



Spectra Lux

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



Lab Code: 200899-0

Moving Mirror Goniophotometer Test Report

Standard(s): IES LM-63, IES LM-79, ANSI C82.77

Customer ANDlight, 1951 Franklin St., Vancouver, British Columbia , Canada, V5L 0C7

General Information		Lamp Details: CY4454		Driver Details: CY2029	
DUT Lab ID	SRIS 2831-1	Seasoning	0 Hour	Type	LED Power Supply
Lamp Type	LED/SSL	Test Product	BUT-90-P-27	Manufacturer	Meanwell
Current Mode	AC	Manufacturer	EPISTAR	Catalog No.	IDLV-45-12
Test Report	S2008175-R1	Lamp Catalog No.	OMNICHIP (320404-xx-300-12-4.4)	Maximum Power	45 W
Test Date	17 August 2020	Drive Current	30 mA	Input Voltage	120.00 V
Report Date	20 November 2020	Nominal Color	2700K	Operating Frequency	60 Hz
Ambient	24.4 °C	Burning Position	Junction Axial	Input Power	26.48 W

Luminaire Data

General Information		Optics		Aperture (feet)	
Manufacturer	ANDlight	Reflector	None	X	-2.9583
Name	BUTTON	Housing	Aluminum Body c/w Nylon Rope	Y	-2.9583
Catalog No.	BUT-90-P-27	Lens	Opalin Acrylic Diffuser	Z	0.0000

Stabilization Time: 1 hour

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).





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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	27E116584	2020/07/22	2021/09/22
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	2019/09/05	2020/09/05

Environment Equipment

Equipment	Manufacturer	Model	Serial Number	Calibration Date	Calibration Due Date
Temperature Humidity Sensor	Omega	HH311	120504176	2020/07/16	2021/07/16

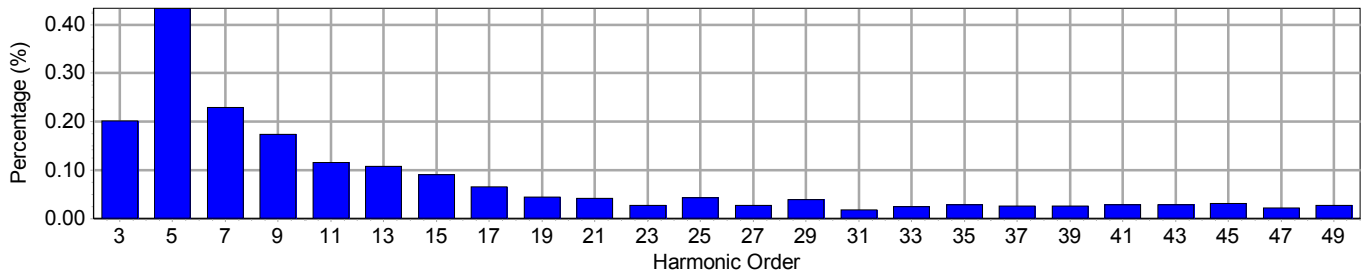


Electrical Measurements

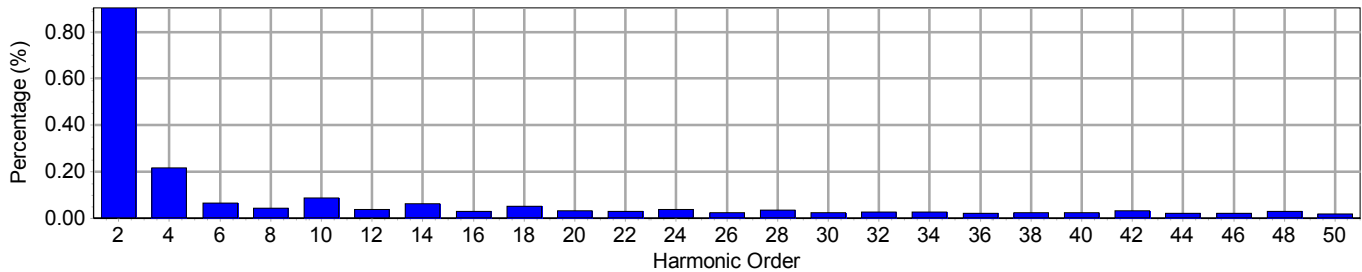
Input

Frequency	60 Hz	Active Power	26.48 W	THDV [ANSI]	1.12 %
Voltage	120.0 V(rms)	Apparent Power	27.11 VA	THDA [ANSI]	6.43 %
Current	0.2259 A(rms)	Power Factor	0.977	Max. Harmonic At	3rd order

