Sunpipe

Natural daylight where windows can't reach

by Monodraught

MAY 2006

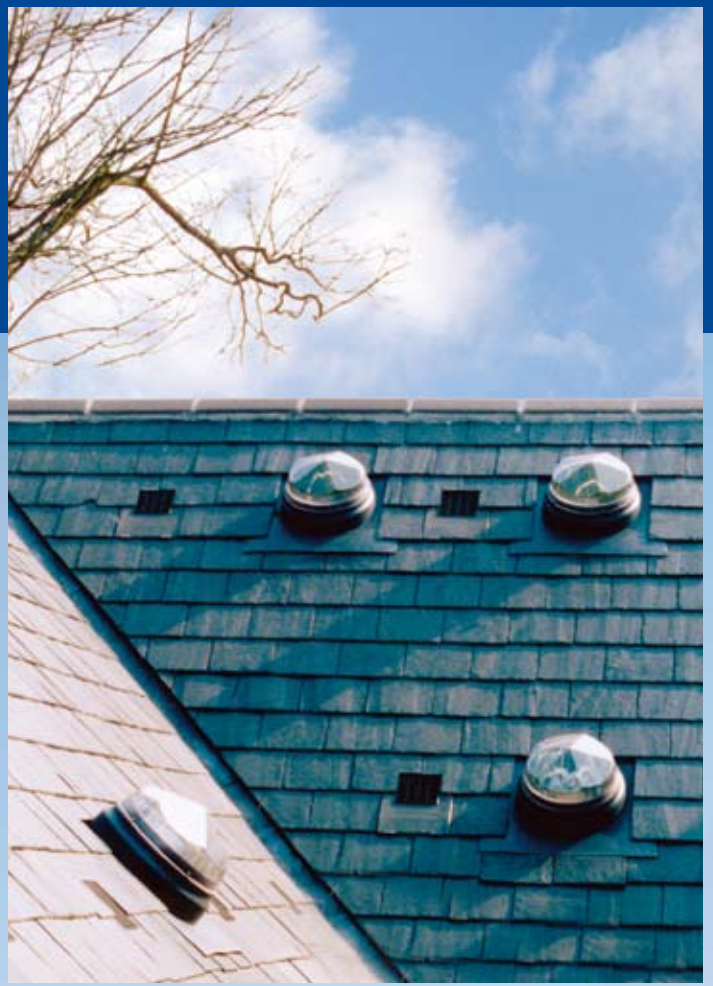
Sunpipe

Contents

'SunPipes' were first used approximately 4000 years ago when the Egyptians used light shafts and mirrors to bring daylight down in to the centre of the Pyramids. The modern version of SunPipes was patented in 1988 but Monodraught recognised the enormous energy saving potential of applying SunPipes to commercial properties, hence the need for this brochure.

According to Government sources, the UK is responsible for discharging 150 million tonnes of carbon dioxide into the atmosphere. In the last 15 years, the amount of energy consumed in Offices, Schools and Hospitals has risen over 250%. More than half of this consumption is electricity. The Government calculates that 20% of the £50 billion a year spent on fuel in the UK could be saved cost effectively by investing in energy conservation.

In Schools alone, Government sources state that 80% of the electricity consumed, is used for electric lighting. By using Monodraught SunPipes, at least 75% of the electricity used for lighting during daytime use can be saved, and a considerable saving in carbon emissions can be achieved.



Monodraught

Professor Terry Payne, Chairman and Managing Director of Monodraught formed the Company over 30 years ago initially to pioneer the development of vertical balanced-flue chimney systems but has since specialised in natural ventilation and associated low energy concepts.

Monodraught at Bluewater Retail Park, Dartford, Kent.

1982 Monodraught saw the launch of the Windcatcher Natural Ventilation system, which encapsulates any prevailing wind to provide energy free, natural ventilation. In 1996 Monodraught introduced the SunPipe to the UK market.

A significant feature of the Monodraught product range has always been the high level of architectural design empathy, producing visually appealing designs whilst achieving an efficient and practical contribution to the optimum harnessing of our natural resources.

The Original Patent

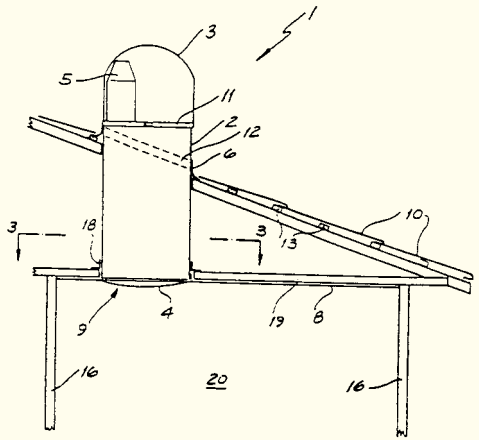
Patent No. 5,099,622 was originally granted to a British inventor, Stephen M Sutton in Oakhurst, Australia on November 22nd, 1988.

The invention was described as, *"a system having a tubular body with a transparent cover to prevent the ingress of dust and with a second transparent cover locating at ceiling level and attached to the tubular body. The composition of all components prevents excess air movement, which creates a static column of air within the tubular skylight. This column of air acts as an insulator which prevents heat from entering the room or conversely in winter from escaping from the room".*

The system has been a remarkable success in both Australia and North America as a highly effective method of conveying natural daylight from roof level down to the room below.

Monodraught has greatly improved the original system and has filed five new Patents covering these improvements. All Monodraught SunPipes are manufactured in the UK and are complemented by a wide range of ancillary products all based on the same concept of energy saving innovations.

Patent No. 5,099,622



Original Patent

Brain Injury Trust, West Heath, Birmingham

The patented SunPipe Diamond dome (Patent No. 0200543.7), introduced in 2002, is available on the four most popular sizes – 9", 12", 18", and 21" (230mm, 300mm, 450mm and 530mm nominal). Some of the photographs or illustrations in this brochure are of the earlier hemispherical design that is continued on the 750, 1000 and 1500mm SunPipes.

Technical Details

Description

This system maximises the concept of renewable energy by reflecting and intensifying sunlight and even normal daylight, down through a pure silver base mirror-finish aluminium tube.

A clear UV stabilised polycarbonate top dome seals the light pipe against the ingress of dust and a clear stipple finish or plain opal polycarbonate diffuser at ceiling level evenly spreads light into the room or space below. The SunPipe system is highly effective in both sunny and overcast conditions and even when it is raining.

There is virtually no limit to the length of SunPipe or the number of bends that can be used and the SunPipe carries a 25 year guarantee with a life expectancy of 35 years.

Composition

The SunPipe consists of a high purity 98% silver coated aluminium tube, which has a 25-year guarantee against discolouration. This specular aluminium surface is coated with PVD and the presence of a UV inhibitor provides outstanding QUV durability with no decrease in total reflectance and the special surface treatment provides excellent colour rendition of natural light.

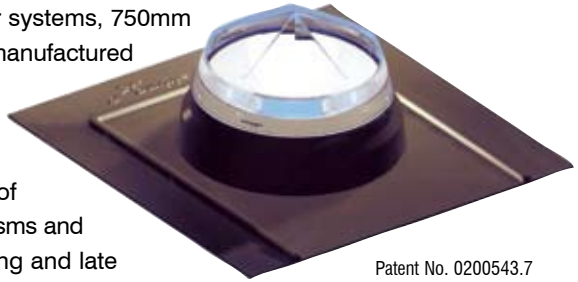
A brushed nylon gasket at the top of the system allows the system to breathe preventing condensation problems, whilst the diffuser at ceiling level seals against the ceiling. All vertical joints are sealed with aluminium tape. This provides a column of still air which is accepted as being an excellent insulator against heat transfer

Top Domes

Top Domes are available in UV stabilised unbreakable polycarbonate as standard or are supplied in impact resistant modified acrylic (ICI Perspex), where SunPipes are to be used in a harsh UV prone environment such as the Middle East. The Diamond domes are injection moulded polycarbonate or acrylic 4mm thick and are unbreakable and vandal resistant.

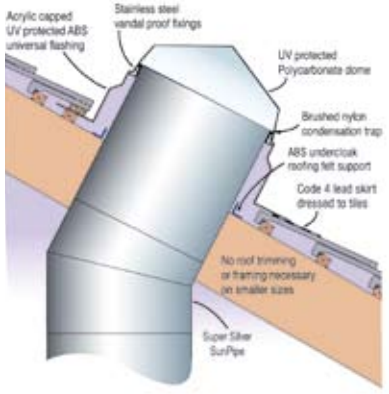
The Diamond Dome

The Diamond shaped dome introduced in March 2002 has proved so popular that all major sizes are manufactured in this Diamond shaped design. The larger systems, 750mm diameter and above, are manufactured as hemispherical domes. Diamond domes are designed specifically to maximise the penetration of sunlight through the flat prisms and to capture the early morning and late afternoon sun through the arrangement of vertical prisms on the circumference.

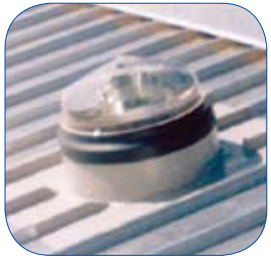


Patent No. 0200543.7

PITCHED ROOF FLASHING

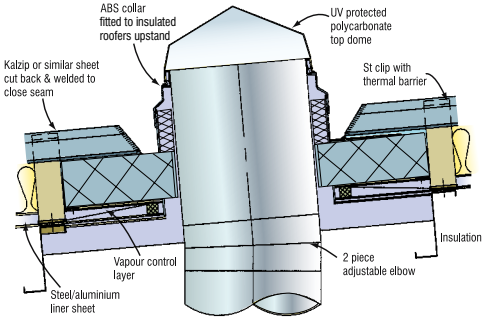


Slate roof

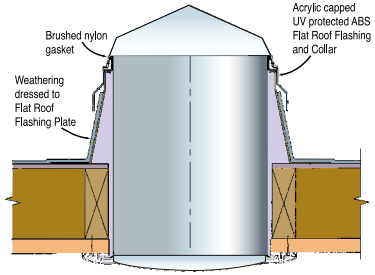


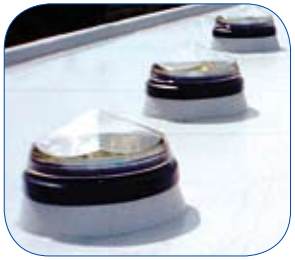
On-site welded upstand to Kalzip type roof with ABS collar

METAL ROOFING PROFILE



FLAT ROOF FLASHING

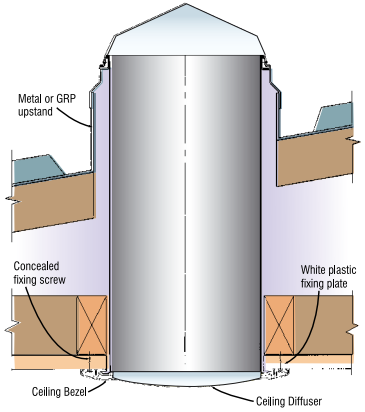




Flat roof application

Alternative GRP upstand for British Steel type colour coated roofing sheet, bonded to surface

VERTICAL FLASHING



NBS Specification

Typical NBS Specification for Sunpipes

- Manufacturer: Monodraught Ltd, Halifax House, Cressex, High Wycombe, Bucks, HP12 3SE. Tel: 01494 897700 Fax 01494 532465.
- Type: Monodraught SunPipe system.
- Lining: 98% reflectance Super Silver, mirror finish aluminium tube in 610mm lengths.
- 45°/30° adjustable elbows.
- Glazing details: UV protected polycarbonate unbreakable Diamond top domes

or • impact resistant modified acrylic Diamond top domes.

