Monodraught Natural Ventilation

Harnessing the environment for building ventilation
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Monodraught has been at the forefront of designing and manufacturing low energy, low carbon, and sustainable solutions for over 40 years. Our company is focused around three product sets in which we are recognised as market leaders: natural and hybrid lighting, natural cooling and natural and hybrid ventilation.

Our products can be found anywhere from a residential build looking to increase its natural light through to a high impact architectural building such as the Copperbox Arena (formerly the Olympics Handball stadium). A key sector for Monodraught is in Education where our products can deliver real dividends in terms of lower energy and carbon footprint and improved environments for students and teachers.

We design, manufacture, install and maintain natural ventilation, natural lighting and natural cooling systems to create low energy, low carbon and sustainable buildings for healthier and more productive occupants.
From R&D to Maintenance

Monodraught is proud of our history of developing products from R&D right through to installation and maintenance, all here in the UK and where possible using suppliers local to our head office base.

Our experience in installation means we can support your project wherever the location. With our own health & safety accredited installation personnel we are able to provide a complete package including commissioning and maintenance. We also have the experience to offer support and advice on installations to be carried out.

Manufacture

The large R&D team are continually challenging the boundaries developing new products to ensure customers continue to receive the market leading products for which Monodraught are renowned. These products are all manufactured within our High Wycombe factory and as R&D is in the same location as production then the highest levels of quality can be ensured.

Installation

We have a team of contract managers who will work with you and your clients from order creation through to delivery and beyond to maintenance if required. Our own team of installers work across England with partner agencies installing in Scotland, Ireland and worldwide. We will visit your site ahead of installation to ensure that all the details are covered and ensure that everything goes smoothly.

Building Simulation

To help architects and consultants deliver low maintenance, energy efficient designs within the built environment, Monodraught and building performance analysis specialist IES have developed Performance Components – a revolutionary way of modelling natural ventilation systems using the Virtual Environment Suite.

Our Project Design Engineers are able to work with you to create the right design for your building.

Maintenance

We can provide on-going service and maintenance of our installed products and this helps provide performance data for our customers and structured feedback that can assist product development, resulting in a system running at optimum performance and costs that are kept to a minimum.
Recognised as Industry Leaders

Monodraught are widely recognised as market leaders in sustainable low energy and low carbon solutions in natural ventilation, natural lighting and natural cooling. We are proud of our accreditations from prestigious independent organisations such as CIBSE and Ashden amongst others.

Awards & Accreditations

- CIBSE Building Performance Awards 2017 Shortlist - COOL-PHASE Hybrid
- Best Product/Service Range Category at the 2016 Best Business Awards
- Company of the Year 2016 Award – Buckinghamshire Business First
- Best Business in Wycombe District 2016 Award – Buckinghamshire Business First
- LUX, FX Design and Edie Awards 2015 shortlist - Sunpipe LuxLoop
- The Energy Awards 2015 finalist - Sunpipe LuxLoop
- Investors in People – The Standard for People Management
- Ashden – Award for Energy Innovation for COOL-PHASE
- ISO 9001 and ISO 14001: Established quality management and environmental management certificates.
- BSI (British Standards Institute) Members
- CIBSE Building Performance Award 2012 - COOL-PHASE
Corporate Citizenship

Monodraught are committed to working in an ethical and responsible manner. Our products and services are low-carbon and low-energy solutions, which help people be in a healthier natural built environment, and as such, we are also keen to extend these strong ethical credentials into ways to contribute to our local and wider community.

Monodraught: A place that benefits people

Our staff are one of our biggest assets and in 2015 we became a Living Wage Accredited Employer. This means that every member of our staff in our organisation earns not just the minimum wage but the Living Wage. We are always looking at ways to improve our impact on employee wellbeing and how we can help in our local community.

Community Relationships are vital and we are pleased to build on our relationship with Bucks Mind and support them in targeted strategic activities. We continue to source our materials within a 100 mile radius of High Wycombe, with 60% of our suppliers within a 50 mile radius, thereby investing in the local economy and supporting employment opportunities.

More skills, more opportunities

Our main focus in this area is in attracting, developing and retaining people through investment in skills. The Investors in People accreditation is a good example of this. Our Research and Development team also have close links with UK Universities, in particular Brunel University and Coventry University and we look forward to working with more placement students this summer.

Positive Environment

Our product set can help our customers create a more positive environment through reduced energy usage and carbon footprint. Across all our product sets we continue to look at ways to innovate and improve the built environment.
Natural Ventilation

Why Choose Natural Ventilation?

Healthier

Natural Ventilation brings a steady supply of fresh air into the building, topping up the oxygen level, whilst at the same time expelling stale air to the atmosphere using the natural buoyancy of thermal forces. Fan noise, often associated with mechanical systems or air conditioning, is eliminated, to the benefit of the occupants.

Sustainable Energy in Action

By maximising the use of wind pressure and the natural stack effect of thermal buoyancy, Natural Ventilation does not use any fossil fuelled energy. Instead it relies on harnessing wind power and the thermal rise of warm air, using it in a controlled way.

Cost Effective

In today’s current climate with energy costs escalating at an unprecedented rate, there is no telling what energy costs will be in 5 or 10 years’ time! Once Natural Ventilation is installed, there are...

no running costs ever ...for the life of the building.

More than Just Passive Stack

Early Naturally Ventilated buildings relied purely on a passive stack approach to act like a ‘chimney stack’. The limitation of such an arrangement is that to work effectively, the temperature in the passive stack has to be some 10°C above the ambient temperature in the room, which in summer months may lead to overheating.

Monodraught systems overcome this problem by incorporating wind driven air intakes to generate a positive pressure in the room below, and combined with temperature differentials, this assists the passive stack element to exhaust the stale air.

Long Term Track Record

Our Victorian forefathers used Natural Ventilation extensively, as indeed did the Persians and Arabsians before that. Today’s Natural Ventilation systems have all the benefits of sophisticated controls but retain the well-established principles of the origins of Natural Ventilation...

...a concept which Monodraught have been utilising for over 40 years.

Best in Class

Monodraught Natural Ventilation systems have achieved an enviable reputation although there have been some companies that have attempted to copy the Monodraught systems and indeed, many Engineers and Designers have designed their own bespoke Natural Ventilation systems.

The fact cannot be ignored however that over the last 10 years, Monodraught’s systems have proved to be consistently effective and reliable and have performed in accordance with the initial design criteria. It is the constant ‘fine tuning’ and feedback to Monodraught’s dedicated Design Teams which enables our products to be improved in their manufacture, aesthetics, and performance. The ‘acid test’ of the effectiveness of Monodraught’s systems has perhaps been best demonstrated during the hot summer of 2006, where daytime temperatures as high as 36°C were recorded and yet, throughout this unprecedented and extensive ‘hot spell’, schools and offices where WINDCATCHER systems were fitted experienced a high satisfaction rate – with no reports of any failures or overheating.

No one knows what future summers hold in store, but if 2006 was anything to go by Monodraught are confident that their systems will continue to provide a completely reliable and effective method of providing energy free Natural Ventilation.

No Leak Guarantee - X-Air Systems

Monodraught’s patented WINDCATCHER X-AIR® Natural Ventilation system is now offered with a...

...10 year No Leak Guarantee

This unrivalled level of weather protection for a roof mounted ventilation system guarantees that WINDCATCHER X-AIR units will not leak for ten years from the date of installation/commissioning thanks to three unique layers of ActivLouvre weather protection.

First, Monodraught’s patented modulating louvre technology allows the weather resistance of the external louvre blade to be increased dependent on weather conditions, even when closed at roof level to prevent snow being blown through its open louvre arrangement. Second, the ActivLouvre uses a weather resistant double-step louvre profile that provides 25% more ventilation than a conventional Classic louvre profile. And third, WINDCATCHER X-AIR units now feature a computer designed, profiled internal rain trap louvre fitted as standard.

WINDCATCHER X-AIR systems carry a 10-year installation guarantee with the systems’ control actuators guaranteed for five years.
The WINDCATCHER Classic is an energy free Natural Ventilation system encompassing the benefits of both top-down and passive stack ventilation. The system consists of an external louvre protected internally by Trilayer Weather Protection and is internally divided. The simple, but effective design of the system provides fresh air during the daytime as well as night-time cooling. When coupled with Monodraught’s iNVent 2 control system (or similar BMS), and operated under Monodraught proven strategy, the system is capable of providing temperature and CO₂ demand controlled ventilation, by means of energy efficient motorised volume control dampers.

Due to the flexibility of the WINDCATCHER Classic, the system can be tailored to suit the needs of almost any area. The systems technological ability has been proven within schools, colleges, healthcare environments, commercial properties as well as many other areas. The flexibility of the design of the system also allows for it to fit with almost any building design providing a seamless look or a striking effect. Whatever is required, the WINDCATCHER Classic can be made to exact requirements.

How Does WINDCATCHER Classic Work?

The main advantage of the WINDCATCHER Natural Ventilation system over other forms of Natural Ventilation is that it doesn’t matter which way the wind blows, the louvres on one side will always encapsulate the prevailing wind and turn that air movement down through 90° due to the internal dividers that split the system into four quadrants.

