

**itl boulder**  
THE LIGHT CENTER OF THE INDUSTRY SINCE 1955

PHONE: (303) 442-1255

FAX: (970) 535-3114

E-MAIL: [itl@itlboulder.com](mailto:itl@itlboulder.com)

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**NVLAP**  
NVLAP LAB CODE: 200925-0

INDEPENDENT TESTING LABORATORIES, INC.

4066 CAMELOT CIRCLE, LONGMONT, CO 80504 USA

## ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINATION

Values based on 15 foot mounting height.



REPORT NUMBER: ITL80202

ISSUE DATE: 12/20/13

PAGE: 1 OF 8

PREPARED FOR: RAB LIGHTING, INC.

CATALOG NUMBER: ALED5T78 (TYPE V)

LUMINAIRE: CAST BROWN PAINTED METAL POST

TOP FITTER WITH 3 FABRICATED BROWN

PAINTED METAL VERTICAL POSTS, CAST 2-

PIECE BROWN PAINTED FINNED METAL

HOUSING, 6 CAST METAL HEAT

SINKS/CIRCUIT BOARD MOUNTING BRACKETS,

6 CIRCUIT BOARDS EACH WITH 1 LED AND

MOLDED PLASTIC CIRCUIT BOARD PERIMETER

OVERLAY WITH SPECULAR FINISH, MOLDED

PLASTIC REFLECTOR WITH SPECULAR FINISH

AND 1 APERTURE PER LED, CLEAR FLAT GLASS

LENS IN CAST BROWN PAINTED METAL FRAME.

LAMPS: SIX WHITE MULTI-CHIP LIGHT

EMITTING DIODES (LEDs), AIMED 5-

DEGREES BELOW THE HORIZON.

TOTAL INPUT WATTS = 89.1 AT 120.0 VOLTS

LED DRIVERS: THREE RAB RDF25U7-02

NOTE: DATA SHOWN IS ABSOLUTE FOR THE

SAMPLE PROVIDED AT RATED INPUT VOLTAGE

(120VAC, 60Hz) TO THE DRIVERS. DRIVER

INFORMATION PROVIDED BY CLIENT.

TEST PROCEDURE: IESNA LM-79-08

TEST DISTANCE = 35.0 FEET

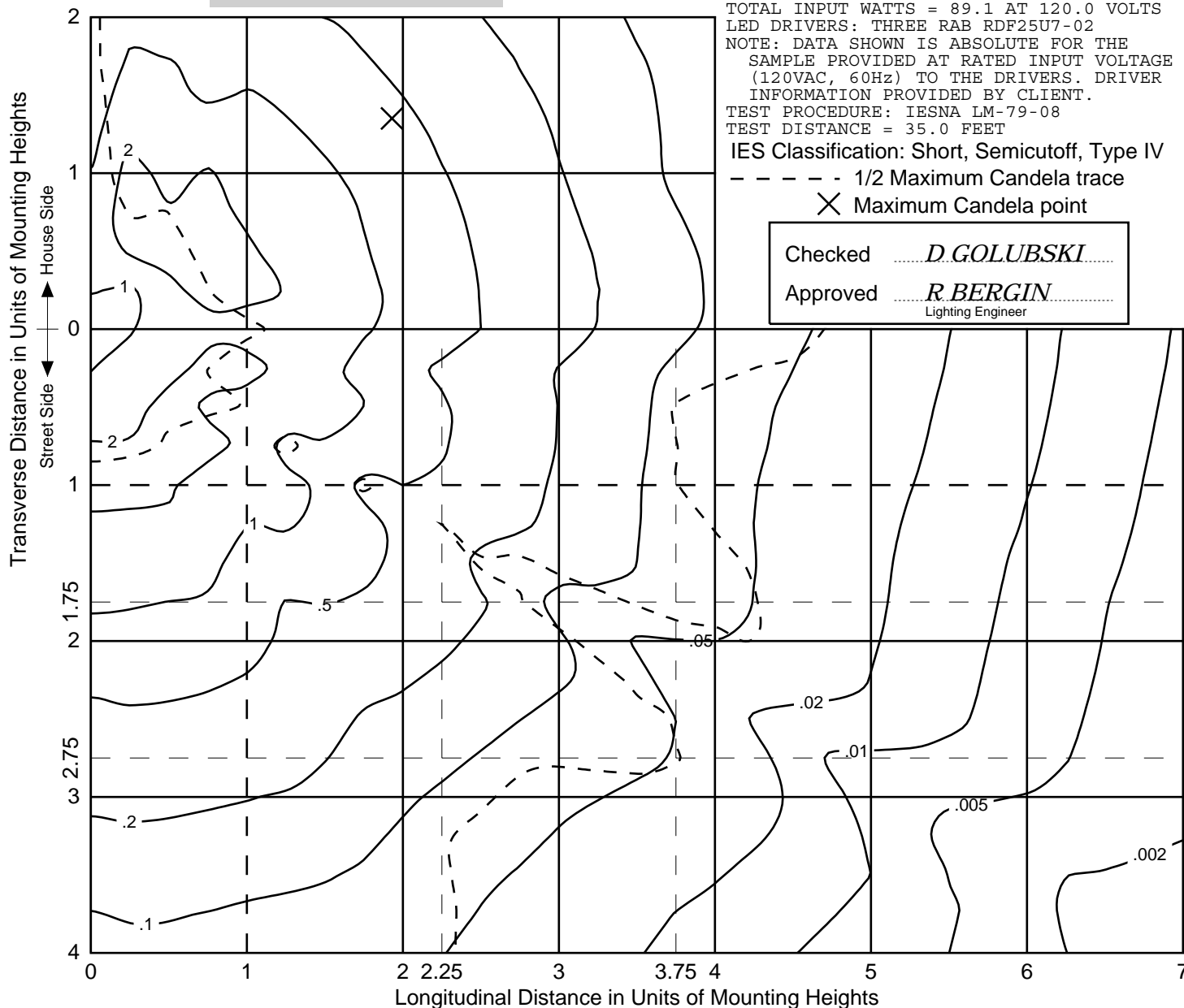
IES Classification: Short, Semicutoff, Type IV

