LM-79-08 Test Report

For

LEDVANCE LLC

200 Ballardvale St. Wilmington MA 01887

LED LAMP

Model Name(s):
LED18A21UNVFR840MED
LED18A21UNVFR850MED

Representative (Tested) Model:
LED18A21UNVFR840MED
LED18A21UNVFR850MED

Model Difference: All construction and rating are the same, except CCT

Prepared by:

Engineer: Alan Wang
Date: 2022-12-29

Reviewed by:

Technical Lead: Vincent Yuan
Issue Date: 2023-02-13
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 d not imply product certification, approval, or endorsement by NVLAP, or any agency of the Federal Government.

Client Information:

Applicant Name:	LEDVANCE LLC
Brand Name:	SYLVANIA, LEDVANCE, SIMPLY DONE

Product Information:

Model Number:	LED18A21UNVFR840MED LED18A21UNVFR850MED
Product Type:	LED LAMP
Rating Input:	120-277Vac, 50/60Hz, 18W
Declared CCT:	4000K,5000K
Declared Light Output:	2605lm
LED Manufacturer:	N/A
LED Model:	N/A

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:	2022-04-08
Quantity of Receipt Samples:	2 pc
Sample Number:	221216001-S1(4000K), S2(5000K)

Laboratory Information:

Test Laboratory:	Dongguan New Testing Centre Co., Ltd
Laboratory Address:	3F, No. 1 the 1st 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-79-08_TRF_V1.5
Issued Date of Test Report:	2023-02-13
Revised Date of Test Report:	N/A
Test Report No.:	NTCLR22120222
Remark *(If applicable)*:	N/A

Test Specification:	
Date of Test	2022-04-10
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

Test Methods:

1. Photometric and Electrical Measurements – Light Distribution Method:

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° horizonal intervals.

2. Photometric and Electrical Measurements – Integrating Sphere Method:

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.

3. THD and PF Measurements:

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.

Integrating Sphere Test Results:4000K

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.0	41.0	Face Down	90	10

Electrical Data:

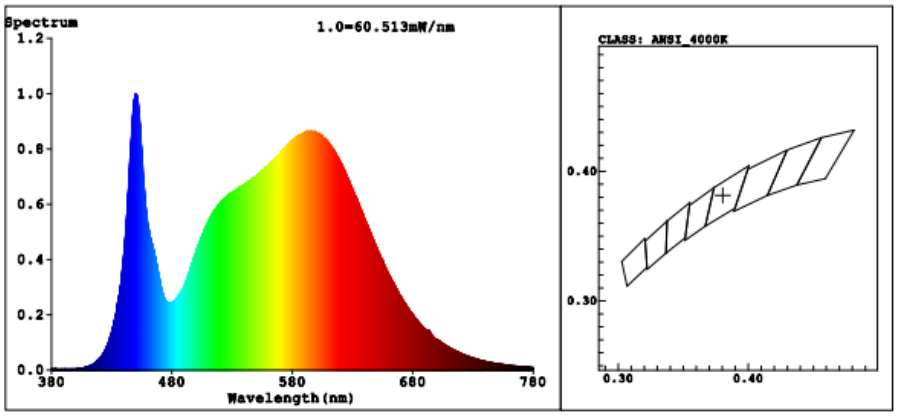
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60.01	0.1414	16.84	0.9928

Color Data:

Parameter	Result
CCT(K)	4035
Ra	83.3
R_f	85
R_g	95
$R_{cs,\ h1}$	-12
Chromaticity, (x, y)	(0.3804,0.3814)
Chromaticity, (u', v')	(0.2232,0.5036)
Duv	0.0022

Specify Color Rendering			
R1	82	R9	9
R2	89	R10	73
R3	95	R11	82
R4	83	R12	62
R5	82	R13	83
R6	85	R14	97
R7	87	R15	75
R8	66	-	-

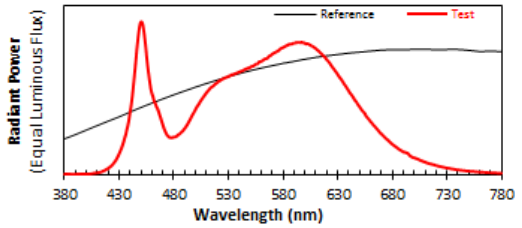
Spectrum Diagram:

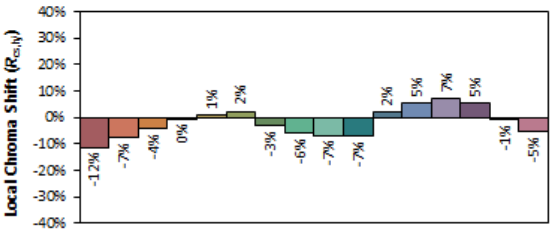


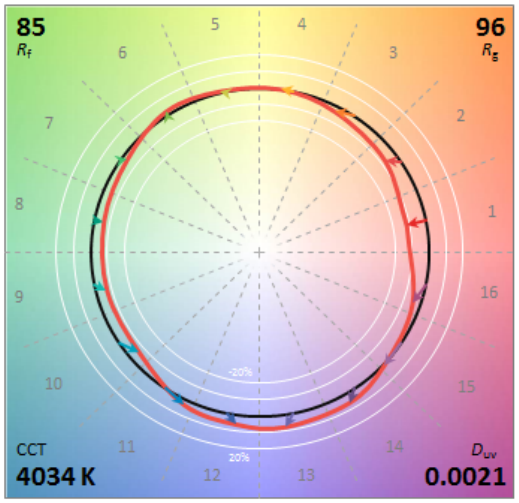
IES TM-30-18 Color Rendition Result (4000K):

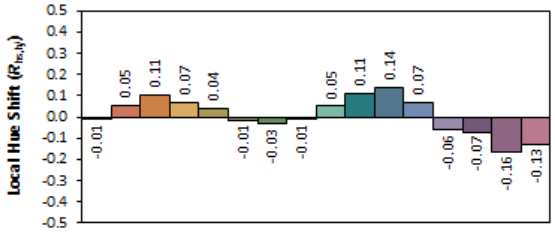
ANSI/IES TM-30-18 Color Rendition Report

