



IESNA LM79-2008 Test Report

TÜV SÜD America

Photometric Testing and Evaluation in Accordance with LM79-2008

Report Prepared for:

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Sample Tested:

Draco 720 4100K Narrow 40W

Manufacturer:

Beghelli North America

Technical Report Number:

JI306325-1-LM79

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Summary of Key Test Results

Model# **Draco 720 4100K Narrow 40W**
Manufacturer **Beghelli North America**
TÜV Sample# **808-1**
Date of Test **June 20, 2013**

Notes:

Tested in intended orientation



Parameter	Measured Result
Luminous Flux	2425 Lumens
Input Power	33.38 Watts
Efficacy	72.65 Lumens/Watt
C.C.T.	4004 K
C.R.I. (R _a)	84.86
Beam Angle	13.6°
Stabilization Time	60 minutes
In-Situ Temp Test (ISTMT)**	Not Tested

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

**ISTMT in accordance with "Energy Star Program Requirements for Integral LED Lamps – Version 1.4".

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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 720 4100K Narrow 40W	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	2425.0	2438.6
Luminous Efficacy (Lumens/Watt)	72.65	72.69
Total Radiant Flux (Watts)	7.7	-
Correlated Color Temperature (CCT)	4004	-
Color Rendering Index (CRI – R _a)	84.86	-
R ₉ Value	25.4	-
Chromaticity (Chroma x / Chroma y)	0.3816 / 0.3818	-
Chromaticity (Chroma u / Chroma v)	0.2239 / 0.3360	-
Chromaticity (Chroma u' / Chroma v')	0.2239 / 0.5040	-
D _{uv} Value	0.00201	-

Electrical Results	Draco 720 4100K Narrow 40W	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	33.38	33.55
Input Voltage (Volts AC)	120.00	120.06
Input Current (Amps)	0.281	0.280
Power Factor (120V / 277V)	0.991 / 0.922	0.996
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %) (120V / 277V)	9.62 % / 9.97 %	10.40 %

Additional Parameters	Draco 720 4100K Narrow 40W	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	60 minutes	62 minutes
Test Geometry Configuration	4 π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	25.1 °C	25.3 °C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	0.18 (0° – 180°) / 0.22 (90° – 270°)	



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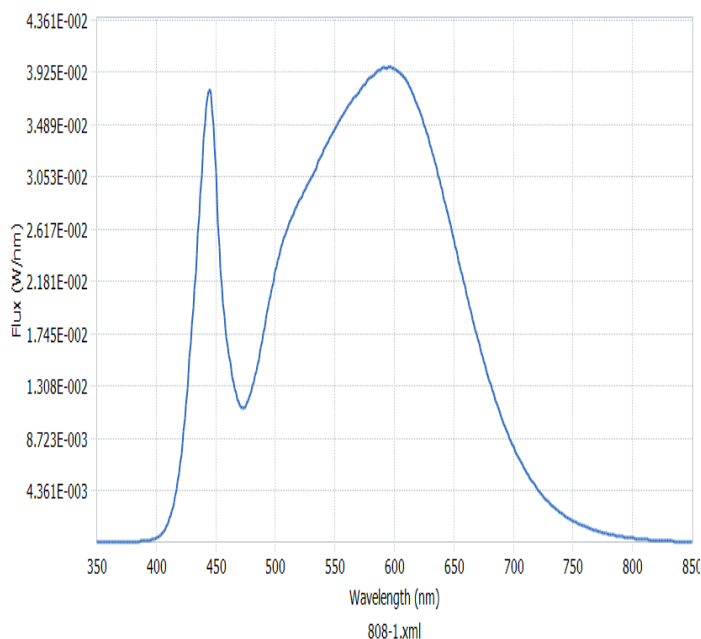
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Spectral Flux and Chromaticity Diagram

Spectral Flux

▼ SPECTRAL FLUX GRAPH:

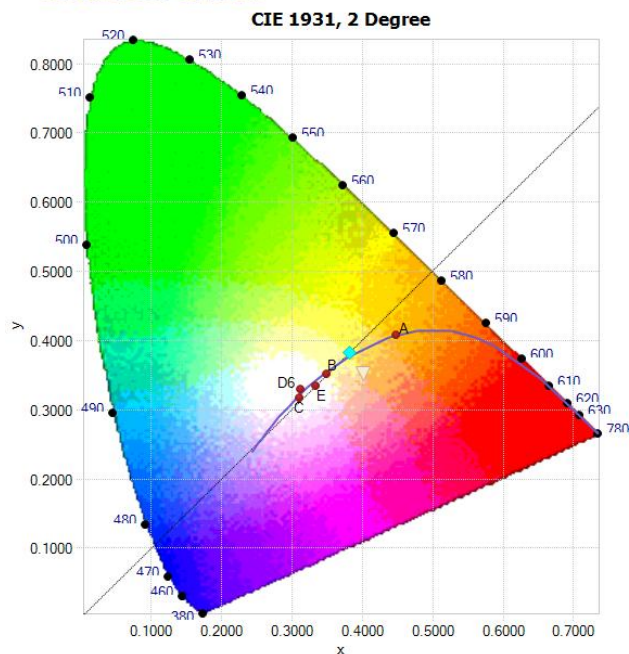


Spectral response of the Radiant Flux

(350nm to 850nm)

