

## LM-79-08 Test Report

For

**VENAS Co., LIMITED**

Flat /RM 8B 4/F Lippo Sun Plaza 28 Canton Road TSIM SHA TSUI Kowloon Hong Kong SAR, China

### LED Panel Light

Model Name(s):

P1-30W DXYYZZ

Representative (Tested) Model:

P1-30W DXYYZZ (0%, 3500K)

P1-30W DXYYZZ (50%, 4000K)

P1-30W DXYYZZ (100%, 5000K)

**Model Difference: N/A**

Prepare by:



Engineer: Alan Wang

Date: 2021-04-30

Review by:



Technical Lead: Vincent Yuan

Issue Date: 2021-05-18

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 does not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

**Client Information:**

Applicant Name:	VENAS Co., LIMITED
Brand Name:	

**Product Information:**

Model Number:	P1-30W DXYYZZ
Product Type:	1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces
Rating Input:	120-277Vac, 50/60Hz, 20/25/30W
Declared CCT:	3500K/4000K/5000K
Declared Light Output:	3900 lm
LED Manufacturer:	Shenzhen Runlite Technology Co., Ltd
LED Model:	P28351-W34SJ0K1FE8F2-XXXX and P28351-W50SJ0K2FE8F2-XXXX
LED Quantity:	P28351-W34SJ0K1FE8F2-XXXX: 48 pcs P28351-W50SJ0K2FE8F2-XXXX: 48 pcs
Driver Manufacturer:	Shenzhen Xiezhen Electronics Co., LTD
Driver Model:	XZ-SE40B-380075-065050-Y-D

**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:	2021-04-26
Quantity of Receipt Samples:	1 pc
Sample Number:	210426004-S1

**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:**

Issued Date of Test Report:	2021-05-18
Revised Date of Test Report:	N/A
Test Report No.:	NTCLR21040250
Remark (If applicable):	1. Product tested IS and Electrical tests for all CCT with the default maximum wattage; 2. Product tested Gonio test for the lowest CCT with the default maximum wattage.

<b>Test Specification:</b>	
Date of Test	2021-04-28
Test Item	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	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products 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 15-2004 Technical Report Colorimetry ANSI IES TM-30-18 IES Method for Evaluating Light Source Color Rendition ANSI C78.77-10-2014 Harmonic Emission Limits – Related Power Quality Requirements IES TM-15-11 Luminaire Classification System for Outdoor Luminaires Addendum A for IES TM-15-11 Backlight, Uplight, and Glare (BUG) Ratings ANSI IES TM-30-18 IES Method for Evaluating Light Source Color Rendition ANSI C78.77-10-2014 Harmonic Emission Limits – Related Power Quality Requirements

<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 C82.77-2002, 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)
25.1	41.0	Face Down	90	10

### Electrical Data:

Rated CCT	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
3500K	120.0	60	0.2413	28.87	0.9970
4000K	120.0	60	0.2478	29.55	0.9936
5000K	120.0	60	0.2531	30.18	0.9937

### Color Data:

Rated CCT	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
3500K	3519	84.1	13	95	97	-11%	(0.4032, 0.3872)	(0.2358, 0.5095)	-0.0011
4000K	4110	83.8	19	84	96	-11%	(0.3735, 0.3731)	(0.2220, 0.4989)	0.0004
5000K	5203	83.7	13	84	95	-12%	(0.3399, 0.3524)	(0.2076, 0.4843)	0.0025

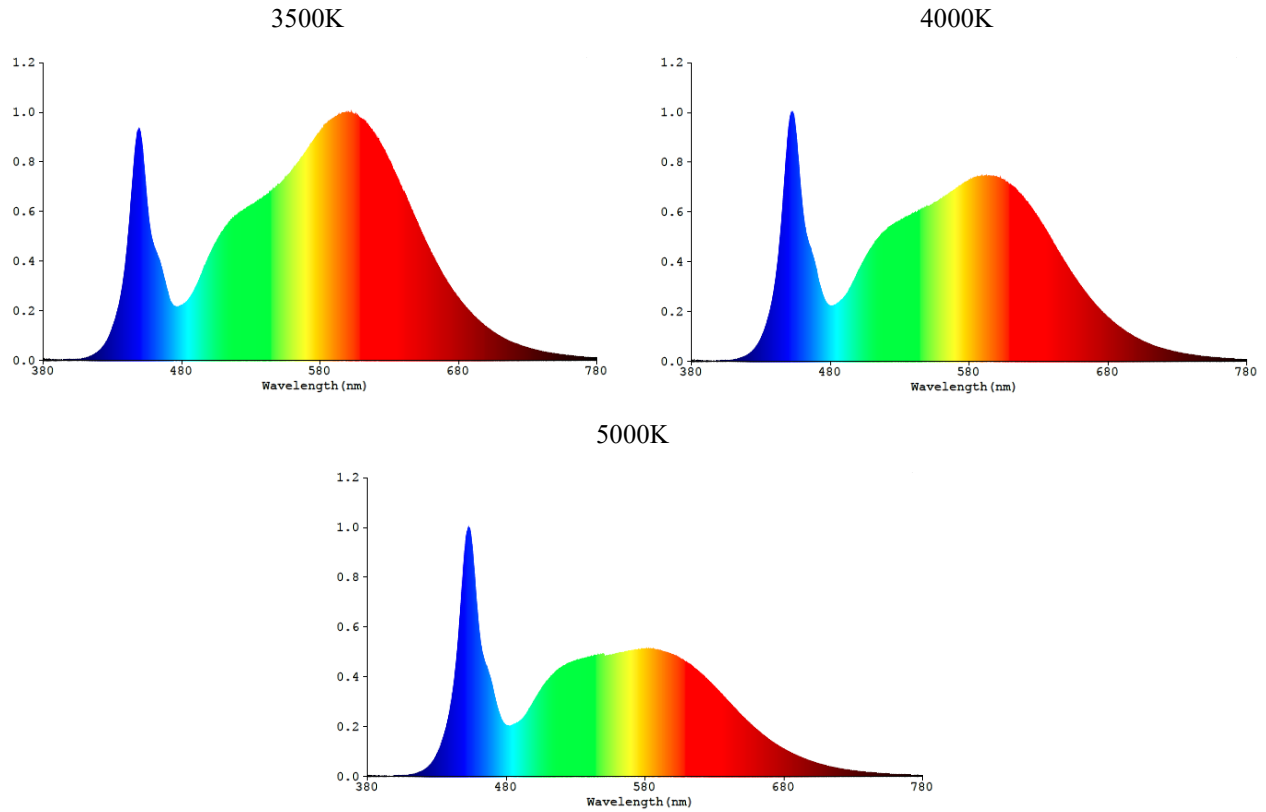
### Specify Color Rendering

Rated CCT	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
3500K	83	90	96	84	83	87	85	64	13	78	84	69	85	98	76
4000K	83	90	94	83	82	85	87	67	14	75	81	59	84	97	77
5000K	82	89	92	83	83	84	88	69	13	72	82	58	84	96	78

### Output Data:

Rated CCT (K)	Light output (lm)	Efficacy (lm/W)
3500K	3760.8	130.27
4000K	4083.9	138.20
5000K	4090.2	135.53