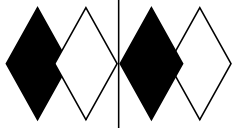
--- 1/2 Maximum Candela trace

X Maximum Candela point

Checked ..... *D. GOLUBSKI* .....

Approved ..... *R. BERGIN* .....  
Lighting Engineer





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PREPARED FOR: RAB LIGHTING, INC.

CATALOG NUMBER: ALED5T78 (TYPE V)

LUMINAIRE: CAST BROWN PAINTED METAL POST  
TOP FITTER WITH 3 FABRICATED BROWN  
PAINTED METAL VERTICAL POSTS, CAST 2-  
PIECE BROWN PAINTED FINNED METAL  
HOUSING, 6 CAST METAL HEAT  
SINKS/CIRCUIT BOARD MOUNTING BRACKETS,  
6 CIRCUIT BOARDS EACH WITH 1 LED AND  
MOLDED PLASTIC CIRCUIT BOARD PERIMETER  
OVERLAY WITH SPECULAR FINISH, MOLDED  
PLASTIC REFLECTOR WITH SPECULAR FINISH  
AND 1 APERTURE PER LED, CLEAR FLAT  
GLASS LENS IN CAST BROWN PAINTED METAL  
FRAME.

LAMPS: SIX WHITE MULTI-CHIP LIGHT  
EMITTING DIODES (LEDs), AIMED 5-  
DEGREES BELOW THE HORIZON.

