Photometric Test Report

Relevant Standards

☑IES LM-79-2008
☑ANSI C82.77:2014

Prepared For

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1.0 Test Summary

DLC Technical Requirements v4.4

Linear Replacement Lamps - Replacement Lamps ("Plug and Play") (UL Type C)				
Requirement Category	**Test Method**	**Requirements**	**Test value**	**Results (Fail/Pass)**
Bare Lamp (with 2 Tube driver)				
Lamp Output for bare lamp (lm)	IES LM-79-2008	≥800	1186	P
		≥800	1203	P
Minimum Lamp Efficacy (lm/W)	IES LM-79-2008	≥110	129.5	P
		≥110	130.6	P
Alowable CCTs* (K)	IES LM-79-2008	3045±175	3053	P
		5029±283	5055	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	81.7	P
		≥80	84.1	P
Power Factor	ANSI C82.77:2014	≥0.9	0.994	P
		≥0.9	0.915	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	≤25%	5.08%	P
		≤25%	11.41%	P
Bare Lamp (with 3 Tube driver)				
Lamp Output for bare lamp (lm)	IES LM-79-2008	≥800	1179	P
		≥800	1197	P
Minimum Lamp Efficacy (lm/W)	IES LM-79-2008	≥110	128.9	P
		≥110	129.8	P
Alowable CCTs* (K)	IES LM-79-2008	3045±175	3048	P
		5029±283	5046	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	81.1	P
		≥80	84.1	P
Power Factor	ANSI C82.77:2014	≥0.9	0.992	P
		≥0.9	0.872	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	≤25%	3.82%	P
		≤25%	18.92%	P
Bare Lamp (with 4 Tube driver)				
Lamp Output for bare lamp (lm)	IES LM-79-2008	≥800	1179	P
		≥800	1197	P
Minimum Lamp Efficacy (lm/W)	IES LM-79-2008	≥110	129.1	P
		≥110	130.5	P
Alowable CCTs* (K)	IES LM-79-2008	3045±175	3047	P
		5029±283	5046	P
Minimum CRI	IES LM-79-2008 CIE 13.3-1995	≥80	81.7	P
		≥80	84.1	P
Power Factor	ANSI C82.77:2014	≥0.9	0.995	P
		≥0.9	0.910	P
Total Harmonic Distortion (A%)	ANSI C82.77:2014	≤25%	2.92%	P
		≤25%	13.79%	P

in Fixture (2 tube)				
Lamp Output (lm)	IES LM-79-2008	⩾1215	1911	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	⩾100	104.1	P
Zonal Lumen Requirement(0°-60°)	IES LM-79-2008	⩾75%	83.39%	P
SC (0°-180°)	IES LM-79-2008	1.0-2.0	1.21	P
SC (90°-270°)	IES LM-79-2008	1.0-2.0	1.33	P
in Fixture (3 tube)				
Lamp Output (lm)	IES LM-79-2008	⩾1800	2857	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	⩾100	103.8	P
Zonal Lumen Requirement(0°-60°)	IES LM-79-2008	⩾75%	83.38%	P
SC (0°-180°)	IES LM-79-2008	1.0-2.0	1.22	P
SC (90°-270°)	IES LM-79-2008	1.0-2.0	1.30	P
in Fixture (4 tube)				
Lamp Output (lm)	IES LM-79-2008	⩾2430	3806	P
Minimum Luminaire Efficacy (lm/W)	IES LM-79-2008	⩾100	104.1	P
Zonal Lumen Requirement(0°-60°)	IES LM-79-2008	⩾75%	83.54%	P
SC (0°-180°)	IES LM-79-2008	1.0-2.0	1.21	P
SC (90°-270°)	IES LM-79-2008	1.0-2.0	1.33	P

2.0 Test List

Test Item	Test	Test Date	Model Number	Sample No.
1	Integrating Sphere Test	2019/7/9	T8-7.5-24G-830-EXT	G1-G4
			T8-7.5-24G-850-EXT	G5-G8
2	Goniophotometer Test	2019/7/9	T8-7.5-24G-830-EXT	G1-G4
3	THD and PF Test	2019/7/9	T8-7.5-24G-830-EXT	G1-G4

Remark(If any)
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2、The results reported herein have been performed in accordance with the laboratory's terms of accreditation. This report shall not be reproduced except in full without the written approval of the Laboratory. The results in this report apply to the test sample(s) mentioned above at the time of the testing period only and are not to be used to indicate applicability to other similar products. This report does not imply that the product(s) has met the criteria for certification.