**Spectrum Diagram:**



# IES TM-30-18 Color Rendition Result for 3500K:

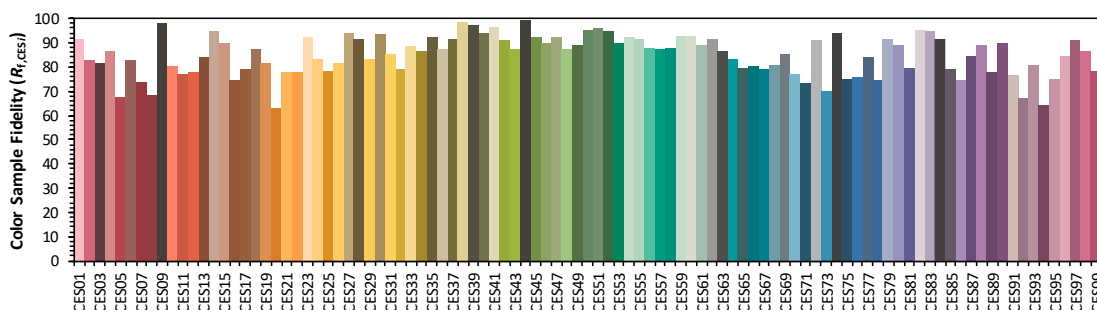
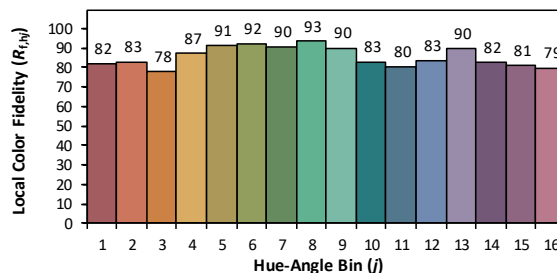
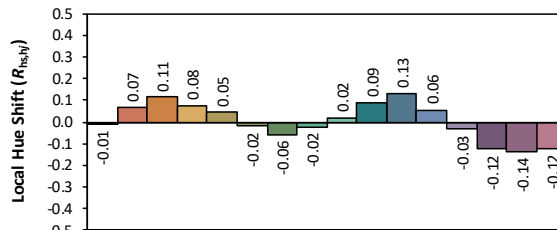
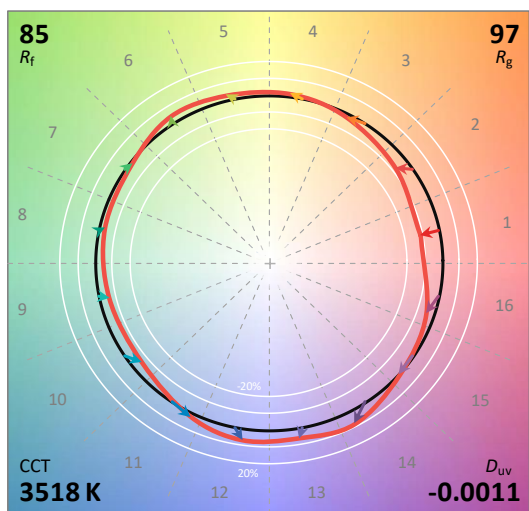
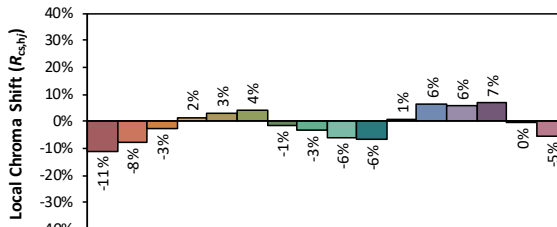
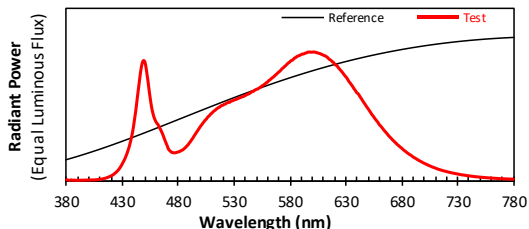
## ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Date: 2021/4/30

Manufacturer: VENAS Co., LIMITED

Model: P1-30W DXYYZZ



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

$x$  0.4032  
 $y$  0.3871  
 $u'$  0.2358  
 $v'$  0.5094

CIE 13.3-1995  
(CRI)  
 $R_a$  84  
 $R_9$  13

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

**Spectrum Data for 3500K:**

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0068	447	0.8843	514	0.5542	581	0.9302	648	0.5815	715	0.0820
381	0.0041	448	0.9199	515	0.5598	582	0.9332	649	0.5681	716	0.0793
382	0.0018	449	0.9311	516	0.5663	583	0.9396	650	0.5572	717	0.0764
383	0.0015	450	0.9192	517	0.5697	584	0.9499	651	0.5436	718	0.0745
384	0.0051	451	0.8809	518	0.5778	585	0.9529	652	0.5311	719	0.0721
385	0.0028	452	0.8207	519	0.5825	586	0.9606	653	0.5169	720	0.0699
386	0.0024	453	0.7595	520	0.5846	587	0.9653	654	0.5056	721	0.0675
387	0.0031	454	0.6893	521	0.5910	588	0.9681	655	0.4942	722	0.0652
388	0.0017	455	0.6274	522	0.5932	589	0.9725	656	0.4815	723	0.0633
389	0.0015	456	0.5715	523	0.5995	590	0.9763	657	0.4699	724	0.0615
390	0.0020	457	0.5305	524	0.6028	591	0.9812	658	0.4597	725	0.0597
391	0.0019	458	0.4973	525	0.6072	592	0.9817	659	0.4480	726	0.0577
392	0.0023	459	0.4737	526	0.6068	593	0.9850	660	0.4340	727	0.0559
393	0.0029	460	0.4551	527	0.6146	594	0.9895	661	0.4248	728	0.0542
394	0.0024	461	0.4421	528	0.6176	595	0.9910	662	0.4151	729	0.0525
395	0.0026	462	0.4310	529	0.6204	596	0.9964	663	0.4039	730	0.0508
396	0.0031	463	0.4126	530	0.6244	597	0.9962	664	0.3928	731	0.0491
397	0.0033	464	0.3975	531	0.6280	598	0.9970	665	0.3823	732	0.0471
398	0.0031	465	0.3779	532	0.6300	599	0.9952	666	0.3728	733	0.0460
399	0.0042	466	0.3589	533	0.6346	600	0.9969	667	0.3626	734	0.0440
400	0.0036	467	0.3354	534	0.6379	601	0.9963	668	0.3518	735	0.0430
401	0.0039	468	0.3130	535	0.6428	602	0.9972	669	0.3419	736	0.0419
402	0.0044	469	0.2906	536	0.6448	603	0.9942	670	0.3329	737	0.0405
403	0.0049	470	0.2705	537	0.6491	604	0.9920	671	0.3240	738	0.0392
404	0.0045	471	0.2468	538	0.6510	605	0.9897	672	0.3140	739	0.0377
405	0.0048	472	0.2344	539	0.6559	606	0.9861	673	0.3061	740	0.0366
406	0.0057	473	0.2269	540	0.6597	607	0.9847	674	0.2976	741	0.0358
407	0.0065	474	0.2191	541	0.6650	608	0.9798	675	0.2891	742	0.0341
408	0.0072	475	0.2173	542	0.6691	609	0.9764	676	0.2803	743	0.0334
409	0.0083	476	0.2146	543	0.6718	610	0.9720	677	0.2732	744	0.0321
410	0.0097	477	0.2154	544	0.6768	611	0.9687	678	0.2654	745	0.0312
411	0.0108	478	0.2166	545	0.6833	612	0.9650	679	0.2583	746	0.0299
412	0.0126	479	0.2199	546	0.6895	613	0.9587	680	0.2514	747	0.0292
413	0.0146	480	0.2217	547	0.6909	614	0.9515	681	0.2430	748	0.0285
414	0.0167	481	0.2247	548	0.6980	615	0.9418	682	0.2357	749	0.0275
415	0.0188	482	0.2292	549	0.7030	616	0.9366	683	0.2288	750	0.0265
416	0.0224	483	0.2341	550	0.7083	617	0.9301	684	0.2225	751	0.0258
417	0.0250	484	0.2380	551	0.7094	618	0.9213	685	0.2151	752	0.0252
418	0.0291	485	0.2454	552	0.7154	619	0.9152	686	0.2093	753	0.0238
419	0.0324	486	0.2530	553	0.7212	620	0.9045	687	0.2027	754	0.0236
420	0.0370	487	0.2620	554	0.7267	621	0.8949	688	0.1970	755	0.0225
421	0.0419	488	0.2712	555	0.7348	622	0.8927	689	0.1921	756	0.0221
422	0.0474	489	0.2806	556	0.7393	623	0.8788	690	0.1845	757	0.0211
423	0.0549	490	0.2929	557	0.7454	624	0.8694	691	0.1792	758	0.0204
424	0.0616	491	0.3037	558	0.7521	625	0.8583	692	0.1743	759	0.0206
425	0.0702	492	0.3170	559	0.7596	626	0.8492	693	0.1690	760	0.0194
426	0.0793	493	0.3290	560	0.7646	627	0.8382	694	0.1634	761	0.0190
427	0.0907	494	0.3440	561	0.7754	628	0.8268	695	0.1586	762	0.0180
428	0.1025	495	0.3566	562	0.7805	629	0.8152	696	0.1531	763	0.0178
429	0.1171	496	0.3707	563	0.7884	630	0.8050	697	0.1486	764	0.0171
430	0.1329	497	0.3831	564	0.7962	631	0.7944	698	0.1444	765	0.0166
431	0.1494	498	0.3959	565	0.8020	632	0.7798	699	0.1388	766	0.0161
432	0.1665	499	0.4097	566	0.8096	633	0.7658	700	0.1350	767	0.0156
433	0.1878	500	0.4219	567	0.8186	634	0.7558	701	0.1304	768	0.0149
434	0.2091	501	0.4329	568	0.8253	635	0.7431	702	0.1266	769	0.0145
435	0.2354	502	0.4457	569	0.8345	636	0.7316	703	0.1229	770	0.0142
436	0.2626	503	0.4559	570	0.8417	637	0.7171	704	0.1180	771	0.0137
437	0.2959	504	0.4682	571	0.8490	638	0.7048	705	0.1142	772	0.0132
438	0.3337	505	0.4758	572	0.8581	639	0.6926	706	0.1110	773	0.0130
439	0.3759	506	0.4883	573	0.8680	640	0.6794	707	0.1069	774	0.0123
440	0.4277	507	0.4976	574	0.8746	641	0.6738	708	0.1035	775	0.0121
441	0.4893	508	0.5049	575	0.8834	642	0.6612	709	0.1008	776	0.0115
442	0.5493	509	0.5160	576	0.8906	643	0.6470	710	0.0971	777	0.0113
443	0.6224	510	0.5226	577	0.8992	644	0.6347	711	0.0939	778	0.0110
444	0.6932	511	0.5318	578	0.9083	645	0.6204	712	0.0903	779	0.0109
445	0.7614	512	0.5398	579	0.9147	646	0.6068	713	0.0875	780	0.0109
446	0.8303	513	0.5451	580	0.9215	647	0.5949	714	0.0844	N/A	N/A

