

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Prepared By

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Issue Date: 2023-10-26

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		14468
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		145.8
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		14080
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	141.9
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		99.2
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	4.31
			277V	8.66
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.997
			277V	0.939
Allowable CCTs* (K) (Integrating Sphere – Section 4.1)	IES LM-79-2008	7 steps	5029±283	5186
		4 steps	5029±220	
Minimum CRI (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	≥70		84.7
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		14
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		95
IES Rcs,h1 (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	-18%≤IES Rcs,h1≤+23%		-12%
Zonal Lumen Requirement (80°-90°) (Goniophotometer – Section 4.2)	IES LM-79-2008	≤10%		2.2%
Input Voltage (V)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Cast		120.0
(Goniophotometer – Section 4.2)		Non-Worst Case		277.0
Input Current (A)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		0.829
(Goniophotometer – Section 4.2)		Non-Worst Case		0.372
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		99.2
(Goniophotometer – Section 4.2)		Non-Worst Case		96.7

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-10-20	WPX3 @ 100W / 5000K	231020001-S1
2	Goniophotometer Test	2023-10-20	WPX3 @ 100W / 5000K	231020001-S1
3	THD and PF Test	2023-10-20	WPX3 @ 100W / 5000K	231020001-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. WPX3 @ 100W / 5000K, 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.	WPX3 @ 100W / 5000K	Sample ID	231020001-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

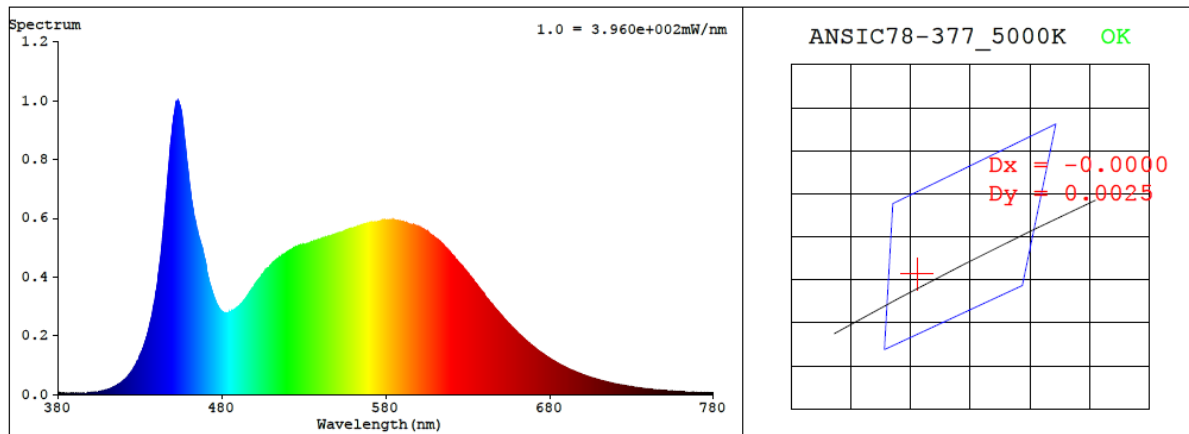
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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	0.829	99.2	0.997
277.0	60	0.372	96.7	0.939

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
5186	84.7	14	0.0013	85	95	-12%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.3401$ $y = 0.3501$ / $u' = 0.2086$ $v' = 0.4832$ ($duv = 1.29e-03$)

CCT= 5186K Prcp WL: $L_d = 567.8\text{nm}$ Purity=7.1%

Peak WL: $L_p = 453\text{nm}$ FWHM: $\approx 24.4\text{nm}$ Ratio: R=15.6% G=79.3% B=5.0%

Render Index: $R_a = 84.7$ AvgR = 78.5 TM30:Rf=84 Rg=95

EEI: 0.09135 A++ Highest

R1 =83 R2 =91 R3 =94 R4 =84 R5 =84 R6 =86 R7 =87

R8 =69 R9 =14 R10=77 R11=83 R12=64 R13=86 R14=97 R15=78

4.1 Integrating Sphere Test

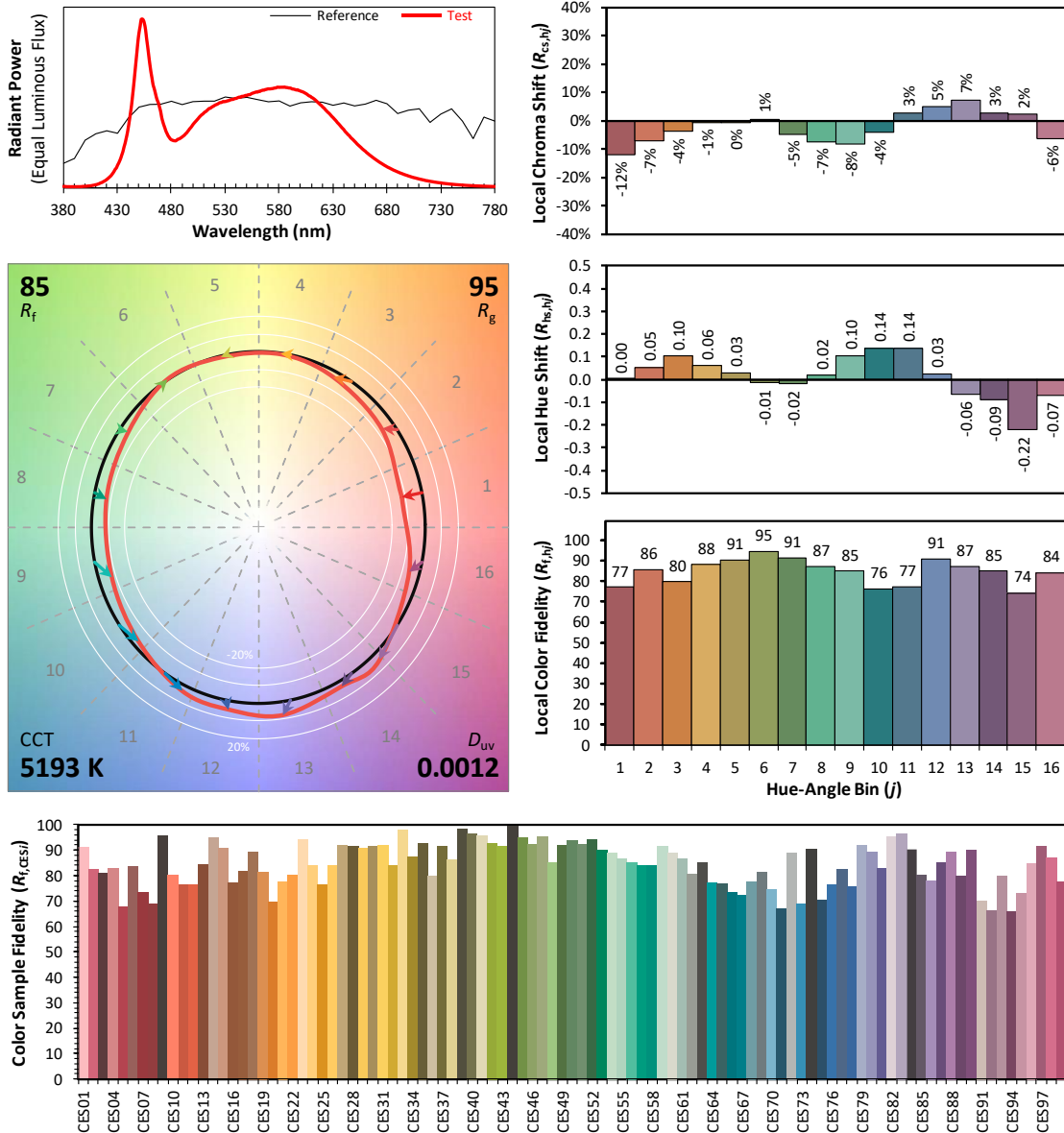
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/10/26

