

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

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Issue Date: 2023-10-30

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		9946
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		143.1
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		9683
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	139.3
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		69.5
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	480V	17.18
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	480V	0.804
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	3045±175	3096
		4 steps	3045±100	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		82.9
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		8
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		97
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-11%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		2.1%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		480.0
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.180
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		69.5
(Goniophotometer – Section 4.2)		Non-Worst Case		N/A

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-10-23	WPX3 @ 65W / 3000K 480	231020002-S1
2	Goniophotometer Test	2023-10-23	WPX3 @ 65W / 3000K 480	231020002-S1
3	THD and PF Test	2023-10-23	WPX3 @ 65W / 3000K 480	231020002-S1

Remark (If any)

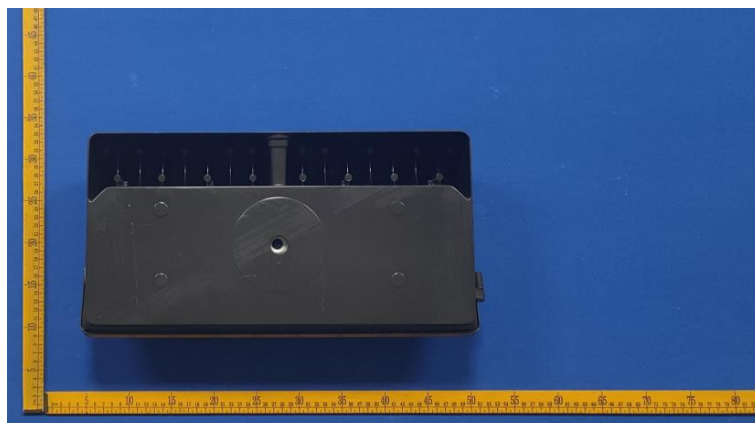
1. The results contained in this report pertain only to the tested samples.
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3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

3.0 Product Description

Luminaire Description: Model No. WPX3 @ 65W / 3000K 480, color tunable from 3000K, 4000K and 5000K.

Electrical Specification: 480Vac, 50/60Hz

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test

Model No.	WPX3 @ 65W / 3000K 480	Sample ID	231020002-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

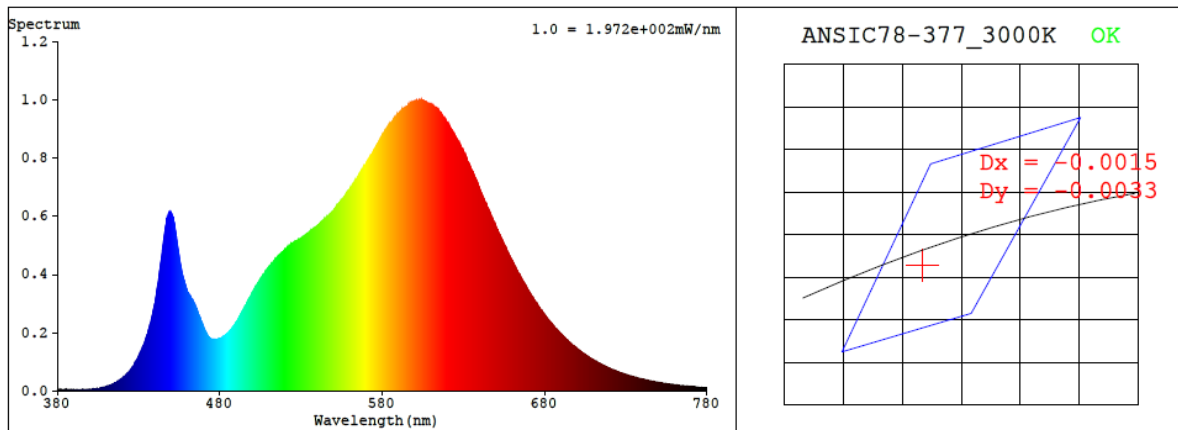
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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
480.0	60	0.180	69.5	0.804

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3096	82.9	8	-0.0011	85	97	-11%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.4288$ $y = 0.3984$ / $u' = 0.2477$ $v' = 0.5179$ ($duv = -1.10e-03$)

CCT= 3096K Prcp WL: Ld=582.8nm Purity=48.3%

Peak WL: Lp=604nm FWHM: =132.8nm Ratio:R=22.4% G=75.0% B=2.6%

Render Index: Ra = 82.9 AvgR = 77.3 TM30:Rf=84 Rg=97

EEl: 0.09816 A++ Highest

R1 =81 R2 =91 R3 =96 R4 =82 R5 =82 R6 =88 R7 =83

R8 =60 R9 =8 R10=79 R11=81 R12=72 R13=84 R14=99 R15=74

4.1 Integrating Sphere Test

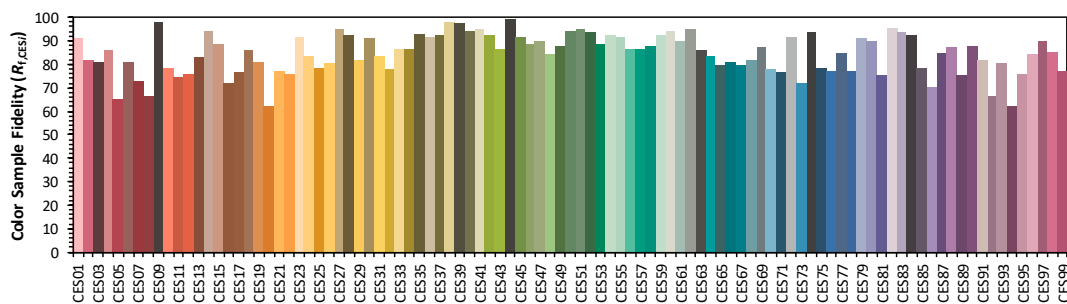
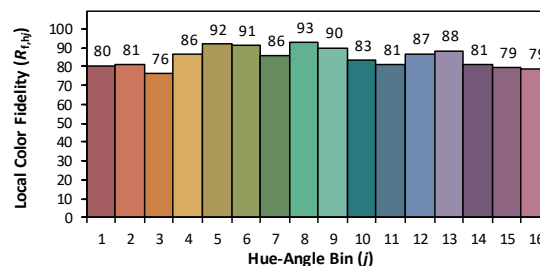
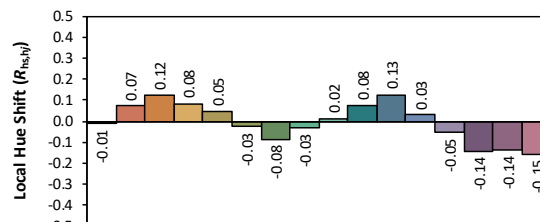
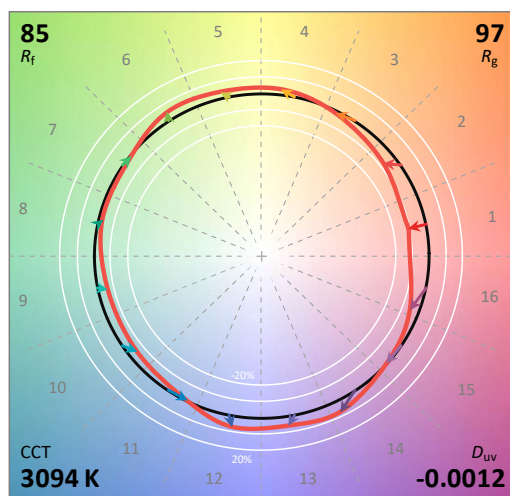
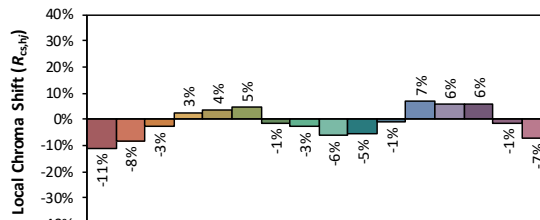
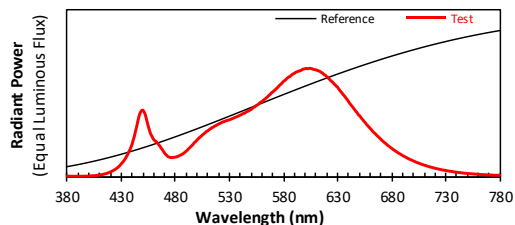
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/10/30

