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<th>13-ATTCP-01</th>
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<td>Acceptance and Training Certification</td>
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<td><strong>TN #:</strong></td>
<td>215156-4</td>
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<tr>
<td><strong>Document Title:</strong></td>
<td>Final Fourth Amendment</td>
</tr>
<tr>
<td><strong>Description:</strong></td>
<td>N/A</td>
</tr>
<tr>
<td><strong>Filer:</strong></td>
<td>Jack Yapp</td>
</tr>
<tr>
<td><strong>Organization:</strong></td>
<td>NLCAA</td>
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<tr>
<td><strong>Submitter Role:</strong></td>
<td>Applicant</td>
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<tr>
<td><strong>Submission Date:</strong></td>
<td>1/4/2017 2:45:13 PM</td>
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FOURTH AMENDMENT

NOTE: ... to the APPLICATION FOR APPROVAL OF NLCAA, (THE NATIONAL LIGHTING CONTRACTORS ASSOCIATION OF AMERICA), AS A LIGHTING CONTROLS ACCEPTANCE TEST TECHNICIAN PROVIDER. (Rev 04)

... Consists of replacing the following APPLICATION Sections:

Attachment 2 – (Lighting Controls Acceptance Test Technician Class Outline)

Attachment 3 - (NLCAA Acceptance Test Technician Employer Class Outline)
Lighting Controls Acceptance Test Technician Class Outline

Introduction
  Why advanced lighting and Title 24? Contents of This Handbook
  Quality and Complaint Policies and Procedures
  Acceptance Test Technician

Modern Lighting Technologies
  Past Technologies
  Luminance and Illuminance
  Units of Interest
    Lumen Output
    Footcandles and Lux
  Absolute vs. Relative Illuminance Measurement
    Proper Use of Lightmeters
    Lightmeter Types
  IES Lighting Levels and Title 24

Lamp Types Review
  Incandescent
  Fluorescent
  Induction
  HID
  LED

Lamp Specifications
  Correlated Color Temperature
  Color Rendering
  Lamp Markings
  DOE Information Labels

Ballasts and Drivers
  Fluorescent Ballasts: BF and BEF
  Starting Fluorescents and ID
  Magnetic and Electronic Ballast: Crest Factor
  Institutional Tuning
  Lumen Maintenance
  Fluorescent Dimming
  LED Drivers: Dimming

Controlling Luminaires
  0-10V Dimming Ballasts and Drivers
  Digital Dimming Ballasts and Drivers
  Installing and Testing
    Wiring Techniques
    Heat Dissipation
    Grounding
    Initial Testing
Lighting Controls

Area Controls and 130.1 (a)

Switching Schemes
- Line Voltage
- Low Voltage
- Relays, Power Packs, Power Pack Logic Functions

Shut-OFF Controls and 130.1 (b)
- Automatic Time Switches
- Occupancy sensors
- Technologies and Applications

Dimming Controls and 130.1 (c)
- Phase Dimmers
- 0-10V and Digital Controls
- Zones, Groups, and Scenes

Daylight Harvesting and 130.1 (d)
- Photosensors vs. Photo-controllers
- Open and Closed Loop Systems Introduction

Automated Demand Response and 130.1 (e)
- The Demand Response Signal

Title 20 and Lighting Systems
- Lighting Systems
- Large Lighting Systems

Working with Lighting Controls

Safety
- Avoiding Equipment Damage
- Test Equipment Types and Use
- Test Equipment Ratings
- Test Equipment Safety
- Lock-out/Tag-out and PPE
- Avoiding “Deprogramming” Controls

Reference Documents

Why advanced lighting and Title 24?
- Contents of the 4 Reference Documents
- Where to find the Reference Documents
- Insuring you have the most recent revisions
- 2016 2013 Building Energy Efficiency Standards
- Definition, Compliance Process, Design, Mandatory Controls, Acceptance
- 2016 2013 Reference Appendices
- Acceptance Tests, Installation Tests
- 2015 2012 Appliance Efficiency Regulations
- Functional Requirements of Lighting Controls
- Insuring devices have been Certified to the Energy Commission
- 2016 2013 Nonresidential Compliance Manual
- Acceptance Forms, Compliance Forms, Installation Form
Regulation and Certification