Stack effect is achieved as a result of the difference between the air temperature inside and outside of a building - and the subsequent imbalance effect on air density and pressure gradient of the internal and external air masses results in the warm air rising up through the quadrants, dispersing to the atmosphere.

Why Choose WINDCATCHER Classic?

**Healthier**
- Introduces natural ventilation within a building reducing CO₂ levels
- Creates and maintains a comfortable working environment
- Expels stale air

**Cost Effective**
- Not affected by rising energy costs
- No running costs for the life of the product

**Sustainable Energy in Action**
- Uses no fossil fuels
- Maximises the use of wind power and the natural stack effect of thermal buoyancy
- Night Time Cooling utilises free cooling to cool the fabric of the building

**No Maintenance**
- This means no disturbance, particularly useful in the health and education sectors

**Long Term Track Record**
- Monodraught have been utilising Natural Ventilation for over 40 years
**Modes of Operation**

**Night Time and Mid-Season Operation**

The Monodraught WINDCATCHER will still continue to operate during mid-seasons, in the evenings or at weekends, when the building is unoccupied, providing all the benefits of this “free air conditioning”. The WINDCATCHER system is not dependent on openable windows or vents in the side of the building, allowing the building to remain fully secure.

This is particularly important during warmer periods. The system will continue to operate in Night Time Cooling mode utilising the cooler night time air to remove heat from the fabric of the building and cool the room ready for the next day.

Volume control dampers at the base of the system at ceiling level will precisely control the amount of airflow through the system. If the internal temperature falls below 15°C the dampers will automatically close to prevent over cooling.

**Summer Operation**

In the summer months, warm air will naturally rise to ceiling level and out of the system. At the same time any prevailing wind on the WINDCATCHER system carries a supply of fresh air down into the room below, thereby slightly pressurising the building and increasing the outward flow of stale air. Perimeter windows can be utilised to aid cross flow ventilation.

With fresh air coming in through the windows on the windward side of the building, stale air will be exhausted through the passive stack element of the WINDCATCHER system.

**Winter Operation**

To minimise ventilation heat loss, control is essential. Monodraught achieve this through the use of insulated (U-Value of 1.2W/m²K) fully modulating dampers in conjunction with our fully automatic iNVent 2 controls system which is in turn linked to internal and external temperature sensors and CO₂ sensors. This allows the systems to continuously meet occupant loading without over ventilating an area, maintaining carbon dioxide concentrations in the 1000 ppm to 1500 ppm range.

Such control can most efficiently be achieved by ensuring that the building structure is airtight and therefore Monodraught specify a damper with low leakage rates of 2.76m³/hr/m² at 50Pa static pressure.

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**Wiring Details**

**3-Core Cable:**

- PVC Cable
  - Farnell: 2240119
  - RS: 660-4087
  - Elec. Wholesaler: 16-2-3A
  - CSA: 0.5mm² (Stranded)

- LSZH Cable
  - Elec. Wholesaler: 1896L
  - CSA: 0.5mm² (Stranded)

**4-Core Cable (Optional):**

- PVC Cable
  - Farnell: 2240121
  - RS: 660-4096
  - Elec. Wholesaler: 16-2-4A
  - CSA: 0.5mm² (Stranded)

- LSZH Cable
  - Elec. Wholesaler: 1896/4L
  - CSA: 0.5mm² (Stranded)
WINDCATCHER CLASSIC - Square

Technical Details

Material
- GRP body with gel coat finish
- Trilayer weather protection

Options
- Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
- Truncated capping (to suit specified pitch)
- Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
- Acoustic foam (25 mm, 50 mm)

Guarantee
- 10 year limited warranty

Dimensions
- Dim A: Capping Width
- Dim B: Capping Height
- Dim C: Louvre Height
- Dim D: Skirt Height
- Dim E: Trunk Length
- Dim F: Trunk Width
- 40 mm high louvre opening
- 70 mm louvre pitch

Performance
- Sound: BS EN 20140 - 10:1992
- Power supply range: 19.2 – 28.8 V DC.
- Running time: 150 s / 95° (for volume control damper)
- IP54 rated actuator motor
- Power consumption:

<table>
<thead>
<tr>
<th>Size</th>
<th>At Nominal Force</th>
<th>At Rest</th>
<th>Wire Sizing</th>
</tr>
</thead>
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<tr>
<td>185</td>
<td>4 W</td>
<td>0.8 W</td>
<td>8 VA</td>
</tr>
</tbody>
</table>

Product Options

- Standard Capping
- Truncated Capping

WINDCATCHER Square System - Dimensions

<table>
<thead>
<tr>
<th>System Size</th>
<th>Capping Width</th>
<th>Capping Height</th>
<th>Louvre Height</th>
<th>Skirt Height</th>
<th>Trunk Length</th>
<th>Trunk Width</th>
<th>Weight</th>
<th>No. of Louvres</th>
<th>Louvre Free Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dim A</td>
<td>Dim B</td>
<td>Dim C</td>
<td>Dim D*</td>
<td>Dim E*</td>
<td>Dim F</td>
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<td>0.531</td>
</tr>
</tbody>
</table>

*Dimension may change subject to roof construction, pitch, roof thickness, installation method and upstand requirements. All dimensions shown in mm.
WINDCATCHER CLASSIC - Oval/Rectangular

Technical Details

Material
• GRP body with gel coat finish
• Trilayer weather protection

Options
• Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
• Truncated capping (to suit specified pitch)
• Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
• Acoustic foam (25 mm, 50 mm)

Guarantee
• 10 year limited warranty

Performance
• Sound: BS EN 20140 - 10:1992
• Power supply range: 19.2 – 28.8 V DC.
• Running time: 150 s / 95° (for volume control damper)
• IP54 rated actuator motor
• Power consumption: 2W @ nominal force, 0.4W at rest, 4VA wire sizing

Dimensions (Oval)
• Overall size: dependent on ventilation rate required well as opening and installation arrangements
• Front and rear elevations can be either vertical or slanted dependant on requirement (for slanted systems, faces can be angled to no more than 60° from the horizontal)
• Minimum 2No. louvre openings required
• 150 mm (h), minimum skirt depth
• 40 mm high louvre opening
• 70 mm louvre pitch

Dimensions (Rectangular)
• Overall size will be dependent on ventilation rate required by specified during calculation stage, as well as opening and installation arrangements
• Overall louvre height at face can be calculated by multiplying the number of free louvres by the louvre pitched + 40 mm
• Minimum 2No. louvre openings required
• 150 mm (h), minimum skirt depth
• 40 mm high louvre opening
• 70 mm louvre pitch

Product Options

• Oval Capping
• Rectangular Capping

Abercrombie Primary School - WINDCATCHER (Rectangular)
WINDCATCHER CLASSIC - Circular

Technical Details

Material
- GRP body with gel coat finish
- Trilayer weather protection

Options
- Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
- Truncated capping (to suit specified pitch)
- Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
- Acoustic foam (25 mm, 50 mm)

Guarantee
- 10 year limited warranty

Performance
- Sound: BS EN 20140 - 10:1992
- Power supply range: 19.2 – 28.8 V DC.
- Running time: 150 s / 95° (for volume control damper)
- IP54 rated actuator motor
- Power consumption:

<table>
<thead>
<tr>
<th>System Size</th>
<th>At Nominal Force</th>
<th>At Rest</th>
<th>Wire Sizing</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>2 W</td>
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<tr>
<td>125</td>
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<tr>
<td>185</td>
<td>4 W</td>
<td>0.8 W</td>
<td>8 VA</td>
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Dimensions
- Dim A: Capping Width
- Dim B: Capping Height
- Dim C: Louvre Height
- Dim D: Skirt Height
- Dim E: Trunk Length
- Dim F: Trunk Width
- 40 mm high louvre opening
- 70 mm louvre pitch

<table>
<thead>
<tr>
<th>WINDCATCHER Circular System - Dimensions</th>
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</thead>
<tbody>
<tr>
<td>System Size</td>
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<tr>
<td>-------------</td>
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</tr>
<tr>
<td>155</td>
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<tr>
<td>185</td>
</tr>
</tbody>
</table>

*Dimension may change subject to roof construction, pitch, roof thickness, installation method and upstand requirements. All dimensions shown in mm.
WINDCATCHER CLASSIC - Heritage

**Technical Details**

**Material**
- GRP body with gel coat finish
- Trilayer weather protection

**Options**
- Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
- Truncated capping (to suit specified pitch)
- Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
- Acoustic foam (25 mm, 50 mm)

**Guarantee**
- 10 year limited warranty

**Performance**
- Sound: BS EN 20140 - 10:1992
- Power supply range: 19.2 – 28.8 V DC.
- Running time: 150 s / 95° (for volume control damper)
- IP54 rated actuator motor
- Power consumption:

**Dimensions**
- Dim A: Capping Width
- Dim B: Capping Height
- Dim C: Louvre Height
- Dim D: Skirt Height
- Dim E: Trunk Length
- Dim F: Trunk Width
- 40 mm high louvre opening
- 70 mm louvre pitch

