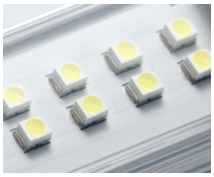
LEDRays inc.

NEXT GENERATION LIGHT

T8 Self Ballasted UL & CSA LED TUBE RETROFITS



Sept. 2011

T8 LED TUBE TECHNICAL SPECIFICATIONS

Part Numbers

Part Numbers	Description
LR-T8-17W-3.2-1200	High output T8 1200mm 3200K warm white 120VAC CL. Internal field replaceable CC driver 288 SMT LEDs 1593 lm C UL us v1
LR-T8-17W-4.5-1200	High output T8 1200mm 4500K neutral white 120VAC CL. Internal field replaceable CC driver 288 SMT LEDs 1665 lm C UL us v1
LR-T8-17W-6.5-1200	High output T8 1200mm 6500K cool white 120VAC CL. Internal field replaceable CC driver 288 SMT LEDs 1733 lm C UL us v1
LRT8-23WW-FS2	T8/10 66 HPLEDS Surface Mount High Power LEDS length 1200mm 85-265 VAC Warm White 23 Watts v2
LRT8-23CW-FS2	T8/10 66 HPLEDS Surface Mount High Power LEDS length 1200mm 85-265 VAC Cool White 23 Watts v2

Notes:
T8 LED tube part# LR-T8-17-xx where XX designates color temperature from 3000-6500K (3.0-6.8K) CCT followed by the length in mm. Ex. LR-T8-17W-3.2-1200 would denote a 1200mm (4') tube. Available in 600mm, 800mm, 1200mm, 1500mm, 1800mm & 2400mm.
Includes warm/warm-neutral/neutral/neutral-cool & cool whites.
Available in clear or frosted or semi opaque covers CL=Clear FR=Frosted SO=Semi opaque
Available with AC347V input with CSA certification (1200mm/4' only)
All specifications herein are for the clear cover models

Physical Diagram

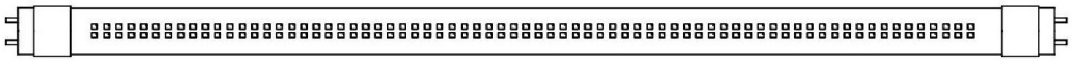


Diagram above is for v1

Diagram above is for v2

Physical Specifications for the 1200mm

Dimensions	1204mm Length X 25.5 Diameter
	3.93' Length X Diameter 1" Diameter
Weight	(Version 1) 375g (Version 2) 305g
Housing Rear	Aluminum
Housing Front (emitting side)	Polycarbonate (Clear/Frosted or Semi)
Socket Type	T8/T10 (Brass/Nickel) G13 (rapid start type with 2 conductors)
Environment	85% Humidity non condensing
Int./Ext. Usage	Interior (Indoor use)

Version 2 denotes lower LED chip count units with higher operating temperatures and Tj more suited for refrigeration lighting applications

Electrical Specifications

Input Voltage	Version 1	Version 2
	120-240-347V AC*	100-275V AC
Frequency	50-60Hz	50-60Hz
Power Consumption	17 Watts ± 1.1 W	22 Watts ± 1.2 W
Power Factor	≥0.90-0.92*	≥0.87-0.88*
LEDS Source	Bridgelux™ SMD LEDS	SMD HPLED
LED Quantity	288	66
Operating Temperature	-20 ~ 40℃ (- 4 ~ 105℉) -40% de-rating for v2	

* Fixed voltage LED tube SMD are Surface Mount Devices * Based on input voltage type
All voltages are C UL us certified expect the AC347V model which is CSA us certified.

Photometric Specifications

LED Tube Type		(Version 1)	(Next Generation Version 2)
Color Range	Warm white	3,200± 200K	3,500± 250K
	Neutral white	4,500± 200K	4,800± 250K
	Cool white	6,500± 200K	6,800± 250K
Lumens		1593 ~1733 lm	1450 ~1680 lm
Luminous Efficacy		93.7~101.9 lm/W	65.9~76.36 lm/W
CRI		≥ 75-82	
Beam Angle		120° (or custom)	
Lumen Maintenance		> 98.9% @ 1,000 hrs	

Test Parameters
Voltage (117 V AC) – Frequency (HZ) 59.9
Ambient Temperature (TA) 25°C- Relative Humidity (RH) 50%
Max case temperature below 37°C averaged across LED tube (34°C typical in standard 2x2 suspended ceiling fixture) for v1 model only
FLIR thermal and LM80 report available.

