Les Industries Spectralux Inc.
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2750 Sabourin, Saint-Laurent (Quebec) H4S 1M2 Canada
Tel.: (514) 332-0082 Fax: (514) 332-3590 www.spectralux.ca

ISO/IEC 17025
NVLAP
NVLAP LAB CODE: 200899-0

Moving Mirror Goniophotometer Test Report

Standard(s): IESNA LM-15-03, IES LM-79-08, ANSI C82.77-2002

Customer Artemide Canada Ltd., 11105 Renaude-Lapointe, Montreal, Québec, Canada, H1J2T4

General Information		SSL Details		Driver Details	
Test Report	S1707061-R1	**Description**	929000921706 LEDs	**Type**	Commercial
Test Date	6 July 2017	**Serial Number**	SRIS 2767-1	**Description**	115SSL-CY1313
Report Date	7 July 2017	**Photometric Method**	Absolute	**Manufacturer**	Advance
Ambient	24.1 °C	**Lamp Lumens**	-1	**Catalog No.**	XI036C100V054DSM5
Humidity	36.9 %	**Test Position**	Vertical Base Up	**Voltage**	120.00 V
Lamp Type	SSL	**Nominal Color**	3000K	**Power Factor**	0.9000

Luminaire Data

General Information		Optics		Aperture (feet)	
Manufacturer	Artemide	**Reflector**	Diffuse HO c/w White Aluminum Optic	**X**	-3.1667
Name	TAGORA 970 LED	**Housing**	Cylindrical Aluminum Shape	**Y**	-3.1667
Catalog No.	MTA9_830DFH	**Lens**	Acrylic Diffuser	**Z**	0.0000

Lamp Stabilization Time: 45 minutes

Tested By: Jacques Dugas

Approved Signatory: Chrisnel Blot

Signature:

Luminaire Test Method

Precise installation and alignment of the luminaire to the rotation axis of the photometer is governed by a servomotor controlled via a microcontroller. A laser is used to validate the luminaire positioning. Before photometric measurements are taken, luminaire is operated long enough to reach stabilization and temperature equilibrium.

All movement commands issued to the photometer axes are mediated by the software to ensure the motion is within the limits of operation. The photometric detector used is a silicon detector corrected to closely match the spectral luminous efficiency photopic curve with a quality index less than 1.5%. Proper shielding is incorporated to the photometric test bench such that only the light from the unit under test is measured.

Luminous intensity measurements are performed at a distance great enough so that the inverse-square law applies. During each measurement the computer records the luminous intensity associated to the corresponding angles of radiation, as well as input electrical operational parameters and temperature measurements. Candela values are reported in IES format as per LM-63.

Equipment, reference standards are traceable to National Institute of Standards and Technology (NIST) and National Research Council of Canada (NRC).

Electrical Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Power Supply	KIKUSUI	SPEC 77766A	1450001	N.P.C.R.	N.P.C.R.
Input Power Meter	Yokogawa	WT210	91L236539	2017/05/05	2018/05/05
Output Power Meter	N/A	N/A	N/A	N.P.C.R.	N.P.C.R.

Photometric Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Photometer	N/A	N/A	N/A	N.P.C.R.	N.P.C.R.
Photodetector	INPHORA	IPR-PDET 19	110802	2016/10/05	2017/10/05

Environment Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Temperature Humidity Sensor	Omega	HH311	051202970	2016/10/20	2017/10/20