3.0 Production Description

Luminaire Description: T8-7.5-24G-830-EXT / T8-7.5-24G-850-EXT

Electrical Specification: 120V-277V,60HZ

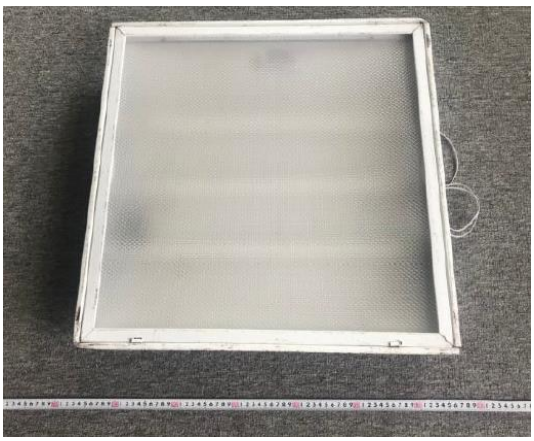
Test in fixture: Lithonia 2GT8 lensed 2x2

LED Driver for 2 tube: DRI-24T8-2L-DIM

LED Driver for 3 tube: DRI-36/48T8-2L-DIM

LED Driver for 4 tube: DRI-36/48T8-2L-DIM

Photos of Luminaire Characteristics



4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test (with 2 Tube driver)

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G2
Model No.	T8-7.5-24G-850-EXT	Sample ID.	G5-G6
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Test Conditions

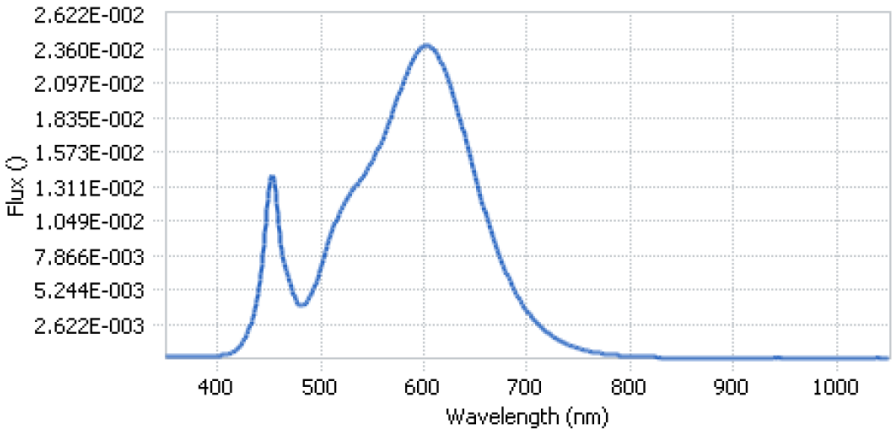
Model No.	Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
T8-7.5-24G-830-EXT	25.1	120.00	60	0.077	9.16	0.994
T8-7.5-24G-850-EXT	25.1	120.00	60	0.077	9.21	0.994

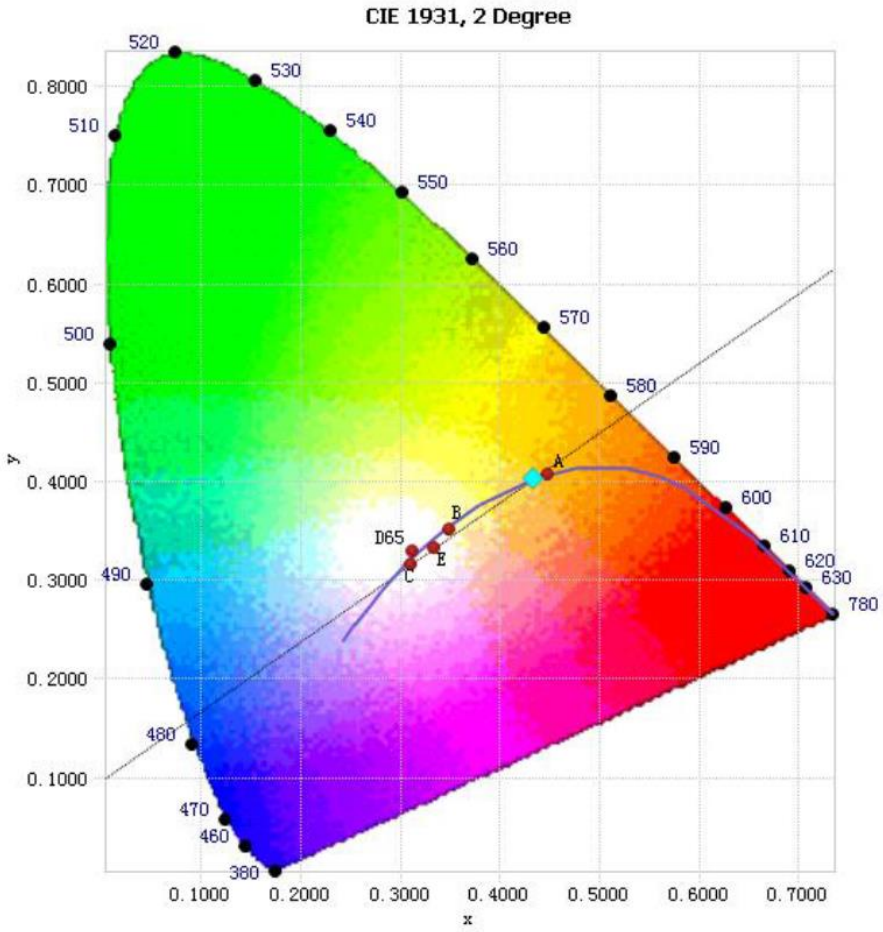
Test Result

Model No.	CCT (K)	CRI (Ra)	Light Output (lm)	Efficacy (lm/W)	Duv
T8-7.5-24G-830-EXT	3053	81.7	1186	129.5	1.0E-04
T8-7.5-24G-850-EXT	5055	84.1	1203	130.6	1.0E-03

