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**Test report of
IES LM-79-08**

**Approved Method: Electrical and Photometric Measurements of
Solid-State Lighting Products**

Rendered to:

LIGHT EFFICIENT DESIGN, DIV OF TADD LLC

188 S. Northwest Highway Cary, IL 60013.

For products:

LED Lamp

Models No.:

LED-8029E42, LED-8029E42C

Test Date: Oct. 15, 2015 to Oct. 16, 2015

Test Lab.: LCTECH (Zhongshan) Testing Service Co., Ltd

2/F., Technology and Enterprise Development Center, Guangyuan Road, Xiaolan,
Zhongshan, Guangdong, China

Test Note: *Model LED-8029E42 and LED-8029E42C are the same except for model number.*

Complied by:

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Nov. 3, 2015

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1. General

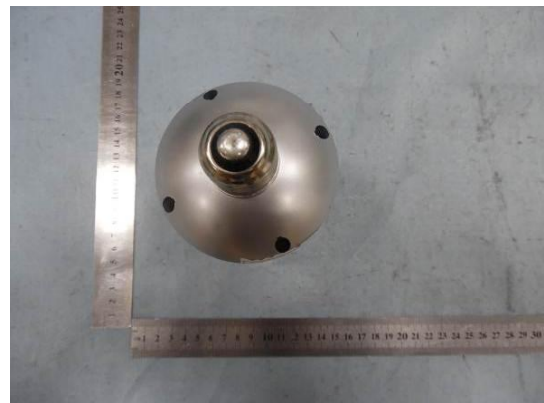
1.1 Product Information

Brand Name	Light Efficient Design
Trade Mark	-
Luminaire Type	LED Lamps
Model Number	LED-8029E42,LED-8029E42C
Rated Inputs	120-277VAC 50-60Hz
Rated Power	24 W
Rated Light output	2500 lm
Declared CCT	4000 K
Power Supply	Integral LED driver
LED Package, Array or Module	Not provided
Receipt Samples	1 unit
Date of Receipt Samples	Oct. 13, 2015

Photo



Picture 1



Picture 2

1.2 Standards or methods

The following standards are partly or totally used or referenced for test:

No.	Name
ANSI/NEMA/ ANSLG C78.377-2011	Specifications for the Chromaticity of Solid State Lighting Products
ANSI C82.77-2002	Harmonic Emission Limits—Related Power Quality Requirements for Lighting Equipment
CIE Pub. No. 13.3-1995	Method of Measuring and Specifying Color Rendering of Light Sources
CIE Pub. No. 15:2004	Colorimetry
IES LM-79-08	Electrical and Photometric Measurements of Solid-State Lighting Products

1.3 Equipment list

Instrument	ID	Model name	Cal. date	Next cal. Date
AC Power supply	LC-I-923	CHP-500	2015-02-05	2016-02-04
AC Power supply	LC-I-987	APW-110N	2015-02-05	2016-02-04
Power analyzer	LC-I-928	WT210	2015-02-09	2016-02-08
Power analyzer	LC-I-954	WT210	2015-03-04	2016-03-03
Multimeter	LC-I-972	Fluke 17B	2015-08-17	2016-08-16
Photometric colorimetric electric system (2 meter sphere)	LC-I-900	SPR3000	Before use	Before use
Standard lamp	LC-I-917	24V100W	2015-10-09	2016-10-08
Luminous Flux Standard Lamp	LC-I-946	110V/200W	2015-10-09	2016-10-08
Goniophotometer(with mirror)	LC-I-902	GMS2000	2012-05-10	2016-05-09
Wireless temperature transmitter	LC-I-978	DWRF-B	2015-02-11	2016-02-10
Wireless temperature transmitter	LC-I-979	DWRF-B	2015-02-11	2016-02-10

2. Test conducted and method

2.1 Ambient Condition

The ambient temperature in which measurements are being taken was maintained at $25\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$; the air flow around the sample(s) being tested did not affect the performance.

2.2 Power Supply Characteristics

The AC power supply had a sinusoidal voltage wave shape at the prescribed frequency (60 Hz) such that the RMS summation of the harmonic components does not exceed 3 percent of the fundamental during operation of the test item.

