



# 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>	S1702142-R1	<b>Description</b>	Clusters of XPE2 LEDs	<b>Type</b> Commercial
<b>Test Date</b>	14 February 2017	<b>Serial Number</b>	SRIS 2690	<b>Description</b> 61SSL-CY1240
<b>Report Date</b>	16 February 2017	<b>Photometric Method</b>	Absolute	<b>Manufacturer</b> Meanwell
<b>Ambient</b>	24.0 °C	<b>Lamp Lumens</b>	-1	<b>Catalog No.</b> LPF 60-24
<b>Humidity</b>	28.3 %	<b>Test Position</b>	Axial	<b>Voltage Tap</b> 120.00 V
<b>Lamp Type</b>	SSL	<b>Bca j b U ` Co ` cf ` ` 4000K</b>		<b>Power Factor</b> 0.9000

### Floodlight Data

General Information		Optics	Aperture (feet)	
<b>Manufacturer</b>	Lumenpulse	<b>Reflector</b>	None	<b>X</b> 0.1667
<b>Name</b>	LUMENFACADE	<b>Housing</b>	Extruded Aluminum	<b>Y</b> 4.0200
<b>Catalog No.</b>	LOGi HO-120/277-48-40K -10x10-NO	<b>Lens</b>	Acrylic Clear Flat Lens with Polycarbonate Diffuser	<b>Z</b> 0.0000

Lamp Stabilization Time: 1 hour 25 minutes

**Tested By:** AUFWJk cbc i `GYbU.....**5 pproved 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	iRDC	CIF-3000A	974998	N.P.C.R.	N.P.C.R.
Input Power Meter	Yokogawa	WT210	91L236539	2016/05/05	2017/05/05
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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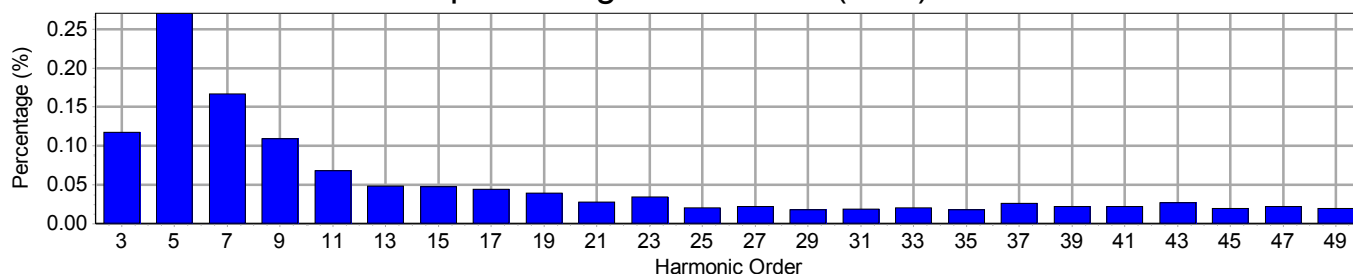
NVLAP LAB CODE: 200899-0

## Electrical Measurements

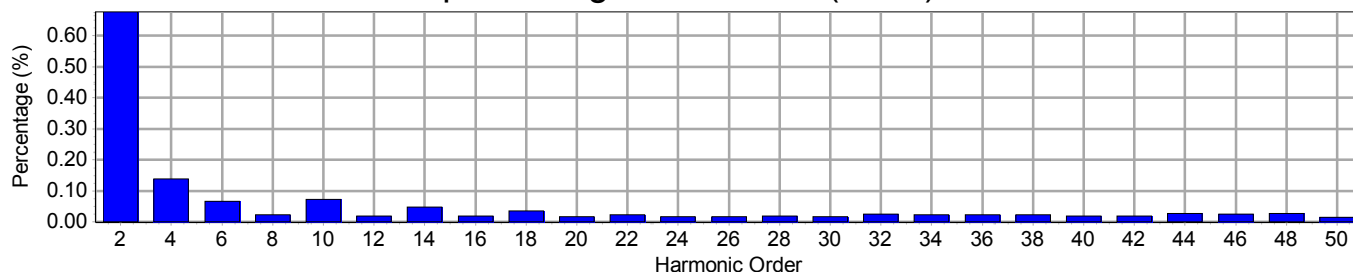
### Input

Frequency	60 Hz	Active Power	62.38 W	THDV [ANSI]	0.80 %
Voltage	120.0 V(rms)	Apparent Power	62.79 VA	THDA [ANSI]	4.53 %
Current	0.5232 A(rms)	Power Factor	0.994	Max. Harmonic At	5th order

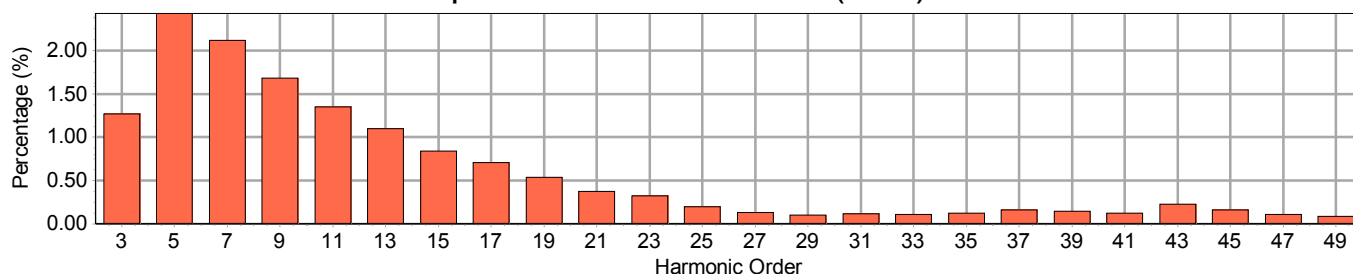
### Input Voltage Harmonics (Odd)



