AET Flexible Space
Under Floor Air Conditioning

UfAC Design Freedom

THE APPLICATION OF UNDERFLOOR AIR CONDITIONING

Selecting an underfloor air conditioning system

Building typology comes in all shapes and sizes, each with unique design criteria. Experience demonstrates that collaboration at design stage is key to yielding the best results when adopting UfAC.

System options include zonal downflow, or all air central plant systems. AET Flexible Space offer two types of downflow unit (Conditioned Air Module / CAM), which can be configured with either Chilled Water (CW) or Direct Expansion Coils (DX):

1. CAM-C – Floor Supply, Floor Return Air

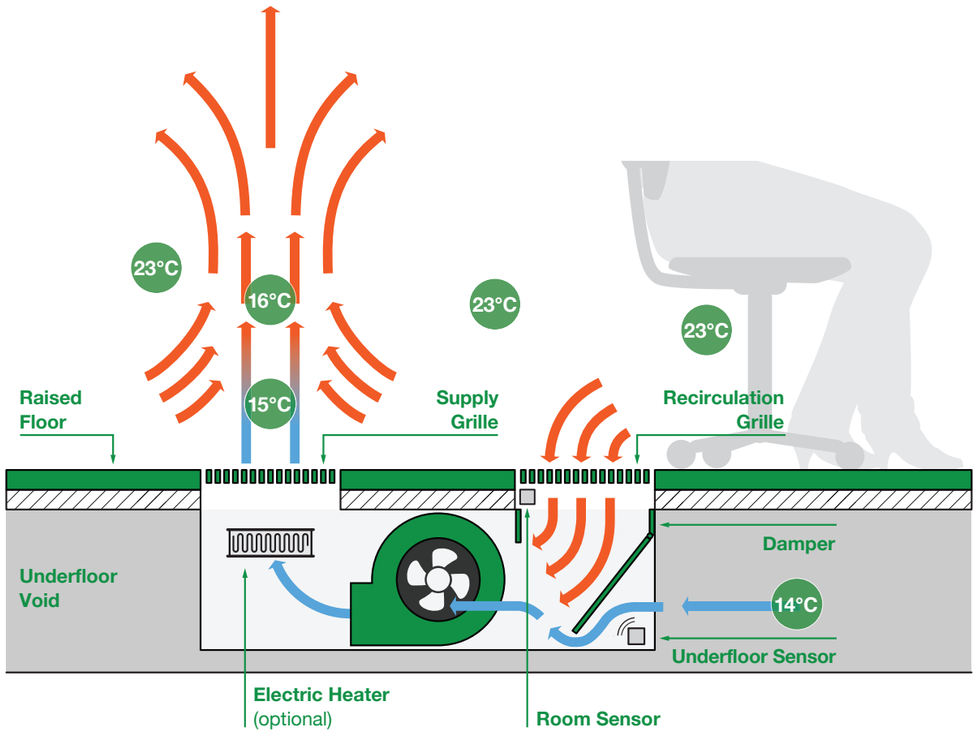
The CAM-C system is the best option for increasing headroom in height restricted buildings and where ceilings may be left exposed to highlight architectural features. It is suited to cellularised office layouts.

2. CAM-V – Floor Supply, High Level Return Air

The CAM-V system allows complete freedom to maximise the floor plate. No division in the floor plenum permits easy reconfiguration and has optimal flexibility. It is best suited to open plan office layouts.

3. Central Plant + Fantiles

Centralised systems provide displacement ventilation (DV) for larger open plan spaces. Fantiles can be added to displacement ventilation systems to boost airflow and cooling performance and reduce the number of passive grilles required.



Architectural Design Freedom

Underfloor air conditioning allows designers to accommodate different building characteristics. The earlier in the design phase UfAC is adopted, the more benefits can be gained.

