



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

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	
Test Report	S1603112-R1	Description	61W White 3000K SSL	Type Commercial
Test Date	11 March 2016	Serial Number	SRIS 2255	Description 61SSL-CY963
Report Date	29 March 2016	Photometric Method	Absolute	Manufacturer Mean Well
Ambient	25.2 °C	Lamp Lumens	-1	Catalog No. LPF-60-24
Humidity	27.7 %	Test Position	Axial	Voltage Tap 120.00 V
Lamp Type	SSL	Comments	Clusters of 48 Cree XPE2 LED's	Power Factor 0.9900

Floodlight Data

General Information		Optics	Aperture (feet)	
Manufacturer	Lumenpulse	Reflector	48 Collimators	X 4.0000
Name	LUMENFACADE	Housing	Extruded Aluminum	Y 0.1667
Catalog No.	LOG-HO-120-48-30K-WWLF-WH-NO	Lens	Polycarbonate	Z 0.0000

Lamp Stabilization Time: 1 hour 15 minutes

Tested By : Ycf[Y< YXfY].....**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	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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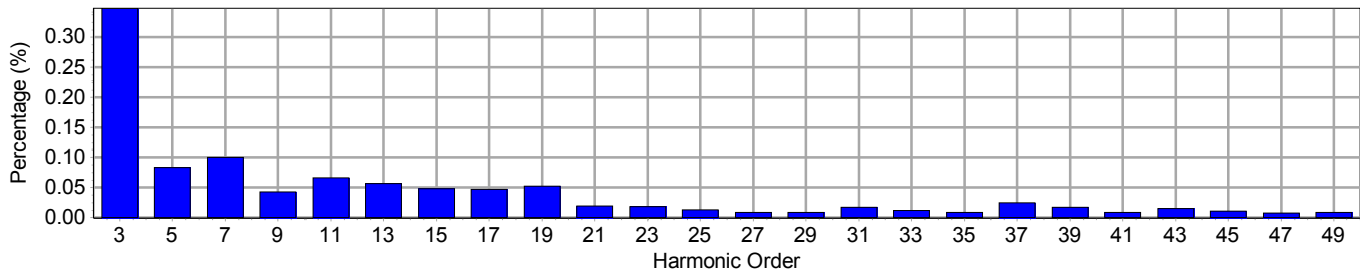
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Electrical Measurements

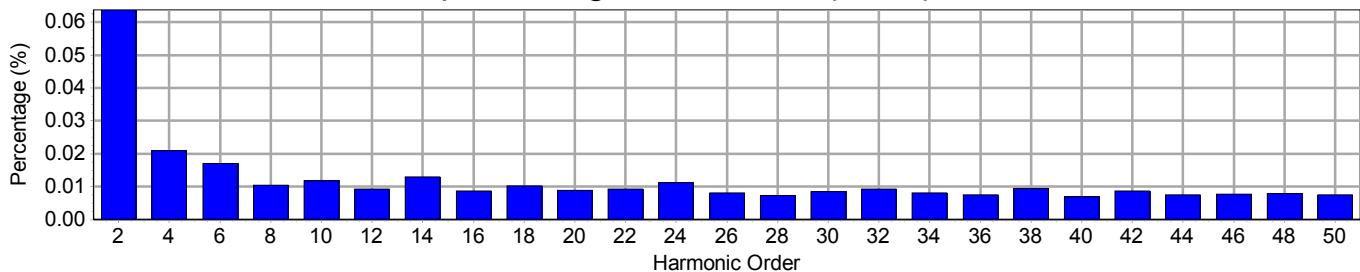
Input

Frequency	60 Hz	Active Power	61.08 W	THDV [ANSI]	0.40 %
Voltage	120.0 V(rms)	Apparent Power	61.39 VA	THDA [ANSI]	5.36 %
Current	0.5115 A(rms)	Power Factor	0.995	Max. Harmonic At	5th order

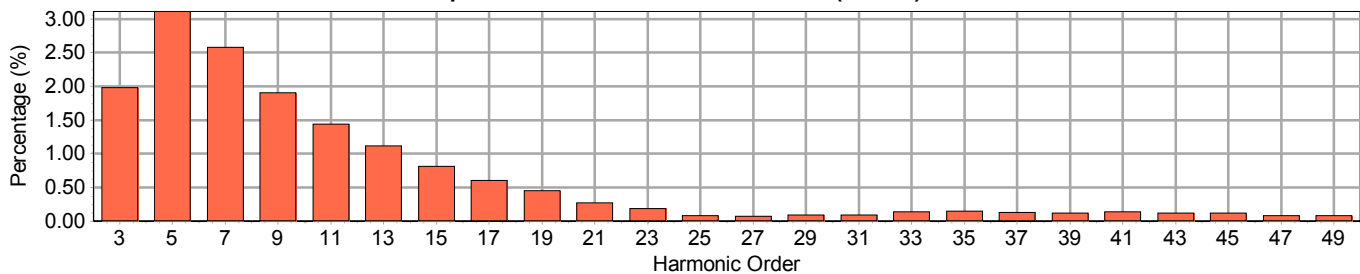
Input Voltage Harmonics (Odd)