- Kerbs – ABS one piece universal flashing (for slate roof)

or • Kerbs – ABS one piece universal flashing (for tiled roof), and integral lead flashing

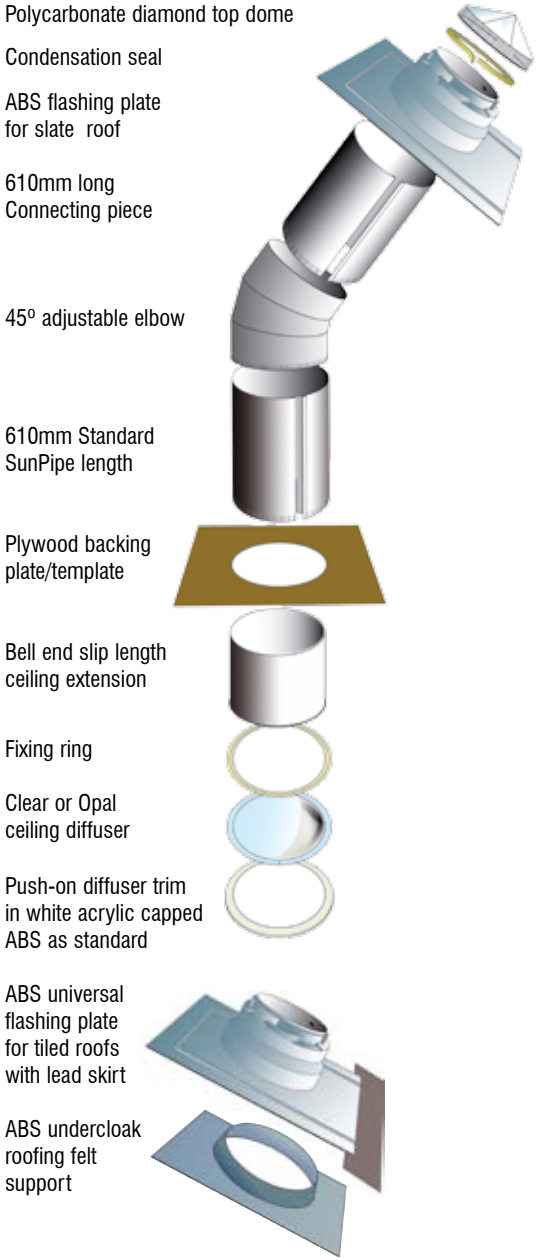
or • Code 4 lead flashing for bold tiled or profile roofs.

- ABS undercloak/roofing felt support
- Flat roofs: Kerbs: ABS two piece flat roof flashing with ABS top collar

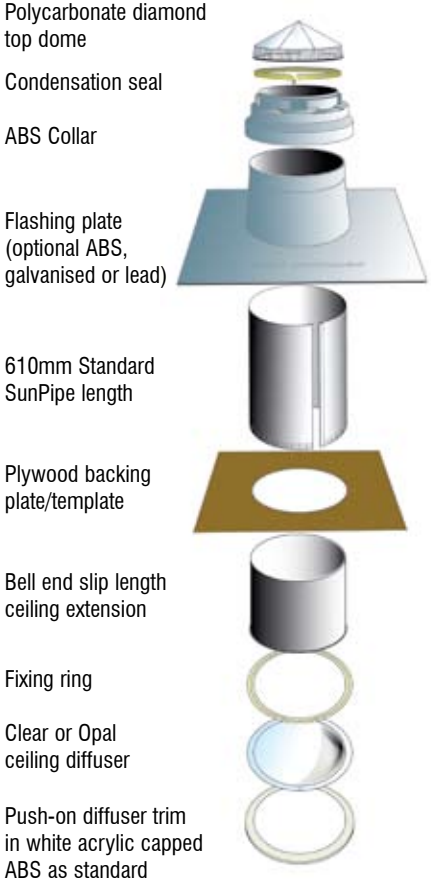
or • Flat roof: Kerbs: Galvanised flat roof flashing for asphalt flat roofs, with ABS top collar

- Colour: grey (standard) black.
- All necessary fixings, brackets and supports.
- Ceiling finish: Internal three part polycarbonate ceiling diffuser with white plastic (or satin finish stainless steel) finish ceiling trim.

PITCHED ROOF Standard Kit



FLAT ROOF Standard Kit



Installation Kit for all systems

Fixing screws & washers, silicone sealant, aluminium tape and installation instructions supplied as standard.

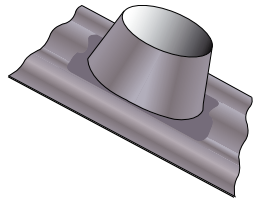
Additional items

45º adjustable elbow

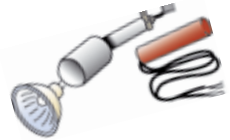
30° adjustable elbow

Standard 610mm SunPipe length

Code 4 lead flashing for bold roll tiled roofs



50 watt low voltage integral Light Kit and transformer



Domestic Applications

Most popular sizes:

9" (230mm) for shower rooms, toilets and bathrooms up to 80sq.ft (7.5sq.m).

12" (300mm) for stairs and landings, kitchens, studies, living rooms and bathrooms to light up to 150sq.ft (14sq.m).

18" (450mm) for larger areas and for where you want that 'wow' factor, will light up to 230sq.ft (22sq.m).

Advantages

- No structural alterations required, easily fits between joists and rafters.
- No maintenance required and will not leak.
- Top dome is self-cleaning due to its shape and eliminates condensation problems.
- All SunPipe systems are guaranteed for 25 years against faulty manufacture.
- Installation can be carried out by most skilled craftsmen and will normally take between 2 to 3 hours.

The SunPipe can twist and turn easily to take natural light where you want it.

There is virtually no limit to the length of SunPipe or number of bends that can be used and the SunPipe can twist and turn easily to take natural light to exactly where you want it.

All bends in the Super Silver aluminium lining are adjustable from 0° to 30° or 0° to 45°.

- Joints are sealed with aluminium tape.
- Few fixings are required, normal single fixing at base of system.
- Virtually burglar proof and vandal resistant.
- Top dome is self cleaning, interior pipe needs no cleaning at all.

Listed Buildings

As a result of the increased interest in the application of SunPipes (instead of traditional plastic roof windows), Listed Buildings Officers in Conservation Areas often favour this more discreet SunPipe termination, which is available with a low profile dome on all sizes.

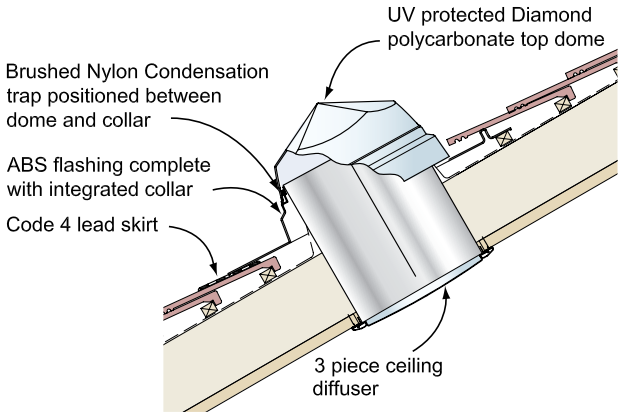
Planning Permission

In general terms, it is not necessary to apply for planning permission for the installation of a SunPipe, particularly on smaller sizes, since a SunPipe of 230mm or 300mm diameter is no different to a flue pipe or chimney flue, which does not require planning permission.

However, if your property is situated in a Conservation Area, then specific permission must be sought from your Listed Buildings Officer for the installation of a SunPipe, since it is unlawful to alter any roof profile or covering without prior permission of the Listed Buildings Officer.

Please also see separate section overleaf on Square and Conservation SunPipes.

SunPipe flashing details for tiled roof with ABS upstand to suit a sloping ceiling



The Gallery SunPipe

Square ~ Conservation

Two systems are available, utilising all the benefits of the SunPipe system but harmonising with a Square or Conservation rooflight that fits virtually flush with any roof surface.

The Square SunPipe

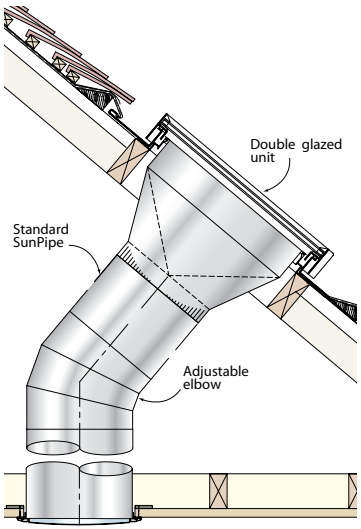
Constructed with 2mm thick CR4 steel, zinc plated to 25 microns and polyester powder coated to 75 microns DFT. The Square SunPipe incorporates a sealed double glazed unit with an outer layer of 3mm toughened glass, a 14mm air gap, and 3mm float inner glass.

Measuring 660mm x 660mm overall with a glass area of 520mm x 520mm to connect to any standard SunPipe system.