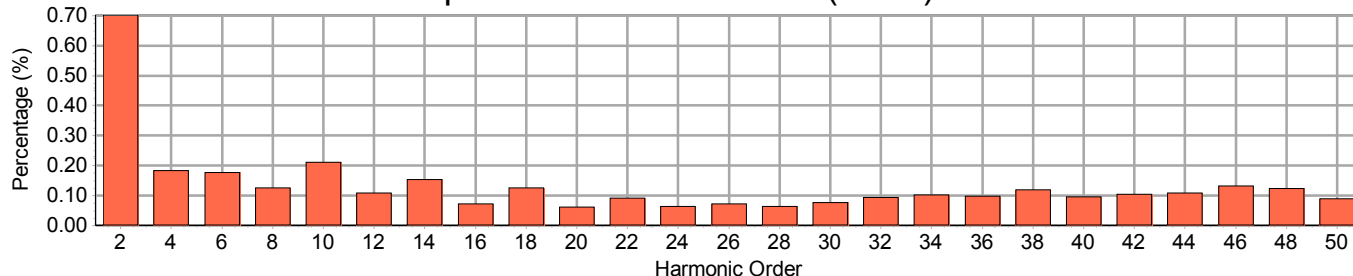
### Input Voltage Harmonics (Even)



### 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	0.677	0.704
3	180	0.118	1.270	4	240	0.138	0.183
5	300	0.271	2.433	6	360	0.068	0.177
7	420	0.167	2.116	8	480	0.023	0.125
9	540	0.109	1.680	10	600	0.073	0.210
11	660	0.068	1.352	12	720	0.020	0.107
13	780	0.048	1.098	14	840	0.047	0.153
15	900	0.047	0.838	16	960	0.020	0.073
17	1020	0.044	0.708	18	1080	0.035	0.125
19	1140	0.039	0.536	20	1200	0.018	0.062
21	1260	0.028	0.371	22	1320	0.024	0.090
23	1380	0.034	0.320	24	1440	0.018	0.063
25	1500	0.021	0.198	26	1560	0.018	0.072
27	1620	0.022	0.132	28	1680	0.019	0.062
29	1740	0.018	0.096	30	1800	0.018	0.077
31	1860	0.018	0.113	32	1920	0.027	0.094
33	1980	0.020	0.105	34	2040	0.024	0.102
35	2100	0.018	0.123	36	2160	0.023	0.098
37	2220	0.026	0.161	38	2280	0.025	0.119
39	2340	0.022	0.147	40	2400	0.019	0.095
41	2460	0.022	0.125	42	2520	0.020	0.103
43	2580	0.026	0.228	44	2640	0.028	0.109
45	2700	0.019	0.162	46	2760	0.025	0.131
47	2820	0.022	0.109	48	2880	0.029	0.122
49	2940	0.020	0.089	50	3000	0.015	0.088



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## Photometric Report: S1702142-R1

Prepared for: Lumenpulse · Test Date: 14 February 2017

Floodlight: LUMENFACADE · Lumcat: LOGi HO-120/277-48-40K-10x10-NO

### Photometric Floodlight Characteristics

Nominal SSL Power	61.00 W	
Measured Input Voltage	120.01 V	<b>Notes</b>
Test SSL Current	0.3000 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	4329	
Measured Input Power	62.38 W	
Floodlight Luminous Efficacy	69.4 lm/W	2) Field performance may differ from laboratory measurements.
Maximum Candela Value	41284	
Maximum Candela Location	0.0 H, 3.0 V	3) Results are valid for the tested material only.
Horizontal Beam Angle (50%)	16.0 °	
Vertical Beam Angle (50%)	15.5 °	4) All data published in this report are based on absolute photometry.
Horizontal Field Angle (10%)	31.0 °	
Vertical Field Angle (10%)	29.5 °	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	3Hx3V	
Beam Lumens (50%)	1706	
Beam Efficiency (50%)	N/A	
Field Lumens (10%)	3302	
Field Efficiency (10%)	N/A	
Spill Lumens	1028	
Total Floodlight Lumens	4329	
Total Floodlight Efficiency	N/A	



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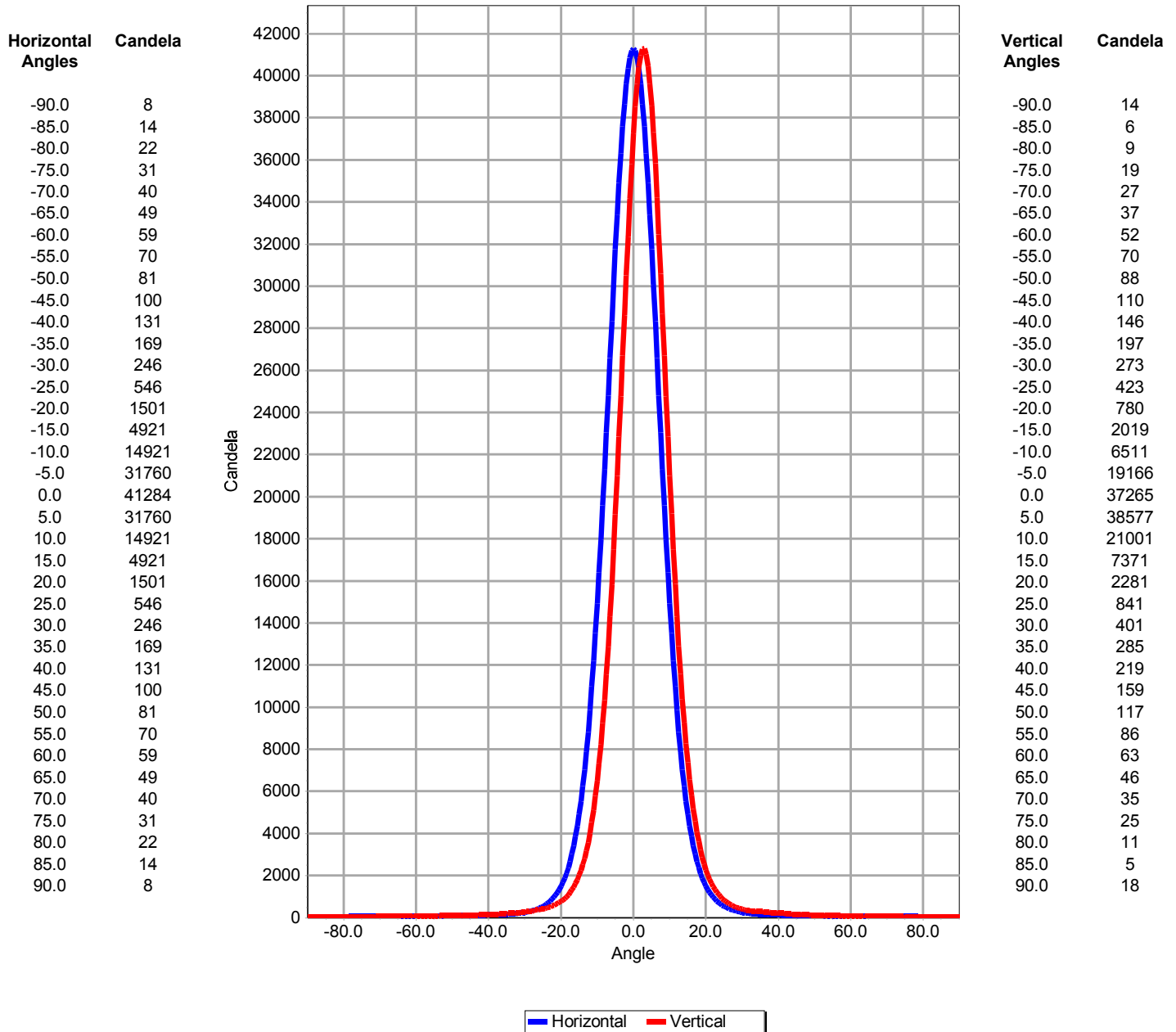
NVLAP LAB CODE: 200899-0