TOTAL INPUT WATTS = 89.1 AT 120.0 VOLTS

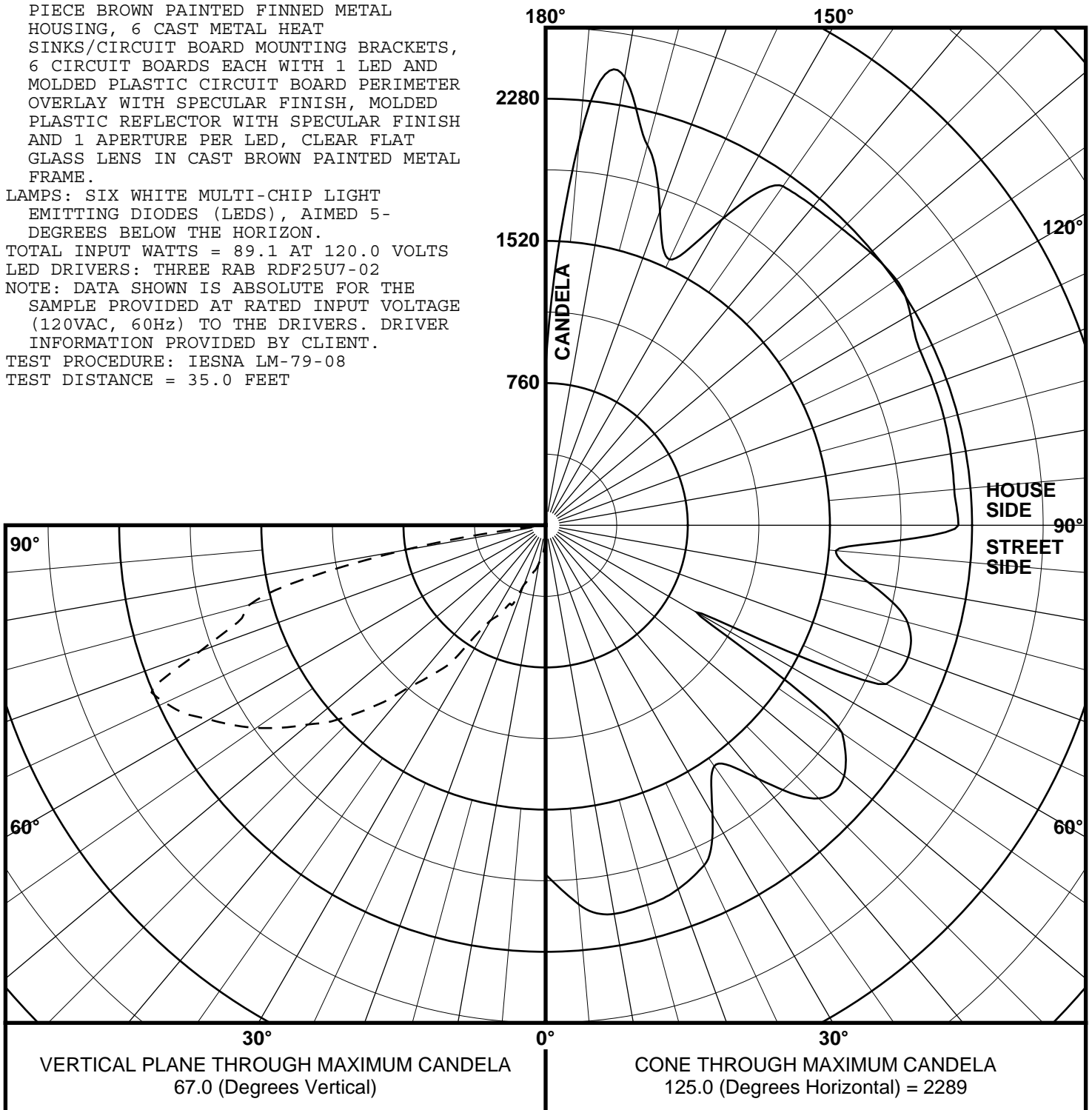
LED DRIVERS: THREE RAB RDF25U7-02

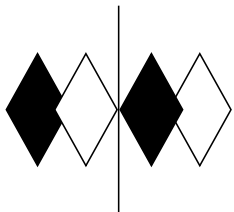
NOTE: DATA SHOWN IS ABSOLUTE FOR THE  
SAMPLE PROVIDED AT RATED INPUT VOLTAGE  
(120VAC, 60Hz) TO THE DRIVERS. DRIVER  
INFORMATION PROVIDED BY CLIENT.

