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# Guide Illuminates Modular Skylight Well Design

## The Problem

Skylights equipped with photosensors and lighting controls can cut energy use in commercial buildings by reducing the use of electric lighting whenever sufficient daylight is present (**Figure 1**). But this technology is seldom implemented, because designers and architects don't have the information they need for designing skylights in commercial buildings with suspended ceilings. In addition, designers who do specify skylights often have to start from scratch with a custom design, because very few modular skylight products are available for integration with suspended ceilings.

## The Solution

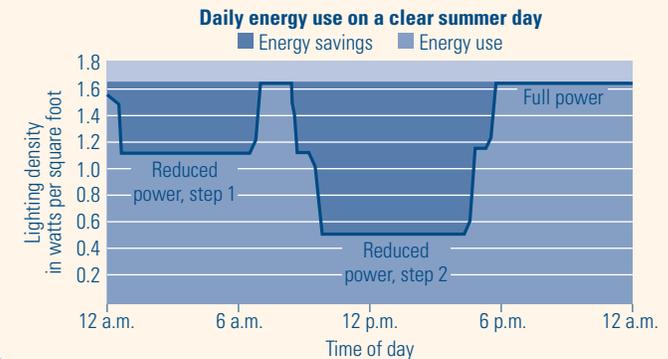
The newly released *Modular Skylight Wells: Design Guidelines for Skylights with Suspended Ceilings* takes architects and engineers through the essential steps to produce an energy-efficient skylight system that provides high-quality, glare-free light. This invaluable guide compares alternate design solutions and summarizes the relevant sections of the building code. In addition, the guide presents market data to manufacturers on modular skylight products so that products compatible with other systems—such as ceiling connectors and suspended ceilings—can be developed.

## Features and Benefits

The guide features information useful to designers and manufacturers. For designers, the guide offers:

- A step-by-step explanation of the design process, including considerations for the size and shape of the skylight well. The guide begins by offering rule-of-thumb calculations for determining the skylight-to-floor-area ratio and proceeds to more detailed analyses that will help refine the design.
- A discussion of the implications of alternate design solutions, describing the performance differences between such choices as using clear or diffusing glazing for the lens that covers the skylight well on the roof.
- Conceptual examples of common skylight systems, showing how designers have addressed construction challenges such as well openings in the ceiling that aren't located precisely underneath the skylight opening at the roof.

**Figure 1: Skylights improve lighting energy profile at a grocery store**  
A grocery store in Valencia, California, used skylights and photocells to reduce lighting energy use by 30 percent during a monitored two-week period. This lighting energy profile shows that electric light use decreased by two-thirds during peak daylight hours.



- Lists of the geometric and physical properties required for each skylight component to satisfy building codes and minimum performance goals for illumination, energy performance, structural integrity, and fire safety.

For manufacturers, the guide includes:

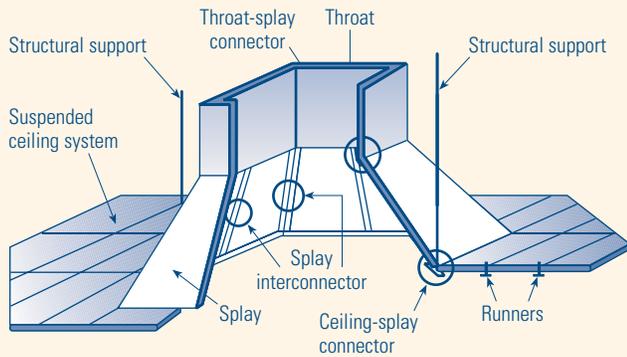
- Estimates of market demand based on the expected new floor area of building types with suspended ceilings. The guide also presents information on current building practices and requirements based on case studies and interviews with architects, lighting designers, and manufacturers of skylights and suspended-ceiling systems.
- Codes and performance metrics for product evaluation, plus descriptions of the standardized tests used to verify compliance with building codes.
- A glossary of technical terms for modular skylight well components (**Figure 2**). This will help manufacturers and designers describe desired features precisely and consistently.

## Applications

The guide defines the main building types that are likely to benefit from skylight wells in either new or retrofit construction, including low-rise offices, retail stores, and schools that use suspended-ceiling systems (**Figure 3**). To benefit from skylights, these buildings must have flat or low-slope roofs, a ceiling height of between 9 and 15 feet, and a ceiling that is not part of a fire-rated assembly. The skylights must not exceed 8 feet in width or length.

Figure 2: Diagram of a skylight well

The guide includes definitions of skylight components to help both manufacturers and designers to precisely describe their systems.



## California Codes and Standards

Some of the research material collected for the guide was used to develop revisions to the 2005 California Energy Code (Title 24). One change establishes skylights as a prescriptive measure for low-rise nonresidential buildings with spaces larger than 25,000 square feet directly under a roof and with a ceiling height of more than 15 feet.

Figure 3: Modular skylight installation

On average, only 15 to 25 percent of the floor space in low-rise commercial buildings can make use of daylighting from windows. Skylights can provide natural light to other parts of the building that are directly under the roof.



## What's Next

California utilities are using the guide in their programs, and at least one manufacturer is already using it to produce a new product. In late 2004, a version of the guide aimed specifically at designers will be posted on the California Public Utility Commission's Energy Design Resources web site. In addition, to encourage the use of modular skylight wells, researchers are hoping to complete a number of field installations and then monitor and publicize the performance of those skylight systems.

## Collaborators

The organizations involved in this project were the Heschong Mahone Group and a technical advisory group that includes members of the suspended ceiling, skylighting, and lighting industries.

## For More Information

This guide may be downloaded from the web at [www.energy.ca.gov/reports/2003-11-17\\_500-03-082\\_A-13.PDF](http://www.energy.ca.gov/reports/2003-11-17_500-03-082_A-13.PDF).

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## About PIER

This project was conducted by the California Energy Commission's Public Interest Energy Research (PIER) program. PIER supports public-interest energy research and development that helps improve the quality of life in California by bringing environmentally safe, affordable, and reliable energy services and products to the marketplace.

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