Model: WPX3 @ 100W / 5000K



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

x 0.3400
 y 0.3499
 u' 0.2087
 v' 0.4831

CIE 13.3-1995
(CRI)

R_a 85
 R_9 14

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	6.00E-06	447	7.36E-04	514	4.62E-04	581	5.93E-04	648	2.86E-04	715	4.27E-05
381	6.80E-06	448	8.00E-04	515	4.67E-04	582	5.93E-04	649	2.80E-04	716	4.10E-05
382	5.00E-06	449	8.67E-04	516	4.69E-04	583	5.94E-04	650	2.73E-04	717	4.01E-05
383	4.80E-06	450	9.17E-04	517	4.73E-04	584	5.93E-04	651	2.67E-04	718	3.90E-05
384	4.60E-06	451	9.54E-04	518	4.78E-04	585	5.94E-04	652	2.60E-04	719	3.76E-05
385	4.70E-06	452	9.95E-04	519	4.81E-04	586	5.92E-04	653	2.53E-04	720	3.65E-05
386	4.40E-06	453	9.97E-04	520	4.85E-04	587	5.92E-04	654	2.48E-04	721	3.54E-05
387	4.30E-06	454	9.90E-04	521	4.89E-04	588	5.90E-04	655	2.42E-04	722	3.45E-05
388	4.60E-06	455	9.69E-04	522	4.91E-04	589	5.89E-04	656	2.36E-04	723	3.33E-05
389	4.40E-06	456	9.35E-04	523	4.94E-04	590	5.89E-04	657	2.30E-04	724	3.21E-05
390	4.00E-06	457	8.80E-04	524	4.98E-04	591	5.87E-04	658	2.24E-04	725	3.12E-05
391	5.00E-06	458	8.33E-04	525	5.02E-04	592	5.83E-04	659	2.19E-04	726	3.02E-05
392	4.30E-06	459	7.79E-04	526	5.03E-04	593	5.83E-04	660	2.14E-04	727	2.92E-05
393	4.80E-06	460	7.29E-04	527	5.05E-04	594	5.81E-04	661	2.07E-04	728	2.84E-05
394	4.70E-06	461	6.84E-04	528	5.09E-04	595	5.79E-04	662	2.02E-04	729	2.76E-05
395	4.70E-06	462	6.47E-04	529	5.08E-04	596	5.77E-04	663	1.97E-04	730	2.71E-05
396	5.10E-06	463	6.08E-04	530	5.09E-04	597	5.79E-04	664	1.92E-04	731	2.59E-05
397	5.30E-06	464	5.87E-04	531	5.10E-04	598	5.75E-04	665	1.87E-04	732	2.47E-05
398	6.50E-06	465	5.62E-04	532	5.13E-04	599	5.73E-04	666	1.82E-04	733	2.42E-05
399	6.50E-06	466	5.35E-04	533	5.14E-04	600	5.70E-04	667	1.77E-04	734	2.34E-05
400	7.30E-06	467	5.15E-04	534	5.17E-04	601	5.68E-04	668	1.72E-04	735	2.27E-05
401	7.30E-06	468	4.99E-04	535	5.19E-04	602	5.65E-04	669	1.68E-04	736	2.19E-05
402	8.20E-06	469	4.75E-04	536	5.21E-04	603	5.63E-04	670	1.63E-04	737	2.13E-05
403	8.70E-06	470	4.50E-04	537	5.21E-04	604	5.59E-04	671	1.59E-04	738	2.06E-05
404	9.20E-06	471	4.15E-04	538	5.24E-04	605	5.55E-04	672	1.54E-04	739	1.99E-05
405	1.00E-05	472	3.90E-04	539	5.27E-04	606	5.51E-04	673	1.50E-04	740	1.93E-05
406	1.09E-05	473	3.69E-04	540	5.27E-04	607	5.46E-04	674	1.46E-04	741	1.88E-05
407	1.25E-05	474	3.52E-04	541	5.30E-04	608	5.42E-04	675	1.42E-04	742	1.80E-05
408	1.33E-05	475	3.32E-04	542	5.33E-04	609	5.39E-04	676	1.38E-04	743	1.75E-05
409	1.52E-05	476	3.19E-04	543	5.35E-04	610	5.34E-04	677	1.34E-04	744	1.68E-05
410	1.65E-05	477	3.06E-04	544	5.34E-04	611	5.30E-04	678	1.30E-04	745	1.64E-05
411	1.80E-05	478	2.97E-04	545	5.38E-04	612	5.26E-04	679	1.27E-04	746	1.59E-05
412	2.03E-05	479	2.87E-04	546	5.39E-04	613	5.21E-04	680	1.23E-04	747	1.54E-05
413	2.26E-05	480	2.82E-04	547	5.40E-04	614	5.15E-04	681	1.19E-04	748	1.52E-05
414	2.62E-05	481	2.80E-04	548	5.43E-04	615	5.09E-04	682	1.16E-04	749	1.45E-05
415	2.84E-05	482	2.77E-04	549	5.45E-04	616	5.03E-04	683	1.13E-04	750	1.40E-05
416	3.10E-05	483	2.77E-04	550	5.45E-04	617	4.97E-04	684	1.10E-04	751	1.36E-05
417	3.52E-05	484	2.76E-04	551	5.48E-04	618	4.91E-04	685	1.07E-04	752	1.32E-05
418	3.83E-05	485	2.80E-04	552	5.49E-04	619	4.86E-04	686	1.03E-04	753	1.26E-05
419	4.25E-05	486	2.85E-04	553	5.50E-04	620	4.79E-04	687	1.01E-04	754	1.23E-05
420	4.73E-05	487	2.87E-04	554	5.54E-04	621	4.73E-04	688	9.77E-05	755	1.19E-05
421	5.25E-05	488	2.90E-04	555	5.57E-04	622	4.67E-04	689	9.48E-05	756	1.16E-05
422	5.81E-05	489	2.95E-04	556	5.59E-04	623	4.59E-04	690	9.21E-05	757	1.13E-05
423	6.40E-05	490	2.99E-04	557	5.62E-04	624	4.53E-04	691	8.94E-05	758	1.09E-05
424	7.01E-05	491	3.04E-04	558	5.64E-04	625	4.46E-04	692	8.64E-05	759	1.06E-05
425	7.85E-05	492	3.09E-04	559	5.66E-04	626	4.41E-04	693	8.43E-05	760	1.02E-05
426	8.73E-05	493	3.17E-04	560	5.64E-04	627	4.34E-04	694	8.18E-05	761	9.70E-06
427	9.75E-05	494	3.22E-04	561	5.69E-04	628	4.27E-04	695	7.94E-05	762	9.50E-06
428	1.09E-04	495	3.31E-04	562	5.68E-04	629	4.20E-04	696	7.68E-05	763	9.30E-06
429	1.16E-04	496	3.39E-04	563	5.72E-04	630	4.14E-04	697	7.46E-05	764	9.00E-06
430	1.31E-04	497	3.48E-04	564	5.74E-04	631	4.07E-04	698	7.25E-05	765	8.80E-06
431	1.43E-04	498	3.55E-04	565	5.76E-04	632	4.00E-04	699	7.04E-05	766	8.60E-06
432	1.58E-04	499	3.63E-04	566	5.76E-04	633	3.93E-04	700	6.79E-05	767	8.20E-06
433	1.73E-04	500	3.72E-04	567	5.79E-04	634	3.84E-04	701	6.61E-05	768	8.10E-06
434	1.93E-04	501	3.80E-04	568	5.80E-04	635	3.78E-04	702	6.40E-05	769	7.70E-06
435	2.12E-04	502	3.88E-04	569	5.82E-04	636	3.71E-04	703	6.18E-05	770	7.50E-06
436	2.39E-04	503	3.95E-04	570	5.84E-04	637	3.63E-04	704	6.01E-05	771	7.30E-06
437	2.61E-04	504	4.02E-04	571	5.83E-04	638	3.56E-04	705	5.81E-05	772	7.10E-06
438	2.89E-04	505	4.09E-04	572	5.84E-04	639	3.49E-04	706	5.69E-05	773	6.80E-06
439	3.18E-04	506	4.17E-04	573	5.85E-04	640	3.42E-04	707	5.52E-05	774	6.70E-06
440	3.55E-04	507	4.23E-04	574	5.86E-04	641	3.33E-04	708	5.33E-05	775	6.40E-06
441	3.96E-04	508	4.30E-04	575	5.87E-04	642	3.26E-04	709	5.18E-05	776	6.30E-06
442	4.40E-04	509	4.34E-04	576	5.89E-04	643	3.19E-04	710	5.01E-05	777	6.10E-06
443	4.86E-04	510	4.40E-04	577	5.89E-04	644	3.12E-04	711	4.84E-05	778	5.90E-06
444	5.44E-04	511	4.46E-04	578	5.93E-04	645	3.07E-04	712	4.74E-05	779	5.90E-06
445	6.04E-04	512	4.50E-04	579	5.94E-04	646	2.99E-04	713	4.55E-05	780	5.90E-06
446	6.70E-04	513	4.56E-04	580	5.93E-04	647	2.92E-04	714	4.45E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	WPX3 @ 100W / 5000K	Sample ID	231020001-S1
Operate time (Min.)	30	Stabilization time (Min.)	60
Temperature (°C)	24.8	Humidity (%RH)	42.9

