NVLAP LAB CODE 201011-0

LM-79-08 Test Report

For

P.Q.L., Inc.

(Brand Name:Superior Life®)

2285 Ward Avenue / Simi Valley, CA 93065

Replacement Lamps for Outdoor Pole/Arm-mounted Decorative Luminaires (Type B)

Model name(s): 91135

Representative (Tested) Model: 2700K
5700K

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

Test & Report By:

Johnson Sun

Engineer: Johnson Sun

Date: Jan.14,2016

Review By:

Tommy Liang

Manager: Tommy Liang

Note: This report does not imply product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government.

Performance Assessment:

Model name	CCT(K)	Total Luminous (lm)	Power (W)	Luminous Efficacy (lm/W)
2700K	2700K	3554.0	54.13	65.66
3000K	3000K	3602.0*1	54.20*2	66.46*3
3500K	3500K	3650.0*1	54.20*2	67.35*3
4000K	4000K	3698.0*1	54.20*2	68.24*3
4500K	4500K	3746.0*1	54.20*2	69.12*3
91135	5000K	3794.0*1	54.20*2	70.01*3
5700K	5700K	3842	54.26	70.81

*1: This value is calculated and the calculation formula is as below:

3602.0= (3842-3554.0)/6+3554.0

3650.0= (3842-3554.0)/6+3602.0

3698.0= (3842-3554.0)/6+3650.0

3746.0= (3842-3554.0)/6+3698.0

3794.0= (3842-3554.0)/6+3746.0

*2: This value is calculated and the calculation formula is as below:

54.20= (54.26+54.13)/2

*3: This value is calculated and the calculation formula is as below:

66.46= 3602.0/54.20

67.35= 3650.0/54.20

68.24= 3689.0/54.20

69.12= 3746.0/54.20

70.01= 3794.0/54.20

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U.S. Department of Energy

Lighting Facts™ Uniform LM-79 Reporting Template

Laboratory Information:

Name of Test Laboratory	Standard-Tech Co., Ltd.
Date of Test Report	Jan.14,2016
Test Report No.	GZE151293-H-PL
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	P.Q.L., Inc.	
Brand Name	Superior Life®	
Model Number	2700K	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Replacement Lamps for Outdoor Pole/Arm-mounted Decorative Luminaires (Type B)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Electrical Measurements:	**Integrating Sphere Output**	**Goniophotometer Output**	
Input Wattage	--	54.13	W
Input Current	--	0.4584	A
Input Voltage (ac)	--	120.0	V
Power Factor	--	0.9840	
Off-State Power	--	0	W

Photometric Characteristics

Total Initial Lumen Output	--	3554.0	lm
Initial Lumen Efficacy	--	65.66	lm/w
Correlated color temperature / CCT	2753	--	K
Color rendering index / CRI	83.7	--	
R9 Value	17	--	
Duv	0.0024	--	
Luminous Intensity Distribution			
Center beam candlepower (if applicable)	-----	86	cd
Beam angle (if applicable)		226.3	°
Zonal lumens in the 0 °-60 °zone		25.7	%
Zonal lumens in the 60 °-90 °zone		41.8	%
Zonal lumens in the 90 °-120 °zone		27.2	%
Zonal lumens in the 120 °-180 °zone		5.2	%

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Laboratory Information:

Name of Test Laboratory	Standard-Tech Co., Ltd.
Date of Test Report	Jan.14,2016
Test Report No.	GZE151293-H-PL
Laboratory Contact Name	Tommy Liang

Product Information:

Organization Name	P.Q.L., Inc.	
Brand Name	Superior Life®	
Model Number	5700K	
SKU (if available)	N/A	
Type of Luminaire (for integral lamps, list base type and lamp type)	Replacement Lamps for Outdoor Pole/Arm-mounted Decorative Luminaires (Type B)	
Luminaire Aperture (for downlights)	--	in.
Luminaire Length	--	mm
Luminaires Width	--	mm
Number of Units (modular products)	N/A	s