# IES TM-30-18 Color Rendition Result for 4000K:

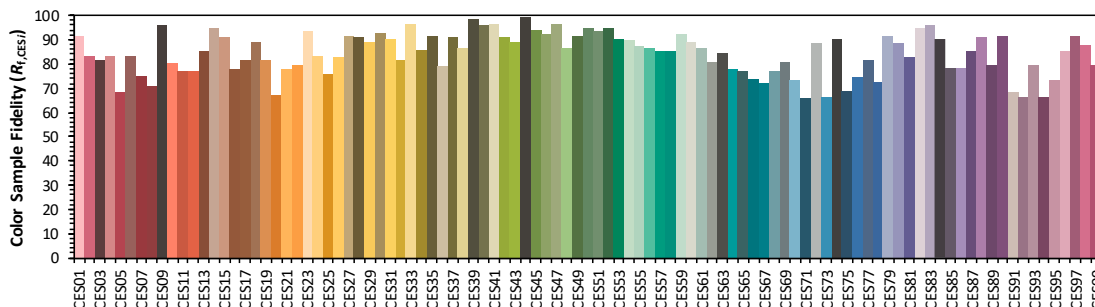
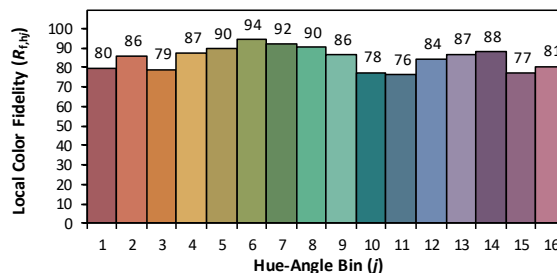
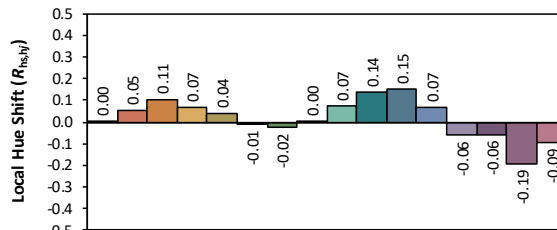
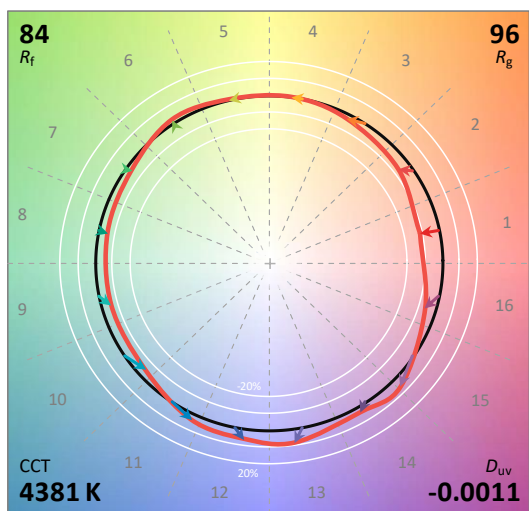
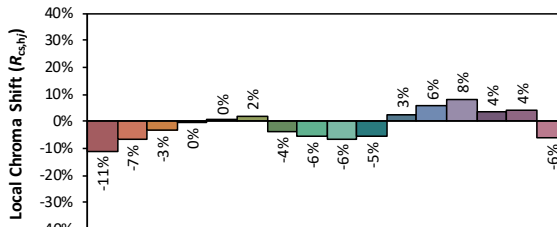
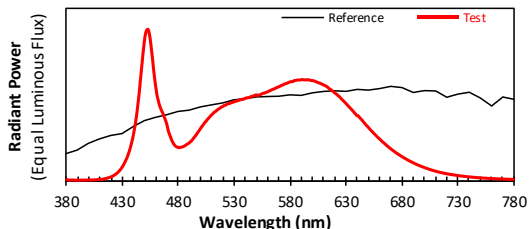
## ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Date: 2021/4/30

Manufacturer: VENAS Co., LIMITED

Model: P1-30W DXYYZZ



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

$x$  0.3646  
 $y$  0.3641  
 $u'$  0.2196  
 $v'$  0.4935

CIE 13.3-1995  
(CRI)  
 $R_a$  85  
 $R_9$  20

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.



