

Torres Rojas, Genara

FOJ#12494

From: ckelly@smartstartlighting.com
Sent: Friday, July 29, 2011 10:41 AM
To: Duffy, Daniel
Cc: Torres Rojas, Genara; Van Duyne, Sheree
Subject: Freedom of Information Online Request Form

Information:

First Name: Colin
Last Name: Kelly
Company: Smart Start Lighting
Mailing Address 1: 784 Monmouth Rd
Mailing Address 2:
City: Cream Ridge
State: NJ
Zip Code: 08514
Email Address: ckelly@smartstartlighting.com
Phone: 908-770-6733
Required copies of the records: Yes

List of specific record(s):

Bid documents submitted by Turtle and Huges regarding Bid Doc 24420 .IES Files, Photometric renderings, LM79, LM80, WOE Certification, Port Certification, EMC testin reports, assembly drawings, Wiring diagrams, UL Certification, and Product spec sheets for the submitted LED Tube

THE PORT AUTHORITY OF NY & NJ

Daniel D. Duffy
FOI Administrator

February 14, 2012

Mr. Colin Kelly
Smart Start Lighting
784 Monmouth Rd
Cream Ridge, NJ 08514

Re: Freedom of Information Reference No. 12494

Dear Mr. Kelly:

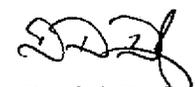
This is a response to your July 29, 2011 request, which has been processed under the Port Authority's Freedom of Information Policy for copies of the bid documents submitted by Turtle and Huges regarding Bid No. 24420.

Material responsive to your request and available under the Policy, which consists of 121 pages, will be forwarded to your attention upon receipt of a photocopying fee of \$30.25 (25¢ per page). Payment should be made in cash, certified check, company check or money order payable to "The Port Authority of New York & New Jersey" and should be sent to my attention at 225 Park Avenue South, 17th Floor, New York, NY 10003.

Certain material responsive to your request is exempt from disclosure pursuant to exemption (1) of the Policy.

Please refer to the above FOI reference number in any future correspondence relating to your request.

Sincerely,



Daniel D. Duffy
FOI Administrator

225 Park Avenue South
New York, NY 10003
T: 212 435 3642 F: 212 435 7555



REQUEST FOR QUOTATION

Vendor No. 120192
TURTLE & HUGHES, INC.
LINDEN NJ 07036

RFQ Number / Bid Due Date
6000101376 / 04/29/2011

Quantity	Description	Unit Price	Total
	<p>This is a Formal Bid Invitation Mail Sealed Bids to:</p> <p>The Port Authority of NY & NJ Attn: Bid Custodian Procurement Department One Madison Avenue, 7th Floor New York, N.Y. 10010</p> <p>by the date and time listed above, where it will be publicly opened and read.</p> <p>Bids are only accepted Monday through Friday, excluding Port Authority holidays, between the hours of 8 A.M. & 5 P.M., via regular mail, express delivery service or hand delivery.</p> <p>If you do not use or have an envelope provided, you must clearly mark the outside envelope/package with 'BID ENCLOSED' and show the company name, address, as well as Bid number and Due date as stated on this bid document.</p> <p>A valid photo id is required to gain access into the building, to attend the bid opening or hand deliver a bid.</p>		
	LED LAMPS		
	PLEASE QUOTE FULLY DELIVERED PRICES	PAYMENT TERMS	Total Delivered Price

This Quotation is subject to the terms and conditions set forth on the back page hereof. Bidder is advised to read these before signing. We have read the instructions and, if favored with an order, we agree to furnish the items enumerated herein at the prices and under the conditions indicated.

Signed _____
Firm Name _____
Telephone number _____ Date _____
Fax Number _____
Federal Taxpayer ID _____

Bidder
Must
Sign
in
Two
Places

NOTICE TO BIDDERS: Unless the following term of assurance that the above offer is irrevocable is signed, the offer submitted herein shall not be deemed to be complete.

The foregoing offer shall be irrevocable for 90 days after the date on which the Port Authority of New York and New Jersey opens this proposal.

Signed _____ Date _____
Firm Name _____



REQUEST FOR QUOTATION

Vendor No. 120192
TURTLE & HUGHES, INC.
LINDEN NJ 07036

RFQ Number / Bid Due Date
6000101376 / 04/29/2011

Quantity	Description	Unit Price	Total
	<p>Furnish and deliver light emitting diode (LED) lamp to replace existing 96-inch (GE Model 15358, F96/T12 75W, single-pin base) and 72-inch (GE Model 13743, F72/T12, 55W, single-pin base) fluorescent tubular lamps used for providing tunnel roadway illumination. The LED lamps will be installed by the Port Authority in existing light fixtures using the existing sockets and will be enclosed inside gasketed tempered glass tubes. The retrofitted lighting system shall meet the current Illuminating Engineering Society of North America RP-22-05 Recommended Practices for Tunnel Lighting.</p> <p>The procurement will be in two parts:</p> <p>1. PRE-PRODUCTION TESTING: The Port Authority will purchase twenty-four (24) LED lamps (each ninety-six (96)-inches in length) and two (2) LED lamps (each seventy-two (72)-inches in length) from the selected manufacturer for a pre-production evaluation. The pre-production lamps shall be delivered to the Port Authority within forty-five (45) calendar days upon written notification from the Port Authority. Payment shall be net sixty (60) days. All pre-production LED lamps shall be of identical design, components, and assembly.</p> <p>2. PURCHASE OF REMAINING LED LAMPS: Contingent upon verification, testing, and at the sole discretion of the Authority, the balance - quantity of three thousand six hundred and forty seven (3,647) 96-inch and fifty-eight (58) 72-inch</p>		
	PLEASE QUOTE FULLY DELIVERED PRICES	PAYMENT TERMS	Total Delivered Price

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Signed _____ Date _____
Firm Name _____



THE PORT AUTHORITY OF NY & NJ

1 Madison Avenue, 7th Floor, New York NY 10010

REQUEST FOR QUOTATION

Vendor No. 120192
TURTLE & HUGHES, INC.
LINDEN NJ 07036

RFQ Number / Bid Due Date
6000101376 / 04/29/2011

Quantity	Description	Unit Price	Total
	<p>lamps will be purchased. All specification requirements and test criteria shall be binding to the procurement of the lamps for permanent installation. Payment shall be net thirty (30) days.</p> <p>Pricing:</p> <p>(60) 72" LED lamps x \$ <u>93.50</u> = \$ <u>5610.00</u></p> <p>(3,671) 96" LED Lamps x \$ <u>113.06</u> = \$ <u>414,823.00</u></p> <p>Grand Total \$ <u>420,433.00</u></p> <p>NOTE: Since the wattage of the new LED lamps has ongoing impacts on the operating costs of the tunnel, the Port Authority is seeking the most efficient lamp at the best pricing. Accordingly, the bid shall be adjusted to reflect the energy efficiency of the LED lamp. The adjustment shall be applied only to those lamps exceeding 5.00 watts per foot. Lamps exceeding 6.00 watts per foot shall not be accepted. For lamps 5.00 watts or less, the adjustment will equal zero (0). The adjustment is being added to the base bid price for evaluation purposes only. If applicable, please note the total adjustment for lamps that exceed 5.00 watts per foot, up to 6.00 watts per foot below, based on the following formulas:</p>		
	<p>PLEASE QUOTE FULLY DELIVERED PRICES</p>	<p>PAYMENT TERMS</p>	<p>Total Delivered Price <u>420433.00</u></p>

This Quotation is subject to the terms and conditions set forth on the back page hereof. Bidder is advised to read these before signing.

We have read the instructions and, if favored with an order, we agree to furnish the items enumerated herein at the prices and under the conditions indicated.

Signed _____
Firm Name _____
Telephone number _____ Date _____
Fax Number _____
Federal Taxpayer ID _____

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The foregoing offer shall be irrevocable for 90 days after the date on which the Port Authority of New York and New Jersey opens this proposal.

Signed _____ Date 4/28/2011
Firm Name Turtle & Hughes, Inc.



REQUEST FOR QUOTATION

Vendor No. 120192
TURTLE & HUGHES, INC.
LINDEN NJ 07036

RFQ Number / Bid Due Date
6000101376 / 04/29/2011

Quantity	Description	Unit Price	Total
1	<p>60" Lamps: (37.1 (wattage of lamp) - 5) x 6 x 60 x 8760 x 0.145 x 5 + 1000 = \$ <u>50,528.556</u></p> <p>72" Lamps: (36.2 (wattage of lamp) - 5) x 8 x 3671 x 8760 x 0.145 x 5 + 1000 = \$ <u>5,837,956.0584</u></p> <p style="text-align: right;">Grand Total: \$ <u>5,888,484.6144</u></p> <p>WATTAGE PER FOOT = 4.5</p> <p>The item covers the following services: LED LAMPS</p>		
	<p style="writing-mode: vertical-rl; transform: rotate(180deg);">05-03-11 10:03:01 RCVD</p>	<p>PAYMENT TERMS</p>	<p>Total Delivered Price \$ <u>4,204,330.00</u></p>
	<p>PLEASE QUOTE FULLY DELIVERED PRICES</p>		

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NOTICE TO BIDDERS: Unless the following term of assurance that the above offer is irrevocable is signed, the offer submitted herein shall not be deemed to be complete.

Signed _____
Firm Name Turtle & Hughes Inc.
Telephone number 732 574 3600 Date 4/28/2011
Fax Number 732 574 3723
Federal Taxpayer ID _____

Bidder
Must
Sign
in
Two
Places

The foregoing offer shall be irrevocable for 90 days after the date on which the Port Authority of New York and New Jersey opens this proposal.
Signed _____ Date 4/28/2011
Firm Name Turtle & Hughes Inc.

TERMS AND CONDITIONS

1. The Port Authority (PA) reserves the right to request information relating to seller's responsibility, experience and capability to perform the work.
2. Unless otherwise provided, complete shipment of all items must be in one delivery FOB delivery point. Payment will not be made on partial deliveries unless authorized in advance by the party to be charged and the discount, if any, will be taken on the total order.
3. PA payment terms are net 30 days. Cash discounts for prompt payment of invoices may be taken but will not be considered in determining award, except in the case of tie bids.
4. Separate unit and total FOB delivered prices must be shown.
5. Sales to the PA and to PATH are currently exempt from New York and New Jersey State and local taxes and generally from federal taxation. The seller certifies that there are no federal, state, municipal or any other taxes included in the prices shown hereon.
6. The PA shall have the absolute right to reject any or all proposals or to accept any proposal in whole or part and to waive defects in proposals.
7. Unless the phrase "no substitute" is indicated, bidder may offer alternate manufacturer / brands, which shall be subject to Port Authority approval. Please indicate details of product being offered with bid.
8. Acceptance of seller's offer will be only by Purchase Order Form signed by the PA. No change shall be made in the agreement except in writing.
9. If the seller fails to perform in accordance with the terms of this purchase order, the PA may obtain the goods or services from another contractor and charge the seller the difference in price, if any, a reletting cost of \$100, plus any other damages to the PA.
10. Upon request, sellers are encouraged to extend the terms and conditions of any terms agreement with the PA to other government and quasi-government entities by separate agreement.
11. By signing this quotation or bid, the seller certifies to all statements on Form PA 3764 regarding non-collusive bidding; compliance with the PA Code of Ethics; and the existence of investigations, indictments, convictions, suspensions, terminations, debarments and other stated occurrences to assist the PA in determining whether there are integrity issues which would prevent award of the contract to the seller. The PA has adopted a policy set forth in full on PA 3764, that it will honor a determination by an agency of the State of New York or New Jersey that a bidder is not eligible to bid on or be awarded public contracts because the bidder has been determined to have engaged in illegal or dishonest conduct or to have violated prevailing wage legislation. The Terms and Conditions of PA 3764 apply to this order. A copy can be obtained by calling (212) 435-3902 or at <http://www.panynj.gov/pdf/PA3764.pdf>.
12. The vendor may subcontract the services or use a supplier for the furnishing of materials required hereunder to such persons or entities as the Manager, Purchasing Services may from time to time expressly approve in writing. All further subcontracting shall also be subject to such approval.
13. The successful bidder (vendor) shall not issue nor permit to be issued any press release, advertisement, or literature of any kind, which refers to the Port Authority or that goods will be, are being or have been provided to it and/or that services will be, are being or have been performed for it in connection with this Agreement, unless the vendor first obtains the written approval of the Port Authority. Such approval may be withheld if for any reason the Port Authority believes that the publication of such information would be harmful to the public interest or is in any way undesirable.

DIVISION 16

SECTION 16555C

LIGHT EMITTING DIODE (LED) DIRECT REPLACEMENT LAMP

PART I - GENERAL

1.01 SUMMARY

- A. The specification describes the requirements for a light emitting diode (LED) lamp to replace existing 96-inch (GE Model 15358, F96/T12 75W, single-pin base) and 72-inch (GE Model 13743, F72/T12, 55W, single-pin base) fluorescent tubular lamps used for providing tunnel roadway illumination. The LED lamps will be installed by the Port Authority in existing light fixtures using the existing sockets and will be enclosed inside gasketed tempered glass tubes. For details of existing installation, see Appendix C. The retrofitted lighting system shall meet the current Illuminating Engineering Society of North America RP-22-05 Recommended Practices for Tunnel Lighting.
- B. The procurement will be in two parts:
1. PRE-PRODUCTION TESTING: The Port Authority will purchase twenty-four (24) 96" LED lamps and two (2) 72" lamps. Lamps will be purchased for the purpose of testing and verification that all requirements of the specifications are met. Additional testing will be performed by the Port Authority to verify electromagnetic compatibility and electromagnetic interference (EMC/EMI) with existing radio systems operating inside the tunnel.
 2. PURCHASE OF REMAINING LED LAMPS: Contingent upon verification, testing, and at the sole discretion of the Port Authority, all specification requirements and test criteria shall be binding to the procurement of the lamps for permanent installation.

1.02 REFERENCES

- A. The LED lamp described in this specification shall meet the requirements of the following standards, codes, and regulatory agencies:
1. American National Standards Institute (ANSI)
 - a. ANSI C 2 - National Electrical Safety Code
 - b. ANSI C78.377- 2008 - Specifications for the Chromaticity of Solid State Lighting Products
 - c. ANSI C82.SSL1- Power Supply
 - d. ANSI C82.77-2002 - Harmonic Emission Limits - Related Power Quality Requirements for Lighting
 2. American Association of State and Highway Transportation Officials (AASHTO)
 3. American Society for Testing and Materials (ASTM)
 4. Department of Defense

- a. MIL-STD-461F – Requirements for the Control of Electromagnetic Interference and Emissions Susceptibility (This requirement is applicable to 1.01.B.1, Purchase of Remaining LED Lamps).
5. Department of Energy (DOE)
 - a. LED Luminaire Lifetime: Recommendations for Testing and Reporting
6. Federal Communications Commission (FCC)
 - a. 47 CFR Part 15 - Radio Frequency Devices Underwriters Laboratories
7. Federal Trade Commission (FTC)
 - a. The Energy Policy Act of 1992
 - b. Lamp Efficiency Labeling and Standards
8. Illuminating Engineering Society of North America (IESNA)
 - a. TM-16-05 - Technical Memorandum on Light Emitting Diode (LED) Sources and Systems
 - b. RP-22-05 - Recommended Practices for Tunnel Lighting
 - c. LM-71-96 - Approved Guide for Photometric Measurement of Tunnel Lighting Installations
 - d. LM-80-08 - Lumen Maintenance
9. National Fire Protection Association (NFPA)
 - a. NFPA 101- Life Safety Code
 - b. NFPA 70-2005 - National Electrical Code International Building Code, New Jersey Edition (NJ IBC)
10. New York City Electrical Code (NYCEC)
11. The International Code Council (ICC) Unified Building Code
12. Underwriters Laboratories (UL)
 - a. UL 1598 - Retrofit Luminaire Conversions
 - b. UL 8750 - Outline of Investigation for Light-Emitting Diode (LED) Light Sources for Use in Lighting Products

1.03 DESIGN AND PERFORMANCE REQUIREMENTS

- A. The LED lamp shall be designed to meet all requirements of IESNA RP-22-05, including but not limited to: veiling luminance, flicker effect, luminance values, and uniformity. The LED lamp shall conform to all references listed in paragraph 1.02. Maintained luminance of the interior zone shall be a minimum of five-candela per square meter (5 cd/sqm) at the road surface, with a uniformity ratio below 3:1. Average pavement luminance of the interior zone shall meet IESNA RP-22-05 for Heavy traffic at 35 mph. The tunnel wall up to ten (10) feet above the roadway shall have at least an average luminance of one-third of the average roadway level as defined in the IESNA RP-22-05 standard.

- B. The LED lamp shall be designed for continuous operation under the following environmental conditions:
 - 1. Temperature: Minus twenty (-20) degrees centigrade to plus forty-five (45) degrees centigrade.
 - 2. Humidity: Eighty (80) percent relative humidity.
- C. Lamp and lamp components shall be Restriction of Hazardous Substances (RoHS) compliant.
- D. Lamp power consumption shall not exceed 6.00 watts per foot. (Measured at a twenty-five (25) degree centigrade ambient temperature and two hundred and seventy-seven (277) Volts).
- E. Lumen depreciation cannot exceed 30% over a five (5)-year period based on running the lamp 100% of the time.

1.04 QUALITY ASSURANCE

- A. Entities manufacturing lamps and lamp components specified herein shall have a minimum of three years manufacturing experience in LED lighting production.
- B. Lamps and lamp components for which there is a nationally recognized standard shall be safety tested by a Nationally Recognized Testing laboratory, such as Underwriters Laboratories Inc. (UL), or approved equal, and bear conformance labeling by the third party inspection authority certifying that the lamp or lamp component is listed as suitable for the purposes specified.

1.05 DELIVERY, STORAGE, AND HANDLING

- A. Deliver materials in unopened protective packaging. Handle materials in a manner to prevent damage. Any lamps damaged during shipping shall be replaced at no cost to the Port Authority.

1.06 SUBMITTALS

- A. See Appendix A for submittal requirements.

PART II – PRODUCTS

2.01 MANUFACTURERS

- A. Subject to compliance with the requirements of this Section, diodes shall be as made by one of the below manufacturers or an approved equal as determined by the Port Authority:
 - 1. AVAGO
 - 2. CREE
 - 3. LUMILED
 - 4. NICHIA
 - 5. OSRAM/SYLVANIA
- B. All diodes shall be from one manufacturer; the use of diodes from multiple manufacturers will not be accepted.

2.02 MATERIALS

- A. Any item, accessory or component not identified in the specifications but necessary or required for the proper fabrication, installation or operation in carrying out the intent of these specifications, shall be furnished as though they were specifically delineated, described, or mentioned.
- B. Light Emitting Diodes (LEDs):
1. All LED's shall be "InGaN" Indium Gallium Nitride technology and L70 life rated for 50,000 hours @ 25°C ambient.
 2. All supplied LEDs shall fall within a two-step MacAdam Ellipse, as per IESNA LM-80.
 3. All LED's shall have a Color Rendering Index (CRI) of 70+.
 4. All LED's shall have a Color Temperature of 6500°K or less. Lamps consisting of diodes with major varying degrees of color temperature will not be accepted.
- C. LED Lamp Construction
1. LED lamps shall be ninety-six (96)-inches and seventy-two (72)-inches in length. No other lengths are acceptable.
 2. LED lamps shall not exceed T12 in diameter. However, all lamps, regardless of length, shall be of the same diameter.
 3. LED lamp shall be designed for mounting in existing fluorescent single pin connection.
 4. Optical System:
 - a. The optical system shall provide adequate light distribution onto roadway and minimize disabling glare.
 - b. For optimum light distribution, all light must exit the lamp in 100° - 120° cone.
 - c. Asymmetric distribution is preferred.
 - d. Manufacturer to provide means or marks on LED lamp to facilitate field aiming the lamp in order to comply with the manufacturer's computer modeling.
 5. Lamphshell shall have a clear polycarbonate lens / aluminum body.
 6. Individual LED modules shall be wired so that a catastrophic failure of one LED module will result in a loss of the damaged LED module only and shall not result in a failure of the entire lamp.
 7. Heat sinking shall be provided to maintain L70 life and lumen output. The ambient temperature and the temperature at the p-n junction of the photodiode shall be controlled by use of an appropriately sized heat sink.
 8. Quality of Visual Environment and Glare
 - a. The LED lamp light distribution shall be designed such that it does not provide disabling glare to drivers or flicker effect.
 - b. Polar plots given in photometric reports depict the pattern of light emitted through the ninety degree (90°) (horizontal) plane and zero degree (0°)

(vertical) plane. In general, LED lamp must provide a reduction in luminous intensity in the seventy degree (70°) to ninety degree (90°) vertical angles to avoid glare.

9. The LED lamps shall be rated for 277-Volt, 1 phase operation.
10. The LED lamp shall be designed to keep the wattage constant for the L80 life of the lamp while allowing the light levels to diminish to no less than the requirements of 1.03. LED lamps that vary wattage over time, while maintaining light levels, are not acceptable.
11. Total LED lamp weight shall not exceed three (3) pounds.
12. Total harmonic distortion induced into an AC power line by a LED lamp shall not exceed twenty (20) percent.

D. POWER SUPPLY

1. Power supply must be integral to the LED lamp.
2. Operating life of power supply shall be a minimum of fifty thousand (50,000) hours.
3. Power supply shall be designed to operate from a supply voltage 277 Volts AC \pm 10 percent, 60Hz. Power supplies rated 90V – 277V are acceptable.
4. The power supply shall provide a power factor of 0.90 or greater.

2.03 ELECTROMAGNETIC COMPATIBILITY & ELECTROMAGNETIC INTERFERENCE (EMC / EMI) TO BE TESTED BY THE PORT AUTHORITY:

- A. The lamps will be subject to the following existing environment: close proximity of the existing radiating antenna cables to the existing lighting fixtures. The radiating antenna cables are located at a distance approximately one-foot to one-inch from the existing lighting fixtures. These conditions are applicable to paragraph 1.01.B.1 (Pre-production Testing) and paragraph 1.01.B.2 (Purchase of Remaining LED Lamps).

Standard equipment specifications and associated parameters for radio and wireless system performance reliability are applicable.

- B. EMC/EMI requirements for the permanent installation as applicable to paragraph 1.01.B.2:
 1. The LED lamp assembly, including electrical and electronics components, shall not present harmful interference to the existing radio systems operating in the AM, FM, Personal Communications Service (PCS), Advance Wireless Service (AWS), VHF, UHF, and 800 MHz radio frequencies bands.
 2. The LED lamp assembly, including electrical and electronics components, shall not experience any degradation in performance due to operation in the existing environment.
- C. The test criteria per paragraph 1.01.B.1 (Pre-production Testing) will apply as binding qualifiers and requirements for 1.01.B.2 (Purchase of Remaining LED Lamps).

2.04 LABELING

- A. Lamps and lamp packaging shall be labeled with the date of manufacture (month, day, and year) along with a lot number.

PART III – EXECUTION

3.01 INSTALLATION

- A. Installation of the LED lamps will be done by the Port Authority. Existing fluorescent lamp ballasts and starters will be removed by the Port Authority prior to installing LED lamps into existing fixtures.

3.02 PRE-PRODUCTION TESTING

- A. The Port Authority will purchase twenty-four (24) LED lamps (each ninety-six (96)-inches in length) and two (2) LED lamps (each seventy-two (72)-inches in length) from the selected manufacturer for a pre-production evaluation. Upon written request, the manufacturer shall fabricate and supply the lamps to the Port Authority. The pre-production lamps shall be delivered to the Port Authority within forty-five (45) calendar days upon written notification from the Port Authority. All pre-production LED lamps shall be of identical design, components, and assembly.
- B. The lamps will be tested by the Port Authority for compliance with IESNA RP-22-05, to confirm the computer modeling.
- C. Light level measurement (Luminance): All light level measurements will be performed by the Port Authority based on IESNA LM-71-96.
- D. The LED lamp assembly, including electrical and electronics components, will be tested by the Port Authority for the subject of electromagnetic compatibility and electromagnetic interference with the existing tunnel radio systems operating in the AM, FM, VHF, UHF, 800 MHz, PCS, and AWS radio frequencies bands. The test criteria and methods will be based on FCC rules, and the MIL-STD-461F standard, as well as on any other requirements necessary to ensure LED Lamp compatibility in the tunnel environment per paragraph 2.03.
- E. The testing of the pre-production lamps will be for a minimum of forty-five (45) calendar days to ensure that the lamps:
 - 1. Meet IESNA RP-22-05.
 - 2. Do not interfere with the existing tunnel radio systems.
 - 3. Meet the specifications stated herein.
- F. Approval or rejection of the pre-production LED lamps, notwithstanding compliance with the requirements specified herein, and without assigning any reason(s), therefore shall be at the sole discretion of the Port Authority. If the pre-production LED lamps receive Port Authority approval, then the Port Authority may purchase the remaining quantity of lamps requested.
- G. If the pre-production LED lamps are rejected (not approved) by the Port Authority due to non-compliance with the requirements specified herein, the bidder, at the bidder's expense, may be given up to forty-five (45) calendar days by the Port Authority, from the date that the bidder was notified of the rejection, to remedy the reason or reasons for the non-compliance. In the event that the bidder fails to remedy the non-compliance within the forty-five (45) days provided, the Port Authority, in its sole discretion, may reject the bidder's Proposal for the purchase of the remaining LED lamps.

3.03 PURCHASE OF REMAINING LED LAMPS

- A. Upon written notification from the Port Authority, deliver 100 percent of the balance - quantity of three thousand six hundred and forty seven (3,647) 96-inch and fifty-eight (58) 72-inch lamps no later than twelve (12) weeks. The balance of lamps shall be delivered in their entirety, as one shipment. Partial deliveries of the lamps will not be accepted.
- B. All LED lamp design, components and assembly shall be identical to the tested and approved pre-production LED lamps to ensure compliance to the test results.

3.04 PAYMENT TERMS

- A. The payment terms for the purchase of the pre-production lamps shall be Net 60 days.
- B. The payment terms for the balance of the remaining lamps (if purchased) shall be Net 30 days.

3.05 WARRANTY

- A. Provide written warranty on the lamp and lamp components for a period of three years from the date of delivery acceptance. Any lamp defective in manufacture or fails to meet the design and performance requirements within the three (3)-year warranty period shall be replaced without cost or obligation to the Port Authority.

PART IV – PERFORMANCE EVALUATION**4.01 PRICING**

- A. Since the wattage of the new LED lamps has ongoing impacts on the operating costs of the tunnel, the Port Authority is seeking the most efficient lamp at the best pricing. Accordingly, the bid shall be adjusted to reflect the energy efficiency of the LED lamp. The adjustment shall be applied only to those lamps exceeding 5.00 watts per foot. Lamps exceeding 6.00 watts per foot shall not be accepted. For lamps 5.00 watts or less, the adjustment will equal zero (0). The adjustment is being added to the base bid price for evaluation purposes only. If applicable, please note the total adjustment for lamps that exceed 5.00 watts per foot, up to 6.00 watts per foot based on the following formulas:

- a. 60" Lamps: $(\text{wattage of lamp}) - 5 \times 6 \times 60 \times 8760 \times 0.145 \times 5 \div 1000$
- b. 72" Lamps: $(\text{wattage of lamp}) - 5 \times 8 \times 3671 \times 8760 \times 0.145 \times 5 \div 1000$

END OF SECTION

DIVISION 16
SECTION 16555C
LIGHT EMITTING DIODE (LED) DIRECT REPLACEMENT LAMP
APPENDIX A
SUBMITTAL REQUIREMENTS

The following shall be submitted within five (5) business days of notification from the Port Authority to determine compliance with the requirements specified in the document entitled "Division 16. Section 16555C. Light Emitting Diode (LED) Direct Replacement Lamp":

- A. Assembly Drawings
 - 1. Provide an illustration showing the basic lamp assemblies, dimensions (including length and diameter), and assembly materials.
- B. Catalog cut sheets and specifications:
 - 1. For the LED showing the following:
 - a. Type of LED, Manufacturer and Part Number
 - 2. For the LED lamps showing the following:
 - a. Restriction of Hazardous Substances (RoHS) compliancy
 - b. Input Voltage / Amperage
 - c. Energy Consumption in Watts
 - d. Efficacy in Lumens per Watt
 - e. Color Rendering Index (CRI)
 - f. Color Temperature
 - g. Total Lumens
 - h. Total Weight
 - i. Operating Life
 - 3. For the power supply showing the following:
 - a. Manufacturer and Part Number
 - b. Operating Life
 - c. Power Factor
 - d. Operating Voltage /Amperage
 - e. Total Harmonic Distortion
 - f. Wiring Diagram

C. Certified Test Reports

1. Provide the following information prepared by an independent testing laboratory for qualifications for pre-production testing and for permanent installation:
 - a. Candela distribution data, presented graphically and numerically in no more than five (5) degree increments (5, 10, 15, etc.). Data developed for up and down quadrants normal, parallel and at 22.5, 45, 167.5 degrees to fixture axis if light output is asymmetric.
 - b. Zonal lumens stated numerically in ten (10) degree increments (10, 20, etc.) and LED lamp efficiency.
 - c. Luminance table with data presented numerically, showing maximum luminance of the LED lamp at the shielding angles. Readings should be taken both crosswise and lengthwise.
 - d. Input Watts.
 - e. LED lamp efficiency.
 - f. LM-80 Test Report
 - g. FCC Part 15 Certificate of Compliance.

