



TEST REPORT

Job No. 161001547SHA

Date: Oct 31, 2016

REPORT NO. 161001547SHA-003

TEST OF ONE LED LAMP
MODEL NO. 91069, 910XX, 91072

RENDERED TO
P.Q.L., Inc.
2285 Ward Avenue / Simi Valley, CA 93065

TEST: Electrical and Photometric as required to the IESNA LM-79 test standard.

LABORATORY NOTE: The laboratory that conducted the testing detailed in this report has been Qualified, Verified, and Recognized for LM-79 Testing for ENERGY STAR for Luminaires by NVLAP program.

AUTHORIZATION: The testing performed was authorized by signed quote number QSH161021008.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:
NEMA ANSLG C78.377: 2008 Specifications of the Chromaticity of Solid State Lighting Products
IESNA LM-79: 2008 Approved Method for the Electrical and Photometric Measurements of Solid-State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted four samples of these models. The sample were received by Intertek on Oct 08, 2016, in undamaged condition, and one sample was tested as received. The sample designations from 0161008-27-001 to 0161008-27-004.

DATES OF TESTS: Oct 12, 2016 through Oct 15, 2016

ISSUED BY: Intertek Testing Services Shanghai

TEST LOCATION: 7 floor, No.51, 1089 Qinzhou Road (North), Shanghai, China 200233

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SUMMARY

Model Number :	91069/91070/910XX_40K/91072
Description :	LED Lamp

Test Condition: 120V 60Hz for 91069

Criteria	Result
Total Lumen Output	1112.1lm
Total Power	10.94W
Luminaire Efficacy	101.70lm/W
Power Factor	0.9321
Correlated Color Temperature (CCT)	2755K
Color Rendering Index (CRI)	82.1
Chromaticity Coordinate (x)	0.4541
Chromaticity Coordinate (y)	0.4071
Chromaticity Coordinate (u')	0.2603
Chromaticity Coordinate (v')	0.5251

Test Condition: 120V 60Hz for 91070

Criteria	Result
Total Lumen Output	1190.18lm
Total Power	10.58W
Luminaire Efficacy	112.45lm/W
Power Factor	0.9234
Correlated Color Temperature (CCT)	3094K
Color Rendering Index (CRI)	82.2
Chromaticity Coordinate (x)	0.4303
Chromaticity Coordinate (y)	0.4015
Chromaticity Coordinate (u')	0.2474
Chromaticity Coordinate (v')	0.5194

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RESULTS OF TESTS

Test Condition: 120V 60Hz for 910XX_40K

Criteria	Result
Total Lumen Output	1291.55lm
Total Power	11.09W
Luminaire Efficacy	116.43lm/W
Power Factor	0.9245
Correlated Color Temperature (CCT)	3963K
Color Rendering Index (CRI)	83.1
Chromaticity Coordinate (x)	0.3841
Chromaticity Coordinate (y)	0.3849
Chromaticity Coordinate (u')	0.2243
Chromaticity Coordinate (v')	0.5056

Test Condition: 120V 60Hz for 91072

Criteria	Result
Total Lumen Output	1202.55lm
Total Power	10.61W
Luminaire Efficacy	113.37lm/W
Power Factor	0.9164
Correlated Color Temperature (CCT)	5083K
Color Rendering Index (CRI)	85.4
Chromaticity Coordinate (x)	0.3432
Chromaticity Coordinate (y)	0.3545
Chromaticity Coordinate (u')	0.2090
Chromaticity Coordinate (v')	0.4858

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EQUIPMENT LIST

Equipment Used	Model Number	Control Number
Fluke Temperature Meter	52	EC2357
Everfine- DC Power Supply	WY12010	EC4753-7
Everfine- AC power source for Integrating Sphere System	VPS1010 PWM	EC4760-12
Everfine - AC power source for Goniophotometer System	VPS1060 PWM	EC4753-8
Two meter integrating sphere unit	Everfine – 2M	EC4760
Everfine - Digital Power Meter	PF2010A	EC4760-10
YOKOGAWA - Digital Power Meter	WT210	EC4553
Everfine – Goniophotometer	Go-R5000	EC4753

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TEST METHOD

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79

Light Distribution and Output Measurements

Light Distribution and total light output (luminous flux) were measured using a Go-R5000 Type-C Rotating Mirror Goniophotometer. Temperature 25°C and relative humidity of 60% was measured at a position in the testing laboratory.

The lamp rotates only around the fixed vertical axle in the prescribed burning position. The lamp and mirror permit the measurement of luminous intensity at the direction of any horizontal or vertical angle without tilting the lamp. The lamp was allowed to stabilize before measurements were made.

Chromaticity Measurements

Chromaticity was measured using a 2 meters integrating sphere spectral lamp measurement system. Temperature was measured at a position inside the sphere shielded from direct light. Relative humidity of 65% was measured at a position in the testing laboratory.

