



# Les Industries Spectralux Inc. Spectralux Industries Inc.

2750 Sabourin, Saint-Laurent (Quebec) H4S 1M2 Canada  
Tel.: (514) 332-0082 Fax: (514) 332-3590 [www.spectralux.ca](http://www.spectralux.ca)

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

## Moving Mirror Goniophotometer Test Report

**Standard(s):** , IESNA LM-35-02, IES LM-79-08, ANSI C82.77-2002

**Customer** Lumenpulse, 1751 Richardson, suite 1505, Montréal, Québec, Canada, H3K 1G6

General Information		SSL Details	Driver Details	
<b>Test Report</b>	S1512101-R1	<b>Description</b>	61W White 4000K SSL	<b>Type</b> Commercial
<b>Test Date</b>	10 December 2015	<b>Serial Number</b>	SRIS 2225	<b>Description</b> 61SSL-CY963
<b>Report Date</b>	17 December 2015	<b>Photometric Method</b>	Absolute	<b>Manufacturer</b> Mean Well
<b>Ambient</b>	25.4°C	<b>Lamp Lumens</b>	-1	<b>Catalog No.</b> LPF-60-24
<b>Humidity</b>	26.4 %	<b>Test Position</b>	Axial	<b>Voltage Tap</b> 120.00 V
<b>Lamp Type</b>	SSL	<b>Comments</b>	Clusters of 48 Cree XPE2 LED's	<b>Power Factor</b> 0.9900

### Floodlight Data

General Information		Optics	Aperture (feet)	
<b>Manufacturer</b>	Lumenpulse	<b>Reflector</b>	48 Collimators	<b>X</b> 4.0000
<b>Name</b>	LUMENFACADE	<b>Housing</b>	Extruded Aluminum	<b>Y</b> 0.1667
<b>Catalog No.</b>	LOGI-HO-120/277-48-40K -60x60-SI-NO	<b>Lens</b>	Polycarbonate	<b>Z</b> 0.0000

Lamp Stabilization Time: 1 hour 15 minutes

**Tested By:** Marc Viwonou Sena

**Approved Signatory:** Chrisnel Blot

**Signature:**



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## 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).





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## Electrical Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Power Supply	Elgar	CW801	30527	N.P.C.R.	N.P.C.R.
Input Power Meter	Yokogawa	WT210	27E116584	2014/10/30	2016/10/30
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	2015/10/05	2016/10/05

## Environment Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Temperature Humidity Sensor	Omega	HH311	120504178	2014/04/16	2016/04/16



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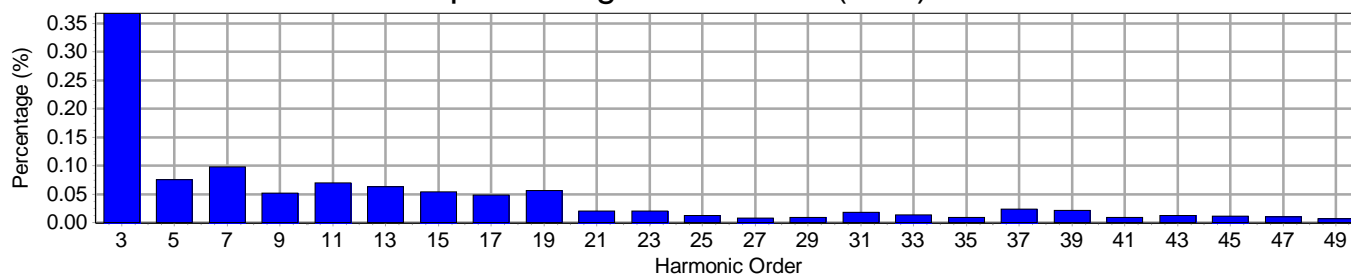
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## Electrical Measurements

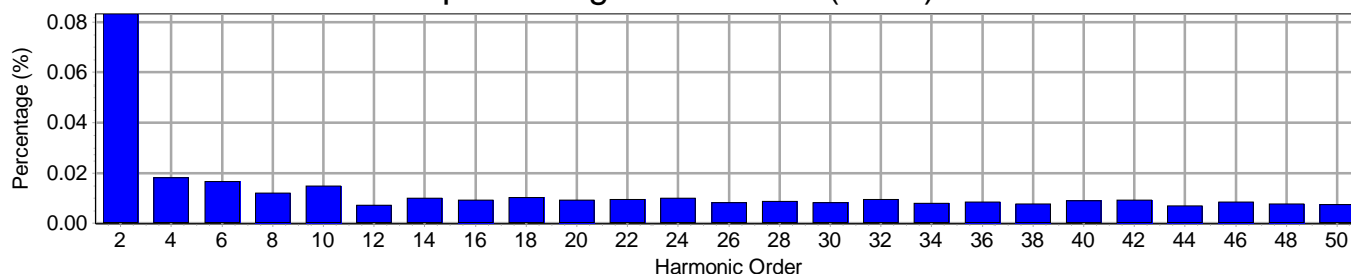
### Input

Frequency	60 Hz	Active Power	61.12 W	THDV [ANSI]	0.43 %
Voltage	120.1 V(rms)	Apparent Power	61.44 VA	THDA [ANSI]	5.27 %
Current	0.5117 A(rms)	Power Factor	0.995	Max. Harmonic At	5th order

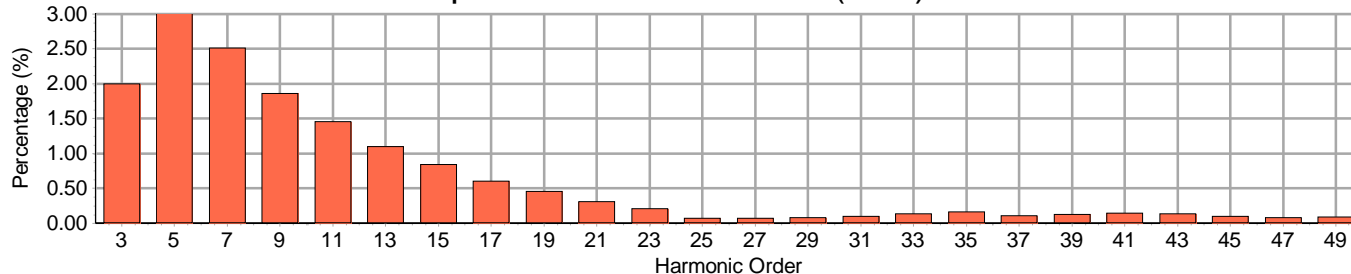
### Input Voltage Harmonics (Odd)



