

LM-79-19 Test Report

For

Reno LED Lighting Inc.

7-615 Dension St, Markham L3R 1B8

High Bay Luminaires for Commercial and Industrial Buildings

Model Name(s):

RENO-HBU-320W-DV-MCCT-G2-R4

Representative (Tested) Model:

RENO-HBU-320W-DV-MCCT-G2-R4

Model Difference:

1. Product is wattage tunable product, can be tunable from 250W, 280W, 300W and 320W;
2. Product is color tunable product, can be tunable from 4000K and 5000K.

Prepared by:

Alan Wang

Engineer: Alan Wang

Date: 2023-12-07

Reviewed by:

Vincent Yuan

Technical Lead: Vincent Yuan

Issue Date: 2023-12-07

Revised Date: N/A

Note:

1. The results contained in this report pertain only to the tested samples.
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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 1st 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

Product Information:

Model Number:	RENO-HBU-320W-DV-MCCT-G2-R4				
Product Type:	High Bay Luminaires for Commercial and Industrial Buildings				
Rating Input:	120-347Vac, 50/60Hz, 250W/280W/300W/320W				
Declared CCT:	4000K and 5000K				
Declared Light Output:		250W	280W	300W	320W
	4000K	41250 lm	46200 lm	49500 lm	52800 lm
	5000K	40000 lm	44800 lm	48000 lm	51200 lm
Declared Efficacy:	4000K: 165 lm/W 5000K: 160 lm/W				
LED Manufacturer:	LUMILEDS				
LED Model:	L128-XX70RC35001A1				
LED Driver Manufacturer:	Shenzhen Fahold Electronics Co., Ltd.				
LED Driver Model:	K1-T320B-260A12				

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:	2023-10-06
Quantity of Receipt Samples:	1 pc
Sample Number:	231006004-S1
Test Representation:	N/A

Laboratory Information:

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

Report Information:

Test Report Form:	LM-79_TRF_V1.5
Issued Date of Test Report:	2023-12-07
Revised Date of Test Report:	N/A
Test Report No.:	NTCLR23120088
Remark (If applicable):	1. This report is copied from NTCLR23100190, due to the same product.

Test Specification:	
Date of Test	2023-10-08
Test Item	<ol style="list-style-type: none"> 1. Total Luminous Flux 2. Luminous Distribution Intensity 3. Luminous Efficacy 4. Correlated Color Temperature 5. Color Rendering Index 6. Chromaticity Coordinate 7. Fidelity Index 8. Gamut Index 9. Local Chroma Shift 10. THD and PF
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

Test Methods:
<p>1. Photometric and Electrical Measurements – Light Distribution Method:</p> <p>Photometric parameters were measured using the goniophotometer and software. The ambient temperature shall be maintained at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$, 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>2. Photometric and Electrical Measurements – Integrating Sphere Method:</p> <p>Photometric parameters were measured using an integrating sphere, as spectroradiometer and software. The ambient temperature condition inside the sphere was measured at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$. 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>3. THD and PF Measurements:</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)
25.2	44.8	Face Down	90	10

Electrical Data:

CCT Setting	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
4000K	120.0	60	2.6314	315.26	0.9984
5000K	120.0	60	2.6893	322.23	0.9985

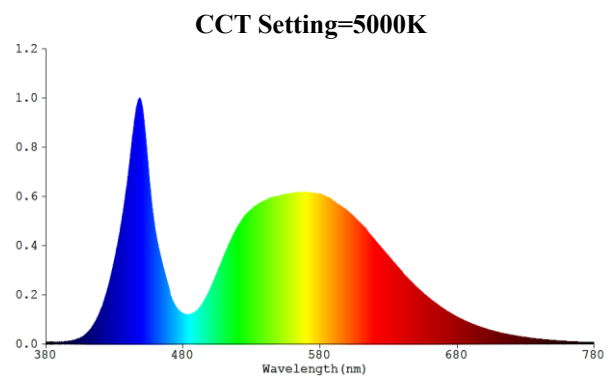
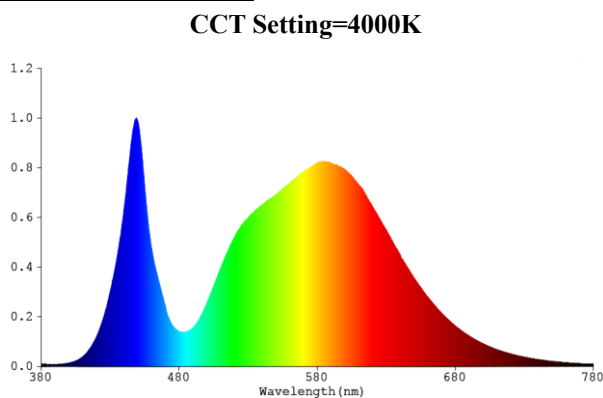
Color Data:

CCT Setting	Test CCT (K)	R _a	R ₉	R _f	R _g	R _{cs, h1}	Chromaticity		
							(x, y)	(u', v')	Duv
4000K	4136	75.3	-15	76	96	-15%	(0.3730, 0.3670)	(0.2241, 0.4961)	-0.0024
5000K	5227	73.2	-21	74	96	-16%	(0.3391, 0.3489)	(0.2084, 0.4825)	0.0011

Specify Color Rendering:

CCT Setting	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
4000K	74	81	86	75	73	73	82	58	-15	55	72	49	75	92	68
5000K	72	77	80	75	73	69	81	60	-21	44	72	47	72	88	67

Spectrum Diagram:



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

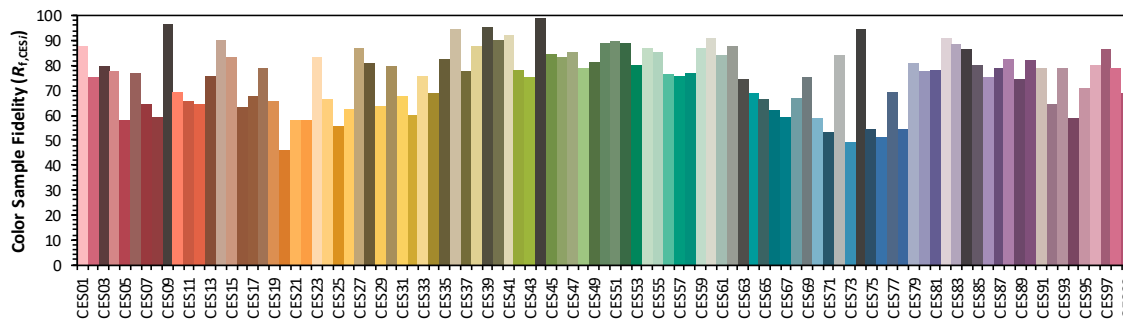
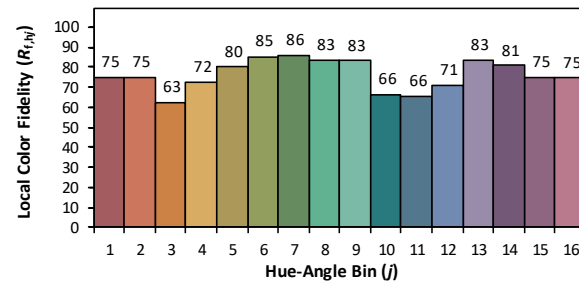
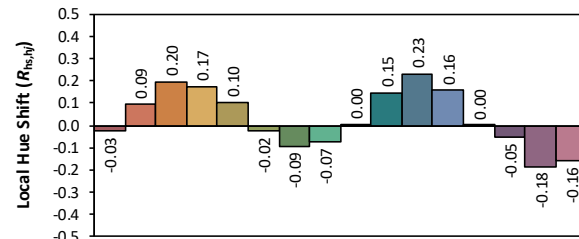
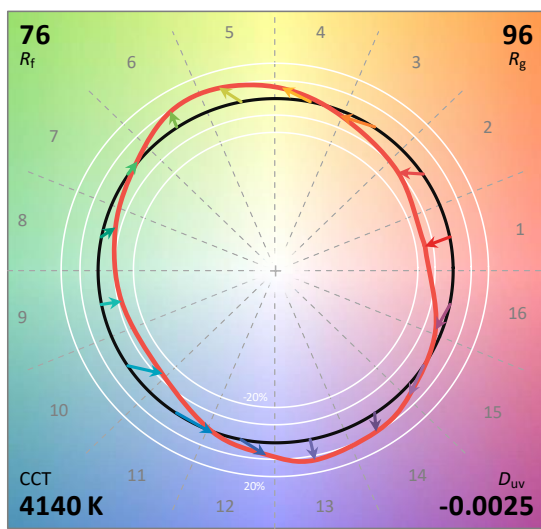
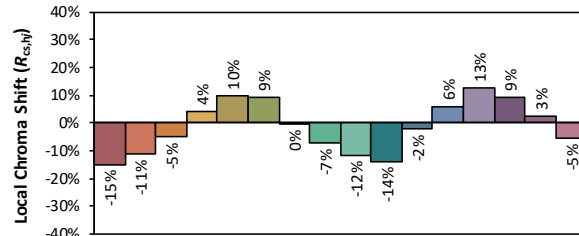
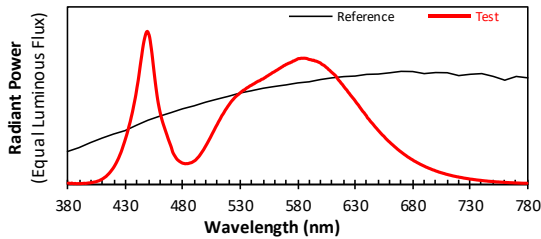
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: Reno LED Lighting Inc.

Date: 2023/12/7

Model: RENO-HBU-320W-DV-MCCT-G2-R4



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

x 0.3730
 y 0.3668
 u' 0.2242
 v' 0.4960

CIE 13.3-1995
(CRI)