Model: WPX3 @ 65W / 3000K 480



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

x 0.4288

y 0.3983

u' 0.2478

v' 0.5179

CIE 13.3-1995
(CRI)

R_a 83

R_g 8

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	4.30E-06	447	5.78E-04	514	4.53E-04	581	8.85E-04	648	5.91E-04	715	9.07E-05
381	2.70E-06	448	5.99E-04	515	4.56E-04	582	8.93E-04	649	5.74E-04	716	8.84E-05
382	5.50E-06	449	6.11E-04	516	4.64E-04	583	9.04E-04	650	5.65E-04	717	8.60E-05
383	3.80E-06	450	6.12E-04	517	4.68E-04	584	9.11E-04	651	5.55E-04	718	8.30E-05
384	3.60E-06	451	5.96E-04	518	4.74E-04	585	9.20E-04	652	5.40E-04	719	8.05E-05
385	4.10E-06	452	5.74E-04	519	4.79E-04	586	9.23E-04	653	5.29E-04	720	7.78E-05
386	2.70E-06	453	5.39E-04	520	4.86E-04	587	9.33E-04	654	5.16E-04	721	7.46E-05
387	3.50E-06	454	4.99E-04	521	4.89E-04	588	9.40E-04	655	5.03E-04	722	7.28E-05
388	3.40E-06	455	4.61E-04	522	4.95E-04	589	9.48E-04	656	4.94E-04	723	7.09E-05
389	3.20E-06	456	4.27E-04	523	4.99E-04	590	9.52E-04	657	4.79E-04	724	6.84E-05
390	4.00E-06	457	3.97E-04	524	5.05E-04	591	9.59E-04	658	4.69E-04	725	6.60E-05
391	3.40E-06	458	3.77E-04	525	5.07E-04	592	9.65E-04	659	4.58E-04	726	6.40E-05
392	3.20E-06	459	3.58E-04	526	5.12E-04	593	9.68E-04	660	4.48E-04	727	6.18E-05
393	3.30E-06	460	3.41E-04	527	5.15E-04	594	9.72E-04	661	4.36E-04	728	6.04E-05
394	4.10E-06	461	3.32E-04	528	5.18E-04	595	9.75E-04	662	4.24E-04	729	5.88E-05
395	3.50E-06	462	3.23E-04	529	5.21E-04	596	9.79E-04	663	4.13E-04	730	5.66E-05
396	4.70E-06	463	3.13E-04	530	5.24E-04	597	9.84E-04	664	4.03E-04	731	5.48E-05
397	4.30E-06	464	3.02E-04	531	5.27E-04	598	9.91E-04	665	3.95E-04	732	5.29E-05
398	4.30E-06	465	2.89E-04	532	5.32E-04	599	9.92E-04	666	3.83E-04	733	5.14E-05
399	4.50E-06	466	2.76E-04	533	5.36E-04	600	9.95E-04	667	3.74E-04	734	4.97E-05
400	5.50E-06	467	2.61E-04	534	5.41E-04	601	9.98E-04	668	3.65E-04	735	4.84E-05
401	6.30E-06	468	2.48E-04	535	5.45E-04	602	9.95E-04	669	3.55E-04	736	4.67E-05
402	7.60E-06	469	2.32E-04	536	5.49E-04	603	9.95E-04	670	3.45E-04	737	4.51E-05
403	7.30E-06	470	2.18E-04	537	5.54E-04	604	9.99E-04	671	3.35E-04	738	4.34E-05
404	8.10E-06	471	2.05E-04	538	5.58E-04	605	9.98E-04	672	3.27E-04	739	4.20E-05
405	9.10E-06	472	1.95E-04	539	5.62E-04	606	9.95E-04	673	3.18E-04	740	4.09E-05
406	9.80E-06	473	1.86E-04	540	5.67E-04	607	9.92E-04	674	3.09E-04	741	3.96E-05
407	1.10E-05	474	1.81E-04	541	5.71E-04	608	9.87E-04	675	3.02E-04	742	3.83E-05
408	1.23E-05	475	1.77E-04	542	5.78E-04	609	9.86E-04	676	2.92E-04	743	3.74E-05
409	1.34E-05	476	1.76E-04	543	5.83E-04	610	9.85E-04	677	2.85E-04	744	3.60E-05
410	1.47E-05	477	1.77E-04	544	5.84E-04	611	9.80E-04	678	2.77E-04	745	3.49E-05
411	1.73E-05	478	1.77E-04	545	5.93E-04	612	9.77E-04	679	2.69E-04	746	3.33E-05
412	1.86E-05	479	1.79E-04	546	5.99E-04	613	9.72E-04	680	2.62E-04	747	3.25E-05
413	2.07E-05	480	1.80E-04	547	6.02E-04	614	9.68E-04	681	2.54E-04	748	3.11E-05
414	2.38E-05	481	1.82E-04	548	6.08E-04	615	9.60E-04	682	2.47E-04	749	3.06E-05
415	2.62E-05	482	1.86E-04	549	6.14E-04	616	9.55E-04	683	2.41E-04	750	2.95E-05
416	2.84E-05	483	1.90E-04	550	6.19E-04	617	9.45E-04	684	2.34E-04	751	2.87E-05
417	3.20E-05	484	1.95E-04	551	6.27E-04	618	9.38E-04	685	2.26E-04	752	2.77E-05
418	3.55E-05	485	1.99E-04	552	6.36E-04	619	9.32E-04	686	2.20E-04	753	2.68E-05
419	3.96E-05	486	2.05E-04	553	6.41E-04	620	9.21E-04	687	2.14E-04	754	2.61E-05
420	4.32E-05	487	2.10E-04	554	6.49E-04	621	9.15E-04	688	2.08E-04	755	2.52E-05
421	4.94E-05	488	2.19E-04	555	6.56E-04	622	9.02E-04	689	2.02E-04	756	2.42E-05
422	5.37E-05	489	2.26E-04	556	6.62E-04	623	8.93E-04	690	1.96E-04	757	2.34E-05
423	5.97E-05	490	2.35E-04	557	6.70E-04	624	8.81E-04	691	1.90E-04	758	2.29E-05
424	6.49E-05	491	2.43E-04	558	6.78E-04	625	8.75E-04	692	1.85E-04	759	2.20E-05
425	7.15E-05	492	2.54E-04	559	6.87E-04	626	8.64E-04	693	1.80E-04	760	2.18E-05
426	7.88E-05	493	2.64E-04	560	6.91E-04	627	8.53E-04	694	1.75E-04	761	2.10E-05
427	8.74E-05	494	2.75E-04	561	7.00E-04	628	8.44E-04	695	1.68E-04	762	2.01E-05
428	9.65E-05	495	2.84E-04	562	7.09E-04	629	8.33E-04	696	1.64E-04	763	1.92E-05
429	1.07E-04	496	2.94E-04	563	7.16E-04	630	8.25E-04	697	1.58E-04	764	1.89E-05
430	1.19E-04	497	3.06E-04	564	7.26E-04	631	8.10E-04	698	1.55E-04	765	1.83E-05
431	1.30E-04	498	3.18E-04	565	7.33E-04	632	7.98E-04	699	1.50E-04	766	1.78E-05
432	1.43E-04	499	3.25E-04	566	7.44E-04	633	7.83E-04	700	1.46E-04	767	1.74E-05
433	1.56E-04	500	3.38E-04	567	7.52E-04	634	7.72E-04	701	1.41E-04	768	1.68E-05
434	1.71E-04	501	3.47E-04	568	7.61E-04	635	7.59E-04	702	1.37E-04	769	1.61E-05
435	1.91E-04	502	3.58E-04	569	7.73E-04	636	7.49E-04	703	1.32E-04	770	1.54E-05
436	2.07E-04	503	3.66E-04	570	7.79E-04	637	7.35E-04	704	1.29E-04	771	1.52E-05
437	2.31E-04	504	3.74E-04	571	7.90E-04	638	7.23E-04	705	1.25E-04	772	1.46E-05
438	2.50E-04	505	3.84E-04	572	7.97E-04	639	7.09E-04	706	1.21E-04	773	1.45E-05
439	2.76E-04	506	3.93E-04	573	8.08E-04	640	6.96E-04	707	1.17E-04	774	1.37E-05
440	3.00E-04	507	4.00E-04	574	8.16E-04	641	6.79E-04	708	1.13E-04	775	1.32E-05
441	3.39E-04	508	4.10E-04	575	8.27E-04	642	6.66E-04	709	1.10E-04	776	1.30E-05
442	3.71E-04	509	4.17E-04	576	8.38E-04	643	6.54E-04	710	1.07E-04	777	1.25E-05
443	4.14E-04	510	4.24E-04	577	8.47E-04	644	6.43E-04	711	1.04E-04	778	1.25E-05
444	4.54E-04	511	4.30E-04	578	8.56E-04	645	6.28E-04	712	1.01E-04	779	1.25E-05
445	4.99E-04	512	4.39E-04	579	8.66E-04	646	6.16E-04	713	9.71E-05	780	1.26E-05
446	5.42E-04	513	4.43E-04	580	8.78E-04	647	6.02E-04	714	9.44E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	WPX3 @ 65W / 3000K 480	Sample ID	231020002-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	25.0	Humidity (%RH)	42.1