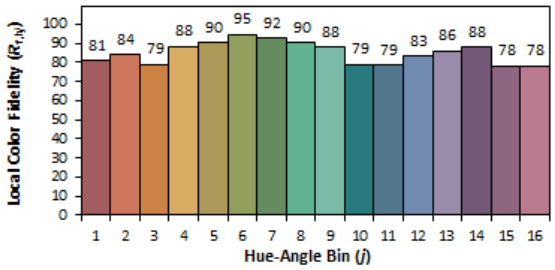
Source: --
Manufacturer: LEDVANCE LLC
Date: 2022/4/10
Model: LED18A21UNVFR840MED

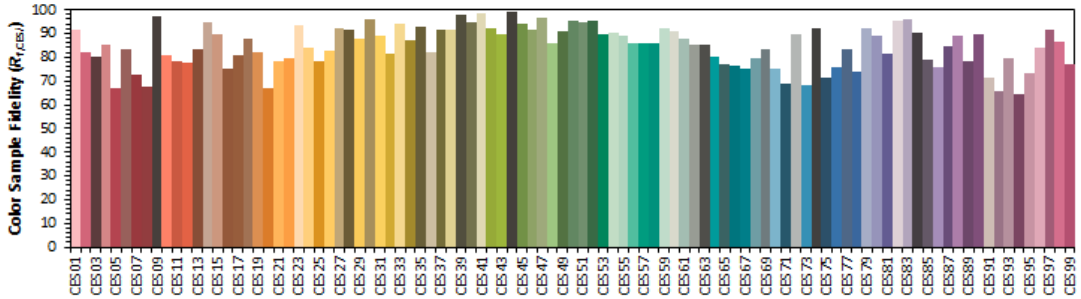












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3804
y	0.3813
u'	0.2233
v'	0.5036

CIE 13.3-1995 (CRI)

R_a	83
R_9	9

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

Spectrum Data (4000K):

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0026	447	0.8764	514	0.5682	581	0.8336	648	0.4642	715	0.0708
381	0.0053	448	0.9396	515	0.5730	582	0.8373	649	0.4529	716	0.0684
382	0.0033	449	0.9801	516	0.5773	583	0.8421	650	0.4442	717	0.0662
383	0.0035	450	0.9978	517	0.5861	584	0.8427	651	0.4323	718	0.0655
384	0.0030	451	0.9908	518	0.5916	585	0.8485	652	0.4230	719	0.0629
385	0.0042	452	0.9607	519	0.5967	586	0.8507	653	0.4139	720	0.0599
386	0.0030	453	0.9108	520	0.6017	587	0.8507	654	0.4056	721	0.0590
387	0.0032	454	0.8480	521	0.6101	588	0.8512	655	0.3985	722	0.0558
388	0.0031	455	0.7756	522	0.6111	589	0.8563	656	0.3834	723	0.0550
389	0.0038	456	0.7093	523	0.6190	590	0.8577	657	0.3735	724	0.0527
390	0.0031	457	0.6527	524	0.6214	591	0.8586	658	0.3658	725	0.0517
391	0.0039	458	0.5977	525	0.6253	592	0.8629	659	0.3570	726	0.0502
392	0.0029	459	0.5560	526	0.6271	593	0.8623	660	0.3473	727	0.0481
393	0.0031	460	0.5268	527	0.6331	594	0.8624	661	0.3398	728	0.0467
394	0.0041	461	0.5058	528	0.6345	595	0.8633	662	0.3310	729	0.0448
395	0.0031	462	0.4793	529	0.6378	596	0.8596	663	0.3210	730	0.0440
396	0.0030	463	0.4646	530	0.6394	597	0.8642	664	0.3156	731	0.0425
397	0.0038	464	0.4449	531	0.6452	598	0.8610	665	0.3065	732	0.0415
398	0.0037	465	0.4319	532	0.6462	599	0.8600	666	0.2982	733	0.0400
399	0.0039	466	0.4111	533	0.6530	600	0.8575	667	0.2892	734	0.0386
400	0.0042	467	0.3890	534	0.6521	601	0.8525	668	0.2822	735	0.0374
401	0.0045	468	0.3688	535	0.6557	602	0.8545	669	0.2713	736	0.0362
402	0.0047	469	0.3445	536	0.6581	603	0.8530	670	0.2671	737	0.0345
403	0.0044	470	0.3224	537	0.6617	604	0.8485	671	0.2587	738	0.0339
404	0.0059	471	0.3011	538	0.6629	605	0.8453	672	0.2520	739	0.0324
405	0.0054	472	0.2838	539	0.6678	606	0.8393	673	0.2442	740	0.0317
406	0.0076	473	0.2692	540	0.6680	607	0.8381	674	0.2382	741	0.0308
407	0.0079	474	0.2560	541	0.6742	608	0.8326	675	0.2314	742	0.0295
408	0.0103	475	0.2482	542	0.6750	609	0.8275	676	0.2265	743	0.0286
409	0.0102	476	0.2437	543	0.6781	610	0.8224	677	0.2184	744	0.0280
410	0.0117	477	0.2419	544	0.6823	611	0.8157	678	0.2120	745	0.0273
411	0.0141	478	0.2401	545	0.6859	612	0.8101	679	0.2055	746	0.0259
412	0.0152	479	0.2432	546	0.6894	613	0.8035	680	0.1987	747	0.0253
413	0.0171	480	0.2444	547	0.6917	614	0.7955	681	0.1939	748	0.0245
414	0.0190	481	0.2456	548	0.6951	615	0.7891	682	0.1878	749	0.0242
415	0.0239	482	0.2499	549	0.6952	616	0.7824	683	0.1829	750	0.0231
416	0.0253	483	0.2524	550	0.7012	617	0.7746	684	0.1777	751	0.0227
417	0.0285	484	0.2605	551	0.7054	618	0.7693	685	0.1725	752	0.0221
418	0.0339	485	0.2641	552	0.7071	619	0.7602	686	0.1667	753	0.0214
419	0.0374	486	0.2711	553	0.7089	620	0.7497	687	0.1620	754	0.0205
420	0.0407	487	0.2775	554	0.7153	621	0.7438	688	0.1579	755	0.0205
421	0.0472	488	0.2830	555	0.7207	622	0.7339	689	0.1537	756	0.0193
422	0.0527	489	0.2934	556	0.7216	623	0.7257	690	0.1494	757	0.0192
423	0.0593	490	0.3011	557	0.7243	624	0.7136	691	0.1468	758	0.0181
424	0.0664	491	0.3127	558	0.7362	625	0.7036	692	0.1450	759	0.0175
425	0.0753	492	0.3228	559	0.7367	626	0.6933	693	0.1427	760	0.0171
426	0.0852	493	0.3336	560	0.7401	627	0.6851	694	0.1404	761	0.0167
427	0.0951	494	0.3485	561	0.7415	628	0.6741	695	0.1343	762	0.0160
428	0.1088	495	0.3614	562	0.7479	629	0.6653	696	0.1241	763	0.0155
429	0.1220	496	0.3747	563	0.7538	630	0.6537	697	0.1203	764	0.0152
430	0.1373	497	0.3893	564	0.7558	631	0.6434	698	0.1152	765	0.0149
431	0.1542	498	0.4008	565	0.7575	632	0.6323	699	0.1120	766	0.0140
432	0.1715	499	0.4133	566	0.7608	633	0.6250	700	0.1104	767	0.0138
433	0.1928	500	0.4266	567	0.7719	634	0.6134	701	0.1085	768	0.0131
434	0.2133	501	0.4412	568	0.7760	635	0.6025	702	0.1050	769	0.0127
435	0.2406	502	0.4513	569	0.7786	636	0.5903	703	0.1028	770	0.0129
436	0.2626	503	0.4616	570	0.7857	637	0.5819	704	0.0997	771	0.0116
437	0.2954	504	0.4747	571	0.7902	638	0.5704	705	0.0962	772	0.0116
438	0.3253	505	0.4858	572	0.7951	639	0.5594	706	0.0924	773	0.0113
439	0.3655	506	0.4943	573	0.7987	640	0.5473	707	0.0904	774	0.0110
440	0.4098	507	0.5067	574	0.8004	641	0.5354	708	0.0873	775	0.0106
441	0.4576	508	0.5157	575	0.8068	642	0.5268	709	0.0849	776	0.0101
442	0.5157	509	0.5257	576	0.8092	643	0.5176	710	0.0824	777	0.0099
443	0.5811	510	0.5360	577	0.8181	644	0.5081	711	0.0795	778	0.0098
444	0.6561	511	0.5442	578	0.8225	645	0.4947	712	0.0769	779	0.0098
445	0.7318	512	0.5520	579	0.8264	646	0.4840	713	0.0745	780	0.0093
446	0.8090	513	0.5612	580	0.8285	647	0.4765	714	0.0721	N/A	N/A

