

Product Data Sheet – Rev. 2.0

EL Wire - LyTec™ HVL-02S

Heavy Duty Grade Product Group

Product Features:

LyTec™ HVL-02S Heavy Duty Grade product line is designed for prolonged outdoor applications. Larger wire diameter also provides a richer visual effect in comparison with the general purpose grade wires.

Certification Status:

- **CE lighting Cable category – No.: AK 9910106 01**

- UL in process
- Available colors:

Blue-Green - Green – Yellow - Red White, Ultra-Marine.

Lighting Color	Non Lighting Color (Idle)	Typical Initial brightness level of the internal light source at 100VAC/ 60/400/2000Hz (cd/m ²)	Useful Lifetime 100VAC/ 60/400/2000 Hz (X1000 Hrs)
*Blue Green	Clear	8 / 41 / 116	25 / 5.7 / 1.6
Green	Green	2 / 10 / 39	20 / 5.7 / 1.6
Yellow	Orange	6 / 19/ 72	20 / 5.7 / 1.6
Red	Red	2 / 10 / 39	20 / 5.7 / 1.6

- Typical LyTec™ Wire diameter 3.3 mm.
- Useful lifetime based upon operation cycles: 6 hours ON, 18 hours OFF - reaching 30% of the initial brightness.
- Blue Green wire color shifts from Green at lower frequencies to Blue at higher frequencies

Product Applications:

- Outdoor signs
- Lighting applications
- Markings

NOTES:

- For application design please refer to detailed technical specifications
- For further assistance please consult our support engineering

The information provided in this document is for reference only and is subject to change without further notice

EL Wire - LyTec™ HVL-02S

General Purpose Product Group

Physical Properties:

Diameter: 3.5 mm/ .14" - Max
Bending Diameter: 17mm/ 0.7 " - Max
Stretching Force: 1 Kg - Max
Twisting Angle: 30°/meter - Max

Packaging

- LyTec™ Wire is shipped on DIN 250 spools in standard quantities of 250m (820 ft) per spool.

Electrical Operation

Absolute Max. Ratings:

Input Voltage: 130VAC (rms)

Average AC current: 100 mAmp

Insulation Breakdown Voltage: 4,000 Volts per IEC 227-2

Flammability: per IEC 332-2 (VDE 0472 Part 804 Test Type A)

Operating Temperature: -20°C to + 55°C (-4°F to +131° F)

Storage Temperature: -40°C to + 65°C (-40°F to +149° F)

Color Stability Data - Time frame during which initial wire illumination chromaticity coordinates remain within the original color region related to the Locus chromaticity diagram after exposure to an average sunlight dose in idle condition.

Color	Mid Europe - Approximate time to beginning of discoloration after average sunlight exposure dose – [months]	Tropical Area - Approximate time to beginning of discoloration after average sunlight exposure dose [months]
Blue-Green	30	30
Green	24	12
White	24	12
Yellow	12	6

Typical Current Consumption (mAmp/1meter of LyTec™ Wire)

Voltage [Vrms]	60 Hz	200 Hz	400 Hz	800 Hz	2000 Hz
80	0.13	0.62	1.12	2.22	5.94
100	0.19	0.88	1.47	2.92	7.84
120	0.27	1.29	1.90	3.68	9.76

Yellow Electroluminescent Fiber
for Indoors and Outdoors* Use

Preliminary Product Specifications(Model **02S Y3**)

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

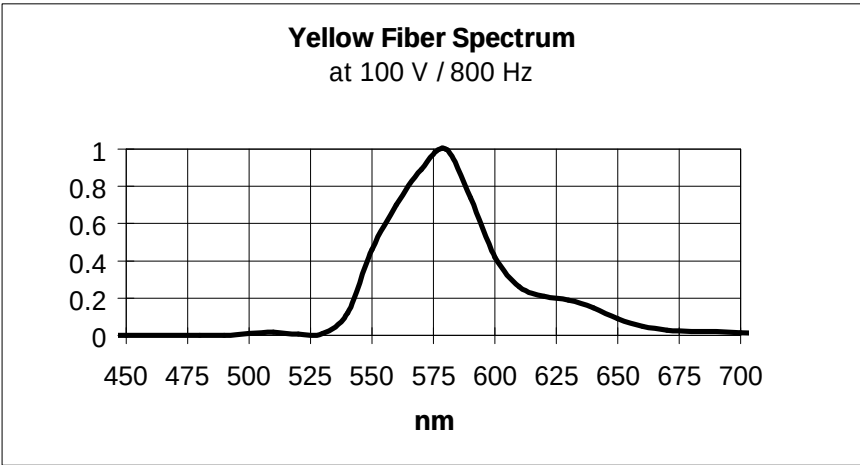
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335-1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
Peak Wavelength at 100V/400 Hz
Chromaticity Coordinates at 100V/400 Hz
Reference Brightness at 100 Volts / 800Hz
Peak Wavelength at 100 Volts / 800Hz
Chromaticity Coordinates at 100 Volts / 800Hz
Reference Brightness at 100 Volts / 2000Hz
Peak Wavelength 100V / 2000 Hz
Chromaticity Coordinates at 100 Volts / 2000Hz
Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