**Product Options**

- **Heritage Capping**

**WINDCATCHER Heritage System - Dimensions**

<table>
<thead>
<tr>
<th>System Size</th>
<th>Capping Width</th>
<th>Capping Height</th>
<th>Louvre Height</th>
<th>Skirt Height</th>
<th>Trunk Length</th>
<th>Trunk Width</th>
<th>Weight</th>
<th>No. of Louvres</th>
<th>Louvre Free Area</th>
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<td>95</td>
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*Dimension may change subject to roof construction, pitch, roof thickness, installation method and upstand requirements. All dimensions shown in mm.
WINDCATCHER CLASSIC - Bespoke

Technical Details

Material
- GRP body with gel coat finish
- Trilayer weather protection

Options
- Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
- Truncated capping (to suit specified pitch)
- Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
- Acoustic foam (25 mm, 50 mm)

Guarantee
- 10 year limited warranty

Product Options

• Colour

• Shape

Royal Chelsea Hospital - WINDCATCHER (Bespoke)
Goldsmiths DMC Building - WINDCATCHER (Bespoke)
Rye Primary School - WINDCATCHER (Bespoke)
iNVent 2

The iNVent 2 system is a bespoke, in-house designed, Natural Ventilation management system for up to 4 zones of Natural Ventilation systems. It utilises our seasonally adjusted proportional control based on temperature and CO₂.

Control

Automatic Control

Provided as standard in the Monodraught package. These panels are controlled by either temperature and CO₂ sensors, depending upon the requirements of each specific application.

Semi-Automatic

Operates in the same fashion as the Automatic Control system, but also allows the end user to control the opening or closing of the dampers using the push button overrides.

Manual Control

Allows the user to operate manual dampers by a lever at ceiling diffuser level.

The BRE established that in its standard format, the style of the WINDCATCHER system has the effect of reducing noise transmission by 15 dB as compared to an open window. However, by incorporating 25 mm of acoustic lining to the air paths, a further 11 dB was achieved. The chart below shows that on larger systems, a greater thickness of insulation foam has the effect of greater attenuation.

Acoustic pods or other forms of attenuation can also be suspended below the Monodraught terminals to achieve an even greater impact on sound insulation.

Additional information available upon request: info@monodraught.com, 01494 897700

<table>
<thead>
<tr>
<th>Test Number</th>
<th>Dₚₜₘₜₜ (C;Cₖ) (dB)</th>
<th>Construction Detail</th>
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<tr>
<td>13</td>
<td>30 (-1 ; -2)</td>
<td>GRP 800 Square System - VCD Closed</td>
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<tr>
<td>14</td>
<td>26 (-1 ; -3)</td>
<td>GRP 800 Square System 25 mm Insulation Foam - VCD Open</td>
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<tr>
<td>15</td>
<td>47 (-1 ; -5)</td>
<td>GRP 800 Square System 25 mm Insulation Foam - VCD Closed</td>
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<tr>
<td>16</td>
<td>24 (-1 ; -4)</td>
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<td>19</td>
<td>47 (-2 ; -7)</td>
<td>GRP 1000 Square System 50 mm Insulation Foam - VCD Closed</td>
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</table>

Acoustics
Monodraught were selected as a natural ventilation solution for the expansion of the National Memorial Arboretum in Staffordshire.

The National Memorial Arboretum is the UK’s year-round centre of Remembrance; a spiritually uplifting place which honours the fallen, recognises service and sacrifice, and fosters pride in our country.

With 30,000 maturing trees and over 300 memorials, it is a beautiful and lasting tribute to those who serve their country, die in conflict or have a special reason for being remembered.

It seems fitting that a site that uses nature as a way to remember the fallen has also chosen a solution for ventilation which harnesses the environment for building ventilation. Monodraught have a long-term track record and have been utilising natural ventilation in their solutions for over 40 years.

The WINDCATCHER encompasses the benefits of both top-down and passive stack ventilation. The system consists of an external louvre protected internally by Trilayer Weather Protection and is internally divided. The simple but effective design of the system provides fresh air during the daytime as well as night-time cooling.

When coupled with Monodraught’s iNVent 2 BMS controls, the system is capable of providing temperature and CO₂ demand controlled ventilation. The system requires little maintenance which is ideal for the Arboretum as it relies heavily on regular visitor numbers to maintain voluntary donation contributions so needs to remain available to the public as much as possible.

The £15.7m development will be completed by late 2016 and will allow the arboretum to host up to 500,000 visitors a year. The improvements will include a new Remembrance Centre with dedicated education facilities that will enable the Arboretum to expand its engagement from 10,000 schoolchildren a year to 25,000. Improvements will also be made to the reception area, restaurant, café and shop.

The natural ventilation system will allow the Arboretum to have a minimal impact on its environment in terms of carbon footprint and by circulating fresh air within the building, it will allow staff and visitors to benefit from fresh air to remain alert and able to enjoy their day at the centre.

To find out which of our solutions are applicable for your building development please look at other projects we have worked on or contact our friendly sales team.
Royal Chelsea Hospital

London

Monodraught WINDCATCHER Natural Ventilation systems were selected to provide energy-free fresh air throughout the new three storey flagship care home. The fifteen systems were cleverly adapted by Monodraught to complement the architectural style of the new infirmary, which is in context with original Wren and Soane buildings. The units were clad in clay pantiles to ensure a perfect blend with the architectural style. CFD analysis was carried out using Monodraught’s own development team and then verified using external specialists to optimise the architectural cladding.

St Joseph’s College

Ipswich

A state-of-the-art Infants and Junior School characterised by the use of bold organic forms, Natural Light and bright colours designed to inspire its young pupils, provides a clear statement of environmental intent by Naturally Ventilating the 125 square metre hall, a circular library and a series of interlinked shared spaces, by means of a bespoke design WINDCATCHER.

Greg Allen, Facilities Manager at St Joseph’s College says, “The systems have regulated the internal temperatures without any outside assistance.”

Imperial College

London

The Library is on the top floor, with full height glazing and suffered for many years from chronic overheating in the summer months. The WINDCATCHER Natural Ventilation systems were the chosen strategy due to their energy saving features. Another major benefit and consideration for the College was the improved health and comfort aspects of Natural Ventilation systems, which have proved to provide a more calm and stress-free working and studying environment.

Phil Evans, Energy Manager says, “We are all aware how difficult it is to study and work in a stuffy and warm environment and this was one of the key factors in the College’s decision... ...after all, what could be more energy efficient than ‘free fresh air’.”

Tranent North Primary School

East Lothian

Monodraught WINDCATCHERS have proven extremely popular in Scotland, being specified and installed now on many schools in the Scottish region. This is all under the direction of Monodraught’s Agents in Scotland, JRF Services of Glenrothes in Fife.

Blackberry Hill Hospital

Bristol

Over 40 WINDCATCHER® natural ventilation systems were specified on the project, with most sited in the ward corridors, the central hub and the Main building. The WINDCATCHER natural ventilation systems are designed to catch the wind from any direction using a series of external louvres linked to quadrants and internal turning vanes. The captured fresh air is brought down into the building via a damper system, which controls the rate of flow. At the same time, the warm internal air is expelled through the same route as a form of displacement ventilation. Among the advantages of the system is that it can be designed and sized to meet the exact ventilation needs of the spaces without relying on external elements, such as rooflights or opening vents, which in this case would have presented a security risk.
The WINDCATCHER X-AIR is the next generation of Natural Ventilation system featuring Monodraught patented ACTIVLOUVRE® modulating aerofoil louvre technology. The system consists of an external static louvre and internal active louvre arrangement, which varies the opening and free area through the louvre face. The variable louvres can provide maximum ventilation rates when fully open or modulated to vary weather resistance or closed to prevent the ingress of precipitation allowing Monodraught to have our unique no leak guarantee.

In addition to the ACTIVLOUVRE arrangement, the system also incorporates external air catchment fins to provide greater area at the louvre improving performance in relation to wind speed. Pressure release vanes at the fins provide a means to reduce face pressure under high winds. The systems can also be specified to include solar powered architectural lighting.

Why Choose WINDCATCHER X-AIR?

Healthier
- Introduces natural ventilation within a building reducing CO₂ levels
- Creates and maintains a comfortable working environment
- Expels stale air

Cost Effective
- Not affected by rising energy costs
- No running costs for the life of the product

No Maintenance
- This means no disturbance, particularly useful in the health and education sectors

Sustainable Energy in Action
- Uses no fossil fuels
- Maximises the use of wind power and the natural stack effect of thermal buoyancy
- Night Time Cooling utilises free cooling to cool the fabric of the building

Long Term Track Record
- Monodraught have been utilising Natural Ventilation for over 40 years

How Does WINDCATCHER X-AIR Work?

The main advantage Monodraught systems have over other forms of Natural Ventilation is that it doesn’t matter which way the wind blows, the louvres on one side will always encapsulate the prevailing wind and turn that air movement down through 90°.

