

A Consumer's Guide to Tubular Daylighting Devices



**Everything you want to know to
make the right choice.**

Tubular Daylight Device (TDD) Components

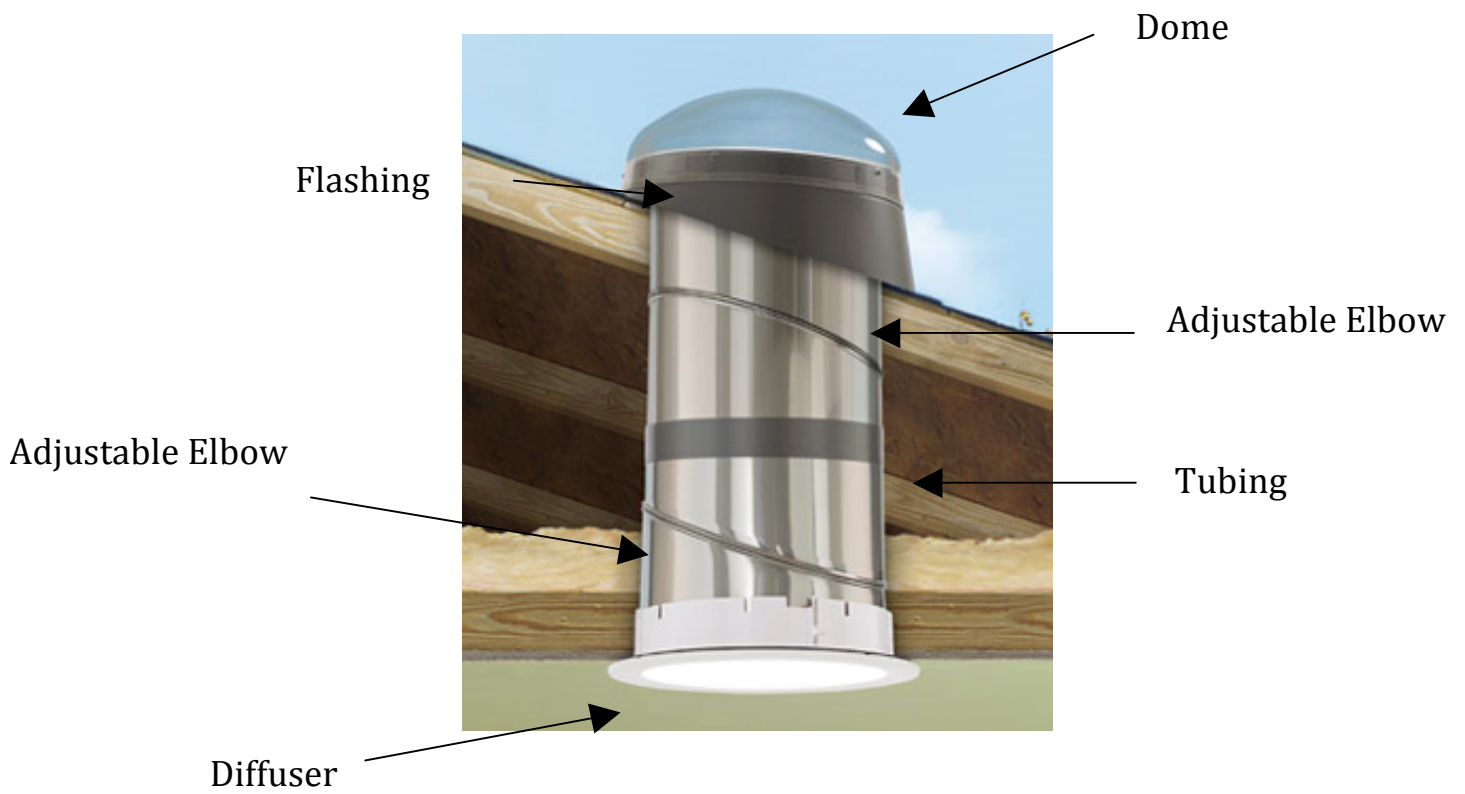


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DAYLIGHTING

How does a TDD compare to a traditional skylight?

