Further information

TermoDeck is an energy efficient environmental control solution that utilises the building’s thermal mass to provide balanced ventilation with passive heating or cooling.
INTRODUCTION AND THE TERMODECK PRINCIPLE

Utilising the thermal mass of a building is a very effective and efficient way of maintaining comfortable and stable temperatures.

Due to thermal mass, there is always a resistance (or time delay) to the flow of heat through the materials that form a building’s envelope, and thus to a change in their temperature. The flow of heat is slowest through dense, heavyweight construction. Once dense materials have reached their maximum internal temperature, the slow release of heat helps maintain comfortable room temperatures for a significant time after the initial heat input has been made.

External temperature variations are not reproduced inside the building because the maximum heat level reached during the day is delayed by the thermal mass of the building until counterbalanced by the cool of the night.

The time delay (or thermal lag) greatly reduces the need for further energy consumption, which in turn reduces atmospheric pollution.

Termodock is a fan-assisted, heating, cooling and ventilation system that uses the high thermal mass of structural, hollowcore floor slabs through which warmed or cooled fresh air is distributed. The supply air passes through the hollow cores at low velocities, allowing prolonged contact between the air and the slabs. This enables the slabs to behave as passive heat exchange elements that release heat to, or absorb heat from, the air in the slabs. The temperature difference, between the slab and the air that exits the slab, is not more than 1 and 2°C.

TERMODECK ENGINEERING AND DESIGN SERVICES

<table>
<thead>
<tr>
<th>Time Line</th>
<th>Months 0-6</th>
<th>Months 7-12</th>
<th>Months 11-14</th>
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<tbody>
<tr>
<td>Client contacts architect and requests an energy efficient building</td>
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<td>Design finalised - solar shading, plant sizes, duct sizes, air flows etc</td>
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<td>Order placed with Termodock by successful main contractor</td>
<td>Order placed with Termodock by successful main contractor</td>
<td>Order placed with Termodock by successful main contractor</td>
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<td>Order placed with hollowcore unit subcontractor</td>
<td>Order placed with hollowcore unit subcontractor</td>
<td>Order placed with hollowcore unit subcontractor</td>
<td>Order placed with hollowcore unit subcontractor</td>
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<tr>
<td>Termodock drawings commence after receipt of architectural, HVAC and structural details</td>
<td>Termodock drawings commence after receipt of architectural, HVAC and structural details</td>
<td>Termodock drawings commence after receipt of architectural, HVAC and structural details</td>
<td>Termodock drawings commence after receipt of architectural, HVAC and structural details</td>
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<td>Hollowcore units are produced by subcontractor - 1st stage adaptation by Termodock</td>
<td>Hollowcore units are produced by subcontractor - 1st stage adaptation by Termodock</td>
<td>Hollowcore units are produced by subcontractor - 1st stage adaptation by Termodock</td>
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<td>Hollowcore units are delivered and erected by subcontractor - witnessed by Termodock</td>
<td>Hollowcore units are delivered and erected by subcontractor - witnessed by Termodock</td>
<td>Hollowcore units are delivered and erected by subcontractor - witnessed by Termodock</td>
<td>Hollowcore units are delivered and erected by subcontractor - witnessed by Termodock</td>
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<tr>
<td>Termodock commences 2nd stage adaptation on site - drilling, cleaning, capping and slab pressure testing</td>
<td>Termodock commences 2nd stage adaptation on site - drilling, cleaning, capping and slab pressure testing</td>
<td>Termodock commences 2nd stage adaptation on site - drilling, cleaning, capping and slab pressure testing</td>
<td>Termodock commences 2nd stage adaptation on site - drilling, cleaning, capping and slab pressure testing</td>
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<tr>
<td>Termodock hands over floors to main contractor for following trades</td>
<td>Termodock hands over floors to main contractor for following trades</td>
<td>Termodock hands over floors to main contractor for following trades</td>
<td>Termodock hands over floors to main contractor for following trades</td>
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<tr>
<td>Termodock maintains liaison with main contractor throughout the build process</td>
<td>Termodock maintains liaison with main contractor throughout the build process</td>
<td>Termodock maintains liaison with main contractor throughout the build process</td>
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<td>Building is pressure tested - witnessed by Termodock</td>
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<td>Building is pressure tested - witnessed by Termodock</td>
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<tr>
<td>Air handling units commissioned and ventilation system balanced - witnessed by Termodock</td>
<td>Air handling units commissioned and ventilation system balanced - witnessed by Termodock</td>
<td>Air handling units commissioned and ventilation system balanced - witnessed by Termodock</td>
<td>Air handling units commissioned and ventilation system balanced - witnessed by Termodock</td>
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<td>Controls commissioned - assisted by Termodock</td>
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<td>Building handed over to client</td>
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<td>Termodock arranges regular monitoring of building for up to 2 years</td>
<td>Termodock arranges regular monitoring of building for up to 2 years</td>
<td>Termodock arranges regular monitoring of building for up to 2 years</td>
<td>Termodock arranges regular monitoring of building for up to 2 years</td>
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**TERMODECK ENGINEERING AND DESIGN SERVICES**

