

# LM-79-19 Test Report

For

## Reno LED Lighting Inc

7-615 Denison St, Markham L3R 1B8 Canada

### Outdoor Pole/Arm-Mounted Area and Roadway Luminaires

Model Name(s):

RENO-SB-320W-MW-DV-MCCT-G2-R4

Representative (Tested) Model:

RENO-SB-320W-MW-DV-MCCT-G2-R4

#### Model Difference:

1. Product is wattage tunable, can be tunable from 240W, 280W, 300W and 320W;
2. Product is color tunable, can be tunable from 3000K, 4000K and 5000K;
3. All is the same construction, except function, mount mean and model design.

Prepared by:

*Alan Wang*

Engineer: Alan Wang

Date: 2024-01-24

Reviewed by:

*Vincent Yuan*

Technical Lead: Vincent Yuan

Issue Date: 2024-01-24

Revised Date: N/A

Note:

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 must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST or any agency of the U.S. Government.

**Laboratory: Dongguan New Testing Centre Co., Ltd**

Address: 3F, No. 1 the 1<sup>st</sup> North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China

Tel: 86-769-22212079

Website: <http://www.ntc-cert.com>

**Client Information:**

Applicant Name:	Reno LED Lighting Inc
Brand Name:	RENO
Manufacturer Name:	Reno LED Lighting Inc
Manufacturer Address:	7-615 Denison St, Markham L3R 1B8 Canada

**Product Information:**

Model Number:	RENO-SB-320W-MW-DV-MCCT-G2-R4				
Product Type:	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires				
Rating Input:	120-347Vac, 50/60Hz, 240W/280W/300W/320W				
Declared CCT:	3000K, 4000K and 5000K				
Declared Light Output:		240W	280W	300W	320W
	3000K	36720 lm	42840 lm	45900 lm	48960 lm
	4000K	40800 lm	47600 lm	51000 lm	54400 lm
	5000K	38400 lm	44800 lm	48000 lm	51200 lm
Declared Efficacy:	3000K: 153 lm/W 4000K: 170 lm/W 5000K: 160 lm/W				
LED Manufacturer:	LUMILEDS				
LED Model:	L130-3070003000X21 and L130-5070003000X21				
LED Driver Manufacturer:	KERHAM				
LED Driver Model:	KHM-NISG320H67M-1450				

**Test Information:**

Standard Lamp:	Total Spectral Radiant Flux Standard Lamp, trace to NIST. 1. D908S for Gonio 2. D215S for Integrating Sphere
Date of Receipt Samples:	2023-12-07
Quantity of Receipt Samples:	1 pc
Sample Number:	231207025-S1
Test Representation:	N/A

**Laboratory Information:**

Test Laboratory:	Dongguan New Testing Centre Co., Ltd
Laboratory Address:	3F, No. 1 the 1 <sup>st</sup> North Industry Road, Songshan Lake Science & Technology Park, Dongguan, Guangdong, China
Laboratory Contact Name:	Neil Zhong
Laboratory Contact E-mail:	<a href="mailto:Neil_zhong@ntc-cert.com">Neil_zhong@ntc-cert.com</a>

**Report Information:**

Test Report Form:	LM-79_TRF_V1.5
Issued Date of Test Report:	2024-01-24
Revised Date of Test Report:	N/A
Test Report No.:	NTCLR24010183
Remark (If applicable):	1. This report is copied from NTCLR24010044, due to the same product.

<b>Test Specification:</b>	
Date of Test	2023-12-23
Test Item	<ol style="list-style-type: none"> <li>1. Total Luminous Flux</li> <li>2. Luminous Distribution Intensity</li> <li>3. Luminous Efficacy</li> <li>4. Correlated Color Temperature</li> <li>5. Color Rendering Index</li> <li>6. Chromaticity Coordinate</li> <li>7. Fidelity Index</li> <li>8. Gamut Index</li> <li>9. Local Chroma Shift</li> <li>10. THD and PF</li> </ol>
Reference Standard	ANSI/IES LM-79:2019 Optical and Electrical Measurements of Solid-State Lighting Products – Chromaticity Uniformity Measurements ANSI C78.377-2017 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Color Rendering Properties of Light Sources CIE 15-2018 Technical Report Colorimetry ANSI IES TM-30-18 IES Method for Evaluating Light Source Color Rendition IES TM-15-11 Luminaire Classification System for Outdoor Luminaires Addendum A for IES TM-15-11 Backlight, Uplight, and Glare (BUG) Ratings ANSI C82.77-10:2020 Harmonic Emission Limits – Related Power Quality Requirements for Lighting Equipment – Solid State

<b>Test Methods:</b>
<p><b>1. Photometric and Electrical Measurements – Light Distribution Method:</b></p> <p>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at 25 °C ± 1°C, measured at a point not more than 1 m from the sample and at the same height as the sample. The sample was operated at required Voltage and Frequency. It was stabilized before measurement was made. Luminous Flux, Luminaire Efficacy and Zonal Lumen were calculated from the software taken at 1° vertical intervals and 15° horizontal intervals.</p>
<p><b>2. Photometric and Electrical Measurements – Integrating Sphere Method:</b></p> <p>Photometric parameters were measured using an integrating sphere, as spectroradiometer and software. The ambient temperature condition inside the sphere was measured at 25 °C± 1°C. The sample measurements were made using a spectroradiometer connected by a fiber optic cable and detector through the detector port of the integrating sphere. The sample was operated at require Voltage and Frequency. It was stabilized before measurement was made. Chromaticity Coordinates, Correlated Color Temperature and Color Rendering Index were calculated from the spectral radiant flux measurements taken at least 1 nm intervals over the rage of 380 to 780 nm.</p>
<p><b>3. THD and PF Measurements:</b></p> <p>The sample was tested according to the ANSI C82.77, the sample was operated at requirement Voltage and Frequency, and was stabilized before measurement. The Total Harmonic Distortion was calculated from the Digital Power Meter.</p>

### Integrating Sphere Test Results:

#### Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.4	41.0	Face Down	90	10

#### Electrical Data:

CCT Setting	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
3000K	120.0	60	2.6793	321.26	0.9992
4000K	120.0	60	2.6085	312.77	0.9992
5000K	120.0	60	2.6912	322.68	0.9992

#### Color Data:

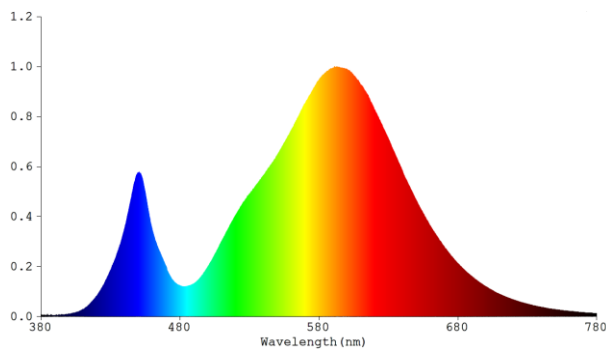
CCT Setting	Test CCT (K)	R <sub>a</sub>	R <sub>9</sub>	R <sub>f</sub>	R <sub>g</sub>	R <sub>cs, h1</sub>	Chromaticity		
							(x, y)	(u', v')	Duv
3000K	3079	72.4	-29	75	95	-16%	(0.4291, 0.3972)	(0.2485, 0.5175)	-0.0017
4000K	3873	74.7	-20	76	95	-16%	(0.3848, 0.3754)	(0.2285, 0.5016)	-0.0019
5000K	5094	73.5	-24	74	96	-16%	(0.3427, 0.3521)	(0.2096, 0.4846)	0.0012