## Photometric Report: S1702142-R1

Prepared for: Lumenpulse · Test Date: 14 February 2017

Floodlight: LUMENFACADE · Lumcat: LOGi HO-120/277-48-40K-10x10-NO

### Maximum Candela Trace (Max. Location: 0.0 H, 3.0 V)





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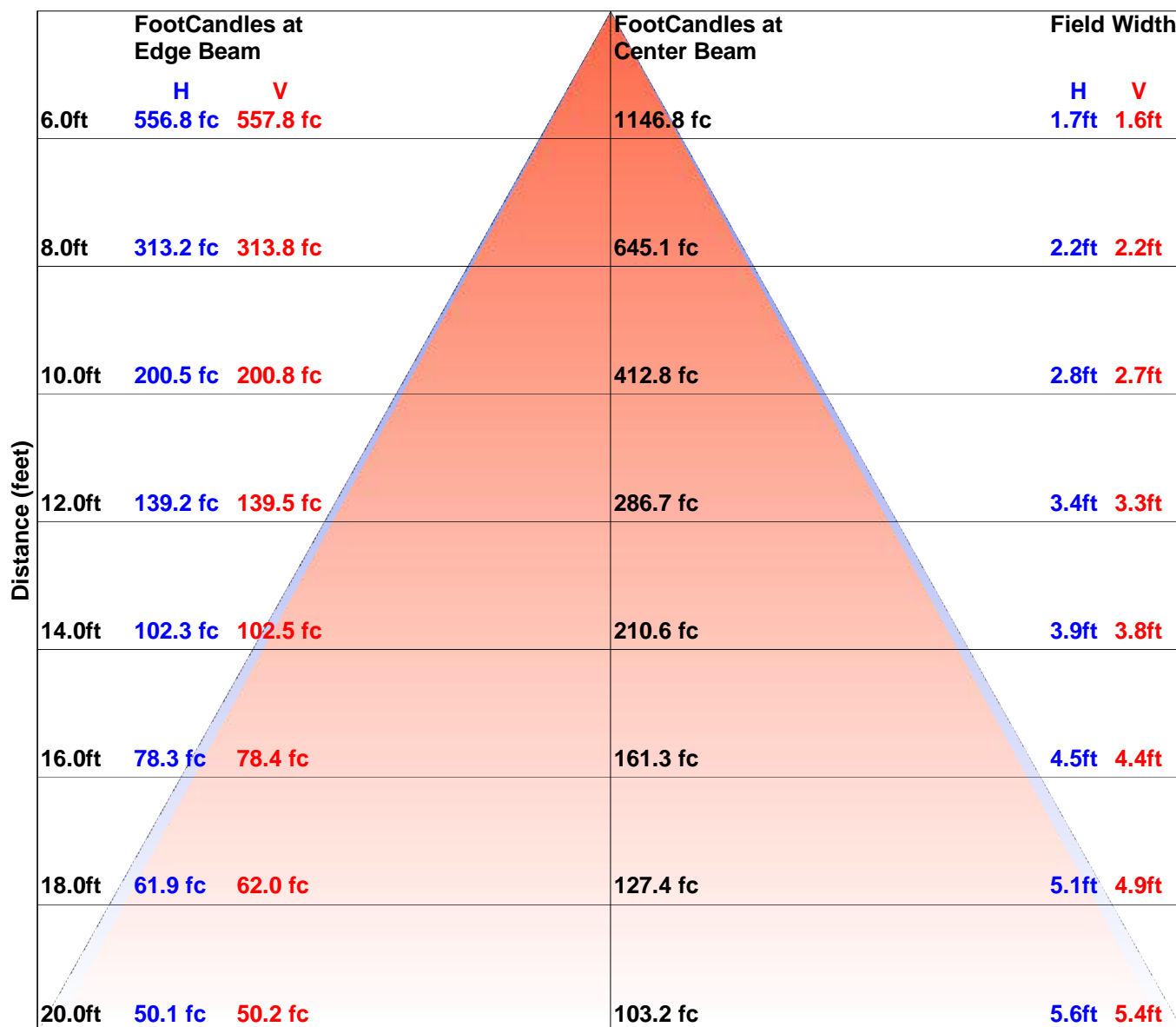
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## Photometric Report: S1702142-R1

