

Lighting reference guide

1. Introduction

The new construction program lighting calculator version 4.0 (“lighting calculator”) is an Excel spreadsheet that estimates potential electrical demand and energy savings of lighting systems for projects participating in our Commercial New Construction Program (“the Program”) whole building design offer. Once the energy-efficient lighting systems have been fully designed for a proposed project, the lighting information needs to be entered into the lighting calculator then the calculator will show the results of electrical energy savings between the proposed lighting systems and the baseline lighting requirements based on the current B.C. Building Code (ASHRAE/ IES Standard 90.1–2016 or NECB 2015) and the program guidelines. The estimated energy savings and the new construction program incentive application are all subject to the terms and conditions of the program.

2. Limitations

The lighting calculator does not predict the actual performance of the lighting systems in a precise manner; rather it estimates the potential energy savings from installing high performance lighting systems. It also uses several assumptions and estimates based on the industry statistics and good design practice. Actual “real life” performance of the lighting system may differ from the calculated data.

3. Overview

The lighting calculator consists of a series of worksheets linked to some background calculations:

- Project info & results: where you will enter the initial project data, choose the compliance method, and see the end results after you have completed all the worksheets.
- Luminaire schedule: enter luminaire information.
- Interior—building area method: if you choose building area method compliance.
- Interior—space-by-space: if you choose space-by-space method compliance.
- Exterior: enter exterior lighting system information.

In addition to the instructions below, we have provided cell comments to help you complete the calculator. Move your mouse over cells with the **red** comment indicator to see the comment. Within each table, clear cells are open to enter, **light yellow** cells contain the drop-down menus, and **light blue** cells (with the data calculated automatically) are locked. Please note that we have intentionally disabled the “Cut” feature in this tool to prevent you from accidentally corrupting the formulas.

4. Step-by-step instructions for calculator completion

A. STEP 1: PROJECT INFO

- i. Open the Project Info & Results worksheet by selecting its tab at the bottom of the screen.
- ii. Enter your project and contact information in the first group of cells.
- iii. Choose your Compliance Method from the dropdown menu. **This is a required field.**
 1. With Building Area Method compliance, you need to enter only your project’s building type or types, the surface area and total luminaire quantities.
 2. With Space-by-Space Method compliance, you will need to enter each separately-lit space individually in the Interior-Space-by-Space worksheet.
 3. If you would like to compare the results from both Compliance Methods, you may switch after completing one method and complete the other; the calculation results will update automatically.

- iv. Choose your Compliance Code from the dropdown menu. **This is a required field.** Please note that all the building systems in the project submission, including lighting, must comply with the same code (ASHRAE/IES Std.90.1–2016 or NECB2015).
- v. Enter the Project Design Date and Estimated Completion Date.
- vi. Choose your Unit System from the dropdown menu. **This is a required field.**
- vii. Choose your Primary Building Type from the dropdown menu. **This is a required field.**

B. STEP 2: LUMINAIRE SCHEDULE

- i. Open the Luminaire Schedule worksheet by selecting its tab at the bottom of the screen.
- ii. For each type of lighting fixture in your project:
 - 1. Choose a unique Luminaire Type. For example, A could refer to a suspended 4' LED luminaire, while B4 could refer to an exterior wall pack.
 - 2. Enter a clear Luminaire Description relevant to the luminaire specification information.
 - 3. Approved luminaire shop drawings or specification sheets shall be provided for each luminaire type listed in the calculator.
 - 4. Enter the Total Wattage of the fixture (refer to the luminaire specification sheet or auxiliary device manufacturer's information).
- iii. The calculated quantity of Luminaires will be displayed for each Luminaire Type.