R_a 75
 R_g -15

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	1.04E-05	447	9.67E-04	514	4.51E-04	581	8.23E-04	648	3.74E-04	715	5.86E-05
381	1.00E-05	448	9.92E-04	515	4.61E-04	582	8.23E-04	649	3.66E-04	716	5.68E-05
382	7.80E-06	449	1.00E-03	516	4.74E-04	583	8.25E-04	650	3.57E-04	717	5.54E-05
383	1.11E-05	450	9.86E-04	517	4.87E-04	584	8.25E-04	651	3.49E-04	718	5.39E-05
384	8.30E-06	451	9.61E-04	518	4.98E-04	585	8.25E-04	652	3.41E-04	719	5.20E-05
385	7.30E-06	452	9.11E-04	519	5.09E-04	586	8.25E-04	653	3.32E-04	720	5.12E-05
386	8.70E-06	453	8.56E-04	520	5.20E-04	587	8.24E-04	654	3.24E-04	721	4.92E-05
387	7.10E-06	454	7.90E-04	521	5.31E-04	588	8.23E-04	655	3.18E-04	722	4.82E-05
388	7.30E-06	455	7.25E-04	522	5.41E-04	589	8.20E-04	656	3.10E-04	723	4.69E-05
389	7.60E-06	456	6.63E-04	523	5.50E-04	590	8.17E-04	657	3.01E-04	724	4.54E-05
390	7.30E-06	457	6.06E-04	524	5.58E-04	591	8.16E-04	658	2.94E-04	725	4.36E-05
391	7.80E-06	458	5.54E-04	525	5.67E-04	592	8.14E-04	659	2.86E-04	726	4.26E-05
392	8.50E-06	459	5.12E-04	526	5.74E-04	593	8.11E-04	660	2.80E-04	727	4.14E-05
393	8.80E-06	460	4.76E-04	527	5.81E-04	594	8.12E-04	661	2.73E-04	728	4.03E-05
394	9.80E-06	461	4.44E-04	528	5.87E-04	595	8.08E-04	662	2.66E-04	729	3.91E-05
395	8.90E-06	462	4.16E-04	529	5.93E-04	596	8.06E-04	663	2.60E-04	730	3.76E-05
396	9.80E-06	463	3.92E-04	530	6.00E-04	597	8.04E-04	664	2.53E-04	731	3.65E-05
397	1.09E-05	464	3.70E-04	531	6.06E-04	598	8.00E-04	665	2.46E-04	732	3.59E-05
398	1.20E-05	465	3.48E-04	532	6.12E-04	599	7.97E-04	666	2.40E-04	733	3.48E-05
399	1.23E-05	466	3.26E-04	533	6.18E-04	600	7.94E-04	667	2.33E-04	734	3.36E-05
400	1.38E-05	467	3.03E-04	534	6.21E-04	601	7.86E-04	668	2.27E-04	735	3.28E-05
401	1.45E-05	468	2.82E-04	535	6.27E-04	602	7.82E-04	669	2.21E-04	736	3.15E-05
402	1.68E-05	469	2.62E-04	536	6.33E-04	603	7.79E-04	670	2.15E-04	737	3.08E-05
403	1.82E-05	470	2.41E-04	537	6.37E-04	604	7.72E-04	671	2.09E-04	738	2.99E-05
404	1.94E-05	471	2.15E-04	538	6.42E-04	605	7.65E-04	672	2.04E-04	739	2.92E-05
405	2.20E-05	472	2.00E-04	539	6.47E-04	606	7.60E-04	673	1.98E-04	740	2.84E-05
406	2.46E-05	473	1.87E-04	540	6.50E-04	607	7.51E-04	674	1.93E-04	741	2.73E-05
407	2.66E-05	474	1.75E-04	541	6.55E-04	608	7.46E-04	675	1.88E-04	742	2.65E-05
408	3.09E-05	475	1.65E-04	542	6.59E-04	609	7.38E-04	676	1.82E-04	743	2.57E-05
409	3.45E-05	476	1.59E-04	543	6.64E-04	610	7.32E-04	677	1.78E-04	744	2.49E-05
410	3.87E-05	477	1.53E-04	544	6.69E-04	611	7.25E-04	678	1.72E-04	745	2.45E-05
411	4.37E-05	478	1.48E-04	545	6.73E-04	612	7.19E-04	679	1.68E-04	746	2.33E-05
412	4.94E-05	479	1.44E-04	546	6.77E-04	613	7.12E-04	680	1.64E-04	747	2.29E-05
413	5.44E-05	480	1.40E-04	547	6.79E-04	614	7.02E-04	681	1.58E-04	748	2.21E-05
414	6.22E-05	481	1.39E-04	548	6.84E-04	615	6.90E-04	682	1.54E-04	749	2.18E-05
415	6.94E-05	482	1.37E-04	549	6.88E-04	616	6.80E-04	683	1.50E-04	750	2.09E-05
416	7.75E-05	483	1.38E-04	550	6.91E-04	617	6.72E-04	684	1.46E-04	751	2.04E-05
417	8.66E-05	484	1.38E-04	551	6.97E-04	618	6.62E-04	685	1.42E-04	752	1.98E-05
418	9.66E-05	485	1.39E-04	552	7.01E-04	619	6.54E-04	686	1.38E-04	753	1.92E-05
419	1.06E-04	486	1.42E-04	553	7.07E-04	620	6.44E-04	687	1.34E-04	754	1.85E-05
420	1.18E-04	487	1.44E-04	554	7.11E-04	621	6.34E-04	688	1.30E-04	755	1.86E-05
421	1.31E-04	488	1.46E-04	555	7.16E-04	622	6.25E-04	689	1.26E-04	756	1.77E-05
422	1.45E-04	489	1.51E-04	556	7.20E-04	623	6.17E-04	690	1.23E-04	757	1.74E-05
423	1.60E-04	490	1.56E-04	557	7.25E-04	624	6.05E-04	691	1.19E-04	758	1.67E-05
424	1.75E-04	491	1.61E-04	558	7.31E-04	625	5.96E-04	692	1.15E-04	759	1.64E-05
425	1.94E-04	492	1.69E-04	559	7.34E-04	626	5.86E-04	693	1.13E-04	760	1.59E-05
426	2.12E-04	493	1.77E-04	560	7.38E-04	627	5.77E-04	694	1.09E-04	761	1.53E-05
427	2.33E-04	494	1.85E-04	561	7.44E-04	628	5.68E-04	695	1.06E-04	762	1.51E-05
428	2.56E-04	495	1.96E-04	562	7.48E-04	629	5.59E-04	696	1.03E-04	763	1.45E-05
429	2.78E-04	496	2.07E-04	563	7.52E-04	630	5.49E-04	697	1.00E-04	764	1.42E-05
430	3.02E-04	497	2.18E-04	564	7.58E-04	631	5.38E-04	698	9.70E-05	765	1.36E-05
431	3.26E-04	498	2.29E-04	565	7.62E-04	632	5.28E-04	699	9.50E-05	766	1.34E-05
432	3.53E-04	499	2.42E-04	566	7.67E-04	633	5.20E-04	700	9.16E-05	767	1.31E-05
433	3.83E-04	500	2.55E-04	567	7.71E-04	634	5.08E-04	701	8.87E-05	768	1.27E-05
434	4.10E-04	501	2.68E-04	568	7.77E-04	635	4.98E-04	702	8.66E-05	769	1.22E-05
435	4.43E-04	502	2.81E-04	569	7.80E-04	636	4.87E-04	703	8.33E-05	770	1.20E-05
436	4.75E-04	503	2.95E-04	570	7.85E-04	637	4.77E-04	704	8.14E-05	771	1.16E-05
437	5.12E-04	504	3.09E-04	571	7.87E-04	638	4.70E-04	705	7.88E-05	772	1.14E-05
438	5.49E-04	505	3.24E-04	572	7.92E-04	639	4.59E-04	706	7.70E-05	773	1.11E-05
439	5.89E-04	506	3.39E-04	573	7.94E-04	640	4.50E-04	707	7.45E-05	774	1.08E-05
440	6.36E-04	507	3.53E-04	574	7.98E-04	641	4.36E-04	708	7.28E-05	775	1.03E-05
441	6.80E-04	508	3.68E-04	575	8.01E-04	642	4.29E-04	709	6.99E-05	776	1.01E-05
442	7.34E-04	509	3.82E-04	576	8.07E-04	643	4.19E-04	710	6.80E-05	777	9.80E-06
443	7.89E-04	510	3.95E-04	577	8.08E-04	644	4.09E-04	711	6.62E-05	778	9.80E-06
444	8.39E-04	511	4.10E-04	578	8.13E-04	645	4.02E-04	712	6.41E-05	779	9.90E-06
445	8.92E-04	512	4.23E-04	579	8.16E-04	646	3.93E-04	713	6.25E-05	780	1.00E-05
446	9.35E-04	513	4.37E-04	580	8.20E-04	647	3.83E-04	714	6.06E-05	N/A	N/A

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

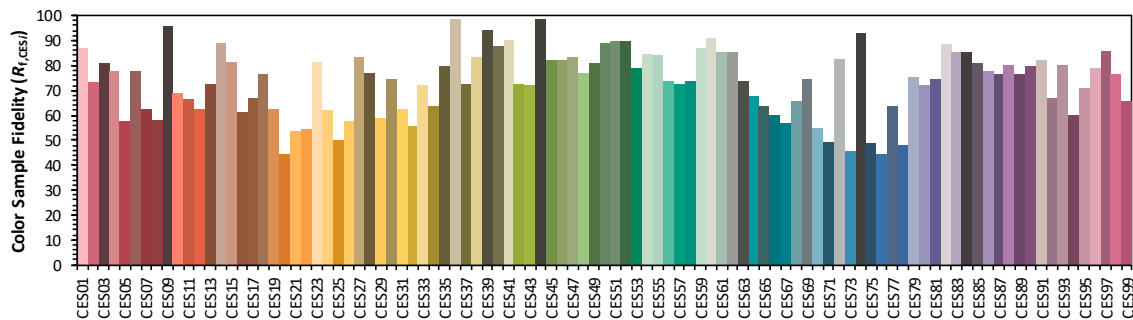
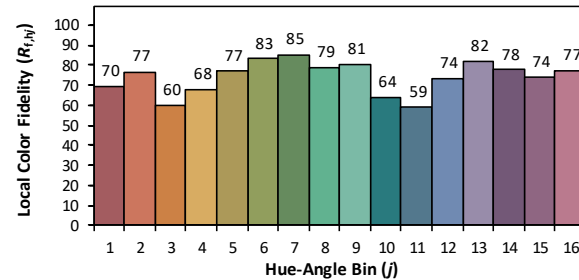
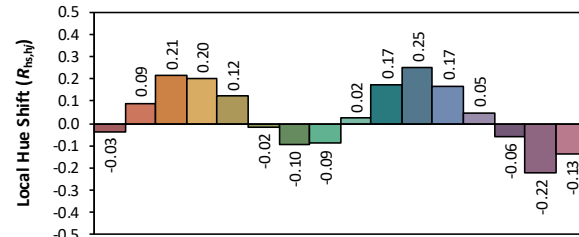
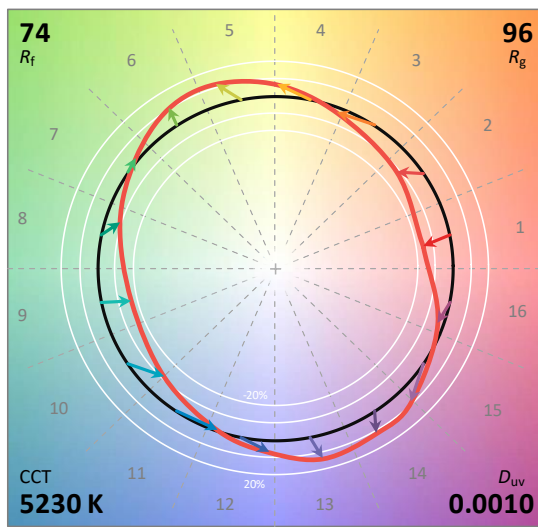
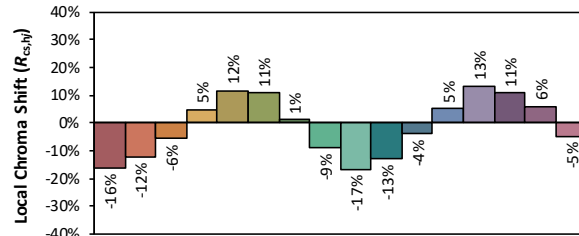
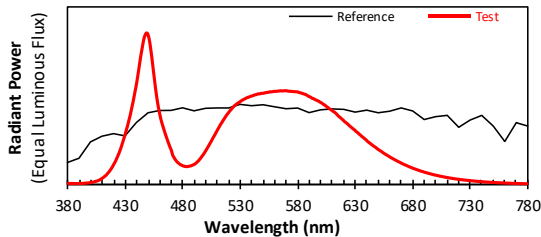
ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: Reno LED Lighting Inc.