IN REFURBISHMENTS

- Maximise floor to ceiling height
- Space optimisation
- Increase natural light levels
- Clean soffits and exposed ceilings
- Retain historical features
- Unusual floor plates and dormer floors

IN GENERAL CONSTRUCTION

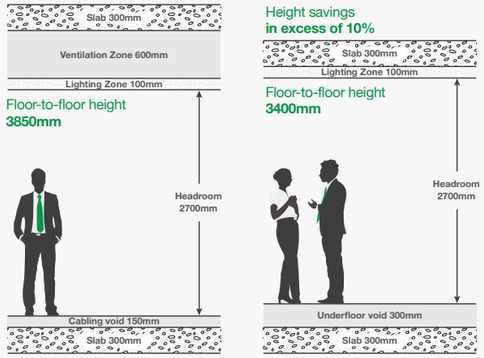
- Save height or gain additional floors
- Overcome planning constraints
- Atriums and climatic envelopes
- Interior design flexibility
- Integration with other building services
- Designing for future change of use (Cat-B fit-out)

Height Saving with UfAC

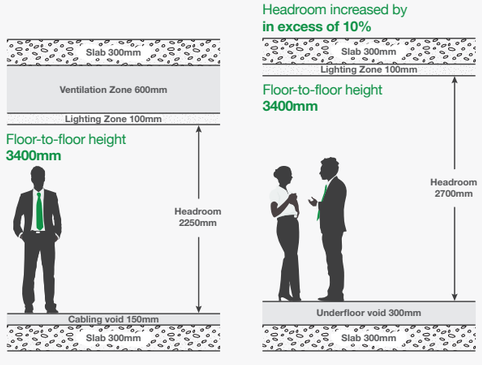
Designers can best optimise space planning throughout a building by integrating UfAC early in the design phase. By using the underfloor plenum as the ventilation zone, a saving of up to 600mm may be achieved by removing services from the ceiling void. In this example, the existing floor void of 150mm can be increased to around 300mm and a saving of 450mm per floor can still be achieved.

This saving could equate to 10% height saving across a development. The Center in Hong Kong for example, stands at 352m. By adopting UfAC throughout, the developer was able to reduce the building height by 35m, saving in the region of $7million in façade materials, not to mention labour and other construction costs. A different approach would be to maintain the existing planned height, but increase the number of floors within the building and consequently the area of nett lettable space.

In new buildings Flexible Space offers **height savings**



In refurbishments Flexible Space offers **increased headroom**



Refurbishment projects typically have reduced slab to slab heights compared with modern buildings, and air conditioning older building stock is challenging due to space restrictions. UfAC can help designers overcome these restrictions and create high specification office space with adequate floor to ceiling height.

In severely restricted buildings, a slim-line Fantile can be used, requiring a minimum floor plenum of 180mm allowing a further saving of 120mm per floor as opposed to a standard 300mm plenum. 20 Cannon Street in London is a typical 1960s building with very limited space and no air conditioning as part of the original design. Retrofitting a fan coil, VAV or split system would have required a minimum ceiling void of 450mm, an option that was simply not viable. Adopting UfAC ensured that the developers could achieve the recommended floor to ceiling height of 2.5m.

Design Application: Zone Units

Conditioned Air Modules (CAM) are zonal downflow units which supply conditioned air into the plenum beneath the raised access floor. They also receive used air for re-conditioning and the way the air is received distinguishes the unit type, and consequently the system type, either fully underfloor supply and return air (CAM-C) or underfloor supply air only with return air at high level (CAM-V).

When considering which of the systems is most applicable to a project, it is important to consider functionality and aesthetics with respect to the zone unit integration.

CAM-C

The CAM-C unit supplies conditioned air into the underfloor plenum and receives spent air back via the underfloor plenum. It is positioned on top of a baseframe located within the floor plenum and there are a range of baseframe designs which can be configured to create different supply and return air paths depending on the final positioning of the CAM.

The CAM-C is the most flexible option. Within the zone, the units may be located centrally or at the perimeter. As airflow is all at underfloor level, the units may be free-standing within the space, or housed within an enclosure.

