A GUIDE FOR PROPERTY OWNERS CHOOSING A SUN TUNNEL

7 TOP TIPS ON CHOOSING THE RIGHT SUN TUNNELS OR SUN PIPES

The following provides some useful insights about sun tunnels, which are sometimes also referred to as sun tubes, sun pipes or light tubes.

So, if you want to have a sun tunnel that provides real daylight in rooms that have been fairly dark and gloomy, then please read the top tips to help you make a more informed decision.

TIP 1 Choose a sun tunnel with a roof dome made from quality Bohemia crystal glass.

This picture shows a crystal glass dome after a sun tunnel from Lightway has been installed on a pitched roof. The roof section of the sun tunnel is made from Bohemia Crystal glass, which is of high quality and a material guarateed not to change or degrade. This is particularly important for the transmission of daylight particles.

There is no deterioration in the unit's ability to catch real daylight when the dome is made from Bohemia Crystal glass. However, if the dome is manufactured from plastic material, in a very short space of time unwanted changes occur in the colours and the surface will become scratched from dust particles in the air during windy conditions - worsening every month. A dome made from crystal glass is immune against ageing caused by the sun and air pollution.

Do you know why the transparent section of a window is normally made from glass and NOT from clear plastic? This photo shows a typical plastic-type sun tunnel dome just 18 months after being installed on a roof and having experienced various weather conditions. The combination of sun and dust in the air terribly affects the surface of plastic-made domes. By contrast a Lightway crystal glass dome is completely resistant under any conditions and stays clear for decades to come.

The fact is that a crystal glass dome will not change and you will receive sufficient clear daylight - even when the sun is not shining brightly outside.

Bohemia crystal glass dome from Lightway stays clear and remains attractive over many tens of years.

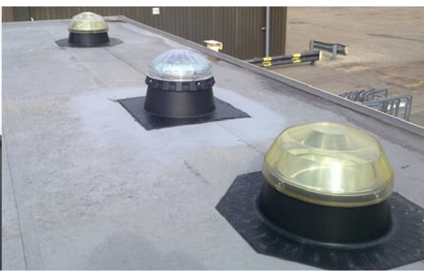


Photo showing the clear Bohemia crystal glass dome in the middle and a plastic dome after thirteen months of wear under British weather conditions.

If you have a crystal glass dome on your roof, you have the guarantee of decades of durability and no discolouring of the dome. Compared to domes manufactured from plastic materials, a glass dome is self washable and no air pollution will stick to the surface of the glass. Furthermore, there is no change in the glass material's structure and it's unaffected by dust abrasion in the atmosphere in windy conditions.

Over just a few months one can really see significant changes with a typical plastic dome, whereby a barrier is created that hinders translucency - i.e. good transmission of daylight. And, given that we are fighting for every small inch of daylight it really helps to have a dome that has high translucency.

A glass dome can also be washed with detergents after twenty years of use and there will be no damage after washing. But here one needs to ask some basic questions. For example: Why are windows not made from plastic?; Why are they made from glass?; and, Have you seen plastic materials used with such domes 2-3 years after being installed and how did it appear?

TIP 2 Select a sun tunnel designed for overcast conditions and where sunshine is absent.

A sunny winter day in California or in Italy. Do you want more sun on these days?

Overcast weather conditions in Northern Europe. Do you want more clear daylight on such days?

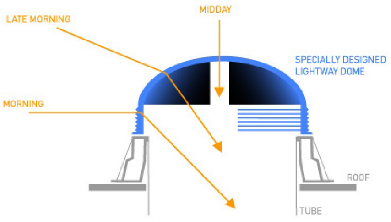
Light pipes, sun tunnels or sun tunnels were originally developed for hot climates in places like Australia and California. Many manufacturers attempted to copy the technology and it was perfectly fine when daylight tube systems were sold and installed in those geographies where pipes can catch the direct sun. However, with overcast conditions their performance is low.

With many types of plastic domes you can see the impact of the rays of direct sun light on them over time. Where there are clear skies and direct sun every sun tunnel is extremely functional, effective and will bring enough light in to a room. However, the true test comes when it's overcast and there is no sunshine. Imagine winter or spring time when one wants more daylight.