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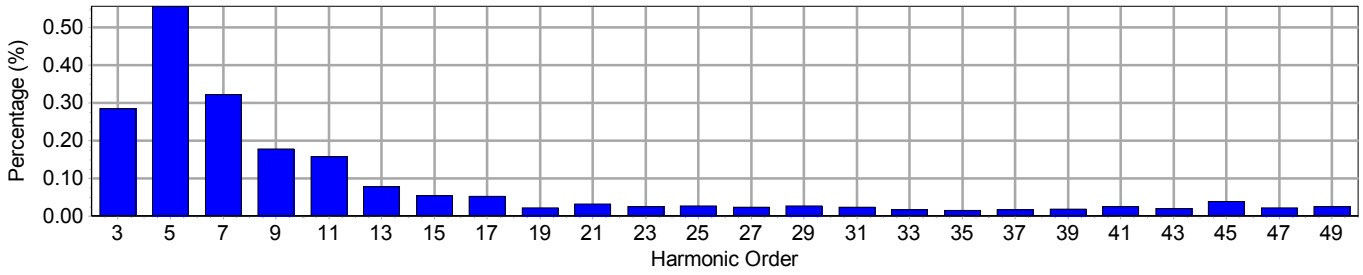
Electrical Measurements

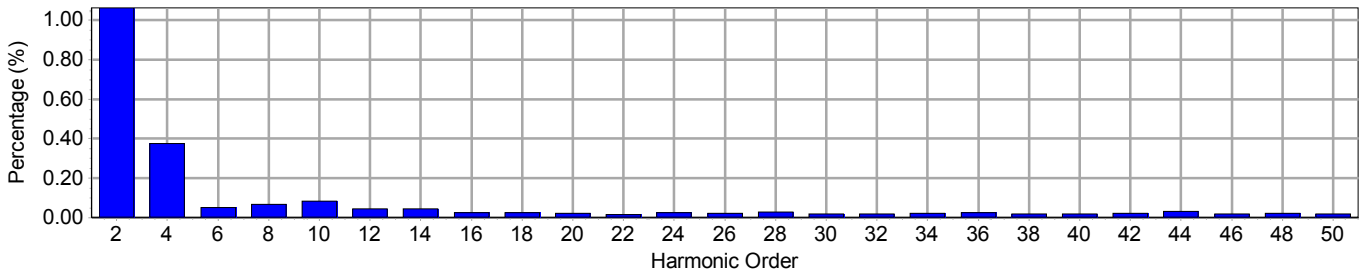
Input

Frequency	60 Hz	Active Power	109.78 W	THDV [ANSI]	1.36 %
Voltage	120.0 V(rms)	Apparent Power	110.31 VA	THDA [ANSI]	6.81 %
Current	0.9190 A(rms)	Power Factor	0.995	Max. Harmonic At	5th order

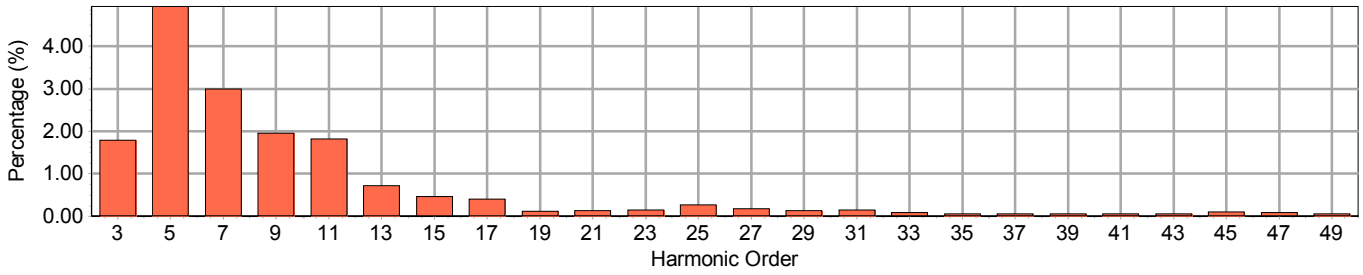
Input Voltage Harmonics (Odd)