Chromaticity Diagram

▼ CHROMATICITY DIAGRAM:



Tristimulus values (from page 5):

$x / y = 0.3816 / 0.3818$

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	2392.3	98.1 %
60 - 90	46.3	1.9 %
0 - 90	2438.6	100.0 %
90 - 180	0.0	0.0 %
0 - 180	2438.6	100.0 %

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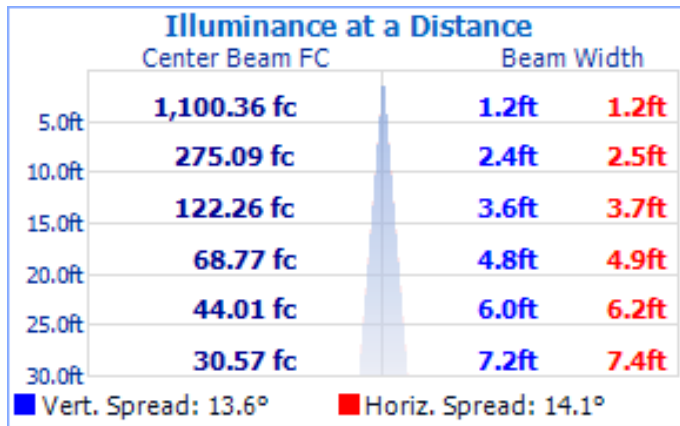


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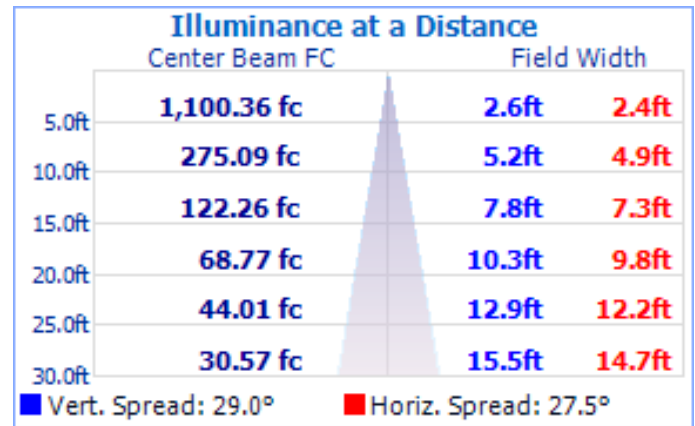
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Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