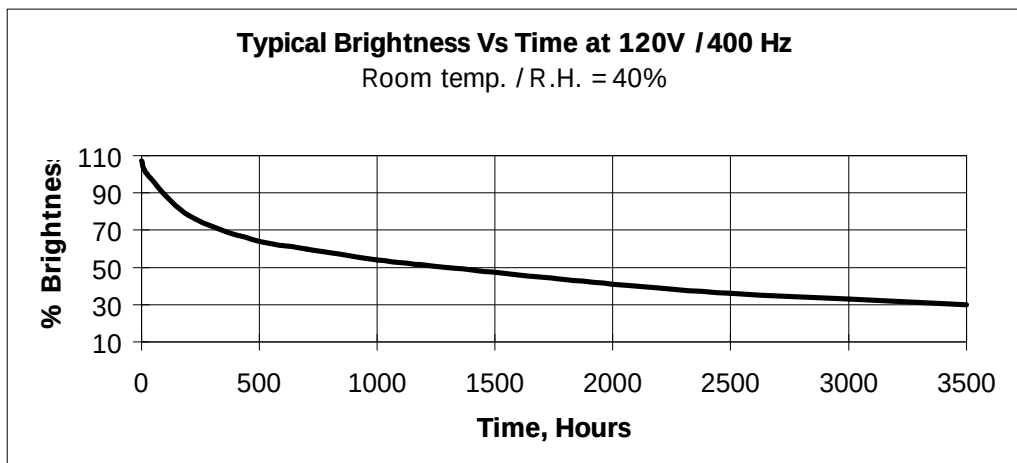
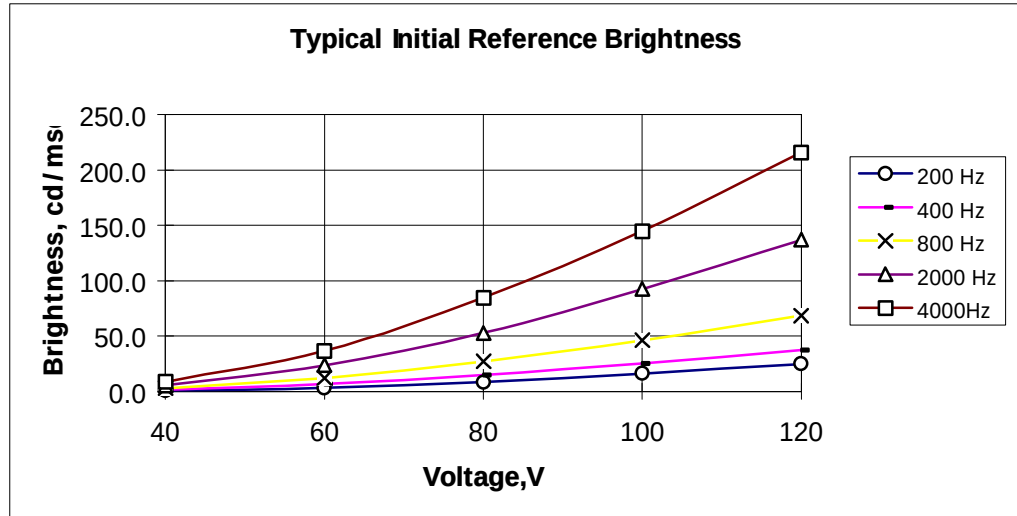
25 cd/m²
580 nm
X = 0.501, Y = 0.497
46 cd/m²
580 nm
X = 0.502, Y = 0.496
92 cd/m²
580 nm
X = 0.503, Y = 0.494
5.3 nF +/- 0.8 nF



Typical Initial Reference Brightness*** cd/(msq)

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Voltage (VRMS)	200 Hz	400 Hz	800 Hz	2000 H z	4000Hz
40	0.7	1.6	2.8	5.6	8.6
60	3.3	6.7	12.3	23.6	36.6
80	8.4	14.9	27.1	53.0	84.7
100	16.0	25.4	46.4	92.5	144.8
120	25.0	37.4	68.5	137.0	216.0



* Remark: Product operation under direct sunlight is not recommended!

** Remark: Actual parameters of each lot may vary from typical values within +/-20%.

*** Remark: The mentioned reference brightness values are related to the light emitting electroluminescent layer having diameter of 0.7 mm.

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Red Electroluminescent Fiber ***for Indoors and Outdoors* Use***

Preliminary Product Specifications(Model **02S R3)**

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

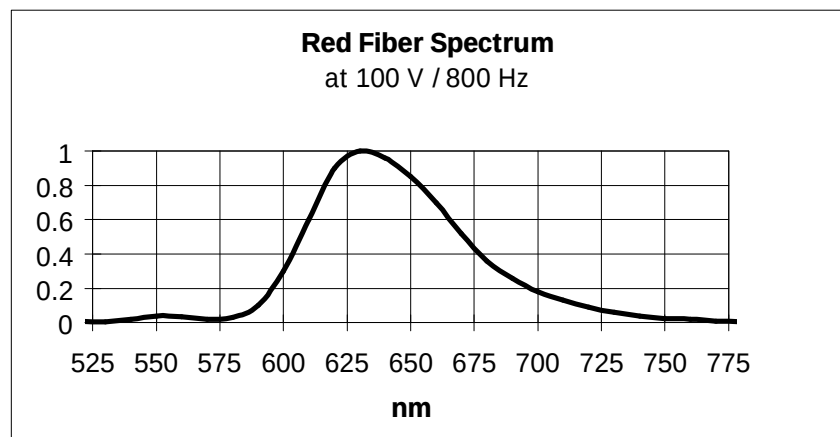
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335-1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
 Peak Wavelength at 100V/400 Hz
 Chromaticity Coordinates at 100V/400 Hz
 Reference Brightness at 100 Volts / 800Hz
 Peak Wavelength at 100 Volts / 800Hz
 Chromaticity Coordinates at 100 Volts / 800Hz
 Reference Brightness at 100 Volts / 2000Hz
 Peak Wavelength 100V / 2000 Hz
 Chromaticity Coordinates at 100 Volts / 2000Hz
 Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

7.7 cd/m²
 630 nm
 X = 0.686, Y = 0.312
 14 cd/m²
 630 nm
 X = 0.687, Y = 0.311
 27 cd/m²
 630 nm
 X = 0.687, Y = 0.311
 5.3 nF +/- 0.8 nF



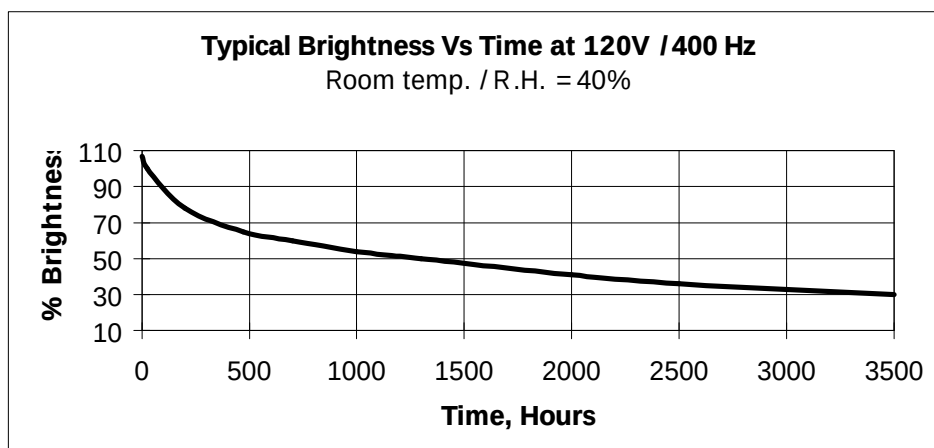
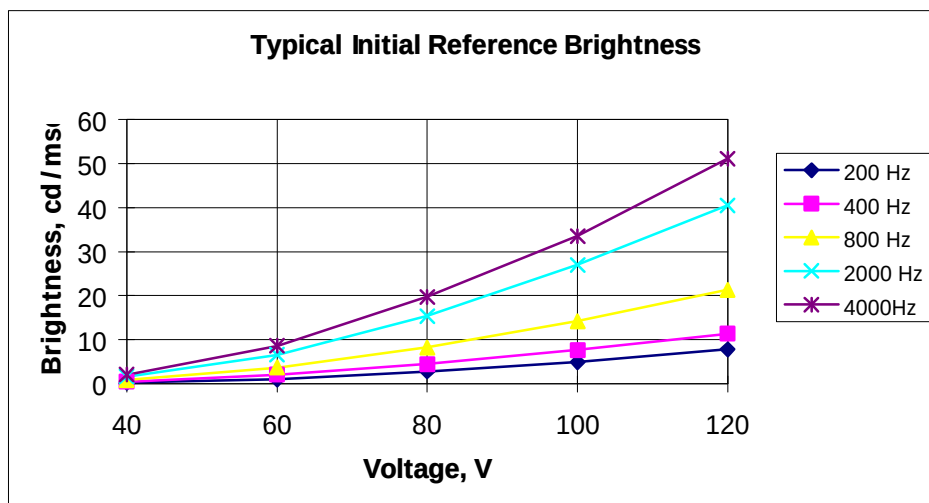
Typical Initial Reference Brightness*** cd/(msq)