Since a tubular daylighting device (TDD) is more compact than a traditional box skylight, it is easier to install. Small areas, such as bathrooms, hallways, closets, and laundry rooms can be brightened with natural light.

The ceiling diffusers on TDDs spread the light over a wider area than box skylights, which tend to light only an area a little larger than the skylight shaft.

TDDs are easier to waterproof than box skylights.

Another common problem with box skylights is overheating in the summer and heat loss in the winter. TDDs are specifically designed to minimize these energy transfer problems.

TDDs are much faster to install than box skylights. TDDs can typically be installed in 2 hours rather than one or two days for a box skylight.

Due to the efficient design and much shorter installation times, TDDs usually cost one-third or less than the amount of a traditional skylight.

How much light can I get from a TDD?

The amount of light you receive depends on the size of the TDD, how efficient its design is, and the availability of sunlight on your roof.

How much light will I get from each size?

A larger diameter tube will produce more light than a smaller diameter. Usually, a 14" diameter tube will produce twice as much light (measured in lumens) as a 10" diameter tube. A 22" diameter tube will bring in approximately twice as much light as a 14" diameter tube. The most efficient 10" TDDs will be approximately as bright as three 100-watt light bulbs (3000-4000 lumens), the 14" TDD will be about as bright as five 100-watt light bulbs (6000-9000 lumens), and the 22" TDD will be like twelve 100-watt light bulbs (13,000-21,000 lumens).

What constitutes an efficiently designed TDD?

THE DOME: The best designs have domes that are engineered to provide the most efficient light gathering.

THE TUBING: The reflectivity of the tubing will determine how much light will get from the roof to the ceiling. The tubes with the highest reflectivity can deliver as much as 200% more light (measured in lumens) than other brands of the same diameter. More reflective tubes send more light into the room. In winter, the reflectivity of the tubing is even more important because the low angle of the sun's rays causes light to bounce more times off the sides of the tube. A highly reflective tube reflects light even on cloudy days and moonlit nights. Many kinds of tubing have great reflectivity when you take it out of the box, but quickly degrade within 1-5 years. The best tubing maintains reflectivity for many years. Look for a reflectivity guarantee. Some brands have a guarantee of 20 years.

THE DIFFUSER: Better ceiling diffuser materials let more light into the room. Also, the shape and engineering of the diffuser material will determine how evenly the light is distributed. Better brands of TDDs have different styles of diffusers for different room conditions and a different look on the ceiling. TDDs with dual glazed diffusers are more energy efficient.

How do I know what size TDD I need?

Different rooms in your home need different levels of light. In general, the 10" diameter tube works well in bathrooms, closets, hallways, and small bedrooms. The 14" diameter tube is often selected for kitchens, dining rooms, and family rooms. The 22" diameter tube is usually installed in living rooms, rooms with cathedral ceilings, offices, and garages. Several smaller-sized tubes can be used instead of one large tube to distribute light more evenly over a large area, or a single TDD can be used to highlight a specific area in a larger space.

What factors affect the availability of sunlight on a roof?

The amount of light that is available on the roof varies tremendously depending on the time of day, the time of year, and the geographic location. The amount of light from the sun in June is more than twice that in December. If you live in a southern latitude, you will have more sunlight available year round compared to a northern latitude.

Shadows from trees, adjacent buildings, chimney chases, parapet walls,

air conditioning equipment, and other parts of the building can cause a temporary or permanent reduction in the amount of light that is available to enter the tube. Prior to installation, it is a good idea to look for possible sources of shadowing. In some situations, the tube can be extended above the roof level to get the dome out of a shadow and vastly improve the amount of light.

Is there a way to turn off or “block” the light from a TDD?