**Spectrum Data for 4000K:**

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0050	447	0.7337	514	0.4593	581	0.6514	648	0.3668	715	0.0525
381	0.0048	448	0.8096	515	0.4649	582	0.6521	649	0.3596	716	0.0506
382	0.0008	449	0.8806	516	0.4714	583	0.6539	650	0.3513	717	0.0493
383	0.0020	450	0.9418	517	0.4751	584	0.6589	651	0.3428	718	0.0477
384	0.0032	451	0.9787	518	0.4811	585	0.6588	652	0.3352	719	0.0465
385	0.0033	452	0.9939	519	0.4854	586	0.6611	653	0.3269	720	0.0449
386	0.0020	453	0.9955	520	0.4887	587	0.6628	654	0.3194	721	0.0432
387	0.0024	454	0.9678	521	0.4946	588	0.6620	655	0.3115	722	0.0421
388	0.0017	455	0.9210	522	0.4960	589	0.6624	656	0.3041	723	0.0409
389	0.0016	456	0.8577	523	0.5002	590	0.6647	657	0.2967	724	0.0396
390	0.0019	457	0.7927	524	0.5042	591	0.6646	658	0.2894	725	0.0384
391	0.0013	458	0.7216	525	0.5073	592	0.6641	659	0.2820	726	0.0374
392	0.0021	459	0.6604	526	0.5072	593	0.6630	660	0.2752	727	0.0363
393	0.0025	460	0.6060	527	0.5125	594	0.6640	661	0.2683	728	0.0350
394	0.0020	461	0.5577	528	0.5139	595	0.6627	662	0.2611	729	0.0338
395	0.0022	462	0.5286	529	0.5164	596	0.6637	663	0.2540	730	0.0324
396	0.0023	463	0.4984	530	0.5192	597	0.6636	664	0.2477	731	0.0318
397	0.0028	464	0.4786	531	0.5215	598	0.6612	665	0.2416	732	0.0304
398	0.0025	465	0.4601	532	0.5225	599	0.6594	666	0.2349	733	0.0296
399	0.0030	466	0.4451	533	0.5259	600	0.6587	667	0.2281	734	0.0288
400	0.0031	467	0.4255	534	0.5283	601	0.6575	668	0.2223	735	0.0279
401	0.0032	468	0.4074	535	0.5305	602	0.6554	669	0.2162	736	0.0272
402	0.0033	469	0.3861	536	0.5331	603	0.6514	670	0.2102	737	0.0261
403	0.0036	470	0.3621	537	0.5353	604	0.6495	671	0.2046	738	0.0254
404	0.0035	471	0.3275	538	0.5347	605	0.6463	672	0.1987	739	0.0245
405	0.0039	472	0.3058	539	0.5388	606	0.6428	673	0.1939	740	0.0240
406	0.0044	473	0.2873	540	0.5418	607	0.6411	674	0.1882	741	0.0232
407	0.0051	474	0.2661	541	0.5443	608	0.6372	675	0.1824	742	0.0223
408	0.0055	475	0.2521	542	0.5457	609	0.6336	676	0.1776	743	0.0218
409	0.0058	476	0.2392	543	0.5462	610	0.6300	677	0.1729	744	0.0209
410	0.0068	477	0.2297	544	0.5495	611	0.6266	678	0.1678	745	0.0204
411	0.0074	478	0.2235	545	0.5526	612	0.6237	679	0.1636	746	0.0198
412	0.0082	479	0.2203	546	0.5548	613	0.6189	680	0.1586	747	0.0190
413	0.0097	480	0.2164	547	0.5559	614	0.6135	681	0.1537	748	0.0183
414	0.0113	481	0.2172	548	0.5603	615	0.6065	682	0.1500	749	0.0181
415	0.0127	482	0.2181	549	0.5623	616	0.6013	683	0.1453	750	0.0174
416	0.0146	483	0.2200	550	0.5644	617	0.5968	684	0.1410	751	0.0167
417	0.0171	484	0.2223	551	0.5609	618	0.5900	685	0.1362	752	0.0164
418	0.0191	485	0.2252	552	0.5625	619	0.5858	686	0.1326	753	0.0158
419	0.0216	486	0.2299	553	0.5644	620	0.5771	687	0.1291	754	0.0154
420	0.0246	487	0.2345	554	0.5680	621	0.5722	688	0.1248	755	0.0150
421	0.0281	488	0.2397	555	0.5716	622	0.5673	689	0.1217	756	0.0144
422	0.0320	489	0.2436	556	0.5749	623	0.5593	690	0.1177	757	0.0140
423	0.0368	490	0.2497	557	0.5762	624	0.5544	691	0.1142	758	0.0134
424	0.0418	491	0.2562	558	0.5784	625	0.5465	692	0.1104	759	0.0134
425	0.0476	492	0.2633	559	0.5825	626	0.5384	693	0.1073	760	0.0129
426	0.0540	493	0.2721	560	0.5840	627	0.5311	694	0.1040	761	0.0124
427	0.0621	494	0.2820	561	0.5884	628	0.5240	695	0.1005	762	0.0120
428	0.0704	495	0.2909	562	0.5919	629	0.5166	696	0.0977	763	0.0116
429	0.0805	496	0.3010	563	0.5950	630	0.5094	697	0.0944	764	0.0113
430	0.0920	497	0.3119	564	0.5990	631	0.5007	698	0.0918	765	0.0108
431	0.1045	498	0.3224	565	0.6020	632	0.4926	699	0.0889	766	0.0108
432	0.1181	499	0.3327	566	0.6041	633	0.4845	700	0.0863	767	0.0104
433	0.1339	500	0.3443	567	0.6089	634	0.4770	701	0.0833	768	0.0099
434	0.1496	501	0.3551	568	0.6114	635	0.4696	702	0.0809	769	0.0096
435	0.1700	502	0.3636	569	0.6155	636	0.4613	703	0.0784	770	0.0093
436	0.1912	503	0.3751	570	0.6175	637	0.4528	704	0.0756	771	0.0091
437	0.2156	504	0.3841	571	0.6218	638	0.4436	705	0.0730	772	0.0088
438	0.2440	505	0.3919	572	0.6247	639	0.4360	706	0.0709	773	0.0085
439	0.2736	506	0.4020	573	0.6288	640	0.4269	707	0.0686	774	0.0083
440	0.3114	507	0.4100	574	0.6308	641	0.4270	708	0.0661	775	0.0081
441	0.3526	508	0.4178	575	0.6357	642	0.4182	709	0.0645	776	0.0079
442	0.3984	509	0.4264	576	0.6377	643	0.4096	710	0.0618	777	0.0075
443	0.4517	510	0.4339	577	0.6399	644	0.4022	711	0.0598	778	0.0074
444	0.5152	511	0.4410	578	0.6435	645	0.3932	712	0.0577	779	0.0070
445	0.5807	512	0.4489	579	0.6467	646	0.3844	713	0.0559	780	0.0070
446	0.6586	513	0.4534	580	0.6498	647	0.3760	714	0.0539	N/A	N/A

# IES TM-30-18 Color Rendition Result for 5000K:

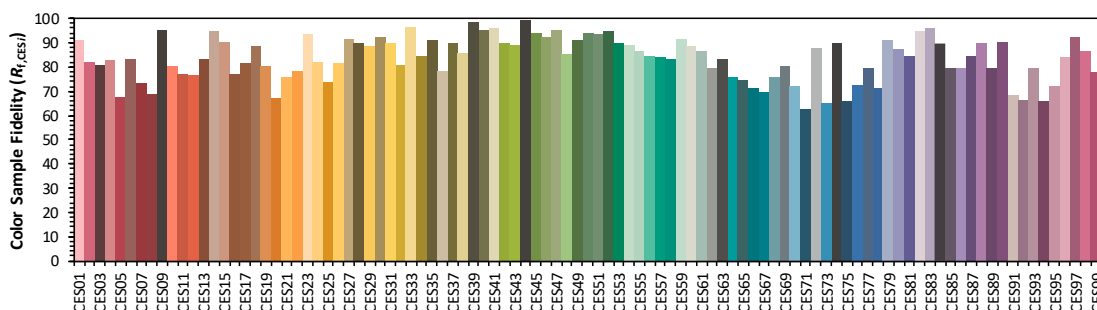
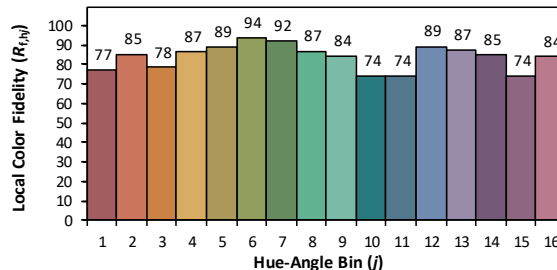
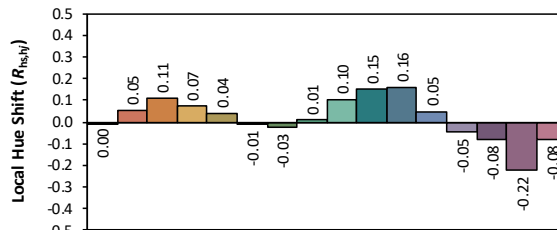
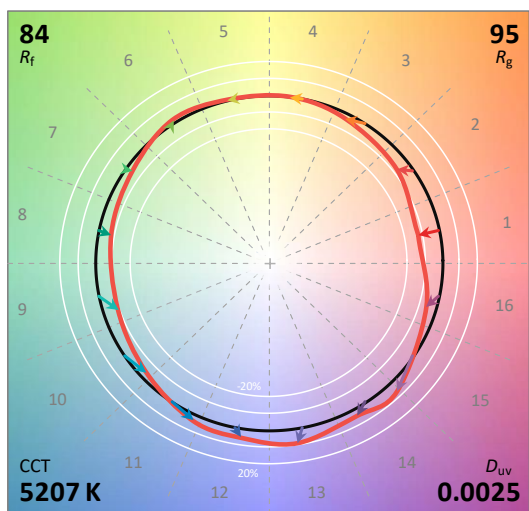
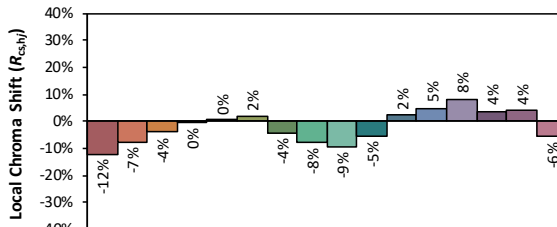
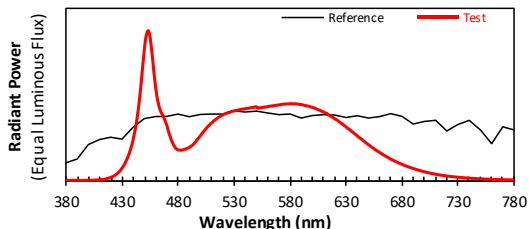
## ANSI/IES TM-30-18 Color Rendition Report