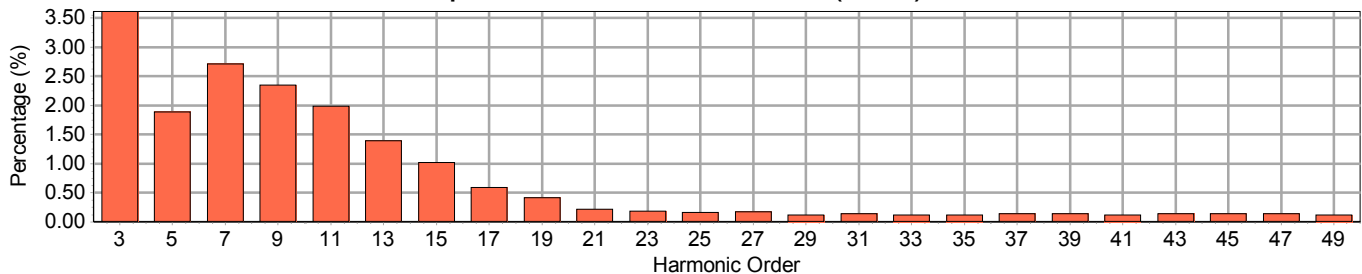
Input Voltage Harmonics (Odd)



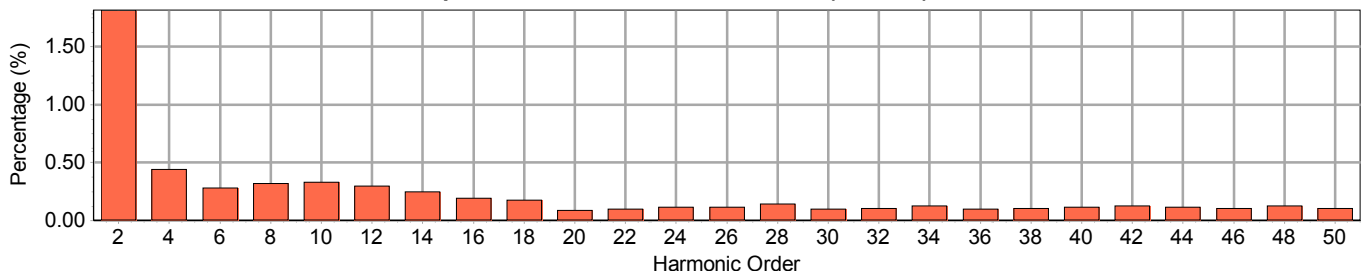
Input Voltage Harmonics (Even)



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	0.905	1.820
3	180	0.201	3.621	4	240	0.216	0.441
5	300	0.435	1.890	6	360	0.064	0.282
7	420	0.230	2.716	8	480	0.042	0.317
9	540	0.174	2.345	10	600	0.085	0.327
11	660	0.116	1.986	12	720	0.037	0.296
13	780	0.107	1.397	14	840	0.062	0.245
15	900	0.090	1.020	16	960	0.030	0.190
17	1020	0.065	0.591	18	1080	0.050	0.172
19	1140	0.044	0.413	20	1200	0.031	0.087
21	1260	0.041	0.214	22	1320	0.028	0.094
23	1380	0.027	0.185	24	1440	0.036	0.114
25	1500	0.043	0.164	26	1560	0.024	0.115
27	1620	0.027	0.173	28	1680	0.033	0.140
29	1740	0.039	0.119	30	1800	0.023	0.096
31	1860	0.018	0.133	32	1920	0.026	0.101
33	1980	0.025	0.120	34	2040	0.026	0.123
35	2100	0.029	0.110	36	2160	0.022	0.097
37	2220	0.026	0.133	38	2280	0.023	0.100
39	2340	0.026	0.141	40	2400	0.024	0.114
41	2460	0.028	0.112	42	2520	0.031	0.124
43	2580	0.028	0.133	44	2640	0.022	0.113
45	2700	0.031	0.132	46	2760	0.021	0.102
47	2820	0.022	0.134	48	2880	0.029	0.126
49	2940	0.027	0.121	50	3000	0.019	0.100



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Photometric Report: S2008175-R1

Prepared for: ANDlight · Test Date: 17 August 2020

Luminaire: BUTTON · Lumcat: BUT-90-P-27

Coefficients of Utilization - Zonal Cavity Method

RCR	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	0.5	0.3	0.1	0
0		121	121	121	121	118	118	118	118	114	114	114	114	108	108	108	96	96	96	96	96	96	94
1		111	106	101	97	107	103	98	95	104	100	96	92	94	91	88	85	83	81	85	83	81	78
2		101	92	84	78	98	89	83	77	94	87	81	75	82	77	73	74	71	68	74	71	68	65
3		92	80	72	65	89	78	70	64	86	76	69	63	72	66	61	65	61	57	65	61	57	55
4		84	71	62	54	81	69	60	54	78	67	59	53	64	57	52	58	53	49	58	53	49	46
5		77	63	54	47	75	62	53	46	72	60	52	46	57	50	44	52	47	42	52	47	42	40
6		71	57	47	40	69	55	46	40	66	54	46	40	52	44	39	47	42	37	47	42	37	35
7		66	51	42	36	64	50	41	35	62	49	41	35	47	40	34	43	37	33	43	37	33	31
8		61	47	38	32	59	46	37	31	57	45	37	31	43	36	30	39	34	29	39	34	29	27
9		57	43	34	28	55	42	34	28	53	41	33	28	39	32	27	36	31	26	36	31	26	25
10		53	39	31	26	52	39	31	25	50	38	30	25	36	30	25	34	28	24	34	28	24	22