Some TDDs can be installed with an option to control the amount of light that enters the room. The electric shutter system within the tube can be controlled with a wall switch, allowing you to adjust the amount of light you need—whether it be in a bedroom during a nap, or in an office while looking at a computer screen. Other brands have a simple manual shade that blocks the light. The manual shades are simple to install and much more affordable than the electric options.

What about heat gain in the summer and heat loss in the winter?

TDDs were specifically designed to minimize heat gain in the summer and heat loss in the winter. First, for the amount of light, the size of TDD is significantly smaller than a traditional skylight. There is simply less surface area for heat to transfer from the outside to the inside of the home. Second, the captive air space inside the TDD insulates similar to the air space in a dual-glazed window. This air space significantly reduces energy transfer, making tubes much cooler in the summer and warmer in the winter. Third, the best TDDs have seals and gaskets to prevent inside air from escaping and outside air from coming in. Fourth, some tubes incorporate a “thermal break” which isolates the metal tube material from the roof flashing. This cuts down on the direct transfer of heat and cold from the outside to the inside.

How long can a tube extend and still bring in sufficient light?

It is entirely possible to have a tube that extends from the roof, through an upstairs, and brings light into a room on a lower floor. A 10” or 14” diameter tube can be as long as 20 feet, and a 22” diameter tube can be as long as 20 or more feet. Architects and building designers are very excited about having the ability to get daylight into previously dark areas.

The effective length of a tube depends completely on its reflectivity. The most effective tubing is over 97% reflective and reflects light in a parallel

pattern (specular reflectivity) that maximizes the amount of light sent down the tube. If the tubing is just 95% reflective, every time the sunlight bounces off the inside of the tube it will lose 5% of its energy. After 10 bounces, approximately 50% of the light is gone.

Will the light fade my furniture or clothes?

The best quality TDDs are designed to filter out 99.9% of the UV rays. These rays are the most damaging to fabrics. Also, the diffuser at the ceiling is designed to flood the light rather than concentrate it in one spot. Diffusing keeps the light from being concentrated in any particular area, further reducing any possibility of damage to items within the home.

WATERPROOFING

How are TDDs waterproofed to prevent leakage?

Tubular daylighting devices (TDDs) are much easier to waterproof than traditional square or rectangular skylights. Waterproofing of TDDs depends upon the engineering of the pieces on the roof and on the expertise and workmanship of the installer.

The most waterproof TDDs are designed with one-piece seamless metal flashings, with no joints to allow water intrusion. Metal flashings are better than plastic flashings because metal lasts much longer, resists warping and cracking from the sun, and withstands harsh weather much better.

Having the correct roof flashing for the roofing material is also important for waterproofing. The best TDDs have a variety of flashing options to match different roofing materials. These flashings are designed to conform to the roofing manufacturer's specifications for waterproofing and longevity.

The dome also plays a role in making the TDD waterproof. Injection-molded high impact acrylic domes resist cracking and impact damage. The best domes are also made of UV-resistant material so that the sun will not destroy them. The most weatherproof dome fits over the flashing and has a gasket or seal between it and the roof flashing.

Perhaps the most important part of the waterproofing of your TDD is the expertise and workmanship of the installer. Installers need to know the

characteristics of the different roofing materials, accepted installation practices, building code regulations, and how to evaluate the condition of each individual roof. The best installers receive rigorous training and are certified for installing TDDs. Professional installers know how to locate and seal a flashing so that it stays weatherproof for a long time. The installer needs to use the correct sealant that is compatible with the roofing material. Screwing rather than nailing the flashing keeps it solidly attached to the roof and prevents the flange of the flashing from coming loose over time. The professional installer also knows how to leave a channel between the flashing and the roofing materials so that roofing debris will be flushed away by rain water.

Do some TDDs leak?