Integrating Sphere Test Results:5000K

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.0	41.0	Face Down	90	10

Electrical Data:

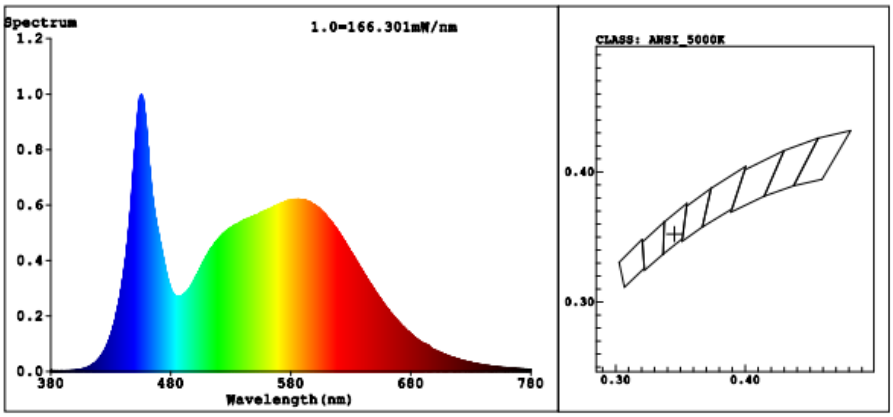
Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60.01	0.1412	16.83	0.9932

Color Data:

Parameter	Result
CCT(K)	4989
Ra	83.9
R_f	83
R_g	95
$R_{cs,\ h1}$	-13
Chromaticity, (x, y)	(0.3454,0.3522)
Chromaticity, (u', v')	(0.2114,0.4850)
Duv	0.0002

Specify Color Rendering			
R1	83	R9	14
R2	91	R10	77
R3	94	R11	79
R4	80	R12	57
R5	82	R13	86
R6	86	R14	97
R7	87	R15	78
R8	68	-	-

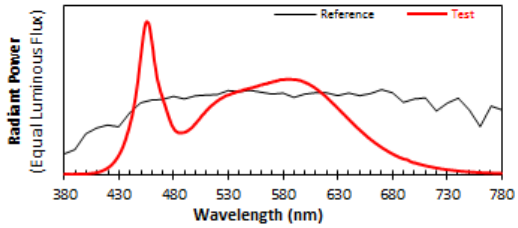
Spectrum Diagram:

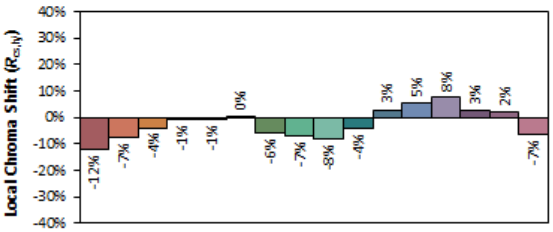


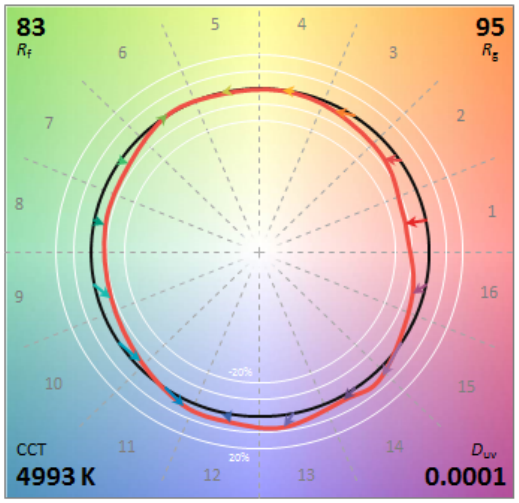
IES TM-30-18 Color Rendition Result (5000K):