#### Specify Color Rendering:

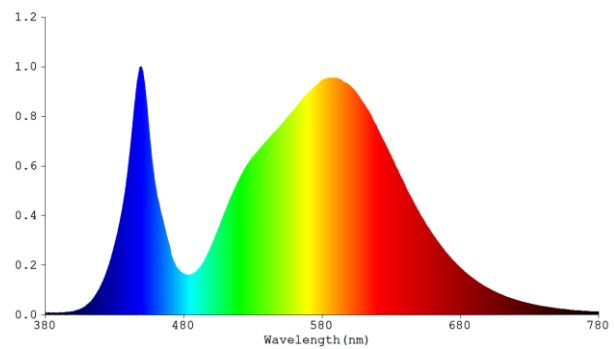
CCT Setting	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
3000K	69	83	93	68	68	75	78	45	-29	59	62	52	71	96	62
4000K	72	82	89	73	72	74	81	55	-20	56	69	50	74	93	67
5000K	71	78	82	75	73	70	81	58	-24	47	72	50	72	90	66

### Spectrum Diagram:

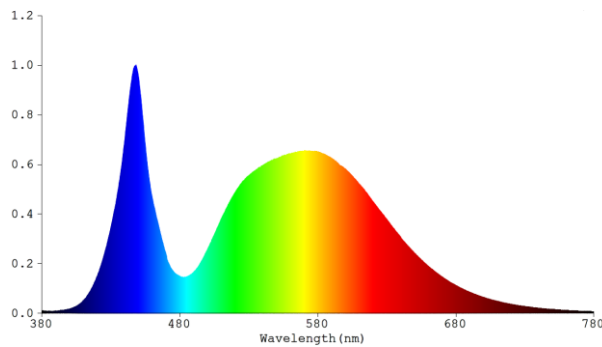
CCT Setting=3000K



CCT Setting=4000K



CCT Setting=5000K



**IES TM-30-18 Color Rendition Result (CCT Setting=3000K):**

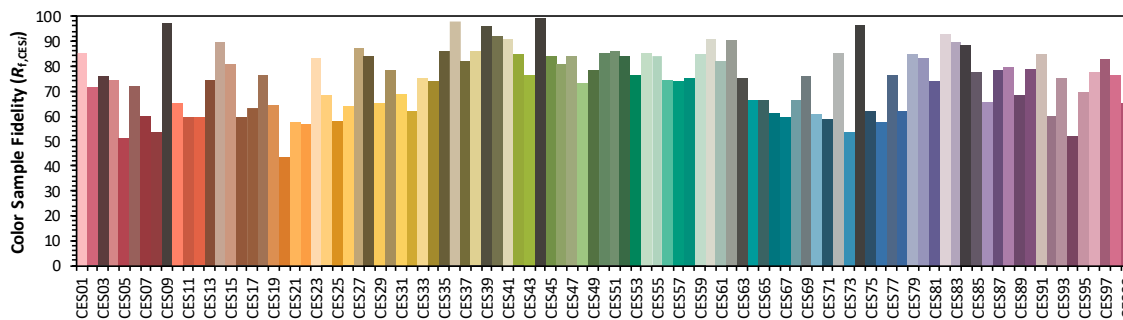
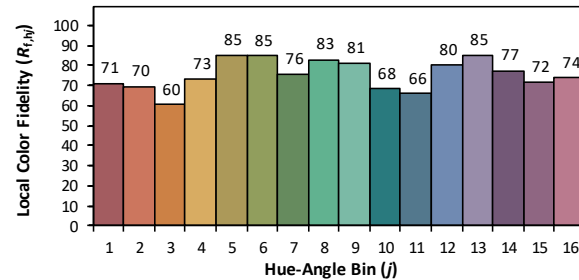
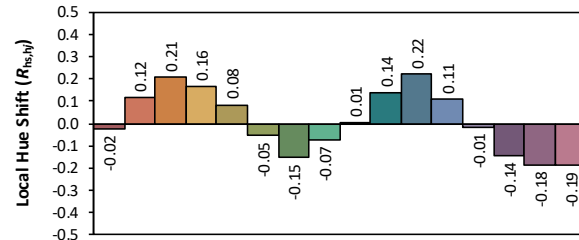
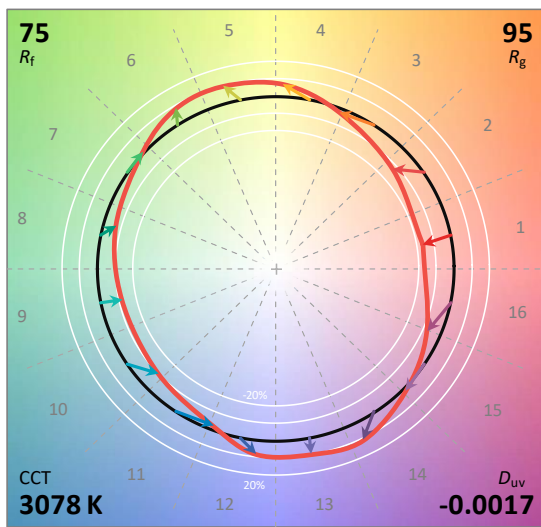
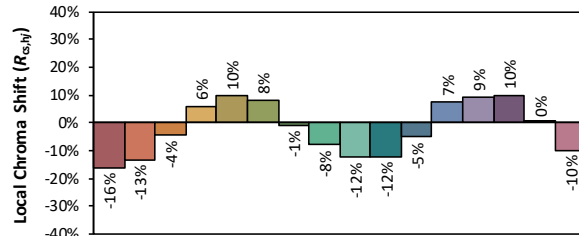
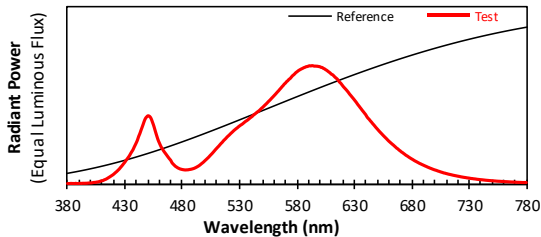
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: Reno LED Lighting Inc

Date: 2024/1/24

Model: RENO-SB-320W-MW-DV-MCCT-G2-R4



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

$x$  0.4291  
 $y$  0.3971  
 $u'$  0.2485  
 $v'$  0.5174

CIE 13.3-1995  
(CRI)