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	480.0	60	0.180	69.5	0.804
NON-WORST CASE	N/A	N/A	N/A	N/A	N/A

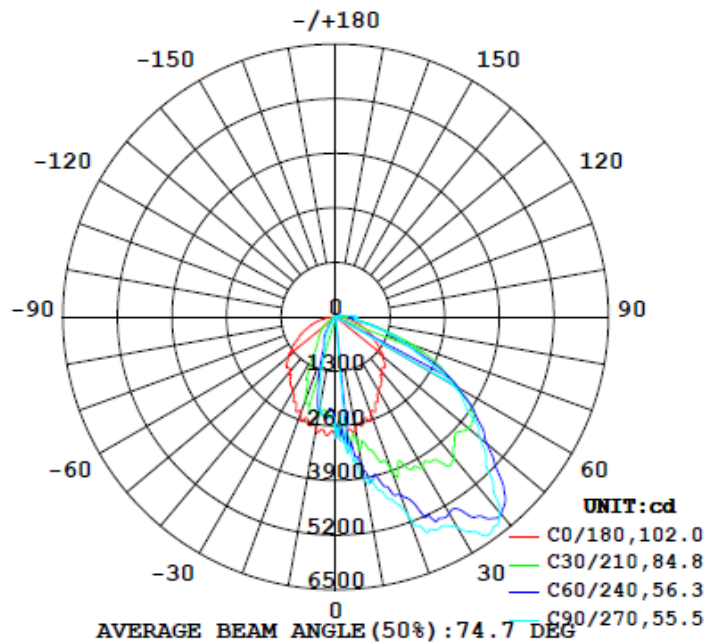
Test Result

Result Type	Flux (lm)	Field Angle (10%)		Beam Angle (50%)		Luminous Efficacy (lm/W)	Zonal Lumen Requirement	BUG
		C0-180	C90-270	C0-180	C90-270		(80°-90°)	
0°-180° zones	9946	107.0	146.0	54.6	101.8	143.1	2.0%	B2-U3-G2
0°-90° zones	9683	107.0	146.0	54.6	101.8	139.3	2.1%	B2-U3-G2

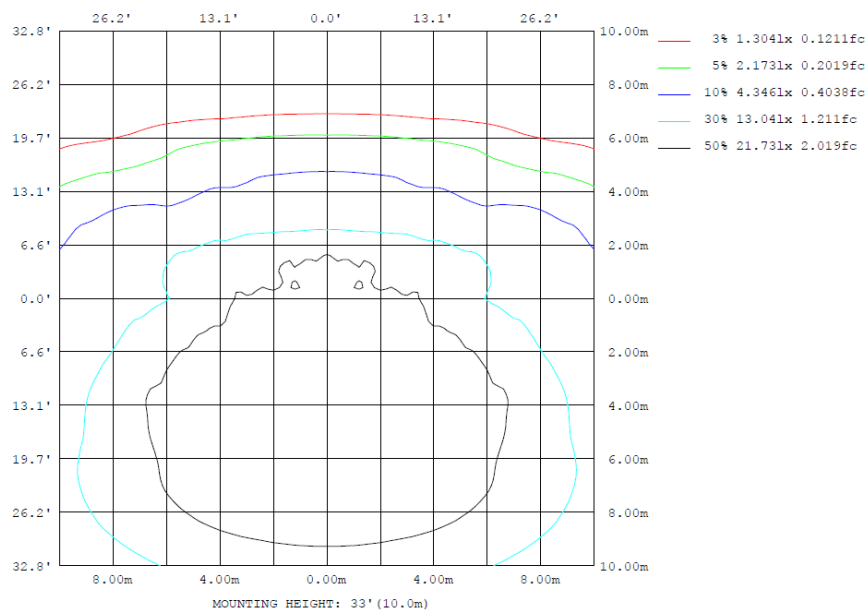
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