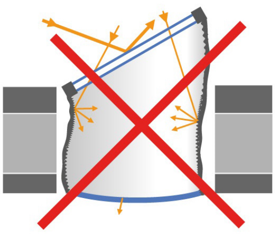
On plastic domes the lenses prevent light travelling inside a building as the rays are not strong enough to penetrate the structure. So, always opt for sun tunnels that are able to catch more daylight when it's overcast to ensure the best results.

TIP 3 Choose a sun tunnel that will be fitted as a roof window but with a glass-shaped round dome on the roof that attracts the largest amount of daylight - even in the worst weather conditions.

The market has developed sun tunnels incorporating a roof window (i.e. flat) instead of the most effective glass round-shaped roof dome to deal with snow, dirt and air-pollution.


LATE MORNING
MIDDAY
SPECIALLY DESIGNED LIGHTWAY DOME
MORNING
ROOF
TUBE

In this picture you can see basic principle at work.



It might seem like an interesting idea to have a sun tunnel where there is a flat roof window instead of a special shaped crystal glass dome up on the roof. But choosing the former means 30% less daylight from the very outset.

One should be aware that the flat glass area reflects daylight back to the sky instead of catching it. By contrast a rounded glass dome has a specially designed surface that catches 30% more daylight. This is particularly beneficial in countries in Northern European in winter time and when it's particularly overcast.

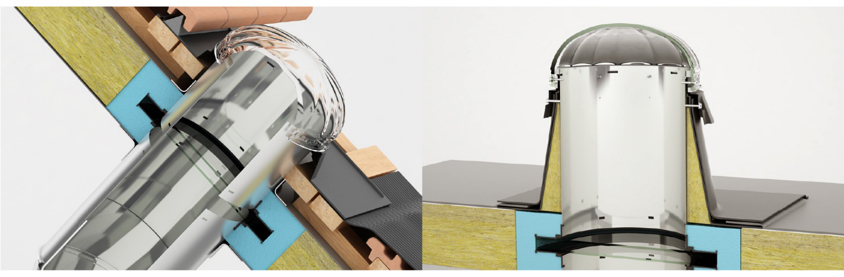
If you choose roof window with flat glass instead of a round crystal glass dome, you will get less daylight as the elements (e.g. air pollution, dust and dirt) will easily stick to the surface of the flat glass.

Roof windows too must be regularly cleaned. Just imagine having to go up on the roof and clean the glass every three months or so. Who will do this? You or your partner or do you pay someone else to do it for you? In winter you will also encounter darkness from such sun tunnel and especially so in snowy conditions. On the surface of the flat roof window snow sticks much more readily and for longer compared with a glass roof dome.

TIP

4

Select the sun tunnel that prevents condensation (i.e. formation of liquid drops of water from water vapour) inside or outside the tube and prevents heat losses in winter and heat gains in summer.

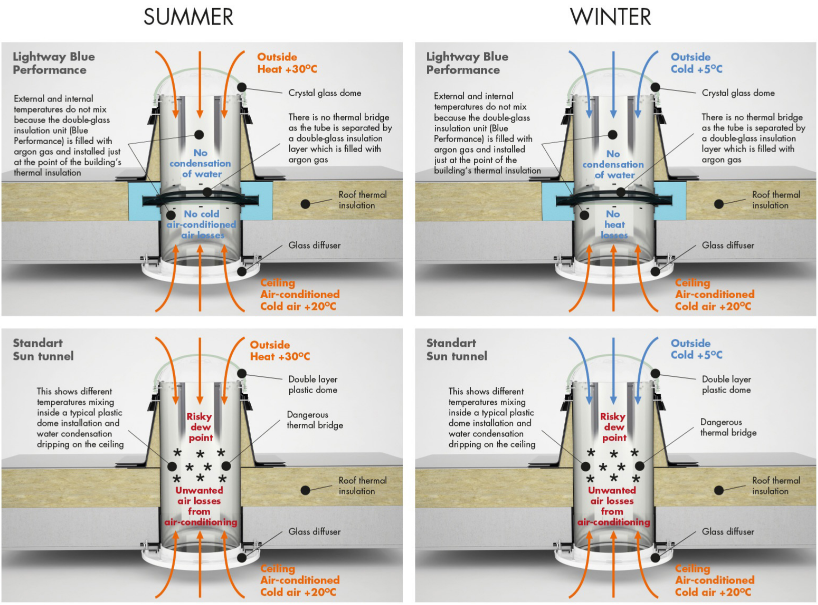


See the blue part in the picture. One can prevent condensation inside or outside the tubes and mould growing on your ceilings or roof construction. Critically it must be mounted in a position where the pipe cuts the thermal insulation of the building.