Stack effect is achieved as a result of the difference between the air temperature inside and outside of a building - and the subsequent imbalance effect on air density and pressure gradient of the internal and external air masses, results in the warm air rising up through the quadrants, dispersing to the atmosphere.

Note: Upstand to protrude 150mm above finished roof level

Insulated Structural Composite Upstand, Supplied by Monodraught for Fitting and Weathering to Roof by Others

Motorised Volume Control Dampers

Grille Arrangement

Solar Panel

Architectural Lighting Fin

Linear Actuator

ACTIVLOUVRE Assembly

Swept Internal Divider

Weathering Skirt

Upstand to protrude 150mm above finished roof level

Monodraught

Logos

3rd party logos

Photo Credit

Monodraught

Monodraught

Monodraught
Although WINDCATCHER X-AIR operates in the same manner as the classic system, Monodraught’s R&D team have worked to improve the system further by adding some new features:

**Composite Upstand**

Monodraught have developed an insulated upstand arrangement to be used with the WINDCATCHER X-AIR. The upstand is a multi-layer construction allowing for high levels of insulation, and also ensures every system maintains an air tight seal, whilst also minimising install time. The WINDCATCHER X-AIR can be installed onto flat roofs, and roofs with a pitch of up to 35°.

**Swept Divider**

Monodraught WINDCATCHER systems are divided into four separate quadrants, but the WINDCATCHER X-AIR system incorporates swept turning vanes to gently direct air flow while avoiding flow separation and increased frictional losses.

**Aerofoil Louvre**

The ActivLouvre technology is designed to provide ventilation control, but also to be aerodynamically efficient and protect against rain. By reducing losses through the louvred section, the level of ventilation per system is increased, compared with a standard louvre. The aerodynamic profile was developed using computational fluid dynamic (CFD) techniques and wind tunnel tests in association with the University of Reading and University of Nottingham.

**ACTIVLOUVRE Modulating Aerofoil Louvre Technology**

The ActivLouvre technology provides ventilation control at roof level and prevents weather ingress into the WINDCATCHER X-AIR. The system comprises of an external set of static louvres and an internal set of active louvres. The ActivLouvre can be raised and lowered automatically to vary the free area of the opening according to the control strategy. The greatest air flow rates through the louvres are achieved when they are fully open, but the ActivLouvre system is able to modulate their position to increase the resistance of the louvre, or they can be fully shut to prevent the ingress of snow and other precipitation, alleviating the susceptibility of an open louvre system.

**External Air Catchment Fins**

The External Air Catchment Fins are located on each corner of the WINDCATCHER X-AIR and comprise of a tear drop profile light tube and a pressure release fin. At low wind speeds, the fins are used to increase the area across the face of the system. This increases the positive and negative pressure on the windward and leeward faces respectively, and increases the total rate of air flow through the system. When wind speed is high the rubber fins flex, helping to relieve excessive wind loading.

**Architectural Solar Powered Lighting System**

The Windcatcher X-Air incorporates an architectural lighting system powered by a 10 W photovoltaic panel, mounted within the cap of the system. The solar panel collects solar energy throughout the day charging an internal Lithium ION battery, even during overcast skies. The system automatically illuminates at low light providing soft architectural lighting without the need for user input.
Technical Details

Material

- Injection moulded luran S 757 G UV – ASA
- Extruded luran S 776SE UV – ASA
- Extruded shore A 58 flexible compound
- Extruded FLUOR-ACRYL® PMMA
- Extruded styron CALIBRE™ 603 3 polycarbonate
- Extruded thermoform sheet; P60R – recycled impact polystyrene
- Extruded thermoform sheet; P91UV – high impact polystyrene with UV resistant capping
- Extruded thermoform sheet; ASA200
- 6063 aluminium extrusion to T6 temper
- Carbon sheet steel construction to BS EN
- 10 W monocrystalline photovoltaic solar panel (LED version only)

Options

- Colours (RAL 7037 Dusty Grey / RAL 7038 agate grey)
- Architectural LED lighting (white / blue /green)
- Acoustic foam (25 mm, 50 mm)
- GRP extended colour-matched skirt (to suit roof pitch from 15 – 35°)

Guarantee

- 10 year limited warranty
- No leak guarantee

Performance

- Fire: DIN EN 13501 - 1: 2010 - 01 (Class E)
- Sound: BS EN 20140 – 10:1992
- Sound: ISO 140 – 10:1991
- Power supply range: 19.2 – 28.8V DC.
- Running time: 150 s / 100 mm
  (for Active Louvre)
- Running time: 150 s / 95° (for volume control damper)
- IP54 rated actuator motors
- Power consumption:

<table>
<thead>
<tr>
<th>Size</th>
<th>At Nominal Force</th>
<th>At Rest</th>
<th>Wire Sizing</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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<td>1.2 W</td>
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<tr>
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Product Options

- Standard Capping
- LED Capping

Technical Details

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<td>1.6 W</td>
<td>16 VA</td>
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Product Options

- Standard Capping
- LED Capping
Modes of Operation

Night Time and Mid-Season Operation
The Monodraught WINDCATCHER X-Air will still continue to operate during mid-seasons, in the evenings or at weekends, when the building is unoccupied, providing all the benefits of this “free air conditioning”. The WINDCATCHER X-Air system is not dependent on openable windows or vents in the side of the building, allowing the building to remain fully secure.

This is particularly important during warmer periods. The system will continue to operate in Night Time Cooling mode utilising the cooler night time air to remove heat from the fabric of the building and cool the room ready for the next day.

Volume control dampers at the base of the system at ceiling level will precisely control the amount of airflow through the system. If the internal temperature falls below 15°C the dampers will automatically close to prevent over cooling.

Summer Operation
In the summer months, warm air will naturally rise to ceiling level and out of the system. At the same time any prevailing wind on the WINDCATCHER X-Air system carries a supply of fresh air down into the room below, thereby slightly pressurising the building and increasing the outward flow of stale air. Perimeter windows can be utilised to aid cross flow ventilation.

With fresh air coming in through the windows on the windward side of the building, stale air will be exhausted through the passive stack element of the WINDCATCHER X-Air system.

Winter Operation
To minimise ventilation heat loss, control is essential. Monodraught achieve this through the use of insulated (U-Value of 1.2W/m) fully modulating dampers in conjunction with our fully automatic iNVent 2 controls system which is in turn linked to internal and external temperature sensors and CO2 sensors. This allows the systems to continuously meet occupant loading without over ventilating an area, maintaining carbon dioxide concentrations in the 1000 ppm to 1500 ppm range.

Such control can most efficiently be achieved by ensuring that the building structure is airtight and therefore Monodraught specify a damper with low leakage rates of 2.76m³/hr/m² at 50Pa static pressure.

Wiring Details

Cable Specification

4-Core Cable:
- PVC Cable
  - Farnell: 2240121
  - RS: 660-4096
  - Elec. Wholesaler: 16-2-4A
  - CSA: 0.5mm² (Stranded)
- LSZH Cable
  - Elec. Wholesaler: 1896/4L
  - CSA: 0.5mm² (Stranded)

6-Core Cable (Optional):
- PVC Cable
  - Farnell: 2240123
  - RS: 660-4099
  - Elec. Wholesaler: 16-2-6A
  - CSA: 0.5mm² (Stranded)
- LSZH Cable
  - Elec. Wholesaler: 1896/6L
  - CSA: 0.5mm² (Stranded)

Wiring for Master connection box out to slave units in the same control zone should use 4 core cable (16-2-4A. RS: 660-4096 or Farnell 1190286), and only the Blue, Green, Yellow and Red cables are connected to the subsequent slave systems. (The feedback lines MUST not be commoned between systems)
The WINDCATCHER® X-Air Thermal Mixing Module system from Monodraught is designed to provide natural ventilation, hybrid ventilation, secure night time cooling and boosted levels of ventilation during summer.

By utilising Monodraught’s proven WINDCATCHER technology with the additional of hybrid mixing we have been able to create an initiative hybrid system ensuring optimal thermal comfort for room occupants.

The system is ideally suited for classrooms and relieves unnecessary strain on the buildings heating system by making use of the thermal gains within the space. The unit intelligently analyses the external and internal environments to manage the rate of thermal energy transfer required and works in conjunction with natural ventilation provided by manual or automatic windows/louvres in cross flow or stack ventilation strategies.

When the external air temperature is below a determined point the X-air Thermal Mixing Unit switches to thermal mixing mode operating the hybrid fan to mix room air with fresh ventilation air to provide tempered fresh air. The system is able to modulate the level of natural ventilation forcing room air to mix within the central fan core.

The X-Air Thermal Mixing unit can also supply boosted ventilation during daytime and night time cool conditions to supplement natural ventilation and to ensure good internal air quality.

Designed to meet Priority School Building Programme requirements, the Monodraught X-Air Thermal Mixing Unit uses TriFlow heat recovery with low specific fan powers and features an intelligent control system. The control system is supplied as standard with full data logging facility, temperature and CO₂ control and an optional BACnet or Modbus modules.