Maximum CAM-C dimensions:
1950mm height x 2000mm width x 750mm depth

CAM-V

The CAM-V unit supplies conditioned air into the underfloor plenum and receives spent air back at high level. It is positioned on top of a standard baseframe with no configuration required as the air is received back to the unit at high level. A high level return air grille is typically incorporated into the design, but alternative air paths are possible.

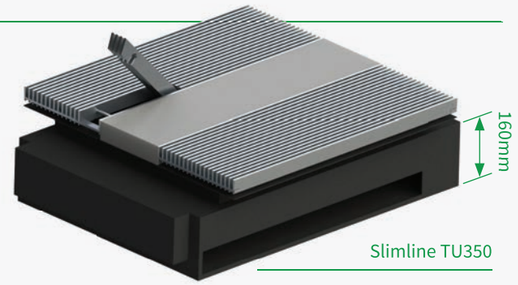
The CAM-V is normally located centrally, requires a full floor to ceiling enclosure and typically requires additional attenuation compared to the CAM-C. These are all design aspects which can impact on the system performance.

Maximum CAM-V dimensions:
1950mm height x 1450mm width x 750mm depth

Design Application: Fan Terminal Units

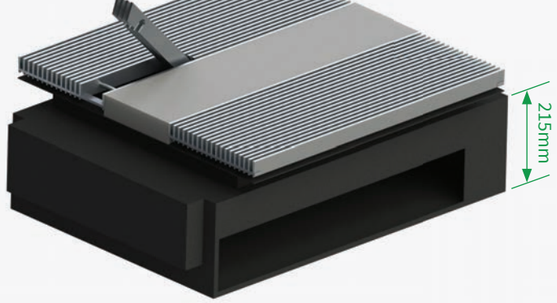
Fantile Unit

The Fantile is designed to replace a standard 600mm x 600mm raised access floor panel and is recessed into the floor. It extracts conditioned air from the plenum below the raised floor and introduces it into the workspace. It also re-circulates room air.



Slimline TU350

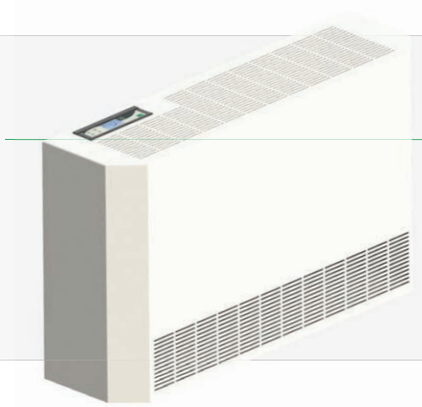
Standard TU4



The slim-line unit was developed especially for buildings with severe slab to slab height restrictions and a minimum plenum of 180mm is recommended.
Note. When considering slim-line units, be advised that additional Fantiles will be required to meet the cooling and airflow performance requirements.

OPTIONS INCLUDE:
- Standard or slim-line units
- AC or EC fans
- Electric trim heaters
- Hot water coil

Fantiles must be orientated correctly within the space according to the proposed use. Incorrect positioning could lead to draughts and potential user discomfort.



Console Unit / TUC-500

A floor standing fan terminal unit designed for areas unsuitable, or with inadequate space for recessed terminals. The unit is positioned over an opening in the raised floor, extracts conditioned air from the plenum and delivers it into the space.

Design Application: Raised Floors & Accessories

Quality raised access floor systems can add tremendous value to UfAC systems and special consideration should be made to the final finishes and floor coverings to ensure continued flexibility.

Floor systems are available with pre-fabricated high class finishes, permitting designers to create fabulous interiors. Granite, Marble, Ceramic, Stone, Glass, Natural Oak and Teak factory bonded finishes are available.

Carpet

600mm x 600mm carpet tiles are recommended for best performance and flexibility, due to size compatibility with the Fantiles. Rolled carpet and 500mm x 500mm carpet tiles are not recommended as they can easily become worn and appear unsightly through future Fantile relocation and general maintenance.

The Fantile grilles are height adjustable to level with any thickness of carpet or other floor finish.

