





TEST REPORT IEC 62612 Self-ballasted LED lamps for general lighting services with supply voltages > 50 V – Performance requirements	
Report reference No..... : LCS190426028BS	
Tested by..... : Wade Liu (Project Engineer)	 
Check by..... : Ian Luo (Director)	
Approved by..... : Jesse Liu (Manager)	
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Contents..... : 18 pages	
Testing laboratory	
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Address : 101-201, No.39 Buliding, Xialang Industrial Zone, Heshuikou Community, Matian Street, Guangming District, Shenzhen, China	
Testing location : As above	
Client	
Name : DIMON Technology Limited	
Address..... : Suite 14, 11/F Cheung Hing Industrial Building, 23 Tai Yip Street, Kwun Tong, Kowloon, Hong Kong.	
Manufacturer	
Name : DIMON Technology Limited	
Address..... : Suite 14, 11/F Cheung Hing Industrial Building, 23 Tai Yip Street, Kwun Tong, Kowloon, Hong Kong.	
Test specification	
Standard..... : IEC 62612: 2013	
Test procedure : Compliance with IEC 62612: 2013	
Non-standard test method : N/A	
Test item Description : LED Tube Light	

TRF No. IEC 62612: 2013

Shenzhen Southern LCS Compliance Testing Laboratory LTD.

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Brand Name	DIMON TECHNOLOGY
Model and/or type reference	TUTA-18W
Rating(s).....	AC110-230V, 50/60Hz, 18W
Test item particulars:	
Lamp cap	N/A
Lamp identification.....	LED Tube Light
Commission received form	Same as applicant
Electrical safety class	--
IP number	N/A
Test case verdicts	
Test case does not apply to the test object :	N (N/A)
Test item does meet the requirement	P(Pass)
Test item does not meet the requirement ...:	F(Fail)
Testing	
Date of receipt of test item	August 09, 2019
Date(s) of performance of test	August 09, 2019 – April 15, 2020
General remarks	
<p>This report shall not be reproduced except in full without the written approval of the testing laboratory.</p> <p>The test results presented in this report relate only to the item tested.</p> <p>"(see remark #)" refers to a remark appended to the report.</p> <p>"(see Annex #)" refers to an annex appended to the report.</p> <p>Throughout this report a comma is used as the decimal separator.</p>	
Remarks	
<p>1. The laboratory ambient for testing: 22.0-28.0°C, 60%-73%R.H.</p> <p>2. The report includes: Attachment 1(S) of LUMINOUS INTENSITY DISTRIBUTION DIAGRAM.</p> <p>3. The report includes: Attachment 2(S) of product photos.</p>	
Label of testing	
Rubbing for 15 s with a piece of cloth soaked with water. And a further 15 s with a piece of cloth soaked with petroleum.	



IEC 62612			
Cl.	Requirement - Test	Result	Verdict

4	GENERAL REQUIREMENTS ON TESTS		P
	The LED lamps for which compliance with this standard is claimed shall comply with the requirements of the relevant safety standard IEC 62560		P
	Self-ballasted LED lamps, which comply with this standard will start and operate satisfactorily at voltages between 92 % and 106 % of rated supply voltage and at an ambient air temperature between -20 °C and 40 °C and in a luminaire complying with IEC 60598-1		P
	Individual LED lamps apply to 95 % of the production population		P
	EMC requirements reference is made to regional requirements		P

5	MARKING		P																																																
5.1	<p>Marking data as requested by Table 1:</p> <p>Table 1 – Required markings</p> <table> <tr> <th></th><th>Product</th><th>Packaging</th><th>Product datasheets, leaflets or website</th></tr> <tr> <td>a) Rated luminous flux (lm), centre beam intensity and beam angle (see Note 1)</td><td>X</td><td>X</td><td>X</td></tr> <tr> <td>b) Lamp photometric code (see Annex B)</td><td>–</td><td>X</td><td>X</td></tr> <tr> <td>c) Rated life (h) and the related lumen maintenance (x)</td><td>–</td><td>X</td><td>X</td></tr> <tr> <td>d) Failure fraction (F_y), corresponding to the rated life</td><td>–</td><td>X</td><td>X</td></tr> <tr> <td>e) Lumen maintenance code (see Table 5)</td><td>–</td><td>–</td><td>X</td></tr> <tr> <td>f) Rated colour (for example: F 2700 to F 6500, see Table 3) including initial and maintained colour variation category (see Table 4)</td><td>–</td><td>X</td><td>X</td></tr> <tr> <td>g) Rated colour rendering index</td><td>–</td><td>X</td><td>X</td></tr> <tr> <td>h) Ageing time (h), if different to 0 h</td><td>–</td><td>–</td><td>X</td></tr> <tr> <td>i) Rated efficacy (lm/W) (see Note 2)</td><td>–</td><td>–</td><td>X</td></tr> <tr> <td>j) Dimensions, including dimensional tolerances</td><td>–</td><td>–</td><td>X</td></tr> <tr> <td>k) Displacement factor (see Note 3 and Annex D)</td><td>–</td><td>–</td><td>X</td></tr> </table> <p>These requirements are minimal. Additional regional regulatory marking requirements may exist and overrule.</p> <p>NOTE 1 For directional lamps, centre beam intensity and beam angle are measured according to IEC/TR 61341.</p> <p>NOTE 2 Efficacy of directional lamps can be classified with a luminous flux defined in a 120° (± sr) cone or 90° (0,6 π sr) cone, see A.3.2.</p> <p>NOTE 3 In Japan, the power factor instead of the displacement factor is relevant.</p> <p>Key X = required – = not required</p>		Product	Packaging	Product datasheets, leaflets or website	a) Rated luminous flux (lm), centre beam intensity and beam angle (see Note 1)	X	X	X	b) Lamp photometric code (see Annex B)	–	X	X	c) Rated life (h) and the related lumen maintenance (x)	–	X	X	d) Failure fraction (F_y), corresponding to the rated life	–	X	X	e) Lumen maintenance code (see Table 5)	–	–	X	f) Rated colour (for example: F 2700 to F 6500, see Table 3) including initial and maintained colour variation category (see Table 4)	–	X	X	g) Rated colour rendering index	–	X	X	h) Ageing time (h), if different to 0 h	–	–	X	i) Rated efficacy (lm/W) (see Note 2)	–	–	X	j) Dimensions, including dimensional tolerances	–	–	X	k) Displacement factor (see Note 3 and Annex D)	–	–	X		P
	Product	Packaging	Product datasheets, leaflets or website																																																
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	a) Rated luminous flux (lm), centre beam intensity and beam angle (see Note 1)	2340 lm	P																																																
	b) Lamp photometric code (see Annex B)		P																																																
	c) Rated life (h) and the related lumen maintenance (x)	75000h	P																																																
	d) Failure fraction (F_y), corresponding to the rated life		P																																																
	f) Rated colour (for example: F 2700 to F 6500, see Table 3) including initial and maintained colour variation category (see Table 4)	4000K	P																																																
	g) Rated colour rendering index	80	P																																																
	h) Ageing time (h), if different to 0 h		P																																																