Prepared for: Lumenpulse · Test Date: 14 February 2017

Floodlight: LUMENFACADE · Lumcat: LOGi HO-120/277-48-40K-10x10-NO

### Downlight Beam



— Horizontal (16.0 °) — Vertical (15.5 °)





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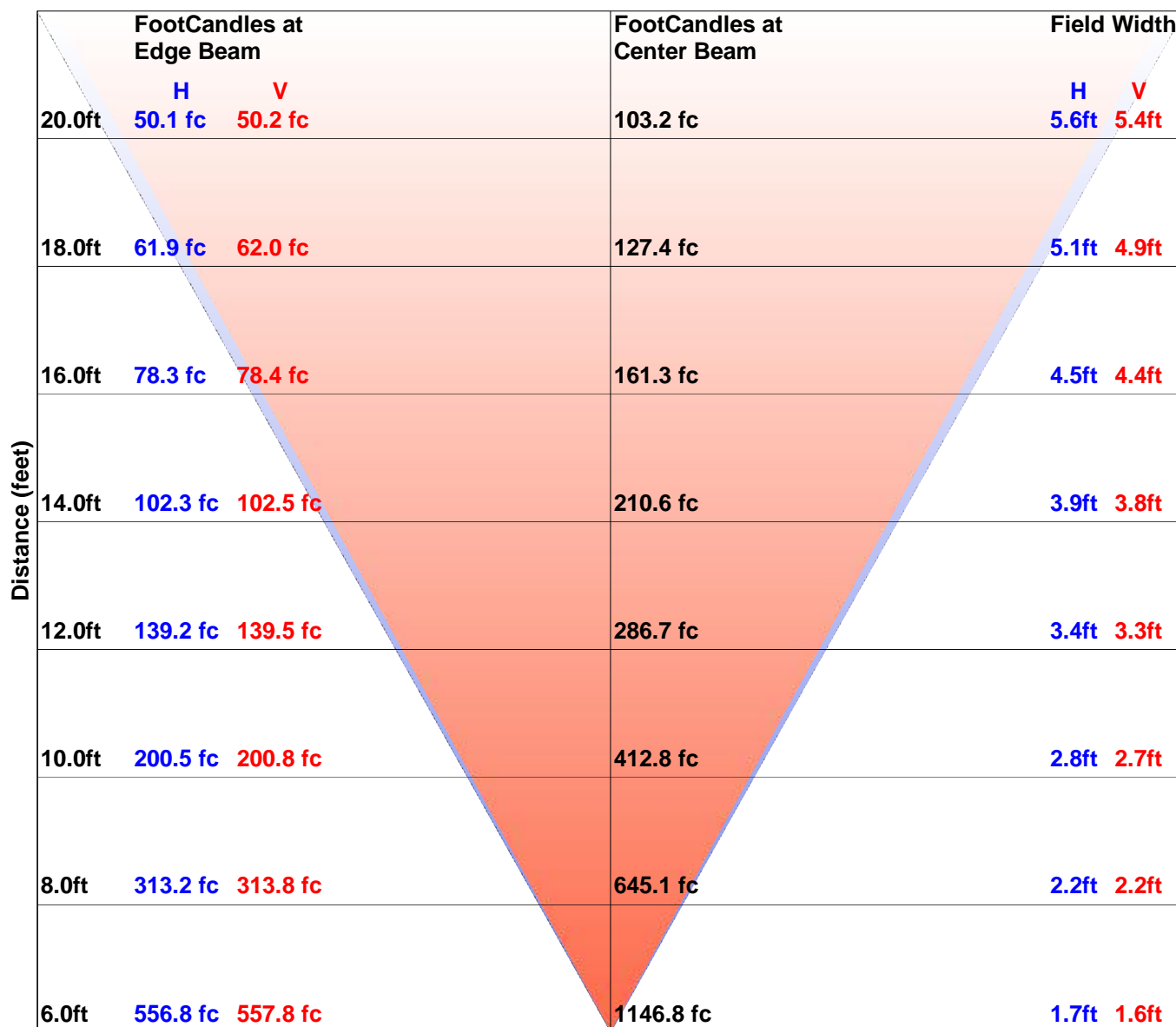
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## Photometric Report: S1702142-R1

Prepared for: Lumenpulse · Test Date: 14 February 2017

Floodlight: LUMENFACADE · Lumcat: LOGi HO-120/277-48-40K-10x10-NO

### Uplight Beam



— Horizontal (16.0 °) — Vertical (15.5 °)



