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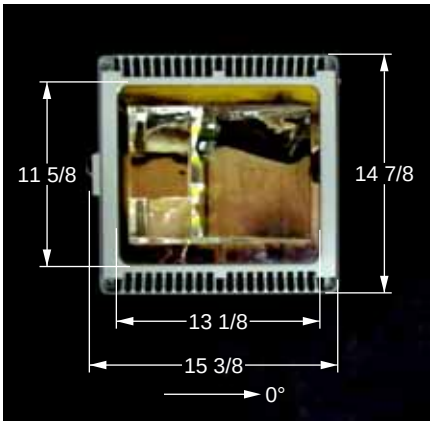
THE LIGHT CENTER OF THE INDUSTRY SINCE 1955
INDEPENDENT TESTING LABORATORIES, INC.
4066 CAMELOT CIRCLE, LONGMONT, CO 80504 USA
PHONE: (303) 442-1255 • FAX: (970) 535-3114 • E-MAIL: itl@itlboulder.com • WEBSITE: www.itlboulder.com

NVLAP LAB CODE: 200925-0

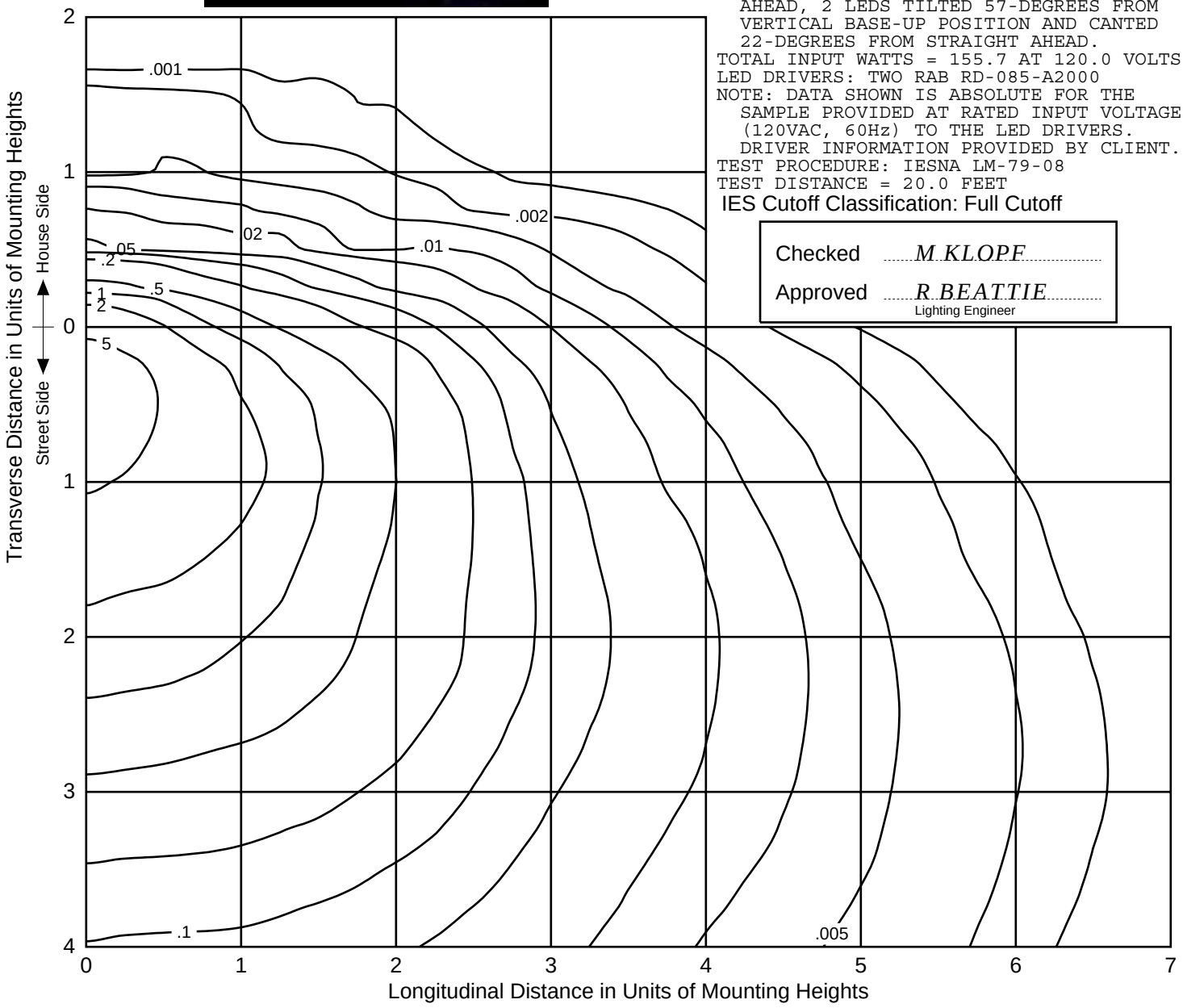
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 25 foot mounting height.