Pre-stressed hollowcore concrete floors for use with TermoDeck

TermoDeck carry out adaptations to standard hollowcore units extensively in the UK on many types of buildings. These adaptations are carried out in two stages. The first stage is on the bed at the hollowcore unit manufacturer’s factory whilst the units are ‘green’, and the second stage involves diamond core drilling, sealing and cleaning on the project site.

TermoDeck do not normally supply the floor units as others usually source these. The following load/span table is indicative only, and specific requirements should be discussed directly with the hollowcore unit supplier.

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**Tarmac Topfloor hollowcore load span table**

<table>
<thead>
<tr>
<th>Clear span (metres)</th>
<th>Live load (kN/m²)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>1.5</td>
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<tr>
<td>0.3 - 0.35</td>
<td>110</td>
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<tr>
<td>0.35 - 0.40</td>
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<tr>
<td>1.75 - 1.80</td>
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</table>

Note: An allowance of 1.5N/m² has been made for screeds and finishes in addition to the self-weight of the unit.

Reproduced by kind permission of Tarmac Topfloor.

**TermoDeck specification**

The TermoDeck specification for hollowcore units is as follows:

- The hollowcore units shall be a modular 1200mm width and a variable length/depth (as defined by others). Unless otherwise agreed by TermoDeck, each hollowcore unit shall consist of a minimum of three cores, and the cores shall have a minimum diameter of 160mm (minimum 250mm deep units)

- The hollowcore units shall be designed in accordance with BS 8110 to support loads defined by others and shall have a fire rating of 120 minutes

- The concrete used in the manufacture of the hollowcore units shall have a minimum characteristic strength of not less than 50N/mm² at 28 days

- The preferred method of manufacture shall be by the long line pre-stressing method using extrusion technology with units sawn to specific lengths. Other technologies shall not be used without prior approval from TermoDeck

- Hollowcore floor unit production shall be carried out by a specialist supplier and unless otherwise agreed by TermoDeck will be with a Class B soffit (as defined in BS 8110: Part 1 Clauses 6.01.2/3 and be free from excessive distortion and blemishes.

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**INTRODUCTION AND THE TERMODECK PRINCIPLE**

The air is further tempered by contact with the exposed mass surfaces in the room, of which the major proportion is the TermoDeck soffit. The slabs also serve as heat exchanging elements between rooms with varying room temperatures, because the slabs can span up to 16 metres enabling them to cover more than one room.

If a building is well insulated, air tight and has heat recovery, the utilisation of the thermal mass of the TermoDeck in combination, will produce a very efficient environmental control solution. As a result, a building’s requirements for cooling machinery, storage heaters and related equipment will be less, and costs significantly reduced.

TermoDeck in conjunction with simple, refrigerant-free mechanical ventilation, simple ductwork, and low U-value materials, creates an holistic system that is quiet in operation, unobtrusive in appearance, and which provides the stable internal conditions required for most types of buildings including offices, libraries, hotels, schools, hospitals, theatres and universities.