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	120.0	60	0.829	99.2	0.997
NON-WORST CASE	277.0	60	0.372	96.7	0.939

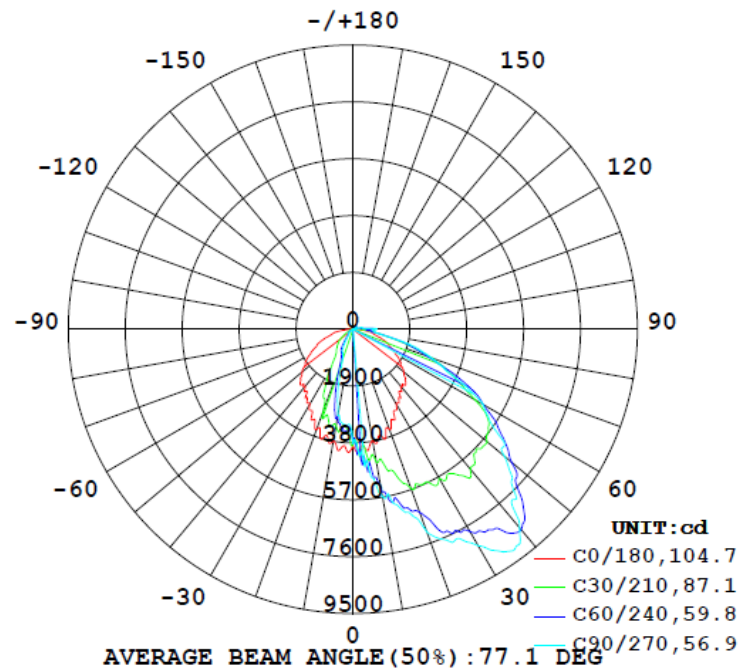
Test Result

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	14468	105.9	147.5	56.4	100.5	145.8	2.2%	B2-U3-G3
0°-90° zones	14080	105.9	147.5	56.4	100.5	141.9	2.2%	B2-U3-G3

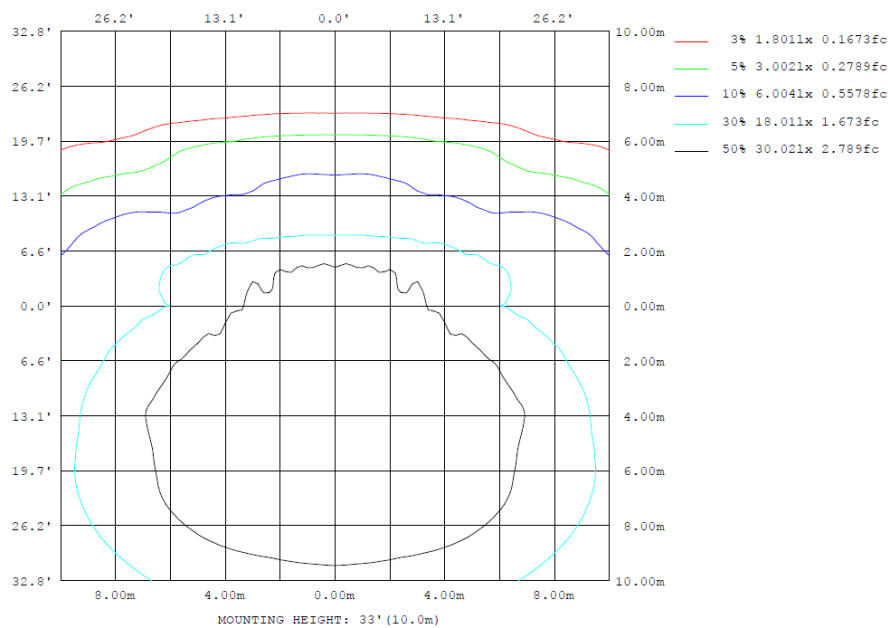
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