TEST PROCEDURE: IESNA LM-79-08

TEST DISTANCE = 35.0 FEET

#### MAXIMUM PLANE AND MAXIMUM CONE PLOTS OF CANDELA





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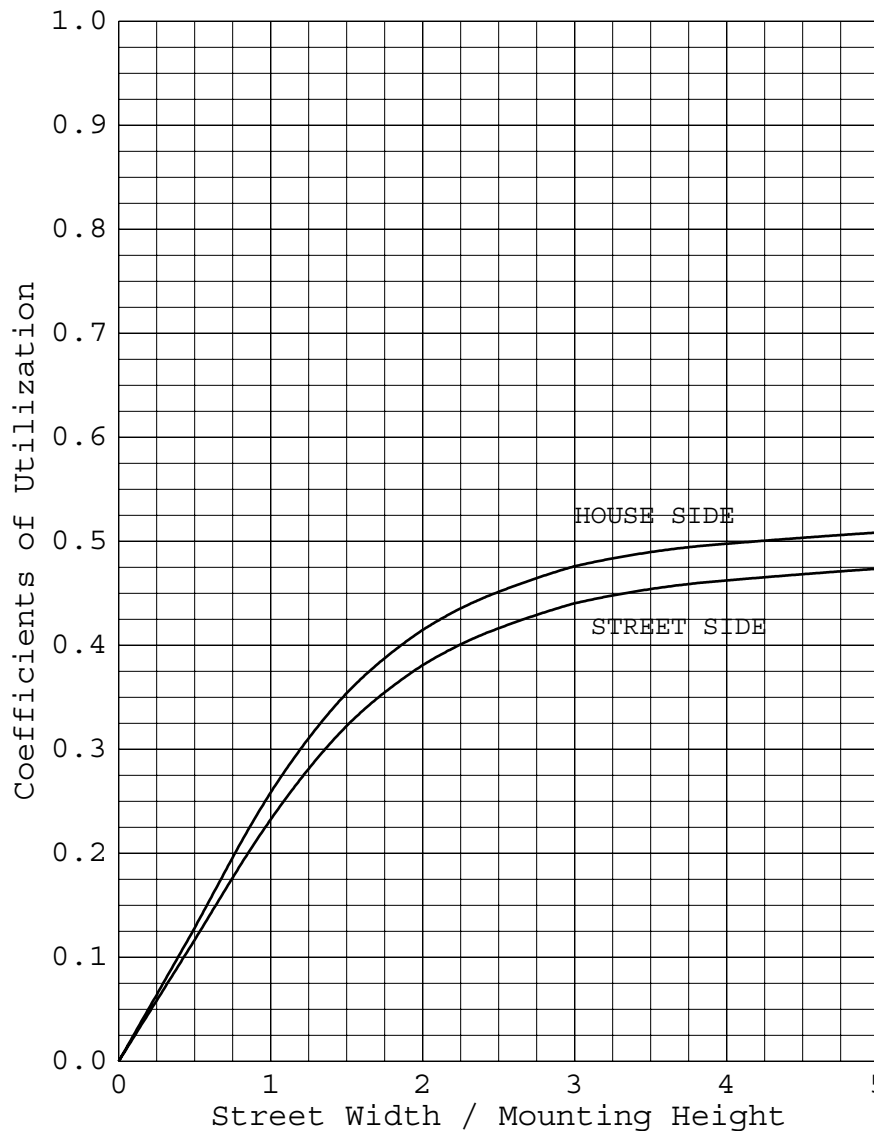
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PREPARED FOR: RAB LIGHTING, INC.

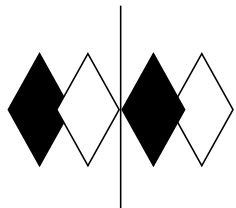
## COEFFICIENTS OF UTILIZATION AND FLUX DISTRIBUTION



	LUMENS	PERCENT OF FIXTURE
DOWNWARD STREET SIDE	3384	48.2
DOWNWARD HOUSE SIDE	3623	51.6
DOWNWARD TOTAL	7007	99.8
UPWARD STREET SIDE	7	0.1
UPWARD HOUSE SIDE	7	0.1
UPWARD TOTAL	14	0.2
TOTAL FLUX	7021	100.0

EFFICACY = 78.8 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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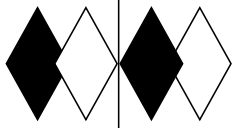
### FLUX DISTRIBUTION BY SOLID ANGLE

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

	LUMENS	PERCENT OF FIXTURE	BUG ZONE RATINGS
FORWARD LIGHT	3384.	48.2	
FL ( 0- 30)	167.1	2.4	
FM ( 30- 60)	1546.1	22.0	
FH ( 60- 80)	1582.8	22.5	G1
FVH( 80- 90)	87.9	1.3	G1
BACK LIGHT	3623.	51.6	
BL ( 0- 30)	164.4	2.3	B1
BM ( 30- 60)	1622.0	23.1	B2
BH ( 60- 80)	1742.3	24.8	B3 G1
BVH( 80- 90)	94.6	1.3	G1
UPLIGHT	14.	0.2	
UL ( 90-100)	7.8	0.1	U1
UH (100-180)	6.6	0.1	U1
TRAPPED LIGHT	0.	0.0	
TOTAL FLUX	7021.	100.0	