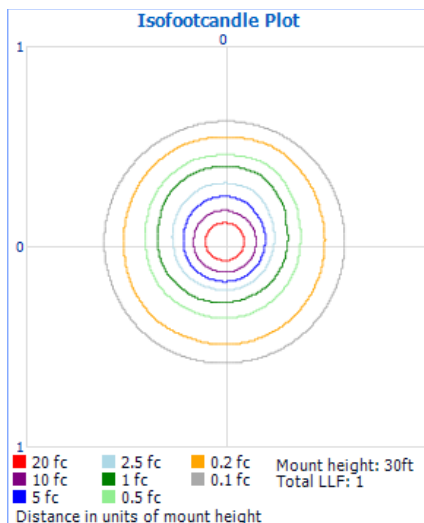
Beam Angle = 13.6°



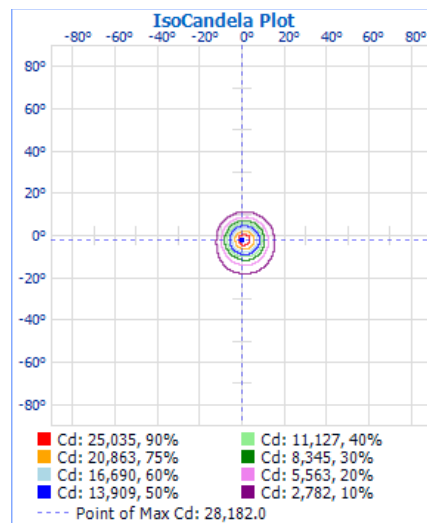
Field Angle = 29.0°

Test Results – Candela Plots

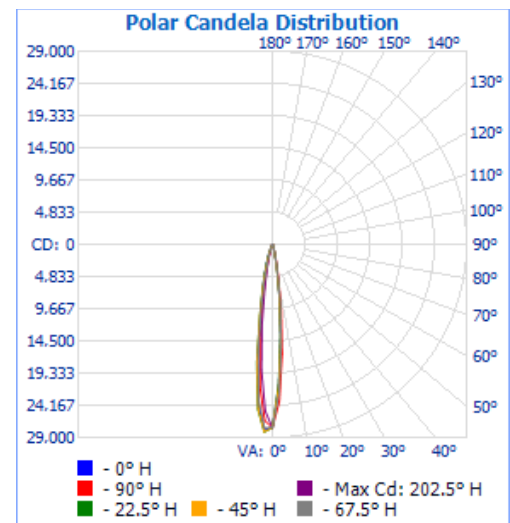
The following images depict the luminous intensity distribution characteristics of the luminaire:



Isofootcandle Plot



Isocandela Plot



Polar Candela



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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	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509	27509
2.5	21264	21056	21492	22418	23580	24819	26096	27225	27817	28182	28147	27565	26492	25018	23410	22079	21260
5.0	13928	13683	14089	15013	16446	18328	20402	22687	24178	24877	24759	23492	21463	18934	16665	14909	13936
7.5	7790	7581	7920	8740	9931	11524	13302	15274	17031	18050	17738	16361	14373	12007	9986	8500	7791
10.0	4071	3827	3934	4380	5098	6191	7573	8929	10130	10857	10730	9833	8390	6767	5421	4566	4071
12.5	1972	1874	1965	2164	2543	3296	4484	5724	6562	6909	6556	5555	4581	3688	2848	2279	1972
15.0	1036	989	1043	1149	1340	1790	2706	3844	4405	4539	4097	3244	2572	2046	1496	1172	1036
17.5	683	659	658	709	787	1028	1653	2492	2780	2885	2536	1895	1457	1171	894	743	683
20.0	489	469	458	471	514	630	1005	1570	1735	1822	1561	1133	876	731	591	522	489
22.5	345	332	323	326	346	406	606	947	1014	1084	930	672	529	469	422	369	345
25.0	271	260	255	256	267	294	390	559	578	630	540	409	347	331	317	280	271
27.5	198	193	191	192	203	220	268	343	342	372	330	281	253	247	236	208	198
30.0	137	132	132	135	143	159	187	212	214	228	217	198	182	173	166	150	137
32.5	83	81	80	85	92	103	116	132	145	144	144	137	128	112	103	95	83
35.0	47	45	46	49	56	59	70	77	83	89	93	88	76	69	64	54	47
37.5	29	27	26	27	32	34	38	45	45	53	54	52	43	41	36	31	29
40.0	25	24	23	23	23	24	25	27	29	31	31	30	27	26	24	24	25
42.5	24	24	23	24	24	25	25	26	27	27	27	27	26	25	24	24	24
45.0	23	22	22	22	23	25	25	26	26	27	27	27	25	24	23	23	23
47.5	21	20	19	20	21	22	22	23	24	25	25	25	24	22	21	21	21
50.0	19	18	18	18	19	20	20	21	22	22	23	23	22	20	19	19	19
52.5	18	18	17	17	18	19	19	20	20	21	21	21	20	19	18	18	18
55.0	17	17	17	17	17	18	18	19	19	20	20	20	19	18	17	17	17
57.5	17	17	16	16	17	17	17	18	18	19	19	19	19	18	17	17	17
60.0	16	16	16	16	16	17	17	17	18	18	18	18	18	17	17	16	16
62.5	16	16	15	15	16	16	16	17	17	18	17	18	17	17	16	16	16
65.0	16	15	15	15	15	16	16	16	17	17	17	17	17	17	16	16	15
67.5	15	15	15	15	15	15	15	16	17	17	16	17	17	17	16	16	15
70.0	15	14	14	14	15	15	15	16	16	16	16	17	16	16	16	16	15
72.5	14	14	14	14	14	15	15	16	16	16	16	17	16	16	15	15	14
75.0	14	14	13	14	14	14	15	16	16	17	16	17	16	16	15	15	14
77.5	14	13	13	13	13	14	14	15	15	16	16	16	16	15	14	14	14
80.0	13	13	13	13	13	13	13	14	15	15	15	15	15	15	14	14	13
82.5	13	13	13	13	13	13	13	13	14	14	14	15	14	14	14	13	13
85.0	13	13	12	13	12	13	13	13	13	14	14	14	14	14	13	13	13
87.5	13	13	12	12	12	12	13	13	13	13	13	14	13	13	13	13	13
90.0	14	16	14	14	13	13	13	13	13	13	13	13	13	13	13	13	14

Maximum Candela = **28,182.0** at Horizontal: 202.5°, Vertical: 2.5°

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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

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