

Photometric Test Report

Relevant Standards

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

Prepared For

RAB Lighting Inc.

Prepared By

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Date: 2023-11-15

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Issue Date: 2023-11-15

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		2497
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-180° zones)	IES LM-79-2008	N/A		139.5
Luminaire Output (lm) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	300		2456
Minimum Luminaire Efficacy (lm/W) (Goniophotometer – Section 4.2) (0°-90° zones)	IES LM-79-2008	Standard	Premium	137.2
		105	120	
Power (Input Wattage) (W) (Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		17.9
Total Harmonic Distortion (A%) (THD & PF – Section 4.3)	ANSI C82.77:2014	20.00%	120V	4.83
			277V	20.06
Power Factor (THD & PF – Section 4.3)	ANSI C82.77:2014	0.9	120V	0.989
			277V	0.822
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		82.0
Minimum R9 (Integrating Sphere – Section 4.1)	IES LM-79-2008 CIE13.3-1995	N/A		7
Minimum Rf (Integrating Sphere – Section 4.1)	ANSI/IES TM-30-18	≥70		84
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%		2.1%
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		0.079
(Goniophotometer – Section 4.2)		Non-Worst Case		0.142
Power (Input Wattage – W)				
(Goniophotometer – Section 4.2)	IES LM-79-2008	Worst Case		17.9
(Goniophotometer – Section 4.2)		Non-Worst Case		16.9

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2023-11-02	WPX1 @ 15W / 3000K	231101002-S1
2	Goniophotometer Test	2023-11-02	WPX1 @ 15W / 3000K	231101002-S1
3	THD and PF Test	2023-11-02	WPX1 @ 15W / 3000K	231101002-S1

Remark (If any)

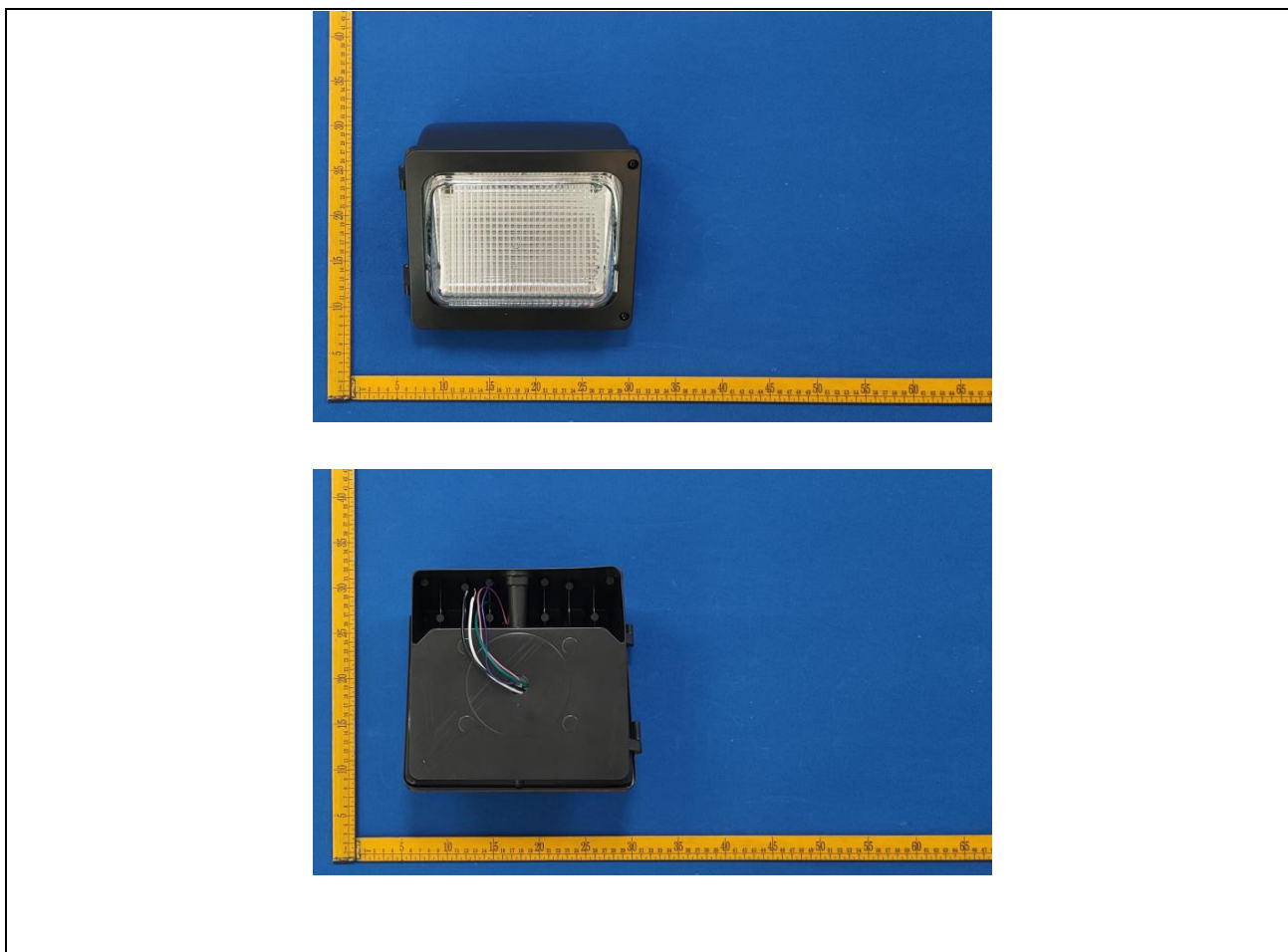
1. The results contained in this report pertain only to the tested samples.
2. This report shall not be reproduced, no limited part or full, without approval of Dongguan New Testing Centre Co., Ltd.
3. This report does not imply product certification, approval, or endorsement by NVLAP, or any agency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

3.0 Product Description

Luminaire Description: Model No. WPX1 @ 15W / 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.	WPX1 @ 15W / 3000K	Sample ID	231101002-S1
Operate time (Min.)	10	Stabilization time (Min.)	60
Temperature (°C)	25.4	Humidity (%RH)	41.0

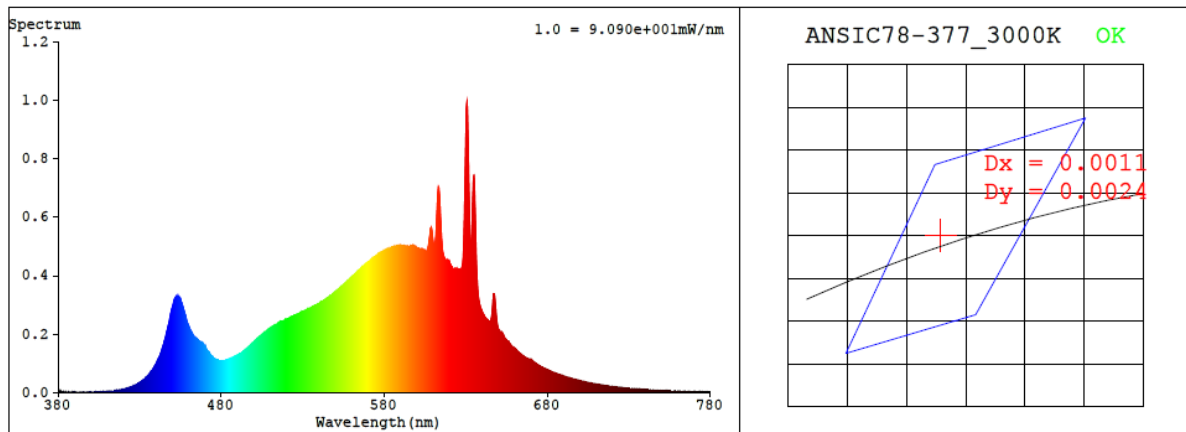
Test Method
<p>The Samples were tested according to the IES LM-79-2008.</p> <p>Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25±1°C.</p> <p>The sample measurements were made using 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	0.142	16.9	0.989
277.0	60	0.079	17.9	0.822