Electrical Measurements:	**Integrating Sphere Output**	**Goniophotometer Output**	
Input Wattage	54.26	--	W
Input Current	0.4569	--	A
Input Voltage (ac)	120.0	--	V
Power Factor	0.9897	--	
Off-State Power	0	--	W
Photometric Characteristics			
Total Initial Lumen Output	3842	--	lm
Initial Lumen Efficacy	70.81	--	lm/w
Correlated color temperature / CCT	5886	--	K
Color rendering index / CRI	82.1	--	
R9 Value	0	--	
Duv	0.0042	--	
Luminous Intensity Distribution			
Center beam candlepower (if applicable)	-----	--	cd
Beam angle (if applicable)		--	°
Zonal lumens in the 0 °-60 °zone		--	%
Zonal lumens in the 60 °-90 °zone		--	%
Zonal lumens in the 90 °-120 °zone		--	%
Zonal lumens in the 120 °-180 °zone		--	%
Test Specifications:			

Date of Receipt	: Jan.05,2016
Date of Test	: Jan.10,2016
Test item	: Total Luminous Flux, Luminous Distribution Intensity, Luminous Efficacy, Correlated Color Temperature, Color Rendering Index, Chromaticity Coordinate, Electrical parameters
Reference Standard	IES LM-79-2008 Electrical and Photometric Measurements of Solid-State Lighting Products ANSI C78.377-2008 Specifications for the Chromaticity of Solid State Lighting Products CIE 13.3-1995 Method of Measuring and Specifying Colour Rendering Properties of Light Sources CIE 15-2004 Technical Report Colorimetry IESNA LM-16-93 Practical Guide to Colorimetry of Light Source IESNA TM-16-05 Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
Reference Work Instruction	QD25

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 120 Volts AC, 60Hz. It was stabilized before measurement was made. Luminous flux, luminaire efficacy, zonal lumen were calculated from the software taken at 1 °vertical intervals and 22.5 °horizontal intervals.

2. Photometric and Electrical Measurements – Integrating Sphere Method:

Photometric parameters were measured using an integrating sphere, a spectroradiometer and software. The ambient temperature condition inside the sphere was maintained at 25 ºC ±1 ºC. 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 120 Volts AC, 60Hz. 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 5 nm intervals over the range of 380 to 780 nm.

1. Product Information:

Brand Name	Superior Life®
Model Number	91135
Luminaire Type	Replacement Lamps for Outdoor Pole/Arm-mounted Decorative Luminaires (Type B)
Rated Voltage / Frequency	100~ 277Vac, 50/60Hz
Nominal Power	54W
Rated Initial Lamp Lumen	--
Declared CCT	2700K,3000K,3500K,4000K,4500K,5000K,5700K
LED Manufacturer	Guangzhou Hongli Opto-Electronic Co., Ltd.
LED Model	HL-A-2835DW-S1-08-HR3
Sample Receipt Date	Jan.05,2015
Sample Number	GZE151293-H1 2700K,H2 5700K

Photo

2.1 Electrical, Photometric and Chromaticity Measurements *(Refer to Work Instruction QD25)*	**IES LM-79 2008**

Test date	2016-01-11	**Test Ambient:**	25.2 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	2700K		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE151293	120.0	60	0.4584	54.13	0.9840	9.57
-H1	277.1	60	0.2048	52.24	0.9203	16.04

Sphere-Spectroradiometer Method in GE PATRIARCHTM LUMINAIRE (POST TOP):

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Color Rendering Index (CRI)	83.7
R9	17
CCT (K)	2753
Chromaticity (x, y)	x=0.4596 y=0.4170
Chromaticity (u', v')	u'=0.2595 v'=0.5297
Duv	0.0024