The Conservation SunPipe

Designed to replicate a Victorian cast iron rooflight complete with a central glazing bar. The Conservation SunPipe is of a heavier construction and measures 665mm x 875mm with a glass area of 440mm x 625mm. The system incorporates a sealed double glazed unit with 4mm toughened glass.

Both systems incorporate the patented Thermoliner® to prevent cold bridging and to eliminate any problems of condensation.



The Square and Conservation SunPipe systems can terminate in either a standard circular diffuser or an optional square diffuser for suspended ceilings.

Horizontal & Basement

Horizontal SunPipe

SunPipes have been used for horizontal applications where a south facing wall is used for termination, up to 4 metres has been used successfully.

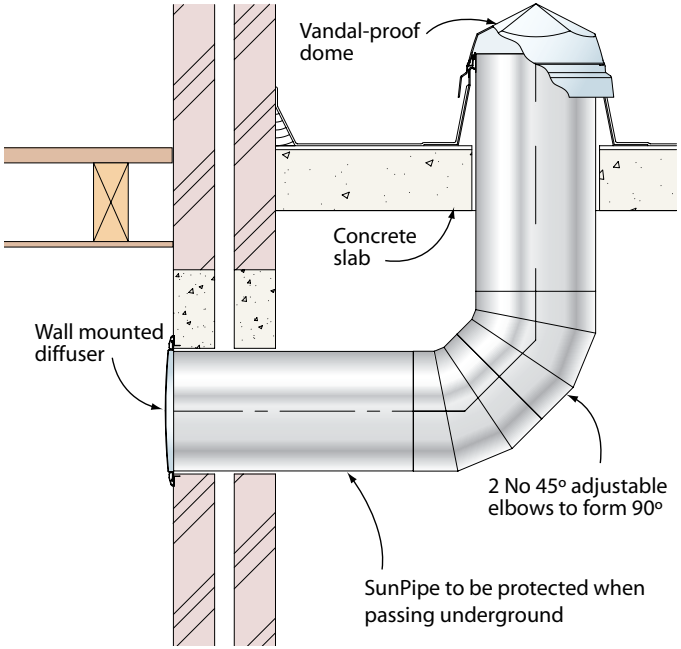
Advantages

- Brings natural daylight into internal rooms, corridors, store rooms etc.
- Mirror finish elbows turn SunPipe through 90°
- Maintenance free installation.
- Easy to install requiring minimum builders work.
- Can suit any wall surface.
- All sizes available.

Basement SunPipe

The Monodraught SunPipe can also pipe natural daylight to basements, where security bars can also be added.

- SunPipe diamond dome can be situated on a flat roof or pitched roof or at ground level.
- Maintenance free installation.
- The alternative to light shafts.
- Monodraught are members of the Basement Information Centre. *www.basements.org.uk*



Schools

Most popular sizes:

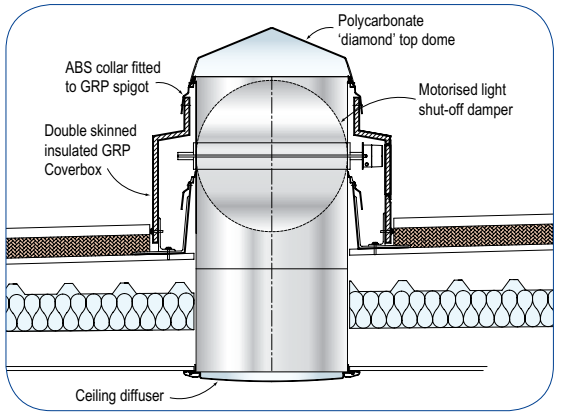
300mm (12" diameter) for corridors at 3m centres, store rooms, toilet areas and changing rooms to light up to 14sq.m (150sq.ft).

450mm (18" diameter) for wide corridors at 4m centres and small classrooms to light up to 22sq.m (230sq.ft) where ceiling heights are 3m or more.

530mm (21" diameter) the most popular size for deep plan class-rooms used in conjunction with Windcatcher natural ventilation systems.

750mm and 1000mm dia. for sports halls and similar areas where floor to ceiling height exceeds 5m.


Classroom of the Future, Telford



Advantages & Benefits

- Enables 4% daylight factor to be met for deep plan classrooms.
- No solar gain in summer months nor heat loss in winter as compared to conventional roof lights.
- No maintenance, inside or out.
- Unbreakable, vandal-proof security domes.
- At least 75% of electricity costs can be saved during the daytime, where SunPipes are used to replace the need for electric lighting during School hours.
- Children and teachers work better under a natural daylight environment.


Trinity School, Bristol


St. Nicholas School, Bristol

Colleges and Universities

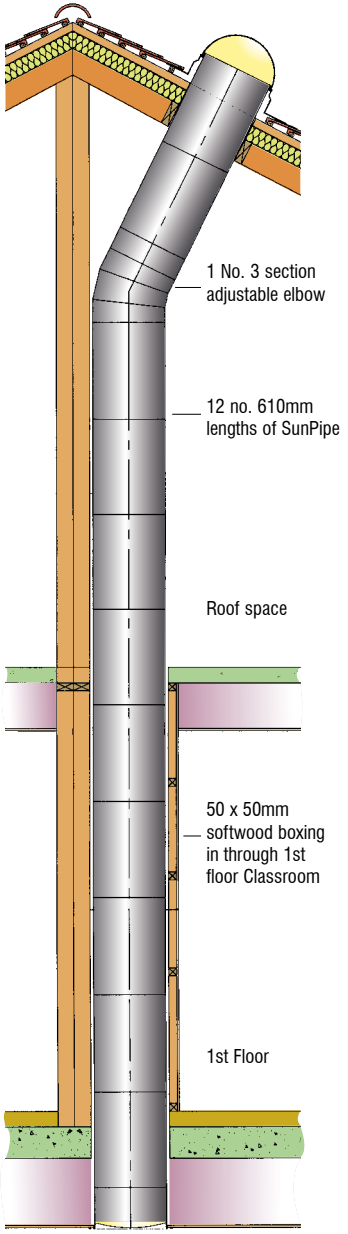
Recent Projects completed include:

- Aylsham High School, Norfolk
- Beaudesert Park School, Minchinhampton
- Bosvigo Junior & Infant School, Truro
- Down House School, Newbury
- Eton College
- Farnborough Sixth Form College
- Greenford High School, Middlesex
- Hamilton Community College, Leicester
- Hengrove School, Bristol
- Henry Compton School, Hammersmith
- Hurlingham and Chelsea Secondary Sch.
- Imperial College, London
- Jane Lane School, Walsall
- Lady Zia Wernher School, Luton
- Latifa School for Girls, Dubai, UAE
- Leeds University
- Manchester University
- Menzies High School, West Bromwich
- Nailsea Community School, Bristol
- Portsmouth High School
- Quedgeley Primary School, Gloucester
- Riverside College, Leicester
- Tamworth College
- The British School, Abu Dhabi
- The Peckham Academy, London
- University of Aberdeen
- University of Glamorgan, Treforest
- Warwickshire College, Rugby
- Walsall Academy, Bloxwich
- Wycombe Abbey School
- Wymondham College, Norfolk

Manchester University

Tamworth College

450mm SunPipe, 7.6m long, serving ground floor lobby at South Charnwood School



Hospitals

Most popular sizes

300mm (12" diameter) for internal corridors and store rooms.

450mm (18" diameter) for consulting rooms, waiting areas, larger offices.

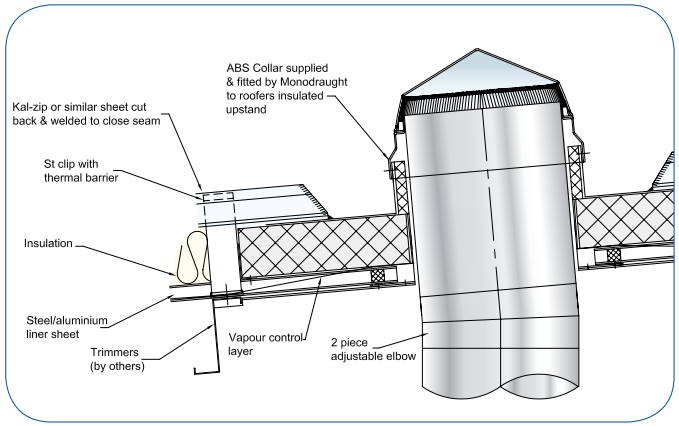
530mm (21" diameter) for floor to ceiling heights of up to 5m.

Advantages & Benefits

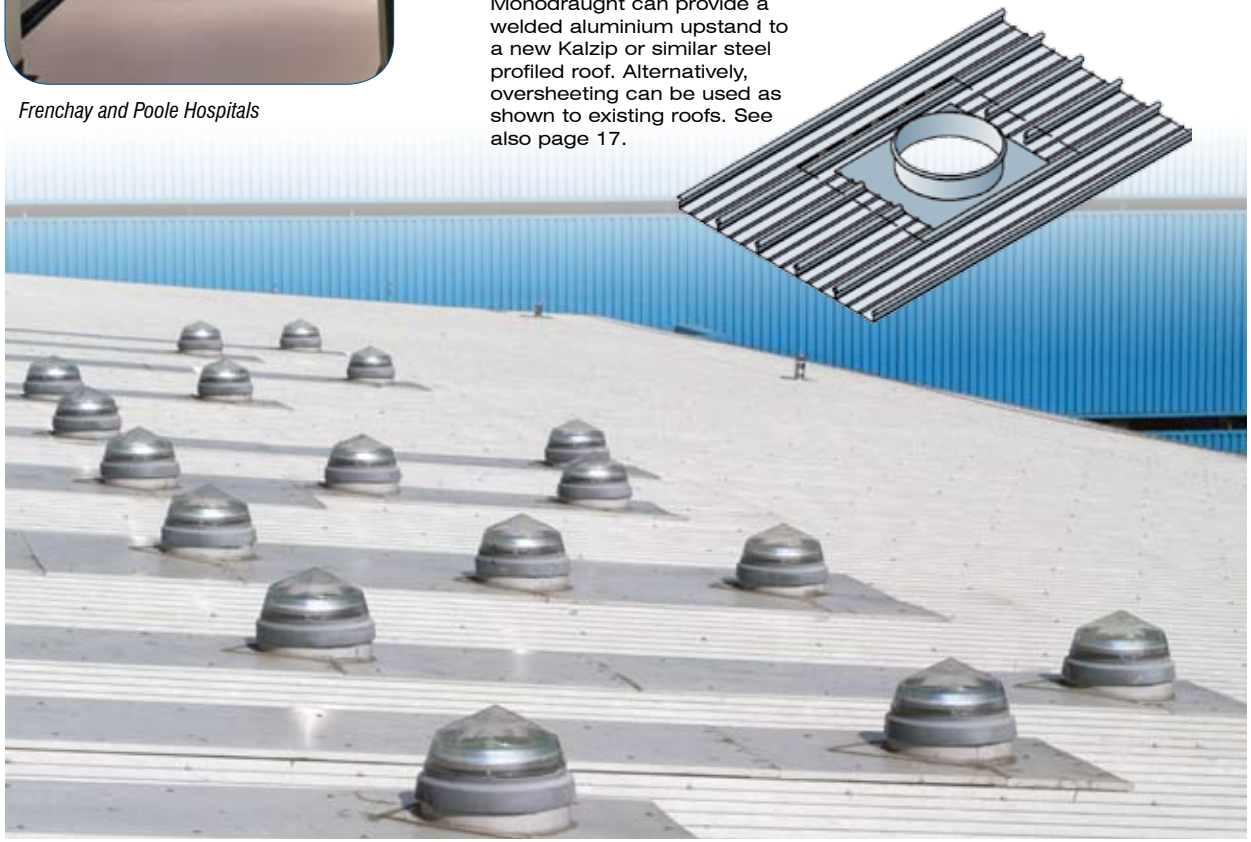
- Energy saving – typical calculations show a pay-back period of 5 to 6 years where SunPipes are used to replace the need for electric lighting during daytime use.
- Health Benefits – natural daylight is known to combat SAD conditions particularly suitable for Day Centres and Old Peoples Homes.
- Installation Service – Monodraught provide a complete installation service with all necessary attendances.
- No maintenance – the shape of the top dome ensures that dust and dirt is washed off naturally and internal ceiling diffusers require no maintenance.