LUX Intensity

Distance	Illumination at center*	
	Version 1	Version 2
1 meter	590 Lux	365 Lux
2 meter	148 Lux	125 Lux
3 meter	68 Lux	51 Lux

* Neutral whites

LED Reliability (lumen maintenance)

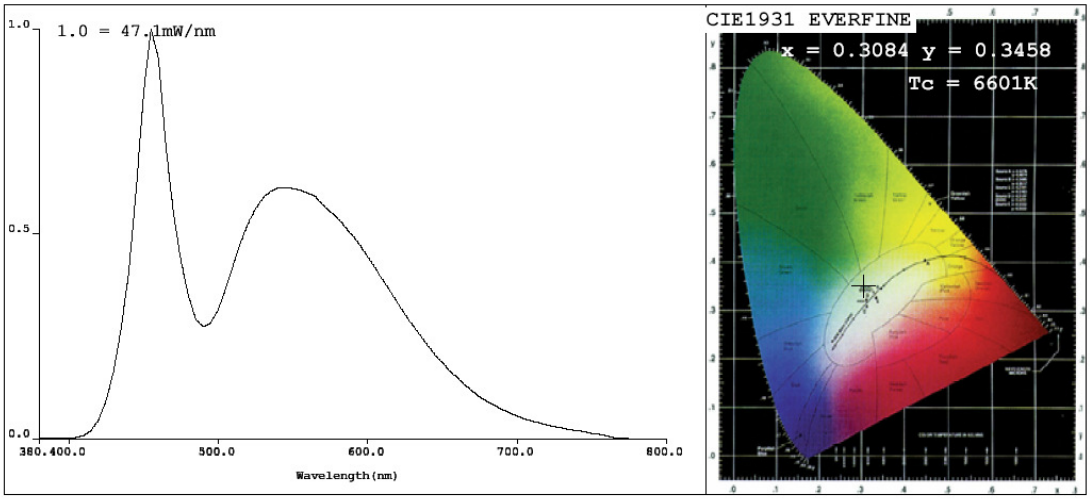
LED Tube Lifetime for L70	40,000k/ hrs	
Operating Temperature Ta	25℃	

LEDRays Inc. LED tubes are de-rated from the initial 50K/hr rating v1 only

Above value is based on chip specifications, Thermal/ Mechanical Shock/cycling, Temperature & humidity cycling, junction temperature Tj optimization, actual in field data and is based on the recommended operating environment.

Spectrophotocolorimeter Test Report (6600K v1 LED tube 1200mm)

Light Source Test Report



CIE Color Parameters:

Chromaticity Coordinate:x=0.3084 y=0.3458/u=0.1888 v=0.3176

CCT:Tc= 6601K Prcp WaveL: λ_d=498.2nm Purity=7.8%

Peak WaveL: λ_p=455nm Half Width: $\Delta\lambda$=29.8nm Ratio:R=11.5% G=83.0% B=5.5%

Average Wave: 539nm

Rendering Index:Ra=75.6

R1 =70	R2 =82	R3 =90	R4 =71	R5 =71	R6 =76	R7 =86	R8 =59
R9 =-30	R10=57	R11=66	R12=46	R13=73	R14=94	R15=64	

Photo Parameters:

Flux: Φ=1733.4(lm) Luminous Efficacy: 113.74(lm/W) Luminous Power:P=5.343(W)

Electrical Parameters:

U=220.5V I=0.0715A P=15.24W PF=0.966

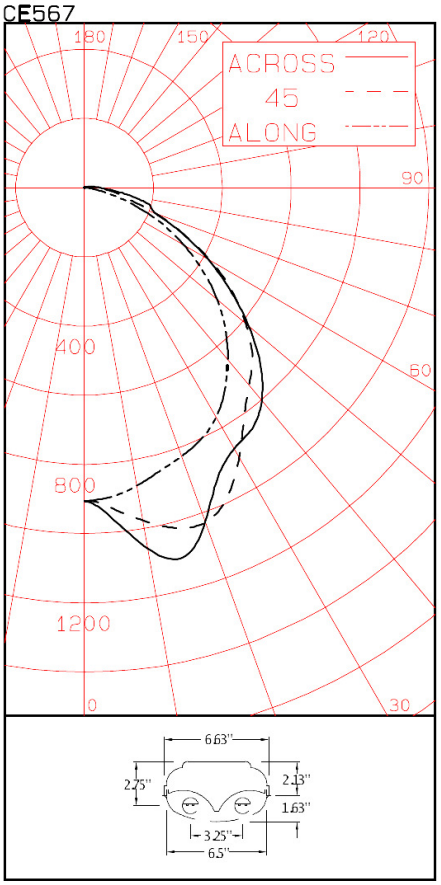
Instrument Status:

Scan Range:380.0nm-800.0nm	Interval:5.0nm	Ip = 10015
REF = 45183	% = -1.001%	TMP(PMT) = 24.1degrees centigrade

Photometric

ENCLOSED LUMINAIRE RETRO-FIT WITH WHITE PAINTED REFLECTOR AND CLEAR DROP DISH LENS WITH TWO LED T8 DOWN REPLACEMENT LAMPS. LUMEN OUTPUT = 2855 LMS.

CE567



ANGLE	ALONG	22.5	45	67.5	ACROSS	OUTPUT LUMENS
0	906	906	906	906	906	
5	897	907	931	954	963	92
15	848	905	1019	1090	1107	280
25	802	909	983	923	920	423
35	711	857	809	811	849	509
45	578	715	690	715	723	532
55	421	553	523	523	517	461
65	249	351	319	309	314	312
75	88	138	137	176	196	159
85	9	32	59	72	76	60
90	1	14	29	39	43	
95	2	7	16	25	28	18
105	1	4	6	8	9	6
115	0	0	4	6	5	3
125	0	0	1	3	4	1
135	0	0	0	1	1	0
145	0	0	0	0	1	0
155	0	0	0	0	0	0
165	0	0	0	0	0	0
175	0	0	0	0	0	0
180	0	0	0	0	0	

ZONE	LUMENS	% LAMP	%LUMINAIRE
0-30	794	27.84	27.84
0-40	1303	45.66	45.66
0-60	2295	80.41	80.41
0-90	2826	98.98	98.98
40-90	1522	53.32	53.32
60-90	530	18.57	18.57
90-180	29	1.02	1.02
0-180	2855	100.00	100.00

** EFFICACY = 80.3 LMS/WATT **

LUMINANCE SUMMARY-CD. / SQ. M.

S/MH = 1.4
SC(ALONG) = 1.3, SC(ACROSS) = 1.4

ANGLE	ALONG	45	ACROSS
45	3851	3971	3994
55	3407	3464	3247
65	2677	2576	2363
75	1479	1478	1914
85	357	1000	1103

TESTED ACCORDING TO IES PROCEDURES. TEST DISTANCE EXCEEDS FIVE TIMES THE GREATEST LUMINOUS OPENING OF LUMINAIRE.

CANDLEPOWER DATA

ANGLE	PLANE						OUTPUT
	ALONG	22.5	45	67.5	ACROSS	AVERAGE	LUMENS
0	906	906	906	906	906	906	
5	897	907	931	954	963	931	92
10	875	911	976	1034	1060	972	
15	848	905	1019	1090	1107	998	280
20	826	905	1029	1037	1028	974	
25	802	909	983	923	920	919	423
30	765	899	899	846	870	865	
35	711	857	809	811	849	814	509
40	647	792	744	776	801	759	
45	578	715	690	715	723	693	532
50	503	639	611	628	624	610	
55	421	553	523	523	517	517	461
60	335	461	424	414	414	418	
65	249	351	319	309	314	315	312
70	164	240	220	214	220	217	
75	88	138	137	176	196	149	159
80	35	67	99	128	136	95	
85	9	32	59	72	76	51	60
90	1	14	29	39	43	26	
95	2	7	16	25	28	16	18
100	1	8	9	14	15	10	
105	1	4	6	8	9	6	6
110	0	2	5	4	5	3	
115	0	0	4	6	5	3	3
120	0	0	2	5	6	2	
125	0	0	1	3	4	2	1
130	0	0	0	2	2	1	
135	0	0	0	1	1	0	0
140	0	0	0	0	1	0	
145	0	0	0	0	1	0	0
150	0	0	0	0	1	0	
155	0	0	0	0	0	0	0
160	0	0	0	0	0	0	
165	0	0	0	0	0	0	0
170	0	0	0	0	0	0	
175	0	0	0	0	0	0	0
180	0	0	0	0	0	0	

AVERAGE LUMINANCE DATA

CD. / SQ. M. (FOOTLAMBERTS)