Special Color Rendering Indices			
R1	82	R9	17
R2	92	R10	82
R3	97	R11	79
R4	81	R12	73
R5	82	R13	84
R6	91	R14	99
R7	84	R15	75
R8	62	--	--

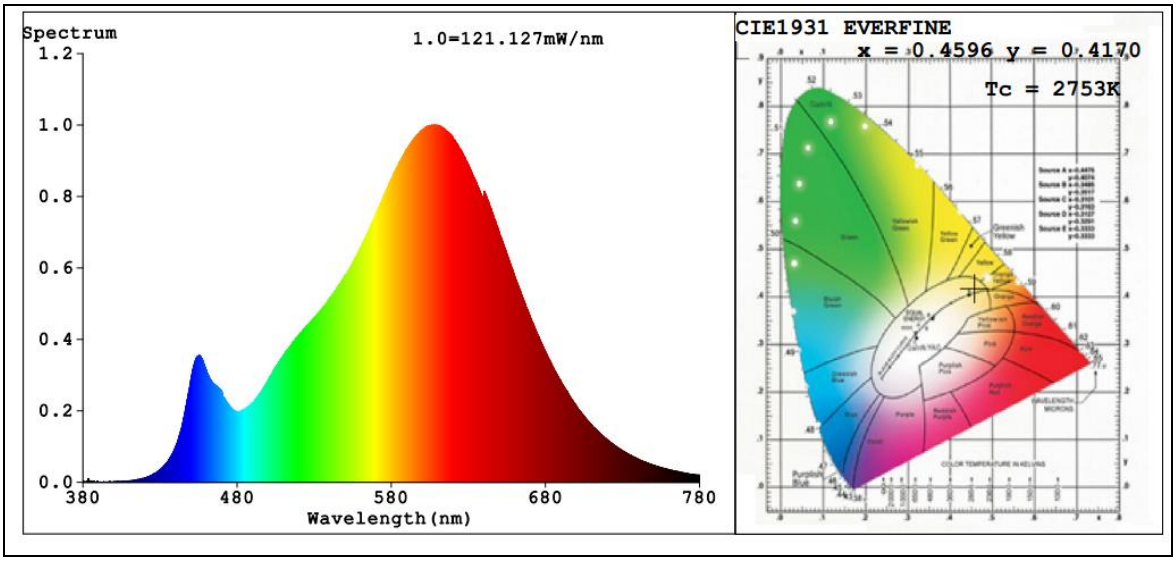
Goniophotometer Method in GE PATRIARCHTM LUMINAIRE (POST TOP):

Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Total Luminous (lm)	3554.0
Luminous Efficacy (lm/W)	65.66
Beam Angle °	226.3
Center Beam Candle Power (cd)	86

Goniophotometer Method in GE PATRIARCHTM LUMINAIRE (POST TOP):

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	3417.2
Luminous Efficacy (lm/W)	65.42

Spectral Power Distribution & Chromaticity Diagram



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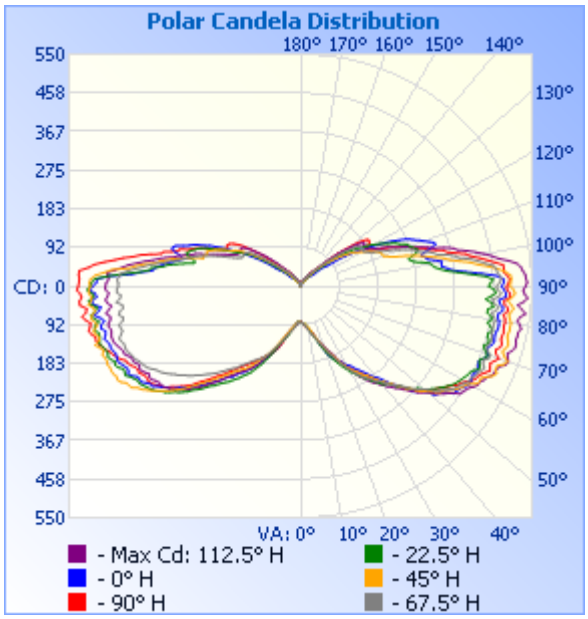
Zonal Lumen Tabulation

