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Photometric Test Report

Relevant Standards
IES LM-79-2008, ANSI C82.77-10-2014, CIE 13.3-1995
CIE 15-2004, ANSI C78.377-2017, IES TM-30-2018

Prepared For
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Catalog Number
HU-LED-TR-X116-FL-WHP-9-C-1-INC-120-PROTOTYPE(4000K)

Order Number
13244408
Test Number
13244408.21

Test Date

2020-03-25

Prepared By

Austin Duff, Technician

Approved By

Eric Gaudreau, Engineering Leader

The results contained in this report pertain only to the tested sample.
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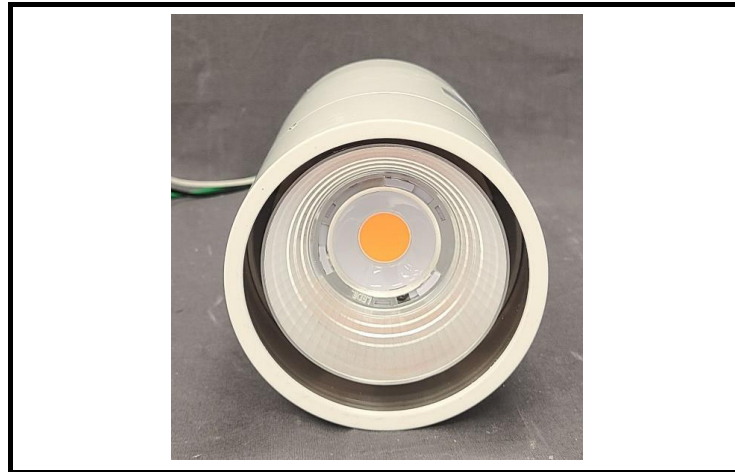
Laboratory results may not be representative of field performance
Ballast factors have not been applied

Testing was performed in a 2-meter integrating sphere using the 4π geometry method.
Absorption correction was employed for Sphere measurement



Luminaire Description: White metal cylindrical housing and clear glass lens
Lamp: One (1) White LED with optic below
Mounting: Pendant
Ballast/Driver: One (1) ERP ESS040W-0900-42

Luminaire



Luminaire Characteristics
Luminous Diameter: 3.50 in.

Summary of Results

Integrating Sphere

Luminous Flux: 3683 Lumens
Efficacy: 107.61 lm/w
CCT: 4177 K
CRI (Ra): 84.3

Distribution

Total Luminaire Output: 3577 Lumens
Luminaire Efficacy: 104.5 lm/w
Maximum Candela: 4841 Candela

Electrical Data at 120 VAC

Test Temperature: 25.3 °C
Voltage: 120.1 VAC
Current: 0.2899 A
Power: 34.23 W
Power Factor: 0.983
Frequency: 60 Hz
Current THD: 12.6 %



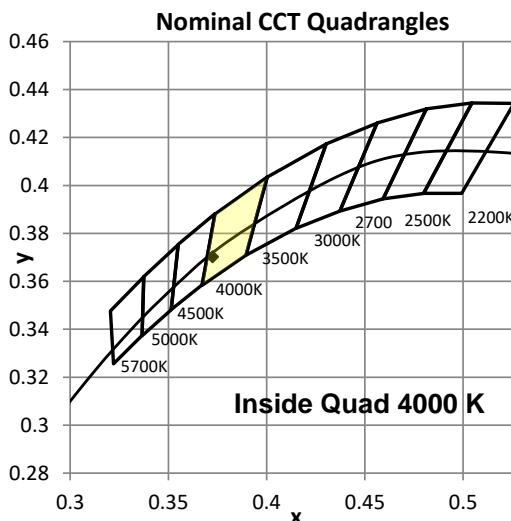
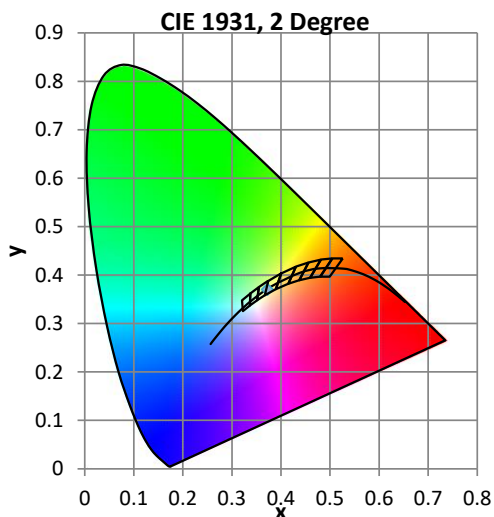
Color Quality - Integrating Sphere

