NVLAP LAB CODE 200707-0

IES LM-79-08

MEASUREMENT AND TEST REPORT

For

P.Q.L., Inc.

2285 Ward Avenue / Simi Valley, CA 93065

Test Model: 90968

Report Type:	Electrical and Photometric tests including: Luminous Flux, Color, Luminous Intensity Distribution
Test Engineer:	Daniel Duan
Report Number:	R2XM140901053-10A1
Test Date:	2014-09-15 to 2014-09-17
Report Date:	2014-09-26
Reviewed By:	Jeanne Han/Safety Manager
Prepared By:	Bay Area Compliance Laboratories Corp. (Shenzhen) 6/F, the 3rd Phase of WanLi Industrial Building, ShiHua Road, FuTian Free Trade Zone Shenzhen, Guangdong, China Tel: +86-755-33320018 Fax: +86-755-33320008
Test Facility:	Test facility was located at Pu Long Cun 69, Puxinghu Industrial Area, Tangxia Town, Dongguan, Guangdong, P.R.China.
Accreditation:	The NVLAP Lab Code is 200707-0.

1. Product Description

General Information:

Two samples were received on 2014-09-01. One was tested in integrating sphere and the other was tested in goniophotometer.

Model Tested:	90968
Manufacturer:	P.Q.L., Inc.
Brand Name:	Superior Life®
Product Designation:	Integral LED Lamp
Burning Time Before Test:	0 hour(For New Products)

Rated Values:

Rated Voltage/Frequency:	120V AC 60Hz
Rated Power:	6W
Nominal CCT:	3000K
Nominal Lumen Output:	500 lm

2. Standards Used

IESNA LM-79-08: Approved Method: Electrical & Photometric Measurement of Solid-state Lighting Products
ANSI C82.77-2002: Harmonic Emission Limits – Related Power Quality Requirements for Lighting

3. Description of Test Equipment

Device	Manufacture	Model No	Serial No	Test Range	Calibration date	Calibration due date
Integrating Sphere	SENSING	N/A	N/A	1.5meter	2014-03-16	2015-03-16
Power Meter	SENSING	UI2008	908735	10.0-600.0V	2014-03-12	2015-03-12
Spectral photometer	SENSING	SPR3000	s0902024	350nm～800nm	2014-03-16	2015-03-16
AC Power Supply	ALL Power	APW-105N	970663	0V-300V 50-400Hz	2014-03-12	2015-03-12
Standard Light Source	EVERFINE	D204	201311	N/A	2013-09-26	2014-09-26
Thermal Meter	SENSING	N/A	N/A	20~30	2014-03-13	2015-03-13
DC Power Supply	ITECH	IT6154	0061 0417 6471 0010 19	0~32V	2014-03-12	2015-03-12
AC Power Supply	EVERFINE	VPS1060 PWM	1101006	0-150V, 0-300V	2014-03-12	2015-03-12
DC Power Supply	EVERFINE	WY12010	1009009	30V/5A	2014-03-12	2015-03-12
Power Meter	YOKOGAWA	WT-210	91KB35700	15/30/60/150/300/600 V	2014-03-12	2015-03-12
Goniophotometer	EVERFINE	GO-R5000	YG108492N10120001	1600mm,3000W/10A	2014-03-04	2015-03-04
Thermal Meter	Victor	VC230	EE091	0~40 0~90%	2013-04-01	2016-03-31
Standard Light Source	EVERFINE	D908	1012001	N/A	2014-05-06	2015-05-06

Statement of Traceability: Bay Area Compliance Laboratories Corp. (Shenzhen) attested that all calibration has been performed using suitable standards traceable to National Primary Standards and International System of Units (SI).

4. Test Method

Product was tested with no seasoning. All stabilization and measurements were made in compliance with IES LM-79-08. The product was operated at rated voltage or at voltage required by manufacturer. The ambient temperature of the sample was maintained at 25°C±1°C during measurement. And relative humidity is less than 65%.

Integrating Sphere System

The system includes AC power source, digital power meter, DC power supply, spectrophotometer, and integrating sphere. The integrating sphere system is calibrated by standard light source before measurement.

4π geometry was used during measurement. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the light output (luminous flux) measurements is U=1.60% (K=2), at the 95% confidence level. The uncertainty of the correlated color temperature measurements is U=21K (K=2), at the 95% confidence level. The uncertainty of the CRI is U=1.3(K=2) , at the 95% confidence level.