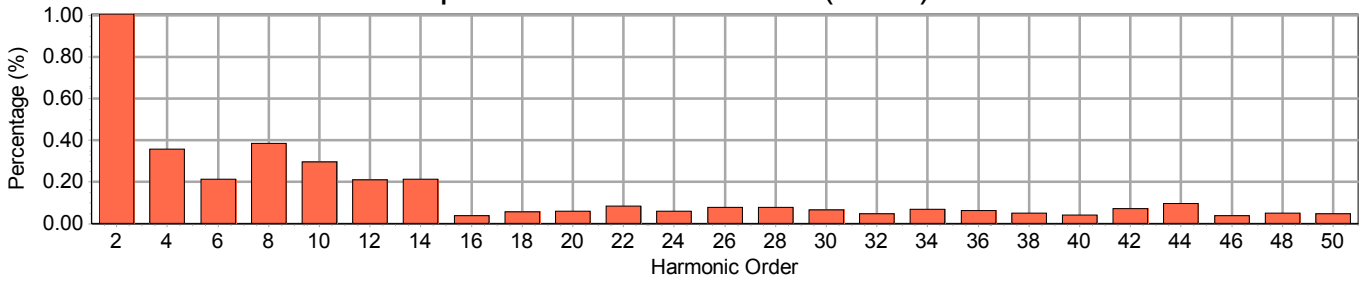
Input Voltage Harmonics (Even)



Input Current Harmonics (Odd)



Input Current Harmonics (Even)



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Harmonic Measurements

Odd Harmonics				Even Harmonics			
Harmonic Order	Frequency (HZ)	Voltage Harmonics (%)	Current Harmonics (%)	Harmonic Order	Frequency (HZ)	Voltage Harmonics (%)	Current Harmonics (%)
1	60	100.000	100.000	2	120	1.064	1.008
3	180	0.285	1.783	4	240	0.373	0.357
5	300	0.557	4.946	6	360	0.051	0.213
7	420	0.321	2.993	8	480	0.067	0.385
9	540	0.177	1.955	10	600	0.083	0.296
11	660	0.156	1.822	12	720	0.043	0.211
13	780	0.078	0.724	14	840	0.043	0.213
15	900	0.053	0.462	16	960	0.024	0.038
17	1020	0.052	0.406	18	1080	0.024	0.058
19	1140	0.022	0.115	20	1200	0.022	0.060
21	1260	0.031	0.124	22	1320	0.015	0.085
23	1380	0.024	0.145	24	1440	0.025	0.060
25	1500	0.026	0.257	26	1560	0.022	0.080
27	1620	0.023	0.180	28	1680	0.029	0.079
29	1740	0.026	0.122	30	1800	0.017	0.067
31	1860	0.022	0.144	32	1920	0.019	0.049
33	1980	0.015	0.085	34	2040	0.021	0.069
35	2100	0.015	0.047	36	2160	0.025	0.065
37	2220	0.015	0.056	38	2280	0.018	0.049
39	2340	0.017	0.055	40	2400	0.019	0.042
41	2460	0.025	0.046	42	2520	0.022	0.072
43	2580	0.019	0.059	44	2640	0.030	0.096
45	2700	0.039	0.103	46	2760	0.017	0.039
47	2820	0.021	0.080	48	2880	0.021	0.051
49	2940	0.025	0.057	50	3000	0.019	0.049

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Photometric Report: S1707061-R1

Prepared for: Artemide Canada Ltd. · Test Date: 06 July 2017

Luminaire: TAGORA 970 LED · Lumcat: MTA9_830DFH

Coefficients of Utilization - Zonal Cavity Method

RC	0.9				0.8				0.7				0.5			0.1			0
RW	0.7	0.5	0.3	0.1	0.7	0.5	0.3	0.1	0.7	0.5	0.3	0.1	0.5	0.3	0.1	0.5	0.3	0.1	0
RCR																			
0	122	122	122	122	119	119	119	119	116	116	116	116	111	111	111	102	102	102	100
1	111	106	101	97	108	104	99	95	106	101	97	94	97	94	91	89	87	85	83
2	101	92	84	78	98	90	83	77	95	88	81	76	84	79	74	78	74	71	68
3	92	80	71	64	89	78	70	63	87	77	69	62	74	67	61	68	63	59	57
4	84	70	61	53	81	69	60	53	79	68	59	52	65	58	52	60	55	50	48
5	77	62	53	45	75	61	52	45	72	60	51	45	58	50	44	54	48	43	41
6	71	56	46	39	69	55	46	39	67	54	45	39	52	44	39	49	43	38	36
7	65	50	41	34	64	50	41	34	62	49	40	34	47	40	34	44	38	33	31
8	61	46	37	31	59	45	36	30	57	44	36	30	43	36	30	41	34	30	28
9	57	42	33	27	55	41	33	27	54	41	33	27	40	32	27	37	31	27	25
10	53	39	30	25	52	38	30	25	50	38	30	25	37	29	24	35	29	24	22