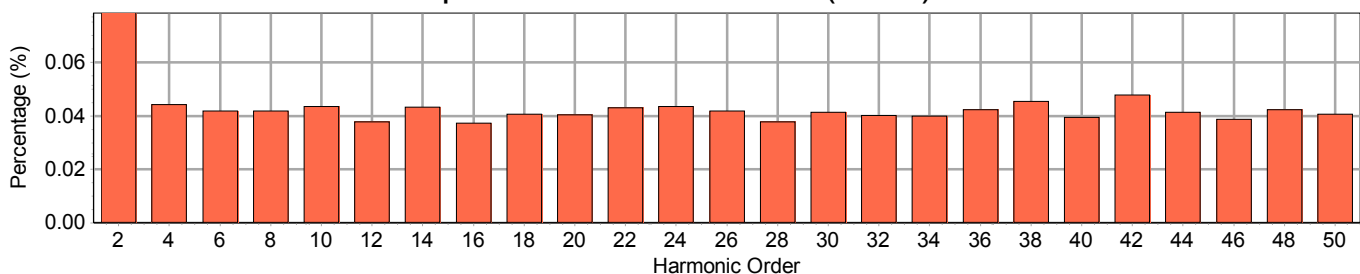
Input Voltage Harmonics (Even)



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	0.064	0.079
3	180	0.348	1.981	4	240	0.021	0.044
5	300	0.083	3.115	6	360	0.017	0.042
7	420	0.101	2.575	8	480	0.011	0.042
9	540	0.043	1.906	10	600	0.012	0.044
11	660	0.066	1.440	12	720	0.009	0.038
13	780	0.057	1.113	14	840	0.013	0.043
15	900	0.048	0.816	16	960	0.009	0.037
17	1020	0.047	0.607	18	1080	0.010	0.041
19	1140	0.052	0.451	20	1200	0.009	0.041
21	1260	0.020	0.273	22	1320	0.009	0.043
23	1380	0.018	0.181	24	1440	0.011	0.044
25	1500	0.013	0.083	26	1560	0.008	0.042
27	1620	0.009	0.067	28	1680	0.007	0.038
29	1740	0.009	0.092	30	1800	0.008	0.041
31	1860	0.018	0.090	32	1920	0.009	0.040
33	1980	0.012	0.142	34	2040	0.008	0.040
35	2100	0.009	0.147	36	2160	0.007	0.042
37	2220	0.025	0.124	38	2280	0.009	0.046
39	2340	0.018	0.119	40	2400	0.007	0.039
41	2460	0.009	0.140	42	2520	0.009	0.048
43	2580	0.015	0.123	44	2640	0.008	0.041
45	2700	0.011	0.121	46	2760	0.008	0.039
47	2820	0.008	0.077	48	2880	0.008	0.042
49	2940	0.009	0.077	50	3000	0.007	0.041



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Photometric Report: S1603112-R1

Prepared for: Lumenpulse · Test Date: 11 March 2016

Floodlight: LUMENFACADE · Lumcat: LOG-HO-120-48-30K-WWLF-WH-NO

Photometric Floodlight Characteristics

Nominal SSL Power	61.00 W	
Measured Input Voltage	120.02 V	Notes
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	3107	
Measured Input Power	61.08 W	
Floodlight Luminous Efficacy	50.9 lm/W	2) Field performance may differ from laboratory measurements.
Maximum Candela Value	5368	
Maximum Candela Location	0.0 H, -2.5 V	3) Results are valid for the tested material only.
Horizontal Beam Angle (50%)	81.0 °	
Vertical Beam Angle (50%)	17.0 °	4) All data published in this report are based on absolute photometry.
Horizontal Field Angle (10%)	129.0 °	
Vertical Field Angle (10%)	52.0 °	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	6Hx4V	
Beam Lumens (50%)	1231	
Beam Efficiency (50%)	N/A	
Field Lumens (10%)	2488	
Field Efficiency (10%)	N/A	
Spill Lumens	620	
Total Floodlight Lumens	3107	
Total Floodlight Efficiency	N/A	



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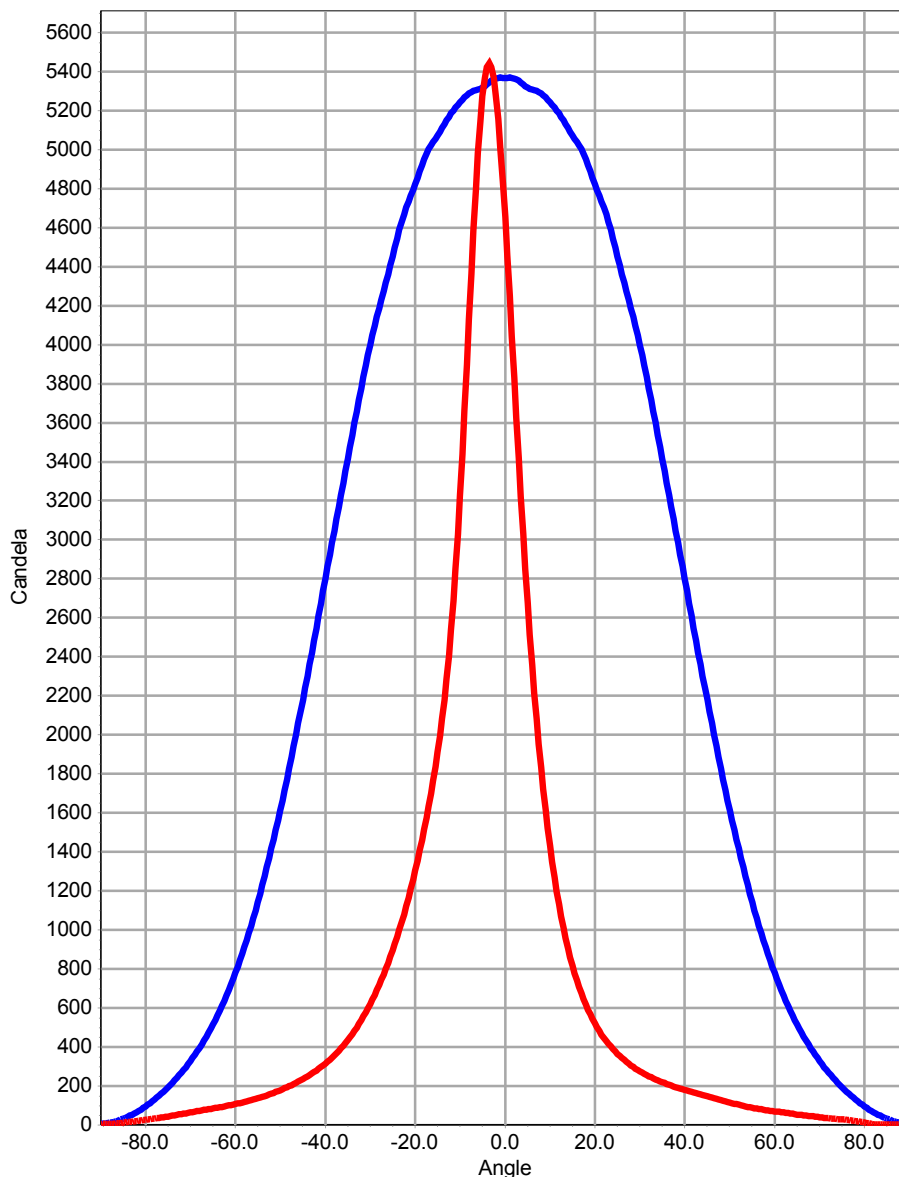
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Floodlight: LUMENFACADE · Lumcat: LOG-HO-120-48-30K-WWLF-WH-NO