Goniophotometer System

The goniophotometer system is calibrated by standard light source before measurement.

Type C goniophotometer was used for measuring total luminous flux, luminous intensity distribution, and color spatial uniformity. The product was operated in its intended orientation in application and was recorded in this report.

The uncertainty of the luminous intensity is U=2.82% (K=2) , at the 95% confidence level.

5. Test Result

[Integrating Sphere System]

Total operating time for integrating sphere test: **1.0 hour**

Test orientation: **Base up**

Electrical Measurement

Voltage (V)	Frequency (Hz)	Current (A)	Power (W)	Power Factor
120.00	60.0	0.058	6.0	0.863

Photometric Measurement

Luminous Flux (lm)	Radiant Flux (W)	Efficacy (lm/W)	CCT (K)	Duv
553.465	1.655	92.244	3127	-3.87E-03

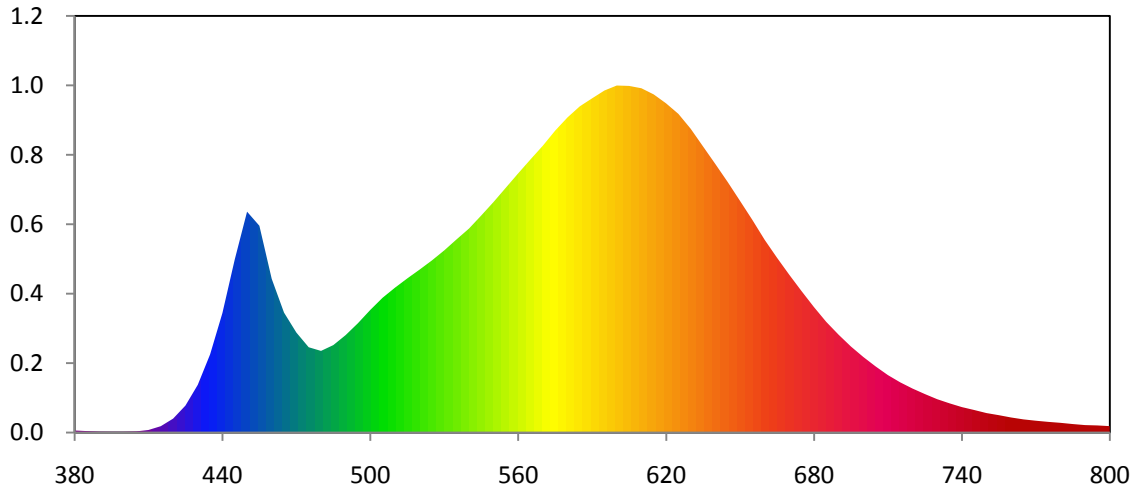
Chromaticity Coordinate

x	y	u	v	u'	v'
0.4231	0.3896	0.2478	0.3423	0.2478	0.5135

Color Rendering Index

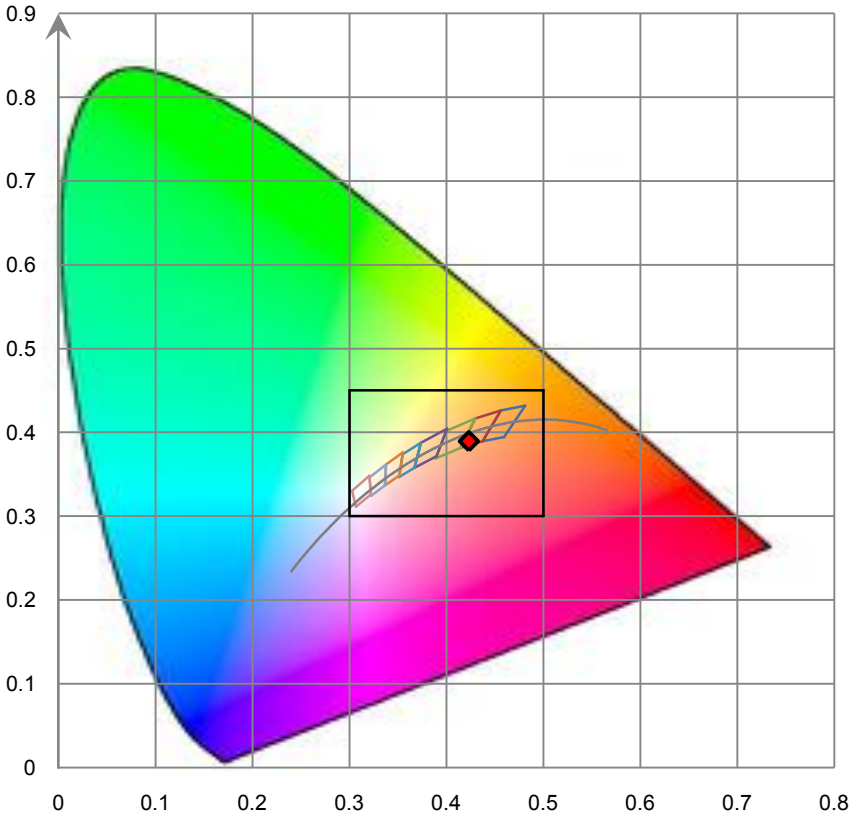
Ra			
84.3			
R1	R2	R3	R4
83	92	96	81
R5	R6	R7	R8
83	89	84	65
R9	R10	R11	R12
22	81	80	75
R13	R14	R15	
86	98	78	