Date: 2023/12/7

Model: RENO-HBU-320W-DV-MCCT-G2-R4



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

x 0.3391
 y 0.3487
 u' 0.2084
 v' 0.4824

CIE 13.3-1995
(CRI)

R_a 73
 R_g -20

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	9.90E-06	447	9.84E-04	514	4.10E-04	581	6.08E-04	648	2.46E-04	715	4.19E-05
381	7.50E-06	448	9.97E-04	515	4.23E-04	582	6.06E-04	649	2.40E-04	716	4.09E-05
382	8.70E-06	449	9.96E-04	516	4.34E-04	583	6.04E-04	650	2.34E-04	717	3.96E-05
383	8.80E-06	450	9.76E-04	517	4.46E-04	584	6.01E-04	651	2.29E-04	718	3.86E-05
384	8.40E-06	451	9.40E-04	518	4.57E-04	585	5.99E-04	652	2.24E-04	719	3.77E-05
385	8.90E-06	452	8.88E-04	519	4.67E-04	586	5.96E-04	653	2.20E-04	720	3.66E-05
386	7.70E-06	453	8.30E-04	520	4.77E-04	587	5.94E-04	654	2.14E-04	721	3.57E-05
387	8.10E-06	454	7.66E-04	521	4.87E-04	588	5.89E-04	655	2.09E-04	722	3.46E-05
388	8.10E-06	455	7.04E-04	522	4.95E-04	589	5.85E-04	656	2.04E-04	723	3.36E-05
389	8.70E-06	456	6.41E-04	523	5.04E-04	590	5.80E-04	657	1.99E-04	724	3.28E-05
390	9.20E-06	457	5.85E-04	524	5.12E-04	591	5.77E-04	658	1.94E-04	725	3.18E-05
391	8.70E-06	458	5.36E-04	525	5.21E-04	592	5.73E-04	659	1.90E-04	726	3.09E-05
392	9.30E-06	459	4.94E-04	526	5.26E-04	593	5.68E-04	660	1.85E-04	727	3.03E-05
393	9.20E-06	460	4.57E-04	527	5.32E-04	594	5.67E-04	661	1.80E-04	728	2.92E-05
394	1.06E-05	461	4.25E-04	528	5.38E-04	595	5.61E-04	662	1.76E-04	729	2.85E-05
395	1.07E-05	462	3.98E-04	529	5.42E-04	596	5.58E-04	663	1.73E-04	730	2.79E-05
396	1.17E-05	463	3.74E-04	530	5.47E-04	597	5.54E-04	664	1.68E-04	731	2.70E-05
397	1.19E-05	464	3.50E-04	531	5.53E-04	598	5.51E-04	665	1.64E-04	732	2.61E-05
398	1.31E-05	465	3.27E-04	532	5.57E-04	599	5.46E-04	666	1.60E-04	733	2.54E-05
399	1.42E-05	466	3.04E-04	533	5.62E-04	600	5.42E-04	667	1.56E-04	734	2.47E-05
400	1.58E-05	467	2.83E-04	534	5.65E-04	601	5.38E-04	668	1.52E-04	735	2.38E-05
401	1.69E-05	468	2.63E-04	535	5.69E-04	602	5.32E-04	669	1.49E-04	736	2.31E-05
402	1.81E-05	469	2.43E-04	536	5.74E-04	603	5.27E-04	670	1.44E-04	737	2.29E-05
403	2.09E-05	470	2.25E-04	537	5.75E-04	604	5.22E-04	671	1.40E-04	738	2.19E-05
404	2.32E-05	471	1.96E-04	538	5.79E-04	605	5.16E-04	672	1.37E-04	739	2.16E-05
405	2.45E-05	472	1.83E-04	539	5.82E-04	606	5.10E-04	673	1.33E-04	740	2.09E-05
406	2.80E-05	473	1.70E-04	540	5.84E-04	607	5.05E-04	674	1.30E-04	741	2.04E-05
407	3.06E-05	474	1.60E-04	541	5.86E-04	608	4.99E-04	675	1.27E-04	742	1.96E-05
408	3.50E-05	475	1.50E-04	542	5.89E-04	609	4.94E-04	676	1.23E-04	743	1.90E-05
409	4.02E-05	476	1.44E-04	543	5.92E-04	610	4.89E-04	677	1.20E-04	744	1.85E-05
410	4.49E-05	477	1.37E-04	544	5.93E-04	611	4.83E-04	678	1.17E-04	745	1.80E-05
411	5.06E-05	478	1.32E-04	545	5.96E-04	612	4.78E-04	679	1.14E-04	746	1.76E-05
412	5.70E-05	479	1.29E-04	546	5.98E-04	613	4.73E-04	680	1.11E-04	747	1.72E-05
413	6.27E-05	480	1.25E-04	547	5.98E-04	614	4.65E-04	681	1.07E-04	748	1.65E-05
414	7.22E-05	481	1.22E-04	548	6.01E-04	615	4.57E-04	682	1.05E-04	749	1.61E-05
415	8.04E-05	482	1.21E-04	549	6.01E-04	616	4.49E-04	683	1.02E-04	750	1.56E-05
416	8.97E-05	483	1.20E-04	550	6.02E-04	617	4.44E-04	684	9.96E-05	751	1.53E-05
417	1.01E-04	484	1.20E-04	551	6.04E-04	618	4.37E-04	685	9.69E-05	752	1.50E-05
418	1.12E-04	485	1.22E-04	552	6.06E-04	619	4.30E-04	686	9.39E-05	753	1.45E-05
419	1.25E-04	486	1.23E-04	553	6.07E-04	620	4.23E-04	687	9.18E-05	754	1.40E-05
420	1.39E-04	487	1.25E-04	554	6.07E-04	621	4.15E-04	688	8.90E-05	755	1.37E-05
421	1.52E-04	488	1.28E-04	555	6.10E-04	622	4.10E-04	689	8.71E-05	756	1.35E-05
422	1.69E-04	489	1.32E-04	556	6.11E-04	623	4.04E-04	690	8.46E-05	757	1.30E-05
423	1.86E-04	490	1.35E-04	557	6.11E-04	624	3.97E-04	691	8.19E-05	758	1.28E-05
424	2.03E-04	491	1.40E-04	558	6.12E-04	625	3.90E-04	692	8.01E-05	759	1.22E-05
425	2.23E-04	492	1.47E-04	559	6.14E-04	626	3.83E-04	693	7.78E-05	760	1.19E-05
426	2.44E-04	493	1.54E-04	560	6.15E-04	627	3.77E-04	694	7.57E-05	761	1.15E-05
427	2.67E-04	494	1.62E-04	561	6.14E-04	628	3.71E-04	695	7.36E-05	762	1.13E-05
428	2.92E-04	495	1.71E-04	562	6.15E-04	629	3.64E-04	696	7.20E-05	763	1.10E-05
429	3.16E-04	496	1.81E-04	563	6.16E-04	630	3.58E-04	697	6.96E-05	764	1.08E-05
430	3.42E-04	497	1.92E-04	564	6.17E-04	631	3.51E-04	698	6.78E-05	765	1.04E-05
431	3.70E-04	498	2.02E-04	565	6.18E-04	632	3.45E-04	699	6.59E-05	766	1.01E-05
432	3.97E-04	499	2.14E-04	566	6.18E-04	633	3.38E-04	700	6.40E-05	767	9.90E-06
433	4.28E-04	500	2.25E-04	567	6.17E-04	634	3.32E-04	701	6.26E-05	768	9.60E-06
434	4.57E-04	501	2.38E-04	568	6.18E-04	635	3.25E-04	702	6.08E-05	769	9.30E-06
435	4.92E-04	502	2.51E-04	569	6.18E-04	636	3.18E-04	703	5.93E-05	770	9.30E-06
436	5.27E-04	503	2.64E-04	570	6.19E-04	637	3.12E-04	704	5.70E-05	771	8.80E-06
437	5.63E-04	504	2.78E-04	571	6.17E-04	638	3.06E-04	705	5.58E-05	772	8.50E-06
438	6.05E-04	505	2.91E-04	572	6.16E-04	639	3.00E-04	706	5.43E-05	773	8.40E-06
439	6.42E-04	506	3.06E-04	573	6.15E-04	640	2.93E-04	707	5.28E-05	774	8.00E-06
440	6.86E-04	507	3.18E-04	574	6.15E-04	641	2.85E-04	708	5.11E-05	775	7.80E-06
441	7.34E-04	508	3.31E-04	575	6.14E-04	642	2.79E-04	709	4.99E-05	776	7.80E-06
442	7.84E-04	509	3.45E-04	576	6.13E-04	643	2.74E-04	710	4.83E-05	777	7.40E-06
443	8.36E-04	510	3.60E-04	577	6.13E-04	644	2.68E-04	711	4.71E-05	778	7.30E-06
444	8.79E-04	511	3.72E-04	578	6.12E-04	645	2.62E-04	712	4.58E-05	779	7.20E-06
445	9.22E-04	512	3.86E-04	579	6.11E-04	646	2.56E-04	713	4.44E-05	780	7.30E-06
446	9.61E-04	513	3.99E-04	580	6.11E-04	647	2.51E-04	714	4.31E-05	N/A	N/A