4.1 Integrating Sphere Test

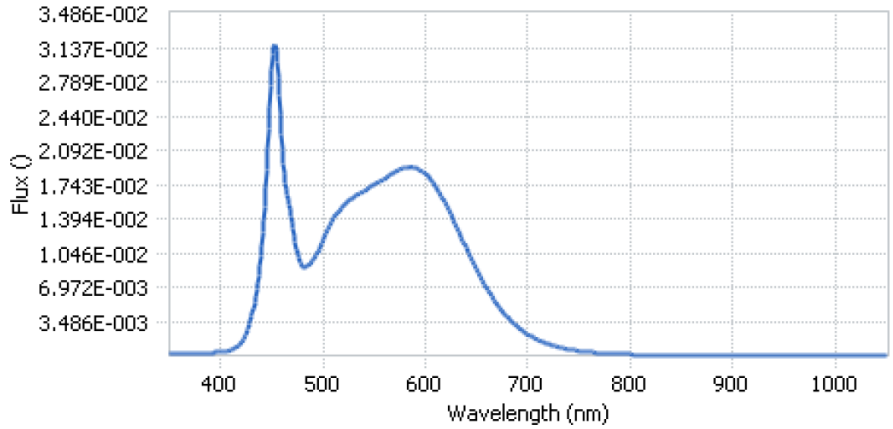
T8-7.5-24G-830-EXT

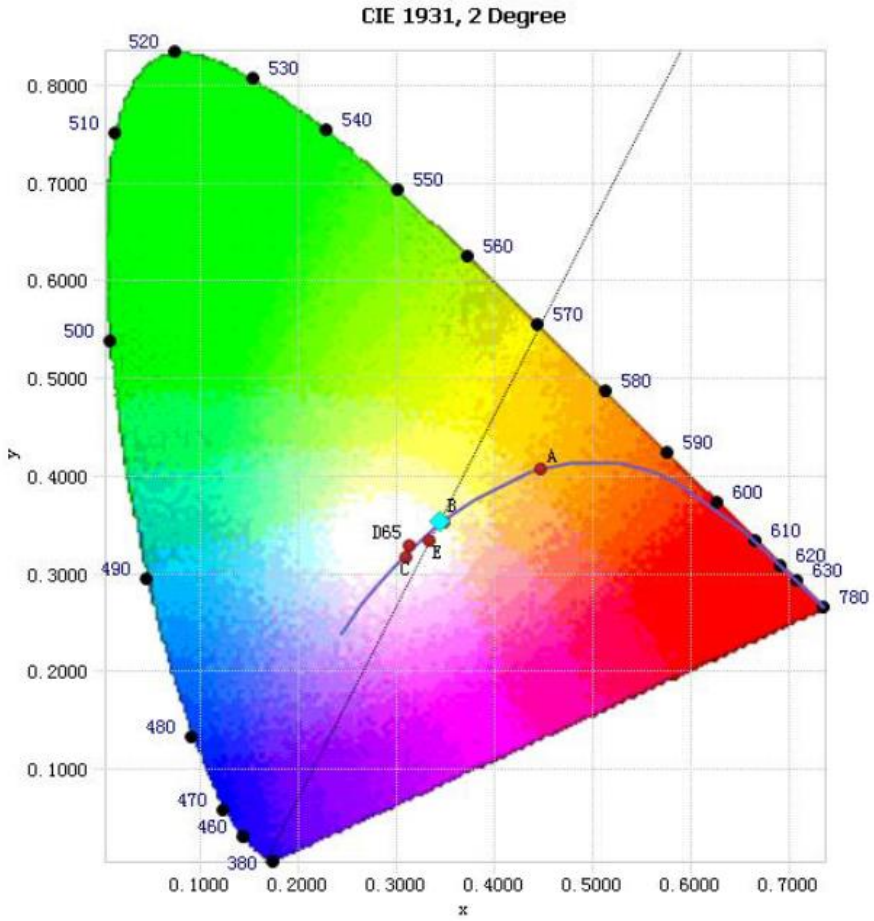




4.1 Integrating Sphere Test

T8-7.5-24G-850-EXT





4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test (with 3 Tube driver)

