WL: Ld=581.7nm Purity=52.9%

Peak WL: $\lambda_p=597\text{nm}$ FWHM: $=119.4\text{nm}$ Ratio: $R=20.9\%$ $G=77.3\%$ $B=1.9\%$

Render Index: Ra = 73.7 AvgR = 64.9 TM30:Rf=77 Rg=94

EEl: 0.09895 A++ Highest

R1 =70 R2 =83 R3 =94 R4 =71 R5 =69 R6 =76 R7 =80

R8 =47 R9 =-28 R10=60 R11=67 R12=53 R13=72 R14=97 R15=62

4.1 Integrating Sphere Test

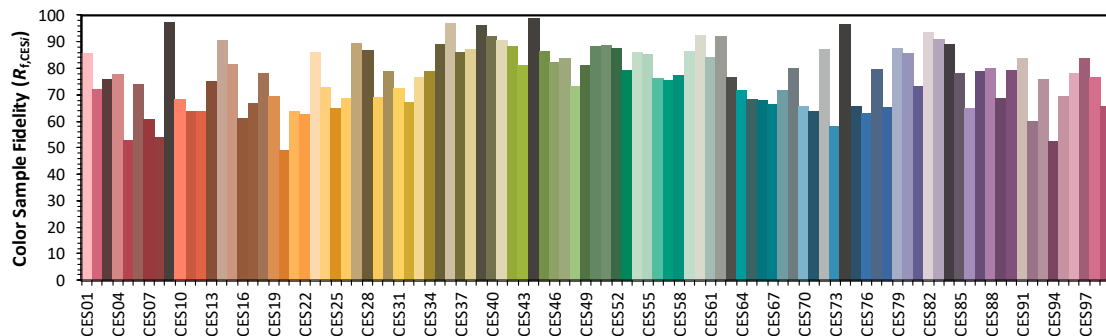
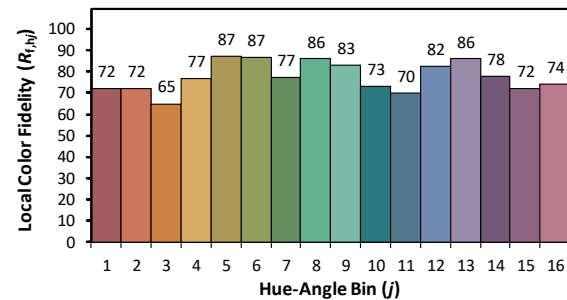
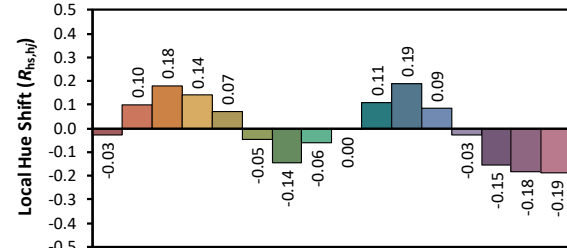
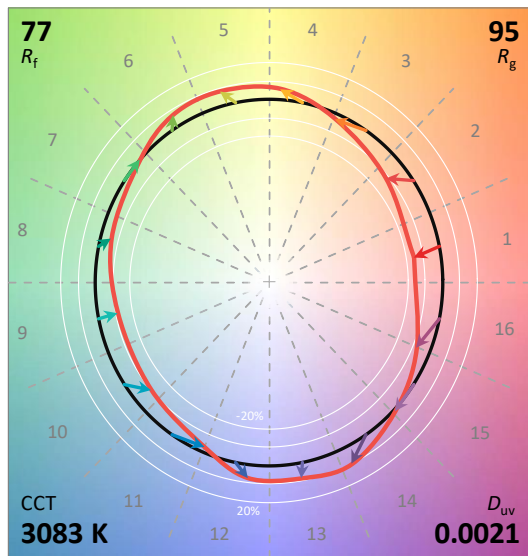
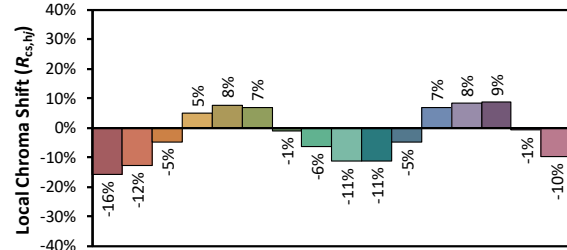
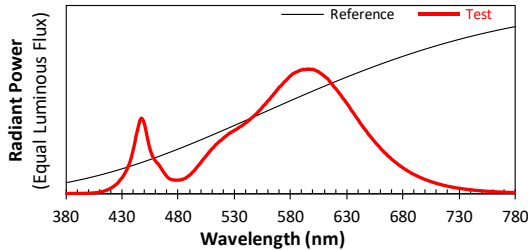
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/6/14

Model: W34S @ 17W / 3000K



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

x 0.4341
 y 0.4084
 u' 0.2469
 v' 0.5226

CIE 13.3-1995
(CRI)