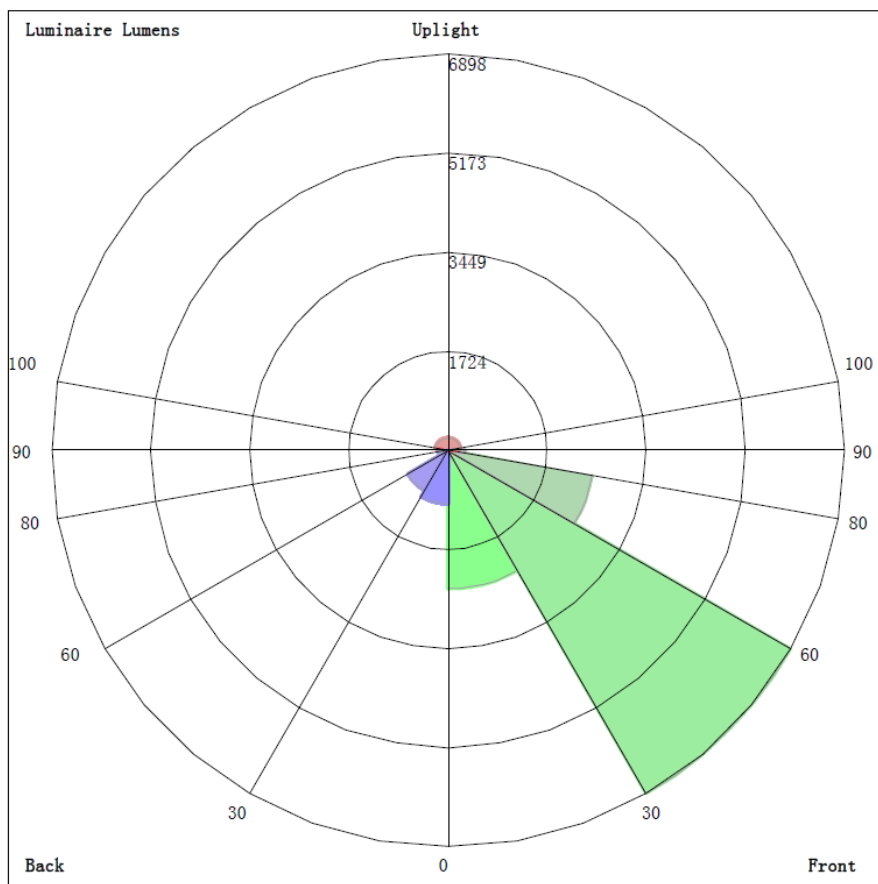
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	3784	5114	5658	5114	3784	3321	2926	3321	0- 10	371.2	371.2	2.57,2.57
20	3566	6144	7199	6144	3566	1999	1005	1999	10- 20	1134	1505	10.4,10.4
30	2900	7220	8353	7220	2900	897.9	611.2	897.9	20- 30	1839	3345	23.1,23.1
40	2486	7270	8643	7270	2486	562.3	202.3	562.3	30- 40	2488	5832	40.3,40.3
50	2215	6917	6613	6917	2215	251.6	97.07	251.6	40- 50	2749	8581	59.3,59.3
60	1632	5145	5007	5145	1632	128.1	45.84	128.1	50- 60	2471	11052	76.4,76.4
70	1118	2761	2794	2761	1118	22.11	1.762	22.11	60- 70	1805	12857	88.9,88.9
80	623.9	955.1	925.2	955.1	623.9	8.112	2.765	8.112	70- 80	910.1	13767	95.2,95.2
90	63.23	301.0	759.8	301.0	63.23	5.516	3.741	5.516	80- 90	312.9	14080	97.3,97.3
100	50.63	235.3	330.0	235.3	50.63	5.721	5.245	5.721	90-100	169.3	14249	98.5,98.5
110	31.28	84.57	111.8	84.57	31.28	4.558	6.069	4.558	100-110	66.90	14316	98.9,98.9
120	23.23	144.5	88.07	144.5	23.23	4.238	4.981	4.238	110-120	45.02	14361	99.3,99.3
130	12.28	117.2	148.8	117.2	12.28	4.269	5.675	4.269	120-130	47.77	14409	99.6,99.6
140	2.227	68.75	139.9	68.75	2.227	4.614	6.014	4.614	130-140	35.40	14444	99.8,99.8
150	2.326	28.65	63.46	28.65	2.326	5.015	5.768	5.015	140-150	17.02	14461	100,100
160	2.760	2.312	18.67	2.312	2.760	5.096	4.970	5.096	150-160	5.127	14466	100,100
170	3.236	3.104	3.140	3.104	3.236	4.109	3.582	4.109	160-170	1.319	14468	100,100
180	3.770	3.607	3.140	3.607	3.770	3.513	3.273	3.513	170-180	0.3414	14468	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Zonal (lm)		Total (lm)		Percent
0-10	371.18	0-10	371.18	2.57%
10-20	1134.14	0-20	1505.32	10.40%
20-30	1839.29	0-30	3344.61	23.12%
30-40	2487.69	0-40	5832.30	40.31%
40-50	2748.50	0-50	8580.80	59.31%
50-60	2471.30	0-60	11052.10	76.39%
60-70	1804.69	0-70	12856.79	88.87%
70-80	910.09	0-80	13766.88	95.16%
80-90	312.94	0-90	14079.82	97.32%
90-100	169.32	0-100	14249.14	98.49%
100-110	66.90	0-110	14316.04	98.95%
110-120	45.02	0-120	14361.06	99.26%
120-130	47.77	0-130	14408.83	99.59%
130-140	35.40	0-140	14444.23	99.84%
140-150	17.02	0-150	14461.25	99.96%
150-160	5.13	0-160	14466.38	99.99%
160-170	1.32	0-170	14467.70	100.00%
170-180	0.34	0-180	14468.04	100.00%