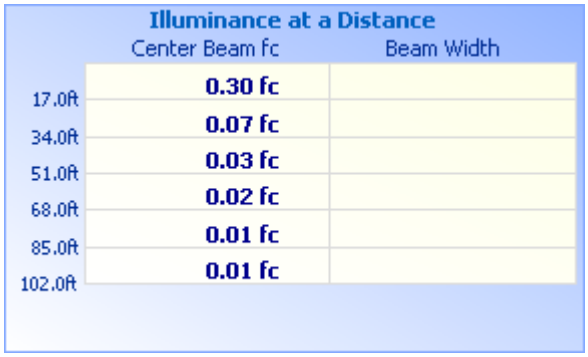
Zonal Lumen Summary		
Zone	Lumens	% Luminaire
0-30	129.0	3.6%
0-40	286.7	8.1%
0-60	914.0	25.7%
60-90	1,487.5	41.8%
70-100	1,493.5	42%
90-120	966.2	27.2%
0-90	2,401.5	67.6%
90-180	1,152.8	32.4%
0-180	3,554.3	100%

Lumens Per Zone					
Zone	Lumens	% Total	Zone	Lumens	% Total
0-10	8.9	0.3%	90-100	463.5	13%
10-20	35.0	1.0%	100-110	301.8	8.5%
20-30	85.1	2.4%	110-120	200.9	5.7%
30-40	157.7	4.4%	120-130	120.1	3.4%
40-50	255.9	7.2%	130-140	46.2	1.3%
50-60	371.5	10.5%	140-150	14.6	0.4%
60-70	457.6	12.9%	150-160	4.6	0.1%
70-80	506.5	14.2%	160-170	1.0	0%
80-90	523.4	14.7%	170-180	0.1	0%