The voltage of AC power supply (RMS voltage) applied to the device under test was regulated to within ± 0.2 percent under load.

2.3 Seasoning and Stabilization

No seasoning was performed in accordance with IESNA LM-79-08. And before the measurement, the sample was stabilized until the light output and power variations were less than 0.5% in 30 minutes intervals (3 readings, 15 minutes apart).

2.4 Electrical Instrumentation

The calibration uncertainties of the instruments for AC voltage and current were less than 0.2 percent, and the calibration uncertainty of the AC power meter was less than 0.5 percent (95 % confidence interval, $k=2$).

2.5 Color Measurement Method

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the color characteristics (Color rendering index, correlated color temperature, chromaticity coordinate) were calculated from these by software automatically.

2.6 Total Luminous Flux Measurement Method

Total luminous flux was measured by sphere-spectroradiometer system and type C goniophotometer system.

Light intensity distribution was measured by a type C goniophotometer (with mirror) which can keep the sample in burn position when the tests conduct, and the total luminous flux was calculated from the intensity data by software automatically.

Spectral radiant flux was measured by a sphere (2 meter)-spectroradiometer system, and the total luminous flux was calculated from these by software automatically.

2.7 Luminous Intensity Distribution Measurement Method

Luminous intensity distribution was measured by a mirror-type goniophotometer (Type C) which can keep the sample in burn position when the tests conduct, and the kinds of graph were generated by software automatically.

2.8 Spatial Non-uniformity of Chromaticity

The customer did not require this measurement.

3. Test Result Summary

3.1 Electrical data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Input Voltage & Frequency	277.00V~60Hz	276.98V~60Hz
Input Current(A)	0.093	0.094
Total Power(W)	24.48	24.46
Power Factor	0.950	0.940
I-THD	16.36%	-

3.2 Photometric data

Criteria Item	Result(Sphere)	Result(Goniophotometer)
Total Lumens(lm)	2502.00	2505.74
Luminaire Efficacy(lm/W)	102.20	102.44
Correlated Color Temperature (CCT)(K)	3996	-
Color Rendering Index (CRI)	84.4	-
R9	18	-
Chromaticity Coordinate (x,y)	x = 0.3805 y = 0.3764	-
Chromaticity Coordinate (u,v)	u = 0.2253 v = 0.3343	-
Chromaticity Coordinate (u',v')	u' = 0.2253 v' = 0.5014	-
Duv	-0.000183	-
Beam Angle	-	C0 plan: 295.90°
Filed Angle	-	C0 plan: N/A°

