

# STANDARD COMMISSIONING PROCEDURE FOR DAYLIGHTING CONTROLS

**BUILDING NAME:** \_\_\_\_\_ **APPLICATION #:** \_\_\_\_\_  
**BUILDING ADDRESS:** \_\_\_\_\_  
 \_\_\_\_\_

**NAME & FIRM OF PERSON(S) DOING TEST:** \_\_\_\_\_  
**DATE(S) OF TEST:** \_\_\_\_\_

**General Notes:**

1. This is a generic test procedure for daylighting control systems. If the complexity, configuration, or other aspects of a specific project require substitute tests or additional tests, explain on the comments sheets, and attach the additional test procedures and field data. Use additional copies of this procedure as required for the total number of zones to be commissioned.
2. In all test sections, circle or otherwise highlight any responses that indicate deficiencies (i.e. responses that don't meet the criteria for acceptance). Acceptance requires correction and retest of all deficiencies, as defined in each test section under "Criteria for Acceptance" or "Acceptance". Attach all retest data sheets. Complete the Deficiency Report Form for all deficiencies.
3. This Commissioning Procedure does not address fire and life safety or basic equipment safety controls.
4. To ensure that this Commissioning Procedure will not damage any equipment or affect any equipment warranties, have the equipment manufacturer's representative review any interventive test procedures prior to execution.

**OPERATOR INTERVIEW (Existing Buildings Only):**

Determine from a discussion with the building operator whether the daylighting controls are operating properly to the best of their knowledge. Note any known problems, and possible solutions.

---



---



---



---

**LIGHTING ZONE SCHEDULE:**

For the purposes of this commissioning procedure, a lighting zone is defined as a group of luminaires that are controlled by a single daylighting/lumen maintenance signal output.

**Sampling:** If there are more than 8 lighting zones in the building, you may select a sample for the following performance tests. The sample should include at least 10% of the total number of zones, or 8 zones, whichever is greater. Zones should be selected from different areas of each floor, and from different floors. Also, if banks of luminaires in spaces are controlled by separate sensors/controllers, include at least one space with two such zones, and test both zones. Note in the table below which zones are selected for the sample.

**Criteria for Acceptance:** Lighting zoning must be in accordance with submittals as approved by Designer.

ZONE #	SAMPLE ZONE? (✓)	DESCRIPTION OF LOCATION	CIRCUIT # (if available)

Building Name: \_\_\_\_\_

ZONE #	SAMPLE ZONE? (✓)	DESCRIPTION OF LOCATION	CIRCUIT # (if available)

COMMENTS ON ZONING (add more sheets if needed):

ZONE # COMMENT


**DAYLIGHTING CONTROL SYSTEM, INSTALLED CHARACTERISTICS** (from field inspection):

**Criteria for Acceptance:** Installed characteristics must be in accordance with submittals as approved by designer, or as noted otherwise. "No" answers to questions marked with an "✱" shall also be considered deficiencies.

DESCRIPTION	RESPONSE (Note: If different lighting zones have different responses to these questions, respond specifically to each group of zones and define which zones lie within each group. Add sheets as necessary.)
1. Does system include lumen maintenance** control? If so, describe scope & intent.	
2. Luminaire control (dimming or switching)?	
3. If luminaire control is dimming, what is setpoint for minimum % of full light output? Acceptance: <30% of full light output	
4. Design illuminance setpoint (foot-candles at work plane**). Acceptance: per design or <100fc, whichever is less.	
5. Define work plane for this application (e.g. desk level, 10 feet from windows).	
6. Is there at least one lighting control zone per each perimeter exposure on each floor? ✱	
7. Were controls calibrated as part of system start-up? (If not, do not proceed with this procedure until calibration is complete.) ✱	
8. Was calibration done with finishings and furniture in place, and after approximately 100 hours of lamp burn-in? ✱	
9. Daylighting control type (closed-loop integral** or open-loop proportional**; or describe other control sequence)? Acceptance: Open-loop control may not be used for applications that include lumen	

Building Name: \_\_\_\_\_

DESCRIPTION	RESPONSE (Note: If different lighting zones have different responses to these questions, respond specifically to each group of zones and define which zones lie within each group. Add sheets as necessary.)
maintenance.	
10. Describe any special system features (e.g. light shelves, skylights, fins, sloped ceilings, special glazings, tracking mirrors, automatic window aperture controls, etc.)	
11. Have occupants been explained the intent and operation of the control system? *	
12. Describe any other ways in which the installed system differs from the design intent &/or approved submittals.	

\*\* See glossary on last page of test.

**COMMENTS ON INSTALLED CHARACTERISTICS** (add more sheets if needed):

ITEM # COMMENT

_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

**NAMEPLATE DATA** (from equipment nameplates, as recorded in field):

**Criteria for Acceptance:** Nameplate data must be in accordance with submittals as approved by Designer.

DESCRIPTION	Manufacturer	Model #	Comments
Photosensor			
Lighting Controller			
Controlled Ballasts			
EMS Interface			
Other: _____			
Other: _____			

**INSTALLATION VERIFICATION:**

**Instructions:** Under each zone write "Y" for yes, "N" for no, "NA" for not applicable, or a number to refer to any needed comments. Explain any "N" answers in the comment section. If other information is requested, write the appropriate values.