Integrating Sphere Test Conditions

Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.3 °C	120.1 VAC	0.2899 A	34.23 W	0.983	60 Hz	12.6 %

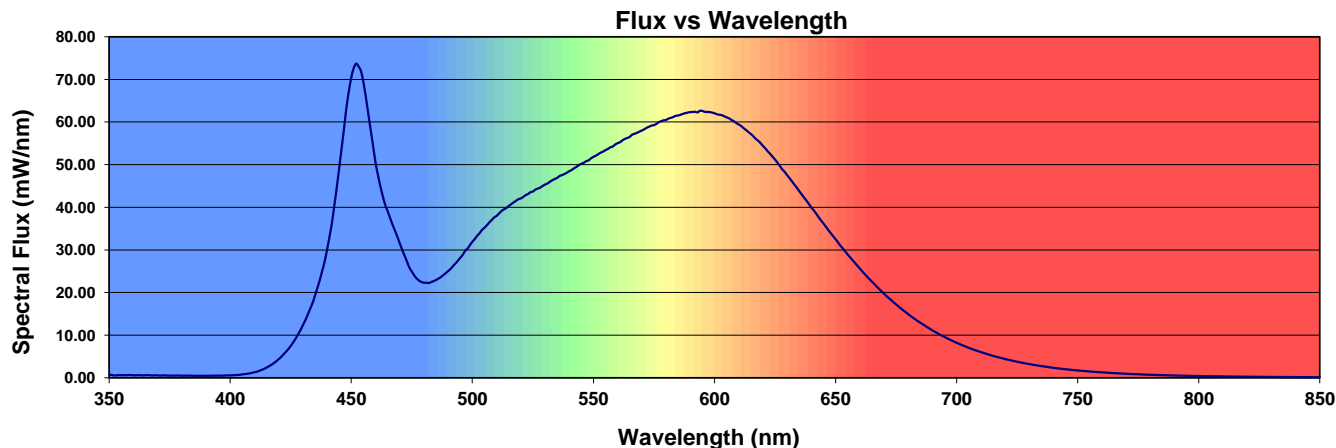
Summary of Results

Total Output:	3683 Lumens	Chromaticity (x):	0.3724
Efficacy:	107.6 lm/w	Chromaticity (y):	0.3702
CCT:	4177 K	Chromaticity (u'):	0.2225
CRI (Ra):	84.3	Chromaticity (v'):	0.4975
CRI (R9):	14.8	TM-30 Rf:	84.6
Peak Wavelength:	452 nm	TM-30 Rg:	95.4
Dominant Wavelength:	579 nm	Duv:	-0.0010
S/P Ratio:	1.76		



Color Rendering Index Detail

Ra (CRI)	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15
84.3	82.9	90.8	95.3	82.5	82.9	86.4	86.6	66.9	14.8	77.4	81.2	64.1	85.1	97.7	77.4





Distribution - Goniophotometer

Distribution Test Conditions

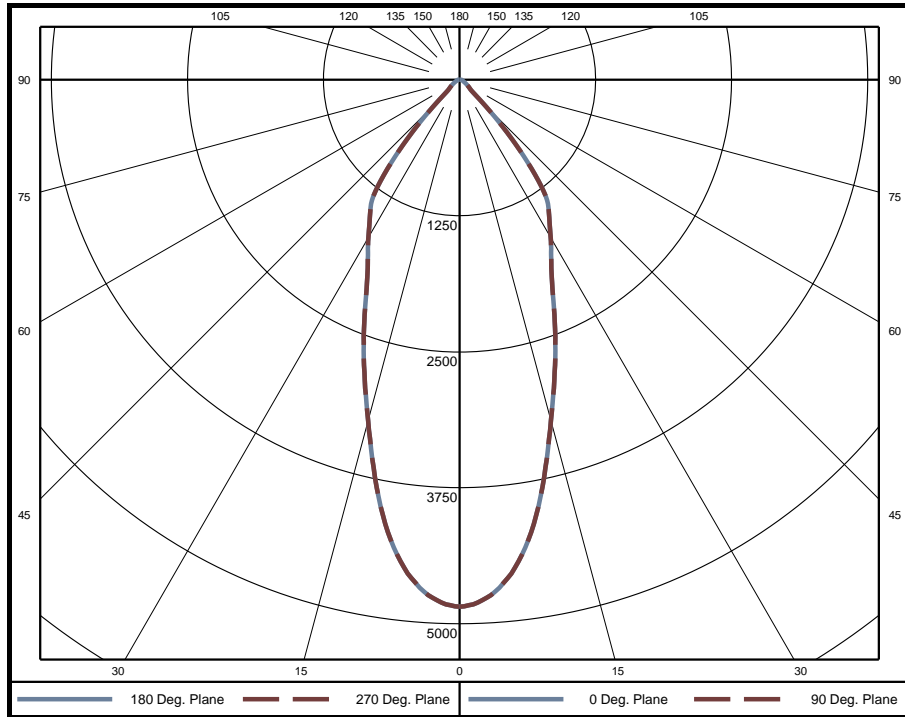
Temperature	Voltage	Current	Power	Power Factor	Frequency	Current THD
25.0 °C	120.0 VAC	0.2904 A	34.24 W	0.983	60 Hz	12.6 %