REPORT NUMBER: ITL79629
ISSUE DATE: 11/14/13 PAGE: 1 OF 8
PREPARED FOR: RAB LIGHTING, INC.
CATALOG NUMBER: ALED4T150 - RWLED4T150 - RWLED4T150SF - WPLED4T150 (TYPE IV)
LUMINAIRE: CAST FINNED METAL HOUSING, 6 CIRCUIT BOARDS EACH WITH 1 LED, MOLDED 2-PIECE PLASTIC REFLECTOR WITH SPECULAR FINISH AND 1 APERTURE PER LED, CLEAR FLAT GLASS LENS IN CAST GRAY PAINTED METAL LENS FRAME.
LAMPS: SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), 2 LEDS TILTED 56-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 18-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 16-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 22-DEGREES FROM STRAIGHT AHEAD.
TOTAL INPUT WATTS = 155.7 AT 120.0 VOLTS
LED DRIVERS: TWO RAB RD-085-A2000
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120VAC, 60Hz) TO THE LED DRIVERS. DRIVER INFORMATION PROVIDED BY CLIENT.
TEST PROCEDURE: IESNA LM-79-08
TEST DISTANCE = 20.0 FEET
IES Cutoff Classification: Full Cutoff

Checked *M KLOPF*
Approved *R BEATTIE*
Lighting Engineer



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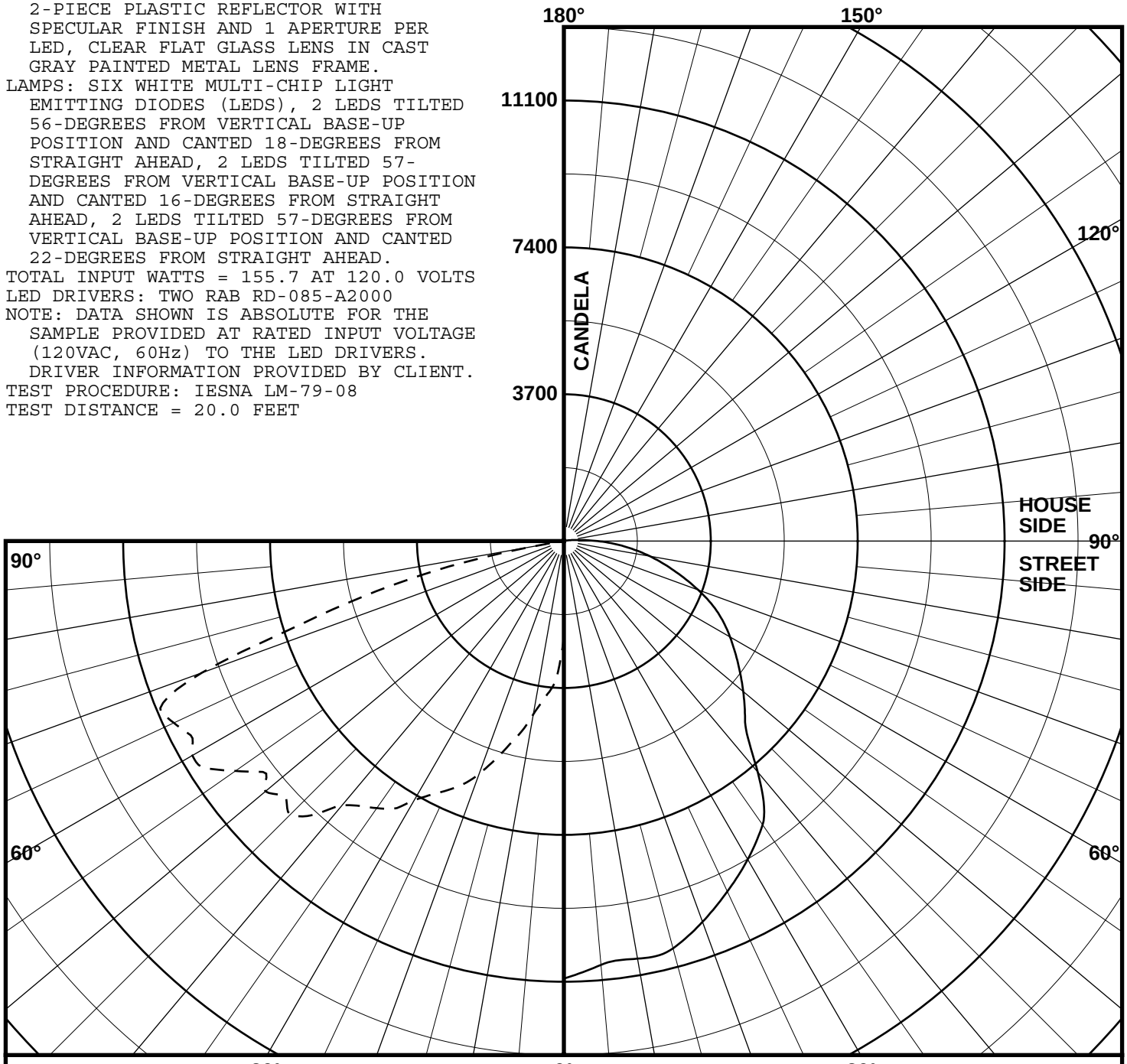
