IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

Bill Dixon
Director of Engineering & Operations

Beghelli North America
3250 Corporate Way, Unit B
Miramar, FL 33025
United States

Telephone: 954-442-6189

Sample Tested:	**Draco 710 5700K Narrow 40W**
Manufacturer:	**Beghelli North America**
Technical Report Number:	**JI306325-10-LM79**
Report Issue Date:	**June 27th , 2013**
Total Number of Pages:	**10** (including this page)

Report Prepared by:

Byrd Evans
TÜV SÜD Project Handler

Report Reviewed by:

Steve Longo
TÜV SÜD Manager

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Summary of Key Test Results

Model#	**Draco 710 5700K Narrow 40W**
Manufacturer	Beghelli North America
TÜV Sample#	808-4
Date of Test	June 27, 2013

Notes:

Tested in intended orientation

Parameter	Measured Result
Luminous Flux	**2,923 Lumens**
Input Power	**34.87 Watts**
Efficacy	**83.83 Lumens/Watt**
C.C.T.	**5346 K**
C.R.I. (R_a)	**73.83**
Beam Angle	**12.7°**
Stabilization Time	**60 minutes**
In-Situ Temp Test (ISTMT)**	**Not Tested on this Model#**

The above results are recorded / derived from measurements in accordance with LM79-08

**ISTMT in accordance with "Energy Star Program Requirements for Luminaires – Version 1.2".

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Test Results –

The following results were obtained after stabilization of the sample in accordance with the requirements set forth in section 5.0 of IES LM79-2008. Stability is achieved when the variation of 3 readings of light output and electrical power over a period of 30 minutes, taken 15 minutes apart, is less than 0.5%.

Photometric Results	Draco 710 5700K Narrow 40W	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	2,923.0	2,848.2
Luminous Efficacy (Lumens/Watt)	83.83	81.40
Total Radiant Flux (Watts)	8.90	-
Correlated Color Temperature (CCT)	5346	-
Color Rendering Index (CRI – R_a)	73.83	-
R_9 Value	-29.6	-
Chromaticity (Chroma x / Chroma y)	0.3363 / 0.3552	-
Chromaticity (Chroma u / Chroma v)	0.2041 / 0.3234	-
Chromaticity (Chroma u' / Chroma v')	0.2041 / 0.4851	-
D_{uv} Value	0.00545	-

Electrical Results	Draco 710 5700K Narrow 40W	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	34.87	34.99
Input Voltage (Volts AC)	119.99	120.04
Input Current (Amps)	0.292	0.290
Power Factor (120V / 277V)	0.995 / 0.912	0.996
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %) (120V / 277V)	2.77 % / 6.42 %	3.73 %

Additional Parameters	Draco 710 5700K Narrow 40W	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	52 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	25.2 °C	24.7 °C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	0.26 (0° – 180°) / 0.18 (90° – 270°)	

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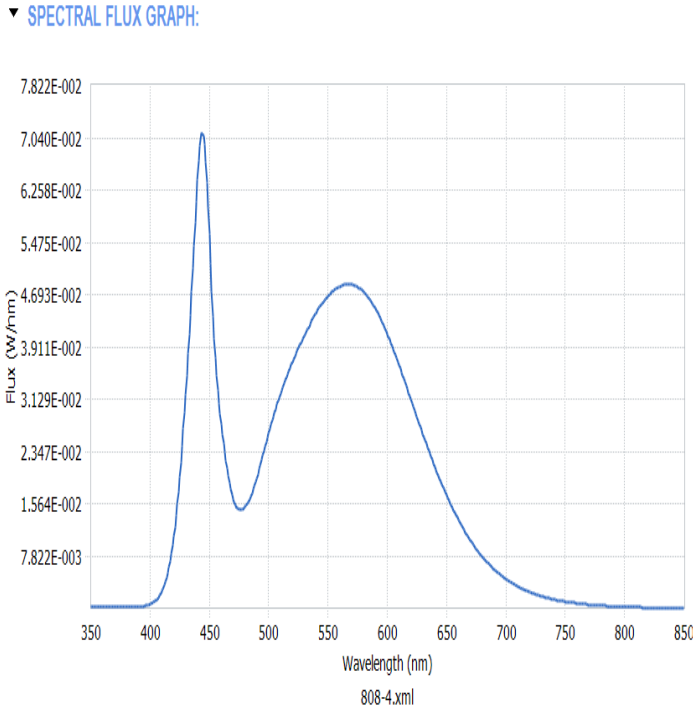
Spectral Flux and Chromaticity Diagram