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

BUG RATING: B3 U1 G1



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# CANDELA TABULATION

	STREET SIDE										
	0.0	5.0	15.0	25.0	35.0	45.0	55.0	60.0	65.0	75.0	85.0
	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	1.	1.	1.	1.	1.	1.	1.	1.	1.	0.
	105.0	3.	3.	4.	5.	3.	7.	7.	7.	8.	4.
	95.0	6.	6.	8.	8.	5.	8.	7.	7.	8.	5.
	92.5	8.	8.	9.	9.	5.	8.	7.	7.	7.	5.
	90.0	11.	11.	9.	8.	5.	7.	7.	7.	7.	5.
	87.5	25.	24.	21.	19.	15.	16.	17.	14.	17.	15.
	85.0	92.	59.	56.	55.	40.	37.	41.	34.	43.	42.
V	82.5	256.	312.	209.	291.	219.	201.	218.	113.	226.	207.
E	80.0	782.	936.	699.	953.	726.	593.	655.	302.	697.	617.
R	77.5	1111.	1291.	1152.	1366.	1029.	973.	1289.	601.	1281.	995.
T	75.0	1291.	1426.	1373.	1450.	1208.	1231.	1432.	785.	1433.	1192.
I	72.5	1530.	1628.	1642.	1747.	1373.	1494.	1526.	865.	1471.	1437.
C	70.0	1828.	1929.	1911.	2079.	1434.	1793.	1797.	960.	1825.	1822.
A	67.5	1862.	2021.	2100.	2017.	1572.	2060.	1927.	956.	2001.	1994.
L	67.0<<	1866.	2034.	2100.	2006.	1572.	2065.	1936.	932.	2009.	2003.
	65.0	1918.	2005.	2021.	2027.	1430.	2026.	1929.	913.	1982.	2005.
A	62.5	1998.	2009.	1996.	2088.	1330.	2011.	1948.	958.	1952.	2008.
N	60.0	2009.	1966.	1988.	2116.	1310.	2007.	1877.	952.	1876.	2014.
G	57.5	1904.	1905.	1935.	2096.	1289.	1963.	1777.	864.	1790.	1966.
L	55.0	1778.	1812.	1859.	2033.	1275.	1913.	1671.	765.	1704.	1897.
E	52.5	1713.	1732.	1788.	1964.	1291.	1857.	1574.	713.	1609.	1832.
	50.0	1656.	1631.	1713.	1839.	1291.	1765.	1442.	694.	1491.	1752.
	47.5	1568.	1536.	1615.	1638.	1285.	1670.	1331.	691.	1383.	1665.
	45.0	1505.	1438.	1471.	1398.	1266.	1539.	1254.	697.	1307.	1540.
	42.5	1358.	1265.	1312.	1144.	1231.	1384.	1162.	625.	1212.	1392.
	40.0	1181.	1121.	1199.	873.	1156.	1262.	1057.	573.	1077.	1276.
	37.5	952.	1011.	1108.	676.	1051.	1147.	940.	548.	954.	1170.
	35.0	765.	890.	984.	576.	910.	1038.	807.	482.	832.	1055.
	30.0	552.	548.	715.	454.	803.	798.	592.	386.	596.	811.
	25.0	479.	489.	308.	418.	587.	646.	454.	330.	474.	650.
	20.0	284.	268.	211.	317.	466.	482.	353.	332.	376.	492.
	15.0	235.	236.	240.	218.	251.	240.	258.	262.	267.	271.
	10.0	194.	191.	180.	158.	160.	199.	206.	203.	209.	196.
	5.0	150.	148.	142.	120.	116.	126.	138.	145.	148.	139.
	0.0	78.	78.	78.	78.	78.	78.	78.	78.	78.	78.

CONE OF MAXIMUM CANDELA

REPORT NUMBER: ITL80202  
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PREPARED FOR: RAB LIGHTING, INC.