REPORT NUMBER: ITL79629
ISSUE DATE: 11/14/13 PAGE: 2 OF 8
PREPARED FOR: RAB LIGHTING, INC.
CATALOG NUMBER: ALED4T150 - RWLED4T150 - RWLED4T150SF - WPLED4T150 (TYPE IV)
LUMINAIRE: CAST FINNED METAL HOUSING, 6 CIRCUIT BOARDS EACH WITH 1 LED, MOLDED 2-PIECE PLASTIC REFLECTOR WITH SPECULAR FINISH AND 1 APERTURE PER LED, CLEAR FLAT GLASS LENS IN CAST GRAY PAINTED METAL LENS FRAME.
LAMPS: SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), 2 LEDS TILTED 56-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 18-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 16-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 22-DEGREES FROM STRAIGHT AHEAD.
TOTAL INPUT WATTS = 155.7 AT 120.0 VOLTS
LED DRIVERS: TWO RAB RD-085-A2000
NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120VAC, 60Hz) TO THE LED DRIVERS. DRIVER INFORMATION PROVIDED BY CLIENT.
TEST PROCEDURE: IESNA LM-79-08
TEST DISTANCE = 20.0 FEET

MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA



VERTICAL PLANE THROUGH MAXIMUM CANDELA
67.0 (Degrees Vertical)