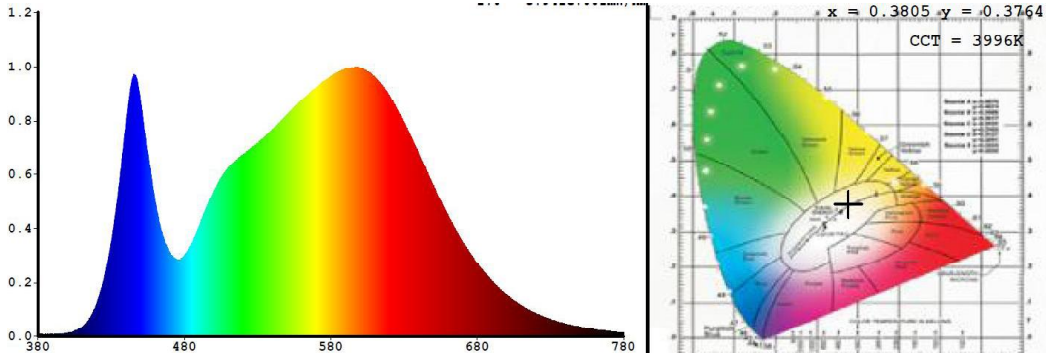
3.3 Color Rendering Details

R1	R2	R3	R4	R5	R6	R7	R8
83	89	94	85	83	85	87	68
R9	R10	R11	R12	R13	R14	R15	-
18	74	84	71	84	97	77	-

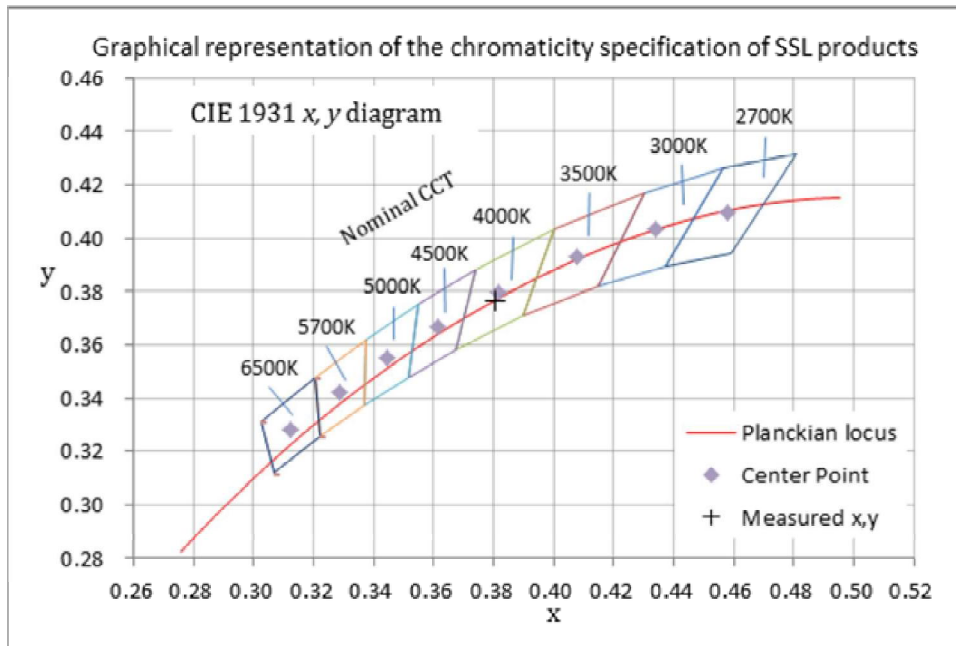
Note: N.A.

4. Test Data

4.1 Spectral Distribution



4.2 ANSI Chromaticity Quadrangles Diagram





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4.3 Goniometry Test Data

CIE Type	General Diffuse	Basic Luminous Shape	Circular w/Sides
Spacing Criteria (0-180)	N/A	Luminous Length	0.06(Diameter)
Spacing Criteria (90-270)	N/A	Luminous Width	0.06(Diameter)
Spacing Criteria (Diagonal)	N/A	Luminous Height	0.08m
Test Distance	30.04 m		

4.4 Zonal Lumen Summary

Zone	Lumens	%Lamp	%Fixt
0-20	69.57	2.80	2.80
0-30	166.39	6.60	6.60
0-40	306.40	12.20	12.20
0-60	718.13	28.70	28.70
0-80	1240.2	49.50	49.50
0-90	1497.59	59.80	59.80
10-90	1481.74	59.10	59.10
20-40	236.83	9.50	9.50
20-50	420.33	16.80	16.80
40-70	671.78	26.80	26.80
60-80	522.07	20.80	20.80
70-80	262.03	10.50	10.50
80-90	257.39	10.30	10.30
90-110	485.18	19.40	19.40
90-120	682.90	27.30	27.30
90-130	824.49	32.90	32.90
90-150	979.54	39.10	39.10
90-180	1008.14	40.20	40.20
110-180	522.97	20.90	20.90
0-180	2505.74	100.00	100.00