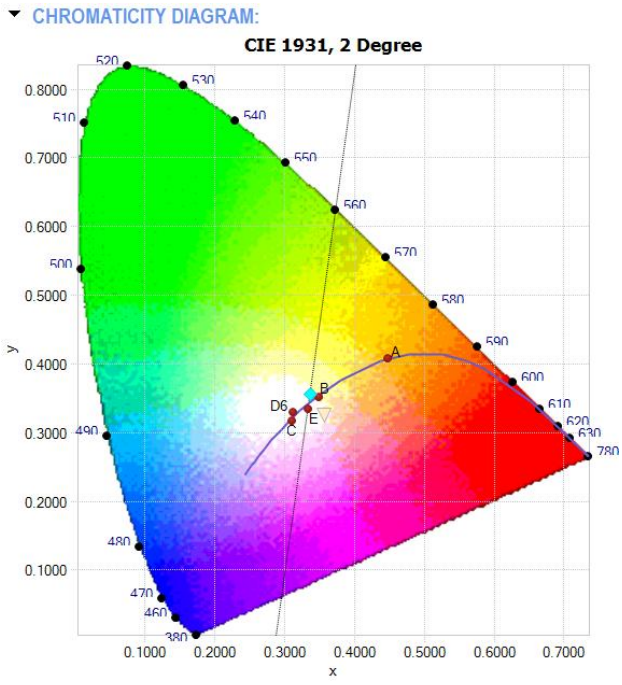
Spectral Flux



Spectral response of the Radiant Flux

(350nm to 850nm)

Chromaticity Diagram



Tristimulus values (from page 5):

x / y = 0.3362 / 0.3552

The locations on the diagram of the tristimulus coordinates are indicated by the blue diamond.

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	2720.6	95.5 %
60 - 90	127.6	4.5 %
0 - 90	2848.2	100.0 %
90 - 180	0.0	0.0 %
0 - 180	2848.2	100.0 %

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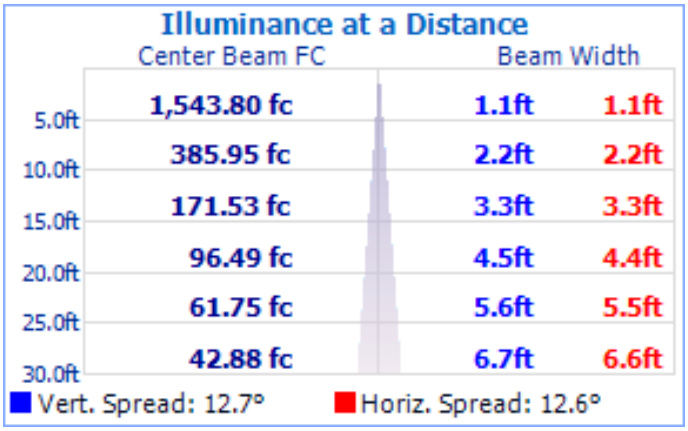
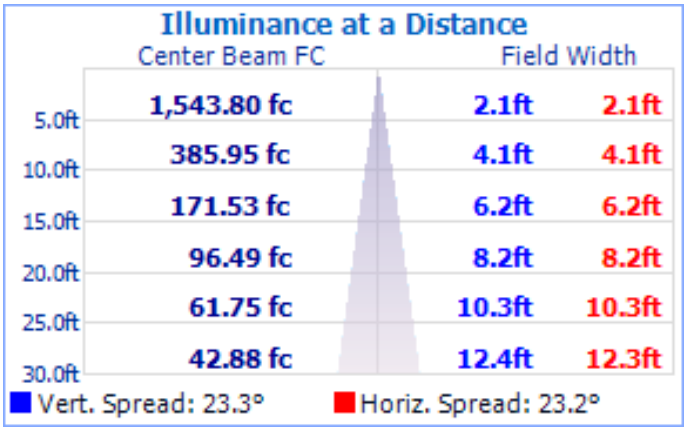
Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