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# CANDELA TABULATION

	HOUSE	SIDE	LATERAL ANGLE									
			90.0	95.0	105.0	115.0	125.0	135.0	145.0	155.0	165.0	175.0
	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	1.	1.	1.	1.	1.	1.	1.	0.	1.	1.	1.
	105.0	6.	5.	4.	4.	4.	4.	5.	4.	7.	7.	7.
	95.0	6.	9.	8.	7.	7.	8.	9.	5.	8.	7.	7.
	92.5	5.	9.	9.	9.	8.	9.	9.	5.	8.	7.	7.
	90.0	4.	8.	10.	11.	11.	10.	8.	5.	7.	7.	7.
	87.5	18.	20.	21.	26.	27.	21.	20.	15.	16.	17.	15.
	85.0	72.	51.	55.	55.	54.	51.	53.	47.	43.	46.	40.
V	82.5	241.	248.	239.	248.	249.	226.	267.	252.	221.	242.	106.
E	80.0	734.	906.	671.	790.	779.	721.	962.	797.	615.	792.	316.
R	77.5	1244.	1393.	1129.	1356.	1315.	1137.	1377.	1067.	950.	1310.	597.
T	75.0	1493.	1575.	1368.	1594.	1638.	1428.	1559.	1179.	1205.	1369.	728.
I	72.5	1748.	1868.	1673.	1704.	1727.	1707.	1926.	1410.	1445.	1544.	879.
C	70.0	2084.	2156.	2034.	2007.	1963.	2029.	2163.	1524.	1842.	1866.	978.
A	67.5	2241.	2201.	2236.	2206.	2271.	2237.	2196.	1594.	2106.	2073.	860.
L	67.0<<	2207.	2193.	2206.	2209.	2289.	2241.	2212.	1568.	2103.	2065.	844.
	65.0	2067.	2184.	2113.	2223.	2245.	2163.	2210.	1427.	2053.	2079.	844.
A	62.5	2023.	2147.	2102.	2183.	2177.	2087.	2166.	1370.	2060.	2040.	878.
N	60.0	1941.	2160.	2071.	2096.	2076.	2043.	2193.	1373.	2043.	1924.	882.
G	57.5	1799.	2141.	2014.	2006.	1987.	1977.	2161.	1354.	1992.	1761.	805.
L	55.0	1597.	2079.	1930.	1907.	1888.	1894.	2095.	1313.	1938.	1615.	715.
E	52.5	1398.	2012.	1831.	1803.	1777.	1799.	2025.	1278.	1861.	1472.	691.
	50.0	1240.	1882.	1732.	1687.	1657.	1712.	1881.	1250.	1770.	1398.	680.
	47.5	1095.	1671.	1621.	1577.	1552.	1617.	1662.	1225.	1659.	1306.	657.
	45.0	993.	1424.	1485.	1474.	1416.	1443.	1428.	1230.	1525.	1291.	661.
	42.5	890.	1141.	1324.	1310.	1281.	1297.	1189.	1209.	1397.	1184.	640.
	40.0	788.	893.	1223.	1136.	1128.	1208.	923.	1175.	1296.	1066.	595.
	37.5	702.	696.	1132.	1025.	1017.	1121.	700.	1084.	1197.	966.	564.
	35.0	644.	582.	1017.	918.	913.	987.	591.	962.	1056.	863.	495.
	30.0	686.	474.	786.	600.	586.	770.	483.	793.	839.	613.	405.
	25.0	593.	434.	331.	482.	468.	350.	454.	647.	689.	486.	383.
	20.0	423.	359.	225.	333.	339.	228.	336.	514.	555.	369.	350.
	15.0	230.	213.	253.	261.	263.	260.	234.	293.	286.	265.	268.
	10.0	151.	150.	177.	205.	206.	190.	163.	169.	204.	214.	217.
	5.0	122.	124.	137.	146.	146.	145.	130.	123.	136.	147.	150.
	0.0	78.	78.	78.	78.	78.	78.	78.	78.	78.	78.	78.



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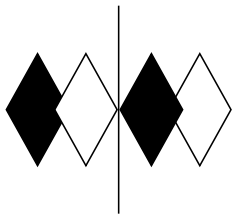
PAGE: 7 OF 8

5-DEGREE  
ZONAL LUMEN SUMMARY

0- 5	3
5- 10	11
10- 15	26
15- 20	51
20- 25	92
25- 30	148
30- 35	223
35- 40	328
40- 45	456
45- 50	597
50- 55	725
55- 60	840
60- 65	928
65- 70	981
70- 75	827
75- 80	589
80- 85	169
85- 90	13
90- 95	4
95-100	4
100-105	3
105-110	2
110-115	1
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	14
0- 20	91
0- 30	331
0- 40	882
0- 50	1935
0- 60	3499
0- 70	5409
0- 80	6825
0- 90	7007
0-100	7015
0-110	7020
0-120	7021
0-130	7021
0-140	7021
0-150	7021
0-160	7021
0-170	7021
0-180	7021