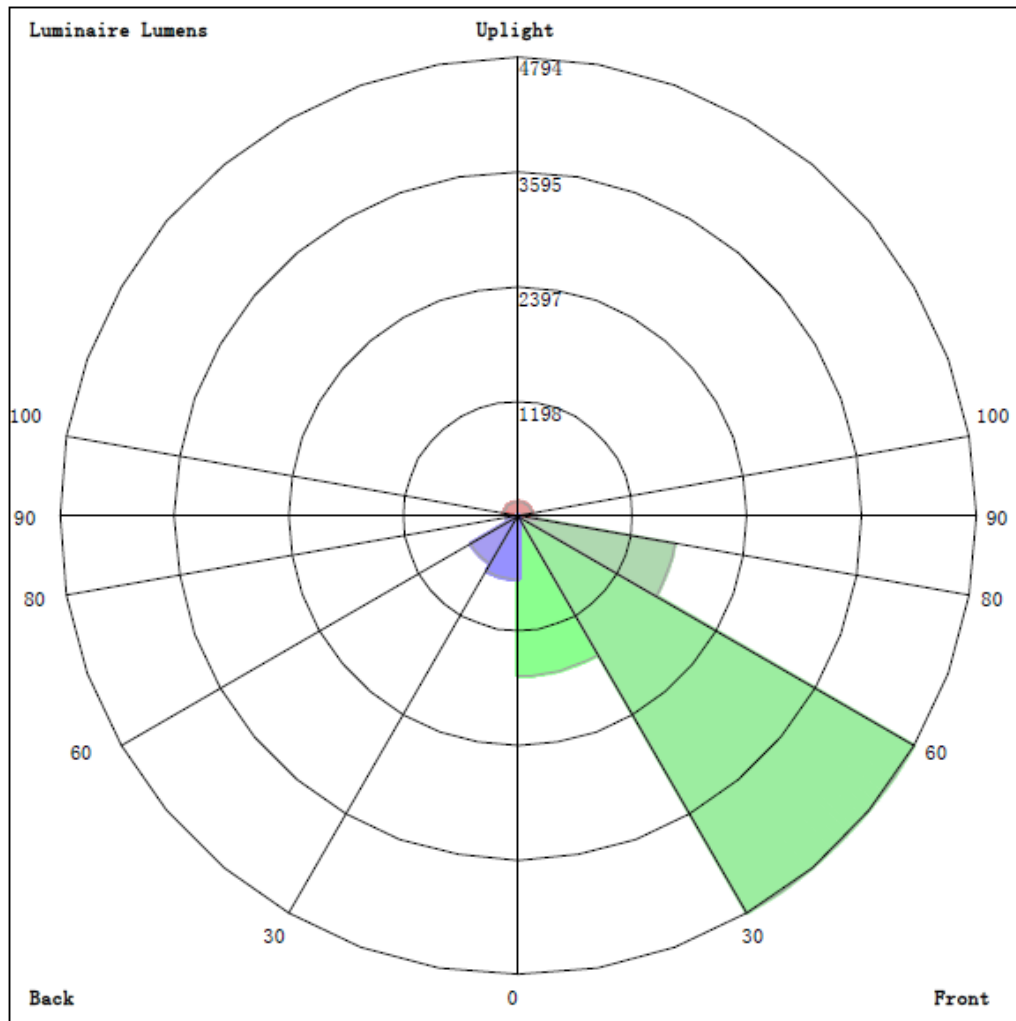
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	2728	3370	3850	3370	2728	2257	2200	2257	0- 10	254.8	254.8	2.56, 2.56
20	2448	4266	5032	4266	2448	1400	749.7	1400	10- 20	788.1	1043	10.5, 10.5
30	2084	5160	5785	5160	2084	680.3	412.5	680.3	20- 30	1293	2336	23.5, 23.5
40	1691	5186	6075	5186	1691	391.4	139.6	391.4	30- 40	1745	4081	41, 41
50	1475	5014	4496	5014	1475	172.7	64.59	172.7	40- 50	1913	5994	60.3, 60.3
60	1030	3560	3195	3560	1030	86.13	24.20	86.13	50- 60	1709	7703	77.4, 77.4
70	670.5	1813	1671	1813	670.5	11.78	2.010	11.78	60- 70	1203	8906	89.5, 89.5
80	286.0	559.7	535.2	559.7	286.0	5.781	2.642	5.781	70- 80	573.8	9480	95.3, 95.3
90	25.18	207.5	492.1	207.5	25.18	4.287	3.473	4.287	80- 90	202.7	9683	97.4, 97.4
100	25.93	162.5	211.5	162.5	25.93	4.546	4.124	4.546	90-100	115.2	9798	98.5, 98.5
110	15.21	54.74	69.65	54.74	15.21	2.966	4.930	2.966	100-110	45.03	9843	99, 99
120	15.91	100.6	59.07	100.6	15.91	2.767	3.371	2.767	110-120	30.30	9873	99.3, 99.3
130	8.262	81.78	97.02	81.78	8.262	2.791	3.929	2.791	120-130	31.95	9905	99.6, 99.6
140	1.810	47.69	94.57	47.69	1.810	3.007	4.160	3.007	130-140	23.92	9929	99.8, 99.8
150	1.603	21.36	43.85	21.36	1.603	3.332	3.899	3.332	140-150	11.89	9941	100, 100
160	1.879	1.520	13.72	1.520	1.879	3.440	3.398	3.440	150-160	3.658	9945	100, 100
170	2.212	2.083	2.249	2.083	2.212	2.779	2.458	2.779	160-170	0.9174	9946	100, 100
180	2.582	2.485	2.164	2.485	2.582	2.410	2.255	2.410	170-180	0.2319	9946	100, 100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	254.77	0-10	254.77	2.56%
10-20	788.14	0-20	1042.91	10.49%
20-30	1293.43	0-30	2336.34	23.49%
30-40	1744.84	0-40	4081.18	41.03%
40-50	1913.32	0-50	5994.50	60.27%
50-60	1708.56	0-60	7703.06	77.45%
60-70	1203.41	0-70	8906.47	89.55%
70-80	573.78	0-80	9480.25	95.32%
80-90	202.73	0-90	9682.98	97.36%
90-100	115.16	0-100	9798.14	98.52%
100-110	45.03	0-110	9843.17	98.97%
110-120	30.30	0-120	9873.47	99.27%
120-130	31.95	0-130	9905.42	99.59%
130-140	23.92	0-140	9929.34	99.83%
140-150	11.89	0-150	9941.23	99.95%
150-160	3.66	0-160	9944.89	99.99%
160-170	0.92	0-170	9945.81	100.00%
170-180	0.23	0-180	9946.04	100.00%