Total Luminaire Efficiency = 100.00%

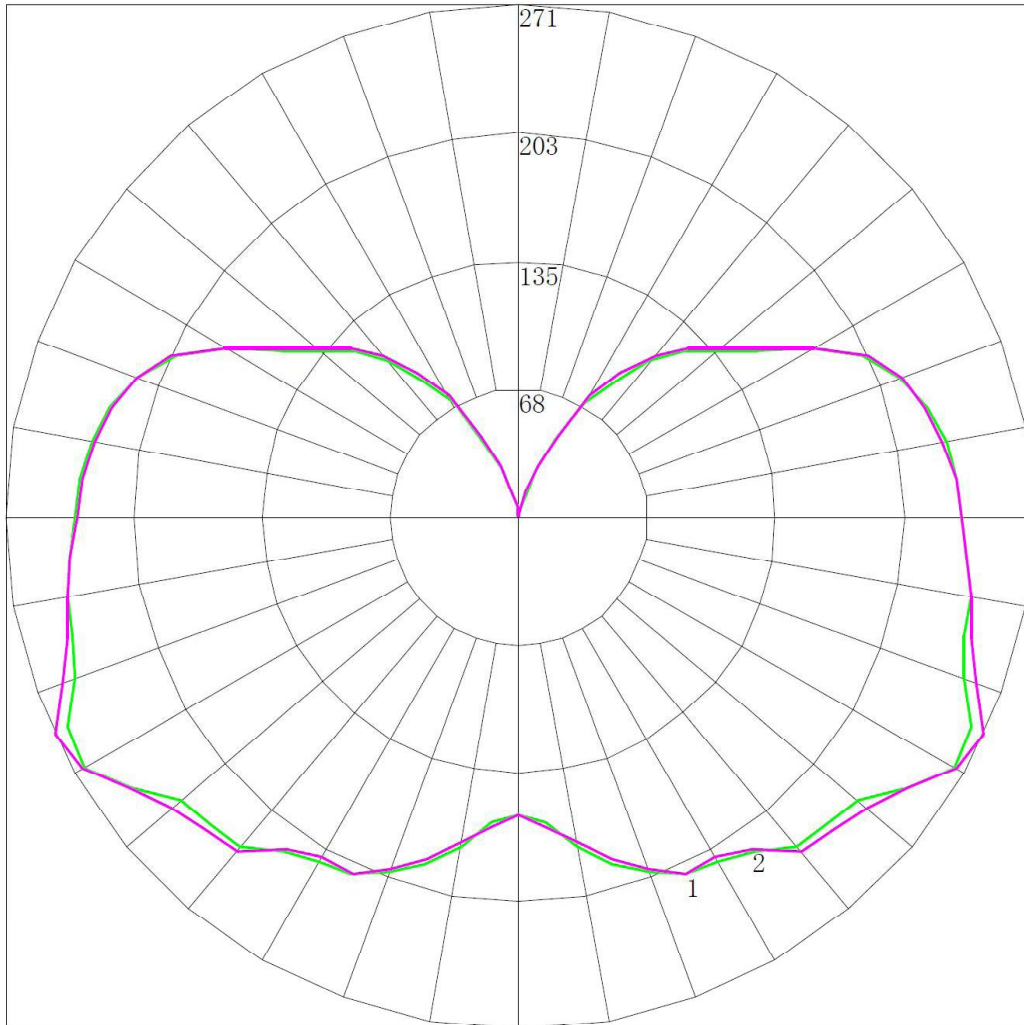
ZONAL LUMEN SUMMARY

Zone	Lumens
0-10	15.86
10-20	53.71
20-30	96.83
30-40	140.01
40-50	183.49
50-60	228.24
60-70	260.04
70-80	262.03
80-90	257.39
90-100	250.98
100-110	234.20
110-120	197.72
120-130	141.59
130-140	96.91
140-150	58.14
150-160	23.66
160-170	4.71
170-180	0.24



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4.5 Polar Curves



Maximum Candela = 270.607 Located At Horizontal Angle = 90, Vertical Angle = 65

1 - Vertical Plane Through Horizontal Angles (0 - 180)