Frenchay and Poole Hospitals

Upstand detail for SunPipe system for a standing seam roof



Monodraught can provide a welded aluminium upstand to a new Kalzip or similar steel profiled roof. Alternatively, oversheeting can be used as shown to existing roofs. See also page 17.



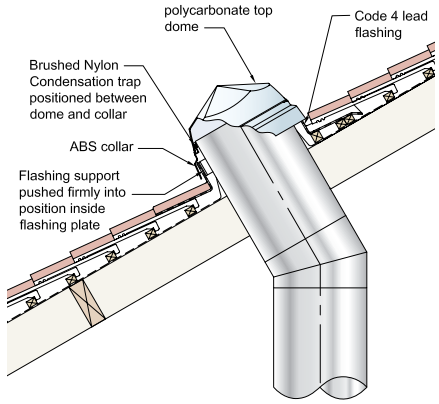
Health Centres & Homes

Recent Hospital Projects completed include:

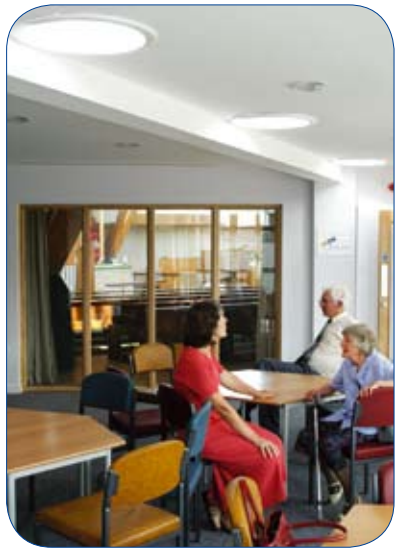
- Addenbrookes Hospital, Cambridge
- Ailsa Hospital, Ayr
- Airedale Hospital, Keighley
- Amersham Hospital
- Brain Injury Rehab Centre, Birmingham
- Basildon Hospital
- Charing Cross Hospital, London
- Cookridge Hospital, Leeds
- Cromer Hospital, Norfolk
- Derbyshire Royal Infirmary, Derby
- Derriford Hospital, Plymouth
- Halton General Hospital, Runcorn
- Hartlepool Hospital
- Heartlands Hospital, Birmingham
- Kent & Sussex Hospital, Tunbridge Wells
- Kettering Hospital
- Monklands District Hospital, Airdrie
- Newham General Hospital, London
- North Manchester General Hospital
- North Tees Hospital
- Ormskirk Hospital
- Peterborough Hospital
- Princess Marina Hospital, Northampton
- Ronkswood Hospital, Worcester
- Rotherham District General Hospital
- Royal Bolton Hospital
- Royal Hallamshire Hospital, Sheffield
- Royal Preston Hospital
- Scarborough Hospital
- Southend Hospital
- St Nicholas Hosp, Newcastle upon Tyne

Brain Injury Rehabilitation Centre

SunPipe flashing detail, where a Code 4 lead flashing is used for bold tiled roofs



For a **Plain tile roof** a standard ABS universal flashing is used with a lead skirt, but for a **Bold tile roof** a Code 4 lead flashing is dressed over the tiles, the ABS undercloak roofing felt support plate is used and the collar fits to the top of the lead flashing.



Technical Matters

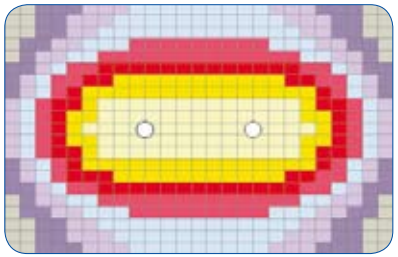
Research and Development

Monodraught have implemented a very active Research and Development Department at their offices at Halifax House in High Wycombe and are also working closely with a number of Universities in the UK. A group of four full-time dedicated R&D Engineers are exploring every avenue of renewable energy features at Halifax House, where a total of 45 SunPipes and Windcatchers which are installed at their offices are constantly monitored on performance.

Nottingham University
Monodraught have a permanent Environmental Test Chamber there to carry out the continuous assessment and development of SunPipes and all their associated components. A 3-year Research Programme is being undertaken. A Monodraught SunCatcher and SunPipe system is also installed at the Eco House at Nottingham University, which was completed five years ago, and is also being constantly monitored.

Brunel University
A 4-year Research Programme is being carried out in conjunction with Brunel to investigate indoor environmental conditions on a wide range of Projects including Schools, Colleges, and Universities to Building Society offices throughout the UK. Buildings are being assessed both before and after Windcatchers and SunPipes have been installed and full Reports will be available on request.

Napier University
A 2-year Study was carried out to develop a computerised prediction model, as shown below, to assess the transmittance of daylight into the interior of buildings. Further advice on light output is always available from Monodraught Head Office.



SunPipe Sizes and maximum light output

on a typical flat roof application measured approximately 1.5m below SunPipe diffuser

Diameter (mm)	Full Summer Sun 105klux		Overcast Summer 45klux		Overcast Winter 20klux		Area Lit (to a normal daylight level)
	Lux Value	Lumen output of system	Lux Value	Lumen output of system	Lux Value	Lumen output of system	
230	360	2160	170	1045	65	370	7.5 sq.m (approx 80sq.ft)
300	760	4460	330	1940	130	760	14 sq.m (approx 150sq.ft)
450	1820	10770	750	4410	300	1768	22 sq.m (approx 230sq.ft)
530	2530	14995	1050	6265	430	2550	30 sq.m (approx 430sq.ft)
Other SunPipe sizes available with hemispherical top domes							
750	4350	25568	1975	11620	900	5300	50 sq.m (approx 530sq.ft)
1000	7700	45300	3850	24650	1425	8390	60 sq.m (approx 650sq.ft)
1500	13630	80180	7505	43380	2250	13050	70 sq.m (approx 750sq.ft)

Note: A 100w light bulb generates approximately 1000 Lumens or 170 Lux.

Reading University
A 3-year Research Programme is being undertaken to study and assess the potential of solar powered air conditioning, to be used in conjunction with the Monovent system and to establish the viability of an energy free cooling system

Liverpool University, Loughborough University and UMIST have all been closely involved with research into Monodraught products and various Papers have been published.

Detailed research has also been carried out into SunPipes at the Belgian Building Research Institute and at Calgary University in Canada.

Range of Systems

The seven most popular sizes are shown and are all available ex-stock.

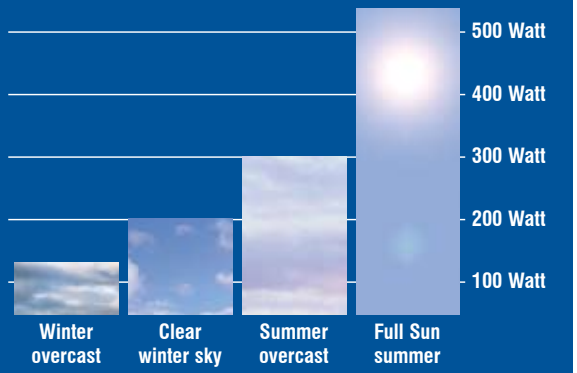
In addition to the standard range, larger SunPipe systems up to 3m diameter, can be produced to special order. All domes are produced in UV protected polycarbonate but are also available in impact resistant acrylic.

Natures World, Middlesborough where a 1500mm dia SunPipe system is installed

...and the Weather?

The most remarkable feature of SunPipe is the amount of intensified light it can deliver. The light will vary depending on the time of year but can be expressed as an equivalent to electric lighting, as shown in these diagrams.

Tables from research conducted by the University of Nottingham



Above chart shows output of a 300mm dia. SunPipe

Table of Weights

SunPipe Kit	230mm (9")	300mm (12")	450mm (18")	530mm (21")
Standard Flat Roof Kit	2.72Kg	3.86Kg	7.12Kg	7.55Kg
Standard Pitched Roof Kit (Slate)	3.22Kg	5.44Kg	7.77Kg	10.08Kg
Standard Pitched Roof Kit (Tiled)	6.07Kg	9.44Kg	13.11Kg	15.33Kg
Optional Extra Components				
Standard 610mm (2') length	0.58Kg	0.82Kg	1.21Kg	1.39Kg
30° Adjustable Elbow	0.13Kg	0.25Kg	0.48Kg	0.62Kg
45° Adjustable Elbow	0.21Kg	0.44Kg	0.82Kg	1.15Kg
Bell End Pipe (300mm)	0.28Kg	0.37Kg	0.59Kg	0.68Kg
Lead Skirt	2.90Kg	3.91Kg	5.24Kg	5.24Kg

For information relating to the weight of other systems please contact Monodraught's Head Office

U-value

The U-value of SunPipes has been assessed by Nottingham University at 2.18W/m² based on a typical application of a 1.5m length of SunPipe. This compared favourably with a double glazed rooflight. However, the actual area of a SunPipe compared to a typical rooflight is only small percentage of the area and so, the contribution to heat loss from the building or heat gain is insignificant. The performance of lightpipes has also been assessed by Liverpool University as part of a European Study of lightpipe performance, TC3-38. The introduction of the double glazed ceiling diffusers has further enhanced the U-value of SunPipe, lowering the figure to 1.66W/m², again for a typical application of 1.5m length of SunPipe. Further information and detailed Reports on U-value performance and of the work carried out by Nottingham University in this connection is available as a Report.