CCT (K)	CRI	R9	Duv	Rf	Rg	IES Rcs,h1
3096	82.0	7	0.0008	84	95	-12%

4.1 Integrating Sphere Test



Colorimetric Parameters

Chromaticity Coordinate: $x = 0.4313$ $y = 0.4040$ / $u' = 0.2470$ $v' = 0.5205$ ($duv=7.96e-04$)

CCT= 3096K Prep WL: Ld=582.1nm Purity=50.8%

Peak WL: Lp=631nm FWHM: =8.2nm Ratio:R=22.2% G=75.1% B=2.7%

Render Index: Ra = 82.0 AvgR = 75.9 TM30:Rf=83 Rg=95

EEL: 0.09917 A++ Highest

R1 =80 R2 =90 R3 =97 R4 =79 R5 =80 R6 =88 R7 =83

R8 =60 R9 =7 R10=77 R11=77 R12=66 R13=82 R14=99 R15=73

4.1 Integrating Sphere Test

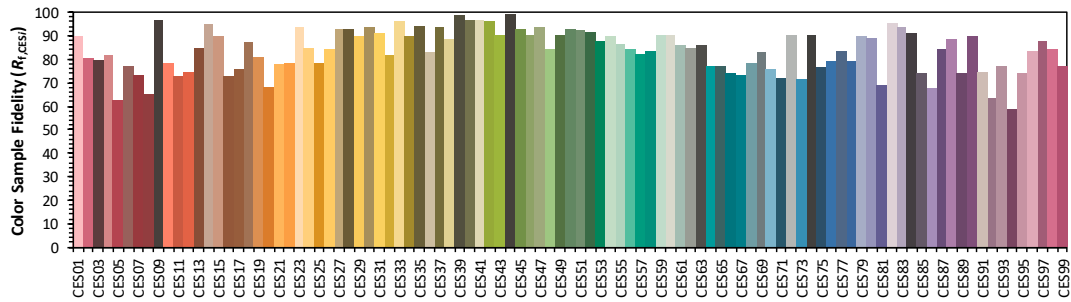
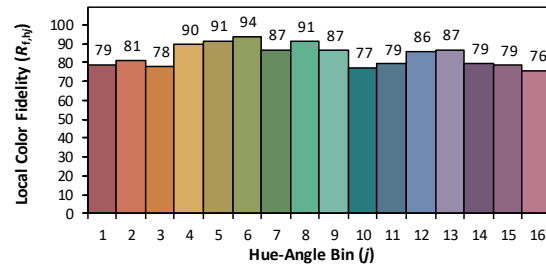
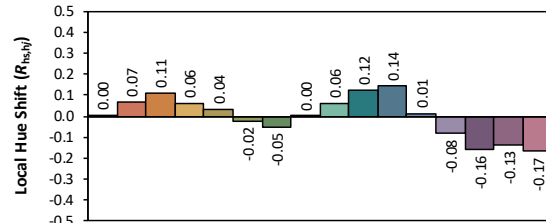
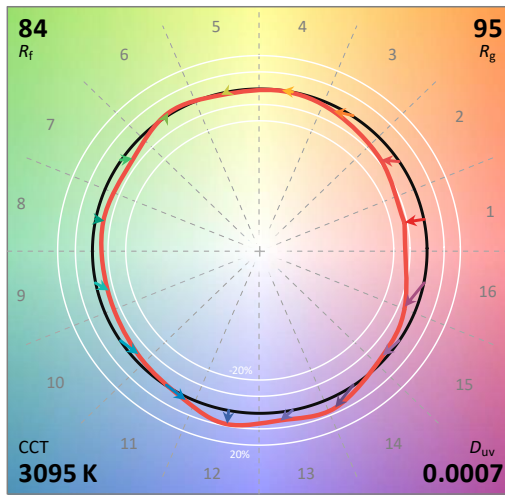
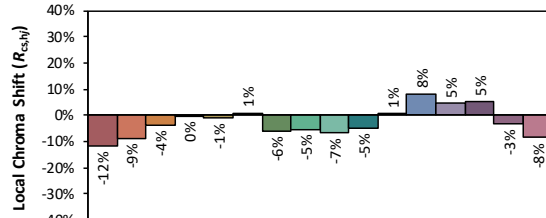
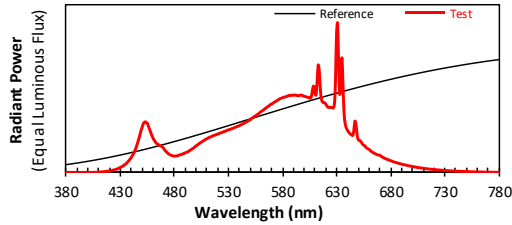
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: RAB Lighting Inc.

Date: 2023/11/15

Model: WPX1 @ 15W / 3000K



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

x 0.4314
 y 0.4039
 u' 0.2470
 v' 0.5205

CIE 13.3-1995
(CRI)