D. Computer Modeling

1. In order to demonstrate compliance of the proposed LED replacement lamps to the IESNA RP-22-05 requirements, submit lighting calculation for 100 running feet of tunnel.
 - a. Calculation Parameters:
 - 1) LLF – 0.58 including:
 - a) Power Supply Loss;
 - b) Tunnel Surface Dirt Depreciation;
 - c) LED Lamp Lumen Depreciation
 - 2) Reflectance's:
 - a) Ceiling – 20%;
 - b) Walls – 50% Reflectance;
 - c) Roadway Classification R4 – smooth texture asphalt.
 - 3) Existing Tunnel Lighting:
 - a) The existing fluorescent fixtures are spanned between existing power node pockets (former recessed light boxes), which are roughly twenty-foot on center, so that two (8) feet fluorescent fixtures are located in between the 20-foot span, with two (2) feet between the lamps.
 - b) For fixture locations, tunnel cross-section, and dimensions see Appendix B.
2. All modeling shall be performed in AGI32 version 2.02 or later. No other modeling software shall be accepted.

- a. Provide a complete listing of all reflectances used for computer modeling.
- b. All assumptions used in the modeling shall be submitted in tabular form as well as in the submitted files. This shall include LED lamp efficiency, lumen depreciation, surface reflectance values (roadway, ceiling, and walls), power supply efficiency, lumen value at design junction temperature and drive current, drive current and forward voltage, etc.
- c. All calculations shall be run with an internal summer tunnel temperature of forty-five (45) deg C.
- d. Point by points shall be run on the roadway surface and tunnel walls for luminance (cd/sqm) and illuminance (Fc). This shall be performed for each of the following design conditions: Initial installation (less than 500 hours), five (5)-years, and ten (10)-years.
- e. The model shall be run in full calculation mode, utilizing the radiosity calculation engine to compute luminance (cd/sqm) for the roadway surface and tunnel walls. Veiling luminance shall also be included.
- f. Pseudo-color with scaling shall be provided.

In the event that any of the foregoing is requested and is not furnished within five (5) days thereafter, or within such additional time as the Port Authority, in its sole discretion, may allow, the Port Authority may not be in a position to determine whether the bidder is qualified, whether the bidder understands the requirements of the contract, or whether the bidder is responsive and may, in its sole discretion, reject the bidder's bid.

END OF APPENDIX A

10/20/10

DIVISION 16
SECTION 16555C
LIGHT EMITTING DIODE (LED) DIRECT REPLACEMENT LAMP
APPENDIX C

DETAILS OF EXISTING HOLLAND TUNNEL
FLUORESCENT LIGHT FIXTURES

Assembly "A" - Lamp Carriers

Assembly "A" is the combination of eight (8) feet or six (6) feet long lamp and the carrier type A8 or A6 respectively. The maximum length for an eight (8) feet long lamp including Carrier type A8 is approximately 120 inches and for six (6) feet long lamp including Carrier type A6 is approximately 90 inches. See Figure 3.42.

A part list per lamp assembly is listed below:

<u>No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Material</u>	<u>Finish</u>
1	1	Boot	#40 Durometer Neoprene	Black
2	1	Spinning	#.032 GA Aluminum	Natural
3	1	Carrier	Clean Glass	---
4	1	Ext. Channel	Aluminum	Natural
5	1	Low Voltage Contact	#.032 GA Aluminum	Silver Plated Contact Surface
6	1	Lamp	F72/T12 CW or F96/T12 CW	CW
7	1	High Voltage Socket	Kulka #572	Screw Contact
8	1	Ferrule	Bronze	Chrome Plated
9	1	Gasket	1-9/16 ID, 2-5/16 OD Neoprene	Blk Cemented to Ferrule

16555C-C1

10	1	Insulator	Havalex	Natural
11	1	End Cap	Bronze	Chrome Plated
12	1	Washer Gasket	3-1/8" OD X 1/16"	40 Dorometer
			Thk. Neoprene	Black
13	1	Washer Gasket	2-7/8" OD x 1/8"	60 Dorometer
			Thk. Neoprene	Black
14	1	Gasket Ring Clamp	Bronze	Chrome Plated
15	4	Fl. Hd. Ms. 8.32 x 3/8"	Phosphor Bronze	Chrome Plated
16	1	Low Voltage Sleeve	Brass	Silver Plated Brush Contact Surface
17	1	High Voltage Pin	Brass	Silver Plated Brush Contact Surface
18	2	Part #15 Screw	SS 8-32 x 1/4"	Natural

Assembly "B" - Spring Carrier

Assembly "B" is the combination of spring and the stainless steel tube. One side of the steel tube is welded to a 1/8" thick steel plate with a 1/4" center hole. The spring is made of stainless steel and is bolted with 1-1/4" bolt in the welded plate side. The spring is A.I.S.I. type 302, stress relieved at 550°F for 45 minutes, 11" long at rest, spring rate 2-1/2 lbs. per inch compression, deflection 7-3/4". The tube is stainless steel, cold drawn, O.D. - 3.5", I.D. - 3.37", lbs/in. ft. - 2.385. See Figure 3.43.

Assembly "C" - Socket Carrier

Assembly "C" is the combination of socket and the stainless tube. See Figure 3.44.

A part list of socket assembly is listed below:

<u>No.</u>	<u>Qty.</u>	<u>Description</u>	<u>Material</u>	<u>Finish</u>
1		Wire	Spec.	Spec.
2	1	Contact Block	Diallyl Phthalate	Brown
3	2	Brush	Beryllium Copper	Silver Plated
4	4	Round Head Machine Screw	#6-32 x 1/4" Brass	Cadmium
5	1	Round Head Machine Screw	#6-32 x 5/8" Brass	Cadmium
6	2	Hex. Nut	#6-32 Brass	Cadmium
7	1	Lock Washer	#6 Brass	Cadmium
8	3	Flat Head M/C Screw	10-22 x 1/4 St'l Steel	Passivated
9	3	Connector	See Spec.	---
10	1	High Voltage Contact	Beryllium Copper	Silver Plated



THE PORT AUTHORITY OF NY & NJ

Anthony R. Coscia
Chairman

Christopher O. Ward
Executive Director

Certified

by

Office of Business & Job Opportunity

Turtle & Hughes, Inc

Certificate PA-4860

This certificate acknowledges that the above named firm is certified as a **Women-owned Business Enterprise**. This company has met the criteria for ownership and control as established by the Port Authority Policy for Revised Minority, Woman and Small Business Enterprise (M/W/SBE) Programs, dated June 10, 1993.

This certification will remain in effect for five years from the date of notice and may be extended only upon submission by you, and acceptance by the Port Authority of a recertification application attesting that the ownership and control of the business, on which this certificate is granted, has not changed. This office must be notified within 30 days of any material changes in the business which affect ownership and control. Failure to do so may result in the revocation of this certification and/or imposition of other sanctions.

Lash Green
Director

Certified: July 1, 2010

Rosemary Jenkins Varela
Manager, Certification

Scheduled Re-evaluation: July 1, 2015

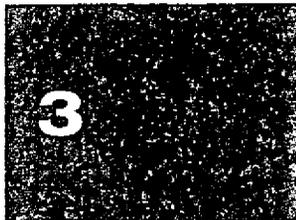


Submittal Requirements
Division 16, Section 16555C

Answers to Appendix A



Catalog Specifications Section
Cree PLCC4 Technical Sheets



Certified Test Report Section
Intertek Reports
#100044444CART-001
IES Photometric File



Computer Modeling Report AGI32



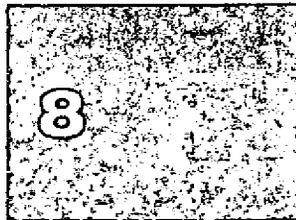
Approvals



5 Year Warranty Statement



The Port Authority of NY & NJ
Bid Doc 0000024420
dated 4/11/2011



CD Rom – Submittal Documents
(electronic format)

DIVISION 16

SECTION 16555C

LIGHT EMITTING DIODE (LED) DIRECT REPLACEMENT LAMP

ANSWERS TO APPENDIX A – SUBMITTAL REQUIREMENTS

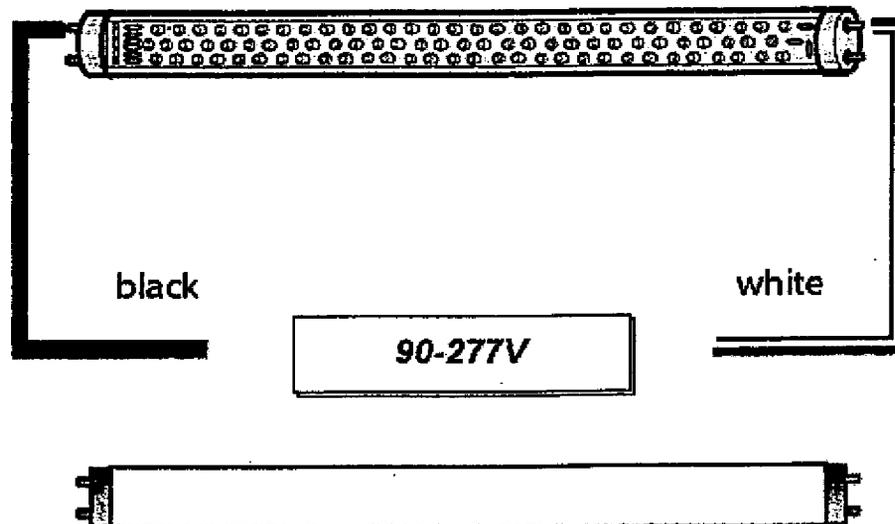
A) Assembly Drawings

- 1) Please refer to the "Catalog Specification Section" for details
- 2) Lamp length and diameter:
 - a) Length
 - (i) 6' lamp: 71.96 inches
 - (ii) 8' lamp: 94.75 inches
 - b) Diameter for both 6' and 8' lamps: 1.234 inches

B) Catalog cut sheets and specifications:

- 1) For the LED:
 - a) Type of LED
 - (i) Manufacturer: CREE
 - (ii) Part Number: PLCC4 (SMD)
- 2) For the LED lamps:
 - a) Ingress Protection (IP) Rating: IP54
 - b) Restriction of Hazardous Substances (RoHS) compliancy: YES
 - c) Input Voltage / Amperage:
 - (i) Voltage: 90-277v±10%
 - (ii) Amperage:
 - (a) 6' lamp: 0.093a
 - (iii) 8' lamp: 0.123a
 - d) Energy Consumption in Watts:
 - (i) 6' lamp: 27.9
 - (ii) 8' lamp: 37.2
 - e) Efficacy in Lumens per Watt: 93.82
 - f) Power Factor: 0.8745
 - g) Color Rendering Index: 83
 - h) Color Temperature: 5000K
 - i) Total Lumens:
 - (i) 6' lamp: 2618
 - (ii) 8' lamp: 3490
 - j) Harmonic Factor: 15%

- k) Total Weight:
 - (i) 6' lamp: 1.76lbs
 - (ii) 8" lamp: 2.3lbs
- l) Operating Life: 65,000 hours
- 3) For the Power Supply:
 - a) Manufacturer: Clean Light Green Light (CLGL)
 - (i) Part Number: 90-277VT10
 - b) Operating Life: 65,000 hours
 - c) Power Factor: 0.8745
 - d) Operating Voltage / Amperage:
 - (i) Voltage: 90-277v \pm 10%
 - (ii) Amperage:
 - (a) 6' lamp: 0.093a
 - (b) 8' lamp: 0.123a
 - e) Harmonic Factor: 15%
 - f) Wiring Diagram: Also see the lamp's Catalog Cut Sheet in the "Catalog Specification Section"



C) Certified Test Reports: "Certified Test Reports Section"

- 1) IES Road Report: Photometric Filename: 342 SMD LED TUBE C4603L.IES
- 2) 6' lamp report: Intertek report # 100044444CRT-005 for CLGL-T872-SMD, dated 3/11/2010
- 3) 8' lamp report: Intertek report # 100044444CRT-006 for CLGL-T896-SMD, dated 3/11/2010
- 4) The testing submitted are the LM79 and LM80 readings for our off the shelf 342 LED tube. We have used these numbers and years of testing to extrapolate the readings for a custom built 6' and 8' tube to match these specifications. In building a custom fixture, we will need to increase the drive voltage by a less than 20%. This drive voltage is very low start with. By increasing it we will be causing a 1.5 degree increase in the inner chip temperature. This will not in any way affect the lifetime rating supplied by Cree. We have built these models and custom

builds for many large multi-facility companies and this will in no way effect our ETL listing or lifetime and specification requirements.

Total lumens based on 342 LED tube using 18.6W and emitting 1746 lumens

6 foot = 2618 lumens

8 foot = 3490 lumens

Total watts

6 foot = 27.90 watts

8 foot = 37.20 watts

- D) Computer Modeling
 - 1) Test report is provided in "Computer Modeling Section"
 - 2) Color rendering has been provided
- E) CD with all results and drawings has been enclosed



**Clean Light
Green Light**

WHERE LED TECHNOLOGY LIVES



CLGL T872-SMD

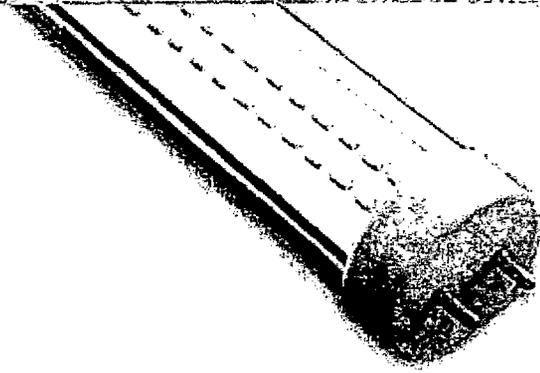
| 6 Ft. SMD LED Retrofit Tube |

Construction

100% Recyclable tube
Direct wire voltage, no ballast needed
Poly carb / Aluminum Tube
Heat Wick® heat sink technology
CREE SMD LED

Operating Ranges

Operating temperature range of -40 to 140°F
Operating humidity range of 10 - 99%

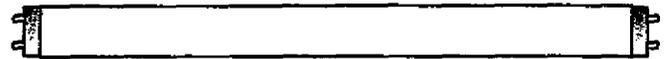
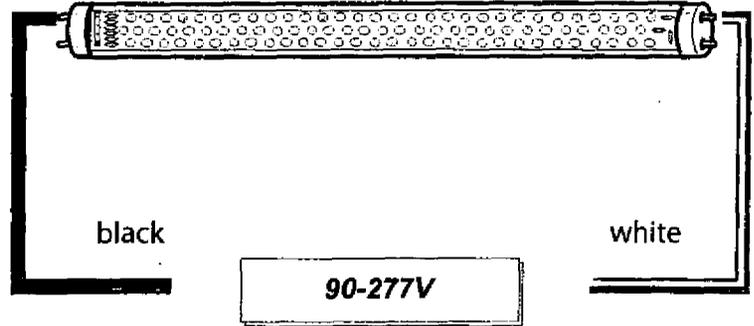


CLGL Design

24 hr run hard design
Engineered for use with standard T8 or T12 fixtures
No hazardous substances. ROHS compliant.
No mercury. No lead.
New single pin & recessed double contact end caps *

Applications

Fluorescent Replacements, Signage Lighting,
Cove Lighting, Outdoor Lighting, Under Cabinet Lighting,
Under Canopy Lighting, Parking Garages, Manufacturing
and Inspection Lighting



Model Details

Wattage	25.65
Lumens	2012.50
Approximate Weight	1 lbs. 7 oz.
Approximate Length	6 feet
Warranty	5 Year

Ordering Information

Please Fill Out Below

Model : CLGL T872-SMD

Lamp Quantity	Aluminum / Poly Carb	Voltage	Lamp Color
<input type="text"/>	<input type="text"/>	90 - 277V	<input type="text"/>

Aluminum (A) or Poly Carb (PC)

4100K (SW), 4600K (WW), 5000K (NW), 6500K (CW)
Custom CCT / RGB Ranges Available



**Clean Light
Green Light**

WHERE LED TECHNOLOGY LIVES



CLGL T896-SMD

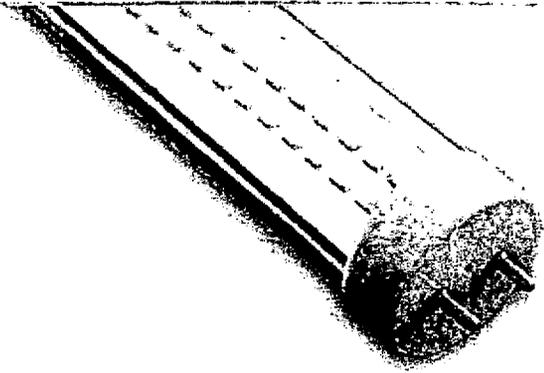
| 8 Ft. SMD LED Retrofit Tube |

Construction

100% Recyclable tube
Direct wire voltage, no ballast needed
Poly carb / Aluminum Tube
Heat Wick® heat sink technology
CREE SMD LED

Operating Ranges

Operating temperature range of -40 to 140°F
Operating humidity range of 10 - 99%

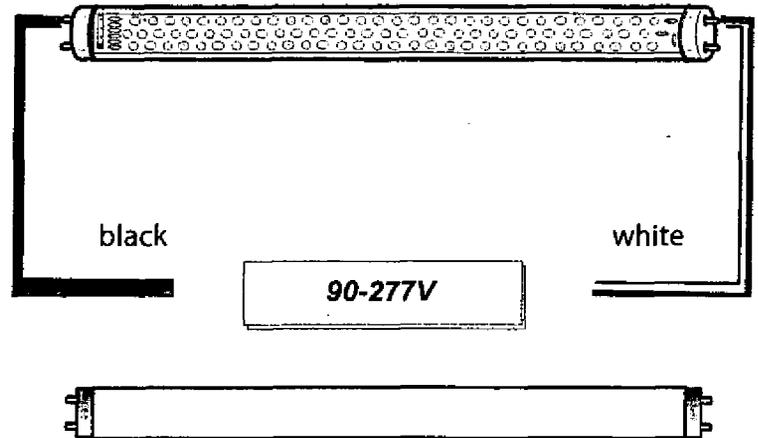


CLGL Design

24 hr run hard design
Engineered for use with standard T8 or T12 fixtures
No hazardous substances. ROHS compliant.
No mercury. No lead.
New single pin & recessed double contact end caps *

Applications

Fluorescent Replacements, Signage Lighting,
Cove Lighting, Outdoor Lighting, Under Cabinet Lighting,
Under Canopy Lighting, Parking Garages, Manufacturing
and Inspection Lighting



Model Details

Wattage	34.2
Lumens	2683
Approximate Weight	2 lbs. 3 oz.
Approximate Length	8 feet
Warranty	5 Year

Ordering Information

Please Fill Out Below

Model : CLGL T896-SMD

Lamp Quantity

Aluminum / Poly Carb

Aluminum (A) or Poly Carb (PC)

Voltage

90 - 277V

Lamp Color

4100K (SW), 4600K (WW), 5000K (NW), 6500K (CW)
Custom CCT / RGB Ranges Available

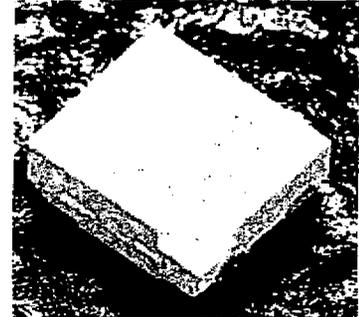
Cree® PLCC4 1 in 1 SMD LED

CLA1A-WKW/MKW

Data Sheet

SMD LEDs is packaged in the industry standard package. These LEDs have high reliability performance and are designed to work under a wide range of environmental conditions. This high reliability feature makes them ideally suited to be used under illumination application conditions.

Its wide viewing angle makes these LEDs ideally suited for channel letter, or general backlighting and illumination applications. The flat top emitting surface makes it easy for these LEDs to mate with light pipes.



FEATURES

- Size (mm): 3.2 x 2.8
- Color Temperatures (K):
CLA1A-WKW: Cool White : Min.(4600) / Typical (5500)
CLA1A-MKW: Warm White: Min. (2500) / Typical (3200)
- CRI :
Typical CRI for Cool White is 72
Typical CRI for Warm White is 80
- Viewing Angle: 120 degree
- Luminous Intensity (mcd):
Cool White (1800 - 4500)
Warm White (1400 - 3550)
- Lead-Free

- RoHS Compliant

APPLICATIONS

- Light Strip
- Channel Letter



Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Items	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_F	35	mA
Peak Forward Current ^{Note}	I_{FP}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_o	147	mW
Operation Temperature	T_{opr}	-40 ~ +100	$^\circ\text{C}$
Storage Temperature	T_{sto}	-40 ~ +100	$^\circ\text{C}$
Junction Temperature	T_j	110	$^\circ\text{C}$
Junction/Ambient	$R_{\theta JA}$	350	$^\circ\text{C/W}$
Junction/Solder Point	$R_{\theta JS}$	200	$^\circ\text{C/W}$

Note: Pulse width ≤ 0.1 msec, duty cycle $\leq 1/10$.

Typical Electrical & Optical Characteristics ($T_A = 25^\circ\text{C}$)

Characteristics	Color	Symbol	Condition	Unit	Minimum	Typical	Maximum
Forward Voltage	Cool/Warm	V_f	$I_f = 30$ mA	V		3.6	4.2
Reverse Current	Cool/Warm	I_R	$V_R = 5$ V	μA			10
Luminous Flux	Cool	Φ_v	$I_f = 30$ mA	mlm		7000	
	Warm	Φ_v	$I_f = 30$ mA	mlm		6000	
Luminous Intensity	Cool	I_v	$I_f = 30$ mA	mcd	1800	2600	
	Warm	I_v	$I_f = 30$ mA	mcd	1400	2000	
Chromaticity Coordinates		x	$I_f = 30$ mA			0.3325	
		y	$I_f = 30$ mA			0.3411	
	Warm	x	$I_f = 30$ mA			0.4234	
	Warm	y	$I_f = 30$ mA			0.3990	
50% Power Angle	Cool/Warm	$2\theta_{1/2}$	$I_f = 30$ mA	deg		120	



Intensity Bin Limit ($I_f = 30 \text{ mA}$)

Cool White

Bin Code	Min.(mcd)	Max.(mcd)
Xa	1800	2240
Xb	2240	2800
Ya	2800	3550
Yb	3550	4500

Warm White

Bin Code	Min.(mcd)	Max.(mcd)
Wb	1400	1800
Xa	1800	2240
Xb	2240	2800
Ya	2800	3550

Tolerance of measurement of luminous intensity is $\pm 10\%$.

VF Bin Limit ($I_f = 30 \text{ mA}$)

Cool White

Bin Code	Min.(V)	Max.(V)
27	2.8	3.0
28	3.0	3.2
29	3.2	3.4
2a	3.4	3.6
2b	3.6	3.8
2c	3.8	4.0
2d	4.0	4.2

Warm White

Bin Code	Min.(V)	Max.(V)
27	2.8	3.0
28	3.0	3.2
29	3.2	3.4
2a	3.4	3.6
2b	3.6	3.8
2c	3.8	4.0
2d	4.0	4.2

Tolerance of measurement of VF is $\pm 0.05\text{V}$.

Color Bin Limit ($I_f = 30 \text{ mA}$)

Cool White

Bin Code	Sub-bin	x	y
W1	Wa	0.2545	0.2480
		0.2633	0.2410
		0.2545	0.2245
		0.2450	0.2290
	Wb	0.2633	0.2410
		0.2720	0.2340
		0.2640	0.2200
		0.2545	0.2245
	Wc	0.2545	0.2480
		0.2640	0.2670
		0.2720	0.2575
		0.2633	0.2410
Wd	0.2633	0.2410	
	0.2720	0.2575	
	0.2800	0.2480	
	0.2720	0.2340	

Bin Code	Sub-bin	x	y
W2	We	0.2640	0.2670
		0.2735	0.2860
		0.2808	0.2740
		0.2720	0.2575
	Wf	0.2720	0.2575
		0.2808	0.2740
		0.2880	0.2620
		0.2800	0.2480
	Wg	0.2735	0.2860
		0.2830	0.3050
		0.2895	0.2905
		0.2808	0.2740
Wh	0.2808	0.2740	
	0.2895	0.2905	
	0.2960	0.2760	
	0.2880	0.2620	

Bin Code	Sub-bin	x	y
W3	Wj	0.2830	0.3050
		0.2950	0.3210
		0.2998	0.3028
		0.2895	0.2905
	Wk	0.2895	0.2905
		0.2998	0.3028
		0.3045	0.2865
		0.2960	0.2760
	Wm	0.2950	0.3210
		0.3070	0.3370
		0.3100	0.3150
		0.2998	0.3028
Wn	0.2998	0.3028	
	0.3100	0.3150	
	0.3130	0.2970	
	0.3045	0.2865	



Color Bin Limit ($I_f = 30 \text{ mA}$)

Cool White

Bin Code	Sub-bin	x	y
W4	Wp	0.3070	0.3370
		0.3185	0.3485
		0.3200	0.3270
		0.3100	0.3150
	Wq	0.3100	0.3150
		0.3200	0.3270
		0.3215	0.3075
		0.3130	0.2970
	Wr	0.3185	0.3485
		0.3300	0.3600
		0.3300	0.3390
		0.3200	0.3270
	Ws	0.3200	0.3270
		0.3300	0.3390
		0.3300	0.3180
		0.3215	0.3075

Bin Code	Sub-bin	x	y
W5	Wt	0.3300	0.3600
		0.3455	0.3725
		0.3443	0.3535
		0.3300	0.3390
	Wu	0.3300	0.3390
		0.3443	0.3535
		0.3430	0.3345
		0.3300	0.3180
	Wv	0.3455	0.3725
		0.3610	0.3850
		0.3585	0.3680
		0.3443	0.3535
	Ww	0.3443	0.3535
		0.3585	0.3680
		0.3560	0.3510
		0.3430	0.3345

Tolerance of measurement of the color coordinates is ± 0.01 .