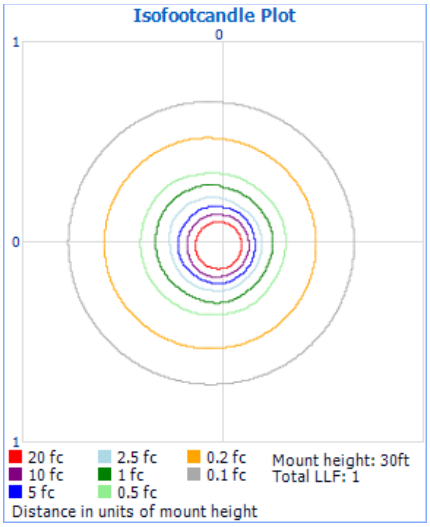


Beam Angle = 12.7°

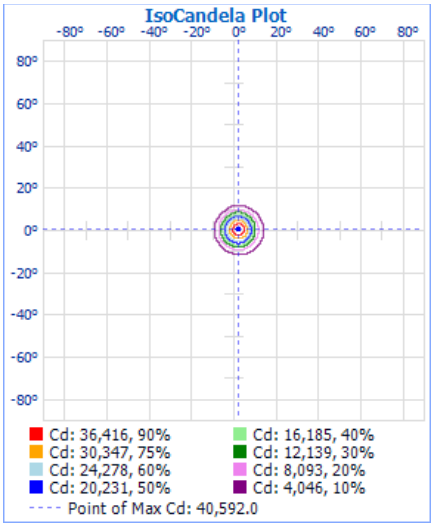
Field Angle = 23.3°

Test Results – Candela Plots

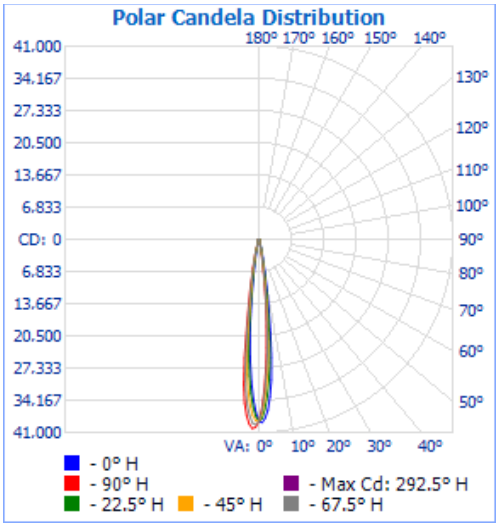
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela

TÜV SÜD America, Inc.
5945 Cabot Parkway, Suite 100,
Alpharetta GA 30005
Telephone: 678-341-5900 www.tuvamerica.com

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Test Results – Candela Tabulation

The table below displays the tabulated Candela measurements from the IES file:
Horizontal (lateral) angles are shown in **red** across the top of the table, in increments of 22.5°.
Vertical (longitudinal) angles are shown in **blue** down the side of the table, in increments of 2.5°.