Grilles

Fantile supply and return air grilles are designed to be part of the floor surface. Construction is typically of a robust aluminium alloy and may be anodised in different colours to blend in with the interior style, although the natural alloy finish is recommended for optimal durability. Circular or custom shape grilles are available on request but these may affect airflow performance.

Case Study:
33 Glasshouse Street, London

52,000 sq ft. Completed 2016. Cat-B fit-out completed 2018

Cut and Carve project with substantial structural reconfiguration of the current format, including demolition of the main spine wall and staircase to form larger, open plan floor plates.

Project Team

Architect
Buckley Gray Yeoman

Consultant
Watkins Payne Partnership

Main Contractor
McLaren Construction

Developer
Hermes Investment Management

Building characteristics

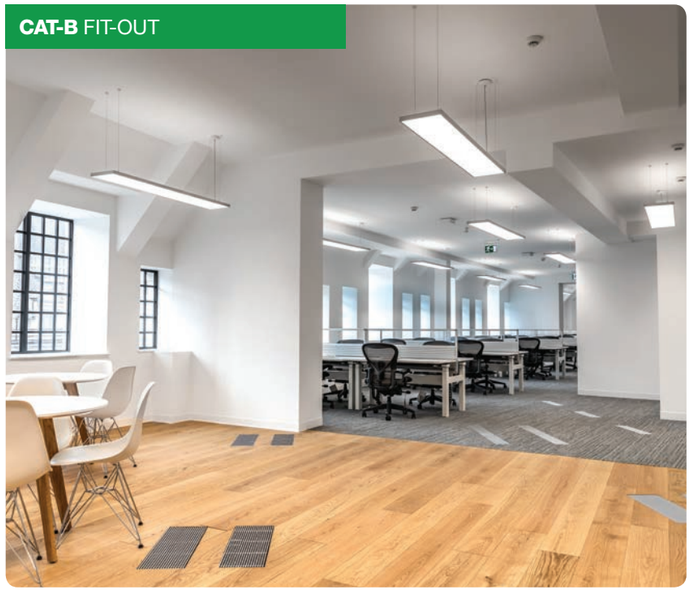
- Fusion of three buildings
- Varying slab heights
- Down and upstand beams
- Low floor to ceiling heights
- Small windows
- Low natural light levels
- Individual floor plates

Design Criteria

- Maximise floor to ceiling heights
- Increase light levels
- Create large open plan offices
- Ensure single floor level throughout

CAT-A FIT-OUT

CAT-B FIT-OUT



Project Outcome

The design criteria were fulfilled and investors were able to quickly yield return on their investment by attracting high profile occupants to the building, including one of the world's biggest tech giants. Less than two years after practical completion, all the speculative office floors have had Cat-B fit-out works completed for incoming tenants.

Case Study: Here East Innovation Centre, Stratford

52,136 sq ft. Completed 2017.
Redevelopment of former Olympic Press Centre to create a mini-city environment with flexible co-working spaces for media and tech start-ups.

Project Team

Architect
Grimshaw Architects

Consultant
Cundall

Main Contractor
Paragon Interiors Group

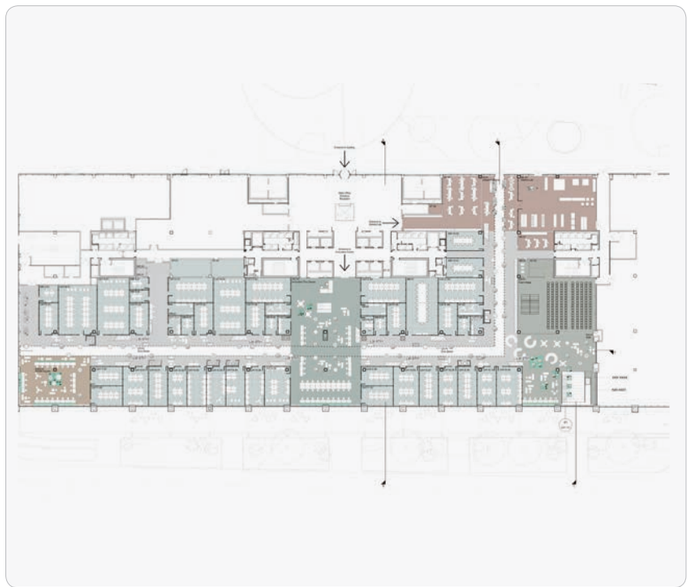
Developer
Plexal

Building characteristics

- 5m high “hangar-style” space
- Existing four-pipe fan coil system
- Perimeter trench heating
- 160mm floor void
- Olympic legacy