ANGLE	ALONG	22.5	45	67.5	ACROSS
0	4407(1286)	4407(1286)	4407(1286)	4407(1286)	4407(1286)
30	4217(1230)	4719(1377)	4540(1325)	4175(1218)	4272(1246)
40	3998(1166)	4563(1331)	4048(1181)	4102(1197)	4207(1228)
45	3851(1124)	4374(1276)	3971(1159)	3968(1158)	3994(1165)
50	3662(1068)	4217(1230)	3735(1090)	3695(1078)	3639(1062)
55	3407(994)	3980(1161)	3464(1011)	3302(963)	3247(947)
60	3082(899)	3691(1077)	3065(894)	2840(828)	2814(821)
65	2677(781)	3183(929)	2576(752)	2343(684)	2363(689)
70	2136(623)	2546(743)	2029(592)	1829(534)	1855(541)
75	1479(431)	1773(517)	1478(431)	1741(508)	1914(558)
80	834(243)	1099(320)	1301(379)	1513(441)	1579(460)
85	357(104)	738(215)	1000(291)	1062(310)	1103(321)

DETERMINED IN ACCORDANCE WITH CURRENT IES PUBLISHED PROCEDURES

COEFFICIENTS OF UTILIZATION

ZONAL CAVITY METHOD

EFFECTIVE FLOOR CAVITY REFLECTANCE = .20

CC	80				70				50			30			10			0
WALL	70	50	30	10	70	50	30	10	50	30	10	50	30	10	50	30	10	0
RCR																		
0	1.19	1.19	1.19	1.19	1.16	1.16	1.16	1.16	1.11	1.11	1.11	1.06	1.06	1.06	1.01	1.01	1.01	.99
1	1.10	1.05	1.01	.98	1.07	1.03	.99	.96	.98	.95	.93	.94	.92	.90	.91	.89	.87	.85
2	1.01	.93	.87	.82	.98	.91	.86	.81	.88	.83	.79	.84	.81	.77	.81	.78	.75	.73
3	.92	.83	.75	.69	.90	.81	.74	.69	.78	.72	.67	.75	.70	.66	.73	.69	.65	.63
4	.85	.74	.66	.60	.83	.73	.66	.60	.70	.64	.59	.68	.62	.58	.66	.61	.57	.55
5	.79	.67	.58	.52	.76	.65	.57	.52	.63	.56	.51	.61	.55	.50	.59	.54	.50	.48
6	.72	.60	.51	.45	.70	.59	.51	.45	.57	.50	.44	.55	.49	.44	.53	.48	.43	.41
7	.66	.53	.45	.39	.65	.53	.45	.39	.51	.44	.38	.49	.43	.38	.48	.42	.38	.36
8	.62	.48	.40	.34	.60	.48	.40	.34	.46	.39	.34	.45	.38	.34	.44	.38	.33	.31
9	.57	.44	.36	.30	.56	.43	.36	.30	.42	.35	.30	.41	.34	.30	.40	.34	.29	.28
10	.53	.40	.32	.27	.52	.39	.32	.27	.38	.31	.27	.37	.31	.26	.36	.30	.26	.24

DETERMINED IN ACCORDANCE WITH CURRENT IES PUBLISHED PROCEDURES
LUMINAIRE INPUT WATTS = 35.6
LABORATORY RESULT MAY NOT BE REPRESENTATIVE OF FIELD PERFORMANCE.
ABSOLUTE PHOTOMETRY TAKEN.