Zonal Lumen Summary

Zone	Lumens	% Lamp	% Luminaire
0 - 10	46	3.00	3.00
10 - 20	134	8.66	8.66
20 - 30	204	13.22	13.22
30 - 40	251	16.22	16.22
40 - 50	265	17.13	17.13
50 - 60	242	15.63	15.63
60 - 70	184	11.90	11.90
70 - 80	100	6.46	6.46
80 - 90	22	1.43	1.43
90 - 120	32	2.05	2.05
90 - 130	48	3.12	3.12
90 - 150	80	5.17	5.17
90 - 180	98	6.35	6.35
0 - 180	1545	100.00	100.00

Average Luminance (Cd/m²)

Angle	0 Degree	45 Degree	90 Degree
45.0	787	661	658
55.0	724	788	800
65.0	678	739	746
75.0	587	496	497
85.0	289	316	303

Luminaire Luminous Flux: 1545

Measured Input Power: 26.48 W

Total Luminaire Efficiency: N/A

Luminaire Luminous Efficacy: 58.3 lm/W

Luminaire Spacing Criterion (0 Degree): 1.2842

Luminaire Spacing Criterion (90 Degree): 1.1504

Category: Up and Down



Photometric Report: S2008175-R1

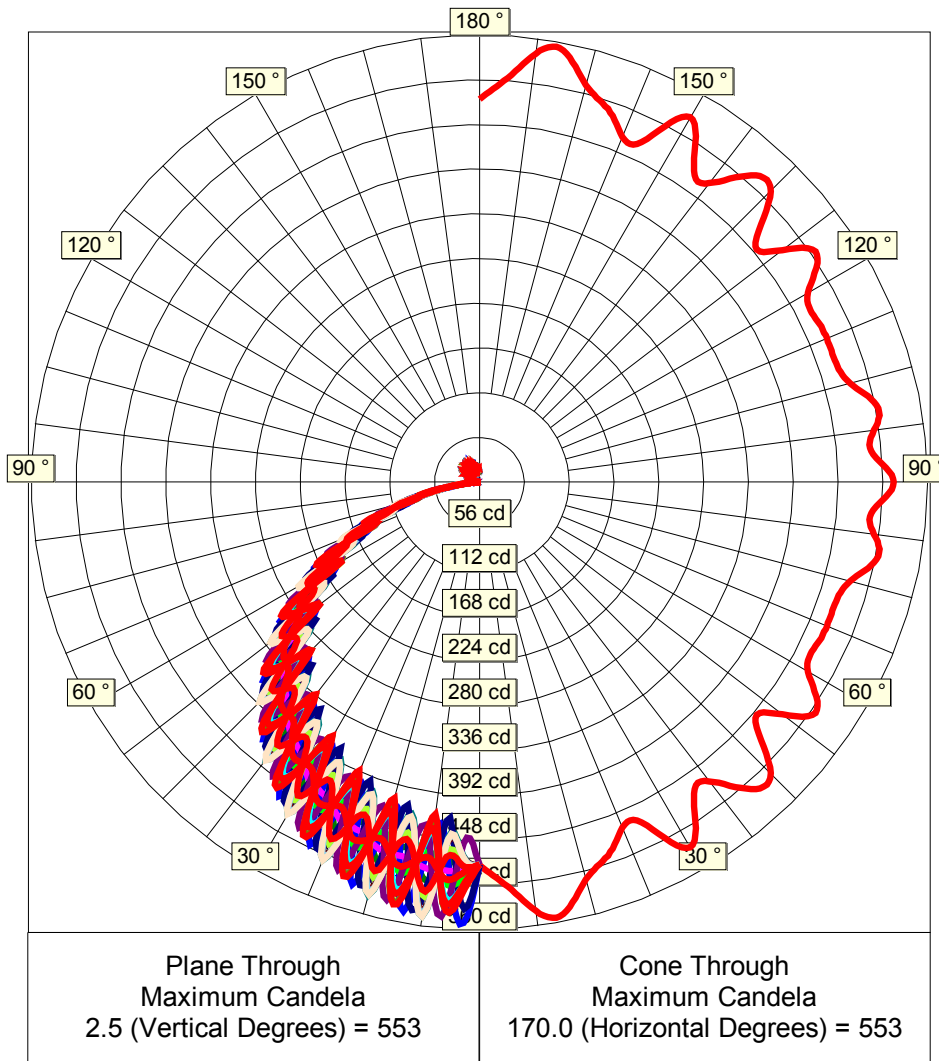
Prepared for: ANDlight · Test Date: 17 August 2020