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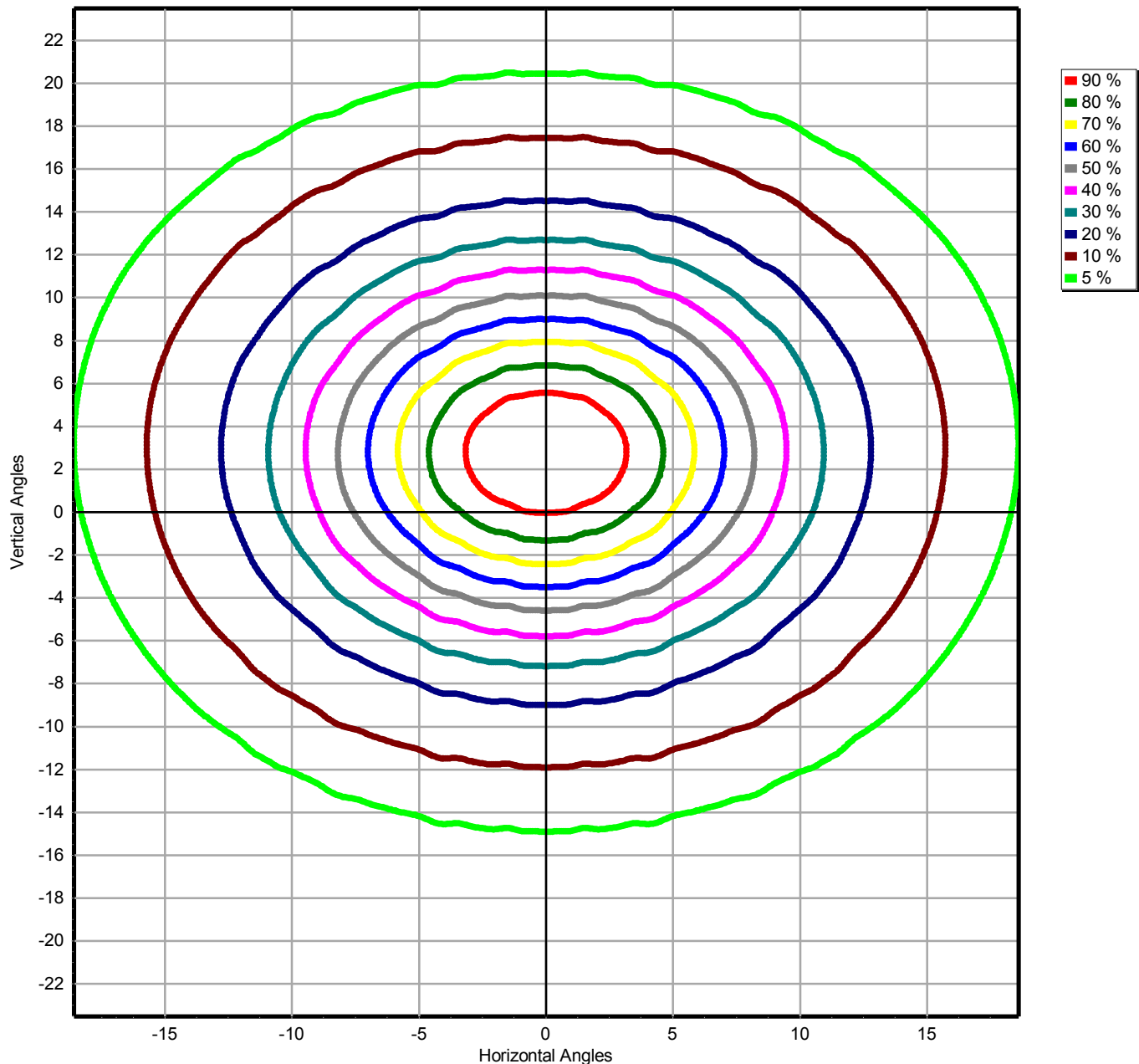
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## Photometric Report: S1702142-R1

Prepared for: Lumenpulse · Test Date: 14 February 2017

Floodlight: LUMENFACADE · Lumcat: LOGi HO-120/277-48-40K-10x10-NO

### ISO Candela Diagram





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## IES File Headers

IESNA:LM-63-2002  
[ISSUEDATE] 14 February 2017  
[TESTLAB] Spectra Lux Industries Inc.  
[TEST] S1702142-R1  
[MANUFAC] Lumenpulse  
[LUMCAT] LOGi HO-120/277-48-40K-10x10-NO  
[LUMINAIRE] LUMENFACADE  
[LAMP] O→|b\æābĀ~āĀĤŌŃĀVŞÓGĀLŌĖb c/w Meanwell Driver LPF 60-24 @ 120.00V  
[\_BURNING] Axial (4,329 Luminaire Lumens)  
[\_REFLECTOR] None  
[\_LENS] Acrylic Clear Flat Lens with Polycarbonate Diffuser  
[\_HOUSING] Extruded Aluminum  
[DISTRIBUTION] NEMA 3Hx3V (Max. CP at 0.0H,3.0V)  
[MORE] (Based on IES LM-35-1989)

## Candela Table

### Horizontal Angles

	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0
V e r t i c a l	-90.0	14	14	14	14	14	14	14	14
	-85.0	6	6	4	4	5	6	6	4
	-75.0	19	18	18	19	19	18	19	18
	-65.0	37	38	37	35	38	35	35	36
	-55.0	70	69	71	70	68	69	69	69
	-45.0	110	111	111	111	109	111	109	108
	-35.0	197	197	197	196	196	197	196	194
	-25.0	423	421	419	414	416	414	411	406
	-20.0	780	777	774	758	768	760	751	742
	-15.0	2019	2012	2001	1943	1969	1949	1906	1855
	-12.5	3577	3564	3543	3436	3475	3429	3346	3240
	-12.0	4031	4015	3990	3869	3909	3858	3760	3640
	-11.5	4541	4523	4497	4359	4402	4341	4227	4090
	-11.0	5123	5105	5077	4915	4964	4891	4762	4603
	-10.5	5777	5757	5723	5543	5591	5509	5358	5176
	-10.0	6511	6484	6445	6244	6293	6198	6026	5815
	-9.5	7326	7298	7257	7025	7080	6968	6772	6532
A n g l e s	-9.0	8237	8204	8155	7894	7948	7820	7595	7324
	-8.5	9236	9198	9147	8855	8908	8759	8505	8198
	-8.0	10332	10294	10234	9907	9960	9789	9504	9154
	-7.5	11552	11505	11434	11074	11122	10931	10604	10211
	-7.0	12877	12827	12747	12343	12389	12170	11801	11358
	-6.5	14315	14257	14171	13730	13766	13516	13106	12610
	-6.0	15848	15781	15680	15204	15228	14948	14489	13937
	-5.5	17471	17402	17293	16776	16780	16462	15959	15351
	-5.0	19166	19093	18973	18416	18411	18049	17492	16823
	-4.5	20982	20897	20763	20161	20134	19741	19128	18393
	-4.0	22856	22763	22613	21979	21921	21487	20819	20017
	-3.5	24768	24673	24509	23838	23754	23270	22547	21680
	-3.0	26710	26608	26428	25726	25603	25079	24300	23371
	-2.5	28639	28527	28336	27607	27439	26867	26038	25046
	-2.0	30518	30411	30204	29456	29246	28624	27742	26691
	-1.5	32360	32255	32025	31264	31008	30346	29410	28301
	-1.0	34143	34028	33787	33019	32710	32001	31021	29855
	-0.5	35788	35675	35423	34650	34288	33538	32517	31307