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G3
Model No.	T8-7.5-24G-850-EXT	Sample ID.	G5-G7
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Test Conditions

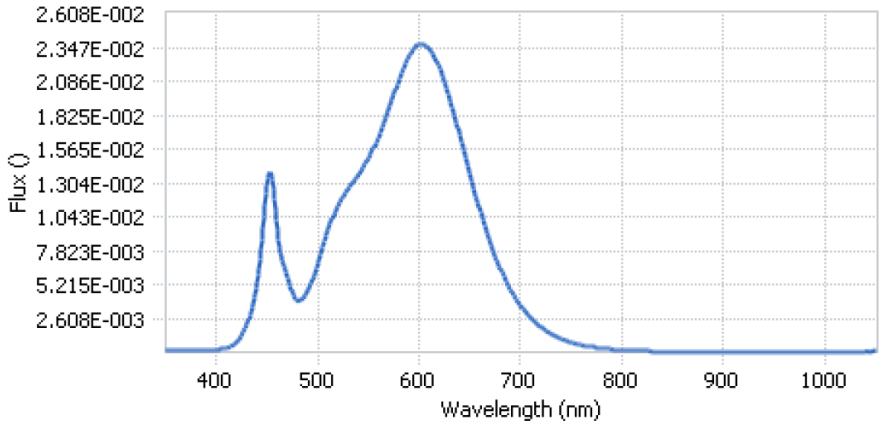
Model No.	Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
T8-7.5-24G-830-EXT	25.1	120.00	60	0.077	9.15	0.992
T8-7.5-24G-850-EXT	25.1	120.00	60	0.077	9.22	0.992

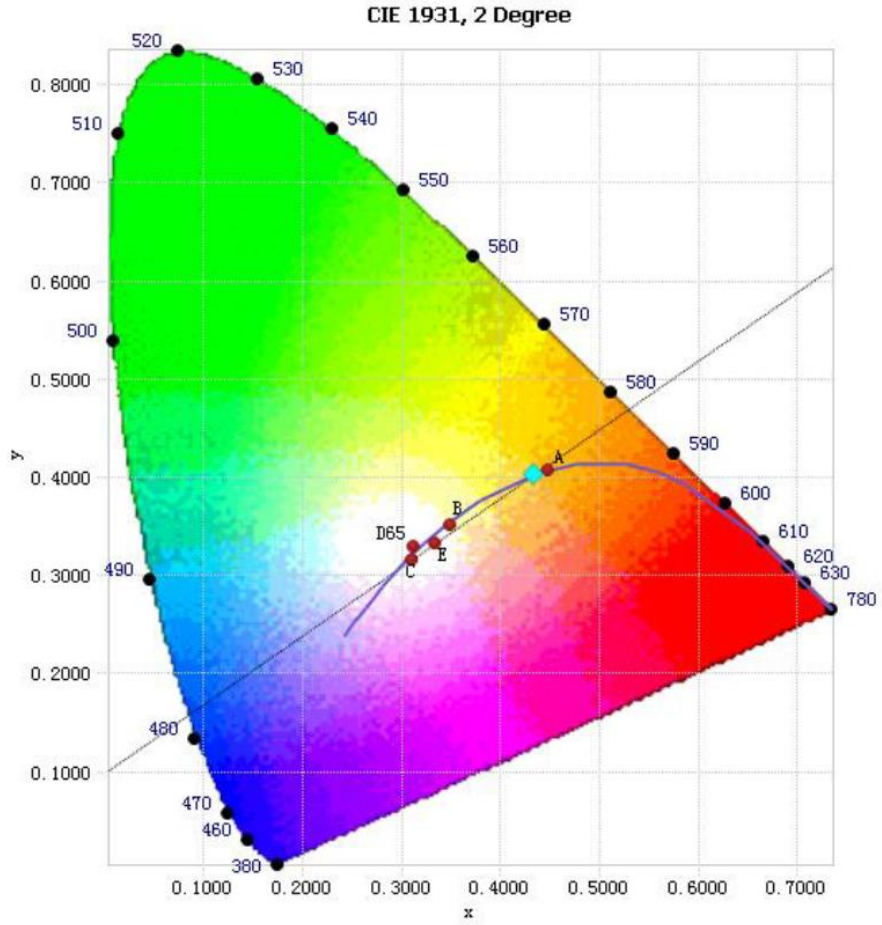
Test Result

Model No.	CCT (K)	CRI (Ra)	Light Output (lm)	Efficacy (lm/W)	Duv
T8-7.5-24G-830-EXT	3048	81.1	1179	128.9	0.0E+00
T8-7.5-24G-850-EXT	5046	84.1	1197	129.8	8.0E-04

4.1 Integrating Sphere Test

T8-7.5-24G-830-EXT





4.1 Integrating Sphere Test

T8-7.5-24G-850-EXT

4.0 LM-79 Measurement and Test Results

4.1 Integrating Sphere Test (with 4 Tube driver)

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G4
Model No.	T8-7.5-24G-850-EXT	Sample ID.	G5-G8
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25º C ± 1º 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 voltage of an AC power supply (RMS voltage) or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The sample was measured using 4π geometry and operated at rated voltage and was stabilized before measurement. Chromaticity coordinates, correlated color temperature and color rendering index were calculated from the spectral radiant flux measurements taken at 1 nm intervals over the range of 380 to 780 nm.