R_a 82
 R_g 7

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	1.80E-06	447	2.18E-04	514	2.33E-04	581	4.89E-04	648	3.13E-04	715	2.48E-05
381	0.00E+00	448	2.43E-04	515	2.38E-04	582	4.90E-04	649	2.47E-04	716	2.41E-05
382	2.60E-06	449	2.71E-04	516	2.40E-04	583	4.92E-04	650	2.18E-04	717	2.31E-05
383	3.30E-06	450	2.91E-04	517	2.43E-04	584	4.95E-04	651	2.09E-04	718	2.26E-05
384	2.00E-07	451	3.14E-04	518	2.46E-04	585	4.98E-04	652	2.07E-04	719	2.19E-05
385	0.00E+00	452	3.25E-04	519	2.48E-04	586	5.01E-04	653	1.97E-04	720	2.13E-05
386	1.10E-06	453	3.30E-04	520	2.51E-04	587	4.99E-04	654	1.86E-04	721	2.05E-05
387	6.00E-07	454	3.25E-04	521	2.52E-04	588	5.03E-04	655	1.79E-04	722	1.98E-05
388	0.00E+00	455	3.20E-04	522	2.57E-04	589	5.02E-04	656	1.75E-04	723	1.90E-05
389	1.50E-06	456	3.02E-04	523	2.60E-04	590	5.02E-04	657	1.67E-04	724	1.86E-05
390	1.10E-06	457	2.82E-04	524	2.61E-04	591	5.03E-04	658	1.60E-04	725	1.77E-05
391	1.10E-06	458	2.63E-04	525	2.64E-04	592	5.03E-04	659	1.55E-04	726	1.75E-05
392	1.70E-06	459	2.44E-04	526	2.67E-04	593	5.01E-04	660	1.52E-04	727	1.67E-05
393	2.10E-06	460	2.28E-04	527	2.69E-04	594	5.01E-04	661	1.46E-04	728	1.61E-05
394	1.60E-06	461	2.14E-04	528	2.72E-04	595	4.99E-04	662	1.40E-04	729	1.57E-05
395	1.60E-06	462	2.04E-04	529	2.76E-04	596	5.02E-04	663	1.34E-04	730	1.53E-05
396	1.70E-06	463	1.94E-04	530	2.78E-04	597	5.03E-04	664	1.30E-04	731	1.47E-05
397	1.50E-06	464	1.88E-04	531	2.80E-04	598	5.03E-04	665	1.26E-04	732	1.42E-05
398	1.90E-06	465	1.84E-04	532	2.82E-04	599	4.98E-04	666	1.23E-04	733	1.36E-05
399	1.20E-06	466	1.79E-04	533	2.85E-04	600	4.95E-04	667	1.19E-04	734	1.32E-05
400	2.00E-06	467	1.75E-04	534	2.88E-04	601	4.94E-04	668	1.16E-04	735	1.28E-05
401	1.90E-06	468	1.72E-04	535	2.91E-04	602	4.92E-04	669	1.15E-04	736	1.24E-05
402	1.70E-06	469	1.67E-04	536	2.94E-04	603	4.90E-04	670	1.14E-04	737	1.23E-05
403	3.20E-06	470	1.59E-04	537	2.97E-04	604	4.87E-04	671	1.09E-04	738	1.16E-05
404	2.00E-06	471	1.47E-04	538	3.00E-04	605	4.86E-04	672	1.04E-04	739	1.12E-05
405	2.20E-06	472	1.41E-04	539	3.03E-04	606	4.83E-04	673	9.98E-05	740	1.08E-05
406	3.40E-06	473	1.33E-04	540	3.04E-04	607	5.02E-04	674	9.59E-05	741	1.04E-05
407	3.10E-06	474	1.26E-04	541	3.09E-04	608	5.47E-04	675	9.27E-05	742	1.02E-05
408	3.10E-06	475	1.21E-04	542	3.12E-04	609	5.61E-04	676	8.90E-05	743	1.01E-05
409	3.70E-06	476	1.16E-04	543	3.16E-04	610	5.16E-04	677	8.62E-05	744	9.70E-06
410	4.90E-06	477	1.13E-04	544	3.20E-04	611	5.04E-04	678	8.39E-05	745	9.40E-06
411	5.20E-06	478	1.12E-04	545	3.23E-04	612	5.83E-04	679	8.10E-05	746	9.10E-06
412	5.10E-06	479	1.08E-04	546	3.27E-04	613	6.97E-04	680	7.82E-05	747	8.70E-06
413	6.30E-06	480	1.08E-04	547	3.31E-04	614	6.60E-04	681	7.59E-05	748	8.20E-06
414	6.50E-06	481	1.09E-04	548	3.35E-04	615	5.45E-04	682	7.31E-05	749	8.20E-06
415	7.60E-06	482	1.09E-04	549	3.40E-04	616	4.79E-04	683	7.06E-05	750	7.90E-06
416	8.70E-06	483	1.10E-04	550	3.42E-04	617	4.59E-04	684	6.85E-05	751	7.50E-06
417	9.10E-06	484	1.14E-04	551	3.50E-04	618	4.55E-04	685	6.64E-05	752	7.30E-06
418	9.90E-06	485	1.16E-04	552	3.55E-04	619	4.54E-04	686	6.44E-05	753	7.20E-06
419	1.14E-05	486	1.18E-04	553	3.59E-04	620	4.46E-04	687	6.24E-05	754	7.10E-06
420	1.24E-05	487	1.20E-04	554	3.64E-04	621	4.33E-04	688	6.03E-05	755	6.80E-06
421	1.35E-05	488	1.23E-04	555	3.68E-04	622	4.25E-04	689	5.84E-05	756	6.40E-06
422	1.52E-05	489	1.26E-04	556	3.74E-04	623	4.23E-04	690	5.68E-05	757	6.30E-06
423	1.68E-05	490	1.29E-04	557	3.79E-04	624	4.23E-04	691	5.45E-05	758	6.00E-06
424	1.81E-05	491	1.32E-04	558	3.83E-04	625	4.23E-04	692	5.31E-05	759	5.90E-06
425	1.98E-05	492	1.34E-04	559	3.90E-04	626	4.22E-04	693	5.15E-05	760	5.50E-06
426	2.30E-05	493	1.39E-04	560	3.96E-04	627	4.20E-04	694	5.01E-05	761	5.90E-06
427	2.51E-05	494	1.44E-04	561	4.00E-04	628	4.42E-04	695	4.84E-05	762	5.30E-06
428	2.75E-05	495	1.48E-04	562	4.05E-04	629	5.87E-04	696	4.66E-05	763	5.20E-06
429	3.15E-05	496	1.52E-04	563	4.10E-04	630	8.99E-04	697	4.50E-05	764	4.90E-06
430	3.50E-05	497	1.57E-04	564	4.17E-04	631	9.68E-04	698	4.39E-05	765	4.90E-06
431	3.85E-05	498	1.62E-04	565	4.21E-04	632	6.86E-04	699	4.24E-05	766	4.70E-06
432	4.29E-05	499	1.69E-04	566	4.26E-04	633	5.07E-04	700	4.09E-05	767	4.80E-06
433	4.70E-05	500	1.74E-04	567	4.31E-04	634	6.30E-04	701	3.96E-05	768	4.30E-06
434	5.32E-05	501	1.79E-04	568	4.36E-04	635	7.45E-04	702	3.84E-05	769	4.30E-06
435	5.71E-05	502	1.85E-04	569	4.43E-04	636	5.62E-04	703	3.69E-05	770	4.10E-06
436	6.42E-05	503	1.90E-04	570	4.45E-04	637	3.84E-04	704	3.58E-05	771	4.00E-06
437	7.18E-05	504	1.94E-04	571	4.50E-04	638	3.19E-04	705	3.43E-05	772	4.00E-06
438	7.96E-05	505	1.98E-04	572	4.55E-04	639	2.92E-04	706	3.34E-05	773	3.70E-06
439	8.87E-05	506	2.04E-04	573	4.59E-04	640	2.77E-04	707	3.26E-05	774	3.70E-06
440	9.83E-05	507	2.07E-04	574	4.64E-04	641	2.66E-04	708	3.15E-05	775	3.60E-06
441	1.10E-04	508	2.12E-04	575	4.67E-04	642	2.56E-04	709	3.06E-05	776	3.50E-06
442	1.21E-04	509	2.17E-04	576	4.73E-04	643	2.50E-04	710	2.92E-05	777	3.30E-06
443	1.36E-04	510	2.21E-04	577	4.77E-04	644	2.45E-04	711	2.85E-05	778	3.20E-06
444	1.54E-04	511	2.24E-04	578	4.81E-04	645	2.43E-04	712	2.77E-05	779	3.30E-06
445	1.73E-04	512	2.28E-04	579	4.83E-04	646	2.72E-04	713	2.65E-05	780	3.30E-06
446	1.96E-04	513	2.32E-04	580	4.86E-04	647	3.34E-04	714	2.57E-05	N/A	N/A

4.0 LM-79 Measurement and Test Results

4.2 Goniophotometer Test

Model No.	WPX1 @ 15W / 3000K	Sample ID	231101002-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	277.0	60	0.079	17.9	0.822
NON-WORST CASE	120.0	60	0.142	16.9	0.989