4.2 Goniophotometer Test

LCS/BUG

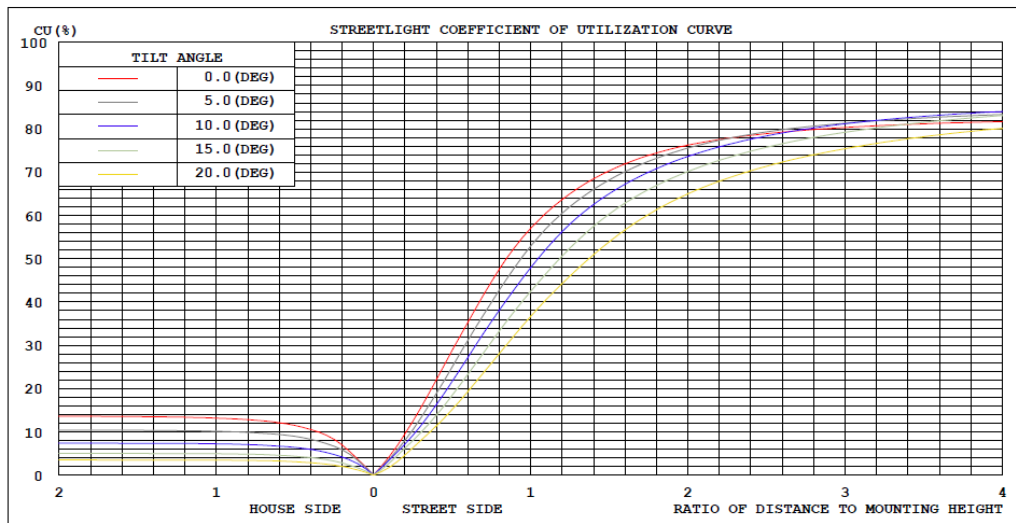


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

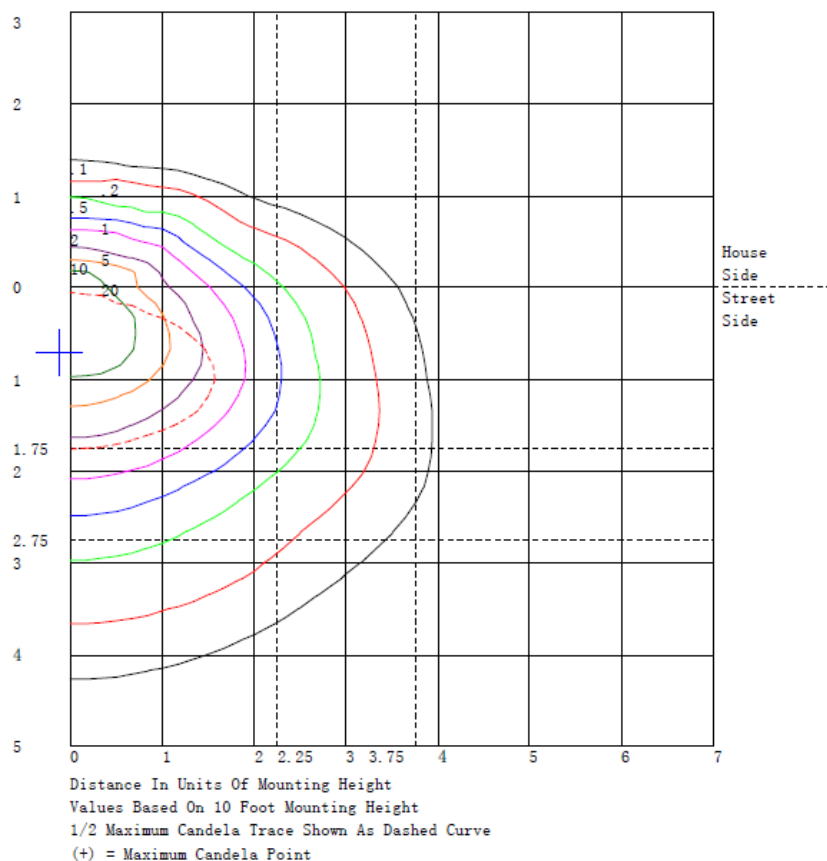
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	1673.3	N.A.	16.8
FM - Front-Medium (30-60)	4793.7	N.A.	48.2
FH - Front-High (60-80)	1666.1	N.A.	16.8
FVH - Front-Very High (80-90)	191.2	N.A.	1.9
BL - Back-Low (0-30)	663.1	N.A.	6.7
BM - Back-Medium (30-60)	573.1	N.A.	5.8
BH - Back-High (60-80)	111.1	N.A.	1.1
BVH - Back-Very High (80-90)	11.5	N.A.	0.1
UL - Uplight-Low (90-100)	115.2	N.A.	1.2
UH - Uplight-High (100-180)	147.9	N.A.	1.5
Total	9946.2	N.A.	100.0
BUG Rating	B2-U3-G2		