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## Horizontal Angles

	0.0	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	
V e r t i c a l	0.0	37265	37149	36878	36129	35697	34909	33857	32614	31626
	0.5	38534	38415	38128	37403	36913	36087	35011	33744	32667
	1.0	39597	39477	39185	38483	37938	37083	35984	34699	33541
	1.5	40424	40299	40003	39336	38733	37847	36732	35447	34211
	2.0	40976	40866	40553	39938	39276	38372	37259	35967	34661
	2.5	41272	41160	40840	40271	39571	38649	37542	36264	34893
	3.0	41284	41185	40856	40346	39594	38666	37576	36321	34895
	3.5	41014	40914	40591	40140	39348	38422	37352	36132	34666
	4.0	40460	40362	40043	39655	38836	37915	36876	35695	34196
	4.5	39636	39550	39232	38907	38058	37153	36148	35023	33502
	5.0	38577	38500	38189	37920	37064	36176	35212	34142	32621
	5.5	37309	37240	36936	36730	35865	35005	34084	33080	31563
	6.0	35836	35778	35487	35343	34475	33640	32776	31835	30337
	6.5	34205	34150	33873	33778	32927	32120	31312	30436	28981
	7.0	32452	32404	32136	32093	31256	30493	29741	28930	27521
	7.5	30595	30555	30304	30300	29487	28766	28069	27334	25975
	8.0	28680	28646	28411	28449	27662	26986	26347	25675	24382
	8.5	26709	26686	26472	26532	25788	25157	24577	23973	22742
	9.0	24767	24752	24550	24635	23929	23349	22822	22278	21125
A n g l e s	9.5	22857	22846	22658	22769	22103	21569	21089	20608	19533
	10.0	21001	20990	20823	20941	20324	19830	19402	18980	17975
	10.5	19197	19193	19036	19166	18591	18145	17769	17390	16466
	11.0	17487	17484	17349	17485	16950	16546	16209	15884	15031
	11.5	15861	15860	15740	15874	15390	15022	14727	14445	13658
	12.0	14327	14332	14222	14360	13913	13588	13326	13081	12367
	12.5	12901	12905	12807	12944	12537	12246	12022	11807	11162
	15.0	7371	7375	7327	7424	7193	7041	6935	6842	6466
	20.0	2281	2285	2275	2309	2243	2209	2189	2173	2071
	25.0	841	843	840	849	834	823	821	816	790
	35.0	285	284	283	285	282	281	281	279	276
45.0	159	158	159	159	158	157	157	158	156	
55.0	86	88	86	88	87	87	85	86	85	
65.0	46	48	47	48	46	47	47	45	47	
75.0	25	23	25	24	24	23	24	24	23	
85.0	5	6	6	7	8	7	7	6	6	
90.0	18	18	18	18	18	18	18	18	18	



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## Horizontal Angles

	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
Vertical Angles	-90.0	14	14	14	14	14	14	14	14
	-85.0	5	5	6	4	4	5	6	5
	-75.0	18	17	19	19	17	18	18	18
	-65.0	36	36	35	34	35	36	35	36
	-55.0	70	69	69	67	68	69	68	69
	-45.0	109	109	107	107	107	106	106	105
	-35.0	192	188	188	186	185	184	181	177
	-25.0	403	392	387	383	377	372	367	357
	-20.0	730	703	691	680	667	652	637	614
	-15.0	1824	1733	1687	1644	1594	1542	1488	1401
	-12.5	3162	2980	2889	2795	2699	2592	2480	2302
	-12.0	3545	3339	3231	3123	3011	2888	2757	2553
	-11.5	3977	3740	3615	3489	3359	3217	3070	2832
	-11.0	4468	4198	4054	3908	3757	3595	3422	3147
	-10.5	5015	4708	4539	4372	4196	4009	3812	3492
	-10.0	5624	5273	5081	4885	4686	4468	4242	3875
	-9.5	6306	5906	5684	5459	5230	4981	4720	4293
	-9.0	7059	6605	6350	6090	5826	5544	5244	4756
	-8.5	7877	7372	7082	6783	6482	6155	5817	5255
	-8.0	8780	8212	7880	7540	7194	6824	6438	5797
Angles	-7.5	9778	9137	8758	8369	7977	7558	7120	6388
	-7.0	10855	10136	9708	9267	8822	8348	7858	7024
	-6.5	12021	11229	10741	10244	9740	9207	8648	7706
	-6.0	13256	12384	11836	11276	10706	10107	9484	8424
	-5.5	14562	13615	12996	12365	11732	11063	10370	9175
	-5.0	15928	14897	14205	13504	12796	12054	11290	9957
	-4.5	17381	16257	15491	14710	13926	13107	12261	10782
	-4.0	18876	17668	16818	15955	15091	14186	13259	11622
	-3.5	20401	19105	18177	17227	16280	15292	14280	12478
	-3.0	21937	20568	19552	18517	17482	16402	15302	13336
	-2.5	23472	22017	20913	19792	18674	17506	16323	14184
	-2.0	24962	23441	22254	21044	19842	18588	17320	15009
	-1.5	26422	24826	23561	22267	20975	19640	18292	15813
	-1.0	27822	26170	24824	23443	22075	20652	19220	16580
	-0.5	29113	27419	25998	24546	23090	21594	20084	17288
	0.0	30265	28548	27060	25535	24008	22437	20861	17916
	0.5	31250	29524	27976	26385	24800	23167	21533	18460
	1.0	32080	30346	28751	27110	25465	23779	22094	18909
	1.5	32722	30993	29360	27674	25981	24255	22539	19254
	2.0	33153	31450	29788	28075	26346	24587	22845	19490
	2.5	33371	31704	30030	28293	26548	24778	23019	19607
	3.0	33372	31760	30083	28338	26579	24807	23048	19609
	3.5	33145	31601	29933	28194	26433	24678	22936	19486
	4.0	32693	31226	29591	27872	26116	24386	22668	19245
	4.5	32038	30653	29048	27369	25639	23945	22261	18888
	5.0	31202	29902	28344	26703	25011	23364	21734	18429
	5.5	30193	28989	27484	25899	24252	22668	21092	17879
	6.0	29026	27915	26483	24957	23367	21851	20338	17238
	6.5	27730	26714	25357	23901	22371	20938	19502	16527
	7.0	26336	25426	24137	22763	21306	19952	18593	15761
	7.5	24861	24045	22840	21550	20169	18905	17627	14953
	8.0	23344	22619	21497	20296	18996	17819	16627	14111
	8.5	21788	21147	20113	18993	17781	16696	15590	13243
	9.0	20246	19687	18731	17700	16576	15579	14556	12385