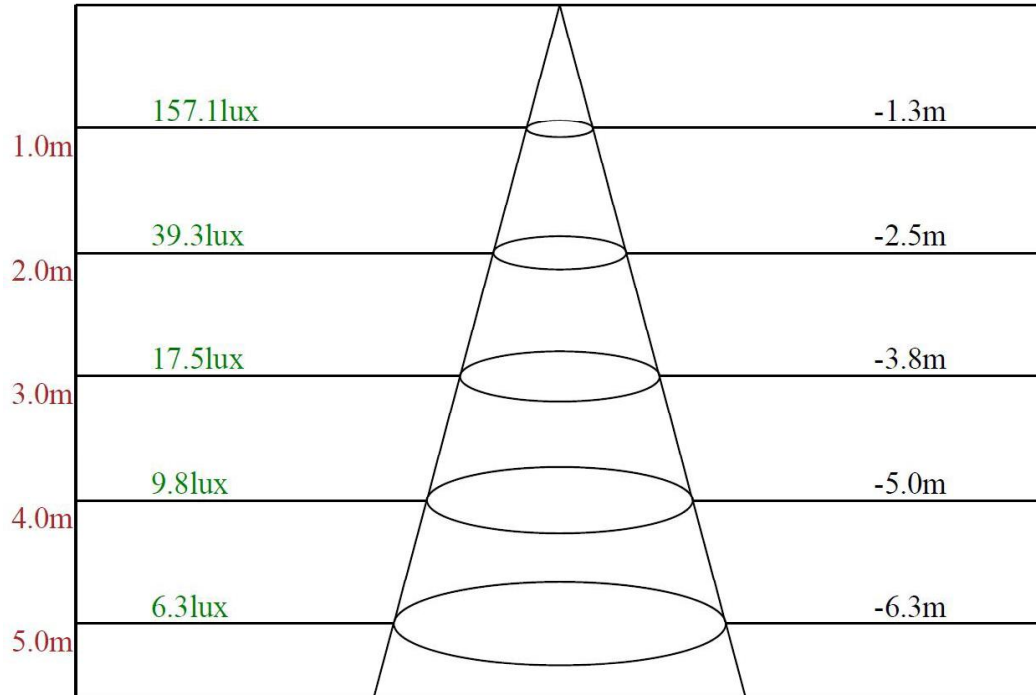
2 - Vertical Plane Through Horizontal Angles (90 - 270)