Warm White

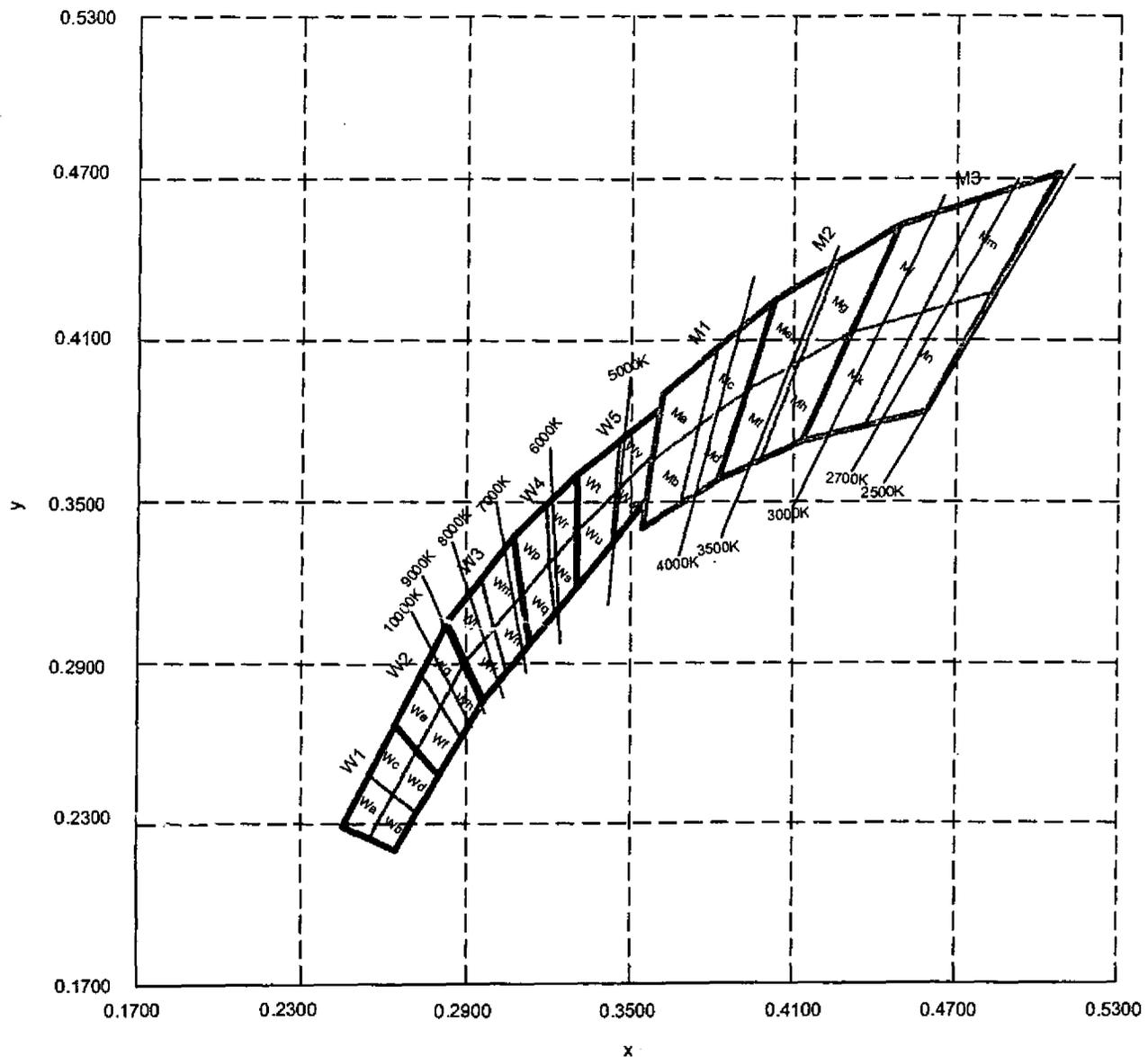
Bin Code	Sub-bin	x	y
M1	Ma	0.3610	0.3900
		0.3576	0.3651
		0.3751	0.3783
		0.3820	0.4075
	Mb	0.3576	0.3651
		0.3541	0.3401
		0.3682	0.3491
		0.3749	0.3781
	Mc	0.3820	0.4075
		0.3751	0.3783
		0.3926	0.3915
		0.4030	0.4250
	Md	0.3751	0.3783
		0.3682	0.3491
		0.3822	0.3580
		0.3926	0.3915

Bin Code	Sub-bin	x	y
M2	Me	0.4030	0.4250
		0.3926	0.3915
		0.4118	0.4021
		0.4260	0.4390
	Mf	0.3926	0.3915
		0.3822	0.3580
		0.3976	0.3653
		0.4118	0.4021
	Mg	0.4260	0.4390
		0.4118	0.4021
		0.4310	0.4128
		0.4490	0.4530
	Mh	0.4118	0.4021
		0.3976	0.3653
		0.4129	0.3725
		0.4310	0.4128

Bin Code	Sub-bin	x	y
M3	Mj	0.4490	0.4530
		0.4310	0.4128
		0.4572	0.4203
		0.4785	0.4625
	Mk	0.4310	0.4128
		0.4129	0.3726
		0.4359	0.3782
		0.4572	0.4203
	Mm	0.4785	0.4625
		0.4572	0.4203
		0.4834	0.4279
		0.5080	0.4720
	Mn	0.4572	0.4203
		0.4359	0.3782
		0.4588	0.3838
		0.4834	0.4279

Tolerance of measurement of the color coordinates is ± 0.01 .

CIE Chromaticity Diagram





Order Code Table*

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code
			Min.	Max.	
Cool White	CLA1A-WKW-CXaYb153	120	1800	4500	W1,W2,W3,W4,W5
Cool White	CLA1A-WKW-CXaYb453	120	1800	4500	W4,W5
Cool White	CLA1A-WKW-CXbYb453	120	2240	4500	W4,W5

Color	Kit Number	Viewing Angle	Luminous Intensity (mcd)		Color Bin Code
			Min.	Max.	
Warm White	CLA1A-MKW-CWbYa133	120	1400	3550	M1,M2,M3
Warm White	CLA1A-MKW-CWbYa513	120	1400	3550	W5,M1
Warm White	CLA1A-MKW-CWbYa233	120	1400	3550	M2,M3
Warm White	CLA1A-MKW-CXaYa233	120	1800	3550	M2,M3
Warm White	CLA1A-MKW-CXaYa513	120	1800	3550	W5,M1

Notes:

1. The above kit numbers represent order codes which include multiple intensity-bin and color-bin codes. Only one intensity-bin code and one color-bin code will be shipped on each reel. Single intensity-bin code and single color bin codes will not be orderable.
2. Please refer to the "Cree LED Lamp Reliability Test Standards" document for reliability test conditions.
3. Please refer to the "Cree LED Lamp Soldering & Handling" document for information about how to use this LED product safely.

Graphs

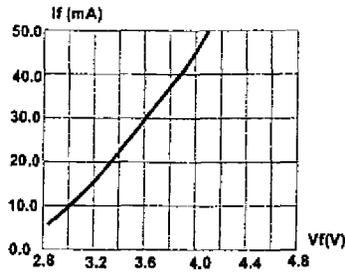


FIG.1 FORWARD CURRENT VS. FORWARD VOLTAGE.

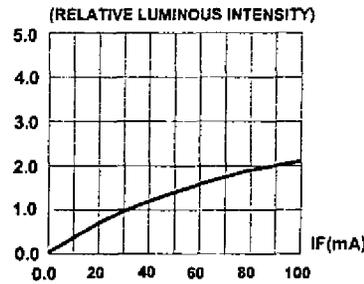


FIG.2 RELATIVE LUMINOUS INTENSITY VS. FORWARD CURRENT

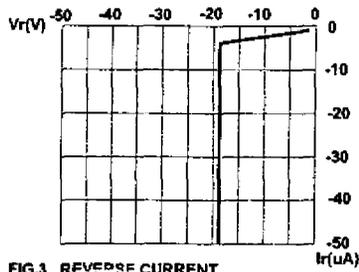


FIG.3 REVERSE CURRENT VS. REVERSE VOLTAGE.

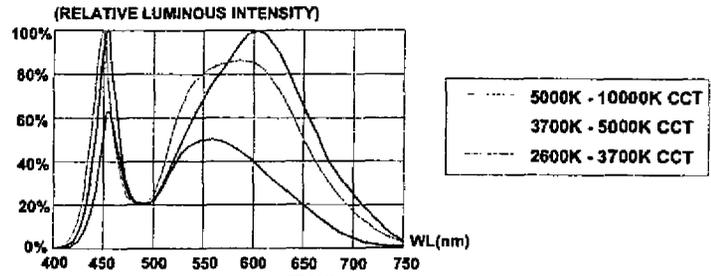


FIG.4 RELATIVE LUMINOUS INTENSITY VS. WAVELENGTH.

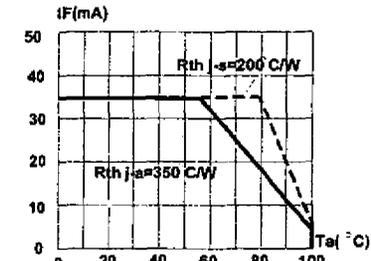


FIG.5 MAXIMUM FORWARD DC CURRENT VS AMBIENT TEMPERATURE ($T_{jmax}=110^{\circ}C$)

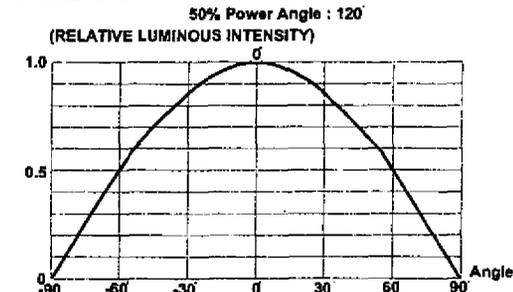
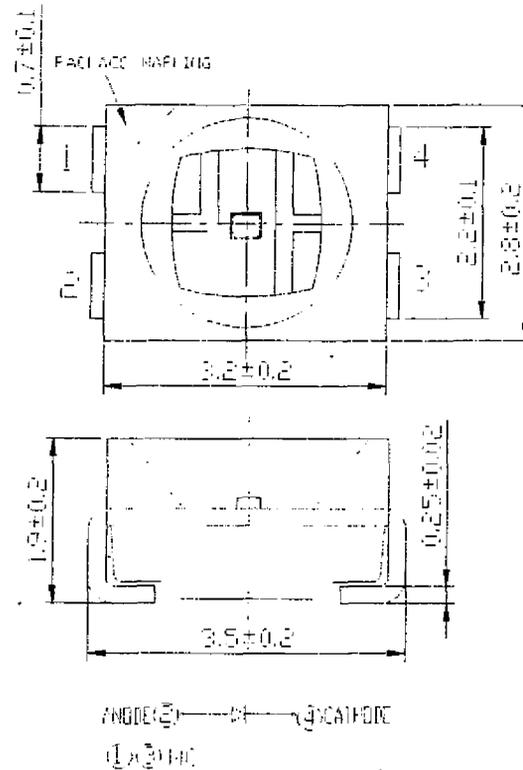


FIG.6 FAR FIELD PATTERN

The above data are collected from statistical figures which do not necessarily correspond to the actual parameters of each single LED. Hence, these data will be changed without further notice.

Mechanical Dimensions

All dimensions are in mm.



Notes

RoHS Compliance

The levels of environmentally sensitive, persistent biologically toxic (PBT), persistent organic pollutants (POP), or otherwise restricted materials in this product are below the maximum concentration values (also referred to as the threshold limits) permitted for such substances, or are used in an exempted application, in accordance with EU Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS), as amended through April 21, 2006.

Vision Advisory Claim

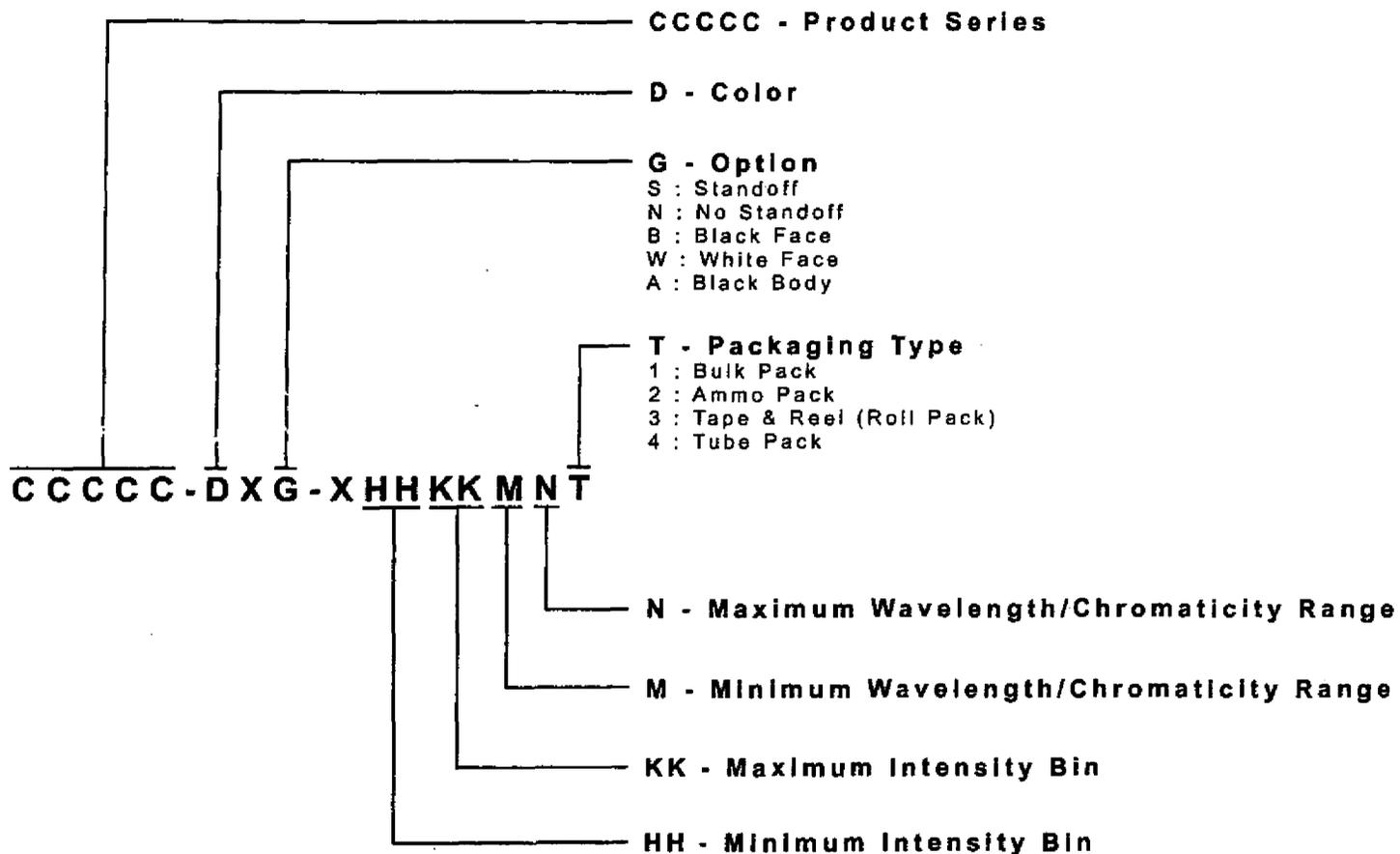
Users should be cautioned not to stare at the light of this LED product. The bright light can damage the eye.



Kit Number System

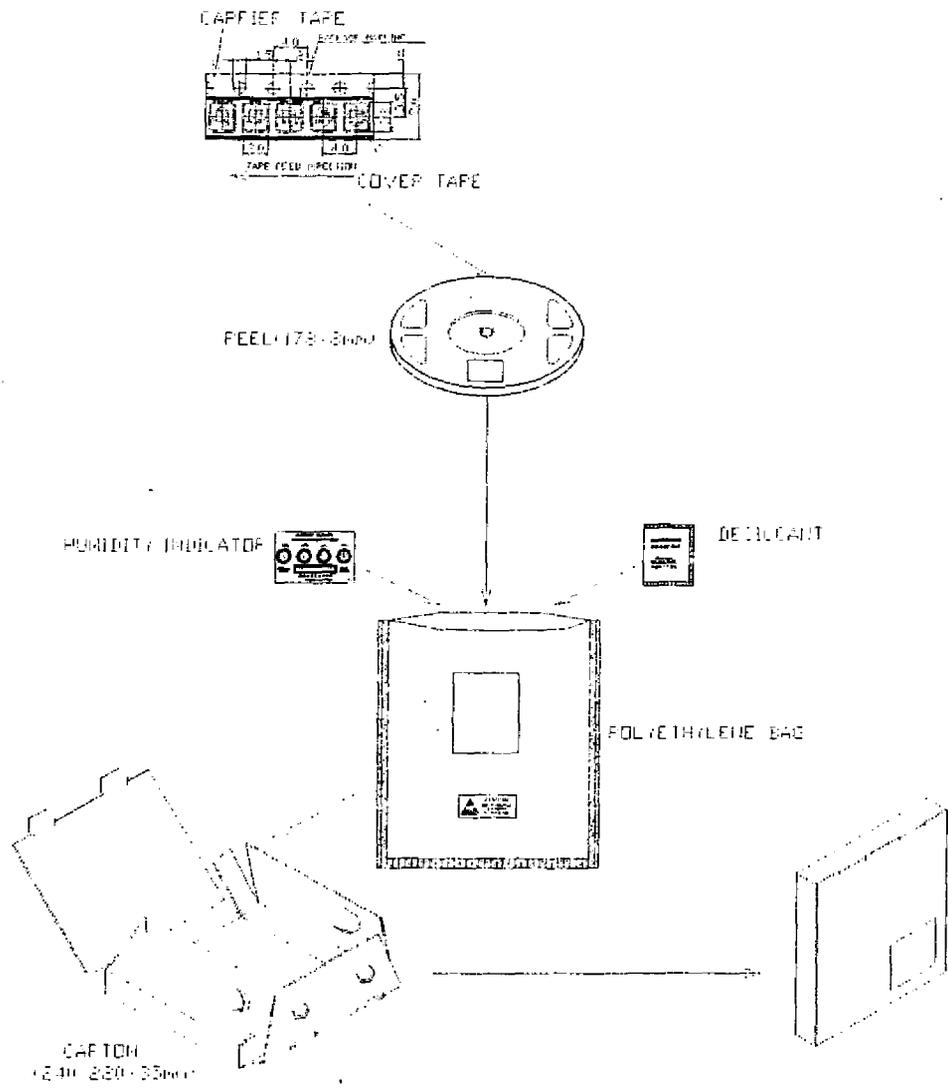
Cree LED lamps are tested and sorted into performance bins. A bin is specified by ranges of color, forward voltage, and brightness. Sorted LEDs are packaged for shipping in various convenient options. Please refer to the "Cree LED Lamp Packaging Standard" document for more information about shipping and packaging options.

Cree LEDs are sold by order codes in combinations of bins called kits. Order codes are configured in the following manner:



Packaging

- The boxes are not water resistant and they must be kept away from water and moisture.
- The LEDs are packed in cardboard boxes after packaging in normal or anti-electrostatic bags.
- Cardboard boxes will be used to protect the LEDs from mechanical shocks during transportation.
- The reel pack is applied in SMD LED.
- Max 2000 pcs per reel.



Intertek

REPORT

3933 US ROUTE 11 CORTLAND, NEW YORK 13045

Project No. 100044444

Date: 3/11/2010

REPORT NO. 100044444CRT-001

TEST OF ONE LED TUBE

TUBE MODEL NO.
CLGL-17-110-342SMDS

RENDERED TO

CLEAN LIGHT GREEN LIGHT
24563 NORTH RIVER ROAD
MOUNT CLEMENS, MI 48043

TEST: Electrical and Photometric tests as required to the IESNA test standard.

AUTHORIZATION: The testing performed was authorized by signed quote number 500210920.

STANDARDS USED: The following American National Standards or Illuminating Engineering Society of North America Test Guides were used in part or totally to test each specimen:

IESNA LM-79: 2008 Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products

DESCRIPTION OF SAMPLE: The client submitted one sample of model number CLGL-17-110-342SMDS. The sample was received by Intertek on February 18, 2010, in undamaged condition, and one sample were tested as received. The sample designation was C4603L.

DATES OF TESTS: March 4, 2010 through March 11, 2010

This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to copy or distribute this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program. Measurement uncertainty budgets have been determined for applicable test methods and are available upon request.



SUMMARY

Model No.:	CLGL-17-110-342SMDS
Description:	LED Tube

Criteria	Result
Total Lumen Output	1343.3
Total Power	17.12W
Luminaire Efficacy	78.46
Power Factor	0.8745
In Situ Maximum Source Temperature	36.5°C

EQUIPMENT LIST

Equipment Used	Model Number	Control Number	Last Calibration Date	Calibration Due Date
Elgar AC Power Supply	1001SX	—	—	—
Xitron Power Analyzer	2503H	E235	03/27/09	03/27/10
Fluke Temperature Meter	52	T801	06/09/09	06/09/10
NIST Luminous Flux Standard Sources	—	150-25, 8036, 3062	12/09/08	12/09/09
LSI High Speed Mirror Goniophotometer	6440	—	Before Use	Before Use

TEST METHODS

Seasoning in Sample Orientation – LED Products

No seasoning was performed in accordance with IESNA LM-79.

Photometric and Electrical measurements – Distribution Method

A LSI Type C High Speed Model 6440 Mirror Goniometer was used to measure the intensity (candelas) at each angle of distribution for each sample.

Ambient temperature was measured equal to the height of the sample mounted on the Goniometer equipment. Each sample was operated at input rated voltage in its designated orientation. Each sample was allowed to stabilize for at least thirty minutes before measurements were made. Electrical measurements including voltage, current, and power were measured using the Xitron or Yokogawa Power Analyzer.

Some graphics were created with Photometrics Plus software.

Maximum Measured Manufacturer Designated Measurement Point Temperature

LED source operating temperature measurements were taken on one test sample per model with a thermocouple and Fluke 87 temperature meter. The SSL sample was allowed to reach thermal equilibrium for seven hours before measurements were taken. Source temperature measurements were measured at the TMP_{PS} or T_S point as indicated by the included diagram in accordance with manufacturers declared hot spot location. The maximum temperature was recorded for the sample. A simulated ceiling or other enclosure may be used in accordance to UL 1598 as applicable

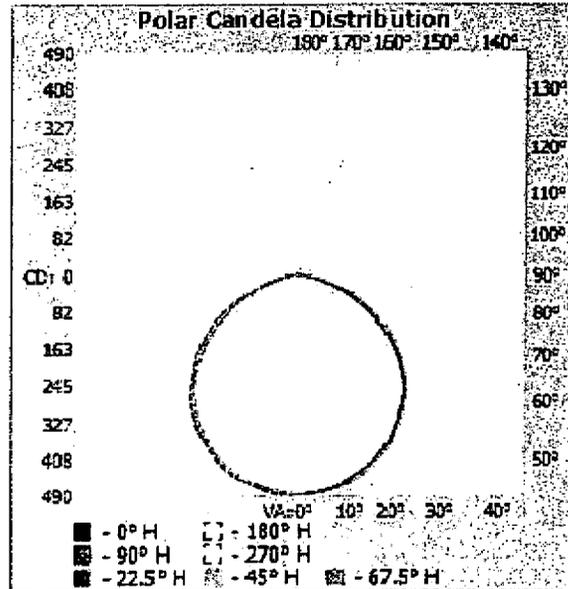
RESULTS OF TESTS

Photometric and Electrical Measurements – Distribution Method

Intertek Sample No.	Base Orientation	Input Voltage (Vac)	Input Current (mA)	Input Power (Watts)	Input Power Factor	Absolute Luminous Flux (Lumens)	Lumen Efficacy (Lumens Per Watt)
CLGL-17-110-342SMDS							
C4603L	DOWN	120.0	164.8	17.12	0.8745	1343.3	78.46

Intensity (Candlepower) Summary at 25°C - Candelas

Angle	0	22.5	45	67.5	90
CLGL-17-110-342SMDS					
0	486	486	486	486	486
5	485	484	486	484	482
10	476	477	481	480	476
15	461	463	467	470	466
20	446	450	450	456	452
25	428	432	433	435	434
30	406	411	413	412	412
35	377	383	386	386	384
40	351	354	357	357	352
45	322	327	322	323	318
50	285	290	290	287	277
55	247	250	253	245	233
60	208	211	209	201	186
65	162	165	167	160	139
70	117	125	124	120	95
75	68	72	83	78	54
80	30	32	39	43	23
85	9	9	10	15	4
90	3	3	4	4	0

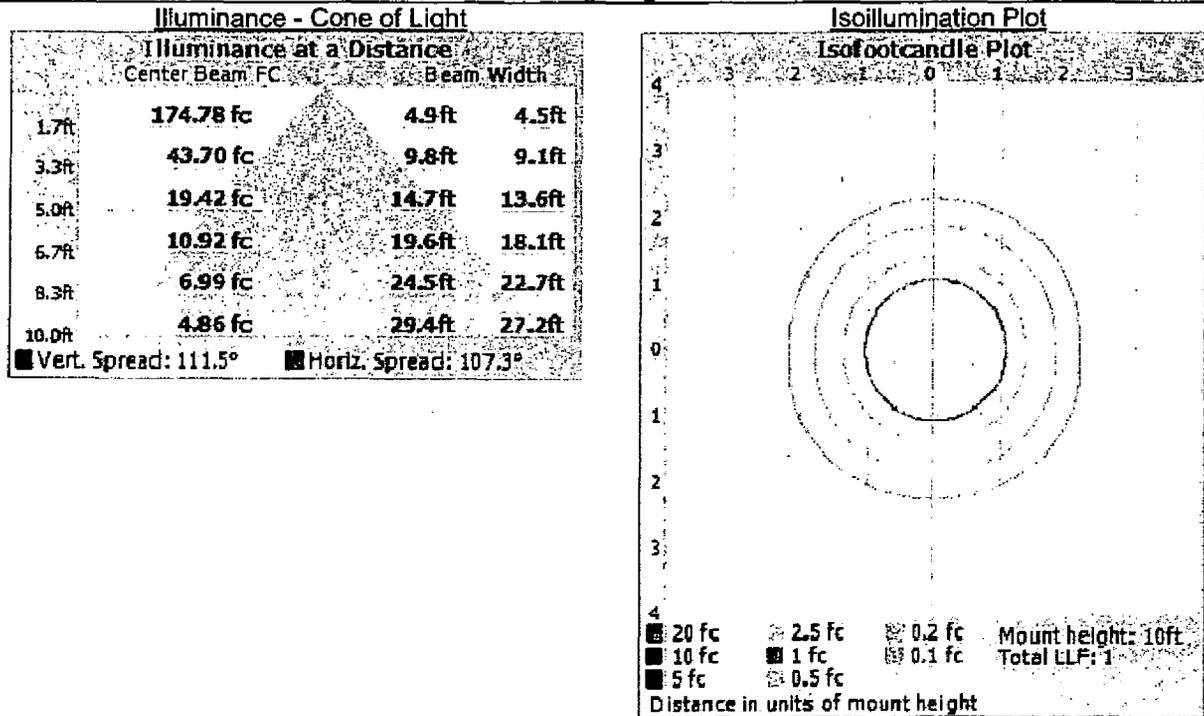




RESULTS OF TESTS (cont'd)

Illumination Plots

Model No.: CLGL-17-110-342SMDS
Mounting Height: 10 FT



Zonal Lumen Summary and Percentages at 25°C

Zone	Lumens	% Luminaire
CLGL-17-110-342SMDS		
0-30	378.2	28.2
0-40	619.2	46.1
0-60	1087.1	80.9
0-90	1336.5	99.5
60-90	249.4	18.6
0-180	1343.3	100.0



RESULTS OF TESTS (cont'd)

Maximum Measured Manufacturer Designated Source Measurement Point Temperature

Manufacturer Supplied Documentation:

LED's identified by client as Cree PLCC4 1 in 1 SMD LED CLA1A-WKW/MKW

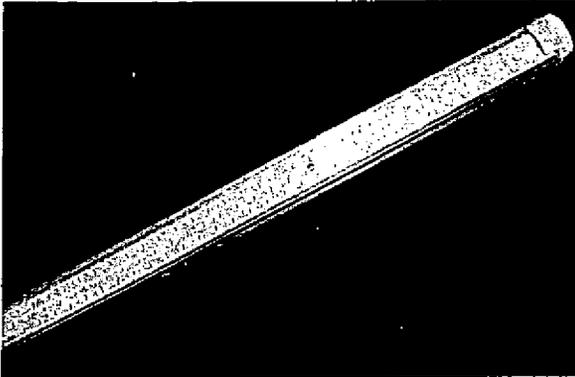
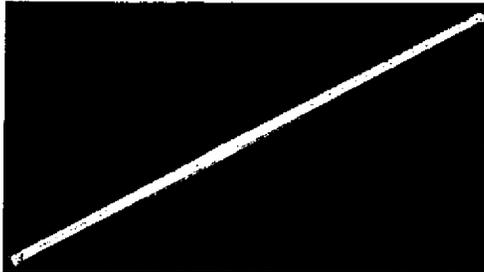
Absolute Maximum Ratings ($T_A = 25^\circ\text{C}$)

Items	Symbol	Absolute Maximum Rating	Unit
Forward Current	I_f	35	mA
Peak Forward Current ^{Notes}	I_{fM}	100	mA
Reverse Voltage	V_R	5	V
Power Dissipation	P_D	147	mW
Operation Temperature	T_{op}	-40 ~ +100	$^\circ\text{C}$
Storage Temperature	T_{stg}	-40 ~ +100	$^\circ\text{C}$
Junction Temperature	T_j	110	$^\circ\text{C}$
Junction/Ambient	$R_{\theta JA}$	350	$^\circ\text{C/W}$
Junction/Solder Point	$R_{\theta JS}$	200	$^\circ\text{C/W}$

Maximum Measured Manufacturer Designated Source Temperature

Sample No.	Model	Maximum Measured Source Temperature ($^\circ\text{C}$)	Location	Maximum Rated Source Temperature ($^\circ\text{C}$)
L4627L	CLGL-17-110-342SMDS	36.5	Per chart above	110

Pictures (not to scale)



CONCLUSION

The results tabulated in this report are representative of the actual test samples submitted for this report only. The data is provided to the client for further evaluation. Compliance to the referenced specification requirements was not determined in this report.