CONE THROUGH MAXIMUM CANDELA
0.0 (Degrees Horizontal) = 11025

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ISSUE DATE: 11/14/13
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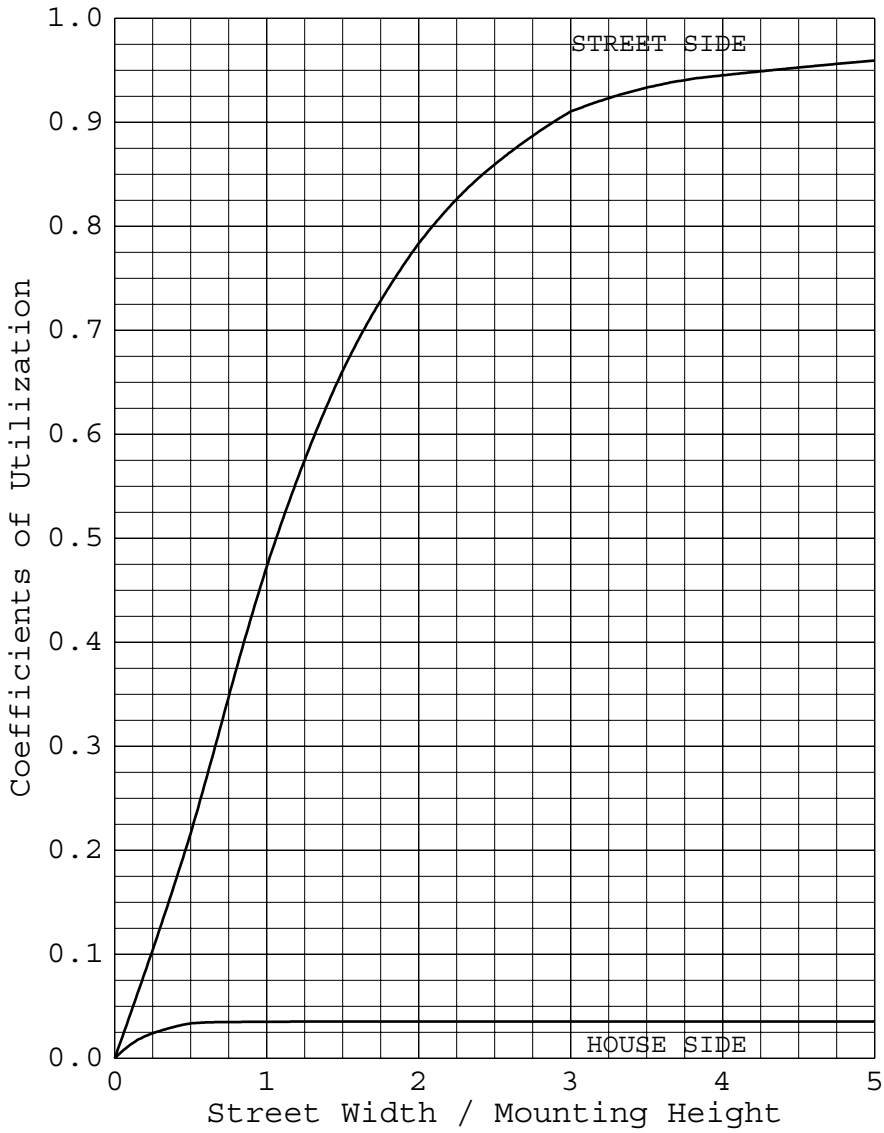
COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	13832	96.4
DOWNWARD HOUSE SIDE	517	3.6
DOWNWARD TOTAL	14349	100.0
UPWARD STREET SIDE	0	0.0
UPWARD HOUSE SIDE	0	0.0
UPWARD TOTAL	0	0.0
TOTAL FLUX	14349	100.0

EFFICACY = 92.2 lm/W

ALL CANDELA AND LUMENS IN THIS REPORT ARE BASED ON ABSOLUTE PHOTOMETRY. THE COEFFICIENT OF UTILIZATION VALUES ARE BASED ON THE TOTAL ABSOLUTE LUMEN OUTPUT OF THIS LUMINAIRE SAMPLE.

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ISSUE DATE: 11/14/13
PREPARED FOR: RAB LIGHTING, INC.

FLUX DISTRIBUTION BY SOLID ANGLE

(PER IESNA TM-15-11, LUMINAIRE CLASSIFICATION SYSTEM FOR OUTDOOR LUMINAIRES)

	LUMENS	PERCENT OF FIXTURE	BUG ZONE RATINGS	
FORWARD LIGHT	13832.	96.4		
FL (0- 30)	1831.7	12.8		
FM (30- 60)	6875.4	47.9		
FH (60- 80)	5030.5	35.1		G3
FVH(80- 90)	94.6	0.7		G1
BACK LIGHT	517.	3.6		
BL (0- 30)	286.9	2.0	B1	
BM (30- 60)	188.3	1.3	B0	
BH (60- 80)	40.9	0.3	B0	G0
BVH(80- 90)	0.5	0.0		G0
UPLIGHT	0.	0.0		
UL (90-100)	0.0	0.0	U0	
UH (100-180)	0.0	0.0	U0	
TRAPPED LIGHT	0.	0.0		
TOTAL FLUX	14349.	100.0		

BACKLIGHT, UPLIGHT, AND GLARE (BUG) RATINGS
(PER ADDENDUM A FOR IESNA TM-15-11)

BUG RATING: B1 U0 G3

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NVLAP LAB CODE: 200925-0

REPORT NUMBER: ITL79629
ISSUE DATE: 11/14/13
PREPARED FOR: RAB LIGHTING, INC.

