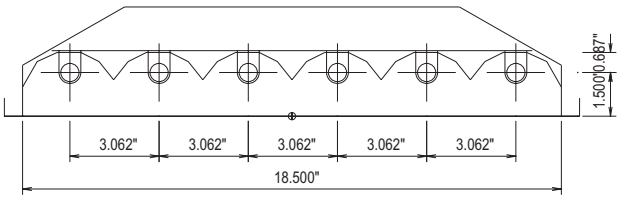
LTL LUMINAIRE TESTING LABORATORY, INC.

SUSTAINING MEMBER of the IESNA

905 Harrison Street · Allentown, PA 18103 · 610-770-1044 · Fax 610-770-8912 · www.LuminaireTesting.com

LTL NUMBER: 13204 DATE: 11-05-2008
PREPARED FOR: EB FLUORESCENT COMPANY, INC.
CATALOG NUMBER: HI BAY 6/54
LUMINAIRE: FORMED WHITE ENAMEL STEEL HOUSING, FORMED SPECULAR ALUMINUM REFLECTOR, NO ENCLOSURE.
LAMPS: SIX 54 WATT HIGH OUTPUT T5 LINEAR FLUORESCENT LAMPS RATED AT 4400 LUMENS EACH.
LAMP CATALOG NUMBER: PHILIPS F54T5/841/HO/ALTO
BALLAST: ONE KEYSTONE TECHNOLOGIES KTEB-254HO-UV-TP-PS/LS AND ONE SYLVANIA QTP4X54T5HO/UNV PSN HT W
MOUNTING: PENDANT
TOTAL INPUT WATTS =321.4 AT 120.0 VOLTS
THE 0 DEGREE PLANE IS PARALLEL WITH THE LAMPS.

#13204



CANDELA DISTRIBUTION						FLUX
	0.0	22.5	45.0	67.5	90.0	
0	10794	10794	10794	10794	10794	
5	10744	10817	10959	11048	11077	1042
15	10307	10662	10551	10132	10041	2926
25	9480	9744	9055	8856	8884	4236
35	8302	8095	7743	7405	7173	4838
45	6837	6401	5906	5366	5060	4553
55	5130	4758	3855	3201	3087	3571
65	3280	2803	2132	2593	2805	2634
75	1520	1072	1839	1869	1823	1691
85	177	344	377	349	325	414
90	0	0	0	0	0	

ZONAL LUMEN SUMMARY

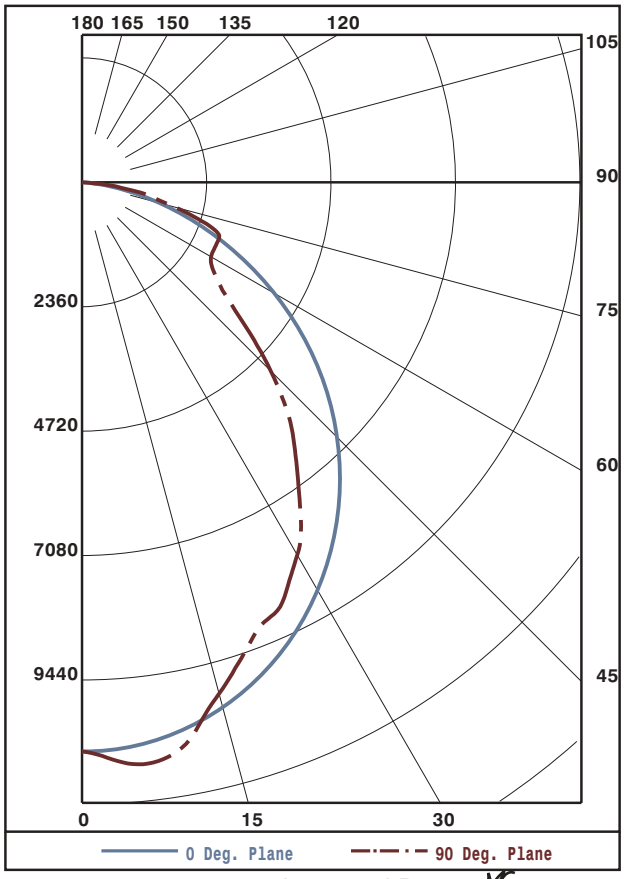
ZONE	LUMENS	%LAMP	%FIXT
0- 30	8204	31.1	31.7
0- 40	13042	49.4	50.3
0- 60	21166	80.2	81.7
0- 90	25905	98.1	100.0
90-180	0	0.0	0.0
0-180	25905	98.1	100.0