R_a 74
 R_g -28

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

4.1 Integrating Sphere Test

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	7.00E-07	447	6.05E-04	514	3.99E-04	581	9.53E-04	648	4.95E-04	715	7.09E-05
381	1.70E-06	448	5.95E-04	515	4.06E-04	582	9.61E-04	649	4.80E-04	716	6.84E-05
382	0.00E+00	449	5.78E-04	516	4.15E-04	583	9.65E-04	650	4.70E-04	717	6.64E-05
383	3.40E-06	450	5.45E-04	517	4.24E-04	584	9.71E-04	651	4.59E-04	718	6.46E-05
384	2.20E-06	451	5.05E-04	518	4.28E-04	585	9.74E-04	652	4.48E-04	719	6.21E-05
385	2.80E-06	452	4.60E-04	519	4.37E-04	586	9.78E-04	653	4.36E-04	720	5.99E-05
386	2.00E-06	453	4.19E-04	520	4.45E-04	587	9.82E-04	654	4.26E-04	721	5.81E-05
387	2.30E-06	454	3.79E-04	521	4.53E-04	588	9.87E-04	655	4.15E-04	722	5.66E-05
388	3.40E-06	455	3.47E-04	522	4.59E-04	589	9.90E-04	656	4.04E-04	723	5.48E-05
389	2.40E-06	456	3.21E-04	523	4.68E-04	590	9.91E-04	657	3.94E-04	724	5.32E-05
390	2.30E-06	457	2.99E-04	524	4.73E-04	591	9.97E-04	658	3.85E-04	725	5.13E-05
391	3.00E-06	458	2.84E-04	525	4.83E-04	592	9.93E-04	659	3.74E-04	726	4.96E-05
392	1.70E-06	459	2.68E-04	526	4.86E-04	593	9.95E-04	660	3.64E-04	727	4.81E-05
393	3.40E-06	460	2.58E-04	527	4.93E-04	594	9.98E-04	661	3.54E-04	728	4.63E-05
394	3.10E-06	461	2.46E-04	528	4.97E-04	595	9.95E-04	662	3.45E-04	729	4.53E-05
395	2.00E-06	462	2.39E-04	529	5.03E-04	596	9.99E-04	663	3.35E-04	730	4.44E-05
396	3.30E-06	463	2.25E-04	530	5.08E-04	597	9.96E-04	664	3.27E-04	731	4.24E-05
397	3.90E-06	464	2.12E-04	531	5.13E-04	598	9.97E-04	665	3.19E-04	732	4.12E-05
398	3.70E-06	465	1.97E-04	532	5.18E-04	599	9.96E-04	666	3.10E-04	733	3.99E-05
399	4.00E-06	466	1.84E-04	533	5.24E-04	600	9.97E-04	667	3.00E-04	734	3.84E-05
400	5.10E-06	467	1.70E-04	534	5.32E-04	601	9.90E-04	668	2.94E-04	735	3.75E-05
401	5.20E-06	468	1.58E-04	535	5.37E-04	602	9.89E-04	669	2.85E-04	736	3.62E-05
402	5.20E-06	469	1.46E-04	536	5.42E-04	603	9.84E-04	670	2.77E-04	737	3.51E-05
403	5.50E-06	470	1.36E-04	537	5.48E-04	604	9.79E-04	671	2.69E-04	738	3.41E-05
404	6.40E-06	471	1.26E-04	538	5.55E-04	605	9.76E-04	672	2.61E-04	739	3.27E-05
405	7.20E-06	472	1.21E-04	539	5.61E-04	606	9.67E-04	673	2.55E-04	740	3.21E-05
406	8.00E-06	473	1.16E-04	540	5.69E-04	607	9.63E-04	674	2.49E-04	741	3.12E-05
407	9.30E-06	474	1.13E-04	541	5.74E-04	608	9.55E-04	675	2.40E-04	742	2.99E-05
408	1.05E-05	475	1.11E-04	542	5.84E-04	609	9.49E-04	676	2.34E-04	743	2.90E-05
409	1.22E-05	476	1.10E-04	543	5.88E-04	610	9.41E-04	677	2.26E-04	744	2.78E-05
410	1.38E-05	477	1.09E-04	544	5.98E-04	611	9.34E-04	678	2.20E-04	745	2.74E-05
411	1.57E-05	478	1.09E-04	545	6.06E-04	612	9.26E-04	679	2.14E-04	746	2.64E-05
412	1.69E-05	479	1.09E-04	546	6.13E-04	613	9.21E-04	680	2.07E-04	747	2.53E-05
413	1.92E-05	480	1.10E-04	547	6.21E-04	614	9.09E-04	681	2.01E-04	748	2.49E-05
414	2.25E-05	481	1.10E-04	548	6.30E-04	615	8.95E-04	682	1.95E-04	749	2.41E-05
415	2.53E-05	482	1.12E-04	549	6.36E-04	616	8.88E-04	683	1.91E-04	750	2.32E-05
416	2.88E-05	483	1.13E-04	550	6.47E-04	617	8.76E-04	684	1.84E-04	751	2.24E-05
417	3.29E-05	484	1.17E-04	551	6.55E-04	618	8.63E-04	685	1.79E-04	752	2.19E-05
418	3.70E-05	485	1.21E-04	552	6.66E-04	619	8.51E-04	686	1.74E-04	753	2.11E-05
419	4.15E-05	486	1.24E-04	553	6.74E-04	620	8.44E-04	687	1.68E-04	754	2.02E-05
420	4.62E-05	487	1.30E-04	554	6.83E-04	621	8.32E-04	688	1.63E-04	755	2.01E-05
421	5.18E-05	488	1.37E-04	555	6.97E-04	622	8.21E-04	689	1.59E-04	756	1.95E-05
422	5.79E-05	489	1.43E-04	556	7.06E-04	623	8.08E-04	690	1.54E-04	757	1.85E-05
423	6.52E-05	490	1.50E-04	557	7.14E-04	624	7.97E-04	691	1.49E-04	758	1.79E-05
424	7.08E-05	491	1.57E-04	558	7.23E-04	625	7.86E-04	692	1.45E-04	759	1.75E-05
425	7.82E-05	492	1.68E-04	559	7.36E-04	626	7.70E-04	693	1.41E-04	760	1.69E-05
426	8.74E-05	493	1.76E-04	560	7.47E-04	627	7.60E-04	694	1.36E-04	761	1.63E-05
427	9.85E-05	494	1.85E-04	561	7.54E-04	628	7.49E-04	695	1.32E-04	762	1.56E-05
428	1.11E-04	495	1.96E-04	562	7.67E-04	629	7.37E-04	696	1.28E-04	763	1.56E-05
429	1.21E-04	496	2.08E-04	563	7.79E-04	630	7.24E-04	697	1.25E-04	764	1.48E-05
430	1.32E-04	497	2.19E-04	564	7.86E-04	631	7.11E-04	698	1.20E-04	765	1.45E-05
431	1.46E-04	498	2.29E-04	565	8.00E-04	632	6.99E-04	699	1.17E-04	766	1.43E-05
432	1.60E-04	499	2.40E-04	566	8.08E-04	633	6.84E-04	700	1.13E-04	767	1.36E-05
433	1.77E-04	500	2.52E-04	567	8.22E-04	634	6.69E-04	701	1.10E-04	768	1.33E-05
434	1.94E-04	501	2.64E-04	568	8.32E-04	635	6.57E-04	702	1.07E-04	769	1.27E-05
435	2.15E-04	502	2.76E-04	569	8.43E-04	636	6.46E-04	703	1.04E-04	770	1.23E-05
436	2.36E-04	503	2.85E-04	570	8.55E-04	637	6.31E-04	704	1.00E-04	771	1.20E-05
437	2.62E-04	504	2.97E-04	571	8.62E-04	638	6.19E-04	705	9.71E-05	772	1.16E-05
438	2.92E-04	505	3.06E-04	572	8.71E-04	639	6.06E-04	706	9.39E-05	773	1.13E-05
439	3.26E-04	506	3.19E-04	573	8.81E-04	640	5.94E-04	707	9.13E-05	774	1.11E-05
440	3.64E-04	507	3.30E-04	574	8.92E-04	641	5.79E-04	708	8.81E-05	775	1.05E-05
441	4.05E-04	508	3.42E-04	575	9.02E-04	642	5.65E-04	709	8.56E-05	776	1.03E-05
442	4.54E-04	509	3.51E-04	576	9.09E-04	643	5.52E-04	710	8.26E-05	777	1.02E-05
443	4.93E-04	510	3.61E-04	577	9.18E-04	644	5.41E-04	711	8.07E-05	778	9.80E-06
444	5.29E-04	511	3.69E-04	578	9.28E-04	645	5.29E-04	712	7.73E-05	779	9.50E-06
445	5.67E-04	512	3.80E-04	579	9.39E-04	646	5.18E-04	713	7.57E-05	780	9.50E-06
446	5.94E-04	513	3.90E-04	580	9.45E-04	647	5.05E-04	714	7.28E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	W34S @ 17W / 3000K	Sample ID	230612003-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	25.0	Humidity (%RH)	40.1

Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using a type C goniophotometer and software.</p> <p>The ambient temperature shall be maintained at $25 \pm 1^\circ\text{C}$, measured at a point not more than 1 m from the sample and at the same height as the sample.</p> <p>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.</p> <p>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 1.0° vertical intervals and 15° horizontal intervals.</p>

Test Conditions

Condition	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
WORST CASE	277.0	60	0.088	19.3	0.790
NON-WORST CASE	120.0	60	0.160	18.9	0.987

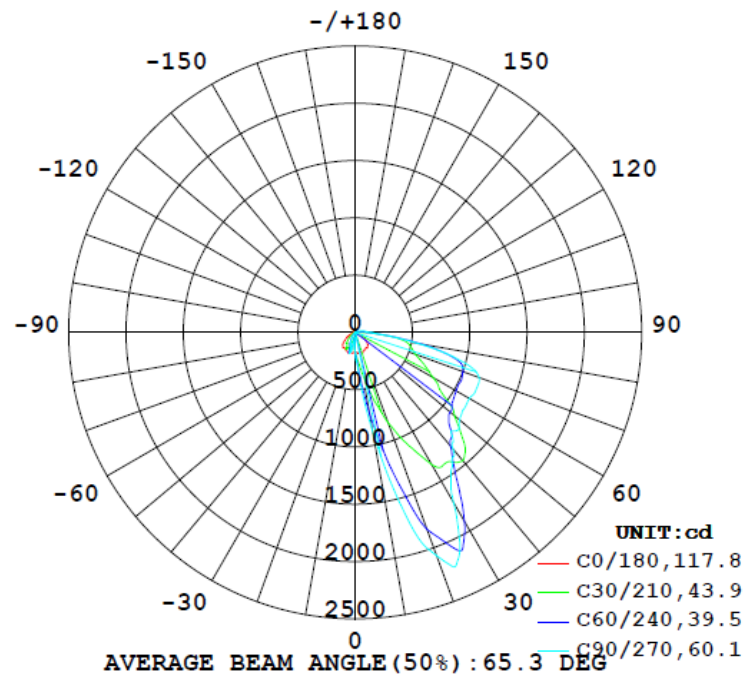
Test Result

Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement (80°-90°)	BUG
		C0-180	C90-270	C0-180	C90-270			
0°-180° zones	2728	83.9	132.0	55.6	80.2	141.3	4.5%	B0-U2-G2
0°-90° zones	2652	83.9	132.0	55.6	80.2	137.4	4.7%	B0-U2-G2

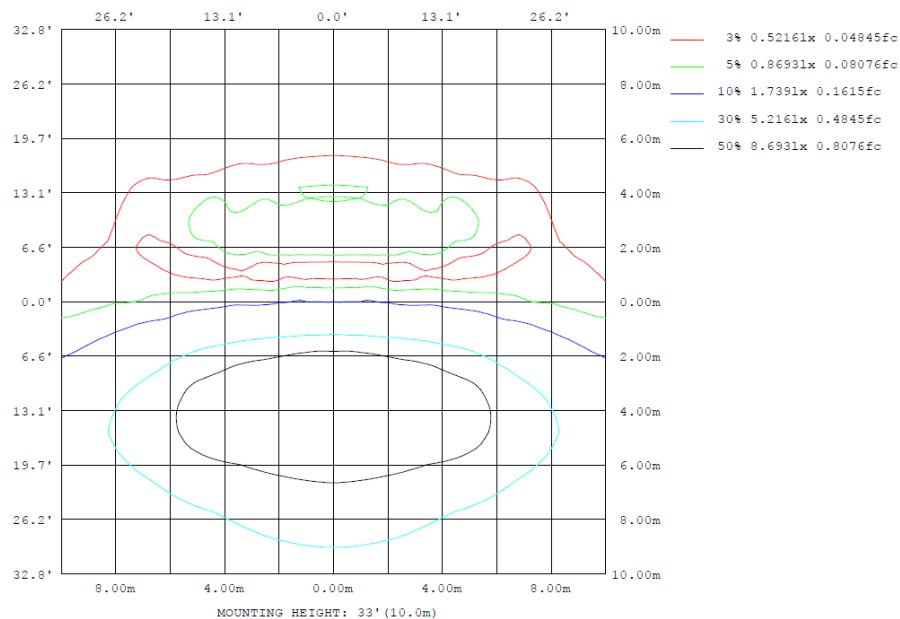
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