Relative Spectral Power Distribution

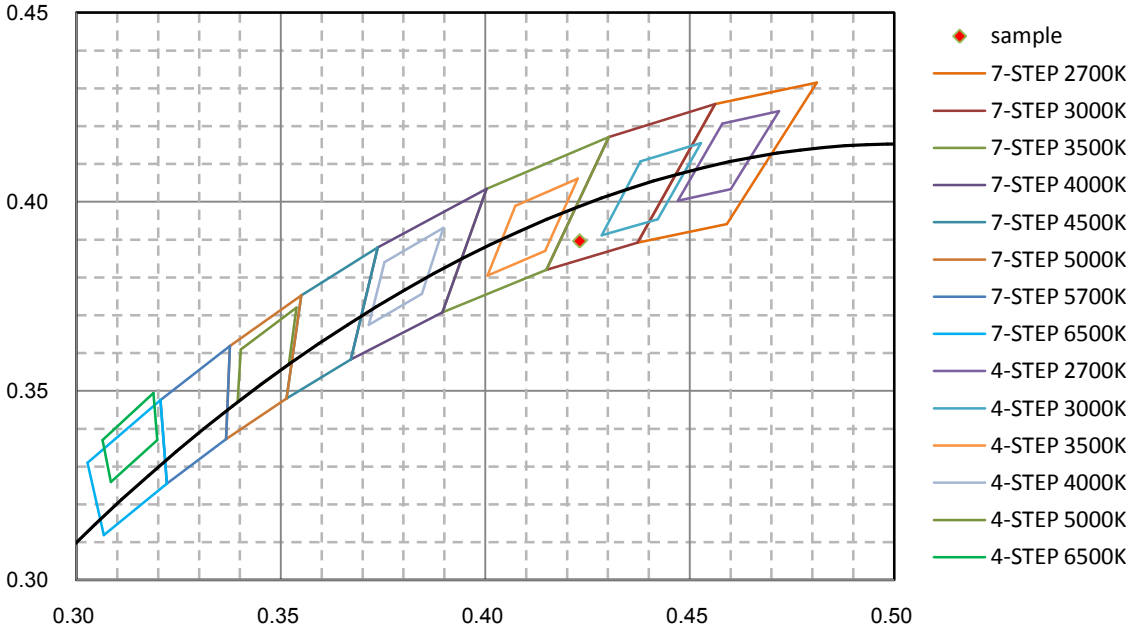


nm	mW	nm	mW	nm	mW	nm	mW	nm	mW
380	2.977E-04	465	1.708E-02	550	3.283E-02	635	4.074E-02	720	6.268E-03
385	2.096E-04	470	1.424E-02	555	3.487E-02	640	3.823E-02	725	5.483E-03
390	1.351E-04	475	1.215E-02	560	3.691E-02	645	3.568E-02	730	4.753E-03
395	1.150E-04	480	1.163E-02	565	3.889E-02	650	3.299E-02	735	4.162E-03
400	1.174E-04	485	1.246E-02	570	4.084E-02	655	3.028E-02	740	3.629E-03
405	1.660E-04	490	1.388E-02	575	4.298E-02	660	2.745E-02	745	3.212E-03
410	3.683E-04	495	1.558E-02	580	4.487E-02	665	2.490E-02	750	2.778E-03
415	9.097E-04	500	1.746E-02	585	4.645E-02	670	2.247E-02	755	2.478E-03
420	1.989E-03	505	1.920E-02	590	4.759E-02	675	2.013E-02	760	2.146E-03
425	3.846E-03	510	2.063E-02	595	4.870E-02	680	1.787E-02	765	1.878E-03
430	6.796E-03	515	2.195E-02	600	4.941E-02	685	1.576E-02	770	1.686E-03
435	1.113E-02	520	2.320E-02	605	4.936E-02	690	1.393E-02	775	1.526E-03
440	1.703E-02	525	2.451E-02	610	4.902E-02	695	1.226E-02	780	1.387E-03
