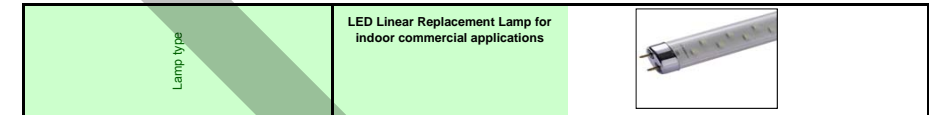


Solid State Lighting Annex 2010-2014

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4ft lamp Minimum light output (lm) and equivalent wattage	Minimum Light output	Minimum lamp luminous efficacy (lm/W)	Delivered efficacy	Color temperature target (K) and tolerance	Chromaticity tolerance (Du, V)	Color Maintenance (Δu, v at 6,000h)	Luminous intensity distribution 0-360°	CRI	Lag start time (sec)	Lumen Maintenance (Minimum time to L70)	Minimum Rated Lamp lifetime (B50)	Flicker (Flicker index)	Minimum power Factor	Harmonic distortion	Dimmer compatibility	Photobiological hazard class (UV & blue light)	Safety marking	Warranty Duration	RoHS Compliant	Recyclability (%)	Rapid Cycling Cycle on-off time TBD																				
Tier 0 This type of product is unusual for off-grid applications and the IEA 4E SSL Annex will not define performance criteria for this Tier.																																									
Tier 1 T8 Equivalent Wattage 15, 18, 25, 28, 30, 32, 36, 38, 58, 70	Minimum Initial Light output 945, 1350, 2000, 2200, 2400, 2700, 3000, 3348, 5220, 6230	>80 lm/watt	65 lm/W in situ spacing criteria: 0° - 1.24, 90° - 1.63 for #1 luminaire; 0° - 1.25, 90° - 1.63 for #2 luminaire All these requirements are according to DLC procedure. See http://www.designlights.org/solidstate.manufacturer.requirements.php	Follow ANSI C78.377, excluding flexible CCT		<0.007	Omnidirectional distribution with even luminous intensity distribution 360° around lamp	≥80	<0.5sec until continuous light output	At 30,000h, Lumen Maintenance >70% of initial	At 30,000h, 50% of population will be operative.	At full power flicker index ≤ 0.3	Self ballasted LED shall have a PF>0.50	20% THD EAC 7.3A/B FCC CFR47 Section 15 and 18. Dimmers are considered incidental radiators and they need to be tested as SSL products act as antennae for the dimmers' EMI/RFI.	Lamps may be dimmable or non-dimmable. Product packaging shall clearly indicate whether the lamp is dimmable or not dimmable. If a product is declared as dimmable, manufacturer shall also declare the conditions under which a lamp will operate as declared, and shall provide a web address for a website that lists dimmer makes and models with which the lamp is compatible. For each compatible dimmer, the manufacturer must also list the minimum and maximum number of lamps that can be satisfactorily dimmed with a given dimmer and the minimum relative luminous flux level a given dimmer-lamp combination can achieve.	Complies with IEC 62471-2	If lamp requires any modification of existing luminaire, then retrofit lamp is non-compliant/banned. Must meet regional requirements (ANSI/UL 1993 or CE Mark)	Minimum 3 year warranty unless regional requirement is higher. Warranty shall cover replacement of defective parts and catastrophic failure	Yes	Yes, following electronic component process	Product will survive rapid cycle for every hour of rated life.																				