**Criteria for Acceptance:** All items require answers of "Y" (or "NA", where relevant) except where other criteria are noted. If there is failure in any of the following tests for more than 20% of the sampled zones (or 2 zones, whichever is more), then the entire daylighting control installation shall be considered to be not in conformance. In this case, the installing contractor is responsible to test all zones prior to calling for a retest under this procedure.

DESCRIPTION	ZONE #							
1. Lighting zone generally correlates with area of daylight availability								
2. There is separate control of luminaires close to and far from the windows								
3. Photosensor is mounted in proper location, per manufacturer's directions &								



**FUNCTIONAL PERFORMANCE VERIFICATION:**

**Daylighting & Lumen Maintenance Control Tests:** Perform the following tests by monitoring and/or observing each lighting zone under actual operation. If the actual control sequence differs from that implied by the tests, attach a description of the control sequence, the tests that were done to verify the sequence, and your conclusions. Use of current dataloggers over a period of several days to document operation is recommended, though visual observation is acceptable. Annotate any logger data and graphs so that it is clear what the data are proving, and attach these to this form. Attach sketch (or marked-up floor plan) showing location of illuminance test points. Trend logs of EMS outputs or schedule print-outs are not acceptable as proof of operation.

**Test Conditions:** Do day-time tests on a bright day, preferably between 10am and 2pm. There should be no direct sun shining on the work plane at the time of testing.

**Criteria for Acceptance:** Foot-candle reading during night-time test should be within  $\pm 20\%$  of design illuminance. (Use 50 to 100 foot-candles for office occupancies if no design values are available.) For day-time test 1, circuit amps must be at least 25% lower than night-time test values. Foot-candle values for both day-time tests may not exceed design illuminance by more than 20% unless amp readings indicate circuit is fully dimmed. If there is failure in any of the following tests for more than 20% of the sampled zones (or 2 zones, whichever is more), then the entire daylighting control installation shall be considered to be not in conformance. In this case, the installing contractor is responsible to test all zones prior to calling for a retest under this procedure.

DESCRIPTION	ZONE #							
1. Night-time test: record foot-candles at work plane. Record lighting circuit amps.	fc amps							
2. Day-time test 1: record work plane fc & lighting circuit amps with blinds open.	fc amps							
3. Day-time test 2: record work plane fc & lighting circuit amps w/ blinds 1/2 closed. (This test is not required for closed loop control zones.)	fc amps							
4. Observe zone during daytime under normal operation, 3 times in a 12 hour period, at least 3 hours apart and for at least 5 minutes each time. Verify that there is no unusual ballast hum, light level hunting, or other problems.								

**COMMENTS ON FUNCTIONAL PERFORMANCE VERIFICATION ITEMS (add more sheets as needed):**

ITEM #	ZONE #	COMMENT
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

I certify that the data and test results as recorded herein are accurate.

\_\_\_\_\_  
Signature, Commissioning Agent

\_\_\_\_\_  
Date

\_\_\_\_\_  
Firm Name

\_\_\_\_\_  
(Area Code) Phone Number

## GLOSSARY OF TERMS:

**Closed Loop Integral Control:** A closed loop integral controller continuously adjusts the output of the electric lights so that the photosensor output is maintained at the setpoint level. As the photosensor detects an increase in light in the space due to daylight, the controller reduces the electric light level to restore the photosensor signal to the setpoint level. This algorithm only works if the photosensor can “see” the electric light it controls.

**Indirect Lighting:** A lighting design in which the fixtures direct the lighting upward to reflect against the ceiling. The luminaires are not directly visible from the space below.

**Lamp Switching:** Use of photoelectric control switches to switch off, rather than dim, lights in daylight perimeter zones. These switches should incorporate a “dead-band” so that the lights don’t cycle between levels if the ambient light level is near the sensor trip level. Some switches also allow the user to adjust a time delay constant that reduces the likelihood of cycling.

**Lumen Maintenance:** A control strategy that uses a photocell to detect the actual illuminance in the space, and adjusts the light level accordingly, so that the design illuminance is maintained at setpoint at all times, not just at the end of the maintenance cycle.

**Open Loop Proportional Control:** With an open loop proportional controller, the photosensor is mounted so that it does not detect the light that is controlled. The photosensor detects only the independent stimulus of daylight.

**Work Plane:** The level (plane) and general location to which the daylight zone illuminance setpoint applies. In office occupancies, this is usually at desk level, and about 10 to 15 feet from the perimeter windows. In retail applications the work plane may be vertical, extending from about 3 feet to 6 feet above the floor.

## REFERENCE:

“*Advanced Lighting Guidelines: 1993.*” Eley Associates. Prepared for U.S. Department of Energy, California Energy Commission, and Electric Power Research Institute. Available from National Technical Information Service, DOE/EE-0008

file:\msoffice\winword\docs\scl\cxproc\dayltqas.pro