Insulation

Where required the SunPipe system can be lagged in the roof space by simply wrapping with 25mm insulation. However, with the relatively small area of the SunPipe system, in comparison to the room as a whole, heat loss from such a small area is considered to be insignificant.

Acoustic Performance

Multilayer Soundguard™ laminated glass supplied by Glazeguard Ltd can be incorporated into SunPipe ceramic ceiling diffusers, (see page 19), and provides a performance of RW 37 dB (Rtra 33 dB).

For details of fire protection systems for the SunPipe please see page 19.

Lengths & Bends

On smaller sizes a total maximum pipe length of 8m is recommended, but on larger sizes up to 20m in length can be used.

There is a 12% reduction of light output for each 45° bend used and there is a 6% reduction in light transmission for every metre of SunPipe. 30° & 45° adjustable elbows can be used with all SunPipe applications to direct daylight to where it is required. Continual research and improvements to performance are carried out on an ongoing basis by Nottingham University, so with research and development the above figures may improve.

Fastcad

All Monodraught systems are featured on Fastcad and detailed drawings can be downloaded from www.fastrackcad.com
Alternatively CAD files on CD Rom are available on request from Monodraught Head Office.

Material Specification

Top Dome
4mm UV stabilised unbreakable polycarbonate.
Density: 1.20g/cm³ to ISO 1183 & to BS476 Class 0
Izod Impact strength: 30KJ/m² to ISO 180/1A.

or 4mm impact resistant modified Acrylic.
Density: 1.18g/cm³ to ISO 1183.
Izod Impact strength: 1.6KJ/m² to ISO 180/1A.

Condensation Trap
Brushed nylon gasket applied to top of SunPipe.

Fixings
Stainless steel self tapping fixing screws with neoprene washers
or tamper-proof pin hex stainless steel fixing screws.

Roof Flashings
3mm ABS universal 1 piece flashing for pitched roofs.
ABS two piece flashing for flat roofs. Galvanised flashing plate for asphalt roofs. Code 4 lead flashing and soaker for bold tiled roofs. ABS collar to top of galvanised or lead flashing. Moulded GRP flashing, site fixed for existing metal profiled roofs.
Purpose made site welded aluminium flashing for Kalzip type roofs and similar plus ABS collar.

Internal Pipe
0.5mm thickness high purity silver impregnated Aluminium
SunPipe with mirror finish and PVD coating 98% reflectance.

Internal Elbows
3-section fully adjustable elbow to 45°
2-section fully adjustable elbow to 30°

Ceiling Diffusers
3 part diffuser with white ABS permanent fixing ring.
2.5mm polycarbonate opal or clear finish diffuser.
2mm white push-on removable ceiling trim, also available in satin finish stainless steel effect, brass or chrome effect finishes.
3mm plywood backing plate fits above plasterboard.
250mm long bell end slip length into fixing ring.

Light Kits
50 watt 12v Dichroic low voltage light kit with dimmable electronic transformer, all low temperature.
Light sensors – purpose designed for each project specification. Provides 430 Lux at desk level.

Offices

Most popular sizes

300mm (12" diameter) for small separate offices up to 14sq.m.

450mm (18" diameter) for open plan offices with a ceiling height grid of 4m.

530mm (21") diameter to suit a ceiling grid of 5 to 6m.

Advantages & Benefits

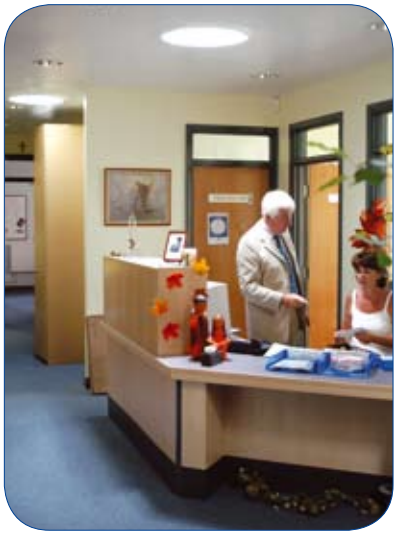
- Natural lighting from SunPipes is known to have a beneficial health effect for office staff as compared to fluorescent lighting.
- No reflection on VDU screens.
- Energy saving helps combat the Climate Change Levy.
- No heat loss or solar gain as compared to conventional rooflights.

Extensive work has been carried out in the USA by Lisa Heschong of the Heschong Mahone's Consulting Group, where it has been found that productivity in offices served by natural daylight shows a 20% increase in output from office employees, with a marked reduction in absence because of sickness. The Heschong research also shows considerable improvement in sales in retail premises and improved performance by school children.

SunPipe Headquarters Office, Halifax House, High Wycombe

It is considered that SunPipes have a marked effect on the reduction of the incidence of Sick Building Syndrome (SBS) and provides a stress-free, soothing, and far more healthy office ambience by eliminating the glare and conflict of electric lighting and computer screens.

Daimler-Chrysler Offices



Industrial and Leisure

Most popular sizes

450mm (18" diameter), as recommended for most office areas, where ceilings are typically 4m above floor level.

530mm (21" diameter), ideally suited to large areas with ceiling heights of up to 5m above floor level.

750mm (30" diameter), for large industrial areas

1m diameter SunPipes for warehousing and similar or where a particular focal point is desirable (such as the Library in The British School in Abu Dhabi).

Advantages & Benefits

Perhaps the most compelling reason for using SunPipes, is to counter the effects of carbon emissions, since the SunPipes can be used to provide natural daylighting from dawn until dusk, thereby significantly affecting the dependence on fossil fuelled electric lighting, which normally accounts for significant usage of electric power throughout daylight hours.


Sutton Arena, London


Sutton Indoor Arena

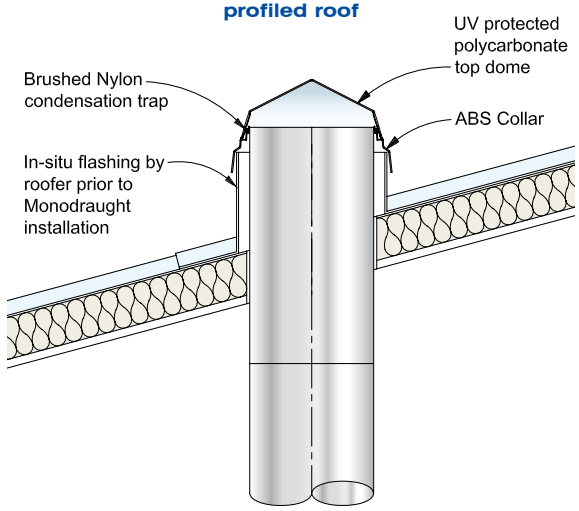

Jaguar Cars, Coventry


Jaguar Offices

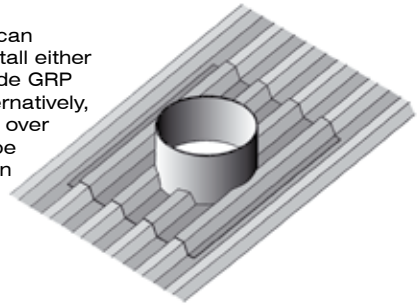

Sutton Arena Pole Vault area


The Old Saatchi Gallery, London

SunPipe flashing detail to metal profiled roof



Monodraught can supply and install either a purpose made GRP flashing or alternatively, flat galvanised over sheeting can be used, as shown above.



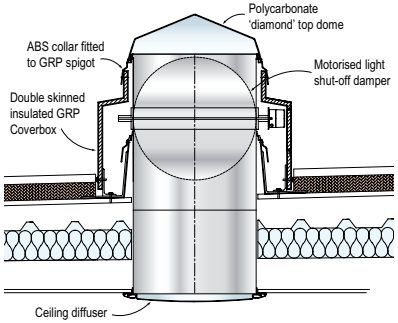
Daylight on Demand

There are times when SunPipe users may wish to shut out the light into the room, for instance in a Hospital Ward or a Nursing Home, a Conference Room, a School class-room or even a private bedroom.

Two simple methods have been developed for either restricting daylight to a desired daylight level or indeed, shutting out the light.

Motorised Damper System

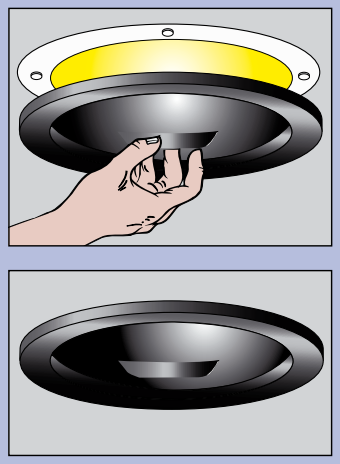
The motorised shut off damper is available with a modulating motor, so that the light level can be varied according to the users requirements. The Belimo motor is linked to a wall switch or small control panel to allow the light to be adjusted accordingly. This system is particularly suitable for larger Conference Halls, Lecture Theatres, etc, where remote control is required.



Motorised Light Shut off Damper Assembly

Black Out Diffuser

This consists of a simple black out cover, which has a magnetic fixing operation, and a matching ceiling trim with corresponding magnets that fits to an existing SunPipe diffuser. Ideally suited to bedrooms or hospital wards where a simple black out is required, which can be applied or removed by hand.