				2700K (2725 ± 145)	0.000 ± 0.006																																				
				3000K (3045 ± 175)	0.000 ± 0.006																																				
				3500K (3465 ± 245)	0.000 ± 0.006																																				
				4000K (3985 ± 275)	0.001 ± 0.006																																				
				5000K (5028 ± 283)	0.002 ± 0.006																																				
				5700K (5665 ± 355)	0.002 ± 0.006																																				
				6500K (6530 ± 510)	0.003 ± 0.006																																				
				Tier 2 T8 Equivalent Wattage 15, 18, 25, 28, 30, 32, 36, 38, 58, 70																																					
				Tier 2 T8 Equivalent Wattage 15, 18, 25, 28, 30, 32, 36, 38, 58, 70	Minimum Initial Light output 945, 1350, 2000, 2200, 2400, 2700, 3000, 3348, 5220, 6230																	>96 lm/watt	75 lm/W in situ spacing criteria: 0° - 1.24, 90° - 1.50 for #1 luminaire; 0° - 1.25, 90° - 1.63 for #2 luminaire All these requirements are according to DLC procedure. See http://www.designlights.org/solidstate.manufacturer.requirements.php	Follow ANSI C78.377, excluding flexible CCT		<0.007	Omnidirectional distribution with even luminous intensity distribution 360° around lamp	≥80, R9> 0	<0.5sec until continuous light output	At 35,000h, Lumen Maintenance >70% of initial	At 35,000h, 50% of population will be operative.	At full power flicker index ≤ 0.3	Self ballasted LED shall have a PF>0.50	20% THD EAC 7.3A/B FCC CFR47 Section 15 and 18. Dimmers are considered incidental radiators and they need to be tested as SSL products act as antennae for the dimmers' EMI/RFI.	Lamps may be dimmable or non-dimmable. Product packaging shall clearly indicate whether the lamp is dimmable or not dimmable. If a product is declared as dimmable, manufacturer shall also declare the conditions under which a lamp will operate as declared, and shall provide a web address for a website that lists dimmer makes and models with which the lamp is compatible. For each compatible dimmer, the manufacturer must also list the minimum and maximum number of lamps that can be satisfactorily dimmed with a given dimmer and the minimum relative luminous flux level a given dimmer-lamp combination can achieve.	Complies with IEC 62471-2	If lamp requires any modification of existing luminaire, then retrofit lamp is non-compliant/banned. Must meet regional requirements (ANSI/UL 1993 or CE Mark)	Minimum 3 year warranty unless regional requirement is higher. Warranty shall cover replacement of defective parts and catastrophic failure	Yes	Yes, following electronic component process	Product will survive rapid cycle for every hour of rated life.
2700K (2725 ± 145)	0.000 ± 0.006																																								
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5700K (5665 ± 355)	0.002 ± 0.006																																								
6500K (6530 ± 510)	0.003 ± 0.006																																								
Tier 3 T5 Equivalent Wattage TBD																																									
Tier 3 T5 Equivalent Wattage TBD	Minimum Initial Light output TBD	>120lm/W	105 lm/W in situ spacing criteria: 0° - 1.24, 90° - 1.50 for #1 luminaire; 0° - 1.25, 90° - 1.63 for #2 luminaire All these requirements are according to DLC procedure. See http://www.designlights.org/solidstate.manufacturer.requirements.php			Follow ANSI C78.377-2011 Table 6A, for 4-step quadrangles excluding flexible CCT		<0.004	Omnidirectional distribution with even luminous intensity distribution 360° around lamp	≥80, R9> 0	<0.5sec until continuous light output	At 50,000h, Lumen Maintenance >70% of initial	At 50,000h, 50% of population will be operative.	At full power flicker index ≤ 0.3	Self ballasted LED shall have a PF>0.50	20% THD EAC 7.3A/B FCC CFR47 Section 15 and 18. Dimmers are considered incidental radiators and they need to be tested as SSL products act as antennae for the dimmers' EMI/RFI.	Lamps may be dimmable or non-dimmable. Product packaging shall clearly indicate whether the lamp is dimmable or not dimmable. If a product is declared as dimmable, manufacturer shall also declare the conditions under which a lamp will operate as declared, and shall provide a web address for a website that lists dimmer makes and models with which the lamp is compatible. For each compatible dimmer, the manufacturer must also list the minimum and maximum number of lamps that can be satisfactorily dimmed with a given dimmer and the minimum relative luminous flux level a given dimmer-lamp combination can achieve.	Complies with IEC 62471-2	If lamp requires any modification of existing luminaire, then retrofit lamp is non-compliant/banned. Must meet regional requirements (ANSI/UL 1993 or CE Mark)	Minimum 5 year warranty unless regional requirement is higher. Warranty shall cover replacement of defective parts and catastrophic failure	Yes			Yes, with recovery of materials (phosphors, base materials)	Product will survive rapid cycle for every hour of rated life.																
				2700K (2723 ± 82)	0.0006 ± 0.0033																																				
				3000K (2940 ± 98)	-0.0008 ± 0.0033																																				
				3500K (3397 ± 125)	-0.0002 ± 0.0033																																				
				4000K (4036 ± 154)	0.0016 ± 0.0033																																				
				5000K (4991 ± 220)	0.0033 ± 0.0033																																				
				5700K (5665 ± 270)	0.0024 ± 0.0033																																				
				6500K (6432 ± 340)	0.0071 ± 0.0033																																				