If a TDD leaks, it is usually due to faulty design or materials. Plastic flashings do not hold up well to the heat and cold, and they can warp, crack, and be a source of early leaks. Some TDDs are designed like stovepipes and they depend upon caulking for weatherproofing. In due course, sun and weather conditions will break down the caulking, causing leaks. Some tubes have roof flashings that are part metal and part plastic with a joint sealed with caulking. Since the metal and plastic expand and contract at different rates, this joint is a cause of leaks. The domes on some tubes are vacuum-formed or made of thin plastic that is vulnerable to early cracking and leaks.

What about condensation inside of the tube?

If warm moist air from the home gets inside of the tube, condensation may form on the inside of the colder dome. The most efficient tubes use a series of seals that prevent leakage of any kind. It is important that the inside of a TDD remain as dry as possible to minimize any negative effects on the reflectivity.

GREEN BUILDING

What are the advantages of sunlight over electric light?

Tubular daylighting devices (TDDs) offer many advantages to people and the environment and are an important part of green building. The most effective TDDs bring in full spectrum sunlight without the UV rays. You can turn off your electric lights and save money. Reduced electricity usage is better

for the environment, cutting down on pollution and the need for more generating plants. It is easier to see with full spectrum sunlight; things look better and colors are truer.

Studies prove that people are healthier, happier, and more efficient when the indoor environment is bathed with natural light rather than light from electrical fixtures. Homes with an abundance of natural light are perceived by people to be more valuable and desirable and using natural light helps designers meet building code-mandated lighting requirements. Buildings with adequate natural light are safer because visibility is improved on stairways and in work areas like kitchens. People with SADD install TDDs in their homes because the sunlight improves their outlook on life.

Will TDDs be cooler than the hot electric lights in my ceiling?

TDDs add much less heat to a room than the equivalent amount of electric lights, reducing the cost of air conditioning.

What areas will benefit from natural light?

Any room that requires electric light in the daytime can benefit by switching to natural light. Spaces like hallways, stairways, and small interior bathrooms that are difficult places for windows are wonderful locations for TDDs. Many garages have few windows, and installing TDDs can transform them into brightly lit workshops. Buildings that, for security reasons, have no windows can have natural light from TDDs in the ceiling. Rooms on the ground floor of two-story buildings can also have natural light from TDDs coming down from the roof. Dim rooms with mold or mildew problems can be improved with the addition of TDDs.

Which rooms need the most light?

Kitchens and home offices seem to be the areas that need the highest light levels for effective visibility. The vanity areas in bathrooms demand better lighting. Stairways are much safer when properly lit. Lighting in the entry area will make a home much more inviting. Sewing rooms, reading areas, workshops, and craft rooms need more light in order to see better and avoid eye strain.

Can I grow plants under the light from a TDD?

The light from a TDD is full spectrum sunlight without the UV rays and

without the excess heat. Many plants will thrive under this light.

Will natural light help me sell my home?

A common objection that realtors hear from home buyers is that a home is dark and depressing. When realtors prepare a home for an open house, they make sure that there is as much natural light as possible in every room. Many realtors are beginning to realize the benefits of TDDs and suggest that their clients brighten up dark areas by installing TDDs. They are a fast, easy, inexpensive, and effective solution for making a home bright and inviting.

What about using TDDs for retail, commercial and school locations?

Schools, retail stores, and commercial locations use between 35-55% of their electricity for lighting. TDDs can dramatically decrease electricity bills. Natural light also markedly increases sales and productivity, reduces absenteeism, and creates a healthier work environment. School children are calmer, have higher test scores, and less illness when there is sufficient daylight in their classrooms. Energy-efficient commercial buildings are more valuable because the operating costs are less, contributing to the profitability of the business. An article in *The Journal of Property Management* (January 2000) stated that energy-efficient green projects sell or lease faster and retain tenants better because they combine superior amenities and comforts with lower operating costs and more competitive terms.