In Charge Of Tests:

Jeffrey Davis
Technical Team Leader
Lighting Division

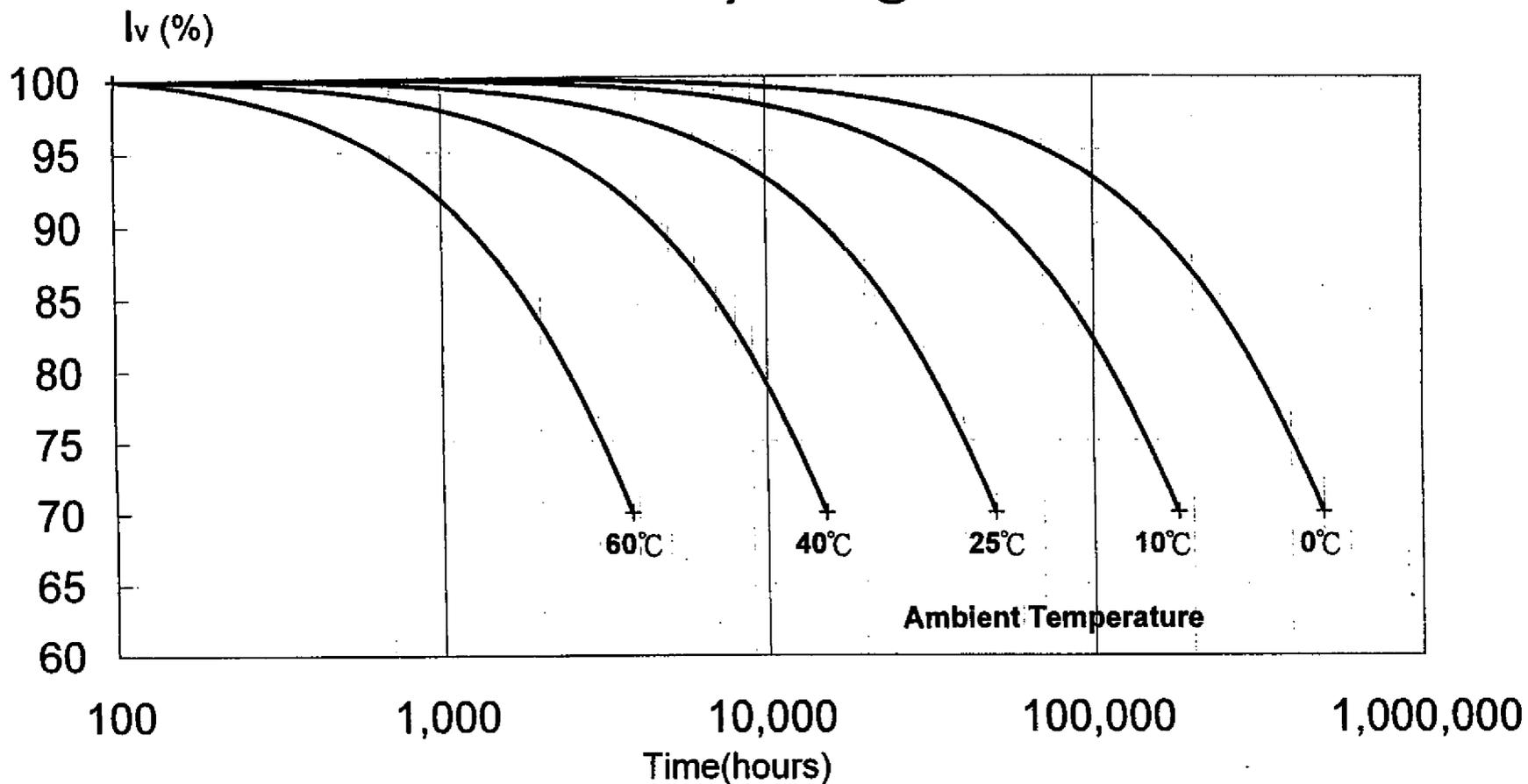
Report Reviewed By:

Jacki Swiernik
Project Engineer
Lighting Division

Attachment: None



CLA1A-WKW Long Term Brightness Maintenance Projections @ $i_f=30\text{mA}$



This data is based on actual measurement test data, hence we can't make a guarantee of these characteristics. Please treat this data as the reference. We may change contents without notice.

DOC NO.: R-0010



Clean Light
Green Light

WHERE LED TECHNOLOGY LIVES

IES ROAD REPORT

PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002

[TEST]

[TESTLAB]Intertek

[ISSUE DATE] 3/ 4/2010

[MANUFAC]CLEAN LIGHT GREEN LIGHT

[LUMCAT]C4603L MODEL CLGL-17-110-342SMDS (CREE)

[LUMINAIRE]LED T8

[LAMP]LED

[LAMPCAT]NA. LUMINAIRE OUTPUT = 1342 LMS

[OTHER]120.0V, 164.8MA, 17.12W, 1.0000PF

CHARACTERISTICS

IES Classification	Type II
Longitudinal Classification	Very Short
Cutoff Classification (deprecated)	Cutoff
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1344
Total Luminaire Efficiency	N.A.
Downward Total Efficiency	N.A.
Upward Waste Light Ratio	0.01
Maximum Candela	488.5
Maximum Candela Angle	180H 5V
Maximum Candela At 90 Degrees Vertical	3.8 (0.3% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	42.8 (3.2% Luminaire Lumens)
Total Luminaire Watts	17.1
Ballast Factor	1.00

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	188.6	N.A.	14.0
FM - Front-Medium (30-60)	354.7	N.A.	26.4
FH - Front-High (60-80)	119.1	N.A.	8.9
FVH - Front-Very High (80-90)	7.4	N.A.	0.6
BL - Back-Low (0-30)	189.7	N.A.	14.1
BM - Back-Medium (30-60)	354.4	N.A.	26.4
BH - Back-High (60-80)	115.9	N.A.	8.6
BVH - Back-Very High (80-90)	7.0	N.A.	0.5
UL - Uplight-Low (90-100)	2.6	N.A.	0.2
UH - Uplight-High (100-180)	4.1	N.A.	0.3
Total	1343.5	N.A.	100.0
BUG Rating	B1-U1-G1		

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	<u>0.0</u>	<u>22.5</u>	<u>45.0</u>	<u>67.5</u>	<u>90.0</u>	<u>112.5</u>	<u>135.0</u>	<u>157.5</u>	<u>180.0</u>	<u>202.5</u>
0.0	485.5	485.5	485.5	485.5	485.5	485.5	485.5	485.5	485.5	485.5
2.5	485.1	484.4	486.3	485.7	482.9	486.6	487.5	485.1	486.9	485.1
5.0	485.0	484.4	485.9	484.1	481.6	485.3	486.3	485.0	488.5	485.0
7.5	482.3	482.6	484.2	482.6	479.3	483.4	484.9	482.9	486.2	482.9
10.0	476.0	476.6	480.9	479.7	476.2	480.2	481.4	478.5	481.0	478.5
12.5	468.4	470.1	474.4	475.5	471.7	476.5	475.8	472.0	475.0	472.0
15.0	460.8	462.6	466.7	470.3	466.3	470.8	468.7	466.3	471.8	466.3
17.5	454.5	456.6	458.5	463.9	459.2	463.7	460.9	461.1	467.0	461.1
20.0	446.0	450.0	450.3	455.7	451.7	455.0	453.6	455.3	460.4	455.3
22.5	438.0	441.5	442.6	446.0	442.9	445.3	445.9	446.7	450.8	446.7
25.0	428.3	431.9	433.0	435.2	433.6	434.7	437.1	436.1	440.6	436.1
27.5	418.3	421.7	423.5	424.1	422.7	422.2	426.8	424.3	429.1	424.3
30.0	406.2	411.2	412.8	411.7	411.5	409.2	414.0	413.4	419.0	413.4
32.5	392.0	397.4	400.4	398.9	398.4	396.4	399.8	402.3	407.5	402.3
35.0	377.3	382.8	386.4	385.9	384.1	382.4	385.6	389.1	393.8	389.1
37.5	364.1	367.6	372.6	372.1	368.2	367.7	372.1	375.6	380.5	375.6
40.0	351.4	354.3	356.7	356.6	352.0	352.4	357.6	361.1	365.4	361.1
42.5	337.9	340.5	340.1	340.5	335.3	336.5	341.2	345.7	347.2	345.7
45.0	322.2	326.7	321.9	323.4	317.6	318.3	324.3	326.2	327.8	326.2
47.5	302.9	309.8	305.8	305.4	297.8	298.3	307.2	306.2	310.0	306.2
50.0	284.7	289.5	290.0	286.7	276.9	278.1	289.1	288.4	291.8	288.4
52.5	265.0	269.7	273.0	266.4	255.6	257.3	267.5	270.8	272.8	270.8
55.0	247.1	249.5	252.7	245.4	233.3	236.5	246.0	251.2	254.0	251.2
57.5	226.9	229.6	230.8	223.4	210.2	214.6	225.2	231.4	232.3	231.4
60.0	208.4	210.8	208.8	201.1	185.9	192.2	205.4	209.0	212.0	209.0
62.5	183.0	190.0	188.6	178.8	162.6	171.9	183.1	189.5	190.7	189.5
65.0	162.3	164.8	167.1	159.6	139.2	151.1	163.4	167.1	168.1	167.1
67.5	145.0	143.3	149.3	141.5	116.7	129.1	143.0	146.0	141.8	146.0
70.0	117.2	124.5	123.8	119.9	94.7	109.4	123.6	117.8	111.7	117.8
72.5	89.6	96.0	103.5	97.0	72.9	90.3	102.5	89.0	87.2	89.0
75.0	68.3	72.1	82.7	77.6	53.8	73.1	75.4	69.8	69.6	69.8
77.5	49.7	52.6	57.4	60.4	36.5	56.8	53.3	52.3	49.4	52.3
80.0	30.3	32.4	39.1	42.8	22.5	40.8	37.9	31.9	30.7	31.9
82.5	15.1	16.6	22.4	27.9	11.4	22.9	21.2	16.7	15.5	16.7
85.0	8.9	9.2	10.3	15.2	4.3	12.2	9.8	9.7	9.6	9.7
87.5	4.5	5.0	5.7	6.5	0.9	5.3	5.6	5.4	5.1	5.4
90.0	3.2	3.4	3.8	3.8	0.2	3.5	3.6	3.5	3.2	3.5
92.5	2.9	3.0	3.3	3.0	0.2	2.8	3.2	2.9	2.7	2.9
95.0	2.6	2.8	3.0	2.6	0.2	2.2	2.9	2.6	2.5	2.6
97.5	2.5	2.6	2.7	2.1	0.2	1.9	2.6	2.4	2.4	2.4
100.0	2.2	2.4	2.5	1.7	0.2	1.5	2.4	2.2	2.1	2.2
102.5	2.1	2.1	2.2	1.3	0.1	1.2	2.0	2.0	2.0	2.0
105.0	1.9	2.0	1.9	1.0	0.2	0.9	1.8	1.9	1.9	1.9
107.5	1.7	1.8	1.7	0.8	0.1	0.7	1.6	1.7	1.7	1.7
110.0	1.6	1.7	1.5	0.6	0.1	0.6	1.4	1.6	1.6	1.6
112.5	1.5	1.5	1.3	0.6	0.1	0.6	1.2	1.4	1.5	1.4
115.0	1.4	1.4	1.1	0.6	0.1	0.5	0.9	1.3	1.3	1.3
117.5	1.3	1.2	0.5	0.5	0.2	0.5	0.4	1.2	1.2	1.2
120.0	1.1	1.1	0.5	0.5	0.2	0.5	0.4	1.0	1.1	1.0
122.5	1.1	0.9	0.5	0.5	0.2	0.4	0.4	0.3	0.9	0.3
125.0	0.8	0.4	0.5	0.5	0.2	0.4	0.6	0.3	0.2	0.3
127.5	0.4	0.4	0.7	0.6	0.2	0.4	0.6	0.3	0.2	0.3
130.0	0.4	0.4	0.7	0.6	0.2	0.4	0.5	0.3	0.2	0.3

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

CANDELA TABULATION - (Cont.)

132.5	0.4	0.5	0.7	0.6	0.3	0.4	0.5	0.5	0.2	0.5
135.0	0.5	0.8	0.7	0.6	0.3	0.4	0.5	0.6	0.5	0.6
137.5	0.8	0.8	0.7	0.7	0.3	0.4	0.5	0.6	0.5	0.6
140.0	0.9	0.8	0.8	0.7	0.4	0.4	0.5	0.5	0.5	0.5
142.5	0.8	0.8	0.8	0.7	0.4	0.4	0.5	0.5	0.5	0.5
145.0	0.9	0.9	0.8	0.7	0.4	0.4	0.5	0.5	0.5	0.5
147.5	0.9	0.8	0.8	0.7	0.4	0.4	0.4	0.5	0.5	0.5
150.0	0.8	0.8	0.8	0.7	0.5	0.4	0.5	0.5	0.5	0.5
152.5	0.8	0.8	0.8	0.7	0.5	0.4	0.5	0.5	0.5	0.5
155.0	0.8	0.8	0.8	0.7	0.5	0.4	0.5	0.5	0.5	0.5
157.5	0.8	0.8	0.8	0.6	0.5	0.3	0.5	0.5	0.5	0.5
160.0	0.8	0.8	0.8	0.6	0.5	0.3	0.5	0.5	0.6	0.5
162.5	0.8	0.8	0.8	0.6	0.5	0.4	0.5	0.5	0.6	0.5
165.0	0.8	0.8	0.7	0.6	0.5	0.4	0.5	0.5	0.6	0.5
167.5	0.8	0.7	0.7	0.6	0.5	0.4	0.4	0.5	0.5	0.5
170.0	0.7	0.7	0.6	0.6	0.5	0.4	0.4	0.5	0.5	0.5
172.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
175.0	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
177.5	0.6	0.6	0.6	0.6	0.6	0.5	0.5	0.5	0.5	0.5
180.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6

**Vert.
Angles**

Horizontal Angles

	<u>225.0</u>	<u>247.5</u>	<u>270.0</u>	<u>292.5</u>	<u>315.0</u>	<u>337.5</u>	<u>360.0</u>
0.0	485.5	485.5	485.5	485.5	485.5	485.5	485.5
2.5	487.5	486.6	482.9	485.7	486.3	484.4	485.1
5.0	486.3	485.3	481.6	484.1	485.9	484.4	485.0
7.5	484.9	483.4	479.3	482.6	484.2	482.6	482.3
10.0	481.4	480.2	476.2	479.7	480.9	476.6	476.0
12.5	475.8	476.5	471.7	475.5	474.4	470.1	468.4
15.0	468.7	470.8	466.3	470.3	466.7	462.6	460.8
17.5	460.9	463.7	459.2	463.9	458.5	456.6	454.5
20.0	453.6	455.0	451.7	455.7	450.3	450.0	446.0
22.5	445.9	445.3	442.9	446.0	442.6	441.5	438.0
25.0	437.1	434.7	433.6	435.2	433.0	431.9	428.3
27.5	426.8	422.2	422.7	424.1	423.5	421.7	418.3
30.0	414.0	409.2	411.5	411.7	412.8	411.2	406.2
32.5	399.8	396.4	398.4	398.9	400.4	397.4	392.0
35.0	385.6	382.4	384.1	385.9	386.4	382.8	377.3
37.5	372.1	367.7	368.2	372.1	372.6	367.6	364.1
40.0	357.6	352.4	352.0	356.6	356.7	354.3	351.4
42.5	341.2	336.5	335.3	340.5	340.1	340.5	337.9
45.0	324.3	318.3	317.6	323.4	321.9	326.7	322.2
47.5	307.2	298.3	297.8	305.4	305.8	309.8	302.9
50.0	289.1	278.1	276.9	286.7	290.0	289.5	284.7
52.5	267.5	257.3	255.6	266.4	273.0	269.7	265.0
55.0	246.0	236.5	233.3	245.4	252.7	249.5	247.1
57.5	225.2	214.6	210.2	223.4	230.8	229.6	226.9
60.0	205.4	192.2	185.9	201.1	208.8	210.8	208.4
62.5	183.1	171.9	162.6	178.8	188.6	190.0	183.0
65.0	163.4	151.1	139.2	159.6	167.1	164.8	162.3
67.5	143.0	129.1	116.7	141.5	149.3	143.3	145.0
70.0	123.6	109.4	94.7	119.9	123.8	124.5	117.2
72.5	102.5	90.3	72.9	97.0	103.5	96.0	89.6
75.0	75.4	73.1	53.8	77.6	82.7	72.1	68.3
77.5	53.3	56.8	36.5	60.4	57.4	52.6	49.7

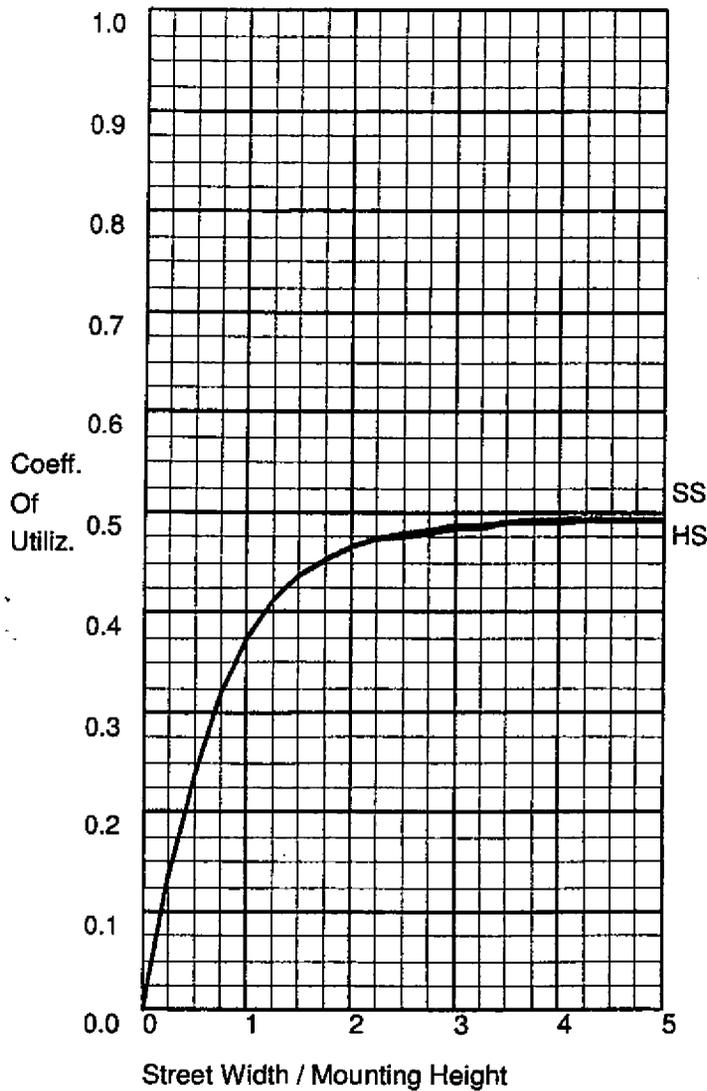
IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

CANDELA TABULATION - (Cont.)

80.0	37.9	40.8	22.5	42.8	39.1	32.4	30.3
82.5	21.2	22.9	11.4	27.9	22.4	16.6	15.1
85.0	9.8	12.2	4.3	15.2	10.3	9.2	8.9
87.5	5.6	5.3	0.9	6.5	5.7	5.0	4.5
90.0	3.6	3.5	0.2	3.8	3.8	3.4	3.2
92.5	3.2	2.8	0.2	3.0	3.3	3.0	2.9
95.0	2.9	2.2	0.2	2.6	3.0	2.8	2.6
97.5	2.6	1.9	0.2	2.1	2.7	2.6	2.5
100.0	2.4	1.5	0.2	1.7	2.5	2.4	2.2
102.5	2.0	1.2	0.1	1.3	2.2	2.1	2.1
105.0	1.8	0.9	0.2	1.0	1.9	2.0	1.9
107.5	1.6	0.7	0.1	0.8	1.7	1.8	1.7
110.0	1.4	0.6	0.1	0.6	1.5	1.7	1.6
112.5	1.2	0.6	0.1	0.6	1.3	1.5	1.5
115.0	0.9	0.5	0.1	0.6	1.1	1.4	1.4
117.5	0.4	0.5	0.2	0.5	0.5	1.2	1.3
120.0	0.4	0.5	0.2	0.5	0.5	1.1	1.1
122.5	0.4	0.4	0.2	0.5	0.5	0.9	1.1
125.0	0.6	0.4	0.2	0.5	0.5	0.4	0.8
127.5	0.6	0.4	0.2	0.6	0.7	0.4	0.4
130.0	0.5	0.4	0.2	0.6	0.7	0.4	0.4
132.5	0.5	0.4	0.3	0.6	0.7	0.5	0.4
135.0	0.5	0.4	0.3	0.6	0.7	0.8	0.5
137.5	0.5	0.4	0.3	0.7	0.7	0.8	0.8
140.0	0.5	0.4	0.4	0.7	0.8	0.8	0.9
142.5	0.5	0.4	0.4	0.7	0.8	0.8	0.8
145.0	0.5	0.4	0.4	0.7	0.8	0.9	0.9
147.5	0.4	0.4	0.4	0.7	0.8	0.8	0.9
150.0	0.5	0.4	0.5	0.7	0.8	0.8	0.8
152.5	0.5	0.4	0.5	0.7	0.8	0.8	0.8
155.0	0.5	0.4	0.5	0.7	0.8	0.8	0.8
157.5	0.5	0.3	0.5	0.6	0.8	0.8	0.8
160.0	0.5	0.3	0.5	0.6	0.8	0.8	0.8
162.5	0.5	0.4	0.5	0.6	0.8	0.8	0.8
165.0	0.5	0.4	0.5	0.6	0.7	0.8	0.8
167.5	0.4	0.4	0.5	0.6	0.7	0.7	0.8
170.0	0.4	0.4	0.5	0.6	0.6	0.7	0.7
172.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
175.0	0.5	0.5	0.6	0.6	0.6	0.6	0.6
177.5	0.5	0.5	0.6	0.6	0.6	0.6	0.6
180.0	0.6	0.6	0.6	0.6	0.6	0.6	0.6

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

COEFFICIENTS OF UTILIZATION

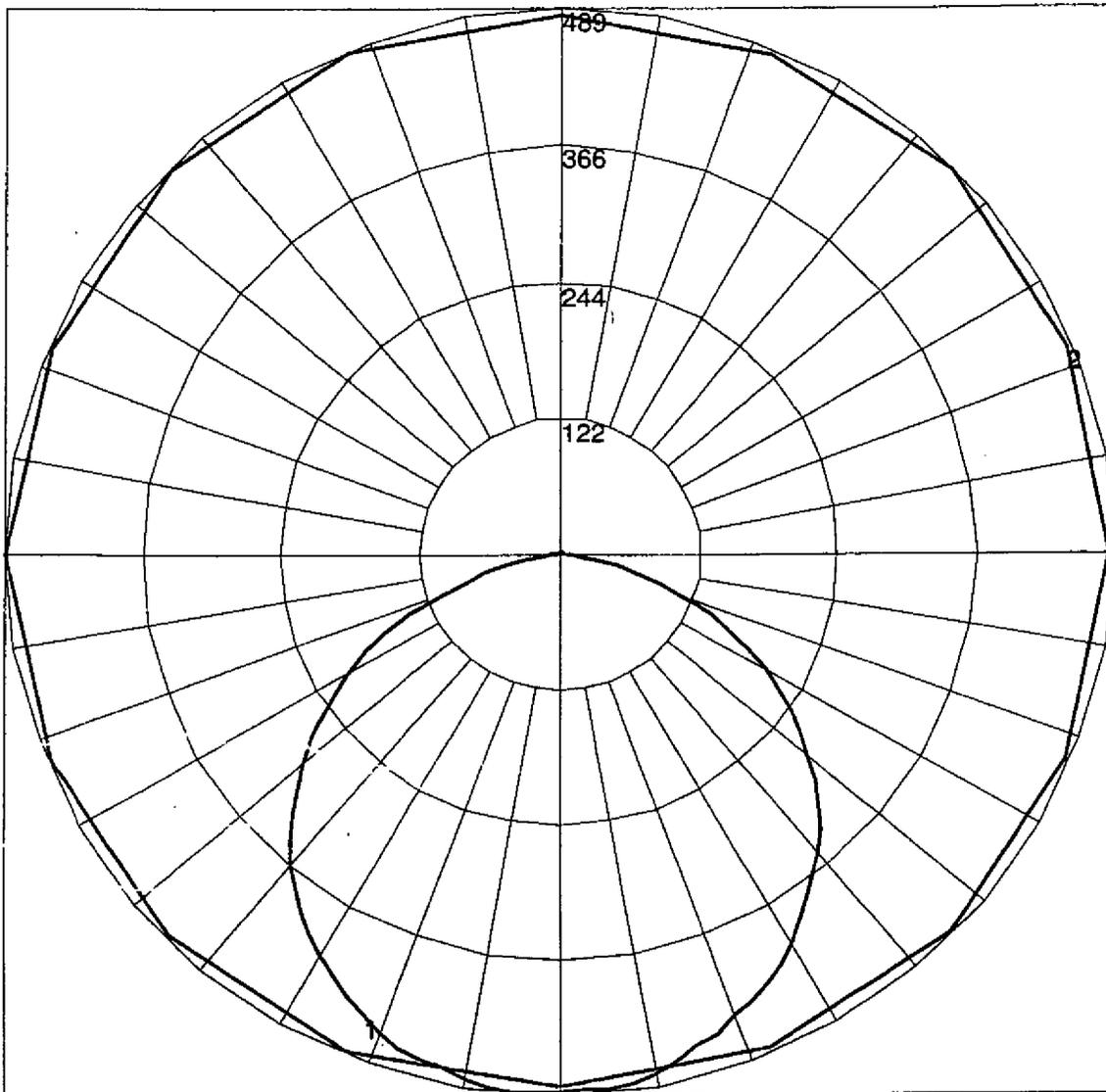


FLUX DISTRIBUTION

	Lumens	Percent Of Luminaire
Downward Street Side	669.8	49.8
Downward House Side	667.1	49.6
Downward Total	1336.9	99.5
Upward Street Side	3.6	0.3
Upward House Side	3.2	0.2
Upward Total	6.8	0.5
Total Flux	1343.7	100.0

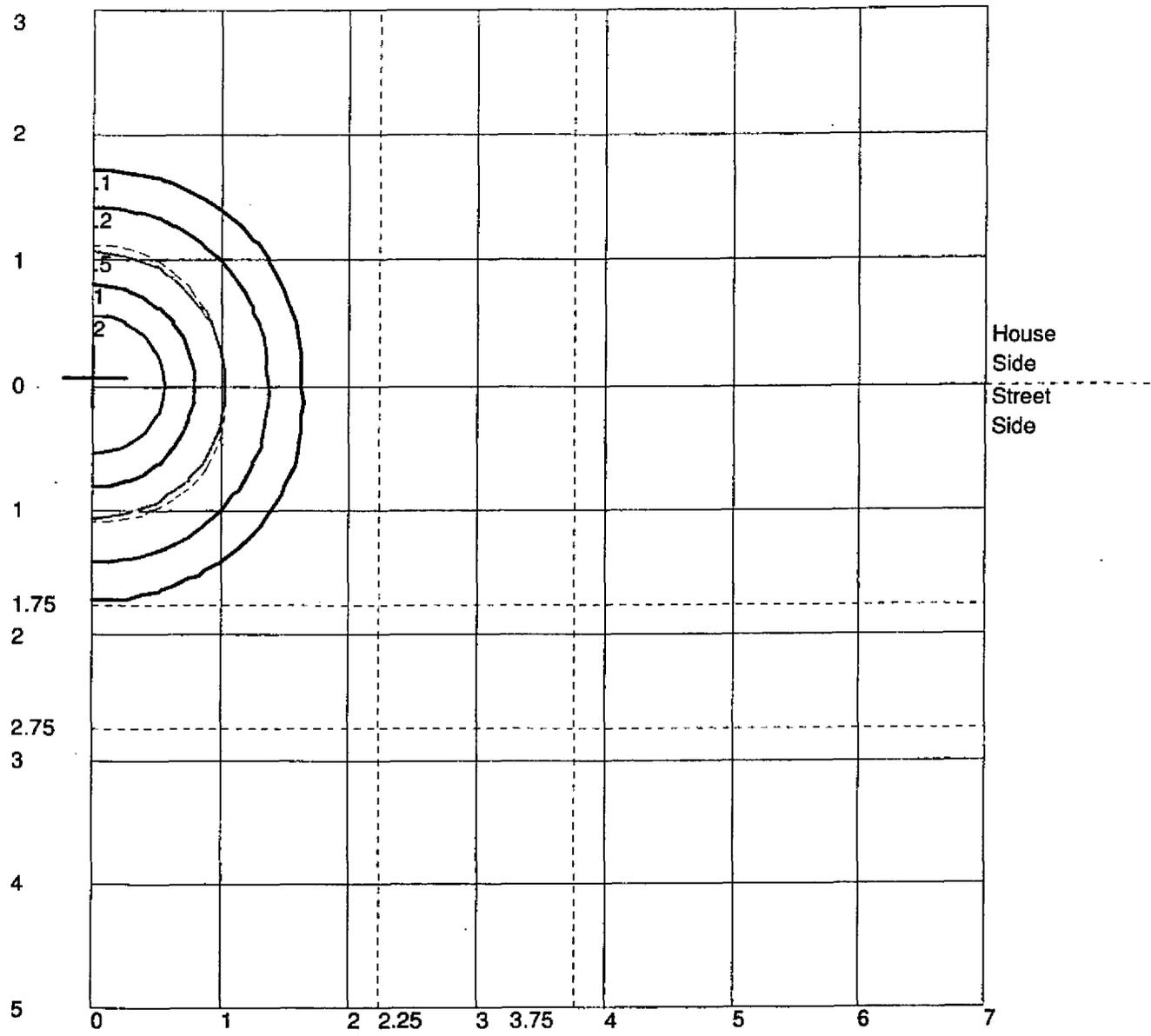
IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

POLAR GRAPH



Maximum Candela = 488.5 Located At Horizontal Angle = 180, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (180 - 0) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (5) (Through Max. Cd.)