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

Horizontal
Angles

Horizontal Angles	Candela
-90.0	5
-85.0	31
-80.0	94
-75.0	191
-70.0	325
-65.0	515
-60.0	779
-55.0	1139
-50.0	1610
-45.0	2179
-40.0	2800
-35.0	3414
-30.0	4000
-25.0	4452
-20.0	4822
-15.0	5073
-10.0	5243
-5.0	5317
0.0	5368
5.0	5317
10.0	5243
15.0	5073
20.0	4822
25.0	4452
30.0	4000
35.0	3414
40.0	2800
45.0	2179
50.0	1610
55.0	1139
60.0	779
65.0	515
70.0	325
75.0	191
80.0	94
85.0	31
90.0	5



Vertical
Angles

Vertical Angles	Candela
-90.0	3
-85.0	11
-80.0	25
-75.0	42
-70.0	63
-65.0	83
-60.0	106
-55.0	135
-50.0	177
-45.0	234
-40.0	314
-35.0	434
-30.0	619
-25.0	893
-20.0	1303
-15.0	1912
-10.0	3225
-5.0	5274
0.0	4654
5.0	2676
10.0	1430
15.0	817
20.0	520
25.0	363
30.0	274
35.0	218
40.0	179
45.0	146
50.0	115
55.0	87
60.0	69
65.0	52
70.0	39
75.0	27
80.0	11
85.0	1
90.0	1

— Horizontal — Vertical



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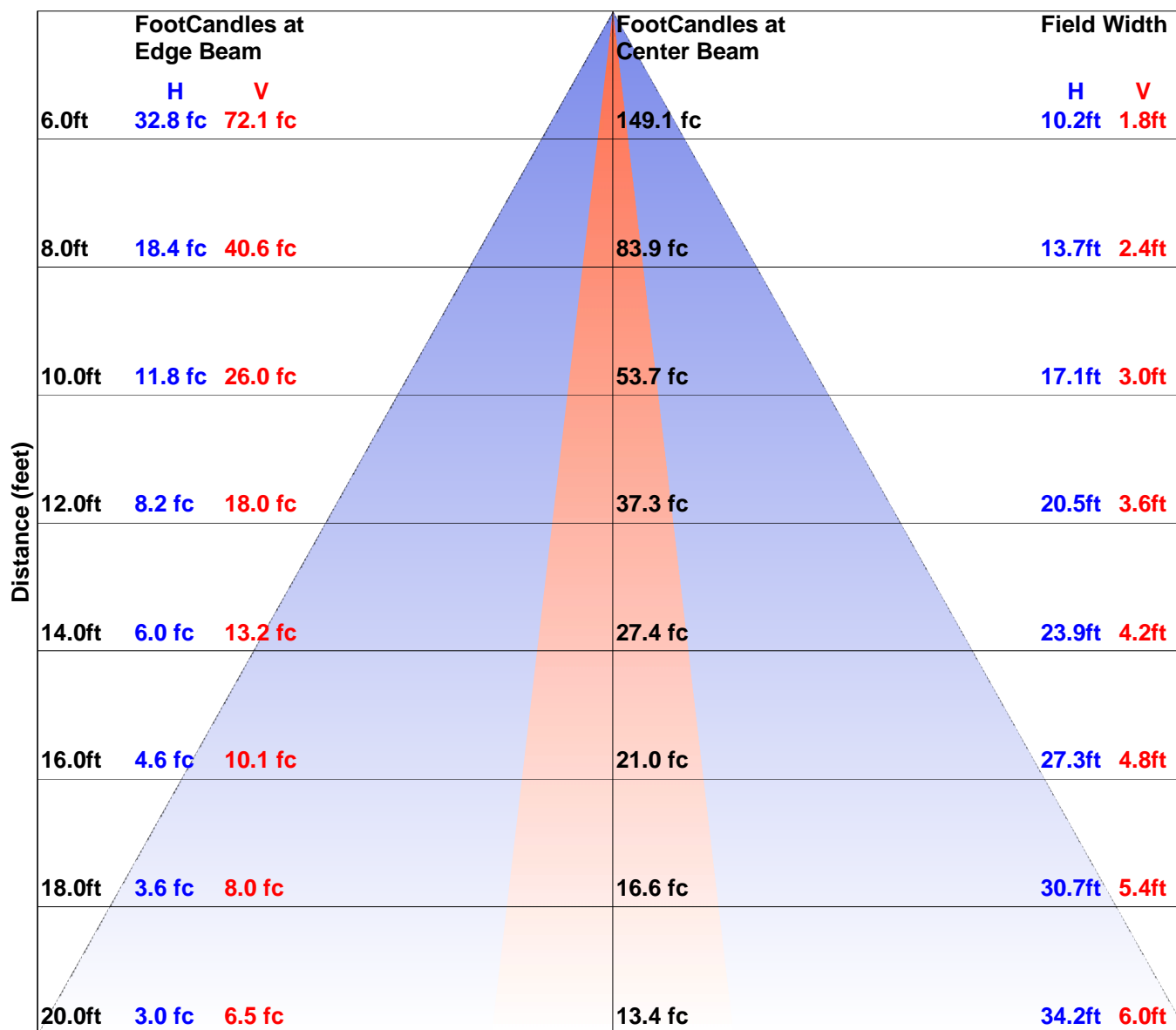
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Photometric Report: S1603112-R1