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Voltage (VRMS)	200 H z	400 Hz	800 H z	2000 H z	4000Hz
40	0.3	0.5	0.9	1.7	2.1
60	1	2.1	3.7	6.6	8.6
80	2.8	4.5	8.3	15.4	19.7
100	4.9	7.7	14.2	27	33.5
120	7.8	11.4	21.3	40.5	51.1



* Remark: Product operation under direct sunlight is not recommended!

** Remark: Actual parameters of each lot may vary from typical values within +/-20%.

*** Remark: The mentioned reference brightness values are related to the light emitting electroluminescent layer having diameter of 0.7 mm.

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Green Electroluminescent Fiber ***for Indoors and Outdoors* Use***

Preliminary Product Specifications(Model **02S G3)**

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

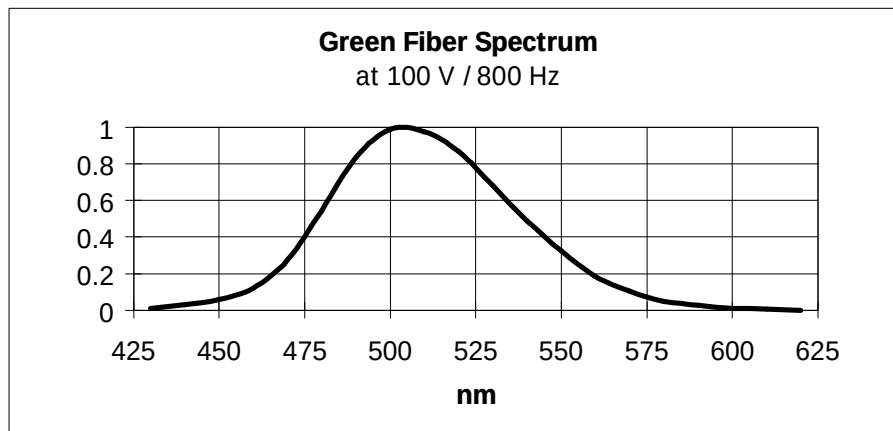
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335-1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
 Chromaticity Coordinates at 100V/400 Hz
 Reference Brightness at 100 Volts / 800Hz
 Chromaticity Coordinates at 100 Volts / 800Hz
 Reference Brightness at 100 Volts / 2000Hz
 Chromaticity Coordinates at 100 Volts / 2000Hz
 Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

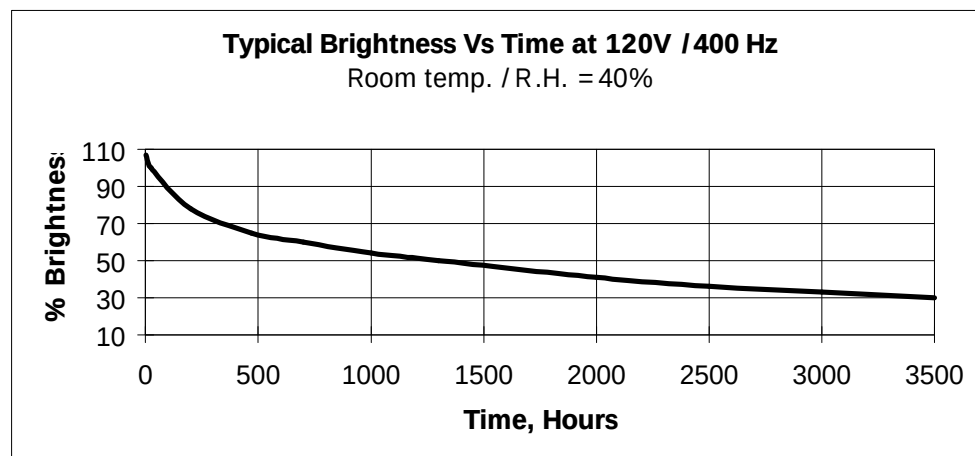
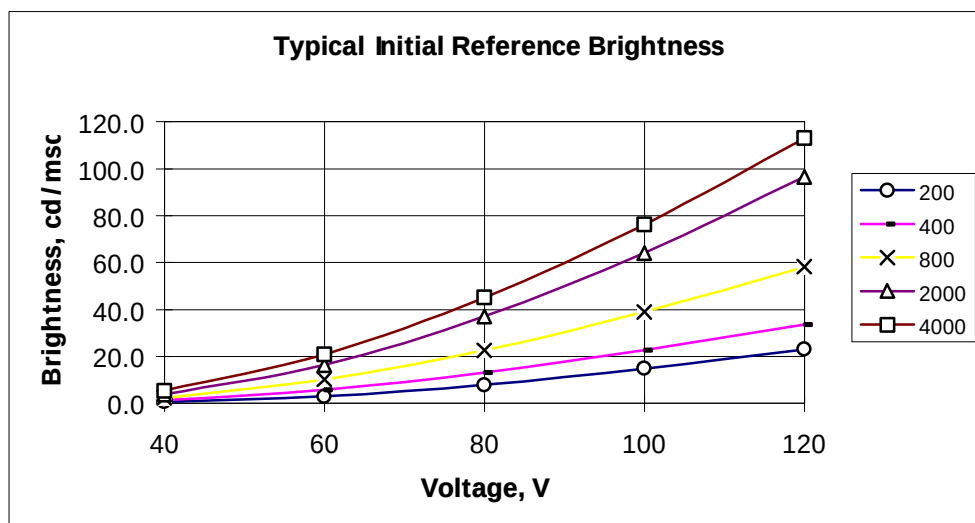
23 cd/m²
 X = 0.137, Y = 0.587
 39 cd/m²
 X = 0.138, Y = 0.573
 64 cd/m²
 X = 0.136, Y = 0.549
 5.3 nF +/- 0.8 nF