Luminaire: BUTTON · Lumcat: BUT-90-P-27

Luminous Intensity - Polar Curve for each Plane(1)

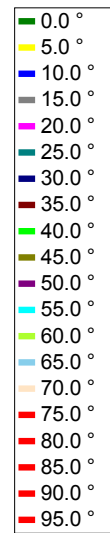
Plane
Angles

Plane Angles	Candela Values
0.0	479
2.5	553
5.0	464
7.5	445
10.0	545
12.5	454
15.0	435
17.5	528
20.0	437
22.5	416
25.0	501
27.5	410
30.0	391
32.5	466
35.0	377
37.5	358
40.0	420
42.5	336
45.0	315
47.5	367
50.0	288
52.5	268
55.0	304
57.5	233
60.0	211
62.5	233
65.0	172
67.5	150
70.0	156
72.5	107
75.0	86
77.5	79
80.0	45
82.5	28
85.0	18
87.5	7
90.0	6
92.5	7
95.0	6
97.5	7



Cone
Angles

Cone Angles	Candela Values
0.0	480
5.0	516
10.0	553
15.0	515
20.0	488
25.0	467
30.0	528
35.0	469
40.0	498
45.0	515
50.0	453
55.0	508
60.0	475
65.0	469
70.0	470
75.0	480
80.0	508
85.0	490
90.0	518
95.0	490





Photometric Report: S2008175-R1

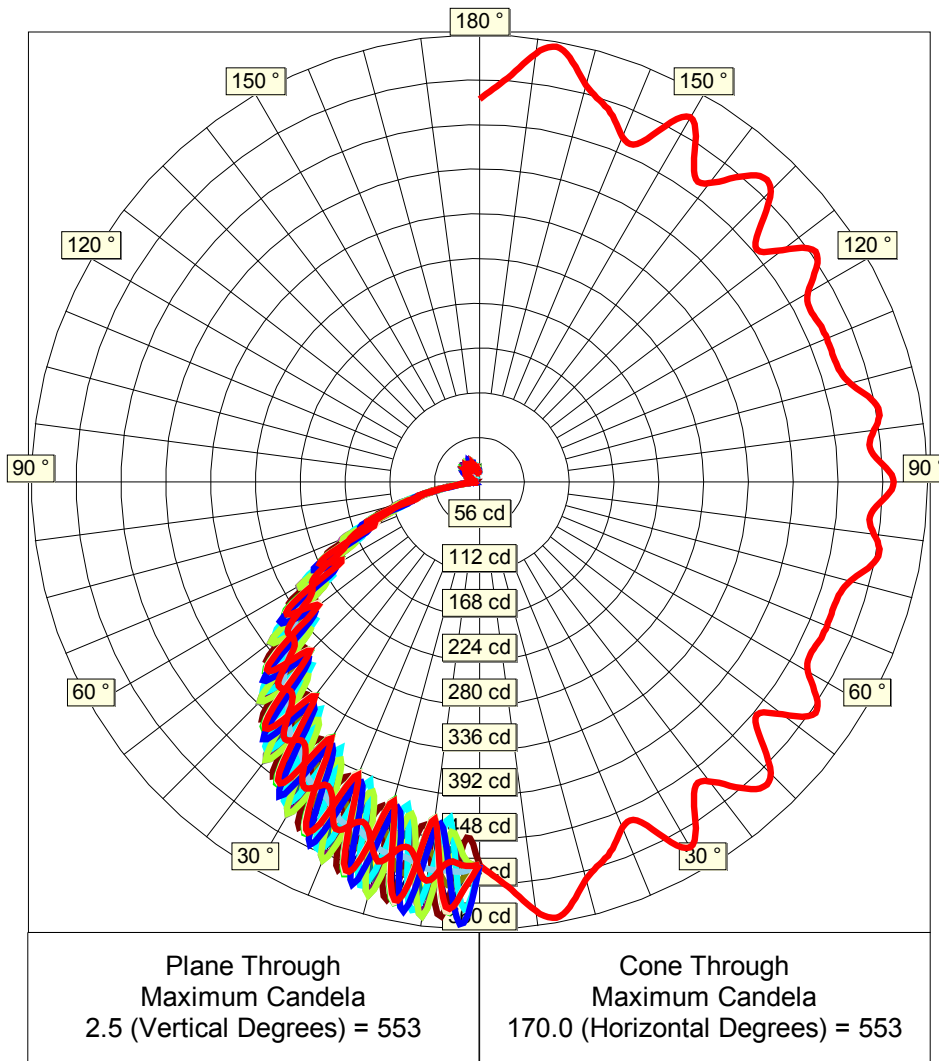
Prepared for: ANDlight · Test Date: 17 August 2020