$R_a$  72  
 $R_g$  -29

### Spectrum Data (CCT Setting=3000K):

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	4.70E-06	447	5.34E-04	514	3.44E-04	581	9.55E-04	648	4.88E-04	715	7.74E-05
381	3.90E-06	448	5.55E-04	515	3.54E-04	582	9.61E-04	649	4.76E-04	716	7.50E-05
382	4.40E-06	449	5.67E-04	516	3.66E-04	583	9.67E-04	650	4.65E-04	717	7.29E-05
383	5.60E-06	450	5.75E-04	517	3.75E-04	584	9.72E-04	651	4.54E-04	718	7.09E-05
384	4.60E-06	451	5.74E-04	518	3.85E-04	585	9.76E-04	652	4.43E-04	719	6.91E-05
385	4.80E-06	452	5.66E-04	519	3.96E-04	586	9.82E-04	653	4.33E-04	720	6.69E-05
386	3.70E-06	453	5.49E-04	520	4.05E-04	587	9.85E-04	654	4.23E-04	721	6.52E-05
387	6.30E-06	454	5.23E-04	521	4.14E-04	588	9.90E-04	655	4.12E-04	722	6.32E-05
388	4.30E-06	455	4.96E-04	522	4.24E-04	589	9.92E-04	656	4.03E-04	723	6.10E-05
389	4.00E-06	456	4.63E-04	523	4.33E-04	590	9.95E-04	657	3.93E-04	724	5.93E-05
390	6.40E-06	457	4.30E-04	524	4.42E-04	591	9.98E-04	658	3.83E-04	725	5.76E-05
391	6.40E-06	458	3.99E-04	525	4.52E-04	592	9.96E-04	659	3.73E-04	726	5.60E-05
392	5.30E-06	459	3.70E-04	526	4.60E-04	593	9.99E-04	660	3.63E-04	727	5.48E-05
393	6.50E-06	460	3.48E-04	527	4.68E-04	594	9.98E-04	661	3.54E-04	728	5.28E-05
394	6.40E-06	461	3.26E-04	528	4.75E-04	595	9.95E-04	662	3.46E-04	729	5.14E-05
395	6.50E-06	462	3.07E-04	529	4.83E-04	596	9.95E-04	663	3.37E-04	730	5.01E-05
396	6.90E-06	463	2.91E-04	530	4.91E-04	597	9.94E-04	664	3.30E-04	731	4.84E-05
397	7.10E-06	464	2.76E-04	531	4.98E-04	598	9.94E-04	665	3.21E-04	732	4.68E-05
398	8.40E-06	465	2.63E-04	532	5.04E-04	599	9.91E-04	666	3.12E-04	733	4.60E-05
399	8.80E-06	466	2.50E-04	533	5.11E-04	600	9.90E-04	667	3.03E-04	734	4.43E-05
400	9.20E-06	467	2.36E-04	534	5.19E-04	601	9.84E-04	668	2.96E-04	735	4.35E-05
401	1.00E-05	468	2.23E-04	535	5.27E-04	602	9.83E-04	669	2.87E-04	736	4.21E-05
402	1.20E-05	469	2.11E-04	536	5.34E-04	603	9.76E-04	670	2.80E-04	737	4.04E-05
403	1.37E-05	470	1.99E-04	537	5.40E-04	604	9.72E-04	671	2.72E-04	738	3.94E-05
404	1.40E-05	471	1.81E-04	538	5.48E-04	605	9.65E-04	672	2.66E-04	739	3.83E-05
405	1.59E-05	472	1.70E-04	539	5.57E-04	606	9.59E-04	673	2.58E-04	740	3.71E-05
406	1.75E-05	473	1.60E-04	540	5.64E-04	607	9.51E-04	674	2.51E-04	741	3.64E-05
407	1.90E-05	474	1.50E-04	541	5.71E-04	608	9.44E-04	675	2.43E-04	742	3.52E-05
408	2.23E-05	475	1.44E-04	542	5.81E-04	609	9.37E-04	676	2.38E-04	743	3.42E-05
409	2.50E-05	476	1.37E-04	543	5.88E-04	610	9.27E-04	677	2.31E-04	744	3.30E-05
410	2.81E-05	477	1.33E-04	544	5.96E-04	611	9.23E-04	678	2.24E-04	745	3.20E-05
411	3.04E-05	478	1.28E-04	545	6.05E-04	612	9.14E-04	679	2.18E-04	746	3.11E-05
412	3.56E-05	479	1.25E-04	546	6.12E-04	613	9.03E-04	680	2.12E-04	747	3.03E-05
413	3.90E-05	480	1.23E-04	547	6.19E-04	614	8.95E-04	681	2.07E-04	748	2.93E-05
414	4.40E-05	481	1.21E-04	548	6.28E-04	615	8.87E-04	682	2.00E-04	749	2.90E-05
415	4.98E-05	482	1.20E-04	549	6.38E-04	616	8.75E-04	683	1.95E-04	750	2.77E-05
416	5.60E-05	483	1.19E-04	550	6.46E-04	617	8.61E-04	684	1.90E-04	751	2.73E-05
417	6.18E-05	484	1.20E-04	551	6.56E-04	618	8.53E-04	685	1.84E-04	752	2.64E-05
418	6.84E-05	485	1.20E-04	552	6.65E-04	619	8.41E-04	686	1.79E-04	753	2.58E-05
419	7.46E-05	486	1.22E-04	553	6.74E-04	620	8.28E-04	687	1.74E-04	754	2.47E-05
420	8.17E-05	487	1.24E-04	554	6.84E-04	621	8.16E-04	688	1.70E-04	755	2.41E-05
421	9.01E-05	488	1.26E-04	555	6.95E-04	622	8.06E-04	689	1.65E-04	756	2.35E-05
422	9.89E-05	489	1.29E-04	556	7.04E-04	623	7.95E-04	690	1.61E-04	757	2.32E-05
423	1.07E-04	490	1.31E-04	557	7.14E-04	624	7.84E-04	691	1.56E-04	758	2.24E-05
424	1.17E-04	491	1.36E-04	558	7.25E-04	625	7.71E-04	692	1.52E-04	759	2.20E-05
425	1.26E-04	492	1.40E-04	559	7.35E-04	626	7.57E-04	693	1.47E-04	760	2.11E-05
426	1.38E-04	493	1.46E-04	560	7.45E-04	627	7.47E-04	694	1.43E-04	761	2.03E-05
427	1.49E-04	494	1.51E-04	561	7.55E-04	628	7.34E-04	695	1.39E-04	762	2.02E-05
428	1.61E-04	495	1.58E-04	562	7.66E-04	629	7.23E-04	696	1.35E-04	763	1.97E-05
429	1.74E-04	496	1.66E-04	563	7.77E-04	630	7.11E-04	697	1.31E-04	764	1.92E-05
430	1.86E-04	497	1.74E-04	564	7.87E-04	631	6.99E-04	698	1.27E-04	765	1.84E-05
431	2.00E-04	498	1.81E-04	565	7.99E-04	632	6.86E-04	699	1.23E-04	766	1.80E-05
432	2.13E-04	499	1.90E-04	566	8.10E-04	633	6.71E-04	700	1.20E-04	767	1.73E-05
433	2.26E-04	500	1.99E-04	567	8.21E-04	634	6.60E-04	701	1.17E-04	768	1.71E-05
434	2.40E-04	501	2.08E-04	568	8.32E-04	635	6.47E-04	702	1.14E-04	769	1.61E-05
435	2.58E-04	502	2.17E-04	569	8.44E-04	636	6.34E-04	703	1.10E-04	770	1.60E-05
436	2.74E-04	503	2.27E-04	570	8.52E-04	637	6.21E-04	704	1.07E-04	771	1.56E-05
437	2.89E-04	504	2.37E-04	571	8.64E-04	638	6.09E-04	705	1.03E-04	772	1.48E-05
438	3.10E-04	505	2.48E-04	572	8.72E-04	639	5.97E-04	706	1.00E-04	773	1.45E-05
439	3.30E-04	506	2.58E-04	573	8.83E-04	640	5.85E-04	707	9.74E-05	774	1.41E-05
440	3.50E-04	507	2.68E-04	574	8.90E-04	641	5.68E-04	708	9.39E-05	775	1.39E-05
441	3.73E-04	508	2.80E-04	575	9.01E-04	642	5.55E-04	709	9.20E-05	776	1.34E-05
442	4.02E-04	509	2.91E-04	576	9.12E-04	643	5.46E-04	710	8.90E-05	777	1.29E-05
443	4.25E-04	510	3.02E-04	577	9.21E-04	644	5.33E-04	711	8.67E-05	778	1.29E-05
444	4.53E-04	511	3.12E-04	578	9.29E-04	645	5.23E-04	712	8.39E-05	779	1.29E-05
445	4.79E-04	512	3.22E-04	579	9.40E-04	646	5.10E-04	713	8.18E-05	780	1.29E-05
446	5.06E-04	513	3.34E-04	580	9.47E-04	647	4.99E-04	714	7.97E-05	N/A	N/A