Test Conditions

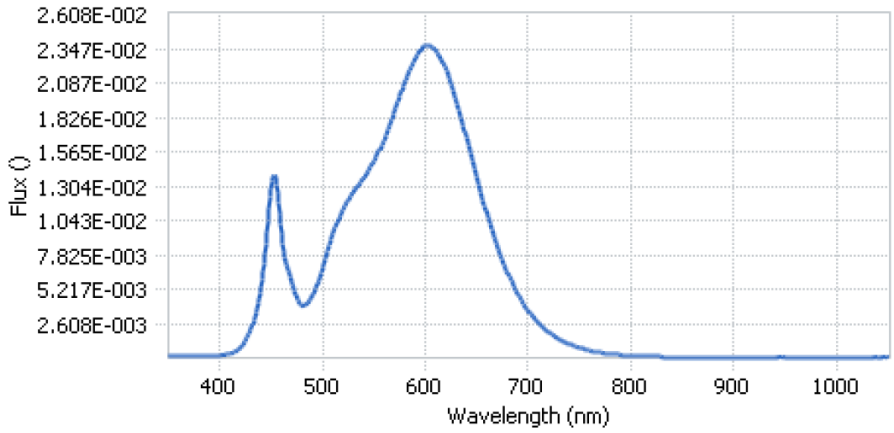
Model No.	Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
T8-7.5-24G-830-EXT	25.1	120.00	60	0.076	9.13	0.995
T8-7.5-24G-850-EXT	25.1	120.00	60	0.077	9.17	0.995

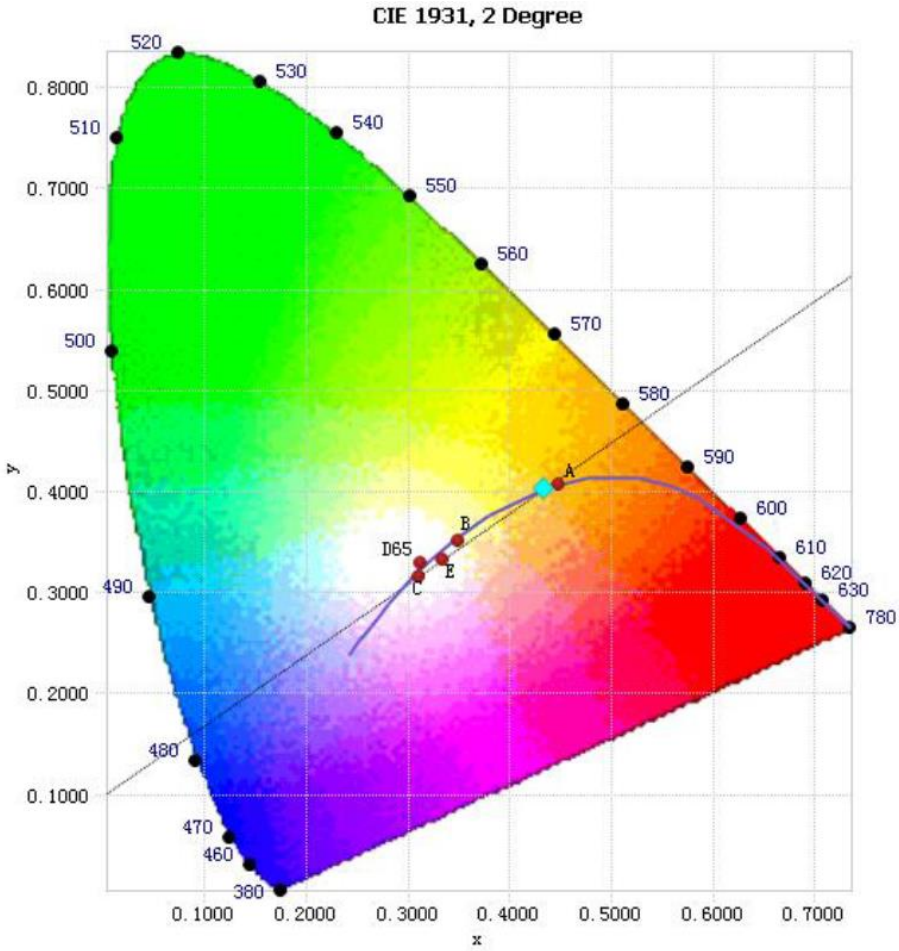
Test Result

Model No.	CCT (K)	CRI (Ra)	Light Output (lm)	Efficacy (lm/W)	Duv
T8-7.5-24G-830-EXT	3047	81.7	1179	129.1	0.0E+00
T8-7.5-24G-850-EXT	5046	84.1	1197	130.5	8.0E-04