445	2.464E-02	530	2.594E-02	615	4.815E-02	700	1.077E-02	785	1.211E-03
450	3.145E-02	535	2.751E-02	620	4.687E-02	705	9.421E-03	790	1.064E-03
455	2.945E-02	540	2.903E-02	625	4.537E-02	710	8.186E-03	795	1.017E-03
460	2.189E-02	545	3.090E-02	630	4.325E-02	715	7.151E-03	800	9.179E-04

CIE 1931 x y Chromaticity Diagram



7-Step & 4-Step Chromaticity Quadrangles



[Goniophotometer System]

Total operating time for luminous intensity distribution: **2.0 hours**

Test orientation: **Base up**

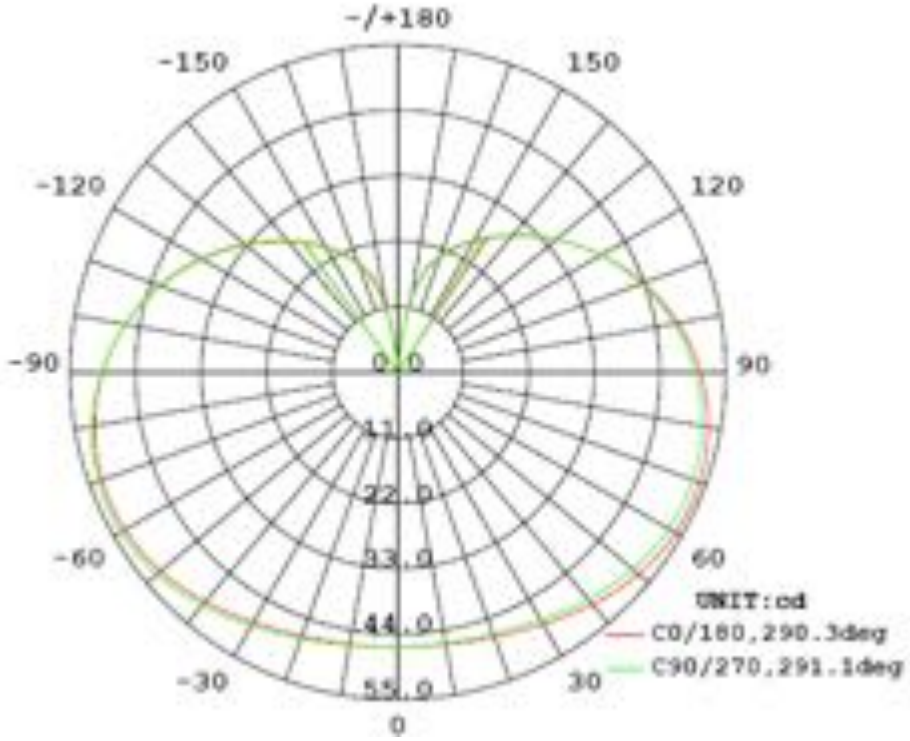
Electrical Measurement

Input Voltage (V)	Frequency (Hz)	Input Current (A)	Power (W)	Power Factor
120.0	60.0	0.0618	6.390	0.8616

Photometric Measurement

Luminous Flux (lm)	Efficacy (lm/W)	CBCP (cd)	S/MH (C0/180)	S/MH (C90/270)
552.686	86.49	46	1.65	1.67

Luminous Intensity Distribution



	C0/180	C45/225	C90/270	C135/315	AVG.
Beam Angle (50% Imax):	290.3	292.3	291.1	291.5	291.30
Field Angle (10% Imax):	345.3	345.2	345.2	344.7	345.10