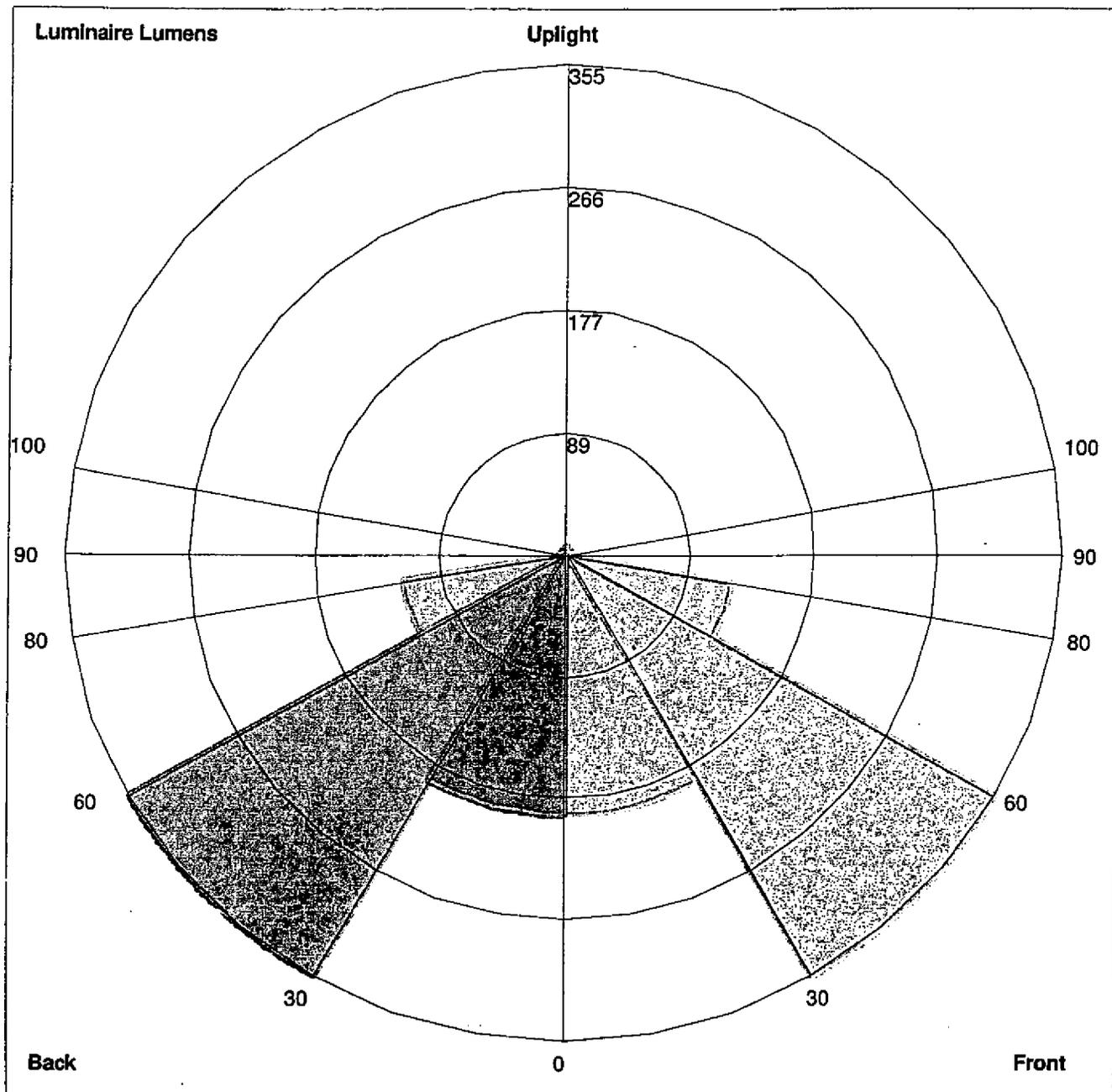
ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
 Values Based On 13.25 Foot Mounting Height
 1/2 Maximum Candela Trace Shown As Dashed Curve
 (+) = Maximum Candela Point

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
Front: Low=188.6, Medium=354.7, High=119.1, Very High=7.4
Back: Low=189.7, Medium=354.4, High=115.9, Very High=7.0
Uplight: Low=2.6, High=4.1

BUG Rating : B1-U1-G1



Clean Light
Green Light

WHERE LED TECHNOLOGY LIVES

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

DESCRIPTIVE INFORMATION (From Photometric File)

IESNA:LM-63-2002

[TEST]

[TESTLAB]Intertek

[ISSUE DATE] 3/ 4/2010

[MANUFAC]CLEAN LIGHT GREEN LIGHT

[LUMCAT]C4603L MODEL CLGL-17-110-342SMDS (CREE)

[LUMINAIRE]LED T8

[LAMP]LED

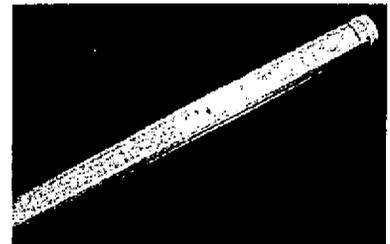
[LAMPCAT]NA. LUMINAIRE OUTPUT = 1744.6 LMS

[OTHER]120.0V, 164.8MA, 17.12W, 1.0000PF

[AGI32] This test has been prorated candela multiplier =1.3 (Original1342 LMS)

CHARACTERISTICS

IES Classification	Type VS
Longitudinal Classification	Very Short
Cutoff Classification (deprecated)	Cutoff
Lumens Per Lamp	N.A. (absolute)
Total Lamp Lumens	N.A. (absolute)
Luminaire Lumens	1747
Total Luminaire Efficiency	N.A.
Downward Total Efficiency	N.A.
Upward Waste Light Ratio	0.01
Maximum Candela	635.05
Maximum Candela Angle	180H 5V
Maximum Candela (<90 Degrees Vertical)	635.05
Maximum Candela Angle (<90 Degrees Vertical)	180H 5V
Maximum Candela At 90 Degrees Vertical	4.94 (0.3% Luminaire Lumens)
Maximum Candela from 80 to <90 Degrees Vertical	55.64 (3.2% Luminaire Lumens)
Total Luminaire Watts	17.1
Ballast Factor	1.00



IES ROAD REPORT

PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

LUMINAIRE CLASSIFICATION SYSTEM (LCS)

	Lumens	% Lamp	% Luminaire
FL - Front-Low (0-30)	245.2	N.A.	14.0
FM - Front-Medium (30-60)	461.1	N.A.	26.4
FH - Front-High (60-80)	154.9	N.A.	8.9
FVH - Front-Very High (80-90)	9.6	N.A.	0.6
BL - Back-Low (0-30)	246.6	N.A.	14.1
BM - Back-Medium (30-60)	460.7	N.A.	26.4
BH - Back-High (60-80)	150.7	N.A.	8.6
BVH - Back-Very High (80-90)	9.1	N.A.	0.5
UL - Uplight-Low (90-100)	3.4	N.A.	0.2
UH - Uplight-High (100-180)	5.4	N.A.	0.3
Total	1746.7	N.A.	100.0
BUG Rating	B1-U1-G0		

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

CANDELA TABULATION

Vert. Angles	Horizontal Angles									
	<u>0.0</u>	<u>22.5</u>	<u>45.0</u>	<u>67.5</u>	<u>90.0</u>	<u>112.5</u>	<u>135.0</u>	<u>157.5</u>	<u>180.0</u>	<u>202.5</u>
0.0	631.15	631.15	631.15	631.15	631.15	631.15	631.15	631.15	631.15	631.15
2.5	630.63	629.72	632.19	631.41	627.77	632.58	633.75	630.63	632.97	630.63
5.0	630.50	629.72	631.67	629.33	626.08	630.89	632.19	630.50	635.05	630.50
7.5	626.99	627.38	629.46	627.38	623.09	628.42	630.37	627.77	632.06	627.77
10.0	618.80	619.58	625.17	623.61	619.06	624.26	625.82	622.05	625.30	622.05
12.5	608.92	611.13	616.72	618.15	613.21	619.45	618.54	613.60	617.50	613.60
15.0	599.04	601.38	606.71	611.39	606.19	612.04	609.31	606.19	613.34	606.19
17.5	590.85	593.58	596.05	603.07	596.96	602.81	599.17	599.43	607.10	599.43
20.0	579.80	585.00	585.39	592.41	587.21	591.50	589.68	591.89	598.52	591.89
22.5	569.40	573.95	575.38	579.80	575.77	578.89	579.67	580.71	586.04	580.71
25.0	556.79	561.47	562.90	565.76	563.68	565.11	568.23	566.93	572.78	566.93
27.5	543.79	548.21	550.55	551.33	549.51	548.86	554.84	551.59	557.83	551.59
30.0	528.06	534.56	536.64	535.21	534.95	531.96	538.20	537.42	544.70	537.42
32.5	509.60	516.62	520.52	518.57	517.92	515.32	519.74	522.99	529.75	522.99
35.0	490.49	497.64	502.32	501.67	499.33	497.12	501.28	505.83	511.94	505.83
37.5	473.33	477.88	484.38	483.73	478.66	478.01	483.73	488.28	494.65	488.28
40.0	456.82	460.59	463.71	463.58	457.60	458.12	464.88	469.43	475.02	469.43
42.5	439.27	442.65	442.13	442.65	435.89	437.45	443.56	449.41	451.36	449.41
45.0	418.86	424.71	418.47	420.42	412.88	413.79	421.59	424.06	426.14	424.06
47.5	393.77	402.74	397.54	397.02	387.14	387.79	399.36	398.06	403.00	398.06
50.0	370.11	376.35	377.00	372.71	359.97	361.53	375.83	374.92	379.34	374.92
52.5	344.50	350.51	354.90	346.32	332.28	334.49	347.75	352.04	354.64	352.04
55.0	321.23	324.35	328.51	319.02	303.29	307.45	319.80	326.56	330.20	326.56
57.5	294.97	298.48	300.04	290.42	273.26	278.98	292.76	300.82	301.99	300.82
60.0	270.92	274.04	271.44	261.43	241.67	249.86	267.02	271.70	275.60	271.70
62.5	237.90	247.00	245.18	232.44	211.38	223.47	238.03	246.35	247.91	246.35
65.0	210.99	214.24	217.23	207.48	180.96	196.43	212.42	217.23	218.53	217.23
67.5	188.50	186.29	194.09	183.95	151.71	167.83	185.90	189.80	184.34	189.80
70.0	152.36	161.85	160.94	155.87	123.11	142.22	160.68	153.14	145.21	153.14
72.5	116.48	124.80	134.55	126.10	94.77	117.39	133.25	115.70	113.36	115.70
75.0	88.79	93.73	107.51	100.88	69.94	95.03	98.02	90.74	90.48	90.74
77.5	64.61	68.38	74.62	78.52	47.45	73.84	69.29	67.99	64.22	67.99
80.0	39.39	42.12	50.83	55.64	29.25	53.04	49.27	41.47	39.91	41.47
82.5	19.63	21.58	29.12	36.27	14.82	29.77	27.56	21.71	20.15	21.71
85.0	11.57	11.96	13.39	19.76	5.59	15.86	12.74	12.61	12.48	12.61
87.5	5.85	6.50	7.41	8.45	1.17	6.89	7.28	7.02	6.63	7.02
90.0	4.16	4.42	4.94	4.94	0.26	4.55	4.68	4.55	4.16	4.55
92.5	3.77	3.90	4.29	3.90	0.26	3.64	4.16	3.77	3.51	3.77
95.0	3.38	3.64	3.90	3.38	0.26	2.86	3.77	3.38	3.25	3.38
97.5	3.25	3.38	3.51	2.73	0.26	2.47	3.38	3.12	3.12	3.12
100.0	2.86	3.12	3.25	2.21	0.26	1.95	3.12	2.86	2.73	2.86
102.5	2.73	2.73	2.86	1.69	0.13	1.56	2.60	2.60	2.60	2.60
105.0	2.47	2.60	2.47	1.30	0.26	1.17	2.34	2.47	2.47	2.47
107.5	2.21	2.34	2.21	1.04	0.13	0.91	2.08	2.21	2.21	2.21
110.0	2.08	2.21	1.95	0.78	0.13	0.78	1.82	2.08	2.08	2.08
112.5	1.95	1.95	1.69	0.78	0.13	0.78	1.56	1.82	1.95	1.82
115.0	1.82	1.82	1.43	0.78	0.13	0.65	1.17	1.69	1.69	1.69
117.5	1.69	1.56	0.65	0.65	0.26	0.65	0.52	1.56	1.56	1.56
120.0	1.43	1.43	0.65	0.65	0.26	0.65	0.52	1.30	1.43	1.30
122.5	1.43	1.17	0.65	0.65	0.26	0.52	0.52	0.39	1.17	0.39
125.0	1.04	0.52	0.65	0.65	0.26	0.52	0.78	0.39	0.26	0.39
127.5	0.52	0.52	0.91	0.78	0.26	0.52	0.78	0.39	0.26	0.39
130.0	0.52	0.52	0.91	0.78	0.26	0.52	0.65	0.39	0.26	0.39

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

CANDELA TABULATION - (Cont.)

132.5	0.52	0.65	0.91	0.78	0.39	0.52	0.65	0.65	0.26	0.65
135.0	0.65	1.04	0.91	0.78	0.39	0.52	0.65	0.78	0.65	0.78
137.5	1.04	1.04	0.91	0.91	0.39	0.52	0.65	0.78	0.65	0.78
140.0	1.17	1.04	1.04	0.91	0.52	0.52	0.65	0.65	0.65	0.65
142.5	1.04	1.04	1.04	0.91	0.52	0.52	0.65	0.65	0.65	0.65
145.0	1.17	1.17	1.04	0.91	0.52	0.52	0.65	0.65	0.65	0.65
147.5	1.17	1.04	1.04	0.91	0.52	0.52	0.52	0.65	0.65	0.65
150.0	1.04	1.04	1.04	0.91	0.65	0.52	0.65	0.65	0.65	0.65
152.5	1.04	1.04	1.04	0.91	0.65	0.52	0.65	0.65	0.65	0.65
155.0	1.04	1.04	1.04	0.91	0.65	0.52	0.65	0.65	0.65	0.65
157.5	1.04	1.04	1.04	0.78	0.65	0.39	0.65	0.65	0.65	0.65
160.0	1.04	1.04	1.04	0.78	0.65	0.39	0.65	0.65	0.78	0.65
162.5	1.04	1.04	1.04	0.78	0.65	0.52	0.65	0.65	0.78	0.65
165.0	1.04	1.04	0.91	0.78	0.65	0.52	0.65	0.65	0.78	0.65
167.5	1.04	0.91	0.91	0.78	0.65	0.52	0.52	0.65	0.65	0.65
170.0	0.91	0.91	0.78	0.78	0.65	0.52	0.52	0.65	0.65	0.65
172.5	0.78	0.78	0.78	0.78	0.78	0.65	0.65	0.65	0.65	0.65
175.0	0.78	0.78	0.78	0.78	0.78	0.65	0.65	0.65	0.65	0.65
177.5	0.78	0.78	0.78	0.78	0.78	0.65	0.65	0.65	0.65	0.65
180.0	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78

**Vert.
Angles**

Horizontal Angles

	<u>225.0</u>	<u>247.5</u>	<u>270.0</u>	<u>292.5</u>	<u>315.0</u>	<u>337.5</u>	<u>360.0</u>
0.0	631.15	631.15	631.15	631.15	631.15	631.15	631.15
2.5	633.75	632.58	627.77	631.41	632.19	629.72	630.63
5.0	632.19	630.89	626.08	629.33	631.67	629.72	630.50
7.5	630.37	628.42	623.09	627.38	629.46	627.38	626.99
10.0	625.82	624.26	619.06	623.61	625.17	619.58	618.80
12.5	618.54	619.45	613.21	618.15	616.72	611.13	608.92
15.0	609.31	612.04	606.19	611.39	606.71	601.38	599.04
17.5	599.17	602.81	596.96	603.07	596.05	593.58	590.85
20.0	589.68	591.50	587.21	592.41	585.39	585.00	579.80
22.5	579.67	578.89	575.77	579.80	575.38	573.95	569.40
25.0	568.23	565.11	563.68	565.76	562.90	561.47	556.79
27.5	554.84	548.86	549.51	551.33	550.55	548.21	543.79
30.0	538.20	531.96	534.95	535.21	536.64	534.56	528.06
32.5	519.74	515.32	517.92	518.57	520.52	516.62	509.60
35.0	501.28	497.12	499.33	501.67	502.32	497.64	490.49
37.5	483.73	478.01	478.66	483.73	484.38	477.88	473.33
40.0	464.88	458.12	457.60	463.58	463.71	460.59	456.82
42.5	443.56	437.45	435.89	442.65	442.13	442.65	439.27
45.0	421.59	413.79	412.88	420.42	418.47	424.71	418.86
47.5	399.36	387.79	387.14	397.02	397.54	402.74	393.77
50.0	375.83	361.53	359.97	372.71	377.00	376.35	370.11
52.5	347.75	334.49	332.28	346.32	354.90	350.61	344.50
55.0	319.80	307.45	303.29	319.02	328.51	324.35	321.23
57.5	292.76	278.98	273.26	290.42	300.04	298.48	294.97
60.0	267.02	249.86	241.67	261.43	271.44	274.04	270.92
62.5	238.03	223.47	211.38	232.44	245.18	247.00	237.90
65.0	212.42	196.43	180.96	207.48	217.23	214.24	210.99
67.5	185.90	167.83	151.71	183.95	194.09	186.29	188.50
70.0	160.68	142.22	123.11	155.87	160.94	161.85	152.36
72.5	133.25	117.39	94.77	126.10	134.55	124.80	116.48
75.0	98.02	95.03	69.94	100.88	107.51	93.73	88.79
77.5	69.29	73.84	47.45	78.52	74.62	68.38	64.61

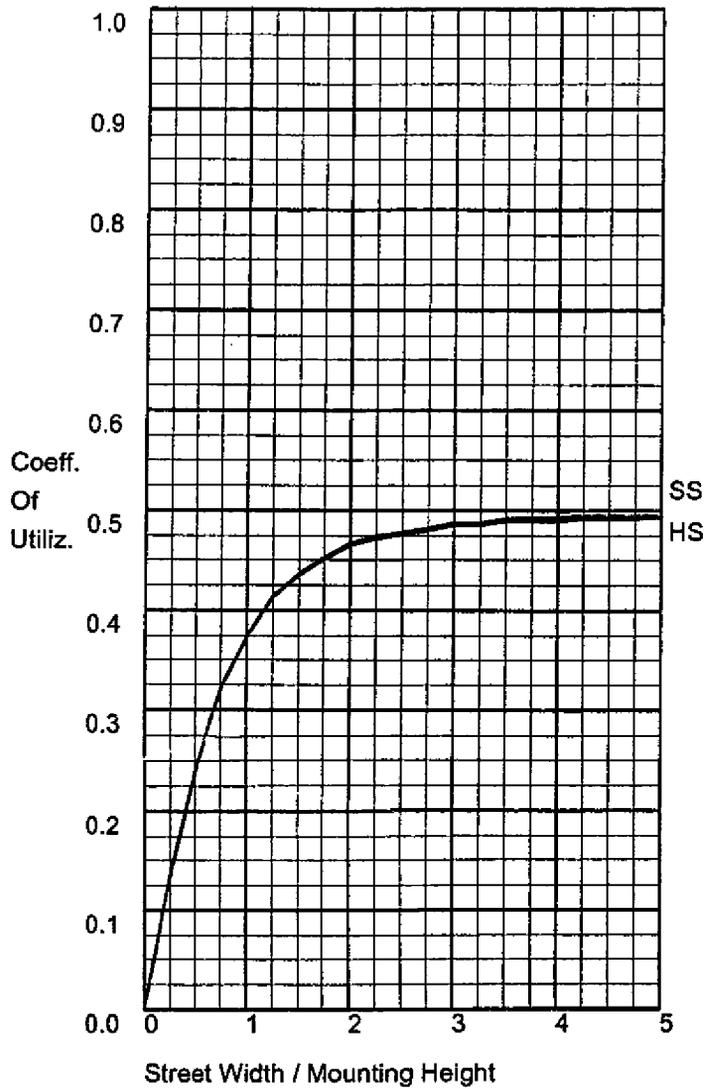
IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

CANDELA TABULATION - (Cont.)