Goniophotometer Test Results:

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.0	42.7	Face Down	90	25

Electrical Data:

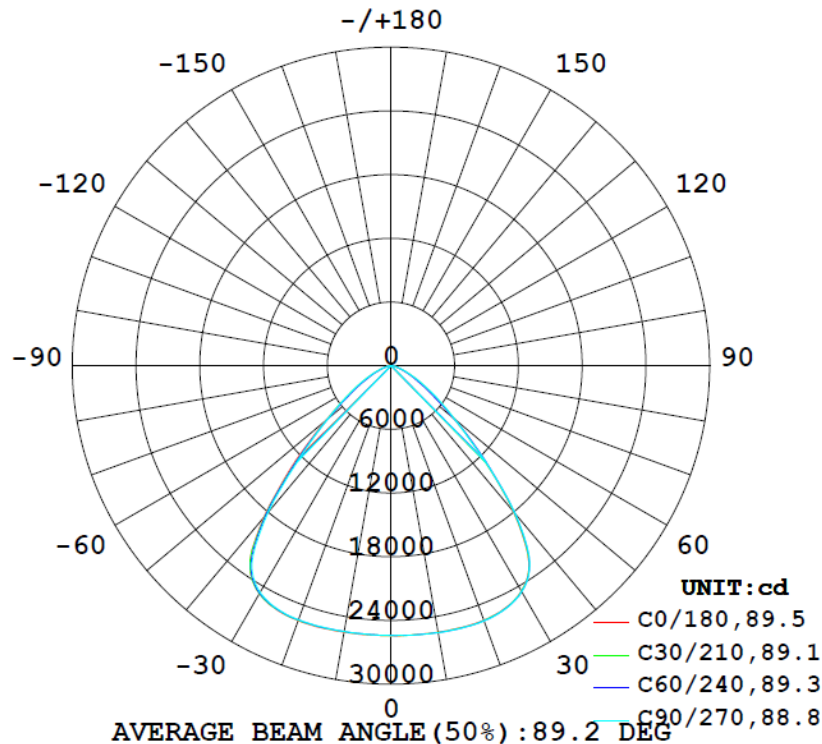
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	2.6314	315.26	0.9984

Goniophotometer Data:

Parameter	Results			
	4000K		5000K	
Total Luminous (lm)	52277.7		51512.3	
Luminous Efficacy (lm/W)	165.82		159.86	
Zonal Lumens Distribution (20-50°)	67.3%		67.3%	
Beam Angle (°)	89.2		89.3	
UGR	Viewed Crosswise	Viewed Endwise	Viewed Crosswise	Viewed Endwise
	26.5	26.5	26.5	26.5

Luminous Intensity Distribution Diagram (CCT Setting=4000K):