Luminaire: BUTTON · Lumcat: BUT-90-P-27

Luminous Intensity - Polar Curve for each Plane(2)

Plane
Angles

Plane Angles	Candela Values
100.0	10
102.5	9
105.0	10
107.5	13
110.0	12
112.5	13
115.0	17
117.5	15
120.0	16
122.5	20
125.0	17
127.5	19
130.0	24
132.5	20
135.0	21
137.5	25
140.0	21
142.5	23
145.0	28
147.5	23
150.0	24
152.5	28
155.0	23
157.5	23
160.0	26
162.5	19
165.0	19
167.5	20
170.0	15
172.5	15
175.0	15
177.5	11
180.0	12



Cone
Angles

Cone Angles	Candela Values
100.0	508
105.0	480
110.0	470
115.0	469
120.0	475
125.0	508
130.0	453
135.0	515
140.0	498
145.0	469
150.0	528
155.0	467
160.0	488
165.0	515
170.0	553
175.0	516
180.0	480

100.0 °
105.0 °
110.0 °
115.0 °
120.0 °
125.0 °
130.0 °
135.0 °
140.0 °
145.0 °
150.0 °
155.0 °
160.0 °
165.0 °
170.0 °
175.0 °
180.0 °



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IES File Headers

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IESNA:LM-63
[ISSUEDATE]      17 August 2020
[TESTLAB]        Spectra Lux
[TEST]           S2008175-R1
[MANUFAC]        ANDlight
[LUMCAT]          BUT-90-P-27
[LUMINAIRE]       BUTTON
[LAMP]           Clusters of EPISTAR OMNICHIP (320404-xx-300-12-4.4) LEDs c/w Meanwell Driver IDLV-45-12 @ 120.00V
[_BURNING]        Axial (1,545 Luminaire Lumens)
[_REFLECTOR]      None
[_LENS]           Opalin Acrylic Diffuser
[_HOUSING]        Aluminum Body c/w Nylon Rope
[_NOMINAL COLOR] 2700K
[_DRIVE CURRENT] 30 mA
```

Candela Table

Lateral Angles

	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0
V e r t i c a l	0.0	479	479	479	479	479	479	479	479	479
	2.5	480	516	553	515	488	467	528	498	515
	5.0	479	522	464	529	488	447	422	453	502
	7.5	503	425	445	424	489	549	515	542	466
	10.0	473	510	545	509	481	459	519	461	491
	12.5	471	512	454	517	478	439	414	444	491
	15.0	491	414	435	412	477	535	503	529	454
	17.5	458	495	528	492	466	444	503	447	476
	20.0	453	491	437	496	460	424	398	428	473
	22.5	470	396	416	394	456	512	482	506	435
	25.0	435	471	501	469	442	421	477	424	452
	27.5	427	462	410	467	434	401	376	405	446
	30.0	440	371	391	369	427	479	452	474	407
	32.5	404	438	466	436	411	390	443	393	422
	35.0	394	426	377	430	400	370	346	374	411
	37.5	402	337	358	337	390	438	414	432	372
	40.0	366	398	420	395	371	352	400	355	382
	42.5	353	380	336	384	358	332	310	335	367
	45.0	356	299	315	298	345	387	366	383	329
A n g l e s	47.5	319	348	367	346	324	307	349	310	334
	50.0	304	326	288	330	308	286	267	288	316
	52.5	301	254	268	252	292	328	312	324	279
	55.0	265	288	304	287	269	254	290	257	277
	57.5	247	266	233	267	250	233	217	234	256
	60.0	238	199	211	199	230	259	247	256	220
	62.5	203	223	233	221	206	195	223	197	213
	65.0	183	195	172	197	185	173	161	174	190
	67.5	169	143	150	141	163	184	175	182	157
	70.0	137	150	156	148	139	131	150	132	144
	72.5	115	124	107	124	116	109	102	110	120
	75.0	97	82	86	81	94	106	102	104	90
	77.5	70	77	79	76	71	67	77	67	73
	80.0	50	53	45	53	50	47	44	47	52
	82.5	32	27	28	27	31	35	35	35	31
	85.0	16	18	18	18	17	16	18	16	17
	87.5	8	9	7	9	8	8	8	8	8
	90.0	6	5	6	5	6	7	7	6	5



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Lateral Angles

	0.0	5.0	10.0	15.0	20.0	25.0	30.0	35.0	40.0	45.0
V e r t i c a l	92.5	6	7	7	7	7	6	7	6	7