Source: 1 CIE F1

Manufacturer: VENAS Co., LIMITED

Date: 2021/4/30

Model: P1-30W DXYYZZ



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

$x$  0.3398  
 $y$  0.3522  
 $u'$  0.2076  
 $v'$  0.4842

CIE 13.3-1995  
(CRI)  
 $R_a$  84  
 $R_9$  13

Colors are for visual orientation purposes only. Created with the ANSI/IES TM-30-18 Calculator Version 2.00.

**Spectrum Data for 5000K:**

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0043	447	0.6734	514	0.4108	581	0.5132	648	0.2524	715	0.0369
381	0.0030	448	0.7552	515	0.4167	582	0.5110	649	0.2472	716	0.0358
382	0.0020	449	0.8315	516	0.4219	583	0.5108	650	0.2411	717	0.0348
383	0.0027	450	0.9043	517	0.4252	584	0.5126	651	0.2359	718	0.0338
384	0.0020	451	0.9567	518	0.4312	585	0.5105	652	0.2308	719	0.0326
385	0.0027	452	0.9844	519	0.4345	586	0.5105	653	0.2244	720	0.0316
386	0.0026	453	0.9986	520	0.4381	587	0.5097	654	0.2198	721	0.0308
387	0.0025	454	0.9814	521	0.4429	588	0.5087	655	0.2148	722	0.0299
388	0.0027	455	0.9378	522	0.4442	589	0.5076	656	0.2084	723	0.0288
389	0.0019	456	0.8754	523	0.4480	590	0.5063	657	0.2042	724	0.0280
390	0.0024	457	0.8070	524	0.4515	591	0.5055	658	0.1984	725	0.0271
391	0.0021	458	0.7304	525	0.4542	592	0.5030	659	0.1940	726	0.0265
392	0.0021	459	0.6632	526	0.4545	593	0.5009	660	0.1889	727	0.0255
393	0.0020	460	0.6024	527	0.4590	594	0.4993	661	0.1846	728	0.0248
394	0.0021	461	0.5520	528	0.4609	595	0.4980	662	0.1797	729	0.0240
395	0.0020	462	0.5185	529	0.4629	596	0.4972	663	0.1752	730	0.0235
396	0.0023	463	0.4870	530	0.4644	597	0.4948	664	0.1705	731	0.0225
397	0.0024	464	0.4655	531	0.4672	598	0.4932	665	0.1665	732	0.0221
398	0.0025	465	0.4487	532	0.4673	599	0.4895	666	0.1620	733	0.0213
399	0.0025	466	0.4370	533	0.4693	600	0.4886	667	0.1576	734	0.0207
400	0.0028	467	0.4197	534	0.4703	601	0.4855	668	0.1532	735	0.0200
401	0.0029	468	0.4020	535	0.4726	602	0.4836	669	0.1485	736	0.0192
402	0.0031	469	0.3822	536	0.4738	603	0.4798	670	0.1449	737	0.0186
403	0.0034	470	0.3606	537	0.4759	604	0.4769	671	0.1409	738	0.0181
404	0.0035	471	0.3324	538	0.4759	605	0.4738	672	0.1370	739	0.0177
405	0.0039	472	0.3087	539	0.4775	606	0.4698	673	0.1337	740	0.0172
406	0.0041	473	0.2877	540	0.4792	607	0.4683	674	0.1295	741	0.0165
407	0.0045	474	0.2657	541	0.4817	608	0.4635	675	0.1262	742	0.0160
408	0.0049	475	0.2494	542	0.4812	609	0.4596	676	0.1234	743	0.0157
409	0.0054	476	0.2343	543	0.4821	610	0.4579	677	0.1190	744	0.0150
410	0.0064	477	0.2229	544	0.4839	611	0.4533	678	0.1160	745	0.0147
411	0.0071	478	0.2132	545	0.4850	612	0.4506	679	0.1128	746	0.0141
412	0.0078	479	0.2080	546	0.4877	613	0.4470	680	0.1102	747	0.0138
413	0.0090	480	0.2044	547	0.4875	614	0.4416	681	0.1064	748	0.0134
414	0.0102	481	0.2036	548	0.4894	615	0.4361	682	0.1035	749	0.0130
415	0.0117	482	0.2028	549	0.4902	616	0.4320	683	0.1003	750	0.0125
416	0.0139	483	0.2032	550	0.4923	617	0.4276	684	0.0975	751	0.0121
417	0.0159	484	0.2053	551	0.4828	618	0.4226	685	0.0948	752	0.0118
418	0.0182	485	0.2073	552	0.4842	619	0.4180	686	0.0921	753	0.0115
419	0.0202	486	0.2095	553	0.4846	620	0.4132	687	0.0898	754	0.0111
420	0.0232	487	0.2122	554	0.4856	621	0.4079	688	0.0869	755	0.0107
421	0.0263	488	0.2154	555	0.4873	622	0.4044	689	0.0845	756	0.0104
422	0.0302	489	0.2181	556	0.4883	623	0.3981	690	0.0821	757	0.0103
423	0.0347	490	0.2222	557	0.4894	624	0.3927	691	0.0796	758	0.0098
424	0.0392	491	0.2271	558	0.4899	625	0.3870	692	0.0774	759	0.0096
425	0.0452	492	0.2328	559	0.4911	626	0.3820	693	0.0746	760	0.0093
426	0.0513	493	0.2391	560	0.4926	627	0.3766	694	0.0727	761	0.0089
427	0.0596	494	0.2472	561	0.4945	628	0.3707	695	0.0704	762	0.0088
428	0.0670	495	0.2553	562	0.4959	629	0.3655	696	0.0682	763	0.0086
429	0.0775	496	0.2639	563	0.4964	630	0.3595	697	0.0660	764	0.0082
430	0.0882	497	0.2741	564	0.4975	631	0.3532	698	0.0638	765	0.0080
431	0.0998	498	0.2831	565	0.4982	632	0.3478	699	0.0619	766	0.0077
432	0.1122	499	0.2924	566	0.4994	633	0.3422	700	0.0600	767	0.0075
433	0.1282	500	0.3024	567	0.5009	634	0.3357	701	0.0582	768	0.0074
434	0.1444	501	0.3123	568	0.5023	635	0.3303	702	0.0565	769	0.0070
435	0.1620	502	0.3212	569	0.5034	636	0.3241	703	0.0544	770	0.0067
436	0.1814	503	0.3297	570	0.5036	637	0.3179	704	0.0531	771	0.0066
437	0.2046	504	0.3395	571	0.5057	638	0.3124	705	0.0512	772	0.0064
438	0.2284	505	0.3470	572	0.5070	639	0.3062	706	0.0496	773	0.0062
439	0.2568	506	0.3575	573	0.5085	640	0.2996	707	0.0482	774	0.0062
440	0.2897	507	0.3645	574	0.5086	641	0.2939	708	0.0466	775	0.0058
441	0.3278	508	0.3711	575	0.5097	642	0.2876	709	0.0451	776	0.0056
442	0.3648	509	0.3804	576	0.5101	643	0.2824	710	0.0435	777	0.0055
443	0.4130	510	0.3849	577	0.5107	644	0.2765	711	0.0419	778	0.0055
444	0.4667	511	0.3923	578	0.5108	645	0.2712	712	0.0407	779	0.0054
445	0.5273	512	0.3997	579	0.5117	646	0.2643	713	0.0394	780	0.0054
446	0.5984	513	0.4044	580	0.5112	647	0.2587	714	0.0382	N/A	N/A