CANDELA TABULATION

	STREET SIDE	LATERAL ANGLE									
		0.0	5.0	15.0	25.0	35.0	45.0	55.0	65.0	75.0	85.0	90.0
		||										
	180.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	175.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	145.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	135.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	125.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	115.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	105.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	95.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	92.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	90.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	87.5	9.	6.	7.	9.	8.	9.	5.	3.	2.	1.	0.
	85.0	86.	81.	102.	122.	84.	63.	46.	44.	17.	5.	3.
V	82.5	168.	155.	229.	375.	332.	343.	229.	177.	61.	22.	13.
E	80.0	805.	707.	866.	1386.	1344.	1084.	992.	675.	293.	111.	52.
R	77.5	2951.	2744.	3153.	3307.	2975.	2235.	1801.	1212.	582.	243.	103.
T	75.0	4892.	4595.	5100.	5111.	4976.	3833.	2791.	1607.	802.	373.	195.
I	72.5	6888.	6698.	7077.	7503.	6856.	5684.	3520.	2128.	1183.	591.	322.
C	70.0	9708.	9416.	9227.	9273.	8241.	6248.	4560.	3159.	1852.	915.	504.
A	67.5	11001.	10688.	10529.	9773.	8741.	6457.	5250.	4128.	2738.	1428.	784.
L	67.0<<	11025.	10718.	10623.	9742.	8727.	6457.	5351.	4285.	2871.	1524.	848.
	65.0 |	10840.	10494.	10539.	9387.	8649.	6425.	5529.	4589.	3283.	1812.	1031.
A	62.5 |	10599.	10034.	10241.	9507.	8920.	7021.	5577.	4558.	3471.	1856.	1078.
N	60.0 |	10803.	10031.	10033.	9456.	9122.	7846.	5940.	4486.	3522.	1707.	1071.
G	57.5 |	10662.	9732.	9584.	9325.	8633.	8270.	6369.	4340.	3430.	1633.	1145.
L	55.0 |	10100.	9259.	9031.	8958.	8124.	8074.	6577.	4383.	3268.	1655.	1208.
E	52.5 |	9554.	9046.	8884.	8615.	7759.	7661.	6300.	4422.	3112.	1743.	1235.
	50.0 |	9811.	9289.	8892.	8541.	7410.	6817.	5731.	4298.	3178.	1756.	1203.
	47.5 |	9538.	9196.	8791.	8074.	7194.	6256.	5371.	4183.	3204.	1810.	1228.
	45.0 |	9742.	9407.	8624.	7935.	6969.	5998.	5089.	4076.	3087.	1851.	1237.
	42.5 |	9364.	9082.	8413.	7544.	6508.	5762.	4888.	4010.	2950.	1913.	1295.
	40.0 |	8690.	8549.	8173.	7207.	6303.	5634.	4851.	3993.	2857.	1959.	1363.
	37.5 |	8417.	8293.	7872.	7001.	6133.	5537.	4796.	3992.	2832.	1993.	1391.
	35.0 |	8214.	8016.	7458.	6679.	5968.	5431.	4778.	3862.	2855.	2107.	1451.
	30.0 |	7536.	7314.	6658.	6254.	5684.	5199.	4564.	3714.	2854.	2316.	1627.
	25.0 |	6924.	6826.	6289.	5898.	5411.	4842.	4232.	3614.	3053.	2498.	1888.
	20.0 |	6243.	6197.	5779.	5401.	5027.	4484.	3958.	3411.	3098.	2456.	1975.
	15.0 |	5315.	5296.	5118.	4790.	4435.	4094.	3708.	3420.	3161.	2476.	2095.
	10.0 |	4434.	4398.	4293.	4163.	3914.	3717.	3585.	3422.	3053.	2505.	2236.
	5.0 |	3753.	3752.	3711.	3688.	3588.	3457.	3271.	3037.	2766.	2451.	2314.
	0.0 |	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.
	|	||										
	|	PLANE OF MAXIMUM CANDELA										
	CONE OF MAXIMUM CANDELA											

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ISSUE DATE: 11/14/13
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CANDELA TABULATION