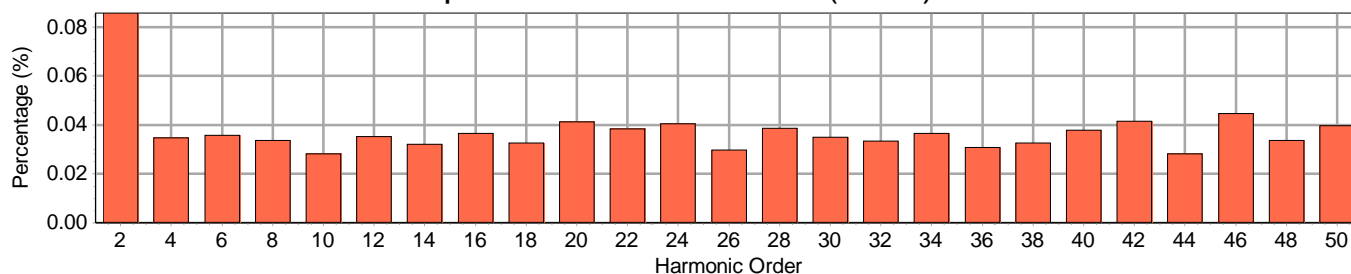
### Input Voltage Harmonics (Even)



### 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	0.083	0.086
3	180	0.369	1.998	4	240	0.018	0.035
5	300	0.076	3.013	6	360	0.017	0.036
7	420	0.099	2.517	8	480	0.012	0.034
9	540	0.053	1.861	10	600	0.015	0.028
11	660	0.070	1.457	12	720	0.007	0.035
13	780	0.064	1.102	14	840	0.010	0.032
15	900	0.054	0.841	16	960	0.009	0.037
17	1020	0.049	0.603	18	1080	0.010	0.033
19	1140	0.056	0.458	20	1200	0.009	0.041
21	1260	0.020	0.311	22	1320	0.010	0.038
23	1380	0.021	0.209	24	1440	0.010	0.040
25	1500	0.012	0.066	26	1560	0.008	0.030
27	1620	0.008	0.067	28	1680	0.009	0.039
29	1740	0.010	0.081	30	1800	0.008	0.035
31	1860	0.019	0.099	32	1920	0.010	0.033
33	1980	0.014	0.133	34	2040	0.008	0.037
35	2100	0.009	0.158	36	2160	0.008	0.031
37	2220	0.025	0.109	38	2280	0.008	0.032
39	2340	0.022	0.124	40	2400	0.009	0.038
41	2460	0.010	0.144	42	2520	0.009	0.041
43	2580	0.013	0.132	44	2640	0.007	0.028
45	2700	0.012	0.100	46	2760	0.009	0.045
47	2820	0.010	0.079	48	2880	0.008	0.034
49	2940	0.008	0.083	50	3000	0.008	0.040



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## Photometric Report: S1512101-R1

Prepared for: Lumenpulse · Test Date: 10 December 2015

Floodlight: LUMENFACADE · Lumcat: LOGI-HO-120/277-48-40K-60x60-SI-NO

### Photometric Floodlight Characteristics

Nominal SSL Power	61.00 W	
Measured Input Voltage	120.07 V	<b>Notes</b>
Test SSL Current	0.300 A	1) Floodlight tested in accordance to IES LM-35-1989 at a distance great enough so that the inverse-square law applies.
Floodlight Luminous Flux	3638	
Measured Input Power	61.12 W	
Floodlight Luminous Efficacy	59.5 lm/W	2) Field performance may differ from laboratory measurements.
Maximum Candela Value	3145	
Maximum Candela Location	0.0 H, -2.5 V	3) Results are valid for the tested material only.
Horizontal Beam Angle (50%)	67.0 °	
Vertical Beam Angle (50%)	62.5 °	4) All data published in this report are based on absolute photometry.
Horizontal Field Angle (10%)	102.0 °	
Vertical Field Angle (10%)	96.5 °	5) The original electronic file or paper report cannot be edited in whole or in part without written consent of Spectralux Industries Inc.
IES/NEMA Type Classification	6Hx5V	
Beam Lumens (50%)	2347	
Beam Efficiency (50%)	N/A	
Field Lumens (10%)	3329	
Field Efficiency (10%)	N/A	
Spill Lumens	309	
Total Floodlight Lumens	3638	
Total Floodlight Efficiency	N/A	