Spectral radiant flux measurements were made using spectroradiometer attached to the detector port of the integrating sphere. Each lamp was allowed to stabilize before measurements were made. The calibration of the integrating sphere spectroradiometer system is by the reference/standard lamps which are traceable to National Institute of Metrology P.R. CHINA. Lamp efficacy (lumens per watt) for each lamp model was then computed based on the luminous flux result. Electrical measurements including voltage, power and power factor were measured using YOKOGAWA - Digital Power Meter., model WT210.

Standard lamp used:
Model: Labsphere SCL-1400
Current: 2.679A

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RESULTS OF TESTS

Test Condition: 120V 60Hz for 91069

Total operation burning time: 71 min
Stabilization time: 61 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
91069							
0161008-27-001	N/A	2755	82.1	0.4541	0.4071	0.2603	0.5251

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
91069							
0161008-27-001	N/A	120	97.7	10.94	0.9321	1112.1	101.70

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
91069		
0-30	112.35	10.10
0-40	195.12	17.55
0-60	406.09	36.52
0-130	1039.64	93.48
0-180	1112.09	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
91069		
Beam (50%)	228.0	227.2

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RESULTS OF TESTS

Test Condition: 120V 60Hz for 91070

Total operation burning time: 71 min
Stabilization time: 61 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
91070							
0161008-27-002	N/A	3094	82.2	0.4303	0.4015	0.2474	0.5194

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
91070							
0161008-27-002	N/A	120	95.6	10.58	0.9234	1190.18	112.45

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
91070		
0-30	119.69	10.06
0-40	208.13	17.49
0-60	434.15	36.48
0-130	1113.10	93.52
0-180	1190.17	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
910XX		
Beam (50%)	229.5	227.7

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RESULTS OF TESTS

Test Condition: 120V 60Hz for 910XX_40K

Total operation burning time: 71 min Stabilization time: 61 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
910XX_40K							
0161008-27-003	N/A	3963	83.1	0.3841	0.3849	0.2243	0.5056

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
910XX_40K							
0161008-27-003	N/A	120	100.0	11.09	0.9245	1291.55	116.43

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
910XX_40K		
0-30	129.32	10.01
0-40	224.97	17.42
0-60	469.77	36.37
0-130	1207.56	93.50
0-180	1291.54	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
910XX_40K		
Beam (50%)	229.8	228.7

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RESULTS OF TESTS

Test Condition: 120V 60Hz for 91072

Total operation burning time: 71 min
Stabilization time: 61 min

Photometric Measurements at 25°C

Intertek Sample No.	Base Orientation	Correlated Color Temperature (K)	CRI	CIE 31' Chromaticity Coordinate (x)	CIE 31' Chromaticity Coordinate (y)	CIE 76' Chromaticity Coordinate (u')	CIE 76' Chromaticity Coordinate (v')
91072							
0161008-27-004	N/A	5083	85.4	0.3432	0.3545	0.2090	0.4858

Photometric and Electrical Measurements at 25°C

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
91072							
0161008-27-004	N/A	120	96.5	10.61	0.9164	1202.55	113.37

Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens (lm)	% Luminaire (%)
91072		
0-30	121.07	10.07
0-40	210.56	17.51
0-60	439.32	36.53
0-135	1125.32	93.58
0-180	1202.54	100.00

Beam Angle

	Horizontal Spread (°)	Vertical Spread (°)
91072		
Beam (50%)	227.9	227.6

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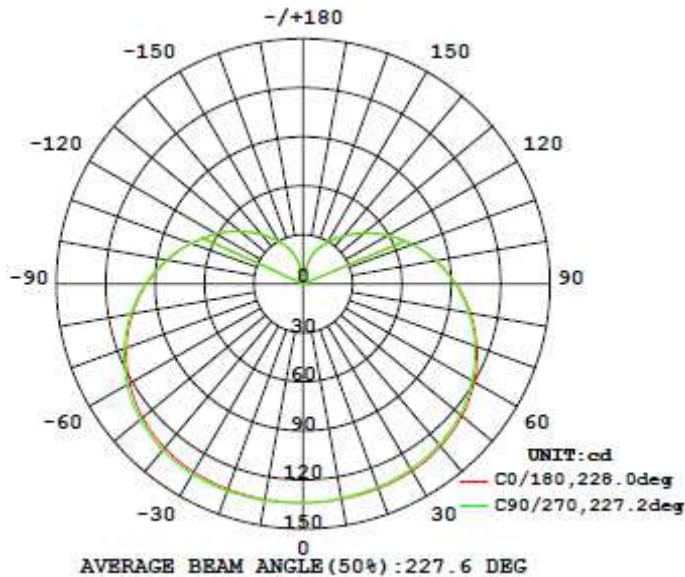


RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 120V 60Hz for 91069

V \ H(°)	0	22.5	45	67.5	90
0	134.0	134.0	134.0	134.0	134.0
5	134.3	134.2	134.1	134.0	133.9
10	134.5	134.5	134.3	134.1	133.8
15	134.8	134.6	134.3	134.0	133.6
20	134.9	134.6	134.3	133.9	133.3
25	134.9	134.5	134.1	133.6	132.9
30	134.7	134.2	133.6	133.1	132.2
35	134.0	133.5	132.8	132.2	131.3
40	133.0	132.4	131.6	130.9	129.9
45	131.4	130.7	129.9	129.2	128.1
50	129.3	128.6	127.7	126.9	125.9
55	126.7	125.9	125.1	124.2	123.1
60	123.5	122.7	121.8	121.0	119.9
65	119.8	119.0	118.2	117.3	116.3
70	115.7	114.9	114.1	113.3	112.2
75	111.2	110.4	109.6	108.8	107.9
80	106.4	105.5	104.7	104.0	103.1
85	101.2	100.4	99.6	99.0	98.1
90	95.8	94.9	94.2	93.6	92.9



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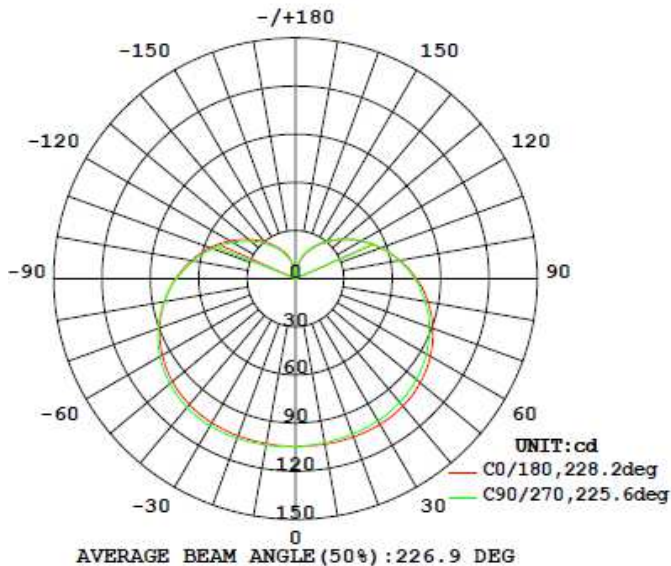


RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 120V 60Hz for 91070

V \ H(°)	0	22.5	45	67.5	90
0	104.6	104.6	104.6	104.6	104.6
5	104.9	104.9	105.0	104.8	104.6
10	105.3	105.3	105.3	105.1	104.8
15	105.5	105.6	105.7	105.4	104.9
20	105.9	105.9	105.9	105.5	105.0
25	106.0	106.1	106.0	105.6	105.0
30	105.9	106.0	105.9	105.5	104.8
35	105.5	105.7	105.6	105.1	104.4
40	104.7	105.0	104.8	104.4	103.6
45	103.5	103.8	103.7	103.2	102.5
50	101.9	102.0	102.1	101.7	101.0
55	99.8	99.9	99.9	99.7	99.0
60	97.2	97.3	97.4	97.2	96.6
65	94.2	94.1	94.3	94.4	93.9
70	90.7	90.7	90.9	91.1	90.7
75	86.9	86.9	87.2	87.5	87.2
80	82.9	82.8	83.1	83.5	83.5
85	78.5	78.5	78.8	79.3	79.4
90	73.9	73.9	74.3	74.8	75.0



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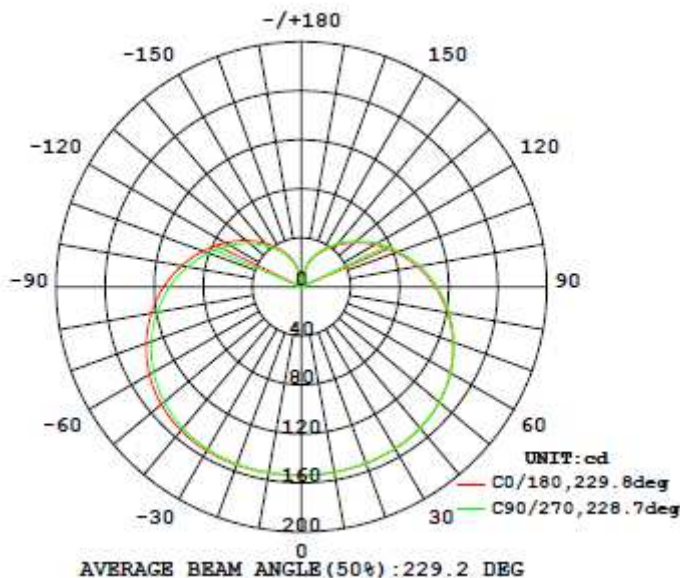


RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 120V 60Hz for 910XX_40K

V \ H(°)	0	22.5	45	67.5	90
0	153.9	153.9	153.9	153.9	153.9
5	154.0	153.9	153.8	153.8	153.7
10	154.0	153.9	153.8	153.7	153.6
15	154.0	153.8	153.7	153.5	153.4
20	153.8	153.7	153.5	153.4	153.3
25	153.6	153.4	153.2	153.2	153.0
30	153.1	152.8	152.7	152.7	152.6
35	152.1	151.8	151.7	151.8	151.8
40	150.7	150.3	150.2	150.4	150.5
45	148.6	148.2	148.2	148.6	148.8
50	146.1	145.6	145.6	146.1	146.4
55	142.9	142.4	142.4	143.1	143.5
60	139.2	138.7	138.7	139.4	140.0
65	135.0	134.4	134.4	135.3	136.0
70	130.2	129.7	129.7	130.6	131.4
75	125.0	124.6	124.6	125.5	126.4
80	119.5	119.0	119.0	120.0	120.9
85	113.7	113.2	113.2	114.2	115.2
90	107.5	106.9	107.0	108.0	109.0



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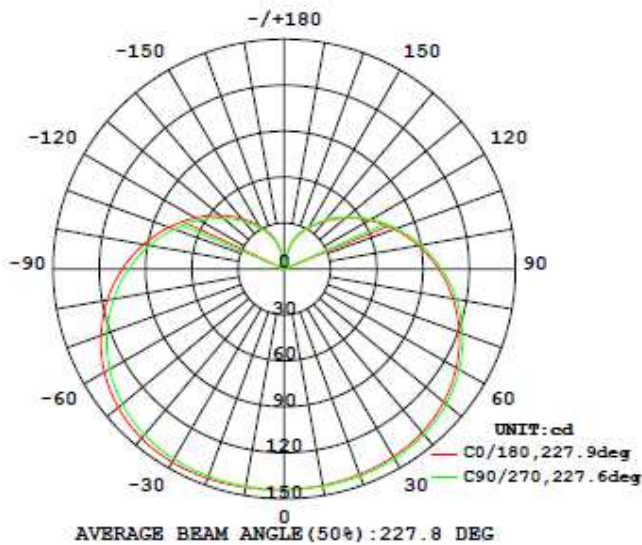


RESULTS OF TESTS (cont'd)

Intensity (Candlepower) Summary at 25°C – Candelas

Test Condition: 120V 60Hz for 91072

V \ H(°)	0	22.5	45	67.5	90
0	144.0	144.0	144.0	144.0	144.0
5	144.1	143.9	143.8	143.7	143.7
10	144.0	143.8	143.6	143.5	143.3
15	144.0	143.7	143.4	143.2	143.0
20	143.9	143.5	143.2	143.0	142.7
25	143.7	143.3	142.8	142.5	142.2
30	143.2	142.7	142.2	141.9	141.5
35	142.4	141.9	141.3	141.0	140.6
40	141.1	140.6	140.0	139.6	139.2
45	139.4	138.7	138.2	137.9	137.4
50	137.0	136.4	135.8	135.5	135.0
55	134.2	133.5	133.0	132.7	132.2
60	130.8	130.1	129.6	129.4	128.9
65	126.9	126.2	125.8	125.6	125.2
70	122.5	121.8	121.4	121.4	120.8
75	117.7	117.0	116.6	116.7	116.2
80	112.4	111.8	111.6	111.7	111.2
85	106.9	106.3	106.1	106.3	105.8
90	101.1	100.6	100.4	100.6	100.2



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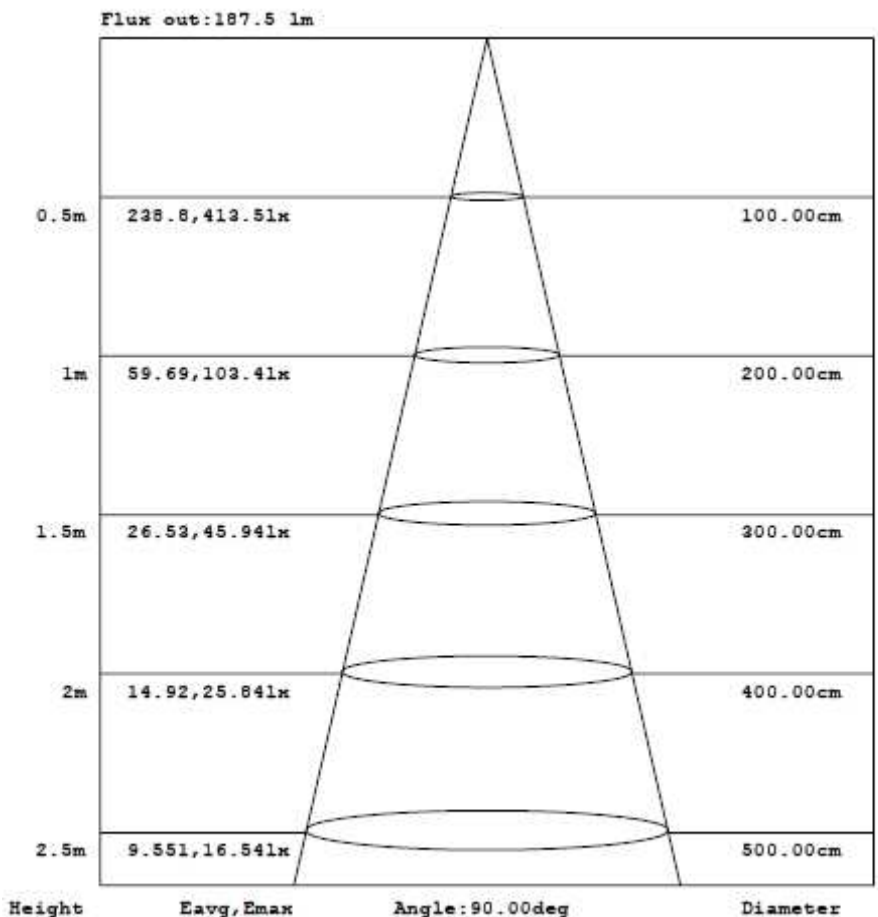
RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91069