**IES TM-30-18 Color Rendition Result (CCT Setting=4000K):**

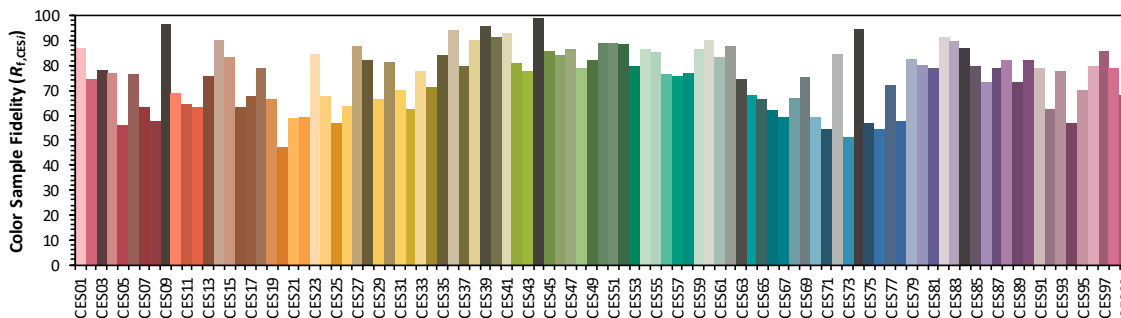
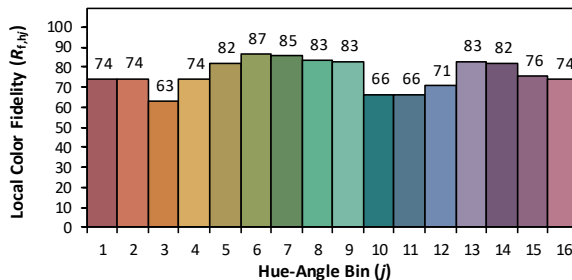
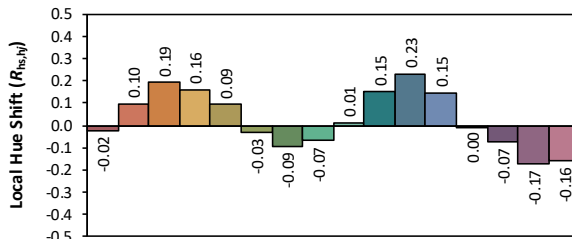
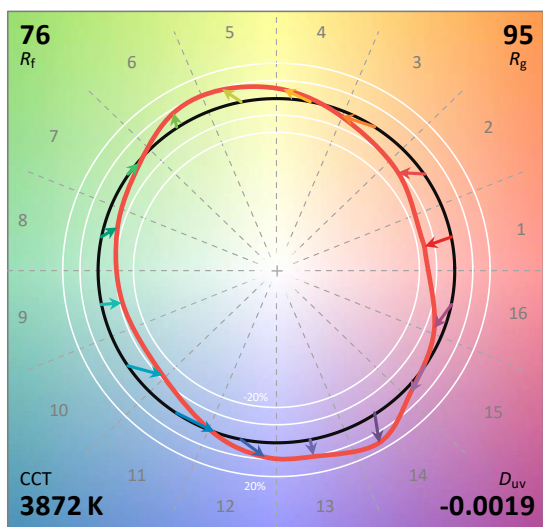
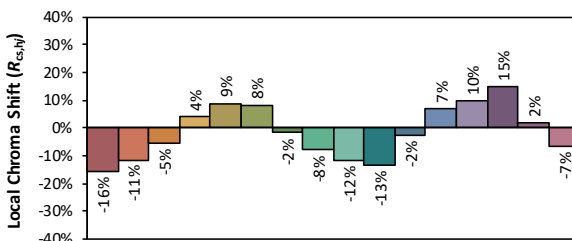
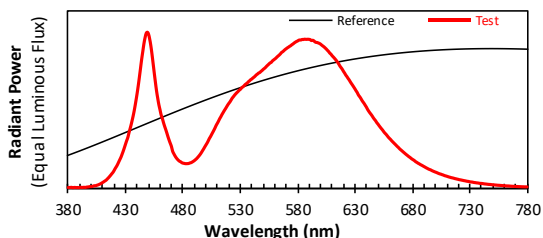
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: Reno LED Lighting Inc

Date: 2024/1/24

Model: RENO-SB-320W-MW-DV-MCCT-G2-R4



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

$x$  0.3847  
 $y$  0.3752  
 $u'$  0.2286  
 $v'$  0.5015

CIE 13.3-1995  
(CRI)