TOTAL LUMINAIRE EFFICIENCY: 98.1%

CIE TYPE:	DIRECT	
PLANE:	0-DEG	90-DEG
SPACING CRITERIA:	1.2	1.1
LUMINOUS LENGTH:	48.000	18.500

LUMINANCE IN CANDELA PER SQUARE METER

ANGLE IN DEG	AVERAGE 0-DEG	AVERAGE 45-DEG	AVERAGE 90-DEG
0	18839.	18839.	18839.
45	16876.	14578.	12490.
55	15610.	11731.	9394.
65	13546.	8805.	11584.
75	10250.	12401.	12294.
85	3545.	7550.	6508.



Approved By: MG

THIS REPORT BASED ON LM-41 AND OTHER PERTINENT IESNA PROCEDURES.

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COEFFICIENTS OF UTILIZATION - ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE 0.20

RC	80				70				50			30			10			0
RW	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
0	117	117	117	117	114	114	114	114	109	109	109	104	104	104	100	100	100	98
1	108	104	100	97	105	102	98	95	97	95	92	94	91	89	90	88	87	85
2	99	92	86	81	97	90	85	80	87	82	78	84	80	76	81	78	75	73
3	91	82	75	69	89	81	74	68	78	72	67	75	70	66	73	69	65	63
4	84	73	66	60	82	72	65	59	70	63	58	68	62	58	66	61	57	55
5	77	66	57	51	75	64	57	51	62	56	50	61	55	50	59	53	49	47
6	72	59	51	45	70	58	50	45	57	49	44	55	49	44	53	48	44	42
7	66	53	45	39	65	53	45	39	51	44	39	50	43	39	48	43	38	37
8	61	48	40	34	60	48	40	34	46	39	34	45	39	34	44	38	34	32
9	56	43	35	30	55	43	35	30	42	35	30	41	34	30	40	34	30	28
10	52	40	32	27	51	39	32	27	38	31	27	37	31	26	36	30	26	25

CANDELA DISTRIBUTION

	0.0	22.5	45.0	67.5	90.0
0	10794	10794	10794	10794	10794
5	10744	10817	10959	11048	11077
10	10577	10820	10963	10927	10892
15	10307	10662	10551	10132	10041
20	9942	10304	9755	9401	9300
25	9480	9744	9055	8856	8884
30	8930	8942	8323	8233	8161
35	8302	8095	7743	7405	7173
40	7601	7241	6940	6360	6209
45	6837	6401	5906	5366	5060
50	6016	5651	4947	4127	3798
55	5130	4758	3855	3201	3087
60	4207	3793	2724	2695	2826
65	3280	2803	2132	2593	2805
70	2373	1838	1945	2564	2703
75	1520	1072	1839	1869	1823
80	766	815	1046	1139	1133
85	177	344	377	349	325
90	0	0	0	0	0

ZONAL LUMEN SUMMARY

0- 5	259.
5- 10	783.
10- 15	1264.
15- 20	1661.
20- 25	1987.
25- 30	2249.
30- 35	2404.
35- 40	2434.
40- 45	2372.
45- 50	2181.
50- 55	1920.
55- 60	1651.
60- 65	1401.
65- 70	1233.
70- 75	1011.
75- 80	681.
80- 85	364.
85- 90	49.