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**Boots Library, Nottingham**
THE BENEFITS OF TERMODECK

Low energy consumption
1. Reduced energy consumption due to the recovery of up to 90% of the heat from the extract air stream (see energy consumption diagram)

Low environmental impact
1. Reduced carbon dioxide emissions
2. Very quiet operation due to air at low velocities passing through hollow slabs, and the slabs themselves acting as silencers against noise from fans and dampers, especially effective within the 125 - 500Hz frequency range (see sound proofing diagram)

Occupant satisfaction
1. Comfortable, stable temperatures all year, with no draughts
2. The fresh supply air is tempered via the mass of the concrete slab before reaching the diffusers, rather than modified with expensive plant and then distributed to the diffusers
3. The concrete slabs are not only exposed to the supply air but also to the air in the room, further helping to stabilise air temperature
4. 100% fresh, filtered air is distributed, well in excess of the recommended 8 litres per second per person, lessening draughtness and body odours
5. Occupied spaces are free of radiators and similar devices
6. TermoDeck is visually unobtrusive, internally and externally, compared with other heating/cooling systems
7. Openable windows do not necessarily compromise the operation of the TermoDeck system, enabling occupants to remain in contact with the outside
8. Various options are available that respond to the different control requirements of clients

The concrete slabs are not only exposed to the supply air but also to the air in the room, further helping to stabilise air temperature.

TermoDeck will carry out thermal modelling with its powerful BRIS programme. This will predict the temperatures for a particular room or part of the building in any given set of circumstances (external temperature, internal heat gains from people and equipment etc) and plot the results over a sequence of days.

The modelling and most of the pre-contract design will usually be carried out ‘at risk’ and TermoDeck will warranty the performance of the system against this model.

The preferred contractual arrangement is that TermoDeck is a nominated subcontractor to the main (principal) contractor. This is because our on-site activities commence at the earliest stage and continue until final commissioning. TermoDeck will also continue to monitor the building and provide help and advice to the occupants for two years after completion. Below is a typical scope of works for a TermoDeck project.

TERMODECK ENGINEERING AND DESIGN SERVICES

Factory, Siteworks and Materials
- Adaptations to, and supervision of, hollowcore unit manufacture at the precaster’s factory and provision of sealing devices to cores during manufacture.
- Inspection of units, pressure/smoke testing prior to dispatch when necessary.
- Supervise installation of hollowcore units on site to ensure correct positioning.
- Carry out diamond core drilling to hollowcore units on site in accordance with approved drawings, and also cleaning of cores prior to sealing.
- Provision of various metalwork items for the sealing of cores and provision of cross flow and cleaning access caps. Fixing of metalwork and sealing cores and pressure testing of each active core.
- Provision and fixing of apertures where necessary for the duct connections to each active hollowcore unit.
- Witness main building pressure test and review commissioning results.
- Post contract monitoring.
- Fees, disbursements, insurances and warranty.

- Technical support to HVAC consultant.
- Thermal modelling using BRIS system.
- Design co-ordination with architect, HVAC and structural consultant.
- Preparation of TermoDeck layout drawings in conjunction with hollowcore unit supplier.
- Co-ordination of same with architect, HVAC and structural consultant.

TermoDeck is not just a product delivered to site, but a comprehensive service from design to delivery. It is important that TermoDeck’s engineers are fully involved in the early stages of a project so those members of the design and construction team are fully conversant with the system’s requirements and performance.

Various options are available that respond to the different control requirements of clients.

Pre Contract Design
- Technical support to HVAC architect.
- Thermal modelling using BRIS system.
- Design co-ordination with architect, HVAC and structural consultant.
- Preparation of TermoDeck layout drawings in conjunction with hollowcore unit supplier.
- Co-ordination of same with architect, HVAC and structural consultant.

Kimberlin Library, De Montfort University.

TermoDeck

Armagh Theatre, Northern Ireland.