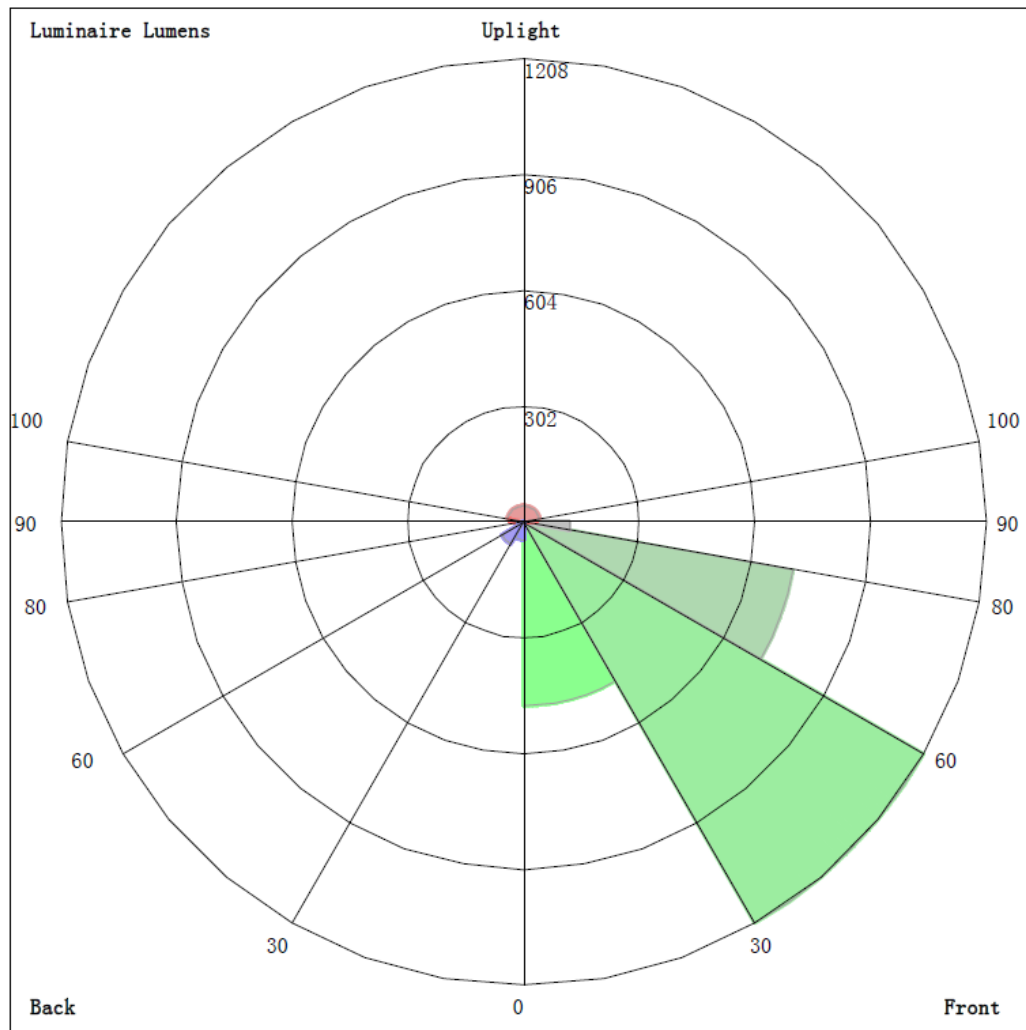
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	Φlum, lamp
10	177.1	541.3	870.0	541.3	177.1	42.69	100.6	42.69	0- 10	21.75	21.75	0.80,0.80
20	190.4	1317	2071	1317	190.4	155.9	104.0	155.9	10- 20	150.6	172.3	6.32,6.32
30	175.6	1925	1718	1925	175.6	119.2	56.44	119.2	20- 30	352.7	525.0	19.2,19.2
40	166.8	1517	1327	1517	166.8	62.61	19.88	62.61	30- 40	427.3	952.3	34.9,34.9
50	131.4	1089	1190	1089	131.4	27.64	2.702	27.64	40- 50	431.2	1383	50.7,50.7
60	81.97	914.5	1151	914.5	81.97	9.864	0.7528	9.864	50- 60	415.6	1799	66,66
70	44.04	851.8	1149	851.8	44.04	5.426	0.1619	5.426	60- 70	397.8	2197	80.5,80.5
80	14.48	611.2	556.7	611.2	14.48	3.320	0.4264	3.320	70- 80	331.6	2528	92.7,92.7
90	4.632	108.6	119.0	108.6	4.632	2.023	0.7664	2.023	80- 90	123.4	2652	97.2,97.2
100	3.134	48.15	78.77	48.15	3.134	1.455	0.9996	1.455	90-100	34.17	2686	98.5,98.5
110	2.572	21.78	33.68	21.78	2.572	1.387	1.055	1.387	100-110	17.22	2703	99.1,99.1
120	1.892	17.98	24.57	17.98	1.892	1.375	1.046	1.375	110-120	9.770	2713	99.5,99.5
130	1.573	12.20	19.85	12.20	1.573	1.411	1.230	1.411	120-130	6.875	2720	99.7,99.7
140	1.253	7.120	12.21	7.120	1.253	1.303	1.329	1.303	130-140	4.620	2724	99.9,99.9
150	0.9728	4.330	7.061	4.330	0.9728	1.130	1.228	1.130	140-150	2.116	2727	100,100
160	0.7666	1.948	3.380	1.948	0.7666	1.019	0.9436	1.019	150-160	0.9512	2727	100,100
170	0.6630	0.4902	0.3987	0.4902	0.6630	0.7890	0.5356	0.7890	160-170	0.2947	2728	100,100
180	0.7465	0.6657	0.6185	0.6657	0.7465	0.6976	0.5936	0.6976	170-180	0.0584	2728	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	21.75	0-10	21.75	0.80%
10-20	150.60	0-20	172.35	6.32%
20-30	352.67	0-30	525.02	19.25%
30-40	427.25	0-40	952.27	34.91%
40-50	431.20	0-50	1383.47	50.72%
50-60	415.57	0-60	1799.04	65.95%
60-70	397.78	0-70	2196.82	80.53%
70-80	331.57	0-80	2528.39	92.69%
80-90	123.38	0-90	2651.77	97.21%
90-100	34.17	0-100	2685.94	98.47%
100-110	17.22	0-110	2703.16	99.10%
110-120	9.77	0-120	2712.93	99.46%
120-130	6.88	0-130	2719.81	99.71%
130-140	4.62	0-140	2724.43	99.88%
140-150	2.12	0-150	2726.55	99.95%
150-160	0.95	0-160	2727.50	99.99%
160-170	0.29	0-170	2727.79	100.00%
170-180	0.06	0-180	2727.85	100.00%

