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:	**TP120-21/PAR38-DIM-3000K-40°**
Manufacturer:	**Tospo**
Technical Report Number:	**JI1307099-5-LM79**
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Total Number of Pages:	**9** (including this page)

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Summary of Key Test Results

Model# **TP120-21/PAR38-DIM-3000K-40°**
Manufacturer **Tospo**
TÜV Sample# 836-5

Date of Test July 18th 2013

Notes:

Tested in LBU orientation (Lamp-Base-Up)

Parameter	Measured Result
Luminous Flux	**1219.0 Lumens**
Input Power	**21.55 Watts**
Efficacy	**56.57 Lumens/Watt**
C.C.T.	**2963 K**
C.R.I. (R_a)	**80.4**
Beam Angle	**26.1°**
Stabilization Time	**65 minutes**

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

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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	TP120-21/PAR38-DIM-3000K-40°	
	Integrating Sphere	Goniophotometer
Total Luminous Flux (Lumens)	1219.0	1217.1
Luminous Efficacy (Lumens/Watt)	56.57	56.95
Total Radiant Flux (Watts)	3.62	-
Correlated Color Temperature (CCT)	2963	-
Color Rendering Index (CRI – R_a)	80.4	-
R_9 Value	-4.2	-
Chromaticity (Chroma x / Chroma y)	0.4419 / 0.4098	-
Chromaticity (Chroma u / Chroma v)	0.2513 / 0.3496	-
Chromaticity (Chroma u' / Chroma v')	0.2513 / 0.5244	-
D_{uv} Value	0.00163	-

Electrical Results	TP120-21/PAR38-DIM-3000K-40°	
	Integrating Sphere	Goniophotometer
Input Power (Watts)	21.55	21.37
Input Voltage (Volts AC)	120.00	119.78
Input Current (Amps)	0.186	0.180
Power Factor	0.965	0.966
Input Frequency (Hertz)	60.0	60.0
A-THD (Current %)	25.87%	26.05%

Additional Parameters	TP120-21/PAR38-DIM-3000K-40°	
	Integrating Sphere	Goniophotometer
Stabilization Time (Light and Power)	65 minutes	55 minutes
Test Geometry Configuration	4π	Type C
Spectroradiometer	Labsphere CDS1100	Gigahertz Optik P9801
Ambient Temperature	25.1°C	25.0°C
ISTMT (In-Situ Temperature Measurement)	Not tested	
Spacing Criteria	0.46 (0° – 180°) / 0.42 (90° – 270°)	

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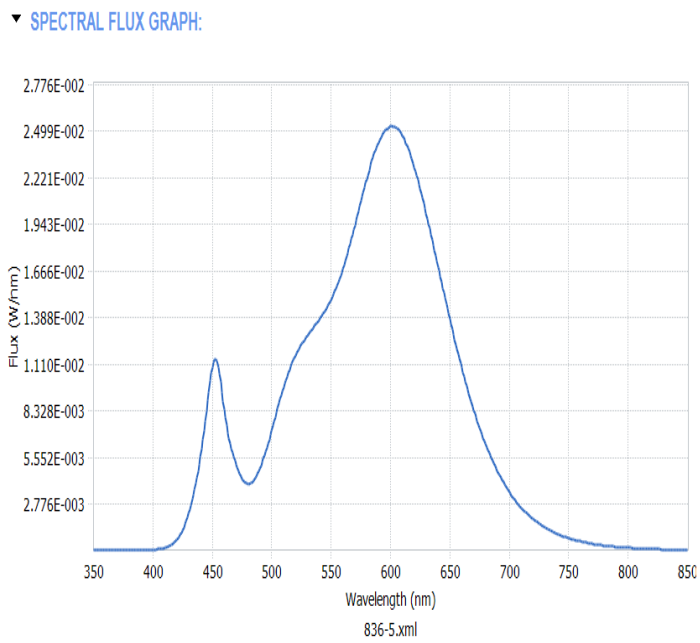
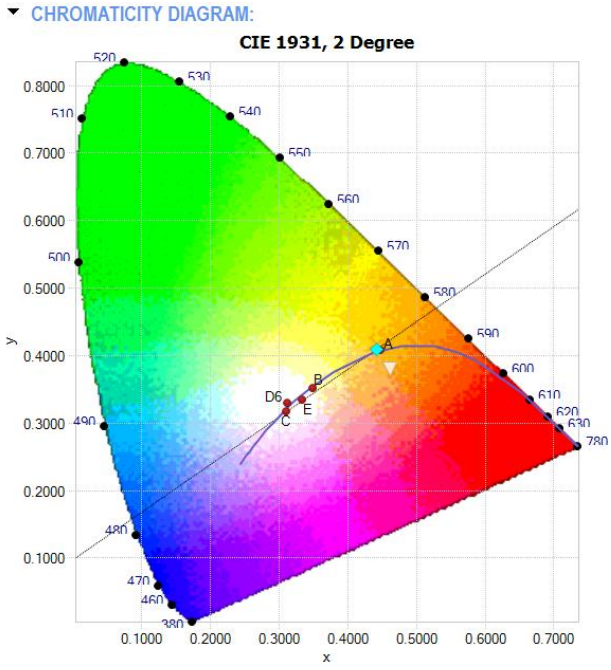
Spectral Flux and Chromaticity Diagram