80.0	49.27	53.04	29.25	55.64	50.83	42.12	39.39
82.5	27.56	29.77	14.82	36.27	29.12	21.58	19.63
85.0	12.74	15.86	5.59	19.76	13.39	11.96	11.57
87.5	7.28	6.89	1.17	8.45	7.41	6.50	5.85
90.0	4.68	4.55	0.26	4.94	4.94	4.42	4.16
92.5	4.16	3.64	0.26	3.90	4.29	3.90	3.77
95.0	3.77	2.86	0.26	3.38	3.90	3.64	3.38
97.5	3.38	2.47	0.26	2.73	3.51	3.38	3.25
100.0	3.12	1.95	0.26	2.21	3.25	3.12	2.86
102.5	2.60	1.56	0.13	1.69	2.86	2.73	2.73
105.0	2.34	1.17	0.26	1.30	2.47	2.60	2.47
107.5	2.08	0.91	0.13	1.04	2.21	2.34	2.21
110.0	1.82	0.78	0.13	0.78	1.95	2.21	2.08
112.5	1.56	0.78	0.13	0.78	1.69	1.95	1.95
115.0	1.17	0.65	0.13	0.78	1.43	1.82	1.82
117.5	0.52	0.65	0.26	0.65	0.65	1.56	1.69
120.0	0.52	0.65	0.26	0.65	0.65	1.43	1.43
122.5	0.52	0.52	0.26	0.65	0.65	1.17	1.43
125.0	0.78	0.52	0.26	0.65	0.65	0.52	1.04
127.5	0.78	0.52	0.26	0.78	0.91	0.52	0.52
130.0	0.65	0.52	0.26	0.78	0.91	0.52	0.52
132.5	0.65	0.52	0.39	0.78	0.91	0.65	0.52
135.0	0.65	0.52	0.39	0.78	0.91	1.04	0.65
137.5	0.65	0.52	0.39	0.91	0.91	1.04	1.04
140.0	0.65	0.52	0.52	0.91	1.04	1.04	1.17
142.5	0.65	0.52	0.52	0.91	1.04	1.04	1.04
145.0	0.65	0.52	0.52	0.91	1.04	1.17	1.17
147.5	0.52	0.52	0.52	0.91	1.04	1.04	1.17
150.0	0.65	0.52	0.65	0.91	1.04	1.04	1.04
152.5	0.65	0.52	0.65	0.91	1.04	1.04	1.04
155.0	0.65	0.52	0.65	0.91	1.04	1.04	1.04
157.5	0.65	0.39	0.65	0.78	1.04	1.04	1.04
160.0	0.65	0.39	0.65	0.78	1.04	1.04	1.04
162.5	0.65	0.52	0.65	0.78	1.04	1.04	1.04
165.0	0.65	0.52	0.65	0.78	0.91	1.04	1.04
167.5	0.52	0.52	0.65	0.78	0.91	0.91	1.04
170.0	0.52	0.52	0.65	0.78	0.78	0.91	0.91
172.5	0.65	0.65	0.78	0.78	0.78	0.78	0.78
175.0	0.65	0.65	0.78	0.78	0.78	0.78	0.78
177.5	0.65	0.65	0.78	0.78	0.78	0.78	0.78
180.0	0.78	0.78	0.78	0.78	0.78	0.78	0.78

IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

COEFFICIENTS OF UTILIZATION

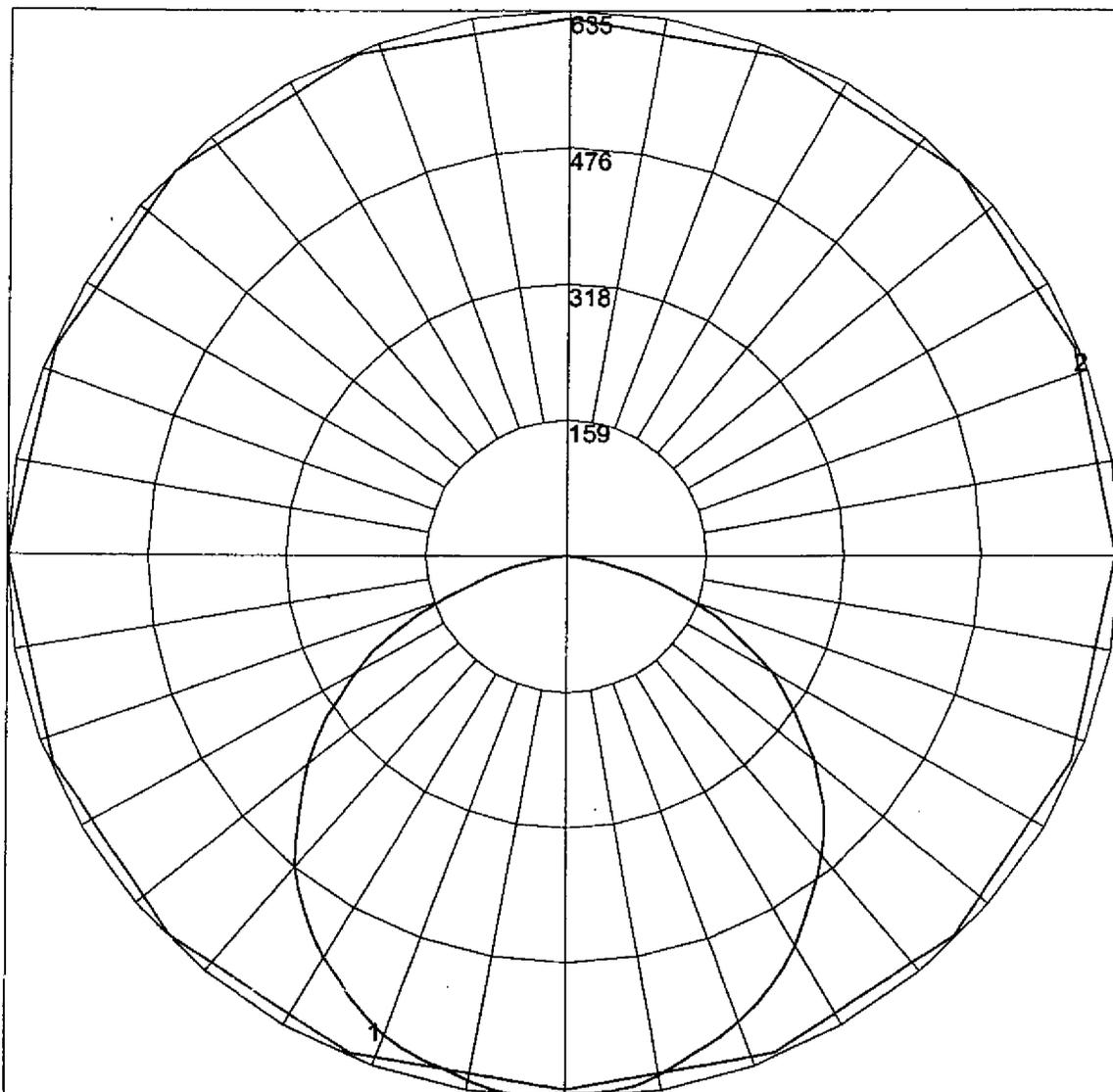


FLUX DISTRIBUTION

	Lumens	Percent Of Luminaire
Downward Street Side	870.7	49.8
Downward House Side	867.2	49.6
Downward Total	1737.9	99.5
Upward Street Side	4.7	0.3
Upward House Side	4.1	0.2
Upward Total	8.8	0.5
Total Flux	1746.7	100.0

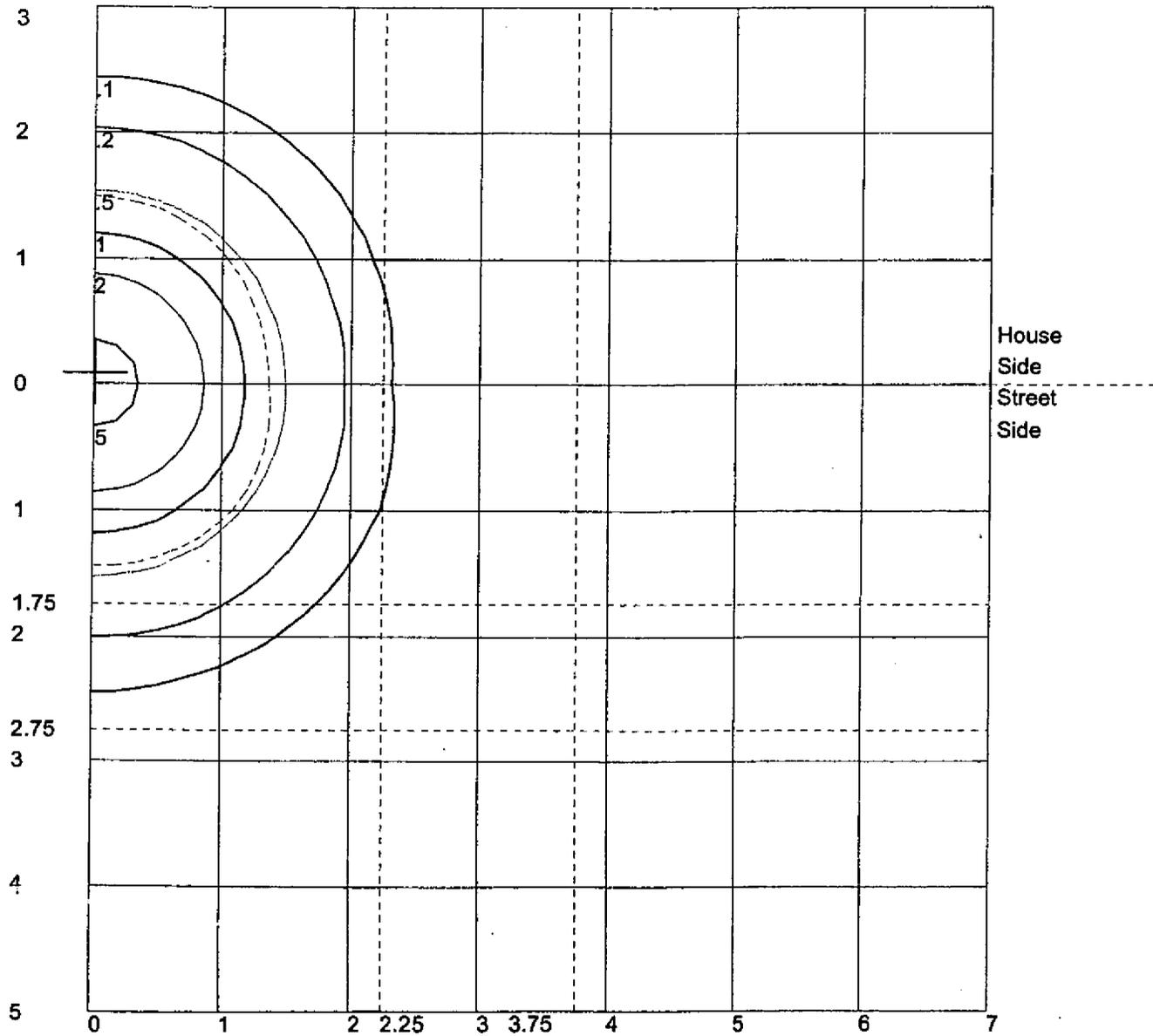
IES ROAD REPORT
PHOTOMETRIC FILENAME : 342 SMD LED TUBE C4603L-MOD.IES

POLAR GRAPH



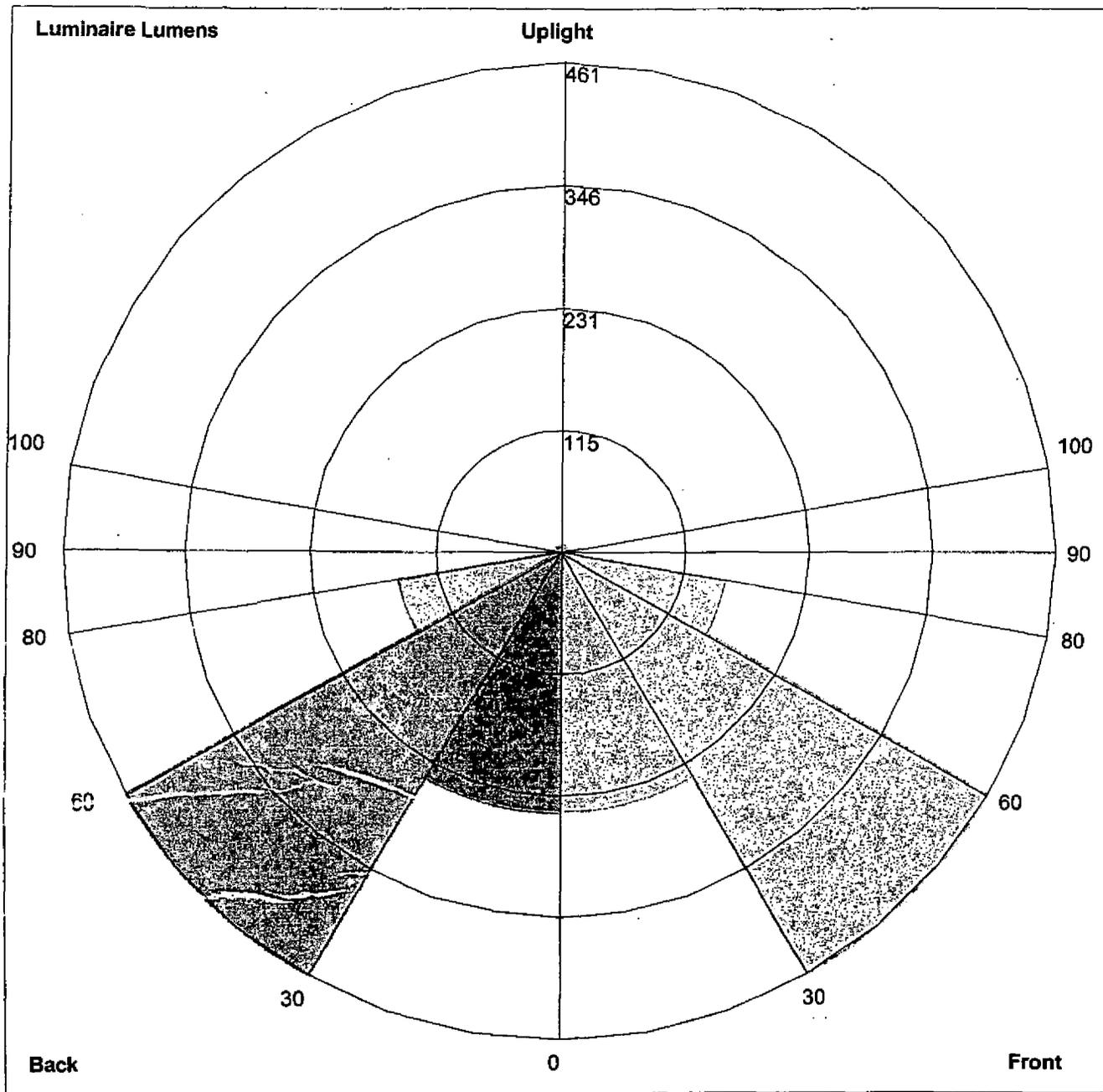
Maximum Candela = 635.05 Located At Horizontal Angle = 180, Vertical Angle = 5
1 - Vertical Plane Through Horizontal Angles (180 - 0) (Through Max. Cd.)
2 - Horizontal Cone Through Vertical Angle (5) (Through Max. Cd.)

ISOFOOTCANDLE LINES OF HORIZONTAL ILLUMINANCE



Distance In Units Of Mounting Height
 Values Based On 10 Foot Mounting Height
 1/2 Maximum Candela Trace Shown As Dashed Curve
 (+) = Maximum Candela Point

LUMINAIRE CLASSIFICATION SYSTEM (LCS) GRAPH



Luminaire Lumens:
 Front: Low=245.2, Medium=461.1, High=154.9, Very High=9.6
 Back: Low=246.6, Medium=460.7, High=150.7, Very High=9.1
 Uplight: Low=3.4, High=5.4

BUG Rating : B1-U1-G0

Design Parameters

Luminaire Label	A	A5	A10
	0.05 years	5 years	10 years
Light Lost Factor	500 hrs	50,000 hrs	100,000 hrs
Light Lost Factor - LLF	0.58	0.58	0.58

Reflectances

Ceiling 20 %

Walls 50%

Roadway clasification R4

Design Parameters

Luminaire Label	A	A5	A10
	0.05 years	5 years	10 years
Light Lost Factor	500 hrs	50,000 hrs	100,000 hrs
Light Lost Factor - LLF	0.58	0.58	0.58

Reflectances

Ceiling 20 %

Walls 50%

Roadway clasification R4



Illuminance (fc)

0.00

0.63

1.25

1.88

2.50

3.13

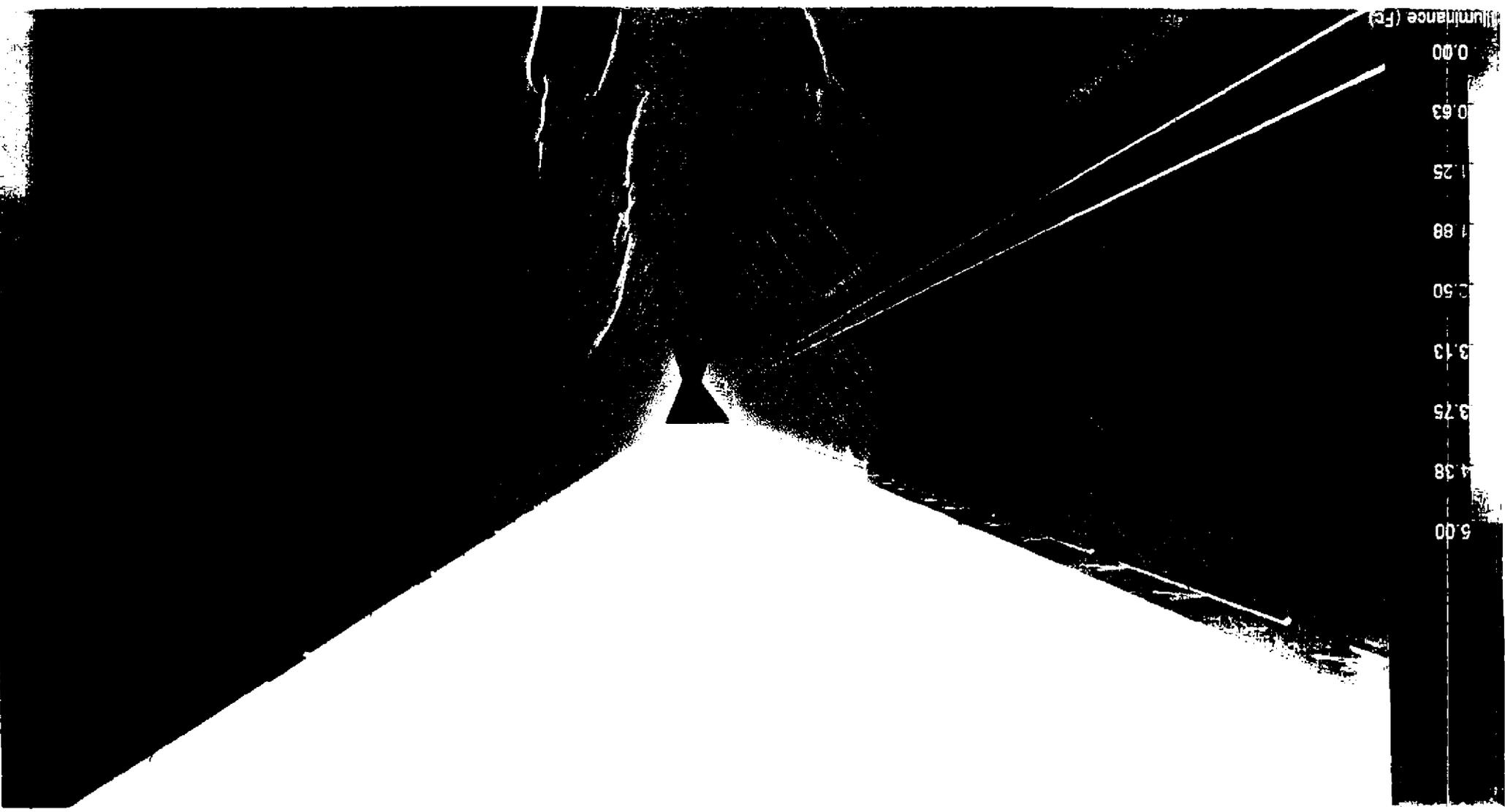
3.75

4.38

5.00



5.00
4.38
3.75
3.13
2.50
1.88
1.25
0.63
0.00
Illuminance (Fc)



Fluorescence (f.c)

0.00

0.63

1.25

1.88

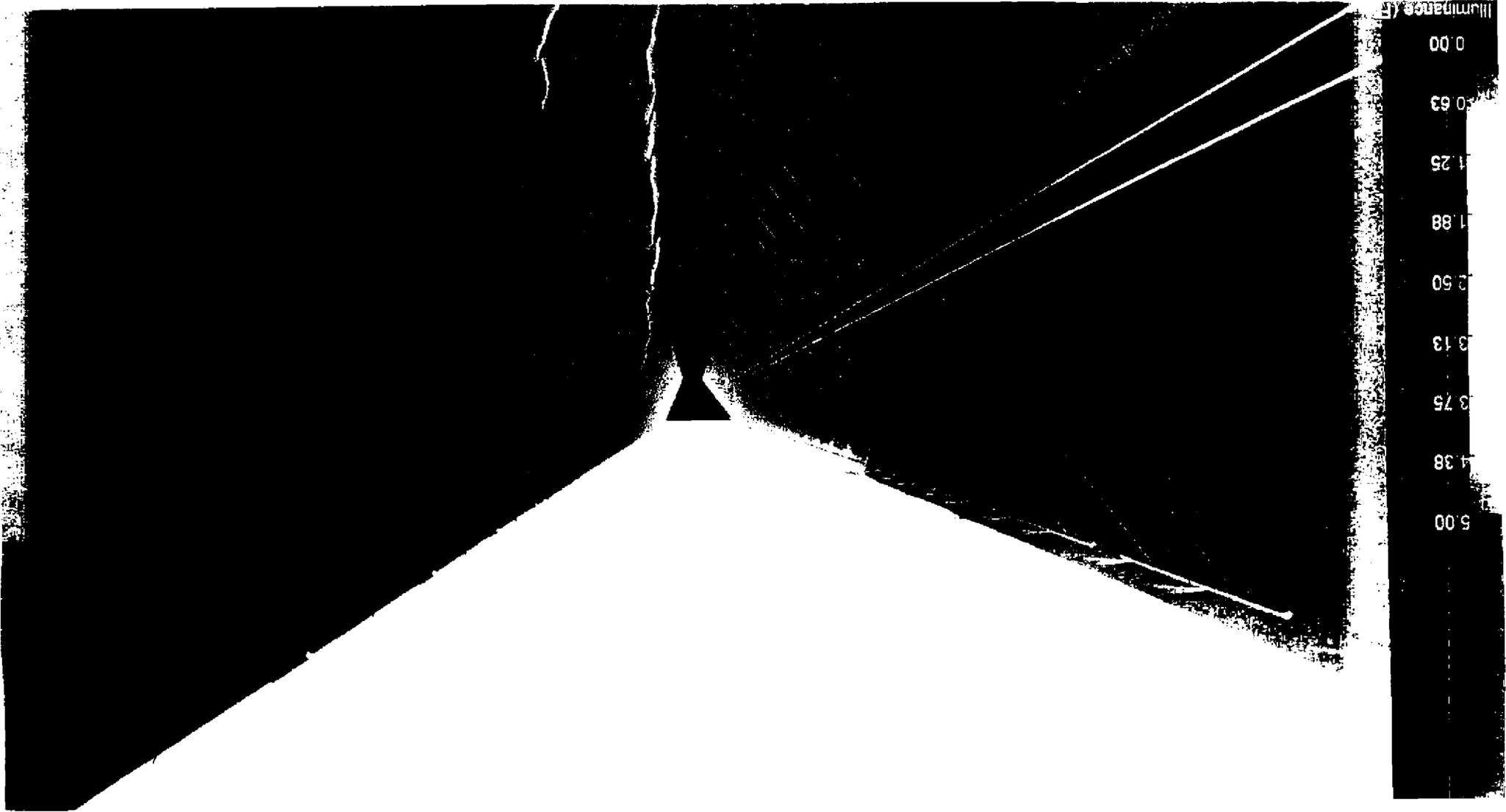
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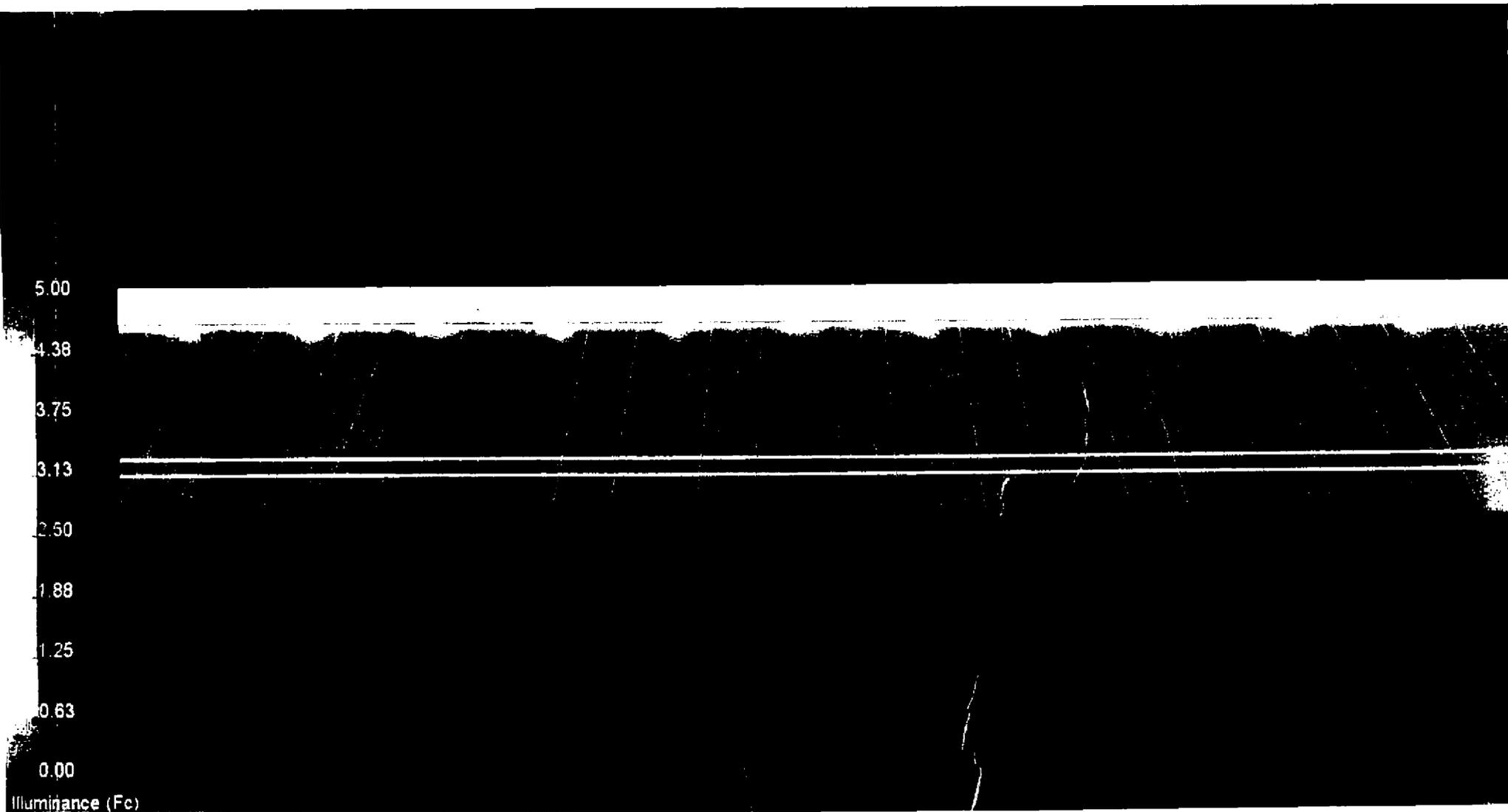
3.13

3.75

4.38

5.00





Illuminance (Fc)