4.2 Goniophotometer Test

LCS/BUG

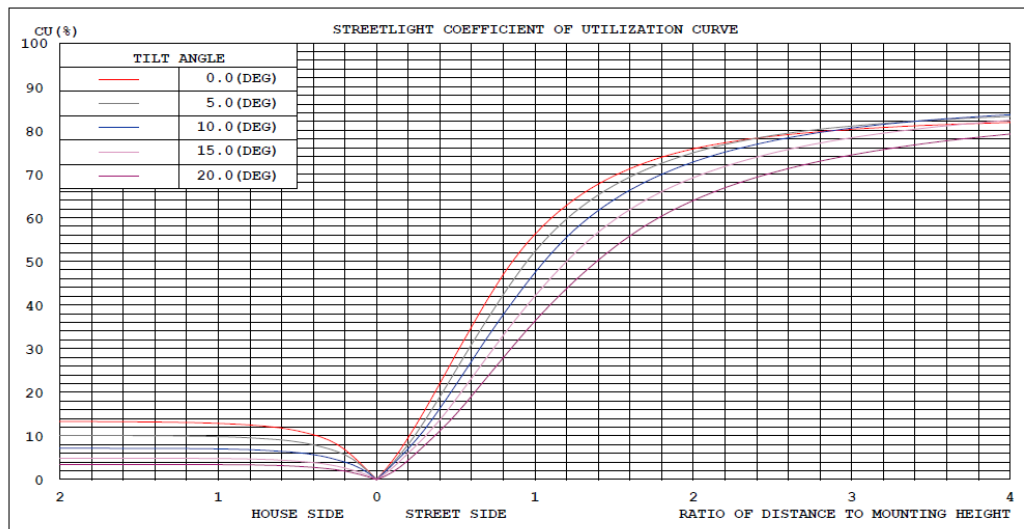


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

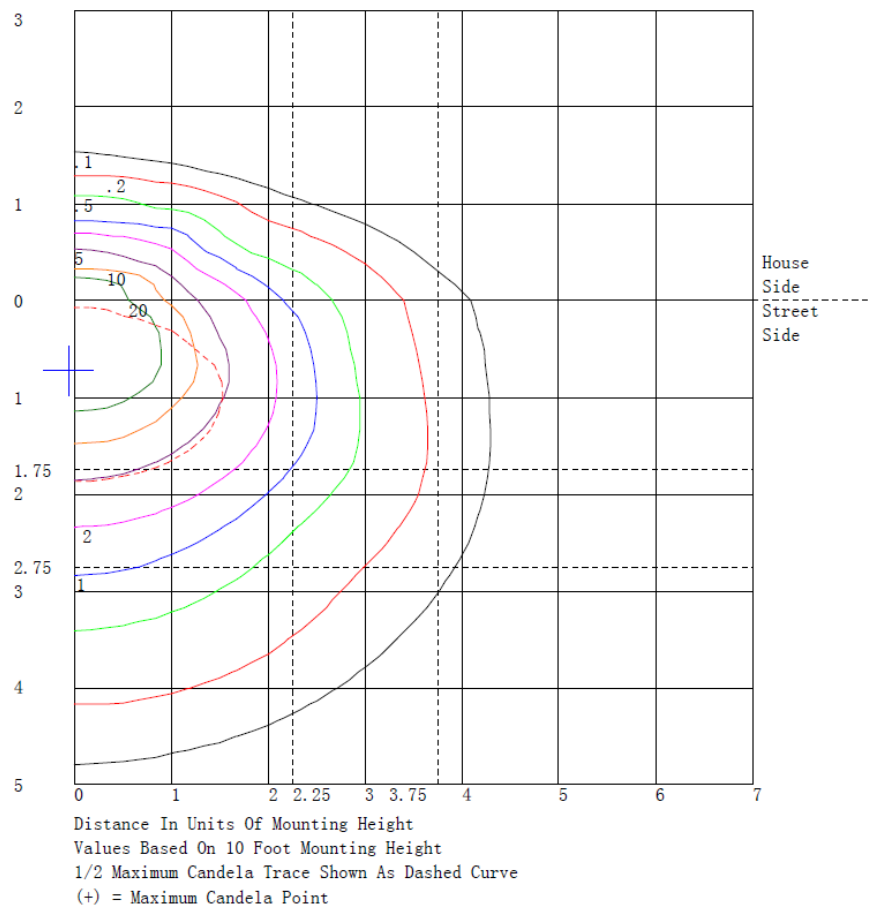
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	2412.4	N.A.	16.7
FM - Front-Medium (30-60)	6897.7	N.A.	47.7
FH - Front-High (60-80)	2542.5	N.A.	17.6
FVH - Front-Very High (80-90)	291.7	N.A.	2.0
BL - Back-Low (0-30)	932.2	N.A.	6.4
BM - Back-Medium (30-60)	809.8	N.A.	5.6
BH - Back-High (60-80)	172.3	N.A.	1.2
BVH - Back-Very High (80-90)	21.2	N.A.	0.1
UL - Uplight-Low (90-100)	169.3	N.A.	1.2
UH - Uplight-High (100-180)	218.9	N.A.	1.5
Total	14468.0	N.A.	100.0
BUG Rating	B2-U3-G3		