Prepared for: Lumenpulse · Test Date: 11 March 2016

Floodlight: LUMENFACADE · Lumcat: LOG-HO-120-48-30K-WWLF-WH-NO

Downlight Beam



— Horizontal (81.0 °) — Vertical (17.0 °)



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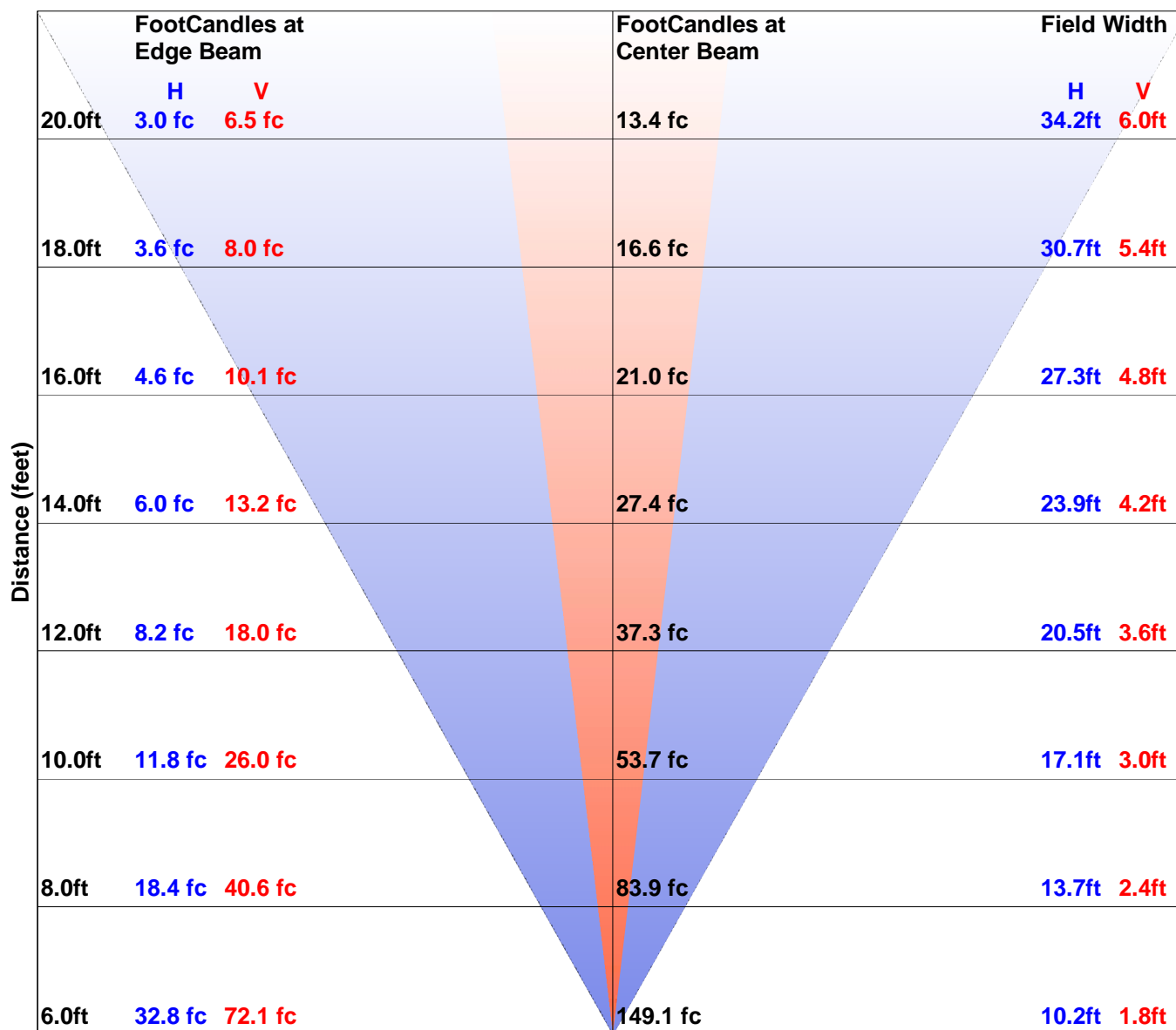
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Prepared for: Lumenpulse · Test Date: 11 March 2016

Floodlight: LUMENFACADE · Lumcat: LOG-HO-120-48-30K-WWLF-WH-NO

Uplight Beam



— Horizontal (81.0 °) — Vertical (17.0 °)