Typical Initial Reference Brightness*** cd/(msq)

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Voltage (VRMS)	200	400	800	2000	4000
40	0.6	1.3	2.3	3.8	5.4
60	3.0	5.8	10.2	16.3	20.9
80	8.0	13.2	22.6	37.1	45.2
100	14.8	22.7	39.0	64.1	76.2
120	23.0	33.5	58.2	96.6	113.0



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*** Remark: The mentioned reference brightness values are related to the light emitting electroluminescent layer having diameter of 0.7 mm.

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Ultra-Marine Electroluminescent Fiber ***for Indoors and Outdoors* Use***

Preliminary Product Specifications(Model **02S UM)**

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

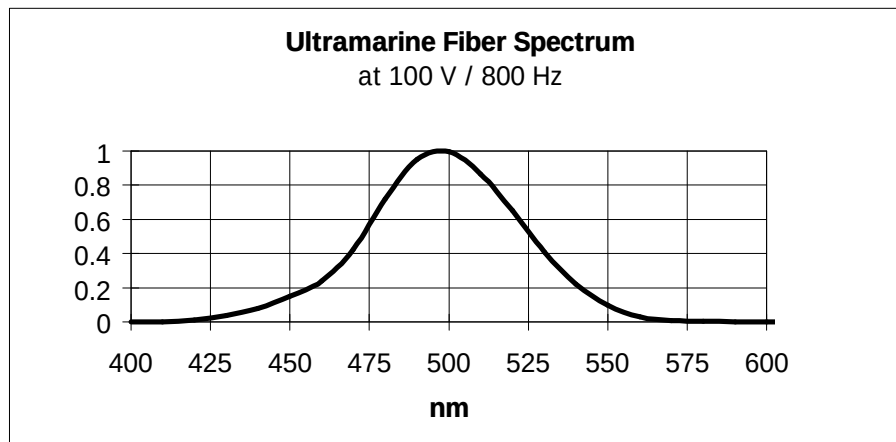
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335-1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
 Chromaticity Coordinates at 100V/400 Hz
 Reference Brightness at 100 Volts / 800Hz
 Chromaticity Coordinates at 100 Volts / 800Hz
 Reference Brightness at 100 Volts / 2000Hz
 Chromaticity Coordinates at 100 Volts / 2000Hz
 Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

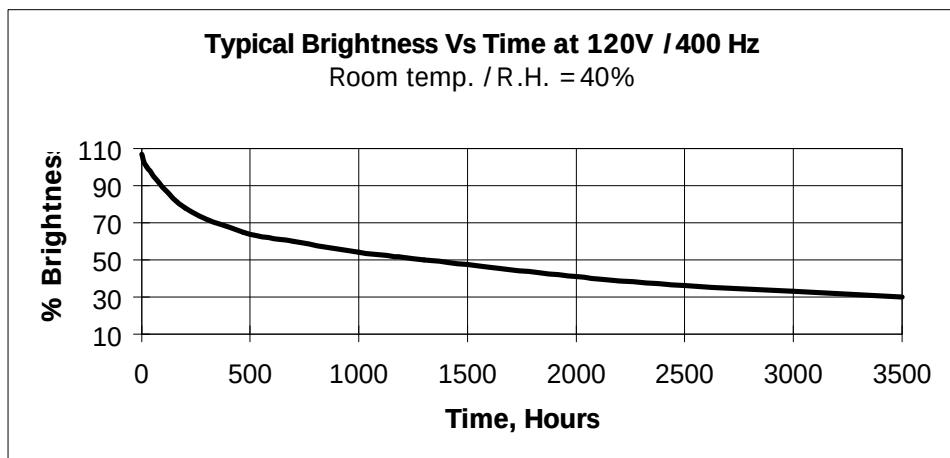
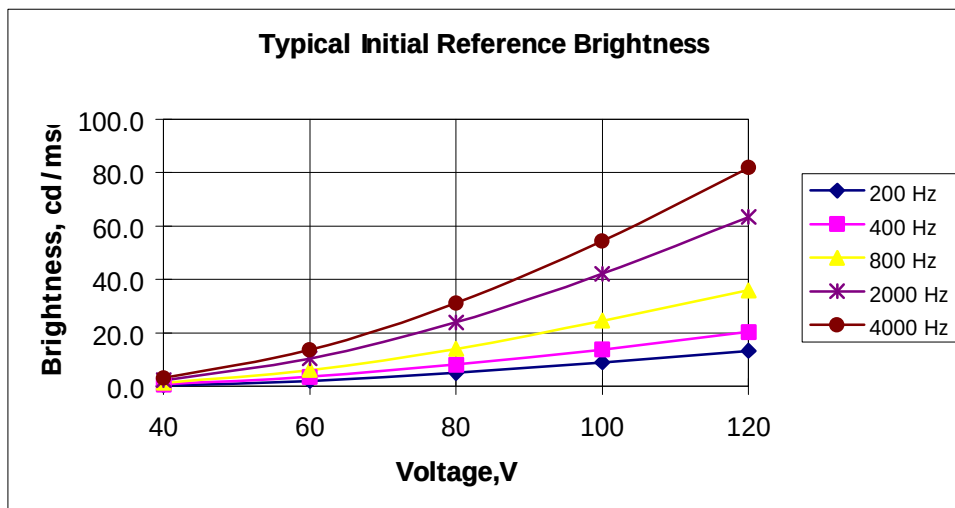
13 cd/m²
 X = 0.098, Y = 0.425
 24 cd/m²
 X = 0.102, Y = 0.398
 42 cd/m²
 X = 0.107, Y = 0.334
 5.3 nF +/- 0.8 nF



Typical Initial Reference Brightness*** cd/(msq)

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Voltage (VRMS)	200 H z	400 H z	800 H z	2000 H z	4000 Hz
40	0.3	0.7	1.3	2.3	3.1
60	2.0	3.6	6.1	10.4	13.7
80	5.0	8.1	14.0	24.0	31.1
100	9.0	13.8	24.5	42.1	54.4
120	13.3	20.3	35.9	63.3	81.8