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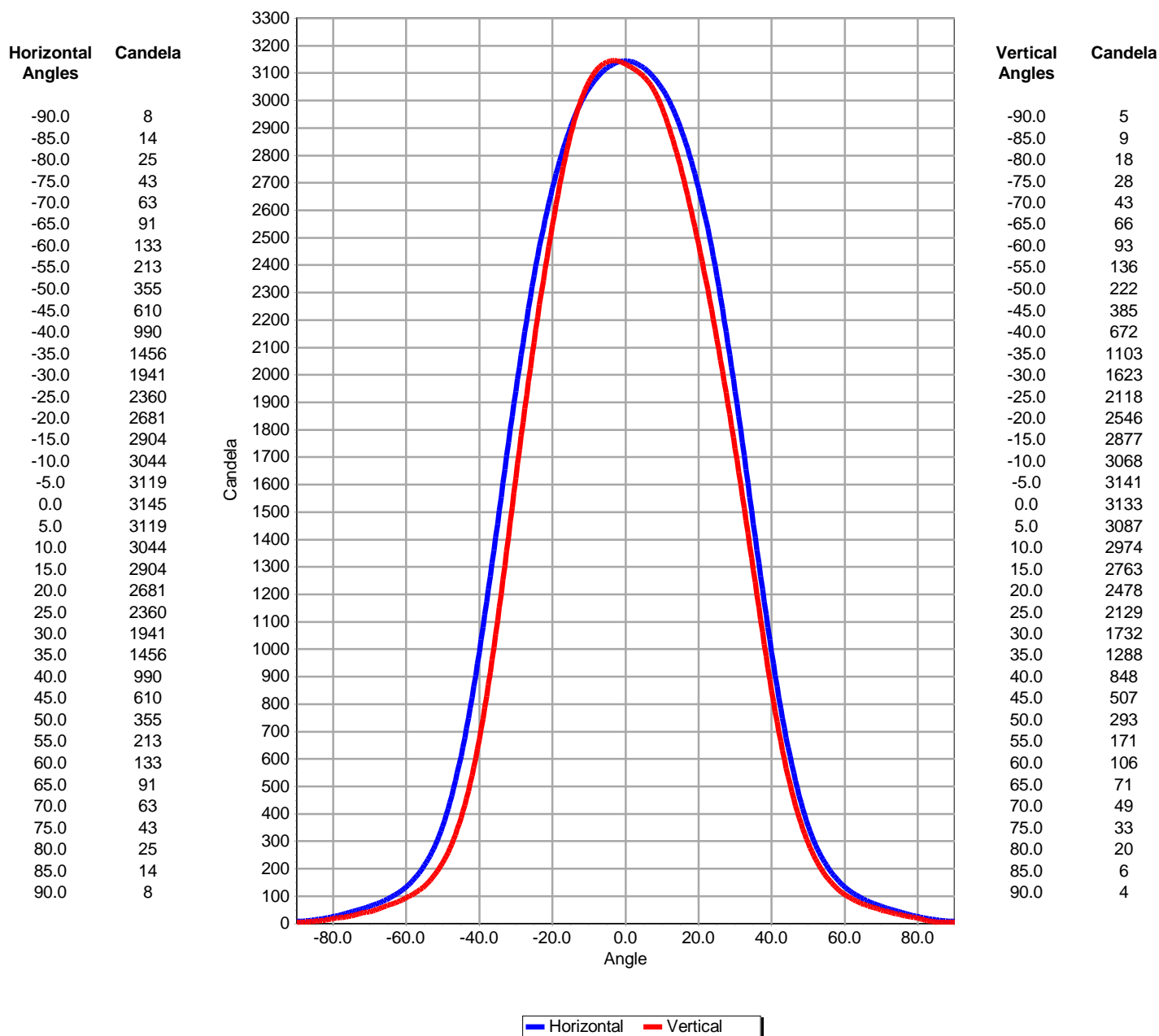
NVLAP LAB CODE: 200899-0

## Photometric Report: S1512101-R1

Prepared for: Lumenpulse · Test Date: 10 December 2015

Floodlight: LUMENFACADE · Lumcat: LOGI-HO-120/277-48-40K-60x60-SI-NO

### Maximum Candela Trace (Max. Location: 0.0 H, -2.5 V)





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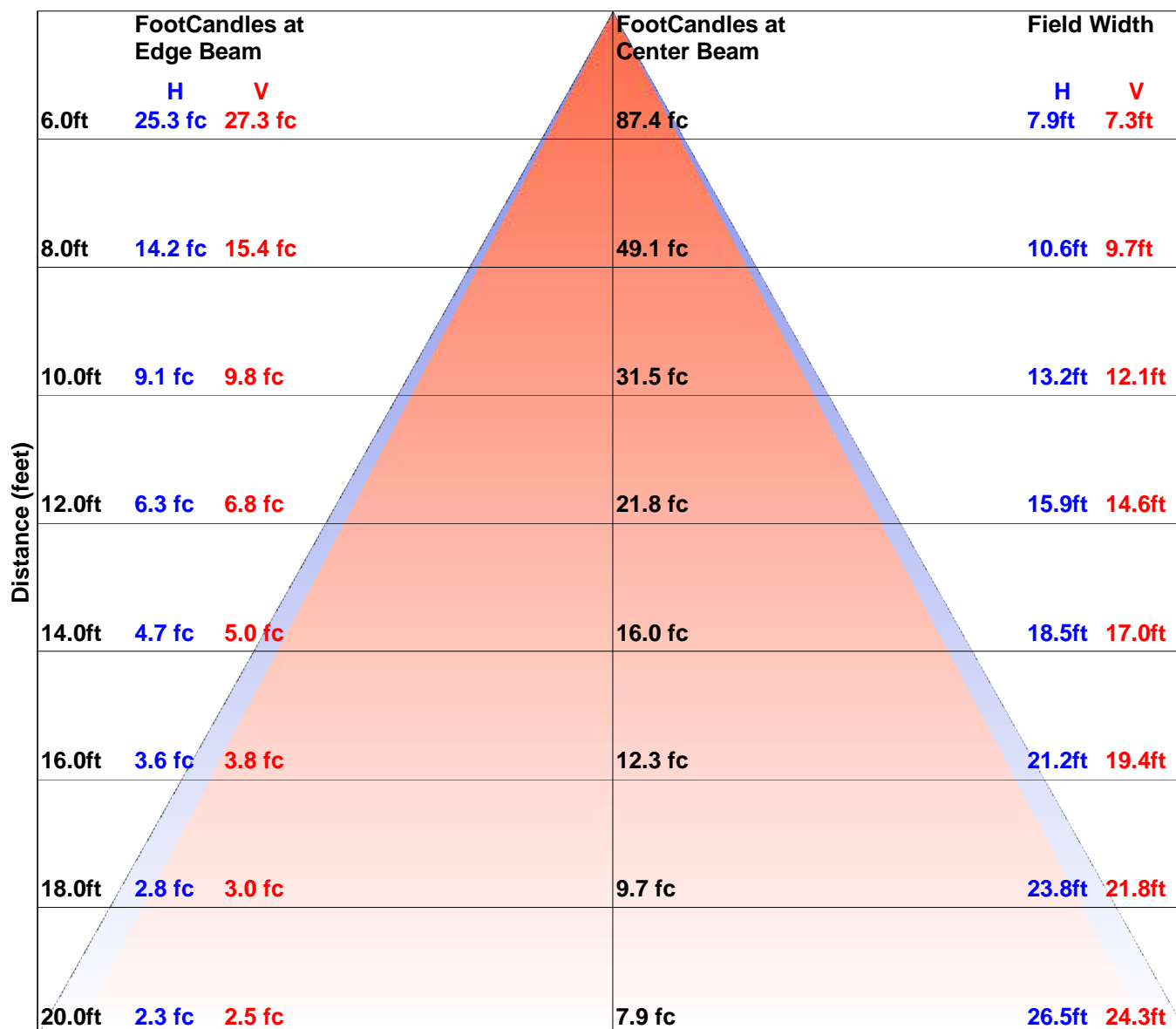
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## Photometric Report: S1512101-R1