SUPPLEMENTARY MEASUREMENTS AS PER IES-LM-79-08 (2 x 1200mm LED tubes)
STABILIZATION TIME: 1 HOUR 15 MINUTES

ELECTRICAL CONSUMPTION

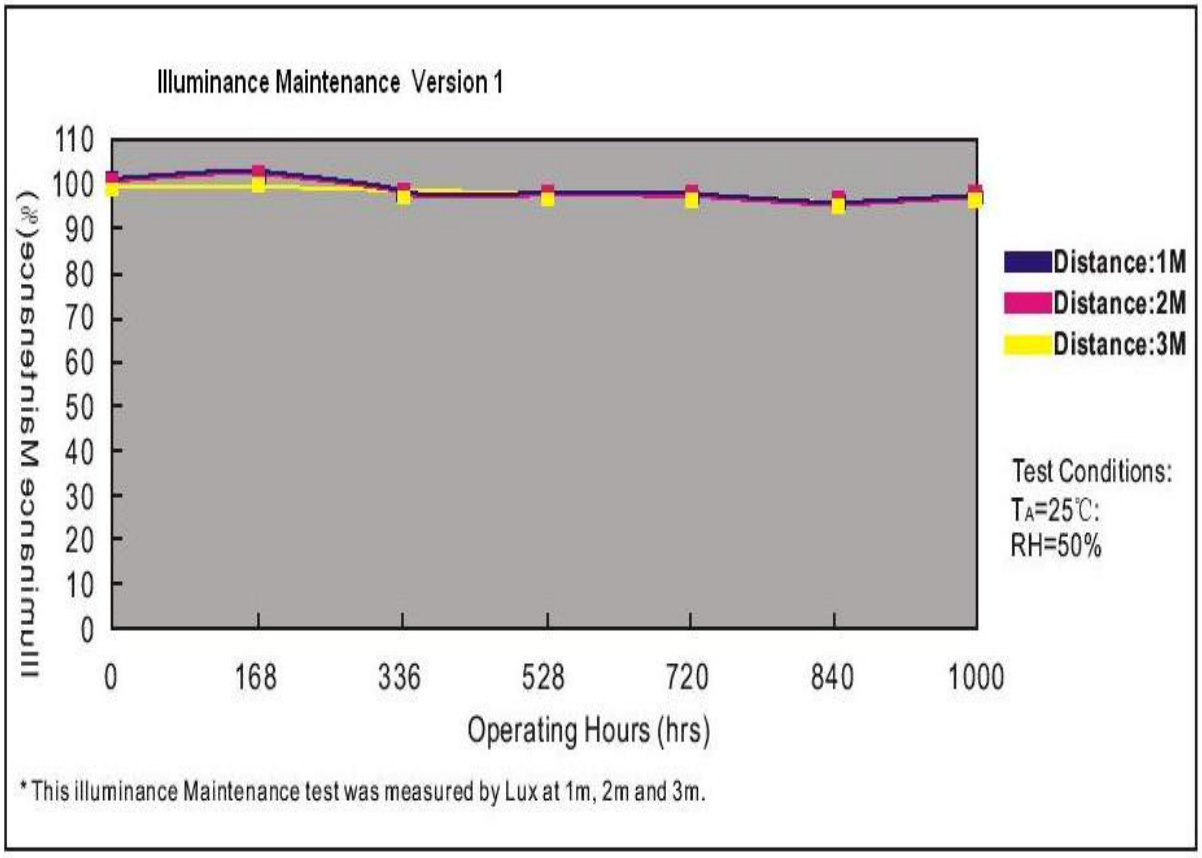
INPUT VOLTAGE: 120.0 VRMS
INPUT CURRENT: 0.328 ARMS
INPUT WATTAGE: 35.57
POWER FACTOR: 0.904

CHROMATICITY MEASUREMENTS

CIE 1931-x: 0.311
CIE 1931-y: 0.330
CORRELATED COLOUR TEMPERATURE: 6591 DEG. K
COLOUR RENDERING INDEX: 75.9%

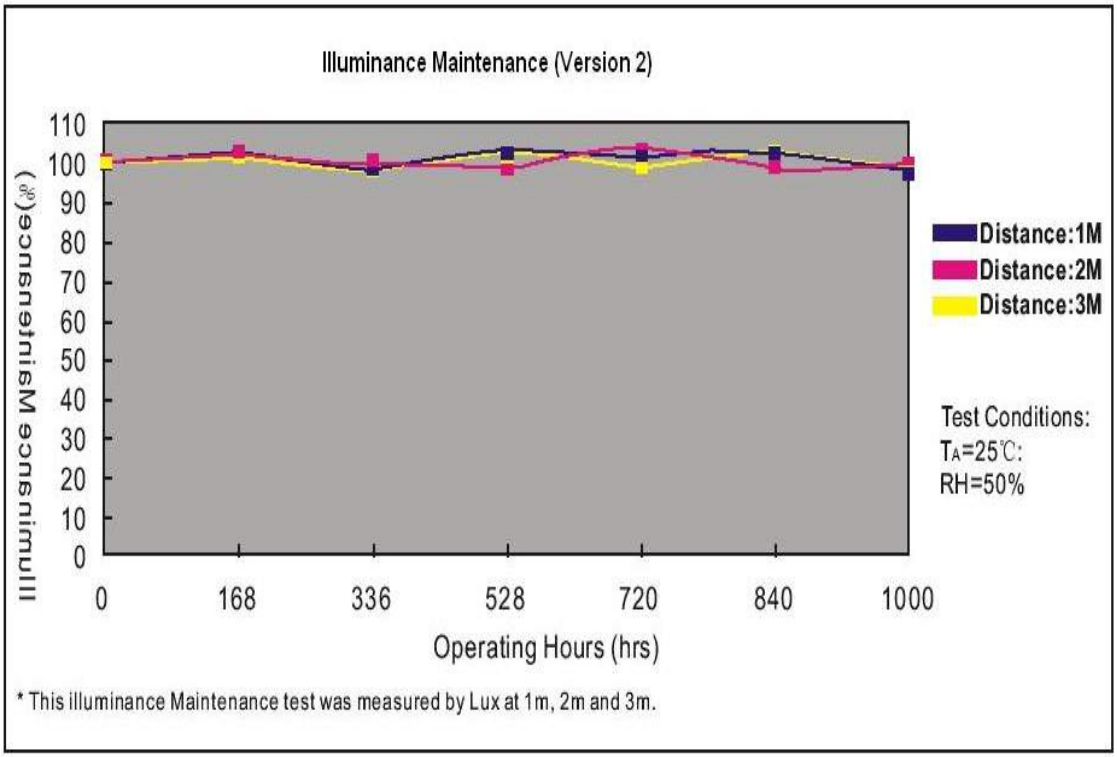
Illuminance Maintenance (V 1)