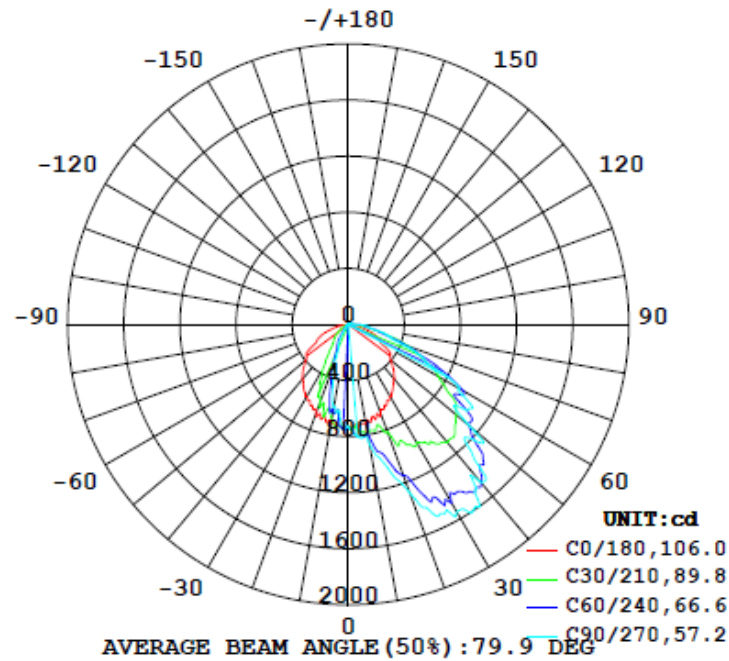
Test Result

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	2497	108.7	146.7	55.6	97.3	139.5	2.0%	B1-U2-G1
0°-90° zones	2456	108.7	146.7	55.6	97.3	137.2	2.1%	B1-U2-G1

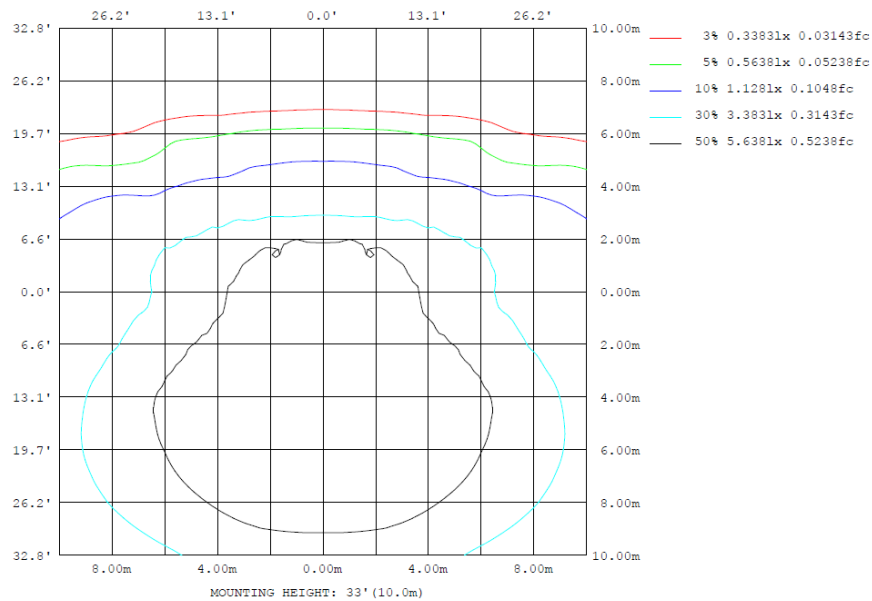
4.2 Goniophotometer Test

Lighting Distribution Curve

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Isolux Plot



4.2 Goniophotometer Test

Zonal Lumen Summary

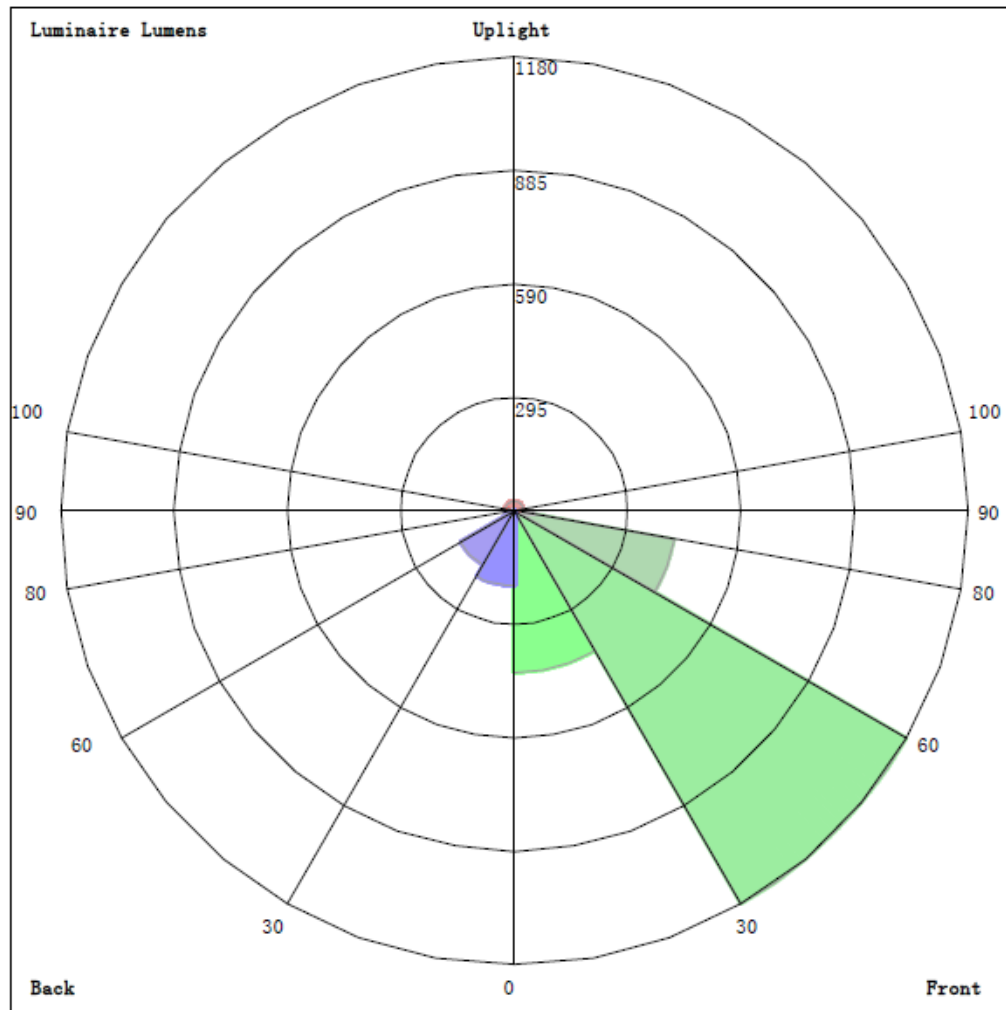
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum, lamp
10	712.2	806.0	864.1	806.0	712.2	635.2	602.8	635.2	0- 10	70.21	70.21	2.81,2.81
20	678.7	990.3	1278	990.3	678.7	439.4	258.5	439.4	10- 20	205.7	275.9	11.1,11.1
30	594.5	1299	1545	1299	594.5	187.9	117.4	187.9	20- 30	339.3	615.2	24.6,24.6
40	507.8	1285	1469	1285	507.8	105.8	33.80	105.8	30- 40	443.6	1059	42.4,42.4
50	391.6	1142	1132	1142	391.6	35.91	15.45	35.91	40- 50	474.6	1533	61.4,61.4
60	274.2	813.9	915.5	813.9	274.2	13.58	0.3077	13.58	50- 60	423.9	1957	78.4,78.4
70	183.0	458.2	376.3	458.2	183.0	2.429	0.4444	2.429	60- 70	306.0	2263	90.7,90.7
80	62.36	158.4	161.6	158.4	62.36	1.062	0.4558	1.062	70- 80	141.8	2405	96.3,96.3
90	8.520	59.63	54.37	59.63	8.520	0.6933	0.5465	0.6933	80- 90	51.01	2456	98.4,98.4
100	5.794	19.10	28.60	19.10	5.794	0.7483	0.7511	0.7483	90-100	15.79	2472	99,99
110	5.441	6.158	21.89	6.158	5.441	0.6786	0.7844	0.6786	100-110	7.490	2479	99.3,99.3
120	4.343	14.90	8.100	14.90	4.343	0.6505	0.8308	0.6505	110-120	5.329	2485	99.5,99.5
130	1.799	12.05	13.12	12.05	1.799	0.7052	0.9981	0.7052	120-130	5.524	2490	99.7,99.7
140	0.4498	7.344	10.51	7.344	0.4498	0.7833	1.040	0.7833	130-140	3.702	2494	99.9,99.9
150	0.4165	3.538	4.944	3.538	0.4165	0.8809	1.014	0.8809	140-150	1.858	2496	100,100
160	0.4941	0.3932	1.693	0.3932	0.4941	0.9368	0.9023	0.9368	150-160	0.6239	2496	100,100
170	0.5974	0.5792	0.4723	0.5792	0.5974	0.7859	0.6863	0.7859	160-170	0.2070	2497	100,100
180	0.6915	0.6641	0.5805	0.6641	0.6915	0.6375	0.5974	0.6375	170-180	0.0636	2497	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