Prepared for: Lumenpulse · Test Date: 10 December 2015

Floodlight: LUMENFACADE · Lumcat: LOGI-HO-120/277-48-40K-60x60-SI-NO

### Downlight Beam



— Horizontal (67.0 °) — Vertical (62.5 °)





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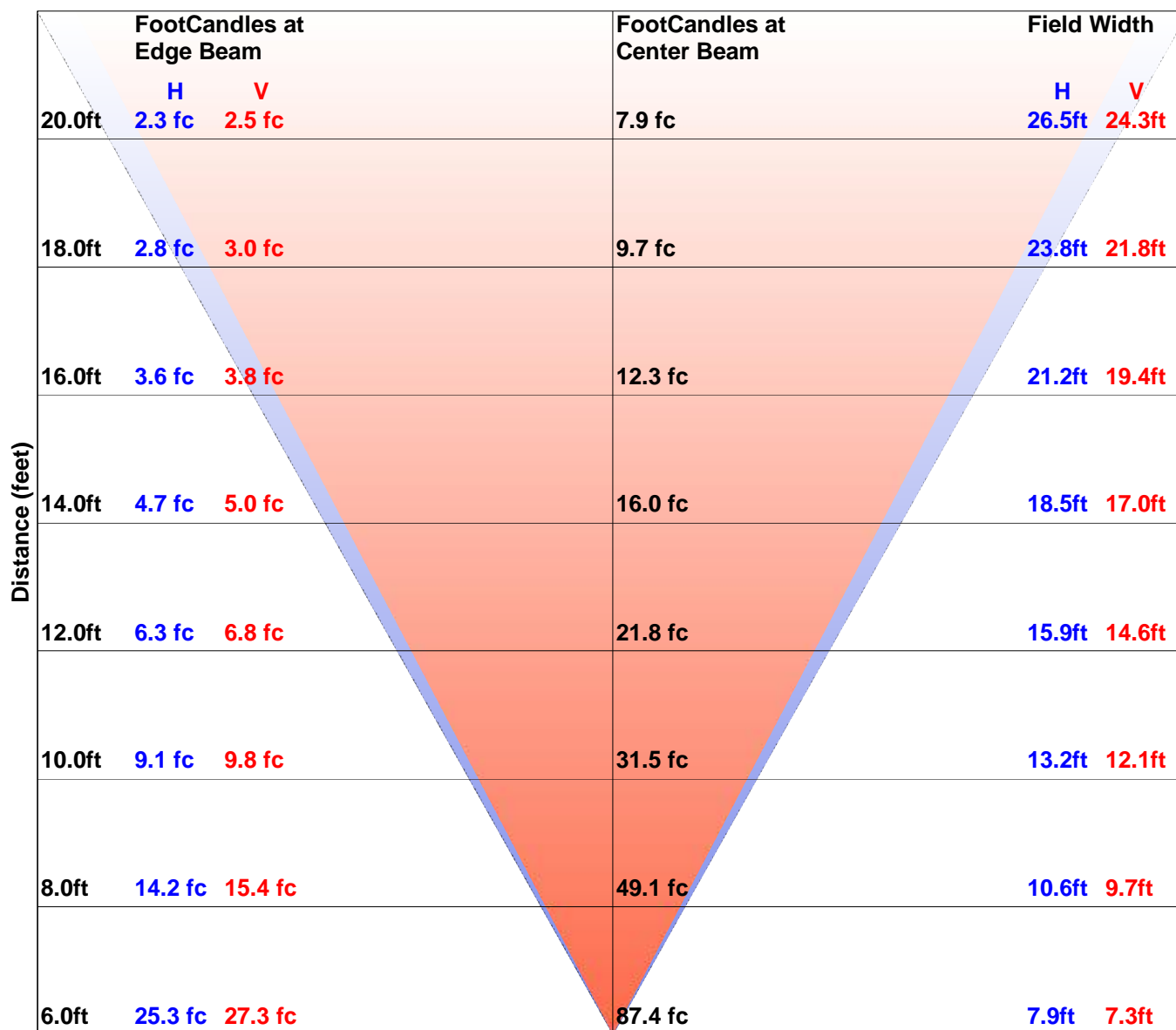
NVLAP LAB CODE: 200899-0

## Photometric Report: S1512101-R1

Prepared for: Lumenpulse · Test Date: 10 December 2015

Floodlight: LUMENFACADE · Lumcat: LOGI-HO-120/277-48-40K-60x60-SI-NO

### Uplight Beam



— Horizontal (67.0 °) — Vertical (62.5 °)