	95.0	7	7	6	7	7	7	6	6	7
	97.5	8	7	7	7	8	9	8	8	7
	100.0	8	9	10	9	9	8	9	8	8
	102.5	9	10	9	10	9	9	8	9	9
	105.0	10	9	10	9	10	12	11	11	10
	107.5	11	12	13	12	11	11	12	11	12
	110.0	12	13	12	13	12	12	11	12	12
	112.5	14	12	13	12	14	15	15	15	13
	115.0	14	16	17	16	15	14	15	14	15
	117.5	15	16	15	16	16	15	13	15	16
	120.0	18	15	16	14	17	19	18	19	16
	122.5	17	19	20	19	18	16	19	17	18
	125.0	18	20	17	20	19	18	16	18	19
	127.5	21	17	19	17	20	22	21	22	19
	130.0	20	22	24	22	20	19	21	19	21
	132.5	21	22	20	22	21	20	18	20	22
	135.0	23	19	21	19	22	25	24	25	21
A n g l e s	137.5	22	25	25	24	22	21	23	21	23
	140.0	23	24	21	24	23	22	19	22	23
	142.5	25	21	23	20	24	26	25	26	23
	145.0	24	27	28	26	24	22	25	22	25
	147.5	25	26	23	25	24	23	21	23	25
	150.0	26	22	24	21	25	28	26	27	23
	152.5	25	28	28	27	24	23	26	23	25
	155.0	24	25	23	25	24	23	21	23	24
	157.5	25	21	23	21	24	27	26	26	23
	160.0	22	25	26	25	22	21	24	21	23
	162.5	21	22	19	22	21	20	19	21	22
	165.0	21	17	19	17	20	23	22	22	19
	167.5	18	20	20	20	18	17	19	17	19
	170.0	17	17	15	17	17	16	15	17	17
	172.5	16	13	15	13	16	17	17	17	15
	175.0	13	14	15	15	13	13	14	12	14
	177.5	12	12	11	13	12	12	10	11	12
	180.0	12	12	12	12	12	12	12	12	12



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Lateral Angles

	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0
V e r t i c a l	0.0	479	479	479	479	479	479	479	479	479
	2.5	453	508	475	469	470	480	508	490	518
	5.0	546	516	466	450	448	471	522	498	527
	7.5	467	440	523	545	548	517	437	475	419
	10.0	447	502	467	462	462	473	501	484	512
	12.5	535	505	457	442	441	462	511	488	516
	15.0	455	429	512	531	535	504	426	464	409
	17.5	435	487	453	447	447	458	487	470	497
	20.0	516	486	441	427	425	446	492	471	499
	22.5	434	411	490	509	512	483	407	444	391
	25.0	414	464	430	424	425	436	464	447	474
	27.5	488	459	417	404	402	422	465	444	469
	30.0	408	385	459	477	480	453	382	417	367
	32.5	386	431	399	394	395	405	432	416	441
	35.0	450	422	385	372	372	389	429	409	432
	37.5	371	352	420	436	439	415	350	381	335
	40.0	349	391	360	356	357	367	392	377	401
	42.5	402	378	345	334	334	349	383	367	387
	45.0	329	311	372	386	389	367	309	338	297
	47.5	306	342	315	311	311	320	343	330	351
A n g l e s	50.0	347	325	297	289	288	301	330	316	333
	52.5	278	264	315	327	329	312	262	287	252
	55.0	255	285	261	258	258	267	286	274	293
	57.5	283	264	242	235	235	245	268	257	272
	60.0	220	209	249	259	261	247	208	227	199
	62.5	196	219	201	198	198	205	221	211	226
	65.0	210	196	180	175	175	183	199	191	201
	67.5	157	149	178	185	186	176	148	162	142
	70.0	133	148	136	134	134	138	150	142	153
	72.5	133	123	114	111	110	116	126	121	127
	75.0	91	86	103	106	108	102	86	94	82
	77.5	69	76	69	68	68	71	76	73	78
	80.0	58	53	49	47	48	50	54	52	54
	82.5	31	29	34	35	36	34	28	31	27
	85.0	16	17	15	15	15	15	17	15	17
	87.5	9	8	7	6	6	6	6	5	6
	90.0	5	5	6	5	5	4	3	3	2
	92.5	6	6	5	5	4	4	5	4	5
	95.0	7	6	6	5	5	6	5	5	5
	97.5	7	6	7	7	7	7	6	6	5
	100.0	7	8	7	7	7	7	7	7	8
	102.5	10	9	8	8	8	8	8	8	8
	105.0	9	9	10	11	11	10	8	9	8
	107.5	10	11	10	10	10	10	11	10	12
	110.0	14	12	11	11	11	11	12	12	12
	112.5	12	12	14	14	15	14	11	12	11
	115.0	14	15	14	13	13	13	15	14	15
	117.5	18	16	15	14	14	15	16	15	16