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Blue/Green Electroluminescent Fiber

for Indoors and Outdoors* Use

Preliminary Product Specifications (Model **02S BG)**

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

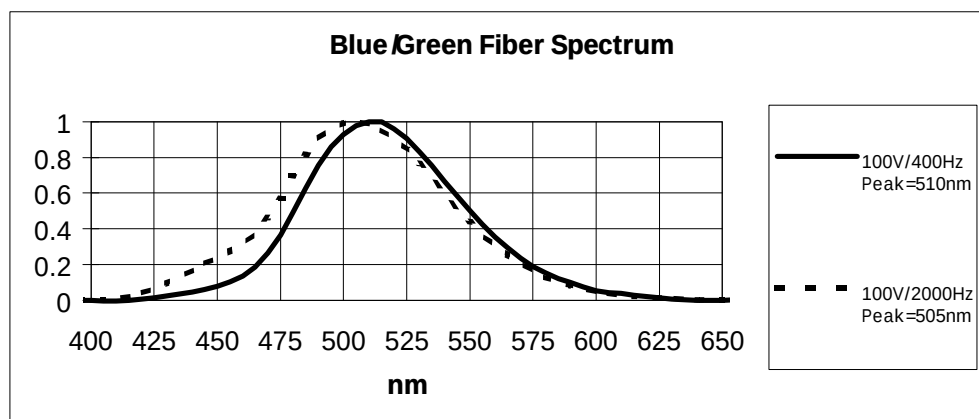
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335 -1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
Peak Wavelength at 100V/400 Hz
Chromaticity Coordinates at 100V/400 Hz
Reference Brightness at 100 Volts / 800Hz
Peak Wavelength at 100 Volts / 800Hz
Chromaticity Coordinates at 100 Volts / 800Hz
Reference Brightness at 100 Volts / 2000Hz
Peak Wavelength 100V / 2000 Hz
Chromaticity Coordinates at 100 Volts / 2000Hz
Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

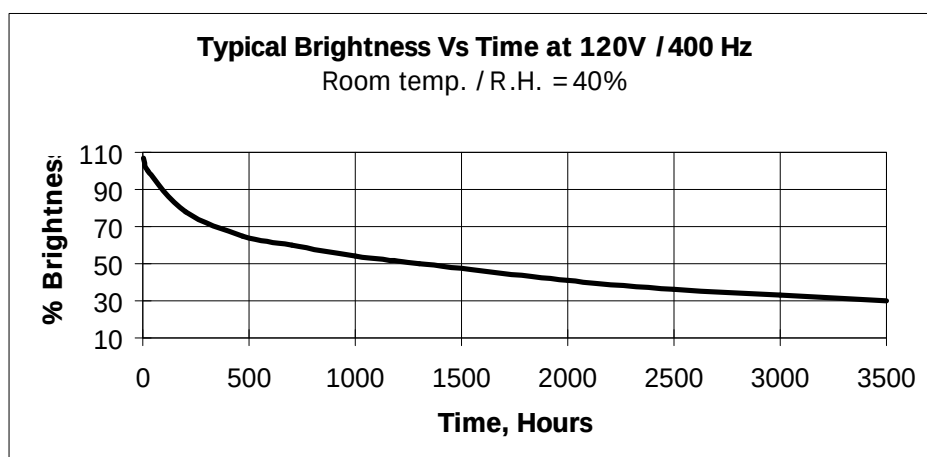
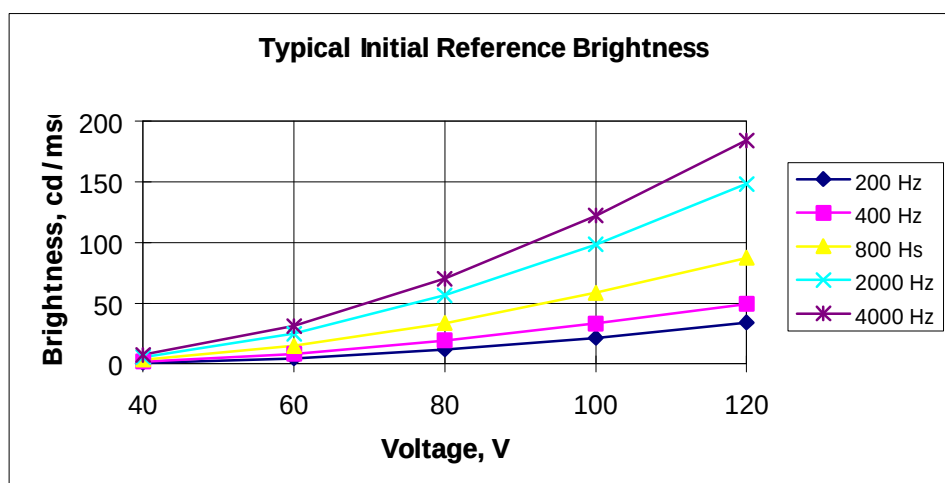
33 cd/m²
510 nm
X = 0.194, Y = 0.546
58 cd/m²
510 nm
X = 0.185, Y = 0.515
99 cd/m²
505 nm
X = 0.176, Y = 0.449
5.3 nF +/- 0.8 nF



Typical Initial Reference Brightness*** cd/(msq)

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Voltage (VRMS)	200 H z	400 Hz	800 H s	2000 H z	4000 Hz
40	0.9	1.8	3.3	5.6	7.4
60	4.5	8.3	14.7	24.7	31.2
80	12	19.3	33.6	56.4	70.3
100	21.5	33.3	58.5	98.5	122.1
120	34	49.4	87.4	148.3	184.1



* Remark: Product operation under direct sunlight is not recommended!

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*** Remark: The mentioned reference brightness values are related to the light emitting electroluminescent layer having diameter of 0.7 mm.