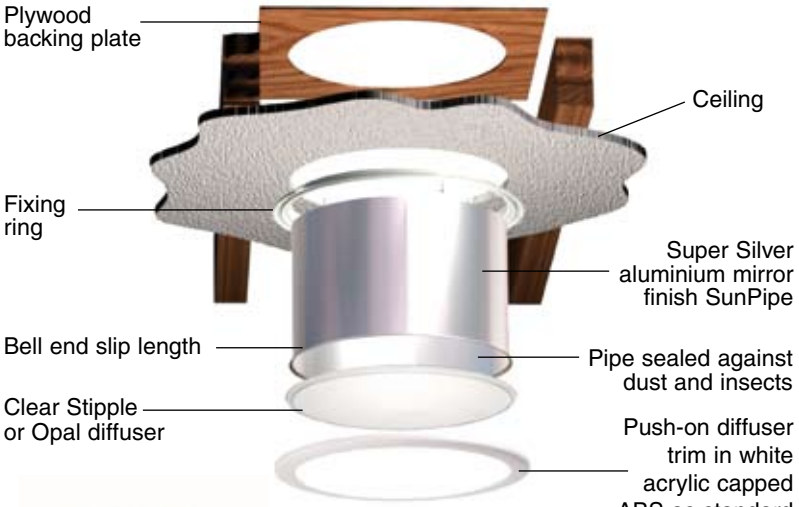
Continual improvements are being made to SunPipes, controlling the light output and particular importance is now placed on " Daylight Linking" in the new Building regulations that was due to be published in April 2006.

Ceiling Diffusers

The new Monodraught SunPipe Ceiling Diffuser assembly is designed for easy installation and cleaning. It also provides an effective seal for the SunPipe, preventing the ingress of dust from ceiling level.

The new diffuser creates an even spread of light across any designated area. Diffusers are available in clear stippled finish for maximum light output or opal finish for a softer, but reduced level of light.

Ceiling trims are provided in white ABS as standard but satin finish stainless steel, brass and chrome effect finishes are available to enhance a variety of décors.

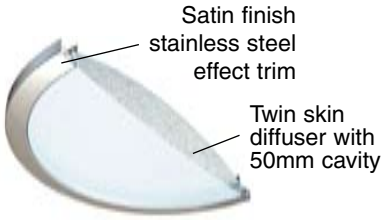


Patent No. 0206398.0


Satin chrome


Brass effect

also available double skin diffuser



Integral Electric Light Kit

Where a single source light is required, such as the top of a staircase, landing etc, the SunPipe can be supplied with a 50 watt low voltage Halogen light fitting and transformer that has been specially designed so as not to affect the natural light output during daytime use. The polished aluminium light fitting can even be supplied with a sensor to automatically bring on the electric light when the natural daylight falls below a preset level. This arrangement provides 430 Lux at desk level.

Fire Protection and Acoustic Performance

Two alternatives

1. SunPipe Fire Guard Fire Resistant Ceiling Diffusers

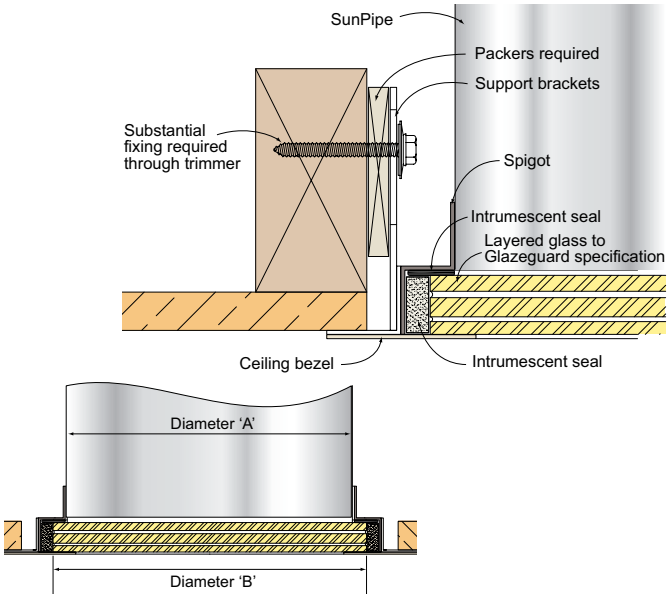
Monodraught have developed a new ceramic based ceiling diffuser for use in conjunction with the complete SunPipe range, to provide up to **2-hour fire resistance**

Consisting of a tough, multi-layered glass/ceramic laminated construction which, in sheet form, can provide up to 4-hour fire resistance. The Fire Guard has an acoustic interlayer to provide a sound and fire resistant solution

The glazed assembly is set into a galvanised steel or stainless steel frame with an intumescent seal.

Acoustic plus

This arrangement of multi layer laminated construction also provides a wide choice of acoustic performance profiles up to 37dBa, using SoundGuard™ systems by Glazeguard Limited.



SunPipe Size	SunPipe Diameter (A)	Fire Guard Diffuser Diameter (B)
230mm (9")	230mm	296mm
300mm (12")	305mm	365mm
450mm (18")	457mm	517mm
530mm (21")	533mm	593mm

- The system has been recently tested at Chiltern International Fire Ltd assessed under BS476: Part 20: 1987.
- In terms of physical safety, SunPipe Fire Guard has been successfully impact tested (BS6206) from both sides.
- The laminated glass will also provide excellent sound resistance to the following performance: 9mm total thickness RW37dB (Rtra 33dB).

Typical Product Performance for 9mm total thickness

Total Thickness	Impact (BS6026)	Rm. (dB)	Rw. (dB)	Rtra (dB)	Weight (kg/m²)	Light Transmission (%)	U Value (W/m²k)
9mm	Class B	34	37	33	21	85	5.30

Notes: Rm. = Mean Sound Reduction Index. Rw. = Mean Sound Reduction Index Weighted with correction ear response. Rtra. = Mean Sound Reduction Index Weighted for road traffic noise.

2. Sleev-it 'Fire Choke' Fire Collars

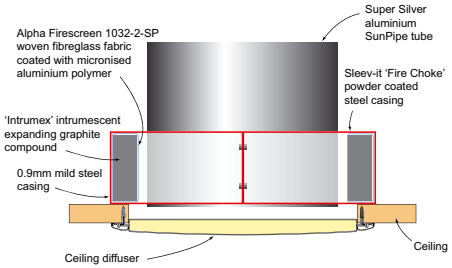
Fitted above a plaster board ceiling and thereby leaving the SunPipe ceiling diffusers unaffected. The Sleev-it 'Fire Choke' collars are designed to prevent the spread of smoke and fire through a roof-space by crushing the SunPipe, when the aluminium is subjected to fire giving up to **2 hours protection**

Each 'Fire Choke' collar contains 'Intumex', an intumescent graphite compound and Alpha Firescreen 1032-2-SP, a woven fibreglass fabric coated with specially formulated micronised aluminium polymer

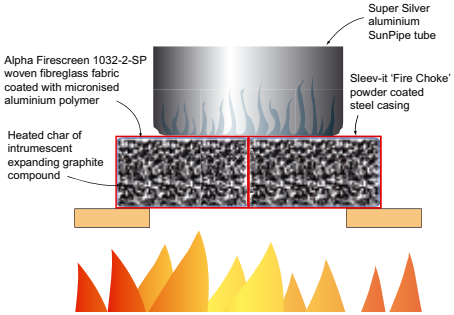
Manufactured in 0.9mm mild steel, the fire choke collar is supplied in two halves, which clamp around the SunPipe aluminium tube.

- Fully tested to current British and/or European Standards. (Test report TE 39902).
- Up to 2 hours fire resistance, specially adapted for Monodraught SunPipes.
- Available in a range of sizes up to 530mm diameter.
- Requires no maintenance and is suitable for all interior applications.

SunPipe with Sleev-it 'Fire Choke' collar under normal conditions



SunPipe with Sleev-it 'Fire Choke' collar in fire situation



The 'Fire Choke' patented system contains an expanding intumescent material which crushes the aluminium SunPipe when the temperature in the room exceeds 150°C.

The Alpha Firescreen 1032-2-SP fabric is secured inside each section of the fire collar, laying between the wall of the aluminium SunPipe, and the 'Intumex' graphite compound within the fire collar casing. Once the intumescent material expands as a reaction to the increasing temperature, it becomes encased within two pillows of woven fibreglass fabric as it virtually blows up the fabric like a balloon, spreading outwards from both sections to cover the inside of the steel casing of the 'Fire Choke' collar. This produces a drumskin effect across the collar opening, which contains the heated char from the exfoliated intumescent material, therefore sealing off the penetration against fire, smoke and hot gases.

World Wide demand

The popularity of SunPipes has now extended worldwide, with Projects completed in:

- Singapore - (Montery Park Condominium).
- Japan - (on private housing, Schools, Health Centres).
- Korea - (on social housing, Private Villas and Sports Halls).
- China - A new Sales Office was opened in Beijing in March 2005 (SunPipes are specified for the Olympic Village in 2008).
- SunPipes have also been a considerable success in Dubai, Bahrain, Abu Dhabi, Kuwait, and other countries in the Middle East.
- More than 1,000 SunPipes have now been installed in the Dubai region alone.

SunPipes are now sold in 35 countries with representation in most parts of the world and full details can be obtained on www.monodraught.com

Due to the worldwide uncertainty of the future of energy costs and the likely increase in energy prices over the coming years, considerable interest has been focused on the advantages the SunPipe system, namely:

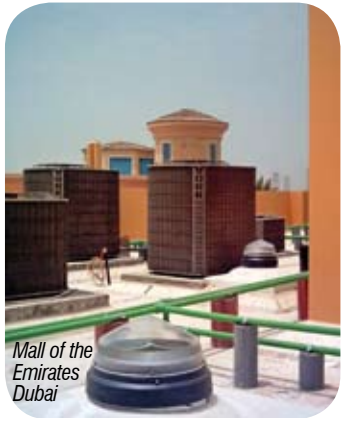
- No solar gain through the SunPipe system.
- Elimination of the need for electric lighting during daylight hours to SunPipe lit areas.
- Reduction in the cooling load will be achieved by the elimination of heat gain generated from electric lighting.
- Where SunPipes are used instead of skylights, a further considerable reduction in solar gain is achieved.
- Virtually self-cleaning in most countries throughout the world due to its unique shape and, therefore, only occasional external cleaning is required.
- Simple to install by local labour.
- High level of security provided as compared to rooflights or skylights and additional security bars can also be incorporated into the construction.

SunPipes have been a considerable success in the UK but the immediate reaction when used in most countries around the world is the remarkable amount of light produced by a SunPipe. This has made them particularly popular for such areas as Underground Car Parks, as well as Schools, Hospitals and Offices.