Illumination Plots

Model No.: 91069
Mount Height: 2.5 m

Illuminance - Cone of Light



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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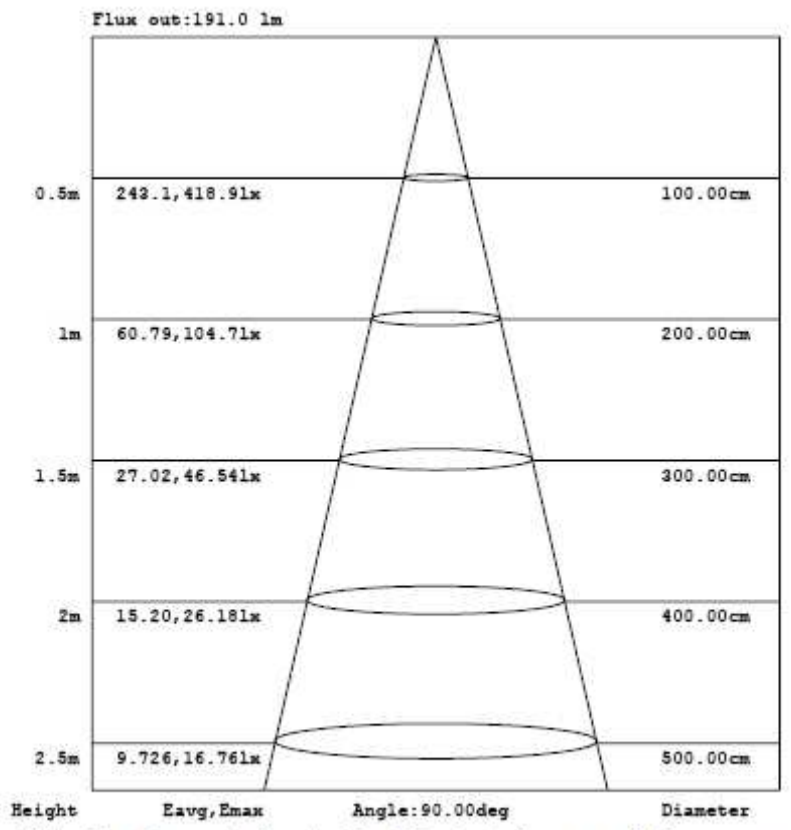
RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91070

Illumination Plots

Model No.: 910XX
Mount Height: 2.5 m

Illuminance - Cone of Light



Note: The Curves indicate the illuminated area and the average illumination when the luminaire is at different distance.

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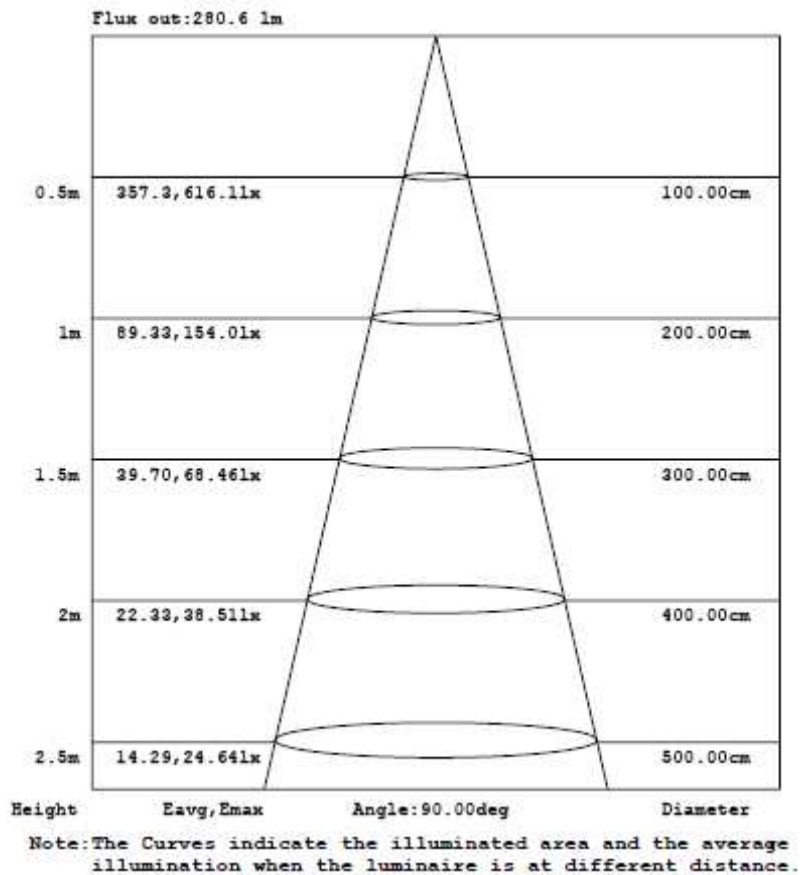
RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 910XX_40K