IEC 62612			
Cl.	Requirement - Test	Result	Verdict
	i) Rated efficacy (lm/W) (see Note 2)	130lm/W	P
	j) Dimensions, including dimensional tolerances		P
	k) Displacement factor (see Note 3 and Annex D)		P
6	DIMENSIONS		P
	The LED lamp dimensions shall comply with the requirements as indicated by the manufacturer or responsible vendor, If an outline as per IEC 60630 is claimed, then the maximum outlines shall not be exceeded		N
	If the luminaire itself or any covering (if applicable) does not interfere with the dimensions of LED lamps, such lamps are also suitable as replacement.		P
7	TEST CONDITIONS		P
7.2.1	General test conditions		P
	Testing duration is 25 % of rated life time up to a maximum of 6 000 h		P
	LED lamps within the same family (see 3.13) may be subjected to decreased testing duration		P
	All tests are conducted on n LED lamps of the same type		P
	LED lamps with dimming control shall be adjusted to maximum light output for all tests		P
	LED lamps with adjustable colour point shall be adjusted/set to one fixed value as indicated by the manufacturer or responsible vendor		P
7.2	Creation of lamp families to reduce test effort		N
7.2.1	General		N
7.2.2	Variations within a family		N



IEC 62612			
Cl.	Requirement - Test	Result	Verdict

	<p>Requirements for the identification of a family of LED lamps for type testing are given in definition 3.13 and used in Table 2:</p> <p>Table 2 – Variations allowed within a family</p> <table><tr><th>Part characteristics where variations are allowed (see Note 2)</th><th>Conditions for acceptance</th></tr><tr><td>Housing/chassis, heat sink/heat management</td><td>t_{LED} (location and value given by the LED lamp supplier) and other components remain at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor (see also Note 1).</td></tr><tr><td>Optics (see Note 1)</td><td>The test results showing the effect of optical material change shall be documented in the manufacturer's technical file.</td></tr><tr><td>LED package</td><td>t_{LED} remains at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor</td></tr><tr><td>Controlgear</td><td>t_{LED} remains at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor. A statistical failure rate calculation based on an MTBF (mean time between failures) calculation by the manufacturer shall show equal or lower failure rate of the electronic controlgear.</td></tr></table> <p>NOTE 1 Optics include for instance secondary optics (lenses), reflectors, trims and gaskets and their interconnections. The results relate to changes in luminous flux, peak luminous intensity, luminous intensity distribution, beam angle, shift in colour co-ordinates, shift in CCT (see 10.1) and shift in colour rendering index (CRI) (see 10.2).</p> <p>NOTE 2 Any change on part tolerances are documented in the manufacturer's technical file.</p> <p>NOTE 3 Examples are under consideration.</p>	Part characteristics where variations are allowed (see Note 2)	Conditions for acceptance	Housing/chassis, heat sink/heat management	t_{LED} (location and value given by the LED lamp supplier) and other components remain at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor (see also Note 1).	Optics (see Note 1)	The test results showing the effect of optical material change shall be documented in the manufacturer's technical file.	LED package	t_{LED} remains at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor	Controlgear	t_{LED} remains at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor. A statistical failure rate calculation based on an MTBF (mean time between failures) calculation by the manufacturer shall show equal or lower failure rate of the electronic controlgear.		N
Part characteristics where variations are allowed (see Note 2)	Conditions for acceptance												
Housing/chassis, heat sink/heat management	t_{LED} (location and value given by the LED lamp supplier) and other components remain at the same or at a lower value, if the rated life time is the same or higher than the baseline product, as indicated and specified by the manufacturer or responsible vendor (see also Note 1).												
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7.2.3	Compliance testing of family members		N										