4.2 Goniophotometer Test

LCS/BUG

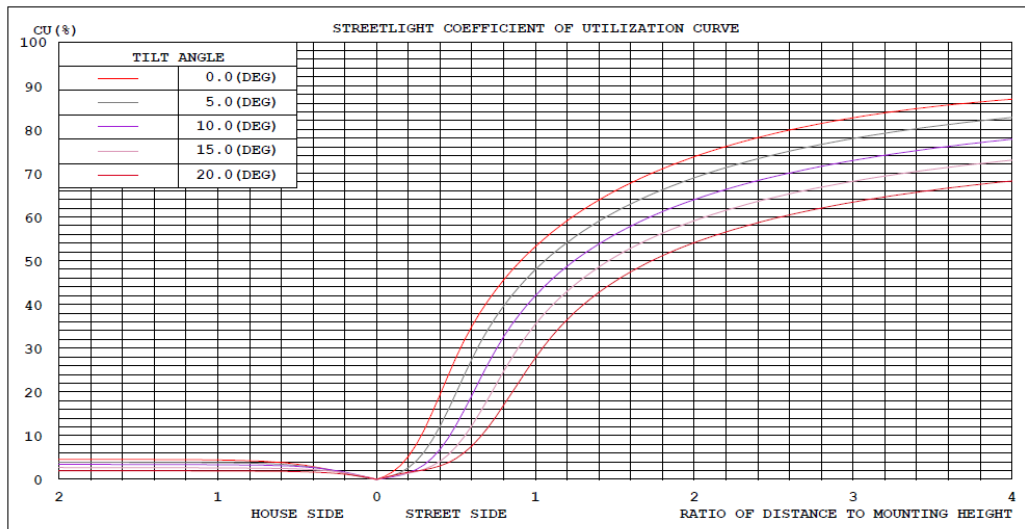


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

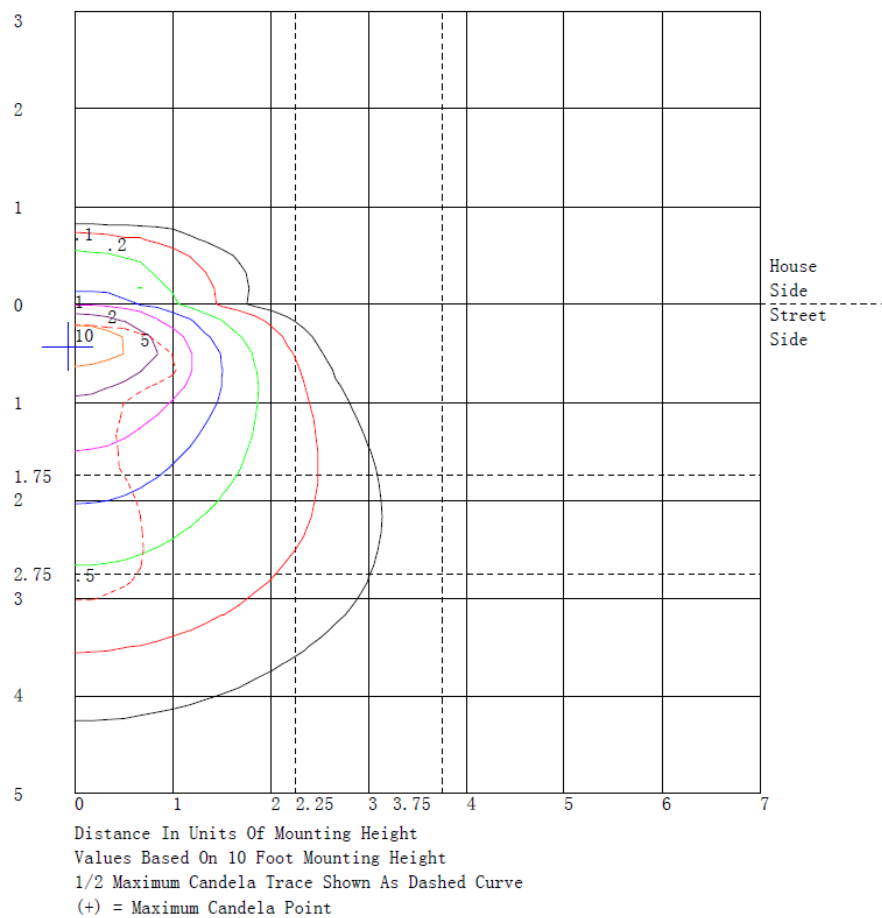
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	479.1	N.A.	17.6
FM - Front-Medium (30-60)	1208.4	N.A.	44.3
FH - Front-High (60-80)	714.8	N.A.	26.2
FVH - Front-Very High (80-90)	121.4	N.A.	4.4
BL - Back-Low (0-30)	45.9	N.A.	1.7
BM - Back-Medium (30-60)	65.6	N.A.	2.4
BH - Back-High (60-80)	14.5	N.A.	0.5
BVH - Back-Very High (80-90)	2.0	N.A.	0.1
UL - Uplight-Low (90-100)	34.2	N.A.	1.3
UH - Uplight-High (100-180)	41.9	N.A.	1.5
Total	2727.8	N.A.	100.0
BUG Rating	B0-U2-G2		

4.2 Goniophotometer Test

Coefficients of Utilization



Isolines



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG) y (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	174	174	174	174	174	174	175	175	175	175	176	176	176	176	177	177	177	178	178
5	175	183	192	203	216	229	242	252	262	272	285	299	314	327	340	351	359	365	367
10	177	197	222	251	284	322	366	421	480	541	603	662	717	765	805	837	856	867	870
15	179	206	249	309	391	486	588	685	787	894	1015	1136	1250	1346	1428	1495	1542	1573	1586
20	190	240	314	410	537	682	838	993	1153	1317	1499	1674	1826	1923	1991	2035	2060	2071	2071
25	178	261	371	508	680	873	1077	1289	1496	1689	1852	1987	2092	2149	2179	2187	2178	2162	2148
30	176	269	402	574	812	1070	1329	1568	1772	1925	1961	1949	1906	1869	1826	1783	1752	1729	1718
35	163	277	427	613	867	1133	1387	1594	1749	1836	1770	1656	1532	1489	1466	1457	1453	1455	1460
40	167	277	430	625	919	1212	1461	1542	1554	1517	1446	1366	1295	1299	1320	1346	1340	1332	1327
45	159	286	441	623	885	1135	1335	1355	1317	1249	1217	1189	1169	1167	1173	1184	1197	1209	1218
50	131	292	455	620	817	995	1133	1151	1129	1089	1080	1077	1082	1106	1136	1164	1178	1187	1190
55	104	260	409	550	694	823	926	969	988	994	1009	1024	1040	1069	1099	1127	1144	1155	1160
60	82.0	232	368	491	603	700	782	837	880	915	951	985	1018	1055	1090	1120	1137	1147	1151
65	62.8	176	283	386	485	578	664	739	807	868	922	971	1015	1060	1099	1132	1151	1163	1167
70	44.0	97.0	163	242	341	449	559	665	764	852	912	961	1001	1045	1084	1115	1134	1145	1149
75	26.8	49.4	95.0	164	268	385	508	620	722	808	860	894	915	930	938	942	947	950	951
80	14.5	30.1	67.8	128	226	334	439	515	573	611	616	606	589	580	572	565	560	557	557
85	9.31	26.1	51.5	85.5	138	192	239	261	272	274	268	259	249	245	243	241	239	238	237
90	4.63	8.73	16.6	28.1	46.8	66.7	85.3	96.4	104	109	109	107	106	109	113	117	118	119	119
95	3.57	5.41	9.17	14.8	23.1	32.7	43.3	55.1	66.3	75.7	79.1	81.0	82.3	86.8	91.3	95.3	97.0	97.8	97.9
100	3.13	4.99	7.57	10.9	14.8	19.5	25.1	32.7	40.6	48.1	53.3	57.7	61.8	66.9	71.7	75.6	77.7	78.6	78.8
105	3.03	4.53	6.49	8.94	12.1	15.6	19.1	22.0	25.0	28.2	32.0	36.2	40.5	45.6	50.3	54.3	56.0	56.7	56.6
110	2.57	3.69	5.29	7.36	10.3	13.4	16.4	18.4	20.1	21.8	24.2	26.6	28.9	30.7	32.3	33.4	33.8	33.8	33.7
115	2.14	3.05	4.43	6.27	8.98	11.8	14.6	16.2	17.5	18.8	20.4	22.2	23.9	25.7	27.3	28.5	28.6	28.5	28.2
120	1.89	2.75	3.85	5.20	6.82	8.67	10.7	13.3	15.8	18.0	19.1	19.9	20.7	22.0	23.4	24.5	24.7	24.7	24.6
125	1.72	2.24	3.04	4.10	5.37	6.95	8.88	11.7	14.6	17.2	18.3	19.0	19.5	20.2	20.8	21.2	21.2	21.0	20.8
130	1.57	1.80	2.33	3.18	4.47	5.98	7.60	8.96	10.5	12.2	15.0	17.8	20.1	20.7	20.6	20.2	20.1	19.9	19.9
135	1.40	1.44	1.80	2.46	3.63	4.97	6.31	7.11	7.92	8.89	10.3	12.1	14.3	17.4	20.5	23.2	24.5	25.1	25.3
140	1.25	1.17	1.38	1.86	2.79	3.87	4.97	5.72	6.42	7.12	7.99	8.87	9.73	10.5	11.3	11.8	12.1	12.2	12.2
145	1.11	0.80	0.80	1.09	1.86	2.79	3.76	4.38	4.95	5.52	6.23	6.94	7.61	8.19	8.67	9.03	9.15	9.15	9.09
150	0.97	0.68	0.61	0.78	1.30	1.96	2.68	3.25	3.80	4.33	4.85	5.35	5.81	6.24	6.60	6.88	7.01	7.07	7.06
155	0.84	0.68	0.64	0.72	0.95	1.28	1.70	2.20	2.73	3.25	3.66	4.02	4.31	4.51	4.64	4.73	4.76	4.76	4.74
160	0.77	0.73	0.71	0.71	0.67	0.67	0.77	1.11	1.52	1.95	2.28	2.58	2.84	3.06	3.24	3.36	3.40	3.40	3.38
165	0.70	0.69	0.68	0.66	0.64	0.61	0.60	0.60	0.63	0.70	0.88	1.10	1.31	1.48	1.62	1.73	1.80	1.84	1.86
170	0.66	0.65	0.64	0.62	0.60	0.58	0.56	0.54	0.51	0.49	0.47	0.45	0.43	0.41	0.40	0.39	0.39	0.39	0.40
175	0.69	0.69	0.68	0.67	0.66	0.65	0.63	0.62	0.60	0.59	0.57	0.55	0.53	0.52	0.50	0.49	0.49	0.49	0.50
180	0.75	0.75	0.74	0.74	0.73	0.72	0.71	0.69	0.68	0.67	0.65	0.64	0.62	0.61	0.60	0.60	0.60	0.61	0.62