**Goniophotometer Test Results (Test for 3500K):**

**Test Condition:**

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.1	49.2	Face Down	90	25

**Electrical Data:**

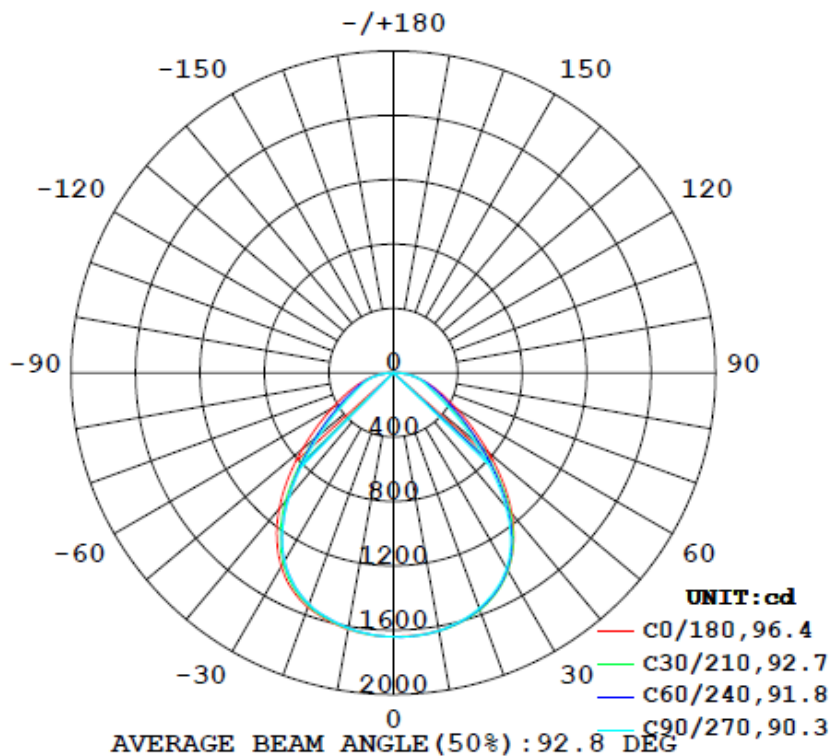
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60	0.2413	28.87	0.9970

**Goniophotometer Data:**

Parameter	Results	
Total Luminous (lm)	3760.8	
Luminous Efficacy (lm/w)	130.27	
Zonal Lumens Distribution (0-60°)	85.2%	
Beam Angle (°)	92.8	
Spacing Criterion	0-180°	90-270°
	1.28	1.24
UGR	Viewed Crosswise	Viewed Endwise
	20.3	19.7

**Luminous Intensity Distribution Diagram:**

**LUMINOUS INTENSITY DISTRIBUTION DIAGRAM**

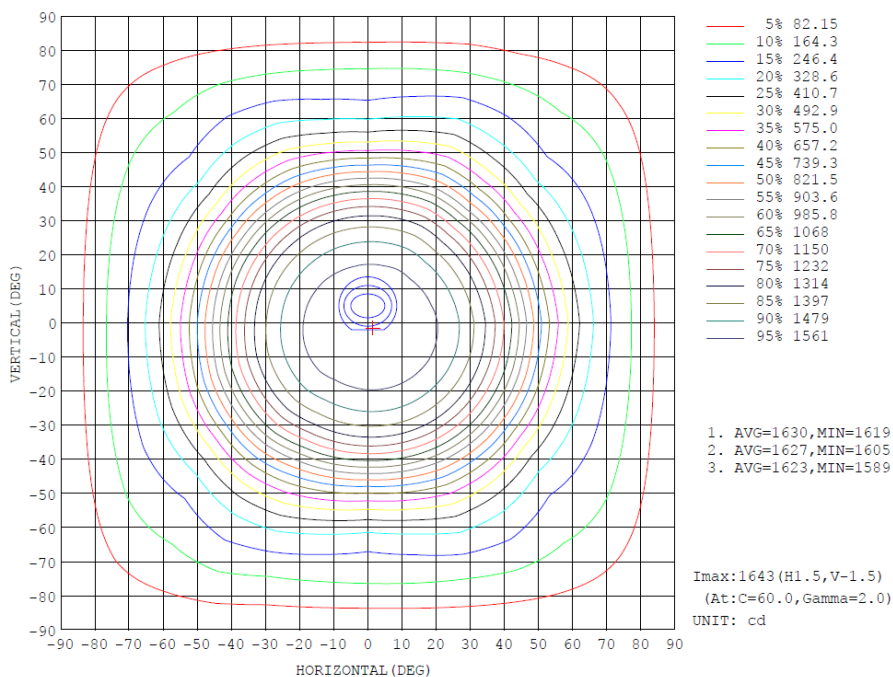


## Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	1625	1629	1626	1625	1619	1612	1611	1615	0- 10	155.7	155.7	4.14,4.14
20	1565	1566	1557	1560	1552	1535	1532	1540	10- 20	449.7	605.3	16.1,16.1
30	1421	1416	1404	1410	1391	1356	1352	1362	20- 30	682.6	1288	34.2,34.2
40	1146	1115	1085	1116	1103	1023	1007	1027	30- 40	779.2	2067	55,55
50	772.0	706.8	655.4	717.8	738.2	630.0	592.4	632.6	40- 50	674.8	2742	72.9,72.9
60	460.9	405.1	357.5	412.7	437.7	362.3	322.3	363.4	50- 60	463.9	3206	85.2,85.2
70	265.6	252.8	219.7	254.8	252.7	227.2	203.7	225.9	60- 70	297.1	3503	93.1,93.1
80	131.1	132.4	125.5	137.6	124.0	114.1	107.6	108.2	70- 80	188.1	3691	98.1,98.1
90	4.294	4.673	6.701	8.156	0.2049	0.2209	0.1926	0.2166	80- 90	65.98	3757	99.9,99.9
100	0.1673	0.1542	0.1571	0.1620	0.2983	0.3245	0.3399	0.3301	90-100	0.5874	3758	99.9,99.9
110	0.2364	0.1996	0.2274	0.2367	0.3642	0.4079	0.4283	0.4271	100-110	0.2963	3758	99.9,99.9
120	0.3508	0.2894	0.3378	0.3592	0.4746	0.5353	0.5864	0.5492	110-120	0.3643	3758	99.9,99.9
130	0.4945	0.4510	0.4923	0.5368	0.6601	0.8152	0.8687	0.7683	120-130	0.4765	3759	99.9,99.9
140	0.6370	0.6127	0.6874	0.6724	0.7877	1.011	1.065	0.9797	130-140	0.5623	3759	100,100
150	0.7934	0.7424	0.7753	0.7925	1.021	1.128	1.185	1.143	140-150	0.5476	3760	100,100
160	0.9880	0.8632	0.8428	0.9185	1.174	1.256	1.215	1.261	150-160	0.4626	3760	100,100
170	1.182	1.078	1.038	1.148	1.239	1.320	1.319	1.298	160-170	0.3209	3761	100,100
180	1.364	1.364	1.364	1.364	1.293	1.293	1.293	1.293	170-180	0.1174	3761	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