Summary of Results

Spacing Criteria
 0-180: 0.65
 90-270: 0.65

Total Lumen Output: 3577 Lumens
Luminaire Efficacy: 104.5 lm/w
Maximum Candela: 4841 Candela

Polar Plot



Zonal Lumen Summary

Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire	Zone	Lumens	% of Luminaire
0-5	113.4	3.2%	60-65	24.3	0.7%	120-125	0	0.0%
5-10	311.5	8.7%	65-70	18.4	0.5%	125-130	0	0.0%
10-15	430.3	12.0%	70-75	15.1	0.4%	130-135	0	0.0%
15-20	475.7	13.3%	75-80	13.0	0.4%	135-140	0	0.0%
20-25	475.1	13.3%	80-85	11.6	0.3%	140-145	0	0.0%
25-30	462.0	12.9%	85-90	6.3	0.2%	145-150	0	0.0%
30-35	453.4	12.7%	90-95	0	0.0%	150-155	0	0.0%
35-40	403.3	11.3%	95-100	0	0.0%	155-160	0	0.0%
40-45	218.9	6.1%	100-105	0	0.0%	160-165	0	0.0%
45-50	67.0	1.9%	105-110	0	0.0%	165-170	0	0.0%
50-55	44.1	1.2%	110-115	0	0.0%	170-175	0	0.0%
55-60	33.1	0.9%	115-120	0	0.0%	175-180	0	0.0%

Zone	Lumens	% of Luminaire
0-40	3125	87.4%
0-60	3488	97.5%
0-90	3577	100.0%
90-180	0	0.0%



Candela Tabulation
Horizontal Angle (Degrees)

Vertical Angle (Degrees)	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	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841	4841
	5	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640	4640
	10	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060	4060
	15	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245	3245
	20	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573	2573
	25	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006	2006
	30	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676	1676
	35	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423	1423
	40	920	920	920	920	920	920	920	920	920	920	920	920	920	920	920
	45	298	298	298	298	298	298	298	298	298	298	298	298	298	298	298
	50	119	119	119	119	119	119	119	119	119	119	119	119	119	119	119
	55	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60	60
	65	42	42	42	42	42	42	42	42	42	42	42	42	42	42	42
	70	32	32	32	32	32	32	32	32	32	32	32	32	32	32	32
	75	26	26	26	26	26	26	26	26	26	26	26	26	26	26	26
	80	23	23	23	23	23	23	23	23	23	23	23	23	23	23	23
	85	20	20	20	20	20	20	20	20	20	20	20	20	20	20	20
	90	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	95	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	100	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	105	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	110	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	115	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	120	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	130	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	135	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	140	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	145	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	150	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	155	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	160	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	165	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	170	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	180	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Average Luminance (cd/m²)

Vertical Angle (Degrees)	Horizontal Angle (Degrees)			
		0	45	90
	0	779900	779900	779900
	45	67860	67860	67860
	55	23980	23980	23980
	65	15950	15950	15950
	75	16370	16370	16370
	85	36520	36520	36520



Coefficients of Utilization - Zonal Cavity Method

Effective Floor Cavity Reflectance 20%																		
Ceiling Cavity Reflectance	80				70				50			30			10			0
Wall Reflectance	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
Room Cavity Ratio (RCR)	** Values are expressed as percent of total lumen output delivered to the task surface **																	
0	119	119	119	119	116	116	116	116	111	111	111	106	106	106	102	102	102	100
1	113	110	107	105	110	108	105	103	104	102	100	100	98	97	97	95	94	92
2	107	102	97	94	105	100	96	93	97	94	91	94	91	89	91	89	87	85
3	101	94	89	85	99	93	88	84	90	86	83	88	84	82	86	83	80	79
4	96	88	82	78	94	87	81	77	85	80	76	83	79	75	81	77	74	73
5	91	82	76	71	89	81	75	71	79	74	70	78	73	70	76	72	69	68
6	86	77	70	66	85	76	70	66	74	69	65	73	68	65	72	68	64	63
7	82	72	66	61	80	71	65	61	70	65	61	69	64	61	68	63	60	59
8	78	68	62	57	76	67	61	57	66	61	57	65	60	57	64	60	56	55
9	74	64	58	54	73	63	58	54	62	57	53	61	57	53	61	56	53	52
10	70	60	54	50	69	60	54	50	59	54	50	58	53	50	58	53	50	49