= Factory, Siteworks and Materials

**BUILDING FABRIC AND DESIGN PREFERENCES**

A building comprised of elements and spaces that have the following properties or characteristics, together with a consideration of appropriate options, will ensure the efficient operation of the TermoDeck system.

The following represents an ideal construction but this may be varied after consultation with TermoDeck, to take account of specific project needs.

**Construction**

- The building fabric to have a high thermal mass, such as dense concrete building blocks.
- Dense internal partitions used wherever possible, will also add to the overall thermal mass of the building.
- Walls to have U-values not exceeding 0.25W/m²K.
- Roofs to have a U-value not exceeding 0.2W/m²K.
- Ground floors to have a U-value not exceeding 0.25W/m²K.
- Windows to have good air-seals to limit infiltration.
- Low E double glazing is acceptable but triple glazing is preferred, which works very well with integral blind in inner air space and low-E sealed unit for inner panes.
- A raised floor finish may be used for inner panes.
- In ‘non thermally active’ areas or corridors, conventional false ceilings may be used.
- A plaster skim may be applied to the slab soffit, but not have insulating properties.
- A raised floor finish may be used as a plenum for displacement air systems.

**TermoDeck**

The TermoDeck system requires heavy mass and a relatively airtight building with fabric U-values which are slightly lower than those of the summer 2001 Building Regulations. However, these additions have been proved to save money in the long term and provide a reliable and stable internal environment.

**Finishes**

- Floor and roof slabs to remain exposed to room air wherever possible, for efficient heat transfer, but soffits may be painted.
- If a ‘thermally active’ area is to have a false ceiling, it should be an open grid or perforated metal tray type (The open or perforated area to be not less than 40% of the TermoDeck slab area).
- In ‘non thermally active’ areas or corridors, conventional false ceilings may be used.
- A plaster skim may be applied to the slab soffit, but not have insulating properties.
- A raised floor finish may be used as a plenum for displacement air systems.

**Services**

- Allocate approximately 6.8% of total building floor area for plant spaces, composed of 1.8% for heating and 5% for ventilation.
- Provide condensing boiler(s) and appropriate flow and return temperatures for maximum energy efficiency.
- Locate the fresh air intakes of air handling units in accordance with CIBSE/ASHRAE recommendations to ensure best air quality and maximise the effect of passive night cooling.
- Optimise airflow rates through the TermoDeck hollowcore units to improve passive cooling.
- Local cooling apparatus such as chilled beams or direct expansion (DX) units may be added to rooms that have very high internal heat loads, such as computer rooms.
- Rooms with large ventilation requirements may need some form of variable air volume (VAV) system.
- Consider zoning ventilation so that air handling units are allocated to serve spaces with similar loads and duration of occupation.
- TermoDeck ventilation rates are usually at least three times greater than CIBSE minimum fresh air requirements.
- Typical rates are 12-20m³/hour/m².

**Design flexibility**

1. Clear spans of up to 1.6 metres
2. Room planning flexibility
3. Visual unobtrusiveness of the system allows architects and interior designers more scope within which to design and manipulate spaces and surfaces
4. More usable space as radiators are eliminated

**Reduced running, operating and maintenance costs**

1. No moving parts outside of plant room
2. Commissions period is short and uncomplicated, with ‘fine tuning’ easily carried out
3. Different zones within a building do not necessarily require separate air supply systems, the same air supply duct can be used for all areas while relying on slab mass to modify air temperature
4. High thermal mass and heat transfer coefficient of slabs provide both radiant and convective heating/cooling effects
5. Cleaning access points allow clean and efficient air distribution to be maintained
6. Significantly reduced running costs compared with buildings utilising heating and air conditioning plant (as low as 46%)
7. Significantly reduced maintenance costs compared with fully conditioned, or naturally ventilated buildings (as low as 13% and 33% respectively)

**The benefits of TermoDeck**

Thermal mass and its contribution to comfortable interior climatic conditions

The Courtyard Theatre, Hereford.