																UNIT: cd				
y	C (DEG) (DEG)																			
		95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	178	177	177	177	176	176	176	176	175	175	175	175	174	174	174	174	174	174	177	177
5	365	359	351	340	327	314	299	285	272	262	252	242	229	216	203	192	183	175	174	177
10	867	856	837	805	765	717	662	603	541	480	421	366	322	284	251	222	197	177	145	177
15	1573	1542	1495	1428	1346	1250	1136	1015	894	787	685	588	486	391	309	249	206	179	129	129
20	2071	2060	2035	1991	1923	1826	1674	1499	1317	1153	993	838	682	537	410	314	240	190	126	126
25	2162	2178	2187	2179	2149	2092	1987	1852	1689	1496	1289	1077	873	680	508	371	261	178	111	111
30	1729	1752	1783	1826	1869	1906	1949	1961	1925	1772	1568	1329	1070	812	574	402	269	176	114	114
35	1455	1453	1457	1466	1489	1532	1656	1770	1836	1749	1594	1387	1133	867	613	427	277	163	127	127
40	1332	1340	1346	1320	1299	1295	1366	1446	1517	1554	1542	1461	1212	919	625	430	277	167	145	145
45	1209	1197	1184	1173	1167	1169	1189	1217	1249	1317	1355	1335	1135	885	623	441	286	159	147	147
50	1187	1178	1164	1136	1106	1082	1077	1080	1089	1129	1151	1133	995	817	620	455	292	131	129	129
55	1155	1144	1127	1099	1069	1040	1024	1009	994	988	969	926	823	694	550	409	260	104	104	104
60	1147	1137	1120	1090	1055	1018	985	951	915	880	837	782	700	603	491	368	232	82.0	86.9	86.9
65	1163	1151	1132	1099	1060	1015	971	922	868	807	739	664	578	485	386	283	176	62.8	67.6	67.6
70	1145	1134	1115	1084	1045	1001	961	912	852	764	665	559	449	341	242	163	97.0	44.0	43.4	43.4
75	950	947	942	938	930	915	894	860	808	722	620	508	385	268	164	95.0	49.4	26.8	25.7	25.7
80	557	560	565	572	580	589	606	616	611	573	515	439	334	226	128	67.8	30.1	14.5	13.9	13.9
85	238	239	241	243	245	249	259	268	274	272	261	239	192	138	85.5	51.5	26.1	9.31	9.40	9.40
90	119	118	117	113	109	106	107	109	109	104	96.4	85.3	66.7	46.8	28.1	16.6	8.73	4.63	4.44	4.44
95	97.8	97.0	95.3	91.3	86.8	82.3	81.0	79.1	75.7	66.3	55.1	43.3	32.7	23.1	14.8	9.17	5.41	3.57	3.57	3.57
100	78.6	77.7	75.6	71.7	66.9	61.8	57.7	53.3	48.1	40.6	32.7	25.1	19.5	14.8	10.9	7.57	4.99	3.13	3.03	3.03
105	56.7	56.0	54.3	50.3	45.6	40.5	36.2	32.0	28.2	25.0	22.0	19.1	15.6	12.1	8.94	6.49	4.53	3.03	3.00	3.00
110	33.8	33.8	33.4	32.3	30.7	28.9	26.6	24.2	21.8	20.1	18.4	16.4	13.4	10.3	7.36	5.29	3.69	2.57	2.70	2.70
115	28.5	28.6	28.5	27.3	25.7	23.9	22.2	20.4	18.8	17.5	16.2	14.6	11.8	8.98	6.27	4.43	3.05	2.14	2.54	2.54
120	24.7	24.7	24.5	23.4	22.0	20.7	19.9	19.1	18.0	15.8	13.3	10.7	8.67	6.82	5.20	3.85	2.75	1.89	2.61	2.61
125	21.0	21.2	21.2	20.8	20.2	19.5	19.0	18.3	17.2	14.6	11.7	8.88	6.95	5.37	4.10	3.04	2.24	1.72	2.18	2.18
130	19.9	20.1	20.2	20.6	20.7	20.1	17.8	15.0	12.2	10.5	8.96	7.60	5.98	4.47	3.18	2.33	1.80	1.57	1.86	1.86
135	25.1	24.5	23.2	20.5	17.4	14.3	12.1	10.3	8.89	7.92	7.11	6.31	4.97	3.63	2.46	1.80	1.44	1.40	1.69	1.69
140	12.2	12.1	11.8	11.3	10.5	9.73	8.87	7.99	7.12	6.42	5.72	4.97	3.87	2.79	1.86	1.38	1.17	1.25	1.39	1.39
145	9.15	9.15	9.03	8.67	8.19	7.61	6.94	6.23	5.52	4.95	4.38	3.76	2.79	1.86	1.09	0.80	0.80	1.11	1.23	1.23
150	7.07	7.01	6.88	6.60	6.24	5.81	5.35	4.85	4.33	3.80	3.25	2.68	1.96	1.30	0.78	0.61	0.68	0.97	1.05	1.05
155	4.76	4.76	4.73	4.64	4.51	4.31	4.02	3.66	3.25	2.73	2.20	1.70	1.28	0.95	0.72	0.64	0.68	0.84	0.99	0.99
160	3.40	3.40	3.36	3.24	3.06	2.84	2.58	2.28	1.95	1.52	1.11	0.77	0.67	0.67	0.71	0.71	0.73	0.77	0.93	0.93
165	1.84	1.80	1.73	1.62	1.48	1.31	1.10	0.88	0.70	0.53	0.60	0.60	0.61	0.64	0.66	0.68	0.69	0.70	0.83	0.83
170	0.39	0.39	0.39	0.40	0.41	0.43	0.45	0.47	0.49	0.51	0.54	0.56	0.58	0.60	0.62	0.64	0.65	0.66	0.73	0.73
175	0.49	0.49	0.49	0.50	0.52	0.53	0.55	0.57	0.59	0.60	0.62	0.63	0.65	0.66	0.67	0.68	0.69	0.69	0.73	0.73
180	0.61	0.60	0.60	0.60	0.61	0.62	0.64	0.65	0.67	0.68	0.69	0.71	0.72	0.73	0.74	0.74	0.75	0.75	0.77	0.77