Design Criteria

- Air-conditioning flexible office pods
- Maximise floor to ceiling heights
- Re-use of existing space and systems
- Provide adaptable, sustainable office space
- 12 month design and build programme
- Community within a mini-city



Project Outcome

“A significant challenge was how to provide cooling to the sealed office boxes when the existing system was at high level. This was overcome by modification to the chilled water system and the creation of underfloor cooling zones. This allows the floor to function not only as a raised floor to distribute power and data, but to supply cold fresh air to cool each individual office. The downflow units also meant ductwork, pipework, wall- and ceiling-mounted units were not required, maximising floor area and clear heights.”
Steve Cook, Cundall

Case Study:
8 Waterloo Place, London

33,000 sq. ft. Completed 2017. Cat B fit-out completed 2018
Restoration of existing historic fabric with the addition of contemporary finishes and building services, permitting the ceiling to remain exposed.

Project Team

Architect
Morrow & Lorraine

Consultant
Watkins Payne Partnership

Main Contractor
Scott Osborn

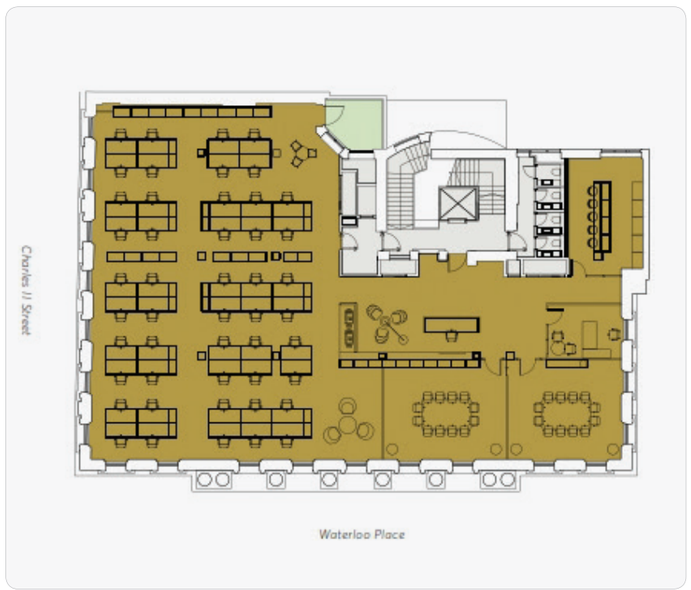
Developer
Barings

Building characteristics

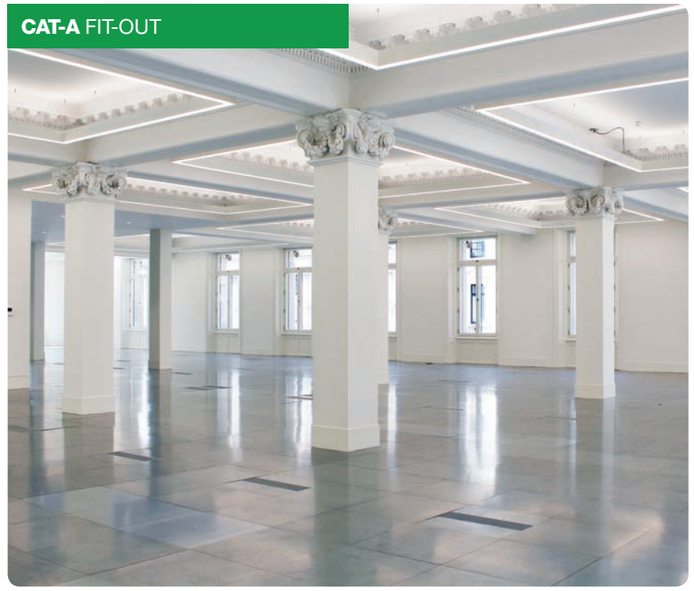
- Grade II listed
- Ornate vaulted ceiling
- Existing 300mm floor void
- Varying floor to ceiling heights between floors