Illumination Plots

Model No.: 910XX
Mount Height: 2.5 m

Illuminance - Cone of Light



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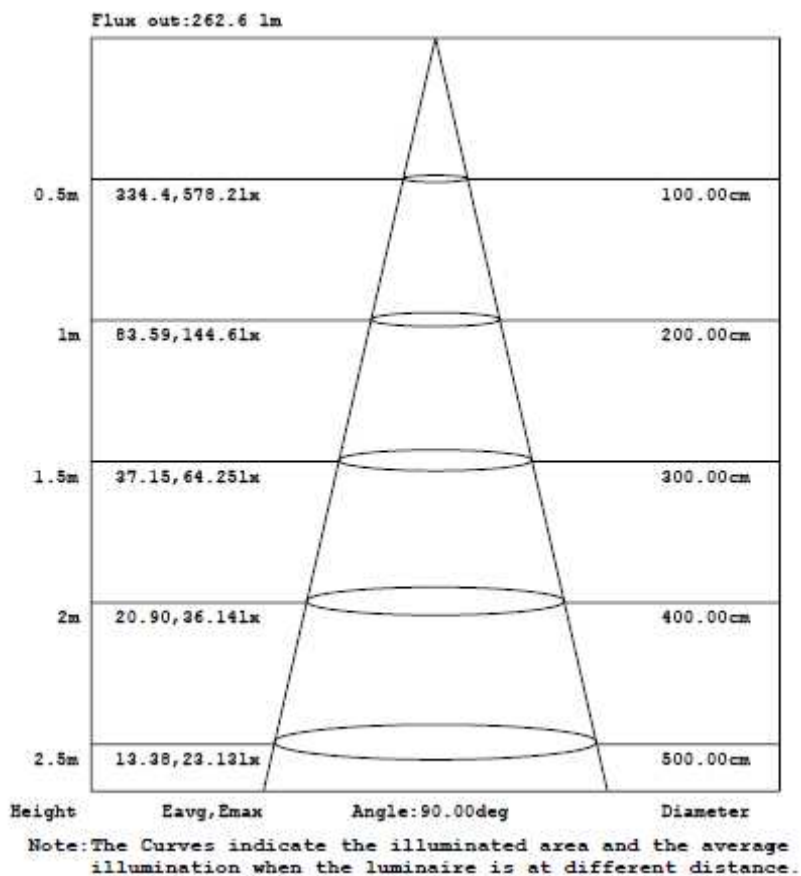
RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91072