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White Electroluminescent Fiber ***for Indoors and Outdoors* Use***

Preliminary Product Specifications (Model 02S w1)

Overall Diameter 2.9 - 3.6 mm (0.114" - 0.142")

Absolute Maximum Ratings

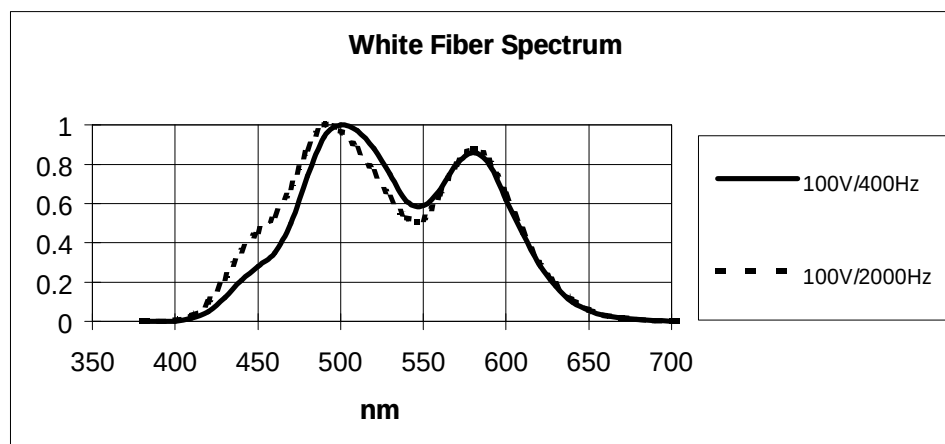
Power Supply Voltage	130 Volts (RMS)
Storage Temperature	-20 to +65 deg. C (-4 to +149 deg.F)
Operating Temperature	-20 to +55 deg. C (-4 to +131 deg.F)
Stretching Force	1 Kg
Bending Diameter	at least 5 times the fiber diameter
Twisting Angle	30 degrees per meter
Average AC current	100 mAmp
Insulation Breakdown Voltage	4000 Volts per IEC 335-1
Flammability	850 deg C per IEC 335-1

Electro-Optical Characteristics

Reference Brightness*** at 100 Volts / 400Hz
 Chromaticity Coordinates at 100V/400 Hz
 Reference Brightness at 100 Volts / 800Hz
 Chromaticity Coordinates at 100 Volts / 800Hz
 Reference Brightness at 100 Volts / 2000Hz
 Chromaticity Coordinates at 100 Volts / 2000Hz
 Dynamic Capacitance at 5 VAC in darkness

Typical Initial Performance**

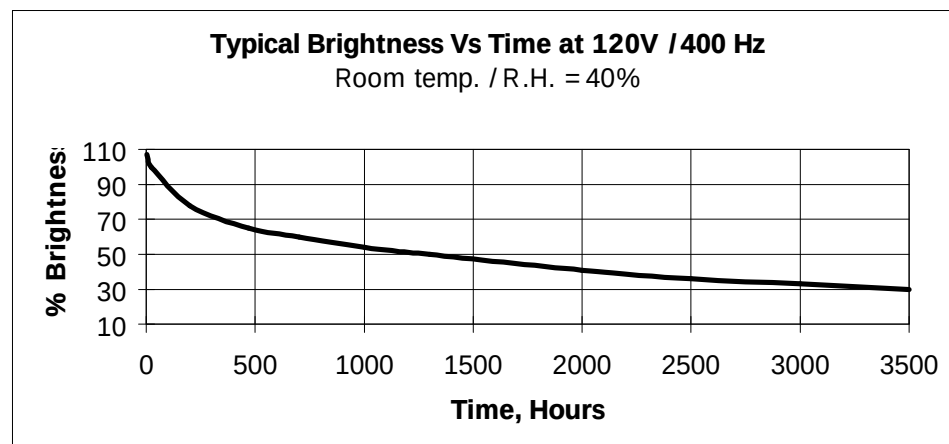
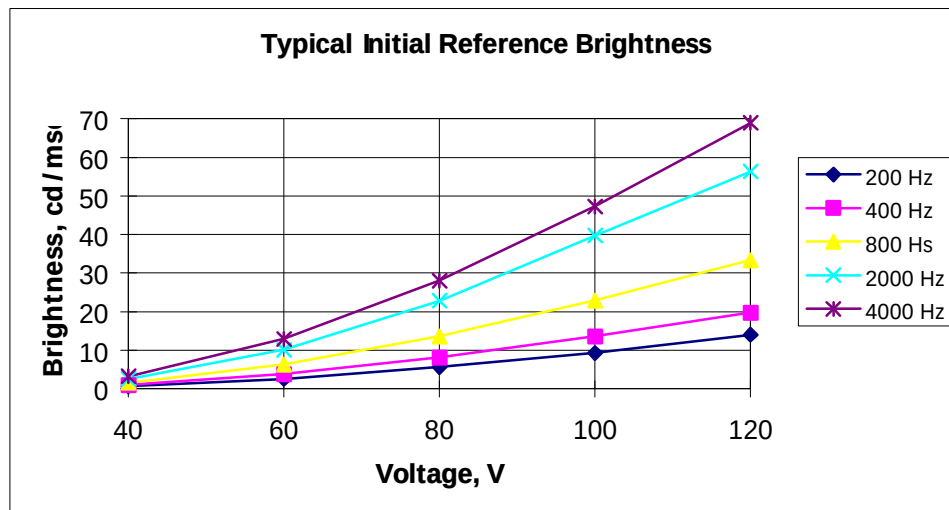
14 cd/m²
 X = 0.322, Y = 0.437
 23 cd/m²
 X = 0.319, Y = 0.419
 39 cd/m²
 X = 0.315, Y = 0.387
 5.3 nF +/- 0.8 nF



Typical Initial Reference Brightness*** cd/(msq)

Voltage (VRMS)	200 Hz	400 H z	800 H s	2000 H z	4000 Hz
40	0.7	1	1.6	2.6	3.2
60	2.6	3.8	6.3	10.1	12.9
80	5.6	8.1	13.6	22.8	28
100	9.3	13.6	22.9	39.7	47.3
120	14	19.7	33.3	56.3	68.9

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* Remark: Product operation under direct sunlight is not recommended!

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*** Remark: The mentioned reference brightness values are related to the light emitting electroluminescent layer having diameter of 0.7 mm.