### X-Air Thermal Mixing Unit

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### Technical Specifications

- Available for WINDCATCHER X-AIR 140, 170 and 200 systems. Upstands must be a minimum of 750 mm tall.

### Function

- Low energy thermal mixing fan alleviates risk of cold draughts in winter
- Summer exhaust boost mode
- Internal and external temperature sensors when used in conjunction with iNVent controls system
- Internal CO₂ sensor

### Advantages

- Tempered natural ventilation ensures fresh air is supplied above 15°C within thermal comfort guidelines
- Low energy mixing fan significantly reduces energy usage over conventional thermal tempering methods
- No additional geometric considerations over X-Air systems
- Summer boosted exhaust mode provides additional rate of cross ventilation and cooling in summer

### Standards

- PSBP
- BB101
- BB93

### Materials

- Powder coated mild steel RAL 9003
- ABS

### Dimensions

<table>
<thead>
<tr>
<th>X-Air System</th>
<th>Internal Upstand [mm]</th>
<th>Mixing Chamber [mm]</th>
<th>Min Upstand Height [mm]</th>
</tr>
</thead>
<tbody>
<tr>
<td>140</td>
<td>800 x 800</td>
<td>690 Ø</td>
<td>750</td>
</tr>
<tr>
<td>170</td>
<td>1000 x 1000</td>
<td>900 Ø</td>
<td>750</td>
</tr>
<tr>
<td>200</td>
<td>1200 x 1200</td>
<td>1090 Ø</td>
<td>750</td>
</tr>
</tbody>
</table>
The following modes are used during the normal occupied hours during the whole year. Depending on the current season, different set points are used by each mode.

**TriFlow Heat Recovery :**
- A series of louvred openings provide ventilation air and exhaust air. When an X-Air system is specified the louvred openings are able to modulate dependant on the requirement for ventilation mode and weather protection. Internal dividers form a diagonal cross section with a central fan core.
- Within a lower insulated trunk section, a three bladed hybrid fan is mounted within the central fan core.
- At the base an insulated volume control damper is used to control the level of natural ventilation air being provided and adjust the direction of the ventilation air.

---

**Natural Ventilation**

*External temp >15°C and internal temp >21°C or CO₂ >1000 ppm*
The X-Air Thermal Mixing Unit can provide natural ventilation through the buoyancy of the internal air and wind pressures exerted upon the system at roof level. Warm air is extracted through the leeward side of the system due to the negative pressure upon the roof terminal. Fresh air is entrained in the windward side.

**Hybrid Thermal Mixing**

*External temp >15°C and internal temp >22°C or CO₂ >1200 ppm*
When the external air temperature is below the set point the X-Air Thermal Mixing Unit switches to thermal mixing operation. The hybrid fan is used to mix room air with ventilation air to provide tempered fresh air. Within X-Air systems louvres modulate restricting the level of natural ventilation with the resulting pressure differential forcing room air to mix within the central fan core.

**Natural Ventilation Boost**

*External temp >15°C and internal temp >26°C or CO₂ >1400 ppm*
The X-Air Thermal Mixing unit can supply boosted ventilation during daytime conditions, when the internal temperature is greater than 26 °C to supplement natural ventilation and to ensure good internal air quality.
Additionally during summer time periods supplemented night time cooling can be provided.

Alternatively you can choose the Thermal Mixing Unit with mushroom cowl.
The WINDCATCHER X-Air upstand duct silencer is a highly innovative upstand module for Monodraught’s X-Air natural ventilation system which enables a high level of acoustic attenuation with minimal impact to the system’s natural ventilation performance. This is achieved by providing a break to the direct line of sound transfer from external sources without reducing the free area through the system.

- **Features**
  - Swept internal dividers and internal upstand lining manufactured in high density glass wool panels reinforced with glass fibre mesh
  - Reinforced galvanised steel supporting framework
  - Module is housed within the X-Air Upstand
  - High level sound attenuation with minimal impact to natural ventilation
  - Ideal for projects where both internal and external noise breakout is a concern

- **Technical Specifications**
  - Available for WINDCATCHER X-Air 140, 170 and 200 systems
  - Performance Rating of X-Air 200 system according to BS EN ISO 717-1:1997 – Dn,e,w(CCtr) = 33(−2;−6) dB

- **Materials**
  - High density glass wool
  - Galvanised steel

- **Standards**
  - BB93
  - BB101
  - PSBP
Acoustic Performance of X-Air 200 system

![Graph showing acoustic performance]

Rating according to EN ISO 717-1:1997
Dn,e,w(0;Ctr) = 33-2-6 dB

Section View

**DIMENSIONS**

<table>
<thead>
<tr>
<th>X-Air System</th>
<th>Dimension A [mm]</th>
<th>Dimension B [mm]</th>
<th>Dimension C [mm]</th>
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<tr>
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<tr>
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<td>1080</td>
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</tr>
<tr>
<td>200</td>
<td>1280</td>
<td>1200</td>
<td>1200</td>
</tr>
</tbody>
</table>

**External dimension of upstand including flashings**

**Internal dimension of opening and clear distance between trimmers**

Confidential

200 mm

Section through upstand
WINDCATCHER X-AIR Projects

Craig Tara - Haven Holiday Park

Ayrshire

Scenario

Monodraught WINDCATCHER X-AIR systems were specified to serve both the Sports Hall and Sports Activity Hall to provide a minimum fresh air requirement of 10 l/s per person with an occupancy level of 100 people. A total of four X-Air 140 systems (two in each area) sharing 1 control panel, covering 4 zones, were used to meet the design criteria following modelling using Navensys.

The WINDCATCHER X-AIR systems were installed in March 2012 and have been monitored by 3 temperature sensors to examine the performance within these areas.

Results

- Room Temperature
  The graph below shows the overall average temperature and average daily peak temperature for the areas serviced by the X-Air systems. As you can see the X-Air systems keep the area at a comfortable temperature of approximately 19°C.

The graph above shows the temperature against the percentage of occupied hours. The X-Air systems maintain an ideal temperature within the room of less than 22°C for 92% of the time. At no point has the room exceeded 26°C and has only been between 25 – 26°C for 0.3% of its occupied time, meeting the target for overheating; where no more than 5% of the occupied hours should exceed 25°C, and no more than 1% of the occupied hours should exceed 28°C.

- CO₂ Levels
  The background or atmospheric CO₂ level is approximately 400 parts per million (ppm), a high level would be considered 1500 ppm or above. The exact CO₂ levels are not recorded at this site; however, results are taken if the levels should exceed 1500 ppm at any time. There have been no recordings of high CO₂ levels showing that at no point have CO₂ levels reached 1500 ppm.

Conclusion

The Monodraught WINDCATCHER X-AIR Natural Ventilation systems have shown that they meet and exceed the design criteria and specification that the client requested. The design was selected to provide a minimum fresh air requirement and ensure that CO₂ levels remain within acceptable boundaries, which the results above have proven is the case. The solution has also been shown to meet the overheating criteria, keeping temperatures within an acceptable level for the vast majority of the time.

Tesco

Cheetham Hill

Tesco, the UK’s leading supermarket chain set itself a target to reduce by 50% the carbon emissions from all its stores by 2020 as compared to a baseline of 2006.

Remarkably they exceeded this ambitious target when they opened their first major new Eco-store at Cheetham Hill, Manchester, reducing the carbon footprint by 70% compared to an equivalent sized store built just over two years ago.

The Corby Eco-Store is expected to become a benchmark for future Tesco Eco-Stores.
Monodraught are pleased to be part of a major local construction project, the Handy Cross re-development scheme. The £150m Handy X Hub development is based on an exercise well, eat well, and work well mix. In addition to a new state of the art Leisure Centre and a full size Waitrose, the development includes a new purpose-built coachway park and ride and the potential to provide fast coach services to Heathrow, London and other national connections.

The leisure centre opened at the beginning of January 2016 and has been very well received by the public. Users of the centre have commented on how bright and airy the building feels.

The leisure centre includes:
- An eight lane 50 m pool with moveable floor and sub-aqua dive pit
- 20 x 8 m learner pool with moving floor
- Splash zone for toddlers
- Climbing wall
- 150 station gym
- Dance studios
- 12 court sports hall
- Four rink bowls hall
- Steam room and sauna
- 2 x squash courts
- 2 x party or meeting rooms
- Café

The Monodraught WINDCATCHER® X-AIR is the latest generation of Natural Ventilation that follows in the footsteps of the successful WINDCATCHER Classic systems. This is an energy free Natural Ventilation system encompassing the benefits of both top-down and passive stack ventilation. The simple, but effective design of the system provides fresh air during the daytime as well as night-time cooling.

The main advantages Monodraught systems have over other forms of Natural Ventilation are:
- It doesn’t matter which way the wind blows, the louvres on one side will always entrain the prevailing wind and turn that air movement down through 90°.
- WINDCATCHER X-AIR natural ventilation systems are guaranteed not to leak from the date of commissioning. Monodraught backs up this promise with a full 10-year product guarantee.
- ACTIVLOUVRE® modulating louvre technology allows the weather resistance of the external louvre blade to be increased dependent on weather conditions and even closed at roof level to prevent snow being blown through an open louvre arrangement.
- ACTIVLOUVRE uses a weather resistant double step louvre profile whilst providing 25% greater levels of ventilation than a conventional Classic louvre profile.
- Computer generated design of profiled internal rain trap louvre is fitted as standard.