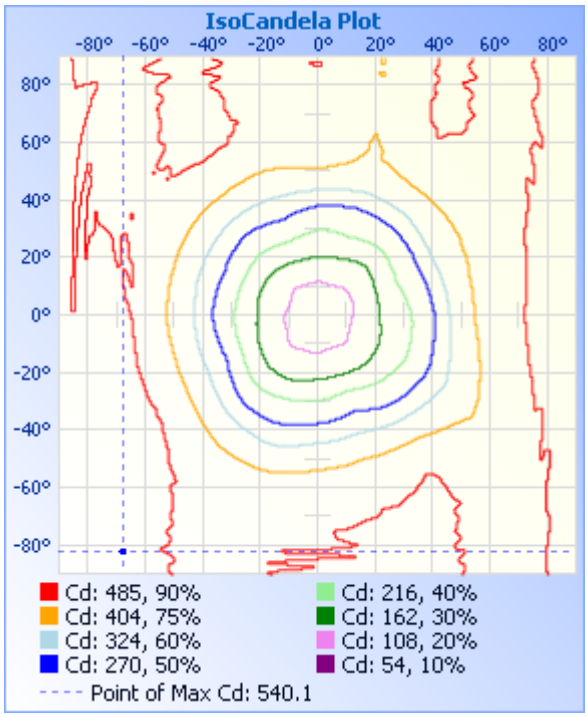
Photometric Data



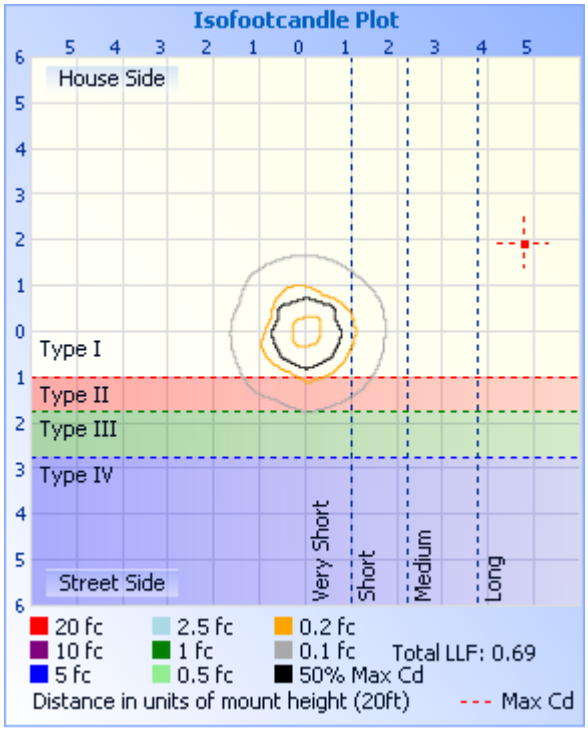
Illuminance Plots



ISOCANDELA DIAGRAM



ISOLUX DIAGRAM



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Candela Table - Type C

	0	22.5	45	67.5	90	112.5	135	157.5	180	202.5	225	247.5	270	292.5	315	337.5	360
0	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86
1	87	87	86	86	85	85	85	85	85	85	85	85	86	86	86	86	87
2	87	88	87	86	86	87	86	85	84	84	84	85	86	86	87	87	87
3	88	89	87	87	88	88	87	85	84	84	84	86	86	86	88	88	88
4	89	89	88	89	90	90	87	86	86	86	86	87	87	88	89	88	89
5	90	89	88	91	93	91	88	87	88	87	88	89	89	89	90	91	90
6	92	90	90	93	95	93	89	89	92	90	89	92	91	89	91	94	92
7	95	93	92	96	97	94	90	91	94	92	92	96	94	91	93	96	95
8	98	95	94	99	99	97	92	92	97	94	94	98	97	94	94	98	98
9	100	98	97	102	100	100	94	94	99	97	96	101	99	97	96	101	100
10	103	101	99	106	102	103	96	97	101	100	98	104	102	99	98	103	103
11	105	105	101	110	105	105	98	100	103	104	101	106	106	102	101	106	105
12	107	110	104	113	108	107	101	104	105	109	103	110	108	105	104	110	107
13	110	115	109	117	110	111	103	108	108	114	106	113	111	108	107	114	110
14	114	120	114	121	115	117	107	113	111	118	110	116	115	112	110	118	114
15	120	125	119	124	120	122	110	118	116	122	114	120	120	117	114	123	120
16	127	131	124	128	126	128	115	123	122	127	118	125	126	123	118	127	127
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22	175	174	163	162	166	158	144	146	163	165	155	156	167	165	152	166	175
23	181	181	170	170	173	165	151	153	171	173	161	162	173	172	158	170	181
24	187	189	177	178	180	171	159	161	178	182	168	169	177	177	165	176	187
25	192	195	183	185	187	177	166	170	184	191	175	176	181	183	171	182	192
26	196	203	191	194	193	186	174	179	192	201	181	181	184	190	177	191	196
27	200	211	199	201	200	195	180	188	198	210	187	187	188	198	183	198	200
28	203	218	206	209	206	203	186	196	205	218	195	192	193	206	190	205	203
29	209	223	214	218	213	214	192	203	214	226	201	196	198	213	197	214	209