$R_a$  75  
 $R_g$  -20

### Spectrum Data (CCT Setting=4000K):

Spectral Distribution over Visible Wavelength											
WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)	WL (nm)	Radiant (W/nm)
380	7.30E-06	447	9.66E-04	514	4.73E-04	581	9.49E-04	648	4.34E-04	715	6.89E-05
381	7.50E-06	448	9.94E-04	515	4.86E-04	582	9.51E-04	649	4.22E-04	716	6.70E-05
382	7.90E-06	449	1.00E-03	516	4.98E-04	583	9.51E-04	650	4.13E-04	717	6.47E-05
383	8.50E-06	450	9.88E-04	517	5.10E-04	584	9.54E-04	651	4.03E-04	718	6.31E-05
384	6.20E-06	451	9.57E-04	518	5.22E-04	585	9.53E-04	652	3.93E-04	719	6.12E-05
385	7.70E-06	452	9.15E-04	519	5.34E-04	586	9.55E-04	653	3.84E-04	720	5.97E-05
386	7.80E-06	453	8.61E-04	520	5.45E-04	587	9.55E-04	654	3.75E-04	721	5.73E-05
387	6.80E-06	454	8.01E-04	521	5.55E-04	588	9.55E-04	655	3.65E-04	722	5.64E-05
388	7.40E-06	455	7.40E-04	522	5.67E-04	589	9.55E-04	656	3.56E-04	723	5.47E-05
389	6.70E-06	456	6.80E-04	523	5.79E-04	590	9.54E-04	657	3.48E-04	724	5.32E-05
390	7.70E-06	457	6.25E-04	524	5.88E-04	591	9.53E-04	658	3.39E-04	725	5.15E-05
391	9.10E-06	458	5.79E-04	525	5.98E-04	592	9.47E-04	659	3.30E-04	726	5.02E-05
392	7.40E-06	459	5.37E-04	526	6.06E-04	593	9.49E-04	660	3.22E-04	727	4.85E-05
393	8.40E-06	460	5.05E-04	527	6.14E-04	594	9.46E-04	661	3.15E-04	728	4.71E-05
394	8.60E-06	461	4.71E-04	528	6.21E-04	595	9.39E-04	662	3.06E-04	729	4.61E-05
395	8.10E-06	462	4.50E-04	529	6.29E-04	596	9.35E-04	663	2.99E-04	730	4.41E-05
396	9.90E-06	463	4.24E-04	530	6.34E-04	597	9.34E-04	664	2.91E-04	731	4.30E-05
397	1.07E-05	464	4.00E-04	531	6.43E-04	598	9.32E-04	665	2.84E-04	732	4.23E-05
398	1.18E-05	465	3.78E-04	532	6.49E-04	599	9.28E-04	666	2.77E-04	733	4.09E-05
399	1.31E-05	466	3.55E-04	533	6.55E-04	600	9.24E-04	667	2.69E-04	734	3.93E-05
400	1.33E-05	467	3.31E-04	534	6.64E-04	601	9.18E-04	668	2.62E-04	735	3.85E-05
401	1.45E-05	468	3.09E-04	535	6.70E-04	602	9.12E-04	669	2.54E-04	736	3.71E-05
402	1.74E-05	469	2.89E-04	536	6.75E-04	603	9.07E-04	670	2.48E-04	737	3.65E-05
403	1.87E-05	470	2.70E-04	537	6.83E-04	604	9.00E-04	671	2.42E-04	738	3.52E-05
404	1.91E-05	471	2.40E-04	538	6.89E-04	605	8.93E-04	672	2.35E-04	739	3.40E-05
405	2.18E-05	472	2.24E-04	539	6.96E-04	606	8.84E-04	673	2.29E-04	740	3.35E-05
406	2.41E-05	473	2.11E-04	540	7.01E-04	607	8.77E-04	674	2.22E-04	741	3.29E-05
407	2.73E-05	474	1.99E-04	541	7.08E-04	608	8.67E-04	675	2.17E-04	742	3.16E-05
408	3.09E-05	475	1.90E-04	542	7.13E-04	609	8.60E-04	676	2.11E-04	743	3.05E-05
409	3.50E-05	476	1.82E-04	543	7.20E-04	610	8.51E-04	677	2.05E-04	744	2.98E-05
410	3.95E-05	477	1.76E-04	544	7.27E-04	611	8.43E-04	678	2.00E-04	745	2.88E-05
411	4.42E-05	478	1.72E-04	545	7.33E-04	612	8.35E-04	679	1.93E-04	746	2.79E-05
412	4.95E-05	479	1.66E-04	546	7.39E-04	613	8.26E-04	680	1.88E-04	747	2.71E-05
413	5.41E-05	480	1.63E-04	547	7.43E-04	614	8.17E-04	681	1.84E-04	748	2.68E-05
414	6.17E-05	481	1.62E-04	548	7.50E-04	615	8.07E-04	682	1.79E-04	749	2.58E-05
415	6.91E-05	482	1.60E-04	549	7.55E-04	616	7.95E-04	683	1.72E-04	750	2.48E-05
416	7.75E-05	483	1.60E-04	550	7.63E-04	617	7.83E-04	684	1.68E-04	751	2.46E-05
417	8.62E-05	484	1.60E-04	551	7.68E-04	618	7.73E-04	685	1.63E-04	752	2.36E-05
418	9.55E-05	485	1.61E-04	552	7.75E-04	619	7.62E-04	686	1.59E-04	753	2.30E-05
419	1.04E-04	486	1.64E-04	553	7.83E-04	620	7.50E-04	687	1.54E-04	754	2.22E-05
420	1.16E-04	487	1.66E-04	554	7.90E-04	621	7.39E-04	688	1.51E-04	755	2.17E-05
421	1.30E-04	488	1.70E-04	555	7.97E-04	622	7.26E-04	689	1.46E-04	756	2.13E-05
422	1.41E-04	489	1.75E-04	556	8.04E-04	623	7.16E-04	690	1.42E-04	757	2.06E-05
423	1.55E-04	490	1.80E-04	557	8.08E-04	624	7.05E-04	691	1.38E-04	758	2.01E-05
424	1.70E-04	491	1.86E-04	558	8.16E-04	625	6.95E-04	692	1.34E-04	759	1.94E-05
425	1.86E-04	492	1.93E-04	559	8.22E-04	626	6.82E-04	693	1.30E-04	760	1.90E-05
426	2.02E-04	493	2.01E-04	560	8.28E-04	627	6.71E-04	694	1.26E-04	761	1.85E-05
427	2.21E-04	494	2.10E-04	561	8.34E-04	628	6.61E-04	695	1.23E-04	762	1.77E-05
428	2.41E-04	495	2.19E-04	562	8.42E-04	629	6.49E-04	696	1.20E-04	763	1.75E-05
429	2.63E-04	496	2.30E-04	563	8.48E-04	630	6.38E-04	697	1.16E-04	764	1.72E-05
430	2.86E-04	497	2.42E-04	564	8.55E-04	631	6.25E-04	698	1.13E-04	765	1.65E-05
431	3.08E-04	498	2.54E-04	565	8.62E-04	632	6.14E-04	699	1.09E-04	766	1.59E-05
432	3.28E-04	499	2.66E-04	566	8.71E-04	633	5.99E-04	700	1.06E-04	767	1.53E-05
433	3.59E-04	500	2.79E-04	567	8.76E-04	634	5.89E-04	701	1.04E-04	768	1.51E-05
434	3.85E-04	501	2.91E-04	568	8.82E-04	635	5.78E-04	702	1.00E-04	769	1.46E-05
435	4.14E-04	502	3.05E-04	569	8.89E-04	636	5.66E-04	703	9.71E-05	770	1.43E-05
436	4.45E-04	503	3.20E-04	570	8.94E-04	637	5.55E-04	704	9.45E-05	771	1.38E-05
437	4.79E-04	504	3.32E-04	571	9.00E-04	638	5.45E-04	705	9.24E-05	772	1.35E-05
438	5.18E-04	505	3.46E-04	572	9.05E-04	639	5.32E-04	706	8.95E-05	773	1.30E-05
439	5.61E-04	506	3.60E-04	573	9.10E-04	640	5.21E-04	707	8.72E-05	774	1.29E-05
440	6.06E-04	507	3.74E-04	574	9.14E-04	641	5.07E-04	708	8.39E-05	775	1.24E-05
441	6.56E-04	508	3.89E-04	575	9.20E-04	642	4.95E-04	709	8.17E-05	776	1.21E-05
442	7.11E-04	509	4.05E-04	576	9.25E-04	643	4.85E-04	710	7.96E-05	777	1.19E-05
443	7.68E-04	510	4.18E-04	577	9.31E-04	644	4.75E-04	711	7.71E-05	778	1.15E-05
444	8.26E-04	511	4.32E-04	578	9.36E-04	645	4.65E-04	712	7.47E-05	779	1.15E-05
445	8.77E-04	512	4.47E-04	579	9.41E-04	646	4.53E-04	713	7.26E-05	780	1.15E-05
446	9.27E-04	513	4.59E-04	580	9.44E-04	647	4.43E-04	714	7.04E-05	N/A	N/A



**IES TM-30-18 Color Rendition Result (CCT Setting=5000K):**

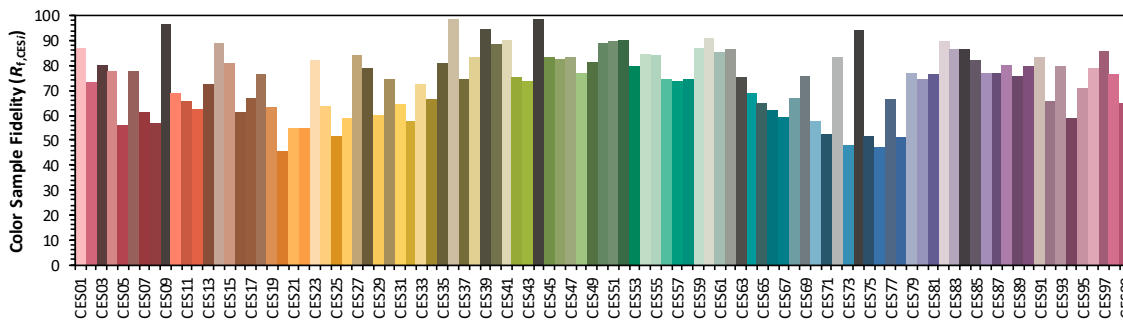
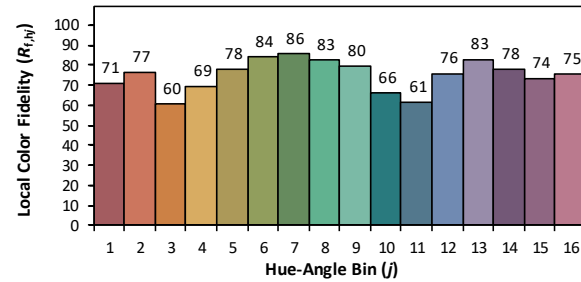
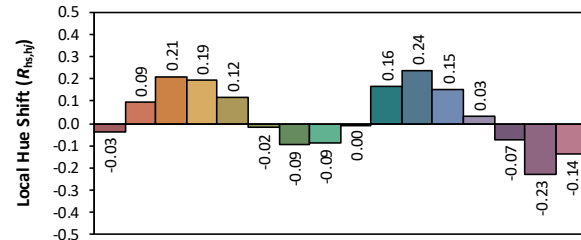
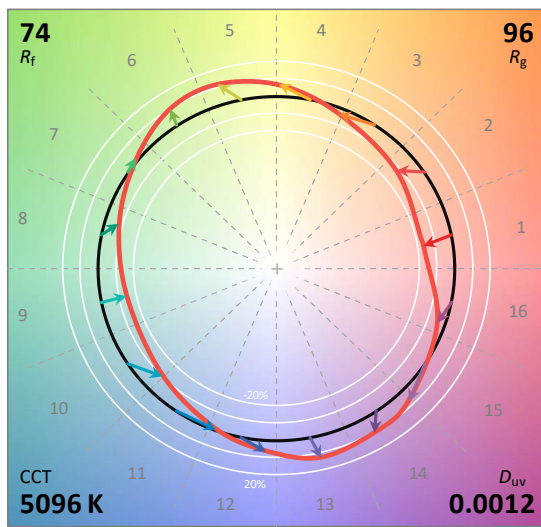
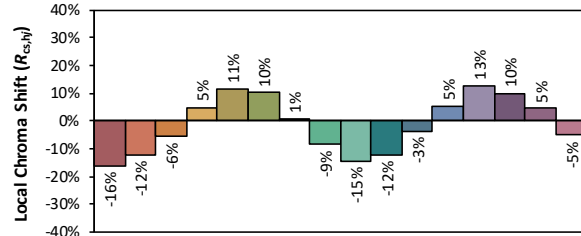
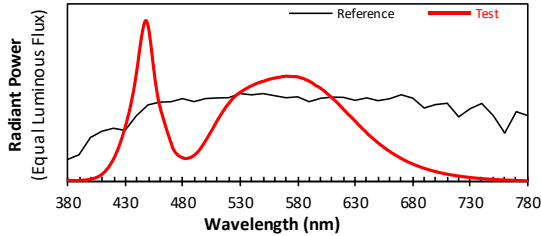
**ANSI/IES TM-30-18 Color Rendition Report**