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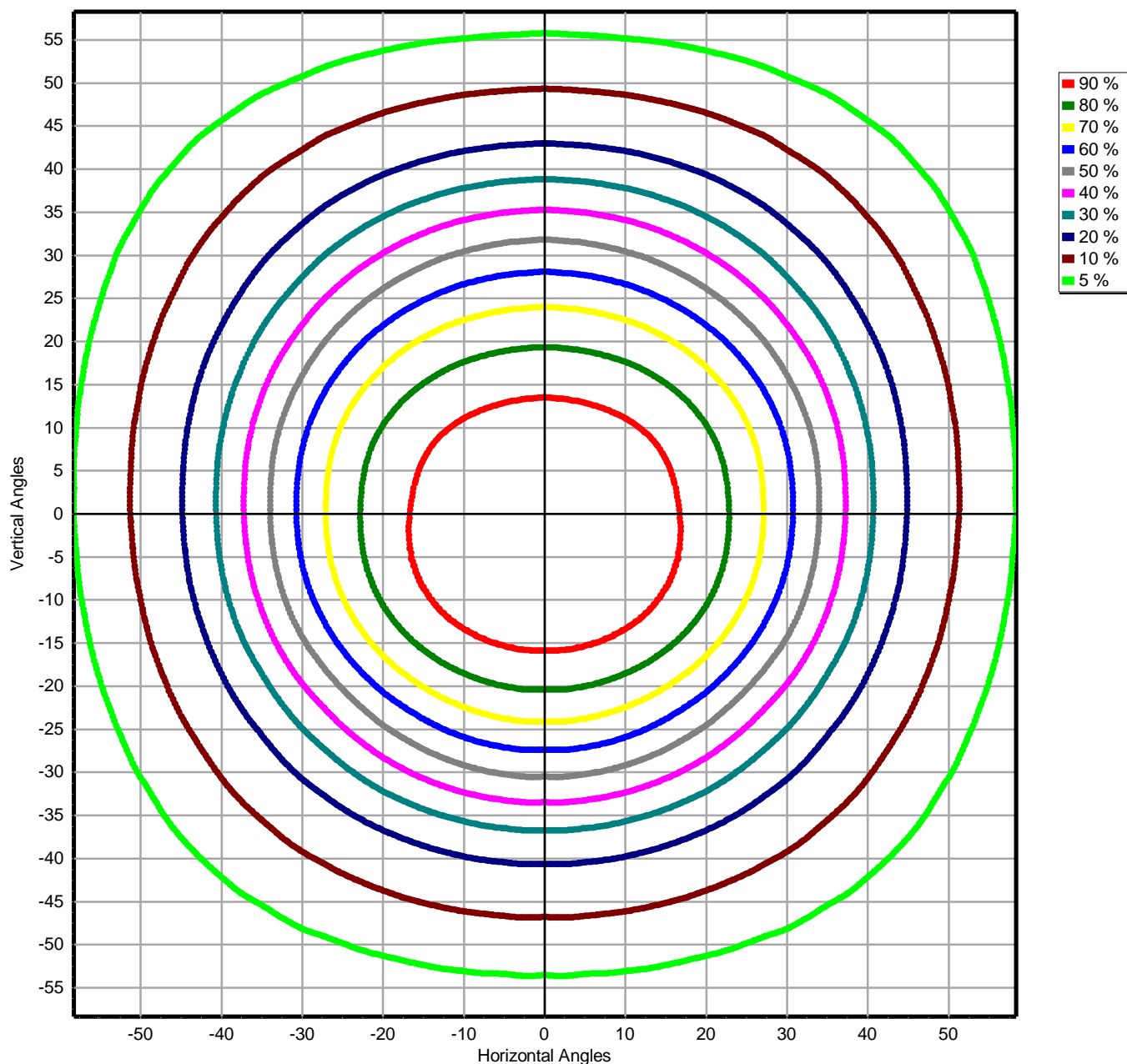
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## Photometric Report: S1512101-R1

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Floodlight: LUMENFACADE · Lumcat: LOGI-HO-120/277-48-40K-60x60-SI-NO

### ISO Candela Diagram





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## IES File Headers

IESNA:LM-63-2002  
[ISSUEDATE] 10 December 2015  
[TESTLAB] Spectra Lux Industries Inc.  
[TEST] S1512101-R1  
[MANUFAC] Lumenpulse  
[LUMCAT] LOGI-HO-120/277-48-40K-60x60-SI-NO  
[LUMINAIRE] LUMENFACADE  
[LAMP] (Clusters of 48 Cree XPE2 LED's) 61W SSL c/w Driver LPF-60-24 @ 120.00V  
[\_BURNING] Axial (3,638 Luminaire Lumens)  
[\_REFLECTOR] 48 Collimators  
[\_LENS] Polycarbonate  
[\_HOUSING] Extruded Aluminum  
[DISTRIBUTION] NEMA 6Hx5V (Max. CP at 0.0H,-2.5V)  
[MORE] (Based on IES LM-35-1989)

## Candela Table

### Horizontal Angles

	0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	
V e r t i c a l	-90.0	5	5	4	4	5	4	5	4	5
	-87.5	6	6	6	6	7	5	7	6	6
	-85.0	9	8	8	7	9	8	8	8	8
	-82.5	11	13	12	13	12	13	12	12	12
	-80.0	18	16	16	17	16	16	18	16	16
	-77.5	23	22	22	21	22	21	21	21	22
	-75.0	28	29	28	29	27	29	28	28	28
	-72.5	38	36	36	36	36	35	36	34	34
	-70.0	43	45	45	43	45	43	43	43	42
	-67.5	54	56	55	55	53	54	53	52	51
	-65.0	66	67	67	66	64	64	63	62	61
	-62.5	78	79	78	78	76	76	74	73	72
	-60.0	93	95	94	92	91	90	89	86	84
	-57.5	112	114	113	112	109	108	106	102	100
	-55.0	136	138	136	135	134	129	126	122	119
A n g l e s	-52.5	173	175	171	169	165	161	155	149	142
	-50.0	222	223	220	216	209	202	194	184	176
	-47.5	289	291	287	279	271	259	246	233	219
	-45.0	385	386	379	369	355	338	319	299	276
	-42.5	511	512	502	488	467	442	416	384	355
	-40.0	672	674	659	640	612	577	540	499	457
	-37.5	871	873	854	829	790	747	696	640	583
	-35.0	1103	1103	1082	1050	1003	947	883	811	740
	-32.5	1357	1357	1331	1294	1240	1173	1095	1008	919
	-30.0	1623	1623	1593	1551	1489	1413	1323	1223	1116
	-27.5	1878	1875	1846	1800	1734	1652	1555	1441	1323
	-25.0	2118	2116	2086	2039	1972	1886	1781	1661	1534
	-22.5	2344	2341	2310	2262	2194	2109	2002	1876	1740
	-20.0	2546	2543	2515	2469	2402	2317	2211	2083	1942
	-17.5	2726	2721	2695	2652	2588	2506	2400	2275	2130
-15.0	2877	2872	2847	2806	2745	2667	2565	2441	2298	
-12.5	2989	2983	2962	2923	2867	2793	2696	2574	2434	
-10.0	3068	3062	3041	3004	2952	2883	2791	2675	2539	
-7.5	3118	3112	3092	3057	3007	2943	2856	2744	2613	
-5.0	3141	3135	3117	3084	3037	2975	2892	2786	2659	