8	LAMP INPUT		P
8.1	Lamp power		P
	The initial power consumed by each individual LED lamp in the measured sample shall not exceed the rated power by more than 10 %.		P
	The average of initial power consumed by the LED lamps in the measured sample shall not exceed the rated power by more than 7,5 %.		P
8.2	Displacement factor		P
	The displacement factor of self-ballasted LED lamps shall be measured according to Annex C. LED lamps with dimming control shall be adjusted to maximum light output		P
	The measured displacement factor for each individual lamp of the sample shall not be less than the marked value by more than 0,05		P

9	LIGHT OUTPUT		P
9.1	Luminous flux		P
	The initial luminous flux of each individual LED lamp in the measured sample shall not be less than the rated luminous flux by more than 10 %.		P



IEC 62612			
Cl.	Requirement - Test	Result	Verdict
	The average initial luminous flux of the LED lamps in the measured sample shall not be less than the rated luminous flux by more than 7,5 %		P
9.2	Luminous intensity distribution, peak intensity and beam angle		P
9.2.1	General		P
9.2.2	Measurement		P
	The intensity of light emitted from the LED lamp in different directions is measured using a goniophotometer. All photometric data shall be declared for the LED lamp operating at a temperature given in Clause A.1		P
	The allowed photometric variations, detailed in the following subclauses, are to take into account the manufacturing tolerances		P
9.2.3	Luminous intensity distribution		P
9.2.4	Peak intensity value ²		P
	Where a peak intensity value is provided by the manufacturer or responsible vendor, the initial peak intensity of each individual LED lamp in the measured sample shall not be less than 75 % of the rated intensity		P
9.2.5	Beam angle value ³		P
	Where a beam angle value is provided by the manufacturer or responsible vendor, the initial beam angle value of each individual LED lamp in the measured sample shall not deviate by more than 25 % of the rated value.		P
9.3	Efficacy		P
	For all tested units in a sample, the LED lamp efficacy shall not be less than 80 % of the rated LED lamp efficacy as declared by the manufacturer or responsible vendor		P
10	COLOUR NOMENCLATURE, VARIATION AND RENDERING		P
10.1	Colour variation categories		P



IEC 62612																																					
Cl.	Requirement - Test	Result	Verdict																																		
	<p>For reference purposes, the standardised chromaticity co-ordinates and CCT (see CIE S 017/E:2011) values corresponding to these colours are given in Table 3 (Source: IEC 60081, Clause D.2, modified):</p> <p style="text-align: center;">Table 3 – Colour</p> <table><tr><th rowspan="2">Colour marking</th><th rowspan="2">CCT (Tc)</th><th colspan="2">Chromaticity coordinates</th></tr><tr><th>x</th><th>y</th></tr><tr><td>F 6500</td><td>6400</td><td>0,313</td><td>0,337</td></tr><tr><td>F 5000</td><td>5000</td><td>0,346</td><td>0,359</td></tr><tr><td>F 4000</td><td>4040</td><td>0,380</td><td>0,380</td></tr><tr><td>F 3500</td><td>3450</td><td>0,409</td><td>0,394</td></tr><tr><td>F 3000</td><td>2940</td><td>0,440</td><td>0,403</td></tr><tr><td>F 2700</td><td>2720</td><td>0,463</td><td>0,420</td></tr><tr><td>P 2700</td><td>2700</td><td>0,458</td><td>0,410</td></tr></table> <p>The letters in the colour marking designation stand for: F = Values from IEC 60081, Annex D P = Value close to the Planckian curve</p>	Colour marking	CCT (Tc)	Chromaticity coordinates		x	y	F 6500	6400	0,313	0,337	F 5000	5000	0,346	0,359	F 4000	4040	0,380	0,380	F 3500	3450	0,409	0,394	F 3000	2940	0,440	0,403	F 2700	2720	0,463	0,420	P 2700	2700	0,458	0,410		P
Colour marking	CCT (Tc)			Chromaticity coordinates																																	
		x	y																																		
F 6500	6400	0,313	0,337																																		
F 5000	5000	0,346	0,359																																		
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F 3000	2940	0,440	0,403																																		
F 2700	2720	0,463	0,420																																		
P 2700	2700	0,458	0,410																																		
	<p>The initial chromaticity co-ordinates are measured. A second measurement of maintained chromaticity co-ordinates is made at an operational time as stated in 7.1. The measured actual chromaticity co-ordinate values (both initial and maintained) shall fit within 1 of 4 categories (see Table 4), which correspond to a particular MacAdam ellipse around the rated chromaticity co-ordinate value, whereby the size of the ellipse (expressed in n steps) is a measure for the tolerance or deviation of an individual LED lamp</p> <p style="text-align: center;">Table 4 – Tolerance (categories) on rated chromaticity co-ordinate values</p> <table><tr><th rowspan="2">Size of MacAdam ellipse, centred on the rated colour target</th><th colspan="2">Colour variation category</th></tr><tr><th>initial</th><th>maintained</th></tr><tr><td>3-step</td><td>3</td><td>3</td></tr><tr><td>5-step</td><td>5</td><td>5</td></tr><tr><td>7-step</td><td>7</td><td>7</td></tr><tr><td>> 7-step ellipse</td><td>7+</td><td>7+</td></tr></table> <p><small>NOTE: The behaviour of the chromaticity co-ordinates is expressed by marking the two measurement results of both the initial chromaticity co-ordinates and the maintained chromaticity co-ordinates. An example is given in Annex B. This standard applies mainly to retrofit LED lamps for which it is important that the chromaticity corresponds as much as possible to the lamps to be replaced. Tolerance areas are based on the ellipses defined by MacAdam, published in the Journal of the Optical Society of America, 1943, as normally applied for (compact) fluorescent lamps and other discharge lamps.</small></p>	Size of MacAdam ellipse, centred on the rated colour target	Colour variation category		initial	maintained	3-step	3	3	5-step	5	5	7-step	7	7	> 7-step ellipse	7+	7+		P																	
Size of MacAdam ellipse, centred on the rated colour target	Colour variation category																																				
	initial	maintained																																			
3-step	3	3																																			
5-step	5	5																																			
7-step	7	7																																			
> 7-step ellipse	7+	7+																																			
	Compliance:		P																																		
10.2	Colour rendering index (CRI)		P																																		
	The initial colour rendering index (CRI) of an LED lamp is measured. A second measurement is made at an operational time as stated in 7.1.		P																																		
	- 3 points from the rated CRI value (see Table 1) for initial CRI values		P																																		