Lightway Blue Performance, anti-condensation unit itself. See double or triple glass inside filled by special gas argon.

Many owners of light pipes in Northern Europe have been suprised when they see the worst kinds of phenomena with their installations. The pipe is a very good conductor - effectively like a chimney - for differing temperatures between the inside and outside of a building. So, just imagine for a moment what happens, if +5 degrees Celsius(°C) of cold air from the outside meets +21°C of hot air on the inside. The mix of temperatures all occurs within the aluminium tube at some point in the middle of the system.

Now have you ever see water condensation and can you imagine what happens? Drops of water become bigger and start trickling down inside or even outside the tube. Not only is the ceiling wet, the roof construction is wet and drops of water can be found on the floor. Dangerous moulds occur and your children could breathe in polluted air with mould spores in the air floating around inside your rooms. As a result the joy of daylight in a home has gone.


SUMMER
Lightway Blue Performance
Outside Heat +30°C
External and internal temperatures do not mix because the double-glass insulation unit (Blue Performance) is filled with argon gas and installed just at the point of the building's thermal insulation
Crystal glass dome
There is no thermal bridge as the tube is separated by a double-glass insulation layer which is filled with argon gas
No condensation of water
No cold air-conditioned air losses
Roof thermal insulation
Glass diffuser
Ceiling Air-conditioned Cold air +20°C
Standart Sun tunnel
Outside Heat +30°C
This shows different temperatures mixing inside a typical plastic dome installation and water condensation dripping on the ceiling
Double layer plastic dome
Risky dew point
Dangerous thermal bridge
Unwanted air losses from air-conditioning
Roof thermal insulation
Glass diffuser
Ceiling Air-conditioned Cold air +20°C
WINTER
Lightway Blue Performance
Outside Cold +5°C
External and internal temperatures do not mix because the double-glass insulation unit (Blue Performance) is filled with argon gas and installed just at the point of the building's thermal insulation
Crystal glass dome
There is no thermal bridge as the tube is separated by a double-glass insulation layer which is filled with argon gas
No condensation of water
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Roof thermal insulation
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Ceiling Air-conditioned Cold air +20°C
Standart Sun tunnel
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This shows different temperatures mixing inside a typical plastic dome installation and water condensation dripping on the ceiling
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Roof thermal insulation
Glass diffuser
Ceiling Air-conditioned Cold air +20°C

Now if you ask your roofer or supplier how they solve the problem of condensation with a sun pipe you will probably get some interesting answers. Some manufacturers try to solve matters by using a double-glazed inner part in the sun tunnel (i.e. typically a double-glazed insulated diffuser that one sees on the ceiling from inside a building). Or, they deploy a double-glazed insulated roof part, with a double dome or double glass roof window.

However, this is not effective. Double or triple glass must critically be mounted in a position where the tube cuts the thermal insulation within a building.

Sunny climates of California and Italy are good geographies for installing sun pipes. Yet even in these places people have been surprised after seeing the condensation effects with certain types of pipes - e.g. water on ceilings, roof constructions and resulting damage to expensive floors.

The 'Blue Performance' anti-condensation unit is double or tripled glass, which is sealed in a block of plastic insulation and is properly connected to the thermal insulation of a building. This is the ONLY functional and effective solution. Daylight can be effectively transmitted, but different temperatures cannot meet and importantly it means NO CONDENSATION.

Ask a typical light pipe manufacturer to address the condesation problem. You will get an immediate answer. It's either something along the lines that they don't encounter condensation or the issue has been solved. If you are more curious, ask them how exactly it was solved. And, if you are not satisfied then ask your architect, builder or roofer how exactly the condensation issue was solved in your pipe.

One of the biggest and well known producers of sun pipes came up with an interesting but questionable concept. They recommended installing a plastic transparent partition inside the tube. The official reason given is that it prevents flows of air inside the tube and prevent condensation.

From physics we know that this solution can be functional for the column of sealed air that is not greater than 18mm. But they have 300mm or a few meters of columns of sealed air to contend with. The real purpose of this transparent 'cork' is to prevent the user seeing water inside the tube. When no water is on the inner part of the pipe, the customer cannot notice it and is therefore at ease.