	0.0	22.5	45.0	67.5	90.0	112.5	135.0	157.5	180.0	202.5	225.0	247.5	270.0	292.5	315.0	337.5	360.0
0.0	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595	38595
1.0	38884	38017	37123	36341	35856	35655	35706	36130	36707	37586	38514	39329	39866	40076	40027	39581	38891
2.0	37935	36087	34325	32877	31999	31686	31908	32726	33919	35579	37364	38988	40153	**40592**	40474	39538	37933
3.0	36238	33401	30939	28862	27574	26946	27224	28480	30306	32692	35392	37564	39286	40143	39973	38719	36235
4.0	33453	30058	27106	24585	23048	22427	22695	23918	26097	29009	32514	35365	37508	38534	38352	36734	33459
5.0	29969	26192	22685	20005	18528	18001	18344	19593	21765	24843	28713	32222	34818	35971	35579	33605	29969
6.0	25311	21319	17378	14874	13805	13458	13900	15058	17251	20232	23970	27904	30953	32081	31347	28938	25339
7.0	20017	16208	12990	10722	9536	9207	9554	10719	12587	15029	18149	21805	25191	26433	25662	23376	20033
8.0	15050	11734	8970	7332	6331	6232	6732	7779	8767	10907	12990	16108	18556	20317	20232	17882	15065
9.0	10861	8234	6088	4947	4290	4230	4742	5462	6529	8180	10043	12049	13899	15414	15372	13960	10879
10.0	7866	5527	4239	3432	2997	2981	3407	3847	4722	5959	8201	9368	10636	11629	11764	10588	7874
11.0	5516	3751	2923	2372	2137	2156	2195	2465	3483	4647	5890	6721	7737	8181	8476	7192	5526
12.0	3923	2696	1912	1594	1602	1652	1502	1770	2670	3865	4196	5013	6287	6377	5635	4563	3930
13.0	2827	2012	1338	1167	1199	1241	1158	1357	1828	2971	3403	4070	4655	4896	3890	3332	2832
14.0	1935	1431	1062	923	919	892	952	1092	1314	2075	2931	3317	3423	3514	2898	2538	1937
15.0	1408	1029	853	757	727	728	788	873	1090	1716	2380	2798	2555	2460	2340	1982	1411
17.5	800	638	530	480	494	502	504	547	652	877	1172	1308	1334	1260	1082	897	801
20.0	493	436	393	365	338	341	360	391	442	543	709	836	834	775	692	612	493
22.5	369	325	297	280	272	276	288	312	356	425	495	549	580	558	493	428	370
25.0	310	278	256	242	236	238	248	266	300	350	400	440	463	448	400	353	310
27.5	262	238	220	209	205	206	214	228	254	290	327	356	373	362	329	294	262
30.0	223	204	191	182	178	180	185	197	217	243	271	292	304	297	273	247	223
32.5	191	177	166	159	156	157	162	172	187	207	228	244	253	248	230	210	191
35.0	166	155	147	141	138	139	143	151	164	179	195	208	214	210	197	181	166
37.5	148	139	132	127	125	126	129	136	146	159	172	182	186	182	172	159	148
40.0	133	126	120	117	115	115	118	124	132	143	153	162	165	161	153	143	133
42.5	122	115	111	108	106	106	109	114	121	129	139	146	147	145	138	130	122
45.0	112	106	102	100	98	98	100	105	110	117	125	131	133	130	125	118	111
47.5	102	97	94	92	90	90	92	96	100	106	112	117	119	117	113	107	102
50.0	93	89	87	85	84	84	85	88	92	96	102	106	108	106	103	98	93
52.5	86	83	81	79	78	78	79	82	84	88	93	97	98	96	94	90	86
55.0	80	77	75	74	73	73	74	76	78	82	85	88	89	88	86	83	80
57.5	74	71	70	69	68	68	68	70	72	75	78	81	82	81	79	77	74
60.0	69	66	66	65	64	63	64	66	67	69	72	74	75	74	73	71	69
62.5	64	62	61	60	59	59	59	61	62	64	66	68	69	68	67	65	64
65.0	59	57	57	56	55	54	55	56	57	59	61	62	63	62	61	60	59
67.5	54	53	52	51	51	50	51	51	53	54	56	57	57	57	56	55	54
70.0	49	48	48	47	47	46	46	47	48	49	50	52	52	51	51	50	49
72.5	45	44	44	43	43	42	42	42	43	44	45	46	47	46	46	45	45
75.0	40	40	40	39	38	37	37	38	38	39	40	41	41	41	41	41	40
77.5	36	36	35	35	34	33	33	33	34	34	35	36	36	36	37	36	36
80.0	32	31	31	31	30	30	30	30	30	30	31	31	32	32	32	32	32