IEC 62612											
Cl.	Requirement - Test	Result	Verdict								
	- 5 points from the rated CRI value (see Table 1) for maintained CRI values		P								
11	LAMP LIFE		P								
11.1	General		P								
11.2	Lumen maintenance		P								
	The lumen maintenance figure may vary depending on the application of the LED lamp. This standard applies a minimum value of 70 %. Dedicated information on the chosen percentage should be provided by the manufacturer		P								
	<p>This standard has opted for lumen maintenance codes (see Figure 1) that cover the initial decrease in lumen output until an operational time as stated in 7.1. There are three codes of lumen maintenance compared to the initial lumen output (see Table 5)</p> <p>Table 5 – Lumen maintenance code at an operational time as stated in 7.1</p> <table><tr><th>Lumen maintenance (%)</th><th>Code</th></tr><tr><td>≥ 90</td><td>9</td></tr><tr><td>≥ 80</td><td>8</td></tr><tr><td>≥ 70</td><td>7</td></tr></table>	Lumen maintenance (%)	Code	≥ 90	9	≥ 80	8	≥ 70	7		P
Lumen maintenance (%)	Code										
≥ 90	9										
≥ 80	8										
≥ 70	7										
	An individual LED lamp is considered having passed the test when the following criteria have been met:		P								
	a) The measured luminous flux value at 25 % of rated life (with a maximum duration of 6 000 h) shall never be less than the luminous flux pertaining to the maximum lumen maintenance value related to the rated life as defined and provided by the manufacturer or responsible vendor		P								
	b) The calculated lumen maintenance shall correspond with the lumen maintenance code as defined and provided by the manufacturer or vendor		P								
11.3	Endurance tests		P								
11.3.1	General		P								
11.3.2	Temperature cycling test		P								



IEC 62612			
Cl.	Requirement - Test	Result	Verdict
	The LED lamp is placed in a test chamber in which the temperature is varied from – 10 °C to +40 °C over a 4 h period and for a test duration of 250 periods (1 000 h). A 4 h period consists of 1 h holding at each extreme temperature and 1 h transfer time (1 K/min) between the extreme temperatures. The LED lamp is switched on at test voltage for 34 min and off for 34 min.		P
	If a supplier claims suitability for operation at extended conditions (voltages or temperatures outside of normal conditions, including high humidity) then:		N
	a) lamps shall be tested under claimed extended conditions;		N
	b) lamps shall start and operate satisfactorily under claimed extended conditions		N
	c) lamps shall meet all performance claims for operation under claimed extended conditions, which may differ from the performance claims under the general conditions for measurement specified in Annex A		N
	At the end of the test all the LED lamps shall operate and have a luminous flux which stays within the claimed lumen maintenance code for a period of at least 15 min and show no physical effects of temperature cycling such as cracks or delaminating of the label.		N
11.3.3	Supply switching test		P
	At test voltage, the lamp shall be switched on and off for 30 s each. The cycling shall be repeated for a number equal to half the rated life in hours (example: 10 k cycles if rated life is 20 000 h.)		P
	At the end of the test all the LED lamps shall operate and have a luminous flux which stays within the claimed lumen maintenance code for a period of at least 15 min		P
11.3.4	Accelerated operational life test		P



IEC 62612			
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	The LED lamp shall be operated continuously without switching at a test voltage and at a temperature corresponding to 10 K (see last paragraph and the note) above the maximum specified operating temperature, if declared by the manufacturer and over an operational time of 1 000 h. If there is no declared value then the test shall be performed at 50 °C. Any thermal protecting devices that would switch off the LED lamp or reduce the light output shall be bypassed		P
	At the end of this test, and after cooling down to room temperature and being stabilised, all the lamps shall have an allowed decrease of light output of maximum 20 % compared to the initial value for at least 15 min.		P