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4.6 Lux Distance curve



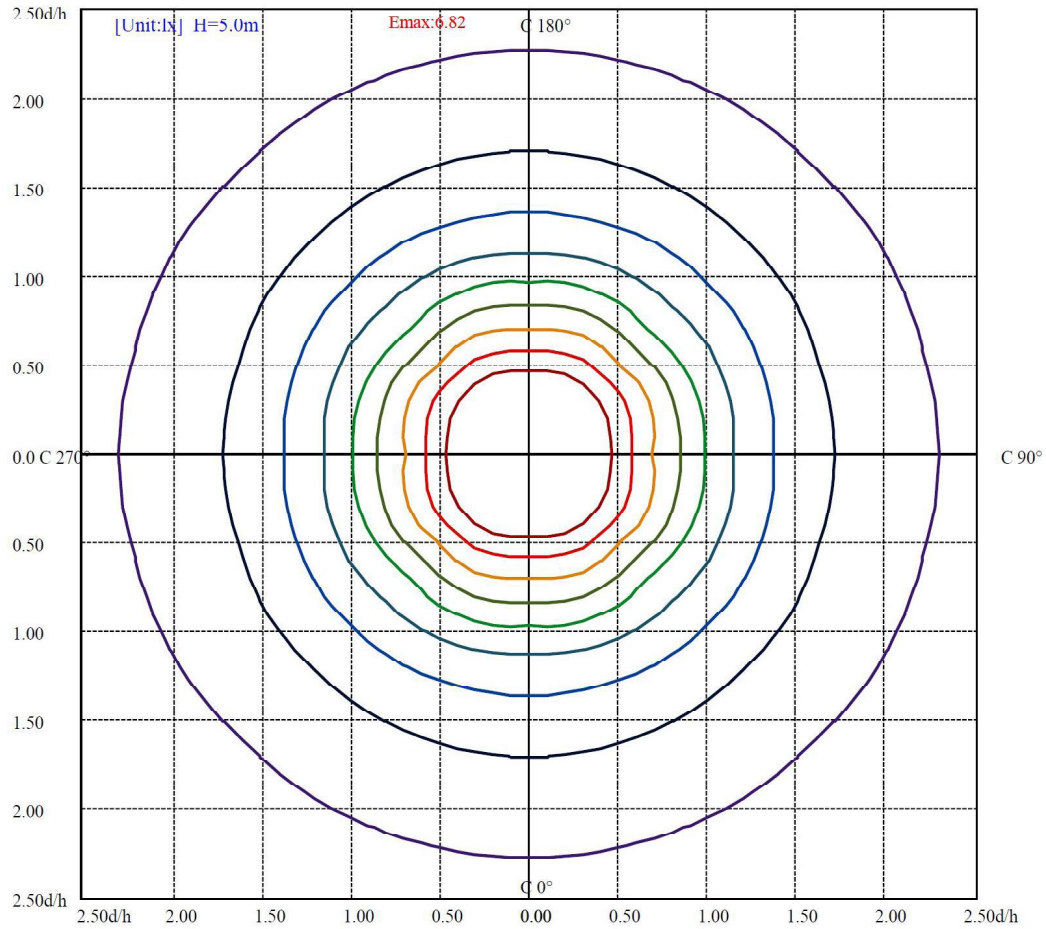
Beam angle of C0plane295.90



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4.7 ISO illuminance diagram



(10%Emax) 0.682456	—
(20%Emax) 1.364912	—
(30%Emax) 2.047364	—
(40%Emax) 2.72982	—
(50%Emax) 3.412276	—
(60%Emax) 4.09472	—
(70%Emax) 4.7772	—
(80%Emax) 5.45964	—
(90%Emax) 6.14208	—



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4.8 Candela Tabulation



	<u>0</u>	<u>15</u>	<u>30</u>	<u>45</u>	<u>60</u>	<u>75</u>	<u>90</u>
0	157.138	157.138	157.138	157.138	157.138	157.138	157.138
5	161.591	162.687	162.226	162.486	162.249	160.879	164.118
10	177.511	176.201	175.389	173.807	172.608	171.688	174.312
15	190.644	189.379	190.404	188.901	189.645	187.995	187.445
20	199.638	200.933	201.968	201.784	202.860	198.565	198.512
25	208.813	210.221	213.238	210.880	211.097	207.222	208.155
30	210.252	213.129	217.289	215.854	218.638	211.476	207.972
35	216.863	221.573	225.253	219.450	227.558	222.041	214.584
40	228.332	233.146	233.384	226.968	236.024	234.089	231.437
45	229.861	237.210	237.272	228.192	238.201	239.164	234.743
50	233.459	239.353	244.507	246.532	251.259	246.819	239.886
55	249.784	247.396	254.736	257.127	259.793	256.120	250.769
60	264.805	263.172	264.388	264.911	267.114	260.684	266.382
65	263.276	260.904	267.318	261.079	270.560	263.158	270.607
70	249.784	254.725	249.569	253.256	254.597	257.669	256.555
75	243.263	246.784	244.272	246.405	250.042	252.852	247.187
80	242.319	240.284	240.138	239.298	243.262	245.856	242.274
85	237.281	233.564	233.234	229.689	237.259	239.008	237.269
90	233.639	230.462	230.730	226.647	233.898	235.431	233.503
95	231.975	229.170	229.574	225.186	233.312	234.237	231.437
100	229.186	226.082	226.366	221.918	230.110	230.944	227.028
105	223.160	221.406	221.406	215.521	224.600	226.205	221.931
110	214.300	214.127	213.378	208.591	216.220	218.201	215.273
115	200.313	201.899	201.358	195.713	202.909	204.027	202.415
120	177.961	180.623	178.854	173.492	181.513	183.317	179.409
125	153.136	155.665	154.270	150.633	158.362	161.507	155.531
130	137.575	139.689	139.342	133.777	140.991	142.428	138.541
135	124.307	126.409	125.114	119.841	126.582	127.733	125.499
140	107.397	110.733	110.273	105.070	111.077	113.297	111.769
145	89.048	94.875	93.170	87.751	95.783	95.437	93.080
150	69.529	73.917	73.700	67.336	70.303	73.679	74.390
155	45.693	51.718	51.061	46.825	51.100	49.602	46.701
160	25.770	30.795	29.764	29.792	29.963	31.870	28.424
165	12.188	12.479	14.528	13.738	14.205	15.234	14.373
170	4.722	4.252	4.325	4.499	4.887	5.144	4.684
175	1.034	1.124	1.216	1.416	1.193	1.433	1.010
180	1.013	1.013	1.013	1.013	1.013	1.013	1.013

****End of test report****