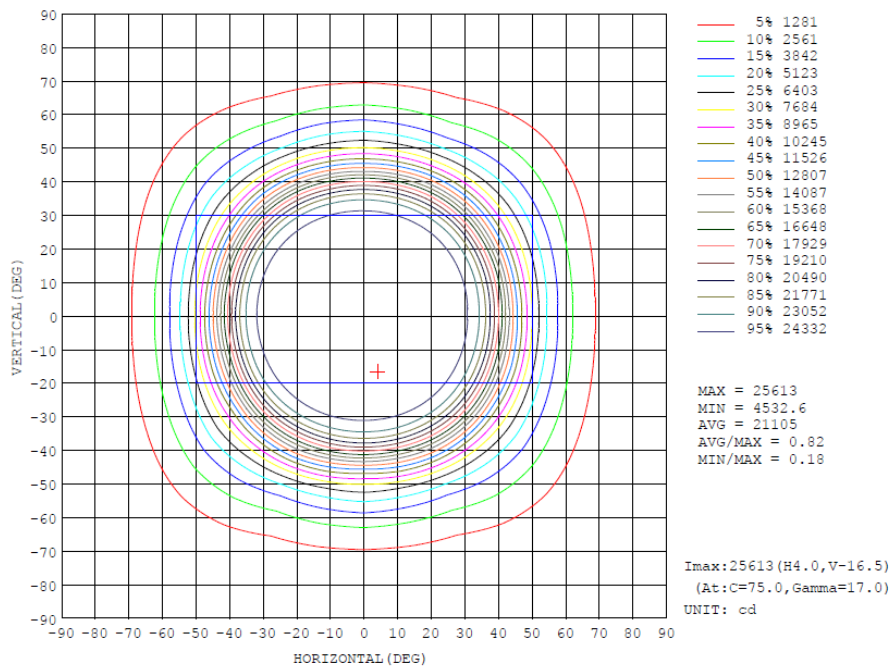
LUMINOUS INTENSITY DISTRIBUTION DIAGRAM



Zonal Flux Diagram (CCT Setting=4000K):

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	φ zone	φ total	lum.lamp
10	2548	2551	2553	2551	2547	2544	2542	2541	0- 10	2428	2428	4.64,4.64
20	2551	2555	2557	2554	2555	2551	2546	2548	10- 20	7234	9662	18.5,18.5
30	2454	2458	2459	2466	2477	2476	2466	2463	20- 30	11668	21330	40.8,40.8
40	1793	1813	1815	1830	1865	1841	1798	1797	30- 40	13940	35269	67.5,67.5
50	771.1	765.4	776.7	781.8	800.7	773.5	776.8	750.8	40- 50	9573	44842	85.8,85.8
60	309.6	319.2	339.0	330.5	317.4	316.4	335.2	309.2	50- 60	4571	49413	94.5,94.5
70	111.2	115.9	121.4	121.7	115.6	116.0	120.7	111.2	60- 70	2021	51434	98.4,98.4
80	24.67	25.40	27.52	28.05	27.41	27.46	27.75	25.31	70- 80	687.1	52121	99.7,99.7
90	0.4186	0.6093	0.9998	1.112	0.4174	0.2616	0.1422	0.1171	80- 90	113.4	52234	99.9,99.9
100	0.0928	0.0912	0.0905	0.0880	0.1998	0.1992	0.2051	0.2062	90-100	1.595	52236	99.9,99.9
110	0.1676	0.1658	0.1677	0.1691	0.3154	0.3186	0.3261	0.3278	100-110	2.070	52238	99.9,99.9
120	0.3529	0.3423	0.3570	0.3595	0.5175	0.5202	0.5244	0.5268	110-120	3.229	52241	99.9,99.9
130	0.6417	0.6241	0.6451	0.6412	0.8510	0.8936	0.9357	0.8796	120-130	5.278	52247	99.9,99.9
140	0.9515	0.9436	0.9543	0.9485	1.218	1.333	1.364	1.300	130-140	7.338	52254	100,100
150	1.277	1.258	1.270	1.261	1.680	1.825	1.867	1.809	140-150	8.307	52262	100,100
160	1.654	1.578	1.452	1.642	2.209	2.240	2.141	2.132	150-160	7.950	52270	100,100
170	1.869	1.868	1.708	1.816	2.274	2.319	2.167	2.112	160-170	5.583	52276	100,100
180	2.191	2.223	2.141	2.071	2.197	2.238	2.102	2.056	170-180	1.970	52278	100,100
DEG	LUMINOUS INTENSITY:×10cd									UNIT:lm		

Isocandela Diagram (CCT Setting=4000K):



Uncorrected UGR Table (CCT Setting=4000K):

UGR TABLE - UNCORRECTED

Reflectances											
Ceiling Cavity	70	70	50	50	30	70	70	50	50	30	
Walls	50	30	50	30	30	50	30	50	30	30	
Floor Cavity	20	20	20	20	20	20	20	20	20	20	
Room Size	UGR Viewed Crosswise					UGR Viewed Endwise					
X=2H	Y=2H	11.7	13.0	12.1	13.3	13.6	11.5	12.9	11.9	13.2	13.5
	3H	12.2	13.4	12.6	13.7	14.1	12.2	13.3	12.5	13.7	14.0
	4H	12.3	13.4	12.7	13.8	14.2	12.3	13.4	12.7	13.7	14.1
	6H	12.4	13.4	12.8	13.7	14.1	12.3	13.3	12.7	13.7	14.1
	8H	12.3	13.3	12.8	13.7	14.1	12.3	13.2	12.7	13.6	14.0
	12H	12.3	13.2	12.7	13.6	14.0	12.3	13.2	12.7	13.6	14.0
4H	2H	11.9	13.0	12.3	13.3	13.7	11.7	12.8	12.1	13.2	13.6
	3H	12.6	13.4	13.0	13.8	14.2	12.5	13.4	12.9	13.8	14.2
	4H	12.7	13.5	13.2	13.9	14.4	12.7	13.4	13.1	13.9	14.3
	6H	12.8	13.4	13.2	13.9	14.4	12.7	13.4	13.2	13.8	14.3
	8H	12.7	13.4	13.2	13.8	14.3	12.7	13.3	13.2	13.8	14.3
	12H	12.7	13.3	13.2	13.8	14.2	12.7	13.2	13.1	13.7	14.2
8H	4H	12.7	13.3	13.2	13.8	14.2	12.6	13.3	13.1	13.7	14.2
	6H	12.8	13.3	13.3	13.8	14.3	12.7	13.2	13.2	13.7	14.2
	8H	12.7	13.2	13.2	13.7	14.2	12.7	13.2	13.2	13.7	14.2
	12H	12.7	13.1	13.2	13.6	14.2	12.7	13.1	13.2	13.6	14.2
12H	4H	12.6	13.2	13.1	13.7	14.2	12.6	13.2	13.1	13.6	14.1
	6H	12.7	13.2	13.2	13.6	14.2	12.7	13.2	13.2	13.6	14.2
	8H	12.7	13.1	13.2	13.6	14.2	12.7	13.1	13.2	13.6	14.2

Maximum UGR = 14.4

Corrected UGR Table (CCT Setting=4000K):