Retail stores have known for a long time that bright lighting means more sales. Natural light from TDDs provides the best light without high electric bills and excess heat gain from hot light fixtures. Grocery stores know that better looking produce, meat, and other products means higher sales and happier customers. Customers return to restaurants that serve meals in pleasant, cheerfully lit rooms. Veterinary clinics have discovered that natural light helps calm their animal patients, allowing them to heal faster. Jewelry stores, gift shops, art studios, and galleries find that natural sunlight provided by TDDs brings out the true colors and beauty of their wares.

INSTALLATION

Are TDDs difficult or messy to install, and how long does it take?

Tubular daylighting devices (TDDs) have been designed to be much faster and easier to install than traditional skylights. They fit between the roof-

framing members so that no extra carpentry is necessary. The tube provides the “shaft” to bring the light from the roof to the ceiling so there is no need for framing, sheet rocking, or painting. The ceiling piece is designed to fasten securely with a trim piece that covers the ceiling opening, eliminating the need for repair or painting of the ceiling.

Composition shingle and wood shakes are the most common roofing materials. On these types of roofs, an experienced installer can usually install a TDD in about two hours. Tarps are placed on the floor underneath the installation location so that all the debris is neatly contained and removed, leaving the room clean and bright when the job is done.

Are there conditions where installation can take longer than the standard?

Some conditions and roofing materials will cause the installation process to take more time and expertise. Roofing materials like tile, metal, or membrane take special installation techniques, tools, and flashings. Steep pitch roofs are harder to walk on and may require safety equipment. Interior locations like stairwells and high ceilings may require special ladders. Ceiling materials like plaster and wood take longer to cut.

Options like electric lights, electric dimmers, and vent fans add to installation time and require some knowledge of electrical codes and procedures. These features require that the installer have access to the attic.

Are some TDDs easier to install than others?

Installation time and difficulty are effected by the design of the TDD materials. Some roof flashings have flanges that are sized, shaped, and designed to be easy to insert under the shingles and easy to waterproof. Also, the availability of different flashing types allows correct matching of the flashing to the particular installation conditions, rather than having to “make do” with a limited choice. Adjustable elbows at the roof and the ceiling make it much easier to get the proper placement in the ceiling and to avoid running into obstructions in the attic or on the roof. Without the elbows, the only option available is to go straight from the ceiling to the roof. Tapered extension tubes that slide into each other make it unnecessary to do any cutting with tin snips.

The TDDs that are easiest to install are designed to reduce the need for crawling in the attic. Most of the installation can be done from the roof and

through the hole in the ceiling.

Some TDDs have parts that are pre-assembled in the factory that reduce the amount of on-site labor and assure more consistent quality of installation. Packages that include all of the necessary parts, fasteners, and sealants eliminate the need to search for things to complete the installation. Clear, illustrated, step-by-step installation instructions also make the process much easier.

Could I install one myself?

Many people get the materials and install their own TDDs. The TDDs that are easiest to install have factory pre-assembled parts that significantly reduce the time and work necessary on the job. Most people find that their first installation will take one day or a little longer, depending on their skill and the roof conditions. Having the correct tools and some general knowledge of construction will make the job easier.

The best TDDs have detailed, illustrated installation instructions. In some cases, installation video tapes are available. Ideally, installation instructions and tips are available on the manufacturer's web site. For the do-it-yourself or first-time installer, an experienced local TDD dealer can assist with explanations. Some TDD dealers teach do-it-yourself classes and are available to answer questions that you may have during the installation process.

What are the advantages of professional installation?

A skilled professional installer will know the exact procedures for installing and waterproofing a TDD for every type of roof and building condition. The installation is finished and cleaned up quickly. An experienced installer sees a lot of different homes and lighting situations, and he can give advice about the proper size TDD to use and where to place it. Careful installers are on the lookout for any defect in your roof that may be causing unseen water damage. They will inform you if they find anything that needs the attention of a roofing contractor. The best installers receive extensive training and are certified to install TDDs. They also know how to install without cutting any structural members of the building. Quality TDD dealers warranty their installations against leakage or other defects of installation.

What if I am re-roofing?