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## Horizontal Angles

	0.0	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	
V e r t i c a l	-2.5	3145	3138	3119	3088	3044	2984	2904	2803	2681
	0.0	3133	3126	3108	3078	3033	2976	2897	2800	2681
	2.5	3114	3106	3090	3058	3014	2957	2881	2784	2669
	5.0	3087	3079	3061	3030	2986	2928	2854	2759	2644
	7.5	3044	3036	3018	2986	2941	2885	2809	2716	2599
	10.0	2974	2964	2946	2914	2871	2814	2740	2644	2529
	12.5	2877	2869	2849	2818	2775	2718	2643	2549	2430
	15.0	2763	2751	2733	2702	2657	2600	2524	2430	2311
	17.5	2627	2618	2600	2567	2525	2466	2389	2292	2174
	20.0	2478	2467	2448	2417	2373	2313	2233	2136	2017
	22.5	2311	2300	2281	2248	2202	2140	2059	1961	1842
	25.0	2129	2117	2097	2063	2015	1951	1870	1772	1658
	27.5	1936	1923	1903	1866	1819	1755	1672	1579	1468
	30.0	1732	1719	1697	1660	1610	1549	1469	1380	1277
	32.5	1514	1499	1480	1444	1397	1336	1264	1182	1091
	35.0	1288	1273	1255	1221	1179	1126	1060	989	908
	37.5	1062	1049	1034	1003	967	922	866	808	741
	40.0	848	839	827	801	773	735	693	643	593
	42.5	664	655	645	626	605	576	542	506	467
A n g l e s	45.0	507	502	496	481	464	444	419	395	365
	47.5	385	381	376	365	355	340	323	305	286
	50.0	293	289	285	279	271	262	249	237	223
	52.5	222	219	217	212	206	201	193	185	175
	55.0	171	168	167	164	160	157	152	147	141
	57.5	133	131	130	128	127	125	121	118	114
	60.0	106	105	105	103	102	101	98	97	93
	62.5	86	86	84	83	83	82	81	79	78
	65.0	71	70	70	70	69	69	66	66	65
	67.5	60	58	59	59	58	58	55	55	53
	70.0	49	49	48	47	47	47	47	46	43
	72.5	41	40	39	40	39	38	37	34	33
	75.0	33	32	32	32	30	31	27	26	24
	77.5	25	25	25	24	23	21	19	20	21
	80.0	20	19	17	15	17	16	15	15	15
	82.5	11	14	11	10	10	10	9	10	10
	85.0	6	7	6	6	6	6	7	8	8
	87.5	4	4	4	3	5	5	5	6	6
	90.0	4	4	4	4	3	4	4	5	4



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## Horizontal Angles

	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5
V e r t i c a l	-90.0	7	6	6	6	6	6	6	6
	-87.5	5	7	6	6	8	7	6	8
	-85.0	10	9	9	10	8	8	9	9
	-82.5	12	13	12	12	11	13	12	12
	-80.0	15	17	16	16	17	16	15	14
	-77.5	22	20	22	21	19	18	19	18
	-75.0	27	27	26	26	25	24	23	23
	-72.5	34	33	32	32	31	30	29	27
	-70.0	41	39	39	39	37	35	34	34
	-67.5	49	49	47	46	45	42	41	40
	-65.0	59	57	56	54	53	50	48	45
	-62.5	70	67	66	64	60	57	55	53
	-60.0	82	79	77	75	72	69	65	62
	-57.5	96	92	89	86	83	78	75	71
	-55.0	114	109	105	102	95	88	85	81
	-52.5	136	129	123	117	111	103	98	91
	-50.0	166	155	145	139	129	120	113	104
	-47.5	204	191	176	164	150	137	127	118
	-45.0	255	234	215	198	180	162	148	135
	-42.5	323	293	263	239	215	191	172	154
A n g l e s	-40.0	412	371	329	294	258	225	201	178
	-37.5	525	465	411	364	316	271	237	206
	-35.0	662	586	512	449	385	328	282	239
	-32.5	822	725	631	550	469	393	334	280
	-30.0	1000	882	769	668	566	472	397	328
	-27.5	1189	1054	918	797	675	560	468	383
	-25.0	1385	1234	1080	937	794	658	546	444
	-22.5	1581	1417	1247	1086	922	766	634	512
	-20.0	1776	1600	1416	1240	1058	880	726	587
	-17.5	1962	1779	1583	1392	1192	993	822	662
	-15.0	2128	1940	1738	1536	1323	1109	918	739
	-12.5	2267	2078	1871	1661	1438	1212	1004	810
	-10.0	2376	2190	1981	1766	1536	1299	1080	873
	-7.5	2456	2274	2066	1848	1614	1372	1143	926
	-5.0	2508	2329	2126	1907	1670	1424	1188	965
	-2.5	2534	2360	2158	1941	1705	1456	1220	990
	0.0	2539	2369	2170	1954	1718	1473	1232	1002
	2.5	2530	2361	2165	1952	1717	1473	1233	1004
	5.0	2506	2339	2144	1933	1699	1457	1221	993
	7.5	2462	2296	2104	1891	1662	1425	1192	970
	10.0	2392	2225	2034	1824	1600	1372	1145	930
	12.5	2293	2129	1940	1734	1518	1299	1082	879
	15.0	2174	2010	1827	1626	1419	1214	1008	820
	17.5	2036	1873	1695	1501	1307	1116	924	753
	20.0	1881	1723	1552	1370	1188	1011	838	682
	22.5	1711	1560	1400	1227	1062	903	748	611
	25.0	1530	1388	1240	1084	934	795	658	540
	27.5	1349	1219	1084	944	812	691	574	472
	30.0	1168	1051	933	808	697	594	495	410
	32.5	991	889	788	683	590	505	422	354
	35.0	825	740	655	568	493	425	360	303
	37.5	673	604	537	467	407	354	303	260
	40.0	540	485	433	379	335	295	255	221
	42.5	427	387	350	308	276	244	217	190