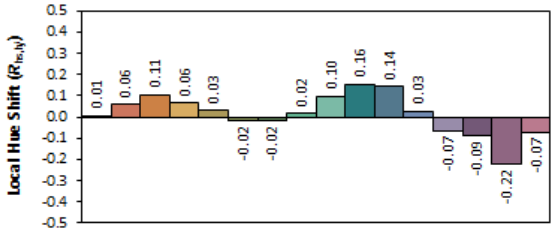
ANSI/IES TM-30-18 Color Rendition Report

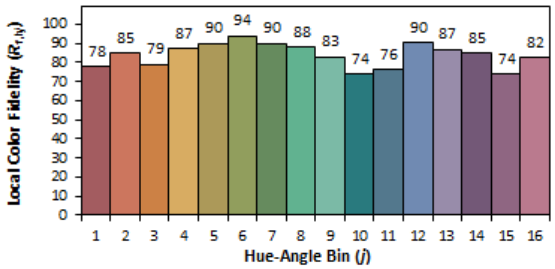
Source: --
Manufacturer: LEDVANCE LLC
Date: 2022/4/10
Model: LED18A21UNVFR850MED

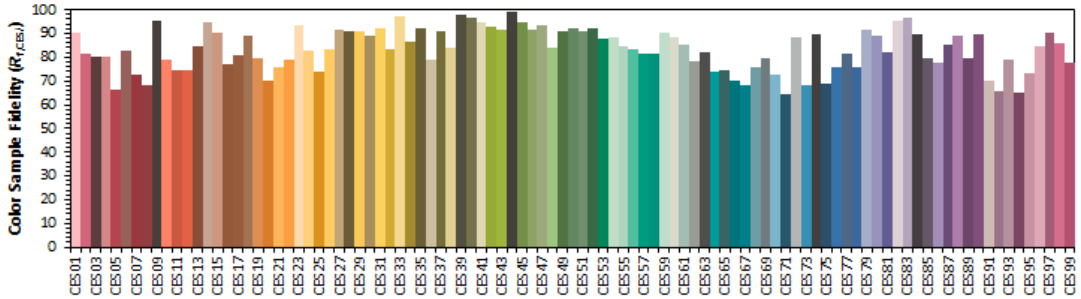












Notes: This is a recommended method for displaying ANSI/IES TM-30-18 information.

x	0.3453
y	0.3520
u'	0.2114
v'	0.4849

CIE 13.3-1995 (CRI)

R_a	84
R_9	14

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

Spectrum Data (5000K):

nm	mW	nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	0.0030	447	0.6032	514	0.4450	581	0.6166	648	0.3040	715	0.0505
381	0.0037	448	0.6643	515	0.4502	582	0.6180	649	0.2980	716	0.0489
382	0.0021	449	0.7234	516	0.4557	583	0.6196	650	0.2915	717	0.0478
383	0.0030	450	0.7827	517	0.4624	584	0.6185	651	0.2846	718	0.0459
384	0.0036	451	0.8404	518	0.4671	585	0.6196	652	0.2781	719	0.0445
385	0.0020	452	0.8980	519	0.4740	586	0.6196	653	0.2725	720	0.0436
386	0.0028	453	0.9438	520	0.4782	587	0.6198	654	0.2655	721	0.0421
387	0.0021	454	0.9776	521	0.4834	588	0.6182	655	0.2601	722	0.0406
388	0.0026	455	0.9924	522	0.4884	589	0.6177	656	0.2533	723	0.0398
389	0.0027	456	0.9893	523	0.4934	590	0.6168	657	0.2475	724	0.0384
390	0.0028	457	0.9807	524	0.4962	591	0.6170	658	0.2401	725	0.0370
391	0.0025	458	0.9470	525	0.5006	592	0.6161	659	0.2355	726	0.0363
392	0.0023	459	0.9044	526	0.5044	593	0.6152	660	0.2296	727	0.0350
393	0.0033	460	0.8558	527	0.5096	594	0.6130	661	0.2231	728	0.0339
394	0.0030	461	0.8055	528	0.5121	595	0.6119	662	0.2186	729	0.0330
395	0.0031	462	0.7465	529	0.5150	596	0.6108	663	0.2123	730	0.0319
396	0.0034	463	0.7015	530	0.5176	597	0.6077	664	0.2080	731	0.0311
397	0.0033	464	0.6544	531	0.5186	598	0.6039	665	0.2019	732	0.0301
398	0.0037	465	0.6172	532	0.5233	599	0.6020	666	0.1973	733	0.0294
399	0.0039	466	0.5871	533	0.5243	600	0.5998	667	0.1923	734	0.0288
400	0.0040	467	0.5598	534	0.5289	601	0.5951	668	0.1871	735	0.0276
401	0.0045	468	0.5342	535	0.5288	602	0.5928	669	0.1827	736	0.0270
402	0.0051	469	0.5137	536	0.5323	603	0.5902	670	0.1779	737	0.0257
403	0.0059	470	0.4905	537	0.5350	604	0.5855	671	0.1722	738	0.0254
404	0.0066	471	0.4681	538	0.5383	605	0.5811	672	0.1682	739	0.0244
405	0.0080	472	0.4486	539	0.5400	606	0.5781	673	0.1640	740	0.0239
406	0.0084	473	0.4250	540	0.5421	607	0.5732	674	0.1603	741	0.0231
407	0.0097	474	0.4026	541	0.5426	608	0.5687	675	0.1553	742	0.0223
408	0.0105	475	0.3811	542	0.5439	609	0.5639	676	0.1506	743	0.0214
409	0.0121	476	0.3603	543	0.5477	610	0.5586	677	0.1467	744	0.0213
410	0.0137	477	0.3407	544	0.5506	611	0.5536	678	0.1434	745	0.0205
411	0.0156	478	0.3225	545	0.5519	612	0.5483	679	0.1382	746	0.0199
412	0.0178	479	0.3104	546	0.5543	613	0.5419	680	0.1355	747	0.0192
413	0.0199	480	0.2974	547	0.5552	614	0.5370	681	0.1317	748	0.0187
414	0.0227	481	0.2878	548	0.5586	615	0.5321	682	0.1271	749	0.0183
415	0.0256	482	0.2808	549	0.5586	616	0.5254	683	0.1241	750	0.0178
416	0.0288	483	0.2765	550	0.5617	617	0.5197	684	0.1204	751	0.0174
417	0.0324	484	0.2719	551	0.5626	618	0.5138	685	0.1174	752	0.0165
418	0.0364	485	0.2704	552	0.5635	619	0.5090	686	0.1134	753	0.0160
419	0.0409	486	0.2707	553	0.5665	620	0.5010	687	0.1102	754	0.0157
420	0.0452	487	0.2696	554	0.5689	621	0.4943	688	0.1079	755	0.0154
421	0.0502	488	0.2720	555	0.5709	622	0.4877	689	0.1048	756	0.0147
422	0.0561	489	0.2725	556	0.5723	623	0.4809	690	0.1022	757	0.0143
423	0.0620	490	0.2749	557	0.5746	624	0.4730	691	0.1002	758	0.0139
424	0.0700	491	0.2773	558	0.5781	625	0.4672	692	0.0987	759	0.0137
425	0.0776	492	0.2818	559	0.5808	626	0.4599	693	0.0978	760	0.0132
426	0.0860	493	0.2844	560	0.5817	627	0.4527	694	0.0959	761	0.0129
427	0.0963	494	0.2910	561	0.5829	628	0.4464	695	0.0923	762	0.0124
428	0.1056	495	0.2959	562	0.5864	629	0.4389	696	0.0867	763	0.0121
429	0.1177	496	0.3022	563	0.5869	630	0.4312	697	0.0835	764	0.0116
430	0.1295	497	0.3076	564	0.5890	631	0.4248	698	0.0807	765	0.0114
431	0.1438	498	0.3156	565	0.5902	632	0.4177	699	0.0780	766	0.0110
432	0.1579	499	0.3262	566	0.5910	633	0.4104	700	0.0765	767	0.0105
433	0.1745	500	0.3308	567	0.5978	634	0.4032	701	0.0760	768	0.0105
434	0.1913	501	0.3415	568	0.5970	635	0.3959	702	0.0735	769	0.0101
435	0.2120	502	0.3488	569	0.5988	636	0.3890	703	0.0712	770	0.0097
436	0.2321	503	0.3568	570	0.6006	637	0.3818	704	0.0692	771	0.0094
437	0.2563	504	0.3661	571	0.6028	638	0.3742	705	0.0674	772	0.0093
438	0.2771	505	0.3753	572	0.6048	639	0.3672	706	0.0654	773	0.0089
439	0.3021	506	0.3847	573	0.6051	640	0.3610	707	0.0636	774	0.0087
440	0.3305	507	0.3922	574	0.6087	641	0.3522	708	0.0619	775	0.0084
441	0.3593	508	0.3994	575	0.6099	642	0.3455	709	0.0601	776	0.0082
442	0.3888	509	0.4078	576	0.6112	643	0.3393	710	0.0581	777	0.0079
443	0.4223	510	0.4166	577	0.6149	644	0.3317	711	0.0563	778	0.0077
444	0.4645	511	0.4230	578	0.6162	645	0.3244	712	0.0548	779	0.0074
445	0.5050	512	0.4309	579	0.6160	646	0.3175	713	0.0535	780	0.0074
446	0.5532	513	0.4383	580	0.6173	647	0.3105	714	0.0520	N/A	N/A