Table--3

UNIT: cd

C (DEG) γ (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	179	181	181	181	180	180	180	180	180	180	179	179	179	179	178	178	178	178	178
5	172	162	143	121	99.4	85.1	73.9	65.5	60.5	57.5	55.9	54.3	53.3	52.6	52.2	51.9	51.9	51.9	52.2
10	117	94.6	77.2	64.0	54.5	47.4	43.4	42.7	46.2	52.4	60.6	71.0	81.6	91.1	96.4	99.5	101	99.5	96.4
15	90.6	63.1	47.1	41.8	47.2	69.2	96.7	125	141	154	161	161	159	156	162	168	172	168	162
20	81.6	58.2	65.1	85.5	112	131	146	156	152	142	131	122	115	108	106	104	104	104	106
25	68.7	51.7	77.2	115	151	146	134	118	116	116	115	107	99.2	91.4	87.3	84.7	83.8	84.7	87.3
30	76.5	63.0	91.8	131	167	160	142	119	105	92.6	81.8	73.8	67.6	63.1	59.4	57.1	56.4	57.1	59.4
35	102	88.4	94.9	107	118	111	98.7	84.5	72.3	61.1	52.0	48.2	46.6	46.1	44.9	44.1	43.7	44.1	44.9
40	129	119	120	123	122	105	83.6	62.6	51.3	43.0	36.7	30.4	25.4	21.8	20.2	19.7	19.9	19.7	20.2
45	134	122	111	99.6	87.8	73.4	59.1	45.6	35.1	26.4	19.5	14.8	11.6	9.59	8.24	7.63	7.62	7.63	8.24
50	124	115	101	84.5	67.7	52.9	39.4	27.6	19.2	12.8	8.21	5.49	3.99	3.35	2.81	2.63	2.70	2.63	2.81
55	101	93.1	79.1	62.9	46.6	33.8	23.0	14.5	9.79	6.99	5.44	3.68	2.45	1.67	1.35	1.31	1.43	1.31	1.35
60	86.5	80.7	65.9	48.5	31.4	21.7	14.7	9.86	6.68	4.75	3.65	2.39	1.48	0.89	0.67	0.65	0.75	0.65	0.67
65	67.3	62.1	47.9	31.8	16.6	11.0	8.25	7.19	5.27	3.79	2.66	1.65	0.89	0.37	0.19	0.19	0.27	0.19	0.19
70	40.8	36.4	28.4	19.8	11.9	8.47	6.50	5.43	4.02	2.89	2.00	1.20	0.59	0.17	0.05	0.07	0.16	0.07	0.05
75	23.8	21.1	16.8	12.3	8.20	6.18	4.86	4.01	3.08	2.33	1.71	1.11	0.62	0.27	0.18	0.20	0.27	0.20	0.18
80	13.1	11.8	10.00	8.03	6.16	4.99	4.06	3.32	2.65	2.08	1.60	1.11	0.72	0.43	0.35	0.37	0.43	0.37	0.35
85	9.14	8.53	7.30	5.92	4.57	3.80	3.20	2.72	2.22	1.79	1.40	1.06	0.79	0.59	0.54	0.55	0.60	0.55	0.54
90	4.21	3.93	3.58	3.21	2.84	2.55	2.28	2.02	1.72	1.42	1.16	0.98	0.85	0.76	0.74	0.74	0.77	0.74	0.74
95	3.48	3.30	2.96	2.59	2.22	1.98	1.78	1.60	1.39	1.20	1.04	0.96	0.91	0.89	0.88	0.89	0.90	0.89	0.88
100	2.90	2.76	2.59	2.40	2.19	1.94	1.69	1.46	1.28	1.15	1.05	1.00	0.98	0.98	0.99	0.99	1.00	0.99	0.98
105	2.90	2.74	2.47	2.17	1.88	1.69	1.55	1.42	1.29	1.17	1.08	1.05	1.04	1.04	1.05	1.05	1.06	1.05	1.05
110	2.72	2.64	2.39	2.08	1.78	1.62	1.49	1.39	1.27	1.16	1.08	1.05	1.04	1.04	1.04	1.05	1.05	1.05	1.04
115	2.75	2.77	2.48	2.09	1.70	1.54	1.45	1.38	1.27	1.17	1.09	1.05	1.04	1.04	1.04	1.04	1.05	1.04	1.04
120	3.02	3.13	2.75	2.21	1.65	1.49	1.41	1.37	1.27	1.18	1.11	1.07	1.06	1.05	1.05	1.05	1.05	1.05	1.05
125	2.45	2.53	2.31	1.98	1.64	1.52	1.44	1.40	1.31	1.24	1.18	1.15	1.14	1.13	1.12	1.12	1.12	1.12	1.12
130	2.03	2.10	1.99	1.81	1.62	1.53	1.46	1.41	1.35	1.30	1.26	1.25	1.24	1.24	1.24	1.24	1.23	1.24	1.24
135	1.87	1.96	1.88	1.74	1.58	1.50	1.43	1.38	1.33	1.30	1.28	1.29	1.30	1.31	1.31	1.31	1.31	1.31	1.31
140	1.48	1.53	1.52	1.48	1.43	1.39	1.34	1.30	1.28	1.26	1.26	1.28	1.30	1.32	1.33	1.33	1.33	1.33	1.33
145	1.28	1.32	1.33	1.31	1.29	1.26	1.23	1.21	1.20	1.20	1.21	1.23	1.26	1.28	1.29	1.30	1.30	1.30	1.29
150	1.18	1.23	1.23	1.22	1.19	1.16	1.14	1.13	1.13	1.15	1.16	1.18	1.20	1.22	1.23	1.23	1.23	1.23	1.23
155	1.09	1.15	1.15	1.12	1.08	1.06	1.05	1.05	1.06	1.07	1.09	1.09	1.10	1.10	1.10	1.10	1.09	1.10	1.10
160	1.01	1.07	1.07	1.04	1.01	1.01	1.01	1.02	1.02	1.02	1.02	1.02	1.01	0.99	0.98	0.96	0.94	0.96	0.98
165	0.89	0.95	0.95	0.94	0.92	0.93	0.94	0.94	0.93	0.92	0.90	0.88	0.85	0.82	0.80	0.78	0.76	0.78	0.80
170	0.78	0.81	0.81	0.80	0.79	0.79	0.79	0.79	0.76	0.73	0.69	0.65	0.60	0.57	0.55	0.54	0.54	0.54	0.55
175	0.75	0.77	0.77	0.77	0.76	0.75	0.74	0.73	0.70	0.66	0.62	0.59	0.57	0.56	0.55	0.55	0.56	0.55	0.55
180	0.70	0.69	0.68	0.68	0.69	0.69	0.70	0.70	0.69	0.68	0.67	0.65	0.63	0.61	0.60	0.60	0.59	0.60	0.60