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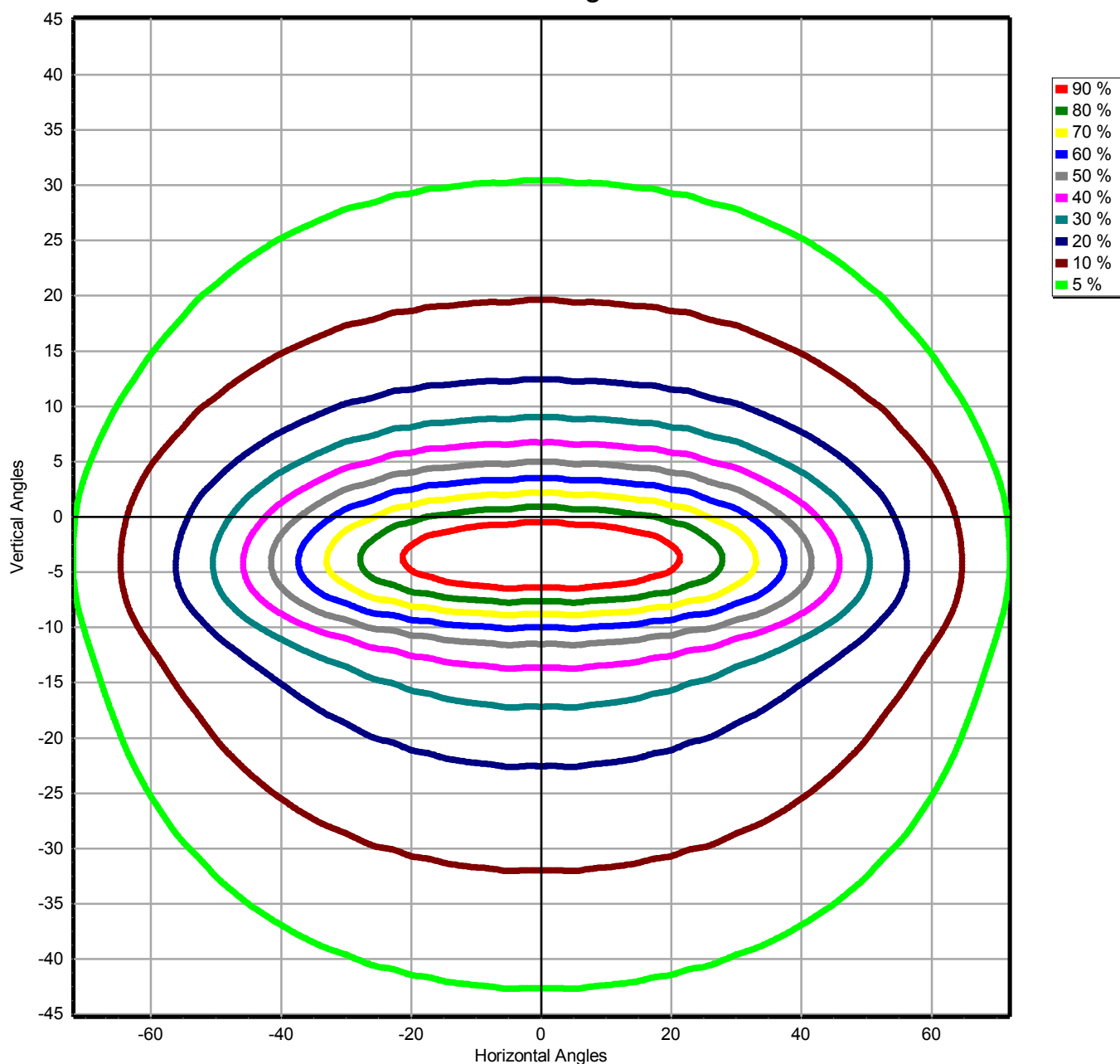
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Photometric Report: S1603112-R1

Prepared for: Lumenpulse · Test Date: 11 March 2016

Floodlight: LUMENFACADE · Lumcat: LOG-HO-120-48-30K-WWLF-WH-NO

ISO Candela Diagram





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IES File Headers

IESNA:LM-63-2002
[ISSUEDATE] 11 March 2016
[TESTLAB] Spectra Lux Industries Inc.
[TEST] S1603112-R1
[MANUFAC] Lumenpulse
[LUMCAT] LOG-HO-120-48-30K-WWLF-WH-NO
[LUMINAIRE] LUMENFACADE
[LAMP] (Clusters of 48 Cree XPE2 LED's) White 61W SSL c/w Mean Well Driver LPF-60-24 @ 120.00V
[_BURNING] Axial (3,107 Luminaire Lumens)
[_REFLECTOR] 48 Collimators
[_LENS] Polycarbonate
[_HOUSING] Extruded Aluminum
[DISTRIBUTION] NEMA 6Hx4V (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 A n g l e s	-90.0	3	3	3	3	3	3	3	3
	-87.5	6	6	6	6	6	6	6	6
	-85.0	11	11	12	11	11	11	11	11
	-82.5	18	18	18	18	17	17	17	17
	-80.0	25	25	25	25	25	25	24	24
	-77.5	33	33	34	33	33	32	32	32
	-75.0	42	42	43	42	42	41	40	40
	-72.5	53	53	53	53	52	52	50	50
	-70.0	63	63	64	63	62	61	60	60
	-67.5	74	73	74	73	72	71	70	70
	-65.0	83	83	84	83	82	81	80	79
	-62.5	94	94	95	94	93	92	90	90
	-60.0	106	106	106	105	104	103	102	101
	-57.5	120	120	120	119	118	117	114	114
	-55.0	135	136	136	135	134	133	132	129
	-52.5	155	155	155	154	152	150	148	147
	-50.0	177	177	178	176	173	172	168	167
	-47.5	203	203	204	202	199	197	193	191
	-45.0	234	234	235	232	229	226	222	220
	-42.5	271	270	271	268	266	264	261	252
A n g l e s	-40.0	314	314	315	312	309	306	302	292
	-37.5	367	367	369	364	361	357	352	344
	-35.0	434	434	436	430	426	421	415	405
	-32.5	517	516	519	512	507	501	493	480
	-30.0	619	618	622	612	606	599	588	572
	-27.5	742	741	745	735	727	717	704	684
	-25.0	893	891	897	883	874	862	845	820
	-22.5	1078	1077	1083	1066	1054	1039	1019	987
	-20.0	1303	1301	1308	1288	1272	1254	1229	1189
	-17.5	1573	1570	1579	1554	1535	1513	1481	1433
A n g l e s	-15.0	1912	1909	1922	1890	1868	1840	1804	1742
	-12.5	2405	2401	2427	2384	2357	2326	2283	2201
	-10.0	3225	3219	3269	3208	3178	3143	3091	2979
	-7.5	4362	4356	4411	4343	4303	4260	4194	4061
	-5.0	5274	5267	5280	5230	5181	5121	5036	4912