Goniophotometer Test Results:4000K

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.2	46.6	Face Down	90	25

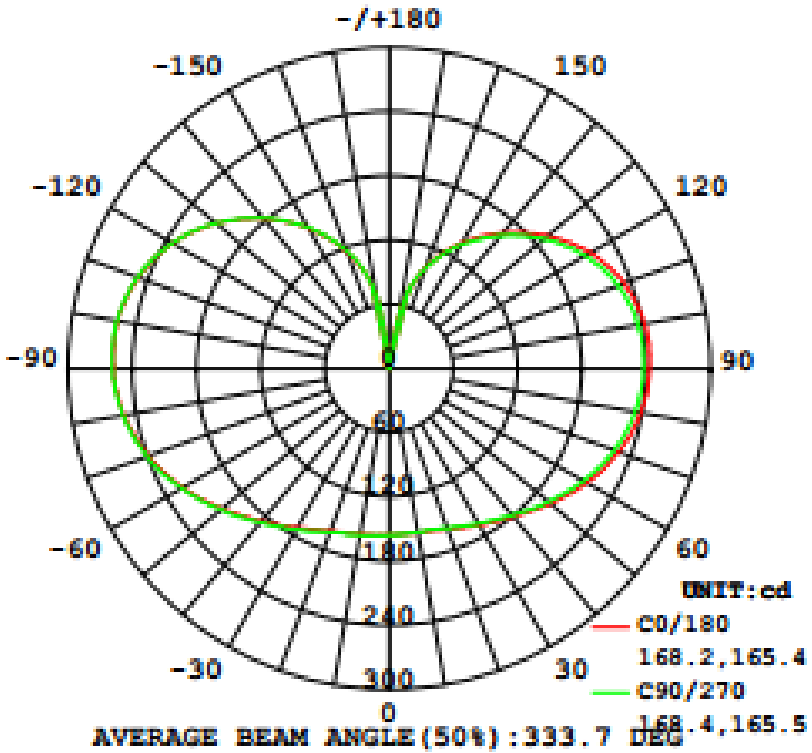
Electrical Data:

Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60.01	0.1406	16.76	0.9936
277.0	60.01	0.0692	17.37	0.9063

Goniophotometer Data:

Parameter	Results	
	120V	277V
Total Luminous (lm)	2626.0	2610.0
Luminous Efficacy (lm/W)	156.67	150.25
Beam Angle (°)	333.7	
Center Beam Intensity (cd)	156	

Luminous Intensity Distribution Diagram:

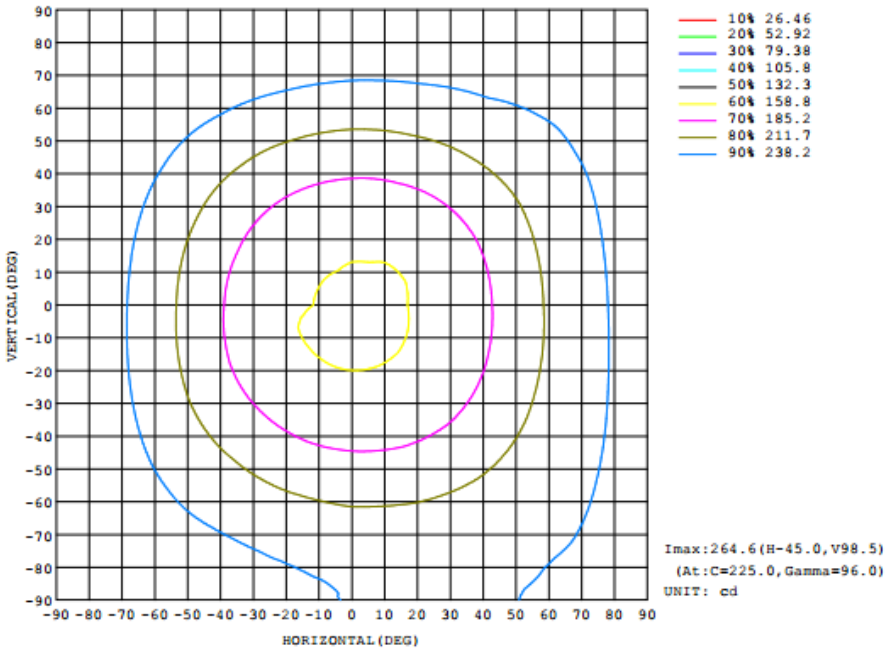


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	Φ zone	Φ total	%lum,lamp
10	155.9	155.2	155.5	156.0	157.1	158.1	157.8	156.6	0- 10	14.90	14.90	0.57,0.57
20	159.8	158.6	159.0	160.2	161.7	163.1	162.8	161.4	10- 20	44.92	59.82	2.28,2.28
30	168.7	166.6	167.6	169.6	172.0	174.0	173.6	171.7	20- 30	76.68	136.5	5.2,5.2
40	180.5	177.5	178.8	182.9	186.1	188.8	187.8	184.3	30- 40	111.1	247.6	9.43,9.43
50	196.2	192.4	194.0	199.6	204.0	207.1	205.5	202.4	40- 50	148.6	396.2	15.1,15.1
60	213.4	208.4	209.7	217.4	222.9	227.0	223.9	221.3	50- 60	187.9	584.1	22.2,22.2
70	228.2	222.4	223.8	233.0	239.2	244.5	240.7	238.3	60- 70	224.7	808.8	30.8,30.8
80	238.3	233.0	233.4	245.4	251.8	257.0	252.6	250.9	70- 80	254.0	1063	40.5,40.5
90	243.1	237.2	237.4	251.1	257.8	263.8	258.7	256.8	80- 90	271.4	1334	50.8,50.8
100	242.2	235.3	235.9	250.0	257.6	263.6	258.6	256.4	90-100	274.0	1608	61.2,61.2
110	233.7	226.0	227.1	241.1	249.4	255.0	250.2	247.2	100-110	260.7	1869	71.2,71.2
120	217.0	208.9	211.2	224.9	234.2	238.8	234.5	231.0	110-120	232.3	2101	80,80
130	192.9	185.8	188.7	201.7	211.1	215.1	211.4	206.3	120-130	192.1	2293	87.3,87.3
140	165.0	158.6	162.1	173.1	183.1	186.2	183.6	176.9	130-140	145.9	2439	92.9,92.9
150	135.6	130.4	133.8	142.6	151.6	154.5	152.3	146.2	140-150	100.1	2539	96.7,96.7
160	100.5	96.64	100.3	108.0	116.2	118.2	117.2	111.5	150-160	59.03	2598	98.9,98.9
170	46.62	39.45	43.65	56.38	64.72	68.11	66.22	60.11	160-170	25.21	2624	99.9,99.9
180	0	0	0	0	0	0	0	0	170-180	2.450	2626	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Isocandela Diagram:



Luminous Distribution Intensity Data:

Table--1 UNIT: cd

C(DEG) / γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5		
0	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156	156		
5	155	155	155	155	155	155	156	156	156	156	157	157	156	156	156	156		
10	156	155	155	155	155	156	156	157	157	158	158	158	158	158	157	156		
15	157	156	156	156	156	157	157	158	159	160	160	160	160	160	158	158		
20	160	159	159	158	159	160	160	161	162	162	163	163	163	163	161	161		
25	164	163	162	162	162	164	164	165	166	167	168	168	168	168	166	165		
30	169	167	167	166	168	169	170	171	172	173	174	174	174	174	172	170		
35	174	172	172	172	172	175	176	177	179	180	181	181	181	180	178	176		
40	181	179	177	178	179	182	183	185	186	188	189	189	188	187	184	183		
45	188	186	185	184	186	189	191	193	195	197	198	198	196	196	193	190		
50	196	194	192	192	194	197	200	202	204	206	207	207	205	205	202	199		
55	205	202	200	200	202	206	209	211	214	216	217	217	215	215	212	209		
60	213	210	208	208	210	214	217	220	223	225	227	226	224	224	221	217		
65	221	218	216	216	217	222	225	229	231	235	236	235	233	233	230	226		
70	228	225	222	222	224	229	233	237	239	243	244	243	241	241	238	233		
75	234	230	228	227	229	236	240	244	246	250	251	249	247	248	245	240		
80	238	235	233	231	233	240	245	249	252	255	257	255	253	253	251	245		
85	242	238	236	234	236	244	249	253	256	260	261	259	256	258	254	249		
90	243	240	237	235	237	245	251	255	258	262	264	261	259	260	257	251		
95	244	240	237	235	238	245	251	255	259	263	264	262	259	261	258	252		
100	242	238	235	233	236	244	250	254	258	262	264	261	259	260	256	250		
105	239	234	231	230	233	241	247	251	255	259	260	258	255	256	252	247		
110	234	229	226	224	227	235	241	246	249	254	255	253	250	251	247	242		
115	226	221	218	217	220	228	234	239	243	246	248	246	243	243	240	234		
120	217	212	209	208	211	219	225	230	234	237	239	237	235	235	231	225		
125	206	201	198	197	200	208	214	219	223	226	228	226	224	223	220	214		
130	193	188	186	185	189	196	202	206	211	214	215	214	211	210	206	200		
135	179	175	172	172	176	182	188	193	197	200	201	200	198	196	192	186		
140	165	161	159	159	162	168	173	178	183	186	186	186	184	181	177	172		
145	151	147	145	145	148	153	158	163	168	170	171	170	168	166	162	157		
150	136	132	130	131	134	138	143	147	152	153	155	154	152	150	146	142		
155	119	116	114	115	118	122	126	130	134	136	137	137	135	133	129	125		
160	100	97.6	96.6	97.6	100	104	108	112	116	117	118	118	117	115	112	108		
165	79.8	76.9	73.7	77.6	80.4	83.2	88.2	92.5	96.1	96.4	97.9	97.9	96.4	95.1	91.3	87.4		
170	46.6	45.0	39.4	38.9	43.7	49.4	56.4	61.1	64.7	65.0	68.1	68.1	66.2	64.9	60.1	56.5		
175	5.42	4.83	4.19	2.10	3.63	6.50	5.06	7.77	12.2	13.3	15.1	15.2	16.9	12.8	10.8	8.66		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Goniophotometer Test Results:5000K