Source: 1 CIE F1

Manufacturer: Reno LED Lighting Inc

Date: 2024/1/24

Model: RENO-SB-320W-MW-DV-MCCT-G2-R4



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

$x$  0.3426  
 $y$  0.3519  
 $u'$  0.2096  
 $v'$  0.4845

CIE 13.3-1995  
(CRI)

$R_a$  73  
 $R_g$  -24

**Spectrum Data (CCT Setting=5000K):**

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	1.06E-05	447	9.97E-04	514	4.27E-04	581	6.49E-04	648	2.55E-04	715	4.22E-05
381	9.90E-06	448	9.99E-04	515	4.38E-04	582	6.47E-04	649	2.50E-04	716	4.11E-05
382	8.80E-06	449	9.84E-04	516	4.48E-04	583	6.45E-04	650	2.43E-04	717	4.01E-05
383	9.20E-06	450	9.55E-04	517	4.59E-04	584	6.43E-04	651	2.38E-04	718	3.87E-05
384	8.50E-06	451	9.07E-04	518	4.69E-04	585	6.41E-04	652	2.32E-04	719	3.78E-05
385	8.90E-06	452	8.55E-04	519	4.78E-04	586	6.38E-04	653	2.26E-04	720	3.67E-05
386	8.50E-06	453	7.94E-04	520	4.87E-04	587	6.34E-04	654	2.21E-04	721	3.56E-05
387	7.50E-06	454	7.32E-04	521	4.95E-04	588	6.31E-04	655	2.15E-04	722	3.47E-05
388	8.40E-06	455	6.76E-04	522	5.05E-04	589	6.28E-04	656	2.11E-04	723	3.38E-05
389	9.10E-06	456	6.20E-04	523	5.13E-04	590	6.25E-04	657	2.05E-04	724	3.26E-05
390	9.70E-06	457	5.74E-04	524	5.21E-04	591	6.21E-04	658	2.00E-04	725	3.19E-05
391	8.90E-06	458	5.31E-04	525	5.28E-04	592	6.16E-04	659	1.95E-04	726	3.11E-05
392	1.01E-05	459	4.95E-04	526	5.34E-04	593	6.13E-04	660	1.90E-04	727	3.03E-05
393	1.06E-05	460	4.66E-04	527	5.40E-04	594	6.08E-04	661	1.85E-04	728	2.93E-05
394	1.16E-05	461	4.38E-04	528	5.46E-04	595	6.02E-04	662	1.80E-04	729	2.84E-05
395	1.24E-05	462	4.15E-04	529	5.52E-04	596	5.96E-04	663	1.77E-04	730	2.77E-05
396	1.27E-05	463	3.89E-04	530	5.56E-04	597	5.94E-04	664	1.72E-04	731	2.69E-05
397	1.37E-05	464	3.66E-04	531	5.61E-04	598	5.90E-04	665	1.67E-04	732	2.62E-05
398	1.48E-05	465	3.42E-04	532	5.65E-04	599	5.85E-04	666	1.63E-04	733	2.55E-05
399	1.62E-05	466	3.19E-04	533	5.70E-04	600	5.82E-04	667	1.59E-04	734	2.49E-05
400	1.78E-05	467	2.97E-04	534	5.74E-04	601	5.75E-04	668	1.55E-04	735	2.39E-05
401	1.96E-05	468	2.77E-04	535	5.78E-04	602	5.70E-04	669	1.51E-04	736	2.33E-05
402	2.13E-05	469	2.55E-04	536	5.81E-04	603	5.65E-04	670	1.47E-04	737	2.28E-05
403	2.35E-05	470	2.37E-04	537	5.86E-04	604	5.59E-04	671	1.43E-04	738	2.21E-05
404	2.63E-05	471	2.12E-04	538	5.89E-04	605	5.53E-04	672	1.39E-04	739	2.15E-05
405	2.88E-05	472	2.00E-04	539	5.94E-04	606	5.46E-04	673	1.35E-04	740	2.08E-05
406	3.23E-05	473	1.87E-04	540	5.96E-04	607	5.41E-04	674	1.32E-04	741	2.01E-05
407	3.61E-05	474	1.78E-04	541	6.00E-04	608	5.34E-04	675	1.28E-04	742	1.98E-05
408	4.02E-05	475	1.71E-04	542	6.03E-04	609	5.28E-04	676	1.24E-04	743	1.93E-05
409	4.49E-05	476	1.64E-04	543	6.06E-04	610	5.20E-04	677	1.21E-04	744	1.87E-05
410	5.14E-05	477	1.59E-04	544	6.10E-04	611	5.15E-04	678	1.19E-04	745	1.83E-05
411	5.72E-05	478	1.55E-04	545	6.12E-04	612	5.09E-04	679	1.16E-04	746	1.75E-05
412	6.38E-05	479	1.52E-04	546	6.15E-04	613	5.02E-04	680	1.12E-04	747	1.72E-05
413	7.24E-05	480	1.49E-04	547	6.17E-04	614	4.95E-04	681	1.09E-04	748	1.65E-05
414	8.12E-05	481	1.46E-04	548	6.21E-04	615	4.88E-04	682	1.06E-04	749	1.63E-05
415	8.92E-05	482	1.46E-04	549	6.22E-04	616	4.80E-04	683	1.03E-04	750	1.57E-05
416	9.97E-05	483	1.45E-04	550	6.24E-04	617	4.72E-04	684	1.01E-04	751	1.54E-05
417	1.11E-04	484	1.46E-04	551	6.26E-04	618	4.65E-04	685	9.84E-05	752	1.49E-05
418	1.24E-04	485	1.47E-04	552	6.29E-04	619	4.57E-04	686	9.48E-05	753	1.46E-05
419	1.35E-04	486	1.50E-04	553	6.30E-04	620	4.50E-04	687	9.27E-05	754	1.42E-05
420	1.49E-04	487	1.53E-04	554	6.34E-04	621	4.42E-04	688	9.00E-05	755	1.38E-05
421	1.63E-04	488	1.57E-04	555	6.35E-04	622	4.35E-04	689	8.74E-05	756	1.34E-05
422	1.80E-04	489	1.61E-04	556	6.38E-04	623	4.28E-04	690	8.51E-05	757	1.30E-05
423	1.97E-04	490	1.66E-04	557	6.39E-04	624	4.20E-04	691	8.29E-05	758	1.27E-05
424	2.15E-04	491	1.72E-04	558	6.41E-04	625	4.14E-04	692	8.06E-05	759	1.22E-05
425	2.35E-04	492	1.79E-04	559	6.43E-04	626	4.07E-04	693	7.83E-05	760	1.22E-05
426	2.56E-04	493	1.86E-04	560	6.43E-04	627	4.00E-04	694	7.63E-05	761	1.19E-05
427	2.76E-04	494	1.95E-04	561	6.45E-04	628	3.93E-04	695	7.39E-05	762	1.14E-05
428	3.00E-04	495	2.04E-04	562	6.47E-04	629	3.85E-04	696	7.21E-05	763	1.11E-05
429	3.23E-04	496	2.13E-04	563	6.48E-04	630	3.79E-04	697	7.03E-05	764	1.10E-05
430	3.49E-04	497	2.24E-04	564	6.49E-04	631	3.71E-04	698	6.81E-05	765	1.06E-05
431	3.74E-04	498	2.36E-04	565	6.49E-04	632	3.63E-04	699	6.62E-05	766	1.01E-05
432	4.03E-04	499	2.47E-04	566	6.52E-04	633	3.55E-04	700	6.46E-05	767	1.00E-05
433	4.30E-04	500	2.58E-04	567	6.54E-04	634	3.48E-04	701	6.27E-05	768	9.70E-06
434	4.61E-04	501	2.69E-04	568	6.53E-04	635	3.42E-04	702	6.08E-05	769	9.40E-06
435	4.95E-04	502	2.82E-04	569	6.54E-04	636	3.34E-04	703	5.94E-05	770	9.10E-06
436	5.30E-04	503	2.95E-04	570	6.56E-04	637	3.27E-04	704	5.75E-05	771	8.90E-06
437	5.67E-04	504	3.06E-04	571	6.55E-04	638	3.20E-04	705	5.61E-05	772	8.70E-06
438	6.08E-04	505	3.18E-04	572	6.55E-04	639	3.14E-04	706	5.42E-05	773	8.50E-06
439	6.54E-04	506	3.30E-04	573	6.54E-04	640	3.07E-04	707	5.26E-05	774	8.20E-06
440	7.00E-04	507	3.44E-04	574	6.54E-04	641	2.98E-04	708	5.12E-05	775	8.00E-06
441	7.52E-04	508	3.56E-04	575	6.53E-04	642	2.92E-04	709	5.00E-05	776	7.70E-06
442	8.06E-04	509	3.68E-04	576	6.54E-04	643	2.86E-04	710	4.81E-05	777	7.50E-06
443	8.55E-04	510	3.82E-04	577	6.53E-04	644	2.80E-04	711	4.75E-05	778	7.50E-06
444	9.03E-04	511	3.93E-04	578	6.53E-04	645	2.73E-04	712	4.58E-05	779	7.40E-06
445	9.42E-04	512	4.04E-04	579	6.53E-04	646	2.67E-04	713	4.46E-05	780	7.40E-06
446	9.75E-04	513	4.16E-04	580	6.51E-04	647	2.61E-04	714	4.33E-05	N/A	N/A