4.1 Integrating Sphere Test

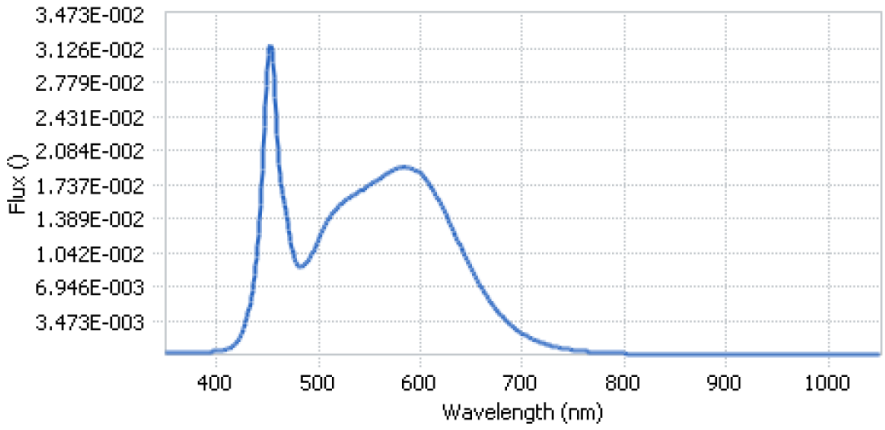
T8-7.5-24G-830-EXT

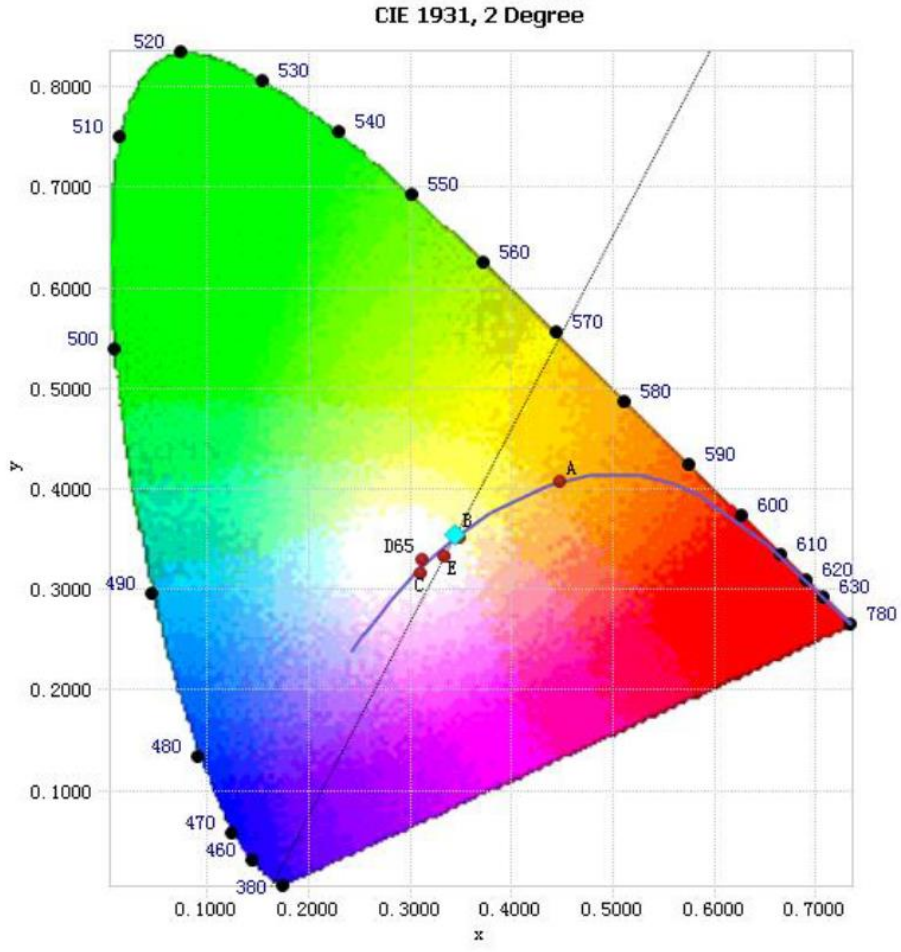




4.1 Integrating Sphere Test

T8-7.5-24G-850-EXT





4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G2
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using a type C 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 voltage of an AC power supply (RMS voltage)or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5^{o} vertical intervals and 10^{o} horizontal intervals.