	HOUSE SIDE	LATERAL ANGLE									
		95.0	105.0	115.0	125.0	135.0	145.0	155.0	165.0	175.0	180.0
	180.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	175.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	165.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	155.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	145.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	135.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	125.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	115.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	105.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	95.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	92.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	90.0	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	87.5	0.	0.	0.	0.	0.	0.	0.	0.	0.	0.
	85.0	2.	0.	0.	0.	0.	0.	0.	0.	0.	0.
V	82.5	7.	2.	1.	0.	0.	0.	0.	0.	0.	0.
E	80.0	17.	6.	3.	1.	0.	0.	0.	0.	0.	0.
R	77.5	34.	11.	5.	2.	1.	0.	0.	0.	0.	0.
T	75.0	91.	15.	9.	3.	2.	1.	0.	0.	0.	0.
I	72.5	127.	20.	10.	4.	3.	1.	0.	0.	0.	0.
C	70.0	223.	25.	11.	7.	3.	2.	1.	0.	0.	0.
A	67.5	293.	37.	16.	13.	5.	2.	1.	0.	0.	0.
L	67.0<<	306.	37.	16.	13.	6.	2.	1.	0.	0.	0.
	65.0 |	345.	41.	20.	10.	11.	3.	2.	1.	0.	0.
A	62.5 |	379.	51.	30.	11.	10.	8.	2.	1.	0.	0.
N	60.0 |	484.	56.	37.	14.	8.	13.	8.	2.	1.	1.
G	57.5 |	565.	76.	38.	18.	9.	10.	13.	8.	6.	6.
L	55.0 |	610.	128.	39.	23.	11.	10.	12.	14.	12.	13.
E	52.5 |	650.	198.	41.	30.	14.	13.	13.	11.	12.	11.
	50.0 |	680.	262.	53.	34.	18.	12.	15.	12.	11.	8.
	47.5 |	692.	315.	61.	38.	22.	13.	10.	8.	7.	6.
	45.0 |	735.	388.	65.	49.	25.	16.	9.	7.	6.	6.
	42.5 |	795.	436.	74.	47.	37.	19.	14.	9.	7.	7.
	40.0 |	873.	442.	114.	46.	44.	26.	23.	15.	13.	12.
	37.5 |	938.	475.	189.	43.	41.	43.	33.	24.	21.	22.
	35.0 |	1012.	508.	294.	53.	42.	55.	55.	37.	33.	36.
	30.0 |	1227.	636.	428.	152.	57.	46.	47.	52.	66.	73.
	25.0 |	1510.	895.	562.	423.	170.	69.	49.	46.	49.	50.
	20.0 |	1657.	1106.	740.	567.	397.	246.	137.	98.	80.	78.
	15.0 |	1835.	1410.	1008.	750.	601.	518.	431.	385.	345.	342.
	10.0 |	2031.	1764.	1435.	1163.	1003.	874.	779.	723.	698.	698.
	5.0 |	2211.	2038.	1930.	1832.	1713.	1604.	1479.	1427.	1385.	1393.
	0.0 |	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.	2419.

CONE OF MAXIMUM CANDELA

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PREPARED FOR: RAB LIGHTING, INC.

5-DEGREE ZONAL LUMEN SUMMARY

0- 5	60
5- 10	176
10- 15	288
15- 20	405
20- 25	532
25- 30	658
30- 35	790
35- 40	931
40- 45	1084
45- 50	1247
50- 55	1419
55- 60	1593
60- 65	1673
65- 70	1653
70- 75	1200
75- 80	546
80- 85	90
85- 90	5
90- 95	0
95-100	0
100-105	0
105-110	0
110-115	0
115-120	0
120-125	0
125-130	0
130-135	0
135-140	0
140-145	0
145-150	0
150-155	0
155-160	0
160-165	0
165-170	0
170-175	0
175-180	0

10-DEGREE ZONAL LUMEN SUMMARY

0- 10	236
0- 20	928
0- 30	2119
0- 40	3840
0- 50	6170
0- 60	9182
0- 70	12508
0- 80	14254
0- 90	14349
0-100	14349
0-110	14349
0-120	14349
0-130	14349
0-140	14349
0-150	14349
0-160	14349
0-170	14349
0-180	14349

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ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

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REPORT NUMBER: ITL79632
DATE: 11/22/13
PREPARED FOR: RAB LIGHTING, INC.
CATALOG NUMBER: ALED4T150 - RWLED4T150 - RWLED4T150SF - WPLED4T150 (TYPE IV)

ADDRESS: 170 LUDLOW AVE
NORTHVALE, NJ 07647

LUMINAIRE: CAST FINNED METAL HOUSING, 6 CIRCUIT BOARDS EACH WITH 1 LED, MOLDED 2-PIECE PLASTIC REFLECTOR WITH SPECULAR FINISH AND 1 APERTURE PER LED, CLEAR FLAT GLASS LENS IN CAST GRAY PAINTED METAL LENS FRAME.