12	VERIFICATION		P																																																																								
	<p>The minimum sampling size for type testing shall be as given in Table 6. The sample shall be representative of a manufacturer's production:</p> <p>Table 6 – Sample sizes</p> <table> <tr> <th>1</th><th>2</th><th>3</th><th>4</th></tr> <tr> <th>Clause or subclause</th><th>Test</th><th>Minimum number of units in a sample for an operational time as stated in 7.1</th><th>Minimum number of units in a sample for testing a family at reduced test duration after changing product feature according to 7.2</th></tr> <tr> <td>7.2^a</td><td>I_{dc} point</td><td></td><td></td></tr> <tr> <td>8</td><td>Dimensions</td><td></td><td></td></tr> <tr> <td>9.2.3</td><td>Luminous intensity distribution</td><td>Same 5 units for all tests</td><td>Same 5 units for all tests</td></tr> <tr> <td>9.2.4</td><td>Peak intensity value</td><td></td><td></td></tr> <tr> <td>9.2.5</td><td>Beam angle value</td><td></td><td></td></tr> <tr> <td>8.1</td><td>Lamp power</td><td></td><td></td></tr> <tr> <td>8.2</td><td>Displacement factor(See Note)</td><td></td><td></td></tr> <tr> <td>9.1</td><td>Luminous flux</td><td></td><td></td></tr> <tr> <td>9.3</td><td>Efficacy</td><td>Same 20 units for all tests</td><td>Same 5 units for all tests</td></tr> <tr> <td>10.1</td><td>Chromaticity tolerance</td><td></td><td></td></tr> <tr> <td>10.2</td><td>Correlated colour temperature</td><td></td><td></td></tr> <tr> <td>10.3</td><td>Colour rendering index</td><td></td><td></td></tr> <tr> <td>11.2</td><td>Lumen maintenance</td><td></td><td></td></tr> <tr> <td>11.3.2</td><td>Temperature cycling, energised</td><td>10</td><td>5</td></tr> <tr> <td>11.3.3</td><td>Supply voltage switching</td><td>10</td><td>5</td></tr> <tr> <td>11.3.4</td><td>Accelerated operational life test</td><td>10</td><td>5</td></tr> </table> <p>NOTE In Japan, the power factor instead of the displacement factor is relevant.</p> <p>^a Temperature measurement only for family compliance testing.</p>	1	2	3	4	Clause or subclause	Test	Minimum number of units in a sample for an operational time as stated in 7.1	Minimum number of units in a sample for testing a family at reduced test duration after changing product feature according to 7.2	7.2 ^a	I_{dc} point			8	Dimensions			9.2.3	Luminous intensity distribution	Same 5 units for all tests	Same 5 units for all tests	9.2.4	Peak intensity value			9.2.5	Beam angle value			8.1	Lamp power			8.2	Displacement factor(See Note)			9.1	Luminous flux			9.3	Efficacy	Same 20 units for all tests	Same 5 units for all tests	10.1	Chromaticity tolerance			10.2	Correlated colour temperature			10.3	Colour rendering index			11.2	Lumen maintenance			11.3.2	Temperature cycling, energised	10	5	11.3.3	Supply voltage switching	10	5	11.3.4	Accelerated operational life test	10	5		P
1	2	3	4																																																																								
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11.3.4	Accelerated operational life test	10	5																																																																								

Annex A	Method of measuring lamp characteristics		P
A.1	General		P
	Unless otherwise specified, all measurements shall be made in a draught-free room at a temperature of 25 °C with a tolerance of ± 1 °C, a relative humidity of 65 % maximum and steady state operation of the LED lamp		P



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Cl.	Requirement - Test	Result	Verdict																				
	a) Operate the lamp and record the luminous flux or luminous intensity and the lamp power as temperature/time depending variables		P																				
	b) During stabilisation period, measurements of luminous flux or luminous intensity and lamp power are made at least at 1 min intervals		P																				
	c) Subsequent measurements of other lamps of the same type within the sample need not repeat the full stabilisation time in the photometer		P																				
	d) The subsequent lamps are submitted to a stabilisation (operation of the light source prior to mounting into the photometer) on basis of the stabilisation time observed in step c)		P																				
A2	Test voltage		P																				
A.2.1	General		P																				
	The test voltage shall be stable within $\pm 0,5 \%$, during stabilization periods, this tolerance being $\pm 0,2 \%$ at the moment of measurements. For ageing and luminous flux maintenance testing the tolerance is 2% . The total harmonic content of the supply voltage shall not exceed 3% . The harmonic content is defined as the r.m.s. summation of the individual harmonic components using the fundamental as 100%		P																				
A.2.2	Relation of rated voltage to test voltage		P																				
A.2.2.1	Lamps with a single rated voltage or rated voltage range where the size of the voltage range is $\leq 20 \text{ V}$ Table A.1 – Relation of rated voltage to test voltage <table><tr><th>Rating</th><th>U_{test} (V)</th><th>f_{test} (Hz)</th></tr><tr><td>230 V 50 Hz</td><td>230</td><td>50</td></tr><tr><td>120 V 60 Hz</td><td>120</td><td>60</td></tr><tr><td>220-240 V 50 Hz</td><td>230</td><td>50</td></tr><tr><td>110-130 V 60 Hz</td><td>120</td><td>60</td></tr><tr><td rowspan="2">220-240 V 50-60 Hz</td><td>230</td><td>50</td></tr><tr><td>230</td><td>60</td></tr></table>	Rating	U_{test} (V)	f_{test} (Hz)	230 V 50 Hz	230	50	120 V 60 Hz	120	60	220-240 V 50 Hz	230	50	110-130 V 60 Hz	120	60	220-240 V 50-60 Hz	230	50	230	60		N
Rating	U_{test} (V)	f_{test} (Hz)																					
230 V 50 Hz	230	50																					
120 V 60 Hz	120	60																					
220-240 V 50 Hz	230	50																					
110-130 V 60 Hz	120	60																					
220-240 V 50-60 Hz	230	50																					
	230	60																					
A.2.2.2	Lamps with two rated voltages or rated voltage ranges where the size of the voltage range is $\leq 20 \text{ V}$		N																				