4.2 Goniophotometer Test

Coefficients of Utilization



Isolines



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DBG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	2890	2889	2888	2888	2888	2887	2886	2883	2880	2877	2878	2879	2881	2882	2883	2883	2882	2882	2882
5	2824	2783	2753	2734	2715	2716	2744	2866	2988	3077	2997	2890	2796	2833	2909	3006	3111	3204	3267
10	2728	2675	2673	2721	2853	3010	3165	3241	3305	3370	3496	3619	3718	3719	3699	3680	3741	3804	3850
15	2557	2624	2713	2823	2951	3103	3283	3547	3806	4021	4061	4053	4031	4086	4149	4212	4258	4290	4305
20	2448	2616	2812	3036	3321	3609	3873	4038	4166	4266	4353	4433	4512	4619	4727	4829	4925	4996	5032
25	2243	2418	2635	2896	3236	3591	3933	4181	4399	4599	4820	5025	5206	5339	5443	5519	5574	5602	5604
30	2084	2360	2663	2995	3374	3766	4156	4538	4880	5160	5288	5361	5405	5492	5575	5650	5714	5760	5785
35	1879	2284	2678	3061	3432	3792	4142	4496	4833	5143	5399	5625	5823	6016	6178	6300	6345	6355	6344
40	1691	2076	2488	2929	3445	3953	4417	4708	4954	5186	5336	5466	5563	5622	5615	5614	5617	5619	5615
45	1641	2133	2588	3003	3345	3674	4018	4512	4991	5399	5577	5652	5643	5573	5463	5338	5225	5134	5084
50	1475	1906	2340	2777	3239	3687	4105	4494	4807	5014	4973	4850	4697	4651	4621	4598	4552	4515	4496
55	1276	1592	1962	2387	2960	3518	3990	4159	4213	4191	4173	4130	4070	4011	3952	3898	3859	3833	3822
60	1030	1360	1712	2086	2544	2978	3342	3499	3564	3560	3517	3448	3372	3336	3307	3283	3244	3213	3195
65	855	1163	1472	1781	2135	2457	2712	2790	2792	2744	2691	2621	2543	2473	2409	2353	2314	2290	2282
70	671	855	1052	1261	1531	1778	1965	1968	1907	1813	1751	1695	1651	1640	1643	1653	1656	1662	1671
75	481	578	685	800	956	1097	1202	1181	1125	1061	1059	1067	1077	1069	1059	1049	1048	1050	1057
80	286	325	375	435	528	614	677	655	610	560	546	540	539	540	542	544	541	538	535
85	102	132	166	205	256	304	345	353	353	353	368	388	412	437	464	488	512	529	537
90	25.2	50.1	74.0	96.9	119	140	159	171	185	208	258	315	371	413	446	472	485	492	492
95	20.7	33.8	47.6	62.1	75.0	90.2	109	139	172	206	236	263	285	296	301	303	308	311	313
100	25.9	28.1	31.0	34.6	34.5	38.5	50.0	86.4	126	162	172	175	176	184	194	202	207	210	211
105	20.0	20.0	23.0	29.2	42.1	55.4	66.7	67.1	64.7	61.3	61.3	62.2	63.7	65.8	68.8	72.7	78.8	85.3	91.3
110	15.2	13.6	18.2	29.0	54.5	79.9	98.9	87.5	70.5	54.7	62.4	74.2	85.7	84.9	81.1	76.1	72.8	70.4	69.7
115	21.0	13.7	13.3	19.8	38.5	60.1	80.5	91.9	96.9	94.3	74.2	50.9	29.9	27.7	30.8	36.6	39.9	42.7	44.6
120	15.9	7.73	6.48	12.1	29.2	49.8	70.7	84.3	94.4	101	101	98.0	92.5	84.6	76.2	68.2	62.8	59.6	59.1
125	11.5	4.65	3.68	8.59	22.7	40.2	58.7	73.4	86.0	95.9	101	103	102	100	97.2	94.3	93.7	93.7	94.3
130	8.26	1.74	0.37	4.17	15.8	30.5	46.5	59.5	71.3	81.8	90.6	97.4	102	102	99.8	97.4	97.1	97.1	97.0
135	2.10	0.00	0.71	4.53	12.5	22.6	34.0	45.2	56.4	67.3	77.5	86.5	93.9	98.0	101	102	104	105	104
140	1.81	4.49	7.67	11.3	15.3	19.9	25.3	32.3	39.8	47.7	55.5	63.0	69.9	75.2	79.7	83.8	88.8	92.7	94.6
145	1.67	3.04	4.86	7.13	9.77	12.9	16.7	21.1	26.3	32.0	39.0	46.0	52.4	56.8	60.1	62.7	65.0	66.5	66.9
150	1.60	2.91	3.67	3.89	2.19	0.98	1.27	7.16	14.3	21.4	24.6	27.1	29.3	33.1	36.8	40.1	42.3	43.6	43.9
155	1.70	1.29	1.29	1.71	2.60	3.86	5.45	7.39	9.54	11.8	14.2	16.5	18.6	20.4	21.9	23.0	23.7	23.9	23.9
160	1.88	1.78	1.76	1.82	2.10	2.37	2.54	1.91	1.45	1.52	3.49	5.96	8.54	10.4	11.9	13.0	13.6	13.8	13.7
165	2.04	2.06	2.06	2.05	1.97	1.92	1.94	2.14	2.45	2.84	3.53	4.11	4.40	3.61	2.60	1.64	1.44	1.46	1.60
170	2.21	2.23	2.24	2.25	2.24	2.23	2.20	2.17	2.13	2.08	2.03	2.00	1.98	2.04	2.11	2.18	2.21	2.23	2.25
175	2.34	2.37	2.39	2.40	2.39	2.37	2.35	2.33	2.30	2.28	2.24	2.21	2.17	2.13	2.10	2.06	2.02	1.99	1.98
180	2.58	2.59	2.60	2.59	2.58	2.56	2.53	2.52	2.50	2.49	2.45	2.41	2.37	2.34	2.31	2.28	2.23	2.19	2.16

C (DEG)		UNIT: cd																	
γ (DEG)	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	2882	2882	2883	2883	2882	2881	2879	2878	2877	2880	2883	2886	2887	2888	2888	2888	2889	2890	2884
5	3204	3111	3006	2909	2833	2796	2890	2997	3077	2988	2866	2744	2716	2715	2734	2753	2783	2824	2601
10	3804	3741	3680	3699	3719	3718	3619	3496	3370	3305	3241	3165	3010	2853	2721	2673	2675	2728	2511
15	4290	4258	4212	4149	4086	4031	4053	4061	4021	3806	3547	3283	3103	2951	2823	2713	2624	2557	2408
20	4996	4925	4829	4727	4619	4512	4433	4353	4266	4166	4038	3873	3609	3321	3036	2812	2616	2448	2411
25	5602	5574	5519	5443	5339	5206	5025	4820	4599	4399	4181	3933	3591	3236	2896	2635	2418	2243	2243
30	5760	5714	5650	5575	5492	5405	5361	5288	5160	4880	4538	4156	3766	3374	2995	2663	2360	2084	2242
35	6355	6345	6300	6178	6016	5823	5625	5399	5143	4833	4496	4142	3792	3432	3061	2678	2284	1879	1983
40	6099	6137	6174	6215	6212	6136	5866	5536	5186	4954	4708	4417	3953	3445	2929	2488	2076	1691	1675
45	5134	5225	5338	5463	5573	5643	5652	5577	5399	4991	4512	4018	3674	3345	3003	2588	2133	1641	1473
50	4515	4552	4598	4621	4651	4697	4850	4973	5014	4807	4494	4105	3687	3239	2777	2340	1906	1475	1190
55	3833	3859	3898	3952	4011	4070	4130	4173	4191	4213	4159	3990	3518	2960	2387	1962	1592	1276	976
60	3213	3244	3283	3307	3336	3372	3448	3517	3560	3564	3499	3342	2978	2544	2086	1712	1360	1030	763
65	2290	2314	2353	2409	2473	2543	2621	2691	2744	2792	2790	2712	2457	2135	1781	1472	1163	855	628
70	1662	1656	1653	1643	1640	1651	1695	1751	1813	1907	1968	1965	1778	1531	1261	1052	855	671	507
75	1050	1048	1049	1059	1069	1077	1067	1059	1061	1125	1181	1202	1097	956	800	685	578	481	359
80	538	541	544	542	540	539	540	546	560	610	655	677	614	528	435	375	325	286	208
85	529	512	488	464	437	412	388	368	353	353	353	345	304	256	205	166	132	102	80.3
90	492	485	472	446	413	371	315	258	208	185	171	159	140	119	96.9	74.0	50.1	25.2	25.4
95	311	308	303	301	296	285	263	236	206	172	139	109	90.2	75.0	62.1	47.6	33.8	20.7	19.1
100	210	207	202	194	184	176	175	172	162	126	86.4	50.0	38.5	34.5	34.6	31.0	28.1	25.9	21.2
105	85.3	78.8	72.7	68.8	65.8	63.7	62.2	61.3	61.3	64.7	67.1	66.7	55.4	42.1	29.2	23.0	20.0	20.0	16.3
110	70.4	72.8	76.1	81.1	84.9	85.7	74.2	62.4	54.7	70.5	87.5	98.9	79.9	54.5	29.0	18.2	13.6	15.2	11.7
115	42.7	39.9	36.6	30.8	27.7	29.9	50.9	74.2	94.3	96.9	91.9	80.5	60.1	38.5	19.8	13.3	13.7	21.0	15.3
120	59.6	62.8	68.2	76.2	84.6	92.5	98.0	101	101	94.4	84.3	70.7	49.8	29.2	12.1	6.48	7.73	15.9	12.1
125	93.7	93.7	94.3	97.2	100	102	103	101	95.9	86.0	73.4	58.7	40.2	22.7	8.59	3.68	4.65	11.5	9.36
130	97.1	97.1	97.4	99.8	102	102	97.4	90.6	81.8	71.3	59.5	46.5	30.5	15.8	4.17	0.37	1.74	8.26	7.13
135	105	104	102	101	98.0	93.9	86.5	77.5	67.3	56.4	45.2	34.0	22.6	12.5	4.53	0.71	0.00	2.10	2.10
140	92.7	88.8	83.8	79.7	75.2	69.9	63.0	55.5	47.7	39.8	32.3	25.3	19.9	15.3	11.3	7.67	4.49	1.81	2.1
145	66.5	62.8	62.7	60.1	56.8	52.4	46.0	39.0	32.0	26.3	21.1	16.7	12.9	9.7	7.13	4.86	3.04	1.67	2.1
150	43.6	42.3	40.1	36.8	33.1	29.3	27.1	24.6	21.4	14.4	9.4	7.16	1.27	0.98	2.19	3.89	3.67	2.91	1.60
155	23.9	23.7	23.0	21.9	20.4	18.6	16.5	14.2	11.8	9.5	7.39	5.45	3.86	2.60	1.71	1.29	1.29	1.70	2.1
160	13.8	13.6	13.0	11.9	10.4	8.54	5.96	3.49	1.52	1.45	1.91	2.54	2.37	2.10	1.82	1.76	1.78	1.88	2.1
165	1.46	1.44	1.64	2.60	3.61	4.40	4.11	3.53	2.84	2.45	2.14	1.94	1.92	1.97	2.05	2.06	2.06	2.04	2.1
170	2.23	2.21	2.18	2.11	2.04	1.98	2.00	2.03	2.08	2.13	2.17	2.20	2.23	2.24	2.25	2.24	2.23	2.21	2.1
175	1.99	2.02	2.06	2.10	2.13	2.17	2.21	2.24	2.28	2.30	2.33	2.35	2.37	2.39	2.40	2.39	2.37	2.34	2.1
180	2.19	2.23	2.28	2.31	2.34	2.37	2.41	2.45	2.49	2.50	2.52	2.53	2.56	2.58	2.59	2.60	2.59	2.58	2.1