	Zonal (lm)		Total (lm)	Percent
0-10	70.21	0-10	70.21	2.81%
10-20	205.68	0-20	275.89	11.05%
20-30	339.29	0-30	615.18	24.64%
30-40	443.63	0-40	1058.81	42.41%
40-50	474.61	0-50	1533.42	61.42%
50-60	423.88	0-60	1957.30	78.40%
60-70	306.03	0-70	2263.33	90.66%
70-80	141.75	0-80	2405.08	96.33%
80-90	51.01	0-90	2456.09	98.38%
90-100	15.79	0-100	2471.88	99.01%
100-110	7.49	0-110	2479.37	99.31%
110-120	5.33	0-120	2484.70	99.52%
120-130	5.52	0-130	2490.22	99.74%
130-140	3.70	0-140	2493.92	99.89%
140-150	1.86	0-150	2495.78	99.97%
150-160	0.62	0-160	2496.40	99.99%
160-170	0.21	0-170	2496.61	100.00%
170-180	0.06	0-180	2496.67	100.00%

4.2 Goniophotometer Test

LCS/BUG

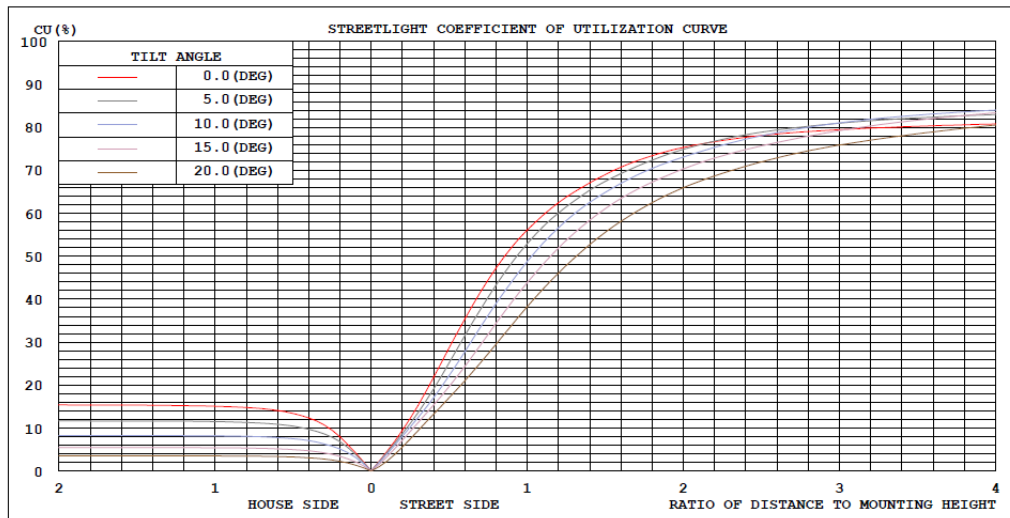


LUMINAIRE CLASSIFICATION SYSTEM (LCS)

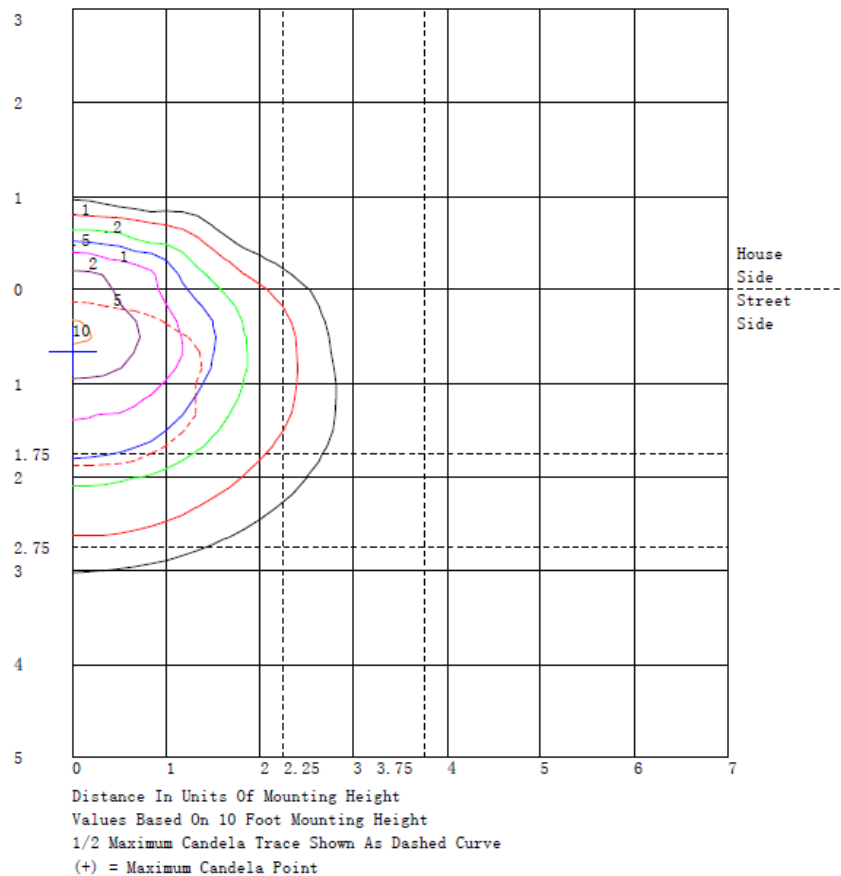
	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	420.1	N.A.	16.8
FM - Front-Medium (30-60)	1180.4	N.A.	47.3
FH - Front-High (60-80)	421.7	N.A.	16.9
FVH - Front-Very High (80-90)	48.6	N.A.	1.9
BL - Back-Low (0-30)	195.1	N.A.	7.8
BM - Back-Medium (30-60)	161.8	N.A.	6.5
BH - Back-High (60-80)	26.0	N.A.	1.0
BVH - Back-Very High (80-90)	2.4	N.A.	0.1
UL - Uplight-Low (90-100)	15.8	N.A.	0.6
UH - Uplight-High (100-180)	24.8	N.A.	1.0
Total	2496.7	N.A.	100.0
BUG Rating	B1-U2-G1		