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Cl.	Requirement - Test	Result	Verdict																						
A.2.2.3	Lamps with a single rated voltage range where the size of the voltage range is ≥ 130 V and the lowest voltage is ≥ 100 V		N																						
A.2.2.4	Lamps with other rated voltage ranges		P																						
A.2.3	Tests		P																						
A.2.3.1	Initial tests		P																						
	<p>For the purpose of this standard, initial tests are defined as in Table A.2.</p> <p style="text-align: center;">Table A.2 – Initial tests</p> <table><tr><th>Clause or subclause</th><th>Test</th></tr><tr><td>8.1</td><td>Lamp power</td></tr><tr><td>8.2</td><td>Displacement factor</td></tr><tr><td>9.1</td><td>Luminous flux</td></tr><tr><td>9.2.3</td><td>Luminous intensity distribution</td></tr><tr><td>9.2.4</td><td>Peak intensity value</td></tr><tr><td>9.2.5</td><td>Beam angle value</td></tr><tr><td>9.3</td><td>Efficacy</td></tr><tr><td>10.1</td><td>Chromaticity tolerance (initial)</td></tr><tr><td>10.1</td><td>Correlated colour temperature (initial)</td></tr><tr><td>10.2</td><td>Colour rendering index (initial)</td></tr></table> <p>NOTE In Japan, the power factor instead of the displacement factor is relevant.</p>	Clause or subclause	Test	8.1	Lamp power	8.2	Displacement factor	9.1	Luminous flux	9.2.3	Luminous intensity distribution	9.2.4	Peak intensity value	9.2.5	Beam angle value	9.3	Efficacy	10.1	Chromaticity tolerance (initial)	10.1	Correlated colour temperature (initial)	10.2	Colour rendering index (initial)		P
Clause or subclause	Test																								
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9.1	Luminous flux																								
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9.2.4	Peak intensity value																								
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9.3	Efficacy																								
10.1	Chromaticity tolerance (initial)																								
10.1	Correlated colour temperature (initial)																								
10.2	Colour rendering index (initial)																								
A.2.3.2	Lifetime tests and endurance tests		P																						
	<p>For the purpose of this standard, lifetime and endurance tests are defined as in Table A.3.</p> <p style="text-align: center;">Table A.3 – Lifetime and endurance tests</p> <table><tr><th>Clause or subclause</th><th>Test</th></tr><tr><td>10.1</td><td>Chromaticity tolerance (maintained)</td></tr><tr><td>10.1</td><td>Correlated colour temperature (maintained)</td></tr><tr><td>10.2</td><td>Colour rendering index (maintained)</td></tr><tr><td>11.2</td><td>Lumen maintenance</td></tr><tr><td>11.3.2</td><td>Temp. cycling, energised</td></tr><tr><td>11.3.3</td><td>Supply voltage switching</td></tr><tr><td>11.3.4</td><td>Accelerated operation life test</td></tr></table>	Clause or subclause	Test	10.1	Chromaticity tolerance (maintained)	10.1	Correlated colour temperature (maintained)	10.2	Colour rendering index (maintained)	11.2	Lumen maintenance	11.3.2	Temp. cycling, energised	11.3.3	Supply voltage switching	11.3.4	Accelerated operation life test		P						
Clause or subclause	Test																								
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11.3.2	Temp. cycling, energised																								
11.3.3	Supply voltage switching																								
11.3.4	Accelerated operation life test																								
A.2.4	Requirements		P																						
A.2.4.1	Lamps with a single rated voltage or rated voltage range where the size of the voltage range is ≤ 20 V		N																						
A.2.4.2	Lamps with two rated voltages or rated voltage ranges where the size of the voltage range is ≤ 20 V		N																						
A.2.4.3	Lamps with a single rated voltage range where the size of the voltage range is ≥ 130 V and the lowest voltage is ≥ 100 V		N																						
A.2.4.4	Lamps with other rated voltage ranges		P																						
A.3	Electric and photometric characteristics		P																						
A.3.1	Test voltage		P																						