## Isocandela Diagram:



### Uncorrected UGR Table:

**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										
X=2H Y=2H	UGR Viewed Crosswise					UGR Viewed Endwise				
3H	10.4	11.9	10.7	12.2	12.5	9.8	11.4	10.2	11.7	12.0
4H	12.0	13.4	12.4	13.7	14.1	11.3	12.7	11.7	13.0	13.4
6H	12.8	14.0	13.2	14.4	14.8	12.0	13.3	12.4	13.6	14.0
8H	13.4	14.6	13.8	15.0	15.3	12.6	13.8	13.1	14.2	14.6
12H	13.7	14.8	14.1	15.2	15.6	12.9	14.0	13.3	14.4	14.8
4H 2H	13.9	14.9	14.3	15.3	15.8	13.1	14.1	13.5	14.5	14.9
4H 3H	10.8	12.1	11.2	12.4	12.8	10.4	11.7	10.8	12.1	12.4
4H 4H	12.7	13.7	13.1	14.1	14.5	12.2	13.3	12.6	13.7	14.1
4H 6H	13.6	14.5	14.0	14.9	15.4	13.1	14.0	13.5	14.4	14.9
4H 8H	14.4	15.2	14.9	15.7	16.1	13.8	14.7	14.3	15.1	15.6
4H 12H	14.7	15.5	15.2	16.0	16.4	14.1	14.9	14.6	15.4	15.8
8H 4H	15.0	15.7	15.5	16.2	16.6	14.3	15.1	14.8	15.5	16.0
8H 6H	13.9	14.7	14.3	15.1	15.6	13.4	14.2	13.9	14.7	15.1
8H 8H	14.8	15.5	15.3	16.0	16.5	14.4	15.0	14.9	15.5	16.0
8H 12H	15.3	15.9	15.8	16.4	16.9	14.7	15.3	15.3	15.9	16.3
12H 4H	15.7	16.2	16.2	16.7	17.2	15.1	15.6	15.6	16.1	16.7
12H 6H	13.9	14.6	14.4	15.1	15.6	13.5	14.2	14.0	14.7	15.2
12H 8H	14.9	15.5	15.4	16.0	16.5	14.5	15.1	15.0	15.5	16.1
	15.4	15.9	15.9	16.4	17.0	14.9	15.5	15.5	16.0	16.5

Maximum UGR = 17.2

### Corrected UGR Table:

**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										
X=2H Y=2H	UGR Viewed Crosswise					UGR Viewed Endwise				
3H	16.0	17.5	16.3	17.8	18.1	15.4	17.0	15.8	17.3	17.6
4H	17.6	19.0	18.0	19.3	19.7	16.9	18.3	17.3	18.6	19.0
6H	18.4	19.6	18.8	20.0	20.4	17.6	18.9	18.0	19.2	19.6
8H	19.0	20.2	19.4	20.6	20.9	18.2	19.4	18.7	19.8	20.2
12H	19.3	20.4	19.7	20.8	21.2	18.5	19.6	18.9	20.0	20.4
4H 2H	19.5	20.5	19.9	20.9	21.4	18.7	19.7	19.1	20.1	20.5
4H 3H	16.4	17.7	16.8	18.0	18.4	16.0	17.3	16.4	17.7	18.0
4H 4H	18.3	19.3	18.7	19.7	20.1	17.8	18.9	18.2	19.3	19.7
4H 6H	19.2	20.1	19.6	20.5	21.0	18.7	19.6	19.1	20.0	20.5
4H 8H	20.0	20.8	20.5	21.3	21.7	19.4	20.3	19.9	20.7	21.2
4H 12H	20.3	21.1	20.8	21.6	22.0	19.7	20.5	20.2	21.0	21.4
8H 4H	20.6	21.3	21.1	21.8	22.2	19.9	20.7	20.4	21.1	21.6
8H 6H	19.5	20.3	19.9	20.7	21.2	19.0	19.8	19.5	20.3	20.7
8H 8H	20.4	21.1	20.9	21.6	22.1	20.0	20.6	20.5	21.1	21.6
8H 12H	20.9	21.5	21.4	22.0	22.5	20.3	20.9	20.9	21.5	21.9
12H 4H	21.3	21.8	21.8	22.3	22.8	20.7	21.2	21.2	21.7	22.3
12H 6H	19.5	20.2	20.0	20.7	21.2	19.1	19.8	19.6	20.3	20.8
12H 8H	20.5	21.1	21.0	21.6	22.1	20.1	20.7	20.6	21.1	21.7
	21.0	21.5	21.5	22.0	22.6	20.5	21.1	21.1	21.6	22.1