Reproduced by kind permission of Robert Greashoff Photography.
INDOOR CLIMATE REGULATION

The TemoDeck system uses the ceiling and floor slabs as mass stores of energy with large surfaces for cooling and heating. As these surfaces are relatively warmer in winter and cooler in summer compared with the room temperature, an even operating temperature or ‘thermal comfort’ is created.

Summer nights:
During the night, the air supply fans bring the cool outside air into the hollow core slabs, and the building frame is cooled.

Summer days:
During the day, the warm outside air is cooled when passing through the cores in the slab. The cool concrete structure also absorbs heat generated from lighting, machinery, people, and re-radiated solar gains.

Examples of the control modes of a low energy air handling unit

Mode 1: Shut off, shut down, standby
Establishing stored heat balance within set limits while building unoccupied. Minimum energy used.

Mode 2: Recirculating
Recycling internal heat gains and equalising temperatures of internal spaces while building unoccupied. Or when building is occupied, CO₂ sensors indicating acceptable levels.

Mode 3: Free cooling
Stage 1 cooling using ‘free’ outside air. 100% fresh air supply and extract. Cooling of building mass at night or cooling of occupied space during day. 100% discharge of humidity gain.

Mode 4/5: Cycling for recovery phases 1 and 2
Stage 1 heating or stage 2 cooling. 100% fresh air supply. Recycling 85% to 95% of internal heat gains originally stored from extract air. Recycling 40% maximum of humidity gain and discharging remainder. The dampers alternate between phase 1 and phase 2 positions at 60 second intervals when required. When external sensors indicate that cycling is not required, dampers stay in their current positions.
INDOOR CLIMATE REGULATION

Winter days:
During the day, the building structure can more efficiently absorb and distribute the surplus heat, and due to high insulation, the heat is retained for long periods.

Winter nights:
During the night, the system is dampered shut. The stored heat is distributed and gradually released to the internal spaces. (In a building of light material, the temperature will fall more rapidly. With the heavy framework and high insulation in a TermoDeck building, the accumulated heat can keep the indoor temperature at a pleasant level.)

TERMODECK SYSTEMS AND CONTROLS

Controls
The operation and control of a TermoDeck building is simple and can be carried out with traditional equipment.

Three key elements of control form the basis of a TermoDeck building.

The three key elements of control (using the Elizabeth Fry Building as an example)

The mechanical heating, ventilation and cooling system used in the Elizabeth Fry Building at the University of East Anglia achieved the lowest energy usage of twelve buildings chosen for analysis by PROBE*.

The building uses:
1. TermoDeck treated hollowcore units
These provide thermal storage at room temperature, cooling without refrigeration and ventilation without recirculation.

2. Low energy air handling units
These help maintain the TermoDeck units at a relatively even temperature by using a heat exchanger (reversing generator shown) to transfer up to 90% of the heat energy from exhaust air to supply air. 100% fresh air is available for ventilation. Outside air provides free night cooling and night recirculation (when the building is unoccupied) with mechanical top-up heating.

3. Building energy management system
This integrates and controls the TermoDeck units, the air handling units and the other building services. Continuous performance monitoring allows adjustment and fine tuning to further reduce building energy use.

These three elements combined with good insulation, encapsulating thermally heavy walls, low air infiltration and reduced solar gain produce year round positive control, comfortable conditions without refrigeration, high air quality and very low energy use.

* PROBE is a research project conducted by Building Services Journal. It is co-funded under the Partners in Technology collaborative research programme run by the DETR.

Illustration courtesy of ECE and ECS (Anglia) Ltd.
The TermoDeck system provides a high degree of design flexibility, either for the architect’s original design intentions or for future adaptations. Changing internal room layouts is simple and inexpensive in a TermoDeck building.

Partitions and corridor walls can also be relocated without involving mechanical and electrical engineering contractors.