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Cl.	Requirement - Test	Result	Verdict										
A.3.2	Ageing		P										
A.3.3	Luminous flux		P										
A.3.4	Luminous intensity distribution		P										
A.3.5	Peak intensity		P										
A.3.6	Beam angle		P										
A.3.7	Colour rendering		P										
A.3.8	Chromaticity co-ordinate values		P										
ANNEX B	EXPLANATION OF THE PHOTOMETRIC CODE		P										
ANNEX C	MEASUREMENT OF DISPLACEMENT FACTOR		P										
ANNEX D	EXPLANATION OF DISPLACEMENT FACTOR		P										
D1	General		P										
D2	Recommended values for displacement factor Table D.1 – Recommended values for displacement factor <table><tr><td>Metric</td><td>P ≤ 2 W</td><td>2 W < P ≤ 5 W</td><td>5 W < P ≤ 25 W</td><td>P > 25 W</td></tr><tr><td>R_{displacement} (C_{us}, P)</td><td>No limit</td><td>≥ 0,4</td><td>≥ 0,7</td><td>≥ 0,9</td></tr></table> NOTE: The values are practical examples and give guidance.	Metric	P ≤ 2 W	2 W < P ≤ 5 W	5 W < P ≤ 25 W	P > 25 W	R _{displacement} (C _{us} , P)	No limit	≥ 0,4	≥ 0,7	≥ 0,9		P
Metric	P ≤ 2 W	2 W < P ≤ 5 W	5 W < P ≤ 25 W	P > 25 W									
R _{displacement} (C _{us} , P)	No limit	≥ 0,4	≥ 0,7	≥ 0,9									
ANNEX E	EXPLANATION OF RECOMMENDED LIFE TIME METRICS		P										
E1	General		P										
E2	Life time specification		P										
E3	Life time specification for gradual light output degradation		P										
E4	Life time specification for abrupt light output degradation		P										
E5	Combined gradual and abrupt light output degradation		P										
E6	Recommended life time metrics		P										
ANNEX F	EXAMPLES OF LED DIES AND LED PACKAGES		N										



IEC 62612			
Tables			

Lamp Wattage (W)		TABLE: Initial Test Results								
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
--	17.93	17.79	17.96	17.75	17.99	17.87	17.95	18.03	17.90	17.86
Test No	11	12	13	14	15	16	17	18	19	20
--	18.02	17.97	17.99	17.96	17.83	18.04	17.92	17.94	18.00	17.84
Average	17.93W									
Note	1、 The initial power consumed by each individual LED lamp in the measured sample shall not exceed the rated power by more than 10 %. 2、 The average of initial power consumed by the LED lamps in the measured sample shall not exceed the rated power by more than 7,5 %.									

Luminous Flux (lm)		TABLE: Initial Test Results								
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
--	2316.5 6	2296. 16	2321. 33	2289.4 0	2327.9 1	2305.7 7	2318.9 6	2332.3 6	2313.9 3	2305.7 3
Test No	11	12	13	14	15	16	17	18	19	20
--	2330.1 7	2324. 60	2324. 85	2322.2 3	2299.8 9	2332.7 5	2315.2 6	2319.8 2	2328.4 8	2301.7 2
Average	2316.39 lm									
Note	1、 The initial luminous flux of each individual LED lamp in the measured sample shall not be less than the rated luminous flux by more than 10 %. 2、 The average initial luminous flux of the LED lamps in the measured sample shall not be less than the rated luminous flux by more than 7,5 %.									

Peak intensity (cd)		TABLE: Initial Test Results			
Model:	TUTA-18W	Voltage (V):	230	Frequency(Hz):	50
Test No	1	2	3	4	5
--	343.7	344.4	344.6	344.1	343.8
Average	344.1 cd				
Note	Where a peak intensity value is provided by the manufacturer or responsible vendor, the initial peak intensity of each individual LED lamp in the measured sample shall not be less than 75 % of the rated intensity.				



IEC 62612			
Tables			

Beam angle (°)		TABLE: Initial Test Results			
Model:	TUTA-18W	Voltage (V):	230	Frequency(Hz):	50
Test No	1	2	3	4	5
--	127.6	123.8	126.1	130.4	118.1
Average	125.2°				
Note	Where a beam angle value is provided by the manufacturer or responsible vendor, the initial beam angle value of each individual LED lamp in the measured sample shall not deviate by more than 25 % of the rated value.				

Efficacy (lm/W)		TABLE: Initial Test Results								
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
--	129.20	129.07	129.25	128.98	129.40	129.03	129.19	129.3 ₆	129.2 ₇	129.1 ₀
Test No	11	12	13	14	15	16	17	18	19	20
--	129.31	129.36	129.23	129.30	128.99	129.31	129.20	129.3 ₁	129.3 ₆	129.0 ₂
Average	129.21 lm/W									
Note	For all tested units in a sample, the LED lamp efficacy shall not be less than 80 % of the rated LED lamp efficacy as declared by the manufacturer or responsible vendor.									

Correlated Color Temperature (K)、chromaticity、Colour Consistency							TABLE: Initial Test Results			
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
CCT	3935	3938	3923	3920	3922	3905	3896	3918	3928	3908
X	0.3862	0.386	0.3863	0.3861	0.3862	0.3863	0.386 ₄	0.386 ₅	0.3862	0.386 ₅
Y	0.3865	0.3869	0.3868	0.3867	0.3871	0.3867	0.386 ₆	0.386 ₄	0.3868	0.386 ₉
SDCM	2.9	2.8	3.0	2.7	3.1	2.9	2.8	3.0	2.8	3.1
Test No	11	12	13	14	15	16	17	18	19	20
CCT	3932	3928	3931	3926	3917	3922	3928	3931	3920	3918
X	0.3861	0.3862	0.3862	0.3863	0.3862	0.3861	0.386 ₂	0.386 ₁	0.3862	0.386 ₁
Y	0.3867	0.3868	0.3868	0.3867	0.3865	0.3866	0.386 ₅	0.386 ₈	0.3867	0.386 ₆
SDCM	3.0	2.9	3.2	3.0	2.8	2.7	2.9	3.0	3.2	2.9