**Goniophotometer Test Results:**

**Test Condition:**

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
24.8	42.7	Face Down	90	25

**Electrical Data:**

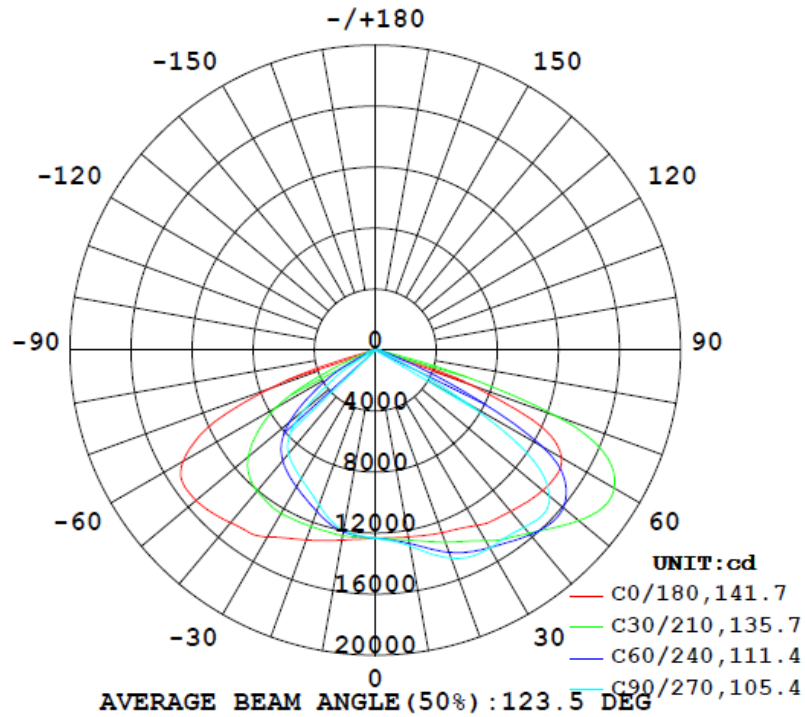
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	2.6793	321.26	0.9992

**Goniophotometer Data:**

Parameter	Results		
	3000K	4000K	5000K
Total Luminous (lm)	48750.2	53853.1	51231.2
Luminous Efficacy (lm/W)	151.75	172.18	158.77
Zonal Lumens Distribution (0-90°)	100.0%	100.0%	100.0%
Zonal Lumens Distribution (80-90°)	0.4%	0.4%	0.4%
Beam Angle (°)	123.5	123.7	123.5
BUG	B5-U0-G3	B5-U0-G3	B5-U0-G3