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0 - 10	270	2.93	2.93
10 - 20	787	8.52	8.52
20 - 30	1226	13.28	13.28
30 - 40	1538	16.65	16.65
40 - 50	1679	18.18	18.18
50 - 60	1603	17.35	17.35
60 - 70	1269	13.74	13.74
70 - 80	714	7.73	7.73
80 - 90	148	1.60	1.60
90 - 120	3	0.04	0.04
90 - 130	3	0.04	0.04
90 - 150	3	0.04	0.04
90 - 180	3	0.04	0.04
0 - 180	9238	100.00	100.00

Average Luminance (Cd/m²)

Angle	0 Degree	45 Degree	90 Degree
45.0	4221	4221	4221
55.0	4293	4293	4293
65.0	4173	4173	4173
75.0	3590	3590	3590
85.0	1561	1561	1561

Luminaire Luminous Flux: 9238

Measured Input Power: 109.78 W

Total Luminaire Efficiency: N/A

Luminaire Luminous Efficacy: 84.1 lm/W

Luminaire Spacing Criterion (0 Degree): 1.3447

Luminaire Spacing Criterion (90 Degree): 1.3447

CIE Type: Direct

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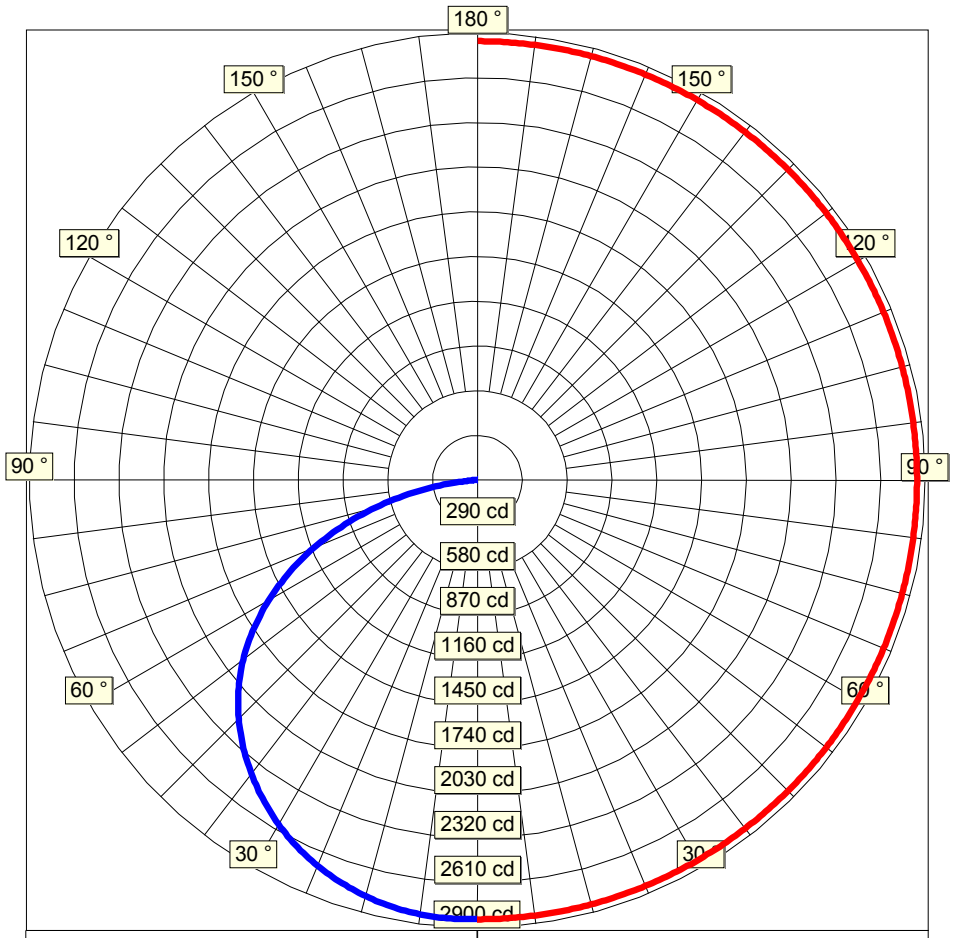
Luminaire: TAGORA 970 LED · Lumcat: MTA9_830DFH