Title 20
Certified to the Commission

Introductory Subjects
The Percent Reduction Formula
Percentages

Compliance Process
The Compliance Process
Examination of Forms
  Compliance Forms
  Installation Forms
  Acceptance Forms

Definitions

Title 24 Controls
Where Required and Exceptions
Lighting Power Density
  Design methods
    Prescriptive methods
    Performance method
  Trade-offs
Interlocked Lighting Systems

Area Controls
Where Required and Exceptions

Multi-Level Controls
Minimum Control Steps by Technology and Wattage
Uniformity Requirements by Technology and Wattage
Where Required and Exceptions
  Dimming Controls

Acceptance Testing Overview
Purpose of Acceptance Testing
When Required
Construction Inspections
Functional Testing
Acceptance Forms

Shut-OFF Controls
Introduction: Timers and Occupancy sensors
Power Adjustment Factors (PAF)
  Calculating and Verifying
  Acceptance Testing

Timers
Automatic Time-Switches
Astronomical Time-Switch
  Where Realized by an EMCS or Lighting Control System
Occupancy Sensors
  Part-OFF
    Why Required
  Part-ON
    Why Utilized
Where Required

Vacancy Sensors
  Where Realized by an EMCS or Lighting Control System

Shut-OFF Controls Acceptance Procedures
  Acceptance tests
    Filling Out NRCA-LTI-02-A
  Review: Where Required

Demand Responsive Controls
  Where Required and Exceptions Area Weighted Average Acceptance Testing
    Full Output Test
    Minimum Output Test
  Special Case: Daylit Spaces

Automatic Daylighting Controllers
  Review of Closed-Loop Lighting Systems
Introduction
  Overview of Common Daylighting Systems
Definitions
Daylit Zones
  Definitions
  Order of Precedence
  Location of Daylit Zones on Plans
Fixtures Located in Daylit Zones
Zones Illuminated by Controlled Luminaires
Acceptance Testing
  Construction Inspection
  EMCS or Lighting Control System Installation Inspections
Stepped or Continuously Dimmed System?
  Photosensor Location and System Type: (Open or Closed) Loop?
Review of Open and Closed Loop Daylighting Systems
Reference Location
  Locating
  Special Case: Parking Garages
Acceptance Testing of Automatic Daylighting Systems

Functional Testing

Closed-Loop Systems
- No Daylight Test
- Full Output Test
- Full Daylight Test
- Power Reduction Calculation
- Partial Daylight Test

Open-Loop Systems
- No Daylight Test
- Sensor Ratio Full Daylight Test
- Power Reduction Calculation (Stepped)
- Power Reduction Calculation (Continuous)
- Partial Daylight Test
- Continuous
- Stepped

Institutional Tuning

How Accomplished
Acceptance Testing
Filling out NRCA-LTI-05-A

Outdoor Lighting Controls

Types of Outdoor Lighting Controls
Where Required and Exceptions Part-Night Controls: Definition
Part-Night Controls: Extended Definition per §110.9 (b) 5.

Acceptance Testing
Construction Testing
Location of Outdoor Controls
Functional Testing
- Motion
- No Motion

Shut-OFF Controls
Timers
Part-Night Timers
Part-Night Motion or Time-Based System

Automatic Scheduling Systems

Demand Responsive Controls
Where Required and Exceptions

Area Weighted Average
Acceptance Testing
Full Output Test
Minimum Output Test

Special Case: Daylit Spaces

Summary
Who Signs the Forms?
Lighting Controls Acceptance Test Employer Class Outline

Introduction
  Why advanced lighting and Title 24?
  Quality and Complaint Policies and Procedures
  Form Review and Field Inspections
  Acceptance Test Technician Employer
  Acceptance Test Technician
  Acceptance Test Employer

Reference Documents
  Contents of the 4 Reference Documents
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    Acceptance Forms, Compliance Forms, Installation Forms

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  Title 20
  Certified to the Commission

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  The Percent Reduction Formula
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  Lighting Power Density
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    Trade-offs
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  Part-OFF
    Why Required
  Part-ON
    Why Utilized
  Where Required
  Vacancy Sensors

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  Acceptance tests
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Review of Open and Closed Loop Sensor Locations

Reference Location
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Full Daylight Test
Partial Daylight Test

Acceptance Testing of Automatic Daylighting Systems

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Continuous
Partial Daylight Test
Continuous
Stepped

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#End of Document