C. STEP 3A: INTERIOR—BUILDING AREA METHOD

- i. If you chose the Building Area Method, open the Interior—Building Area Method worksheet by selecting its tab at the bottom of the screen.
- ii. Your Primary Building Type will appear automatically. Enter the Type Area (this is the gross lighted area) of this Building Type. If you have other Building Types within the same project (up to 5 are allowed), list them under Type #2, Type #3, etc., and enter the Type Area below.
 - 1. The Gross Lighted Area must be measured from the exterior faces of exterior walls or from the centreline of walls separating building types.
 - 2. For multifamily residential buildings, do not include the area of dwelling units in the multifamily building type total area (include common areas for the above-ground part only), and do not list the luminaires within dwelling units.
 - 3. Include underground vehicle parking, plus associated underground common areas (corridors, elevator lobbies, stairways, storages, service rooms, etc.), as part of the parking garage building type, separate from the above-ground part of the building.
 - 4. Do not include parts of buildings where lighting systems design have been left for future Tenant Improvement (Commercial Retail Units—CRUs, office floors for future lease, etc.) in the total building type area, and do not list the temporary lighting load within those areas.
- iii. For each Luminaire Type in your project, enter the total Luminaire Quantity broken-down per Building Type.

D. STEP 3B: INTERIOR—SPACE-BY-SPACE METHOD

- i. If you chose the Space-by-Space Method, open the Interior—Space-By-Space worksheet by selecting its tab at the bottom of the screen.
- ii. For each space in you project:
 - 1. Enter a descriptive Area Name. Using the same space name as the electrical drawings to make organizing your spaces easier.

2. Enter the Number of Identical Areas for this space. For a unique space, enter 1. If there are multiple spaces that are exactly identical (in terms of space type, space area, luminaire type and quantity, and lighting controls) simply enter the number of spaces.
 3. When entering the properties of a space with multiple identical areas, input the values for each space, NOT the total.
 4. Choose the appropriate Space Type from the dropdown menu.
 5. If you chose the ASHRAE Compliance Code, certain Room Cavity Ratio (RCR) or Width values allow extra lighting power. You may enter the value as the RCR of a room (to be calculated separately by you), or the Width of a corridor.
 6. Enter the Surface Area of the space, as measured from the lighting drawings.
 - a) Each Interior Lighted Area should be measured to the outside surface of exterior walls and to the centreline of interior partitions.
 7. Choose the appropriate Lighting Control Type from the dropdown menu.
 - a) You may need to divide a room in several spaces following the control option used (e.g., daylighting controls for a secondary daylight zone in an open office).
 8. Choose the Luminaire Types used in the space, and enter the Quantity of each.
 - a) If you need more (or fewer) columns to enter all the types per space in your project, you can change the number of shown types using the dropdown menu at the top of the sheet.
- iii. If you chose the ASHRAE Compliance Code AND your project includes Lighting for Merchandise Highlighting, this task lighting load may be exempt from the lighting energy savings calculations. Note that lighting only qualifies for Merchandise Highlighting if it is:
- a) used specifically to highlight merchandise within Retail space type, not to provide general lighting, and
 - b) automatically controlled separately from the general lighting in the space
- iv. If you need more total lines to enter all of the spaces in your project, use the Insert Multiple Lines to Bottom button.
- v. If you missed a space and wish to input it in a specific place, select the row below which you wish to insert it, and then use the Insert Line Below Cursor button.

E. STEP 4: EXTERIOR

- i. If your project includes outdoor areas, open the Exterior worksheet by selecting its tab at the bottom of the screen.
- ii. Choose the Lighting Zone of your project from the dropdown menu at the top of the worksheet. Please note that you can choose Lighting Zone 4 only when it is confirmed by the Authority Having Jurisdiction (AHJ).
- iii. Fill in the area for each exterior space the same way as detailed above in Step 3B, but note the following differences:
 1. Certain space types have [linear] beside their names. For these spaces, enter the characteristic length of the space instead of the area.
 - a) For example, for Walkways (less than 10ft wide) [linear], enter the measured length of the walkway.
 - b) Another example: for Main Entries [linear], enter the width of the entry door.
 2. You do not have the option of entering multiple identical areas. Each space entered is counted as 1.
 3. Enter the annual hours, but you may not go over 12 hours per day (4,380 hours per year) in the Annual Hours column.

F. STEP 5: RESULTS

- i. Once you have finished entering all information, return to the Project Info & Results worksheet.
- ii. The Savings Information will appear in the table on the right hand side.
- iii. An Energy Savings Breakdown chart will also appear at the bottom of the worksheet.