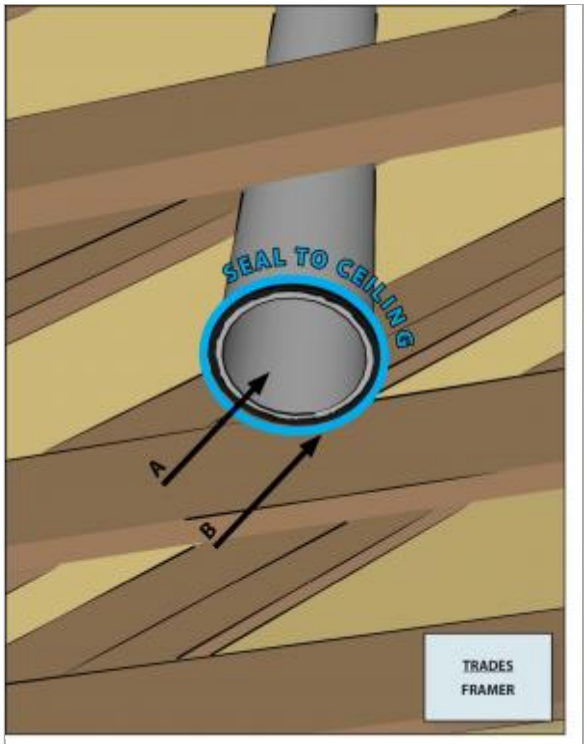
Air Sealing Light Tubes

Last Updated: 03/13/2018

Scope



Light tubes adjacent to unconditioned space include lens separating unconditioned and conditioned space and are fully gasketed

Air seal around light tubes to minimize leakage to and from unconditioned attic space.

- Seal all gaps around the light tube at the ceiling plane with caulk and/or spray foam.
- Seal and flash around the light tube at the roof plane.
- Select a light tube kit that includes a lens and a gasket..
- Cover the tube with R-8 or greater duct insulation that includes a vapor barrier.

See the **Compliance Tab** for related codes and standards requirements.

Description

A light tube (also known as a solar tube or tubular skylight) is a tube that brings light from the roof to a room inside the house. One end of the tube has a clear dome that is mounted on the roof to allow in sunlight from any angle. The sunlight is directed down the tube, which is lined with highly reflective material that carries the sunlight to a diffuser mounted at the ceiling. The diffuser distributes the light inside the room. Light tubes can save energy by replacing electric lights for daytime light in rooms that do not have windows. Energy savings can be lost however if the tube is not air sealed and insulated.

How to Air Seal a Light Tube

1. Locate a spot centered between ceiling joists. Cut the ceiling hole no larger than necessary and use a saw that will provide a clean smooth cut, which will be easier to seal.
2. Following the manufacturer's instructions, cut a hole in the roofing to the appropriate size. Apply a bead of caulk to the underside of the flashing collar that will be installed on the roof. Use a shingle ripper or reciprocating saw to loosen the roof shingles above the hole where the tube will be installed. Slip the flashing base under the loosened shingles above the hole. Screw the flashing into place. Cover the screw heads with caulk.
3. Assemble the tube and use metal tape or mastic to seal any seams in the tube. Install the light tube according to the manufacturer's instructions, installing any gaskets or seals supplied by the manufacturer. Ensure that a manufacturer-supplied gasket or caulk is applied around the base of the tube in the bottom tube assembly between the flange and the drywall.
4. From the attic side, caulk or spray foam where the tube meets the drywall.
5. Cover the tube with R-8 or greater duct insulation that includes a vapor barrier. Use mastic, metal tape (not duct tape), or fasteners to seal the insulation to the light tube.

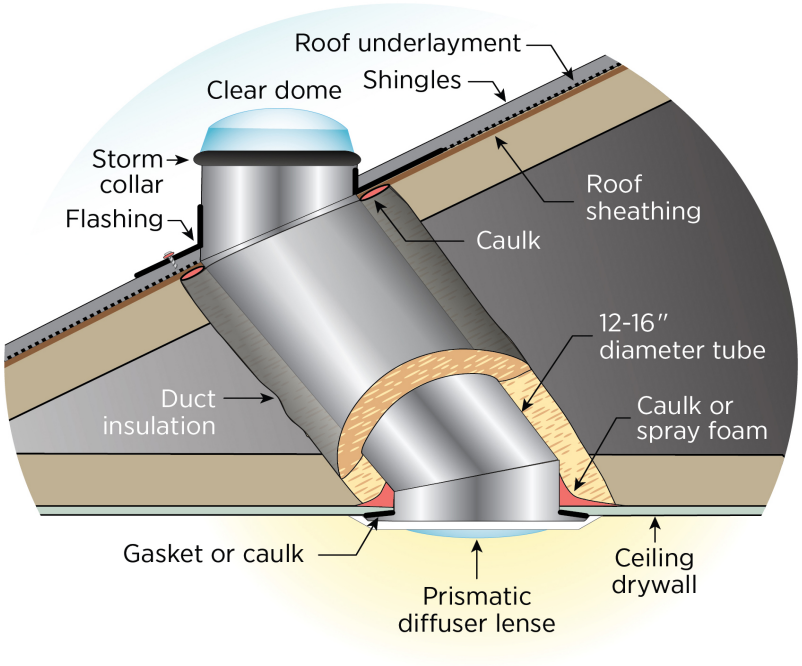


Figure 1 - Light tubes can represent a significant amount of surface area that is exposed to unconditioned attics. The metal tube needs to be air sealed at both ends and along all seams and it should be insulated.