Design Criteria

- Exposed ceiling
- No services at high level
- Retain existing ceiling cornices
- Bi-directional lighting
- Maximise floor to ceiling heights



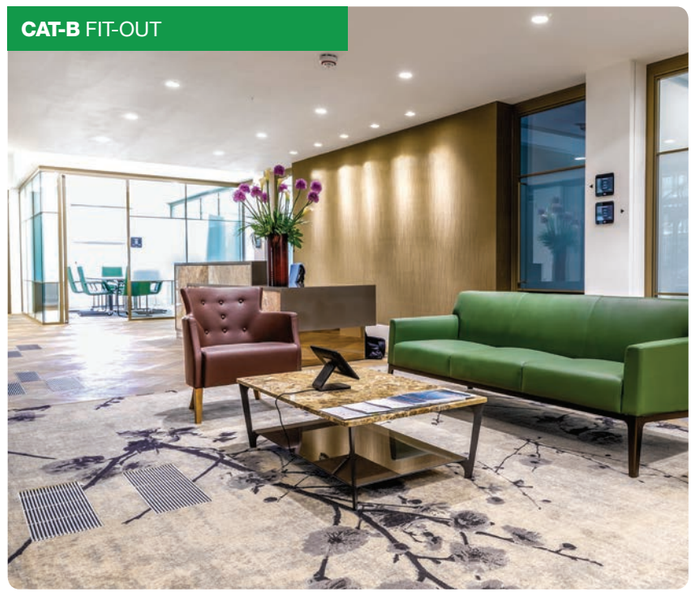
CAT-A FIT-OUT



Project Outcome

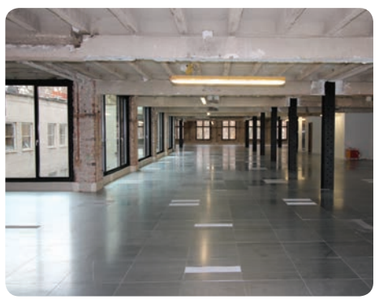
The speculative refurbishment was successful in attracting high profile occupants quickly after completion, who have since proceeded with Cat-B fit-out works of the highest quality, retaining and highlighting the building's unique characteristics. Barings Real Estate commented, "We have created a truly special building which is being reflected in the high levels of rent we are achieving."

CAT-B FIT-OUT



Selected Case Studies

20 Soho Square, London



The shell, core and floor project was able to create large open plan floor plates and maximise full height glazing by adopting UfAC. The original steelwork was left exposed, highlighting the building's original features.

6 Warwick Street, London

UfAC was specified as part of the full structural refurbishment to the Soho property. The fourth floor design, with its unusually shaped full height glazing is realised with the absence of ceiling based services.

Cathedral Hill, Guildford

UfAC was originally specified in 1998 for the Atrium area of the new building where a ceiling based air conditioning system could not be used. The system was fully upgraded with new equipment and controls in 2017.

Parkview Green, Beijing

The building has unique architectural form with a pyramidal roof and comprises four buildings arranged in a cluster, with atrium spaces set in between the buildings. Office areas are air-conditioned using a hybrid system of chilled ceilings and Fantiles.

Sky Central, Osterley

The expansive building is cooled by Displacement Ventilation, with the addition of Fantiles to enhance cooling in the cellular meeting pods.

First Point, Gatwick

By adopting UfAC, developers were able to increase nett lettable space by creating an additional floor, compared with an identical building at Heathrow with a ceiling based air conditioning system installed.

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