THIS TEST WAS CONDUCTED USING RELATIVE PHOTOMETRY TECHNIQUES ACCORDING TO STANDARD IESNA PROCEDURES. THE USER MUST THEREFORE USE CAUTION IN THE FOLLOWING SITUATIONS: 1) THIS TEST WAS PERFORMED USING A SPECIFIC BALLAST/LAMP COMBINATION. EXTRAPOLATION OF THESE DATA FOR OTHER BALLAST/LAMP COMBINATIONS MAY PRODUCE ERRONEOUS RESULTS. 2) ACCORDING TO IESNA PROCEDURES, THE BALLAST(S) AND LAMP(S) ARE PRESUMED TO PRODUCE 100% OF RATED OUTPUT. AN APPROPRIATE BALLAST FACTOR MUST BE APPLIED TO THE LUMEN OUTPUT RATINGS AND LUMINOUS INTENSITY VALUES GIVEN. 3) THIS TEST WAS CONDUCTED IN A CONTROLLED LABORATORY ENVIRONMENT WHERE THE AMBIENT TEMPERATURE WAS HELD AT 25°C ±1°C. FIELD PERFORMANCE MAY DIFFER PARTICULARLY IN REGARDS TO CHANGE IN LUMINOUS OUTPUT AS A RESULT OF DIFFERENCE IN AMBIENT TEMPERATURE AND METHOD OF MOUNTING THE LUMINAIRE.

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A Notice About Extremely High Efficiencies and Efficiencies Exceeding 100%

Preface

All fluorescent lamps exhibit some change in lumen output as a function of ambient temperature. Highly loaded lamps such as T5 high output, twin tube fluorescent, and high-wattage compact fluorescent lamps typically exhibit the most dramatic light output versus temperature curves. These curves are non-linear functions that have a peak light output at a temperature near the middle of the lamp's usable temperature range. See Figure 1 for the temperature response of a typical T5 high output lamp. The specific temperature where the peak lumen output occurs is dependent on many variables within the lamp manufacturing process as well as the lamp orientation within the luminaire (base up, base down, horizontal).

In the case of T5 high output lamps, the peak lumen output temperature falls near the 35˚C(95˚F) temperature.

What does this have to do with testing?

You might be wondering, "Since IESNA standards on fluorescent testing are based on relative photometry, what effect does this have on my photometric test?" Although the relative photometry method of testing luminaires is designed to normalize as many variables as possible, the efficiency that is calculated from the results of a relative photometric test is not a pure "optical efficiency". Consider the following:

- When the "bare lamps" are tested, they are tested in the ambient atmosphere of the lab 25˚C(77˚ F).
- When the luminaire is tested, it is tested in the ambient atmosphere of the lab 25˚ C(77˚ F). The ambient temperature within the luminaire is guaranteed to be warmer than 25˚ C(77˚ F).

As it was stated earlier, the lumen output of the lamps will vary as a function of the ambient temperature. This means that the lumen output of the lamps when operated inside of the luminaire will be different from the lumen output of the lamps when they are tested for bare lamp output. The efficiency that is reported on a photometric test report is the ratio of the total luminous output of the luminaire to the total luminous output of the bare lamps. The only way that a test report can show the true "optical efficiency" of a luminaire is if the lamps produce the same amount of lumens in the luminaire as they did in the bare lamp test.

The point of this notice

Because the lumen output of the lamps operating within the luminaire can be different from the lumen output of the lamps operating outside of the luminaire, the luminaire efficiency can be increased/decreased beyond the "optical efficiency" of the luminaire. As an example, this situation could occur in a two lamp pendant T5 high output luminaire where mutual heating of the lamps, reflected radiant heat, contained heat, etc. can bring the temperature of the lamp close to the temperature that the lamp would operate at if it were in a 35˚C(95˚F) ambient temperature. Since T5 high output lamps have a peak lumen output near 35˚C(95˚F) ambient temperature, there is a possibility that an already high efficiency could be increased above 100%.

A Word of Caution

Although the efficiency shown in a relative photometric test report is not a pure "optical efficiency", this does not mean that there is a problem with the test procedure. It means that there is a temperature factor included into the test report based on an ambient temperature of 25˚C(77˚F). If you are using the test results in a situation where you know the ambient temperature will be significantly different from the 25˚C(77˚F) laboratory conditions, make sure that you use an appropriate temperature correction factor.

Figure 1. Temperature Response of a Typical T5 HO Lamp.