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ISO/IEC 17025



NVLAP LAB CODE: 200899-0

## Horizontal Angles

	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0	42.5
45.0	336	307	281	250	226	204	182	163	148
47.5	265	245	225	203	186	171	155	141	128
50.0	208	196	182	167	155	144	132	121	112
52.5	167	158	148	138	129	121	112	104	97
55.0	134	129	122	114	107	103	95	90	85
57.5	109	105	101	96	92	85	82	74	70
60.0	90	88	84	80	76	71	68	64	58
62.5	76	73	71	68	61	59	55	52	49
65.0	64	61	57	54	51	48	46	42	42
67.5	52	48	46	44	41	39	37	35	33
70.0	40	39	37	34	32	32	30	29	28
72.5	32	30	29	28	28	26	26	24	24
75.0	25	22	24	23	22	22	21	22	19
77.5	19	18	18	16	16	18	17	16	17
80.0	14	13	14	14	15	13	15	13	13
82.5	10	9	11	10	11	11	12	12	10
85.0	8	8	8	7	8	9	8	9	10
87.5	5	5	5	4	7	5	6	7	6
90.0	4	4	4	4	5	5	6	7	4

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NVLAP LAB CODE: 200899-0

## Horizontal Angles

	45.0	47.5	50.0	52.5	55.0	57.5	60.0	62.5	65.0
V e r t i c a l	-90.0	7	7	8	7	6	8	7	8
	-87.5	7	8	7	8	7	8	8	8
	-85.0	9	9	10	9	10	10	9	9
	-82.5	12	12	10	9	10	10	10	10
	-80.0	14	14	13	14	13	12	11	12
	-77.5	17	17	18	16	16	15	14	12
	-75.0	22	21	19	19	18	17	15	13
	-72.5	26	24	24	23	22	19	17	15
	-70.0	30	28	28	26	24	22	19	16
	-67.5	36	33	32	30	28	24	23	18
	-65.0	42	39	37	35	32	28	25	22
	-62.5	47	44	42	39	37	33	28	25
	-60.0	55	52	49	45	41	38	34	29
	-57.5	62	58	54	51	46	42	38	31
	-55.0	70	66	61	56	52	47	43	33
	-52.5	80	74	68	62	56	52	47	37
	-50.0	90	83	75	69	63	57	51	41
	-47.5	100	92	84	76	70	63	56	43
	-45.0	113	103	92	85	76	68	60	48
	-42.5	125	114	101	92	82	73	66	51
A n g l e s	-40.0	140	124	111	100	90	80	70	54
	-37.5	158	138	123	109	96	86	76	59
	-35.0	177	154	133	117	103	91	81	61
	-32.5	200	170	145	127	112	98	85	64
	-30.0	227	190	161	138	118	104	90	68
	-27.5	255	211	176	149	127	109	97	71
	-25.0	290	236	192	161	136	116	100	74
	-22.5	329	264	213	175	144	123	105	77
	-20.0	370	292	233	189	155	129	109	80
	-17.5	414	323	254	203	165	136	114	82
	-15.0	458	356	277	220	175	143	118	84
	-12.5	498	385	297	233	184	149	123	87
	-10.0	537	413	315	245	193	155	126	87
	-7.5	570	437	333	258	200	160	130	89
	-5.0	591	453	345	267	205	163	132	90
	-2.5	610	466	355	272	213	167	133	91
	0.0	619	474	361	277	213	169	135	92
	2.5	620	475	363	278	214	169	135	92
	5.0	614	472	359	276	214	169	136	91
	7.5	602	463	354	272	211	167	135	92
	10.0	579	446	344	266	206	164	133	91
	12.5	550	426	329	255	202	161	131	89
	15.0	516	402	313	245	194	155	128	89
	17.5	475	374	293	232	184	150	124	86
	20.0	435	344	272	218	176	144	120	83
	22.5	395	315	252	204	166	138	116	83
	25.0	353	285	232	189	156	130	111	81
	27.5	315	258	212	175	147	124	106	76
	30.0	281	232	193	163	138	118	102	75
	32.5	246	208	176	150	128	111	96	71
	35.0	219	185	159	137	120	103	91	67
	37.5	194	167	145	127	111	99	85	65
	40.0	170	148	132	117	102	91	80	62
	42.5	150	133	118	107	95	84	75	57



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ISO/IEC 17025



NVLAP LAB CODE: 200899-0

## Horizontal Angles

	45.0	47.5	50.0	52.5	55.0	57.5	60.0	62.5	65.0
45.0	134	120	108	98	86	79	70	60	54
47.5	117	107	97	87	78	70	65	57	49
50.0	102	94	86	78	71	64	58	50	44
52.5	91	83	76	69	62	57	51	45	41
55.0	77	71	66	60	54	49	44	40	36
57.5	65	59	55	50	48	43	40	36	31
60.0	56	51	48	44	42	38	35	31	28
62.5	46	43	41	38	35	32	31	28	26
65.0	37	35	34	32	31	28	27	25	22
67.5	34	31	30	29	27	26	24	23	20
70.0	27	26	27	24	23	21	21	21	18
72.5	23	22	22	21	21	19	18	18	15
75.0	20	19	19	18	18	17	16	15	15
77.5	16	16	16	15	15	14	14	14	14
80.0	14	13	13	13	14	12	12	12	11
82.5	12	11	10	10	11	11	10	11	10
85.0	9	9	10	9	9	7	8	8	8
87.5	6	5	6	7	8	6	6	6	5
90.0	5	6	5	6	6	6	6	7	8