Common Characteristics for All Colors

Current Consumption(mAmp) of 1meter

Voltage(VRMS)	200Hz	400Hz	800Hz	1000Hz	2000Hz
5	0.03	0.06	0.12	0.16	0.33
20	0.12	0.24	0.48	0.61	1.27
40	0.23	0.50	1.00	1.24	2.59
60	0.38	0.80	1.62	1.98	4.17
80	0.62	1.12	2.22	2.83	5.94
100	0.88	1.47	2.92	3.66	7.84
120	1.29	1.90	3.68	4.64	9.76

Irms,mA/0.47m

U,V / F,Hz	200Hz	400Hz	800Hz	1000Hz	2000Hz
5	0.015	0.030	0.058	0.073	0.156
20	0.058	0.115	0.227	0.286	0.598
40	0.107	0.237	0.468	0.583	1.216
60	0.178	0.374	0.760	0.930	1.960
80	0.291	0.527	1.040	1.330	2.790
100	0.413	0.690	1.370	1.720	3.680
120	0.604	0.890	1.730	2.180	4.580

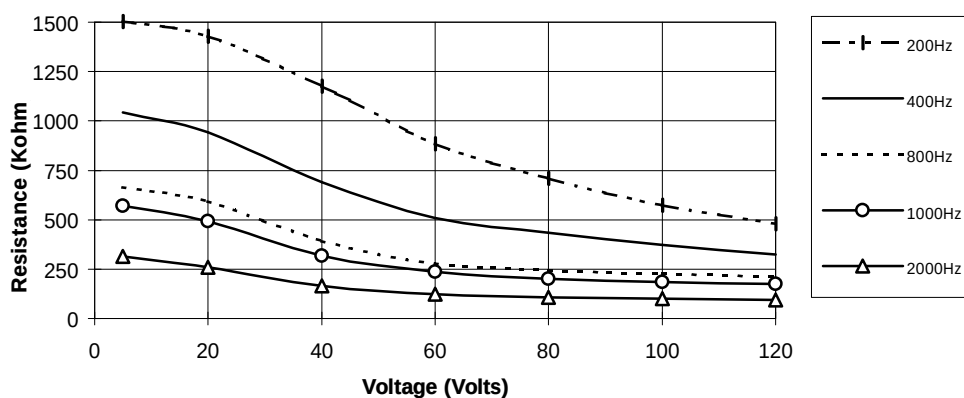
R,KOhm /0.47m

Equivalent Ohmic Resistance(kOhm) of 1 meter

(Ohmic Component of the Parallel RC Circuit)

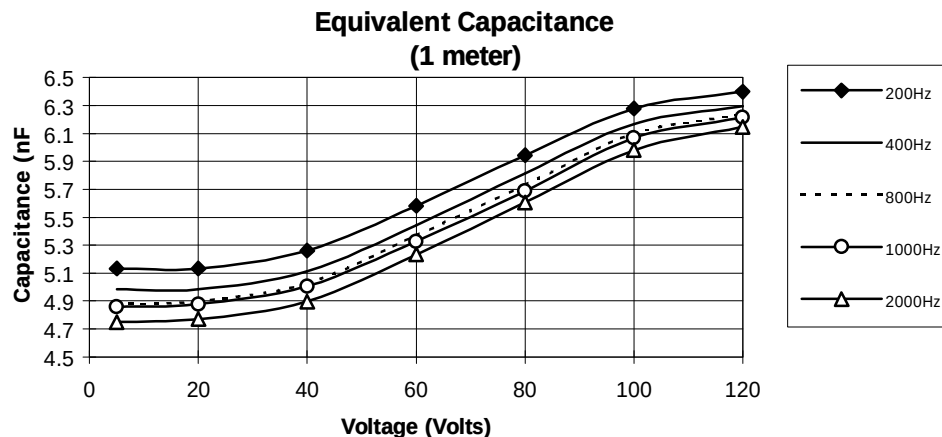
Voltage	200Hz	400Hz	800Hz	1000Hz	2000Hz
5	1504	1043	663	569	314
20	1428	942	592	494	259
40	1175	691	393	316	165
60	886	510	280	235	123
80	709	435	243	200	107
100	572	374	226	184	101
120	480	323	210	174	94

Equivalent Ohmic Resistance (1 meter)

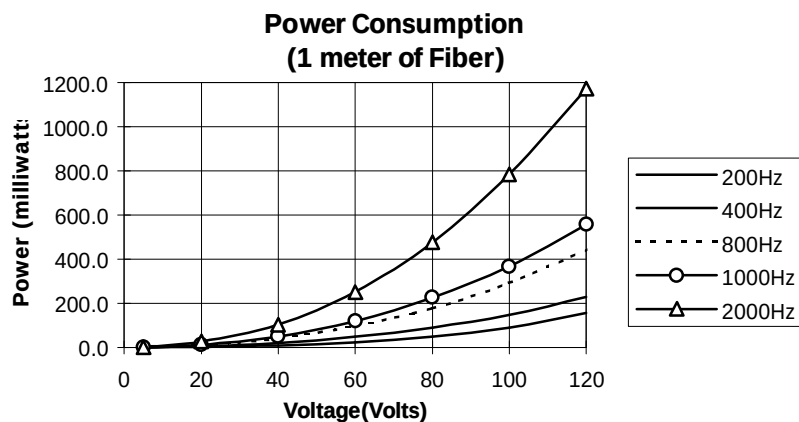


Equivalent Capacitance(nF) of 1 meter(Capacitive Component of the Parallel RC Circuit)

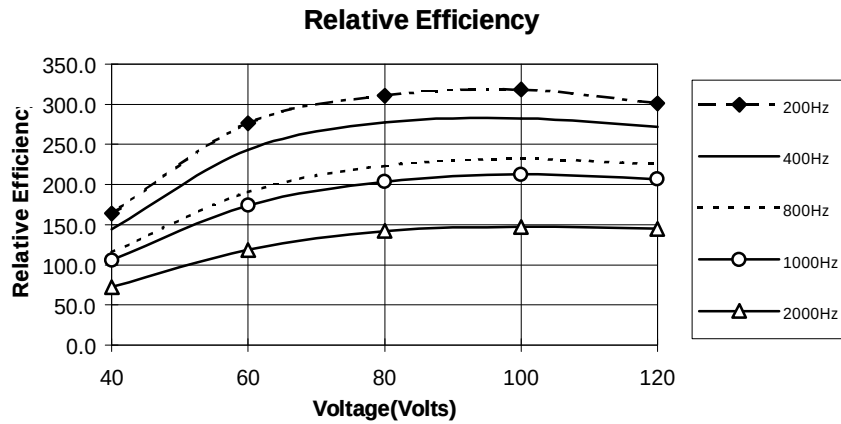
Voltage (VRMS)	200Hz	400Hz	800Hz	1000Hz	2000Hz
5	5.1	5.0	4.9	4.9	4.7
20	5.1	5.0	4.9	4.9	4.8
40	5.3	5.1	5.0	5.0	4.9
60	5.6	5.4	5.4	5.3	5.2
80	5.9	5.8	5.7	5.7	5.6
100	6.3	6.2	6.1	6.1	6.0
120	6.4	6.3	6.2	6.2	6.1