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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	5368	5361	5317	5296	5243	5169	5073	4979	4822
	0.0	4654	4646	4569	4571	4524	4450	4362	4301	4135
	2.5	3624	3617	3541	3552	3515	3455	3385	3349	3209
	5.0	2676	2671	2611	2622	2596	2552	2501	2479	2375
	7.5	1950	1947	1904	1912	1893	1862	1827	1812	1738
	10.0	1430	1428	1397	1403	1389	1368	1344	1333	1281
	12.5	1067	1065	1044	1048	1039	1024	1006	999	962
	15.0	817	816	801	803	796	786	774	768	743
	17.5	644	643	633	634	629	621	613	609	590
	20.0	520	519	511	513	509	503	496	493	480
	22.5	429	429	423	424	421	417	412	409	399
	25.0	363	363	358	359	356	353	350	348	340
	27.5	313	313	309	310	308	305	302	301	294
	30.0	274	274	272	272	270	268	265	264	259
	32.5	244	243	241	241	240	238	236	235	230
	35.0	218	218	216	216	215	214	211	210	207
	37.5	197	197	195	195	194	193	192	190	188
	40.0	179	179	177	178	176	175	174	173	171
	42.5	162	162	161	161	160	159	157	157	154
	45.0	146	146	145	145	144	143	142	141	138
A n g l e s	47.5	131	130	129	129	128	127	126	125	122
	50.0	115	114	113	113	112	111	110	109	107
	52.5	100	100	99	98	98	97	96	95	93
	55.0	87	87	86	86	85	85	84	84	82
	57.5	77	77	76	76	76	76	75	74	73
	60.0	69	69	68	68	68	67	67	66	65
	62.5	61	61	60	60	59	59	58	57	56
	65.0	52	52	52	52	51	51	50	50	49
	67.5	45	46	45	45	45	44	43	43	41
	70.0	39	39	38	38	38	37	37	34	31
	72.5	32	32	31	31	31	30	27	25	24
	75.0	27	27	27	27	24	21	20	20	19
	77.5	21	21	17	16	15	15	15	14	14
	80.0	11	12	11	11	10	10	9	9	9
	82.5	2	2	3	4	5	5	6	6	6
85.0	1	2	1	2	2	3	3	4	4	
87.5	1	1	1	2	2	2	2	2	2	
90.0	1	1	2	1	2	1	2	2	2	



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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	3	3	3	3	3	4	4	4
	-87.5	6	6	6	6	6	6	6	6
	-85.0	11	10	11	10	10	10	10	10
	-82.5	16	17	16	16	16	15	15	14
	-80.0	23	23	23	22	22	21	20	19
	-77.5	31	31	30	29	29	28	27	26
	-75.0	39	39	38	37	36	35	34	33
	-72.5	49	48	47	45	44	43	42	40
	-70.0	59	58	57	55	54	52	50	48
	-67.5	68	68	66	64	63	61	59	57
	-65.0	78	77	76	74	72	70	68	66
	-62.5	88	87	86	83	82	80	78	75
	-60.0	99	98	96	94	92	90	88	85
	-57.5	111	110	108	106	104	101	99	95
	-55.0	126	125	122	119	117	114	111	107
	-52.5	143	142	139	135	132	129	125	121
	-50.0	163	161	158	153	150	146	141	136
	-47.5	186	184	180	174	170	165	160	154
	-45.0	213	211	205	199	194	188	181	174
	-42.5	245	242	236	228	222	215	207	198
A n g l e s	-40.0	284	280	272	262	255	247	237	227
	-37.5	329	325	315	304	295	285	272	260
	-35.0	387	381	369	354	343	330	315	300
	-32.5	457	449	434	416	402	385	367	348
	-30.0	542	532	513	490	472	452	429	405
	-27.5	646	632	609	580	557	532	503	472
	-25.0	772	754	725	688	660	627	591	554
	-22.5	926	903	866	820	784	743	697	650
	-20.0	1113	1083	1037	979	933	881	824	765
	-17.5	1338	1300	1242	1170	1112	1046	975	903
	-15.0	1625	1581	1508	1417	1346	1264	1174	1082
	-12.5	2056	2010	1919	1796	1710	1603	1486	1363
	-10.0	2792	2745	2623	2449	2337	2187	2019	1840
	-7.5	3816	3736	3570	3340	3171	2951	2709	2455
	-5.0	4615	4460	4250	3997	3753	3467	3165	2855
	-2.5	4669	4452	4230	4000	3718	3414	3106	2800
	0.0	4032	3807	3613	3436	3177	2912	2653	2399
	2.5	3146	2959	2811	2687	2484	2283	2090	1902
	5.0	2335	2197	2092	2006	1861	1719	1582	1450
	7.5	1712	1613	1541	1482	1381	1282	1187	1096
	10.0	1264	1195	1145	1105	1035	967	902	838
	12.5	951	903	869	841	793	745	699	655
	15.0	734	701	677	658	624	590	558	526
	17.5	584	560	543	529	504	480	456	433
	20.0	475	458	445	435	416	398	380	363
	22.5	395	382	373	365	351	337	324	311
	25.0	337	327	319	313	302	292	282	271
	27.5	292	284	278	273	265	257	248	240
	30.0	257	250	246	242	235	228	221	214
	32.5	229	224	220	216	211	205	199	192
	35.0	206	201	198	195	190	185	180	174
	37.5	186	183	180	177	172	168	163	158
	40.0	169	166	163	160	156	152	147	142
	42.5	153	149	147	144	140	136	132	126