0.00

0.63

1.25

1.88

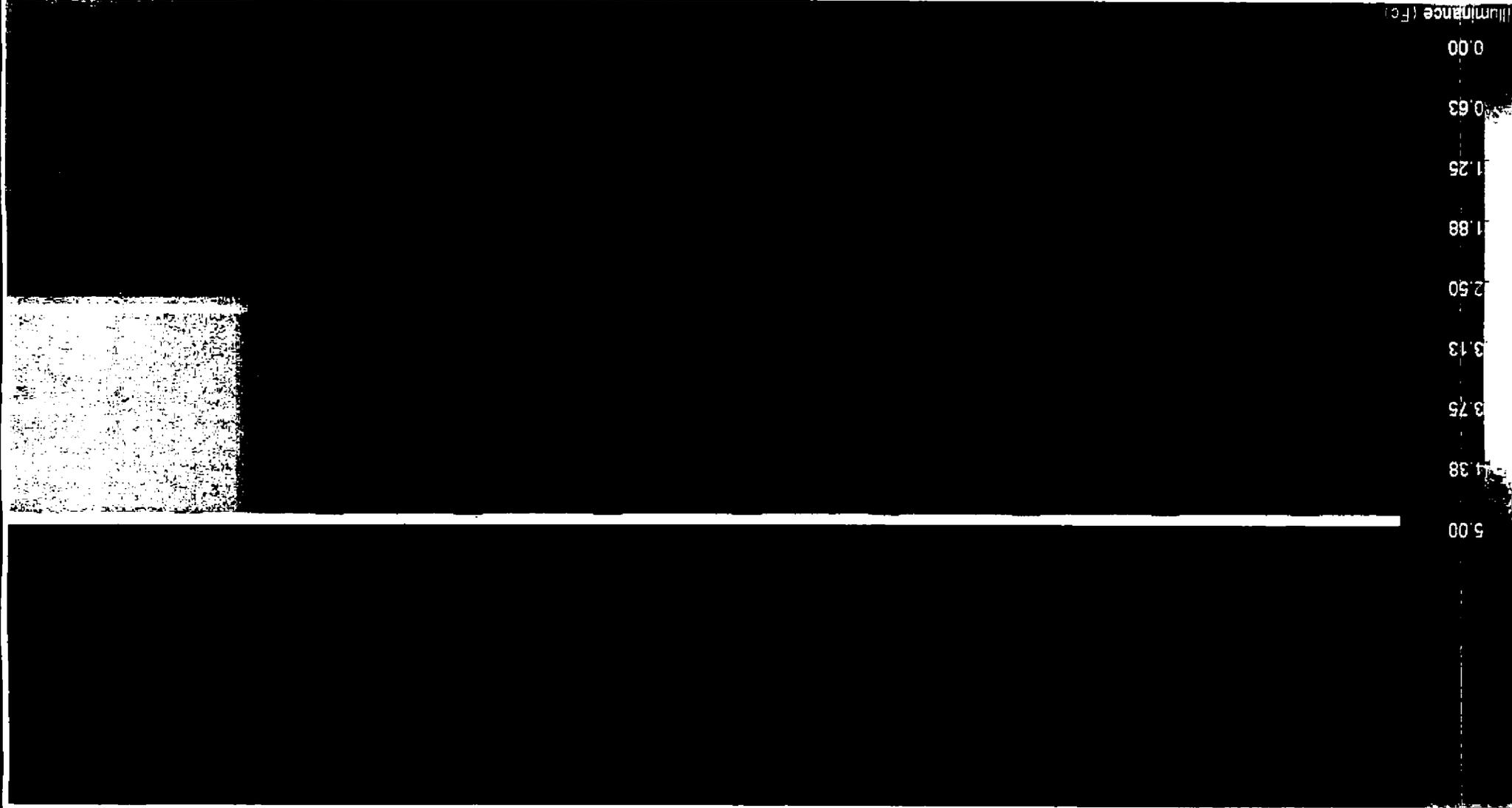
2.50

3.13

3.75

4.38

5.00



7.00

6.13

5.25

4.38

3.50

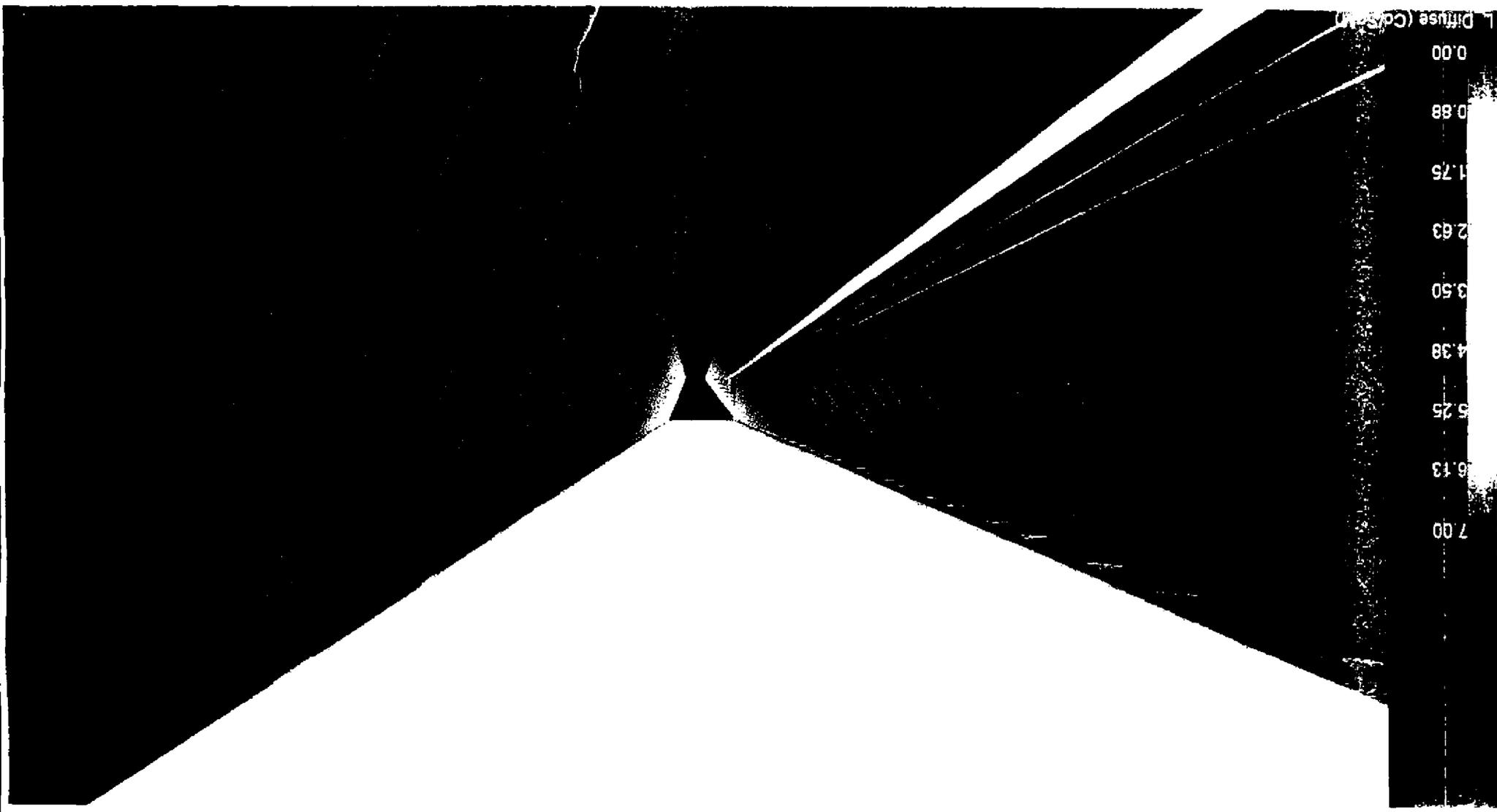
2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)



L. Diffuse (Col/cm)

0.00
0.88
1.75
2.63
3.50
4.38
5.25
6.13
7.00

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)

Design Parameters

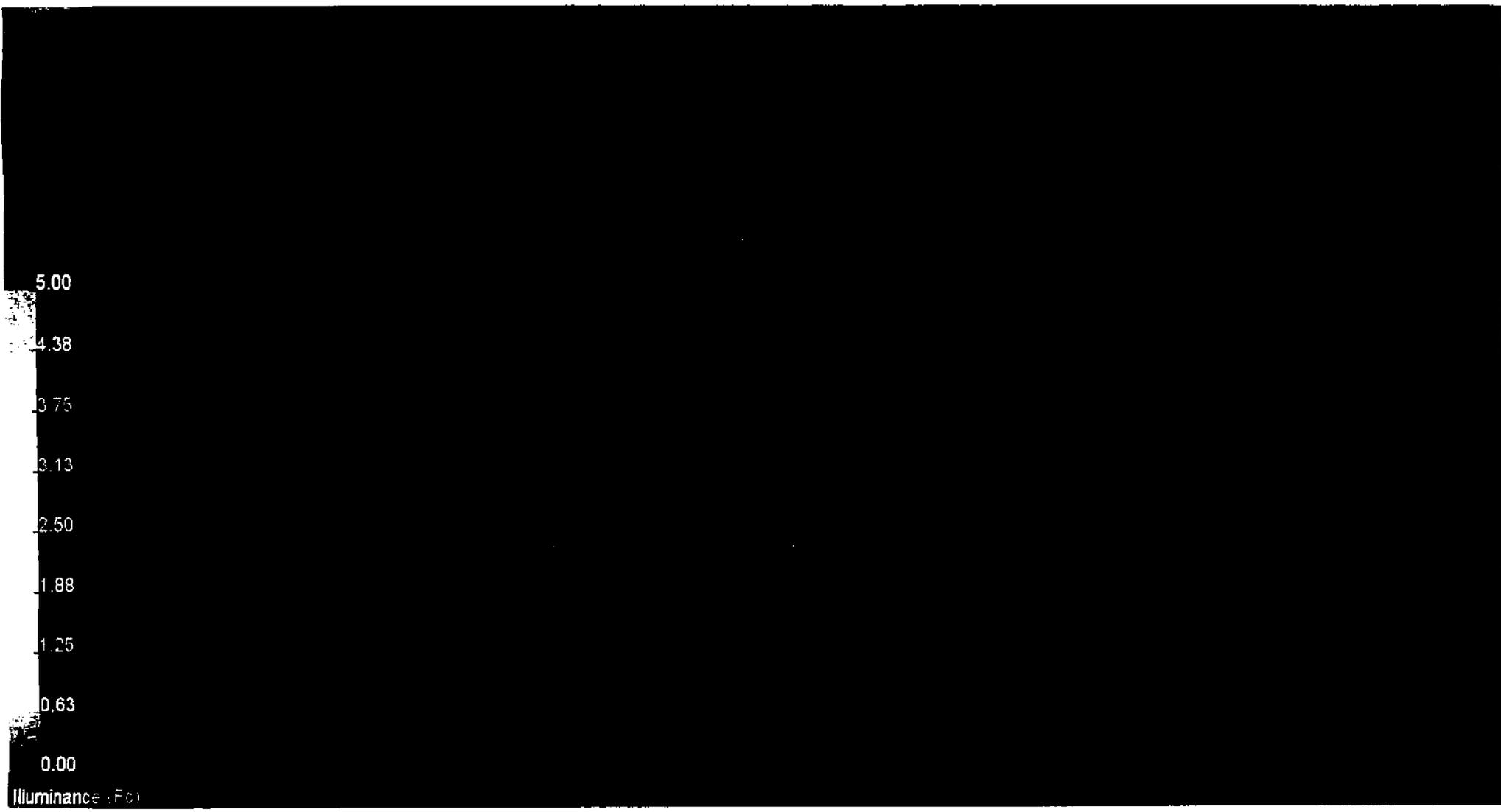
Luminaire Label	A	A5	A10
	0.05 years	5 years	10 years
Light Lost Factor	500 hrs	50,000 hrs	100,000 hrs
Light Lost Factor - LLF	0.58	0.58	0.58

Reflectances

Ceiling 20 %

Walls 50%

Roadway clasification R4



5.00

4.38

3.75

3.13

2.50

1.88

1.25

0.63

0.00

Illuminance (Fc)

5.00

4.38

3.75

3.13

2.50

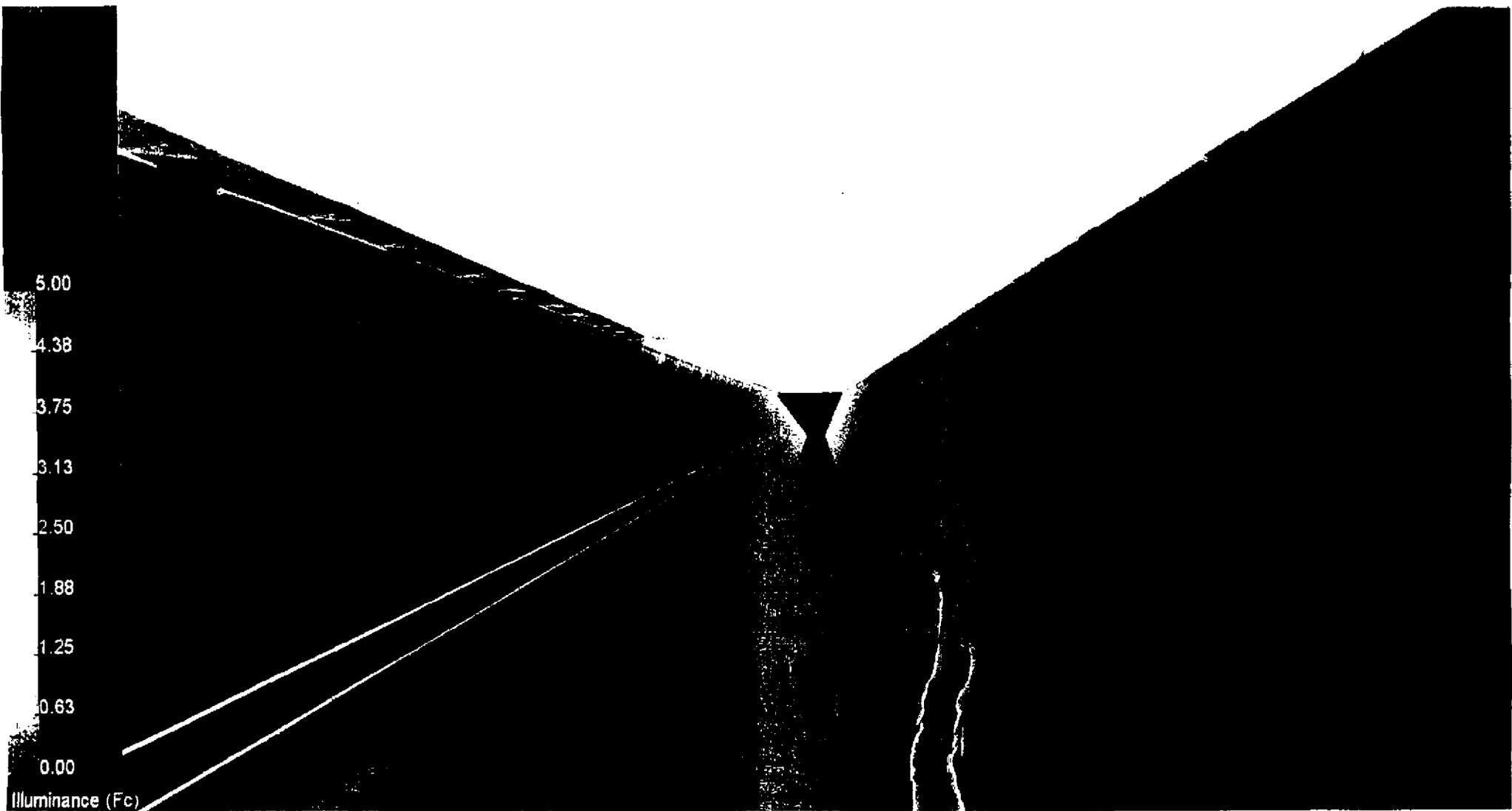
1.88

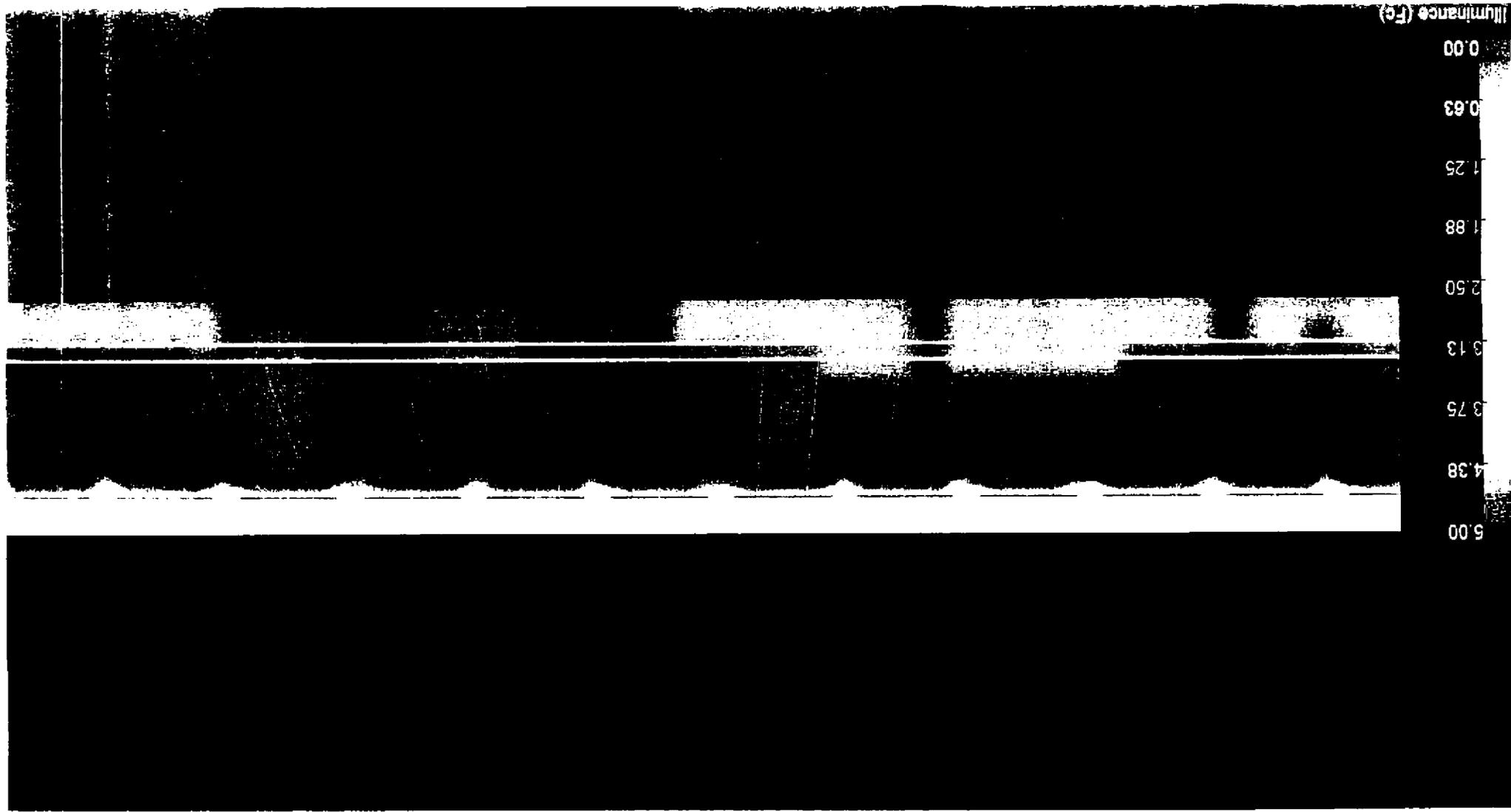
1.25

0.63

0.00

Illuminance (Fc)





5.00

4.38

3.75

3.13

2.50

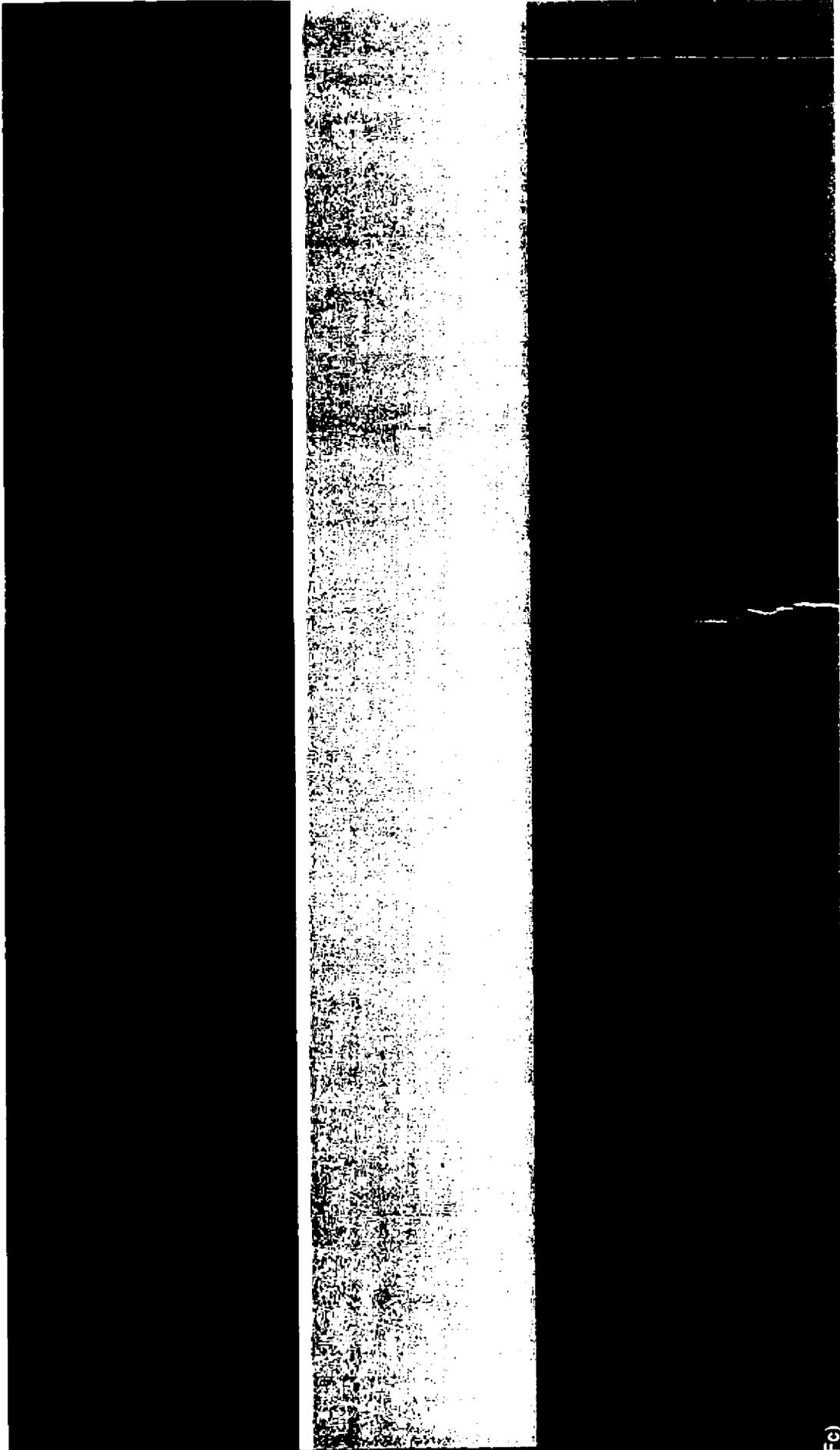
1.88

1.25

0.63

0.00

Illuminance (Fc)



L Diffuse (lb/sqmi)

0.00

0.88

1.75

2.63

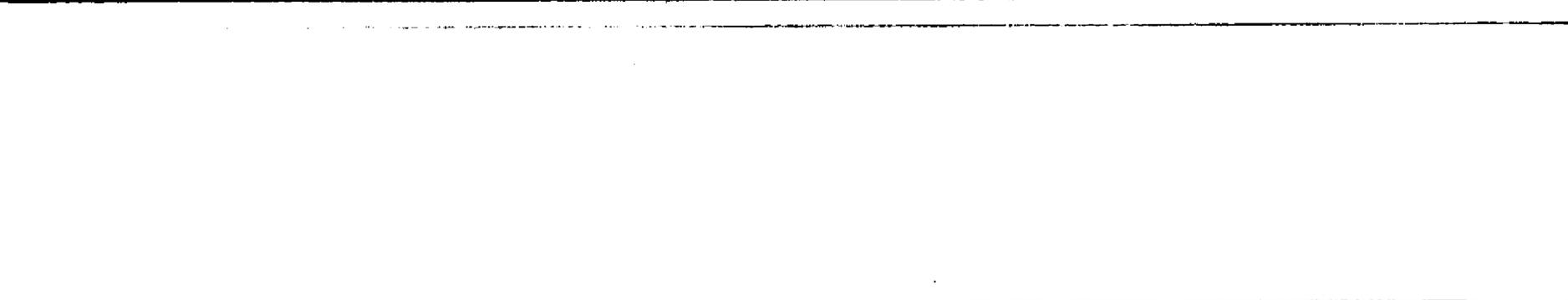
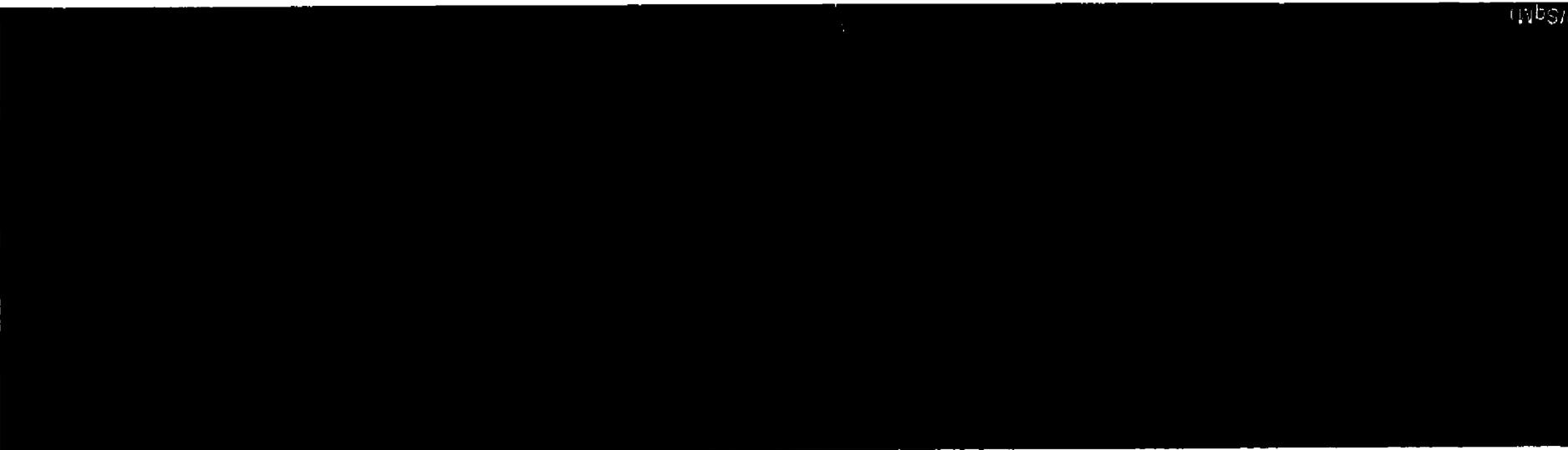
3.50

4.38

5.25

6.13

7.00



7.00

6.13

5.25

4.38

3.50

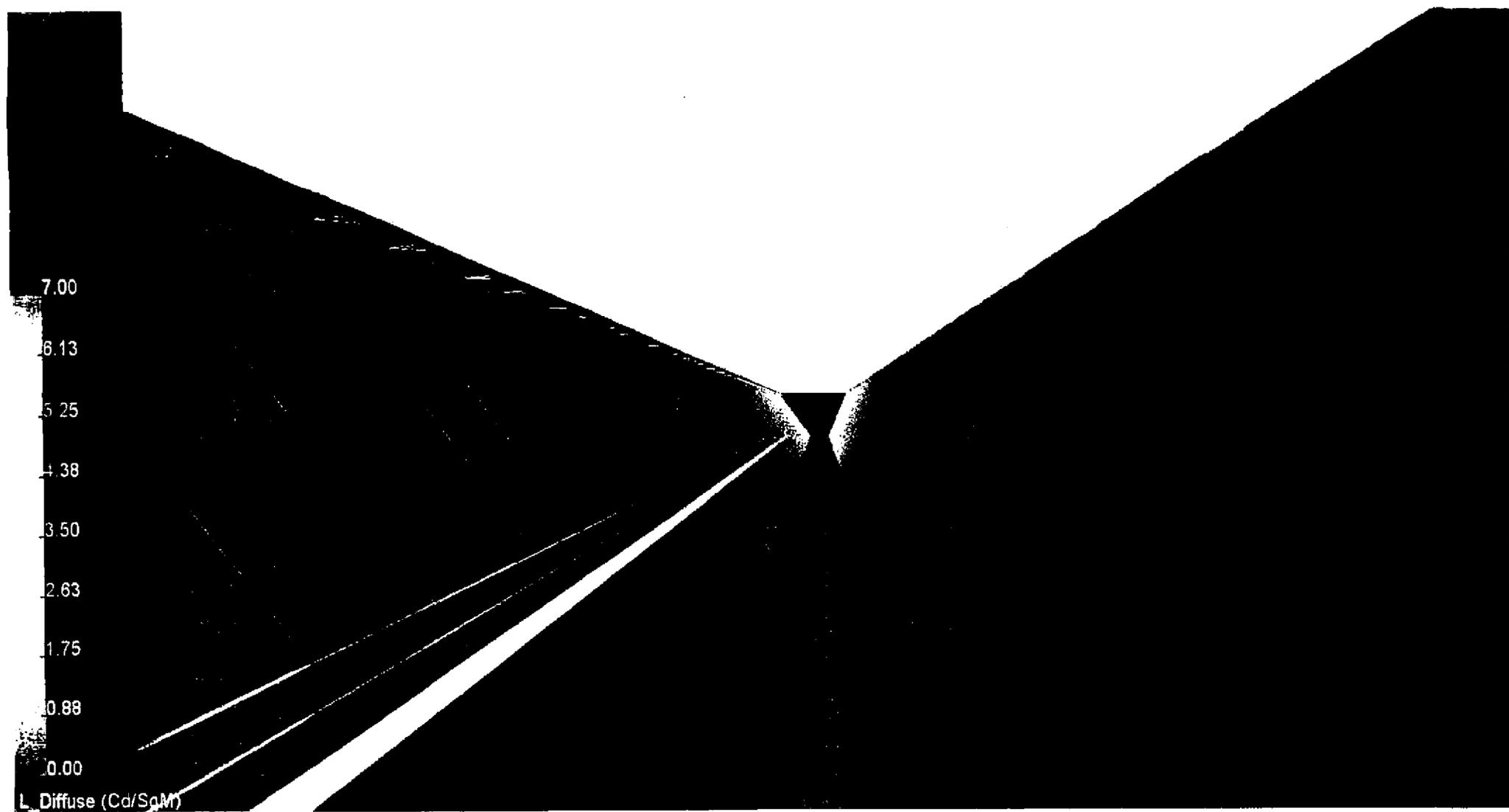
2.63

1.75

0.88

0.00

L Diffuse (Cd/SdM)



L Diffuse (cd/Sqm)