Test Conditions

Two tubes were placed in a reference housing during testing

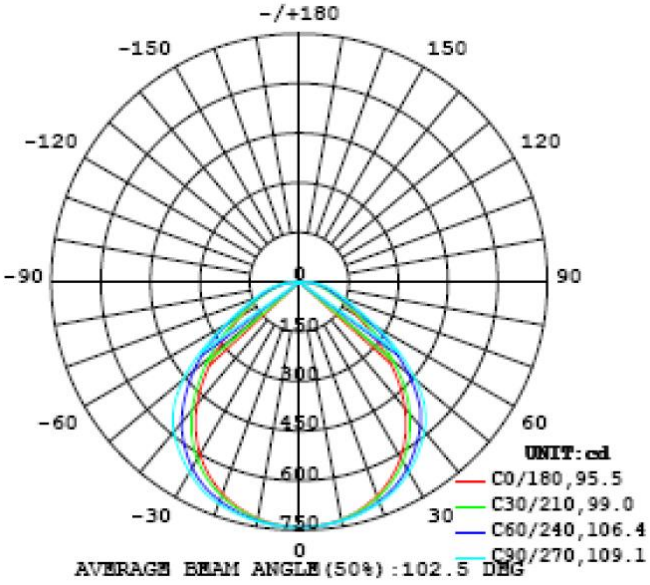
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power (W)	Orientation
25.10	120.00	60	18.36	Light Down

Test Result

Flux(lm)	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Luminous Efficacy (lm/W)
1911	83.39%	1.21	1.33	104.1

4.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

γ(°)	T8-7.5-24G-830-EXT 2 tubes in Lithonia 2GT8 lensed 2x2	
	Lumens	% Total
0- 10	70.174	3.67%
10- 20	202.299	10.59%
20- 30	308.97	16.17%
30- 40	369.156	19.32%
40- 50	362.691	18.98%
50- 60	280.33	14.67%
60- 70	170.583	8.93%
70- 80	99.236	5.19%
80- 90	36.099	1.89%
90-100	2.672	0.14%
100-110	2.057	0.11%
110-120	1.81	0.09%
120-130	1.58	0.08%
130-140	1.293	0.07%
140-150	0.941	0.05%
150-160	0.667	0.03%
160-170	0.363	0.02%
170-180	0.12	0.01%
Total	1911.0	100%

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G3
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using a type C 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 voltage of an AC power supply (RMS voltage)or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5^{o} vertical intervals and 10^{o} horizontal intervals.

Test Conditions

Three tubes were placed in a reference housing during testing

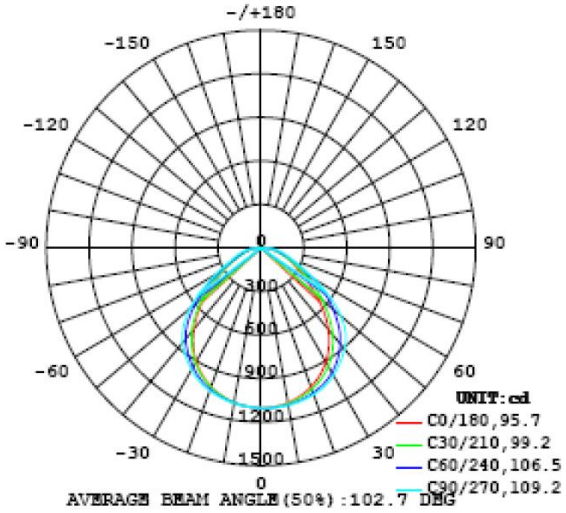
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power (W)	Orientation
25.10	120.00	60	27.53	Light Down

Test Result

Flux(lm)	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Luminous Efficacy (lm/W)
2857	83.38%	1.22	1.30	103.8

4.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

γ(°)	T8-7.5-24G-830-EXT 3 tubes in Lithonia 2GT8 lensed 2x2	
	Lumens	% Total
0- 10	104.564	3.66%
10- 20	301.652	10.56%
20- 30	461.353	16.15%
30- 40	552.091	19.32%
40- 50	542.691	18.99%
50- 60	420.076	14.70%
60- 70	256.119	8.96%
70- 80	148.995	5.21%
80- 90	54.649	1.91%
90-100	3.209	0.11%
100-110	2.748	0.10%
110-120	2.329	0.08%
120-130	2.096	0.07%
130-140	1.8	0.06%
140-150	1.349	0.05%
150-160	0.988	0.03%
160-170	0.571	0.02%
170-180	0.171	0.01%
Total	2857.5	100%

4.0 LM-79 Measurement and Test Results

4.3 Goniophotometer Test

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G4
Opreate time (Min.)	90	Stabilization time (Min.)	45

Test Method
The samples were tested according to the IES LM-79-2008.
Photometric paramters were measured using a type C 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 voltage of an AC power supply (RMS voltage)or DC power supply (instantaneous voltage) applied to the device under test shall be regulated to within ±0.2 percent under load.
The samples were operated at rated voltage and was stabilized before measurement. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 0.5^{o} vertical intervals and 10^{o} horizontal intervals.