**Luminous Intensity Distribution Diagram (CCT Setting=3000K):**

LUMINOUS INTENSITY DISTRIBUTION DIAGRAM

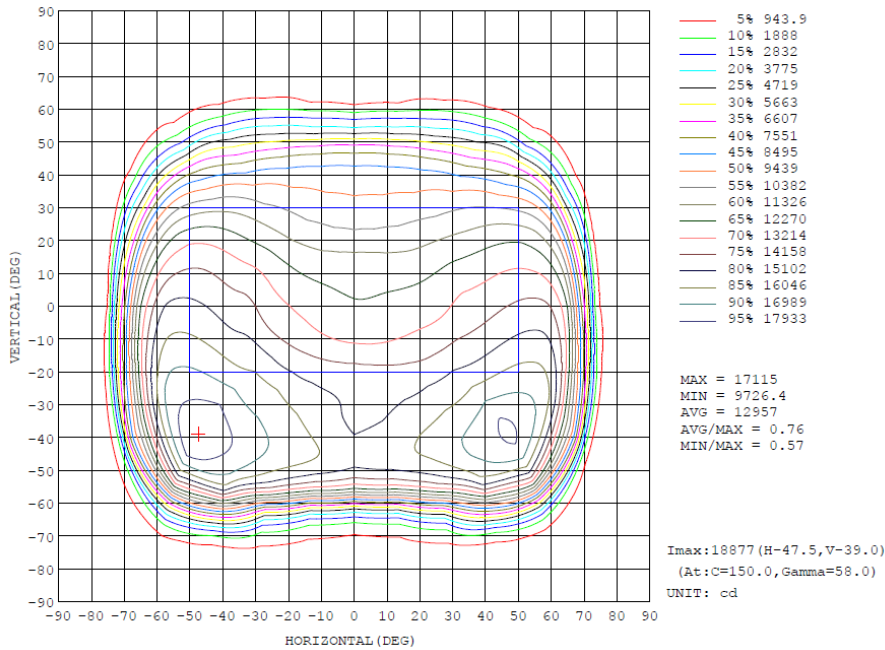


**Zonal Flux Diagram (CCT Setting=3000K):**

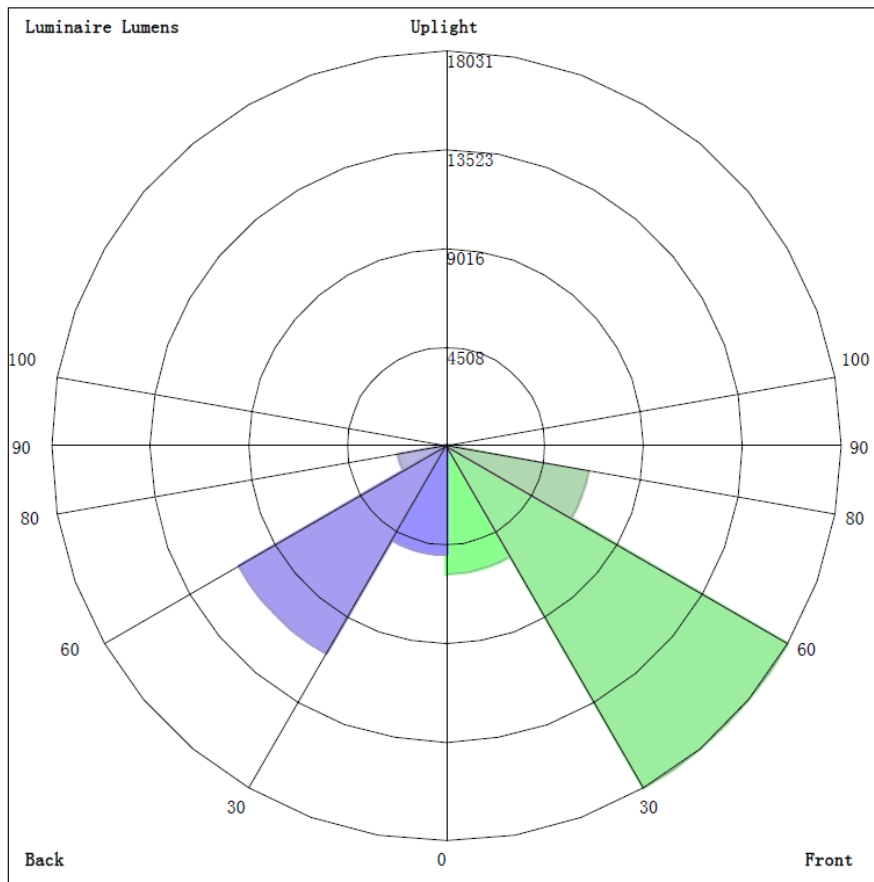
ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	zone	total	%lum, lamp
10	1243	1275	1304	1295	1265	1220	1198	1213	0- 10	1186	1186	2.43,2.43
20	1273	1376	1451	1413	1324	1174	1080	1154	10- 20	3596	4782	9.81,9.81
30	1326	1482	1498	1550	1415	1119	972.6	1083	20- 30	5986	10768	22.1,22.1
40	1379	1591	1515	1666	1476	1044	886.0	1002	30- 40	8276	19044	39.1,39.1
50	1432	1698	1489	1758	1534	862.8	613.9	832.7	40- 50	10205	29250	60,60
60	1409	1632	681.8	1705	1455	473.2	141.0	438.0	50- 60	10487	39737	81.5,81.5
70	669.3	718.9	90.59	820.9	736.1	80.73	58.76	72.28	60- 70	7017	46754	95.9,95.9
80	34.27	48.38	46.90	51.72	40.29	23.18	24.80	21.13	70- 80	1794	48548	99.6,99.6
90	0	0	0	0	0	0	0	0	80- 90	202.1	48750	100,100
100	0	0	0	0	0	0	0	0	90-100	0	48750	100,100
110	0	0	0	0	0	0	0	0	100-110	0	48750	100,100
120	0	0	0	0	0	0	0	0	110-120	0	48750	100,100
130	0	0	0	0	0	0	0	0	120-130	0	48750	100,100
140	0	0	0	0	0	0	0	0	130-140	0	48750	100,100
150	0	0	0	0	0	0	0	0	140-150	0	48750	100,100
160	0	0	0	0	0	0	0	0	150-160	0	48750	100,100
170	0	0	0	0	0	0	0	0	160-170	0	48750	100,100
180	0	0	0	0	0	0	0	0	170-180	0	48750	100,100
DEG	LUMINOUS INTENSITY: *10cd								UNIT:lm			

**Isocandela Diagram (CCT Setting=3000K):**



**BUG Rating (CCT Setting=3000K):**



**LUMINAIRE CLASSIFICATION SYSTEM (LCS)**

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	5827.5	N.A.	12.0
FM - Front-Medium (30-60)	18031.0	N.A.	37.0
FH - Front-High (60-80)	6585.4	N.A.	13.5
FVH - Front-Very High (80-90)	147.7	N.A.	0.3
BL - Back-Low (0-30)	4940.9	N.A.	10.1
BM - Back-Medium (30-60)	10937.5	N.A.	22.4
BH - Back-High (60-80)	2225.8	N.A.	4.6
BVH - Back-Very High (80-90)	54.4	N.A.	0.1
UL - Uplight-Low (90-100)	0.0	N.A.	0.0
UH - Uplight-High (100-180)	0.0	N.A.	0.0
<b>Total</b>	<b>48750.2</b>	<b>N.A.</b>	<b>100.0</b>
<b>BUG Rating</b>	<b>B5-U0-G3</b>		



**THD and PF Measurement Test Results:**

**Electrical Measurement:**

CCT Setting	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor	iTHD(%)
3000K	120.0	60	2.6793	321.26	0.9992	2.56
	277.0	60	1.1707	317.30	0.9785	7.65
	347.0	60	0.9676	317.10	0.9444	10.39
4000K	120.0	60	2.6085	312.77	0.9992	2.37
	277.0	60	1.1170	302.10	0.9764	7.41
	347.0	60	0.9251	301.50	0.9392	10.37
5000K	120.0	60	2.6912	322.68	0.9992	2.66
	277.0	60	1.1721	317.60	0.9782	7.89
	347.0	60	0.9678	317.20	0.9445	10.71

**Annex:**

ANSI CCT Quadrangle (omit any outside product range)/Worst-Case Value	Actual CCT (K)	Power Consumption (W)	Lumen Output (lm)	Efficacy (lm/W)	Input Control Signal Applied
3000K	3079	321.26	48750.2	151.75	Set Switch 0% to 3000K
4000K	3873	312.77	53853.1	172.18	Set Switch 50% to 4000K
5000K	5094	322.68	51231.2	158.77	Set Switch 100% to 5000K
Lowest Efficacy	151.75 lm/W (@3000K)				
Maximum Power	322.68 W				

**Photo of Sample:**





**Equipment List:**

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2023-11-08	2024-11-07
NTC-F01-006	2.0 meter Integrating Sphere	2023-11-08	2024-11-07
NTC-F01-012	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-013	Standard Lamp	2023-11-02	2024-11-01
NTC-F01-031	Digital Power Meter	2023-08-25	2024-08-24
NTC-F01-020	Temperature & Humidity Meter	2023-11-06	2024-11-05

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