Test Condition:

Test Ambient (°C)	Test Humidity (%)	Orientation	Stabilization Time (minute)	Test Time (minute)
25.2	46.6	Face Down	90	25

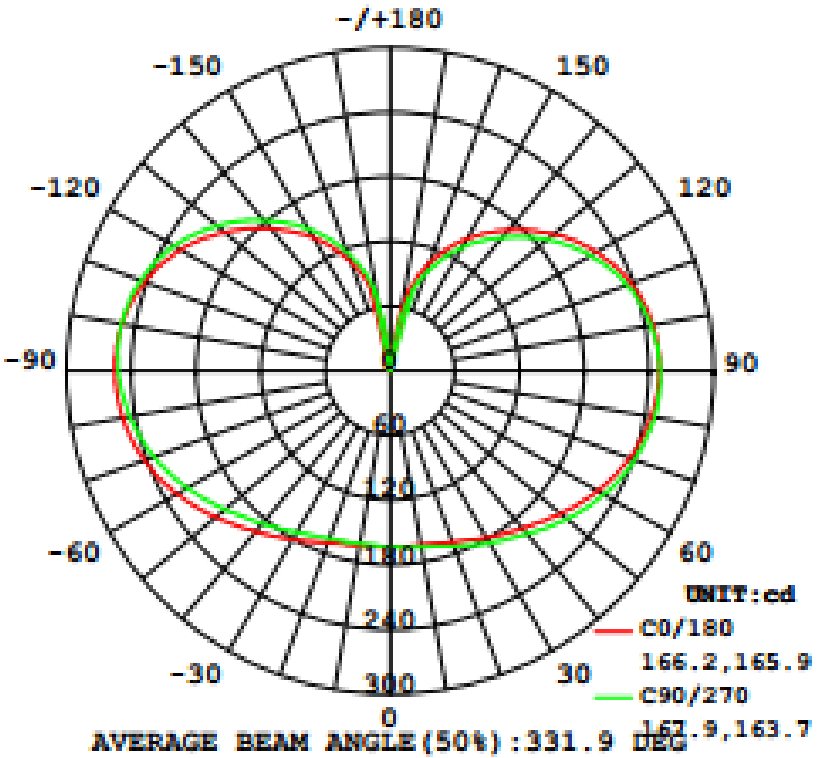
Electrical Data:

Voltage (V)	Frequency (Hz)	Current (A)	Wattage (W)	Power Factor
120.0	60.01	0.1417	16.89	0.9934
277.0	60.01	0.0655	15.85	0.8732

Goniophotometer Data:

Parameter	Results	
	120V	277V
Total Luminous (lm)	2643.5	2736.7
Luminous Efficacy (lm/W)	156.54	172.72
Beam Angle (°)	331.9	
Center Beam Intensity (cd)	163	

Luminous Intensity Distribution Diagram:

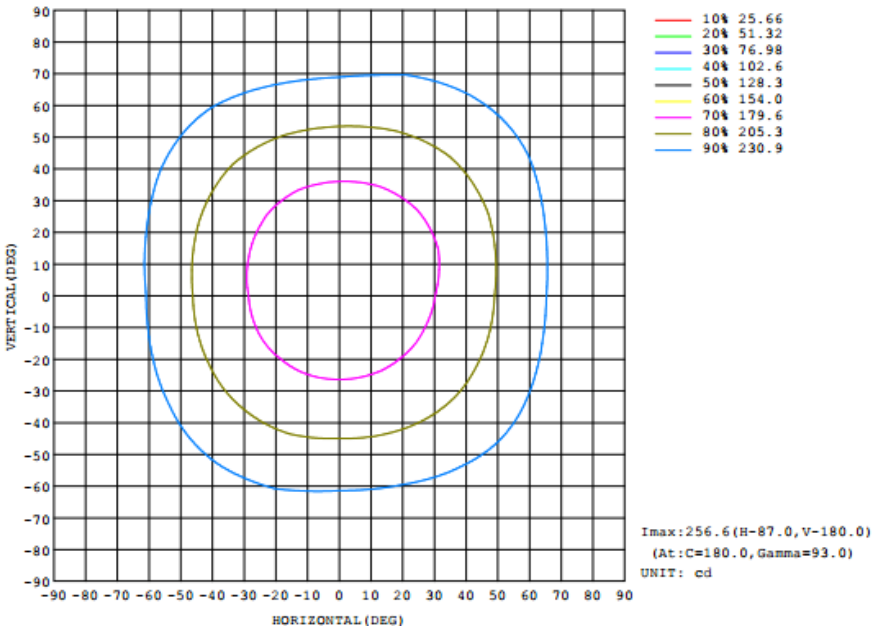


Zonal Flux Diagram:

ZONAL FLUX DIAGRAM:

γ	C0	C45	C90	C135	C180	C225	C270	C315	γ	● zone	● total	%lum,lamp
10	164.1	165.2	166.1	165.8	164.6	163.4	162.8	162.8	0- 10	15.62	15.62	0.59,0.59
20	168.9	171.5	173.3	172.4	169.6	166.3	165.3	166.2	10- 20	47.20	62.82	2.38,2.38
30	178.6	182.4	184.3	184.0	180.5	174.8	173.0	173.8	20- 30	80.53	143.3	5.42,5.42
40	190.8	195.0	197.2	197.5	194.5	187.4	184.8	185.3	30- 40	116.4	259.7	9.82,9.82
50	206.1	211.1	213.6	213.8	211.1	202.8	200.2	200.2	40- 50	154.3	414.1	15.7,15.7
60	222.4	227.1	228.9	229.2	228.4	219.8	217.5	216.5	50- 60	193.4	607.5	23,23
70	236.1	239.5	240.7	241.4	242.5	234.6	233.1	231.7	60- 70	229.1	836.5	31.6,31.6
80	245.8	247.7	248.4	248.3	251.9	245.7	245.3	242.3	70- 80	256.4	1093	41.3,41.3
90	249.5	249.8	250.1	250.9	255.3	251.4	252.3	248.5	80- 90	271.9	1365	51.6,51.6
100	247.2	245.8	245.5	246.1	252.6	251.9	252.9	248.3	90-100	272.9	1638	62,62
110	237.7	234.3	233.3	234.6	242.0	244.6	246.3	240.9	100-110	250.5	1896	71.7,71.7
120	220.9	216.3	214.2	215.6	224.7	229.3	231.9	226.2	110-120	229.5	2126	80.4,80.4
130	197.8	192.0	190.0	191.7	200.5	207.0	209.9	204.6	120-130	189.5	2315	87.6,87.6
140	170.9	164.2	161.7	163.8	172.6	179.4	182.5	178.4	130-140	146.0	2459	93,93
150	141.5	134.7	132.3	134.5	142.8	148.7	152.5	149.4	140-150	99.01	2558	96.8,96.8
160	106.7	99.31	96.44	99.16	107.9	113.0	117.5	115.7	150-160	58.29	2617	99,99
170	53.00	42.79	36.26	44.70	56.15	61.73	67.58	65.73	160-170	24.60	2641	99.9,99.9
180	0	0	0	0	0	0	0	0	170-180	2.320	2643	100,100
DEG	LUMINOUS INTENSITY:cd									UNIT:lm		

Isocandela Diagram:



Luminous Distribution Intensity Data:

Table--1 UNIT: cd

C (DEG) / γ (DEG)	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5		
0	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163	163		
5	163	164	163	164	164	164	164	163	164	163	163	163	162	162	163	162		
10	164	165	165	166	166	166	166	165	165	164	163	163	163	163	163	163		
15	166	167	168	168	169	168	168	167	166	165	165	163	164	163	164	164		
20	169	170	171	173	173	173	172	171	170	168	166	166	165	165	166	167		
25	173	175	176	178	178	178	178	177	175	172	170	169	169	168	170	171		
30	179	181	182	183	184	184	184	183	181	178	175	173	173	173	174	176		
35	184	187	188	190	190	190	191	189	187	184	181	179	179	178	179	181		
40	191	193	195	196	197	197	198	197	194	191	187	185	185	184	185	188		
45	198	200	203	204	206	204	205	205	202	198	194	192	192	191	192	194		
50	206	208	211	212	214	213	214	214	211	206	203	200	200	199	200	202		
55	214	216	219	221	222	220	222	222	220	215	211	209	209	207	209	211		
60	222	224	227	228	229	227	229	231	228	223	220	218	217	215	216	219		
65	230	231	234	235	236	234	236	238	236	231	228	226	226	223	224	227		
70	236	237	240	241	241	239	241	244	242	237	235	234	233	230	232	234		
75	241	242	244	246	245	243	245	249	248	243	241	241	240	236	238	239		
80	246	245	248	249	248	247	248	252	252	247	246	246	245	241	242	244		
85	248	248	250	251	250	248	250	254	254	250	249	250	249	245	246	247		
90	250	249	250	251	250	248	251	254	255	252	251	253	252	248	248	249		
95	249	248	249	249	249	246	249	254	255	252	253	254	253	249	249	250		
100	247	245	246	247	246	242	246	251	253	250	252	253	253	248	248	248		
105	243	241	241	242	240	238	241	246	248	247	249	251	251	246	245	245		
110	238	235	234	235	233	232	235	239	242	242	245	247	246	242	241	239		
115	230	227	226	226	225	223	226	231	234	235	238	240	240	236	234	233		
120	221	217	216	215	214	213	216	221	225	226	229	231	232	228	226	224		
125	210	206	205	204	202	202	204	209	214	215	219	221	222	218	216	214		
130	198	194	192	191	190	189	192	195	201	203	207	209	210	207	205	202		
135	184	181	178	177	176	175	178	182	187	190	194	196	197	194	192	189		
140	171	167	164	163	162	161	164	167	173	176	179	181	183	180	178	175		
145	157	153	150	148	147	147	150	153	158	161	164	166	168	166	164	161		
150	142	138	135	133	132	132	134	138	143	145	149	151	153	152	149	146		
155	125	121	118	116	115	115	117	120	126	128	131	134	136	135	134	131		
160	107	103	99.3	97.3	96.4	96.9	99.2	103	108	109	113	115	118	117	116	113		
165	85.9	81.1	76.2	75.8	75.1	73.7	77.9	82.1	87.5	88.8	92.4	95.2	96.5	96.9	95.4	93.4		
170	53.0	48.5	42.8	36.1	36.3	38.1	44.7	49.6	56.2	56.4	61.7	65.3	67.6	68.1	65.7	63.3		
175	4.84	6.07	4.35	1.69	2.55	2.11	4.24	4.75	7.15	9.54	12.1	14.8	16.6	17.2	16.5	14.3		
180	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		

Photo of Sample:4000K

5000K

Equipment List:

Equipment ID	Equipment Name	Last Cal.	Due Cal.
NTC-F01-001	Goniophotometer System	2021-11-10	2022-11-09
NTC-F01-006	2.0 meter Integrating Sphere	2021-11-10	2022-11-09
NTC-F01-012	Standard Lamp	2021-11-10	2022-11-09
NTC-F01-013	Standard Lamp	2021-11-10	2022-11-09
NTC-F01-031	Digital Power Meter	2021-08-22	2022-08-21
NTC-F01-020	Temperature & Humidity Meter	2021-11-15	2022-11-14

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