Table--3

UNIT: °C

γ	C (DEG)	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0		2844	2830	2825	2824	2826	2827	2830	2833	2833	2835	2839	2855	2872	2886	2888	2885	2882	2885	2888
5		2435	2324	2295	2303	2327	2319	2309	2300	2298	2295	2291	2271	2256	2255	2306	2363	2413	2363	2306
10		2357	2267	2278	2324	2374	2346	2303	2257	2230	2211	2201	2214	2231	2245	2239	2224	2200	2224	2239
15		2304	2244	2270	2310	2335	2256	2144	2011	1875	1740	1615	1524	1452	1401	1375	1364	1363	1364	1375
20		2368	2319	2288	2233	2135	1911	1657	1400	1208	1047	921	850	809	787	766	753	750	753	766
25		2204	2128	2014	1862	1671	1390	1106	856	751	699	678	651	634	623	610	601	596	601	610
30		2270	2169	1847	1463	1087	896	765	680	620	581	554	517	483	455	434	419	412	419	434
35		1970	1841	1498	1111	751	636	586	569	497	427	363	316	280	253	235	225	222	225	235
40		1596	1453	1191	907	644	522	444	391	319	257	207	176	157	146	140	138	140	138	140
45		1296	1113	901	696	514	398	313	252	202	167	145	139	140	145	142	139	137	139	142
50		948	749	609	502	416	319	237	173	147	136	131	112	93.1	76.9	69.2	65.3	64.6	65.3	69.2
55		731	539	422	344	292	230	178	136	106	84.6	69.8	60.1	54.5	51.7	48.9	47.4	47.1	47.4	48.9
60		548	384	289	232	197	152	115	86.1	65.2	50.4	40.3	33.4	29.3	27.2	25.3	24.4	24.2	24.4	25.3
65		442	299	212	157	124	88.7	62.5	43.0	26.2	13.8	5.47	1.68	0.53	0.98	0.95	1.25	1.63	1.25	0.95
70		369	257	177	119	77.4	45.8	24.7	11.8	4.27	1.23	1.04	0.37	0.53	1.15	1.48	1.80	2.01	1.80	1.48
75		255	172	111	67.1	37.5	20.2	11.4	8.11	4.03	1.87	1.07	0.62	0.74	1.19	1.61	2.02	2.29	2.02	1.61
80		143	92.2	58.3	35.5	21.4	12.3	7.58	5.78	3.36	1.95	1.29	1.01	1.12	1.48	1.93	2.37	2.64	2.37	1.93
85		61.5	45.3	31.7	20.7	12.5	8.08	5.73	4.66	3.21	2.23	1.67	1.48	1.56	1.85	2.35	2.82	3.13	2.82	2.35
90		24.6	22.5	18.5	13.9	9.54	7.16	5.46	4.29	3.31	2.64	2.25	2.05	2.06	2.23	2.71	3.17	3.47	3.17	2.71
95		17.4	15.4	13.1	10.7	8.44	6.61	5.07	3.86	3.13	2.68	2.46	2.32	2.32	2.47	2.94	3.39	3.68	3.39	2.94
100		17.1	13.7	10.9	8.76	7.10	5.94	5.12	4.55	3.97	3.53	3.22	3.00	2.92	2.98	3.41	3.84	4.12	3.84	3.41
105		12.9	9.86	6.93	4.52	2.80	2.56	2.89	3.53	3.84	4.13	4.36	4.34	4.29	4.28	4.60	4.91	5.11	4.91	4.60
110		9.00	7.00	6.10	5.65	5.40	4.51	3.66	2.97	2.80	2.86	3.09	3.42	3.80	4.20	4.54	4.79	4.93	4.79	4.54
115		10.8	7.43	5.71	4.84	4.47	3.82	3.33	3.02	2.96	3.02	3.13	3.16	3.18	3.21	3.27	3.32	3.35	3.32	3.27
120		9.02	6.62	5.13	4.19	3.63	3.15	2.88	2.77	2.82	2.95	3.11	3.17	3.21	3.24	3.30	3.35	3.37	3.35	3.30
125		7.50	5.96	4.76	3.85	3.21	2.84	2.67	2.67	2.80	3.00	3.21	3.30	3.37	3.43	3.51	3.57	3.60	3.57	3.51
130		6.09	5.15	4.26	3.51	2.94	2.74	2.70	2.79	2.90	3.05	3.23	3.40	3.55	3.69	3.81	3.89	3.93	3.89	3.81
135		2.98	3.18	3.15	3.02	2.87	2.84	2.85	2.91	3.06	3.23	3.41	3.53	3.64	3.73	3.83	3.91	3.96	3.91	3.83
140		3.46	3.80	3.61	3.25	2.86	2.83	2.89	3.01	3.11	3.24	3.38	3.55	3.72	3.88	4.00	4.10	4.16	4.10	4.00
145		3.02	3.35	3.32	3.16	2.96	2.99	3.07	3.18	3.28	3.39	3.52	3.69	3.85	4.00	4.09	4.15	4.17	4.15	4.09
150		2.74	3.06	3.14	3.11	3.06	3.14	3.23	3.33	3.39	3.45	3.53	3.69	3.84	3.97	3.97	3.94	3.90	3.94	3.97
155		2.94	3.30	3.43	3.44	3.39	3.36	3.33	3.31	3.35	3.42	3.51	3.64	3.77	3.85	3.79	3.70	3.61	3.70	3.79
160		3.24	3.63	3.75	3.73	3.63	3.56	3.49	3.44	3.46	3.49	3.53	3.52	3.51	3.48	3.46	3.43	3.40	3.43	3.46
165		3.35	3.71	3.78	3.72	3.59	3.52	3.46	3.40	3.35	3.30	3.25	3.14	3.04	2.95	2.96	2.98	3.01	2.98	2.96
170		3.21	3.47	3.50	3.41	3.25	3.09	2.93	2.78	2.71	2.67	2.65	2.60	2.55	2.51	2.48	2.46	2.46	2.46	2.48
175		3.04	3.22	3.25	3.19	3.05	2.86	2.66	2.49	2.45	2.45	2.45	2.38	2.31	2.25	2.26	2.29	2.33	2.29	2.26
180		2.56	2.56	2.56	2.56	2.55	2.52	2.47	2.41	2.34	2.28	2.22	2.19	2.18	2.18	2.20	2.22	2.25	2.22	2.20