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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	137	134	131	129	124	120	116	111	106
47.5	121	118	115	112	108	105	101	97	93
50.0	106	102	100	98	95	92	89	86	83
52.5	92	90	88	87	84	82	79	77	73
55.0	82	80	78	77	75	73	70	68	65
57.5	73	71	70	69	67	64	60	57	54
60.0	65	63	61	59	56	52	50	47	45
62.5	55	54	52	49	46	44	42	40	37
65.0	48	46	42	41	38	36	34	32	31
67.5	39	36	34	33	31	29	28	27	26
70.0	30	28	26	26	25	25	24	23	22
72.5	24	23	23	22	21	20	20	19	18
75.0	19	18	17	17	16	16	16	15	15
77.5	13	13	13	13	12	12	12	13	12
80.0	9	9	9	10	10	10	10	10	10
82.5	6	7	7	7	7	7	7	7	8
85.0	4	5	5	5	5	5	5	5	5
87.5	3	3	3	3	3	3	3	3	3
90.0	2	2	2	2	2	2	3	3	3

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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	4	4	4	4	5	5	4	5
	-87.5	6	6	6	6	6	6	6	6
	-85.0	9	9	9	8	8	8	8	7
	-82.5	14	13	13	12	12	11	10	10
	-80.0	19	18	17	16	16	15	14	12
	-77.5	24	23	22	21	20	19	17	15
	-75.0	30	29	28	26	24	23	21	18
	-72.5	37	35	33	31	30	28	26	21
	-70.0	44	42	40	37	35	33	30	25
	-67.5	52	49	46	43	41	38	35	29
	-65.0	61	58	54	51	47	44	40	33
	-62.5	69	66	63	58	55	51	46	38
	-60.0	79	75	71	67	63	58	53	43
	-57.5	89	85	81	76	72	67	60	49
	-55.0	100	95	91	85	80	75	69	55
	-52.5	111	107	101	95	90	84	77	62
	-50.0	125	120	113	107	101	94	86	70
	-47.5	141	134	127	119	113	105	96	78
	-45.0	159	151	143	134	126	117	107	87
	-42.5	181	171	161	151	141	131	120	97
A n g l e s	-40.0	205	194	183	169	159	147	134	109
	-37.5	234	221	207	192	179	165	150	121
	-35.0	269	252	236	217	203	186	169	135
	-32.5	309	289	269	247	230	210	190	151
	-30.0	356	332	308	282	261	237	214	169
	-27.5	413	383	354	322	297	269	241	189
	-25.0	480	443	407	369	338	305	272	211
	-22.5	558	513	469	422	385	345	306	235
	-20.0	651	595	540	484	438	391	344	261
	-17.5	761	691	624	556	500	442	387	289
	-15.0	904	815	732	645	577	505	438	321
	-12.5	1125	1006	895	778	689	596	510	363
	-10.0	1492	1318	1157	989	863	734	616	423
	-7.5	1950	1702	1471	1242	1061	886	730	485
	-5.0	2233	1933	1654	1395	1169	969	793	520
	-2.5	2179	1884	1610	1368	1139	946	779	515
	0.0	1882	1638	1410	1215	1017	855	714	484
	2.5	1516	1334	1161	1017	860	734	622	435
	5.0	1176	1046	921	818	701	606	522	375
	7.5	905	813	725	652	566	496	433	319
	10.0	705	641	577	525	462	410	362	273
	12.5	561	515	469	431	384	344	307	236
	15.0	458	424	390	361	325	293	264	206
	17.5	382	357	330	308	279	254	230	182
	20.0	324	305	284	266	243	223	203	162
	22.5	281	265	249	234	215	198	180	145
	25.0	247	235	221	208	192	177	161	130
	27.5	220	209	197	186	172	159	145	117
	30.0	197	187	177	167	154	142	130	105
	32.5	177	169	159	150	139	128	117	94
	35.0	160	152	144	135	125	115	105	84
	37.5	145	137	130	122	112	103	94	75
	40.0	130	123	116	109	100	91	83	67
	42.5	115	109	102	96	88	81	75	59



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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
45.0	101	95	90	84	78	73	66	58	52
47.5	89	85	80	75	70	64	57	51	47
50.0	79	75	71	68	61	56	51	46	41
52.5	71	68	62	57	52	48	44	40	37
55.0	61	56	52	49	45	41	39	35	32
57.5	50	47	44	42	38	36	33	31	28
60.0	42	40	37	35	33	31	29	26	24
62.5	35	33	31	30	28	26	24	22	21
65.0	29	28	27	26	24	23	21	20	18
67.5	25	24	23	22	21	20	19	18	16
70.0	21	20	20	19	18	17	17	16	15
72.5	18	17	17	16	16	15	14	14	13
75.0	15	15	14	14	13	13	13	12	11
77.5	13	12	12	12	11	11	10	10	10
80.0	10	10	9	9	9	9	9	8	8
82.5	7	7	7	7	7	7	7	7	7
85.0	5	5	5	5	5	5	5	5	5
87.5	3	4	4	4	4	4	4	4	4
90.0	3	3	3	3	3	4	4	4	4