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ADDRESS: 170 LUDLOW AVE  
NORTHVALE, NJ 07647

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REPORT NUMBER: ITL80205  
DATE: 12/24/13  
PREPARED FOR: RAB LIGHTING, INC.  
CATALOG NUMBER: ALED5T78 (TYPE V)

ADDRESS: 170 LUDLOW AVE  
NORTHVALE, NJ 07647

LUMINAIRE: CAST BROWN PAINTED METAL POST TOP FITTER WITH 3 FABRICATED BROWN PAINTED METAL VERTICAL POSTS, CAST 2-PIECE BROWN PAINTED FINNED METAL HOUSING, 6 CAST METAL HEAT SINKS/CIRCUIT BOARD MOUNTING BRACKETS, 6 CIRCUIT BOARDS EACH WITH 1 LED AND MOLDED PLASTIC CIRCUIT BOARD PERIMETER OVERLAY WITH SPECULAR FINISH, MOLDED PLASTIC REFLECTOR WITH SPECULAR FINISH AND 1 APERTURE PER LED, CLEAR FLAT GLASS LENS IN CAST BROWN PAINTED METAL FRAME.

LAMP: SIX WHITE MULTI-CHIP LIGHT EMITTING DIODES (LEDs), AIMED 5-DEGREES BELOW THE HORIZON.

DRIVERS: THREE RAB RDF25U7-02

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:	Associated Power Technologies APT5040 AC Power Source	Calibration Due: 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 (CRI<sub>a</sub>,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.

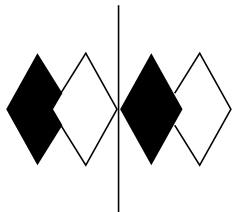
PROCEDURE: The test sample was provided by the customer and had an unknown number of operating hours. The test sample was mounted inside the integrating sphere and allowed to stabilize. After stabilization occurred, measurements were taken. In order to measure mean performance, multiple data sets were 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)

THIS ITL REPORT WITH THE USE OF THE NVLAP LOGO SHALL NOT BE USED BY THE CLIENT TO CLAIM PRODUCT CERTIFICATION, APPROVAL, OR ENDORSEMENT BY NVLAP, NIST, OR ANY AGENCY OF THE FEDERAL GOVERNMENT.

Checked	<i>N THOMAS</i>
Approved	<i>P O'CONNOR</i>
	SPHERE LAB SUPERVISOR



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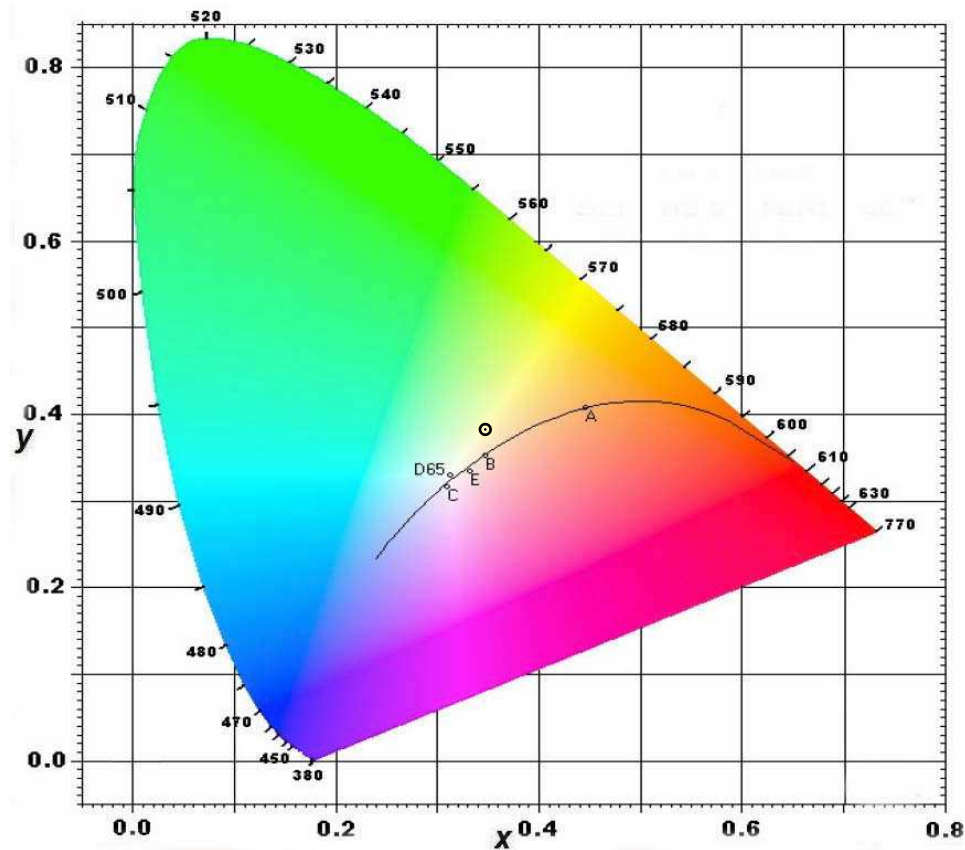
**NVLAP**  
NVLAP LAB CODE: 200925-0