																	UNIT: °cd			
γ	C (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
	(DEG)																			
0		2886	2872	2855	2839	2835	2833	2833	2830	2827	2826	2824	2825	2830	2844	2864				
5		2255	2256	2271	2291	2295	2298	2300	2309	2319	2327	2303	2295	2324	2435	2601				
10		2245	2231	2214	2201	2211	2230	2257	2303	2346	2374	2324	2278	2267	2357	2511				
15		1401	1452	1524	1615	1740	1875	2011	2144	2256	2335	2310	2270	2244	2304	2408				
20		787	809	850	921	1047	1208	1400	1657	1911	2135	2233	2288	2319	2368	2411				
25		623	634	651	678	699	751	856	1106	1390	1671	1862	2014	2128	2204	2243				
30		455	483	517	554	581	620	680	765	896	1087	1463	1847	2169	2270	2242				
35		253	280	316	363	427	497	569	586	636	751	1111	1498	1841	1970	1983				
40		146	157	176	207	257	319	391	444	522	644	907	1191	1453	1596	1675				
45		145	140	139	145	167	202	252	313	398	514	696	901	1113	1296	1473				
50		76.9	93.1	112	131	136	147	173	237	319	416	502	609	749	948	1190				
55		51.7	54.5	60.1	69.8	84.6	106	136	178	230	292	344	422	539	731	976				
60		27.2	29.3	33.4	40.3	50.4	65.2	86.1	115	152	197	232	289	384	548	763				
65		0.98	0.53	1.68	5.47	13.8	26.2	43.0	62.5	88.7	124	157	212	299	442	628				
70		1.15	0.53	0.37	1.04	1.23	4.27	11.8	24.7	45.8	77.4	119	177	257	369	507				
75		1.19	0.74	0.62	1.07	1.87	4.03	8.11	11.4	20.2	37.5	67.1	111	172	255	359				
80		1.48	1.12	1.01	1.29	1.95	3.36	5.78	7.58	12.3	21.4	35.5	58.3	92.2	143	208				
85		1.85	1.56	1.48	1.67	2.23	3.21	4.66	5.73	8.08	12.5	20.7	31.7	45.3	61.5	80.3				
90		2.23	2.06	2.05	2.25	2.64	3.31	4.29	5.46	7.16	9.54	13.9	18.5	22.5	24.6	25.4				
95		2.47	2.32	2.32	2.46	2.68	3.13	3.86	5.07	6.61	8.44	10.7	13.1	15.4	17.4	19.1				
100		2.98	2.92	3.00	3.22	3.53	3.97	4.55	5.12	5.94	7.10	8.76	10.9	13.7	17.1	21.2				
105		4.28	4.29	4.34	4.36	4.13	3.84	3.53	2.89	2.56	2.80	4.52	6.93	9.86	12.9	16.3				
110		4.20	3.80	3.42	3.09	2.86	2.80	2.97	3.66	4.51	5.40	5.65	6.10	7.00	9.00	11.7				
115		3.21	3.18	3.16	3.13	3.02	2.96	3.02	3.33	3.82	4.47	4.84	5.71	7.43	10.8	15.3				
120		3.24	3.21	3.17	3.11	2.95	2.82	2.77	2.88	3.15	3.63	4.19	5.13	6.62	9.02	12.1				
125		3.43	3.37	3.30	3.21	3.00	2.80	2.67	2.67	2.84	3.21	3.85	4.76	5.96	7.50	9.36				
130		3.69	3.55	3.40	3.23	3.05	2.90	2.79	2.70	2.74	2.94	3.51	4.26	5.15	6.09	7.13				
135		3.73	3.64	3.53	3.41	3.23	3.06	2.91	2.85	2.84	2.87	3.02	3.15	3.18	2.98	2.62				
140		3.88	3.72	3.55	3.38	3.24	3.11	3.01	2.89	2.83	2.86	3.25	3.61	3.80	3.46	2.80				
145		4.00	3.85	3.69	3.52	3.39	3.28	3.18	3.07	2.99	2.96	3.16	3.32	3.35	3.02	2.46				
150		3.97	3.84	3.69	3.53	3.45	3.39	3.33	3.23	3.14	3.06	3.11	3.14	3.06	2.74	2.25				
155		3.85	3.77	3.64	3.51	3.42	3.35	3.31	3.33	3.36	3.39	3.44	3.43	3.30	2.94	2.40				
160		3.48	3.51	3.52	3.53	3.49	3.46	3.44	3.49	3.56	3.63	3.73	3.75	3.63	3.24	2.66				
165		2.95	3.04	3.14	3.25	3.30	3.35	3.40	3.46	3.52	3.59	3.72	3.78	3.71	3.35	2.79				
170		2.51	2.55	2.60	2.65	2.67	2.71	2.78	2.93	3.09	3.25	3.41	3.50	3.47	3.21	2.79				
175		2.25	2.31	2.38	2.45	2.45	2.45	2.49	2.66	2.82	3.05	3.19	3.25	3.22	3.04	2.75				
180		2.18	2.18	2.19	2.22	2.28	2.34	2.41	2.47	2.56	2.56	2.56	2.56	2.56	2.56	2.57				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX3 @ 65W / 3000K 480	Sample ID	231020002-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(%)
480.0	60	0.180	69.5	0.804	17.18

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	2023-08-25	2024-08-24
NTC-F01-019	Temperature & Humidity Meter	2022-11-12	2023-11-11

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