The VENTSAIR® wall mounted natural ventilation system is a high specification small format louvre system. The system has been used extensively in education facilities, health facilities as well as retail schemes.

Andrew McCubbin, Managing Director of Monodraught said “Monodraught’s whole team pulled together to ensure we were part of this landmark development. We are delighted to have installed our WINDCATCHER and VENTSAIR products for the benefit of Leisure Centre users right here on our doorstep.”

We look forward to continuing to support this development with further product installations as the construction is completed. Check back for further updates!
The VENTSAIR Roof Mounted Terminals have a similar appearance to the standard WINDCATCHER® Classic systems but have a different internal configuration. The main difference being the removal of the internal dividers, allowing the VENTSAIR Roof Mounted Terminal to act simply as an intake or exhaust system.

VENTSAIR systems are mainly used to encourage cross flow ventilation within a room, usually where the aspect is too deep for openable windows or other wall openings to work efficiently. In these cases, the VENTSAIR Roof Mounted Terminal would be located at the far end of the room to draw the air through the room and allow the warm stale air to be exhausted via the passive stack method.

Why Choose VENTSAIR?

Healthier
• Can increase the flow of natural ventilation within a building reducing CO₂ levels
• Expels stale air

Cost Effective
• Not affected by rising energy costs
• No running costs for the life of the product
• Can work in conjunction with other natural ventilation systems to increase performance

No Maintenance
• This means no disturbance, particularly useful in the health and education sectors

Sustainable Energy in Action
• Uses no fossil fuels
• Maximises the use of wind power and the natural stack effect of thermal buoyancy
• Night Time Cooling utilises free cooling to cool the fabric of the building

Long Term Track Record
• Monodraught have been utilising Natural Ventilation for over 40 years
Technical Details

Material
• Roof terminal GRP construction in class 1 fire retardant resin with GRP airways
• Outer Casing: Glass-fibre construction in Class 1 fire retardant resin
• Internal Airways: GRP airway protected internally with trilayer weather protection

Options
• GRP construction

Guarantee
• 10 year limited warranty

Performance
• Class 'A' BSRIA tested weathering performance.
• Anti-bird mesh.
• Trilayer weather protection

Dimensions
• GRP systems manufactured to any bespoke arrangement.

Performance
The Building Research Establishments (BRE) carried out a series of airborne acoustic tests on the full range of VENTSAIR Natural Ventilation systems, together with various insulation thicknesses.

The BRE established that in its standard format, the style of the VENTSAIR Roof Mounted Terminal system has the effect of reducing noise transmission by 15 dB as compared to an open window. However, by incorporating 25 mm of acoustic lining to the air paths, a further 11 dB was achieved. The Chart shows that on larger system, a greater thickness of insulation foam has the effect of greater attenuation:

### Acoustic Performance

<table>
<thead>
<tr>
<th>Test Number</th>
<th>D_{n,e,w} (C;Ctr) (dB)</th>
<th>Construction Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>15 (0 ; -1)</td>
<td>GRP 800 Square System - VCD Open</td>
</tr>
<tr>
<td>13</td>
<td>30 (-1 ; -2)</td>
<td>GRP 800 Square System - VCD Closed</td>
</tr>
<tr>
<td>14</td>
<td>26 (-1 ; -3)</td>
<td>GRP 800 Square System 25 mm Insulation Foam - VCD Open</td>
</tr>
<tr>
<td>15</td>
<td>47 (-1 ; -5)</td>
<td>GRP 800 Square System 25 mm Insulation Foam - VCD Closed</td>
</tr>
<tr>
<td>16</td>
<td>24 (-1 ; -4)</td>
<td>GRP 1000 Square System 25 mm Insulation Foam - VCD Open</td>
</tr>
<tr>
<td>17</td>
<td>39 (-1 ; -5)</td>
<td>GRP 1000 Square System 25 mm Insulation Foam - VCD Closed</td>
</tr>
<tr>
<td>18</td>
<td>31 (-1 ; -5)</td>
<td>GRP 1000 Square System 50 mm Insulation Foam - VCD Open</td>
</tr>
<tr>
<td>19</td>
<td>47 (-2 ; -7)</td>
<td>GRP 1000 Square System 50 mm Insulation Foam - VCD Closed</td>
</tr>
</tbody>
</table>

**Product Options**

**Product Specifications**

Manufacturer
• Monodraught Ltd, Halifax House, Cressex Business Park, High Wycombe, Bucks HP12 3SE, Tel: 01494 897700, Fax: 01494 532465

Kerb
• Roofers prepared kerb upstand to suit associated roof
• Volume control dampers with 24 Volt actuator

Ceiling Grilles
• White powder coated eggcrate or linear bar grilles

Controls
• Automatic Control: iVent 2 programmable control system with night-time cooling facility, temperature sensors and manual override – contractor to allow for internal electrical wiring

Guarantee
• Monodraught VENTSAIR Roof Mounted Terminal systems are covered by a 10 year guarantee
• Dampers and controls fitted with Monodraught systems will be covered by the standard manufacturer’s warranty

Wiring Details

Cable Specification

**3-Core Cable:**
• PVC Cable
  - Farnell: 2240119
  - RS: 660-4087
  - Elec. Wholesaler: 16-2-3A
  - CCA: 0.5mm² (Stranded)

**4-Core Cable (Optional):**
• PVC Cable
  - Farnell: 2240121
  - RS: 660-4096
  - Elec. Wholesaler: 16-2-4A
  - CCA: 0.5mm² (Stranded)
  - LSZH Cable
    - Elec. Wholesaler: 1896L
    - CCA: 0.5mm² (Stranded)
The VENTSAIR Façade Ventilation System (VAF) is a high specification louvre system designed for use within the commercial industry. The system comprises of an external aluminium louvre, a high specification volume control damper and an internal grille.

**Options**

**VA150/VA300 Sound Attenuating Louvre**

The VA150 and VA300 are available powder coated in any BS or RAL colour reference. Supplied in panel format they are specifically designed for commercial projects.

**VA38 External Weather Louvre**

The VA38 is a high specification small format louvre system designed for use within the commercial industry. The system has been used extensively in education facilities, health facilities as well as retail schemes.
Technical Details - VA38

Material
- Extruded aluminium alloy profiles to 6063 T6
- Profile thickness of 1.5 mm
- Mechanically jointed with Zintec corner chevrons

Options
- 24 or 28 mm glazed-in frames as standard
- Flanged outer frame

Performance
- Class ‘A’ BSRIA tested weathering performance
- Physical Free area approximately 40%
- Mean Ce Factor 0.202 (Class 3)
- Security bars fitted internally as standard

Dimensions
- 34 mm blade pitch
- Product depth 38 mm overall
- Glazing rebate height 24 mm
- Minimum manufacture height 171 mm (for glazed-in variants)

Product Options

Outer Frame

Glazed-In

Technical Details - VA150/300

Material
- Manufactured from 2.0 mm thick aluminium sheet
- Comprising 120 mm depth of acoustic infill material of 45 kg/m² of material density tissue faced
- Powder coated in any BS or RAL colour reference

Options
- Expanded metal bird guard is fitted as standard
- Flanged outer frame
- Internal insect mesh available
- Glazed-in outer frames to suit 24 and 28 mm as standard

Dimensions
- Available in sizes 500 mm x 500 mm up to 2000 mm wide and 1500 mm high
- 90 mm air passage with intervening acoustic infill blade of 120 mm depth
- Product depth: VA150 - 150 mm & VA300 - 300 mm
- Weights: VA150 - approx 30 kg/m² & VA300 - approx 50 kg/m²

Product Options

Standard Façade System

The VENTSAIR Natural Ventilation Façade system is designed to suit a variety of different building façade applications to provide controlled fresh air during the day and secure night time cooling via cross flow and stack ventilation. They do this through use of the external weather louvre. This catches any prevailing wind, whilst still ensuring there is no weather ingress. The amount of air that is then let into the room is determined by the motorised volume control dampers, ensuring a suitable level of ventilation is provided to the rooms occupants.

Acoustic Façade System

Façade variants include the VAF150 and VAF300 models. Both of these systems are available for applications with acoustic considerations, and are able to provide a deeper louvre profile that is specifically designed to reduce noise entering the room. The system is manufactured from 2 mm aluminium sheet, and comprises of 120 mm depth of acoustic infill material of 45 kg/m² material density that can be powder coated in any BS or RAL colour reference.