Re-roofing is an ideal time to install TDDs. The roofing contractor can install and waterproof the roof flashings during the roofing process, just like all of the other flashings that are on a roof. Installing the TDD flashings during re-roofing will often result in the most thorough waterproofing system. This is especially true for low-pitch roofs with hot-mopped roofing or membrane roofing. Installation is also easier when the roofing material is tile, metal tile or some kind of material that takes extra labor and care for the installation of roof flashings.

If you are having your roof torn off before the new roof is installed, it is best to locate the TDDs and cut the holes through the roof sheathing after the old roof is torn off and before the new roof is installed. In the case of wood shakes or shingles, after the roof is torn off, the roofer will be installing plywood or OSB over the old “skip sheathing” (usually 1x6 boards with spaces between them). Before the new plywood is installed, it is very easy to see through the spaces between the old sheathing and determine if the locations for the TDDs are free of attic obstructions.

What kinds of optional accessories are available?

ELECTRIC LIGHTS: These can be installed inside some TDDs. This allows the tube to bring in sunlight during the day and to illuminate with electric light at night. The best electric light options are Underwriters Laboratories (UL) approved specifically for use in the TDD. There are some electric light options on the market that say they are UL approved, but the UL approval refers to the light socket only, not for its use as a fixture inside of a TDD. The correct size light bulbs specified must be used in a TDD fixture to avoid danger from overheating. **VENTILATION PACKAGE:** This integrates an exhaust fan with the TDD for use in bathrooms, laundry rooms, or any other room which would benefit from ventilating moisture or heat. These fans are not designed for use in kitchens because they do not include grease traps. The best ventilation packages are unobtrusive on the ceiling, move enough air to create effective ventilation, have fans remotely mounted in the attic to reduce noise, incorporate back draft dampers, and use insulated ducting that sends the exhaust air out of the building.

ELECTRIC DIMMER: Offered with some high-end products, the dimmer allows the amount of sunlight to be infinitely adjusted to suit the occupant of the room. An electric shutter system inside the TDD is operated by a wall switch. In an office situation, the amount of light can be adjusted for someone

using a computer screen.

MANUAL SHADE: A more affordable sun-adjusting solution, a black out shade consists of a disc that magnetically adheres to the diffuser ring. If the TDD is in a bedroom, the light can be shut off when you want to take an afternoon nap.

TURRET EXTENSIONS: These can be use to extend the roof flashing to allow the dome to be raised above the roof in order to get out of shadows and bring in more sunlight.

How much will a TDD cost?

The cost depends upon the size of the TDD, the distance from your roof to the ceiling, the quality of the product, which options you choose, the type of roofing material, the steepness of the roof, and what area of the country you live in. For a do-it-yourself materials package, the prices start at approximately \$300 for the smallest size and go up to \$800 for the largest size. For installed TDDs, the prices start at approximately \$500 for the smallest size and go to \$1200 for the largest size.

ROOF & CEILING VARIABLES

What about installing in a home with cathedral ceilings?

Some cathedral ceilings have only enough space between the roof and the ceiling for the insulation. Some cathedral ceilings consist of tongue and groove wood with the roofing on the outside. There can also be various thicknesses of rigid foam insulation between the roofing and the tongue and groove wood. Newer homes have scissor trusses that create the cathedral ceilings. In these homes, there is an actual attic space; however, it may not be accessible.

In all cathedral ceiling types, tubular daylighting devices (TDDs) can usually be installed. The length of the tube is often as short as 12", just long enough to go from the top of the roof flashing to the inside surface of the ceiling. The TDDs that are easiest to install in cathedral ceilings have a top tube and a bottom tube that are different diameters so that they slide into each other. If the distance is very short, the tubing can be cut down with tin snips.

What about installing when there is no access to my attic?