Table--4

UNIT: cd

C (DBG)		285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
γ (DBG)		0	179	179	179	179	180	180	180	180	180	181	181	181	179	177				
		5	52.6	53.3	54.3	55.9	57.5	60.5	65.5	73.9	85.1	99.4	121	143	162	172	176			
	10	91.1	81.6	71.0	60.6	52.4	46.2	42.7	43.4	47.4	54.5	64.0	77.2	94.6	117	145				
	15	156	159	161	161	154	141	125	96.7	69.2	47.2	41.8	47.1	63.1	90.6	129				
	20	108	115	122	131	142	152	156	146	131	112	85.5	65.1	58.2	81.6	126				
	25	91.4	99.2	107	115	116	116	118	134	146	151	115	77.2	51.7	68.7	111				
	30	63.1	67.6	73.8	81.8	92.6	105	119	142	160	167	131	91.8	63.0	76.5	114				
	35	46.1	46.6	48.2	52.0	61.1	72.3	84.5	98.7	111	118	107	94.9	88.4	102	127				
	40	21.8	25.4	30.4	36.7	43.0	51.3	62.6	83.6	105	122	123	120	119	129	145				
	45	9.59	11.6	14.8	19.5	26.4	35.1	45.6	59.1	73.4	87.8	99.6	111	122	134	147				
	50	3.35	3.99	5.49	8.21	12.8	19.2	27.6	39.4	52.9	67.7	84.5	101	115	124	129				
	55	1.67	2.45	3.68	5.44	6.99	9.79	14.5	23.0	33.8	46.6	62.9	79.1	93.1	101	104				
	60	0.89	1.48	2.39	3.65	4.75	6.68	9.86	14.7	21.7	31.4	48.5	65.9	80.7	86.5	86.9				
	65	0.37	0.89	1.65	2.66	3.79	5.27	7.19	8.25	11.0	16.6	31.8	47.9	62.1	67.3	67.6				
	70	0.17	0.59	1.20	2.00	2.89	4.02	5.43	6.50	8.47	11.9	19.8	28.4	36.4	40.8	43.4				
	75	0.27	0.62	1.11	1.71	2.33	3.08	4.01	4.86	6.18	8.20	12.3	16.8	21.1	23.8	25.7				
	80	0.43	0.72	1.11	1.60	2.08	2.65	3.32	4.06	4.99	6.16	8.03	10.00	11.8	13.1	13.9				
	85	0.59	0.79	1.06	1.40	1.79	2.22	2.72	3.20	3.80	4.57	5.92	7.30	8.53	9.14	9.40				
	90	0.76	0.85	0.98	1.16	1.42	1.72	2.02	2.28	2.55	2.84	3.21	3.58	3.93	4.21	4.44				
	95	0.89	0.91	0.96	1.04	1.20	1.39	1.60	1.78	1.98	2.22	2.59	2.96	3.30	3.48	3.57				
	100	0.98	0.98	1.00	1.05	1.15	1.28	1.46	1.69	1.94	2.19	2.40	2.59	2.76	2.90	3.03				
	105	1.04	1.04	1.05	1.08	1.17	1.29	1.42	1.55	1.69	1.88	2.17	2.47	2.74	2.90	3.00				
	110	1.04	1.04	1.05	1.08	1.16	1.27	1.39	1.49	1.62	1.78	2.08	2.39	2.64	2.72	2.70				
	115	1.04	1.04	1.05	1.09	1.17	1.27	1.38	1.45	1.54	1.70	2.09	2.48	2.77	2.75	2.54				
	120	1.05	1.06	1.07	1.11	1.18	1.27	1.37	1.41	1.49	1.65	2.21	2.75	3.13	3.02	2.61				
	125	1.13	1.14	1.15	1.18	1.24	1.31	1.40	1.44	1.52	1.64	1.98	2.31	2.53	2.45	2.18				
	130	1.24	1.24	1.25	1.26	1.30	1.35	1.41	1.46	1.53	1.62	1.81	1.99	2.10	2.03	1.86				
	135	1.31	1.30	1.29	1.28	1.30	1.33	1.38	1.43	1.50	1.58	1.74	1.88	1.96	1.87	1.69				
	140	1.32	1.30	1.28	1.26	1.26	1.28	1.30	1.34	1.39	1.43	1.48	1.52	1.53	1.48	1.39				
	145	1.28	1.26	1.23	1.21	1.20	1.20	1.21	1.23	1.26	1.29	1.31	1.33	1.32	1.28	1.21				
	150	1.22	1.20	1.18	1.16	1.15	1.13	1.13	1.14	1.16	1.19	1.22	1.23	1.23	1.18	1.09				
	155	1.10	1.10	1.09	1.09	1.07	1.06	1.05	1.05	1.06	1.08	1.12	1.15	1.15	1.09	0.99				
	160	0.99	1.01	1.02	1.02	1.02	1.02	1.02	1.01	1.01	1.01	1.04	1.07	1.07	1.01	0.91				
	165	0.82	0.85	0.88	0.90	0.92	0.93	0.94	0.94	0.93	0.92	0.94	0.95	0.95	0.89	0.81				
	170	0.57	0.60	0.65	0.69	0.73	0.76	0.79	0.79	0.79	0.79	0.80	0.81	0.81	0.78	0.73				
	175	0.56	0.57	0.59	0.62	0.66	0.70	0.73	0.74	0.75	0.76	0.77	0.77	0.77	0.75	0.72				
	180	0.61	0.63	0.65	0.67	0.68	0.69	0.70	0.70	0.69	0.69	0.68	0.68	0.69	0.70	0.72				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	W34S @ 17W / 3000K	Sample ID	230612003-S1
Temperature (°C)	25.4	Humidity (%RH)	41.0

Test Method
<p>The samples were tested according to the ANSI C82.77:2014</p> <p>The total harmonic distortion shall be measured to the 40th order.</p> <p>The ambient temperature shall be maintained at 25±1°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 was calculated.</p>

Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.160	18.9	0.987	2.66
277.0	60	0.088	19.3	0.790	15.26

5.0 Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2022-11-09	2023-11-08
NTC-F01-006	2.0 meter Integrating Sphere	2022-11-09	2023-11-08
NTC-F01-012	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-013	Standard Lamp	2022-11-09	2023-11-08
NTC-F01-031	Digital Power Meter	2022-08-31	2023-08-30
NTC-F01-019	Temperature & Humidity Meter	2022-11-12	2023-11-11

*****End of Report*****