30	215	234	222	226	220	225	202	210	221	236	209	200	203	220	206	220	215
31	220	238	230	235	228	234	207	217	226	243	217	204	209	226	213	225	220
32	223	245	236	242	234	245	216	224	233	248	224	208	214	232	220	232	223
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37	259	281	266	275	269	287	253	253	269	284	253	237	242	263	251	254	259
38	268	288	275	285	277	291	262	259	272	289	259	246	251	270	258	260	268
39	278	295	285	291	286	300	269	266	279	296	268	250	259	278	270	265	278
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42	305	311	309	312	310	322	293	283	305	318	293	271	285	307	296	290	305
43	318	320	317	322	319	331	303	290	312	327	303	277	292	317	304	298	318
44	326	331	327	326	327	337	313	297	321	338	314	286	304	329	314	309	326
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56	446	423	439	437	424	457	414	404	425	435	440	373	418	407	429	389	446
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58	452	434	453	445	442	463	422	418	433	443	456	387	427	418	449	397	452
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61	463	446	478	460	463	482	437	436	443	452	474	405	430	422	468	395	463

62	462	449	482	461	470	482	438	442	454	458	485	412	436	428	472	399	462
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86	473	441	494	458	485	531	470	485	498	506	499	431	528	465	504	407	473
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88	489	465	510	477	498	533	463	473	489	496	504	437	524	457	499	402	489
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91	483	452	499	472	495	539	467	476	486	497	502	434	527	462	502	401	483
92	482	458	501	477	497	536	462	466	484	490	499	437	526	457	495	393	482
93	467	442	500	474	491	534	457	438	457	458	489	432	529	460	486	373	467

94	431	406	488	468	484	529	442	399	403	419	468	429	527	461	477	347	431
95	392	376	472	467	485	525	422	367	382	384	450	413	506	443	451	318	392
96	362	348	449	462	484	517	400	343	354	363	410	396	493	426	425	293	362
97	350	334	424	442	465	497	377	325	350	357	395	377	470	413	397	277	350
98	338	322	407	427	447	474	355	311	340	332	376	364	447	393	384	267	338
99	339	317	381	410	430	459	335	290	331	320	349	344	427	375	369	253	339
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101	323	295	348	375	400	423	296	256	307	282	324	313	387	342	333	221	323
102	307	277	329	359	377	404	278	240	297	260	313	299	364	327	311	209	307
103	305	270	311	333	358	382	266	232	287	257	292	285	341	308	293	199	305
104	295	265	296	325	351	374	243	236	291	265	274	275	336	298	277	199	295
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107	334	292	241	286	308	316	201	238	317	278	243	247	300	263	238	213	334
108	334	289	226	281	293	301	190	233	311	275	237	235	281	247	233	211	334
109	323	281	217	266	279	280	189	231	294	266	234	221	272	233	226	210	323
110	312	277	210	251	274	273	183	223	282	261	239	208	263	222	218	207	312
111	304	272	208	243	260	262	176	219	275	251	234	195	251	212	210	205	304
112	293	267	207	227	246	244	176	211	261	240	227	184	240	201	200	202	293
113	284	256	204	211	236	237	169	199	247	226	222	174	227	193	198	195	284
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117	229	223	182	179	191	194	168	158	193	180	187	155	196	166	180	163	229
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123	139	168	145	171	193	180	163	98	111	130	139	144	183	166	151	124	139
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2.1 Electrical, Photometric and Chromaticity Measurements *(Refer to Work Instruction QD25)*	**IES LM-79 2008**

Test date	2016-01-11	**Test Ambient:**	25.2 ºC
Test Orientation	As intended	**Stabilization Time (min)**	90
Model Number	5700K		

Electrical Measurement:

Sample No.	Voltage (Vac)	Frequency (Hz)	Current (A)	Power (W)	Power Factor	THD %
GZE151293	120.0	60	0.4569	54.26	0.9897	9.48
-H2	277.1	60	0.2047	52.11	0.9185	15.93

Sphere-Spectroradiometer Method in GE PATRIARCHTM LUMINAIRE (POST TOP):