Maximum UGR = 22.8



## Luminous Distribution Intensity Data:

Table--1

UNIT: cd

C (DEG)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270
γ (DEG)	0	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642	1642
5	1637	1640	1641	1641	1641	1640	1640	1640	1638	1638	1638	1637	1636	1636	1634	1633	1632	1632	1633
10	1625	1629	1630	1629	1629	1627	1626	1624	1624	1625	1624	1621	1619	1617	1615	1612	1611	1610	1611
15	1602	1606	1607	1605	1603	1602	1599	1597	1597	1601	1599	1596	1591	1587	1583	1580	1577	1576	1577
20	1565	1568	1569	1566	1563	1560	1557	1554	1553	1560	1559	1556	1552	1547	1541	1535	1532	1530	1532
25	1507	1510	1510	1506	1503	1499	1494	1490	1489	1499	1498	1495	1487	1479	1470	1462	1457	1456	1458
30	1421	1424	1421	1416	1412	1409	1404	1399	1396	1410	1408	1406	1391	1381	1367	1356	1351	1349	1352
35	1300	1303	1295	1288	1283	1276	1270	1265	1263	1285	1284	1283	1264	1247	1225	1210	1203	1198	1201
40	1146	1143	1126	1115	1106	1095	1085	1084	1085	1116	1119	1125	1103	1077	1043	1023	1014	1006	1007
45	964	952	922	908	903	884	867	875	884	914	922	942	922	884	836	817	814	799	792
50	772	748	711	707	711	680	655	677	698	718	718	749	738	688	635	630	633	605	592
55	601	563	519	535	548	510	483	510	539	545	533	571	573	517	467	477	482	450	436
60	461	420	377	405	420	382	357	384	413	413	390	428	438	387	343	362	368	337	322
65	350	318	282	314	326	292	271	293	319	319	291	326	333	296	261	284	286	261	249
70	266	249	222	253	254	232	220	230	247	255	228	255	253	233	209	227	223	209	204
75	194	195	179	194	189	182	178	178	181	198	181	198	185	180	164	172	167	161	160
80	131	137	130	132	129	129	126	124	123	138	131	140	124	123	114	114	112	109	108
85	67.1	70.2	70.1	70.5	70.4	68.8	66.5	66.2	65.6	76.1	74.0	75.1	60.5	58.3	54.2	52.7	51.9	50.6	50.2
90	4.29	5.60	5.90	4.67	11.5	9.32	6.70	3.76	3.41	8.16	9.03	9.21	0.20	0.28	0.31	0.22	0.22	0.20	0.19
95	0.13	0.13	0.13	0.12	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.13	0.25	0.25	0.26	0.28	0.28	0.29	0.29
100	0.17	0.16	0.16	0.15	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.16	0.30	0.30	0.31	0.32	0.34	0.34	0.34
105	0.20	0.18	0.18	0.18	0.19	0.20	0.20	0.20	0.20	0.20	0.19	0.19	0.35	0.34	0.36	0.37	0.38	0.39	0.39
110	0.24	0.23	0.20	0.20	0.21	0.22	0.23	0.23	0.24	0.24	0.23	0.24	0.36	0.37	0.39	0.41	0.42	0.42	0.43
115	0.29	0.27	0.24	0.23	0.25	0.27	0.27	0.28	0.29	0.29	0.28	0.29	0.39	0.41	0.43	0.45	0.47	0.49	0.50
120	0.35	0.33	0.30	0.29	0.31	0.33	0.34	0.35	0.36	0.36	0.37	0.35	0.47	0.50	0.52	0.54	0.55	0.57	0.59
125	0.41	0.40	0.37	0.36	0.38	0.39	0.41	0.43	0.45	0.45	0.44	0.42	0.56	0.61	0.63	0.68	0.68	0.70	0.72
130	0.49	0.47	0.44	0.45	0.46	0.47	0.49	0.51	0.54	0.54	0.51	0.50	0.66	0.71	0.78	0.82	0.85	0.86	0.87
135	0.58	0.55	0.55	0.51	0.55	0.59	0.59	0.62	0.64	0.60	0.60	0.57	0.74	0.79	0.87	0.91	0.97	0.99	1.00
140	0.64	0.63	0.64	0.61	0.62	0.67	0.69	0.69	0.70	0.67	0.67	0.64	0.79	0.85	0.93	1.01	1.03	1.04	1.07
145	0.70	0.74	0.70	0.69	0.66	0.68	0.70	0.71	0.76	0.74	0.73	0.72	0.91	0.92	0.99	1.06	1.11	1.12	1.13
150	0.79	0.80	0.77	0.74	0.72	0.76	0.78	0.78	0.81	0.79	0.78	0.78	1.02	1.02	1.06	1.13	1.15	1.15	1.19
155	0.88	0.88	0.85	0.80	0.79	0.82	0.81	0.84	0.87	0.85	0.85	0.85	1.07	1.09	1.15	1.17	1.18	1.19	1.20
160	0.99	0.97	0.94	0.86	0.84	0.85	0.84	0.90	0.93	0.92	0.95	0.94	1.17	1.18	1.19	1.26	1.27	1.24	1.21
165	1.09	1.08	1.04	1.02	0.93	0.91	0.90	0.97	1.04	1.06	1.06	1.04	1.20	1.21	1.25	1.28	1.33	1.33	1.29
170	1.18	1.16	1.13	1.08	1.03	1.03	1.04	1.06	1.13	1.15	1.13	1.13	1.24	1.25	1.28	1.32	1.37	1.37	1.32
175	1.27	1.26	1.23	1.17	1.11	1.10	1.08	1.12	1.17	1.17	1.16	1.18	1.30	1.30	1.31	1.33	1.35	1.38	1.36
180	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.36	1.29	1.29	1.29	1.29	1.29	1.29	1.29

Table--2

UNIT: cd

C (DEG)	285	300	315	330	345														
γ (DEG)	0	1642	1642	1642	1642														
5	1632	1632	1633	1633	1635														
10	1612	1615	1615	1617	1620														
15	1579	1583	1583	1587	1593														
20	1535	1541	1540	1548	1555														
25	1463	1471	1467	1478	1491														
30	1359	1370	1362	1377	1396														
35	1212	1227	1215	1235	1264														
40	1022	1043	1027	1054	1095														
45	816	843	820	847	901														
50	625	661	633	643	701														
55	470	509	479	471	529														
60	353	389	363	346	397														
65	272	301	284	263	304														
70	216	233	226	209	239														
75	165	170	168	163	184														
80	111	114	108	110	122														
85	52.9	55.1	44.1	47.1	53.1														
90	0.20	0.20	0.22	0.21	0.20														
95	0.29	0.29	0.28	0.27	0.25														
100	0.35	0.34	0.33	0.32	0.30														
105	0.39	0.39	0.38	0.38	0.35														
110	0.43	0.43	0.43	0.40	0.37														
115	0.50	0.49	0.48	0.45	0.42														
120	0.58	0.57	0.55	0.53	0.51														
125	0.70	0.67	0.67	0.62	0.60														
130	0.85	0.81	0.77	0.76	0.67														
135	0.96	0.91	0.88	0.84	0.77														
140	1.02	1.00	0.98	0.91	0.82														
145	1.13	1.10	1.07	0.99	0.90														
150	1.18	1.17	1.14	1.09	1.00														
155	1.23	1.22	1.19	1.19	1.07														
160	1.23	1.26	1.26	1.23	1.16														
165	1.30	1.30	1.28	1.29	1.23														
170	1.30	1.30	1.30	1.32	1.26														
175	1.35	1.34	1.33	1.31	1.26														
180	1.29	1.29	1.29	1.29	1.29														

### **THD and PF Measurement Test Results:**

#### **Electrical Measurement:**

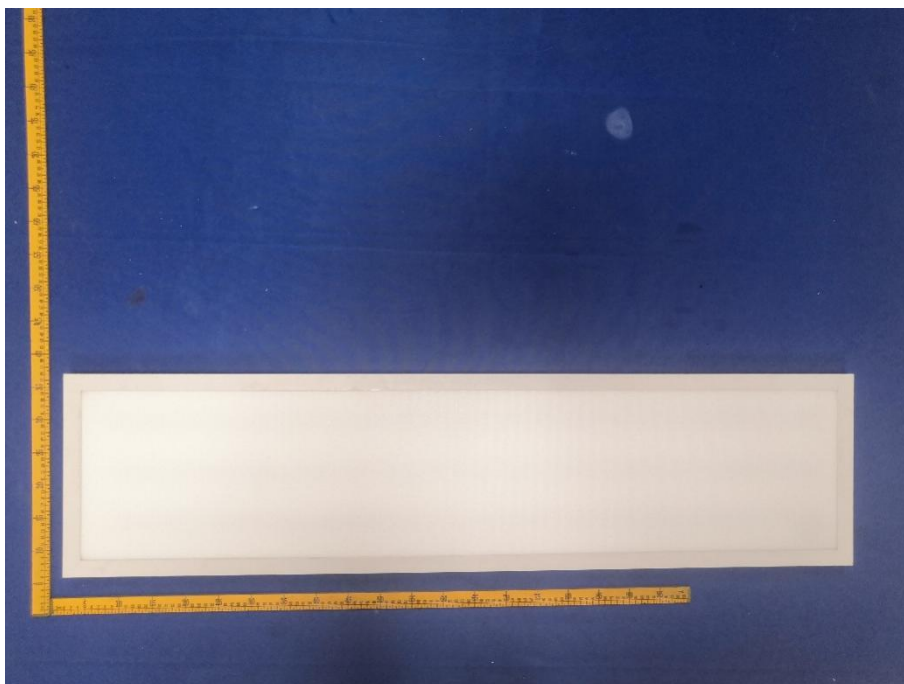
Rated CCT	Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor	iTHD(%)
3500K	277.0	60	0.1039	28.56	0.9921	12.26
4000K	277.0	60	0.1069	29.32	0.9904	11.17
5000K	277.0	60	0.1099	30.11	0.9887	12.48

### **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
3500K	3519	28.87	3760.8	130.27	Set Switch 0% to 3500K
4000K	4110	29.55	4083.9	138.20	Set Switch 50% to 4000K
5000K	5203	30.18	4090.2	135.53	Set Switch 100% to 5000K
Lowest Efficacy	130.27 lm/W (@ 3500K)				
Maximum Power	30.18 W				



**Photo of Sample:**



**Equipment List:**

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2020-11-12	2021-11-11
NTC-F01-006	2.0 meter Integrating Sphere	2020-11-12	2021-11-11
NTC-F01-012	Standard Lamp	2020-11-12	2021-11-11
NTC-F01-013	Standard Lamp	2020-11-12	2021-11-11
NTC-F01-031	Digital Power Meter	2020-08-22	2021-08-21
NTC-F01-019	Temperature & Humidity Meter	2020-11-13	2021-11-12

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