IEC 62612			
Tables			

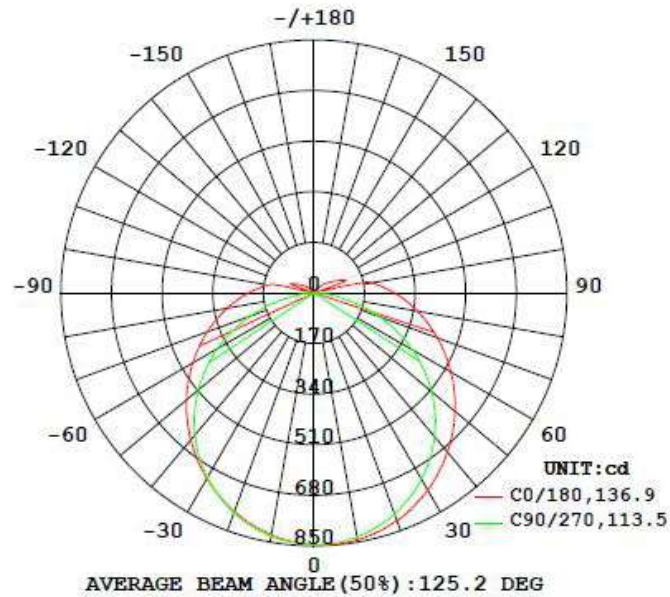
Colour rendering(Ra) for lamp										
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
The initial CRI	81.5	81.7	81.4	81.8	81.5	80.7	80.9	81.1	81.4	81.2
6000 hours of CRI	80.4	80.6	80.3	80.7	80.4	79.6	79.8	80	80.3	80.1
--	11	12	13	14	15	16	17	18	19	20
The initial CRI	83.5	80.7	81	81.2	81.4	80.9	80.7	81.6	80.7	81.1
6000 hours of CRI	83.5	79.6	79.9	80.1	80.3	79.8	79.6	80.5	79.6	80
Average	81.2									
6000 hours of Average CRI	80.1									
Note	For all tested units in a sample the measured CRI values shall not decrease by more than: - 3 points from the rated CRI value (see Table 1) for initial CRI values, and - 5 points from the rated CRI value (see Table 1) for maintained CRI values.									

Lumen maintenance (%)										
Model:	TUTA-18W		Voltage (V):		230		Frequency(Hz):		50	
Test No	1	2	3	4	5	6	7	8	9	10
Luminous Flux at 6 000 h	2184.51	2183.64	2208.05	2182.02	2219.19	2215.84	2198.37	2197.08	2191.29	2181.22
Lumen Maintenance	94.30%	95.10%	95.12%	95.31%	95.33%	96.10%	94.80%	94.20%	94.70%	94.60%
--	11	12	13	14	15	16	17	18	19	20
Luminous Flux at 6 000 h	2197.35	2194.42	2213.26	2208.44	2180.30	2220.78	2201.82	2208.93	2216.95	2191.92
Lumen Maintenance	94.30%	94.40%	95.20%	95.10%	94.80%	95.20%	95.10%	95.22%	95.21%	95.23%
Average Lumen Maintenance	94.97%									



IEC 62612

Tables

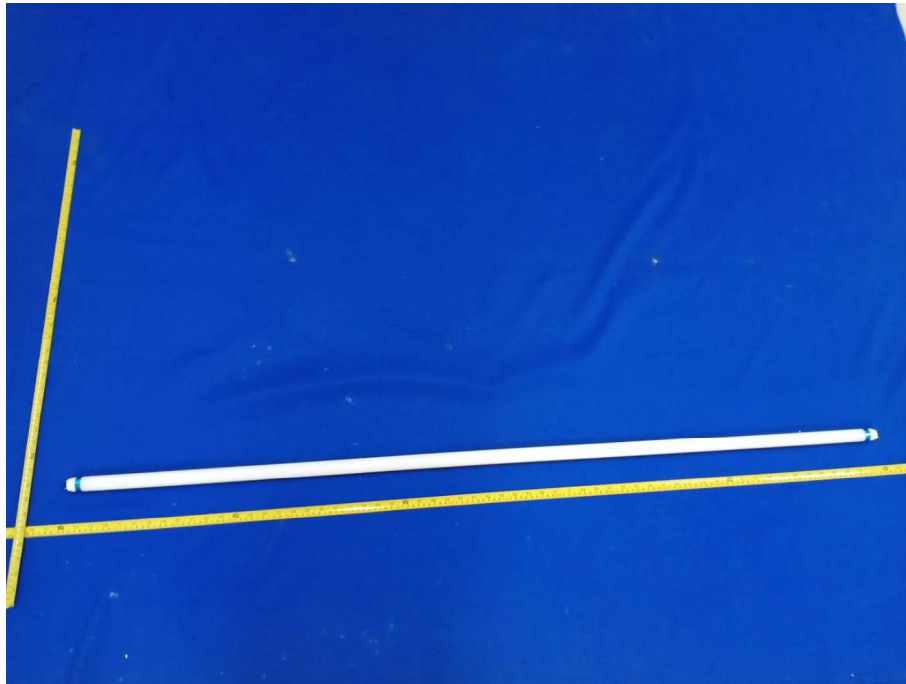
ATTACHMENT 1(S)**LUMINOUS INTENSITY DISTRIBUTION DIAGRAM for TUTA-18W**



IEC 62612			
Tables			

ATTACHMENT 1(S)

Photos of TUTA-18W



----- End of test report-----