LAMP: SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDS), 2 LEDS TILTED 56-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 18-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 16-DEGREES FROM STRAIGHT AHEAD, 2 LEDS TILTED 57-DEGREES FROM VERTICAL BASE-UP POSITION AND CANTED 22-DEGREES FROM STRAIGHT AHEAD.

DRIVERS: TWO RAB RD-085-A2000

NOTE: DATA SHOWN IS ABSOLUTE FOR THE SAMPLE PROVIDED AT RATED INPUT VOLTAGE (120.0 AND 277.0 VAC, 60Hz) TO THE LED DRIVERS. DRIVER INFORMATION PROVIDED BY CLIENT.

INSTRUMENTS:		Calibration Due:
	Associated Power Technologies APT5040 AC Power Source	N/A
	Yokogawa WT210 Digital Power Meter #9	02/28/14
	Ocean Optics QE65000 Spectroradiometer	10/16/14
	ITL 2.0m Diameter Integrating Sphere S20-2, 4PI Geometry	10/16/14

OBJECT OF TEST: Measure the Total Radiant Flux*, Spectral Power Distribution (SPD), Correlated Color Temperature (CCT), Color Rendering Indices (CRIa,1-14), Chromaticity Coordinates (x,y; u'v'), ANSI C78.377 Duv, and electrical data including ANSI C82.77-2002 Power Factor (PF) and Total Harmonic Distortion (THD) to the test sample. Report Off-State Power. Measure electrical data including Total Harmonic Distortion (THD) at maximum rated voltage.

PROCEDURE: The test sample was provided by the customer and had an unknown number of operating hours. The test sample was mounted inside the integrating sphere and allowed to stabilize. After stabilization occurred, measurements were taken. In order to measure mean performance, multiple data sets were recorded and averaged. Readings were taken with the test sample operating at 120.0 VAC input. Electrical data was also recorded at maximum nominal rated input voltage (277.0 VAC). All testing performed in a 25 +/-1 degree Celsius free air ambient and in accordance with IESNA LM-79-08. All data are traceable to the National Institute of Standards and Technology. Off-State Power was reported with no voltage applied to the sample.

*NOTE: Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

RESULTS: (continued subsequent pages)

Checked *P O'CONNOR*
Approved *L GRABA*
Lighting Engineer

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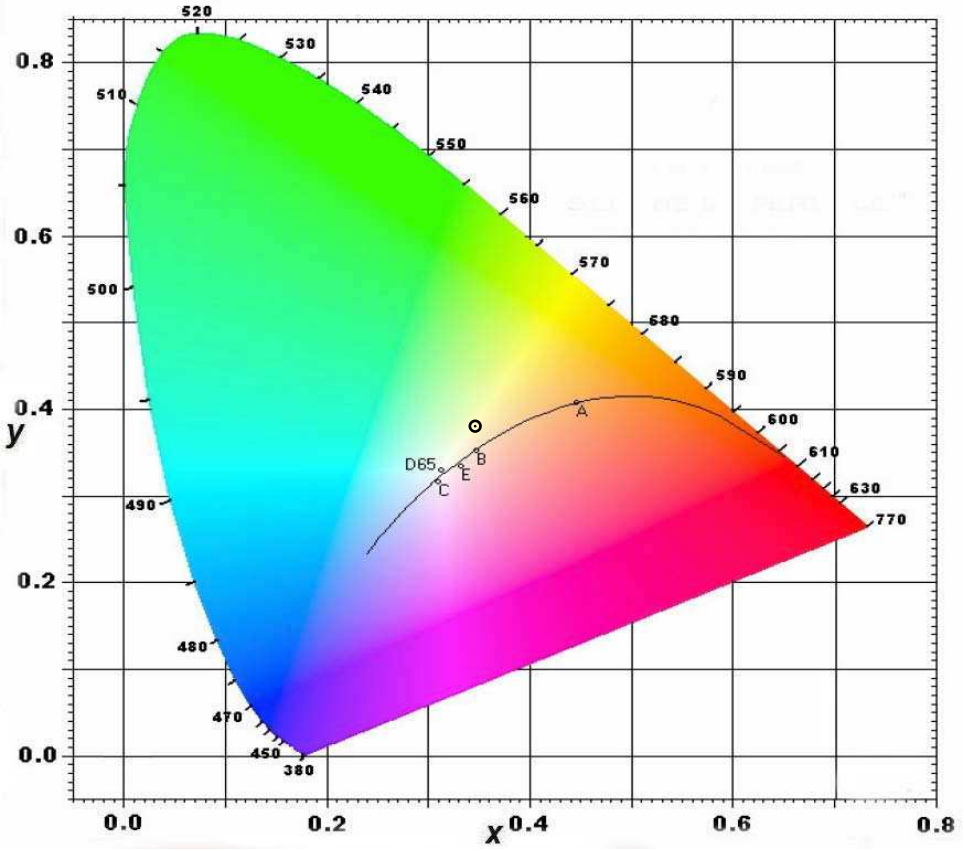
THE LIGHT CENTER OF THE INDUSTRY SINCE 1955
NVLAP LAB CODE: 200925-0
INDEPENDENT TESTING LABORATORIES, INC.
4066 CAMELOT CIRCLE, LONGMONT, CO 80504 USA
PHONE: (303)442-1255 • FAX: (970)535-3114 • E-MAIL: itl@itlboulder.com • WEBSITE: www.itlboulder.com