From our experience over many years some customers recounted strange tales to us. For example, on certain winter nights they heard the sound of drums! Do you know what that is? The drumming sound can be explained by droplets of condensed water falling on the plastic plate inside the tube. That is until it's full of water.

By choosing a Blue Performance unit from Lightway (see: www.lightwaydaylight.co.uk/products/blue-performance/) and having it properly installed at the point of a building's thermal insulation, heat losses will be prevented and unnecessary large heating bills will not be incurred. During summer months you will also avoid getting hot air inside the pipe because the Blue Performance unit prevents your rooms from overheating.

TIP
5

Choose the sun tunnel that has a highly effective reflective surface inside the tube made from real silver.

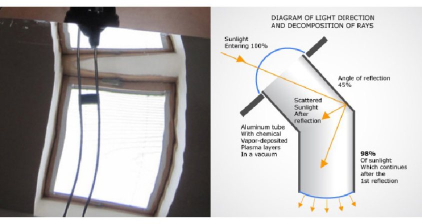


DIAGRAM OF LIGHT DIRECTION AND DECOMPOSITION OF RAYS
Sunlight Entering 100%
Angle of reflection 45%
Scattered Sunlight After reflection
Aluminum tube With chemical Vapor-deposited Plasma layers In a vacuum
98% Of sunlight Which continues after the 1st reflection

The different layers of reflective surface inside the light pipe ensures longevity and undistorted natural daylight. A real silver layer with extremely thin and flexible materials similar to glass layers will ensure the best reflectivity for decades.

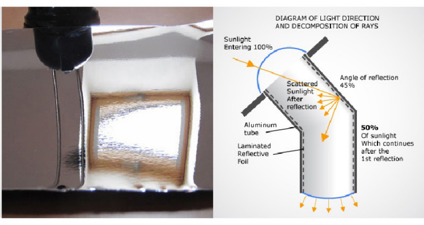
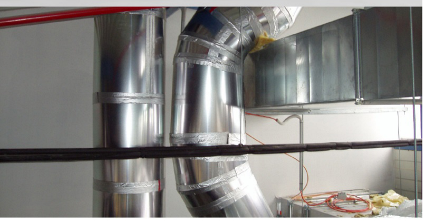
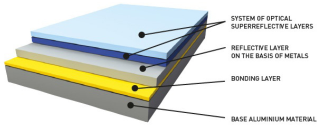


DIAGRAM OF LIGHT DIRECTION AND DECOMPOSITION OF RAYS
Sunlight Entering 100%
Angle of reflection 45%
Scattered Sunlight After reflection
Aluminum tube
Laminated Reflective Foil
50% Of sunlight Which continues after the 1st reflection

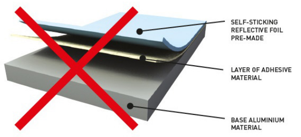
Some manufacturers use reflective layers of self-adhesive plastic foil applied to the aluminium tube. What happens to this plastic foil? Well, after just a couple of years of changing temperatures and humidity it rapidly deteriorates.



CROSS SECTION OF THE REFLECTIVE LIGHTWAY SILVER SHEET METAL PHYSICAL VAPOUR DEPOSITION PROCESS APPLYING OF SUPERREFLECTIVE AND REFLECTION-ENHANCING LAYERS IN VACUUM


SYSTEM OF OPTICAL SUPERREFLECTIVE LAYERS
REFLECTIVE LAYER ON THE BASIS OF METALS
BONDING LAYER
BASE ALUMINIUM MATERIAL

CROSS SECTION OF METAL SHEET WITH PRE-MADE SELF-STICKING REFLECTIVE FOIL


SELF-STICKING REFLECTIVE FOIL PRE-MADE
LAYER OF ADHESIVE MATERIAL
BASE ALUMINIUM MATERIAL

The main purpose of a sun tunnel is to bring natural and healthy daylight into buildings. But critically it's important to try and find out what the reflective layer inside the tube of your pipe is made from. It's very common that the reflective surface is made only from an aluminium layer. With this there is low reflectivity and the ratio between reflecting different colour rays of daylight is unbalanced.

The result with a 2-metre long tube can be more a case of yellow coloured light being transmitted, which cannot be regarded as a true daylight. You will be assured from the marketing literature you receive from some manufacturers/suppliers that their systems (i.e. light tubes) offer 99% reflectivity. But just ask them about what precise colour has the highest reflectivity.