Illumination Plots

Model No.: 91072
Mount Height: 2.5 m

Illuminance - Cone of Light



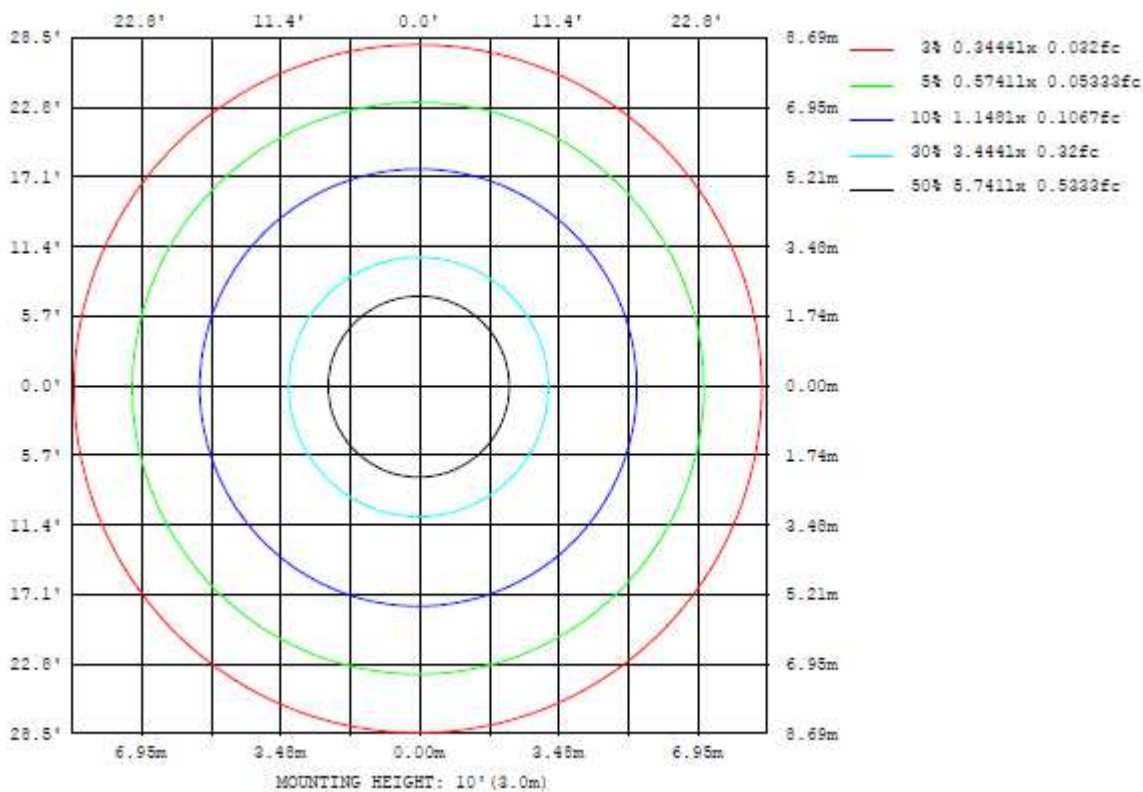
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RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91069

Model No.: 91069
Mount Height: 3 m
Isoillumination Plot



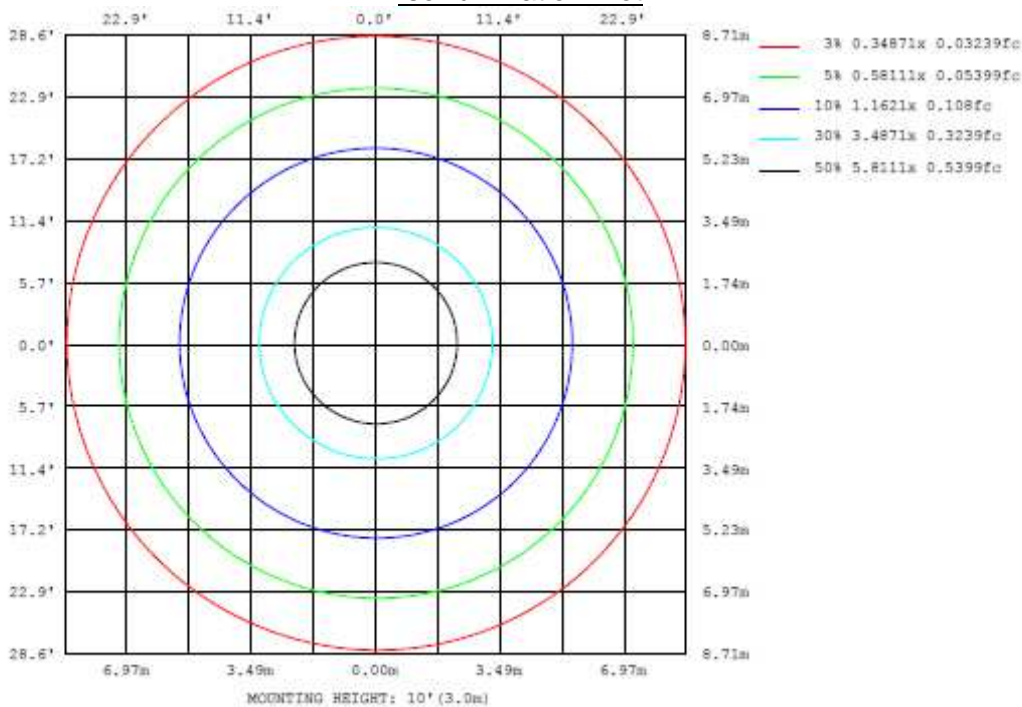
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RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91070