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	3874	3873	3871	3869	3867	3864	3861	3857	3853	3848	3840	3833	3825	3819	3814	3812	3817	3822	3824
5	3924	3899	3879	3862	3823	3809	3841	4035	4246	4422	4382	4305	4238	4335	4460	4581	4612	4621	4618
10	3784	3716	3724	3808	4007	4253	4516	4733	4933	5114	5265	5393	5495	5564	5612	5642	5653	5656	5658
15	3702	3739	3839	4002	4250	4545	4869	5230	5569	5851	5949	5988	6001	6075	6147	6205	6221	6220	6207
20	3566	3661	3857	4154	4645	5166	5648	5881	6036	6144	6274	6392	6505	6623	6739	6855	7006	7129	7199
25	3320	3561	3863	4225	4704	5200	5672	5986	6258	6513	6846	7162	7435	7583	7679	7739	7798	7838	7860
30	2900	3352	3814	4285	4772	5264	5759	6290	6788	7220	7478	7664	7802	7949	8074	8176	8260	8319	8353
35	2799	3424	4005	4544	5023	5470	5898	6346	6777	7183	7539	7866	8167	8481	8755	8968	9048	9070	9053
40	2486	3195	3860	4483	5065	5602	6092	6497	6881	7270	7615	8327	8741	8837	8820	8741	8694	8655	8643
45	2491	3193	3836	4418	4899	5352	5809	6423	7015	7523	7775	7911	7957	7951	7899	7818	7714	7623	7570
50	2215	2805	3400	4002	4651	5275	5844	6302	6663	6917	6987	6974	6913	6892	6860	6816	6734	6660	6613
55	1957	2334	2799	3354	4125	4889	5548	5801	5909	5928	5979	6003	6009	6018	6011	5983	5887	5793	5730
60	1632	2000	2425	2906	3536	4154	4692	4954	5096	5145	5129	5075	5008	4998	4999	5005	5003	5003	5007
65	1339	1744	2145	2542	2974	3374	3711	3899	4010	4058	4060	4023	3959	3876	3788	3709	3669	3649	3647
70	1118	1326	1560	1820	2164	2492	2759	2823	2814	2761	2720	2677	2647	2671	2708	2750	2771	2786	2794
75	792	895	1003	1146	1358	1560	1721	1715	1669	1619	1668	1735	1808	1854	1891	1919	1933	1941	1947
80	624	631	655	698	777	861	934	957	962	955	944	931	918	915	915	917	920	922	925
85	262	277	300	330	374	421	466	497	522	544	565	584	604	630	656	683	712	735	750
90	63.2	92.9	122	150	177	203	229	245	267	301	375	459	546	619	682	731	751	759	760
95	39.6	56.7	74.7	93.7	111	131	157	197	242	289	334	374	405	413	412	406	402	397	395
100	50.6	47.9	48.5	52.5	55.6	65.2	84.7	133	187	235	253	263	269	284	299	312	321	327	330
105	36.8	30.9	31.5	38.4	57.8	79.1	97.7	99.2	96.2	91.3	90.8	91.2	92.3	94.6	97.3	100	103	106	107
110	31.3	23.8	27.0	40.9	78.3	117	146	130	106	84.6	97.8	117	136	135	129	122	116	113	112
115	31.4	20.3	19.3	28.4	55.6	87.0	117	133	140	136	109	76.1	46.8	42.1	45.2	53.5	63.3	73.2	80.8
120	23.2	11.5	9.60	17.6	41.7	70.9	101	120	134	144	149	149	144	133	119	106	95.5	89.2	88.1
125	16.8	7.13	5.67	12.4	31.9	56.2	82.0	102	120	135	144	151	155	156	155	154	151	148	146
130	12.3	3.06	1.09	6.36	22.5	43.1	65.6	84.1	101	117	131	143	151	154	154	153	151	150	149
135	2.59	0.85	2.93	8.84	19.9	33.8	49.5	65.8	82.4	98.4	113	126	137	144	149	153	156	158	159
140	2.23	6.17	10.7	15.9	21.4	27.7	35.3	45.6	56.9	68.7	80.6	91.9	102	109	115	121	129	136	140
145	2.27	4.23	6.78	9.90	13.3	17.6	22.8	29.7	37.6	46.2	55.9	65.4	74.1	80.1	84.8	88.6	92.7	95.7	97.2
150	2.33	4.28	5.42	5.75	3.40	1.65	1.89	9.63	19.1	28.7	33.5	37.5	41.1	46.3	51.5	56.1	59.8	62.3	63.5
155	2.51	2.07	2.13	2.69	3.89	5.49	7.38	9.15	11.2	13.8	17.5	21.4	25.2	28.0	30.2	31.9	32.9	33.5	33.6
160	2.76	2.69	2.69	2.75	2.99	3.21	3.33	2.61	2.13	2.31	4.73	7.78	11.0	13.6	15.9	17.6	18.4	18.7	18.7
165	2.98	3.06	3.10	3.10	3.00	2.91	2.89	3.05	3.33	3.75	4.66	5.46	5.89	4.91	3.64	2.42	2.17	2.19	2.36
170	3.24	3.29	3.32	3.34	3.35	3.33	3.30	3.25	3.18	3.10	3.03	2.97	2.93	2.94	2.98	3.03	3.06	3.10	3.14
175	3.41	3.46	3.49	3.51	3.50	3.49	3.46	3.44	3.42	3.39	3.34	3.28	3.22	3.16	3.10	3.05	3.01	2.99	3.00
180	3.77	3.78	3.78	3.77	3.75	3.72	3.69	3.66	3.64	3.61	3.55	3.50	3.44	3.39	3.34	3.29	3.23	3.18	3.14

C (DEG)																	UNIT: cd		
y	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	3822	3817	3812	3814	3819	3825	3833	3840	3848	3853	3857	3861	3864	3867	3869	3871	3873	3874	3851
5	4621	4612	4581	4460	4335	4238	4305	4382	4422	4246	4035	3841	3809	3823	3862	3879	3899	3924	3628
10	5656	5653	5642	5612	5564	5495	5393	5265	5114	4933	4733	4516	4253	4007	3808	3724	3716	3784	3501
15	6220	6221	6205	6147	6075	6001	5988	5949	5851	5569	5230	4869	4545	4250	4002	3839	3739	3702	3495
20	7129	7006	6855	6739	6623	6505	6392	6274	6144	6036	5881	5648	5166	4645	4154	3857	3661	3566	3397
25	7838	7798	7739	7679	7583	7435	7162	6846	6513	6258	5986	5672	5200	4704	4225	3863	3561	3320	3411
30	8319	8260	8176	8074	7949	7802	7664	7478	7220	6788	6290	5759	5264	4772	4285	3814	3352	2900	3043
35	9070	9048	8968	8755	8481	8167	7866	7539	7183	6777	6346	5898	5470	5023	4544	4005	3424	2799	2917
40	8655	8694	8741	8820	8837	8741	8327	7815	7270	6881	6497	6092	5602	5065	4483	3860	3195	2486	2390
45	7623	7714	7818	7899	7951	7957	7911	7775	7523	7015	6423	5809	5352	4899	4418	3836	3193	2491	2126
50	6660	6734	6816	6860	6892	6913	6974	6987	6917	6663	6302	5844	5275	4651	4002	3400	2805	2215	1708
55	5793	5887	5983	6011	6018	6009	6003	5979	5928	5909	5801	5548	4889	4125	3354	2799	2334	1957	1443
60	5003	5003	5005	4999	4998	5008	5075	5129	5145	5096	4954	4692	4154	3536	2906	2425	2000	1632	1178
65	3649	3669	3709	3788	3876	3959	4023	4060	4058	4010	3899	3711	3374	2974	2542	2145	1744	1339	971
70	2786	2771	2750	2708	2671	2647	2677	2720	2761	2814	2823	2759	2492	2164	1820	1560	1326	1118	817
75	1941	1933	1919	1891	1854	1808	1735	1668	1619	1669	1715	1721	1560	1358	1146	1003	885	792	579
80	922	920	917	915	915	918	931	944	955	962	957	934	861	777	698	655	631	624	422
85	735	712	683	656	630	604	584	565	544	522	497	466	421	374	330	300	277	262	183
90	759	751	731	682	619	546	459	375	301	267	245	229	203	177	150	122	92.9	63.2	53.3
95	397	402	406	412	413	405	374	334	289	242	197	157	131	111	93.7	74.7	56.7	39.6	34.6
100	327	321	312	299	284	269	263	253	235	187	133	84.7	65.2	55.6	52.5	48.5	47.9	50.6	39.2
105	106	103	100	97.3	94.6	92.3	91.2	90.8	91.3	96.2	99.2	97.7	79.1	57.8	38.4	31.5	30.9	36.8	28.6
110	113	116	122	129	135	136	117	97.8	84.6	106	130	146	117	78.3	40.9	27.0	23.8	31.3	21.0
115	73.2	63.3	53.5	45.2	42.1	46.8	76.1	109	136	140	133	117	87.0	55.6	28.4	19.3	20.3	31.4	21.4
120	89.2	95.5	106	119	133	144	149	149	144	134	120	101	70.9	41.7	17.6	9.60	11.5	23.2	16.7
125	148	151	154	155	156	155	151	144	135	120	102	82.0	56.2	31.9	12.4	5.67	7.13	16.8	13.1
130	150	151	153	154	154	151	143	131	117	101	84.1	65.6	43.1	22.5	6.36	1.09	3.06	12.3	10.4
135	158	156	153	149	144	137	126	113	98.4	82.4	65.8	49.5	33.8	19.9	8.84	2.93	0.85	2.59	3.62
140	136	129	121	115	109	102	91.9	80.6	68.7	56.9	45.6	35.3	27.7	21.4	15.9	10.7	6.17	2.23	3.99
145	95.7	92.7	88.6	84.8	80.1	74.1	65.4	55.9	46.2	37.6	29.7	22.8	17.6	13.3	9.90	6.78	4.23	2.27	3.55
150	62.3	59.8	56.1	51.5	46.3	41.1	37.5	33.5	28.7	19.1	9.63	1.89	1.65	3.40	5.75	5.42	2.28	2.33	3.33
155	33.5	32.9	31.9	30.2	28.0	25.2	21.4	17.5	13.8	11.2	9.15	7.38	5.49	3.89	2.69	2.13	4.07	2.51	3.55
160	18.7	18.4	17.6	15.9	13.6	11.0	7.78	4.78	3.31	2.13	2.61	3.33	3.21	2.99	2.75	2.69	2.69	2.76	3.99
165	2.19	2.17	2.42	3.64	4.91	5.89	5.46	4.66	2.35	3.33	3.05	2.89	2.91	3.30	3.10	3.06	2.98	4.11	4.11
170	3.10	3.06	3.03	2.98	2.94	2.93	2.97	3.03	3.10	3.18	3.25	3.30	3.33	3.35	3.34	3.32	3.29	3.24	4.11
175	2.99	3.01	3.05	3.10	3.16	3.22	3.28	3.34	3.39	3.42	3.44	3.46	3.49	3.50	3.51	3.49	3.46	3.41	4.00
180	3.18	3.23	3.29	3.34	3.39	3.44	3.50	3.55	3.61	3.64	3.66	3.69	3.72	3.75	3.77	3.78	3.78	3.77	3.78