0.00

0.88

1.75

2.63

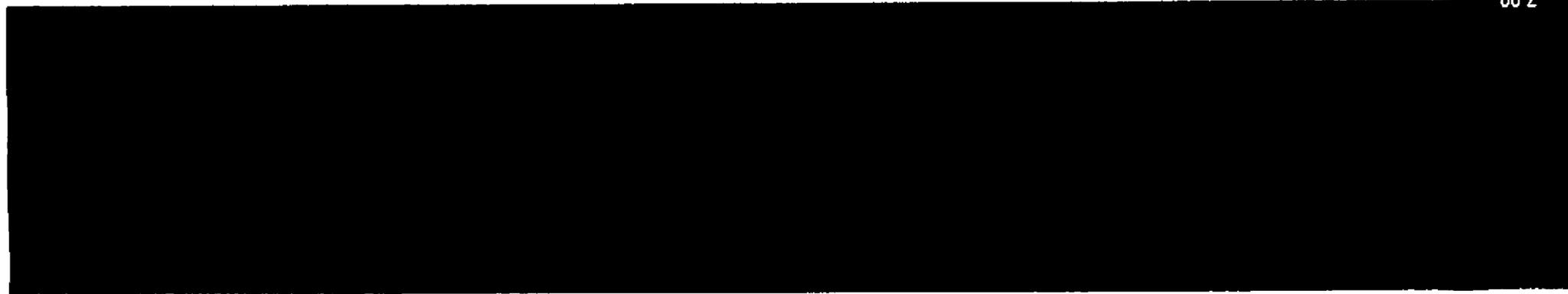
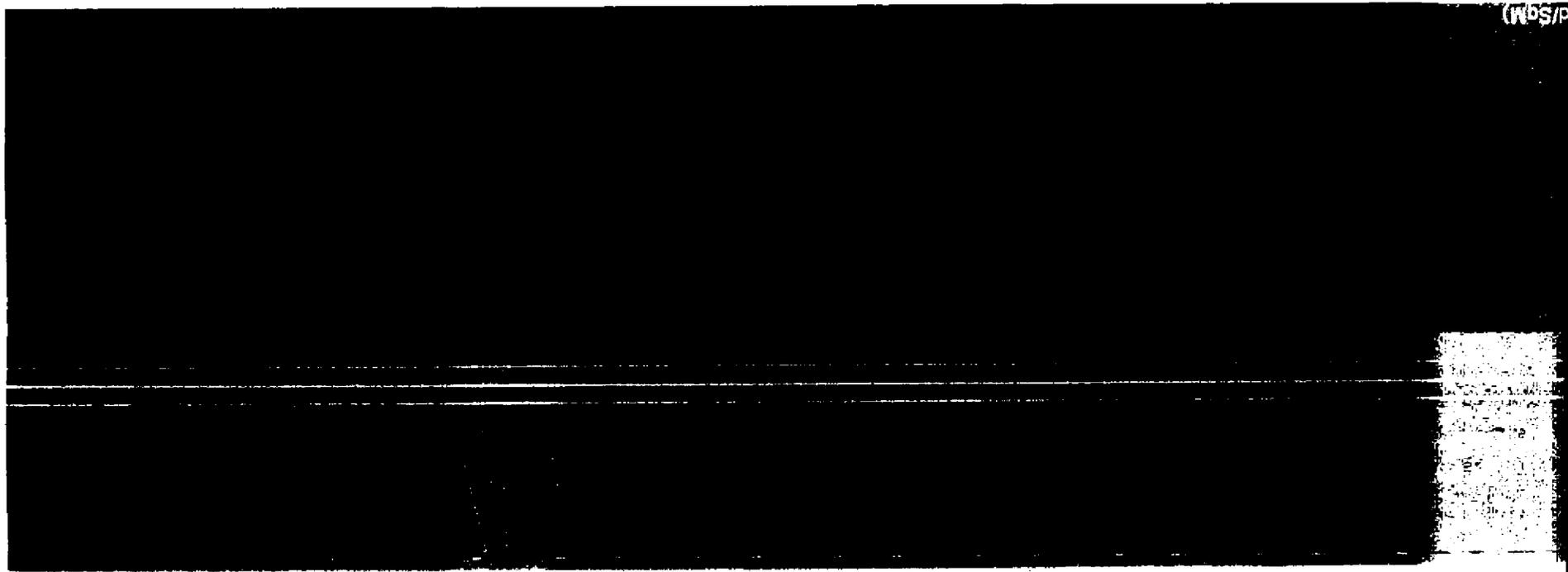
3.50

4.38

5.25

6.13

7.00



7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L_Diffuse (Cd/SqM)

Design Parameters

Luminaire Label	A	A5	A10
	0.05 years	5 years	10 years
Light Lost Factor	500 hrs	50,000 hrs	100,000 hrs
Light Lost Factor - LLF	0.58	0.58	0.58

Reflectances

Ceiling 20 %

Walls 50%

Roadway clasification R4

Illuminance, Fc

0.00

0.63

1.25

1.88

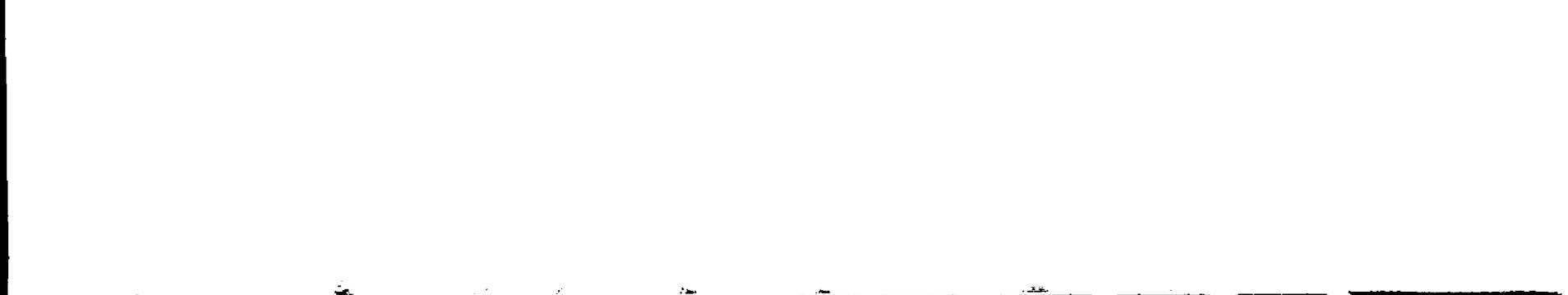
2.50

3.13

3.75

4.38

5.00



5.00

4.38

3.75

3.13

2.50

1.88

1.25

0.63

0.00

Illuminance (Fc)



5.00

4.38

3.75

3.13

2.50

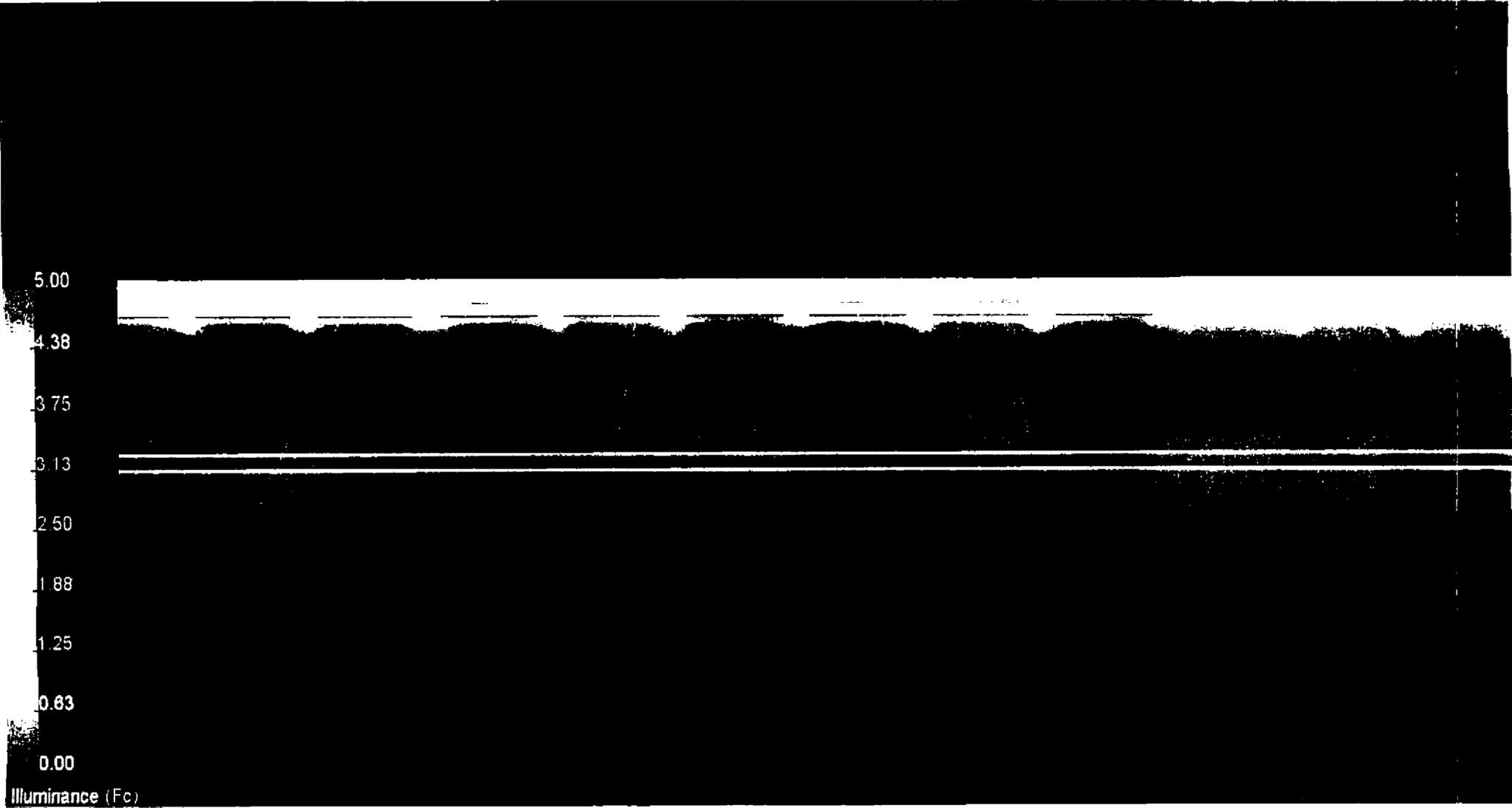
1.88

1.25

0.63

0.00

Illuminance (Fc)



5.00

4.38

3.75

3.13

2.50

1.88

1.25

0.63

0.00

Illuminance (Fc)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)



7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L_Diffuse (Cd/SqM)

7.00

6.13

5.25

4.38

3.50

2.63

1.75

0.88

0.00

L Diffuse (Cd/SqM)



Clean Light
Green Light



WHERE LED TECHNOLOGY LIVES

November 17, 2010

To New York Port Authority,

Clean Light Green Light is a custom manufacturer of LED products and as such, sometimes our development cycles can coincide with current projects.

The project pieces we bid for the New York Port Authority is an LED tube which is currently in the ETL approval process. Our components used in this piece have already been approved in a smaller form by Underwriters Laboratory (UL, E329010). Both entities being Nationally Recognized Testing Laboratory (NRTL), certified by OSHA. We have the expertise and skill to accomplish these goals in a timely fashion to meet the specifications and deadlines of the New York Port Authority.

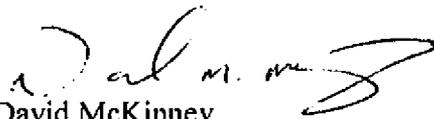
CLGL warrants the products that have been bid to specifically have ETL certification by the time balance of the product is delivered, with a certification sticker affixed for the following products bid:

CLGLT872-SMD (6' SMD LED Tube)

CLGLT896-SMD (8' SMD LED Tube)

We appreciate your understanding of this situation and look forward to delivering a top tier LED product with a NRTL Certification affixed.

Sincerely,



David McKinney

CEO, Clean Light Green Light Inc.

24501 North River Rd, Mt. Clemens, MI 48043

Dmckinney@cleanlightgreenlight.com

888.499.5337 Direct Ext. 705

HEADQUARTERS
24501 North River Rd. Mount Clemens, MI 48043 fax . 480.275.3212

CUSTOMER SERVICE
1-888-499-LEDS (5337)

sales@cleanlightgreenlight.com

cleanlightgreenlight.com



Clean Light
Green Light

WHERE LED TECHNOLOGY LIVES



January 25th, 2011

To Whom It May Concern:

It has come to our attention that there is some concern about standards or lamp components existing to said standards of use.

In section 1.04, subsection B it states:

Lamps and lamp components for which there is a nationally recognized standard shall be safety tested by a Nationally Recognized Testing laboratory, such as Underwriters Laboratories Inc. (UL), MET Laboratories, or approved equal, and bear conformance labeling by the third party inspection authority certifying that the lamp or lamp component is listed as suitable for the purposes specified.

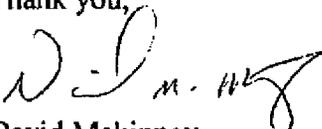
To that end we would like to include into record the PDF document from the UL (see Attachment A) in the approval of our 342 LED tube and all its components, of which the same components are used to build our larger models. These components have all been certified to withstand dry and damp location use. Each component was certified to cUL standards as being in conformance with or listed by UL previously.

We have also started ETL testing of sub components that are related to the larger series of tubes to expedite our full ETL listing on the LED tube series. Listing completion is expected before first tube deliveries.

The last portion that is highlighted points to the components being listed as certified for the use intended which is what we have done.

If there is any questions please feel free to contact our Distributor.

Thank you,



David McKinney

CEO/Clean Light Green Light

HEADQUARTERS
21501 North River Rd. Mount Clemens, MI 48033 Fax: 480-275-3212
sales@cleanlightgreelight.com

CUSTOMER SERVICE
1-888-499-LEDS (5337)
cleanlightgreelight.com

File E329010
Project 09CA20446

April 9, 2010

REPORT

On

UNLISTED COMPONENT - LAMPS, SELF-BALLASTED, LIGHT-EMITTING-DIODE TYPE
FOR USE ONLY IN
APPLICANT'S CLASSIFICATION PROGRAM

CLEAN LIGHT GREEN LIGHT
MT CLEMENS, MI

Copyright © 2010 Underwriters Laboratories Inc.

DESCRIPTION

PRODUCT COVERED:

USU, CNU - Unlisted Component - LED lamp, Model CLGL 342

ELECTRICAL RATINGS:

Model No.	No. of LED	Voltage V	Frequency Hz	Wattage W
CLGL 342	342	110	50/60	17

TECHNICAL CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE)

For use only in (or with) Applicant's complete equipment where the acceptability is determined by Underwriters Laboratories Inc.

Product designated USU has been investigated to the United States requirements contained in the UL Standard for Self-Ballasted Lamps and Lamp Adapters, UL 1993, Second Edition, and the UL Outline of Investigation (OOI) for Light Emitting Diode (LED) Light Sources For Use In Lighting Products, Subject 8750, Issue No. 3, dated 2008-07-22.

Products designated CNU have been investigated using requirements contained in the CSA Standard for Equipment for Use With Electric Discharge Lamps, C22.2, No. 74, CSA Technical Information Letter (TIL) TIL B-36B.

GENERAL:

Each product in this report complies with the description on the following pages. These devices are provided with lamp bases, at each end and are to equivalent to medium bi-pin (G13) for connection to a 110 V source of supply. Product features:

A LED lamp and is for use indoor dry and damp locations only and has been evaluated for surface mount or recessed non IC ceiling fixtures. The product is not for use with light dimmers. For use in indoor dry or damp locations only.

Use - For use in products where the acceptability of the combination is determined by Underwriters Laboratories Inc.

Conditions of Acceptability - When installed in the final use equipment, the following considerations shall be made:

1. An enclosure shall be provided, which will provide suitable electrical and mechanical properties required by the end use product standard.
2. The suitability of lampholders for mounting shall be considered in end use application.
3. The need for additional end product markings, shall be considered in the end product evaluation.
4. Mold stress relief test shall be repeated if the maximum temperature on the lamp tube exceeds 70°C in the end use application.
5. This device is not for use with lighting dimmers.
6. The LED lamp has been evaluated for use in dry and damp locations. The use in other environments shall be considered in the end product.

CONSTRUCTION DETAILS:

See Section General for additional details.

Assembly and Packing - When shipped from the factory, each unit shall be completely assembled and wired with each electrical component mounted in place and with each splice and connection completed.

Current-Carrying Parts - A current-carrying part shall be of silver, copper alloy, stainless steel or other similar metal. Ordinary iron or steel, plain or plated, shall not be used as a current-carrying part.

Spacings - The minimum spacing of 3.2 mm for through air and 6.4 mm for over surface shall be maintained between uninsulated live parts of opposite polarity, and between uninsulated live parts and dead metal parts where it can be contacted by persons.

Corrosion Protection - Ferrous metal parts are protected against corrosion by plating or painting.

Soldered Connections - All soldered connection are mechanically secured before soldering.

Printed Wiring Board - R/C (ZPMV2), rated V-1, suitable for the solder time and temperature used by the manufacturer and having an operating temperature rating of at least 105°C.

Electrical Tubing and Sleeving - R/C (YDPU2, YDPU8) or R/C (UZFT2, UZFT8), rated 300 V, 125°C minimum.

Abbreviations - R/C - Recognized Component

Markings - The product is provided with the model number for identification purposes.

Illustrations - The following illustrations are included in this Report.

ILL.	Descriptions
1	Electrical Schematics diagram of Power Supply Board
2	Trace Layout of Power Supply Board
3	Lamp Base Drawing

Model CLGL 342 - FIG. 1 - 4 - Overall View and Lamp Base

- *1. Tube - R/C (QMFZ2), KINGFA SCI & TECH CO LTD., Cat. No. JH830 rated V-0, 80°C. Overall dimensions min. 1 mm thick, 30 mm OD, 119.5 cm long.
2. Lamp Base - Type G13, Medium Bipin, consists of:

Shell (End Cap) - R/C (QMFZ2), KINGFA SCI & TECH CO LTD., Cat. No. JH830 rated V-0, 80°C, (HWI 0, HAI 3, CTI 2), suitable for direct support of live parts, min. 2.2 mm thick near pins and min. 1 mm thick at the side, 32 mm OD, 15 mm high. Provided with two 9.5 mm high, 1.7 mm thick internal ridges for securement to tube. Provided with 3 openings, 1.9 mm diameter and 20 openings, 1 mm diameter for ventilation. The Shell is placed on Tube and secured in place by compression fit and adhesive.

Adhesive - R/C (QMFZ2), CEMEDINE CO LTD, Cat. No., SX720+ rated V-0, 105°C.

Pins - Copper alloy, 7.8 mm long, 2.4 mm diameter and provided with 3 mm diameter ridge at entry to Shell. Pins are secured to Shell by compression fit and ridge on pin.
3. Lead - R/C (AVLV2), CN, min. 22 AWG, 300 V, 200°C. Mechanically secured and soldered to Power Supply Board PCB and Lamp Base pins. Both leads secured to one lamp end.

Model CLGL 342 - FIG. 5 - LED PCB

- *1. PCB - R/C (ZPMV2/8), rated V-0, 130°C. Overall dimensions Min. 1 mm thick, 23.3 mm wide, 119.2 cm long. Secured on PCB holder.
- *2. PCB Holder - R/C (QMFZ2), KINGFA SCI & TECH CO LTD., Cat. No HF-630, rated V-0, 60°C, (HWI 4, HAI 0, CTI 0), suitable for direct support of live parts, "C" shaped. Overall dimensions min. 1.5 mm thick, 117.3 cm long, 27 mm wide. Provided with slot for LED PCB.
3. LED - 342 provided. Secured to PCB by solder.
4. Resistors - Six provided, 150 ohms, 1/4 W.

Model CLGL 342 - FIG. 6-7 - Power Supply Board

1. Power Supply Board PCB - R/C (ZPMV2/8), rated V-0, 130°C. Min. 1 mm thick, 23.5 mm wide, 215 mm long. Secured by three pins from LED board. Provided with insulating PCB between Power Supply Board PCB and LED PCB.
- *2. Insulating PCB - R/C (ZPMV2/8), rated V-0, 130°C. Overall dimensions Min. 0.5 mm thick, 23.5 mm wide, 215 mm long. Secured to back of Power Supply Board PCB by Power Supply Board Pins.
3. Fuse (F1) - Listed (JDYX/7), rated 1 A, 250 V.
4. Varistor (ZNR1) - R/C (FOWX2/8), BRIGHTKING (SHENZHEN) CO LTD., Cat. No. 471KD20, rated 250 V, suppressed voltage 470 Vdc.
5. Capacitor (CX1) (Across-Line) - R/C (FOWX2/8), SHENZHEN SURONG CAPACITORS CO LTD., Cat. No. MPX/MKP, rated 0.1 uF, 250 V.
6. Inductor Coil (L1) - Rated 6 mH.

Constructed of:
* Bobbin: Ferrite, Min. 9 mm by 12 mm, Max. 11.5 mm by 16.5 mm.
Coil: R/C (OBMW2), 0.16 mm diameter.
7. Diodes (D1-7) - Type 1N4007.
8. Capacitor (C1) - Rated 0.22 uF, 400 V.
9. Capacitor (C2-3) - Electrolytic, rated 22 uF, 250 V, 105°C.
10. Inductor Coil (L2) - Rated 1 mH.

Constructed of:
* Bobbin: Ferrite, Min. 10 mm by 16 mm, Max. 12 mm by 20 mm.
Coil: R/C (OBMW2), 0.35 mm diameter.
- *11. Diodes (D8-9) - Type UF4007 or SF28.
12. Voltage Regulator IC (U1) - Type LNK306PN.
13. Capacitor (C4) - Rated 100 nF.
14. Optoisolator (U1) - R/C (FPQU2/8), SHARP CORP ELECTRONIC COMPONENTS AND DEVICES GROUP, Cat. No. PC817, rated 5000 V isolation voltage, 100°C.
15. Capacitor (C5) - Electrolytic, rated 10 uF, 400 V, 85°C.
16. Resistor (R1) - 20 ohm
- *17. Resistor (R2) - 100 kohm

18. PTC (R4) - 13.6 ohm, 1/4 W.

19. Resistor (R3) - 30 ohm



Clean Light
Green Light



WHERE LED TECHNOLOGY LIVES

5 Year Warranty

This Warranty only covers product manufactured by Clean Light Green Light LLP and does not cover any products manufactured by others. These products carry their own warranties and should be considered before returning any products. Clean Light Green Light will not accept returned items without prior written return goods authorization number. We warrant to the original purchaser, with proof of purchase, its delivered products should be free from defects in the material and workmanship for up to five years from date of purchase.

For any breach by Clean Light Green Light, of this limited warranty, the exclusive remedy of the Customer and the sole liability of Clean Light Green Light shall be, at the option of Clean Light Green Light, to replace or repair the affected products, or to refund to Customer the price of the affected products. The availability of replacement products is subject to product for exchange, Clean Light Green Light shall provide shipping from and to the customer's location.

All LED products are eligible for a full refund. Providing the product is returned to the shipping facility, within (30) thirty days from date of purchase. All returns must be in their original packaging and condition to be eligible for return. All returns must have a return goods authorization number included in the return packaging as well. All products returned that do not meet these criteria will be charged a 25% restocking fee. Shipping charges will not be refunded.

The warranties set forth herein are exclusive. Clean Light Green Light LLP disclaims all other warranties, whether express, implied or statutory, including, without limitation, any warranty of merchantability, fitness for a particular purpose, or non-infringement, and any warranty that may arise from course of dealing, course of performance, or usage of trade.

This warranty does not cover acts of nature such as lightning damage, or corrosion and discoloration of components, nor does it cover damages caused through abuse, improper installation, surges in electrical current, acts of third parties, or any error, neglect or default of Customer.

Failure of an LED fixture is defined as having more than 5% of total fixture count LED failure. This warranty is null and void if the product is not installed within the manufacturer's strict guidelines or if any of the following occur: under/over voltage, under/over current or any damage arising out of any act of God, external forces, fire, misuse, vandalism, abuse or civil disturbance or any other factor not under control of Clean Light Green Light LLP. Purchaser must notify us in writing within (30) thirty days of noticing the defect.

HEADQUARTERS
24501 North River Rd. Mount Clemens, MI 48043 Fax : 480.275.3212

CUSTOMER SERVICE
1-888-499-LEDS (5337)

sales@cleanlightgreenlight.com

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All LED products are warranted for a period of (5) five years from the date of purchase to the original buyer with proof of purchase. This warranty excludes field labor or service charges related to the repair or replacement of the product.

7 Year Warranty On High Power Outdoor Fixtures

This Warranty only covers product manufactured by Clean Light Green Light LLP and does not cover any products manufactured by others. These products carry their own warranties and should be considered before returning any products. Clean Light Green Light will not accept returned items without prior written return goods authorization number. We warrant to the original purchaser, with proof of purchase, its delivered products should be free from defects in the material and workmanship for up to seven years from date of purchase.

For any breach by Clean Light Green Light, of this limited warranty, the exclusive remedy of the Customer and the sole liability of Clean Light Green Light shall be, at the option of Clean Light Green Light, to replace or repair the affected products, or to refund to Customer the price of the affected products. The availability of replacement products is subject to product discontinuance policies at Clean Light Green Light. When returning defective product for exchange, Clean Light Green Light shall provide shipping from and to the customer's location.

All LED products are eligible for a full refund. Providing the product is returned to the shipping facility, within (30) thirty days from date of purchase. All returns must be in their original packaging and condition to be eligible for return. All returns must have a return goods authorization number included in the return packaging as well. All products returned that do not meet these criteria will be charged a 25% restocking fee. Shipping charges will not be refunded.

The warranties set forth herein are exclusive. Clean Light Green Light LLP disclaims all other warranties, whether express, implied or statutory, including, without limitation, any warranty of merchantability, fitness for a particular purpose, or non-infringement, and any warranty that may arise from course of dealing, course of performance, or usage of trade.

This warranty does not cover acts of nature such as lightning damages, or corrosion and discoloration of components, nor does it cover damages caused through abuse, improper installation, surges in electrical current, acts of third parties, or any error, neglect or default of Customer.

Failure of an LED fixture is defined as having more than 5% of total fixture count LED failure. This warranty is null and void if the product is not installed within the manufactures strict guidelines or if any of the following occur: under/over voltage, under/over current or any damage arising out of any acts of God, external forces, fire, misuse, vandalism, abuse or civil disturbance or any other factor not under control of Clean Light Green Light LLP. Purchaser must notify us in writing within (30) thirty days of noticing the defect.

All High Power outdoor LED products are warranted for a period of (7) seven years from the date of purchase to the original buyer with proof of purchase. This warranty excludes field labor or service charges related to the repair or replacement of the product.

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10 Year Limited Warranty on Housing

We will warrant to the original purchaser, with proof of purchase, its housing finish for a period of (10) ten years from date of shipment. We will repair, or at our option, replace the defective finish if it exhibits cracking, peeling, excessive fading or corrosion defects during the warranty period.

This warranty applies only to the housing finish and only when the product is properly handled, maintained, installed and exposed to normal environmental conditions. This warranty excludes defects resulting from improper handling, storage, installation, acts of God, external forces, fire, misuse, vandalism or civil disturbances.

Purchaser must notify us in writing within (30) thirty days of noticing the defect. This warranty excludes field labor or service charges related to the repair or replacement of the housing. We reserve the right to change the warranty period without prior notice and without incurring obligation and expressly disclaim all warranties not stated in this limited warranty.

Our promise to you...

We at CLGL promise to treat you and your business with the utmost respect and kindness. We promise to educate you to all the possibilities that can and will influence the lighting of your facility. As an educated customer you are armed to make the right decisions regarding your LED purchase.

Our team wants you to be happy with our product and its effect on your life. As an informed customer you will clearly be able to see the difference between CLGL and other companies. We hope to win your business and that of your friends and neighbors as well.

Servicing our customer's needs and helping them from the first inquiry all the way through the installation.

Thank you for the opportunity to win your business.

David Mckinney
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