UGR TABLE - CORRECTED

Reflectances											
Ceiling Cavity	70	70	50	50	30	70	70	50	50	30	
Walls	50	30	50	30	30	50	30	50	30	30	
Floor Cavity	20	20	20	20	20	20	20	20	20	20	
Room Size	UGR Viewed Crosswise					UGR Viewed Endwise					
X=2H	Y=2H	25.5	26.8	25.9	27.1	27.4	25.3	26.7	25.7	27.0	27.3
	3H	26.0	27.2	26.4	27.5	27.9	26.0	27.1	26.3	27.5	27.8
	4H	26.1	27.2	26.5	27.6	28.0	26.1	27.2	26.5	27.5	27.9
	6H	26.2	27.2	26.6	27.5	27.9	26.1	27.1	26.5	27.5	27.9
	8H	26.1	27.1	26.6	27.5	27.9	26.1	27.0	26.5	27.4	27.8
	12H	26.1	27.0	26.5	27.4	27.8	26.1	27.0	26.5	27.4	27.8
4H	2H	25.7	26.8	26.1	27.1	27.5	25.5	26.6	25.9	27.0	27.4
	3H	26.4	27.2	26.8	27.6	28.0	26.3	27.2	26.7	27.6	28.0
	4H	26.5	27.3	27.0	27.7	28.2	26.5	27.2	26.9	27.7	28.1
	6H	26.6	27.2	27.0	27.7	28.2	26.5	27.2	27.0	27.6	28.1
	8H	26.5	27.2	27.0	27.6	28.1	26.5	27.1	27.0	27.6	28.1
	12H	26.5	27.1	27.0	27.6	28.0	26.5	27.0	26.9	27.5	28.0
8H	4H	26.5	27.1	27.0	27.6	28.0	26.4	27.1	26.9	27.5	28.0
	6H	26.6	27.1	27.1	27.6	28.1	26.5	27.0	27.0	27.5	28.0
	8H	26.5	27.0	27.0	27.5	28.0	26.5	27.0	27.0	27.5	28.0
	12H	26.5	26.9	27.0	27.4	28.0	26.5	26.9	27.0	27.4	28.0
12H	4H	26.4	27.0	26.9	27.5	28.0	26.4	27.0	26.9	27.4	27.9
	6H	26.5	27.0	27.0	27.4	28.0	26.5	27.0	27.0	27.4	28.0
	8H	26.5	26.9	27.0	27.4	28.0	26.5	26.9	27.0	27.4	28.0

Maximum UGR = 28.2

Luminous Distribution Intensity Data (CCT Setting=4000K):

Table--1 UNIT: ×10cd

C (DEG) \ y (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
0	2543	2542	2541	2541	2539	2541	2540	2541	2541	2539	2539	2539	2543	2542	2541	2541	2539	2541	2540
5	2544	2544	2543	2544	2546	2545	2546	2546	2544	2544	2544	2544	2544	2544	2540	2540	2540	2539	2539
10	2548	2549	2550	2551	2553	2552	2553	2552	2551	2550	2549	2547	2546	2543	2544	2542	2542	2542	2542
15	2554	2554	2555	2557	2558	2559	2560	2558	2557	2558	2555	2555	2554	2552	2550	2547	2548	2546	2545
20	2551	2550	2552	2555	2556	2559	2557	2556	2557	2554	2556	2555	2555	2553	2551	2551	2546	2547	2546
25	2525	2526	2528	2531	2531	2531	2532	2531	2532	2534	2533	2533	2538	2537	2536	2536	2533	2529	2527
30	2454	2452	2454	2458	2458	2459	2459	2461	2461	2466	2469	2472	2477	2479	2479	2476	2474	2469	2466
35	2263	2263	2266	2273	2274	2279	2278	2280	2284	2289	2299	2304	2315	2319	2318	2312	2303	2291	2284
40	1793	1786	1797	1813	1816	1812	1815	1824	1824	1830	1833	1837	1865	1862	1846	1841	1833	1809	1798
45	1213	1226	1204	1218	1239	1232	1215	1238	1260	1238	1223	1250	1280	1251	1235	1241	1228	1211	1195
50	771	779	778	765	768	775	777	782	783	782	797	804	801	795	787	774	770	775	777
55	488	498	512	491	468	494	524	499	480	507	533	510	499	512	515	490	478	503	513
60	310	319	331	319	293	316	339	324	300	331	348	326	317	328	333	316	302	325	335
65	192	197	206	200	180	197	210	202	184	208	217	204	200	206	208	200	186	203	210
70	111	114	119	116	104	115	121	118	108	122	125	118	116	120	121	116	107	117	121
75	60.7	61.9	64.5	63.5	57.2	63.4	66.5	65.0	60.3	67.1	68.1	65.0	63.6	65.6	65.4	62.5	59.4	63.5	65.7
80	24.7	25.6	26.2	25.4	24.3	26.6	27.5	27.6	26.8	28.1	28.3	26.6	27.4	27.9	28.0	27.5	26.5	27.7	27.8
85	8.44	8.77	8.95	8.78	8.08	9.29	9.80	9.61	9.59	9.62	9.41	9.25	9.61	9.53	9.50	9.22	9.24	9.16	9.52
90	0.42	0.47	0.54	0.61	0.92	0.98	1.00	1.06	1.06	1.11	1.09	1.05	0.42	0.35	0.31	0.26	0.21	0.17	0.14
95	0.07	0.07	0.07	0.07	0.07	0.07	0.07	0.06	0.06	0.06	0.07	0.07	0.14	0.14	0.14	0.14	0.14	0.14	0.14
100	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.20	0.20	0.20	0.20	0.20	0.20	0.21
105	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.12	0.27	0.27	0.27	0.27	0.27	0.27	0.27
110	0.17	0.17	0.16	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.17	0.32	0.32	0.32	0.32	0.32	0.32	0.33
115	0.24	0.24	0.23	0.24	0.25	0.24	0.25	0.25	0.25	0.25	0.24	0.24	0.38	0.38	0.39	0.39	0.40	0.40	0.40
120	0.35	0.33	0.33	0.34	0.35	0.35	0.36	0.36	0.36	0.36	0.35	0.34	0.52	0.52	0.51	0.52	0.52	0.53	0.52
125	0.49	0.47	0.46	0.48	0.49	0.48	0.49	0.50	0.50	0.49	0.48	0.48	0.67	0.67	0.67	0.70	0.71	0.71	0.70
130	0.64	0.63	0.63	0.62	0.66	0.62	0.65	0.65	0.65	0.64	0.65	0.63	0.85	0.86	0.87	0.89	0.92	0.93	0.94
135	0.81	0.80	0.81	0.78	0.82	0.81	0.82	0.82	0.81	0.81	0.81	0.81	1.05	1.05	1.08	1.11	1.14	1.17	1.17
140	0.95	0.95	0.92	0.94	0.96	0.98	0.95	0.96	0.95	0.95	0.93	0.95	1.22	1.24	1.27	1.33	1.36	1.37	1.36
145	1.11	1.13	1.09	1.07	1.14	1.16	1.13	1.13	1.12	1.09	1.08	1.09	1.46	1.48	1.51	1.58	1.63	1.64	1.62
150	1.28	1.30	1.29	1.26	1.27	1.28	1.27	1.27	1.25	1.26	1.23	1.23	1.68	1.71	1.72	1.82	1.86	1.90	1.87
155	1.47	1.53	1.55	1.43	1.43	1.47	1.43	1.46	1.46	1.46	1.51	1.42	1.93	1.93	2.02	2.02	2.04	2.05	2.01
160	1.65	1.69	1.69	1.58	1.54	1.54	1.45	1.60	1.60	1.64	1.63	1.62	2.21	2.19	2.22	2.24	2.20	2.22	2.14
165	1.75	1.81	1.79	1.71	1.66	1.63	1.58	1.70	1.73	1.73	1.72	1.74	2.26	2.26	2.30	2.33	2.32	2.27	2.19
170	1.87	1.92	1.92	1.87	1.74	1.74	1.71	1.78	1.80	1.82	1.82	1.85	2.27	2.27	2.31	2.32	2.32	2.28	2.17
175	2.09	2.14	2.14	2.10	1.94	1.91	1.85	1.89	1.98	1.99	2.01	2.05	2.27	2.27	2.31	2.32	2.27	2.25	2.16
180	2.19	2.26	2.24	2.22	2.18	2.15	2.14	2.07	2.06	2.07	2.14	2.39	2.20	2.19	2.26	2.24	2.22	2.14	2.10