If there is no access to an attic space, it is sometimes difficult to

determine if there is a clear path from the ceiling to the roof. Ducting, wires, gas lines, and water lines can all be in attic spaces. In some cases, it is necessary to make an investigation hole in the ceiling or through the roof to be sure that there are no obstructions in the location where the TDD is to be installed. This can take extra labor time and expense.

The best TDD designs can be installed working from the roof and from the ceiling. They do not require that the installer go into the attic.

If there is no attic access, it may not be possible to use some of the optional features like electric lights or ventilation fans.

Can TDDs be installed in mobile homes and manufactured homes?

TDDs are an excellent way to get light into mobile homes and modular homes because they fit easily between the framing members. There is no need for expensive carpentry alterations. TDDs are also much easier than traditional skylights to waterproof on the different roofing surfaces that are used in manufactured homes.

Can TDDs be installed in homes with flat roofs?

Flat roofs are usually waterproofed with membrane roofing or hot tar. These roofs take extra care and expertise when it comes to waterproofing the roof flashing. The newer membrane roofing systems may require a professional roofing contractor to install the roof flashing for the TDD. This is especially important when there is any pooling of water on the roof.

How are TDDs installed in new homes or additions?

During the construction of a new home or addition, TDDs are usually installed after the framing and roof sheathing are complete, before the roofing is installed. There are two techniques.

The first technique is to have the roofing contractor install the roof flashing and dome on the roof during the roofing process. After the ceiling material is installed (typically sheetrock), the TDD is installed from the roof to the ceiling. The advantage to this technique is that the TDD will not be damaged during the construction process. The disadvantage to this technique is that it takes two trips to the job to install the TDD and it is possible, during the construction process that another subcontractor will put an obstruction in the path between the roof dome and flashing and the ceiling location.

The second installation process involves installing the entire TDD all the

way to the ceiling just prior to the roofing. This requires some kind of mounting surface at the ceiling. The bottom end of the tube is immediately covered with clear plastic and masked off to keep out dust and moisture. When the new ceiling is completed, the masking is removed and the ceiling diffuser is installed. The advantage to this technique is that it only takes one trip to the job to install the TDD; the tube is in place before any other obstructions are installed, and there is some light coming through the tube during the construction process.

MAINTENANCE

What kind of maintenance is needed?

There is very little maintenance necessary on the best-engineered tubular daylighting devices (TDDs). The roof dome is usually cleaned by rain. In some dry climates with dustier conditions, a yearly washing with soap and water is all that is necessary. The TDDs with carefully sealed joints keep the dust and insects out so that it is not necessary to clean out the ceiling diffuser.

Check with your local dealer to see if they offer a yearly maintenance program. This usually includes inspecting the flashing, checking the surrounding roof for anything that might effect the waterproofing of the TDD, checking gaskets and seals, and repairing or replacing of any damaged parts.

How long will a TDD last?

THE DOME AND FLASHING: The materials used for the dome and its flashing are very important to the longevity of the TDD since these parts are constantly exposed to the extremes of weather. The longest lasting domes are injection molded out of impact resistant acrylic that includes UV inhibitors. This type of dome is 10 times stronger than standard acrylics. The longest lasting flashings are made of corrosion-resistant steel and are finished with a factory applied coating that's specifically designed withstand the baking sun. This combination of dome and flashing will resist damage from wind, rain, sun, and flying objects.

THE TUBING: The longevity of the tubing itself depends upon the initial quality of the material and how well it is protected from damaging factors. Rigid aluminum tubing is the best at resisting mechanical damage and possible damage from insects or rodents. Also, the more thorough and exacting the manufacturing process is with applying the reflective materials to the

aluminum, the longer the tubing will maintain its ability to send light into the house. The tubing needs to be protected from the damaging effects of dust and moisture. That means that the design of the TDD needs to include seals and gaskets to stop infiltration of air from the home, the attic, or the outside. The longest lasting TDDs incorporate an expansion joint in the tube that prevents flexing and movement in the roof from damaging the tube structure or the attachment at the ceiling.