4.2 Goniophotometer Test

Coefficients of Utilization



Isolines



4.2 Goniophotometer Test

Luminous Distribution Intensity Data

Table--1

UNIT: cd

C (DEG)	0	5	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90
0	725	725	725	725	725	725	725	726	726	726	726	726	726	726	726	726	726	726	726
5	731	737	743	747	748	749	751	760	770	781	792	801	808	808	806	803	803	804	805
10	712	718	727	739	758	777	793	801	805	806	800	795	793	808	827	845	855	861	864
15	678	701	720	737	746	756	769	799	834	870	902	932	960	988	1013	1032	1041	1044	1041
20	679	695	714	736	756	782	816	869	929	990	1046	1098	1147	1191	1228	1257	1272	1278	1278
25	641	638	656	693	759	838	923	991	1060	1133	1227	1319	1400	1444	1473	1491	1504	1511	1512
30	595	602	632	684	766	864	972	1086	1198	1299	1371	1428	1472	1508	1534	1550	1554	1551	1545
35	558	596	649	718	810	912	1017	1118	1212	1298	1364	1420	1467	1514	1553	1581	1591	1591	1585
40	508	562	634	724	849	978	1099	1173	1232	1285	1360	1426	1475	1469	1448	1426	1439	1455	1469
45	459	517	593	686	816	951	1076	1153	1212	1258	1306	1340	1356	1332	1293	1249	1216	1190	1175
50	392	465	551	648	772	896	1008	1074	1117	1142	1139	1130	1125	1169	1214	1246	1213	1169	1132
55	368	466	561	652	750	837	908	937	950	953	958	962	969	989	1011	1031	1041	1047	1047
60	274	384	482	566	638	697	744	771	792	814	862	908	943	934	916	895	900	908	915
65	235	318	392	457	511	557	596	632	661	682	693	694	687	664	638	613	601	593	591
70	183	218	256	300	357	411	455	467	467	458	451	441	431	425	418	411	399	386	376
75	115	142	169	197	231	262	285	283	273	261	257	255	256	261	267	274	278	281	281
80	62.4	81.5	98.5	113	126	137	146	152	156	158	158	157	155	155	156	157	159	161	162
85	22.7	30.5	38.7	47.3	57.1	66.8	75.9	82.6	88.6	94.2	101	107	113	117	120	122	125	127	128
90	8.52	12.3	16.9	22.4	29.4	36.8	44.1	50.6	55.9	59.6	59.8	58.6	56.8	55.9	55.1	54.4	54.4	54.4	54.4
95	6.19	9.57	13.0	16.4	20.3	23.9	26.7	27.5	27.3	27.3	27.6	28.1	29.6	31.3	32.9	34.2	35.0	35.3	35.3
100	5.79	6.20	6.65	7.15	7.30	7.80	8.94	12.1	15.7	19.1	20.7	21.8	22.7	24.3	25.8	27.1	28.0	28.5	28.6
105	1.04	2.39	3.61	4.69	5.54	6.33	7.12	8.04	9.05	10.2	11.5	12.9	14.3	15.6	16.8	17.9	19.1	20.0	20.6
110	5.44	4.71	4.75	5.54	8.11	10.7	12.5	10.4	7.90	6.16	8.94	12.7	16.6	18.4	19.5	20.3	21.1	21.6	21.9
115	4.89	3.89	3.73	4.40	6.53	9.03	11.4	13.0	13.8	13.5	10.4	7.02	4.19	4.81	6.41	8.45	10.1	11.4	11.9
120	4.34	3.31	3.04	3.55	5.21	7.35	9.68	11.6	13.3	14.9	16.5	17.6	18.1	17.0	15.4	13.5	11.1	9.15	8.10
125	3.20	2.43	2.29	2.77	4.14	5.94	7.99	9.96	11.9	13.8	15.6	17.1	18.2	18.9	19.1	18.8	16.8	14.9	13.7
130	1.80	1.38	1.44	1.98	3.16	4.69	6.47	8.29	10.2	12.1	14.0	15.7	17.1	17.6	17.6	17.1	15.5	14.1	13.1
135	0.58	0.00	0.00	0.30	1.64	3.37	5.27	6.84	8.41	10.0	11.9	13.7	15.1	15.5	15.3	14.9	13.9	12.9	12.3
140	0.45	1.14	1.81	2.44	2.97	3.54	4.20	5.09	6.14	7.34	8.97	10.5	11.8	12.3	12.3	12.1	11.5	10.9	10.5
145	0.42	0.78	1.16	1.58	2.00	2.47	3.00	3.64	4.37	5.17	6.25	7.27	8.11	8.33	8.32	8.15	7.88	7.63	7.49
150	0.42	0.66	0.80	0.84	0.54	0.31	0.32	1.25	2.39	3.54	4.18	4.64	4.94	5.07	5.11	5.07	5.01	4.96	4.94
155	0.45	0.44	0.45	0.47	0.43	0.45	0.57	1.00	1.49	1.98	2.29	2.53	2.70	2.79	2.84	2.87	2.92	2.95	2.98
160	0.49	0.49	0.49	0.48	0.47	0.46	0.44	0.38	0.36	0.39	0.64	0.93	1.23	1.39	1.51	1.60	1.65	1.68	1.69
165	0.54	0.55	0.55	0.55	0.54	0.52	0.51	0.49	0.48	0.48	0.51	0.55	0.57	0.54	0.50	0.45	0.43	0.42	0.42
170	0.60	0.61	0.61	0.62	0.62	0.61	0.61	0.60	0.59	0.58	0.57	0.56	0.56	0.55	0.54	0.53	0.51	0.49	0.47
175	0.64	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64	0.64	0.63	0.62	0.59	0.56	0.54	0.52	0.51	0.51
180	0.69	0.70	0.70	0.70	0.69	0.69	0.68	0.68	0.67	0.66	0.65	0.64	0.62	0.62	0.61	0.61	0.60	0.59	0.58