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ISO/IEC 17025



NVLAP LAB CODE: 200899-0

## Horizontal Angles

	4.5	5.0	5.5	6.0	6.5	7.0	7.5	8.0	8.5
9.5	18728	18237	17369	16422	15384	14475	13537	12423	11530
10.0	17248	16822	16038	15171	14212	13391	12534	11505	10693
10.5	15808	15447	14731	13949	13080	12336	11560	10616	9877
11.0	14441	14137	13492	12784	11995	11325	10626	9763	9096
11.5	13138	12883	12304	11671	10959	10362	9728	8943	8347
12.0	11904	11701	11178	10614	9975	9442	8879	8168	7632
12.5	10756	10586	10128	9623	9051	8578	8080	7437	6958
15.0	6266	6213	5970	5706	5399	5151	4885	4523	4266
20.0	2027	2029	1971	1908	1835	1771	1708	1604	1539
25.0	779	781	767	749	731	716	698	669	652
35.0	275	275	273	269	268	265	262	257	254
45.0	155	155	155	154	153	151	150	150	147
55.0	85	86	84	84	85	85	83	84	82
65.0	47	47	46	46	46	45	47	46	46
75.0	24	23	23	23	24	22	24	23	24
85.0	5	6	5	5	6	7	7	6	6
90.0	18	18	18	18	18	18	18	18	18

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## Horizontal Angles

	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	15.0
V e r t i c a l	-90.0	14	14	14	14	14	14	14	14
	-85.0	5	4	5	6	4	5	5	3
	-75.0	18	18	18	18	18	18	18	18
	-65.0	35	35	35	34	35	35	34	35
	-55.0	67	67	67	68	67	66	65	64
	-45.0	104	102	102	103	103	102	99	95
	-35.0	174	172	171	170	168	165	163	150
	-25.0	347	340	333	329	323	315	305	265
	-20.0	585	569	553	545	527	512	487	397
	-15.0	1310	1251	1199	1164	1109	1056	978	708
	-12.5	2127	2015	1913	1843	1736	1636	1497	1012
	-12.0	2355	2225	2108	2027	1905	1792	1635	1089
	-11.5	2606	2459	2325	2230	2090	1963	1786	1172
	-11.0	2890	2721	2569	2460	2300	2156	1956	1266
	-10.5	3203	3010	2835	2708	2527	2364	2139	1365
	-10.0	3546	3326	3127	2979	2775	2588	2340	1471
	-9.5	3923	3674	3448	3280	3047	2837	2558	1587
	-9.0	4339	4054	3797	3603	3342	3105	2792	1707
	-8.5	4790	4468	4175	3951	3657	3391	3044	1837
	-8.0	5275	4913	4585	4330	3998	3699	3315	1973
A n g l e s	-7.5	5806	5398	5027	4736	4366	4031	3606	2118
	-7.0	6376	5916	5501	5171	4759	4384	3915	2269
	-6.5	6988	6476	6012	5636	5175	4761	4245	2430
	-6.0	7632	7063	6540	6121	5612	5151	4588	2591
	-5.5	8313	7682	7102	6626	6067	5557	4947	2760
	-5.0	9012	8316	7680	7151	6534	5975	5313	2930
	-4.5	9754	8989	8286	7700	7028	6416	5698	3106
	-4.0	10516	9677	8908	8258	7526	6859	6090	3284
	-3.5	11287	10378	9540	8826	8032	7308	6486	3463
	-3.0	12069	11081	10173	9393	8537	7755	6882	3637
	-2.5	12838	11778	10800	9946	9032	8197	7273	3810
	-2.0	13590	12459	11409	10490	9514	8624	7652	3977
	-1.5	14325	13119	12000	11016	9983	9038	8021	4139
	-1.0	15034	13757	12571	11518	10428	9432	8375	4289
	-0.5	15686	14348	13096	11980	10841	9794	8703	4431
	0.0	16280	14882	13572	12391	11208	10117	8998	4557
	0.5	16790	15341	13983	12747	11523	10393	9254	4663
	1.0	17219	15730	14327	13042	11787	10624	9471	4757
	1.5	17561	16039	14598	13270	11991	10801	9643	4829
	2.0	17802	16258	14791	13428	12132	10922	9766	4878
	2.5	17941	16382	14898	13510	12206	10987	9840	4910
	3.0	17972	16413	14921	13517	12213	10990	9863	4921
	3.5	17896	16346	14859	13449	12154	10934	9831	4910
	4.0	17706	16178	14705	13296	12022	10819	9746	4873
	4.5	17413	15914	14465	13072	11823	10643	9608	4813
	5.0	17025	15568	14154	12781	11565	10412	9421	4734
	5.5	16551	15144	13772	12432	11256	10138	9195	4640
	6.0	16000	14647	13321	12017	10891	9814	8925	4524
	6.5	15373	14081	12814	11559	10483	9455	8617	4392
	7.0	14692	13473	12268	11063	10044	9064	8287	4251
	7.5	13972	12823	11681	10536	9577	8652	7928	4096
	8.0	13217	12143	11074	9988	9089	8219	7555	3934
	8.5	12435	11441	10439	9420	8585	7769	7163	3763
	9.0	11657	10732	9803	8852	8077	7321	6764	3587



