6 SKYLIGHTS

ESSENTIAL KNOWLEDGE

Skylights brought light and ventilation into buildings before the advent of artificial lighting. Skylights have developed in tandem with windows and have become similarly sophisticated and high performing. Most glazing options available on windows today are also available on skylights. Long plagued by leaks, skylights now incorporate new flashing techniques to address virtually all variations of roofs, and numerous options have been developed for these increasingly popular units. Early skylight units also lacked effective means of shading. Shades and screens are now available in a wide variety from several manufacturers, including pleated and roller shades or aluminum slat blinds. These devices can also be operated remotely. Motorized skylights and shading devices may be controlled by a single device that can be programmed to respond to rain and temperature.

Older, mass produced skylights were typically made of a steel frame and wire glass. As artificial lighting and air conditioning became commonplace, these units have been neglected and/or painted over. As integral parts of the roofing system, however, they require regular maintenance. The conventional single layer of glazing is subject to condensation, which is collected by an integral gutter at the interior, and directed out through a weep hole. This hole, however, often becomes blocked or sealed, leading to what are perceived as leaks but what is, in fact, condensation. A well maintained skylight of this vintage, if regularly inspected, cleaned, and painted, will last many years. The thermal performance of these units, however, may be addressed by a strategy similar to storm windows to prevent heat from escaping in a chimney fashion. Most local iron shops can repair existing units with conventional methods.

New skylights may be employed in rehabilitation to provide light and ventilation in homes on small lots while providing privacy. The recent development of new skylights that are designed to fit between conventional framing spacing and around obstacles provides new opportunities to introduce lighting and ventilation without a significant amount of structural modification. There are essentially two types that do not require modification of framing: new narrow conventional units, and units generally described as tubular, (Fig. 1). Tubular skylights (also referred to as light tubes or pipes) concentrate light through a dome on the roof and direct it through a tube to a diffuser at ceiling height. These tubes do not have to be routed in a straight line, although it is preferable to efficiently distribute daylight.

Skylights can be compared by the NFRC rating system, and are rated with the units in a vertical application. Sloped applications reduce the thermal resistance of the unit by inducing convective loops. The NFRC is reevaluating skylight performance in sloped applications, given this concern.

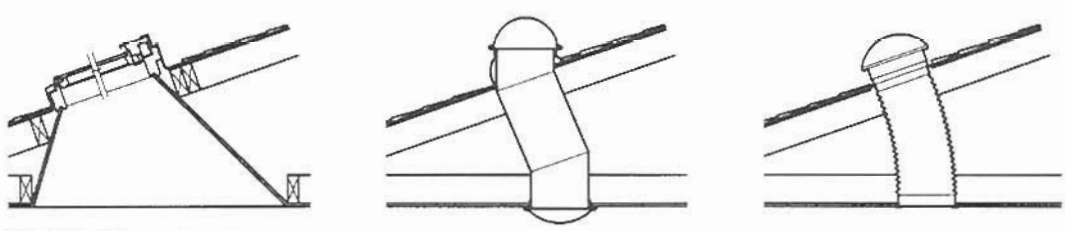

FIGURE 1 SKYLIGHT TYPES

TECHNIQUES, MATERIALS, TOOLS

1. REPAIR OR REPLACE EXISTING METAL SKYLIGHTS.

The repair of existing metal skylights is generally achieved by means of traditional metal work. Architectural metal fabricators and roofing contractors often can replicate or repair existing units. A few producers of traditional metal skylights still exist, including J.S. Wagner Company and Fisher Skylights.

ADVANTAGES: Skylights often play a significant role in defining architectural spaces within older buildings. A properly functioning skylight can provide effective ventilation and lighting during much of the year. Older units are capable of long service if properly maintained.

DISADVANTAGES: Original skylights are generally subject to high energy losses and condensation. They can also siphon heat in cold climates in a chimney effect. Roof openings should be minimized, as they are a source of call backs unassociated with workmanship.