UNIT: cd																			
γ (DEG)	C (DEG)																		
	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175	180	185
0	726	726	726	726	726	725	726	726	726	726	726	725	725	725	725	725	725	725	725
5	804	803	803	806	808	808	801	792	781	770	760	751	749	748	747	743	737	731	738
10	861	855	845	827	808	793	795	800	806	805	801	793	777	758	739	727	718	712	730
15	1044	1041	1032	1013	988	960	932	902	870	834	799	769	756	746	737	720	701	678	679
20	1278	1272	1257	1228	1191	1147	1098	1046	990	929	869	816	782	756	736	714	695	679	674
25	1511	1504	1491	1473	1444	1400	1319	1227	1133	1060	991	923	838	759	693	656	638	641	623
30	1551	1554	1550	1534	1508	1472	1428	1371	1299	1198	1086	972	864	766	684	632	602	595	607
35	1591	1591	1581	1553	1514	1467	1420	1364	1298	1212	1118	1017	912	810	718	649	596	558	573
40	1455	1439	1426	1448	1469	1475	1426	1360	1285	1232	1173	1099	978	849	724	634	562	508	530
45	1190	1216	1249	1293	1332	1356	1340	1306	1258	1212	1153	1076	951	816	686	593	517	459	440
50	1169	1213	1246	1214	1169	1125	1130	1139	1142	1117	1074	1008	896	772	648	551	465	392	348
55	1047	1041	1031	1011	989	969	962	958	953	950	937	908	837	750	652	561	466	368	287
60	908	900	895	916	934	943	908	862	814	792	771	744	697	638	566	482	384	274	202
65	593	601	613	638	664	687	694	693	682	661	632	596	557	511	457	392	318	235	167
70	386	399	411	418	425	431	441	451	458	467	467	455	411	357	300	256	218	183	129
75	281	278	274	267	261	256	255	257	261	273	283	285	262	231	197	169	142	115	80.9
80	161	159	157	156	155	155	157	158	158	156	152	146	137	126	113	98.5	81.5	62.4	43.4
85	127	125	122	120	117	113	107	101	94.2	88.6	82.6	75.9	66.8	57.1	47.3	38.7	30.5	22.7	17.0
90	54.4	54.4	54.4	55.1	55.9	56.8	58.6	59.8	59.6	55.9	50.6	44.1	36.8	29.4	22.4	16.9	12.3	8.52	6.98
95	35.0	34.2	32.9	31.3	29.6	28.1	27.6	27.3	27.3	27.5	27.5	26.7	23.9	20.3	16.4	13.0	9.57	6.19	5.00
100	28.5	28.0	27.1	25.8	24.3	22.7	21.8	20.7	19.1	15.7	12.1	8.94	7.80	7.30	7.15	6.65	6.20	5.79	4.51
105	20.0	19.1	17.9	16.8	15.6	14.3	12.9	11.5	10.2	9.05	8.04	7.12	6.33	5.54	4.69	3.61	2.39	1.04	0.84
110	21.6	21.1	20.3	19.5	18.4	16.6	12.7	8.94	6.16	7.90	10.4	12.5	10.7	8.11	5.54	4.75	4.71	5.44	3.43
115	11.4	10.1	8.45	6.41	4.81	4.19	7.02	10.4	13.5	13.8	13.0	11.4	9.03	6.53	4.40	3.73	3.89	4.89	3.11
120	9.15	11.1	13.5	15.4	17.0	18.1	17.6	16.5	14.9	13.3	11.6	9.68	7.35	5.21	3.55	3.04	3.31	4.34	2.82
125	14.9	16.8	18.8	19.1	18.9	18.2	17.1	15.6	13.8	11.9	9.96	7.99	5.94	4.14	2.77	2.29	2.43	3.20	2.21
130	14.1	15.5	17.1	17.6	17.6	17.1	15.7	14.0	12.1	10.2	8.29	6.47	4.69	3.16	1.98	1.44	1.38	1.80	1.38
135	12.9	13.9	14.9	15.3	15.5	15.1	13.7	11.9	10.0	8.41	6.84	5.27	3.37	1.64	0.30	0.00	0.00	0.58	0.69
140	10.9	11.5	12.1	12.3	12.3	11.8	10.5	8.97	7.34	6.14	5.09	4.20	3.54	2.97	2.44	1.81	1.14	0.45	0.57
145	7.63	7.88	8.15	8.32	8.33	8.11	7.27	6.25	5.17	4.37	3.64	3.00	2.47	2.00	1.58	1.16	0.78	0.42	0.55
150	4.96	5.01	5.07	5.15	5.07	4.94	4.64	4.18	3.54	2.39	1.25	0.32	0.31	0.54	0.84	0.80	0.66	0.42	0.57
155	2.95	2.92	2.87	2.84	2.79	2.70	2.53	2.29	1.98	1.49	1.00	0.57	0.45	0.43	0.47	0.45	0.44	0.45	0.63
160	1.68	1.65	1.60	1.51	1.39	1.23	0.93	0.64	0.39	0.36	0.38	0.44	0.46	0.47	0.48	0.49	0.49	0.49	0.71
165	0.42	0.43	0.45	0.50	0.54	0.57	0.55	0.51	0.48	0.48	0.49	0.51	0.52	0.54	0.55	0.55	0.55	0.54	0.76
170	0.49	0.51	0.53	0.54	0.55	0.56	0.56	0.57	0.58	0.59	0.60	0.61	0.61	0.62	0.62	0.61	0.61	0.60	0.76
175	0.51	0.52	0.54	0.56	0.59	0.62	0.63	0.64	0.64	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.65	0.64	0.74
180	0.59	0.60	0.61	0.61	0.62	0.62	0.64	0.65	0.66	0.67	0.68	0.68	0.69	0.69	0.70	0.70	0.70	0.69	0.68

Table--3

UNIT: °C

C (DEG) y	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	280
0	726	726	726	726	726	726	726	727	727	727	728	727	727	726	726	726	726	726	726
5	742	744	742	739	733	722	712	706	714	724	732	727	718	708	697	689	683	689	697
10	738	737	723	703	681	664	649	635	625	616	608	608	608	605	604	603	604	604	605
15	681	682	688	691	686	659	624	588	560	534	510	484	461	442	434	431	431	431	434
20	666	654	642	624	597	548	494	439	399	364	333	303	278	260	255	256	259	256	255
25	601	574	543	506	464	409	352	297	255	221	195	182	177	175	171	169	167	169	171
30	598	568	506	432	354	289	233	188	168	158	154	144	135	128	122	119	117	119	122
35	560	520	433	334	241	198	171	153	131	113	97.8	84.2	73.3	65.1	60.4	58.1	57.8	58.1	60.4
40	520	479	380	269	167	131	113	106	84.6	65.2	49.2	41.0	36.5	34.6	33.4	33.3	33.8	33.3	33.4
45	406	360	287	210	140	103	77.8	61.5	46.6	36.1	29.4	26.3	25.4	25.7	24.9	24.3	23.9	24.3	24.9
50	303	257	205	154	109	77.1	53.1	35.9	26.1	20.9	18.8	16.7	15.8	15.6	15.4	15.4	15.4	15.4	15.4
55	218	163	126	98.3	77.7	55.3	36.7	22.4	15.3	11.8	10.7	9.37	8.87	8.86	8.70	8.65	8.65	8.65	8.70
60	144	100	75.6	60.6	51.1	36.5	23.8	13.6	8.31	5.34	3.89	2.32	1.33	0.79	0.44	0.30	0.31	0.30	0.44
65	112	71.3	48.7	35.8	28.8	19.1	11.5	5.95	2.75	1.03	0.37	0.06	0.17	0.47	0.45	0.41	0.36	0.41	0.45
70	85.7	52.9	34.4	23.6	17.8	10.8	5.76	2.43	0.82	0.28	0.40	0.31	0.37	0.50	0.50	0.48	0.44	0.48	0.50
75	53.5	32.7	20.9	14.0	10.4	6.23	3.35	1.55	0.64	0.34	0.43	0.39	0.44	0.52	0.51	0.48	0.45	0.48	0.51
80	28.2	16.9	10.7	7.31	5.68	3.54	2.03	1.06	0.58	0.42	0.46	0.43	0.45	0.49	0.48	0.47	0.46	0.47	0.48
85	12.2	8.52	6.10	4.44	3.32	2.20	1.36	0.79	0.52	0.43	0.45	0.44	0.45	0.48	0.48	0.49	0.48	0.49	0.48
90	5.64	4.50	3.62	2.89	2.27	1.63	1.10	0.69	0.54	0.49	0.51	0.50	0.50	0.52	0.52	0.54	0.55	0.54	0.52
95	3.99	3.16	2.59	2.16	1.80	1.38	1.01	0.72	0.61	0.58	0.59	0.58	0.57	0.58	0.59	0.60	0.63	0.60	0.59
100	3.45	2.61	2.09	1.73	1.48	1.18	0.93	0.75	0.68	0.66	0.68	0.67	0.68	0.69	0.70	0.72	0.75	0.72	0.70
105	0.68	0.59	0.57	0.59	0.63	0.66	0.69	0.72	0.72	0.72	0.72	0.72	0.74	0.75	0.77	0.79	0.81	0.79	0.77
110	1.93	0.93	0.68	0.75	0.97	0.87	0.77	0.68	0.68	0.70	0.73	0.75	0.76	0.77	0.78	0.78	0.78	0.78	0.78
115	1.76	0.86	0.58	0.60	0.76	0.71	0.68	0.65	0.67	0.69	0.72	0.74	0.75	0.76	0.77	0.79	0.80	0.79	0.77
120	1.65	0.85	0.57	0.53	0.63	0.62	0.63	0.65	0.68	0.71	0.74	0.76	0.78	0.79	0.81	0.82	0.83	0.82	0.81
125	1.44	0.90	0.66	0.58	0.60	0.60	0.62	0.67	0.71	0.76	0.80	0.82	0.84	0.86	0.88	0.90	0.91	0.90	0.88
130	1.04	0.80	0.68	0.62	0.62	0.63	0.66	0.71	0.74	0.78	0.83	0.87	0.91	0.94	0.97	0.99	1.00	0.99	0.97
135	0.75	0.79	0.75	0.70	0.65	0.67	0.70	0.74	0.78	0.83	0.87	0.91	0.95	0.97	1.00	1.01	1.02	1.01	1.00
140	0.66	0.72	0.73	0.72	0.70	0.72	0.75	0.78	0.81	0.85	0.88	0.92	0.96	0.99	1.01	1.03	1.04	1.03	1.01
145	0.66	0.73	0.75	0.76	0.76	0.78	0.81	0.83	0.87	0.90	0.93	0.96	0.98	1.00	1.02	1.04	1.04	1.04	1.02
150	0.69	0.77	0.80	0.81	0.81	0.83	0.86	0.88	0.90	0.92	0.94	0.95	0.97	0.98	0.99	1.01	1.01	1.01	0.99
155	0.78	0.88	0.91	0.92	0.91	0.90	0.88	0.87	0.89	0.91	0.93	0.95	0.96	0.97	0.96	0.96	0.95	0.96	0.96
160	0.87	0.98	1.01	1.01	0.99	0.98	0.96	0.94	0.93	0.93	0.92	0.90	0.88	0.86	0.87	0.89	0.90	0.89	0.87
165	0.91	1.02	1.04	1.02	0.99	0.98	0.96	0.95	0.93	0.92	0.89	0.85	0.80	0.77	0.77	0.79	0.81	0.79	0.77
170	0.87	0.94	0.96	0.94	0.91	0.87	0.83	0.79	0.77	0.76	0.75	0.72	0.69	0.67	0.67	0.67	0.69	0.67	0.67
175	0.81	0.86	0.87	0.86	0.83	0.79	0.74	0.70	0.68	0.66	0.65	0.63	0.61	0.60	0.61	0.63	0.65	0.63	0.61
180	0.68	0.67	0.67	0.67	0.67	0.66	0.65	0.64	0.62	0.61	0.59	0.58	0.57	0.57	0.58	0.59	0.60	0.59	0.58