The British School, Abu Dhabi


Jumeriah International Offices, Dubai


The famous 'Indoor Ski Slope' Dubai


Mall of the Emirates Dubai

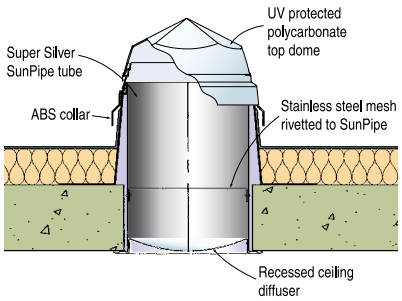

Private Villa, Dubai

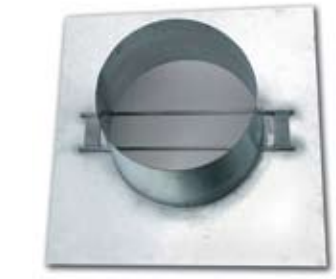

The British School, Abu Dhabi

Secure Establishments

SunPipe offers the opportunity to achieve a high level of security by providing small diameter openings through the roof structure which can be heavily protected by additional stainless steel security bars. This is accomplished without detracting from the remarkable ability of the SunPipe to reflect and intensify sunlight and natural daylight.

SunPipe flashing detail to flat roof, serving Ward areas at HMP Winson Green, Birmingham



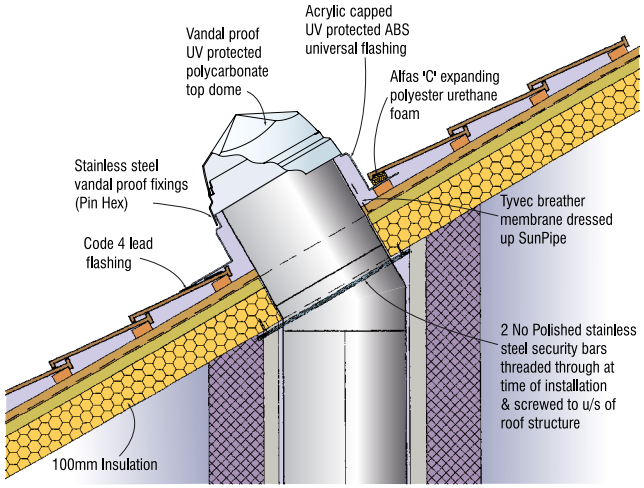


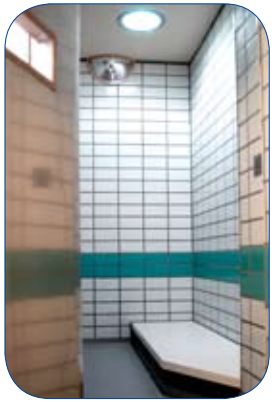
Galvanised steel upstand with security bars

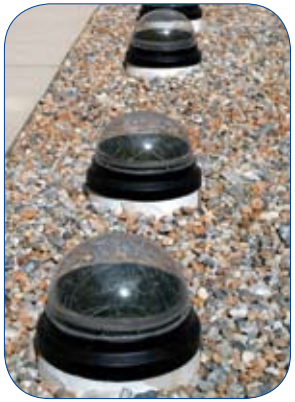
Top: Battersea Park Police Headquarters, where 19 No. 530mm diameter SunPipes were installed to internal cells, corridors and interview rooms.

Centre right & lower right: Lewisham Police Station, London, where 50 No. 330mm diameter SunPipes were installed to the cells of this high security building. The SunPipe systems were fitted with vandal resistant top domes and security bars. Stainless steel ceiling trims were fitted with security screws.

SunPipe flashing detail to pitched tiled roof, at St Catherine's Centre for Girls, St Helens







Recent Projects completed include:

- HMP Rochester Wood, Kent
- HMP Winson Green, Birmingham
- HMP Stanford Hill, Kent
- HMP Preston
- HMP Lincoln
- HMP Wellingborough
- Andover Police Station
- Basingstoke Police Station
- Battersea Park Police Headquarters
- Greater Manchester Police Training College, Prestwich
- Huddersfield Police Station
- Keighley Police Station
- Launceston Police Station
- Lewisham Police Station, London
- Lincoln Police Headquarters
- Plympton Police Station, Plymouth
- Rutherford Appleton Laboratories
- South Yorkshire Police, Doncaster
- St Catherine's Centre for Girls Secure Unit, St Helens
- St Helens Police Station

The Polycarbonate Diamond Domes are vandal resistant. Security fixings are available to order.

Natural Ventilation

Always a compliment to the Monodraught SunPipes are the Monodraught Windcatcher natural ventilation systems.

Having eliminated the solar gain associated with conventional rooflights and skylights, the Windcatchers have an even more important role to play in providing the fresh air requirements, as well as providing another energy saving breakthrough by eliminating the need for air conditioning.

In the last 10 years alone, more than 3500 Monodraught Windcatcher systems have been installed.

Please send for separate 28-page brochure and Case Studies on Windcatcher applications.

Bridgetown, Barbados

Plymouth University

Addy and Stanhope School, Deptford

Kings Acre School, Clapham Common

Peckham Academy, London

South Fields School, Surrey

The Press Association Offices, Howden

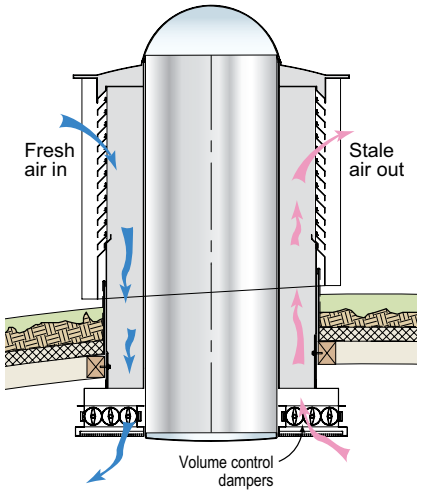
Starhurst School, Dorking in Surrey

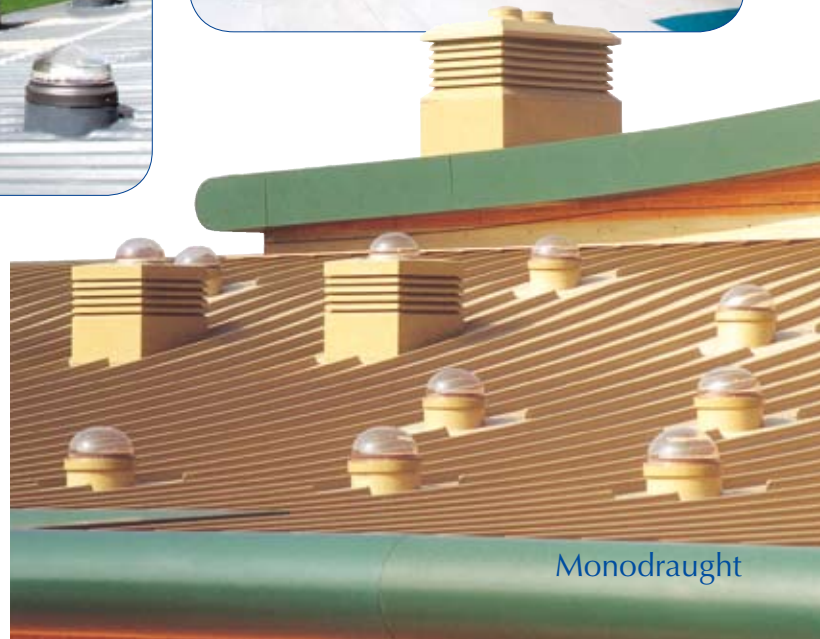
Natural Daylight & Natural Ventilation

Monodraught SunCatchers provide a most satisfactory solution of combining natural light and natural ventilation in one composite unit.

The Monodraught SunCatcher system provides controlled natural ventilation as well as providing all the benefits of natural daylight. Any prevailing wind pressure carries a continuous fresh air supply through weather protected louvres on the windward side of the system at roof level. The wind movement is encapsulated by internal quadrants which turns the wind through 90° forcing air down through internal ducts into the room below, slightly pressurising the internal space. Warm, stale air is expelled from the room by the Passive Stack ventilation principle of differential temperatures and the natural buoyancy of air movement. Manual or motorised motors at the base of the system control the rate of ventilation. The central SunPipe is integrated into the system and conveys natural daylight to the same room or internal space.

The SunCatcher has the unique advantage that with air intakes on all four sides, it does not matter which way the wind is blowing since one side of the system will always act as the air intake, whilst the opposite side, being in the low pressure zone, related to the system, becomes a natural extract to the room. When the wind changes direction, so the intake and extract will also change their function maintaining a balanced condition but providing energy free air conditioning.





Above: Wycombe Wanderers Football Club

Top left: John Groom Housing Association at Borehamwood.

Top right: The Key Centre, University of Hertfordshire.

Centre right: Jane Lane Special School, Walsall.

Lower right: Handsworth Community Fire Station, Birmingham showing SunPipes, SunCatchers and Balance-flue systems installed in 1998

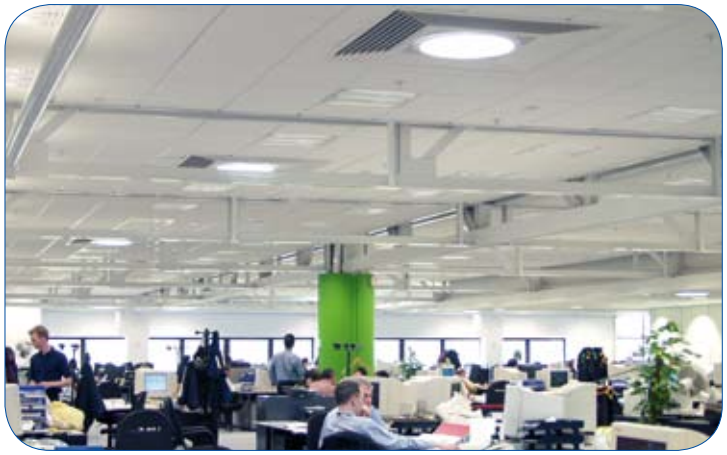
Night-Time Cooling

One of the major advantage of the SunCatcher and Windcatcher is that the dampers can be programmed to fully open at night-time during summer months to allow the prevailing wind movement to force fresh air down into the room below. This not only provides a 'cleansing' effect purging and removing stale odours from the room, but achieves all this without compromising the security of the building.