Luminous Intensity - Polar Curve for each Plane(1)

Plane Angles	Candela Values
0.0	2844
2.5	2846
5.0	2844
7.5	2838
10.0	2827
12.5	2812
15.0	2792
17.5	2767
20.0	2737
22.5	2704
25.0	2665
27.5	2622
30.0	2574
32.5	2521
35.0	2463
37.5	2401
40.0	2333
42.5	2261
45.0	2184
47.5	2099
50.0	2009
52.5	1910
55.0	1801
57.5	1684
60.0	1560
62.5	1429
65.0	1290
67.5	1145
70.0	994
72.5	839
75.0	680
77.5	520
80.0	363
82.5	218
85.0	100
87.5	45
90.0	26
92.5	0
95.0	0
97.5	0



Cone Angles	Candela Values
0.0	2846

Plane Through Maximum Candela	Cone Through Maximum Candela
2.5 (Vertical Degrees) = 2846	0.0 (Horizontal Degrees) = 2846

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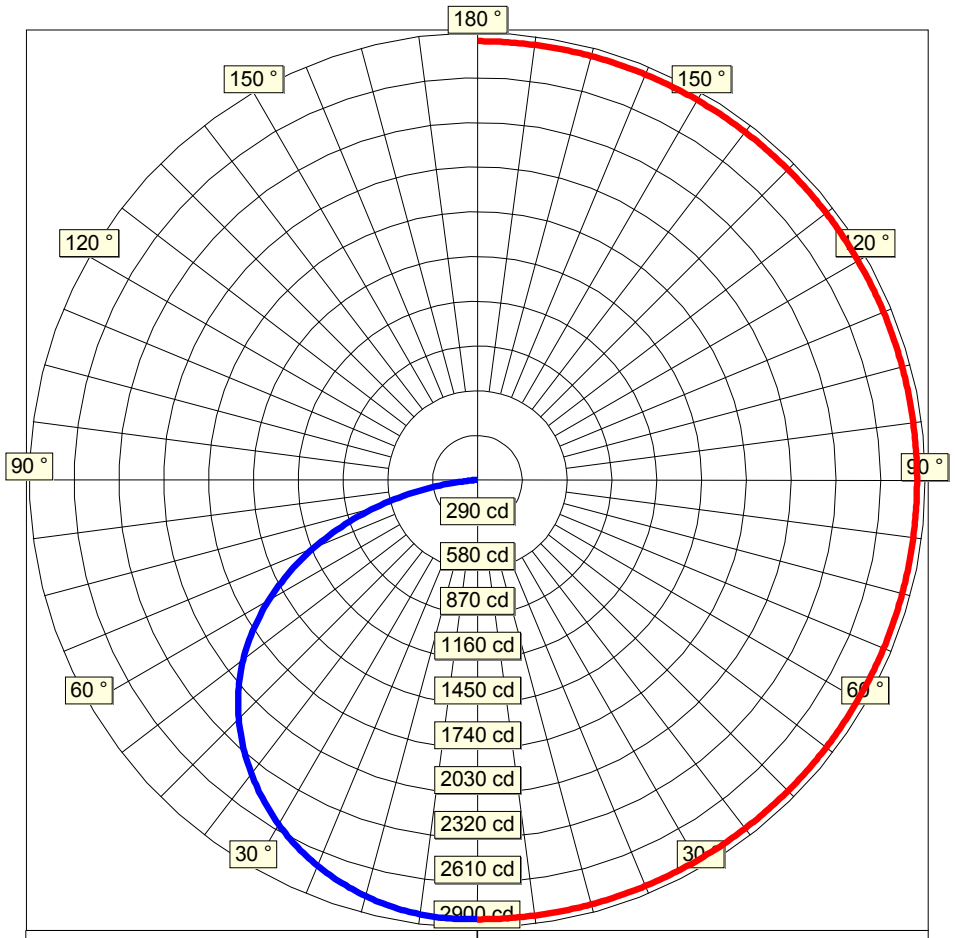
Luminaire: TAGORA 970 LED · Lumcat: MTA9_830DFH