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ISO/IEC 17025



NVLAP LAB CODE: 200899-0

## Horizontal Angles

	9.0	9.5	10.0	10.5	11.0	11.5	12.0	12.5	15.0
9.5	10879	10028	9172	8285	7573	6872	6368	5761	3411
10.0	10112	9338	8547	7727	7072	6428	5973	5413	3233
10.5	9363	8658	7934	7180	6584	5994	5584	5068	3058
11.0	8641	8005	7346	6653	6112	5573	5206	4732	2885
11.5	7948	7374	6777	6144	5655	5166	4839	4409	2715
12.0	7286	6771	6231	5655	5216	4773	4485	4094	2547
12.5	6659	6198	5716	5195	4799	4399	4146	3792	2387
15.0	4127	3875	3604	3304	3082	2857	2727	2521	1681
20.0	1513	1448	1375	1284	1223	1158	1128	1066	800
25.0	645	627	609	581	564	544	535	518	430
35.0	252	251	247	241	237	234	234	229	210
45.0	149	146	145	144	143	142	141	138	132
55.0	83	83	83	80	81	81	80	80	77
65.0	45	44	45	44	46	45	45	43	43
75.0	24	24	23	23	22	23	23	21	22
85.0	5	7	7	5	6	6	5	6	6
90.0	18	18	18	18	18	18	18	18	18

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## Horizontal Angles

	20.0	25.0	35.0	45.0	55.0	65.0	75.0	85.0	90.0
V e r t i c a l  A n g l e s	-90.0	14	14	14	14	14	14	14	14
	-85.0	6	4	7	10	8	4	6	7
	-75.0	17	18	18	19	17	13	7	8
	-65.0	31	32	30	30	26	18	11	8
	-55.0	62	57	52	44	36	25	13	9
	-45.0	89	81	74	65	51	33	19	11
	-35.0	129	113	89	74	62	43	23	12
	-25.0	209	166	110	83	66	48	27	12
	-20.0	282	206	122	85	65	49	29	12
	-15.0	418	266	139	92	68	49	32	13
	-12.5	527	307	146	93	69	50	30	14
	-12.0	557	315	149	94	69	50	31	13
	-11.5	583	325	150	95	69	50	30	13
	-11.0	612	334	150	94	69	49	30	14
	-10.5	647	345	153	97	69	50	32	13
	-10.0	677	355	154	96	70	49	30	14
	-9.5	712	364	155	96	69	51	31	14
	-9.0	748	374	157	98	70	50	31	13
	-8.5	784	385	158	98	70	49	30	13
	-8.0	822	395	158	97	69	49	30	15
	-7.5	863	405	162	98	70	49	32	14
	-7.0	901	415	161	98	71	49	29	15
	-6.5	942	425	162	98	70	50	30	14
	-6.0	984	436	164	99	69	49	31	13
	-5.5	1025	447	164	99	71	48	30	14
	-5.0	1066	454	164	100	69	49	31	14
	-4.5	1109	464	166	100	69	49	32	14
	-4.0	1148	473	166	99	69	49	30	15
	-3.5	1189	481	165	100	69	48	30	15
	-3.0	1229	491	168	100	71	49	31	15
	-2.5	1266	499	166	101	70	48	30	14
	-2.0	1301	505	166	100	68	48	30	14
	-1.5	1338	512	169	100	70	49	30	13
	-1.0	1367	520	169	100	69	48	28	15
	-0.5	1398	525	169	101	68	49	29	15
	0.0	1425	531	169	101	70	48	30	14
	0.5	1446	537	169	101	70	49	29	14
	1.0	1465	540	169	100	69	49	30	15
	1.5	1482	543	171	100	68	48	31	15
	2.0	1491	546	169	102	69	48	30	15
	2.5	1497	546	169	100	69	48	30	16
	3.0	1501	546	169	100	70	49	31	14
	3.5	1499	546	170	100	70	49	29	14
	4.0	1490	543	168	99	69	48	30	16
	4.5	1481	540	169	100	69	50	31	14
	5.0	1464	539	169	99	69	49	29	14
	5.5	1443	534	167	100	69	49	30	16
	6.0	1423	527	168	99	70	49	32	15
	6.5	1394	522	167	98	69	49	30	15
	7.0	1365	515	167	99	69	50	31	15
	7.5	1335	509	167	98	69	48	31	15
	8.0	1299	502	167	98	70	50	30	15
	8.5	1263	494	164	97	68	49	30	16
	9.0	1225	485	165	96	69	49	31	15



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## Horizontal Angles

	20.0	25.0	35.0	45.0	55.0	65.0	75.0	85.0	90.0	
V e r t i c a l	9.5	1185	477	164	97	69	49	29	16	7
	10.0	1144	465	163	95	67	49	31	15	9
	10.5	1106	457	163	94	68	49	32	15	7
	11.0	1063	449	162	95	68	48	31	16	7
	11.5	1021	437	159	95	68	48	30	17	9
	12.0	982	428	160	93	68	49	32	14	8
	12.5	939	418	158	94	68	50	30	16	6
	15.0	745	364	152	92	67	49	32	14	7
	20.0	449	270	134	87	66	49	30	15	7
	25.0	296	207	122	84	66	49	30	15	8
	35.0	175	144	104	80	66	47	26	13	9
	45.0	118	102	82	69	56	40	24	14	8
	55.0	72	68	58	52	41	28	18	12	9
	65.0	40	39	33	30	27	20	13	11	8
	75.0	19	17	19	21	20	14	11	10	9
	85.0	5	7	8	14	13	9	8	10	10
	90.0	18	18	18	18	18	18	18	18	18

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