Performance

<table>
<thead>
<tr>
<th>Louvre Type</th>
<th>Depth Airborne Sound Reduction Index (dB) at Octave Band</th>
</tr>
</thead>
<tbody>
<tr>
<td>VA150</td>
<td>63 125 250 500 1K 2K 4K 8K 11 9 9</td>
</tr>
<tr>
<td>VA300</td>
<td>6 3 4 8 12 11 9 15 14 14</td>
</tr>
</tbody>
</table>

- Free area may vary due to size and configuration though generally a 36% free area is achieved
The VENTSAIR Acoustic Air Transfer System (ATS) is a patented, internal wall mounted, attenuating air transfer system, utilised to naturally promote cross flow ventilation within rooms reducing heat build-up and providing fresh air to occupants. The system has a number of options including: Intumescent fire damper and volume control dampers. It has been designed to maximise air flow and minimise sound transfer and meets the requirements for both BB93 and BB101.

**Materials**
- Acoustic ducting finished in white
- Internal and External Metal Frame
- High and low frequency attenuating materials
- Recycled HIPs

**Performance**
- Sound reduction of 34 - 39 $D_{n,e,w}$

**Options**
- Intumescent fire damper
- Volume control damper

**Technical Details**
**Product Specifications**

**Outer Casing**
- Extruded aluminium alloy profiles to 6063 T6
- Foam board body finished in white

**Internal Airways**
- Constructed from perforated aluminium sheet

**Wall Opening**
- Builders to prepare opening to suit associated wall

**Dampers (Optional)**
- Volume control dampers with 24 Volt actuator

**Wall Grilles**
- White powder coated eggcrate or linear bar grilles

**Controls (if dampers selected)**
- Automatic control - iNVent 2 programmable control system with night-time cooling facility, temperature sensors and manual override – contractor to allow for internal electrical wiring

**Guarantee**
- Monodraught VENTS AIR Acoustic Air Transfer Systems are covered by a 10 year guarantee
- Dampers and controls fitted with Monodraught systems will be covered by standard manufacturer’s warranty

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**Product Options and Dimensions**

---

**Performance**

<table>
<thead>
<tr>
<th>Attenuator Option</th>
<th>Airborne Sound Reduction Index (dB) at Octave Band Mid Frequency (Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>63</td>
</tr>
<tr>
<td>Standard - 5No. Pods</td>
<td>25.6</td>
</tr>
</tbody>
</table>
Why Choose SOLA-BOOST?

Healthier
• Introduces natural ventilation within a building reducing CO₂ levels
• Creates and maintains a comfortable working environment
• Expels stale air

Sustainable Energy in Action
• Uses no fossil fuels
• Maximises the use of wind power and the natural stack effect of thermal buoyancy
• Night Time Cooling utilises free cooling to cool the fabric of the building

Cost Effective
• Not affected by rising energy costs
• No running costs for the life of the product

Long Term Track Record
• Monodraught have been utilising Natural Ventilation for over 40 years

No Maintenance
• This means no disturbance, particularly useful in the health and education sectors

SOLA-BOOST Classic

The SOLA-BOOST CLASSIC is an energy free Natural Ventilation system encompassing the benefits of both top-down and passive stack ventilation and a DC solar powered fan, controlled by Monodraught's PowerTrack™ system. The system consists of an external louvre protected internally by Trilayer Weather Protection and is internally divided. The simple, but effective design of the system provides fresh air during the daytime as well as night-time cooling.

A fan served by a central core provides intake or extract air (intake as standard), powered by solar panels situated within the system capping. In order to maximise the performance of the solar powered fan, the system utilises the PowerTrack™ control system, ensuring a steady current from the solar panels to the fan. Due to the flexibility of the SOLA-BOOST Classic, the system can be tailored to suit the needs of almost any area, and has been proven within schools, colleges, healthcare environments, and commercial properties, as well as many other areas.

Fan

The fan used in the SOLA-BOOST system can be set up to either bring in fresh air from outside or expel the stale air from the room the system is serving. As the fan is powered by a solar panel, it ensures a cost free solution to create a comfortable environment for the user.

Solar Panel

The high efficiency polycrystalline solar panel is optimised for sunny weather, so more power is transmitted on sunny days.
Technical Details

Material
- GRP body with gel coat finish
- Trilayer weather protection
- 225 mm Dia 24V axial fan
- 40W monocrystalline photovoltaic solar module

Options
- Colours: Available in any RAL or BS 4800 colour (Excludes RAL & BS metallic finishes)
- Intake fan arrangement or Extract fan arrangement
- Modified & extended skirt arrangements (to suit specified roof pitch and alternate upstand arrangements, on request)
- Acoustic foam (25 mm, 50 mm)

Guarantee
- 10 year limited warranty

Performance
- Sound: BS EN 20140 - 10:1992
- Power supply range: 19.2 – 28.8 V DC.
- Running time: 150 s / 95° (for volume control damper)
- IP54 rated actuator motor
- 260 l/s maximum fan flow
- Power consumption:

Dimensions
- Dim A: Capping Width
- Dim B: Capping Height
- Dim C: Louvre Height
- Dim D: Skirt Height
- Dim E: Trunk Length
- Dim F: Trunk Width
- 40 mm high louvre opening
- 70 mm louvre pitch

Product Options

- Standard Capping

Trilayer Weather Protection

Monodraught's Trilayer Weather Protection combines the use of the WINDCATCHER Classics external louvre bank, rain trap louvre and internal fibre mesh to protect against extreme weather conditions, such as snow. Trilayer Weather Protection is supplied as standard on the SOLA-BOOST system.

SOLA-BOOST Classic System - Dimensions

<table>
<thead>
<tr>
<th>System Size</th>
<th>Capping Width</th>
<th>Capping Height</th>
<th>Louvre Height</th>
<th>Skirt Height</th>
<th>Trunk Length</th>
<th>Trunk Width</th>
<th>Fan Core Dia.</th>
<th>Weight</th>
<th>No. of Louvres</th>
<th>Louvre Free Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>95</td>
<td>Dim A</td>
<td>Dim B</td>
<td>Dim C</td>
<td>Dim D*</td>
<td>Dim E*</td>
<td>Dim F</td>
<td>Dim G</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>706</td>
<td>339</td>
<td>460</td>
<td>150</td>
<td>278</td>
<td>600</td>
<td>49</td>
<td>55</td>
<td>8</td>
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<td>395</td>
<td>600</td>
<td>150</td>
<td>278</td>
<td>800</td>
<td>74</td>
<td>79</td>
<td>10</td>
<td>0.252</td>
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<tr>
<td>185</td>
<td>1106</td>
<td>446</td>
<td>740</td>
<td>150</td>
<td>278</td>
<td>1000</td>
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<tr>
<td></td>
<td>1206</td>
<td>500</td>
<td>880</td>
<td>150</td>
<td>278</td>
<td>1200</td>
<td>157</td>
<td>158</td>
<td>14</td>
<td>0.572</td>
</tr>
</tbody>
</table>

*Dimension may change subject to roof construction, pitch, roof thickness, installation method and upstand requirements. All dimensions shown in mm.
Weather Conditions

Normal Conditions

Under normal conditions, the WINDCATCHER technology provides Natural Ventilation without any moving parts by encapsulating the prevailing wind, no matter how light, and turning that wind movement down through 90°. Using the compartmentalised vertical vents, fresh air is brought into the room and stale air is expelled using the natural energy of buoyancy and stack effect common to all Natural Ventilation systems.

Sunny Conditions

The high efficiency polycrystalline solar panel activates the fan once the DC electricity generated exceeds a set point. Passing of a second set point for electricity generation will cause the patented POWERTRACK system to boost the power transmitted even further, resulting in a 250% increase in the speed of the fan. Maximum efficiency of the system can be achieved by ensuring the solar panel is south facing when the SOLA-BOOST is installed.

PowerTrack™

A unique feature of the system is the patented POWERTRACK control system. This system works on the basis that the brighter the sun, the greater the speed of the boost fan. The unique switching maximises the solar output to provide a smooth current from the solar panels and optimised fan flow and results in 2.5 times more power from the solar panel that can otherwise be achieved by a direct connection.

Wiring Details

Cable Specification

4-Core Cable:
- PVC Cable
  - Farnell: 2240121
  - RS: 660-4096
  - Elec. Wholesaler: 16-2-4A
  - CSA: 0.5mm² (Stranded)
- LSZH Cable
  - Elec. Wholesaler: 1896/4L
  - CSA: 0.5mm² (Stranded)

Monodraught provides a 10m long Cat 5E network cable, as standard, for connecting to the wall mounted controller. Should additional length be required, these must be straight wired to TIA/EIA-568B RJ45 wiring standard (T-568B at both ends).
Norwich & Norfolk University Hospital

Norwich

This new part refurbishment and part new build centre was opened in June 2010 and the Architects chose Monodraught SOLA-BOOST solar assisted Natural Ventilation and SUNPIPE Natural Lighting systems to provide Natural Ventilation and Light to the internal office spaces and resource rooms.

SOLA-BOOST Classic Projects

Seaside School

Lancing

Twenty Monodraught SUNPIPES and eight SOLA-BOOST Natural Ventilation units with an 8-Zone iNVent Natural Ventilation control system have been installed at the Seaside School in Lancing. The SOLA-BOOST systems were chosen as part of a thermal model for the building, to work in tandem with the underfloor heating. If sensors detect that temperatures and/or CO₂ levels in the classrooms have exceeded maximum pre-determined settings, the SOLA-BOOST units automatically respond by bringing in fresh, natural air from the outside.