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	3833	3820	3813	3810	3810	3811	3812	3813	3812	3810	3807	3800	3794	3791	3801	3814	3824	3814	3801
5	3406	3257	3211	3216	3248	3249	3258	3280	3344	3408	3456	3440	3401	3348	3282	3222	3180	3222	3282
10	3297	3172	3163	3205	3271	3310	3332	3321	3203	3073	2963	2989	3040	3088	3033	2971	2926	2971	3033
15	3335	3221	3190	3178	3158	3058	2931	2785	2623	2459	2303	2178	2072	1985	1918	1874	1856	1874	1918
20	3253	3135	3090	3034	2933	2657	2333	1999	1719	1474	1274	1161	1092	1055	1024	1008	1005	1008	1024
25	3395	3272	3003	2658	2267	1849	1454	1123	985	923	907	882	870	866	851	839	832	839	851
30	3032	2865	2432	1928	1438	1181	1007	898	840	813	800	755	711	670	641	621	611	621	641
35	2867	2648	2114	1522	982	830	785	789	702	613	530	468	418	379	352	335	330	335	352
40	2223	1986	1605	1208	851	701	615	562	464	375	300	260	236	222	210	204	202	204	210
45	1788	1478	1188	932	716	565	451	366	294	242	209	200	203	212	210	208	207	208	210
50	1296	979	796	679	596	464	347	252	216	200	194	167	142	119	106	99.2	97.1	99.2	106
55	1033	725	561	470	419	335	262	200	157	125	103	88.2	79.7	75.5	72.2	71.0	71.5	71.0	72.2
60	816	546	405	328	289	224	171	128	97.3	75.4	61.0	52.4	48.3	47.0	45.7	45.4	45.8	45.4	45.7
65	673	445	312	231	184	133	94.4	66.4	43.6	27.0	15.6	7.90	3.48	1.46	0.56	0.70	1.36	0.70	0.56
70	570	377	252	169	117	71.2	40.9	22.1	9.55	3.23	1.23	0.13	0.60	1.82	1.85	1.83	1.76	1.83	1.85
75	403	262	166	99.1	56.5	29.8	16.3	11.3	5.36	2.40	1.53	1.11	1.45	2.13	2.25	2.30	2.27	2.30	2.25
80	261	142	77.8	44.3	31.1	17.2	10.4	8.11	4.64	2.66	1.82	1.61	1.90	2.42	2.60	2.73	2.77	2.73	2.60
85	119	70.3	42.2	26.0	18.0	11.2	7.69	6.26	4.23	2.94	2.27	2.18	2.42	2.82	3.03	3.20	3.29	3.20	3.03
90	43.9	35.3	27.0	19.6	13.5	9.73	7.17	5.52	4.17	3.33	2.91	2.83	2.98	3.25	3.46	3.63	3.74	3.63	3.46
95	29.8	25.0	20.1	15.5	11.5	8.83	6.86	5.47	4.53	3.98	3.72	3.62	3.67	3.83	4.07	4.31	4.47	4.31	4.07
100	29.6	21.9	16.6	12.8	10.1	8.07	6.65	5.72	5.00	4.57	4.35	4.28	4.33	4.49	4.77	5.05	5.24	5.05	4.77
105	21.4	15.5	10.5	6.77	4.28	3.79	4.19	5.01	5.26	5.47	5.62	5.58	5.51	5.49	5.73	6.00	6.20	6.00	5.73
110	13.3	8.12	6.83	7.12	8.01	6.89	5.65	4.56	4.36	4.45	4.70	4.89	5.12	5.38	5.68	5.92	6.07	5.92	5.68
115	13.7	8.44	6.57	6.26	6.70	5.90	5.14	4.55	4.48	4.59	4.77	4.84	4.89	4.93	4.97	4.99	5.00	4.99	4.97
120	11.6	7.91	6.26	5.62	5.53	4.94	4.51	4.24	4.30	4.49	4.72	4.82	4.89	4.93	4.97	4.99	4.98	4.99	4.97
125	10.1	7.74	6.30	5.41	4.90	4.45	4.20	4.14	4.30	4.56	4.84	4.98	5.09	5.16	5.23	5.26	5.25	5.26	5.23
130	8.69	7.27	6.08	5.14	4.48	4.21	4.16	4.27	4.41	4.61	4.84	5.09	5.32	5.52	5.63	5.68	5.67	5.68	5.63
135	4.35	4.79	4.78	4.59	4.34	4.33	4.38	4.49	4.69	4.93	5.18	5.37	5.53	5.66	5.74	5.78	5.78	5.78	5.74
140	5.19	5.83	5.56	4.98	4.34	4.31	4.42	4.61	4.77	4.95	5.15	5.43	5.69	5.92	6.00	6.02	6.01	6.02	6.00
145	4.53	5.09	5.05	4.79	4.47	4.52	4.64	4.82	4.97	5.14	5.33	5.59	5.84	6.04	6.09	6.08	6.03	6.08	6.09
150	4.10	4.60	4.71	4.67	4.57	4.69	4.85	5.02	5.13	5.25	5.38	5.58	5.77	5.91	5.90	5.85	5.77	5.85	5.90
155	4.36	4.91	5.09	5.10	5.02	4.99	4.96	4.96	5.03	5.14	5.27	5.42	5.55	5.64	5.57	5.46	5.35	5.46	5.57
160	4.80	5.38	5.55	5.52	5.36	5.27	5.17	5.10	5.14	5.21	5.26	5.22	5.16	5.08	5.04	5.01	4.97	5.01	5.04
165	4.95	5.49	5.60	5.51	5.32	5.25	5.17	5.09	5.00	4.90	4.78	4.62	4.46	4.33	4.32	4.34	4.37	4.34	4.32
170	4.76	5.15	5.19	5.06	4.81	4.58	4.33	4.11	4.02	3.96	3.91	3.82	3.73	3.65	3.61	3.58	3.58	3.58	3.61
175	4.49	4.75	4.76	4.63	4.40	4.13	3.85	3.60	3.56	3.56	3.57	3.46	3.35	3.26	3.27	3.31	3.37	3.31	3.27
180	3.77	3.77	3.77	3.76	3.74	3.68	3.60	3.51	3.42	3.32	3.24	3.20	3.19	3.18	3.20	3.23	3.27	3.23	3.20