Operating Hours(hrs)	0	168	336	528	720	840	1000
Illuminance Maintenance(%)@1 meter	100	102	99.1	101.6	100.3	100.7	99
Illuminance Maintenance(%)@2 meter	100	101.9	100	99.4	101.5	99.6	99.8
Illuminance Maintenance(%)@3 meter	100	100.9	99.1	101.2	99.3	101	99.2



Illuminance Maintenance (V2)

Operating Hours(hrs)	0	168	336	528	720	840	1000
Illuminance Maintenance(%)@1 meter	100	102	99.1	101.6	100.3	100.7	99
Illuminance Maintenance(%)@2 meter	100	101.9	100	99.4	101.5	99.6	99.8
Illuminance Maintenance(%)@3 meter	100	100.9	99.1	101.2	99.3	101	99.2

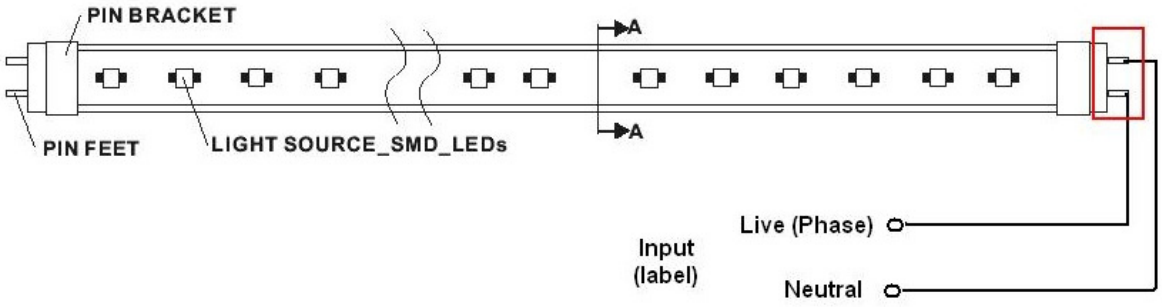


Based on a de-rating of 40% from ambient temperature operation

Reliability Test

Time(hrs) rating	Brightness loss	Operating temperature
1,000 hrs	0%	-20-60℃
10,000 hrs	10%	-20-60℃
30,000 hrs	20%	-20-60℃

Wiring Diagram (V1 & 2)



Please note LEDRays Inc. T8 sized LED tubes include a field replaceable power supply featuring easily removable end caps and miniature M/F plug in connectors. Please see www.ledrays.com for complete installations instructions.

Existing ballast must be bypassed from the circuit and T8 LED tubes cannot be utilized with shunted (shorted) pin lampholders.
Pins opposite of input end are open circuit (no connection) and used for mechanical support only.
Unless otherwise stated T8 LED tubes are non dimming.
U shape tubes and dimming are available as options.

LEDRays Inc. T8 high performance LED tubes are primarily designed for the replacement of older T12 fluorescent type tubes and are classified as: Luminaire conversion, retrofit for use only with a fluorescent luminaires identified in manufacturer's instructions in dry locations only.
IES files available upon request.

For technical enquiries please call one of our application engineers @ 514 484-8462

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