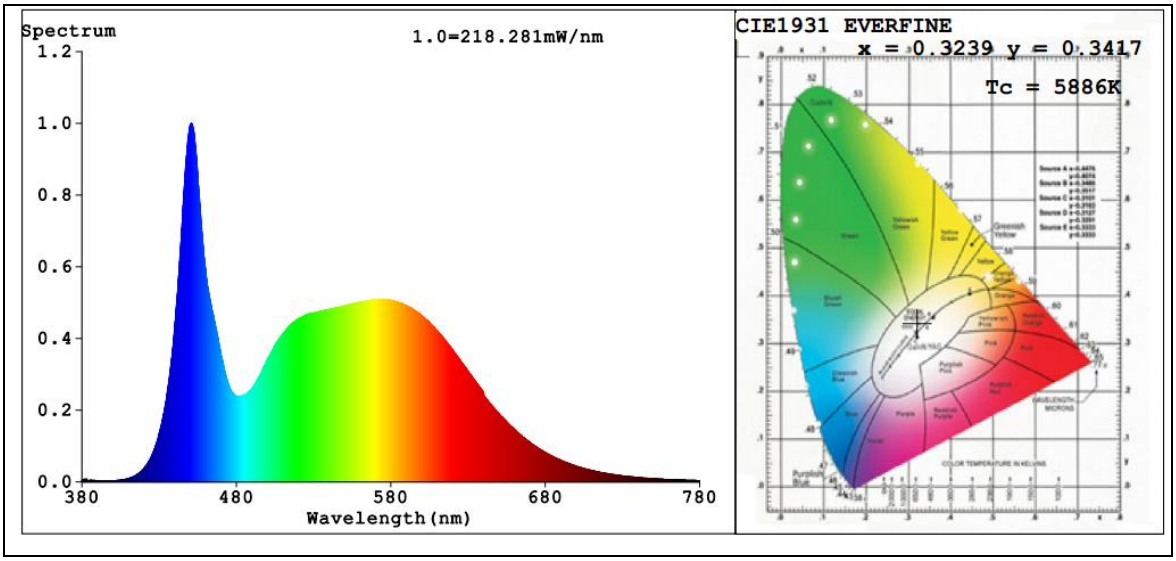
Parameter	Result
Test Voltage (V)	120.0
Frequency (Hz)	60
Color Rendering Index (CRI)	82.1
R9	0
CCT (K)	5886
Chromaticity (x, y)	x=0.3239 y=0.3417
Chromaticity (u', v')	u'=0.2008 v'=0.4766
Duv	0.0042
Total Luminous (lm)	3842
Luminous Efficacy (lm/W)	70.81

Special Color Rendering Indices			
R1	80	R9	0
R2	87	R10	69
R3	92	R11	81
R4	82	R12	59
R5	81	R13	82
R6	82	R14	96
R7	87	R15	74
R8	66	--	--

Sphere-Spectroradiometer Method in GE PATRIARCHTM LUMINAIRE (POST TOP):

Parameter	Result
Test Voltage (V)	277.0
Frequency (Hz)	60
Total Luminous (lm)	3706
Luminous Efficacy (lm/W)	71.12

Spectral Power Distribution & Chromaticity Diagram



3. Test Equipment

Equipment ID	Equipment Name	Last Calibration Date	Next Calibration Date
ST-R-336	2 meter Integrating Sphere	2015-07-01	2016-06-30
ST-R-331	Spectral analysis system HAAS-2000	2015-07-01	2016-06-30
D204	Standard Lamp	2015-07-01	2016-06-30
PF2010	Power Meter for Integrating Sphere	2015-07-01	2016-06-30
EE-09	Goniophotometer system	2015-07-01	2016-06-30
D908S	Standard Lamp	2015-07-01	2016-06-30
PF210	Power Meter for Goniophotometer	2015-07-01	2016-06-30
ST-R-181A	Temperature Tester	2015-07-01	2016-06-30
Uncertainty Photometric Measurement (Sphere):1.74% Chromaticity Measurement(Sphere):14.3K Photometric Measurement(Goniophotometer):1.62%			

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