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## Horizontal Angles

		67.5	70.0	72.5	75.0	77.5	80.0	82.5	85.0	87.5
V e r t i c a l	-90.0	7	9	8	8	9	8	9	7	9
	-87.5	8	9	8	8	8	10	10	7	8
	-85.0	9	8	9	9	8	9	9	8	9
	-82.5	10	10	9	9	9	9	9	9	10
	-80.0	11	10	9	10	9	10	9	8	9
	-77.5	11	11	12	10	10	9	9	9	10
	-75.0	14	12	12	11	10	10	9	9	10
	-72.5	15	14	12	12	11	10	10	8	8
	-70.0	17	15	14	12	12	11	10	10	8
	-67.5	19	17	15	13	12	12	9	9	8
	-65.0	21	18	16	15	13	11	10	8	8
	-62.5	24	20	19	16	14	12	10	10	8
	-60.0	26	23	20	17	15	12	11	9	9
	-57.5	28	25	21	18	15	13	11	8	8
	-55.0	30	25	24	20	16	14	12	10	7
	-52.5	33	29	25	20	17	14	11	9	8
	-50.0	36	30	26	22	18	15	12	8	8
	-47.5	39	31	29	24	20	16	12	10	7
	-45.0	42	35	30	25	20	16	13	9	9
	A n g l e s	-42.5	44	38	32	26	21	16	14	9
-40.0		48	39	34	28	22	18	14	10	8
-37.5		50	42	35	28	24	18	15	10	9
-35.0		53	45	37	30	25	20	15	11	8
-32.5		55	46	39	32	26	20	16	11	9
-30.0		59	49	41	32	27	20	15	12	9
-27.5		60	52	43	34	29	22	17	12	9
-25.0		63	53	45	36	29	23	17	13	10
-22.5		65	55	44	37	30	24	18	14	11
-20.0		67	58	47	37	31	24	18	13	9
-17.5		69	57	49	40	32	24	19	13	10
-15.0		71	60	49	40	32	25	18	13	10
-12.5		72	62	50	40	32	25	19	13	9
-10.0		72	61	52	42	33	25	19	14	10
-7.5		75	63	50	42	33	25	18	14	10
-5.0		75	64	51	42	34	26	19	14	9
-2.5		75	63	52	43	34	25	19	14	10
0.0		76	64	51	44	33	26	20	13	11
2.5		76	64	53	42	33	26	20	13	10
5.0		76	63	52	43	33	26	20	14	9
7.5	78	63	51	43	34	26	19	14	11	
10.0	76	64	52	42	34	26	19	14	10	
12.5	74	63	52	43	33	26	20	14	10	
15.0	74	62	50	42	34	26	19	14	11	
17.5	73	62	51	40	33	25	18	13	9	
20.0	71	60	50	41	33	26	19	14	10	
22.5	70	58	49	41	31	25	19	13	10	
25.0	68	58	49	38	31	25	18	13	9	
27.5	66	55	46	38	32	24	19	14	10	
30.0	64	53	45	37	29	23	18	13	11	
32.5	61	53	44	35	29	23	18	13	9	
35.0	59	50	42	34	28	23	17	13	10	
37.5	57	48	41	34	28	22	18	13	11	
40.0	53	46	39	31	27	21	17	12	10	
42.5	50	44	36	30	25	20	16	13	9	



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NVLAP LAB CODE: 200899-0

## Horizontal Angles

	67.5	70.0	72.5	75.0	77.5	80.0	82.5	85.0	87.5	
V e r t i c a l	45.0	47	40	35	29	23	20	15	12	10
	47.5	43	38	32	26	23	18	15	11	9
	50.0	40	34	29	25	20	17	13	11	8
	52.5	37	30	27	24	19	16	13	11	9
	55.0	32	29	24	20	19	15	12	11	8
	57.5	29	25	21	19	16	14	11	9	8
	60.0	26	22	20	19	15	14	12	9	9
	62.5	21	21	18	16	14	14	12	9	8
	65.0	20	19	18	16	13	12	11	9	8
	67.5	19	18	16	15	12	12	10	9	8
	70.0	17	16	14	13	13	11	9	8	8
	72.5	16	14	13	12	11	10	9	8	7
	75.0	14	13	13	12	10	10	8	7	8
	77.5	12	12	11	10	9	9	9	8	6
	80.0	12	11	9	9	8	9	7	7	8
	82.5	9	9	10	9	8	8	7	7	8
	85.0	8	7	7	6	7	7	8	8	8
	87.5	6	7	6	7	6	8	7	8	8
	90.0	7	8	8	7	7	7	7	6	8
A n g l e s										



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## Horizontal Angles

	90.0
V e r t i c a l	-90.0 8
	-87.5 8
	-85.0 8
	-82.5 9
	-80.0 10
	-77.5 9
	-75.0 9
	-72.5 9
	-70.0 9
	-67.5 9
	-65.0 8
	-62.5 8
	-60.0 8
	-57.5 7
	-55.0 7
	-52.5 7
	-50.0 7
	-47.5 7
	-45.0 7
	-42.5 7
A n g l e s	-40.0 8
	-37.5 8
	-35.0 7
	-32.5 8
	-30.0 10
	-27.5 7
	-25.0 8
	-22.5 9
	-20.0 8
	-17.5 8
	-15.0 9
	-12.5 8
	-10.0 7
	-7.5 9
	-5.0 8
	-2.5 8
	0.0 8
	2.5 8
	5.0 8
	7.5 8
	10.0 8
	12.5 8
	15.0 9
	17.5 7
	20.0 8
	22.5 9
	25.0 8
	27.5 7
	30.0 9
	32.5 8
	35.0 8
	37.5 7
	40.0 7
	42.5 8



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NVLAP LAB CODE: 200899-0

Horizontal Angles

		90.0
V e r t i c a l	45.0	8
	47.5	8
	50.0	8
	52.5	7
	55.0	7
	57.5	9
	60.0	7
	62.5	7
	65.0	7
	67.5	7
	70.0	7
	72.5	8
	75.0	7
	77.5	7
	80.0	8
	82.5	8
	85.0	8
	87.5	8
	90.0	8
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