The following points indicate the inherent flexibility of the TermoDeck system:

- The system is an integral part of the whole floor area, and so does not depend on the function of a building, thereby allowing complete planning freedom.
- The system could be completed before final decisions are made on room layouts and/or before partitions are erected.
- The diffusers for the supply air can be located at any point in each slab, although the following considerations will help with planning:
  (a) Generally, the diffusers are placed in the ceiling 1-2 metres in front of windows to prevent possible down-draughts and/or clashing with partitions.
  (b) If required, pre-drilled and sealed openings for the future location of diffusers at mid span, make it possible to locate conference rooms or similar spaces in the centre of a building.
  (c) Diffusers may also be located to supply air from the floor surface or via a raised access floor acting as a plenum.
- Exhaust air is taken back to the air handling unit in a manner that either eliminates or reduces the need for return air ducting and associated equipment, thereby increasing the space available for occupant activities.
  (a) The exhaust air is normally ventilated via transfer grills to a corridor area and from there centrally evacuated.
  (b) If required, pre-drilled and sealed openings for the future location of diffusers at mid span, make it possible to locate conference rooms or similar spaces in the centre of a building.
  (c) Diffusers may also be located to supply air from the floor surface or via a raised access floor acting as a plenum.

PLANNING AND DESIGN FLEXIBILITY

Looking up at ceiling (single span example shown)

Typical temperature curves with and without switch-flow

TERMODECK SYSTEMS AND CONTROLS

Option 4
TermoDeck with Displacement Ventilation

Displacement ventilation is very effective for rooms that have high internal heat emissions and/or occupant densities such as those found in offices and lecture theatres. The air is passed through the slabs in the normal way and then ducted to the space beneath a raised floor, which acts as a plenum. Floor diffusers can then be positioned and moved to suit the changing use of the building.

Displacement ventilation can be used with options 1, 2 and 3.

Option 5
TermoDeck with Switch-flow

The switch-flow system has also been developed to provide adjustment to individual room temperature and can be used in conjunction with options 2 and 3. The system is regulated by a ‘switch unit’ that incorporates a change-over damper to re-route supply air. When a room has to be cooled, the air supply route through the hollow slabs is channelled directly to the core that contains the ceiling diffuser rather than the usual route through all three cores before being discharged. The shorter distance prevents the supply air taking heat from the slab.

The switch-flow system is based upon cooling the slab during non-working hours plus the possibility of direct cooling during working hours. At a chosen temperature, say 25°C, a motor driven damper increases the air flow directly to the diffuser, giving a very fast, controlled and efficient cooling effect.
**TERMODECK SYSTEMS AND CONTROLS**

**Basic TermoDeck system**

- Exhaust air fan
- Heat exchanger
- Return air damper
- Filter
- Air cooler
- Air heater
- Supply air fan

**Option 1**

The Basic TermoDeck System

The basic TermoDeck system using forced, fresh air, consists of air handling units, distribution ducts with connections and dampers in such spaces as corridors, and diffusers in the ceiling close to windows and/or external walls. The TermoDeck treated slabs are usually 1200mm wide, approximately 250 to 400mm deep (depending on the span), and incorporate up to five, smooth-faced extruded holes along the length. The slabs can span up to 16 metres, with three of the five airways connected together to effectively make a three pass heat exchanger system through each slab section. The slab sections are all connected into a main air supply duct acting as a header along the width of the slabs, usually within the false ceiling of the corridor. The extract air can be removed into a central corridor plenum and is drawn back to the plant room.

The galvanised sheet metal distribution ductwork is similar in construction to that found in traditional systems. The main difference is that in the TermoDeck system, the ducts are connected to the cores in the slabs rather than to the diffusers in the corridor walls.

From the fan room, the supply air ducts run in vertical shafts inside the building, then to distribution ducts placed in corridors behind false ceilings, or made into a design feature.

**Option 2**

TermoDeck with Mechanical Cooling

Using a plain direct expansion (DX) unit the supply air is cooled to say 15°C or to a maximum of 10°C below ambient (to reduce peak cooling duty). Cooled air is circulated in the hollow cores of the slabs, which may themselves need cooling if internal heat loads are very high. Air is then introduced at approximately 3°C below the temperature of the room, without draughts. The air flow is generally 12-20 m³/hour/m².