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REPORT NUMBER: ITL80205  
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CATALOG NUMBER: ALED5T78 (TYPE V)

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## CIE Chromaticity Diagram



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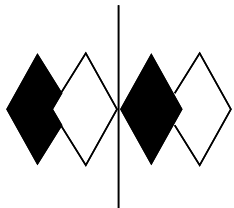
# RESULTS:

SPECTRORADIOMETRIC	
Observer	CIE 1931 2 degree
Chromaticity Ordinate x	0.3470
Chromaticity Ordinate y	0.3821
Observer	CIE 1976 2 degree
Chromaticity Ordinate u'	0.2014
Chromaticity Ordinate v'	0.4990
Correlated Color Temp CCT (K)	5027
ANSI C78.377-2008 Duv	0.014
Total Radiant Flux (milliWatts)	19713 *
ELECTRICAL	
Input Voltage (Volts AC)	120.0
Input Current (Amps AC)	0.746
Input Power (Watts)	89.1
Input Power Factor (%)	99.5
Input Current THD (%)	7.9
Input Voltage THD (%)	0.1
Off-State Power (Watts)	
	0.0
ELECTRICAL AT MAX NONIMAL INPUT	
Input Voltage (Volts AC)	277.0
Input Current (Amps AC)	0.352
Input Power (Watts)	88.7
Input Power Factor (%)	91.0
Input Current THD (%)	11.0
Input Voltage THD (%)	0.1

COLOR RENDERING INDICES	CRI
Ra (Average 1-8)	64
R1 Light greyish red	59
R2 Dark greyish yellow	68
R3 Strong yellowish green	75
R4 Moderate yellowish green	65
R5 Light bluish green	60
R6 Light blue	57
R7 Light violet	77
R8 Light reddish purple	49
R9 Strong red	-60
R10 Strong yellow	25
R11 Strong green	60
R12 Strong blue	29
R13 Light yellowish pink (skin)	59
R14 Moderate olive green (leaf)	86

## \*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	0.560	515	78.886	650	38.499
385	0.774	520	93.228	655	34.472
390	0.801	525	104.449	660	30.740
395	0.993	530	112.608	665	27.381
400	1.538	535	117.855	670	24.272
405	2.671	540	121.111	675	21.494
410	5.059	545	122.735	680	18.981
415	9.865	550	123.369	685	16.756
420	18.841	555	122.880	690	14.766
425	33.874	560	121.840	695	12.996
430	55.587	565	120.485	700	11.411
435	84.964	570	118.102	705	10.015
440	127.130	575	115.276	710	8.789
445	161.939	580	111.767	715	7.697
450	139.804	585	107.778	720	6.742
455	85.512	590	103.206	725	5.889
460	52.669	595	98.173	730	5.151
465	34.389	600	92.747	735	4.505
470	21.717	605	87.075	740	3.941
475	15.060	610	81.278	745	3.459
480	12.377	615	75.305	750	3.037
485	12.045	620	69.463	755	2.667
490	14.612	625	63.647	760	2.337
495	21.020	630	57.941	765	2.052
500	31.712	635	52.615	770	1.802
505	45.976	640	47.641	775	1.587
510	62.541	645	42.900	780	1.396