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Test Results – Candela Tabulation cont'd

82.5	28	28	28	27	27	27	27	26	26	26	27	27	28	28	28	28	28
85.0	25	25	25	25	25	25	25	24	24	24	24	24	24	24	25	25	25
87.5	23	23	24	24	24	23	23	23	23	22	22	22	22	22	23	23	23
90.0	23	23	24	24	25	25	25	24	24	24	22	22	22	22	22	22	23

Maximum Candela = **40,592.0** at Horizontal: 292.5°, Vertical: 2.0°

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TÜV SÜD Photometric Testing Information

Testing is performed in accordance with the procedures outlined in IESNA LM79-2008. The sample is evaluated for photometric and electrical characteristics using an integrating sphere and a goniophotometer, located in an accredited, temperature and humidity-controlled, draft free photometric laboratory.

Sphere Geometry

The integrating spheres used for measurement utilize a "4π geometry" configuration in accordance with section 9 of IES LM-79-2008 and is applicable for all types of SSL products (directional and non-directional light projections). The spectroradiometer is an array-type detector manufactured and calibrated by Labsphere (Model# CDS1100).

Self-Absorption Correction

The integrating sphere uses self-absorption correction to eliminate errors due to mismatches between the standard reference lamp and the test samples being measured. This auxiliary correction lamp is a halogen type lamp powered by a calibrated Lamp Power Supply manufactured and calibrated by Labsphere (model LPS150). Ambient temperature is measured using a thermocouple located inside the integrating sphere at the same height as the sample under test (UUT) and not more than 1 meter in horizontal distance away from the sample (section 2.2 of LM79-2008). The thermocouple is located behind a baffle in order to eliminate any direct optical radiation from the sample under test.

Sample Stabilization

The sample (UUT) is placed inside the integrating sphere and powered by a regulated and conditioned alternating or direct current supply. The stabilization times shown on the results pages of this report denote the time of the 3rd measurement (of the 3 consecutive readings) since this is the minimum time that the sample is assumed to have taken to reach stabilization in accordance with section 5.0 of LM79-2008.

Sphere Calibration

The integrating sphere is calibrated using a quartzline halogen lamp with the following specifications:

Manufacturer: EYE Lighting International
Model# J94/JD28V75W
Voltage = 28.0 Volts DC
Wattage = 75.0 Watts
Calibration Current = 2.679 Amperes
Luminous Flux = 1685 Lumens
Calibration Date = 2-17-2011 (calibrated by Labsphere – NIST traceable).

Continued…..

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TÜV SÜD Photometric Testing Information (continued)

Goniophotometer

The Goniophotometer is a Mirror based Type C optical measurement system in accordance with section 9.3.1 of IESNA LM79-2008.

Goniophotometer Calibration

The Goniophotometer is calibrated using a frosted tungsten filament FDS/DZE lamp with the following specifications:

Manufacturer: General Electric
Part Number: CSB-110
Lamp Number: 112-A
Voltage: 16.52 Volts DC
Wattage: 150.0 Watts
Calibration Current: 4.816 Amperes
Luminous Intensity: 151.5 Candelas
Calibration Date: 02-13-2011 (NIST traceable)

TÜV SÜD Test Equipment List:

TÜV SÜD Sphere System – contains the following:			
Description	**Manufacturer / Model#**	**TÜV SÜD Ref#**	**Calibration Due Date**
Integrating Sphere	Labsphere LM760	SPH003	weekly
Spectroradiometer	Labsphere CDS1100	ATLE0048	9/7/2016
Power Analyzer	Yokogawa WT210	ATLE0058	3/7/2014
Power Source	Chroma 61602	AC003	N/A
Thermometer	Fluke 52-II	ATLE0008	11/17/2013
TÜV SÜD Mirror Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC02	GON002	weekly
Spectroradiometer	Gigahertz Optik P9801	GIG002	weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2013
Power Source	Chroma 61603	AC007	N/A