Luminous Intensity - Polar Curve for each Plane(2)

Plane Angles	Candela Values
100.0	0
102.5	0
105.0	0
107.5	0
110.0	0
112.5	0
115.0	0
117.5	0
120.0	0
122.5	0
125.0	0
127.5	0
130.0	0
132.5	0
135.0	0
137.5	0
140.0	0
142.5	0
145.0	0
147.5	0
150.0	0
152.5	0
155.0	0
157.5	0
160.0	0
162.5	0
165.0	0
167.5	0
170.0	0
172.5	0
175.0	0
177.5	0
180.0	0



Cone Angles	Candela Values
0.0	2846

Plane Through Maximum Candela	Cone Through Maximum Candela
2.5 (Vertical Degrees) = 2846	0.0 (Horizontal Degrees) = 2846

IES File Headers

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IESNA:LM-63-2002
[ISSUEDATE]     06 July 2017
[TESTLAB]       Spectra Lux Industries Inc.
[TEST]          S1707061-R1
[MANUFAC]       Artemide
[LUMCAT]        MTA9_830DFH
[LUMINAIRE]     TAGORA 970 LED
[LAMP]          Clusters of 929000921706 LEDs c/w Advance Driver XI036C100V054DSM5 @ 120.00V
[_BURNING]      Vertical Base Up (9,238 Luminaire Lumens)
[_REFLECTOR]    Diffuse HO c/w White Aluminum Optic
[_LENS]         Acrylic Diffuser
[_HOUSING]      Cylindrical Aluminum Shape
[DISTRIBUTION] Direct Type - Downlight
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Candela Table

Lateral Angles

Vertical Angles	0.0
0.0	2844
2.5	2846
5.0	2844
7.5	2838
10.0	2827
12.5	2812
15.0	2792
17.5	2767
20.0	2737
22.5	2704
25.0	2665
27.5	2622
30.0	2574
32.5	2521
35.0	2463
37.5	2401
40.0	2333
42.5	2261
45.0	2184
47.5	2099
50.0	2009
52.5	1910
55.0	1801
57.5	1684
60.0	1560
62.5	1429
65.0	1290
67.5	1145
70.0	994
72.5	839
75.0	680
77.5	520
80.0	363
82.5	218
85.0	100
87.5	45
90.0	26

Lateral Angles

Vertical Angles	0.0
92.5	0
95.0	0
97.5	0
100.0	0
102.5	0
105.0	0
107.5	0
110.0	0
112.5	0
115.0	0
117.5	0
120.0	0
122.5	0
125.0	0
127.5	0
130.0	0
132.5	0
135.0	0
137.5	0
140.0	0
142.5	0
145.0	0
147.5	0
150.0	0
152.5	0
155.0	0
157.5	0
160.0	0
162.5	0
165.0	0
167.5	0
170.0	0
172.5	0
175.0	0
177.5	0
180.0	0