Luminous Intensity (cd) Distribution Data

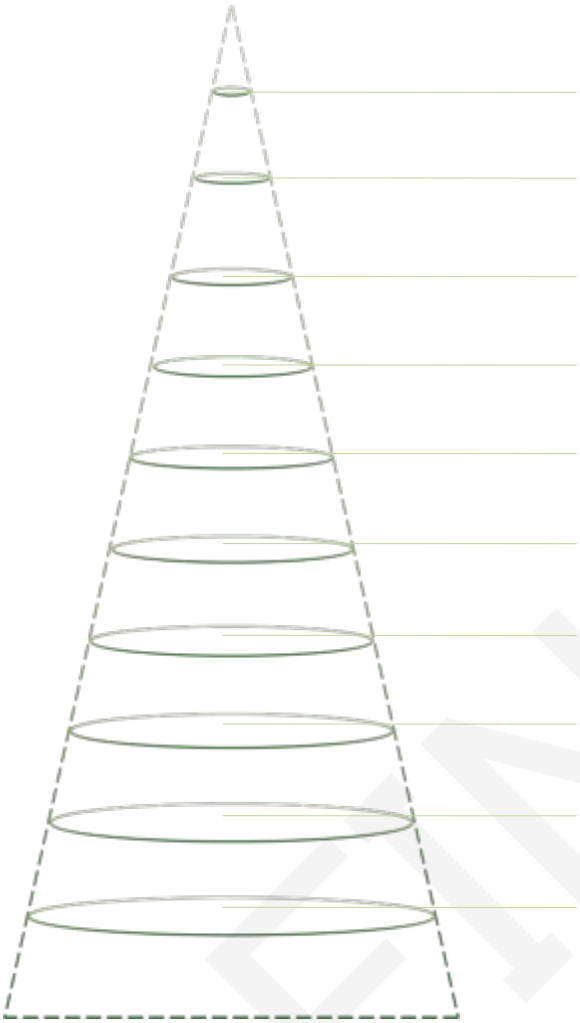
C / γ	0°	22.5°	45°	67.5°	90°	112.5°	135°	157.5°
0.0°	46	46	46	46	46	46	46	46
5.0°	46	46	46	46	46	46	46	46
10.0°	46	46	46	47	47	47	47	46
15.0°	47	47	47	47	47	47	47	47
20.0°	47	47	47	47	48	48	48	47
25.0°	48	48	48	48	48	48	48	48
30.0°	48	49	49	49	49	49	49	49
35.0°	49	50	50	50	50	50	50	50
40.0°	50	50	51	51	51	51	51	51
45.0°	51	51	51	52	52	52	52	52
50.0°	52	52	52	53	53	53	53	53
55.0°	53	52	53	53	53	53	53	54
60.0°	53	52	53	54	54	53	54	54
65.0°	53	52	53	54	54	53	54	54
70.0°	53	52	52	53	53	53	53	54
75.0°	52	52	52	53	53	52	53	54
80.0°	52	51	51	52	52	52	52	53
85.0°	51	50	50	51	51	51	51	52
90.0°	50	49	49	50	50	49	50	51
95.0°	48	47	47	48	48	48	49	50
100.0°	46	45	46	46	46	46	47	48
105.0°	45	44	44	44	44	44	45	46
110.0°	43	42	42	42	42	42	43	44
115.0°	40	40	40	40	40	40	41	42
120.0°	38	37	37	38	38	38	39	39
125.0°	36	35	35	35	36	36	36	37
130.0°	34	33	33	33	33	33	34	35
135.0°	31	31	31	31	31	31	32	32
140.0°	29	28	28	28	28	29	29	30
145.0°	27	26	26	26	26	27	27	27
150.0°	24	24	24	24	24	24	25	25
155.0°	22	22	22	21	22	22	23	23
160.0°	20	20	19	19	19	20	20	20
165.0°	17	16	16	16	15	17	17	17
170.0°	11	10	10	10	9	9	10	11
175.0°	0	0	0	0	0	0	0	1
180.0°	0	0	0	0	0	0	0	0

Luminous Intensity (cd) Distribution Data (cont.)