Model No.: 910XX
Mount Height: 3 m
Isoillumination Plot



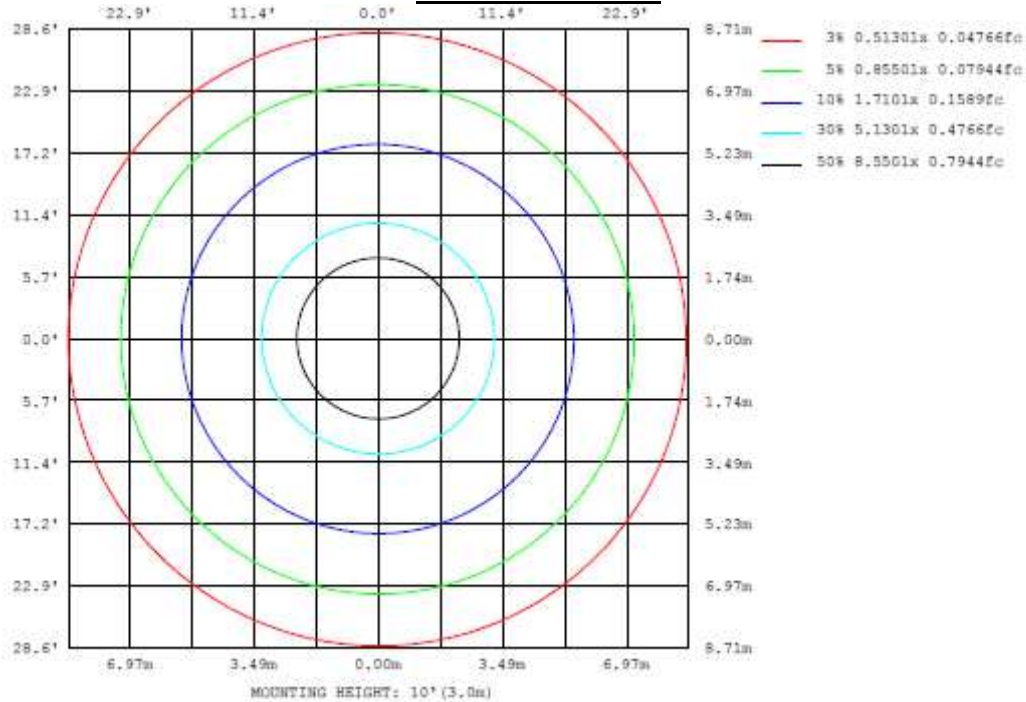
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RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 910XX_40K

Model No.: 910XX
Mount Height: 3 m
Isoillumination Plot



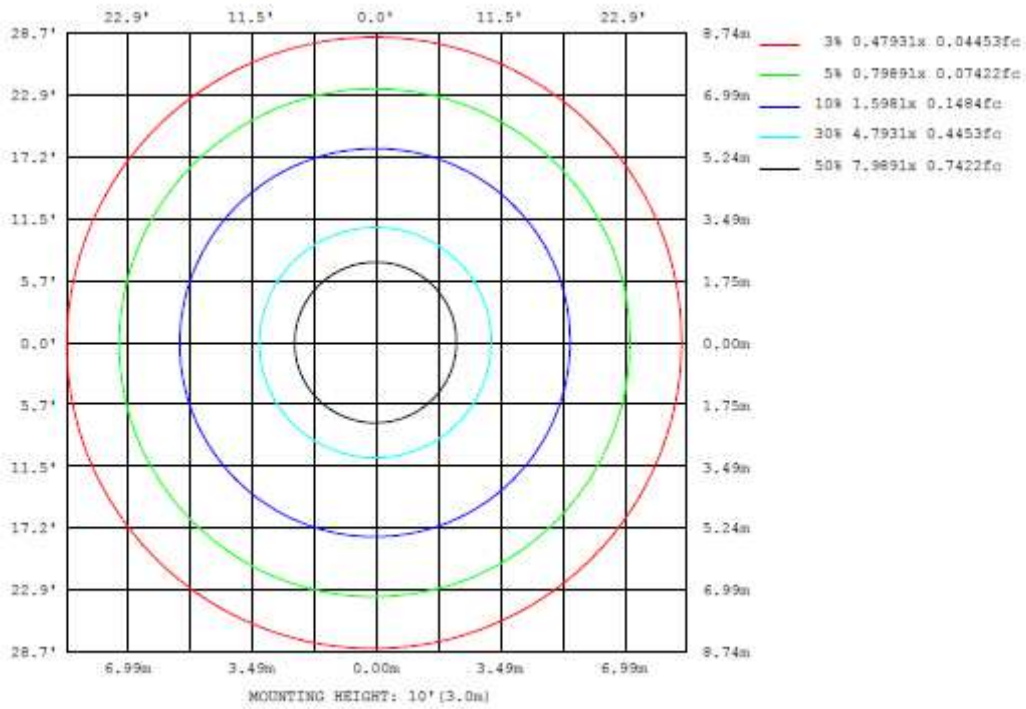
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RESULTS OF TESTS (cont'd)

Test Condition: 120V 60Hz for 91072

Model No.: 91072
Mount Height: 3 m
Isoillumination Plot



***** End of Page *****



RESULTS OF TESTS (cont'd)

Product Picture (not to scale)



External view

In Charge Of Tests:

Jordan Rao
Project Engineer

Report Reviewed By:

Jimmy Wang
Reviewer

Attachment: None

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