**Power Consumption (milliWatt/meter)**

Voltage(VRMS)	200Hz	400Hz	800Hz	1000Hz	2000Hz
5	0.2	0.3	0.6	0.8	1.7
20	2.5	4.9	9.7	12.2	25.5
40	9.1	20.2	39.9	49.7	103.6
60	22.8	47.8	97.1	118.9	250.5
80	49.6	89.8	177.2	226.6	475.4
100	88.0	147.0	291.8	366.4	783.8
120	154.4	227.5	442.2	557.2	1170.6



Relative Efficiency					
Voltage(VRMS)	200Hz	400Hz	800Hz	1000Hz	2000Hz
40	164.0	144.5	115.6	105.9	72.6
60	276.3	243.4	190.6	174.1	118.8
80	310.5	277.1	223.2	203.3	142.2
100	318.2	282.2	231.6	212.8	147.5
120	301.0	271.8	224.9	206.7	145.0



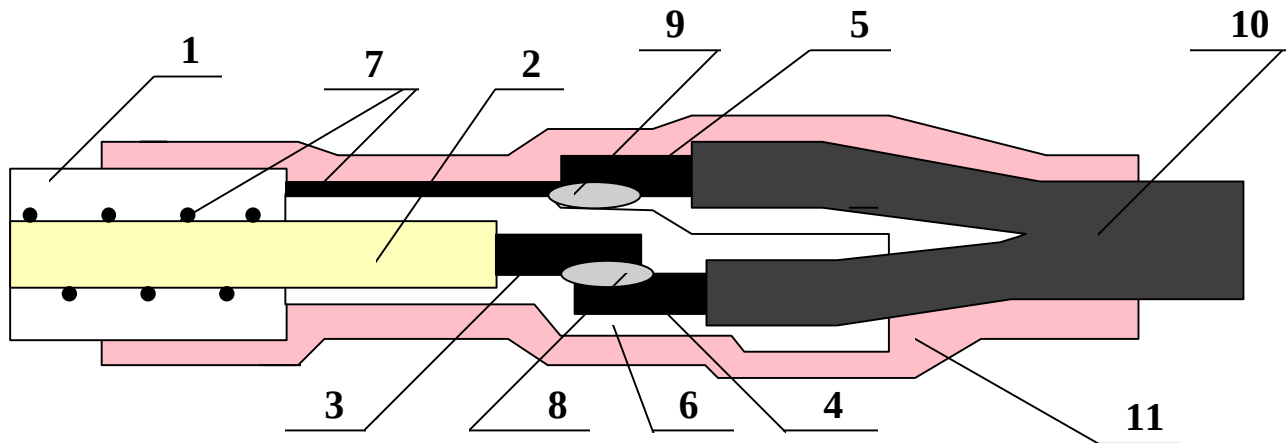
Contact Preparation

Fig. 1

Step by step instructions for connection preparation:

1. Strip the external insulator(1) off using a usual wire stripper. Be careful not to damage the additional electrodes (7).
2. Pull the free ends of the additional electrodes(7) back 3.Strip the dielectric layers(2) off the core copper electrode(3) using a magnet wire stripper or a sharp knife.
4. Strip the insulation off both edges (4 and 5) of a dual conductor flexible insulated wire(10) leaving the ends ~4cm long.
5. Put a 3 cm long shrinkable tube (6) on the insulated wire (4), solder the edge of wire (4) to the core electrode (3), pull the tube (6) to cover the soldering area (8) and shrike the tube (6) with the heat gun.
6. Bring the free ends of the additional electrodes (7) forward and solder them to the edge of the insulated wire (5).
7. Cover the contact areas (8 and 9) with a 6 cm long shrinkable tube (11) in such way that one side of the tube (11) is on top of the ELF (1) and the other side is on top and shrink it using a heat gun.
8. The ELF can be connected to an AC power source by soldering contacts A and B.

- Recommended Components:

- (6) 3M Shrink Tubing 1/8 inch 80610220230 MW Black
or Raychem Shrink Tubing CGAT 3/1-0 MW Black
- (11) 3M Shrink Tubing 1/4 inch 80610220255 MW Black
or Raychem Shrink Tubing CGAT 6/2-0 MW Black

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ELF Free End Termination

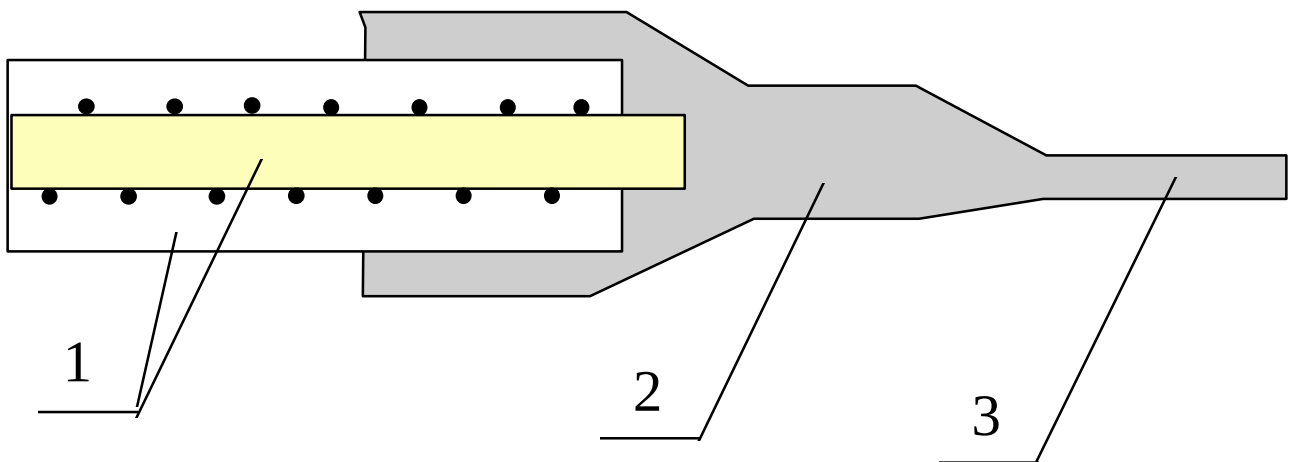


Fig. 3

1. ELF
2. Shrinkable Tube
3. Shrink Edge Sealed off

It is recommended to terminate the free end of the ELF to reduce moisture penetration into the phosphor layers.

- Recommended Components:
 - (2) 3M Shrink Tubing 1/8 inch 80610220230 MW Black
 - or Raychem Shrink Tubing CGAT 3/1-0 MW Black