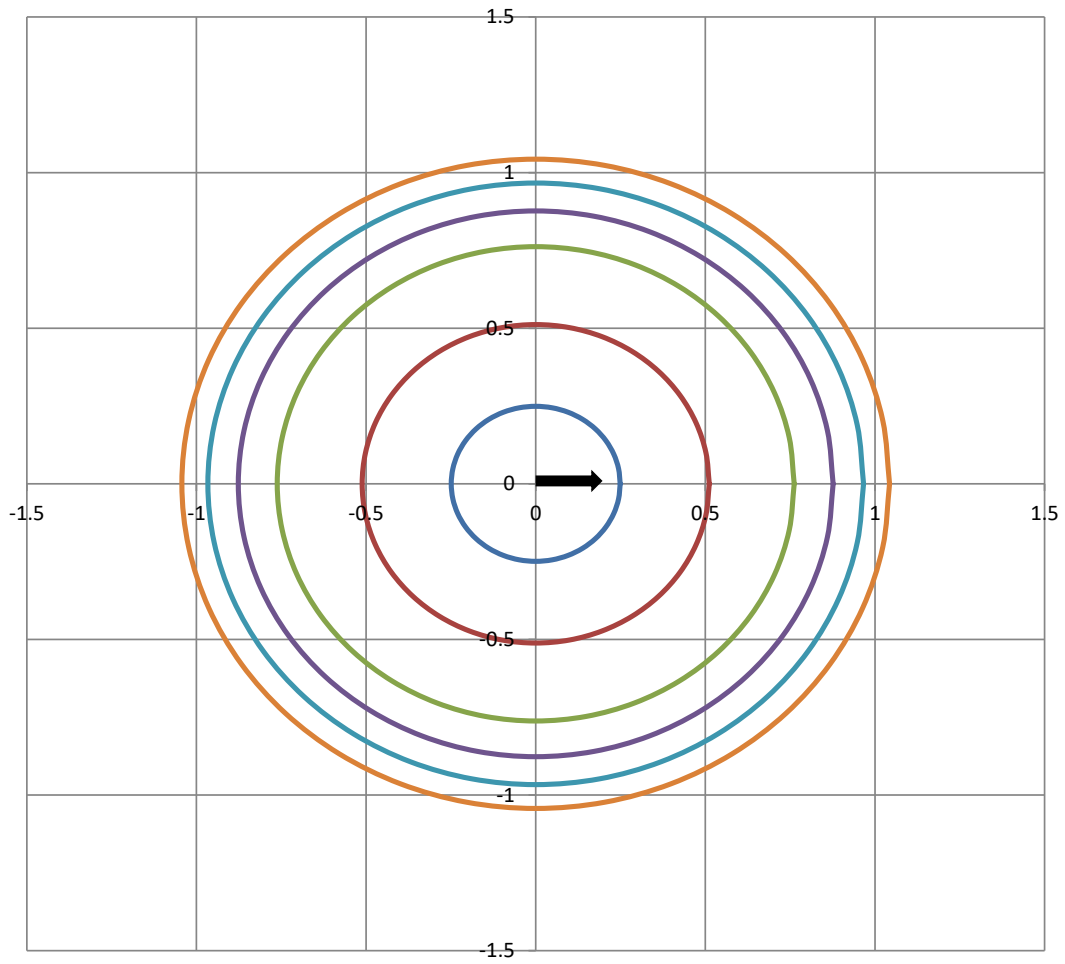
Beam and Field Information	
CIE Type:	Direct
Center Beam Intensity:	4841 Candela
Central Cone Intensity:	4769 Candela
Beam Flux:	1451.0 Lumens
Beam Angle (0-180):	42.5 Degrees
Beam Angle (90-270):	42.5 Degrees
Field Angle (0-180):	86.7 Degrees
Field Angle (90-270):	86.7 Degrees

Cone of Light Tabulation			
Mounting Height (Feet)		Footcandles at Nadir	Diameter (Feet)
4.00		303	2.61
6.00		134	3.92
8.00		75.6	5.22
10.0		48.4	6.53
12.0		33.6	7.84
14.0		24.7	9.14
16.0		18.9	10.4



ISOFootcandle Plot

Mounting Height - 8 Feet



Grid Lines in Units of Mounting Height

50 fc 20 fc 10 fc 5 fc 2 fc 1 fc