REPORT NUMBER: ITL79632
DATE: 11/22/13
PREPARED FOR: RAB LIGHTING, INC.
CATALOG NUMBER: ALED4T150 - RWLED4T150 - RWLED4T150SF - WPLED4T150 (TYPE IV)

CIE Chromaticity Diagram



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RESULTS:

SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3459
Chromaticity Ordinate y	0.3801
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2014
Chromaticity Ordinate v'	0.4980
Correlated Color Temp CCT (K)	5056
ANSI C78.377-2008 Duv	0.013
Total Radiant Flux (milliWatts)	40582 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	1.31
Input Power (Watts)	155.9
Input Power Factor (%)	99.2
Input Current THD (%)	4.7
Input Voltage THD (%)	0.2
Off-State Power (Watts)	0.0
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.588
Input Power (Watts)	152.4
Input Power Factor (%)	93.6
Input Current THD (%)	13.3
Input Voltage THD (%)	0.1

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	65
R1 Light greyish red	60
R2 Dark greyish yellow	69
R3 Strong yellowish green	77
R4 Moderate yellowish green	65
R5 Light bluish green	61
R6 Light blue	59
R7 Light violet	78
R8 Light reddish purple	50
R9 Strong red	-57
R10 Strong yellow	28
R11 Strong green	60
R12 Strong blue	31
R13 Light yellowish pink (skin)	61
R14 Moderate olive green (leaf)	87

*NOTE: Proper calibration of integrating spheres for measuring total flux output of non-directional samples will produce reliable, repeatable results within the calibration tolerances of the equipment used. However, measurement of test samples with significant self absorption and/or directional output, even when these effects are compensated for, are likely to have a greater variation in results compared to the flux output calculated from a goniophotometric exploration since these artifacts do not affect the goniophotometric results.

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RESULTS:

Wavelength	mW per nm	Wavelength	mW per nm	Wavelength	mW per nm
380	1.192	515	158.772	650	79.533
385	1.354	520	187.112	655	71.316
390	1.612	525	209.983	660	63.644
395	2.194	530	227.166	665	56.669
400	3.277	535	238.700	670	50.382
405	5.712	540	245.913	675	44.655
410	10.735	545	249.935	680	39.525
415	20.519	550	251.636	685	34.973
420	38.022	555	251.421	690	30.909
425	66.544	560	249.369	695	27.456
430	107.478	565	246.480	700	23.943
435	159.742	570	241.761	705	21.032
440	230.108	575	235.954	710	18.493
445	303.858	580	228.805	715	16.256
450	298.491	585	220.400	720	14.226
455	208.480	590	211.095	725	12.459
460	130.862	595	200.685	730	10.916
465	86.690	600	189.697	735	9.566
470	57.378	605	178.265	740	8.371
475	39.762	610	166.559	745	7.354
480	31.960	615	154.367	750	6.475
485	30.482	620	142.404	755	5.683
490	35.043	625	130.679	760	4.978
495	47.171	630	119.225	765	4.365
500	67.689	635	108.432	770	3.847
505	95.051	640	98.270	775	3.375
510	126.884	645	88.552	780	2.969