Fundamentally one needs to have an ideal reflective layer, which is high in reflectivity for every natural colour in the daylight spectrum. So, always ask for it on when selecting a sun pipe or sun tunnel.

Also some producers put reflective layers of self-adhesive plastic foil on the tube's surface. But how will this foil appear after three years? If it's on the inside of the tube, which has to handle humidity, large temperature differences and changing temperatures between summer and winter, it's pretty likely that it will peel off and the reflectivity will rapidly dissappear. And, the result? The pipe will be dark. Just see the tube's interior surface for yourself.

The quickest way to recognise the highest quality tube with real silver and a special extremely thin layers of glass material is very easy. If you see sharp and bright objects as you would in the mirror then it's the right one. While self-adhesive foil does offer some reflectivity it will nevertheless only allow 50% or less of possible daylight to find its way into a room during winter periods. So do a check if your sun tunnel incorporates a real silver layer.

TIP
6

Choose a sun pipe or sun tunnel that has a light diffuser inside the room made from real glass.

The diffusser for dispersing daylight inside a room that is made from real glass provides you a great amount of unaltered daylight and does not lose light transmittance for years.

Lightway Universum: A massive hand-cut piece of Bohemia crystal glass from the hands of Czech glass masters. Weighing 210 kilos and with a diametre of 60cm, it illuminates rooms by providing healthy natural daylight. This is channelled from the roof via a Lightway pipe. It helps counter depression and headaches once fully installed.

Real daylight inside dark rooms where is no-windows.

Sun tunnels Lightway bringing real daylight into the dark areas inside any buildings.

Catching natural daylight on the roof by the crystal glass dome.

If you have sun pipe with a daylight diffuser made from plastic you will achieve poor results in terms of light just a short time after installation. The effect of the sun and alternating temperatures will create changes in the structure of plastic. Specifically, the plastic diffuser becomes a barrier against daylight and will negatively influence the true colours of real daylight.

Clearly you want to install a sun tunnel because you need a substantial amount of real daylight and particularly over winter. So, if you have a real glass diffuser you will benefit from a material with great longevity that provides true daylight for many decades to come. And, it will not get scratched from cleaning as a plastic diffuser would.

Furthermore, a glass diffuser spreads daylight evenly and efficiently around the room where you want increased light. Ask your roofer, builder or architect if your sun pipe has a real glass diffuser to transmit daylight down into the room in question. This is important as it has a huge bearing on the quality and amount of daylight you will receive.

TIP 7

Ask for a proposal and estimate from the professionals and make sure you have an installation of your chosen sun tunnel undertaken by experts.

Avoid letting a roofer or building worker install your sun tunnel. Give the job to the professionals who install sun pipes or sun tunnels every day.

Request a proposal and an estimate from the experts. A roofer can typically suggest the model that they can find in their favourite shop that might be on sale and will probably tell you anything you want to hear. Ask for a site visit from an expert and get a robust proposal.

If you ask manufacturers or suppliers of sun pipes for an installation, you will probably get the following response: "Yes, it's possible." However, they normally do not like this approach as it brings worries in terms of managing various things together. They like to send a box containing sun tunnel kit and tell you that it's simple and straightforward to install.

However, be warned that many people who chose this option were suprised to find this was not the case.
Installing a sun pipe or sun tunnel is much easier for the professional fitter as it's the job they specialise in and do every day. For instance, they know exactly how to cut the hole, how to connect every layer of waterproofing, vapour bariers and diffusion foils in the roof to the system. They also know astute ways to prevent leakages and water condensation.

It's important to note as well that the quality and amount of light is influenced by a professional installation. There are many examples of where a good quality sun tunnel was severely impaired by as a 'pseudo-professional' roofer or carpenter on the job. They need to learn how to install a sun pipe properly. However, are you really willing to pay them while they are effectively learning on the job and installing the pipe in your home? This aspect needs considering.

By far the better course of action is to ask for a site visit from an expert who designs sun tunnels professionally. They should ensure that you will receive the best solution and to the specifications you want. It's not just a case of coming to your home to measure the roof and present you with brochures and a pricelist. They need to discuss with you your needs, your ideas on how much of light you want and the ultimate purpose of the installation.