Test Conditions

Four tubes were placed in a reference housing during testing

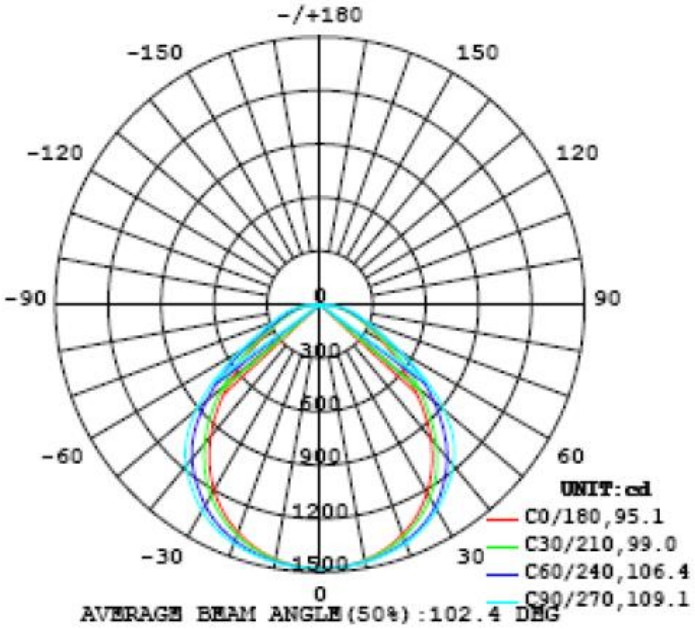
Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power (W)	Orientation
25.10	120.00	60	36.56	Light Down

Test Result

Flux(lm)	Zonal Lumen Requirement(0°-60°)	SC (0°-180°)	SC (90°-270°)	Luminous Efficacy (lm/W)
3806	83.54%	1.21	1.33	104.1

4.3 Goniophotometer Test

Light Distrubtion Curve



Zonal Lumen Summary

γ(°)	T8-7.5-24G-830-EXT 4 tubes in Lithonia 2GT8 lensed 2x2	
	Lumens	% Total
0- 10	140.231	3.68%
10- 20	404.482	10.63%
20- 30	618.01	16.24%
30- 40	737.588	19.38%
40- 50	722.247	18.98%
50- 60	556.862	14.63%
60- 70	338.147	8.89%
70- 80	197.609	5.19%
80- 90	72.301	1.90%
90-100	3.116	0.08%
100-110	3.26	0.09%
110-120	2.985	0.08%
120-130	2.743	0.07%
130-140	2.255	0.06%
140-150	1.694	0.04%
150-160	1.224	0.03%
160-170	0.691	0.02%
170-180	0.202	0.01%
Total	3805.6	100%

5.0 THD and PF Test

Model No.	T8-7.5-24G-830-EXT	Sample ID.	G1-G4

Test Method
The samples were tested according to the ANSI C82.77:2002. The total harmonic distortion shall be measured to the 40th order. The ambient temperature condition was maintained at 25º C ± 1º C. The sample measurements were made using a digital power meter and power supply. The sample was operated at rated voltage and was stabilized before measurement. The total harmonic distortion were calculated.

Test Results (with 2 Tube driver)

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power Factor	THD
25.1	120.00	60	0.994	5.08%
25.1	277.00	60	0.915	11.41%

Test Results (with 3 Tube driver)

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power Factor	THD
25.1	120.00	60	0.992	3.82%
25.1	277.00	60	0.872	18.92%

Test Results (with 4 Tube driver)

Temperature (°C)	Voltage (Vac)	Frequency (Hz)	Power Factor	THD
25.1	120.00	60	0.995	2.92%
25.1	277.00	60	0.910	13.79%

6.0 Equipment Information

Test Equipment			
Equipment ID	Equipment Name	Last Calibration Date	Calibration Due Date
DLF107	Integrating Sphere System	2018/12/26	2019/12/25
DLF108	Auxiliary Lamp	2018/12/26	2019/12/25
DLF122	Measurement Standard Lamp Standard Lamp Type: 220 V, 0.4720 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF116	AC Power Source	2018/12/26	2019/12/25
DLF113	Power Meter	2018/12/26	2019/12/25
DLF112	Temperature Recorder	2018/12/26	2019/12/25
DLF114	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF101	Goniophotometer	2018/12/26	2019/12/25
DLF125	Standard Lamp Standard Lamp Type: 76.58 V, 6.7875 A, Tungsten, Omni-derectional	2018/12/26	2019/12/25
DLF104	AC Power Source	2018/12/26	2019/12/25
DLF507	DC Power Source	2018/12/26	2019/12/25
DLF102	Power Meter	2018/12/26	2019/12/25
DLF111	Temperature & Humidity Datalogger	2018/12/26	2019/12/25
DLF119	Power Meter	2018/12/26	2019/12/25
DLF031	Temperature data logger	2018/12/26	2019/12/25
DLF022	Digital power meter	2018/12/26	2019/12/25
DLF003	Temperature & Humidity Datalogger	2018/12/26	2019/12/25

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