C (DEG) y	285	290	295	300	305	310	315	320	325	330	335	340	345	350	355				
0	726	727	727	728	727	727	727	726	726	726	726	726	726	726	725				
5	708	718	727	732	724	714	706	712	722	733	739	742	744	742	738				
10	608	608	608	611	616	625	635	649	664	681	703	723	737	738	730				
15	442	461	484	510	534	560	588	624	659	686	691	688	682	681	679				
20	260	278	303	333	364	399	439	494	548	597	624	642	654	666	674				
25	175	177	182	195	221	255	297	352	409	464	506	543	574	601	623				
30	128	135	144	154	158	168	188	233	289	354	432	506	568	598	607				
35	65.1	73.3	84.2	97.8	113	131	153	171	198	241	334	433	520	560	573				
40	34.6	36.5	41.0	49.2	65.2	84.6	106	113	131	167	269	380	479	520	530				
45	25.7	25.4	26.3	29.4	36.1	46.6	61.5	77.8	103	140	210	287	360	406	440				
50	15.6	15.8	16.7	18.8	20.9	26.1	35.9	53.1	77.1	109	154	205	257	303	348				
55	8.86	8.87	9.37	10.7	11.8	15.3	22.4	36.7	55.3	77.7	98.3	126	163	218	287				
60	0.79	1.33	2.32	3.89	5.34	8.31	13.6	23.8	36.5	51.1	60.6	75.6	100	144	202				
65	0.47	0.17	0.06	0.37	1.03	2.75	5.95	11.5	19.1	28.8	35.8	48.7	71.3	112	167				
70	0.50	0.37	0.31	0.40	0.28	0.82	2.43	5.76	10.8	17.8	23.6	34.4	52.9	85.7	129				
75	0.52	0.44	0.39	0.43	0.34	0.64	1.55	3.35	6.23	10.4	14.0	20.9	32.7	53.5	80.9				
80	0.49	0.45	0.43	0.46	0.42	0.58	1.06	2.03	3.54	5.68	7.31	10.7	16.9	28.2	43.4				
85	0.48	0.45	0.44	0.45	0.43	0.52	0.79	1.36	2.20	3.32	4.44	6.10	8.52	12.2	17.0				
90	0.52	0.50	0.50	0.51	0.49	0.54	0.69	1.10	1.63	2.27	2.89	3.62	4.50	5.64	6.98				
95	0.58	0.57	0.58	0.59	0.58	0.61	0.72	1.01	1.38	1.80	2.16	2.59	3.16	3.99	5.00				
100	0.69	0.68	0.67	0.68	0.66	0.68	0.75	0.93	1.18	1.48	1.73	2.09	2.61	3.45	4.51				
105	0.75	0.74	0.72	0.72	0.72	0.72	0.72	0.69	0.66	0.63	0.59	0.57	0.59	0.68	0.84				
110	0.77	0.76	0.75	0.73	0.70	0.68	0.68	0.77	0.87	0.97	0.75	0.68	0.93	1.93	3.43				
115	0.76	0.75	0.74	0.72	0.69	0.67	0.65	0.68	0.71	0.76	0.60	0.58	0.86	1.76	3.11				
120	0.79	0.78	0.76	0.74	0.71	0.68	0.65	0.63	0.62	0.63	0.53	0.57	0.85	1.65	2.82				
125	0.86	0.84	0.82	0.80	0.76	0.71	0.67	0.62	0.60	0.60	0.58	0.66	0.90	1.44	2.21				
130	0.94	0.91	0.87	0.83	0.78	0.74	0.71	0.66	0.63	0.62	0.62	0.68	0.80	1.04	1.38				
135	0.97	0.95	0.91	0.87	0.83	0.78	0.74	0.70	0.67	0.65	0.70	0.75	0.79	0.75	0.69				
140	0.99	0.96	0.92	0.88	0.85	0.81	0.78	0.75	0.72	0.70	0.72	0.73	0.72	0.66	0.57				
145	1.00	0.98	0.96	0.93	0.90	0.87	0.83	0.81	0.78	0.76	0.76	0.75	0.73	0.66	0.55				
150	0.98	0.97	0.95	0.94	0.92	0.90	0.88	0.86	0.83	0.81	0.81	0.80	0.77	0.69	0.57				
155	0.97	0.96	0.95	0.93	0.91	0.89	0.87	0.88	0.90	0.91	0.92	0.91	0.88	0.78	0.63				
160	0.86	0.88	0.90	0.92	0.93	0.93	0.94	0.96	0.98	0.99	1.01	1.01	0.98	0.87	0.71				
165	0.77	0.80	0.85	0.89	0.92	0.93	0.95	0.96	0.98	0.99	1.02	1.04	1.02	0.91	0.76				
170	0.67	0.69	0.72	0.75	0.76	0.77	0.79	0.83	0.87	0.91	0.94	0.96	0.94	0.87	0.76				
175	0.60	0.61	0.63	0.65	0.66	0.68	0.70	0.74	0.79	0.83	0.86	0.87	0.86	0.81	0.74				
180	0.57	0.57	0.58	0.59	0.61	0.62	0.64	0.65	0.66	0.67	0.67	0.67	0.67	0.68	0.68				

4.0 LM-79 Measurement and Test Results

4.3 THD and PF Test

Model No.	WPX1 @ 15W / 3000K	Sample ID	231101002-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	0.142	16.9	0.989	4.83
277.0	60	0.079	17.9	0.822	20.06

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*****