Mount Vernon Treatment Centre

Northwood

This new extension to the present chemotherapy suite comprises of a ‘link-building’ which joins the existing waiting area and new treatment building, and a new larger treatment space. This treatment area accommodates chemotherapy treatment and clinical cancer trial areas.

The architects approach for the building was to design a bright and spacious environment that would be uplifting for both staff and patients and offer a therapeutic value due to the link to the outside.

The Chemotherapy unit uses SOLA-BOOST solar assisted Natural Ventilation systems to provide energy free and maintenance free ventilation to the office spaces, counselling and PICC rooms. SUNPIPE systems were also used, dropping through the first floor to provide Natural Daylight to deep plan and land locked areas on the ground floor.

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Hazeley School

Milton Keynes

Milton Keynes were one of the first Authorities to implement the use of both SOLA-BOOST and Sunpipes to serve every classroom throughout new school developments. WINDCATCHERS have proved to be successful in eliminating the need for air conditioning in classrooms for many years, the SOLA-BOOST system seemed a natural step for the Architects to further improve and enhance the Natural Ventilation capabilities.

Each classroom, on both the ground and first floors, is served by a separate SOLA-BOOST system and SUNPIPES are similarly used to bring daylight down into the rear of the ground floor classrooms.
The SOLA-BOOST X-AIR is the next generation of Natural Ventilation system featuring the patented ACTIVLOUVRE® modulating aerofoil louver technology and DC solar powered fan controlled by Monodraught’s PowerTrack™ system.

The system consists of an external static louver and internal active louver arrangement, which varies the opening and free area through the louver face. The variable louvres can provide maximum ventilation rates when fully open or be modulated to vary the weather resistance or closed to prevent the ingress of precipitation.

A fan served by a central core provides intake or extract air (intake as standard), powered by solar panels situated within the system capping. In order to maximise the performance of the solar powered fan, the system utilises the PowerTrack™ control system, ensuring a steady current from the solar panels to the fan. Further features include external air catchment fins, pressure release vanes and optional solar powered architectural lighting.

**Technical Details**

**Material**
- Injection moulded ASA / Capping
- Extruded luran ABS / Louvres
- 6063 aluminium extrusion / Frame
- 10 W monocrystalline photovoltaic solar module
- 4 x 15 W monocrystalline photovoltaic solar modules

**Options**
- Colours (RAL 7037 Dusty Grey / RAL 7038 Agate Grey)
- Architectural LED lighting (white / blue / green)
- Acoustic foam (25 mm, 50 mm)
- GRP extended colour-matched skirt (to suit roof pitch from 15 – 35°)

**Guarantee**
- 10 year limited warranty

**Performance**
- Fire: DIN EN 13501 - 1:2010 - 01 (Class E)
- Sound: BS EN 20140 - 10:1992
- Sound: ISO 140 - 10:1991
- Power supply range: 19.2 – 28.8 V DC.
- Running time: 150 s / 100 mm (for Active Louvre)
- Running time: 150 s / 95° (for volume controldamper)
- P54 rated actuator motors
- 260 l/s maximum fan flow
- Power consumption:

<table>
<thead>
<tr>
<th>Size</th>
<th>At Nominal Force</th>
<th>At Rest</th>
<th>Wire Sizing</th>
</tr>
</thead>
<tbody>
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<td>0.4 W</td>
<td>4 VA</td>
</tr>
<tr>
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<td>2 W</td>
<td>0.4 W</td>
<td>4 VA</td>
</tr>
<tr>
<td>170</td>
<td>2 W</td>
<td>0.4 W</td>
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<tr>
<td>200</td>
<td>4 W</td>
<td>0.8 W</td>
<td>8 VA</td>
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</table>

**Product Options**

- **Standard Capping**
Weather Conditions

Normal Conditions
Under normal conditions, the WINDCATCHER technology provides Natural Ventilation without any moving parts by encapsulating the prevailing wind, no matter how light, and turning that wind movement down through 90°. Using the compartmentalised vertical vents, fresh air is brought into the room and stale air is expelled using the natural energy of buoyancy and stack effect common to all Natural Ventilation systems.

Sunny Conditions
The high efficiency polycrystalline solar panel activates the fan once the DC electricity generated exceeds a set point. Passing of a second set point for electricity generation will cause the patented POWERTRACK system to boost the power transmitted even further, resulting in a 250% increase in the speed of the fan. Maximum efficiency of the system can be achieved by ensuring the solar panel is south facing when the SOLA-BOOST is installed.

PowerTrack™
A unique feature of the system is the patented POWERTRACK control system. This system works on the basis that the brighter the sun, the greater the speed of the boost fan. The unique switching maximises the solar output to provide a smooth current from the solar panels and optimised fan flow and results in 2.5 times more power from the solar panel that can otherwise be achieved by a direct connection.

Cable Specification

4-Core Cable:
- PVC Cable
  - Farnell: 2240121
  - RS: 660-4096
  - Elec. Wholesaler: 16-2-4A
  - CSA: 0.5mm² (Stranded)
- LSZH Cable
  - Elec. Wholesaler: 1896/4L
  - CSA: 0.5mm² (Stranded)

6-Core Cable (Optional):
- PVC Cable
  - Farnell: 2240123
  - RS: 660-4099
  - Elec. Wholesaler: 16-2-6A
  - CSA: 0.5mm² (Stranded)
- LSZH Cable
  - Elec. Wholesaler: 1896/6L
  - CSA: 0.5mm² (Stranded)

Monodraught provides a 10 m long Cat 5E network cable, as standard, for connecting to the wall mounted controller. Should additional length be required, these must be straight wired to TIA/EIA-568-B RJ45 wiring standard (T-568B at both ends).
Ford Runcorn

The Scenario

Monodraught SOLA-BOOST X-AIR 200 systems were specified to serve the Showroom and Service Reception. The systems provide fresh air to the area which maintains thermal comfort and air quality levels throughout the year.

The design team at Monodraught carried out dynamic thermal modelling which predicted that two square SOLA-BOOST X-AIR 200 systems would fully dissipate the heat gains within each specified area of the building where the SOLA-BOOST X-AIR systems were to be installed.

Results

- Temperature Comparison

<table>
<thead>
<tr>
<th>Daily Temperatures (°C)</th>
<th>Average</th>
<th>Min. Average</th>
<th>Max. Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>23°C</td>
<td>18°C</td>
<td>26°C</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Max Temperatures (%)</th>
<th>&gt;24°C</th>
<th>&gt;26°C</th>
<th>&gt;28°C</th>
<th>&gt;32°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>17%</td>
<td>2%</td>
<td>0%</td>
<td>0%</td>
<td></td>
</tr>
</tbody>
</table>

There is a small percentage of time when the room was monitored having exceeded 25°C; however, at no time had this temperature risen to more than 28°C, more than meeting the target for overheating in terms of CIBSE guide A.

- CO₂ Levels

Background or atmospheric CO₂ level is approximately 400 parts per million (ppm) and a high level would be considered 1500 ppm or above. The exact CO₂ levels are not recorded at this site; however, results are taken if the levels should exceed 1500 ppm at any time. There have been no recordings of high CO₂ levels at, or above this threshold, showing that at no point have CO₂ levels reached 1500 ppm.

Conclusion

The Monodraught SOLA-BOOST X-AIR systems have shown that they meet the design criteria and specification that the client requested. The design was selected to provide a minimum fresh air requirement and ensure that CO₂ levels remain within acceptable boundaries, which the results above have proven is the case. The solution has also been shown to meet the overheating criteria, keeping temperatures within an acceptable level for the vast majority of the time.

Devon Cliffs – Haven Holiday Park

Exmouth
The Scenario

Two square SOLA-BOOST X-AIR 140 systems with an iNVent control panel were used to meet the design criteria following modelling using Navensys.

Results

- Temperature

This graph shows the temperature against the percentage of occupied hours. The X-AIR systems maintain an ideal temperature within the room of less than 22°C for 89% of the time. At no point has the room exceeded 25°C within its occupied time, meeting the target for overheating; where no more than 5% of the occupied hours should exceed 25°C, and no more than 1% of the occupied hours should exceed 28°C.

- CO₂ Levels

The background or atmospheric CO₂ level is approximately 400 parts per million (ppm) and a high level would be considered 1500 ppm or above. The exact CO₂ levels are not recorded at this site; however, results are taken if the levels should exceed 1500 ppm at any time. There have been no recordings of high CO₂ levels at, or above this threshold, showing that at no point have CO₂ levels reached 1500 ppm.

Conclusion

The Monodraught SOLA-BOOST X-AIR Natural Ventilation systems have shown that they meet the design criteria and specification that the client requested. The design was selected to provide a minimum fresh air requirement and ensure that CO₂ levels remain within acceptable boundaries, which the results above have proven is the case. The solution has also been shown to meet the overheating criteria, keeping temperatures within an acceptable level for the vast majority of the time.