C (DEG) γ (DEG)	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	3791	3794	3800	3807	3810	3812	3813	3812	3811	3810	3810	3813	3820	3833	3851				
5	3348	3401	3440	3456	3408	3344	3280	3258	3249	3248	3216	3211	3257	3406	3628				
10	3088	3040	2989	2963	3073	3203	3321	3332	3310	3271	3205	3163	3172	3297	3501				
15	1985	2072	2178	2303	2459	2623	2785	2931	3058	3158	3178	3190	3221	3335	3495				
20	1055	1092	1161	1274	1474	1719	1999	2333	2657	2933	3034	3090	3135	3253	3397				
25	866	870	882	907	923	985	1123	1454	1849	2267	2658	3003	3272	3395	3411				
30	670	711	755	800	813	840	898	1007	1181	1438	1928	2432	2865	3032	3043				
35	379	418	468	530	613	702	789	785	830	982	1522	2114	2648	2867	2917				
40	222	236	260	300	375	464	562	615	701	851	1208	1605	1986	2223	2390				
45	212	203	200	209	242	294	366	451	565	716	932	1188	1478	1788	2126				
50	119	142	167	194	200	216	252	347	464	596	679	796	979	1296	1708				
55	75.5	79.7	88.2	103	125	157	200	262	335	419	470	561	725	1033	1443				
60	47.0	48.3	52.4	61.0	75.4	97.3	128	171	224	289	328	405	546	816	1178				
65	1.46	3.48	7.90	15.6	27.0	43.6	66.4	94.4	133	184	231	312	445	673	971				
70	1.82	0.60	0.13	1.23	3.23	9.55	22.1	40.9	71.2	117	169	252	377	570	817				
75	2.13	1.45	1.11	1.53	2.40	5.36	11.3	16.3	29.8	56.5	99.1	166	262	403	579				
80	2.42	1.90	1.61	1.82	2.66	4.64	8.11	10.4	17.2	31.1	44.3	77.8	142	261	422				
85	2.82	2.42	2.18	2.27	2.94	4.23	6.26	7.69	11.2	18.0	26.0	42.2	70.3	119	183				
90	3.25	2.98	2.83	2.91	3.33	4.17	5.52	7.17	9.73	13.5	19.6	27.0	35.3	43.9	53.3				
95	3.83	3.67	3.62	3.72	3.98	4.53	5.47	6.86	8.83	11.5	15.5	20.1	25.0	29.8	34.6				
100	4.49	4.33	4.28	4.35	4.57	5.00	5.72	6.65	8.07	10.1	12.8	16.6	21.9	29.6	39.2				
105	5.49	5.51	5.58	5.62	5.47	5.26	5.01	4.19	3.79	4.28	6.77	10.5	15.5	21.4	28.6				
110	5.38	5.12	4.89	4.70	4.45	4.36	4.56	5.65	6.89	8.01	7.12	6.83	8.12	13.3	21.0				
115	4.93	4.89	4.84	4.77	4.59	4.48	4.55	5.14	5.90	6.70	6.26	6.57	8.44	13.7	21.4				
120	4.93	4.89	4.82	4.72	4.49	4.30	4.24	4.51	4.94	5.53	5.62	6.26	7.91	11.6	16.7				
125	5.16	5.09	4.98	4.84	4.56	4.30	4.14	4.20	4.45	4.90	5.41	6.30	7.74	10.1	13.1				
130	5.52	5.32	5.09	4.84	4.61	4.41	4.27	4.16	4.21	4.48	5.14	6.08	7.27	8.69	10.4				
135	5.66	5.53	5.37	5.18	4.93	4.69	4.49	4.38	4.33	4.34	4.59	4.78	4.79	4.35	3.62				
140	5.92	5.69	5.43	5.15	4.95	4.77	4.61	4.42	4.31	4.34	4.98	5.56	5.83	5.19	3.99				
145	6.04	5.84	5.59	5.33	5.14	4.97	4.82	4.64	4.52	4.47	4.79	5.05	5.09	4.53	3.59				
150	5.91	5.77	5.58	5.38	5.25	5.13	5.02	4.85	4.69	4.57	4.67	4.71	4.60	4.10	3.34				
155	5.64	5.55	5.42	5.27	5.14	5.03	4.96	4.96	4.99	5.02	5.10	5.09	4.91	4.36	3.56				
160	5.08	5.16	5.22	5.26	5.21	5.14	5.10	5.17	5.27	5.36	5.52	5.55	5.38	4.80	3.93				
165	4.33	4.46	4.62	4.78	4.90	5.00	5.09	5.17	5.25	5.32	5.51	5.60	5.49	4.95	4.11				
170	3.65	3.73	3.82	3.91	3.96	4.02	4.11	4.33	4.58	4.81	5.06	5.19	5.15	4.76	4.12				
175	3.26	3.35	3.46	3.57	3.56	3.56	3.60	3.85	4.13	4.40	4.63	4.76	4.75	4.49	4.04				
180	3.18	3.19	3.20	3.24	3.32	3.42	3.51	3.60	3.68	3.74	3.76	3.77	3.77	3.77	3.77				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX3 @ 100W / 5000K	Sample ID	231020001-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 $25 \pm 1^{\circ}\text{C}$. 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 was calculated.</p>

Test Results

Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	iTHD(%)
120.0	60	0.829	99.2	0.997	4.31
277.0	60	0.372	96.7	0.939	8.66

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*****