	120.0	16	15	18	18	18	18	15	16	14
	122.5	17	19	17	16	16	17	19	18	19
	125.0	21	19	18	18	17	18	19	19	19
	127.5	18	18	21	22	22	20	18	19	17
	130.0	19	22	19	19	19	19	22	21	22
	132.5	24	22	21	20	20	20	22	22	22



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Lateral Angles

	50.0	55.0	60.0	65.0	70.0	75.0	80.0	85.0	90.0	95.0	
V e r t i c a l	135.0	21	20	24	24	24	23	20	22	19	22
	137.5	21	24	21	21	21	22	24	23	25	23
	140.0	26	24	22	22	22	22	24	23	24	23
	142.5	22	21	25	26	26	25	21	23	20	23
	145.0	23	25	22	22	22	23	25	24	26	24
	147.5	27	25	23	23	23	23	25	24	25	24
	150.0	23	22	26	27	27	25	21	23	20	23
	152.5	23	26	23	22	22	23	25	24	26	24
	155.0	27	25	23	23	23	23	25	24	25	24
	157.5	22	21	25	26	26	25	21	23	20	23
	160.0	22	24	21	21	21	22	24	23	25	23
	162.5	24	22	21	20	21	21	22	22	22	22
	165.0	19	18	22	23	23	21	18	20	17	20
	167.5	18	20	18	17	17	18	20	19	20	19
	170.0	19	18	17	16	17	17	18	18	18	18
A n g l e s	172.5	15	14	17	17	18	17	14	16	14	16
	175.0	13	14	13	13	13	13	15	14	15	14
	177.5	13	12	12	11	11	12	12	12	12	12
	180.0	12	12	12	12	12	12	12	12	12	12



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Lateral Angles

	100.0	105.0	110.0	115.0	120.0	125.0	130.0	135.0	140.0	145.0
V e r t i c a l	0.0	479	479	479	479	479	479	479	479	479
	2.5	508	480	470	469	475	508	453	515	498
	5.0	522	471	448	450	466	516	546	529	502
	7.5	437	517	548	545	523	440	467	423	466
	10.0	501	473	462	462	467	502	447	508	491
	12.5	511	462	441	442	457	505	535	518	491
	15.0	426	504	535	531	512	429	455	412	454
	17.5	487	458	447	447	453	487	435	494	476
	20.0	492	446	425	427	441	486	516	498	473
	22.5	407	483	512	509	490	411	434	394	435
	25.0	464	436	425	424	430	464	414	470	452
	27.5	465	422	402	404	417	459	488	470	446
	30.0	382	453	480	477	459	385	408	369	407
	32.5	432	405	395	394	399	431	386	437	422
	35.0	429	389	372	372	385	422	450	433	411
	37.5	350	415	439	436	420	352	371	337	372
	40.0	392	367	357	356	360	391	349	397	382
	42.5	383	349	334	334	345	378	402	386	367
	45.0	309	367	389	386	372	311	329	298	329
	47.5	343	320	311	311	315	342	306	347	334
A n g l e s	50.0	330	301	288	289	297	325	347	333	316
	52.5	262	312	329	327	315	264	278	253	279
	55.0	286	267	258	258	261	285	255	289	277
	57.5	268	245	235	235	242	264	283	270	256
	60.0	208	247	261	259	249	209	220	200	220
	62.5	221	205	198	198	201	219	196	222	213
	65.0	199	183	175	175	180	196	210	199	190
	67.5	148	176	186	185	178	149	157	142	157
	70.0	150	138	134	134	136	148	133	150	144
	72.5	126	116	110	111	114	123	133	126	120
	75.0	86	102	108	106	103	86	91	82	90
	77.5	76	71	68	68	69	76	69	77	73
	80.0	54	50	48	47	49	53	58	54	52
	82.5	28	34	36	35	34	29	31	28	31
	85.0	17	15	15	15	15	17	16	18	17
	87.5	6	6	6	6	7	8	9	8	8
	90.0	3	4	5	5	6	5	5	5	6
	92.5	5	4	4	5	5	6	6	7	6
	95.0	5	6	5	5	6	6	7	7	7
	97.5	6	7	7	7	7	6	7	6	7
	100.0	7	7	7	7	7	8	7	9	8
	102.5	8	8	8	8	8	9	10	10	9
	105.0	8	10	11	11	10	9	9	9	10
	107.5	11	10	10	10	10	11	10	12	12
	110.0	12	11	11	11	11	12	14	13	12
	112.5	11	14	15	14	14	12	12	12	13
	115.0	15	13	13	13	14	15	14	16	15
	117.5	16	15	14	14	15	16	18	17	16
	120.0	15	18	18	18	18	15	16	15	16
	122.5	19	17	16	16	17	19	17	19	18
	125.0	19	18	17	18	18	19	21	20	19
	127.5	18	20	22	22	21	18	18	17	19