THE DIFFUSER: The ceiling fixture or diffuser needs to be high-quality injection molded materials with built-in gaskets that keep warm, moist, inside air from entering the TDD. The actual diffuser material also needs to be securely attached to the trim ring to complete the air-tight seal.

INSTALLATION: Even the best-designed materials need careful, quality installation in order to last a long time. A professional installer is careful to place all the seals and gaskets in the correct locations. The joints in the tubing are tightly sealed with high-quality aluminum duct tape, not the old gray type that soon becomes dry and useless. The fasteners are correctly screwed down, not over-tightened. The ceiling ring is securely attached. Any options, such as electric light kits, are securely installed and sealed.

A quality TDD which is carefully installed will be weatherproof and will efficiently light your home for many years.

Will I get a warranty?

Most tubing manufacturers provide a warranty of at least 10 years. You need to look carefully at the actual terms and conditions of the warranty in order to understand what is covered and what is not. Some warranties are more hype than substance. Also, the warranty is only as good as the ability and willingness of the company to stand behind it. The most satisfying warranties are those backed by strong manufacturers with local dealers who are quick to assist customers and to resolve any issues that arise.

RESOURCES & APPROVALS

Are TDDs rated for energy efficiency?

Some TDDs are Energy Star certified. The Environmental Protection Agency and the U.S. Department of Energy work together to determine the energy performance levels that must be met for a product to earn the Energy Star rating. While traditional skylights bring in outside temperatures, creating a need to run the air conditioner or heater, the TDDs that are Energy Star certified are designed with an insulating air pocket in the diffuser, which prevents such a heat-cold transfer. Energy Star enables consumers to easily identify NFRC certified products with superior energy performance. (www.energystar.gov)

Do manufacturers offer data on tube lighting output?

There are many claims about how large an area you can illuminate with each size tube. Some TDDs have data that gives the amount of light in lumens. This allows you to compare the light output of the tube to the amount of light you get from an electric light bulb. Be aware, however, that measured lumen output of a TDD is completely dependant on the conditions under which the test is conducted. Many variables will affect the amount of light in the test room, such as the time of day, the time of year, the latitude location of the test, the length of the tube, and the size of the tube. The most reliable data will specify the test conditions and will usually tell you a yearly average light output.

Be careful about exaggerated claims of how large an area a TDD can light. Some manufacturer's put out information that is very misleading and not backed by accurate testing. There is a big difference between the best and the worst products on the market. One of the best ways to compare is to see some TDDs that a company has installed in a home or office.

What kind of independent approvals and testing are available?

Some TDDs are tested and approved by the independent testing companies to show that they comply with the requirements of the Uniform Building Code. Electrical components are tested and approved by UL. HUD is a governmental agency that evaluates building products for manufactured housing. The Southern Building Code Congress International (SBCCI) is a regional organization that checks products for code compliance. The City of Los Angeles has its own approval process as does Metro Dade County, Florida.

The value of any of these approvals is to assure the buyer that the product has been thoroughly tested and will comply with the rules and regulations of the building code.

The TDD manufacturer's website should have information about testing and approvals.

Can I get information from the web?

The major manufacturers and TDD dealers have web sites. Some of them are very extensive with technical information, specifications, pictures, testimonials, and references. Some of the web sites are merely marketing fluff. There isn't any web resource for completely unbiased, independent evaluation.

On the subject of "daylighting," the practice of infusing natural sunlight into buildings, there are many web sites with independent studies to substantiate the overwhelming benefits of natural light over electric light. (www.h-m-g.com)

NATURALIGHT SOLAR, INC. INSTALLATION WARRANTY

Naturalight Solar, Inc. warrants that if Naturalight Solar installs Products, the installation of the Products will be free from defects in workmanship for a period of ten (10) years from the date of installation. Should such installation be determined by Naturalight Solar to be defective, Naturalight Solar shall repair the defect. Customer shall give notice of any such defect to Naturalight Solar within thirty (30) days of discovery of such defect.

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