**Option 3**

TermoDeck with Evaporative Cooling

TermoDeck can be combined with evaporative cooling which uses humidifiers to bring down the exhaust air temperature. Heat exchangers of various types are used to transfer the 'coolth' from the exhaust air to the supply air.

**Performance Data: Costs and Energy Consumption**

An independent report produced by Gardner and Theobald and Matt McDonald compares the capital, running and maintenance costs of three environmental systems for a school project: ‘comfort cooling’, natural ventilation, and TermoDeck. The report shows that although the capital cost of a building using the TermoDeck system is greater than a ‘naturally ventilated’ building, the annual running and maintenance costs are the lowest of all the systems compared. Refer to charts 1 and 2.

Life cycle costs (over a 25-year period) undertaken in the report further indicate that the TermoDeck system compares very favourably with the cheapest solution (the naturally ventilated building) as shown in chart 3. Also during that period, the TermoDeck system will have provided a more stable and comfortable environment than the naturally ventilated building. (It is worth noting that the life cycle appraisal is unaffected by the different capital outlays of the three systems.)

The report therefore confirms that the TermoDeck system is a viable alternative to air-conditioned (or ‘comfort cooling’) systems using a compounded battery of environmental controls, and also to naturally ventilated buildings.

**A Summary of Factors Contributing to Lower Energy Consumption**

- Low energy consumption
- Lower overall building height and consequent reduced use of materials
- No need for suspended ceilings—best limited to corridors, or omitted completely
- Reduced need for mechanical installations such as fan coils, cooling units and radiators
- Slab, duct and diffuser layouts allow possibility of conversions and interior alterations
- Low maintenance because of simpler controls and equipment
- Lower U-values of the building envelope
- Efficient heat reclamation
A building using the TermoDeck system will typically generate a 3 to 4 degree temperature swing throughout the day. Spread over a working period of eight hours or more, however, this temperature swing is not often perceived by occupants. Very close and precise control of internal temperatures is unnecessary, and may even be undesirable.

In traditional air conditioned buildings, temperatures are kept to within plus/minus 1ºC. Windows are usually fixed shut to avoid compromising the closely controlled system, thereby reducing individual control while increasing isolation from the outside environment.

Occupants within air-conditioned buildings may as a result experience thermal shock when moving between conditioned and unconditioned spaces particularly if the external temperature is extreme. If the internal temperature was allowed to move in tandem with the external temperature but still remained within the comfort zone, the difference between the conditioned and unconditioned spaces would be less noticeable.

It is in fact crucial to allow the room temperature to fluctuate by a few degrees so that the surplus heat, stored in the TermoDeck slabs due to their thermal mass, can be properly utilised. Precise controlling of internal temperatures as found in an air-conditioned system, will not allow the efficient exploitation of the slow release of stored surplus heat because the inherent characteristic of a TermoDeck building is to respond to changes over days, not minutes. Tight fitting false ceilings would similarly compromise the inherent benefits of the TermoDeck system.

The TermoDeck system utilises the recovery of heat from the extract air stream with an efficiency of up to 90%. When combined with a well insulated, heavy external envelope, the TermoDeck system can guarantee and maintain an internal temperature within a predetermined band. The system does not require elaborate primary air distribution ductwork, and enables the flexible location or relocation of internal partitions.

The TermoDeck system is available as several options to suit the varying demands of climate, air quality and noise protection as perceived by different clients. Each option is designed for low energy consumption.

The system selector diagram helps with the initial option choice by comparing the dry resultant temperature range and the expected room heat gains. The selection of options will depend on the needs of each building based on the anticipated occupancy patterns, individual room requirements (if exceptional), solar gains, and equipment heating output. For example, a room or building with 24 hour usage, 1 person per 5m², and high equipment gains will usually require some type of mechanical cooling adding to the system.

The market place arts centre, Armagh.

The courtyard theatre, Hereford.

Weidmuller building.