	130.0	22	19	19	19	19	22	19	22	21
	132.5	22	20	20	20	21	22	24	23	22



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Lateral Angles

	100.0	105.0	110.0	115.0	120.0	125.0	130.0	135.0	140.0	145.0
135.0	20	23	24	24	24	20	21	19	21	25
137.5	24	22	21	21	21	24	21	24	23	21
140.0	24	22	22	22	22	24	26	24	23	22
142.5	21	25	26	26	25	21	22	20	23	26
145.0	25	23	22	22	22	25	23	26	25	22
147.5	25	23	23	23	23	25	27	26	25	23
150.0	21	25	27	27	26	22	23	21	23	27
152.5	25	23	22	22	23	26	23	26	25	23
155.0	25	23	23	23	23	25	27	25	24	23
157.5	21	25	26	26	25	21	22	20	23	26
160.0	24	22	21	21	21	24	22	24	23	21
162.5	22	21	21	20	21	22	24	23	22	21
165.0	18	21	23	23	22	18	19	17	19	22
167.5	20	18	17	17	18	20	18	20	19	17
170.0	18	17	17	16	17	18	19	18	17	17
172.5	14	17	18	17	17	14	15	14	15	17
175.0	15	13	13	13	13	14	13	15	14	12
177.5	12	12	11	11	12	12	13	12	12	11
180.0	12	12	12	12	12	12	12	12	12	12

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Lateral Angles

	150.0	155.0	160.0	165.0	170.0	175.0	180.0
V e r t i c a l	0.0	479	479	479	479	479	479
	2.5	528	467	488	515	553	480
	5.0	422	447	488	529	464	522
	7.5	515	549	489	424	445	425
	10.0	519	459	481	509	545	510
	12.5	414	439	478	517	454	512
	15.0	503	535	477	412	435	414
	17.5	503	444	466	492	528	495
	20.0	398	424	460	496	437	491
	22.5	482	512	456	394	416	396
	25.0	477	421	442	469	501	471
	27.5	376	401	434	467	410	462
	30.0	452	479	427	369	391	371
	32.5	443	390	411	436	466	438
	35.0	346	370	400	430	377	426
	37.5	414	438	390	337	358	337
	40.0	400	352	371	395	420	398
	42.5	310	332	358	384	336	380
	45.0	366	387	345	298	315	299
	47.5	349	307	324	346	367	348
A n g l e s	50.0	267	286	308	330	288	326
	52.5	312	328	292	252	268	254
	55.0	290	254	269	287	304	288
	57.5	217	233	250	267	233	266
	60.0	247	259	230	199	211	199
	62.5	223	195	206	221	233	223
	65.0	161	173	185	197	172	195
	67.5	175	184	163	141	150	143
	70.0	150	131	139	148	156	150
	72.5	102	109	116	124	107	124
	75.0	102	106	94	81	86	82
	77.5	77	67	71	76	79	77
	80.0	44	47	50	53	45	53
	82.5	35	35	31	27	28	27
	85.0	18	16	17	18	18	18
	87.5	8	8	8	9	7	9
	90.0	7	7	6	5	6	5
	92.5	7	6	7	7	7	7
	95.0	6	7	7	7	6	7
	97.5	8	9	8	7	7	7
	100.0	9	8	9	9	10	9
	102.5	8	9	9	10	9	10
	105.0	11	12	10	9	10	9
	107.5	12	11	11	12	13	12
	110.0	11	12	12	13	12	13
	112.5	15	15	14	12	13	12
	115.0	15	14	15	16	17	16
	117.5	13	15	16	16	15	16
	120.0	18	19	17	14	16	15
	122.5	19	16	18	19	20	19
	125.0	16	18	19	20	17	20
	127.5	21	22	20	17	19	17
	130.0	21	19	20	22	24	22
	132.5	18	20	21	22	20	22



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Lateral Angles

	150.0	155.0	160.0	165.0	170.0	175.0	180.0	
V e r t i c a l	135.0	24	25	22	19	21	19	23
	137.5	23	21	22	24	25	25	22
	140.0	19	22	23	24	21	24	23
	142.5	25	26	24	20	23	21	25
	145.0	25	22	24	26	28	27	24
	147.5	21	23	24	25	23	26	25
	150.0	26	28	25	21	24	22	26
	152.5	26	23	24	27	28	28	25
	155.0	21	23	24	25	23	25	24
	157.5	26	27	24	21	23	21	25
	160.0	24	21	22	25	26	25	22
	162.5	19	20	21	22	19	22	21
	165.0	22	23	20	17	19	17	21
	167.5	19	17	18	20	20	20	18
	170.0	15	16	17	17	15	17	17
	172.5	17	17	16	13	15	13	16
	175.0	14	13	13	15	15	14	13
	177.5	10	12	12	13	11	12	12
	180.0	12	12	12	12	12	12	12
A n g l e s								