C / γ	180°	202.5°	225°	247.5°	270°	292.5°	315°	337.5°
0.0°	46	46	46	46	46	46	46	46
5.0°	46	46	46	46	46	46	46	46
10.0°	46	46	46	46	46	46	46	46
15.0°	47	47	47	46	46	46	46	47
20.0°	47	47	47	47	47	47	47	47
25.0°	48	48	48	47	47	47	47	48
30.0°	49	49	48	48	48	48	48	48
35.0°	50	49	49	49	49	49	49	49
40.0°	51	50	50	50	50	50	50	50
45.0°	52	51	51	51	51	51	51	51
50.0°	53	52	52	52	51	51	52	52
55.0°	53	53	52	52	52	52	52	53
60.0°	54	53	53	53	53	52	52	53
65.0°	54	53	53	53	53	52	53	53
70.0°	54	53	53	53	53	52	52	53
75.0°	54	53	53	53	52	52	52	53
80.0°	53	52	52	52	52	51	51	52
85.0°	52	51	51	52	51	50	51	51
90.0°	51	50	50	50	50	49	49	50
95.0°	49	49	49	49	49	48	48	49
100.0°	48	47	47	48	47	46	46	47
105.0°	46	45	46	46	45	45	45	45
110.0°	44	43	44	44	44	43	43	43
115.0°	42	41	42	42	42	41	41	41
120.0°	39	39	39	40	39	39	39	39
125.0°	37	37	37	37	37	37	36	36
130.0°	35	35	35	35	35	34	34	34
135.0°	32	32	33	33	32	32	32	31
140.0°	30	30	30	30	30	30	29	29
145.0°	28	28	28	28	28	28	27	27
150.0°	25	26	26	26	26	26	25	25
155.0°	23	23	23	23	23	23	23	23
160.0°	21	21	21	21	21	21	21	20
165.0°	17	18	18	18	18	18	18	17
170.0°	12	12	12	12	12	12	11	11
175.0°	0	0	1	1	1	1	0	0
180.0°	0	0	0	0	0	0	0	0

Average Area Illumination Figure

Angle: 90.00°. Flux out: 89.82 lm.



Height (m)	Diameter (cm)	E_{avg}(lx)	E_{max}(lx)
0.5	100.0	114.4	186.2
1.0	200.0	28.6	46.6
1.5	300.0	12.7	20.7
2.0	400.0	7.1	11.6
2.5	500.0	4.6	7.5
3.0	600.0	3.2	5.2
3.5	700.0	2.3	3.8
4.0	800.0	1.8	2.9
4.5	900.0	1.4	2.3
5.0	1000.0	1.1	1.9

Zonal Lumen Density Measurement

Deg	Flux (lm)	%
0-5	1.1	0.20
5-10	3.3	0.60
10-15	5.5	1.00
15-20	7.7	1.40
20-25	10.0	1.80
25-30	12.2	2.21
30-35	14.4	2.61
35-40	16.7	3.02
40-45	18.9	3.41
45-50	20.9	3.79
50-55	22.8	4.13
55-60	24.5	4.43
60-65	25.8	4.67
65-70	26.9	4.87
70-75	27.6	5.00
75-80	28.0	5.06
80-85	28.0	5.05
85-90	27.6	5.00
90-95	26.9	4.86
95-100	25.8	4.67
100-105	24.5	4.44
105-110	23.0	4.16
110-115	21.2	3.83
115-120	19.3	3.50
120-125	17.3	3.13
125-130	15.3	2.77
130-135	13.3	2.40
135-140	11.3	2.04
140-145	9.4	1.71
145-150	7.7	1.38
150-155	6.0	1.10
155-160	4.5	0.81
160-165	3.1	0.56
165-170	1.7	0.31
170-175	0.4	0.08
175-180	0.0	0.00

Deg	Flux (lm)	%
0-5	1.1	0.20
0-10	4.4	0.80
0-15	9.9	1.80
0-20	17.7	3.20
0-25	27.6	5.00
0-30	39.8	7.21
0-35	54.3	9.82
0-40	71.0	12.84
0-45	89.8	16.25
0-50	110.8	20.04
0-55	133.6	24.17
0-60	158.0	28.60
0-65	183.9	33.27
0-70	210.8	38.14
0-75	238.4	43.14
0-80	266.4	48.20
0-85	294.3	53.25
0-90	321.9	58.25
0-95	348.8	63.11
0-100	374.6	67.78
0-105	399.2	72.22
0-110	422.1	76.38
0-115	443.3	80.21
0-120	462.6	83.71
0-125	480.0	86.84
0-130	495.3	89.61
0-135	508.5	92.01
0-140	519.8	94.05
0-145	529.2	95.76
0-150	536.9	97.14
0-155	542.9	98.24
0-160	547.4	99.05
0-165	550.5	99.61
0-170	552.2	99.92
0-175	552.7	100.00
0-180	552.7	100.00

6. Product Photo

**********END OF REPORT**********