Table--2 UNIT: ×10cd

C (DEG) \ y (DEG)	285	300	315	330	345
0	2541	2541	2539	2539	2539
5	2539	2538	2539	2541	2541
10	2540	2541	2541	2542	2546
15	2545	2546	2547	2549	2550
20	2546	2545	2548	2548	2548
25	2528	2528	2528	2527	2525
30	2465	2464	2463	2462	2458
35	2283	2285	2286	2283	2278
40	1801	1810	1797	1788	1803
45	1203	1204	1196	1194	1204
50	760	748	751	765	774
55	486	460	475	498	504
60	312	286	309	322	322
65	197	177	195	201	201
70	113	102	111	116	115
75	61.4	57.0	59.7	62.5	63.0
80	26.3	24.6	25.3	26.6	27.0
85	8.90	8.62	8.37	8.66	8.81
90	0.13	0.12	0.12	0.11	0.11
95	0.14	0.14	0.14	0.15	0.14
100	0.20	0.20	0.21	0.21	0.21
105	0.27	0.28	0.28	0.28	0.28
110	0.33	0.33	0.33	0.33	0.32
115	0.41	0.41	0.40	0.39	0.39
120	0.53	0.53	0.53	0.52	0.52
125	0.70	0.70	0.69	0.67	0.68
130	0.93	0.91	0.88	0.87	0.86
135	1.14	1.11	1.09	1.09	1.07
140	1.33	1.31	1.30	1.29	1.26
145	1.57	1.57	1.56	1.52	1.50
150	1.84	1.81	1.81	1.78	1.76
155	2.01	1.98	1.98	2.04	2.01
160	2.11	2.16	2.13	2.24	2.22
165	2.15	2.19	2.20	2.27	2.28
170	2.14	2.16	2.11	2.18	2.24
175	2.06	2.13	2.09	2.19	2.22
180	2.06	2.01	2.06	2.08	2.09

THD and PF Measurement Test Results:

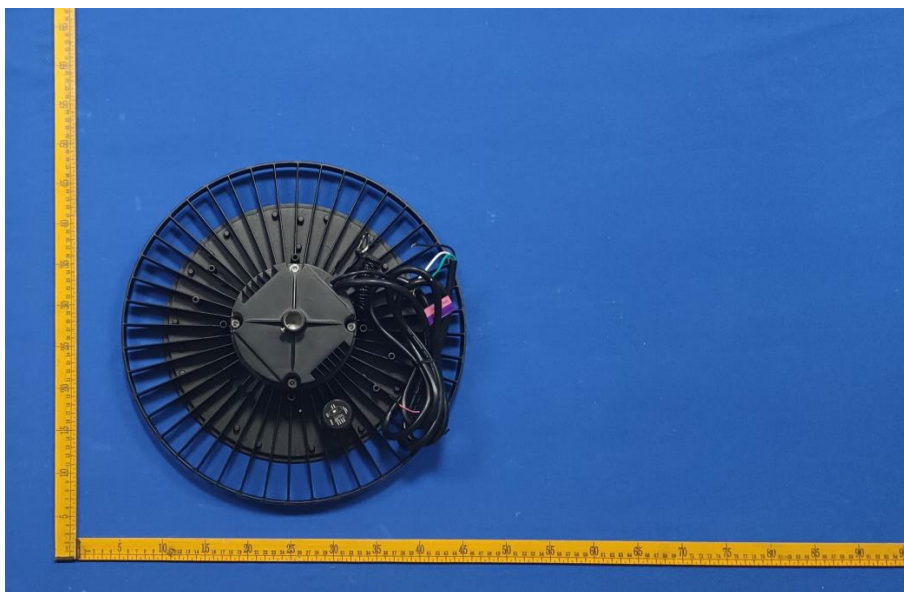
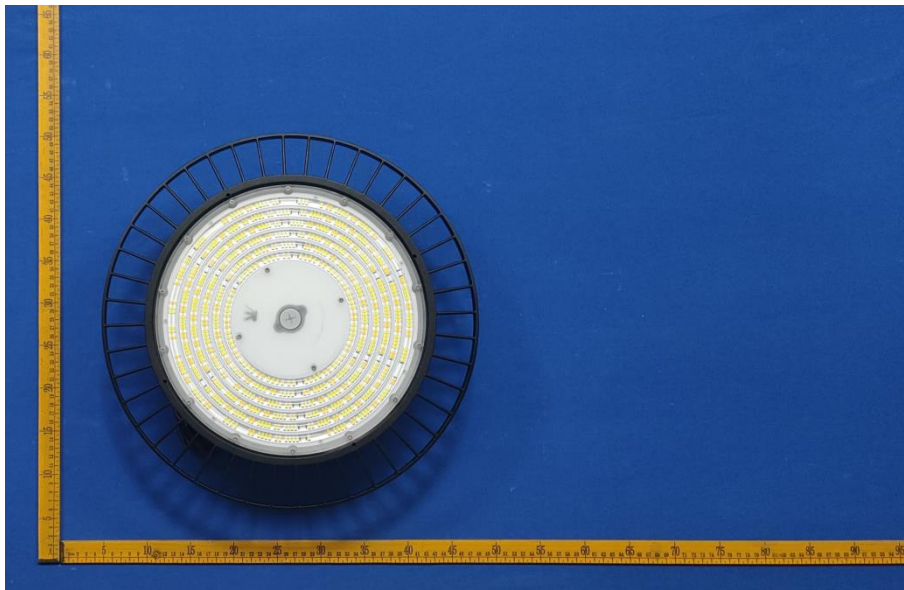
Electrical Measurement:

CCT Setting	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor	iTHD(%)
4000K	120.0	60	2.6314	315.26	0.9984	4.72
	277.0	60	1.1492	309.50	0.9723	3.75
	347.0	60	0.9457	306.40	0.9337	6.33
5000K	120.0	60	2.6893	322.23	0.9985	4.22
	277.0	60	1.1807	317.90	0.9720	4.78
	347.0	60	0.9737	316.70	0.9373	6.23

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
4000K	4136	315.26	52277.7	165.82	Set Switch 0% to 4000K
5000K	5227	322.23	51512.3	159.86	Set Switch 100% to 5000K
Lowest Efficacy	159.86 lm/W (@5000K)				
Maximum Power	322.23W				

Photo of Sample:



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-F01-020	Temperature & Humidity Meter	2022-11-12	2023-11-11

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