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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	5	5	5	5	5	5	5	5
	-87.5	6	6	6	5	5	5	5	5
	-85.0	7	7	6	6	6	6	5	5
	-82.5	9	9	8	8	7	6	5	5
	-80.0	11	10	10	9	8	7	6	5
	-77.5	14	13	11	10	9	8	7	6
	-75.0	16	15	13	12	10	9	8	7
	-72.5	19	17	15	13	11	9	8	7
	-70.0	23	20	17	15	13	11	9	7
	-67.5	26	23	20	17	14	12	9	7
	-65.0	30	26	23	19	16	13	10	8
	-62.5	34	30	25	21	18	14	11	8
	-60.0	39	34	29	24	20	15	12	9
	-57.5	43	38	32	27	22	17	13	9
	-55.0	49	43	36	30	24	19	14	10
	-52.5	55	47	40	33	27	21	15	10
	-50.0	61	53	45	37	29	22	16	11
	-47.5	69	60	50	41	33	25	18	12
	-45.0	77	66	56	46	36	27	19	12
	-42.5	86	74	62	51	40	30	21	13
A n g l e s	-40.0	96	83	69	56	44	33	23	14
	-37.5	107	92	77	63	49	36	25	16
	-35.0	119	103	86	70	54	40	27	17
	-32.5	133	114	95	77	60	44	30	18
	-30.0	148	127	106	86	67	49	33	20
	-27.5	164	141	117	95	73	53	36	21
	-25.0	183	156	129	104	81	58	39	23
	-22.5	203	172	142	114	88	64	42	25
	-20.0	223	188	155	124	95	69	45	26
	-17.5	246	206	168	134	102	73	48	28
	-15.0	271	225	182	144	109	77	51	29
	-12.5	302	247	198	154	115	81	52	30
	-10.0	346	278	219	167	122	85	54	30
	-7.5	391	310	241	182	132	89	56	30
	-5.0	415	327	253	190	137	93	57	31
	-2.5	412	325	253	191	138	94	58	31
	0.0	391	313	246	188	137	94	59	32
	2.5	356	288	229	177	131	92	59	32
	5.0	311	254	205	160	120	86	56	31
	7.5	268	222	181	143	109	78	51	28
	10.0	231	194	159	127	98	71	46	25
	12.5	202	170	141	114	88	63	41	22
	15.0	178	151	126	102	79	56	36	20
	17.5	157	135	112	91	70	50	32	18
	20.0	141	120	101	81	62	45	28	16
	22.5	126	108	90	73	56	39	25	15
	25.0	113	97	81	65	49	35	23	14
	27.5	102	87	72	58	44	32	21	13
	30.0	91	77	64	52	40	28	19	13
	32.5	81	69	57	46	36	26	18	12
	35.0	73	61	51	42	33	24	17	11
	37.5	65	55	47	39	30	22	16	11
	40.0	58	51	43	35	27	21	15	10
	42.5	53	46	39	32	25	19	14	10



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Horizontal Angles

	67.5	70.0	72.5	75.0	77.5	80.0	82.5	85.0	87.5
45.0	46	41	35	29	23	17	13	9	6
47.5	41	36	31	25	20	16	12	9	6
50.0	37	32	27	22	18	15	11	8	5
52.5	33	28	24	20	17	13	10	8	6
55.0	28	25	21	18	15	12	9	7	5
57.5	24	21	18	16	13	11	9	7	5
60.0	21	19	17	14	12	10	8	6	5
62.5	18	17	15	13	11	9	8	6	5
65.0	17	15	14	12	10	9	7	6	5
67.5	15	14	13	11	10	8	7	6	5
70.0	13	13	11	10	8	7	6	5	5
72.5	12	11	10	9	8	7	6	5	4
75.0	11	10	9	8	7	6	6	5	5
77.5	9	9	8	7	6	6	5	5	4
80.0	7	7	7	6	6	6	5	5	4
82.5	6	6	6	6	5	5	5	5	5
85.0	5	5	5	5	5	4	5	4	4
87.5	4	4	4	4	4	5	4	4	4
90.0	4	4	4	4	4	4	4	4	5

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Horizontal Angles

	90.0
V e r t i c a l	-90.0 5
	-87.5 5
	-85.0 5
	-82.5 5
	-80.0 5
	-77.5 5
	-75.0 5
	-72.5 5
	-70.0 5
	-67.5 5
	-65.0 5
	-62.5 5
	-60.0 5
	-57.5 5
	-55.0 5
	-52.5 5
	-50.0 5
	-47.5 5
	-45.0 5
	-42.5 5
A n g l e s	-40.0 5
	-37.5 5
	-35.0 5
	-32.5 5
	-30.0 5
	-27.5 5
	-25.0 5
	-22.5 6
	-20.0 5
	-17.5 5
	-15.0 6
	-12.5 5
	-10.0 5
	-7.5 6
	-5.0 5
	-2.5 5
	0.0 5
	2.5 5
	5.0 5
	7.5 5
	10.0 5
	12.5 4
	15.0 4
	17.5 4
	20.0 4
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	25.0 4
	27.5 4
	30.0 4
	32.5 4
	35.0 4
	37.5 4
	40.0 4
	42.5 4



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Horizontal Angles

	90.0
	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	67.5
	70.0
	72.5
	75.0
	77.5
	80.0
	82.5
	85.0
	87.5
	90.0
A n g l e s	