Spectral Flux



Chromaticity Diagram



Spectral response of the Radiant Flux (350nm to 850nm)

Parameter	Stable Data
Peak Wavelength (nm)	600.9
Dominant Wavelength (nm)	582.4

Tristimulus values (from page 4):

x / y = 0.4419 / 0.4098

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

Zonal Lumen Summary

Zone	Lumens	% Lamp / Luminaire
0 - 60	1162.9	95.5 %
60 - 90	54.2	4.5 %
0 - 90	1217.1	100 %
90 - 180	0.0	0.0 %
0 - 180	1217.1	100 %

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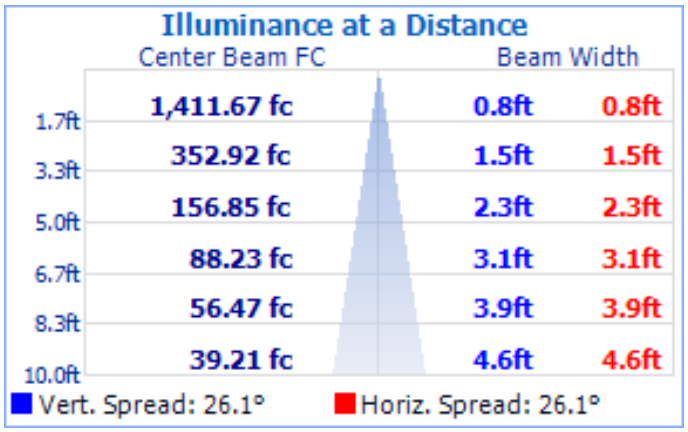
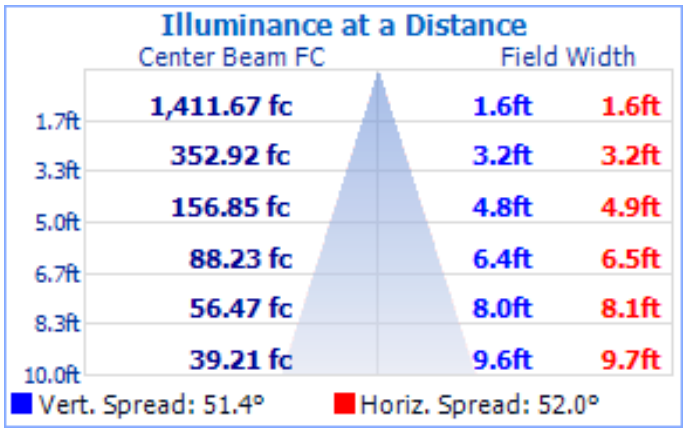
Test Results – Illuminance Plots

The following images depict the illuminance characteristics of the luminaire.



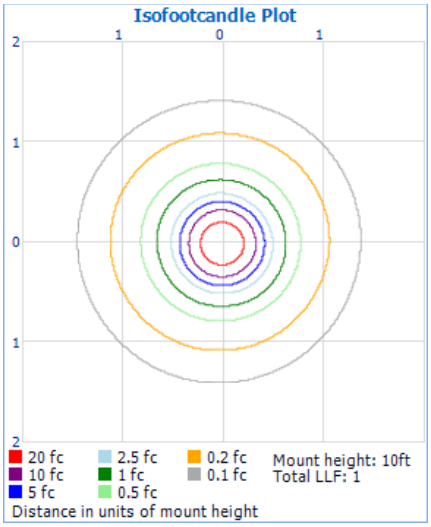
Beam Angle = 26.1°



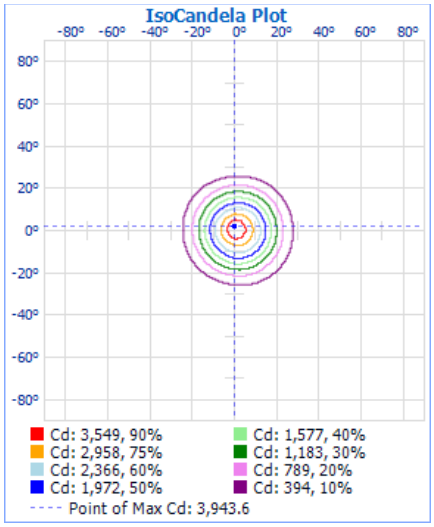
Field Angle = 51.4°

Test Results – Candela Plots

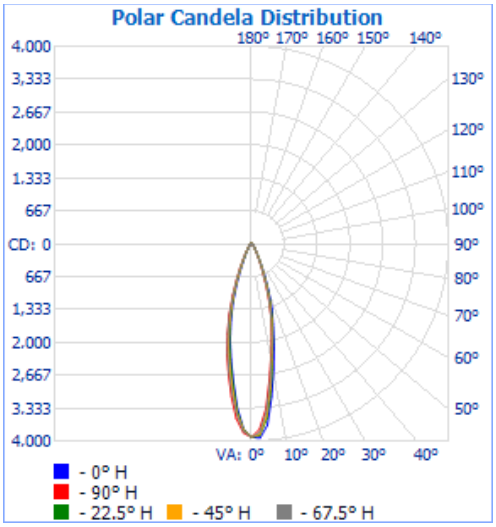
The following images depict the luminous intensity distribution characteristics of the luminaire:



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	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921	3921
2.5	**3944**	3888	3868	3827	3762	3727	3696	3684	3753	3762	3776	3802	3835	3876	3898	3915	**3944**
5.0	3695	3562	3505	3427	3360	3280	3215	3192	3329	3382	3431	3467	3553	3610	3653	3688	3695
7.5	3135	3015	2942	2861	2780	2689	2664	2671	2815	2879	2959	3049	3127	3175	3221	3230	3135
10.0	2588	2445	2381	2343	2292	2236	2221	2252	2388	2455	2552	2639	2691	2705	2693	2667	2588
12.5	2123	2008	1951	1919	1886	1829	1830	1867	2005	2075	2161	2250	2302	2297	2267	2206	2123
15.0	1695	1649	1586	1548	1518	1467	1472	1500	1614	1698	1762	1855	1887	1893	1876	1808	1695
17.5	1380	1287	1226	1186	1153	1111	1113	1139	1250	1333	1376	1468	1511	1501	1519	1445	1380
20.0	1015	942	893	862	815	783	782	823	896	983	1004	1090	1117	1144	1162	1078	1015
22.5	707	649	618	586	560	528	518	543	604	686	711	777	801	809	816	764	707
25.0	456	438	425	399	374	353	347	361	411	462	496	539	560	545	544	511	456
27.5	310	300	292	274	260	247	245	252	284	320	344	376	383	369	357	337	310
30.0	219	213	207	198	189	183	182	186	208	228	246	267	271	258	250	238	219
32.5	164	158	155	149	146	143	144	147	160	174	188	200	200	191	185	177	164
35.0	129	123	122	119	116	116	117	121	130	139	149	158	157	150	145	138	129
37.5	106	101	99	97	97	97	99	102	109	117	124	130	128	124	118	113	106
40.0	89	85	83	81	82	83	85	88	93	99	104	109	108	104	99	95	89
42.5	77	74	71	70	72	73	75	77	81	85	90	93	93	89	86	82	77
45.0	69	66	63	62	64	65	67	69	72	75	79	81	81	79	76	73	69
47.5	62	59	57	57	58	59	61	63	65	68	71	73	72	70	68	66	62
50.0	57	55	53	52	53	54	56	58	60	62	65	66	66	64	62	61	57
52.5	53	51	49	49	49	51	52	54	56	58	60	61	61	59	58	56	53
55.0	50	48	46	46	46	47	49	50	52	54	56	57	57	55	54	52	50
57.5	47	45	43	43	43	44	45	46	48	50	51	53	53	52	50	49	47
60.0	43	42	40	39	39	40	41	42	44	45	46	48	48	47	47	46	43
62.5	39	38	36	36	35	36	36	37	39	40	41	42	43	43	42	41	39
65.0	35	34	32	31	31	31	31	32	34	35	36	37	38	37	37	37	35
67.5	30	28	27	26	26	26	26	26	28	29	30	31	32	32	32	32	30
70.0	25	23	22	21	21	21	21	21	23	24	25	26	26	27	27	26	25
72.5	20	19	18	17	16	16	16	17	19	20	20	21	21	22	22	21	20
75.0	15	14	13	13	12	12	13	13	15	16	17	17	17	17	17	17	15
77.5	12	11	10	9	9	9	10	10	12	13	14	14	14	14	14	13	12
80.0	9	8	7	6	6	6	7	7	9	10	11	11	11	11	11	10	9
82.5	6	5	4	4	3	3	3	5	6	7	8	9	9	8	8	8	6
85.0	3	3	2	2	1	1	1	2	4	5	5	6	6	6	5	5	3
87.5	1	1	0	0	0	0	0	0	2	3	3	4	4	3	3	2	1
90.0	0	0	0	0	0	0	0	0	0	0	1	1	2	1	1	1	0

Maximum Candela = **3943.6** at Horizontal 0.0°, 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 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: 105-A
Voltage: 16.71 Volts DC
Wattage: 150.0 Watts
Calibration Current: 4.847 Amperes
Luminous Intensity: 166.3 Candelas
Calibration Date: 11-07-2011 (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 Goniophotometer System – contains the following:			
Goniophotometer	M.E. GONC01	GON001	weekly
Spectroradiometer	Gigahertz Optik P9801	GIG001	weekly
Power Analyzer	Yokogawa WT210	ATLE0031	11/16/2013
Power Source	Chroma 61602	AC006	N/A