Winter Operation

During winter months the dampers can be programmed to provide background ventilation only. An air quality monitor can also be incorporated so as to override temperatures where necessary. Under normal ventilation strategies the dampers will be set to be between 3% and 5% open. This will allow trickle ventilation whilst avoiding problems of cold draughts entering the building. The limited cold air intake being denser than the internal ambient air falls to floor level allowing the warmer stale air to rise and exit through the controlled ventilation openings.

The system is controlled by manual or fully modulating dampers, linked to temperature and air quality sensors which in turn are linked to a Cylon digital control panel.



Above: St Pauls RC School, Burgess Hill

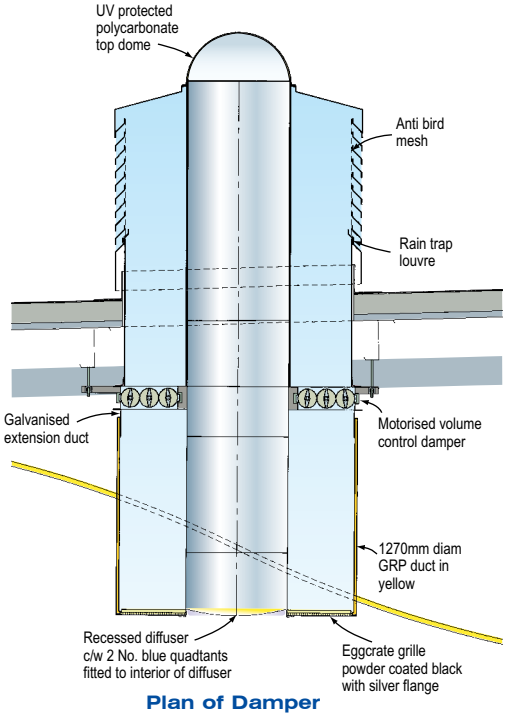
Top centre: 26 of the 1200mm square SunCatcher systems installed at BMW Design & Facilities Offices at Cowley, Oxford.

Top right: Detail of the base of the SunCatcher where the SunPipe features the BMW logo.

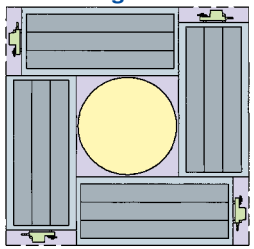
Centre right: Internal view of BMW Office area.

Lower right and below: The Priory Neighbourhood Centre, Hastings.

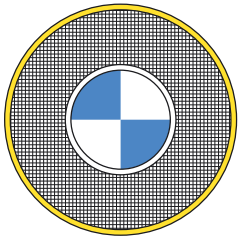
Detail of one of the 1200 Square SunCatcher systems serving the BMW Amenity area



Plan of Damper arrangement



Plan from below (Amenity area)



Monovent SunCatcher

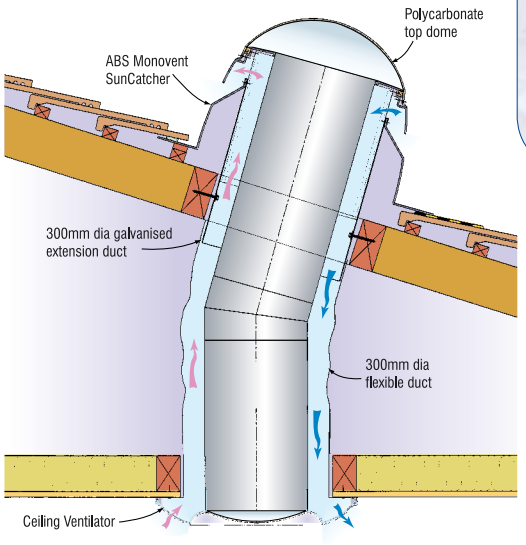
The SunPipe and Natural Ventilation in one compact, energy-free system

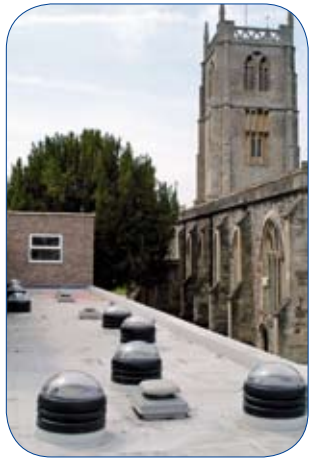
Designed to provide natural light and ventilation to bathrooms, kitchens, toilets, etc, this low cost ABS system is similar in operation to its big brothers the SunCatcher and Windcatcher. The Monovent can be used on flat roof and any pitched roof applications as the ventilation is carried through flexible ducting.

The Monovent expels stale air from the room as a result of the passive stack ventilation principle, but also has the added advantages of bringing in a supply of fresh air on the windward side of the system.

The ceiling ventilator is fully adjustable from closed to open and is also available with a brass or chrome finish, where required.

The Monovent encompasses all the advantages of PSV systems, which have proved so popular for social housing, and meets the Building Regulation requirements. However, as with its stable mates the Monovent also brings in natural light.

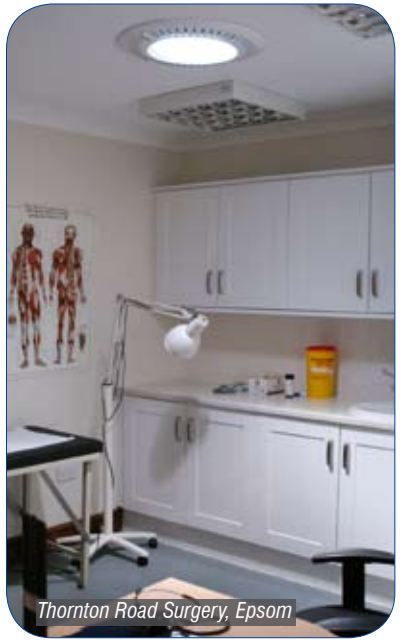




Monovent Windcatcher

The ABS Monovent is a lightweight, cost-effective ABS unit which is ideal for providing ventilation to all small interior areas. The system normally terminates in a 600mm x 600mm eggcrate grill fitted with manual dampers.


Wycombe Wanderers F.C.


Thornton Road Surgery, Epsom

BUILDING REGULATIONS

The Monovent system complies with the requirements of the Building Regulations Approved Document F in providing a Passive Stack Ventilation (PSV) system in accordance with BRE Paper, Reference 13/94. This PSV system allows an internal room, without windows, ie. bathroom or utility room, to be used. The Monovent system exceeds the minimum ventilation requirements laid down by the Building Regulations, which is 8,000mm^2 and a ventilation rate of 15 l/s.

Two Monovent SunCatcher systems are available:

ABS 350: with a 230mm (9") dia SunPipe
To light an area up to 6m^2
Has a free area grille of 9,300mm^2
Weight: 11kg inc. ductwork 1.5m overall

ABS 550: with a 300mm (12") dia SunPipe
To light an area up to 12m^2
Has a free area grille of 18,600mm^2
Weight: 20kg inc. ductwork 1.5m overall

Performance Criteria
Minimum area to meet Building Regulations – free air required 8,000mm^2

Minimum ventilation rate required – 15 l/s or 0.015m^3/s

Monovent Performance
Ventilation rate at external wind speed of 4m/s
ABS 350: 16 l/s or 0.016m^3/s
ABS 550: 62 l/s or 0.062m^3/s

Note: The ABS 550 system can also be supplied with a 450mm (18") dia SunPipe.

Solar powered ventilation and natural daylight from rooftop... to bathroom

The Monodraught Sola-vent is a fully integrated bathroom light/ ventilation kit, incorporating the SunPipe, two compact fluorescent downlighters and a solar powered extract fan – all in one unit! The Sola-vent is available in two attractive, modern designs and is the ideal solution for bathrooms and shower rooms where ventilation is essential.

The Sola-vent is available in two sizes.

The 230 Sola-vent system is ideally suited for internal bathrooms and shower rooms to meet current Building Regulations to provide 15l/s extract ventilation.

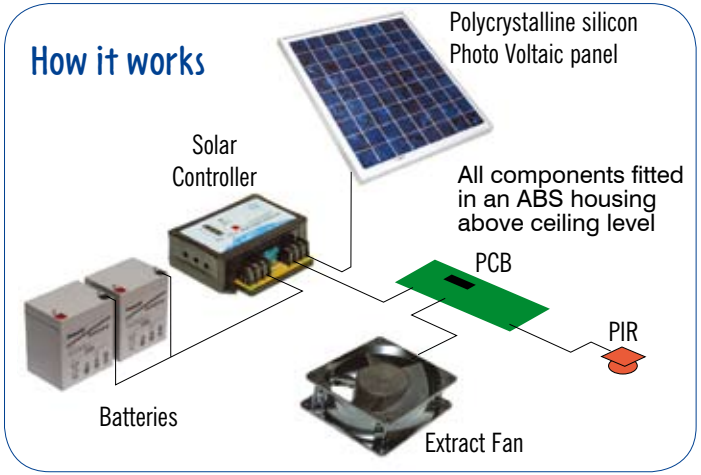
The 300 Sola-vent system is designed for larger areas, such as kitchens and utility areas, utilising the 300mm diameter SunPipe, which provides approximately twice as much natural light as the smaller 230 Sola-vent system. It also incorporates a higher rated fan.

Please ask for a separate brochure

The Sirroco

The Mistral

How it works



Advantages of the Sola-vent system

- Automatically provides required ventilation to comply with current Building Regulations "Part F" to supply extract ventilation.
- Two ceiling facias designs available to suit individual room décor and layout.
- Miniature PIR controlled. Ensures the correct level of ventilation to bathrooms, shower rooms, utility areas etc, without user input.
- Low voltage uses just 5W of electrical power allowing the PV panel to provide all the power for ventilation even during winter months.
- Solar powered. Photovoltaic panel charges internal batteries to provide up to 7 days usage.
- Two integral, compact fluorescent downlighters provide light during evening use and are easily connected to existing wiring.

When these Sola-vent are used on Commercial applications, such as in a School or Office area, the overall performance of the Sola-Vent system can actually increase. Such premises are often used less at weekends, providing greater capability of the batteries to recharge, allowing the system to provide up to five hours use per day. This makes the Sola-vent system ideal for all applications.

For further information on Solar panels and Wind Turbines please ask for the Monodraught International brochure on Sola-wind

Sunpipe

Monodraught

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