Ensuring Success

Visually inspect and verify that the light tube is sealed at the ceiling deck and roof deck and is covered with insulation and an air barrier. Blower door testing and use of an infrared camera may help indicate whether a light tube is sufficiently air tight.

Climate

No climate specific information applies.

Training

Right and Wrong Images

None Available

CAD

None Available

Compliance

The Compliance tab contains both program and code information. Code language is excerpted and summarized below. For exact code language, refer to the applicable code, which may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

ENERGY STAR Certified Homes (Version 3, Rev. 08)

ENERGY STAR Certified Homes (Version 3/3.1, Revision 08), Rater Field Checklist Thermal Enclosure System:

4. Air Sealing (Unless otherwise noted below, "sealed" indicates the use of caulk, foam, or equivalent material):

4.1 Ducts, flues, shafts, plumbing, piping, wiring, exhaust fans, & other penetrations to unconditioned space sealed, with blocking / flashing as needed (Light tubes are not specifically mentioned in the ENERGY STAR Version 3, Rev. 08 specifications.)

DOE Zero Energy Ready Home

Exhibit 1: Mandatory Requirements. Certified under ENERGY STAR Qualified Homes Version 3.

AAMA/WDMA/CSA 101/I.S.2/A440-08 NAFS

North American Fenestration Standard/Specification for Windows, Doors, and Skylights. Available from AAMA. This is a voluntary standard/specification that covers requirements for the following components for new construction and retrofits: single and dual windows, single and dual side-hinged door systems, sliding doors, tubular daylighting devices, and unit skylights.

2009 IECC

Section 402.4.1. The building thermal envelope shall be durably sealed to limit infiltration...including joints, seams, and penetrations.

2012 IECC, 2015 IECC, and 2018 IECC

Table R402.4.1.1 Air Barrier and Insulation Installation, Shafts/penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed.

Retrofit: 2009, 2012, 2015, and 2018 IECC

Section R101.4.3 (Section R501.1.1 in 2015 and 2018 IECC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

2009 IRC

Section N1102.4.1 Building thermal envelope. Joints (including rim joist junctions), attic access openings, penetrations, and all other such openings in the building envelope that are sources of air leakage are sealed with caulk, gasketed, weatherstripped or otherwise sealed with an air barrier material, suitable film or solid material.

2012 IRC, 2015 IRC, and 2018 IRC

Table N1102.4.1.1 Shafts, Penetrations: Air Barrier and Insulation Installation, Shafts/penetrations: Duct shafts, utility penetrations, and flue shafts opening to exterior or unconditioned space are air sealed. General Requirements: Air barrier and thermal barrier: A continuous air barrier is installed in the building envelope including rim joists and exposed edges of insulation. Breaks or joints in the air barrier are sealed. Air permeable insulation is not used as a sealing material.

Retrofit: 2009, 2012, 2015, and 2018 IRC

Section N1101.3 (Section N1107.1.1 in 2015 and 2018 IRC). Additions, alterations, renovations, or repairs shall conform to the provisions of this code, without requiring the unaltered portions of the existing building to comply with this code. (See code for additional requirements and exceptions.)

Appendix J regulates the repair, renovation, alteration, and reconstruction of existing buildings and is intended to encourage their continued safe use.

More Info.

Access to some references may require purchase from the publisher. While we continually update our database, links may have changed since posting. Please contact our webmaster if you find broken links.

Case Studies

None Available

References and Resources*

1. **DOE Zero Energy Ready Home National Program Requirements**
   Author(s): Department of Energy
   Organization(s): DOE
   Publication Date: April, 2017
   Standard requirements for DOE's Zero Energy Ready Home national program certification.

2. **ENERGY STAR Certified Homes, Version 3 (Rev. 07) Inspection Checklists for National Program Requirements**
   Author(s): U.S. Environmental Protection Agency
   Organization(s): EPA
   Publication Date: June, 2013
   Standard document containing the rater checklists and national program requirements for ENERGY STAR Certified Homes, Version 3 (Rev. 7).

3. **Thermal Enclosure System Rater Checklist Guidebook**
   Author(s): U.S. Environmental Protection Agency
   Organization(s): EPA
   Publication Date: October, 2011
   Guide describing details that serve as a visual reference for each of the line items in the Thermal Enclosure System Rater Checklist.

*Publication dates are shown for formal documents. Dates are not shown for non-dated media. Access dates for referenced, non-dated media, such as web sites, are shown in the measure guide text.