2. REPLACE EXISTING SKYLIGHTS WITH NEW UNITS.

New skylight units have been designed to minimize labor associated with installation. Innovations include specially designed flashing materials and narrower units that do not require framing modification. The Wasco E-Class skylight requires no mastic or step flashing due to its continuous flexible flange, which provides a tighter seal against suction when subjected to high winds. The gasket attaches directly to the deck and eliminates the need for a curb, thus increasing daylight admitted. The integral vinyl curb provides good thermal conductive qualities and is resistant to decay caused by condensation. Narrower units available from Roto Frank of America fit within 16" and 24" on center framing spacing so that no structural modifications are necessary.

ADVANTAGES: New skylight products provide the opportunity to introduce ventilation and daylight in formerly inaccessible areas with minimal alteration.

DISADVANTAGES: Skylights in general are often the source of unwanted heat gain or loss, which is difficult to control. The shaft used to introduce light and ventilation to the conditioned spaces also increases the volume requiring conditioning and the amount of thermal stratification within the space, resulting in poor thermal performance relative to benefit.

3. INSTALL A TUBULAR SKYLIGHT.

Tubular skylights can be installed without modifying roof framing and can be configured around obstructions such as plumbing or ductwork. Some units are available with supplementary artificial light sources for use at night. These units are ideally suited for interior spaces, such as bathrooms, hallways, and closets. Flexible tubing is also available for ease of installation but is generally less effective at transmitting light. Available from several national manufacturers, including Solatube, Sun Light Systems, and Sun Tunnel among others.

ADVANTAGES: No structural modification required for installation. Light can be delivered to interior areas. Diffuser prevents conditioned air from traveling upward.

DISADVANTAGES: The value of this daylighting has yet to be confirmed as being a cost-effective replacement for artificial lighting, although the quality of daylight and the connection to the exterior it provides has intangible benefits. The uninsulated or poorly insulated tubes are subject to the formation of condensation. Acrylic domes and diffusers are also subject to discoloration over time.

FURTHER READING

Residential Windows, John Carmody, Stephen Selkowitz & Lisa Heschong, New Yrok: W.W. Norton, 1996.

"Skylights: Daylights & Dollars," Sanford Wilk, *Roofer Magazine*, January 1997.

"Skylights: Design & Installation Basics," Donna Milner, *Journal of Light Construction* (New England Edition), May 1989, pp. 47-51.

"Skylights: The Design and Upkeep of Old Fashioned Rooftop Windows," J. Randall Cotton, *Old House Journal*, July/August 1992, pp.42-46.

"Skylight Options and Accessories," John Wagner, *Journal of Light Construction*, April 1996, pp. 47-50.

"Tubular Daylighting for Sun Lovers," Ted Rieger, *Home Energy*, January/February 1997, pp. 9-10.

PRODUCT INFORMATION

Andersen Windows, 100 Fourth Ave. North, Bayport, MN 55003-1096; 800-426 4261 (skylights).

Fisher Skylights, 50 Snake Hill Rd., West Nyack, NY 10994; 914-358-9000.

J.S. Wagner Company, Inc., 4909 46th Ave., Hyattsville, MD 20781; 301-927-9030.

Pella Corporation, 102 Main Street, Pella, IA 50219; 800-847-3552; www.pella.com (skylights).

Roto Frank of America, P.O. Box 599, Research Park, CT 06412; 800-243-0893; www.rotogroup.com (skylights).

Solatube, 5825 Avienda Encias, Suite 101, Carlsbad, CA 92008; 800-773-7652.

The Sun Pipe Company, P. O. Box 2223, Northbrook, IL 60065; 800-844-4786.

Sun Light Systems, Inc., 21602 N. 2nd Ave., Suite B4, Phoenix, AZ 85027; 800-786- 7827; www.sun-starskylights.com.

Sun Tunnel, 2H Systems Incorporated, 5704 Clark Rd., Sarasota, FL 34233; 800-369-3664.

Velux-America, P.O. Box 5001, Greenwood, SC 29648; 800-283-2831 (skylights).

Wasco Products, Inc., P.O. Box 351, Sanford, Maine 04073; 800-388-0293 (skylights).